

The archaeology of a fishing community in Hawai‘i as seen within an ethnographically informed context

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ABSTRACT

Archaeological data-recovery excavations at Site Complex 50-10-05-4157, near the northwestern corner of the Island of Hawai‘i, showed that by the fourteenth century AD people prepared food at what later became the center of the site complex, presumably during (a) short-term visit(s). The recovery of an increasing amount and variety of marine and terrestrial remains from a sixteenth-century deposit in the same area indicates more intensive use of the locale. The recovery of turtle, shark, coral and urchin abraders, specialized fishing gear, bird and pig bones, and basalt and volcanic glass scrapers from a seventeenth-century altar-like feature conform to male-related activities in the ethnographic record. By the eighteenth century, stonewalled structures had spread to the southern portion of the site complex, some of them most likely being co-residential common houses. Recovery of historic period materials suggests that both the center and southern portions of the site complex were occupied well into the nineteenth century. Compared to the variety of items recovered from structures associated with male-meeting and canoe-maintenance activities, domestic co-residential common houses contained a limited amount and variety of items. The spatial division of the site complex along gender lines is explored in terms of diet, subsistence and manufacturing activities, and religious practices. It is suggested that the standard Hawaiian household complex, or *kauhale*, comprises spatially separated but paired male and female activity areas. It is also proposed that along the coast a number of *kauhales* tend to be centered on a bay and communal canoe shed. Agricultural and specialist activity complexes farther inland appear to lack the readily apparent structured nature of a fishing *kauhale*.

KEY WORDS: Hawai‘i, ethnography, archaeology, fishing community, *kauhale*, settlement layout, activity areas, gender.

Just as the rhythmic tim-tom beat generated by the Hawaiian gourd drum, or *ipu heke*, helps traditional *hula* dancers negotiate their way through exacting *mele* songs, the analytical and interpretive approaches developed by Tim Maggs and Tom Huffman have helped me navigate the unfamiliar waters of Polynesian archaeology. Tom was my instructor throughout my post-graduate years at the University of the Witwatersrand, whereas Tim and I worked together primarily during my stint as a National Serviceman in Natal between 1982 and 1983. I took their analytical and interpretive influences with me when I emigrated from South Africa to the United States of America at the end of 1993, in the same way that Polynesian seafarers took agricultural and animal husbandry know-how across vast expanses of ocean.

To interpret the results of their archaeological excavations with a greater degree of confidence, archaeologists working in the Hawaiian archipelago have for a long time referred to the ethno-historic record of the indigenous people whose ancestors created the material remains that make up the archaeological record (e.g. Kirch 1997). These archaeologists have especially interpreted the function of artefacts and structures by referring to the well-documented Hawaiian ethnographic record, dating back to the time when Captain Cook first landed on the islands in 1778.

In South Africa, both Tim Maggs (1976) and Tom Huffman (1982) have similarly utilized ethno-historic information to interpret the archaeological record. Tim’s work has demonstrated regularities and groupings in stonewalled settlement layout on the southern

Highveld, while Tom took an additional step by explicitly tying these similarities to the worldview and gender divisions among the Southern Bantu-speaking people whose ancestors built the settlements. Basically, Tom has shown that, cross-cutting cultural and chronological variations, the settlement layout of Southern Bantu people over the last two millennia or so was arranged around a single or series of contiguous male-associated central cattle corrals.

Although Hawaiian archaeologists such as Cordy (2000) and Kirch (1997) have made great strides in interpreting individual stonewalled structures in terms of the documented ethno-historic record, to my knowledge no known attempt has yet been made to interpret settlement layout explicitly or to investigate underlying structural principles that may inform the layout. One possible reason for this ostensible omission is that the classification of the often dense and seemingly continuous Hawaiian stonewalled sites remains a thorny issue yet to be resolved to the satisfaction of all archaeologists working on the islands (see Kirch 1997: 35–6).

Given the considerable variation in the form and size of Hawaiian stone structures, the term ‘site’ has been applied in a number of different ways by archaeologists working on the islands. In an attempt to standardize nomenclature for different scales of analyses and interpretations, Kirch (1997: 38–9) proposed a hierarchical schema for labeling and comparing stone structures. At the smallest scale is the feature, referring to a spatially delineated area, such as a hearth, wall, platform or enclosure. Two or more features may be combined to form a site. Aggregations of features and sites on the landscape are termed ‘site complexes’, such as all the features and sites that make up a residential unit or a number of residential units.

Unfortunately, even concerted attempts to standardize units for the purposes of analyses and interpretations have their pitfalls, one being that surface appearances such as a structure’s shape and size can be misleading. To assess accurately the most likely function of any feature, site or site complex, archaeological excavation is needed to recover what is hidden from view. It is only when buried features and artefacts are exposed and recovered for identification and analysis that any site or site complex can be interpreted with some degree of confidence.

In the following paper, data-recovery excavations at a site complex on the southwestern side of the Kohala Peninsula were designed to date and interpret the features and sites within the complex. As will be shown, the site complex was not a single or static entity. Radiocarbon dates and diagnostic artefacts show that it contained a number of smaller site complexes, with newer ones ‘filling in’ the landscape as time passed. The paper starts with relevant background information before moving on to an outline of research questions, a description of excavation results, and finally an overview. The retention of field and laboratory information despite the page limits of this paper is in recognition of the data-rich publications produced by Tim and Tom.

BACKGROUND TO THE PROJECT AND DESCRIPTION OF PROJECT AREA

At the request of Kohala Kai LLC, Rechtman Consulting LLC undertook archaeological data-recovery investigations on Site Complex 50-10-05-4157, in Kahuā 2 and Waikā Ahupua‘a, North Kohala District, Island of Hawai‘i. The project area is sandwiched between the Akoni Pule Highway to the east and the shoreline of southern North Kohala to the west (Fig. 1).

Site Complex 50-10-05-4157 straddles Keanahalulu‘u Gulch, which falls on the boundary between Kahuā 2 and Waikā *ahupua‘a*. (Ever since ancient times in Hawai‘i, an *ahupua‘a* has been a narrow sliver of land that extends from the ocean to the uplands.) Instead of the *ahupua‘a* boundary between Kahuā 2 and Waikā being the straight line that is depicted on relatively recent maps, it followed the slightly winding course of Keanahalulu‘u Gulch prior to 1859—the 1859 State Survey Office describes Waikā’s boundary as “following the meanders of the middle of the Keanahalulu‘u Gulch” (Kalima 1993: B-7). Measuring 1800 m from southeast to northwest (i.e. along the coastline) and 1250 m from southwest to northeast (i.e. between the highway and the coast), Site Complex 50-10-05-4157 contains a total of 30 sites.

Remnants of the oldest of the five volcanoes on the Island of Hawai‘i make up the Kohala Mountain, upslope and to the east of the site complex. The Keanahalulu‘u Gulch has its origin between two extinct cinder cones, Pu‘u Pili and Pu‘u Lapalapa, almost 1524 m above sea level on Kohala Mountain. The rocky shoreline that demarcates the *makai*, or ocean-side, of the project area displays exposed cliffs and a few cobble-filled small bays, but no sandy beaches. Keanahalulu‘u Gulch empties into a protected cove with a cobble beach. The offshore reefs support abundant and diverse marine life.

The coastline along leeward North Kohala is hot, dry and windy. Temperatures in the area average 26°C (Armstrong 1983: 64). Kohala Mountain prevents rain-carrying northeasterly tradewinds from reaching the west coast and annual rainfall averages less than 250 mm in the research area (ibid.: 63). The strong *mumuku* winds of Kohala that are celebrated in Hawaiian songs and chants (e.g. Pukui et al. 1974: 1256, 1313, 1455, 2533) at times make it difficult for people to move on water and even on land in the vicinity of the project area. Several large gulches cut down the slope of Kohala Mountain to the seashore, Keanahalulu‘u and Keawewai being two of the bigger ones in the area. At least during historic times, the streams in these gulches flowed only during and immediately after heavy rainfall in the uplands, and at those times they could become raging torrents. Soils in the project area are extremely stony with some fine sandy loams (Sato et al. 1973: 26). Most of the soils have been eroded in historic times due to cattle ranching; only a few pockets have survived intact either behind ancient Hawaiian stone walls or naturally occurring lava ridges. The deflated ground surface is dominated by outcrops of volcanic rock.

Reconstructing the indigenous biota prior to human settlement is not straightforward, considering the amount of environmental alteration brought about by the early Polynesian introduction of foreign plants and animals (Kirch 1997: 28–9). Seasonal fluctuations in rainfall meant fluctuations in plant growth, such as attested by Menzies’s 1792–94 account of the dry season when “herbs and grasses which the soil produced in the rainy season were now mostly in a shriveled state” (Menzies 1920: 156). The coastal cliffs within the project area almost certainly supported large nesting populations of various sea birds.

The missionary Ellis (2004), whose colleague Thurston traveled through the project area in 1823, not only noted a barren coastline, but also limited cultivation around settlements. Early European travelers’ accounts indicate that managed stands of trees normally occurred near settlements. These included coconut, *lauhala* (*Pandanus* sp.), *loulou* (*Prichardia* sp.), *milo* (*Thespesia populnea*), and *kou* (*Cordia subcordata*). Hawaiians in general cultivated a number of tropical root, tuber and tree crops, the most important being taro (*kalo*, *Colocasia esculanta*) and sweet potato (*‘uala*, *Ipomoea*

batatas). Planting, tending and harvesting crops was typically men's work, although women weeded and maintained dry land fields (Kirch 1997: 2).

Dry taro was grown in the lower forest zone farther up the slopes of Kohala Mountain (Handy & Handy 1991: 531). According to Handy and Handy this forest once extended farther *makai* (seaward) over what is now open pasture. Wet taro was grown in small pockets wherever even intermittent streams flowed (*ibid.*). However, sweet potato was probably the main source of carbohydrates for people who lived in the dry *kula* lands (*ibid.* 532). According to Maly (1999), mounds mulched with sugarcane refuse were known as *Pu'u- 'aina-ko*, and this is recorded as a regional name for the fields that once occurred within the general vicinity of the project area. Taken together, orally transmitted accounts and documented eyewitness accounts suggest that the project area was far more luxuriant than is currently the case.

In 1825 Thurston told Ellis (2004: 408) that people living in the wooded and upslope part of the Kohala coast interior "were far more numerous than those of the sea-shore". It is conceivably people from this area that Menzies (1920: 56) observed carrying timber from the uplands to the coast in 1873. That people laboring in the uplands were the same as those fishing along the coast, however, is attested to by Ellis's 1823 observation of "inhabitants of the northern shores ... being employed in the mountains cutting sandalwood" (Ellis 2004: 409). Apart from cultivating fields and using inland resources, Ellis (2004: 408) observed that inhabitants of the settlements in the project area fished extensively in the nearby ocean. This is substantiated by Varigny's (1981: 73) observation in the 1850s that the seas leeward of Kohala "are rich in fishing grounds" and "covered with small native canoes, shaped from hollowed logs and balanced by a cross-beam, or outrigger, and nearly all equipped with triangular sails". In Hawai'i, it was the ocean that yielded the greatest variety and abundance of protein. Hawaiian fishermen used varied techniques and tools, including bone and shell fishhooks, spears, traps, nets and weirs. Women gathered mollusks, sea urchins and seaweed from rocky headlands and bays (Kirch 1997: 3).

In addition to being accomplished extractors of food from the ocean, Polynesians brought domestic pigs, dogs and fowl with them to Hawai'i and raised a substantial number of these animals for food. Pigs and much of the produce used within the vicinity of the project area seem to have been raised in the uplands and brought down to the shore. An ancient trail marked on a 1935 tax map links the wooded uplands with the comparatively barren coast just north of the project area. This trail is physical testimony of long-standing transhumance between different ecological areas.

For many years archaeologists have proposed that Polynesian settlement voyages between Kahiki (also pronounced Tahiti, the ancestral homelands recalled in Hawaiian oral traditions and song) and Hawai'i were under way by AD 600, with long-distance voyages occurring fairly regularly through at least the thirteenth century (e.g. Cordy 2000: 102–4). According to archaeological results obtained from previous excavations in the vicinity of the project area, the first significant occupation of the area seems to have occurred only around AD 1300. Based on available evidence, the population appears to have been small and engaged primarily in fishing, with some cultivation of crops near the coastline. Over the next two centuries the uplands too were increasingly cultivated. This period experienced more regular seasonal transhumance between the coast in summer and uplands in winter. Around AD 1500, neighboring *ahupua'as*

were clearly delineated, and bounded fields in the uplands also became more marked. By AD 1700, more-or-less permanent settlements occurred along the coast and in the uplands. The *ahupua'a* system of social organization was firmly established at this time, with wedge-shaped land units extending from the ocean into the mountains. Local chiefs controlled the *ahupua'a*, which in turn were integrated at the district level. Paramount chiefs ruled over the district within a feudal-like system of taxation and redistribution. Class distinction between ruling *ali'i* (chiefs) and *maka'āinana* (commoners) characterized the overall political economy and ideology prior to the *Māhele* (redistribution of the land) in 1848.

RESEARCH QUESTIONS IN THE CONTEXT OF ARCHAEOLOGY AND ETHNOGRAPHY

Two main research issues were addressed during excavations, analyses and syntheses. The first was to define a chronology for the establishment and spread of temporary and permanent habitation features within the project area. The second was to determine the range of activities associated with each excavated feature, including functional types, and where possible, to identify activity areas.

Expectations of results were based on both the archaeological and ethno-historical records. Archaeologists in Hawai'i are fortunate that Europeans and Hawaiians have documented traditional architectural and settlement information. Such information forms a baseline for the identification and interpretation of prehistoric architecture and settlement patterns. 'Triangulating' backwards in time from a documented historic period baseline may reveal instances where details of architecture and settlement layout differ from ethnographically recorded ones. Interpreting prehistoric structures and sites in terms of the ethnographic record does not imply that the past is a mirror image of the present. Feature and site functions were not fixed in any case; uses varied depending on everyday or ritual occasions, type of landscape occupied, socioeconomic status of the occupants, and the predominant politico-religious system at the time of use.

Handy and Handy (1991: 290–300) provide the most thorough ethnographic account of a farmer's homestead, or household complex, known as *kauhale*. Their account is based primarily on work that they conducted with Pukui in the district of Ka'ū in southern Hawai'i. It is worth noting that the nineteenth-century descriptions by Ellis (2004) and Malo (1951) certainly do not contradict those provided by Pukui.

