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A Question of Design: The Investigation of Space and Structure in Hawaiian Kauhale

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A Question of Design: The Investigation of Space and Structure in Hawaiian Kauhale

By

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Professor Patrick V. Kirch, Chair
Professor Rosemary Joyce
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Abstract

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Remnants of past communities dot the landscape in southeast Maui, preserving the memory of the people that once lived along the southern slopes of Haleakalā. The remaining agricultural field systems, foundations of houses (hale), and the materials within preserve fragments of daily life that speak to the construction of place and identity on this leeward landscape. This dissertation analyzes seven kauhale (house complexes) in Nuʻu, Kaupō, Maui ahupuaʻa (political division of land) that were in use between the 16th and 18th centuries for the anthropological goal of discerning how the relationship between Kānaka Maoli (Native peoples) and the āina (land) shaped social practices in the community (defined as the ahupuaʻa). The construction and use of kauhale were impacted by geographic location and social status (e.g. gender, class, and occupation). making house complexes an important entrypoint for exploring place-specific adaptations of larger social structures.

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Chapter 1: Kuleana: Questions and Engagements

Kule.ana. Positionality and obligations. (Goodyear-Kaʻōpua 2016:2)

Remnants of past communities dot the landscape in southeast Maui, preserving the memory of the people that once lived along the southern slopes of Haleakalā. The remaining agricultural field systems, foundations of houses (hale), and the materials within preserve fragments of daily life that speak to the construction of place and identity on this leeward landscape. This dissertation analyzes seven kauhale (house complexes) in Nuʻu, Kaupō, Maui ahupuaʻa (political division of land) that were in use between the 16th and 18th centuries for the anthropological goal of discerning how the relationship between Kānaka Maoli (Native peoples) and the āina (land) shaped social practices in the community (defined as the ahupuaʻa). The construction and use of kauhale were impacted by geographic location and social status (e.g. gender, class, and occupation). making house complexes an important entrypoint for exploring place-specific adaptations of larger social structures.

Hawaiian history and culture has been a topic of interest to western scholars since Captain Cook first set foot on the shores of Kauaiʻi in 1778. However, the research conducted by westerners has too frequently discounted Hawaiian oral histories, neglected to incorporate Kānaka Maoli (Native Hawaiian) voices, or undervalued Hawaiian perspectives. To combat colonial erasures in archaeological literature, I braid together different ways of knowinga, relying on research approaches grounded in western science for the analysis while centering Kānaka Maoli perspectives in the orientation and interpretation of the data. The political goal of this approach is to contribute to the ongoing efforts by several Hawaiian and Western scholars (e.g. Kathy Kawelu, Noenoe Silva, Rona Tamiko Halualani, Haunani-Kay Trask, J. Kēahaulani Kauanui, Peter Mills, Greg Chun and Ross Cordy among others) to decolonize the historical and anthropological record. I paint a dynamic picture of Hawaiian history that challenges static depictions most often produced when researchers *only* rely on western academic tools and interpretations without incorporating perspectives from Hawaiian scholars.

Mōʻike: Hawaiian Epistemology

Archaeological work does not happen in a vacuum—the projects researchers tackle affect and are affected by the social contexts within which they operate. Choosing appropriate theoretical engagements that ethically inform the researcher, while critically assessing the methodology, is of utmost importance in the production of a project that benefits the stakeholders. With this in mind, I pull from long-established ideas that argue for reflexivity in archaeology in the design of this project. For example, Ian Hodder (1997; 2000) made clear that every aspect of an archaeological investigation is informed by theory (whether consciously or not) and Allison Wylie (2002) argued for a reflexivity in our practice that requires we identify these engagements. In this chapter, I briefly outline the most prominent theoretical engagements that are woven throughout this dissertation and inform my approach to the archaeological record as well as my interpretations of the material culture. I begin with the relationship between my work and the Hawaiian community with respect to the goals of the project, followed by an examination of how specific theoretical paradigms are applicable to research in Hawaiʻi. Finally, I examine how the interplay of theoretical engagements and historical documents inform my methodological approach to the material record.

Archaeological work that takes as its subject Hawaiian heritage must ethically engage with indigenous scholarship. Sustainable, reciprocal research that benefits the descendant community (Atalay 2012:5) is of paramount importance in this endeavor. Keeping native communities central to the research project takes various forms in the process of research and analysis (Atalay 2012). In keeping with community-centered scholarship, my project is driven by questions and concerns raised by Kānaka Maoli scholars from a variety of disciplines. First, I have organized this research in a way that reflects the Hawaiian epistemology forwarded by Manulani Aluli Meyer. Meyer (2001:126) conceptualizes knowledge as contingent on space and place. To understand a Hawaiian perspective is to understand how knowledge of the world formed, and conceptualize how knowledge was experienced. Meyer provides us with ways of understanding Kānaka Maoli ways of knowing that preface ideas relevant to Hawaiian epistemology. These ways of knowing were shared with Meyer by other educational leaders in Hawaiʻi. Below I list the approaches to understanding the experience of Hawaiian knowing that Meyer outlines:

1. Spirituality and Knowing—the cultural context of knowledge
2. That Which Feeds—physical place and knowing
3. The Cultural Nature of the Senses—expanding the idea of empiricism
4. Relationship and Knowledge—self through other
5. Utility and Knowledge—ideas of wealth and usefulness
6. Words and Knowledge—causality in language and thought
7. The Body-Mind Question—illusions of separation

(Meyer 2001:126)

I organize the sections in this piece working from these places of knowing, but in order to best present the information and research pertinent to the questions I address, I will engage with the concepts laid out by Meyer (2001:126) in the following order (I have included in parentheses the chapters or sections associated with each approach):

1. Spirituality and Knowing—the cultural contexts of knowledge
   - Ch. 1 Kuleana: Questions and Engagements
2. Words and Knowledge—causality in language and thought
   - Ch. 2 Papa Hana: Research Plan
3. Relationship and Knowledge—self through other
   - Ch. 3 Moʻokūʻauhau: Polynesian Ancestral Knowledge;
   - Ch. 4 Moʻolelo: Kanaka Maoli Ancestral Knowledge
4. That Which Feeds—physical place and knowing
   - Ch. 5 ʻĀina: Place and Space
5. The Body-Mind Question—illusions of separation
   - Ch. 6 Hōʻoike: Data
6. The Cultural Nature of the Senses—expanding the idea of empiricism
   - Ch. 7: Haku Mele: Interpreting Nuʻu Kauhale
7. Utility and Knowledge—ideas of wealth and usefulness
   - Ch. 8 Moʻopuna: Conclusions

Meyer was clear, however, that these are only *some* of the ways to orient oneself towards Hawaiian epistemology. Throughout this piece, I also engage with perspectives proffered by other Kānaka Maoli scholars for a multivocal approach to the past. I rely on Kathy Kawelu's work that calls for a more ethical and engaged archaeology, focused on the concerns of the Hawaiians. In her 2015 book, Kawelu foregrounds her research in the Hawaiian concept of kuleana, or right, privilege, and responsibility to the community and to the land (to define quite simplistically a complex concept). Kawelu (2015:4) recognized that her kuleana as a Kanaka Maoli archaeologist is to "ensure the practice of archaeology in Hawaiʻi is respectful, professional, and beneficial to the descendants whose past we [archaeologists] seek to understand." Following the suggestions and examples set by archaeologists that practice community-centered research, I forefront the importance placed on archaeological research by the Hawaiian community and recognize that access to this knowledge is a priviledge. This priviledge "[comes] with attendant responsibilities to a larger collective and to the ʻāina…" (Goodyear-Kaʻōpua 2016:15). I see my responsibilities as a white, female, US archaeologist as centering Kānaka Maoli voices in the discussion and analysis of Hawaiian archaeology, and producing research that benefits the living descendent community. To avoid perpetuating colonial structures I place Hawaiian knowledge and ways of knowing in conversation with archaeological work rather than instating a hierarchy of knowledge. This follows the example set by Aikau *et al*. (2016:158) to examine "what (productive) tensions rise when we bring settler and Indigenous people [or knowledge] together in a *transient* learning community whose purpose is to make trans-Indigenous crossings". To successfully follow through with these responsibilities, I pool intellectual resources from archaeological and feminist literature together with the Kānaka Maoli academic community and the oral histories of the Hawaiian people (Atalay 2012:55) to produce a more holistic interpretation of the materials from Nuʻu house sites. Further, I center the voices of Hawaiian scholars when possible, alongside or in place of more traditional sources that are cited in archaeological work on the Hawaiian house.

Critical Indigenous Theory

Engaging in the descriptions of lives that are not our own is an intensely complicated task wrought with problematic obstacles. The deeper in time people travel, the more complicated reconstruction of past lives becomes. Archaeologists are charged with the seemingly impossible goal of reconstructing historical events, social relationships, cultural constructs, and daily lives (among many other social concerns) from fragmentary material evidence that comprises the primary source of information on these past lives. While the material manifestation of the past is a real phenomenon that cannot be ignored, archaeologists must acknowledge that the past cannot escape the present within which it is currently situated (Alberti 2017). Simultaneously, the structuration that is ever-occurring in the present cannot escape irruptions from the past. Context comes to the forefront of archaeological interpretation as a method for dealing with this complex discursiveness between the past and present. Context in this sense refers to the traditional contextualization of the material record within space, but also historical and social contextualization (or the concept of 'place'). Science itself is contextual, as it is not a "mirror of nature" (Keller 2010) but rather a tool used to "narrativize phenomena using the epistemological resources available in particular times and places" (Cipolla *et al*. 2017:3).

Contextualizing archaeological scientific research within a social and historical moment requires the consideration of disparate ontologies, or rather, alterity. Alberti argues for a recursive archaeology in which we adjust our interpretive and theoretical practices with each alternative perspective that challenges our assumptions. Critical Indigenous theory and Native studies continuously challenge our preconceived notions in archaeology, critiquing archaeologists for too frequently remaining complicit in (if not altogether perpetuating) settler colonialism. Theoretical approaches that parallel Alberti's argument call for an integration of Native studies with scholarly pursuits. Atalay (an archaeologist and Native American working toward an ethically-informed archaeology) argues for approaches that are project specific, considering the needs and desires of descendants and stakeholders, which meld Native and Indigenous theories with Western approaches to find the best tools for the project. Atalay (2006:301) advocates for a collaborative archaeology that blends strengths from Indigenous and Western methodologies, while relying on "epistemologies of Indigenous peoples". Similarly, White and Tengan (2001) seek to expand concerns of identity to problematize the position of Native and Indigenous peoples as objects of analysis. Alberti's specific example of such an approach outlines recursive archaeology through the body; the body is theorized by Alberti and Aparecida as a bundle of affects that are fixed through shared habits.

I argue that the ways in which these bodies are understood and the habits that fix bodies are ontological. The understanding of 'what is' (or actions, behaviors, materials that can possibly exist in the world) influence habits by informing or limiting the ways bodies act in the world. Materiality is an extension of the body which serves as the bridge that connects the body to culturally shared habits. The material record is part of the corporeal bundle of affects *and* representative of shared habits (as is extensively discussed below through engagements with practice theory). Hawaiian historical records reflect Alberti's ruminations on the materiality of the body. The oral histories that explain the cultural impetus behind exhibitions of status through food consumption state that such practices originated with the deities. A key part of the Hawaiian embodiment and (re)production of personhood and identity was said to be the kauhale, which was also regulated by the kapu system. An archaeological investigation of these spaces requires what Atalay and Alberti call for—an elevation of Native epistemology in the theoretical discussion and methodological analysis.

Engaging with Native and Indigenous scholarship is crucial to the decolonization process, but the terms of engagement are dependent on the context (White and Tengan 2001:382). Decolonization is simply defined as an ongoing movement aimed at resisting and refusing "the legacies and ongoing relations and patterns of power established by external and internal colonialism" (Walsh 2018:16). By engaging with these critical theories, I interrogate the naturalization of knowledge that is perceived as universal but is in fact culturally and historically contextual (Mignolo 2018:127). Kānaka critical race theorists argue that academic knowledge can perpetuate colonialism as educational structures are indicative of the broader society (Wright and Balutski 2016:92-5). For example, the framing of Hawaiian women as polluting has been argued as more indicative of western conceptualizations of gender than historical Kānaka worldviews (see Linnekin 1990—although this is a complicated issue with many varied perspectives).

Another issue raised by critical Indigenous and critical race theorists related to contextualizing scholarly work is the tendency to homogenize Native communities. While comparative information can be generative, it cannot replace contextually specific knowledge that is necessary for avoiding homogenizing Native groups. This includes, for example, glossing Hawaiians as "Indigenous". Hawaiʻi has a deep history of sea-fairing ancestors. Several scholars of Hawaiian history have problematized the term Indigenous as an identity for those native to the region due to this wayfaring history (Kawelu 2015:3; Young 2004). The term "Hawaiian" specifically refers to those from the island of Hawaiʻi and was only applied to people from the other islands after Kamehameha (who was from the big island) united the archipelago. It is therefore inappropriate to use 'Native Hawaiian' as a blanket term for Kānaka ancestors. The Native scholars problematizing the use of "Indigenous" and "Hawaiian" instead propose using Kanaka Maoli, which most closely translates to aboriginal or native (Kawelu 2014; Silva 2004). For clarity in discussion, I will continue to use 'Hawaiian' and 'Hawaiʻi' to signal shared cultural heritage of the archipelago, as there exists no other comparable term that references the shared cultural constructs of the communities on the islands. However, I wish to acknowledge that these terms are loose categories that encompass islands with unique individual histories. I will use "Kānaka" (people) or "Kānaka Maoli" (Native peoples) when referencing the people of the Hawaiian archipelago. I will specify Nuʻu communities when discussing evidence specific to the Nuʻu, Kaupō ahupuaʻa (territory) in southeast Maui, and will use kamaʻāina (local people) when talking about people in a specific community, and kuaʻāina (back country, back country people) when discussing the kuaʻāina lands[1].

Still Here: From Past through Present to the Future.

> And so American settlement histories are of necessity deeply ideological. They frame Indian peoples around two distinct modes of disappearance: Indians can simply die or vanish; or they can assimilate into America, disappearing as distinct peoples into some vast melting pot. [Deloria *et al*. 2018:15]

> We can imagine a future when the United States and its citizens commit to grappling with fundamental questions: what does it mean to live on Indian land? What does it mean that Indian people are still here? Moral, legal, ethical, and social issues and debates tumble out of those questions. [Deloria *et al*. 2018:15]

The quotes above introduce a volume that gets to the heart of the political and social justice issues calling for respect of the deep histories of Native communities. The authors critiques work that resigns Native or Indigenous identities to the past, instead challenging us to think "through the lens of *futurity*" (Deloria et al 2018:9, emphasis in original). Goodyear-Kaʻōpua and Kuwada (2018:50) use the metaphor of making the ʻaha rope to illustrate the importance of cultivating a "Kanaka Maoli futurity that strengthens relations between Kānaka living, passed, and yet-to-come", and in doing so, produce knowledge for future generations. This project critiques archaeological practice that divides early Hawaiian people from the living descendants, in effect promulgating the settlement mythologies and resigning Native Hawaiianness to the archaic past. According to Goodyear-Kaʻōpua and Kuwada (2018:52), "Hawaiian futurities as articulated in

[1] Following the lead of Native Hawaiian activists and scholars, I also do not italicize Hawaiian words (unless quoting directly from a source) to avoid making them appear foreign within this research project about kānaka maoli histories.

the contemporary Hawaiian-sovereignty movement have typically operated on a logic of inclusive, non-violent change through the power of education"—This project seeks to continue in these footsteps by providing additional information for the present about past peoples that can be of service to Hawaiian descendants in establishing a future.

Feminist Concerns

A community-centered approach requires forefronting community questions and concerns while a collaborative and discursive approach melds scientific methods with Native epistemologies in answering these questions. The concerns of Hawaiian community members discussed in the literature frequently center on colonial erasures, particularly the erasure of wāhine identity in favor of a western construct of women and patriarchal power imbalance in colonial Hawaiʻi. Noenoe Silva (2004:20) writes about the method of recording in Western texts—the practices of historiography that worked to produce and reinforce western practices, "denying the reader possible glimpses into another worldview." Specifically, Silva (2004:21) argues that the translation of the oral traditions removed reference of the power of Hawaiian women in controlling their own lives, instead reshaping the histories and narratives to conform to western gender norms. Kēhaulani Kauanui (2016) takes this a step further, arguing that 19^{th} century colonialism in Hawaiʻi elevated men's status by legally subordinating women and criminalizing sexual activities that fell outside of heteronormative European behaviors. This criminalization worked to shape practices that are today considered normative in the academy and in Hawaiian daily life, but would have been foreign to early Hawaiians before their contact with the western world. The material that archaeologists most frequently focus on as well as the way that this material is commonly discussed and interpreted further erases much of the role wāhine played in Hawaiian history.

I take up these concerns raised by these and other Kānaka Maoli scholars and community members that I have talked with about gaps in archaeological research in Hawaiʻi as part of my community centered, collaborative approach. I question the problematic absence of extensive archaeological investigations on the contribution of wāhine (especially when compared with the amount of work conducted on the role kāne (men) played in Hawaiian communities) and explore the ways in which the material record reflects the roles wāhine played in their communities. Critical theorists speak to the importance of this goal in their assertion that "research, in this case archaeology, if unchallenged, reproduces systems of oppression. Emancipation from domination and coercion, even self-imposed coercion, is the goal of critical theory" (Kawelu 2015:6). The colonial history of archaeology is reflected in the systems of oppression that are perpetuated through work that denies a voice to Kanaka Maoli women. While the field of archaeology has made great strides toward decolonizing research practices, the striking absence of wāhine in archaeological narratives signals the continued presence of colonial ideals that are perpetuated in the literature. Wāhine are frequently neglected in historical records that continue the colonial project; "Chandra Mohanty, Anne McClintock, Gayatri Chakravorty Spivak, and Ruth Mabanglo have shown how valuable it is to notice the ways that women are kept out of colonial and postcolonial histories, and how important it is to search out their contributions" (Silva 2004:7). Here, I wish to echo White and Tengan's assertion by clarifying that I am not recognizing these absences (and critique archaeological practice) as a means of ridiculing or pigeonholing archaeological practice, but rather as a means of probing "institutional practices that enforce and maintain boundaries of inside-out, native-other, and representor-represented in Pacific scholarship." (White and Tengan 2001:382). Perpetuating this divide results in the projection of western heteronormative constructs onto the interpretation of the Hawaiian material record, effectively preserving the silences surrounding women's lives in early Hawaiʻi.

Three intersecting social identities that impacted the daily life of households were occupation, gender, and class. These identities must be considered together to understand how they impact one another. Interpreting the physical remnants of these complex social identities requires first reviewing the effects of colonialism that risk impacting our contemporary interpretations; "[Colonialism] affected aliʻi, kahuna (experts, healers), and makaʻāinana, women and men, and residents of different islands differently. Hawaiʻi's people were not a homogenous group, even before European contact" (Silva 2004:9). Social and political power relationships are visible through the reading of academic texts against the grain. Much of the literature addressing the period of Hawaiian life previous to the arrival of Captain Cook fails to account for the pivitol roles wāhine played in their communities. Sexuality in particular, an integral part of Hawaiian life, falls prey to these strategies of erasure that can be traced from religious colonial roots through to the colonial impact of academia. Sexual acts can be read as political maneuvers just as political (and politically charged academic) histories can be traced through the circumscription of sexuality. As Lisa Kahaleole Hall (2008:278) notes, colonialism takes sexualized and gendered forms that serve to stigmatize and disempower indigenous communities. The deliberate control of the Hawaiian body is inextricable from the control of Hawaiian land (Hall 2008:278). The concepts from feminist and sexuality studies are used to evaluate academic writings about Hawaiian culture in order to assess the complex colonial relationships that continue to affect academic perceptions of Hawaiʻi and its people. Addressing gender and sexuality archaeologically allows for visibility of those that were oppressed by colonial structures. Working backward from the colonial period to the period represented by the material record analyzed in this research project will in practice be moving from women as oppressed to wāhine as active participants in complex social relationships.

Queer Feminist Science

Queering heteronormative reproductive practices that perpetuate colonial structures within and outside of the academy must happen on multiple levels. Queer theory is a generative framework for research that questions extablished narratives. Queer theory "queries the blurred limits of meaning, knowing and existing", asking if we really know what we think we know, interrogating the familiar and taken-for-granted (Eichner 2017:10). Queer theory is used in this project to interrogate the structures of power and reproduction previously discussed that work to perpetuate colonialism. Queer feminist science approaches argue that engrained colonial paradigms "obscure the empirical adequacy of alternative paradigms" (Marinucci 2016:10). The subjectless critique allows for an examination and deconstruction of the colonial academy. A queer feminist scientific approach inquires, "How do we know what we know about bodies? What is science? What is nature? What is race? What is sex? What is sexuality? How do these categories intra-act? How do our knowledges of them (epistemology) shape their existence (ontology)?" (Cippola *et al*. 2017:8). Questions asked by queer feminist scientists are relevant both to thinking through what we consider established knowledge in scholarship, but also reorienting ourselves to Kanaka Maoli was of knowing and what they considered unconventional or extraordinary.

Turning the critical eye of queer theory on the reproduction of academic knowledge in archaeology helps with questioning the way narratives are produced and reproduced from one particular perspective—most commonly that of white and male—that leads to the erasures in the literature pointed to by Kauanui, Silva, Kawelu, and other Hawaiian scholars. Queering the normative narrative requires a queering of the archaeological archive. The ‘archive’ takes many forms and is often defined relative to the research. As an amorphous entity, the archive is “a slippery concept”, a curation of memories meant to assist researchers with restoring, constructing and reconstructing the past (Bradley 1999:108). Physically, ‘the archive’ refers to a repository of personally or publicly curated objects and texts that are “constituted by exclusion” (Danbolt 2010:93). The consideration of the material record previous to excavation as an archive may not be reasonable, but the choices made in our methodological approach and collection processes transform the physical record into the archaeological archive. In addition to the excavated and curated material, archaeologists produce innumerable written records on excavations that become part of our personal archaeological archive from which we construct and reconstruct our narratives of the past.

Narrative implies a history of connected events, which forces the interpreter of archaeological remains to produce an interpretation that ignores potential erasures and is blind to other possibilities. Narratives at their core are chronological and linear with a beginning and an end (Pluciennik 1999:654). They can be harmful or useful in helping us reconstruct past events depending upon how they are used. The implementation of a narrative as immutable truth is problematic as it gives the author power over the construction of history, but the use of narrative as an evidential tool, or the construction of narrative that retains recognition of the fluidity can benefit interpretation. Foucault points to power relations as stemming from the relationality of bodies in narrative—what position does the subject occupy? Who controls the discourse, where does it exist? The archaeological narrator and their perspective cannot be forgotten, as they are the voice constructing an image of the past and therefore wield power over the subject. The way in which an author resolves crisis in their research, crisis such as discontinuities and the unknown, affects the interpretation. When employing the prehistoric/historic narrative, new information recovered in the process of research is forced to conform to already established “latent colonial paradigms” (Walz 2013:69). These colonial paradigms silence Indigenous communities rather than allowing for the multiplicity of influences that worked to construct the material record (Kehoe 2013; Lane 2013). Opening a conversation between queer and Native/Indigenous studies allows for a critical analysis of the effect of colonialism on our understanding of the past, the impact of colonial erasures in academic work on the present, and a path toward decolonization.

Queer theory is also an important tool for critically analyzing how ideas about the past are normalized and reproduced to fit within a patriarchal paradigm, a particularly important consideration when studying the construct of daily life. Historically, academic work in Hawaiʻi tends toward interpretations of the household that are homogenous and static, which reflect the colonial past more than they reflect Hawaiian history. An example of this that has already been extensively discussed is the interpretation of the role of wāhine within the community. This issue connects to a larger interpretive problem, however—the analysis of gendered social space in kauhale. The reproduction of household space is traditionally understood through the lens of class status. The social class system in early Hawaiʻi is frequently framed within a binary system of of aliʻi (chiefs) and makaʻāinana (commoners). In practice, the class system was more of a gradient, which is reflected in the diverse architectural and material remains (see Field *et al.* 2010; Garwood 2010; Kahn 2014; Kirch and O'Day 2003; Van Gilder and Kirch 1997; and Vacca 2014 for examples). Silva (2004:9) writes that colonialism in all its complexity affected each resident of the islands differently as the Hawaiian people were not a homogenous group before or after European arrival. Taking from this and Hawaiian moʻolelo descriptions (Malo 1951; Kamakau 1976) of the many various crosscutting and intersecting social identities that made up the fabric of Hawaiian life, we must account for this complexity, queering 'domestic' space interpretations that produce homogenous interpretations of 'domestic' life. In the following section, I will review the history of household archaeology and theories of everyday life that move us from theoretical to methodological engagement.

Connecting Theory to Practice through the Everyday

"The everyday: what is most difficult to discover" (Blanchot 1987:12)

'Everyday life' is a foundational term in archaeological research that is concerned with households and communities. Within the 'everyday' we find the minute details of life—repeated practice and performance—that form social relationships and dynamic social structures. The 'everyday' according to Blanchot (1987) is consistently reconstituted, always in the process of becoming and not created or structured by any one individual. Parallels Blanchot's description, de Certeau (1984:xi) defined the everyday as "ways of operating." According to de Certeau the everyday does not consist of operators or objects, but rather the many *ways* individuals can interact with the material world and with one another. Similarly, de Certeau argued against a relationship of assimilation of the everyday, instead considering reappropriation as a method by which individuals take part in the everyday. The actualization (to use Blanchot's 1987 term) of the everyday occurs through the subject's unique engagement with the material world based on their context within their social network. These moments of actualization are unique because they reflect the individual's experiences and their many interwoven identities that form the foundation of their knowledge for how to interact with the world around them. People continue to cultivate their knowledge base through these interactions, forming a discursive relationship between engagements with the material world and epistemology. For Kanaka, knowledge was place-based. Discursive relationships with the ʻāina and the community informed they ways people interacted with the material world. Engagments with the material world are particularly significant for archaeologists because they inevitably leave traces behind that preserve moments of actualization of everyday life.

The oral and written histories that describe kauhale are an entrance into conceptualizing daily life in early Hawaiʻi, yet we must be cautious with pushing the 19th century writings too far into the past—doing so risks painting the historical record as static, reinstating academic colonialism by homogenizing Kanaka history. The oral traditions that were recorded in the 19th century when applied to the archaeological record as an interpretive mold also serve to negate the changes and adaptations of earlier Hawaiian communities. Rather than moving in one direction from the moʻolelo to the material record, I instead tack back and forth between the archaeological record, the oral histories, academic literature, and primary sources to produce a multivocal and reflexive interpretation. The recorded oral histories remain vital to this process, but are used as a historically contextualized accounts rather than restrictive templates into which the material record must fit. Geoarchaeological methodologies are incorporated in the analysis of materials to contextualize the history of the kauhale within their physical environment. Native Hawaiian epistemologies are integrated in the interpretations to avoid relegating Kānaka to position of the eternal subject in conversations of their own histories. Engagements with feminist and queer theoretical paradigms provide critical lenses through which interpretations are scrutinized for latent colonial epistemologies.

Dissertation Outline

The theories outlined here heavily influence the research presented in this dissertation, but are not exhaustive. Throughout this dissertation, I weave together method and theory in an attempt to remain transparent regarding the theoretical reasoning behind methodological and interpretive decisions.

This introductory chapter has focused on the epistemological approach to the research. The explanation of the theoretical approach that centers Indigenous and feminist critical theory orients the reader to the standpoint I take in the following chapters. The second chapter will introduce my research design. The chapter will outline the research questions and hypotheses I address throughout the rest of the dissertation. This section goes into detail about the landscape and architecture that forms the core of the research project. A brief explanation of the approach to the excavation, and laboratory analysis of the material culture and sediment samples recovered from the kauhale follows.

In the third chapter, I detail the history of the Polynesian culture that provides important historical and cultural context for the research discussed in proceeding chapters. This chapter details the traditions and histories that carried through from the ancestral Polynesian culture to the Hawaiian descendants, tracing the continuation of knowledge through time. The fourth chapter carries these histories through to a discussion of daily life on the Hawaiian built landscape. I first give a brief overview of more generalized Hawaiian history and tradition, including a discussion of the cycle of events a community would have participated in together throughout the year. I then bring this history into a discussion of the ahupuaʻa that is the center of this research. I delve into the Hawaiian taskscapes from a historical perspective, weaving a description of the architecture, ethnohistoric accounts, and oral histories (moʻolelo) of daily life together with the material culture from the excavated houses.

The fifth chapter continues to explore these themes on Maui and within the Nuʻu community. I review the political history of Maui, then turn to Kaupō. I contextualize the social history of the region within the geological history. In the sixth chapter I present details about the analytical methods, then review the data from the excavations as well as artifact and sediment sample analyses. The final two chapters synthesize the data to paint a picture of life within the 15th-17th century Kanaka community. In the chapter 7 synthesis, I string together the multiple lines of evidence by moving backward from the 19th and 20th century moʻolelo and forward from the ancestral Polynesian and Hawaiian knowledge to interpret the data from each kauhale. Chapter 8 contextualizes the kauhale within the social and political community relationships.

Chapter 2: Papa Hana: Research Plan

papa hana. n. 1. Work method, plan, stratagem, policy, program, agenda, project. 2. Ceremony for the gods, as in offering kava (Pukui and Elbert 1986:316)

As discussed in the previous chapter, investigating daily life in early Hawaiʻi requires attending to the material that illuminates patterns of behavior. An analysis of the material record that results from the performance of social identity (i.e. gender, age, class, and occupational identities) forms the basis of my research. The repetition of activities (signaled through the build-up of similar types of materials and features on the landscape) suggests that actions are reinforced by cultural structures that encourage the participants to continue acting in similar ways through time (Friesem 2016; Jusseret 2010; Matthews 2012a, 2012b; Shahack-Gross 2017; Walsh 2004). Divergences from these patterns can then be understood as alterations of interactions with the material world that theoretically represents individual agency. These divergences, whether social or functional, may also serve a purpose for the community. Kamaʻāina (native-born in a place) exhibited agency in their design and use of space that was informed by their specific cultural and historical contexts. The resulting houses therefore reflected the diversity across the landscape while also remaining situated within a distinctly Kānaka worldview.[2] In this chapter, I will discuss the technical approach to the research that I have chosen in order to achieve the goals outlined in the introduction. I will discuss the types of methods I undertook while researching the intricate social relationships of the 17^{th}-18^{th} century Nuʻu community and the justification for these methods by reviewing the type of household archaeology that fulfills the goals outlined in the Introduction. I also specify the questions and hypotheses that are addressed at each stage of the analytical process.

Household and Community Archaeology

Household archaeology enjoys a rich history within the discipline that reaches back to the 1970s. Initially touted as an approach to the most basic unit of social reproduction (Goody 1972; Wilk and Rathje 1982), household archaeology has since developed into a theoretical and methodological tool for analyzing the "process of living" through the study of houses and their inhabitants (Carsten and Hugh-Jones 1995:37). Later household research (e.g. Carsten and Hugh-Jones 1995; Beaudry 1989, 2004; Deetz 1982; Allison 1999; Joyce 2000; Spencer-Wood 2004) critiqued the earliest studies of the house and occupants by problematizing the preference given to kinship and economy. Researchers like Carsten and Hugh-Jones (1995) instead acknowledged the importance of socialization and the central role of the house in this process. In addition, the authors advance Bourdieu's early concept of practice (Bourdieu 1977) as a primary means for understanding the embodiment of the house and reproduction of culture (Carsten and Hugh-Jones 1995:2). Conflict in theoretical discussions allows us to grow as a discipline. We accumulate knowledge as we move through and outgrow theories—each useful in their time, but we must move forward or we risk intellectual sterility (McGuire 1992). The movement among household archaeologists to include social theories coming out of sociology and social cultural anthropology in the 1980s and 1990s resulted in interpretations that accounted for embodied

[2] Kirch (2010:121) similar explains the ever-evolving political structure as a result of individual agency informed by historical president.

social structures. The far-reaching implications of these newly implemented social theories were seen in studies that were able to paint a picture of the lives people led within and around house structure. Household archaeologists were no longer bound to interpretations that homogenized whole swaths of people, but could instead talk about the similarities and differences within or between communities. This in turn allowed for the conceptualization of how social and political structures that had been intensively studied archaeologically, differentially affected people in their daily lives. Understanding the household as a place for the embodiment and production of culture allows for the possibility that communities developed unique practices in different regions. This approach fulfills the need to contextualize communities within time and space, avoiding the assumption of static practices.

Methodologically, social theories that developed the concept of 'practice' provided a paradigm within which patterned artifacts could be interpreted. The existing literature tends to implement practice as a tool in two different types of interpretations—understanding activity areas, and deciphering how social identities develop over time through repeated practices which leave behind material traces that demarcate these activity areas. Exemplifying the former, Mary Beaudry (2004) discussed her approach to archaeology and the household as "practice" oriented, or "what people do in their daily lives (Beaudry 2004:255), although she dismissed the "sum of habitual practice" advanced by Bourdieu (Beaudry 2004:255). Godino and Madella (2013:1) discussed the history of association of daily practice with architectural remains, specifically citing Kent (1990) and Blanton (1994)—both of whom were concerned with the use by members of the household of activity space in and around the structures. Penelope Allison (1999:6) introduced her edited household volume with an emphasis on the patterning of spatial distribution, and contributor Karen Meadows (1999) utilized practice theory in order to better understand the household culinary habits. Approaches by scholars like Rosemary Joyce, Julia Hendon, Barbara Voss, and Lynn Meskell exemplify practice as a performance and mode of embodiment. Joyce (2000c) explored the notion of play as practice, a method of testing the body and embodying social conscriptions. Joyce (2005:141-142—citing work from Joyce [2004] and Meskell [2001]) stated, "The demonstration that constructions of sexed/gendered bodies are always simultaneously constructions of age, class, ethnicity, race, and social status has shifted the attention of archaeologists to a wider gamut of practices shaping embodied personhood." Joyce (2001) also argued for the importance of burials in exploring individual identities within a larger social structure, focusing on the importance of the embodiment of social memory for house members in Tlatilco (a Mexican highland site). Hendon (2004:272) outlined what a "social archaeology of household production" should look like, focusing on people as agents, subjects, and embodied beings (Hendon 2004:274). She emphasized the necessity for taking practice into account when researching the household if one wishes to understand the process of "creating and defining social relations and identities" (Hendon 2004:275). Hendon (2004) questioned how human subjects were shaped, identities embodied, and roles enacted so that she might reveal how societies were constituted and how they changed through time.

I borrow from both types of implementation of practice theory, utilizing the concept of repeated patterning in the archaeological record to interpret the ways in which space was organized as a means for understanding the modes of embodiment of early Hawaiians. The kauhale, or house complexes in Hawaiʻi evidence structuration as they were designed to reflect and maintain social practices. The ways in which communities interacted with one another in their daily lives was restricted by their socially-proscribed status within the social and political hierarchy. Hawaiian elites enforced this social structure using the kapu (tabu) system as a means for regulation and control. The kapu system provided a set of "protocols and prohibitions" (Kirch 2010:21) that structured the ways in which people interacted with one another across the landscape based on their age, class, or gender identity. The material tied to these social identities not only signals the use of space in the household, but the ways in which household members embodied the social structures.

Finally, Julia Hendon (2000, 2010), while engaging with the work of social theorists such as Giddens, proposed a new way of thinking about households that connected them with the surrounding landscape through memory and materiality. Hendon (2000) delved into the impact of the memory on the landscape in her investigation of storage complexes. She hypothesized that storage as an element of mutual knowledge was connected to moral order that becomes the "basis for power and authority" (Hendon 2000:42); therefore, something as simple as storage affected the structuration of society. Agency of things and landscapes of memory were picked up by household archaeologists as critiques of bounded spatial activity.

Landscape Archaeology

Graves and Ladefoged stated that "successful and rigorous landscape archaeology must be both specific and general, attending to both theory and fact, and it must evaluate potential hypotheses or narratives in light of alternatives" (Graves and Ladefoged 2002:5). While there may have been a hint of exasperation in their words, I would argue that this is precisely what landscape archaeology must entail because the landscape is not bounded and so must be conceptualized on a sliding scale, which is what the methods described in this chapter attempt. Graves and Ladefoged (2002:5) identified several themes in landscape archaeology, from which I have extracted those that are relevant to this research project:

1. The scale of investigation extends beyond a single site or the traditionally recognized archaeological settlement
2. Typically, multiple kinds and levels of data are deployed in the analysis and/or interpretation of landscapes.
3. While spatial in focus, landscape archaeology often includes a temporal or historical component.
4. At the scale of a landscape, humans both interact with their environment and may produce impacts to that environment. These both may have contingent effects of subsequent human behavior.
5. Humans produce a cognized version of the landscape and their environment and this model is related to the ways in which individuals are distributed over the landscape. This produces spatially redundant patterns of archaeological materials.
6. At the scale of a landscape, humans interact with each other, and this is archaeologically manifest/visible at the organizational level of groups.
7. Humans organize themselves in a variety of ways with respect to each other and the environment across a landscape and through time.
8. Landscapes are temporally dynamic with respect to geologically forms that may

be variably affected by climatic, environmental, and human impacts [adapted from Graves and Ladefoged 2002:5].

These themes in landscape archaeology exemplify why a landscape approach was chosen for this project. Specifically, many of the goals advanced by Graves *et al*. (2002:245) give credence to the idea that change was constant; "rather than being static or univariate, traditional Hawaiian community organization shows considerable variation." Approaching kauhale from the perspective of the landscape allows for comparisons within (and between) communities. These comparisons illuminate similarities and differences in the adaptation of the cultural structures through architecture and use of space. The benefits of a landscape approach as outlined here also favor a focus on maka‘āinana to better understand community organization as the commoners constituted the majority of the population and as such would have heavily influenced social life through their daily interactions with the landscape. Landscape approaches that consider the use of space are incomplete without a conceptualization of ‘place’, however. While ‘space’ is amorphous and non-specific, ‘place’ is rooted, contextual, specific, and can be approached at multiple interconnected scales (Casey 2008). Integrating place and place-making research with a built environment approach demands specificity, recognizing contingent knowledge so important to kanaka epistemologies.

Geoarchaeological Landscape Approach

I turn to geoarchaeology and methods from soil science to analyze human-environmental interactions at a community and household scale. Discriminating between human and environmental processes in the creation of the archaeological record is a primary goal of geoarchaeology (Butzer 2008; Garrison 2016:298). Context, as defined by The Society for American Archaeology, is "the relationship that artifacts have to each other and the situation in which they are found" (saa.org/about-archaeology/what-is-archaeology). The sediment matrix within which material is encapsulated is part of that context, providing important clues to how the material was deposited and the geological processes that have altered the material since deposition. Using geoarchaeological methods to determine the processes that formed the archaeological record results in an understanding of the complex relationships between past peoples and their material culture, the landscape, and related ecological processes (Shahack-Gross 2017). The ultimate goal in using geoarchaeological methods is the investigation of the direct interrelationship between Hawaiians and their landscape at all scales, addressing the social, economic, technological, and ideological contexts that are reflected in the interactions with the environment. These interactions alter the landscape through physical and social activities. Using these methods outlined below, I emphasize the complex interrelationships between people, place, and things (Maher 2018). The outline of methods moves from large scale to small scale while indicating how the data from each scale converges to form a picture of the intricate connection between daily life and the broader social structures of 17th-18th century Hawai‘i.

Landscape Scale

My primary interest in the analysis of the landscape data from the Nu‘u *ahupua‘a* is analyzing the relationship between the house complexes on the landscape. I reconstruct the social and physical characteristics of the landscape through GIS modeling in order to provide a robust understanding of how these structures embodied and evoked status while elucidating the connections between households within the communities in which they lived. While the term 'Household' is important for considering the importance of daily life and I use this concept as a means to designate the inhabitants of the individual kauhale, I prefer thinking in terms of 'communities of practice' (Hendon 2010; Joyce and Hendon 2000; Lave 1991) for the consideration of social interaction as this affects the material remains on the landscape and the life history of a place (Ashmore 2002). Communities of practice, to quote Hendon (2010:60), "are created through mutual engagement in a joint enterprise defined and sustained through practice". This approach in archaeology recognizes shared memories transmitted through practice while simultaneously considering the temporality of practices, meaning the potential for change across space and through time. Memories passed down generationally are central to the perpetuation of culture. These memories are visible in the material recorded through the way that cultural practices alter the landscape (see Mills and Walker 2008). Hendon's analysis of the way the landscape is constructed through memory closely resembles Ingold's (1993) "taskscapes" that references reshaping of the landscape through human activity. Incorporating both approaches, I consider the shared ideology that shaped the houses and surrounding landscape alongside the role each unique kauhale played in perpetuating the shared community practices. Approaching the landscape through the lens of memory and practice makes room for consideration of the Nuʻu community's adherence to inherited practices as well as changing behaviors.

Excavation and Mapping

Seven house complexes were selected from over 400 surveyed archaeological features from a small community in Nuʻu ahupuaʻa within the Kaupō moku on the southern slopes of Haleakalā in southeast Maui. These kauhale were chosen based on their spatial relationships with one another and the variability in house sizes they represented. Five of the seven kauhale were occupied contemporaneously, along the same horseshoe-shaped ridge that rose above intensively farmed agricultural swales. Their proximity to one another indicates that they formed what we might consider to be a small neighborhood within the larger Nuʻu community. Each complex would have been visible from people standing within the other complexes when this landscape was at its most active. The two kauhale not part of this neighborhood represent larger complexes that were likely inhabited by higher status individuals. These kauhale were set apart on prominent hill crests overlooking the vast stretches of farmland below, but lacking neighbors with which to share the view. One of these complexes sat to the north and one to the south of the small neighborhood. The land around each of the seven complexes was mapped for the purpose of connecting the households to the surrounding taskscapes through a visualization of how the Nuʻu community built their landscape to meet the broader political and religious requirements of the period while attending to the local needs.

The landscape-scale analyses integrated survey data with the maps of the excavated kauhale. The spaces occupied by house complexes were mapped using both plane-table and alidade, and total station techniques. The digitization of the plane table maps created an image of the structures present on the landscape that is not available through photography, satellite images, or total station data. The total station data allowed for the maps to be georeferenced to the correct locations and manipulated to the appropriate size on the landscape while providing a foundation for creating a geodatabase that stores the information about each structure, unit excavated and feature identified in order to visualize patterns across the activity space within or between the complexes. These maps were then placed in ArcGIS for spatial analysis. Utilizing mapping data from total station and plane table maps that were created over the course of four archaeological field seasons, I created a visual representation of the area in Nuʻu that was the focus of my research. The spatial distribution data served an important role in adding contextual information to the material culture. The second stage of ArcGIS analysis modeled the areas of the landscape that are visible from particular structures of interest—specifically high-status house complexes. This representation provided an additional tool to use in the visualization of social networks and settlement patterns across the landscape as well as support for historical information on the preferred locations for building kauhale.

Site Scale

The built landscape has been heavily theorized and researched, but site scale research relies heavily on architectural analysis, which is under-theorized in anthropology (Ingold 2013:10). Ingold suggests that thinking of architecture "as creative process that gives rise to the environments we inhabit", thereby investigating the making of place and space (Ingold 2013:10). Architecture also plays an important role in place making (Whatmore 2002; Whitridge 2004). The purposeful design of space indicates the assertion of community (Joyce and Hendon 2000:143) by the builders that reinforces their ideas regarding how the household members should interact. Site scale also reveals the primary practices of daily life in the past, with the everyday serving as the "locus of memory" (Hendon 2010:5). Site-scale research reveals "the production of social difference, the entrenchment of social hierarchies, and the ability of some to exert control over others" (Hendon 2010:5). In essence, site-level spatial data can be used to access the political and social structures of a community when integrated with information on the manipulation of the environment. The kauhale architecture represents the intersection of daily life and environmental manipulation by representing how the landscape was shaped to structure daily interactions.

Hawaiian settlements as described in the historical records are kauhale that are quintessentially composed of multiple structures, each with a distinct function, within which households resided and performed their activities (Malo 1951, Handy and Pukui 1972). Historical accounts of traditional Hawaiian practices commonly discussed the household complex as a key component of social life in the 17th-18th centuries. Excavations at the site scale were designed to access repeated practices that would indicate whether the spaces mapped at the landscape scale adhered to the structure of the house described in historical documents (see Chapter 4 for detailed information from moʻolelo on kauhale structure). At least one unit (1m^2) was placed in each house feature and at least one unit in terraced areas around the house features. Artifacts were collected during the screening process and sediment samples were collected from the unit floor during excavation (see Chapter 7 for detailed information about excavation and sampling strategies).

Building a database for macro-artifact analysis required that I record the class, type, genus and species, count, and weight of the excavated material from each unit (Appendix C). With this database, I was able to compare the assemblage of cultural remains from each unit within and between sites. These data provided preliminary insights into the possible activities that may have occurred at each location. Data on artifact material, types, and ecofact (i.e. any unmodified material transported to the site) genus and species were then used to identify the potential for specific activities that occurred in each space. This information is more specific than density data and artifact class data, allowing for the identification of specific repeated activities and/or events. However, the analysis is incomplete without consideration for the microartifact record that provides context for macroscopic remains. Integrating the microstratigraphic scale compliments the site scale in ascertaining social relationships within the Nuʻu community.

Microstratigraphic Scale

The humidity and soil moisture in subtropical Hawaiʻi deteriorates organic matter, harming preservation of materials commonly used in daily life. Cleaning activities by household occupants would have contributed to the absence of cultural remains larger than 1-2mm as well, further depleting the material record. Movement of people across the landscape was accompanied by the movement of important materials out of abandoned houses, another key component in the removal of material used in daily life from the spaces in which they were used. The materials that are recovered archaeologically are used to construct a narrative about use and activity, as well as an interpretation of abandonment and degradation following the habitation of the kauhale. In order to ascertain the primary location of use for the surviving macro-artifacts recovered from the excavated kauhale, I turned to microartifact analysis.

Accessing the microarchaeological record required collecting several different types of sediment samples in the process of excavation. Three types of samples were collected and processed from each cultural context—samples for phytolith and starch extraction; and a bulk sample for particle size distribution, loss on ignition (LOI), pH, and the extraction of microartifacts. These analytical methods were all strategically chosen to answer smaller questions that build the larger picture. Care was taken to establish the sampling strategy that best answered the research questions. In the first season of excavations, only bulk samples were collected from each context visible in the profiles of the units. Upon analyzing the samples and contemplating the goals of the research, I modified the sampling strategy to instead collect sediment in the process of excavation. In doing so, I was able to capture signatures of activity that were not visible in the stratigraphy of the sidewalls. The focus of the second season was on capturing phytolith and starch signatures every 5cm and from each new context, while bulk samples were collected at the beginning of each new context, or every 15cm (whichever came first). During the third season additional updates were made to the sample strategy. All three types of samples were collected at the beginning of each 5cm level. This change reflected the need for contextual information about the sediment that comes from the analysis of bulk samples and is necessary background for interpreting the phytolith and starch data. Fine temporal control through the collection of bulk samples every 5cm also added important detail to the accumulation of microartifacts. This strategy was implemented in the third and fourth field seasons. Bulk sediment samples were also collected from offsite locations that provided important comparative information for the sediment data from within the kauhale.

Particle Size Distribution

Analysis of the particle-size range from each sediment sample provides information on taphonomic process, lithology/composition, texture, grain size and shape, fabric and sedimentary structure (Gee and Bauder 1986; Schiffer 1983). Relying on the size spectrum of particles is based on research produced by earth sciences that have observed distributions of particle sizes that are associated with specific depositional environments (i.e. alluvial fan, tidal flat, beach, etc.) due to unique signatures that result from the variation in transport mode and the energy inherent in the environment (Visher 1969:1103). Recording the size range of sediment grains is a basic method for analyzing unconsolidated geological material (Mellalieu 1996:70) and the information obtained from this initial step is the first foray into identifying the geological and anthropogenic activities that work in tandem to create the sediment. This sediment is akin to the memory of each site, storing information from depositional events that tell the interwoven geological and cultural history of the landscape. Information on composition signals the type of parent material that erodes into the smaller particles which are eventually deposited onto the house floors. Compositional data provides a window into the landscape history through the identification of the larger parent material present in the region. The grain sizes and shapes provide clues about whether these depositional events occurred through natural weathering events such as aeolian or fluvial deposition, or anthropogenic events, such as flint knapping or food preparation among other activities. The fabric and structure of the sediment illustrates the spatial relationships between the components of the sediment, signaling the type of event responsible for deposition and the timing of different events in relation to one another. Comparison of particle size distribution between lithofacies in a unit provides an important piece of evidence toward understanding the transition from distinct depositional events to soil formation. Fine fractions move downward within a soil profile as natural processes produce soil on stable surfaces. Higher percentages of grains $\leq 63\mu m$ in the lower strata evidences soil formation—the higher the percentage, the longer soil formation has likely been occurring.

pH analysis

Information on sediment acidity within the excavated house sites was obtained through pH measurements. Sediment acidity affects the preservation of artifacts and faunal remains, providing important information for interpreting presence/absence of materials in the kauhale. Levels of acidity can also signal the potential for preservation of phytoliths (Piperno 2006).

Loss on Ignition

The results of loss on ignition (LOI) analyses provide an additional line of evidence for uses of space across the site based on variation in the level of organic carbon. The amount of organic carbon in the sediment is a proxy for the total amount of soil organic matter that was deposited as the space was utilized through time (Hunt 1989).

Microartifact Analysis

Micro-artifacts provide contextualizing data for the recovered macro-artifacts because they accumulate *each time* a space is used (Goldberg and Macphail 2006; O'Connell 1987; Sherwood *et al.* 1995:430; Weiner 2010:44). Micro-artifact evidence is particularly valuable when extracted from the sediment of compacted dirt floors in which the artifacts would have become embedded. This line of evidence reveals spatial divisions due to *in situ* association of micro-artifacts with specific tasks, thereby clarifying spatial divisions within the house complexes. By revealing otherwise elusive spatial patterning in daily tasks, the micro-artifact evidence will help clarify the level of adherence to *kapu* restrictions through time in each complex. Incorporating the analysis of micro-refuse leads to the accessibility of the *habitus* (Bourdieu 1977, 1990) of past households (Ullah *et al.* 2014:2) due to the regular *in situ* preservation of microscopic remains. However, micro-artifacts can only produce data on continued use of the types of material collected at the macro-scale. Absent from these data is information on the organic materials integral to the majority of activities conducted in kauhale spaces.

Microfossil Analysis

Starch and phytolith evidence has been under-utilized in household research in Hawai‘i, but is easily adaptable from projects focused on agricultural production (Coil 2003; Horrocks 2005; Horrocks and Bedord 2010; Horrocks and Lawlor 2006; Horrocks and Rechtman 2009; Horrocks and Wozniak 2008; Horrocks *et al.* 2000; Horrocks *et al.* 2003; Horrocks *et al.* 2004; Horrocks *et al.* 2008; Horrocks *et al*. 2009; McCoy *et al.* 2016) to kauhale contexts. For example, McCoy *et al.* (2016) recovered the micro-fossils of paper mulberry, taro, sweet potato, breadfruit, coconut and kī from the Kona field system, proving that these microfossils are present in Hawaiian archaeological contexts. The plant micro-fossils recovered by McCoy *et al.* (2016) from the field systems were remnants of important resources that were also utilized in house complexes. Historically, Hawaiians used paper mulberry for barkcloth production (predominately made by women). The other plants identified by McCoy *et al.* (2016) were used in food processing and consumption. The organic material identified in the field systems represent a fraction of the plants that produce phytoliths or starches and were used by household members. The evidence from microfossils is important for reconstructing the way space was organized, assessing the class status of the household, and determining the level of separation by gender between household members in kauhale. For example, reconstructing floor deposits through micro-botanical remains can determine whether matting was present on the floors of the house, which is important information for interpreting the deposition of micro-artifacts. Identifying areas for processing and consumption in a kauhale would indicate the level of adherence to the ‘ai kapu regulations. Two processing and consumption areas in a kauhale would indicate higher levels of adherence than the presence of only one. The assemblages of inorganic palaeoethnobotanical remains with macro- and micro-artifacts provide the evidence necessary for interpreting how space was used in each kauhale, which in turn contributes to a broader understanding of the power and influence of the kapu system.

Most materials used in and around kauhale were plant-based. Plant remnants are therefore crucial for understanding the way space was used. Organic artifacts, however, rarely survive in Hawai‘i's subtropical climate. According to Weiner (2010: 99), the most likely biogenic artifacts to preserve in the archaeological record are "bones, teeth, mollusk shells, eggshells, otoliths, and plant phytoliths" due to their biomineral structure that increases their chance of preservation. Phytoliths are silica that develop in and are deposited by some plants as a result of physical and biological processes (Piperno 2006:5). As mineralized inorganic traces of plants used by people, phytoliths can form an important part of the archaeobotanical record, providing valuable information about human interactions with plants in the past (Weiner 2010:135). Extracting and analyzing microfossil traces of plants that persist in households provide valuable data on the types of plants processed, used, or consumed in household spaces.

Starch grain analysis is complementary to phytolith analysis. Plants that produce starch grains often do not target their organs for silicification (Piperno 2009:146), so the identification of starches is necessary to provide a more complete picture of plant use in the past. Starches enter the archaeological record in a variety of ways, the most direct of which is the decomposition of the plant (Beck and Torrence 2006:54). Beck and Torrence (2006:54) list the cultural pathways for the introduction of starch to the record as resulting from the selection, processing, and cooking of food, the use of starchy plants for material, and residual starches on discarded tools used for processing or holding plant material (Beck and Torrence 2006:54). In addition, starch granules may attach to an object through contact in a midden or storage and be later introduced into the archaeological record in a context unrelated to the plant's original use (Beck and Torrence 2006:54). In order to properly analyze the potential deposition and use of starches historically, Beck and Torrence (2006:57) encouraged taking advantage of ethnohistoric documentation of plant use, ethnoarchaeological and experimental data, and biological information regarding the distribution of starches.

Micromorphology

Micromorphology is defined as the study of sediment micro-fabrics in their undisturbed arrangement (Courty *et al.*1989; Kubiena 1937). Matthews *et al.* (1997:281-2) considered the primary contribution of micromorphology to archaeology to be the simultaneous analysis of sediments with artifactual and bioarchaeological components, along with the precise details of their depositional and contextual relationships. The resultant data collected from thin sections serves as a valuable source of sociocultural and environmental information (Matthews *et al.* 1997:281-2; Weiner 2010:30).

Geoarchaeological studies in Polynesia have infrequently included micromorphology although researchers recognize its potential (Carson 2002:354; Kirch *et al*. 2003; Weisler 1999:642; Wozniak 2003). Geoarchaeological projects in other regions of the world have demonstrated the potential for micromorphology analysis in household sites as well. Following their example, I use thin sections to identify use of space (e.g. Friesem *et al* 2011; Friesam *et al* 2014a, 2014b, 2014c; Karkanas 2006; Matthews *et al.* 1997), *in situ* combustion events (e.g. Berna *et al.* 2012), the presence or absence of matting on the floors (e.g. Goldberg and Berna 2010), and evidence of sweeping events (e.g. Goldberg *et al.* 2009). The investigations of space use and occupation sequences using micromorphology have incorporated analysis of deposits within caves (Goldberg 2000; Courty *et al*. 1991), settlements (Courty *et al*. 1989; Matthews and Postgate 1994; Courty *et al.* 1994; Macphail and Goldberg 1995), agricultural practices and landscape modifications (Macphail *et al.* 1998; Guttman *et al.* 2008) and site formation of abandoned structures (Friesem *et al.* 2011). For example, Matthews *et al*. (1997) worked on a practical application of micromorphology for the investigation of space use, construction and maintenance of houses, and site formation processes at Çatalhöyük. Currently, researchers are developing analysis concerned with plant remains (Wattez and Courty 1987; Schiegl *et al*. 1996; Mallol *et* *al.* 2007; Guttman *et al*. 2008; Shahack-Gros *et al.* 2003; Shahack-Gros *et al.* 2005; Goldberg *et al.* 2009; Matthews 2010; Cabanes *et al.* 2011; Shillito 2011; Shillito and Ryan 2013 among others), and other scholars are undertaking experimental and ethnoarchaeological research (e.g. Davidson *et al*. 1992; Freisem *et al.* 2014c; Goldberg and Whitbread 1993; Goodman-Egar 2008; Mallol *et al.* 2007; Shahack-Gross *et al.* 2003). Micromorphology in household research enables high-resolution analysis of activity areas that are given meaning through constant repetition of sociocultural behaviors (or *practice*) (Matthews et al. 1997:283). Other studies detailing the use of space within a household include Shahack-Gross *et al.* (2005), Karkanas *et al.* (2007), Karkanas and Efstratiou (2009) and Matarazzo (2010). The identification and nature of occupational surfaces has been investigated through the use of micromorphology in places like the Iron Age Tel Dor, where lime plastered floors made of burnt calcareous sandstone were located (Matthews *et al.* 1997). Micromorphology also allowed for the differentiation between construction fills and occupational-accumulated fills through the identification of microscopic fabric and content (Shahack-Gross *et al.* 2005).

Synthesizing and Interpreting Scales of Research

Historical documents provide insight into Hawaiian worldviews that connect the diversity of practice seen in the material record to ideological questions surrounding socially constructed identities. Testing the archival Kanaka Maoli records against the archaeological record, rather than using them as a mold into which the archaeological evidence is shoehorned, contributes a more nuanced understanding of daily life in the household across status lines. Research currently delineating the ways in which households fit into and support the larger sociopolitical system focusses on a top-down approach. Applying instead a bottom-up approach that looks to how daily life shaped and reinforced social relationships not only adds to this picture, but also considers social statuses that are not frequently discussed in Hawaiian archaeology (commoners and women specifically). This project relies on micro-artifact analyses and geoarchaeological methodologies (particle size distribution, pH, LOI, micromorphology, starch and phytolith analysis) to reconstruct daily practices by comparing the data with the historically-derived predictive models.

Returning to Hawaiian Epistemology

I wish to connect this discussion of scientific methods back to Hawaiian epistemology. Manualani Aluli Meyer (2001:127) describes knowledge as shaped by a culturally contextual understanding of "best practices" that is passed on generationally. Meyers illustrates this "spiritual continuity" as the mode of transference of Hawaiian knowledge, creating a "Hawaiian chain reaching back to antiquity" (Meyer 2001:128). This continuity signifies the importance of individual place(s) within a larger cultural context, tying together the pasts and presents (Meyer 2001:128). Meyer defines the ways in which Hawaiians interact with the material world and one another—relationship to the past through mentors, to one another through ʻohana, and to the ʻāina—as spiritual bonds that shape knowledge. These bonds shape the material world by informing daily practices that are constantly constituted and reconstituted through time as Hawaiian knowledge and understanding is passed on. These bonds are visible on the landscape through the materiality (and variability) of the houses which are the physical manifestation of Hawaiian epistemology.

Relationships to places are important themes in Meyer's and others' (e.g. Halualani 2002; Kauanui 2008a, 2008b; Oliveira 2016; Silva 2004; Trask 1999) discussion of the Hawaiian worldview. They are also important themes for contextualizing the kauhale excavated as part of this research project. The space and place that connect these disparate complexes speaks to the organization of a broader community that would have built knowledge and understanding of the world together through daily actions and interactions. While some of this knowledge will inevitably remain unrecoverable archaeologically, an investigation of space can provide some insight into social ties between one small Nuʻu community.

Chapter 3: Mo‘okū‘auhau: Polynesian Ancestral Knowledge

mo‘o kū.‘au.hau. n. Genealogical succession, continuation of knowledge (Pukui and Elbert 1986:254)

Reliable interpretations of material remains from 17th century Hawaiian kauhale require a consideration for the complex history that preceded contact-era Hawaiian culture. Practices dating to the period as the excavated Nu‘u house complexes were the culmination of centuries of ancestral life in the Pacific. In order to arrive at this specific place and time in Hawaiian history, I will work forward from the historical narratives and archaeological projects that detail this ancestral history. Deciphering the record in the present also requires an understanding for the events that played a role in altering the landscape following the abandonment of the sites in question. In subsequent chapters, I will work backward from the present, chronicling the history following abandonment of the sites that have not only altered each site, but have also altered Hawaiian social structures.

In this chapter, I detail the continuation of knowledge that connects the Hawaiians to their Polynesian, Lapita, and Austronesian ancestors. Intertwined in the ancestral histories is the anthropological research that has produced in part our understanding of these early people. This approach to the interpretation of the archaeological record that requires tracing the relationship between ancestors and descendants is inspired by the work of scholars who have used similar (albeit far more intricate) practices to trace Polynesian languages, cultural material and practices to their ancestral population. Kirch and Green (2001:13) for example used the phylogenic model, which they defined within the parameters of historical anthropology as an approach that incorporates data and perspectives from each of the four anthropological subdisciplines in an effort to trace through time the Polynesian traits that connect Hawaiians to their ancestral homeland and culture. Tracing the "*commonly inherited structural base*" (Kirch 1984:262; Kirch and Green 2001:30) provides insight into the practices that would eventually inform the cultural structure of Kānaka Maoli. The archaeological remains cannot be the only line of evidence relied upon, as it is estimated that approximately 82% of the range of material culture was manufactured from organic substances that degrade in sub-tropical environments over time (Kirch and Green 2001:164). Theoretically, the worldviews structuring daily life in the Nu‘u communities that are the focus of this study would have been informed by the history and traditions passed down from their ancestors. Therefore, it is necessary to identify the linguistic and ethnohistoric traces of Hawaiian ancestry in order to build a foundation from which I can interpret material traces found in 17th century Hawaiian house sites.

I will briefly review the migration of Austronesians, Lapita peoples and Polynesians across the Pacific, discussing the plants and animals brought with them and the cultural practices that developed as voyaging canoes pushed deeper into the Pacific. While each community tended to retain ties to their islands of origin, these Pacific island cultures were not homogenous or temporally static; each developed unique political and social structures. While the descendant cultures developed independently to different degrees due to centuries of settlement and increased isolation, political and social structures retained distinctly Polynesian characteristics which signaled a relation to their relatives that, by 1200CE, were thriving on each of the islands in Near and Remote Oceania. Below I detail the narrative of Pacific settlement, including details about the cultural structures and practices that influenced Hawaiian kauhale design. Each section is followed by a general discussion on how the ancestral practices impacted their Hawaiian descendants.

Austronesian Pacific Expansion

Austronesian is an ethnolinguistic group that encompasses ~1200 modern languages in a single language family (subdivided into ten subfamilies) that extends from Taiwan (the hypothesized island of origin) through island Southeast Asia, Melanesia, and to the eastern edge of the Polynesian Triangle (Hurles *et al.* 2003:533; Bellwood 1998). A branch of the Austronesian family also extends across the Indian Ocean to Madagascar. Phylogenic research traces the Proto-Austronesian language to the island of Taiwan off the coast of China and supports a pulse-pause scenario (as opposed to 'slow-boat' theories) that dates the incipient Austronesian culture to roughly 3000 B.C.E. (Gray *et al.* 2009; Blust 1995:458). Ceramic evidence dating to this period further confirms the emergence of a "Neolithic", or advanced stone tool cultural complex in the Taiwan region (Kirch 2000a:91). Approximately 5000 years ago, the descendants of Austronesian-speaking peoples initiated what is, today, called the Austronesian expansion, traveling south and east over the course of the next 1500 years into Near Oceania (Kirch 2000a:91; Kirch 1995; Carson *et al*. 2013). Linguistic evidence indicates a split in the Austronesian ethnolinguistic group (Western Malayo-Polynesian and Central Eastern Malayo-Polynesian) following settlement in the southern Philippines, with the Central-Eastern Malayo-Polynesian (MP) group subsequently breaking into two population segments—Central MP and Eastern MP (Blust 1995:485). The Eastern MP group was ancestral to the cultures associated with Oceanic languages and descended from the Lapita peoples (Tryon 1984:153; Blunt 1995:485; Pawley and Green 1984:124; Carson *et al*. 2013).

Scholars believe the Lapita cultural complex to have arisen in the Bismarck Archipelago between 1300-1100 B.C.E., subsequently moving into the uninhabited region of Remote Oceania (P. Kirch Personal Communication, 2019). Historical linguistic research indicates that the Lapita people spoke a branch of Austronesian referred to as Proto-Oceanic. Research relying on radiocarbon dates and dentate-stamped pottery pieces among other material remains have provided a relatively reliable timetable for tracking the dispersal of Lapita people in previously-uninhabited Remote Oceania, through island Melanesia and into Polynesia (Kirch 2000a; Kirch 2010; Hurles *et al*. 2003). Polynesia as a cultural complex developed out of the Lapita cultural complex in the Tonga-Samoa region, or Western Polynesia, which was settled in roughly 2850 BP (Kirch 2000a:96; Kirch 2010:138; Burley *et al.* 1999). Burley *et al*. (2012:5) established a date of 2830-2846 BP for the initial Lapita occupation of the Nukuleka site on Tongatapu Island, using U/Th dating to date coral abraders. Linguistic changes resulted in the emergence of a distinct Proto-Polynesian language (descended from Proto-Oceanic) in the Tonga-Samoa region over the span of approximately one millennium (Kirch 2010:140; Kirch and Green 2001). Eastern Polynesians all regarded Hawaiki or Havaiki as the homeland of their people (Kirch and Green 2001; Taonui 2006:52). In addition to the development of language, a distinctly Polynesian culture emerged as a result of adaptation to a new environment, different social conditions, and partial isolation (Kirch 2000a:210). From this Western Polynesian homeland, the descendants settled the remainder of the Polynesian triangle in Eastern Polynesia between ~850 C.E. and 1300 C.E., with New Zealand being the last of the islands discovered and settled (Hogg *et al*. 2003; Kirch 2010:140).

Canoe plants and animals

Austronesians brought crucial plants (called canoe plants) and animals with them as they traversed into the Pacific roughly 5000 years ago. Table 3.1 lists the plants transported by Austronesian and Polynesian ancestors that would eventually be utilized by Hawaiians. While many of these species originated in East and Southeast Asia, some were incorporated into the Lapita or Polynesian arsenal along the way. The column that lists the use of each plant illustrates why each of these plants was so vital to the shared ancestral culture that they were packed onto a voyaging canoe that likely had little space to spare, and cared for with precious resources on the arduous journey across the great expanse of the Pacific.

The plants and animals brought by Austronesian and Polynesian ancestors to Maui can arguably be considered some of the most important inheritances from their ancestors. Settlement and agriculture irrevocably changed physical aspects of the landscape, from large scale structures to micro-stratigraphic features and chemical composition of soil. Kauhale construction, planned around the agricultural fields, by its very nature transformed landscapes into "taskscapes" that laid the backdrop for these communities of practice. These plants (along with the pigs, dogs, fowls, rats, and geckos) accompanying Polynesians across the Pacific) were key factors in the political relationships within the smaller ahupuaʻa communities, part of their religious life, a determinant in decisions on how to work with the land, and integral to the kauhale and therefore ʻai kapu structure. Due to the extent of these introduced species, the natural landscape that greeted the Kānaka at their initial settlement of the region had dramatically changed by the time the Nuʻu house sites were abandoned. Organic materials deposited in the sediment through time serve as a proxy for landscape use and alteration after the associated cultural activities ceased.

Scientific Name	Family	Hawaiian Name	English Name	Origin	Environment	Use
Aleurites moluccana	Euphorbiaceae (Spurge Family)	kukui	Candlenut	Tropical Asia	Horticultural complex, native forests	The seeds were used as ornaments, supplemental food, and as a fuel for light. Seed also used to make black dye for tattooing and tapa cloth. Crushed seed, scraped bark and sap used medicinally. Bark used for waterproofing
Alocasia macrorrhiza	Araceae (Arum Family)	‘ape	Giant taro	Tropical Asia or New Guinea	Horticultural complex (damp or dry soil)	Corm used as pig fodder and famine food. Leaves used for temporary thatch, oven covers
Artocarpus altilis	Moraceae (Mulberry Family)	‘ulu	Breadfruit	Southeast Asia (possibly Java)	Horticultural complex	One of the most useful trees. Fruit used as primary source of food, flowers are medicinal and used in tapa cloth decoration. Sticky pulp used to caulk canoes. Latex used to stick together gourd drums and to catch birds, and chewing gum. Seeds strung for decoration. Bast used for cordage. Bark used for cloth making. Wood used for house beams, canoes, surfboards, poi boards, drums and other carved artifacts. Leaves used to cover earthen ovens. Sap used medicinally.
Broussonetia papyrifera	Moraceae (Mulberry Family)	wauke	Paper mulberry	Japan or China	Horticultural complex, plantations	Fibrous bark used for tapa (bark cloth) production. Primary tree used for this purpose. Raw bast fashioned into fishnets and cord mesh. Sap and ash of burnt tapa used medicinally
Calophyllum inophyllum	Clusiaceae (Mangosteen Family)	kamani	Alexandrian laurel	East Africa to eastern Polynesia	Littoral and coastal forests	Wood used for carving figures, bowls, slit gongs, furniture and house posts. One of the best carving woods in Hawai‘i. Seed burned in lamps, flowers used in leis. Leaves used medicinally
Cocos nucifera	Arecaceae (Palm family)	niu	Coconut	Island Southeast Asian and southern regions of Indian subcontinent**	Horticultural complex	The most useful tree in Polynesia. Coconut water, meat and cream important sources of food. Coconut water was particularly crucial in areas with scarce fresh water. Leaves used for adornment. Oil and milk used medicinally. Leaves woven into baskets and mats, food platters, fans, hats, fish traps, thatch, tongs and brooms. Fronds used for thatch and fish sweep. Leaf mesh husk used for strainers cordage. Shell used for vessels, tools, and charcoal. Fibrous husks used for cordage, brushes for painting tapa, and kindling. dried leaves used for torches. Branches and flowers used for kindling. Oil along with leaves, flowers and wood used on hair, skin, tapa (waterproofing), artifacts (polishing), and anointing the dead. Oil and cream

						used medicinally. Timber used as house posts and drums.
Colocasia esculenta	Araceae (Arum Family)	kalo	Taro	Southeast Asia	Horticultural complex (wetland and dryland)	Paramount Polynesian food plant on many islands. Corm used as primary source of food. Leaves and inflorescence are also a source of food. Corm used medicinally. Stalks used to make red or pink dye.
Cordia subcordata	Boraginaceae (Heliotrope Family)	kou	Cordia	Dispersed throughout tropical Asia to eastern Polynesia	Coastal area	Timber soft but durable, used for carving calabashes, dishes, cups, bowls, paddles, furniture, drums and other carved artifacts. Edible seed used as famine food. Flowers used in leis. Leaves and roots used in making red dye, leaves used to make light tan dye for fishing lines. Leaves used medicinally.
Cordyline fruticosa	Agavaceae (Century-Plant Family)	kī	Tī	Area between Himalayas and northern Australia	Horticultural complex	Leaves used medicinally and for adornment/clothing, thatch for temporary huts, and food preparation. Root used as supplemental food source and used as sweetener.
Curcuma longa	Zingiberaceae (Ginger Family)	ʻōlena	Turmeric	Southeast Asia	Horticultural complex	Primary use was of the rhizome for making yellow dye for tapa and temporary body paint. Rhizome also used medicinally.
Dioscorea alata	Dioscoreaceae (Yam Family)	uhi	Winged Yam	Southeast Asia	Horticultural complex (relatively dry, drained soil on slopes)	Tuber used as primary or supplemental food depending on island and location
Dioscorea bulbifera.	Dioscoreaceae (Yam Family)	hoi	Bitter Yam	Somewhere from Southeast Asia to Africa	Plantations and secondary forests	Tuber eaten as famine food.
Dioscorea pentaphylla.	Dioscoreaceae (Yam Family)	piʻa, piʻia	Five-Fingered Yam	Tropical Asia	Secondary or native forests	Tubers eaten as famine food
Hibiscus tiliaceus	Malvaceae (Mallow Family)	hau	Beach hibiscus	Uncertain	Littoral, disturbed and secondary forests, mangrove swamp margins.	Bast used for cordage and wringers. Fibrous bark used for plaiting in mats and kava strainers, fishnets, cordage, and dance skirts. Most common use was of the soft, easily worked timber that lasted in salt water. Timber used for outrigger floats, booms, canoe, fishnet floats, house parts, tool handles and firewood. Sap used medicinally.
Ipomoea batatas	Convolvulaceae (Morning-Glory Family)	ʻuala	Sweet Potato	Probably South America (Peru)	Horticultural complex	Tuber used as primary source of food

Lagenaria siceraria	Cucurbitaceae (Pumpkin Family)	ipu	Gourd	Probably tropics of Africa	Horticultural complex	Cultivated for shells used as containers for liquids, poi, salt, clothing and fishing gear. Gourds with edible pulp used for supplementary food source. Also used as bowls, cups, drums, and rattles (for hula). Poisonous pulp used medicinally.
Morinda citrifolia	Rubiaceae (Coffee Family)	noni	Indian mulberry	Southeast Asia	Open coastal areas and lowland forests	Bark/root used for yellow and red dyes. Bast used for cordage. Fruit used as famine food and to feed pigs. Leaves and fruit used medicinally.
Musa acuminata hybrids	Musaceae (Banana Family)	mai‘a	Banana	Indo-Malaya	Horticultural complex	Fruit used as primary source of food (a staple crop)-ripened inside the house or buried in a pit with smoldering husks. Leaves used for adornment (dance skirts, neck and ankle decorations), temporary thatching, and food preparation (wrapping and oven covers). Trunk used for steam in ovens and temporary canoe rollers.
Piper methysticum	Piperaceae (Pepper Family)	‘awa	Kava	Vanuatu	Horticultural complex	Root used to prepare psychoactive beverage. Plant used medicinally.
Saccharum officinarum	Poaceae (Grass Family)	kō	Sugarcane	Tropical Asia	Horticultural complex	Cultivated primarily as a sweetener. Leaves used for thatch in wet areas lacking pili grass. Stem pith used as a famine food
Schizostachyum glaucifolium	Poaceae (Grass Family)	‘ohe	Polynesian bamboo	Fiji	Groves along streams and in mountain forests	Split bamboo used for knives. Stems used for carved stamps (tapa decoration), musical instruments, fishing poles and house walls (poles and thatch). Larger stems used as water containers. Young stems used for plaiting. Leaves used medicinally
Solanum americanum	Solanaceae (Nightshade Family)	pōpolo	Black nightshade†	Uncertain (possibly native, from the Americas)	?	Leaves used medicinally (called foundation of Hawaiian pharmacy)
Syzgium malaccense	Myrtaceae (Myrtle Family)	‘ōhi‘a ‘ai	Malay apple (mountain apple)	Indonesia	Horticultural complex	Used as primary source of fruit. Bark used medicinally
Tacca leontopetaloides	Taccaceae	pia	Polynesian arrowroot†	Coastal tropical Asia	Horticultural complex	Tuber used as supplemental starch food added to other foods. Tuber used medicinally.
Thespesia populnea	Fabaceae	milo	Pacific rosewood	Uncertain (possibly from southern Africa)	Dry, sunny lowland volcanic regions	Plant used to stupefy fish and for medicinal purposes. Leaves used to make light tan dye.
Zingiber zerumbet	Zingiberaceae (Ginger Family)	‘awapuhi	Shampoo ginger	Indo-Malaya or Southern Asia	Forests and plantations	Plant used as shampoo. Rhizome used to scent tapa, and for medicinal purposes. Stalks and leaves used to flavor meat in earthen ovens.

†Possibly Polynesian introduced
*Table adapted from Abbott 1992:3; Lincoln 2009; and Whistler 2009
**Gunn BF, Baudouin L, Olsen KM (2011) Independent Origins of Cultivated Coconut (Cocos nucifera L.) in the Old World Tropics. PLoS ONE 6(6): e21143. https://doi.org/10.1371/journal.pone.0021143

Table 3.1: Plants introduced to Hawai‘i by early Polynesian voyagers and their use in Hawai

Austronesian house system

Claude Lévi-Strauss introduced the concept of the "house society" in his book *The Way of the Masks* to introduce a particular kind of social organization that had eluded previous anthropologists (Lévi-Strauss 1975:187; Gillespie 2000; Kirch and Green 2001). He was attempting to understand the social organization of societies that did not adhere to traditional kinship categories (i.e. matrilineal or patrilineal descent groups) or sociopolitical descriptors (i.e. tribe, village, clan, lineage) used by previous anthropologists (Lévi-Strauss 1975:174). Lévi-Strauss (1975:172) observed that groups such as the Yurok of California were distributed among 'houses' that were perpetual establishments, "each bearing a descriptive name inspired by the location, the topography of the area, the decoration of the façade, the ceremonial function—the name from which is derived that of the one or several owners." He recognized that the notions anthropologists previously used to determine known societal types (descent, filiation and residence, hypogamy and hypergamy, distance marriage and close marriage, election and heredity) were all united in the Yurok house (Levi-Strauss 1975:184). Levi-Strauss (1975:174) subsequently defined the characteristics of a 'house' within this type of social structure as "a corporate body holding an estate made up of both material and immaterial wealth, which perpetuates itself through the transmission of its name, its goods, and its titles down a real or imaginary line, considered legitimate as long as this continuity can express itself in the language of kinship or of affinity and, most often, of both."

Levi-Strauss (1975:174) suggested looking toward historical descriptions of medieval Europe, Japan, Greece, and other well-documented societies with noble houses to understand how the 'house' can be a corporate body, or an institution. In his 1976 lecture, Levi-Strauss further elucidated the idea of the 'house' in relation to the 'noble houses' of Europe, aiming to clarify social structures in societies where such social organizations existed (Levi-Strauss 1987:151). He suggested that anthropologists studying social organization found in groups that do not so easily conform to traditional kinship structures may benefit from conceptualizing the 'houses' as the "bearers of rights and duties" (Levi-Strauss 1987:151), to which many individuals are connected that are not necessarily blood-related. The extent to which this unit of analysis has proved useful varies from region to region, but found a stronghold in the literature of Pacific ethnographers and, later, in the research of Pacific archaeologists.

James Fox (1993b:1) elucidated the importance of the Austronesian house with regards to the social and spiritual role it plays in society. This discussion introduced a volume of work entitled *Inside Austronesian Houses: Perspectives on Domestic Designs for Living* with contributions from scholars that were committed to approaching the Austronesian house in contemporary settings as an important social group and cultural category. Fox goes beyond the conceptualization of the 'house' as a category of social organization in the present, exploring the 'house' as a means for transmitting memory across generations through materiality of the physical structure and material objects. He argued that embodiment of the cosmological order often occurs through the construction of the physical house structure, and from this physical structure, one can trace the "abstract social ideals" of the particular Austronesian society (Fox 1993b:2).

Toon van Meijl (1993) recognized the simultaneous existence of a perceived timelessness and constant flux in the cultural meaning imbued in Maori meeting houses. He found that while *marae* houses were perceived as timeless in their connection to the ancestors and ancestral practices, the symbolism and physical structures were not static, changing with the evolving culture (van Meijl 1993:237). Similarly, Roxana Waterson's (1993) significant contribution to the Austronesian house society literature was the recognition of the relationship between the built environment and uses of space in South-East Asia, shedding light on the importance of the house's architecture. Her work (Waterson 1993:229-231) tied together the Lévi-Straussian concept of the house as a corporate kinship unit with Bourdieu's (1977:94) concept of the house as a 'book' (read by the inhabitants as part of the process of embodying the structure of the world). She was primarily concerned with investigating the meaning of the enduring styles of Austronesian architecture in Southeast Asia (Waterson 1993:227). In her review of several Indonesian houses she explored the intersection of gender, class and power within the house structure (both social structure and architectural structure) (Waterson 1993). Waterson (1993:237) identified a reoccurrence in the theme of a house as a womb, which she interpreted as a "starting-point for a wide-reaching web of ideas about life-processes and the reproduction of social groupings, which themselves are intimately identified with the house." In 1995, Waterson examined the importance of memory in the house, arguing that the house embodies the memories of the ancestors in its physical presence, transferring that memory to its members through daily activities while continuously being reshaped by the members (Watterson 1995).

Kirch and Green (2001:202) supported the "house-based" approach for Austronesian cultures, maintaining that it allowed archaeologists to focus on the physical manifestation of social practices—the architecture of the house, associated features and buildings. Pierre Bourdieu's *habitus* was relevant for this approach, as it addressed the creation of patterns in the material record from minute daily activities. Bourdieu described the concept of *habitus* as a product of history that also *produces* history in the form of collective and individual practices (Bourdieu 1977:56). *Habitus* structures new experiences in accordance with structures that were produced by past experiences (Bourdieu 1977:60). He illustrated this concept through his work on the Kabyle (or Berber) house in Algeria, where he observed that the culture's social structure was mirrored in and reinforced daily through the houses' physical structure (Bourdieu 1970). The architectural construction of Austronesian houses is similarly crucial for understanding the daily lives of the people inhabiting these spaces (Kirch and Green 2001:202). Taking from Levi-Strauss's envisioned analysis of the house unit and incorporating analysis of architecture with spaces and social organization, the House then represents a "multifaceted social unit" (Kirch and Green 2001:202) that can be utilized for analysis of the social structure.

Dominance of the house in Austronesian societies as a physical feature on the landscape *and* grouping of kin is inescapable. Jennifer Kahn advanced an emic conception of 'house' as a social unit with archaeological and ethnohistoric evidence that allows for actively linking present members to ancestral occupants through heirlooms, burials, and descent myths (Kahn 2007; Kirch 1996, 2000b; Waterson 2000; Weiner 1992). The House-society concept, illustrated by this and the previously described examples, constitutes a powerful tool for inquiry into the social organization and structure of ancient Polynesian societies (Waterson 1995). Tikopia serves as an important case study that can illuminate these concepts.

Tikopia lies in the eastern extent of Solomon Island group in Remote Oceania just southwest of the boundary with Near Oceania. The island is considered a Polynesian outlier because the people are culturally Polynesian even though the geographic location of the island falls outside of the Polynesian triangle. Tikopia has been the focus of descriptive household ethnographic and archaeological research. Firth's project in Tikopia demonstrates the relevance of the topics covered in this section through his glimpse into the cycles of daily life in an early 20th century Polynesian household. While his research findings should not be projected onto Polynesian ancestors from different times and places, the picture he painted details the relevance of cultural concepts that are found throughout Polynesia in seemingly mundane daily experiences. Firth's ethnographic accounts of daily life in Tikopian households includes a thick description with the justification that "too often a certain pattern of domestic behavior is simply taken for granted without investigation because it seems obvious, or it is inferred from a few dramatic events" (Firth 1936:90). This sentiment is equally applicable to Hawaiian household research. Attention to the detailed descriptions of the rhythms of daily life in a Polynesian household recorded by Firth provides insight into the repetitions that we may expect to see in the ancient ancestors of these houses.

Firth begins his discussion with a clarification that the seasons affected the activities of daily life, something seen throughout Polynesia (seasons are reviewed in Table 3.2). Yet the sequences of events, whether repeated daily, weekly, monthly or yearly, left traces in the material record. Daily events that theoretically made the most impact were detailed by Firth as they relate to social status of individual household members.

The description of one day in the life of the Tikopian chief's household begins with the parents, children and grandchildren waking for the day from a night of sleep on their pandanus mats and (gender-specific) pillows (Firth 1936:91). Material traces that illustrate sleeping areas are marked by remains of pandanus plants, and gendered division within that space marked by specific cultural artifacts. The first task of the day is preparation of the food for the morning ceremony, which required little more than removing the leaves covering the meal slowly cooking on hot stones in the nearby oven house overnight in a shallow pit (Firth 1936:92). Food preparation required clearing the oven pit of debris, laying leaves on the bare earth, building a fire, heating and spreading the oven stones, scraping, grating or peeling food, covering the stones with leaves and packing in wrapped food before finally laying a mat pinned with rocks over the food. This prep was a social event shared by men and women (Firth 1936:95). This scene paints a picture of the possible material that would remain following the use of an earthen oven, including food debris left behind, charcoal, cooking stones, tools used in preparation, and evidence of the pit. While oral histories of Hawaiʻi talk about food preparation as the domain of men in the household, the associated materials closely aligned with those described by Firth.

Morning meals were not taken in this Tikopian household. The cooked food observed by Firth was meant for a ceremony while the household went off to their morning tasks as assigned by the chief with a snack at most (Firth 1936:92). The first meal of the day came after a morning of working in the orchards, along the reef, or conducting ceremonies. These tasks were not limited to the household, however, but rather shared amongst the community, as the "household group is not necessarily coincident with the economic productive group…ties of kinship and neighbourliness being drawn upon to meet the demands of the moment" (Firth 1936:92). Firth's observation illustrates the importance of considering house sites within their community context, accounting for relationships and resources shared with others. While not divided along household lines, the division of labor did evidence gender differences. Firth described men, women and children working alongside one another in the fields or orchards. However, tasks related to marine resource collection were divided between genders. Women collected resources from the shallow pools with nets and fishing kits, while men used rod and line to deep sea fish from the canoe or along the edge of the reef (Firth 1936:92). Children and the elderly intermittently helped with the various tasks parents or younger adults were involved in, suggesting that age did not necessarily dictate activity. The gendered division, however, reflects what is known of gendered division of labor in Hawaiian fishing from oral histories. Material traces of these activities is reflected in the types of marine faunal remains found at house sites, with inshore species representing the labor of women and deep-sea species reflecting the labor of men.

The mid-afternoon communal meal commenced with more prep including cooking more food in the earthen oven. Making pudding represented another important activity that revealed the social connections of the household and community members. In this particular Tikopian community, men were tasked with grating and squeezing coconut or turmeric meat, while women (or other available household members) watched the oven, removing in this case the breadfruit once it was fully cooked. Men then pounded the breadfruit in a bowl while adding the cream. This process of meal production required multiple plant parts, from toasted banana or palm leaves for wrapping or plaiting to coconut shells for cups, and breadfruit or coconut meat for consumption. This scene exemplifies that microfossils from these plants that are integral to the meal preparation and consumption process are an important line of evidence for identifying the areas of the house complexes in which these activities took place, as well as the types of food and resources available to each house (Firth observed a chiefly family, which does not represent the majority of households on the islands).

Firth does not describe in detail the evening hours following this shared meal, but explains that the rest of the day was spent in leisure until nightfall with a final period of recreation before the community goes to sleep for the night (Firth 1936:90). The narrative Firth presents provides compelling information on the foundation of social structures and organization within Polynesian houses. While this ethnography cannot be projected onto households from a different time and place, shared worldviews and cultural practices that connect Polynesians scattered across the Pacific are observable at the microscale through this description of a day in the life of one Tikopian community. Most notably is the shared community labor, directed by the chief, and the attention to food as an important social activity connecting each member to their community and culture. The following section details research more broadly on Polynesian communities that explains the underlying structures affecting the actions of both this contemporary Polynesian village and the structure of 16th century Hawaiian communities.

Kirch revisits Tikopia social life with specific attention paid to the household in his 1996 article. He found that the Tikopia did “organize their spatial world consistently according to a few fundamental principles” (Kirch 1996:269), indicating that one of the primary axes of social differentiation was the male-female dichotomy. Tikopia communities were attentive to this and other dichotomies in the design of their living spaces, including the related “seaward-landward” division which was correlated with gender (as were other complex dichotomies like sacred and secular or high vs low social rank) (Kirch 1996:269). Perhaps the most relevant takeaway from the ethnographic and archaeological work on Tikopia households was the finding that space was actively used by the community to "subtly underscore and reinforce social action" (Kirch 1996:269).

Polynesian Communities

The early phase of habitation in Western Polynesia from approximately 2830 BP to 2500 PB (Burley *et al*. 2012; Kirch and Green 2001:207) saw narrow settlement zones of approximately 50 m in width concentrated on beach terraces (Kirch 1988:242). These settlements gradually expanded to the edges of this habitation zones on both seaward and landward sides until eventually people moved into the inward portions of the islands due to increased population and changes in the landscape (Kirch 1988).

Green (1986:53) believed that the household units, clusters, and complexes found throughout Polynesia were ancestral Polynesian traits. Linguistic evidence points to ancestral settlement patterns that are delineated by the proto-Polynesian (PPN) word **kainanga* (from the root word **kai(n)* meaning 'the people') and indexed as a "land-holding or controlling group tracing ascent from a common ancestor" (Kirch and Green 2001:214). **Kainanga* were "larger than minimal residential groups" that "incorporated several such smaller groups (the **kainga*)" (Kirch and Green 2001:214). Kirch and Green (2001:214) further argued that the PPN word for the head of these residential groups was the **qariki*, or priest-chief. The term for smaller groups, or **kaainga,* Kirch and Green (2001:215) argued, incorporated references to a social group that maintained rights to an estate on which sat dwellings or house sites. In essence, the **kainanga* was a "unilineal ascent group led by an elite" while the **kaainga* was "a residentially oriented social group" (Kirch and Green 2001:235). Kirch and Green (2001:236) argued that the PPN term for principle dwellings on the land was **fale.* They then traced the evolution in the structure and meaning of these words temporally and spatially throughout Polynesia. One such theme connecting later cultural developments with one another as well as the Ancestral Polynesian Culture were the house *complexes* that Green (1986:53) argued dominated the landscapes of Polynesia in later prehistory, with canoe sheds, cook houses, and dwellings appearing as commonalities between the islands.

Culturally structured activity space within and around house complexes was common throughout Eastern Polynesia (Kahn 2003; Kamakau 1991; Malo 1951). The archaeological landscape and material record support ethnohistoric documentation in that remains illustrate division of crafts regulated to particular areas of the household (micro-scale) or landscape (macro-scale). For example, Kahn (2003:373) identified an area utilized as adze reworking and production within a house in the Society Islands, and Hawaiian literature discusses the division of tasks within the *kauhale* (house complex) (Kamakau 1976; Kirch 1992; Malo 1951; Kirch 1985; Handy 1965).

The household, often thought of as a single economic and social unit that may inhabit/utilize one or many physical structures and/or spaces (Goody 1973, Bender 1967, Wilk and Rathje 1982), should be defined flexibly and contextually in relation to the research project (Beaudry 2004). This research is modeled after household studies that are concerned with how individuals in the household embody and reproduce social practices (Hendon 2004). Of particular interest is the use of space within these dwellings (Bourdieu 1979) seen through the archaeological record that resulted from the daily activities of the household residents (Prine 2000:198, Bourdieu 1977, Foucault 1970, Giddens 1979, 1984). One household occupying a group of dwellings, or conversely, more than one household utilizing the same activity spaces are patterns commonly found in Polynesian societies (Firth 1936, Kirch 1996, Handy and Pukui 1972) and vary within a culture. In addition, this study seeks to analyze the social relations that are created by and result from the settlement patterns and social regulations (Kirch 1996, Green 1970, 1967).

Ancestral social and political structures

Research on the Proto-Polynesian language provides insight into the cultural practices of the ancestral homeland that formed the basis of the Hawaiian culture. Considering the words (and worldviews they represent) that survived the transition to the uniquely Hawaiian cultural system provides a foundation from which to start when working to differentiate the input from ancestral practices from subsequent changes following colonialism.

Connection to the land can be traced back through Hawaiian history to their Polynesian and Austronesian ancestors through their transported landscape detailed in Table 3.1, and through their language that demonstrated that connection to the land. The Hawaiian cognate of Proto-Polynesian *kāinga* is *ʻāina*, meaning land in the general sense (Kirch and Green 2001:216). The PPN word **mata,* a possible reference to a collectivity of people, was later prefixed to **kainanga* in Central Eastern Polynesia (Kirch and Green 2001:218). From this came the Hawaiian category of makaʻāinana*,* meaning literally "people that attend the land" (Pukui and Elbert 1986:224). Class status amongst the people was eventually distinguished and the hierarchical relationships would travel with the ancestral Polynesians to Hawaiʻi where it would increase in complexity. As previously mentioned, the Hawaiian word for chief, aliʻi*,* developed from the PPN word **qariki*, which designated an individual as "the senior, male, titled leader of a social group, probably the **kainanga,* who typically inherited his position patrilineally within the senior ranked line of this group, and who acted as the group's secular as well as ritual leader" (Kirch and Green 2001:231).

According to Sahlins (1958), the high islands of Polynesia (Tonga, Samoa, Tahiti, Hawaiʻi) all developed complex social structures, while the low-lying atolls and smaller islands exhibited less-stratified kinship-based societies late into the 18th century. This rule does not always apply—New Zealand Maori lacked the complex social structure present in 18th century Hawaiʻi—but the amount of resources present on the larger islands certainly aided these developments. The Eastern Polynesian islands covered a much larger expanse of the Pacific and therefore lacked the extensive trade network seen in the Western Polynesian homeland due to relative isolation. While limited trade did occur between island groups (particularly in central Polynesia) the increased isolation of the Eastern islands compared with the west likely contributed to a divergence in sociopolitical developments. All social structures, however, sprung from the foundational Ancestral Polynesian Culture (APC) (Kirch 2000a:248), and were founded on genealogy—whether that be kinship with the people of the district as seen in early Tahitian society (Suggs 1960:146), or genealogical ties to the deities that increased the ruling power of the elite, as seen in Hawaiʻi (Malo 1951). This ancestral system will be revisited in chapters 4 and 5 in my discussion of the transition from the genealogical system to the ahupuaʻa territorial division of 15th century Hawai‘i.

Ancestral Spiritual Power Structures

While scholars maintain that mana was part of the Proto-Oceanic language, it was seemingly not yet infused with the intangible reference to spiritual power (Mills 2016: 79), but rather thought to have signified ‘thunder’ (Blust 2007). Still, Austronesian peoples treated power (signaled by the word mana) as a verb: “Things and human enterprises and efforts are *mana*” (Keesing 1984:138; Shore 1989:137) The PPN word **mana* in its iteration as a specific term for “power” or “supernatural force”, however, can only be reliably traced to the Proto-Polynesian language (Kirch and Green 2001:239). Intimately connected to kapu and the sacred, mana was similarly defined in a Hawaiian context as “power originating from a spiritual source” (Silva 1997:91). Research examining the meaning of the concept in the Polynesian homeland (the Tonga-Samoa region) found that the concept can be conceptualized as connected to kapu through cause and effect (Keesing 1984; Shore 1989). While kapu played an important role in defining daily actions, mana was the justification for and benefit of the rules that restricted these actions. The concept of mana became so central to interpersonal relations and daily life, that scholars have argued there is no better path to understanding the Polynesian worldview (Shore 1989:137).

Mana was historically a difficult concept for western observers to understand. Shore (1989:137) lists several questions asked by scholars of Polynesian history as to whether mana was substance or process (Keesing 1984, Valeri 1985:99), cause or effect (Firth 1940 and others), abstract and ubiquitous (Handy 1927), concrete, localized or particular powers (Oliver 1974). Scholars have also questioned the relationship between mana and women when considering potency of power, and the relationship to tapu and noa. The difficulty with understanding mana may originate from the misunderstanding that it can only be one *or* the other rather than a complex concept that occupies both the abstract *and* ubiquitous, substance *and* process, cause *and* effect. As Shore (1989:139) explains, people had mana intrinsically, through potency and “authentic decent”. Yet mana could also be fickle, “fluctuating according to a person’s success or failure” (Shore 1989:139). Mana originates with the power of the ancestors and the deities, yet Polynesians understood the relationship between power on earth and in the cosmos through dynamic possibilities of exchange, as “mana is not simply possessed; it is appropriated, and at times even wrested from its divine sources” (Shore 1989:139, 142). The relationship between mana and tapu illustrates this complexity—the power rested from the cosmos was guarded by tapu, but could also be lost if one breached the protocol set in place. Breaking protocol had social and cosmic consequences as the set of practices associated with mana were intertwined with the religious and political structures (Shore 1989:143).

Tapu (kapu in Hawaiian)[3] represents another concept that eludes simplistic understandings. Intimately tied to the concept of mana, tapu defined the modes of interaction amongst individuals or between people and their environment. Shore (1989:144), building from Valeri (1985:90) identified the two usages of the term as active and passive. In its passive use, Shore (1989:144) argues that tapu means “forbidden or dangerous for someone who is noa [free of tapu].” The active use explains this danger, as persons, places or things considered tapu contained potency

[3] When discussing Hawaiian traditions, I use kapu. When discussing ancestral Polynesia, I use tapu.

not experienced by those deemed noa. The potency of people, objects, animals, landscapes, or other culturally significant features was directly tied to the embodied mana. This potency made interaction with tapu beings or things dangerous for those who were noa, therefore kapu in Hawaiian has come to be glossed as forbidden but encompasses far more complicated relationships to embodied sacredness and power.

The relationships between noa, tapu and mana played an essential role in defining appropriate activities and social interactions in the daily lives of ancestral Polynesians. Here I will describe two influential areas of social life that are most relevant to this research. The relationship between mana and kapu informed the social hierarchy in ancestral Hawai‘i and elsewhere, defining everything from who had access to resources and how these resources were dispersed, to how individuals of different social standings could interact with one another. These concepts also underlay the ways in which Polynesians developed the landscape. Shore, quoting Dening (1980:53), "argues that in traditional Marquesan society, “to know the *tapu* was to know a social map of Te Henua [the landscape]” (Shore 1989:143).

Mana, noa and tapu also defined gender relationships, a phenomenon seen in Eastern[4] and Western Polynesia to varying degrees. Shore (1989:145) argued that the common notion of tapu that was shared between Polynesian cultures was transformed from Western to Eastern Polynesia. Ethnographers have noted that in Eastern Polynesia, women were perceived as noa, and therefore common, dangerous, and polluting through their association with darkness, earth and the underworld while men were sacred, valued for their association with sky, light and the divine (Goldman 1970; Johansen 1954; Valeri 1985). Maori women were stigmatized as representing everyday life, a justification that Johansen (1954:214, 216) argues supports the idea that this common role equates to inhabiting a lower social status when compared with Maori men, whom were by nature tapu, pure, and therefore barred from areas associated with daily life such as the cook house.

Discrepancies in interpretation are visible in these arguments made about the status of women in Eastern Polynesia. While some ethnographers simplify the concepts with an explanation that women were by nature polluting in Hawai‘i and elsewhere in Polynesia, the worldviews that underlay the practices of separation and isolation do not align with the justifications used in the interpretation of gender hierarchies. For example, gendered tasks in Hawai‘i differed from other Eastern Polynesian island districts in that kāne were required to cook food for the household. Scholars have explained this division of labor by stating that wāhine were polluting and therefore barred from touching men’s food. Explanations for why Maori women *were* associated with cooking hinged on their association with the common and therefore their polluting nature that barred them from sacred tasks outside the home. While I will discuss these issues related to the organization of social life specific to Hawai‘i in more detail in the following chapter, here I want to make the point that the complexity of these relationships defy simplistic explanations.

Other Eastern Polynesian practices regarding menstruation provide examples that can be compared against Hawaiian practices for examining the place of women within the mana and tapu system. Associations between Hawaiians, Tahitians, Maori and Marquesans were drawn in ethnographic work when evaluating the practice of menstrual houses as a place for isolation of

[4] The material remains that evidence these relationships and are specific to Hawai‘i will be discussed in Chapter 4.

women during this period of defilement (Best 1914; Hanson 1982; Hanson and Hanson 1983; Levy 1973; Valeri 1985). However, Shore (1989) questions simplistic explanations of these practices, pointing to the complex nature of menstrual blood for Maori peoples who viewed menses as underdeveloped human beings that required protection through tapu (Handy 1972:47). Valeri's work in particular has been called into question regarding the place of women within Polynesian power structures. Borofsky and Howard (1989:268) critique his tendency for "overinterpret[ing] primary materials, to fit facts to predetermined forms", a critique supported by Linnekin (1990) in her assertion that Valeri's interpretations reflect European rather than Hawaiian worldviews.

Marquesan examples further complicate the simplistic notion that Eastern Polynesian cultures saw menstruation as polluting. Examples of rituals surrounding the onset of menses (Handy 1923:71) seem to indicate the sacredness of this event. Specifically, rituals from Nuku Hiva convinced Hanson (1987:430) to reconsider the common interpretation, arguing instead that "menstruation was a passageway between the godly and human realms of existence". When considering menstruation as a time of heightened power, the association with danger begins to coalesce with the seemingly contradictory ideas describing women as both sacred and profane. Further complicating this relationship between women and the divine in Polynesia, Shore (1989:147) reminds us that human orifices "played a central role in the channeling of *mana* between the realms of *ao* and *po."* The vagina was perceived as the most potent of these channels due to the association with birth (Thomas 1987:128). From these examples, we can infer that female genitals (and women themselves) were regarded as a source of danger and power—able to wound or heal. These abilities were contextual, dependent upon the circumstances within which a person came into contact with this source of power. The social standing of the other person and the stage of the menstrual cycle seem to be contextualizing elements that determine the outcome of this contact. The complicated relationship between women and power is paralleled by the relationship of mana and tapu in the chiefly class. Context defines the outcome of interactions with tapu substances associated with mana. Those deemed noa (or free, unconstrained by tapu) put themselves in danger if they came into contact with the elite who embodied powerful mana, just as men put themselves in danger if they came into contact with the power imbued in female genitals or the associated menstrual blood.

The complicated relationships between mana and tapu as illustrated through gender or social class hierarchies indicate that conceptualizing social relationships in Hawaiian households requires consideration for the balance between mana, kapu, and noa rather than relying on restrictive labels that limit our understanding of these relationships. Following the development of mana and kapu through time and space helps contextualize these concepts within a Polynesian rather than western worldview.

Time and Rhythms in Ancestral Polynesia

Polynesian rituals (including daily activities) connected to kapu structures were linked to the calendric system (Kirch and Green 2001:239). Ascribing to a humanistic interpretation of daily life requires accounting for all intersections affecting daily, weekly, or monthly activities. The importance of status and gender has thus far been extensively discussed, but without the concept of Polynesian time, a holistic interpretation of Polynesian activities remains out of reach.

Understanding the seasons or times of day in which certain activities were deemed appropriate adds depth to the interpretation of the material culture. Knowing roughly what time of year certain crops would have been harvested, or what time of day particular species of mollusks were collected for example lets us tell a story of the rhythms of daily life that may otherwise be inaccessible without the contextualizing information provided through a description of the calendric system—the "ritual cycle and calendar were inseparably linked to the horticultural year" (Kirch and Green 2001:265). Time was perceived as cyclical with the endless alternation of the dual seasons (PPN **taqu*) in Ancestral Polynesia marked by the rising and setting of the Pleiades, which signaled harvesting events both for crops and other subsistence strategies (e.g. sea turtle egg collecting) (Kirch and Green 2001:265). Where •*taqu* likely meant yam season in PPN, Kirch and Green (2001:267) hypothesize that Eastern Polynesians followed the tradition of dividing the year into two seasons, while moving beyond the importance of yams to the seasonal cycle.

In addition to the two-season cycle, Polynesian calendars revolved around a thirteen-month lunar cycle that can be traced to the Proto-Polynesian culture (Kirch and Green 2001:271). Polynesians connected the seasons to ritual events, with the two seasons containing months associated with specific rituals. Evidence across Polynesia points to the year consistently divided into two periods—the wet and dry seasons (Kirch and Green 2001:261). Tracking the rains was necessary for agriculture, which meant that months and their associated rituals were also connected with subsistence practices. Rituals associated with agriculture were connected to particular times of the year through the associated stage of production, processing or consumption, which defined a large part of daily life.

Possibly the most important period in the agricultural cycle was marked by the rising of the Pleiades star cluster, or PPN **Mata-liki* (2001:269-271) as the proper name for the Pleiades star cluster. The rising of the Pleiades in the eastern sky coincided with the beginning of the wet season in increased horticultural work occurred. The end of the season when •*mata-liki* is visible in the sky would have coincided with the end of the harvest season, just before the rains stopped. Kirch and Green (2001:274) postulated that observation of the rising and setting of **mata-liki* marked the changing seasons (in the month of October as we know it). This term carried through to the Proto-Eastern Polynesian language, until eventually **Mata-liki* became makalili in Hawai‘i, the rising of which also marked the harvest season or Makahiki. The Makahiki was the period of time in Hawai‘i associated with the god Lono, while the other half of the year was dedicated to Kū. In table 3.1 I list the thirteen reconstructed PPN months, the associated season and rituals that may have been associated with the yearly cycles. Monthly rituals increased in frequency and intensity in Eastern Polynesia, but the roots of these traditions stretch back to their ancestral rituals connected to the Polynesian agricultural calendar outlined here.

Polynesian Material Culture

Edwin Burrows (1938, 1940) and H.D. Skinner (1934) were among the first to identify a division in Polynesian culture, labeling the different regions "Western Polynesia" (consisting of Samoa, Tonga, Futuna, Uvea, Niue, Tongareva, Tokelau) and "Central Polynesia" (consisting of Cook Islands, Society Islands, Tuamotus, Hawaii, Rapa Nui, and New Zealand), with marginal islands to the north, east and south listed as being more closely related to Central Polynesia. The same year, Katharine Luomala labeled these regions Eastern Polynesia (corresponding with Burrows' central-marginal grouping) and Western Polynesia (corresponding with Burrows' western grouping) based on similarities and differences in mythological stories (Burrows 1940:358; Luomala 1940:370). Historical linguistic research conducted by Roger Green (1966), Bruce Biggs (1971) and others found evidence of the division between Eastern and Western Polynesia in the Polynesian language family tree, supporting the continued use of these categories in contemporary research.

Beginning with Burrows's (1938) initial division between Eastern and Western Polynesia, subsequent researchers have defined the region of Western Polynesia as encompassing the archipelagoes of Tonga and Samoa, as well as the islands of "Rotuma, 'Uvea, Futuna and Alofi, Niuafo'ou, Niuatoputapu and Tafahi, and Niue" (Kirch 1988:2). Ancestral Polynesian Culture developed within this region from the Lapita cultural complex (Kirch 1988:2; Kirch 1984; Kirch and Green 1987). The Western Polynesian archaeological record exhibits distinctive cultural features shared among the islands that were related to and important for understanding Eastern Polynesia characteristics (as the original settlers were the ancestors of the Eastern Polynesian people) but prove unique to this sub-region. The cultural traits that connect Western and Eastern Polynesia demonstrates the shared cultural heritage, while the unique technology found in Eastern Polynesia demonstrates regional development or innovation. The characteristics that differentiate the sub-regions are not only relevant to understanding sub-regional categorization in the anthropological literature, but also for tracing the origin of the Hawaiian peoples. These tasks have been extensively tackled in other literature (see Howard and Borofsky 1989; Kirch and Green 2001; and Kirch 2014, 2017 among others). Here I limit the discussion to similarities in material culture that assist with understanding practices passed down generationally, withstanding the test of time.

The material culture listed in Table 3.3 details the physical evidence that connects Eastern Polynesian cultural groups to their ancestors, illustrating an important line of evidence for sustained practices through time. Material used in these practices was connected to the availability of resources on each island the Polynesians inhabited, which means that the material traces of activities changed as communities adapted to new environments. In addition, Table 3.3 illustrates changes in production techniques from Western to Eastern Polynesian islands, showing how practices are not static through time, yet shared worldviews persisted. Tracing the material culture across space therefore, provides information on the stability of cultural practices that Polynesians relied on in daily life, as well as adaptations and innovations that exemplify the dynamic nature of Polynesian cultures. Upon reviewing these materials, however, I can safely argue that consistencies in production and consumption activities in which communities were participating are observable through time. Interpreting the association with cultural meaning and social status, however, requires tacking between the information presented here, and the oral histories/cultural knowledge passed down through the 19th century mo'olelo texts discussed in Chapter 4.

Gregorian Months	PPN/PCE Seasons	PPN Months	Associated Subsistence Cycles in Ancestral Polynesia	Associated Rituals	PEP Months	Hawaiian Months
Oct-Nov	*Mata-fiti (PCE)*	*Palolo muli*	Onset of harvest, yam season	Acronitic Rising of Pleiades (*Mataliki)*	*Palolo muli*	‘Ikuwa
Nov-Dec		*[Munifa]*	First Fruits Rituals *(*quinati?)*		*Murifa (Dec)*	Welehu
Dec-Jan		?	Yam Harvesting		*Takaonga*	Makali‘i
Jan-Feb		*Siringa kelekele (Jan)*	Yam Harvesting		*Silinga (Jan)*	Ka‘elo
February		*Siringa maqa*	Yam Harvesting		*Silinga ma*	
Feb-Mar		*Wai mua*	Yam Harvesting		*Utua mua*	Kaulua
March-April	*Taqu (PPN)*	*Wai muli*	Yam Harvesting	Acronitic Setting of Pleiades	*Utua muli, *Wai (noa)*	Nana
April-May		*Faka-qafu muli*	Yam Harvesting			Welo
May-June		*Faka-qafu mate (May)*	End of the wet season, beginning of the dry season. Prepare yam planting mounds	Heliacal Rising of Pleiades *(*Mataliki)*	*Fakaafu (May)*	Ikiiki
June-July		*Mataliki(?)*	Sea Turtle Egg Laying (Turtle Feasts?)	Extraction of ritually marked **renga* pigment	*Mataliki(?)*	Ka‘aona
July-Aug		*Li(h,s)a mua (July)*	Harvesting of Ritual Turmeric (**ango*), commencement of yam gardening work		*Kaununu (July)*	Hinaia-‘ele‘ele
Aug-Sept		*Li(h,s)a muli (Aug)*			*Oroamanu (Aug)*	Mahoe-mua
Sept-Oct		*Palolo mua*	Beginning of the wet season, end of the dry season. Neiris Worms (*palolo) spawn		*Palolo mua*	Mahoe-hope

Table adapted from Kirch and Green 2001, and Malo 1951

Table 3.2: Ancestral Polynesian calendar with associated rituals and planting cycles, compared with Hawaiian names for the months.

Material Culture and Physical Features associated with the House	Western Polynesia	Eastern Polynesia**^	Use
Industrial Tools*^			
Adzes	Stone and Shell, tangless	Stone, tanged	Chisels, axes, gouges. Used for working wood
	1) Stone heavy, curved cutting-edge adz head	1) Lenticular; plano convex	Wood working
	2) Stone light flake adz head with quadrangular section	2) Quadrangular (regular, incipient tang, tanged)	Wood working
	3) Stone small light rectangular-sectioned adz heads and chisels	3) Triangular (regular, tanged, reverse tanged)	Wood working
	4) Stone light reverse-subtriangular or trapezoidal adz	4) Trapezoidal (reverse, reverse tanged, regular)	Wood working
	5) Stone planilateral and circular-to-elliptical adz head	5) Circular--oval	Wood working
	6) Shell (*Conus)* Gouges	6) Pearl shell gorge	Wood working
	7) Shell (*Terebra)* Chisel	7) *Cassis*, *Terebra* and *Cypraea* shell chisel; stone chisel	Wood working
	8) Shell (*Tridacna)* ovoid-to-quadrangular cross-section adz heads	8) Shell and bone	Wood working
		9) Unspecified, untanged	Wood working
Shaping Implements	Echinoid, coral, chert drills	Echinoid, coral, *Terebra* drills	Drills for shaping stone, shell, bone or wood
	Stone, Echinoid, coral abraders	Coral files and abraders; echinoid abrader	Abraders for shaping stone, shell, bone or wood
	Coral, stone and pumice grinders		Grinders for shaping stone, shell, bone, or wood
	Grindstone/whetstone	Grindstone	Shaping and finishing adzes
	Volcanic glass and chert flakes	Volcanic glass flakes and basalt flakes	Convenient cutting tools ('knives') used in plant or animal processing; butchering, scaling fish; scraping tubers

Head and Body Accessories/Decorations[a]«			
Bark Cloth Characteristics	Pasting Joint, Tablet Rubbing Decoration, Right Angle Plaiting	Retting, Felting Joint, Watermarking, Stamping Decoration	Production and decoration of bark clothing
Bark Cloth Production Implements	Wooden Beater or Mallet	Wooden beater with stamping decoration	Beating bark pulp into felt
	Board or Log	Board or log	Implement on which bark cloth is beaten
Needles	Bone	Bone	Sewing; making nets
Tattooing Comb/Chisel	Bone	Pearl shell	Body decoration
Comb	Coconut leaf	Bone	Hair coiffing
Ear-pendant	Shell; bone	Plant, bone (bird), tooth (dog, human), shell, stone	Body decoration
Headband/head-dress	Fronds/leaves; flowers	Feathers; fronds/leaves; flowers	Body decoration, ceremonial or for hula
Eyeshade	woven hats	woven hats	shade from the sun
Fly Whisk, Fan	Woven palm leaves	Woven palm leaves	cooling, shooing flies
Necklace/bracelet/anklet	*Cypraea* and *Conus* shell beads, *Conus* shell pendants; shark tooth pendant	Whale, porpoise, dog, human, and fish tooth pendants; bone pendants; pearl shell pendants; pierced shell; pig tusk amulet	Decoration for hula, marker of status
Ring	*Tridacna* and *Conus* shell rings	?	Body decoration
Stringed Items	Shell bracelets, bangles, or armbands; shell, coconut and bone beads	Shell, coral, boar tusks, dog teeth, coconut shell and bone beads for bracelets, anklets, armbands and other body decorations	Arm, ankle and wrist adornments often ceremonial
Sandals	Coconut shells	woven palm leaves	foot protection
Other	Bone or teeth ornament; boar tusk decoration; mussel shell ornamental disc; whale bone breast plate	Reel ornaments; pearl shell and *Conus* shell discs; tanged pearl shell ornament; pearl shell breastplate; shell and bone plaques; rectangular shell tabs	Body decoration
Containers *			
Perishable	Wooden Bowls	Wooden bowls	Kava and food consumption, containers for pastes and dyes, cooking, pounding breadfruit
	Gourd	Gourds	Liquid vessels
	Shell (coconut)	Cassius shell scoop	Drinking cup/ladle/dipper, container for liquid

	Bamboo containers	Bamboo containers	Fluid and liquid-based food transportation/storage
	Coiled Basketry	Twined Basketry	Personal effects, storage, transportation of goods
	Plaited Containers	Plaited Containers	transporting food and goods
Non-Perishable			Temporary Containers
	Earthenware Pot	Earthenware pot (limited to certain islands)	Food consumption, water jar, frying pan, cup/ladle/dipper,
	Earthenware Bowl	Earthenware bowl (limited to certain islands)	Food preparation and consumption, containers for pastes and dyes,
Instruments*†	Wooden slit-gong; *Triton* Shell Trumpet, Bamboo nose flute	Drum; Shell Trumpet; Nose flute (not bamboo)	For hula and other ceremonial purposes
Games and Sports*	Stone and wood disks; bone points; coral top	Stone and tuber disks; bone points,	Bowling games; dart games
Subsistence*			
Garden	Mulch or swidden plot	Mulch or earthen plot	Growing crops for individual households
Agricultural mound	Earth mound for planting yams	Earth mound for planting yams and sweet potatoes	Planting
Dibble Stick	Wooden stick	wooden stick	Cultivating soil; digging; weeding
Fishhooks*†	One-piece pen sea trolling hook made of *Trochus* shell, possibly other shells *(Ruvettas*fishhook)	Two-piece open sea trolling hook made of pearl shell, possibly other shells (Bonito fish hook); compound shank hooks	Catching fish (inshore and deep-sea fishing)
	one-piece hooks made of *Turbo setosus,* (less frequently) pearl shell, bone, or wood	One-piece hooks (acute recurved point; angular shank; barrel shank jabbing; bent upper shank; heavy shank; jabbing; narrow curved shank; obtuse recurved point; open jabbing hook; rotating; v-bend jabbing; wiggly shank; Y-bend; pearl shell hook blanks; unspecified one-piece fishhooks)	Angling hook
Lures	Stone weight with *Cypraea* cap, lashed to wooden or fiber shaft for octopus	Trolling lure shanks; biflanged lure points; proximal base projecting lure points; L-shaped lure points; cowrie octopus lure; octopus lure points; octopus lure flappers; turtle lures	Luring octopus and other fish
Nets	Mesh; float	Mesh; woven fiber nets; fish sweeps	Catching inshore fish

Spears		Harpoon heads	spearing fish
Traps	Traps/baskets made of cord	Traps/baskets made of cord	Catching inshore fish
Torches	Made of coconut fronds		Fishing at night
Sinkers	Conical?	Coffee bean and conical octopus sinkers	Sinking lures
Food Preparation*^			
Scrapers and peelers	Grater heads (shell, coral, stone) lashed to wooden seats; hand-held bivalve shell scrapers	Grater heads (serrated pearl shell, basalt) lashed to wooden seats; pearl shell scrapers; *Conus* coconut graters; shell vegetable peelers	Scraping/peeling coconuts and breadfruit
Hammerstone	stone with pecked finger grips	stone with pecked finger grips	Cracking nuts, opening shellfish, making stone tools
Breadfruit splitters	stone	basalt	Split breadfruit
Pounders†*	Coconut frond midrib; sticks	Distal projection; made of stone or coral	Pounding taro and breadfruit
Tongs, pincers	Coconut midrib or pandanus root	Coconut midrib or pandanus root	handling hot stones
Mats	woven from palm leaves	woven from palm leaves	Serving food
Houses and Community Structures*			
Primary house or dwelling structure	Rounded-ended and straight-sided; open-sided, structural posts; exterior pavement; stone foundation with organic superstructure	Dominated by straight-sided structures;	Center of daily life where cooking and eating, sleeping, recreation, and worship of family deities among other daily activities occur.
Enclosures	Wall, fence	Wall, fence	Animal enclosures; markers for family plots
Oven	Earthen lined with heated stones; scoop-basin; circular in plan, basin-shaped in cross-section	Earthen lined with heated stones; scoop-basin; circular in plan, basin-shaped in cross-section	Cooking community and ceremonial meals
Storage	pit; hole; shelf in the dwelling; platform	pit; hole; shelf in the dwelling; platform	Storage for food, fermentation (straight-sided pits lacking evidence of burning) and supplies (shelf, platform)
Paving	Gravel	Gravel	Interior and/or exterior of houses
Platform	Stone courses	Stone courses	Status marker
Floor coverings	mats, grass, paving	mats, grass, paving	Interior of houses
Cookhouses	Small, mirror architecture of dwellings with pen sides and thatched roof over oven for wet weather	Small, mirror architecture of dwellings with pen sides and thatched roof over oven for wet weather	For cooking, particularly in inclement weather
Hearth/combustion feature	Circular or rectangular	Circular or rectangular	Reheating, drying, or smoking food

*Kirch and Green 2001 †Burrows 1938 **Walter 1996 ˆKirch 1985 ªOrchiston 2012 «Little and Ruthenberg 2006

Table 3.3: Sampling of material variation and consistency between Eastern and Western Polynesia

Similarities between material evidence of daily activities in Hawaiʻi and other Polynesian islands does, however, suggest that findings from household archaeological studies conducted on other archipelagos are an important tool in interpreting the suite cultural material recovered from Hawaiian house complexes. Looking to the direct ancestors of Hawaiians will also move us closer to understanding the cultural meaning imbued in these material remains. I will now review specific cultural traits from Central Eastern Polynesia, the likely homeland of the seafarers that settled Hawaiʻi. According to the most recent archaeological research, the evidence is "sufficient to continue entertaining the possibility that the Marquesas Islands were a departure point for the Polynesian settlers of Hawai'i, although many uncertainties remain" (Allen 2004; Horsbugh and McCoy 2017:7).

Central Polynesia: Influences from the Marquesas Archipelago and Tahiti

The exploration and settlement of Eastern Polynesia followed what has been termed the "long pause" in Western Polynesia. Anderson and Sinoto (2002:253) argued that the Marquesas and Society islands were the first to be settled from Western Polynesia. While scholars continue to debate from which Polynesian islands the settlers of Hawaiʻi first sailed, current evidence suggests the Marquesas (Allen 2004; Horsburgh and McCoy 2017). The apices of the Polynesian triangle were the last islands to be settled by Polynesian voyagers. Marquesas Islands peoples are hypothesized to be the first people that settled the Hawaiian archipelago because of evidence from oral histories (including consideration for lineage accounts) and archaeological data that coalesce around ca. AD 1000. Melinda Allen (2014) revisited the colonization of Eastern Polynesia, pointing to the issues with radiocarbon dates and lack of other material evidence that has led to a "fragile basis for inferring colonisation processes and inter-island relationships" (Allen 2014:13). While specifically questioning the tenuous nature of our current understanding of the Hawaiian archipelago colonization, she does support the argument that the Marquesan archipelago was likely the point of origin for Hawaiian colonization. Based on radiocarbon and geochemical evidence, the Marquesan archipelago was settled by the 11^{th}-12^{th} centuries C.E., with ceramic and stone tool evidence pointing to "multiple and unusually far-ranging regional contacts between roughly the 12^{th} to 15^{th} centuries" (Allen 2014:1). This chronological window supports archaeological evidence that suggests a settlement period for Hawaiʻi between AD 940 and 1129 (Allen 2014; Athens *et al*. 2014; Dye 2011, 2015; Horsburgh and McCoy 2017; Kirch 2011). This initial settlement predated the islands at the other two apexes of the Polynesian triangle—Rapa Nui, possibly settled around AD 1200 (Hunt and Lipo 2011; Wilmshurst et al 2011) and New Zealand, settled ca. AD 1250 (Horsburgh and McCoy 2017:7). Archaeological research from the Marquesas supplies ample information that can be utilized to understand the structure of early settlements on the Hawaiian Islands.

The thatch houses in which Marquesans lived perhaps provide the best parallel to the houses occupied by their Kānaka Maoli cousins. Early accounts of Marquesas houses described stone foundations beneath thatched roofs, with variability in sizes and construction that was likely dependent on status (Allen 2009:342). Allen identified roughly 100 domestic house foundations along the coast in northeastern Nuku Hiva Island. All houses dating to the period of arrival of the first European foreigners were constructed with rectangular plans, three to four raised sides, a raised section along the back (regardless of status), and a thatched roof overhead (Allen 2009:346-7). The interior of the habitation features were observed to at times be subdivided into sections for domestic activities and sleeping areas, which were covered in mats and grass (Allen 2009:347).

The material assemblages in the Marquesas resemble those dominating the Hawaiian archaeological record. While the cultural sequence of the Marquesas archipelago continues to be debated as new evidence comes to light, archaeological studies of habitation sites that date to the period of time that coincides with the settlement and occupation of Hawai‘i can be fruitful for understanding the antiquity of cultural activities. Manufacturing debris (including coral abraders), pearl shell (along with associated fishhooks) and fine-grained basalt debitage dominated the material assemblage of the Teavau‘ua Site described by Allen and Addison (2002) that dated to AD 1400 to AD 1680. In addition, inshore fish were remains were found in the excavated oven pit. The artifacts and ecofacts recovered here were interpreted by Allen and Addison to represent a subsistence strategy heavily focused on inshore fishing at this site that was located on a coastal flat. The second site of excavation discussed by Allen and Addison (2002:89) tested an area adjacent to a beach and an inland valley with traditional agricultural terracing featuring stone house platforms. The test units placed in the inland dunes revealed similar material remains to the previous units, including "pearlshell fishhooks and manufacturing debris, basalt debitage, a coral abrader, a nearly complete cowrie (*Cypraea*) shell vegetable peeler, a drilled sea mammal tooth, and a cut bone" (Allen and Addison 2002:90).

The usefulness of these archaeological findings for research focused on archaeological material from the Hawaiian archipelago is twofold. First, the findings support Kirch and Green's (2001) assessment that manufacturing products tend to be the type of remains that survive in the Polynesian material record due to the non-perishable, inorganic nature of the parent material. We can presume that the food processing tools mentioned would have been used for the processing of flora and fauna even though Allen and Addison (2002:90) note that few faunal remains were found and no floral remains were mentioned. We can also presume that this community settlement, as described by the authors, would have made use of other material objects that support manufacturing activities in daily life (as described in Table 3.3), none of which were recovered from these test units. Second, the data garnered from these excavations support interpretations of material culture that is used in tool manufacture and food processing. The context in which the tools were found alongside faunal remains and near an earthen oven confirms that such materials were used by Eastern Polynesians for the interrelated activities of subsistence practices and meal preparation. These settlements also reflect the difference in material remains of people living on different parts of the islands. The evidence confirms the expectation of variability between household clusters (further discussed in Allen 2009), particularly in the degree of reliance on particular subsistence strategies depending on the distance of the household from the water (although Suggs 1961:188 maintained that the 'zoning' of agriculture as it existed in Hawai‘i was absent from the Marquesas). This is a specific example of small-scale household organization, whereas community organization is expanded upon in other Marquesas research.

Excavations at the Hane site on Ua Huka Island in the Marquesas revealed that communities built separate spaces for dwelling and cooking (Kirch 2017:202; Suggs 1961:25), a characteristic reflected in Hawaiian settlement patterns. Other architectural features exhibiting parallels between Hawai‘i and the Marquesas included the size of stone house platforms, which developed in the Marquesan Expansion Period (A.D. 1300-1600) as markers of household status (Allen 2010; Kahn 2016; Kirch 2017:226), pavement separating sleeping and cooking areas within a house (Suggs 1961:24), pig pens and garden plots that provided necessary produce for household members outside of large-scale agriculture (Suggs 1961:188). Beyond describing distinct architectural components, Suggs (1961:17) details the method of stone house construction that included using earth fill from demolished structures to build new *paepae* (house platforms)—an important method to consider when interpreting remains recovered from early layers of kauhale and a process that can be identified with the use of micromorphology.

The Hawaiian ancestors from Central Eastern Polynesia brought with them practices and worldviews that would form the foundation for the Hawaiian culture. Connections drawn between the two can help us better understand Hawaiian house site. While Polynesians that would eventually settle Hawaiʻi likely came from the Marquesas archipelago, evidence also suggests sustained contact between Tahiti in the Society Islands and the Hawaiian archipelago (Taonui 2006:45). The Hawaiian traditions also exhibit links to Tahiti. The chiefs of Maui and Hawaiʻi trace their ancestry to ʻUlu, and the chiefs of Kauaʻi and Oʻahu to Nanaʻulu (although both may be mythological figures). Other arrival traditions trace a sequence of migrations from Tahiti, of which Kapawa led the first and Paʻao and Makuakaʻumana followed from sixteen generations later--Kahaʻi is said to have been the last voyager to Tahiti (Taonui 2006:45-6).

Although evidence linking Hawaiian cultural practices to Tahitian influence is debated, contact between the Hawaiian Islands and Tahiti was early enough that it is possible these travelers influenced the practices in Kaupō, Maui, particularly when considering that Kahikinui, the moku to the west of Kaupō, was said to have been named after Tahiti by long-distance voyagers settling in the region, with "names from homeland clusters…transported across the Pacific" (Taonui 2006:52). The aim here is not to prove that Tahitians influenced Hawaiian practices however, but rather to review archaeological evidence from this period in the Society Islands that can provide examples for interpreting Kānaka practices. Household research from the Society Islands provides important parallels that can inform approaches to Hawaiian households. First, pronounced and hierarchical ranking between houses in the Society Islands parallels hierarchy of households in Hawaiʻi, and is observable through the material record (Kahn 2014:19). In both archipelagos, wealth and power was signaled through access to resources used to build increasingly elaborate house clusters that exhibit rich material assemblages archaeologically (Kahn 2014:25, Kahn and Kirch 2013). Kahn's (2005) excavation data from ʻOpunohu Valley in the Society Islands indicated that these complexes also included separate spaces for sleeping, cooking, household crafts, or communal gathering spaces. However, she concluded that interpretation of such spaces required attention to the material culture rather than reliance on simple architectural components due to the massive amount of variability on the landscape (Kahn 2005:217). Kahn (2005:217) pointed to the importance of considering status when interpreting the use of space, as social standing rather than purpose of the architectural feature may explain differences in size or design. These social markers of difference that manifest in the material record also heavily influence Hawaiian architecture.

Conclusion

The information presented in this chapter illustrates both the cultural foundations from which the Hawaiian culture arose, and the deep history of continuity and change that tied Kānaka to their ancestors. Each of the sections discussed in this chapter describe the precedence set from which innovation sprung—innovation that retained ties to the Polynesian roots. The plants and animals that accompanied Austronesians and, later, Lapita peoples and Polynesians across the Pacific formed the basis of each community's diet and economy. Yet the perpetuation of farming required innovation in order to adapt crops or animals to the different environments encountered on each new island. The social and political structures that evolved over time also required adaptation due to changing demographics through time. The foundation of community organization, however, can be traced to the proto-Polynesian ancestors through the material record and the language, which provides an important line of evidence for understanding the cultural impetus behind the design and use of space in Hawaiian communities. Similarly, religions practices that can be traced to proto-Polynesian origins provide important context for the Hawaiian worldview that informed daily social interactions. Finally, the material culture reviewed in this chapter reveals consistencies in production and consumption activities. Comparing how these materials were used across space and through time can yield stronger interpretations of the use of spaces within Hawaiian kauhale. The history and culture of Kānaka Maoli was heavily influenced by their ancestors. The interpretation of Hawaiian material culture must consider these influences alongside the descriptions of daily life and social organization from Kānaka oral traditions. In the following chapter, I will review Hawaiian oral histories (moʻolelo), historical documents, and archaeological research that detail these social practices.

Chapter 4: Mo‘olelo: Kanaka Maoli Ancestral Knowledge

Mo'o.lelo. **n. Story, tale, myth, history, tradition, literature, legend, journal, log, yarn, fable, essay, chronicle, record, article; minutes, as of a meeting (from mo‘ōlelo, succession of talk; all stories were oral, not written) (Handy and Pukui 1986:254)**

Mo‘olelo are defined as the oral histories and stories passed down generationally. The mo‘olelo in this chapter come from the Hawaiian historians whom wrote down these oral traditions in the late 19th to early 20th centuries. The introduction of writing, and of the printing press to Hawai‘i provided an alternative medium to oral recitation for perpetuating cultural memories and traditions. Each of these narratives woven together tell a history that is complicated, sometimes contradictory, and illustrative of the diversity of perspectives and experiences that were present in the daily lives of ancient Kānaka Maoli. Supplementing the mo‘olelo included in this chapter are the writings of the European sailors and American missionaries whom recorded their encounters with and reflections on Hawaiian communities. Archaeological literature on kauhale and community social organization has typically been synthesized with these histories, providing important context for narratives that were frequently used to understand earlier periods in which the authors did not live. In addition, I turn to contemporary Hawaiian scholars in order to contextualize histories written in the 19th and 20th centuries by Hawaiians and foreigners alike within a Hawaiian worldview. Reviewing information from the many varied accounts that discuss household and community life in early Hawai‘i provides a well-rounded account that is not fully accessible through the use of any one source. In synthesizing information from different sources and time periods, I also work to differentiate Euro-American influences on our understanding of the Hawaiian social structure from Hawaiian worldviews that would have informed community interactions in the 17th and 18th centuries previous to the arrival of Europeans. While knowing exactly how ancient Hawaiians thought about their world without living in that context is an impossible task, working from the known to unknown through identifying behaviors known to be affected by cultural contact between Hawai‘i and the West provides a more solid foundation for producing interpretations of the material record. To begin this process, I first detail the chain of events that occurred in Hawai‘i following the initial arrival of Europeans to the islands. These events led to the production of the texts archaeologists have come to rely upon when interpreting the material record, specifically those written by David Malo, Samuel Kamakau, and John Papa ‘Ī‘ī. I specifically focus on two events—the establishment of seminary schools and the Great Mahele—that had the greatest impact on Kānaka relationships with each other and their ‘āina.

European Interventions in Hawai‘i

Captain Cook and the men on the 1778-79 voyage aboard the *Resolution* and *Discovery* were the first Europeans to set foot in the Hawaiian Islands. After 1778, other western explorers found their way to Hawai‘i’s shores followed by a burgeoning sandalwood trade between 1810 and 1820 and a sprawling whaling industry by the 1830s. The shifting economy was one of several catalysts causing a small diasporic event with Kānaka moving from the countryside to cities in order to procure steady income. In the midst of a changing economic environment, the political structure changed after King Kamehameha I united the islands in 1795 (with Kaua‘i and Ni‘ihau joining in 1810). Kamehameha shrunk the districts assigned to lower chiefs as a method of maintaining control. Kamehameha also continued the practice of bringing powerful chiefs to live at the palace near him[5], thus distancing the aliʻi from the makaʻāinana and straining their relationship (Ralston 1984:29). Power became imbalanced, with aliʻi no longer relying on tributes from makaʻāinana to support military campaigns and, instead, turning to foreign goods and services in their rapidly globalizing world while simultaneously continuing to exploit makaʻāinana labor for products that could be sold to Western ships (Sahlins 1992:87).

The social system that structured daily life also began to undergo dramatic changes in this period when the kapu that was integral to dictating appropriate social interactions was broken by Queen Kaʻahumanu and King Kamehameha II following King Kamehameha's death in 1819. The arrival of Christian missionaries to the islands in 1820 and subsequent conversion of the aliʻi were followed by the outlawing of Hawaiian cultural practices like the hula, or worship of Hawaiian deities. Outlawing traditional cultural practices was precipitated by the founding of seminary schools by Protestant missionaries in order to educate Kānaka men and women in western Christian values. The women's missionary schools were particularly impactful as they identified women as the progenitors of culture, targeting female roles in an effort to alter the way that Hawaiians lived and organized their communities. These schools were established with the express goal of altering Hawaiian gender structures (Beyer 2003). This and other events discussed in this section not only altered the Hawaiian social structure of the period, but also altered how traditions were passed down to future generations. Scholars of Hawaiian history continue to be affected by the lack of information concerning the nuances of ancestral Hawaiian gender relationships, particularly the many roles filled by women. Understanding the statuses and social roles associated with each gender previous to western missionization therefore requires examining how these roles were targeted and altered following the arrival of Europeans.

Hawaiian women were considered by the first Anglo arrivals to the islands to be paradoxically oppressed through the constant labor they were forced to do and lazy because they did not work enough. Missionaries described Hawaiian houses as dirty, appalled that wāhine did not stay home to cook, clean and care for the children. The observations that wāhine did not housekeep in a way familiar to western women led to concerns about Hawaiian women being lazy. Missionary women set out on an ambitious plan to instill protestant values (associated at the time with the Cult of True Womanhood) in Hawaiian women. The founders of the first female seminaries, white middle class protestant women, mirrored the education they provided kamaʻāina women on their training in east coast seminaries (Beyer 2003). These schools first targeted adult Hawaiian women (Grimshaw 1989:xvii) but soon realized that Kānaka were uninterested in their version of womanhood. One particularly telling anecdote from 1833 describes missionary Abigail Smith's frustration with Hawaiian women observing her work, but unwilling to follow her instructions to go home and tend to their households. Further, the wāhine expressed pity for American women that they watched them ironing clothing (Frear 1934:71; Kaomea 2006: 344). This anecdote illustrates the different ideas Hawaiian women held regarding oppressive gender structures, considering the tasks European women were tasked with to be akin to being trapped within your own home as a servant. The story also illustrates that missionary women were failing to achieve their goals through modeling behavior for Hawaiian women. Missionaries continued to express concern over the "sloth and idleness" they perceived in Kānaka activities as well as sexual behaviors defined as promiscuous by the protestants (Beyer 2003:97). Missionaries enjoyed a modicum of success in forcing Hawaiians to alter their sexual practices through the

[5] This was not the first instance of the existence of a 'royal court', see Kirch 2010:166.

institution of formal marriage, but the first seminaries were largely a failure. This led to a shift in their approach from targeting adults to children. Missionaries began removing girls from their homes and training them from a young age in Euro-American rather than Hawaiian gender practices (Beyer 2003). While earlier seminaries for girls continued to struggle with enrollment issues, the Great Mahele that began in 1848 along with changing subsistence practices caused by the onslaught of capitalist industries in the islands left many Kānaka Maoli (particularly maka'āinana) without recourse for paying taxes or buying land which was now required in cash, not kind. This created an environment of economic coercion in which I would argue Hawaiians saw few options outside of sending their daughters to seminary boarding schools where they were guaranteed placement in a job upon completion of the program (or marriage to a Hawaiian man who was also a graduate of the seminary schools) (Beyer 2003).

Diasporic events caused by the social and political upheavals related to seminary schools and changing economic structures had lasting effects on the availability of oral histories connected to ancestral lands. The changing social and political environment precipitated movement out of more rural regions like Kaupō into heavily populated port towns. The event that had the biggest diasporic impact was the Great Mahele of 1846-1855, which served as "the final blow to the hegemony of the Hawaiian chiefs and the community of the common people" (Sahlins 1992:132). While justifications for the Mahele were made by those in power regarding the benefit this "distribution of land in freehold tenures" (Sahlins 1992:132) would have for commoners, in actuality the maka'āinana who comprised the majority of the Kānaka Maoli population, would only receive less than 1% of the land (Sahlins 1992:132). The foreign whalers, sandalwood and fur traders, and missionaries who had gradually been accruing power and influence in the islands "vigorously challenged the right of the king and chiefs to disposes them at will" (Chinen 1958:7). Their actions were supported by the commanders of warships from their homelands that were in Hawaiian waters—strong arming King Kamehameha III into changing national policies (Chinen 1958) that on the surface addressed land tenure, but at their core targeted the Kānaka worldview. The bill of rights and constitution that followed in 1840 changed the Hawaiian government, severely limiting the right of the monarchy to control the land. The constitution also allowed for a house of nobles and representative body chosen by the common people which permitted a shift in power from the ruling ali'i to haole businessmen and missionaries with dual citizenship. On the heels of these newly acquired "rights" a land commission was established that was to collect claims to land and dole out property rights following the great land division (Mahele) beginning in 1846. If Kānaka failed to file a claim, they would forfeit their right to the land (Chinen 1958:12). Maka'āinana that did manage to maintain control over ancestral plots still lost access to communal areas which rendered subsistence farming largely impossible (Ralston 1984:31). The awarded plots were bounded, cutting people off from the wider resources of the ahupua'a they had traditionally relied upon. The shifting structure, catalyzed by the interjection of the Euro-American perception of property rights, ignored the historical balance of power between the ali'i, maka'āinana and their relationship with the land. The shift in land tenure practice was more than a simple change in the way that land rights were conceived politically—this was a paradigm shift that fundamentally altered the relationship between Hawaiians, the 'āina and each other. The diaspora away from ancestral land also affected ancestral knowledge of place.

The government permitted property to be sold to foreigners in 1850 following the Great Mahele. The majority of Hawaiians who were denied their claims to ancestral land also did not have the means to buy land like the wealthy haole. The meager salaries Hawaiians did earn were needed to pay taxes, which shifted from in-kind to cash payments in the 1840s (Ralston 1984). The jobs that paid cash rather than in kind were few and far between, generally necessitating moves to populated port towns where the invasion by merchant companies was relentless (Ralston 1984), further consolidating power into the hands of foreign capitalists.

Deaths from introduced diseases were rampant throughout the late 18th and early 19th centuries, playing a key role in many of the changes in the social structure previously discussed as the aliʻi feverishly tried to find ways to protect their people. It has been hypothesized that the abolishment of the kapu system and conversion to Christianity may have been part of these attempts to stall the spread of disease. The death tolls further weakened social cohesion (Ralston 1984:38), undermining the social systems that were reliant on community collaboration, and resulted in the loss of community knowledge. Leeward regions were hit the hardest with diasporic events that forced the majority of the population away from these drier lands in favor of port towns where work that paid in cash could be found. Turning to Kaupō, the effects of depopulation and diaspora on the community were drastic—estimates put the population of Kaupō between eight and ten thousand at its peak (Baer 2015:250; Kirch et al 2009). By the missionary census of 1832, 3,220 residents remained and only 21 claims were made for land in the region during the Great Mahele (Baer 2015:250).

Seminaries prospered on the islands of Hawaiʻi, Maui, and O'ahu after the Great Mahele, teaching young girls' industrial skills alongside their academic training so that they could be employed as domestic help. Hawaiian seminaries emphasized manual labor and training, as well as control over their bodies for Hawaiian women with "less enthusiasm over the academic successes of their students" (Beyer 2003:113). In addition, the seminaries enforced Christian ideals for girls and boys, encouraging careers in missionization while removing them from their land and any Hawaiian cultural influence or exposure in an attempt to isolate the source of their knowledge and power (the connection to the ʻāina informs and defines many relationships—relationships to ancestors, to knowledge, to community and to self as explained in Chapter 1). The seminaries enjoyed a far reach, impacting thousands of Hawaiian women over the years. One school in remote Kohala on Hawaiian island trained at least 800 girls. While the seminaries may have paralleled the goals of the female seminary schools on the continent, the results had very different implications. While the seminaries on the mainland were teaching middle-class white women the culture in which they were raised, the seminaries in Hawaiʻi were educating young girls from traditional Hawaiian families by stripping them of their cultural practices with the aim of assimilating them into European culture (and through them, future generations). Beyers argued that the "education for Hawaiian girls was mostly concerned with changing their values, attitudes, and behaviors" (Beyer 2003:113) and not on improving their position in society through formal education. There was also a clear power differential between the graduates of seminaries on the continent and the islands. Middle-class white women were meant to graduate and become missionaries, wives, and teachers or fulfill other middle-class positions. Hawaiian women, however, were being trained more commonly for domestic service with the primary focus of seminary training being the elimination of Hawaiian cultural practices.

The interventions of western haole purposefully and forcefully altered the lifeways of Hawaiians. The new institutions established by missionaries played a central role in the loss of many cultural practices, yet the introduction of writing helped to preserve the memories that survived this period of social upheaval. In addition, with each new wave of migrants to the islands came records that provided additional information on the ways Hawaiians lived before practices were altered or outlawed. However, the perspectives from which the documents were written must be considered when using them to interpret the material record, as their authors filtered Hawaiian social practices through a western lens. For example, the myths of slothfulness and idleness or of wāhine overworked by a cruel patriarchal society persisted throughout the 19th and 20th centuries through school curricula. Such myths were adopted by anthropologists in their interpretations of women as polluting. Interpretations that do not look critically at the context of the ancient Hawaiian practices and subsequent changes brought by dynamic sociopolitical contexts, instead interpreting kapu practices with a European gaze perpetuate the colonial structures instituted by the seminary schools. This is not a new observation—Julie Kaomea (2006) critiqued curricula for teaching that Hawaiian women were severely oppressed by Hawaiian men before the arrival of the Europeans, while also neglecting to include women in the narrative of old Hawaiʻi. In addition, Hawaiian scholars such as Noenoe Silva, argue for the sacredness of their wāhine ancestors, rejecting the narrative of pollution. I want to stress here that looking to historical case studies of colonial structures like the seminaries can help us to better understand how narratives have been interpreted using a western lens. Acknowledging the place of colonial narratives allows for a reevaluation of material culture analyses from kauhale contexts. Recognizing colonial structures helps identify where the pernicious myths constructed during the 19th century persist today. The next section details the historical documents available to us today while also reviewing the problems associated with using a limited number of voices to interpret all ancient Hawaiian house sites.

Using Historical Narratives to Understand a Past Without Writing

The loss of historical knowledge specific to places and times that predated missionization necessitates more indirect methods for determining how people lived and worked in these spaces, and how their daily actions reflected Kānaka ancestral worldviews. The combination of moʻolelo with archaeological data and other historical documents provides a robust dataset for interpreting the array of ancestral activities preserved on the landscape. In this section, I review the historical development of these records, then detail the benefits and drawbacks of utilizing different historical texts to interpret the archaeological record.

Some Kānaka learned to read and write in English before the missionaries "reduced" the Hawaiian language to writing (Silva 2004:32), however the majority of Hawaiians became literate after 1820 with the introduction and dissemination of 'primers' as well as the establishment of schools in all districts by Kaʻahumanu's order. Routine letter writing by the 1830s and the subsequent boom in production of Hawaiian-language newspapers illustrated the literacy of the Hawaiian populace (Schütz 1994:71; Silva 2004:33-35). The moʻolelo relied upon today were written after the introduction of seminary schools, rampant death from disease, and diaspora away from homelands. They record important surviving memories of community life before these events took place, but are limited in scope due to the lack of representation of voices. While the influence of Protestant Christian values is observable in these moʻolelo, Hawaiians were committed to using the tools they learned at the missionary institutions to preserve their culture that was being gradually stripped away. Therefore, the moʻolelo, first published in newspapers and later compiled into volumes that were edited by missionaries provide an interesting glimpse into the struggle between Hawaiian and Western Christian values.

In 1834 the first Hawaiian-language newspaper, *Ka Lama Hawaii,* was established by the missionaries at Lahainaluna Seminary as a conduit of colonial messages (Silva 2004:34). The Hawaiian students who worked on this newspaper and other similar publications such as *Ke Kumu Hawaii* and *Ka Nonanona*, papers also printed and/or controlled by the missions, learned how to write and became skilled at using the printing presses, eventually writing and submitting publications themselves (Silva 2004:34-5). The Hawaiian government learned the utility of communicating to the public through print and started two state-sponsored newspapers— *Ka Hae Hawaii* and *The Polynesian*—that were published throughout the mid-1800s (Silva 2004:35). These publications communicated government policies, but were also used by the missionaries to proselytize (Silva 2004:35). Kanaka who submitted to these publications also wrote about their "moʻolelo, moʻokūʻauhau, mele and their opinions on religion, politics, and other matters" (Silva 2004:35). One major newspaper titled *Ka Hoku o ka Pakipika* was connected to resistance against colonial powers (Silva 2004:46). These mediums for communication left future generations with insight into the lives of Kānaka Maoli, family and community histories, as well as the cultural ideals of the 19th century.

The earlier Hawaiian scholars (e.g. Kamakau, Malo, ʻĪʻī, and Kepelino) first published their material in Hawaiian through the mission presses. Kamakau, for example, published weekly in *Ke Au Okoa* and *Ka Nupepa Kuokoa* for five years from 1865-1871. These publications were later compiled, translated, and published in English for a broader audience as *Ruling Chiefs of Hawaii* (1961); *Ka Poʻi Kahiko: The People of Old* (1964); *The Works of the People of Old: Na Hana a ka Poʻe Kahiko* (1976); and *Tales and Traditions of the People of Old* (1991) (Nogelmeier 2010:106).

Using historical documents created decades (in some cases centuries) after the period of time under investigation introduces complications that when left unchecked can result in a portrayal of the ancient past as static and homogenous. Archaeologists in Hawai'i have relied heavily on a "canon" of 19th-century scholarship written by native Hawaiian writers such as Malo (1952), Kepelino (Beckwith 1932), Īʻī (1959), and Kamakau (1964, 1976) that has been critiqued as part of the cause for the homogenization of the Hawaiian past.

The translation of the texts to English proved to be another obstacle that is important to consider when implementing these documents in the interpretation of the material record. *Ruling Chiefs of Hawaii* was compiled and translated by a group of Hawaiian scholars that included Beckwith, Pukui and Thomas G. Thrum. Martha Beckwith and Mary Pukui reviewed the translation, adding footnotes, and the 1991 reprint by Bishop museum that is widely used today also included the original extensive index by Elspeth P. Sterling (Kamehameha Schools Press 1992:vii). While both the English and Hawaiian texts detail the history of the aliʻi ruling class from ʻUmi through to the imposition of Western laws and politics on the Hawaiian governing system, issues encountered in the translation of the document into English rendered the task incomplete. The final transcript was also reordered, changing the original order in which Kamakau published the moʻolelo in the Hawaiian newspapers (Nogelmeier 2010). Issues with translation and the editorial decisions made, sometimes changed the meaning of the text. Translation issues are an inescapable reality. Words hold cultural context associated with histories that are culturally specific:

> In discussing the role of Hawaiian in Hawaiian culture, it is also well to remember that American English is a vehicle of its own culture and that English words carry their own connotation and history. Whenever Hawaiian is translated into English, the English words used add cultural connotations to the idea conveyed, while eliminating intended connotations and meanings of the original Hawaiian. (Kimura 1983:182)

The history of Hawaiian writing illuminates another issue with relying purely on a limited cannon—the Hawaiian scholars most commonly relied upon knew one another. Kamakau and Malo for example both attended the Lahainaluna seminary school, wrote together and read one another's work. These scholars were from higher status families, thus it is important to recognize the overrepresentation of the historical voices of the aliʻi. Due to the location of the school on Maui, and the birthplaces of Malo and Kamakau on Hawaiʻi and Oʻahu respectively, these islands are also over represented in the histories written about the archipelago. Malo does acknowledge, however, that he writes about a particular place and time and other moku did things differently.

John Papa ʻĪʻī was the only author of a famous autobiographical account written from first-hand experience. ʻĪʻī was older than Kamakau and therefore experienced events that Kamakau wrote about as second-hand accounts. ʻĪʻī was born in 1800 in O'ahu and lived under the kapu system until 1819 and was a member of the king's household (ʻĪʻī 1959:xi). John Papa ʻĪʻī's work suffered fewer issues in the translation process, as Mary Kawena Pukui was the only translator for *Fragments,* lending consistency to the translation. However, Nogelmeier (2010) argues that ʻĪʻī's work was still decontextualized in the process of translation and editing. Further, ʻĪʻī, raised in the court of Kamehameha also represents the aliʻi perspective on Hawaiʻi island.

Mary Kawena Pukui's work with western scholar E.S.C. Handy, *The Polynesian Family System in Kaʻu, Hawaiʻi*, does not suffer from translation issues as the original publication was in English, but the text similarly represents Hawaiʻi island from an elite perspective. However, Pukui does include commoner voices in her accounts of Hawaiian history. Pukui and Handy's work suffers from a lack of temporal contextualization, however, with Pukui's memories and the memories of the people interviewed presented as if the practices were contemporaneous with one another when they were likely not. A similar issue plagues Malo, Kamakau and Īʻī's work due to the translation of the past and present tense (Nogelmeier 2010). In addition, Pukui and Handy were writing in the 20th century several decades after the other manuscripts discussed here were written.

The community of Kānaka cultural experts and scholars working with Anthropologists in the 20th century was small, which resulted in the same people translating earlier texts written in Hawaiian. This also affected the information provided to anthropologists and historians of the period. For example, historian Thomas Thrum, archaeologist Winslow Walker and Anthropologist E.S.C Handy all consulted the men of the Marciel household—a family considered local exports in Kaupō—on their various research projects (Maunupau 1998:166). While reliance on one family of experts certainly does not invalidate the research provided, we must consider the limitations inherent in such an approach (especially when only men were consulted).

The critiques presented here do not invalidate this important canon of works that archaeologists have come to rely on in the interpretation of the material record. Rather, this review of problems we inherit when utilizing these sources allows for a more reflexive approach to their implementation. The best solution to combat the biases introduced when using a limited amount of translated texts is to broaden the scope of the project to include more voices, but due to the limitations of this project the incorporation of the newspaper archives was not possible. Instead, point to the multivocality already present in the historical canon that is not always acknowledged in projects with questions focused only on normative practice. Each text discussed above includes contradictions that are places where the potential for diversity of practice across the landscape is often seen most clearly. Engaging in a close-reading of these texts (as I do in the rest of this chapter) leads to an outline of normative practices as well as differences between districts; "we should strive to carefully piece together the diverse possibilities of past experience, avoid generalizing from one individual to represent an entire group, and question the temptation to impose broad-scale patterns upon a single individual's story" (Sesma 2016:42). Caution still must be exercised when using 19th century mo'olelo for interpreting earlier material culture with vastly different social and regional contexts. The practice of writing the interpretations from these texts directly onto the remaining kauhale architecture is inappropriate. Such practices flatten dynamic historical events that worked to make and remake the landscapes. I work to minimize these issues by incorporating historical texts from earlier periods written by explorers, and archaeological findings that best illustrated the diverse built landscape.

In the discussion that follows, I review information from Hawaiian historical texts on landscape design and cultural practice. While relying on the information from the texts discussed above I do not assume representational status for all kauhale on the Nu'u landscape. Rather, I point to the cultural ideals detailed in these canon texts, while outlining key contradictions, and interspersing additional voices from voyager journals and contemporary Hawaiian scholarship. I then expand upon this historical framework through the discussion of archaeological research on Hawaiian kauhale that date to the time period in which this project is situated.

Ahupua'a as Community

ahu.pua'a. n. 1. Land division usually extending from the uplands to the seas, so called because the boundary was marked by a heap (ahu) of stones surmounted by an image of a pig (pua'a), or because a pig or other tribute was laid on the altar as tax to the chief. (Elbert and Pukui 1986:9).
2. "Functionally, the most important land section was the *ahupua'a*, ideally a valley running from the mountain (*aka*) to the sea (*kai*). In its typical form the *ahupua'a* was a naturally bounded unit containing a full range of ecological and productive zones…" (Linnekin 1990:88).

The social, political, and environmental landscapes were mutually formed in ancient Hawai'i. The dynamic physical environment that resulted from these entanglements from the 15th century onward manifests most clearly in the development and organization of ahupua'a land divisions. Ahupua'a were discrete territories within moku districts. Although ahupua'a began as political tools, they would become synonymous with "community" and were the division of land most important for understanding the relationships between households. These divisions of land where ideally shaped like slices of pie that stretched from the mountain to the ocean, providing access to all necessary resources in the highland forests, farmland, and the ocean regions. Each district also incorporated the necessary social resources such as heiau or shrines specific to the needs of the people (i.e. farming shrines, Lono heiau). Within the ahupua'a, people worked plots generationally and built kauhale to house their extended families.

Archaeological and historical data show social and political developments that altered daily life in the Hawaiian archipelago between CE 1400-1650. These changes included population growth, shifting subsistence patterns, migration into the leeward island regions, and elaboration of religious beliefs (Baer 2015; Coil and Kirch 2005; Kirch 1992:14; Kirch 2005:24; Kirch *et al.* 2005:240; Kirch and McCoy 2007:402; Kirch *et al.* 2010:266; Kolb 1997:276, 2006; Ladefoged *et al.* 1996:864; Ladefoged *et al* 2008). The rapid construction of heiau in dryland regions of Maui, for example, occurred during this era and was hypothesized to be the work of a single Maui chief during a period of "predatory expansion" (Kirch and Sharp 2005:102). Ancestral Polynesian worldviews that dictated everything from kinship and relationships, to land ownership and rulership gave way to increasingly hierarchical structures divided along the lines of class status, gender, and age. The elites and commoners became further divided, with multiple differentiated ali'i and commoner classes (Kamakau 1991:39-40). Increasingly communities settled the leeward island regions, and the growing power of the elite effected the ways in which daily life was organized. Paramount chiefs (ali'i nui) became the vested owners of the districts, separating decent groups from the land (Ladefoged and Graves 2006:261) and assigned lower chiefs to oversee the individual moku and ahupua'a. The ever-evolving language evidences these changes through the addition of hierarchical terms. Archaeological research has elucidated the stages of development through the field systems, intensified construction of heiau and shrines, and increasingly complex kauhale. Ethnography and ethnohistory illustrate the resultant daily practices, including social and political organization that these changes produced.

Understanding the period that preceded the establishment of the ahupua'a system is necessary to contextualize the rapid social change that led to the development of the Nu'u community through expanded populations, movement out to leeward regions like Kaupō, and the subsequent intensification of agriculture in these regions. The governing body was modeled after the ancestral organization with chiefly elites tied to the commoners they ruled by familial relationships. Previous to the implementation of the sweeping changes to political organization, anthropologists argue that the system in place was akin to ancestral Polynesian systems in which corporate descent groups were associated with landholdings (Kirch 2010; Linnekin 1990:117). The structure of the social-political system after the 15th century, though intensified, was related to Ancestral Polynesian lineage-based cultural groups—the *kāinanga* and *kāinga* social groups (Kirch and Green 2001). These changes came about as the Hawaiian archipelago ceased to have contact with Kahiki and the tradition of voyaging chiefs came to an end. Evidence from Moloka'i[6], Maui's neighboring island to the northwest, suggests that the era preceding the 15th century was marked by the continued settlement of regions favorable to agriculture, along with a focus on natural resources (McCoy 2007:398). Changing social structures however, let to the erosion of ancestral land tenure practices. The system of organization that relied on relations between people based on lineage, and the transfer of property intricately connected to these kinship ties, began to cede to the chiefs that were gradually usurping control of the 'āina (Sahlins 1992:192). These developments contributed to an elite ruling class that became internally differentiated from the maka'āinana, tracing their descent from gods rather than common people (Cordy 2000; Holm 2006:4; Kirch 2000[7]). The ahupua'a system developed within (and largely as a result of) this new political system.

Ahupua'a are considered the communities within which Kānaka Maoli went about their daily lives. These territories served political and social purposes. The story of this new type of

[6] While each island has a unique historical trajectory, the broader trends evidenced archaeologically show similar changes across the different districts during the same periods.
[7] Need more information on this. I want to tie this paragraph into the other developments listed below to show that all of these changing circumstances worked together to affect the way the elite differentiated themselves. This will set up the later analysis to show that house complexes were instrumental in these changes.

hierarchical land division that resulted in sweeping social and political changes for Maui island begins on Oʻahu in the 15th century when the aliʻi nui Māʼilikūkahi[8] adapted the previous system of partitioned districts into segments of land embedded within one another and administered by a hierarchical system of chiefs (Kirch 2010:89-90). In establishing this new land tenure system, Māʼilikūkahi succeeded in widening the gap between the classes (Kirch 2012:133). Kamakau relays the organization of this new hierarchical structure on Oʻahu:

> When the kingdom passed to Māʻili-kūkahi, the land divisions were in a state of confusion; the *ahupuaʻa*, the *kū,* [*ʻili kūpono*], the *ʻili ʻāina,* the *moʻo ʻāina*, the *paukū ʻāina*, and the *kīhāpai* were not clearly defined. Therefore Māʻili-kūkahi ordered the chiefs, *aliʻi*, the lesser chiefs, *kauai aliʻi*, the warrior chiefs, *pūʻali aliʻi,* and the overseers, *luna* to divide all of Oʻahu into *moku* and *ahupuaʻa, ʻili kūpono, ʻili ʻāina,* and *moʻo ʻāina.* There were six districts, *moku*, and six district chiefs, *aliʻi nui ʻai moku*. Chiefs were assigned to the *ahupuaʻa*—if it was a large *ahupuaʻa*, a high chief, an *aliʻi nui*, was assigned to it. Lesser chiefs, *kauai aliʻi*, were placed over the *kūpono* lands, and warrior chiefs over *ʻili ʻāina.* Lands were given to the *makaʻāinana* all over Oʻahu. (Kamakau 1991:54-55)

Kamakau (1991:55) goes on to discuss Māʼilikūkahi's commands addressing the treatment of makaʻāinana by the aliʻi placed in charge of each land segment. The aliʻi nui forbid his lesser chiefs from plundering the land, stealing from the common people under their rule on penalty of death. All people—commoners and aliʻi alike—were commanded to "cultivate the land, raise pigs and dogs and fowl, and take the produce for food" (Kamakau 1991:55). This history is worth detailing as the restructuring that occurred in Oʻahu in the 15th century was later adopted archipelago-wide, effectively altering social relationships and interactions with the landscape for future generations. Further, the subsequent regulations placed on the chiefly interaction with commoners reveals a precedence for the development of community relationships generationally.

Archaeology and ethnohistory of Maui suggest that the hierarchical structure of the chiefdom had not yet reached its apex by the 15th century, but polities the size of districts were beginning to form (Kolb 2006:663). The Maui aliʻi nui, Kakaʻalaneo**,** implemented a similar system, with a focus on agriculture (Kirch 2010:91). This focus on crop production serves as a central focus for many historical and archaeological discussions. Within the ahupuaʻa, there remained five smaller divisions of land that evidence small scale 'neighborhood' social interactions. Kamakau identified them as the ʻili kūpono, ʻili ʻāina, moʻo ʻāina, paukū ʻāina and kīhāpai (1992:54), stating that each smaller division was placed under the control of lesser chiefs under the command of the aliʻi ʻai moku. Malo's brief description of land divisions included several larger than the ahupuaʻa, but those of concern here are the eight divisions of land listed by Malo that are smaller than the ahupuaʻa communities. Malo (1951:16) wrote about the same land divisions as Kamakau, but adds koele, haku one and kuakua, which are all subdivisions of kīhāpai. Iliʻāina, or land inheritance and ʻili ʻāina, or the small land division that pays tribute to the chief, and the smaller fragments of land or

[8] It is important to note that Kamakau, writing in the 19th century, credits the later ahupuaʻa land tenure system to Māʻilikūkahi, which Kirch (2010:90) points to as potentially up for debate. While the system in place in the 18th century likely did not directly mirror divisions and practices implemented by Māʻilikūkahi in the 15th century, the historical and archaeological records do evidence a shift in relationship to the land and relationships within the community during the period in question.

moʻo ʻāina and subdivisions paukū ʻāina and kīhāpai (Pukui and Elbert 1986:97) are the primary foci in this study due to the relevance of these smaller land segments for neighborhoods and households. Malo's koele and haku one were land divisions specifically cultivated for the aliʻi, and the kuakua was a small land strip used for the cultivation of taro (Handy and Pukui 1986)—three types of divisions not directly relevant to this research so will not be further discussed.

Archaeologists have estimated that the population on Maui following this period of social upheaval expanded, reaching between 200,000 and 280,000 at its peak (Kirch 2014:157). Similarly, movement into neighboring Kahikinui swelled after AD 1400, reaching a peak between the 18th and 19th centuries (Kirch 2014:156). The dynamic link between population density in leeward regions of Maui (specifically the most heavily researched districts of Kahikinui and Kaupō), the overall increase in population on the islands, and the drive for surplus food to fulfill the ever increasing demand of the newly vested aliʻi is hypothesized to have produced the 'critical conditions' for the emergence of the archaic state in Hawaiʻi (Kirch 2010:201).[9] The adjacent moku of Kahikinui and Kaupō were ideal for high production of crops as both districts were part of the same extensive dryland planting region with optimal environments for growing sweet potatoes and dryland taro (Baer *et al*. 2015; Handy 1940; Holm 2006; Kirch and Baer 2010; Kirch *et al*. 2005; Ladefoged *et al*. 2009). Environmental factors played an important role in the initial settlement of windward regions and the subsequent migration into leeward regions. Malo (1951) described the leeward regions as those able to support kalo (taro) without irrigation. The drier regions were therefore distinguished by a reliance on rainwater rather than irrigation. The drylands, or ʻāina maloʻo, were characterized by ≤500mm of rainwater per year in the leeward coastal zones (Holm 2006:80) to around 1400mm in the dryland farm regions (Giambelluca *et al*. 2013). Kānaka Maoli moving into leeward regions continued farming traditions while adapting new practices in order to sustain crops, support the growing communities, and provide surplus to the ruling elite. The dryland planting fields were built in the zone between the ocean and the mountain that provided the most nutrients and rainwater. As was common with ahupuaʻa land divisions, the resources from the mauka dryland forests to the makai resources collected from the ocean sustained the communities living in these marginal environments.

The socio-political changes had a ripple effect on other aspects of daily life, including the design of the house. It is highly likely that the changing land tenure system, intertwined as it was with increasingly complex social organization, resulted in an intensification of the kapu system and a shift in the construction of house complexes (kauhale) at a community level (Baer 2015:202; Beckwith 1976:294; Garwood 2010; Kamakau 1991:223; Kolb *et al.* 1997; Vacca and Kolb n.d.). House complexes, or multiple house structures that were inhabited by one household, were designed to facilitate appropriate social interactions. The design and organization of house clusters varied depending on social status and location on the landscape, among other factors, reflecting the expanded social hierarchy.

By the 18th century, regional populations were peaking and the new political system of the 16th century was the established way of life throughout the islands.[10] A glimpse into life in the

[9] When considering the reason behind population increase and increase of food production in the region, it remains difficult to determine the primary drive—there is no clear 'smoking gun' causing the development of the state (Kirch 2010:218). Like other regions that experienced similar phenomena, these political and social changes were clearly intertwined as shown archaeologically.
[10] The basic structure of the social and political system on each island shared similar characteristics but was

islands during this period was recorded in Cook's journals, providing useful (although biased) records for a narrow period of time that can be used to better understand how Hawaiian ideals recorded in the 19th and 20th centuries were practiced by the ancestors of Hawaiian historians living in the 18th century. This comparative analysis is a step toward deconstructing static and homogenous perspectives of Kānaka histories. These journals, like other historical documents, come with challenges however. Namely, the authors wrote about a worldview they did not share and struggled to understand due to language barriers and cultural differences. Condemnation resulting from judgement of these cultural differences is infused throughout the text. The purpose of the voyage also affected the information recorded in the journals, with Cook less concerned about social organization or political dynamics and more interested in finding the Northwest Passage he was tasked to improve the understanding of geography and navigation of the tome (lxvii). Cook was given strict instructions regarding the path he was to take across the Atlantic and Pacific Oceans in search of a northwest passage, but was allowed some leeway by his benefactors: "nevertheless, if you shall find it more eligible to pursue any other measures than those above pointed out, in order to make a discovery of the before-mentioned passage,…you are at liberty, and we leave it to your discretion, to pursue such measures accordingly" (Beaglehole 1967:lxvii). Captain Cook himself was preoccupied[10] with this mission and in his personal journals recorded little information about the cultural constructs of Hawaiians. The 'intellectuals' brought along for the scientific endeavors (as opposed to the commercial endeavor) did make extensive records of their brief observations in the Hawaiian Islands. The usefulness of the journals lies in a close reading of the description of activities when compared to descriptions of traditions recorded in the moʻolelo a century later. The generative nature of this comparison is twofold. First, the observed details of daily life (while subjective and limited) provide a glimpse of the diversity of social practices that can assist archaeological interpretation. Second, the brief glimpse provided through these journals provides a comparison against later practices to better understand how subsequent political changes brought by warfare and increased globalization of Hawaiʻi changed daily life for kamaʻāina (and how these changes may have impacted anthropological interpretations of the material record). Here I outline the goals of Cook's third voyage then detail the observations provided in the journals that relate to ahupuaʻa land divisions.[11]

The crew aboard the *Resolution* and *Discovery* led by Captain James Cook from England were the first Europeans to visit the Hawaiian Islands. This was Captain Cook's third voyage, planned for the purpose of searching for a northwest passage by the British Admiralty, headed by Cook's benefactor, the Earl of Sandwich (Beaglehole 1967:lxvi)[12]. While the English government's interest in this voyage was primarily economical (within the paradigm of scientific discovery), scientific explorations played a more central role for Cook and some of his men (Beaglehole 1967:lxv). These scientific interests meant that the men aboard the ships kept extensive records of the people and places encountered throughout the voyage, including those living in the Hawaiian Islands in 1778 and 1779.

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implemented in ways that met the needs of the people. The islands were not united at this point, therefore each political and social organization manifested differently.

[10] Anderson, one of the intellectuals aboard, was distressed when Cook cursed the scientists", saying "'Curse the scientists, and all science into the bargain!" (Beaglehole 1967:lxxvi).

[11] In subsequent sections I begin with historical and archaeological information then turn to Cook's journals as a case study of sorts that provides observational data.

[12] The Royal Society and Parliament were instrumental in promoting a search for the northwest Passage for 'many advantages both to commerce and science' (Beaglehole 1967:liv).

Captain Cook planned the third voyage to pass by known Pacific islands in order to refresh supplies and rest on his way to exploration of the Northwest Pacific region. The planned route placed the Hawaiian Islands in the path of the *Resolution* and *Discovery*, and on the 8th of January, 1778 the Island group that Cook would name the Sandwich Islands after the Earl of Sandwich was spotted for the first time by western explorers (Beaglehole 1967:cxv). This first trip was brief due to seasonal weather preventing the ships from properly anchoring off the coast. The exploration of the islands was limited as the primary purpose for the visit was to refresh the ships. While Cook and his men spent two weeks in the waters off the coast of Kauaʻi and Niʻihau, only Cook, Anderson, Clerke, and King went ashore, spending a total of three days between the two islands (thrice ashore in the Kauaʻi village of Waimea and once in Niʻihau) (Beaglehole 1967:cxvii).[13] Similarly, the return of the *Resolution* and *Discovery* to the waters around the Hawaiian Islands on November 26, 1778 was to refresh the supplies and wait out the harsher winter months before returning again to the northern waters to renew the search for the Northwest Passage. On the return voyage the ships first visited Hawaiʻi island before setting sail for Oʻahu then Kauaiʻi and Niʻihau. This return trip, while longer, was treated with caution by Cook who barred his men from visiting the shore.[14] The ships instead sailed around the islands of Maui and Hawaiʻi for seven weeks, trading with canoes but not going ashore. Repairs needed for the ships, however, forced Cook to anchor in Kealakekua Bay on Hawaiʻi Island. Cook remained most concerned with "wooding, watering and provisioning, and of repairing the ships" (Beaglehole 1967:cxlv) in the two weeks men were allowed on shore. The ships sailed out of the bay after the ships were repaired and restocked but a broken mast required they return soon after. On this return trip, theft combined with misunderstandings between the British and Hawaiians escalated tensions, resulting in Captain Cook's death (along with several other men on both sides of the skirmish). After Cook was killed on February 14th, 1779, the ships quickly completed their repairs and on the 22nd of February sailed out of Kealakekua Bay past Maui and Molokaʻi to Oʻahu for a short period of time before anchoring in Waimea Bay on March 1st for additional supplies. Cook's journal ends one month before his death (Beaglehole 1967:clxxi) and therefore does not record any information from the two weeks spent ashore in Kealakekua Bay, but the journals of his shipmates do include this period. The observations recorded in the ship's journals from both visits to the Hawaiian Islands were extensive for such short periods but were limited by the increasingly tense social/political relationships, geography, language barriers, and time constraints.[15] Nevertheless, the information in the journals represents the earliest European observations of the islands, including records from places like Niʻihau that were not typically the focus of later historical documents. Below I discuss the observations and events recorded by the English visitors of each island.

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[13] The information gleaned from Cook's journals on the pronunciation of Hawaiian names along with the later missionary records (specifically the committee that standardized the Hawaiian language in 1826) provides further evidence of differing traditions between island districts and between islands. King notes that "It is to be observed that among the Windward Islands the K is used instead of the T, as Morokoi instead of Morotoi" (Beaglehole 1967:cxv). This observation lends further credence to the argument that while similar Hawaiian cultural ideals structured daily life across the islands, these practices were in no way homogenous.

[14] Cook remember the difficulty he previously experienced trying to anchor off the coast of Kauaʻi and was uninterested in struggling to do so again, especially amidst the rough surf common in the winter months. Cook was also trying to stymie the spread of venereal disease afflicted sailors brought with them from England (Beaglehole 1967:cxl).

[15] Lieutenant King noted that any desire by the crew to inquire about Kānaka Maoli customs was frustrated by Cook's decision to spend little time on land (Beaglehole 1967:504).

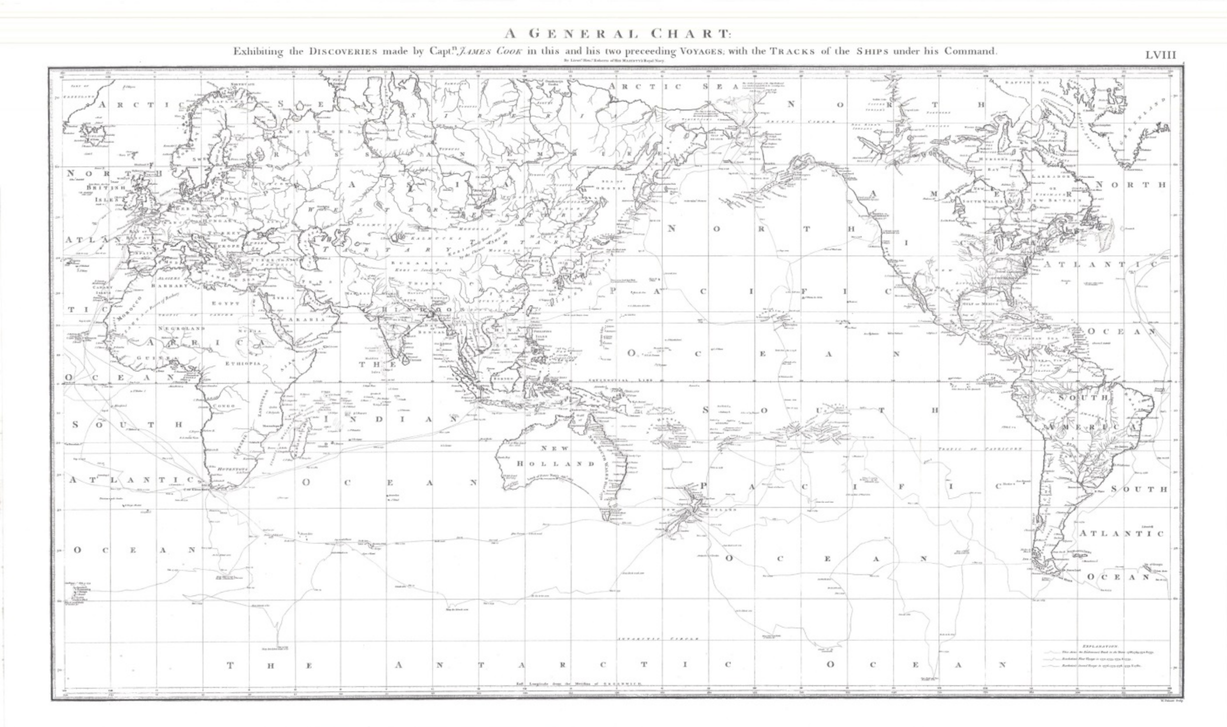


Figure 4.1: The Third Voyage of Captain James Cook (From Beaglehole 1967).

Cook on the built landscape

The built landscape of 18th century Hawai‘i included the many diverse architectural features that facilitated daily life. One early observation recorded the organization of houses in villages on Kaua‘i and Ni‘ihau. Cook observed that villages were seated along the shore and “up in the Country” (Beaglehole 1967:264) as they sailed past the islands. Clerke (Beaglehole 1967:599) stated that all the towns observed were built along the seashore with only a few temporary shelters upland and small houses within the farm land where commoners lived that looked after the crops.

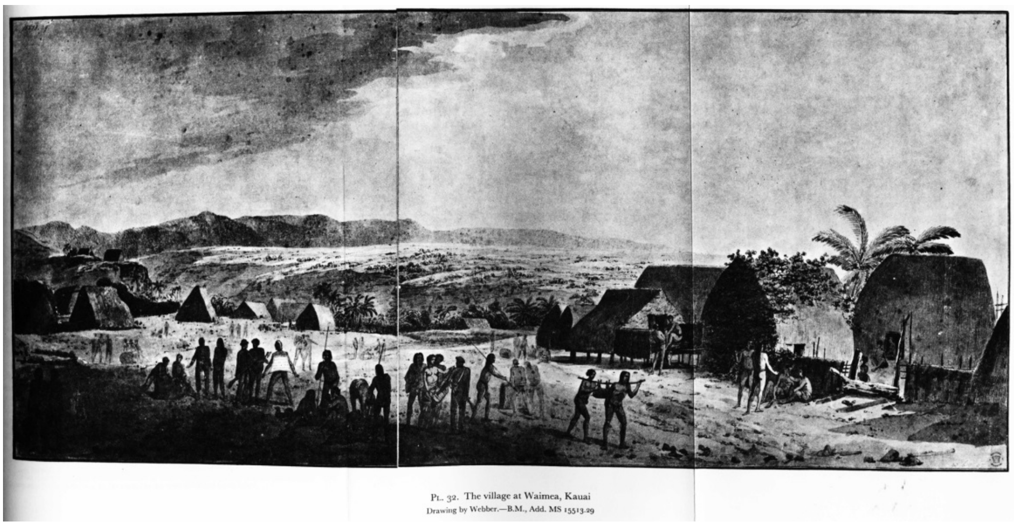


Figure 4.2: Drawing by Webber of the village at Waimea, Kaua‘i, the first depiction of a Hawaiian kauhale (from Beaglehole 1967, Plate 32).

People searching for materials were observed using a few temporary shelters were observed in the wooded areas. Some convenient shelters were also observed to be built in lava caverns beyond the villages. The observation that towns were only built along the seashore was not connected to a particular island, but the landscape of lava on Hawaiʻi island as described by Clerke (the only place where the sailors traveled inland to observe the built landscape) may have prohibited building towns further inland. Captain King (Beaglehole 1967:618) observed that the “lava surface prevails mostly within 2 or 3 miles of the Sea”, upon which sweet potatoes grew. This observation may indicate why villages were not found further inland on Hawaiʻi Island. Contrary to Clerke’s observation however, Captain Cook insinuated that towns continued several miles inland. The party sent to explore Hawaiʻi Island inland of Kealakekua Bay observed houses within the fields but did note the poverty evident in these residences. They passed through several hospitable villages, observing that none of the villages were more than four or five miles from the ocean (Beaglehole 1967:524).

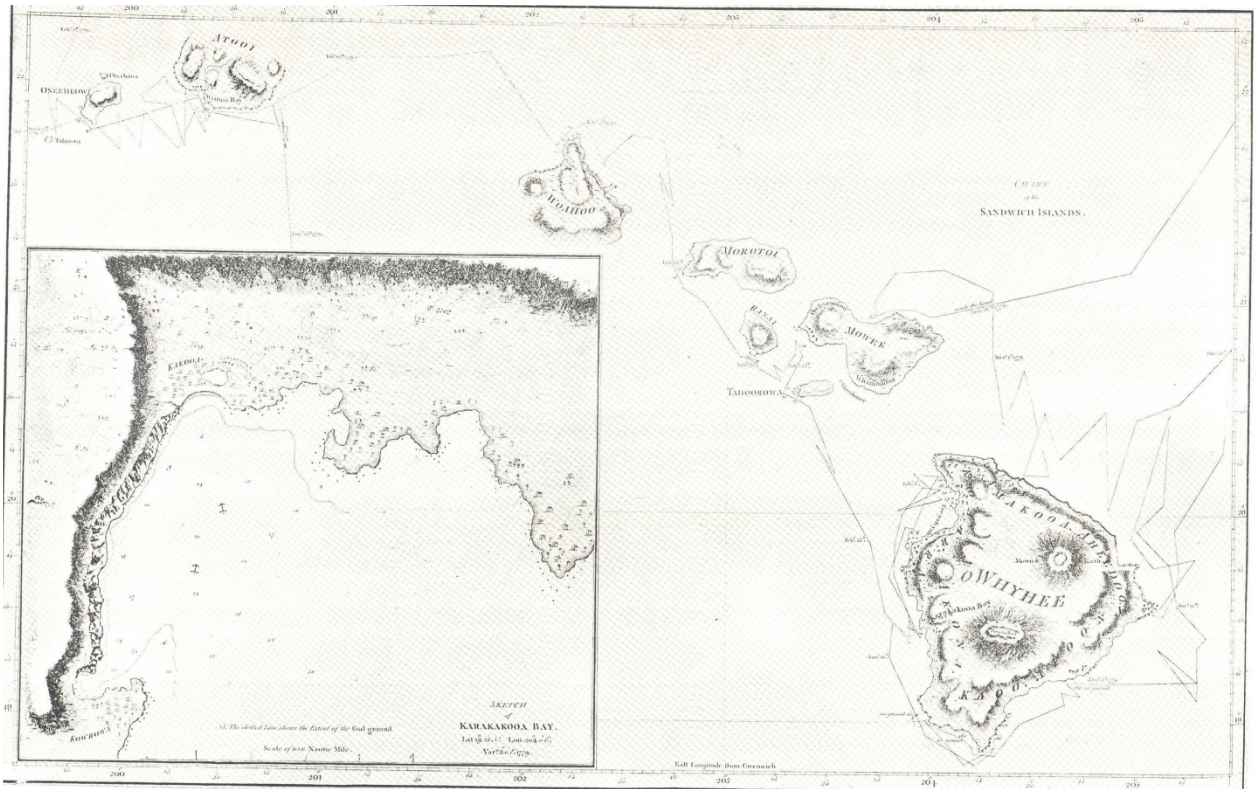


Figure 4.3: Map of Hawaiʻi from Captain Cook’s Third Voyage (Beaglehole 1967).

Concluding thoughts on the land

The history of the changing land tenure system and altered landscape conveyed in this section evidences a dynamic culture that integrated ancestral practices with cultural innovations. Taking both tradition and innovation into account in archaeological interpretation avoids the tendency to idealize ancient social structures, assuming fixity and structural predictability (Linnekin 1990:117). Avoiding the assumption of predictability requires temporal specificity. I attempt that temporal specificity by identifying the unique combination of tradition and innovation that created the built landscape that existed when the Nuʻu house sites were occupied, using the journals, moʻolelo, and archaeological research for temporal, cultural, and regional specificity respectively.

In the following section I will evaluate relevant information culled from moʻolelo and other historical or anthropological documents about life within an ahupuaʻa community. I note any time periods that are associated with this historical information but for the most part these descriptions of life in the archipelago are atemporal or associated with periods spanning several hundred years. I first discuss broader social structures then describe their implications for daily life within communities.

Primary structuring agents: kapu and mana

> kapu. 1. nvs. taboo, prohibition; special privilege or exemption from ordinary taboo; sacredness; prohibited, forbidden; sacred, holy, consecrated (Pukui and Elbert 1986:132-133)
> mana. 1. nvs. Supernatural or divine power, mana, miraculous power; a powerful nation, authority; to give man to, to make powerful; to have mana, power, authority, authorization, privilege; miraculous, divinely powerful, spiritual; possessed of mana, power. (Pukui and Elbert 1986:235)

The concepts of mana and kapu are complex and foundational to the Kānaka worldview—any one definition of these terms cannot provide a comprehensive interpretive framework. In addition, no singular value system existed for ancestral Hawaiians (Silva 2002:ix), which resulted in a range of practices encompassed under the umbrella of Hawaiian culture. Here I use definitions from both Lorrin Andrews (19th century) and Pukui-Elbert (20th century) English to Hawaiian dictionaries as well as the interpretation of kapu and mana by contemporary Hawaiian scholars to illustrate some of the many ways mana and kapu may have been conceptualized historically. In addition, utilizing the Andrews dictionary provides insight into 19th century missionary texts by explaining how texts from the missionary outlets understood kapu and mana. Andrews' immersion in the Hawaiian language also provided him information on its symbolic nature and historical context (Silva 2002:viii). In addition, this dictionary was written when the Hawaiian language was widely spoken in the islands whereas the Pukui-Elbert dictionary was created to assist translators at a time when the language had nearly died off. While Pukui was also a native speaker of the Hawaiian language, she wrote in 1949 that "As we move farther off into modern times from ancient times it is increasingly difficult to understand the kaona ["inner meaning"]. We have left the old atmosphere and associations, and it is no longer possible to re-create them" (in Schütz 1994:210). However, Pukui's translation more accurately reflects Native Hawaiian value systems as opposed to European values (Silva 2002:ix). Silva (2002:ix) argues that utilizing multiple sources for definition helps translate the meaning behind historical texts, allowing our interpretations to be more precise by better understanding how historical events were filtered through the author's cultural lens.

Kapu was an important ancestral concept that continued to shape Hawaiian worldviews throughout history. Kapu determined the ways in which the elite could engage with those beneath them and many of the daily mundane social interactions. An individual's kapu that defined their formal interactions and marked their rank was inherited and could not be lost (Linnekin 1990:99). Kapu requirements that restricted certain types of social interactions had implications for the use of space that in turn altered the built landscape. ʻAi kapu (eating tabu) in particular is the most insightful due to the ample material traces that result from following this particular taboo. Food restrictions distinguish commoners from elites and men from women. Features in the household associated with food production and consumption distinguish male from female spaces. The kapu system was often interpreted by outsiders as the Kānaka Maoli system of religion practiced previous to the introduction of Christianity that kept common people in obedience to the chiefs and priests; "but many of the kapus extended to the chiefs themselves" (Andrews 2003:259). While kapu was often used to prohibit or forbid actions, activities, or access, the term also recognized places or people as sacred or consecrated. Both the Andrews and Pukui-Elbert dictionaries included the words "sacred", "consecrated", and "prohibited" in their definitions which suggests these are the most robust and resilient definitions.

Mana and kapu were reliant on one another. Mana is a complex concept that can be traced back to Ancestral Polynesia and continued to play an important role in Hawaiian social life. As described in Chapter 3, this concept has proved difficult for western observers to fully understand or define. Power in Hawai'i was represented by mana and the physical manifestation of this power on the landscape was structured through kapu that restricted the ways in which people interacted with one another (Andrews 2003:259). Pukui and Elbert defined mana as power that is supernatural, divine, or miraculous in nature and ho'o mana as empowering or authorizing someone. Andrews (2003:284-5) similarly defined mana as supernatural power but went further with this explanation, attributing this power to the gods' power and strength. The Andrews dictionary also included in the definition spirit and "energy of character", strong, powerful, intelligence, majesty and glory. People were born with mana, but this spiritual power could also be gained or lost through actions, objects, or food for example. The mana each person possessed played an important role in defining their hierarchical position and subsequently the nature of their social interactions. These interactions are most clearly observed through the relationship between the ali'i and maka'āinana.

Relationships of Power

Archaeological and historical data evidence the existence of multiple status classes under the umbrella of ali'i and maka'āinana designations. Archaeological research evidences these status differences in the many varied types of architectural features and associated material culture on the landscape. The historical documents outline the general understanding of these power relations that shed light on the meaning and use of the architectural features found on the landscape. The explorers' journals provide a glimpse into the daily enactment of these power relations. The relationship between maka'āinana and their ali'i is important to review in order to understand the community organization. The degree to which difference in status is displayed materially differs between districts (Kahn 2014:20), therefore I compare the historical information about relationships of power with examples specific to the Kaupō moku when possible. When such an example is not available, I turn to archaeological research on households from other southeast Maui moku (especially Kahikinui) occupied during the same period as the Nu'u houses that comprise the foundation of this study.

The ahupua'a were normatively arranged as pie-shaped districts inclusive of the island's many natural resources that were necessary for daily activities.[1] The apex of the pie-shaped district ideally encompassed a portion of the mountain peak, stretching makai and outward to encompass upland forests, then further downslope to include the farmlands and, finally, encompassing the marine resources at its base. The larger moku regions that were subdivided into ahupua'a increased the ease with which the annual tribute (ho'okupu) was collected by the ali'i 'ai ahupua'a (or konohiki), the ruler of the smaller region that was appointed by the ali'i ai moku (the ruler of the district) who was in turn appointed by the high chief, ali'i nui, ruler of the island (Kamehameha Schools 1994:VI). The kama'āina, or children of the land,

that lived under the rule of the aliʻi were free to move around, yet tended to remain on the land of their birth, tethered to the land through the burial of their ancestors. The aliʻi benefitted from maintaining the loyalty of the kamaʻāina. The people produced goods from the crops tended and materials gathered on the lands allotted to them for use.
The balance of power between elites and commoners in ahupuaʻa was reliant on a delicate balance between those that provided power and protection, and those that provided labor and sustenance. The accepted social protocols necessitated that in return for the makaʻāinana labor, goods, and support in political struggles, the aliʻi provided land usage rights, security, and ensured their well-being (Ralston 1984:24). The bond between the ruling elite and the commoner population was not along the lines of kinship, as it was within households or makaʻāinana communities, but rather a bond of responsibility. If an aliʻi broke this bond, the makaʻāinana were able to move to another district or, in dire situations, overthrow and replace the ruler who violated this sacred contract (Sahlins 1992; Malo 1951). Familial bonds connected those considered commoners. Within the ahupuaʻa, community members worked ʻili plots that they would live off of generationally. On their plots of land, they would build kauhale for their households.

Anthropologists have described the ties that connected the families that formed these communities as both fictive and hereditary kin. ʻIli ʻāina (smaller land division, land inheritance), moʻo ʻāina (land parcel, subdivisions of ʻili ʻāina) and paukū ʻāina (section of land, smaller division of moʻo ʻāina) were all portions of land that were connected generationally to the makaʻāinana families that lived within each district, weathering shifts in ruling elite and remaining tied to the land (Abad 2000:92; Malo 1951[1898]:16). The iwi (ancestral bones) buried in these parcels created a homeland, or kulāiwi (Abad 2000:92) that tied the ohana both physically and spiritually to the portion of the ʻāina on which they carried out their daily tasks and passed down their knowledge generation after generation. The word "ʻohana" is even defined through the relationship to the land, with "ʻOha [meaning] "to sprout," or "a sprout"; the "buds" or off-shoots of the taro plant which furnished the staple of life for the Hawaiian are called ʻ*oha.* With the substantive suffix *na* added, ʻ*oha-na* literally means "off-shoots," or "that which is composed of off-shoots"" (Handy and Pukui 1972:3). Handy and Pukui (1972) interpreted the ʻohana as descending from their kupuna, their ancestors both alive and deceased. This word also referenced a relationship to the land, with the kupuna being "the stock from with the ʻ*ohana* spring as offshoots", derived from "*kupu "*to grow," with the suffix *na* added" (Handy and Pukui 1972:4). However, Sahlins (1992:193) critiqued Handy and Pukuʻi's interpretation of ʻohana as misleading. He argued that " ʻ*ohana* as a congeries of people related to each other in various ways" is a fair description of the feeling of familial connections across the landscape, but that the formalization of these ties through a description of the ʻohana as descended from a senior branch, representing a discrete group of kinsmen that held particular lands is an inaccurate depiction of ancient Kānaka Maoli kinship (Sahlins 1992:193-194). The makaʻāinana tied to the land did not own these parcels, but rather were granted access by the shifting tide of ruling elites that were tasked with caring for the people and the land under their control. Households did not hold plots, rather communities worked together, sharing the resources of the land. Access was granted by the aliʻi to the kamaʻāina in different productive zones like Nuʻu. Konohiki, or land managers that collected hoʻokupu from the people of the land also assured access to "qualitative rather than spatial distinctions" (Linnekin 1990:88) from the forest to the sea (testimony of Makalena, L-542, 1871, in Linnekin 1990:89). This access ideally guaranteed that each household in this study was provided with the resources needed to sustain their daily activities. This access in turn resulted in hoʻokupu for the aliʻi that ranged from kapa cloth to edible goods. The importance of the concept " ʻohana" to this project therefore lies in the term’s signaling of the familial connections felt amongst community members that were tied to the same land.

Oral histories record the relationships between ali‘i and maka‘āinana as mutually beneficial based on the myth of origin. Kamakau (1991:35) places the development of the classes at the time of Wākea and Papa. The god asked who had lived righteously and established that man “as a chief over all the things [the god had] made” (Kamakau 1991:35). The people were then divided into commoners (maka‘āinana), outcasts (kauwā), priests (kāhuna) and chiefs (ali‘i). This mythology illustrated the importance of mana for ali‘i through the concern for righteousness. The political role of ali‘i is also revealed in role given to the most righteous among the people. However, not all ali‘i held equal positions in society—ali‘i’ as a category encompassed a range of people of very high to very low status, many of whom were considered akin to gods or traced their lineage to the deities. By contrast, the maka‘āinana were conceptualized by Kamakau (1991:40) and Malo (1951:60) as the long lost ‘younger siblings’ of the ali‘i whose genealogy had long been forgotten.[16] Ali‘i continued to trace their lineage to the gods, but maka‘āinana were forbidden from tracing genealogies through time after the time of Umi but maintained robust lateral familial connections[17] (Kamakau 1961:196). According to Kamakau (1991:80), commoners were denied the right to trace their genealogies because they were forbidden from acting like chiefs, therefore they were only taught the names of their family as far back as their grandparents. The descendants of these ‘forgotten’ lines were also common people and included attendants (kāpi‘i), masseurs (kālole), subjects (uli), people with reddish hair (‘ehu), taro diggers (kā‘ai), flatterers (kuala‘i‘i), and country chiefs (ali‘i kua‘āina) (Kamakau 1992:40) among others. Kamakau outlined four distinct castes which were further divided by power and position in society. The formal categories of ali‘i, konohiki, kahuna, and maka‘āinana classes as described by Kamakau (1991a:39-41;1991b:7-9) are detailed in Table 4.* below.

Status	Description	Category
ali‘i nī‘aupi‘o	The children of two ali‘i nui with kapu moe (prostrating kapu). The offspring of brother-sister, or half-brother/sister unions. Their kapu was equal to that of the gods.	Ali‘i
Ali‘i pi‘o	The children of ali‘i ni‘aupi‘o and were considered gods, only conversed at night and possessed the highest kapu equal to the gods.	Ali‘i
Ali‘i naha	Sacred kapu chiefs, the children of half siblings from ali‘i nī‘aupi‘o parents. Their kapu was not equal to pi‘o ali‘i.	Ali‘i
Ali‘i wohi	The children of second pedigree chiefs with one parent that was ali‘i nī‘aupi‘o and the other from the family of ali‘i nui.	Ali‘i
Lō ali‘i	Not defined by their heritage but by their location on O‘ahu and preserved their kapu through their children.	Ali‘i
Ali‘i papa	The children of a mother from the ali‘i nī‘aupi‘o or ali‘i pi‘o with the kapu moe and a father that was kaukau ali‘i, a lesser chief.	Ali‘i
Lōkea ali‘i	Children from fathers that were nī‘aupi‘o or ali‘i pi‘o and mothers from families of ali‘i nui	Ali‘i

[16] Genealogically the relationship between ali‘i and maka‘āinana was not familial however, although mythologies tie all people to a common ancestor.
[17] Adoption practices strengthen those lateral connections but could also build ties across class lines. Adoption practices strengthened the relationships between families or communities, and increased access to power for those adopted by the ali‘i.

La‘auli ali‘i	Children from a father and mother of a high chief family (from second pairing) of equal rank, considered second pedigree chiefs.	Ali‘i
Kaukau ali‘i	Children from the father of an ali‘i nui and a mother of an ali‘i of little rank (he wahi ali‘i iki)	Ali‘i
Kūkae pōpolo	Children from an ali‘i father of little rank and a mother of no rank (noanoa) or vice versa	Ali‘i
Ali‘i kapu	Sacred chief of the highest rank	Ali‘i
Ali‘i noanoa	Ali‘i of no particular rank, a lowborn chief from one chiefly parent and one parent of no rank (also called ali‘i lepo popolo).	Ali‘i
Ali’i ho‘opilipili	A chief that had added themselves to a genealogy	Ali‘i
Ali‘i maka‘āinana	Ali‘i born in the country to high chief parents. They lived amongst the maka‘āinana as regular people.	Ali‘i
Konohiki	Relatives of ruling chiefs appointed to supervise the distribution and use of land and resources. Also served as tax collectors	Konohiki
‘Oihana kāhuna	Superior priesthood profession, entered into by papa ali‘i chiefly class. Nearly the same status as kapu ali‘i	Kahuna
Papa kahuna pule	The priesthood, of the papa ali‘i class. Held high kapus	Kahuna
Papa kaula	Order of prophets tasked with foretelling important future events.	Kahuna
Papa hulihonua	Land experts who knew the configuration of the earth	Kahuna
Papa kuhikuhi pu‘uone	Priests who knew how to locate sites	Kahuna
Papa kilokilo lani	Priests who could read signs in the sky	Kahuna
Kilo hoku	Priests who studies the stars	Kahuna
Kilo ‘opua	Priests who read the signs in the clouds	Kahuna
Kilo honua	Priests who read the sings in the earth	Kahuna
Papa ku‘ialua	Experts in lua fighting	Kahuna
Papa lonomakaihe	Experts in spear throwing	Kahuna[18]
Maka‘āinana	A class most commonly referred to as commoners that also included some people of chiefly rank or prominence. It was said that the well-being of the land was in their hands. Backcountry folk were called kua‘āina.	Maka‘āinana
Hūpoenui	Children of one parent that was an outcast (kauwā), considered half outcast	Maka‘āinana
Papa kauwa	Outcasts, landless people. Despised by others, free-eating (kauwa ‘quinoa), load carrying (kauwa kuapa‘a), with tatted foreheads (kauwa makawela) and red-eyed (kauwā makawela).	Maka‘āinana

Table 4.1: Class status and description

The description of each rank within the larger classes of chief and commoner indicate the importance of lineage which confirms the hereditary nature of power. In addition, these ranks illustrate the finely graduated classes without distinct separations (Linnekin 1990:95)

[18] This list of kahuna only covers those classes described by Kamakau (1991b:8), which he follows with the statement that many others existed.

suggesting finely graduated architectural features designed to suit the needs of the people that belong to each of these classes.
Land management and distribution practices illustrates the different care taking roles played by aliʻi and makaʻāinana. The decree made by the first implementor of the ahupuaʻa system, Māʻili-kukahi, commanded all people to "cultivate the land, raise pigs and dogs and fowl, and take the produce for food", further warning the aliʻi against stealing from one another or plundering makaʻāinana (Kamakau 1991a:55). From the outset, this system was meant to be one of mutual support through shared resources and protection. Malo (1951:53) confirms this protective relationship in his description of aliʻi as protector of the oppressed. The executive duties that accompanied this task were leading warriors, deciding important state decisions, presiding over ceremonies (including the Makahiki celebration), collecting yearly taxes, and controlling the distribution of land (Malo 1951:53). Resources were redistributed to the people by the aliʻi during the time of the Makahiki festival as discussed by Malo, Kamakau, and ʻĪʻī. All three describe kings inviting people to distribute the goods they obtained and in doing so, the aliʻi provide sustenance and support to their people (ʻĪʻī 1959:76; Kamakau 1964:21; Malo 1951:194). Kamakau (1961:378) compared this relationship to that of parents with their children, exhibiting the qualities of "generosity, fairness, and caring for the commoners" (Linnekin 1990:81) most highly prized in aliʻi.

Unlike the itinerant nature of the aliʻi, makaʻāinana were rooted to the land, a concept connected to the Kumulipo origin chant and enacted through the social and political organization of the landscape. Makaʻāinana were defined by their profession (farmers, fishermen, house builders, etc.) and their location (back country versus political center) (Malo 1951:61). Although common people were not restricted from moving across the landscape, most people remained in the place where their ancestors had worked, died, and were buried, symbolizing eternal connection to the ʻāina. The tie to the land through ancestral burials resulted in "inherent love of the land of one's birth inherited from one's ancestors, so that men do not [willingly] wander from place to place but remain on the land of their ancestors" (Kamakau 1992:376). From this description of the connection between the makaʻāinana and their ʻāina, it is clear that while commoners were not allowed to trace their lineage to specific ancestors through time, their heritage was connected to the land—in a sense, the ʻāina was their ancestor. By contrast, the aliʻi retained the history of their kinship to a line of descendants but were disassociated from place and space. The moʻolelo draw out this connection, stating that the makaʻāinana were fixed residents of the land as opposed to the aliʻi that moved from one district to another (Malo 1951:61). Early missionaries also recorded this practice—Ellis (1969:417) wrote that the commoners "are generally considered attached to the soil, and are transferred with the land from one chief to another." This cultural connection to the land was reinforced through political measures with konohiki legitimizing commoner's claims through the continued allocation of use rights to descendants "as long as the holder met the chief's tributary and labor requirements" (Linnekin 1990:86).

While the relationship between the classes was said to be mutually beneficial, Malo (1951:60-61) expressed a more negative view of the common people, describing the origin of makaʻāinana in terms of family lines that grew from banishment and disgust. Further, he outlines the condition of the common people as subjected to burdensome tasks and oppressed by their aliʻi, forced to endure in order to purchase favor from the ruling elite. This 'favor' was earned through providing food, cloth and matting to the aliʻi along with labor for building their houses and armies for fighting their wars. Malo argued that makaʻāinana became separated from the aliʻi classes due to the very fixedness that defined the common people and the tendency for aliʻi to move from place to place. In addition, few people knowingly saw high chiefs, particularly in the back districts like Nuʻu, due to the concern for the safety of the kamaʻāina unaccustomed to interacting appropriately with a kapu aliʻi (Kamakau 1991b:10). These precautions likely played a role in the isolation of people within their own classes which increased the social division between the elite and commoners while leading to the development of social centers specifically for elite, evidenced in descriptions of life ways that differed between the out districts and the aliʻi nui residence.[19]

Kaupō, the moku within which Nuʻu is located, provides an exceptional example for looking at the relationships of power between the aliʻi and makaʻāinana. At the turn of the 18th century, Kaupō became the royal seat for King Kekaulike who was at the time waring with the king of Hawaiʻi island (Cachola-Abad 2000; Baer 2015; Kamakau 1961). The increase in residents associated with the range of classes following the shifting center of power led to a more robust and varied built landscape, providing material evidence to which the power relationships discussed in historical documents can be compared. Archaeological remains suggest that the historic Paukū region, located at the center of Kaupō, was the region's primary food producer and the location where the majority of commoners lived (Baer 2015:152). Here, architecture associated with commoner house sites, agricultural shrines, and intensified agricultural fields were found that evidenced the increased presence of people in this region and production for political purposes. The Mokulau area by contrast was an important sociopolitical center where the primary residence of the aliʻi classes, dense ritual features, and elaborated agricultural features were evidenced through the surviving architectural features (Baer 2015:152). Temples were located along the western edge of Nuʻu (also the western edge of the Kaupō moku) and the eastern edge of Kaupō which demarcate the important social centers (Baer 2015:152). These sites were constructed earlier than Kekaulike's movement of the seat of power to Kaupō, but archaeological data from the continued maintenance and reuse speak to the power relationships between aliʻi and makaʻāinana in Kaupō. The radiocarbon dates analyzed by Baer (2015) suggest a thriving community in Kaupō before the arrival of Kekaulike, which would have included lesser chiefs and commoners alike. The boom in population associated with an increased amount of community architectural features in Kaupō indicate that the community was well established in the 1600s around the time that power was consolidated by the elites. However, the establishment of the sociopolitical center in Mokulau that was separate from the primary population centers elsewhere evidences separation of the communities of higher status individuals from the common people in this district.

Similar settlement patterns in nearby Kahikinui provide physical evidence that illuminate how the idealized power relationships within the community took shape in daily life. Early records from Walker's exploration of the southeast Maui district recorded the previous existence of numerous villages with similar architectural features seen in Kaupō and elsewhere—canoe sheds, storage locations, pens, shrines, burials, heiau, and houses ranging in size including those with several platforms and enclosures within the confines of the site (Walker 1930:66-71 in Sterling 1998:193). The population that occupied these villages and built the ritualized landscape increased in the few centuries prior to European arrival and was sustained by the success of the sweet potato crop (Coil and Kirch 2006:84). The in-depth analysis of one of these houses, located in the middle of a group of temples, led to an interpretation of the occupant serving as a priest (Kirch et al. 2010). This priest in Kahikinui evidences access to a variety of marine and faunal resources, and to fine-grained basalt (Kirch et al 2010) that supports the higher status of priests within this community. Other

[19] See Malo 1951:63-68.

higher status households in Kahikinui showed evidence of access to high quality material and choice meats like pig, dog, and carnivorous fish, while poorer communities in the region evidenced limited access to pig, reliance on small fish, and absence of dog (Kirch and O'Day 2003:494).

Cook on political and social life

The political and social organization described above served as the backdrop to Cook's visit to the islands. Kānaka Maoli worldviews informed how the kama'āina interacted with the haole sailors. While much of the information recorded by Cook and his men was relevant only to ali'i or priestly classes, some general descriptions of the societal structure at the time were recorded that provide a basic understanding of the social structure in the 18th century that is clarified in later historical documents.

By the time Cook arrived in the Hawaiian Islands in 1778, the archipelago was divided into four kingdoms, Kaua'i, Maui, O'ahu, and Hawai'i, the last being the largest in land area (the island and kingdom from which the islands would later take their name). On the return trip to the islands in November of 1778, more information was available regarding the governmental structure of the islands. Lieutenant King explained what he learned from questioning multiple islanders: at the time of their arrival Kalani'ōpu'u ruled Hawai'i and was at war with Kahekili who was the ali'i nui of Maui and the four nearby islands. Pelei'ōhōlani ruled O'ahu at the time and was competing with Kahekili for control of Moloka'i. King (Beaglehole 1976:500) stated that Kaua'i and the rest of the islands known to the local people were governed by Keawe.

Samwell's journal incorporated the clearest description of the ruling hierarchy present in the islands at the time. Samwell (Beaglehole 1976:1188) found that Hawai'i Island was divided into six districts under the direction of different chiefs and described the highest ranking person ruling over the entire island as the king. The king's family was called he mau ali'i or ruling family. Samwell distinguishes two different status levels he observed below the ruling family, the ali'i "of the first rank" and other ali'i of lower rank. Samwell further noted that ali'i held great power over the people and high-ranking ali'i were shown respect through the prostrating kapu. These higher ranking elite employed servants to feed them. They were also known to have multiple sexual partners of both sexes. Priests were observed to possess great authority as well. They were respected for their role in taking care of the spiritual well-being of the people, and for serving as the physicians (Beaglehole 1976:1185). The only other class noted as associated with a particular profession were warriors. Samwell (Beaglehole 1976:1193) postulated that on Hawai'i island there seemed to be a specific class of men (the tallest and strongest, called kanaka koa) that served as warriors.

Classes below ali'i, today referred to as maka'āinana, were called 'inferior', 'common' people, or 'kauwa' in the journals, but did not differentiate between commoners that worked the land, servants, or slave-born commoners. There is only one mention of the lowest class of maka'āinana. Samwell briefly mentions a man who lived aboard the *Resolution* for a few days off of Hawai'i, whom he said was a kauwa, or slave-born as translated by Beaglehole (1976:1155). Samwell classified him as one of the common people, seemingly without recognizing a difference in status between the people that the more general status of commoner encompasses. Clerke also inadvertently observed the living habits of these lower status individuals, writing that some people seemingly lived in caverns and utilized the resources in the forest more often than others (specifically the wild plantains) suggesting that they do not have the same access to farmlands.

The number of individuals who occupied each class was not included in the descriptions, but the explorers estimated the population of the islands at the time of their arrival based on the amount of houses they observed. The structure of houses made this estimation difficult however. King assumed that the leeward villages were less populated based on observation of the villages from the water, but the level of cultivation and the sheer number of people that surrounded the ships and greeted the foreigners on shore in Hawaiʻi (which Clerke and King estimated as more than 10,000) led King to question this assumption (Beaglehole 1976:618).[20] Regardless of population numbers, it was clear that the makaʻāinana, while composing the largest portion of the population, were not of interest to the visiting Europeans. As with later historical documents, they focused predominately on the elite when describing acceptable social protocol.

Exchanges between the foreign visitors and islanders detail moments where the observation of proper protocol was visible regarding respectful interactions between people occupying different (or similar) social statuses. For example villagers on Hawaiʻi, Kauaʻi and Oʻahu islands prostrated themselves when Captains Clerke or Cook came ashore as they were understood to be the highest ranking men aboard the ships, similar to prostration for the aliʻi nui. The kapu for Kalaniʻōpuʻu, also manifested in prostration and other ceremonial flourishes during his visit to the *Resolution*. These displays were observed as being grandly conducted on public visits, but more private visits resulted in fewer physical displays of kapu suggesting that context was equally important as status for adherence to kapu. Exchange of gifts played an important role in appropriate social protocol. The foreign explorers were offered gifts of pigs, fruit, roots and cloth when they came on shore. At the ships, high-ranking visitors like the priest Koa brought gifts of pigs, coconuts, fruits and roots, and red cloth, the marker of high status (Beaglehole 1976:491). A chief on Hawaiʻi brought a small pig and piece of red cloth to the *Resolution* which he wrapped around Captain Cook while repeating a prayer. Hawaiʻi aliʻi Kalaniʻōpuʻu (Beaglehole 1976:476) who visited the ships with several of his canoes to barter a few small pigs. Kalaniʻōpuʻu wore a cap of black and yellow feathers along with a feather cloak that he presented to Captain Cook (Beaglehole 1976:499). At their second meeting on board the ships, Kalaniʻōpuʻu threw his feather cape around Cook's shoulders, presented the Captain several hogs and other food, his kahili and laid multiple cloaks at Cook's feet (Beaglehole 1976:512). An important woman on Hawaiʻi (Kaheana) also visited the *Resolution* off the coast of Hawaiʻi. Samwell wrote that she was a large woman, wearing red and white striped cloth, holding a fly swatter, wearing bracelets of boars tusks and a palaʻoa ornament around her neck. She presented Captain Cook with a chicken (Beaglehole 1976:1160). The exchange of gifts that were recorded in the journals showed that feathered items, cloth, and large hogs were considered the most prized products on the islands

[20] However, the ships did not spend much time in leeward Hawaiʻi island, and King did recognize that their brief observations of the land did lead him to believe that the different soil observable in northwest region of the island looked richer and just as cultivated. In addition, he noted that villages did appear to be denser in the windward regions. Relying on observations of village size and cultivation levels, King estimates a population of 100,000 people on Maui at the time and 500,000 people total in the Hawaiian islands. Estimates by Bligh put the population at roughly 242,200, which more closely aligns with later estimates but no clear answer is possible due to the influx of disease after the arrival of Europeans but before the official census in 1823 (620).

The aliʻi were not the only people to offer gifts and trade with Cook and other men aboard the ships. These exchange practices provide insight not only to the materials valued by Kānaka in the period, but also the materials each class had access to on the different islands visited. Trade served an important social role as part of the barter economy in place at that time and the foreigners often remarked on the honesty of the Kānaka Maoli in these negotiations. Common items traded by makaʻāinana and aliʻi alike were hogs, chickens, fish, taro, bananas, potatoes, yams, breadfruit, and sea salt for iron (Beaglehole 1867:269), although aliʻi tended to trade items that portrayed their higher status such as large pigs (as opposed to the smaller pigs commoners tended to trade) or feather capes as previously described. Samwell (Beaglehole 1976:1231) observed that dogs were plentiful on the islands (especially Niʻihau), but there is no mention of either Kānaka or Englishmen eating them, nor are they mentioned as items traded to the ships. The items bartered that represented the commoner's wealth were their crops and occasionally small pigs. All Kānaka regardless of status sought iron in return for the goods they supplied the Europeans, showing the value placed on this source material that was unavailable on the islands and could improve the efficacy of their tools or weapons.

Little was learned of social relations beyond kapu for aliʻi nui and the practice of gift giving or trade. However, small details mentioned as asides give some indication of what the hierarchy looked like at the time. There were some indications of power relationships, but only brief comments on punishment or control of resources. Control of community resources largely fell to aliʻi or priests. Clerke (Beaglehole 1976:543) mentioned multiple "classes" of priests inferring a hierarchy within the religions sphere that was present in this period and observed that the priests had access to "the riches of the Country which they deal out with a most liberal hand". The foreign visitors also witnessed a redistribution ceremony involving goods received from the Europeans and locally sourced. The priest Kao presented vast quantities of feathers, iron, cloth, pigs and other foods to Kalaniʻōpuʻu who selected what he wanted then in turn offered the remaining items to Cook for his choosing and distributed pigs, breadfruit, coconut and sweet potatoes not taken by the visitors to the villagers (Beaglehole 1976:517-8). The sailors astutely observed that social control was based on kapu regulations. Kapu placed on spaces, activities, food, or people by the aliʻi or priests were interpreted as methods for maintaining peace, protecting people, and curbing unsuitable behaviors. Aliʻi were also responsible for the punishments doled out upon violation of kapu, but it appeared that chiefs dealt with indiscretions differently. King observed that there seemed to be greater equality amongst the people of Kauaʻi (Beaglehole 1976:611) while on Hawaiʻi island, commoners who disobeyed the kapu expressed fear that their chief or king would kill them. On several occasions the Englishmen witnessed Hawaiʻi chiefs striking commoners for disobeying protocol. These observations suggest that while death may have been the accepted punishment for disobeying kapu, more lenient punishments were given at the discretion of the ruling chief.

Grieving and burial practices were recorded due to the death of some of the islanders during the time the ships were anchored off of Hawaiʻi island. The absence of many of the community member's front teeth suggests that the mourning practice of knocking out one's teeth after the death of their chief or loved one was practiced at the time. Clerke (Beaglehole 1976:599) and Samwell (Beaglehole 1976:1178) both mention multiple local people with missing multiple teeth. The ceremonies following the death of a person were described as occurring within the house where the death occurred, with the actual burial occurring secretly at night so that the final resting place was kept secret to avoid enemies taking the long bones for their mana. These practices seemed to be reserved for higher status individuals, however, as one lower status individual was said to have been given a sea burial and another was

buried in a more obvious location.[21] These practices parallel the description of connection to the land through burial described in the moʻolelo.
Clear social protocols dictated by kapu were followed in the 18th century, but the diversity in individual or community actions infer relative freedom enjoyed by the people within each district. Daily habits of aliʻi that were recorded by Samwell (Beaglehole 1976:1187) in on Hawaiʻi island community reflect individual activities within the communities. The days of aliʻi in the observed community began and ended with drinking kava while their evenings were spent resting in the shade while watching women and children dance (paralleling Malo's comments about aliʻi women dancing and singing hula rather than making tapa) (Beaglehole 1976:1187).[22] Outside of kapu, the makaʻāinana and even lower chiefs often acted independently of one another, mostly conforming as a community when a kapu was placed on an activity or a place. This inference highlights the importance of remaining attentive to the diversity of practice that manifests in material remains on the landscape. Although the actions of individuals, households, or even communities may have differed, the cohesion witnessed when a kapu was put in place suggests that actions were still informed by the system of beliefs that connected Kānaka Maoli to one another.

Cook on religion

Captain King observed that the people of the Hawaiian Islands engaged in more outward show of religious practices than any other people they had encountered in the Pacific (Beaglehole 1976:620). However, he maintained that while the explorers observed multiple ceremonies, they still did not have a firm grasp on the tenets of the religion. The journals mentioned the presence of heiau and/or oracle towers (as translated by Beaglehole) in most towns and described their interactions with priests but remain ignorant of the meaning or purpose of these structures or the ceremonies performed therein. Common occurrences observed at the heiau were offerings and prayers made to the deities that included sacrifices of food, animals, and, occasionally, people. Human sacrifices were a result of warfare or kapu transgressions. Cook detailed the design of one heiau he visited in Kaua'i, noting the three levels of construction, carved images along the edges, and graves of lower-status aliʻi nearby. The ceremony welcoming Cook to Hawaiʻi Island (what Sahlins 1995:55 argued was the ceremony of hānaipū or ceremonial feeding of Lono) occurred at this heiau. Following his arrival on shore he was accompanied by men who were chanting and holding "wands tipt with dogs hair" (Beaglehole 1976:504). The actual ceremony made use of pigs and kava while the makaʻāinana lay prostrate nearby. This ceremony, while more extravagant that others described contained many of the same elements that, through their use, illustrate their associated status and meaning. Kava specifically was observed to be consumed regularly socially and ceremonially, but not without uttering a prayer and pouring a portion out for a deity first (Beaglehole 1976:620). A similar practice of laying aside food for akua was recorded (Beaglehole 1976:620). The "wands tipt with dog hair" mentioned in the description of the ceremony above was one of many physical signals from the chiefs and priests given to the common people as instruction on how to behave. A shipman's journal later mentions another signal—a black flag—that an aliʻi explained was a signal to the people to remain quiet and peaceful (Beaglehole 1976:546). Beyond these minor ceremonial observations, little was ascertained about practices and meaning of the Kānaka religious system.

[21] The sea burial could have also related to family aumakua, with the locals stating their intent that sharks might ingest the body (and with it the soul of the person) thereby providing protection for the relatives of the individual through the sharks that would recognize the kin.
[22] Samwell does not specify here if these evening activities were specific to the aliʻi or activities participated in by all people.

Revisiting the built landscape and social relations through the material record

The design of the landscape indicates the relationship between classes that were distant from one another yet reliant on the same resources shared within the community. The level of resources available to households did not necessarily translate into the size or richness of the material remains according to some historical documents. William Richards (1973:26) in 1841 commented on the restrictions placed on people in displaying their available resources, stating that "none of the lower orders even if they were able ever dared to live in a large house, cook a large hog, fish with a large net, or wear the finest quality dress." This indicates that while the perceived material wealth of different kauhale may still serve as an important proxy for class status, interpreting the amount of resources available in the community is not possible outside of a community approach that compares households across status lines. Archaeological research that supports this hypothesis includes the large-scale project in Kahikinui that compared multiple kauhale across status lines, forming a picture of the preferences for or access to materials throughout the community (Holm 2006) and smaller projects in Kaupō that found a marked difference between the resource-poor houses with smaller/fewer architectural features and the larger habitation features with a wider range of material (i.e. wider variety of animals represented in the bone) (Baer 2015:161-256). Early settlement pattern studies corroborate more recent archaeological research, arguing that the amount of architectural features, the frequency of status foods, the density of formal artifacts, and topographic settings among other signifiers could be used to deduce the status of the household (Weisler and Kirch 1985:148). As we have learned from the historical documents, the people who worked the land provided many of these materials (or the workforce for the construction of the house features) to the ali‘i, and were also the people that were permanently connected to the land. Therefore, we can deduce that the religious and cultural structures dictated the different lifestyles enjoyed by the separate households but that the interplay between social and environmental factors affected the resources available to the community as a whole. Therefore, historical and archaeological data shows that the role of one household is best understood when considered within the context of their community.

The term ‘household’ signals the social unit that occupied house spaces. The composition of the household in Hawai‘i, similar to other regions in Polynesia, consisted of individuals connected to the house through social or familial ties. According to Handy and Pukui (1972:5), "The household included members of the family proper of all ages plus attached but unrelated dependents and helpers." Each household included a head of house (po‘o) who could be male or female and was not necessarily the senior member but rather whoever assumed the responsibility (Handy and Pukui 1972:5). In addition to family members, households also included ‘ohua or dependents that were not related by blood or adopted (Handy and Pukui 1972:5). These important social structures formed the foundation of community networks. The taxes given to the ali‘i on a yearly basis were not the only obligatory exchange networks in which people participated. Households within each ‘ohana, or family, were constantly engaged in the voluntary (but obligatory) sharing or exchange of goods and services (Handy and Pukui 1972:5). These exchanges frequently occurred between households that had access to different types of goods. For example, "*Ohana* living inland (*ko kulauka*), raising taro, bananas, *wauke* (for *tapa*, or barkcloth, making and *olona* (for its fibre), and needing gourds, coconuts and marine foods, would take a gift to some ‘*ohana* living near the shore (*ko kula kai*) and in return would receive fish or whatever was needed" thereby sustaining the economic life of the land (Handy and Pukui 1972:5-6). The ‘ohana was "the fundamental unit in the social organization of the Hawaiians" composed of blood relatives as well as relatives through marriage and adoption (Handy and Pukui 1972:3). The ‘ohana were connected to each other and to the ‘āina. It was through both of these connections that they learned to live on the land by coupling experience with social understanding which was acquired through “the ‘signifying practices’” of “families and extended communities” (Holm 2006:222). ‘Ohana represents social ties across the landscape by illustrating in the most general sense the feeling of connectedness people had with one another within communities tied to the same ‘āina. However, Sahlins (1992:193) argued that it would be inaccurate to interpret this term (and the social relationships it signals) as delineating a formal descent group that was “internally ranked and segmented into lineage ‘branches’ by seniority” as Handy and Pukui‘s description inferred.

The “organization of thought [and] social relations [was] imprinted on the landscape” (Douglas 1972:521) through the design of kauhale house complexes. Learning how to live on the land required manufacturing the appropriate surroundings that facilitated the daily tasks and social interactions that were deemed appropriate for each class. This process began with choosing a location to build the house complexes. The locations of the kauhale and other architectural features were purposeful. Households were expected to consult with a kuhikuhi pu‘uone[23] before building the house to ensure their safety and prosperity (Handy and Pukui 1972:7-8). Upon completion of the kauhale, the kahuna pule performed a blessing ceremony before the house was occupied (Malo 1951:121). These practices indicate the thoughtfulness with which each house was built and occupied, indicating specific social roles for the household within the community.

The physical house was called the hale, which Handy and Pukui (1972:5) deemed the functional unit of the ‘ohana. Several hale built as part of a complex were called kauhale and were the primary structuring agents for daily activities. The official Hawaiian-English dictionary definition for kauhale is as follows:

> kau.hale. loc. n. Group of houses comprising a Hawaiian home, formerly consisting of men’s eating house, women’s eating house, sleeping house, cookhouse, canoe house, etc. Term was later used even if the home included but a single house, and is sometimes used for hamlet or settlement. (Pukui and Elbert 1986:135).

Handy and Pukui (1972:4-5) described settlement on the landscape as dependent upon the resources that were the focus of the individual or family’s labor (e.g. fishermen were near the water whereas farmers built their kauhale in the fields). The placement of kauhale in these regions, however, was based on prior knowledge of landscape and the health of the household. If the kauhale was improperly built, it was said to bring “unpleasant experiences…to those who dwell there, such as sickness, a going away, constant misfortune or death” (Handy and Pukui 1972:7-8). The attention paid to the construction of the home made the design personal and not just a place to live (Handy and Pukui 1972:8). These individual needs explain the vast diversity of architectural features that have been recorded archaeologically (see Baer 2015; Kirch 1992, 2014; Van Gilder 2005; Weisler and Kirch 1985).

[23] Handy and Pukui (1972:8) wrote that the kuhikuhi pu‘uone was “The one who points out contours, the person the head of the family would consult before building a *kauhale*, a person skilled in picking good sites. Would point out where the house should stand and which direction it should face. The picking of a good site was imperative as a bad site brought trouble to the family. The *kukikuhi pu‘uone* knew that a home should not stand at the base of a cliff where there was danger of a landslide or between two ponds where there was a danger of keeping the house constantly damp and cold, where it was open to draughts and so on.”

The spatial arrangements of kauhale were a major structuring agent of kapu by the 15th century in Hawai‘i and the material record within reflects the social constructs that were embodied and enacted in daily life. The idealized images of house complexes that predate the abolishment of the kapu system in 1819 were recorded in the 19th century. The kapu system, among other regulations, required that men and women perform activities in segregated spaces within the house complex, particularly with regards to food preparation and consumption, and ritual activity. Economic tasks were also separated by gender, but perhaps not regulated by the kapu system. Under the ‘ai kapu, men and women ate separately with men handling food preparation and cooking. Of interest to household studies are the material remains produced by these gendered tasks (Malo 1951, Handy 1965, Kamakau 1976, Johnson and Earle 2000, Kirch 1985).

The 19th century Hawaiian authors (e.g. David Malo and Samuel Kamakau), and 20th century ethnohistorians (e.g. E.S.C. Handy and his associate Mary Kawena Pukui) offered a glimpse of the idealized organization for the kauhale in Hawai‘i. Tasks in the kauhale were divided by activity spaces—women were said to work in the home (beating *kapa* and weaving mats) while men worked outside (with food production and procurement) (Malo 1951). Kamakau (1976) illuminated gendered activities and household practices defined by kapu, describing the various structures built and utilized by the Hawaiians. He differentiated between elite and commoner house complexes, with the elite class possessing much larger and complete complexes (1976:96). In household construction, elite families incorporated multiple features. Handy and Pukui (1972:) listed performed Hawaiian tasks with reference to the dwelling name where each took place, describing in detail characteristics of the spaces (such as matted floors or no walls). Central to their descriptions of kauhale were the acceptable activities performed within each space by specified people (identified by sex and age).

The primary houses included in each account were defined by the rules surrounding food. The hale mua, or men’s eating-house, had a reputation in the mo‘olelo (oral and written traditions) as the most prominent structure. Women were forbidden from entering the house on pain of death. It was within the walls of the hale mua that Hawaiian men constructed their identity through time, here men and gods ate together (Handy and Pukui 1972). Once boys reached the age of nine, they were ‘pushed’ from the women’s eating house to the men’s (Handy and Pukui 1972:9).

The elite kauhale also incorporated a female eating house, called the hale ‘āina. Here, women ate with children (according to some accounts)—if male, the child moved to the men’s house for meals around the age of nine (Handy and Pukui 1972:9). Children ate with the mother, as she was considered the imbuer of cultural knowledge for at least a short while, and therefore the primary caretaker of children. Here, we see an interesting transition in the lives of male Hawaiians in which they undergo transitions through embodied identities through the course of their lives, identities that are ultimately altered through ceremony rather than changing physicality.

The women did not prepare food in the hale ‘āina, (the men cooked all meals in earthen ovens)—they merely ate and socialized in this house. Little is known of the hale ‘āina beyond its purpose, a social structure resembling the hale mua has yet to be discovered. Currently, the literature defines the women’s house by what was not present (for example all the food kapu to women like pig, turtle, and several types of bananas). Although women held powerful positions in society (several wāhine ali‘i featured prominently in mo‘olelo), dog meat remains the only food argued by some to be the luxury food of the female ruling class. However, Handy and Handy (1972:245) state that their informant Mary Kawena Pukui claimed dog only became a favorite food of the female ruling class after the death of Kamehameha and the abolishment of the kapu system. Similarly, Titcomb (1969:7) included an excerpt from Lucy Thurston's 1882 journal stating that dog was a great delicacy forbidden from passing the lips of women in ancient Hawaiʻi. Some have interpreted women as embodying a lower status compared with men due to their dietary restrictions. Although more research is required on this topic, I believe the fault to be with the perspective of the current available literature—far too many contradictions exist to presume a status of 'other' for women. For example, Malo (1951) discussed the power of female priests, Linnekin (1990) wrote about the mana imbued in the highest ranking aliʻi women, and Beckwith (1976) wrote about the power of women as a possible impetus in the establishment of the kapu system. The interpretation of the status of women will be further discussed in the next section.

The hale noa was thus named because it was considered free of kapu. Here, men, women, and children met, socialized, and slept. No eating was allowed, although some accounts talk about children breast-feeding here (Handy and Pukui 1972). Once the children came of age, they were required to eat in their respective houses. If such an event occurred, the breast-feeding age would encompass another stage in the Hawaiian life in which young children were not yet considered people.

The hale peʻa is the final structure I will discuss with regards to its importance in the elite complex. This structure was the menstrual hut within which women were sequestered once a month. Here, women cared for themselves until the isolation period was complete. Wāhine were required to enter into the hale peʻa during their menstrual cycle and were granted leave once their bleeding had ended. During the time they were confined to the hale peʻa, wāhine were barred from returning to the kauhale and kāne were barred from setting foot near the menstrual house. Other household wāhine brought food to those in the hale peʻa. To stave off boredom, days were spent weaving (Malo 1951:29; Handy and Pukui 1972: 10-11). Isolation in the hale peʻa did not revolve around the absence or presence of blood, but rather (similar to young boys in the hale ʻāina) the completion of a ceremony (Linnekin 1990). Although past ethnographers have interpreted this period of separation from the rest of the population as evidence of female pollution, Linnekin (1990) mentions that women were considered most fertile when still bleeding. Due to seemingly positive understanding of blood as a life-giving substance, I am disinclined to be convinced that women were seen as polluting in a negative sense. Rather, the actions surrounding the move to and from the hale peʻa more resemble Mary Douglas's discussion about the power one possesses as a result of "matter out of place" (1988:41). However, she describes matter out of place as a way to gain insight into concepts of pollution whereas I believe it to be a way to negate the loaded term 'pollution' entirely in favor of a more robust understanding of cultural practices. Though ethnographers explained the menstrual hut in terms of female pollution (along with the kapu on free-eating), a plausible explanation may lie in the presence of uncontrollable power associated with an unclassifiable and/or uncontrollable substance.

While the ideal composition of the kauhale incorporated all of these structures designed for specific tasks or activities, Malo (1951) explained that not all Hawaiians built such elaborate complexes. He illustrated the spectrum of living conditions in the following quotes about elite and commoner households:

> Such folks [lower class] only cared for a little shanty, anyway; the fire-place was close to their head, and the *poi* dish conveniently at hand; and so, with but one house, they made shift to get along.
>
> People who were well off, however, those of respectability, of character, persons of wealth or who belonged to the *alii* class, sought to do everything decorously and in good style; they had separate houses for themselves and for their wives.
> [Malo 1951:122]

Archaeological work also acknowledges the difference between elite and commoner kauhale:

> Kauʻāina folks were less concerned with the rigid protocols of the ʻai kapu, leaving such matters to those who lived in proximity to the ruling chiefs. (Kirch 2014:115-6)

Hiroa confirms that variability existed in the construction of houses that related to the status of the household and the family's needs. He stated that the chiefly and konohiki kauhale were large and incorporated numerous features while makaʻāinana houses were small but occasionally incorporated multiple features in order to accommodate friends or relatives (Hiroa 1957:76). The gradient in design of houses in conjunction with the many statuses of both elite and commoners confirms that one clear model for building kauhale did not exist, but rather the households constructed what was needed to suit the family's physical, spiritual, and cultural needs.

There existed different types of habitation sites and dwellings outside of the family house complex (Handy and Pukui 1991:13). Farmers working in upland forests lived in small papaʻi houses for a portion of the year, and some people built this type of temporary house on the beach (Handy and Pukui 1991:13). Canoe makers utilized similar temporary homes called kamala, and caves (lua or ana) were occasionally used as temporary shelters or for other purposes such as mat making or burials (Handy and Pukui 1991:14).

The method for construction of houses is relayed through historical documents and is a useful starting point for identifying architectural features today. Hiroa (1957:75) spoke of the ancestral knowledge Hawaiians brought with them regarding building thatched houses with "house posts (pou), ridgepoles (kauhuhu), rafters (oʻa), and thatch rafters (ʻaho)". Kamakau reviewed the development of house construction, stating that the final form was built with rows of ridge and wall posts. Wherever there was thatching material on the land, people would build houses while adhering to the rules for laying the foundation, constructing the framework, thatching the walls and roof, ceremonially cutting the thatch above the door, laying mats on the floors, and finally completing the ceremony for occupying the newly built house (Hiroa 1957:76). The houses observed on Maui as late as 1828 were said to be 8-10 feet long, 6-8 feet wide and only 4-6 feet tall without one small doorway that required occupants or visitors to crawl through (Hiroa 1957:78; Stewart 1828:182-183). These houses described by Stewart (1828:182) were observed in Lahaina. Stewart postulated that the kamaʻāina made little use of the structures outside of protecting food or clothing and were only used as shelters when the weather was cold or wet. Rather the people preferred to live outside. The houses described by Stewart were the simplest type to build because they lacked vertical walls, but rather were constructed with the roof directly supported by the ground with vertical ridge posts at each end supporting a min ridgepole in the center and rafters running diagonally over these poles (lashed using rope) that are embedded in the ground (Hiroa 1957:78). Hiroa (1957:78) hypothesizes that these were the hale most frequently built by commoners. Houses similarly constructed but with stone walls were also simple to build and were observed by Emory in Hāna on Maui as late as 1936 and in Kaupō in 1915 (Hiroa 1957:80). The stones that needed to be cleared in order to build the house were utilized to build rectangular walls (generally core-filled) of appropriate size in which the raters would be embedded instead of embedding them in the ground (Hiroa 1957:80). While the houses that Hiroa describes as belonging to this style that were observed on Maui seem to be built after the construction of houses changed following western influence and colonial impositions, the method of building stone walls from materials found on the land along with the practice of embedding the house poles in or along the stone wall can be presumed to have carried over from pre-colonial periods.

COMPONENT	DESCRIPTION	USE	ARCHITECTURAL FEATURE
HALE NOA*	House free of kapu	Sleeping house, no eating allowed. Separated into two halves, one half used as a sleeping area by the household, one half used as a sitting area for adults, play area for children.	Polygonal feature with smaller level internal surfaces. Low end: 17-24 m^2 High end: $66m^2$
HALE ʻĀINA*	Women's eating house	The space where **women** worshipped and where women and children ate together	Polygonal feature with smaller level internal surfaces. Low end: 17-24 m^2 High end: $66m^2$
HALE MUA*	Men's house	The space where **men** ate, communed with family deities, and left offerings	Polygonal feature, up to $144m^2$ in size.
HALE PEʻA*	Menstrual hut	Women were confined within this hut during monthly infirmity.	Raised platform with small hut, built away from the rest of the complex
HALE PAPAʻA	Store house	A house were inland dwellers stored tools and crops or other provisions until needed	Large or uneven internal floors. Found within or close to agricultural fields
HALE KUKU	Tapa beating hut	Where women pounded bark into tapa	Shed built next to a pen where tapa was laid out to dry (pen was made of stone and sticks)
Oven House*	for imu ovens	Used when cooking needed to be done inside, two imu ovens would be needed--**one for men and one for women**.	Shed built to block the wind and keep out rain

Table 4.2: Features in a kauhale and their descriptions.

Figure 4.4: Reconstruction of a Hawaiian hale on Kauaʻi at Kauaʻi Museum.

Cook on Houses

Samwell (Beaglehole 1976:1176) described the villages on Hawaiʻi Island as composed of 60-80 houses. The houses were built close together but lacking in any regular pattern. Streets were not included in these villages, but rather paths ran through the houses "in a zig zag manner" (Beaglehole 1976:1176). The best houses were said to be on Kauaʻi (Beaglehole 1976:626) although the men wrote about the similarities observed in the construction of houses between the different islands. Clerke and Cook confirmed that they noticed no difference in house construction on the islands they sailed past or in the villages they visited.

Houses were described as visually similar to corn stacks, varying in size from caverns in the lava to small huts and fifty-foot long dwellings. The walls were low and roofs high, with two flat sides inclined toward one another. Samwell (Beaglehole 1976:1176) noted that the houses were generally small at approximately six to seven yards long and four yards wide and about as tall as they are long. The framing was made with wood, and dry grass or sugar cane leaves were used for thatching. The thatched sides of the house were built nearly perpendicular and almost reached the ground according to Samwell (Beaglehole 1976:1176). Low doors (framed with wood and equipped with sliders for closing) required that a person crawl through to enter the house. No windows were observed, but when light was needed, a hole could be opened in the side of the wall. Samwell observed that the larger aliʻi houses on Hawaiʻi island built fires in the middle of the house floor in a square area surrounded by wood planks (Beaglehole 1976:1163).[24] Most of the houses were built with courts or large squares walled in. The courts were paved with ʻiliʻili and used to dry and stain kapa cloth. Cook noted that the floors in the houses were covered with hay, then mats on which the people slept that were kept clean. Clerke confirmed that their main furniture was also the

[24] Beaglehole notes that these fires were likely for warmth and not cooking, although Malo and Kamakau make clear that fires in the house were also used to rewarm food.

matting laid on the floor for sleeping and vast amounts of cloth for different purposes (Beaglehole 1976:598). The mats would occasionally be colored, but not as finely as the kapa cloth (Beaglehole 1976:283). The only other furniture observed by Samwell (Beaglehole 1976:1176) in the houses on Hawaiʻi Island were shelves made of long pieces of wood on which they placed bowls and hang gourds of water and other household items. In addition, Samwell mentioned that carved images of akua were also abundant in the houses (Beaglehole 1976:1185). The images were described as made with wicker and feathers with human hair and dogs teeth that are knocked out in the same manner as human teeth at the death of a chief (Beaglehole 1976:1185)[25], or as carved wooden images on poles. The houses were connected into villages like those seen from the water (Beaglehole 1976:283) in which families living together in the thatched houses with their hogs and dogs (Beaglehole 1976:1321). Although the descriptions of houses mostly focused on construction, material culture, and village life, the presence of kauhale were referenced in the description of houses as connected to one another (Beaglehole 1976:618).

While each district observed by the ships produced similar crops, the resources available to the locals were impacted by the unique geological features of the region. Alongside the villages in Kauaiʻi, Cook noted plantations of wet-land taro bounded by plantain trees, sugar cane, coconut trees, breadfruit tress, and paper mulberry trees. Similarly, during the short stop on the northwest coast of Oʻahu island King (Beaglehole 1976:583) noted extensive cultivation and large villages similar to that of the other islands. King wrote about several houses along the water in southwest Maui but thought the upland to be barren whereas the western end of the island was covered with houses and coconut trees (Beaglehole 1976:583). Samwell, however, observed the open plains below the tree line on southwest where houses were built and plantations of sweet potatoes and dry-land taro were planted—sheer cliffs prevented the construction of houses too close to the shoreline in this region however (Beaglehole 1976:1151).[26] The difference between dry-land and wetland farming practices was noted, with the dryland taro and sweet potatoes planted along mounds four feet from one another—taro left bare to the root and sweet potatoes covered in light mulch (Beaglehole 1976:521). Towns on the leeward side of Hawaiʻi Island were built extending along the shore[1127] and backed up by their plantations of potatoes, dry-land taro, sugar canes and plantains. At the back of the village in Kealakekua Bay, with its houses built closely together, the surface of the ground was covered with sweet potatoes and paper mulberry trees (Beaglehole 1976:521). Behind this area, King noted breadfruit trees growing. Even further upland an exploratory party observed an extensively cultivated area of taro, sweet potato and paper mulberry, with walls separating plots along which plantain and breadfruit trees grew. The walls hid behind sugar cane that was planted on either side (Beaglehole 1976:521). In order to access "rich loam" for crops, locals needed to dig through the "Cindars" up to six feet (Beaglehole 1976:592). These plantations were said to be divided by walls, which Clerke interpreted as personal property (Beaglehole 1976:592), but which were instead likely separation between plots historically worked by different households or associated with different ahupuaʻa. Sugar cane grew along these stone walls giving the appearance of a green fence (Beaglehole 1976:592). In many places, Clerke observed that the plantations continue up the mountainside approximately seven miles, meeting with the tree line (Beaglehole

[25] This and the hula anklets are the only mention of dogs in the journals aside from a brief comment Samwell makes about the presence of dogs and rats on Hawaiʻi island (Beaglehole 1976:1188).
[26] It is not clear whether King and Samwell are talking about the same area of Maui here. While both reference the southern side, King talks about one area with houses along the seashore where the land slopes to the ocean and another region that appears desolate.
[27] Three such villages were observed built along the shore at Kealakekua Bay (Beaglehole 1976:592)

1976:592). While off the coast of Lana‘i, Samwell (Beaglehole 1976:1220) was told by the locals that breadfruit and plantains did not grow on the island but plenty of yams, taro and sweet potatoes were available. Samwell did not see a tree of any kind growing on Lana‘i, Moloka‘i or Ni‘ihau. Upon sailing around Molokai‘i, Captain Clerke observed fires burning along the shore where houses were built, but noted less cultivation here. The people of Ni‘ihau did not have much to offer either, trading sea salt, salted fish, and yams, which Cook and King referred to as their chief produce. Upon leaving Kaua‘i, Cook remarks that the only abundant food in the villages he visited were sweet potatoes (which he stated were the largest he had ever seen) and taro (Beaglehole 1967:278). He also observed that hogs, dogs and fowls were kept by the people of Kaua‘i. King later noted that dogs were also abundant on Lanai‘i. Although the differences in agriculture between islands were subtle, they inform us of how the geology of the regions affected human-environmental interaction, which in turn affected daily life.

Captain Cook and his men collected plant and animal specimens from the Hawaiian Islands for identification purposes. The plants listed below in Table 4.2 provide insight into the landscape of the period. While some of the plants grew wild, most were cultivated and used for specific purposes by the communities at that time. These identifications assist with understanding the alteration of the landscape at the time for agricultural purposes as well as providing insight into the raw materials available for and used in known activities that were occurring in and around the house features.

Scientific Name	Hawaiian Name	English Name
Aleurites moluccana	Kukui	Candlenut Tree
Artocarpus incisus	‘Ulu	Breadfruit Tree
Kokia drynarioides	Koki‘o	Silk Cotton Tree
Pritchardia	Loulu	Palm Tree
Colocasia antiquorum	Kalo	Taro
Capparis sandwichiana	Maiapilo	Caper Bush
Cassia gaudichaudii	Kolomona	Wild Sena
Cocos nucifera	Niu	Coconut
Ipomoea batatas[28]	‘Uala	Sweet Potato
I. pes caprae	Pohuehue	Wild Ipomoea sp., inedible
I. congesta	Koali‘awa	Sweet Potato
I. cairica	Koali‘ai	Wild Ipomoea sp., inedible
Cucurbita lagenaria	Ipu or Hue	Gourd
Jussiaea suffruticosa		Primrose Willow
Cyanea solanacea[29]	‘Oha kepau	Lobelia Tree

[28] This and the following three species of sweet potato are the inferred species by Beaglehole based on Clerke’s note on page 601 that there were four species of sweet potato which he classified under the term “Convolvulus”.
[29] This is another Beaglehole inference as the plant that Clerke recorded and described, Euphorbia (or Euphorbia splendens) is not native to Hawai‘i and was an import from Madagascar. The scientific names in this table were those used at the time, many of which were later revised.

Dioscorea alata	Uhi	Yams
Bambusa vulgaris	‘Ohe	Bamboo Cane
Caesalpina crista	Kakalaioa	Nicker Tree
Hibiscus tiliaceus[30]	Hau	Hibiscus
Tacca leontopetaloides	Pia	Polynesian Arrowroot
Indigofera suffruticosa	‘Iniko or Kolu	Indigo
Broussonetia papyrifera	Wauke	Paper Mulberry Tree
Musa spp.	Maia	Banana (three types observed)
Oxalis corniculata	‘Ihi	Wood Sorral
Phylotacca sandwicensis	Poplo kumai	Hawaiian Pokeberry
Rubus hawaiiensis	‘Akala	Raspberry
Saccharum officinarum	Ko or To	Sugar Cane
Sida fallax	‘Ilima	Indian Mallow[31]
Sophora chrysophylla	‘Mamane[32]	
Urera sandwicensis	Opuhe	Indian Mallow[33]
Eugenia malaccensis	‘Ohi‘a or ‘Ohi‘a ‘ai	Mountain Apple
Pandanus odoratissimus	Hala	Palm[34]

Table 4.2: List of Hawaiian plants from Captain Clerke’s journal. Although Clerke does not include kava in his list of plants, the kava drink was mentioned multiple times by Clerke, Cook and King when referencing ceremonies and the propensity of some Hawai‘i island chiefs to over indulge.

Gender in Kauhale[35]

The paucity of intensive work on gendered roles, specifically wāhine in Hawaiian households, limits the analysis of kauhale spaces that can be completed. However, some anthropological research projects undertaken in the last few decades have questioned normative interpretations of the historic status of Hawaiian women. Anthropologist Jocelyn Linnekin (1990:14) in particular, detailed the importance of female tasks to Hawaiian societal structure, stating “they manufactured some of the highest valuable [items] of the society—mats, tapas, loincloths, and possibly feather cloaks…”. Hawaiian scholars have also grown concerned with the characterization of their ancestors in scholarly literature. Noenoe Silva

30 There were many varieties of Hibiscus, Clerke does not specify a species. The species specification was done by Beaglehole
31 Beaglehole notes that the small yellow flowers were used in leis.
32 No English name is given by Clerke or Beaglehole, but Beaglehole mentions that this tall tree was used in house construction and for runners on sleds.
33 Clerke lists this plant as Urena, but Beaglehole comments that Urena was not likely to be in Hawai‘i at this time. Urera sandwicensis was present and its bark was used for fishing nets.
34 The palm leaves used to make sails.
35 See Appendix A for additional information on gender in kauhale from the mo‘olelo

argues for the sacredness of her wāhine ancestors and Julie Kaomea critiqued curricula taught in contemporary schools that characterize ancient Hawaiian women as oppressed. Scholars like Kaomea, Silva, Kauanui, Hall, and Linnekin are arguing that the status of women in ancient Hawaiʻi has been significantly understudied and underestimated.

Archaeological work on the household that incorporates a discussion of gender does so primarily as an explanation for the ʻai kapu (eating taboo) which necessitated many of the structures described in the previous section. While gender is considered an important status for structuring the kauhale, household archaeological studies infrequently move from investigating the use of space by considering different structuring agents, to interpreting gendered relationships and roles through the surviving remains. In addition, features like the hale mua that are associated with men are given preferential treatment in archaeological research, which (intentionally or not) elevates the status of men through our interpretations. Important research that bucks these trends are the projects conducted in Kahikinui that evaluate why double hearths were found in households there (e.g. Kirch and OʻDay 2003; Kirch 2014; Van Gilder 2005) or research that questions the intersections between women, status, and luxury food (Kirch and OʻDay 2003). Studies that look to the diversity in the material record rather than universalizing patterns and question earlier interpretations of wāhine as lazy and oppressed (reaching back to the era of Cook and the missionaries) bring archaeology closer to critically analyzing rather than assuming the many roles of ancient wāhine. Here I review our current understanding of how the physical environment was built to reflect gender constructs, then present an alternative interpretive framework to normative explanations that see the early Hawaiian gender structures as rigid practices that devalued women.

Eating Under the *Kapu* System (Ideal)	
"The husband was burdened and wearied with the preparation of two ovens of food, one for himself and a separate one for his wife"	Malo 1951:27
"The man first started an oven of food for his wife, and, when that was done, he went to the house [called] *mua* and started an oven of food for himself. Then he would return to the house and open his wife's oven, peel the *taro*, pound it into *poi,* knead it and put it into the calabash. This ended the food-cooking for his wife."	Malo 1951:27
"Then he must return to *mua,* open his own oven, peel the *taro*, pound and knead it into *poi*, put the mass into a (separate) calabash for himself and remove the lumps. Thus did he prepare his food (*ai*, vegetable food); and thus was he ever compelled to do so long as he and his wife lived"	Malo 1951:27
"During the days of religious tabu, when the gods were specially worshipped, many women were put to death by reason of infraction of some tabu. According to the tabu a woman must live entirely apart from her husband during the period of her infirmity; she always ate in her own house, and the man ate in the house called *mua*. As a result of this custom, the mutual love of the man and his wife was not kept warm; the man might use this opportunity to associate with another woman, likewise the woman with another man."	Malo 1951:28
"It has not been stated who was the author of this [ʻ*ai*] tabu that prohibited the mingling of the sexes while partaking of food. It was no doubt a very ancient practice; possibly dates from the time of Wakea; but it may be subsequent to that…It is stated in one of the traditions relating to the gods that the motive of the tabu restricting eating was the desire on the part of Wakea to keep secret his incestuous intercourse with Hoo-hoku-ka-lani. For this reason he devised a plan by which he might escape the observation of Papa; and he according lt appointed certain nights for prayer and religious observance, and at the same time tabued certain articles of food to women, The reason for this arrangement was not communicated to Papa, and she incautiously consented to it, and thus the tabu was established. The truth of this story I cannot vouch for."	Malo 1951:28
ʻAi kapu abolished on the third or fourth day of October, 1819 by Kamehameha II (Liholiho)	Malo 1951:29
"The house in which the men ate was called the *mua*...the house in which the women ate was called the *hale aina*. These houses were the ones to which the restrictions and tabu applied…"	Malo 1951:29

Samwell assumes that eating fish appears to be below high-status individuals due to a high-ranking individual rejecting the Europeans' offer of fish, stating that it was "the food of women" However, Samwell proposes no additional evidence regarding this assumption. .	Beaglehole 1967:1184
Contradictions to Eating Under the *Kapu* System	
"While the husband was busy and exhausted with all these labors [constructing the *hale*], the wife had to cook and serve the food for her husband, and thus it fell that the burdens that lay upon the woman were even heavier than those allotted to the man"	Malo 1951:28
"The effect of this [*'ai kapu*] tabu, which bore equally on men and women, was to separate men and women, husbands and wives from each other when partaking of food"	Malo 1951:29
"The man, however, was permitted to enter his wife's eating house, but the woman was forbidden to enter her husband's *mua*"	Malo 1951:29
"Certain men were appointed to an office in the service of the female chiefs and women of high station which was termed *ai-noa*. It was their duty to prepare the food of these chief women and it was permitted them at all times to eat in their presence, for which they were termed *ai-noa*--to eat in common--or *ai-puhiu.*"	Malo 1951:30

Table 4.3: Descriptions of eating in the Kauhale from mo'olelo

The tangible archaeological features associated most closely with gender kapu in kauhale were the dual imu or earth ovens, the eating houses (hale mua and hale 'āina), and the menstrual house (hale pe'a). As discussed in the previous section, wāhine and kāne were ideally required to eat in separate structures according to the 'ai kapu. In addition, kāne took care of all food preparation and cooking using separate features so that the 'ai or food for men and women did not touch. The hale mua was also an important place for male worship.

David Malo (1951) divulges a possible origin story for the strict Hawaiian kapu structure in his discussion regarding the rules and regulations associated with eating:

> There is, however, a tradition accepted by some that Wakea himself was the originator of this [separation] tabu…it is stated in one of the traditions relating to the gods that the motive of the tabu restricting eating was the desire on the part of Wakea to keep secret his incestuous intercourse with Hoo-hoku-ka-lani. For this reason he devised a plan by which he might escape the observation of Papa ; and he accordingly appointed certain nights for prayer and religious observance, and at the same time tabued certain articles of food to women. The reason for this was not communicated to Papa and she incautiously consented to it, and thus the tabu was established. (Malo 1951:28)

Here, Malo is referencing Papa, "a goddess of earth and the underworld and mother of gods" (Beckwith 1976:294) and her husband Wakea, "god of light and of the heavens" (Beckwith 1976:294). From this husband and wife and their children come the people of Hawai'i. Beckwith corroborates the story of incest told by Malo, but also relays the story of a struggle that enforces separation of the chiefly class from the commoner class that results in the imposing of tabus, "especially related to women, by which so powerful a weapon is placed in the hands of the new theocracy" (Beckwith 1976:294). Although Malo states he cannot ensure the truthfulness of the kapu origins, the connection with Beckwith's research and other oral histories regarding the political atmosphere of fifteenth century Hawai'i provides a more robust understanding of this highly politicized religious system.

Beyond the mythology, there exists little evidence that can establish the time period or century within which the eating kapu began. However, Kamakau (1991:223) asserts "the old chiefs may not have been under so strict tabu, since the strict tabus are said to date back not more than three hundred years, but they must have preserved such tabus as were observed by tabu chiefs inside the house". This statement implies that kapu related to kauhale intensified approximately three centuries previous to the time of Kamehameha, which places the establishment of the food restrictions around the same time as Māʻilikūkahi's reign and the division of the land into the ahupua'a system.

The intensification of the kapu on free eating corresponds with this increase in power held by the ruling class over the land and its people. According to Kamakau, the kapu upon free eating was in place as a way for the aliʻi to substantiate and retain their power over the makaʻāinana; "The eating tabu belonged to the tabus of the gods; it was forbidden by the god and held sacred by all. It was this tabu that gave the chiefs their high station" (1992:223-4). By following the food kapu, the aliʻi were recognizing their lineage and paying homage to the gods in order to remain in power. The household played an important role as it was a constant reminder of the mythology that reinforced the legitimacy of chiefly power. The hale mua is the most extensively researched house within the complex and is an appropriate starting point. It was within the walls of the hale mua that kāne constructed their identity, here men and gods ate together (Handy and Pukui 1972). The cycle of cultural transmission within the hale mua began with historically situated memory that incorporated emotion, embodied recollections, a sense of historicity, and a nostalgia for an imagined or real past and created tradition (Holtzman 2006). The elite men who partook of food in the hale mua performed these types of cultural memories that formed the preferred *taste* (taking from Bourdieu 1984). This taste in turn symbolized the lifestyle and identity of the men who were internalizing the structure (Bourdieu 1984). The Hawaiian literature strongly associated certain 'luxury' (i.e. fatty, greasy) foods with the male gender (Kirch & O'Day 2003)—aliʻi were often recognized by their large bodies and greasy skin. Traditionally we are told that pig was the primary Hawaiian male elite food, but a long list of luxury items can be interpreted as men's food due to their status as kapu to women. Handy and Pukui (1972) list such items followed by an interpretation for why women were forbidden from consuming them:

> Pork: Related to the god Lono
> Bananas: The body of Kanaloa
> Coconuts: The body of Ku
> Ulua: Offered to Ku
> Kumu: Offering in various rituals
> Niuhi shark: Symbol of the high chief
> Turtle: Probably a form of Kanaloa
> Sea Tortoise: Probably a form of Kanaloa
> Porpoise: Probably a form of Kanaloa
> Whale: A form of Kanaloa
> Sting Ray: Probably a form of Kanaloa
> (Handy and Pukui 1972:177)[12]

As evidenced by this list, the foods consumed by men were connected with male akua or religious rituals associated with male akua. If Handy and Pukui's associations are accurate (and they too are subject to their particular historical context), the men were physically eating the oral tradition as a means of reproducing, creating, and recreating more 'traditional' identities. Unfortunately, the ethnohistoric documents write little about female worship, therefore it is difficult to say whether foods associated with female deities are kapu to men; this is a topic that will be investigated through the material record in the subsequent chapters.

[12] Silva also mentions this connection between the akua and the ʻai kapu

The separations of activities related to bodily functions (isolation in the hale peʻa or sleeping arrangements in the hale noa) that were also dictated by kapu were not dictated by modesty or shame as seen in other areas of the world. Girls would have witnessed their female relatives traveling to the hale peʻa throughout their lives and children were initiated early into sex (Handy and Pukui 1972:95, 110). Openness about anatomical differences, sexuality, and reproduction were also an integral part of daily life with family members sleeping together in the hale noa and sexual activities of legendary figures included in storytelling, chants, and hulas (Gutmanis 2001:31). In addition, wāhine and kāne were equally free to choose multiple sexual partners. This openness about bodies and sexuality supports the inference that taboos influencing the performance of gender were in place to protect the spirit rather than the body.

Linnekin's work is relevant to the current discussion, as she addresses the misinterpretation of wāhine restrictions in the house. Female food restrictions, namely tabus against consumption of sea turtle, porpoise, and whale (Linnekin 1990:15) are reinterpreted consideration for cultural values and spiritual beliefs. Men did the majority of the cooking, as was common elsewhere in Polynesia, but took care to cook the female food in separate imu so as not to mix the mana (or spirit) of the sexes (Linnekin 1990:15). The distinction Linnekin makes here is crucial, taking care to describe the practices as avoiding mixing rather than fear of pollution that only flows in one direction from female to male. Her interpretation suggests that kapu were concerned with maintaining balance between two equally powerful forces rather than elevating one of these forces over the other.

Hawaiian Name	Scientific Name	English Name	Association	Additional info	Source
Pahu	?	Name of a fish	Set apart for the exclusive use of man	if a woman was clearly detected in eating this, she was put to death	Malo 1951:29
Kakā, pīwai	*Anas wyvilliana*	Duck	Food for all	Fine eating	Malo 1951:39
Kalo stalks	Araceae	Petioles (Taro) Stalks	Cooked as greens, favored in the diet	Especially for women at the end of pregnancy	Handy and Handy 1972:116
Kalo	*Arum esculentum*	Taro	Food staple for all	When beaten into *poi,* or made up into bundles of hard *poi,* called *pai-ai*, *omao,* or *holo-ai,* it is a delicious food. The young and tender leaves are cooked and eaten as greens called *lu-au,* likewise the stems under the name *ha-ha.* There are many varieties of *taro,* named according to color. Cooked in *imu* or *imu lua* about 18 inches deep. Fuel was first set on fire to heat cooking stones stacked atop. Once fire was out, ashes were prodded and stones were leveled, ti, banana leaves, grass, or seaweed was laid on top of hot stones (roundish stream or beach boulders of porous lava), and washed corms were placed on top, then coarsely woven mats, banana or tea leaves. Cooked anywhere from two to six hours	Handy and Handy 1972:111
Hahalua hihimanu, Hailipo	*Batoidea*	Ray	Set apart for the exclusive use of man	if a woman was clearly detected in eating this, she was put to death, related to the god Kanaloa	Malo 1951:29
ʻĪlio	*Canis lupus familiaris*	Dog	Food for aliʻi kāne previous to abolishment of the kapu	"Mrs. Pukui says that after Kamehameha the Great's death and the abolition of *kapu* relating to eating, dog meat came to be regarded as food primarily for women (hitherto it had been forbidden them)" "Natives consider baked dog a great delicacy, too much so…ever to allow it to pass the lips of women."	Handy and Handy 1991:245 Titcomb 1969:7
ʻUlua	*Carangidae*	Species of crevalle, jack or pompano fish	Set apart for the exclusive use of man	if a woman was clearly detected in eating this, she was put to death, related to the god Ku. Offered as a sacrifice in place of humans to Kuʻula	Malo 1951:29, Handy and Pukui 1972:177; Handy and Handy 1972:78
ʻOpihi	*Cellana sp.*	Limpets	Food for all	Food from the rocky shoreline	
Koholā	*Cetaceans*	Whale	Set apart for the exclusive use of man	if a woman was clearly detected in eating this, she was put to death, related to the god Kanaloa. Property of the king	Malo 1951:29, 37, 47; Handy and Pukui 1972:177
Pāpaʻi	*Charybdis hawaiensis*	Crab	Food for all	Good food	Malo 1951:45
E-a	*Cheloniidae*	Sea Turtle	Set apart for the exclusive use of man, most important animal, related to the god Lono	Furnished tortoise shell, if a woman was learly detected in eating this, she was put to death	Malo 1951:29, Handy and Pukui 1972

Niu	*Cocos nucifera*	Coconuts	Set apart for the exclusive use of man	if a woman was clearly detected in eating this, she was put to death, related to the god Ku	Malo 1951:29, Handy and Pukui 1972:177
Wana	*Echinoidea sp.*	Sea urchin	Food for all	Sea urchin meat was called alelo, poke ʻina. Sea urchin sauce was called kai ʻina	Pukui and Elbert 1086:520
Moa	*Gallus gallus*	Jungle Fowl	Food for all	Delicious to eat, used as sacrifice	Malo 1951:38, Handy and Handy 1972
Ōpae, mahiki	*Halocaridina rubra*	Shrimp	Food for all	Mahiki used ceremonially	Malo 1951:45, Pukui and Elbert 1986:524
ʻUala	*Ipomea batatas*	Sweet potato	Food staple for all	Important food staple in kuaʻāina regions	Abbott 1992:28-32; Handy and Handy 1972
Hīnālea	Labroides phthirophagus	Wrasse	Food for all	some of the most common fish on the islands and were not utilized ceremonially. Caught using hook and line fishing	Titcomb 1952; Kirch 1982:469
ʻAmaʻama and Uouoa	*Mugil cephalus* and *Neomyxus leuciscus*	Mullet	Food for all	Swim along the shore	
Multiple animals	*Multiple species*	Sea Bird	Food for all	fine eating and some used for feathers to make kahili	Malo 1951:37
Multiple animals	*Multiple species*	Pronged sea creature	Food for all	Good food	Malo 1951:45
Niuhi	*Multiple species*	Shark	Set apart for the exclusive use of man	if a woman was clearly detected in eating this, she was put to death	Malo 1951:29
Puhi	*Muraenidae*	Eel	Food for all	Freshwater fish. Food resource, considered the best food	Malo 1951:45; Hiroa 1957:319
Maiʻa	*Musa sp.*	Bananas	Set apart for the exclusive use of man	if a woman was clearly detected in eating this, she was put to death	Malo 1951:29
Pipipi	*Nerita sp.*	Sea snail	Food for all	Excellent eating	Malo 1951:45
Na-ia, Nuao	*Phocoenidae*	porpoise	Set apart for the exclusive use of man	if a woman was clearly detected in eating this, she was put to death, related to the god Kanaloa. Set aside for the purpose of the king	Malo 1951:29; 47, Handy and Pukui 1972:177
Puaʻa	*Sus scrofa*	Pork	Set apart for the exclusive use of man, most important animal, related to the god Lono	if a woman was clearly detected in eating this, she was put to death	Malo 1951:29, 37, Handy and Pukui 1972:177
Kumu	*Trachichthyidae* and *Berycidae*	Red Fish	Set apart for the exclusive use of man	Used in sacrifice, if a woman was clearly detected in eating this, she was put to death. Placed under house post as offering	Malo 1951:29; Handy and Handy 1972:116

Table 4.4: Food eaten by Hawaiians with the associated social status.

Another assumption made about gendered interactions regarding the rigidity and static nature of kapu is also addressed by Linnekin. Although kāne and wāhine are often depicted as ideally living in separate spheres due to the prohibitions placed on their daily actions, the lived experience suggests that both men and women enjoyed some level of autonomy regardless of their class status (Linnekin 1990:113). Commoners, however, likely enjoyed more autonomy than their elite counterparts from the stricter kapu regulations, as makaʻāinana kāne did not possess the life-or-death authority over household wāhine that kāhuna did for aliʻi and makaʻāinana women alike (Linnekin 1990:113). Kuaʻāina women in particular would have had less contact with people wielding the authority to punish them for breaking kapu, which could explain the difference in adherence to the ʻai kapu in the kauhale seen archaeologically in places like Kahikinui or Nuʻu.

Household labor was divided along gender lines, but not all of this work was regulated by kapu. The general trend across the islands was division of labor between 'indoor' and outdoor work (Kamakau 1975; Malo 1951) with kāne working the fields or fishing, building houses, and processing and cooking food. Wāhine in turn made cloth or wove mats, and made the furnishings for the house (Kamakau 1992:238). However, this distinction between jobs that were not regulated by kapu seems to be based more on a fair balance of labor rather than perceived appropriateness of different tasks. Women, for example, worked outdoors procuring food in environments that necessitated more labor. Wāhine were said to work gathering shellfish or fishing in shallow waters (Hiroa 1957:287) and working alongside kāne farming in harsher environments like Kaupō. Kamakau (1992:238-9) mentioned that Kauaʻi, Oʻahu, and Molokaʻi generally adhered to this normative division, while households in leeward districts of Hawaiʻi and Maui shared outdoor labor—"often cooking, tilling the ground, and performing the duties in the house as well." Malo (1951:183) defined this difference by region rather than island, stating that kuaʻāina women worked with the men in all outdoor activities. Women working taro and sweet potato fields were conceivably common in Maui comparatively, as large dryland field systems required intensive labor (Kirch 1985, Linnekin 1990; Kirch 2007). Gendered labor also differed depending on the status of the household. Makaʻāinana wāhine made and provided kapa or matting for the aliʻi wāhine, which resulted in Malo's (1951:183) description of elite women not needing to beat or stamp kapa, instead spending their time composing songs.

Too frequently, scholars draw parallels between the 'indoor' work associated with Hawaiian women and the domestic sphere associated with western women. These parallels result in interpretations that devalue the status of wāhine because work conducted within the domestic sphere in western contexts is devalued culturally. There exists a difference between how value is assessed between the two cultural constructs, however. In a western construct, jobs consistently filled by men tend to be labelled as masculine and therefore more highly valued (which results in certain careers defined as more appropriate for men, continuing the cycle). In a Hawaiian context, however, value was placed on certain skills and products, and as a result, the people that made those products regardless of gender were esteemed. This perspective aligns with what we know about mana—while individuals were born into a particular class (and as a result perceived as embodying a certain level of mana) based on their ancestry, their actions in daily life affected this divine power granted them for better or worse. Craftswomen specialized in making highly prized tapa cloth and woven goods. The women making these products were said to be wealthy or well-off, with rights over their own goods (Malo 1951:50; Linnekin 1990:120). Most tapa work was traditionally associated with wāhine, but this classification as 'woman's work' did not define the value of the product, rather the product elevated the class status of the women that produced it.

Misinterpretations associated with the status of gender are likely grounded in the different gender ideologies between ancient Hawaiians and foreign scholars; “It may be ‘obvious’ to us what is male and female within our own cultural context, yet we must be careful not to extend these categories to other cultures” (Nelson 2004:5). Perceived differences in sexes/genders are filtered through cultural perception becoming naturalized over time. Gender identities that manifest in the roles people play are affected by these naturalized ideologies. Our perceptions of value and identity when observing cultural roles that differ from our own are also affected by these engrained ideologies. Effective interpretation of the archaeological record requires building from the gender structure in place in the period under investigation. For Hawaiʻi, the basic structure started with the designation of three categories that were defined by the actions of the individual, as the concept of biological sex was not introduced until Europeans arrived. Gender as a concept does not appear to be conceptualized in the same way it is thought of in the western world, as the same words introduced for ‘sex’ also stood in for ‘gender’ according to the Pukui and Elbert dictionary.

> Keka/seka: Hawaiian words developed for gender and biological sex after the introduction of English to the islands [see entries in Pukui and Elbert 1986 dictionary]

The absence of a term for biological sex does not indicate that Hawaiians did not categorize differences between bodies. On the contrary, the established kapu that required women remove themselves to the hale peʻa when menstruating and other practices such as clothing that differed between men and women indicates acknowledgement of biological difference. The absence of a term for sex merely indicates that the physical differences that were observed were conceptualized and valued differently than what is commonly seen in western gender constructs (e.g. physical sex characteristics determining gender roles).

The three genders acknowledged by Kānaka Maoli were as follows:

> Kāne. n. Male, masculine, to be a husband or brother-in-law of a woman. [Pukui and Elbert 1986]
>
> Wahine. nvs. Woman, lady, wife; sister-in-law, womanliness, female, femininity, feminine, connotation of goddess. [Pukui and Elbert 1986]
>
> Māhū. s. A man[36] who assimilates his manners and dresses his person like a woman [Andrews 2003]

Similarly, sexuality was conceptualized differently. This is evidenced through the practices already discussed regarding training children at a young age in sexual conduct, the absence of strict monogamy or institutionalized marriage, and the freedom to choose multiple partners regardless of gender. The difference in perspectives regarding sexuality is also evidenced linguistically through the lack of a Hawaiian word for fornication previous to the arrival of missionaries. The constructs outlined here evidence a cultural gender ideology concerned with the role a person plays in society rather than the way one’s body presents.

[36] Handy and Pukui do not specify a directionality, stating that māhū could be either sex.

Cook on gender and sexuality

Relationships affected by gender were frequently miscalculated by the European visitors. For example, King assumed descent through the paternal line when trying to determine the lineage of Hawaiian chiefs and at multiple points in the journals, female partners of male ali'i are listed as concubines while their male partners are named as advisors. The Europeans were also offended by the sexual relationships that they deemed abnormal or, frequently, amoral. King was particularly disturbed by the lack of affection observed from men towards women perceived to be their wives, made worse for him by the presence of multiple sexual partners for each sex. These errors (subsequent corrections were made by Beaglehole in his footnotes) and judgements are a window into the European worldview that assist us with understanding why certain details are either absent or misinterpreted.

The actions of women outside of their sexual activities were conspicuously absent from the journals. The men aboard the Resolution and Discovery frequently remarked on the attempts by wāhine to sleep with them. Off the coast of Maui, Lieutenant King makes mention of women in canoes that were "desirous of coming on board, & by no means took the refusal Patiently" (Beaglehole 1976:498). Cook at one point was forced to issue a moratorium on any sexual contact with native women due to the venereal disease many of the Europeans brought with them. This focus on sexual behavior over other daily activities of women can be attributed to the assumptions about gender held by the Europeans which led them to interpret male-female relationships as hierarchical with women placed predominately in supporting roles.

When discussing male-female relationships, Captain King interpreted the status of women as holding a lesser status because they were "depriv'd of eating with their Lords"[37] and are tabooed from eating pork in the presence of men[38] and were at all times forbidden from eating turtle, and certain types of plantains and fish[39] (Beaglehole 1976:624).[40] Kamakahelei spent time aboard Clerke's ship in the waters of Kaua'i, but Clerke observed that she would not eat with them which infers her adherence to this 'ai kapu. The observation was not noted for other women aboard the ships that Clerke and Cook wrote about as staying for several days, suggesting that the 'ai kapu may have been more important for ali'i wāhine to follow. Samwell observed that men did eat by themselves on the islands, and women were not permitted to drink kava, eat pork or ripe plantains and instead relied upon raw fish, chicken, and roots (Beaglehole 1976:1163, 1181).[41] He did, however, observe women eating pork and ripe bananas stealthily on board the ships. Samwell (Beaglehole 1976:1184) briefly mentioned that the male chief Parea refused fish from the foreigners, stating that it was the food of women. This is the only indication given in these journals that certain foods were only designated for women. While Samwell interprets this refusal as the ali'i thinking the food beneath him, it could alternatively be interpreted in the same way the refusal of men's food by women is taken. Samwell fails to identify the species of fish offered to Parea, but this

[37] It is interesting to note here that men are not seen as deprived of eating with their ladies.
[38] This is another interesting note, as he does not specify that pork was strictly forbidden like the other foods mentioned, but rather that they would not eat it in the presence of men.
[39] King recalled that one woman on board their ship was beaten for eating the wrong type of plantain (but did not specify who beat her) (624).
[40] The phrasing used in King's journal when discussing the 'ai kapu illustrates the presumed status of gender based on European worldviews.
[41] Note that he did not mention dog as a food women relied upon.

idea that certain fish was conceived of as women's food is important to consider when deciphering how gender was performed.

King's description of the separation of labor within the houses paralleled the information from mo'olelo, with women responsible for making kapa cloth and ornamental dresses. Samwell also noted that the primary task of women was crafting kapa cloth (Beaglehole 1976:1181). Wāhine prepared the bark from paper mulberry trees by pounding it then painted the dried product using dye made from mata berries, kou leaves, and roots. King does not mention other tasks women are responsible for and instead moves on to men's work in the areas he visited. Men were responsible for cultivation, building houses, carving canoes, and making weapons and other items requiring of wood. King also noted that he did not observe specialization to the degree that he expected, stating that all men built their houses, learned how to make nets and carved canoes (Beaglehole 1976:625). This information represents the only record of the products produced by women found in the journals.

Although ali'i were generally recorded as men or their gender left unmarked, King mentioned that women did hold high ranking positions, with "some to whom the others prostrated themselves, & shewd their superiority by many Acts" (Beaglehole 1976:625). Upon their return to Kaua'i, Captain Clerke met Kamakahelei, who announced herself as Queen of the island (Beaglehole 1976:576). Connections between women and the divine were also recorded on the landscape. Two carvings of women at the entrance of a house next to the heiau, one carved with the helmet of a warrior. Their Kanaka guide stated that these were the gods of women (Beaglehole 1967:271). In addition, Samwell mentions a women they assumed to be a priest on Kaua'i (Walako'i) who was respected by the people, performing daily ceremonies such as offering up small pigs as sacrifices while living with the men on shore (Beaglehole 1976:1085). Samwell and Burney mentioned the presence of female priests in Ni'ihau, a site they had not observed elsewhere.

The recreational activities and skills of the locals were often remarked upon when seen as unusual. The sailors were particularly impressed that all Kānaka, including women, were trained from birth to swim. Cook remarked that women would swim to or from the boats, even in rough surf while carrying their babies (Beaglehole 1967:281). Clerke (Beaglehole 1976:1321) observed that both men and women were masters of themselves in the water, but it is unclear whether he is referencing swimming or handling of boats (although the context of the sentence infers that he is referencing their dexterity with canoes). He and others were also impressed with the skill of men, women, and children in surfing (a sport previously unknown to the Europeans). These water sports shows that such skills were not restricted by gender or class.

Sexual relationships as much as social roles provide insight into social identities. The primary focus on sexuality in the journals was on the sexual freedom of women and the sexual relationships between men. Although these relationships were only remarked upon because they were deemed abnormal, they still provide useful information about Kānaka worldviews. Samwell wrote that women lacked modesty in the European sense, and were raised with "unbounded Liberty both of Words & Actions…" (Beaglehole 1976:1181). Parea, a lower chief but with great authority over other ali'i[42], stated his relationship with Kalani'ōpu'u at the time was as his ke aikāne, which likely signified a romantic or sexual relationship at the time (Beaglehole 1967:509; Silva 2004). This and other similar relationships show that

[42] Illustrated by the account of Pareea throwing other ali'i off of Cook's ships

gender identity was not tied to sexual partner as is common in the western world. Clerke mentions as an aside that the king of Hawaiʻi, Kalaniʻōpuʻu, had multiple wives (Beaglehole 1976:535). There were a few brief mentions of women in power, as stated above, who also had multiple husbands (Beaglehole 1976:577). While the terms ʻwivesʼ and ʻhusbandsʼ are used in the journals, these relationships as they are understood in contemporary contexts did not exist in 18th century Hawaiʻi. Clerke wrote that aliʻi had multiple partners of both sexes and the formal practice of marriage did not exist (Beaglehole 1976:596). Instead, the polyamorous relationships commonly engaged in illustrated the relative freedom of desire both men and women enjoyed. Lack of control exerted over sexuality in either direction suggests that a gender hierarchy was absent or less extreme than what was assumed by the Europeans.

Material culture of the kauhale

The material culture in the kauhale resulted from objects needed in daily activities and can speak to social identity. These objects were created from six main types of materials that were available on the islands: basalt, volcanic glass, coral, marine shell, animal remains (e.g. bone, teeth, feathers, etc.), and plant material. Organic material (both plant and animal) is the broadest category of material culture and used in a myriad of ways, from food resources to construction materials, fuels, medicines, clothing, and materials for other crafts. Organic materials are also the first to degrade in subtropical environments and, thus, least durable, usually only directly detectable archaeologically as microscopic traces of phytoliths or starches deposited in the soil, charcoal from burning episodes, and changes in soil chemistry that elevate pH and LOI. Indirectly, the uses of organic materials are also evidenced by the tools used to modify these materials. The presence of certain basalt, coral, shell and volcanic glass tools all serve as a proxy for the presence of organic materials that have long since decayed away. Organic traces are also important in their own right, evidencing the types of tools each house relied upon to thrive on the landscape, how they worshipped their family deities, or where the household stood with regards to class status. Animal bones and shell, in particular, speak to class status and the spatial organization interpreted from their deposition (like other preserved artifacts) provides a glimpse into each householdʼs understanding of appropriate gendered activities. In this section, I review the types of artifacts that are most commonly recovered archaeologically from house features and briefly discuss the material signatures different activities would leave on a house floor based on integrating the information passed down in moʻolelo and data recovered archaeologically.

Coral is ubiquitous at archaeological sites in Hawaiʻi. The mere presence of coral at upland house sites, such as those built in the farmlands of Kaupō, evidences purposeful action, as household members would have had to carry coral up from the ocean (or come by this material through trade with their ʻohana living near the water). Coral also had few recorded uses and, therefore, is a good place to start to decipher the household activities its members were engaged in. Hawaiians differentiated between the two main categories of coral: branch and block coral. Branch coral (which Kirch and Sharp [2005:103] define as multiple species from the genus *Pocillopora*) is the least common of the two types found in houses, and used only for ritual offerings or ritually blessing a building following its construction (Kahn 2014:23; Kirch *et al*. 2005; Kirch *et al*. 2010:277; Sharp *et al*. 2010). Block coral on the other hand is a catch-all category that includes all other types of coral and its use is multifaceted. Small pieces of block coral were used as game pieces (along with small dark basalt pebbles) in the board game konane that was popular amongst the aliʻi. Larger fragments of coral were shaped into triangular pieces and utilized as coral abraders for shaping shell, bone, and wood objects (Field *et al*. 2010:75; Hiroa 1975: ; Kirch 1971:73). Larger cobble-sized pieces of block coral were utilized in the same way basalt cobbles were used—as building material and weights for making cloth. This last use was less common in upland areas, however, where rocks were abundant while coral required effort to haul from the ocean to the house sites.

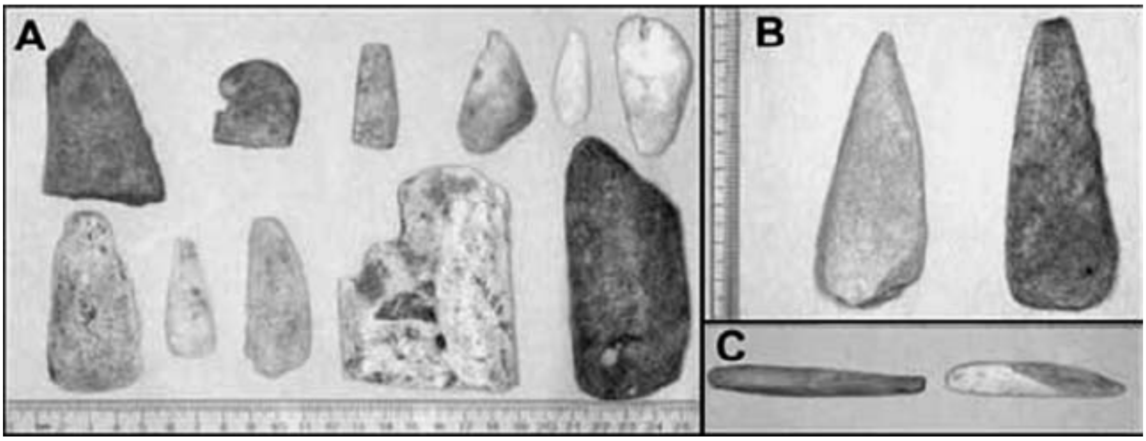


Figure 4.5: Coral abraders (A), coral saws (B) and sea urchin spines (C) from Makauwahi. Photo from Burney and Kikuchi 2006.

The presence of marine shells in upland sites also indicates direct links to the coast as this material also required transportation to upland regions. The living organisms were largely consumed as food, but the shell left over after the meat was removed was also (sometimes modified and) used as tools or personal ornamentation. Larger shells (specifically *Cellana sp*.) were used as scrapers in the preparation of animals for cooking (Field *et al*. 2010:71; Hiroa 1957:22). Smaller shells (e.g., sea snails, *Nerita*, *Conus,* or cowrie like *Cypraea caputserpentis*) were occasionally used in lei-making (Hiroa 1957:542). Some shells were useful for capturing other marine resources; larger *Cypraea sp.* are known to have been used as octopus lures (Field *et al*. 2010:71) and pearl shell (uhi) were the primary raw material for shell fishhooks (Hiroa 1957:325). Thus the species of shell present has the potential to indicate the food(s) to which each household had access. A comparison of these household resources can provide a better understanding of the resources available to a community. The range of species present in the community and each individual kauhale provides one line of evidence for inferring status based on access to highly-prized species (highly prized species are listed in Table 4.* below).

Fish bone can similarly indicate the types of resources available to the community and any differences in access to highly-prized species. Fish were the main source of protein, particularly for communities by the water. Upland communities may have also had access to chickens, pigs, and dogs, but these were largely considered elite foods and often reserved for special occasions. The word for ‘flesh food’ in Hawaiian (i‘a) originally meant fish, signifying this close connection between meat and marine resources (although ‘flesh food’ later evolved to encompass all sources of meat) (Kirch and O‘Day 2003:486). The Hawaiians enjoyed a variety of fish, both reef and more sought-after pelagic species (Kirch and O‘Day 2003:486). Identifying the type of fish present on-site reveals potential trade relationships between mauka and makai communities as well as the status of different households based on their access to pelagic fish.

Other meats (pig, dog, and chicken) were important sources of protein, but also had gender associations and/or ritual connotations (the previous section details these connections so I will not describe them further). In addition to the importance of pig and dog as food sources, the bones had other uses. Long bones of mammals were used to make fishhooks (Hiroa 1957:326) and dog canines were used in anklets for male hula dancers (Hiroa 1957:555). Boar tusks were also used decoratively in bracelets (Hiroa 1957:547). Other tools made from bone that played an important role in household production included needles made from bird bone and tapa groover made from the jaws of pigs[13]. Materials used from animals other than bone included feathers for capes, helmets and idols, or eggs for tapa varnish.

Figure 4.6: Bone fishhook from Nuʻu site NUU-2

Organic plant material is the broadest category both in terms of species and use. Many of these uses are included in Table 4.5 and 4.6 but I will outline a few important uses here. Two of the primary activities involving plant materials were making tapa and weaving mats—both the work of women. Tapa making most commonly utilized the inner bark of the paper mulberry tree. The pulp was harvested and brought back to the house, beat with wooden tapa beaters into strips that were dried then sown together and painted or stamped. The finished product was used as clothing, bedding in the hale noa, or padding in the hale peʻa. Matting was most frequently woven from the leaves of pandanus trees and used to cover the dirt floors of houses, with the thicker mats used as sails. Making tapa and weaving mats left traces in the material record that help identify these processes, these traces are outlined in table 4.5. The mats and tapas themselves leave micro-traces behind. The plants from which they are made produce phytoliths that, after the plants degrade, deposit these micro-remains into the sediment where they were last deposited.

[13] The moʻolelo do not mention any conscriptions placed on the tools made from the bones of animals kapu to women.

Scientific Name	Hawaiian Name	English Name	Hawaiian Use	Location	Description	Resource
Acacia koa	KOA	Hardwood Tree	Used as building material for open-ocean canoes. Wood useful in making weapons and as fuel. Bark used for dye and tanning wood. Largest tree in the islands "made into canoes, surf-boards, paddles, spears"	Wet forest zones	Pea Family, Endemic	Abbott 1992:110; Krauss 1993; Lincoln 2009:108-109 Malo 1951:20
Acacia koaia	KOAI'A	Hardwood Tree	Dryland cousin of *koa*, favorite for making spears, canoe paddles, and *kapa* beaters	Upper elevation dry forests of Hawai'i and Maui	Pea Family, endemic	Lincoln 2009:58
Aleurites moluccana	KUKUI	Candlenut Tree	The seeds were used as ornaments and as a fuel for light. Dies were extracted from the fruits, leaves, bark and roots. Used medicinally. Wood used for canoes and house timber. Oil used for polishing and fishing, Meat of the seed eaten as relish	Mesic valleys	Spurge Family, Polynesian introduced	Abbott 1992; Handy *et al*. 1972:231-2; Lincoln 2009:88-89; Malo 1951:21; Wagner *et al*. 1990:598
Alocasia macrorrhizos	‘APE	Elephant’s ear taro	Meat of the corm and liquid used medicinally. Corm eaten as famine food.	Low elevation along streams or wet sites	Araceae family, Polynesian introduced	Abbott 1992:43; Chun 1994:46
Alyxia stellata	MAILE	Twining shrub	A favorite in lei making, one of the five sacred plants to the hula altar and used in hula as adornment and offering	Wet forest zone	Apocynaceae family, endemic	Lincoln 2009:114
Antidesma (2 species)	HAME	None (Tree)	Used medicinally. Fruit used to make red/dark purple dye, wood used for house frames and kapa anvil.	Mesic to wet forests	Euphorbiaceae family, endemic	Abbott 1992:68; Chun 1994:72-3; Krauss 1993:65; Newal 1965:500; Wagner *et al*. 1990:600-1
Aplitonia ponderosa	KAUILA	Buckthorn Tree	Reputation for being the hardest of Hawai'i's wood, used to make	Dry forest	Buckthorn family, endemic	Lincoln 2009:56

			most durable items such as working implements and weapons			
Artocarpus altilis	'ULU	Breadfruit	Source of food. Wood used for making drums, surfboards, house doors, canoes, and poi boards. Inner bark fibers used to make low-grade kapa. Flowers used to make yellow-brown dye.	Lowland groves	Mulberry Family, Polynesian Introduced	Abbott 1992:51; Kamakau 1976:103,118; Krauss 1993:94; Lincoln 2009:95; Malo 1951:48
Bidens spp.	KO'OKO'OLAU	Beggar ticks plants	Brewed into teas that were used to treat weight loss, thrush, especially in children, and other ailments	Dry forest zone	Sunflower Family, endemic	Lincoln 2009:65
Bobea spp.	‘AHAKEA	None (trees)	"valued in canoe-making, the fabrication of *poi* boards, paddles, and many other uses". Furnished material used for carved pieces adorning the bow and stern of Hawaiian canoes (Emerson footnote p.24).	Mesic valleys and wet forests	Endemic	Malo 1951:20; Wagner et al. 1990:1115-1118
Broussonetia papayrifera	WAUKE	Paper Mulberry	Inner bark utilized in the making of *kapa* cloth	Persists after cultivation along water courses	Mulberry Family, Polynesian Introduced	Abbott 1992:49; Lincoln 2009:96-97; Wagner et al. 1990:924
Caesalpinia kavaiensis	UHIUHI	Legume	Wood was extremely dense, used for spears, farming and fishing tools, and occasionally building	Dry forests of larger islands	Pea Family, Endemic	Lincoln 2009:76
Calophyllum inophyllum	KAMANI	Alexandrian laurel	Wood used for poi bowls and calabashes, flowers used to scent kapa, oils used to waterproof kapa.	Cultivated in coastal and low elevation areas	Clusiaceae family, Polynesian introduced	Abbott 1992; Kamehameha Schools 1994:14; Wagner *et al.* 1990:540-2
Chamaesyce olowaluana	'AKOKO	Shrub	Sap used in medicinal concoctions, said to increase amount of milk produced by a nursing mother	Dry forests on Hawaii and Maui	Spurge Family, endemic	Lincoln 2009:49
Chenopodium oahuense	'ĀWEOWEO	Hawaiian Goosefoot	Fresh leaves were cooked and added to other vegetables and starches for their fishy taste.	Dry forest land	Goosefoot family, Endemic	Chun 1994:64-6; Kamakau 1976:77; Krauss 1993:43;

			Medicinal uses. Part of composite fish hooks.			Lincoln 2009:52; Malo 1951:23
Cibotium spp.	HĀPU'U	Hawaiian Tree Fern	Soft hairs on the fronds were used as bandages	Wet forest zone	Endemic	Lincoln 2009:101
Cocos nucifera	NIU	Coconut	Food supplement, containers, cordage, eating utensil, fan material, feather work, fire-making, fish bait, in hula, kapa scenting, as mortars, musical instruments, as sacrifice, for thatching. Kapu to women	Farmlands	Introduced	Abbott 1992
Colocasia esculenta	KALO	Taro	The most important plant in Hawaiian culture: the staple food and the center of spiritualism, mythology and social structure. Over 300 varieties were recognized by skilled Hawaiian farmers	Wet and dry farmland	Philodendron Family, Polynesian introduced	Lincoln 2009:84-85
Cordia subcordata	KOU	None (small tree)	Soft wood made into bowls and utensils, planted as shade trees, seeds eaten.	Dry coastal areas	Boraginaceae family, Polynesian introduced	Krauss 1993:22; Handy *et al* 1972:232; Wagner *et al*. 1990:392-4
Coprosma ernodeides	‘AIAKANĒNĒ	None (shrub)	Fruits used in lei making, inner bark used to make yellow dye, fruit used to make purple and black dye	Lava and cinder fields in subalpine woodlands on East Maui and Hawai‘i	Rubiaceae family, endemic	Krauss 1993:65; McDonald 1989:67; Wagner *et al*. 1990:1125
Cordyline fruticosa	KĪ	Ti Leaf	The root was eaten, the root and sap were used medicinally, and the leaves were utilized in cordage, hula skirts, shoes, thatch, plates, and in cooking.	Cultivated in mesic valleys and forests	Agave Family, Polynesian introduced	Lincoln 2009:86; Wagner *et al*. 1990:1348-50
Curcuma longa	'ŌLENA	Turmeric	Medicinal purposes and for yellow dye	Cultivated, near habitation areas	Ginger family, Polynesian introduced	Krauss 1993:66; Lincoln 2009:91; Wagner *et al*. 1990:1620

Cyperus javanicus	‘AHU‘AWA	Sedge	Fibers used to make cordage for lashing house timbers and in fishing nets. Leaves used to strain kava	Marshy areas, stream banks, rocky coasts, cliffs	Cyperaceae family, indigenous	Chun 1994:13; Abbott 1992:62-3
Cyperus laevigatus	MAKALOA	Umbrella sage	Leaves used to wave fine mats and hats, bed or floor coverings, malo and pa‘u. Used medicinally	Mud flats, sandy coastal sites, near/in fresh, brackish and saltwater ponds	Cyperaceae family, indigenous	Chun 1994:213-4; Kamehameha Schools 1994:25; Wagner *et al.* 1990:1398
Dianella sandwicensis	'UKĪ'UKI	None	Leaves were used for cordage (lashing in houses)	Wet forest zone	Lily family, indigenous	Abbott 1992; Lincoln 2009:125
Dioscorea alata	UHI	Yam	Tubers were steamed and eaten. Used medicinally	Cultivated in dry mesic areas	Dioscoreaceae family, Polynesian introduced	Chun 1994:247-8; Handy *et al.* 1972:182; Malo 1951:42-3; Wagner *et al.* 1990:1437
Dioscorea pentaphylla	PI‘A	Wild yam	Tubers eaten as a famine food	Windward mesic valleys	Discoreaceae family, Polynesian introduced	Krauss 1993:11-2; Wagner *et al.* 1990:1439
Diospyros sandwicensis	LAMA	Persimmon, ebony	Dominant dry forest canopy. Fruit is sweet and delicious, wood was held sacred to the goddess of hula, Laka	Most dry forest habitats	Ebony family, endemic	Lincoln 2009:68
Dodonaea viscosa	A'ALI'I	None (shrub/tree)	One of first plants to re-inhabit a lava flow. Red seed capsule woven in lei, used as medicine or dye.	Dry Forest Land	Soapberry Family, Indigenous	Abbott 1992; Lincoln 2009:46
Erythrina sandwicensis	WILIWILI	None (tree)	Wood used to make surfboards, outriggers, and fish floats. Wood burned to make paint, seeds used in lei and hula leglets	Dry lowland forests	Famaceae family, endemic	Abbott 1992; Kamehameha Schools 1994:29; Malo 1951; Wagner *et al.* 1990:672
Freycinetia arborea	'IE'IE	None (woody climbers on trees)	Strong aerial roots were used for fish traps, sluice gates and as the framework for war helmets and feather capes. Used medicinally,	Wet forest zone	Indigenous	Abbott 1992:105; Chun 1994:96-8; Emerson 1909:19; Krauss 1993:81;

			offering at hula alters, basketmaking. Leaves and roots used for handle of rattle			Lincoln 2009:104; Pukui 1942
Gardenia (3 species)	NĀNŪ	Hawaiian gardenia	Wood used to make kapa anvils. Fruit used to make yellow kapa dye	Dry and wet forests	Rubiaceae family, endemic	Abbott 1992:50; Lamb 1981:134-5; Wagner *et al*. 1990:1131-3
Heteropogon contortus	PILI	Pili grass	Favorite plant for roof thatching on houses. Used medicinally	Dry rocky regions	Poaceae family, indigenous (?)	Malo 1951; Wagner *et al*. 1990:1550-1
Hibiscus brackenridgei	MA'O HAU HELE	None (shrub)	An attractive yellow-green dye is made from the leaves of the flower	Dryland habitat	Mallow family, endemic	Lincoln 2009:72
Hibiscus kokio	KOKI'O 'ULA	None (shrub)	The flower was used medicinally while the bark could be used for fibers	Wet forest zones in Kauaiʻi and occasionally on the larger islands	Mallow Family, endemic	Lincoln 2009:111
Hibiscus tillaceus	HAU	None (shrub/tree)	Fibers used for cordage to sew kapa together, tie sandals, and make kapa design sticks. Wood used for outriggers, fishnet floats, fire making, sandals, and adz handles. Flower and sap used medicinally.	Coastal areas, streams, other wet habitats	Malvaceae family, indigenous (?)	Abbott 1992:101; Handy *et al*. 1972:233; Krauss 1993:71; Lucas 1982:44
Ilex anomala	KĀWAʻU	Hawaiian holly	"tree useful for canoe timber and for *tapa* logs"	Mesic to wet forests	Indigenous	Malo 1951:21; Wagner *et al*. 1990:221-222
Ipomoea batatas	'UALA	Sweet Potato	A source of food and the embodiment of the god Lono. There existed over 50 varieties of the Hawaiian sweet potato. Originally from South America. Important in dry areas were kalo did not flourish	Semi-desert and desert habitats	Morning glory family, Polynesian introduced	Abbott 1992:28-31; Lincoln 2009:94
Ipomoea spp.	KOALI	Sweet Potato	Used extensively in a variety of medicines	Dry to mesic habitats	Morning glory, Indigenous	Lincoln 2009:60

Kadua (3 species)	MANONO	None (shrub/small tree)	furnished canoe timber	Wet to mesic forests	Endemic, Rubiaceae family	Malo 1951:21; Wagner *et al*. 1990:1145-55
Kokia drynarioides	KOKI'O	None (shrub/small tree)	Sap of plant dries to nearly waterproof resin that was used to dye fishing nets, increasing their lifespan. The red coloring allowed them to catch more fish	Dry Forest Zone	Mallow Family, endemic	Lincoln 2009:62-3
Lagenaria siceraria	IPU	Bottle gourd	Gourds made into containers for water, food, dyes, fishing line, hooks, etc., and for musical instruments. Leaves, flesh and flower used medicinally.	Cultivated in dry areas	Cucurbitaceae family, Polynesian introduced	Abbott 1992:78; Chun 1994:117-20; Krauss 1993:881-3; Lucas 1982:38
Leptecophylla tameiameiae	PŪKIAWE, PUPU-KEAWE, PU-KEAWE, MAI-ELI	None (Shrubs)	brush that grows on the mountain side, "used in the cremation of the body of any one who made himself an outlaw beyond the protection of the tabu"	Scattered	Ericaceae family, Indigenous	Malo 1951:20; Wagner *et al*. 1990:591
Metrosideros polymorpha	'OHI'A	None (tree)	First tree to appear on new lava flows. Sacred to volcano goddess Pele. Wood for images, posts, rafters, fences, firewood, canoes. Flowers for lei. Placed on hula alters. Used for bowls and musical instruments	Nearly all Hawaiian habitats	Myrtle Family, endemic	Abbott 1992:126-7; Krauss 1993:80; Lincoln 2009:73-4; Malo 1951:20
Morinda citrifolia	NONI	Indian mulberry	Important medicinal plant. Inner bark and roots used to make yellow and red dyes. Fruit eaten raw and cooked. Oil used on hair.	Cultivated in dry regions	Rubiaceae, Polynesian introduced	Krauss 1993:66; Malo 1951:22; Rock 1913:467; Wagner *et al*. 1990:1157
Musa spp.	MAI'A	Banana	A food source. Numerous medicinal uses. Offered to the gods. Three varieties available for consumption by women, the rest were forbidden. Some varieties steamed in imu, pounded to make poi. Stalks symbolized man, used to line imu. Leaves used in lei	Cultivated. Mesic to wet valleys and forests. Near habitation sites.	Banana family, Polynesian introduced	Abbott 1992: 37-9; Handy *et al*. 1972:155-67; Lincoln 2009:90; Wagner *et al*. 1990:1464

			making, sap used as dye. Nectar used to feed babies.			
Myoporum sandwicense	NAIO	False sandalwood	Wood used for house posts, fishnet gauges, and torches.	Varied	Scrophulariaceae family, indigenous	Krauss 1993:56; Lamb 1981:127; Wagner *et al*. 1990:928-9
Myrsine (20 species)	KŌLEA	None (shrub/tree)	Bark and charcoal/ashes used for dye. Wood for kapa anvils, posts and beams in houses.	Vary but favors wet forests	Primulaceae family, endemic	Degener 1930:249; Hillebrand 1888:280; Lamb 1981:107; Malo 1951:21; Wagner *et al*. 1990:937-47
Nestegis sandwicensis	OLOPUA	None (tree)	Hard wood used to make adze handles, house frames, fishing stick, and as fuel	Dry forests	Oleaceae family, endemic	Abbott 1992; Kamakau 1976:63; Little and Skolment 1989:278; Wagner *et al*. 1990:992
Nothocestrum breviflorum	'AIEA	None (shrub/tree)	Known for strong scent furnished canoe timber	Dry Forest Land	Nightshade family, native	Lincoln 2009:48 Malo 1951:21
Nototrichium sandwicense	KULU'I	None	Downy flower spikes and wood were used as a form of ancient fireworks	Throughout dry habitats	Amaranth Family, endemic	Lincoln 2009:66
Ochrosia (4 species)	HŌLEI	None (tree/shrub)	Bark and roots used for yellow kapa dye	Dry habitats	Apocynaceae family, endemic	Krauss 1992:65; Wagner *et al*. 1990:216-9
Osteomeles anthyllidifolia	ʻŪLEI	None (shrub)	Wood used to make oʻo, musical instruments, spears, and fish net loops. Fruit eaten and used to make lavender dye. Used medicinally	Variable, mostly dry habitats	Rosaceae family, indigenous	Chun 1994:250-1; Krauss 1993; Malo 1951:22; Wagner *et al*. 1990:1104-5
Pandanus tectorius	HALA	Screw Pine	Fruit, roots and leaves used medicinally. Leaves woven into mats, pillows and thatch, seeds and fruit eaten, roots used for cordage, keys used in lei and as brushes for painting kapa.	Mesic coastal and valley sites	Pandanaceae family, indigenous	Abbott 1992; Summers 1990:99-100; Wagner *et al*. 1990:1479-1481

Phytolacca sandwicensis	PŌPOLU KŪ MAI	Pokeberry	Fruit used to make dark purple dye	Wet forests and streambeds	Phytolaccaceae family, endemic	Krauss 1993:67; Wagner *et al*. 1990:1061
Piper methysticum	‘AWA	Kava	Medicinal. Also for religious and spiritual ceremonies, and consumed as evidence of power	Widely planted	Pepper family, Polynesian introduced	Lincoln 2009:81; Wagner *et al*. 1990:1036
Pipturus albidus	MĀMAKI	Hawaiian Nettle	Small fruits used for medicinal purposes (relaxation, muscle cramps, and menstruation cramps). The bark was used for cordage and kapa.	Wet Forest, high altitude, mesic forest	Urticaceae family, endemic	Abbott 1992:102; Malo 1951:22, 48; Wagner *et al*. 1990:1308
Pittosporum hosmeri	HŌ'AWA	Hawaiian magnolia	Favorite food of the Hawaiian crow. Wood good for fuel, fruits good for medicine.	Upper elevation leeward wet forests	Pittosporaceae family, Endemic	Chun 1994:91-2; Lincoln 2009:102; Malo 1951:22-23
Pleomele hawaiiensis	HALA PEPE	None (tree)	Long skinny leaves occasionally used for hula skirts and adornment, and this tree is one of the five plants that were sacred to the hula altar	Hot, dry, desert climates	Agave family, endemic	Lincoln 2009: 53
Plumbago zeylanica	'ILIE'E	Leadwort	dark, sticky sap was used to darken tattoos	Dry forest in Hawai'i	Plumbago family, Indigenous	Abbott 1992:128; Lincoln 2009:55
Pouteria sandwicensis	‘ĀIA‘A	None (shrub/tree)	Leaves and bark used medicinally. Hard wood uses for ‘o‘o and house posts. Sap used to catch birds	Dry and mesic forests	Sapotaceae family, endemic	Chun 1994;30; Wagner *et al*. 1990:1233-4
Pritchardia spp.	LOULU	Native fan palm	Only genus of palms native to Hawaii, 19 different species. Wood was used for house posts, altars, drums, and canoes. Leaves were woven into various hats and baskets.	Traditionally found in many Hawaiian habitats, today in dry forest regions	Palm Family, endemic	Lincoln 2009:70-1
Psychotria (11 species)	KŌPIKO	None (trees/shrubs)	Tree that furnished wood used for *tapa* logs (*kua kuku kapa*). Also furnished good fuel	Mesic to wet forests	Rubiaceae family, endemic	Malo 1951:21; Wagner *et al*. 1990:1163-70
Psydrax odorata	ALAHE'E	None (shrub/tree)	Dense wood used to make the traditional Hawaiian farming tool, the *'o'o*. Used as cutting tool on softer woods, for farming tools,	Dry forest land	Coffee family, indigenous	Abbott 1992:12; Kamakau 1976:122; Krauss 1993:25; Lincoln

			hooks (shark), bait sticks, leaves for dye, fashioned into adzes			2009:50; Malo 1951:22
Rorippa sarmentosa	PĀ‘IHI	None	Bark used to make black dye	Wet areas and disturbed habitats	Brassicaceae family, Polynesian introduced (?)	Krauss 1993:66; Wagner *et al*. 1990:412
Rubus (2 species)	‘ĀKALA	Hawaiian raspberry	Edible fruit, used medicinally. Rose colored dye made from fruit	Mesic to wet forests, subalpine woodland	Rosaceae family, endemic	Abbott 1992:56; Chun 1994:20-1; Handy et al. 1972:235; Wagner *et al.* 1990:1108-9.
Saccharum officinarum	KŌ	Sugarcane	Juice used to sweeten dishes and as medicine. The stalks were chewed on. Used as knives. Used as inside wall covering, charcoal used as a dye, leaves used for thatch. Shows great diversity today on the islands	Cultivated in lowland environments	Grass family, Polynesian introduced	Abbott 1992:69; Degener 1930:58; Handy *et al.* 1972:186-7; Krauss 1993:65; Lincoln 2009:87
Sadleria spp.	'AMA'U	None (tree fern)	Stalk flesh was used medicinally and the pith of the trunk was a famine food. Fronds used for thatching of houses. Red dye for tapa.	Wet forest zone	Blechnaceae family, Endemic	Abbott 1992:70; Lincoln 2009:100; Little and Skolmen 1989:50
Santalum paniculatum	'ILIAHI	Sandalwood	Flowers were used to add fragrance to *kapa* cloth and the wood of the tree for incense	Wet forest zone	Santalaceae family, Endemic	Lincoln 2009:106-107
Sapindus saponaria	MĀNELE	Soapberry	Hard round seeds were used in lei making	Wet forest zone	Soapberry Family, Indigenous	Lincoln 2009:118
Scaevola (9 species)	NAUPAKA KUAHIWI	Dwarf naupaka	Fruit used to make purplish black dye	Varied	Goodeniaceae family, endemic	Krauss 1993:66; Wagner *et al*. 1990
Schizostachyum glaucifolium	‘OHE	Polynesian bamboo	Stalks used as musical instruments, frame for houses, fishing rods, sleds, irrigation pipes, knives, needles, kapa design sticks, stamps, and net shuttles.	Shaded habitats along streams	Poaceae family, Polynesian introduced	Abbott 1992:120; Buck 1964:390-1; Krauss 1993; Lucas 1982:13; Wagner *et al*. 1990:1591

Schoenoplectus lacustris	‘AKA‘AKAI	Great Bulrush	Stems used in making lower layers of floor mats that protected lauhala mats. Used medicinally	Fresh and saltwater marshes	Cyperaceae Family, Indigenous	Chun 1994:19; Abbott 1992:73; Wagner *et al*. 1432
Senna gaudichaudii	KOLOMONA	None (shrub)	Flowers used in lei. Played an important role in dry forests--able to pull nitrogen out of the air	Fringe habitats and young lava flows in sunny areas	Pea family, indigenous	Lincoln 2009:64; McDonald 1989:67
Sida fallax	‘ILIMA	None (shrub)	Stems used in house frames, vines used for rough basketry and for floor covering under sleeping mats	Rocky or sandy coasts, open dry forests	Malvaceae family, indigenous	Handy *et al*. 1972: Wagner *et al*. 1990:897-8
Solanum americanum	PŌPOLO	Glossy nightshade	Valuable medicinal herbs. Fruits eaten, used to make blackish purple dye	Variety of wet and dry habitats	Nightshade family, possibly indigenous, possibly post-contact introduction	Handy *et al*. 1972:235; Krauss 1992:67; Lincoln 2009:74
Sphenomeris chinensis	PALA‘Ā	Lace fern	Old fronds used to make red dye. Used medicinally	Variable	Lindsaeaceae family, indigenous	Krauss 1993:67; Valiers 1995:56-7
Syzygium malaccense	'ŌHI'A 'AI, OHIO, LEHUA	Mountain Apple	Wood for carving large images (*ki'i*). The bark of the plant was also medicinal. Brown dyes made from root, trunk and inner bark. Red dye made from fruit skin. Large tree that grows in the mountain. Fruit eaten. "In it, the bird-catchers practiced their art of bird-snaring. It was much used for making idols, also hewn into posts and rafters for houses, used in making the enclosures about temples, and for fuel, also from it were made the sticks to couple together the double canoes, besides which it had many other uses"	Wet forest zone	Myrtaceae family, Polynesian introduced	Krauss 1993:66; Lincoln 2009:120-121; Malo 1951:20

Tacca leontopetaloides	PIA	Polynesian Arrowroot	Used to make the starch in *haupia* and the paste for repairing *kapa* cloth	Naturalized in disturbed areas	Tacca Family, Polynesian introduced	Lincoln 2009:92-93; Wagner *et al.* 1990:1613-4
Thespesia populnea	MILO	Portia tree	Wood used for bowls, canoe hulls, and fiber. Fruit used to make yellowish-green dye.	Coastal sites	Malvaceae family, indigenous (?)	Abbott 1992:80; Krauss 1993:22; Malo 1951:23; Wagner *et al*. 1990:902
Touchardia latifolia	OLONĀ	None (shrub)	High quality fibers used in making cordage for fishing and other activities	Wet forest zone	Nettle Family, Endemic	Abbott 1992:106; Krauss 1993; Lincoln 2009:132
Waltheria indica	'UHALOA	None (shrub)	Dense flower buds were brewed and tea used to cure throat ailments, chest pains, and weight loss	Dry, open habitats	Cacao family, Indigenous (?)	Chun 1994; Lincoln 2009:75
Zingiber zermbut	'AWAPUHI	Shampoo Ginger	For medicinal and culinary purposes. Fluid used as shampoo, powdered rhizome used to scent kapa, leaves used to flavor meat.	Wet habitats	Ginger family, Polynesian introduced	Lincoln 2009:82; Wagner *et al*. 1990:16-24

Table 4.5: Hawaiian plants listed by scientific name, Hawaiian name, and common name. Table includes information on the use of the plant, the habitat, family, and introduced status.

Basalt and volcanic glass are the two types of stone made into various tools for use within and outside of the house. The type of basalt that dominates this landscape is scientifically classified as basanite, but Hawaiians utilized their own elaborate system of basalt classification that allowed for ease in identifying the proper stone for a specific tool. The most basic and well-known categories are pahoehoe and a‘a lava, or smooth and rough lava, respectively. These categories were broken down into multiple sub-categories outlined by Malo (1951:19) and listed in Table 4.7 below. Less is known about the importance and use of volcanic glass. Barrera and Kirch (1973:185-186) described flakes of volcanic glass as good scutting and scraping tools, postulating that they might have been a ‘pocketknife’ type of implement used in food prep, delicate wood work, cutting, scraping, or any other task requiring a sharp edge. The products made with stone are also listed in the table below. The mo‘olelo do not indicate who made stone tools, but it is likely that convenient cutting implements, at least, were made ‘on-the-spot’ by any individual who needed them for a particular task, like butchering animals or cutting leaves for mats. Adzes, however, were said to be made by an elite class (although this class did not have an associated gender). Kamakau (1976:122) referred to an “expert stoneworker” that examined “the quality and grain of the stones to see which would make good solid adzes.” Malo (1951:51) similarly described an esteemed class of adze workers called poe ka koi, stating that “the art of making it was handed down from remote ages”. Carvers are commonly gendered as male which may explain the assumption that adze makers were also male, but multiple mentions of an ungendered elite class call into question this assumption.

Activity	Gender	Associated Material Remains and Notes	Source
Cooking	Husband/Man	Imu ovens, combustion features	Malo 1951:27
Thatching Houses	Kāne	See *Kauhale* Tab	Malo 1951:27
Cooking and serving while husband prepares houses	Wāhine	See 'Food' Tab	Malo 1951:27
Farming	Kāne farmed taro, kāne and wāhine farmed sweet potatoes. Wāhine cultivated small sweet potato patches by the house		Handy and Handy 1972; Malo 1951
Fishing	Kāne	Fishhooks, fish bones, abraders, files, sinkers	Kamakau 1976:123
Scraping Olona	Kāne	Scrapers	Kamakau 1976:123
Making Nets and cords	Kāne	Needles, plant fiber	Kamakau 1976:123
Collecting Feathers	Kāne	Gum and sticks for snaring	Hiroa 1972:538
Making Feather Capes	Kāne	Feathers, needles	Kamakau 1976:123, Hiroa 1972:538
Making round leis	Kāne		Kamakau 1976:123
Building Canoes	Kāne	Adzes	Kamakau 1976:123
Carving Wooden Bowls	Kāne	Adzes	Kamakau 1976:123
Offerings	Kāne made offerings to family deities		Handy and Pukui 1972
Collecting bark for cloth	Wāhine and Kāne	Go into the woods together to collect bark for cloth.	
Tapa Making	Wāhine	Women and men collected bark. Women peeled, soaked and beat the bark, and decorated tapa. Mulberry bark, scrappers, ʻiliʻili, dyes, combs, stamps, and needles were used. Sharp cutting implements (basalt and volcanic glass) used.	Hiroa 1972; Kooijman 1972
Painting kuaʻula tapa	Kāne	pig jaw, grooving board, round beater, tapa dyes, hen's eggs	Kamaka 1972:112
Adze maker	Esteemed class	See 'topics' below	Hiroa 1972
Mat plaiting	Wāhine	Women collected, wilted and dried leaves, and braided mats. Cut leaves using basalt and bamboo cutting implements	Handy and Pukui 1972; Handy and Handy 1972

Gathering shellfish	Wāhine	Shells	Handy and Pukui 1972; Handy and Handy 1972
Gathering Salt	Wāhine		Handy and Pukui 1972; Handy and Handy 1972
Gathering seaweed	Wāhine		Handy and Pukui 1972; Handy and Handy 1972
Nursing children	Wāhine		Handy and Pukui 1972; Handy and Handy 1972
Poi pounding	Kāne	once taro was cooked, family pitched in to help with work--children pulled off outer skin (used as fertilizer), then passed to peelers who scraped off the peelings and flaws with ‘opihi shell (scrapings fed to pigs and chickens)	Handy and Handy 1972:113
Processing cooked taro	‘ohana		Handy and Handy 1972:113
Processing Pigs	Kāne	Scraped animals with shell or basalt scrapers. Cut animals with bamboo knives.	Hiroa 1972:23
Planting Sweet potatoes	Communal enterprise in upland places like Kaupō		Kamakau 1992, Malo 1951

Table 4.6: Activities conducted in or around the house with associated gender and resulting material

Hawaiian Name of Stone	Description of Stone	Use of Material
Pohaku	various hard, mineral substances	
Pali-pohaku	Rocky cliff	
Pohaku uuku iho	a smaller boulder or mass of rock	
a-a	stones of somewhat smaller size	
iliili	pebbles	
one	still smaller size, such as gravel or sand	
lepo	dirt, still more finely comminuted	
uli-uli, ehu-ehu	Very hard rock in the mountain	Adze
ke-i, ke-pue, ala-mea, kai-alii, humu-ula, pi-wai, awa-lii, lau-kea, mauna	Stone used for adze	Adze
lu-hee		For squid fishing
hyena, ma-heu, hau, pa-pa, lae-koloa, lei-ole, ha-pou, kawau-puu, ma-ili, au, nani-nui, pa-pohaku, kaula-ula, wai-anuu-kole, hono-ke-a-a, kupa-oa, poli-poli, ho-one, no-hu, lu-au, wai-mano, hule-ia, maka-wela	Stone used in making lu-hee	For squid fishing
ma-ki-ki	Stone used in making lu-hee and for maka	For squid fishing and maka
pa-pohaku, kaua-ula	Stone used in making lu-hee	For squid fishing
ma-ka (maka-a?), hiu-pa, iki-makua, kumu-one, kumu-mao-mao, ka-lama-ula	Stones used for maika	Maika
paa-kea	Stones used for maika, volcanic sinter	Maika
Pa-hoe-hoe	Class of rocks melted by the fires of Pele	
Ele-ku, a-na	Pumice, light and porous rocks	
a-la	Other forms of rock. Hardest and densest kind of basalt	making poi pounder, making the best axes
pa-ea	Other forms of rock	
Puna	coral stones	smoothing and polishing canoes and wooden dishes
o-ahi	vesiculated stone	smoothing and polishing canoes and wooden dishes
o-la-i	Pumice	smoothing and polishing canoes and wooden dishes
po-huehue, ka-wae-wae		smoothing and polishing canoes and wooden dishes

o-i-o, a-na		smoothing and polishing canoes and wooden dishes
lau-a, kohe-nalo	Stone	making poi pounder
kumu-one	white sandstone composed of sea sand	making poi pounder
koa	Coral stone	making poi pounder
	Rough stones or coral	Grate tubers
[Basalt]	basalt, similar to an adze	Breadfruit Splitter
[Basalt]	stone knife	used for heavier work such as carving pigs or dogs

Table 4.7: Description of different types of stone from Malo 1951:19-20, Hiroa 1957:23; and Handy and Handy 1972:261. The spelling of Hawaiian words is taken directly from Malo.

Archaeology of Hawaiian Kauhale

The material remains of Hawaiian societal organization are often studied archaeologically within the context of three socio-political levels—the domestic (household), community, and political (Green 1986, 1993). The majority of surviving features on the landscape are associated with the domestic sphere (specifically kauhale).[43] In the following section, I review different stages of archaeological research conducted on kauhale while drawing connections between this research and the moʻolelo on kauhale above.

Mākaha Valley on Oʻahu, Lapakahi region on the northwest coast of Hawaiʻi, and Hālawa Valley on Molokaʻi were all part of Roger Green's a three-project program (Green 1980:1). The knowledge garnered from these settlement patterns provided insight into three of the main Hawaiian Islands. Green began the Mākaha Valley Historical Project (MVHP) for the purpose of understanding the valley's "history, prehistory, and ecology" (1980:1) that was infrequently included in the oral histories of Oʻahu. The study focused on Mākaha Valley before the 1880s when the isolation of Waiʻanae was broken by invading railroads and sugar cane farms (Green 1980:1). Green found that this ahupuaʻa differed from neighboring communities in its historic-era settlement pattern—indicating that the focus on inland housing reflected the different landscape use for irrigated taro fields rather than a focus on fishing villages like neighboring regions (Green 1980:20). This observation supports the importance of the environment for the organization of communities. Further, Green states that the major assumption challenged by the work in Mākaha was that the settlements always focused on the coast in the Waiʻanai district (1980:70). While Green maintained that this is an atypical settlement pattern for an ahupuaʻa, other settlement pattern surveys show that in fact ahupuaʻa are highly variable and places like Nuʻu exhibit inland settlements for a large portion of the population. The work done in Mākaha, Halawa, and Lapakahi only scratched the surface of information that can be garnered from investigating the surviving architecture in Hawaiʻi. In reviewing the MVHP report, Kirch (1981:84) noted that in light of all the work completed, "we still have as yet grasped only the bare outline of the rich and varied fabric of the valley's hidden past". This statement remains true for valleys across the archipelago.

[43] It is important to keep in mind that the ties between the three socio-political levels frequently make clear delineations between the three categories difficult.

Archaeologists following in Green's footsteps began looking for ways to assess social relationships visible in these spatial patterns on the landscape. In Hawai'i researchers tackled the structure and organization on the landscape through areal excavations of features in order to better understand use and relationship (Weisler and Kirch 1985). Kirch (1985) established a descriptive system specifically for residential archaeological sites in order to distinguish between architectural features on the landscape. Kirch (1985:248) explained that the majority of Hawaiian archaeological sites are associated with domestic life. The types of residence sites one might find on the Hawaiian landscape as described by Rosendahl (1972) are permanent, extended, or temporary (as listed in Kirch 1985:248). Temporary sites include "L-Shapes", "C-Shapes", and "box C-Shapes", and are often found in regions like southeast Maui that practice dry agriculture (Kirch 1985:248). Weisler and Kirch (1985:135) grouped the archaeological landscape into three functional classes in order to further identify spatial patterns and range of variation. The three categories are as follows:

> 1) Features associated with agriculture and production
> 2) Residential features and complexes, both temporary and permanent
> 3) Special purpose features, especially those used for ritual activities
> [Weisler and Kirch 1985:135]

Along with these categories, Weisler and Kirch proposed four different approaches to the analysis of these features—"(1) environmental; (2) social; (3) economic and political; and (4) semiotic" (1985:148). Weisler and Kirch further touched on several causes of variability previously broached by ethnohistoric documents. They defined the kauhale as minimally including the primary living space, smaller storage shelters or features, and agricultural ridges (1985:142). The range of variability for the composition of these complexes was identified as dependent on status differences. Weisler and Kirch (1985:148) identified eight attributes that signal higher status households: number of structural features included, type of ritual feature present, existence of burial platforms, large amount of dog and/or pig bone, presence and variability of formal artifacts in high densities, imported lithic material, density of faunal remains, and positioning on the hillside. Working from research establishing the spatial relationships between architectural features on the landscape, Ladefoged (1998) delved into the ideological component of the structuring principles, thereby achieving the goals of settlement pattern approaches as established by Green. Ladefoged (1998) and others (e.g. Kahn 2005; Field et al 2010; Field et al 2011; Van Gilder and Kirch 1997) illustrated the importance of an approach that utilizes Levi-Strauss' concept of the house as a social entity in conjunction with Green's settlement pattern approach in order to address the full range of social relationships within a community context.

Household archaeology at the site scale contributes to data on kauhale by looking more closely at the spatial relationship between artifacts found on site. For example, Van Gilder and Kirch (1997) described permanent and temporary architectural structures associated with three house clusters in Kahikinui, southeast Maui. The project uncovered expected material remains like lithic debitage, coral files, slab-lined hearths, and faunal remains but organized in unexpected ways. The analysis of these finds (most significantly, double slab-lined hearths in the hale noa) led the researchers to believe the people of Kahikinui were interpreting kapu regulations to suit their needs (Van Gilder and Kirch 1997:60). The study ultimately illustrated the need for continued investigation of cultural practices and social structures across class lines and ahupuaʻa boundaries.

Other archaeological research investigates potential causes for the variability seen on the landscape. The excavation of residential sites along the Kohala coastline of Hawai'i Island suggested that an increase in structures was prompted by an increase in population *as well as* an increased focus on surplus production, signaling a transition to a more politically integrated community (Field *et al*. 2010). The intensified political system in turn signaled changes in the household as the microcosm of society (Sahlins 1976; Ladefoged 1998). This is reflected in the household and field expansions that occurred from 1400-1800 AD in the Kohala and Kahikinui regions, connected to surplus requirements and supervisory presence (Field *et al*. 2011, Kirch 2004). Investigating the archaeological landscape as a whole permits an investigation of relationships between the agricultural fields and households on a microscale, and political and social structures on a macroscale, allowing for an investigation of variability and change on both temporal and spatial planes. Shifting foci in archaeological research from technological and economic production to ideological questions have allowed for studies that are addressing variability and providing an increasingly robust understanding of Hawaiian households (Kahn 2014).

Cook on material culture

The items Cook and his men observed in use during their visits help shed light on the materials in use in the 18th century as well as the methods of manufacture that were popular at this time. The methods with which people make or use materials evolves over time. Therefore, the snapshot of daily life provided by these journals from a known place and time, while not diachronic, serves as a tool that can be used to compare with other accounts of daily life. This comparison results in a synchronic understanding of how cultural processes from a particular place and time are reflected in the surviving material record of that period. This method is particularly fruitful for producing interpretations from the material record of Hawaiian households that go beyond the more general descriptions of atemporal accounts. This section is an attempt at engaging in this comparative process by reviewing the materials that Captain Cook and his men observed Kānaka relying on as well as the associated space and activity in which the material was used.

The first introduction for the foreign sailors to the materials available for use on the islands was through the trading with the locals. As the ships sailed past the island communities, villagers paddled out in canoes to trade local food (primarily root crops, fruit, and pigs) for iron. The locals were already familiar with iron and its uses from the small quantities attached to driftwood that was said to have previously washed ashore (Beaglehole 1967:266).[44] The reaction of Kānaka to other goods aboard the ships confirm what is well known today—that certain parent materials and/or crafts were absent from the islands. Locals were hungry for iron to fashion into adzes and daggers, and were fascinated by the china aboard the ships, mistaking the material for wood (Beaglehole 1967:265). Cook noted that bits of iron were already present[45], generally ground down to a sharp edge (similar to the stone tools) and these among other tools bore similarity to Polynesian tools elsewhere (Beaglehole 1967:cxix). Similarly, the bowls and cups that replaced pottery for Hawaiians were fashioned out of gourds, coconut shells, or skillfully carved from hardwood. Although the foreigners did not observe any large-scale carving operations in their short time on the islands, they noted that skillful crafters carved items for daily ceremonial or social use such as the decorative kava bowl given to Clerke by a high chief on Kauaʻi (Beaglehole 1967:cxix, 281). Observations of

[44] The officers postulated that the driftwood resulted from Spanish vessels that had shipwrecked in the Pacific Ocean.
[45] Researchers considering the presence of iron in the islands previous to the arrival of the Revolution and Discovery ships have postulated that it arrived via the tide, possibly from previous shipwrecks in the Pacific Ocean (Beaglehole 1967:cxvii)

the products made by Kānaka extended to the expertly built double-hulled and outrigger canoes that were constructed from hardwood and fastened with thick woven mats for sails.

The clothing and hair styles worn by the community members coming on board were also described in the journals. Ali‘i visiting the ships to give and receive gifts frequently wore feathered capes that were frequently remarked upon as beautifully made of yellow, red, and/or black feathers set in a net of woven fabric. These capes were found to represent the status of the chief which Samwell (Beaglehole 1976:1179) remarked ali‘i wore in war and when dealing with matters of the state (as they must have seen the visits to the ships to be). The birds whose feathers were used to make the capes were caught using sticks with bird lime on the end, which was made with breadfruit and the juice of the *Cyanea solanacea* or ‘oha kepau (Beaglehole 1976:1167).

Scientific Name	Hawaiian Name	Description
Drepanis pacifica	Mamo	Glossy black bird with yellow feathers on legs
Vestiaria coccinea	‘I‘iwi	Bright scarlet colored bird with black wings and tail
Loxops virens	Amakihi	Green bird with tinge of yellow
Phaeornis obscura	Amaui or Omao	Hawai‘i thrush with a grey breast
Chasiempis sandwichensis	Elepaio	Small fly-catcher bird
Pennula sandwichensis millsi		Rail with short wings and no tail
Corvus tropicus	Alala	Dark brown to black ravan
Loxops coccinea	Akepa	Reddish male and drark green female with yellow-green on the belly
Psittirostra psittacea	O‘u	Bird with a yellow head
Asio flammeus sandwichensis	Pueo	Owls
Heteroscelus incanum	Ulili	Wandering Tattler
Pluvialis dominica fulva	Kolea	Pacific Golden Plover
Gygis alba candida		White tern found in the woods and among coconut palms
Moho nobilis	O‘o	Bird with long black tail and yellow feathers under the wings
Gallinula chloropus sandvicensis	Alae	Mudhen with darker feathers.
Himatione sanguinea	Apapane	Crimson colored bird
Loxops virens	Amakihi	Dark green bird with black bill
Moho nobilis	O‘o	Black bird with yellow feathers on the breast and rump
Loxops maculata mana		Small pale olive-green Creeper
Chasiempis sandwichensis	Elepaio	Flycatcher bird
Corvus tropicus	Alala	Raven, sometimes kept around houses
Branta sandvicensis	Nene	Hawaiian goose, sometimes tame[46]

[46] Some birds not identified here lived on uninhabited islands. King assumed these birds to be albatross or man of war birds after men passing by the ship in a canoe said that they were traveling to one of these islands for feathers.

Table 4.7: Table of Hawaiian birds that were observed on the landscape and their associated feather colors.

Many of these feathers were used for the capes described above while other birds served purposes unknown to Cook and his men. Hawaiʻi Island was said to produce the longest feathered capes[47]. Samwell distinguished between the status of chiefs as signified through the capes, stating that the "inferior chiefs have Cloaks made of Cock's Tail feathers with a Collar of red & yellow, others of white bordered with Cocks feathers & a Collar of red and yellow" while the chiefs of higher rank wear longer cloaks of yellow feathers (occasionally from the cock's tail) or yellow cloth in imitation of these cloaks (Beaglehole 1976:1179). Other types of aliʻi adornment worn on board the ships and in their communities included women of status distinguishing themselves by wearing "ruffles made of Boars Tusks" (Beaglehole 1976:626), rings or bracelets with turtle images that were made of bone, and carrying "fly flaps" (Beaglehole 1976:1180). Women also prized wearing lei round their necks according to Trevenen (Beaglehole 1976:626). Men and women both wore "bracelets, necklaces and Amulets, which are made of shells, bone or stone" (Beaglehole 1967:280) as decoration.

On his first visit to shore on Kauaʻi island, Cook noted that Kānaka were scantily clad (according to European standards) with men wearing only the malo and women kapa cloth that wrapped around their waists and hung to their knees (Beaglehole 1967:280). Clerke recorded that neither kāne or wāhine wore much more than the basic dress (which he describes as the malo, but others differentiated between the malo for men and paʻu for women) (Beaglehole 1967:598). While he states that this was particularly true for makaʻāinana, the aliʻi would occasionally don their red cloaks and the women longer skirts that reached to their calves (Beaglehole 1967:599) in place of the daily malo and paʻu. Samwell (Beaglehole 1967:1180) also observed this difference in status amongst women marked by their clothing. The paʻu was a short thin kapa cloth and the larger pieces of kapa cloth that wrapped several times around their waist and reaching down to their knees worn only by elite women. In the evening, Samwell (Beaglehole 1967:1180) noted that women wore large pieces of fine white cloth "thrown over them" and the young women wear "ornaments" of leis made of red, yellow, black, white and green feathers on their heads and necks.[48] Items made from human bone were carried by aliʻi. Clerke mentioned two such items on his second trip to Kauaʻi—fishhooks made of the bones of defeated warriors gifted to him from Queen Makakahelei, and a kahili carried by her daughter with a handle of another fallen warrior's bone.

Hair styles seemed consistent across the islands, with wāhine wearing their hair long in front and short behind while kāne preferred a type of wig of human hair twisted into long tails down their back, with mostly short beards (Beaglehole 1967:280-1). Hair was sometimes died yellow using a mixture of clay and powdered shell (Beaglehole 1967:280). Tattoos were recorded as decoration for the skin based on desire rather than ritual. Samwell (Beaglehole 1967:1181) observed that while tattoos were common, only the women of Hawaiʻi island were tattooed on their tongues (a practice not observed amongst the men). Other adornment practices differed between islands. Samwell (Beaglehole 1967:1231) observed that women on Kauaʻi wore necklaces made of black seeds and small shells as well as blue stones used for mirrors—items not observed to be worn by wāhine in other communities. Samwell

[47] Beaglehole comments that the length of the cape denoted status and while the yellow color was the mark of royalty (626).

[48] Samwell does not specify here which island he is specifically talking about, nor does he specify whether all women wore these types of feather leis or only the aliʻi wāhine.

(Beaglehole 1967:1231) also observed that women wore "thick feathered rolls" (likely a lei) around their feather caps, a fashion also not observed elsewhere. As for footwear on the islands, Samwell observed that traveling across the aʻa lava surrounding Kealakekua Bay on Hawaiʻi island required that the locals wear sandals made of platted twine (Beaglehole 1967:1179). Each of these observed clothing and adornment styles required extensive labor to make, leaving material traces at the site of production.

Three types of cloth items were made: common kapa clothing, mats for sleeping and as floor coverings[49], and decorative ornamental or ceremonial wear (Beaglehole 1967:625). Clerke detailed the production of kapa cloth from the bark of paper mulberry trees while King and Samwell mentioned that breadfruit tree bark was also used for this purpose (Beaglehole 1967:625, 1187). Clerke (Beaglehole 1967:594) detailed the process of production, writing that Kānaka wāhine would beat the strips of bark until they were three feet by four feet then sew strips together to achieve the desired length and width. Samwell (1186-7) included in his description that the women used round beaters with grooves to beat the bark. The women would then spread out the cloth to dry before staining it using a brush made of pandanus-key. Decoration of the kapa cloth, at least for those near Kealakekua Bay, relied on bamboo stalks dipped in ink (Beaglehole 1967:594)—neither Clerke nor King, who both wrote about kapa design, observed the use of stamps. The colors used for decoration were "white, black, red, yellow, green and gray" (Beaglehole 1967:1186) but the plants used to make these different dyes were not specified. The beauty of their kapa designs was remarked upon several times throughout the journals. The quality of woven mats was also noted, with the inhabitants of Niʻihau specifically identified as having the finest mats (Beaglehole 1967:626). The production of kapa cloth and matting occurred within house complexes with many of the houses incorporating flat courtyards for drying kapa as noted above. The material remnants from the production process and use of the matting on the floors likely survives only at the microscopic level, even though the matted floors were said to be consistently swept clean. Evidence of these and other household goods elucidate the social organization that was reinforced through the architecture during this period.

Other tools of note used daily within the household spaces included utensils used in food preparation and consumption. Food preparation include curing fish and pork in sea salt produced in salt ponds for preservation purposes. This practice was particularly prevalent on Niʻihau (Beaglehole 1967:279). Preparing fresh food required an earthen oven and heated stones, which leave a distinct material trace. Samwell (Beaglehole 1967:1163) detailed the method used for cooking pigs that he observed at the ceremony for Captain Cook on Hawaiʻi Island. He stated that first the pig was strangled, put on the fire, shaved of hair and washed, cut open with a bamboo knife, entrails removed, then hot stones placed in the abdomen and around the pig. The pig and hot stones were then covered with soil and plantain leaves to cook. At this particular event described by Samwell (Beaglehole 1967:1163), the pig was cooked for approximately 20 minutes before it was pulled out and cut to the joints and eaten by the people. While the event described was ceremonial in nature, it can be assumed that similar materials were used for slow cooking food in household imu ovens. Aside from the knives described as used in the process of cooking pig, other household utensils used in food processing, consumption or storage included gourds and wooden bowls on Kauaʻi and Niʻihau (1967:283) along with wooden bowls and plates of green plants, coconut shells for drinking or storing feathers, knives made with wood and sharks teeth (along with the bamboo

[49] Samwell also observed that thinner mats were worn by the aliʻi as clothing and the thicker mats were placed on the floors of houses and employed as sails for the canoes (Beaglehole 1967:1187).

stalk knife described above), and gourds used to hold water or thin puddings on Hawaiʻi island (Beaglehole 1967:1167, 1182). Larger gourds were also used to store fishing line and fishhooks (Beaglehole 1967:1183). Kava bowls were described as the most decorative household item and only seen in the houses of aliʻi nui (Beaglehole 1967:1183). Tools used for work outside of food production that were observed in the houses included the kapa-making materials described above, and adzes used in carving wood. Kukui nut candles also furnished the house, providing light at night (Beaglehole 1967:599). The remnants of these materials not only indicate the function of different household features/spaces but also possible status associations or craft specializations. Other tools used outside the home that could illuminate individual specialties or statuses are described below.

Samwell reviews the tools used in fishing, listing nets and different types of fishhooks made of wood, bone, and pearl shell. These items were often stored in the house as described above, or temporary storage features. The descriptions of warriors in the journals describe the people that fought as a separate class, their tools being the weapons of warfare. On Kauaʻi spears, barbed lances, and daggers were prevalent (Beaglehole 1967:282). Hawaiʻi island warriors were observed using pahoa daggers made of metal from the ships. Clerke (Beaglehole 1967:538, 594) wrote that each aliʻi had one of these daggers in their possession which took the form of their wooden daggers made of dark wood. These wooden and increasingly common metal daggers were also found to be the ʻuniversal' weapon of aliʻi on both Maui and Hawaiʻi islands. Aliʻi were also frequently equipped with spears and shark tooth knives (Beaglehole 1967:626). Samwell (Beaglehole 1967:1182) adds to this list of weapons short clubs, bows and arrows, and slings. To protect from the sharp implements, armor made of palm fiber (called "mats" in the journals) was worn by lower ranking warriors while aliʻi wore their feathered capes and helmets in battle.

Activities that occurred in and around the home unrelated to daily survival included recreational games and hula dancing. The journals include several references to the kōnane game played in the households, which consisted of a wooden board along with black and white pieces (made from basalt and coral respectively) (Beaglehole 1967:1168). Dancing also appeared to be a topic of conversation among the men aboard the ships. The haole sailors seemed equal parts delighted and distraught by the 'lascivious nature' of hula dances. Their fascination with these dances, however, led them to record the types of decoration worn by the dancers as well as instruments used. Clerke (Beaglehole 1967:597) for example observed different types of drums and the presence of ʻuliʻuli rattles used in hula on Kauaʻi. Samwell (Beaglehole 1967:1168) mentioned the kupeʻe anklets with dog teeth in rows worn by a woman that rattled as she danced on Hawaiʻi island, an interesting observation considering later historical documents would associated dog tooth anklets with male hula dancers. Descriptions of materials associated with these more recreational or ceremonial activities provides a different avenue into community connections outside of purely functional activities.

Conclusions

The information presented in this chapter covers archaeological, ethnographic, and historical data that, when synthesized paints a picture of a complex ancient Hawaiʻi. Cook's journals provide descriptions of the cultural phenomena included in the moʻolelo while also evidencing the diversity of practice in an archipelago not yet politically united. The archaeological research supports both the stories of political intensification and structured hierarchical organization while also evidencing differences in how political intensification occurred and the different manifestations of changing social organization in the material record. What this data does not provide is more complete spatial descriptions by district of the cultural heterogeneity in the 17th and 18th century or an interpretation of archaeological data grounded in Kānaka worldviews for social relationships across the islands. Interpretations of Nuʻu house sites that consider the social and environmental contexts in understanding why space was designed in a certain way is more supportable when building from the knowledge that kuaʻāina lands constructed their houses differently due to rough terrain, dry environment, and distance from the chiefly courts. Knowledge of specific items associated with higher status community members from historical documents and moʻolelo synthesized with data from archaeological studies on how status presents in the material record of households provides multiple lines of evidence for interpreting hierarchical relationships on the landscape. Gender relationships discussed in moʻolelo and historical documents reveal an ideology that raises questions about earlier anthropological interpretations of Hawaiian relationships while suggesting a road forward by reconceptualizing how value is placed on certain activities or goods. The picture painted by the information in this chapter illustrates an umbrella of Hawaiian culture that actually encompassed a diverse set of practices with each district organizing their communities differently, dependent on their specific historical, social, political, and environmental contexts.

Chapter 5: ‘Āina: Place and Space

“the act of living through land” (Halualani 2002:44)

‘Āina, like many Hawaiian words, resists simple definition. Each section in this chapter examines a different way to understand the ‘āina, speaking to the complexity of the term. A unifying thread connects the diverse definitions, however. The ‘āina as the core of the space and place from which Meyer (2001) argued Hawaiian knowing originates encompassed an explanation of political and religious structure as well as community relationships amongst people and nature. Kānaka lived “through” the land by developing subsistence strategies while building communal ties. The landscape was shaped by these community-building actions and reinforced the ways the community could interact. Kānaka interacted with the natural and built environment in a way that signaled their surroundings were more than physical space, rather the ‘āina was “a way of life”. In this way, the land extended beyond the physical realm into the spiritual as “the physical manifestation of a greater nonmaterial power” (Halualani 2002:44). This perception of land persists for contemporary Hawaiians:

> “As a Native Hawaiian, a place tells me who I am and who my extended family is. A place gives me my history, the history of my clan, and the history of my people…The concept of wahi pana merges the importance of place with that of the spiritual. My culture accepts the spiritual as a dominant factor in life; this value links me to my past and to my future, and is physically located at my wahi pana.” [James, In E. Kanahele 1991 and McGregor 2007:6].

Conceptualizing land in this way changes discussion of the built landscape. More than simply taskscapes, living *through* the ‘āina suggests intimate connections to ‘place’. The land embodied power and tradition through the lives of the people that altered the natural environment in daily life. The ‘āina was understood as “the natural, deified force of Lono, the god of fertility and love, or Kāne, the god of agricultural growth” (Halualani 2002:44). One argument for the prevalence of the place name Hawaiki, both considered the homeland of Polynesians, and a “passage between creation and reality” (Taonui 2006:49), traces back to the propensity to geographic spaces with spiritual places. Taonui (2006:49) argued that as Polynesians migrated across the Pacific, they utilized this place name repetitively “because they regarded the ideas of geographic and spiritual origin as mutually similar.” New names were added for the ‘āina through time, imbuing the place with meaning, shaping the community’s conceptualization and therefore their interactions with the land. “The names of places…not only provide a profound sense of identity with the ‘āina or land and natural resources, they also convey a sense of responsibility to provide stewardship of the area where they live” (McGregor 2007:5).

The land was also conceptualized as embodying the community and the ‘ohana. Handy and Pukui (1972:3) argued that “The expanded and all-inclusive family or ‘*ohana,* and the home-land or ‘*aina,* were two complementary factors which constituted this regional dispersed community.” The land was part of the ‘ohana in that people were connected to the land of their birth and the location of their ancestors’ burial. This connection shaped actions in life and in death. In life, the land played an integral part in the daily exchange and sustenance, with kama‘āina in Kaupō participating in exchanges between upland and low-land ‘ohana. In death, the people of Kaupō that had left in their lifetime were returned for burial in the land of their ancestors (Maunupau 1998:113), reinforcing the familial connection between their ‘ohana and the ‘āina.

This conceptualization of the land parallels anthropological theories that emphasize landscape as “place created by human activity that formed the medium for peoples’ lives…hermeneutically created landscape has been shaped by, and in turn shaped, human behavior” (Graves and Ladefoged 2002:4). Thinking of the land as a force that people worked within to shape, but that also shaped community actions, points to why the differences in kauhale design and use are crucial to interpreting the construction and enforcement of social identity. The community’s unique relationship with the ‘āina requires detailing of the Nu‘u ahupua‘a geographical and geological characteristics that differentiated it from the other communities on the island. Due to the continuous reinscribement of practice through “collective rituals and community functions” (practices still utilized by Hawaiian descendants today to affirm Native identity) (Halualani 2002:223), looking to daily life within a community is where these structuring forces of social identity become most visible. I discuss the available history of Kaupō in this chapter, with particular attention paid to the farmlands of Nu‘u. I also discuss the physical characteristics of the land that were altered by human occupation.

Southeast Maui Geography and Geology

‘āina. n. land, earth (Elbert and Pukui 1986:11)

Kaupō moku is located on the southern flank of Haleakalā. The district stretches from an elevation of 2470m at Pōhaku Pālaha to the ocean, and 13km east to west from Kālepa Gulch to Wai‘ōpai Gulch (Kirch et al 2010:267). Kaupō is unique in its geologic formation, located on an accretion fan (the Hawaiians named this place Nāholokū) that was created as a result of several lava flows beginning around 120 kya (Kirch *et. al* 2010:268). These flows are younger than some other substrates of Haleakalā Mountain and, thus, their soils possess higher nutrient levels than those on older flows depleted of nutrients (Kirch *et al* 2010:268). The young lava flows came through the dominating Kaupō gap, a deeply incised valley in the Haleakalā shield (Kirch *et al.* 2010).

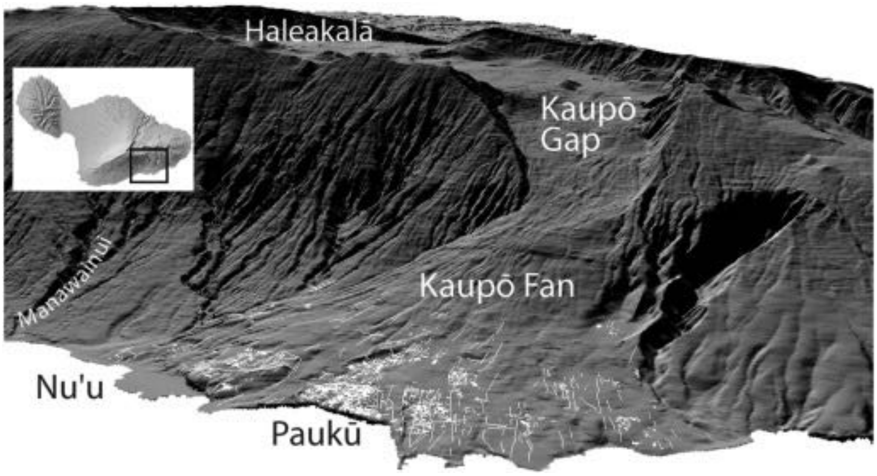


Figure 5.1: Illustration of the Kaupō Gap and Kaupō Fan with surveyed sites (from Baer *et al.* 2015: Figure 1).

A phase of rejuvenated volcanism that began 120 kya ago led to a major mudflow and newer lava flows that brought with them to the area deposits carrying important nutrients, creating ideal conditions for dryland agriculture (Kirch 2010:268; Stearn and MacDonald 1942). The most recent geological substrate in Kaupō is a result of the Hāna series lava flows from

Haleakalā volcanic within the last 5000 years. The Qhn6 flow that covers much of the central region of Kaupō occurred 3-5 kya, while the Qhn4 flow, also dated to 3-5 kya, dominates local geology towards the westernmost edge of the region (Sherrod *et al*. 2007:39), where Nuʻu ahupuaʻa is located (Figure 5.1). This side of the alluvial fan where Nuʻu is located characterized by a younger substrate and lower annual rainfall, would have exhibited limited agricultural yield due to inconsistent rainfall (Kirch *et al*. 2010:271). The basalt that dominates this flow, Puʻu Maile Basanite (Sherrod *et al*. 2007:39), is a tephrite (Nockolds *et al.* 1978:183). Classic tephrites have a porous structure and rough texture; Hawaiians refer to this type of lava as aʻa. This aʻa dominates the Kaupō landscape, forming jutting outcrops of bedrock that Hawaiians utilized as key components in the foundations of houses, heiau, and other structures integral to daily life.

While Puʻu Nole Basanite (0.75-1 kyr) and Puʻu Maile Basanite (3-5 kyr) dominate the Nuʻu landscape, only Puʻu Maile Basanite was found to be productive for agriculture (Kirch *et al*. 2010:279). The substrate age of Puʻu Maile Basanite allowed time for nutrients to be released from the breakdown of the lava flow, and was not yet leached of nutrients. The resulting high nutrient levels combined with the high level of rainfall in the region (though less than that of ahupuaʻa to the east at 800 mm per year) fell within an optimal range of conditions for agricultural production (Baer *et al*. 2015:429; Chadwick *et al*. 2003), particularly for sweet potatoes that require 760-1270 mm of rainfall per year (Purseglove 1968:82). The central zone below 300 m elevation was the ideal location for farming sweet potatoes due to the presence of optimal nutrients combined with optimal rainfall (Baer *et al*. 2015).

Rainfall in Kaupō varied across the Nāholokū fan, but the most productive regions at the center reached 1000 mm of rainfall per year that, when combined with the young age of the local substrate, resulted in ideal conditions for high crop yields (Kirch *et al*. 2010:271). Sweet potatoes, the staple food in the lower forest belt regions, were planted during the rainy seasons, relying on water from the rains and from springs like Waiū (McGregor 2007:92). Nutrient-rich soils likely contributed to this leeward region becoming an important center for dryland agriculture on Maui, and part of one of the largest dryland planting zones in the Hawaiian Islands (Handy 1940; Kirch *et. al* 2010:284).

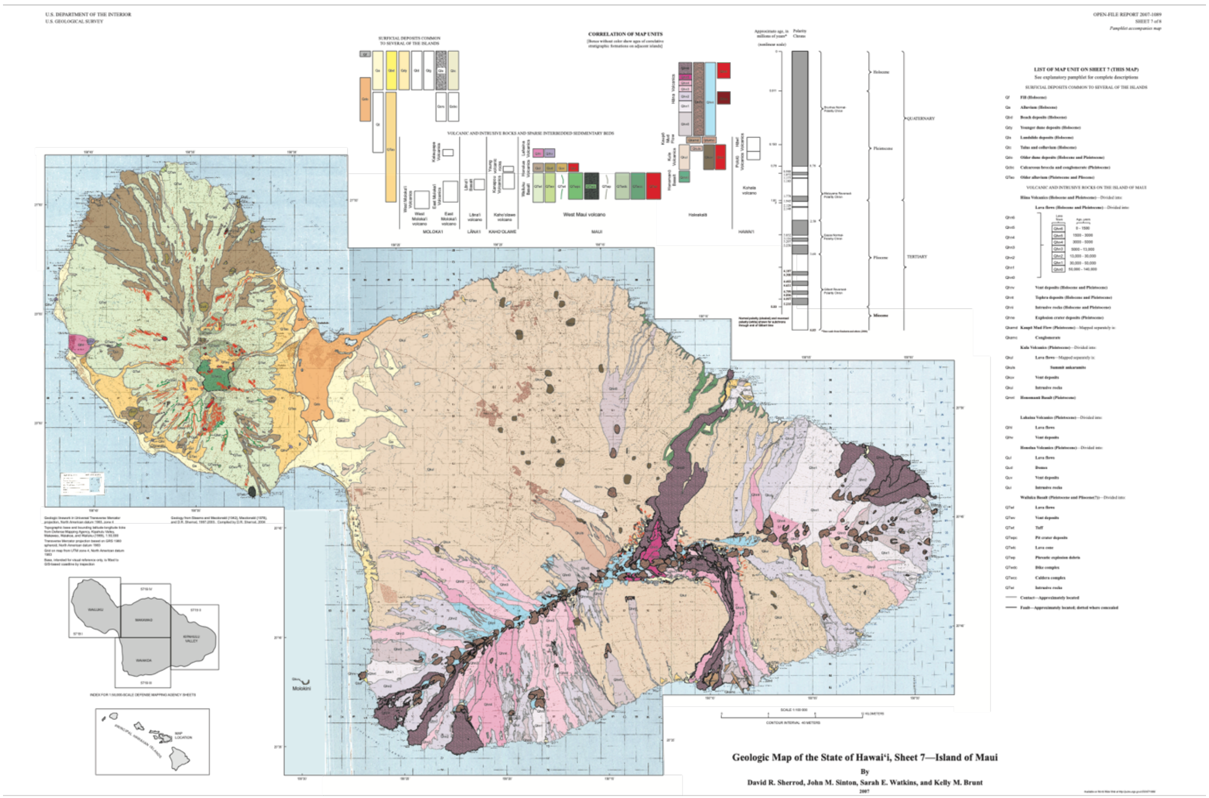


Figure 5.2: Map of lava flows across Maui (from Sherrod *et al*. 2007).

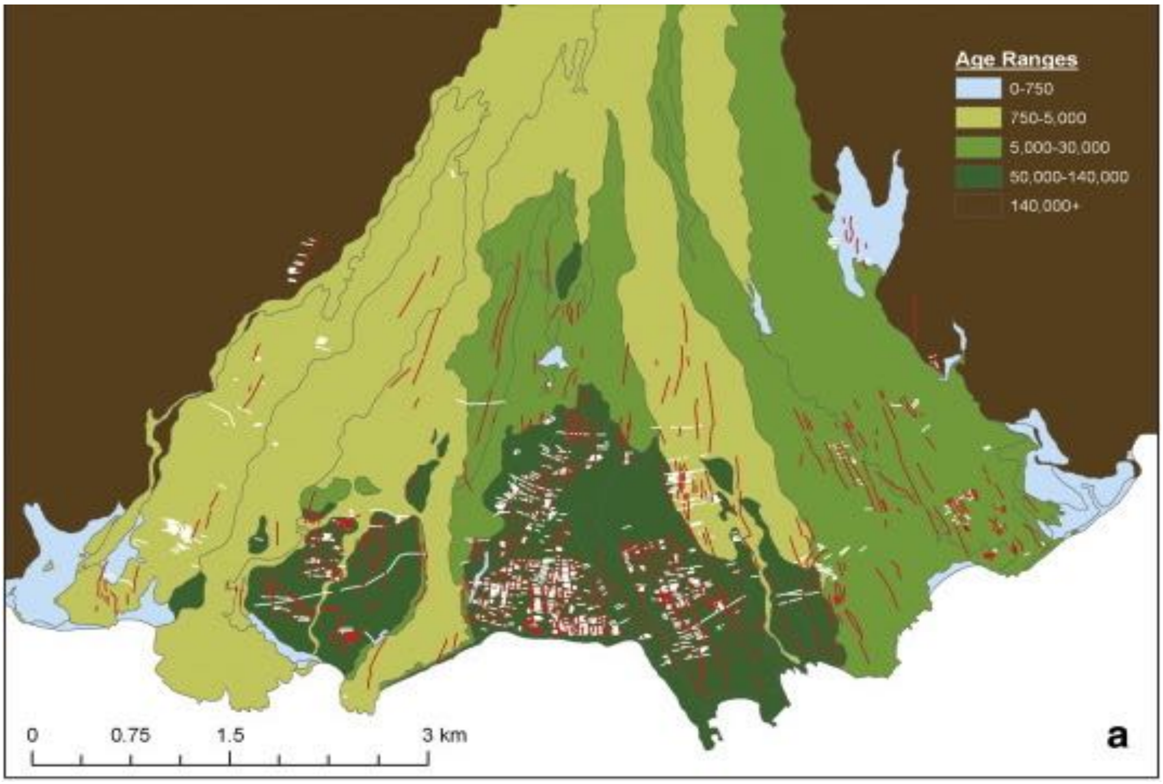
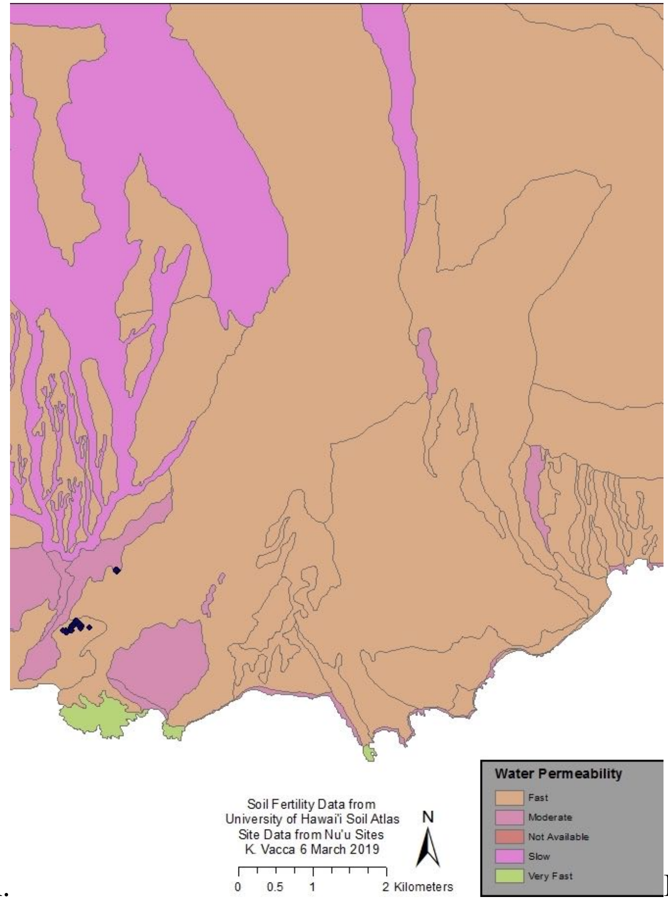


Figure 5.3: Illustration of substrate age on the Nāholokū with the surveyed sites. (From Baer *et al*. 2015, Fig. 3a)

As one of the six pie-shaped districts in east Maui, Kaupō incorporated three primary ecological zones: coastal zone, dry forest zone, and wet forest zone. Coastal zones, generally defined as habitats below 500 feet elevation (Lincoln 2009:7), are diverse habitats with variable characteristics depending on the age of the island. Coastal habitats get less yearly rainfall and are often affected by salt spray from the ocean, making agriculture difficult. Younger regions like southeast Maui exhibit uneroded coastlines that lack deep soil profiles present on older islands. The coast on younger islands is instead dominated by rough, rocky lava—any fresh or brackish water therefore becomes an oasis to wild plants and an important source of water for drinking and irrigation (Lincoln 2009:7). The wet forest zone occurs in regions that receive a minimum of 2500 mm of rainfall each year (Lincoln 2009:99). The elevations for this zone are variable, extending from the sea level at the coastal zone to reach ~2134 m above sea level on some islands. On the windward side of Maui, the rainforest extends above 1650m elevation (Cuddihy 1989:51). Plants that grow in this habitat tend to be fast-growing as they are competing for access to sunlight. Ancient Hawaiians considered the wet forests (wao akua) sacred and powerful, entering them only for specified reasons like collecting feathers from brightly colored birds (Lincoln 2009:99). The final zone, dry forests, are the most relevant to the current research project. These areas are found on the leeward sides of the islands and extend from the coastal zone (0-152 m above sea level) and up the mountain slope to the rainfall boundary (reaching 1500 mm/yr) (Lincoln 2009:45). The upper boundary varies from island to island and on the higher peaks can reach elevations of 2134 m above sea level (Lincoln 2009:45). This was the region most commonly cleared by Hawaiians for dryland agriculture (and later utilized by westerners for cattle ranching and sugar cane cultivation) (Lincoln 2009:45).

The house sites excavated for this study fall within this dry forest zone in the Nuʻu ahupuaʻa. In this region, the kuaʻāina planted crops along constructed agricultural alignments made of rock and soil that ran parallel to one another across the slope in the protected swales and cleared fields near households. The primary crop of Kaupō was likely sweet potato but dryland taro may have also been planted in the higher elevations with greater rainfall (Handy et. al 1972). In dryland regions, farmers also planted introduced secondary crops like banana and sugar cane along the ridges as border crops that potentially served as shade barriers and windbreaks to capture moisture and promote mulch development for growing tubers (Lincoln 2009:79).


Water Permeability
Fast
Moderate
Not Available
Slow
Very Fast
Soil Fertility Data from
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Site Data from Nu'u Sites
K. Vacca 6 March 2019
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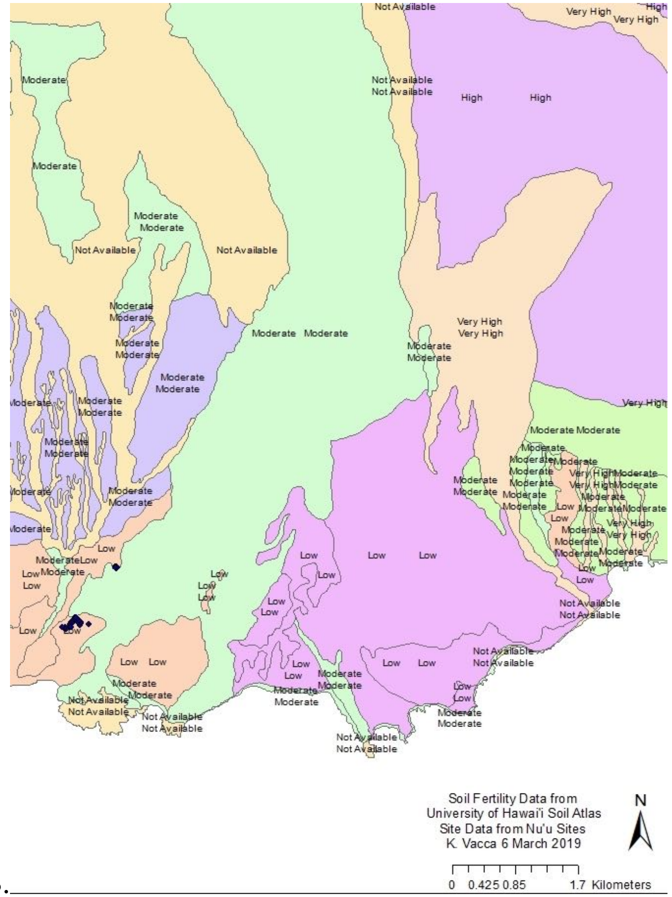
A.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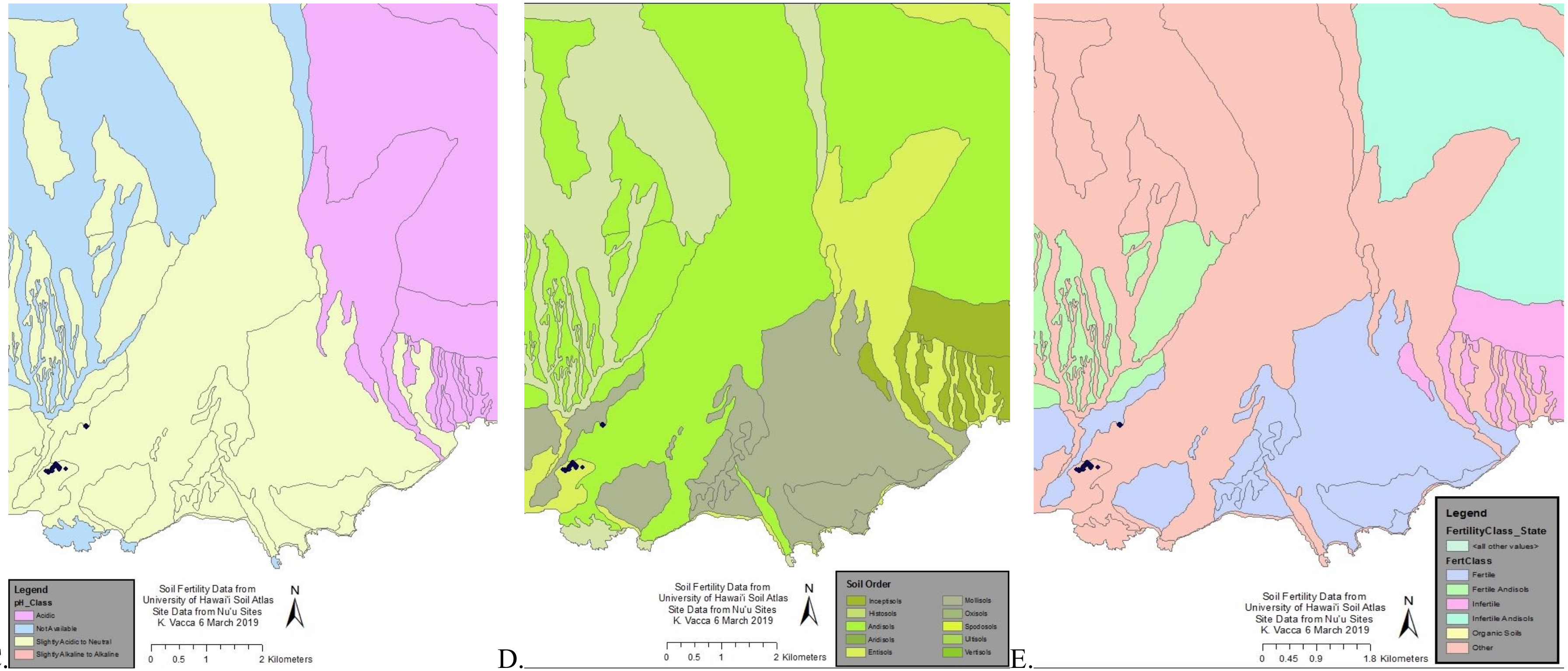


Figure 5.4: Soil properties on the Kaupō fan with the excavated Nu‘u sites marked. Soil data is courtesy of the University of Hawai‘i Soil Atlas (http://gis.ctahr.hawaii.edu/SoilAtlas) (A) Water Permeability (B) Level of Organic Matter (C) Level of pH (D) Soil Order (E) Fertility Class

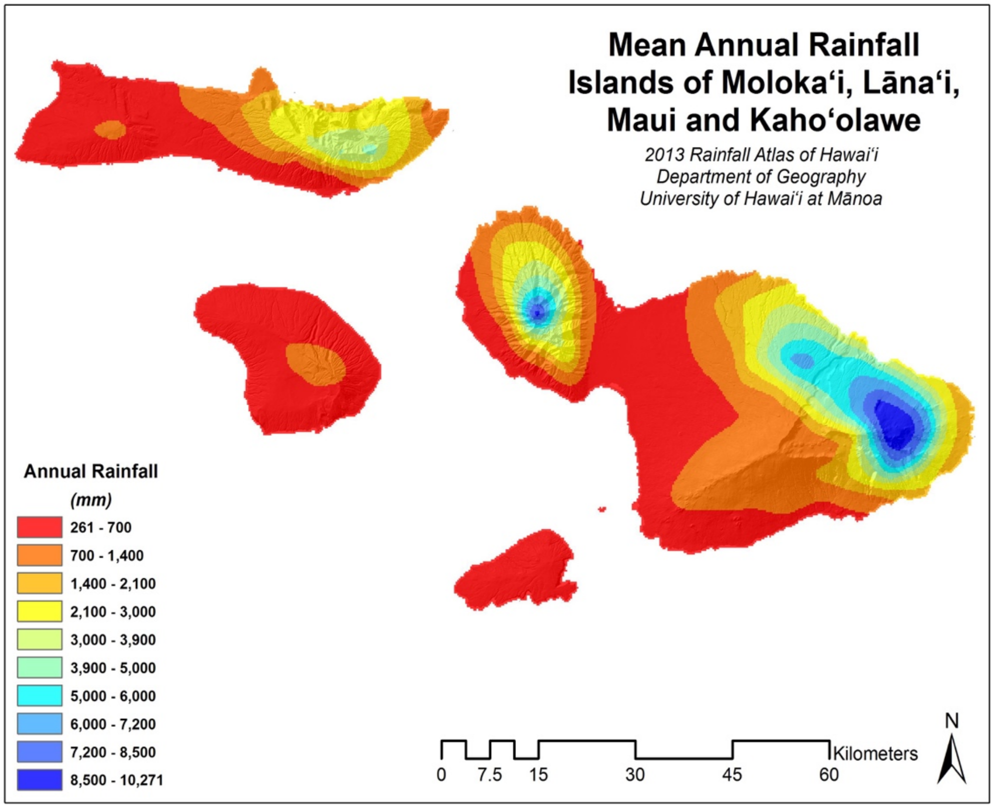


Figure 5.5: Mean annual rainfall for Maui Nui (From Giambelluca *et al*. 2013, http://rainfall.geography.hawaii.edu/).

Kua‘āina

The leeward regions of the islands including the dry landscape of southeast Maui were known to Hawaiians as the kua‘āina. Kua‘āina, translated today as the backlands, shifted in meaning during the cultural renaissance of the 20th century (McGregor 2007:4). In earlier times, the term invoked the backbone of the islands, "the Native Hawaiians who remained in the rural communities of our islands, took care of the *kūpuna* or elders, continued to speak Hawaiian, bent their backs and worked and sweated in the taro patches and sweet potato fields, and held that which is precious and sacred in the culture in their care" (McGregor 2007:4). The definition of ‘āina that becomes most relevant for these communities are associated with arable farmland, the homeland of agricultural people that birthed and fed the people of the country (Handy *et al*. 1972:45).

The lands of Kaupō were and remain kua‘āina lands. Kua‘āina people were said to be seasonally occupied with their year revolving around agricultural cycles. Fields were cleared after the heavy rains of February, then planted with tubers, gourds, paper mulberry, and other plants harvested in the uplands (Handy *et al*. 1972:31). In dry localities like Kaupō, planting occurred after the ground was soaked numerous times—planting time began in August in this locale when the showers started (Handy *et al*. 1972:128). This was the time of year when food was scarce—resources gathered from upland forests and along the seashore were instrumental for survival until crops were ready to be harvested. This was also the period when households were more mobile (Handy *et al*. 1972:32), with members visiting relatives and engaging in activities unrelated to specific occupations. By June when the hot weather arrived, women were able to make bark cloth that could dry in the sun while men were able to hunt in the forests, deep sea fish in the calmer summer waters, dry salt, and work on their fishing nets (Handy *et al*. 1972:32). June was also the period in which the spring restrictions on inshore fishing were lifted after the fish spawning season ended. Many fish caught at this time were salted and preserved for the winter months. Along the coast of Kaupō, deep sea fishing was said to be poor while shellfish and limu were limited (Handy *et al*. 1972:276). The absence of deep-sea fish and ample shellfish limited the meat available to the communities there. By fall, crops were ready to harvest and they were preserved for winter months when food was scarcer (Handy *et al*. 1972:32). This yearly cycle is well documented in communities that lived along the southern slope of Maui:

> Hawaiian *mauka-makai* (mountain-ocean) use of the ahupuaʻa in southeast Maui was linked to the planting cycle, which was dependent upon the variations in rainfall according to elevation and seasons. In the uplands, where it usually rained daily, planting could be done year-round. In the lowlands, planting was usually done in conjunction with the rainy season. When the rains moved on to the lowlands, each family lived at temporary habitation sites along the coast where they cultivated small plots of sweet potatoes and gourds. This important seasonal habitation cycle is documented in the interviews with Sam Po, a native of Kanaio. According to him, even though the latter half of the nineteenth century the kuaʻāina in the district continued to live seasonally mauka and makai and plant in accordance with the annual rains. [McGregor 2007:92]

Remains found from these different periods in kuaʻāina houses evidence the cycles of the year, available resources, and the time spent living in their upland houses.

Kuaʻāina farmers led different lives than their counterparts in royal centers or in wetland regions. Agriculturalists in these marginal lands were most concerned with implementing their deep knowledge of soil in the production of a variety of crops grown to feed their communities (Handy *et al*. 1972:310). This knowledge extended to moisture levels, elevation where the most nutrient-rich soil could be found, and techniques for growing potatoes on dry volcanic slopes (Handy *et al.* 1972:310-1). In Kaupō, the farmers worked with gravelly decomposing lava (described at length above), growing sweet potato in stony patches (Handy *et al*. 1972:128-9). The farming communities were designed to be reciprocal like all communities in early Hawaiʻi, but organized around the farmland with houses built on soil less likely to produce high yields of crops. Communities in Kaupō, in particular, approached farming as a communal enterprise. Everyone worked clearing patches and digging holes for planting the tubers (Handy *et al*. 1972:137). In regions like Kaupō, houses tended to be built along rocky ridges above the nutrient rich swales reserved for farming, scattered between the inland and sea (Handy *et al.* 1972:286). This led to more dispersed households that maintained a certain level of independence, while also sharing goods and pleasures (Handy *et al*. 1972:312).

Maui History

“Stones rot: only the chants remain.” (Decker *et al*. 1987:IX)

Maui Island is the second youngest and second largest in the Hawaiian archipelago. The island of Maui was politically divided into 12 moku, that were further subdivided into ahupuaʻa, ʻili, moʻo and paukū (Kirch *et al*. 2010; Malo 1951; Sterling 1998:166). Nuʻu ahupuaʻa on the western-most edge of Kaupō moku in southeast Maui, is a prime example of the ahupuaʻa land division. Within the ahupuaʻa, the land was divided into smaller segments on which families lived and worked, farming dry land taro and sweet potato for a sizable population. Settlement of the Kaupō region corresponds with a rise in population and increasing sociopolitical complexity archipelago-wide occurring around 1400CE, followed by the settling of more leeward regions (Cordy 1981; Hommon 2013; Van Gilder 2005; Kirch and Sharp 2005; Kirch 2007). The moku along the southeastern slope of Haleakalā were the last regions to be settled with Hawaiians moving to this area around 1400 CE but remaining relatively isolated from other well-populated regions until the 19th century (Handy *et al*. 1972:507). Demographic estimates based on ethnographic and archaeological evidence suggest that the Kaupō region sustained a population of between 8,000 and 10,000 people at its peak in the 1600s CE (Kirch *et al* 2010:286).

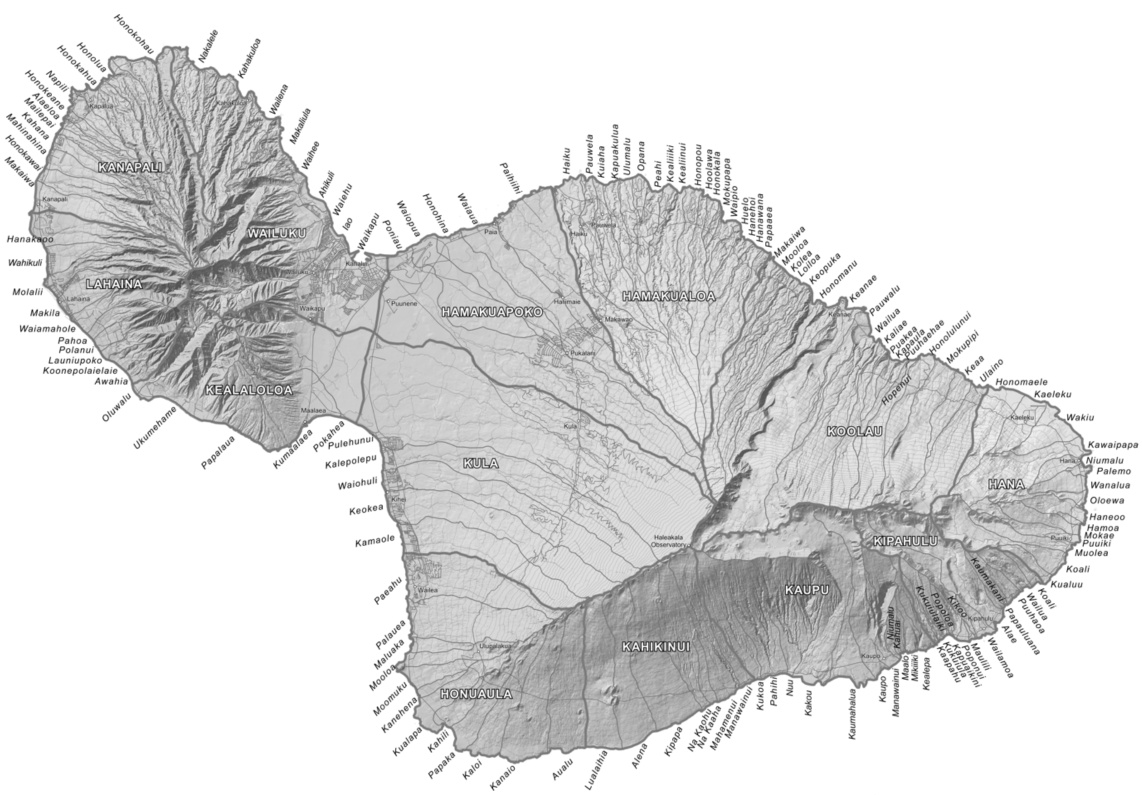


Figure 5.6: The contemporary understanding of land divisions on Maui[14] from Aha Moku Advisory Committee (http://www.ahamoku.org).

[14] This illustration represents what was possible, but many of the place names for ahupuaʻa on Maui have been lost to time.

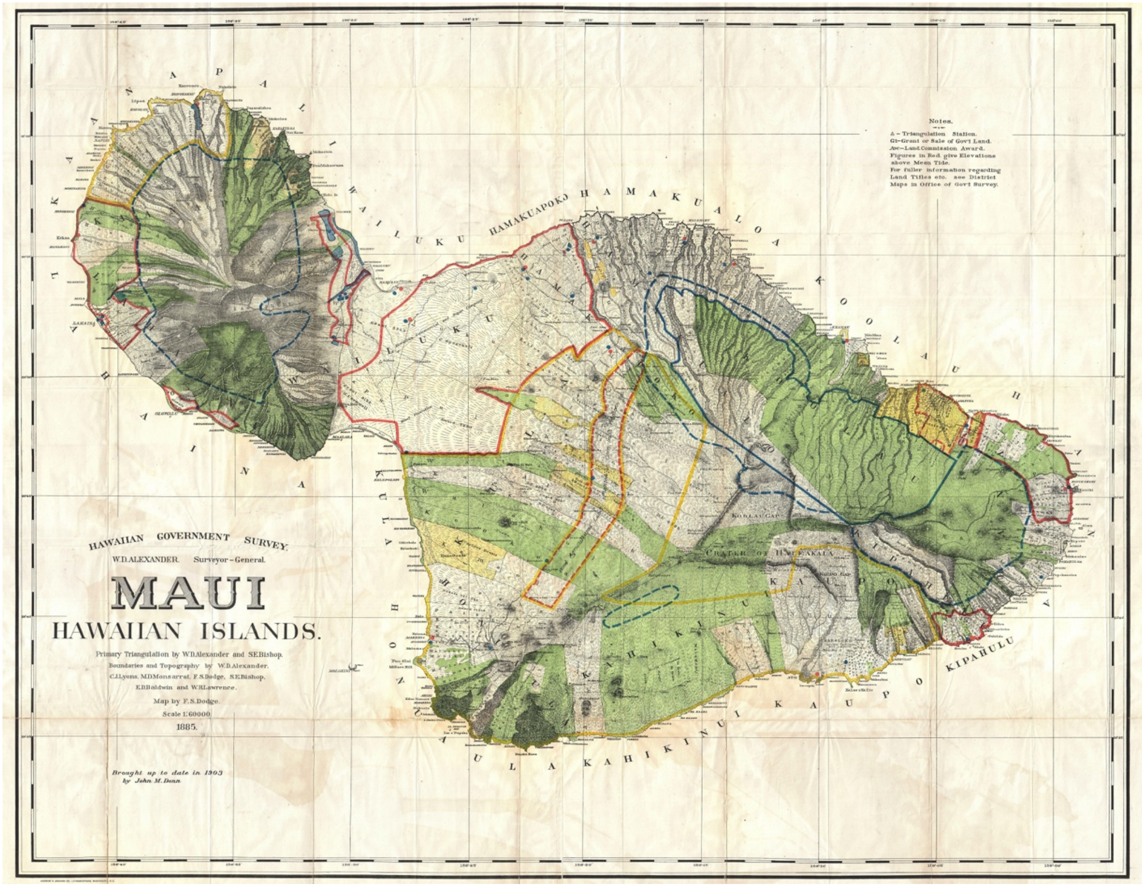


Figure 5.7: 1903 Hawaiian Government Survey map of Maui with the districts labelled Publisher Andrew B. Graham Co., Washington, D.C. American Geographical Society Library, University of Wisconsin-Milwaukee Libraries (https://collections.lib.uwm.edu/digital/collection/agdm/id/138/).

Commoners in the region provided armies for the chiefly wars frequently fought after the 16th century between the moku that resulted in shifting territorial boundaries. Wars of this type dominate the historical narratives of Kaupō from the 16th through 18th centuries. Ethnohistoric documents supported by numerous archaeological investigations tell us that the island was important in the social and political history of the archipelago. Perhaps the most well-known account, Kamakau (1961) tells the story the ruling chiefs of Maui through their entangled and often antagonistic relationships with the Hawaiʻi Island chiefs. The history of Hawaiian social and political changes affected the way that people interacted with the land.

The shifting political relationships resulted in the archaeological material record of settlement present on the land today. Oral traditions concerning Kaupō note that the seat of the Maui government was moved to Kaupō as relationships between the Maui and Hawaiʻi Island polities became increasingly antagonistic. Kaupō was an ideal location for the government seat in this period of warfare as it was geographically the closest district in Maui to Hawai'i Island (Kamakau 1961:66). The oral traditions describe periodic warfare between the two polities that ended with the conquest of Maui by Hawai'i Island paramount Kamehameha I following European contact.

The history of ruling chiefs in Kaupō begins with the death of Piʻilani, a well-loved and respected chief who ruled Maui in a time of peace. Although the genealogy of Hawaiian rulers goes back further than Piʻilani, these lineages have been thoroughly analyzed and discussed by other scholars (Abad 2000). For the purposes of the current project, the important place of entry in the genealogy is the period when Pi'ilani ruled as the paramount as his rule coincided with the phase of expansion in Hawaiian socio-political trajectory (Abad 2000:331; Kirch and Sharp 2005:104). Most significantly, the island of Maui became one unified polity under Piʻilani, gaining strength and influence (Abad 2000:331; Fornander 1996:87; Kalakaua 1990:157). The daughter of high chief Piʻilani (Piʻi-Kea) married the Hawai'i Island chief 'Umi-a-Līloa (Kamakau 1961:21) while the two sons of Piʻilani—Lono-a-Piʻi-lani and Kiha-a-Piʻi-lani were meant to rule Maui together. However, Kiha-a-Piʻilani was on O'ahu where he was raised when their father died, so the kingdom of Maui went to Lono-a-Piʻi-lani with his brother living under him in peace caring for the people by growing food (Kamakau 1961:22). However, Kamakau revealed that this peace was short-lived, as the ruling chief began abusing his brother, causing him to flee. Kiha-a-Piʻi-lani worked for several years to regain the kingdom and eventually did so with the help of his sister's husband, chief ʻUmi-a-Līloa from Hawaiʻi (Kamakau 1961:31). Piʻilani's grandson, Kamalālāwalu, ruled Maui following his father, Kiha-a-Pi'ilani and unlike his predecessors, was hungry to control the island of Hawaiʻi—waging war on the Kona chiefs, but died in battle (Kamakau 1961:55). Relationships between Maui and Hawaiʻi became volatile in the years proceeding his death, leading to his descendant, Kekaulike, moving the seat of the government to Kaupō for strategic purposes (Kamakau 1961:66). Warfare between Maui and the Kailua-Kona region of Hawaiʻi continued through the next two generations (Kamehameha-nui and his brother Kahekili) while the umbrella of Maui rule and influence grew to include Molokaʻi, Lānaʻi, and Oʻahu (Kamakau 1961:81, 166). The moʻolelo tell us that the warfare between the two polities ended with the conquest of Maui by Kamehameha following European contact. Many people in Kaupō were killed over the course of these territorial wars. While this chain of events was immortalized through Kamakau's moʻolelo, the impact on the social context of the period left lasting marks on the landscape through the construction of infrastructure necessary to accommodate the physical and spiritual needs of the ever-increasing elite and commoner population.

Continuities and Transformations in Kaupō Communities

La Pérouse was the first European to visit Maui's shores, anchored for one night in 1788 on the southwestern edge of the island. While sailing past the shores of southeast Maui, La Pérouse sighted the fertile fields of Kaupō, then the most populous district in east Maui (Speakman 2014:48). Vancouver noted in 1793 the verdant green fields and populated landscape with distinct houses in Kaupō, but also commented on the poverty experienced throughout Maui at this time due to the continuous wars (Speakman 2014:57). Vancouver was the second European visitor to Maui, leaving behind a lasting influence through the introduction of cattle to the islands. Cattle ranching would eventually become a prominent trade in the 19th century. Following these visits by haole explorers were increasingly frequent foreign merchant ships which brought another wave of social, economic, and political changes to the islands.

The effects of depopulation and diaspora on the community were evident by the 1830s in Kaupō. Estimates put the population between 8-10,000 at its peak (Baer 2015:250; Kirch et al 2009) but by the missionary census of 1831, 3,220 residents remained and in 1920 only 3,100 remained in the vast Hāna district which at the time included Kaupō (Maunupau 1998:165). During the great Māhele, only 21 claims were made for land in the region (Baer 2015:250).

Rocky Nuʻu beach, once an important canoe landing, was used instead as a landing for boats shipping cattle to Kaupō ranches following the Great Māhele. Kula lands in particular became pastureland for goats, horses, and cattle by the Māhele (Linnekin 1990:90). Kaupō farmlands once famous for traditional sweet potato farming turned to ranching as the only alternative for the livelihood of the community (Maunupau 1998:165, see Figure 5.8 below). Nuʻu Mauka Ranch was established along the western portion of the Kaupō moku in 2000. Only the family that owns the land lives on the Nuʻu landscape today. Modern structures are limited to the ranch house, three small hunting cabins, a greenhouse, and infrastructure that includes large water tanks and a road that runs from the highway past the cabins to the ranch house. In the construction of the road and in the day to day care-taking tasks for the ranch, the owners are careful not to disturb the archaeological remains.

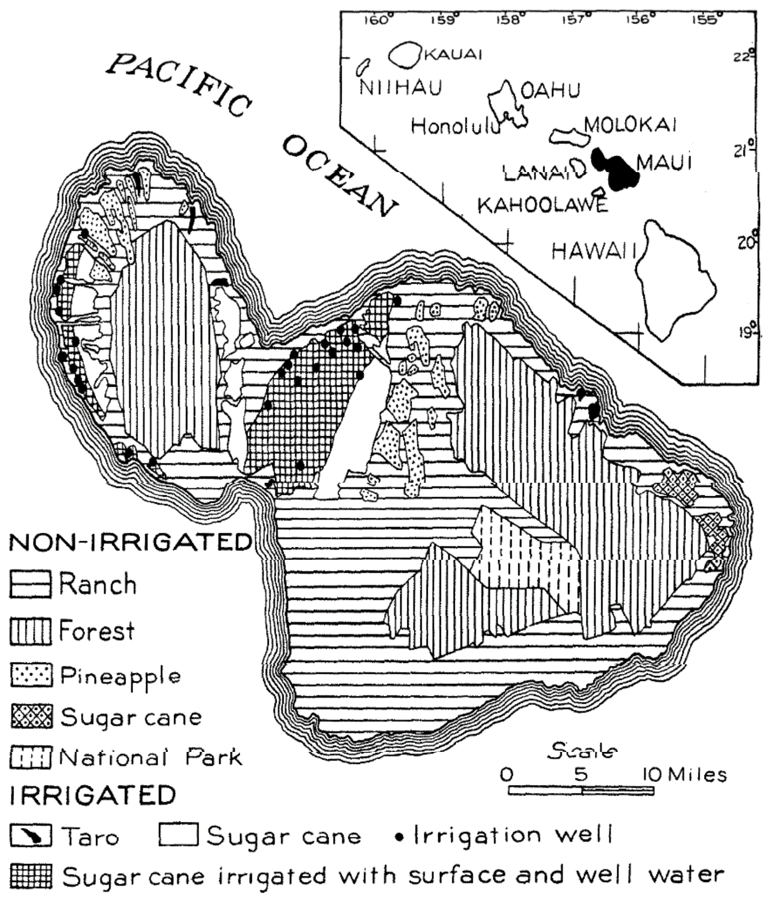


Figure 1. Map of Maui showing land utilization in 1937 and position of Maui in the Hawaiian group. The taro and the white areas of sugar cane are irrigated with surface water only. (After pl. 35, First Progress Rept., Territorial Planning Board, 1939.)

9

Figure 5.8 Map of Land Use in 1937 (from Stearns and MacDonald 1942, Figure 1).

Invasive plants and animals currently dominate the Nu'u landscape. Aside from the owner's pets, there are no longer dogs in Nu'u, but the occasional wild pig can still be spotted. Hundreds of wild goats run rampant from the remnants of the old agricultural region up the slopes of Haleakalā to the border of the national park. Axis deer also roam free, attracted to the undeveloped slope and abundant sources of food. Other invasive pests that are commonly sighted today include mongooses, mice, centipedes, scorpions, and various insects like beetles and sow bugs that can lead to bioturbation on archaeological sites. Invasive plants that grow within and around the sites, providing shade and sustenance for the roaming goats and cattle are the haole koa tree (*Leucaena leucocephala*, an arid climate shrubby that is a favorite snack for the ranch cows), kiawe tree (*Prosopis pallida*, a thorny mesquite tree native to South America). Invasive grasses, bushes, and other species that occasionally damage the material record. Polynesian-introduced and endemic trees still grow on the landscape. Kukui (the Polynesian-introduced *Aleurites moluccana*, a candlenut tree) and the wiliwili tree (the endemic *Erythrina sandwicensis* of the pea family) may still grow in the same groves where they prospered in ancient times.

Easterly trade winds sweep across the sloping landscape, disrupting the soil and making simple tasks difficult. The thicker and taller walls that line the eastern side of the kauhale architecture indicate that the winds posed a similar obstacle to daily existence when the houses were built. Maunupau (1998:103) lists the name of the strong wind said to come to maturity in Kaupō as Moae-ku, inferring that this wind was well known in the region.

The sharp a'a lava rocks that form the basalt cliffs along the ocean are covered with sea urchin, limpets, and sea snails today. Maui locals fish off a low basalt cliff that overhangs a relatively calm portion of the water adjacent to a beach covered with waterworn basalt boulders. Remnants from marine animals recovered from sites along the southeast Maui coast indicated that similar resources were relied upon in the past. The following section will review archaeological work on regional households to connect the material record with the landscape.

Archaeological Work in Southeast Maui

People lived in each habitable zone from the beaches to the mountain, leaving the remains of houses observed by Maunupau and Emory in 1922. Maunupau (1998:101) recorded that "in the olden days the people of Kaupō lived in a stone foundation house with pili grass roof…the families who lived there had many houses in accordance with their resources." Maunupau goes on to explain the organization of the house structures in terms of architecture and furnishing. The older houses lacked windows and only included one low doorway (as was also observed by Cook and his men). The primary furnishing mentioned by Maunupau (1998:102) were stacks of mats used for sleeping. Basic descriptions of architectural features, however, are not sufficient for understanding how the use of household space reflected social relationships on the built landscape. The archaeological evidence of kauhale on Maui provides the best insight into architectural design and organization of house space from the period of occupation of the Nu'u sites. While the interpretation of the sites still relies on the meaning provided by the ethnohistories and oral traditions, details of the built landscape illuminates the patterns in community construction.

Archaeological work on Maui spans topics from the macro-scale (e.g. political concerns) to the micro-scale (e.g. household social relationships). Winslow Walker conducted the first archaeological survey of religious structures on Maui from 1928-1929, incorporating notes from Thomas Thrum's observations of *heiau* in 1909 (Walker 1931). Archaeological work in leeward Maui focuses predominately on moku other than Kaupō—specifically Kahikinui—but archaeological data from the Kaupō district has been recorded as part of multiple projects since the 1930s. Following Walker's identification of sites along the coast and, in some instances, inland, Elspeth Sterling collected information on Maui archaeological features, compiling notes about these sites as well as associated descriptions of activities and legends (her notes are currently housed in the Maui Historical Society archive). Reconnaissance work was again initiated in 1963 with Soehren's survey of east Maui (Soehren 1963). In 1966, an additional 544 sites were recorded in the Kahikinui *moku* by a Bishop Museum team directed by Peter Chapman (Kirch 1997a:10). Surveys of archaeological sites in Kaupō under the direction of Patrick Kirch began in the early 2000s and excavations of house sites in Kaupō were conducted by Alex Baer (Baer 2015).

Archaeological excavations are less common on Maui compared with the neighboring islands of O'ahu and Hawaiʻi. The first excavation began in 1921 with Kenneth Emory's investigation of stone remains in Haleakalā Crater (Kirch 1985:13). Subsequent archaeological literature offered a glimpse into the design of field systems, settlement patterns, tool production, household construction and use, resource exploitation and other areas of social interaction. Excavations in Kahikinui led to the conclusion that people began moving to/farming previously unoccupied land in the late 15th century (Kirch *et al*. 2013:98). This process consisted of farmers locating the most viable land for transformation into intensive swale cultivation that supported large populations and produced surplus for the next five centuries (Kirch *et al*. 2013). These intrepid farmers discovered that the best lands for soil accumulation, wind protection, and water collection were the swales between ridges, which meant a transition in settlement patterns to houses built on ridges and gardens in depressions (Kirch 2010; Kirch *et al*. 2004; Coil and Kirch 2005). Historical records describe these modified landscapes that are found archaeologically throughout the Kaupō district, which were meant to sustain intensive dryland farming of sweet potato throughout the Kaupō district. Archaeological survey and GIS mapping identified the presence of "reticulate grid patterns" on the landscape, indicating intensive agricultural productions similar to that found in Kahikinui, Kohala, and Kona among other dryland farming regions on the leeward sides of the other islands (Kirch *et al*. 2010:267).

Starch and phytolith evidence from projects recovered from field systems in Hawaiʻi (e.g. Coil 2003; Horrocks 2004; Horrocks and Bedord 2010; Horrocks and Lawlor 2006; Horrocks and Rechtman 2009; Horrocks and Wozniak 2008; Horrocks *et al.* 2000; Horrocks *et al.* 2003; Horrocks *et al.* 2004; Horrocks *et al.* 2008; Horrocks *et al*. 2009; McCoy *et al.* 2016) evidence the plants people were using in the household. For example, McCoy *et al.* (2016) recovered the micro-fossils of paper mulberry, taro, sweet potato, breadfruit, coconut and ki from the Kona field system, proving that these microfossils are present in Hawaiian archaeological contexts. The plant micro-fossils recovered by McCoy *et al.* (2016) from the field systems were remnants of important resources that were known historically to have been processed in the house. This research establishes the environment within which the house sites were built and the resources available to communities.

Household archaeology on Maui connects social life with environmental contexts, yet through Van Gilder and Kirch's (1997) work the heterogeneity of the Maui landscape was revealed. Most remarkably, they described the discovery of a double-hearth feature in Kahikinui households, which was interpreted as an illustration of regional performance of kapu requirements. This and other investigations such as the excavation of a late pre-contact chief's house in Kahikinui (Kirch *et al*. 2009) brought into conversation two intersecting factors that play a key role in determining kauhale design—household status and access to resources. Baer's research in the eastern portion of Kaupō, while not explicitly focused on identifying differences in construction of households within the community, confirms that architectural diversity is present on the landscape.

In Kahikinui, Dixon et al. (1999:250) investigated the role of political control in the settlement of this dry leeward region. They postulated that the extensive agricultural settlement occurring around AD 1450 targeted microenvironmental zones (as previously suggested) that produced surplus that acted to increase political involvement, eventually creating what Handy (1940:161) called "…the greatest continuous dry planting area in the Hawaiian Islands". The risk-minimization strategy Dixon *et al*. (1999) suggest the people employed when settling this land corresponds with O'Day's (2004) research regarding marine resource exploitation. In her analysis of archaeological survey and excavation, O'Day found that the political hierarchy also affected access to marine resources, which in turn affected settlement patterns. Kirch (2010) similarly argued that marine fauna dictated settlement patterns of the elite along the coast (O'Day 2004:97). While the subsistence research tells us where elites and commoners were likely to build house complexes, additional archaeological survey and excavation offers more information on settlement, types of structures, and space use within these structures.

Connecting domestic and political spheres together in Kahikinui, Kirch (1997a) and Dixon *et a*l. (1997a) discussed the multiple types of structures and uses in this region. Smaller heiau discovered suggest small ʻili land divisions within which kauhale were built with functionally differentiated structures (Kirch 1997a:26). Kirch (1997a:19) argued that the greatest range of structures exists in the household and includes windbreak shelters (L, U, C, and linear shaped) and rectangular or square enclosures. Middens found within the L-shaped structures indicate habitation and domestic use, while C-shaped enclosures and U-shaped enclosures appeared to provide protection from wind, were more temporary, and were associated with agriculture (Dixon *et al.* 1997:31-34). Rectangular enclosures were suggested to serve as the permanent habitation loci and associated terraces served as activity spaces (Dixon *et al*. 1997:31-34). Further evidence found in household structures pointed toward exchange networks between the upland and coastal zones (Dixon *et al.* 1997:42) and between polities (Kirch *et al*. 2011). Kirch *et al*. (2011) investigated the exchange of resources between polities that may point to a wealth-based agricultural economy that was important to political life on Maui. Millerstrom and Kirch (2004) found further evidence of political control of resources through the use of petroglyphs to mark boundaries, or rights to water in the Kahikinui region.

Each of the archaeological projects discussed here necessitated understanding the ʻāina on which the sites were built. However, this foundational knowledge requires more than researching how geology affected construction or limited resources. Analysis of the material record also requires understanding how Hawaiians conceptualized the ʻāina, how these perspectives developed into generational knowledge, and the resulting social effects of these knowledge systems that manifest in the material record. In the following chapters, I describe geological and material culture data from Nuʻu house sites before synthesizing with Hawaiian epistemologies and historical narratives.

Chapter 6: Hōʻike

hō.ʻike. (a) To show, make known, display, tell, exhibit, reveal, indicate, inform, report, notify, explain, testify, cause to know or see, discover, announce, allege; acquaint; testimony, notice, information; identifying characteristics, as of land claims; proof, token, guide, exhibition.
(Elbert and Pukui 1986:96)

Seven house complexes were excavated over the course of this project. The data recorded from site materials and spatial information is the focus of analysis in this and the following chapter. In this chapter I move from a description of the landscape-scale of community organization illustrated through GIS maps, to a description of the site-scale through a discussion of the excavation, architecture, stratigraphic profiles, and house features of the kauhale. Descriptions and illustrations of the material culture recovered from each site follows, contextualized with data from micro-scale evidence through sediment and soil data. These data detail the environment within which the artifacts were deposited as well as geological events that occurred following depositional events. Finally, I identify and discuss inter- and intra-site patterns in the data that can explain the use of space through the development of the stratigraphic record.

The data reported in this chapter come from multiple analyses conducted on sediment samples and recorded from artifact analyses. The landscape-scale information is synthesized with data from artifacts recovered during excavation, and sediment data from particle-size analysis, pH measurements, measurement of the levels of organic carbon from loss on ignition (LOI), description of microartifacts extracted from varying sediment class sizes, phytolith and starch identifications, and microstratigraphy descriptions from micromorphology thin sections. The general use and description of each process is described below, with the protocols of analysis and descriptions of technical terms provided in Appendix B. I first review excavation strategies and lab methodologies before describing the data collected from each site. The different data sets are reviewed together for each site to better understand how they impact one another. Brief interpretations are mentioned in this chapter where appropriate but the primary focus here is a thick description of the archaeological record in each kauhale. Chapter 7 does the work of synthesizing this data from each site, interpreting the traces of past communities and discussing the possible activities these traces could represent. Chapter 8 brings together the interpretations of the sites in a discussion of broader trends within the community.

Excavation Strategies

The house complex excavations relied on judgmental sampling with occasional areal excavation in order to capture subtle changes in the use of space within and between the architectural components of the house complexes. I attended to minute variations in spatial and temporal evidence of activities by using site grids to associate units to one another with reference to the site datum, and excavating in 5cm arbitrary levels within the natural stratigraphy. I placed at least one unit in each of the architectural features in the seven kauhale. The larger features necessitated additional units in order to detect changes in material remains that indicate a change in the use of the feature. These subtle changes in the use of space are frequently only observable following excavation and are difficult to detect when solely relying on architectural changes. The units were placed along the foundation walls, a strategy that offers the best chance of capturing material remains protected from erosional forces by the basalt boulders. The material culture recovered at this scale was collected from sediment screened through 1/8" and 1/16" mesh in the process of excavation. Radiocarbon dates provided calibrated age ranges for the period in which the houses were inhabited, and comparing artifact evidence from the cultural layers of each unit provided information on the activities that household members participated in through time. The dirt floors in the houses are a palimpsest of accumulated material, revealing the level of continuity in household activities throughout the use life of the house.

A minimum of three sediment samples were collected from each 5cm level within the natural stratigraphy of the sites[15]. Samples designated for phytolith, starch, and a bulk sample (used of LOI, pH, particle size analysis, and microartifact analysis) were scooped with a clean spoon approximately 1-2cm into each level. If multiple contexts were present in on level (i.e. an ash lens or a hearth) then a complete set of samples was collected from each unique context. Approximately 5-10g of sediment were collected for the phytoliths and starch samples, and around 150-300g of sediment was collected for the bulk samples. The samples were point-provenienced and the context information was recorded on the field forms. In addition to the onsite samples, a minimum of two samples were collected offsite from the landscape surrounding the kauhale. These samples were collected from below the O-horizon (3-5cm below the surface). The samples were shipped to the Archaeological Research Facility at the University of California, Berkeley where they were housed in quarantined storage until they were processed at the university. The samples were required to be quarantined or sterilized, therefore each sample needed to be dried and sterilized at 110º C for 16 hours before it could be processed (with the exception of the pH samples, which where were sterilized after the pH was measured). Not all of the samples were analyzed for this project, instead sample were chosen from the topsoil, sterile soil, and at least one sample from each context. Care was taken to choose samples from active floor contexts for analysis.

Methods

Particle Size Analysis

Particle size analysis methods are many and varied. The primary concern amongst archaeologists is internal consistency for samples within the same project, and external consistency with other projects in the region. Projects in Hawaiʻi and more broadly in Polynesia have followed Folk's (1980) methods that detail the need for processing 50-100g of sediment or soil that is predominately sand or silt and clay through geological sieves. Aggregate dissolution is necessary to get an accurate measurement of the percentage of particle sizes in each phi. Recommendations for breaking up aggregates range from gentle methods that only require fingers or a rolling pin to break up aggregates without damaging the grain size, to harsh techniques involving HCl acid and distilled water for peds that are cemented together (Folk 1960; Green 2010; Ostrom 1961; Ray et al 1957; Stuut *et al*. 2002). While using gentle techniques runs the risk of unsuccessful disaggregation, harsh techniques that require acid dissolves carbonates but also some clays and shell material (Green 2010:282). The technique chosen for this project followed Folk's

[15] With the exception of samples from NUU-152 Units J6, T6, U14, and AE9/10 which were collected from the contexts in the profile.

suggestion for processing 50-100g of sediment, but did not utilize harsh methods for breaking down aggregates as the microartifacts still present in each sample needed to be preserved in larger fractions for analysis. After running several test samples, (beyond using a mechanical shaker) (see Appendix B for the complete protocol). Each sample was poured through eight stacked geological sieves that were based on the Wentworth grade scale. Each sample was divided into gravel, sand, or silt/clay size fractions with additional screens added to separate coarser fractions for microartifact extraction (see Figure 6.1 and Table 6.1 below for specifics on size of the sieves and corresponding fraction description). The resulting data delineated the percentage of each fraction present in the samples.

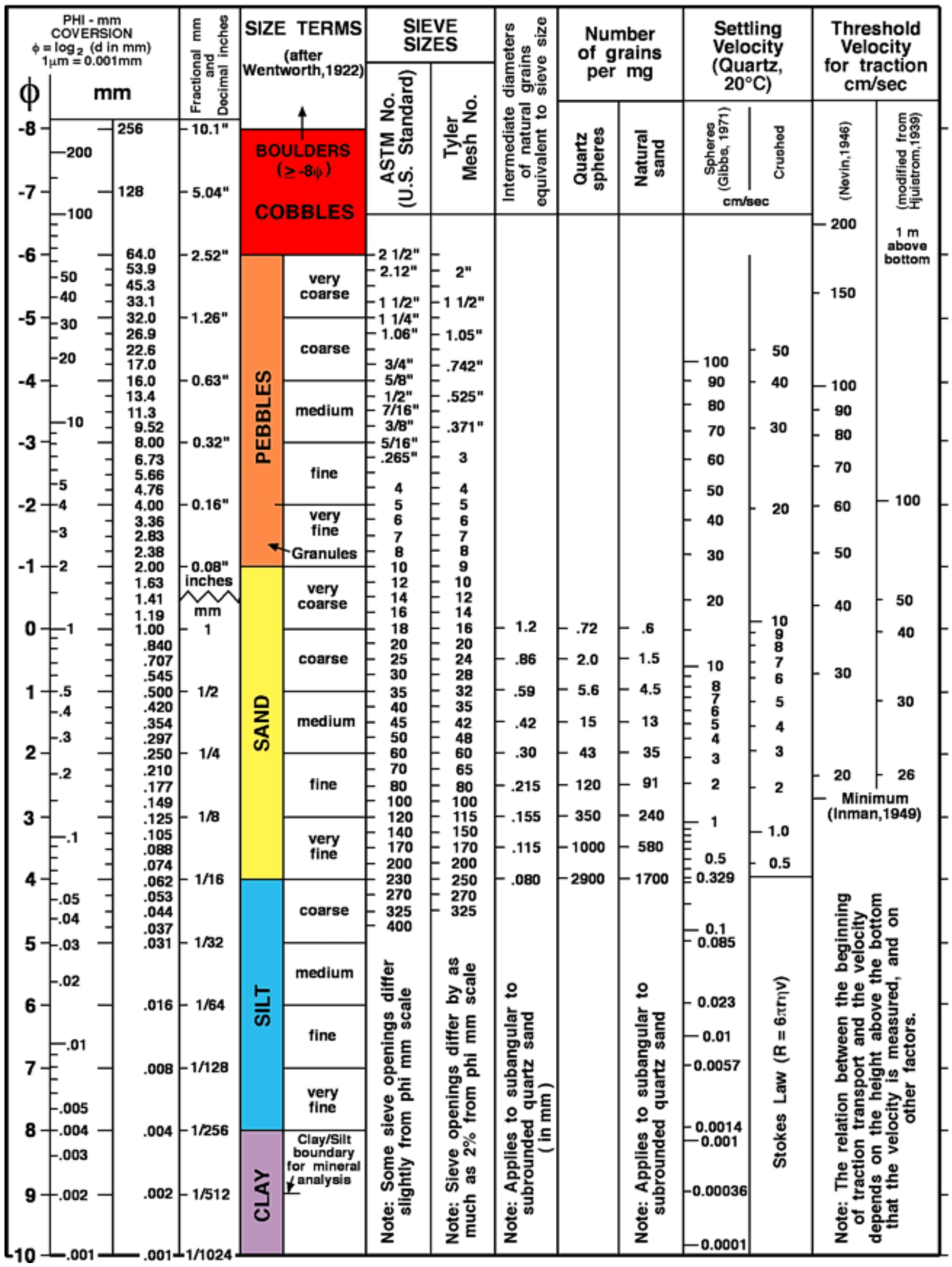


Figure 6.1: USGS Table for Wentworth scale and size association of other designations

Wentworth Class (Geology)	Size Range	Phi (ϕ) units	US Sieve Sizes Used (ASTM No.)	Broader Categories (Following Blott and Pye 2012)	Processes
Medium to Very Coarse Pebbles	6.3mm-64mm	≥6.3mm	5/16"	Gravel	PSA. artifact sorting
Fine Pebbles	4mm-6.3mm	ϕ-2 to ϕ-6	5	Sand	PSA, artifact sorting
Very Fine Pebbles	2mm-4mm	ϕ-1 to ϕ-2	10		PSA, artifact sorting
Very Coarse Sand	1mm-2mm	ϕ0 to ϕ1	18		PSA, pH, LOI, artifact sorting
Coarse Sand	0.5mm-1mm	ϕ1 to ϕ2	35		PSA, artifact sorting
Medium Sand	0.25mm-0.5mm	ϕ2 to ϕ1	60		PSA
Fine Sand	0.125mm-0.25mm	ϕ3 to ϕ2	120		PSA
Very Fine Sand	0.063mm-0.125mm	ϕ4 to ϕ3	230		PSA
Silt and Clay	<0.063mm	<ϕ4	Pan	Mud	PSA

Table 6.1: Size class of sieves used and associated sediment description

Microartifacts

Cultural remains 0.5-5mm in size (Dunnell and Stein 1989; Fladmark 1982; Hull 1987; Rosen 1986; Ullah 2012; Vance 1987) were extracted from the bulk samples that were collected from primary depositional contexts. These contexts usually represent the use of the space over time from repeated activities, rather than discarded material from middens or other refuse deposits (Rosen 1989:565). These artifacts form a portion of the clastic sediment that builds up in houses, particularly in features with 'dirt' floors. Samples were collected for the purpose of analyzing microartifacts, as was recommended for spatial questions by Sherwood *et al.* (1995). These bulk samples, ranging in size from 100g to 200g depending on the context, were collected from each 5cm level from the same depth and stratum as the macroartifacts that were found over the course of excavation in order to represent the horizontal spatial distribution of the artifacts in each unit (Sherwood 2001:332). Samples of either 50g or 100g (depending on the available sediment) were sieved in the lab, but were not chemically pretreated to disaggregate clay and organic aggregates out of concern for the preservation of artifacts. Sherwood (2001:333) warns against such harsh pretreatment when shell or bone is present, which were the primary artifact classes that I was interested in investigating at the microscale. The size of artifacts that fall within this micro-scale range was decided on the basis of multiple studies that suggest the size of materials that consistently remain in situ following cleaning or other potentially disruptive activities. The microartifacts that were identified as part of this study were extracted from 0.5mm-0.9mm, 1mm-1.9mm, 2mm-3.9mmm, 4mm-6.2mm and ≥6.3mm class sizes following the separation of the sediment grains in the particle size analysis process. Although objects larger than 4mm are generally considered macroartifacts (Sherwood 2001:334), the material collected and sorted as part of each bulk sample was still included in the artifact tables for each sample as a comparison. Microartifacts recovered from each context are displayed in tables and visually represented in graphs.

pH

Sediment and soil[16] pH levels are indicative of the preservation potential for organic materials. The sediments in this study most commonly have an acidic (<3.5-6.5) pH, suitable for the preservation of pollen, phytoliths, some macrobotanical material, and soil diatoms. However, acidic soils are less ideal for the preservation of bone and other organic matter (Goldberg and Macphail 2006:47). Some of the sediments measure in the neutral to alkali pH range (6.5-7.5) where bone, mollusk, phytoliths, soil diatoms, and some macrobotanical material are more likely to preserve; however, here other materials are negatively affected as pollen oxidizes and charcoal becomes fragmented (Goldberg and Macphail 2006:47). The presence of shell (made of alkali-based carbonate) often neutralized acidic soils and aids in the preservation of other organic materials like bone that degrade in acidic soils. The descriptive terms for pH used in this study are common labels delineating levels of acidity. These categories are listed in Table 6.1 along with examples of materials or elements that have a pH that falls within each category.

Descriptive Term	pH Range	Example of Material
Extremely acidic	<4.5	Sulfuric acid (found in voghurt)
Very strongly acidic	4.5-5.0	Bananas
Strongly acidic	5.1-5.5	Sweet Potatoes
Moderately acidic	5.6-6.0	
Slightly acid	6.1-6.5	Nāholokū fan soil (ranges from slightly acidic to neutral), Charcoal (lowest range)
Neutral	6.6-7.3	Bone
Slightly alkaline	7.4-7.8	Eggs
Moderately alkaline	7.9-8.4	Sea water
Strongly alkaline	8.5-9	
Very strongly alkaline	>9.1	Lime, calcium carbonate (found in sea shells and coral)

Table 6.2: Description of pH examples of substances that fall within these categories and are relevant to the current study. The categories are adapted from www.esf.edu SUNY College of Environmental Science and Forestry Soil pH page. The pH of the edible items listed as examples depends on the variety and growing conditions, therefore the value given is a general range.

[16] It is important to recognize the difference between sediments and soils, particularly in the formation of archaeological sites. The data from this project show that the deposits are largely anthropogenic with little evidence of pedogenesis and therefore sediment is used to describe the samples from the house sites. Soil is used when referencing the off-site comparative samples, the topsoil, and the C-horizon below the level of anthropogenic activity. However, the site sediments exist within pre-existing soils in a heavily farmed region and therefore are subject to soil formation, making the distinction between sediment and soil difficult at times.

As with the other methods described here, there are multiple methods that could be used to determine pH. Internal consistency within the project was the most important factor to ensure results were comparable across sites and within units. Following protocols for organic soil from soil science laboratories (Murray 2011; Rayment 1992) the pH in each sample was measured using a 1:4 ratio of sediment to deionized water/$CaCl_2$ solution (see Appendix B for the complete protocol). The $CaCl_2$ solution was used to maintain stability of the pH measurement between samples, and a 1:4 ratio of sample to solution was used due to the high organic material present in the majority of the processed soil and sediment samples.

Loss on Ignition

Soil scientists define soil organic matter (SOM) from which organic carbon comes as "mainly composed of carbon, hydrogen and oxygen but also has small amounts of nutrients such as nitrogen, phosphorous, sulphur, potassium, calcium and magnesium contained within organic residues" (Agriculture and Food 2017). Four categories make up SOM, with humus representing the majority (living and fresh organic material make up small portions of the total organic material) (Agriculture and Food 2017). As humus (or mature, decayed organic material forming the upper horizon of a soil profile) composes the vast majority of the organic material and therefore the organic carbon present in soil or sediment, measuring the total organic carbon provides a relative measurement of the history of organic material deposition. However, soils do not retain the total organic carbon—up to 30% of the organic input can be preserved through conversion to humus, but microorganisms can "digest up to 90% of the organic carbon that enters a soil in organic residues" (Agriculture and Food 2017). Soil organic matter is also affected by the type of soil parent material and climate in the region. Naturally-occurring clay that binds to organic matter, a defining characteristic of Nuʻu soils, tends to protect the organic matter from breaking down and/or limits microbial access. Similarly, rainfall increases soil organic matter by providing improved growth conditions, but erosion caused by rainfall and increased temperatures negatively impact SOM as they result in expedited decomposition (Agriculture and Food 2017). Soil pH also affects the preservation of organic matter—as soil pH rises, organic matter breaks down (which leads to lower pH over time with long-term decomposition). Acidic soils are poor environments for microorganisms and bacteria to thrive and therefore protect organic matter (Agriculture and Food 2017), but if the sediments are too acidic, it will also break down organic material. The levels of SOM do not easily or rapidly fluctuate. Generally, more than ten years are required to detect significant changes in SOM in cropping systems (Agriculture and Food 2017) and can reasonably be assumed to fluctuate even more slowly outside of cropping systems. The top 10cm of a deposit are also the most susceptible to these more frequent fluctuations due to the faster turnover rate of surface organisms like dissolved organic matter (e.g. soluble root exudates) and particulate organic matter (e.g. fresh and decomposing plant and animal matter).

Humus (or concentrated decayed organic material) can survive for hundreds of years in the soil and make up more than 50% of SOM (Agriculture and Food 2017). Resistant organic matter like charcoal and other organic remnants can survive hundreds to thousands of years, but only accounts for up to 10% of the SOM (Agriculture and Food 2017). Therefore, the levels of organic carbon measured in this study is targeting humus and resistant organic matter due to the longevity of the deposits and the relationship to human activity on the site, as it is reasonably assumed that any organic material decomposing on house floors would be the result of human activity. Sample from top soil and off-site locations are used as comparisons to show the levels of SOM on a landscape currently overgrown by modern plant growth and experiencing consistent input from the grazing animals. Comparing current levels with older deposits that may have lost anywhere from 40-90% of the organic carbon over time can provide an additional line of evidence for human activities in these different spaces. However, the factors listed above that can negatively impact the preservation of SOM must be accounted for, which requires the inclusion of pH, granulometry, and micromorphology data to better understand how the soil and sediment is interacting with organic material.

The most common method for measuring soil pH in a lab setting is through Loss on Ignition (LOI), where a weighed sample is placed in a furnace for a predetermined amount of time so that organic carbon can burn off, then re-weighed. The difference in weigh represents the organic content lost. The difficulty with measuring the total organic carbon in samples using Loss on Ignition is the assurance that all (or at least the vast majority) of the carbon has burnt away. The furnace temperature must be hot enough and the combustion time long enough to accomplish the task. In addition, the sample must not be too large to risk not heating evenly throughout. Recent standards for LOI indicate that 4g of ground soil screened through 2mm mesh and heated to 550ºC for four hours provides an accurate assessment of organic content (Wang *et al*. 2011; Wang *et al*. 2012). Following these guidelines (see Appendix B for full protocol), the level of organic carbon in each of the processed sediment samples was recorded and the data compared across and between units.

Phytoliths

Phytoliths result from “biological and physical processes” where certain plants absorb silica from groundwater and deposit it in “intracellular or extracellular location” (Piperno 2006:5). The silica forms to the shape and structure of the cell walls, becoming solid pieces of diagnostic silica that survive after the plants die and decompose. Phytoliths are deposited in the environment in a variety of ways, but the most common (and, arguably, most important for archaeological research) is deposition of phytoliths into the A horizon following the decomposition of dead plants (Piperno 2006:21). Phytoliths are often preserved *in situ*, as the dispersal of the siliceous bodies is not necessary for plant survival (Piperno 2006:21). However, it is important to note that phytoliths may also be deposited through animal droppings, wind, or fire—all of which are important site formation factors (Piperno 2006:21). The composition of the sediment and the morphological characteristics of phytoliths affect preservation in archaeological contexts (Piperno 2006:21-22). Phytoliths tend to show higher levels of preservation in acidic soils or sediments (preservation drops dramatically in soils with a pH of 8 or higher) and more robust morphologies provide further protection from degradation (Piperno 2006). The preservation of particular morphologies has important implications for the analysis of plants used in the past, as the absence of certain groups of plants does not necessarily preclude their original presence or use within or around the site (Piperno 2006).

Phytolith morphologies are generally characteristic of the plant taxon, or a part of the plant within a specific taxon. As a result, phytoliths can be used to identify the plant taxa of origin.

The three primary categories of phytolith morphologies were outlined by Piperno (2006:24) as complete silicification of the plant cell resulting in phytolith morphology that reflects the gross cell morphology, incomplete silicification of a part of the cell interior that results in non-diagnostic shapes, and silicification of lower hypodermal and upper mesocarpal tissues, which results in phytoliths with characteristics from both tissues (Bozrath 1987; Piperno *et al*. 2002). While this makes classification and identification of phytolith morphologies more difficult, it can also lead to increased opportunities for "precise discrimination of plants and identification of different structures from individual taxa" (Piperno 2006:27). In some plant groups, phytoliths produced by different parts of the plant (e.g., reproductive structures as opposed to the leaves or stem) can be differentiated from one another, allowing for further analysis of the activity occurring in a particular space, as parts of plants and plant groups are often used for very different activities (Weiner 2010:140). However, the sturdier part of the plant (e.g. the stem as opposed to the flower) takes longer to degrade and therefore the phytoliths are more likely to remain articulated in situ for an extended period of time. Archaeologically, the plant-specific morphology allows for an increasingly nuanced analysis of space through the identification of the materials households used. Two canoe plants commonly used by the households that are high phytolith producers are banana (*Musa* spp.) and paper mulberry (*Broussonetia papayrifera*). Not all plants used by Hawaiians produce phytoliths. However, some low-producing phytolith plants (i.e., taro and sweet potato, tubers important to the Hawaiian diet) produce starch granules. Like phytoliths, starch granules are taphonomically durable and morphologically unique. In this way, starch extraction provides a similar opportunity for recovering evidence on how space was used (Horrocks and Weisler 2006a, 2006b).

Starch

The field of starch grain analysis has produced a vast amount of information available to archaeologists as a result of the extensive research performed by botanists and the food industry on the biochemical properties and unique morphologies of starch (Torrence 2006:30). Plants produce starch in various parts of their anatomy as a source of energy (Gott *et al*. 2006:35). The formation of starch grains begins at the hilum (the point of attachment to the ovule around which starch layers are deposited) as a result of the photosynthesis process (Gott *et al.* 2006:35). Under normal conditions, grains are laid down successively at the rate of one granule per day (Tester 1997:166). Plants store the more diagnostic reserve starch in the organs (i.e. fruits, seeds, roots, and tubers) (Gott *et al*. 2006:36). The amount of starch stored by plants differs from species to species, but those historically indispensable to the human diet are yams, potatoes, and sweet potatoes, which exhibit storage contents between 65 and 90% in the underground storage units (Gott *et al*. 2006:36). Above-ground storage of starch occurs in the bark of trees, the base of grasses, and in the heads of flowers and seeds (Gott *et al*. 2006:38-39). Such plants were used in cultural activities for wooden tools and implements (*Acacia* species) as well as other food sources (bananas) (Gott *et al*. 2006:38-39), providing additional opportunities for understanding cultural activities through the archaeological record. The unique morphology of starch that is specific to taxa of the parent plant, and preservation over long periods of time in a variety of environmental conditions compared with other parts of the plant makes starch analysis a valuable analytical tool (Barton and Matthews 2006:75).

Starch and phytolith extraction methodology

Due to the dense silica bodies, phytoliths tend to remain relatively in situ. In contrast, starch grains are easily transported on the wind or on the hands of people handling food and household items throughout the day (certainly an issue in the house sites that are part of this study, as they are surrounded by sweet potato fields). Due to the transportability of starches, this line of evidence was not used for fine resolution of use of space, but as an indicator of the types of starch-producing plants that were utilized in the excavated house sites. Phytolith silica is a more reliable proxy for the fine-resolution of use of space. One sample for phytolith extraction was chosen for processing from the context where the active floor of the house was presumed to be in each excavated unit, and one from each combustion feature or charcoal/ash deposit in the house complexes. One sample was taken from each structure within the house complexes for starch extraction. Starch samples were also taken from floor contexts, in areas of the structure that displayed the most macroscopic material evidence of food-based activities. One control sample was selected for processing from upslope of each house complex.

Working with the U.C. Berkeley Palaeoethnobotany Laboratory, a phytolith extraction protocol was developed using the microwave digestion method from Cuthrell (2011). Phytoliths that were extracted from several of the collected samples confirmed the usefulness of this line of evidence. However, creating a full reference collection for starch and phytolith identification was beyond the scope of this dissertation project, therefore samples were sent to Dr. Mark Horrocks (Microfossil Research Ltd. at the University of Auckland in New Zealand) for phytolith and starch analysis. Horrocks has an extensive reference collection for Polynesia and has published on phytoliths and starches from Polynesian archaeological contexts (Horrocks 2004; Horrocks and Bedord 2010; Horrocks and Weisler 2006; Horrocks and Wozniak 2008; Horrocks *et al.* 2000; Horrocks *et al.* 2003; Horrocks *et al.* 2004). Horrocks employed a combined procedure in the extraction process (Horrocks 2005), using density separation to prepare phytoliths, starches and microcharcoal (Horrocks 2018). Data collection of pH, loss on ignition (LOI), particle size analysis, microartifacts, and microfossils provided important temporal and spatial information on presence/absence, mode of deposition, preservation/decomposition, and organic input at each site. Micromorphology, however, is necessary to bring these data together by illustrating the order and relationship of depositions.