For reasons of *kapu* (taboo), or rules of avoidance, structures with different uses, or occupied by people of different gender or rank, were spatially segregated. Within most household complexes sleeping was in common, but males and females ate and worked separately. The following structures normally occurred within a *kauhale* of a fairly well-to-do family: common house, men's house, women's *tapa* (paper-like plant fiber) manufacturing structures, women's menstrual huts, a storage shed for crops and implements, and cooking sheds separated along gender lines. A structure closer to the shore would have been a comparatively large canoe shed. Apparently only a few households ever exhibited the full complement of structures, although sleeping and cook houses were present within most household complexes. Special-purpose habitation sites farther inland and upslope, such as those located near lithic-extraction quarries, agricultural fields, or forests with trees suitable for wood-carving, tend to differ from the standard *kauhale* model, both in the ethnographic (e.g. Ellis 2004) and archaeological (e.g. Rechtman et al. 2009) records.

What follows is an overview of the more ubiquitous structures and excavated items that can be expected to be found within a standard *kauhale*. This approach is not a form of circular argument, where the archaeological interpretation is prefigured in the ethnography. Rather, it explores similarities and differences in the two data sets: matches in features and artefacts will be indicative of the applicability of the *kauhale* layout, whereas divergences will suggest that something else was going on. It was only after exhaustive identifications and analyses had been completed that alternative scenarios of the data recovery results were eliminated and the following *kauhale* model could be proposed.

The main structure within the *kauhale* household complex was the common house, or *hale noa*, in which all the family members slept at night. It was the largest building within a family compound and the most weatherproof. Its frame consisted of end posts, upon which rested the ridgepole. There were also four corner posts, with side posts between them. Prior to thatching, the house frame looked like a great cage. In drier areas a low stone wall often formed the outside perimeter support of the thatched rafters. The house normally rested on a stone platform or walled enclosure of varying size and thickness. This platform or wall at times extended beyond the front of the house to provide a roofless porch, or *lanai*. A single, waist-high doorway was usually placed in the center of the front wall. During dedication rituals for a new house, fishes were placed under the threshold to keep out evil influences. Pigs, dogs and chickens were also consumed and discarded during this ritual consecration. Except for a brief period during early pregnancy (Pukui et al. 1972: 19), women normally did not eat pork or dog (e.g. Handy & Handy 1991: 292). The sleeping area was usually against the back wall. It was raised slightly and covered with pebbles, dried vines, and leaf mats. Women sat weaving mats and children played on rainy days in the mat-covered space between the sleeping area and the door. Light in the evening was from candles made of the oily *kukui* nuts. Bearing in mind that no food was supposed to be consumed within the *hale noa*, with the exception of the initial house dedication feast, excavated food residues should ideally be a reflection of what was consumed during this feast. Shellfish would have been consumed by everybody, and *kukui* nut fragments most likely would have come from candles or from their consumption as a delicacy during the dedication feast. Areas covered with mats might appear as voids, whereas food items could be expected to accumulate near the wall, particularly in corners, and near the doorway. A cooking structure, as indicated by pits or stone-lined hearths and/or a semi-enclosed wall, occurred close to the common house, where men normally prepared food for the women and children.

Some distance in front of the main sleeping house was the men's house, or *hale mua*. Interestingly, the term *mua* also refers to the fore-part, or bow, of a canoe, showing the pervasiveness of a seafaring mindset in Hawaiian culture. In historic times the men's house was smaller than the sleeping house. Within the *hale mua* men kept and worked on their tools, including adzes and files for making fishhooks and weapons. Men also carved bowls of wood here and made cords and nets for fishing. No women were allowed within the men's quarters. Against the narrow back wall of the *hale mua* was the slightly raised shrine of the family ancestor spirits, or '*aumakua*. This shrine often included an altar, or *Kahuā*, that comprised a framework of poles supporting a shelf, on which was an image of the family ancestor. Shrines could also be simply an upright stone, often

inserted in the rear raised platform or wall. At the time of the main meal, once a day, the family head placed the slightly narcotic *‘awa* liquid on the altar while praying to the family ancestors. On special occasions, such as prior to fishing expeditions or raids, the men would sleep in the *hale mua*, for intercourse with women was *kapu* at such times. Within or close to the men's house was the oven, or *imu*, where the men cooked their own food. Considered overall then, material traces of a *hale mua* would include fragments of basalt adzes, pumice abraders, bone and shell fishhooks, and other types of non-perishable fishing and cultivation gear. Food residues within *hale mua* would almost always include pig, dog and/or chicken bones. Upright stones, unusual food residues and coral at one end of the structure could be remnants associated with a shrine.

In certain instances, prominent *hale mua* were linked by a wall to associated structures, normally a storage shed and a shed dedicated specifically to cooking or sleeping. Hawaiians called a place with two or more linked structures around a court, an *amana* (Malo 1951: 122).

Women made their bark cloth, or *tapa*, in the *hale ku‘a*, where strips of bark were processed and stored. These were often raised stone platforms without a roof, the implements being stored inside cupboard-like hollows within the platforms. The structures were apparently somewhat separate from the main house complex as it was *kapu* for men to touch the tools of *tapa* processing. Instruments associated with bark-cloth processing include wooden beaters that are sometimes preserved within their storage spaces in the drier areas of Hawai‘i.

The menstrual hut, or *hale pe‘a*, was even more remote than the *tapa*-processing locales to ensure that ‘impure’ women did not come into contact with men. Women who were not menstruating took food to the secluded, menstruating women. Remains associated with *tapa*-production locales and menstrual huts are expected to be limited and restricted to certain spots, and would include *tapa* beaters, abraders and certain shellfish.

Close to the cultivated fields, a farmer would have had a stout storage shed, or *hale papa‘a*. This shed served as a storehouse for crops, a place to keep digging sticks, and cuttings of taro, sweet potato and sugar cane for replanting. Cultivators also sheltered in this shed during bad weather. Due to the perishable nature of cultivation-related tools and foodstuffs, storage sheds are not expected to contain many items, unless a fire carbonized and so preserved some of the plants and implements from decay.

A comparatively large shed-like structure, or *halau wa‘a*, sheltered the community's canoe and its paddles, along with fishing nets, lines and hooks. Storage cupboards within stone walls and remains of fishhooks can be expected to be found within canoe sheds. The location of such a structure close to a conveniently secluded launching and landing beach could also be expected. Fishermen were required to follow certain observances lest they meet with misfortune—such as no fish, strong seas, or even death upon the sea. An important observance was that wives and non-fishing family members were forbidden to sleep in the canoe shed, or on the mats where preparations for fishing were made (Maly 1999: 42). It was also expected that fishermen distribute their fish to people who helped carry the canoe to its shelter, to fellow villagers and to those who cultivated plant foods (ibid.). Doors of canoe sheds were typically made of wood to add extra protection from weather and people.

As protection against inclement weather and against ghosts, or *lapu*, structures in general were kept firmly shut at night (Handy & Handy 1991: 300). Ritual cuttings of

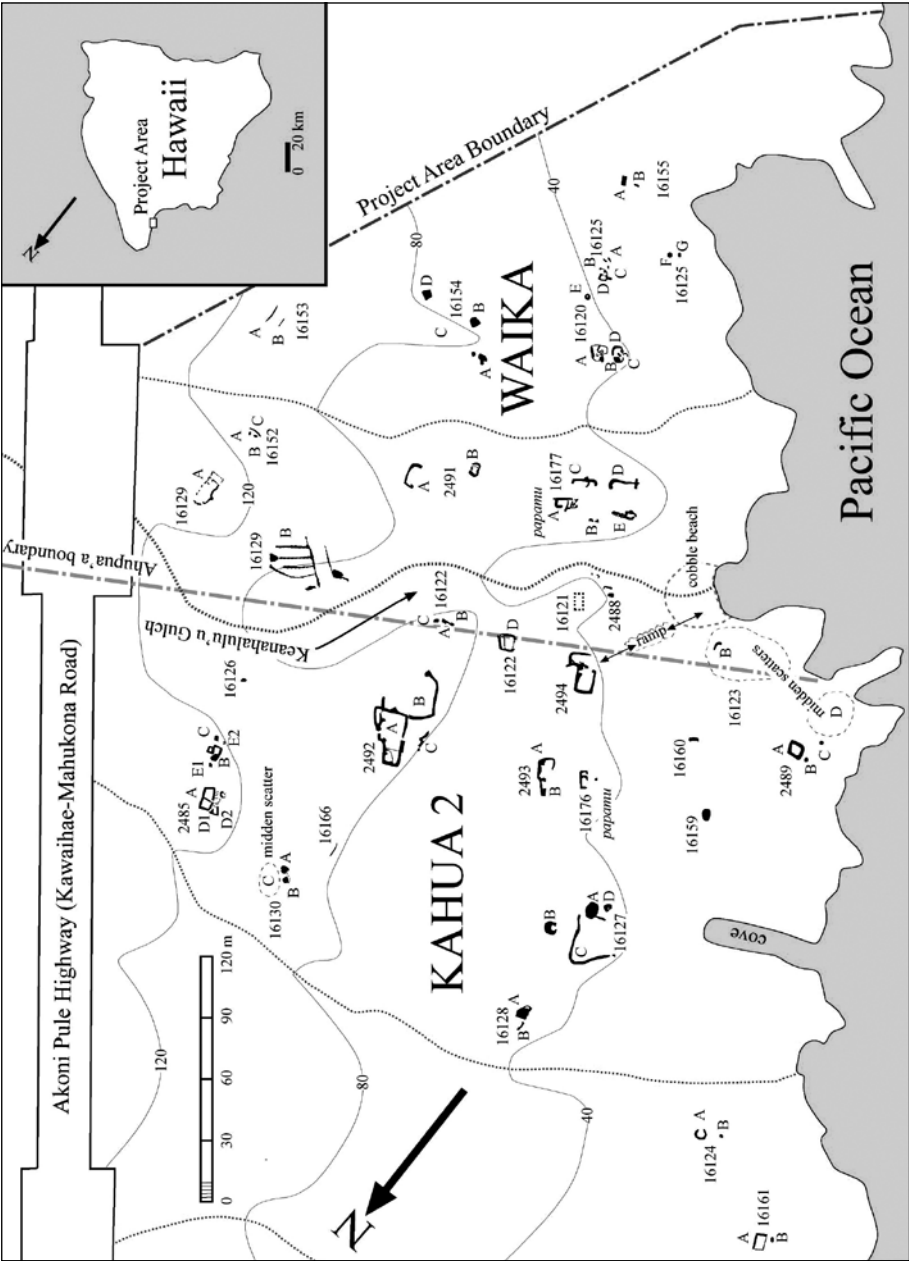


Fig. 1. Site complex map showing location of sites and major features.

the doorway's 'navel' during the house-warming consecration and regular libations to the ancestors were believed to protect inhabitants from malignant spirits who were particularly active along trails leading into settlements at night. Accordingly, the sturdy and well-enclosed structures and spaces in Hawai'i appear to have been more than mere protection against the elements; at least some stonewalled enclosures also served as fortifications against night-marcher spirit beings (ibid.).

EXCAVATIONS AND RESULTS

Excavation units were placed within or near piled stone features with deposits that were most likely to yield the greatest possible sample size per excavated volume (Fig. 2). Excavation of each excavation unit (abbreviated as EU in Hawaiian archaeology reports, whereas test unit is abbreviated as TU) was accomplished using 10 cm levels within natural layers. All soils from an excavated level were passed through a 6 mm mesh sieve. Soils were for the most part brown to dark-brown silt, ranging in thickness between 5 and 30 cm.

Of the 30 sites within Site Complex 50-10-05-4157, the excavated results from 13 sites (27 excavation units) are relevant to the following discussion (two excavated sites that contained human remains are not discussed in detail here). Following traditional Hawaiian convention for indicating directions on the western and eastern sides of an island, in this report north and south are referred to as cardinal directions and west and east are referred to as *makai* (ocean-side) and *mauka* (inland-side) respectively.

Excavations are presented in the order of radiocarbon and diagnostic artefact dates, moving from early to more recent. Every effort was made to present back-to-back those sites that have a related range of finds and/or architectural layout (i.e. related functions). Ordered in this non-numerical fashion, excavated results will hopefully assist the reader to follow the unfolding interpretation of the entire site complex more easily. For detailed information pertaining to individual sites, features, soil profiles, artefacts, species counts, minimum number of individuals, and weights by level, the reader is referred to the figures and tables within the actual data recovery report of Loubser and Rechtman (2007).

Dates and function of structures

A chronological framework, based primarily on radiocarbon assays (Fig. 3; Table 1, all tables at end of paper), supplemented by diagnostic artefacts, particularly fishhooks, gives some idea of when and where Site Complex 50-10-05-4157 most likely started, subsequently expanded, and finally contracted.

The oldest calibrated date comes from the pit-like Feature 2 in Site 2492, at the bottom of EU-20 near the center of the site complex, on a landform that is north of Keanahalulu'u Gulch within Kahuā 2 (Fig. 2). Judging from the fire-cracked rocks, charcoal chunks, dark soil, and the remains of shells, urchins and crustaceans recovered within, Feature 2 is conceivably the remnant of a small cooking pit. Its fourteenth-century AD calibrated date range (Fig. 3) makes this pre-stonewall context roughly contemporary with pre-stonewall deposits at Site 4015 of the nearby Site Complex 50-10-05-4156, centered on Waiakailio Bay (O'Hare & Goodfellow 1999). Such occasional coastal middens suggest that small-scale communities focused seasonally on marine resources, conceivably cultivating the land as well (e.g. Tomonari-Tuggle 1988: 13).