Micromorphology

Micromorphology is “the study of undisturbed, oriented samples” using microscopic techniques to analyze the “composition of the constituents and their spatial relationship” in order to understand the relationship between different components (Stoops and Nicosia 2017:1). Thin-sections extracted from micromorphological samples are the focus of analysis. Thin-section slides show the relationship of adjacent contexts and allow for identification of anthropogenic or natural causes that affect sediment deposition and diagenesis (Courty 1991; Goldberg and Berna 2010; Matthews 2005; Matthews *et al.* 1997; Matthews *et al* 1998). Separating natural sedimentary processes from anthropogenic activities is particularly fruitful for revealing the accumulation of material from repeated practices within house complexes. Spatial and temporal variation is inferred from the contextualization of anthropogenic information with the taphonomic processes (Matthews 2010). Karkanas and Goldberg (2008:64) best illustrated the importance of examining the articulation of soil horizons or sediment layers with one another: "We cannot interpret excavated earth by treating it as bulk material, because there is no possibility of unraveling the compound effect of two successive events superimposed on the same material, and we cannot differentiate materials that produce the same analytical measurements." Thin sections assist with this issue, allowing for the differentiation between inclusions while preserving the context (Macphail and Goldberg 1995:1). More information remains available to archaeologists when the spatial relationships between minerals are maintained through micromorphology (Weiner 2010:69)

Nineteen micromorphology samples were collected from Nuʻu house complexes to provide temporal and spatial context for the ethnobotanical and micro-artifact remains recovered from other sediment samples. The undisturbed blocks of excavated sediment were sent to Spectrum Petrographics Inc. for impregnation with a clear epoxy resin, and preparation of thin-sections (a 5 cm at a standard thickness of 30µm) of the larger impregnated block for examination under a microscope (Courty *et al.* 1989; Matthews 2010).

Although micromorphology is a valuable tool, there exist some surmountable drawbacks to the utilization of the approach. Primarily, we are lacking in diversity with micromorphological studies both temporally and spatially (Karkanas and Goldberg 2008:69), which can be overcome through proper sampling techniques. There is also a lack of unequivocal well-established criteria for identifying the formation of living floors, which leads to problems of equifinality—but this may be due to the uniqueness and variability of regions in that anthropogenic deposits at various sites resist standardization of our approaches (Karkanas and Goldberg 2008:69) However, ongoing research has made strides toward standardized protocols for identifying microfacies for predicting activity spaces (Matthews *et al.* 1997; 2012; Friesem 2016; Macphail and Goldberg 2018). Micromorphology can further be problematic in that the thin sections taken from samples may not be representative of the soil or sediment composition (Weiner 2010:74), but this issue impacts all sampling strategies. Combing micromorphology with other microscopic techniques reviewed above, specifically phytolith analysis (e.g. Albert *et al*. 2008) and micro-artifact analysis, can help mitigate these drawbacks and provide a more holistic interpretation of archaeological sites (Karkanas and Goldberg 2008:68).

Analysis of the Built Landscape

Community relationships in Hawaiʻi are first visible on the built landscape through the spatial relationships of architectural structures. The topographic location provides valuable information for assessing household activities and economic status of each household. Reviewing the markers of status in the placement on the landscape and relationship between the houses required landscape-scale GIS maps of the Nuʻu ahupuaʻa. A visibility analysis was performed in order to ascertain whether the complexes exhibiting architectural features associated with higher status households (e.g., size of complex, number of associated features, courses of stone, pavement, and/or platforms, see Chapter 4 of this dissertation, and Weisler and Kirch [1985] for a more extensive description) were also strategically placed on the landscape so as to afford them better views (Figure 6.2). Wheatley and Gillings (2002) discussed past implementations of viewshed-type analyses, warning against underlying assumptions that can affect the interpretation. While analyses that encompass viewsheds and visibility offer insights into the reasons for constructing a building at a particular location, one cannot privilege vision over other possible explanations when trying to understand causation such as weather (Wheatley and Gillings 2002). The analysis of a landscape using GIS and the processes that allow us to attempt to reconstruct past inhabitant's visualization of that same landscape should not be the final analytical goal, but rather as Llobero (2012) argues, a tool in the larger analytical process. Conolly and Lake (2006) argue that this tool should strengthen and extend our understanding of the past rather than be our sole evidentiary source.

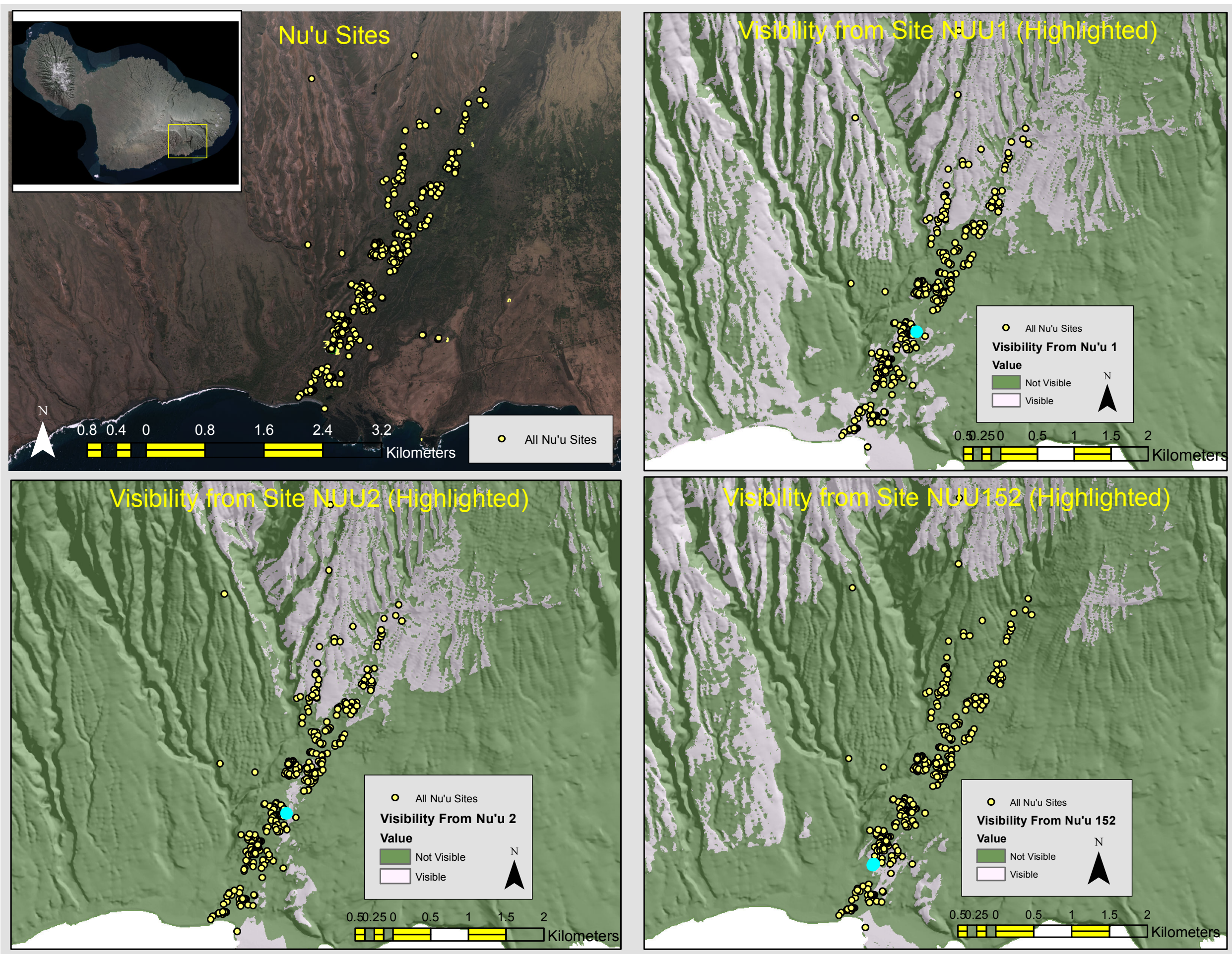


Figure 6.2: Viewshed analysis for sites NUU-1, NUU-2 and NUU-152, three kauhale with features associated with higher status households. Maui DEM from USGS.

The location of different topographical features can also tell us something about the lives of people on the landscape. Figure 6.3 shows the location of streams and the mauka-makai location of each feature. The arid landscape of Nuʻu relied on rains during the wet seasons to water the crops that supported the community and streams for fresh drinking water. The proximity to the natural rain-fed streams on the landscape is therefore expected to be an important factor in house location. While there is a large stream located relatively close to the Nuʻu houses in this study, they are still situated approximately 0.25 km away over rough aʻa terrain.

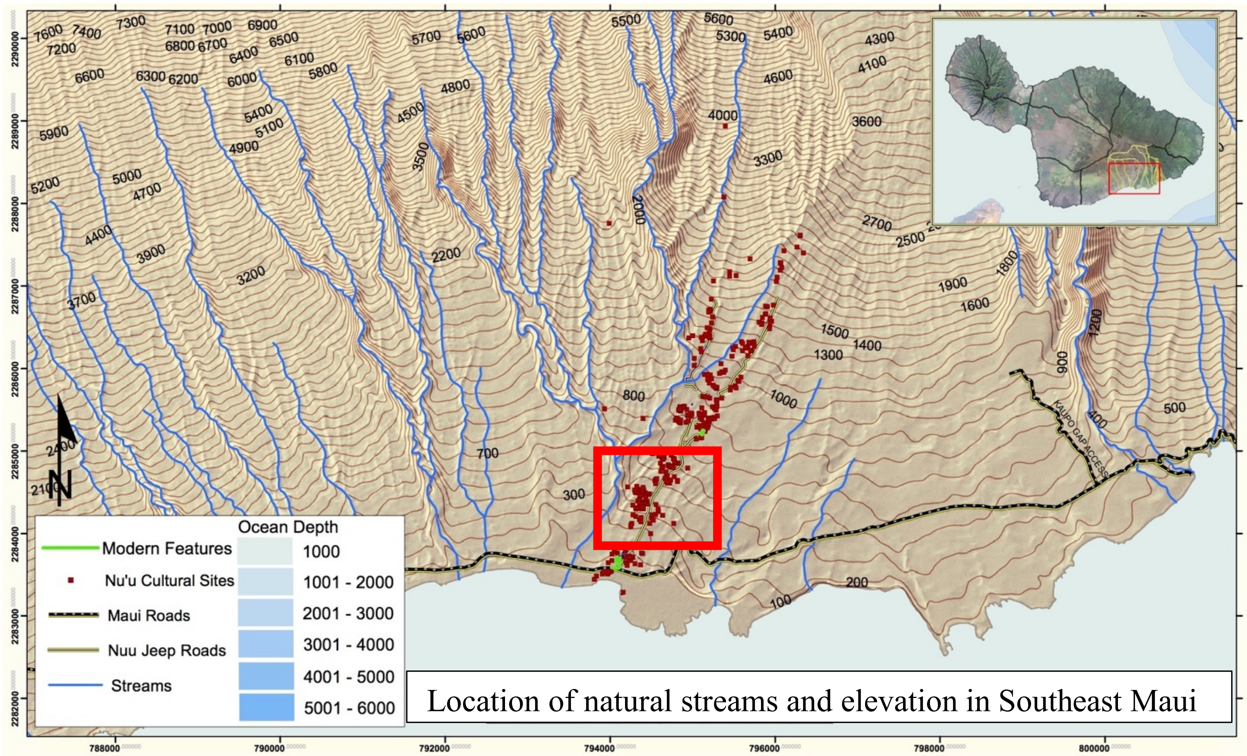


Figure 6.3: The location of the major streams in southeast Maui and the associated elevation overlaid with the modern and archaeological features. The location of the sites excavated for this study are within the red box. The GIS stream, and elevation data from USGS DLNR Division of Aquatic Resources, ocean depth data is from ESRI Hawaii Office, 2009. The survey data for Nuʻu sites was collected by Pat Kirch and members of the OAL.

The figure below (Figure 6.4) highlights the excavated kauhale in relation to the other features surveyed superimposed over a satellite image of the landscape. This illustrates the geological setting, showing the marginal ahupuaʻa just west of a lusher landscape, east of the drier moku of Kahikinui. The excavated kauhale are within the field systems located in the middle of the surveyed sites. The basalt that dominates this flow is Puʻu Maile Basanite (Sherrod *et al.* 2007:39). This basalt flow is a tephrite that is characterized by olivine, calcic plagioclase and feldspathoid (Nockolds *et al.* 1978:183), minerals that are all abundant in the micromorphology samples from the excavated units. This type of basalt is strongly alkaline, rich in magnesium and iron, which affects the natural pH level and weathering of the landscape. Weathering in the region where Puʻu Maile Basanite dominated was estimated to have higher volume of rock in the soil with a mean value of 58% [Baer *et al.* 2010:433]). The region also had a soil pH boundary at 5.7 [Vitousek *et al.* 2014:55] with Puʻu Maile Basanite measuring between 5.2 and 7.2 [Baer *et al.* 2015 supplementary table]). Higher rock volume is evidenced in the particle size distribution of the comparative samples and the C-horizons and the pH boundary described here and in Chapter 6 provides an important reference for pH levels collected from the kauhale sediment samples.

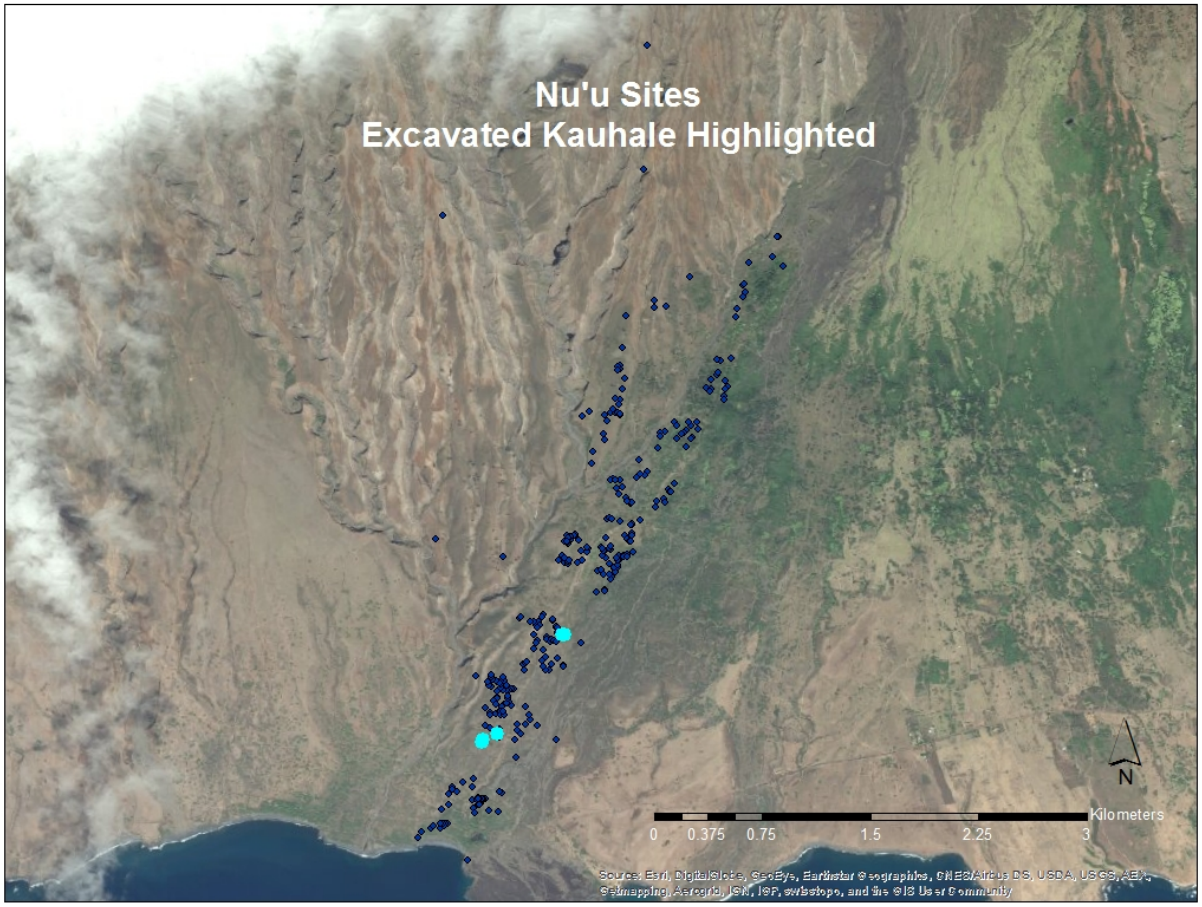


Figure 6.4: All surveyed cultural sites in the Nu‘u ahupua‘a, with the excavated sites highlighted. survey is courtesy of Patrick Kirch and the OAL. The satellite map is provided by ESRI.

Figure 6.5 illustrates the topographic setting in conjunction with the different types of structures, most notably field system walls throughout the Kaupō moku. The map shows that the agricultural fields are concentrated the excavated sites are within the range of 200-700m above sea level. This is also the topographic location of the kauhale excavated for this project. Figure 6.6 provides a more fine-grained view of the relationship between the kauhale and field systems in this neighborhood, illustrating the close proximity of household members to the agricultural ridges, some of which run up to or through the boundaries of the complexes.

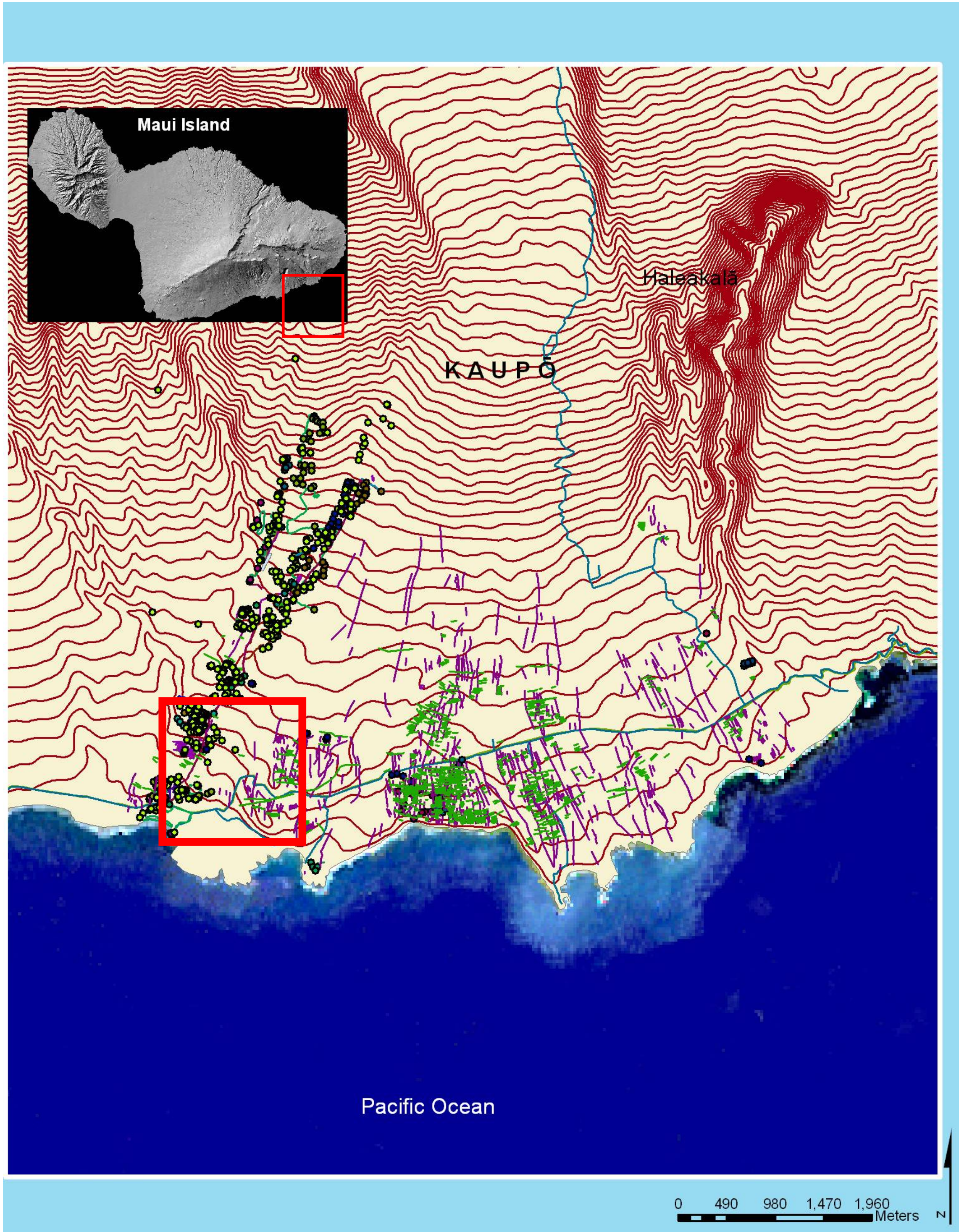


Figure 6.5: Kaupō sites recorded during extensive surveys of the landscape, overlaid on a map marking the topographic changes on the Nāholokū fan. The location of the excavated sites is marked with the red rectangle. Survey data collected by Patrick Kirch and the OAL.

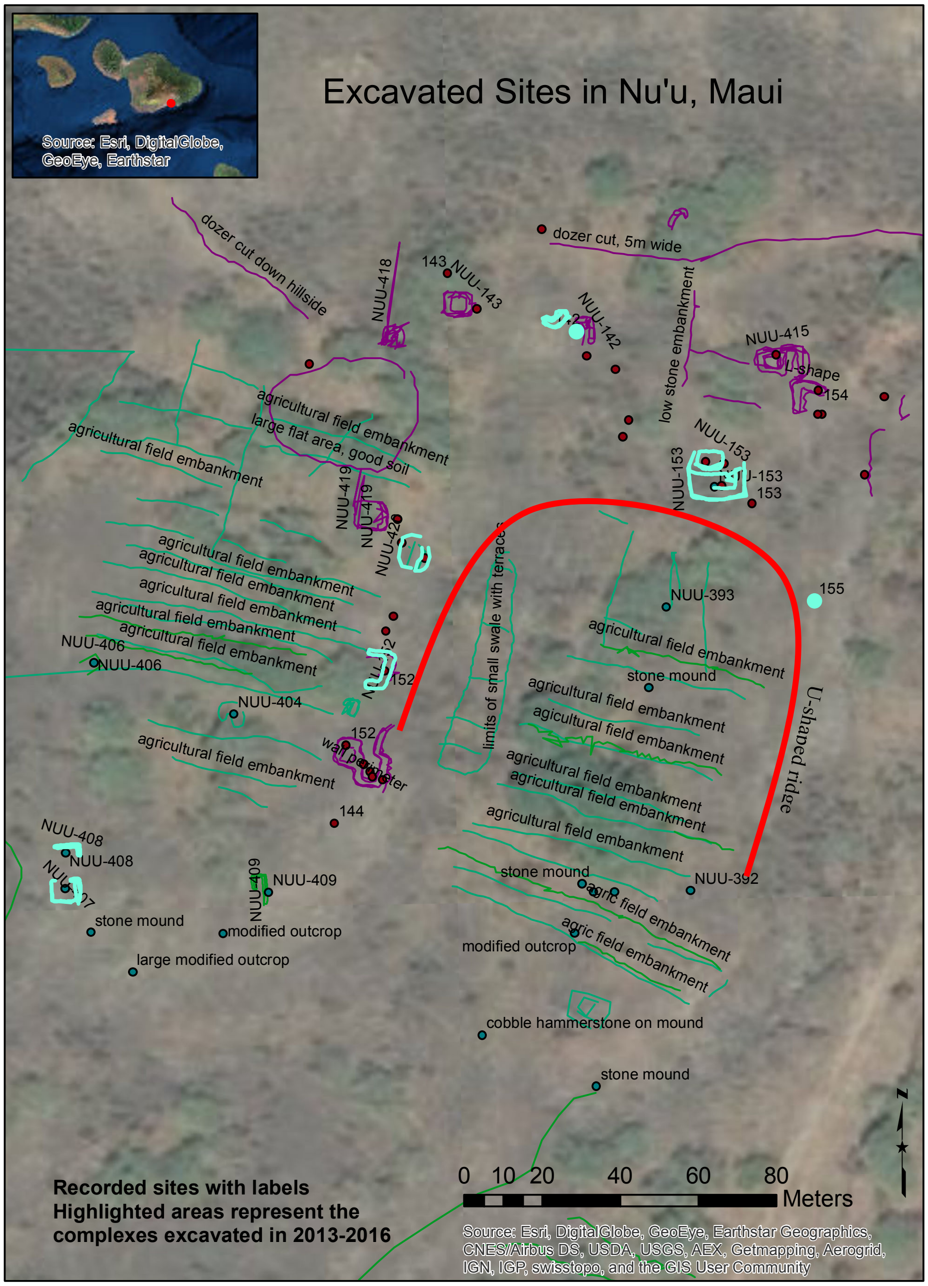


Figure 6.6: Map of a Nu‘u neighborhood with excavated sites highlighted. GPS data courtesy of Patrick Kirch and the OAL.

The only household not built in close proximity to agricultural ridges (but located along the northern edge of the primary agricultural zone) was site NUU-2 (the northern most site marked by the light blue highlight in Figure 6.2). However, the topographic setting for this house complex guaranteed a sweeping view of the fields below.

Radiocarbon Dates of Sites

Carbonized nut shells of *Aleurites moluccana* and wood charcoal from twigs of young-growth species that were collected during excavation were chosen from each kauhale for radiocarbon dating. The resulting dates indicated that each of the kauhale were built and occupied during the period of population and expansion and increasing complexity on the south side of Maui. Although the available funds limited the amount of radiocarbon dates (resulting in absence of dates from each context excavated) dates for each kauhale feature were attained and are presented in Figure 6.7 and Table 6.3 below.

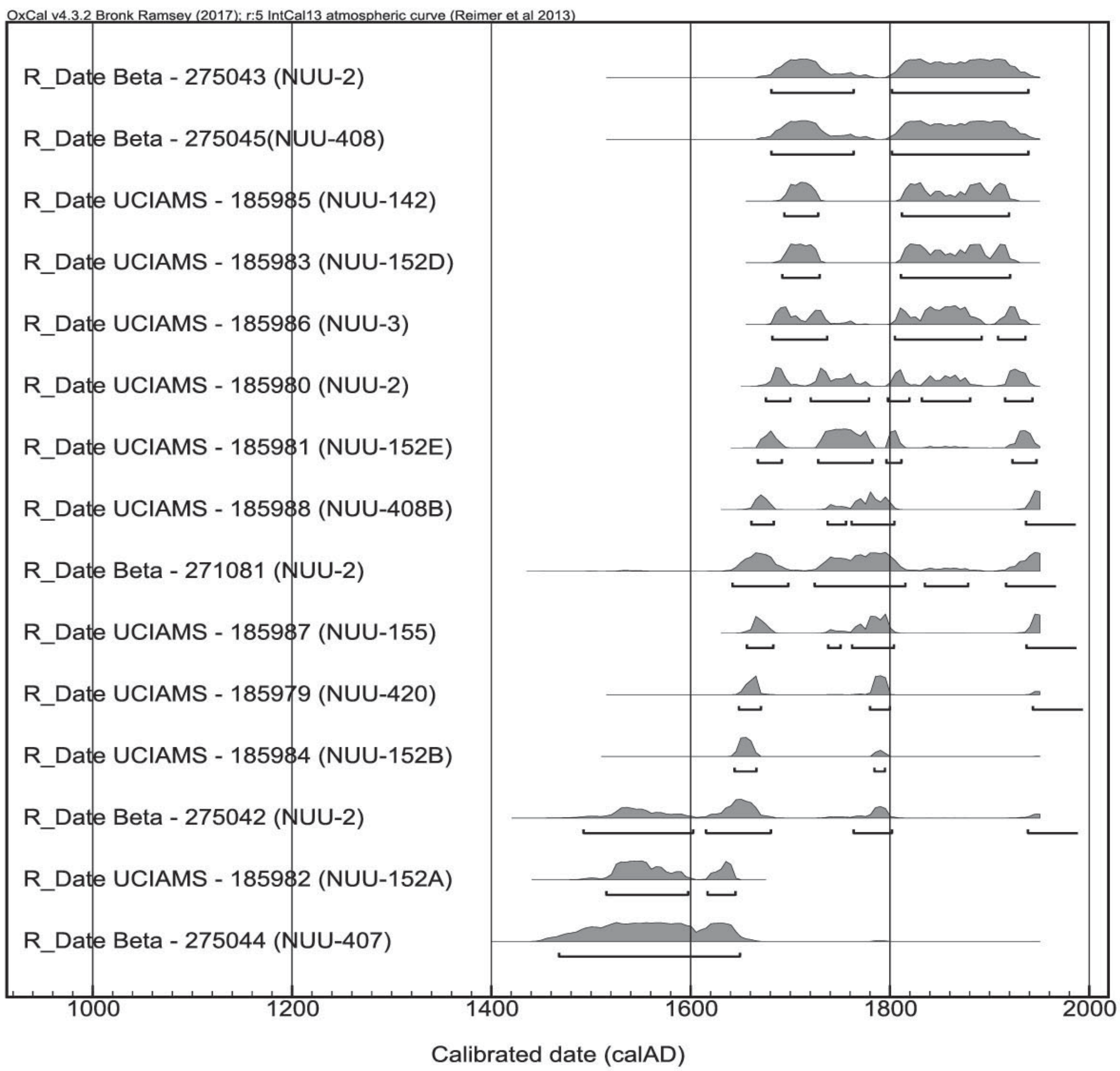


Figure 6.7: Calibrated radiocarbon dates from Nu‘u kauhale sites from Beta Analytics and UCIAMS

Lab. No.	Loci	Sample No.	Material	Conventional 14C Age (B.P.)	Uncertainty	Calendar Date Calibrated Age Ranges and Probability
Beta - 271081	NUU-2 Test Pit 1 Level 3	NUU-2-TP1-3-2	Young growth wood charcoal	200	40	1642-1698calAD (24.8%) 1724-1815 (47.7%) 1835-1878calAD (4.6%) 1916+ calAD (18.3%)
Beta - 275042	NUU-2 Test Pit 1 Level 4	NUU-2-TP1-4-2	Young growth wood charcoal	260	40	1492-1680calAD (40.6%) 1615-1680calAD (40.6%) 1763-1802calAD (13.9%) 1938+ calAD (3.6%)
Beta - 275043	NUU-2 Test Pit 2 Feature 1	NUU-2-TP2-Fe1-1	Young growth wood charcoal	90	40	1681-1763calAD (29.1%) 1802-1939calAD (66.3%)
185986	NUU-3 Unit H4 Level 9 Charcoal Lens	NUU3-H4-L9-O4	Carbonized *Aleurites moluccana* endocarp	125	15	1682-1737calAD (27.1%) 1805-1892calAD (54.4%) 1908-1936 (13.9%)
185980	NUU-2 Unit R8 Level 5 Layer II	NUU2-R8-L5-O4-West	Carbonized *Aleurites moluccana* endocarp	140	15	1675-1700calAD (15.5%) 1720-1779calAD (27%) 1798-1819calAD (11.4%) 1832-1880calAD (22%) 1915-1943calAD (19.55)
Beta - 275044	NUU-407 Test Pit 1 Level 3	NUU-407-TP1-3-1	Young growth wood charcoal	320	40	1468-1649calAD (95.4%)
Beta - 275045	NUU-408 Test Pit 1 Level 4	NUU-408-TP1-4-6	Young growth wood charcoal	90	40	1681-1763calAD (29.1%) 1802-1939calAD (66.3)
185988	NUU-408B Unit J8 Level 8 Layer IV	NUU408B-J8-L8-O7	Carbonized *Aleurites moluccana* endocarp	195	15	1661-1683calAD (21.1%) 1737-1756calAD (6.5%) 1761-1804calAD (40.9%) 1936+ calAD (26.9%)
185981	NUU-152E Unit J14 Level 4 Layer II	NUU152E-J14-L4-O7	Carbonized *Aleurites moluccana* endocarp	160	15	1667-1691 (15.6%) 1728-1782calAD (50.9%) 1796-1811 (11.3%) 1923-1947 (17.6%)
185982	NUU-152A Unit J7 Level 3 Layer II	NUU152A-J7-L3-O6	Carbonized *Aleurites*	310	15	1515-1597calAD (73.7%) 1617-1645calAD (21.7%)

			moluccana endocarp			
185983	NUU-152D Unit S7 Level 8 Layer II	NUU152D-S7-L8-O5	Carbonized *Aleurites moluccana* endocarp	100	15	1692-1729calAD (27.8%) 1811-1920calAD (67.6%)
185984	NUU-152B Unit AE9 Level 7 Layer III	NUU152B-AE9-L7-O6	Carbonized *Aleurites moluccana* endocarp	245	15	1644-1666calAD (81.5%) 1784-1795calAD (13.9%)
185979	NUU-420 Unit H12 Level 4 Layer II	NUU420-H12-4-4	Carbonized *Aleurites moluccana* endocarp	220	15	1648-1670calAD (40.6%) 1780-1800calAD (48.7%) 1943+ calAD (6.1%)
185985	NUU-142 Unit O4 Level 7 Layer III	NUU142-04-L7-O3	Carbonized *Aleurites moluccana* endocarp	95	15	1694-1728calAD (27.6%) 1812-1919 (67.8%)
185987	NUU-155 Unit O21 Feature 1 Level 6	NUU155-021-F1-L6-O4	Carbonized *Aleurites moluccana* endocarp	200	15	1656-1683calAD (22.7%) 1738-1750calAD (3%) 1762-1804calAD (44.4%) 1937+ calAD (25.2%)

Table 6.3: Data from Beta Analytics and UCIAMS on Nu‘u radiocarbon dates

The calibrated age ranges reported in the final column reflect the most likely age for each feature/context based on the probability and on the presence or absence of historic artifacts. The dates returned for the samples show that the kauhale were occupied within the same period, often within a couple generations of one another. The features within kauhale like NUU-2 hearths show contemporary use, while other features such as those in NUU-152 show construction through time.

NUU-2 and NUU-3

The kauhale designated NUU-2 was the largest complex excavated for this project, and the only one not surrounded by observable agricultural ridges. Built more than 300 meters above sea level, the kauhale sat atop a promontory that overlooked the sprawling field system below the cliff's edge and the lava-covered shoreline to the south. The slopes mauka of the site are obscured by the gently rising hill that abuts the complex to the north, yet the view to the west encompassed the vast slope of Haleakalā that, during the time of occupation, would have been strewn with the houses and fields of Kanaka living in the Kahikinui district.

The NUU-2 complex consists of one L-shaped structure with core-filled walls that run 10m north to south and 5m east to west. The sturdy L-shaped feature opens to the earth-filled terraced area west of the walls, on which a small circular foundation was built (site number NUU-3). The square earth-filled terrace was outlined with a line of basalt boulders that connected with the western-most tip of the L-shaped feature walls. The terrace in total stretches 10m north to south and 15m meters east to west.

The field crew excavated six $1m^2$ units located within the L-Shaped feature. Units R8 through R10 were placed in the northern end along the wall (as seen in Figure 5.1 above) while Units R4, R5, and Q5 were placed in the southern end. Two previous test units had also been placed in the center of the feature in 2010 by Patrick Kirch and Alex Baer. The earlier test excavations revealed a combustion feature toward the southern end of the stone foundation (located in grid squares R4 and R3), while the more recent excavation revealed a combustion feature in the northern half of the foundation (located in the grid square R8 and R9). No additional features were observed in the process of excavating the other units in this architectural structure. The artifacts and sediment samples, however, elucidate the use of these spaces (as well as the spaces encompassing the combustion features) using other types of evidence to make increasingly robust interpretations of anthropogenic activities.

The map of the site below (Figure 6.8) shows a tape and compass map of the L-shaped structure overlaid on a GIS map relying on total station points of sub-centimeter accuracy. The two maps together show the characteristics of the architecture with the true dimensions in space of each feature. The site and surrounding landscape are pictured in Figures 6.9 and 6.10.

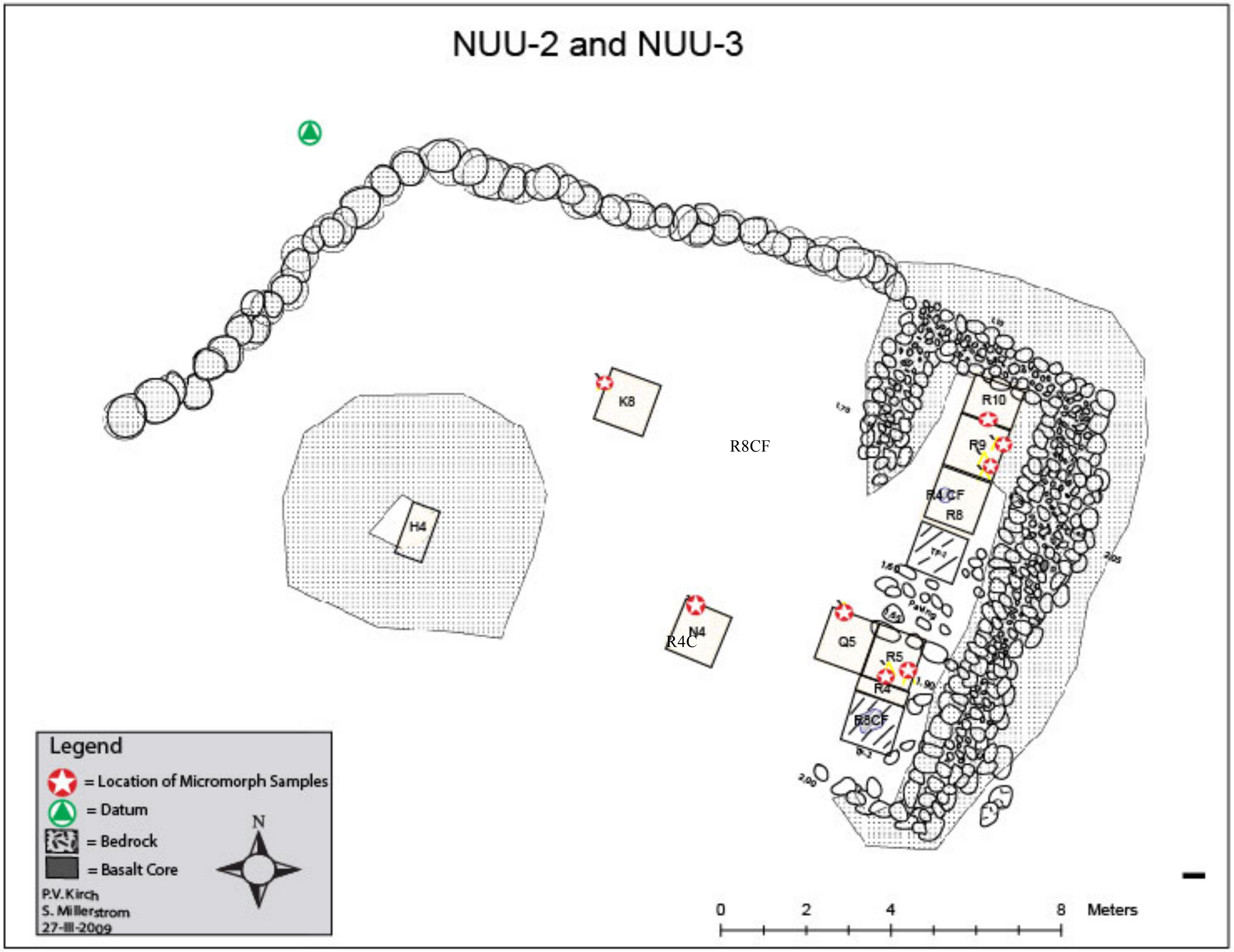


Figure 6.8: Plan map of NUU-2 and NUU-3 with the location of the excavated units and micromorphology samples marked. Tape and compass map provided by Patrick Kirch, total station data collected by K. Vacca.

Figure 6.9: View of NUU-2 and NUU-3 facing south

Figure 6.10: View of NUU-2 facing north, with crew excavating Unit R10. Screeners can be seen in the background by the wiliwili tree

Based on the earliest calibrated range for the feature, this area was in use by 1680 cal AD to 1779 cal AD (Figure 6.11). The earliest and latest age ranges returned for site NUU-2 were both associated with the L-shaped feature, suggesting long-term occupation and use of the site. The date returned for the NUU-3 circular feature falls within the dates returned for the L-shaped feature suggesting roughly contemporary use. However, charcoal from the foundation of the features were not analyzed so the date of construction cannot be determined at this point.

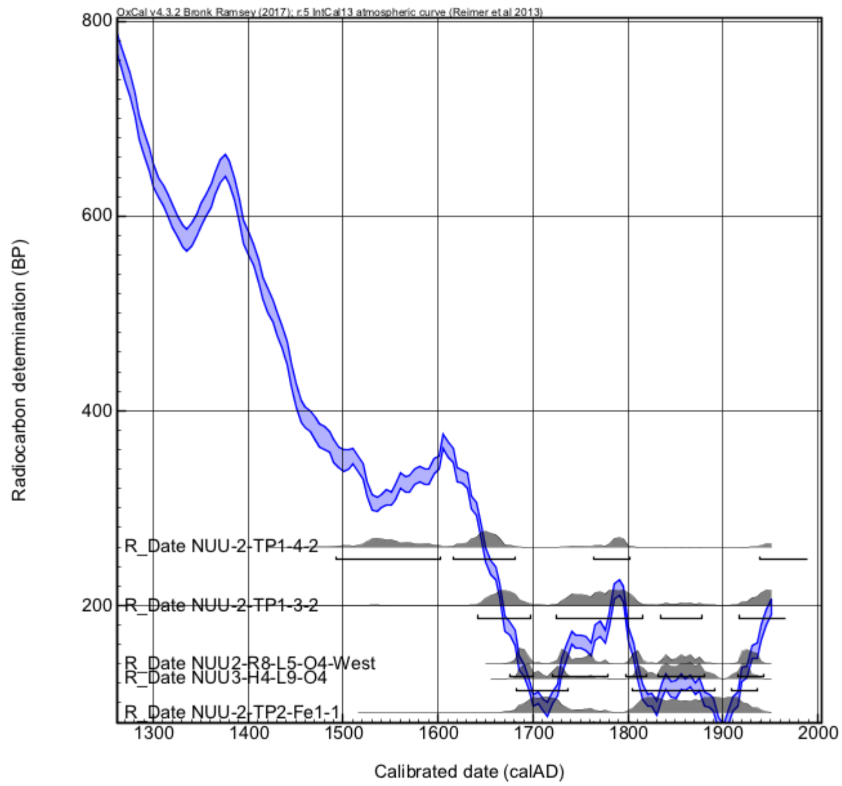


Figure 6.11: Calibrated dates for the features in NUU-2 and NUU-3.

Starch and phytolith extraction from the sediment samples collected in the process of excavating NUU-2 and NUU-3 resulted in the identification of plants utilized in this kauhale (Figure 6.12 and 6.13). The results from starch identification show the likely presence of sweet potato only in the L-shaped feature, Unit O8 alongside large amounts of microcharcoal. Phytoliths recovered were identified as banana and palm. Banana was found in the units beside both hearths in the L-shaped feature and in the circular feature. Palm phytoliths were recovered from every unit. Spherical verrucose phytoliths were recovered from all but one unit and absent from the feature. This type of phytolith is "found in a wide range of taxa" including woody plants (Horrocks et al. 2009:2052, see Appendix G for photos of phytoliths recovered from the Nuʻu sediment samples). Grasses are always the most common phytolith recovered as they are abundant producers. The different counts of grass phytoliths are telling. Bulliform/elongate, rondel, saddle shaped, bilobate, quadrilobate, and point shaped are all present but bulliform/elongate, saddle shaped and bilobate are abundant in all Nuʻu samples. The combustion feature units exhibiting far less grass phytoliths than surrounding units and less evidence of grass than the comparative off-site unit. Similarly, sedges were absent from the combustion features while most prominent in theNUU-3 unit.

Fig. 2. Starch and charcoal diagram from Nu‘u, Kaupo, Maui, Hawaiian Islands (+ = small amount, ++ = large amount).

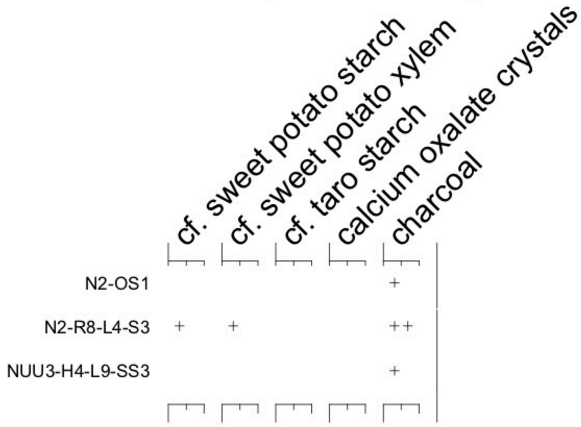


Figure 6.12: Presence and quantity of starch grains, charcoal, and calcium oxalate crystals from NUU-2 sediment samples. Data processed and provided my Mark Horrocks, table adapted from Mark Horrocks 2017 lab report.

Fig. 1. Phytolith percentage diagram from Nu‘u, Kaupo, Maui, Hawaiian Islands (+ = found after count).

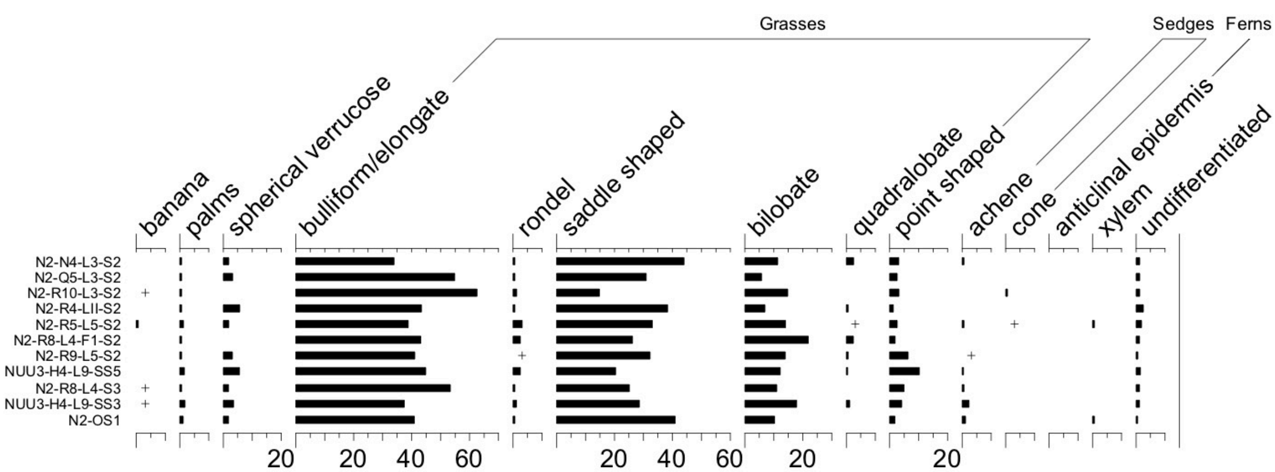


Figure 6.13: Presence and quantity of phytoliths from NUU-2 sediment samples. Data was provided my Mark Horrocks, table adapted from Mark Horrocks 2017 lab report.

This illustration shows the kauhale is clearly lacking the multiple structures outlined by mo‘ōlelo, but space encompassed by the outer walls measures 180m^2 (ten of which were excavated). The radiocarbon dates show that the features tested were all in use after the 15th century, which was the earliest period outlined by the mo‘olelo in which kauhale were being constructed with multiple features and used to enforce the ‘ai kapu. While the space encompassed by the stone wall surrounding the site is large enough to allow for all of the typical activities of daily life like preparation and cooking of food, sleeping, or making kapa, the numerous features outlined in the mo‘olelo that are associated with kauhale were not observed. Deciphering which activities were likely to have taken place here requires turning to an analysis of the artifacts and the micro-stratigraphic record. The data from the excavated units in NUU-2 show variability across space within this kauhale. Here I review each unit individually before describing the patterning across space.

Sediment sample analysis also indicates either different depositional events across the site, or different activities that affected the sediment after it was deposited. The granulometry data indicates that the most common type of sediment was sand, but each context exhibits varying degrees of gravel or mud (the combination of silt and clay) which changes the way artifacts and other inclusions in the sediment act. The sediment profile also differs depending on the context within each unit. However, samples tested from the same unit tend toward similar patterns with samples from units with high artifact density clustering towards the bottom right (higher silt and clay—referred to as mud here, following Blott and Pye 2012) and units with lower artifact density clustering towards the top (higher gravel content).

NUU-2 Terrace

NUU-2 Units K8 and N4

Unit K8, located between NUU-3 and the northern wall of the site, proved to be shallow and rocky. The top layer was dense with organic material, while the bottom layer was filled with cobbles from the parent material Figure 6.14 and 6.16). No cultural layer was observed in this unit and only two artifact classes were recovered. Soil samples were collected, which supports the relative absence of activity in this location. The absence of a 'cultural' layer[17], generally signified by a darker sediment color and, most importantly, higher density of artifacts, was reflected in the near absence of material culture (Figure 6.17). No microartifacts were recovered from the soil samples, indicating that the few artifacts that were recovered from this location were unlikely to have been used or made on the terrace.

Unit N4 was located southeast from Unit K8 half-way between NUU-3 and the southern portion of the L-shaped feature in NUU-2. The material retrieved from this unit (Figure 6.18) combined with the microartifact (Table 6.5) and sediment analysis, and profile description (Figure 6.15) indicated that this part of the terrace experienced heavier use and/or foot traffic (not a surprising revelation considering it is located directly between two architectural features).

[17] The cultural layers in each site are defined as the contexts with clear anthropogenic deposition that separates the sediment from the soil in the O Horizon and the C Horizon.

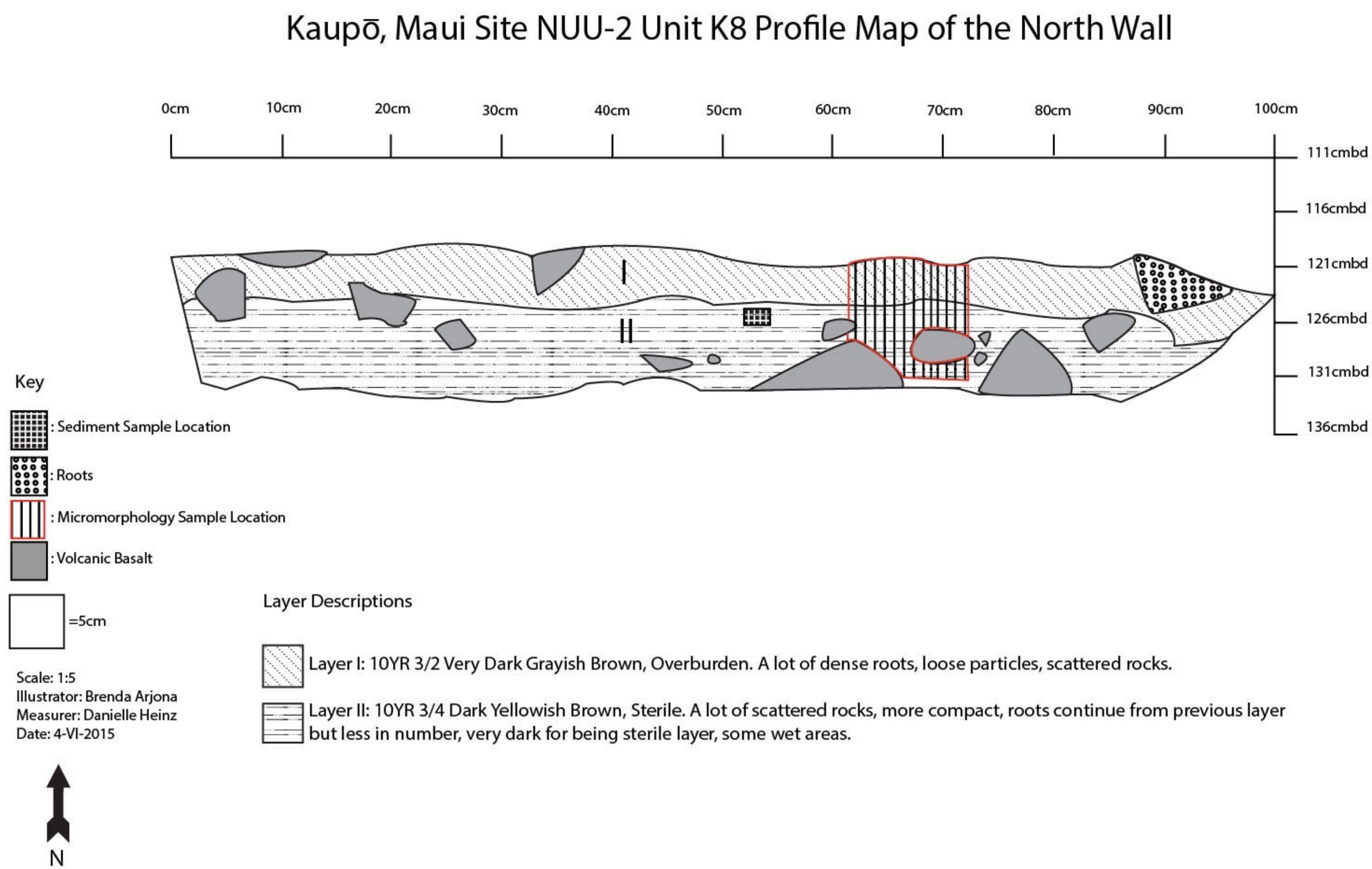


Figure 6.14: Profile map of the north wall of Site NUU-2 Unit K8 with description of contexts.

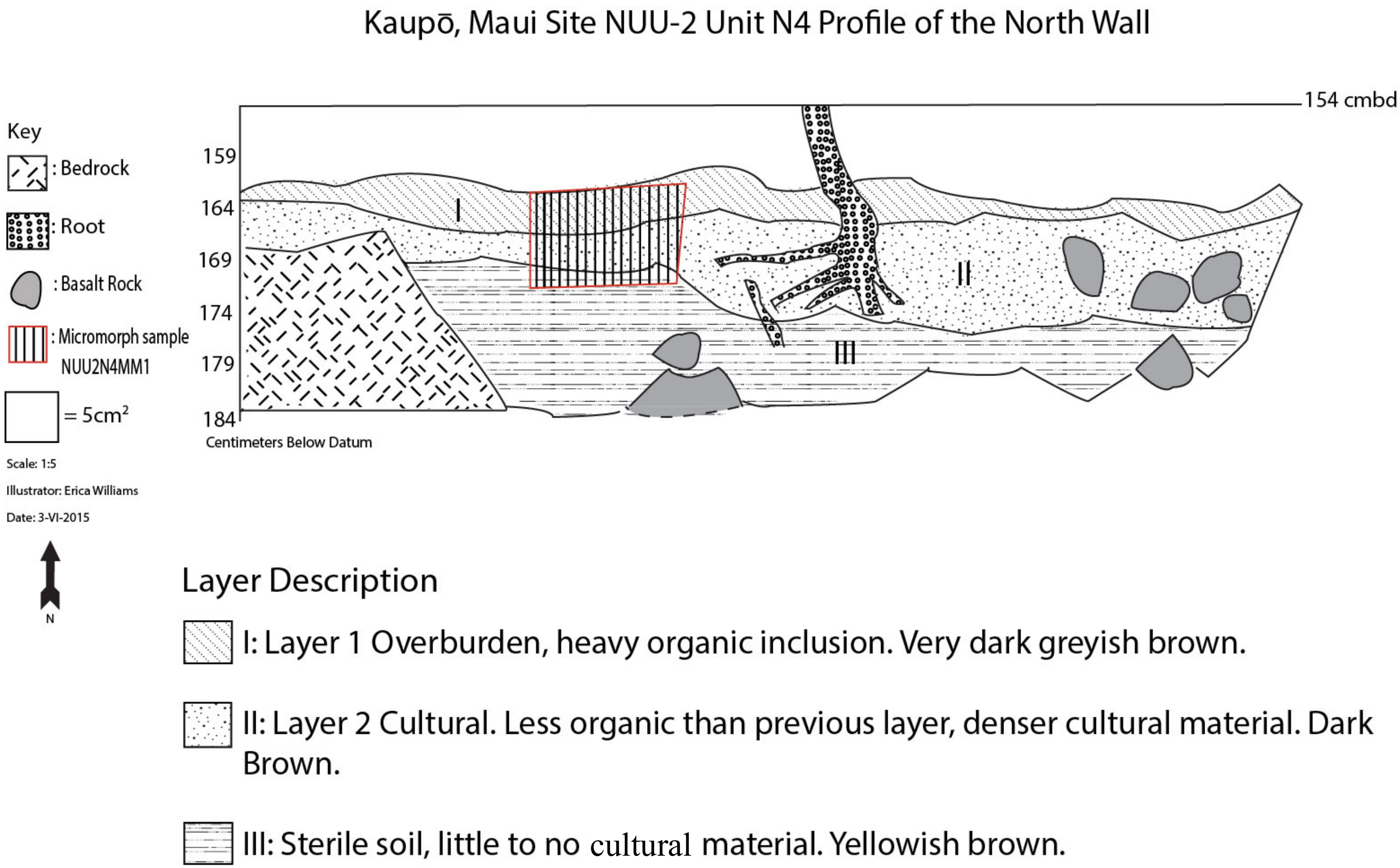


Figure 6.15: Profile map of the north wall of Site NUU-2 Unit N4 with a description of the contexts.

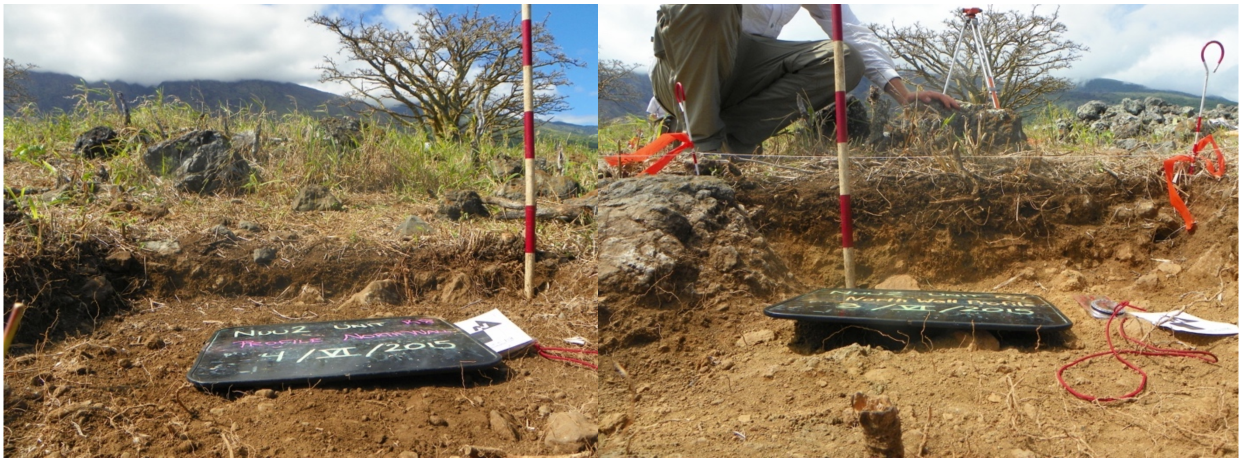


Figure 6.16: Photographs of the profiles from the NUU-2 terrace units. Left: Unit K8. Right: Unit N4

Few artifacts were recovered from Units K8 and N4. Unit K8 was deemed to be sterile as only two pieces of raw kukui nut and two pieces of potential lithic debitage were recovered, none of which can be easily attributed to cultural rather than natural deposition activities. Unit N4 produced more identifiable cultural artifacts, but in limited densities compared to the material culture present inside of the L-shaped structure. The majority of artifacts were recovered from the second layer and decreased in density with depth. Artifacts from the second layer were more indicative of human activity (e.g., *cf. Drupa* shell recovered). Based on the characteristics of Layer III, this layer was deemed sterile with the artifacts recovered mostly present at the top of the layer. Shell is commonly found in Nuʻu sites and therefore was notably absent from Unit K8. Coral is similarly common and notably absent from both units. While bone is not found at the rate of other artifact or ecofact classes in Nuʻu sites, the absence in both terrace units is still an important observation.

The microartifacts support the inference that objects recovered from Unit K8 were natural rather than cultural depositions (Table 6.5, Figure 6.18). The microartifacts identified as part of this unit resemble the assemblage of microartifacts from off-site comparative samples. The microartifacts also support the interpretation of the second layer in Unit N4 being the primary cultural layer with a sterile third layer. The presence of sea urchin spine in microartifacts identified from Nuʻu sites was uncommon and therefore worth noting for Unit N4—especially due to the absence of sea urchin in the larger artifact classes.

The sediment data from the terrace units when compared with the offsite samples show little variability. All contexts analyzed in Units N4 and K8 show pH levels that are slightly more acidic than the offsite comparison (Figure 6.19). The organic carbon measured from the K8 contexts was similar to the offsite sample, but the organic content in the cultural context from Unit N4 measured noticeably lower than the offsite sample (although a p-value was not calculated for the difference between the two samples). Other trends also emerge from the data. While the pH level and percent organic carbon in Unit K8 are adversely correlated, the pH and percent organic carbon were directly correlated for the off-site sample and N4 cultural context. The granulometry data from Unit K8 (Figure 6.20) and the offsite sample show evenly distributed samples. The cultural context in Unit N4 diverges from this trend, showing a unimodal distribution with a spike in coarse sand-size particles.

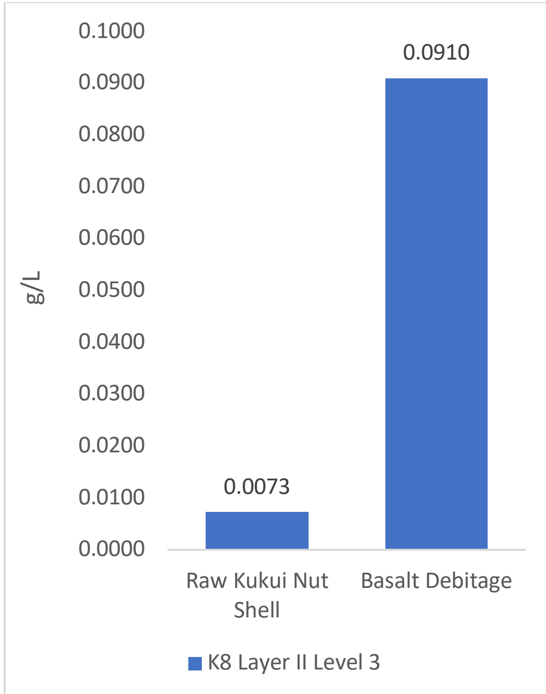
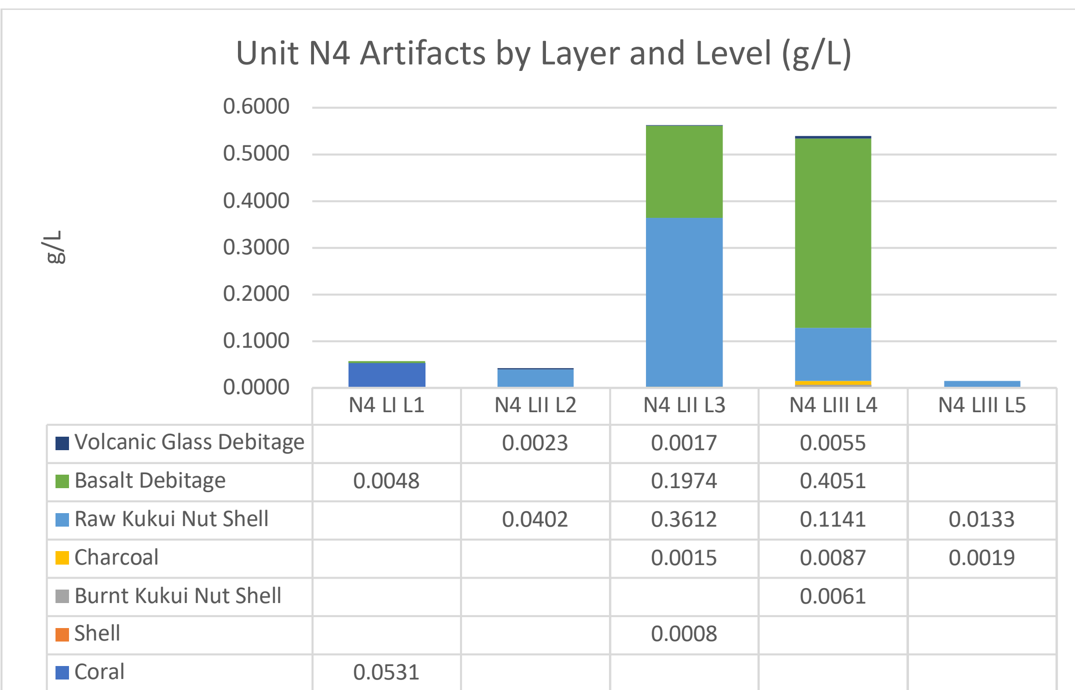


Figure 6.17: Unit K8 graph of artifacts displayed as grams per liter of sediment excavated in each context



	N4 LI L1	N4 LII L2	N4 LII L3	N4 LIII L4	N4 LIII L5
Volcanic Glass Debitage		0.0023	0.0017	0.0055	
Basalt Debitage	0.0048		0.1974	0.4051	
Raw Kukui Nut Shell		0.0402	0.3612	0.1141	0.0133
Charcoal			0.0015	0.0087	0.0019
Burnt Kukui Nut Shell				0.0061	
Shell			0.0008		
Coral	0.0531				

Figure 6.18: Unit N4 graph of artifacts displayed as grams per liter of sediment excavated in each context

Unit	Level	Artifact Class	Scientific Determination	NISP	MNI	Weight (g)
N4	3	Shell	cf. *Drupa* sp.	1	1	0.05

Table 6.4: NISP, MNI, Weight, and ID for shell in Unit N4.

Unit	Layer	Artifact Size	Item Type	Count	Weight (g)
K8	II	2mm - 4mm	Insect remnant	1	0.0019
K8	II	2mm - 4mm	Lithic Debitage	4	0.1115
K8	II	2mm - 4mm	Modern flora	13	0.0368
K8	II	2mm - 4mm	wood	10	0.0753
N4	II	0.5mm - 2mm	sea urchin spine	1	0.0044

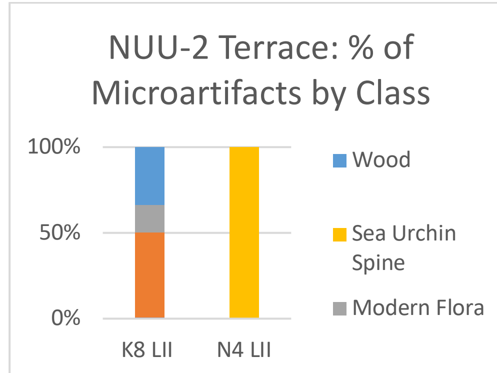


Table 6.5: Size, type, count, and weight of microartifacts recovered from Units K8 and N4. Artifacts are displayed by grams per liter of excavated sediment in each context

Figure 6.18: Graph of microartifacts classes from Units K8 and N4.

Unit/ Layer/Level	**pH**	**% Organic Carbon**	**Particle Size Distribution**							
Unit K8			**<0.063**	**0.063**	**0.125**	**0.25**	**0.5**	**1**	**2**	**4**	**6.3**
L2 LII SS1	4.98	36.3196	5.74	14.58	25.3	37.3	48.2	64.58	82.3	88.82	100.12
L3 LII SS1	5.07	30.4071	6.43	14.24	21.87	28.24	34.04	43.24	57.43	63.17	101.92
Unit N4											
N4 L3 SS1	5.09	24.4400	11.42	24.54	37.78	53.24	77.02		83.92	87.58	100.7
NUU2 OFFSITE											
Sample 1	5.28	40.6833	5.28	20.01	37.66	51.1	60.62	70.51	80.42	85.32	98.66

Table 6.6: Sediment sample data from Units K8, N4 and the offsite comparison

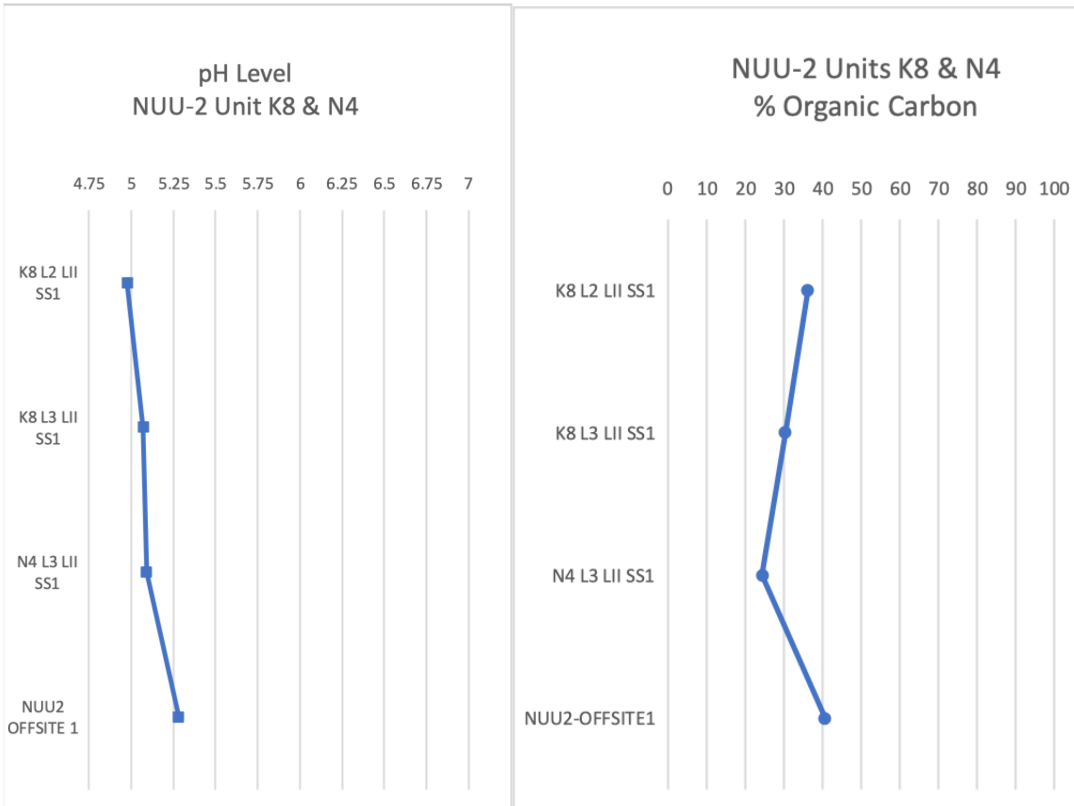


Figure 6.19: pH and Loss on Ignition of NUU-2 Units K8 and N4 levels/layers compared with the NUU-2 off-site sample.

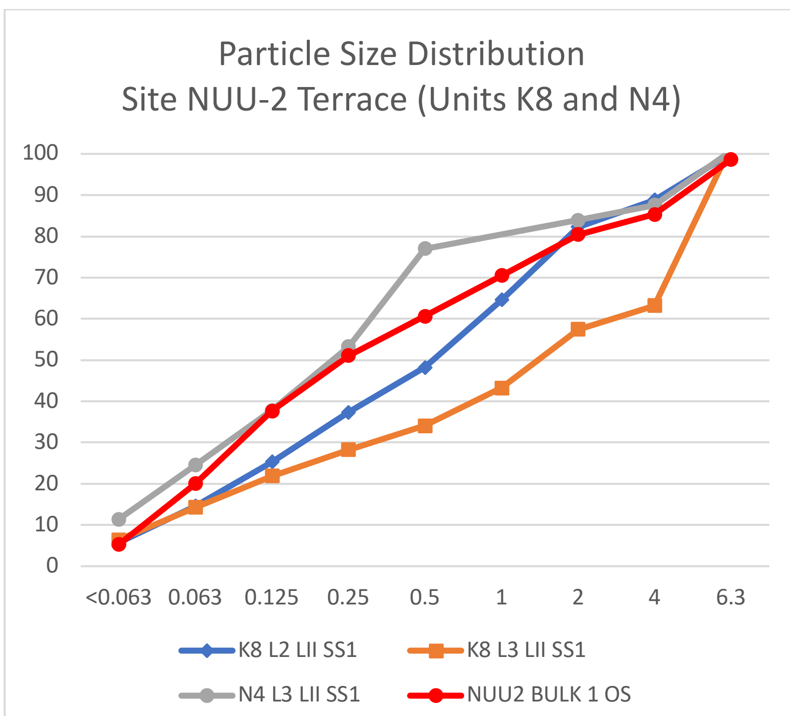
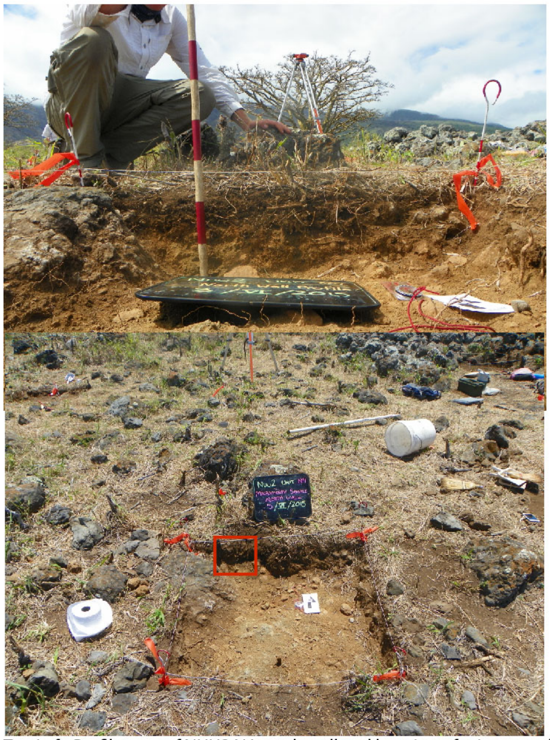


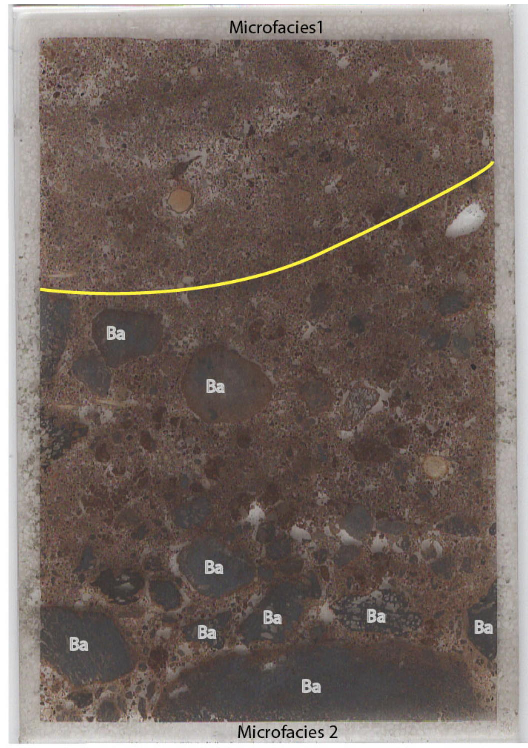
Figure 6.20: Particle size distribution of samples from the units on NUU-2 terrace compared with NUU-2 off-site sample.

The micromorphology data from both units compliment the data from the bulk samples. The sample taken from N4 captured the boundary between the cultural and sterile layers (Figure 6.21). Microfacies 1 was moderately homogenous and sorted with some small peds visible. The related distribution of the particles was classified as fine to equal single-spaced enaulic[18] with a granular packing structure, moderately separated inter-grain, microaggregate microstructure, and vughy voids with evidence of infilling. The inclusions were limited, consisting of rare microcharcoal and dominated by a moderate density of fibrous brown plant material. The sediment peds were randomly distributed but banded and oriented parallel to one another. Insect excrements were also observed, with insect activity potentially responsible for the small granules also observed. Weathering was most evident when looking at the rounded weathered basalt pieces and olivine grains with pellicular and cross-linear weathering. Packing voids dominate, but still are only roughly 20% of more compact microfacies.

The boundary between microfacies 1 and 2 was diffuse and wavy under magnification, but distinct to the naked eye. Microfacies 2 exhibits highly varied grain size comparatively, ranging from clay to gravel, all poorly sorted. This dark yellowish-brown soil exhibited a single-spaced, fine, enaulic related distribution with a granular structure and subangular blocky peds that decrease with depth. Complex packing voids were the most common voids, with vughs observed around the fragmented and weathered basalt and planar voids in blocky peds. Beyond the rare pieces of microcharcoal, no artifacts were observed, but fibrous yellow plant material was present, running both parallel and perpendicular to the bed. Other plant material included abundant cross sections of dicot stems (likely grass roots). Post-depositional weathering was observed in the abundant coarse sand- to gravel-sized rounded basalt with a spongy internal structure and thin clay coatings, as well as in the pellicular weathering of olivine.

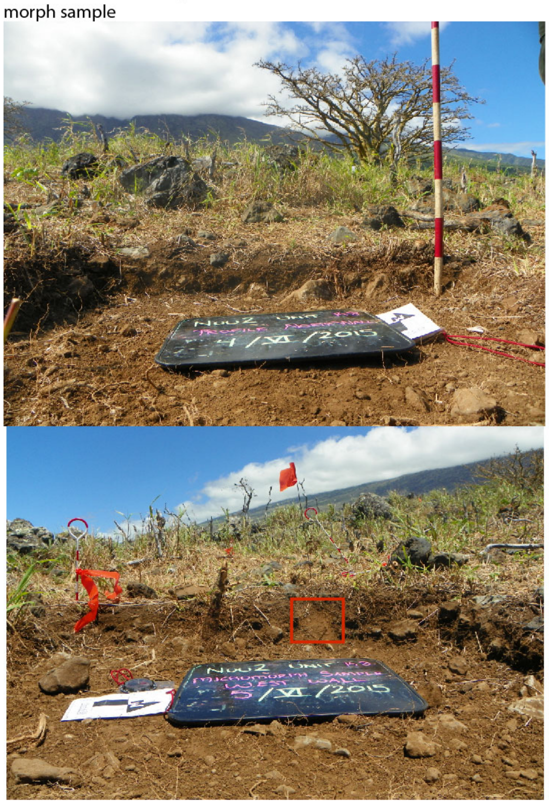
[18] The coarse/fine (c/f) ratio refers to the relationship between coarse and fine particles in the thin-section. Enaulic refers to the presence of fine-grained microaggregates in samples, which are categorized by their size in relation to coarse-grain particles in the sample (fine, open, or coarse) and proximity of the aggregates to one another (single-spaced, double-spaced, open). See Appendix D for micromorphology descriptor definitions.





Top Left: Profile map of NUU2 N4 north wall and location of micromorph sample
Bottom Left: Profile map of NUU-2 K8 north wall and location of micro-morph sample

Top Right: NUU-2 Unit N4 micrmomorphology thin section.
Bottom Right: NUU-2 Unit K8 micromorphology thin section
Key: Ba=Basalt PM=Plant Material



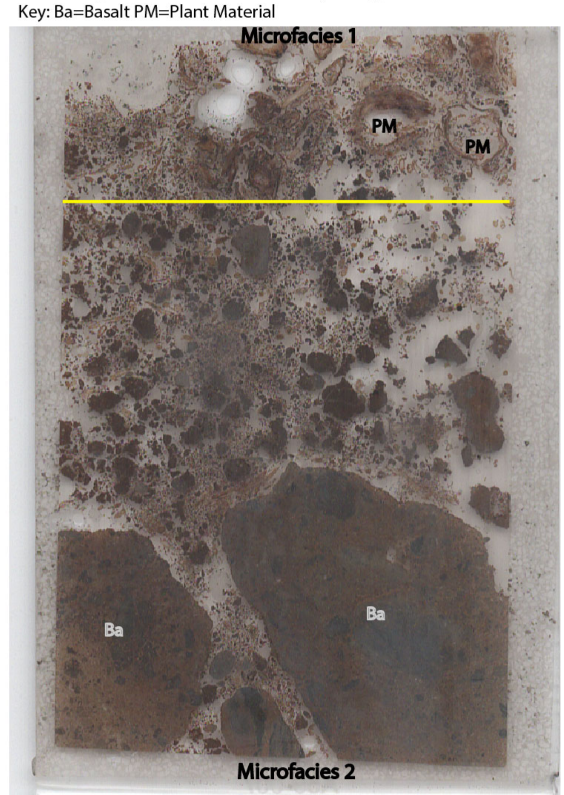


Figure 6.21: Micromorphology thin sections and associated profile photos of the units with the location of the samples marked for Unit N4 (top) and K8 (bottom).

The thin section taken from the north wall of Unit K8 captured the transition from the topsoil layer to the sterile layer. The top layer (Bed 1) was dominated by light, yellowish-brown spongy plant tissue. The soil was not compact, with roughly 60% void space (predominately complex packing voids and vughs from desiccated plant material with evidence of infilling) and poorly-sorted coarse particles dominating. The related distribution is double-spaced, fine enaulic with very little structure, but what structure was observable was classified as crumb and granule microstructure. Insect feces were visible in the vughs where plant material was degrading, which was also the primary evidence of weathering. Olivine, the most dominant mineral observed in other thin-section microfacies, was observed to be rare in this context.

The border between the two microfacies was diffuse and smooth under magnification, but distinct and smooth to the naked eye. Similar to Unit N4 Microfacies 2, Unit K8 Microfacies 2 exhibited a wide range of particle sizes from clay through gravel, that were poorly sorted and more densely packed than microfacies 1, but still loosely compacted (roughly 50% void space). Similarities extended to the color of the soil, which was a dark, yellowish-brown with double-spaced, equal enaulic distribution and subrounded peds surrounded by complex packing voids. Vughs were present where desiccated plants were degrading. Insect fecal material was still present in these voids, created by degrading plant material. Soil aggregates also abounded, and minerals from the basaltic parent material were abundant (including weathered olivine). Evidence of weathering was observed on the rounded basalt with pellicular weathering, and olivine with linear and pellicular weathering. Clay coatings were visible on the basalt and some plant material.

The sediment and soil data above indicate that the contexts in Unit K8 and N4 were dominated by sand-size particles. The particle size increased with depth due to the shallow parent material present at the bottom of the units that easily fractured into gravel-size units. The range in particle sizes suggests deposition occurring close to the source. The soil here likely resulted from erosion of the parent material and aeolian deposition from the strong winds that frequent southeast Maui. The acidic pH level remained stable through the levels, indicating continued low organic input through time, which further suggests little human activity. The change in this trend (lower pH and spike in coarse-size sand particles) in the Unit N4 cultural layer suggests a change in deposition from the surrounding contexts in the topsoil and sterile layers. Similarities between the K8 and N4 soil contexts, and the offsite sample confirms a lack of anthropogenic input through the absence of alteration of the pH levels and similar pattern of particle size distribution to the natural soils. The low pH means that preservation of bone from any ongoing human activity is less likely to be preserved, but the preservation of phytoliths is improved. These samples suggest that the presence of entisol or inceptisol soil rather than sediment in Unit K8 whereas the sediment in Unit N4 Layer II likely resulted from anthropogenic deposition.

NUU-2 L-Shaped Feature

Units TU 2, Q5, R5 and R4

The units excavated in the southern portion of the L-shaped feature are adjacent to one another and abut the cobble paving along the southern end of the feature. Unit Q5 shares its eastern wall with R5, which is south of R4 on the site grid. Unit R4 was placed next to the location of Test

Unit 2 (TU_2), which was excavated in 2010 by Patrick Kirch and the OAL. The excavation uncovered a hearth, which is marked on the map of the site above (Figure 6.8). The artifact data from the 2010 test excavation is presented below in table and graph form.

NUU-2 L-shaped Feature 2010 Test Units

The test unit was initially excavated in 2010. A calibrated radiocarbon age range returned the youngest date for site NUU-2 with both 1492-1698calAD and 1615-1680calAD both given a 40.6% probability. Given the timeline of settlement in Nuʻu however, settlement in the late 16^{th} to 17^{th} century is most likely. The artifacts recovered from this initial test excavation show that the majority of artifacts were recovered from the feature and from Unit 2, which exhibited predominately lithic debitage associated with adze use and rejuvenation whereas a specialized tool and mammal bone was recovered from Unit 2a (Figure 6.22). These artifact assemblages looked different from the types of artifacts recovered from the other units across the L-shaped feature, illustrating a gradient in the use of space across the site.

Units Q5, R4, and R5 are located directly to the south of Test Unit 2 but exhibited drastically different characteristics. Below are three profile maps for Units Q5 and R5 (Figure 6.24, Figure 6.25, Figure 6.26), Unit R4 was excavated directly to the south of Unit R5, therefore the profile map of the southern wall of Unit R5 also serves as a map of the north wall of Unit R4.

Unit Q5 was located in a transitional zone between the terrace and what might be considered the inside of the L-shaped feature. The artifacts reflect this position outside of what appears to be the main indoor activity space. The assemblage in Unit Q5 was dominated by poor quality basalt debitage that showed signs of potential working. Unit R4 was adjacent to the Test Unit excavated in 2010 which uncovered a hearth feature. This location is reflected in the dominant artifact class recovered from Unit R4—charcoal. The increase in artifacts related to food processing and consumption in Unit R4 and R5 are likely spatially correlated with a combustion feature. Both of these units produced an array of shell and sea urchin (identified in Table 6.7) and bone (identified in Table 6.8). The artifacts from these units illustrate the type of protein to which this household had access. While raw and burnt kukui nut shell was recovered at higher densities in NUU-2 units than in other kauhale, Unit R5 displayed inordinately high levels of kukui nut shell fragments, with 306 pieces (41g) recovered from Layer III.

The microartifacts compliment but do not directly reflect the data recovered from the macroartifacts. The limited amount of microartifacts recovered from Q5 confirms the absence of intensive, continuous activity in this location. The presence of more varied artifact classes that were recovered from the 0.5mm-2mm range compliments the artifact materials from larger class sizes, but the low density and small artifact size may only indicate tracked objects from post-depositional trampling.

Microartifacts recovered from Units R4 and R5 (listed in Table 6.9) reflected the artifacts collected from larger class sizes. Microcharcoal and microlithic debitage dominated the assemblages with burnt bone also recovered at low densities. Shell and coral were curiously absent from the microartifact assemblages.

The sediment samples from the southern end of the L-shaped structure indicate anthropogenic deposition in the cultural contexts. The pH levels in the cultural contexts are higher than the comparative off site sample and the topsoil samples, while there was less organic content found compared with the off-site samples. Several factors could account for these differences. The high pH could be explained by input from the charcoal inclusions, but this would presumably also raise the levels of organic carbon found in the samples. The low levels of organic matter may indicate the absence of input from organic material outside of stray charcoal from the adjacent hearth.

The particle size distribution for the three adjacent unit evidence a marked difference between off-site and on-site samples. While the off-site sample exhibited a relatively even distribution of particle sizes, the cultural layers evidence the increased percentage of fine particles as depth increases until sterile soil is reached and the gravel from the parent material dominates (specifically in Unit R4). Layer II particle distribution reflects similar sediment characteristics, suggesting a continuation of this layer and correlates with an increased presence of microartifacts resulting from confirmed cultural activity (e.g., shell and bone as opposed to unidentified organic material). Layer III also shares similar characteristics across the units and suggests a bimodal distribution with increased presence of medium sand and pebble-sized particles. This particular signature correlates with the layers where macroartifacts were most dense, particularly charcoal. The denser presence of charcoal could explain the bimodal distribution due to the friable nature of the charcoal pieces. Alternatively, inorganic carbonate material such as mollusk shells or coral could lead to an increase in pH without affecting the levels of organic carbon.

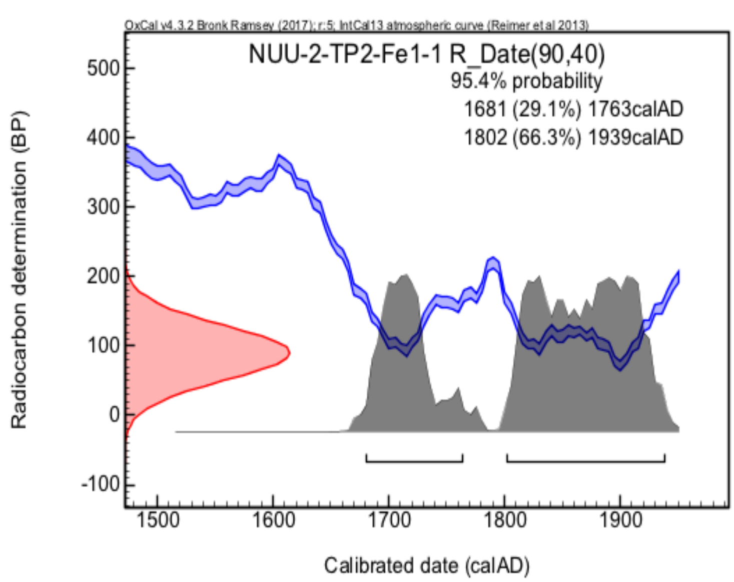
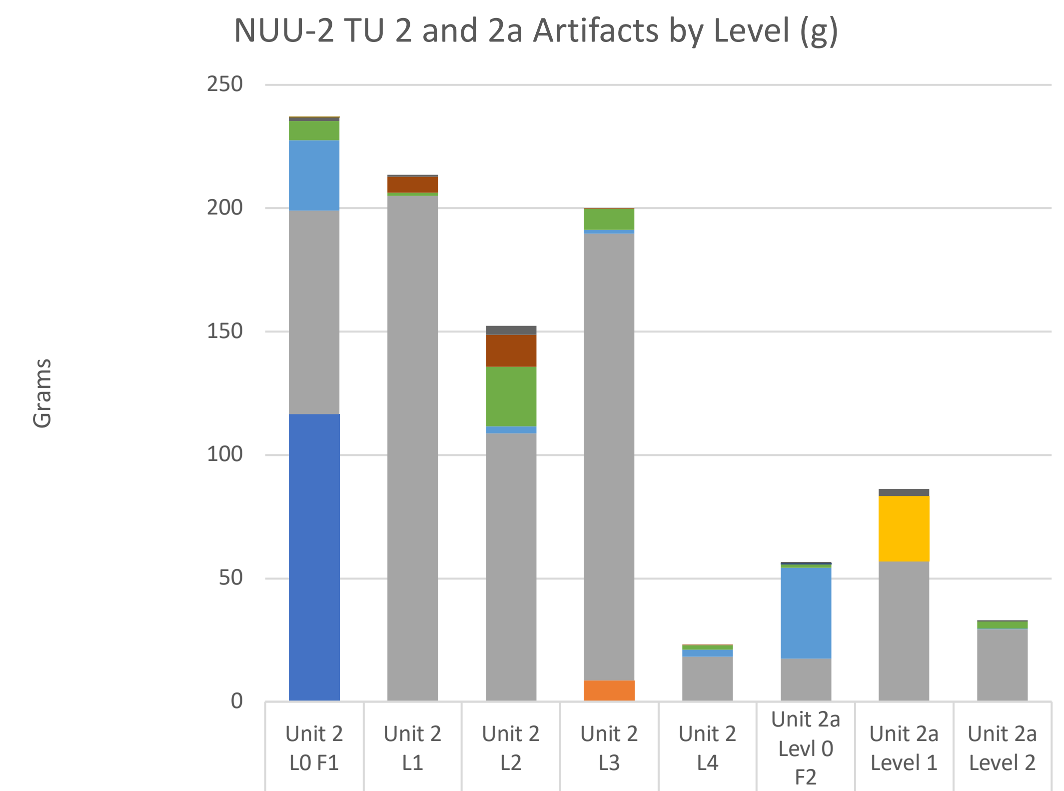


Figure 6.22: Calibrated radiocarbon date for NUU-2 Test Unit 2 Feature.



	Unit 2 L0 F1	Unit 2 L1	Unit 2 L2	Unit 2 L3	Unit 2 L4	Unit 2a Levl 0 F2	Unit 2a Level 1	Unit 2a Level 2
Volcanic Glass Flake	0.1							
Shell	1.5	0.8	3.6			0.7	2.8	0.4
Coral		6.4	13	0.3	0.1			
Mammal bone						0.4		
Kukui nut shell	7.7	1.4	24	8.6	1.8	1.4		3
Charcoal	28.5		3	1.5	2.9	36.7		0.3
Basalt stone awl							26.5	
Basalt Flake	82.5	205	108.7	181.2	18.3	17.5	56.9	29.3
Adze flake				8.6				
Adze (preform)	116.6							

Figure 6.23: Test Unit 2 and 2a graph of artifacts displayed as grams of artifacts in each context

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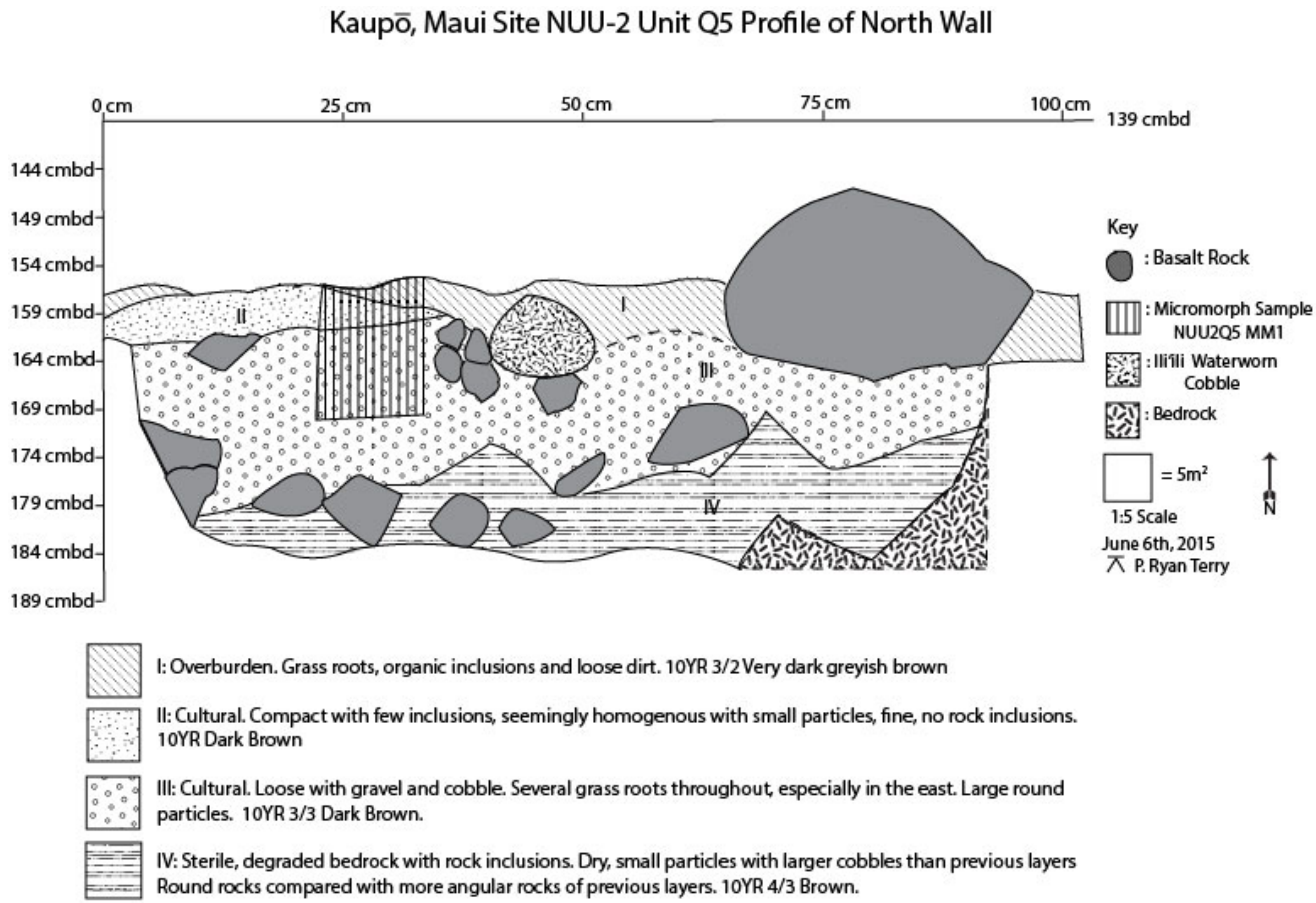


Figure 6.24: Profile map of NUU-2 Unit Q5 north wall with description of the contexts and location of the micromorphology sample.

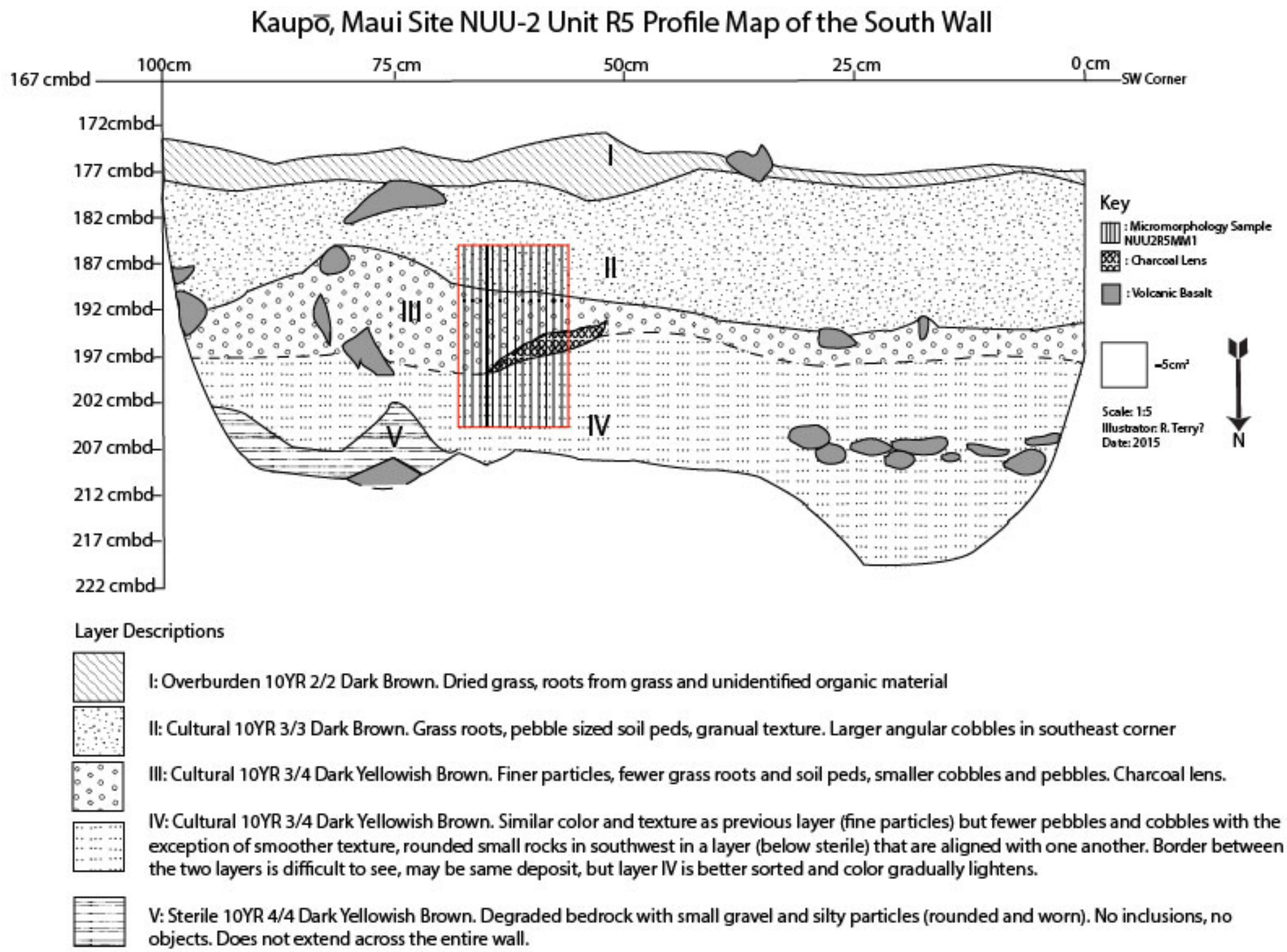


Figure 6.25: Profile map of NUU-2 Unit R5 south wall with the description of the contexts and location of the micromorphology sample.

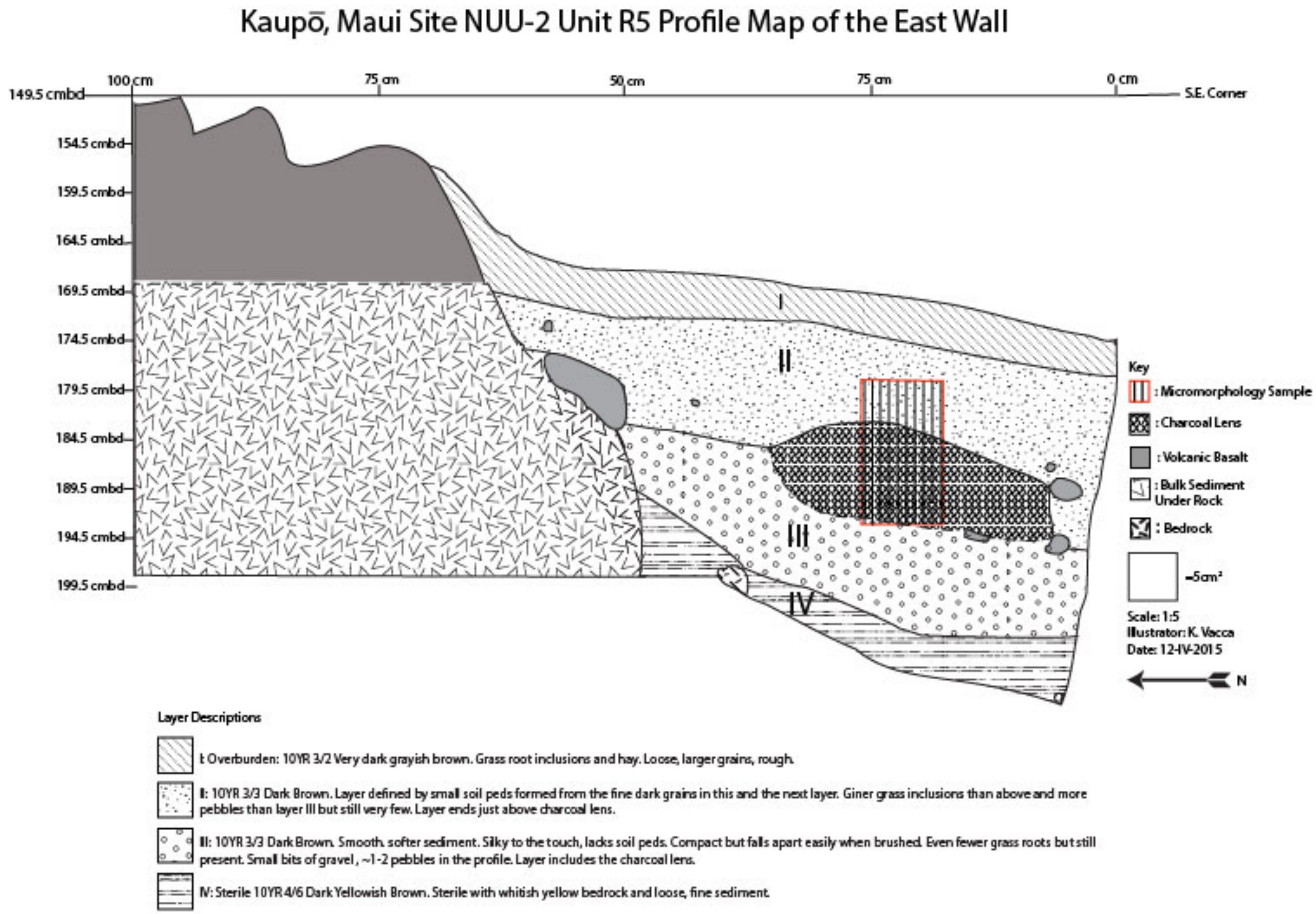
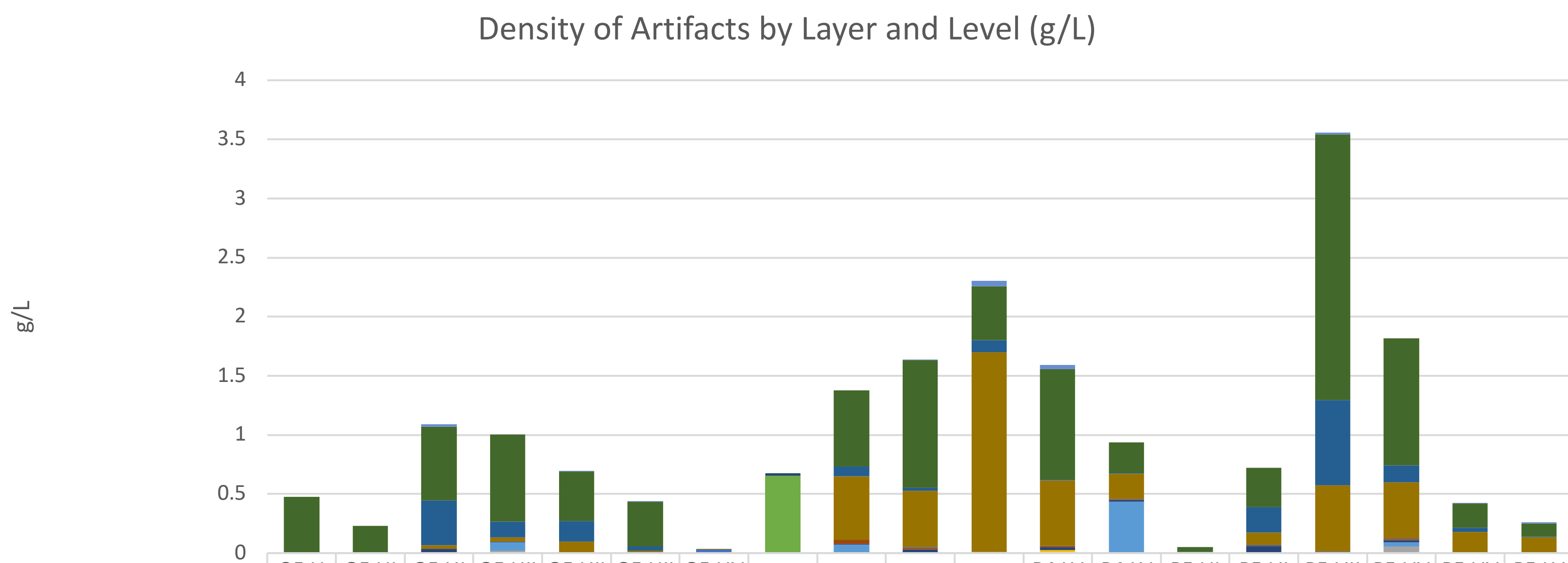


Figure 6.26: Profile map of NUU-2 Unit R5 east wall with the description of the contexts and location of the micromorphology sample.

Figure 6.27: Photographs of the mapped profile walls from Units Q5 (left), R5 South (center) and R5 East (right).

Excavation Unit	Level	Layer	Special	Scientific Determination	NISP	MNI	Weight (g)
Q5	3	II		cf. *Cypraea caputserpentis*	2	2	1.25
Q5	4	III		Undetermined mollusk	2	1	0.85
Q5	5	III		Undetermined mollusk	1	1	0.31
R4		I		cf. *Drupa* sp.	1	1	0.09
R4		II		Undetermined mollusk	1	1	0.06
R4		III		Undetermined mollusk	1	1	0.6
R4		III		Undetermined mollusk	2	1	0.03
R4		IV		Undetermined mollusk	12	1	0.1
R4	1	V	Eastern Half	*Cellana* sp.	5	1	0.14
R4	1	V	Eastern Half	Undetermined mollusk	5	1	0.43
R4	1	V	Western Half	Undetermined mollusk	2	1	0.09
R4	2	V		Undetermined mollusk	1	1	0.08
R4	2	V		cf. *Cypraea caputserpentis*	1	1	0.59
R5	2	II		Undetermined mollusk	1	1	0.03
R5	3	II		cf. *Drupa* sp.	5	1	5
R5	4	III		Undetermined mollusk	2	1	0.27
R5	5	IV		*Cypraea caputserpentis*	2	1	1.32
R5	5	IV		Undetermined mollusk	2	1	0.06

Table 6.7: NISP, MNI, Weight, and ID for shell and sea urchin in Q5, R4, and R5



	Q5 LI LI	Q5 LII L2	Q5 LII L3	Q5 LIII L4	Q5 LIII L5	Q5 LIII L6	Q5 LIV L7	R4 LI	R4 LII	R4 LIII	R4 LIV	R4 LV L1	R4 LV L2	R5 LII L2	R5 LII L3	R5 LIII L4	R5 LIV L5	R5 LIV L6	R5 LV L7
Volcanic Glass Debitage			0.0208		0.0026	0.0022				0.0016	0.0460	0.0389				0.0160		0.0057	0.0063
Basalt Debitage	0.4734	0.2252	0.6256	0.7354	0.4226	0.3811			0.6456	1.0805	0.4554	0.9366	0.2599	0.0423	0.3305	2.2493	1.0736	0.2053	0.1157
Raw Kukui Nut			0.3771	0.1365	0.1734	0.0317			0.0817	0.0269	0.0983	0.0021	0.0034	0.0083	0.2154	0.7187	0.1456	0.0371	0.0048
Charcoal	0.0011	0.0036	0.0311	0.0343	0.0941	0.0228	0.0037		0.5368	0.4787	1.6933	0.5537	0.2134	0.0015	0.1029	0.5581	0.4714	0.1729	0.1318
Burnt Kukui Nut									0.0025	0.0058			0.0029		0.0161	0.0099	0.0102	0.0019	
Bone Not Worked									0.0349	0.0106	0.0032	0.0089	0.0048				0.0100		
Shell			0.0377	0.0069	0.0026			0.0159	0.0028	0.0328	0.0053	0.0283	0.0182	0.0004	0.0516	0.0046	0.0134		
Manuport Branch Coral								0.6578											
Coral				0.0693					0.0687				0.4264			0.0014	0.0386	0.0033	
Worked Bone									0.0042			0.0245							
‘Ili‘ili				0.0176													0.0477		
Volcanic Glass Debitage				0.0033									0.0071		0.0030		0.0076		
Basalt Debitage							0.0328												

Figure 6.28: Units Q5, R4, and R5 graph of artifacts displayed as grams per liter of sediment excavated in each context

Unit	Level	Layer	Special	NISP	MNI	Weight (g)	Artifact Class	Scientific Determination	Comments
R4		II		1	1	0.34	bone not worked	Pig	Pig first pre-molar. Split in two but easily fits back together
R4		II		4	1	0.13	bone not worked	cf. Small mammal	NID fragments
R4		II		2	1	0.52	bone not worked	Medium mammal	NID fragments
R4		II		1	1	0.12	Worked bone	general undetermined bone	fragment that appears to be worked
R4		III		29	1	0.2	bone not worked	Undetermined fish	Friable bone fragments, broken since collection
R4		IV		8	1	0.06	bone not worked	Undetermined fish	NID fragments
R4	1	V	Eastern Half	5	1	0.11	bone not worked	Medium mammal	NID fragments
R4	1	V	Eastern Half	2	1	0.04	bone not worked	Undetermined bird	Long bone and fragment
R4	1	V	Eastern Half	1	1	0.29	Worked bone	general undetermined bone	Possibly worked bone. Appears to fit together with object 6 from Western half of unit, LVL1
R4	1	V	Western Half	1	1	0.29	Worked bone	general undetermined bone	Possibly burnt bone. Has hole that may drilled, fits together with object 7 from eastern half
R4	1	V	Western Half	2	1	0.1	bone not worked	Medium mammal	NID worn fragment
R4	2	V		1	1	0.11	bone not worked	Undetermined fish	Small fragment that may be diagnostic
R4	2	V		3	1	0.37	bone not worked	Medium mammal	NID fragments, pos. cranial
R5	5			15	1	1.04	bone not worked	Medium mammal	4 main bones with small flakes coming off of them
R5	4 to 5		Under Rock	40	1	0.97	bone not worked	Medium mammal	Burnt mammal bone, highly fragmented
Q5	1-7		Wall Fall SE Corner	1	1	0.07	bone not worked	*Elasmobranchii* (ray/shark)	Tooth

Table 6.8: Identification, NISP, MNI, and weight of bone fragments recovered from Units R4, R5, and Q5.

Unit	Layer	Level	Artifact Size	Item Type	Sum of item count	Sum of weight /g
Q5	II	3	2mm-4mm	Cf. carbonized tuber	2	0.0037
	III	5	0.5mm-2mm	Charcoal	11	0.0105
				Lithic	3	0.0065
				Shell	1	0.0008
				Un ID/Wood	20	0.0048
				Volcanic Glass	1	0.0065
	IV	7	2mm-4mm	wood	5	0.014
R4	II		2mm-4mm	Charcoal	2	0.025
				Lithic	4	0.086
				wood	13	0.05
			4mm-6.3mm	wood(?)	6	0.1
	III		≥6.3mm	Lithic	1	7.3544
			2mm-4mm	Charcoal	1	0.0297
				Contemporary flora	3	0.0348
				Lithic	7	0.1255
				organic material	1	0.01
			4mm-6.3mm	Charcoal	1	0.0372
				Contemporary flora	1	0.0647
				Lithic	1	0.1023
	IV		≥6.3mm	Charcoal	2	0.13
				Lithic	1	1.43
			2mm-4mm	Charcoal	47	0.62
				Lithic	26	1.14
			4mm-6.3mm	Charcoal	32	1.01
				Lithic	10	0.85
	V	1	≥6.3mm	Lithic	1	0.232
				wood	1	0.0001
			2mm-4mm	Charcoal	8	0.042
				Lithic	6	0.129
				wood	5	0.031
			4mm-6.3mm	Charcoal	1	0.038
				Lithic	1	0.324
				wood	1	0.0001
		2	1mm-2mm	Charcoal	10	0.0181
				Lithic	7	0.0283
				wood	10	0.0108
			2mm-4mm	Charcoal	10	0.114
				Lithic	4	0.0832
				wood	1	0.0042
			4mm-6.3mm	Charcoal	1	0.0232
				rock/ maybe lithic	1	0.1697
			2mm-4mm	Charcoal	3	0.0241
				Contemporary flora	7	0.0165
				Lithic	3	0.0799
			4mm-6.3mm	Contemporary flora	4	0.0442
				Lithic	1	0.1888
R5	II	2	0.5mm-2mm	burnt bone	1	0.0001
				carbonized seed	2	0.0001
				Charcoal	4	0.0043
				Shell	2	0.0005
				Volcanic Glass	1	0.0012

Table 6.9: Microartifact size, type, count, and weight from Units Q5, R4, and R5.

Unit	Layer	Level	Artifact Size	Item Type	Sum of item count	Sum of weight /g
R5	IV	5	≥6.3mm	Lithic	1	0.5635
			2mm-4mm	Charcoal	10	0.1076
				Lithic	3	0.032
				wood	3	0.0083
			4mm-6.3mm	Lithic	1	0.0821
		6	2mm-4mm	Charcoal	7	0.012
				Lithic	3	0.053
				wood	3	0.026
			4mm-6.3mm	Lithic	1	0.102
	V	7	2mm-4mm	Contemporary flora	5	0.058
			4mm-6.3mm	Contemporary flora	3	0.0011

Table 6.9 continued.

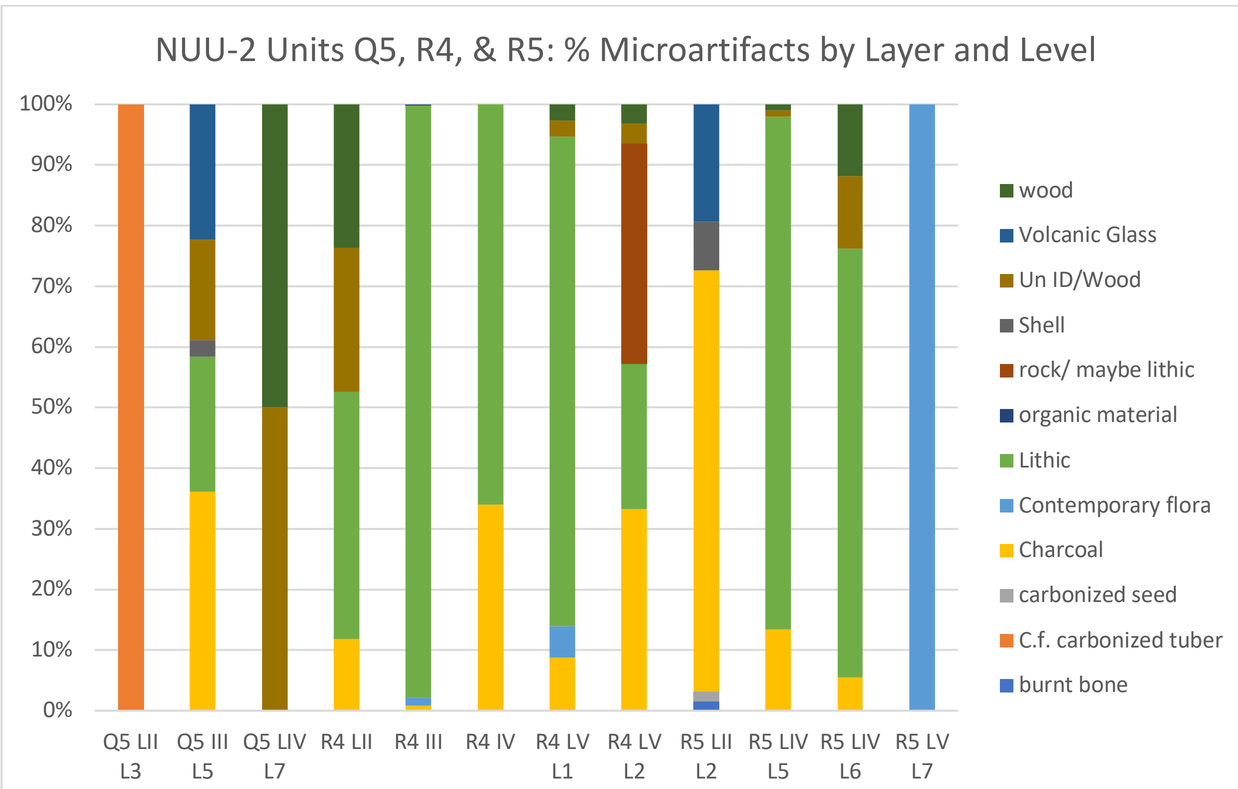


Figure 6.29: Graph of microartifact percentages in Units Q5, R4, and R5.

Unit/ Layer/Level	pH	% Organic Carbon	Particle Size Distribution								
Unit Q5			**<0.063**	**0.063**	**0.125**	**0.25**	**0.5**	**1**	**2**	**4**	**6.3**
L3 LII SS1	5.90	24.2610	5.24	10.32	20.12	28.38	38.08	46.5	68.96	69.54	98.66
L5 LIII SS1	5.59	23.4688	5.78	12.2	19.04	26.6	43.9		53.88	57.08	100.24
L7 LIV SS1	6.08	18.5538	7.29	14.62	21.01	26.53	32.78	43.02	56.97	66	100.64
Unit R4											
LII SS1	6.30	25.1093	5.28	13.08	21.78	28.72	34.82	45.82	63.12	66.6	100
LIII SS1	6.55	17.2999	6.01	12.31	19.01	24.01	26.58	28.86	33.04	34.86	99.98
LIV SS1	6.50	16.4979	8.16	15.16	21.82	26.36	27.74	29.12	31.04	33.62	99.5
LIV SS5-1	-	19.5972	-	-	-	-	-	-	-	-	-
LIV SS5-2	-	19.3798	-	-	-	-	-	-	-	-	-
LV SS1	6.59	15.4386	7.22	23.54	39.17	50.19	54.79	58.56	62.28	65.18	99.65
LV SS4	6.41	14.7275	8.48	21.42	31.58	38.62	41.72	44.14	46.04	49.3	99.84
LV(2) SS1	6.73	16.0734	8.36	28.56	43.66	54.52	59.44	62.58	66.5	71	99.84
Unit R5											
L2 LII SS1	5.43	26.4173	12.46	27.02	40.98	52.74	76.84		94.78	95.94	99.76
L5 LIII SS1	6.14	21.5808	-	-	-	-	-	-	-	-	-
L6 LIV SS1	6.00	21.2458	25.57	43.34	57.73	68.25	71.93	74.6	78.66	82.43	100.01
L7 LIV SS1	6.15	25.5981	4.48	7.74	10.42	12.8	14.41	16.61	19.8	21.63	100.53
NUU2 OFFSITE											
Sample 1	5.28	40.6833	5.28	20.01	37.66	51.1	60.62	70.51	80.42	85.32	98.66

Table 6.10: Sediment and soil sample information for Units Q5, R4, and R5

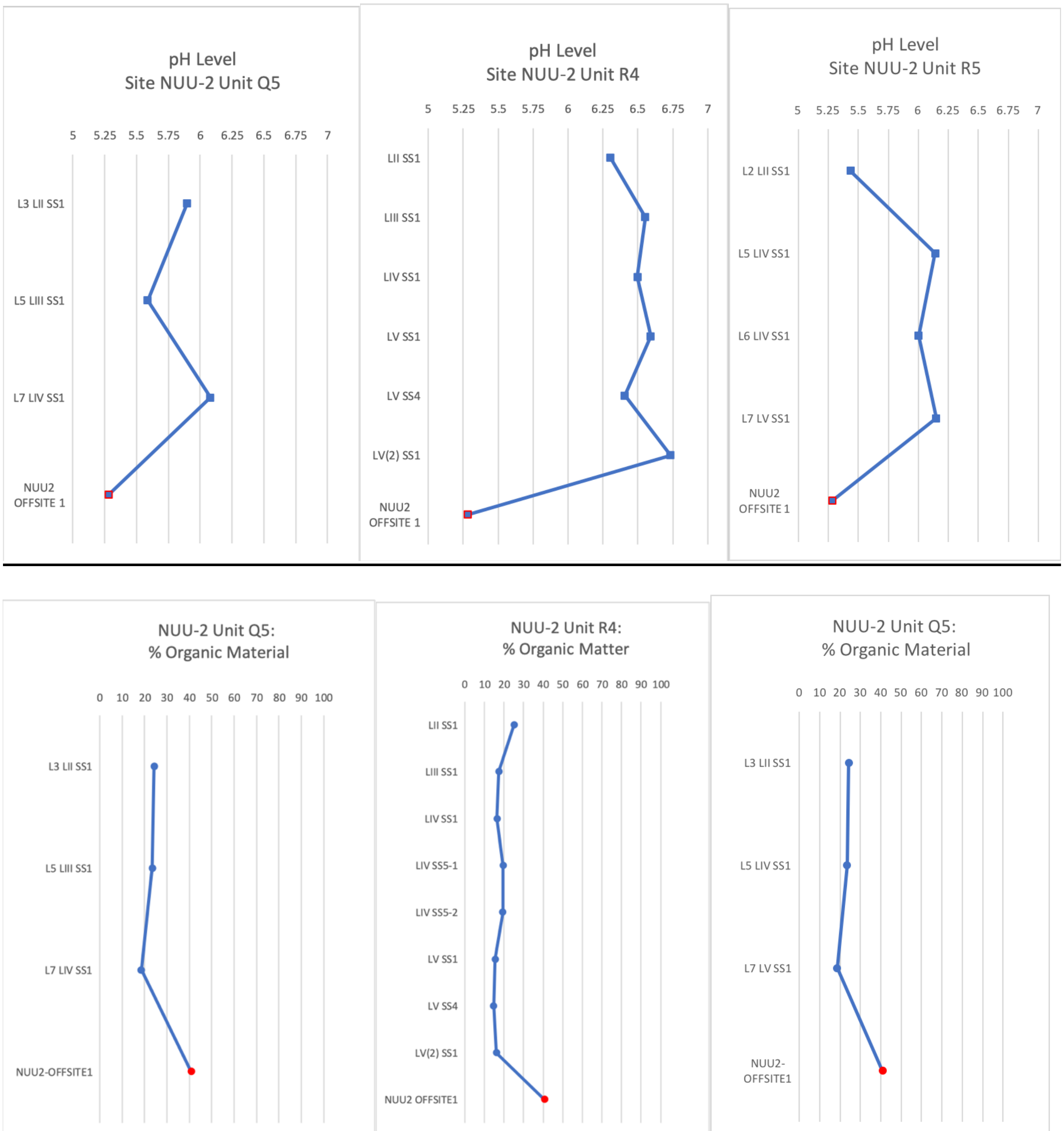


Figure 6.30: pH levels and percent organic matter in sediment and soil samples from Units Q5, R4, and R5.

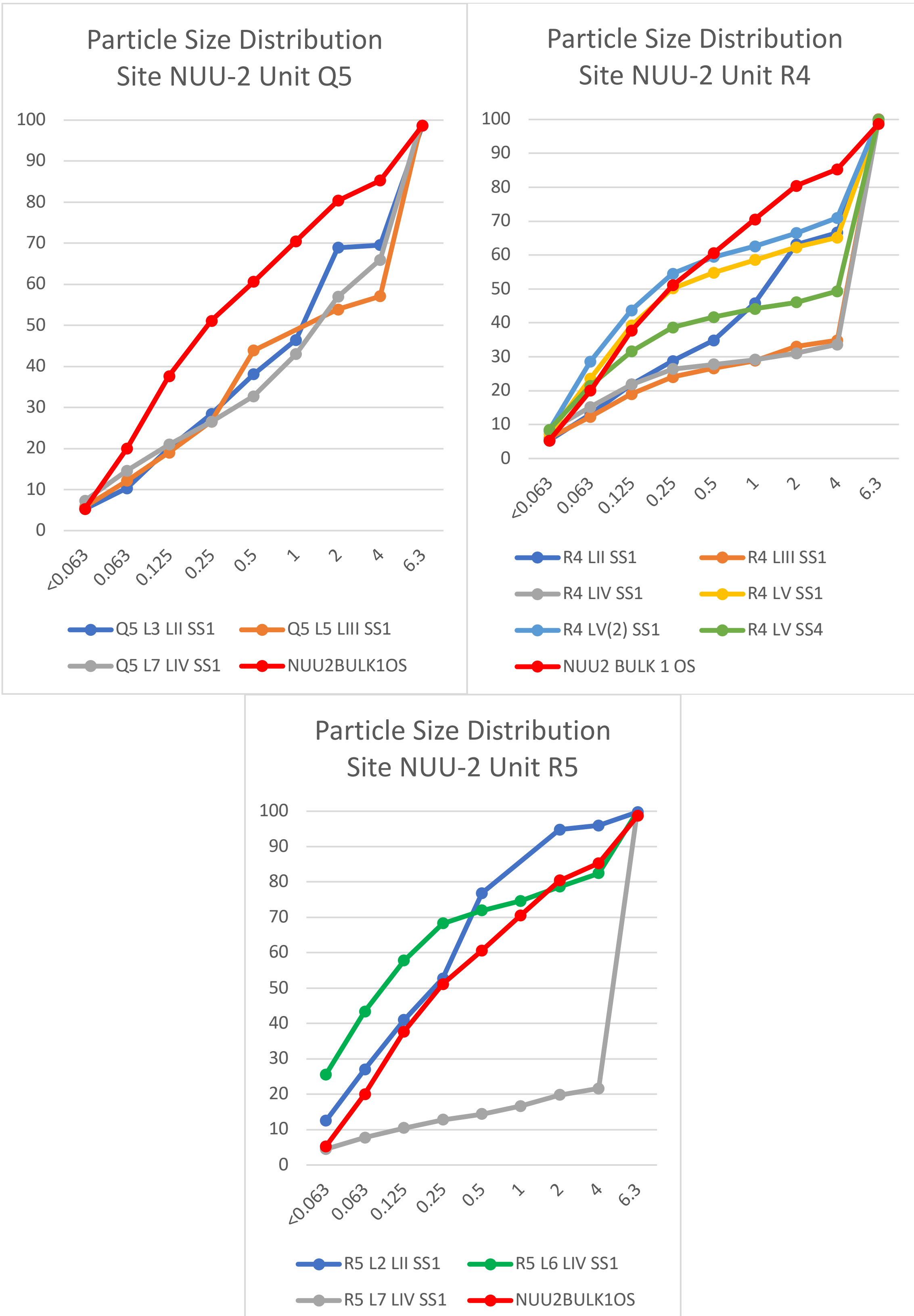


Figure 6.31: Particle size distribution for bulk samples from Units Q5, R4, and R5 and offsite samples showing different particle size distribution patterns

Three micromorph samples were examined from the southern half of the L-feature—one from the north wall of Unit Q5 capturing the boundary between Layers I, II, and III, and two from Unit R5. Sample one from Unit R5 was taken out of the south wall and captured the boundary between layers II, III, and IV as well as a charcoal lens cutting through the center (see Figure 6.24). The second sample from Unit R5 was extracted from the eastern wall, capturing the boundary between layer II and a charcoal lens.

Four microfacies were observed in sample NUU2Q5MM1. Microfacies 1 was a moderately sorted, loosely compact layer dominated by coarse components. The related distribution was determined to be chitonic[19] and open enaulic with coarse fraction surrounded by a fine clay coating and complex packing voids. The inclusions were limited to organic plant remains and impressions of deteriorated plants (roughly 80-90% of the layer) and the rare piece of microcharcoal. Basalt fragments were present but rare and weathered. Small soil peds (on average silt and fine sand size) were moderately to sparsely observed. Minerals were also observed (mostly olivine) but rare and exhibited slight pellicular weathering.

The boundary between microfacies was distinct and smooth. The dominant feature that differentiated microfacies 2 was the increased percent of fine material and density. The grains are poorly sorted and more compact than the previous and organized in a related distribution with close equal enaulic in a ped structure within complex packing voids and vughs around basalt and plant tissue. The plant tissue significantly decreased in this microfacies but was still 10-15% of the context. Microcharcoal was observed but rare, one possible bone fragment was present, and articulated phytoliths were observed within desiccated plant tissue. The size of sediment peds increased in this context—granules were the most common but subangular blocky peds were also present and densely packed. Weathering was observed in the form of subrounded basalt, pellicular weathering of basalt and olivine, irregular linear weathering of olivine, and thin clay coatings on roughly 50% of the plant and basalt inclusions.

The boundary between microfacies 2 and 3 is diffuse and wavy. The dominant feature differentiating the two microfacies is the decreased compactness, decreased size of peds and increased percent of vugh voids. The sediment is poorly sorted with granules and subangular blocky non-accommodating peds with interstitial grains and complex packing voids. The most common related distribution for this microfacies is double spaced equal enaulic. The inclusions observed were exceedingly rare and only included microcharcoal and plant tissue. Slightly weathered basalt fragments were observed, but no lithic debitage was recorded.

The boundary between microfacies 3 and 4 is diffuse but with clear differences in the composition. The primary differentiating feature for microfacies 4 is the presence of larger and more frequent blocky peds, and larger more frequent pieces of charcoal that is located within the blocky peds. The blocky peds exhibited low accommodation and complex packing voids with planar voids within the peds. Vughs and channels infrequently ran in between the peds. Fibrous plant material was still present, but less frequent. Fine grained basalt was also present in this microfacies, an inclusion that was absent from the previous contexts, lithic debitage was still not

[19] Chitonic refers to a c/f related distribution that is dominated by fine particles (<63µm) which wholly encompass the sparse coarse grain particles. See Appendix D for definitions.

observed however. Weathering was limited, but some pellicular and cross linear weathering was observed on olivine and roughly 5% of the basalt. Thin clay coatings also appeared to have been forming around some pieces of basalt.

The micromorphology elucidates the data from the bulk sediment samples. For example, although the percentage of fine material appears to be consistent within the different contexts according to the particle size distribution, but the thin section analysis shows the differential distribution of these particles. In microfacies 3 and 4, the fine particles are concentrated in peds whereas the fine particles were looser and denser in microfacies 2. This indicates different patterns of deposition and post-depositional processes. The absence of anthropogenic inclusions aside from microcharcoal also speaks how this space was used (or lack of use in this case), reinforcing the information provided by the low density of artifacts and microartifacts. The differences in voids, microstructures, related distributions, and lack of weathering in microfacies 2, 3, and 4 further suggests depositional and post-depositional processes related to anthropogenic rather than pedogenic processes.

The two micromorphology samples taken from Unit R5 show more evidence of anthropogenic deposition through the increased density of charcoal and other microartifacts. Sample one featured three microfacies. The first microfacies was distinguished by the oxidized gravel-size pieces of basalt that were reddish in color. Other burnt material was also recorded in this context, including bone, plant tissue, fine-grained basalt debitage from flaking, and other pieces of silt to coarse sand-size charcoal that was common throughout. Grey ash was also observed surrounding sediment peds. Peds in this context were granular and lenticular with planar voids with complex packing voids and channels in between the peds. The related distribution was recorded as double-spaced equal enaulic. The particle sizes in this context were poorly sorted. The finer grained basalt did not have clay coatings around the outer edge while the more rounded basalt did feature thin clay coatings. Clay coatings were also rare on charcoal pieces, evidencing a clear house deposit.

The boundary between microfacies 1 and 2 was diffuse and occluded. The primary defining feature of the middle microfacies is denser charcoal inclusions. However, other features continued through this context including the related distribution and the structure of the bedding. The grains were also poorly sorted, but featured denser coarse particles due to the increased density of microcharcoal. Burnt bone and microlithics were also observed to be randomly distributed and rare. Clay coatings were more common around the basalt in this context, but were still absent around the charcoal.

Microfacies three was nearly identical to microfacies one with the exception of the anthropogenic material and homogeneity. This context was moderately sorted with less coarse fraction and smaller peds. Ash was only observed at the top of the context as was basalt debitage. While charcoal was still common, burnt bone was absent and coarse sand to fine gravel size lithic debitage was only observed along the top of the microfacies.

The second slide, NUU2R5MM2, captured Layer II and the articulation with a charcoal lens. Microfacies 1 is characterized by large subangular blocky peds with granular peds and interstitial grains. Ash and charcoal were moderate to common while burnt bone was observed but rare.

Four pieces of fine gravel-sizes angular basalt was also observed, which may result from lithic working activity or fire cracked rock. A single-spaced fine enaulic related distribution was observed with a dominant granule microstructure. Planar voids with infilling are present in the blocky peds, which also evidenced rubification. Other evidence of post-depositional alteration and weathering includes typic clay coatings around the majority of the coarse fraction and pellicular weathering of olivine and basalt. More evidence of pedogenic processes was observed in this context than in the microfacies associated with Layer II from sample NUU2R5MM1.

The boundary between microfacies 1 and 2 was indistinct and occluded. It was difficult to tell whether this area of the thin section truly represented a different depositional event or if the differences observed were an artifact of the thin section (e.g., an over polished area, Figure 6.50 Slide NUU2R10MM1). Microfacies 2 is characterized by fewer peds and a higher percentage of fine fraction compared with coarse fraction. Perhaps the most differentiating factor is the color of the sediment in this context, which appeared reddish-yellowish brown under magnification. The context was moderately sorted with 40% void space. Similar anthropogenic materials were observed in this microfacies—burnt bone, ash, and charcoal—but with the exception of the charcoal, their presence was rare. The related distribution was recorded as double-spaced fine enaulic with blocky peds and a granular structure. Rubification of peds was observed with iron nodules present in larger peds. Weathering is limited to typic clay coatings around peds and basalt fragments. The basalt does not appear to be eroded.

The transition between microfacies 2 and 3 is also indistinct while the boundary with microfacies 1 is irregular and bounded by larger, subangular blocky peds. The debitage in this microfacies is distributed randomly throughout the bed, but with the long-axis horizontal to the ground. Bone fragments observed in this context exhibited a perpendicular orientation. Ash, charcoal, and degraded plant material was also present in this microfacies as well as angular basalt debitage and rounded, weathered basalt fragments. No clear rubification was observed in the peds in this microfacies, but minerals are highly weathered as is the desiccated plant material within the vughs. Typic clay coats were observed around cylindrical basalt and minerals, but absent from angular basalt. This layer was far more compact with roughly 10% randomly distributed void spaces (complex packing, vugh, and planar).

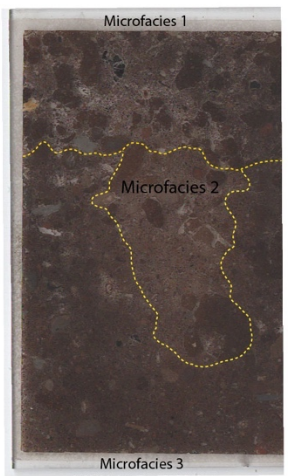
The microfacies analyzed from Unit R5 thin sections do not directly reflect the information recorded in the profile map of the east wall. Little evidence of the charcoal lenses was observed, and the information from slide 2 indicates change through time that is not captured in data recorded from field observations. The referred oblique orientation and linear distributions of the inclusions suggests post-depositional processes around the hearth that may have related to sweeping, which may also explain the absence of the class of microartifacts most vulnerable to cleaning practices (sizes below 1mm or above 2mm). In addition, the micromorphology does not provide evidence for the higher density of coarse sand to gravel indicated by the particle size distribution outside of the larger peds. However, the photographs of the unit profiles show the rocky nature of this area, which precluded obtaining intact blocks for micromorphological analyses. The datasets from different analytical methods must be used in conjunction with one another in order to produce a picture of depositional and post-depositional events here.

NUU-2 Plan photograph of Units Q5 (top left), R5 (top right) and R4 (bottom right) with the location of micromorph samples outlined in red. NUU2Q5MM1 top left, NUU2R5MM2 top right, NUU2R5MM1 bottom.

Figure 6.32: Photograph of the location of micromorphology samples in Units Q5, R4, and R5.

NUU2R5MM1

NUU-2 Unit R5 Photograph of the south wall stratigraphy with the location of micromorph sample NUU2R5MM1 outlined in red.



NUU2R5MM2

NUU-2 Unit R5 Photograph of the east wall stratigraphy with the location of micromorph sample NUU2R5MM2 outlined in red.

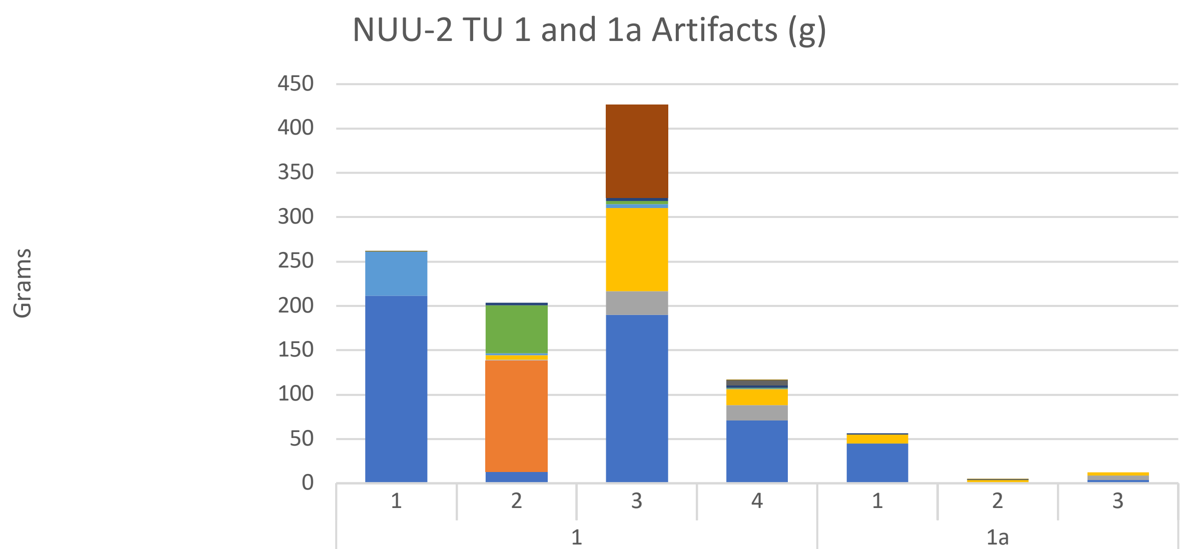
NUU2Q5MM1

NUU-2 Unit Q5 Photograph of the north wall stratigraphy with the location of micromorph sample NUU2Q5MM1 outlined in red.

Figure 6.33: Thin-sections of micromorphology samples and associated location from Units R5 and Q5

Units TU1, R8, R9, R10

The units in the northern half of the L-Shaped feature were adjacent to (or encompassed) a second hearth uncovered in Unit R8. One test unit was excavated to the north of the hearth in 2010 and the recovered artifacts are listed in Table 6.34 below. The assemblage from the test unit parallels the artifacts recovered from Units R8, R9, and R10. Although the mammal bone recovered was limited, its presence did indicate access to types of protein that smaller features like NUU-142, NUU-155, and NUU-420 did not appear to have access to. Kukui nut was again observed to be present at higher densities in test Unit 1 than was commonly seen in Nuʻu kauhale with 94g of fragments recovered. The other artifacts in conjunction with the mammal bone, charcoal, shell, and proximity to the hearth may evidence food processing. The increased diversity in artifacts and larger number of artifacts in Level 3 suggests that this level may have served as the surface of the activity space.



	1				1a		
	1	2	3	4	1	2	3
Volcanic Glass Flake	0.1			0.2		0.4	
Pumice				6.1			
Metal			105				
Shell	0.2	3.4	3.7	2.8	1	0.2	
Coral		54.1	3.8	1			
Mammal bone	49.9	2.2	4.2	0.4		0.1	
Kukui nut shell		4.7	94.2	18.1	10.2	3.7	3.7
Charcoal		0.6	26.1	17.6		0.1	5
Basalt groundstone fragment		125.5					
Basalt Flake	211.3	13.3	190.1	70.5	44.9		3.4

Figure 6.34: Test Unit 1 and 1a graph of artifacts displayed as grams of artifacts

Units R8, R9, and R10 were adjacent to one another running north to south. Units R9 and R10 were north of the excavated hearth that was in the northern half of Unit R8. A profile map was not made for Unit R8 due to the combination of the shallow bedrock and the cobbles that formed the hearth which resulted in little sediment and no visible stratigraphy in the profiles. The four contexts that were mapped in Units R9 and R10 extended through both units with intermittent ash lenses and a possible post hole in Unit R10.

The macro-artifact data from these units elucidates the potential use of this space. The charcoal can be presumed to come from the nearby hearth. Several rare but telling artifacts were recovered including shark teeth—an animal kapu to women in the period. Other rare but telling artifacts include the fishhook and pumice recovered from Layer II in Unit R8—evidencing of subsistence strategies and food preparation, respectively. These rarer artifacts alongside the presence of mammal bones help contextualize the more common artifacts found such as mollusk shell and lithic debitage. Finally, the presence of a dense charcoal lens and abundant microcharcoal that was covered by a floor surface, and artifacts within levels interpreted as fill indicates change in the use of space through time, but more contextualizing information is necessary for an interpretation of this change.

The excavation revealed that the top of the unit exhibited smaller particles in the center of the unit and larger particles along the edge. This pattern of particle distribution changes as depth increases, with larger particles present in the center and smaller particles dominating the corners. The lithology of the unit also reflects this pattern, with gravel-size stones dominating the lithology of the unit, only increasing in size once bedrock was reached at the bottom of the unit. Large ash and charcoal lenses were visible from 137cm below datum (cmbd) to 157cmbd, migrating slightly from the western half to the east with the increase in depth. At 137cmbd the excavators identified a charcoal lens near the middle of the southern wall. This charcoal lens spread to the middle of Unit R10 and to the northeastern half where a small ash lens developed on top of the charcoal lens to the northeast, and eventually along the eastern wall. Layer II exhibited the highest density of artifacts—specifically lithic debitage—which overlaid an ash and charcoal lens below. Near 157cmbd, the charcoal was observed coming from the northeastern and southeastern corners and center of the western half. The sediment in these deposits was loose and soft with fine particles. Conversely, the sediment surrounding the charcoal and ash lenses was highly compact with rougher texture and more gravel inclusions. The artifacts recovered in the process of excavation was observed coming from the western half of Unit R10 within the lenses aside from charcoal—specifically, shell and coral. In additional, larger charcoal pieces (coarse sand to gravel size) were recovered from below cobbles in the northwest and southwest corners. The degree of compaction in the final 15 cm of Units R9 and R10 required excavation with a pick axe. An unusual amount of animal bones and volcanic glass flakes were recovered from this unit (both at the macro- and micro-scale level) compared with the other kauhale excavated in this project. The presence of canine teeth was particularly rare. The compaction of the lower levels, the presence of the ash and charcoal deposits suggest that the layers formed in the northernmost area of the L-shaped structure were a result of anthropogenic dumping or an early combustion feature. Additional lines of evidence can clarify this interpretation by distinguishing between primary and secondary deposits (differentiate whether the charcoal and ash lenses are in situ or secondary deposits) and in doing so, provide additional information for what such an activity area can look like in Hawaiian kauhale.

The faunal remains identified from this unit show a reliance on sea urchin and the same species of mollusk as other kauhale (*Cypraea caputserpentis*, *Cellana spp., Drupa sp.*) but an increased reliance on mammal bone—specifically dog. All of the bones were fragmented and many were burnt, evidencing cooked meat.

The microartifacts that were identified mirror the array of artifacts recovered in excavation. Unit R8 had the least amount of microartifacts and the collection was dominated by charcoal as can be expected in a unit with a hearth. The assemblages in Units R9 and R10 are composed differently with higher densities of bone alongside the charcoal, particularly in Layer III and the ash/charcoal lens. There also appears to be either change in the cause of deposition through time, whether that is due to an initial fill event followed by daily household depositions, or slow build up over time as a result of multiple activities happening in this space. Each 5cm level displayed different densities of artifacts and the material assemblages changed. For example, basalt fragments dominate the artifact collection in the levels where the active floor is thought to be located around levels 3 and 4, but other artifacts like charcoal and coral form a larger percentage of the assemblage as depth increases. Changes in artifact assemblages with depth indicate the importance of horizontal control when excavating earthen floors that build up over time.

The sediment and soil sample analyses for the three contiguous units revealed similar patterns to the units north of the paving next to the first hearth that was excavated in 2010. The pH of the cultural layers was more basic than the off-site comparison and increased with depth (with the exception of Unit R10 which exhibits more fluctuation with depth). The organic carbon was inversely correlated with the pH, similar to Units R4 and R5. The percent of the organic carbon in Units R8, R9, and R10 also aligned with the levels measured in Units R4 and R5. Conversely the particle size distribution does not reflect the distributions seen in Units R4 and R5. Clay to fine sand size particles are more dominant in these samples, likely due to the finer sediment from the ash and charcoal lenses. Silt and clay do not appear to increase with depth, indicating less evidence of post-depositional pedogenic processes. Layer II in all three of the northern units exhibits the least constant distribution, evidencing the higher densities of micro- and macro-artifact content.

Figure 6.35: Photo of the east wall profile of Units R9 and R10 (left) and the south wall of R10 (right)

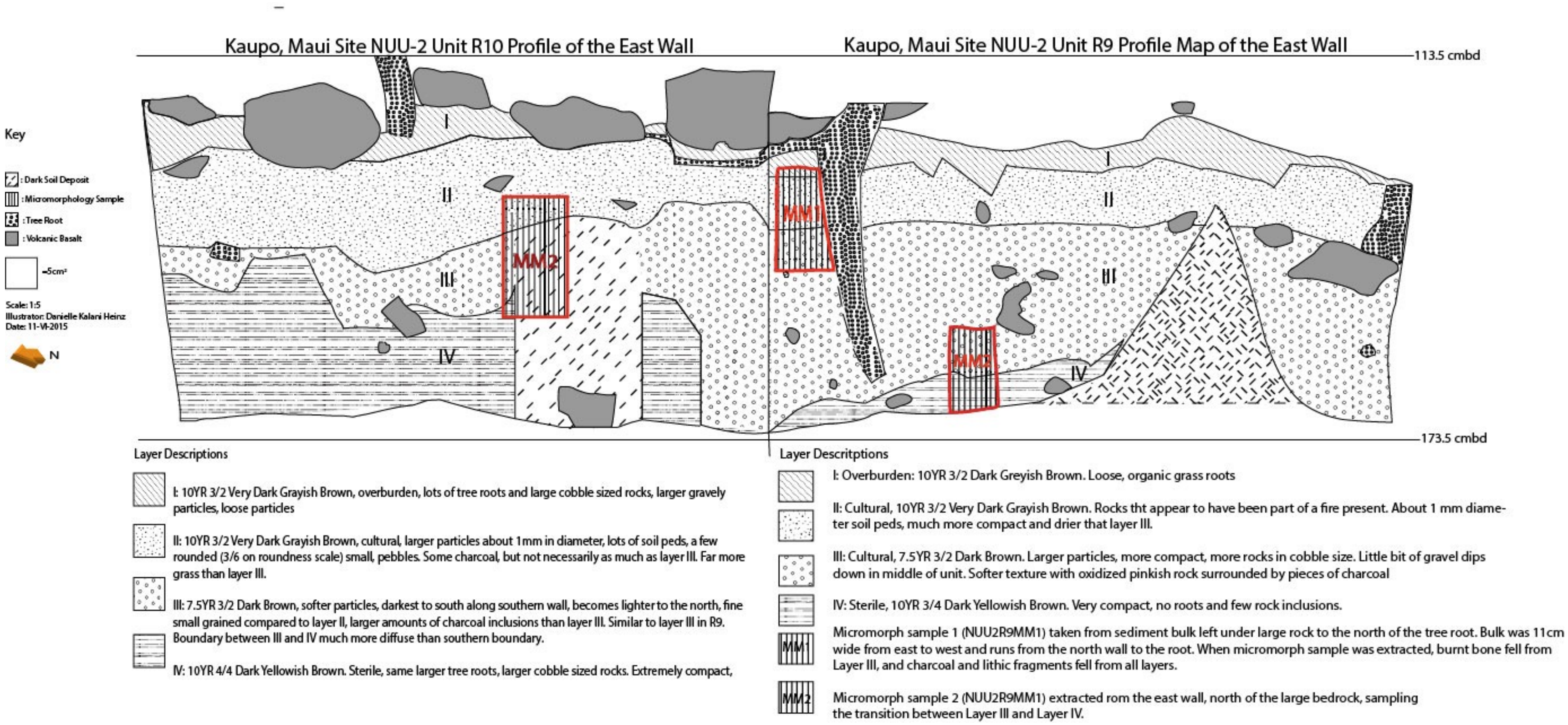


Figure 6.36: Profile map of the east wall of Unit R10 (left) and R9 (right), context descriptions, and locations of micromorphology samples.

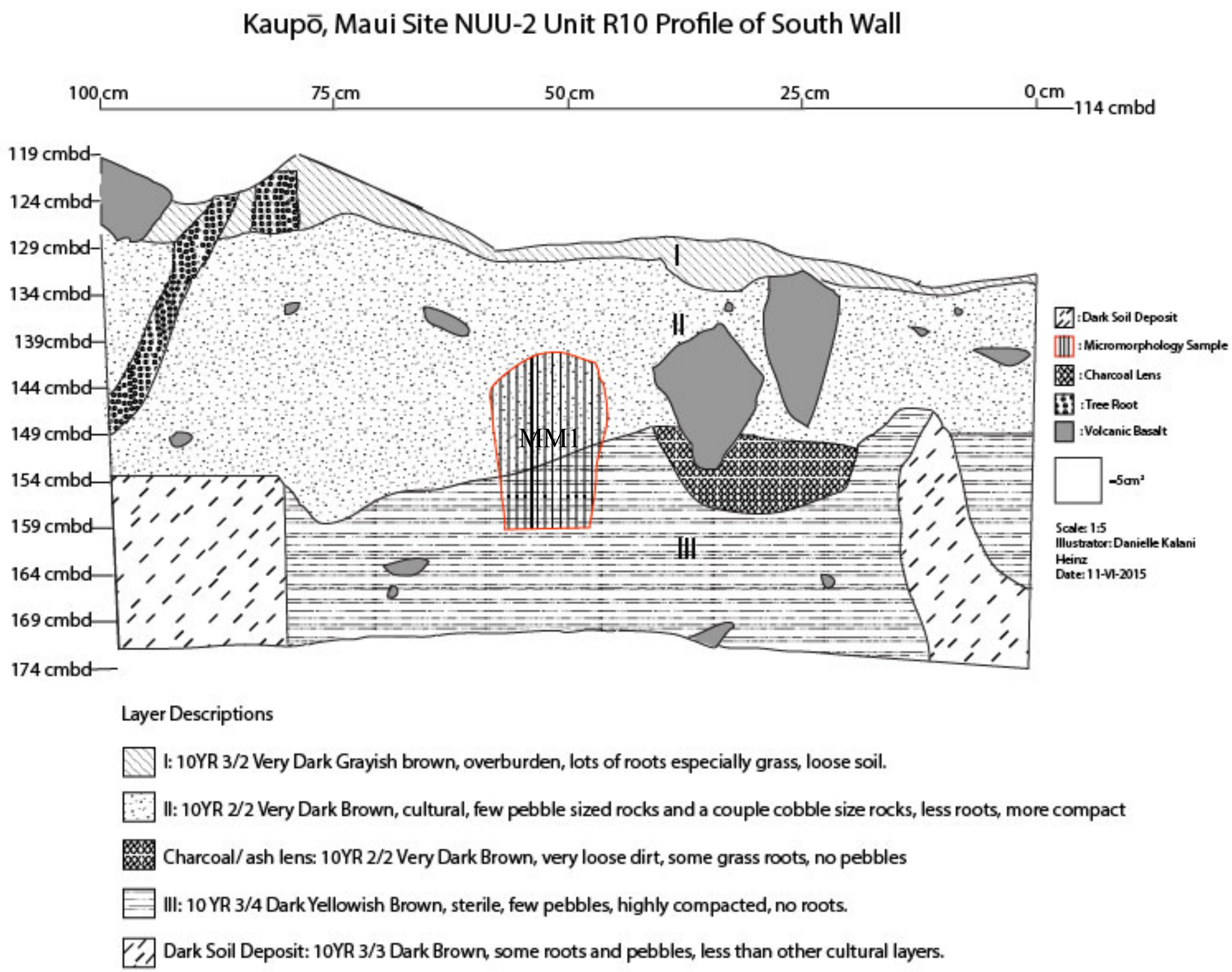


Figure 6.37: Profile map of the south wall of Unit R10 with context descriptions and location of the micromorphology sample.

Figure 6.38: Photographs of the unit profiles in Unit R9 and R10 that were not mapped. Left: Unit R10 North Wall. Right: Units R9 and R10 West Wall.


Figure 6:39: Photographs of combustion feature 1 in Units R8 and R9.

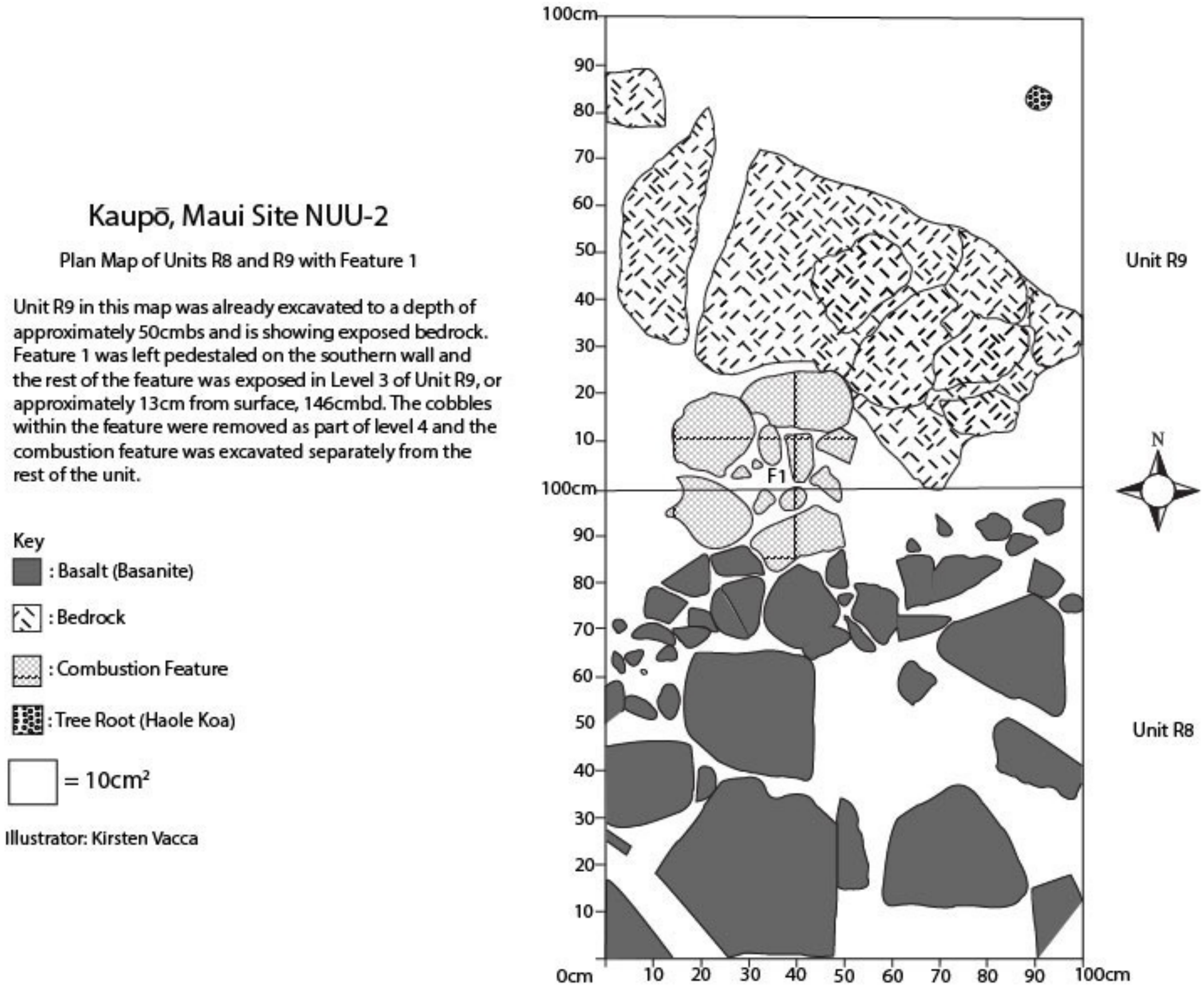


Figure 6.40: Plan map of Feature 1 and surrounding Units R8 and R9 with description of the feature.

Figure 6.41: View of NUU-2 facing south with units R10, R9, R8 (north to south) and Feature 1. Crew members are pointing at two combustion features—feature 1 in the foreground, excavated in 2016 and the second hearth excavated in 2010 in the background.

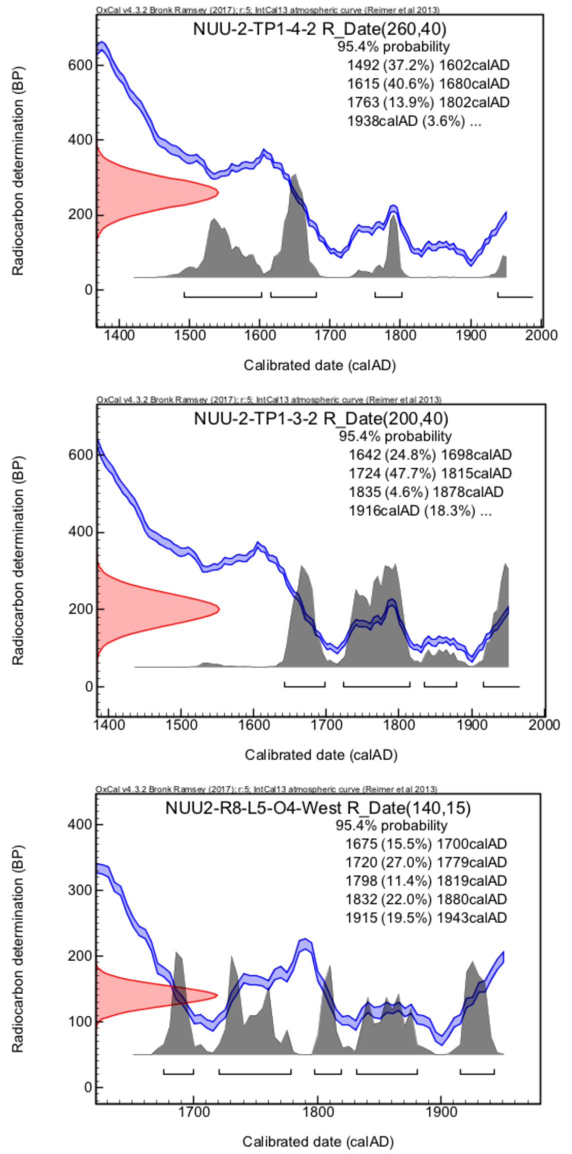
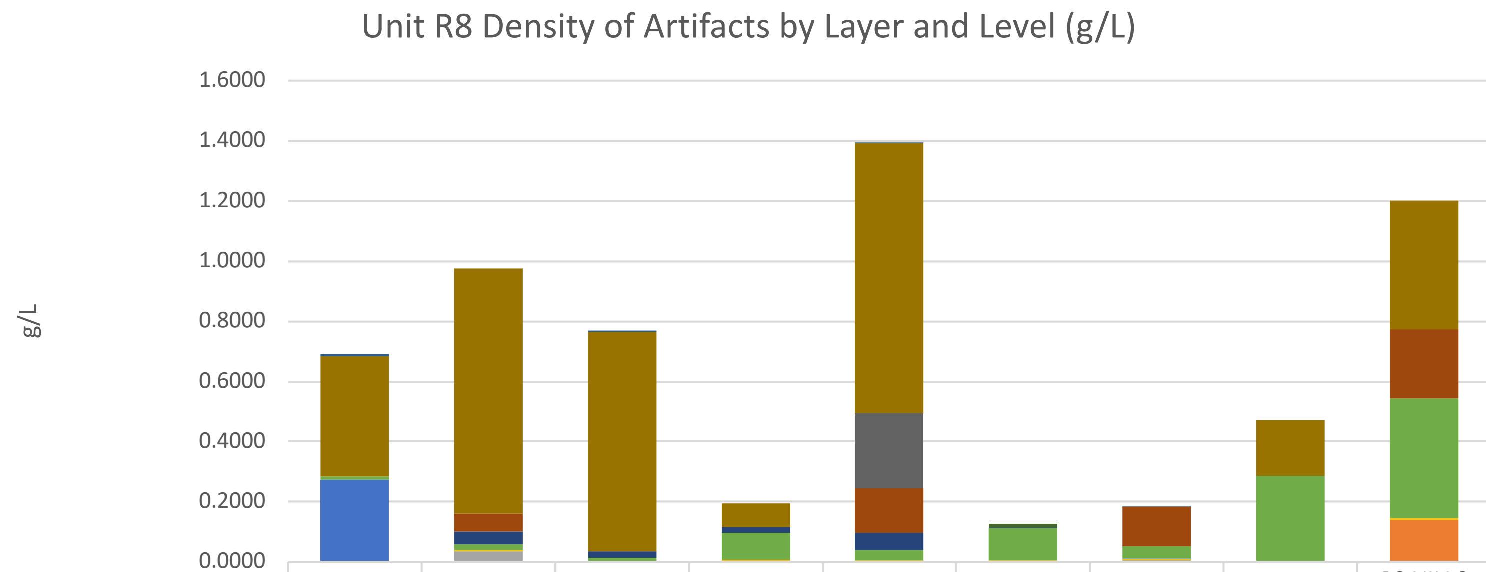
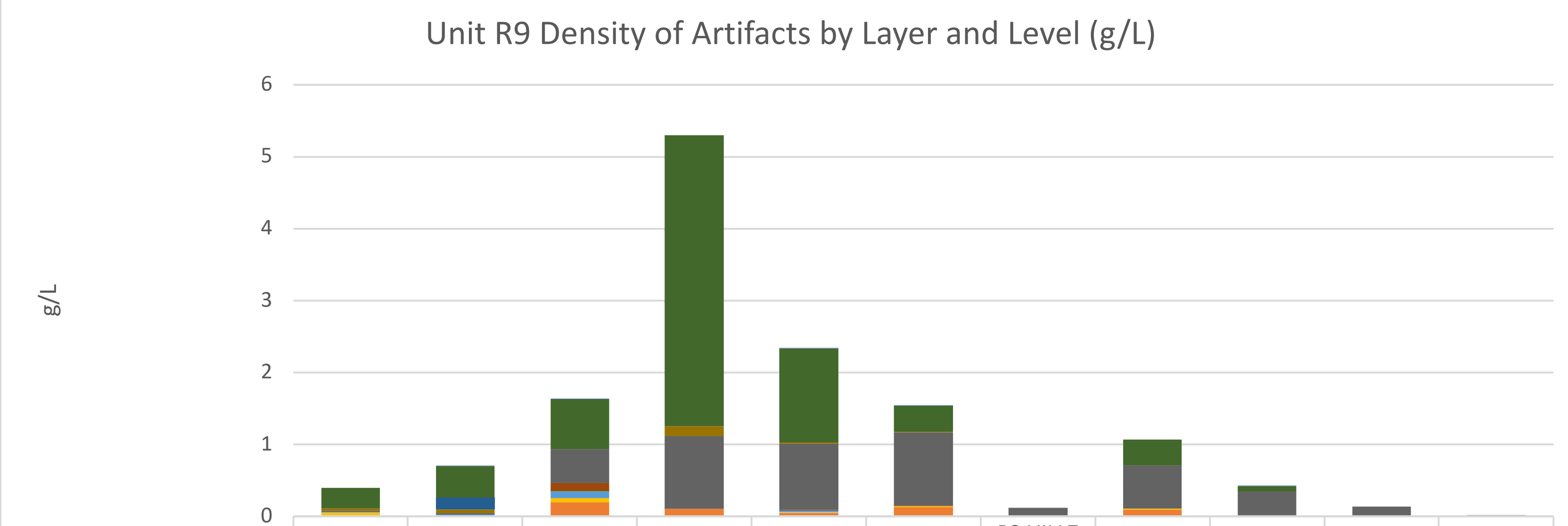


Figure 6.42: Radiocarbon dates for the 2010 units (top and center) and Unit R8 Level 5 (bottom).



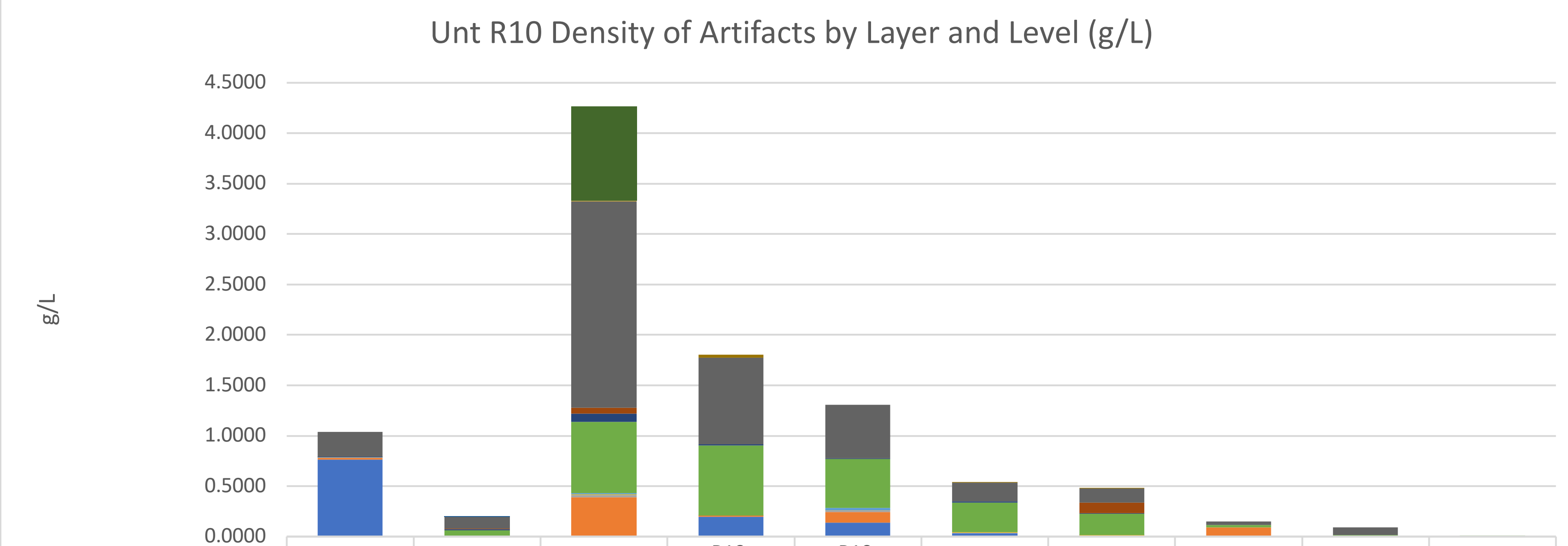
	R8 LI L1	R8 LII L2	R8 LII L3	R8 LII L4 E	R8 LII L4 W	R8 LII L5 E	R8 LII L5 W	R8 LIII L6 E	R8 LIII L6 W
Pumice						0.0143			
Volcanic Glass Debitage	0.0058		0.0034		0.0013		0.0011		
Basalt Debitage	0.4005	0.8154	0.7311	0.0782	0.8987			0.1849	0.4269
Fire-altered rock					0.2497				
Water-rolled rock		0.0584			0.1479		0.1315		0.2293
Raw Kukui Nut		0.0424	0.0206	0.0203	0.0579	0.0003	0.0002		
Charcoal	0.0100	0.0197	0.0135	0.0886	0.0337	0.1083	0.0398	0.2864	0.3994
Burnt Kukui Nut				0.0015			0.0037		
Bone Not Worked		0.0037		0.0063	0.0046	0.0003	0.0028		0.0053
Shell		0.0338				0.0041	0.0059		
Coral		0.0016			0.0010		0.0002		0.1395
‘Ili‘ili	0.2732								

Figure 6.43: Unit R8 graph of artifacts displayed as grams per liter of sediment excavated in each context



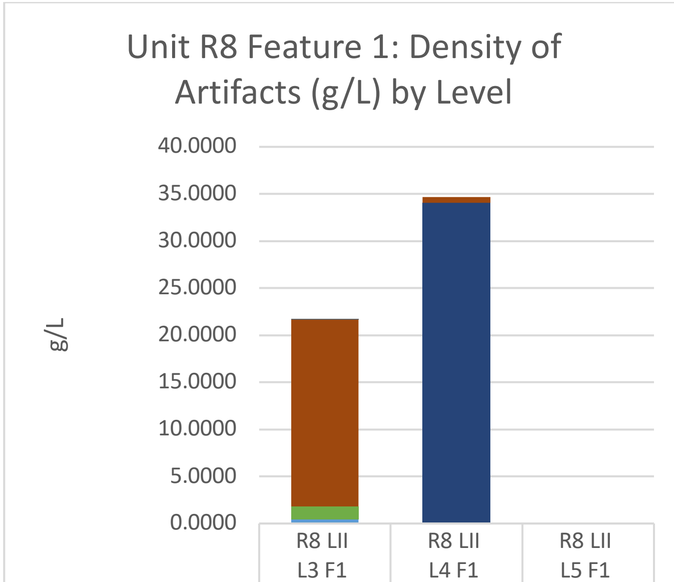
	R9 LI L1	R9 LII L2	R9 LII L3	R9 LII L4	R9 LIII L5	R9 LIII L6	R9 LIII L7 U.R.	R9 LIII L7	R9 LIII L8	R9 LIV L9	R9 LIV L10
Volcanic Glass Debitage		0.0008	0.0044		0.0019	0.0016			0.0001		
Basalt Debitage	0.2825	0.4411	0.7040	4.0442	1.3123	0.3587		0.3615	0.0762		
Water-rolled rock		0.1678									
Raw Kukui Nut	0.0331	0.0479		0.1326	0.0200	0.0093			0.0027		
Charcoal	0.0243	0.0152	0.4640	0.9961	0.9131	1.0201	0.1169	0.5891	0.3375	0.1372	0.0185
Burnt Kukui Nut			0.1136	0.0107	0.0104	0.0086		0.0012			
Bone Not Worked		0.0004	0.0017	0.0048	0.0013			0.0006	0.0030	0.0011	
Sea Urchin			0.0014								
Shell	0.0063	0.0181	0.0917	0.0020	0.0193	0.0001		0.0001	0.0005	0.0004	
Coral	0.0497		0.0608	0.0044	0.0095	0.0094		0.0242	0.0005		
Worked Bone				0.0020	0.0051						
‘Ili‘ili		0.0092	0.1963	0.0990	0.0470	0.1310		0.0875			
Volcanic Glass Debitage								0.0023			

Figure 6.44: Unit R9 graph of artifacts displayed as grams per liter of sediment excavated in each context



	R10 LI L1	R10 LI L2	R10 LII L3	R10 Charcoal Lens L4	R10 Charcoal Lens L5	R10 LIII L6	R10 LIII L7	R10 LIV L8	R10 LIV L9	R10 LIV L10
Worked Stone			0.9373							
Polished Stone		0.0005								
Volcanic Glass Debitage			0.0070	0.0290		0.0054	0.0013			
Basalt Debitage	0.2454	0.1207	2.0403	0.8574	0.5320	0.1897	0.1396	0.0391	0.0707	
Water-rolled rock		0.0034	0.0616				0.1038			
Raw Kukui Nut	0.0042	0.0151	0.0810	0.0120	0.0012	0.0100	0.0045			
Charcoal	0.0017	0.0541	0.7076	0.6969	0.4878	0.2935	0.2118	0.0195	0.0178	0.0103
Burnt Kukui Nut	0.0007	0.0012	0.0132		0.0207	0.0027	0.0014			
Bone Not Worked		0.0042	0.0011	0.0014	0.0023	0.0021	0.0022			
Shell	0.0038		0.0268	0.0005	0.0161	0.0075	0.0010		0.0004	0.0004
Coral	0.0197		0.3885	0.0091	0.1088		0.0112	0.0933		
ʻIliʻili	0.7632			0.1979	0.1354	0.0323				

Figure 6.45: Unit R10 graph of artifacts displayed as grams per liter of sediment excavated in each context



	R8 LII L3 F1	R8 LII L4 F1	R8 LII L5 F1
Volcanic Glass Debitage	0.0262		
Basalt Debitage	19.8495	0.5562	
Fire-altered rock		34.0048	
Raw Kukui Nut	1.3652		
Charcoal	0.3901	0.0778	
Bone Not Worked	0.0135	0.0004	0.0017
Shell	0.0241		
Coral	0.0106		
Bone Fishhook	0.0271		

Figure 6.46: Combustion Feature 1 graph of artifacts displayed as grams per liter of sediment excavated in each context

Unit	Feature	Level	Layer	Special	NISP	MNI	Weight (g)	Scientific Determination
R8		2	LII		5	2	2.07	Undetermined mollusk
R8	F1	3	LII		6	2	0.58	Undetermined mollusk
R8		5	II	Eastern Half	6	1	0.23	Undetermined mollusk
R8		5	II	Western Half	3	2	0.35	Undetermined mollusk
R9		1	LI		1	1	0.18	Undetermined mollusk
R9		1	LI		1	1	0.18	Undetermined mollusk
R9		2	LII		12		2.49	Undetermined mollusk
R9		2	LII		13	1	0.24	*Cellana* sp.
R9		2	LII		2	1	2.25	Undetermined mollusk
R9		3	LII		143	1	6.37	*Cellana sandwicensis*
R9		3	LII		3	1	0.28	Undetermined mollusk
R9		3	LII		1	1	0.69	*Cypraea caputserpentis*
R9		3	LII		1	1	4.8	*Cypracidae spp.*
R9		3	LII		1	1	0.24	cf. *Phenacolepas granocostata*
R9		3	LII		6	1	0.19	Sea urchin test any species
R9		4	LII		2	2	0.28	*Cypraea caputserpentis*
R9		5	LIII		1	1	3.11	Undetermined mollusk
R9		5	LIII		1	1	3.11	Undetermined mollusk
R9		6	LIII		3	1	0.02	Undetermined mollusk
R9		7	LIII		1	1	0.01	Undetermined mollusk
R9		8	LIII		1	1	0.08	Undetermined mollusk
R9		9	IV		1	1	0.02	*Cellana* sp.
R10		1	I		8	1	0.37	Undetermined mollusk
R10		3	II		2	1	0.78	*Cypraea caputserpentis*
R10		3	II		7	1	0.74	Undetermined mollusk
R10		4	Charcoal Lens		4	1	0.05	Undetermined mollusk
R10		5	Charcoal Lens		28	1	1.69	Undetermined mollusk
R10		6	LIII		1	1	0.29	cf. *cellana* sp.
R10		6	LIII		13	1	0.51	cf. *cypraea* sp.
R10		7	LIII		6	1	0.15	Undetermined mollusk
R10		9	LIV		3	1	0.13	cf. *cellana* sp.
R10		10	LIV		1	1	0.05	Undetermined mollusk

Table 6.11: NISP, MNI, Weight, and identification of shell and sea urchin species from Units R8, R9, and R10.

Unit	Fe.	Level	Layer	Special	NISP	MNI	Weight (g)	Scientific Determination	Comments
R8		2	II		4	1	0.23	general undetermined bone	Four fragments of NID bone
R8	F1	3	II		4	1	0.32	Medium mammal	Three fragments from different bones
R8		4	II	Eastern Half	6	1	0.1	cf. Undetermined bird	NID highly fragmented pieces
R8		4	II	Eastern Half	2	1	0.26	*Elasmobranchii* (ray/shark)	Teeth, burnt
R8		4	II	Western Half	17	1	0.28	Undetermined Mammal	NID burnt fragments
R8	F1	4	II		2	1	less than 0.01	general undetermined bone	NID tiny fragments
R8		5	II	Western Half	4	1	0.17	Undetermined Mammal	cf. tooth
R8		5	II	Eastern Half	7	1	0.02	Undetermined fish	NID, highly fragmented
R8	F1	5	II		7	1	0.04	cf. Undetermined bird	NID fragments
R8		6	III	Western Half	6	1	0.05	general undetermined bone	NID fragments
R9		1	I	General Wall Fall	1	1		Medium mammal	Possibly dog bone
R9		1	I	General Wall Clean	7	1	0.0163	general undetermined bone	Highly degraded, calcified
R9		2	II		2	1	0.06	general undetermined bone	NID fragments, pos. fish
R9		3	II		2	1	0.08	Medium mammal	NID fragments
R9		3	II		1	1	0.1	Small mammal	cf. Pacific rat
R9		3	II		2	1	0.06	Undetermined Mammal	NID fragments
R9		4	II		13	1	1.05	Medium mammal	NID highly fragmented bone, some pieces broke after excavation
R9		4	II		1	1	0.27	general undetermined bone	Bone broken in half but parts easily fit together. Appears to be worked
R9		5	III		4	1	0.21	general undetermined bone	Fragments of different bones
R9		5	III		2	1	0.82	general undetermined bone	Small pieces that appear to be worked in the middle
R9		7	III		3	1	0.09	Undetermined Mammal	NID fragments from same bone
R9		8	III		1	1	<0.01	general undetermined bone	NID fragment, broken after collection
R9		8	III		3	1	0.48	Medium mammal	NID fragments from same bone
R9		9	IV		1	1	0.05	*Elasmobranchii* (ray/shark)	One tooth

Table 6.12: NISP, MNI, weight, and identification of bone fragments from Units R8, R9, and R10.

Unit	Fe.	Level	Layer	Special	NISP	MNI	Weight (g)	Scientific Determination	Comments
R9		9	IV		1	1	0.01	general undetermined bone	NID fragment, has broken into 3 pieces since collection
R9				Wall Fall from Micromorph Sample	1	1	0.02	general undetermined bone	
R9				Wall Fall NE	1	1	0.58	Medium mammal	Burnt bone, appears to be worked
R10		2	I		3	1	0.4	Medium mammal	Possible fragments of long bones
R10		3	II		1	1	0.06	Dog	cf. tooth
R10		4	Charcoal Lens		22	1	0.15	general undetermined bone	Recent breaks, likely happened in transport. Part of same bone
R10		5	Charcoal Lens		5	1	0.06	Undetermined fish	NID Fragments
R10		5	Charcoal Lens		1	1	0.04	general undetermined bone	NID fragment
R10		5	Charcoal Lens		4	1	0.14	Undetermined Mammal	NID broken small fragments
R10		6	III		4	1	0.23	Dog	Distal metapodial canine and other bone fragments
R10		7	III		3	1	0.24	Dog	Cranial bone
R10		1 to 10		General Wall Clean	1	1	0.02	general undetermined bone	NID fragment

Table 6.12 Continued.

Unit	Layer	Level	Feature	Artifact Size	Item Type	Item Count	Item Weight (g)
R8	I	1		≥6.3mm	modern flora	2	0.2567
R8	I	1		1mm-2mm	Charcoal	2	0.0012
R8	I	1		1mm-2mm	Modern Flora		6.585
R8	I	1		1mm-2mm	Shell	3	0.0036
R8	I	1		2mm-4mm	Charcoal	1	0.0098
R8	I	1		2mm-4mm	modern flora	0	1.8991
R8	I	1		2mm-4mm	lithic debitage	4	0.166
R8	I	1		2mm-4mm	seeds	15	0.2159
R8	I	1		4mm-6.3mm	modern flora	38	0.8357
R8	I	1		4mm-6.3mm	lithic debitage	2	0.2704
R8	II	3		0.5mm-2mm	Charcoal	4	0.018
R8	II	3		0.5mm-2mm	lithic	1	0.007
R8	II	3		0.5mm-2mm	wood	70	0.026
R8	II	3		2mm-4mm	lithic debitage	4	0.099
R8	II	3		2mm-4mm	wood	1	0.005
R8	II	3		4mm-6.3mm	lithic debitage	1	0.124
R8	II	4	1	≥6.3mm	Fire cracked rock	4	10.3513
R8	II	4	1	2mm-4mm	Charcoal	4	0.0482
R8	II	4	1	2mm-4mm	Modern Flora	3	0.003
R8	II	4	1	2mm-4mm	lithic debitage	10	0.2093
R8	II	4	1	4mm-6.3mm	Fire cracked rock	1	0.0786
R8	II	4	1	4mm-6.3mm	lithic debitage	4	0.5474
R8	II	4		≥6.3mm	Charcoal	1	0.0651
R8	II	4		2mm-4mm	Charcoal	1	0.0086
R8	II	4		2mm-4mm	contemporary organic material	8	0.0093
R8	II	5		≥6.3mm	Charcoal	1	0.201
R8	II	5		2mm-4mm	Charcoal	10	0.1284
R8	II	5		2mm-4mm	Modern Flora	3	0.0063
R8	II	5		2mm-4mm	lithic debitage	6	0.1651
R8	II	5		4mm-6.3mm	Charcoal	4	0.0709
R8	II	5		4mm-6.3mm	Modern Flora	2	0.0313
R8	II	5		4mm-6.3mm	lithic debitage	3	0.2654
R8	III	6		2mm-4mm	Modern Flora	2	0.0157

Table 6.13: Unit R8 microartifact size, type, count, and weight.

Unit	Layer	Level	Artifact Size	Item Type	Count	Weight (g)
R9	I	1	≥6.3mm	lithic debitage	1	0.5294
R9	I	1	≥6.3mm	Plant material	1	0.0332
R9	I	1	1mm-2mm	Shell	3	0.0018
R9	I	1	2mm-4mm	Charcoal	2	0.0093
R9	I	1	2mm-4mm	Goat dung	1	0.0225
R9	I	1	2mm-4mm	lithic debitage	3	0.1144
R9	I	1	2mm-4mm	Plant material	0	0.3603
R9	I	1	2mm-4mm	seeds	1	0.0185
R9	I	1	4mm-6.33mm	lithic debitage	2	0.3284
R9	I	1	4mm-6.33mm	Plant material	7	0.3308
R9	I	1	4mm-6.33mm	Archaic seed		0.0114
R9	I	1	4mm-6.33mm	Charcoal		0.0582
R9	I	1	4mm-6.33mm	Plant material		0.4428
R9	I	1	4mm-6.33mm	seeds		0.0232
R9	II	2	≥6.3mm	lithic debitage	1	0.716
R9	II	2	0.5mm-2mm	Charcoal	65	0.0548
R9	II	2	0.5mm-2mm	lithic debitage	22	0.0597
R9	II	2	0.5mm-2mm	Shell	1	0
R9	II	2	0.5mm-2mm	Un ID/ Bone	5	0.0007
R9	II	2	0.5mm-2mm	wood	45	0.0444
R9	II	2	2mm-4mm	Charcoal	2	0.0152
R9	II	2	2mm-4mm	lithic debitage	9	0.23
R9	II	2	2mm-4mm	wood	3	0.0128
R9	II	2	4mm-6.3mm	lithic debitage	1	0.0997
R9	II	2	4mm-6.3mm	wood	1	0.035
R9	II	3	≥6.3mm	Charcoal	1	0.1109
R9	II	3	2mm-4mm	Charcoal	7	0.0399
R9	II	3	2mm-4mm	lithic debitage	23	0.4335
R9	II	3	2mm-4mm	Unidentified Flora	19	0.0574
R9	II	3	4mm-6.3mm	lithic debitage	8	0.9934
R9	II	3	4mm-6.3mm	Unidentified Flora	4	0.0711
R9	II	4	≥6.3mm	lithic debitage	1	0.366
R9	II	4	2mm-4mm	Burnt Kukui Nut	2	0.0245
R9	II	4	2mm-4mm	Charcoal	24	0.2444
R9	II	4	2mm-4mm	lithic debitage	5	0.1251
R9	II	4	2mm-4mm	Modern Flora	3	0.0008
R9	II	4	4mm-6.3mm	Charcoal	2	0.1566
R9	III	5	0.5mm-2mm	burnt bone	1	0.0002
R9	III	5	0.5mm-2mm	Charcoal		0.3531
R9	III	5	0.5mm-2mm	unburnt bone	11	0.0123
R9	III	5	2mm-4mm	Charcoal	30	0.3017
R9	III	5	2mm-4mm	unburnt bone	2	0.0072
R9	III	5	4mm-6.3mm	Charcoal	3	0.1475
R9	III	6	≥6.3mm	Charcoal	1	0.1207
R9	III	6	≥6.3mm	lithic debitage	2	0.4521

Table 6.14: Unit R9 microartifact sizes, counts, weights, and types.

Unit	Layer	Level	Artifact Size	Item Type	Count	Weight (g)
R9	III	6	2mm-4mm	Charcoal	1	0.1857
R9	III	6	2mm-4mm	lithic debitage	14	0.2355
R9	III	6	4mm-6.3mm	Charcoal	6	0.1402
R9	III	6	4mm-6.3mm	lithic debitage	2	0.107
R9	III	7	2mm-4mm	Bone (bird?)	1	0.0053
R9	III	7	2mm-4mm	lithic debitage	2	0.0179
R9	III	7	2mm-4mm	Modern Flora	3	0.0085
R9	III	7	4mm-6.3mm	lithic debitage	1	0.146
R9	III	8	≥6.3mm	Charcoal	5	1.3457
R9	III	8	≥6.3mm	lithic debitage	2	3.6031
R9	III	8	2mm-4mm	burnt bone	1	0.0141
R9	III	8	2mm-4mm	Burnt Shell	1	0.0039
R9	III	8	2mm-4mm	Charcoal	58	0.4373
R9	III	8	2mm-4mm	lithic debitage	12	0.1993
R9	III	8	2mm-4mm	Unidentified Flora	3	0.0006
R9	III	8	4mm-6.3mm	Charcoal	11	0.4369
R9	III	8	4mm-6.3mm	lithic debitage	3	0.4955

Table 6.14 continued.

Unit	Layer	Level	Artifact Size	Item Type	Count	Weight (g)
R10	II	3	0.5mm-1mm	Bone	11	0.004
R10	II	3	0.5mm-1mm	Charcoal	241	0.0571
R10	II	3	0.5mm-1mm	Insect remains/feces	26	0.0038
R10	II	3	0.5mm-1mm	lithic debitage	135	0.0827
R10	II	3	0.5mm-1mm	Modern Flora	0	0.0633
R10	II	3	0.5mm-1mm	Shell/Coral	6	0.0019
R10	II	3	0.5mm-1mm	Unknown Mineral	59	0.0406
R10	II	3	0.5mm-1mm	Volcanic Glass	26	0.0224
R10	II	3	1mm-2mm	Bone	7	0.0108
R10	II	3	1mm-2mm	Charcoal	108	0.2093
R10	II	3	1mm-2mm	Insect remains/feces	6	0.0038
R10	II	3	1mm-2mm	lithic debitage	155	0.6029
R10	II	3	1mm-2mm	Quartz	1	0.0021
R10	II	3	1mm-2mm	Shell	1	0.0071
R10	II	3	1mm-2mm	Unidentified Flora	0	0.0591
R10	II	3	1mm-2mm	Unknown Minerals	5	0.0244
R10	II	3	1mm-2mm	Volcanic Glass	9	0.026
R10	II	3	2mm-4mm	Charcoal	7	0.0485
R10	II	3	2mm-4mm	lithic debitage	22	0.6138
R10	II	3	2mm-4mm	wood	1	0.036
R10	II	3	4mm-6.3mm	lithic debitage	4	0.7109
R10	Charcoal Lens	5	0.5mm-1mm	Bone	4	0.0019
R10	Charcoal Lens	5	0.5mm-1mm	Charcoal	260	0.0678
R10	Charcoal Lens	5	0.5mm-1mm	Modern Flora	0	0.0262

Table 6.15: Unit R10 microartifacts with size, count, weight and type.

Unit	Layer	Level	Artifact Size	Item Type	Count	Weight (g)
R10	Charcoal Lens	5	0.5mm-1mm	lithic debitage	178	0.0957
R10	Charcoal Lens	5	0.5mm-1mm	Quartz	1	0.0006
R10	Charcoal Lens	5	0.5mm-1mm	Shell	1	0
R10	Charcoal Lens	5	0.5mm-1mm	Unknown Seed?	8	0.0017
R10	Charcoal Lens	5	0.5mm-1mm	Volcanic Glass	3	0.003
R10	Charcoal Lens	5	0.5mm-2mm	Charcoal		0.0082
R10	Charcoal Lens	5	0.5mm-2mm	unburnt bone	2	0.003
R10	Charcoal Lens	5	0.5mm-2mm	Volcanic Glass	9	0.0169
R10	Charcoal Lens	5	1mm-2mm	cf. Bone	5	0.0061
R10	Charcoal Lens	5	1mm-2mm	cf. Burnt bone	4	0.0058
R10	Charcoal Lens	5	1mm-2mm	Charcoal	0	0.1673
R10	Charcoal Lens	5	1mm-2mm	lithic debitage	112	0.3124
R10	Charcoal Lens	5	1mm-2mm	Unknown Organics	75	0.0337
R10	Charcoal Lens	5	2mm-4mm	Charcoal	11	0.0503
R10	Charcoal Lens	5	2mm-4mm	lithic debitage	20	0.3445
R10	Charcoal Lens	5	4mm-6.3mm	lithic debitage	1	0.0989
R10	III	6	0.5mm-2mm	Charcoal	1	0.0002
R10	III	6	0.5mm-2mm	Volcanic Glass	1	0.0007
R10	III	7	0.5mm-2mm	burnt bone	2	0.0001
R10	III	7	0.5mm-2mm	Charcoal	5	0.6257
R10	III	7	0.5mm-2mm	Shell	5	0.0001
R10	III	7	0.5mm-2mm	unburnt bone	29	0.0123
R10	III	7	0.5mm-2mm	Volcanic Glass	1	0.0004
R10	III	7	2mm-4mm	Charcoal	2	0.402
R10	III	7	2mm-4mm	unburnt bone	4	0.0316
R10	III	7	4mm-6.3mm	Charcoal	3	0.1375
R10	IV	9	2mm-4mm	Modern Flora	1	0.0033
R10	IV	10	2mm-4mm	wood	2	0.019
R10	IV	10	4mm-6.3mm	wood	3	0.0064

Table 6:15 continued.

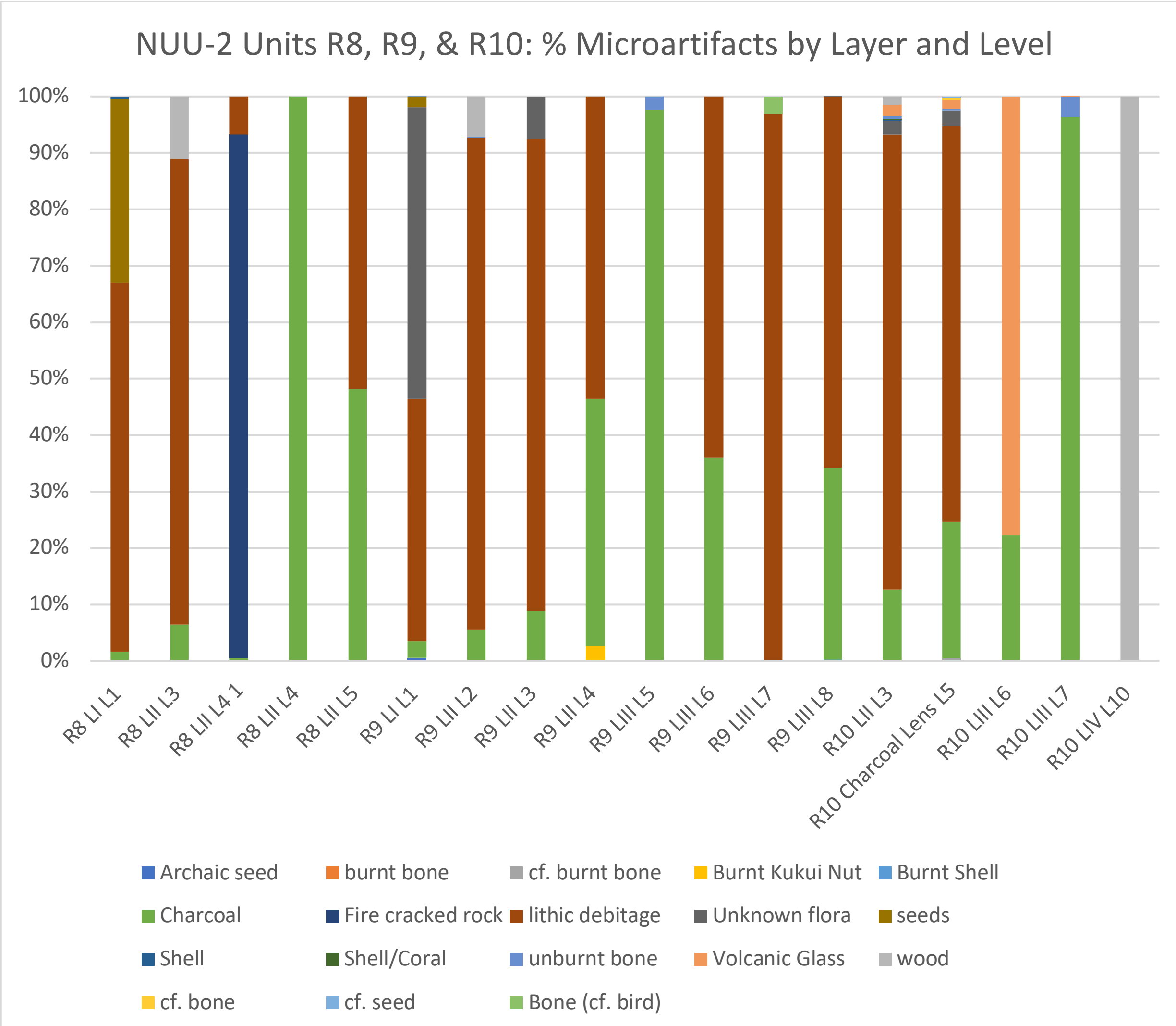


Figure 6.47: Graph comparing total microartifacts by unit, layer and level in Units R8, R9, and R10.

Site/Layer/Level/Sample	pH	% Organic Carbon	Particle Size Distribution <0.063	0.063	0.125	0.25	0.5	1	2	4	6.3
R8 LI L1 SS1			3.7	14.36	29.4	50.52	70.72	83.78	91.7	95.58	100.54
R8 LII L3 SS1	5.71	19.9312	4.68	11.48	19.76	28.76	56.46		85.04	90.06	100.14
R8 LII L4 F1 SS1	6.23	19.5055	7.34	17.68	29.02	39.82	46.92	55.96	72.42	78	99.94
R8 LII L4 SS1	6.14	16.4738	4.9	16.2	29.9	43.02	53.44	67.92	95.16	99.72	100.68
R8 LII L5 SS1	6.24	19.1014	5.66	19.1	34.34	48.94	58.92	71.4	93.56	98.57	100.32
R8 LIII L6 SS1	6.31	15.6784	10	27.12	45.52	63.74	76	84.44	94	96.7	100.88
R9 LI L1 SS1	5.70	33.6650	9.68	27.86	48.15	64.48	74.64	84.48	89.79	92.28	100.56
R9 LII L2 SS1	5.86	22.1808	9.34	20.62	34.02	46.12	66.82		82.44	85.82	99.48
R9 LII L3 SS1	5.84	22.4739	5.97	19.13	32.43	44.77	57.19	73.33	89.44	93.26	100.41
R9 LII L4 SS1	5.90	21.8503	13.24	29.22	44.44	56.9	62.96	71.82	88.66	92.3	100.42
R9 LIII L5 SS1	5.73	19.1716	11.52	33.1	53.03	67.8	81.27		92.95	96.64	99.76
R9 LIII L6 SS1	6.02	17.6500	11.99	38.4	62.34	80.59	87.04	91.77	97.91	99.02	99.93
R9 LIII L7 SS1	6.37	16.8129	8.33	24.2	41.87	60.15	69.16	78.13	86.79	91.05	100.51
R9 LIII L8 SS1	6.29	19.6976	6.42	28.02	47.47	62.39	69.34	74.11	77.59	79.24	99.88
R9 LIV L9SS1	6.42	16.1475	14.28	35.8	56.62	74.12	86.5	93.96	99	100.5	100.48
R9 LIV L10 SS1			38.59	61.36	85.21	97.66	98.15	98.35	98.43	98.94	100
R10 LI L1 SS1		43.2265	5.56	24.32	49.22	72.28	93.64		99.36	100.5	100.94
R10 LII L3 SS1	5.86	21.6457	10.2	20.68	32.07	41.92	51	69.44	91.39	94.15	101.46
R10 Charcoal Lens L5 SS1	6.22	14.9727	5.88	20.05	35.94	52.21	74.93		92.17	95.44	100.14
R10 Charcoal Lens L5 SS4	5.90	17.4710	12.99	32.88	54.87	75.7	81.25	87.81	96.73	99.1	99.36
R10 LIII L6 SS1	6.21	15.0509	8.48	26.16	46.26	68.58	86.74		92.8	93.14	100.32
R10 LIII L7 SS1	6.31	15.4359	8.24	22.96	38.86	54.28	77.7		96.56	96.9	98.76
R10 LIII L7 SS4	5.86	17.4474	10.23	33.2	56.84	74.8	89.51		95.54	98.67	100.3
R10 LIV L9 SS1		14.8114	8.59	23.31	37.08	50.47	61.97	71.77	81.77	87.66	100.14
R10 LIV L10 SS1	6.37	14.6343	13.44	28.29	40.98	52.54	64.95	75.83	87.47	93.04	99.86
NUU2 OFFSITE 1	5.28	40.6833	5.28	20.01	37.66	51.1	60.62	70.51	80.42	85.32	98.66

Table 6.16: Sediment sample context and results from Units R8, R9, and R10

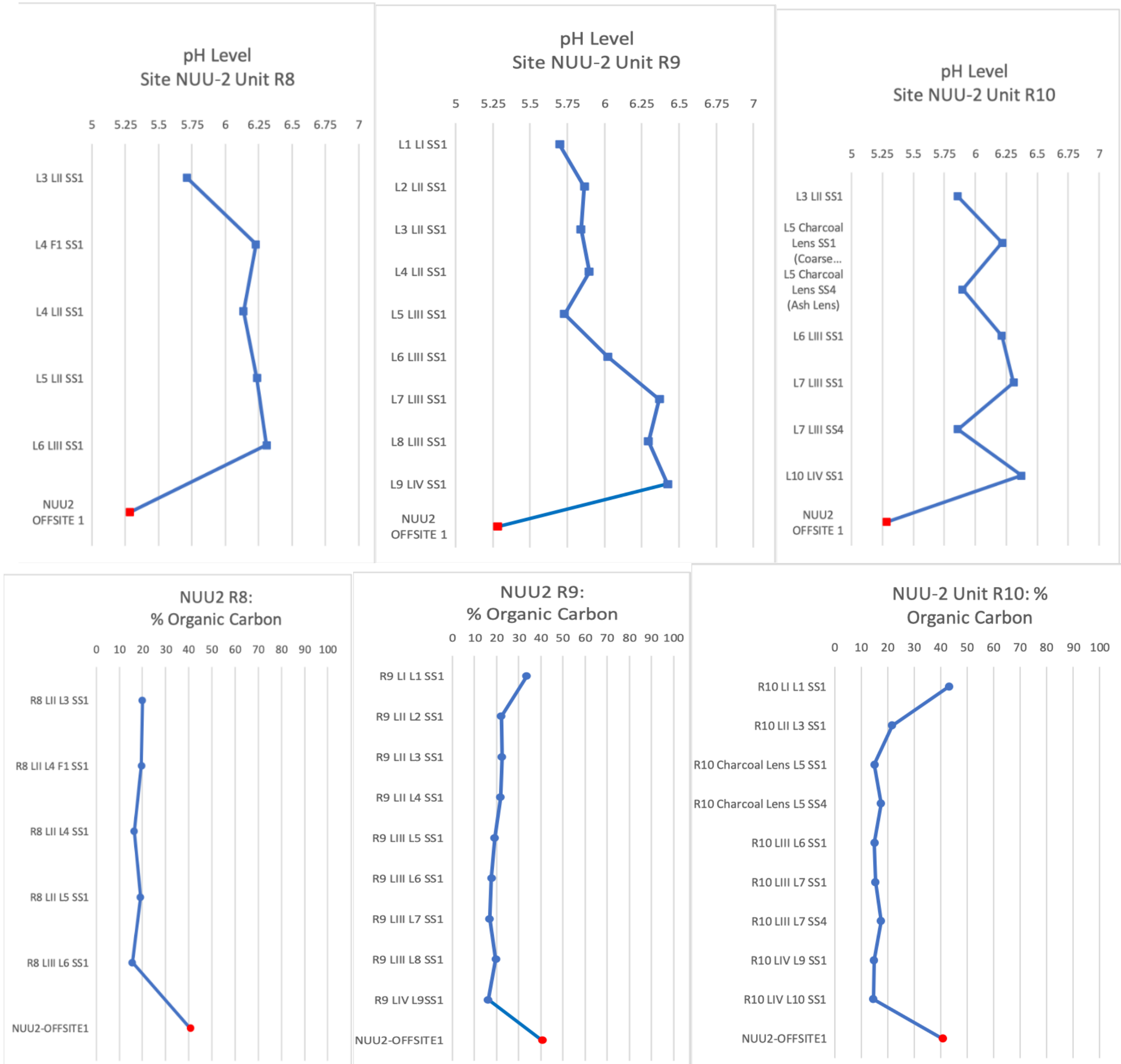


Figure 6.47: Levels of pH and Organic Carbon in the bulk samples from Units R8, R9, and R10 and notably different off-site samples showing anthropogenic deposits in the units

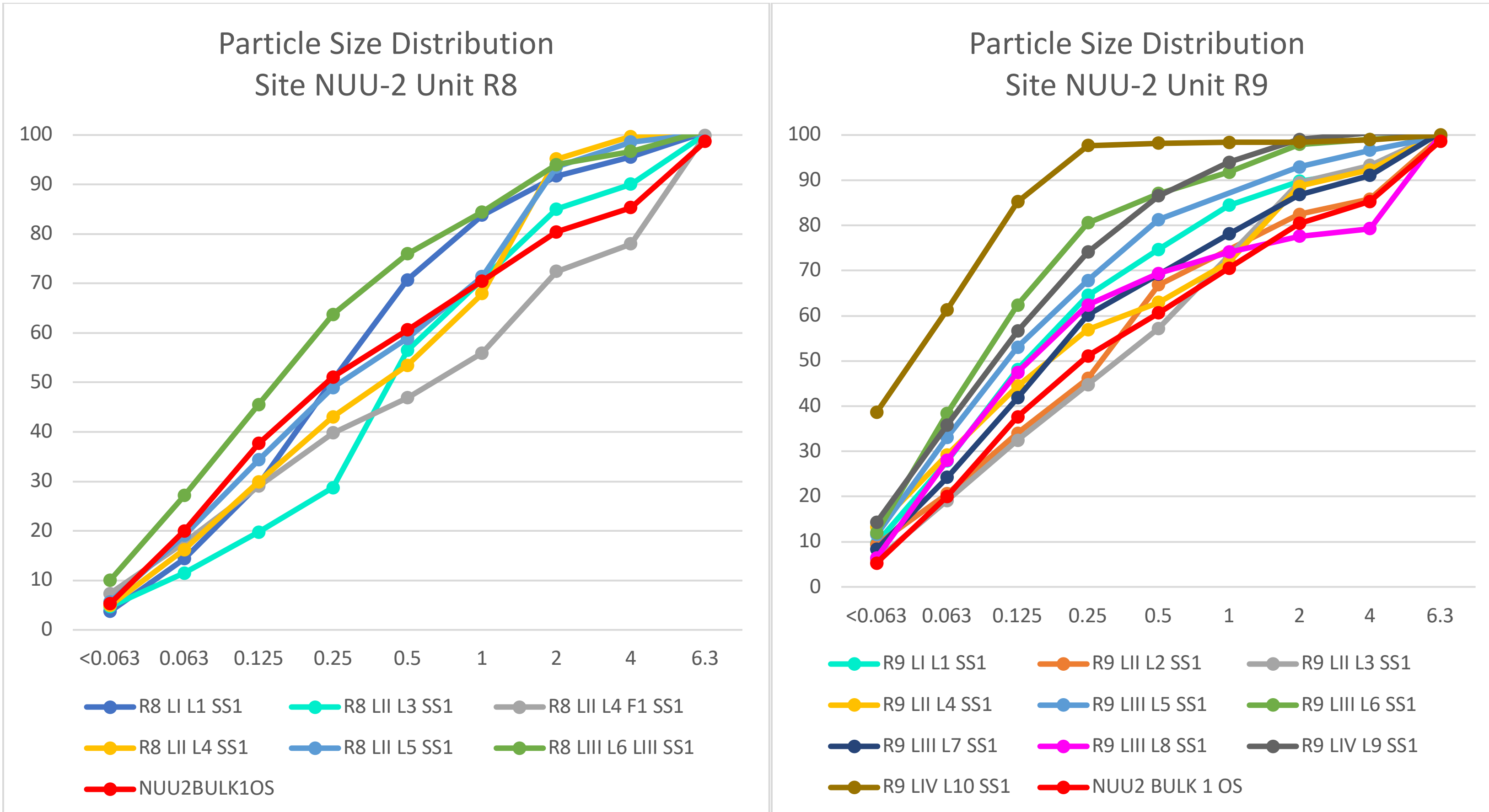


Figure 6.48: Particle size distribution data from Units R8 (left) and R9 (right) bulk samples.