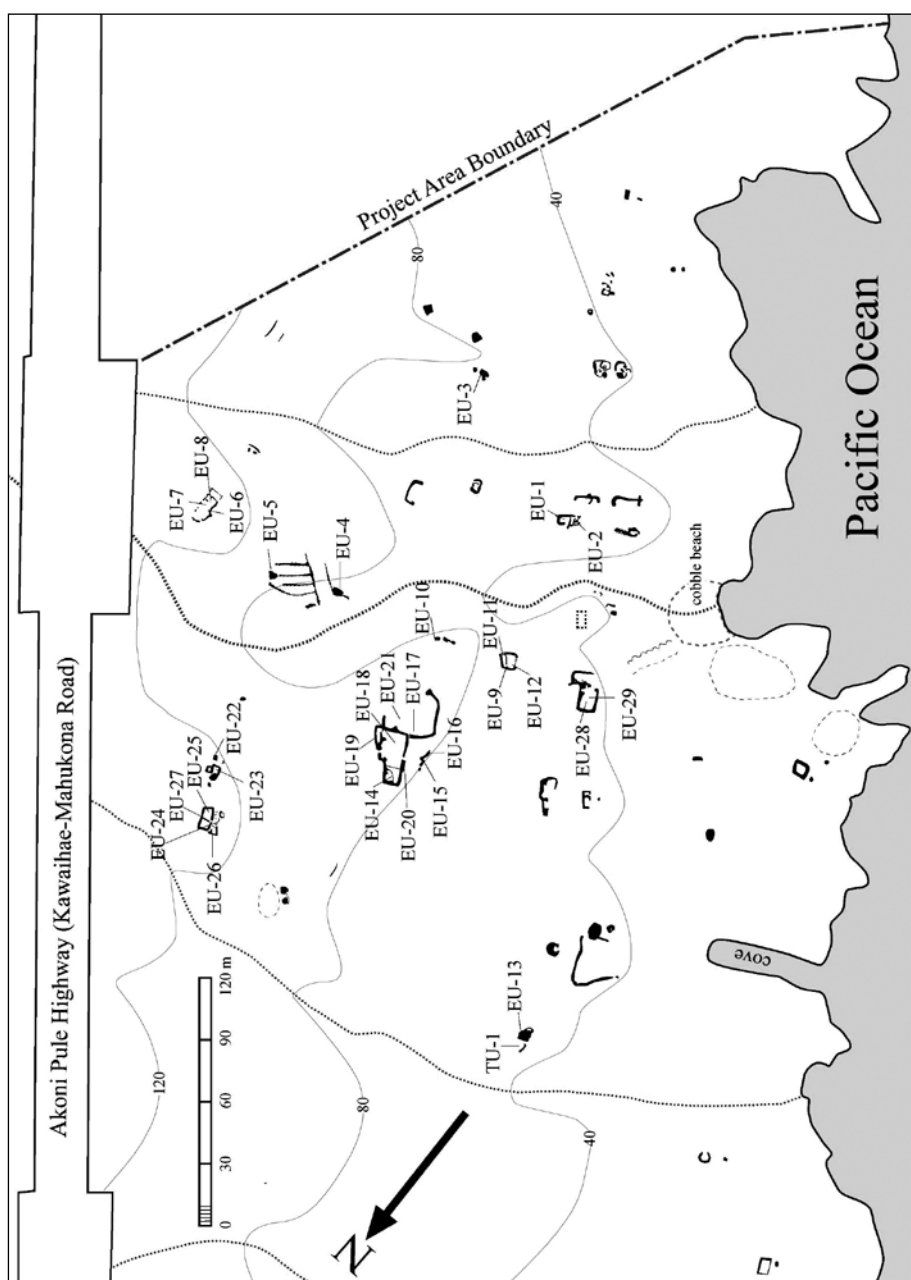


Fig. 2. Site complex map showing test and excavation units.

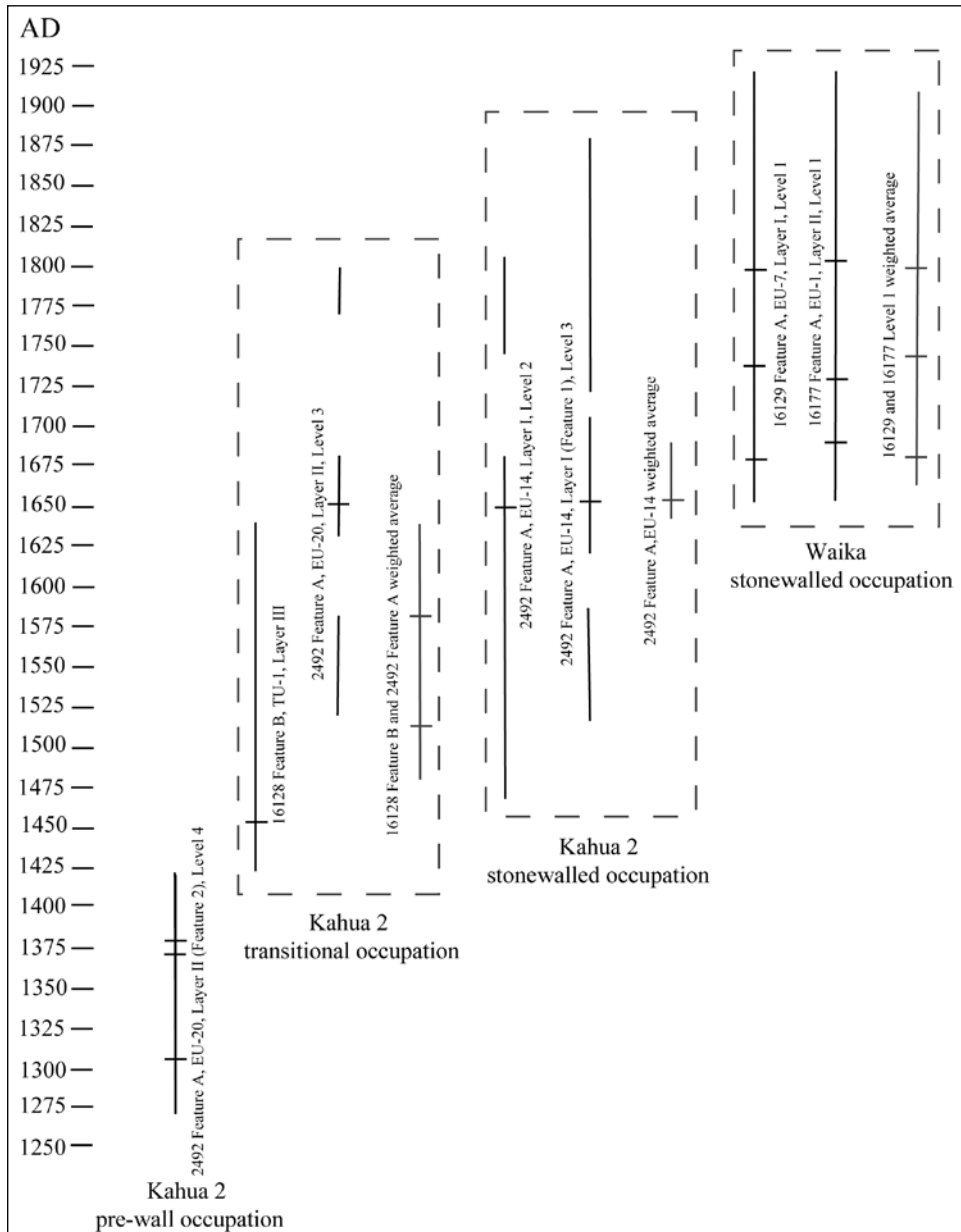


Fig. 3. Graphic representation of calibrated radiocarbon dates from the site complex.



Fig. 4. View of Site 2492 stone walls from the south (note coastline cliffs in the upper left).

The second-oldest date also came from the landform north of Keanahalulu‘u Gulch, within Kahuā 2. More specifically, it came from Graves et al.’s (1993: 22–3) TU-1, excavated below the Feature B stone pile of Site 16128, some 120 m northeast and *makai* from EU-20 (Fig. 2). Its fifteenth- to sixteenth-century AD calibrated date range overlaps with that of the third-oldest date, obtained from a charcoal sample from Level 3 of EU-20 in Site 2492 (that is, from a shallower depth than the oldest date) (Fig. 3). The calibrated weighted average of these two radiocarbon assays indicates that the most likely age for the two proveniences ranges between the early sixteenth and early seventeenth centuries AD (Fig. 3).

The later deposits within EU-20 included fish, shellfish from the beach, mammal bone, basalt adzes and debitage, and volcanic glass debitage. These items show that by the sixteenth century, inhabitants of the area exploited a variety of marine and terrestrial resources.

Urchin spine abraders from EU-20 were most likely used to manufacture and sharpen delicate tools such as shell fishhooks. Indeed, fishhook blanks from TU-1 (Graves et al. 1993) testify to the production of fishing gear. Shell scrapers found within these units were probably used in conjunction with a variety of tasks, including fishing-gear production. The recovered adze fragments were probably from adzes that were used for cutting trees and a variety of woodworking tasks, such as sculpting canoes. The quadrangular cross-section of one comparatively big adze fragment is typical of prehistoric Hawaiian adze types (e.g. Kirch 1997: 185). Overall, the presence of abrading and chopping tools, in conjunction with basalt and volcanic glass debitage, suggests that male-related activities occurred in the immediate vicinity of EU-20 (e.g. Handy & Handy 1991: 28, 301).

Situated 6 m north of the early pre-wall layers within EU-20 were the EU-14 deposits (Figs 1 & 2) that were stratigraphically associated with the stonewalled Feature A enclosure (Fig. 4). A curving sub-wall of roughly stacked stones (Feature B)



Fig. 5. Site 2429, photograph of slab-lined Features 1 and 2 within EU-14.

demarcated the southern side of this platform-like corner within Feature A. The northern third of the Feature A enclosure is delineated by a line of stones, which very likely formed the southern wall of an enclosed structure. A nearby slab-lined, covered trench for the keeping of a roof beam is 6.5 m long, the same length as that of the structure. EU-14 was placed on a platform in the northeastern corner of this structure. The roughly square-shaped Features 1 and 2 within EU-14 were constructed from angular slabs placed on edge (Fig. 5). Each measured approximately 40 cm across and was filled with a mixture of white ash and grey soil. Burned remains within the ashy fill from each feature suggest that they were hearths or receptacles for food refuse. Additionally, the features could have served as slots to hold carved wooden effigies. Based on Hawaiian custom, these effigies would have received food as tribute on a regular basis.

It is proposed that EU-14 was located in the back of a men's house, or *hale mua*. Within the *hale mua* men worked on their tools and cooked. Against the narrow back wall of the *hale mua* was the shrine of the family ancestor spirits, or '*aumakua*. This shrine often included an altar, or *kuahu*. Often set within a *kuahu* were depressions to hold carved effigies representing ancestor spirits. The slightly raised terrace on which EU-14 was placed could very well be part of such *kuahu*, especially considering that it occupies the narrow rear portion of the stonewalled enclosure.

Two charcoal samples from EU-14 were submitted for radiocarbon dating, one from the midden deposit surrounding a stone-lined feature and the other from within

the stone-lined Feature 1 (Fig. 5). They yielded a weighted average that calibrates to between AD 1640 and 1690 (Fig. 3; Table 1).

EU-14 revealed a dramatic expansion of activities in this central portion of the site complex: turtle, shark, bird bones, an octopus lure, a coral sinker and various scrapers testify to a wide range of exploited ecotones and subsistence-oriented activities. The sea turtle and shark remains were the only ones recovered during data-recovery excavations. According to Malo (1951), sea turtle was *kapu* for Hawaiian women prior to 1819. Shark meat was also *kapu* for women, while some men used shark teeth as cutting tools or awls.

An *Isognomon* shell fishhook fragment from the nearby EU-18, within the walled courtyard in the southern part of the Feature A enclosure (Figs 1 & 2), closely resembles a bonito-lure hook point (e.g. Emory et al. 1959: 11, 13, 27, plate 3). Such points were typically combined with lure shanks to form composite hooks. The curved base of the EU-18 specimen matches forms at the South Point site complex in Hawai'i, dated through associated radiocarbon to around AD 1650 (ibid.: 39, 42–3). Taking cognizance of the problems associated with stylistic cross-dating, this age estimate falls within the second half of the seventeenth-century AD date range suggested by the radiocarbon assays from the nearby EU-14 and Feature 1 (Fig. 3).

Pig remains from EU-18 suggest that it was a male-related area. According to Handy and Handy (1991: 301), fishing and the making of fishing gear were essentially male activities. Together with the two stone-lined and ash-filled hearths in the upper northeastern corner of Feature A (i.e. EU-14) and lithic debitage surrounding the hearths and burned remains, there is reason to infer that males used this locale not only for cooking specialized foods, but also for conducting male-related activities.

The unusually dense concentration of coral and urchin abrader fragments recovered from EU-18 suggests that this courtyard locality was where specialized or semi-specialized production occurred. Many of the coral abraders have shapes reminiscent of metal files or saws and were most likely used for preparing tabs of shell, bone and perhaps wood. Once a preform was prepared, finer finishing work was done with the abrasive spines of the slate-pencil sea urchin (e.g. Kirch 1997: 204). Four basalt adze fragments from the same provenience suggest that wood items were shaped in the area too. The recovery of a basalt core and the numerous volcanic glass debitage furthermore suggests primary and extensive lithic reduction activities. Curiously, no charcoal or *kukui* fragments came from EU-18, suggesting that no cooking occurred in the courtyard.

A little upslope from Site 2492 was Site 2485 (Fig. 1). Feature A of Site 2485 was a clearly defined, rectangular stonewalled enclosure measuring 10 m northwest/southeast by 4.5 m northeast/southwest. The enclosing wall had a generally well-finished stacked edge all around. A carefully aligned, L-shaped stone-bordered pathway leads to the doorway. Carefully built into the northeastern corner of the enclosing wall was a cylindrical hollow, measuring some 35 cm across and 60 cm deep. A water-worn slab had been inserted as the southern rim of the hollow, whereas a thin, flat slab next to the rim could have served as a lid. This post-hole in the corner, together with the dimensions of the Feature A structure at Site 2485, conforms to those found within the common sleeping house, or *hale noa* (Buck 1957: 77). The low wall that sub-divides the rectangular structure of Site 2485 could be the base of an internal division mentioned within ethnographic contexts.

The tabular-shaped coral and basalt abraders recovered from EU-24 and EU-27 (Fig. 2) within Site 2485 are somewhat different from the pencil-shaped abraders recovered from the Site 2492 *hale mua* courtyard. The distinctive shapes of the abraders from within the Site 2485 *hale noa* suggest that they were used to abrade raw fibrous bark into coarse strips for cordage or to extract sap for expedient medicinal use (e.g. Handy & Handy 1991: 211–12).

Feature B near the main Feature A of Site 2485 (Fig. 1) contained numerous shell remains from the rocky headlands. These and its small size suggest Feature B was the remains of an eating and cooking shed. Moreover, Malo (1951: 50) states that women and children normally had a small eating shed near the main sleeping house. The eating shed, known as *hale 'aina*, was typically near an oven where men prepared food for their wives and children once a day. It was expected of men to prepare the family meal before returning to the *hale mua*, where they then prepared their own meals.

Although Site 2485 yielded no radiocarbon dates or chronologically diagnostic artefacts, the absence of historic period remains suggests that it is contemporary with the prehistoric Site 2492 directly downslope. If so, then the Site 2485 *hale noa* and the Site 2492 *hale mua* were part of one homestead, or *kauhale*.

The earliest charcoal radiocarbon dates from south of Keanahalulu‘u Gulch, within Waikā, come from Sites 16129 and 16177 that are located on the same landform (Fig. 1). Dated charcoal samples from both sites were firmly associated with their respective stonewalled structures. The virtually identical dates from EU-7 in Site 16129 and EU-1 in Site 16177 have a weighted average with intercepts that calibrate to the eighteenth century (Fig. 3; Table 1).

Two traditional-looking metal fishhooks, the one copper and the other iron, from EU-1 suggest that the occupation of Site 16177 extended at least into the nineteenth century. The head of the copper fishhook has been carefully pointed with a protruding knob and the tip of its point has been angled. These modifications created a hook that is reminiscent of late prehistoric bone and shell fishhooks documented by Emory et al. (1959: 8, 12, 15). Sinoto’s (1962) seriation of fishhook-head shapes shows that the pointed- and protruding-knob type peaks in the most recent proto-historic levels at the South Point site.

The iron hook with its weathered, pointed head resembles a prehistoric jabbing hook normally shaped from bone or wood (e.g. Kirch 1997: 201). Such definite proto-historical stylistic traits on fishhooks show how traditional preferences have been imposed onto newly acquired foreign raw materials, most probably dating to the nineteenth century.

The nineteenth-century occupation implies that the site could have been one of the coastal villages that Thurston visited in 1823. According to Thurston, the “coast was barren; the rocks volcanic; the men were all employed in fishing” (Ellis 2004: 408). Although the recovery of metal fishhooks indeed reflects Thurston’s observation that men fished, additional items (e.g. basalt and volcanic glass) at the site complex suggest diversification, including the use of local and extra-local resources from the interior.

Fish, coral and urchin abraders, bone tools, bird and pig bones, a basalt adze and a volcanic glass scraper from EU-2 near EU-1 within Site 16177, are physical testimony that the mid-seventeenth century male-related activities of Site 2492 north of Keanahalulu‘u Gulch were perpetuated at the mid-eighteenth- to nineteenth-century Site 16177 south of the gulch.

A bulldozer has cut Site 16177 in half, destroying the center of the site from *makai* to *mauka*. During previous work, Graves et al. (1993: 1–40) noted a water-worn, vesicular basalt upright within Feature A. According to Kamakau (1976: 133), such an upright stone, or *pōhaku a Kāne*, was frequently incorporated within the men's house, or *hale mua*. Graves et al. (1993: 1–38) also mention a *papamū* game board in the vicinity of the Site 16177 ruins. According to available ethnographic information, the *papamū* game board is associated with men and post-menstrual women (Ellis 2004: 213, Emory 1924: 84–5). Taken together then, the recovery of *pōhaku a Kāne* and *papamū* at Feature A of Site 16177 strongly suggests that it functioned as a *hale mua*.

In contrast to Site 16177, the much bigger Site 16129 Feature A structure farther upslope (Fig. 1) yielded a relatively limited amount of items. These comprised mainly marine shell, but also a few fishhook fragments and urchin abraders signifying a male presence within. These data are reminiscent of co-residential common-house settings documented in the ethnographic record. Moreover, the dimensions of the Feature A structure (91 m²) at Site 16129 conform to the typical common sleeping-house measurements mentioned by Buck (1957: 77). Such a common house would have been the biggest structure within a particular *kauhale* homestead; only the inter-homestead canoe shed would have been bigger. Based on the Feature A dimensions, together with the features and finds observed within, it is proposed that Feature A of Site 16129 represents a common sleeping house, or *hale noa*.

Charcoal collected from EU-7 within Site 16129 calibrates to between AD 1660 and 1950 (Fig. 3; Table 1), which makes it roughly contemporary with EU-1 within the proposed *hale mua* Site 16177. The general contemporaneity of these two sites makes a compelling case for their being part of the same homestead unit, or *kauhale*.

A third stonewalled structure with evidence of male-related diets and/or ritual activities, notably pig and dog remains, is Site 16122 north of Keanahalulu'u Gulch, within Kahuā 2 (Fig. 1). The presence of at least one pig, two dogs and three birds (chickens?) from EU-11 in Site 16122 (Fig. 2) could be significant; all three animal species were consumed by men or used as offerings to the family ancestor spirits in the *hale mua* (Handy & Handy 1991: 244). Even after the early nineteenth-century abolition of the *kapu* against women eating pig and dog, these animals were still considered a favorite among men (ibid.: 245). An elongated coral artefact from EU-11 had an oval-shaped bowl carved into its bulbous end, perpendicular to its long axis. This phallic-shaped artefact matches the description of a *kukui* oil lamp in the Bishop Museum (see Brigham 1892: 35) known as *poho kukui*, or *ipu kukui*. Oil expressed from the *kukui* nut was burned with a wick that was placed within the carved bowl.

Site 16122 with its collection of unusual artefacts could be dated by a diagnostic bone fishhook head from the lowest levels of EU-11 and a *kiawe* wood fragment from the upper level of the same excavation unit. The pointed and protruding knobbed head of the bone fishhook stylistically dates to the late seventeenth century (e.g. Kirch 1997; Sinoto 1962). The *kiawe* wood fragment most likely dates to the mid-nineteenth century, as the first *kiawe* tree on the Hawaiian Islands was planted in 1828 and by 1840 progenies of the tree had spread to the dry leeward sides of all the islands (Nelson & Wheeler 1963: 48). The absence of historic period items at other sites within Site Complex 50-10-05-4157 suggests that the male-related structures at Sites 16177 and 16122 were among the last to be occupied.

Although no radiocarbon dates were obtained from Site 2494 (Fig. 1), two metal items recovered from EU-28 (Fig. 2) suggest that this enclosed space was still used in the historic period. Its unusual architecture and prominent placement are suggestive of its function. The site comprised two abutting rectangular stonewalled enclosures that were located less than 40 m northeast of the only cobble beach within the project area (Fig. 1). On the slope halfway down to the beach were the remains of a massive ramp, constructed from big rounded boulders. This ramp hugged the northwestern slope immediately *mauka* of the beach, creating a comparatively gradual slope and a fairly even walking surface. Aligned from the beach straight up to Site 2494, this ramp was very likely constructed to facilitate easier movement between beach and site.

Site 2494 was on the central *makai* edge in relation to the rest of the site complex structures. Its two abutting enclosures together formed an overall L-shape. Both enclosures had wide *makai* openings—part of the larger enclosure's *makai* wall was absent, whereas virtually all of the *makai* wall of the smaller enclosure was absent. The *makai* wall of the larger enclosure contained a neatly stacked vault resembling a built-in cupboard. A second cupboard-like vault had been built into a stone platform attachment of the *mauka* wall of the smaller enclosure. In the northern *mauka* corner of the smaller enclosure was a third neatly stacked, vertical cupboard-like vault.

At the time of fieldwork the smaller enclosure still exhibited neatly stacked walls with clearly delineated outer casings, whereas only the bottom southeastern corner of the larger enclosure still showed signs of stacking. A stone platform was stacked against the *mauka* wall of the larger enclosure. Evidence of a paved floor surface was apparent in the vicinity of the wall that divided the two enclosures. Water-worn cobbles could also be found embedded in the top of the enclosure walls. Viewed overall, Site 2494 was arguably the most carefully constructed and architecturally elaborate structure within the entire site complex.

The function of the stonewalled enclosures at Site 2494 can be ascertained on architectural grounds alone. The big size of the structures and cupboard-like storage areas match those recorded for the *halau wa'a*, where the canoe, or *wa'a*, was kept (cf. Handy & Handy 1991: 299). Knowing that the canoe, nets and other fishing gear were maintained and stored within this shed, the abrading, scraping and grinding implements found in EU-28 and EU-29 (Fig. 2), together with the raised stone-working surfaces and built-in cupboards, make sense. The proximity to the only beach along the rocky shore and central placement of the shed in relation to the site complex are typical location preferences for a canoe shed. The prominent boulder ramp between the shed and beach would have been used to transport the communal canoe.

A missionary census of AD 1835 mentions 256 people in Kahuā and another 100 in Waikā (Schmitt 1973: 27). Judging from historic period documents, it is probably safe to say that after AD 1850 most of the site complex was abandoned (e.g. Kalima 1993: 1–9). Metal bowls found within a vault in Site 16120 south of the southernmost gulch in the site complex (Fig. 1), could be evidence of occasional revisits to a comparatively productive fishing and cultivation locale that most probably experienced its heyday from the late seventeenth through eighteenth centuries.

By 1823 Ellis had already noted a precipitous loss of population, including the total abandonment of some villages in Hawai'i (Oaks 2003: 53). Population decline in the research area may be due to a number of factors. First, the introduction of European

and Asian diseases was devastating to native Hawaiians. The shift of political power and of European ships to Oahu from the 1820s also drew off population from Hawai'i Island. Meanwhile, the labor obligations and taxes for people on the land were not reduced. Increasing incorporation into the international cash economy meant that fewer and fewer people practised traditional occupations or lived in traditional areas in order to make a living (e.g. Sahlins 1992).

In summary then, the available dating evidence suggests that the geographic core of the site complex, the ridge line in the center of Kahuā 2 north of Keanahalulu'u Gulch, also appears to be its oldest, dating back to the fourteenth century AD (Fig. 6). Settlement expanded on this landform through the sixteenth century and stone walls were added by the mid-seventeenth century (Fig. 7). It was seemingly only in the eighteenth century that settlement spilled over into Waikā south of Keanahalulu'u Gulch (Fig. 8). Occupation persisted on both sides of this gulch until the mid-nineteenth century. The dates of the isolated sites 16161 and 16124 on the northern periphery of the site complex (Fig. 1) are not known. The general lack of deposits and diagnostic artefacts from the comparatively insignificant stonewalled structures there suggests that this portion of the site complex was peripheral in more than just a physical sense. As implied in the next section, landforms framed by gulches conveniently separated homestead complexes.

Site Layout

According to the ethnographic record, and implied by the archaeological evidence, each homestead, or *kauhale*, typically included more than one building, the *hale noa* and *hale mua* being the most commonly paired structures within. It is proposed that at least six probable *hale noa-hale mua* complexes occurred within Site Complex 50-10-05-4157 (Fig. 9; Table 2). For descriptive purposes each proposed *hale noa-hale mua* complex, or *kauhale*, is numbered. It should be noted that unexcavated sites are included in this portion of the discussion for interpretative purposes.

Within almost every *kauhale* of Site Complex 50-10-05-4157, the *hale noa* is *mauka* of the *hale mua*. Where this is not the case, the *hale noa* is nonetheless still on higher ground than the *hale mua* (see Complexes 4 and 6 in Fig. 9). This *mauka-makai* or high ground-low ground opposition might be significant in terms of the traditional Hawaiian divisions of space along gender lines.

According to the dating evidence, the earliest *kauhale* is probably Complex 1, dating between the mid-seventeenth and mid-nineteenth centuries. The dating evidence furthermore suggests that the Site 16112 Feature D *hale mua* replaced the earlier one that occurred in the Site 2492 Feature A enclosure. This replacement had most probably occurred by the beginning of the nineteenth century, judging from the absence of historic period artefacts in Site 2492.

According to ethnographic information, *hale mua* are normally the first structures built in a settlement (e.g. Malo 1951: 28). Indeed, radiocarbon dates have shown that *hale mua* are the earliest structures at various sites down the leeward coast of Hawai'i (e.g. Loubser et al. 2007). Moreover, *hale mua* occurred in the front of a settlement (e.g. Valeri 1985: 174), where guests were received and business was transacted (e.g. Ellis 2004: 357–8). Interestingly, a *hale mua* itself was considered a small *heiau* (temple platform) for the men living at the single household level (Kamakau 1976: 133, Malo 1951: 126,

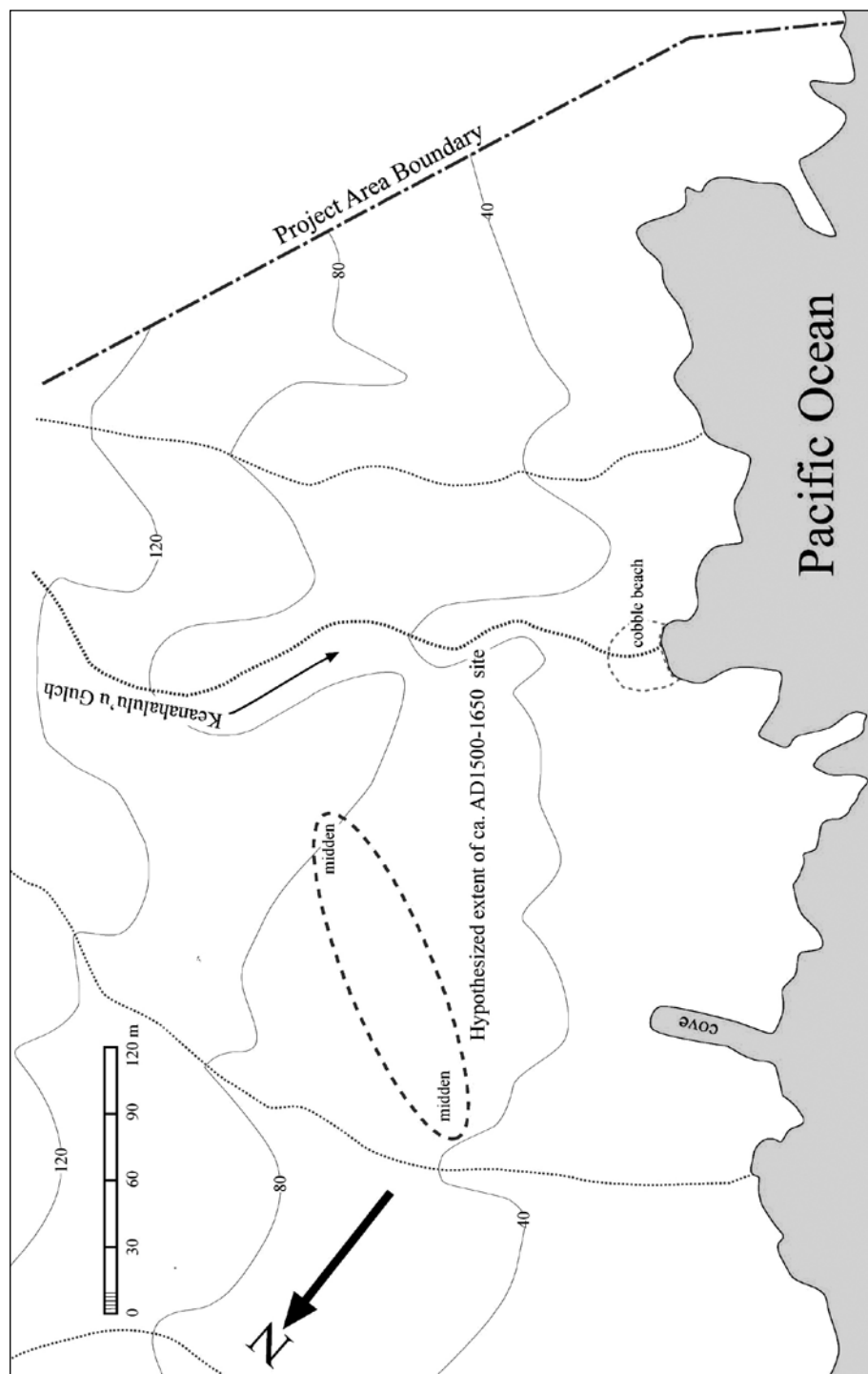


Fig. 6. Hypothesized extent of the transitional occupation within Kahua 2.