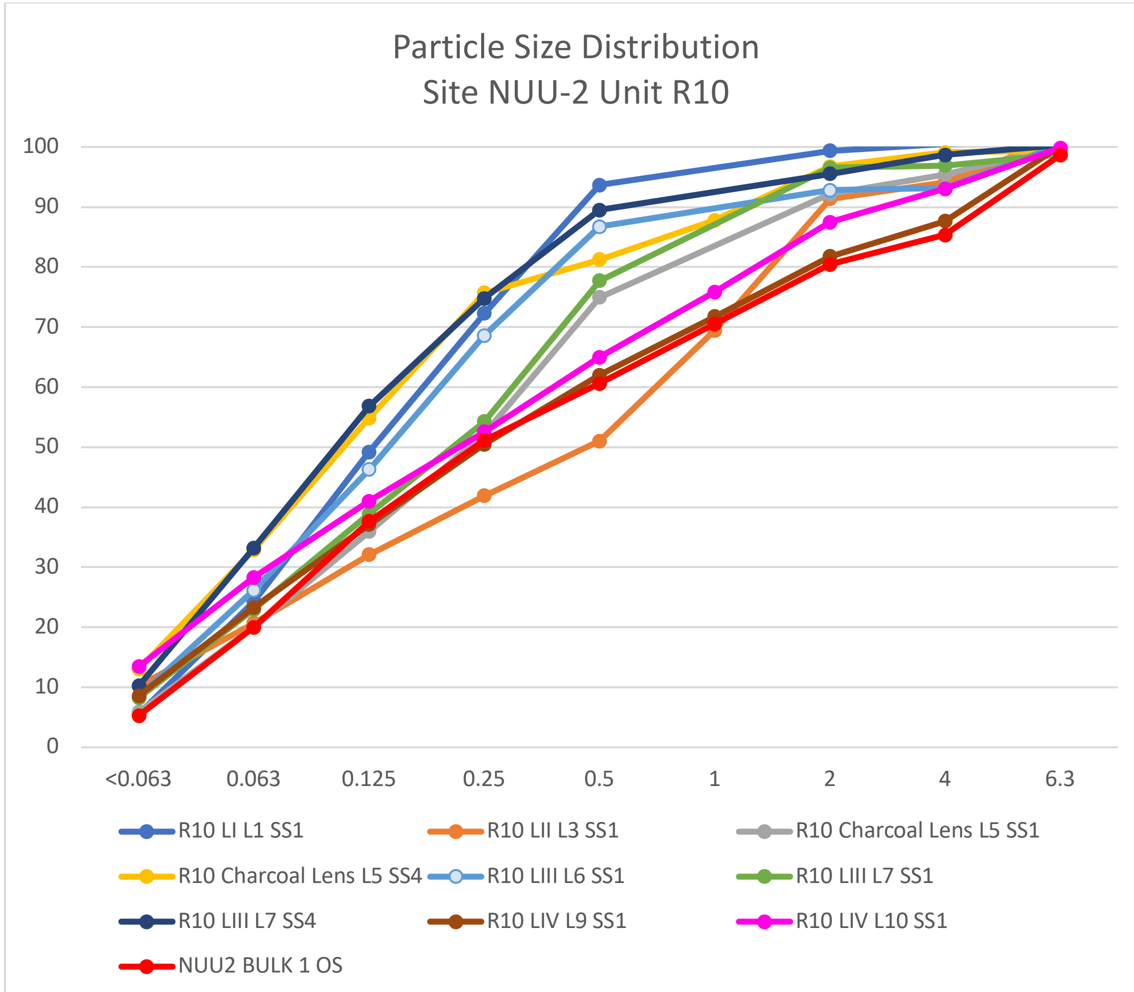


Figure 6.49: Particle size distribution data from Unit R10 bulk samples.

Micromorphology

The characteristics of the microfacies in the micromorphology samples from NUU2 Unit R9 show that aggregates dominated the sediment matrix, with inclusions of olivine basalt and other minerals bound by clay particles. In sample NUU2R9MM1, the dominant coarse fraction in the top bed is basanite basalt (originating from the bedrock parent material that dominates the flow in the region). Both spherical rounded basalt and cylindrical subrounded to angular basalt is present. The spherical basalt appears within the soil peds, which suggests that it is inherited with the peds, while the cylindrical subrounded and angular basalt appears as lithic debitage outside of soil peds. Aside from the debitage, there are also charcoal and plant inclusions within the coarse fraction. The anthropogenic material is randomly arranged at the top of the bed, and oblique orientation within the boundary between bed 1 and bed 2. The minerals embedded in Bed 1show signs of weathering that include clay coating around 90% of the coarse fraction. Olivine showed varying degrees of pellicular, irregular, linear and complex alterations. The related distribution between coarse and fine fraction in Bed 1 was coarse, single-spaced enaulic, with a c/f ratio of 20/80. The peds in this bed can be described as a mixture of granules and crumbs, with a smaller percentage of sub-angular and rounded peds that are broken up by planar voids. These details combined suggest certain depositional and post-depositional events. The random arrangement of peds and large fraction indicates deposition through anthropogenic means (gravity). The fracturing of the peds indicates trampling post-deposition and the weathering of the coarse fraction suggests that the material sat on the surface for a longer period of time.

The boundary between the first and second bed in the micromorphology sample NUU2R9MM1 is diffuse and wavy. Throughout this diffuse boundary appears plant material. This plant material takes the form of deteriorating tissue and the important boundaries between microfacies seen in the thin sections from samples NUU2R9MM1 shows a distinction between layers II and III (beds 1 and 2 in the thin section description) that is more diffuse and occluded than that observed in the field.

The thin section from the NUU2R9MM2 sample captured the articulation of the bottom of the cultural layer with the sterile soil below. Four microfacies were recorded on the slide—the cultural microfacies were differentiated primarily by the compactness and density of the fine grain material in interstitial zones between peds while the microfacies representing the sterile layer is characterized by channel and vugh voids. Microfacies 1 was a small rounded layer with reddish brown to black sediment dominated by fine material with an estimated 20/80 c/f ratio. The dominate related distribution is unrelated/random single spaced enaulic with inter-pedal clay coatings. The dominant microstructure is inter-grain micro-aggregate microstructure with moderately separated granules and subangular peds that are loosely packed. The wide range of particle distribution results in poorly sorted sediment. The inclusions were varied—wood, micro-charcoal, sea urchin, shell, and a possible eggshell were all observed. These inclusions were obliquely oriented and randomly distributed. Evidence of weathering was seen in typic clay coatings around the minerals, but not around the anthropogenic material. Evidence of pellicular, parallel linear, and irregular weathering was also observed on the minerals (specifically the olivine grains).

Microfacies 2 shared an indistinct border with microfacies 1. The dominant differentiating characteristics of microfacies 2 is the higher percentage of coarse material compared with fine material (40/60 ratio). The grains are moderately sorted, dark brown with black charcoal and ash specks. The dominant related distribution is recorded as double spaced coarse enaulic and dominant microstructure is complex moderately to strongly separated crumb and granule microstructure, but with larger partially accommodating subangular blocky peds than Microfacies 1. This context also appears less compact with vugh and complex packing voids expressed at 50% density (planar voids were also observed around the partially accommodating blocky peds). Charcoal was common in this context, but other anthropogenic inclusions were limited to sediment peds with evidence of microcharcoal in the aggregates, and possible burnt bone that were randomly oriented and distributed. One piece of angular basalt that was possible lithic debitage was observed. Subrounded basanite basalt was sparse and randomly oriented. Feldspar and olivine were also observed to be randomly distributed and exhibited evidence of moderate pellicular and irregular linear weathering. Typic clay coatings and pendants were observed on larger charcoal pieces and minerals.

Microfacies 3 shared an indistinct, occluded border with microfacies 2. The distinguishing characteristics of this microfacies was the more compact, higher density fine material with a c/f ratio of 30/70. The related distribution was recorded as subangular single spaced coarse enaulic with a dominant microstructure of weakly separated granule microstructure. The interstitial grains outside of the peds were more compact in this microfacies. The microfacies exhibited 30% voids (complex packing and vughs). Subrounded and rounded basalt fragments were observed but no lithic debitage was recorded. Anthropogenic inclusions were randomly oriented and distributed, and included burnt reddish orange and black bone (sparse) and charcoal (common, ranging in size from silt to gravel). Yellowish-grey desiccated plant tissue and cross-sections of monocot grass stems were also observed. Observations of post-depositional processes included limited pellicular and irregular linear weathering of olivine, thin typic clay coatings on bone and minerals (no clay coatings were observed on larger charcoal pieces), and ash infilling in voids.

The boundary between microfacies 3 and 4 was abrupt and wavy. The distinct characteristics of microfacies 1 were the density of the material, dominant fine material (10/90 c/f ratio), and dominance of channel voids as opposed to the complex packing voids that dominated the other microfacies in the thin section. The absence of basalt in this context was also notable. The compactness of the clay aggregates and interstitial individual grains resulted in a low frequency of voids (approximately 15% of the context). The related distribution was determined to be close porphyric with a spongy (90%) and massive (10%) microstructure. Flecks of silt and very fine sand size charcoal were observed in the massive microstructure at the top of the context, but no anthropogenic was observed elsewhere. The yellowish reddish-brown color of this microfacies also drastically differed from those above, which were observed to be a dark brown. Evidence of pedogenic processes were observed by the extensive channel voids throughout the context, and moderate loose, discontinuous infilling of these voids that relate to extensive bioturbation. Typic clay coatings and hypo-coatings were observed in the channel voids and the olivine exhibited extensive pellicular and cross-linear weathering.

Sample NUU2R9MM2 exhibits a unique profile for the transition from cultural to sterile layers that is not seen in other units. In this unit, the sterile layer was far more compact with higher percentage of finer material that was far more compacted with less evidence of anthropogenic materials moving down through the profile because of this compaction. The particle size analysis supports this observation of a unimodal distribution with dominant fine particles, exhibiting characteristics that differ significantly from the cultural contexts in Units R8, R9, and R10. Such distinct compaction of the sterile layer in this unit also suggest that the site formation in this area differed from areas of the site to the south and west.

Micromorph sample NUU2R10MM1 was taken from the southern wall of Unit R10 which was the northern wall of Unit R9 and can therefore help to elucidate the formation of the cultural contexts that crosscut both units and its articulation with the underlying sterile soil. This sample captured the transition from Layer II to Layer III which is the transition from the cultural to the sterile context. The thin section slide shows a more complicated profile, however, with three microfacies identified.

Microfacies 1 was characterized by a lower density matrix, but higher density of basalt fragments and larger blocky peds. The sediment was heterogeneous at each level of magnification, appearing moderately sorted at lower magnification, but poorly sorted at higher magnification. The ratio of coarse-to-fine (c/f) particles was estimated to be 40/60, with a related distribution of double-spaced, coarse enaulic. Void space was randomly distributed and covered roughly 30-40% of the microfacies area. The types of voids included complex packing voids (primary type), planar voids in blocky peds, and vughs. The sediment appeared mottled in color with dark reddish-brown portions interspersed with black areas where silty micro-charcoal was more concentrated. The microstructure was identified as complex, with moderately separated subangular blocky microstructure interspersed with moderately separated crumb microstructure. The anthropogenic inclusions that were recorded included charred bone (medium sand size 200-500 µm, rare), angular lithic debitage (very coarse sand 1000-2000 µm to fine gravel > 2000 µm and not weathered, rare), burnt shell (rare), charcoal (common) and ash (rare). Coarse sand size (500-1000 µm) yellowish brown organic tissue was also observed but rare, and rounded to subrounded basalt was common. The anthropogenic inclusions appeared randomly oriented and distributed, but the blocky sediment peds (defined as such by the presence of anthropogenic material within the peds) were oriented perpendicular with one another and distributed parallel to the matrix. Post-depositional processes were observed through the rubification of the sediment observed in the sediment peds, desiccated plant material, typic clay coatings surrounding weathered inherited basalt and minerals, but the anthropogenic materials showed no signs of clay coatings forming.

Microfacies 2 shared an indistinct, smooth border with microfacies 1. This microfacies was characterized by darker sediment and denser charcoal inclusions, heterogeneity of grains, and the poorly sorted matrix. The coarse/fine ratio was similar to that of microfacies 1 at an estimated 40/60, but with a different composition and organization. The related distribution was a mixture of single spaced coarse enaulic and single spaced equal enaulic due to the range of particle sizes present. The dominant microstructure was determined to be weakly separated granular but subangular blocky peds were also present, with clustered distribution patterns along the outer edges of the microfacies, and perpendicular relational orientation. The void space was estimated at a density of 20-30%. Natural inclusions included olivine minerals, rounded basalt, fibrous plant tissue (rare), and clay aggregates. Anthropogenic inclusions observed were fine gravel size (> 2000 μm) bone fragments (black edges with red interior), micro-charcoal (abundant), and lithic debitage (moderate). Sediment aggregates are also present and defined by the presence of micro-charcoal within the peds and the appearance of reddish sediment that may indicate iron oxidization through weathering. The anthropogenic deposits were clustered together, and randomly oriented. Post-depositional processes were observed in the rare clay coatings on weathered rounded basalt, angular basalt debitage, and sand-size charcoal fragments. There also appears to be limited infillings of fine material within the packing voids surround the cluster of anthropogenic inclusions. Heavy pellicular weathering of olivine and desiccated plant material was also observed. Other notable characteristics in this microfacies includes a region of lighter material in the center that was determined to be an artifact of the slide where the thin-section was over-polished, and a cluster of basalt along the edge of the context in which the majority of fine-gravel size basalt was located.

The final context in sample NUU2R10MM1, microfacies 3, shares a diffuse and wavy border with microfacies 2. This microfacies is characterized by a moderately homogenous and moderately-sorted matrix with a significantly higher percentage of fine material (c/f ratio at 10/90). The related distribution of coarse to fine material was determined to be double-spaced, fine enaulic with a dominant granular microstructure type that was moderately separated with compound packing voids and interstitial grains. The void space was estimated to fill 30-40% of the microfacies. Complex packing voids were the most common, but vugh and planar voids were also present. The only type of anthropogenic material observed was micro-charcoal ranging in size from very fine sand to silt throughout the context but far less dense than microfacies 1 and 2. Other inclusions were rare but included desiccated plant tissue and rounded weathered basalt. Evidence of pedogenesis observed was the formation of typic clay coatings around 80-100% of the sand size basalt fragments as well as pellicular and cross-linear weathering of basalt and olivine. Although this microfacies is related to the same layer that sample NUU2R9MM2 microfacies 3 is associated with, the characteristics associated with the two microfacies differ significantly. These differences reflect the location of the samples, as sample NUU2R9MM2 is located adjacent to the feature wall whereas NUU2R10MM1 was extracted from the center of the area available for daily activities.

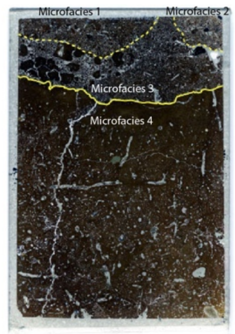
Sample NUU2R10MM2 was extracted from the eastern unit wall along the structure wall. This sample captured the transition between layers II and III as well as a darker brown sediment deposit observed as vertically crosscutting the layers in the unit. Three microfacies were identified and described. Microfacies 1 was characterized by the moderately-sorted matrix, low density of coarse material, and absence of all anthropogenic material aside from micro-charcoal. Fine material dominated the matrix (c/f ratio was recorded as 5/95) with a related distribution of double-spaced, coarse enaulic and a dominant granular microstructure. Lenticular peds are also present, but rare. Complex packing voids and vughs were evenly distributed at a density of 40%. Natural inclusions in the sediment consisted of very fine grass roots and yellow fibrous plant tissue, as well as highly weathered rounded basalt fragments. The only cultural inclusion, charcoal, was clustered and ranged in size with some ribbed, blocky angular fragments with a reddish tint that may be burnt bone. Weathering events that were observed was extensive pellicular and cross-linear weathering on blocky olivine and thick typic clay coatings on rounded minerals. Thin typic clay coatings were present on weathered basalt.

The boundary between microfacies 1 and 2 runs vertically across the thin-section and is indistinct and occluded. Microfacies 2 is characterized by poorly sorted sediment with low homogeneity. The ratio of coarse-to-fine particles is roughly equivalent to the previous microfacies at 15/85 with a related distribution of single-spaced coarse enaulic. The dominant microstructure was identified as complex with moderately separated subangular blocky peds and weakly separated granular peds. The void space was estimated at 30% and dominated by complex packing voids (also present are vugh, chamber, and planar voids). The natural inclusions that were observed in the microfacies were highly deteriorated yellowish fibrous tissue (sparse) and dicot root cross-sections along with rounded and subangular weathered basalt. The lenticular peds that were observed in the matrix are distributed in clusters and banded, with some forming circles in the matrix. The anthropogenic inclusions that were observed were two angular basalt flakes and charcoal (predominately micro-charcoal with some larger coarse sand-size pieces), which were distributed randomly throughout the matrix. Evidence of weathering was observed in the heavy pellicular weathering of olivine.

Microfacies 3 shares an indistinct boundary with microfacies 1 along the top of the matrix, and with microfacies 2 along the vertical edge of the matrix. Both boundaries are delineated by blocky peds. Microfacies 3 is characterized by the lower density of these subangular blocky peds and the higher density of anthropogenic material. The c/f ratio of microfacies 3 remained consistent with the rest of the slide, estimated at 10/90 with a related distribution dominated by single-spaced, equal enaulic interspersed with single-spaced, fine enaulic. Weakly separated granular microstructure dominated this microfacies with typic and concentric nodules observed in the rarer subangular blocky peds. The void space was estimated to encompass 20-30% of the slide, with the dominant void type determined to be complex packing voids, which were interspersed with vughs and chambers, all evenly dispersed throughout. Natural inclusions observed were rounded sand-size basalt fragments and long, fibrous plant tissue that ran perpendicular to the groundmass. The anthropogenic inclusions observed were gravel (> 2000 µm) and medium sand size (200-500 µm) bone fragments (rare), ash (rare), and silt (2-63 µm) to very fine sand size (63-100 µm) charcoal fragments (with the occasional larger fragment rarely observed), and lithic debitage that is oriented parallel to one another and distributed parallel to the groundmass along the bottom of the slide. The weathering of the microfacies is evidenced through the pellicular patterns on rounded sand size basal and the typic clay coatings present on minerals and sand size basalt fragments.

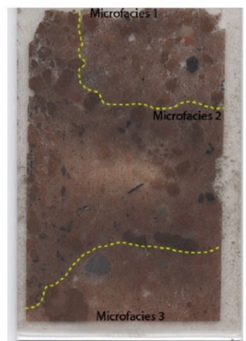
Coarse material is roughly 90% anthropogenic or basalt fragments. Clay aggregates, however, seem to be well-formed and resistant which may have negatively impacted the accuracy of particle size distribution data in the NUU-2 units where clay aggregates were common features of all the thin-section slides, particularly within the cultural contexts.

NUU2R9MM1



NUU2R9MM2

NUU-2 Unit R9 Photograph of the east wall stratigraphy with the location of the two samples taken from this unit outlined in red (NUU2R9MM1 on the top left and NUU2R9MM2 on the bottom right)



NUU2R10MM1

NUU-2 Unit R10 Photograph of the south wall stratigraphy with the location of sample NUU2R10MM1 outlined in red.

NUU2R10MM2

NUU-2 Unit R10 Photographic of the east wall stratigraphy with the location of sample NUU2R10MM2 outlined in red.

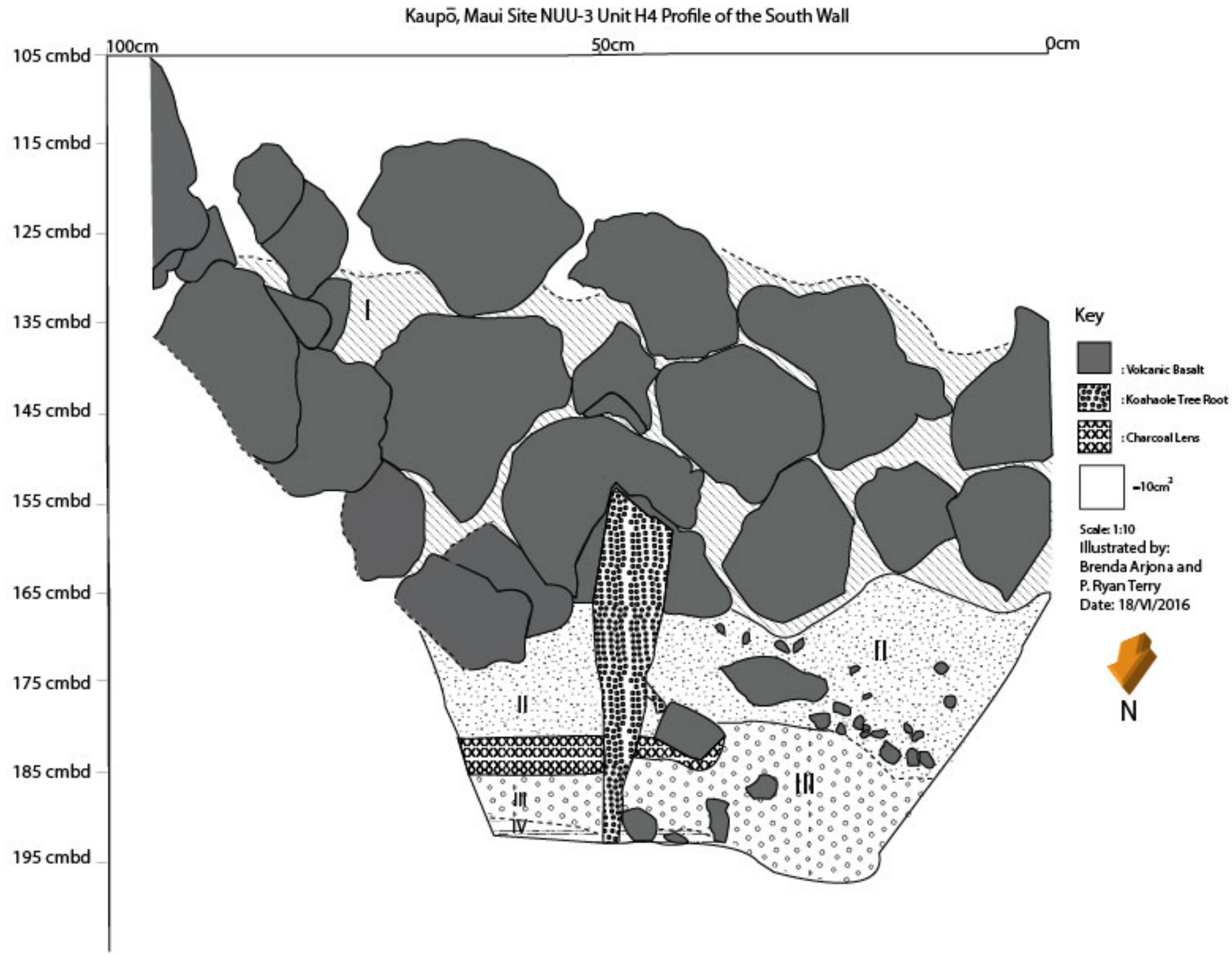
NUU-2 Photograph of the east wall profile for units R10, R9, and R8 (from left to right) with the location of the micromorphology samples outlined in read. From left to right the samples are NUU2R10MM2, NUU2R9MM1, NUU2R9MM2. Sample NUU2R10MM1 was taken from the south wall of Unit R10 which was later excavated and is therefore not shown in this photograph.

Figure 6.50: Thin section slides and corresponding profile photos with the location of the micromorphology samples marked.

Site NUU-3 Unit H4

Although site NUU-3 was recorded during survey with a unique site number, the architecture of NUU-2 makes clear that this site is part of the same complex. The approximately 20cm tall by 20 cm wide wall that runs from the edge of the L-shaped structure west then south around the terraced soil encompasses this large circular architectural feature. While it is clear that the walls of feature NUU-3 were quite thick, poor preservation has resulted in the collapse of what may have once been stacked courses of stone. The resulting wall fall obstructed most of the interior of this structure. Figures 6.51 and 6.54 illustrate the area we were able to excavate after clearing away as many basalt boulders as was safe without removing boulders that were deemed to still be part of the original wall. The small area that was cleared proved difficult to excavate, but produced results that differed from anything else seen in NUU-2 units or in units from the other excavated kauhale.

Figure 6.51: Photo of Unit H4 south wall profile.



Layer Descriptions

I: Overburden 10YR 3/2 Very Dark Greyish Brown. Dried grass, grass rootes, and other organic inclusions (leavies, dung, insects, and wood) in the form of mulch as well as a thick, dense layer of matted grass roots. Also structure wall (large boulders), wall fall and koahaole tree roots. The overburden is very deep and falls beneath the boulders.

II: Cultural 10YR 3/3 Dark Brown. Loose sediment with grass roots and pebbles/cobble rocks. The soil was condensed into gravel sized soil peds and was very dry. A few larger cobbles in the south wall near the koahaole root, as well as several pebbles, divide this layer from layer III. Charcoal was abundant throughout the layer, particularly near the tree root. Granular texture. Shell and bone also found.

Charcoal Lens 10YR 2/1 Black. Homogenous charcoal, possibly related to a combustion feature situated between layer II and layer III.

III: Cultural 10YR 4/6 Dark Yellowish Brown. Homogenous, smooth clay-like sediment that appears oxidized (orangish-yellow to the eye). Grass roots end, tree roots continue through layer. Artifacts diminish, some charcoal but likely from walls and previous layer. Compact soil.

IV: Sterile 10YR 5/4 Yellowish Brown. Degraded, rounded bedrock cobbles and light, sand-like soil. No inclusions. Very diffuce boundary between layer III, but very little west of koahaole root. No artifacts, very compact soil, dry and with large peds.

Figure 6.52: Profile map of the south wall of Unit H4 with the description of the contexts.

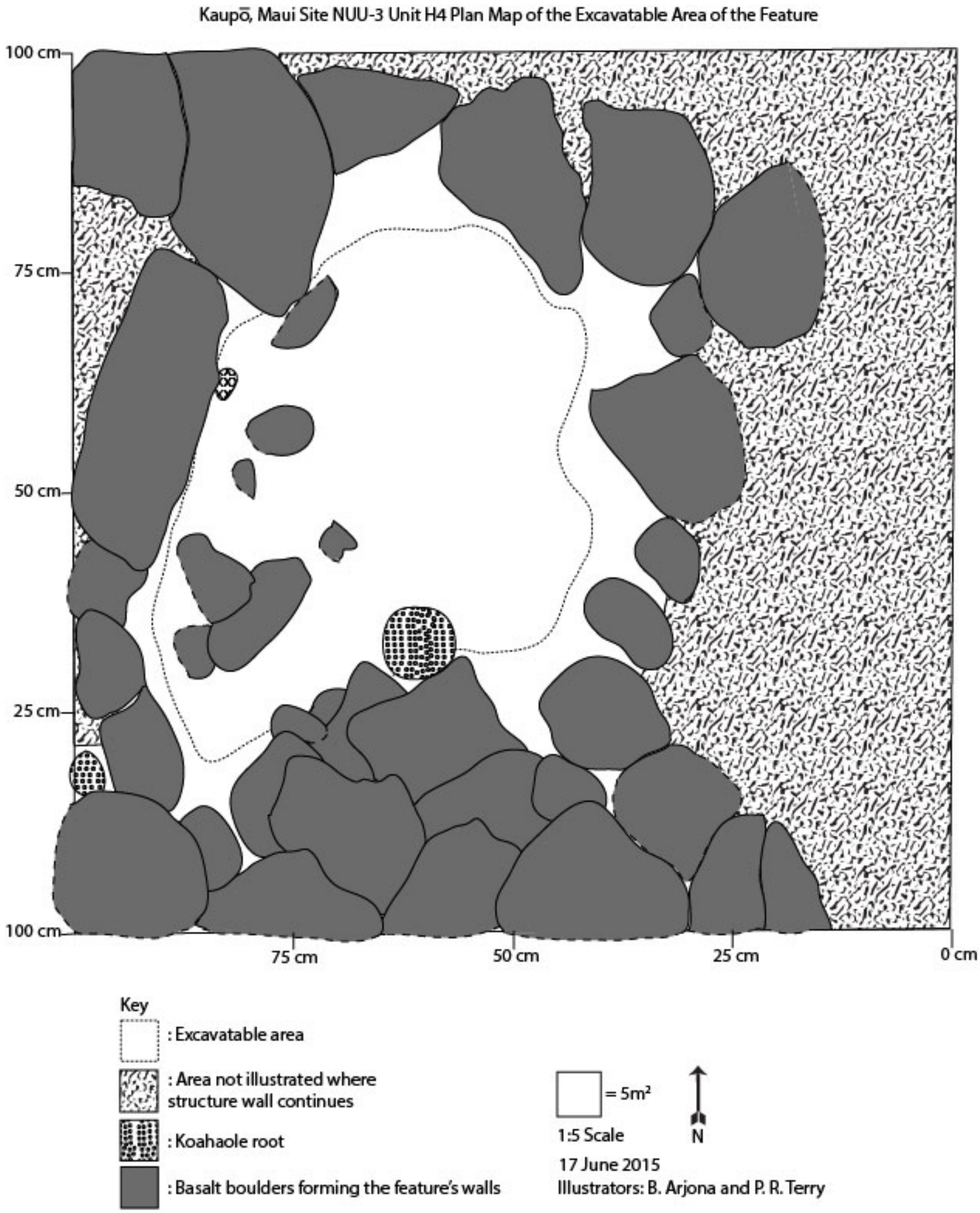


Figure 6.53: Plan map of the excavated area in Unit H4.

Figure 6.54: Photo of the excavatable area in NUU-3 Unit H4.

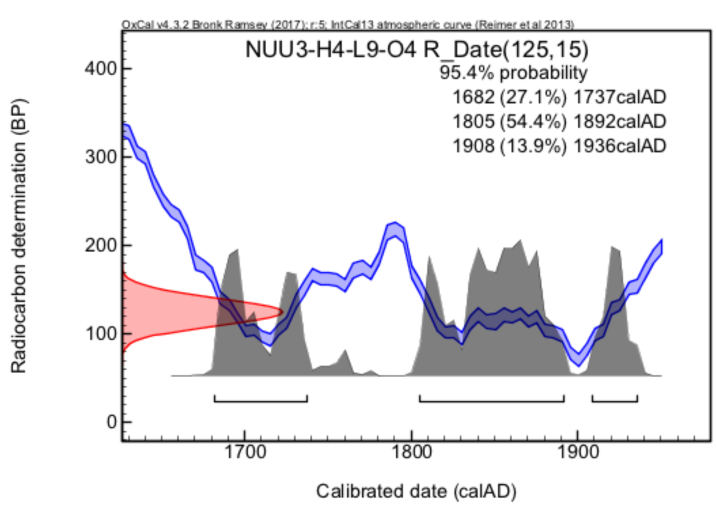
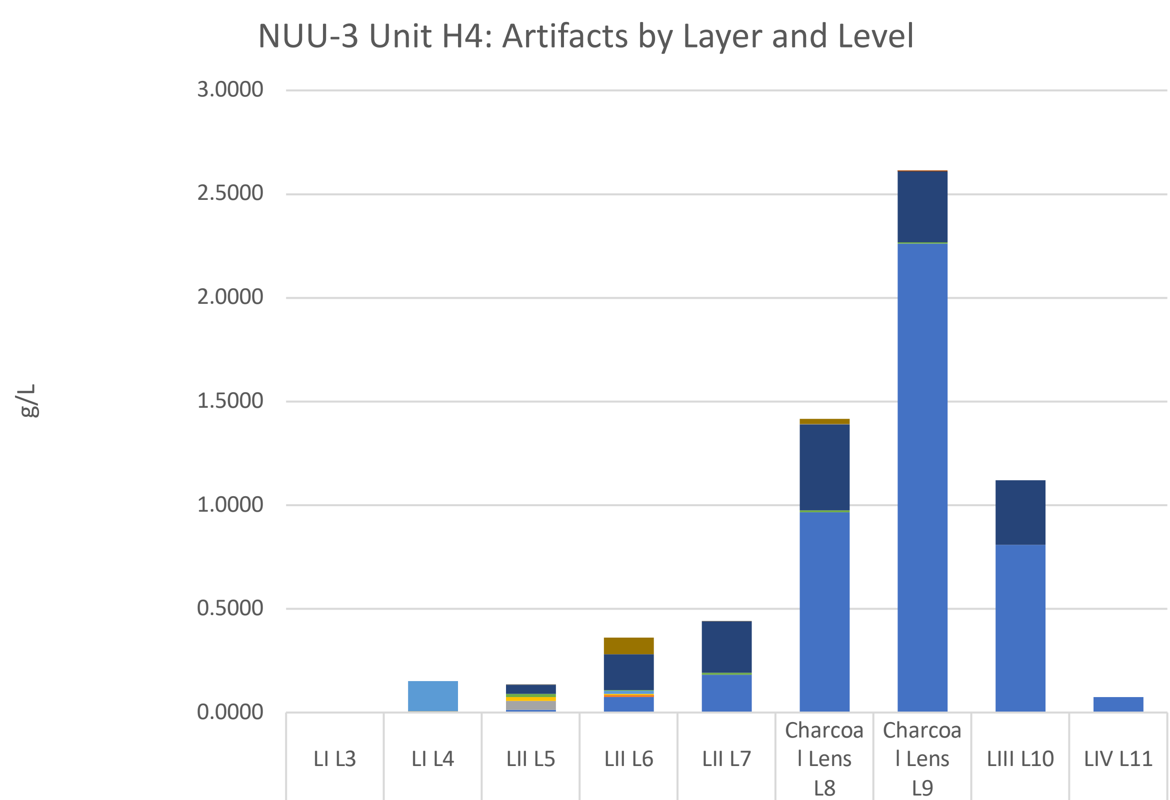


Figure 6.55: Radiocarbon dates Unit H4-L9-Charcoal Lens

The artifact assemblage from NUU-3 was less varied and not as dense as what was found in units within the L-shaped structure (NUU-2), but faunal remains similar to what was seen in the units near the hearths as well as similarity in the density of charcoal observed in oven and hearth features. What appeared as a charcoal lens in the profile wall was confirmed by the artifacts recovered in excavation by the dense charcoal material recovered from this context. Unworked bone was also recovered from the charcoal lens but only at slightly higher densities than the surrounding layers. The dominance of these two material types, however, still supports an interpretation of this feature as an oven house where stray bone fragments are more likely to escape the scrutiny of someone cleaning the area (compared with a house floor). The absence of shell in this area is also not surprising, as mollusk meat was commonly eaten raw. The microartifacts identified from the bulk samples from the charcoal lens and Layer IV confirm that bone and charcoal were the dominant materials used or produced in this location. The type of animal bone recovered from this feature enhances the understanding of the resources available to this household.



	LI L3	LI L4	LII L5	LII L6	LII L7	Charcoal Lens L8	Charcoal Lens L9	LIII L10	LIV L11
‘Ili‘ili				0.0815		0.0244			
bone not worked			0.0044		0.0030	0.0013			
Volcanic Glass Debitage							0.0010		
Basalt Debitage			0.0421	0.1730	0.2458	0.4134	0.3424	0.3107	
Burnt Kukui Nut			0.0149	0.0032	0.0075	0.0111	0.0051		
Basalt Debitage		0.1462		0.0154					
Shell		0.0007	0.0193	0.0060					
Raw Kukui Nut Shell		0.0046	0.0411		0.0020				
Raw Kukui Shell				0.0091					
Charcoal	0.0001	0.0015	0.0143	0.0741	0.1819	0.9653	2.2625	0.8094	0.0747

Figure 6.56 : NUU-3 H4 graph of artifacts displayed as grams per liter of sediment excavated in each context

Site	Excavation Unit	Level	Layer	NISP	MNI	Weight (g)	Scientific Determination
3	H4	6	II	3	1	0.42	Cellana sp.

Table 6.17 : NISP, MNI, Weight, and ID for shell in Unit H4.

Site	Unit	Level	NISP	MNI	Weight (g)	Scientific Determination	Comments
3	H4	5	1	1	0.04	Undetermined Mammal	NID fragment
3	H4	5	2	1	0.25	Pig	Pig PM-1 tooth
3	H4	7	4	1	0.01	Elasmobranchii (ray/shark)	Four teeth
3	H4	7	2	1	0.12	general undetermined bone	Root of tooth
3	H4	7	1	1	0.07	Scaridae	Tooth
3	H4	8	4	1	0.04	general undetermined bone	Small fragments
3	H4	8	2	1	0.01	Elasmobranchii (ray/shark)	Two teeth

Table 6.18 : Bone identification, NISP, MNI, and weight for Unit H4.

Level	Artifact Size	Item Type	item count	weight /g
Charcoal Lens L9	0.5mm-2mm	charcoal	N/A	0.4688
Charcoal Lens L9	0.5mm-2mm	volcanic glass	2	0.0007
Charcoal Lens L9	2mm-4mm	charcoal	4	0.2238
Charcoal Lens L9	4mm-6.3mm	charcoal	N/A	0.3033
LIV L11	0.5mm-2mm	charcoal	1	0.0011
LIV L11	0.5mm-2mm	unburnt bone	5	0.0001

Table 6.19 : Microartifact identification, size, count, and weight for Unit H4

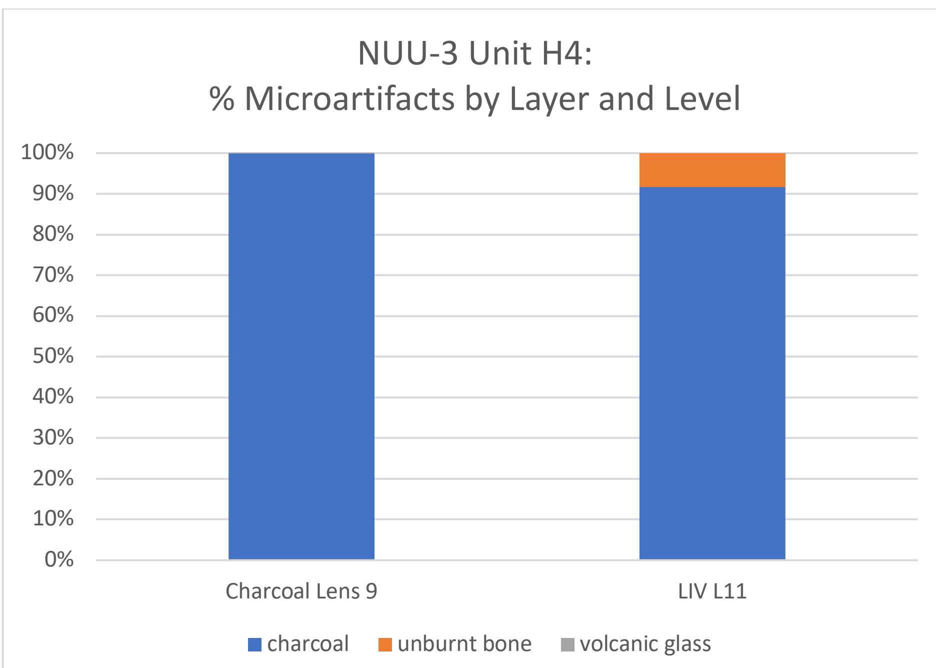


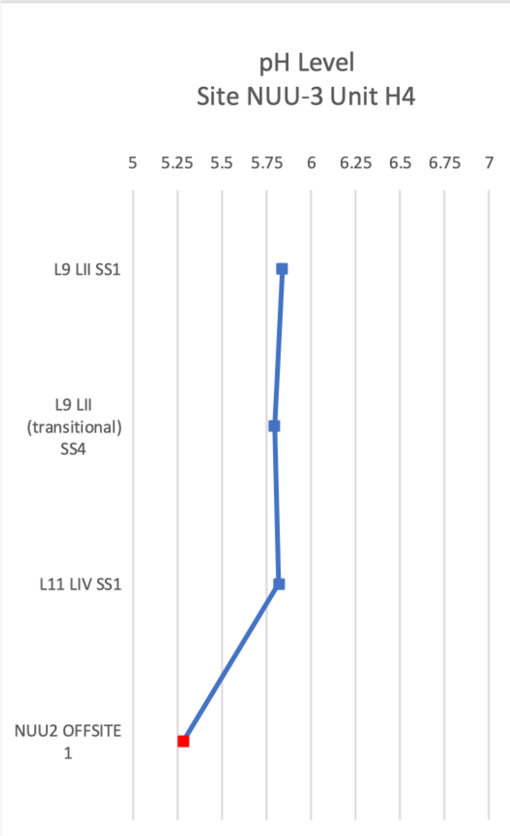
Figure 6.57 : Total microartifacts recovered from Unit H4 by context.

NUU-3 Unit H4 Sediment and Soil Samples

The sediment samples that were processed from Unit H4 show similar patterns seen elsewhere in areas with heavy anthropogenic use. Specifically, pH levels within the site measure higher than the off-site comparative sample, while the percent of organic carbon present in the sediment measures lower than the off-site comparative sample (an interpretation of this trend will be discussed in chapter 7). The pH and percent of organic material was understandably highest in the area with the densest charcoal deposits. Particle size analysis of the off-site comparative bulk sample showed an even distribution of particle sizes. Comparison of these results with the results from the samples taken from cultural layers evidences different pre-depositional, depositional, and post-depositional processes. Pre-depositional processes reference the events that occurred before sediment was transported from one place to another that can affect the level of weathering and therefore grain size. Depositional processes reference the mode of transportation—smaller particles require less energy to be transported than larger particles (e.g. a light breeze verse heavy winds). Therefore, if there is a difference in the sediment onsite versus the soil offsite the mode of deposition may have differed. Post-depositional processes also affect particle size through weathering or other stress placed on the deposit (for example, in situ burning or trampling in anthropogenic deposits, and pedogenesis in offsite deposits). Any one of these categories could result in the difference seen in particle size distribution between the two samples. To determine what did in fact impact the particle sizes requires microscopic analysis of the deposit and contextualization with other lines of evidence. The charcoal lens contained the lowest percentage of fine material and exhibits a spike in the amount of material at the medium sand size fraction which may be due to the high-density charcoal (seen in the Figure 6.60 plan photo of level 9). Conversely, the sample from the transitional level 9 context appears to be bimodal and included the highest percentage of gravel-size fraction which may be explained by the higher density of pebbles and cobbles observed in the side wall that appeared to fill this entire level (as seen in Figure 6.51 profile photo and Figure 6.61 plan photo of the bottom of this context). The bulk sample from Level 11 most closely resembled the offsite sample, which is to be expected from the sterile soil unit contexts.

Site/Layer/ Level/Sample	**pH**	**LOI**	**Particle Size Distribution**								
			<0.063	**0.063**	**0.125**	**0.25**	**0.5**	**1**	**2**	**4**	**6.3**
H4 Lens L9 SS1	5.84	23.11	3.88	9.94	16.24	24.32	46.02		68.52	77.46	100
H4 L9 SS4	5.80	14.38	5.72	13.74	19.8	25.76	37.8		48.42	52.26	100
H4 LIV L11 SS1	5.82	15.53	8.82	22.88	37.62	58.2	76.28		89.46	91.94	100
NUU2-OFFSITE1	5.28	40.68	5.28	20.01	37.66	51.1	60.62	70.51	80.42	85.32	100

Table 6.20 : Sediment sample data from NUU-3 Unit H4



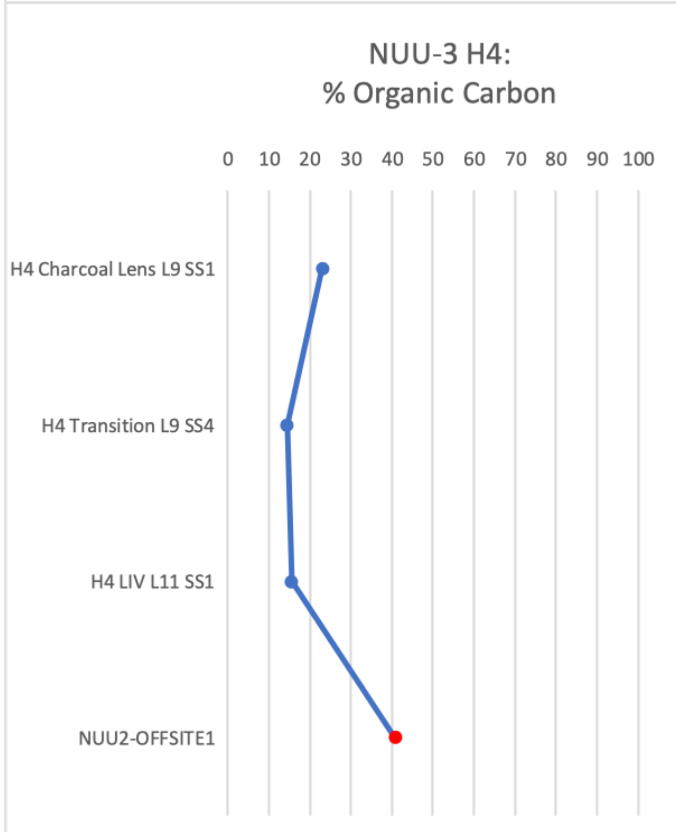


Figure 6.58 : pH and LOI for NUU-3 Unit H4

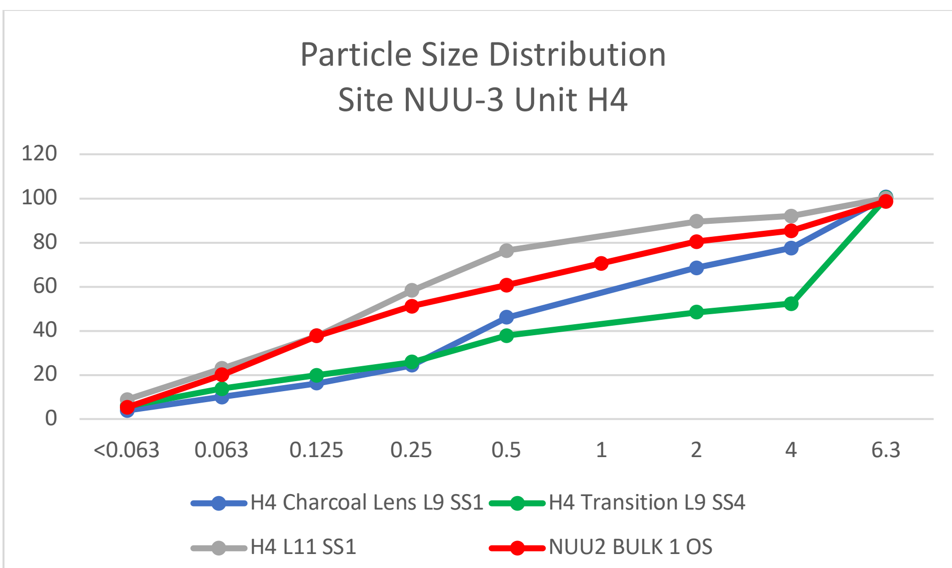


Figure 6.59 : Particle size distribution for NUU-3 Unit H4.

Figure 6.60: Plan photo of the ash lens in NUU-3 Unit H4.

Figure 6.61: Plan photo of the layer of cobbles and gravel in NUU-3 Unit H4.

Site NUU-152

Sites NUU-152, NUU-420, NUU-153, NUU-142 and NUU-155 lie long the ridgeline of a horse-shoe shaped ridge approximately 0.75 km south of NUU-2. NUU-152 consists of four architectural features that, together form a kauhale connected by a low-lying basalt enclosure running along the ridge's western edge on the natural bedrock outcrop that drops off at a steep decline to the swale below. The entire site stretches 30 meters north to south along the ridge, and 15 meters east to west. A large C-shape structure (Feature B) open to the northwest completes the northern-most edge of the kauhale. A low agricultural embankment or linear mound of cobbles that is part of the adjacent field system begins in the center of this feature and runs across the top of the ridge to the west. A large kiawe (*Prosopis pallida*) tree grows from the inside center of the C-shape. A small wall made of basalt cobbles connects Feature E to Feature C. South of Feature D sits a much smaller C-shape, encompassing roughly $4m^2$ of level space. The largest portion of the wall was built to the east, blocking the strong winds. The smaller C-shape (Feature D) resembles that present in site NUU-417, but opens to the south rather than the west. A small ridge of soil and basalt cobble fill runs along the opening of Feature D, with the remnants of an agricultural field embankment terminating along the southern edge. A rectangular architectural feature (Feature A) was constructed to the south of feature D. Wall-fall covered most of the northern end of the feature, with the walls on this end poorly preserved. An earth-filled terrace to the west (Feature E) mimics the shape of feature D, but is shaped instead by an exterior wall that was built into the basalt enclosure encompassing the kauhale. Feature E was roughly the same size as Feature A yet was not completely enclosed but rather open to the west. A portion of the basalt enclosure along the ridge to the north is highly deteriorated due to trampling by the local goats and cattle currently grazing the landscape.

The radiocarbon dates collected from the different architectural features that comprise site NUU-152 suggest that this kauhale was constructed over time. Although the dated *Aleurites* moluccana nut shells were collected during excavation rather than extracted from underneath the wall and, therefore, do not necessary provide a *terminus post quem* for the construction date, they do provide information about when the features were in use as a proxy for the order of construction. The oldest feature, NUU-152A (the rectangular feature to the southwest, pictured in Figure 6.63 and Figure 6.64) was in use by the late 16th century, followed by feature NUU-152B (the large C-shape structure), which was in use by the mid-17th century. The next date was associated with NUU-152D (the small C-shape structure) which was in use by the early 18th century, followed by NUU-152E which was in use by the late 17th century. Not only do these dates indicate a possible order of construction, looking to the artifacts and sediment data for information about the use of these structures helps clarify the additional activities that household members participated in, over time which necessitated new architecture.

Phytolith and starch data in these architectural features provide some initial insight into the use of these spaces over time. Banana phytoliths were recovered from Features E and D as well as the terrace unit (U14). Palm phytoliths were recovered from these same features as well as from feature E, but were most concentrated in feature D (neither of these phytoliths were recovered from the off-site comparative samples). As is common, grass phytoliths were the most abundant in all of the units. Horrocks (2018 report) postulates that the abundant saddle phytoliths in these samples come from the Chloridoideae and Panicoidoideae sub-families and the Festcuceae tribe, which are in the Poaceae or grass family that pili grass and sugarcane belong to. *Eragrostis* *variabilis* (kāwelu) was a grass used as a substitute for pili as thatching or floor covering and is part of the Chloridoideae subfamily. *Digitaria setigera* or itchy crabgrass is part of the Panicoidoedeae subfamily and was masticated with coconuts and used medicinally for eye disorders (Chun 1994:168-170). Pili grass is also part of the Panicoidoideae family and was the most popular plant for thatching houses (Malo 1951), used to cover house floors along with other grasses (Krauss 1993:59), and burnt to make black tapa dye (Krauss 1993:67). Sugar cane (*Saccharum officinarum*) is part of the Panicoidoideae sub-family and was also commonly used in houses as a condiment (Handy *et al.* 1972:187), wall covering (Abbott 1992:69), burnt for black dye (Krauss 1993:65), and used as thatch (Degener 1930:58). The denser presence of these grasses in the different features may be explained by any of these practices (particularly by thatching practices or floor coverings as many of these features likely were covered with thatched roofs and matted floors when in use), or could reflect modern grasses on the landscape. Differentiating between the possible reasons for the presence of the high percentage of grass phytoliths requires additional data from artifact and sediment data.

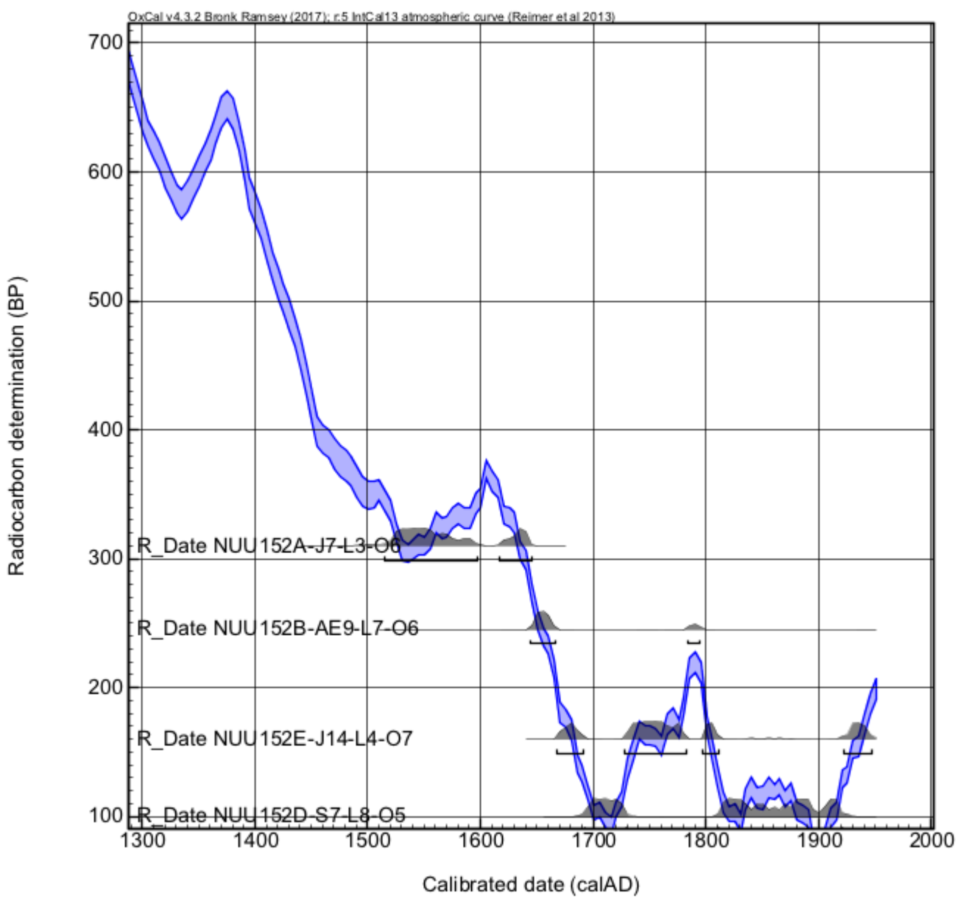


Figure 6.62: Calibrated radiocarbon dates from *Aleurites moluccana* nut shells from the features in site NUU-152.

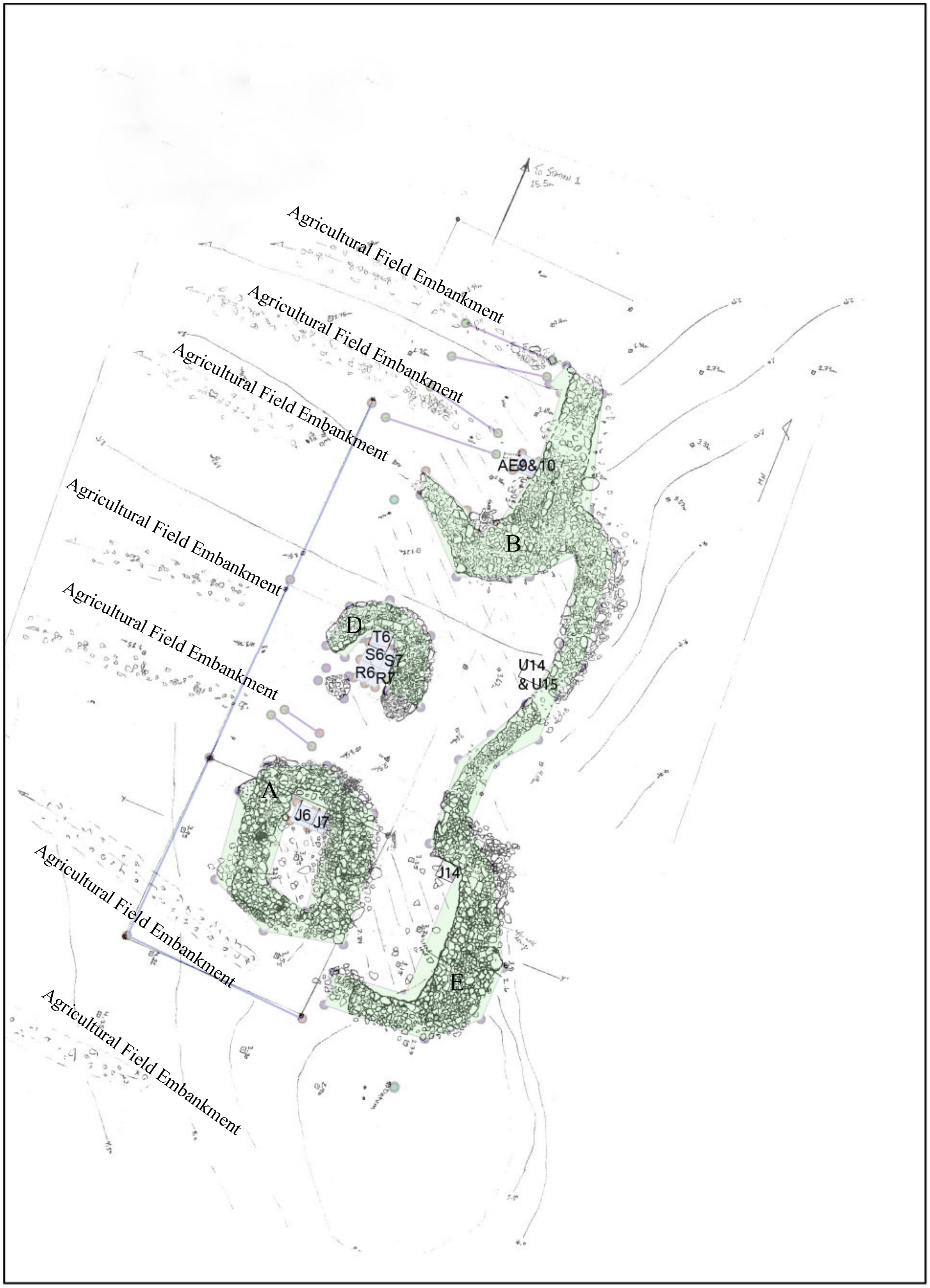


Figure 6.63: Plane table map of site NUU-152.

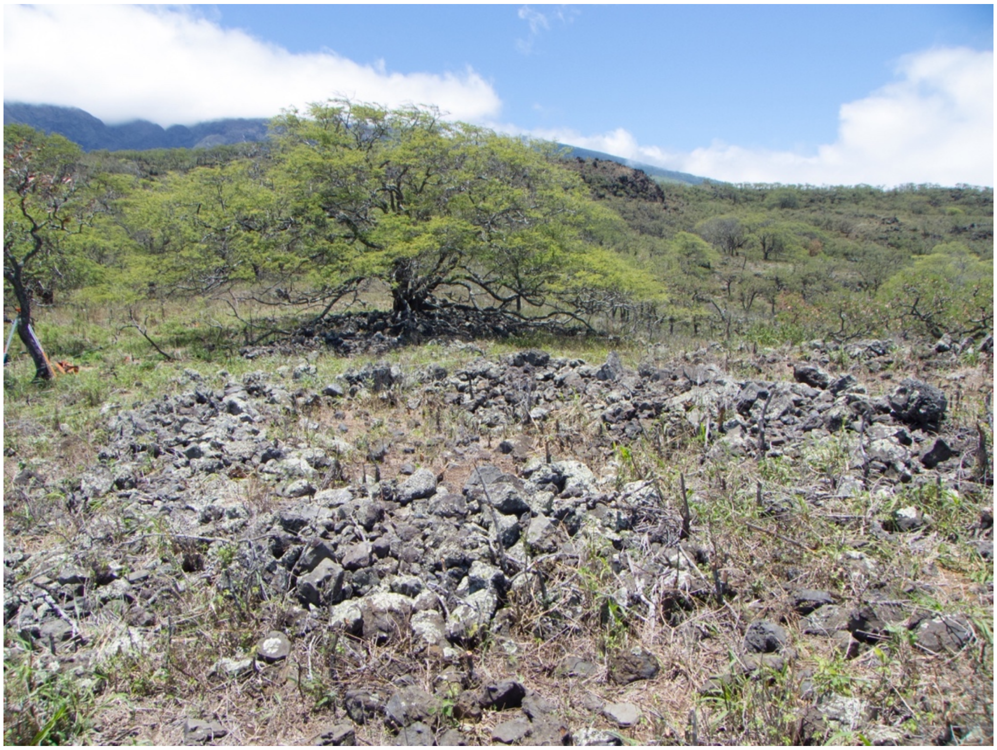


Figure 6.64: Photo of NUU-152 facing north and east

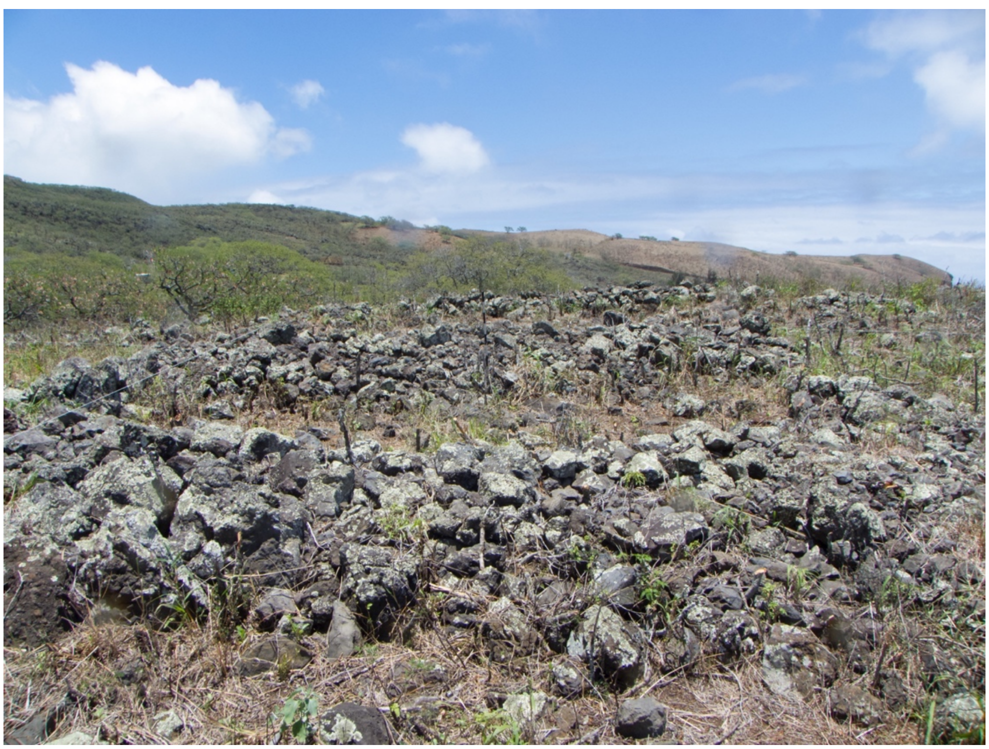


Figure 6.65: Photo of NUU-152 facing south and east

(+ = small amount, ++ = large amount).

	cf. sweet potato starch	cf. sweet potato xylem	cf. taro starch	calcium oxalate crystals	charcoal
NUU-152 A Unit J7 Level 3 Layer II Sample 1					+
NUU-152 D Unit S6 Level 5 Layer II Feature 1 Sample 4			+		++
NUU-152D Unit S6 Level 5 Layer II Feature 1 Sample 4					++
Offsite Sample 2 (NUU-420)					+
Offsite Sample 3 (NUU-420)					+

Figure 6.66: Presence and amount of starch grains, calcium oxalate crystals, and charcoal in NUU-152 samples. Data were provided by Mark Horrocks and the table is modified from Horrocks 2017 lab report.

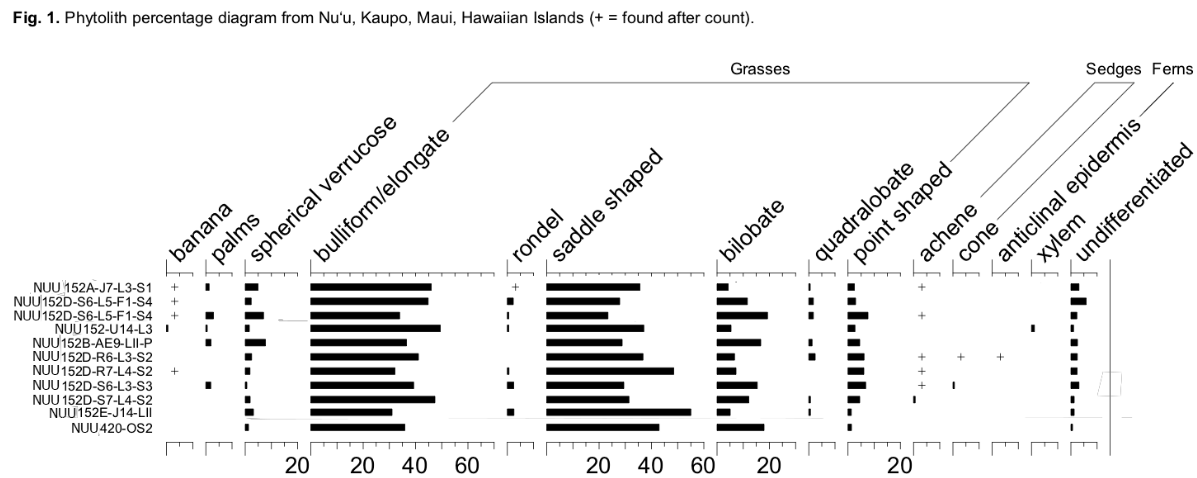


Figure 6.67: Presence and amount of phytoliths charcoal in NUU-152 samples. Data were provided by Mark Horrocks and the table is modified from Horrocks 2017 lab report.

NUU-152D C-Shape Feature

Feature D was initially excavated in 2013 (Unit T6) and returned to in 2014 due an interesting combustion feature captured in the initial excavation. In 2014, four additional units were placed in Feature D (Units S6, S7, R6, and R7). The contexts recorded during excavation extended throughout the five units in this architectural feature, and two combustion features were recorded within Units T6, S6, and S7 (F1), and R7 (F2). Feature 1 (F1) was the larger combustion feature, extending 15cm in depth and measuring approximately 70cm wide by 70cm long. Feature 2 (F2) extended approximately 10-15cm in depth and measured approximately 30cm wide by 30cm long. The majority of artifacts were recovered from the two features, specifically charcoal and bone fragments. The shell fragments, however, were largely recovered from outside of the features. Faunal remains were dense in these five units compared with other units on site. Specifically, small gastropods dominate the shell assemblage, and mammal bone dominates the bone assemblage. The microartifacts reflect evidence of the heavy burning occurring over time in these units as well as the presence of faunal remains in these spaces. Wood was also represented in the microartifacts, including charred wood which may modern wildfires.

The test excavations I conducted in 2013 focused on NUU-152, where one unit was placed in each architectural feature and one unit in the open terrace. Sediment samples from NUU-152 cultural contexts were processed in 2013 as part of a preliminary analysis of pH, particle size, and organic matter (using LOI). The preliminary analyses showed that pH fell within the range of 5.5-7, which is typical for the Kaupō region (Baer 2015:165) thereby indicating that acidic degradation does not account for differences in artifact recovery from the Nuʻu sites when compared with other ahupuaʻa within the Kaupō region. The information obtained from LOI and particle-size analyses indicated that ongoing pedogenesis may be occurring, resulting in weakly developed A, B, and C soil horizons even though layers resulting from cultural activities are clearly visible. This information promoted the plan to extract and analyze micromorphology samples from the Nuʻu house sites in order to gather more information about whether pedogenetic processes were altering the cultural contexts observed during excavation.

The subsequent samples collected from NUU-152D in 2014 provide some insight into the site formation processes for this architectural feature. The pH in the oven feature changes from moderately acidic (5.6-6.0) to neutral (6.6-7.3). The neutral pH levels may reflect the dense charcoal which has a higher pH than the natural soils in Nuʻu. The neutral pH and slightly acidic (6.1-6.5) sediments are not all within the feature but are at the same depth of the feature. Similar to other combustion features, the percent of organic carbon appears to be inversely correlated with the levels of charcoal. This may suggest that organic carbon percentages may be a better indicator of the areas with more organic input, while pH levels may be indicating the presence of other materials or elements (e.g., phosphorous or calcium carbonate from inorganic biological materials) that is raising the pH but not the organic carbon in these levels. Conversely, the negative correlation may indicate that as pH rises, the preservation of organic matter decreases and in moderately acidic sediments LOI is more likely to survive (with preservation of organic matter again decreasing when sediments become highly acidic). Finally, this inverse relationship may signal that while charcoal is organic, it does not represent enough of an organic input in combustion features to raise the sediment to the levels of organic matter seen in house floors for example.

The particle size distribution of the different contexts in these units do not vary significantly from the off-site comparative sample. The samples from cultural contexts do tend to skew towards the finer particle size, which may be accounted for by the density of ash and charcoal in these units. The sterile contexts differ significantly from the rest of these units, exhibiting higher densities of coarse sand to gravel-size fractions.

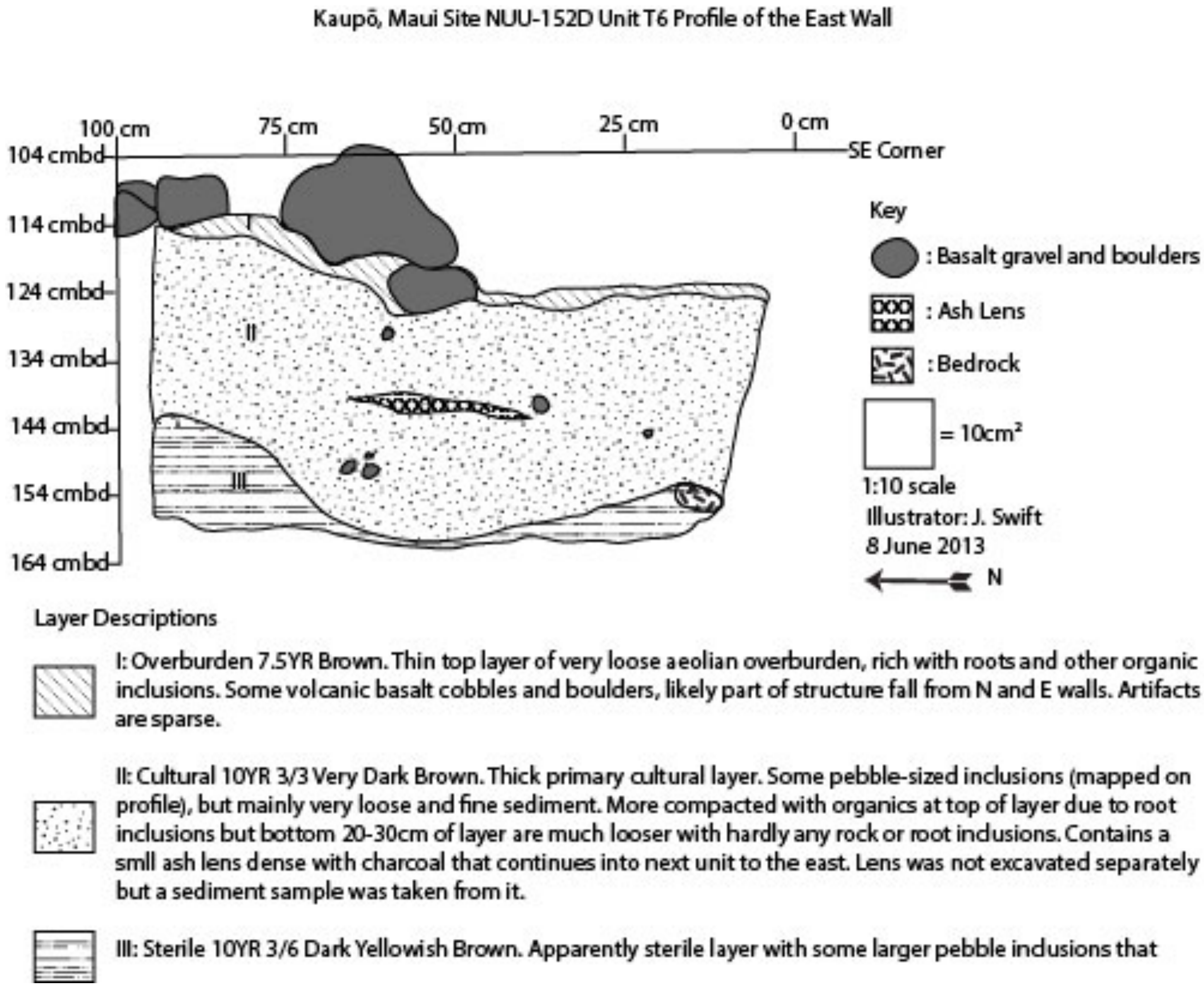


Figure 6.68: Profile map of the east wall of Unit T6 and the context descriptions.

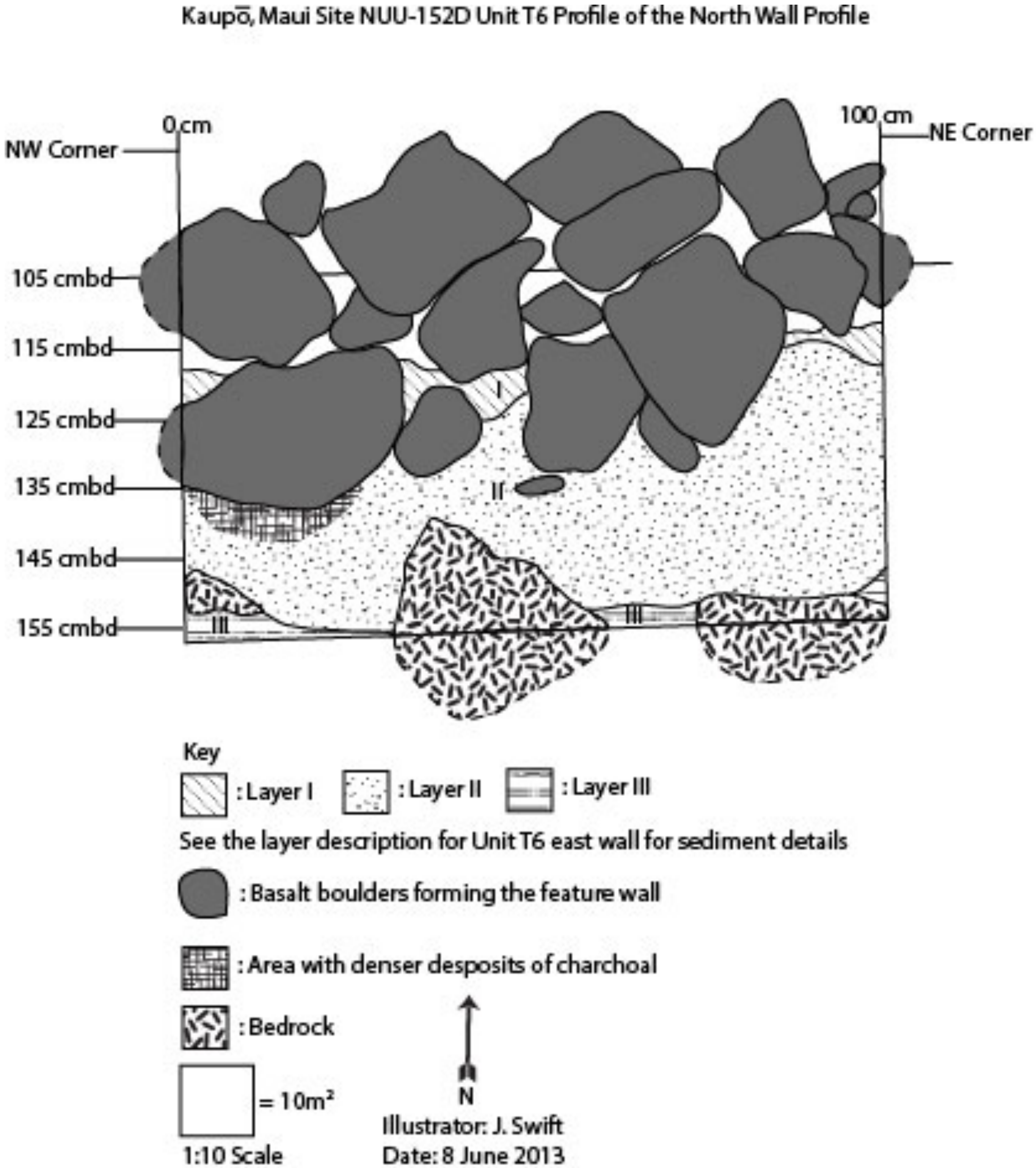


Figure 6.69: Profile map of the north wall. See Figure 6.68 for context descriptions.

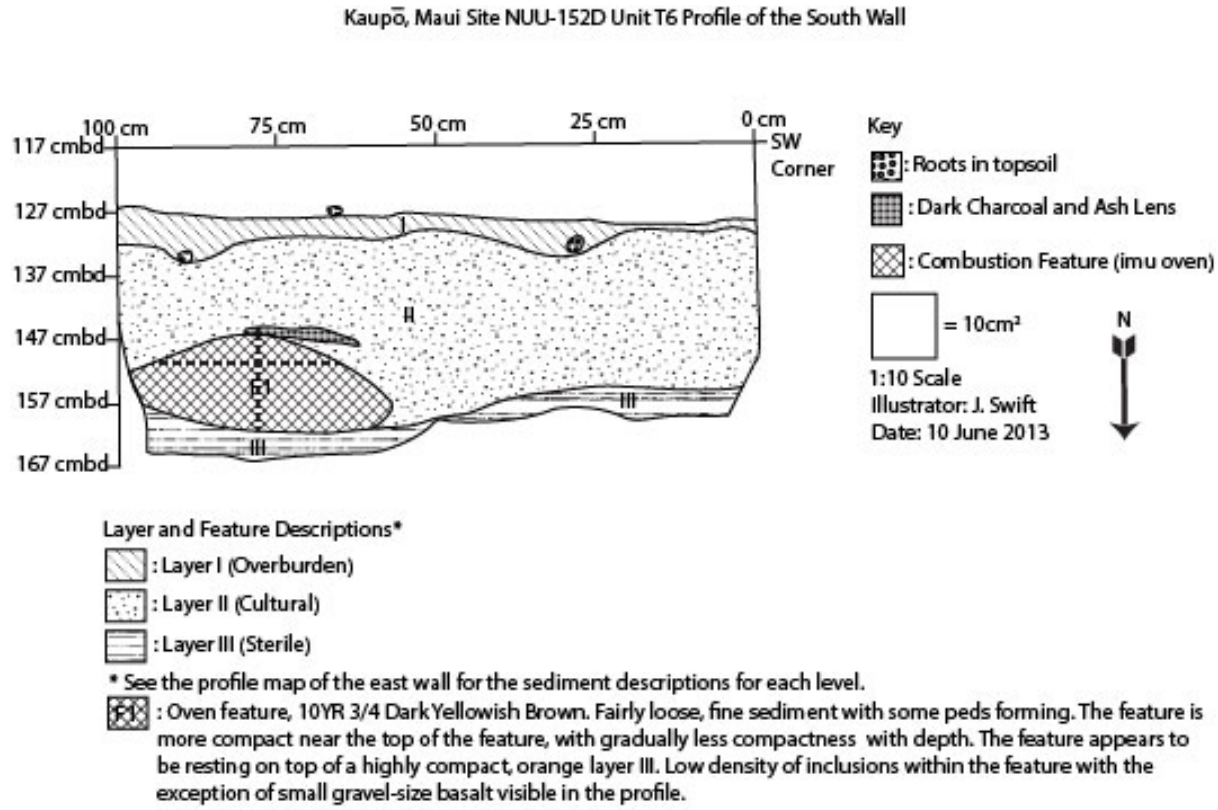


Figure 6.70: Profile map of the Unit T6 south wall with context information. See Figure 6.68 for full context info.

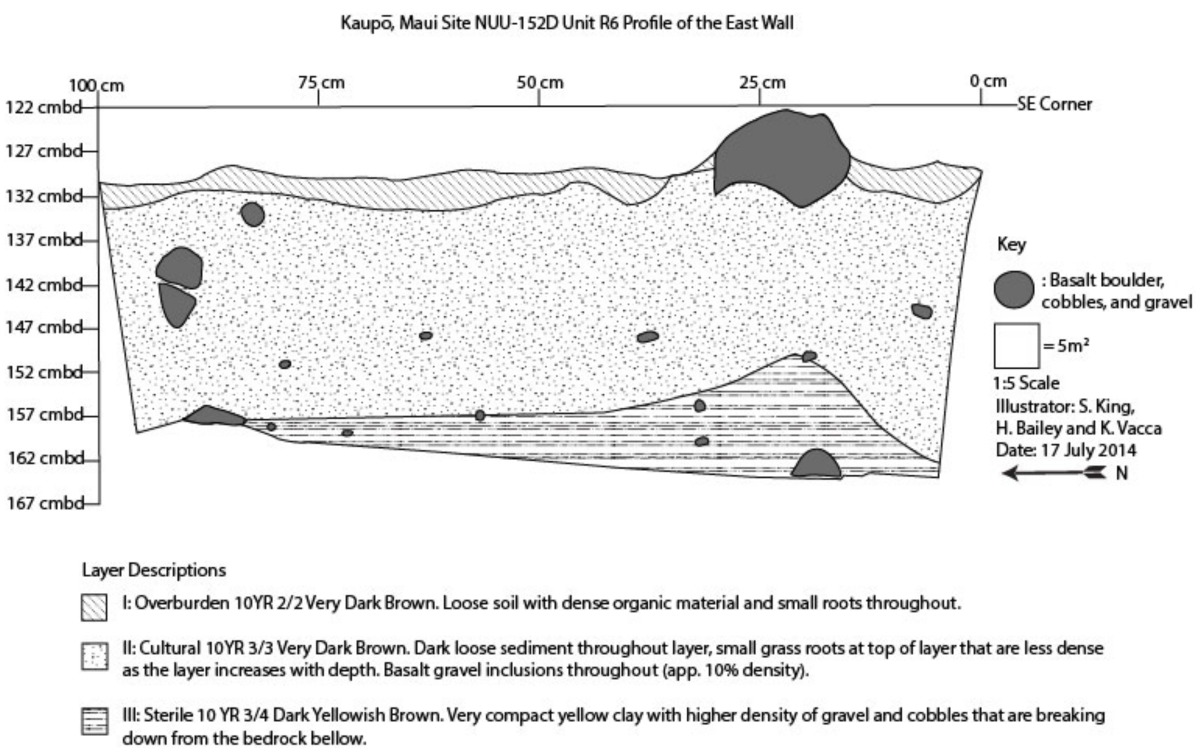


Figure 6.71: Profile map of the Unit R6 east wall with context information.

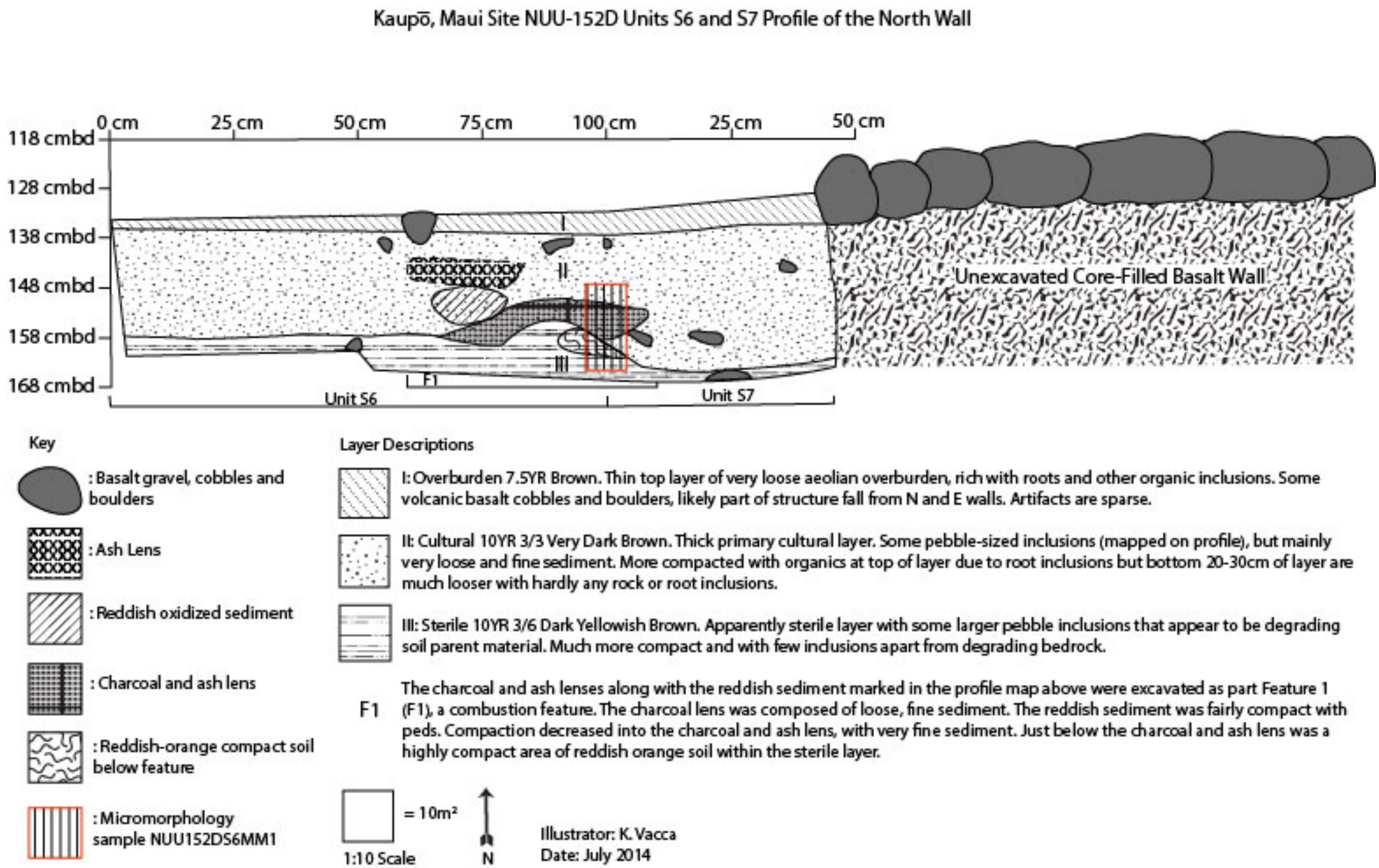


Figure 6.72: Profile map of Units S6 and S7 north wall with context information.

Figure 6.73: Photo of Unit R6 east wall profile .


Figure 6.74: Photo of Units S6 and S7 north wall profile with remnants of the feature visible in the profile.

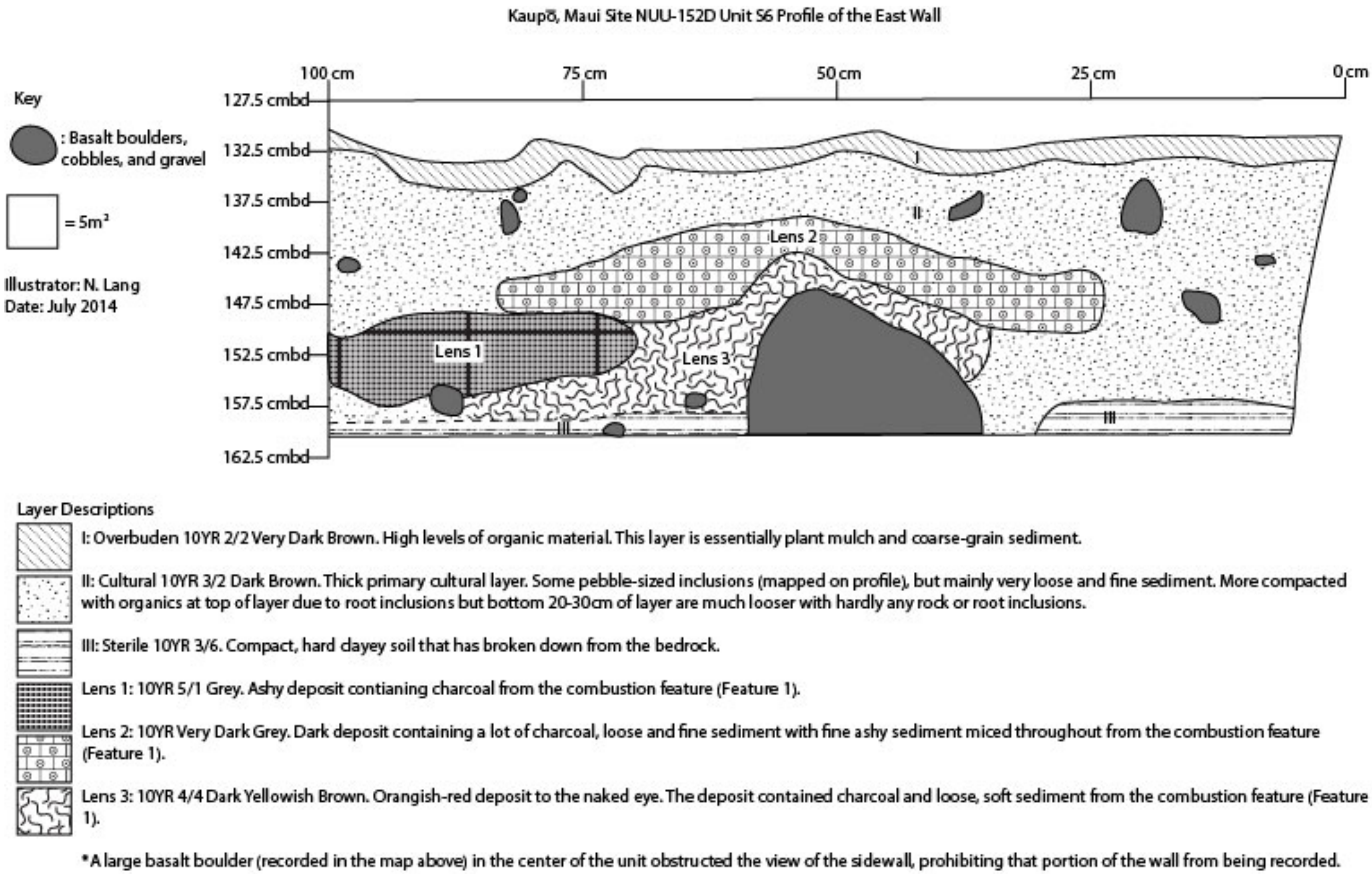


Figure 6.75: Profile map of Unit S6 east wall profile map with context information.

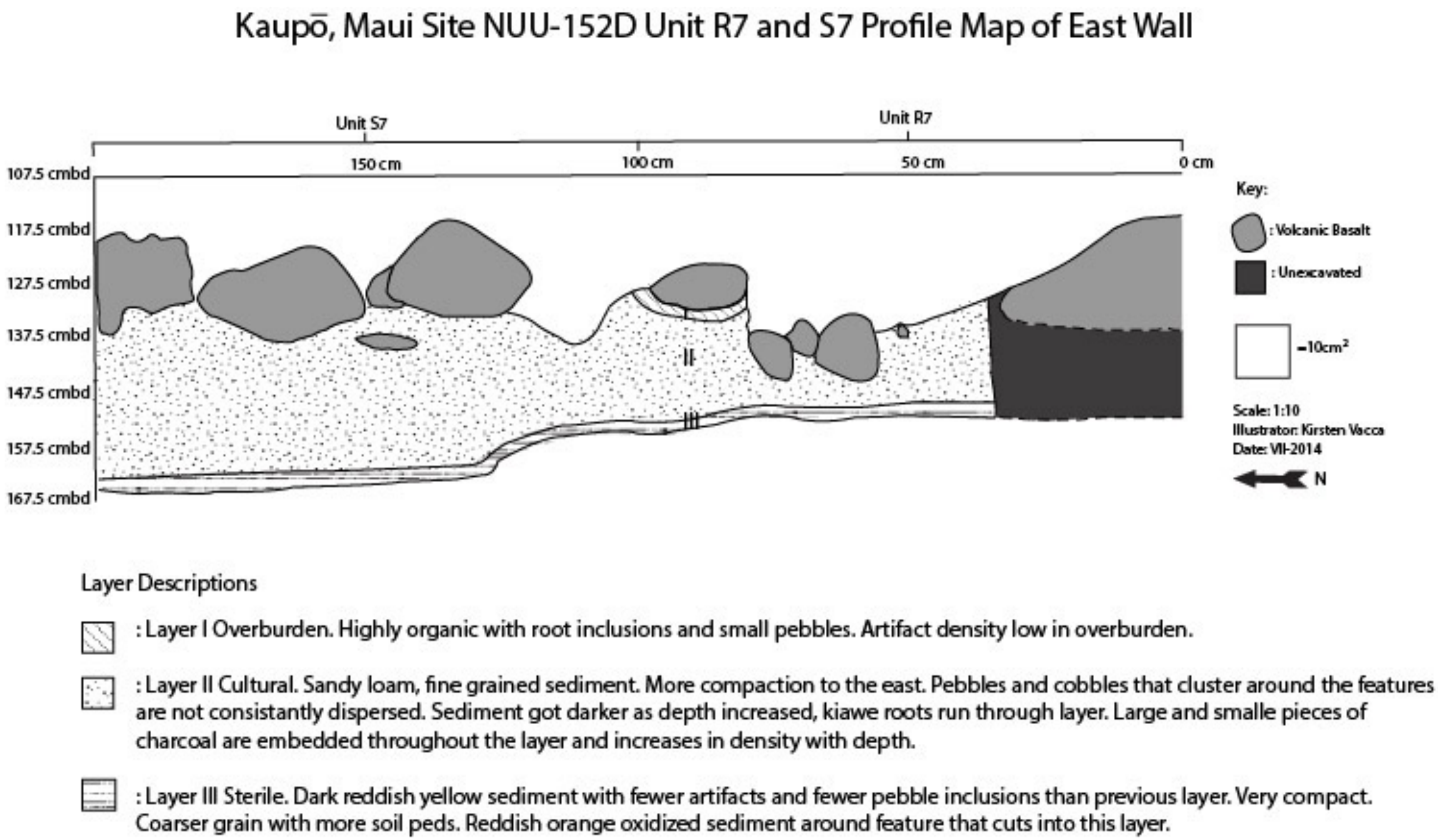


Figure 6.76: Profile map of Units R7 and S7 east wall with context information.

Figure 6.77: Photo of NUU-152D Unit S6 profile of east wall with evidence of combustion feature (feature 1).


Figure 6.78: Photo of NUU-152D Unit R7 and S7 east wall.

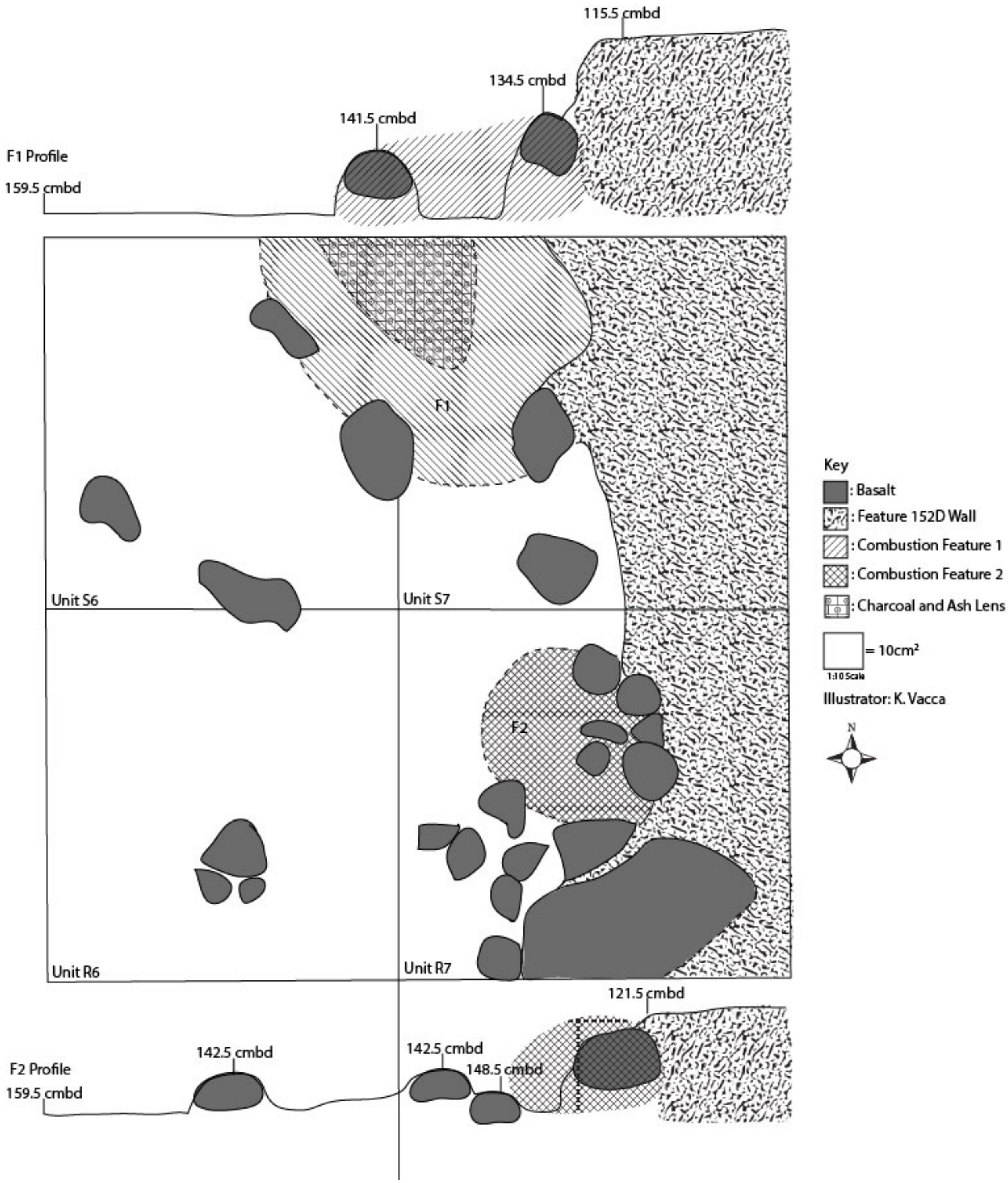
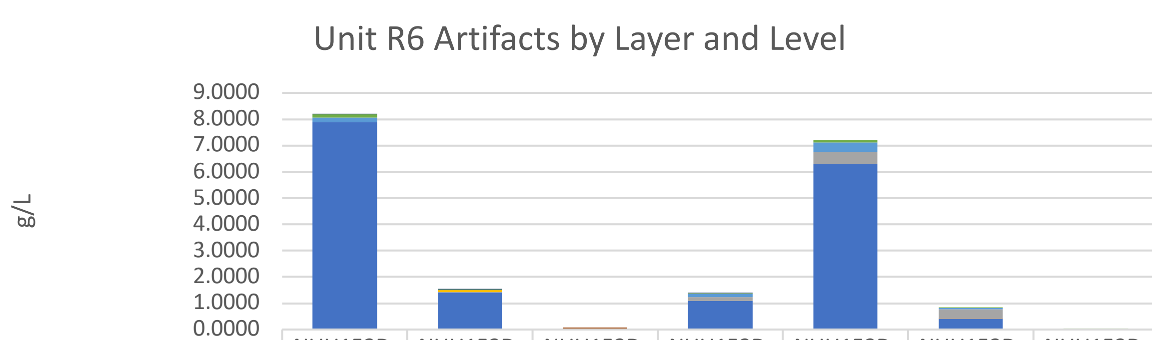


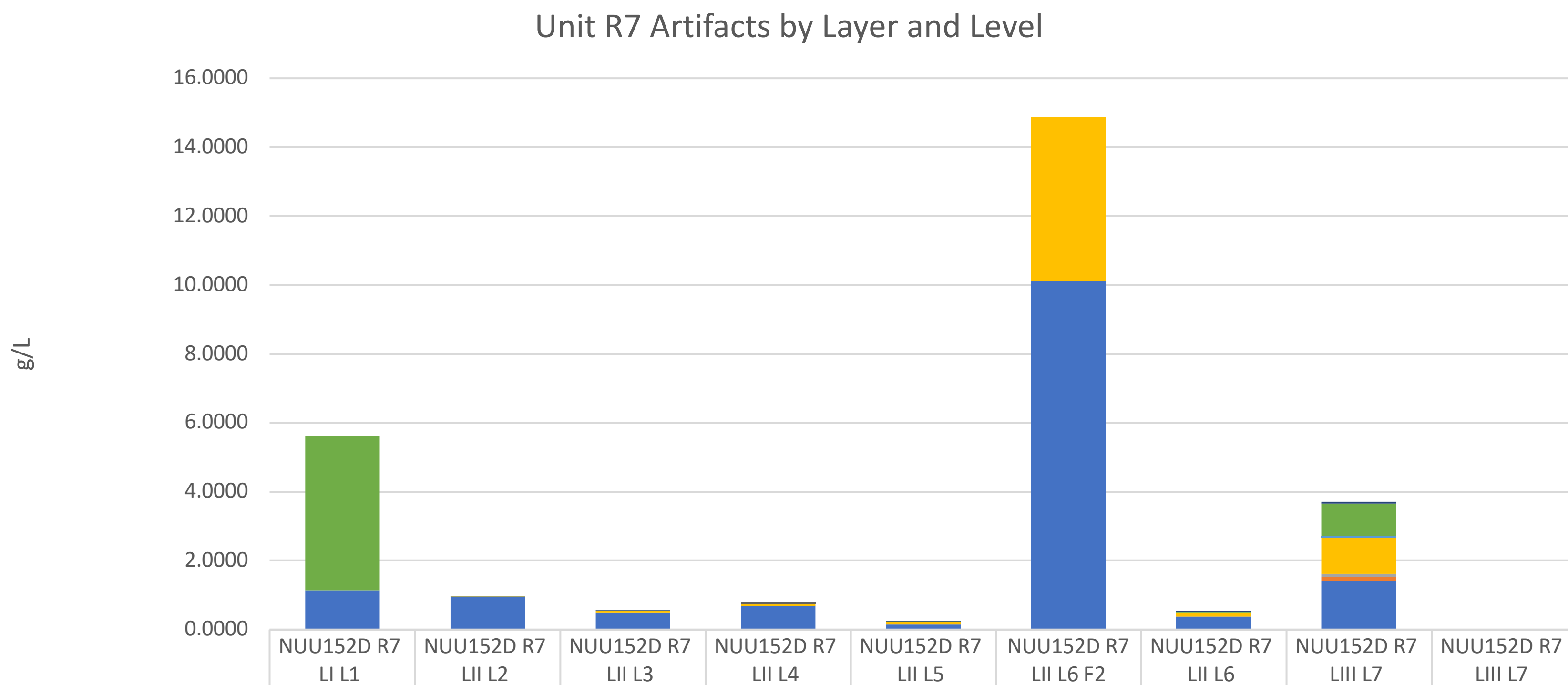
Figure 6.79: Plan map of combustion Features 1 and 2 in Units S6, S7, and R7.

Figure 6.80: Plan photo of Units R6, R7, S6, and S7 with features visible.



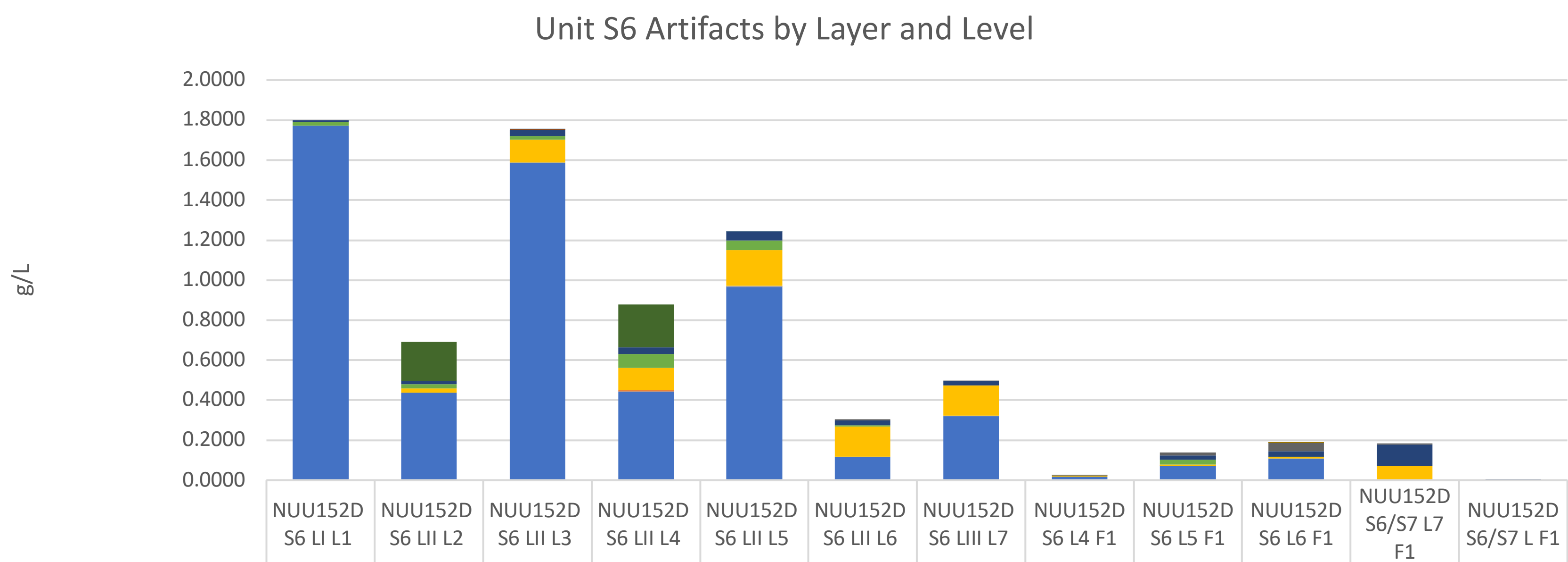
	NUU152D R6 LI L1	NUU152D R6 LII L2	NUU152D R6 LII L3	NUU152D R6 LII L4	NUU152D R6 LIII L5	NUU152D R6 LIII L6	NUU152D R6 LIV L7
Water-rolled rock			0.0033				
Volcanic Glass Debitage	0.0047	0.0009	0.0000	0.0095			
Shell	0.1109	0.0115	0.0006	0.0066	0.0986	0.0326	0.0303
Coral	0.1867	0.0176	0.0018	0.1231	0.3624	0.0468	
ʻIliʻili		0.0529					
Charcoal		0.0301	0.0041	0.1448	0.4531	0.3533	0.0197
Burnt Kukui Nut			0.0000			0.0091	
Basalt Debitage	7.8853	1.4071	0.0323	1.0944	6.2978	0.3982	

Figure 6.81: Unit R6 graph of artifacts displayed as grams per liter of sediment excavated in each context



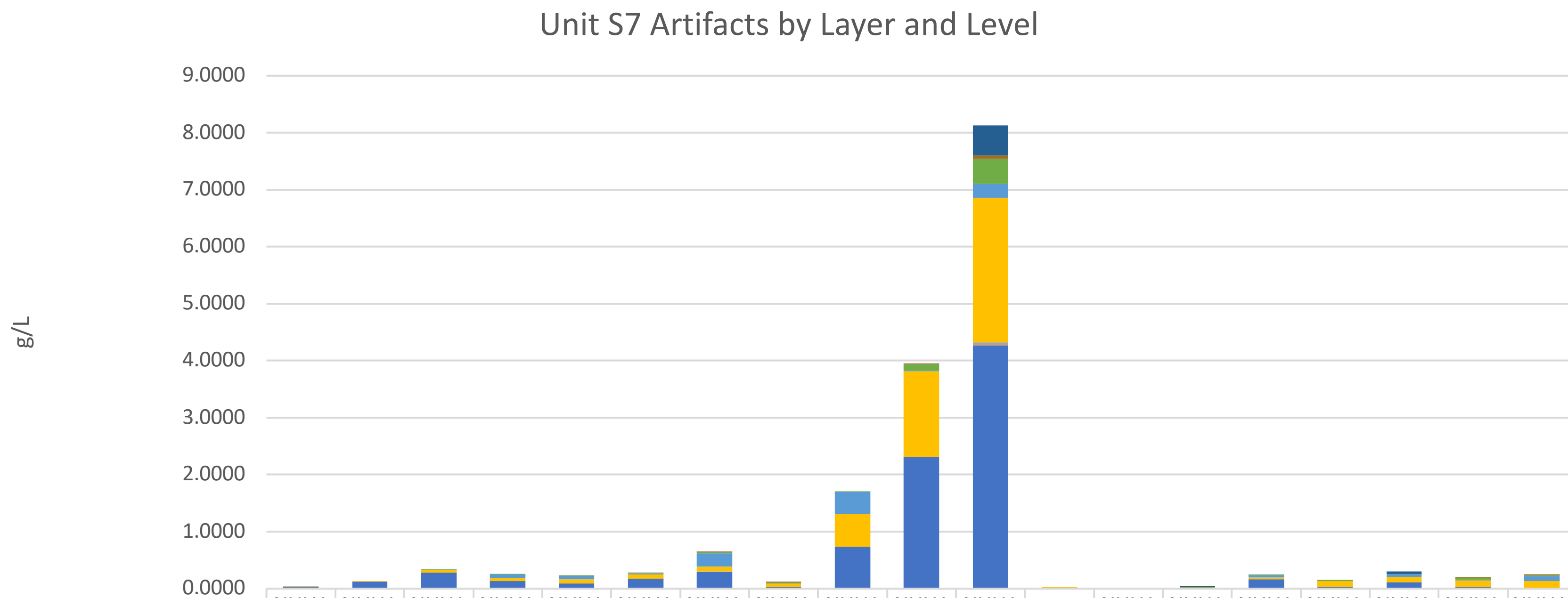
	NUU152D R7 LI L1	NUU152D R7 LII L2	NUU152D R7 LII L3	NUU152D R7 LII L4	NUU152D R7 LII L5	NUU152D R7 LII L6 F2	NUU152D R7 LII L6	NUU152D R7 LIII L7	NUU152D R7 LIII L7
Water-rolled rock				0.0548					
Volcanic Glass Debitage				0.0061					
Shell			0.0126	0.0087	0.0014		0.0356	0.0452	
Coral	4.4663	0.0001	0.0295	0.0019	0.0102		0.0121	0.9452	
ʻIliʻili								0.0505	
Charcoal		0.0098	0.0462	0.0537	0.0827	4.7700	0.1159	1.0376	0.0172
Burnt Kukui Nut		0.0008		0.0007	0.0008		0.0020	0.1000	
Bone not worked		0.0001						0.1129	
Basalt Debitage	1.1422	0.9552	0.4846	0.6779	0.1481	10.1100	0.3698	1.4129	

Figure 6.82: Unit R7 graph of artifacts displayed as grams per liter of sediment excavated in each context



	NUU152D S6 LI L1	NUU152D S6 LII L2	NUU152D S6 LII L3	NUU152D S6 LII L4	NUU152D S6 LII L5	NUU152D S6 LII L6	NUU152D S6 LIII L7	NUU152D S6 L4 F1	NUU152D S6 L5 F1	NUU152D S6 L6 F1	NUU152D S6/S7 L7 F1	NUU152D S6/S7 L F1
Water-rolled rock		0.1960		0.2150								
Volcanic Glass Debitage		0.0015	0.0028		0.0016							
Terrestrial Gastropod										0.0010		
Sea Urchin					0.0005	0.0040	0.0028	0.0008	0.0153	0.0439	0.0076	
Raw Kukui Nut			0.0015									
Shell	0.0091	0.0130	0.0327	0.0326	0.0470	0.0252	0.0198	0.0002	0.0216	0.0262	0.1048	0.0014
Coral	0.0179	0.0220	0.0156	0.0710	0.0482	0.0064			0.0251	0.0002		
ʻIliʻili												
Charcoal		0.0208	0.1173	0.1111	0.1778	0.1507	0.1520	0.0057	0.0038	0.0103	0.0722	0.0019
Burnt Kukui Nut					0.0051		0.0045					
Bone not worked				0.0070	0.0003				0.0023			
Basalt Debitage	1.7721	0.4382	1.5869	0.4426	0.9664	0.1176	0.3188	0.0169	0.0709	0.1075		

Figure 6.83: Unit S6 graph of artifacts displayed as grams per liter of sediment excavated in each context



	NUU152D S7 LI L1	NUU152D S7 LII L2	NUU152D S7 LII L3	NUU152D S7 LII L4	NUU152D S7 LII L5	NUU152D S7 LII L6	NUU152D S7 LII L7	NUU152D S7 LII L8	NUU152D S7 L5 F1	NUU152D S7 L6 F1	NUU152D S7 L7 F1	NUU152D S7 F1	NUU152D T6 LI L1	NUU152D T6 LII L2	NUU152D T6 LII L3	NUU152D T6 LII L4	NUU152D T6 LII L5	NUU152D T6 LII L6	NUU152D T6 LIII L7
Water-rolled rock											0.5377						0.0339		
Volcanic Glass Debitage											0.0225							0.0032	
Terrestrial Gastropod						0.0002							0.0009	0.0000					
Sea Urchin							0.0004	0.0024		0.0014	0.0254						0.0007	0.0024	0.0154
Raw Kukui Nut														0.0001					
Shell			0.0003	0.0042	0.0018	0.0178	0.0156	0.0215	0.0029	0.1181	0.4471			0.0180	0.0015	0.0214	0.0094	0.0281	0.0147
Coral			0.0023	0.0615	0.0610	0.0026	0.2372	0.0018	0.3935	0.0052	0.2377			0.0028	0.0418	0.0028	0.0433	0.0100	0.0858
Charcoal	0.0046	0.0008	0.0476	0.0545	0.0731	0.0796	0.0885	0.0656	0.5623	1.5000	2.5428	0.0239		0.0016	0.0301	0.1076	0.0992	0.1212	0.1210
Burnt Kukui Nut				0.0004		0.0025	0.0096	0.0010			0.0428				0.0009				
Bone not worked											0.0080						0.0004	0.0001	
Basalt Debitage	0.0351	0.1252	0.2807	0.1311	0.0907	0.1721	0.2896	0.0262	0.7406	2.3167	4.2688			0.0039	0.1683	0.0246	0.1123	0.0234	0.0144

Figure 6.84: Unit S7 graph of artifacts displayed as grams per liter of sediment excavated in each context

Excavation Unit	Scientific Determination	NISP	MNI	Weight (g)
R6 LI L1	Cypracidae sp.	1	1	3.45
R6 LI L1	*Cypraea caputserpentis*	3	1	1.54
R6 LII L2	*Cypraea caputserpentis*	2	2	0.48
R6 LII L2	*Drupa* cf. *ricinus*	1	1	1.22
R6 LII L2	Undetermined mollusk	5	1	0.26
R6 LII L3	*Cypraea caputserpentis*	3	1	2.25
R6 LII L3	Undetermined mollusk	5	1	0.38
R6 LII L4	*Cypraea caputserpentis*	2	1	0.41
R6 LII L4	Undetermined mollusk	23	1	0.58
R6 LIII L5	*Cellana* sp.	7	1	0.02
R6 LIII L5	*Conus* sp.	1	1	0.37
R6 LIII L5	*Cypraea caputserpentis*	7	3	6.26
R6 LIII L5	Undetermined mollusk	8	4	0.78
R6 LIII L6	*Cellana* sp.	2	1	0.21
R6 LIII L6	cf. *Drupa* sp.	1	1	0.11
R6 LIII L6	*Cypraea caputserpentis*	5	3	1.62
R6 LIII L6	*Planaxis labiosa*	4	4	0.21
R6 LIII L6	Sea urchin test any species	1	1	0.05
R6 LIII L6	Undetermined mollusk	12	1	0.32
R6 LIV L7 Under Rock	*Cellana* sp.	2	1	0.02
R6 LIV L7 Under Rock	Cypracidae sp.	1	1	1.4
R6 LIV L7 Under Rock	*Drupa* sp.	2	1	0.75
R6 LIV L7 Under Rock	Sea urchin test any species	11	1	0.31
R6 LIV L7	*Cypraea caputserpentis*	2	1	0.84
R6 LIV L7	*Nerita* sp.	1	1	0.17
R6 LIV L7	Undetermined mollusk	1	1	0.04
R7 LII L3	*Cellana* sp.	5	2	0.54
R7 LII L3	*Drupa* sp.	1	1	1.18
R7 LII L4	*Cypraea caputserpentis*	4	1	1.18
R7 LIII L5	Undetermined mollusk	1	1	0.19
R7 LIII L6	Cypracidae spp.	4	2	3.55
R7 LIII L6	*Cypraea caputserpentis*	3	1	0.73
R7 LIII L6	*Planaxis labiosa*	1	1	0.16
R7 LIII L6	Undetermined mollusk	5	2	0.41
R7 LIV L7	*Drupa* sp.	1	1	0.05
R7 LIV L7	Littorina sp.	1	1	0.07
R7 LIV L7	*Planaxis labiosa*	4	4	0.14
R7 LIV L7	Undetermined mollusk	5	1	0.13
R7 L1 to 7 F2 General Wall Fall	Cypracidae sp.	1	1	1.65
R7 L1 to 7 F2 General Wall Fall	Littorina sp.	1	1	0.14
R7 L1 to 7 General Wall Clean	Undetermined mollusk	1	1	0.03
S6 LI L1	Undetermined mollusk	3	2	0.3
S6 LII L2	*Cypraea caputserpentis*	6	2	2.14

Table 6.21: NISP, MNI, Weight, and ID for shell and sea urchin in Feature D.

Unit	Scientific Determination	NISP	MNI	Weight (g)
S6 LII L2	Undetermined mollusk	8	2	0.36
S6 LII L3	*Cypraea caputserpentis*	1	1	0.23
S6 LII L3	*Drupa* sp.	1	1	0.85
S6 LII L3	Thaididae spp.	1	1	3.48
S6 LII L3	Undetermined mollusk	8	4	1.49
S6 LII L4	Cypracidae spp.	8	6	5.83
S6 LII L4	Undetermined mollusk	8	1	0.47
S6 LII L5	cf. *Cellana* sp.	1	1	0.04
S6 LII L5	cf. Cypracidae spp.	3	1	6.91
S6 LII L5	Cypracidae sp.	1	1	0.41
S6 LII L5	*Planaxis labiosa*	5	5	0.35
S6 LII L5	Undetermined mollusk	21	2	0.84
S6 LII L6	cf. *Drupa* sp.	1	1	0.14
S6 LII L6	*Cypraea caputserpentis*	5		0.49
S6 LII L6	*Drupa* sp.	1		0.23
S6 LII L6	*Nerita* sp.	1	1	0.04
S6 LII L6	*Planaxis labiosa*	32	32	2.42
S6 LII L6	Sea urchin test any species	20	1	0.78
S6 LII L6	Undetermined mollusk	22	2	1.55
S6 LIII L7	*Planaxis labiosa*	6	5	0.56
S6 LIII L7	Sea urchin jaw any species	1	1	0.03
S6 LIII L7	Sea urchin test any species	3	1	0.1
S6 LIII L7	Undetermined mollusk	4	1	0.22
S6 L4 F1	Sea urchin test any species	2	1	0.05
S6 L4 F1	Undetermined mollusk	1	1	0.01
S6 L5 F1	*Planaxis labiosa*	4	4	0.47
S6 L5 F1	Sea urchin test any species	32	1	0.8
S6 L5 F1	Undetermined mollusk	18	2	0.83
S6 L6 F1 Flot	Sea urchin test any species	39	2	1.15
S6 L6 F1 Flot	Undetermined mollusk	13	2	0.59
S6 L6 F1	general terrestrial gastropod	3	1	0.05
S6 L6 F1	Undetermined mollusk	1	1	0.22
S6 L1 to 5 General Wall Clean	Sea urchin test any species	11	1	0.11
S6 L1 to 5 General Wall Clean	Undetermined mollusk	38	1	0.16
S6/S7 L7 F1	*Drupa* sp.	1	1	1.06
S6/S7 L7 F1	*Planaxis labiosa*	1	1	0.18
S6/S7 L7 F1	Sea urchin test any species	5	1	0.16
S6/S7 L7 F1	Undetermined mollusk	2	1	0.96
S6/S7 F1 Under Rock	cf. *Planaxis labiosa*	1	1	0.02
S7 LII L3	cf. *Cellana* sp.	1	1	0.04
S7 LII L4	cf. *Drupa* sp.	1	1	0.07
S7 LII L4	*Cypraea caputserpentis*	2	1	0.42
S7 LII L4	Undetermined mollusk	5	1	0.21
S7 LII L5	Undetermined mollusk	2	1	0.31
S7 LII L6	Cypraea caputserpentis	2	1	2.99
S7 LII L6	Undetermined mollusk	11	3	0.1
S7 LII L7	*Cellana* sp.	1	1	0.07

Table 6.21 continued.

Excavation Unit	Scientific Determination	NISP	MNI	Weight (g)
S7 LII L7	cf. *Cypraea caputserpentis*	2	2	0.2
S7 LII L7	Cypracidae sp.	1	1	1.14
S7 LII L7	*Drupa* cf. *ricinus*	1	1	0.05
S7 LII L7	*Echinothrix* sp.	1	1	0.05
S7 LII L7	*Planaxis labiosa*	13	12	0.78
S7 LII L7	Sea urchin test any species	1	1	0.01
S7 LII L7	Undetermined mollusk	12	2	0.39
S7 LII L8	cf. *Cypraea cernica*	1	1	0.11
S7 LII L8	*Echinothrix* sp.	1	1	0.06
S7 LII L8	*Nerita picea*	4	2	0.97
S7 LII L8	*Planaxis labiosa*	13	13	1.64
S7 LII L8	Sea urchin test any species	15	1	0.4
S7 LII L8	Undetermined mollusk	13	1	0.63
S7 L5 F1	Undetermined mollusk	2	2	0.04
S7 L6 F1	*Echinothrix* sp.	1	1	0.02
S7 L6 F1	Nerita picea	1	1	0.08
S7 L6 F1	*Planaxis labiosa*	4	4	0.57
S7 L6 F1	Sea urchin test any species	1	1	0.01
S7 L6 F1	Undetermined mollusk	8	2	0.9
S7 L7 F1 Wall Clean SE	cf. *Cypraea caputserpentis*	4	1	0.68
S7 L7 F1 Wall Clean SE	cf. *Drupa* sp.	1	1	0.03
S7 L7 F1 Wall Clean SE	cf. Sea Urchin jaw	1	1	0.06
S7 L7 F1 Wall Clean SE	*Drupa* cf. *ricinus*	3	1	0.15
S7 L7 F1 Wall Clean SE	*Nerita picea*	1	1	0.01
S7 L7 F1 Wall Clean SE	Sea urchin test any species	4	1	0.12
S7 L7 F1 Wall Clean SE	Undetermined mollusk	10	4	0.4
S7 L7 F1	*Cellana exarata*	2	1	0.05
S7 L7 F1	cf. *Drupa* sp.	1	1	0.03
S7 L7 F1	Cypracidae sp.	1	1	1.91
S7 L7 F1	*Echinothrix* sp.	1	1	0.03
S7 L7 F1	*Nerita picea*	1	1	0.27
S7 L7 F1	*Planaxis labiosa*	15	13	1.66
S7 L7 F1	Sea urchin test any species	6	1	0.19
S7 L7 F1	Undetermined mollusk	7	2	0.73
S7 L7 Wall Fall from Micromorph Sample	Sea urchin test any species	8	1	0.2
S7 L7 Wall Fall from Micromorph Sample	Undetermined mollusk	1	1	0.02
S7 L1 to 8 Wall Clean North Wall	cf. *Cypraea* sp.	1	1	0.34
S7 L1 to 8 Wall Clean North Wall	Cypracidae sp.	1	1	0.15
S7 L1 to 8 Wall Clean North Wall	*Cypraea caputserpentis*	1	1	1.81
S7 L1 to 8 Wall Clean North Wall	Sea urchin test any species	3	1	0.09
S7 L1 to 8 Wall Clean North Wall	Undetermined mollusk	9	1	0.22
T6 LI L1	*Achatina fulica*	18	1	0.31

Table 6.21 continued.

Excavation Unit	Scientific Determination	NISP	MNI	Weight (g)

T6 LII L2	*Cypraea caputserpentis*	7	6	3.62
T6 LII L2	general terrestrial gastropod	5		0.0045
T6 LII L2	Undetermined mollusk	8	3	0.24
T6 LII L3	*Cypraea caputserpentis*	1	1	0.33
T6 LII L4	*Conidae* spp.	2	2	6.45
T6 LII L4	*Nerita* sp.	1	1	0.16
T6 LII L4	Undetermined mollusk	8	2	1.26
T6 LII L5	*Cypraea caputserpentis*	1	1	1.13
T6 LII L5	*Planaxis labiosa*	3	3	0.27
T6 LII L5	Sea urchin test any species	2	1	0.14
T6 LII L5	Undetermined mollusk	15	8	0.58
T6 LII L6	cf. Cypracidae sp.	3	1	1.38
T6 LII L6	cf. *Drupa* spp.	3	2	0.42
T6 LII L6	*Planaxis labiosa*	11	11	1.84
T6 LII L6	Sea urchin test any species	14		0.52
T6 LII L6	Undetermined mollusk	37	7	2.13
T6 LII L6	Undetermined Sea Snail	6	6	0.2
T6 LIII L7	*Planaxis labiosa*	2	2	0.25
T6 LIII L7	Sea urchin test any species	11	2	0.45
T6 LIII L7	Undetermined mollusk	2	2	0.15
T6 L7 General Wall Clean	Sea urchin test any species	8	1	0.26

Table 6.22 continued.

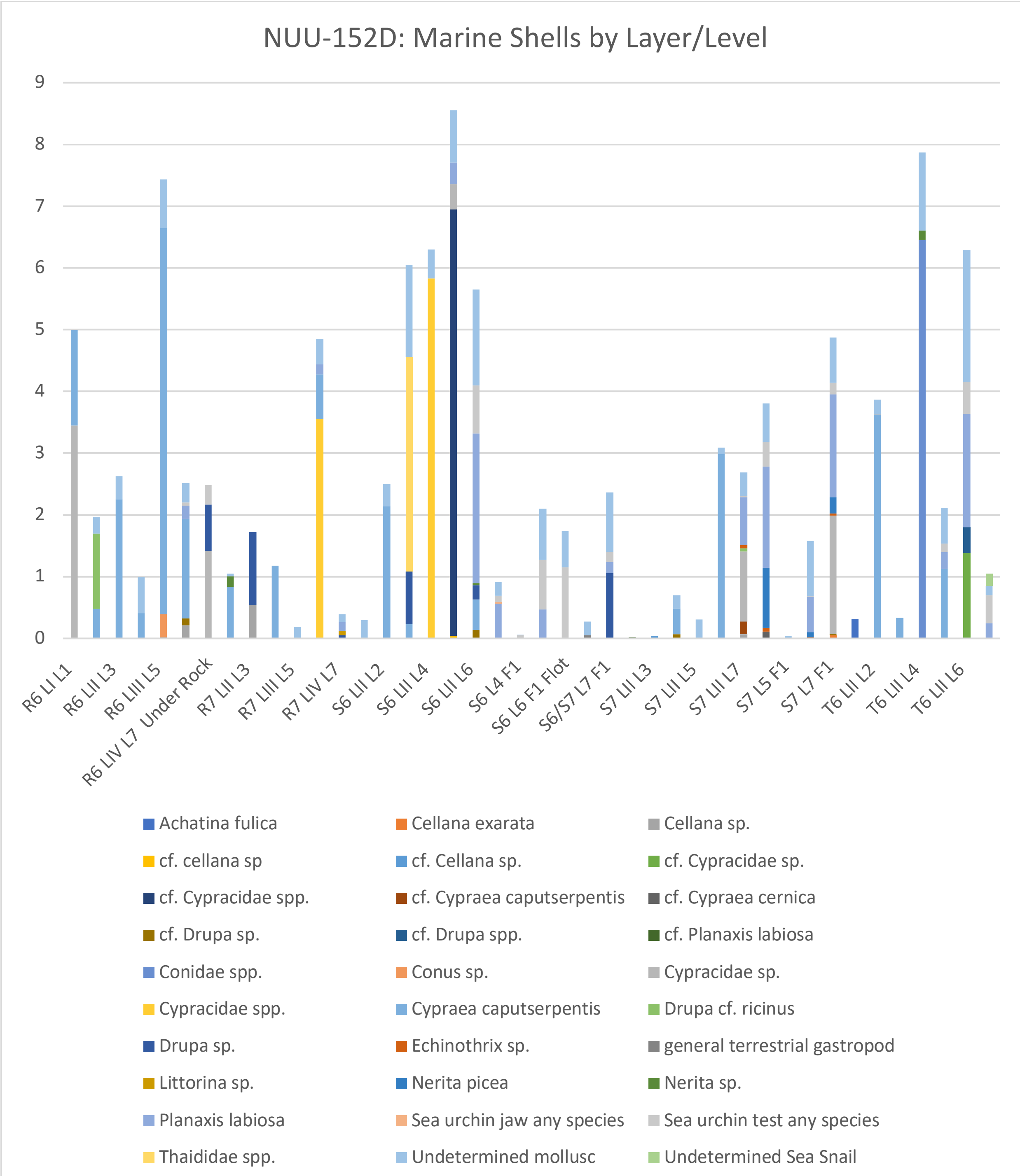


Figure 6.85: Summary of marine species in NUU-152D by unit and layer.

Unit	Artifact Size	Item Type	Sum of item count	Sum of weight /g
R6 LI L1	≥6.33mm	Wood	1	0.1706
R6 LI L1	2mm-4mm	Lithic	4	0.0994
R6 LI L1	2mm-4mm	Wood	0	0.5961
R6 LI L1	4mm-6.3mm	Lithic	2	0.2645
R6 LI L1	4mm-6.3mm	Wood	9	0.3426
R6 LIV L7	0.5mm-2mm	Charcoal	2	0.0008
R7 LI L1	≥6.33mm	Wood	3	0.2027
R7 LI L1	2mm-4mm	insect	3	0.0086
R7 LI L1	2mm-4mm	Lithic	2	0.0534
R7 LI L1	2mm-4mm	plant material	0	0.0863
R7 LI L1	2mm-4mm	Wood	0	0.4581
R7 LI L1	4mm-6.3mm	Lithic	2	0.1916
R7 LI L1	4mm-6.3mm	plant material	4	0.0086
R7 LI L1	4mm-6.3mm	Wood	20	0.4092
R7 LII L3	0.5mm-2mm	Charcoal		0.0093
R7 LII L3	2mm-4mm	Charcoal	2	0.0216
R7 LII L6	0.5mm-2mm	Charcoal	69	0.0322
S6 LI L1	0.5mm-2mm	Charcoal	1	0.0005
S6 LI L1	0.5mm-2mm	unburnt bone	3	0.0043
S6 LII L3	0.5mm-2mm	Charcoal		0.016
S6 LII L3	2mm-4mm	Charcoal	1	0.009
S6 LII L4	≥6.33mm	Lithic	1	0.3112
S6 LII L4	2mm-4mm	Charcoal	5	0.0359
S6 LII L4	2mm-4mm	Lithic	5	0.1038
S6 LII L4	2mm-4mm	unknown	1	0.0062
S6 LII L4	2mm-4mm	Wood	3	0.0451
S6 LII L4	4mm-6.3mm	Charcoal	1	0.0317
S6 L5 F1	≥6.33mm	Charcoal	5	0.2359
S6 L5 F1	2mm-4mm	Burnt shell	1	0.0199
S6 L5 F1	2mm-4mm	Charcoal	0	0.391
S6 L5 F1	2mm-4mm	Contemporary flora	8	0.0289
S6 L5 F1	2mm-4mm	Fire cracked rock	8	0.2675
S6 L5 F1	2mm-4mm	Lithic	6	0.1226
S6 L5 F1	2mm-4mm	Shell	2	0.0252
S6 L5 F1	4mm-6.3mm	Charcoal	8	0.1142
S6 L5 F1	4mm-6.3mm	Fire cracked rock	2	0.3634
S6 L5 F1	4mm-6.3mm	Lithic	1	0.039
S7 LII L4	2mm-4mm	Charcoal	4	0.017
S7 LII L4	2mm-4mm	Lithic	5	0.174
S7 LII L4	2mm-4mm	Wood	6	0.014
S7 LII L4	4mm-6.3mm	Charcoal	1	0.046
S7 LII L4	4mm-6.3mm	Wood	10	0.055
S7 L5 F1	2mm-4mm	Bone	1	0.0092
S7 L5 F1	2mm-4mm	Charcoal	13	0.1345
S7 L5 F1	2mm-4mm	Lithics	4	0.1033
S7 L5 F1	4mm-6.3mm	Charcoal	3	0.0252
S7 L5 F1	4mm-6.3mm	Lithic	3	0.5009

Table 6.23: Microartifacts from NUU-152D units.

Site/Unit/Layer/Level	Scientific Determination	NISP	MNI	Weight (g)	Comments
NUU152D R7 LII L2	Undetermined fish	1	1	0.01	fish 'pelvis'
NUU152D R7 LIII L7	Pig	4	1	1.05	Pig teeth
NUU152D S6 L5 F1	general undetermined bone	1		0.12	possible bone -Missing
NUU152D S6 LII L4	Pig	9	1	1.33	Pig molars
NUU152D S6 LII L4	Undetermined fish	1	1	0.03	Fish mandible
NUU152D S6 LII L5	Undetermined Mammal	6	1	0.05	NID Fragment. Broken, likely from same bone.
NUU152D S7 L7 F1	Medium mammal	7	1	0.09	NID fragments likely from same bone
NUU152D S7 L7 F1 Wall Clean S.E. Corner	general undetermined bone	1	1	0.02	NID Fragment
NUU152D S7 L8 Wall Clean North Wall	general undetermined bone	1	1	0.01	
NUU152D T6 LII L5	Medium mammal	1	1	0.09	NID fragment
NUU152D T6 LII L6	Undetermined fish	1	1	0.03	fish vertebrae

Table 6.24: Identification of bone, NISP, MNI, and weight from NUU-152D.

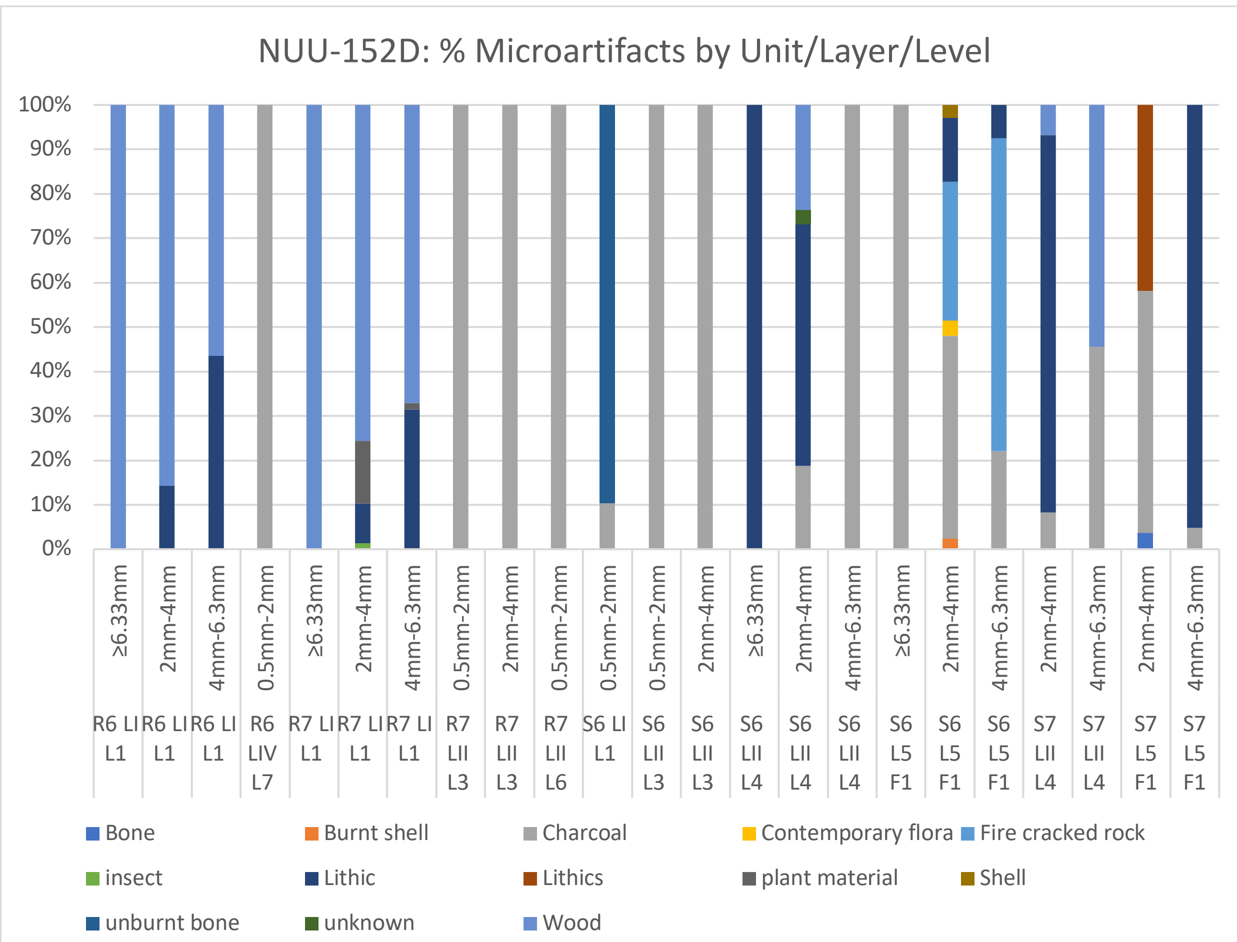


Figure 6.86: Comparisons of total microartifact collections in NUU-152D across units, layers and levels

Site/Layer/Level/Sample	pH	% Organic Carbon	**Particle Size Distribution**								
			<0.063	**0.063**	**0.125**	**0.25**	**0.5**	**1**	**2**	**4**	**6.3**
R6 L1 LI SS1	5.78	41.5222	6.48	18.1	32.44	47.22	55.88	63.8	70.06	75.9	100.6
R6 L7 LIII SS1	6.20	14.9406	9.18	24.72	41.94	60.36	84.54		97.08	99.5	100.12
R7 L1 LI SS1	6.09	39.7860	7.74	29	50.66	70.16	83.74	93.72	97.86	99.36	99.74
R7 L3 LII SS3	6.28	23.6824	22.44	51.72	79.18	91.64	96.7		98.22	99.02	100.54
R7 L6 F2 SS3	5.96	22.4080	21.2	47.26	71.72	86.16	94.2		95.2	96.78	100.46
R7 L7 LIII SS1	6.38	14.0564	4.06	10.42	17.95	27.13	56.39		82.14	88.65	100.44
S6 L1 LI SS1	5.70	55.0722	3.48	15.14	32.08	51.38	72.76		80.62	87.36	100.42
S6 L3 LII SS1	6.15	20.7864	13.64	31.46	48.96	63.06	73.74		77.64	80.38	100
S6 L4 LII SS3	6.47	18.6224	18.32	39.36	60.52	75.16	81.74	88.08	92.3	93.78	99.28
S6 L5 F1 SS5	7.17		27.84	48.24	67.9	81.04	87.5	92.58	96.7	98.16	101.64
S6 L7 LIII SS3	6.85	16.1464	1.02	2.18	3.9	6.62	10.68	21.08	42.38	52.48	100.38
S7 L4 LII SS3	6.14	21.0778	23.24	50.32	75.52	87.84	91.56	93.52	95	96.3	98.48
S7 L5 F1 SS5	6.51	21.0993	16.28	37.64	56.98	69.6	75.62	79.88	82.94	85.28	98.66
			<0.5mm%	**>0.5mm%**	**>2mm%**						
T6 L2 LII SS	6.42		71.49	92.37	100.00						
T6 L3-4 Charcoal Lens	6.71		71.29	90.10	100.00						
			<0.063	**0.063**	**0.125**	**0.25**	**0.5**	**1**	**2**	**4**	**6.3**
NUU420/152 OFFSITE 3	5.69	53.1197	9.64	34.96	56.86	67.14	70.72	73.66	75.86	78.92	100.44

Table 6.25: Sediment sample data from NUU-152D units.

Figure 6.87: Graphs of difference in pH for NUU152D units.

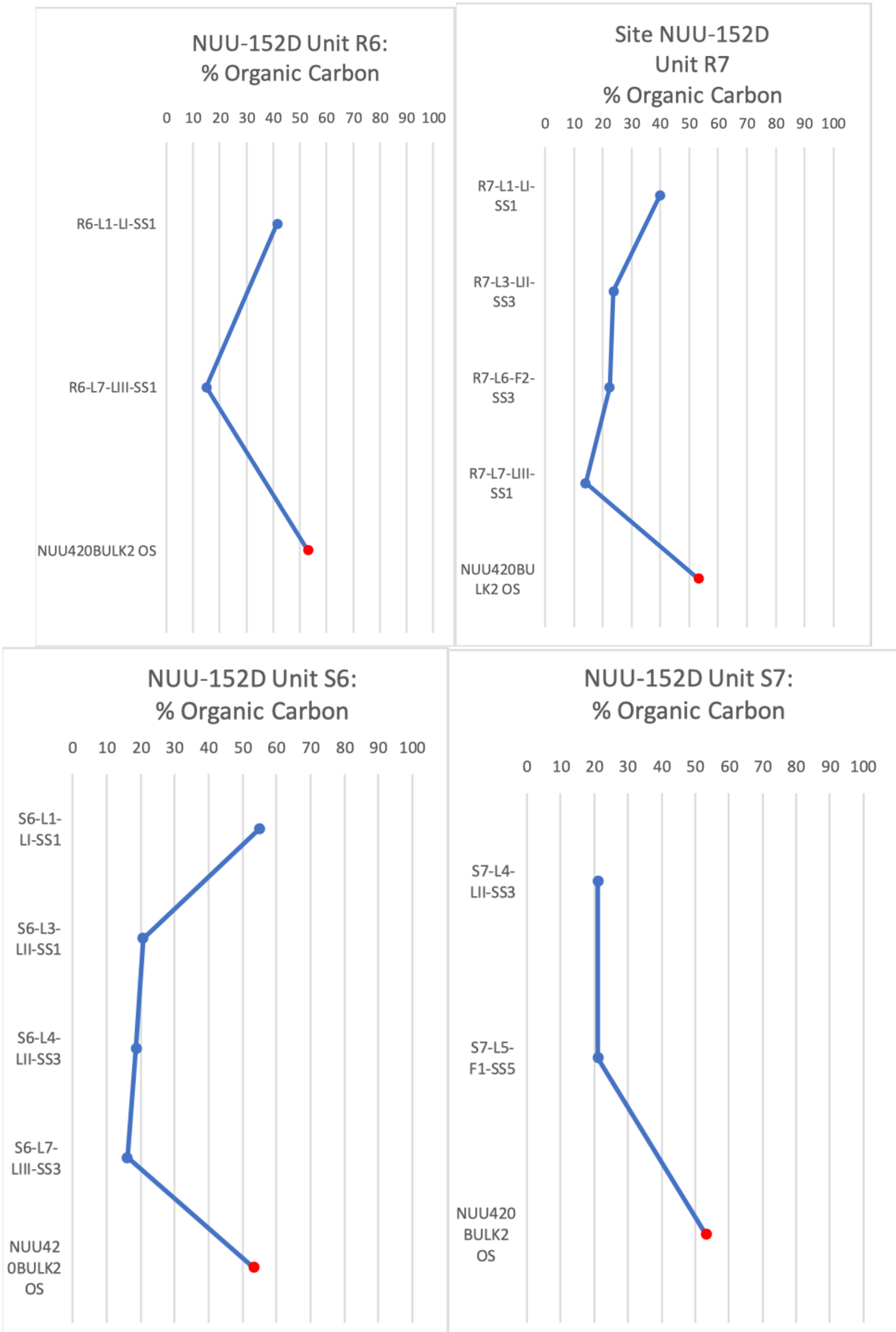


Figure 6.88: Difference in LOI for NUU-152D units.

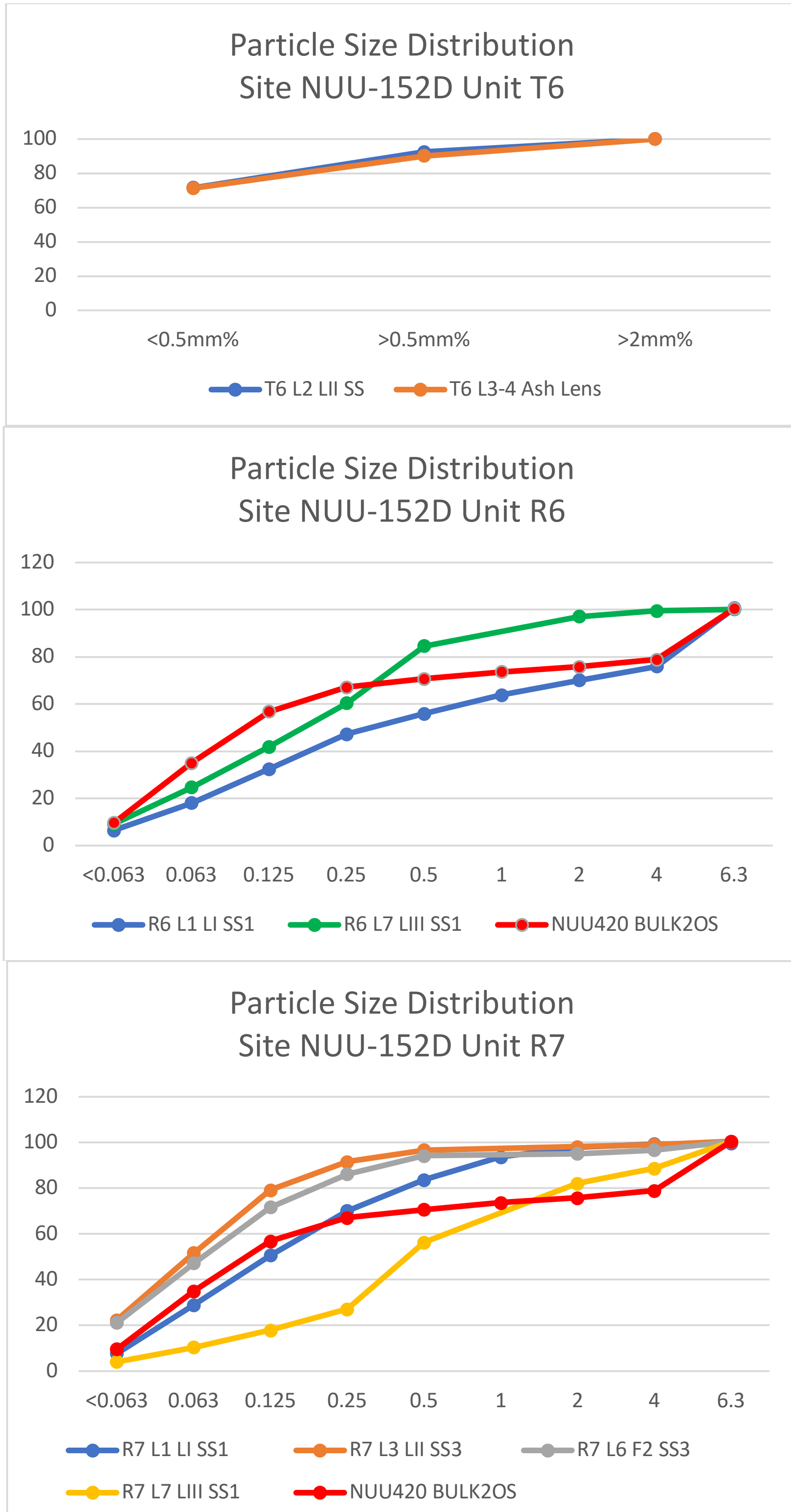
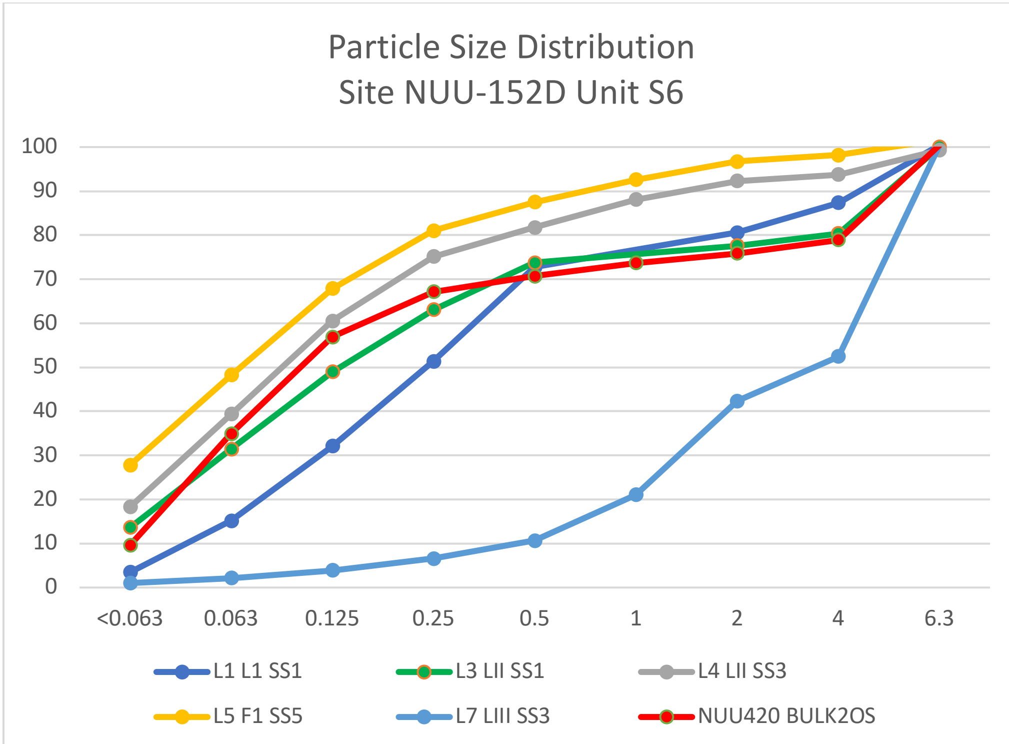


Figure 6.89: Particle size distribution data for Units T6, R6, and R7.



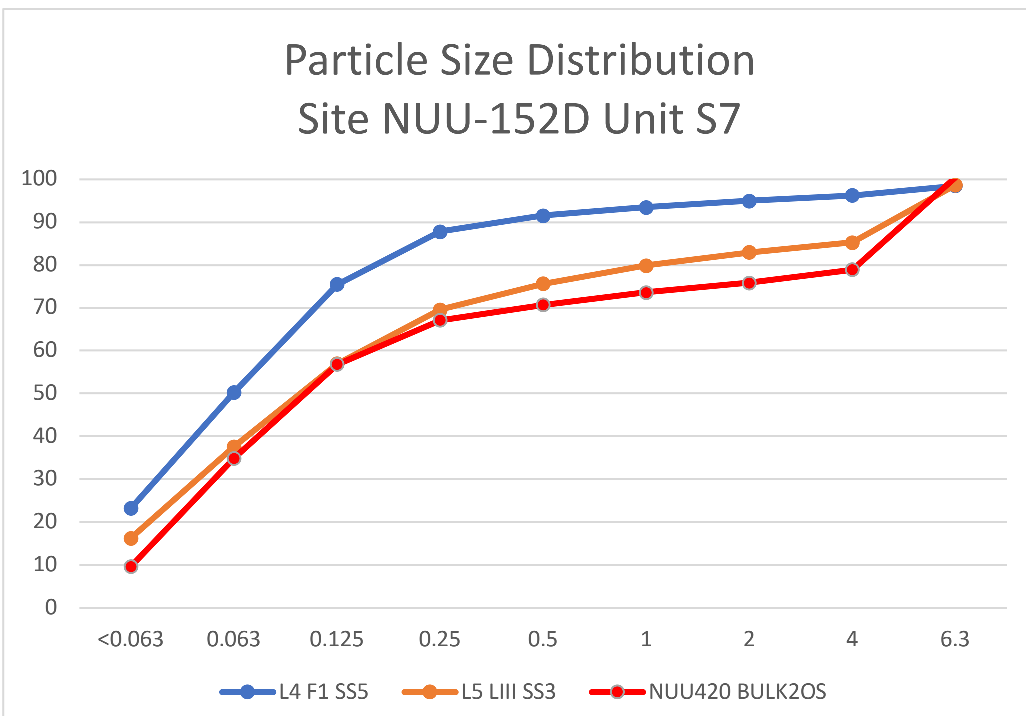


Figure 6.90: Particle size distribution data for Units S6 and S7.

NUU-152 Terrace Units U14, U15, and J14

The units excavated in the terrace of site NUU-152 were shallow compared with the units placed in ‘inside’ spaces and produced fewer artifacts per liter. The dominant artifacts recovered during excavation were lithic debitage fragments from highly fractured basalt (which could actually represent natural breaks). Volcanic glass flakes in the terrace units were found at higher densities than elsewhere on site. Artifacts that could contextualize these volcanic glass flakes were largely absent. The basalt core, basalt debitage, burnt kukui, coral, ‘ili‘ili and degraded marine shell all found at low densities signal a multiplicity of activities that may have been taking place on the terraces. The water-rolled rocks would have been transported from the ocean to the site for a purpose. Their presence on the terrace may indicate their use as a weights but such hypotheses require additional information. The basalt core and volcanic glass flakes clearly indicate that stone tools were being made or modified, but to a limited degree given the paucity of the record. The faunal analyses clarify the picture slightly, indicating the presence of similar gastropods that were present in the NUU-152D units and evidence of the presence of medium mammals in the area. Microartifacts were not extracted from the sediment samples in these units and organic carbon was not measured due to differences in sampling practices for the original test units. The high pH levels, however, do indicate anthropogenic or organic input. The particle size distribution shows similarities between the on and off-site samples, evidencing little difference in the site formation processes of these different areas.

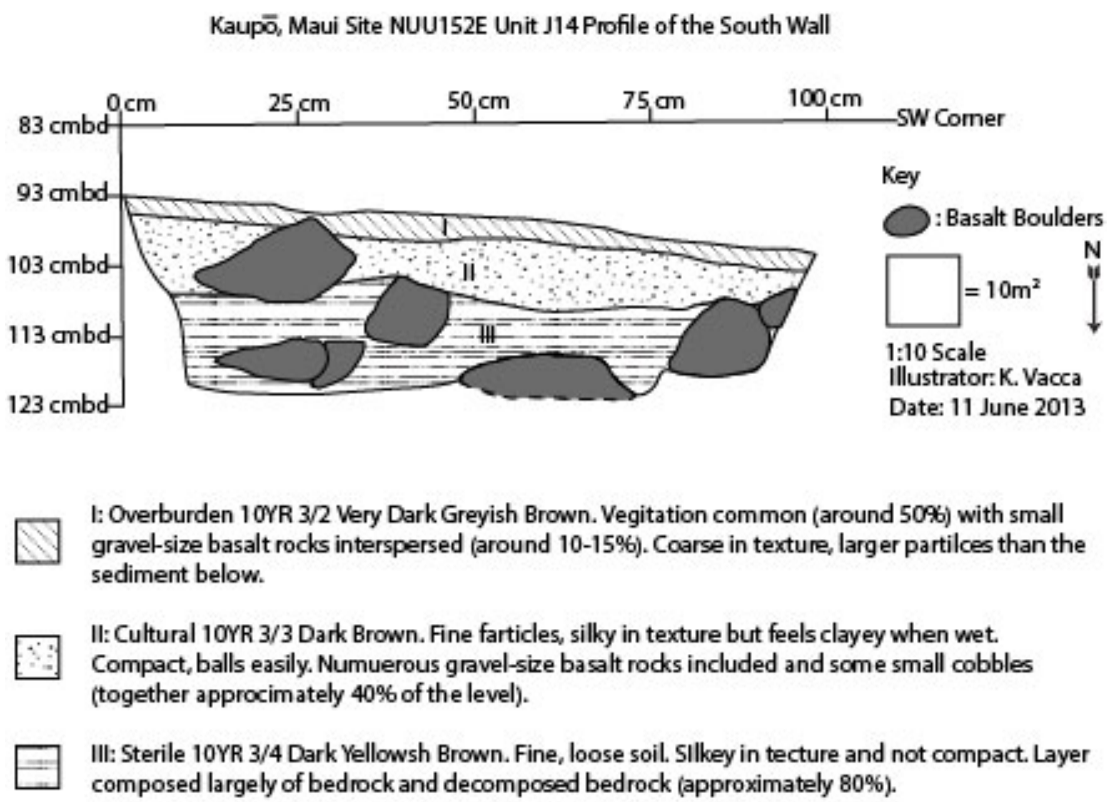


Figure 6.91: Profile map of ths south wall in Unit J14 with context information..

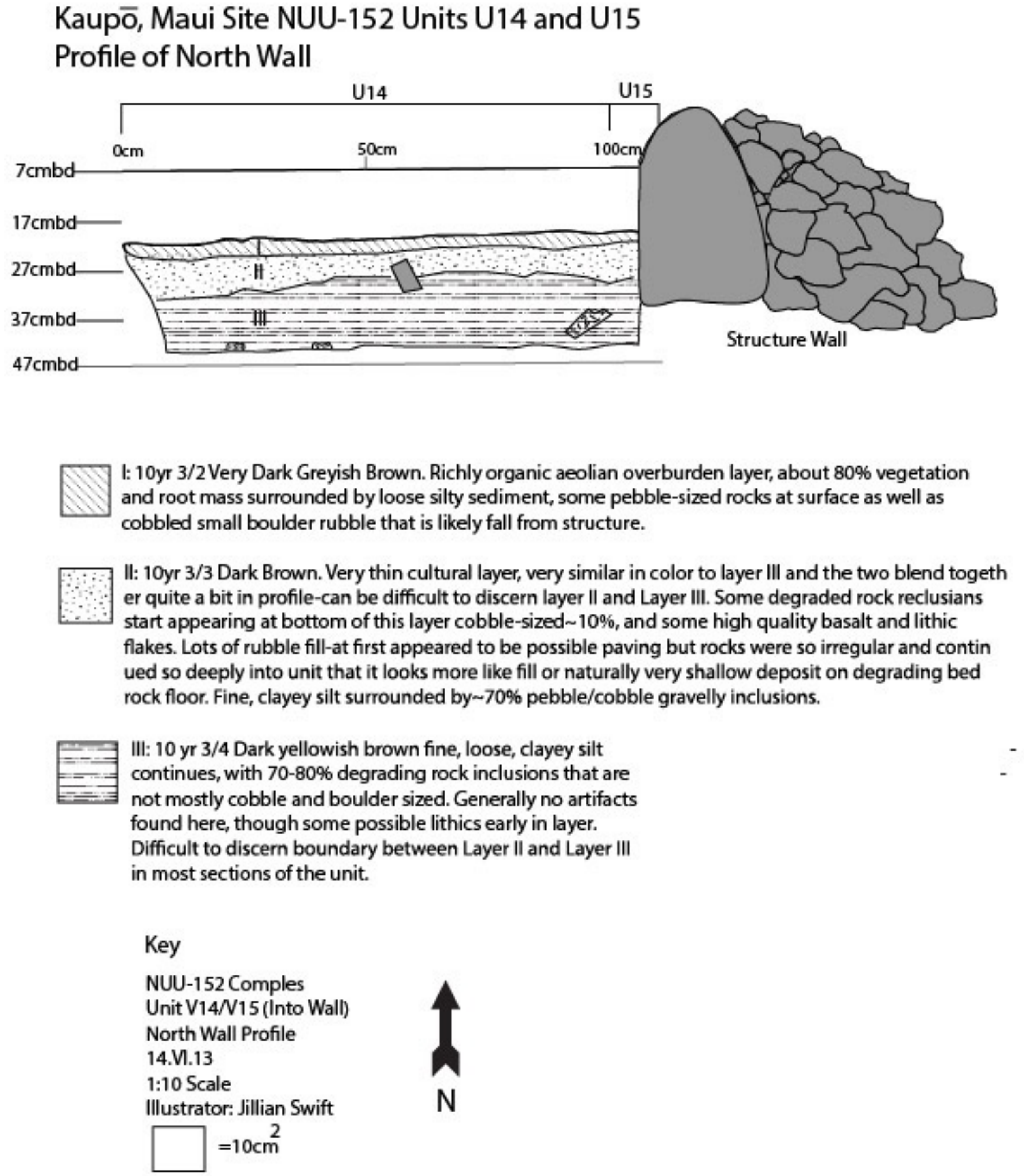
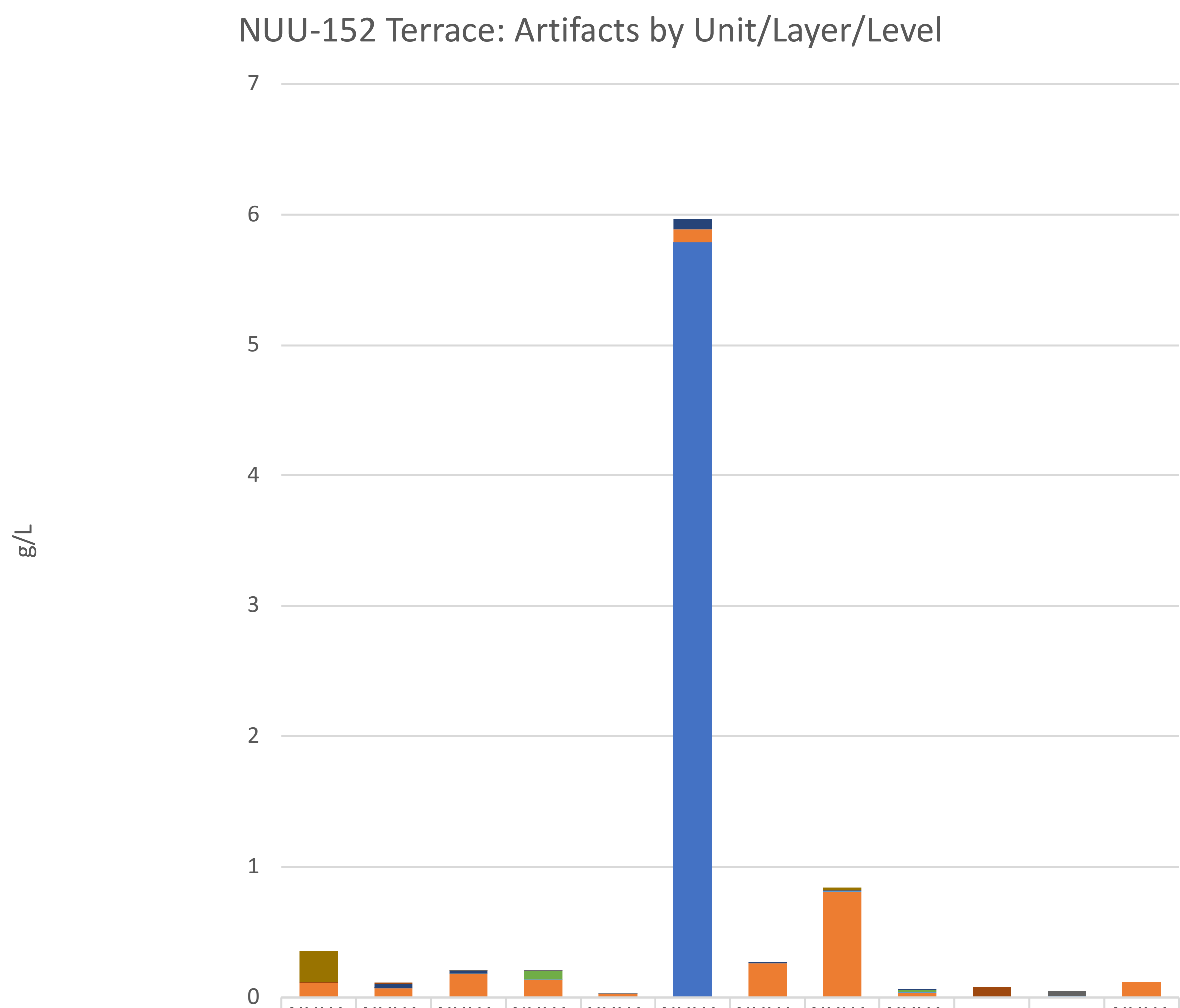


Figure 6.92: Profile map of the north wall in Units U14 and U15 with context information.



	NUU152E J14 LI L1	NUU152E J14 LII L2	NUU152E J14 LII L3	NUU152E J14 LII L4	NUU152E J14 LIII L5	NUU152 U14 LI L1	NUU152 U14 LII L2	NUU152 U14 LII L3	NUU152 U14 LIII L4	NUU152 U15 LI	NUU152 U15 LII	NUU152 U15 LIII
Water-rolled rock	0.2330							0.0286				
Volcanic Glass Debitage			0.0089	0.0054	0.0065			0.0019			0.0371	
Shell	0.0090	0.0098	0.0005	0.0012	0.0002					0.0800		
Coral		0.0362	0.0210	0.0030		0.0775	0.0070		0.0084			
ʻIliʻili				0.0628					0.0141			
Charcoal		0.0006	0.0050	0.0057	0.0023			0.0083	0.0031		0.0114	
Burnt Kukui Nut			0.0005	0.0002								
Bone not worked		0.0009										
Basalt Debitage	0.1100	0.0675	0.1757	0.1320	0.0277	0.1020	0.2608	0.8066	0.0370			0.1174
Basalt Core						5.7885						

Figure 6.93: Terrace units graph of artifacts displayed as grams per liter of sediment excavated in each context

Excavation Unit	Layer	Level	Scientific Determination	Sum of MNI	Sum of NISP	Sum of Weight (g)
J14	I	1	Undetermined mollusk	1	1	0.18
	II	2	*Cypraea caputserpentis*	1	1	2.38
			Undetermined mollusk	1	1	0.15
		3	Undetermined mollusk	2	2	0.1
		4	cf. *Drupa* sp.	1	1	0.05
			Planaxis labiosa	1	1	0.01
			Undetermined mollusk	2	5	0.24
	III	5	Undetermined mollusk	1	1	0.04
U15	I		Undetermined mollusk	1	1	0.17

Table 6.26: NISP, MNI, Weight, and ID for shell and sea urchin in the terrace units.

Site	Scientific Determination	Item Count	MNI	Weight (g)	Comments
NUU152E J14 LII L2	Medium mammal	1	1	0.22	NID fragment

Table 6.27: Bone found in terrace units.

Site/Layer/Level/Sample	pH	Particle Size Distribution		
		<0.5mm%	**>0.5mm%**	**>2mm%**
U14 L1 LI	6.32	57.9831933	84.03361345	100
U14 L3 LII	6.35	46.5408805	76.10062893	100
U14 L4 LIII	6.29	66.8393782	86.01036269	100
NUU420/152 OFFSITE 3	5.6933			

Table 6.28: Sediment sample information for the terrace units.

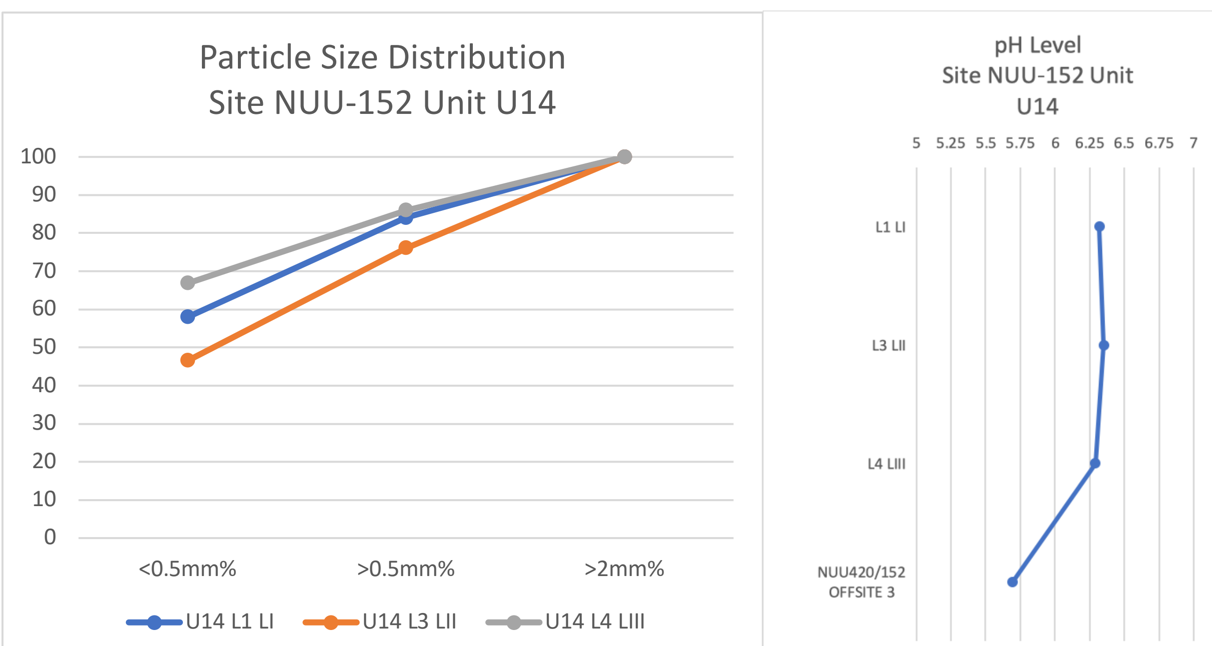


Figure 6.94: Particle size distribution and pH data for terrace units.

Feature NUU-152A Units J6 and J7

Units J6 and J7 in feature A were placed along the wall of the structure at the northern end (Figure 6.63 profiles a portion of the northern wall of the feature). This feature was excavated over the course of two excavation seasons. Unit J6 and the western half of Unit J7 were excavated in the summer of 2013. Upon identifying that the eastern half of Unit J7 was covered in wall fall rather than the actual structure, the fallen boulders were removed and the eastern half of the unit was excavated in the summer of 2014. The gap in excavation between the two halves of the unit is reflected in the artifacts collected and recorded in the artifact table in Appendix C. Figure 6.95 shows the profile of the north wall of Feature A, which abutted the eastern side of the unit while Figure 6.96 shows the profile of the north wall of J6. The purpose of Unit J7 was to find the bottom of the structure in order to collect charcoal for dating the construction of the feature. The unit was extended to better understand how this feature was utilized when the kauhale was occupied, and how the feature was constructed.

Both dates from feature NUU-152A are earlier than those recovered from other features in this kauhale. The early dates indicate that feature was likely one of the first built in the complex but without additional radiocarbon dates from multiple contexts it is difficult to ascertain how long the feature was used. The low density of artifacts indicates that the activities that did occur in this space over time left limited traces. Basalt as the dominant material class suggests limited use of expedient tools while the presence of burnt and non-carbonized kukui in conjunction with charcoal (and little else) may indicate the use of kukui candles but could have also been used medicinally, as personal adornment, or for making dye. The absence of bone and the low density of shell suggests that little food was processed or consumed in this space. The microartifacts confirm these observations, as lithic debitage and charcoal were the primary types of materials recovered.

The sediment analyses revealed that the pH of Layer II (the cultural context) was higher than the top soil or off-site sample while the organic carbon percentage was lower than these comparative samples (estimated to be 20% which is common for the activity areas—see the description above for NUU-152D and the interpretation of the results in Chapter 7 for possible explanations of these results). The particle size distribution exhibited a different pattern from the terrace units in that the results for the cultural context in Unit J6 showed higher percentages of coarse material than the offsite samples (particularly sample J6LIIPSS that cut into some of the construction fill in the feature). The results for J7, however, show a higher percentage of fine material in the cultural layer which may indicate differential fill across this space as both units produced roughly the same amount of artifacts aside from the increased density of charcoal recovered from the charcoal lens that was designated a feature.

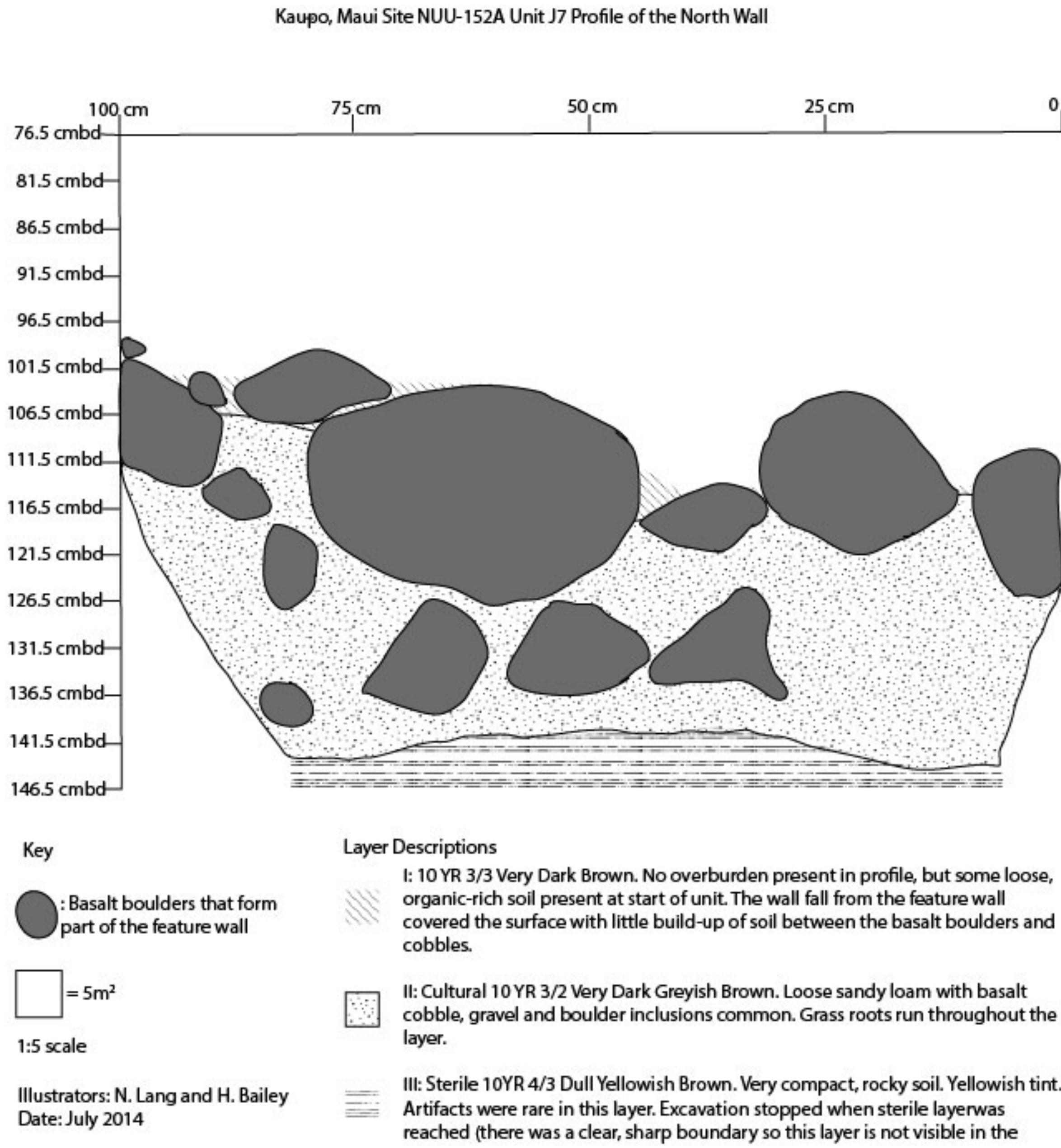


Figure 6.95: Profile map of the north wall in Unit J7 and associated context information.

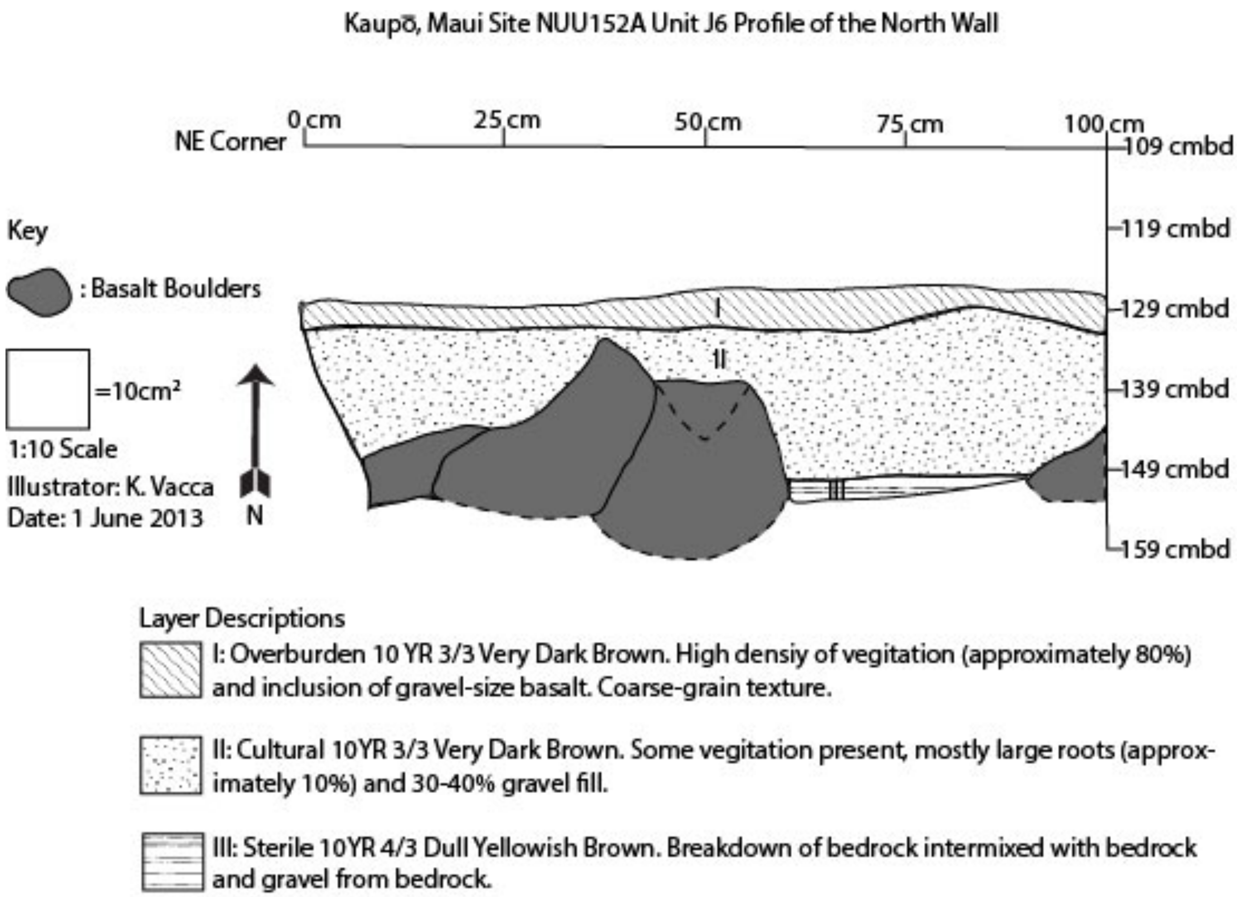


Figure 6.96: Profile map of the north wall in Unit J6 and associated context information.

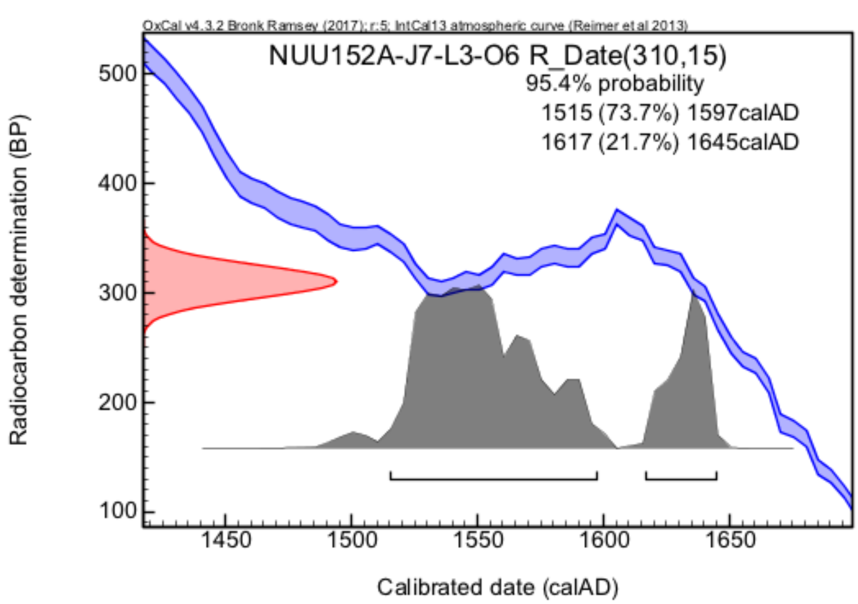
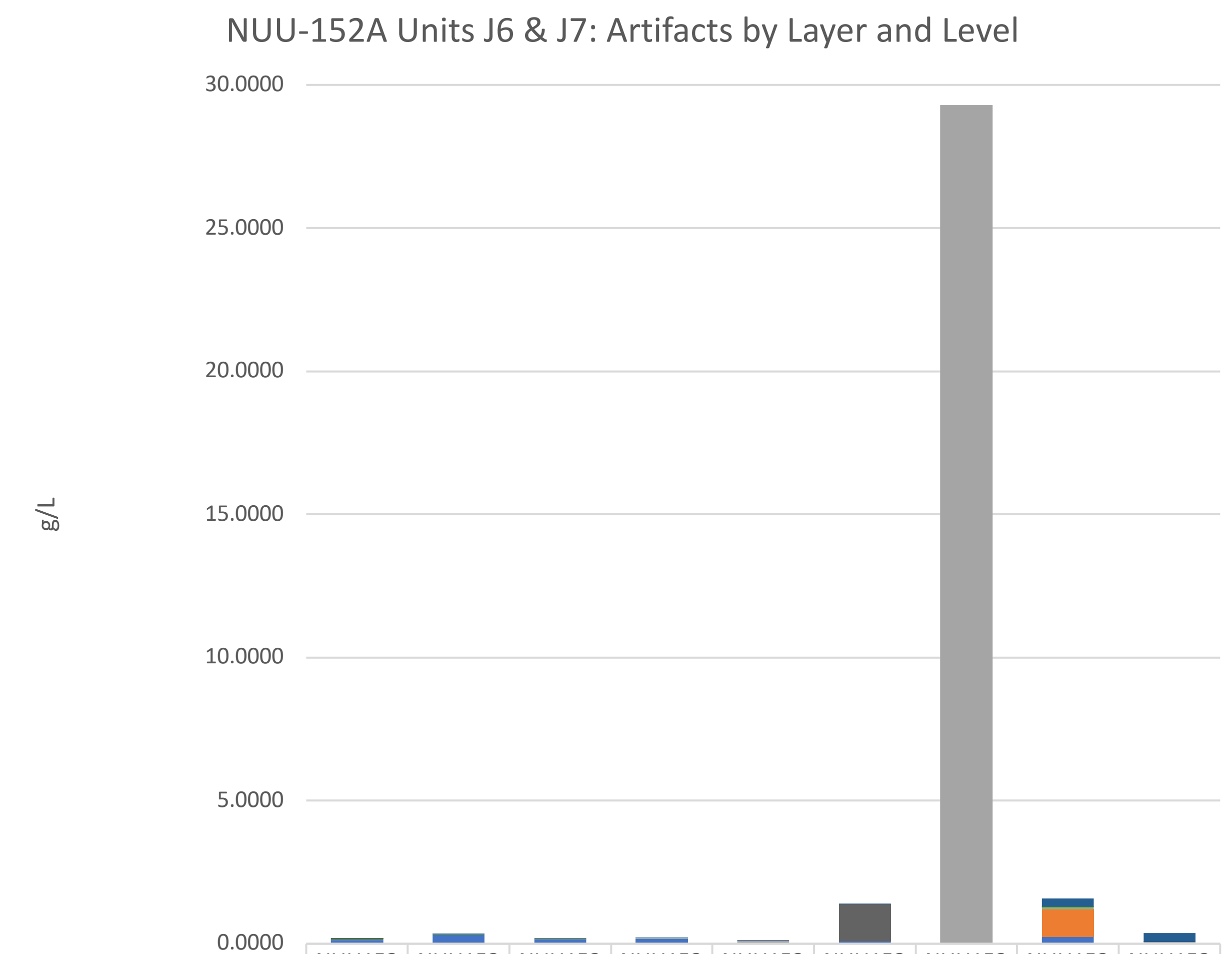


Figure 6.97: Calibrated radiocarbon date for NUU-152A.



	NUU152 A J6 LII L2	NUU152 A J6 LII L3	NUU152 A J6 LII L4	NUU152 A J6 LIII L5	NUU152 A J7 LI L1	NUU152 A J7 LII L2	NUU152 A J7 LII L3 F1	NUU152 A J7 LII L3	NUU152 A J7 LII L4
Volcanic Glass Debitage	0.0035	0.0037		0.0036		0.0113		0.2761	0.2929
Terrestrial Gastropod	0.0002								
Raw Kukui Nut						1.2869			
Preform Adze									
Shell	0.0123	0.0009	0.0015		0.0008			0.0009	0.0110
Coral	0.0348	0.0129	0.0101	0.0022		0.0031		0.0800	0.0106
ʻIliʻili									0.0007
Coral File						0.0085			
Charcoal		0.0095	0.0040	0.0076	0.0915	0.0033	29.3000	0.0245	0.0115
Burnt Kukui Nut								0.9439	
Basalt Debitage	0.1257	0.3075	0.1515	0.1782	0.0049	0.0742		0.2495	0.0439

Figure 6.98: Feature A graph of artifacts displayed as grams per liter of sediment excavated in each context

Excavation Unit	Layer	Level	Scientific Determination	Sum of NISP	Sum of MNI	Sum of Weight (g)
J6	II	2	*Achatina fulica*	1	1	0.03
			cf. *drupa*	1	1	0.37
			Undetermined mollusk	5	1	1.15
		3	Undetermined mollusk	1	1	0.11
		4	Undetermined mollusk	1	1	0.19
J7	I	1	*Cypraea caputserpentis*	1	1	1.03
	II	3	Undetermined mollusk	4	1	0.13
		4	Undetermined mollusk	1	1	0.11

Table 6.29: NISP, MNI, Weight, and ID for shell and sea urchin in NUU152A units

Unit	Artifact Size	Item Type	count	weight /g
J6 LII	2mm-4mm	Charcoal	8	0.044
J6 LII	2mm-4mm	Contemporary flora	5	0.0471
J6 LII	2mm-4mm	Lithic	13	0.2918
J6 LII	4mm-6.3mm	Contemporary flora	2	0.1034
J6 LII	4mm-6.3mm	Lithic	2	0.1585
J7 LII L3	0.5mm-2mm	carbonized seed	4	0.0001
J7 LII L3	0.5mm-2mm	Charcoal		0.0206
J7 LII L3	0.5mm-2mm	volcanic glass	3	0.0033

Table 6.30: Bone identification, NISM, MNI, and weight from NUU152A

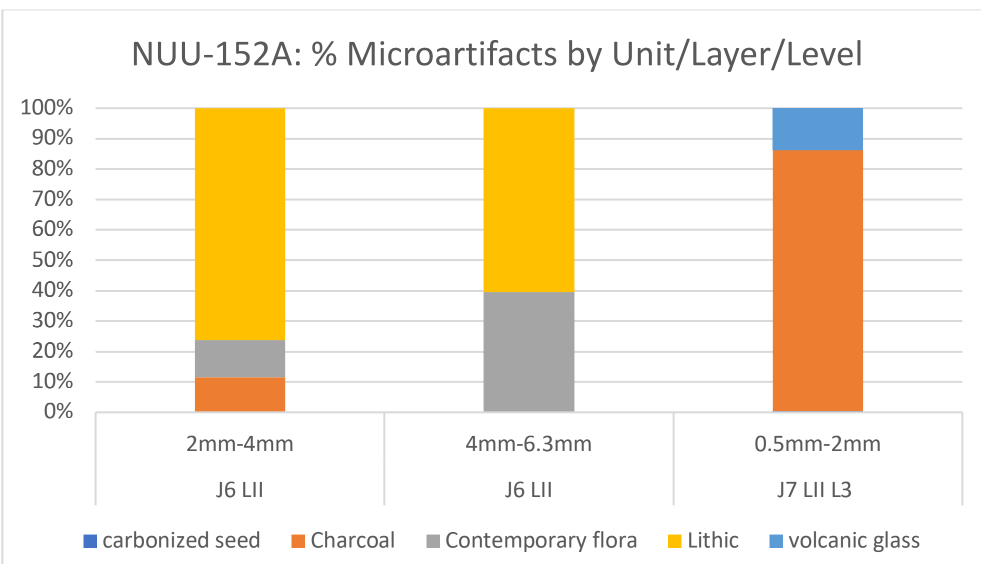


Figure 6.99: Comparison of total microartifact assemblages in the NUU152A units.

Site/Layer/ Level/Sample	pH	% Organic Carbon	Particle Size Distribution <0.063	0.063	0.125	0.25	0.5	1	2	4	6.3
J7 L1 LI SS3	5.48	30.1361309	23.04	61.9	81.22	90.28	94.32	94.32	95.8	96.44	99.54
J7 L3 LII SS3			24.17652027	50.78125	66.427	74.51	80.173	80.17	84.08	89.74	100.19
J6 LII PSS	5.886666667	23.9388031	5.6	12.05	16.55	19.54	21.49	24.29	29.91	36.64	100.08
NUU420/152 OFFSITE 3	5.693333333	53.119688	9.64	34.96	56.86	67.14	70.72	73.66	75.86	78.92	100.44

Table 6.31: NUU152A sediment sample data

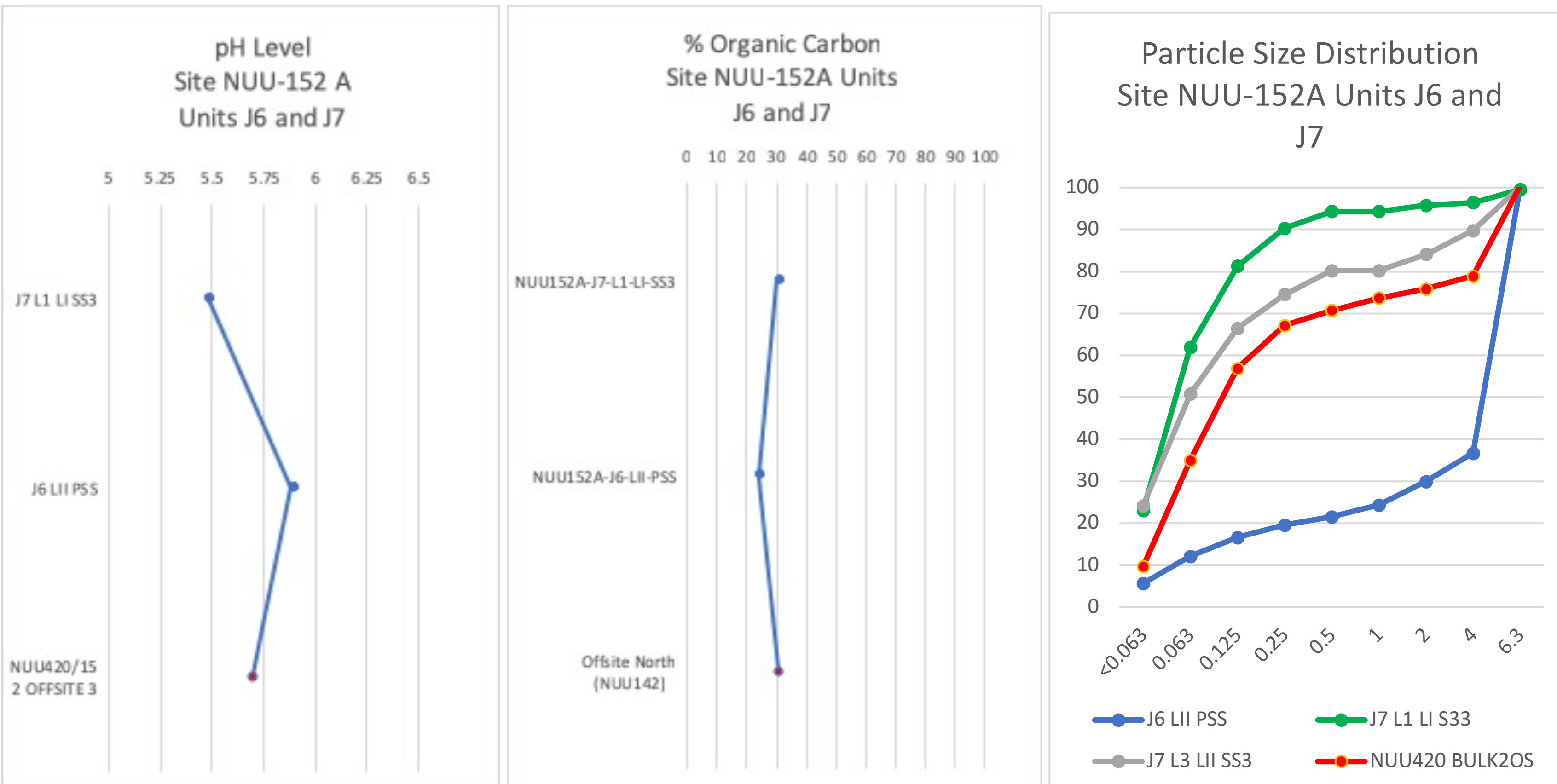


Figure 6.100: pH, LOI, and particle size distribution for NUU-152A units.

NUU-152B Large C-Shape Feature Units AE9 & AE10

The units placed in Feature B were similarly located along the feature wall in order to capture evidence of site formation and the use of space from a place where the material would be most likely to survive. A wide range of artifacts were recovered during excavation and the assemblage shows unique characteristics when compared with other assemblages in the site. Shell increases with depth as does the charcoal density. Multiple species of mollusk were recovered from the five units, with sea urchin recovered at higher densities than in any other Nuʻu units and was often found within charcoal and ash lenses. The microartifacts did not reflect this pattern, however. Although charcoal was common in the microartifacts, lithic debitage was the other common material recovered. While bone was conspicuously absent from the artifacts recovered during excavation, seven bone fragments were identified during the microartifact analysis process. Even fewer pieces of shell were recovered from the microartifact size fractions.

The pH of Unit AE9 followed the pattern seen elsewhere with the cultural contexts showing elevated pH when compared with the surrounding off-site samples. This unit exhibits one unique characteristic—the pH of the sterile context is higher than that of the cultural layer. This may indicate leaching and pedogenic processes moving organic material down through the unit. The organic carbon for the unit shows that the sterile context has less organic material than the off-site sample which is to be expected, but indicates that whatever material is raising the pH in this level may not be affecting the organic carbon (although the level of organic carbon is comparable to other cultural contexts).

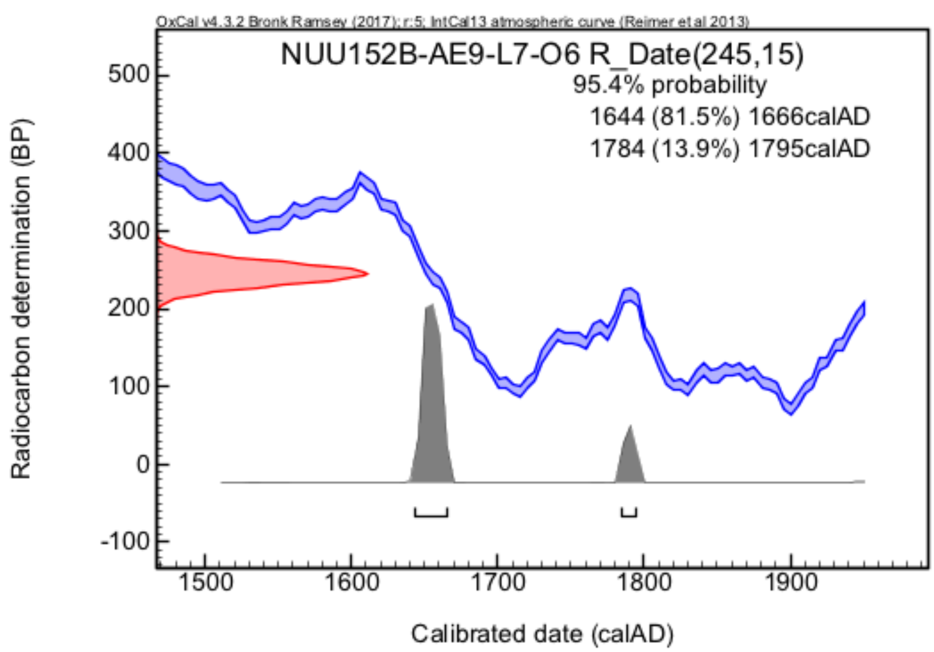
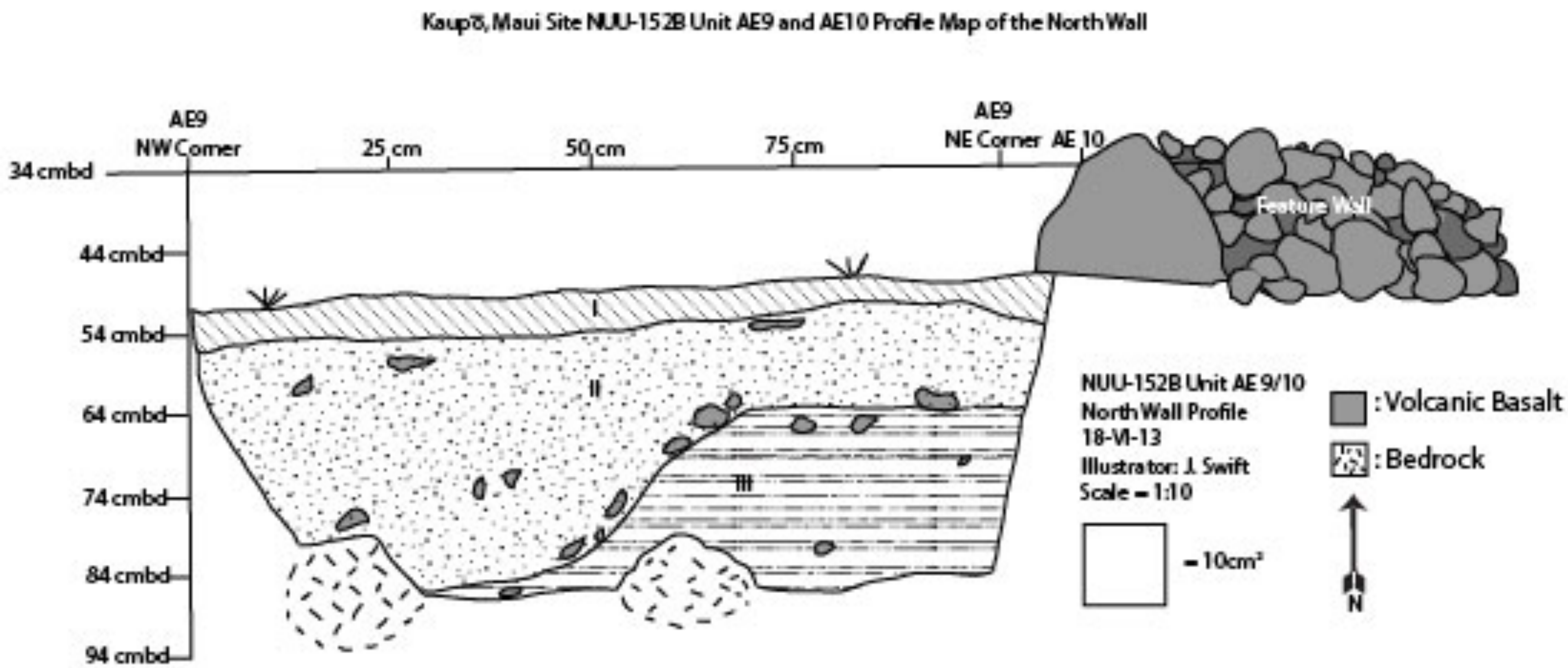


Figure 6.101: Calibrated radiocarbon date for NUU152A.



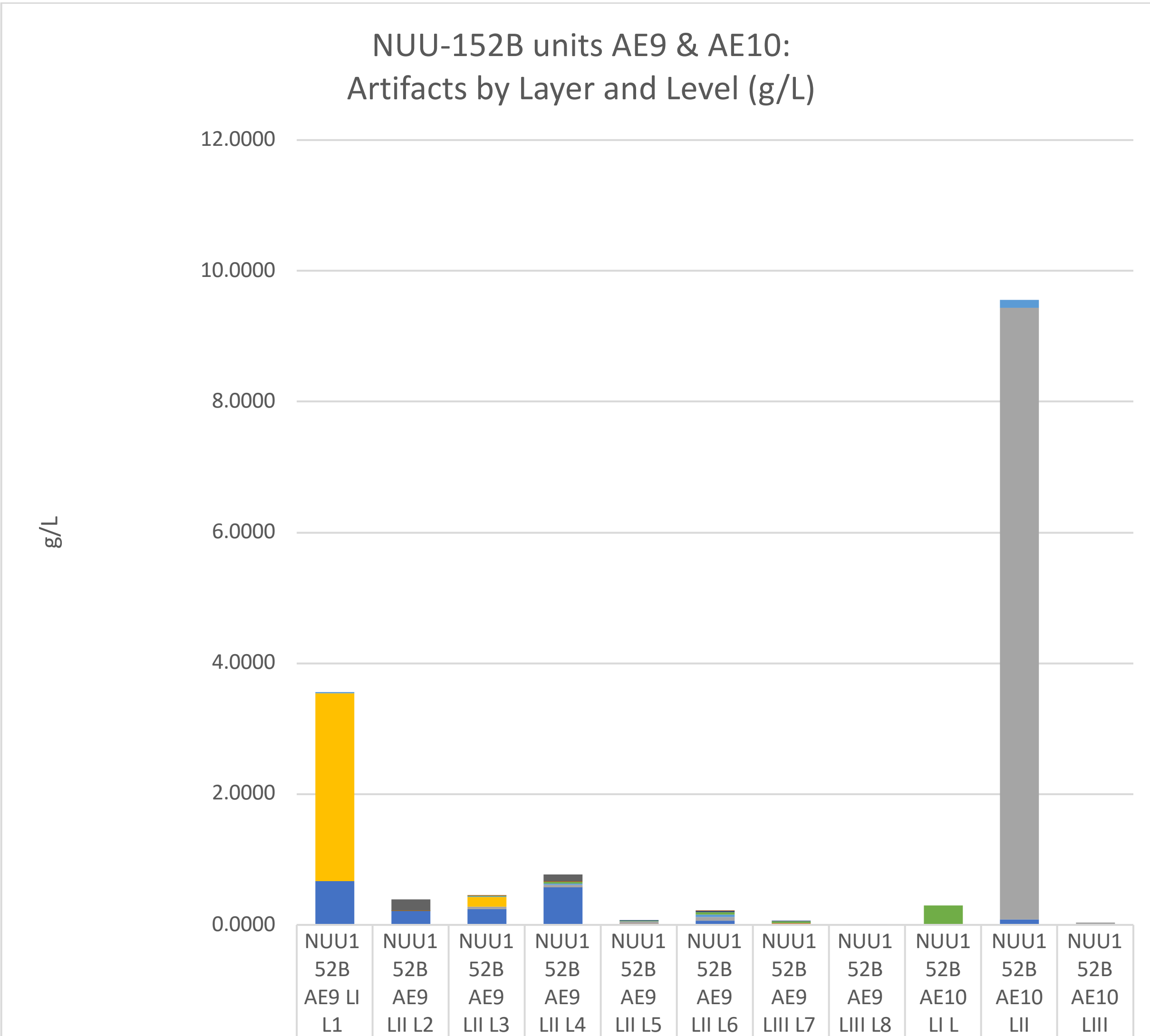
Layer Descriptions

I: 10 YR 3/2 Very Dark Greyish Brown. Loose, fine, silty aeolian sediment, rich with ~80% organics. Few cobble/boulder inclusions (7-10%) likely due to wall fall from east structure wall.

II: 10 YR 3/3 Dark Brown. Loose clayey silt forming occasional small peds throughout. ~20% pebble/cobble inclusions, and particularly in the bottom of layer, where rock (some volcanic basalt, some rounded degraded bedrock-ty[e incusions) appears to be tracing the boundary between Layers II and III to some extent. Layer contained lots of loose, fine, dark silty sediment - particularly in NW end of unit where layer dips down. However, this is unfortunately not visible in N wall profile. Layer II is main cultural layer containing most artifacts.

III: 10YR 4/4 Dark Yellow Brown. Non-cultural layer. Rocky, yellowish, gravelly sediment with many cobble and large boulder inclusions compressed of degrading bedrock. Few if any artifacts found here--possibly some lithic flakes near top of layer.

Figure 6.102: Profile map of the north wall in Unit AE9 with context information.



	NUU152B AE9 LI L1	NUU152B AE9 LII L2	NUU152B AE9 LII L3	NUU152B AE9 LII L4	NUU152B AE9 LII L5	NUU152B AE9 LII L6	NUU152B AE9 LIII L7	NUU152B AE9 LIII L8	NUU152B AE10 LI L	NUU152B AE10 LII	NUU152B AE10 LIII
Water-rolled rock		0.1727		0.1087							
Volcanic Glass Debitage		0.0020	0.0003	0.0024		0.0004					
Sea Urchin					0.0064	0.0180	0.0056	0.0048			
Shell		0.0009	0.0131	0.0289	0.0101	0.0381	0.0295		0.2971		
Coral	0.0254		0.0039	0.0190	0.0023	0.0356	0.0011			0.1225	
ʻIliʻili	2.8706		0.1483								
Charcoal		0.0010	0.0389	0.0389	0.0351	0.0520	0.0031	0.0000		9.3550	0.0400
Burnt Kukui Nut				0.0010	0.0012		0.0225				
Basalt Debitage	0.6682	0.2145	0.2425	0.5762	0.0176	0.0686	0.0016	0.0022		0.0825	

Figure 6.103: NUU-152B graph of artifacts displayed as grams per liter of sediment excavated in each context

Unit	Layer	Level	Scientific Determination	Sum of NISP	Sum of MNI	Sum of Weight (g)
AE10	I	1	Undetermined mollusk	1	1	0.46
AE9	II	2	cf. *Conus* sp.	1	1	0.23
AE9	II	3	*Cellana exarata*	1	1	0.22
AE9	II	3	*Cypracidae* sp.	1	1	1.75
AE9	II	3	*Drupa* sp.	1	1	0.28
AE9	II	3	Sea urchin jaw any species	1	1	0.07
AE9	II	3	Undetermined mollusk	9	2	0.86
AE9	II	4	cf. *Cypraea* sp.	1	1	0.06
AE9	II	4	cf. *Planaxis labiosa*	3	3	0.15
AE9	II	4	cf. *Turbo sandwicensis* operculum	1	1	0.06
AE9	II	4	Cypracidae sp.	2	1	6.38
AE9	II	4	*Drupa* sp.	2	1	0.71
AE9	II	4	Sea urchin jaw any species	1	1	0.06
AE9	II	4	Undetermined Mammal	16	1	0.55
AE9	II	4	Undetermined mollusk	10	2	0.71
AE9	II	5	cf. *Conus abbreviatus*	1	1	0.39
AE9	II	5	cf. *Planaxis labiosa*	1	1	0.06
AE9	II	5	*Echinothrix* sp.	1	1	0.04
AE9	II	5	*Planaxis labiosa*	4	4	0.56
AE9	II	5	Sea urchin test any species	43	1	1.51
AE9	II	5	Undetermined mollusk	1	1	0.02
AE9	II	6	*Cellana exarata*	3	1	1.3
AE9	II	6	*Cellana* sp.	1	1	0.07
AE9	II	6	cf. *Nerita* sp.	1	1	0.05
AE9	II	6	cf. *Planaxis labiosa*	1	1	0.01
AE9	II	6	*Echinothrix* sp.	6	2	0.25
AE9	II	6	*Hetrocentrotus mamillatus* spine	1	1	0.07
AE9	II	6	large *Cypraea* sp.	2	1	4.39
AE9	II	6	*Littorina* sp.	1	1	0.13
AE9	II	6	*Planaxis labiosa*	4	4	0.63
AE9	II	6	Sea urchin test any species	127	2	3.8
AE9	II	6	Undetermined mollusk	10	3	0.57
AE9	III	7	*Cellana* sp.	6	1	0.27
AE9	III	7	cf. *Conus abbreviatus*	1	1	0.52
AE9	III	7	*Echinothrix* sp.	2	1	0.18
AE9	III	7	*Planaxis labiosa*	4	4	0.44
AE9	III	7	Sea urchin jaw any species	1	1	0.03
AE9	III	7	Sea urchin test any species	62	1	2.12
AE9	III	7	Undetermined mollusk	4	1	0.1
AE9	III	8	Sea urchin test any species	6	1	0.13

Table 6.32: NISP, MNI, Weight, and ID for shell and sea urchin in NUU252B.