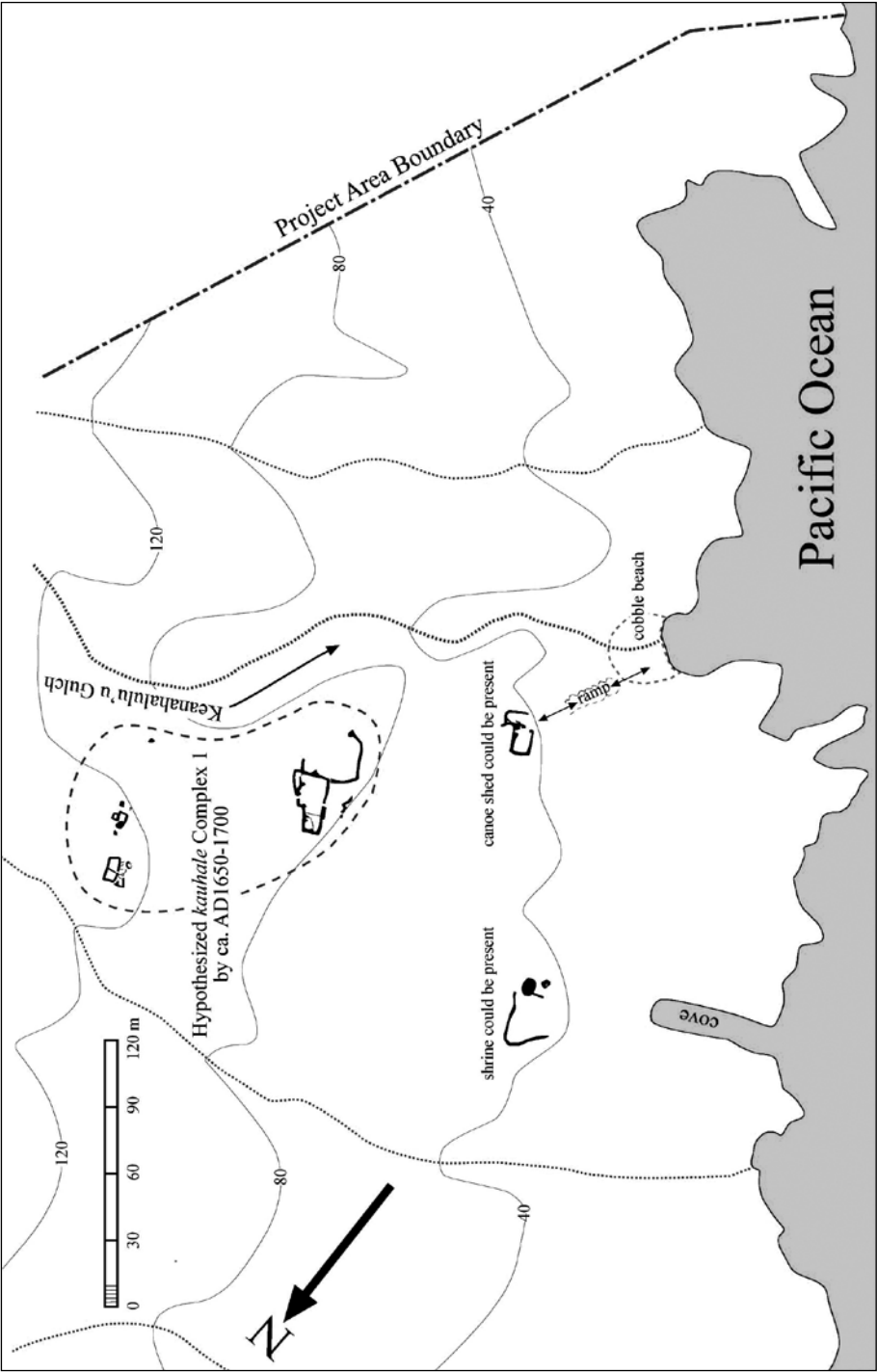


Fig. 7. Hypothesized extent of the stone-walled occupation within Kahua 2.

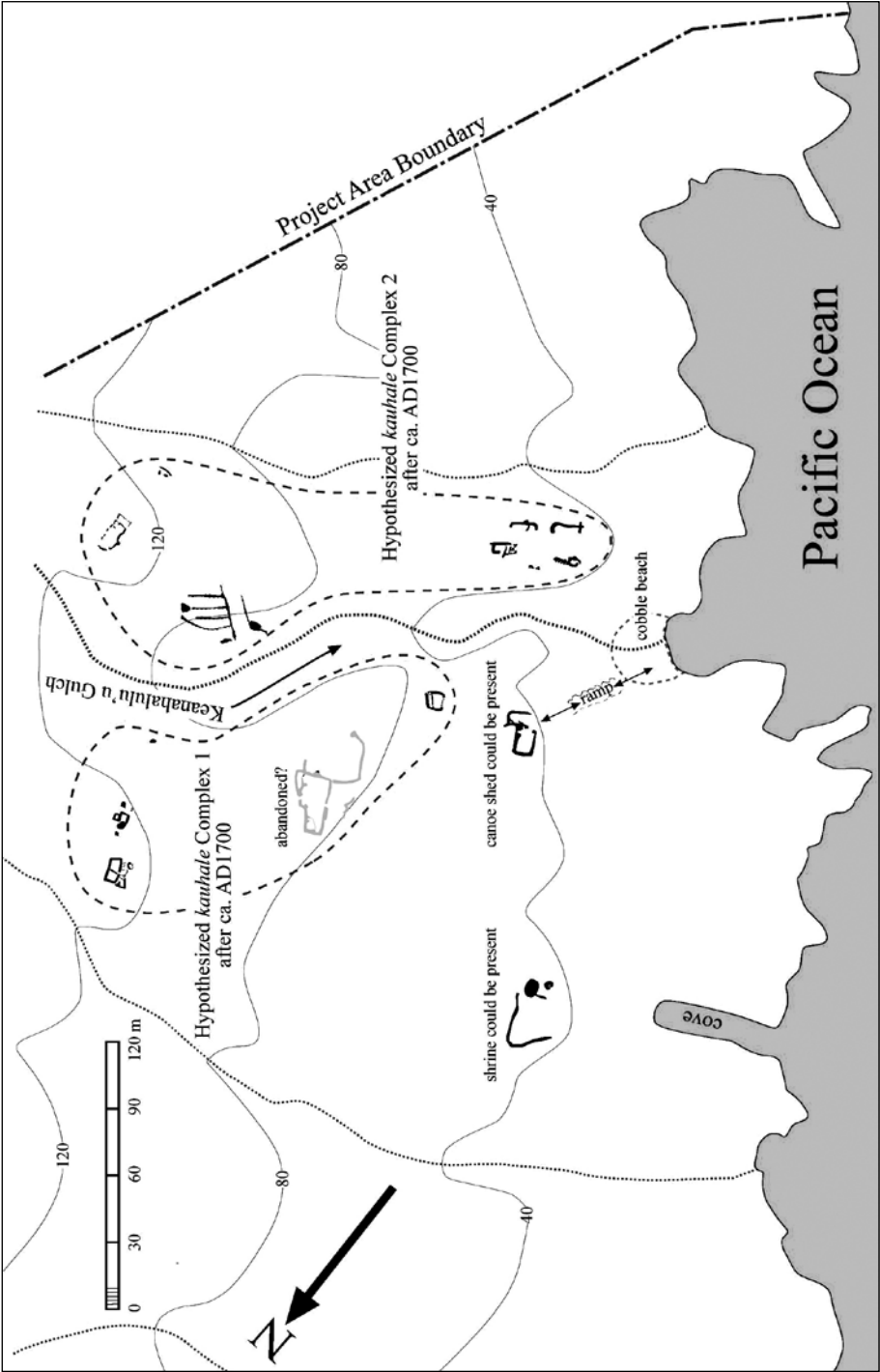


Fig. 8. Hypothesized extent of the stone-walled occupation within Kahua 2 and Waika.

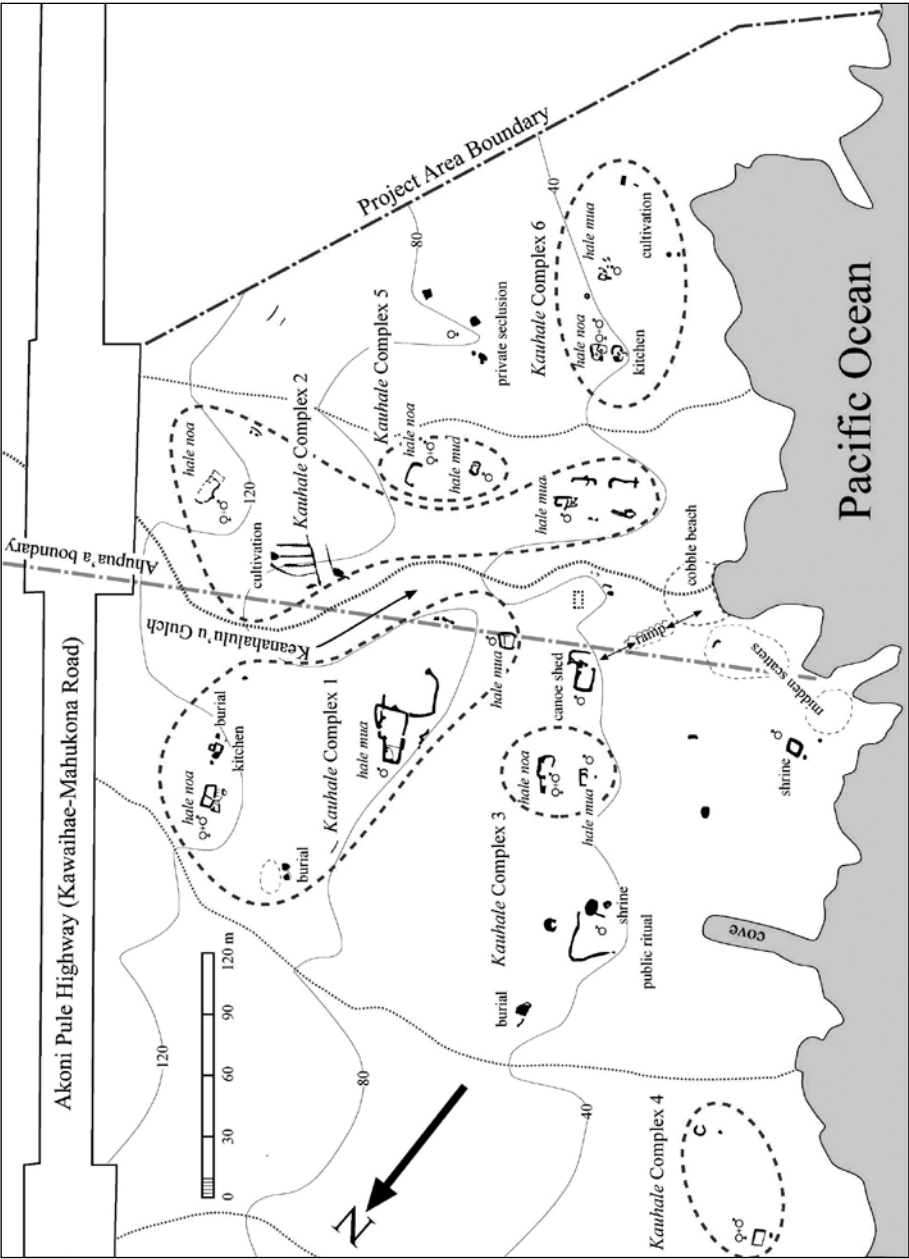


Fig. 9. Hypothesized household complexes.

210). Like *hale muas*, *heiau* were placed at the approach towards a settlement, in front of a household cluster (Valeri 1985: 174). The main approach to the site complex was almost certainly from the cobble beach via the canoe shed, as all the proposed *hale muas* were on this side.

By the mid-eighteenth century a *hale noa-hale mua* complex (Complex 2) appeared on the landform within Waikā Ahupua‘a. Based on the historic period artefacts recovered within Feature A of Site 16177, Complex 2 was occupied until the mid-nineteenth century.

The *hale noa* common house (Feature A of Site 16129) within the upper reaches of the slightly later *kauhale* in Complex 2 directly overlooks four parallel, stonewalled terraces (Feature B of Site 16129) on the steep slopes of Keanahalulu‘u Gulch directly below (Figs 1 & 9). It is conceivable that water from the Keanahalulu‘u Gulch upslope was diverted to irrigate the probable garden plots located on the terraces (see Kirch 1997: 231 for more clear-cut archaeological examples). Three rock piles, possibly resulting from field clearing or storage, occurred among the terraces. The vaulted appearance of the EU-5 stone pile (Fig. 2) suggests that it could have been used for the storage of implements and foodstuffs, probably including wooden digging sticks and sweet potatoes (Handy & Handy 1991: 301). Placed within a comparative ethnographic context, the collapsed structure most closely matches a *hale papa‘a* plantation storage shed (ibid.: 299).

Traditionally, Hawaiian men helped women to construct and maintain irrigated terraced fields (Handy & Handy 1991: 301). Men also helped with the more physically demanding tasks involved with planting, cultivating and harvesting taro and sweet potato. Sweet potato was probably the main source of carbohydrates for people living in the project area (ibid.: 532). Whereas the first task of the men in the project area was fishing, mothers and older daughters did most of the planting, cultivating and harvesting (ibid.: 302). They collected moss and grass for mulch, in which they planted sweet potato vine cuttings, and encouraged gourd and pumpkin vines to grow along the terrace walls. Females furthermore spent considerable time and effort collecting shellfish, crustaceans and seaweed along the rocky shorelines for the evening meals and day-time snacks. The solitary limpet shell from the agricultural terrace could conceivably be the remains of such a snack.

Another possible *hale noa-hale mua* complex (Complex 3) existed lower down the same landform within Kahuā 2 Ahupua‘a (Fig. 9). Due to the paucity of archaeological evidence from Sites 2493 and 16176, not much can be said about when Complex 3 was occupied. For the same reason, the occupancy of Complex 4 farther to the north is uncertain, as are the occupation dates for Complexes 5 and 6 within Waikā. Based on the metal bowls found within Feature A of Site 16120, at least this part of Complex 6 could have been revisited even after the mid-nineteenth century.

For Complex 1, it is assumed that the undated Feature A *hale noa* at Site 2485 is contemporary with the dated *hale mua* structures at Sites 2492 and 16122. The absence of historic period artefacts at the Site 2492 *hale noa* suggests a pre-European contact date for this site. Alternatively, scarce extra-local artefacts of European origin might not have found their way into the co-residential sleeping areas. The same possibility could also explain the absence of European goods from the Site 16129 *hale noa*. It is even possible that after the 1819 abandonment of the *kapu* system, women and

children increasingly joined men in the *hale mua*. Handy and Handy (1991: 294–5) observe that with the abandonment of *kapu* restrictions “food was brought into the living quarters” and “what had been a ... sanctum for man ... became a free-for-all gathering place for all ages and both sexes”. The distinctive signatures left by highly gendered activities within structures might have become smudged in the twilight years of the occupation.

Associated with Complex 1 is the Site 2485 Feature B probable kitchen/eating hut for women and children of the nearby Feature A *hale noa*. A nearby burial has been found underneath the stone mound Feature E2 (Figs 1 & 9). More burials were located *makai* of the Site 2485 *hale noa*, below the paired mound features of Site 16130. Farther downslope, a third burial came from below Feature A of Site 16128. At least within this part of Kahuā 2, the *hale noa* is the highest and overlooks all the known burials. The burial within Feature B of Site 2491 in Waikā is similarly lower on the landscape than the associated *hale noa*. One of the main concerns with the remains of deceased relatives “was to hide the bones ... any place where they would be concealed” (Kamakau 1964: 43). Within the shallow soils of the project area, remains could be conveniently covered with stones, yet it was probably prudent to keep an eye out for people, pigs or dogs that might try to disturb the grave sites. It could, at least in part, be for surveillance purposes that burial mounds were placed below, but in full view from *hale noa* doorways.

The two opposing doorways found in some of the stonewalled structures, such as Site 2492 Feature A and Site 16122 Feature D, differ from the single doorway per structure mentioned in the ethnographic literature (e.g. Handy & Handy 1991: 292). Moreover, the corner doorways in Feature D of Site 16122, Feature A of Site 16129, and Feature B of Site 2485 also differ from historically known practice where the doorway was typically placed in the center of the *makai* wall. The reasons behind culturally informed choices on doorway numbers and placement require research that is beyond the scope of this project.

The relatively big stonewalled courtyard spaces with no apparent roof covering, such as those proposed for the southeastern portion of Feature A and the entire Feature B within Site 2492 (Fig. 1), are apparent in both the archaeological record (e.g. Kirch 1997: 140, 257) and in the illustrations of late seventeenth-century European chroniclers (e.g. a depiction by Ellis and another by Webber in Cordy 2000: 302, 308). The big open space around most of Site 16127 is another example of a courtyard-like feature within Site Complex 50-10-05-4157. Bearing in mind that the Site 2492 enclosure was associated with a proposed *hale mua* and the Site 16127 enclosure was associated with a proposed *heiau*—both associated with males—it could be that the walls acted as physical *kapu* boundaries.

Another culturally informed decision seems to be the placement of the probable *heiau* shrine at Site 16127 and the probable *ko'a* shrine at Site 2489, both of which are located between the domestic *kauhale* and the ocean (Figs 1 & 9). Tantalizingly, this northwestern portion of Kahuā 2 within the project area contains only shrines and burial mounds but no evidence of habitation. This implies that sacred places, such as shrines and burials, occupy the space between the predominantly secular *hale noa* and the ocean. The placement of at least burials *makai* of the living could be related to the belief in Kanaloa, the deity of the sea and death. Indeed, Hawaiians generally believed that the disembodied spirits of the dead traveled toward the coast, where they plunged

over the cliffs into *Pō*, the timeless place where the sea and sky merge (Pukui et al. 1972: 35). Burial of the dead between the *hale noa* and the ocean is explicable in terms of this belief.

Signs of cultivated fields also occur downhill from *hale noa*. These include stone terrace Site 16166 and stone pile Site 16126, respectively west and south from the Site 2485 *hale noa*. Terraced sites 16129 Feature B and 16152 similarly occur west and south from the Site 16129 *hale noa*. As in the case of burial mounds, it was probably a consolation to view cultivation plots from the *hale noa* doorway.

Altogether, the five irregularly shaped stone pavements of Site 16154 occurred southeast of the southernmost gulch within the larger site complex, behind the bottom of a steep ridge toe that could not be seen from the rest of the site complex (Figs 1 & 9). Wood-charcoal fragments and edible shellfish from EU-3 in one of the platforms of Site 16154 (Figs 1 & 2) suggest cooking and consumption of rocky shore foodstuffs. It is proposed that Site 16154 was occupied only intermittently by individuals who subsisted almost exclusively on locally available shellfish. Considered together, evidence seems to suggest that the locale contains five possible *hale pe'a*, or menstrual seclusion platforms.

This exclusively female and somewhat private locale is in the southeastern portion of Site Complex 50-10-05-4157, on the side opposite from the more visible and predominantly male public shrines (Fig. 9). These suggestive patterns must be checked against the results from other data recoveries and more in-depth ethnographic investigations. It is at least instructive to know that for most family and community rituals, men acted as ritual functionaries, whereas women tended to serve as mediums for specific spirits during private ceremonies (Handy & Handy 1991: 301). It is proposed here that these respective public and private roles of men and women translated into their slightly different use of space. Also, different kinds and proportions of items recovered from different areas seem to reflect the different ecotonal ranges and activities involving males and females.

Use of resources

As can be seen in Table 3, items from the ocean are mainly found in male activity areas, such as the *hale mua* and canoe shed. Items from the rocky headlands and beach are found almost everywhere in the site, including the co-residential sleeping areas and probable menstrual seclusion area. Pig and dog remains are limited to the *hale mua*, whereas volcanic glass and *kukui* nut fragments are restricted to the *hale mua* and canoe shed. The most likely known source of tool-quality basalt is on the slopes of the Mauna Kea crater and that of volcanic glass in the vicinity of the Hualalai crater. It could be that *kukui* too came from an extra-local source on the island.

The overall relationship between source and area of use or consumption appears to be as follows: food or items comparatively difficult to procure, such as from the sea or from the interior, ended up in male-related spaces, whereas food or items that could easily be collected from the nearby rocky headlands and beach ended up in co-residential or female-related spaces. Prestige foodstuffs and ritual items, such as pig and dog, come from male-oriented locales too. Generally speaking, men conceivably roamed farther from the home base and developed extra-local contacts, probably including suppliers of volcanic glass and European trade items.

Male-related areas yielded far more items than areas where women were present. Of 17 243 items recovered, 14 179 (82 %) came from male-related locales and only 1285 (7 %) from areas where women also worked or lived. The concentration of items in male-related areas probably has much to do with the traditional Hawaiian custom of males being the cooks and so generating substantial refuse where they worked and ate. The scarcity of items in areas where women are present probably has to do, at least in part, with the practice that food was normally not prepared, consumed or discarded within co-residential houses. Other than these differences, both male- and female-related areas show similar percentages of shellfish use and consumption

In spite of gender differences, the amount of refuse generated decreased after the mid-eighteenth century. The 5016 items recovered from the AD 1650 *hale mua* Site 2492 outnumbers the 3867 items from the AD 1750 *hale mua* Site 16177, which are in turn more than the 2775 items from the *hale mua* Site 16122 (Table 4). This decline in item-count by the second half of the 1700s is also evident in other project areas along the west coast of Hawai'i (e.g. Loubser et al. 2007; Loubser & Rechtman 2007; Rechtman et al. 2009) and could possibly be related to an increasing presence of Europeans following Captain Cook's visit.

Certain suggestive chronological trends become apparent when the recovered artefacts from dated contexts are compared (Fig. 10, Tables 5 & 6). Shell tools, most likely scrapers, are limited to the AD 1500 and 1650 proveniences of Site 2492. The numbers of basalt adze fragments seem to drop off through time, although these numbers are too small to make any reliable inferences. Bone tools, *kukui* nuts, fishing gear, beads, coral abraders, and basalt abraders and hammers appear only after AD 1650. These suggestive trends and associations can be checked during future data recoveries in the region.

In spite of these changes through time, the spatial distinction between certain activities, as exemplified mostly by hardy materials that have survived natural weathering processes, suggests a fairly persistent gender bias. Fishing gear, lithic reduction debitage,

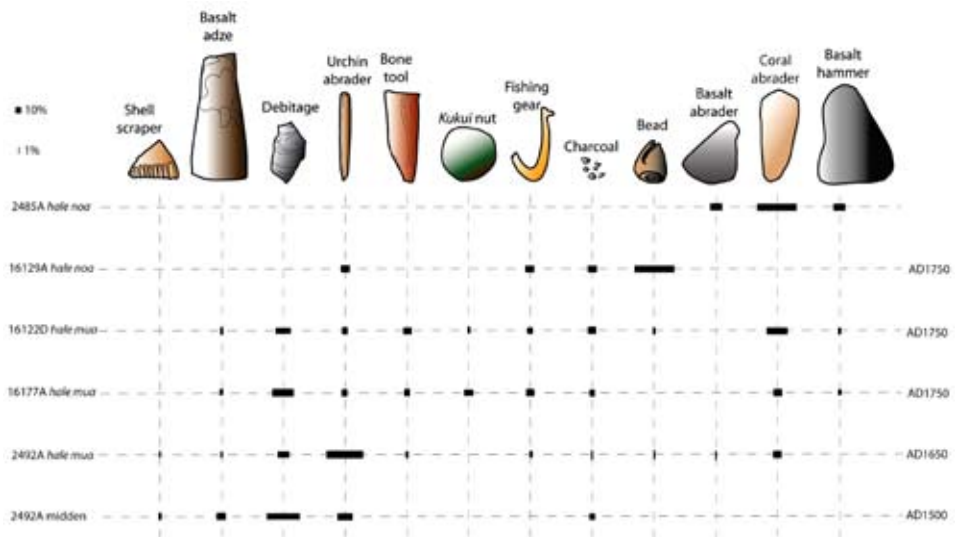


Fig. 10. Graphic comparison of activities at dated household complexes.

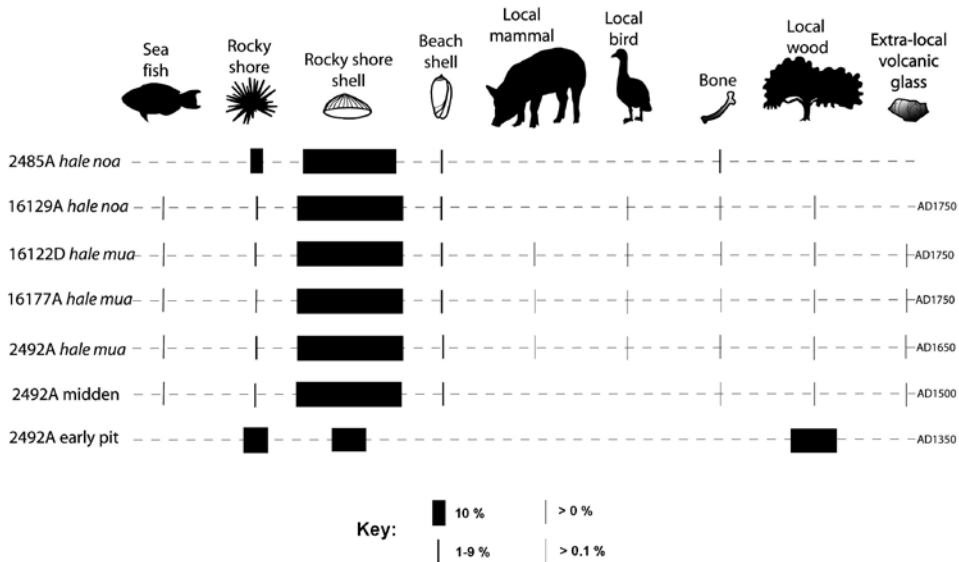


Fig. 11. Graphic comparison of exploited ecotones from dated household complexes.

adze fragments from chopping, bone and shell scrapers, and *kukui* nuts mostly ended up in male-related locales (Fig. 10, Table 5). Basalt, coral and urchin abraders, basalt hammers, shell beads, and charcoal fragments came from areas that were frequented by both males and females. Also, judging from the surviving items, more residues were left in male-related areas: of 314 items considered, 296 (94 %) came from the *hale mua* and the canoe shed, whereas only 18 (6 %) came from co-residential areas and outfields. Had *tapa* cloth and wooden tools used in its production survived deterioration, then co-residential areas would probably have appeared busier. The number of different activities is greatest within the *hale mua* of Site 2492 (165 artefacts reflecting 13 different activities), and fewer at the *hale mua* of Site 16122 (36 artefacts reflecting 11 different activities) and of Site 16177 (28 artefacts reflecting 9 different activities).

Most of the shell remains in the archaeological record are the fruits of female labor. A closer look at the types of shell and the most likely ecotonal zones of their collection might be informative of preferences and also perhaps of changes in natural conditions along the coast. It is clear from Table 7 that *Nerita* (marine snail, or *kūpe'e*), *Cypraea* (cowry, or *leho*), and *Cellana* (limpet, or *'opihi*) shell dominate the overall collection. In terms of ubiquity (i.e. presence/absence at excavated proveniences expressed as a percentage of all proveniences), cowry is found at 94 % of the 32 sampled proveniences, followed by limpet at 88 % and marine snail at 81 %. If all the *Drupa* shell (rough castor bean rock shell, or *makaloa*) are combined, then they rank third in terms of raw counts ($n = 7633$), second in terms of minimum numbers (MNI = 1814), second in terms of weight (4871 g), and second in terms of ubiquity (91 %). All these shell species are from the rocky shoreline.

Shells from beach-like habitats are less prominent in the collection. In terms of the minimum number of individuals, 97 % of the diagnostic shells came from the rocky

shore and only 3 % came from the beach. In spite of these quantitative differences, the relative proportions of shell from the beach resemble those from the rocky shores (Fig. 11, Table 8), suggesting that the overall diets did not differ that much between the various areas within the site complex. Nonetheless, the following 10 shell species occurred in male-related locales only: *Charonia* (conch trumpet, or *pū*, or *olē*), *Tridacna*, *Hipponix* (hoofsnail), *Turbo* (turban snail, or moon snail, or *pūpū mahina*), *Nassarius* (rough nassa), Arcidae (clam, or *paua*), *Oliva* (olive snail), Tonidae (tun shell, or *pūleho*), Mitridae, and Terebridae (auger snail). Seven of these probably came from a beach-like habitat, while the conch trumpets probably came from deeper water. Hawaiian men used comparatively large *pū* conch trumpets as horns (Pukui & Elbert 1986: 344) to announce the opening of ritual ceremonies.