Unit	Artifact Size	Item Type	Sum of item count	Sum of weight /g
AE9 LI	≥6.33mm	Contemporary flora	1	0.0348
AE9 LI	≥6.33mm	Lithic	1	0.3744
AE9 LI	2mm-4mm	Contemporary flora	18	0.1038
AE9 LI	2mm-4mm	Lithic	9	0.215
AE9 LI	2mm-4mm	Lithics	9	0.2453
AE9 LI	2mm-4mm	Seed	1	0.0183
AE9 LI	4mm-6.3mm	Fire cracked rock	1	0.163
AE9 LI	4mm-6.3mm	Lithic	2	0.2134
AE9 LII L3	≥6.33mm	Lithic	1	0.2208
AE9 LII L3	2mm-4mm	Charcoal	6	0.0544
AE9 LII L3	2mm-4mm	Contemporary flora	5	0.012
AE9 LII L3	2mm-4mm	Lithic	9	0.2329
AE9 LII L3	4mm-6.3mm	Charcoal	1	0.029
AE9 LII L3	4mm-6.3mm	Lithic	2	0.1908
AE9 LII L4	0.5mm-1mm	Bone	7	0.0024
AE9 LII L4	0.5mm-1mm	Charcoal	181	0.0433
AE9 LII L4	0.5mm-1mm	Contemporary flora	0	0.0612
AE9 LII L4	0.5mm-1mm	Insect Remains	3	0.0008
AE9 LII L4	0.5mm-1mm	Lithic	100	0.0571
AE9 LII L4	0.5mm-1mm	Shell/coral	3	0.0013
AE9 LII L4	0.5mm-1mm	Unknown Mineral	2	0.0017
AE9 LII L4	0.5mm-1mm	volcanic glass	7	0.0074
AE9 LII	2mm-4mm	Charcoal	6	0.0348
AE9 LII	2mm-4mm	Contemporary Flora	9	0.0145
AE9 LII	2mm-4mm	Lithic	10	0.2808
AE9 LII	4mm-6.3mm	Charcoal	1	0.0435
AE9 LII	4mm-6.3mm	Contemporary flora	1	0.0422
AE9 LII	4mm-6.3mm	Lithic	3	0.4404
AE9 LIII	2mm-4mm	Contemporary flora	22	0.1058
AE9 LIII	2mm-4mm	Lithics	6	0.1788
AE9 LIII	4mm-6.3mm	Contemporary flora	1	0.0208

Table 6.33: Microartifact size, identification, count, and weight from NUU152B.

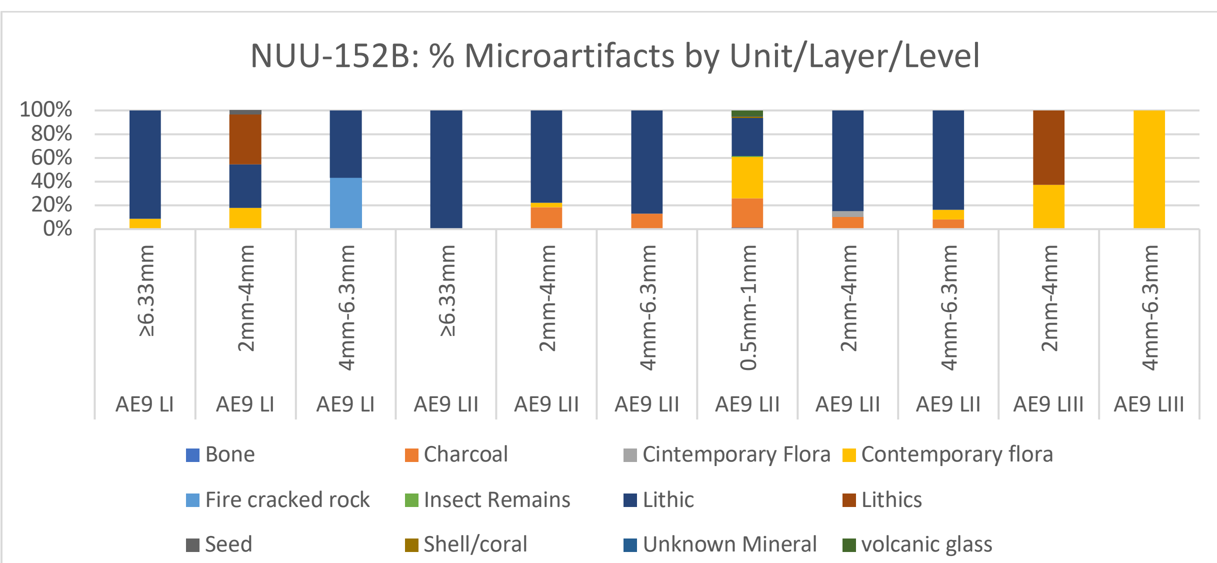


Figure 6.104: Total microartifact assemblage for NUU152B by layer.

Site/Layer/Level/Sample	pH	% Organic Carbon	Particle Size Distribution								
			<0.063	0.063	0.125	0.25	0.5	1	2	4	6.3
AE9 LIPSS	5.63	49.7863	2.52	12.86	23.62	33.5	39.4	45.1	51.02	61.06	100.76
AE9 LIISS	6.11										
AE9 LIIIPSS	6.35	24.9863	5.58	16.9	24.39	28.38	31.85	36.99	45.6	53.38	100.52
NUU420/152 OFFSITE 3	5.69	53.1197	9.64	34.96	56.86	67.14	70.72	73.66	75.86	78.92	100.44

Table 6.34: Sediment sample data from NUU-152B.

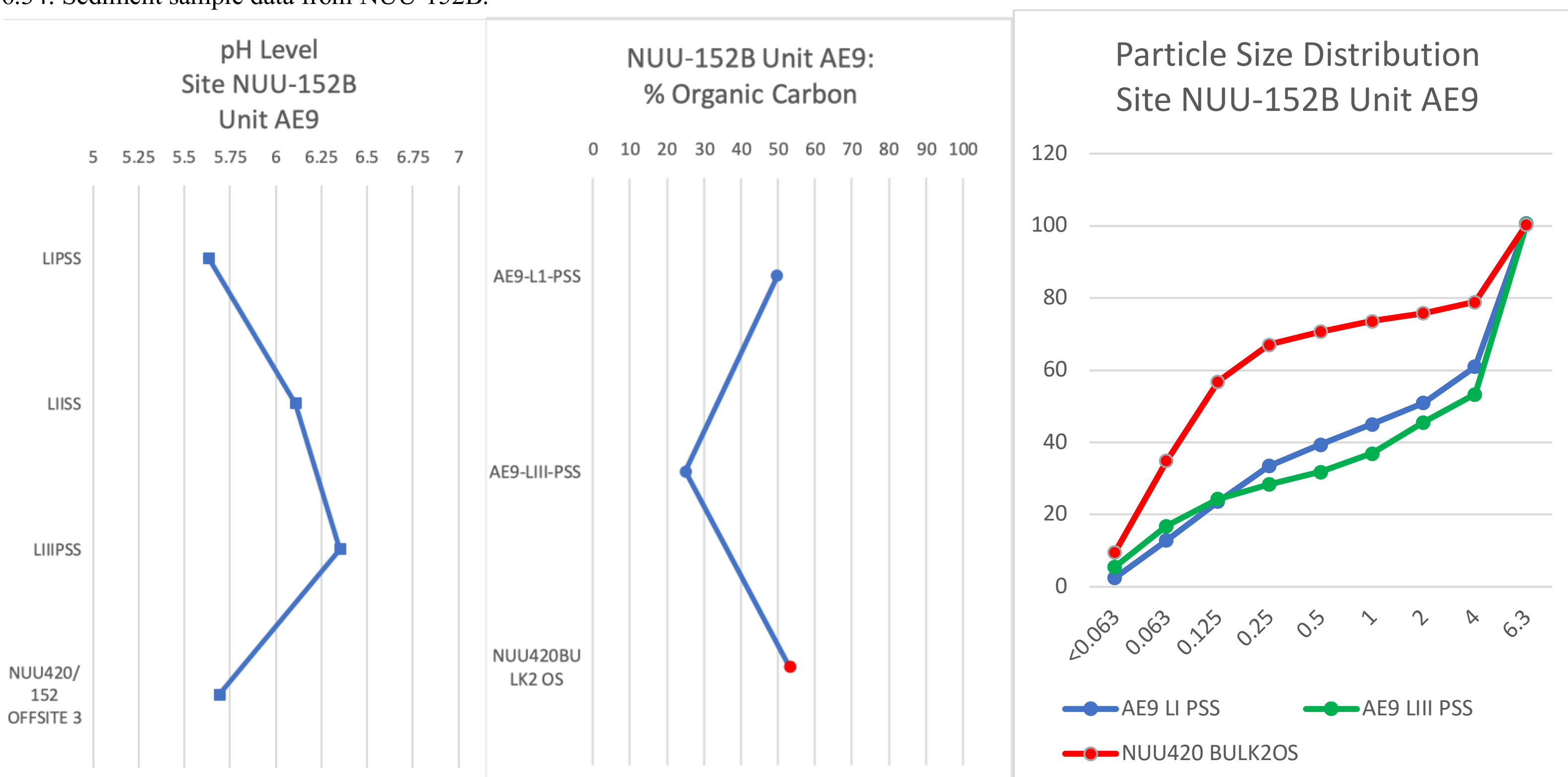


Figure 6.105: pH, LOI, and particle size distribution data from NUU-152B

Site NUU-420

Site NUU-420 was built approximately 15m mauka of complex NUU-152 along the same ridge line. Architecturally, the walls are low and wide, meant to retain the cobble, pebble and soil filled terrace within the rectangular foundation. The walls are buttressed by basalt boulders along the outside and filled with cobbles within. The cobbles became part of the terraced fill on the inside of the western wall, parts of which had fallen in, impairing the architecture. The eastern wall stands taller, with basalt cobbles and pebbles filling the opening between the outer walls of stacked basalt boulders. The feature in its entirety stretches 8 mauka to makai and is completely enclosed. An entrance would have been built into one of the walls of the feature, but I could not identify one due to the poor state of the western and northern walls. Pebble fill stretches roughly 1m into the structure along the western wall, forming a coarse fill that leveled the floor of the feature. Feature NUU-420 was built along the top edge of the horseshoe ridge, with a thick eastern wall supported by bedrock jutting out from the face of the steep slope. From the vantage point of this feature, the other kauhale along the ridge are visible, as is the swale along with its agricultural field embankments. It is unclear whether this architectural feature is associated with other features as part of a larger kauhale. Small features that resemble NUU-420 were recorded to the west, but similar features are scattered throughout the landscape without identifiable kauhale associations.

Artifacts recovered from the three units excavated in NUU-420 (Units F10, G10, and H12) were sparse. Basalt debitage dominated the assemblages, but the poor quality of the basalt material indicates that some of the presumed lithic debitage may be natural breakage within the basalt fill (although a thorough lithic analysis would need to be conducted to determine this). The only other type of material collected with any consistency was charcoal and coral. While mollusks were collected from the cultural contexts, their densities were low, and no bone was recovered from this feature. Carbonized wood and lithics were recovered microscopically, but the absence of bone from the microscopic scale confirms the absence of faunal evidence at this site.

The pH levels in Units F10 and G10 showed a slight elevation over one offsite sample taken to the north and were more acidic than the sample taken to the south. The consistency with offsite samples suggests that any anthropogenic activities that occurred at this site did not deposit the same types of materials seen in Site NUU-152 to the south where the sediment is slightly acidic to neutral. This hypothesis is supported by the low density of phytoliths and absence of starches in these units. Organic carbon was directly correlated with the pH levels and did not show any notable patterns when compared with the off-site samples. Similarly, the particle size analyses showed virtually identical patterns of distribution between the offsite and on-site samples indicating similar patterns of site formation. The only notable differences in particle size distribution were observed in the high levels of fine to coarse size pebbles in Units F10 and G10 which likely relates to the rocky fill that was excavated through.

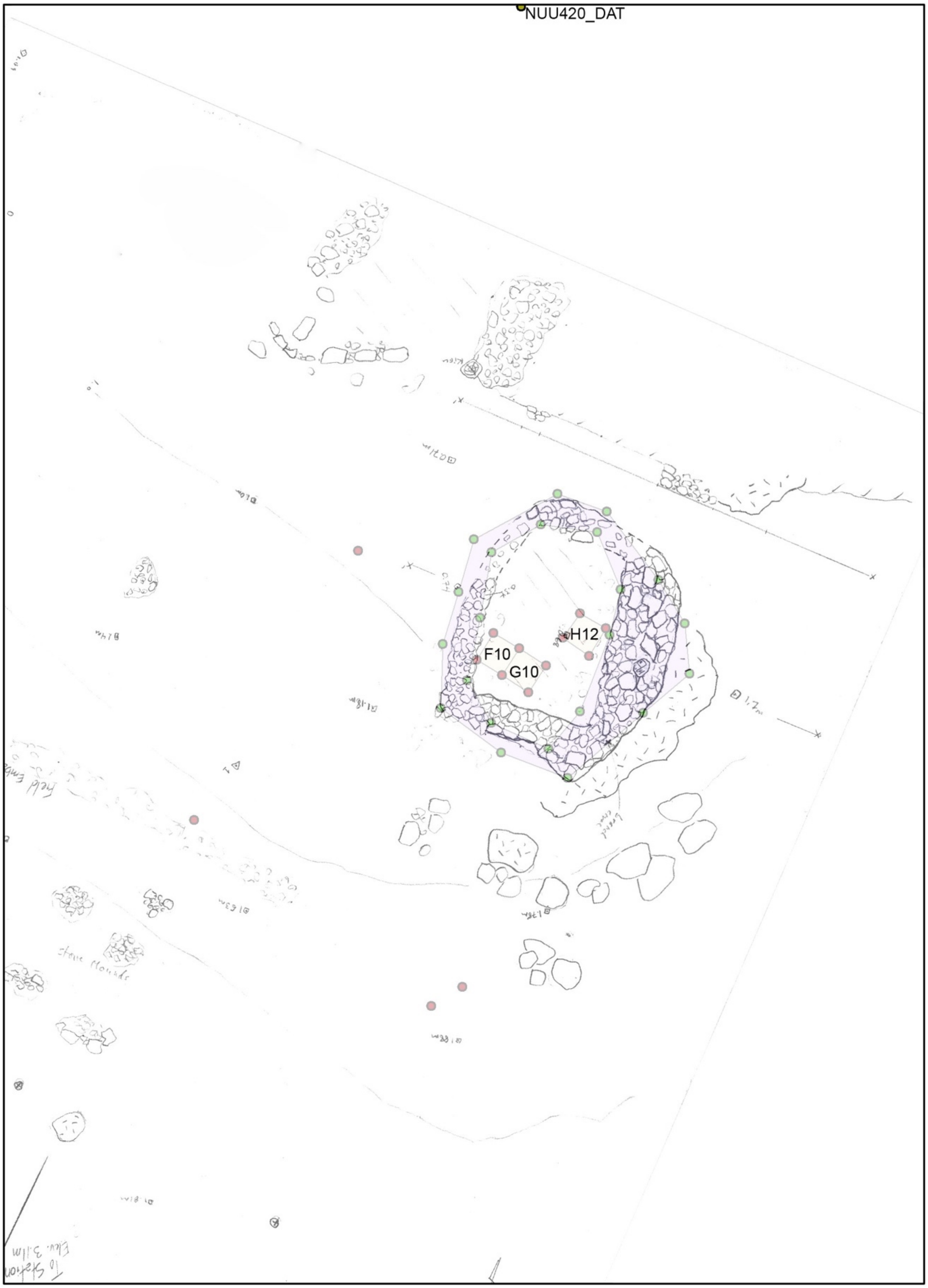


Figure 6.106: Plane table map of site NUU-420 with excavated units marked.

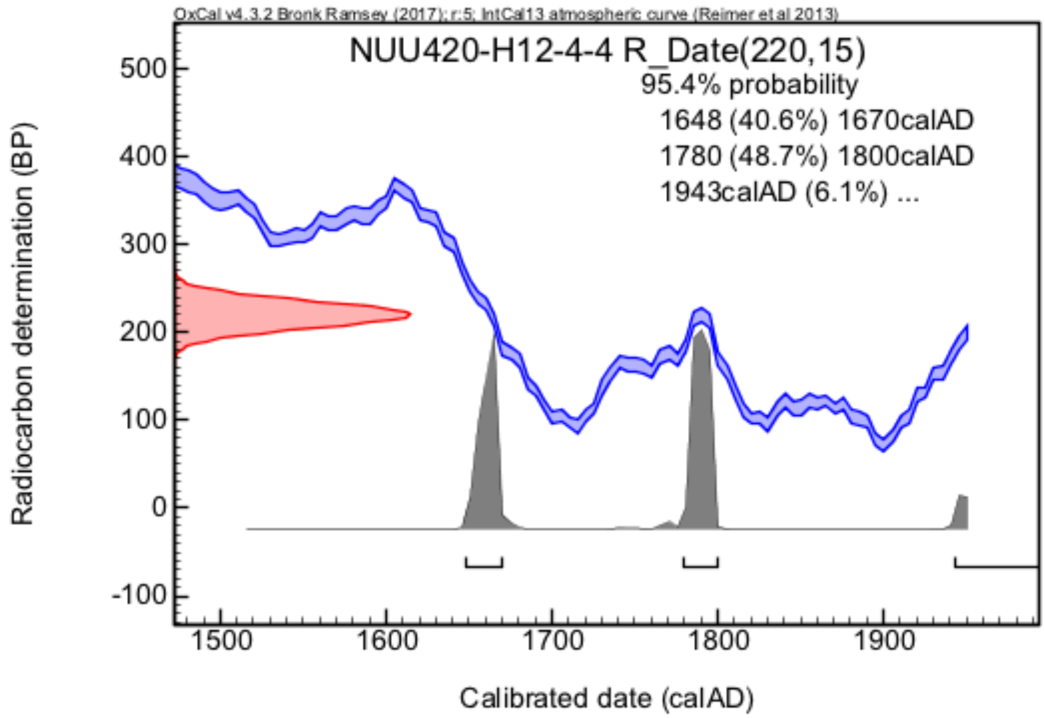


Figure 6.107: Calibrated radiocarbon date for NUU-420.

Fig. 1. Phytolith percentage diagram from Nu'u, Kaupo, Maui, Hawaiian Islands (+ = found after count).

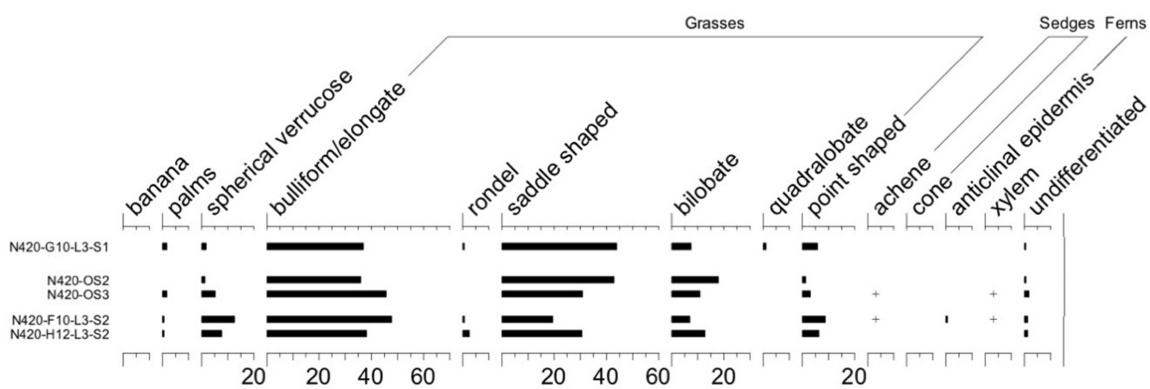


Figure 6.108: Presence and amount of phytoliths in NUU-420 samples. Data were provided by Mark Horrocks and the table is modified from Horrocks 2017 lab report.

Fig. 2. Starch and charcoal diagram from Nu'u, Kaupo, Maui, Hawaiian Islands (+ = small amount, ++ = large amount).

	cf. sweet potato starch	cf. sweet potato xylem	cf. taro starch	calcium oxalate crystals	charcoal
N420-G10-L3-S1					+
N420-OS2					+
N420-OS3					+

Figure 6.109: Presence and amount of starch grains, calcium oxalate crystals, and charcoal in NUU-420 samples. Data were provided by Mark Horrocks and the table is modified from Horrocks 2017 lab report.

Figure 6.110: Photo of NUU-420 east wall and northeast corner—the best-preserved portion of the wall.

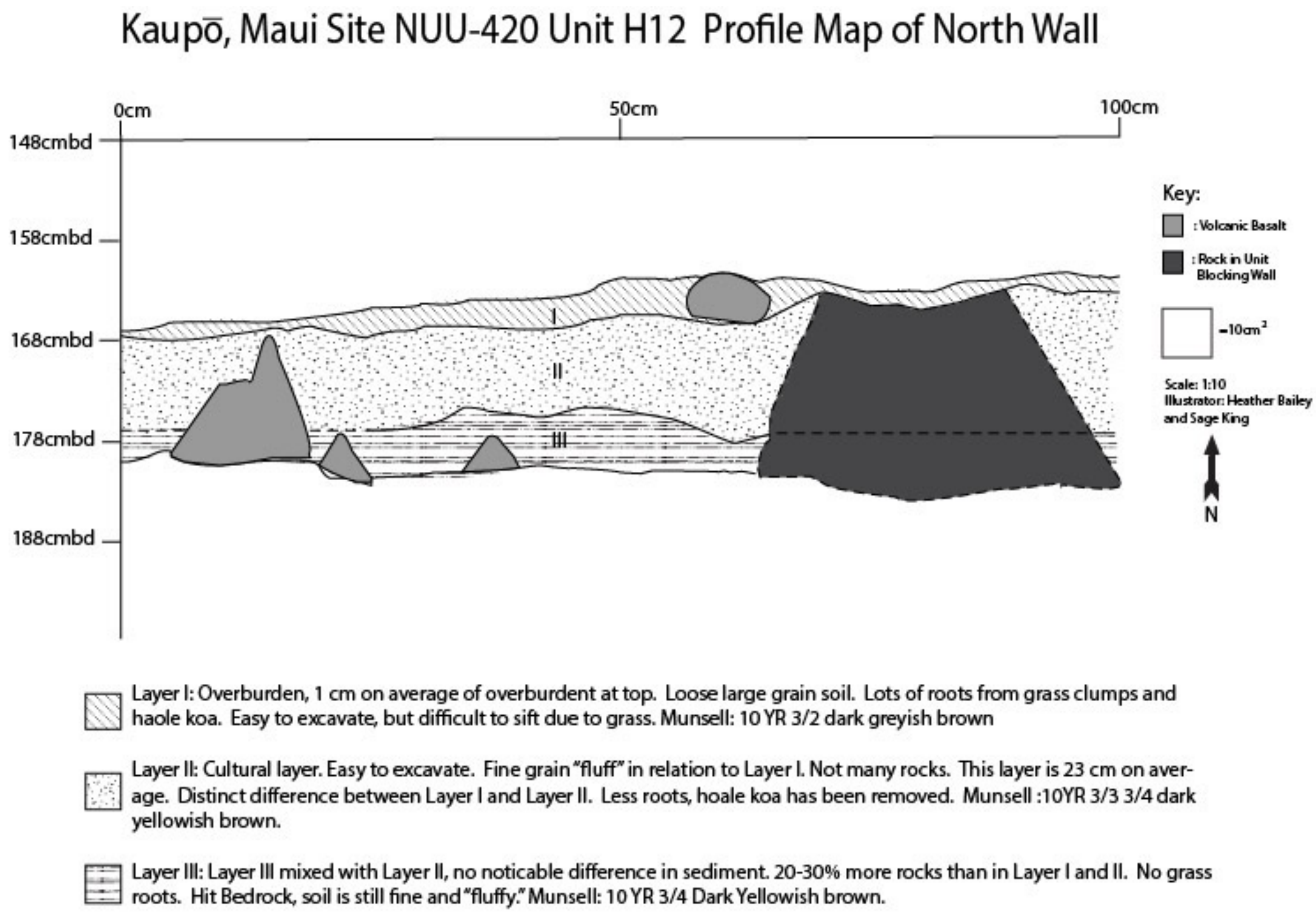


Figure 6:111: Profile map of the north wall in Unit H12 with context information.

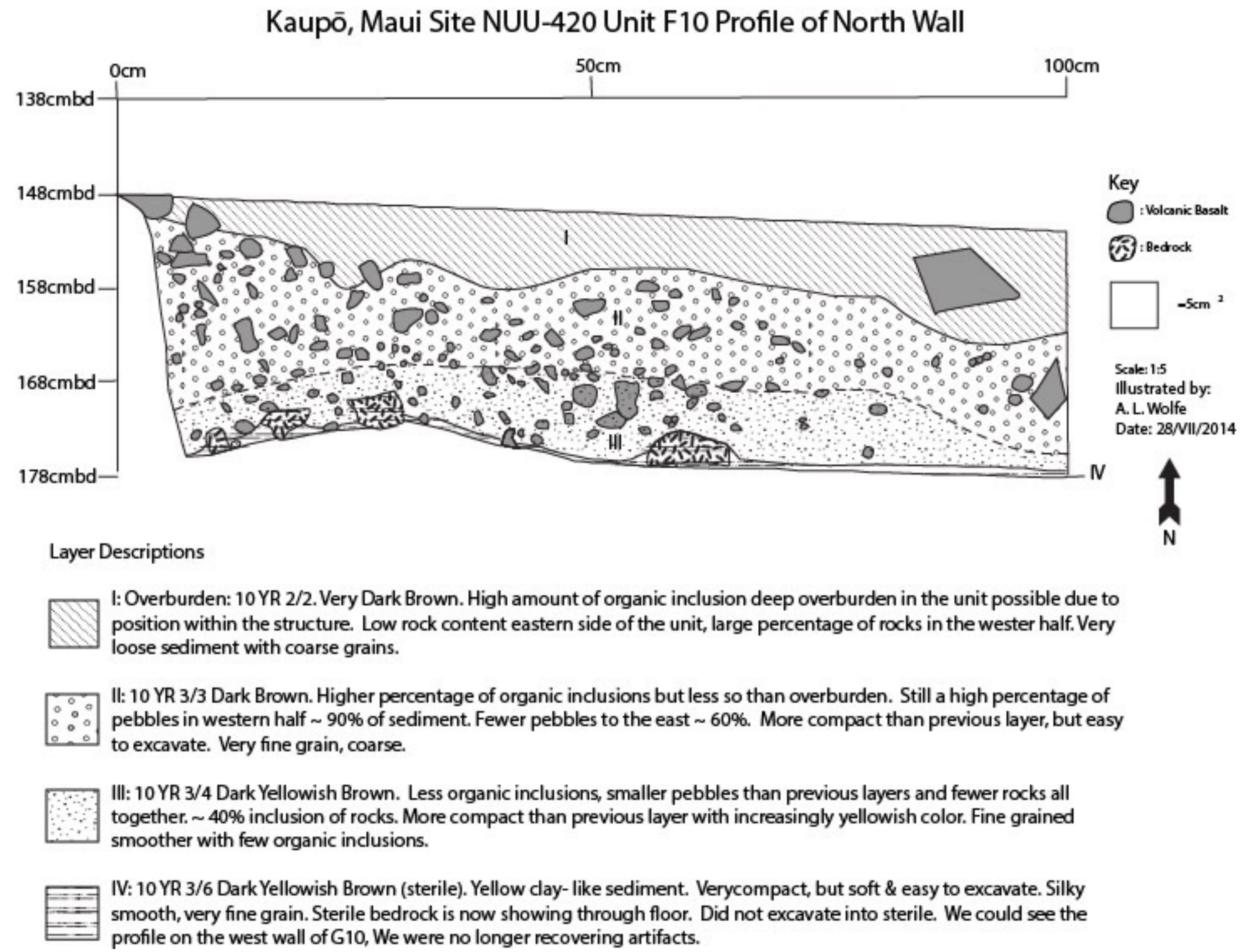
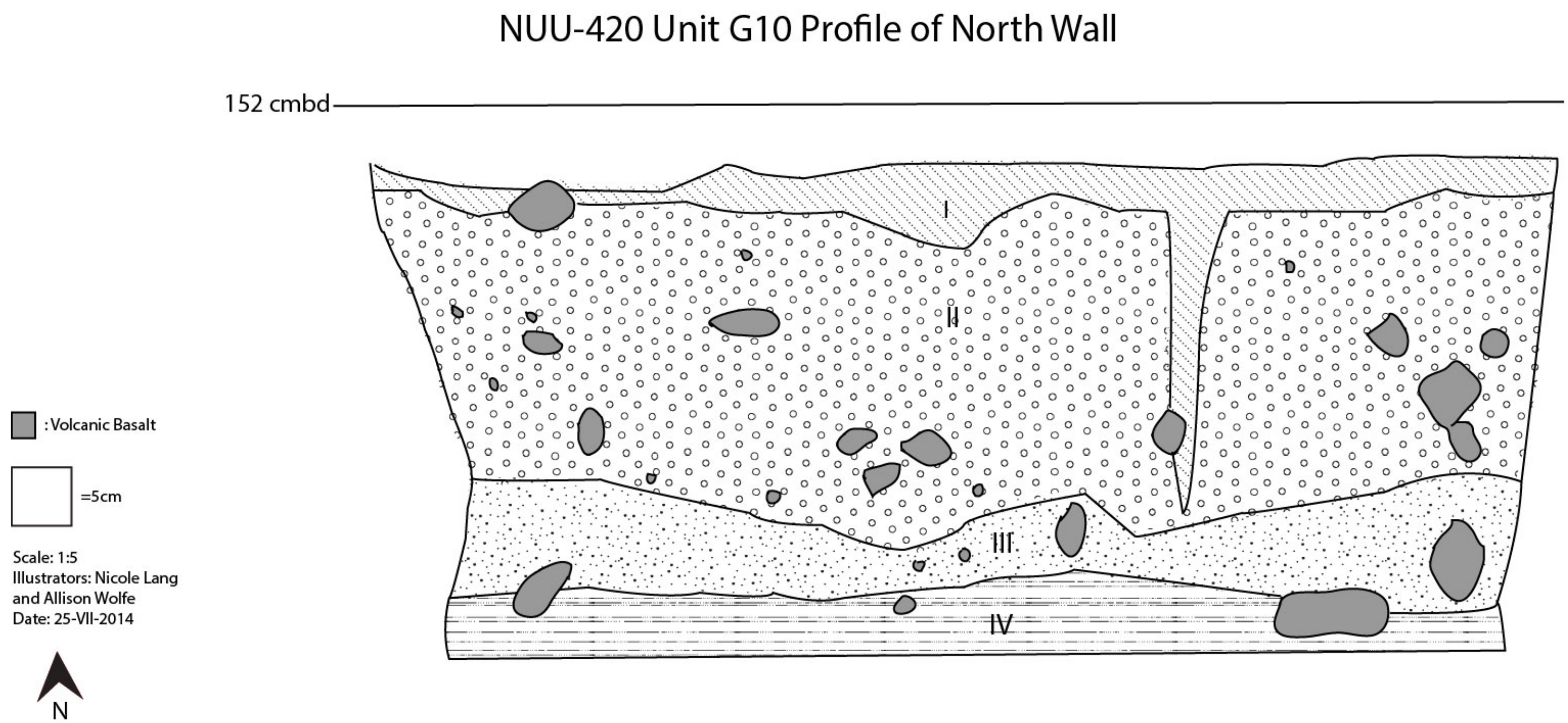


Figure 6.112: Profile map of the north wall in Unit F10.



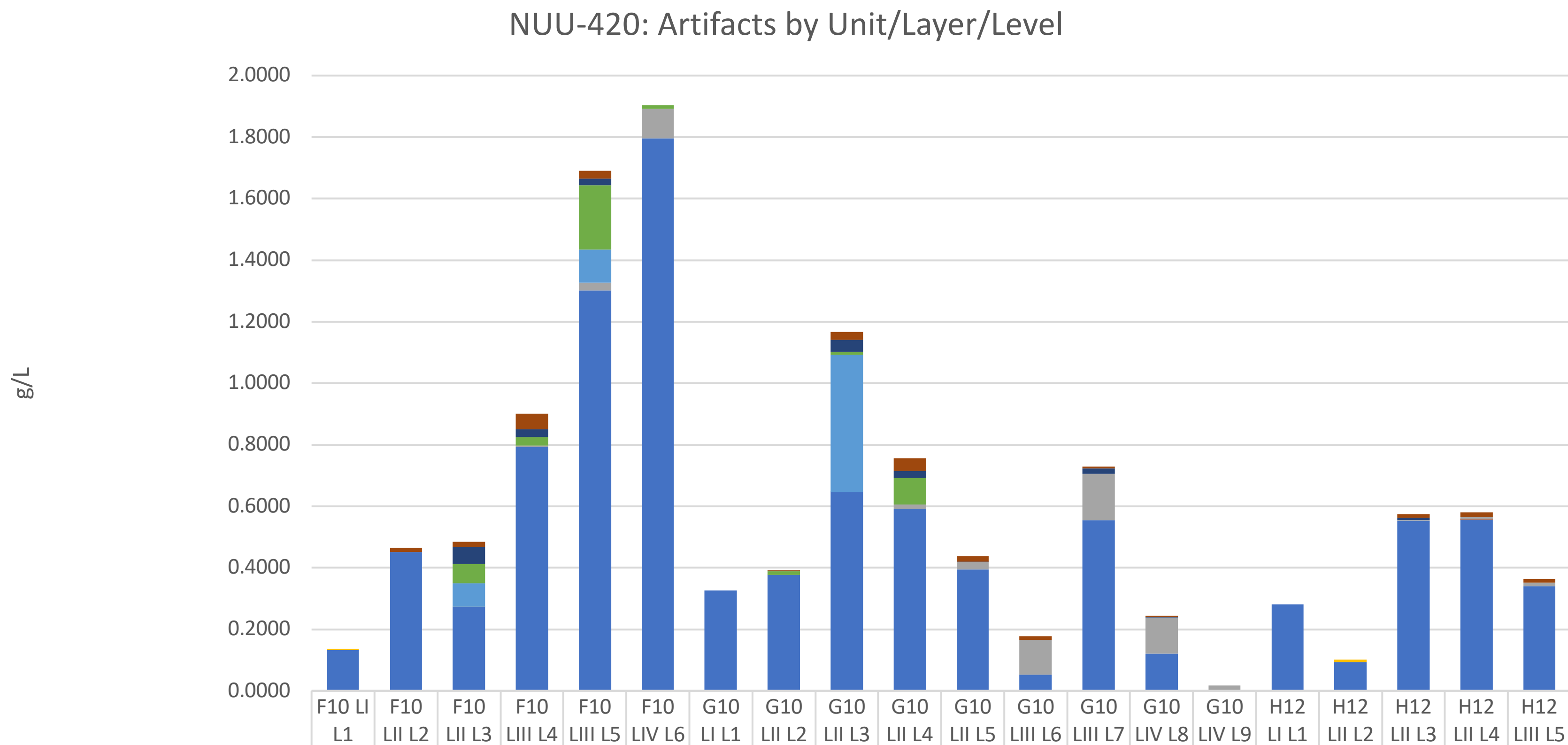
Layer I: A root carried the overburden down between around 40cm-55cm and also ~67cm-72cm. Overburden

Layer II: Mostly cultural layer containing volcanic glass, lithics, shell, coral and charcoal but with a very heterogeneous composition. The western side was very rocky and compacted. The eastern side was a lighter, silkier texture. Contained a lot of roots from overburden.

Layer III: A more uniform layer, still cultural, containing a lot of charcoal but less lithics, volcanicglass, no coral and little shell. Not compacted, silky and fluffy texture and a lighter reddish-yellow color.

Layer IV: Sterile, but not as compacted as other steriles in Nu'u. Hit bedrock.

Figure 6.113: Profile map of the north wall in Unit G10 with context information.



	F10 LI L1	F10 LII L2	F10 LII L3	F10 LIII L4	F10 LIII L5	F10 LIV L6	G10 LI L1	G10 LII L2	G10 LII L3	G10 LII L4	G10 LII L5	G10 LIII L6	G10 LIII L7	G10 LIV L8	G10 LIV L9	H12 LI L1	H12 LII L2	H12 LII L3	H12 LII L4	H12 LIII L5
Volcanic Glass Debitage		0.0147	0.0174	0.0506	0.0267			0.0035	0.0258	0.0398	0.0164	0.0120	0.0051	0.0031			0.0000	0.0117	0.0149	0.0109
Undetermined mollusc			0.0552	0.0259	0.0207			0.0007	0.0387	0.0247	0.0003		0.0183	0.0026				0.0073		
Coral			0.0626	0.0272	0.2086	0.0108		0.0120	0.0109	0.0849										
ʻIliʻili			0.0753		0.1085				0.4445											
general terrestrial gastropod	0.0048																0.0079		0.0001	
Charcoal			0.0011	0.0041	0.0254	0.0954		0.0000	0.0012	0.0131	0.0256	0.1129	0.1497	0.1172	0.0164			0.0020	0.0063	0.0124
Burnt Kukui Nut																			0.0004	
Basalt Debitage	0.1324	0.4503	0.2733	0.7935	1.3010	1.7962	0.3255	0.3772	0.6463	0.5929	0.3943	0.0525	0.5556	0.1204		0.2806	0.0938	0.5535	0.5577	0.3391

Figure 6.114: NUU-420 units graph of artifacts displayed as grams per liter of sediment excavated in each context

Excavation Unit	Scientific Determination	NISP	MNI	Weight (g)
F10 LI L1	general terrestrial gastropod	1	1	0.18
F10 LII L3	Cypracidae sp.	2	1	1.12
F10 LII L3	*Cypraea caputserpentis*	2	1	2.81
F10 LII L3	Undetermined mollusk	2	1	0.09
F10 LIII L4	Thaididae spp.	2	1	2.49
F10 LIII L4	Undetermined mollusk	2	1	0.23
F10 LIII L5	*Cypraea caputserpentis*	2	2	0.98
F10 LIII L5	Undetermined mollusk	4	2	2.72
F10 L L5 General Wall Clean	Undetermined mollusk	3	2	0.44
G10 LII L2	Undetermined mollusk	1	1	0.15
G10 LII L3	Conidae spp.	1	1	4.29
G10 LII L3	*Cypraea caputserpentis*	2	2	2.45
G10 LII L3	Undetermined mollusk	5	1	0.91
G10 LII L4	*Cypraea caputserpentis*	4	3	1.15
G10 LII L4	*Cypraea* cf. *mauritiana*	1	1	3.7
G10 LII L4	Undetermined mollusk	1	1	0.09
G10 LII L5	Undetermined mollusk	2	2	0.07
G10 LIII L7	*Cypraea caputserpentis*	1	1	0.13
G10 LIII L7	*Drupa recina*	1	1	1.96
G10 L L8 General Wall Clean	*Cypraea caputserpentis*	1	1	0.19
G10 L L8 General Wall Clean	Undetermined mollusk	2	1	<0.01
H12 LII L2	general terrestrial gastropod	29	1	0.88
H12 LII L3	Cypracidae sp.	1	1	0.59
H12 LII L3	Undetermined mollusk	5	2	0.96
H12 LIII L4	Undetermined mollusk	1	1	<0.01

Table 6.35: NISP, MNI, Weight, and ID for shell and sea urchin in NUU-420 units.

Unit	Artifact Size	Item Type	Sum of item count	Sum of weight /g
F10 LII L3	2mm-4mm	lithic	5	0.0087
G10 LI L1	≥6.3mm	wood	1	0.0538
G10 LI L1	1mm - 2mm	flora	20	0.02
G10 LI L1	1mm - 2mm	land snail	10	0.0165
G10 LI L1	1mm - 2mm	lithic	10	0.0462
G10 LI L1	1mm - 2mm	seed	2	0.0232
G10 LI L1	1mm - 2mm	wood	0	0.6449
G10 LI L1	2mm - 4mm	lithic	3	0.0457
G10 LI L1	2mm - 4mm	seed	5	0.0667
G10 LI L1	2mm - 4mm	shell	1	0.0171
G10 LI L1	2mm - 4mm	wood	20	0.642
G10 LI L1	2mm - 4mm	flora	10	0.0118
G10 LI L1	4mm-6mm	flora	10	0.0074
G10 LI L1	4mm-6mm	lithic	1	0.2453
G10 LI L1	4mm-6mm	wood	10	0.4908
G10 LII L3	2mm-4mm	lithic	2	0.094
G10 LII L3	2mm-4mm	wood	2	0.003
G10 LIV L9	1mm-2mm	burnt wood	10	0.0148
G10 LIV L9	1mm-2mm	flora	15	0.001
G10 LIV L9	1mm-2mm	lithic	3	0.0351
G10 LIV L9	1mm-2mm	seed	1	0.0098
G10 LIV L9	1mm-2mm	wood	12	0.0256
G10 LIV L9	2mm-4mm	wood	1	0.0205
G10 LIV L9	4mm-6.3mm	lithic	1	0.0487
G10 LIV L9	4mm-6.3mm	wood	3	0.0097
H12 LI L1	≥6.3mm	modern flora	2	0.04
H12 LI L1	2mm-4mm	land snail	1	0.0442
H12 LI L1	2mm-4mm	modern flora	49	0.3521
H12 LI L1	4mm-6.3mm	modern flora	4	0.1158
H12 LII L3	2mm-4mm	lithic	2	0.0583
H12 LII L3	2mm-4mm	wood	5	0.051
Offsite Bulk 2	4mm-6.3mm	modern flora	10	0.0941
Offsite Bulk 3	2mm-4mm	modern flora	28	0.3306
Offsite Bulk 3	4mm-6.3mm	wood	1	0.0662
Offsite Bulk 4	2mm-4mm	Faunal Bone	3	0.0245
Offsite Bulk 4	2mm-4mm	modern flora	10	0.0533

Table 6.36: Microartifact size, type, count, and weight for NUU-420 units.

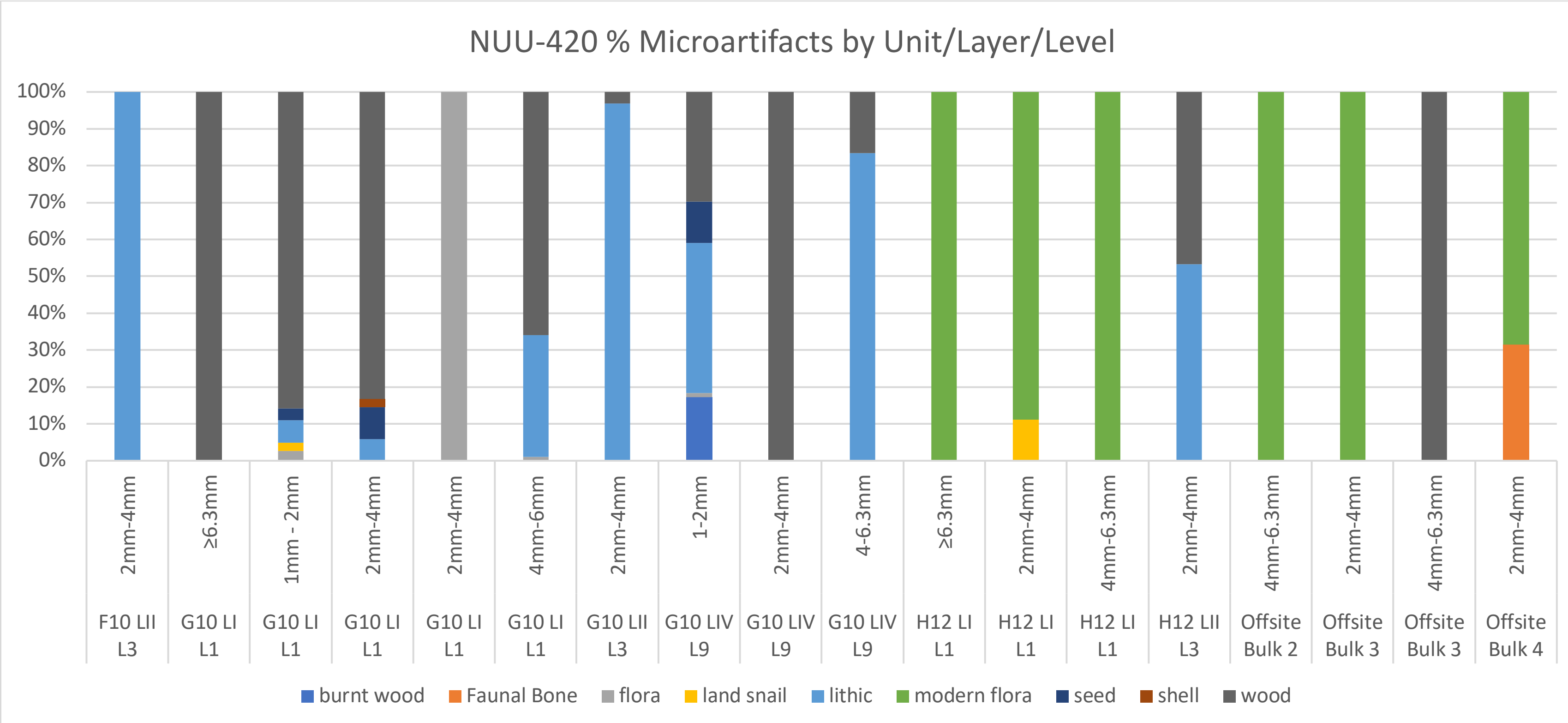


Figure 6.115: Total microartifact assemblage for NUU-420 units, compared across units.

Site/Layer/ Level/Sample	pH	% Organic Carbon	Particle Size Distribution <0.063	0.063	0.125	0.25	0.5	1	2	4	6.3
F10 L3 LII SS1	5.58	30.35	14.52	25.84	32.88	36.26	40.34		44.44	49.06	99.84
G10 L1 LI SS3			3.02	14.05	27.42	46.15	56.82	64.00	68.34	71.90	101.20
G10 L3 LII SS3	5.48	35.24	5.76	12.14	16.56	18.96	22.08		24.10	25.66	99.94
H12 L3 LII SS3		31.13	19.50	47.27	66.31	77.04	83.20	88.40	89.94	91.46	99.28
NUU420 BULK2OS	5.25	53.12	9.64	34.96	56.86	67.14	70.72	73.66	75.86	78.92	100.44
NUU420/152BULK3OS	5.69		4.55	24.88	42.12	52.63	59.70	63.31	65.18	66.35	100.45

Table 6.37: Sediment sample data from NUU-420 units.

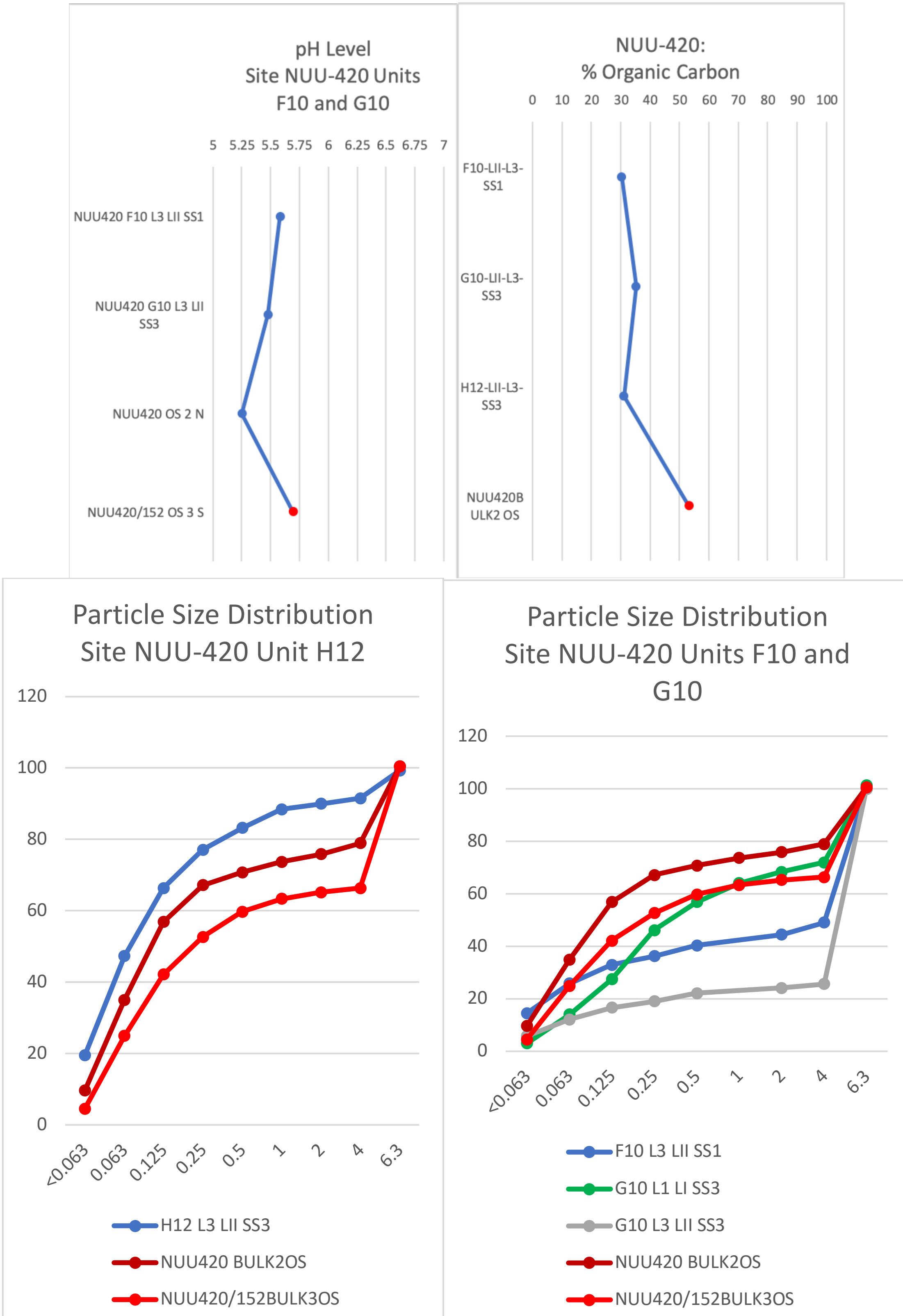


Figure 6.116: pH, LOI, and Particle Size Distribution data for NUU-420 units.

Site NUU-153

Across the ridge from NUU-420 to the northeast stands site NUU-153, an imposing architectural feature with multiple stone courses built up the side of the slope. The feature is clearly visible from the ridge to the south and the swale below, but the five courses of stone are built in such a way that they do not extend above the ridgeline and are therefore not visible from the north. NUU-153 extends up the side of the steep slope and 15m across. Very little level and open space was available inside the feature with the stone paving sloped and stepped down the hillside. The flattest, most open area was on top of the feature where one test unit was placed in 2010[20]. I returned to the site in 2014 and placed three units in the northeast corner along the main wall facing and another down the slope at the next level area available. A fifth unit was placed at the bottom of the feature to test the association of this open space in the swale with the massive architectural feature.

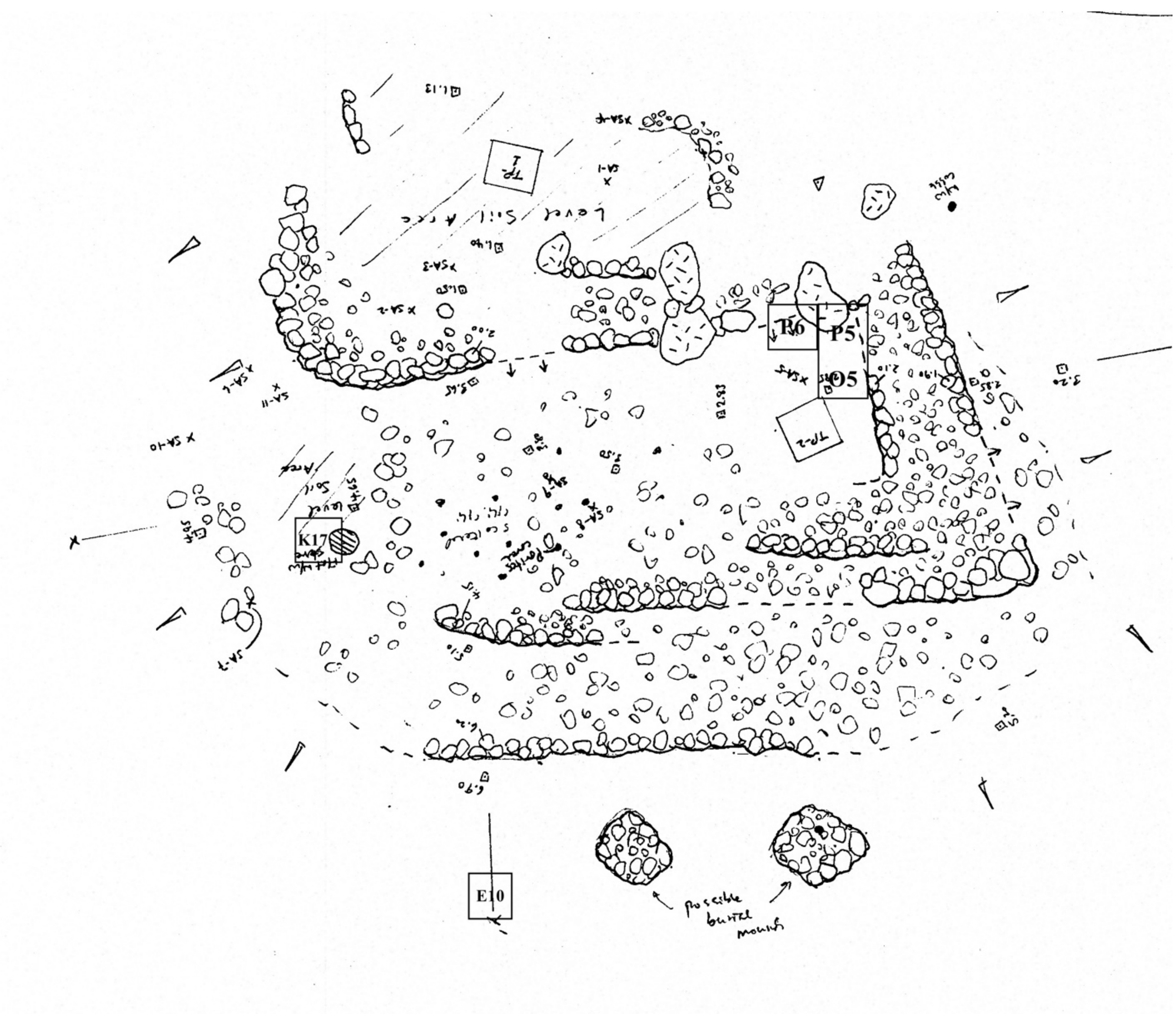


Figure 6.117: Plane table map of NUU-153 with the units marked (map by Patrick Kirch.).

[20] This data was not available to me to include here.

Fig. 1. Phytolith percentage diagram from Nu'u, Kaupo, Maui, Hawaiian Islands (+ = found after count).

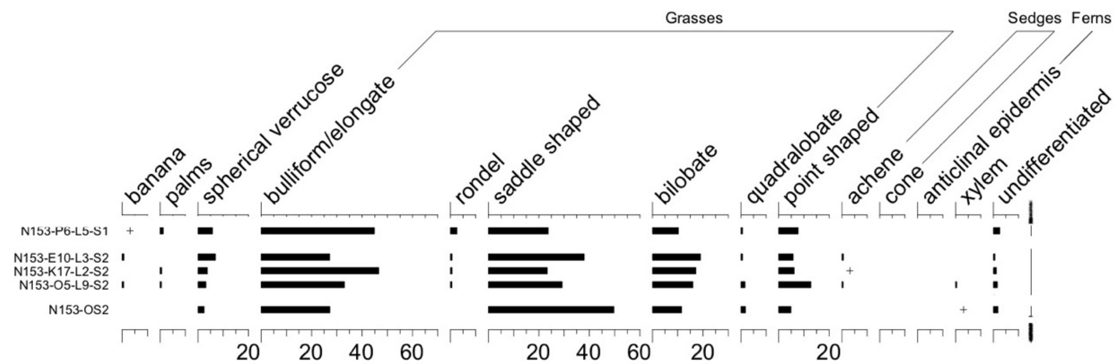


Figure 6.118: Phytoliths extracted from NUU-153 sediment samples. Data provided by Mark Horrocks, table is adapted from Horrocks 2018 Lab Report.

Fig. 2. Starch and charcoal diagram from Nu'u, Kaupo, Maui, Hawaiian Islands (+ = small amount, ++ = large amount).

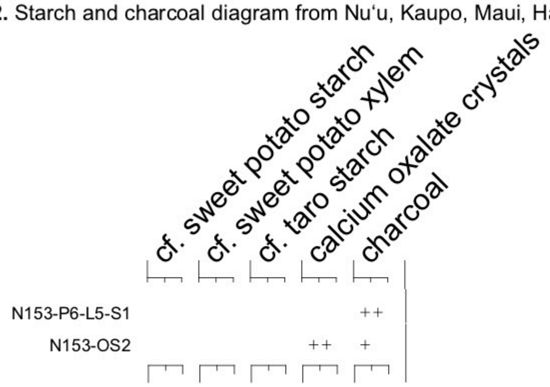


Figure 6.119: Starch, calcium oxalate crystals, and charcoal identified in NUU-153 sediment samples. Data provided by Mark Horrocks, table is adapted from Horrocks 2018 Lab Report.

Main Terrace

The three units within the northeast corner of the feature uncovered characteristics unique to this site. Unit O5 uncovered dense charcoal deposits that extended through the unit to the bedrock below. The large bedrock that served as the part of the foundation and extended to the base of the unit was covered in grey charcoal dust and ash as a result of the dense deposits. Other materials were also recovered from Unit O5 more frequently than the neighboring units. The majority of faunal fragments were recovered from this unit. Of the identifiable species, the most common shell fragments were from *Cellana sp.*, or ʻopihi, and sea urchin test was also abundant. The most common type of animal associated with bone fragments were small fish (specifically vertebrae and teeth, thought to be from the *Scaridae* family). The basalt fragments that were recovered from this unit was also found at higher densities that the neighboring units, made of finer grained basalt than what was found in other kauhale in the area with the exception of NUU-155. A hammerstone was also recovered from this area, indicating occasional lithic working.

The excavation of Units P5 and P6 led to the discovery of a hearth, which is the likely source of the dense charcoal in Unit O5. Although it is reasonable to assert that this combustion feature produced the charcoal found the in the surrounding units and may have been the center of activity in this portion of the architectural feature, the least amount of anthropogenic material was recovered from P5. ʻIliʻili were the only type of artifacts that proved more concentrated in this unit. A cache of ʻiliʻili were recovered from the northeast corner, tucked behind the hearth. ʻIliʻili and charcoal, few other artifacts. As for material of biological origin, sea urchin and fishbone from unidentified species were the most common remnants, but the presence of a shark tooth and mammal bone are also notable.

Unit P6 was placed up against the bedrock outcrop on the northern wall to the west of the hearth (components of the hearth feature did overlap this unit along the unit's eastern wall). Unit P6 shared similar characteristics with Units O5 and P5 regarding type of artifacts. Basalt debitage and charcoal were still the most common types of artifacts found, but ʻiliʻili were also recovered more frequently than was typically seen in other Nuʻu kauhale. Similar to Unit O5, a variety of marine species were identifiable from the fragments of shell and sea urchin recovered from Unit P6. *Cellana sp., Cypraea sp.* and sea urchin test were the most abundant, but other small gastropods commonly found in the kauhale in this region were identified.

The microartifacts from the three units on this middle terrace provided little additional information. Lithic and charcoal fragments were abundant, as was insect feces, evidencing bioturbation in this woody, charcoal-rich area. A koa haole tree stump was pulled from the excavation units prior to excavation, and much of the desiccated wood found in these samples that was covered in termite feces is thought to be from that tree. Several of the larger charcoal pieces also evidenced termite activity. Micro-faunal remains were only found in the bulk samples from Unit P6.

The artifact assemblages for this area show consistency in the materials used through time. The artifacts are most dense with more variety of materials in the levels and layers below the hearth (the top of which was uncovered in Unit P6 Level 6 and the base was uncovered in Level 11). This may indicate change in practice over time, bioturbation, or fill beneath the hearth. I turn to a discussion of the sediment data to help clarify the site formation process.

The pH remained constant through the units with the biggest spike seen just below the level of the hearth. The levels of organic carbon remained constant throughout all units but Unit P6, where it fluctuated slightly, increasing with depth. The relatively constant composition of O5 shows a slight decrease in organic carbon where pH spikes. This may reflect the poor preservation of organic material in the heavily heated area near the hearth and the impact of higher pH levels on decomposition. However, the fact that the decrease in organic matter is so minimal when the spike in pH is so significant may indicate that this area experienced much higher organic input than the surrounding layers.

The particle size distribution shows P6 contexts are dominated by gravel while sand dominates the P5 depositions. O5 is the most variable, with gravel, sand, and mud deposits inconsistently fluctuating with depth. Although each sample does have at least 30% of gravel (aside from the sample from layer VI which was primarily mud and very fine sand). The contexts with finer sediments are more likely to have preserved humus over time and indicate different depositional processes than the gravel-dominated sediments. The recovery of insect wings, exoskeletons, and feces during the microartifact analysis also indicated heavy bioturbation by termites in this area. The sediment samples helped clarify that there was not one process, but many that affected the site formation. Bioturbation moved artifacts, specifically charcoal around the units (insect feces was found connected to charcoal pieces), but the deep deposits also show extended use and reworking of the space over time.

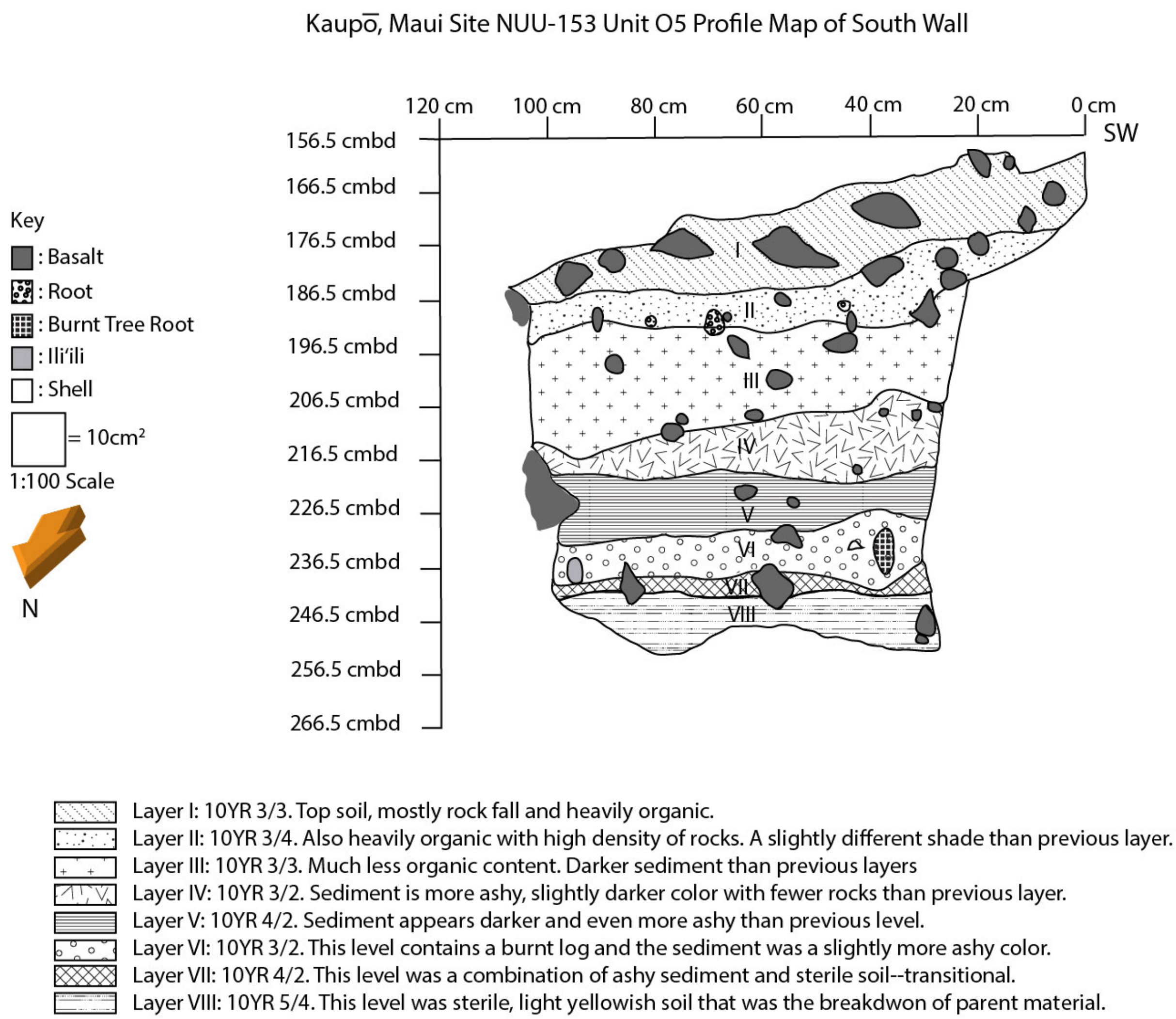


Figure 6.120: Profile map of the south wall in Unit O5 with context information.

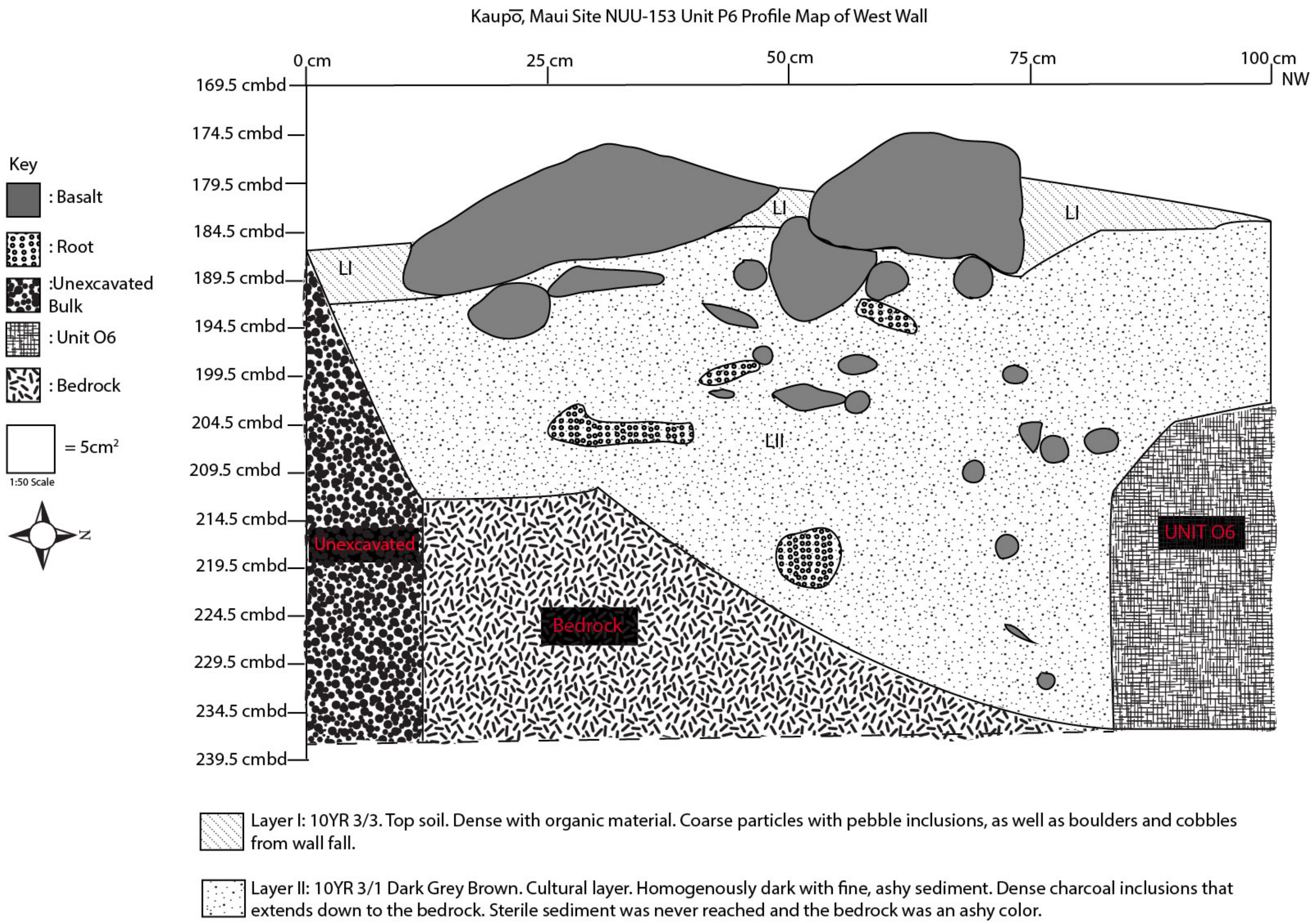


Figure 6.120: Profile map of the west wall in Unit P6 with context information.

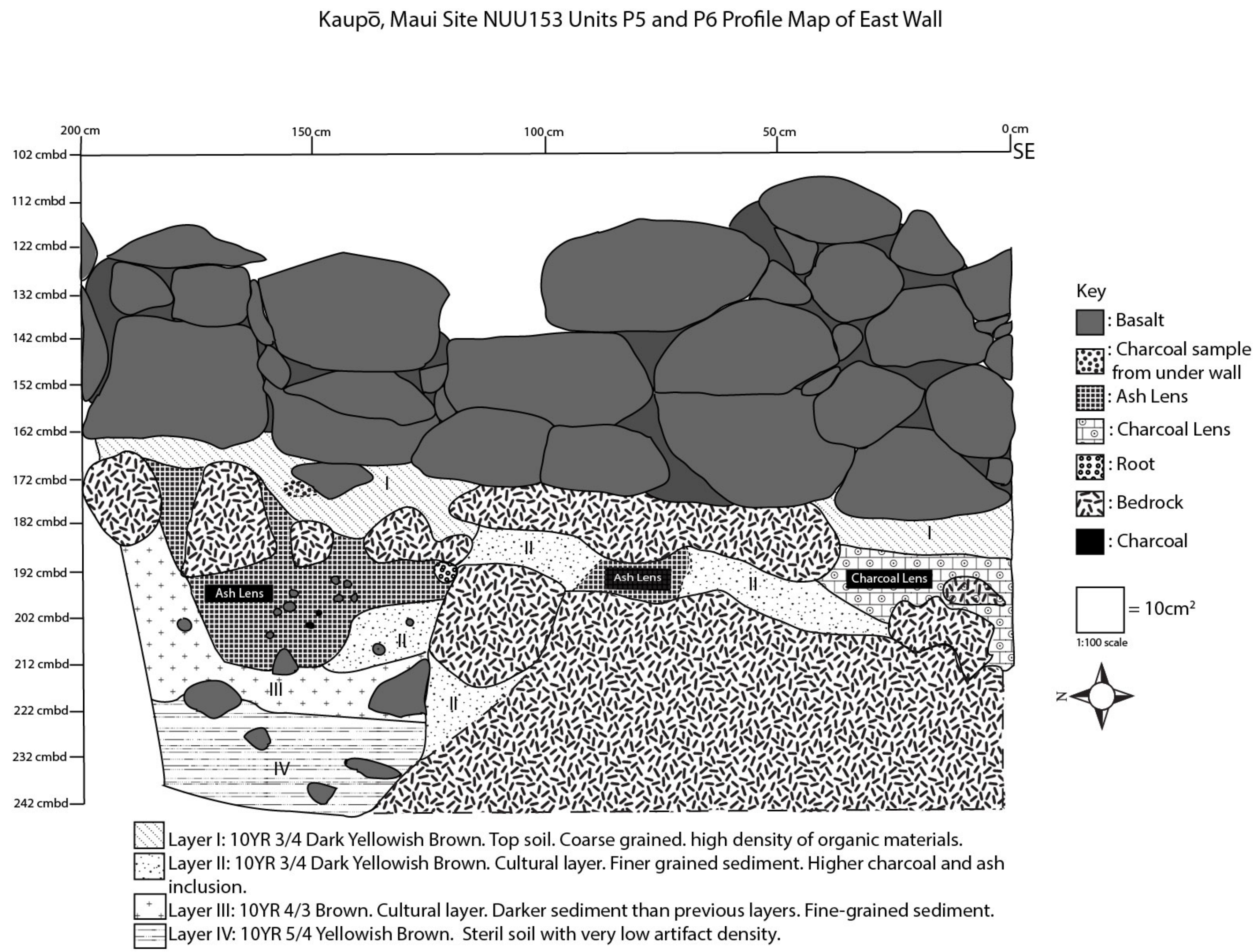
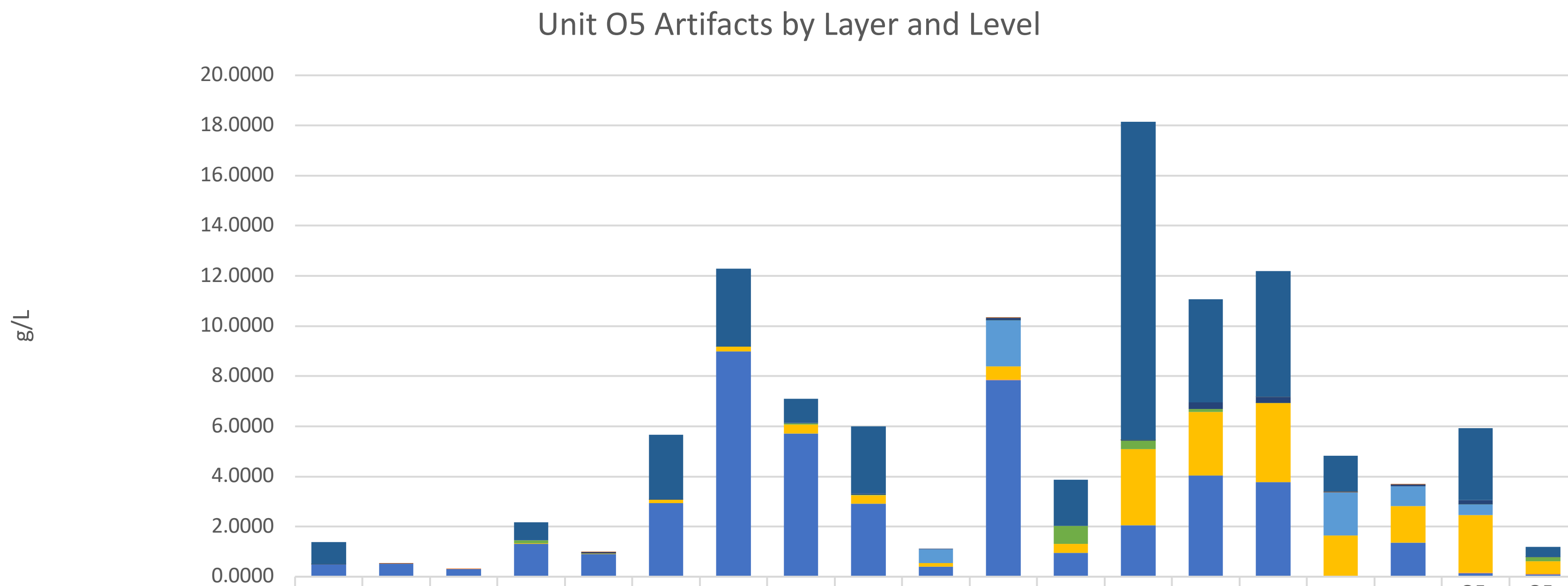


Figure 6.121: Profile map of the east wall in Units P5 and P6 with context information.

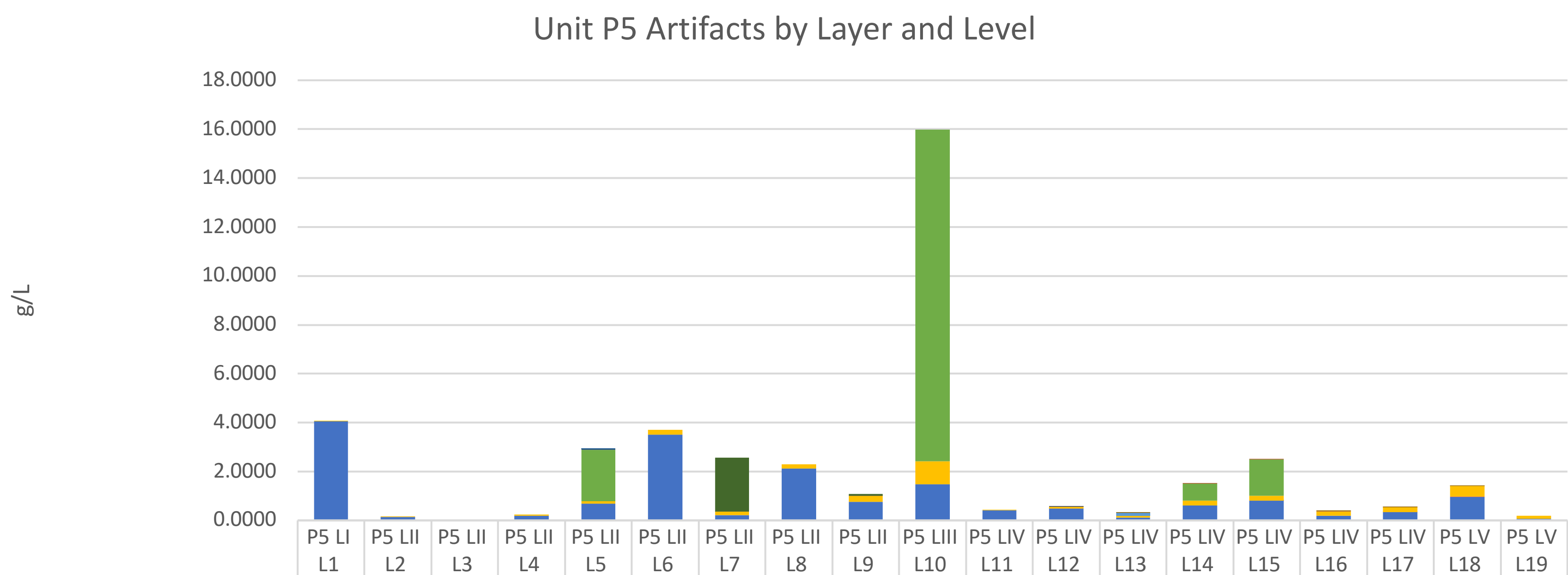
Figure 6.122: Profile photo of the mapped west wall in NUU-153 Unit P6.

Figure 6.123: Profile map of the mapped east wall in NUU-153 Unit P5.



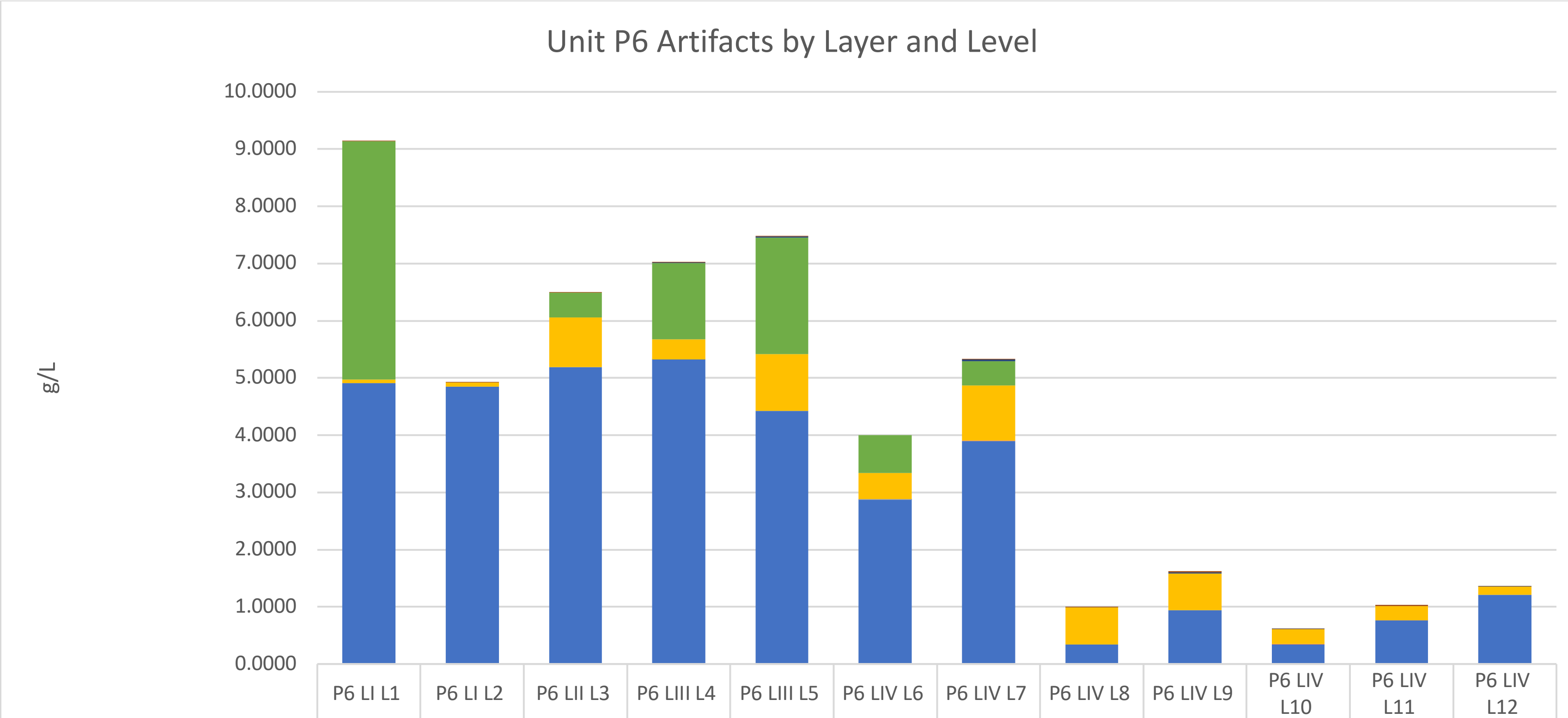
	O5 LI L1	O5 LI L2	O5 LI L3	O5 LI L4	O5 LI L5	O5 LII L6	O5 LII L7	O5 LII L8	O5 LIII L9	O5 LIII L10	O5 LIII L11	O5 LIII L12	O5 LIV L13	O5 LV L14	O5 LV L15	O5 LVI L16	O5 LVI L17	O5 LVII L18	O5 LVIII L19
Water-rolled basalt	0.8779			0.7234		2.5670	3.1043	0.9669	2.6776			1.8429	12.707	4.1048	5.0071	1.4557		2.8718	0.4085
Volcanic Glass Debitage													0.0049						
undertermined						0.0017													
Sea Urchin	0.0010	0.0002			0.0004						0.0002		0.0022		0.0067	0.0090	0.0085		0.0058
Shell	0.0027				0.0468	0.0006	0.0040	0.0128	0.0254	0.0010	0.0879		0.0038	0.2742	0.2403	0.0036	0.0608	0.1576	0.0033
Coral	0.0002			0.1161	0.0066			0.0575	0.0448		0.0168	0.7062	0.3358	0.1107	0.0004	0.0039		0.0005	0.1687
‘Ili‘ili										0.5383	1.8221					1.7121	0.8016	0.4325	
Charcoal	0.0024			0.0144	0.0337	0.1563	0.1950	0.3622	0.3149	0.1528	0.5431	0.3802	3.0501	2.5299	3.1615	1.6427	1.4615	2.3040	0.5043
Carbonized Kukui Nut Shell																0.0028			
Bone not worked			0.0004								0.0062					0.0054		0.0053	0.0007
Basalt Debitage	0.4892	0.5174	0.3051	1.3154	0.8972	2.9263	8.9854	5.7004	2.9229	0.3958	7.8482	0.9396	2.0474	4.0386	3.7719		1.3538	0.1443	0.1012

Figure 6.124: Unit O5 graph of artifacts displayed as grams per liter of sediment excavated in each context



	P5 LI L1	P5 LII L2	P5 LII L3	P5 LII L4	P5 LII L5	P5 LII L6	P5 LII L7	P5 LII L8	P5 LII L9	P5 LIII L10	P5 LIV L11	P5 LIV L12	P5 LIV L13	P5 LIV L14	P5 LIV L15	P5 LIV L16	P5 LIV L17	P5 LV L18	P5 LV L19
Water-rolled basalt							2.1931		0.0790										
Volcanic Glass Debitage					0.0015														
Sea Urchin													0.0003			0.0006	0.0015	0.0146	
Manuport Stone												0.0005							
Shell					0.0014				0.0054				0.0004	0.0002	0.0019	0.0064	0.0026	0.0105	
Coral					0.0123		0.0063												
‘Ili‘ili					2.0976					13.556				0.6854	1.5028				
Hammer Stone													0.1152						
Charcoal	0.0138	0.0001	0.0020	0.0267	0.1184	0.1807	0.1344	0.1843	0.2380	0.9422	0.0428	0.0854	0.0942	0.2112	0.1909	0.1718	0.1951	0.4282	0.1235
Carbonized Kukui Nut Shell															0.0031				
Bone not worked												0.0003					0.0011	0.0027	
Basalt Debitage	4.0545	0.1478		0.2026	0.6750	3.5168	0.2273	2.1217	0.7635	1.4864	0.4039	0.4772	0.1069	0.6094	0.8056	0.2003	0.3376	0.9684	0.0622

Figure 6.125: Unit P5 graph of artifacts displayed as grams per liter of sediment excavated in each context



	P6 LI L1	P6 LI L2	P6 LII L3	P6 LIII L4	P6 LIII L5	P6 LIV L6	P6 LIV L7	P6 LIV L8	P6 LIV L9	P6 LIV L10	P6 LIV L11	P6 LIV L12
Sea Urchin										0.0033		0.0040
Shell	0.0071	0.0050	0.0005	0.0061	0.0043		0.0157	0.0054	0.0175	0.0021	0.0188	0.0043
Coral				0.0078	0.0118		0.0251	0.0014	0.0275			
ʻIliʻili	4.1709		0.4348	1.3344	2.0441	0.6603	0.4234					
Hammer Stone												
Charcoal	0.0569	0.0661	0.8738	0.3513	0.9934	0.4614	0.9687	0.6428	0.6331	0.2604	0.2467	0.1438
Carbonized Kukui Nut Shell						0.0012						
Bone not worked				0.0012			0.0002			0.0010	0.0005	
Basalt Debitage	4.9106	4.8526	5.1867	5.3246	4.4200	2.8779	3.9020	0.3460	0.9435	0.3454	0.7657	1.2054

Figure 6.126: Unit P6 graph of artifacts displayed as grams per liter of sediment excavated in each context

Excavation Unit	Level	Layer	NISP	MNI	Weight (g)	Scientific Determination	Comments
O5	11	III	3	1	0.01	general undetermined bone	NID small fragments
O5	11	III	1	1	0.55	Pig	Pig incisor
O5	16	VI	1	1	0.1	cf. Pacific Rat	Possible long bone of rat
O5	16	VI	3	1	0.26	Medium mammal	Incisor root from mammal
O5	16	VI	1	1	0.17	Small mammal	Left humerus, distal end of sm/md rodent (not mongoose)
O5	16	VI	1	1	0.04	Undetermined bird	Small long bone fragment
O5	18	VII	5	1	0.26	Undetermined fish	Large fish vertebrae and other broken bones
O5	18	VII	1	1	0.02	*Scaridae*	Tooth
O5	18	VII	1	1	0.03	Undetermined Mammal	NID fragment
O5	18	VII	1	1	0.05	general undetermined bone	NID fragment
O5	19	VIII	2	1	0.04	Undetermined Mammal	NID Fragments
P5	12	IV	1	1	0.04	Undetermined fish	Possible vertebrae fragment
P5	17	IV	1	1	0.03	cf. *Elasmobranchii* (ray/shark)	cf. shark tooth
P5	17	IV	4	1	0.05	Undetermined fish	NID fragments
P5	17	IV	1	1	<0.01	general undetermined bone	NID fragments
P5	17	IV	1		0.1	Undetermined fish	Fish jaw/teeth
P5	18	V	1	1	0.04	Undetermined fish	NID fragment
P5	18	V	1	1	0.04	Medium mammal	NID fragment
P6	4	III	2	1	0.1	Undetermined fish	Fish jaw/teeth
P6	7	IV	1	1	0.01	Undetermined fish	Fish Vertebrae
P6	10	IV	1	1	0.06	Undetermined fish	Fish Vertebrae
P6	11	IV	1	1	0.03	Undetermined fish	Fish vertebrae

Table 6.38: Bone identification, NISP, MNI and weight from Units O5, P5, and P6

Unit	Level	Feature	Scientific Determination	NISP	MNI	Weight (g)
O5	1		*Drupa recina*	1	1	0.33
O5	1		Sea urchin test any species	3	1	0.13
O5	2		Sea urchin test any species	1	1	0.02
O5	5		*Cellana* sp.	1	1	0.04
O5	5		*Drupa morum*	1	1	5.73
O5	5		Sea urchin test any species	2	1	0.05
O5	5		Undetermined mollusk	1	1	0.03
O5	6		Undetermined mollusk	5	1	0.03

O5	7		*Cypraea caputserpentis*	1	1	0.16
O5	7		Undetermined mollusk	1	1	0.12
O5	8		cf. *Cypraea caputserpentis*	1	1	0.92
O5	9		cf. *Drupa* sp.	1	1	2.15
O5	9		Undetermined mollusk	1	1	0.13
O5	10		Undetermined mollusk	2	1	0.1
O5	11		*Cellana* sp.	2	1	0.3
O5	11		Cypracidae sp.	1	1	3.9
O5	11		Sea urchin test any species	1	1	0.06
O5	11		Undetermined mollusk	1	1	3.63
O5	13		*Cellana* sp.	3	1	0.06
O5	13		Sea urchin test any species	1	1	0.06
O5	14		Undetermined mollusk	2	1	0.57
O5	15		*Cellana* sp.	19	2	1.33
O5	15		Conidae spp.	2	1	1
O5	15		Cypracidae sp.	1	1	1.86
O5	15		*Echinothrix* sp.	1	1	0.03
O5	15		Sea urchin test any species	9	2	0.24
O5	15		Undetermined mollusk	12	2	1.48
O5	16		*Cellana* sp.	1	1	0.06
O5	16		cf. *Cypraea caputserpentis*	1	1	0.01
O5	16		cf. *Drupa* sp.	1	1	0.04
O5	16		cf. *Hetrocentrotus mamillatus* spine	1	1	0.04
O5	16		Sea urchin test and jaw any species	3	1	0.07
O5	16		Sea urchin test any species	17	2	0.59
O5	16		Undetermined mollusk	2	1	0.03
O5	17		Sea urchin test any species	20	2	0.64
O5	17		Undetermined mollusk	26	4	4.56
O5	18		*Cellana* sp.	3	1	1.28
O5	18		cf. *Drupa recina*	1	1	1.62
O5	18		*Echinothrix* sp.	4	1	0.24
O5	18		*Nerita picea*	1	1	0.04
O5	18		Sea urchin test any species	18	2	1.47
O5	18		Thaididae spp.	1	1	0.78
O5	18		Undetermined mollusk	17	1	0.58
O5	19		*Cellana* sp.	1	1	0.01
O5	19		cf. Sea urchin jaw	1	1	0.04
O5	19		*Echinothrix* sp.	2	1	0.06
O5	19		Sea urchin test any species	6	1	0.24
O5	19		Undetermined mollusk	11	3	0.18
O5	1 to 15		Undetermined mollusk	1	1	0.02
O5	10 to 11		cf. Cypracidae spp.	1	1	0.53
O5	10 to 11		Sea urchin test any species	9	1	0.04
O5			cf. *Cellana* sp.	1	1	0.04
O5			*Echinothrix* sp.	1	1	0.02
O5			Undetermined mollusk	1	1	0.02
P5	5		Undetermined mollusk	6	1	0.1
P5	9		Undetermined mollusk	2	1	0.38
P5	13	1	*Cellana* sp.	3	1	0.18
P5	13	1	Undetermined mollusk	1	1	0.02
P5	13		Sea urchin test any species	2	1	0.05
P5	13		Undetermined mollusk	4	1	0.08
P5	14		Undetermined mollusk	3	1	0.03
P5	15		Undetermined mollusk	2	2	0.28

P5	16		*Echinothrix* sp.	3	2	0.04
P5	16		*Littorina scabra*	1	1	0.63
P5	16		Sea urchin test any species	3	1	0.06
P5	16		Undetermined mollusk	18	4	1.31
P5	17		*Cellana* sp.	1	1	0.01
P5	17		Sea urchin test any species	15	1	0.24
P5	17		Undetermined mollusk	5	2	0.39
P5	18		Sea urchin test any species	13	2	0.43
P5	18		Undetermined mollusk	2	2	0.32
P5	1 to 3		Undetermined mollusk	1	1	0.27
P6	1		Undetermined mollusk	1	1	0.25
P6	2		Undetermined mollusk	1	1	0.18
P6	4		*Cellana* sp.	2	1	0.32
P6	4		*Drupa* sp.	1	1	0.17
P6	5		*Cellana* sp.	15	1	0.09
P6	5		*Planaxis labiosa*	1	1	0.08
P6	5		Undetermined mollusk	9	1	0.18
P6	7		*Cellana* sp.	3	1	0.01
P6	7		cf. *Cypraea caputserpentis*	3	1	0.1
P6	7		cf. *Planaxis labiosa*	1	1	0.01
P6	7		*Drupa* sp.	1	1	0.64
P6	7		Undetermined mollusk	7	1	0.12
P6	8		cf. *Planaxis labiosa*	2	1	0.06
P6	8		Undetermined mollusk	6	1	0.29
P6	9		*Cellana* sp.	9	1	0.23
P6	9		Cypracidae sp.	2	1	0.62
P6	9		Undetermined mollusk	12	1	0.15
P6	10		*Planaxis labiosa*	1	1	0.06
P6	10		Sea urchin test any species	5	1	0.19
P6	10		Undetermined mollusk	2	1	0.06
P6	11		*Cellana* sp.	2	1	0.07
P6	11		*Littorina* sp.	1	1	0.65
P6	11		Undetermined mollusk	5	1	0.37
P6	12		*Planaxis labiosa*	2	2	0.15
P6	12		Sea urchin spine any species	2	1	0.06
P6	12		Sea urchin test any species	7	1	0.22
P6	12		Undetermined mollusk	2	1	0.05
P6	1 to 6		Sea urchin test any species	1	1	0.05
P6	1 to 13		Sea urchin test any species	4	2	0.11
P6	1 to 13		Undetermined mollusk	1	1	0.01
P6			*Cellana* sp.	3	1	0.03

Table 6.39: NISP, MNI, Weight, and ID for shell and sea urchin in Units O5, P5, P6

Unit	Layer	Level	Feature	Artifact Size	Item Type	weight /g	count
O5	II	6		2mm-4mm	Charcoal	0.008	1
O5	II	6		2mm-4mm	Wood	0.031	3
O5	II	9		2mm-4mm	Charcoal	0.02	8
O5	II	9		2mm-4mm	Lithic Debitage	0.0134	1
O5	II	9		2mm-4mm	Wood	0.016	17
O5	II	9		4mm-6.3mm	Charcoal	0.015	1
O5	II	9		4mm-6.3mm	Lithic Debitage	0.085	1
O5	II	9		4mm-6.3mm	Wood	0.022	1

O5	III	12	≥6.3mm	Lithic Debitage	1.2525	3
O5	III	12	2mm-4mm	Charcoal	0.127	10
O5	III	12	2mm-4mm	Lithic Debitage	0.0366	2
O5	III	12	2mm-4mm	Wood	0.0086	3
O5	III	12	4mm-6.3mm	Lithic Debitage	0.0851	1
O5	V	15	2mm-4mm	Charcoal	0.1345	20
O5	V	15	2mm-4mm	Lithic Debitage	0.2263	5
O5	V	15	4mm-6.3mm	Charcoal	0.126	1
O5	V	15	4mm-6.3mm	Lithic Debitage	0.154	1
O5	VI	17	≥6.3mm	Lithic Debitage	0.2265	1
O5	VI	17	2mm-4mm	Charcoal	0.0943	18
O5	VI	17	2mm-4mm	Flora	0.0462	3
O5	VI	17	2mm-4mm	Lithic Debitage	0.0183	2
O5	VI	17	4mm-6.3mm	Charcoal	0.1067	2
O5	VII	18S	≥6.3mm	Lithic Debitage	0.4138	1
O5	VII	18S	2mm-4mm	Charcoal	0.2605	35
O5	VII	18S	2mm-4mm	Lithic Debitage	0.2115	11
O5	VII	18S	4mm-6.3mm	Charcoal	0.0714	4
O5	VII	18S	4mm-6.3mm	Lithic Debitage	0.1639	1
O5	VII	18N	≥6.3mm	Lithic Debitage	0.8938	1
O5	VII	18N	2mm-4mm	Charcoal	0.3179	41
O5	VII	18N	2mm-4mm	Lithic Debitage	0.1561	6
O5	VII	18N	2mm-4mm	Shell	0.0085	1
O5	VII	18N	4mm-6.3mm	Charcoal	0.2608	18
O5	VII	18N	4mm-6.3mm	Contemporary flora	0.0121	3
O5	VII	18N	4mm-6.3mm	Lithic Debitage	0.1327	2
O5		20 End	1mm-2mm	Wood	0.0055	10
O5		20 End	2mm-4mm	Wood	0.0167	1
P5	II	3	0.5mm-2mm	carbonized seed	0.0002	7
P5	II	3	2mm-4mm	Charcoal	0.0233	2
P5	II	5	≥6.3mm	Wood	0.2147	1
P5	II	5	2mm-4mm	Charcoal	0.0637	8
P5	II	5	2mm-4mm	Contemporary flora	0.0259	9
P5	II	5	2mm-4mm	Lithic Debitage	0.2137	9
P5	II	5	4mm-6.3mm	Contemporary flora	0.0045	3
P5	II	5	4mm-6.3mm	Lithic Debitage	0.4815	2
P5	II	6	≥6.3mm	Charcoal	0.546	5
P5	II	6	≥6.3mm	Lithic Debitage	0.126	1
P5	II	6	2mm-4mm	Charcoal	0.196	34
P5	II	6	2mm-4mm	Lithic Debitage	0.237	8
P5	II	6	2mm-4mm	Wood	0.032	18
P5	II	6	4mm-6.3mm	Charcoal	0.087	4
P5	II	6	4mm-6.3mm	Lithic Debitage	0.056	2
P5	II	6	4mm-6.3mm	Wood	0.011	3
P6	I	1	2mm-4mm	Terrestrial Gastropod	0.0019	2
P6	I	1	4mm-6.3mm	Wood	1.1063	11
P6	II	3	≥6.3mm	Lithic Debitage	0.453	1
P6	II	3	2mm-4mm	Charcoal	0.056	5
P6	II	3	2mm-4mm	koa haole seeds	0.118	9
P6	II	3	2mm-4mm	Lithic Debitage	0.131	6
P6	II	3	2mm-4mm	Wood	0.137	10
P6	II	3	2mm-4mm	Terrestrial Gastropod	0.008	1
P6	II	3	4mm-6.3mm	Lithic Debitage	0.096	1
P6	IV	12	0.5mm-2mm	burnt bone	0.012	22

P6	IV	12	0.5mm-2mm	Charcoal	0.3481	
P6	IV	12	0.5mm-2mm	sea urchin spine	0.0024	3
P6	IV	12	0.5mm-2mm	Shell	0.0024	8
P6	IV	12	0.5mm-2mm	sea urchin jaw	0.0004	1
P6	IV	12	0.5mm-2mm	bone	0.0148	10
P6	IV	12	2mm-4mm	Charcoal	0.3081	39
P6	IV	12	4mm-6.3mm	Charcoal	0.1462	4
O.S.			2mm-4mm	Contemporary flora	0.0817	26
O.S.			4mm-6.3mm	Contemporary flora	0.074	5

Table 6.40: Microartifact identification and weight for Units O5, P5, and P6.

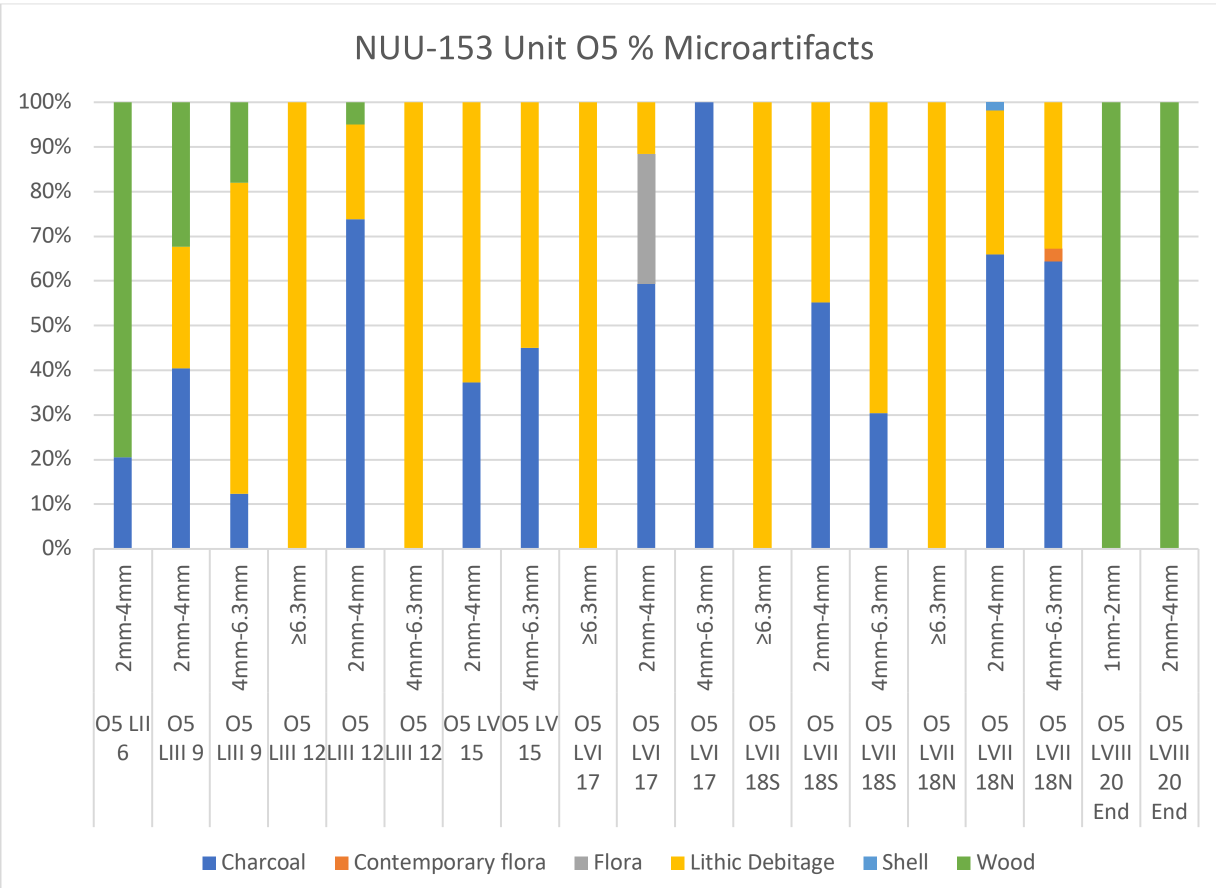


Figure 6.127: Graph of total microartifacts through Unit O5

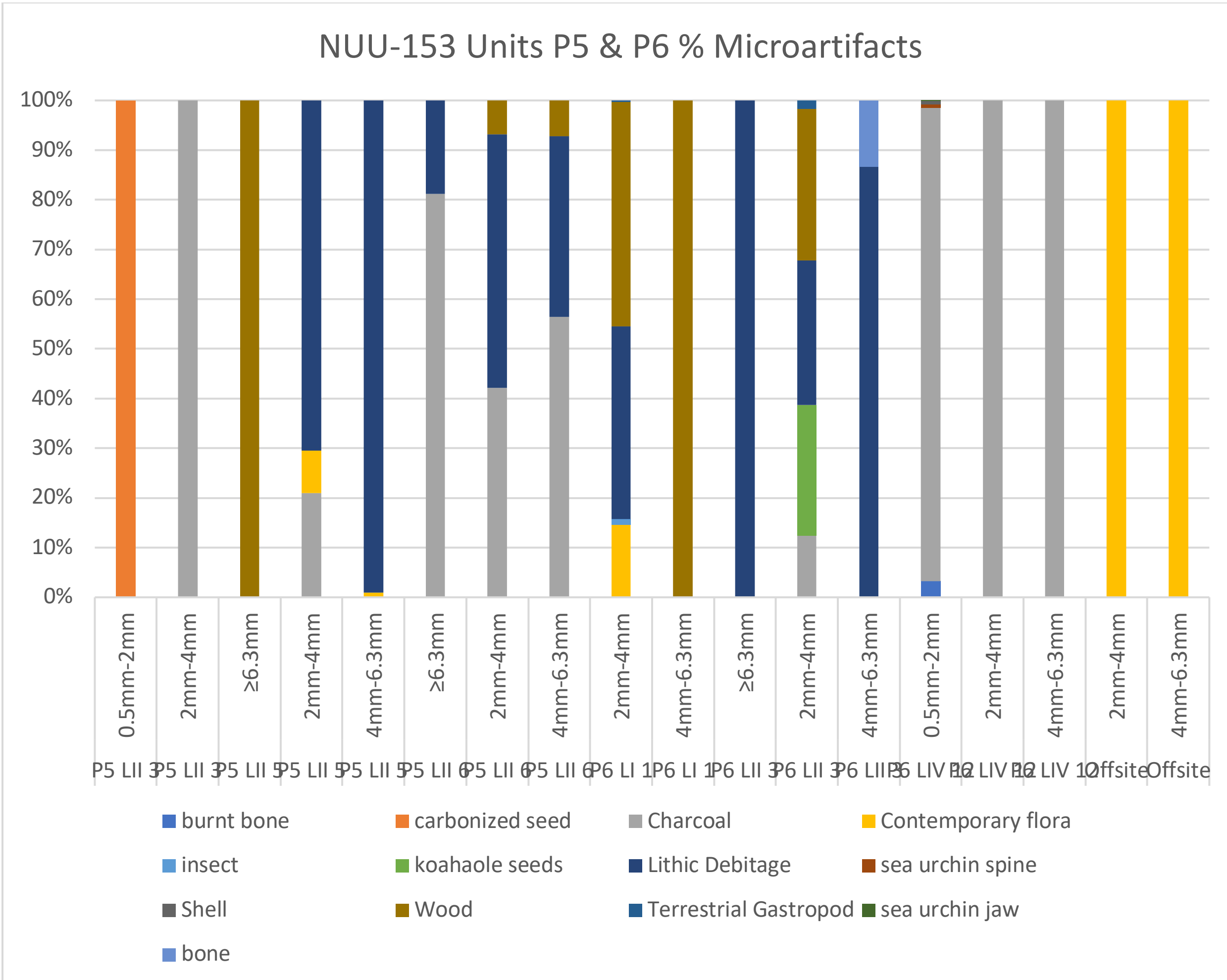


Figure 6.128: Graph of microartifacts through Units P5 and P6

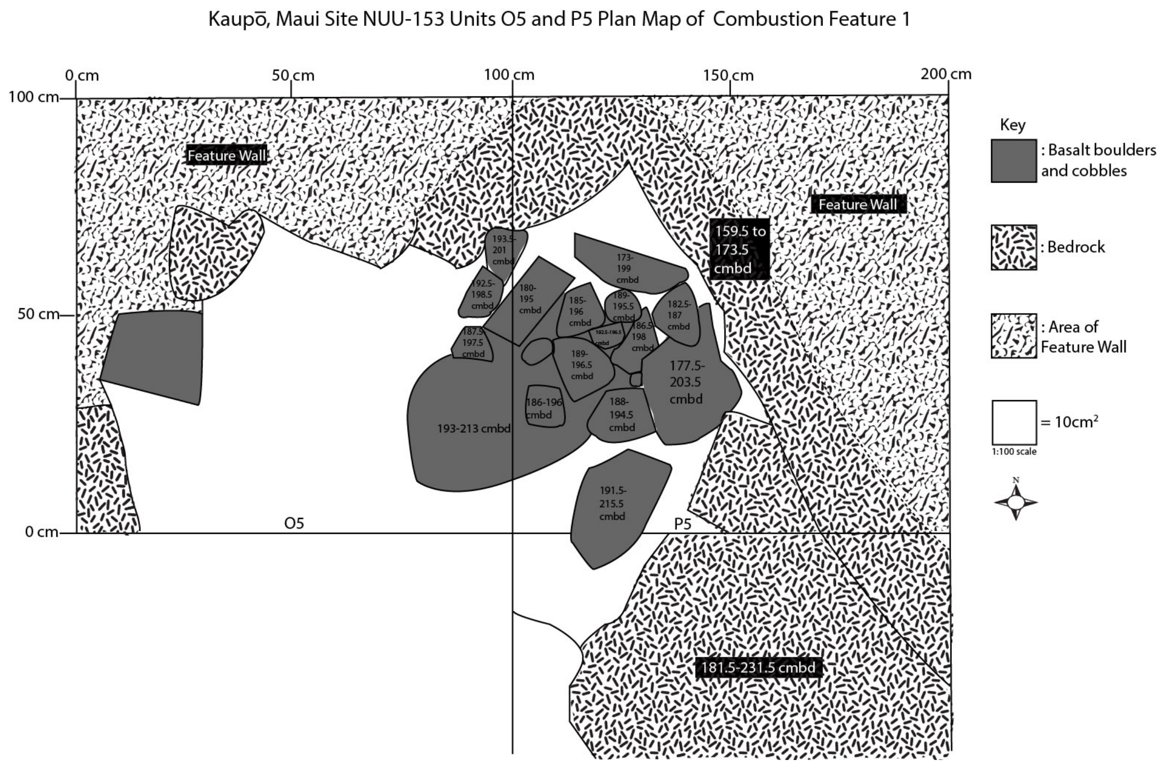
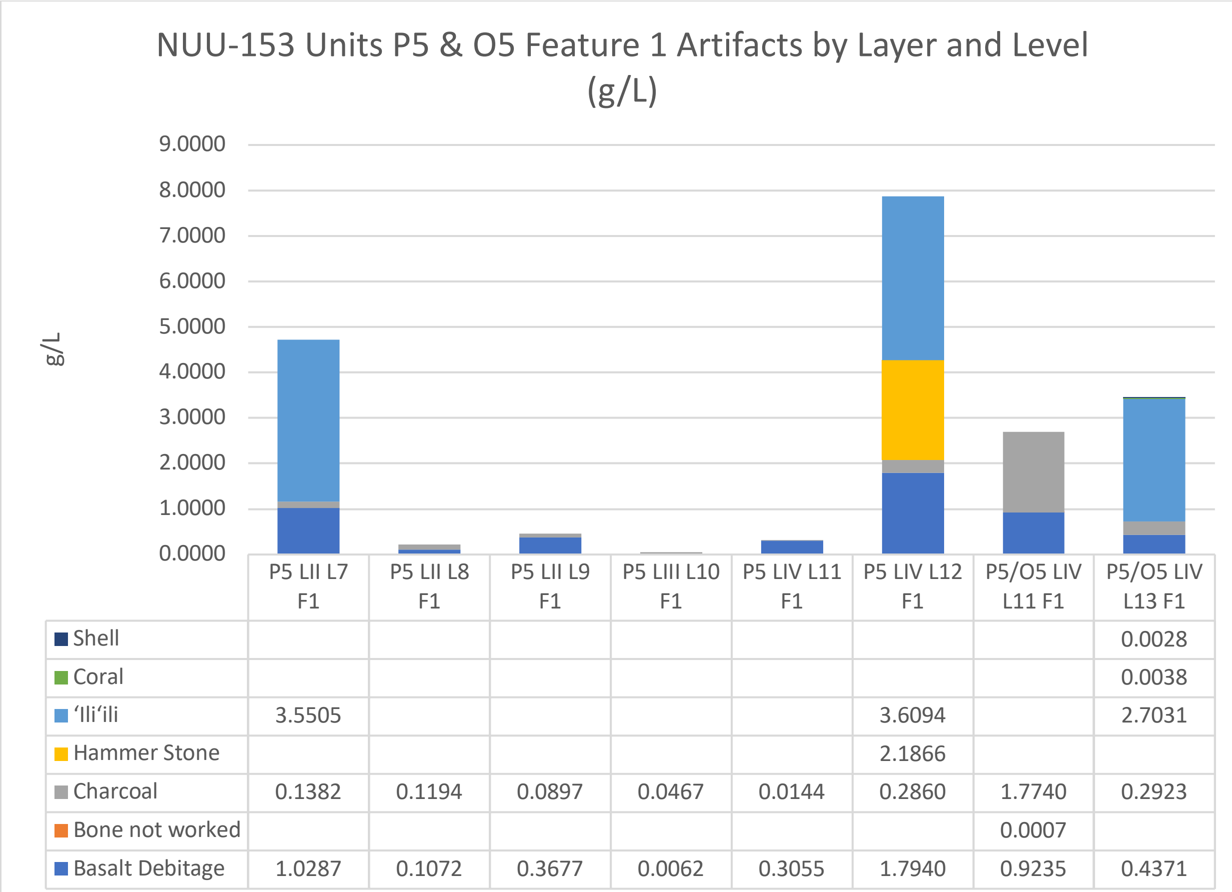


Figure 6.129: Plan view of the combustion feature in Units O5, P5, and P6

Figure 6.130: Plan photos of combustion feature in Units O5, P5, and P6



	P5 LII L7 F1	P5 LII L8 F1	P5 LII L9 F1	P5 LIII L10 F1	P5 LIV L11 F1	P5 LIV L12 F1	P5/O5 LIV L11 F1	P5/O5 LIV L13 F1
Shell								0.0028
Coral								0.0038
ʻIliʻili	3.5505					3.6094		2.7031
Hammer Stone						2.1866		
Charcoal	0.1382	0.1194	0.0897	0.0467	0.0144	0.2860	1.7740	0.2923
Bone not worked							0.0007	
Basalt Debitage	1.0287	0.1072	0.3677	0.0062	0.3055	1.7940	0.9235	0.4371

Figure 6.131: Units P5 and O5 graph of artifacts displayed as grams per liter of sediment excavated in each context

Unit/Layer/Level/Feature	Scientific Determination	Sum of NISP	Sum of MNI
P5 LIV L13 F1	*Cellana* sp.	3	1
P5 LIV L13 F1	Undetermined mollusk	1	1

Table 6.41: NISP, MNI, Weight, and ID for shell in Unit P5 and O5.

Excavation Unit	Feature	Level	Layer	Item Count	MNI	Weight (g)	Scientific Determination	Comments
P5/O5	F1 Under Rock	11	III	1	1	0.05	Small mammal	cf. rat vertebrae

Table 6.42: Bone recovered from the feature in Units P5 and O5

Unit	Layer	Level	Feature	Artifact Size	Item Type	weight /g	count
P5	II	9	1	≥6.3mm	Wood	0.1243	1
P5	II	9	1	0.5mm-1mm	Charcoal	0.1901	0
P5	II	9	1	0.5mm-1mm	Contemporary flora	0.0694	0
P5	II	9	1	0.5mm-1mm	Fire cracked rock	0.0007	2
P5	II	9	1	0.5mm-1mm	Lithic Debitage	0.0686	139
P5	II	9	1	0.5mm-1mm	Termite Fecal Matter/Remains	0.0108	86
P5	II	9	1	0.5mm-1mm	Unknown	0.0033	8
P5	II	9	1	0.5mm-1mm	Unknown (insects?)	0.0085	57
P5	II	9	1	0.5mm-1mm	Unknown Minerals	0.0104	19
P5	II	9	1	0.5mm-1mm	Unknown Seed Pods	0.0092	90
P5	II	9	1	0.5mm-1mm	Volcanic Glass	0.0179	20
P5	II	9	1	0.5mm-1mm	Terrestrial Gastropod	0	1
P5	II	9	1	1mm-2mm	Charcoal	0.4628	350
P5	II	9	1	1mm-2mm	Fire cracked rock	0.0043	1
P5	II	9	1	1mm-2mm	Flora	0.1685	0
P5	II	9	1	1mm-2mm	Lithic Debitage	0.2785	75
P5	II	9	1	1mm-2mm	Un-ID Mineral	0.0027	1
P5	II	9	1	2mm-4mm	Charcoal	0.4359	54
P5	II	9	1	2mm-4mm	Lithic Debitage	0.586	21
P5	II	9	1	2mm-4mm	Wood	0.1634	28
P5	II	9	1	2mm-4mm	cf. bone	0	1
P5	II	9	1	4mm-6.3mm	Charcoal	0.8683	15
P5	II	9	1	4mm-6.3mm	Lithic Debitage	0.2052	2
P5	II	9	1	4mm-6.3mm	Wood	0.1635	7
P5			1	≥6.3mm	Lithic Debitage	3.9185	3
P5			1	1mm-2mm	Charcoal	0.5234	75
P5			1	1mm-2mm	Lithic Debitage	0.8742	50
P5			1	1mm-2mm	Wood	0.0233	5
P5			1	2mm-4mm	Charcoal	0.8326	50
P5			1	2mm-4mm	Lithic Debitage	0.6812	35
P5			1	4mm-6.3mm	Charcoal	0.0981	3
P5			1	4mm-6.3mm	Lithic Debitage	0.2087	1
P6	I	1		2mm-4mm	Contemporary flora	0.0861	0
P6	I	1		2mm-4mm	insect	0.0071	1
P6	I	1		2mm-4mm	Lithic Debitage	0.2283	2
P6	I	1		2mm-4mm	Wood	0.2667	0

Table 6.43: Microartifacts identified from Unit P5 Feature 1.

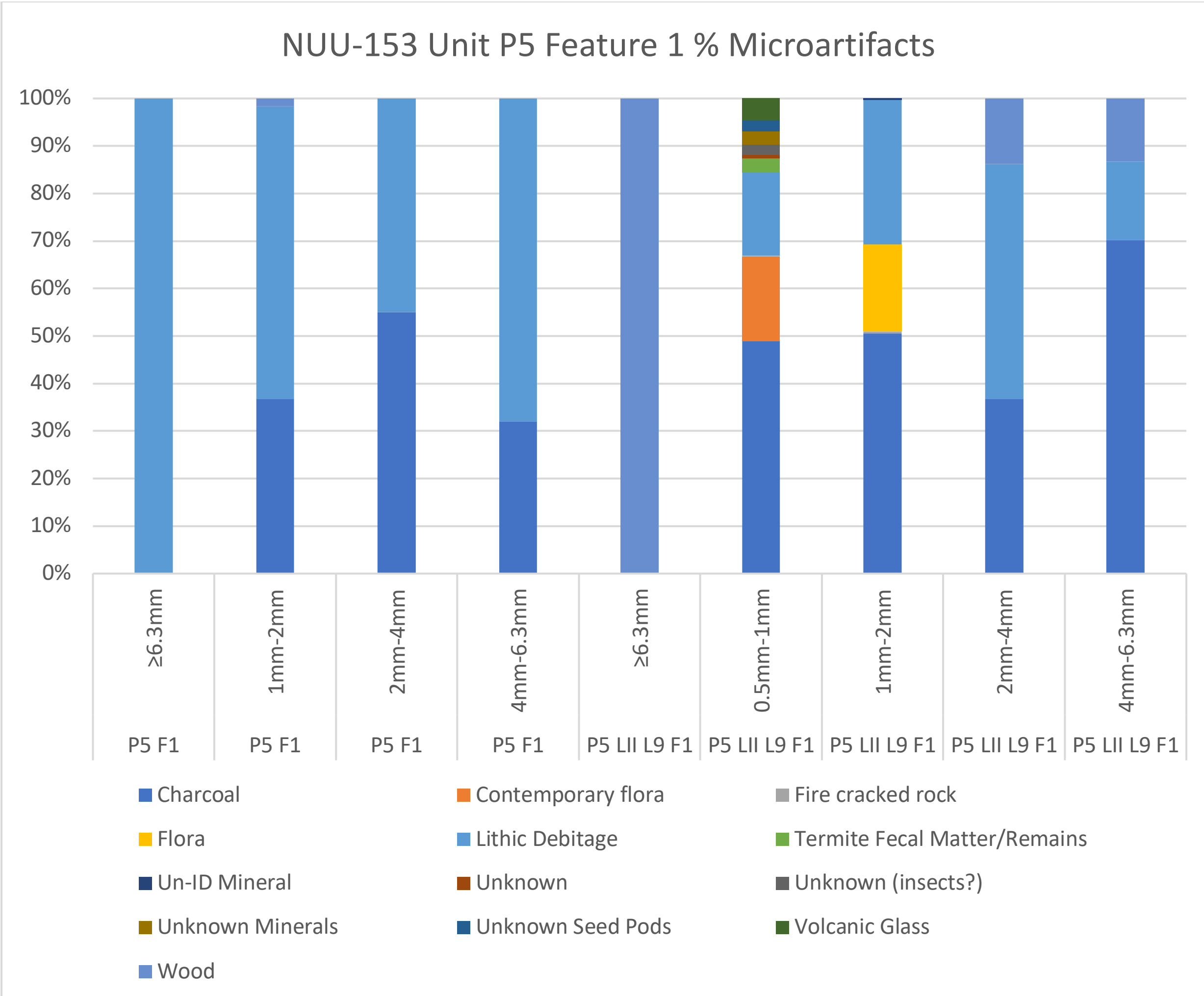


Figure 6.132: Total microartifacts in the feature in Unit P5

Site/Layer/ Level/Sample	pH	% Organic Carbon*	Particle Size Distribution								
			<0.063	0.063	0.125	0.25	0.5	1	2	4	6.3
O5 L6 LII SS3	5.79	29.94	3.82	8.22	11.76	13.17	13.57	13.99	15.65	18.17	99.68
O5 L9 LIII SS3	5.96	28.69	11.20	19.34	24.12	26.30	29.46		33.94	42.74	100.16
O5 L12 LIII SS3	5.91	27.55	17.12	26.44	31.88	34.82	36.10	38.50	41.90	47.74	100.56
O5 L15 LV SS3		25.11	20.48	36.80	45.61	49.89	52.01	55.12	61.72	69.85	99.28
O5 L17 LVI SS1			33.06	59.47	72.41	79.65	83.12	87.06	90.65	94.00	98.12
O5 L18N LVII SS3	7.24	21.71	17.08	35.58	43.98	49.14	52.96	57.82	66.20	73.64	99.58
O5 L18S LVII S SS6	5.96	25.10	23.82	37.48	45.26	49.60	51.02	53.58	58.22	63.14	100.06
O5 L20 LVIII END SS3	6.74	25.82	7.18	12.66	16.08	19.42	22.36	25.78	28.68	31.80	99.16
P5 L3 LII SS3	5.71	26.7078	25.04	51.3	66.92	73.82	79.14		82.8	84.2	99.6
P5 L6 LII SS3			14.94	39.81	53.78	58.32	59.91	62.35	69.05	73.76	97.99
P5 L9 F1 LII SS3			20.12	40.71	52.87	58.69	61.65	66.51	72.47	80.21	99.37
P5 F1 Under Rock SS3	5.56	32.6260	21.96	41.68	51.82	57.54	61.54	67.5	74.34	79.9	100.52
P6 L1 LI SS3	4.78	57.2939	4.74	12.98	22.04	31.16	34.78	37.76	40	43.26	100.86
P6 L3 LII SS3		47.3101	7.36	17.64	24.9	31.16	34.12	36.96	41.04	45.68	100.48
P6 L5 LIII SS3	5.44		18.72	33.06	39.9	42.2	43.86	46.1	50.88	59.26	99.66
P6 L12 LIV SS3		25.7707	12.15	24.32	30.21	33.13	36.96		41.37	49.09	99.73
NUU 153 BULK 2 OS	6.21	30.4902	7.04	17.66	24.85	30.16	32.78	36.53	41.47	51.57	100.41

*LOI Comparative Sample from NUU142/417 Offsite 1

Table 6.44: Sediment sample data from Units O5, P5, and P6.

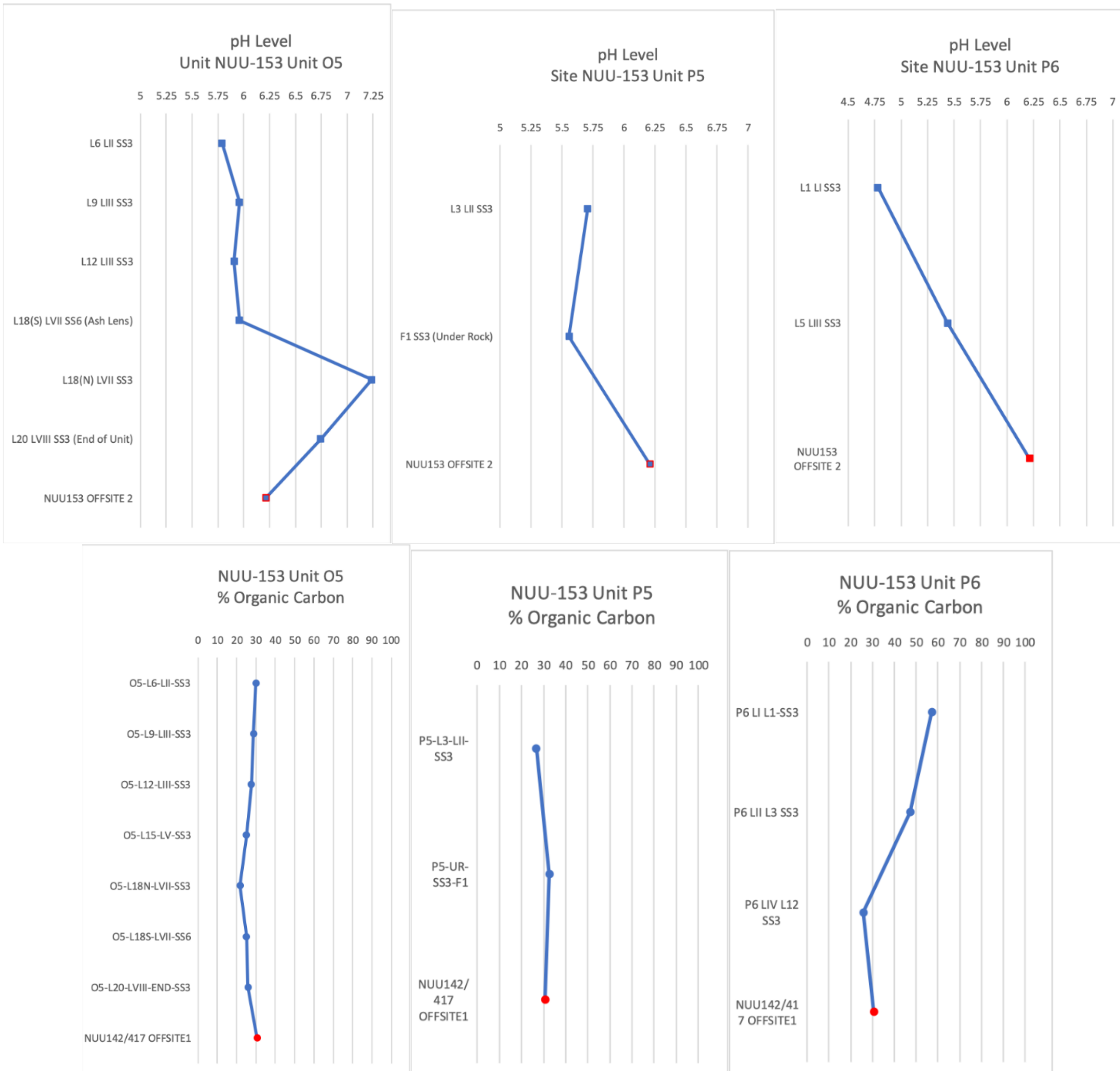


Figure 6.133: pH and LOI levels in Units O5, P5, and P6.

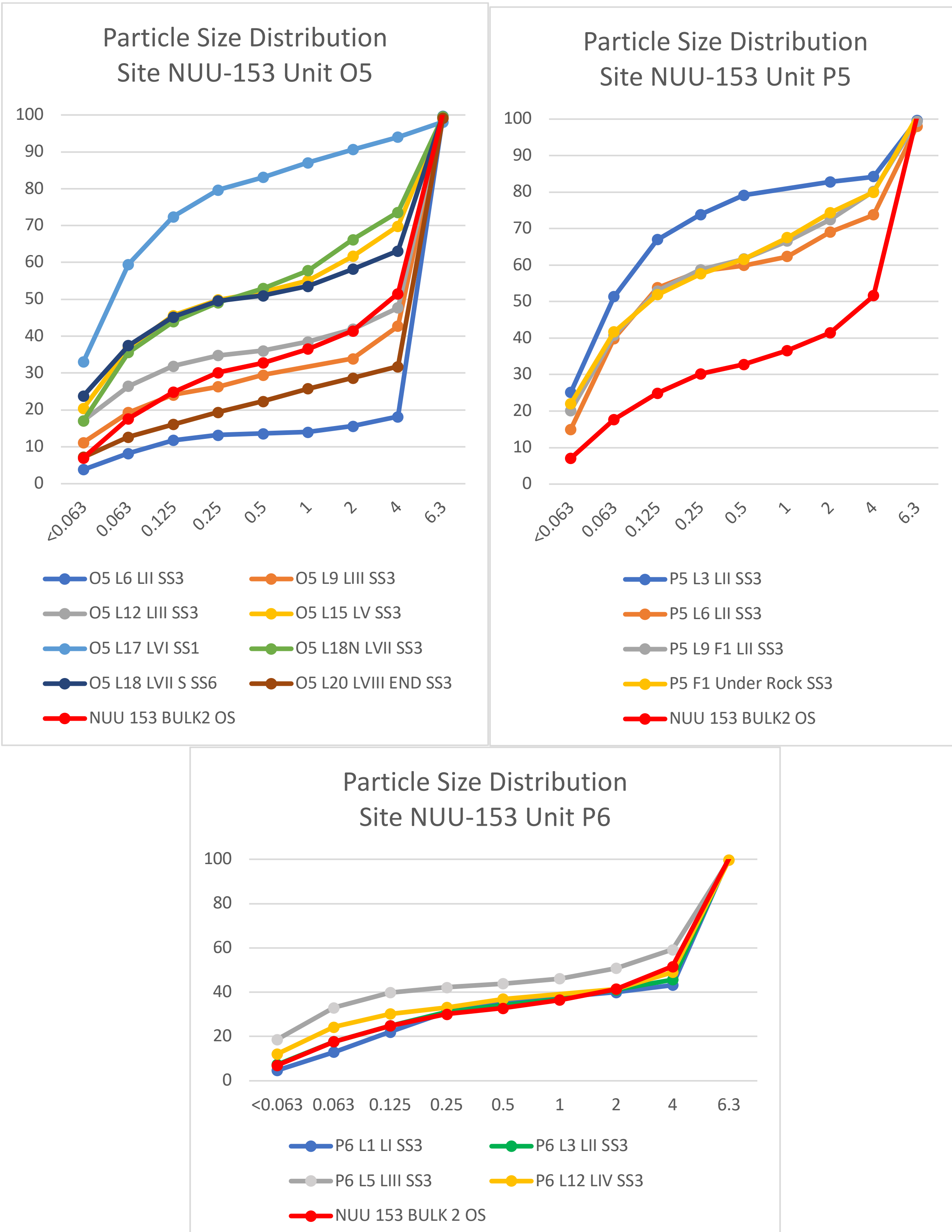


Figure 6.134: Particle size distribution of Units O5, P5, and p6

Pathway and Bottom of Feature NUU-153. Units E10 and K8 were placed in areas that I wished to test for potential activity. Both units resulted in data that showed little anthropogenic input overtime which is further evidenced in soil profiles that mirrored the off-site comparative sample and the sterile context. Unit E10, placed along the walkway that led down the architectural feature to the bottom of the swale below, did exhibit three contexts—one of which was deemed anthropogenic. The materials recovered from this context, however, were limited primarily to worked basalt, water-rolled basalt, and highly fragmented shell remnants. The area was paved with a large flat smooth basalt boulder and filled with pebbles, to form a relatively level walkway. Worked stone was visible across the entire feature and, therefore, the limited presence of worked basalt found here does not indicate any specific activity zone. This is true of Unit K17 as well when considering the limited amount of worked basalt recovered from this area. The absence of additional materials and the shallow nature of the unit precludes interpreting this space as an area that was heavily utilized in the past. The microartifacts support the interpretations. Micro-charcoal was the primary material recovered (outside of contemporary flora and wood that came from the dense organic top soil), which was found in all deposits and is therefore not an indicator of a designated activity space.

The pH and SOM measurements are consistent with the off-site comparative sample, while the anthropogenic context in Unit E10 shows some differentiation in the distribution of particle sizes. This context had a higher percentage of mud (clay and silt) with a lower percentage of gravel than what was seen in the offsite and top soil samples. This particle size distribution may be explained by post-depositional events, particularly constant trampling over time which may have resulted in smaller particle sizes.

Figure 6.135: Photo of the mapped profile of the south wall in Unit E10.

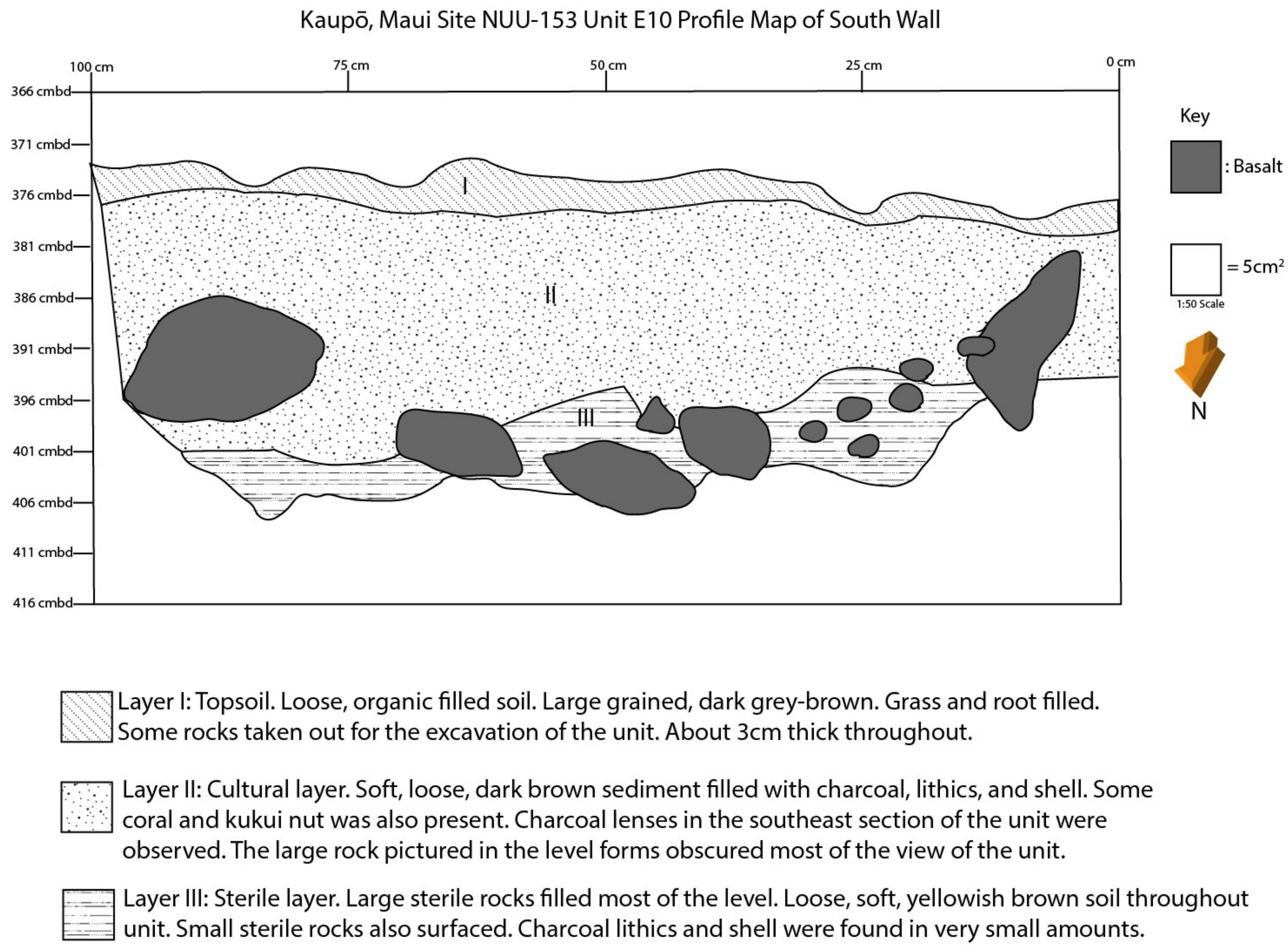


Figure 6.136: Profile map of the south wall in NUU-153.

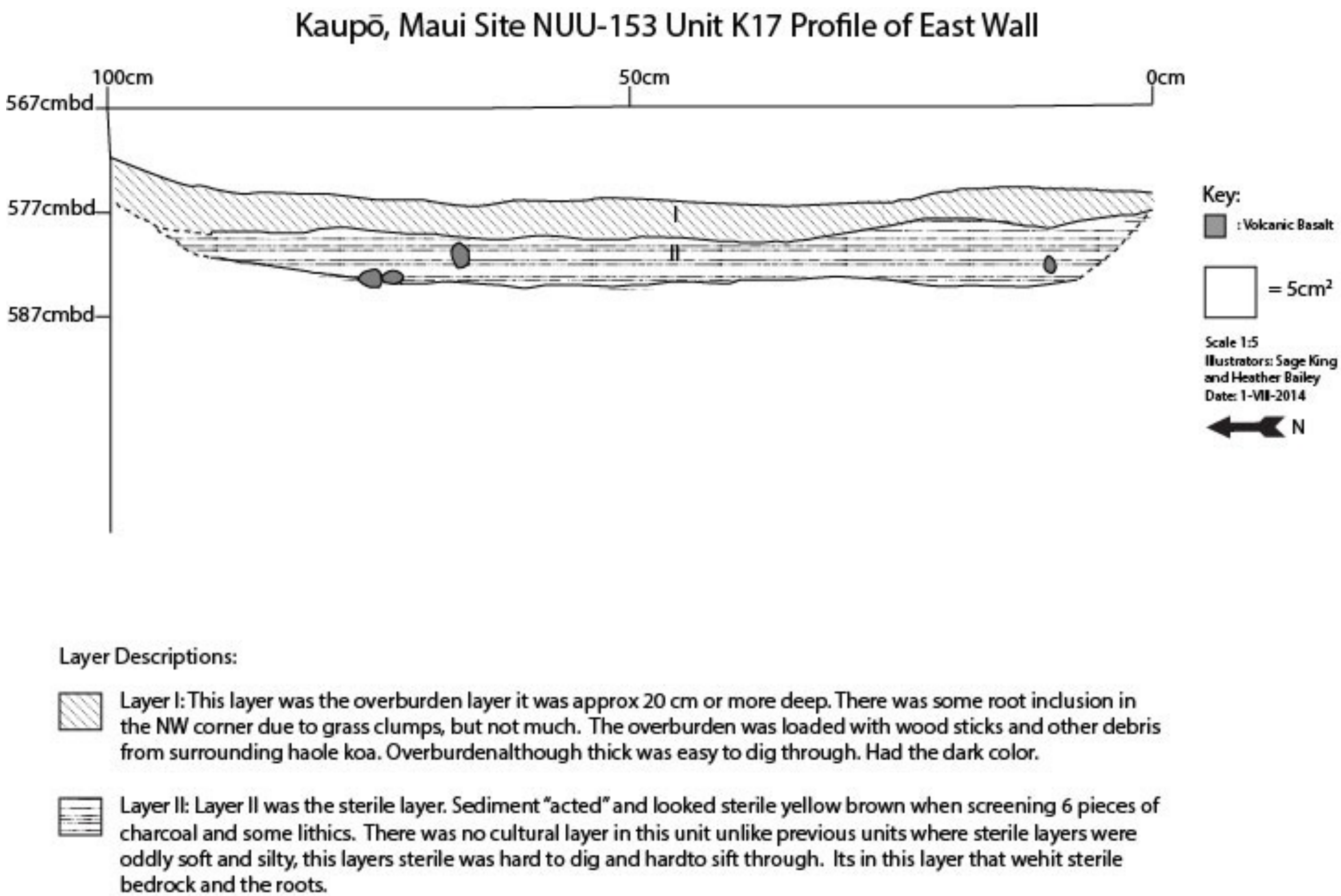
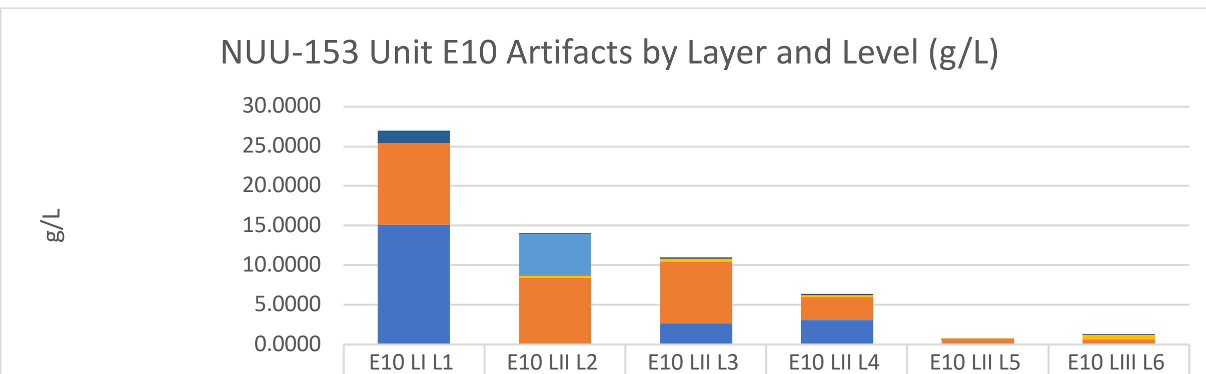


Figure 6.137: Profile map of the east wall in Unit K17

Figure 6.138: Photo of mapped east wall in Unit K17



	E10 LI L1	E10 LII L2	E10 LII L3	E10 LII L4	E10 LII L5	E10 LIII L6
Water-rolled basalt	1.4859		0.0105			
Terrestrial Gastropod					0.0004	
Sea Urchin			0.0012	0.0056	0.0145	0.0406
Raw Kukui Nut Shell	0.0033					
Manuport Shell		0.0384	0.0635	0.0190	0.0105	0.0536
Manuport Coral	0.0880	0.0046	0.0683			
Ili'ili		5.3280		0.0156		
Charcoal	0.0086	0.2637	0.3939	0.2993	0.1005	0.4958
Carbonized Kukui Nut Shell			0.0023		0.0006	
Basalt Debitage	10.2580	8.3973	7.7420	2.8695	0.5459	0.6844
Basalt Core	15.1235		2.6637	3.0798		

Figure 6.139: Unit E10 graph of artifacts displayed as grams per liter of sediment excavated in each context

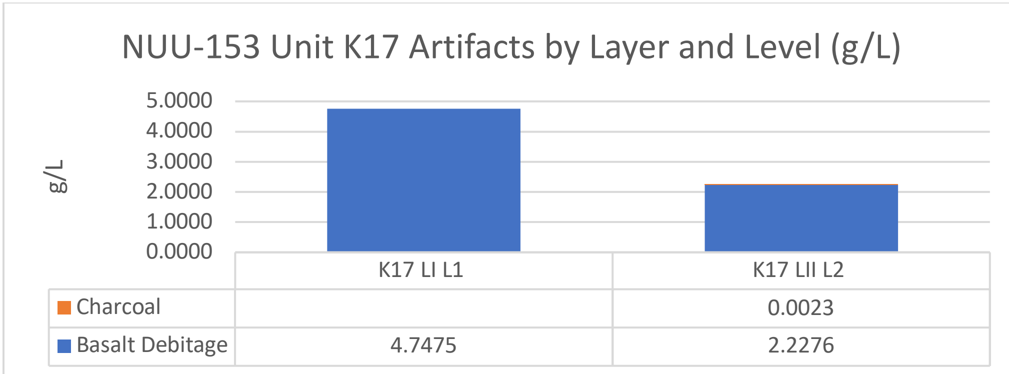


Figure 6.140: Unit K8 graph of artifacts displayed as grams per liter of sediment excavated in each context

Unit/Layer/Level	Scientific Determination	Sum of NISP	Sum of MNI
E10 LI L1	*Cypraea caputserpentis*	1	1
E10 LII L2	*Cellana* sp.	1	1
E10 LII L2	Cymatidae sp.	1	1
E10 LII L2	*Cypraea caputserpentis*	2	1
E10 LII L2	*Littorina* sp.	2	2
E10 LII L2	Sea urchin jaw any species	1	1
E10 LII L2	Undetermined mollusk	3	2
E10 LII L3	*Cellana* sp.	7	4
E10 LII L3	Cypracidae sp.	1	1
E10 LII L3	*Nerita picea*	1	1
E10 LII L3	*Planaxis labiosa*	5	5
E10 LII L3	Sea urchin test any species	6	4
E10 LII L3	Undetermined mollusk	32	5
E10 LII L4	*Cellana* sp.	8	1
E10 LII L4	*Echinothrix calamaris* spine	2	1
E10 LII L4	*Mitretlla* spp.	1	1
E10 LII L4	*Planaxis labiosa*	4	4
E10 LII L4	Sea urchin test any species	17	2
E10 LII L4	Undetermined mollusk	20	3
E10 LII L5	*Cellana* sp.	11	3
E10 LII L5	*Echinothrix diadima*	19	1
E10 LII L5	*Planaxis labiosa*	1	1
E10 LII L5	Terrestrial Gastropod	1	1
E10 LIII L6	*Cypraea caputserpentis*	1	1
E10 LIII L6	*Planaxis labiosa*	3	3
E10 LIII L6	Sea urchin test any species	18	1
E10 LIII L6	Undetermined mollusk	15	2

Table 6.45: NISP, MNI, Weight, and ID for shell and sea urchin in Unit E10

Unit	Artifact Size	Item Type	Count	weight /g
E10 LII L3	0.5mm-2mm	carbonized seed	4	0.0001
E10 LII L3	0.5mm-2mm	Charcoal		0.0467
E10 LII L3	0.5mm-2mm	Coral	1	0.0079
E10 LII L3	2mm-4mm	Charcoal		0.0672
E10 LII L3	4mm-6.3mm	Charcoal	2	0.0291
K17 LII L2	2mm-4mm	Charcoal	6	0.035
K17 LII L2	2mm-4mm	Lithic Debitage	20	0.025
K17 LII L2	2mm-4mm	Wood	1	0.03
K17 LII L2	4mm-6.3mm	Lithic Debitage	5	0.108
K17 LII L2	4mm-6.3mm	Wood	20	0.057
K17 LI L1	≥6.3mm	Wood	1	0.9466
K17 LI L1	1mm-2mm	Contemporary flora	1	0.0561
K17 LI L1	1mm-2mm	Lithic Debitage	15	0.0258
K17 LI L1	1mm-2mm	Shell	10	0.0133
K17 LI L1	1mm-2mm	Wood	10	0.2877
K17 LI L1	2mm-4mm	Shell	5	0.0119
K17 LI L1	2mm-4mm	Unknown	1	0.019
K17 LI L1	2mm-4mm	Wood	6	1.175
K17 LI L1	2mm-4mm	seed	1	0.0715
K17 LI L1	4mm-6.3mm	Wood	1	0.5838

Table 6.46: Microartifact type and weight for Units E10 and K8

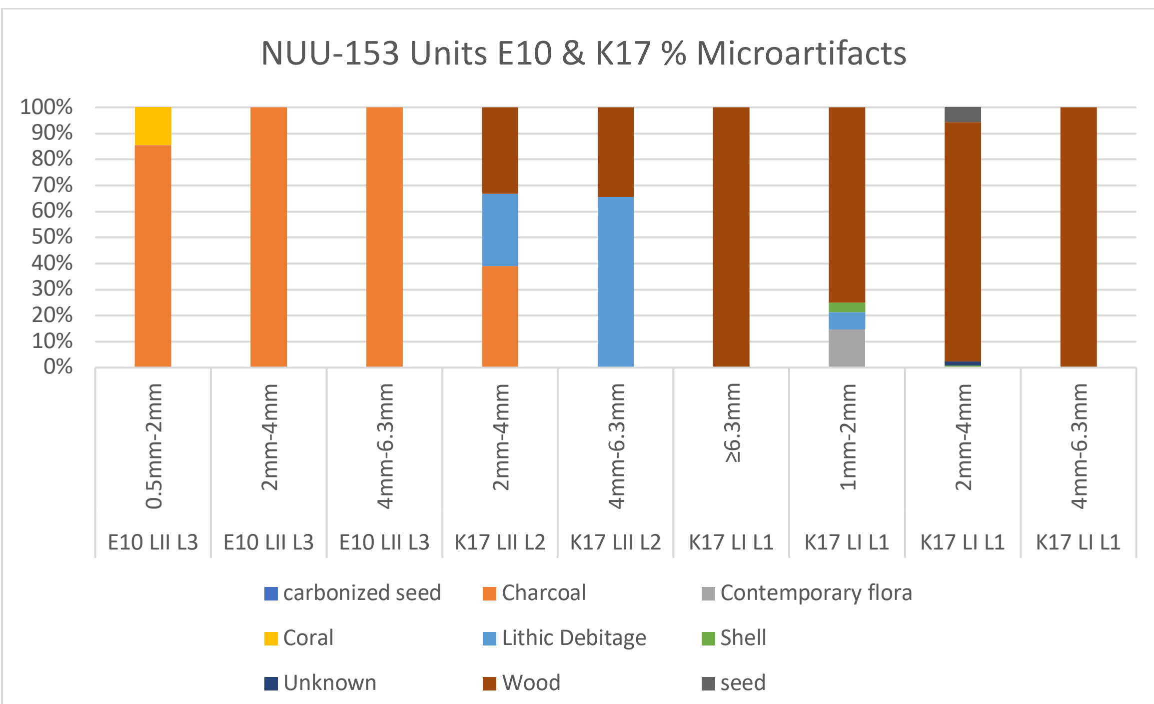


Figure 6.141: Graph of total microartifacts by unit and context.

Site/Layer/ Level/Sample	pH	% Organic Carbon*	Particle Size Distribution								
			<0.063	0.063	0.125	0.25	0.5	1	2	4	6.3
E10 L3 LII SS3	6.17	30.3552	26.56	51.6	56.84	62.08	69.84		77.2	82.28	99.22
K17 L1 LI SS1			0.84	7.06	20.31	50.25	77.32	87.35	92.41	95.20	101.32
K17 L2 LII SS3	5.86	28.76	11.84	21.96	29.02	32.26	37.26		43.52	50.60	99.20
NUU 153 BULK 2 OS	6.21	30.49	7.04	17.66	24.85	30.16	32.78	36.53	41.47	51.57	100.41
*LOI Comparative Sample from NUU142/417 OFFSITE1											

Table 6.47: Sediment sample data for Units E10 and K17

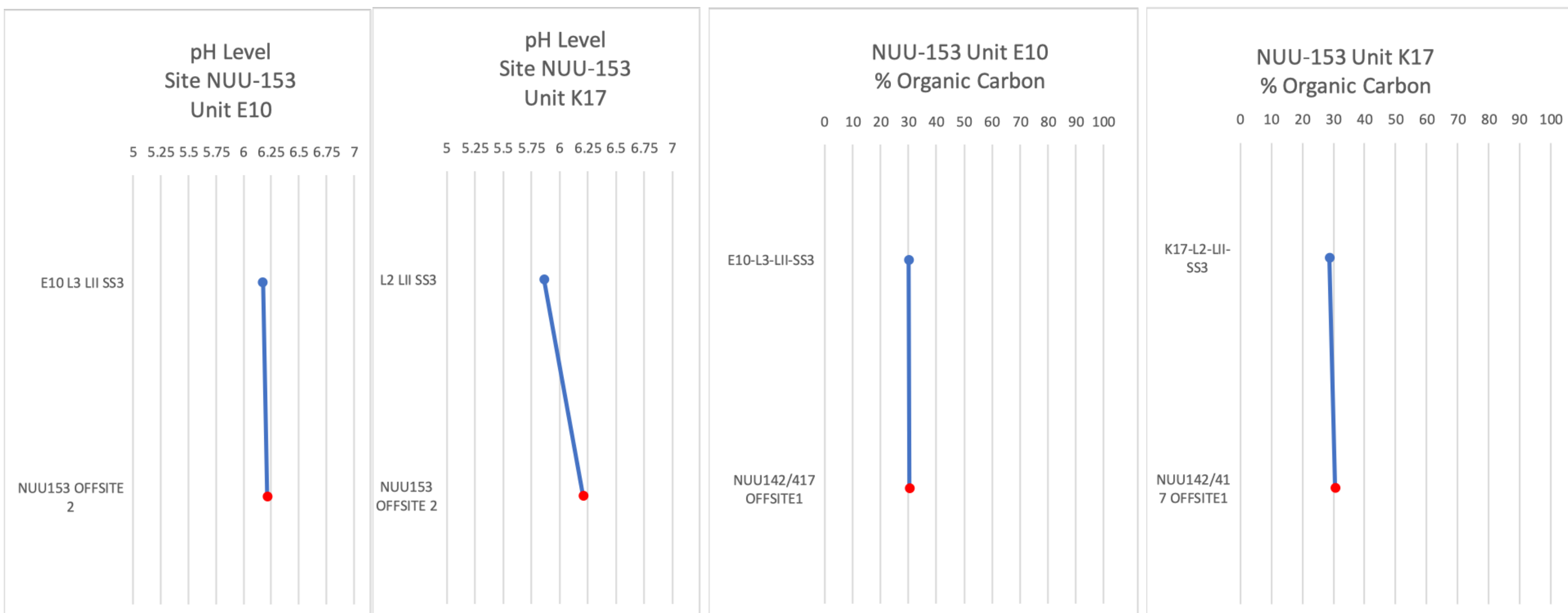


Figure 6.142: pH and LOI levels in Units E10 and K17.

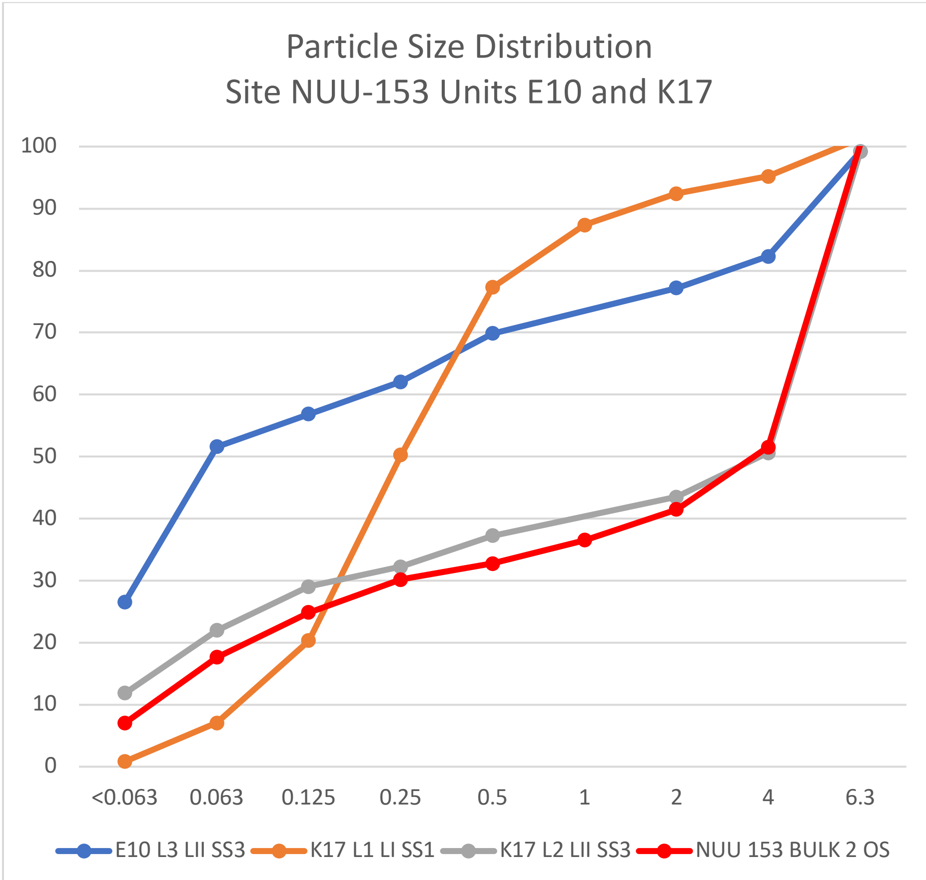


Figure 6.143: Particle size distribution for Units E10 and K17.

Figure 6.143: Plane table map of NUU-142 and NUU-417

Following the top of the horse-shoe-shaped ridge to the southeast, one would find site NUU-155. Earth-filled terraces lined with basalt stones run from the top of the ridge down the slope, surrounding NUU-155 and connecting the site to NUU-153. The complex designated NUU-155 is composed of two stone foundations—one rectangular foundation creating an impressive wall. This rectangular feature runs mauka to makai along the top of the ridge. Open to the west, the feature appeared to be protecting two earth-filled terraces that abut the feature's western wall from the strong easterly winds that sweep across these southeast slopes of Haleakalā. The construction of the feature also allows a view of the agricultural swale and the other features along the ridge, but not of the landscape to the east. The earth-filled terraces built directly adjacent to NUU-155 were smaller and more rectangular than the surrounding terraces that mark the hillside. These terraces were covered with basalt tools and debitage remnants that are indications of stone-tool working. To the southeast of this feature lies a leveled patch of earth outlined by basalt boulders that form another, larger rectangular foundation. The walls along the western and southern edges of this feature were thin and not core-filled, indicating that they were merely meant to retain soil that was deposited to level the terrace. The wall to the east was thickest and tallest, again giving the indication that it was meant to block the easterly winds.

There existed no wall along the northern edge of the foundation, leaving the feature open towards the mountain. This feature was built along an outcrop of bedrock that resulted in a steep drop-off to the northeast.

Units O4, O5 and O8 were located within the L-shaped architectural feature designated NUU-142. Unit O8 was placed in the northern end of the feature while O4 and O5 were 3m south. A combustion feature was uncovered in Units O4 and O5 (F1) along with a charcoal lens associated with several stacked cobbles to the south in O4 (Fe1). The combustion feature was constructed differently from hearths that were excavated in NUU-2 and NUU-153. Where those hearths were built with flat long stones that sat on their edges in a circle and filled with round fist size cobbles in the interior, the NUU-142 combustion feature was constructed with long flat stones laid on their longest, flattest side, forming a rectangular feature on the ground. The NUU-142 combustion feature was placed directly adjacent to a C-shaped nook built into the wall of NUU-142. The artifacts recovered from the two units with the combustion features were limited in variety and density. Charcoal was abundant and carbonized plant material was recovered including a charred tuber and unidentified seeds. Shell and coral were recovered at much lower densities than in the other combustion features that were excavated as part of this project. The shell was so fragmented and degraded that identification proved largely impossible. The only bone fragments recovered were identified during microartifact analysis. Sea urchin was also identified in microartifact analysis but was not recovered from the field screening. The samples that yielded the most microartifact data were from Layer IV, which was the context associated with the features. Materials present at the micro-scale that were not recovered at the macro-sale (and the relative absence of evidence in general that was recovered from around this seemingly heavily used combustion feature) may indicate that the inhabitants of this kauhale frequently cleaned the area.

Unit O8 in the corner of the architectural feature was found to be sterile aside from one piece of lithic debitage. The area excavated for this unit was thought to be gravel fill from the construction of the site wall. No faunal remains or microartifacts were recovered from this area. The sediment sample data from Unit O8 confirms the lack of anthropogenic input. The pH level recorded for this unit is nearly identical to the offsite comparison.

Sediment data for Units O4 and O5 show surprising trends in both units. The samples collected from within the features tend to be more acidic than the samples collected from outside of the features. The tendency for charcoal to raise the pH of a deposit generally results in the opposite trend. The spike in pH for Unit O4 Layer IV does not correspond with a drop in organic carbon as is seen elsewhere, but rather a slight spike in organic matter in layer IV (and elsewhere). The pH levels are still relatively low for a combustion feature, so the SOM may be better preserved here, or the amount of organic carbon input may be elevated here. Evidence of preservation may be visible in Unit O5 L7-F1-LIV-SS1 sample that sees a spike in organic carbon that corresponds with a drop in pH. The particle size distribution data exhibits similar patterns with NUU-152 Units O5 and P6 with fluctuating degrees of gravel versus mud. The difference in these units is that the percentage of the coarser fractions increases with depth while fine fractions decreases, as opposed to the more random distributions seen in in NUU-153

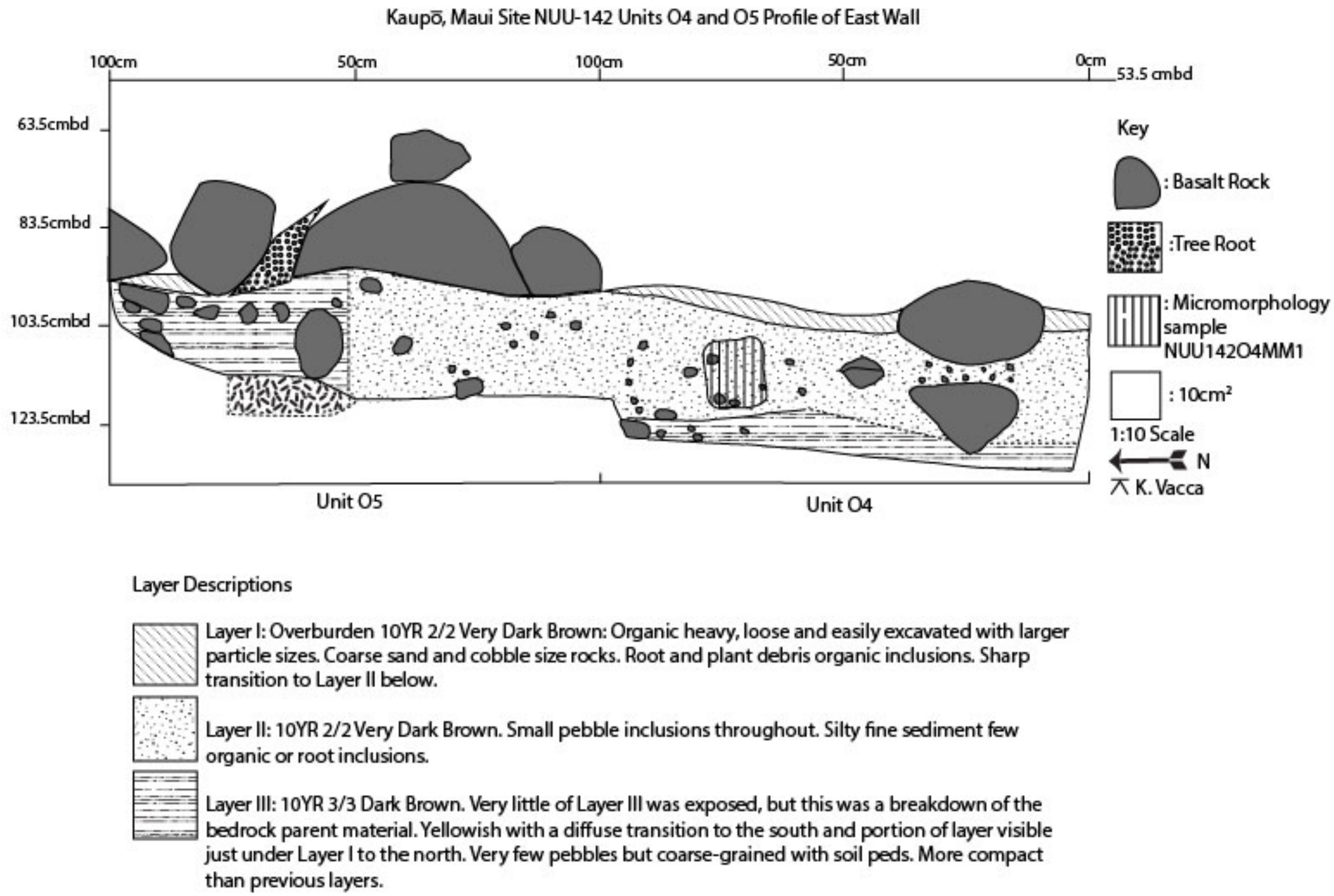


Figure 6.144: Profile map of the east wall in Units O4 and O5.

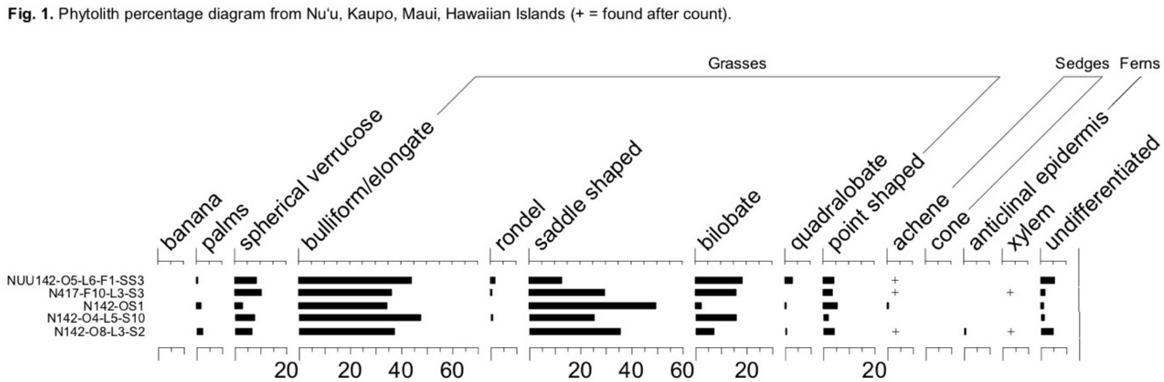


Figure 6.145: Phytolith data from NUU-142 and NUU-417. Data provided by Mark Horrocks. Table is adapted from Horrocks 2018 Lab Report.

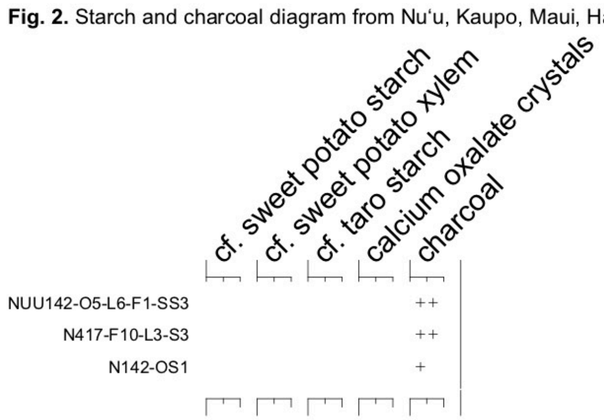


Figure 6.146: Starch data from NUU142 and NUU-417. Data provided by Mark Horrocks. Table is adapted from Horrocks 2018 Lab Report.

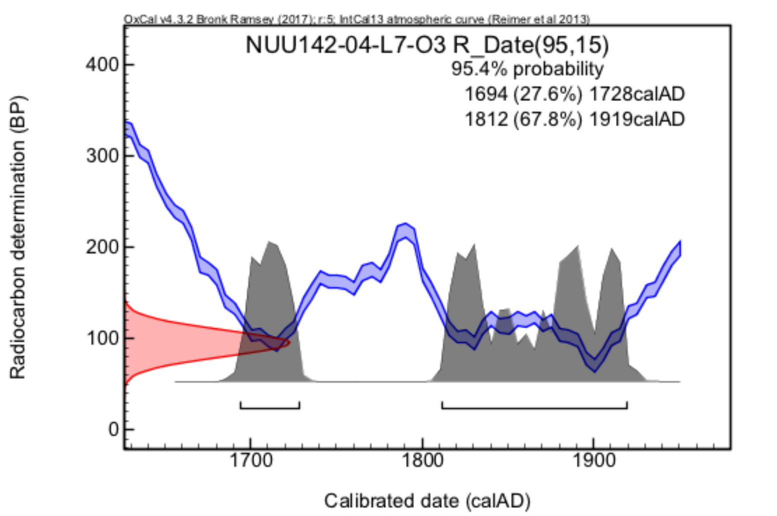


Figure 6.147: Calibrated radiocarbon date from NUU-142.

Figure 6.148: Photo of NUU-142 and NUU-417 facing southeast.

Figure 6.149: Photo of Feature 1 in NUU-142 Units O4 and O5 following excavation of surrounding area

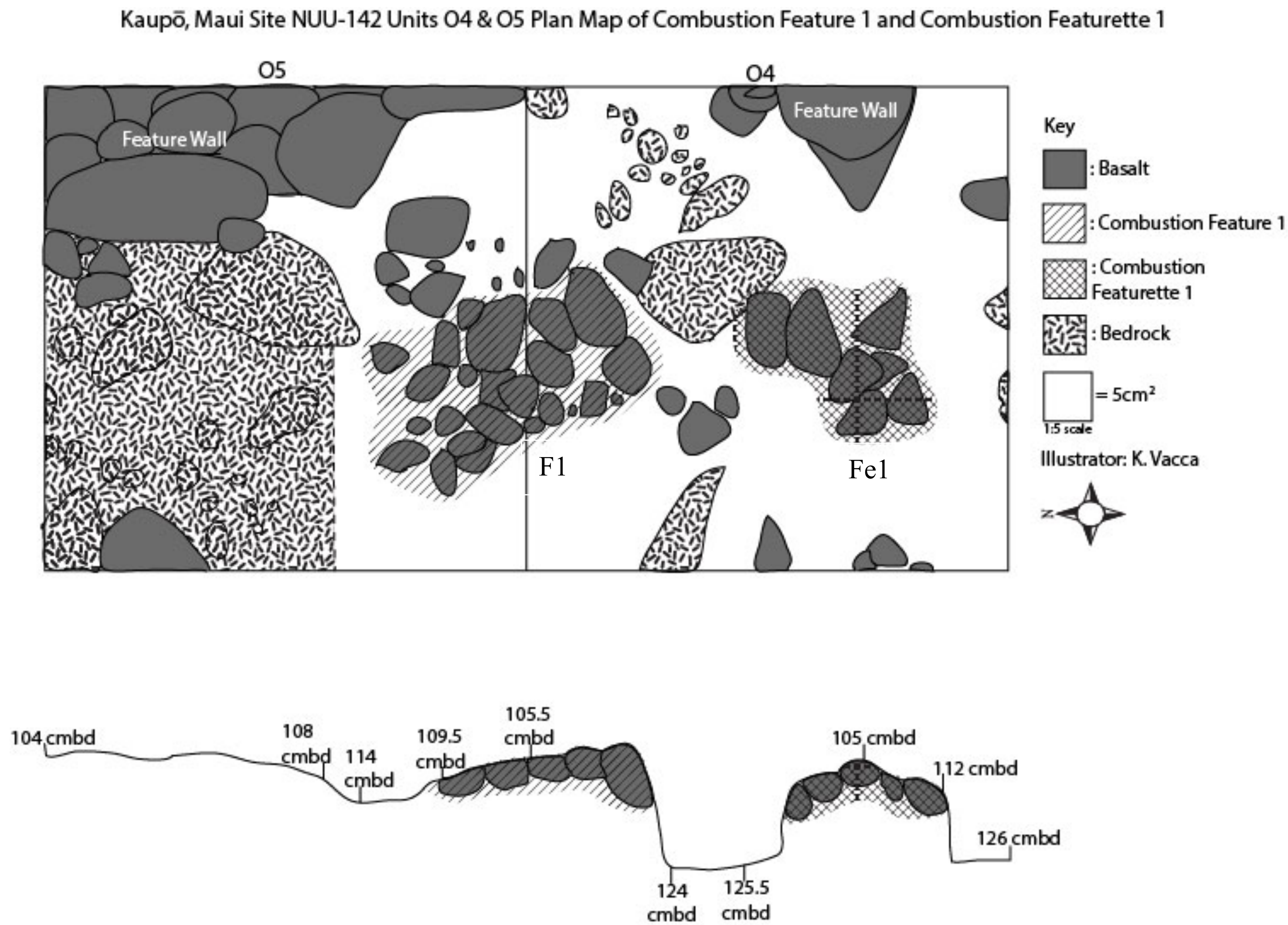
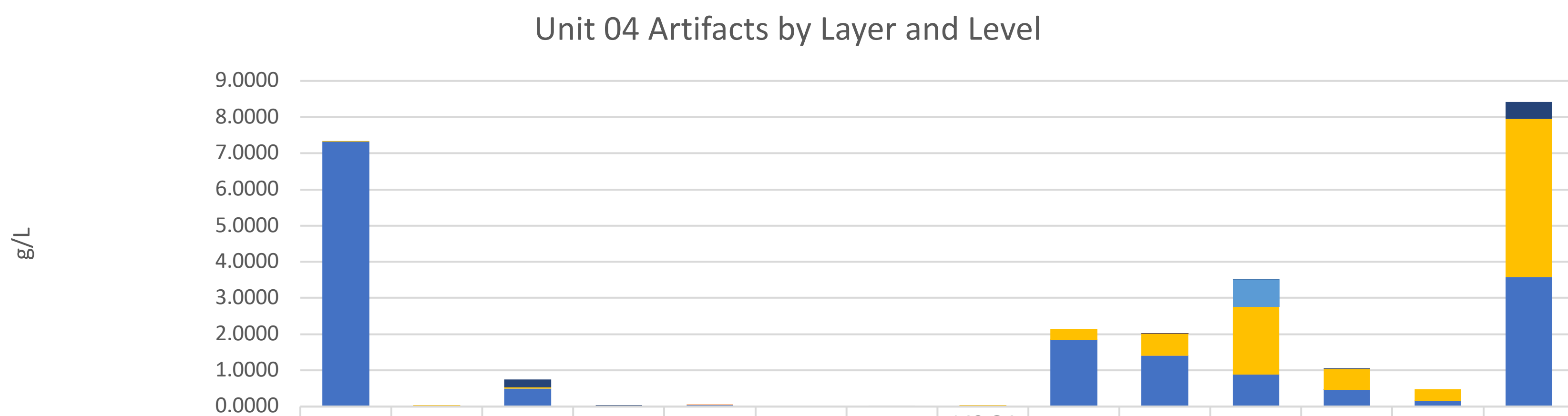
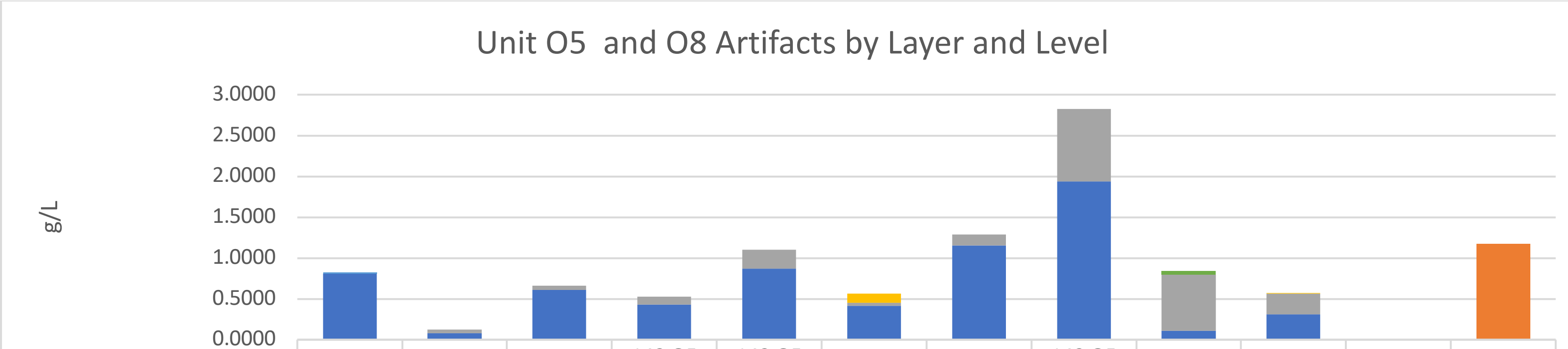


Figure 6.150: Plan map of the feature in Units O4 and O5.



	142 O4 LI L1	142 O4 LII L2 1/16'' SCREEN	142 O4 LII L2	142 O4 LIII L3 1/16'' SCREEN	142 O4 LIII L3 1/16''SCREEN	142 O4 LIII L3 1/8''SCREEN	142 O4 LIII L3 1/8" SCREEN	142 O4 LIII L3 General Wall Clean	142 O4 LIII L3	142 O4 LIII L4	142 O4 LIV L5	142 O4 LIV L6	142 O4 LIV L7	142 O4 LIV L5 to 6 F1
Volcanic Glass Debitage							0.0043			0.0010		0.0029		
Raw Kukui Nut Shell										0.0097				
Shell			0.2206	0.0010			0.0017			0.0002	0.0010	0.0005		0.4734
Coral						0.0119				0.0004				
‘Ili‘ili											0.7545			
Charcoal	0.0090	0.0372	0.0296	0.0280				0.0025	0.3042	0.5984	1.8776	0.5823	0.3187	4.3549
Carbonized seed												0.0001		
Carbonized Kukui Nut Shell					0.0008				0.0003	0.0031	0.0023	0.0021	0.0011	
Basalt Debitage	7.3180		0.4988		0.0405			0.0266	1.8378	1.4058	0.8832	0.4597	0.1517	3.5843

Figure 6.151: Unit O4 graph of artifacts displayed as grams per liter of sediment excavated in each context



	142 O5 LI L1	142 O5 LII L2	142 O5 LIII L3	142 O5 LIII L4 North 1/3 of Unit	142 O5 LIII L4 South 2/3 of Unit	142 O5 LIV L5 NE Quadrant	142 O5 LIV L5 SE Quadrant	142 O5 LIV L5 SW Quadrant	142 O5 LIV L6 F1	142 O5 LIV L6	142 O5 LIV L7 F1	142 O8 LII L2
Volcanic Glass Flake									0.0486			
Volcanic Glass Debitage	0.0153											
Coral						0.1133				0.0069		
Charcoal		0.0433	0.0574	0.0946	0.2304	0.0369	0.1300	0.8882	0.6826	0.2487	0.0000	
Basalt Flake												1.1763
Basalt Debitage	0.8105	0.0793	0.6076	0.4294	0.8707	0.4173	1.1571	1.9363	0.1110	0.3124		

Figure 6.152: Unit O5 and O8 graph of artifacts displayed as grams per liter of sediment excavated in each context

Site	Unit	Feature	Level	Layer	NISP	MNI	Weight (g)	Scientific Determination	Comments
142	O4		2	II	3	1	5.19	Undetermined mollusk	
142	O4		3	III	2	1	0.17	Undetermined mollusk	1/8 screen
142	O4		3	III	1	1	0.12	cf. *drupa* sp.	
142	O4		4	III	2	1	0.01	Undetermined mollusk	
142	O4	F1	5	IV	1	1	6.47	Undetermined mollusk	
142	O4		5	IV	1	1	0.11	Undetermined mollusk	
142	O4		6	IV	1	1	0.06	Undetermined mollusk	
142	O4	Fe 1			4	1	0.2	Undetermined mollusk	

Table 6.48: NISP, MNI, Weight, and ID for shell and sea urchin in Site NUU-142.

Unit	Layer	Level	Feature	Artifact Size	Item Type	Count	weight /g
O4	I	1		≥6.3mm	Lithic debitage	1	1.1031
O4	I	1		≥6.3mm	Wood	3	8.7489
O4	I	1		2mm-4mm	Charcoal	3	0.0433
O4	I	1		2mm-4mm	Lithic debitage	10	0.3065
O4	I	1		2mm-4mm	Seed pod	1	0.0075
O4	I	1		2mm-4mm	Wood	25	0.5531
O4	I	1		4mm-6.3mm	Lithic debitage	1	0.0491
O4	I	1		4mm-6.3mm	Shell	1	0.0737
O4	I	1		4mm-6.3mm	Wood	5	0.3356
O4	II	2		≥6.3mm	Lithic debitage	1	0.3457
O4	II	2		2mm-4mm	Charcoal	1	0.0055
O4	II	2		2mm-4mm	Contemporary Flora	28	0.1768
O4	II	2		2mm-4mm	Lithic debitage	11	0.2865
O4	IV	5	1	≥6.3mm	Lithic debitage	1	0.2512
O4	IV	5	1	2mm-4mm	Charcoal	9	0.0382
O4	IV	5	1	2mm-4mm	Contemporary Flora	2	0.0205
O4	IV	5	1	2mm-4mm	Lithic debitage	12	0.2753
O4	IV	5	1	4mm-6.3mm	Contemporary Flora	1	0.0035
O4	IV	5	1	4mm-6.3mm	Fire cracked rock	1	0.0346
O4	IV	5	1	4mm-6.3mm	Lithic debitage	2	0.2709
O4	IV	5		≥6.3mm	Lithic debitage	1	0.5261
O4	IV	5		1mm-2mm	Archaic seed	2	0.0043
O4	IV	5		1mm-2mm	Charcoal	20	0.0746
O4	IV	5		1mm-2mm	Lithic debitage	15	0.1353
O4	IV	5		1mm-2mm	Wood	15	0.0184
O4	IV	5		2mm-4mm	Bone	1	0.004
O4	IV	5		2mm-4mm	Burnt bone	3	0.0142
O4	IV	5		2mm-4mm	Charcoal	68	1.0155
O4	IV	5		2mm-4mm	Contemporary Flora	2	0.0045
O4	IV	5		2mm-4mm	Lithic debitage	20	0.3164
O4	IV	5		2mm-4mm	Wood	7	0.0297
O4	IV	5		4mm-6.3mm	Charcoal	19	0.6261
O4	IV	5		4mm-6.3mm	Lithic debitage	4	0.7417
O4	IV	5		4mm-6.3mm	Wood	2	0.1062
O4	IV	6	1	≥6.3mm	Charcoal	6	2.181
O4	IV	6	1	≥6.3mm	Lithic debitage	1	0.915
O4	IV	6	1	≥6.3mm	Wood	1	0.372
O4	IV	6	1	2mm-4mm	Charcoal	50	1.065
O4	IV	6	1	2mm-4mm	Lithic debitage	4	0.128
O4	IV	6	1	4mm-6.3mm	Charcoal	25	1.507
O4	IV	6	1	4mm-6.3mm	Lithic debitage	2	0.315
O4	IV	6	1	4mm-6.3mm	Wood	3	0.146
O4	IV	6		0.5mm-2mm	carbonized seed	3	0.001
O4	IV	6		0.5mm-2mm	Charcoal		0.1093
O4	IV	6		2mm-4mm	Charcoal	9	0.0809
O4	IV	6		4mm-6.3mm	Charcoal	1	0.0634
O4	IV	7		1mm-2mm	Charcoal	25	0.1443
O4	IV	7		1mm-2mm	Contemporary flora	10	0.0909
O4	IV	7		1mm-2mm	Lithic debitage	15	0.1935
O4	IV	7		1mm-2mm	Shell	2	0.0906
O4	IV	7		1mm-2mm	Wood	10	0.1092

O4	IV	7		2mm-4mm	Charcoal	15	0.2199
O4	IV	7		2mm-4mm	Lithic debitage	8	0.3471
O4	IV	7		4mm-6.3mm	Charcoal	5	0.3706
O4	IV	7		4mm-6.3mm	Lithic debitage	2	0.2986
O5	I	1		≥6.3mm	Goat dung	1	0.1464
O5	I	1		≥6.3mm	Wood	3	0.4095
O5	I	1		2mm-4mm	Charcoal	2	0.01
O5	I	1		2mm-4mm	Contemporary flora	0	0.0141
O5	I	1		2mm-4mm	Lithic debitage	2	0.0511
O5	I	1		2mm-4mm	Wood	0	0.8333
O5	I	1		4mm-6.3mm	Lithic debitage	1	0.0743
O5	I	1		4mm-6.3mm	Seed	1	0
O5	I	1		4mm-6.3mm	Wood	16	0.5374
O5	II	2		2mm-4mm	Lithic debitage	12	0.4939
O5	II	2		2mm-4mm	Wood	2	0.0188
O5	II	2		4mm-6.3mm	Lithic debitage	3	0.4943
O5	III	3		2mm-4mm	Charcoal	7	0.0416
O5	III	3		2mm-4mm	Contemporary Flora	6	0.1158
O5	III	3		2mm-4mm	Lithic debitage	6	0.1903
O5	III	3		2mm-4mm	Wood	5	0.0117
O5	III	3		4mm-6.3mm	Contemporary Flora	1	0.0256
O5	III	3		4mm-6.3mm	Lithic debitage	2	0.4205
O5	III	3		4mm-6.3mm	Wood	1	0.0299
O5	IV	5		≥6.3mm	Charcoal	1	0.0825
O5	IV	5		≥6.3mm	Contemporary Flora	1	0.0959
O5	IV	5		0.5mm-2mm	Burnt bone	1	0.0012
O5	IV	5		0.5mm-2mm	carbonized seed	2	0.0003
O5	IV	5		0.5mm-2mm	Charcoal		0.0731
O5	IV	5		2mm-4mm	Charcoal	38	0.2305
O5	IV	5		2mm-4mm	Contemporary Flora	22	0.1935
O5	IV	5		2mm-4mm	Lithic debitage	26	0.5659
O5	IV	5		2mm-4mm	Unknown Flora	1	0.0029
O5	IV	5		2mm-4mm	Wood	1	0.005
O5	IV	5		4mm-6.3mm	Charcoal	5	0.1429
O5	IV	5		4mm-6.3mm	Lithic debitage	2	0.1205
O5	IV	6	1	2mm-4mm	Charcoal	0	0.463
O5	IV	6	1	2mm-4mm	Lithic debitage	6	0.1152
O5	IV	6	1	4mm-6.3mm	Charcoal	2	0.0183
O5	IV	6		0.5mm-2mm	carbonized seed	2	0.0001
O5	IV	6		0.5mm-2mm	Charcoal		0.1273
O5	IV	6		2mm-4mm	Charcoal		0.099
O5	IV	7	1	≥6.3mm	Charcoal	8	0.871
O5	IV	7	1	≥6.3mm	Lithic debitage	1	1.25
O5	IV	7	1	1mm-2mm	Charcoal	0	0.9144
O5	IV	7	1	1mm-2mm	Contemporary flora	5	0.0041
O5	IV	7	1	1mm-2mm	Lithic debitage	12	0.1214
O5	IV	7	1	2mm-4mm	Burnt bone	3	0.05
O5	IV	7	1	2mm-4mm	Burnt sea urchin spine	4	0.02
O5	IV	7	1	2mm-4mm	Charcoal	179	2.47
O5	IV	7	1	2mm-4mm	Contemporary flora	1	0.0035
O5	IV	7	1	2mm-4mm	Lithic debitage	35	1.1697
O5	IV	7	1	4mm-6.3mm	Charcoal	31	1.6171
O5	IV	7	1	4mm-6.3mm	Lithic debitage	2	0.2225

142/417 OS Bulk 1N			2mm-4mm	Contemporary Flora	11	0.1085
142/417 OS Bulk 1N			4mm-6.3mm	Cf. fire cracked rock	3	0.4346
142/417 OS Bulk 1N			4mm-6.3mm	Contemporary Flora	3	0.0719

Table 6.49: Microartifact types and weight in Units O4, O5, and O8.

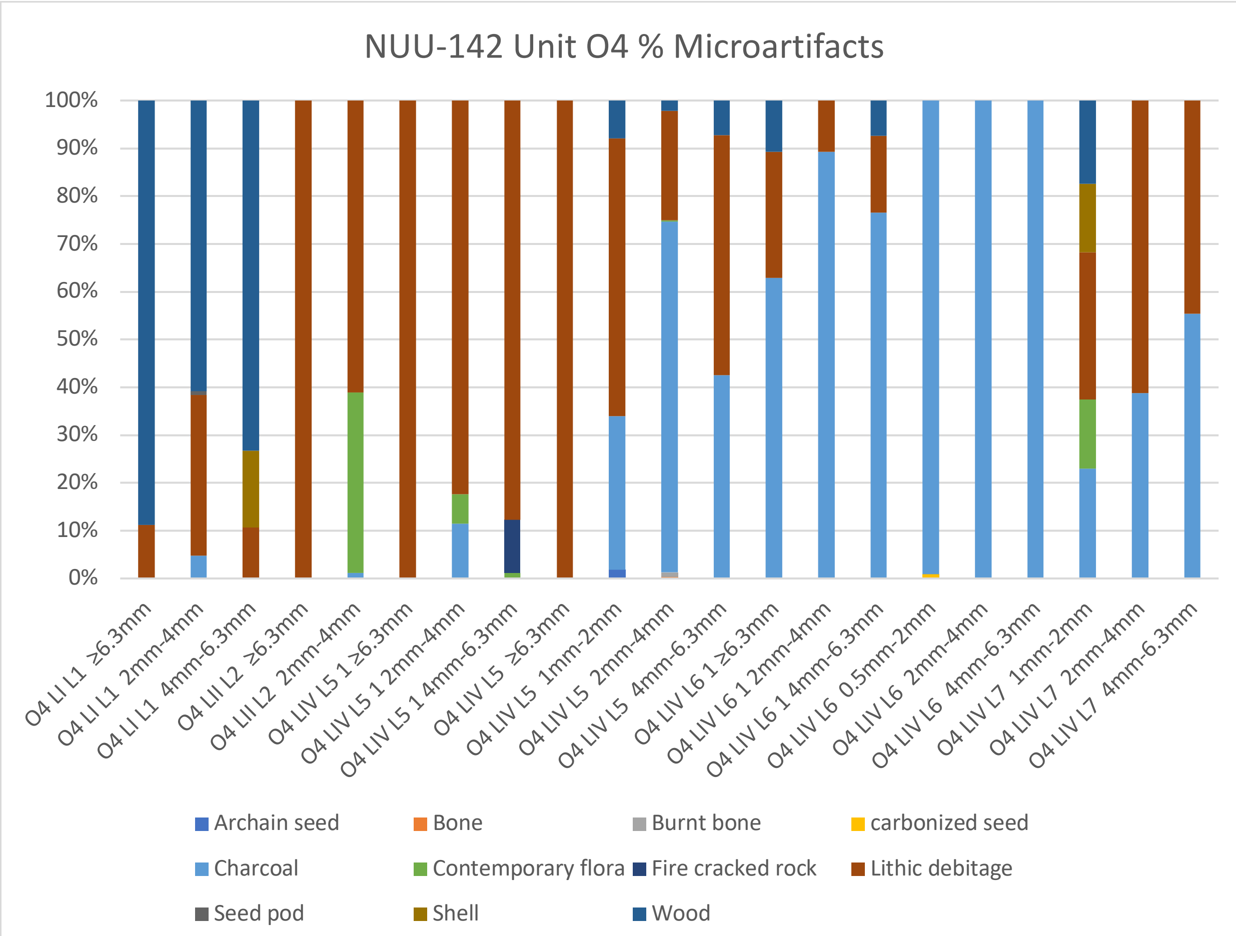


Figure 6.153: Microartifact totals in Unit O4 by layer and level.

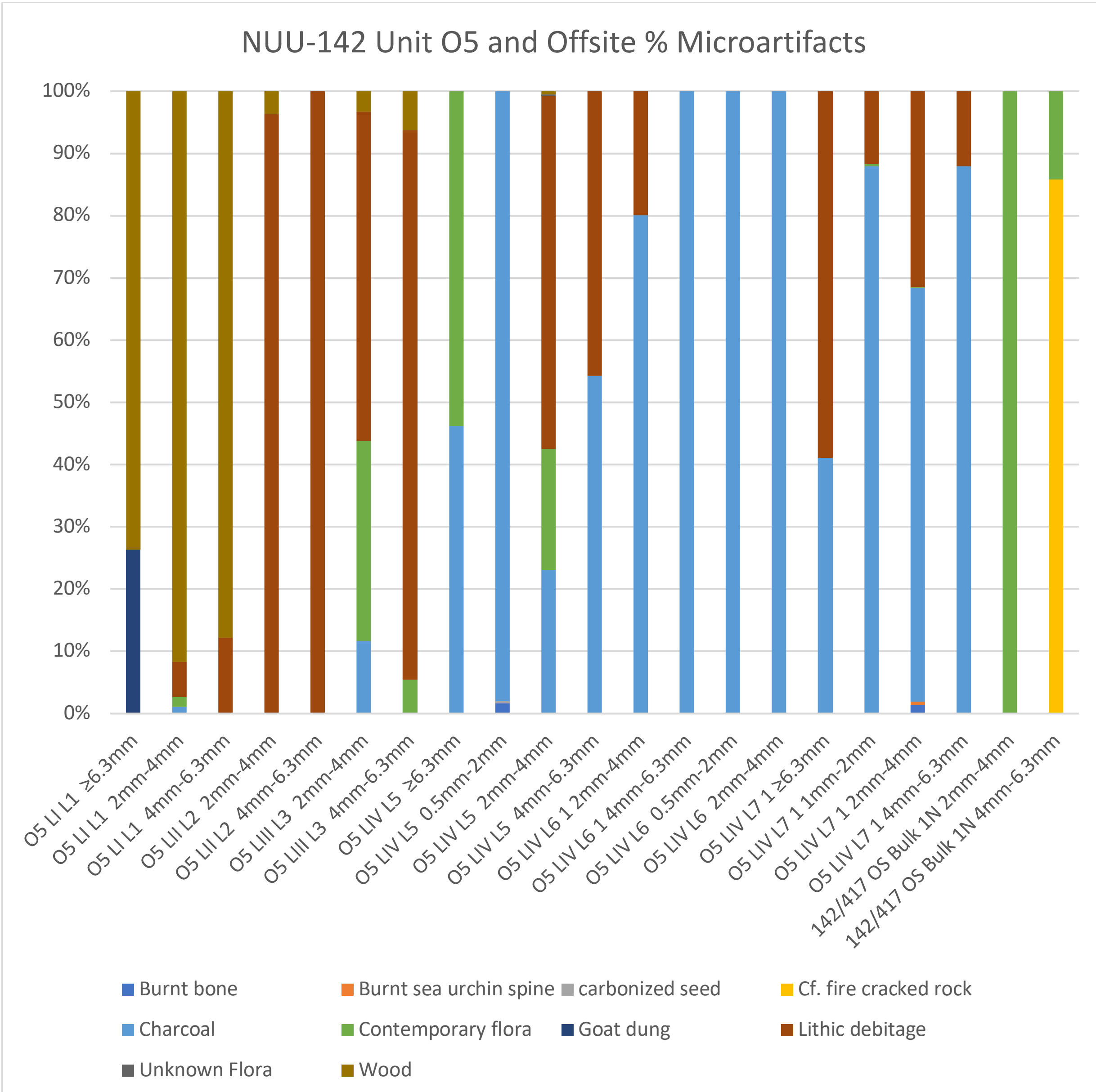


Figure 6.154: Microartifacts by layer and level in Unit O5

Site/Layer/Level/Sample	pH	% Organic Carbon	Particle Size Distribution								
			<0.063	0.063	0.125	0.25	0.5	1	2	4	6.3
O4 L1 SS1	6.11	49.2301	9.42	30.91	52.23	67.75	80.48		85.13	90.15	99.39
O4 L2 SS1	6.09	34.2453	12.08	45.85	66.21	75.01	80.55	83.22	85.31	87.71	100.18
O4 L2 SS4		31.5638	15.04	45.58	64.26	72.14	78.18	87.34	93.82	96.44	101.66
O4 L5 F1 SS1	5.74	30.6087	14.12	31.94	38.78	41.50	43.60	45.80	50.30	53.60	99.60
O4 L5 SS1	5.89	30.2962	28.55	53.71	67.75	72.42	74.43	77.21	81.94	85.73	99.42
O4 L5 SS4	6.13	28.8978	20.38	37.27	45.99	50.61	51.47	52.84	55.33	58.72	99.37
O4 L5 SS7	5.89	30.1750	25.34	44.68	52.86	56.84	61.10	62.64	67.08	72.02	99.28
O4 L5 SS10	5.62	31.2488	27.74	52.54	64.36	70.54	73.70	76.26	82.70	88.24	99.02
O4 L5 SS11	5.75	36.3052	21.36	38.20	46.18	49.26	51.06	53.92	57.92	62.70	99.72
O4 L6 Fe1 SS5	5.86	34.0807	18.64	40.17	50.42	53.90	55.53	58.32	62.86	68.77	98.75
O4 L6 SS1	5.68	29.8165	25.88	44.70	53.20	56.32	60.38		64.08	70.06	99.14
O4 L7 SS1	6.27	26.8655	13.09	22.64	26.61	28.20	29.11	30.22	32.76	36.18	100.15
O5 L1 LI SS1		64.1774	2.26	11.60	26.02	44.36	58.46	66.18	70.70	75.14	101.18
O5 L2 LII SS1	6.28	29.0487	17.86	39.66	51.56	58.64	68.38	71.96	78.30	86.64	99.94
O5 L3 LII SS1	6.23	32.4319	28.39	59.57	84.49	89.06	91.38	93.26	94.69	95.30	99.06
O5 L3 SS4	6.23	37.1844	12.36	34.76	54.48	66.02	77.02	81.62	85.00	89.22	99.88
O5 L5 SS1	5.91	28.2047	18.00	31.67	37.66	40.40	41.62	43.15	46.69	50.74	100.09
O5 L5 SS4	6.06	28.5926	16.09	27.90	32.48	34.54	36.59		38.98	44.43	99.58
O5 L5 SS7	5.86	27.0203	16.98	31.84	38.96	41.38	42.66	44.73	49.87	56.63	99.20
O5 L6 F1 SS1	5.99		18.64	31.76	37.26	39.00	39.90	41.38	44.64	47.26	100.98
O5 L6 SS1	6.01	27.5583	25.52	46.80	54.96	58.24	61.71		66.40	71.54	100.21
O5 L7 F1 SS1	5.61	48.0567	30.00	56.76	68.78	73.50	76.26	79.92	86.26	89.28	98.76
NUU142/417 BULK1 OSN	5.70	30.4902	20.38	37.27	45.99	50.61	51.47	52.84	55.33	58.72	99.37

Table 6.50: Sediment sample data from Units O4 and O5.

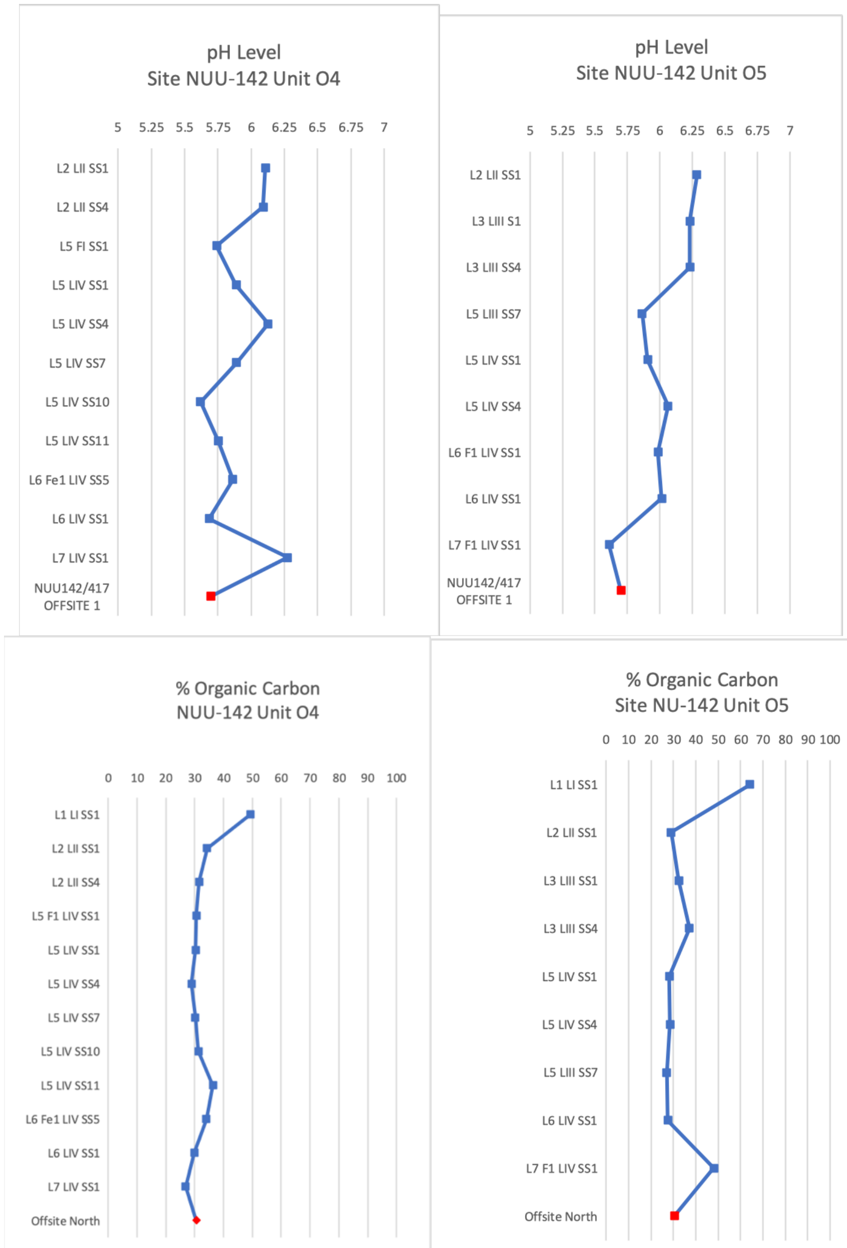
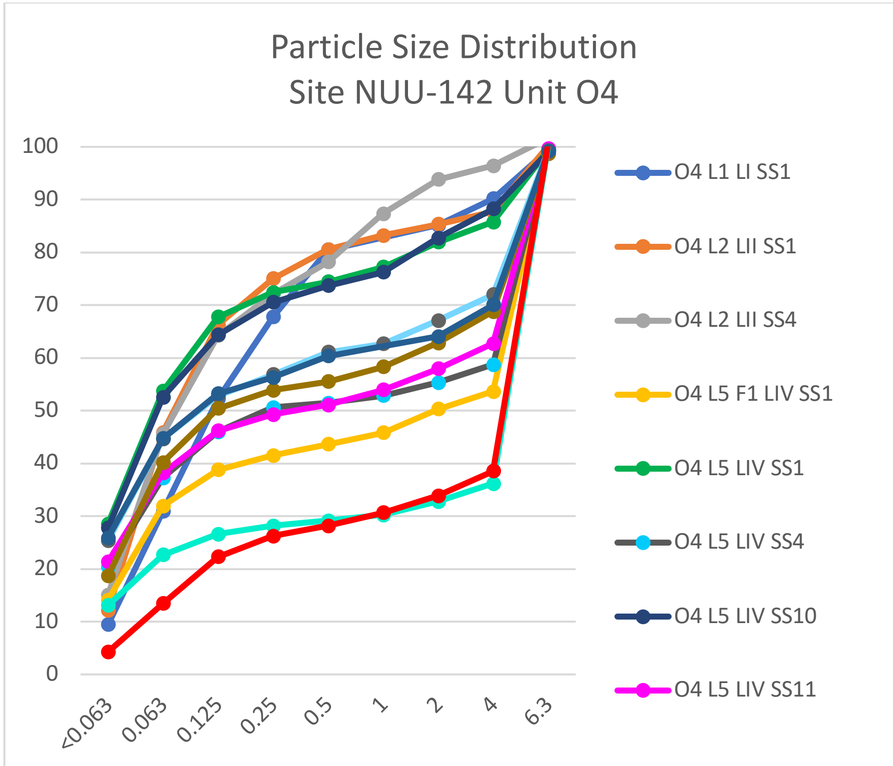


Figure 6.155: pH and LOI from Units O4 and O5.



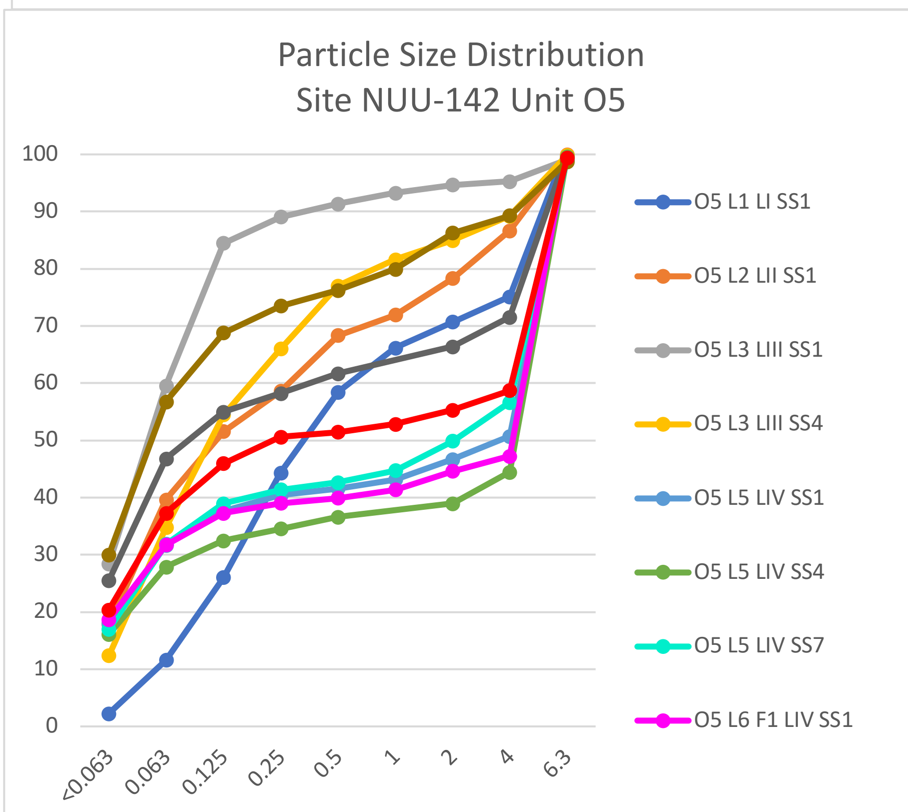


Figure 6.156: Particle size distribution for Units O4 and O5.

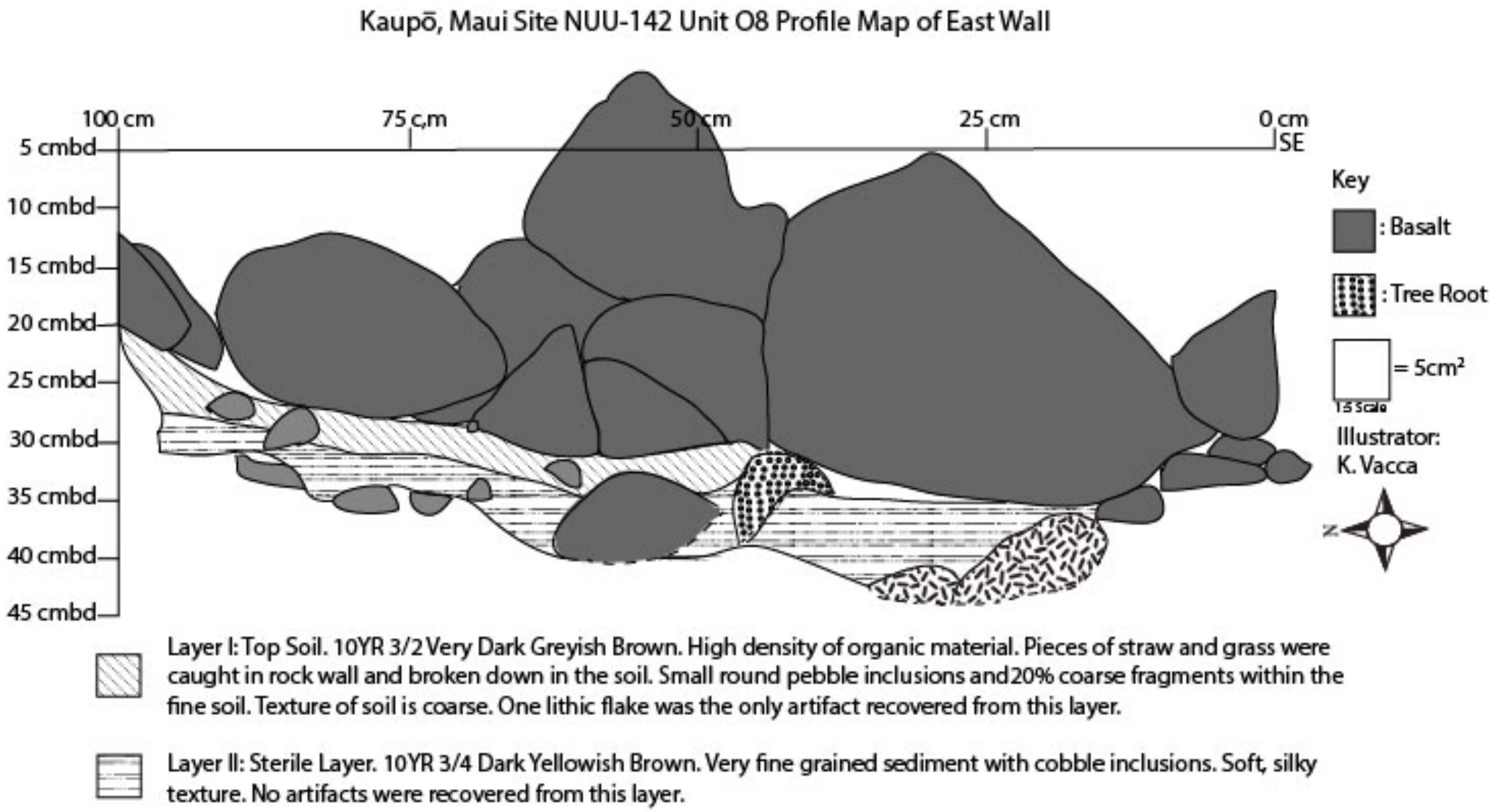


Figure 6.157: Profile map of Unit O8 with context information.

Site	Artifact Class	Item Count	Weight (g)	g/L
142 O8 LII L2	Basalt Flake	1	27.83	1.1762

Table 6.51: Artifact found in Unit O8.

Site/Layer /Level/Sample	pH	% Organic Carbon	Particle Size Distribution								
			<0.063	0.063	0.125	0.25	0.5	1	2	4	6.3
NUU142 O8 L3 LII SS1	5.77	29.5932	27.06	55.08	68.82	74.38	78.98		81.26	87.24	99.72
NUU142/417 BULK1O SN	5.70		13.09	22.64	26.61	28.20	29.11	30.22	32.76	36.18	100.15

Table 6.52: Sediment sample data from Unit O8.

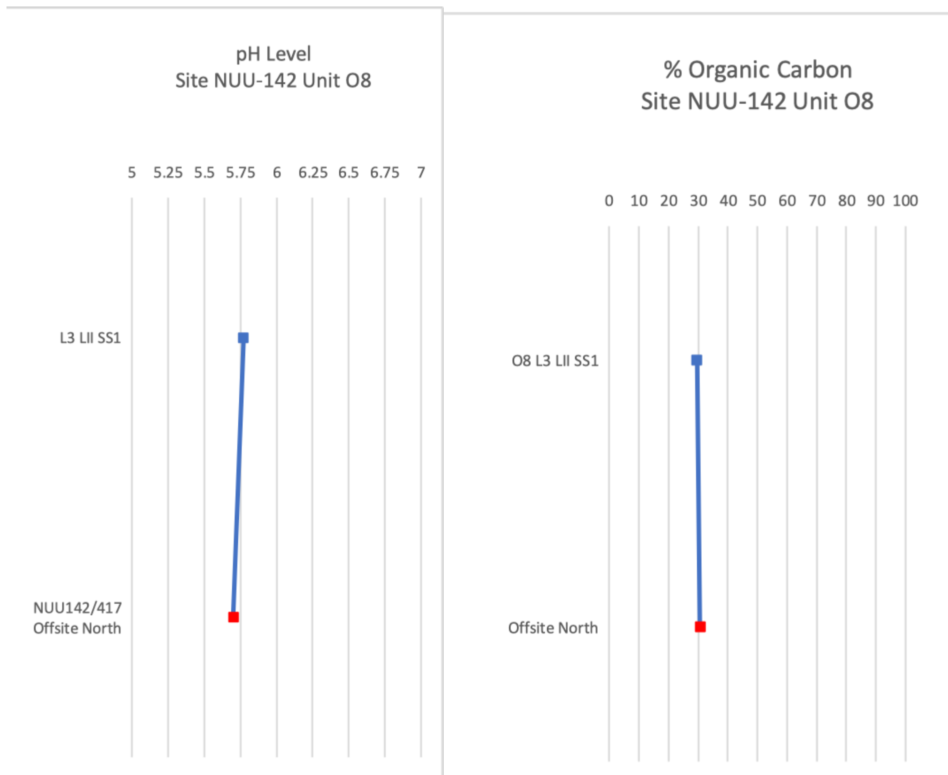


Figure 6.158: pH and LOI from Unit O8.

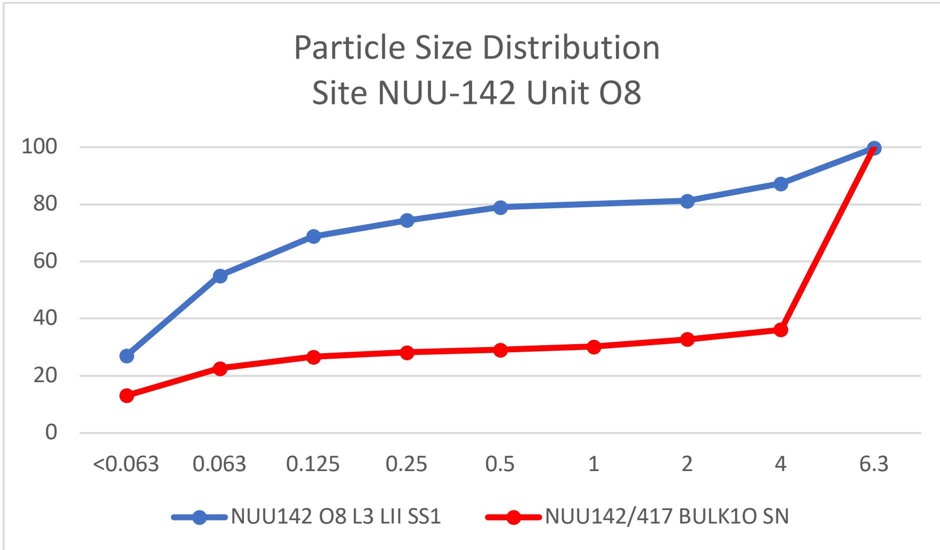


Figure 6.159: Particle size distribution for Unit O8.

Micromorphology

One micromorphology sample was extracted from the east profile of Unit O4. The area where sample NUU142O4MM1 was extracted was located directly below the surface of a C-shape feature built into the larger wall, and east of the combustion feature that was uncovered along the border of Units O4 and O5. However, the context associated with the combustion feature did not extend to the east wall and is therefore not evidenced in the profile of the unit. Sample NUU142O4MM1 captured only Layer II as a result of its location and the shallow nature of the unit. No additional microfacies were observed in the thin section. The sediment was relatively homogenous throughout and moderately sorted with an equal enaulic distribution and a spongy appearance. A vughy microstructure was determined to be the most dominant type. Voids comprised approximately 30% of the microfacies and were randomly but evenly distributed. The most dominant type of void were channel voids that ran parallel to one another and perpendicular through the bedding. Other void types include vughs and complex packing voids. Heavily weathered, rounded basalt (gravel to sand size) comprised the dominant naturally occurring inclusion type. Plant material was also present but the dark yellowish-brown color may indicate burning which makes determining the origin of deposition as natural or anthropogenic difficult. Anthropogenic inclusions that were observed included burnt bone (rare), ash (rare), and charcoal (common, medium sand size). Fire-cracked rock and anthropogenic sediment aggregates were also observed, each characterized by evidence of burning. Weathering was evidenced on olivine with lenticular patterns and on the thin typic clay coatings on some basalt fragments.

NUU142O4MM1

NUU-142 Unit O4 Profile photo of the east wall stratigraphy with the location of the micromorph sample NUU142O4MM1 outlined in red.

NUU-142 Plan of Units O4 (right) and O5 (left) with the location of micromorph sample NUU142O4MM1 outlined in red.

Figure 6.160: Thin section slide and photo of location from Unit O4.

Unit F10 was placed in the C-shape feature designated NUU-417. Although feature NUU-417 was assigned a separate site number from NUU-142, it was deemed part of the same kauhale due to its proximity to the L-shaped feature. Although four contexts were recorded, few artifacts were recovered during excavation of this feature. Basalt debitage was densest but still limited and with poor parent material. Shell fragments were also minimal—one unidentified piece was recovered from Layer III. Lithic material and wood dominated the microartifact assemblage. Sediment was screened through 1/16-inch screen to capture fishbone or other artifacts too small for the larger 1/8-inch screen. This practice combined with the identification of microartifacts did not result in the recovery of any additional material which indicates that this feature was either well-cleaned or sparsely used.

The sediment sample data also shows little evidence of anthropogenic input. The pH level of Layer II is far more acidic than the surrounding layers and the comparative sample. If this context was at one point the surface of the feature, rainwater leaching may be to blame for the strongly acidic sediment which means that this feature may not have been protected from the elements by a thatched roof. Particle size distribution in this feature exhibits an increase in fine material directly corresponding with an increase in depth, which may also support an interpretation of post-depositional leaching and pedogenic processes (evidenced in the profile of the unit as well). This feature was initially thought to be an oven house, but the excavation did not support this hypothesis and instead provided evidence of this being a temporary shelter or storage space with short-term use.

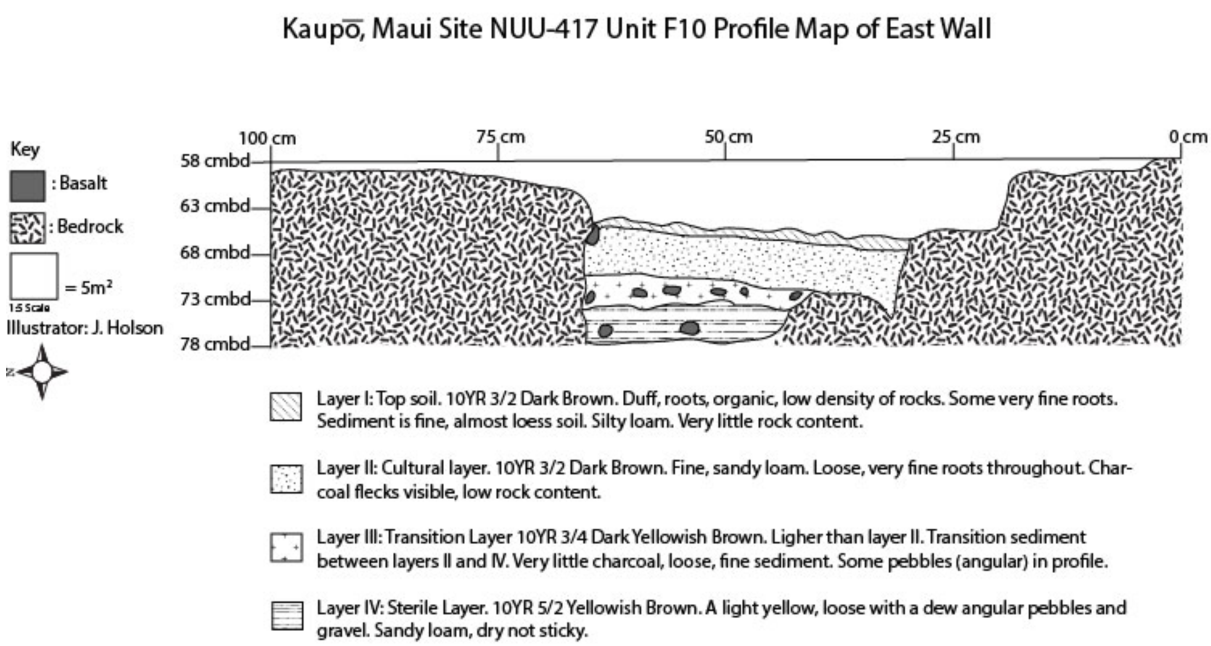


Figure 6.161: Profile map of the east wall in NUU-417 Unit F10

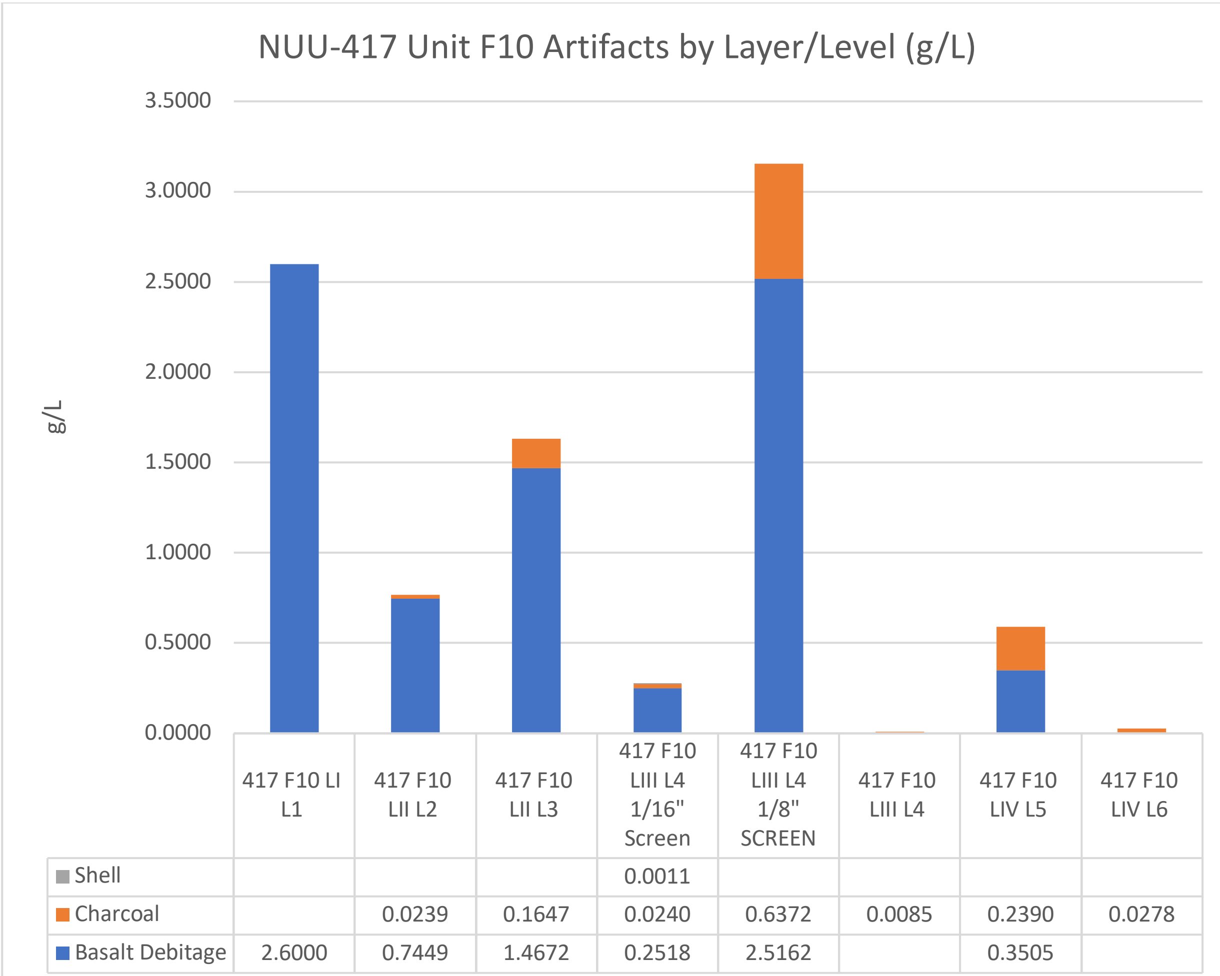


Figure 6.162: Artifacts in Unit F10, presented in grams per liter of sediment excavated from each layer

Site	Excavation Unit	Level	Layer	NISP	MNI	Weight (g)	Scientific Determination
417	F10	4	III	1	1	0.04	Undetermined mollusk

Table 6.53: NISP, MNI, Weight, and ID for shell in Unit F10

Unit	Layer	Level	Artifact Size	Item Type	Count	Sum of weight /g
F10	I	1	≥6.3mm	Lithic debitage	3	7.0537
F10	I	1	≥6.3mm	Wood	3	0.3473
F10	I	1	2mm-4mm	Charcoal	15	0.1879
F10	I	1	2mm-4mm	Lithic debitage	12	0.5297
F10	I	1	2mm-4mm	Shell	12	0.0037
F10	I	1	2mm-4mm	Wood	40	0.6091
F10	I	1	4mm-6.3mm	Lithic debitage	2	0.2194
F10	I	1	4mm-6.3mm	Wood	25	0.8204
F10	II	3	2mm-4mm	Charcoal	3	0.0222
F10	II	3	2mm-4mm	Lithic debitage	5	0.1257
F10	II	3	2mm-4mm	Wood	8	0.0191
F10	II	3	4mm-6.3mm	Lithic debitage	1	0.1469
F10	IV	5	2mm-4mm	Charcoal	3	0.0171
F10	IV	5	2mm-4mm	Lithic debitage	7	0.1931

F10	IV	5	4mm-6.3mm	Lithic debitage	1	0.2767
F10	IV	6	≥6.3mm	Contemporary Flora	1	0.1142
F10	IV	6	2mm-4mm	Charcoal	1	0.0013
F10	IV	6	2mm-4mm	Contemporary Flora	5	0.0602
F10	IV	6	2mm-4mm	Lithic debitage	4	0.067
F10	IV	6	4mm-6.3mm	Contemporary Flora	2	0.0068
F10	IV	6	4mm-6.3mm	Lithic debitage	1	0.0625

Table 6.54: Microartifact types, size, and weight from Unit F10.

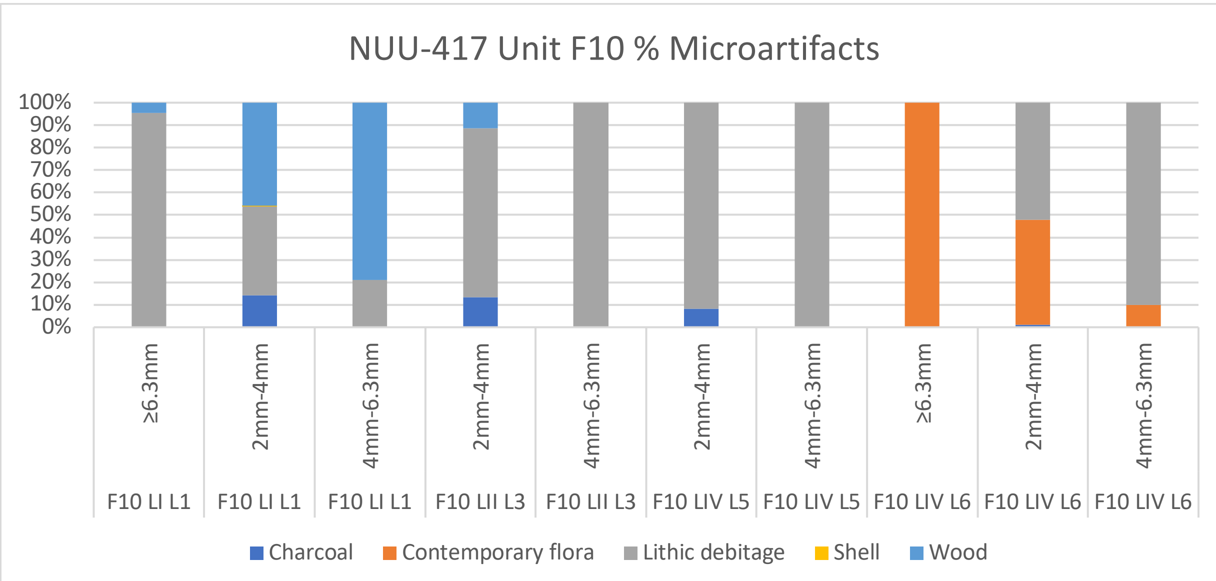


Figure 6.163: Microartifacts by layer and level in Unit F10

Site/Layer/ Level/ Sample	pH	LOI	Particle Size Distribution								
			<0.063	0.063	0.125	0.25	0.5	1	2	4	6.3
F10 L1 SS1	6.35	42.76	4.09	15.93	28.62	36.22	39.67	43.32	49.90	56.87	99.65
F10 L3 SS1	5.43	29.77	8.82	14.47	17.58	19.08	20.14	20.69	22.14	23.40	99.64
F10 L5 SS1	5.94	27.36	22.82	41.08	49.86	54.14	56.02	59.66	66.26	74.22	98.26
F10 L6 SS1	5.83	30.10	30.94	58.76	72.28	78.32	81.40	84.13	88.32	91.92	99.72
NUU142/417 BULK1 OSN	5.70		16.98	31.84	38.96	41.38	42.66	44.73	49.87	56.63	99.2

Table 6.55: Sediment data for Unit F10

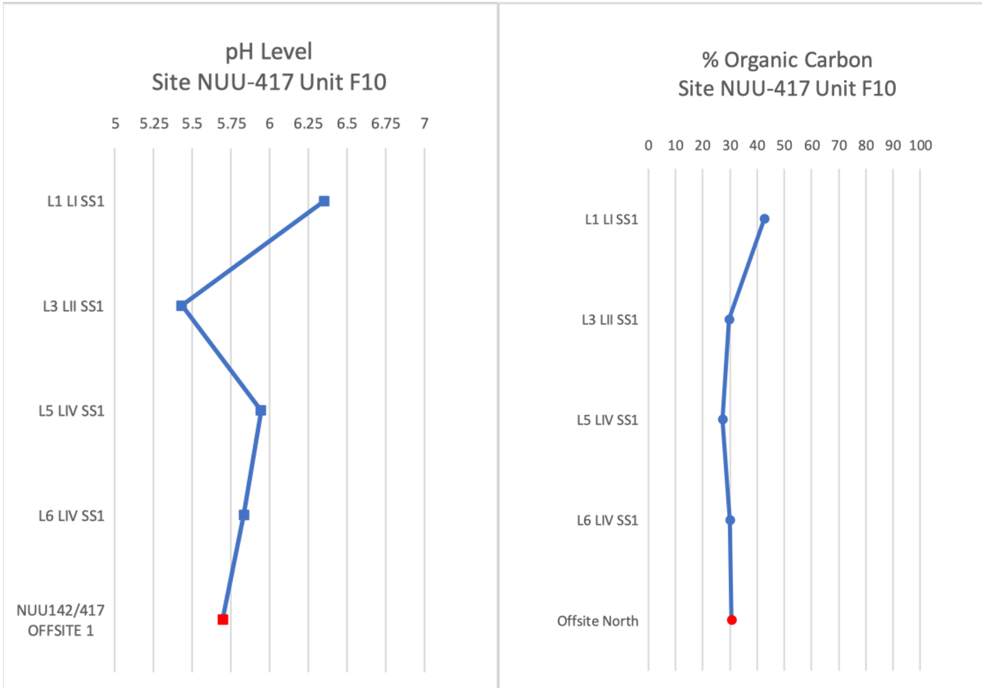


Figure 6.164: pH and LOI for Unit F10

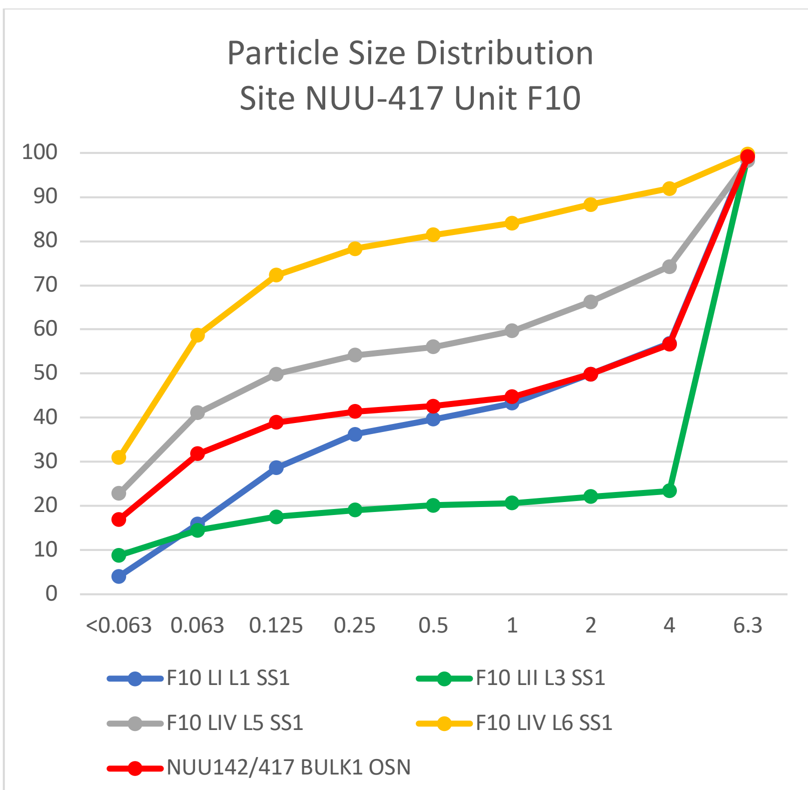


Figure 6.165: Particle size distribution for Unit F10

Site NUU-155

NUU-155 was built to the southeast of NUU-153 and NUU-142, and directly across the swale from NUU-152 and NUU-420. The feature wall is 7m long and approximately 1m high at the best-preserved portion. Several associated terraces were built along the hillside moving down into the swale below. A surface survey of site NUU-155 revealed that the area surrounding the architectural feature was covered in fine-grained basalt debitage and tools associated with lithic working. Several flakes, cores and tools from the surface were collected (listed in Table 6.56) and two test units were subsequently placed in the site to gather more information. Unit O21 was placed along the wall and Unit M23 was placed on a terrace west of the wall down the slope.

Figure 6.166: Map of NUU-155

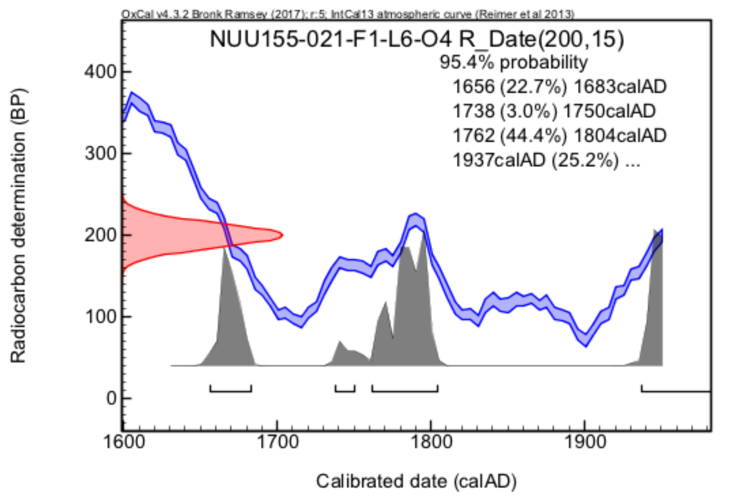


Figure 6.167: Calibrated age ranges for NUU-155 from Unit O21 Feature 1


Figure 6.168: Photo of NUU-155 facing north.

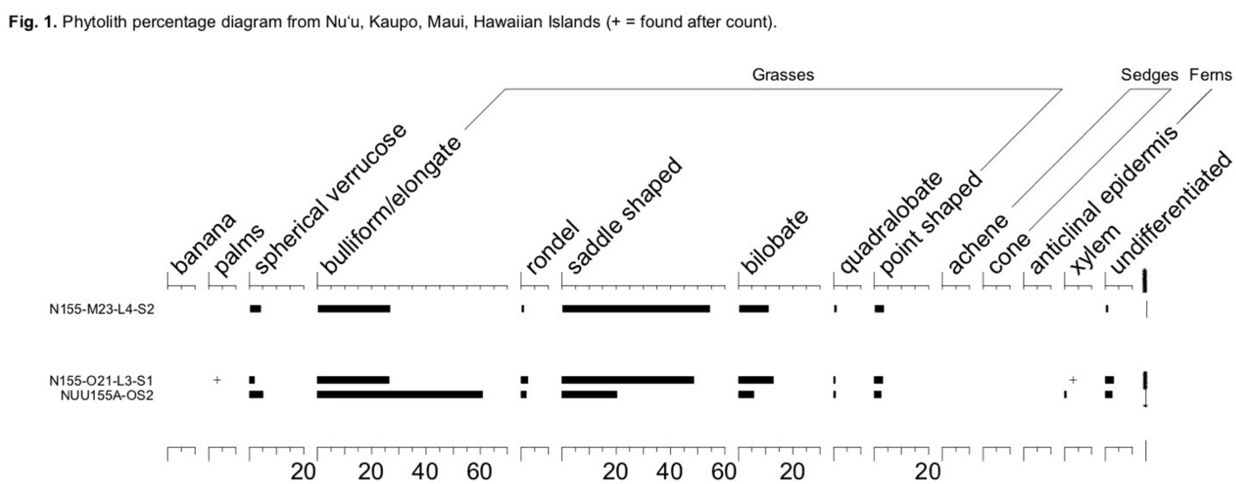


Figure 6.169: Phytolith data from NUU-155. Data provided by Mark Horrocks. Table adapted from Horrocks 2018 Lab Report.

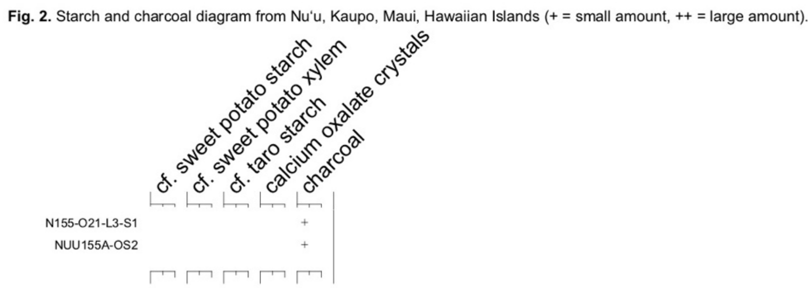


Figure 6.170: Starch data from NUU-155. Data provided by Mark Horrocks. Table adapted from Horrocks 2018 Lab Report.

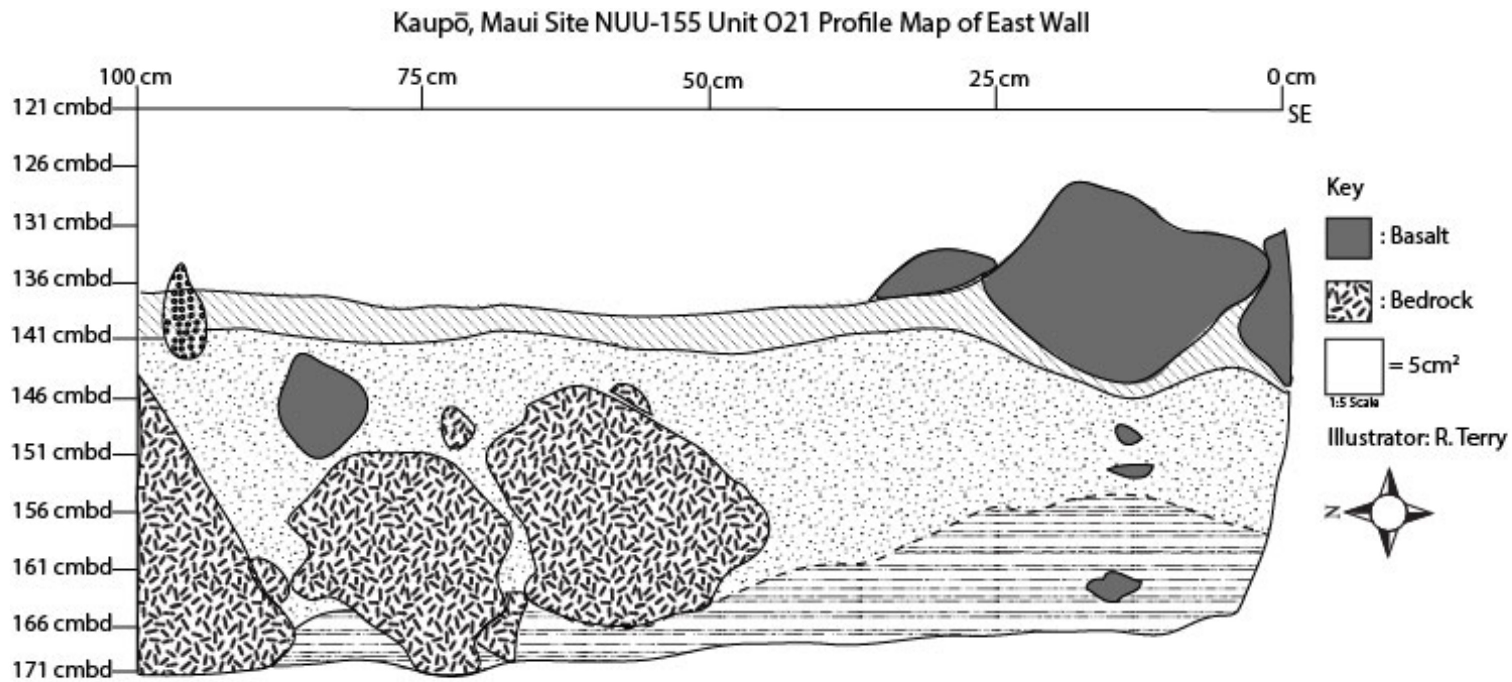
Unit O21 placed along the wall produced more evidence of lithic working along with evidence of a possible combustion feature. The evidence of lithic working included the presence of hammerstones, cores, flakes and debitage in Layer II. The presence of a possible combustion feature was evidenced by a charcoal and ash lens within a natural half-circle bedrock outcrop. The greatest variety of materials were collected from the designated combustion feature, and included burnt and raw kukui nut, mollusk shell, coral, 'ili'ili, charcoal, and fire-cracked rock. Bone fragments were recovered from the unit, but only from upper levels. The microartifacts showed the same array of materials with the exception of bone which may indicate that the smaller fragments of bone did not result from anthropogenic use of the feature. Insect feces were also observed in the process of microartifact sorting which indicates post-depositional bioturbation events.

Data from Unit O21 sediment samples show a gradual increase in pH with depth associated with a gradual decrease in organic carbon with depth is a similar pattern seen elsewhere. This trend is understood to be the result of organic carbon decomposing more quickly when sediment moves from moderately acidic to slightly acidic. Less clay in these units would have also resulted in faster decomposition of organic matter. Most of the samples are sand-rich apart from Layer II sample 3 that is gravel-rich. This sample was taken from a dark sediment deposit that, according the microartifacts, may have been impacted by the fire-cracked rock and increased density of charcoal.

Figure 6.171: Photo of Unit O21 (top) and Unit M23 (bottom) on NUU-155 terrace.

Site	Artifact Class	Item Count	Weight (g)
155 I24 Surface	Basalt Core	1	87.35
155 I24 Surface	Basalt Flake	1	93.72
155 K18 Surface	‘ili‘ili	1	
155 K19 Surface	Basalt Flake	1	124.52
155 K21 Surface	Basalt Core	1	192.25
155 K22 Surface	Basalt Flake	1	59.2
155 K23 Surface	Basalt Core	2	
155 K23 Surface	Basalt Flake	4	183.29
155 L20 Surface	Basalt Flake	3	55.41
155 L21 Surface	Basalt Flake	1	60.88
155 L22 Surface	Basalt Hammerstone	1	202.93
155 L23 Surface	Basalt Core	1	152.07
155 L23 Surface	Basalt Flake	1	35.46
155 M19 Surface	Basalt Core	1	214.1
155 M22 Surface	Basalt Core	2	216.18
155 N16 Surface	Basalt Flake	2	24.07
155 O15 Surface	core and flake	1	126.82
155 O16 Surface	Basalt Flake	2	91.67
155 O27 Surface	Basalt Flake	1	68.36
155 U22 Surface	Basalt Flake	2	89.42
155 U22 Surface	Basalt Hammerstone	1	166.68
155 V22 Surface	Basalt Flake	1	85.39
155 W9 Surface	Basalt Hammerstone	1	183.5

Table 6.56: Surface collection of basalt tools and debitage from NUU-155

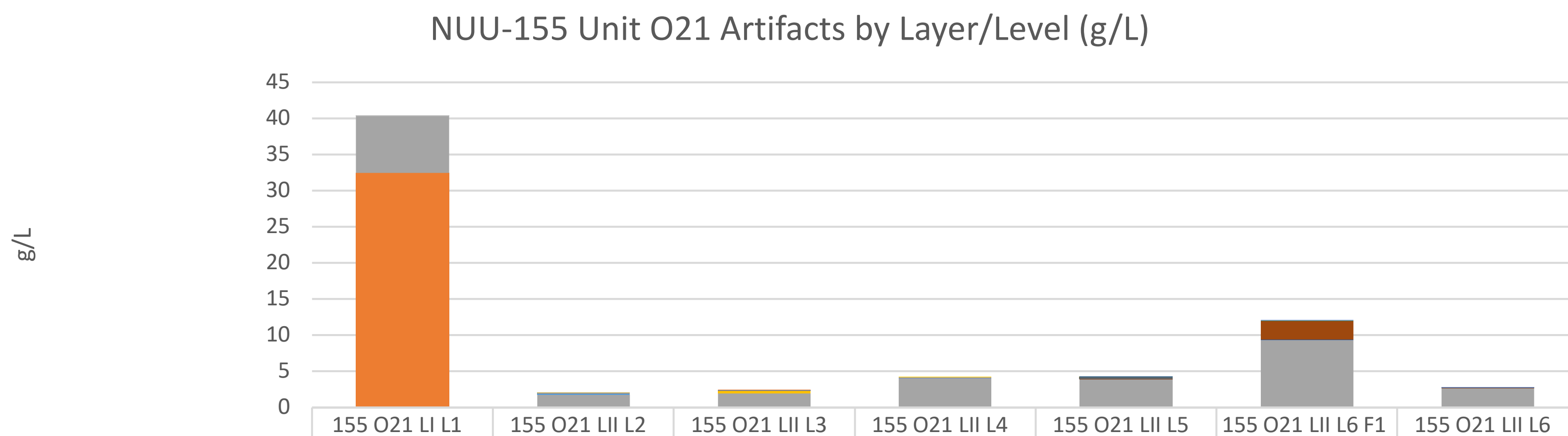


Layer I: Top soil. 10YR 2/2 Very Dark Brown. Fine Particles, several inclusions including lithic depitage, roots, grasses, wall fall cobbles and boulders, and animal droppings. Rough texture, very loose soil with some compaction around roots.

Layer II: Cultural Layer. 10YR 2/2 Very Dark Brown. Very fine particles, cobbles, and bedrock inclusions with some continuing roots. More lithic debitage with charcoal lenses, kukui, shell, bone, and coral artifacts. Loose, soft sediment.

Layer III: Sterile Layer. 10YR 3/3 Dark Brown. Very fine particles, some bedrock and bedrock cobbles. Slightly compacted. Soft texture.

Figure 6.172: Profile map of the east wall in NUU-155



	155 O21 LI L1	155 O21 LII L2	155 O21 LII L3	155 O21 LII L4	155 O21 LII L5	155 O21 LII L6 F1	155 O21 LII L6
Volcanic Glass Flake				0.0013			
Volcanic Glass Debitage	0.0037						
Terrestrial Gastropod		0.0003	0.0001				
Raw Kukui Nut Shell			0.0282	0.0235	0.0416	0.0724	0.0209
Manupport Shell			0.0012		0.0027	0.0127	
Coral				0.0026	0.0074		0.0039
ʻIliʻili					0.0073		
Fire-altered basalt					0.1963		
Charcoal			0.0148	0.0204	0.1183	2.6100	0.0805
Carbonized Kukui Nut Shell			0.0002		0.0015	0.0433	0.0009
Bone not worked		0.0009					
Basalt Hammerstone		0.1709					
Basalt Flake			0.3342				
Basalt Debitage	7.9008	1.8021	2.0016	4.0739	3.8738	9.3384	2.6906
Basalt Core	32.4771						
bone not worked			0.0001				

Figure 6.173: NUU-155 graph of artifacts displayed as grams per liter of sediment excavated in each context

Site	Unit	Feature	Level	Layer	NISP	MNI	Weight (g)	Scientific Determination	Comments
155	O21		2	II	1	1	0.07	general terrestrial gastropod	African land snail
155	O21		3	II	1	1	0.32	Undetermined mollusk	
155	O21		3	II	10	10	0.03	general terrestrial gastropod	tiny 1mm shells
155	O21		5	II	5		0.74	Undetermined mollusk	
155	O21	F1	6	II	3	1	0.24	Undetermined mollusk	was originally one piece, but has broken into three

Table 6.57: NISP, MNI, Weight, and ID for shell in NUU-155.

Site	Unit	Level	Layer	Object Number	NISP	MNI	Weight (g)	Scientific Determination	Comments
155	O21	2	II	3	22	1	0.25	general undetermined bone	Broken in the transportation process. There are two larger pieces from which the smaller shards have broken off.
155	O21	3	II	8	12	1	0.04	general undetermined bone	one larger piece has broken into smaller pieces

Table 6.58: Bone data from NUU-155.

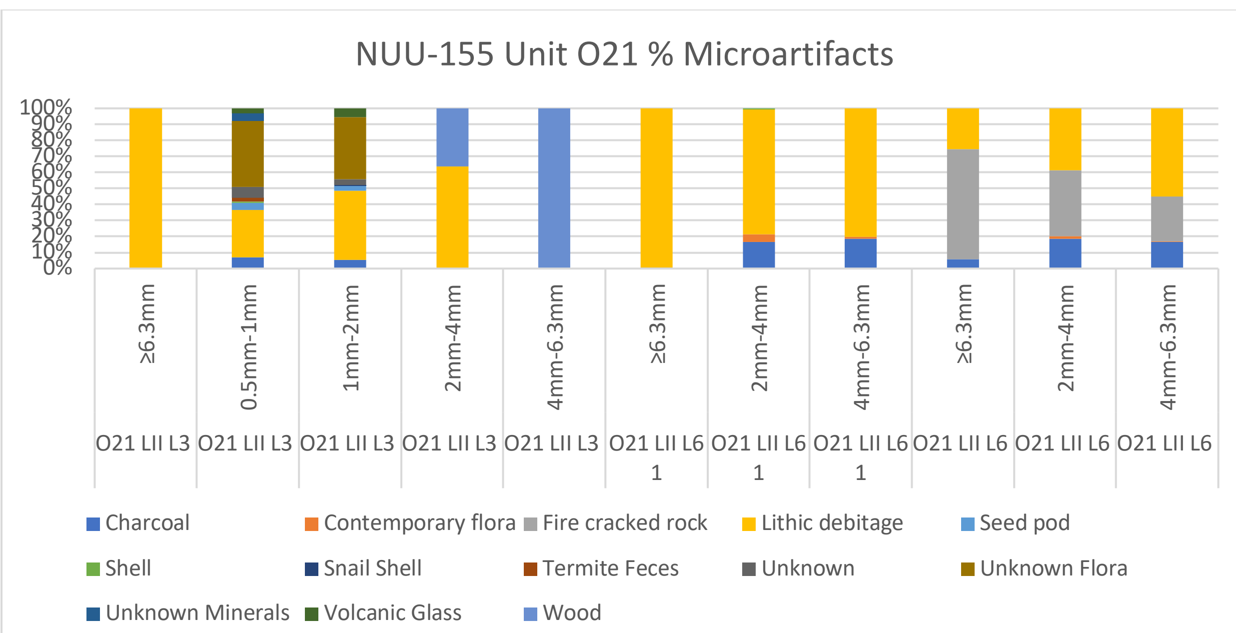


Figure 6.174: Graph of microartifact data from NUU-155

Unit	Layer	Level	Feature	Artifact Size	Item Type	Count	Sum of weight /g
O21	II	3		≥6.3mm	Lithic debitage	1	0.8523
O21	II	3		0.5mm-1mm	Charcoal	36	0.0068
O21	II	3		0.5mm-1mm	Lithic debitage	47	0.0287
O21	II	3		0.5mm-1mm	Seed pod	41	0.0043
O21	II	3		0.5mm-1mm	Shell	4	0.0009
O21	II	3		0.5mm-1mm	Termite Feces	17	0.0023
O21	II	3		0.5mm-1mm	Unknown	18	0.0066
O21	II	3		0.5mm-1mm	Unknown Flora	0	0.0399
O21	II	3		0.5mm-1mm	Unknown Minerals	7	0.0046
O21	II	3		0.5mm-1mm	Volcanic Glass	4	0.0032
O21	II	3		1mm-2mm	Charcoal	7	0.0076
O21	II	3		1mm-2mm	Lithic debitage	15	0.0618
O21	II	3		1mm-2mm	Seed pod	14	0.0046
O21	II	3		1mm-2mm	Snail Shell	1	0.0008
O21	II	3		1mm-2mm	Unknown	5	0.005
O21	II	3		1mm-2mm	Unknown Flora	0	0.0551
O21	II	3		1mm-2mm	Volcanic Glass	2	0.008
O21	II	3		2mm-4mm	Lithic debitage	7	0.2091
O21	II	3		2mm-4mm	Wood	10	0.119
O21	II	3		4mm-6.3mm	Wood	4	0.0659
O21	II	6	1	≥6.3mm	Charcoal	1	0.1196
O21	II	6	1	≥6.3mm	Lithic debitage	18	25.9272
O21	II	6	1	2mm-4mm	Charcoal	50	0.7216
O21	II	6	1	2mm-4mm	Contemporary Flora	36	0.2174
O21	II	6	1	2mm-4mm	Lithic debitage	50	3.4014
O21	II	6	1	2mm-4mm	Shell	1	0.0225
O21	II	6	1	4mm-6.3mm	Charcoal	33	0.7032
O21	II	6	1	4mm-6.3mm	Contemporary Flora	6	0.04476
O21	II	6	1	4mm-6.3mm	Lithic debitage	24	3.0043
O21	II	6		≥6.3mm	Charcoal	12	1.2431
O21	II	6		≥6.3mm	Fire cracked rock	11	14.6423
O21	II	6		≥6.3mm	Lithic debitage	5	5.4507
O21	II	6		2mm-4mm	Charcoal	23	1.1753
O21	II	6		2mm-4mm	Contemporary Flora	18	0.0973
O21	II	6		2mm-4mm	Fire cracked rock	16	2.5892
O21	II	6		2mm-4mm	Lithic debitage	107	2.4149
O21	II	6		4mm-6.3mm	Charcoal	2	1.2244
O21	II	6		4mm-6.3mm	Contemporary Flora	5	0.0202
O21	II	6		4mm-6.3mm	Fire cracked rock	18	2.0505
O21	II	6		4mm-6.3mm	Lithic debitage	31	4.0407

Table 6.59: Microartifact data from NUU-155.

Site/Layer/ Level/Sample	pH	% Organic Carbon	Particle Size Distribution <0.063	0.063	0.125	0.25	0.5	1	2	4	6.3
O21 L3 LII SS3	5.83	31.6841	14.42	31.42	40.10	43.92	44.82	45.90	47.96	49.48	99.32
O21 L6 F1 SS1	6.05	31.4326	17.40	29.64	35.38	38.24	40.40	45.02	52.46	58.38	100.26
O21 L6 LII SS3	6.08	26.8295	8.66	18.82	22.28	23.65	24.37	25.31	26.89	30.15	98.83
O21 L6 LII SS4	6.02		16.12	31.14	37.74	40.26	42.12	45.44	50.44	57.22	99.80
O21 L6 LII SS5	6.35		28.52	45.08	52.38	55.32	56.96	59.24	63.14	72.34	100.10
O21 L6 F1 SS4	6.14	28.7139	18.10	37.86	46.16	48.94	51.06	53.34	57.36	62.00	99.39
O21 L6 F1 SS5	6.03	29.6386	11.68	28.93	35.56	38.63	40.50	43.03	46.53	50.92	98.12
NUU155A BULK2 OS	5.50		11.80	31.84	54.38	77.76	90.86	97.10	99.44	100.52	101.22

Table 6.60: Sediment sample data from NUU-155.

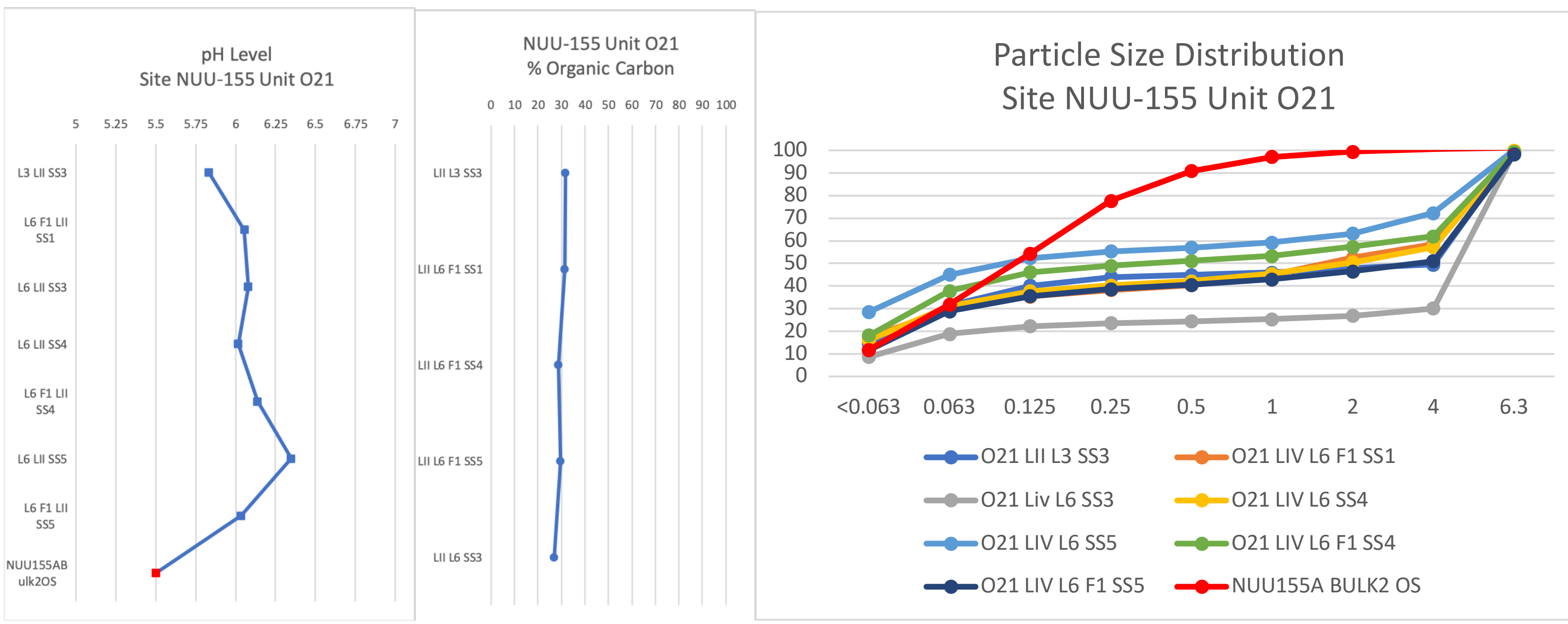


Figure 6.175: pH, LOI, and particle size analysis data from NUU-155.

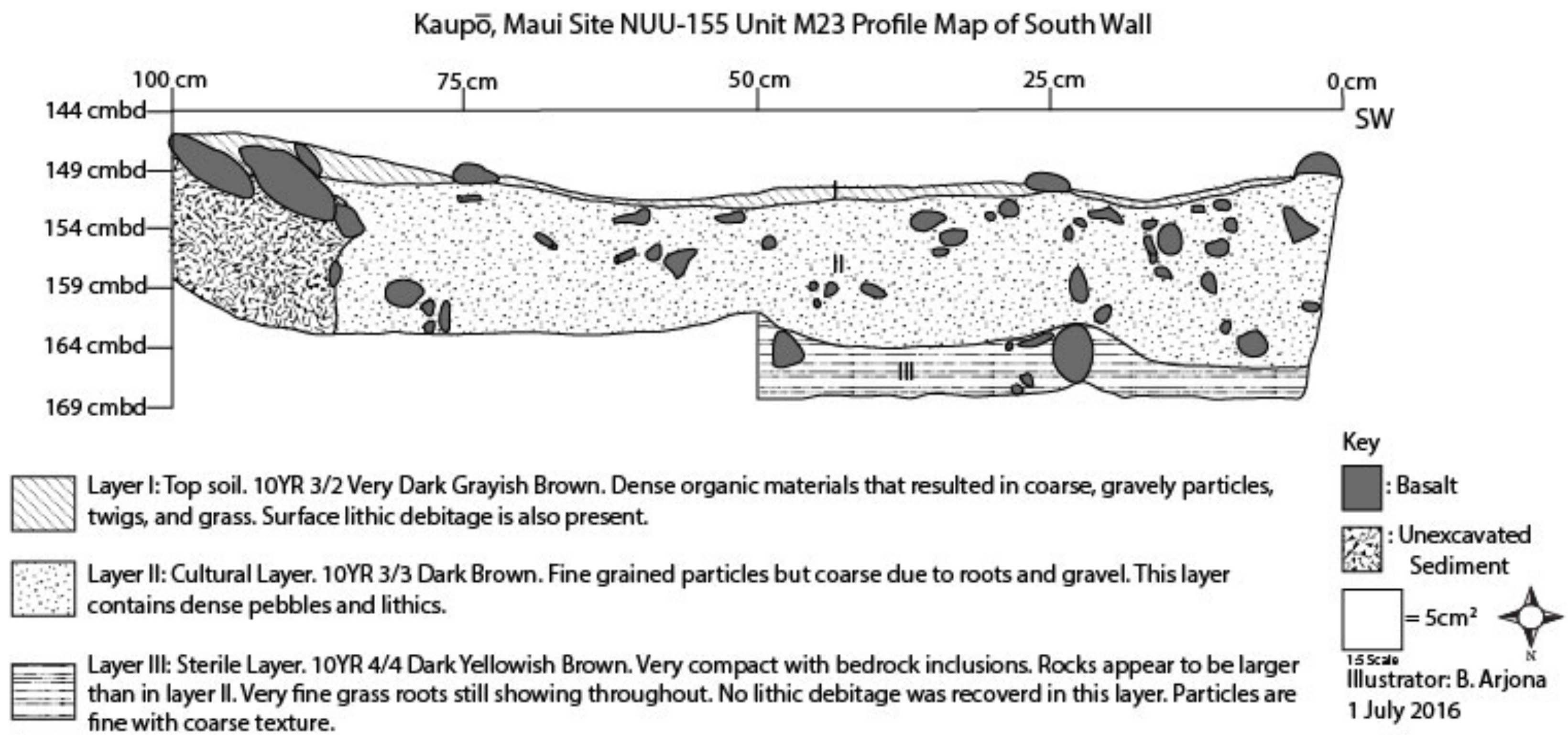
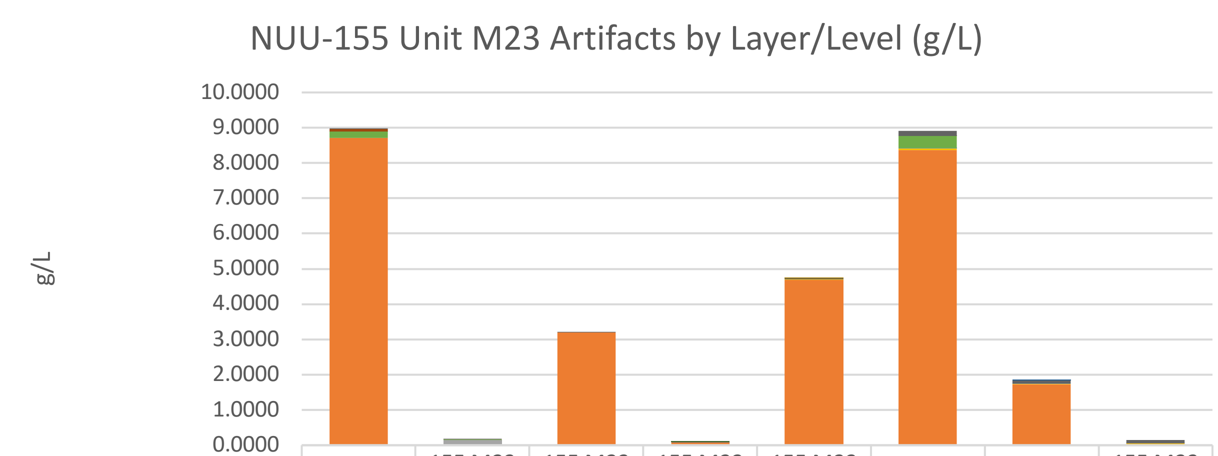


Figure 6.176: Profile of the south wall in NUU-155

Unit M23 on the terrace produced far little other than evidence for lithic working. Kukui nut shell, charcoal, shell, coral, and volcanic glass were present in the cultural layer, but at low densities. All but coral and shell were also recovered at the micro-scale. The low density of everything but lithic debitage and the lack of evidence of organic input in the sediment profile indicates that these materials were not used in this locale but were tracked or dumped here.

The pH of the samples from Unit M23 are within the range of moderately acidic (except for Level 3 Sample 1 which is strongly acidic) whereas the offsite comparison falls within the range of strongly acidic. All samples are considered organic, but the organic carbon is higher in the strongly acidic sediment. In addition, the particle size distribution of the cultural layer is predominately gravel-size sediment which likely reflects the high density of lithic material (this differs from the top soil and sterile layers which are sand-dominant). The low percentage of clay suggests that either the depositional environment was high-energy, or the current environment was eroding away at the clay in the deposit. The absence of clay would have negatively impacted the preservation of organic carbon.



	155 M23 LI L1	155 M23 LII L2 1/16" Screen	155 M23 LII L2 1/8" SCREEN	155 M23 LII L3 1/16" Screen	155 M23 LII L3 1/8" SCREEN	155 M23 LII L4	155 M23 LII L5	155 M23 LIII L6 SW Quadrant
Volcanic Glass Flake				0.0005				
Volcanic Glass Debitage							0.0025	
Terrestrial Gastropod					0.0006			
Raw Kukui Nut Shell	0.0042	0.0016	0.0033	0.0015	0.0372	0.1386	0.0672	0.0814
Manupport Shell	0.0761					0.0053		
Coral	0.0095					0.0017	0.0141	0.0032
ʻIliʻili	0.1733	0.0173				0.3485		
Contemporary Flora						0.0001		
Charcoal		0.0001		0.0009	0.0090	0.0399	0.0269	0.0634
Basalt Flake		0.1522						
Basalt Debitage	8.7106		3.1941	0.0834	4.6906	8.3745	1.7200	
bone not worked	0.0021							

Figure 6.177: NUU-155 graph of artifacts displayed as grams per liter of sediment excavated in each context

Site	Unit	Level	Layer	Special	NISP	MNI	Wgt (g)	Scientific Determination	Comments
155	M23	1	I		1	1	2.16	Cypracidae spp.	Large species
155	M23	3	II	1/8" Screen	?		0.1	general terrestrial gastropod	Not identifiable--broken to pieces
155	M23	4	II		1	1	0.55	Undetermined mollusk	
155	M23	4	II		4		0.28	Undetermined mollusk	

Table 6.61: NISP, MNI, Weight, and ID for shell and sea urchin in NUU-155.

Site	Unit	Level	Layer	NISP	MNI	Weight (g)	Scientific Determination	Comments
155	M23	1	I	5	1	0.06	general undetermined bone	NID fragments

Table 6.62: Bone data from NUU-155

Unit	Layer	Level	Artifact Size	Item Type		Sum of weight /g
M23	I	1	≥6.3mm	Goat dung	1	0.0897
M23	I	1	≥6.3mm	Wood	1	0.0828
M23	I	1	1mm-2mm	Archaic seeds	15	0.0223
M23	I	1	1mm-2mm	Lithic debitage	10	0.0574
M23	I	1	1mm-2mm	Seed	25	0.0834
M23	I	1	1mm-2mm	Shell	1	0.0088
M23	I	1	1mm-2mm	Unknown	1	0.0014
M23	I	1	1mm-2mm	Wood	0	0.367
M23	I	1	2mm-4mm	Contemporary flora	3	0.0079
M23	I	1	2mm-4mm	Lithic debitage	3	0.0471
M23	I	1	2mm-4mm	Wood	25	0.3569
M23	I	1	4mm-6.3mm	Wood	4	0.1044
M23	II	3	≥6.3mm	Lithic debitage	3	3.4025
M23	II	3	2mm-4mm	Charcoal	7	0.0766
M23	II	3	2mm-4mm	Lithic debitage	12	0.3467
M23	II	3	2mm-4mm	Volcanic Glass	1	0.0281
M23	II	3	2mm-4mm	Wood	3	0.0441
M23	II	3	4mm-6.3mm	Lithic debitage	5	0.5238
M23	II	4	≥6.3mm	Kukui nut shell	1	0.1325
M23	II	4	≥6.3mm	Lithic debitage	4	2.6742
M23	II	4	2mm-4mm	Charcoal	3	0.0342
M23	II	4	2mm-4mm	Contemporary Flora	10	0.0301
M23	II	4	2mm-4mm	Lithic debitage	19	0.4785
M23	II	4	4mm-6.3mm	Lithic debitage	5	0.3613
M23	III	6	≥6.3mm	Kukui nut shell	2	0.1828
M23	III	6	≥6.3mm	Lithic debitage	1	0.7233
M23	III	6	2mm-4mm	Contemporary Flora	6	0.0138
M23	III	6	2mm-4mm	Lithic debitage	7	0.3049
M23	III	6	4mm-6.3mm	Lithic debitage	4	0.4769
155 Offsite			≥6.3mm	Contemporary Flora	3	0.3736
155 Offsite			2mm-4mm	Contemporary Flora	272	1.1471
155 Offsite			2mm-4mm	Lithic debitage	1	0.0398
155 Offsite			4mm-6.3mm	Contemporary Flora	41	0.4613

Table 6.63: Micrartifact data from NUU-155.

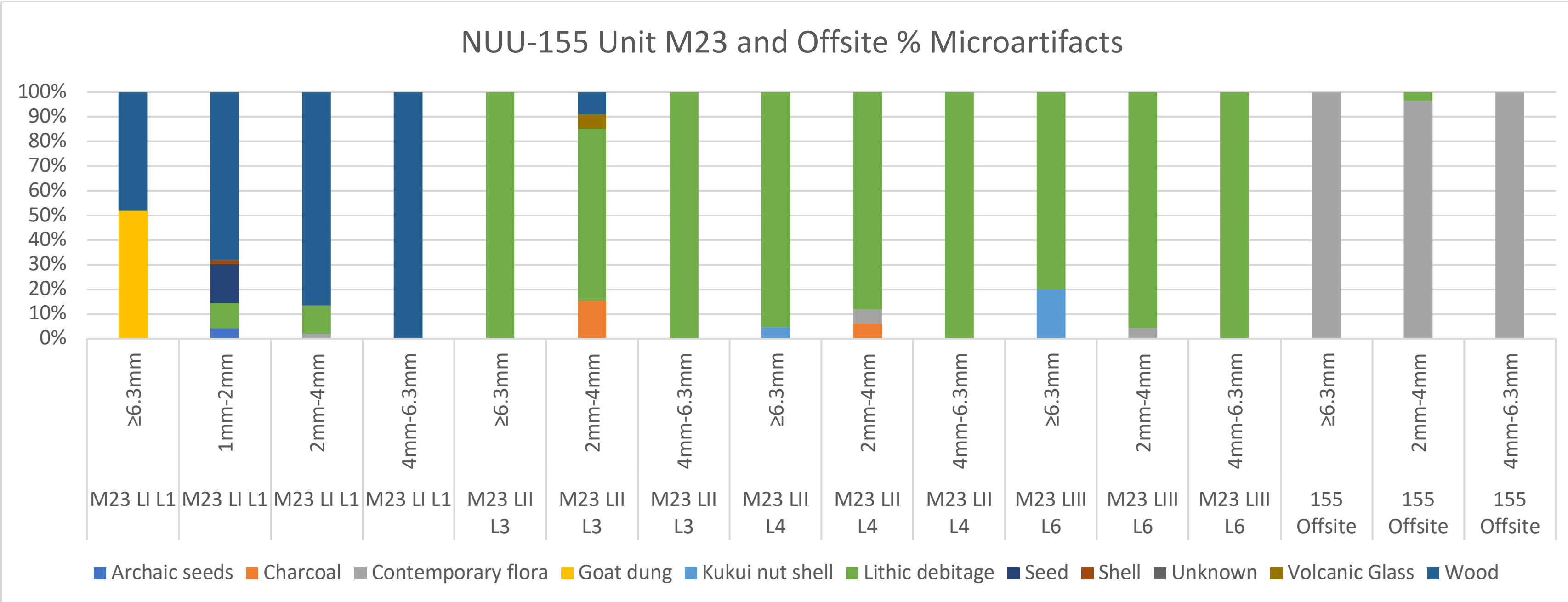


Figure 6.178: Graph of microartifact data from NUU-155.

Site/Layer/ Level/Sample	pH	% Organic Carbon	Particle Size Distribution <0.063	0.063	0.125	0.25	0.5	1	2	4	6.3
M23 LI L1 SS1	5.60	56.6143	8.18	28.12	44.88	57.44	62.54	64.76	66.92	70.18	101.60
M23 LII L3 SS1	5.23	31.3608	12.77	24.82	32.01	37.11	38.70	40.24	42.34	44.74	100.07
M23 LII L4 SS1	5.66		15.27	27.73	35.03	37.55	38.75	40.20	43.25	47.05	100.38
M23 LIII L6 SS1	5.86	22.8989	13.82	32.67	38.60	42.49	50.61		53.92	58.45	98.90
NUU155A BULK2 OS	5.50		11.80	31.84	54.38	77.76	90.86	97.10	99.44	100.52	101.22

Table 6.64: Sediment sample data from NUU-155.

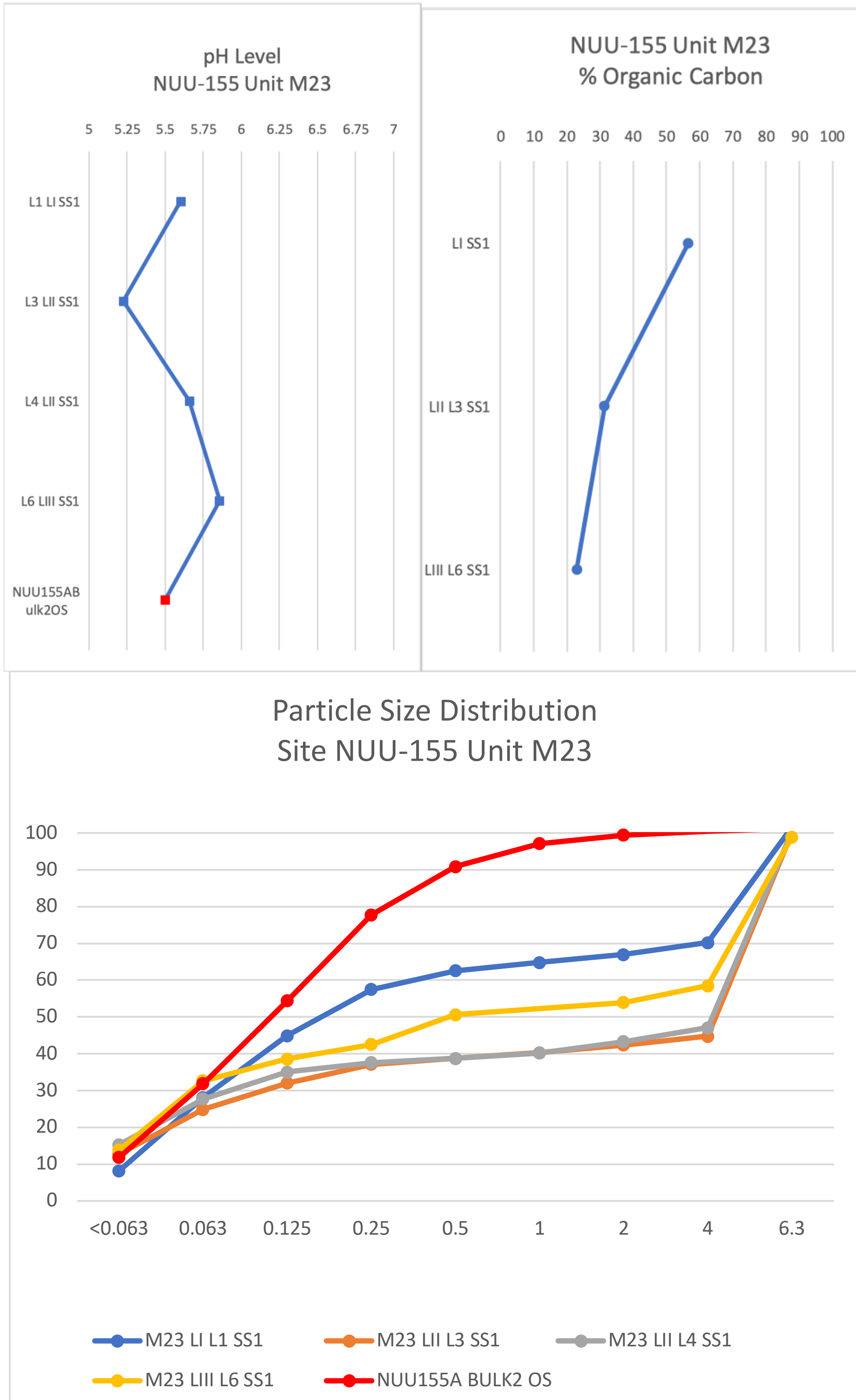
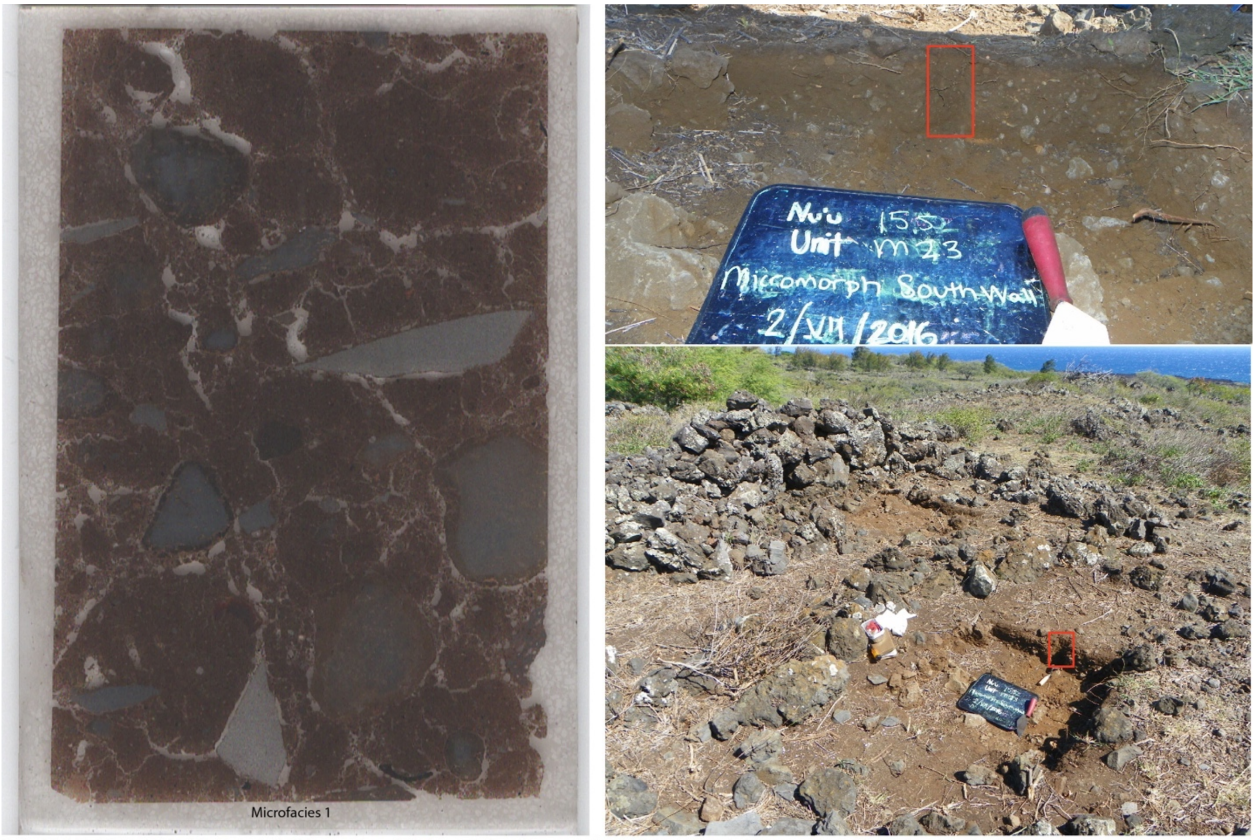


Figure 6.179: pH, LOI and particle size distribution data from NUU-155.

Micromorphology

The micromorphology sample from Unit M23 complimented the artifacts at the micro- and macro-scale, strengthening the interpretation of this space as a lithic workshop. The thin section made from sample NUU155M23MM1 only captured one layer due to the shallow nature of the excavation units at site NUU-155. Only one microfacies was observed in the thin-section slide as well. The structure of the matrix resembled sample NUU142O4MM1 macroscopically but microscopically appeared to have a different structure. The particle size distribution appeared polymodal with gravel-size coarse components evenly distributed throughout a matrix of fine material. The related distribution was identified as open, coarse enaulic with a moderately to weakly formed granular microstructure. The sediment is moderately sorted at all magnifications. Void space was an estimated 20-30% of the slide with channel voids (70% of voids), complex packing voids (20% of voids), and vughs (10% of voids). A mix of natural and anthropogenic material inclusions were observed. Weathered basalt with coarse grained irregular large minerals ranging in size from gravel to medium sand and rounded with high sphericity were observed alongside fine-grained angular basalt fragments that were identified as lithic flakes (some of these flakes are clearly visible in the slide scan pictured in Figure 6.179). Plant remains were rare but included long fibrous fragments and round dicot stems. Plant material was observed inside vughy and channel voids, which indicates modern roots. Channel voids are evidence of bioturbation, while the vugh voids with desiccated plant material may be modern or archaic. Other clearly anthropogenic inclusions that were recorded were sediment aggregates with micro-charcoal as well as silt-size micro-charcoal observed outside of sediment aggregates. Gravel-sized(> 2000 µm) size orange bone fragments were observed but rare. Evidence of weathering was present but limited. Coarse sand-size minerals (specifically olivine) exhibited limited pellicular and parallel linear weathering, while thin typic clay coatings (approximately 20µm thick) had formed around basalt fragments.



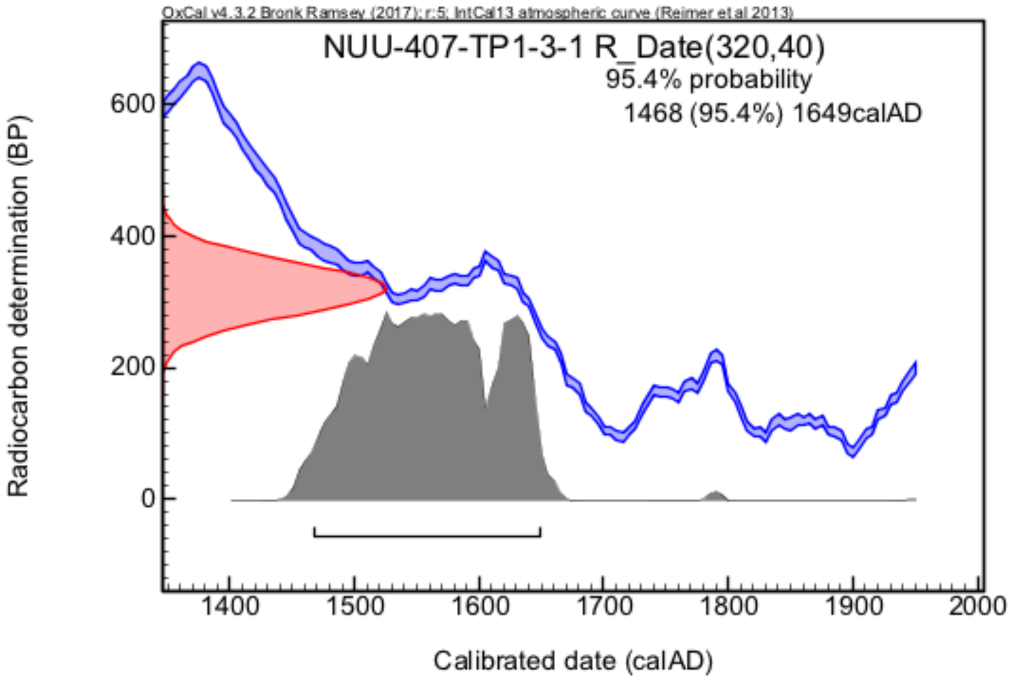
Left: NUU155M23MM1 Micromorph thin section slide. Top right: Photograph of NUU-155 Unit M23 south wall profile with the location of the micromorph sample outlined in red. Bottom right: Photograph of site NUU-155 units M23 (bottom) and O21 (top) with the location of micromorph sample NUU155M23MM1 outlined in red.

Figure 6.180: Thin section slide and photos of the location.

NUU-407, NUU-408, and NUU-408B

Two ridges to the southwest, past several lines of agricultural field embankments and smaller architectural features sits another kauhale that includes sites NUU-407, NUU-408 and NUU-408B. Features 407 and 408 resemble those recorded at site NUU-155, but the rectangular foundations face each other rather than away from one another. These two rectangular features were built on top of a promontory that drops off to the south and west, yet stretches gently up the slope of Haleakalā to the north. Site NUU-407 is the feature farthest to the south that overlooks the sprawling slopes of farmland below the natural outcrop on which the southern wall was built. This wall was constructed with courses of stone that is most impressive from below, with the thickest portion in the southwest corner. Below the eastern corner rests a small terrace built atop the steep sloping hillside. NUU-407 was built to open to the north facing NUU-408, which sits approximately 3m makai of NUU-407. While feature NUU-408 mirrors NUU-407, it is roughly half the size of the larger feature with significantly smaller walls as the feature does not rest on the cusp of the promontory, but rather on the broad level portion of the ridge that is today a grassy field dotted with bushes and koa haole trees.

Figure 6.181: Plane table map of NUU-407 and NUU-408



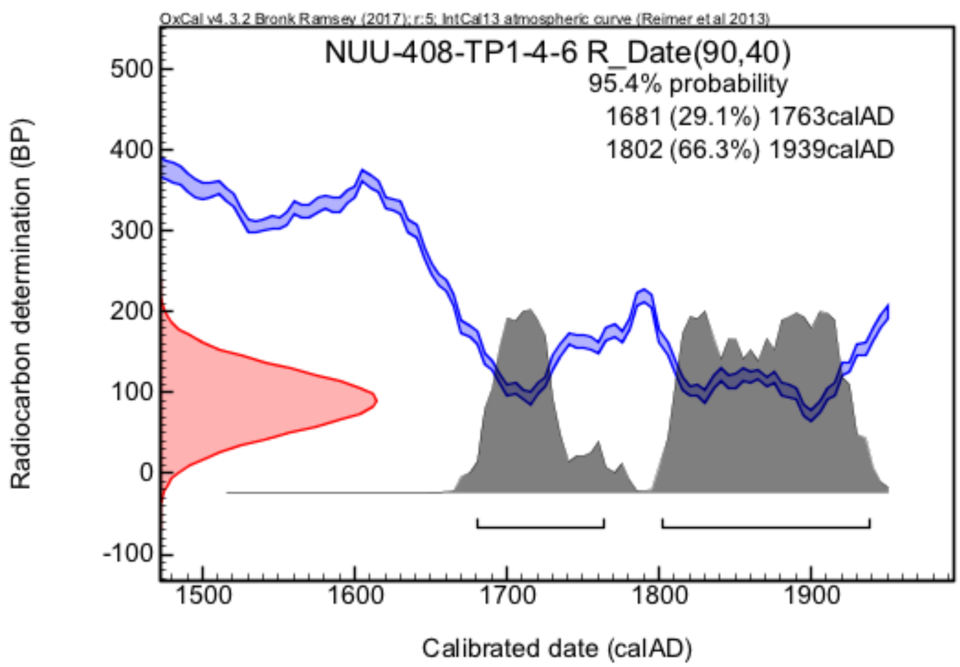


Figure 6.182: Calibrated radiocarbon date for NUU-407 and NUU-408

Fig. 1. Phytolith percentage diagram from Nu'u, Kaupo, Maui, Hawaiian Islands (+ = found after count).

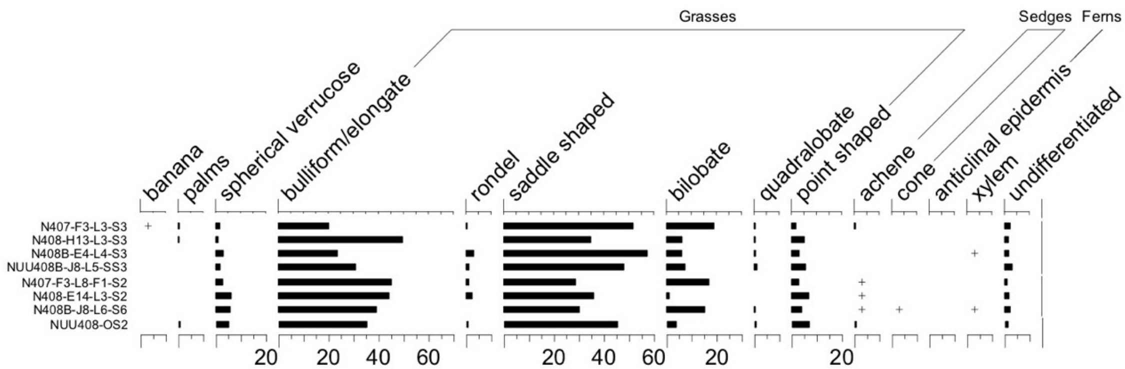


Figure 6.183: Phytolith data from NUU-155. Data provided by Mark Horrocks. Table adapted from Horrocks 2017 Lab Report.

Fig. 2. Starch and charcoal diagram from Nu'u, Kaupo, Maui, Hawaiian Islands (+ = small amount, ++ = large amount).

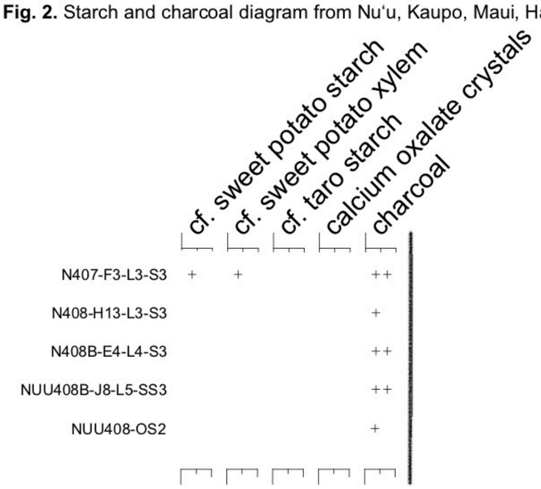
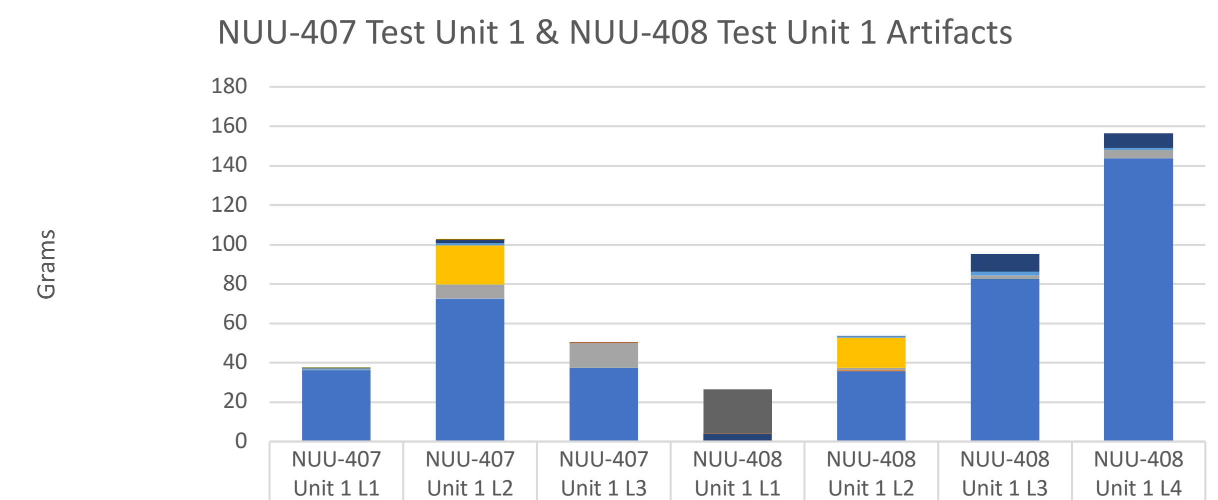


Figure 6.184: Starch data from NUU-155. Data provided by Mark Horrocks. Table adapted from Horrocks 2017 Lab report.

NUU-407

The test unit placed in NUU-407 in 2010 recovered a suite of artifacts typical of Nu'u kauhale. Charcoal and basalt flakes were recovered most frequently, but 'ili'ili, kukui nut, coral, and volcanic glass were also found in the cultural layer. I returned to NUU-407 in 2015 and excavated Unit F3. This excavation uncovered a combustion feature within the slope of a bedrock outcrop as pictured in Figure 6.184. This excavation also recovered a wider range of material than the initial test excavation, including a sea urchin file, mammal bone, and shell. Coral, shell, bone, charcoal, carbonized tuber, lithic debitage, and fire-cracked rock were also identified as microartifacts. Bone fragments in the microartifacts were found in the feature as was coral and the burnt tuber.

The sediment samples from NUU-407 show that the feature was associated with higher pH levels. Layer II was strongly acidic (corresponding with higher levels of organic carbon) while Layer III was moderately acidic and the feature reached slightly acidic. All the samples are considered organic but are increasingly less organic as depth increases. The level of organic carbon in the feature was the lowest of any samples. Granulometry showed that the amount of fine material increased with depth, starting at the level of the feature. The increased presence of fine material therefore appears to be directly associated with the increased presence of ash and charcoal dust. Increased levels of clay do not appear to have affected the levels of organic carbon, but the level of SOM was not measured for all the samples.



	NUU-407 Unit 1 L1	NUU-407 Unit 1 L2	NUU-407 Unit 1 L3	NUU-408 Unit 1 L1	NUU-408 Unit 1 L2	NUU-408 Unit 1 L3	NUU-408 Unit 1 L4
Volcanic Glass Flake		0.3					
Metal				22.1			
Manuport Shell	0.2		0.2	0.3			
Manuport Coral		1.6		4	0.2	8.9	7.6
Mammal bone	0.1						
Kukui nut shell	0.7	1.4			0.5	2.2	0.8
Ili'ili		19.9			15.5		
Charcoal	0.1	7.2	12.7		1.1	1.5	4.1
cf. egg shell					0.3		
Basalt Flake	36.3	72.5	37.3		35.9	82.6	143.9

Figure 6.185: NUU-407 Test Unit 1 and NUU-408 Test Unit 2 displayed by grams per context

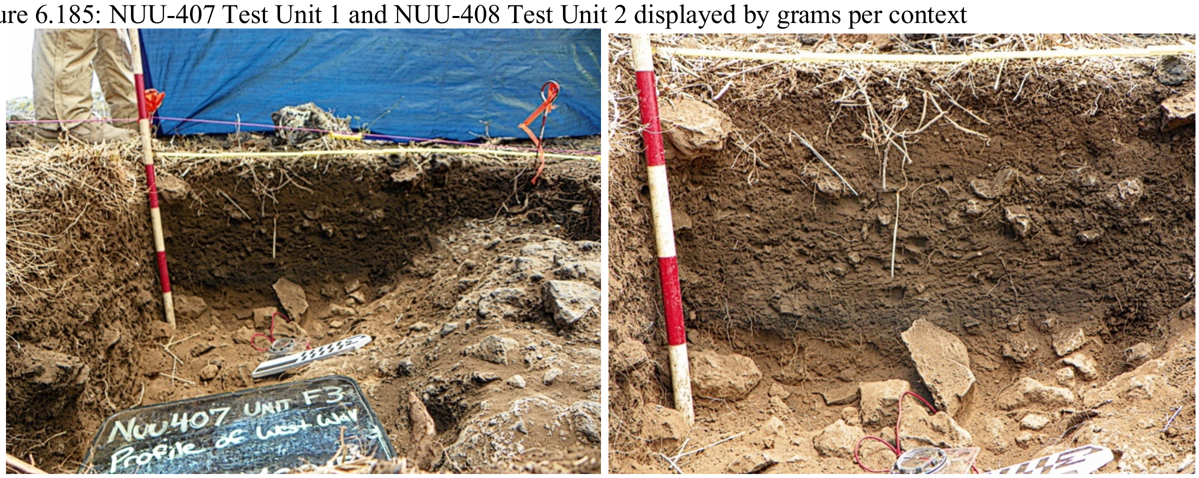


Figure 6.186: Photos of the west wall profile in NUU-407 Unit F3 with Feature 1 visible.

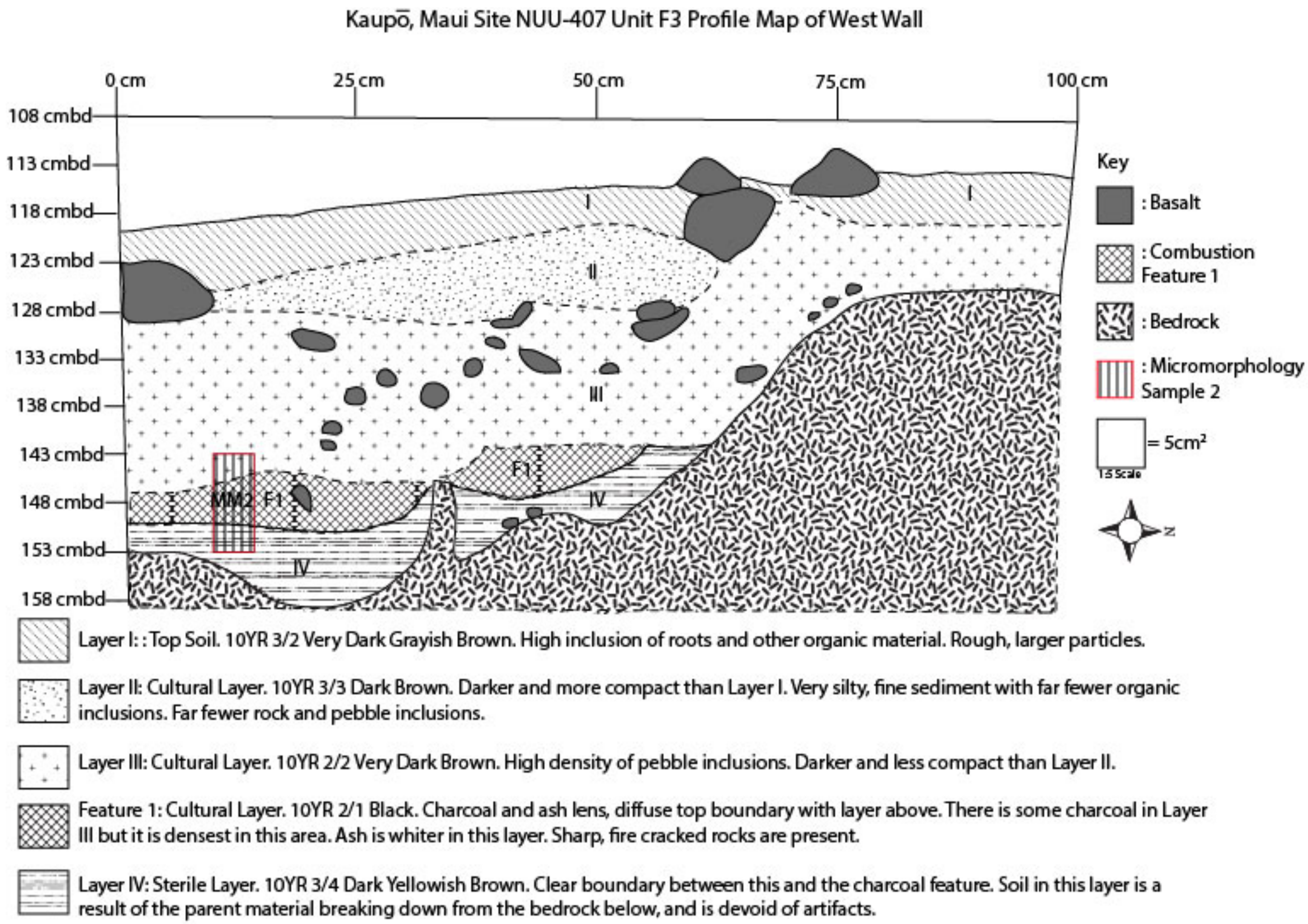


Figure 6.187: Profile map of the west wall in NUU-407 Unit F3.

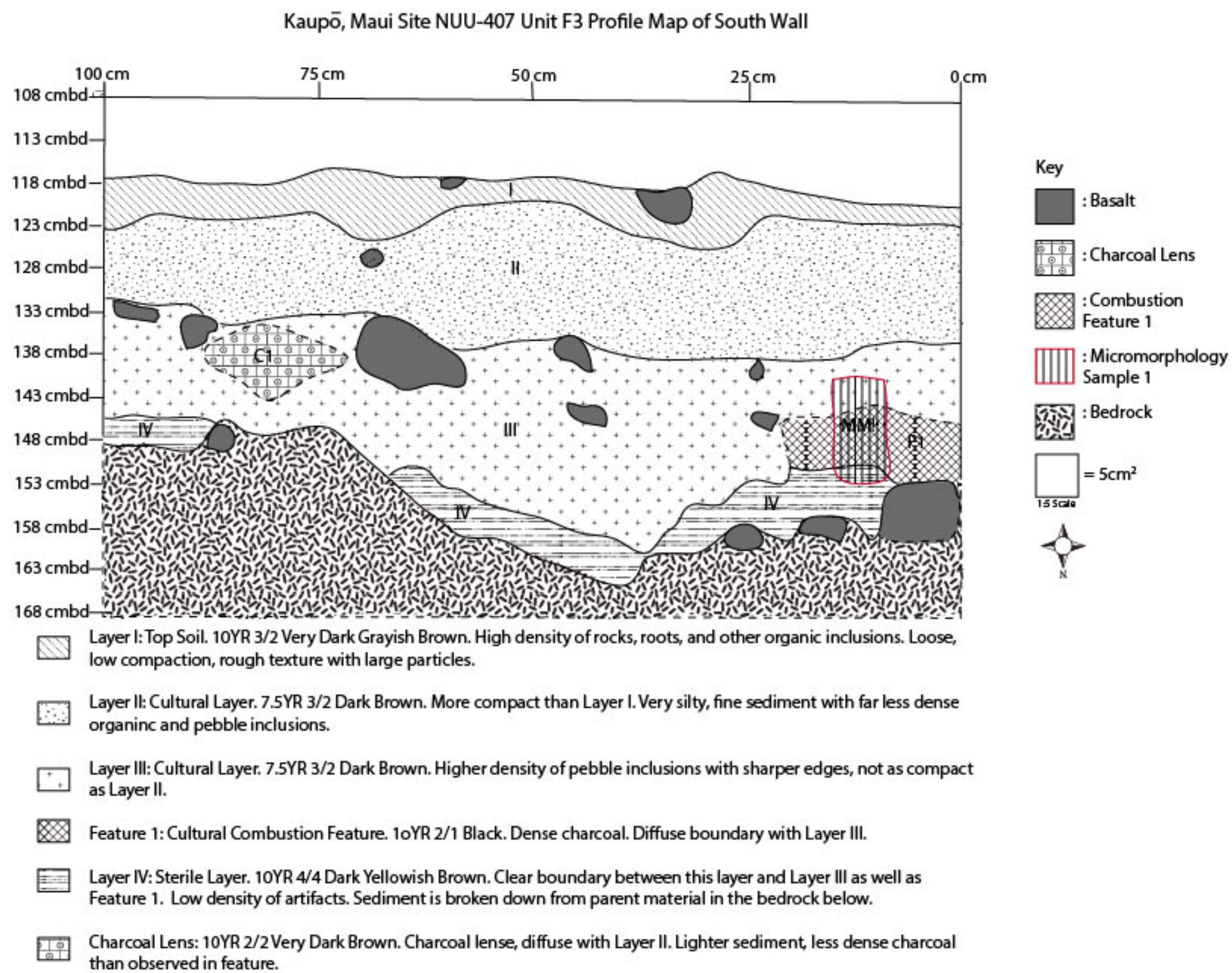
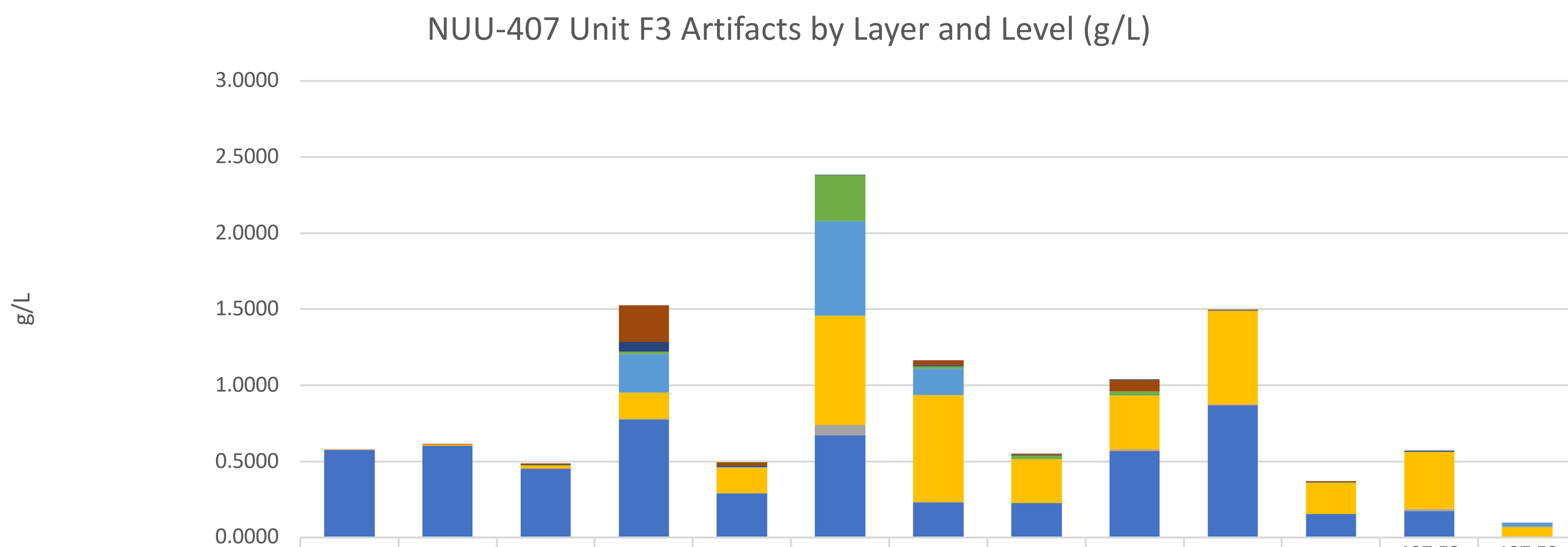


Figure 6.188: Profile map of the south wall in NUU-407 Unit F3.



	407 F3 LI L1	407 F3 LII L2	407 F3 LII L3	407 F3 LII L4	407 F3 LII L5	407 F3 LIII L6	407 F3 LIII L7	407 F3 LIII L8 F1	407 F3 LIII L8	407 F3 LIII L9 F1	407 F3 LIII L9	407 F3 LIV L10 F1	407 F3 LIV L11 F1
Volcanic Glass Core					0.0013								
Sea Urchin File									0.0056				
Raw Kukui Nut Shell		0.0043	0.0053	0.2428	0.0185		0.0339	0.0071	0.0736	0.0033	0.0070		
Shell			0.0056	0.0630	0.0079	0.0059	0.0078	0.0020		0.0036	0.0012	0.0071	
Coral			0.0004	0.0180		0.3011	0.0165	0.0261	0.0265		0.0018		
ʻIliʻili				0.2501	0.0066	0.6205	0.1698						0.0270
Charcoal		0.0052	0.0204	0.1747	0.1659	0.7195	0.7027	0.2882	0.3551	0.6164	0.2055	0.3779	0.0697
Carbonized Kukui Nut Shell				0.0014	0.0015	0.0679	0.0050	0.0003	0.0058	0.0042		0.0119	
Bone not worked	0.0066	0.0007	0.0010	0.0004			0.0020	0.0003	0.0053	0.0015			
Basalt Debitage	0.5740	0.6046	0.4529	0.7771	0.2899	0.6706	0.2286	0.2263	0.5671	0.8697	0.1552	0.1741	

Figure 6.189: NUU-407 Unit F3 graph of artifacts displayed as grams per liter of sediment excavated in each context

Unit	Feature	Layer	Level	NISP	MNI	Weight (g)	Scientific Determination
F3		II	3	1	1	0.78	Cypraea caputserpentis
F3		II	3	1	1	0.24	Drupa sp.
F3		II	3	5	1	0.15	Undetermined mollusk
F3		II	4	7	2	0.37	Undetermined mollusk
F3		II	4	8	1	0.19	Achatina fulica
F3		II	5	4	1	1.76	Undetermined mollusk
F3		III	6	1	1	0.41	Cypraea sp.
F3		III	6	10	1	0.17	Undetermined mollusk
F3		III	7	1	1	0.74	Undetermined mollusk
F3	F1	III	8	1		0.19	Drupa sp.
F3		III	8	5	1	0.54	Undetermined mollusk
F3	F1	III	9	4	4	0.11	Planaxis labiosa
F3		III	9	6	1	0.12	Undetermined mollusk
F3	F1	IV	10	1	1	0.21	Undetermined mollusk
F3	F1	IV	10	1	1	0.03	Undetermined mollusk

Table 6.65: NISP, MNI, Weight, and ID for shell and sea urchin in Unit F3

Unit	Feature	Level	Layer	Special	NISP	MNI	Weight (g)	Scientific Determination	Comments
F3		1	I		1	1	0.25	Undetermined fish	Fish teeth/jaw
F3		2	II		1	1	0.15	Undetermined fish	Fish teeth/jaw
F3		3	II		3	1	0.22	Scaridae	Three teeth
F3		4	II		1	1	0.09	Scaridae	Tooth
F3		7	III		2	1	0.16	Small mammal	NID fragments of cf. long bone
F3		7	III		1	1	0.03	Scaridae	Tooth
F3		8	III		4	1	0.51	Dog	Dog canine
F3	F1	8	III		4		0.03	general undetermined bone	Burnt bone fragments
F3	F1	9	III		3	1	0.05	Undetermined Mammal	NID fragments
F3				Wall Fall from Micromorph Sample	2	1	0.02	899-general undetermined bone	NID fragments

Table 6.66: Bone data for NUU-407 Unit F3

Unit	Layer	Level	Feature	Artifact Size	Item Type	Count	Weight (g)
F3	I	1		≥6.3mm	Contemporary flora	11	1.9597
F3	I	1		≥6.3mm	Lithic Debitage	1	1.3956
F3	I	1		2mm-4mm	Contemporary flora	0	5.3088
F3	I	1		2mm-4mm	Lithic Debitage	3	0.0436
F3	I	1		2mm-4mm	Terrestrial Gastropod	2	0.0118
F3	I	1		4mm-6.3mm	Contemporary flora	54	1.5002
F3	II	3		2mm-4mm	Charcoal	4	0.0235
F3	II	3		2mm-4mm	Contemporary flora	3	0.0171
F3	II	3		2mm-4mm	Lithic Debitage	4	0.0954
F3	II	3		4mm-6.3mm	Charcoal	1	0.0837
F3	II	3		4mm-6.3mm	Lithic Debitage	1	0.0792
F3	III	6		≥6.3mm	Contemporary flora	5	0.001
F3	III	6		≥6.3mm	Lithic Debitage	2	0.7757
F3	III	6		2mm-4mm	Charcoal	0	0.2695
F3	III	6		2mm-4mm	Contemporary flora	11	0.0329
F3	III	6		2mm-4mm	Lithic Debitage	22	0.527
F3	III	6		4mm-6.3mm	Charcoal	2	0.0478
F3	III	6		4mm-6.3mm	Lithic Debitage	5	0.4598
F3	III	7		0.5mm-2mm	burnt bone	1	0.001
F3	III	7		0.5mm-2mm	Charcoal		0.1083
F3	III	7		2mm-4mm	Charcoal		0.1177
F3	III	8	1	≥6.3mm	Lithic Debitage	3	3.2196
F3	III	8	1	2mm-4mm	Bone	1	0.0095
F3	III	8	1	2mm-4mm	Charcoal	10	0.2176
F3	III	8	1	2mm-4mm	Lithic Debitage	22	0.4844
F3	III	8	1	4mm-6.3mm	Lithic Debitage	3	0.3486
F3	III	8		≥6.3mm	Lithic Debitage	3	1.431
F3	III	8		2mm-4mm	Charcoal	17	0.1473
F3	III	8		2mm-4mm	Contemporary flora	14	0.075
F3	III	8		2mm-4mm	Lithic Debitage	13	0.3562
F3	III	8		4mm-6.3mm	Charcoal	1	0.0399
F3	III	8		4mm-6.3mm	Contemporary flora	2	0.0009
F3	III	9	1	≥6.3mm	cf. fire cracked rock	7	19.1989
F3	III	9	1	2mm-4mm	cf. burnt tuber	1	0.0089
F3	III	9	1	2mm-4mm	Charcoal	16	0.1522
F3	III	9	1	2mm-4mm	Contemporary flora	5	0.0068
F3	III	9	1	2mm-4mm	Coral	1	0.0095
F3	III	9	1	2mm-4mm	Fire cracked rock	31	0.5373
F3	III	9	1	4mm-6.3mm	Contemporary flora	2	0.001
F3	III	9	1	4mm-6.3mm	Fire cracked rock	9	0.8926
F3	III	9		≥6.3mm	Lithic Debitage	1	0.6522
F3	III	9		2mm-4mm	Charcoal	15	0.0932
F3	III	9		2mm-4mm	Contemporary flora	16	0.034
F3	III	9		2mm-4mm	Lithic Debitage	10	0.2003
F3	III	9		4mm-6.3mm	Contemporary flora	5	0.0053
F3	IV	11	1	≥6.3mm	Lithic Debitage	1	0.1624
F3	IV	11	1	2mm-4mm	Charcoal	1	0.0083
F3	IV	11	1	2mm-4mm	Contemporary flora	3	0.0042
F3	IV	11	1	2mm-4mm	Lithic Debitage	12	0.3157
F3	IV	11	1	4mm-6.3mm	Lithic Debitage	1	0.2396

Table 6.67: Microartifact data for NUU-407 Unit F3

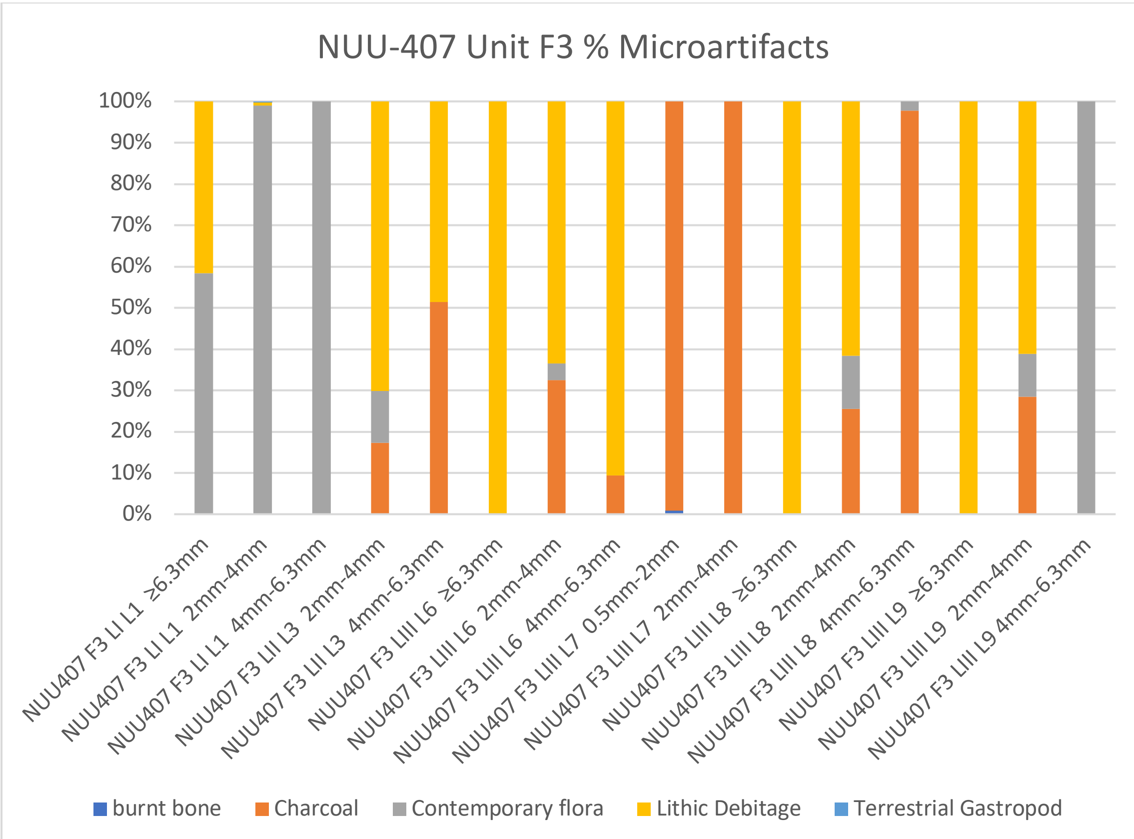


Figure 6.190: Graph of microartifact data from NUU-407 Unit F3

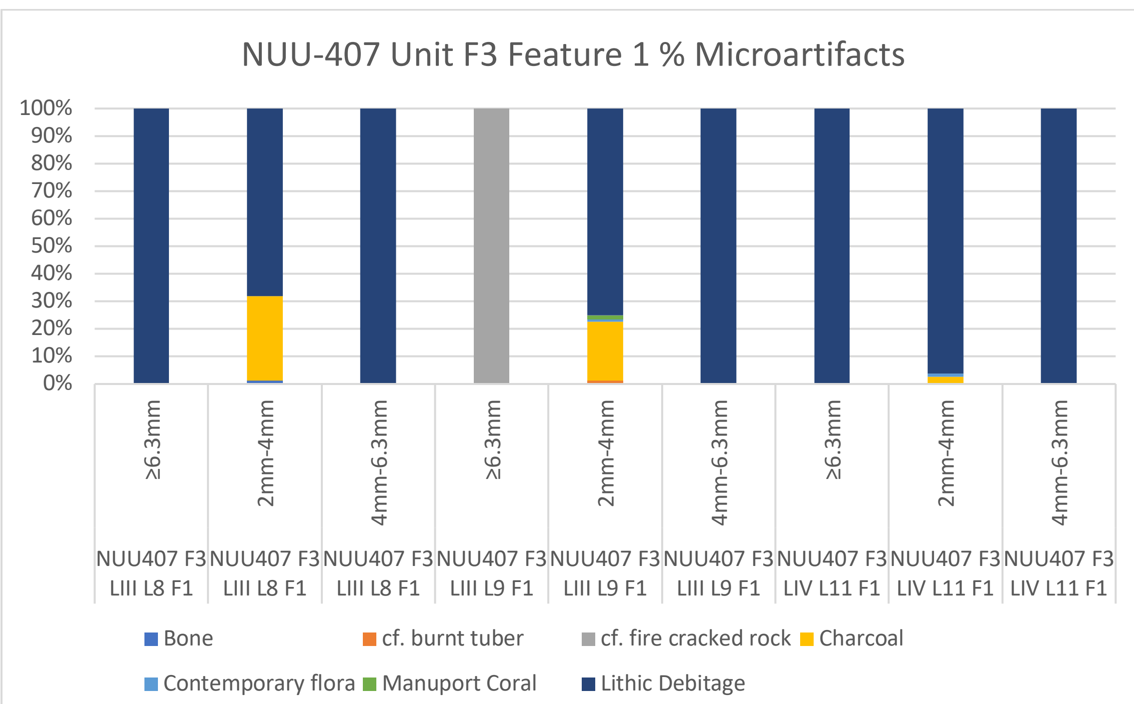


Figure 6.191: Graph of microartifact data from NUU-407 Unit F3 Feature 1

Site/Layer/ Level/Sample	pH	% Organic Carbon	Particle Size Distribution <0.063	0.063	0.125	0.25	0.5	1	2	4	6.3
F3 LI L1 SS1	6.17		1.52	5.4	11.6	20.24	31.7	48.1	64.8	76.94	100.74
F3 LII L3 SS1	5.45	28.4905	12.64	29.96	41.26	47.22	50.9	55.28	61.14	64.96	100.52
F3 LIII L6 SS1	5.79	29.0092	11.11	24.5	31.43	35.36	37.82	40.93	46.27	54.02	99.45
F3 LIII L7 SS1	5.66	24.1749	19.1	38.26	48.3	53.66	62.22		70.82	77.5	99.78
F3 LIII L8 F1 SS1	5.91	21.5725	22.86	40.6	51.66	56.86	60.3	64.64	72.32	80.12	99.9
F3 LIII L8 SS1	5.76		21.66	39.7	49.78	54.46	57.72	62.56	71.2	79.5	99.9
F3 LIII L9 F1 SS1	6.06		15.12	35.03	42.65	47.07	49.76	54.17	62.21	68.33	99.91
F3 LIII L9 SS1	5.71		21.22	39.88	50.18	56.4	61.5	68.16	78.64	90.28	100.34
F3 LIV L11 F1 SS1			19.04	38.94	48.42	53.34	56.78	60.78	66.42	75.66	99.14
NUU407/408 BULK2 OSN	6.04		6.06	14.17	19.44	21.16	21.94	22.83	23.65	25.43	100.38

Table 6.68: Sediment sample data from NUU-407 Unit F3.

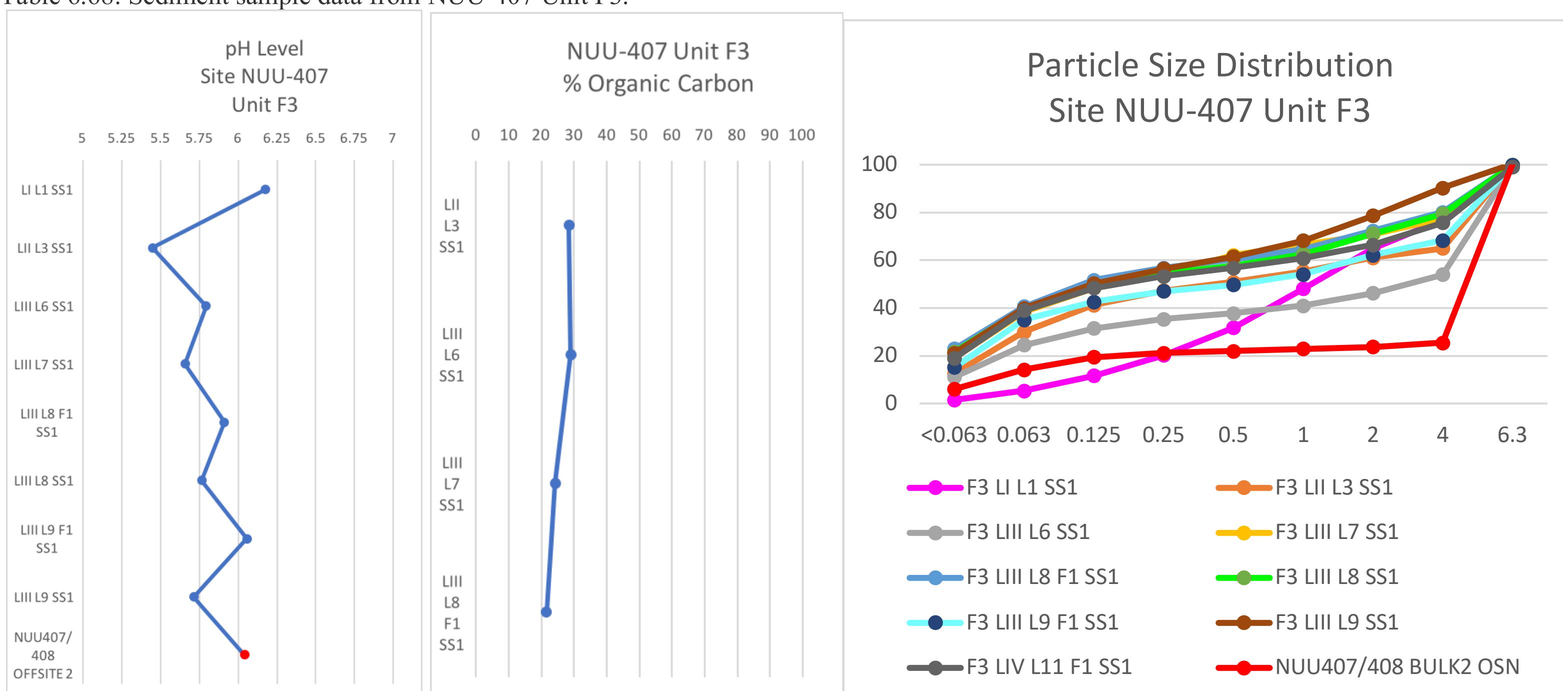


Figure 6.192: pH, LOI, and Particle Size Distribution data from NUU-407 Unit F3

Micromorphology

Two micromorphology samples were extracted from NUU-407 Unit F3. The resulting thin-sections are pictured below, but only one of these slides was analyzed due to time constraints. Both slides were included in Figure 6.192 for a general comparison, however. Sample NUU407F3MM1 was extracted from the south profile wall of NUU407 captured the transition from Layer III to Feature 1, and from Feature 1 to Layer IV (sample NUU407F3MM2 captured these same transitions on the west wall of the unit). Three microfacies were identified in the resulting thin section and described below.

Microfacies 1 was characterized by moderately sorted dark brown to black sediment that was poorly sorted and dominated by coarse material (80/20 c/f ratio). The related distribution was classified as single spaced fine enaulic with a moderately developed granular microstructure. The dominant coarse component was charcoal, but the largest coarse component was highly weathered (and potentially burnt) gravel-size basalt. This microfacies was compact with an estimated 15-20% of the microfacies occupied by voids. Complex packing voids were the dominant type, but vughs were also present. Charcoal dust was so common that it frequently obscured other features in the microfacies. Plant material was rare but present as fibrous yellowish-brown tissue. Basalt debitage associated with lithic working was observed, but the fragments were weathered gravel-size pieces that were randomly oriented and distributed. Th bottom of one large piece of angular basalt debitage (visible in Figure 6.194 below) delineated the lower boundary of microfacies 1. No other anthropogenic materials were observed that could evidence human activity. Anthropogenic sediment aggregates were present, however, characterized by a mixture of fine-grained burnt material and sediment in the granules. Pellicular weathering of basalt was observed (olivine was present but sparse and did not show evidence of such weathering). Thicker (approximately 43µm thick) typic clay coatings were present on gravel size basal and on minerals. Thinner clay coatings (roughly 10µm thick) were observed on smaller pieces of basalt.

The boundary between microfacies 1 and 2 was characterized as distinct and wavy under magnification, separated by banded basalt fragments. This microfacies is more compact and charcoal-rich than microfacies 1. The density of void spaces was estimated to be 5-10%. The dark sediment color and compactness of this context made the analysis difficult. Charcoal, the dominant coarse component, was also the most dominant component in the microfacies. The c/f ratio was estimated at 90/10 with a close fine enaulic related distribution and weakly developed granular microstructure. However, the dense charcoal and silty charcoal dust frequently made distinguishing between sediment granules and charcoal fragments difficult. Complex packing voids were the most dominant void type, but vughs were also observed (and visible in Figure 6.192 below). Plant material was present but rare, highly fragmented, and obscured by the charcoal inclusions. Anthropogenic deposits aside from charcoal were limited to basalt debitage which was clustered at the bottom of the bed. Pellicular weathering of basalt was visible, and typic clay coatings may have been present but the dark sediment made this identification uncertain. No other weathering or evidence of post-depositional processes were observed.

The boundary between microfacies 2 and 3 was distinct and wavy under magnification. The course and fine material were estimated to be evenly distributed in microfacies, with a c/f of

50/50. The related distribution was determined to be equal single-spaced enaulic with a moderately developed granular microstructure typical of Nuʻu sediments. Ash was observed to be denser in this microfacies compared with all other microfacies described from this and other thin-sections from Nuʻu sites, but would still be considered sparse. Charcoal was still the most dominant coarse component, but less dense than in microfacies 2. Charcoal fragments primarily fell within the very fine sand class size. Lithic debitage was sparse and grouped along the boundary with microfacies 2. Fibrous plant tissue was present but desiccated and rare. The tissue that was visible ran parallel to the bed. Basalt exhibited pellicular weathering and typic clay coatings. No infillings or other evidence of post-depositional processes were observed. The high density of charcoal in each of the microfacies and continued present of lithic debitage in microfacies 3 suggests that Layer III was not captured by the thin-section and instead microfacies 3 represents a thin transitional bed between Feature 1 and the sterile soil in Layer III.

Photograph of NUU-407 Unit F3 facing south with locations of micromorph samples outlined in red.

Figure 6.193: Photograph of NUU-407 with the location of the micromorphology samples marked in red.

NUU407F3MM1

NUU407F3MM2

Top Left: Photograph of NUU-407 Unit F3 profile of the south wall with the location of the micromorph sample NUU407F3MM1 outlined in red.
Top Right: Micromorph thin section slide NUU407F3MM1 with microfacies delineated.
Bottom Left: Photograph of NUU-407 Unit F3 profile of the west wall with the location of the micromorph sample NUU407F3MM2 outlined in red.
Bottom Right: Micromorph thin section slide NUU407F3MM2.

Figure 6.194: Thin section slides and corresponding location photos.

NUU-408

NUU-408 was also tested in 2010 (see Figure 6.183 for artifact data), which recovered coral and shell, ‘ili‘ili, kukui nut, charcoal, basalt flakes, a possible egg shell, and metal fragments. Returning to this area in 2015, I placed one unit on two separate terraces in 408 but recovered far fewer artifacts than were previously found. The few artifacts recovered from the terrace units included basalt, charcoal, unworked bone, coral and shell, kukui nut, and a metal fragment. The metal fragment, found approximately 15cm from the surface, was determined to be the blade of a pocket knife dating to the early to mid-19^{th} century which may indicate that this site was still in use at this late date, or that visitors to Kaupō left this knife behind. The other artifacts were found at such low density that it is difficult to determine the possible use of this space. Unit E14 Layer II produced the most evidence of activities through the microartifact record, in which bone, shell, charcoal and lithic debitage was recovered from the same sample.

The pH levels of the terrace unit cultural layers were strongly acidic and organic. These cultural layers were also dominated by coarse sand to gravel particles. The acidity combined with high organic content shows possible leaching of the soil combined with preservation of organic carbon.

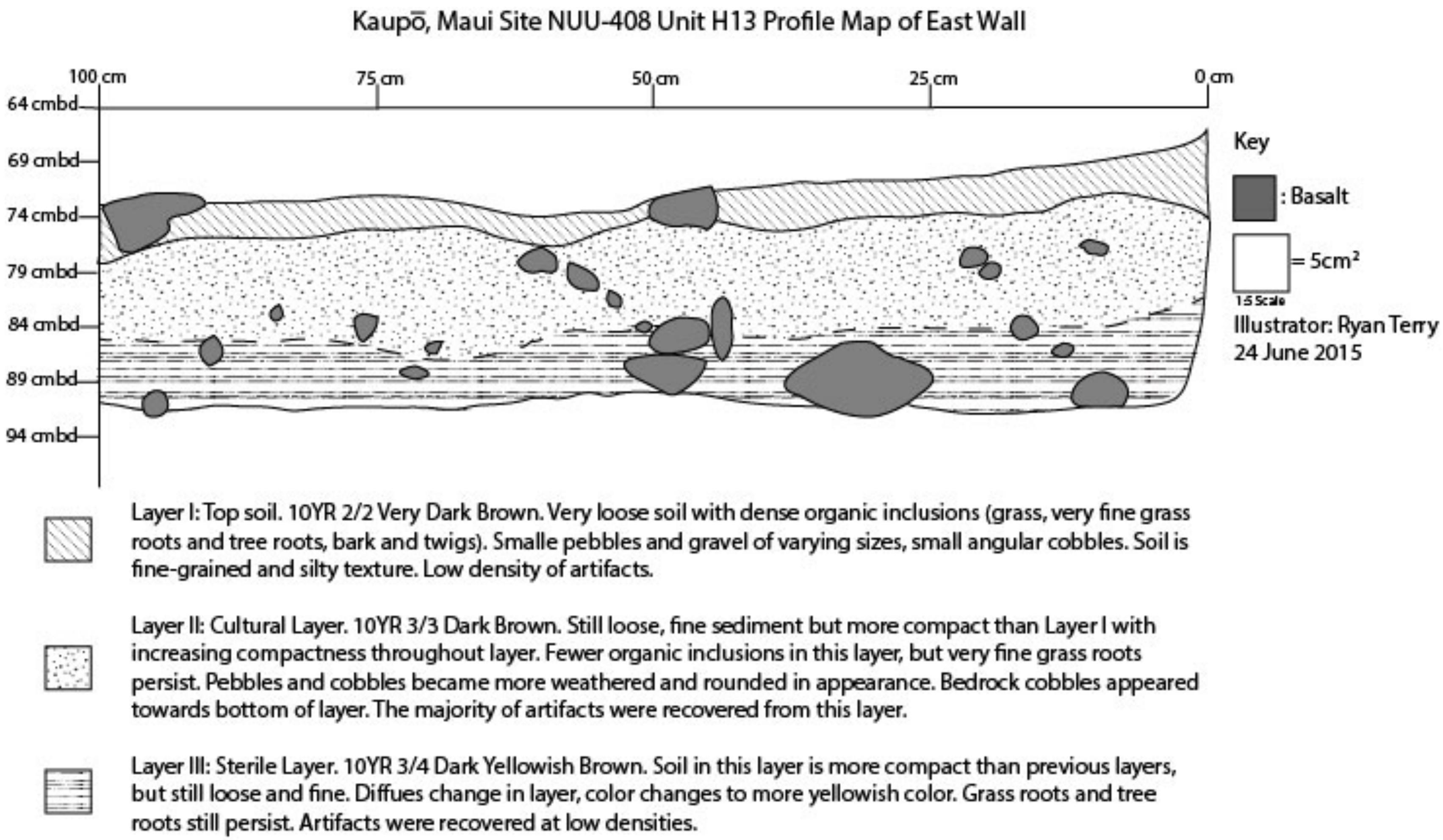


Figure 6.194: Profile map of the east wall in Unit H13 with context information.

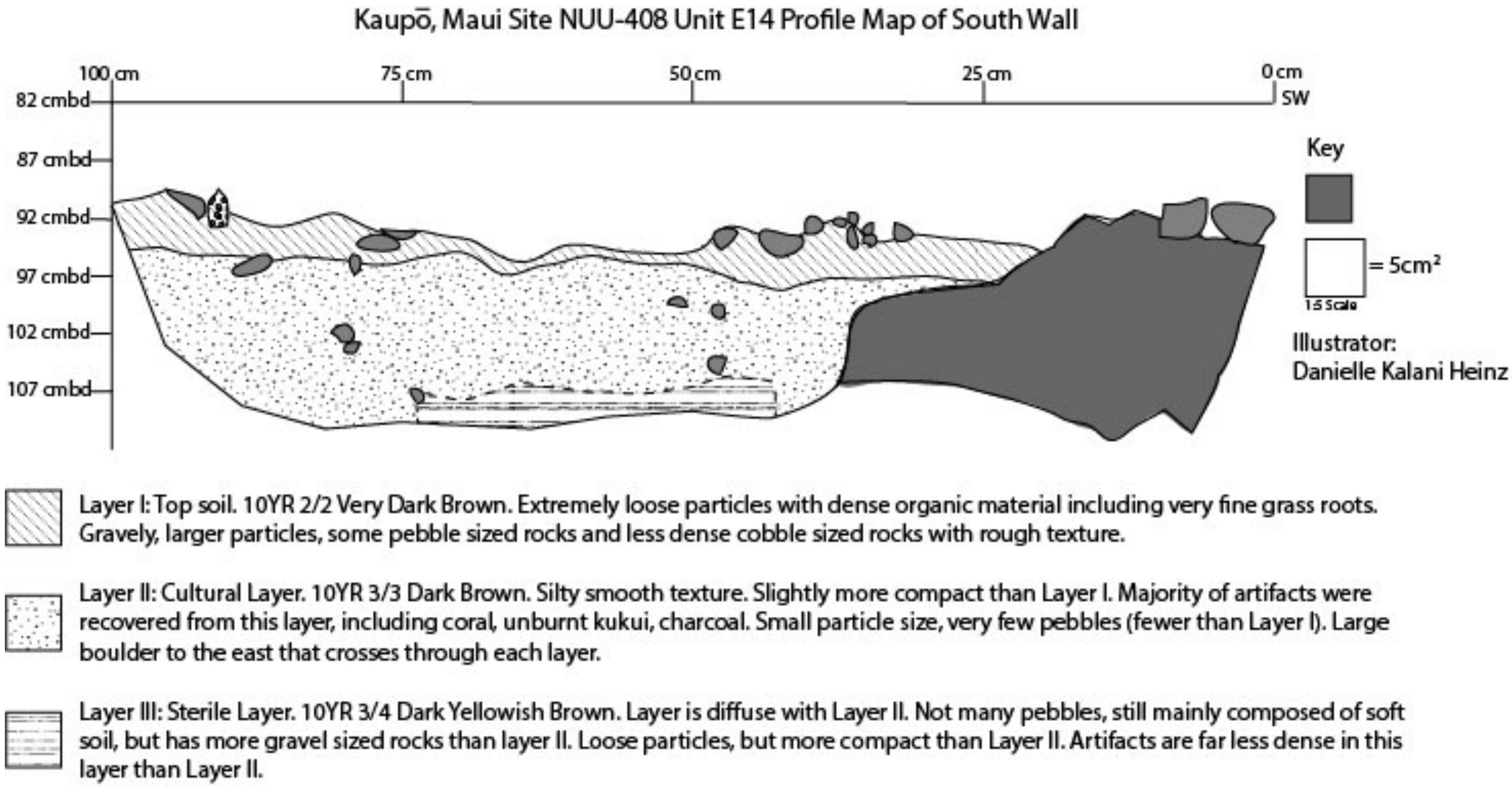
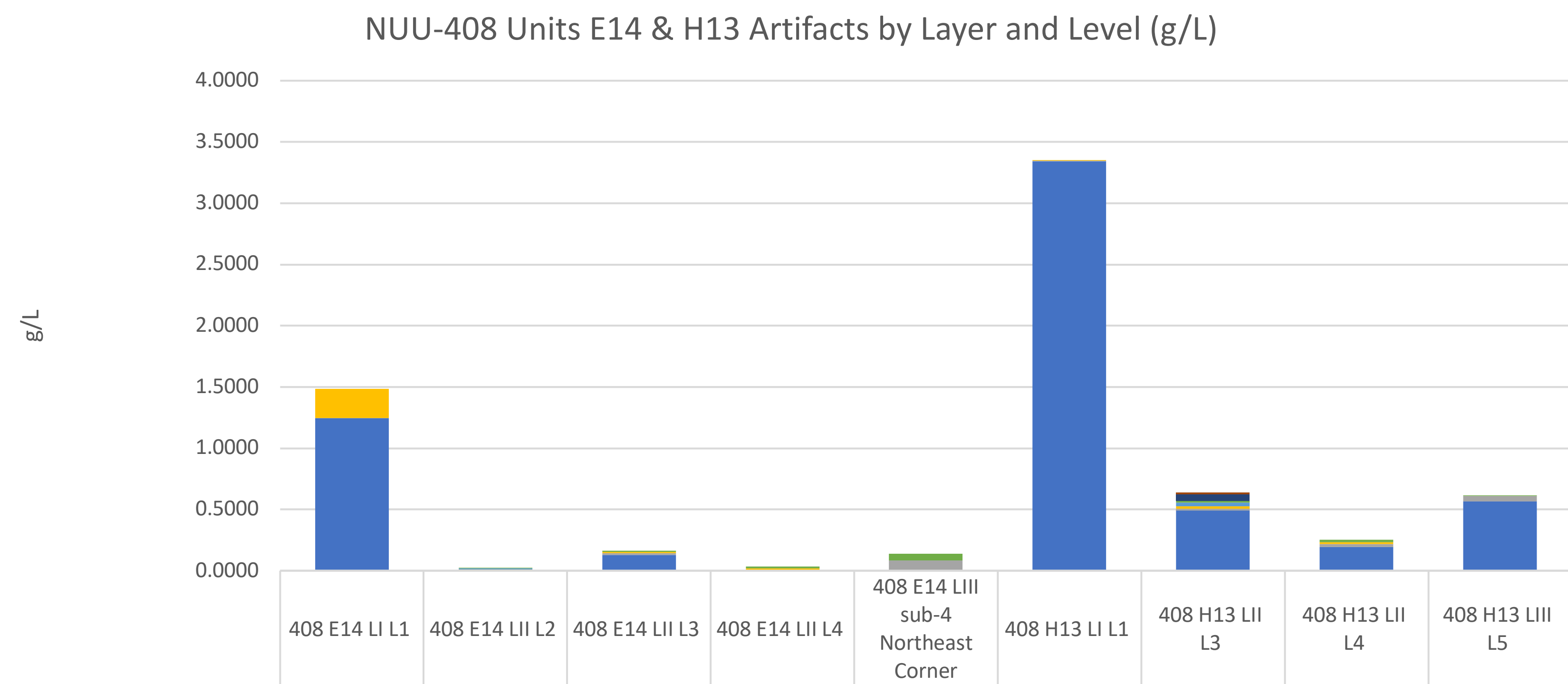


Figure 6.195: Profile map of the south wall in Unit E14 with context information.



	408 E14 LI L1	408 E14 LII L2	408 E14 LII L3	408 E14 LII L4	408 E14 LIII sub-4 Northeast Corner	408 H13 LI L1	408 H13 LII L3	408 H13 LII L4	408 H13 LIII L5
Water-rolled rock							0.0188		
Steel pocket knife blade							0.0539		
Raw Kukui Nut Shell		0.0063	0.0086	0.0165	0.0556		0.0126	0.0195	0.0049
Shell		0.0075					0.0314		
Coral	0.2380	0.0092	0.0138	0.0129		0.0026	0.0217	0.0146	
Charcoal		0.0006	0.0102	0.0063	0.0852	0.0037	0.0124	0.0249	0.0423
Bone not worked							0.0004		
Basalt Debitage	1.2464		0.1309			3.3444	0.4908	0.1936	0.5672

Figure 6.196: NUU-408 Units graph of artifacts displayed as grams per liter of sediment excavated in each context

Site	Unit	Layer	Level	Artifact Size	Item Type	Count	Weight (g)
NUU408	E14	II	3	0.5mm-2mm	cf. bone	8	0.01
NUU408	E14	II	3	0.5mm-2mm	Charcoal	5	0.0054
NUU408	E14	II	3	0.5mm-2mm	Shell	2	0.0009
NUU408	E14	II	3	0.5mm-2mm	Un ID/Wood	16	0.01
NUU408	E14	II	3	2mm-4mm	Lithic Debitage	1	0.03
NUU408	E14	II	3	4mm-6.3mm	Un ID/Wood	1	0.06
NUU408	H13	I	1	≥6.3mm	Contemporary flora	1	0.324
NUU408	H13	I	1	2mm-4mm	Contemporary flora	70	0.324
NUU408	H13	I	1	2mm-4mm	Lithic Debitage	3	0.0497
NUU408	H13	II	3	0.5mm-2mm	Charcoal	14	0.0064
NUU407/408	Offsite	North	0.5mm-1mm		cf. seed pods	5	0
NUU407/408	Offsite	North	0.5mm-1mm		Charcoal	3	0.0006
NUU407/408	Offsite	North	0.5mm-1mm		Contemporary flora	0	0.0135
NUU407/408	Offsite	North	0.5mm-1mm		Unknown Mineral	9	0.0079
NUU407/408	Offsite	North	0.5mm-1mm		Volcanic Glass	12	0.0085
NUU407/408	Offsite	North	1mm-2mm		Contemporary flora	117	0.0737
NUU407/408	Offsite	North	1mm-2mm		Insect feces	5	0.0064
NUU407/408	Offsite	North	1mm-2mm		Lithic Debitage	2	0.0016
NUU407/408	Offsite	North	1mm-2mm		Unknown Mineral	6	0.025
NUU407/408	Offsite	North	1mm-2mm		Volcanic Glass	1	0.0048
NUU407/408	Offsite	North	2mm-4mm		Contemporary flora	13	0.0972
NUU407/408	Offsite	North	4mm-6.3mm		Contemporary flora	6	0.3063

Table 6.69: Microartifact data for NUU-408 Units with offsite comparison.

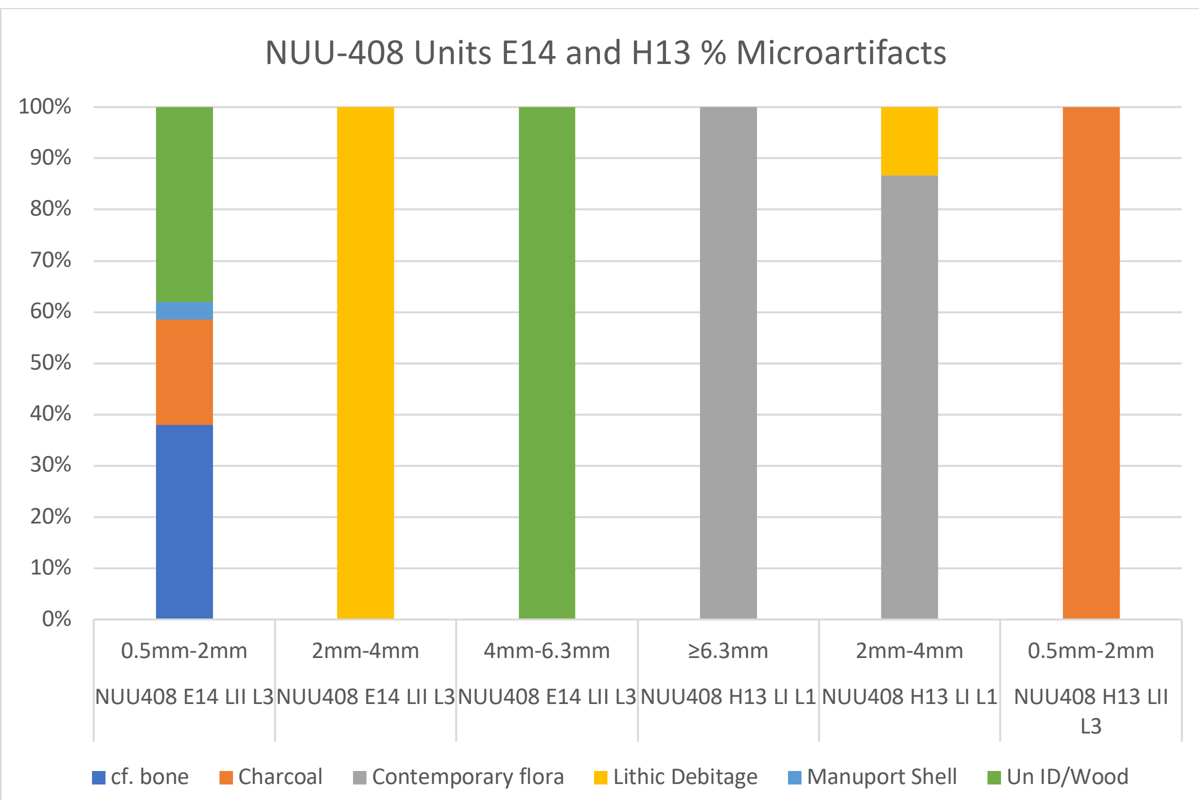


Figure 6.197: Graph of microartifact data from NUU-408 Units

Site/Layer/ Level/Sample	pH	% Organic Carbon	Particle Size Distribution								
			<0.063	0.063	0.125	0.25	0.5	1	2	4	6.3
E14 LII L3 SS1	5.2	23.8865	13.02	22.94	31.06	34.84	38.24		40.62	47.94	99.18
H13 LI L1 SS1	5.99		15.76	39.42	63.32	78.2	84.38	89.78	95.32	96.36	100.6
H13 LII L3 SS1	5.07	35.2982	8.85	26.37	41.57	50.6	61.07		67.09	71.69	99.79
NUU407/408 BULK2 OSN	6.04		6.06	14.17	19.44	21.16	21.94	22.83	23.65	25.43	100.38

Table 6.70: Sediment sample data from NUU-408 units.

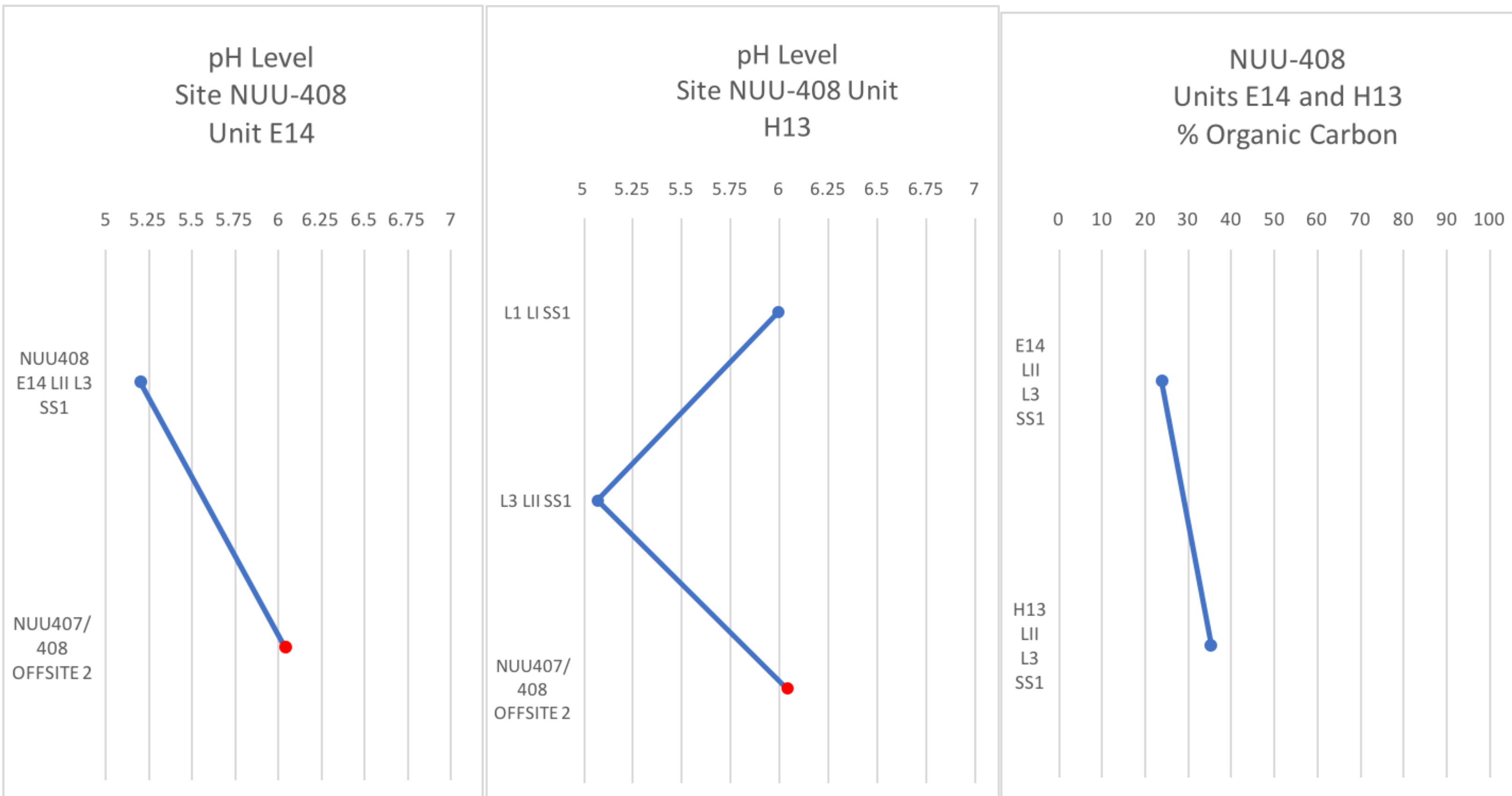


Figure 6.198: pH and LOI data for NUU-408 Units.

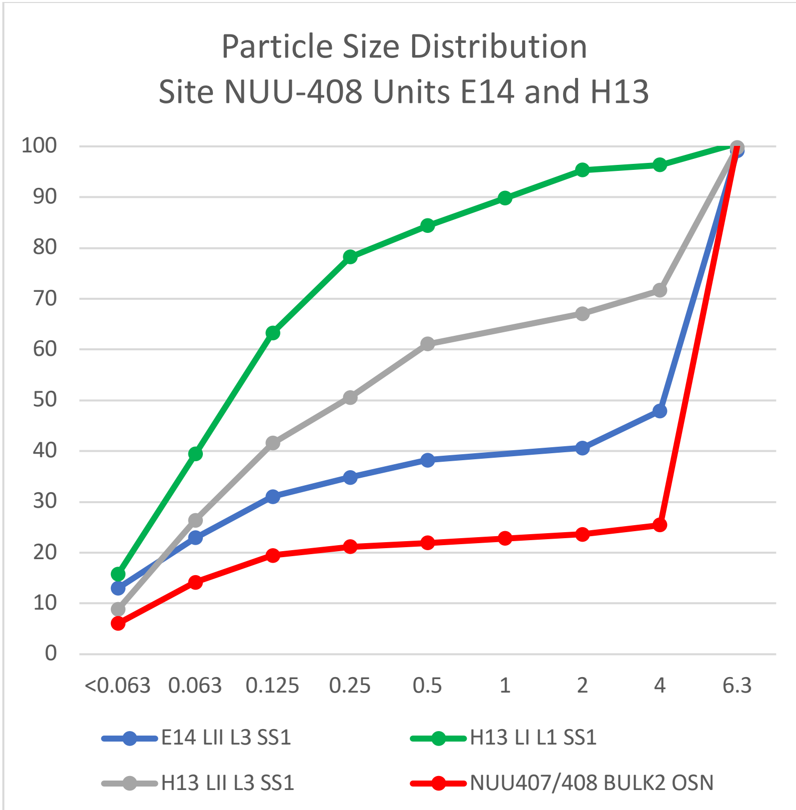
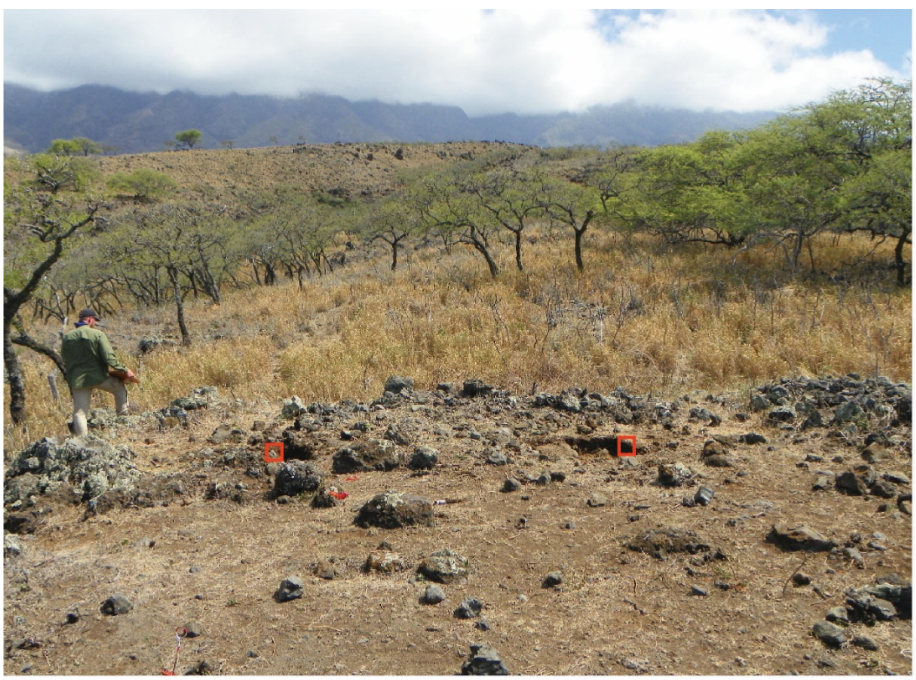


Figure 6.199: Particle size distribution data for NUU-408 units.



Photograph of NUU-408 with units H13 (right) and E14 (left), and location of the micromorph samples NUUH13MM1 (right) and NUUE14MM1 (left) marked in red.

Figure 6.200: Photograph of NUU-408 with location of micromorphology samples highlighted.

Micromorphology

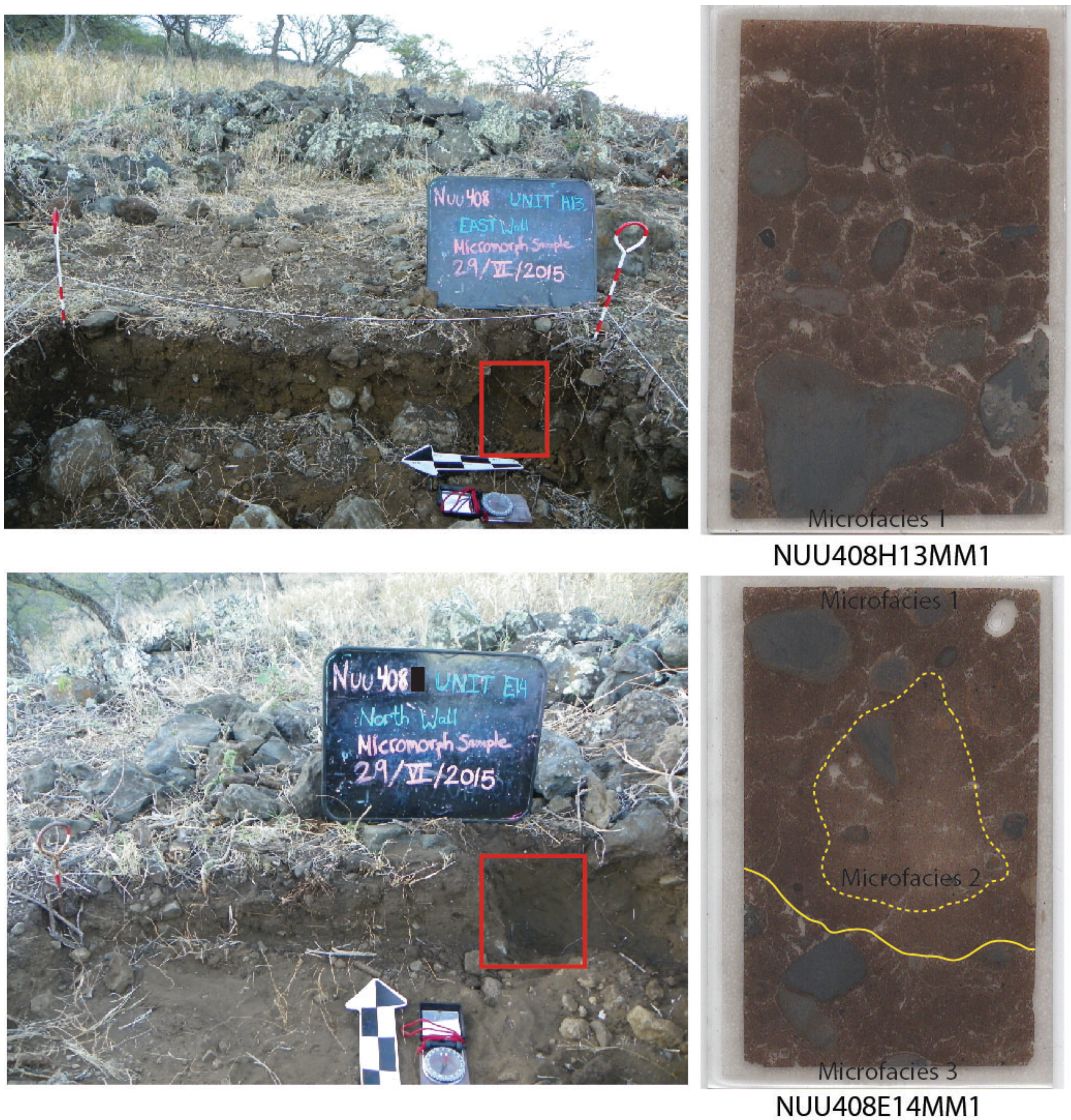
One micromorphology sample was extracted from the east profile of Unit H13 in the southeast corner where the depth of the unit and less dense gravel made the extraction of a sample possible. Although I attempted to capture the transition from cultural sediment to sterile soil with sample NUU408H13MM1, only one microfacies was visible in the thin-section cut from the sample. This microfacies exhibited polymodal particle sizes with moderately sorted gravel-size basalt fragments surrounded by a bed of moderately sorted fine material. The related distribution was determined to be double-spaced, fine enaulic with a moderate granular non-porous microstructure. Channels were the dominant type of void, but complex packing voids and vughs were also present. In total, voids were estimated to comprise 20-25% of the space in this compact microfacies. As previously stated, gravel-size rounded and sub-rounded basalt fragments were distributed throughout, but mostly clustered toward the bottom of the microfacies. Interspersed with the more weathered, worn basalt were angular fragments determined to be lithic debitage within the fine-gravel size class. Straw-like fibrous plant material was also observed but rare. Along with the lithic debitage, other anthropogenic inclusions recorded were burnt bone fragments and charred organic material (very fine to fine sand size), both sparsely observed. Weathering of the deposit was evidenced in the typic clay coatings forming on basalt and charcoal inclusions, and pellicular weathering of basalt and minerals, as well as cross linear weathering of olivine minerals. Termite feces were also observed in the desiccated plant material.

One micromorphology sample was also extracted for analysis from the north wall of Unit E14. The location of sample NUU408E14MM1 was also dictated by the depth of the unit and density of gravel in the profile walls. This sample captured the transition between Layer II (anthropogenic sediment) and Layer III (sterile soil). Three microfacies were identified on the thin-section and are described here.

Microfacies 1 was characterized by bimodal distributions of gravel-size basalt and silt to fine sand size material. The related distribution was classified as single spaced open enaulic with a moderately granular microstructure. Channel and complex packing voids dominate, but vughs are also present. The density of void spaces was estimated at 10-15%. Angular gravel-size basalt with low sphericity was the most common coarse component, olivine minerals were also observed but unusually rare (which may evidence that the basalt is not as deteriorated here as at other microfacies that were analyzed). None of the angular basalt fragments were determined to have resulted from lithic work. Plant remains that were observed were heavily desiccated but some still exhibited internal characteristics. Pockets of charcoal and silt-size ash deposits were observed but rare. Extensive weathering of the inclusions was evident, including pellicular and irregular weathering of olivine, and typic clay coatings (approximately 17µm thick) forming around plant material. Post-depositional processes were evidenced by loose, discontinuous infilling of channel voids.

Microfacies 2 was an irregular feature in that it was completed encompassed by microfacies 1. Microfacies 1 and 2 shared a diffuse and occluded boundary. This type of feature is observed in two other thin-section slides from the Nuʻu sites, NUU2R10MM1 and NUU2R5MM2. While the similar feature in NUU2R10MM1 was determined to be an artifact of the slide-making process, Microfacies 2 in both NUU2R5MM2 and NUU408E14MM1 were determined to be real features in the sediment captured by the slide. Microfacies 2 in sample NUU408E14MM1 was distinguishable by the lighter color of the sediment and well-sorted nature of the deposit. The coarse/fine ratio was estimated to be 5/95 with a double spaced enaulic related distribution and strong granular microstructure. Complex packing voids are the dominant void type, with vughs and channels sparsely present. The few channel voids present ran parallel to the bedding in a perpendicular orientation. In total, void spaces were present at an estimated density of 15-20% in this compact deposit. The basalt inclusions are the most dominant component, as seen in the other microfacies in this thin-section, but are distributed along the outer edge of microfacies (similar to the bounding of NUU2R5MM1 Microfacies 2 by sediment peds). The basalt along the edges of the deposit was gravel-size, with other medium sand size and smaller rounded fragments randomly distributed throughout the deposit. Charred remains were sparsely observed (7-10% of deposit) and were mostly fine sand size inclusions. No additional anthropogenic materials were observed. Weathering was observed in this deposit through the pellicular and cross-linear patterns on the olivine minerals. Typic clay coatings were also observed, but thinner (9µm) and less frequent than in microfacies 1. Post-depositional processes that were observed were limited to loose, discontinuous infilling of channel void spaces.

Microfacies 3 shared a diffuse upper boundary with microfacies 1 and did not share a boundary with microfacies 2. This microfacies is characterized by its reddish-brown color, well-sorted matrix, and denser groundmass than microfacies 1. Microfacies 3 is a combination of the characteristics observed in the other two microfacies described above. Similar to microfacies 1, microfacies 3 has gravel-size basalt inclusions and dark sediment. The fine material, however, shares characteristics with microfacies 2 in that it is more compact with complex packing voids representing the most common type of void. The c/f ratio of microfacies 3 was estimated to be 10/95 with a related distribution of double spaced enaulic and a weak granular microstructure. While the inclusions are oriented randomly, they are clustered towards the bottom corner of the context. The basalt inclusions are characterized by low-sphericity and are subrounded. None of the basalt inclusions were determined to be a result of lithic working. The only anthropogenic material observed was very fine to fine sand size charred remains in moderate amounts (10-15% of the microfacies). Plant remains were rare and observed to be desiccated, dark yellowish brown and fibrous. Some fibrous material was observed in channel voids, but plant material also was present outside of these voids. Heavy pellicular and cross-linear weathering of the basalt and olivine inclusions was observed, but clay coatings were limited and not fully formed on basalt inclusions. Loose discontinuous infilling of voids was observed.



Top Left: Photograph of NUU-408 Unit H13 profile of the east wall with the location of micromorph sample NUU408H13MM1 outlined in red.
Top Right: Thin section from micromorph sample NUU408H13MM
Bottom Left: Photograph of NUU-408 Unit E14 profile of the north wall with the location of micromorph sample NUU408E14MM1 outlined in red.
Bottom Right: Thin section from micromorph sample NUU408E14MM1.

Figure 6.201: Thin section slides pictured with corresponding photos of the locations in the units.

NUU-408B

Two terraces form steps down the side of the steep slope to the west, both outlined in stone and open to the south. From the top of this kauhale, the features appear small and unassuming, gazing out over the ocean and surrounding fields. However, from below the steep bedrock outcropping along the southern and western edges, the multiple courses of stone built up the cliff face form an impressive wall. To the west of the elevated features, site NUU-408B are also visible. This portion of the kauhale is composed of three large terraces supported by lines of basalt boulders along their western edges and tucked against the cliff face of the outcrop to the east. A small C-shape feature was built on top of one of these terraces. Below the terraces are rows of agricultural field system embankments running along the swale to the next promontory to the west. Tucked within the fields in the swale to the west are smaller architectural features that resemble the C-shape built on top of the terraces of NUU-408B.

Unit E4 was placed in the C-shaped structure on the terrace. This unit was initially hypothesized to be an oven house or storage house due to the shape and size of the architectural feature and the location next to the agricultural ridges to the west and the kauhale to the east. Evidence of a combustion feature was not found, but low densities of shell and coral, basalt debitage, unworked bone, raw kukui nut shell, and volcanic glass debitage were recovered. Charcoal was present, but was so limited that it was not considered to be consistently produced in this location. The small about of charcoal identified in the microartifacts supports this observation. The most unique characteristic for this site was the amount of volcanic glass flakes and debitage recovered from this feature. Volcanic glass was also a common microartifact recovered.

The sediment in E4 can be described as strongly acidic to moderately acidic. The organic carbon for Layer II Level 2 is extraordinarily high but this level is also close to the surface so may be affected by modern plant litter on the surface. The location of site NUU-408B against the face of the large outcrop protects this area from the harsh winds and other erosional events that affect other sites so the leaf and plant litter remained in situ. This protection from erosion is also supported by the unusually high level of organic material seen in Layer I. The particle size distribution of the Unit E4 contexts shows a bimodal distribution of the cultural contexts, with particles finer than very fine sand and coarser than medium pebbles dominating the deposit. These deposits differ from the topsoil and the offsite comparison, which are both dominated by pebbles.

Unit J8 produced a variety of artifacts at low densities. Ash deposits were uncovered that were randomly situated throughout the unit. Charcoal, bone, shell and sea urchin were found together in the ash lenses. Invertebrate and mollusk, particularly sea urchin test and *Planaxis labiosa* were found at unusual densities outside of the ash lenses. Possible bird bone and a dog's tooth were also recovered from outside of the ash lens.

The sediment profile for the cultural contexts in Unit J8 shows that the samples were neutral, making this unit that with the consistently highest pH of any excavated for this project. While the sediment is considered organic, the organic matter decreased with depth which may account for the age of the deposits as the pH remains relatively stable throughout the deposit. The granulometry shows a dominance of silt and clay to very fine sand for the majority of the deposits. The deposits dominated by coarse sand to gravel were collected from areas outside of the ash deposits, and from the sterile C horizon.

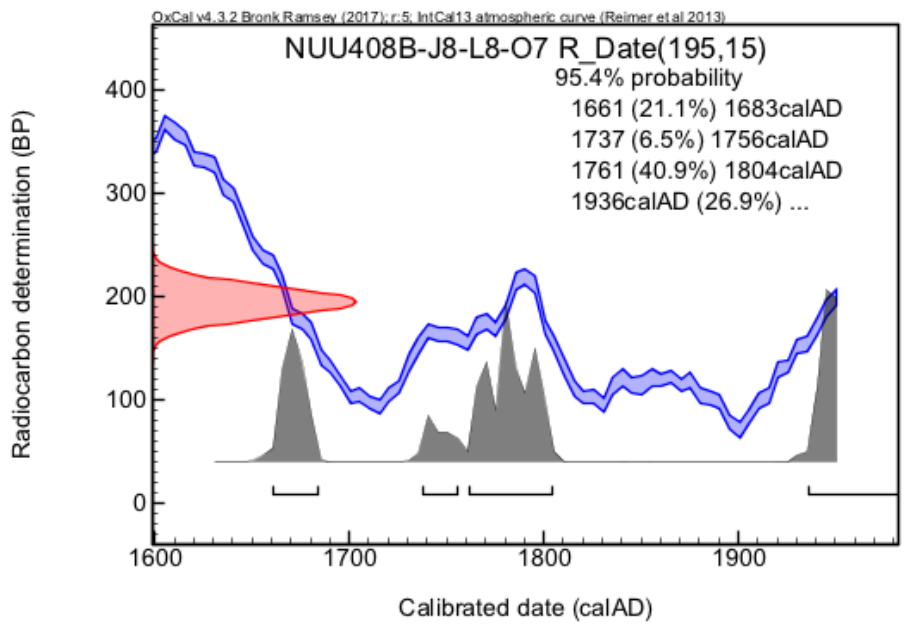


Figure 202: Calibrated radiocarbon date for NUU-408B

Figure 6.203: Plane table map of NUU-408B and the location of the units.

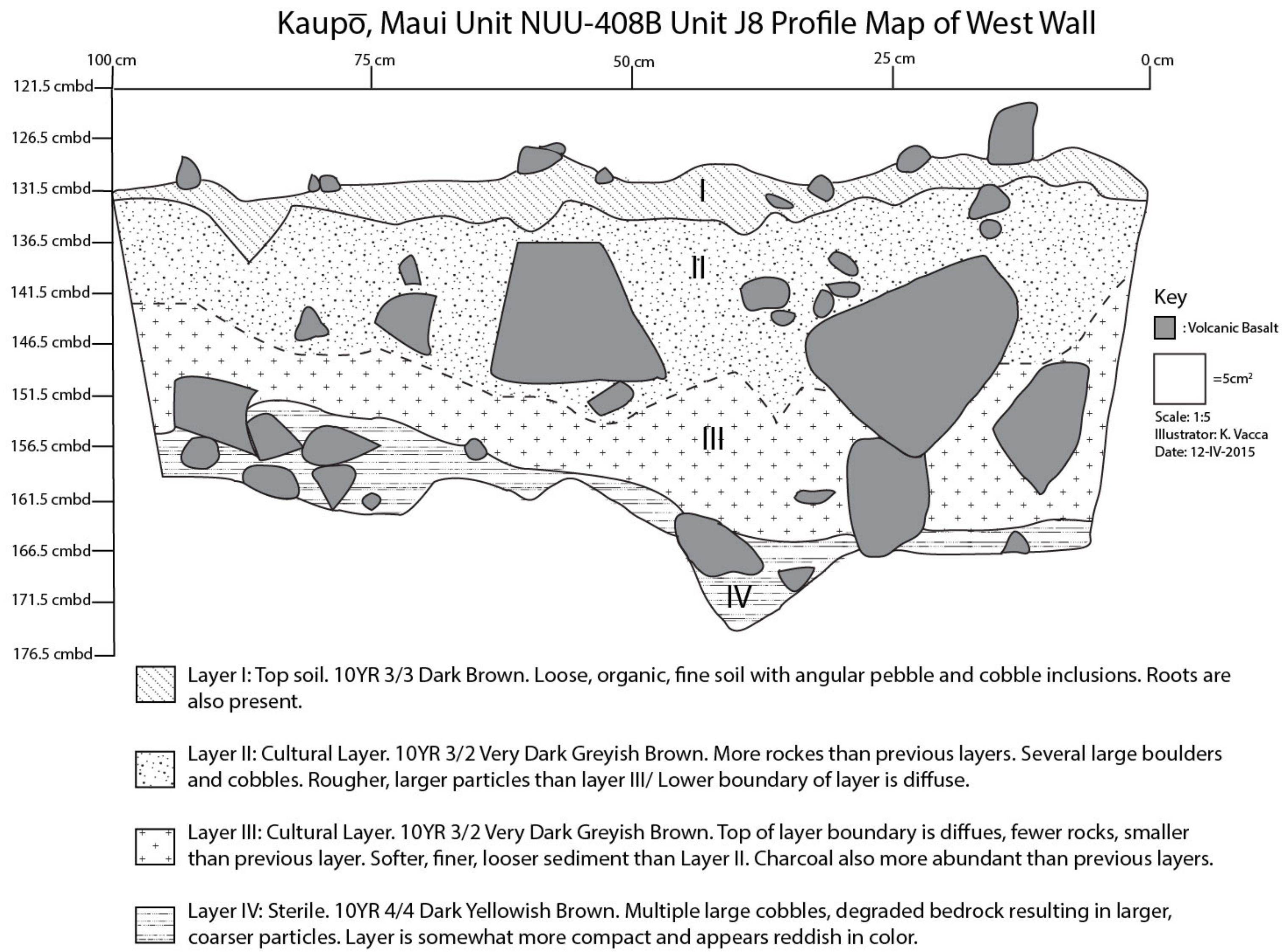


Figure 6.204: Profile map of the west wall in NUU-408B Unit J8 with context information.

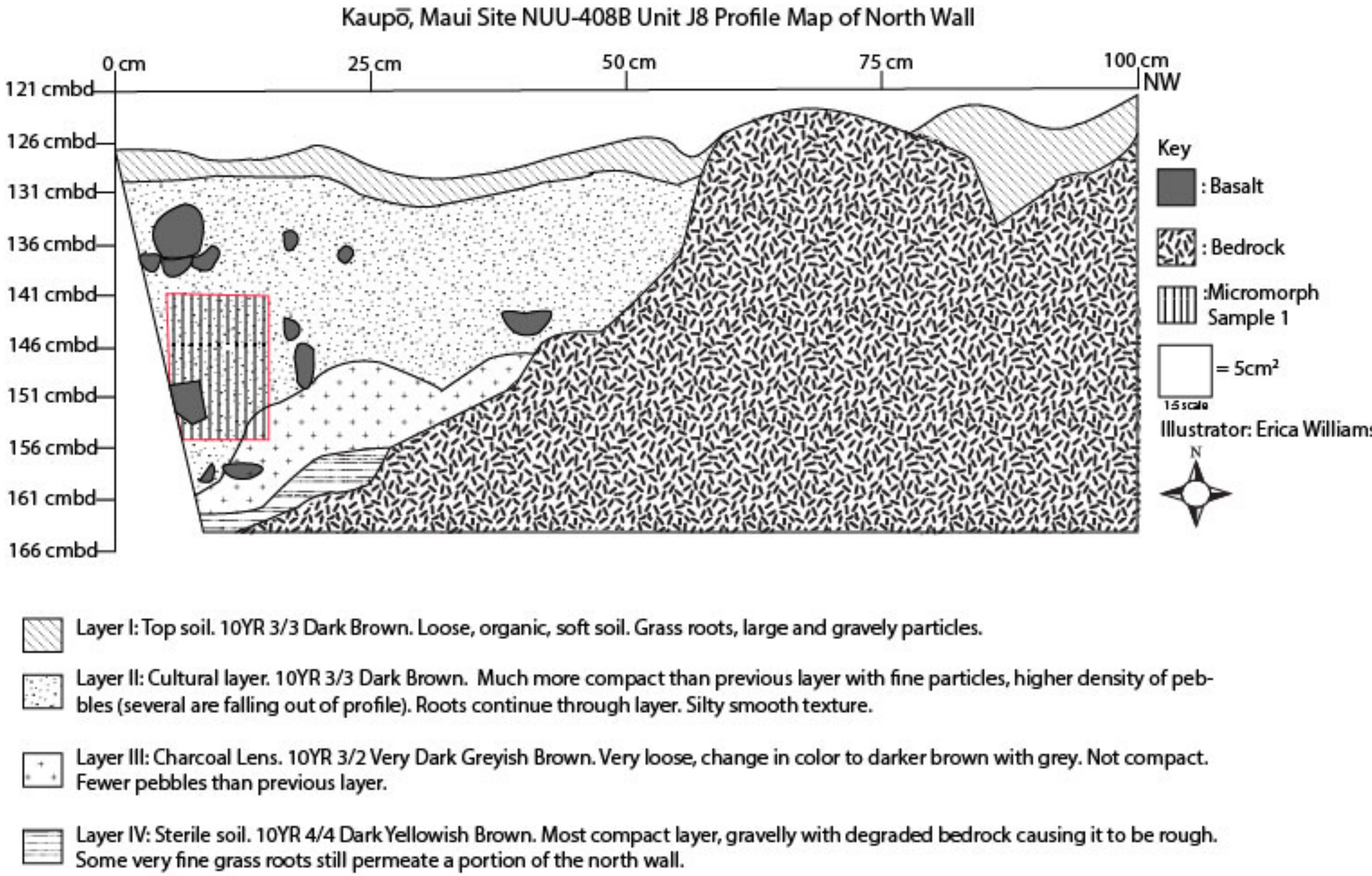
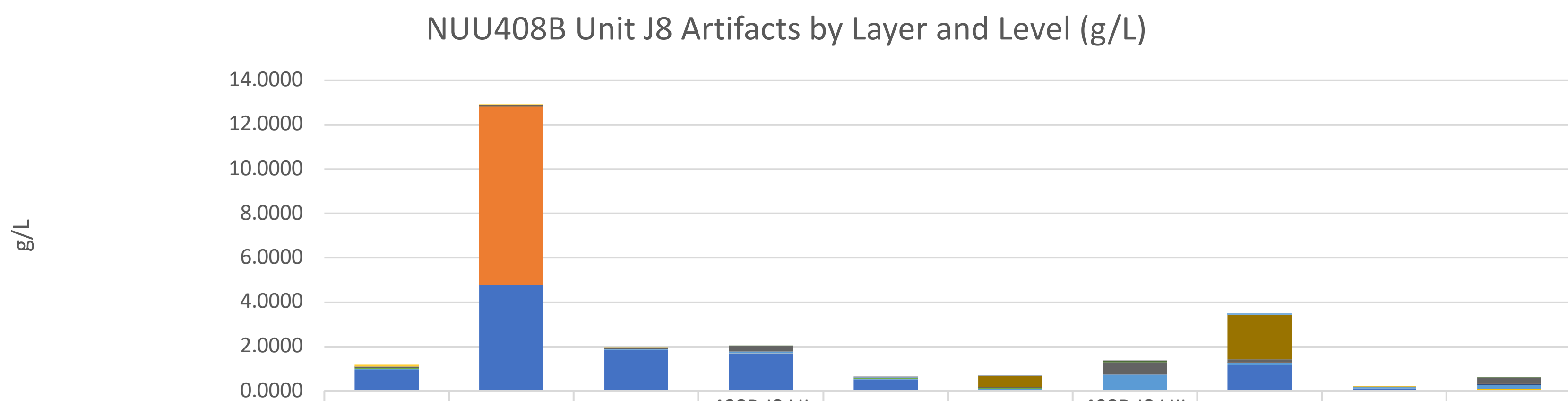


Figure 6.205: Profile map of the north wall in NUU-408B Unit J8 with context information.



	408B J8 LI L1	408B J8 LII L2	408B J8 LII L3	408B J8 LII L4 Ash Deposit	408B J8 LII L4	408B J8 LIII L5	408B J8 LIII L6 Ash Deposit	408B J8 LIII L6	408B J8 LIII L7	408B J8 LIV L8
Water-rolled rock								0.0733		
Volcanic Glass Flake	0.0893	0.0106	0.0021						0.0006	
Volcanic Glass Debitage					0.0049	0.0012	0.0338			
Volcanic Glass Core								0.0122		
Undetermined Plant	0.0016		0.0011		0.0194	0.0049		0.0002		
Sea Urchin Test Any Species				0.0296			0.0613	0.0047		0.0217
Sea Urchin Jaw Any Species						0.0002				
Manuport Stone						0.5175		1.9800		
Shell	0.0734	0.0254	0.0594	0.2367	0.0254	0.0203	0.5326	0.1413	0.0073	0.2837
Coral		0.0110				0.0018	0.0148	0.0050	0.0112	0.0058
ʻIliʻili		0.0218								0.0555
General Terrestrial Gastropod	0.0560	0.0015			0.0395	0.0432			0.0244	
Charcoal	0.0090	0.0040	0.0076	0.0824	0.0182	0.0437	0.7418	0.1263	0.0517	0.1786
Carbonized Kukui Nut Shell										0.0217
Bone not worked				0.0169		0.0021		0.0008		0.0011
Basalt Stone Tool		8.0713								
Basalt Debitage	0.9611	4.7707	1.8663	1.6780	0.5190	0.0453		1.1564	0.1021	0.0629

Figure 6.206: Artifact information for Unit J8.

Unit	Layer	Level	Special	Scientific Determination	NISP	MNI	Weight (g)
J8	I	1		*Achatina fulica*	3	1	0.06
J8	I	1		*Cellana* sp.	6	1	0.17
J8	I	1		Thaididae spp.	1	1	0.87
J8	I	1		Undetermined mollusk	9	1	0.33
J8	II	2		*Achatina fulica*	8	2	0.07
J8	II	2		*Planaxis labiosa*	9	9	0.35
J8	II	2		Undetermined mollusk	4	2	0.81
J8	II	2		unidentified sea snail	2	2	0
J8	II	3		*Achatina fulica*	6	1	0.16
J8	II	3		Gastropod Columella	3	3	0.04
J8	II	3		Osteichthyes	1	1	0.03
J8	II	3		*Planaxis labiosa*	10	10	0.75
J8	II	3		*Turbo sandwicensis*	1	1	2.48
J8	II	3		Undetermined mollusk	7	2	0.07
J8	II	4	Ash Deposit	*Cellana* sp.	4	1	0.11
J8	II	4	Ash Deposit	*Planaxis labiosa*	12	11	1.01
J8	II	4	Ash Deposit	Sea urchin test any species	11	1	0.14
J8	II	4		*Achatina fulica*	18	2	0.46
J8	II	4		cf. *Syrnola lacteola*	3	2	0.11
J8	II	4		*Littorina* sp.	1	1	0.17
J8	II	4		*Nerita picea*	1	1	0.17
J8	II	4		*Planaxis labiosa*	42	42	2.2
J8	II	4		Undetermined mollusk	17	7	1.39
J8	III	5		*Cellana* spp.	10	2	0.64
J8	III	5		Conidae spp.	1	1	0.78
J8	III	5		*Nerita picea*	3	3	0.55
J8	III	5		*Planaxis labiosa*	100	96	6.55
J8	III	5		Sea urchin jaw	1	1	0.03
J8	III	5		Undetermined mollusk	68	9	1.99
J8	III	6	Ash Deposit	*Cellana* sp.	2	1	0.08
J8	III	6	Ash Deposit	Sea urchin test any species	17	1	0.29
J8	III	6	Ash Deposit	Undetermined mollusk	15	1	0.17
J8	III	6		*Cellana exarata*	1	1	0.44
J8	III	6		*Cellana* sp.	17	1	0.33
J8	III	6		cf. *Cellana* sp.	1	1	0.23
J8	III	6		*Cypraea caputserpentis*	3	1	1.11
J8	III	6		*Drupa* sp.	6	2	1.78
J8	III	6		*Nerita picea*	3	3	0.51
J8	III	6		*Planaxis labiosa*	176	176	15.28
J8	III	6		Sea urchin test any species	63	1	0.77
J8	III	6		Undetermined mollusk	94	14	3.14
J8	III	7	Ash Lens	*Planaxis labiosa*	42	23	2.25
J8	III	7		*Cellana exarata*	3	1	0.04
J8	III	7		cf. *littorina*	3	3	0.13
J8	III	7		*Littorina scabra*	1	1	0.16
J8	III	7		*Nerita picea*	1	1	0.14
J8	III	7		*Nerita* sp.	3	1	0.25
J8	III	7		*Planaxis labiosa*	35	34	3.5
J8	III	7		Sea urchin test any species	15	1	0.59
J8	III	7		Undetermined mollusk	30	1	0.22

J8	IV	8	Wall Clean North Wall	general terrestrial gastropod	13	13	1.61
J8	IV	8		*Cellana* sp.	5	1	1.54
J8	IV	8		cf. *Hetrocentrotus mamillatus* spine	1	1	1
J8	IV	8		Neritidae spp.	1	1	0.08
J8	IV	8		*Planaxis labiosa*	58	58	6.94
J8	IV	8		Sea urchin test and jaw any species	16	2	0.37
J8	IV	8		Undetermined mollusk	19	9	0.3057
J8	IV	10		*Planaxis labiosa*	15	14	1.05
J8	IV	10		Undetermined mollusk	1	1	0.0032
J8		1 to 8	General Wall Clean	*Planaxis labiosa*	13	13	1.59
J8		1 to 8	General Wall Clean	Sea urchin test and jaw any species	7	1	0.23
J8			Wall Fall from Micromorph Sample	*Planaxis labiosa*	11	11	1.36
J8			Wall Fall from Micromorph Sample	Sea urchin jaw	4	1	0.14

Table 6.71: NISP, MNI, Weight, and ID for shell and sea urchin in Unit J8.

Unit	Level	Layer	Special	NISP	MNI	Weight (g)	Scientific Determination	Comments
J8	4	II	Ash Deposit	2	1	0.08	general undetermined bone	NID burnt fragments
J8	5	III		1	1	0.03	Undetermined bird	NID small fragment
J8	5	III		1	1	0.04	cf. Dog	Possible dog tooth
J8	5	III		3	1	0.24	Medium mammal	NID burnt fragments
J8	6	III		2	1	0.13	general undetermined bone	NID fragments
J8	8	IV		1	1	0.02	general undetermined bone	NID tiny fragment

Table 6.71: Bone data from Unit J8.

Site	Unit	Layer	Level	Artifact Size	Item Type	Count	Weight (g)
NUU408B	J8	I	1	≥6.3mm	Contemporary flora	1	0.2738
NUU408B	J8	I	1	≥6.3mm	Goat dung	1	0.181
NUU408B	J8	I	1	2mm-4mm	Contemporary flora	0	0.952
NUU408B	J8	I	1	2mm-4mm	Lithic Debitage	3	0.0416
NUU408B	J8	I	1	4mm-6.3mm	Contemporary flora	11	0.3382
NUU408B	J8	I	1	4mm-6.3mm	Goat dung	1	0.0251
NUU408B	J8	III	5	2mm-4mm	Lithic Debitage	3	0.0251
NUU408B	J8	III	5	2mm-4mm	UnID Organic	2	0.0041
NUU408B	J8	III	5	2mm-4mm	Wood	6	0.0093
NUU408B	J8	III	6	≥6.3mm	Lithic Debitage	2	0.7528
NUU408B	J8	III	6	1mm-2mm	Charcoal	15	0.0974
NUU408B	J8	III	6	1mm-2mm	Lithic Debitage	15	0.161

NUU408B	J8	III	6	1mm-2mm	Shell	4	0.0118
NUU408B	J8	III	6	1mm-2mm	Wood	10	0.0223
NUU408B	J8	III	6	2mm-4mm	cf. quartz	1	0.0872
NUU408B	J8	III	6	2mm-4mm	Charcoal	46	0.4496
NUU408B	J8	III	6	2mm-4mm	Contemporary flora	18	0.0188
NUU408B	J8	III	6	2mm-4mm	Lithic Debitage	40	1.0168
NUU408B	J8	III	6	2mm-4mm	Shell	1	0.0373
NUU408B	J8	III	6	2mm-4mm	Planaxis labiosa	1	0.0335
NUU408B	J8	III	6	2mm-4mm	Sea Urchin Spine	1	0.0077
NUU408B	J8	III	6	2mm-4mm	Sea Urchin Test	1	0.0082
NUU408B	J8	III	6	2mm-4mm	Unknown	3	0.0222
NUU408B	J8	III	6	2mm-4mm	Wood	10	0.1085
NUU408B	J8	III	6	4mm-6.3mm	cf. littorina	1	0.1276
NUU408B	J8	III	6	4mm-6.3mm	Charcoal	4	0.214
NUU408B	J8	III	6	4mm-6.3mm	Charred Wood	1	0.0276
NUU408B	J8	III	6	4mm-6.3mm	Coral	1	0.1182
NUU408B	J8	III	6	4mm-6.3mm	Lithic Debitage	10	1.3654
NUU408B	J8	III	7	2mm-4mm	Bone	1	0.0098
NUU408B	J8	III	7	2mm-4mm	Charcoal	4	0.4285
NUU408B	J8	III	7	2mm-4mm	Contemporary flora	7	0.06618
NUU408B	J8	III	7	2mm-4mm	Lithic Debitage	6	0.1038
NUU408B	J8	III	7	2mm-4mm	Shell	2	0.0333
NUU408B	J8	III	7	2mm-4mm	Sea Urchin Test	4	0.1053
NUU408B	J8	III	7	2mm-4mm	Volcanic Glass	1	0.0258
NUU408B	J8	III	7	4mm-6.3mm	Charcoal	5	0.1763
NUU408B	J8	III	7	4mm-6.3mm	Contemporary flora	3	0.1371
NUU408B	J8	III	7	4mm-6.3mm	Lithic Debitage	1	0.1571
NUU408B	J8	III	7	4mm-6.3mm	Shell	1	0.1492
NUU408B	J8	IV	8	≥6.3mm	Lithic Debitage	1	0.9626
NUU408B	J8	IV	8	2mm-4mm	Charcoal	0	0.2059
NUU408B	J8	IV	8	2mm-4mm	Contemporary flora	12	0.1347
NUU408B	J8	IV	8	2mm-4mm	Lithic Debitage	15	0.3727
NUU408B	J8	IV	8	2mm-4mm	Shell	2	0.0163
NUU408B	J8	IV	8	2mm-4mm	Sea Urchin Test	1	0.0068
NUU408B	J8	IV	8	4mm-6.3mm	Charcoal	16	0.2509
NUU408B	J8	IV	8	4mm-6.3mm	Lithic Debitage	3	0.3377
NUU408B	J8	IV	8	4mm-6.3mm	Terrestrial Gastropod	1	0.1286
NUU408B	J8	IV	SUBL8	≥6.3mm	Contemporary flora	2	0.15
NUU408B	J8	IV	SUBL8	≥6.3mm	Volcanic Glass	1	0.5296
NUU408B	J8	IV	SUBL8	2mm-4mm	Charcoal	10	0.0672
NUU408B	J8	IV	SUBL8	2mm-4mm	Contemporary flora	15	0.2568
NUU408B	J8	IV	SUBL8	2mm-4mm	Lithic Debitage	5	0.0859
NUU408B	J8	IV	SUBL8	2mm-4mm	Sea Urchin Test	7	0.1135
NUU408B	J8	IV	SUBL8	2mm-4mm	Unknown	2	0.0193
NUU408B	J8	IV	SUBL8	4mm-6.3mm	Contemporary flora	1	0.0061
NUU408B	J8	IV	SUBL8	4mm-6.3mm	Lithic Debitage	2	0.2863
NUU408B	J8	IV	SUBL8	4mm-6.3mm	Shell	1	0.1132

Table 6.72: Microartifact data from Unit J8.

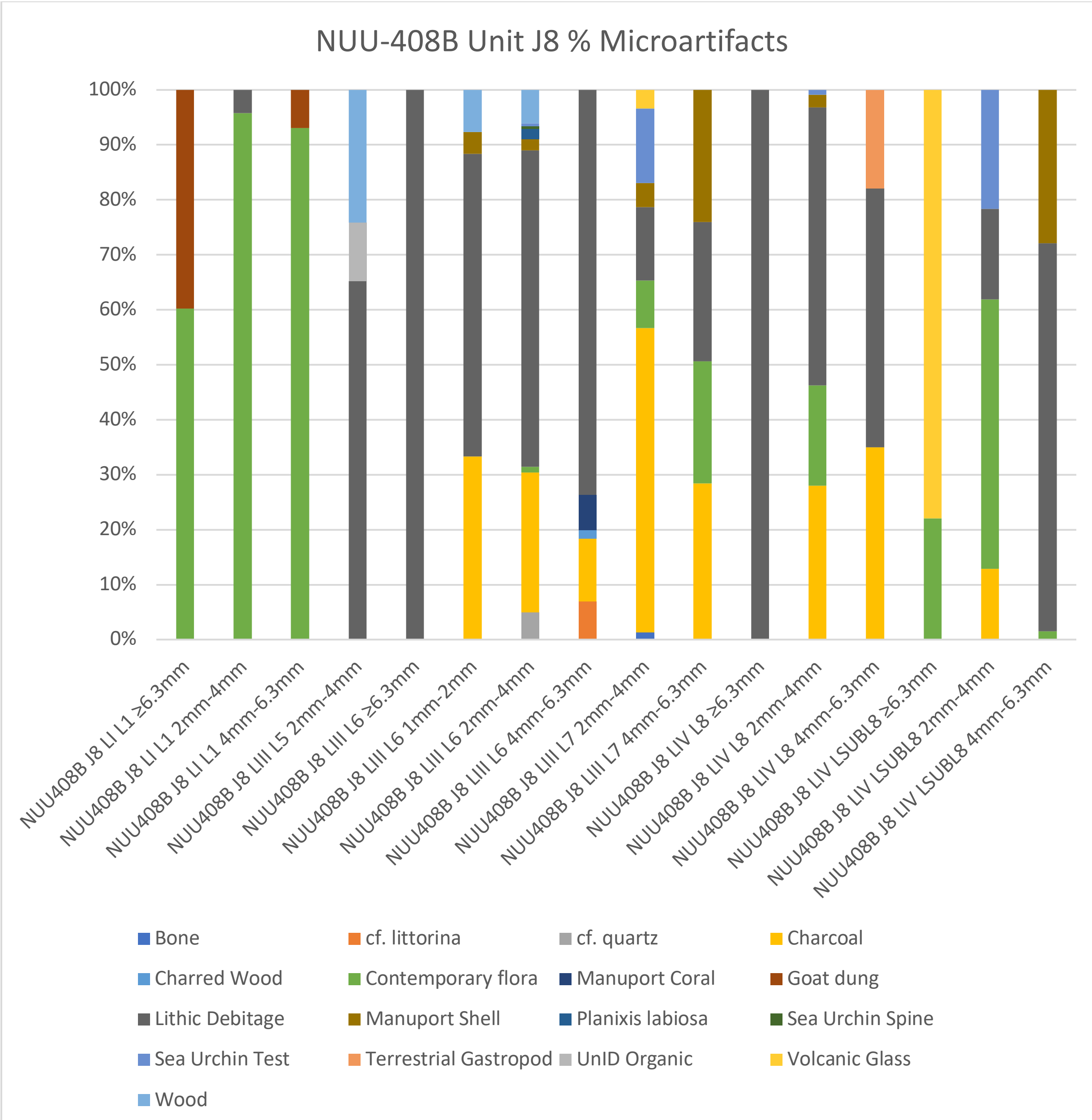


Figure 6.207: Graph of microartifact data from Unit J8.

Site/Layer/ Level/Sample	pH	% Organic Carbon	Particle Size Distribution <0.063	0.063	0.125	0.25	0.5	1	2	4	6.3
J8 LI L1 SS1	6.12	33.8673	7.68	19.04	30.36	42.84	53.12	62.54	71.48	77	100.24
J8 LIII L5 SS1	5.95	28.7500	17.48	33.84	44.64	52.76	61.92		66.72	73.26	100.1
J8 LIII L6 SS1	6.70	23.4009	22.46	41.78	52.68	60.34	66.74	71.7	77.92	83.88	99.3
J8 LIII L6 SS4	7.27	24.3332	24.38	44.92	56.18	64.66	71.46	77.74	85.36	90.52	99.18
J8 LIII L6 SS7	7.31		16.25	45.88	55.7	62.21	68.83	77.41	86.16	91.21	99.81
J8 LIII L7 SS1	7.27	23.1979	10.41	36.49	48.02	54.39	58.54	63.02	68.26	71.66	98.81
J8 LIII L7 SS4	7.37	21.1050	13.72	21.72	28.44	34.6	39.7	45.02	53.48	65.14	99.42
J8 LIV L8 SS1	7.22	18.9872	11.29	31.1	45.46	52.44	58.87	66.8	76.99	87.62	99.64
J8 LIV SUB L8 SS1	6.89	17.8623	3.53	7.21	11.5	17.56	23.89	32.41	42.76	52.43	99.85
J8 LIV SUB-L8 SS4-2	7.21	19.5241	8.43	21.25	31.36	40.05	47.67	57.23	68.04	74.67	99.22
J8 LIV SUB L8 SS4	7.22	21.6301	9.62	19.35	27.76	37.53	46.31	57.14	70.3	81.34	100.09
NUU407/408 BULK2 OSN	6.04		6.06	14.17	19.44	21.16	21.94	22.83	23.65	25.43	100.38

Table 6.73: Sediment sample data from Unit J8.

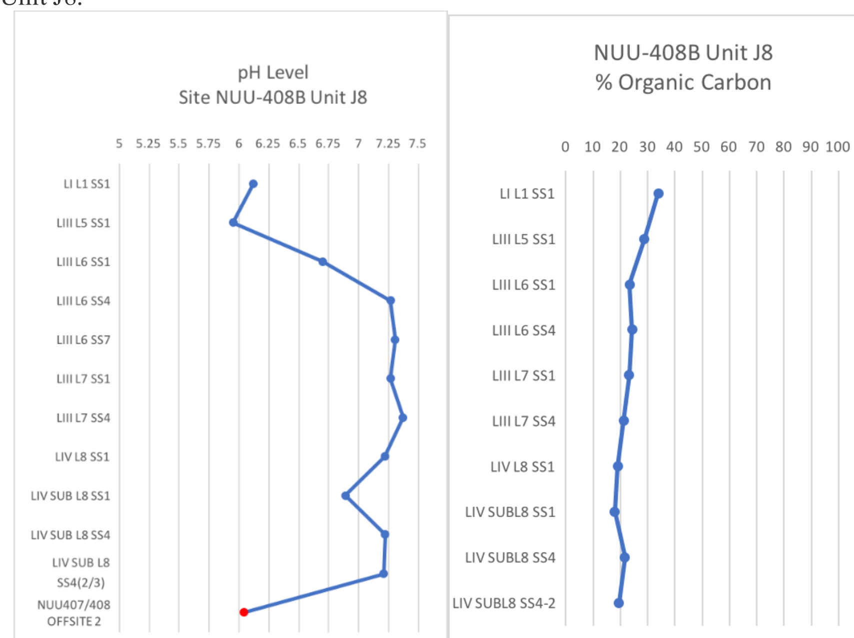


Figure 6.208: pH and LOI data for Unit J8.

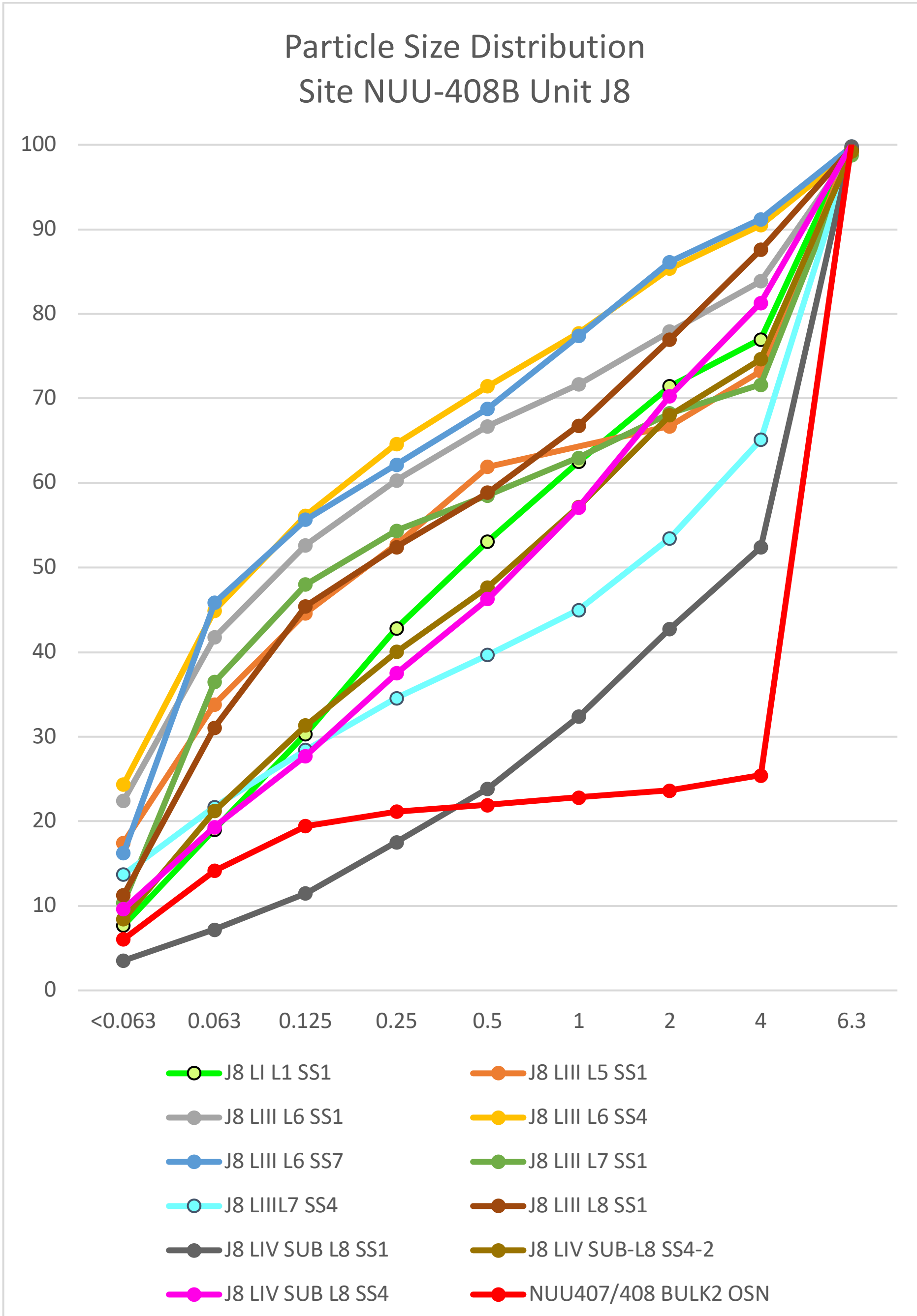
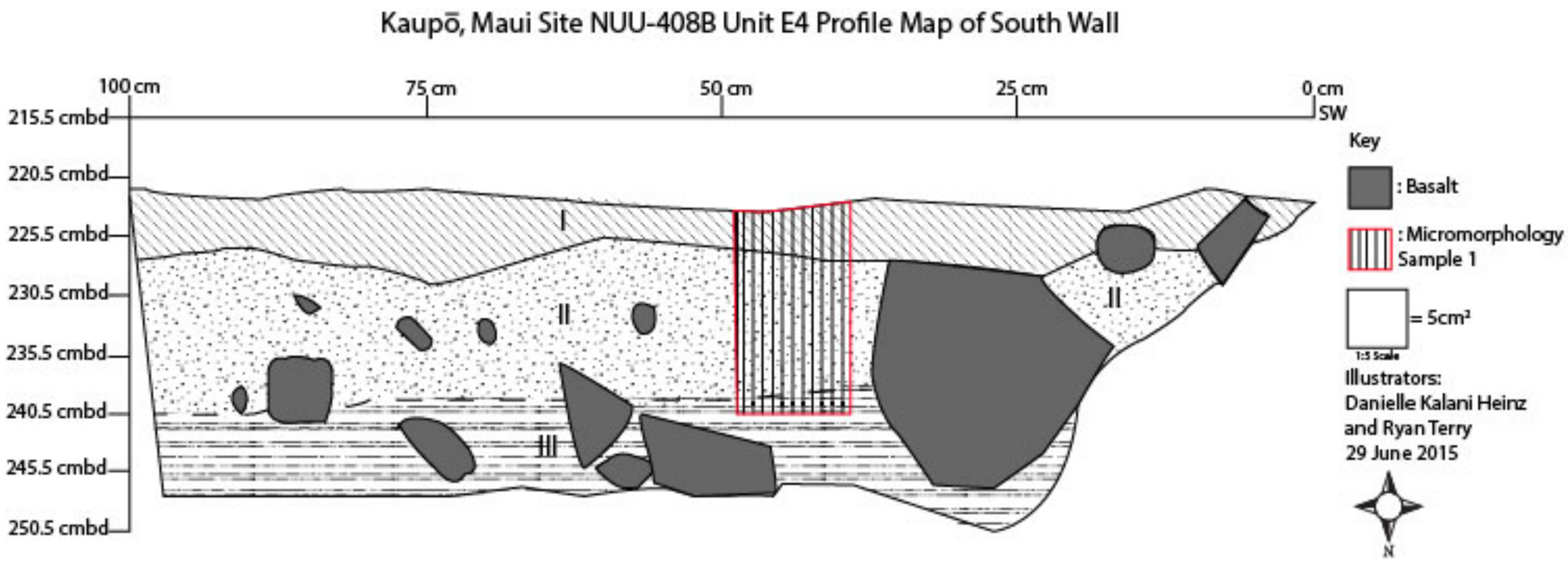


Figure 6.209: Particle size distribution data for Unit J8.

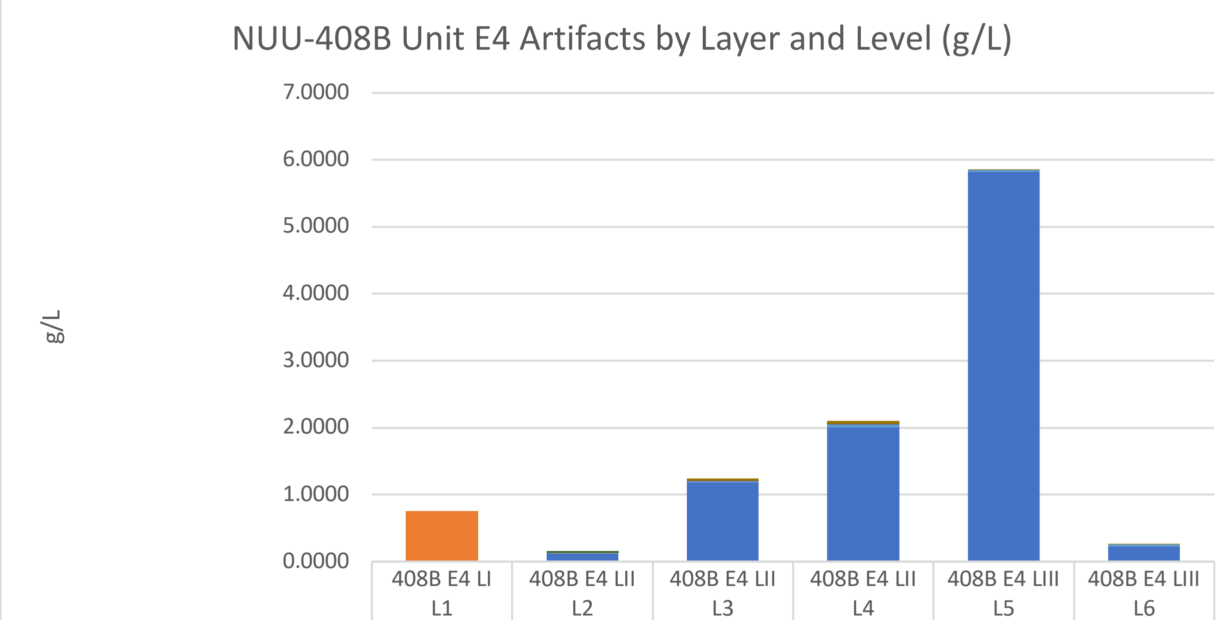


Layer I: 10YR 3/3 Dark Brown. Top soil. High density of organic material. Grass roots throughout. Sticks and bark, rough, angular gravel, and pebble-sized rocks, surface boulders, and cobble sized basalt twards the western side. Soft, fine particles, very loose, fewer artifacts found than other layers.

Layer II: 10YR 3/4 Dark Yellowish Brown. Cultural Layer. Diffuse between layers II and III. Still very loose, but more compact than layer I. Predominately gravel and pebbles that are rough but more worn than those in Layer I. Grass roots continue throughout. Most of the artifacts were recovered from this layer. Bone was particularly prevelant.

Layer III: 10YR 4/4 Dark Yellowish Brown. Sterile soil. Very fine grass roots continue through layer. Gravel and cobbles that are mostly deteriorated bedrock are more weathered than Layer II. Same compactness as Layer II with slightly darker coloring than Layer II which is the main feature that distinguishes Layer III from Layer II. .

Figure 6.210: Profile map of south wall in Unit E4 with context information.



	408B E4 LI L1	408B E4 LII L2	408B E4 LII L3	408B E4 LII L4	408B E4 LIII L5	408B E4 LIII L6
Water-rolled rock		0.0287				
Volcanic Glass Flake		0.0008				
Volcanic Glass Debitage			0.0204	0.0509	0.0099	0.0127
Raw Kukui Nut Shell				0.0005		
Shell		0.0007	0.0103			
Coral		0.0000	0.0024	0.0041		
General Terrestrial Gastropod		0.0009	0.0020		0.0000	
Charcoal		0.0022	0.0201	0.0454	0.0261	0.0298
cf. seeds		0.0004				
Bone not worked		0.0022	0.0004	0.0016	0.0002	
Basalt Flake	0.7545					
Basalt Debitage		0.1266	1.1815	2.0040	5.8186	0.2256

Figure 6.211: Artifact data for Unit E4.

Unit	Layer	Level	Special	Scientific Determination	NISP	MNI	Weight (g)
E4	II	2		general terrestrial gastropod	6	3	0.11
E4	II	2		Planaxis labiosa	1	1	0.01
E4	II	2		Undetermined mollusk	4	1	0.09
E4	II	3		cf. Conidae sp.	1	1	0.38
E4	II	3		cf. Cypracidae spp.	3	1	0.48
E4	II	3		cf. Drupa sp.	1	1	0.37
E4	II	3		Planaxis labiosa	9	5	0.25
E4	II	3		Undetermined mollusk	1	1	0.01
E4	III	5		Undetermined mollusk	1	1	0
E4			Wall Clean North Wall	Planaxis labiosa	1	1	0.04
E4			Wall Fall from Micromorph Sample	general terrestrial gastropod	1	1	0

Table 6.74: NISP, MNI, Weight, and ID for shell and sea urchin in Unit E4.

Unit	Level	Layer	NISP	MNI	Weight (g)	Scientific Determination	Comments
E4	2	II	1	1	0.05	*Scaridae*	One tooth
E4	2	II	1	1	0.21	Medium mammal	Pig or dog parietal bone
E4	3	II	2	1	0.05	general undetermined bone	Fragmented pieced of bone
E4	4	II	1	1	0.15	cf. Undetermined bird	Possible bird bone with hinge
E4	4	II	1	1	0.04	*Scaridae*	Tooth
E4	5	III	1	1	0.01	general undetermined bone	NID tiny fragment

Table 6.75: Bone data for Unit E4.