Counts based on the minimum number of shells appear to peak in deposits that date to between AD 1650 and 1750 and decline thereafter (Table 9). However, relative proportions of species appear to be even through time (Fig. 11). Apparent deviations from the trend in the pre-wall pit Feature 1 in EU-20 and in the *hale noa* Feature A of Site 2485 could be the result of these proveniences yielding a restricted range of species.

Fish and associated marine vertebrates came mainly from male-related activity areas within the excavated site complex. The widest range came from the seventeenth-century *hale mua* Feature A enclosure in Site 2492 (Table 10). In terms of weight, most fish remains came from the late eighteenth/early nineteenth-century *hale mua* Feature A of Site 16177. The *Naso unicornis*, or surgeon fish (*kala* in Hawaiian), is respected for its sharp tail fin (Pukui & Elbert 1986: 120), while some Hawaiians considered shark (*manō* in Hawaiian) as *‘aumākua*, or familiars of the ancestral spirits. As a result of this reverence, many fishermen tried their best not to injure sharks (Pukui & Elbert 1986: 3, 32). To reciprocate, *‘aumākua* familiars warned these fishermen about future danger, often in dreams, visions or calls (Beckwith 1932: 124–34). Yet other fishermen freely caught and consumed sharks or used their teeth as knives, known as *niho ‘oki*. Boxfish (*pahu* in Hawaiian), such as the one found in the canoe shed, was *kapu* for Hawaiian women (Malo 1951: 29).

CONCLUDING REMARKS

Site Complex 50-10-05-4157 very likely constituted “a nucleated settlement of several households, or co-residential domestic groups, each with a dwelling house” (Kirch 1971: 84). The archaeological identification of nucleated settlements comprising several households contrasts with the historic period household complex, or *kauhale*, that typically stood in isolation from other *kauhale* (Handy & Handy 1991: 284). According to Handy and Handy, it was apparently only when certain physical features on the landscape attracted members of more than one *kauhale* that complexes of numerous *kauhale* developed around those features. The relatively protected bay and cobble beach in the project area must have been such a physical feature, as it is the focal point of Site Complex 50-10-05-4157. Also, readily available fresh water along Keanahalulu‘u Gulch could have attracted people to the locale. A number of *kauhale* along the shore were known as *ko kaha kai* (Handy & Handy 1991: 287).

Socio-religious and economic ties integrated neighboring *kauhale*, both of the dispersed and the nucleated varieties. These ties were in many instances shared by people with close consanguinal, affinal or adoptive relationships, collectively known

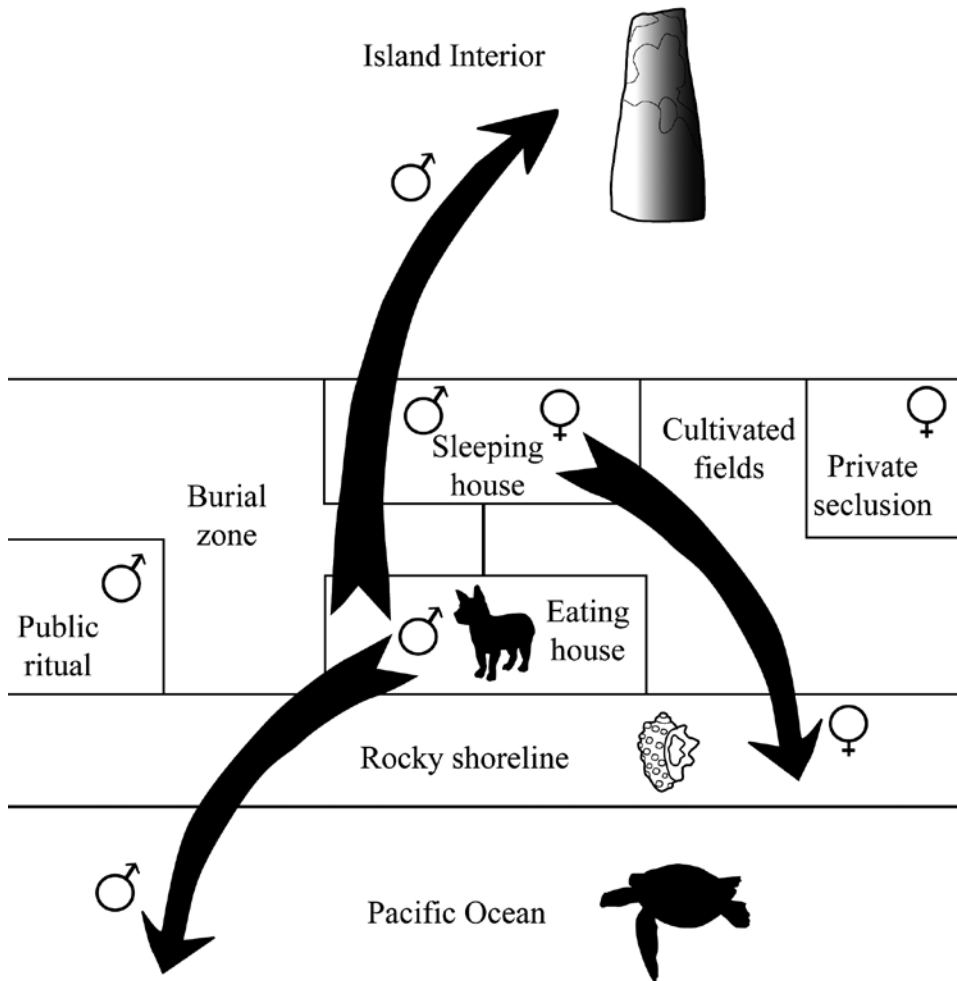


Fig. 12. Proposed model of gendered space and resource procurement.

as *'ohana*. Neighborly interdependence and the sharing of goods and services ensured that members of any given *'ohana* would settle in contiguous areas. In some cases the ancestors of an *'ohana* had reputedly settled areas many generations ago (Handy & Handy 1991: 288). An *'ohana* was not an independent group with an autonomous political economy, however, bearing in mind that commoner members paid tribute in the form of produce and services to members of royal lineages and their priestly collaborators. Some tribute payments were left at stone monuments near the sea shore and on *ahupua'a* boundaries for collection by members of the upper class. An *'ohana* head did not inherit his position, nor was he elected. Competence and organizational skills were apparently the main requirements. It is important to note that *'ohana* did not hold rights to land by the time of first European contact in the late eighteenth century; chiefs could remove those commoners who failed to pay tribute, render certain labor services or show the necessary ritualized respect (e.g. Sahlins 1992: 33).

The transition from loosely defined land held by descent groups of related kin to clearly defined land units, or *ahupua'a*, held by a class of chiefly rulers, occurred some time between AD 1500 and 1600 (e.g. Kirch 1997: 294, 301). The local chronology reconstructed from archaeological work at Site Complex 50-10-05-4157 suggests that it was occupied through this period of transition from a lineage-based to a more feudal-oriented socio-economic system. The abandonment of the site complex furthermore appears to correspond roughly with the unraveling of the feudal-oriented system in the first half of the nineteenth century.

In spite of changes through time detected in the archaeological record of Site Complex 50-10-05-4157, a spatial distinction in resource acquisition appears to persist. Basically, the architecturally elaborate but comparatively smaller structures closer to the coastline yielded basalt adzes, volcanic glass and ocean fish from extra-local sources, whereas the elongated and larger inland structures on the higher inland side of the site complex yielded mainly shellfish that can be obtained from the nearby rocky shoreline (Fig. 12). The closest ethnographic match for these structures and associated finds are male-related *hale muas* closer to the coast and paired female-dominated, co-residential *hale noas* farther inland. The archaeology is nevertheless not a perfect match of the ethnographic record, as indicated, for example, by the corner doorways of some excavated *hale muas* that contrast with doorways in the central portion of one long wall. In spite of such small variations, a tentative model of Hawaiian coastal settlement layout and acquisition of resources can be proposed, as graphically summarized in Figure 12.

Having worked on many Southern Bantu settlements, where sacred and male-related activities tended to occur on higher ground in the rear portion of a settlement, my initial expectation was that the same would be the case in Hawai'i. Correct etiquette for people approaching a traditional settlement in southern Africa was to do so from the downhill, or 'front', side. In Hawai'i, etiquette seemingly required people to approach first the sacred 'front' portion that normally contained *heiau* temples, various shrines and male *hale mua* eating houses. Approaching a fishing hamlet from a beach landing, visitors first would have had to walk via the temples, shrines and meeting houses to reach the common sleeping houses. Farther inland, *heiaus*, *hale muas* and *hale noa* sleeping houses are often aligned with weathered trails that are still visible on the exposed lava surfaces, suggesting that there too settlements had fronts and backs.

Whether Tim and Tom will agree fully with all the interpretations presented in this paper is not as important as the fact that they taught me to try to make sense of the often complicated archaeological record in innovative but verifiable ways, and for that I am thankful.

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REFERENCES

- Armstrong, R.W. 1983. *Atlas of Hawaii*. Honolulu: University of Hawaii Press.
- Beckwith, M.W. 1932. *Kepelino's traditions of Hawaii*. B.P. Bishop Museum Special Publication 95. Honolulu: Bishop Museum Press.
- Brigham, W.T. 1892. *A preliminary catalogue of the Bernice Pauahi Bishop Museum of Polynesian Ethnology and Native History*. Honolulu: Bishop Museum Press.
- Buck, P. 1957. *Arts and crafts of Hawaii. Book II: houses*. B.P. Bishop Museum Special Publication 45. Honolulu: Bishop Museum Press.
- Cordy, R. 2000. *Exalted sits the chief: the ancient history of Hawai'i Island*. Honolulu: Mutual Publishing.
- Ellis, W. 2004. *Journal of William Ellis: a narrative of an 1823 tour through Hawai'i*. Honolulu: Mutual Publishing Company.
- Emory, K.P. 1924. *The island of Lanai, a survey of native culture*. B.P. Bishop Museum Bulletin 12. Honolulu: Bishop Museum Press.
- Emory, K.P., Bonk, W.J. & Sinoto, Y.H. 1959. *Fishhooks*. B.P. Bishop Museum Special Publication 47. Honolulu: Bishop Museum Press.
- Graves, D.K., Cassebeer, E. & Thompson, K.W. (with data analyses by S.T. Goodfellow). 1993. Archaeological inventory survey, Kahua Makai/Kahua Shores coastal parcels, Lands of Kahua 1 and 2 and Waika, North Kohala District, Island of Hawai'i (TMK: 3-5-9-01:7, 8). PHRI report 1024-020393 prepared for Gentry Hawai'i Company.
- Handy, E.S.C. & Handy, E.G. 1991. *Native planters in old Hawaii: their life, lore, and environment*. B.P. Bishop Museum Bulletin 233. Honolulu: Bishop Museum Press.
- Huffman, T.N. 1982. Archaeology and ethnohistory of the African Iron Age. *Annual Review of Anthropology* 11: 133-50.
- Kalima, B.A. 1993. Appendix B: Historical documentary research. In: D.K. Graves et al. Archaeological inventory survey, Kahua Makai/Kahua Shores Coastal Parcels, Lands of Kahua 1 and 2 and Waika, North Kohala District, Island of Hawai'i (TMK: 3-5-9-01:7,8). PHRI report 1024-020393 prepared for Gentry Hawai'i Company, Kona.
- Kamakau, S.M. 1964. *Ka Po'e Kahiko: the people of old*. B.P. Bishop Museum Special Publication 51. Honolulu: Bishop Museum Press.
- Kamakau, S.M. 1976. *The works of the people of old*. B.P. Bishop Museum Special Publication 61. Honolulu: Bishop Museum Press.
- Kirch, P. 1971. Archaeological excavations at Palauea, southeast Maui, Hawaiian Islands. *Archaeology and Physical Anthropology in Oceania* 6: 62-86.
- Kirch, P. 1997. *Feathered gods and fishhooks: an introduction to Hawaiian archaeology and prehistory*. Honolulu: University of Hawaii Press.
- Loubser, J. & Rechtman, R. 2007. Archaeological Data Recovery Investigations at SIHP Sites 2492, 16177, 16122, 2494, 16129, 2485, and 16154, within Site Complex 50-10-05-4157 (TMK: 3-5-9-017:001-007) Kahuā 2 and Waikā ahupua', North Kohala District, Island of Hawai'i. Rechtman report submitted to Kohala Kai LLC, Kealahou.
- Loubser, J., Rechtman, R. & Clark, M. 2007. Archaeological mitigation of five sites, on TMKs: 3-7-3-10:03), 'O'oma ahupua'a, North Kona District, Island of Hawai'i. Rechtman report submitted to Bill Brooks, Kailua-Kona.
- Maggs, T. 1976. *Iron Age communities of the southern Highveld*. Pietermaritzburg: Natal Museum.
- Malo, D. 1951. *Hawaiian antiquities*. B.P. Bishop Museum Special Publication 2. Honolulu: Bishop Museum Press.
- Maly, K. 1999. Historical background. In: T.S. Dye & K. Maly, Archaeological inventory survey of the coastal portion of Kaiholena Ahupua'a, North Kohala, Hawai'i. International Archaeological Research Institute, Inc. report prepared for Pohaku Kea LLC., Honolulu, pp. 23-66.
- Menzies, A. 1920. *Hawaii Nei 128 years ago*. Honolulu: W.F. Wilson.
- Nelson, R.E. & Wheeler, P.R. 1963. *Forest Resources of Hawaii - 1961*. USDA Forest Service, Pacific Southwest Forest and Range Experiment Station in cooperation with the Hawaii Department of Land and Natural Resources, Division of Forestry, Honolulu.
- O'Hare, C.R. & Goodfellow, S.T. 1999. Archaeological mitigation program, data recovery excavations, Site 50-10-05-4015, Kahua Makai/Kahua Shores coastal parcels, Land of Kahua 1, North Kohala District, Island of Hawai'i (TMK: 5-9-01:7,8). PHRI report 1572-081799 prepared for Gentry Hawaii Ltd.
- Oaks, R.F. 2003. *Hawai'i: a history of the Big Island*. Charleston: Arcadia Publishing.
- Pukui, M.K. & Elbert, S.H. 1986. *Hawaiian dictionary*. Honolulu: University of Hawaii Press.
- Pukui, M.K., Elbert, S.H. & Mookini, E.T. 1974. *Place names of Hawaii*. Honolulu: University of Hawaii Press.