Site	Unit	Layer	Level	Artifact Size	Item Type	Count	Weight (g)
NUU408B	E4	I	1	≥6.3mm	Goat dung	8	0.335
NUU408B	E4	I	1	≥6.3mm	Wood	8	1.663
NUU408B	E4	I	1	2mm-4mm	Contemporary flora	0	0.505
NUU408B	E4	I	1	2mm-4mm	Kukui nut shell	1	0.032
NUU408B	E4	I	1	2mm-4mm	Lithic Debitage	3	0.109
NUU408B	E4	I	1	2mm-4mm	wood cf. archaic	0	0.77
NUU408B	E4	I	1	4mm-6.3mm	Lithic Debitage	2	0.191
NUU408B	E4	I	1	4mm-6.3mm	Volcanic Glass	1	0.173
NUU408B	E4	I	1	4mm-6.3mm	Wood	20	0.806
NUU408B	E4	II	2	2mm-4mm	Lithic Debitage	4	0.1017
NUU408B	E4	II	2	2mm-4mm	Wood	3	0.0159
NUU408B	E4	II	2	4mm-6.3mm	Lithic Debitage	1	0.1065
NUU408B	E4	II	4	2mm-4mm	Charcoal	6	0.0079
NUU408B	E4	II	4	2mm-4mm	Contemporary flora	5	0.0104
NUU408B	E4	II	4	2mm-4mm	Lithic Debitage	8	0.2027
NUU408B	E4	II	4	2mm-4mm	Volcanic Glass	1	0.0712
NUU408B	E4	II	4	4mm-6.3mm	Charcoal	2	0.1199
NUU408B	E4	II	4	4mm-6.3mm	Contemporary flora	1	0.0356
NUU408B	E4	II	4	4mm-6.3mm	Fire cracked rock	2	0.4659
NUU408B	E4	II	4	4mm-6.3mm	Lithic Debitage	1	0.08
NUU408B	E4	III	6	≥6.3mm	Lithic Debitage	2	0.2976
NUU408B	E4	III	6	2mm-4mm	Charcoal	5	0.0111
NUU408B	E4	III	6	2mm-4mm	Contemporary flora	3	0.0246
NUU408B	E4	III	6	2mm-4mm	Lithic Debitage	4	0.1016

Table 6.76: Microartifact data for Unit E4.

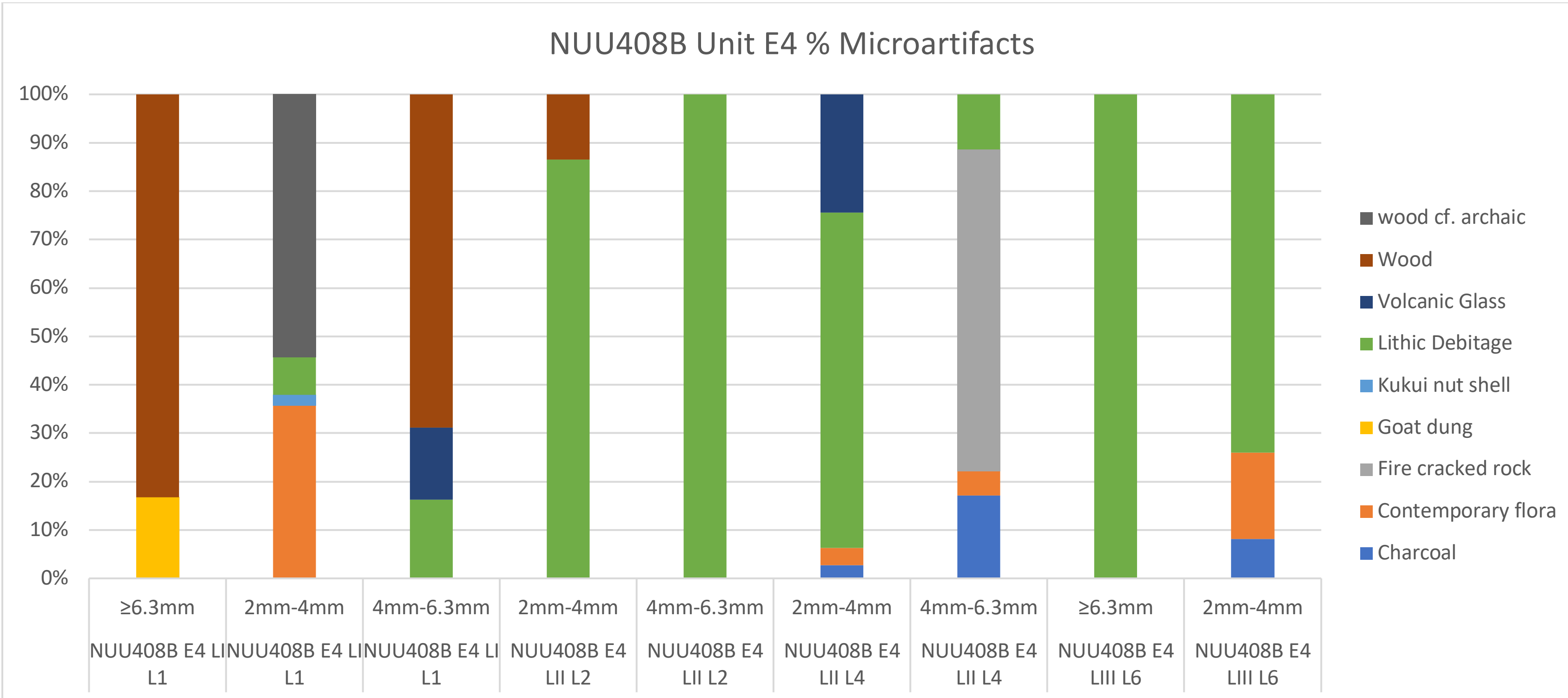


Figure 6.212: Graph of microartifact data from Unit E4.

Site/Layer/ Level/Sample	pH	% Organic Carbon	Particle Size Distribution								
			<0.063	0.063	0.125	0.25	0.5	1	2	4	6.3
E4 LI L1 SS1	5.32	63.6345	1.78	9.4	19.9	38.62	51.96	60.12	71.4	85.6	100.82
E4 LII L2 SS1	5.14	40.0195	14.2	29.22	40.7	47.44	49.74	53.44	57.86	61.04	99.7
E4 LII L4 SS1	5.71	25.4049	13.33	28.78	37.26	41.71	45.58	50.24	56.84	65.64	100.1
E4 LIII L6 SS1	6.43	20.9258	18.16	32.88	40.44	44.08	46.8	49.64	53.68	62.66	99.98
NUU407/408 BULK2 OSN	6.04		6.06	14.17	19.44	21.16	21.94	22.83	23.65	25.43	100.38

Table 6.77: Sediment sample data from Unit E4.

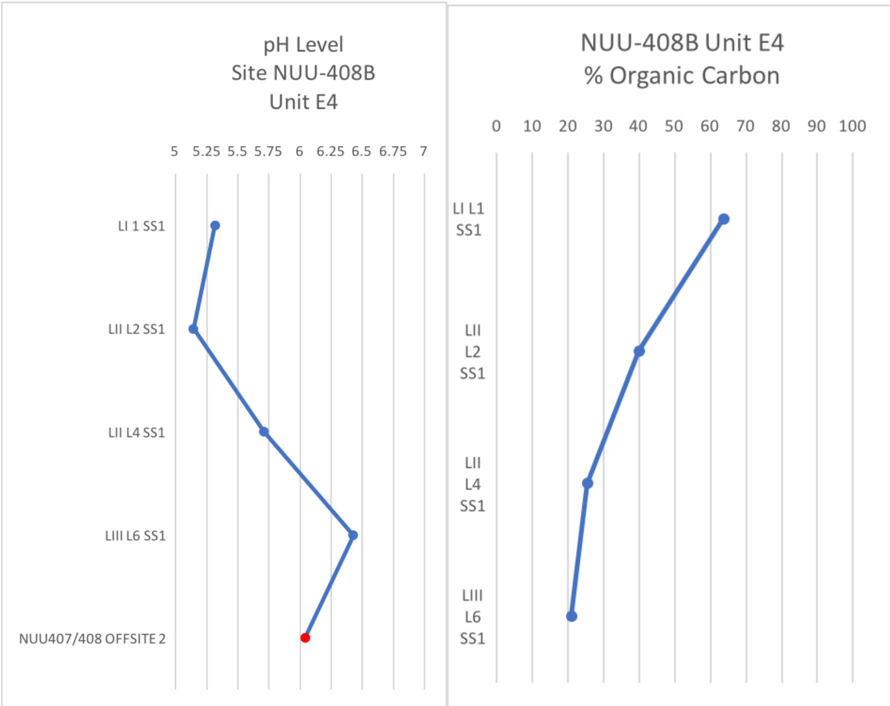


Figure 6.213: pH and LOI data from Unit E4.

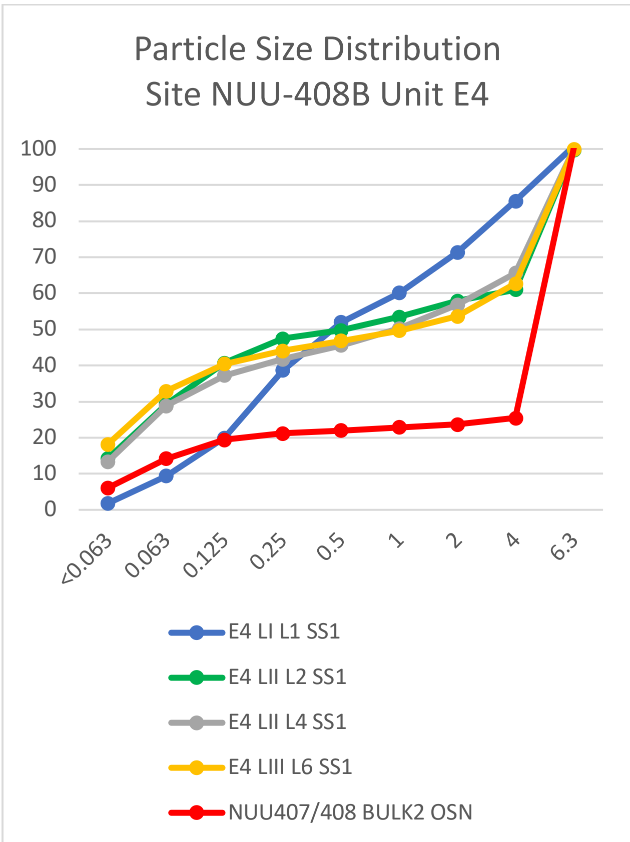


Figure 6.214: Particle size distribution data from Unit E4.

Chapter 7: Haku Mele

Poet, composer, compose a song or chant. Use mele as a tool to piece together, string together history and tell moʻolelo (Daven Chang Society for Hawaiian Archaeology 2017)

Southeast Maui districts have been characterized politically, socially and environmentally as hinterlands, or kuaʻāina (Baer 2019), by contemporary scholars and Hawaiians alike—the rustic backland where the kuaʻāina people lived and worked. For example, Kirch (2014:xv) described the kuaʻāina of neighboring Kahikinui moku as dry, marginal landscapes shunned by aliʻi and lacking representation in oral histories. Kuaʻāina lands within Kaupō may be defined by a drier landscape compared to the windward districts, but Kaupō differs from its neighboring district in that it was, for a time, the center of political life with the arrival of Kekaulike and his court in the early 18th century (Abad 2000; Baer 2015; Kamakau 1992). Defining Kaupō as kuaʻāina at any point in its history is most appropriately done when thinking of such lands as the agricultural backbone of the islands (McGregor 2007:4). Defining the periphery by political organization defines kuaʻāina from the perspective of the elite and marginalizes the lives of commoners that lived outside of the courts but worked to support their communities (including the chiefs). Characterizing districts as political hinterlands also necessitates the existence of a core for comparison (Heinz 2019). However, such comparisons risk simplification of the landscape. Multiple cores existed on Maui throughout history as aliʻi vied for territory and moved their royal courts across the landscape (Baer 2019). Although it is not possible at present to say whether the people living in Kaupō in the 15th-18th centuries considered themselves on the periphery or at the center of different social and political events, the Kānaka conception of the ʻāina meant that their home was at the core of their existence regardless of changing political and social landscapes. Approaching the material record from the perspective of the ʻāina as the root of knowledge in Nuʻu reveals place-based differences (Heinz 2019; Kahn *et al.* 2016). Attending to ʻplace' resists reinscribing colonial erasures in archaeological interpretations, but instead accounts for how evolving social and political landscapes were created and navigated by individual actors and households within this community central to their own histories.

Contexts of Construction

A place-specific interpretation of the kauhale is incomplete without an understanding of the broader social and political events occurring on Maui and in Kaupō during the periods the kauhale were constructed and in use. The design of Hawaiian houses is thought to have changed around the same time Kānaka began intensively settling the kuaʻāina lands as a result of the ʻai kapu. The Polynesian ancestors of Hawaiians built small houses along the shorelines of the islands they settled rather than the larger complexes, patterns that early Hawaiian ancestors likely followed. Evolving social and political structures, however, led to the development of the Hawaiian kauhale as it is described in the popular moʻolelo accounts from the 19th century.

The rise in importance of kauhale as major structuring agents in the 15th century coincided with a population boom archipelago wide, an increased complexity of the political structure, and the institution of the ʻai kapu (see Chapter 4 for the complete discussion). By the 19th century, the Hawaiian scholars considered multiple features necessary to include in a kauhale house complex for the household to be deemed respectable (Malo 1952:122). The features most discussed in academic work accommodated the ʻai kapu (the requirement for two eating houses and two ʻimu ovens to allow wāhine and kāne to eat separately). As discussed in Chapter 4, other features that were said to frequently be included in kauhale were sleeping houses and houses to accommodate craft production or storage (see Table 4.2 for descriptions of the kauhale features).

The political and social changes resulting in the ahupuaʻa system that began with Māʻilikūkahi on Oʻahu, and thought to coincide with the introduction of the ʻai kapu and increasingly elaborate kauhale, were introduced on Maui by Kakaʻalaneo in the 15th century around the same time that people began moving to this drier side of the island. The radiocarbon dates from the excavated features at Nu'u evidence this history of settlement. The calibrated age range with the highest probability for NUU-152A, 1515-1597calAD1597 cal AD (73.7% probability), falls completely within this early settlement period of Kaupō. This rectangular feature with core-filled walls appears to be the only architectural feature until evidence of the use of NUU-152B, a large C-shaped feature dated to 1644-1666calAD1666 cal AD (81.5% probability). By the mid 17th century, the design of kauhale similar to those described by Hawaiian historians may have been more widespread, which could explain the addition of two more features (NUU-152D and NUU-152E) by the early 18th century[21] (Table 6.3). The calibrated age ranges returned for the other excavated kauhale do not provide the same level of detail regarding the order of construction, but evidence the movement of people into kuaʻāina lands. The most probable period for the construction and use of the rest of the Nuʻu houses fall within a one hundred-year span between the mid-17th to mid-18th century (aligning with the construction of the additional features in NUU-152).

Given the timing, it is likely that the impetus for the construction of the kauhale was population expansion in the 16th and 17th centuries that led to increasingly concentrated populations in kuaʻāina; associated social changes related to landscape crowding resulted in expanded kauhale. The expansion of agricultural systems in the mid-17th to mid-18th century coincides with Kekaulike's reign of Kaupō (Kirch *et al*. 2010). It is unclear whether Kekaulike's reign impacted the construction of houses in this area, as both the estimated date of his rule based on genealogies and the age ranges of the sites are too broad to make a direct causal connection. However, their overlap suggests that some of the occupants of the houses did live under his rule and, thus, the generational wars between Maui and Hawaiʻi likely served as a backdrop to their daily lives.

Adapting to the Regional Geology

The geology that formed the land on which kua'āina peoples in Nuʻu lived and worked was comprised of a mud and lava flow that formed ~120 kya (Kirch 201:268; Stearn and MacDonald 1942) and produced the Kaupō fan. The Puʻu Maile lava flow that dominates the region today formed 3000-5000 years ago; its young age means that its ongoing erosion provided a highly productive, nutrient-rich soil in which these farming communities thrived (Kirch *et al*. 2010:279; Sherrod *et al*. 2007:39). While earlier settlements in the region may have existed, Kānaka Maoli began intensively settling the region in the 15th century (Handy at al. 1972:507), such that this area was likely not considered marginal and communities grew to sustain a peak population of around 8000-10,000 people by the 17th century (Kirch *et al.* 2010:286). The infrastructure necessary to support such growing communities included

[21] The calibrated age ranges returned for these features dated *Aleurites moluccana* from the cultural deposits rather than charcoal from the bottom of the wall. Therefore, these dates mark the latest possible dates for construction rather than the earliest, the stone foundations may have been built even earlier than these age ranges imply.

construction endeavors like heiau, agricultural fields, and kauhale, but also required a degree of social cohesion between communities in the various Kaupō ahupuaʻa to work together. Nuʻu was the most unreliable or risky area in this landscape due to a yearly rainfall at the lower end of what is necessary for sustainable agricultural production here, unlike the better-watered ahupuaʻa on the Kaupō fan to the east. Nevertheless, kuaʻāina managed to thrive on this dry landscape. Daily, monthly, and yearly cycles of the households were guided by the social entanglements that came with living in a farming community in a region often considered the political and social hinterlands of Maui.

As people moved to the Nuʻu landscape in the 15th century, they began to alter the landscape for crop production in the dry forest zone. They also built the infrastructure to support the growing communities—field embankments to define family plots, houses and shelters, storage for tools or crops, and heiau for spiritual needs. The people who built up the Nuʻu neighborhoods where NUU-152/420, NUU-153, NUU-142/417, NUU-155, and NUU-407/408/408B are located were likely sweet potato farmers. Sweet potatoes are known to thrive in environments similar to the dry forest zone (or central zone) on the slopes of Haleakalā. As kauhale began to spring up to accommodate the physical and social needs of the farmers, the kamaʻāina had to contend with the unique environment within which they lived.

The Nuʻu landscape was rocky due to breakdown of local parent material—Puʻu Maile Basanite basalt—that weathered to create a higher rock volume than what was produced in the erosion of other flows on the Kaupō fan (Baer *et al*. 2010:433). The Puʻu Maile Basanite is porous and rough (called ʻaʻā lava by Hawaiians), creating jutting outcrops that the kuaʻāina used to their advantage (Figure 7.1). Across the landscape, these bedrock outcrops were incorporated into architectural features as building foundations or built into core-filled walls. The naturally-rocky soil provided pebbles and cobbles for the core fill of walls, floor paving, terrace fill, and agricultural mounds. Any construction and land clearing would have resulted in excess pebbles, cobbles, and boulders that could be incorporated into these architectural features. The Puʻu Maile flow created landforms of swales and rocky ridges. The swales benefited from erosion of the surrounding rocky ridges, filling in with nutrient-rich soil over time. Survey data from Kaupō shows that people took advantage of these landforms, building houses along the ridges that were unsuitable for farming and planting in the nearby swales. The swale agriculture-based agricultural field system effected the locations of houses, resulting in a series of more dispersed, independent communities as was common in kuaʻāina lands (Handy *et al*. 1972:312). The kauhale community in this study exemplifies this type of community organization. NUU-152, NUU-420, NUU-153, and NUU-155 are built along the edge of the same U-shaped ridge overlooking a swale with multiple agricultural field embankments running east to west across the rich soil that is protected from the wind by the large outcrops that form the ridge (Figure 6.6). Field embankments also run across the slope to the west of NUU-152 and NUU-420. While this area is not a swale to the same degree as the land to the east of the kauhale, the land gradually slopes to the west to create a trap for eroding sediment and thus a rich soil covering the rocky parent material. NUU-142 to the northwest of NUU-153 was not built along a ridgeline, but occupies a flat, open rocky area south of a large cliff face. It is difficult to tell whether the land to the north of NUU-142 was farmed in the past, as this area has been heavily altered by modern ranching practices and feral goat grazing.

NUU-407 and NUU-408 were not built along this same ridgeline, but on top of another ridge to the southwest that overlooks agricultural field embankments surrounding the site to the south and west. NUU-408B was built along the bottom of the outcrop face that was used as the foundation for NUU-407 and NUU-408. The agricultural embankments run up to the edge of the rocky ground on which NUU-408B was built. Standing on the terraces that are part of this feature, the integration of natural features in the construction is evident. Basalt boulders were stacked in a particularly large gap along the face of the outcrop to shore up the wall against which the feature was built and level the ground above (Figure 7.1).

Figure 7.1: Example of the integration of natural features and constructed architecture from NUU-408B.

NUU-2 was also built along a ridge, but approximately 1km northeast of these sites and above 300m elevation. The precipice upon which NUU-2 was built was equally rocky but, unlike the others, did not overlook agricultural swales. The higher elevation created a different landscape than the sites to the southwest, which may have resulted in different use of this land. Other species of plants besides sweet potato thrive in this area today. A grove of wiliwili trees directly to the north of the site (pictured in Figure 6.10) and a grove of kukui trees growing just below the ridge to the east evidence the type of arboreal plants that are successful at this location that are not found around the houses to the south. While it is uncertain if these groves were present historically or a modern introduction, it is a possibility that they mark the location of ancient growth in the area. The landscape directly below the ridge to the south has not been as extensively surveyed as other areas, and modern ranching has altered the area. The ranch road runs south, passing along the eastern edge of the site below the ridge and large water troughs for cows dot the landscape to the southwest. Archaeological features dot the landscape up the mountain, attesting to the reach of the Nuʻu ahupuaʻa community.

The excavated houses do not represent the entire neighborhood in the three areas visited along the slope, but rather a sample of the houses. Surveys of each area do show that there is a low density of houses, and the surrounding swales make building kauhale directly beside one another difficult. The location of each house also helps us begin to understand the daily lives of the people living within the complexes and their relationships to one another. The kamaʻāina living in NUU-2 had a very different neighborhood than those along the U-shaped ridge, or by NUU-407/408. The NUU-2 household sat between the terraced sweet potato fields directly to the north, and the swale agriculture to the south with a view of both. This household was more distant from their neighbors and more removed from marine resources living further up the mountain slope. Kānaka in the neighborhood along the U-shaped ridge lived in the midst of agricultural ridge embankments. Their lives would have been defined by agricultural work. Whether they were the laborers, overseeing the farmers, or mere onlookers engaged in other related activities, the rhythms of field work would have been inescapable in these locations. Their proximity to neighboring kauhale also suggests more intimate relationships with one another. The household that occupied NUU-407/408/408B to the southwest was also surrounded by field embankments and therefore tied in some way to the rhythms of the agriculture cycle. The southern houses were closer to marine resources than NUU-2, which may have played into their subsistence strategies during the planting season when food was scarce in farming communities (Handy *et al*. 1972:32).

Building the Nuʻu Community

Learning to live on the land required building the necessary physical structures in the appropriate places; a fitting location for a kauhale needed to be both geographically and socially suitable. Locations chosen for kauhale were said to be chosen upon consultation with kukikuhi puʻuone, the expert that knew where to build a house and which direction it should face to ensure the safety and comfort of the inhabitants. According to Handy and Pukui (1972:8), "the *kukikuhi puʻuone* knew that a home should not stand at the base of a cliff where there was danger of a landslide or between two ponds where there was a danger of keeping the house constantly damp and cold, where it was open to draughts and so on." The location of the households in this study suggests consultation with kukihui puʻuone or personal knowledge of the landscape as the each kauhale was placed in rocky areas less suited for agricultural productive, built away from cliff faces and oriented to block the howling winds that sweep across the landscape on a near daily basis. Each of the kauhale excavated was built running north to south with the thickest and tallest wall along the eastern edge protecting any inhabitants from winds that move east to west in the region. Each of the houses also featured a short wall along the northern end of the feature that may have protected inhabitants from stray tumbling rocks, as well as shored terraces along the southern end to keep the level floors from eroding down the hillside. The integration of natural bedrock features on the landscape would have made construction easier by requiring fewer boulders for the foundations, and the kauhale sturdier by building upon anchored landmasses (see Figure 7.2 for an example of this practice) but would have also placed constraints on where people could live. The evidence indicates a deep knowledge of, and relationship with, the ʻāina in the construction of comfortable, stable kauhale.

Figure 7.2: Bedrock outcrop used as the corner of the wall face in NUU-153.

Construction Techniques

Construction methods for the houses were observed during excavation, providing insights into the life history of the features. The method of choosing the proper location for a kauhale and incorporating natural features speaks to the familiarly with the land, but steps still needed to be taken to alter the landscape so that the steep slopes of Haleakalā were livable. The plane table maps presented in Chapter 6 evidence the thick core-filled wall foundations used to build the main living spaces of each kauhale. This was a common technique used in houses previous to the changes in construction introduced by Europeans in the 19th century. Although stone foundations have survived to evidence the locations of kauhale, their organic superstructures have long since decomposed.

The Nuʻu house sites provide abundant information about the foundations for the kauhale, some of which has already been discussed (the use of outcrops to anchor the houses). Units placed in sediment-filled terraces along the edge of the houses closest to the downward slope ran into fill used to create a level living surface for the inhabitants. When thick core-filled terraces and walls were used to shore up the living space, as was the case for NUU-407 and NUU-153, they incorporated outcrops as previously discussed, but also placed the foundational boulders in the soil on a foundation of bedrock and used multiple courses of stone and thicker, extended corners built down the slope of the hill to support the inner walls. Construction fill (found in Units NUU-155 M23, NUU-2 Units N4 and Q5, NUU-420 Units F10 and G10, and Unit 408 Unit E14) was also characterized by the low density of artifacts when compared with other site units, particle size dominated by gravel, and low pH (no pattern was observed in the LOI percentages). The sample from NUU-2 Unit N4 is the only sample from a fill context with sand as the dominant component, which indicates that this space was a transitional space from inside to outside, similar to Q5.

The majority of the contexts excavated in the Nuʻu hale are dominated by sand. Although sand does require a higher energy environment for deposition, the energy need not be as high as the energy required to transport gravel. Anthropogenic activity is therefore the most likely explanation for these deposits. All of the fill contexts had a pH between 5.09 and 5.9, placing them squarely in the strongly acidic to moderately acidic categories. These numbers are in direct contrast to the sterile layers that have pH values above 6.0 (slightly acidic, matching the soil fertility data for the region which places the pH of the soil on the Kaupō fan in the slightly acidic to neutral categories—see Figure 5.4). These values reflect the presence of organic matter in the fill deposits further supporting the idea that the sediment on site was being reworked, moved around to create a level living space on which more organic material was deposited. If the sediment were not altered in some way, the deeper deposits below the active floor would more reflect the organic profile of the sterile units, NUU-2 K8 and NUU-153 K17, that are characterized by a smooth gradient from the very acidic pH of the topsoil (Horizon O) to the slightly acidic pH of the sterile soil (Horizon C). These physical signatures are specific to terrace fill, however. As I discuss below, fill for house floors and combustion features look very different.

Figure 7.3: A profile photo of the north wall in NUU-2 Unit Q5 showing construction fill uncovered during excavation.

Figure 7.4: A plan photo of NUU-420 Unit F10 showing the construction fill uncovered during excavation.

Figure 7.5: The foundation of the NUU-153 Units P5 and P6 east wall showing the bedrock foundation.

Figure 7.6: Photo of the southern wall of NUU-407 showing the extended corners that are supporting the wall and terrace above.

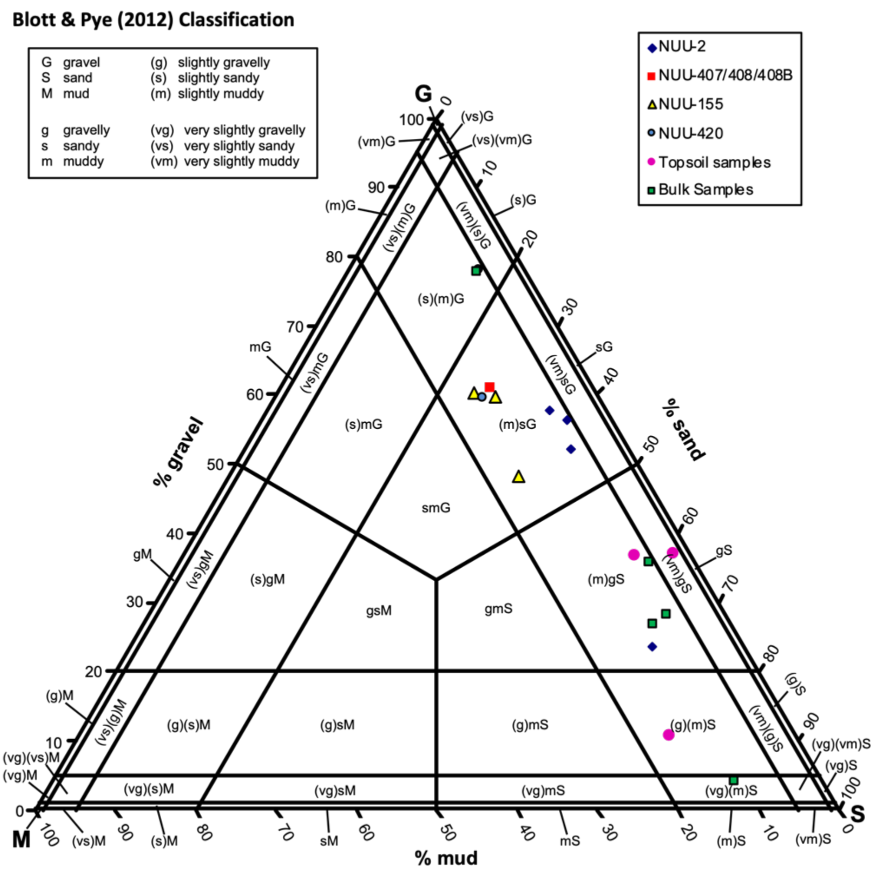


Figure 7.7: Classification of samples from fill contexts.

Construction fill for terraces was used to create level living spaces so that the foundations would support the superstructures of the houses. Although these superstructures do not survive the archaeological record, their construction leaves behind evidence that witnesses their existence. The moʻolelo refer to the types of hale that were enclosed with thatched roofs over a superstructure of poles lodged in the stone walls or the ground (e.g.., sleeping houses, eating houses, oven houses and some tapa making houses). The method for thatching differed depending on status, the permanent or temporary nature of the house, or location (Hiroa 1957; Malo 1951). The thatching commonly used was made from pili grass, which is in the family of grasses that dominates the phytoliths at every site. Pili grass was also laid beneath woven mats on the floor of indoor spaces. These abundant phytoliths evidence thatching in the Nuʻu houses as do other surviving material traces.

The most obvious evidence for the presence of a pole and thatch house was observed along the eastern profile of NUU-2 Unit R10 where soft, a dark sediment deposit was observed that is deeper than the cultural layer in the unit and any tree roots (which do not appear in the sterile C Horizon below cultural layers). This probable posthole interpretation (Figures 6.36 and 6.37).) visible during excavation from the sediment profile is bolstered by the thin-section slide that captured the transition between the dark sediment deposits and the surrounding layer (sample NUU2R10MM2). The posthole context in the thin section, explained in Table 7.1 differs from the surrounding context in that it is less dense with larger aggregates and vughs that represent organic material no longer present.[22] Cultural material is largely absent (aside from micro-charcoal) and the coarse material is heavily weathered. The presence of a post would keep artifacts from accruing in this space and foot traffic from compacting the sediment. The erosion of the post over time would leave voids and organic material that would bind with clay when sediment is moist and decomposing plant matter would lead to darker sediment.

The construction of this house most resembles the gable roof style described by Hiroa (1957:81), which featured stone foundation walls supporting posts and thatched walls. In these houses, the posts were 15 to 20 cm in diameter (the same width as the dark deposit) and supported by a stone footing (cobbles are visible at the base of the dark deposit in the R10 profile photo, Figure 6.35). Several posts were placed on either end of the hale and along the wall, each with its own name provided in the historical record (Hiroa 1957). Ridgepoles were also erected down the center of the house to support the tall peak of the roof. The poles were lashed together and the sides and top were thatched with grass (usually pili grass). Historical reconstructions show these posts placed in the stone foundations rather than beside them to support the houses but earlier houses did also place posts along the stone walls. Gable houses were photographed in Kaupō as late as 1915 (Hiroa 1957:82, Fig. 49). The stone foundation of NUU-2 diverges from the historical descriptions of gable houses, as a wall is not present along the eastern edge of the feature. This may indicate that the hale was instead open along one side, or that the support poles along the eastern edge of the hale were placed directly into the ground, mixing two styles of houses (gable houses and grass wall houses). Evidence of postholes are rare in the excavation of kauhale, however, and other data was relied upon to define indoor versus outdoor space and with this, the location of house floors that provide information about activities.

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[22] The Nuʻu sediment forms aggregates of organic material and clay through compaction or rain and are broken up by foot traffic—this will be discussed in more detail in the section below about house floors.

Determining outside versus inside space elucidates the use of features and site formation processes. Stone foundations are generally a good indication that a thatched roof was present at some point in the past. However, depending on the feature, a thatched roof may not have been necessary. In addition, with stone foundations that are open along one side like NUU-2, it is difficult to ascertain the width of the structure and thus the amount of floor space a roof would have covered. Therefore, other lines of evidence are necessary to delineate indoor versus outdoor space.

Identifying house floors requires understanding how they were constructed. The design of house floors was similar to the design of terraces previously discussed, but key differences between the two were observed in excavation. The fill used to level house floors that were inside features exhibited finer-grained sediment with fewer pebbles throughout. The particle size distributions of indoor floor contexts vary from terrace units. Rather than moving from sand to cobble fill with depth, indoor floors were characterized by a bimodal distribution of particle sizes. Small and large particles were represented, but the coarse particles were primarily artifacts rather than inherited basalt. Sand-size particles dominate the majority of the contexts inside the house and the profiles show far fewer pebbles and cobbles (compare Figures 6.111 and 6.112 for a prime example of this phenomenon). Finer, less rocky fill within the confines of the houses would have made for softer ground for sitting and sleeping. However, the finer sediment does not preclude these units being exposed to the elements, only that larger pebbles and cobbles were removed.

Particle size distribution, pH, LOI, and clay aggregates commonly formed in the Nuʻu sediments and soils may be able to inform us of the extent to which different deposits were subjected to wind and rain. Aeolian processes in arid environments without stabilizing surfaces continuously erode and deposit materials across the landscape (Rodriguez 2016). The wind is certainly an erosional and depositional force in Nuʻu (a factor made obvious when attempting to screen sediment from a site). The transport of clays, silts, and sands via wind in areas without protection is constant. Stone walls that protect a site on multiple sides, like those found in NUU-2, NUU-152A, and NUU-420, keep wind from carrying away sand and silt deposits, but without superstructures, the other sites would experience more erosion. Sites protected from the wind still risk exposure to rain during the wet seasons that would result in translocation for the house floor deposits. The peds that naturally form in Nuʻu sediment create voids by keeping the floors from packing too tightly. Water moves more easily through these voids. House floors exposed to rainwater therefore are vulnerable to translocation by the water moving microdeposits as it flows through the sediment. Rainwater also has a leaching effect, lowering pH in sediments. Therefore, deposits exhibiting smaller particle sizes and higher pH values (compared to off-site samples) are more likely to have been covered by thatching in the past. All of the contexts within kauhale features in site NUU-420 Unit H13, NUU-153, and NUU-407/408 that were not part of a hearth context (and therefore skewed by the high amounts of gravel-size charcoal) had sand-dominant deposits. About half of these deposits also had pH values higher than 6.0 (with the exception of samples taken from charcoal lenses and the units in site NUU-420, NUU-152A, and NUU-408). pH levels might therefore be a better indicator for the types of activities taking place rather than the presence or absence of a roof.

Crusts form in arid landscapes that experience periodic intensive rainfall followed by a lack of rain (Fedoroff and Courty 1999; Rodriguez 2016). The crusts are easily broken and reincorporated into the sediment where the aggregates are visible microscopically and at times, macroscopically (Fedoroff and Courty 1999; Han *et al*. 2015; White 1999; Rodriquez 2016). The aggregates are unstable and easily broken but this is dependent on the speed of wetting and the intensity of heat (deposits closer to combustion features for example may have more resilient peds). Fast wetting of sediment or soil (defined as 50mm per hour) produces harder crusts that are better able to resist damage from trampling or from rain (Han *et al.* 2016). Similarly, heating of the sediment also makes the aggregates more resistant to damage, requiring more energy to break them up. Arid landscapes also have reduced soil activity which means that buried deposits are more protected from pedogenic processes. Features with floor deposits exhibiting fewer aggregates therefore may a roof or superstructure protecting it from regular exposure to wind and rain or other agents of weathering and erosion.

Aggregate and micro-aggregate structures are best observed in thin section. The micromorphology samples taken from the Nuʻu units showed that aggregates were far more common in the NUU-2 sites, but were present in all of the units. Aggregation is affected by both particle size (i.e., the abundance of clays) and different chemical compounds in the soil (that act as cementing agents, like calcium carbonate, aluminum oxide and, or iron oxide (Han *et al*. 2015). All of these are often activated by water infiltration. NUU-2 samples exhibited more peds than other sites which may indicate more rainfall at this higher elevation, and a different elemental composition of the local soil. Regardless, the aggregates proved to be good indicators of weathering on site. Units with a fine enaulic c/f distribution, where the aggregates were smaller than the coarse fraction in the samples, were more common in units that were inside house features. For example, NUU-408 Unit H13 showed a fine enaulic structure whereas Unit E14 showed an open enaulic structure with larger aggregates. Weathering due to water movement is seen by the development of clay coatings around clasts and in voids, and the alteration of olivine (a delicate, sensitive mineral). The units with smaller aggregates also showed only poorly-developed clay coatings, if they were present at all, and considerably less weathering of olivine crystals.

The level of organic matter and phytoliths are the final pieces of evidence that can help determine whether houses were covered by thatched roofs. It was a common practice throughout Polynesia to 'furnish' thatched house floors with grass covering by a woven them mat made from plan leaves (Kirch and Green 2001). Kānaka followed this tradition, using grasses or sweet potato vines to pad the ground under the woven mats (Krauss 1993:59). As the organic material used to cover the interior house floors degraded away, the grass and palm material would have deposited phytoliths into the soil and the desiccated organic material would have become bound up and preserved by the clay-rich deposits.[23] The spaces that were covered during occupation of each structure would, therefore, evidence higher levels of organic matter and grass phytoliths than uncovered outdoor units areas.[24] The LOI data presented in Chapter 6 is inconclusive on this point, however. There appears to be more of a difference based on the location of the kauhale on the landscape rather than the location of the deposits in the house, with NUU-2 deposits containing the least amount of organic

[23] This tendency for organic material to bind to clay was observed in the process of extracting phytoliths from Nuʻu samples. The deflocculating process resulted in the removal of small amounts of clay before the organic matter was burned off and the clay was released.

[24] LOI is a difficult measure to use here as the speed of desiccation and removal of organic carbon from the sediment is intimately connected to pH levels and temperature. Units closer to hearths and, thus, exposed to higher temperatures will lose organic carbon quicker. Higher pH levels also cause organic matter to deteriorate more quickly. House deposits tend to have higher pH values as anthropogenic input neutralizes any natural soil acidity. Therefore, LOI could prove to be an unreliable line of evidence for identifying covered house floors.

materials (the majority of the deposits fall at or below 20%%, whereas the cultural deposits from kauhale to the south most commonly measure above 25% with several measuring levels of organic matter in the 30%+ percentile range). Palm, rather than grass, phytoliths seem to be the best indicator for whether a surface/floor was covered with grass and matting since grasses produce so many phytoliths that they are the most abundant taxon in archaeological and non-archaeological settings. Grasses are particularly abundant at the Nuʻu house sites were the thick thatch on the houses and grass cover for floors would have surely resulted in grass phytoliths throughout the site, including areas without matting or roofs. Palm phytoliths on the other hand are rarer and, in the Nu,ʻu samples are only present in the units that also exhibit the other characteristics of indoor spaces listed above.

Based on the many lines of evidence, the spaces that appear to have been covered by a thatched roof in NUU-2 were R8, R9, R10, R4, and R5 (Q5 and N4 are more complicated units that appear to be in a transitional area, as the deposits show characteristics associated with both indoor and outdoor spaces). In NUU-153, P5, P6, and O5 were likely covered, but Units E10 and K17 were exposed. NUU-407 likely included a thatched house as did 408, but the thatch would not have extended to the terrace where Unit E14 was located (a stark difference between the sediment profiles of E14 and H12 that was not observed in the artifact assemblage illustrates the usefulness of the sedimentary evidence). The information available for NUU-152 sediment is limited, therefore Feature A is the only component of this kauhale that can be said to have incorporated a thatched roof with reasonable confidence. Similarly, NUU-420 and NUU-417 also included thatched superstructures, while NUU-417, NUU-408B and NUU-155 all appear to have been left exposed.

Curated Space in the Kauhale

Developing descriptive models for identifying house floors in excavation is the first step toward interpreting the possible activities that occurred within each space. The next step in the analytical process is differentiating the active surface of a house from what Macphail and Goldberg (2018) call the ʻreactiveʼ and ʻpassiveʼ zones that represent older surfaces or fill below, and the sediment caps above. This is particularly complicated with unpaved, sediment-filled house floors, like those in the Nuʻu kauhale, that built up over time through maintenance and continued use.

Here, passive zones are the prepared floors—the natural compacted ground surface or the prepared surface made from the addition of sediment and plant materials to raise and/or level the floors (Macphail and Goldberg 2018:344). Passive zones in Nuʻu would include the fill discussed previously that was used to raise and level house terraces, or prepared C Horizons (through the removal of larger cobbles and boulders from house floors) on which the houses are built. Any anthropogenic materials in this zone are likely accidental and inherited from digging for fill material in other on-site areas. They are identifiable by their randomly oriented and distributed nature. Reactive zones are layers between the passive and active zones that have fewer, fragmented aggregates that are inherited from the passive zone. These zones include less anthropogenic materials, elongated, densely compacted and subrounded microaggregates, channels and subhorizontal fissures that signal trampling on sandy surfaces (Macphail and Goldberg 2018:345).

The active zone is the uppermost layer of the floor where material was actively being deposited in the sediment. The anthropogenic materials associated with these prepared floors are predominantly accidental inclusions dropped onto floors, trapped below mats, and able to escape cleaning efforts by their small size. These deposits are most easily observed in thin section and appear as “well-sorted aggregates which can include large amounts of anthropogenic microartifacts…wholly fragmented microartifacts and microaggregates… delicate charcoal and burned bone becoming broken up by trampling, becoming part of a well-sorted deposit” (Macphail and Goldberg 2018:343). Matted floors like those seen in Hawaiʻi complicate the signature. Floors become less compacted by trampling when covered by mats than they would otherwise, and fine sediment becomes integrated with plant fragments that are relics of the matting (Macphail and Goldberg 2018:345). However, it is possible to differentiate between indoor and outdoor traffic based on the materials found in the active zone. House deposits “often include fragmented floor makeup, ash aggregates, charcoal, burned clay, and bone" (Macphail and Goldberg 2018:345). Trampling in dry conditions on covered floors like those found inside Nuʻu houses (particularly close to hearths) would result in loose packing when compared with the reactive zone below. In wet conditions where the floors are not covered, deposits become densely packed. Larger objects may relate to permanent or routinely used installations, but more likely, to placements associated with the last uses of the house or discard after house abandonment. Thus, the microstratigraphy of these contexts provides a more reliable basis on which to understand activities related to their construction and use.

Finally, the sedimentary or sealing layer can include surface soil horizons, dumped waste on top of the active floor zone, collapsed roofs, or desiccated floor coverings (Macphail and Goldberg 2018). These layers cap the active floor and signal the start of a new active floor zone, or the end of the use-life of the house. In Nuʻu, these contexts were found to be present following the abandonment of the site features, which I will discuss more extensively below.

Micromorphology samples taken from the NUU-2 units exemplify the characteristics of active, reactive, and passive floors in Nuʻu (see Table 7.1for descriptions of the microfacies). Sample NUU2R9MM1, in particular, captured the probably location of the active floor when the feature was in use. Figure 7.9 shows the different stages of activity that led to the development of the house floors with photos of features in the slides evidencing these events (see Figure 7.8 for the key to the symbols used on the thin-section illustrations).

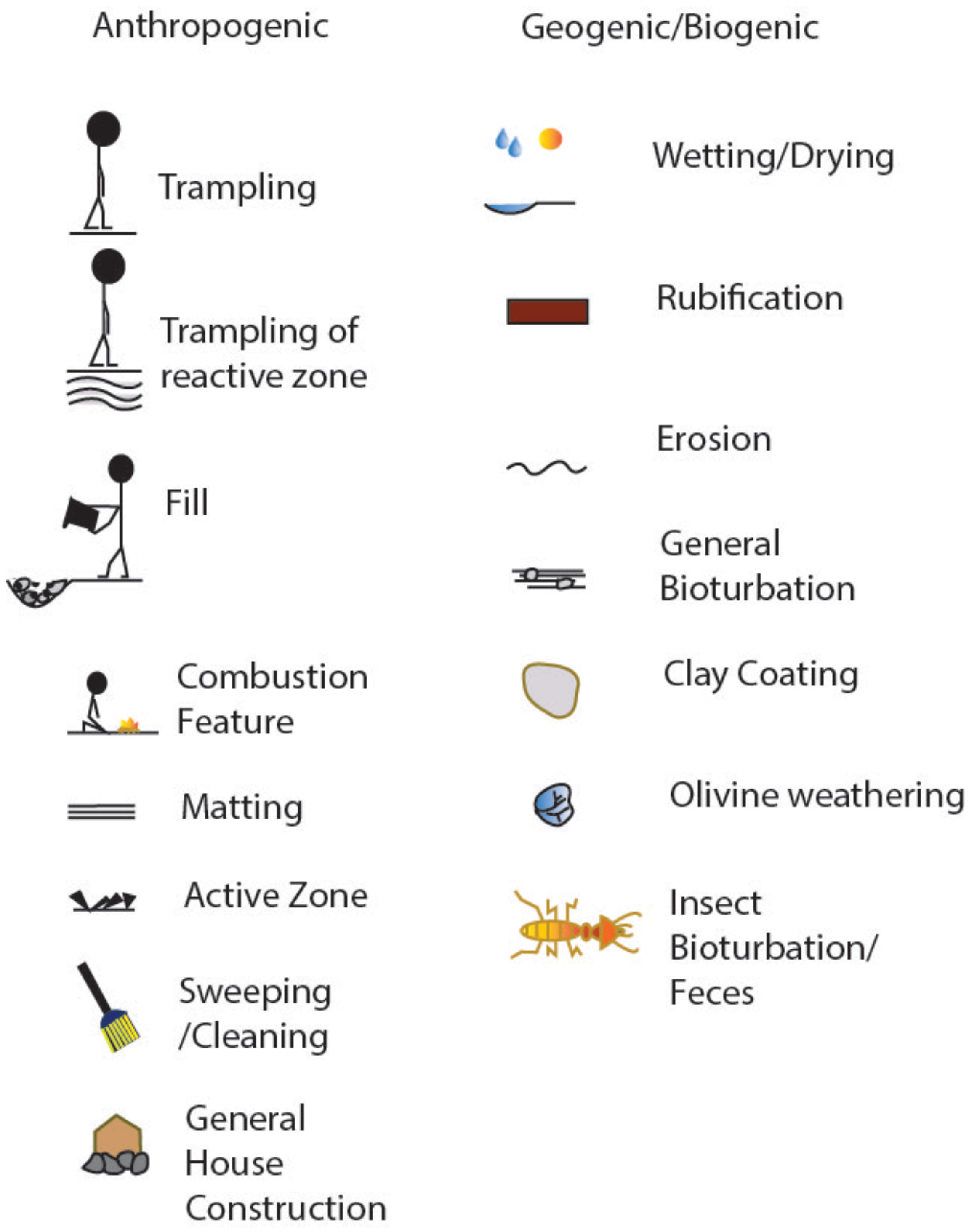

Figure 7.8: Key for processes identified in micromorphology illustrations

Feature	Artifacts	Microartifacts	Microbotanicals	Granulometry	Bulk chemistry	Micromorphology	Units/Layers /Levels	Thin Section Beds
Sedimentary/sealing layer with floor covering	Less fragmented materials. A variety of materials, denser materials (particularly basalt debitage).	Increased density of lithic debitage than active zone, decreased density of charcoal compared with active zone.	No information available	Coarse sand to pebble-size fraction dominant	Elevated pH (Moderately acidic) but lower than super-levels. Elevated LOI compared with active zones and reactive zones (22+%)	Poorly sored, heterogeneous deposits. Peds of varying sizes randomly oriented and distributed. Complex packing voids are most common void types. Low compactness with an estimated 60% void space. Peds are dominant microstructure for fine material with limited interstitial fine fraction. Coarse enaulic related distribution (peds are considerably larger than coarse material) Obliquely oriented micro-artifacts distributed parallel to the groundmass. Plant tissue with parallel orientation and oblique orientation. Cross-cut stems.	Unit R9 Layer II Level 3. Unit R4 Layer II, III. Unit R5 Levels 3-4, Layer II, III. Unit Q5 L2,3 (Layer II)	NUU2R9M M1 Layer II. NUU2R5M M1 Layer II, IIIA
Active indoor/outdoor floor built up through time with continued use.	Variety of materials that are highly fragmented. More fragmented and weathered faunal remains (shell and bone).	More fragmented microartifacts, lower density, Abundant microcharcoal.	Palm phytoliths present. Dominant bulliform/elongate forms.	Clay to fine sand-size fraction dominant	Elevated pH (Moderately acidic to slightly acidic). Elevated LOI compared to reactive zones (17-19%).	Moderately sorted, heterogeneous deposits. Peds of varying sizes. Blocky, subrounded peds along boundaries between microfacies. Sediment peds form around the limited anthropogenic residues, creating a coarse enaulic structure (peds are considerably larger than the coarse material). Complex packing voids are most common. Compact with an estimated 20% void space. Finer, fragmented pieces of anthropogenic material. More compact that supra-microfacies with more fine material in between larger peds. Planar voids through	Unit R9 Layer III, Levels 4 (transitional) to 6. Unit R4 and R5 Layer IV (Level 5). NUU2Q5MM1 Level 4	NUU2R9M M1 Layer III, NUU2R10M M2 Layer III. NUU2Q5M M1 Layer IIIB

						subangular blocky peds. Some evidence of rubification. Plant tissue in voids in parallel and perpendicular orientation. Cross-cut stems.		
Reactive zone, extant house floor or debris of previous episodes	Same artifact classes but less dense than active zones, progressively fewer artifacts towards bottom of reactive zone. Highly fragmented, largely unidentifiable faunal remains.	Highly fragmented materials, but higher densities of materials, Specifically lithic and charcoal.	No information available	Bimodal distribution with clay to fine sand, and coarse+ pebbles dominant	Elevated pH (slightly acidic), LOI equal to active zones (17-19%	Moderately sorted, heterogeneous deposits. Randomly oriented and distributed peds, densely compacted subrounded microaggregates. Absence of planar voids through subangular blocky peds. Equal enaulic or gefuric related distribution. Complex packing voids are most common void type. Low compaction with an estimated 40-60% void space. Sparse organic matter, sparse to moderate anthropogenic deposition (including faunal remains and charcoal) that is randomly distributed and oriented. Limited weathering of anthropogenic deposits. Clay coatings on subrounded basalt.	Unit R9 Layer III Level 8. Units R4 and R5 bottom of Layer IV (Level 6)	NUU2R9M M2 Microfacies 1, 2, and 3, NUU2R10M M2 Layer 3. NUU2R5M M1 Layer IV
Passive zone, possible prepared surface for construction of the house wall and floor.	Limited if present. Highly fragmented, unidentifiable faunal remains if present.	Absent	No information available	Clay and silt dominant	Elevated pH compared to active and reactive zones (Slightly acidic). LOI decreased compared with all supra contexts.	Well sorted, homogenous deposit with close porphyric related distribution. Vughs and channel voids are more common than packing voids. High compaction with an estimated 15% void space. Anthropogenic material is rare if present, found along the upper boundary, and highly fragmented. Heavily weathered minerals, infillings in voids, and clay coatings around coarse fraction.	Unit R9 Layer IV Level 10. Units R4 and R5 Layer V (Level 7)	NUU2R9M M2 Layer 4.

Possible post hole	Sparse aside from charcoal	Sparse aside from microcharcoal	No information available	Uncertain	Uncertain	Moderately sorted, moderately homogenous deposit. Complex packing voids are dominant type but large vughs are present. Low compaction with an estimated 40% void space. Sparse organic matter. Coarse enaulic related distribution with sparse anthropogenic materials. Aggregates with densely packed charcoal. Aggregates are distributed in clusters. heavily weathered minerals. Some infilling of voids, thick clay coatings on minerals and thin clay coatings on weathered basalt.	Unit R10 Level 4-7	NUU2R10M M2 Layer 1
Possible matted area of active zone	Presence of smaller artifacts, less dense than context that represents abandonment, but equally varied.	Highly fragmented cultural materials.	No information available	Finer particles than previous layer, dominated by clay to very fine sand	Lower pH than active zone below (Slightly to moderately acidic), organic sediment higher but comparable LOI to active layers below (16-17%)	Heterogeneous, moderately sorted. Soluble spaced coarse enaulic. Primary void type is complex packing void. Less compact with an estimated 30-40% void space. Granule and lenticular microaggregates with planar voids. Dominant coarse component is microcharcoal. Other anthropogenic materials are rare. Coarse components are clustered, randomly oriented. Desiccated plant material. The microstructure is complex and appears mottled with some areas less dense than other. No clay coatings observed around anthropogenic materials, only around mineral grains and inherited basalt. Highly weathered basalt and olivine.	Unit R10 Layer II Level 4-5	NUU2R10M M1 Layer 1
Active Indoor floor close to a hearth	Density decreases through context, same	Increasingly fragmented and less dense but includes more	No information available.	Dominated by clay to fine sand.	Elevated pH (Slightly acidic), organic sediment with	Heterogeneous deposit, poorly sorted. Complex packing voids are dominant type. Medium compaction with 20-30% void	Unit R10 Layer III Levels 6-7	NUU2R10M M1 Layer 2

	type of artifacts as those found above the context, but less dense.	cultural material than contexts above the floor that represent abandonment events.			LOI the is higher than Passive zone, lower than top soil (15-17%)	space. Mixture of coarse enaulic and equal enaulic. Primary coarse component is anthropogenic and includes burnt bone, shell, dense microcharcoal, and debitage. Anthropogenic and other coarse materials are randomly oriented, but clustered. Sparse fibrous plant material. Microaggregates are granular, lenticular, and blocky. Microaggregates range in size from fine sand to fine gravel. Heavy pellicular weathering of olivine. Limited incomplete clay coatings around basalt. Absence of rubification and less dense peds separate this microfacies from outdoor microfacies of active floors.		

Table 7.1: Characteristics of different cultural deposits.

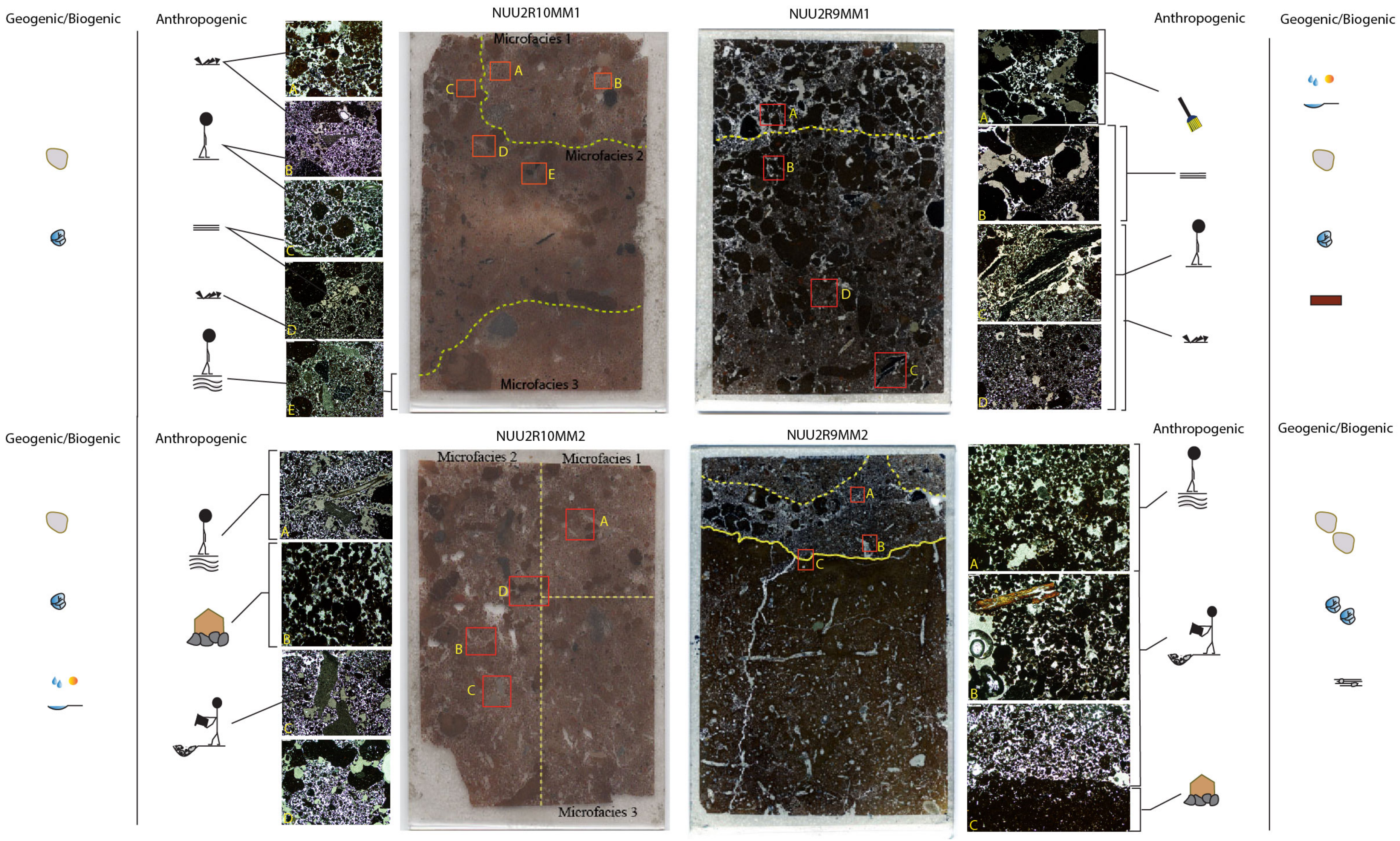

Figure 7.9: Flatbed scans of thin-section slides from NUU-2 Units R9 and R10, photos of inclusions, and explanations of processes.

NUU2R10MM1: Top left: Anthropogenic deposition on the active floor evidenced by (A) PP 10x. obliquely oriented charcoal within a loose deposit and a lithic flake laying (B) parallel (PP 2x) or (D) obliquely to the bedding in between the microaggregates. Trampling of the active floor deposit is seen in the (D) increased compaction (C) and dense microaggregates. (C) PP 4x and (D) PP 2x show plant material running parallel to the bedding within vughs and complex packing voids suggesting the location of possible floor covering. (E) PP 2x Randomly oriented lithic fragments interspersed with dense peds within a compact microstructure indicating the location of a reactive zone. Limited weathering is evidenced through thin clay coatings on inherited basalt and weathering of olivine.
NUU2R10MM2: Bottom left: (A) PP 2x Reactive zone evidenced by the compact bed and randomly distributed materials interspersed with dense microaggregates. (B) PP 4x Part of the house construction—the location of a posthole evidenced by dark sediment with randomly distributed vughy voids and peds arranged in a circular formation within voids (D) PP 2x. (C) PP 2x Sediment fill or reworking evidenced by the looser deposit and randomly oriented and distributed cultural material. Limited evidence of weathering through thin, typic clay coatings and weathering of olivine. Evidence of wetting and drying seen in the amount of large dense aggregates.
NUU2R9MM1: Top right: Sweeping activities evidenced by (A) (PP 2x) the absence of medium to fine material between the aggregates and obliquely oriented artifacts. (B) PP 2xMatting evidenced by the desiccated plant material in voids around dense microaggregates. (C) PP 2x Trampling of active floor seen in density of the deposit (C and D) and in obliquely oriented charcoal (D) PP 2x Active floor signaled by obliquely oriented charcoal. Limited weathering seen in rubification of sediment, wetting and drying causing peds to form, limited formation of clay coatings, and some weathering of olivine
NUU2R9MM2: Bottom right: Reactive zone: (A) PP 4x. Tightly packed enaulic related distribution in a reactive zone with larger, more compacted peds than bed above (photo captures transition) Randomly dispersed deposit with multiple intersecting beds. (B) PP 4x. Dumping or reworking of sediment, see in loose sediment and randomly distributed voids and material culture (picture B shows a heavily burnt bone fragment). (C) PP 2x. clear transition to the C-horizon that is dense with clay and compact without out evidence of human deposition. Heavily weathered deposit with thick clay coatings around the majority of the coarse fraction and heavily weathered olivine. Root bioturbation creating channel voids.

In slide NUU2R9MM1 above, the top layer (Layer II) was observed to be less densely packed with desiccated plant remains and larger aggregates with limited fine fraction between the aggregates, unlike what is seen in Layer III. The organization and shape of the microaggregates and the plant material that appears as if it is overlapping and perpendicular throughout this context suggests that this was the active zone most exposed to trampling and human activity. The microartifacts that are obliquely oriented to the matrix suggest that the floor was swept clean of residual debris with only the smallest, most resilient artifacts remaining (the location of the sample against the wall of the feature could in fact be capturing where debris from the swept floor accrued). Finally, the denser and larger microaggregates present in this context compared with others from the feature do suggest different post-depositional processes. The location of this sample so close to the hearth in Unit R8 caused indirect baking of the sediment which resulted in larger, more resistant peds. Less foot traffic due to proximity to the structure wall may have left micro-aggregates intact. Evidence for the translocation of clay and extensive clay coatings throughout the profile was not observed, making indirect exposure to fire rather than erosion by water the best supported explanation for the more robust aggregates seen in this sample compared with others in the hale.

Layer III, interpreted as the reactive zone, shows more compaction with the micro-aggregates clustered at the top of the layer, suggesting this was the sediment most actively compacted and bordering the top of the active layer. Microartifacts in this layer are smaller, more fragmented than Layer II and elongated peds with anthropogenic material, which indicates post-depositional trampling (Rentzel *et al.* 2017:287). The anthropogenic materials were determined to be deposited in situ rather than inherited with the soil due to the difference in weathering processes that affected the weathered, rounded basalt pieces and olivine minerals. This reactive zone continues through to slide NUU2R9MM2 (bottom right in Figure 7.2) where limited, but densely compacted micro-aggregates with a granular structure are visible along the border with the second layer, and channels have formed through Layer IIIC that relates to poorly developed soil formation interrupted by anthropogenic activity. Less fragmented, randomly oriented artifacts were found in this area as well which suggests that this floor was prepared with fill. The different beds outlined on the NUU2R9MM2 slide also suggest different dumping events to form the floors above.[25] This interpretation means that Layers IIIA, IIIB, and IIIC on slide NUU2R9MM2 were initially passive zones that became reactive zones as the floors were built up or altered with continued use. The absence of anthropogenic material and the dense packing of Layer III on slide NUU2R9MM2 signals that this layer served as the prepared surface on which the house was built (the passive zone).

The thin-section slides from NUU-2 Unit R10 exhibited similar characteristics. NUU2R10MM1 captured an area in the middle of the feature (Figure 6.35) at the same depth of NUU2R9MM1. Fewer aggregates were visible in this sample (likely due to higher foot traffic in an area not adjacent to the wall) but the distinction between a less dense poorly sorted sedimentary or sealing layer with desiccated plant material, a denser, moderately sorted active zone with more fragmented anthropogenic material, and fewer, denser aggregates in a reactive zone with fewer anthropogenic materials. The second slide take from NUU-2 Unit R10 from along the wall captured the existence of a house post and the surrounding sediment as described above.

[25] Beds are stratigraphic features that are greater than 1cm thick and represent one depositional event.

When comparing these zones with the bulk chemistry, granulometry, and artifact data from the same contexts, patterns emerge. The sedimentary contexts were also associated with moderately acidic pH levels, larger grain sizes than active zones, and more organic matter than active contexts. The artifacts and microartifacts in these contexts were less fragmented, with a variety of materials present, including an increased density of faunal materials compared with lower contexts. No microbotanical samples were processed for these samples and so these data cannot be included in the present analysis.

Active zone contexts from NUU-2 R9 and R10 were associated with moderately acidic to slightly acidic pH levels, elevated LOI compared with reactive zones, finer particle sizes compared with the surrounding zones (and better sorting of this fine fraction), and higher levels of organic matter than the reactive zones. Artifacts in these contexts are still dense, but more fragmented than the sedimentary zones and with less material variety (mostly charcoal and some bone), evidencing trampling and cleaning practices. Surprisingly, microartifacts appear to be less dense in these contexts, which may indicate that these smaller fragments are moving through the aggregated sediment (aggregates create more voids that allow for more movement downward). Palm and grass phytoliths were recovered from these contexts as well, evidencing the presence of floor coverings.

Reactive zones were associated with slightly acidic pH levels, decreased organic matter when compared with the active zones, and a bimodal distribution of particles with pebbles and clay/silt dominating rather than sand, suggesting dumping practices. Artifacts are less dense with less material represented in these contexts, but microartifacts are denser at the top of this zone than the previous zone, corroborating their downward infiltration. with fragmentation. However, the increase in the amount of clay outside of aggregates that creates a denser groundmass and makes this zone less permeable may prevent microartifacts from further downward movement.

Finally, the passive zone was associated with slightly acidic pH levels, the lowest level of organic matter of all contexts, and higher levels of clay and silt (although this depends on the proximity of the bedrock—units closer to the bedrock have a higher percentage of gravel mixed with the finer silt and clay soil). Artifacts are limited in abundance, if present at all, and no anthropogenic micro-artifacts were recovered from these passive zones (no microbotanical data is available for these zones either).

Applying these findings to other units allows for the identification of use of space. One caveat to keep in mind, however, is that deposition from different activities alters the pH and LOI of the bulk samples so while the descriptions above are general guidelines for identifying the active floors of houses, the use of different spaces must be considered when interpreting the bulk chemistry (and vice versa).

The thin sections from the other side of the feature in NUU-2, north of the second hearth (with the same spatial association R9 and R10 have with the northern hearth) follow similar patterns. Active, reactive, and passive zones were captured in NUU2R5MM1 Layers II, III, and IV, respectively. The thin section from NUU-2 Unit Q5 displays similar trends, capturing the topsoil, the sedimentary sealing layer, the location of possible matting, and an active zone. Layer I is typical of the topsoil in the region, showing 80-90% organic material. The lack of evidence of any anthropogenic material in Layer II suggests the buildup of post-abandonment sediment. The large aggregates and compactness of this layer also suggest post-abandonment trampling by animals and people in this high-traffic area (cows and coats were seen frequently traipsing over this area of the site). Layer IIIA is the most interesting on this slide, as it shows the clearest evidence of matting seen on any of the slides (accompanied by insect feces within the plant matter) that sat on top of the active zone (Layer IIIB). This evidence of matting was an approximately 100µm thick bed of desiccated plant material below a loose, sealing layer, running parallel to the groundmass.

All of the layers seen in these thin sections were more compact than those observed in the northern units, likely due to this area being a more central, accessible space in the NUU-2 house. The trends observed in the artifact densities and fragmentation and presence of palm phytoliths in the northern units were also true for these samples (see Table 7.1 for layer and level information). However, the bulk chemistry of the samples shows different signatures, indicating different post-depositional trends. The density of charcoal in these units is higher, which may explain the less acidic pH, which contributes to the faster decomposition of organic carbon (as does heat from a hearth).

Floor formation with terrace fill mirrors trampling patterns in the micromorphology but with different material traces and chemical signatures. By comparing NUU2N4MM1 with NUU2K8MM1, we can see that terrace units at the center of traffic in the house have a different signature than terrace units out of the way. NUU2K8MM1 captured the heavily organic topsoil and the rocky substrate that evidences the absence of cultural activity. NUU2N4MM1 captured a distinction between well-sorted finer material and weathered basalt intermixed with aggregates below the organic topsoil that evidences occupation of the site and, thus, some time elapsed between site construction and abandonment. Sand dominates the active zone and gravel dominates the passive zone on which the active zone is laid. The layers in NUU-2 N4 are also far more compact, evidencing more traffic in this space. Artifact and microartifact patterns also follow similar patterns with the top levels in layer II (in the depositional and active zone) containing the most artifacts and microartifacts. What sets this area apart from the floors inside the feature is the very strongly acidic pH values that may be a result of large amounts of degrading plant material. Palm and grass phytoliths were also recovered from the sample associated with this area indicating the area may have been matted, and a lower density of material culture was observed over all.

Two samples from NUU-408 bolster the findings in NUU-2. Sample NUU408H13MM1 shows a trampled active zone with compact, well-sorted sediment filled with fissures atop a bed of fill with gravel-size sized weathered basalt. By comparison, the terrace sample NUU408BE14MM1 shows several poorly-sorted deposits filled with randomly oriented weathered basalt and lacking vertical planar voids that may indicate trampling on dry sediment (Macphail and Goldberg 2018). NUU-408 H13 is most similar to NUU-2 N4 with regards to the very highly acidic sediment and 30%+ levels of organic matter, and traces of palm phytoliths (no palm phytoliths were recovered from Unit E14, showing a marked difference in the use of space). This unit was also similarly lacking in material culture but, as was seen in the units in NUU-2, the sealing layer and top of the active zone produced the densest artifacts. Finally, the sample taken from NUU-155 Unit M23 shares similarities with both of the NUU-408 units. The sediment is compact with fissures throughout, similar to Unit H13, but like E14 the basalt fragments within the deposit are randomly oriented and the care put into preparing a nice surface area is not evident. The types of macroscopic anthropogenic material (fine-grained worked basalt) and evidence of trampling indicates that this floor reflects that of a workshop, rather than a carefully curated domestic floor.

The micromorphological samples combined with bulk chemistry, particle size distribution, and artifact data provides a generative understanding of floor formation in indoor and outdoor spaces, as well as the gradient between the two. The data shows the careful curation of domestic floors with fine sediment and pebbles for fill, and the construction of terraces to provide level living spaces. The data on floors also shows that domestic floors continued to be curated over time by cleaning practices like sweeping, leaving only small, unnoticed fragments to be ground into the floor (or sweeping the fragments under the mat). The densest artifact depositions that were recovered from contexts above the floors resulted from the most recent household activities or midden deposits that were not cleaned out and discarded elsewhere before the house was abandoned. Applying this information to the sites already discussed and to sites not yet reviewed due to the absence of micromorphological samples, provides necessary context for interpreting the artifact assemblages for the purpose of better understanding the use of space across these house floors.

Living in the Kauhale

Indoor and outdoor spaces were equally central to life in a kauhale. Stewart in 1828 observed that Hawaiians did most of their living (and sleeping) outdoors, only venturing inside during inclement weather (Hiroa 1957:79). The very design of kauhale preferences the inclusion of outdoor space rather than encompassing all activities under one roof. The houses in this study reflect the fluid nature of indoor and outdoor space on the Hawaiian landscape.

NUU-2

Combustion features define the living space in NUU-2/3, the large kauhale mauka of the smaller six sites. Two hearths were uncovered in the L-shaped feature separated by an area paved with smooth cobbles, and another combustion feature was found in the large circular feature deemed NUU-3. Unsurprisingly, the most common material recovered from any unit was charcoal due to the multiple combustion features present on site. Debitage and fire-cracked rock, other common materials marking the location of past fires, were also present at high densities in and around the hearth spaces. The flora and fauna recovered are the equally compelling materials, however, telling a story about the people that lived in this space.

Four and a half units were excavated around the hearth in the southern half of the L-shaped feature (including the initial test unit that uncovered the hearth). All of the units show surprisingly dense deposits of kukui (*Aleurites moluccana*), a candlenut that served a variety of purposes in the ancient past as medicine, food for babies, ornaments, dyes, and candles for the houses (Abbott 1992; Handy *et al*. 1972:231-2; Lincoln 2009:88-89; Malo 1951:21; Wagner *et al*. 1990:598). A full lithic analysis was not conducted on the basalt fragments, but none from this context were considered connected to adze production. The faunal material from this area was identified as pig (a molar) and unidentified fish bones, both a rare protein in this dry landscape. One shark's tooth was also recovered from collapsed wall fall (debris (and therefore not be directly associated to any one floor zone). Individual shark teeth were used to cut hair (Malo 1951) and as knives for food processing. Shark meat was also a revered delicacy. The only shell remains that were identified with any certainty were determined to be *Cypraea caputserpentis,* a species of cowrie commonly found in the Nuʻu sites that indicates a connection with makai communities, or travel to the water's edge where these sea snails live in the rocky crags to collect supplemental food for their diet. *Cypraea caputserpentis* shells were also known to be used for lei making, but this required whole shells not found on site. Eating cowries meant breaking the shells open to retrieve the meat to heat over hot coals. All of these materials were found throughout the deposits (both in macro-and micro-artifact remains), but faunal remains in particular became increasingly fragmented and difficult to identify in deeper deposits. Coral was the only material recovered in the deeper deposits that was not found near the active floor zone. Coral stones were used to make different household implements like wooden bowls, or grating tubers (see Table 4.6).

The location of the materials in the units speaks to repeated practices over time, but also evidences one important change. The profiles in Unit R5 showed dense charcoal deposits in the shape of a scooped hearth or broiling feature below the level of the current hearth. The micromorphology sample NUU2R5MM2 further supports this interpretation, showing a dense, dark deposit with burnt bone randomly scattered throughout, with a sediment cap filled with large dense aggregates and interstitial fine material indicating the presence of a floor. It appears that at some point a combustion feature was utilized in Unit R5 before the feature in NUU-2 TU2 was built, perhaps as an earlier version of a hearth or a convenient bed of coals to broil meat on rather than cooking it in the earth oven (Hiroa 1957; Titcomb 1969). The deep deposits of charcoal, bone, and lithic debitage are thus explained as related to this earlier feature.

These materials together with their contexts begin to tell a story. The presence of the hearth orients this area as a place for cooking and the materials as byproducts of meals. These items suggest meals supplemented with protein from the sea and from land. The presence of banana phytoliths and burnt tubers also provide evidence that plants were included in these meals. The coral and lithic debitage even has a role in this interpretation—sharp stone debitage and shark teeth used to carve meat, and coral was instrumental in producing the household implements needed to prep eat food (coral may only appear in deeper contexts because it was briefly needed, or simply was removed from the house floors). One can imagine the kukui nut serving multiple purposes—as supplements to meals, medicine for upset stomachs, and candle light to brighten the dark house at night.

The four units excavated around the northern hearth revealed similar patterns, including evidence of an earlier combustion feature in Unit R10 that was also capped with a floor. The artifacts in R4 and R5 were twice as dense as the deposits in R8, R9, and R10 but the units to the north had a wider variety of materials and far denser deposits of microartifacts. The microartifacts reflect the charcoal, bone, lithic debitage, and shell materials found in this space indicating consistent use through time. Micro-bone fragments (both burnt and unburnt) are particularly prevalent in the active and reactive floor zones, indicating food processing and consumption here. The faunal material identified in this area included dog teeth and bones, multiple shark teeth (some of which were burnt), undetermined fish species, *Cellana* sp. (ʻopihi), *Cypraea caputserpentis* (cowrie), and sea urchin test. The clear difference between this faunal material and the faunal remains in the units to the north is the presence of dog and ʻopihi, and the absence of pig. ʻOpihi is another species that lives on the rocks in the intertidal reef zone. The meat was often eaten raw as a delicious snack or used as supplemental protein for meals and the shells served as scrapers. Dog was also eaten as a delicacy, and the canine teeth used to make ankle decorations for male hula dancers. Aside from the typical materials found across the space (kukui nut, basalt debitage, charcoal, banana phytoliths), these units also had multiple ʻiliʻili dispersed throughout the units, a small worked bone fishhook found beside the hearth (Figure 4.5), and denser coral deposits.

Both of these hearths were in use in the same period according to the calibrated radiocarbon dates (Figures 6.23 and 6.42). The hearths were in use by different household members simultaneously based on the difference in materials. Moʻolelo describing the ʻai kapu talk about wāhine and kāne eating separately and outline the foods favored by each gender (specifically, the foods kapu to wāhine, see Chapter 4 and Appendix A for a more detailed discussion). These moʻolelo describe pig as kapu to women because it represents the male deity Kū. Scholars have postulated that elite women replaced pig protein with more highly valued dog meat, a favorite of the chiefs, although Lucy Thurston wrote in 1820 that dog was considered such a delicacy that it was not allowed to pass the lips of women (Titcomb 1969:7) and Mary Kawena Pukui noted that dog did not become a favorite food of aliʻi wāhine until after the abolition of the kapu system (Handy and Handy 1991:245). The presence of dog does also explain the ʻiliʻili, stones that could be heated and placed inside of the dogs which were wrapped in banana leaves and cooked in the imu (Titcomb 1969:10). The stones that would have been removed and discarded when the animal was eaten. The separation of pig and dog between these two hearths, however, does presume a gendered separation of the food.

Figure 7.10: Possible adze flake and cooking stone from the northern hearth of NUU-2

One interpretation for the northern hearth is that the presence of excess protein (including the most favored dog meat and dog teeth used for male hula anklets), the bone fishhook (associated with male labor), and the location of the hearth in the northeastern or sacred corner of the house suggests that this space was designated for kāne. Conversely, wāhine were said to have raised and cared for the household dogs, and not enough information exists to confirm dog meat was kapu to women. The excessive amount of shellfish in Units R8, R9 and R10 represents women's labor, and tools or dye made from sea urchin were most commonly used by women to make kapa cloth. Some historical sources also mention women and children engaging in inshore fishing, which the small bone fishhook would be more suited for as opposed to the deep-sea fishing men more commonly participated in. The pig tooth found in the southern unit can equally be interpreted as associated with either kāne or wāhine. While pig was considered kapu to wāhine (as was shark and banana which were found at both hearths), pig tusks were used to make bracelets and the jaw used as a grooving tool for tapa (which was made by women). Regardless of the many possible gendered associations that could be interpreted for these two spaces, it is clear that the household was following the ʻai kapu to a certain extent by using two separate hearths (albeit in the same hale) demonstrating both gendered use of space and adaptation to the local social system. Two separate imu ovens were not recovered, but it is possible another existed in a nearby structure.

The large circular structure recorded as NUU-3 proved to be a unique feature not found elsewhere on the landscape. The presence of ʻiliʻili, dense lenses of charcoal and ash, bone fragments from shark, pig and *Scaridae*, and charcoal as the only recovered microartifact led to an interpretation of this feature as an imu house. This interpretation was bolstered by the presence of stones lining the bottom of the unit, and what appeared to be a lens of sand and pebbles (used to cover food in earthen ovens while cooking). Banana and palm phytoliths were also found in this unit (the leaves are used to wrap foods and bananas can be cooked with meat for flavor) but grass phytoliths were less frequent than terrace units indicating that the palm phytoliths were not from floor coverings, but rather oven covers. Organic carbon levels were lower than the comparative samples, indicating consistent heating, and the pH range fell within the moderately acidic range indicating input of organic material. The absence of dog bone in this feature is interesting, but not wholly surprising considering oven features were frequently cleaned out. The presence of pig and shark bone, however, does confirm that both of these species were cooked and eaten on site. This feature is unique due its sheer size and thickness of the walls. Typical oven houses were C-shaped, but this feature suggests greater importance was placed on this oven.

Little artifactual evidence was recovered from the terrace spaces, but the LOI levels found in Unit N4 do suggest some use of the space. The absence of a clear hale noa, or sleeping house may indicate that, while space for food preparation and consumption was privileged, this area may have also accommodated sleeping space. Sleeping near a fire would have made the cooler nights on the mountain slope more comfortable, but sleeping in the same area where food was consumed was considered kapu. Any of the large terrace space could have been used for this purpose—as Stewart noted in 1828, Kānaka did not have a problem with sleeping outside. The LOI percentage above 30% in Unit N4 suggests that the many mats piled on top of one another to sleep on may have been placed in this area just outside the hearth space in the inner confines of the feature. Alternatively, this feature may have only been used as a place to prep, cook, and eat food with household members sleeping elsewhere.

NUU-152

Though the smaller kauhale to the south lacked the richer material record of NUU-2, but interpreting how households lived in these spaces is still possible. The architecture of site NUU-152 most resembled classic kauhale styles with multiple features associated with the same complex. Feature D had the densest artifact deposits and clear stratigraphic profile of layered charcoal, ash, and burnt sediment (seen in Figure 6.74 and 6.75) that indicated this C-shaped feature served as an oven house for the household. At the level of the oven feature, remnants of shell, sea urchin, kukui, coral, and ʻiliʻili were recovered in high quantities along with small amounts of mammal and fish bone (the only identifiable mammal bone were pig's teeth). A variety of shell species were identifiable, however, suggesting that these marine resources were the primary source of protein for the house. The most common mollusk species were *Cypraea caputserpentis* (similar to NUU-2), but *Drupa* sp. (possibly makaloa or *Drupa recina*) *Nerita* sp. (pipipi), *Cellana* sp. (ʻopihi), and *Planaxis labiosa* were also found. The heavy focus on in-shore marine resources not only represents the labor of women and children, but also the primary source of protein in the household diet.

The small quantity of artifacts and microartifacts recovered from Feature A provided the least amount of information for this site which was surprising for the oldest feature in this or any of the sites that were excavated. Limited basalt flakes, a coral file, and bits of largely unidentifiable shell evidenced a multiplicity of possible activities happening in that space over the years. Charcoal and lithic microartifacts collected also did not suggest any specific activity for which this space was used. A dense charcoal lens signaled the location of a convenient fire—possible for warmth or light (burnt kukui were found nearby) but no faunal material was found in the lens. The particle size of Unit J6 shows little difference from the comparative samples, and J7 is most similar to fill contexts, unsurprising for a unit so close to the stone wall. The levels of organic matter are also indistinguishable from comparative samples, only the slightly acidic pH, and presence of banana and palm phytoliths separate this context from comparative samples. The absence of evidence in this space, the rectangular enclosed shape of this feature, and its status as the first feature in this kauhale suggest that this space was used as a hale noa or sleeping house. The lower levels of organic carbon and limited excavation space, however, make this interpretation tenuous at best. The tools found lodged in the rock walls used as shelves, and array (but limited density) of artifacts do support this conclusion, however, as hale noa spaces were multipurpose spaces where people socialized, played games, worked, or relaxed indoors.

Feature B was a unique feature not observed in the other Nuʻu kauhale. This large C-shaped feature encompassed as much space as the terrace with a thick corner to support the wall that blocked the winds from the east. Kauhale features described as encompassing this much open, flat surface area were said to be used for kapa making, an interpretation supported by the materials excavated from Units AE9 and AE10. Sea urchin, the only source for purple die for kapa cloth, was found intermixed with burnt kukui nut (used for brown and black dye and charcoal (used for black dyes) (Abbott 1991; Hiroa 1957; Koojiman 1972). No evidence of in situ burning was found, however—only lenses of charcoal, shell, and sea urchin randomly dispersed throughout the unit, as if discarded. Other objects present were also used in kapa production or weaving—‘ili‘ili to weigh down the light cloth, and volcanic glass flakes as convenient cutting tools. While these materials are found elsewhere, the amount of each type of tool, and the associated spatial contexts that points to tapa making. The overabundance of sea urchin in particular that was mixed with charcoal deposits and large worked volcanic glass flakes which leads to the interpretation of this space a place where tapa was made. The other shells that were present in any abundance at the level of the active floor zone were ‘opihi, used for scraping the bark from which kapa is made. The microartifacts confirm the use of charcoal, lithic, and shell in the active layers (as does the slightly acidic pH), but also recovered fragments of bone even though none was recovered through macroartifacts. If these fragments are from anthropogenic activities, they may have resulted from the use of bone tools in the kapa-making process (i.e., bone needles or jaws as grooving tools). The materials present and evidence of absence of palm phytoliths, and in situ burning indicate that this was not a carefully curated house floor, but rather a work space for kapa making.

The terrace units (one placed in Feature E and one along the wall that surrounded the site) were not artifact dense, but did include the same type of tools found elsewhere on site—namely worked basalt flakes and worked volcanic glass flakes (see Figure 7.11 and 7.12). Only sediment data from terrace Unit U14 was collected and processed, which proved unreliable due to the location of this unit along the primary goat path through the site. However, the worked stone flakes in conjunction with the same species of shell found elsewhere from both terrace units support the interpretation of this site as a workshop.

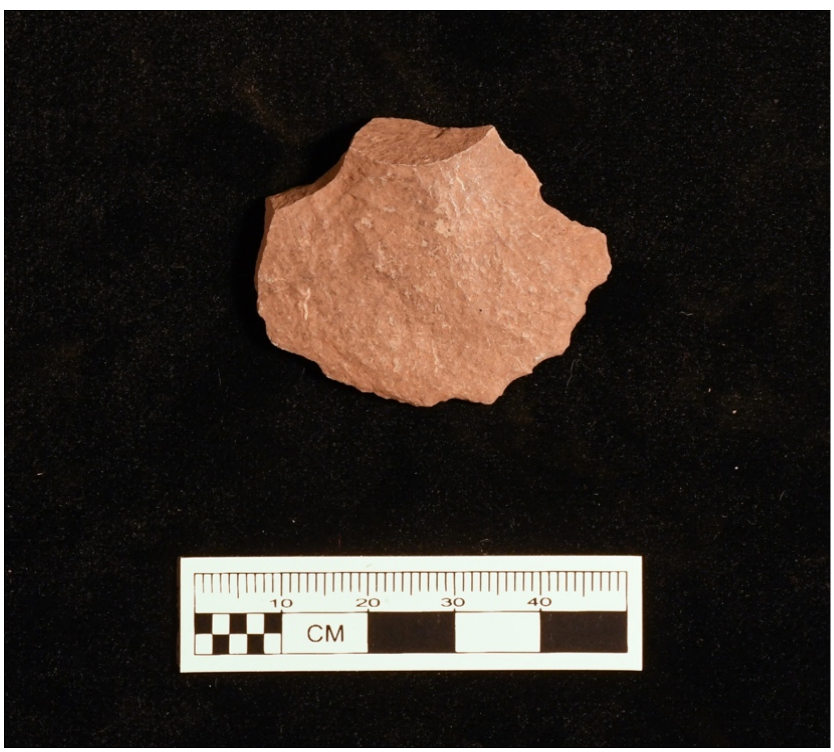

Figure 7.11: A worked basalt flake from NUU-152 Unit U14

The order of construction of this kauhale evidenced by the radiocarbon dates of the time periods when the features were in use shows that, unlike NUU-2, Kānaka who first built this space privileged indoor sleeping/all-purpose space over designated eating areas. Features and terraces for craft production were next privileged before finally an oven house was added (but only one). Based on the architectural and material evidence, this house was less concerned with following ʻai kapu regulations than producing goods[26]. The evidence also shows a continuity in artifacts, with the same materials cooked in the oven, meat eaten, and charcoal and shells taken for dyes or tools in the workshop. This evidences the multiple uses households could get from one type of material.

Figure 7.13: A worked volcanic glass flake from NUU-152 Unit U14.

NUU-420

The small, rectangular feature NUU-420 north of NUU-152, was not clearly associated with other features and therefore cannot be considered a kauhale on its own (only a hale). The palm and grass phytoliths show a carefully prepared floor, likely with a roof, as do the sand-dominant deposits in the cultural layers. The organic carbon levels reaching higher than 30% (above 35% in the deposit from the active floor zone) also suggest extensive floor covering in this feature (although the natural levels of organic matter in this area are high, as is evidenced by the offsite samples). The low density of artifacts aside from lithic debitage from basalt and volcanic glass (one particularly large worked volcanic glass flake was found) and a coral abrader (along with

[26] It is possible that only wāhine used this space and therefore two hearths or two ovens were not necessary.

other smaller coral pieces) combined with the strongly acidic pH levels show little cultural input. Microartifacts were limited to small wood chunks throughout the profiles of the units. The only identifiable faunal remains were fragmented *Cypraea caputserpentis* shells and no evidence of combustion features were found. The types of lithics (sharp carving implements, one piece of basalt shaped like a chisel, and coral (used as an abrader) recovered here, in conjunction with the lack of other material culture, evidences possible wood working activities in this space (an activity associated with men). However, micromorphology data and additional test units would prove fruitful for testing the likelihood of this activity, and whether other activities were also occurring in this hale.

Figure 7.14: Shaped coral and basalt artifacts from NUU-420.

NUU-153

Site NUU-153 to the northeast of NUU-420 and NUU-152 was the most prominent feature along the ridgeline where the hale were built. The rather large and imposing feature with multiple stone courses has limited surface space that could be excavated. Three units were placed in the northeast corner of the middle terrace, finding deep deposits that likely resulted from fill required to build the platforms up along the side of the steep slope. In the corner of the feature, a small hearth was discovered that is the likely source of the dense charcoal in the surrounding units. Banana and palm phytoliths were recovered from the very organic, moderately acidic, sandy sediment of the active floors near the hearth. The dense faunal remains evidence a greater variety of species than found in any of the other excavated Nuʻu houses, including pig, shark and numerous fish bones. Multiple species of sea urchin, cowrie, ʻopihi, pipipi, *Littorina, Planaxis labiosa,* and *Drupa* sp. were also all recovered from this area. The units next to the hearth (particularly Unit P5) were full of discarded hearth remnants down to bedrock. Sea urchin, wood, and charcoal were also evidenced in the microartifacts, as was modern insect activity (termite feces were found attached to larger charcoal pieces). Behind the hearth to the southeast a cache of ʻiliʻili stones was found that continued through the unit to the bottom of the hearth.

The faunal assemblage that dominated seemed to spread to other areas of the structure as well. Along the walkway where a unit was placed next to a flat, smooth stepping stone, few artifacts were found but the array of shellfish matched the species found near the hearth. Fine grained basalt was also found covering the feature and a preform adzes was collected from the surface of the top terrace. The design of this feature would make daily use difficult, rather the space seems more designed for prominence than function which suggests a ritual purpose. The faunal remains found inside, specifically pig and shark (but also some fish) is associated with men as are adzes for wood working. It is possible that this feature was designed to serve as a community hale mua where kāne could retired during kapu nights.

Figure 7.15: Ground adze surface collection from NUU-153.

NUU-142/417

The small site north west of NUU-153 off the main ridge shares design characteristics with NUU-2 but is much humbler. Three units placed along the open rectangular feature in NUU-142 uncovered a combustion feature next to a C-shaped curve in the wall along the southern end and fill from the construction of the wall along the northern end (as opposed to a second hearth). Units O4 and O5 encompassed the combustion feature, which consisted of several basalt cobbles laid flat end to end in a rectangular shape, appearing more like a broiling feature rather than a hearth. The presence of palm phytoliths around the hearth evidence the presence of a prepared mat-covered floor. A micromorphology sample taken from the west wall behind the combustion feature evidenced long-term burning through the dense microcharcoal deposits and burnt sediment aggregates as the only inclusions. The stones of the combustion feature appeared to be replaced every so often, evidenced by a nearby stack of similarly sized stones covered in charcoal in Unit R4 (see figure 6.150). The deposit around this feature mimicked that found in NUU-2. Basalt and volcanic glass flakes were intermixed with dense charcoal deposits and mollusk shells. Although no bone was recovered during excavation, burnt and unburnt bone fragments were identified in the microartifacts. All of the shells that were collected during excavation and in the microartifacts were too degraded or fragmented to be identified. A single piece of burnt tuber and small kukui nut fragments were the only recovered faunal materials. While this space resembles the area where food was cooked and consumed in NUU-2, this household clearly had access to far fewer resources, which may have affected the mode of cooking (broiling versus cooking over a hearth, a more common method for small mollusks).

Figure 7.16: Hammerstone surface collection from NUU-155

NUU-417, initially assumed to be an oven house based on the proximity to NUU-142 and its shape, lacked any evidence of in situ fire. Instead, the strongly to moderately acidic, gravely sediment showed little evidence of anthropogenic input (even exhibiting fewer grass phytoliths than other units on site). The artifacts and microartifacts that were found here (mostly lithic debitage with bits of micro-charcoal) are more suggestive of feature as a storage space with a quick, temporary wall built to block the wind. The construction of NUU-142/417 and the materials found within show the limited resources of the household and may suggest that this was a temporary upland house for farmers moving between the mauka and makai regions.

NUU-155

Sediment and micromorphology data were not needed to determine the use of this site due to the massive amount of surface artifacts including fine-grained worked basalt and tools for working basalt (see Table 6.56 for a list of samples that were collected). However, the signatures described previously that identified the terraces as workshop space bolstered the interpretation of this site as a lithic workshop, likely for adzes due to the finer grained material present compared with elsewhere on the landscape (aside from NUU-152 collections). However, it is possible that other basalt tools were also made here (see chapter 4 for a list of Hawaiian implements made from basalt). Sediment signatures do not indicate that any matting or roofing was present, only the long tall wall to protect the workers from the wind. One combustion feature was found along the wall that evidenced in situ burning. The deep charcoal lens was surrounded by boulders broken down from the bedrock and a bedrock outcrop which would have protected it from the wind sweeping across the ridge. Bone and shell fragments were recovered from this area and not from this area but were not identifiable. Shell fragments recovered from the terrace, however, show the presence of *Cypraea caputserpentis*. The feature therefore may have been the location of a one-time use fire to cook a quick cowrie snack.

NUU-407/408/408B

The kauhale across the field from this main ridge to the southwest produced multiple material traces from the different features, evidencing a clear distinction between their uses in the kauhale. Excavations of NUU-407 uncovered the corner of a combustion feature towards the southwest corner of the wall just south of a large basalt outcrop. The base of the outcrop extends to this northern edge of Unit F3 and provided a nicely sloped surface along which the combustion feature rested. The micromorphology samples taken of this feature show a hearth or oven base resting upon a natural (though possibly prepared) surface and covered by fill. Faunal remains from the level of the feature included *Scaridae* teeth, dog teeth, and unidentified mammal bone along with several unidentified mollusk species. The species that were identifiable from the level of the feature were *Cypraea* sp., *Drupa* sp. and *Planaxis labiosa*. The presence of faunal material and sweet potato starches in the dense charcoal deposits suggest that this area was dug out at some point for the purpose of slow cooking mammal meat (likely dog based on the remains) but was not a permanent oven feature (evidenced by the absence of extensively burnt sediment like that seen in NUU-152) so was covered again as was sometimes common (Hiroa 1957 described this process). The materials found above the feature are indicative of common household deposits—fragments of shell, kukui, volcanic glass and sea urchin randomly distributed. It's possible that this area was frequently dug out to be used as an oven then filled in with the remaining debris and the deposit captured here was the last use.

If NUU-407 bears the signatures of food processing and consumption, the sediment and signature traces of the main platform area in NUU-408 bear the signatures of a sleeping house. As previously mentioned in the discussion of house floors, the prepared surface with palm phytoliths, low density of artifacts, high organic carbon signature compared with other on-site areas, and low pH suggest that the area where H13 is located was covered in sleeping mats. The unit to the south along the lower terrace, E14, does not bear these same signatures, providing a clear juxtaposition between two units in close proximity.

The terrace running along the bottom of the steep outcrop upon which NUU-407 and NUU-408 were built was deemed NUU-408B. The naturally flat, protected surface was built up in this area. Two small C-shapes that were constructed along the retaining wall of the terrace from the boulders cleared from the long flat terrace exemplified the propensity to use natural landforms to ease the burden of construction, a practice particularly evident at this site (see Figure 6.203). Unit J8, placed along the outcrop wall, proved the most compelling with hundreds of tiny sea snails recovered from charcoal lenses throughout the unit (mostly *Planaxis labiosa,* but fragments of pipipi, ʻopihi, sea urchin, and *Cypraea caputserpentis* were all identified in the deposit). The sheer volume of *Planaxis labiosa* suggests that these shells were the target of collection and the others were accidental collections as they all inhabit the same environment along the rocky inshore tidal zone. The *Planaxis labiosa* are small creatures, the meat would have been difficult to access without breaking the shell and hardly worth the effort when so many other intertidal species were available as food. The majority of shells were complete in the deposit with the exception of small jagged holes through the center of the circular base of the shells. A few of the holes appear drilled and some shells appear to have been polished (which may be the function of the charcoal). Shell leis were common in Hawaiʻi, but historical records show they were usually made with pipipi or cowrie shells. However, Hiroa includes an example of a land shell lei of shells that bear a striking resemblance to *Planaxis labiosa*. Making such a lei would have required hundreds of tiny shells and those recovered from Unit J8 might represent the failed attempts of one afternoon's work of lei making.

Figure 7.17: *Planaxis labiosa* shell from NUU-408B Unit J8

Unit E4 in one of the C-shaped features produced fewer artifacts but was still informative. Typical household deposits of charcoal, volcanic glass, lithic, and kukui were recovered during excavation and from the microartifacts. Faunal remnants from *Scaridae* and dog also show a connection between this feature and NUU-407 above. *Planaxis labiosa* was recovered here as well, but in equal quantities to other mollusks more commonly eaten. Basalt debitage was the most common artifact, but did not reflect any evidence of tool making or use in this space beyond one flake found on the surface. The clear inverse relationship between pH and organic carbon in Unit E4 combined with the highest amount of saddle-shaped phytoliths associated with the sub-families of pili grass and sugarcane shows rapid deterioration of organic matter as pH rose (likely because of the organic input). Although this unit did not look like a typical oven house in excavation, the faunal remnants, fire-cracked rock, microcharcoal (and micro-debitage from fire-cracked rock) along with the elevated levels of articulated grass phytoliths from species frequently used to start oven fires all suggest that this feature was at some point used as an oven.

This chapter reviewed how methodologies that attend to both large and small-scale place making can generate dynamic interpretations of the archaeological record. The findings presented here are particularly important for Hawai‘i were the perceived absence of evidence too often leads to a lack of concern for maka‘āinana communities, or neglect of the role daily life played in shaping Hawaiian history. I have presented a model for using floors and thus activity spaces, as an entry point into interpreting the design and use of houses. The study of houses is in turn an entry point into better understanding the development and maintenance of social ties. This project can be implemented and expanded upon to continue to improve our understanding of how Kanaka actions reflected their place-based relationship with their ʻāina and their community. Future directions for this work will integrate a more in-depth lithic analysis on the different types of flakes and materials found across the landscape. Future research will also continue to build a model for identifying house floors through sediment analysis by further exploring the relationship between soil chemistry and anthropogenic deposition. In the following chapter, I bring together the many lines of evidence from the current project in a discussion of the cycles of daily life in this Nuʻu community.

Chapter 8: Moʻopuna
moʻo.puna n. Grandchild, descendant; posterity

The excavated kauhale in Nu'u for this dissertation exhibit variability in their construction. I have hypothesized that this heterogeneity exists for multiple reasons--to meet the needs and desires of the household or community, adhere to social standards, and reflect the social position of the household. Although the moʻolelo reference different lifestyles, fully understanding the heterogeneity of daily life and its deep connection to place requires turning to the material record. Interpreting the material record without overly relying on the historic moʻolelo, thus flattening the diversity, itself presents a challenge. To avoid oversimplification, Ingold (1993) cautions against simplistic interpretations of assigning one activity to one space (an easy thing to do in a place where houses were said to be built for specifically one activity), but rather considering the palimpsest of the material record by relaying multiple possibilities and interpretations for the space. This is what I have attempted for the Nuʻu kauhale analyzed in this study. Pinpointing one activity that happened in a place over time is difficult, but talking about a range of activities that potentially occurred is plausible, leaving the interpretation open to new evidence while also resisting the urge to force kauhale to fit the idealized models portrayed in the moʻolelo. The interpretations presented in Chapter 7 drew upon the moʻolelo, but also upon previous archaeological studies and histories about Polynesia to interpret the unique depositions. Here, I relay patterns and possibilities observed in the Nuʻu community's social relationships.

Markers of Status in the Use of Space

Markers of status found on the built landscape are not as discernable in Nuʻu as they may be other places. Settlement pattern studies in Hawaiʻi identified trends in the status of the household based on the number of structural features included, type of ritual feature present, existence of burial platforms, large amount of dog and/or pig bone, presence and variability of formal artifacts in high densities, imported lithic material, density of faunal remains, and positioning on the hillside (Weisler and Kirch 1985:148). Number of features was not found to be a relevant status marker in Nuʻu, as "kuaʻāina folks were less concerned with the rigid protocols of the ʻai kapu, leaving such matters to those who lived in proximity to the ruling chiefs" (Kirch 2014:115-6). Ritual features to that end were also largely absent, but the types of materials, variability in materials, and position on the hillside did seem to factor into the status of the households.

The placement of NUU-2 with a sweeping view of the households below and the mountain above coincided with a larger site (albeit not a higher number of features or platforms), wider diversity in the material assemblage, and a larger faunal assemblage (particularly with regards to dog, pig, and shark teeth). Although the site only had two architectural features, the presence of two hearths signaled some level of adherence to the ʻai kapu. Several of the sites along the edge of the ridgelines to the south (NUU-152, NUU-153, NUU-155 and NUU-407/408/408B) each evidenced different markers of status. The numerous features in NUU-152 in conjunction with a wide variety of faunal material (including some mammal bone) and evidence of kapa working indicate a position of status in the community. The prominence of NUU-153 with its multiple courses of stone built up the sloping hillside, the presence of fine-grained basalt, and the variety of animal bones found within its floors, (including shark, pig and dog) speak to the prominent position of this architectural feature in the community. The fine-grained lithic scatter imported from a source other than the basalt on the surrounding landscape signaled the reach and influence of the workers in NUU-155. Finally, the impressive, thick, multi-course wall supporting the southern edge of NUU-407 and the many mammal and fish bones found within the multiple features associated with the site indicates this household also held a more prominent position in the community of farmers. Even NUU-420 may have held status within a neighborhood of other craftspeople, if wood carving was a continuous practice rather than a one-time event captured by the sediment. The absence of other status markers, however, including fine-grained basalt for carving and a wide range of materials suggests that the inhabitants did not have access to many resources. The household of NUU-142 was in a similar position, lacking in the influence, resources, or social ties necessary to access the materials that other houses in the area seemed to have in abundance.

Interpreting these status markers is more difficult than identifying them. Information about the embodied ‘taste’ of people in different classes helps with delineating between makaʻāinana and aliʻi. Stahl (2003:832) pulls heavily from Bourdieu, relying on his literature about “taste as a form of practical knowledge”. She uses taste in the sense that styles fall in and out of fashion, affect and are affected by social context and surroundings. Ancient aliʻi taste literally and figuratively favored dog meat above all other proteins for taste (pig was favored for ceremonial purposes) (Titcomb 1969). Aliʻi also favored locations for kauhale outside of agricultural production zones. Finally, the “embodied practical knowledge” (Stahl 2003:827) of the aliʻi dictated following the ʻai kapu and therefore privileging the necessary eating spaces over other types of areas (for example, areas for producing goods). These preferences are illustrated in the design of NUU-2. Still, this kauhale is smaller with far fewer resources than what is seen in other zones. Status and the associated taste that defines status is spatially and temporally contextual, constantly constructed and reconstructed. Breaking free from static interpretations allows for understanding of networks and events as part of a dynamic culture that imbues meaning in objects—a meaning constantly in flux. To the Nuʻu people living in a contemporaneous period with the inhabitants of NUU-2, this household may have simple been seen as aliʻi. To outsiders they may have been perceived as lower chiefs—what Kamakau called kuaʻāina aliʻi, or kaukau aliʻi, for the backcountry was said to have no true aliʻi.

The households to the south of Nuʻu appeared to all occupy varying positions within the makaʻāinana community. Roles were prized differently and households overseeing large swaths of farmland as the NUU-407/408/408B household appears to do were said to be more revered than farmers with often temporary hale placed in the fields they tended (as seems to be the case for the NUU-142 household). If dog bone is a useful proxy for status on the Nuʻu landscape, then the evidence supports the assertion of status for NUU-407/408/408B. Similarly, craftspeople who made adzes and other stone tools, or tapa cloth also achieved higher status positions (although perhaps not as high as overseers of farmland in this agricultural community). The varying degrees of status within this Nuʻu community and the services each household offers are witnessed through the material record. The type of space privileged by makaʻāinana was also observed to be different from the household to the north with commoners privileging sleeping and activity spaces over those associated with eating and the ʻai kapu when designing (or adding to) their kauhale.

The status of the households also appears to have impacted the way in which meals were cooked (which needed to be adapted for the types of foods available to them). Cooking was done using three methods—broiling, boiling and steaming/roasting in the ʻimu (Hiroa 1957:17). Broiling, koʻala or pulehu in Hawaiian, "was used in the fields or at home when the quantity of food did not warrant the trouble of preparing an earth oven" (Hiroa 1957:17). Koʻala refers to the use of a bed of hot coals to cook the food, and pulehu is hot ashes, similar to those found in NUU-142 and NUU-155. ʻ*Olala* was another term used for food turned over a fire to warm (Hiroa 1957:17). Broiled foods included some fish, banana, and breadfruit (Hiroa 1957:18). Boiling required hot stones placed in wooden bowls to cook foods like fish and greens (Hiroa 1957:18). Remnants from this process were observed in NUU-2 and NUU-152. Imu (earthen ovens) were used for roasting and seaming food. The ovens were "placed in shallow holes in the ground under a shelter forming a permanent kitchen" as was seen in NUU-152D and NUU-408B, or "in the open for special occasions if the weather is fine" (Hiroa 1957:18) as was observed in NUU-407. The households of higher status therefore used multiple methods for cooking foods which evidences the variety of foods they had at their disposal. Conversely commoners—particularly those of lower status—appear to have relied on broiling or boiling and may only have eaten steamed or roasted foods at special community events.

Gender and Status

Questioning widespread adherence to the idealized ethnohistoric description of kauhale requires a consideration of how the categories of gender were constructed on the early Hawaiian landscape. What does it mean to be wāhine, kāne, or māhū—categories that differ from our binary western constructs of male and female? Gender identities are affected by ideology and intersecting social statuses. Looking to the everyday lived experience clarifies the ways in which gender ideology was implemented in the material world.

Whether explicit in the minds of researchers or not, archaeological interpretations of kauhale spaces in Hawaiʻi tend to focus on male-dominated social relations and presume women are polluting. Discussions of social status focus on men's narratives in the political sphere while women's narratives are attached to the domestic sphere in terms of kapu restrictions and their status as noa, polluting (with important exceptions being the stories of famous queens like Kaʻahumanu and Liliʻuokalani). However, kāne and wāhine played important roles in both spheres and the Hawaiian social structure did not allow for such a strict dichotomy between public and private life. Reframing these discussions to include the important roles women were also playing outside of the home within the larger political sphere, and reconsidering the power wielded by their perceived danger would align interpretations with a Hawaiian worldview (fulfilling the goals of queer theory and indigenous theory).To fully address the gaps in our interpretations, we must ask how are we resolving crises in our research, crisis such as incontinuities and the unknown that are affecting the interpretation. What is the default interpretation? Do we default to an interpretation of women as polluting because the ʻai kapu practices make the most sense to us through that lens due to normative western gender constructs? Or is there supportable evidence for these interpretations? Kānaka communities were not homogenous and both of these beliefs may have existed in different spaces. Kapu and noa (discussed in Chapter 4) were complex terms that can be interpreted as mutually opposed or conceptualized as mutually beneficial, two different spirits needed to balance one another

(Connors 2009:19-22). The definition and embodiment of ideas such as this does not remain static over time and either could have been privileged depending on the community and the period (or a different understanding could have existed altogether). Taking a place-based approach and looking to the material records helps resolve some of these uncertainties.

The restrictive polluting narrative is not born out by the data from the Nuʻu households. Evidence of two ovens was not observed in any of the sites, and only one site, NUU-2 evidenced two separate eating spaces with the double hearths (a phenomenon described in archaeological literature about Kahikinui houses—see Van Gilder and Kirch 1997). The materials recovered from the double hearths, however, do not evidence a clear distinction in food eaten by the people that used each hearth. Dog, theorized in archaeological literature as protein that replaced pig in the diets of elite women (O'Day and Kirch 2003) was abundant in the hearth with the widest variety of faunal material and sweet potato phytoliths indicating a nourishing diet. If this was in fact the hearth for household kāne, the southern hearth still evidenced the presence of rich meats like mammal and shark (just in lower quantities). In addition, the presence of only one imu observed on site suggests that the household members were willing to cook their food together (or separately but in the same oven). This method for following ʻai kapu indicates a willingness to follow practices that were meant to ingratiate themselves with the gods. The kapu to them was about power rather than fear of pollution. Houses to the south did not appear to follow any ʻai kapu restrictions (based on the units excavated), suggesting they were not concerned about pollution either and did not occupy a position of status (or possess the mana) that made following the constrictions within their kauhale worthwhile[27]. Lilikalā Kameʻeleihiwa (1992) typifies this perspective of noa and kapu, stating "It was the Aliʻi Nui who had to follow the dictates of the ʻAikapu most closely, because they were the Akua on earth who mediated between ordinary humans and the destructive-reproductive forces of the unseen divinities of the cosmos"…Kameʻeleihiwa explicates a foundational Kānaka epistemology of balance here, their understanding of human existence—a person could not both be akua and makaʻāinana, or a deity and field laborer. Balance of spirits and balance of roles was necessary to care for one another and the shared ʻāina. This balance is reflected on the built landscape and in the material record through the variability in the way people designed and used their spaces—each diverging from the stated ideal and therefore non-normative, but not explicitly subversive.

Analysis of material culture outside of spaces associated with food is also generative for understanding gender constructs. Material culture is coded with meaning that "serves as a bridge between generations and events", allowing for the preservation of "gender ideology through time as long-term structures develop" (Sørensen 2000:236). However, the two most studied classes of artifacts in Hawaiʻi (and the Pacific at large) are fishhooks and basalt adzes—both indicative of men's work. This heavy focus artificially inflates the importance of these tasks over those traditionally performed by women (e.g., tapa making and weaving, both researched extensively in work focused on contemporary or historical practices, but archaeological work is lacking). While this is partially due to the resilience of basalt and shell over those associated with women's labor, these phenomena does not completely explain the inconsistency as both shell and basalt are also used to make tools for women's work (and often the presence of shell on site itself signals women's labor, as previously discussed). Whittaker (1994) warns us that past studies

[27] We must also consider the possibility that these houses did not have more than one gender of occupants. It was possible for people to live alone, with family and friends of the same gender, and/or in aikāne relationships.

have remained biased on this front in that most research on stone tools has focused on male knappers. This does not mean that females did not knap, it means females (and female tools) were not studied which creates a selection bias. For example, wāhine required stone tools for tapa work and for weaving, doing the gathering and processing of materials themselves. Studies of stone tools used by men and women outside of adzes exist but are rare (e.g. Allen *et al.* 1995).

Activity spaces in some of the Nuʻu kauhale specifically point to stone tool use by women. Most pointedly, stone fragments indicating the presence of cutting tools were found around both of the double hearths in NUU-2 which evidence use of the tools by kāne and wāhine. A more interpretive use of space in NUU-152 suggests that women were knapping and using stone tools found on site in the tapa-making process. Finally, although finished adzes were used by men to carve wood, the literature does not specify that adze makers were male, only that "ax-makers were a greatly esteemed class in Hawaii nei" (Malo 1952:51). It is possible that in a place like NUU-155, the crafters of the dense lithic debitage, could have been of any gender.

It is important to note here that materials do not equal individuals. We must remember that these divisions of labor by gender are guidelines handed down through antiquity. The presence of materials associated with tasks generally performed by kāne or wāhine may suggest their presence but does not ensure it. Community labor was common in ahupuaʻa. The materials that represent different social identities such as gender or age may not, therefore, represent the labor of individual household members, but rather labor of community members. Conversely, the materials may represent the labor of someone in a single-gender household without another to perform the task.

Time and Rhythms in Nuʻu

The approach to the built landscape that I take in this dissertation provides a broader picture of daily and yearly cycles that the community went through together. The cycles in Kaupō were linked to the wet and dry seasons that dictated the planting cycles. These were inherited cycles from Polynesian ancestors, but also specific to the Nuʻu ʻāina. The Polynesian calendar revolved around thirteen-month lunar cycles perceived as endless iterations of the wet and dry seasons (Kirch and Green 2001:265). Months were also associated with rituals connected to the agricultural cycle. Nuʻu life also revolved around a two-season cycle. Heavy rains would come in February that signaled the start of the planting season. The rocky slopes then needed to be cleared and planted with tubers and other secondary crops like bananas and sugarcane to protect the tubers from the harsh elements while providing additional moisture. Phytoliths and starches from the house context confirmed the presence of these three crops in Nuʻu. Food would have been scarce during planting season as the stores from the previous planting cycle ran low and would not be replenished until the harvest. The community would have relied more heavily upon upland forest and marine resources to supplement their diets during these periods (Handy *et al.* 1972:32). Subsistence strategies relied upon by the Nuʻu houses are seen in the remnants of flora and fauna gathered from around hearths. Mollusks collected from Nuʻu samples (e.g. pipipi) have peculiar habits that were said necessitate specific gathering practices, which the Nuʻu communities may have engaged in when they were not farming:

> "Fishing and ocean gathering were carried out according to the moon phases and the stars. When the stars were numerous and bright, that was the time to go and

> look for the shellfish such as kūpeʻe (*Nerita polita)*, which usually hide during the day. This gathering was done in the utmost silence, lest the shellfish drop and burrow to hide themselves" [McGregor 2007:93]

The mounded agricultural field embankments recorded running through the swales on the dry landscape show the community was engaged in intensive sweet potato planting (Malo 1951:205), a crop that required six months (approximately 30 days per lunar month) of planting and cultivation (Malo 1951:205) with planting in Kaupō said to have begun in the Gregorian month of August and ending in April (Handy and Handy 1972:128). Historic documents also recorded four kapu periods in each month, for a total of nine nights, five full days (with the kapu imposed at night and lifted in the morning following either the second or third night) each month, (Handy and Handy 1972:40; Malo 1951:32). These nights of kapu and ordinary worship days were suspended during the Makahiki period, in which "men, women and chiefs rested and abstained from all work, either on the farm or elsewhere" (Malo 1951:33, 141). If these kapu days were observed during the time the Nuʻu kauhale were occupied, we can hypothesize that hard labor in the agricultural fields occurred 150 days per year rather than 300. The off-season may have been spent around the kauhale making mats, baskets, spinning cord, repairing house thatch, making weapons, fishing and hunting gear, carving cups or other containers, or other household goods necessary for daily life (Handy and Handy 1972:29-30).

The daily cycle is more difficult to discern. More labor was required for rain fed agriculture based on historical information provided by Malo (1951, discussed in chapter 5) and through ethnographic information that quantifies the amount of labor necessary for producing yields that can support the community. Yen's (1973) Anuta Island study suggested that "annual labor of 2.9 workers per hectare" was needed "assuming that 300 days a year were devoted to subsistence activities", twice the amount required for wetland agriculture (Ladefoged 2009:2381). The area in which five of the seven excavated kauhale were located (along a horse-shoe shaped ridge between the other two sites) measured approximately 4 hectares, of which 1.6 hectares are covered in surviving agricultural ridges (Figure 6.6). Assuming that the community worked 300 days of the year at 8 hours per day, approximately five adults were needed to farm the area directly adjacent to these house complexes.
Malo (1951), and Handy and Handy (1972) describe farmers as working in the fields during the day and at night, with some spending more hours than others on their crops. If an eight-hour average work day is assumed (a big assumption based on modern labor practices), with 150 days of labor in the fields, twice the amount of labor would be required. Therefore, anywhere from five to ten adults must have lived and worked in this area in order to farm even this small area mapped in Figure 6.6 that abuts the excavated kauhale. These fields represent a small portion of the agricultural ridges that have been observed and recorded in the region.

The Nuʻu houses may have been seasonal or permanent year-round dwellings for the community. The smaller kauhale like NUU-142/417 is more likely to have been a semi-permanent dwelling for makaʻāinana during the planting season similar to those described by McGregor (2007) and Handy and Pukui (1972).

> Farmers who did much of his planting in the upland forest often had a *papa'i* or small house there, where he could stay occasionally". These were often built with walls and covered with *ukiuki* grass, ti leaf (*la-'i*) or sugar cane leaves (*la-'o*)….perhaps, on one side of the room, more fern leaves were laid and then a smaller mat, and there was the bed. [Handy and Pukui 1972:13]

> Hawaiian *mauka-makai* (mountain-ocean) use of the ahupuaʻa in southeast Maui was linked to the planting cycle, which was dependent upon the variations in rainfall according to elevation and seasons. In the uplands, where it usually rained daily, planting could be done year-round. In the lowlands, planting was usually done in conjunction with the rainy season. When the rains moved on to the lowlands, each family lived at temporary habitation sites along the coast where they cultivated small plots of sweet potatoes and gourds. This important seasonal habitation cycle is documented in the interviews with Sam Po, a native of Kanaio. According to him, even though the latter half of the nineteenth century the kuaʻāina in the district continued to live seasonally mauka and makai and plant in accordance with the annual rains. [McGregor 2007:92]

Conversely, the larger kauhale with sturdier walls and denser deposits like NUU-407/408/408B, NUU-2, NUU-153, and NUU-155 may have been permanent dwellings for people living in Nuʻu year-round.

Conclusions on the Everyday

The data presented in this dissertation contribute to the development of a model for interpreting the diverse spaces in traditional Hawaiian kauhale. Tacking back and forth between different scales of analysis allows for a synthesis of single events within larger processes on the landscape. Once appropriate techniques have been implemented for achieving an integration of large- and small-scale processes, we can start to tell inclusive stories of daily lives in kuaʻāina lands that account for aliʻi and makaʻāinana, kāne, wāhine, and māhū. These stories lead to more robust understandings of the social constructs that governed these experiences.

We can never actually see any one subject archaeologically without records that tie materials to an individual. What we see is the "unactualized everyday" (de Cearteau 1980). The palimpsest of archaeological remains creates patterns of the mundane over time that reflect the silent unconscious practices that formed the core of everyday life. Community is central to this endeavor. One house does not define the everyday, but rather the relationships between architectural features and the altered landscape that connects them, "[tearing] from obscurity what is hidden" (de Certeau 1980:242). In de Certeau's world, the everyday "escapes because it is without subject" (de Certeau 1980:244) but in archaeology the everyday *is* the subject as it is actualized through the material remains left behind from the connections between generations of individuals we can no longer observe.

Bibliography

Abbott, I. A. (1992). *La'au Hawai'i: traditional Hawaiian uses of plants*. Bishop Museum Press.

Addison, D. J. (2001) Irrigation in Traditional Marquesan Agriculture: Surface Survey Evidence from Hatiheʻu Valley, Nuku Hiva. In Pacific 2000: Proceedings of the Fifth International Conference on Easter Island and the Pacific, edited by C. M. Stevenson, G. Lee, and F.J. Morin, pp. 267-271. Easter Island Foundation, Los Osos.

Aikau, Hōkūlani K., Noelani Goodyear-Ka ʻŌpua and Noenoe K. Silva (2016) The Practice of Kuleana: Reflections on Critical Indigenous Studies Through Trans-Indigenous Exchange. In *Critical Indigenous Studies: Engagements in First World Locations*, edited by Aileen Moreton-Robinson, pp. 157-175. University of Arizona Press.

Alberti, Benjamin 2017 Recursive Archaeology: An ontological approach to anthropomorphic ceramics from the first millennium CE northwest Argentina. *Spring 2017 Lecture* Archaeological Research Facility, University of California, Berkeley. April 4, 2017.

Allen, M. S. (2004). Revisiting and revising Marquesan culture history: new archaeological investigations at Anaho Bay, Nuku Hiva Island. *Journal of the Polynesian Society, The*, *113*(2), 143.

Allen, M. S. (2009). Morphological variability and temporal patterning in Marquesan domestic architecture:

Andrews, Lorne (2003 [1865]). *A dictionary of the Hawaiian language: to which is appended an English-Hawaiian vocabulary and a chronological table of remarkable events*. HM Whitney.

Anaho Valley in regional context. *Asian Perspectives*, 342-382.

Allen, M. S. (2010). Oscillating climate and socio-political process: The case of the Marquesan chiefdom, Polynesia. *Antiquity*, *84*(323), 86-102.

Allen, M. S. (2014). Marquesan colonisation chronologies and postcolonisation interaction: Implications for Hawaiian origins and the 'Marquesan Homeland' hypothesis. *Journal of Pacific Archaeology*, *5*(2), 1-17.

Allen, J., Newman, M.E., Riford, M., and Archer, G.H. (1995). Blood and Plant Residues on Hawaiian Stone Tools from Two Archaeological Sites in Upland Kāne'ohe, Ko'olau Poko District, O'ahu Island. *Asian Perspectives*, 34(2): 283-302.

Allison, Penelope 1999 Introduction. In *The archaeology of household activities*, edited by Penelope Allison, pp. 1-18. London, Routledge.

Ambrose, S. (1993) Isotopic analysis in paleodiets: Methodological and interpretive considerations. In *Investigations of ancient human tissue: chemical analyses in anthropology*, edited by M.K. Sandford, Gordon and Breach, Langhorne, pp. 59-129.

Anderson, A., & Y.H Sinoto (2002). New radiocarbon ages of colonization sites in East Polynesia. *Asian Perspectives*, *41*(2), 242-257.

Anderson, Atholl, Helen Leach, Ian Smith, and Richard Walter (1994) Reconsideration of the Marquesan Sequence in East Polynesian Prehistory, with particular reference to Hane (MUH1). Archaeology in Oceania 29:29-52.

Anderson, Nesta (2014) Finding the Space Between Spatial Boundaries and Social Dynamics: The Archaeology of Nested Households. *Household Chores and Household Choices*, 86:109-120. University of Alabama Press.

Anderson, Pia-Kristina B. (2001) Houses of the Kama' aina: Historical Anthropology in a Rural Hawaiian Valley. Ph.D. Dissertation, University of California, Berkeley.

Andrews, Lorrin 2003 *A Dictionary of the Hawaiian Language.* Island Heritage Publishing: Waipahu, Hawaiʻi

Ashmore, Wendy (2002) "Decisions and Dispositions": Socializing Spatial Archaeology. *American Anthropologist* 104(4): 1172–1183.

Atalay, Sonya 2006 Indigenous Archaeology as Decolonizing Practice. *American Indian Quarterly,* 30(3/4): 280-310.

Atalay, Sonya 2012 *Community-based archaeology: research with, by, and for indigenous and local communities*. University of California Press, Berkeley

Atalay, Sonya 2016 Engaging archaeology: Positivism, objectivity, and rigor in activist archaeology. In *Transforming Archaeology*, edited by Sonya Atalay, Lee Rains Clauss, Randall H. McGuire, and John R. Welch, pp. 45-60. Routledge, New York.

Athens, J. S., Rieth, T. M., & Dye, T. S. (2014). A Paleoenvironmental and Archaeological Model-Based Age Estimate for the Colonization of Hawai'i. *American Antiquity*, *79*(1), 144-155.

Bachand, Holly, Rosemary A. Joyce and Julia A. Hendon (2003) Bodies Moving in Space: Ancient Mesoamerican Human Sculpture and Embodiment, pp. 238-247 *Cambridge Archaeological Journal* 13.

Baer, Alexander Underhill 2015 On the Cloak of Kings: Agriculture, Power, and Community in Kaupō, Maui. PhD Dissertation, Anthropology Department, University of California, Berkeley.

Baer, Alexander (2019) Society for American Archaeology Annual Conference, Albuquerque, NM.

Baer, A., Chadwick, O., & Kirch, P. V. (2015). Soil nutrients and intensive dryland agricultural production in Kaupō, Maui, Hawaiian Islands. *Journal of Archaeological Science: Reports*, *3*, 429-436.

Barrera, William Jr. and Kirch, P.V. (1973) Basaltic-Glass Artefacts from Hawaii: Their Dating and Prehistoric Uses. *The Journal of the Polynesian Society* 82(2): 176-187.

Battle-Baptiste, W. (2011) *Black feminist archaeology*. Left Coast Press.

Bayman and Nakamura 2001

Bayman, James M., and J.J. Moniz-Nakamura (2001) Craft Specialization and Adze Production on Hawaiʻi Island. Journal of Field Archaeology 28(3/4):239-252.

Beaglehole, J.C. (editor) 1955, 1961, 1967 The Journals of Captain Cook on his Voyage of Discovery, 3 volumes. Cambridge University Press, Cambridge.

Beaudry, Mary C. 1989 Household structure and the Archaeological Record: examples from New World Historical sites. In: S. MacEacherd, D. Archer, and R Gavin (eds.) *Households and Communities*, Proceedings of 21st Annual Conference, pp. 84-92. Chacomool, Calgary, Alberta.

Beaudry, Mary 2004 Doing the Housework: New Approaches to the Archaeology of Households. In *Household Chores and Household Choices*: *Theorizing the* ….edited by Kerri Saige Barile, Mary Jo Galindo, Mindy L Bonine, Efstathios I Pappas, and Maria Franklin. Pp. 254–262. University of Alabama Press.

Beck, W., & Torrence, R. (2006). Starch pathways. *Ancient starch research*, 53-74.

Beckwith, Martha W. (1932). *Kepelino's traditions of Hawaii* (No. 95). Hawaii The Museum.

Beckwith, Martha W. (1976). *Hawaiian mythology*. University of Hawaii Press.

Bellwood, P.S. (1972) A Settlement Pattern Survey, Hanatekua Valley, Hiva Oa, Marquesas Islands. Pacific Anthropological Records 17. Department of Anthropology, Bernice P. Bishop Museum, Honolulu.

Bellwood, P.S. (1978) Archaeological Research in the Cook Islands. Pacific Anthropological Records 27. Department of Anthropology, Bernice P. Bishop Museum, Honolulu.

Bellwood, P. (1998) The archaeology of Papuan and Austronesian prehistory in the Northern Moluccas, Eastern Indonesia. In R. Blench and M. Spriggs, eds., *Archaeology and Language II: Correlating Archaeological and Linguistic Hypotheses,* pp. 128-40. London: Routledge.

Bender, D. (1967). A redefinement of the concept of household: families co-residence and domestic functions. *American Ethnologist 8(1): 1-20.*

Berna, Francesco, Paul Goldberg, Liora Kolska Horwitz, James Brink, Sharon Holt, Marion Bamford, and Michael Chazan. 2012 Microstratigraphic evidence of in situ fire in the Acheulean strata of Wonderwerk Cave, Northern Cape province, South Africa. *Proceedings of the National Academy of Sciences* 109(20): E1215-E1220.

Best, E. (1914). 66. Maori Beliefs Concerning the Human Organs of Generation. *Man*, *14*, 132-134.

Best, E. (1924) The Maori as He Was: A Brief Account of Maori Life as it was in Pre- European Days. New Zealand Board of Science and Art Manual No. 4. Dominion Museum.

Beyer, C. K. (2003). Female seminaries in America and Hawai'i during the 19th century.

Biggs, Bruce. (1971). *The languages of Polynesia*. Mouton.

Binford, Lewis R. 1962 Archaeology as Anthropology. *American Antiquity* 28:217-225

Blackmore, C. (2011) How to queer the past without sex: Queer theory, feminisms and the archaeology of identity. *Archaeologies*, *7*(1), 75-96.

Blanchot, Marcel 1987 Everyday Speech. *Yale French Studies,* 73: 12-20.

Blanton, R. E. 1994 *Houses and Households: A Comparative Study, Interdisciplinary Contributions to Archaeology.* London and New York, Plenum Press.

Blust, R. (1976) Austronesian Culture History: Some Linguistic Inferences and their Relations to the Archaeological Record. World Archaeology 8:19-43.

Blust, R. (1980) Early Austronesian Social Organization: The Evidence of Language. Current Anthropology 21(2):205-47.

Blust, R. (1987) Lexical Reconstruction and Semantic Reconstruction: The Case of Austronesian "House" Words. Diachronica 4(l-2):79-106.

Blust, R. (1995) The prehistory of the Austronesian-speaking peoples: A view from language. *Journal of World Prehistory* 9:453-510.

Blust, Robert (2007). Proto-Oceanic* mana revisited. *Oceanic Linguistics*, 404-423.

Bourdeiu, Pierre. (1979). *Algeria 1960: the disenchantment of the world: the sense of honour: the Kabyle house or the world reversed.* Translated by Richard Nice, New York: Cambridge University Press.

Bourdieu, P. (1970). La maison kabyle ou le monde renversé. Echanges et communications, *Mélanges offerts à Claude Levi-Strauss à l'ocassion de son 60éme anniversaire*, 739-758.

Bourdieu, Pierre 1977 *Outline of a Theory of Practice,* New York: Cambridge University Press.

Borofsky, Robert and Alan Howard (1989) *Developments in Polynesian Ethnology.* Honolulu: University of Hawaii Press.

Bradley, Harriet 1999 The seductions of the archive: voices lost and found. *History of the human sciences*, 12(2):107-122.
Bourdieu, Pierre 1990 *The logic of practice*. Stanford university press.
Brandon, Jamie C. (2014) Reconstructing Domesticity and Segregating Households: The Intersections of Gender and Race in the Postbellum South. In *Household Chores and Household Choices* Pp. 197–209. The University of Alabama Press.
Brodkin, Karen (2006) Toward a Unified Theory of Class, Race, and Gender. In *Feminist Anthropology: A Reader*. Ellen Lewin ed. Pp. 129-146. Malden, MA: Blackwell.
Brown, J. MacMillan (1907) *Maori and Polynesian: Their Origin, History and Culture*. London: Hutchinson & Co.
Brumfiel, EM (1991) Weaving and Cooking: Women's Production in Aztec Mexico. In *Engendering Archaeology: Women and Prehistory*. Edited by JM Gero and Margaret W. Conkey. Cambridge: Basil Blackwell.
Buck, Peter (Te Rangi Hiroa) (1957) *Art and Crafts of Hawai'i.* Bishop Museum, Honolulu
Buck, Peter H. (1932) Ethnology of Tongareva. Bernice P. Bishop Museum Bulletin 92. Honolulu.
Buck, Peter H. (1934) Mangaian Society. Bernice P. Bishop Museum Bulletin 122. Honolulu.
Buck, Peter H. (1944) Arts and Crafts in the Cook Islands. Bernice P. Bishop Museum Bulletin 179. Honolulu.
Buck, Peter H. (Hiroa, Te Rangi) (1930) Samoan Material Culture. Bernice P. Bishop Museum Bulletin 75. Honolulu.
Bulger, Teresa and Rosemary Joyce. (2013) Archaeology of Embodied Subjectivities. In *A Companion to Gender Prehistory*, edited by Diane Bolger., pp. 68-85. Blackwell, Oxford.
Burley DV, Nelson E, Shutler R Jr. (1999) A radiocarbon chronology for the Eastern Lapita frontier in Tonga. *Archaeology. Oceania* 34:59-72
Burley, D.V., Marshall I. Weisler and Jian-xin Zhao. (2012) High Precision U/Th Dating of First Polynesian Settlement. *PLOS one,* 7(11):1-6.
Burrows, Edwin G. (1938) *Western Polynesia: A Study in Cultural Differentiation*. Etnologiska Studier 7. Göteborg.
Burrows, Edwin G. (1940) Culture-Areas in Polynesia. *The Journal of the Polynesian Society* 49(195): 347-364.
Butler, Judith (1990) *Gender Trouble: feminism and the subversion of identity*
Butzer, Karl 2009 Challenges for a cross-disciplinary geoarchaeology: the intersection between environmental history and geomorphology. Geomorphology 101(1-2): 402-411.
Cabanes, D., Weiner, S., Shahack-Gross, R. 2011. Stability of phytoliths in the archaeological record: a dissolution study of modern and fossil phytoliths. *Journal of Archaeological Science,* 38: 2480-2490.
Cachola-Abad, C. K. (2000). The evolution of Hawaiian socio-political complexity: an analysis *of Hawaiian oral traditions*. University of Hawaii at Manoa.
Carson, Mike T. 2002 Tī ovens in Polynesia: Ethnological and archaeological perspectives. *The Journal of the Polynesian Society* 111(4):339-370.
Carson, Mike T., Hsiao-chun Hung, Glenn Summerhayes, and Peter Bellwood (2013) The Pottery Trail from Southeast Asia to Remote Oceania. *Journal of Island and Coastal Archaeology,* 8:17-36.
Carsten, Janet and Stephen Hugh-Jones, Eds. 1995 *About the House: Lévi-Strauss and Beyond*. Cambridge University Press.

Casella, Eleanor (2006) 'Safe' genders? *Archaeological Dialogues,* 13(1):25-27.
Casey, Edward (2008) Place in Archaeology: A western Philosophical prelude. In David, B., and J. Thomas. Editors. 2008. *Handbook of Landscape Archaeology*. Walnut Creek: Left Coast Press
Chiu, Scarlett (2003) The Socioeconomic Functions of Lapita Ceramic Production and Exchange: A Case Study From Site WKO-013A, Kone, New Caledonia. Ph.D. Dissertation, University of California, Berkeley. 2005 Meanings of a Lapita Face: Materialized Social Memory in Ancient House Societies. Taiwan Journal of Anthropology 3(1): 1-47.
Chinen, Jon J. (1958). *The Great Mahele: Hawaii's land division of 1848* (Vol. 1, No. 1). University of Hawaii Press.
Cipolla, Cyd, Kristina Gupta, David A. Rubin, and Angela Willey, eds. 2017 *Queer Feminist Science Studies: A Reader*. University of Washington Press.
Clark, J.T., and D.J. Herdrich (1988) The Eastern Tutuila Archaeological Project: Final Report. Report on File, Pago Pago, Historic Preservation Office, American Samoan Office. 1993 Prehistoric Settlement System in Eastern Tutuila, American Samoa. Journal of the Polynesian Society 102(2): 147-185.
Clark, J.T., and M.G. Michlovich (1996) An Early Settlement in the Polynesian Homeland: Excavations at 'Aoa Valley, Tutuila Island, American Samoa. Journal of Field Archaeology 23(2): 151-167.
Clark, J.T., and M.G. Michlovich (1996) An Early Settlement in the Polynesian Homeland: Excavations at ‘Aoa Valley, Tutuila Island, American Samoa. Journal of Field Archaeology 23(2): 151-167.
Cleghorn, Paul L. (1982) The Mauna Kea Adze Quarry: Technological Analysis and Experimental Results. Ph.D. Dissertation, University of Hawaii.
Cleghorn, Paul L. (1984) An Historical Review of Polynesian Adze Studies. Journal of the Polynesian Society 93:399-422.
Cleghorn, Paul L. (1986) Organization Structure at the Mauna Kea Adze Quarry complex, Hawaii. Journal of Archaeological Science 13(4):375-387.
Cleghorn, Paul L. (1992) A Hawaiian Adze Sequence of Just Different Kinds of Adzes? New Zealand Journal of Archaeology 14:29-149.
Coil, James 2003 Design, methods, and initial results for microfossil research in Kahikinui, Maui, Hawaiian Islands. *Phytolith and Starch Research in the Australian-Pacific Asian Regions: The State of the Art,* pp. 55-68. Pandanus Books, Canberra.
Coil, J., & Kirch, P. V. (2005). An Ipomoean landscape: archaeology and the sweet potato in Kahikinui, Maui, Hawaiian Islands. *The sweet potato in the Pacific: a reappraisal, Oceania Monograph*, 56, 71-84.
Coil, James, & Kirch, Patrick Vinton 2005 An Ipomoean landscape: archaeology and the sweet potato in Kahikinui, Maui, Hawaiian Islands. *The sweet potato in the Pacific: a reappraisal, Oceania Monograph*, *56*, 71-84.
Collins, Patricia Hill 1991 *The politics of Black feminist thought*. New York: Routledge.
Collins, Patricia Hill 1991 *The politics of Black feminist thought*. New York: Routledge.
Conkey, M. W., & Spector, J. D. (1984) Archaeology and the study of gender. *Advances in archaeological method and theory*, 1-38.
Connolly, James and Mark Lake 2006 Geographical Information Systems in Archaeology. Manuals in Archaeology. Cambridge University Press, Cambridge, UK

Conte, Eric (2006) Ethnoarchaeolgy in Polynesia. In: *Archaeology of Oceania: Australia and the Pacific Islands*. Editor: Ian Lilley. Blackwell Publishing Lmtd: Malden, MA. 240-258

Conte, Eric and Patrick Vinton Kirch (editors) (2004) *Archaeological Investigations in the Mangareva Islands (Gambier Archipelago). French Polynesia*. Contribution Number 62 Archaeological Research Facility University of California, Berkeley.

Cook, James, and James King (1784) A Voyage to the Pacific Ocean, Performed under the Direction of Captain Cooke, Clerke, and Gore in His Majesty's Ships the Resolution and Discovery; in the Years 1776, 1777, 1778, 1779, and 1780. 3 vols. Nicol and Cadell, London.

Cordy, R. H. (1981). *A Study of Prehistoric Social Change: the development of complex societies in the*

Cordy, R. H. (1985) Settlement Patterns of Complex Societies in the Pacific. New Zealand Journal of Archaeology 7:159-182.

Cordy, R.H. (1981) A Study in Prehistoric Social Change: The Development of Complex Societies in the Hawaiian Islands. Academic Press, New York.

Cordy, R.H. (2000) Exalted Sits the Chief: The Ancient History of Hawai'i Island. Honolulu: Mutual Publishing

Cordy, R.H. 2000 Exalted Sits the Chief: The Ancient History of Hawai'i Island. Honolulu: Mutual Publishing

Cordy, Ross (1981) *A Study of Prehistoric Change: The Development of Complex Societies in the Hawaiian Islands.* Academic Press, New York.

Courty, Marie Agnes, Richard I. Macphail, and Julia Wattez 1991 Soil micromorphological indicators of pastoralism: with special reference to Arene Candide, Finale Ligure, Italy. *Rivista di Studi Liguri,* LVII(1-4):127-50.

Courty, Marie Agnes, Paul Goldberg, and Richard I. Macphail 1989 *Soils and Micromorphology in Archaeology.* Cambridge University Press, Cambridge.

Cuddihy, L. W. (1989). Vegetation zones of the Hawaiian Islands.

Danbolt, Mathias 2010 We're here! We're queer?: Activist archives and archival activism. *Lambda Nordica* 3-4: 90-118.

Davidson, D.A., Carter, S., and Quine, T.A. 1992. An evaluation of micromorphology as an aid to archaeological interpretation. *Geoarchaeology,* 7(1) 55-65.

Davidson, Janet M. (1967) Excavations of Two Round-Ended House Sites in the Eastern Portion of the ‘Opunohu Valley. In Archeology on the Island of Mo‘orea, French Polynesia, edited by Roger C. Green, Kaye Green, Roy A. Rappaport, Ann Rappaport, and Janet Davidson, pp. 118-140. Anthropological Papers of the American Museum of Natural History 51(2): 111-230.

Davidson, Janet M. (1974) Samoan Structural Remains and Settlement Patterns. In Archaeology in Western Samoa, Vol. 2, edited by R.C. Green and J.M. Davidson, pp. 225- 244. Auckland Institute and Museum Bulletin 7.

De Boer, Arnoud (2010) Processing old maps and drawings to create virtual historic landscapes.

De Boer, Arnoud, Leen Breure, Sandor Spruit, and Hans Voorbij (2001) "Virtual historical landscapes." *Research in Urbanism Series* 2.1 (2011), 185-203.

de Certeau, Michel (1984) *The Practice of Everyday Life.* University of California Press, Berkeley.

Deetz, James 1982 Households: a structural key to archaeological explanation. In *Archaeology of the Household: building a prehistory of Domestic Life*, edited by R. Wilk and W. Rathje, pp. 717-724. American Behavioral Scientist 25:6.

Del Valle, Teresa (editor) (1993) *Gendered Anthropology*. New York: Routledge.

Deloria, Philip J., K Tsianina Lomawaima, Bryan McKinley Jones Brayboy, Mark N. Trahant, Loren Ghiglione, Douglas Medin & Ned Blackhawk 2018 Unfolding Futures: Indigenous Ways of Knowing for the Twenty-First Century. *Dædalus, the Journal of the American Academy of Arts & Sciences,* 147(2):6-15.

Deloria, Philip J., K. Tsianina Lomawaima, Bryan McKinley Jones Brayboy, Mark N. Trahant, Loren Ghiglione, Douglas Medin, and Ned Blackhawk 2018 Unfolding Futures: Indigenous Ways of Knowing for the Twenty-First Century. *Daedalus* 147(2): 6-16.

Deloria, Philip J., K. Tsianina Lomawaima, Bryan McKinley Jones Brayboy, Mark N. Trahant, Loren Ghiglione, Douglas Medin, and Ned Blackhawk 2018 Unfolding Futures: Indigenous Ways of Knowing for the Twenty-First Century. *Daedalus* 147(2): 6-16.

Dening, G. (1966) Ethnohistory in Polynesia. Pacific History Series 1:23-42. 1980 Islands and Beaches: Discourse on a Silent Land: Marquesas 1774-1880. Dorsey Press, Chicago. 1986 Possessing Tahiti. Archaeology in Oceania 21(1): 103-118.

Dening, G. (1980). *Islands and beaches: Discourse on a silent land: Marquesas, 1774-1880*. University Press of Hawaii.

Descantes, Christophe (1990) Symbolic Stone Structures: Protohistoric and Early Historic Spatial Patterns of the 'Opunohu Valley, Mo'orea, French Polynesia. M.A. Thesis, University of Auckland, New Zealand. 1993 Simple Marae of the 'Opunohu Valley, Mo'orea, Society Islands, French Polynesia. Journal of the Polynesian Society 102(2): 187-216

Devaney, Dennis M. and Lucius G. Eldredge (editors) (1987) *Reef and Shore Fauna of Hawaii Section 2: Platyhelminthes through Phoronida and Section 3: Sipuncula through Annelida*. Bishop Museum Special Publication 64 (2 and 3). Bishop Museum Press: Honolulu, Hawaiʻi.

Dixon, B., A. Carpenter, F. Eble, C. Mitchell, and M. Major (1995) Community Growth and Heiau Construction: Possible Evidence of Political Hegemony at the Site of Kaunolu, Lanaʻi, Hawaiʻi. Asian Perspectives 34(2):229-256.

Dixon, B., A. Carpenter, F. Eble, C. Mitchell, and M. Major 1995 Community Growth and Heiau Construction: Possible Evidence of Political Hegemony at the Site of Kaunolu, Lanaʻi, Hawaiʻi. Asian Perspectives 34(2), 229-256.

Dixon, B., M. Major, M. Price, A. Carpenter, C. Stine, and B. Longton (1994) Lithic Tool Production and Dryland Planting Adaptations to Regional Agricultural Intensification: Preliminary Evidence from Leeward Molokaʻi Hawaii. Bishop Museum Occasional Papers 39:1-19. Bishop Museum Press, Honolulu.

Dixon, B., P. J. Conte, V. Nagahara, and W. K. Hodgins (1999) Risk Minimization and the Traditional Ahupuaʻa in Kahikinui, Island of Maui, Hawaiʻi. Asian Perspectives 38(2):229-254.

Dixon, Boyd, Dennis Gosser and Scott S. Williams (2008) Traditional Hawaiian Men's Houses and their Socio-Political Context in Lualualei, Leeward West O'ahu, Hawai'i. *The Journal of the Polynesian Society,* 117(3):267-295.

Dixon, Boyd, Dennis Gosser and Scott S. Williams (2008) Traditional Hawaiian Men's Houses and their Socio-Political Context in Lualualei, Leeward West O'ahu, Hawai'i. *The Journal of the Polynesian Society,* 117(3):267-295.

Dobres, Marcia-Anne and Christopher R. Hoffman. (1994). Social Agency and the Dynamics of Prehistoric Technology. *Journal of Archaeological Method and Theory 1(3): 211-258.*

Douglas 1972

Dowson, Thomas A. (2006) Archaeologists, Feminists, and Queers: Sexual Politics in the Construction of the Past. In *Feminist Anthropology: Past, Present, and Future*, edited by Pamela L. Geller and Miranda K. Stockett, pp. 89-102. University of Pennsylvania Press, Philadelphia.

Earle, Timothy (1977) A Reappraisal of Redistribution: Complex Hawaiian Chiefdoms. *In* Exchange Systems in Prehistory. T. Earle and J. Ericson, eds. pp. 213-229. New York: Academic Press.

Earle, Timothy (1978) Economic and Social Organization o f a Complex Chiefdom: The Halele'a District, Kaua'i, Hawai'i. Anthropological Papers of the Museum of Anthropology, Univ. Michigan, No. 63.

Earle, Timothy (1980) Prehistoric Irrigation in the Hawaiian Islands: An Evaluation of Evolutionary Significance. Archaeology and Physical Anthropology in Oceania 15:1-28.

Earle, Timothy (1997) Exchange in Oceania: Search for Evolutionary Explanations. In Prehistoric Long-Distance Interaction in Oceania: An Interdisciplinary Approach, edited by Marshall I. Weisler, pp. 224-237. New Zealand Archaeological Association Monograph 21, Auckland.

Ebron, Paulla A. (2006) Contingent Stories of Anthropology, Race, and Feminism. In *Feminist Anthropology: A Reader*. Ellen Lewin ed. Pp. 203-216. Malden, MA: Blackwell.

Eichner, Katrina Christiana Loening 2017 Queering Frontier Identities: Archaeological Investigations at a Nineteenth-Century U.S. Army Laundresses' Quarters in Fort Davis*, Texas.* PhD dissertation, Department of Anthropology, University of California, Berkeley.

Ellis, W. (1829) (1831) Polynesian Researches, 2 vols. Fischer, Son and Jackson, London. Polynesian Researches during a Residence of nearly Eight years in the Society and Sandwich Islands, 4 vols. Fisher, Son & Jackson, London. Reproduced

Emory, K.P. (1964) Eastern Polynesian Burials at Maupiti. Journal of the Polynesian Society 73(2): 143-159.

Emory, K.P. (1965) Preliminary Report on the Archaeological Investigations in Polynesia. Bishop Museum, Honolulu.

Emory, K.P., and Y.H. Sinoto (1961) Hawaiian Archaeology: Oahu Excavations. Bernice P. Bishop Museum Special Publication 49. Bishop Museum Press, Honolulu.

Endicott 2002;

Endicott, J. M. E. (2000) Archaeological and Ethnohistoric Evidence for Protohistoric Social Relations on Mangaia Island, Cook Islands. Ph.D. Dissertation, Department of Anthropology, University of California, Berkeley.

Endicott, J. M. E. (2002). The social landscape of Mangaia Island, Southern Cook Islands. *Pacific Landscapes: Archaeological Approaches, Easter Island Foundation, Los Osos*, 175-188.

Endicott, J.M.E. (2002) The Social Landscape of Mangaia Island, Southern Cook Islands. In Pacific Landscapes: Archaeological Approaches, edited by T. N. Ladefoged and M. W. Graves, pp. 175-188. Easter Island Foundation, Los Osos. Fanning,

Engelstad, Ericka (1991) Feminist Theory and Post-Processual Archaeology. *The Archaeology of Gender: Proceedings of the Twenty-Second Annual Conference of the Archaeological Association of the University of Calgary*, edited by Dale Walde and Noreen D. Willows, pp. 116-120. Calgary.

Fanning, Edmund (1924) Voyages and Discoveries in the South Seas, 1792-1832. Marine Research Society, Publication No. 6, Salem.

Fausto-Sterling (2000) Gender Systems: Toward a Theory of Human Sexuality. In *Sexing the Body: Gender Politics and the Construction of Sexuality* Pp. 233–255. New York, NY: Basic Books.

Field, J. S., Kirch, P. V., Kawelu, K., & Ladefoged, T. N. (2010). Households and hierarchy: Domestic modes of production in Leeward Kohala, Hawai'i Island. *Journal of Island & Coastal Archaeology*, *5*(1), 52-85.

Field, J. S., Ladefoged, T. N., & Kirch, P. V. and Sharp, W. (2011a). Residential chronology, household subsistence, and the emergence of socioeconomic territories in Leeward Kohala, Hawaiʻi Island. *Radiocarbon* 53:605-627.

Field, J. S., Ladefoged, T. N., & Kirch, P. V. (2011). Household expansion linked to agricultural intensification during emergence of Hawaiian archaic states. *Proceedings of the National*

Field, J. S., Ladefoged, T. N., & Kirch, P. V. 2011 Household expansion linked to agricultural intensification during emergence of Hawaiian archaic states. *Proceedings of the National Academy of Sciences*, *108*(18), 7327-7332.

Field, J. S., Ladefoged, T. N., Sharp, W. D., & Kirch, P. V. (2011). Residential chronology, household subsistence, and the emergence of socioeconomic territories in leeward Kohala, Hawai'i Island. *Radiocarbon*, 53(4), 605.

Field, Julie S., Patrick V. Kirch, Kathy Kawelu, and Thegn N. Ladefoged 2010 Households and hierarchy: Domestic modes of production in leeward Kohala, Hawai'i Island. *Journal of Island & Coastal Archaeology* 5(1): 52-85.

Firth, R. (1936) We, the Tikopia: A Sociological Study of Kinship in Primitive Polynesia. American Book Co., New York.

Firth, R. (1959) Ritual Adzes in Tikopia. In Anthropology in the South Seas, edited by J.E. Freeman and W.R. Geddes, pp. 149-159. Thomas Avery and Sons, New Plymouth.

Firth, Raymond (1939) *Primitive Polynesian Economy*. London: Routledge.

Firth, Raymond (1970) The Analysis of *Mana*: An Empirical Approach. Harding, In Thomas G. And Ben J. Wallace, eds. *Cultures of the Pacific Selected Readings.* New York: The Free Press, 316-334.

Fladmark, K.R. (1982) Microdebitage Analysis: Initial Considerations. *Journal of Archaeological Science*, 9: 205-220.

Flanner, K.V. and Winter, M. (1976). Analyzing household activities. In: Kent Flannery (ed.) *The Early Mesoamerican Village,* New York: Academic Press.

Flannery, K.V. (1972). The cultural evolution of civilizations. *Annual review of ecology and systematics*, 399-426

Forester, J.R. (1968) A Voyage Round the World 1754-1794. Akademie-Verlag (reprint), Berlin.

Forester, J.R. (1996 [1778]) Observations Made During a Voyage Round the World. Edited by Nicholas Thomas, Harriet Guest, and Michael Dettelbach. University of Hawaii Press, Honolulu.

Fornander, A. (1996) Ancient History of the Hawaiian People to the Times of Kamehameha I. (Originally published as An Account of the Polynesian Race: Its Origin and Migrations, Vol. II). Honolulu: Mutual Publishing.

Forster, George (1777) A Voyage round the World in his Brittanic Majesty's Sloop, Resolution, Commnaded by Captain James Cook, during the years 1772, 3, 4, and 5. J. Robson, P. Elmsley, and G. Robinson, London.

Forster, J.R (1778) Observations Made During a Voyage Around the World in Physical Geography, Natural History, and Ethic Philosophy. G. Robinson, London.

Fosberg, F. Raymond (1991) Polynesian Plant Environments. In Islands, Plants, and Polynesians, edited by Paul Alan Cox and Sandra Anne Banack, pp. 11-23. Dioscorides Press, Portland.

Fosberg, F. Raymond 1991 Polynesian Plant Environments. In *Islands, Plants, and Polynesians: An Introduction to Polynesian Ethnobotany.* Ed Paul Alan Cox and Sandra Ann Banack. Dioscorides Press:Hong Kong, pp. 11-24.

Foucault, M. (1970). *The Order of Things* pp. 34-47, New York: Vintage Books.

Fox, James J. (1993b) Comparative Perspectives on Austronesian Houses: An Introductory Essay. In Inside Austronesian Houses: Perspectives on Domestic Designs for Living, edited by J.J. Fox, pp. 1-28. Australian National University, Canberra.

Fox, James J. (1993c) Memories of Ridge-Poles and Cross-Beams: The Categorical Foundations of a Rotinese Cultural Design. In Inside Austronesian Houses: Perspectives on Domestic Designs for Living, edited by J.J. Fox, pp. 140- 177. Australian National University, Canberra.

Fox, James J. (1995) Austronesian Societies and Their Transformations. In The Austronesians: Historical and Comparative Perspectives, edited by P. Bellwood. J.J. Fox, and D. Tryon, pp. 96-111. Australian National University, Canberra. Frankel,

Fox, James J. (editor) (1993a) Inside Austronesian Houses: Perspectives on Domestic Designs for Living. Australian National University, Canberra.

Franklin, M. (2001) A Black feminist-inspired archaeology? *Journal of Social Archaeology*, 1(1), 108-125.

Franklin, Maria 2001 A Black feminist-inspired archaeology?. *Journal of Social Archaeology* 1(1):108-125.

Franklin, Maria 2001 A Black feminist-inspired archaeology?. *Journal of Social Archaeology* 1(1):108-125.

Freisem, David E. 2016 Geo-ethnoarchaeology in action. *Journal of Archaeological Science*, 70: 145-157.

Friesam, David, Elisabetta Boaretto, Adi Eliyahu-Behar and Ruth Shahack-Gross 2011 Degradation of mud brick houses in an arid environment: a geoarchaeological model. *Journal of Archaeological Science* 38(5):1135-1147.

Friesem, David E., Panagiotis Karkanas, Georgia Tsartsidou and Ruth Shahack-Gross 2014a Sedimentary processes involved in mud brick degradation in temperate environments: a micromorphological approach in an ethnoarchaeological context in northern Greece. *Journal of Archaeological Science* 41:556-567.

Friesem, David E., Panagiotis Karkanas, Georgia Tsartsidou and Ruth Shahack-Gross 2014b Where are the roofs? A geo-ethnoarchaeological study of mud brick structures and their collapse processes, focusing on the identification of roofs. *Archaeological and Anthropological Sciences* 6, no. 1: 73-92.

Friesem, David E., Yossi Zaidner, and Ruth Shahack-Gross. 2014c Formation processes and combustion features at the lower layers of the Middle Palaeolithic open-air site of Nesher Ramla, Israel. *Quaternary International* 331: 128-138.

Garrison, Ervan 2016 *Techniques in Archaeological Geology*. Springer.

Garwood, Kirsten Marquise 2010 Gender, social hierarchy, and the kapu system in pre-European contact Hawaiian house sites. Master's Thesis, Northern Illinois University.

Gee, G.W. and J.W. Bauder 1986 Particle-size Analysis. In *Methods of Soil Analysis, Part 1. Physical and Mineralogical Methods*—Agronomy Monograph no. 9. (2nd edition), pp. 383-411.

Geller, P. L. (2009) Identity and difference: complicating gender in archaeology. *Annual Review of Anthropology*, *38*, 65-81.

Gero, J. (1991). Genderlithics: Women's Roles in Stone Tool Production. In *Engendered Archaeology: Women in Prehistory*, ed. Joan Gero and Margaret Conkey, 163-193

Giambelluca, T.W., Q. Chen, A.G. Frazier, J.P. Price, Y.-L. Chen, P.-S. Chu, J.K. Eischeid, and D.M. Delparte, 2013: Online Rainfall Atlas of Hawaiʻi. Bull. Amer. Meteor. Soc. 94, 313-316, doi: 10.1175/BAMS-D-11-00228.1.

Giddens, Anthony (1979). *Central problems in social theory: Action, structure, and contradiction in social analysis*. University of California Press, Berkeley.

Giddens, Anthony (1984) *The Constitution of the Theory of Structuration*. University of California Press: Berkeley.

Gilchrist, Roberta (2004) Archaeology and the Life Course: A Time and Age for Gender. In *A Companion to Social Archaeology*, edited by Lynn Meskell and Robert Preucel, pp. 142–160. Blackwell Publishing.

Gillespie, S. D. (2000). Lévi-Strauss: maison and société à maisons. *Beyond kinship: Social and material reproduction in house societies*, 22-52.

Gillespie, Susan and Rosemary Joyce (1997) Gendered Goods: The Symbolism of Maya Hierarchical Exchange Relations. In *Women in Prehistory: North America and Mesoamerica*, edited by Cheryl Claassen and Rosemary Joyce, pp. 189-207. University of Pennsylvania Press.

Godina, Ivan Briz i and Marco Madella 2013 The Archaeology of Household – an Introduction. In *The Archaeology of Household* edited by Marco Madella, Gabriella Kovács, Brigitta Kulcsarne-Berzsenyi and Ivan Briz I Godina, pp. 1-5. Oxbow Books.

Goldberg P (2000) Micromorphology and site formation at DieKelders Cave 1, South Africa. Journal of Human Evolution 38:43–90.

Goldberg, Paul, and Francesco Berna 2010 Micromorphology and context. *Quaternary International* 214(1): 56-62.

Goldberg, P., Whitbread, I. 1993. Micromorphological studies of a Bedouin tent floor. In *Formation Processes in Archaeological Context. Monographs in World Archaeology* no. 17 (eds P. Goldberg, D.T. Nash and M.D. Petraglia). Madison: Prehistory Press, pp. 165-188.

Goldberg, P. and MacPhail, R.I. (2006) *Practical and Theoretical Geoarchaeology*. Malden, Blackwell Science.

Goldberg, Paul, Christopher E. Miller, Solveig Schiegl, Bertrand Ligouis, Francesco Berna, Nicholas J. Conard, and Lyn Wadley 2009 Bedding, hearths, and site maintenance in the Middle Stone age of Sibudu cave, KwaZulu-Natal, South Africa. *Archaeological and Anthropological Sciences* 1(2): 95-122.
Goldman, Irving (1970) Ancient Polynesian Society. University of Chicago Press, Chicago.
Goodman-Elgar, M. 2008. The devolution of mudbrick: ethnoarchaeology of abandoned earthen dwellings in the Bolivian Andes. *Journal of Archaeological Science*. 35(12): 3057-3071.
Goody, J. 1972 *Domestic groups* (No. 28). Addison-Wesley Publishing Company.
Goody, J. (1973). Strategies of heirship. *Comparative Studyin Society and History 15: 13-30.*
Goodyear-Kaʻōpua, Noelani 2016 Reproducing the Ropes of Resistance: Hawaiian Studies Methodologies. In *Kanaka ʻŌiwi Methodologies: Moʻolelo and Metaphor*, edited by Latrina-Ann R. Kapāʻanaokalāokeola Nākoa Oliveira and Erin Kahunawaikaʻala Wright, pp. 1-29. University of Hawaiʻi Press, Honolulu.
Goodyear-Ka ʻōpua, Noelani, and Bryan Kamaoli Kuwada 2018 Making ʻAha: Independent Hawaiian Pasts, Presents & Futures." *Daedalus* 147(2): 49-59.
Goodyear-Ka ʻōpua, Noelani, and Bryan Kamaoli Kuwada 2018 Making ʻAha: Independent Hawaiian Pasts, Presents & Futures." *Daedalus* 147(2): 49-59.
Goodyear-Kaʻōpua and Kuwada (2018:50)
Goodyear-Kaʻōpua, Noelani and Bryan Kamaoli Kuwada 2018 Making ʻAha: Independent Hawaiian Pasts, Presents & Futures. *Dædalus, the Journal of the American Academy of Arts & Sciences, 147(2):49-59.*
Goren and Goldberg (1991)
Graves, M. W., B.V. O'Connor, and T. N. Ladefoged (2002) Tracking Changes in Community-Scale Organization in Kohala and Kona, Hawai'i Island. In Pacific Landscapes: Archaeological Approaches, edited by T.N. Ladefoged and M.W. Graves, pp. 231-254. Easter Island Foundation, Los Osos.
Graves, Michael W. and Thegn N. Ladefoged 2002 In Introduction to Pacific Landscapes. In *Pacific Landscapes: Archaeological Approaches.* Edited by Thegn N. Ladefoged and Michael W. Graves. The Easter Island Foundation, Bearsville Press:Los Osos, CA. Pp.1-10.
Graves, Michael W., and Roger C. Green (editors) (1993) The Evolution and Organisation of Prehistoric Society in Polynesia. New Zealand Archaeological Association, Monograph 19, Auckland.
Graves, Michael W., Blaze V. O'Connor and Thegn N. Ladefoged 2002 Tracking Changes in Community-Scaled Organization in Kohala and Kona, Hawaiʻi Island. In *Pacific Landscapes: Archaeological Approaches.* Edited by Thegn N. Ladefoged and Michael W. Graves. The Easter Island Foundation, Bearsville Press:Los Osos, CA. Pp.1-10.
Gray, R. D., Drummond, A. J., & Greenhill, S. J. (2009). Language phylogenies reveal expansion pulses and pauses in Pacific settlement. *science*, *323*(5913), 479-483.
Green 2010:16
Green, R. (1966). Linguistic subgrouping within Polynesia: the implications for prehistoric settlement. *The Journal of the Polynesian Society*, 6-38.
Green, R. C. (1981). Location of the Polynesian homeland: a continuing problem. *Studies in Pacific languages and cultures in honour of Bruce Biggs*, 133-158.

Green, R.C. (1967) Settlement Patterns: Four Case Studies from Polynesia. In Archaeology at the Eleventh Pacific Science Congress, pp. 101-132. Asian and Pacific Archaeology 1. Social Science Research Institute, University of Hawaii, Honolulu.

Green, R.C. (1967). Settlement Patterns: Four case studies from Polynesia. In W.G. Solheim ed., *Archaeology at the Eleventh Pacific Science Congress*. Asian and Pacific Archaeology Series 1:101-32. Honolulu, Social Science Research Institute, University of Hawaii.

Green, R.C. (1970) Settlement pattern archaeology in Polynesia. In R.C. Green and M. Kelly (eds), *Studies in Oceanic Culture History Volume 1*. Pacific Anthropological Records 11:13-32. Honolulu, Department of Anthropology, Bernice P. Bishop Museum.

Green, R.C. (1974) Excavation of the Prehistoric Occupations of SU-Sa-3. In Archaeology in Western Samoa, edited by R.C. Green and J.M. Davidson, vol. 2, pp. 1 OS- 154. Auckland Institute and Museum Bulletin 7, Auckland. 1984 Settlement Pattern Studies in Oceania: An Introduction to a Symposium. New Zealand Journal of Archaeology 6:59-69.

Green, R.C. (1986) Some Basic Components of the Ancestral Polynesian Settlement System: Building Blocks for More Complex Polynesian Societies. In Island Societies, Archaeological Approaches to Evolution and Transformation, edited by P.V. Kirch, pp. 50-54. Cambridge University Press, Cambridge.

Green, R.C. (1990) The Study of Open Settlements in New Zealand Prehistory. In The Archaeology of the Kainga: A Study of Precontact Maori Undefended Settlements at Pouerua, Northland, New Zealand, edited by Douglas G. Sutton, pp. 23-32. Auckland University Press, Auckland.

Green, R.C. (1993) Community-Level Organization, Power, and Elites in Polynesian Settlement Pattern Studies. In The Evolution and Organization of Prehistoric Society in Polynesia, edited by M.W. Graves and R.C. Green, pp. 9-12. New Zealand Archaeological Association Mopnograph 19, Auckland.

Green, R.C. (1996) Settlement Patterns and Complex Society in the Windward Society Islands: Retrospective Commentary from the 'Opunohu Valley, Mo'orea. In Memoire de Pierre, Memoire d'Homme: Tradition et Archeologie en Oceanie, edited by M. Julien, M. Orliac, and C. Orliac, pp. 209-228. Publications de la Sorbonne, Paris.

Green, R.C. (1998) From Proto-Oceanic *Rumaq to Proto-Polynesian *Fale: A Significant Reorganization in Austronesian Housing. Archaeology in New Zealand 41(4):253-272.

Green, R.C. (1999) Early Oceanic Architectural Forms and Settlement Patterns: Linguistic, Archaeological and Ethnological Perspectives. In Archaeology and Language III: Artefacts, Languages and Texts: Building Connections, edited by R. Blench and M. Spriggs, pp. 31-89. One World Archaeology No. 34. Routledge, London.

Green, R.C. 1967 Settlement Patterns: Four Case Studies from Polynesia. In Archaeology at the Eleventh Pacific Science Congress, pp. 101-132. Asian and Pacific Archaeology 1. Social Science Research Institute, University of Hawaii, Honolulu.

Green, Roger (1984) Settlement pattern studies in Oceania: an introduction to a symposium.

Green, Roger C.

Green, Roger C. (1961) Moorean Archaeology: A Preliminary Report. Man 61:169-73. 1967a Summary and Conclusions. In Archeology on the Island of Mo'orea, French Polynesia, edited by Roger C. Green, Kay Green, Roy A. Rappaport, Ann Rappaport, and Janet M.

Davidson, pp. 216-227. Anthropological Papers of the American Museum of Natural History 51(2):111-230.
Green, Roger C. (1993). Community-Level Organisation, Power and Elites in Polynesian Settlement Pattern Studies. In: Michael W. Graves and Roger C. Green eds., *The Evolution and Organisation of Prehistoric Society in Polynesia,* pp.9-11. Auckland: New Zealand Archaeological Association.
Green, Roger C. 1980 Mākaha Before 1880 A.D.: Mahaka Valley Historical Project-Summary Report No.5. *Pacific Anthropological Records.* Department of Anthropology Bernice Pauahi Bishop Museum: Honolulu, Hawai‘i.
Green, Roger C., and Andrew K. Pawley (1998) Architectural Forms and Settlement Patterns. In The Lexicon of Proto Oceanic: The Culture and Environment of Ancestral Oceanic Society, vol. 1, Material Culture, edited by M. Ross, A. Pawley, and M. Osmond, pp. 37-66. Pacific Linguistics C-152. Australian National University, Canberra.
Green, Roger C., and Janet M. Davidson (editors) (1969) Archaeology in Western Samoa, vol. 1. Auckland Institute and Museum Bulletin 7. Auckland. 1974 Archaeology in Western Samoa, vol. 2. Auckland Institute and Museum Bulletin 7. Auckland.
Green, Roger C., and Kaye Green (1967) Interpretation of Round-Ended House Sites of the ‘Opunohu Valley Based on Excavation of an Example in the Western Portion of the Valley. In Archeology on the Island of Mo ’orea, French Polynesia, edited by Roger C. Green, Kaye Green, Roy A. Rappaport, Ann Rappaport, and Janet Davidson, pp. 164-176. Anthropological Papers of the American Museum of Natural History 51 (2): 111-230.
Grimshaw, Patricia (1989) *Paths of Duty: American Missionary Wives in Nineteenth-Century Hawaii*. Honolulu: University of Hawai‘i Press.
Grosz, E. A. (1995). Space, time, and perversion: Essays on the politics of bodies. Dix
Gunn BF, Baudouin L, Olsen KM (2011) Independent Origins of Cultivated Coconut (Cocos nucifera L.) in the Old World Tropics. PLoS ONE 6(6): e21143. https://doi.org/10.1371/journal.pone.0021143
Guttman, Erika B., Ian A. Simpson, Nina Nielsen, and Stephen J. Dockrill 2008 Anthrosols in Iron Age Shetland: Implications for Arable and Economic Activity. *Geoarchaeology* 23(6): 799-823.
Hage, P. (1998) Was Proto-Oceanic Society Matrilineal? Journal of the Polynesian Society 107(4):365-379.
Hall, Lisa Kahaleole (2008) "Strategies of erasure: US colonialism and Native Hawaiian feminism." *American Quarterly* 60 (2): 273-280.
Halualani, Rona Tamiko 2002 *In the name of Hawaiians: Native identities and cultural politics*. U of Minnesota Press.
Handy, E.S.C. (1923) The Native Culture in the Marquesas. Bernice P. Bishop Museum Bulletin 9. Honolulu.
Handy, E.S.C. (1927) *Polynesian Religion*. Bernice P. Bishop Museum Bulletin no. 34. Honolulu.
Handy, E.S.C (1930) History and Culture in the Society Islands. Bernice P. Bishop Museum Occasional Papers 79. Honolulu.
Handy, E.S.C. (1932) Houses, Boats, and Fishing in the Society Islands. Bernice P. Bishop Museum Bulletin 90. Honolulu.
Handy, E. S. C. (1940). *The Hawaiian Planter* (Vol. 1). The Museum.

Handy, E.S.C. (1965) Houses and Villages. In: *Ancient Hawaiian Civilization: A Series of Lectures Delivered at the Kamehameha Schools*, pp.69-80. Japan: Charles E. Tuttle.
Handy, E.S.C., and W.C. Handy (1923) Samoan House Building, Cooking, and Tattooing. Bernice P. Bishop Museum Bulletin 15. Honolulu
Handy, E.S. Craighill, and Mary Kawena Pukui (1972) *The Polynesian Family System in Ka-'u, Hawai'i*. Charles E. Tuttle Company, Rutland. Handy, W.D. 1927 Handcrafts of the Society Islands. Bernice P. Bishop Museum Bulletin 42. Honolulu.
Harding, Thomas G. And Ben J. Wallace, eds. (1970) *Cultures of the Pacific Selected Readings.* New York: The Free Press.
Hanson, F. Allan, 1982. Female Pollution in Polynesia? Journal of the Polynesian Society, 91:335-81.
Hanson, F. Allan and Louise Hanson 1983 Counterpoint in Maori Culture. London, Routledge & Kegan Paul.
Hanson, F. Allan 1987 Polynesian Religions: An Overview. In *Encyclopedia of Religion* edited by M. Eliade, pp. 423-432. Macmillan, New York.
Hartshorn, A. S., Chadwick, O. A., Vitousek, P. M., & Kirch, P. V. (2006). Prehistoric agricultural depletion of soil nutrients in Hawai'i. *Proceedings of the National Academy of Sciences*, *103*(29), 11092-11097.
Hastorf, C. (1999) Recent research and innovations in Paleoethnobotany. *Journal of Archaeological Research* 7(1): 55-103.
Hastorf, C. A. (1991) Gender, Space, and Food in Prehistory. Engendering Archaeology. Women and Prehistory, edited by Joan M. Gero and Margaret W. Conkey, 132-159.
Hawaiian islands. Academic Press.
Heinz, Danielle Kalani (2019) Society for American Archaeology Annual Conference, Albuquerque, NM.
Hendon, Julia (2000) Having and Holding: Storage, Memory, Knowledge, and Social Relations. *American Anthropologist,* 102(1):42-53.
Hendon, Julia (2001) Household Archaeology and Reconstructing Social Organization in Ancient Complex Societies: A Consideration of Models and Concepts Based on Study of the Prehispanic Model. *Gettysburg College Anthropology Faculty Publications.*
Hendon, Julia 2004 Living and Working at Home: The Social Archaeology of Household Production and Social Relations. In *A Companion to Social Archaeology,* edited by Lynn Meskell and Robert Preucel, pp. 272-286. Blackwell Publishing Ltd., Oxford.
Hendon, Julia (2010) *Houses in a Landscape: Memory and Everyday Life in Mesoamerica*. Duke University Press, London.
Hendon, Julia A. 2009 *Houses in a landscape: memory and everyday life in Mesoamerica*. Duke University Press.
Hendon, Julia, Rosemary A. Joyce and Jeanne Lopiparo (2014) *Relations: The Marriage Figurines of Prehispanic Honduras.* University Press of Colorado, Boulder, CO.
Hiroa, Te Rangi. (1957). *Arts and Crafts of Hawaii*. Bernice P. Bishop Museum Special Publication 45. Honolulu: Bishop Museum Press.
Hoang 2014:9
Hodder, Ian 1997 'Always momentary, fluid and flexible': towards a reflexive excavation methodology. *Antiquity*, 71(273): 691-700.

Hodder, Ian 2000 Developing a reflexive method in archaeology. In *Towards reflexive method in archaeology: The example at Çatalhöyük*, edited by Ian Hodder, pp. 3-15 British Institute of Archaeology at Ankara Monography No. 28.

Hogg, AG, Higham, TG, Lowe DJ Palmer, JG, Reimer PJ, Newnham RM (2003) A wiggle-match date for Polynesian settlement of New Zealand. *Antiquity* 77:116-25.

Holm, Lisa A. (2006). *The Archaeology and the Āina of Mahamenui and Manawainui, Kahikinui, Maui Island*. PhD Dissertation, Department of Anthropology, University of California, Berkeley.

Hommon, R. (1986) Social Evolution in Hawaii. *In* Island Societies: Archaeological Approaches to Evolution and transformation. P. Kirch, ed. pp. 55-68. Cambridge: Cambridge University Press.

Hommon, Robert J. (2013). *The Hawaiian State: Origins of a Political Society*. New York: Oxford University Press.

Horrocks, Mark 2005 A combined procedure for recovering phytoliths and starch residues from soils, sedimentary deposits and similar materials. Journal of
Archaeological Science 32, 1169-1175.

Horrocks, M. and Weisler, M.I. (2006). Analysis of Plant Microfossils in Archaeological Deposits from Two Remote Archipelagos: The Marshall Islands, Eastern Micronesia, and the Pitcairn Group, Southeast Polynesia. *Pacific Science* 60(2): 261-280.

Horrocks, M., & Bedford, S. (2010). Introduced Dioscorea spp. starch in Lapita and later deposits, Vao Island, Vanuatu. *New Zealand Journal of Botany*, *48*(3-4), 179-183.

Horrocks, M., & Lawlor, I. (2006). Plant microfossil analysis of soils from Polynesian stonefields in South Auckland, New Zealand. *Journal of archaeological science*, *33*(2), 200-217.

Horrocks, M., & Rechtman, R. B. (2009). Sweet potato (Ipomoea batatas) and banana (Musa sp.) microfossils in deposits from the Kona Field System, Island of Hawaii. *Journal of Archaeological Science*, *36*(5), 1115-1126.

Horrocks, M., & Weisler, M. I. (2006). A short note on starch and xylem of Colocasia esculenta (taro) in archaeological deposits from Pitcairn Island, southeast Polynesia. *Journal of archaeological science*, *33*(9), 1189-1193.

Horrocks, M., & Wozniak, J. A. (2008). Plant microfossil analysis reveals disturbed forest and a mixed-crop, dryland production system at Te Niu, Easter Island. *Journal of Archaeological Science*, *35*(1), 126-142.

Horrocks, M., Bedford, S., & Spriggs, M. (2009). A short note on banana (Musa) phytoliths in Lapita, immediately post-Lapita and modern period archaeological deposits from Vanuatu. *Journal of Archaeological Science*, *36*(9), 2048-2054.

Horrocks, M., Jones, M. D., Carter, J. A., & Sutton, D. G. (2000). Pollen and phytoliths in stone mounds at Pouerua, Northland, New Zealand: implications for the study of Polynesian farming. *Antiquity*, *74*(286), 863-872.

Horrocks, M., Shane, P. A., Barber, I. G., D'Costa, D. M., & Nichol, S. L. (2004). Microbotanical remains reveal Polynesian agriculture and mixed cropping in early New Zealand. *Review of Palaeobotany and Palynology*, *131*(3), 147-157.

Horrocks, M., Smith, I. W., Nichol, S. L., & Wallace, R. (2008). Sediment, soil and plant microfossil analysis of Maori gardens at Anaura Bay, eastern North Island, New Zealand: comparison with descriptions made in 1769 by Captain Cook's expedition. *Journal of Archaeological Science*, *35*(9), 2446-2464.

Horsburgh, K., & McCoy, M. (2017). Dispersal, isolation, and interaction in the islands of Polynesia: a critical review of archaeological and genetic evidence. *Diversity*, *9*(3), 37.
Howard, Alan and Robert Borofsky (eds) (1989) *Developments in Polynesian Ethnology.* Honolulu: University of Hawaii Press.
Hull, K.L. (1987) Identification of Cultural Site Formation Processes through Microdebitage Analysis. *American Antiquity,* 52(4): 772-783
Hunt, Terry 1989 A Geoarchaeological Analysis of Sediments from the Anahulu Valley Rockshelters. In *Prehistoric Hawaiian Occupation in the Anahulu Valley, O'ahu Island: Excavations in Three Inland Rockshelters,* edited by Patrick V. Kirch, pp. 43-60. Contributions of the University of California Archaeological Research Facility 47, Department of Anthropology, University of California, Berkeley.
Hunt, T., & Lipo, C. (2011). *The statues that walked: unraveling the mystery of Easter Island*. Simon and Schuster.
Hurles, M.E., Matisoo-Smith E, Gray, R.D., Penny D. (2003) Untangling Oceanic settlement: the edge of the knowable. *TRENDS in Ecology and Evolution* 18(10):531-540.
Ingold, Tim (1993) The temporality of the landscape. *World archaeology*, *25*(2), 152-174.
Ingold, Tim 2013 *Making: Anthropology, archaeology, art and architecture*. Routledge.
Irwin, Geoffrey (1992) *The Prehistoric Exploration and Colonisation of the Pacific.* Cambridge University Press.
'Ī'ī, John Papa (1963) *Fragments of Hawaiian history*. Bishop Museum Press.
Jennings, J., R Holmer, and G. Jackmond (1982) Samoan village patterns: Four examples. *Journal of the Polynesian Society* 91:81-102.
Jennings, J.D., and R.N. Holmer (1980) Archaeological Excavations at Western Samoa. Pacific Anthropological Records 32. Bernice P. Bishop Museum. Honolulu.
Jennings, J.D., R.N. Holmer, J. Janetski, and H.L. Smith (1976) Excavations at Upolu, Western Samoa. Pacific Anthropological Records 25. Department of Anthropology, Bernice P. Bishop Museum. Honolulu.
Johansen, J. Prytz, 1954. The Maori and His Religion in Its Non-Ritualistic Aspects. Copenhagen: Ejnar Munksgaard.
Johnson, A. W. and Timothy Earle (2000) The Evolution of Human Societies. From Foraging Group to Agrarian State.
Johnson, A., & Earle, T. (2000). *The evolution of human societies: from foraging group to agrarian state*. Stanford University Press
Jones, Sharyn (2009) *Food and Gender in Fiji*: *Ethnoarchaeological Explorations*. New York: Lexington Books.
Joyce, Rosemary A. 1993 *Embodying Personhood in Preshispanic Costa Rica.* Davis Museum and Cultural Center, Welleley, MA.
Joyce, Rosemary A. Burying the Dead at Tlatilco: Social Memory and Social Identities. In New Perspectives on Mortuary Analysis, Meredith Chesson, editor, pp. 12-26. Archaeology Division of the American Anthropology Association, Monograph 10.
Joyce, Rosemary A. 2005 Archaeology of the Body. *Annual Review of Anthropology,* 34: 139-58.
Joyce, Rosemary A. (2006) Feminist Theories of Embodiment and Anthropological Imagination: Making Bodies Matter. In Feminist Anthropology: Past, Present, and Future, edited by Pamela L. Geller and Miranda K. Stockett, pp. 43-54. University of Pennsylvania Press, Philadelphia.

Joyce, Rosemary A. 2000a A Precolumbian Gaze: Male Sexuality Among the Ancient Maya. In Archaeologies of Sexuality, Barb Voss and Rob Schmidt, eds, pp. 263-283. Routledge Press, London.
Joyce, Rosemary A. 2000b Heirlooms and Houses: Materiality and Social Memory. In *Beyond Kinship: Social and Material Reproduction in House Societies,* edited by Rosemary A. Joyce and Susan D. Gillespie, pp. 189-212. University of Pennsylvania Press, Philadelphia.
Joyce, Rosemary A. 2000c Girling the girl and boying the boy: The production of adulthood in ancient Mesoamerica. World Archaeology 31 (3):473-483.
Joyce, Rosemary A. (2003) Making Something of Herself: Embodiment in Life and Death at Playa de los Muertos, Honduras. *Cambridge Archaeological Journal* 13 (2): 248-261.
Joyce, Rosemary A. (2004) Embodied Subjectivity: Gender, Femininity, Masculinity, Sexuality. In A Companion to Social Archaeology. Basic Books, ed. Pp. 82–95. Blackwell Publishing.
Joyce, Rosemary A. (2010) Girling the Girl and Boying the Boy: The Production of Adulthood in Ancient Mesoamerica. In Contemporary Archaeology in Theory: The New Pragmatism. Robert W. Preucel and Stephen A. Mrozowski eds. Pp. 256-264. John Wiley and Sons.
Joyce, Rosemary A., and Susan D. Gillespie, eds. (2000) Beyond Kinship: Social and Material Reproduction in House Societies. Philadelphia: University of Pennsylvania Press.
Jusseret, Simon 2010 Socializing geoarchaeology: Insights from Bourdieu's theory of practice applied to Neolithic and Bronze Age Crete. *Geoarchaeology*, *25*(6), 675-708.
Kahn, J. G. (2005). *Household and community organization in the late prehistoric Society Island Chiefdoms (French Polynesia)*. University of California, Berkeley.
Kahn, J. G. (2007). Power and precedence in ancient house societies: A case study from the Society Island chiefdoms (French Polynesia). *The durable house: House society models in archaeology, ed., R. Beck*, 98-223.
Kahn, J. G. (2016). Household Archaeology in Polynesia: Historical Context and New Directions. *Journal of Archaeological Research*, 1-48.
Kahn, J.G. 1999-2002 'Opunohu Valley Archaeological Project Field Notes. In possession of the author. 2003 Maohi Social Organization at the Micro-Scale: Household Archaeology in the ‘Opunohu Valley, Mo‘orea, Society Islands (French Polynesia). In Pacific Archaeology: Assessments and Prospects. Proceedings o f the International Conference for the 50th anniversary o f the First Lapita Excavation (July 1952), Kone-Noumea 2002, edited by C. Sand, pp. 353- 367. Noumea: Le Cahiers de l'Archeologie en Nouvelle-Caledonie 15.
Kahn, Jennifer G. (1996) Prehistoric Stone Tool Use and Manufacture at the Ha ‘atuatua Dune Site, Marquesas Islands, French Polynesia. M.A. Thesis, Department of Archaeology, University of Calgary.
Kahn, Jennifer G. (2003). Ma’ohi social organization at the micro-scale: Household archaeology in the ‘Opunohu Valley, Mo’orea, Society Islands (French Polynesia). In Sand, C. (ed.), Pacific Archaeology: Assessments and Prospects, Le Cahiers de l’Arche´ologie en Nouvelle-Cale´donie, No. 15, Service des Muse´es de du Patrimoine, Noumea, New Caledonia, pp. 353–367.
Kahn, Jennifer G. (2007). Power and precedence in ancient house societies: A case study from the Society Island chiefdoms. In Beck, R. (ed.), The Durable House: Architecture,

Ancestors, and Origins, Center for Archaeological Investigations, Occasional Paper No. 35, Southern Illinois University, Carbondale
Kahn, Jennifer G. (2014) Household Archaeology and 'House Societies' in the Hawaiian Archipelago. Journal of Pacific Archaeology 5(2):18-29
Kalākaua, His Hawaiian Majesty King David. (1990) The legends and myths of Hawaiʻi.
Kamakau, S. M. (1961). Ruling Chiefs of Hawaii. *Honolulu: Kamehameha Schools Press.*
Kamakau, Samuel Manaiakalani 1976 *The works of the people of old: Na Hana a ka Poʻe Kahiko.* Bernice Pauahi Bishop Museum Special Publication 61. Translated by Mary Kawena Pukui. Bishop Museum Press, Honolulu. Barrère, Dorothy B. (ed).
Kamakau, S. M. (1991). Tales and Traditions of the People of Old: Na Mo'olelo a ka Poye Kahiko, tr. by Mary Kawena Pukui from newspaper articles in Ka Nupepa Kuokoa and Ke Au'Oko'a from 1868-1870.
Kamakau, Samuel Mānaiakalani. (1991). *Tales and Traditions of the People of Old = Nā Mo'olelo a ka Po'e Kahiko*. Honolulu: Bishop Press.
Kameʻeleihiwa, Lilikala (1992). *Native land and foreign desires: Pehea La E Pono Ai? How shall we live in harmony*. Honolulu: Bishop Museum Press.
Kaomea, J. (2006). Nā wāhine mana: A postcolonial reading of classroom discourse on the imperial rescue of oppressed Hawaiian women. *Pedagogy, Culture & Society*, *14*(3), 329-348.
Karkanas, Panagiotis 2006 Late Neolithic household activities in marginal areas: the micromorphological evidence from the Kouveleiki caves, Peloponnese, Greece. *Journal of Archaeological Science* 33(11):1628-1641.
Karkanas, P., Shahack-Gross, R., Ayalon, A., Bar-Matthews, M., Barkai, R., Fumkin, A., Gopher, A., and Stiner, M.C. 2007. Evidence for habitual use of fire at the end of the Lower Paleolithic: Site-formation processes at Qesem Cave, Isreal. *Journal of Human Evolution,* 53(2):197-212.
Karkanas, P., Efstratiou, N. 2009. Floor sequences in Neolithic Makri, Greece: micromorphology reveals cycles of renovation. *Antiquity,* 83(322): 955-967.
Karkanas *et al.* 2004;
Kauanui, J. Kēhaulani 2008a Native Hawaiian decolonization and the politics of gender. *American Quarterly* 60(2): 281-287.
Kauanui, J. Kēhaulani 2016 "A structure, not an event": Settler colonialism and enduring indigeneity. *Lateral* 5(1)
Kauanui, K. Kēhaulani 2008b *Hawaiian Blood: Colonialism and the Politics of Sovereignty and Indigeneity*, Duke University Press.
Kawelu 2014
Kawelu, Kathleen 2015 *Kuleana and Commitment: Working Toward a Collaborative Hawaiian Archaeology*. University of Hawaiʻi Press, Honolulu.
Kay, Alison E. (1979) *Hawaiian Marine Shells: Reef and Shore Fauna of Hawaii Section 4: Mollusca*. Bernice Pauahi Bishop Museum. Special Publication 64(4). Bishop Museum Press: Honolulu, HI.
Kay, Alison E. and Olive Schoenberg-Dole (1991) *Shells of Hawaiʻi.* University of Hawaii Press: Honolulu.
Keesing, Roger M. (1984). Rethinking" Mana". *Journal of Anthropological Research*, *40*(1), 137-156.

Kehoe, Alice B. 2013 ‘Prehistory’s’ History. In *The Death of Prehistory,* edited by Peter Schmidt and Stephen Mrozowski, pp. 31-46. Oxford University Press, Oxford.
Keller, Evelyn Fox 2010 *The mirage of a space between nature and nurture*. Duke University Press.
Kent, S. (ed.) (1990) *Domestic Architecture and the Use of Space: An Interdisciplinary Cross-cultural Study*. Cambridge, Cambridge University Press.
Kent, Susan (1984) Analyzing Activity Areas: An Ethnoarchaeological Study of the Use of Space. University of New Mexico Press: Albuquerque.
Kent, Susan (1990). A Cross-cultural study of segmentation, architecture and the use of space. In: S. Kent (ed.) *Domestic Architecture and the use of space*, pp127-152. Cambridge: Cambridge University Press.
Kepler, A. K. (1995). *Maui's floral splendor: a friendly color guide to the island's native & introduced flowers*. Mutual Pub Co.
Kimura, Larry (1983) Natuve Hawaiian Culture. In *Report on the Culture, Needs, and Concerns of Native Hawaiians, Vol. 1,* Native Hawaiian Study Commission, 173-224. Washington D.C.: The Commisssion.
Kirch, Patrick V. (1977) Valley Agricultural Systems in prehistoric Hawaii: An Archaeological Consideration. Asian Perspectives 20:246-280.
Kirch, P.V. (1984) The Evolution of the Polynesian Chiefdoms. Cambridge University Press, Cambridge.
Kirch, P.V. (1985) Feathered Gods and Fishhooks: An Introduction to Hawaiian Archaeology and Prehistory. University of Hawaii Press, Honolulu.
Kirch, P.V. (1986) Rethinking East Polynesian Prehistory. Journal o f the Polynesian Society 95:9-40.
Kirch, P.V. (1988). *Niuatoputapu: The Prehistory of a Polynesian Chiefdom*. Thomas Burke Memorial Washington State Museum Monograph No. 5. Seattle: Burke Museum.
Kirch, P.V. (1989) Prehistory. In Developments in Polynesian Ethnology, edited by Alan Howard and Robert Borofsky, pp. 13-46. University of Hawaii Press, Honolulu.
Kirch, P.V. (1990) The Evolution of Socio-Political Complexity in Prehistoric Hawaii: An Assessment of the Archaeological Evidence. Journal o f World Prehistory 4:311-345.
Kirch, P.V. (1991) Chiefship and Competitive Involution: The Marquesas Islands of Eastern Polynesia. In Chiefdoms: Power, Economy, and Ideology, edited by T. Earle, pp. 119-145. Cambridge University Press, Cambridge.
Kirch, P.V. (1992) Anahulu: The Anthropology o f History in the Kingdom o f Hawaii, vol. 2: The Archaeology o f History. University of Chicago Press, Chicago. Knight, Vernon James 2004 Characterizing Elite Midden Deposits at Moundville. American Antiquity 69(2):304-321.
Kirch, P.V. (1994a) The Wet and the Dry : Irrigation and Agricultural Intensification in Polynesia. The University of Chicago Press, Chicago.
Kirch, P.V. (1994b) The Pre-Christian Ritual Cycle of Futuna, Western Polynesia. Journal o f the Polynesian Society 103(3):255-298.
Kirch, P.V. (1995) The Lapita culture of western Melanesia in the context of Austronesian origins and dispersals. In P. Li, C. Tsang, Y. Huang, F. Ho, and C. Tseng, eds., *Austronesian Studies Relating to Taiwan*. pp. 255-94. Taipei: Academia Sinica.
Kirch, P.V. (1996) Tikopia Social Space Revisited. In Oceanic Culture History: Essays in Honour of Roger Green, edited by Janet Davidson, Geoffrey Irwin, Foss Leach, Andrew

Pawley, and Dorothy Brown, pp. 257-274. New Zealand Journal of Archaeology Special Publication, Dunedin.
Kirch, Patrick V., ed. (1997a) *Na Mea Kahiko o Kahikinui: Studies in the Archaeology of Kahikinui, Maui*(Archaeological Research Facility, Univ. of California, Berkeley).
Kirch, P.V. (1997b) The Lapita Peoples: Ancestors o f the Oceanic World. Blackwell Publishers, Cambridge. 1998 Landscapes of Power: Late Prehistoric Settlement and Land Use of Marginal Environments in the Hawaiian Islands. In Easter Island and East Polynesian Prehistory, edited by P. Vargas Casanova, pp. 59-72. Proceedings II International Congress on Easter Island & East Polynesian Archaeology, Universidad de Chile.
Kirch, P.V. (2000a) *On the Road of the Winds*. Berkeley, University of California Press.
Kirch, P.V. (2000b) Temples as "Holy Houses" Houses": The Transformation of Ritual Architecture in Traditional Polynesian Societies. In Beyond Kinship: Social and Material Reproduction in House Societies, edited by R. A. Joyce and S. D. Gillespie, pp. 103-114. University of Pennsylvania Press, Philadelphia.
Kirch, P.V. (2001) Polynesian Feasting in Ethnohistoric, Ethnographic, and Archaeological Contexts: A Comparison of Three Societies. In Feasts: Archaeological and Ethnographic Perspectives o f Food, Politics, and Power, edited by Michael Dietler and Brian Hayden, pp. 168-184. Smithsonian Institute Press, Washington.
Kirch, P.V. (2002a) Te Kai Paka-Anuta: Food in a Polynesian Outlier Society. Journal de la Societe des Oceanistes 114-115:71-89.
Kirch, Patrick V. (2004). Temple sites in Kahikinui, Maui, Hawaiian Islands: their orientations decoded. *Antiquity*, *78*(299), 102-114.
Kirch, P.V. (2005). *From chiefdom to archaic state: Social evolution in Hawaii*. Department of
Kirch, Patrick V. (2007). Hawaii as a Model System for Human Ecodynamics. *American Anthropologist* 109(1): 8-26.
Kirch, Patrick V. (2010). *How chiefs became kings: Divine kingship and the rise of archaic states in ancient Hawai'i*. University of California Press, Berkeley.
Kirch, Patrick V. (2012). *A Shark Going Inland is My Chief: The Island Civilization of Ancient Hawai'i*. Univ of California Press.
Kirch, P.V. (2014) *Kau'āina Kahiko: Life and Land in Ancient Kahikinui, Maui*. University of Hawai'i Press, Honolulu.
Kirch, P.V. (2014) Understanding the Hawaiian Past: A personal reflection. Journal of Pacific Archaeology 5(2): 109-114.
Kirch, P. V. (2017). *On the road of the winds: an archaeological history of the Pacific Islands before European contact*. University of California Press.
Kirch, P.V., and M. Kelly (editors) (1975) Prehistory and Ecology in a Windward Hawaiian Valley: Halawa Valley, Molokai. Pacific Anthropological Records 24. Bernice P. Bishop Museum, Honolulu. 510
Kirch Patrick V., and Roger C. Green (1987) History, phylogeny and evolution in Polynesia. Cur. Anthropol. 28:431-456.
Kirch, Patrick V., M. Sahlins (1992) Anahulu: The Anthropology of History in the Kingdom of Hawaii, vol. 1: Historical Ethnography. University of Chicago Press, Chicago.
Kirch, Patrick V., and Roger C. Green (2001). *Hawaiki, ancestral Polynesia: an essay in historical anthropology*. Cambridge University Press.
Kirch, Patrick V., and Sharon Jones O'Day (2003) New Archaeological Insights into Food and Status: A Case Study from Pre-Contact Hawaii. *World Archaeology* 34(3):484-497.

Kirch, Patrick V., & W.D. Sharp (2005). Coral 230Th dating of the imposition of a ritual control hierarchy in precontact Hawaii. *Science*, *307*(5706), 102-104.
Kirch, Patrick V. and Jennifer G. Kahn (2007) Advances in Polynesian Prehistory: A review and assessment of the past decade (1994-2004). *Journal of Archaeological Research*. 15:191-238
Kirch, P.V., & McCoy, M.D. (2007). Reconfiguring the Hawaiian cultural sequence: Results of re-dating the Halawa Dune Site (Mo-A1-3), Moloka'i Island. *The Journal of the Polynesian Society*, 116(4), 385.
Kirch, P. V., O'Day, S., Coil, J., Morgenstein, M., Kawelu, K., & Millerstrom, S. (2003). The Kaupikiawa Rockshelter, Kalaupapa Peninsula, Moloka'i: New investigations and reinterpretation of its significance for Hawaiian prehistory. *People and Culture in Oceania*, *19*, 1-27.
Kirch, Patrick V., Anthony S. Hartshorn, Oliver A. Chadwick, Peter M. Vitousek, David R. Sherrod, James Coil, Lisa Holm, and Warren D. Sharp 2004 Environment, agriculture, and settlement patterns in a marginal Polynesian landscape.*Proceedings of the National Academy of Sciences of the United States of America* 101(26), 9936-9941.
Kirch, Patrick V., Coil, J., Hartshorn, A. S., Jeraj, M., Vitousek, P. M., & Chadwick, O. A. (2005). Intensive dryland farming on the leeward slopes of Haleakala, Maui, Hawaiian Islands: archaeological, archaeobotanical, and geochemical perspectives. *World Archaeology*, *37*(2), 240-258.
Kirch, Patrick V., Holson, J. and Baer, A. 2010 Intensive Dryland Agriculture in Kaupō, Maui, Hawaiian Islands. *Asian Perspectives* 48(2), 265-290.
Kirch, Patrick V., Sidsel Millerstrom, Sharyn Jones, and Mark D. McCoy (2010) Dwelling among the gods: A late pre-contact priest's house in Kahikinui, Maui, Hawaiian Islands. *Journal of Pacific Archaeology,* 1(2):145-160.
Kirch, Patrick V., Peter R. Mills, Steven P. Lundblad, John Sinton, and Jennifer G. Kahn (2011) Interpolity exchange of basalt tools facilitated via elite control in Hawaiian archaic states. *Proceedings of the National Academy of Sciences,* 109(4): 1056-1061.
Kirch, Patrick V., John Holson, Paul Cleghorn, Tsim D. Schneider, and Oliver Chadwick (2013) Five Centuries of Dryland Farming and Floodwater Irrigation at Hōkūkano Flat, Auwahi, Maui Island. *Hawaiian Archaeology.*
Kirch, Patrick V., Regina Mertz-Kraus, and Warren D. Sharp (2015) Precise chronology of Polynesian temple construction and use for southeastern Maui, Hawaiian Islands determined by 230 Th dating of corals. *Journal of Archaeological Science* 53: 166-177.
Kolb, M. (2006). The origins of monumental architecture in ancient Hawai ʻi.*Current anthropology*, *47*(4), 657-665.
Kolb, M. J., and J.E. Snead (1997) It's a Small World After All: Comparative Analysis of Community Organization in Archaeology. American Antiquity 62(4):609-629.
Kolb, M.J. (1994) Monumentality and the Rise of Religious Authority in Precontact Hawaiʻi. Current Anthropology 34(5):521 -547.
Kolb, M.J. (1999) Staple Finance, Ritual Pig Sacrifice, and Ideological Power in Ancient Hawaiʻi. In Complex Polities in the Ancient Tropical New World, edited by E.A. Bacus and L.J. Lucero, pp. 89-107. Archaeological Papers of the American Anthropological Association, Number 9.
Kolb, Michael J. (1992) Diachronic Design Changes in Heiau Temple Architecture on the Island of Maui, Hawai'i. Asian Perspectives 31:9-38.

Kolb, Michael J., and Gail M. Murakami (1994) Cultural Dynamics and the Ritual Role of Woods in Pre-Contact Hawaii. Asian Perspectives 33(l):57-78.

Kramer, C. (1982). Ethnographic Households and Archaeological Interpretation. In: R. Wilk and W. Rathje eds., *Archaeology of the Household: building a prehistory of Domestic Life,* pp. 663-676.

Krauss, B. H. (1993). *Plants in Hawaiian culture*. University of Hawaii Press.

Kubiena, W. L. 1937 Method of preparing thin slices of soils in an undisturbed state. *Zeiss-Nachr* 2:81.

Kurashima, Natalie, and Patrick V. Kirch 2011 "Geospatial modeling of pre-contact Hawaiian production systems on Molokaʻi Island, Hawaiian Islands." *Journal of Archaeological Science* 38(12), 3662-3674.

Ladefoged, Thegn N., Mark D. McCoy, Gregory P. Asner, Patrick V. Kirch, Cedric O. Puleston, Oliver A. Chadwick, and Peter M. Vitousek (2011) Agricultural potential and actualized development in Hawai'i: an airborne LiDAR (Links to an external site.) *Journal of Archaeological Science* 38, 3605-3619

Ladefoged, T. and Graves, M. (2006) The Formation of Hawaiian Territories. In: *Archaeology of Oceania: Australia and the Pacific Islands*. Editor: Ian Lilley. Blackwell Publishing Lmtd: Malden, MA. pp. 259-283.

Ladefoged, T. N. (1998) Spatial Similarities and Change in Hawaiian Architecture: The Expression of Ritual Offering and Kapu in Luakini Heiau, Residential Complexes, and Houses. Asian Perspectives 37(l):59-73.

Ladefoged, T. N., Kirch, P. V., Gon, S. M., Chadwick, O. A., Hartshorn, A. S., & Vitousek, P. M. (2009). Opportunities and constraints for intensive agriculture in the Hawaiian archipelago prior to European contact. *Journal of Archaeological Science*, *36*(10), 2374-2383.

Ladefoged, T., G.F. Somers, and M.M. Lane-Hamasaki (1987) Settlement Pattern Analysis o f a Portion of Hawaii Volcanoes Park: Archaeology at Hawaii Volcanoes National Park. Western Archaeological and Conservation Center Publications in Anthropology 44.

Ladefoged, T., G.F. Somers, and M.M. Lane-Hamasaki (1987) Settlement Pattern Analysis o f a Portion o f Hawaii Volcanoes Park: Archaeology at Hawaii Volcanoes National Park. Western Archaeological and Conservation Center Publications in Anthropology 44.

Ladefoged, Thegn and Michael Graves (2006) The Formation of Hawaiian Territories. In: *Archaeology of Oceania: Australia and the Pacific Islands*. Editor: Ian Lilley. Blackwell Publishing Lmtd: Malden, MA. pp. 259-283.

LaMotta, V. M., and Schiffer, M.B. (1999). Formation Processes of House Floor Assemblages. In *The Archaeology of Household Activities,* edited by Penelope Allison. Routledge, London.

LaMotta, Vincent M. and Michael Schiffer (1999) Formation processes of house floor assemblages. In *The Archaeology of Household Activity,* edited by Penelope Alison, pp19-29. London, Routledge.

Lamphere, Louise (2006) Foreword: Taking Stock—The Transformation of Feminist Theorizing in Anthropology. In *Feminist Anthropology: Past, Present, and Future*, edited by Pamela L. Geller and Miranda K. Stockett, pp. ix-xvi. University of Pennsylvania Press, Philadelphia.

Lane, Paul 2013 Presencing the Past: Implications for Bridging the History/Prehistory Divide. In *The Death of Prehistory,* edited by Peter Schmidt and Stephen Mrozowski, pp. 47-68. Oxford University Press, Oxford.
Lass, Barbara (1994) Hawaiian Adze Production and Distribution: Implications for the Development o f Chiefdoms. Monograph 37, University of California, Institute for Archeology, Los Angeles.
Lave, Jean (1991) Situating Learning in Communities of Practice *Perspectives on Socially Shared Cognition.* Ed. Lauren B. Resnick, John M. Levine, and Stephanie Teasley. American Psychological Association, Washington D.C.. pp. 63-82.
Leach, F., J. M. Davidson, and R. Wallace (1999) The Form and Construction of the Makotukutuku House, a Pre-European Dwelling in Palliser Bay, New Zealand. New Zealand Journal o f Archaeology 21:87-117
Leach, H.M. (1984) Prehistory o f New Zealand. Longman Paul, Auckland.
Leach, H.M. (1993) The Role of Major Quarries in Polynesian Prehistory. In The Evolution and Organization o f Prehistoric Society in Polynesia, edited by Michael W. Graves and Roger C. Green, pp. 33-42. New Zealand Archaeological Association Monograph 19 (monograph editor: Nigel Prickett), Auckland.
Leach, H.M. (2003) Did East Polynesians have a Concept of Luxury Goods? World Archaeology 34(3):442-457.
Leach, Helen M. (1981) Technological Changes in the Development of Polynesian Adzes. In Archaeological Studies o f Pacific Stone Resources, edited by F. Leach and J. Davidson, pp. 167-183. BAR International Series 104.
Lepofsky, D. (1994) Prehistoric Agricultural Intensification in Society Islands, French Polynesia. Ph.D. Dissertation, University of California, Berkeley.
Lévi-Strauss, Claude (1962) *The Savage Mind or Untamed Thinking.* Chicago: The University of Chicago Press.
Lévi-Strauss, Claude (1975) *The Way of the Masks.* Seattle: University of Washington Press.
Lévi-Strauss, C. (1979) Nobles Sauvages. In Culture, Science et Developement: Contribution a une Histoire de I 'Homme, pp. 41-55. Edouard Privat, Paris.
Lévi-Strauss, Claude (1987) *Anthropology and Myth: Lectures 1951-1982.* Translated by Roy Willis. Basil Blackwell: New York.
Levy, Robert, 1973. Tahitians: Mind and Experience in the Society Islands. Chicago, University of Chicago Press.
Lichens, T. (1997) Acquiring Adzes: Use, Production, Exchange, and Distribution o f Stone Tools in Kahikinui, Maui. Honors Thesis, Department of Anthropology, University of California, Berkeley.
Lincoln, Noa Kekuewa. (2009) *Amy Greenwell Garden Ethnobotanical Guide to Native Hawaiian Plants and Polynesian Introduced plants*. Honolulu, Bishop Museum Press.
Linnekin, J. (1990) Sacred Queens and Women of Consequence. University of Michigan Press, Ann Arbor.
Linnekin, Jocelyn 1990 *Sacred Queens and Women of Consequence: Rank, Gender, and Colonialism in the Hawaiian Islands.* Ann Arbor: University of Michigan Press.
Linnekin, Jocelyn 1990 *Sacred Queens and Women of Consequence: Rank, Gender, and Colonialism in the Hawaiian Islands.* Ann Arbor: University of Michigan Press.
Linnekin, Jocelyn. (1990) *Sacred Queens and Women of Consequence.* Ann Arbor: The University of Michigan Press.

Linnkein, J. (1990) Inside, Outside: A Hawaiian Community in the World System. In Culture Through Time: Anthropological Approaches, edited by E. Ohnuki-Tiemey, pp. 165-204. Stanford University Press, Stanford.

Linton, R. (1923) The Material Culture o f the Marquesas Islands. Bernice P. Bishop Museum Memoirs VIII(5). Honolulu

Llobera, M. 2012 Life on a pixel: challenges in the development of digital methods within an “Interpretive” landscape archaeology framework. *Journal of Archaeological Method and Theory*, *19*(4), 495-509

Luomala, Katharine (1940) The Development of Polynesian Hero Cycles. *The Journal of the Polynesian Society* 49(195): 347-364.

Lyons, Diane (1989) Men's Houses: Women's Spaces: The spatial Ordering of Households in Doulo, North Carolina. Household and Communities: Proceedings of the 21st Annual Chacmool Conference, edited by Scott MacEachern, David J.W. Archer, and Richard D. Garvin, pp. 28-34. Calgary.

Lyons, Diane (1991) The Construction of Gender, Time And Space. The Archaeology of Gender: Proceedings of the Twenty-Second Annual Conference of the Archaeological Association of the University of Calgary, edited by Dale Walde and Noreen D. Willows, pp. 108-114. Calgary.

Macphail, R. I., & Goldberg, P. (1995). Recent advances in micromorphological interpretations of soils and sediments from archaeological sites. *Archaeological sediments and soils: Analysis, interpretation and management*, 1-24.

Macphail, Richard I., and Paul Goldberg (2017) *Applied soils and micromorphology in archaeology*. Cambridge University Press.

Macphail, R. I. (1998). A reply to Carter and Davidson's “An evaluation of the contribution of soil micromorphology to the study of ancient arable agriculture”. *Geoarchaeology: An International Journal*, *13*(6), 549-564.

Maher, Lisa A. (2018) Persistent Place-Making in Prehistory: The creation, maintenance and transformation of an Epipalaeolithic landscape. *Journal of Archaeological Method and Theory* 25:1-86.

Mallol, Carolina, Frank W. Marlowe, Brian M. Wood, and Claire C. Porter (2007) Earth, wind, and fire: ethnoarchaeological signals of Hadza fires. *Journal of Archaeological Science* 34(12): 2035-2052.

Malo, Davida (1951 [1898]) Hawaiian Antiquities. Bernice P. Bishop Special Publication 2. Honolulu.

Marck, Jeff (1996) Eastern Polynesian Subgrouping Today. In Oceanic Culture History: Essays in Honour o f Roger Green, edited by Janet Davidson, Geoffrey Irwin, Foss Leach, Andrew Pawley, and Dorothy Brown, pp. 491-511. New Zealand Journal of Archaeology Special Publication, Dunedin

Marinucci, Mimi (2016) *Feminism is queer: The intimate connection between queer and feminist theory*. Zed Books Ltd.

Martinsson-Wallin, H. (1994) Ahu - The Ceremonial Stone Structures o f Easter Island. Analyses o f Variation and Interpretation of Meanings. Soceitas Archaeologica Upsaliensis, Aun 18, Uppsala.

Martinsson-Wallin, H. (2001) Construction, Destruction, Reconstruction of Monumental Architecture on Rapa Nui. In Pacific 2000: Proceedings o f the Fifth International

Conference on Easter Island and the Pacific, edited by C. M. Stevenson, G. Lee, and F.J. Morin, pp. 73-78. Easter Island Foundation, Los Osos
Matarazzo, T., Berna, F., and Goldberg, P. 2010 Occupation surfaces sealed by the Avellino eruption of Vesuvius at the Early Bronze Age village of Afragola in southern Italy: A micromorphological analysis, *Geoarchaeology*, 25(4): 437-466.
Matthews, Wendy 2012a *Household life-histories and boundaries.* In Last House on the Hill: BACH Area Reports from Çatalhöyük, 1997-2003 edited by R. Tringham and M. Stevanovic, Monumenta Archaeologica 27, pp. 205-224. Cotsen Institute of Archaeology Press and British Institute at Ankara, Los Angeles.
Matthews, Wendy 2012b *Defining households: micro-contextual analysis of early Neolithic households in the Zagros, Iran.*In Household archaeology: new perspectives from the Near East and beyond, edited by B. J. Parker and C. P. Foster, pp. 183-216. Eisenbrauns, Winona Lake.
Matthews, Wendy 2010 Geoarchaeology and taphonomy of plant remains and microarchaeological residues in early urban environments in the Ancient Near East. *Quaternary International* 214(1):98-113.
Matthews, W. (2005) Micromorphological microstratigraphic traces of uses and concepts of space. In *Inhabiting Çatalhöyük: reports from the 1995-1999 seasons,* edited by I. Hodder, McDonald Institute for Archaeological Research/British Instutue of Archaeology at Ankara Monograph, Cambridge.