- Pukui, M.K., Haertig, E.W. & Lee, C.A. 1972. *Nānā i ke kumu: look at the source*. Honolulu: Hui Hānai Press.
- Rechtman, R., Maly, K., Clark, M., Dougherty, D., Maly, O. & Loubser, J. 2009. Archaeological Data Recovery Excavations in the Ki'īlae Estates Development Area (TMK: 3-8-5-05:19, 22, 26, 27), Ki'īlae and Kauleolī Ahupua'a, South Kona District, Island of Hawai'i. Rechtman Consulting Report submitted to Ki'īlae Estates LLC, Makawao.
- Sahlins, M. 1992. *Historical ethnography*. Volume 1 of *Anahulu: the anthropology of history in the Kingdom of Hawai'i*. Edited by P. Kirch & M. Sahlins. Chicago: University of Chicago Press.
- Sato, H.H., Ikeda, W., Paeth, R., Smythe, R. & Takehiro, M. 1973. *Soil survey of the Island of Hawaii, State of Hawaii*. Washington D.C.: University of Hawaii Agricultural Experiment Station and United States Department of Agriculture, Soil Conservation Service.
- Schmitt, R.C. 1973. *The missionary censuses of Hawaii*. Pacific Anthropological Records No. 20. Department of Anthropology, Honolulu: Bishop Museum.
- Sinoto, Y.H. 1962. Chronology of Hawaiian fishhooks. *Journal of Polynesian Sociology* 71: 162–6.
- Tomonari-Tuggle, M.J. 1988. *North Kohala: perception of a changing community*. Division of State Parks, Outdoor Recreation and Historic Sites, Department of Land and Natural resources, State of Hawaii, Honolulu.
- Valeri, V. 1985. *Kingship and sacrifice: ritual and society in ancient Hawaii*. Chicago: The University of Chicago Press.
- Varigny, C.V.C. 1981. *Fourteen years in the Sandwich Islands, 1855–1868*. Translated by A. Korn, Honolulu: University of Hawaii and Hawaii Historical Society.

TABLE 1
Calibrated radiocarbon dates by increasing age (weighted averages are included).

Site/Feature	EU	Layer	Level	Beta lab#	2 σ calibrated AD	Intercept AD
2485/B	23	I	2	218367	Recent	-
16154/A	3	II	1	218372	N/A	-
16177 + 16129	1 + 7	II + I	1	average	1670–1920	1680/1740/1800
16177/A	1	II	1	218373	1660–1950	1690/1730/1810
16129/A	7	I	1	218371	1660–1950	1680/1740/1800
2492/A,b	14	I	2 + 3	average	1680–1920	
2492/A,b	14	I	3	218368	1890–1910	1960
2492/A,a	14	I	2 + 3	average	1640–1689	1655
2492/ A,a	14	I	3	218369	1520–1590/ 1620–1710/ 1720–1880	1660
2492/ A	14	I	2	218370	1470–1680/ 1740–1810	1650
2492/A	20	Ila (fea.1 + 2)	3 + 4	average	1400–1430	1420
16128 + 2492	1 + 20	III + Ila		average	1480–1640	1520/1590/1620
2492/A	20	Ila (fea.1)	3	218365	1520–1580/ 1630–1680/ 1770–1800	1650
16128/B	1	III	?	46779	1420–1640	1450
2492/A	20	Ila (fea.2)	4	218366	1270–1420	1310/1370/1380

TABLE 2
Proposed *hale noa/hale mua* complexes by decreasing age and *ahupua'a* (excavated sites are in bold).

Complex	<i>Ahupua'a</i>	Site	Function	Length (m)	Width (m)	Area (m ²)
1	Kahua 2	2485	<i>hale noa</i>	10.0	4.5	45.0
1	Kahua 2	2492A (NW)	<i>hale mua</i>	6.5	6.5	42.3
1	Kahua 2	16122D	<i>hale mua</i>	6.5	6.5	42.3
2	Waika	16129A	<i>hale noa</i>	14.0	6.5	91.0
2	Waika	16177A	<i>hale mua</i>	10.0	5.0	50.0
3	Kahua 2	2493	<i>hale noa</i>	16.0	8.5	136.0
3	Kahua 2	16176	<i>hale mua</i>	8.0	5.0	40.0
4	Kahua 2	16161	<i>hale noa</i>	9.5	7.5	71.3
4	Kahua 2	16124	<i>hale mua</i>	2.5	2.5	6.3
5	Waika	2491A	<i>hale noa</i>	15.0	10.0	150.0
5	Waika	2491B	<i>hale mua</i>	11.0	8.0	88.0
6	Waika	16120	<i>hale noa</i>	9.0	8.0	72.0
6	Waika	16125D	<i>hale mua</i>	3.5	2.5	8.8

TABLE 3 (continued)

Summary of exploited ecotones by site function and decreasing age.

Function	Site	EU	turtle	shark	fish	coral	barnacle	urchin	crab	shell	shell	beach	bird	pig	dog	rodent	UID bone	charcoal	kukui	basalt	volc. glass	Total
			-	-	1	-	-	6	1	84	3	-	-	-	-	-	-	-	-	-	-	95
		21	-	-	-	-	-	2	-	40	3	-	-	-	-	-	-	-	-	1	-	46
		17	-	-	1	1	1	4	2	697	21	1	-	-	-	-	2	7	-	-	-	737
		7	-	-	-	-	-	5	-	135	-	-	-	-	-	-	-	1	-	-	-	141
		6	-	-	-	-	-	2	-	48	1	-	-	-	-	-	-	-	-	-	-	51
		8	-	-	-	-	-	-	-	17	1	-	-	-	-	-	1	-	-	1	-	22
		24	-	-	2	2	-	-	-	4	-	-	-	-	-	-	1	-	-	-	-	6
		25	-	-	1	1	-	-	1	19	-	-	-	-	-	-	-	1	-	-	-	22
		27	-	-	1	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	1
		26	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	52
		23	-	-	-	-	-	5	1	40	3	1	-	-	-	-	-	2	-	-	-	70
		3	-	-	-	-	-	1	-	65	2	-	-	-	-	-	-	2	-	-	-	41
		16154A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		10	-	-	-	-	-	-	-	41	-	-	-	-	-	-	-	-	-	-	-	-
		16122A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1
		n	2	1	44	41	5	209	33	16396	319	8	4	3	1	-	26	-	-	45	54	17243

TABLE 4
Comparison of exploited ecotones from dated site complexes by function and increasing age.

			fish	non-shell rocky shore	shell rocky shore	shell shell beach	mammal local area	bird local area	UID bone local area	plant local area	volc. glass extra-lo-cal	
Function	Site	EU	ocean									AD
<i>hale noa</i>	2485A	24 + 25 + 27	-	12.50 %	83.33 %	2.08 %	-	-	2.08 %	-	-	-
<i>hale noa</i>	16129A	6 + 7 + 8	0.11 %	1.61 %	94.62 %	2.47 %	-	0.11 %	0.22 %	0.86 %	-	1750
<i>hale mua</i>	16122D	9 + 11 + 12	0.18 %	1.19 %	96.28 %	1.44 %	0.14 %	0.11 %	0.18 %	0.18 %	0.29 %	1750
<i>hale mua</i>	16177A	1 + 2	0.34 %	0.65 %	97.20 %	1.35 %	0.08 %	0.03 %	0.08 %	0.26 %	0.03 %	1750
<i>hale mua</i>	2492A	14 + 18	0.42 %	2.88 %	93.51 %	2.18 %	0.08 %	0.04 %	0.22 %	0.24 %	0.44 %	1650
midden	2492A	20	0.11 %	1.70 %	94.95 %	2.50 %	-	-	0.06 %	0.11 %	0.57 %	1450
pre-wall	2492A	20	-	22.22 %	33.33 %	-	-	-	-	44.44 %	-	1350

TABLE 6
Comparison of activities at dated site complexes by function and increasing age.

AD		1750	1750	1650	1450	1350
basalt hammers	17 %	-	3 %	4 %	-	-
coral abraders	67 %	-	31 %	11 %	11 %	-
basalt abraders	17 %	-	-	-	1 %	-
bead	-	63 %	3 %	-	1 %	-
charcoal	-	13 %	11 %	7 %	1 %	8 %
fishing gear	-	13 %	6 %	11 %	3 %	-
kukui nuts	-	3 %	3 %	14 %	-	-
bone tools	-	11 %	11 %	7 %	3 %	-
urchin abrader	-	-	6 %	7 %	59 %	23 %
debitage	-	-	22 %	33 %	16 %	53 %
basalt adze	-		3 %	4 %	2 %	12 %
shell scraper	-	-	-	-	1 %	4 %
EU	24 + 25 + 27	6 + 7 + 8	9 + 11 + 12	1 + 2	14 + 18	20
Site	2485A	16129A	16122D	16177A	2492A	2492A
Function	<i>hale noa</i>	<i>hale noa</i>	<i>hale mua</i>	<i>hale mua</i>	<i>hale mua</i>	midden

TABLE 7

Rank ordering of shell by raw counts, minimum number of individuals, and weight.

Name	n	Name	MNI	Name	g
<i>Nerita</i>	13690	<i>Nerita</i>	10673	<i>Cypraea</i>	14996.2
<i>Cypraea</i>	12207	<i>Cellana</i>	1422	<i>Nerita</i>	3423.3
<i>Cellana</i>	4618	<i>Cypraea</i>	987	<i>Cellana</i>	1693.7
<i>Drupa</i>	3086	<i>Drupa rubusidaeus</i>	972	<i>Conus</i>	1679.0
<i>Drupa rubusidaeus</i>	2635	<i>Littorina</i>	893	<i>Drupa</i>	1546.7
<i>Conus</i>	1363	<i>Drupa</i>	507	<i>Drupa rubusidaeus</i>	1387.5
<i>Drupa morum</i>	1337	<i>Littorina scabra</i>	257	<i>Drupa morum</i>	1314.7
<i>Littorina</i>	989	<i>Nerita polita</i>	246	<i>Drupa ricina</i>	622.1
<i>Drupa ricina</i>	575	<i>Conus</i>	245	<i>Littorina</i>	239.4
<i>Nerita polita</i>	382	<i>Drupa morum</i>	213	<i>Latirus nodatus</i>	192.8
<i>Isognomon</i>	271	<i>Drupa ricina</i>	122	<i>Charonia tritonus</i>	190.9
<i>Littorina scabra</i>	259	<i>Morula</i>	81	<i>Morula</i>	94.8
<i>Morula</i>	102	<i>Planaxis labiosa</i>	73	<i>Nerita polita</i>	79.2
<i>Latirus nodatus</i>	94	<i>Isognomon</i>	53	<i>Isognomon</i>	53.0
<i>Planaxis labiosa</i>	73	<i>Trochus</i>	26	<i>Littorina scabra</i>	50.5
<i>Trochus</i>	70	<i>Oyster</i>	26	<i>Trochus</i>	28.3
<i>Charonia tritonus</i>	58	<i>Latirus nodatus</i>	21	<i>Tellina</i>	21.0
<i>Oyster</i>	39	<i>Cantharus</i>	20	<i>Thais intermedia</i>	20.4
<i>Strombus</i>	32	<i>Charonia tritonus</i>	14	<i>Strombus</i>	16.4
<i>Thais intermedia</i>	32	<i>Thais intermedia</i>	14	<i>Oyster</i>	14.6
<i>Cantharus</i>	30	<i>Cymatium</i>	11	<i>Planaxis labiosa</i>	13.2
<i>Tellina</i>	19	<i>Strombus</i>	11	<i>Cymatium</i>	13.1
<i>Cymatium</i>	14	<i>Tellina</i>	8	<i>Cantharus</i>	10.5
<i>Hipponix</i>	4	<i>Hipponix</i>	4	<i>Nassarius hirtus</i>	6.8
<i>Thais</i>	4	<i>Oliva</i>	3	<i>Tridacna</i>	2.4
<i>Oliva</i>	3	<i>Mitridae</i>	3	<i>Fimbria</i>	1.8
<i>Mitridae</i>	3	<i>Thais</i>	2	<i>Oliva</i>	1.5
<i>Tridacna</i>	2	<i>Tridacna</i>	1	<i>Thais</i>	1.3
<i>Turbo sandwicensis</i>	2	<i>Turbo sandwicensis</i>	1	<i>Turbo sandwicensis</i>	0.9
<i>Arcidae</i>	2	<i>Nassarius hirtus</i>	1	<i>Mitridae</i>	0.9
<i>Nassarius hirtus</i>	1	<i>Arcidae</i>	1	<i>Hipponix</i>	0.7
<i>Fimbria</i>	1	<i>Fimbria</i>	1	<i>Arcidae</i>	0.6
<i>Tonnidae</i>	1	<i>Tonnidae</i>	1	<i>Tonnidae</i>	0.6
<i>Terebridae</i>	1	<i>Terebridae</i>	1	<i>Terebridae</i>	0.1

TABLE 8
Comparison of shell at different types of locales.

	Rocky coast shell		Cobble beach shell	
	n	%	n	%
Male-related areas	34 157	94	1082	90
Co-residential areas	1,925	5	111	9
Female-related areas	273	1	4	1
Total:	36 355	100	1197	100

TABLE 9
Comparison of shell MNI by dated site complexes by function and increasing age.

Date range	Site	Identification	Excavation Units	MNI shell
AD 1750–1800?	2485 Feature A	walled <i>hale noa</i>	24 + 25 + 27	100
AD 1750–1800	16129 Feature A	walled <i>hale noa</i>	6 + 7 + 8	1691
AD 1750–1800	16122 Feature D	walled <i>hale mua</i>	9 + 11 + 12	6307
AD 1750–1800	16177 Feature A	walled <i>hale mua</i>	1 + 2	10 126
AD 1650–1750	2492 Feature A	walled <i>hale mua</i>	14 + 18	13 031
AD 1350–1650	2493 Feature A	pre-wall pit and midden	20	4447

TABLE 10
Vertebrate marine remains by site function and increasing age.

Function	Site	EU	Species		g	AD range
<i>hale noa</i>	16129A	7	unident. fish	1	0.1	1750
canoe shed	2494	28 + 29	Box fish, unident. fish	4	2.6	?
<i>hale mua</i>	16122D	11 + 12	unident. fish	6	5.5	1700–1800
<i>hale mua</i>	16177A	1 + 2	<i>Pervagor spliosoma</i> , unident. fish	13		1700–1800
activity area	2492B	21	unident. fish	1	0.5	?
<i>hale mua</i>	2492A	14 + 18	Turtle, shark, <i>Naso unicornis</i> , unident.	19		1650–1700