Matthews, W., Postgate, J. N., Payne, S., Charles, M. P., & Dobney, K. (1994). The imprint of living in an early Mesopotamian city: questions and answers. In *Whither environmental archaeology* (Vol. 38, pp. 171-212). Oxbow Books Oxford.
Matthews, Wendy, Charles AI French, Thomas Lawrence, David F. Cutler, and Martin K. Jones 1997 Microstratigraphic traces of site formation processes and human activities. *World archaeology* 29(2):281-308.
Maudry, S. (2006) "The Integration of Historical Cartographic Data within the GIS Environment (Links to an external site.)" in Between Dirt and Discussion: Methods, Methodology, and Interpretation in Historical Archaeology edited by Archer and Bartoy. New York: Springer. pp 33-60.
Maunupau, Thomas K. (1998) Huakai Makaikai a Kaupo, Maui: A Visit to Kaupō, Maui. Honolulu: Bishop Museum Press.
McCoy, Mark D., Mara A. Mulrooney, Mark Horrocks, Hai Cheng, and Theng N. Ladefoged 2016 Evaluating agricultural bet-hedging strategies in the Kona Field System: New high-precision 230Th/U and 14C dates and plant microfossil data from Kealakekua, Hawai'i Island. *Archaeology in Oceania* 00:1-11.
McCoy, P.C. (1976) Easter Island Settlement Patterns in the Late Prehistoric and Protohistoric Periods. Easter Island Committee. Bulletin Five. International Fund For Monuments, Inc.
McCoy, P.C. (1986) Archaeological Investigations in the Hopukani and Liloe Springs Area o f the Mauna KeaAdze Quarry. Ms. 092386 on file, Department of Anthropology, Bernice P. Bishop Museum. Reproduced
McCoy, P.C. (1990) Subsistence in a 'Non-Subsistence' Environment: Factors of Production in a Hawaiian Alpine Desert Adze Quarry. In Pacific Production Systems: Approaches to Economic Prehistory, edited by D.E. Yen and J.M.J. Mummery, pp. 85-119. Occasional

Papers in Prehistory, Department of Prehistory, Research School of Pacific Studies. Australian National University, Canberra.
McCoy, P.C. (1999) Neither Here nor There: A Rites of Passage Site on the Eastern Fringes of the Mauna Kea Adze Quarry, Hawai'i. *Hawaiian Archaeology* (7): 11-34.
McCoy, Patrick C. (1973) Excavation of a Rectangular House on the East Rim of Rano Kau Volcanoe, Easter Island. Archaeology and Physical Anthropology in Oceania 8(1):51 -67.
McCoy, Patrick C., A. Makanani, and A. Sinoto (1993) Archaeological Investigations o f the Pu 'u Moiwi Adze Quarry Complex, Kaho 'olawe. Consultant Report 14. Kaho'olawe Island Conveyance Commission, Honolulu.
McGregor, Davianna (2007) *Na kua'aina: living Hawaiian culture*. University of Hawaii Press.
McGuire, Randall H. *"A" Marxist Archaeology*. Academic Press.
Meadows, Karen 1999 The Appetites of Households in Roman Britain. In *The Archaeology of Household Activity*. ed. Penelope Allison. pp. 101-120. London, Routledge.
Mellalieu, Simeon James 1996 *Archaeology in the Intertidal Zone: Models of Lithostratigraphic Resolution in Relation to Site Preservation.* Thesis, Institute of Archaeology University College London.
Meskell LM. (2001) Archaeologies of identity. In *Archaeological Theory Today*, edited by. I Hodder, pp. 187–213. Cambridge, UK, Polity
Meskell, Lynn M. And Rosemary A. Joyce (2003) *Embodied Lives: Figuring Ancient Maya and Egyptian Experience*. New York: Routledge.
Metraux, Alfred (1940) Ethnology o f Easter Island. B.P. Bishop Museum Bulletin 160. Honolulu.
Meyer, Manulani Aluli (2001) Our own liberation: Reflections on Hawaiian epistemology. *The Contemporary Pacific* 13(1): 124-148.
Mignolo, Walter D. 2018 What Does It Mean to Decolonize? In *On Decoloniality: Concepts, Analytics Praxis,* by Walter Mignolo and Catherine E. Walsh, pp. 105-134. Duke University Press.
Millerstrom, Sidsel (2006) Ritual and Domestic Architecture, Sacred Places and Images: Archaeology in the Marquesas Archipelago, French Polynesia. In: *Archaeology of Oceania: Australia and the Pacific Islands*. Editor: Ian Lilley. Blackwell Publishing Lmtd: Malden, MA pp. 284-301
Millerstrom, Sidsel and Patrick Kirch (2004) Petroglyphs of Kahikinui, Maui, Hawaiian Islands: Rock Images within a Polynesian Settlement Landscape. *Proceedings of the Prehistoric Society,* 70:107-127.
Mills, Andy (2016) Bodies Permeability and Divine: Tapu, Mana, and the Embodiment of Hegemony in Pre-Christian Tonga. In *New Mana: Transformations of a Classic Concept in Pacific Languages and Cultures* edited by Matt Tomlinson and Ty P. Kāwika Tengan, pp. 77-106. ANU Press.
Mills, Barbara J. and William H. Walker (2008) *Memory work: archaeologies of material practices.* School for Advanced Research advanced seminar series. School for Advanced Research Press.
Mills, Peter R, Steven P. Lundblad, Jacob G. Smith, Patrick C. McCory and Sean P. Naleimaile. (2008). Science and Sensitivity: A Geochemical Characterization of the Mauna Kea Adze Quarry Complex, Hawai'i Island, Hawaii. *American Antiquity,* 73(4): 743-758.

Moore, Henrietta (1994) Embodied Selves: Dialogues Between Anthropology and Psychoanalysis. In A Passion For Difference Pp. 28–48. Bloomington and Indianapolis: Indiana University Press.

Moore, Henrietta L. (1988) *Feminism and anthropology*. U of Minnesota Press.

Mulrooney, M. A., and T. Ladefoged (2005) Hawaiian Heiau and Agricultural Production in the Kohala Dryland Field System. Journal o f the Polynesian Society 114(1):45-68

Nelson, Sarah Milledge (2015) *Shamans, Queens, and Figurines: The development of Gender Archaeology*. Left Coast Press: Walnut Creek, California.

Netting, R. M., Wilk, R. R., & Arnould, E. J. (Eds.). (1984) *Households: Comparative and historical studies of the domestic group*. Univ of California Press.

New Zealand Journal of Archaeology Volume 6 pp. 59-69

Nogelmeier, Puakea (2010) *Mai Pa'a i Ka Leo: Historical Voice in Hawaiian Primary Materials: Looking Forward and Listening Back*. Bishop Museum Press.

O'Day, S. J. (2004). Marine resource exploitation and diversity in Kahikinui, Maui, Hawaii: Bringing together multiple lines of evidence to interpret the past.*Archaeofauna: International Journal of archaeozoology*, (13), 97-108.

O'Connell, J.F. (1987) Alyawara Site Structure and its Archaeological Implications. *American Antiquity* 52:74-108.

O'Day, S. J. (2001) Excavations at the Kipapa Rockshelter, Kahikinui, Maui, Hawai'i, Asian Perspectives 40(2):279-304.

Oliveira, Katrina-Ann R. Kapāʻanaokalāokeola Nākoa 2016 Ka Wai Ola: The Life-Sustaining Water of Kanaka Knowledge. In *Kanaka ʻŌiwi Methodologies: Moʻolelo and Metaphor,* edited by Katrina-Ann R. Kapāʻanaokalāokeola Nākoa Oliveira and Erin Kahunawaikaʻala Wright, pp. 72-85. University of HawaiʻI Press, Honolulu.

Oliver, Douglas L. (1974). Ancient Tahitian Society, 2 vols. Honolulu: University of Hawai'i Press.

Oliver, Douglas L. (1989) *The Native Cultures of Australia and the Pacific Islands*, Vol. 2. Honolulu: University of Hawaii Press.

Ortner, Sherry B. (1981) Gender and sexuality in hierarchical societies: the case of Polynesia and some comparative implications. In *Sexual Meanings: The Cultural Construction of Gender and Sexuality.*Edited by Sherry B. Ortner and Harriet Whitehead, pp. 359-411. Cambridge, Cambridge University Press.

Ortner, Sherry B. (1996) *Making Gender: The Politics and Erotics of Culture*. Boston: Beacon Press.

Ortner, Sherry B. and Harriet Whitehead (editors) (1981) *Sexual meanings: The cultural construction of gender and sexuality*. CUP Archive.

Oyuela-Caycedo, Augusto (1991) Ideology and Structure of Gender Spaces: The Case of the Kaggaba Indians. The Archaeology of Gender: Proceedings of the Twenty-Second Annual Conference of the Archaeological Association of the University of Calgary, edited by Dale Walde and Noreen D. Willows, pp. 326-335. Calgary.

Parkes, A. (1997) Environmental Change and the Impact of Polynesian Colonization: Sedimentary Records from Central Polynesia. In Historical Ecology in the Pacific Islands: Prehistoric Environmental and Landscape Change, edited by Patrick V. Kirch and Terry L. Hunt, pp. 166-99. Yale University Press, New Haven.

Pauketat, T. R., & Alt, S. M. (2003). In *Mounds, memory, and contested Mississippian history* (pp. 151-179). Blackwell Publishers Ltd.

Pauketat, T. R., & Alt, S. M. (2003). In *Mounds, memory, and contested Mississippian history* (pp. 151-179). Blackwell Publishers Ltd.
Pauketat, Timothy (2001) Practice and history in archaeology: an emerging paradigm. Anthropological Theory 1(1): 73-98.
Pauketat, Timothy (2010) Practice and History in Archaeology: An Emerging Pardigm. In *Contemporary Archaeology in Theory: The New Pragmatism*. Robert W. Preucel and Stephen A. Mrozowski eds. Pp. 137-155. John Wiley and Sons.
Pawley, Andrew and Roger C. Green (1984) The Proto-Oceanic Language Community. *The Journal of Pacific History*, 19(3):123-146.
Pearsall, D. M., & Trimble, M. K. (1984). Identifying past agricultural activity through soil phytolith analysis: a case study from the Hawaiian Islands. *Journal of Archaeological Science*, *11*(2), 119-133.
Perry, Elizabeth and Rosemary A. Joyce (2001) Special Issue: Butler Matters: Judith Butler Impact on Feminist and Queer Studies Since Gender Trouble. *International Journal of Sexuality and Gender Studies* 6 (1 and 2): 63-76.
Perry, Elizabeth and Rosemary A. Joyce (2005) Past Performance: The Archaeology of Gender as Influenced by the Work of Judith Butler. In *Butler Matters: Judith Butler's Impact on Feminist and Queer Studies*, edited by Margaret Sönser Breen and Warren Blumenfeld, pp. 113-126. Aldershot: Ashgate. [revised version of Perry and Joyce 2001]
Perry, Elizabeth M. and James M. Potter (2006) Materiality and Social Change in the Practice of Feminist Anthropology. In *Feminist Anthropology: Past, Present, and Future*, edited by Pamela L. Geller and Miranda K. Stockett, pp. 115-126. University of Pennsylvania Press, Philadelphia.
Philip J Deloria, K. Tsianina Lomawaima, Bryan McKinley Jones Brayboy, Mark N. Trahant, Loren Ghiglione, Douglas Medin and Ned Blackhawk 2018:15
Piperno, Dolores R. 2006 *Phytoliths: A Comprehensive Guide for Archaeologists and Paleoecologists.* AltaMira Press: Oxford.
Pluciennik, Mark 1999 Archaeological narratives and other ways of telling. *Current anthropology* 40(5):653-678.
Pollard, A. Batt, C., Stern, B. and Young, S. (2007) *Analytical chemistry in archaeology.* Cambridge University Press, Campbridge.
Prine, Elizabeth (2000) Searching for third genders: towards a prehistory of domestic space in Middle Missouri villages. In *Archaeologies of Sexuality*, edited by Robert A. Schmidt and Barbara L. Voss, pp. 197-219. New York: Routledge.
Prine, Elizabeth. (2000). Searching for third genders: towards a prehistory of domestic space in Middle Missouri villages. In: R.A. Schmidt and B.L. Voss (eds.) *Archaeologies of Sexuality*. New York: Routledge.
Pukui, Mary Kawena and Samuel H. Elbert. (1986) *Hawaiian Dictionary.* Honolulu: University of Hawaii Press.
Ralston, C. (1984). Hawaii 1778–1854: some aspects of maka'ainana response to rapid cultural change. *The Journal of Pacific History*, *19*(1), 21-40.
Reitz, E. and Wing, E. (2007) *Zooarchaeology 2nd edition*. Cambridge University Press, Cambridge, Chapters 6 and 7, pp. 153-250.
Richards 1973:26)

Rodriguez, Erin C. (2015). Soil Micromorphology with the Fort Davis Archaeology Project. PhD Dissertation, Anthropology Department, University of California, Berkeley.

Rolett, Barry V. (1998) Hanamiai: Prehistoric Colonization and Cultural Change in the Marquesas Islands (East Polynesia). Yale University Publications in Anthropology Number Eighty-one. Department of Anthropology and The Peabody Museum, New Haven.

Rosaldo M, Lamphere L, eds (1980) The use and abuse of anthropology: reflections on feminism and cross-cultural understanding. *Signs*, 389-417.

Rosaldo M, Lamphere L, eds. (1974) Women, Culture and Society. Stanford, CA: Stanford Univ. Press

Rosen, A.M. (1986) *Cities of Clay: The Geoarchaeoogy of Tells*. University of Chicago Press, Chicago.

Rosen, A.M. (1989) Ancient Town and City Sites: A View from the Microscope. *American Antiquity*, 54(3): 564-578.

Rosendahl, P. (1972). "Aboriginal agriculture and residence patterns in upland Lapakahi, Island of Hawaii." Ph.D. dissertation, Univ. Hawaii.

SAA http://www.saa.org/public/educators/03_whatis.html#06

saa.org/about-archaeology/what-is-archaeology

Sahlins, M. (1958) Social Stratification in Polynesia. American Ethnological Society, Seattle
Sahlins, M. (1958) Social Stratification in Polynesia. American Ethnological Society, Seattle
Sahlins, M. (1976) *Culture and Practical Reason.* University of Chicago Press.

Sahlins, M. D. (1972). *Stone age economics*. Transaction Publishers.

Sahlins, M. D. (1992). *Anahulu: The Anthropology of History in the Kingdom of Hawaii. Historical Ethnography*. University of Chicago Press.

Sahlins, Marshall (1992). *Anahulu: The Anthropology of History in the Kingdom of Hawaii*. Historical Ethnography: University of Chicago Press.

Sahlins, Marshall 1958 Social Stratification in Polynesia. American Ethnological Society, Seattle

Sahlins, Marshall D. (1958). *Social Stratification in Polynesia.* Seattle: University of Washington Press.

Samuels, S.R. (1989). Spatial Patterns in Ozette Longhouse Floor Middens. In: Scott MacEachern (ed.) *Households and Communities,* pp. 143-156. Chacmool, Calgary.

Sassaman, Kenneth E. (2010) Structure and Practice in the Archaic Southeas. In *Contemporary Archaeology in Theory: The New Pragmatism*, edited by Robert W. Preucel and Stephen A. Mrozowski, pp. 170-190. John Wiley and Sons.

Schiegl, S., Goldberg, P., Bar-Yosef, O., & Weiner, S. (1996). Ash deposits in Hayonim and Kebara caves, Israel: macroscopic, microscopic and mineralogical observations, and their archaeological implications. *Journal of archaeological Science*, *23*(5), 763-781

Schiffer, M.B. 1983 Toward the identification of formation processes. *American Antiquity*, *48*(4), 675-706.

Schiffer, M. B. (1972). Archaeological context and systemic context. *American antiquity*, 156-165.

Schütz, A. J. (1994). *The voices of Eden: A history of Hawaiian language studies*. University of Hawaii Press.

Sesma, Elena (2016). Creating Mindful Heritage Narratives: Black Women in Slavery and Freedom. *Journal of African Diaspora Archaeology and Heritage*, *5*(1), 38-61.

Shaffer, B. and Sancehz, J. (1994) Comparison of 1/8” and 1/4”-Mesh Recovery of Controlled Samples of Small-to-Medium Sized Mammals. *American Antiquity* 59(3):525-530.
Shahack-Gross, R., Marshall, F., Weiner, S. 2003. Geo-archaeology of pastoral sites: the identification of livestock enclosures in abandoned Maasai settlements. Journal of Archaeological Science 30: 439–459.
Shahack-Gross, R., Albert, R.M., Gilboa, A., Nagar-Hilman, O., Sharon, I., Weiner, S. 2005. Geoarchaeology in an urban context: the uses of space in a Phoenician monumental building at Tel Dor (Israel). Journal of Archaeological Science 32: 1417–1431.
Shahack-Gross, Ruth 2017. Archaeological formation theory and geoarchaeology: State-of-the-art in 2016. *Journal of Archaeological Science* 79:36-43.
Sherwood, S.C., Simek, J.F. and Polhemus, R.R. (1995) Artifact Size and Spatial Process: Macro- and Microartifacts in a Mississippian House. *Geoarchaeology: An International Journal,* 10(6): 429-455.
Shillito, L. M. 2011 Taphonomic Observations of Archaeological Wheat Phytoliths from Neolithic Çatalhöyük, Turkey, and the Use of Conjoined Phytolith Size as an Indicator of Water Availability. *Archaeolometry,* 53(3): 631-641.
Shillito, L.M and P. Ryan 2013 Surfaces and streets: phytoliths, micromorphology and changing use of space at Neolithic Çatalhöyük (Turkey). *Antiquity* 87(337): 684-700.
Shore, B. (1989) Mana and Tapu. In Developments in Polynesian Ethnology, edited by A. Howard and R. Borofsky, pp. 137-173. University o Hawaii Press, Honolulu.
Silva, Noenoe (1997). Ku'e! Hawaiian women's resistance to the annexation. *Social Process in Hawai'i*, *38*, 4-15.
Silva, Noenoe (2003) Introduction to the New Edition Lorrin Andrews’s Dictionary: A Bridge to Nineteenth-Century Hawaiian Thought. In *A Dictionary of the Hawaiian Language.* Island Heritage Publishing: Waipahu, Hawaiʻi, pp. vii-x.
Silva, Noenoe K. 2004 *Aloha betrayed: Native Hawaiian resistance to American colonialism*. Duke University Press.
Sinoto, Yoshihiko H. (1962) Chronology of Hawaiian Fishhooks. *The Journal of the Polynesian Society*. 71(2):162-166.
Sinoto, Yoshiko H. (1967) Artifacts from Excavated Sites in the Hawaiian, Marquesas, and Society Islands. In Polynesian Culture History: Essays in Honor o f Kenneth P. Emory, edited by G.A. Highland, R.W. Force, A. Howard, M. Kelly, and Y.H. Sinoto, pp. 341-361. Bernice P. Bishop Museum Special Publication 56. Bishop Museum Press, Honolulu.
Sinoto, Yosihiko H. (1963) Polynesia. Asian Perspectives Bulletin o f the Far-Eastern Prehistory Association 7(1-2).
Skinner, H. D. (1921). Culture Areas in New Zealand. *The Journal of the Polynesian Society*, 71-78.
Skinner, H.D. (1934) “Archaeology in Polynesia.” *Proc. Fifth Pacific Sci,. Cong.* (Canada) Vol. IV, pp. 2847-2849. Toronto: Univ. Toronto Press
Soehren, Lloyd J. (1963) An archaeological survey of portions of East Maui, Hawaii. Manuscript on file, Bernice P. Bishop Museum, Honolulu.
Soffer, O. (2004) Recovering perishable technologies through use wear on tools: preliminary evidence for Upper Paleolithic weaving and net making. *Current Anthropology* 45(3): 407-415.

Sørensen, Marie Louise Stig (1991) The Construction of Gender Through Appearance. The Archaeology of Gender: Proceedings of the Twenty-Second Annual Conference of the Archaeological Association of the University of Calgary, edited by Dale Walde and Noreen D. Willows, pp. 121-129. Calgary.

Spencer-Wood, Suzanne (2004) What Difference Does Feminist Theory Make in Researching Households?: A Commentary. In Household Chores and Household Choices Pp. 235–253. The University of Alabama Press.

Spivak, G. C. (1989). Feminism and deconstruction, again: Negotiating with unacknowledged masculinism.

Stannard, D. (1989) Before the Horror: The Population o f Hawai 7 on the Eve o f Western Contact. Social Science Research Institute, University of Hawaii, Honolulu

Stäuble, S., Martin, S., & Reynard, E. 2008 Historical mapping for landscape reconstruction: examples from the Canton of Valais (Switzerland). *Mountain Mapping and Visualisation*, 211-217.

Stein, J.K. (1993) Scale in archaeology, geosciences, and geoarchaeology. *Boulder: Geological Society of America Special Paper 283.*

Stein, J.K.(1987) Deposits for Archaeologists. *Advances in Archaeological Method and Theory* 10(2):337-394.

Stoops, G. (2003). *Guidelines for analysis and description of soil and regolith thin sections*. Soil Science Society of America Inc..

Suggs, R.C. (1960) The Archaeology ofNuku Hiva, Marquesas Islands, French Polynesia. Anthropological Papers of the American Museum of Natural History 49 (1).

Sutton, D.G. (1993) The Archaeology of the Peripheral Pa at Pouerua, Northland, New Zealand. Auckland University Press, Auckland.

Sutton, Douglas G. (editor) (1990) The Archaeology o f the Kainga: A Study o f Precontact Maori Undefended Settlements at Pouerua, Northland, New Zealand. Auckland University Press, Auckland.

Tainter, Joseph, and Ross Cordy (1977) An Archaeological Analysis of Social Ranking and Residence Groups in Prehistoric Hawaii. Archaeology and Physical Anthropology in Oceania 11(2):95-112.

Tainter, Joseph, and Ross Cordy (1977) An Archaeological Analysis of Social Ranking and Residence Groups in Prehistoric Hawaii. Archaeology and Physical Anthropology in Oceania 11(2):95-112.

Tan Hoang Nguyen, A. 2014 *View from the Bottom: Asian American Masculinity and Sexual Representation*. Durham, NC.: Duke University Press.

Tan Hoang Nguyen, A. 2014 *View from the Bottom: Asian American Masculinity and Sexual Representation*. Durham, NC.: Duke University Press.

Taomia, J. (2000) Household Units in the Analysis of Prehistoric Social Complexity, Cook Islands. Asian Perspectives 39(1-2): 139-164.

Taomia, J. (2002) The Social Landscape of Mangaia, Southern Cook Islands. In Pacific Landscapes : Archaeological Approaches, edited by T.N. Ladefoged and M.W. Graves, pp. 175-188. Easter Island Foundation, Los Osos.

Taonui, Rawiri 2006 Polynesian Oral Traditions. In *Vaka Moana Voyages of the Ancestors: The Discovery and Settlement of the Pacific.* Ed. K.R. Howe. David Bateman Ltd:Aukland, pp. 22-53.

Taylor, R. (1870) Te Ika a Maui; or New Zealand and Its Inhabitants. Second edition, London.

Thomas, N. (1987). Unstable categories: tapu and gender in the Marquesas. *The Journal of Pacific History*, *22*(3), 123-138.

Thomas, Nicholas (1990) Marquesan Societies: Inequality and Political Transformation in Eastern Polynesia. Clarendon Press, Oxford

Titcomb, M., & Pukui, M. K. (1969). *Dog and man in the ancient Pacific, with special attention to Hawaii*.

Titcomb, Margaret (1972) *Native Use of Fish in Hawaii.* The University Press of Hawaii:Honolulu.

Trask, Haunani-Kay 1999 *From a Native Daughter: Colonialism and Sovereignty in Hawai? i.* University of Hawaii Press.

Trigger, Bruce (2003). *Understanding Early Civilizations*. Cambridge: Cambridge University Press.

Tringham, R. (1990). Households, Housefulls, and Archaeological House Remains: social archaeology at a microscale. Unpublished plenary address at the 21st Chacmool conference: *Households and Communities*.

Tringham, Ruth (1991) Households with faces: the challenge of gender in prehistoric architectural remains. *Engendering archaeology: women and prehistory*, 93-131.

Tryon, D.T. (1984) The Peopling of the Pacific: A Linguistic Appraisal. *The Journal of Pacific History,* 19(3):147-159.

Tuggle, H.D., and P.B. Griffin (1973) Lapakahi, Hawaii: Archaeological Studies. Asian and Pacific Studies Archaeological Series No. 5. Social Science Research Institute, University of Hawaii.

Ullah, I.I. (2005) *The State of Micrarchaeology Today With Special Implications for Household Archaeology and Intra-Site Spatial Analysis.* University of Toronto.

Ullah, I.I. 2012 Particles from the past: Microarchaeological spatial analysis of ancient house floors. In *New Perspectives in household archaeology* edited by B.J. Parker and C.P. Foster, pp. 123-138. Winowna Lakem Eisenbrauns.

Ullah, Isaac I., Paul R. Duffy, and E.B. Banning (2014) Modernizing Spatial Micro-Refuse Analysis: New Methods for Collecting, Analyzing, and Interpreting the Spatial Patterning of Micro-Refuse from House-Floor Contexts. *J, Archaeol. Method Theory.*

Vacca, K.M.G and Michael Kolb (In Review) Gender and Social Hierarchy in the Hawaiian *Kauhale* of Keokea, Maui. *Society for Hawaiian Archaeology*.

Vacca, Kirsten. 2014 His, hers, or theirs: The archaeology of gendered space in Hawaiian houses. *Thinking Gender Papers.* UCLA.

Valeri, V. (1985) Kingship and Sacrifice: Ritual and Society in Ancient Hawaii. University of Chicago Press, Chicago.

Van Gilder, C. (2005) *Familis on the Land: Archaeology and Identity in Kahikinui, Maui.* Doctoral Dissertation, U.C. Berkeley.

Van Gilder, C. and Kirch, P.V. (1997). Household Archaeology in Kīpapa and Nakaohu, Kahikinui. In *Nā Mea Kahiko o Kahikinui: Studies in the Archaeology of Kahikinui Maui*, edited by Patrick Kirch, pp.45-60. Berkeley: Archaeological Research Facility.

Van Gilder, C. L. (2001) Gender and Household Archaeology in Kahikinui, Maui. In Pacific 2000: Proceedings o f the Fifth International Conference on Easter Island and the Pacific, edited by C.M. Stevenson, G. Lee, and F.J. Morin, pp. 135- 140. Easter Island Foundation, Los Osos.

Van Gilder, C. L. (2001) Gender and Household Archaeology in Kahikinui, Maui. In Pacific 2000: Proceedings o f the Fifth International Conference on Easter Island and the Pacific, edited by C.M. Stevenson, G. Lee, and F.J. Morin, pp. 135- 140. Easter Island Foundation, Los Osos.

Van Gilder, C. L. (2005). *Families on the land: Archaeology and identity in Kahikinui, Maui* (Doctoral dissertation, University of California, Berkeley).

Van Gilder, C. L. (2005). *Families on the land: Archaeology and identity in Kahikinui, Maui* (Doctoral dissertation, University of California, Berkeley).

Van Gilder, C., and P. V. Kirch (1997) Household Archaeology in Kipapa and Nakaohu, Kahikinui. In Na Mea Kahiko Kahikinui, Studies in the Archaeology o f Kahikinui, Maui, edited by P. V. Kirch, pp. 45-60. Special Publication No.l. Archaeological Research Facility, University of California, Berkeley.

Van Gilder, C., and P. V. Kirch (1997) Household Archaeology in Kipapa and Nakaohu, Kahikinui. In Na Mea Kahiko Kahikinui, Studies in the Archaeology o f Kahikinui, Maui, edited by P. V. Kirch, pp. 45-60. Special Publication No.l. Archaeological Research Facility, University of California, Berkeley.

Van Gilder, Cynthia L., and Patrick V. Kirch1997 Household archaeology in Kipapa and Nakaohu, Kahikinui." *Na Mea Kahiko o Kahikinui: Studies in the Archaeology of Kahikinui, Maui, Oceanic Archaeology Laboratory, Special Publication* 1:45-60.

Van Gilder, Cynthia L., and Patrick V. Kirch1997 Household archaeology in Kipapa and Nakaohu, Kahikinui." *Na Mea Kahiko o Kahikinui: Studies in the Archaeology of Kahikinui, Maui, Oceanic Archaeology Laboratory, Special Publication* 1:45-60.

van Meijl, Toon. (1993) Moari Meeting- Houses in and Over Time. In Fox, James J. (editor) *Inside Austronesian Houses: Perspectives on Domestic Designs for Living.* Australian National University, Canberra, pp. 201-226.

Van Tilburg, J. (1994) Easter Island: Archaeology, Ecology, and Culture. Smithsonian Institution Press, Washington.

Vargas Casanova, P. (1998) Rapa Nui Settlement Patterns: Types, Function and Spatial Distribution of Households Structural Components. In Easter Island and East Polynesian Prehistory, edited by P. Vargas Casanova, pp. 111-130. Proceedings II International Congress on Easter Island & East Polynesian Archaeology, Universidad de Chile.

Vayda, A. P. (1968). *Peoples and cultures of the Pacific: an anthropological reader*. New York: The Natural History Press.

Visher, Glenn S. (1969). Grain size distributions and depositional processes. *Journal of Sedimentary Research*, *39*(3).

Vitousek, P. M., Ladefoged, T. N., Kirch, P. V., Hartshorn, A. S., Graves, M. W., Hotchkiss, S. C., ... & Chadwick, O. A. (2004). Soils, agriculture, and society in precontact Hawaii. *Science*, *304*(5677), 1665-1669.

Voss, Barbara (2000) Feminisms, queer theories, and the archaeological study of past sexualities. *World Archaeology*, *32*(2), 180-192.

Walker, Winslow M. (1931) Archaeology of Maui. Manuscript on file, Bernice P. Bishop Museum, Honolulu.

Walsh, Catherine E. 2018 The Decolonial *For:* Resurgences, Shifts, and Movements. In *On Decoloniality: Concepts, Analytics Praxis,* by Walter Mignolo and Catherine E. Walsh, pp. 15-32. Duke University Press.

Walsh, Kevin 2004 Caring about sediments: the role of cultural geoarchaeology in Mediterranean landscapes. *Journal of Mediterranean Archaeology 17*(2):223-245.

Walter, R. 1996 What is the East Polynesian 'Archaic'? A view from the Cook Islands, in Oceanic culture history: Essays in honour of Roger Green: 513-529, ed. J. M. Davidson, B. F. Pawley, and D. Brown. Dunedin: New Zealand Journal of Archaeology Special

Walter, R. (1998). *Anai'o: The Archaeology of a Fourteenth Century Polynesian Community in the Cook Islands,* Monograph No. 22. New Zealand Archaeological Association, Auckland.

Walz, R. Jonathan (2013) Routes to history: Archaeology and being articulate in eastern Africa. In *The Death of Prehistory,* Edited by Peter Schmidt and Stephen Mrozowski. Oxford: Oxford University Press, pp.69-91.

Wandsnider, L. (1992) Archaeological Landscape Studies. *Space, Time and Archaeological Landscapes,* J. Rosignol and L.Wandsnider, eds. :285-292. New York: Plenum Press.

Waterson, Roxanna. (1993) Houses and the Built Environment in Island South-East Asia: Tracing some shared themes in the uses of space. In Fox, James J. (editor) *Inside Austronesian Houses: Perspectives on Domestic Designs for Living*. Australian National University, Canberra, pp. 227-242.

Waterson, R. (1995). Houses and hierarchies in island Southeast Asia. *About the house: Levi-Strauss and beyond*, 47-68.

Waterson, Roxana (1995) Houses and hierarchies in island Southeast Asia *in About the House: Lévi-Strauss and Beyond* edited by Janet Carsten and Stephen Hugh-Jones. Cambridge University Press, pp47-68.

Waterson, Roxana (2000) House, Place, and Memory in Tana Toraja (Indonesia). In Beyond Kinship: Social and Material Reproduction in House Societies, edited by Rosemary A. Joyce and Susan D. Gillespie, pp. 177–188. University of Pennsylvania Press, Philadelphia.

Wattez, J., & Courty, M. A. (1987). Morphology of ash of some plant materials. *Soil Micromorphology'.(Eds N Fedoroff, LM Bresson, MA Courty) pp*, 677-683.

Weiner, Annette B. (1992) Inalienable Possessions: The Paradox of Keeping-While-Giving. University of California Press, Berkeley.

Weiner, Stephen (2010) *Microarchaeology: Beyond the Visible Archaeological Record*. Cambridge, Cambridge University Press.

Weisler, Marshall I. (1999) The antiquity of aroid pit agriculture and significance of buried A horizons on Pacific atolls. *Geoarchaeology* 14(7):621-654.Weisler and Kirch 1985

Weisler, M. and Kirch, P.V. (1985). The structure of settlement space in a Polynesian chiefdom: Kawela, Molokai, Hawaiian Islands. *New Zealand Journal of Archaeology*. 7: 129-158.

Weisler, M.I., E. Conte, and P.V. Kirch (2004) Material Culture and Geochemical Sourcing of Basalt Artifacts. In Archaeological Investigations in the Mangareva Islands (Gambier Archipelago), French Poylnesia, edited by E. Conte and P.V. Kirch, pp. 128-148. Contribution Number 62, Archaeological Research Facility, Berkeley.

Weisler, Marshall I. (1990) A Technological, Petrographic, and Geochemical Analysis of the Kapohaku Adze Quarry, Lanai'i, Hawaiian Islands. New Zealand Journal o f Archaeology 12:29-50.

Weisler, Marshall I. (1993) Chemical Characterization and Provenance of Manu'a Adz Material Using a Non-Destructive X-Ray Flourescence Technique. In The To 'aga Site: Three

Millennia o f Polynesian Occupation in the Manu'a Islands, American Samoa, edited by P.V. Kirch and T.L Hunt, pp. 165-187. ARF Contribution 51, Berkeley.
Weisler, Marshall I. (1998) Hard Evidence for Prehistoric Interaction in Polynesia. Current Anthropology 39(4):521-532.
Weisler, Marshall I. (2002) Centrality and the collapse of long-distance voyaging in East Polynesia. In Geochemical Evidence for Long-Distance Exchange, edited by M.D. Glascock, pp. 257-273. Bergin and Garvey, London.
Weisler, Marshall I. (editor) (1997) Prehistoric Long-Distance Interaction in Oceania: An Interdisciplinary Approach. New Zealand Archaeological Association Monograph 21, Auckland.
Weisler, Marshall I., and Patrick V. Kirch (1985) The Structure of Settlement Space at Kawela, Molokai, Hawaiian Islands. New Zealand Journal o f Archaeology 7:129-158.
Weisler, Marshall I., and Patrick V. Kirch (1985) The Structure of Settlement Space at Kawela, Molokai, Hawaiian Islands. New Zealand Journal o f Archaeology 7:129-158.
Weisler, Marshall I., and Patrick V. Kirch. (1996) Interisland and interarchipelago transfer of stone tools in prehistoric Polynesia. Proceedings o f the National Academy o f Science 93:1381-1385
Weisler, Marshall I., Kenneth D. Collerson, Yue-Xing Feng, Jian-Xin Zhao, and Ke-Fu Yu (2005) Thorium-230 Coral Chronology of a Late Prehistoric Hawaiian Chiefdom. Journal of Archaeological Science In Press.
Whatmore, S. 2002 *Hyprid Geographies.* Sage, London.
Whistler, W. Arthur 1991 Polynesian Plant Introductions. In *Islands, Plants, and Polynesians: An Introduction to Polynesian Ethnobotany*, edited by Paul Alan Cox and Sandra Anne Banack. Proceedings of a Symposium Sponsored by the Institute of Polynesian Studies, Dioscorides Press, Portland.
White, Geoffrey M., and Ty Kāwika Tengan (2001) Disappearing worlds: Anthropology and cultural studies in Hawai'i and the Pacific. *The Contemporary Pacific* 13(2): 381-416.
Whitridge, P. (2004) Landscapes, houses, bodies, things: "place" and the archaeology of Inuit imaginaries. *Journal of Archaeological Method and Theory* 11(2): 213-250.
Wilk, R. and W. Rathje (1982) Household Archaeology. In *Archaeology of the Household: building a prehistory of Domestic Life,* edited by R. Wilk and W. Rathje, pp. 617-640. American Behavioral Scientist 25:6.
Wissler, Clark. (1938) *The American Indian.* 3rd edition, New York.
Wozniak, Joan Alice 2003 Exploring Landscapes on Easter Island (Rapanui) with Geoarchaeological Studies: Settlement, Subsistence, and Environmental Changes. Ph.D. Dissertation, Department of Anthropology, University of Oregon
Wright, Erin Kahunawaikaʻala and Brandi Jean Nālani Baltuski (2016) Ka ʻIkena a ka Hawaiʻi: Toward a Kanaka ʻŌiwi Critical Race Theory. In *Kanaka ʻōiwi Methodologies: Moʻolelo and Metaphor* Oliveira edited by Katrina-Ann R. Kapāʻanaokalāokeola Nākoa, and Erin Kahunawaikaʻala Wright, pp. 86-108. University of Hawaiʻi Press.
Wylie, Allison (2002) *Thinking From Things: Essays in the Philosophy of Archaeology.* University of California Press, Berkeley.
Yanagisako, Sylvia (1979) Family and Household: The analysis of Domestic groups. *Annual Review of Anthropology*, 8:161-205.
Yoffee, N. (2005). *Myths of the archaic state: Evolution of the earliest cities, states, and civilizations*. Cambridge University Press.

Young, Kanalu (2004) An Interdisciplinary Study of the Term Hawaiian. *Hawaiian Journal of Law & Politics* 1:23-45.

Appendix A: Mo'olelo on Kauhale and Gender

Mo'olelo on Households

Term	On the Hawaiian Community and Family		Notes/Comments
'Aina	"Because old Hawai'I lacked village units regulated by established institutions such as existed in New Zealand and Samoa, it must not be concluded that the *community* was not a reality and a fundamental factor in the old political and economic order. The fundamental unit in the social organization of the Hawaiians of Ka'u was the dispersed community of '*ohana* or relatives by blood, marriage and adoption, living some inland and some near the sea by concetrated geogrphically in and tied by ancestry, birth and sentiment to a particular locality which was termed the '*aina*. The expanded and all-inclusive family or '*ohana,* and the home-land or '*aina,* were two complementary factors which consituted this regional dispersed community. The term '*aina* represented a concept essentially belonging to an agricultural people, deriving as it did from the verb '*ai,* to feed, with the substantive suffix *na* added, so that it signified "that which fees" or "feeder."	Handy and Pukui 1972:3	
'Ohana	The term '*ohana* was likewise a fugure essentially belonging to a people who were taro planters. '*Oha* means "to sprout," or "a sprout"; the "buds" or off-shoots of the taro plant which furnished the staple of life for the Hawaiian are called '*oha.* With the substantive suffic *na* added, '*oha-na* litterally means "off-shoots," or "that which is composed of off-shoots." This term, then, as employed to signify the family, has, precisely, the meaning "the off-shoots of a family stock."	Handy and Pukui 1972:3	
	"the '*ohana* functioned as a unit in external economic and social affairs. The levy of the *ali'i* during the period of collection of tribute (the *makahiki*) or for offerings prior to making war, or in honour of his first-born, used to fall not upon individuals or single households but upon the '*ohana*."	Handy and Pukui 1972:6	
Haku	The pivot of the '*ohana*, the master or director, the elder male of the senior branch of the whole '*ohana*. The *haku* divided the catch of fish amongst the households of the '*ohana* which had participated in the fishing; he presided over family councils; and in general he had authority over the individuals and households in all such matters as entertaining strangers and welcoming the *ali'i,* in supervising work worship and planned communal activities. The term differs from *ali'i* in that it has no relation to class politics or occupation. There were *haku* of *ali'i* families, of *kahuna* (priestly)families, of fishing and planting families. *Haku* in general means a "master" in the sense of "director." Thus the man in charge of the composition of eulogistic chants (*mele*) for an *ali'i*	Handy and Pukui 1972:6-7	

	first born was the *haku-mele;* a man in charge of land was *haku-ʻaina*. The *haku* headed the councils of the ʻ*ohana*; he was the revered leader; but the old folk, men and women, of strong character were extremeley independent in speech and action; consequently the *haku* was no dictator but was subject to the advice and opnion of householders and of all other members of his ʻ*ohana* concerned in or affected by decisions and enterprises."	
Kupuna	"But the family was not conceived of as consisting only of its living members. It included the family forbears, to whom was applied another term that is a figure from the speech of fold for whom growth, as observed in the vegetable world, is a basic concept. The inclusive term for deceased ancestors and living elders, *kupuna*, as representing the stock from which the *ʻohana* spring as off-shoots, was derived from the verb *kupu* "to grow," with the suffix *na* added."	Handy and Pukui 1972:4
ko kula uka	Of the upland slope--used to signify ʻ*ohana* that lived towards the mountain, or upland	Handy and Pukui 1972:4
ko kula kai	of the seaward slopes--used to signify ʻ*ohana* that lived towards the sea, or seaward, "*kula* signifying the sloping terrain between the forest and the shore"	Handy and Pukui 1972:4
Kuhikuhi puʻuone	The one who points out contours, the person the head of the family would consult before building a *kauhale*, a person skilled in picking good sites.Would point out where the house should stand and which direction it should face. The picking of a good site was imperative as a bad site brough trouble to the family. The *kukikuhi puʻuone* knew that a home should not stand at the base of a cliff where there was danger of a landslide or between two ponds where there was a danger of keeping the house constantly damp and cold, where it was open to draughts and so on.	Handy and Pukui 1972:8
Term	**On Land Divisions**	
Moku	Island or district, ruled by *Aliʻi ʻai moku (*"Chief who ate the island or district")	Handy and Pukui 1972:4-5
Ahupuaʻa	A land division that was a segment of the *moku,* "cut so that they constituted segments running from the shore back into the mountains."	Handy and Pukui 1972:4
	"The *ahupuaʻa* or major subdivision wa the domain of the *Aliʻi ʻai ahupuaʻa* ("Chief who ate the *ahupuaʻa*), he being the feudal chiefling whose tenure was dependent upon the Ruling Chief or *Aliʻi ʻai moku.* Many ʻ*ohana* made up the population of the *ahupuaʻa*, constitution altogether the *ma-ka-ʻaina-na* ([people]-on-the-land)."	Handy and Pukui 1972:5
	"Inshore fishing rights on the coast belonged to the respective *ahupuaʻa proprietors and the ʻohana* on their lands."	Handy and Pukui 1972:5
ʻ*ili*	Smaller segment of land within the *ahupuaʻa.* "The complete *ʻili* was narrow strip of the *ahupuaʻa,* continuous from shore to mountain top. But some ʻ*ili* were broken or discontinuous, that is to say, there was a piece near the sea and another disconnected piece	Handy and Pukui 1972:4

	inland. Such an ‘*ili* was termed an ‘*ili lele* or "leaping ‘*ili.*" The disconnected ‘*ili*--the one *ma uka* was referred to as the " ‘*umeke ‘ai"* as it was that which filled the *poi* bowl: that is, taro was planted there. The *ma kai* one was the " *ipukai,"* the "meat bowl," where fish could be found. There were also the ‘*ili kupono* ("‘*ili* in established right") whose owners held perpetual tutle through some ancient grant. All other *‘ili* were subject to reallocation by the Ruling Chief (*Ali‘i)*, though in practice tenants who were faithful henchmen cultivated the same land generation after generation."	
	"There was no *Ali‘i ‘ai ‘ili.* It is to be inferred that the ‘*ili*, with its inland and seaward expanses, was essentially and probably orignally the province of a singel ‘*ohana*, those living and cultivating or hunting inland being *ko kula uka* and those to seaward being *ko kula kai*. Inevitably, in the course of inter-marriage between families, the ‘*ohana* would ramify throughout the *‘ahumua‘a,* and ultimately into neighboring *moku;* though there would remian a concentration of closest-related ‘*ohana* in the original ‘*ili*.	Handy and Pukui 1972:5
Term	**On The Hawaiian Household**	
Household	"The household included members of the family proper of all ages plus attached but unrelated dependends and helpers."	Handy and Pukui 1972:5
	"Between households within the ‘*ohana* there was constant sharing and exchange of foods and of utilitarian articles and also of services, not in barter but as voluntary (though decidedly obligaory) giving.‘*Ohana* living inland (*ko kulauka*), raising taro, bananas, *wauke* (for *tapa*, or barkcloth, making and *olona* (for its fibre), and needing gourds, coconuts and marine foods, would take a gift to some ‘*ohana* living near the shore (*ko kula kai*) and in return would receive fish or whatever was needed. he fisherman needing *poi* or ‘*awa* would take fish, squidor lobster upland to a household known to have taro, and would return with his *kalo* (taro) or *pa‘i‘ai* (hard *poi*, the steamed and pounded taro corm). A woman from seaward, wanting some medicinal plant, or sugar cane perhaps, growing on the land of a relative living inland would take with her a basket of shellfish or some edible seaweed and would return with her stalks of sugar cane or her medicinal palnts. It was the ‘*ohana* that constituted the community within which the economic life moved."	Handy and Pukui 1972:5-6
Community	"In enterprise requiring communal labour the inland and seaward ‘*ohana* combined. When *olona* fibre for the fishnets used to be harvested, scraped and spun, all the ‘*ohana* joined forces in the shed built near the *olona* plantation in the lower forest zone. If there was to be a *huka lau* (fishing by dragging the shallows), relatives from the upland lent a hand with the *lau* (leaf-drag) and the ‘*upena* (net), and the catch was divided up amongst all the households that participated.	Handy and Pukui 1972:6

	Similarly, a man building a new dwelling was aided by his ‘*ohana*. When there was a feast to mark the first year of the first-born, to celebrate a wedding, to welcome a returning member or distinguished stranger, all households of the ‘*ohana* contributed what they had, some fish, some poi, or potatoes, or cane; or perhaps, where gifts were in order, mats, gourds or bowls."	
	Community members would barter for things they needed (upland or lowland)	Handy and Handy 1972:113
	The people living in these complexes were likley farmers trading goods for other food.	Handy and Pukui? 1972:20
Hale	"Within the *‘ohana* the functional unit is the household. One term used for household was the word *hale*, house. In inquiring about the number of "families" or domiciles in a given localtiy, one would ask "*Ehia hale la?"* (how many houses?) that	Handy and Pukui 1972:5
Po‘o	Head of the house. The functional head of the domicile. Not necessarily the senior member. "It was and is specifically the member who assumes responsibility and makes decisions"	Handy and Pukui 1972:5
‘Ohua	a term that "signified retainers or dependents in the household. In contradistinction to "family" (‘*ohana*), inmates who were not kin by blood or adoption were ‘*ohua*. This word signified passengers on a canoe or ship exclusive of owner or crew. Through the head of the house the ‘*ohua* integrated with the *‘ohana*.	Handy and Pukui 1972:5
Kauhale	A group of houses every Hawaiian household had. Word used for dwelling place. In olden days, were widely scattered, wherever a living could be secured--on the beaches for the fishermen's family and in the upland for the farmer's. The kukikuhi pu‘uone knew that a home should not stand at the base of a cliff where there was danger of a landslide or between two ponds where there was a danger of keeping the house constantly damp and cold, where it was open to draughts and so on. Even if teh home was built right, the location and surroundings should be right also, therefore the home builder was told not to have trees directly before the doorway. Such things as tress, houses and so on before the doorway of a house were called ‘*alai* or obstructions preventing blessings from entering the house. The entry should have light and no obstructions. A home wrongly built drew comments termed *ho‘oiloilo*, that is, a foretelling of unpleasant experiences to befall those who dwell there, such as sickness, a going away, constant misfortune or death. A home was not just a place to live in, but there was a certain personal quality, so the *kuhikuhi pu‘uone* was consulted to make it a happy home.	Handy and Pukui 1972:7-8

	Another burden that fell to the lot of the man was thatching the hosues for himself and his wife; because the houses for the man must be other than those for the woman. The man had first to thatch a house for himself to eat in and another house as sanctuary (heiau) in which to worship his idols. And, that accomplished, he had to prepare a third hosue for himself and his wife to sleep in. After that he must build and thatch an eating house for his wife, and lastly he had to prepare a *hale kua*, a place for his wife to beat *tapa* in (as well as to engage in other domestic occupations--TRANSLATOR).	Malo 1951:28	
Kulana-kauhale	A large group of *kauhale* or family houses, word used for village.		
***Kauhale* Structure**	**Structure Use**	**Source**	
Hale Mua	"The *Mua* or men's eating house was a sacred place from which women were excluded. It was the place where the men and older boys ate their meals and where the head of the family offered the daily offerings of '*awa* to the family *'aumakua*. Here men and family gods ate together, and that was why women, who were periodically unclean, were not allowed to enter here. The daily offering was never omitted and if the head of the family was unable to perform his duty, he appointed some one to do it. The prayers were for the welfare of the ruling chief and for the family itself. When a serious problem arose, such as a new venture to be attempted or sickness in the family, the head of the family slept in the *mua*, where the family gods would give him directins as to what to do. Thus the *Mua* served both as a place for the men to eat and a meeting place with the family gods. After a ceremony called *"ka i Mua"* or "expulsion to the *Mua*," which usually occured in the sixth year of a boy's life, he was permitted to wear a *malo* and join the men in their eating house. He was then a man. The boy was never more allowed to return and partake of food with the women of the family."	Handy and Pukui 1972:9	
	"Certain places were set apart for the husband's sole and exclusive use; such were the sanctuary in which he worshipped and the eating house in which he took his food. The wife might not enter these places while her husband was worshipping or while he was eating; nor might she enter the sanctuary or eating-house of another man, and if she did so she must suffer the penalty of death, if her action was discovered."	Malo 1951:29	Note that he says the woman cannot enter ***while the man is worshipping or eating***, but says nothing of other times.
	"The house in which the men ate was called the *mua"*	Malo 1951:29	
Heiau	"the sanctuary in which they [men] worshipped was called *heiau,* and it was a very tabu place." These houses [mua and heiau] were the ones to which the restrictions and tabu applied	Malo 1951:29	

Hale ʻaina	"The women had their own eating house, the *hale ʻaina.* Here the women, girls and small boys ate together. From infancy to about five or six the boys remained with their mothers…There were prayers in the women's eating house for the family *ʻaumakua* to bless their food and to come and partake, but the presenting of offerings belonged to the men in the *Mua". *(no mention by Handy and Pukui whether men were permitted to enter the hale ʻaina, but Emerson comments on Malo's work, stating that men were* kapu *from entering the women's eating house)*	Handy and Pukui 1972:9	
	"The house in which the women ate was called the *hale aina."* One in which the restrictions and tabu applied	Malo 1951:29	Note that he says the *kapu* applied to the *hale aina* just as it applied to the *hale mua*
Hale Noa	"Everybody slept in the *Hale noa* (house freed of *kapu)*, where no restrictions were placed on the men and women sharing it together. This house was for sleeping and no eating was permitted there".	Handy and Pukui 1972:10	
	"Everybody slept in the *Hale Noa* (House freed of *kapu),* where no restrictions were placed on the men and women sharing it together. This house was for sleeping and no eating was permitted there. In sleeping, there was a set pattern which was kept up until private bedrooms became common. A man slept beside his wife, and next, but not too close, to her might be her sister. Next to the sister might be the sister's husband. A man never slept between two women unless both were his wives, nor did a woman sleep between two men. A young son might sleep next to his mother but not after he had grown up--likewise, with a daughter and father. Whole families and guests, too, slept together in the sleeping house but always with the thought of who was sleeping next to whom. Several men might sleep near each other, and so might several women. Thus confusion and mix-up of wedded pairs were avoided. In the olden days, no one slept with head close to the wall where there was danger from the thrust of an enemy's spear through the thatching. The *hale noa* was divided into a sleeping place and a sitting or walking place. The sleeping place was raised and covered with finer mats. When unused for sleeping, no one was allowed to walk, sit or play on it. It was strictly *kapu.* The lower floor division was also covered with mats, but plaited with a wider mesh than that used for the sleeping mats. Here the family and guests sat and talked and the children played quiet games…In the daytime the making of string figures was allowed but not at night, being suggestive of death...*".*	Handy and Pukui 1972:10	
	The common dwelling house, free of tabu in which the man and wife met freely together	Malo 1951:29	
Hale Moe	"The house in which the wife and husband slept together was also called *hale-moe*. It was there they	Malo 1951:29	

	met and lived and worked together and associated with their children."		
Hale Pe'a	"The women had another house that was built near but not too close to the other houses of the *kauhale*. This was the *hale pe'a*, a small comfortable thatched house where the women of the family retired when menstruating and remained until the period was completely over. The woman was restricted by the *kapu* from taking part in any outside activities, thus forcing her to take care of herself during that period. But it did not restrict her from repairing the mats in the *hale pe'a* or making new ones in there for her own comfort during the time of retirement. Men were not allowed to set foot on the area around it or on the *paepae* or raised platform on which the house was built, nor to enter under penalty of death".	Handy and Pukui 1972:10-11	
	"According to the tabu a woman must live entirely apart from her husband during the period of her infirmity; she always ate in her own house, and the man ate in the house called *mua*"	Malo 1951:28	
	"Certain places also were set apart for the woman alone. These were the *hale pea,* where she stayed during her period of monthly infirmity--at which time it was tabu for a man to associate with his own wife, or with any other woman. The penalty was death if he were discovered in the act of approaching any woman during such a period. A flowing woman was looked upon as both uncean and unlucky (*haumia, poino*).	Malo 1951:29	Note that he says the man cannot associate with any woman during this period, but not that the woman could not associate with any man. Note that Malo also says that ***places*** were set apart for women, but then only mentions the *hale pea*
"The other houses depended on the activity of the adult members of the family"		Handy and Pukui 1972:11	
Halau	"A fisherman had a *ahlau* or long thatched house where he kept his canoe, fish-nets, and other paraphernalia. *Kapu* were enforced there also, for no women were permitted to handle the large nets, nor was anyone allowed to step over the lines, hooks or nets. Women had their own nets, usually smaller ones. They made their own scoop nets and fish basket traps"	Handy and Pukui 1972:11	
	"A canoe builder also had his *halau* where the canoes were finished with added parts, such as dash boards and out-rigger. No one was permitted to enter except the helpers who worked with the expert on the canoes"	Handy and Pukui 1972:11	
Hale Papa'a	"An inland dweller would have a house to keep his implements and store his crops until needed. A house in which to store the crops was a *hale papa'a*"	Handy and Pukui 1972:11	

	"A chief had, among his houses, a *hale papa'a* or store house (the word *papa'a* in this case should be hyphenated to *pa-pa'a*, a solid enclosure). Here were kept his extra mats, tapas, nets, dried fish and whatever else he might have. It was usually built up on posts to prevent dogs and pigs from getting in after the food. A very prosperous chief had several of these *hale papa'a*, with stewards to watch over his property"	Handy and Pukui 1972:12
Hale Kuku	*Tapa* makers had a thatched shed, called a *hale kuku*, where they pounded the inner bark of *mamaki* or *wauke* into *tapa* cloth. Sometimes there was a *pa kaula'i*, a drying pen where the *tapa* could be dried without animals running over them; it was made of stone or sticks"	Handy and Pukui 1972:12
	A house put up for the women, "the place where she beat out *tapa* cloth into plankets, into *pa-u* for herself, *malo* for her husband, in fact, the clothing for the whole family as well as for her friends, not forgetting the landlord and chiefs"	Malo 1951:29
Hale Ulana	"If the mother of the family was a skilled maker of mats she too, had a shed with thatched roof, the *hale ulana,* where she plied her art and stored her materials"	Handy and Pukui 1972:12
Hale Kahumu	"A thatched shed where cooking was done in bad weather and cooking materials were stored. The men had one, and the women had theirs, until the *kapu* on eating was abolished. In good weather, cooking was done in outdoor *imu*, one for the men and one for the women…Some of these were small but many were large enough to include the storage of the utensils and implements…Thick course mats were purposefully made for the *imu* and when the cooking was over, these were rinsed to free them of soil, spread out to dry and kept in the *hale kahumu.* The *hale kahumu* was rare. It had thatched walls …many were walled with stone with a roof of thatching. Some were just posts and a roof, with the windy sides covered with plaited coconut leaves, or strips of bark. Wood and kindling had their own storage corner in the *hale kahumu*. The *kapuahi* was not a deepened pit like the *imu*, but was built on the ground or with a very shallow depression. It was just a circle of stones to keep the fire confined and an opening for the addition of fuel"	Handy and Pukui 1972:12-13
Kamala	"A temporary house…was called a *kamala*. It was tent shaped…the rafters came right to the ground"	Handy and Pukui 1972:13

Moʻolelo on Gender and Household Activities

TOPIC	Arti Assoc	Midden Assoc	Kauhale Architectural Assoc	Gender Association	Notes	Ref
TAPA	Mulberry bark	Microfossils	Mulberry groves	Wahine and Kane	Tapa was beaten, spread to dry in the sun	Malo 1951:48
	Mamake tapa	fire, oven	Outskirst of upland forests	Wahine and Kane	mamake used to make tapa blankets was first steamed in the oven by women	Malo 1951:48
	scrappers	wood chips	Stone tool working area	wahine		Cordy 1972: 13
	adzes	lithic debitage	Stone tool working area	kane	lg. trees cut by men	Cordy 1972: 13
	bowl for soaking	microfossils	hale kuku (tapa house)	wahine	soak material	Cordy 1972: 13
	Hohoa (rd. beater)	Microfossils	hale kuku (tapa house)	wahine	to beat into strips	Cordy 1972: 13
	stone anvil	lithic debitage	hale kuku (tapa house)	wahine	to beat into strips	Cordy 1972: 13
	ʻiliʻili	ʻiliʻili	kahua kaula'i	wahine	drying material	Cordy 1972: 13; Kamakau 1976:112
	wooden anvil	Microfossils	hale kuku (tapa house)	wahine	2nd beating	Cordy 1972: 13, Malo 1951
	i'e kuku (quad beat)	Microfossils	hale kuku (tapa house)	wahine	2rd beating	Cordy 1972: 13
	dyes, see below	Microfossils, charcoal, kukui nut, sea urchin, coconut meat	hale ho'olu'u (dye house)	wahine	for finishing	Cordy 1972: 13; Kamakau 1976:110
	bamboo stamps	Microfossils	hale kuku (tapa house)	wahine	Kamakau (1976:109) stated that kane supplied the tools to wahine	Cordy 1972: table 5
	comb stamps	Microfossils	hale kuku (tapa house)	wahine	for finishing	Cordy 1972: table 5
	straight wood stamps	Microfossils	hale kuku (tapa house)	wahine	for finishing	Cordy 1972: table 5
	turtle shell stamps	Turtle shell	hale kuku (tapa house)	wahine	for finishing	Cordy 1972: table 5
	cloth swab	Microfossils	hale kuku (tapa house)	wahine	for finishing	Cordy 1972: table 5

	wooden board	Microfossils	hale kuku (tapa house)	wahine	base for printing	Cordy 1972: table 5
	brushes	Microfossils	hale kuku (tapa house)	wahine	for painting	Cordy 1972: table 5
	cowry shell	Shell	hale kuku (tapa house)	wahine	for rubbing	Kamakau 1976:110
	puna (bamboo container)	Microfossils	hale kuku (tapa house)	wahine	holds stamps	Kamakau 1976:110
	olulo (gourd container)	Microfossils	hale kuku (tapa house)	wahine	holds stamps	Kamakau 1976:110
	Cobbles	combustion feature	hale kuku (tapa house)	wahine	to heat rocks	Kamakau 1976:110
	bone needle	bone	hale kuku (tapa house)	wahine	to stitch tapa	Kamakau 1976:111
	shark's tooth	shark's tooth	hale kuku (tapa house)	kane	to grove hohoa*	Kamakau 1976:109
	NOTE: ANVILS MADE PARTICULAR SOUND, WOMEN COULD COMMUNICATE OVER DISTANCES WITH WELL KNOWN CODE					Kooijman 1972:115
	NOTE: HINA WAS THE GODDESS OF TAPA (WORSHIPPED BY TAPA MAKERS)					Kooikman 1972:115
HAMO ‘ULA TAPA	round beater		kahua hana and hakua kaula‘i	kane	2 acre space surrounded by a fence	Kamakau 1976:112
	ko'i hole grooving tool	pig jaw	kahua hana and hakua kaula‘i	kane		Kamakau 1976:112
	papa hole kua'ula grooving board	Microfossils	kahua hana and hakua kaula‘i	kane		Kamakau 1976:112
	Tapa varnish	hen's eggs		kane		Kamakau 1976:112
	NOTE: THE MO‘OLELO INFER THAT THIS TAPA MAY HAVE ONLY BEEN					

	PAINTED BY MEN, NOT MADE (KAMAKAU 1992:238)					
MATS	pandanus	Microfossils				Kamakau 1976:112
	makaloa sedge	Microfossils				Kamakau 1976:112
	bulruch	Microfossils				Kamakau 1976:112
	thorns of abv.	Microfossils				Kamakau 1976:112
	fire	charcoal			bleached leaves	Kamakau 1976:112
	hohoa beater	Microfossils				Kamakau 1976:112
	rolls of leaves	Microfossils				Kamakau 1976:112
	Pandanus	Microfossils			wilted pandanus leaves over the fire then dreid in the sun	Malo 1951:49
	Cutting implements	lithic debitage				
	NOTE: WOMEN THAT MADE TAPA AND WOVE MATS WERE OF HIGHEST VALUE AND WOMEN WHO ENGAGED IN SUCH ACTIVITY WERE CONSIDERE D TO BE WELL OFF					
DYES	Stone pestals and cups	noni root (red)	hale ho'olu'u (dye house)	wahine (unless hamo‘ula tapa)		Cordy 1972: table 5; Handy and Handy 1972:117 ; Hiroa 1972:186 .
	Stone pestals and cups	turmeric root (yell)	hale ho'olu'u (dye house)	wahine (unless		Cordy 1972: table 5;

				hamo‘ula tapa)		Handy and Handy 1972:117; Hiroa 1972:186.
	Stone pestals and cups	ground kukui nut (oil)	hale ho'olu'u (dye house)	wahine (unless hamo‘ula tapa)		Cordy 1972: table 5; Handy and Handy 1972:117; Hiroa 1972:186.
	Stone pestals and cups	Poni Taro (red)	hale ho'olu'u (dye house)	wahine (unless hamo‘ula tapa)		Cordy 1972: table 5; Handy and Handy 1972:117; Hiroa 1972:186.
	Stone pestals and cups	Sea Urchin (lavender or purplish)	hale ho'olu'u (dye house)	wahine (unless hamo‘ula tapa)		Cordy 1972: table 5; Handy and Handy 1972:117; Hiroa 1972:186.
	Stone pestals and cups	Coconut meat (oil)	hale ho'olu'u (dye house)	wahine (unless hamo‘ula tapa)		Cordy 1972: table 5; Handy and Handy 1972:117; Hiroa 1972:186.
	Stone pestals and cups	Charcoal	hale ho'olu'u (dye house)	wahine (unless hamo‘ula tapa)		Cordy 1972: table 5; Handy and Handy 1972:117; Hiroa

						1972:186 .
Hale	Tapa	Microfossils, higher pH levels	Hale pe'a	Wahine	menstrual house	Linnekin 1990:15
	Surplus storage	Mats, tapas, nets, dried fish and whatever else the ali'i might have.	Hale o papa	Wahine and Kane	Storage	Handy and Pukui 1972:12
	Food	combustion feature and charcoal, food remnants (bone, shell, microfossils), matting (microfossils)	Hale ʻāina	Wahine	womens eating h.	Malo p. 29
	Mats and tapa, games	microfossils, coral and basalt game pieces	Hale noa	Wahine and Kane	common/sleepin g house	I'i 1959:120
	Mats and tapa, games	Microfossils	Hale moe	Wahine and Kane	sleeping house	I'i 1959:120
	Mats, fiire, offerings, food	Microfossils, food remains (microfossils, bone, shell) combustion feature (charcoal, hearth), branch coral	Hale mua	Kane	men's eating/worship house	Handy and Pukui 1927:9; Malo 1951:29
	Tapa and tools	See tapa tools above	Hale kuku	Wahine	tapa beating house	Handy and Pukui 1979:11; Malo 1951:29
	NOTE: ALL HOUSES WERE MADE WITH STONE WITH THATCHED GRASS WITH ONE OR TWO DOORS					I'i 1959:120
ADZE	Adzes	vegetable juice, sand, higher pH and LOI	Lithic workshop	Neither Malo, Kamakau, or Hiroa specify the gender of the adze maker. Malo (1951:51)	Process: "Esteemed class would prospect for good material. After splitting core, long fragments	Malo 1951:51

				only states that adze makers were an esteemed class.	were soaked in vegetable juice to soften then made into preforms. Rude shape is then ground on a stone sprinkled with sand and water.	
	Preforms	core	Lithic workshop			Malo 1951:51
	Grinding Stones	lithic debitage	Lithic workshop			Malo 1951:51
	Hammer Stones	hammer stones	Lithic workshop			Malo 1951:51

Appendix B: Methods Protocols

LOI Protocol

Day 1

1. Place empty 15 mL beakers on scale
    a. Record # of beaker in Column B of spreadsheet
    b. record in column C on spreadsheet of corresponding sample
2. Pour sample into beaker

. Record sample identification in column spreadsheet column A

a. Column F equation will subtract weight of beaker from weight of beaker + sample

3. Place beakers in oven, following corresponding graph
4. Sterilize soils using 16 hour sterilization process (110ºC) in soils lab oven
5. Wash crucibles using one bucket lab soap and warm tap water, and the other with deionized water.

. Wear latex gloves whenever you handle the crucibles to avoid transferring oil from hands to crucibles, which would increase the weight of the crucibles

a. Scrub crucibles till baked on residue is gone.

b. Rinse in deionized bath

6. Bake clean crucibles in furnace for 16 hours at 550ºC (this actually only needs to be 4 hours, but it is easiest to dry the crucibles at the same time the soils are drying in the other oven)

Day 2

1. Turn off lab ovens

a. Allow samples to cool for 1 hour

b. Allow crucibles to cool for 1 hour (30 minutes in oven, 30 minutes on table)

i. Follow the same cooling method for crucibles with samples that you follow for empty crucibles here for consistency in crucible weight

2. Using corresponding map, place crucibles in desiccator for 1 hour until moisture is removed and crucibles have reached room temperature
3. Once samples are cool remove from oven and weigh

. Record in spreadsheet column E

4. Grind soil and sieve dried sample through 2mm sieve
5. Weigh and record dry weight of crucibles in spreadsheet column
6. Add 4g of ground and sieved soil to crucibles, record combined weight on spreadsheet
7. Place crcucibles with soil in dessicator overnight (or you can continue with next step if time allows)

Day 3

8. Set furnace to 550ºc (takes roughly 2.5 hours to reach temp)

9. Place filled crucibles in heated furnace for 4 hours (follow corresponding placement chart)

10. At the end of the four hours, turn off furnace and open door to allow samples to cool

11. Once samples have cooled enough to remove (app. half an hour), move crucibles to table to cool, cover with aluminum foil. If still warm after another 30 minutes, move to desiccator to cool for app. 1 hour(?) (until reaching room temperature).

a. Be consistent with each run, if you cool for 30 minutes in oven and 30 minutes on lab bench, continue to do so for each run.

12. Weigh filled crucibles again to .0001g , record weight in column __ of spreadsheet

. Column __ equation will fill in the weight of lost Organic Material (OM)

13. Take Munsell of combusted samples

14. Put sample in smaller sample bag inside of LOI bag

15. Return LOI bag to larger context bag and mark LOI as complete on larger context bag and on the main spreadsheet sample page

16. Begin process over (start at Day 1 Step 1)

. If last samples processed of the week, rinse crucibles and leave out to wash next week

Particle Size Analysis Protocol:

- Record weight of sample
- Place samples in 500mL beakers, record beaker number and place in oven
- Dry samples in oven overnight, 16 hours at 110º
  - This serves to sterilize the samples while avoiding burning off any important inclusions
- Once samples cool, remove from oven, weigh, and record
- Weigh out 50g or 100g of sediment (depending on how much sample is available)
  - Record how much sample was poured through the screens
  - If there is not enough sample for 50g, weigh how much sample remains and record
- Ensure screens are clean and dry
- Stack screens
  - From bottom to top: Catch tray, #230 (0.05mm), #120 (0.125mm), #60 (0.25mm), #35 (0.5), #10 (2mm), #5 (4mm), #? (6.3mm)

- Measure out 50g or 100g of sediment (if less than 50g, use all sediment)
- Pour through screens
- Put lid on stacked screens
- Place screens on shaker and shake for 10 minutes
- Remove from shaker, weigh and record the amount of sediment in each screen
  - Brush smaller particles caught on edges through screen
  - Be sure to get all caught bits into weigh boat--doing this requires gentle pounding and brushing of screen with blue brush
  - Break up any remaining soil peds. If too many peds remain, consider wet screening, record that there was a high level of peds in notes
- Bag each sieve size in its own bag. Write designation, sieve size and weight of sediment on bag.
  - Repeat for all screens and catch pan at bottom (<.05mm)
- Shake out screens, brush down with scrub brush and paper towels
  - Don't use water, screens take too long to dry
- Repeat

pH Analysis Protocol

- Pull 10 pH samples from the separated bulk sample bags
- Enter each provenienced sample ID into the pH spreadsheet with associated beaker # that the sample will be placed in
- Starting with the Beaker 1 sample, grind sample with pestle and mortar then pour through 2mm geological sieve
- Pour the portion of the sample that remains in the screen (the portion of the sediment) back into the sample whirl-pak bag that is larger than 2mm

- Weigh out exactly 10.00g (or 5g if there is not enough sediment) of sieved sediment into a weigh boat, then pour into the associated beaker
    - If any sieved sediment remains, return to sample whirl-pak bag
- Repeat grinding, sieving, weighing and adding to beaker with all 10 samples
- For beakers with 10g of sediment, place 50mL of solution (solution made with 1000mL deionized water, 1.47g CaCl2) into each beaker and mix with a glass rod until all sediment is saturated (use a different glass rod for each sample so that you avoid contaminating the samples)
    - For beakers with 5g of sediment, place 20mL of solution into each beaker and mix with a glass rod
- Once the solution has been added to all of the beakers and mixed in with the sediment, allow the mixture to sit for 30 minutes
- While mixture settles, calibrate pH meter with 7.0 buffer and 4.01 buffer and fill 2 beakers for rinsing the probes in between measurements. Fill one beaker with tap water and one beaker with deionized water
- At the end of 30 minutes, begin taking measurements
    - Ensure the beakers with the sample mixture are not bumped and unsettled in any way
    - Using the stand, place the pH and temperature probe into the solution so that the tips sit approximately 1cm above the settled sediment in the supernatant
    - ***Gently*** stir the solution for 60 seconds while the pH meter measures
    - At the end of 60 seconds, record the pH and temperature of the solution in the pH spreadsheet in the appropriate row
    - Thoroughly rinse the probes in the tap water beaker, spray down with the deionized water bottle, then swirl in the deionized water beaker to rinse
    - Measure the next sample, repeat process
- At the end of the first set of measurements, check calibration with buffer solution and if need be, recalibrate
- Repeat measurement process and record the second set of pH and temperature measurements for the samples in the appropriate column
- Recalibrate
- Repeat measurement process and record the second set of pH and temperature measurements for the samples in the appropriate column
- Average pH and temperature measurements for each sample (do this by copying the formula from previous samples--grab the bottom right corner of the cell and pull down)
- Sterilize sediment and clean supplies once three sets of measurements were taken and recorded

Microartifact Protocol

Following the collection of sediment samples from the center and sides of room floors, Rosen's (1989:568) most successful processing technique required the samples to be dried and weighed, measured for volume, and wet sieved through a .25 mm sieve. The remaining sample was dried again, and dry sieved, separating the sample into fractions of >5 mm, 2 mm, 1 mm, .50 mm, and .25 mm (Rosen 1989:568). Using this methodology, Rosen (1987:568) was able to analyze microartifacts of varying sizes separately and record volume estimates for each fraction in order to determine whether the remains were primary or secondary refuse (relying on the Hull 1987 study for a definition of these terms).

Sherwood *et al* (1995) described the analytical procedures as beginning with the collection of 600 g of sediment from sample units across the house floors, which were later processed in the lab through geological screens, then analyzed by size under a microscope

As part of her dissertation research, Rainville (2000, as cited in Ullah 2005:9) found that microarchaeology offered insights into households with less wealth or possessions and therefore fewer macroartifacts to collect for analysis (for example, the non-elite or commoners).

Ullah *et al*. (2014:2) illustrate the possibilities of understanding the *habitus* of past households through the use of microrefuse analysis, arguing that this type of approach focuses on "spatially persistent activity over the life of the household, rather than just the last use, abandonment, or post-abandonment re-purposing of a space." Ullah investigated two objectives of household archaeology (understanding the processes through which environments were built and changed through time and how people used these built environments) through the use of microartifact analysis (2012).

Sherwood *et al*. (1995:452) reported that the largest class of microartifacts analyzed in previous studies (2 mm as defined by Dunnell and Stein [1989]) was an unreliable indicator of activity space, as material of this size was found to be easily moved by sweeping activities from the 'public' center of the floor space to the walls. They argued instead that the next larger class (2-4 mm) may be more reliable due to its relative stability during the sweeping process resulting from the increased robustness of the material (Sherwood *et al*. 1995:452). In addition, Neilson (1991:5) found that the smallest flakes (< 1 mm) were moved around the surface of the living floor with the loose dirt, resulting in uniform distribution across the samples collected. Sherwood *et al*. (1995:453) concluded from these findings that various formation processes affect material classes and grain sizes differently (as evidenced by the differential affect sweeping had on the various fee sizes of the microartifacts). These findings indicated the necessity for utilizing the appropriate-sized microartifacts in order to properly assess the activities performed within architectural units, and the proper understanding of formation processes in order to reliably interpret microartifact distribution (Sherwood *et al*. 1995:453).

Ullah advocates for the use of flotation in spatial micro-refuse studies when it is feasible, can use surfacants or other safe reagents (such as 5% solution of distilled white vinegar or other mild organic acid) added to flotation liquid.

Advocate for separation of multiple size classes of microrefuse and associated sediment clasts and separation of floated micro-refuse by nested geological sieves with mesh sizes aligned to standard sedimentary clast size divisions for sands and gravels using either Udden-Wentworth scale used in N.A. or ISO 14688-1 scale used internationally (considerable data exists on the effects of fluvial, colluvial and aeolian transport process on sedimentary grains).

1.4-2.0mm size fraction are easily viewed under low magnification with binocular microscopes and are sufficiently large to resist traction or transport by moderately powered natural processes (e.g., normal winds, rain splash, etc) while still small enough to evade removal during the use and maintenance of floors.

Each volunteer analyst should maintain a log of each sediment context as it was sampled, noting the size fraction and the date of the counted.

Samples should be drawn from the larger bag after mixing its contents gently, using a graduated cylinder to determine the correct sampling volume.

Samples should be sorted into small piles by category on a Petrie dish under binocular optical microscopes

After initial sorting, analysts should re-examine the piles and ensure identification of micromaterials by checking against the reference collection or requesting supervisory confirmation

Counts and weights of each micro-refuse should then be entered on a central form, along with the date and analyst

Reduce fatigue error by making space ergonomically comfortable and having analysts only work sorting with the microscope for one hour, can count one or two subsamples during this time. Also helps to be near window so analysts can look out and change focus to relieve eye strain

Appendix C: Artifact Tables

Site NUU-2

Layer	Artifact Class	Sum of Item Count	Sum of Weight (g)	Sum of g/L (Layer)
K8 LII L3	Raw Kukui Nut Shell	2	0.62	0.0073
K8 LII L3	Basalt Debitage	2	7.75	0.0910

Layer	Artifact Class	Sum of Item Count	Sum of Weight (g)	Sum of g/L (Layer)
N4 LI L1	Manuport Coral	1	2.01	0.0531
N4 LI L1	Basalt Debitage	1	0.18	0.0048
N4 LII L2	Raw Kukui Nut Shell	5	1.9	0.0402
N4 LII L2	Volcanic Glass Debitage	1	0.11	0.0023
N4 LII L3	Manuport Shell	1	0.04	0.0008
N4 LII L3	Charcoal	4	0.07	0.0015
N4 LII L3	Raw Kukui Nut Shell	41	17.09	0.3612
N4 LII L3	Basalt Debitage	1	9.34	0.1974
N4 LII L3	Volcanic Glass Debitage	1	0.08	0.0017
N4 LIII L4	Burnt Kukui Nut Shell	5	0.29	0.0061
N4 LIII L4	Charcoal	0	0.41	0.0087
N4 LIII L4	Raw Kukui Nut Shell	28	5.4	0.1141
N4 LIII L4	Basalt Debitage	6	19.17	0.4051
N4 LIII L4	Volcanic Glass Debitage	4	0.26	0.0055
N4 LIII L5	Charcoal	6	0.09	0.0019
N4 LIII L5	Raw Kukui Nut Shell	3	0.63	0.0133

Excavation Unit	Level	Feature Number	Artifact Class	Sum of Item Count	Sum of Weight
2	**0**	1	Adze (preform)	1	116.6
2	**0**	1	Basalt Flake	41	82.5
2	**0**	1	Charcoal	189	28.5
2	**0**	1	Kukui nut shell	11	7.7
2	**0**	1	Manuport Shell	9	1.5
2	**0**	1	Volcanic Glass Flake	1	0.1

2	**1**		Basalt Flake	12	205
2	**1**		Kukui nut shell	3	1.4
2	**1**		Manuport Coral	1	6.4
2	**1**		Manuport Shell	3	0.8
2	**2**		Basalt Flake	64	108.7
2	**2**		Charcoal	15	3
2	**2**		Kukui nut shell	47	24
2	**2**		Manuport Coral	4	13
2	**2**		Manuport Shell	9	3.6
2	**3**		Adze flake	1	8.6
2	**3**		Basalt Flake	52	181.2
2	**3**		Charcoal	14	1.5
2	**3**		Kukui nut shell	20	8.6
2	**3**		Manuport Coral	1	0.3
2	**4**		Basalt Flake	24	18.3
2	**4**		Charcoal	34	2.9
2	**4**		Kukui nut shell	8	1.8
2	**4**		Manuport Coral	1	0.1
2a	**0**	2	Basalt Flake	15	17.5
2a	**0**	2	Charcoal	231	36.7
2a	**0**	2	Kukui nut shell	8	1.4
2a	**0**	2	Mammal bone	3	0.4
2a	**0**	2	Manuport Shell	4	0.7
2a	**1**		Basalt Flake	6	56.9
2a	**1**		Basalt stone awl	1	26.5
2a	**1**		Manuport Shell	6	2.8
2a	**2**		Basalt Flake	15	29.3
2a	**2**		Charcoal	10	0.3
2a	**2**		Kukui nut shell	10	3
2a	**2**		Manuport Shell	3	0.4

Unit	Layer	Level	Artifact Class	Count	Weight (g)	g/L (Layer)
Q5	I	1	Basalt Debitage	1	4.48	0.4734
Q5	I	1	Charcoal	1	0.01	0.0011
Q5	II	2	Basalt Debitage	6	7.46	0.2252
Q5	II	2	Charcoal	0	0.12	0.0036
Q5	II	3	Basalt Debitage	7	20.72	0.6256
Q5	II	3	Volcanic Glass Debitage	2	0.69	0.0208
Q5	II	3	Manuport Shell	2	1.25	0.0377
Q5	II	3	Charcoal	0	1.03	0.0311
Q5	II	3	Raw Kukui Nut Shell	34	12.49	0.3771
Q5	III	4	Basalt Debitage	10	90.47	0.7354
Q5	III	4	Volcanic Glass Flake	4	0.41	0.0033
Q5	III	4	‘ili‘ili	1	2.17	0.0176
Q5	III	4	Manuport Coral	11	8.52	0.0693
Q5	III	4	Manuport Shell	2	0.85	0.0069
Q5	III	4	Charcoal	0	4.22	0.0343
Q5	III	4	Raw Kukui Nut Shell	38	16.79	0.1365
Q5	III	5	Basalt Debitage	17	51.99	0.4226
Q5	III	5	Volcanic Glass Debitage	4	0.32	0.0026
Q5	III	5	Manuport Shell	1	0.32	0.0026
Q5	III	5	Charcoal	0	11.58	0.0941
Q5	III	5	Raw Kukui Nut Shell	86	21.33	0.1734
Q5	III	6	Basalt Debitage	4	46.89	0.3811

Q5	III	6	Volcanic Glass Debitage	2	0.27	0.0022
Q5	III	6	Charcoal	0	2.81	0.0228
Q5	III	6	Raw Kukui Nut Shell	28	3.9	0.0317
Q5	III	6	Basalt Debitage	1	1.86	0.0328
Q5	III	6	Charcoal	0	0.79	0.0037
R4	I		Manuport Coral	1	4.15	0.6578
R4	I		Manuport Shell	1	0.1	0.0159
R4	I		Burnt kukui nut shell	2	0.15	0.0079
R4	II		Basalt Debitage	17	18.33	0.6456
R4	II		Worked bone	1	0.12	0.0042
R4	II		Manuport Coral	4	1.95	0.0687
R4	II		Manuport Shell	1	0.08	0.0028
R4	II		cf. small mammal	4	0.13	0.0046
R4	II		medium mammal	2	0.52	0.0183
R4	II		cf. pig	1	0.34	0.0120
R4	II		Burnt kukui nut shell	2	0.07	0.0025
R4	II		Charcoal	0	15.24	0.5368
R4	II		Raw Kukui Nut Shell	35	2.32	0.0817
R4	III		Basalt Debitage	6	20.45	1.0805
R4	III		Volcanic Glass Debitage	1	0.03	0.0016
R4	III		Manuport Shell	3	0.62	0.0328
R4	III		Bone not worked	29	0.2	0.0106
R4	III		Burnt kukui nut shell	3	0.11	0.0058
R4	III		Charcoal	0	9.06	0.4787
R4	III		Raw Kukui Nut Shell	8	0.51	0.0269
R4	IV		Basalt Debitage	12	8.62	0.4554
R4	IV		Volcanic Glass Debitage	6	0.87	0.0460
R4	IV		Manuport Shell	12	0.1	0.0053
R4	IV		Bone not worked	8	0.06	0.0032
R4	IV		Charcoal	1	32.05	1.6933
R4	IV		Raw Kukui Nut Shell	19	1.86	0.0983
R4	V	1	Basalt Debitage	25	22.16	0.9366
R4	V	1	Volcanic Glass Debitage	5	0.92	0.0389
R4	V	1	Worked bone	2	0.58	0.0245
R4	V	1	Manuport Shell	14	0.67	0.0283
R4	V	1	Bone not worked	6	0.21	0.0089
R4	V	1	Charcoal	0	13.1	0.5537
R4	V	1	Raw Kukui Nut Shell	2	0.05	0.0021
R4	V	2	Basalt Debitage	9	9.84	0.2599
R4	V	2	Volcanic Glass Flake	1	0.27	0.0071
R4	V	2	Manuport Coral	1	16.14	0.4264
R4	V	2	Manuport Shell	3	0.69	0.0182
R4	V	2	Undetermined fish	2	0.18	0.0048
R4	V	2	Burnt kukui nut shell	1	0.11	0.0029
R4	V	2	Charcoal	0	8.08	0.2134
R4	V	2	Raw Kukui Nut Shell	3	0.13	0.0034
R5	II	2	Not applicable	1	0.34	0.0045
R5	II	2	Basalt Debitage	7	3.2	0.0423
R5	II	2	Manuport Shell	1	0.03	0.0004
R5	II	2	Charcoal	5	0.11	0.0015
R5	II	2	Raw Kukui Nut Shell	6	0.63	0.0083
R5	II	3	Basalt Debitage	9	25.02	0.3305
R5	II	3	Volcanic Glass Flake	2	0.23	0.0030
R5	II	3	Manuport Shell	5	3.91	0.0516

R5	II	3	Burnt kukui nut shell	3	1.22	0.0161
R5	II	3	Charcoal	0	7.79	0.1029
R5	II	3	Raw Kukui Nut Shell	58	16.31	0.2154
R5	III	4	Basalt Debitage	39	127.72	2.2493
R5	III	4		8	0.91	0.0160
R5	III	4	Manuport Coral	1	0.08	0.0014
R5	III	4	Manuport Shell	2	0.26	0.0046
R5	III	4	Burnt kukui nut shell	7	0.56	0.0099
R5	III	4	Charcoal	0	31.69	0.5581
R5	III	4	Raw Kukui Nut Shell	306	40.81	0.7187
R5	IV	5	Basalt Debitage	75	111.76	1.0736
R5	IV	5	Volcanic Glass Flake	3	0.79	0.0076
R5	IV	5	‘ili‘ili	3	4.97	0.0477
R5	IV	5	Manuport Coral	4	4.02	0.0386
R5	IV	5	Manuport Shell	3	1.4	0.0134
R5	IV	5	Bone not worked	15	1.04	0.0100
R5	IV	5	Burnt kukui nut shell	18	1.06	0.0102
R5	IV	5	Charcoal	0	49.07	0.4714
R5	IV	5	Raw Kukui Nut Shell	91	15.16	0.1456
R5	IV	6	Basalt Debitage	19	21.37	0.2053
R5	IV	6	Volcanic Glass Debitage	8	0.59	0.0057
R5	IV	6	Manuport Coral	1	0.34	0.0033
R5	IV	6	Burnt kukui nut shell	3	0.2	0.0019
R5	IV	6	Charcoal	0	18	0.1729
R5	IV	6	Raw Kukui Nut Shell	23	3.86	0.0371
R5	V	7	Basalt Debitage	2	4.38	0.1157
R5	V	7	Volcanic Glass Debitage	1	0.24	0.0063
R5	V	7	Charcoal	0	4.99	0.1318
R5	V	7	Raw Kukui Nut Shell	2	0.18	0.0048

Excavation Unit	Level	Feature Number	Artifact Class	Sum of Item Count	Sum of Weight
1	**1**		Basalt Flake	5	211.3
1	**1**		Mammal bone	7	49.9
1	**1**		Manuport Shell	2	0.2
1	**1**		Volcanic Glass Flake	1	0.1
1	**2**		Basalt Flake	20	13.3
1	**2**		Basalt groundstone fragment	1	125.5
1	**2**		Charcoal	1	0.6
1	**2**		Kukui nut shell	14	4.7
1	**2**		Mammal bone	9	2.2
1	**2**		Manuport Coral	1	54.1
1	**2**		Manuport Shell	6	3.4
1	**3**		Basalt Flake	30	190.1
1	**3**		Charcoal	173	26.1
1	**3**		Kukui nut shell	101	94.2
1	**3**		Mammal bone	12	4.2
1	**3**		Manuport Coral	4	3.8
1	**3**		Manuport Shell	11	3.7
1	**3**		Metal	48	105
1	**4**		Basalt Flake	40	70.5
1	**4**		Charcoal	133	17.6
1	**4**		Kukui nut shell	60	18.1
1	**4**		Mammal bone	1	0.4

1	**4**	Manuport Coral	1	1
1	**4**	Manuport Shell	6	2.8
1	**4**	Pumice	1	6.1
1	**4**	Volcanic Glass Flake	2	0.2
1a	**1**	Basalt Flake	7	44.9
1a	**1**	Kukui nut shell	14	10.2
1a	**1**	Manuport Shell	4	1
1a	**2**	Charcoal	4	0.1
1a	**2**	Kukui nut shell	8	3.7
1a	**2**	Mammal bone	1	0.1
1a	**2**	Manuport Shell	1	0.2
1a	**2**	Volcanic Glass Flake	3	0.4
1a	**3**	Basalt Flake	5	3.4
1a	**3**	Charcoal	22	5
1a	**3**	Kukui nut shell	5	3.7

Unit	Layer	Level	Feature	Special	Artifact	Item Count	Weight (g)	g/L (Layer)
R8	I	1			‘ili‘ili	2	5.17	0.2732
R8	I	1			Charcoal	0	0.19	0.0100
R8	I	1			Basalt Debitage	9	7.58	0.4005
R8	I	1			Volcanic Glass Debitage	1	0.11	0.0058
R8	II	2			Manuport Coral	1	0.1	0.0016
R8	II	2			Manuport Shell	5	2.08	0.0338
R8	II	2			Bone Not Worked	4	0.23	0.0037
R8	II	2			Charcoal	0	1.21	0.0197
R8	II	2			Raw Kukui Nut	17	2.61	0.0424
R8	II	2			Water-Rolled Rock	2	3.59	0.0584
R8	II	2			Basalt Debitage	27	50.16	0.8154
R8	II	3	F1		Bone Fishhook	1	0.64	0.0271
R8	II	3	F1		Manuport Coral	6	0.25	0.0106
R8	II	3	F1		Manuport Shell	5	0.57	0.0241
R8	II	3	F1		Bone Not Worked	4	0.32	0.0135
R8	II	3	F1		Charcoal	0	9.23	0.3901
R8	II	3	F1		Raw Kukui Nut	42	32.3	1.3652
R8	II	3	F1		Volcanic Glass Debitage	12	0.62	0.0262
R8	II	3	F1		Basalt Debitage	51	469.62	19.8495
R8	II	3			Charcoal	0	0.83	0.0135
R8	II	3			Raw Kukui Nut	13	1.27	0.0206
R8	II	3			Basalt Debitage	6	44.97	0.7311
R8	II	3			Volcanic Glass Debitage	3	0.21	0.0034
R8	II	4	F1		Bone Not Worked	2	0.01	0.0004
R8	II	4	F1		Charcoal	0	1.84	0.0778
R8	II	4	F1		Fire-altered rock	5	804.52	34.0048
R8	II	4	F1		Basalt Debitage	18	13.16	0.5562
R8	II	4		Eastern Half	Bone Not Worked	8	0.39	0.0063
R8	II	4		Eastern Half	Burnt Kukui Nut	3	0.09	0.0015
R8	II	4		Eastern Half	Charcoal	0	5.45	0.0886
R8	II	4		Eastern Half	Raw Kukui Nut	4	1.25	0.0203
R8	II	4		Eastern Half	Basalt Debitage	8	4.81	0.0782
R8	II	4		Western Half	Manuport Coral	4	0.06	0.0010

R8	II	4		Western Half	Bone Not Worked	17	0.28	0.0046
R8	II	4		Western Half	Charcoal	0	2.07	0.0337
R8	II	4		Western Half	Raw Kukui Nut	18	3.56	0.0579
R8	II	4		Western Half	Water-Rolled Rock	2	9.1	0.1479
R8	II	4		Western Half	Fire-altered rock	1	15.36	0.2497
R8	II	4		Western Half	Basalt Debitage	6	55.28	0.8987
R8	II	4		Western Half	Volcanic Glass Debitage	1	0.08	0.0013
R8	II	5	F1		Bone Not Worked	7	0.04	0.0017
R8	II	5		Eastern Half	Manuport Shell	7	0.25	0.0041
R8	II	5		Eastern Half	Bone Not Worked	7	0.02	0.0003
R8	II	5		Eastern Half	Charcoal	0	6.66	0.1083
R8	II	5		Eastern Half	Raw Kukui Nut	1	0.02	0.0003
R8	II	5		Eastern Half	Pumice	1	0.88	0.0143
R8	II	5		Western Half	Manuport Coral	3	0.01	0.0002
R8	II	5		Western Half	Manuport Shell	3	0.36	0.0059
R8	II	5		Western Half	Bone Not Worked	4	0.17	0.0028
R8	II	5		Western Half	Burnt Kukui Nut	6	0.23	0.0037
R8	II	5		Western Half	Charcoal	0	2.45	0.0398
R8	II	5		Western Half	Raw Kukui Nut	3	0.01	0.0002
R8	II	5		Western Half	Water-Rolled Rock	4	8.09	0.1315
R8	II	5		Western Half	Volcanic Glass Debitage	1	0.07	0.0011
R8	III	6		Eastern Half	Charcoal	0	2.71	0.2864
R8	III	6		Eastern Half	Basalt Debitage	2	1.75	0.1849
R8	III	6		Western Half	Manuport Coral	1	1.32	0.1395
R8	III	6		Western Half	Bone Not Worked	6	0.05	0.0053
R8	III	6		Western Half	Charcoal	0	3.78	0.3994
R8	III	6		Western Half	Water-Rolled Rock	1	2.17	0.2293
R8	III	6		Western Half	Basalt Debitage	3	4.04	0.4269

Unit	Layer	Level	Feature	Special	Artifact Class	Item Count	Weight (g)	g/L (Layer)
R9	I	1			Manuport Coral	3	1.41	0.0497
R9	I	1			Manuport Shell	1	0.18	0.0063
R9	I	1			Charcoal	0	0.69	0.0243
R9	I	1			Raw Kukui Nut	2	0.94	0.0331
R9	I	1			Basalt Debitage	5	8.02	0.2825
R9	II	2			‘ili‘ili	1	1.26	0.0092
R9	II	2			Manuport Shell	12	2.49	0.0181
R9	II	2			Bone Not Worked	2	0.06	0.0004
R9	II	2			Charcoal	0	2.08	0.0152
R9	II	2			Raw Kukui Nut	13	6.57	0.0479
R9	II	2			Volcanic Glass Debitage	2	0.11	0.0008
R9	II	2			Water-Rolled Rock	1	23.03	0.1678
R9	II	2			Basalt Debitage	25	60.53	0.4411
R9	II	3			‘ili‘ili	5	26.94	0.1963
R9	II	3			Manuport Coral	7	8.34	0.0608
R9	II	3			‘Opihi	143	6.37	0.0464
R9	II	3			Manuport Shell	12	6.22	0.0453
R9	II	3			Sea Urchin	6	0.19	0.0014

R9	II	3			Bone Not Worked	5	0.23	0.0017
R9	II	3			Burnt Kukui Nut	70	15.59	0.1136
R9	II	3			Charcoal	0	63.67	0.4640
R9	II	3			Basalt Debitage	43	96.6	0.7040
R9	II	3			Volcanic Glass Debitage	2	0.61	0.0044
R9	II	4			‘ili‘ili	4	13.58	0.0990
R9	II	4			Worked Bone	1	0.27	0.0020
R9	II	4			Manuport Coral	2	0.6	0.0044
R9	II	4			Manuport Shell	2	0.28	0.0020
R9	II	4			Bone Not Worked	13	0.66	0.0048
R9	II	4			Burnt Kukui Nut	40	1.47	0.0107
R9	II	4			Charcoal	0	136.69	0.9961
R9	II	4			Raw Kukui Nut	78	18.19	0.1326
R9	II	4			Basalt Debitage	73	554.95	4.0442
R9	III	5			‘ili‘ili	3	7.56	0.0470
R9	III	5			Worked Bone	2	0.82	0.0051
R9	III	5			Manuport Coral	4	1.53	0.0095
R9	III	5			Manuport Shell	1	3.11	0.0193
R9	III	5			Bone Not Worked	4	0.21	0.0013
R9	III	5			Burnt Kukui Nut	16	1.68	0.0104
R9	III	5			Charcoal	0	146.9	0.9131
R9	III	5			Raw Kukui Nut	41	3.22	0.0200
R9	III	5			Basalt Debitage	26	211.12	1.3123
R9	III	5			Volcanic Glass Debitage	3	0.31	0.0019
R9	III	6			‘ili‘ili	6	21.07	0.1310
R9	III	6			Manuport Coral	9	1.52	0.0094
R9	III	6			Manuport Shell	3	0.02	0.0001
R9	III	6			Burnt Kukui Nut	21	1.38	0.0086
R9	III	6			Charcoal	0	164.12	1.0201
R9	III	6			Raw Kukui Nut	9	1.5	0.0093
R9	III	6			Basalt Debitage	24	57.71	0.3587
R9	III	6			Volcanic Glass Debitage	2	0.26	0.0016
R9	III	7		Under Rock	Charcoal	0	18.81	0.1169
R9	III	7			Volcanic Glass Debitage	1	0.37	0.0023
R9	III	7			‘ili‘ili	2	14.07	0.0875
R9	III	7			Manuport Coral	2	3.9	0.0242
R9	III	7			Manuport Shell	1	0.01	0.0001
R9	III	7			Bone Not Worked	3	0.09	0.0006
R9	III	7			Burnt Kukui Nut	1	0.19	0.0012
R9	III	7			Charcoal	0	94.77	0.5891
R9	III	7			Basalt Debitage	19	58.16	0.3615
R9	III	8			Manuport Coral	2	0.08	0.0005
R9	III	8			Manuport Shell	1	0.08	0.0005
R9	III	8			Bone Not Worked	4	0.49	0.0030
R9	III	8			Charcoal	0	54.29	0.3375
R9	III	8			Raw Kukui Nut	2	0.43	0.0027
R9	III	8			Basalt Debitage	4	12.26	0.0762
R9	III	8			Volcanic Glass Debitage	1	0.02	0.0001
R9	IV	9			Manuport Shell	1	0.02	0.0004

R9	IV	9			Bone Not Worked	2	0.06	0.0011
R9	IV	9			Charcoal	0	7.79	0.1372
R9	IV	10			Charcoal	0	1.05	0.0185

Unit	Layer	Level	Feature	Special	Artifact Class	Item Count	Weight (g)	g/L (Layer)
R10	I	1			‘ili‘ili	1	72.23	0.7632
R10	I	1			Manuport Coral	1	1.86	0.0197
R10	I	1			Manuport Shell	4	0.36	0.0038
R10	I	1			Burnt Kukui Nut	2	0.07	0.0007
R10	I	1			Charcoal	10	0.16	0.0017
R10	I	1			Raw Kukui Nut	1	0.4	0.0042
R10	I	1			Basalt Debitage	5	23.22	0.2454
R10	I	2			Bone Not Worked	3	0.4	0.0042
R10	I	2			Burnt Kukui Nut	2	0.11	0.0012
R10	I	2			Charcoal	0	5.12	0.0541
R10	I	2			Raw Kukui Nut	10	1.43	0.0151
R10	I	2			Water-Rolled Rock	1	0.32	0.0034
R10	I	2			Basalt Debitage	4	11.42	0.1207
R10	I	2			Polished Stone	1	0.05	0.0005
R10	II	3			Manuport Coral	5	22.06	0.3885
R10	II	3			Manuport Shell	9	1.52	0.0268
R10	II	3			Bone Not Worked	1	0.06	0.0011
R10	II	3			Burnt Kukui Nut	10	0.75	0.0132
R10	II	3			Charcoal	2	40.18	0.7076
R10	II	3			Raw Kukui Nut	35	4.6	0.0810
R10	II	3			Water-Rolled Rock	2	3.5	0.0616
R10	II	3			Basalt Debitage	18	115.85	2.0403
R10	II	3			Volcanic Glass Debitage	2	0.4	0.0070
R10	II	3			Worked Stone	3	53.22	0.9373
R10	Charcoal Lens	4			‘ili‘ili	3	20.6	0.1979
R10	Charcoal Lens	4			Manuport Coral	4	0.95	0.0091
R10	Charcoal Lens	4			Manuport Shell	4	0.05	0.0005
R10	Charcoal Lens	4			Bone Not Worked	22	0.15	0.0014
R10	Charcoal Lens	4			Charcoal	1	72.55	0.6969
R10	Charcoal Lens	4			Raw Kukui Nut	16	1.25	0.0120
R10	Charcoal Lens	4			Basalt Debitage	61	89.26	0.8574
R10	Charcoal Lens	4			Volcanic Glass Debitage	84	3.02	0.0290
R10	Charcoal Lens	5			‘ili‘ili	4	14.1	0.1354
R10	Charcoal Lens	5			Manuport Coral	4	11.33	0.1088
R10	Charcoal Lens	5			Manuport Shell	20	1.68	0.0161

R10	Charcoal Lens	5			Bone Not Worked	9	0.24	0.0023
R10	Charcoal Lens	5			Burnt Kukui Nut	36	2.16	0.0207
R10	Charcoal Lens	5			Charcoal	0	50.78	0.4878
R10	Charcoal Lens	5			Raw Kukui Nut	7	0.12	0.0012
R10	Charcoal Lens	5			Basalt Debitage	46	55.38	0.5320
R10	III	6			‘ili‘ili	2	3.52	0.0323
R10	III	6			Manuport Shell	11	0.82	0.0075
R10	III	6			Bone Not Worked	4	0.23	0.0021
R10	III	6			Burnt Kukui Nut	1	0.29	0.0027
R10	III	6			Charcoal	0	31.94	0.2935
R10	III	6			Raw Kukui Nut	8	1.09	0.0100
R10	III	6			Basalt Debitage	31	20.64	0.1897
R10	III	6			Volcanic Glass Debitage	2	0.59	0.0054
R10	III	7			Manuport Coral	2	1.22	0.0112
R10	III	7			Manuport Shell	6	0.11	0.0010
R10	III	7			Bone Not Worked	3	0.24	0.0022
R10	III	7			Burnt Kukui Nut	3	0.15	0.0014
R10	III	7			Charcoal	0	23.05	0.2118
R10	III	7			Raw Kukui Nut	3	0.49	0.0045
R10	III	7			Water-Rolled Rock	3	11.3	0.1038
R10	III	7			Basalt Debitage	11	15.19	0.1396
R10	III	7			Volcanic Glass Debitage	1	0.14	0.0013
R10	IV	8			Manuport Coral	1	11.04	0.0933
R10	IV	8			Charcoal	0	2.31	0.0195
R10	IV	8			Basalt Debitage	4	4.62	0.0391
R10	IV	9			Manuport Shell	2	0.05	0.0004
R10	IV	9			Charcoal	0	2.1	0.0178
R10	IV	9			Basalt Debitage	3	8.36	0.0707
R10	IV	10			Manuport Shell	1	0.05	0.0004
R10	IV	10			Charcoal	0	1.22	0.0103

Site NUU-3 Unit H4

Level	Artifact Class	sum of Item Count	Sum of Weight (g)	Sum of g/L (Layer)
LI L3	Charcoal	1	0.01	0.00011536
LI L4	Charcoal	5	0.13	0.00149966
LI L4	Raw Kukui Nut Shell	6	0.4	0.00461432
LI L4	Manuport shell	2	0.06	0.00069215
LI L4	Basalt Debitage	2	12.67	0.14615869
LII L5	Charcoal	N/A	0.95	0.01434066
LII L5	Raw Kukui Nut Shell	11	2.72	0.04105957
LII L5	Manuport shell	1	1.28	0.01932215
LII L5	Burnt Kukui Nut	2	0.99	0.01494447
LII L5	Basalt Debitage	3	2.79	0.04211625
LII L5	bone not worked	1	0.04	0.00060382

LII L5	Pig Bone		2	0.25	0.00377386
LII L6	Charcoal	N/A		4.91	0.07411855
LII L6	Raw Kukui Shell		4	0.6	0.00905726
LII L6	Manuport shell		3	0.4	0.00603817
LII L6	Basalt Debitage		1	1.02	0.01539734
LII L6	Burnt Kukui Nut		1	0.21	0.00317004
LII L6	Basalt Debitage		15	11.46	0.17299361
LII L6	‘ili‘ili		1	5.4	0.08151531
LII L7	Charcoal	N/A		12.05	0.18189991
LII L7	Raw Kukui Nut Shell		2	0.13	0.00196241
LII L7	Burnt Kukui Nut		2	0.5	0.00754771
LII L7	Basalt Debitage		11	16.28	0.24575358
LII L7	bone not worked		6	0.2	0.00301909
Charcoal Lens L8	Charcoal	N/A		30.45	0.96527718
Charcoal Lens L8	Burnt Kukui Nut		5	0.35	0.01109514
Charcoal Lens L8	Basalt Debitage		4	13.04	0.41337322
Charcoal Lens L8	bone not worked		5	0.04	0.00126802
Charcoal Lens L8	‘ili‘ili		1	0.77	0.02440931
Charcoal Lens L9	Charcoal	N/A		71.37	2.26245755
Charcoal Lens L9	Burnt Kukui Nut		2	0.16	0.00507206
Charcoal Lens L9	Basalt Debitage		7	10.8	0.34236432
Charcoal Lens L9	Volcanic Glass Debitage		1	0.03	0.00095101
Charcoal Lens L8_9	Charcoal	N/A		0.33	0.01046113
Charcoal Lens L8_9	Basalt Debitage		1	3.37	0.10683035
LIII L10	Charcoal	N/A		3.83	0.80941688
LIII L10	Basalt Debitage		2	1.47	0.31066392
LIV L11	Charcoal	N/A		1.06	0.07467205

Site NUU-152

Site	Artifact Class	Item Count	Weight (g)	g/L (Layer)
NUU152D R6 LI L1	Basalt Debitage	175	354.84	7.8853
NUU152D R6 LI L1	Manuport coral	9	8.4	0.1867
NUU152D R6 LI L1	Manuport Shell	4	4.99	0.1109
NUU152D R6 LI L1	Volcanic Glass Debitage	1	0.21	0.0047
NUU152D R6 LII L2	Basalt Debitage	153	216.7	1.4071
NUU152D R6 LII L2	Charcoal	0	4.63	0.0301
NUU152D R6 LII L2	‘ili‘ili	1	8.14	0.0529
NUU152D R6 LII L2	Manuport coral	16	2.71	0.0176
NUU152D R6 LII L2	Manuport Shell	7	1.77	0.0115
NUU152D R6 LII L2	Volcanic Glass Debitage	1	0.14	0.0009
NUU152D R6 LII L3	Basalt Debitage	225	4.9695	0.0323
NUU152D R6 LII L3	Burnt Kukui Nut	5	0.0045	0.0000
NUU152D R6 LII L3	Charcoal		0.639	0.0041
NUU152D R6 LII L3	Manuport coral	11	0.2725	0.0018
NUU152D R6 LII L3	Manuport Shell	9	0.093	0.0006
NUU152D R6 LII L3	Volcanic Glass Debitage	2	0.0045	0.0000
NUU152D R6 LII L3	water-rolled rock	2	0.5125	0.0033
NUU152D R6 LII L4	Basalt Debitage	163	168.53	1.0944
NUU152D R6 LII L4	Charcoal	0	22.3	0.1448
NUU152D R6 LII L4	Manuport coral	14	18.96	0.1231
NUU152D R6 LII L4	Manuport Shell	25	1.01	0.0066
NUU152D R6 LII L4	Volcanic Glass Debitage	4	1.47	0.0095

NUU152D R6 LIII L5	Basalt Debitage	330	491.23	6.2978
NUU152D R6 LIII L5	Charcoal	0	35.34	0.4531
NUU152D R6 LIII L5	Manuport coral	2	28.27	0.3624
NUU152D R6 LIII L5	Manuport Shell	23	7.69	0.0986
NUU152D R6 LIII L6	Basalt Debitage	66	31.06	0.3982
NUU152D R6 LIII L6	Burnt Kukui Nut	12	0.71	0.0091
NUU152D R6 LIII L6	Charcoal	0	27.56	0.3533
NUU152D R6 LIII L6	Manuport coral	5	3.65	0.0468
NUU152D R6 LIII L6	Manuport Shell	25	2.54	0.0326
NUU152D R6 LIV L7	Charcoal	0	0.73	0.0197
NUU152D R6 LIV L7	Manuport Shell	4	1.12	0.0303
NUU152D R7 LI L1	Basalt Debitage	37	23.37	1.1422
NUU152D R7 LI L1	Manuport coral	2	91.38	4.4663
NUU152D R7 LII L2	Basalt Debitage	52	130.29	0.9552
NUU152D R7 LII L2	Bone not worked	1	0.01	0.0001
NUU152D R7 LII L2	Burnt Kukui Nut	11	0.11	0.0008
NUU152D R7 LII L2	Charcoal		1.34	0.0098
NUU152D R7 LII L2	Manuport coral	1	0.01	0.0001
NUU152D R7 LII L3	Basalt Debitage	30	66.1	0.4846
NUU152D R7 LII L3	Charcoal		6.3	0.0462
NUU152D R7 LII L3	Manuport coral	4	4.03	0.0295
NUU152D R7 LII L3	Manuport Shell	5	1.72	0.0126
NUU152D R7 LII L4	Basalt Debitage	55	92.46	0.6779
NUU152D R7 LII L4	Burnt Kukui Nut	1	0.1	0.0007
NUU152D R7 LII L4	Charcoal		7.32	0.0537
NUU152D R7 LII L4	Manuport coral	1	0.26	0.0019
NUU152D R7 LII L4	Manuport Shell	4	1.19	0.0087
NUU152D R7 LII L4	Volcanic Glass Debitage	2	0.83	0.0061
NUU152D R7 LII L4	water-rolled rock	1	7.48	0.0548
NUU152D R7 LII L5	Basalt Debitage	20	20.2	0.1481
NUU152D R7 LII L5	Burnt Kukui Nut	1	0.11	0.0008
NUU152D R7 LII L5	Charcoal		11.28	0.0827
NUU152D R7 LII L5	Manuport coral	2	1.39	0.0102
NUU152D R7 LII L5	Manuport Shell	1	0.19	0.0014
NUU152D R7 LII L6 F2	Basalt Debitage	10	10.11	10.1100
NUU152D R7 LII L6 F2	Charcoal		4.77	4.7700
NUU152D R7 LII L6	Basalt Debitage	32	50.44	0.3698
NUU152D R7 LII L6	Burnt Kukui Nut	4	0.27	0.0020
NUU152D R7 LII L6	Charcoal		15.81	0.1159
NUU152D R7 LII L6	Manuport coral	3	1.65	0.0121
NUU152D R7 LII L6	Manuport Shell	12	4.85	0.0356
NUU152D R7 LIII L7	Basalt Debitage	17	13.14	1.4129
NUU152D R7 LIII L7	Bone not worked	4	1.05	0.1129
NUU152D R7 LIII L7	Burnt Kukui Nut	17	0.93	0.1000
NUU152D R7 LIII L7	Charcoal		9.65	1.0376
NUU152D R7 LIII L7	‘ili‘ili	1	0.47	0.0505
NUU152D R7 LIII L7	Manuport coral	5	8.79	0.9452
NUU152D R7 LIII L7	Manuport Shell	11	0.42	0.0452
NUU152D R7 L L7	Charcoal	2	0.16	0.0172
NUU152D S6 LI L1	Basalt Debitage	29	58.48	1.7721
NUU152D S6 LI L1	Manuport coral	2	0.59	0.0179
NUU152D S6 LI L1	Manuport Shell	3	0.3	0.0091
NUU152D S6 LII L2	Basalt Debitage	113	84.57	0.4382

NUU152D S6 LII L2	Charcoal	0	4.01	0.0208
NUU152D S6 LII L2	Manuport coral	12	4.24	0.0220
NUU152D S6 LII L2	Manuport Shell	14	2.51	0.0130
NUU152D S6 LII L2	Volcanic Glass Debitage	2	0.29	0.0015
NUU152D S6 LII L2	water-rolled rock	2	37.82	0.1960
NUU152D S6 LII L3	Basalt Debitage	97	306.27	1.5869
NUU152D S6 LII L3	Charcoal	0	22.63	0.1173
NUU152D S6 LII L3	Manuport coral	4	3.01	0.0156
NUU152D S6 LII L3	Manuport Shell	11	6.31	0.0327
NUU152D S6 LII L3	Raw Kukui Nut	3	0.28	0.0015
NUU152D S6 LII L3	Volcanic Glass Debitage	5	0.54	0.0028
NUU152D S6 LII L4	Basalt Debitage	26	85.43	0.4426
NUU152D S6 LII L4	Bone not worked	10	1.36	0.0070
NUU152D S6 LII L4	Charcoal	0	21.44	0.1111
NUU152D S6 LII L4	Manuport coral	10	13.71	0.0710
NUU152D S6 LII L4	Manuport Shell	15	6.3	0.0326
NUU152D S6 LII L4	water-rolled rock	2	41.5	0.2150
NUU152D S6 LII L5	Basalt Debitage	35	186.52	0.9664
NUU152D S6 LII L5	Bone not worked	6	0.05	0.0003
NUU152D S6 LII L5	Burnt Kukui Nut	19	0.99	0.0051
NUU152D S6 LII L5	Charcoal	0	34.31	0.1778
NUU152D S6 LII L5	Manuport coral	13	9.3	0.0482
NUU152D S6 LII L5	Manuport Shell	27	9.07	0.0470
NUU152D S6 LII L5	Sea Urchin	10	0.1	0.0005
NUU152D S6 LII L5	Volcanic Glass Debitage	2	0.3	0.0016
NUU152D S6 LII L6	Basalt Debitage	9	22.69	0.1176
NUU152D S6 LII L6	Charcoal		29.09	0.1507
NUU152D S6 LII L6	Manuport coral	11	1.24	0.0064
NUU152D S6 LII L6	Manuport Shell	57	4.87	0.0252
NUU152D S6 LII L6	Sea Urchin	20	0.78	0.0040
NUU152D S6 LIII L7	Basalt Debitage	10	12.69	0.3188
NUU152D S6 LIII L7	Burnt Kukui Nut	3	0.18	0.0045
NUU152D S6 LIII L7	Charcoal		6.05	0.1520
NUU152D S6 LIII L7	Manuport Shell	11	0.79	0.0198
NUU152D S6 LIII L7	Sea Urchin	4	0.11	0.0028
NUU152D S6 L4 F1	Basalt Debitage	5	0.88	0.0169
NUU152D S6 L4 F1	Charcoal	0	0.3	0.0057
NUU152D S6 L4 F1	Manuport Shell	1	0.01	0.0002
NUU152D S6 L4 F1	Sea Urchin	2	0.04	0.0008
NUU152D S6 L4 F1	Basalt Debitage	5	3.7	0.0709
NUU152D S6 L5 F1	Bone not worked	1	0.12	0.0023
NUU152D S6 L5 F1	Charcoal	0	0.2	0.0038
NUU152D S6 L5 F1	Manuport coral	6	1.31	0.0251
NUU152D S6 L5 F1	Manuport Shell	16	1.13	0.0216
NUU152D S6 L5 F1	Sea Urchin	32	0.8	0.0153
NUU152D S6 L6 F1	Basalt Debitage	4	5.61	0.1075
NUU152D S6 L6 F1	Charcoal	7	0.54	0.0103
NUU152D S6 L6 F1	Manuport coral	1	0.01	0.0002
NUU152D S6 L6 F1	Manuport Shell	23	1.37	0.0262
NUU152D S6 L6 F1	Sea Urchin	74	2.29	0.0439
NUU152D S6 L6 F1	Terrestrial Gastropod	3	0.05	0.0010
NUU152D S6/S7 L7 F1	Charcoal	0	1.91	0.0722
NUU152D S6/S7 L7 F1	Manuport Shell	4	2.2	0.1048
NUU152D S6/S7 L7 F1	Sea Urchin	5	0.16	0.0076

NUU152D S6/S7 F1	Charcoal	2	0.04	0.0019
NUU152D S6/S7 F1	Manuport Shell	1	0.03	0.0014
NUU152D S7 LI L1	Basalt Debitage	2	0.69	0.0351
NUU152D S7 LI L1	Charcoal	0	0.09	0.0046
NUU152D S7 LII L2	Basalt Debitage	7	21.86	0.1252
NUU152D S7 LII L2	Charcoal	0	0.14	0.0008
NUU152D S7 LII L3	Basalt Debitage	7	49.01	0.2807
NUU152D S7 LII L3	Charcoal		8.31	0.0476
NUU152D S7 LII L3	Manuport coral	1	0.4	0.0023
NUU152D S7 LII L3	Manuport Shell	1	0.05	0.0003
NUU152D S7 LII L4	Basalt Debitage	15	22.88	0.1311
NUU152D S7 LII L4	Burnt Kukui Nut	2	0.07	0.0004
NUU152D S7 LII L4	Charcoal		9.52	0.0545
NUU152D S7 LII L4	Manuport coral	3	10.73	0.0615
NUU152D S7 LII L4	Manuport Shell	8	0.73	0.0042
NUU152D S7 LII L5	Basalt Debitage	8	15.84	0.0907
NUU152D S7 LII L5	Charcoal		12.76	0.0731
NUU152D S7 LII L5	Manuport coral	2	10.65	0.0610
NUU152D S7 LII L5	Manuport Shell	2	0.32	0.0018
NUU152D S7 LII L6	Basalt Debitage	13	30.04	0.1721
NUU152D S7 LII L6	Burnt Kukui Nut	6	0.43	0.0025
NUU152D S7 LII L6	Charcoal		13.9	0.0796
NUU152D S7 LII L6	Manuport coral	1	0.45	0.0026
NUU152D S7 LII L6	Manuport Shell	10	3.1	0.0178
NUU152D S7 LII L6	Terrestrial Gastropod	2	0.03	0.0002
NUU152D S7 LII L7	Basalt Debitage	14	50.55	0.2896
NUU152D S7 LII L7	Burnt Kukui Nut	26	1.27	0.0073
NUU152D S7 LII L7	Charcoal		15.45	0.0885
NUU152D S7 LII L7	Manuport coral	5	41.41	0.2372
NUU152D S7 LII L7	Manuport Shell	25	2.71	0.0155
NUU152D S7 LII L7	Sea Urchin	2	0.07	0.0004
NUU152D S7 LII L8	Basalt Debitage	6	4.58	0.0262
NUU152D S7 LII L8	Burnt Kukui Nut	3	0.18	0.0010
NUU152D S7 LII L8	Charcoal	0	11.46	0.0656
NUU152D S7 LII L8	Manuport coral	1	0.31	0.0018
NUU152D S7 LII L8	Manuport Shell	32	3.76	0.0215
NUU152D S7 LII L8	Sea Urchin	15	0.42	0.0024
NUU152D S7 L5 F1	Basalt Debitage	7	10.22	0.7406
NUU152D S7 L5 F1	Charcoal		7.76	0.5623
NUU152D S7 L5 F1	Manuport coral	1	5.43	0.3935
NUU152D S7 L5 F1	Manuport Shell	2	0.04	0.0029
NUU152D S7 L6 F1	Basalt Debitage	9	31.97	2.3167
NUU152D S7 L6 F1	Charcoal		20.7	1.5000
NUU152D S7 L6 F1	Manuport coral	1	0.072	0.0052
NUU152D S7 L6 F1	Manuport Shell	14	1.63	0.1181
NUU152D S7 L6 F1	Sea Urchin	1	0.02	0.0014
NUU152D S7 L7 F1	Basalt Debitage	23	58.91	4.2688
NUU152D S7 L7 F1	Bone not worked	8	0.11	0.0080
NUU152D S7 L7 F1	Burnt Kukui Nut	11	0.59	0.0428
NUU152D S7 L7 F1	Charcoal		35.09	2.5428
NUU152D S7 L7 F1	Manuport coral	9	3.28	0.2377
NUU152D S7 L7 F1	Manuport Shell	44	6.17	0.4471
NUU152D S7 L7 F1	Sea Urchin	11	0.35	0.0254

NUU152D S7 L7 F1	Volcanic Glass Debitage	1	0.31	0.0225
NUU152D S7 L7 F1	water-rolled rock	1	7.42	0.5377
NUU152D S7 F1	Charcoal	0	0.33	0.0239
NUU152D T6 LI L1	Terrestrial Gastropod	9	0.011	0.0009
NUU152D T6 LII L2	Basalt Debitage	16	0.8435	0.0039
NUU152D T6 LII L2	Charcoal		0.3415	0.0016
NUU152D T6 LII L2	Manuport coral	6	0.599	0.0028
NUU152D T6 LII L2	Manuport Shell	15	3.86	0.0180
NUU152D T6 LII L2	Raw Kukui Nut	1	0.0285	0.0001
NUU152D T6 LII L2	Terrestrial Gastropod	5	0.0045	0.0000
NUU152D T6 LII L3	Basalt Debitage	10	36.09	0.1683
NUU152D T6 LII L3	Burnt Kukui Nut	2	0.19	0.0009
NUU152D T6 LII L3	Charcoal	0	6.46	0.0301
NUU152D T6 LII L3	Manuport coral	1	8.97	0.0418
NUU152D T6 LII L3	Manuport Shell	1	0.33	0.0015
NUU152D T6 LII L4	Basalt Debitage	14	5.27	0.0246
NUU152D T6 LII L4	Charcoal	0	23.09	0.1076
NUU152D T6 LII L4	Manuport coral	2	0.61	0.0028
NUU152D T6 LII L4	Manuport Shell	10	4.6	0.0214
NUU152D T6 LII L5	Basalt Debitage	16	24.08	0.1123
NUU152D T6 LII L5	Bone not worked	1	0.09	0.0004
NUU152D T6 LII L5	Charcoal	0	21.28	0.0992
NUU152D T6 LII L5	Manuport coral	7	9.28	0.0433
NUU152D T6 LII L5	Manuport Shell	14	2.01	0.0094
NUU152D T6 LII L5	Sea Urchin	2	0.14	0.0007
NUU152D T6 LII L5	water-rolled rock	1	7.28	0.0339
NUU152D T6 LII L6	Basalt Debitage	8	5.02	0.0234
NUU152D T6 LII L6	Bone not worked	1	0.03	0.0001
NUU152D T6 LII L6	Charcoal	0	25.99	0.1212
NUU152D T6 LII L6	Manuport coral	7	2.14	0.0100
NUU152D T6 LII L6	Manuport Shell	60	6.02	0.0281
NUU152D T6 LII L6	Sea Urchin	14	0.52	0.0024
NUU152D T6 LII L6	Volcanic Glass Debitage	3	0.68	0.0032
NUU152D T6 LIII L7	Basalt Debitage	2	0.42	0.0144
NUU152D T6 LIII L7	Charcoal		3.54	0.1210
NUU152D T6 LIII L7	Manuport coral	2	2.51	0.0858
NUU152D T6 LIII L7	Manuport Shell	4	0.43	0.0147
NUU152D T6 LIII L7	Sea Urchin	11	0.45	0.0154

Site	Artifact Class	Count of Item Count	Count of Weight (g)	Sum of g/L (Layer)
NUU152 U14 LI L1	Basalt Core	1	115.77	5.7885
NUU152 U14 LI L1	Basalt Debitage	2	2.04	0.1020
NUU152 U14 LI L1	Manuport coral	5	1.55	0.0775
NUU152 U14 LII L2	Basalt Debitage	15	20.86	0.2608
NUU152 U14 LII L2	Manuport coral	4	0.56	0.0070
NUU152 U14 LII L3	Basalt Debitage	25	64.53	0.8066
NUU152 U14 LII L3	Charcoal		0.66	0.0083
NUU152 U14 LII L3	Volcanic Glass Debitage	1	0.15	0.0019
NUU152 U14 LII L3	water-rolled rock	1	2.29	0.0286

NUU152 U14 LIII L4	Basalt Debitage	3	4.21	0.0370
NUU152 U14 LIII L4	Charcoal		0.35	0.0031
NUU152 U14 LIII L4	‘ili‘ili	1	1.6	0.0141
NUU152 U14 LIII L4	Manuport coral	2	0.95	0.0084
NUU152 U15 LI	Manuport Shell	1	0.16	0.0800
NUU152 U15 LII	Charcoal		0.04	0.0114
NUU152 U15 LII	Volcanic Glass Debitage	1	0.13	0.0371
NUU152 U15 LIII	Basalt Debitage	2	1.79	0.1174
NUU152E J14 LI L1	Basalt Debitage	2	2.2	0.1100
NUU152E J14 LI L1	Manuport Shell	1	0.18	0.0090
NUU152E J14 LI L1	water-rolled rock	1	4.66	0.2330
NUU152E J14 LII L2	Basalt Debitage	23	17.39	0.0675
NUU152E J14 LII L2	Bone not worked	1	0.22	0.0009
NUU152E J14 LII L2	Charcoal		0.16	0.0006
NUU152E J14 LII L2	Manuport coral	8	9.31	0.0362
NUU152E J14 LII L2	Manuport Shell	2	2.53	0.0098
NUU152E J14 LII L3	Basalt Debitage	15	45.24	0.1757
NUU152E J14 LII L3	Burnt Kukui Nut	3	0.14	0.0005
NUU152E J14 LII L3	Charcoal		1.3	0.0050
NUU152E J14 LII L3	Manuport coral	6	5.42	0.0210
NUU152E J14 LII L3	Manuport Shell	2	0.14	0.0005
NUU152E J14 LII L3	Volcanic Glass Debitage	18	2.3	0.0089
NUU152E J14 LII L4	Basalt Debitage	14	33.99	0.1320
NUU152E J14 LII L4	Burnt Kukui Nut	3	0.04	0.0002
NUU152E J14 LII L4	Charcoal		1.46	0.0057
NUU152E J14 LII L4	‘ili‘ili	2	16.18	0.0628
NUU152E J14 LII L4	Manuport coral	4	0.76	0.0030
NUU152E J14 LII L4	Manuport Shell	7	0.3	0.0012
NUU152E J14 LII L4	Volcanic Glass Debitage	16	1.39	0.0054
NUU152E J14 LIII L5	Basalt Debitage	4	2.91	0.0277

NUU152E J14 LIII L5	Charcoal		0.24	0.0023
NUU152E J14 LIII L5	Manuport Shell	1	0.02	0.0002
NUU152E J14 LIII L5	Volcanic Glass Debitage	4	0.68	0.0065

Site	Artifact Class	Item Count	Count of Weight (g)	Sum of g/L (Layer)
NUU152A J5 LI SURFACE	Manuport coral	1	6.18	6.18
NUU152A J6 LII L2	Basalt Debitage	9	15.55	0.1257
NUU152A J6 LII L2	Manuport coral	4	4.31	0.0348
NUU152A J6 LII L2	Manuport Shell	6	1.52	0.0123
NUU152A J6 LII L2	Terrestrial Gastropod	1	0.02	0.0002
NUU152A J6 LII L2	Volcanic Glass Debitage	1	0.43	0.0035
NUU152A J6 LII L3	Basalt Debitage	26	38.05	0.3075
NUU152A J6 LII L3	Charcoal		1.18	0.0095
NUU152A J6 LII L3	Manuport coral	2	1.6	0.0129
NUU152A J6 LII L3	Manuport Shell	1	0.11	0.0009
NUU152A J6 LII L3	Volcanic Glass Debitage	3	0.46	0.0037
NUU152A J6 LII L4	Basalt Debitage	20	18.75	0.1515
NUU152A J6 LII L4	Charcoal		0.5	0.0040
NUU152A J6 LII L4	Manuport coral	1	1.25	0.0101
NUU152A J6 LII L4	Manuport Shell	1	0.19	0.0015
NUU152A J6 LIII L5	Basalt Debitage	4	4.9	0.1782
NUU152A J6 LIII L5	Charcoal	1	0.21	0.0076
NUU152A J6 LIII L5	Manuport coral	1	0.06	0.0022
NUU152A J6 LIII L5	Volcanic Glass Debitage	1	0.1	0.0036
NUU152A J7 LI L1	Basalt Debitage	19	80.31	0.0049
NUU152A J7 LI L1	Charcoal		0.33	0.0915
NUU152A J7 LI L1	Manuport Shell	1	1.04	0.0008
NUU152A J7 LII L2	Basalt Debitage	40	200.74	0.0742
NUU152A J7 LII L2	Charcoal		1.15	0.0033
NUU152A J7 LII L2	Coral File	1	1.26	0.0085
NUU152A J7 LII L2	Manuport coral	2	0.47	0.0031
NUU152A J7 LII L2	Raw Kukui Nut	3	2.86	1.2869
NUU152A J7 LII L2	Volcanic Glass Debitage	1	0.05	0.0113
NUU152A J7 LII L3 F1	Charcoal		5.86	29.3000
NUU152A J7 LII L3	Basalt Debitage	40	170.99	0.2495
NUU152A J7 LII L3	Burnt Kukui Nut	2	0.74	0.9439
NUU152A J7 LII L3	Charcoal		4.41	0.0245
NUU152A J7 LII L3	Manuport coral	2	11.8	0.0800
NUU152A J7 LII L3	Manuport Shell	4	0.13	0.0009
NUU152A J7 LII L3	Volcanic Glass Debitage	7	0.76	0.2761
NUU152A J7 LII L4	Basalt Debitage	54	44.17	0.0439
NUU152A J7 LII L4	Charcoal		5.66	0.0115
NUU152A J7 LII L4	‘ili‘ili	1	2.55	0.0007
NUU152A J7 LII L4	Manuport coral	1	1.56	0.0106

NUU152A J7 LII L4	Manuport Shell	1	0.11	0.0110
NUU152A J7 LII L4	Volcanic Glass Debitage	6	0.94	0.2929
NUU152A J7 LIII L5	Basalt Debitage	17	43.2	0.0025
NUU152A J7 LIII L5	Charcoal	7	1.72	6.9259
NUU152A J7 LIII L5	Volcanic Glass Debitage	2	0.13	0.0041
NUU152A J8 LI SURFACE	Preform Adze	1	91.18	91.18

Site	Artifact Class	Item Count	Item Weight (g)	g/L (Layer)
NUU152B AE9 LI L1	Basalt Debitage	25	19.21	0.6682
NUU152B AE9 LI L1	‘ili‘ili	2	82.53	2.8706
NUU152B AE9 LI L1	Manuport coral	2	0.73	0.0254
NUU152B AE9 LII L2	Basalt Debitage	28	53.9	0.2145
NUU152B AE9 LII L2	Charcoal		0.24	0.0010
NUU152B AE9 LII L2	Manuport Shell	1	0.23	0.0009
NUU152B AE9 LII L2	Volcanic Glass Debitage	4	0.49	0.0020
NUU152B AE9 LII L2	water-rolled rock	3	43.4	0.1727
NUU152B AE9 LII L3	Basalt Debitage	28	60.93	0.2425
NUU152B AE9 LII L3	Charcoal		9.77	0.0389
NUU152B AE9 LII L3	‘ili‘ili	1	37.26	0.1483
NUU152B AE9 LII L3	Manuport coral	4	0.98	0.0039
NUU152B AE9 LII L3	Manuport Shell	11	3.3	0.0131
NUU152B AE9 LII L3	Volcanic Glass Debitage	1	0.07	0.0003
NUU152B AE9 LII L4	Adze Flake	3	0.83	0.0033
NUU152B AE9 LII L4	Basalt Core	1	43.04	0.1713
NUU152B AE9 LII L4	Basalt Debitage	70	144.76	0.5762
NUU152B AE9 LII L4	Burnt Kukui Nut	5	0.26	0.0010
NUU152B AE9 LII L4	Charcoal		9.77	0.0389
NUU152B AE9 LII L4	Manuport coral	5	4.77	0.0190
NUU152B AE9 LII L4	Manuport Shell	14	7.26	0.0289
NUU152B AE9 LII L4	Volcanic Glass Debitage	1	0.6	0.0024
NUU152B AE9 LII L4	water-rolled rock	1	27.31	0.1087
NUU152B AE9 LII L5	Basalt Debitage	6	4.43	0.0176
NUU152B AE9 LII L5	Burnt Kukui Nut	5	0.3	0.0012
NUU152B AE9 LII L5	Charcoal		8.81	0.0351
NUU152B AE9 LII L5	Manuport coral	4	0.57	0.0023
NUU152B AE9 LII L5	Manuport Shell	26	2.55	0.0101
NUU152B AE9 LII L5	Sea Urchin	42	1.6	0.0064
NUU152B AE9 LII L6	Basalt Debitage	6	17.23	0.0686
NUU152B AE9 LII L6	Charcoal		13.06	0.0520
NUU152B AE9 LII L6	Manuport coral	5	8.95	0.0356
NUU152B AE9 LII L6	Manuport Shell	23	7.35	0.0381
NUU152B AE9 LII L6	Sea Urchin	133	4.24	0.0180
NUU152B AE9 LII L6	Volcanic Glass Debitage	1	0.11	0.0004
NUU152B AE9 LIII L7	Basalt Debitage	2	2.65	0.0016
NUU152B AE9 LIII L7	Burnt Kukui Nut	4	0.15	0.0225
NUU152B AE9 LIII L7	Charcoal		1.84	0.0031
NUU152B AE9 LIII L7	Manuport coral	2	0.29	0.0011
NUU152B AE9 LIII L7	Manuport Shell	12	1.35	0.0295
NUU152B AE9 LIII L7	Sea Urchin	65	2.34	0.0056
NUU152B AE9 LIII L8	Basalt Debitage			0.0022

NUU152B AE9 LIII L8	Sea Urchin	4	0.12	0.0048
NUU152B AE10 LI	Manuport Shell	1	0.46	0.2971
NUU152B AE10 LII	Basalt Debitage	1	37.42	0.6682
NUU152B AE10 LII	Charcoal		0.21	2.8706
NUU152B AE10 LII	Manuport coral	2	0.78	0.0254
NUU152B AE10 LIII	Charcoal		0.49	0.2145

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Unit	Artifact	Item Count	Weight (g)	g/L (Layer)
F10 LI L1	Basalt Debitage	3	5.01	0.13235061
F10 LI L1	general terrestrial gastropod	1	0.18	0.00475511
F10 LII L2	Basalt Debitage	22	34.09	0.45028266
F10 LII L2	Volcanic Glass Debitage	2	1.11	0.01466159
F10 LII L3	Basalt Debitage	23	20.69	0.27328684
F10 LII L3	Charcoal	4	0.08	0.00105669
F10 LII L3	‘ili‘ili	1	5.7	0.07528927
F10 LII L3	Manuport Coral	1	4.74	0.06260897
F10 LII L3	Undetermined mollusc	6	4.18	0.05521213
F10 LII L3	Volcanic Glass Debitage	7	1.32	0.01743541
F10 LII L3	Water-rolled rock	1		0
F10 LIII L4	Basalt Debitage	38	87.29	0.79354545
F10 LIII L4	Charcoal		0.45	0.00409091
F10 LIII L4	Manuport Coral	8	2.99	0.02718182
F10 LIII L4	Undetermined mollusc	4	2.85	0.02590909
F10 LIII L4	Volcanic Glass Debitage	26	5.57	0.05063636
F10 LIII L5	Basalt Debitage	90	143.11	1.301
F10 LIII L5	Charcoal	4	2.79	0.02536364
F10 LIII L5	‘ili‘ili	1	11.93	0.10845455
F10 LIII L5	Manuport Coral	4	22.95	0.20863636
F10 LIII L5	Undetermined mollusc	6	2.28	0.02072727
F10 LIII L5	Volcanic Glass Debitage	32	2.94	0.02672727
F10 LIV L6	Basalt Debitage	6	66.46	1.79621622
F10 LIV L6	Charcoal		3.53	0.09540541
F10 LIV L6	Manuport Coral	4	0.4	0.01081081

Unit	Artifact	Item Count	Weight (g)	g/L (Layer)
G10 LI L1	Basalt Debitage	13	9.24	0.32545525
G10 LII L2	Basalt Debitage	52	76.19	0.37717822

G10 LII L2	Charcoal	4	0.01	4.9505E-05
G10 LII L2	Manuport Coral	2	2.43	0.0120297
G10 LII L2	Undetermined mollusc	1	0.15	0.00074257
G10 LII L2	Volcanic Glass Debitage	7	0.71	0.00351485
G10 LII L3	Basalt Debitage	44	130.55	0.64628713
G10 LII L3	Charcoal	0	0.25	0.00123762
G10 LII L3	‘ili‘ili	5	89.79	0.44450495
G10 LII L3	Manuport Coral	6	2.21	0.01094059
G10 LII L3	Undetermined mollusc	8	7.81	0.03866337
G10 LII L3	Volcanic Glass Debitage	35	5.21	0.02579208
G10 LII L4	Basalt Debitage	50	119.77	0.59292079
G10 LII L4	Charcoal	0	2.65	0.01311881
G10 LII L4	Manuport Coral	7	17.15	0.08490099
G10 LII L4	Undetermined mollusc	6	4.98	0.02465347
G10 LII L4	Volcanic Glass Debitage	41	8.03	0.03975248
G10 LII L5	Basalt Debitage	41	79.65	0.39430693
G10 LII L5	Charcoal	0	5.17	0.02559406
G10 LII L5	Undetermined mollusc	2	0.07	0.00034653
G10 LII L5	Volcanic Glass Debitage	27	3.31	0.01638614
G10 LIII L6	Basalt Debitage	5	6.04	0.05252174
G10 LIII L6	Charcoal	0	12.98	0.11286957
G10 LIII L6	Volcanic Glass Debitage	6	1.38	0.012
G10 LIII L7	Basalt Debitage	13	63.89	0.55556522
G10 LIII L7	Charcoal	0	17.22	0.14973913
G10 LIII L7	Undetermined mollusc	2	2.1	0.01826087
G10 LIII L7	Volcanic Glass Debitage	1	0.59	0.00513043
G10 LIV L8	Basalt Debitage	7	9.75	0.12037037
G10 LIV L8	Charcoal		9.49	0.11716049
G10 LIV L8	Undetermined mollusc	3	0.21	0.00259259
G10 LIV L8	Volcanic Glass Debitage	4	0.25	0.00308642
G10 LIV L9	Charcoal		1.33	0.01641975
Unit	Artifact	Item Count	Weight (g)	g/L (Layer)
H12 LI L1	Basalt Debitage	7	5.05	0.28055556
H12 LII L2	Basalt Debitage	12	10.41	0.09378378
H12 LII L2	general terrestrial gastropod	29	0.88	0.00792793
H12 LII L3	Basalt Debitage	46	61.44	0.55351351
H12 LII L3	Charcoal	0	0.22	0.00198198

H12 LII L3	Undetermined mollusc	3	0.81	0.0072973
H12 LII L3	Volcanic Glass Debitage	5	1.3	0.01171171
H12 LII L4	Basalt Debitage	92	61.91	0.55774775
H12 LII L4	Burnt Kukui Nut	2	0.04	0.00036036
H12 LII L4	Charcoal	0	0.7	0.00630631
H12 LII L4	general terrestrial gastropod	1	0.01	9.009E-05
H12 LII L4	Volcanic Glass Debitage	13	1.65	0.01486486
H12 LIII L5	Basalt Debitage	60	19.67	0.33913793
H12 LIII L5	Charcoal	0	0.72	0.01241379
H12 LIII L5	Volcanic Glass Debitage	4	0.63	0.01086207

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Unit/Layer/Level	Artifact Class	Count	Weight (g)	g/L (Layer)
O5 LI L1	Basalt Debitage	14	60.96	0.4892
O5 LI L1	Charcoal	0	0.3	0.0024
O5 LI L1	Manuport Coral	1	0.02	0.0002
O5 LI L1	Manuport Shell	1	0.34	0.0027
O5 LI L1	Raw Kukui Nut Shell	1	0.62	0.0050
O5 LI L1	Sea Urchin	3	0.13	0.0010
O5 LI L1	Water-rolled basalt	1	109.39	0.8779
O5 LI L2	Basalt Debitage	4	64.47	0.5174
O5 LI L2	Sea Urchin	1	0.02	0.0002
O5 LI L3	Basalt Debitage	5	38.02	0.3051
O5 LI L3	Bone not worked	2	0.05	0.0004
O5 LI L4	Basalt Debitage	14	163.9	1.3154
O5 LI L4	Charcoal		1.8	0.0144
O5 LI L4	Manuport Coral	9	14.46	0.1161

O5 LI L4	Water-rolled basalt	1	90.14	0.7234
O5 LI L5	Basalt Debitage	13	111.79	0.8972
O5 LI L5	Charcoal	0	4.2	0.0337
O5 LI L5	Manuport Coral	4	0.82	0.0066
O5 LI L5	Manuport Shell	3	5.83	0.0468
O5 LI L5	Sea Urchin	2	0.05	0.0004
O5 LII L6	Basalt Debitage	53	212.16	2.9263
O5 LII L6	Charcoal	0	11.33	0.1563
O5 LII L6	Manuport Shell	9	0.04	0.0006
O5 LII L6	undertermined	1	0.12	0.0017
O5 LII L6	Water-rolled basalt	2	186.11	2.5670
O5 LII L7	Basalt Debitage	70	651.44	8.9854
O5 LII L7	Charcoal	0	14.14	0.1950
O5 LII L7	Manuport Shell	2	0.29	0.0040
O5 LII L7	Water-rolled basalt	5	225.06	3.1043
O5 LII L8	Basalt Debitage	73	413.28	5.7004
O5 LII L8	Charcoal	0	26.26	0.3622
O5 LII L8	Manuport Coral	2	4.17	0.0575
O5 LII L8	Manuport Shell	1	0.93	0.0128
O5 LII L8	Water-rolled basalt	2	70.1	0.9669
O5 LIII L9	Basalt Debitage	35	263.06	2.9229
O5 LIII L9	Charcoal	0	28.34	0.3149
O5 LIII L9	Manuport Coral	1	4.03	0.0448
O5 LIII L9	Manuport Shell	2	2.29	0.0254
O5 LIII L9	Water-rolled basalt	5	240.98	2.6776
O5 LIII L10	Basalt Debitage	35	35.62	0.3958
O5 LIII L10	Charcoal	0	13.75	0.1528
O5 LIII L10	‘ili‘ili	1	48.45	0.5383
O5 LIII L10	Manuport Shell	2	0.09	0.0010
O5 LIII L11	Basalt Debitage	30	706.34	7.8482
O5 LIII L11	Bone not worked	4	0.56	0.0062
O5 LIII L11	Charcoal	0	48.88	0.5431
O5 LIII L11	‘ili‘ili	4	163.99	1.8221
O5 LIII L11	Manuport Coral	2	1.51	0.0168
O5 LIII L11	Manuport Shell	4	7.91	0.0879
O5 LIII L11	Sea Urchin	1	0.02	0.0002
O5 LIII L12	Basalt Debitage	36	84.56	0.9396
O5 LIII L12	Charcoal		34.22	0.3802
O5 LIII L12	Manuport Coral	2	63.56	0.7062

O5 LIII L12	Water-rolled basalt	1	165.86	1.8429
O5 LIV L13	Basalt Debitage	8	37.98	2.0474
O5 LIV L13	Charcoal	0	56.58	3.0501
O5 LIV L13	Manuport Coral	1	6.23	0.3358
O5 LIV L13	Manuport Shell	15	0.07	0.0038
O5 LIV L13	Sea Urchin	1	0.04	0.0022
O5 LIV L13	Volcanic Glass Debitage	1	0.09	0.0049
O5 LIV L13	Water-rolled basalt	3	235.72	12.7073
O5 LV L14	Basalt Debitage	46	102.5	4.0386
O5 LV L14	Charcoal	0	64.21	2.5299
O5 LV L14	Manuport Coral	1	2.81	0.1107
O5 LV L14	Manuport Shell	2	6.96	0.2742
O5 LV L14	Water-rolled basalt	3	104.18	4.1048
O5 LV L15	Basalt Debitage	39	95.73	3.7719
O5 LV L15	Charcoal	0	80.24	3.1615
O5 LV L15	Manuport Coral	6	0.01	0.0004
O5 LV L15	Manuport Shell	17	6.1	0.2403
O5 LV L15	Sea Urchin	6	0.17	0.0067
O5 LV L15	Water-rolled basalt	2	127.08	5.0071
O5 LVI L16	Bone not worked	6	0.37	0.0054
O5 LVI L16	Carbonized Kukui Nut Shell	1	0.19	0.0028
O5 LVI L16	Charcoal	0	112.69	1.6427
O5 LVI L16	‘ili‘ili	4	117.45	1.7121
O5 LVI L16	Manuport Coral	5	0.27	0.0039
O5 LVI L16	Manuport Shell	8	0.25	0.0036
O5 LVI L16	Sea Urchin	19	0.62	0.0090
O5 LVI L16	Water-rolled basalt	3	99.86	1.4557
O5 LVI L17	Basalt Debitage	21	92.87	1.3538
O5 LVI L17	Charcoal	0	100.26	1.4615
O5 LVI L17	‘ili‘ili	2	54.99	0.8016
O5 LVI L17	Manuport Shell	23	4.17	0.0608
O5 LVI L17	Sea Urchin	28	0.58	0.0085
O5 LVII L18	Basalt Debitage	13	5.45	0.1443
O5 LVII L18	Bone not worked	8	0.2	0.0053
O5 LVII L18	Charcoal	0	87	2.3040
O5 LVII L18	‘ili‘ili	1	16.33	0.4325
O5 LVII L18	Manuport Coral	1	0.02	0.0005

O5 LVII L18	Manuport Shell	51	5.95	0.1576
O5 LVII L18	Water-rolled basalt	1	108.44	2.8718
O5 LVIII L19	Basalt Debitage	9	5.8	0.1012
O5 LVIII L19	Bone not worked	2	0.04	0.0007
O5 LVIII L19	Charcoal	0	28.91	0.5043
O5 LVIII L19	Manuport Coral	3	9.67	0.1687
O5 LVIII L19	Manuport Shell	12	0.19	0.0033
O5 LVIII L19	Sea Urchin	9	0.33	0.0058
O5 LVIII L19	Water-rolled basalt	2	23.42	0.4085
P5 LI L1	Basalt Debitage	6	58.79	4.0545
P5 LI L1	Charcoal	0	0.2	0.0138
P5 LII L2	Basalt Debitage	6	10.59	0.1478
P5 LII L2	Charcoal	1	0.01	0.0001
P5 LII L3	Charcoal	0	0.14	0.0020
P5 LII L4	Basalt Debitage	11	14.51	0.2026
P5 LII L4	Charcoal	0	1.91	0.0267
P5 LII L5	Basalt Debitage	16	48.35	0.6750
P5 LII L5	Charcoal	0	8.48	0.1184
P5 LII L5	‘ili‘ili	2	150.25	2.0976
P5 LII L5	Manuport Coral	2	0.88	0.0123
P5 LII L5	Manuport Shell	3	0.1	0.0014
P5 LII L5	Volcanic Glass Debitage	1	0.11	0.0015
P5 LII L6	Basalt Debitage	30	251.9	3.5168
P5 LII L6	Charcoal	0	12.94	0.1807
P5 LII L7	Basalt Debitage	8	16.28	0.2273
P5 LII L7	Charcoal	0	9.63	0.1344
P5 LII L7	Manuport Coral	2	0.45	0.0063
P5 LII L7	Water-rolled basalt	2	157.09	2.1931
P5 LII L8	Basalt Debitage	27	151.97	2.1217
P5 LII L8	Charcoal	0	13.2	0.1843
P5 LII L9	Basalt Debitage	40	54.69	0.7635
P5 LII L9	Charcoal	0	17.05	0.2380
P5 LII L9	Manuport Shell	2	0.39	0.0054
P5 LII L9	Water-rolled basalt	2	5.66	0.0790
P5 LIII L10	Basalt Debitage	5	22.37	1.4864
P5 LIII L10	Charcoal	0	14.18	0.9422
P5 LIII L10	‘ili‘ili	1	204.02	13.5561
P5 LIV L11	Basalt Debitage	20	63.29	0.4039

P5 LIV L11	Charcoal	7	6.7	0.0428
P5 LIV L12	Basalt Debitage	52	74.78	0.4772
P5 LIV L12	Bone not worked	1	0.04	0.0003
P5 LIV L12	Charcoal	0	13.39	0.0854
P5 LIV L12	Manuport Stone	2	0.08	0.0005
P5 LIV L13	Basalt Debitage	37	16.76	0.1069
P5 LIV L13	Charcoal	0	14.76	0.0942
P5 LIV L13	Hammer Stone	1	18.05	0.1152
P5 LIV L13	Manuport Shell	1	0.07	0.0004
P5 LIV L13	Sea Urchin	1	0.04	0.0003
P5 LIV L14	Basalt Debitage	16	95.5	0.6094
P5 LIV L14	Charcoal		33.1	0.2112
P5 LIV L14	‘ili‘ili	2	107.41	0.6854
P5 LIV L14	Manuport Shell	1	0.03	0.0002
P5 LIV L15	Basalt Debitage	100	126.25	0.8056
P5 LIV L15	Carbonized Kukui Nut Shell	3	0.49	0.0031
P5 LIV L15	Charcoal	0	29.91	0.1909
P5 LIV L15	‘ili‘ili	2	235.51	1.5028
P5 LIV L15	Manuport Shell	2	0.29	0.0019
P5 LIV L16	Basalt Debitage	33	31.39	0.2003
P5 LIV L16	Charcoal	0	26.92	0.1718
P5 LIV L16	Manuport Shell	10	1	0.0064
P5 LIV L16	Sea Urchin	6	0.09	0.0006
P5 LIV L17	Basalt Debitage	50	52.9	0.3376
P5 LIV L17	Bone not worked	8	0.18	0.0011
P5 LIV L17	Charcoal	0	30.58	0.1951
P5 LIV L17	Manuport Shell	6	0.41	0.0026
P5 LIV L17	Sea Urchin	10	0.23	0.0015
P5 LV L18	Basalt Debitage	18	28.47	0.9684
P5 LV L18	Bone not worked	2	0.08	0.0027
P5 LV L18	Charcoal	0	12.59	0.4282
P5 LV L18	Manuport Shell	2	0.31	0.0105
P5 LV L18	Sea Urchin	11	0.43	0.0146
P5 LV L19	Basalt Debitage	5	1.83	0.0622
P5 LV L19	Charcoal	0	3.63	0.1235
P6 LI L1	Basalt Debitage	24	185.62	4.9106
P6 LI L1	Charcoal	0	2.15	0.0569
P6 LI L1	‘ili‘ili	3	157.66	4.1709

P6 LI L1	Manuport Shell	1	0.27	0.0071
P6 LI L2	Basalt Debitage	19	183.43	4.8526
P6 LI L2	Charcoal	0	2.5	0.0661
P6 LI L2	Manuport Shell	1	0.19	0.0050
P6 LII L3	Basalt Debitage	27	108.92	5.1867
P6 LII L3	Charcoal	0	18.35	0.8738
P6 LII L3	‘ili‘ili	1	9.13	0.4348
P6 LII L3	Manuport Shell	1	0.01	0.0005
P6 LIII L4	Basalt Debitage	121	428.63	5.3246
P6 LIII L4	Bone not worked	2	0.1	0.0012
P6 LIII L4	Charcoal	0	28.28	0.3513
P6 LIII L4	‘ili‘ili	2	107.42	1.3344
P6 LIII L4	Manuport Coral	1	0.63	0.0078
P6 LIII L4	Manuport Shell	2	0.49	0.0061
P6 LIII L5	Basalt Debitage	46	355.81	4.4200
P6 LIII L5	Charcoal	0	79.97	0.9934
P6 LIII L5	‘ili‘ili	2	164.55	2.0441
P6 LIII L5	Manuport Coral	6	0.95	0.0118
P6 LIII L5	Manuport Shell	13	0.35	0.0043
P6 LIV L6	Basalt Debitage	87	166.46	2.8779
P6 LIV L6	Carbonized Kukui Nut Shell	1	0.07	0.0012
P6 LIV L6	Charcoal	0	26.69	0.4614
P6 LIV L6	‘ili‘ili	1	38.19	0.6603
P6 LIV L7	Basalt Debitage	55	225.69	3.9020
P6 LIV L7	Bone not worked	1	0.01	0.0002
P6 LIV L7	Charcoal	0	56.03	0.9687
P6 LIV L7	‘ili‘ili	2	24.49	0.4234
P6 LIV L7	Manuport Coral	3	1.45	0.0251
P6 LIV L7	Manuport Shell	11	0.91	0.0157
P6 LIV L8	Basalt Debitage	26	20.01	0.3460
P6 LIV L8	Charcoal	0	37.18	0.6428
P6 LIV L8	Manuport Coral	1	0.08	0.0014
P6 LIV L8	Manuport Shell	6	0.31	0.0054
P6 LIV L9	Basalt Debitage	8	54.57	0.9435
P6 LIV L9	Charcoal	0	36.62	0.6331
P6 LIV L9	Manuport Coral	2	1.59	0.0275
P6 LIV L9	Manuport Shell	12	1.01	0.0175
P6 LIV L10	Basalt Debitage	25	19.98	0.3454

P6 LIV L10	Bone not worked	1	0.06	0.0010
P6 LIV L10	Charcoal	0	15.06	0.2604
P6 LIV L10	Manuport Shell	3	0.12	0.0021
P6 LIV L10	Sea Urchin	5	0.19	0.0033
P6 LIV L11	Basalt Debitage	10	44.29	0.7657
P6 LIV L11	Bone not worked	1	0.03	0.0005
P6 LIV L11	Charcoal	0	14.27	0.2467
P6 LIV L11	Manuport Shell	9	1.09	0.0188
P6 LIV L12	Basalt Debitage	18	69.72	1.2054
P6 LIV L12	Charcoal	0	8.32	0.1438
P6 LIV L12	Manuport Shell	6	0.25	0.0043
P6 LIV L12	Sea Urchin	7	0.23	0.0040

Unit/Layer/Level/Feature	Artifact Class	Count	Weight (g)	g/L (Layer)
P5 LII L7 F1	Basalt Debitage	28	73.55	1.0287
P5 LII L7 F1	Charcoal	0	9.88	0.1382
P5 LII L7 F1	‘ili‘ili	2	253.86	3.5505
P5 LII L8 F1	Basalt Debitage	2	7.68	0.1072
P5 LII L8 F1	Charcoal	0	8.55	0.1194
P5 LII L9 F1	Basalt Debitage	11	26.29	0.3677
P5 LII L9 F1	Charcoal		6.41	0.0897
P5 LIII L10 F1	Basalt Debitage	2	0.44	0.0062
P5 LIII L10 F1	Charcoal	0	3.34	0.0467
P5 LIV L11 F1	Basalt Debitage	14	21.84	0.3055
P5 LIV L11 F1	Charcoal	0	1.03	0.0144
P5 LIV L12 F1	Basalt Debitage	37	128.27	1.7940
P5 LIV L12 F1	Charcoal	0	20.45	0.2860
P5 LIV L12 F1	Hammer Stone	1	156.34	2.1866
P5 LIV L12 F1	‘ili‘ili	2	258.07	3.6094
P5/O5 LIV L11 F1	Basalt Debitage	47	66.03	0.9235
P5/O5 LIV L11 F1	Bone not worked	1	0.05	0.0007
P5/O5 LIV L11 F1	Charcoal	0	126.84	1.7740
P5/O5 LIV L13 F1	Basalt Debitage	12	31.25	0.4371
P5/O5 LIV L13 F1	Charcoal		20.9	0.2923
P5/O5 LIV L13 F1	‘ili‘ili	2	193.27	2.7031
P5/O5 LIV L13 F1	Manuport Coral	1	0.27	0.0038
P5/O5 LIV L13 F1	Manuport Shell	4	0.2	0.0028
P5 LV F1	Charcoal	3	0.31	0.0043

Unit/Layer/Level	Artifact Class	Count	Weight (g)	g/L (Layer)
E10 LI L1	Basalt Core	2	1950.93	15.1235
E10 LI L1	Basalt Debitage	2	1323.28	10.2580
E10 LI L1	Charcoal	11	1.11	0.0086
E10 LI L1	Manuport Coral	6	11.35	0.0880
E10 LI L1	Raw Kukui Nut Shell	2	0.43	0.0033
E10 LI L1	Water-rolled basalt	8	191.68	1.4859
E10 LII L2	Basalt Debitage	529	688.58	8.3973
E10 LII L2	Charcoal	0	21.62	0.2637
E10 LII L2	‘ili‘ili	1	436.9	5.3280
E10 LII L2	Manuport Coral	6	0.38	0.0046
E10 LII L2	Manuport Shell	10	3.15	0.0384
E10 LII L3	Basalt Core	1	218.42	2.6637
E10 LII L3	Basalt Debitage	238	634.84	7.7420
E10 LII L3	Carbonized Kukui Nut Shell	8	0.19	0.0023
E10 LII L3	Charcoal	0	32.3	0.3939
E10 LII L3	Manuport Coral	4	5.6	0.0683
E10 LII L3	Manuport Shell	49	5.21	0.0635
E10 LII L3	Sea Urchin	3	0.1	0.0012
E10 LII L3	Water-rolled basalt	1	0.86	0.0105
E10 LII L4	Basalt Core	2	252.54	3.0798
E10 LII L4	Basalt Debitage	116	235.3	2.8695
E10 LII L4	Charcoal	0	24.54	0.2993
E10 LII L4	‘ili‘ili	2	1.28	0.0156
E10 LII L4	Manuport Shell	37	1.56	0.0190
E10 LII L4	Sea Urchin	15	0.46	0.0056
E10 LII L5	Basalt Debitage	22	44.76	0.5459
E10 LII L5	Carbonized Kukui Nut Shell	2	0.05	0.0006
E10 LII L5	Charcoal	0	8.24	0.1005
E10 LII L5	Manuport Shell	12	0.86	0.0105
E10 LII L5	Sea Urchin	19	1.19	0.0145
E10 LII L5	Terrestrial Gastropod	1	0.03	0.0004
E10 LIII L6	Basalt Debitage	13	13.14	0.6844
E10 LIII L6	Charcoal	0	9.52	0.4958
E10 LIII L6	Manuport Shell	19	1.03	0.0536
E10 LIII L6	Sea Urchin	18	0.78	0.0406
K17 LI L1	Basalt Debitage	27	75.96	4.7475

K17 LII L2	Basalt Debitage	121	85.54	2.2276
K17 LII L2	Charcoal	0	0.09	0.0023

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Site	Artifact Class	Item Count	Weight (g)	g/L
142 O4 LI L1	Basalt Debitage	24	138.51	7.3180
142 O4 LI L1	Charcoal	3	0.17	0.0090
142 O4 LII L2 1/16" SCREEN	Charcoal	0	0.88	0.0372
142 O4 LII L2	Basalt Debitage	11	11.8	0.4988
142 O4 LII L2	Charcoal	0	0.7	0.0296
142 O4 LII L2	Manuport Shell	3	5.22	0.2206
142 O4 LIII L3 1/16" SCREEN	Charcoal	0	3.05	0.0280
142 O4 LIII L3 1/16" SCREEN	Manuport Shell	1	0.11	0.0010
142 O4 LIII L3 1/16"SCREEN	Basalt Debitage	12	4.41	0.0405
142 O4 LIII L3 1/16"SCREEN	Carbonized Kukui Nut Shell	1	0.09	0.0008
142 O4 LIII L3 1/8"SCREEN	Manuport Coral	1	1.3	0.0119
142 O4 LIII L3 1/8" SCREEN	Manuport Shell	2	0.18	0.0017
142 O4 LIII L3 1/8" SCREEN	Volcanic Glass Debitage	6	0.47	0.0043
142 O4 LIII L3 General Wall Clean	Basalt Debitage	2	2.9	0.0266
142 O4 LIII L3 General Wall Clean	Charcoal	0	0.27	0.0025
142 O4 LIII L3	Basalt Debitage	101	200.01	1.8378
142 O4 LIII L3	Carbonized Kukui Nut Shell	1	0.03	0.0003
142 O4 LIII L3	Charcoal	0	33.11	0.3042
142 O4 LIII L4	Basalt Debitage	60	152.99	1.4058
142 O4 LIII L4	Carbonized Kukui Nut Shell	11	0.34	0.0031
142 O4 LIII L4	Charcoal	1	65.13	0.5984
142 O4 LIII L4	Manuport Coral	1	0.04	0.0004
142 O4 LIII L4	Manuport Shell	2	0.02	0.0002
142 O4 LIII L4	Raw Kukui Nut Shell	10	1.06	0.0097
142 O4 LIII L4	Volcanic Glass Debitage	1	0.11	0.0010
142 O4 LIV L5	Basalt Debitage	50	100.3	0.8832
142 O4 LIV L5	Carbonized Kukui Nut Shell	3	0.26	0.0023
142 O4 LIV L5	Charcoal	3	213.23	1.8776
142 O4 LIV L5	‘ili‘ili	2	85.68	0.7545
142 O4 LIV L5	Manuport Shell	1	0.11	0.0010
142 O4 LIV L6	Basalt Debitage	26	52.2	0.4597
142 O4 LIV L6	Carbonized Kukui Nut Shell	4	0.24	0.0021
142 O4 LIV L6	Carbonized seed	1	0.01	0.0001

142 O4 LIV L6	Charcoal	2	66.13	0.5823
142 O4 LIV L6	Manuport Shell	1	0.06	0.0005
142 O4 LIV L6	Volcanic Glass Debitage	4	0.33	0.0029
142 O4 LIV L7	Basalt Debitage	10	17.23	0.1517
142 O4 LIV L7	Carbonized Kukui Nut Shell	2	0.12	0.0011
142 O4 LIV L7	Charcoal	0	36.19	0.3187
142 O4 LIV L5/6 F1	Basalt Debitage	12	50.88	3.5843
143 O4 LIV L5/6 F1	Charcoal	3	61.82	4.3549
144 O4 LIV L5/6 F1	Manuport Shell	5	6.72	0.4734
142 O5 LI L1	Basalt Debitage	5	15.34	0.8105
142 O5 LI L1	Volcanic Glass Debitage	2	0.29	0.0153
142 O5 LII L2	Basalt Debitage	2	0.75	0.0793
142 O5 LII L2	Charcoal	18	0.41	0.0433
142 O5 LIII L3	Basalt Debitage	15	53.67	0.6076
142 O5 LIII L3	Charcoal	0	5.07	0.0574
142 O5 LIII L4 North 1/3 of Unit	Basalt Debitage	27	37.93	0.4294
142 O5 LIII L4 North 1/3 of Unit	Charcoal	0	8.36	0.0946
142 O5 LIII L4 South 2/3 of Unit	Basalt Debitage	38	76.91	0.8707
142 O5 LIII L4 South 2/3 of Unit	Charcoal	0	20.35	0.2304
142 O5 LIV L5 NE Quadrant	Basalt Debitage	5	14.48	0.4173
142 O5 LIV L5 NE Quadrant	Charcoal	0	1.28	0.0369
142 O5 LIV L5 NE Quadrant	Manuport Coral	1	3.93	0.1133
142 O5 LIV L5 SE Quadrant	Basalt Debitage	13	40.15	1.1571
142 O5 LIV L5 SE Quadrant	Charcoal	0	4.51	0.1300
142 O5 LIV L5 SW Quadrant	Basalt Debitage	34	67.19	1.9363
142 O5 LIV L5 SW Quadrant	Charcoal	0	30.82	0.8882
142 O5 LIV L6 F1	Basalt Debitage	2	1.05	0.1110
142 O5 LIV L6 F1	Charcoal	0	6.46	0.6826
142 O5 LIV L6 F1	Volcanic Glass Flake	1	0.46	0.0486
142 O5 LIV L6	Basalt Debitage	8	10.84	0.3124
142 O5 LIV L6	Charcoal	0	8.63	0.2487
142 O5 LIV L6	Manuport Coral	1	0.24	0.0069

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Site	Artifact Class	Item Count	Weight (g)	g/L
417 F10 LI L1	Basalt Debitage	21	49.21	2.6000
417 F10 LII L2	Basalt Debitage	28	45.82	0.7449
417 F10 LII L2	Charcoal	0	1.47	0.0239

417 F10 LII L3	Basalt Debitage	45	90.25	1.4672
417 F10 LII L3	Charcoal	0	10.13	0.1647
417 F10 LIII L4 1/16" Screen	Basalt Debitage	5	9.53	0.2518
417 F10 LIII L4 1/16" Screen	Charcoal	N/A	0.91	0.0240
417 F10 LIII L4 1/16" Screen	Manuport Shell	1	0.04	0.0011
417 F10 LIII L4 1/8" SCREEN	Basalt Debitage	55	95.25	2.5162
417 F10 LIII L4 1/8" SCREEN	Charcoal	N/A	24.12	0.6372
417 F10 LIII L4	Charcoal	1	0.32	0.0085
417 F10 LIV L5	Basalt Debitage	22	21.56	0.3505
417 F10 LIV L5	Charcoal	N/A	14.7	0.2390
417 F10 LIV L6	Charcoal	N/A	1.71	0.0278

Site NUU-155

Site NUU-155	Artifact Class	Item Count	Weight (g)	g/L
155 O21 LI L1	Basalt Core	1	614.7	32.4771
155 O21 LI L1	Basalt Debitage	21	149.54	7.9008
155 O21 LI L1	Volcanic Glass Debitage	1	0.07	0.0037
155 O21 LII L2	Basalt Debitage	150	486.04	1.8021
155 O21 LII L2	Basalt Hammerstone	1	46.1	0.1709
155 O21 LII L2	Bone not worked	22	0.25	0.0009
155 O21 LII L2	Terrestrial Gastropod	1	0.07	0.0003
155 O21 LII L3	52-bone not worked	12	0.04	0.0001
155 O21 LII L3	Basalt Debitage	237	539.86	2.0016
155 O21 LII L3	Basalt Flake	3	90.15	0.3342
155 O21 LII L3	Carbonized Kukui Nut Shell	2	0.06	0.0002
155 O21 LII L3	Charcoal	1	3.99	0.0148
155 O21 LII L3	Manupport Shell	1	0.32	0.0012
155 O21 LII L3	Raw Kukui Nut Shell	27	7.6	0.0282
155 O21 LII L3	Terrestrial Gastropod	10	0.04	0.0001
155 O21 LII L4	Basalt Debitage	250	1098.77	4.0739
155 O21 LII L4	Charcoal	0	5.49	0.0204
155 O21 LII L4	Manuport Coral	1	0.7	0.0026
155 O21 LII L4	Raw Kukui Nut Shell	37	6.34	0.0235
155 O21 LII L4	Volcanic Glass Flake	2	0.35	0.0013
155 O21 LII L5	Basalt Debitage	180	1044.82	3.8738
155 O21 LII L5	Carbonized Kukui Nut Shell	1	0.4	0.0015
155 O21 LII L5	Charcoal	0	31.9	0.1183
155 O21 LII L5	Fire-altered basalt	1	52.95	0.1963
155 O21 LII L5	‘ili‘ili	1	1.97	0.0073
155 O21 LII L5	Manuport Coral	3	1.99	0.0074
155 O21 LII L5	Manupport Shell	5	0.74	0.0027
155 O21 LII L5	Raw Kukui Nut Shell	53	11.23	0.0416
155 O21 LII L6 F1	Basalt Debitage	17	176.75	9.3384
155 O21 LII L6 F1	Carbonized Kukui Nut Shell	19	0.82	0.0433
155 O21 LII L6 F1	Charcoal	0	49.4	2.6100
155 O21 LII L6 F1	Manupport Shell	3	0.24	0.0127
155 O21 LII L6 F1	Raw Kukui Nut Shell	10	1.37	0.0724
155 O21 LII L6	Basalt Debitage	111	725.7	2.6906

155 O21 LII L6	Carbonized Kukui Nut Shell	2	0.25	0.0009
155 O21 LII L6	Charcoal	0	21.7	0.0805
155 O21 LII L6	Manuport Coral	1	1.05	0.0039
155 O21 LII L6	Raw Kukui Nut Shell	33	5.65	0.0209

Site	Artifact Class	Item Count	Weight (g)	g/L
155 M23 LI L1	bone not worked	5	0.06	0.0021
155 M23 LI L1	Basalt Debitage	132	247.3	8.7106
155 M23 LI L1	‘ili‘ili	1	4.92	0.1733
155 M23 LI L1	Manuport Coral	1	0.27	0.0095
155 M23 LI L1	Manuport Shell	1	2.16	0.0761
155 M23 LI L1	Raw Kukui Nut Shell	2	0.12	0.0042
155 M23 LII L2 1/16" Screen	Basalt Flake	2	23.77	0.1522
155 M23 LII L2 1/16" Screen	Charcoal	4	0.02	0.0001
155 M23 LII L2 1/16" Screen	‘ili‘ili	1	2.7	0.0173
155 M23 LII L2 1/16" Screen	Quartz	1	0.01	0.0001
155 M23 LII L2 1/16" Screen	Raw Kukui Nut Shell	9	0.25	0.0016
155 M23 LII L2 1/8" SCREEN	Basalt Debitage	114	498.75	3.1941
155 M23 LII L2 1/8" SCREEN	Raw Kukui Nut Shell	3	0.51	0.0033
155 M23 LII L3 1/16" Screen	Basalt Debitage	9	13.03	0.0834
155 M23 LII L3 1/16" Screen	Charcoal	0	0.14	0.0009
155 M23 LII L3 1/16" Screen	Raw Kukui Nut Shell	4	0.23	0.0015
155 M23 LII L3 1/16" Screen	Volcanic Glass Flake	2	0.08	0.0005
155 M23 LII L3 1/8" SCREEN	Basalt Debitage	173	732.44	4.6906
155 M23 LII L3 1/8" SCREEN	Charcoal	0	1.4	0.0090
155 M23 LII L3 1/8" SCREEN	Quarts	2	0.24	0.0015
155 M23 LII L3 1/8" SCREEN	Raw Kukui Nut Shell	42	5.81	0.0372
155 M23 LII L3 1/8" SCREEN	Terrestrial Gastropod	0	0.1	0.0006
155 M23 LII L4	Basalt Debitage	394	1307.67	8.3745
155 M23 LII L4	Charcoal	0	6.23	0.0399
155 M23 LII L4	Contemporary Flora	1	0.01	0.0001
155 M23 LII L4	‘ili‘ili	3	54.42	0.3485
155 M23 LII L4	Manuport Coral	2	0.27	0.0017
155 M23 LII L4	Manupport Shell	5	0.83	0.0053
155 M23 LII L4	Raw Kukui Nut Shell	214	21.65	0.1386
155 M23 LII L5	Basalt Debitage	103	268.58	1.7200
155 M23 LII L5	Charcoal	0	4.2	0.0269
155 M23 LII L5	Manuport Coral	3	2.2	0.0141
155 M23 LII L5	Raw Kukui Nut Shell	116	10.5	0.0672
155 M23 LII L5	Volcanic Glass Debitage	2	0.39	0.0025
155 M23 LIII L6 SW Quadrant	Charcoal	0	0.6	0.0634
155 M23 LIII L6 SW Quadrant	Manuport Coral	1	0.03	0.0032
155 M23 LIII L6 SW Quadrant	Raw Kukui Nut Shell	13	0.77	0.0814

Site NUU-407 Test Unit

Site	Excavation Unit	Layer	Artifact Class	Sum of Item Count	Sum of Weight
407	**1**	1	Basalt Flake	9	36.3
407	**1**	1	Charcoal	1	0.1
407	**1**	1	Kukui nut shell	2	0.7
407	**1**	1	Mammal bone	2	0.1

407	**1**		1	Manuport Shell	8	0.2
407	**1**		2	Basalt Flake	21	72.5
407	**1**		2	Charcoal	65	7.2
407	**1**		2	‘ili‘ili	2	19.9
407	**1**		2	Kukui nut shell	2	1.4
407	**1**		2	Manuport Coral	3	1.6
407	**1**		2	Volcanic Glass Flake	1	0.3
407	**1**		3	Basalt Flake	16	37.3
407	**1**		3	Charcoal	80	12.7
407	**1**		3	Manuport Shell	2	0.2
408	**1**		1	Manuport Coral	4	4
408	**1**		1	Manuport Shell	6	0.3
408	**1**		1	Metal	2	22.1
408	**1**		2	Basalt Flake	15	35.9
408	**1**		2	cf. egg shell	6	0.3
408	**1**		2	Charcoal	10	1.1
408	**1**		2	‘ili‘ili	1	15.5
408	**1**		2	Kukui nut shell	2	0.5
408	**1**		2	Manuport Coral	1	0.2
408	**1**		3	Basalt Flake	22	82.6
408	**1**		3	Charcoal	17	1.5
408	**1**		3	Kukui nut shell	6	2.2
408	**1**		3	Manuport Coral	3	8.9
408	**1**		4	Basalt Flake	19	143.9
408	**1**		4	Charcoal	32	4.1
408	**1**		4	Kukui nut shell	2	0.8
408	**1**		4	Manuport Coral	3	7.6

Site NUU-407

Site	Unit	Layer	Level	Feature	Artifact Class	Count	Weight (g)	g/L (Layer)
407	F3	I	1		Basalt Debitage	13	21.73	0.5740
407	F3	I	1		Bone not worked	1	0.25	0.0066
407	F3	II	2		Basalt Debitage	61	134.47	0.6046
407	F3	II	2		Bone not worked	1	0.15	0.0007
407	F3	II	2		Charcoal	0	1.15	0.0052
407	F3	II	2		Raw Kukui Nut Shell	1	0.96	0.0043
407	F3	II	3		Basalt Debitage	68	100.72	0.4529
407	F3	II	3		Bone not worked	3	0.22	0.0010
407	F3	II	3		Charcoal	0	4.53	0.0204
407	F3	II	3		Manuport Coral	2	0.08	0.0004
407	F3	II	3		Manuport Shell	7	1.25	0.0056
407	F3	II	3		Raw Kukui Nut Shell	11	1.17	0.0053
407	F3	II	4		Basalt Debitage	42	172.82	0.7771
407	F3	II	4		Bone not worked	1	0.09	0.0004
407	F3	II	4		Carbonized Kukui Nut Shell	3	0.31	0.0014
407	F3	II	4		Charcoal	1	38.86	0.1747
407	F3	II	4		‘ili‘ili	17	55.63	0.2501
407	F3	II	4		Manuport Coral	0.7	4	0.0180
407	F3	II	4		Manuport Shell	0.57	14	0.0630

407	F3	II	4		Raw Kukui Nut Shell	7.53	54	0.2428
407	F3	II	5		Basalt Debitage	8	64.48	0.2899
407	F3	II	5		Carbonized Kukui Nut Shell	8	0.33	0.0015
407	F3	II	5		Charcoal	4	36.9	0.1659
407	F3	II	5		‘ili‘ili	9.07	1.46	0.0066
407	F3	II	5		Manuport Shell	4	1.76	0.0079
407	F3	II	5		Raw Kukui Nut Shell	14	4.12	0.0185
407	F3	II	5		Volcanic Glass Core	1	0.3	0.0013
407	F3	III	6		Basalt Debitage	14	64.52	0.6706
407	F3	III	6		Carbonized Kukui Nut Shell	74	6.53	0.0679
407	F3	III	6		Charcoal	0	69.23	0.7195
407	F3	III	6		‘ili‘ili	3	59.7	0.6205
407	F3	III	6		Manuport Coral	9	28.97	0.3011
407	F3	III	6		Manuport Shell	10	0.57	0.0059
407	F3	III	7		Basalt Debitage	17	21.99	0.2286
407	F3	III	7		Bone not worked	3	0.19	0.0020
407	F3	III	7		Carbonized Kukui Nut Shell	6	0.48	0.0050
407	F3	III	7		Charcoal	0	67.61	0.7027
407	F3	III	7		‘ili‘ili	6	16.34	0.1698
407	F3	III	7		Manuport Coral	6	1.59	0.0165
407	F3	III	7		Manuport Shell	3	0.75	0.0078
407	F3	III	7		Raw Kukui Nut Shell	24	3.26	0.0339
407	F3	III	8	F1	Basalt Debitage	9	21.77	0.2263
407	F3	III	8	F1	Bone not worked	4	0.03	0.0003
407	F3	III	8	F1	Carbonized Kukui Nut Shell	2	0.03	0.0003
407	F3	III	8	F1	Charcoal	0	27.73	0.2882
407	F3	III	8	F1	Manuport Coral	6	2.51	0.0261
407	F3	III	8	F1	Manuport Shell	1	0.19	0.0020
407	F3	III	8	F1	Raw Kukui Nut Shell	3	0.68	0.0071
407	F3	III	8		Basalt Debitage	12	54.56	0.5671
407	F3	III	8		Bone not worked	4	0.51	0.0053
407	F3	III	8		Carbonized Kukui Nut Shell	35	0.56	0.0058
407	F3	III	8		Charcoal	0	34.17	0.3551
407	F3	III	8		Manuport Coral	5	2.55	0.0265
407	F3	III	8		Raw Kukui Nut Shell	16	7.08	0.0736
407	F3	III	8		Sea Urchin File	6	0.54	0.0056
407	F3	III	9	F1	Basalt Debitage	8	29.32	0.8697
407	F3	III	9	F1	Bone not worked	3	0.05	0.0015
407	F3	III	9	F1	Carbonized Kukui Nut Shell	3	0.14	0.0042
407	F3	III	9	F1	Charcoal	0	20.78	0.6164
407	F3	III	9	F1	Manuport Shell	4	0.12	0.0036
407	F3	III	9	F1	Raw Kukui Nut Shell	2	0.11	0.0033
407	F3	III	9		Basalt Debitage	8	14.93	0.1552
407	F3	III	9		Charcoal	0	19.77	0.2055
407	F3	III	9		Manuport Coral	3	0.17	0.0018
407	F3	III	9		Manuport Shell	6	0.12	0.0012
407	F3	III	9		Raw Kukui Nut Shell	2	0.67	0.0070
407	F3	IV	10	F1	Basalt Debitage	2	5.87	0.1741

407	F3	IV	10	F1	Carbonized Kukui Nut Shell	3	0.4	0.0119
407	F3	IV	10	F1	Charcoal	0	12.74	0.3779
407	F3	IV	10	F1	Manuport Shell	2	0.24	0.0071
407	F3	IV	11	F1	Charcoal	0	2.35	0.0697
407	F3	IV	11	F1	‘ili‘ili	1	0.91	0.0270

Site NUU-408

Site	Unit	Layer	Level	Special	Artifact Class	Count	Weight (g)	g/L (Layer)
408	E14	I	1		Basalt Debitage	5	47.18	1.2464
408	E14	I	1		Manuport Coral	1	9.01	0.2380
408	E14	II	2		Charcoal	5	0.07	0.0006
408	E14	II	2		Manuport Coral	2	1.05	0.0092
408	E14	II	2		Manuport Shell	2	0.85	0.0075
408	E14	II	2		Raw Kukui Nut Shell	4	0.72	0.0063
408	E14	II	3		Basalt Debitage	9	14.86	0.1309
408	E14	II	3		Charcoal	0	1.16	0.0102
408	E14	II	3		Manuport Coral	3	1.57	0.0138
408	E14	II	3		Raw Kukui Nut Shell	17	0.98	0.0086
408	E14	II	4		Charcoal	0	0.72	0.0063
408	E14	II	4		Manuport Coral	3	1.47	0.0129
408	E14	II	4		Raw Kukui Nut Shell	7	1.87	0.0165
408	E14	III	sub-4	Northeast Corner	Charcoal	0	0.46	0.0852
408	E14	III	sub-4	Northeast Corner	Raw Kukui Nut Shell	1	0.3	0.0556
408	H13	I	1		Basalt Debitage	6	63.3	3.3444
408	H13	I	1		Charcoal	5	0.07	0.0037
408	H13	I	1		Manuport Coral	2	0.05	0.0026
408	H13	II	3		Basalt Debitage	15	55.74	0.4908
408	H13	II	3		Bone not worked	1	0.04	0.0004
408	H13	II	3		Charcoal	0	1.41	0.0124
408	H13	II	3		Manuport Coral	5	2.46	0.0217
408	H13	II	3		Manuport Shell	2	3.57	0.0314
408	H13	II	3		Raw Kukui Nut Shell	9	1.43	0.0126
408	H13	II	3		Steel pocket knife blade	3	6.12	0.0539
408	H13	II	3		Water-rolled rock	1	2.14	0.0188
408	H13	II	4		Basalt Debitage	11	21.99	0.1936
408	H13	II	4		Charcoal	0	2.83	0.0249
408	H13	II	4		Manuport Coral	3	1.66	0.0146
408	H13	II	4		Raw Kukui Nut Shell	9	2.22	0.0195
408	H13	III	5		Basalt Debitage	5	26.84	0.5672
408	H13	III	5		Charcoal	0	2	0.0423
408	H13	III	5		Raw Kukui Nut Shell	1	0.23	0.0049

Site NUU-408B

Site	Unit	Layer	Level	Feature	Special	Artifact Class	Count	Weight (g)	g/L (Layer)

408B	J8	I	1			Basalt Debitage	8	18.19	0.9611
408B	J8	I	1			Charcoal	0	0.17	0.0090
408B	J8	I	1			General Terrestrial Gastropod	16	1.06	0.0560
408B	J8	I	1			Manuport Shell	16	1.39	0.0734
408B	J8	I	1			Undetermined Plant	1	0.03	0.0016
408B	J8	I	1			Volcanic Glass Flake	3	1.69	0.0893
408B	J8	II	2			Basalt Debitage	36	225.74	4.7707
408B	J8	II	2			Basalt Stone Tool	1	381.92	8.0713
408B	J8	II	2			Charcoal	0	0.19	0.0040
408B	J8	II	2			General Terrestrial Gastropod	8	0.07	0.0015
408B	J8	II	2			‘ili‘ili	1	1.03	0.0218
408B	J8	II	2			Manuport Coral	1	0.52	0.0110
408B	J8	II	2			Manuport Shell	15	1.19	0.0254
408B	J8	II	2			Volcanic Glass Flake	1	0.5	0.0106
408B	J8	II	3			Basalt Debitage	16	88.31	1.8663
408B	J8	II	3			Charcoal	0	0.36	0.0076
408B	J8	II	3			Manuport Shell	27	2.81	0.0594
408B	J8	II	3			Undetermined Plant	1	0.05	0.0011
408B	J8	II	3			Volcanic Glass Flake	1	0.1	0.0021
408B	J8	II	4		Ash Deposit	Basalt Debitage	25	7.94	1.6780
408B	J8	II	4		Ash Deposit	Bone not worked	2	0.08	0.0169
408B	J8	II	4		Ash Deposit	Charcoal	0	0.39	0.0824
408B	J8	II	4		Ash Deposit	Manuport Shell	16	1.12	0.2367
408B	J8	II	4		Ash Deposit	Sea Urchin Test Any Species	11	0.14	0.0296
408B	J8	II	4			Basalt Debitage	26	24.56	0.5190
408B	J8	II	4			Charcoal	0	0.86	0.0182
408B	J8	II	4			General Terrestrial Gastropod	40	1.87	0.0395
408B	J8	II	4			Manuport Shell	9	1.2	0.0254
408B	J8	II	4			Undetermined Plant	18	0.92	0.0194
408B	J8	II	4			Volcanic Glass Debitage	3	0.23	0.0049
408B	J8	III	5			Basalt Debitage	11	7.29	0.0453
408B	J8	III	5			Bone not worked	5	0.33	0.0021
408B	J8	III	5			Charcoal	0	7.03	0.0437
408B	J8	III	5			General Terrestrial Gastropod	105	6.95	0.0432
408B	J8	III	5			Manuport Coral	3	0.29	0.0018
408B	J8	III	5			Manuport Shell	76	3.27	0.0203
408B	J8	III	5			Manuport Stone	1	83.26	0.5175
408B	J8	III	5			Sea Urchin Jaw Any Species	1	0.04	0.0002
408B	J8	III	5			Undetermined Plant	16	0.79	0.0049
408B	J8	III	5			Volcanic Glass Debitage	4	0.2	0.0012
408B	J8	III	6		Ash Deposit	Charcoal	0	3.51	0.7418

408B	J8	III	6	Ash Deposit	Manuport Coral	3	0.07	0.0148
408B	J8	III	6	Ash Deposit	Manuport Shell	61	2.52	0.5326
408B	J8	III	6	Ash Deposit	Sea Urchin Test Any Species	17	0.29	0.0613
408B	J8	III	6	Ash Deposit	Volcanic Glass Debitage	1	0.16	0.0338
408B	J8	III	6		Basalt Debitage	83	186.04	1.1564
408B	J8	III	6		Bone not worked	2	0.13	0.0008
408B	J8	III	6		Charcoal	0	20.32	0.1263
408B	J8	III	6		Manuport Coral	15	0.8	0.0050
408B	J8	III	6		Manuport Shell	305	22.73	0.1413
408B	J8	III	6		Manuport Stone	1	318.55	1.9800
408B	J8	III	6		Sea Urchin Test Any Species	63	0.76	0.0047
408B	J8	III	6		Undetermined Plant	1	0.04	0.0002
408B	J8	III	6		Volcanic Glass Core	1	1.97	0.0122
408B	J8	III	6		Water-rolled rock	2	11.8	0.0733
408B	J8	III	7		Basalt Debitage	11	16.43	0.1021
408B	J8	III	7		Charcoal	1	8.32	0.0517
408B	J8	III	7		General Terrestrial Gastropod	35	3.93	0.0244
408B	J8	III	7		Manuport Coral	3	1.8	0.0112
408B	J8	III	7		Manuport Shell	37	1.18	0.0073
408B	J8	III	7		Volcanic Glass Flake	1	0.1	0.0006
408B	J8	IV	8		Basalt Debitage	3	1.19	0.0629
408B	J8	IV	8		Bone not worked	1	0.02	0.0011
408B	J8	IV	8		Carbonized Kukui Nut Shell	5	0.41	0.0217
408B	J8	IV	8		Charcoal	0	3.38	0.1786
408B	J8	IV	8		‘ili‘ili	1	1.05	0.0555
408B	J8	IV	8		Manuport Coral	3	0.11	0.0058
408B	J8	IV	8		Manuport Shell	49	5.37	0.2837
408B	J8	IV	8		Sea Urchin Test Any Species	17	0.41	0.0217

Site	Unit	Layer	Level	Artifact Class	Count	Weight (g)	g/L (Layer)
408B	E4	I	1	Basalt Flake	2	14.28	0.7545
408B	E4	II	2	Basalt Debitage	12	15.58	0.1266
408B	E4	II	2	Bone not worked	2	0.27	0.0022
408B	E4	II	2	cf. seeds	16	0.05	0.0004
408B	E4	II	2	Charcoal	0	0.27	0.0022
408B	E4	II	2	General Terrestrial Gastropod	6	0.11	0.0009
408B	E4	II	2	Manuport Coral	1	0	0.0000
408B	E4	II	2	Manuport Shell	5	0.09	0.0007
408B	E4	II	2	Volcanic Glass Flake	1	0.1	0.0008
408B	E4	II	2	Water-rolled rock	2	3.53	0.0287
408B	E4	II	3	Basalt Debitage	29	145.36	1.1815
408B	E4	II	3	Bone not worked	2	0.05	0.0004
408B	E4	II	3	Charcoal	0	2.47	0.0201
408B	E4	II	3	General Terrestrial Gastropod	8	0.25	0.0020
408B	E4	II	3	Manuport Coral	2	0.29	0.0024

408B	E4	II	3	Manuport Shell	6	1.27	0.0103
408B	E4	II	3	Volcanic Glass Debitage	20	2.51	0.0204
408B	E4	II	4	Basalt Debitage	39	246.55	2.0040
408B	E4	II	4	Bone not worked	2	0.2	0.0016
408B	E4	II	4	Charcoal	0	5.58	0.0454
408B	E4	II	4	Manuport Coral	3	0.51	0.0041
408B	E4	II	4	Raw Kukui Nut Shell	1	0.06	0.0005
408B	E4	II	4	Volcanic Glass Debitage	44	6.26	0.0509
408B	E4	III	5	Basalt Debitage	27	330.39	5.8186
408B	E4	III	5	Bone not worked	1	0.01	0.0002
408B	E4	III	5	Charcoal	0	1.48	0.0261
408B	E4	III	5	General Terrestrial Gastropod	1	0	0.0000
408B	E4	III	5	Volcanic Glass Debitage	7	0.56	0.0099
408B	E4	III	6	Basalt Debitage	6	12.81	0.2256
408B	E4	III	6	Charcoal	0	1.69	0.0298
408B	E4	III	6	Volcanic Glass Debitage	9	0.72	0.0127

Appendix D: Micromorphology Definitions

The c/f-Related Distribution

The *c/f-related distribution* expresses the distribution of individual fabric units in relation to smaller fabric units and associated pores (Stoops & Jongerius, 1975).

The main types of c/f-related distribution patterns and their relationship are illustrated in Fig. 4.6 and 4.7 and in Appendix 2. A short discussion is given below. Original definitions have been adapted in order to allow the introduction of subtypes.

- **Monic:** only fabric units larger (*coarse monic**) or smaller (*fine monic**) than a given size limit and associated interstitial pores are present. Coarse monic can be seen in sands or gravels (Photos 4.9, 4.10, and 4.20), and fine monic in clays, but the pores between clay particles will not be visible with an optical microscope.
- **Gefuric:** braces of smaller fabric units (e.g., in initial spodic horizons) link the large fabric units. According to the morphology of the bridges, *concave gefuric** and *convex gefuric** are distinguished (Photos 4.11 and 4.12).
- **Chitonic:** a cover of smaller units (e.g., in sandy argillic or spodic horizons) surrounds the larger fabric units (Photos 4.13–4.15 and 6.75).
- **Enaulic:** the smaller units form aggregates, which occur in the interstitial spaces between the larger units (e.g., in loose spodic horizons and some A horizons). The aggregates should not fill the complete pore space. Subtypes can be distinguished based on
  - (i) the relative distance between the coarse grains:
    - *Close enaulic**: the coarser units have points of contact (not necessarily visible in thin sections (see Section 3.1.2) (Photos 4.16 and 4.18).
    - *Single-spaced enaulic**: the distance between the coarser units is less than their mean diameter.
    - *Double-spaced enaulic**: the distance is one to two times the mean diameter (Photo 4.17).
    - *Open enaulic**: the distance between the coarser units is more than twice their mean diameter.
  - (ii) the relative size of the coarser grains and the aggregates:
    - *Fine enaulic**: the aggregates of fine material are considerably smaller than the coarser units (Photos 4.16–4.18).
    - *Equal enaulic**: the aggregates have approximately the same size as the coarser material.

Table 4.1. Recommended terms to describe the sizes of fabric units.

Class	Size limits
	µm
Clay	<2
Silt	2–20 (or 2–50 or 2–63)
Very fine sand	20–100 (or 50–100 or 63–100)
Fine sand	100–200
Medium sand	200–500
Coarse sand	500–1000
Very coarse sand	1000–2000
Fine gravel	>2000

Stoops 2003 Definitions for Micromorphology most relevant to the Nu‘u samples:
c/f related Distributions from Stoops 2003:42. Size of fabric units from Stoops 2003 Table 4.1

Appendix E: Processed Sediment Samples

Site	Unit	Fe.	Level	Layer	Soil Sample #	Soil Sample Type	x (cm)	y (cm)	z (cmbd)	Soils Log Weight	Context
NUU142	O4		1		1	BULK	54	30	100	78.34	Overburden
NUU142	O4		2		1	Bulk	54	29	102	146.1	Cultural
NUU142	O4		2		4	BULK (North)	50	77	100.5	139.98	
NUU142	O4		5		1	BULK	60	44	114	119.54	Cultural
NUU142	O4		5		4	BULK	54	9	113.5	183.65	Cultural
NUU142	O4		5		7	BULK	15	80	114	164.03	Cultural
NUU142	O4		5		10	BULK	26	36	117	222.74	Cultural
NUU142	O4	1	5		1	BULK	35	86	43.5	137.08	Feature
NUU142	O4		5		11	BULK	40	90	115	126.17	Cultural
NUU142	O4		6		1	Bulk	30	33	119	124.61	Cultural
NUU142	O4		7		1	BULK	64	36	124	203.83	Sterile?
NUU142	O4	1	5/6		1	BULK					Feature
NUU142	O4	1	5/6		4	BULK					Feature
NUU142	O4	Fe1	5/6		5	BULK	50	45	120	144.25	Feature
NUU142	O4	1	5/6		6	BULK					Feature
NUU142	O5		1		1	BULK	44	23	94	88.42	Overburden
NUU142	O5		2		1	BULK	29	67	94.5		Cultural
NUU142	O5		3		1	BULK	42	80	96	85.28	Cultural
NUU142	O5		3		4	BULK	50	22	48?		Cultural
NUU142	O5		5		1	BULK	47	28	107.5	185.24	Cultural
NUU142	O5		5		7	BULK	50	93	107	209.54	Cultural
NUU142	O5	1	6		1	Bulk	40	15	114.5	159.71	Feature
NUU142	O5	1	6		3	Starch	40	15	114.5		Feature
NUU142	O5	1	7		1	BULK	50	6	117.5	198.31	Feature
NUU142	O5		2		1	Bulk	29	67	94.5	112.21	Cultural
NUU142	O5		5		4	Bulk	86	12	107	219.77	Cultural
NUU142	O5		6		1	Bulk	81	16	113.5	171	Cultural
NUU142	O5		7		1	Flot	50	6	117.5		Sterile?
NUU142	O8		3		1	Bulk	90	90	36.5	106.71	Fill
NUU142	O8		4		1	BULK					Sterile
NUU142	O8		4		4	BULK					Sterile
NUU152A	J6			II		Pytolith	0-10	0-10	135?-141		

NUU152A	J7		1	I	3	bulk	69	9	126	101.1	Overburden
NUU152A	J7		3	II	1	starch	68	13	131.5		Cultural
NUU152A	J7		3	II	3	bulk	68	13	131.5	62.5	Cultural
NUU152D	R6		1	I	1	bulk	45	30.5	133.5	97	Overburden
NUU152B	AE9			I	PSS	Phytolith	0-10	0-10	51-53		
NUU152B	AE9			II	PSS	Phytolith	0-10	0-10	67-69		Cultual
NUU152B	AE9		3	II	SS	Charcoal Sample	40-50	25-33	57-59		
NUU152B	AE9			II	SS	S.W. Charcoal	0-10	0-10	67-69		
NUU152B	AE9		4	NW Corner	SS	N.W. Corner Charcoal Lens	0	100	62.5		
NUU152B	AE9			III	PSS	Phytolith	20-30	0	84-86		Sterile
NUU152D	R6		3	II	2	phytolith	48	21.5	141		Cultural
NUU152D	R6		7	III	1	bulk	53	10	158.5	127.4	Sterile
NUU152D	R7		1	I	1	bulk	30	36	130	94.1	Overburden
NUU152D	R7		3	II	3	Bulk	21	31	138	120.3	Cultural
NUU152D	R7		4		2	phytolith	28	33	141.5		Cultural
NUU152D	R7	F2	6		3	Bulk	36	60	148.5	81.6	Feature
NUU152D	R7		7	III	1	bulk	16	43	156.5	160.6	Sterile
NUU152D	S6		1	I	1	bulk	92	30	132	100.5	Overburden
NUU152D	S6		3	II	1	bulk	50	30	139	87.8	Cultural
NUU152D	S6		3	II	3	phytolith	50	30	139		Cultural
NUU152D	S6	1	4	II	3	bulk	81	60	142.5	156.7	Feature
NUU152D	S6	1	5			Phytolith	79	73	152.5		Feature
NUU152D	S6	1	5			Starch	79	73	152.5		Feature
NUU152D	S6		7	III	3	BULK	53	23	159	142.2	Sterile
NUU152D	S7		4	II	3	bulk	34	15	142	83	Cultural
NUU152D	S7		4			Phytolith	34	15	142		Cultural
NUU152D	S7	1	5	II	5	BULK	24	85	154	134.72	Feature
NUU153	E10		1	I	3	BULK					Overburden
NUU153	E10		3	II	3	Bulk	45	21	181	90.6	Cultural
NUU153	K17		1	I	1	BULK	50	26	577		Overburden
NUU153	K17		2	II	3	bulk	50	28	581.5	103.86	Sterile
NUU153	K17		2		2	Phytolith	52	26.5	580		Sterile
NUU153	O5		18(NORTH)		3	BULK	62	43	238.5	109.72	Cultural
NUU153	O5		18 (South)		6	Bulk	67	13	239.9	105.1	Cultural?
NUU153	O5		20 (END)		3	BULK	79	35	253	123.26	Sterile
NUU153	O5		6	II	3	bulk	53	30	179	189.79	Cultural
NUU153	O5		9		3	bulk	60	23	194.5	120.8	Cultural

NUU153	O5		9		3	bulk	60	23	194.5		Cultural
NUU153	O5		12		3	bulk	68	27	206	139.4	Cultural
NUU153	O5		15		3	Bulk	64.5	30	223	85.8	Cultural
NUU153	O5		17	IV	1	Starch	73	11	231		Cultural
NUU153	P5		3		3	Bulk	25	80	168	84.24	Cultural
NUU153	P5		6		3	Bulk	33	30	283.5	58	Cultural
NUU153	P5	1	9	II	3	Bulk	67	27	188	45.5	Feature
NUU153	P5	1	9		1	Starch	67	27	188		Feature
NUU153	P5	1	UNDER ROCK	II	3	BULK	23	39	202	134.66	Feature
NUU153	P6		1	I	3	bulk	83	11	184.5	85.8	Overburden
NUU153	P6		3	II	3	bulk	79	21	186.5	98.9	Cultural
NUU153	P6		5		3	Bulk	27	42	194	115.97	
NUU153	P6		12	II	3	bulk	18	78	234.5	138.55	Cultural
NUU155	M23		1		1	BULK					Overburden
NUU155	M23		3		1	Bulk	47	20	153	208.49	Cultural
NUU155	M23		4		1	Bulk	51	30	157.5	223.51	Cultural
NUU155	M23		4		2	Phytolith	51	30	157.5		Cultural
NUU155	M23		6		1	BULK	20	16	167	216.52	Sterile?
NUU155	O21		1		1	BULK					Overburden
NUU155	O21		3	II	3	Bulk	41	20	149.5	101.42	Cultural
NUU155	O21		6		1	BULK					Cultural
NUU155	O21		6		3	BULK	47	26	168		Cultural
NUU155	O21		6		4	BULK	85	88	167	109.14	Cultural
NUU155	O21		6		5	BULK	67	52	172	113.42	Cultural
NUU155	O21	1	6		1	BULK	85	87	168.5	102.45	
NUU155	O21	1	6		4	BULK	91	82	170		Feature
NUU155	O21	1	6		5	BULK					Feature
NUU2	K8		2		1	Bulk	52	78	126.5	99.67	Sterile
NUU2	K8		3		1	BULK	50	30	130.5		Sterile
NUU2	N4		3		1	Bulk	61	50	171	97.55	Cultural
NUU2	Q5		3		1	Bulk	50.5?	79	167	91.91	Cultural
NUU2	Q5		3		2	Phytolith	58.5?	79	167		Cultural
NUU2	Q5		5		1	Bulk	57	29	176.5	132.05	Cultural
NUU2	Q5		7		1	BULK	41	25	189	168.99	Sterile?
NUU2	R10		1		1	Bulk	52	15	129.5	71.93	Overburden
NUU2	R10		3		1	Bulk	52	30	135.5	169.2	Cultural
NUU2	R10		5		1	Bulk	52	27	144	162.63	Cultural

NUU2	R10		5		4	Bulk	59	62	143	177.67	Cultural
NUU2	R10		6		1	Bulk	51	29	150	134.09	Cultural
NUU2	R10		7		1	Bulk	51	27	155.5	147.63	Cultural
SS4	R10		7		4	Bulk	67	78	156	150.53	Cultural
NUU2	R10		9		1	BULK	49	16	164.5	148	Cultural
NUU2	R10		10		1	Bulk	52	23	171	143.07	Sterile?
NUU2	R4			IV		Flot	56	90	199		Cultural
NUU2	R4			IV		Flot	56	90	199		Cultural
NUU2	R4			IV	1	Bulk	38	72	197.5	132.32	Cultural
NUU2	R4			II	1	BULK	54	83	184.5	147.47	Cultural
NUU2	R4			III	1	BULK	43	89	192.5	179.01	Cultural
NUU2	R4			V	1	BULK	18	86	207	165.82	Cultural
NUU2	R4			V	4	BULK	74	90	206		Cultural
NUU2	R4			V.2	1	BULK	50	85	216	151.69	Cultural
NUU2	R5		1		1	BULK	58	30	171		Overburden
NUU2	R5		2		1	Bulk	59	20	177	23.41	Cultural
NUU2	R5		5		1	Bulk	64	28	188	128.71	Cultural
NUU2	R5		6		1	Bulk	56	28	196	147.67	Cultural
NUU2	R5		7		1	BULK	48.5	28	200	188.34	Sterile?
NUU2	R8		1		1	BULK	41	29	136.5	64.28	Overburden
NUU2	R8		3		1	Bulk	60	80	144	142.13	Cultural
NUU2	R8		4		1	BULK	66	92	148.5	132.32	Cultural
NUU2	R8	1	4		1	BULK	41	100	149	103.56	Feature
NUU2	R8		5		1	BULK	66	90	154	155.74	Cultural
NUU2	R8		6		1	BULK	65	88	161.5	147.39	Sterile?
NUU2	R8	1	6		1	BULK					Sterile?
NUU2	R9		1	I	1	BULK	45.5	16	134	146.2	
NUU2	R9		2		1	Bulk	77	58	136.5	133.83	Cultural
NUU2	R9		3		1	BULK	46	26	138	155.15	
NUU2	R9		4		1	BULK	46	35	143	125.38	
NUU2	R9		5		1	Bulk	30.5	36	149	151.35	Cultural
NUU2	R9		6		1	BULK	34	48	154.5	156.96	
NUU2	R9		7		1	BULK	24	36	160	159.15	
NUU2	R9		8		1	BULK	56	70	160.5	160.36	
NUU2	R9		9		1	BULK	53	84	169	155.38	
NUU2	R9		10		1	BULK	64	80	171.5	172	Sterile
NUU3	H4		1			BULK					Overburden
NUU3	H4		9		1	Bulk	35	40	190	129.77	Cultural

NUU3	H4		9		4	Bulk	61	49	191.5	93.43	Cultural
NUU3	H4		9		3	Starch	35	40	190		Cultural
NUU3	H4		11		1	Bulk	39	45	195.5	135.87	Sterile?
NUU407	F3		1		1	BULK	50	16	107		Overburden
NUU407	F3		3	II	1	Bulk	51	73	121	128.74	Cultural
NUU407	F3		3		3	Starch	51	73	121		Cultural
NUU407	F3		6		1	BULK	51	28	136	160.39	Cultural
NUU407	F3		6		4	BULK					Cultural
NUU407	F3		7		1	Bulk	41.5	21.5	142.5	127.07	Cultural
NUU407	F3		8		1	BULK	75	15	143	141.25	Cultural
NUU407	F3		9		1	BULK	64	16.9	149.5	117.41	Cultural
NUU407	F3	1	8		1	BULK	19	26	147.5	134.28	Feature
NUU407	F3	1	9		1	BULK	24	28	150	130.75	Feature
NUU407	F3	1	11		1	BULK	46	16	159.5	64.5	Feature
NUU408	E14		3		1	Bulk	48	21	105.5	134.78	Cultural
NUU408	H13		1		1	BULK	50	22	75.5		Overburden
NUU408	H13		3		1	Bulk	39	32	79.5	138.39	Cultural
NUU408	H13		3		3	Starch	39	32	79.5		Cultural
NUU408	H13		5		1	BULK	43	21	89.5		Sterile?
NUU408B	E4		1		1	BULK	52	9	224		Overburden
NUU408B	E4		2		1	Bulk	20	38	228.5	114.53	Cultural
NUU408B	E4		4		1	BULK	57	27	237.5	154.86	
NUU408B	E4		6		1	BULK	53	18	245.5		Sterile?
NUU408B	J8		1		1	BULK	24	51	136.5		Overburden
NUU408B	J8		5		1	Bulk	40?	70	141.5	123.45	Cultural
NUU408B	J8		5		3	Starch	46?	70	141.5		Cultural
NUU408B	J8		6		1	BULK	26	70	147.5	130.41	Cultural
NUU408B	J8		6		4	BULK	58	60	148.5	114.7	Cultural
NUU408B	J8		6		7	BULK	56	31	150	208.38	Cultural
NUU408B	J8		7		1	BULK	20	90	155	181.72	Cultural
NUU408B	J8		7		4	BULK	50	36	155.5	145.79	Cultural
NUU408B	J8		7		7	BULK					Cultural
NUU408B	J8		8		1	BULK	7	80	158		Sterile
NUU408B	J8		SUB8		1	BULK	46	21	164.5	240.61	Sterile
NUU408B	J8		SUB8		4	BULK	7	65	164.5	105.59	3 separate sample bags!
NUU417	F10		1		1	BULK	46	29	78	188	Overburden
NUU417	F10		3		1	Bulk	44	30	82.5	200.96	Cultural

NUU417	F10		5		1	Bulk	45	40	91.5	116.83	Cultural
NUU417	F10		6		1	BULK	11	10	96.5	114.46	Cultural
NUU420	F10		3		1	BULK	55	24	161	95.4	Cultural
NUU420	F10		3		2	Phytolith	55	24	161		Cultural
NUU420	G10		1		3	BULK	78	18	158	54.52	Overburden
NUU420	G10		3		3	BULK	44	17	162	95.07	Cultural
NUU420	G10		3		1	Starch	44	17	162		Cultural
NUU420	G10		9		3	BULK	51	18	193.5	53.35	Sterile?
NUU420	H12		1		3	BULK	50	38	157	76.1	Overburden
NUU420	H12		3		3	BULK	46	26	160.5	70.6	Cultural
NUU420	H12		3		2	Phytolith	46	26	160.5		Cultural
NUU407/408	Offsite				2	Bulk	North of site				Offsite
NUU155A	Offsite				2	Bulk	North of site				Offsite
NUU142/417	Offsite				1	Bulk	North of site				Offsite
NUU420/152	Offsite				3	Bulk	Equal distance				Offsite
NUU153	Offsite				2	Bulk					Offsite
NUU2	Offsite				1	Bulk	Northeast of site				

Samples Sent for Phytolith and Starch Extraction

ID	Site	Unit	Fe.	Level	Layer	Soil Sample #	x (cm)	y (cm)	z (cmbd)	Feature Type
NUU142-O5-L6-F1-SS3	NUU142	O5	1	6		3	40	15	114.5	Combustion Feature--flat stones fitted together, potentially for heating food. Tuber found within the stones
N152A-J7-L3-S1	NUU152A	J7		3	II	1	68	13	131.5	
N152D-S6-L5-F1-S4	NUU152D	S6	1	5		4	79	73	152.5	Combustion Feature--Possible imu earthen oven
N153-P5-L9-F1-S1	NUU153	P5	1	9		1	67	27	188	Combustion Feature--Circular Hearth
N153-P6-L5-S1	NUU153	P6		5		1	74	33	193	
N155-O21-L3-S1	NUU155	O21		3		1	41	20	149.5	
N2-R8-L4-S3	NUU2	R8		4		3	66	92	148.5	
NUU3-H4-L9-SS3	NUU3	H4		9		3	35	40	190	
N407-F3-L3-S3	NUU407	F3		3		3	51	73	121	
N408-H13-L3-S3	NUU408	H13		3		3	39	32	79.5	
N408B-E4-L4-S3	NUU408B	E4		4		3	57	21	237.5	
NUU408B-J8-L5-SS3	NUU408B	J8		5		3	46	70	141.5	
N417-F10-L3-S3	NUU417	F10		3		3	44	30	82.5	
N420-G10-L3-S1	NUU420	G10		3		1	44	17	162	
N142-OS1	NUU142/417	Offsite				1	North of site			
N153-OS2	NUU153	Offsite				2	North of site			

NUU155A-OS2	NUU155A	Offsite				2	North of site			
N2-OS1	NUU2	Offsite				1	North of site			
NUU408-OS2	NUU407/408	Offsite				2	North of site			
N420-OS2	NUU420	Offsite				2	North of site			
N420-OS3	NUU420/152	Offsite				3	Between 420 and 152			
For Phytolith Extraction										
ID	Site	Unit	Feature	Level	Layer	Soil Sample #	x (cm)	y (cm)	z (cmbd)	Feature Type
N142-O4-L5-S10	NUU142	O4		5		10	26	36	117	
N142-O8-L3-S2	NUU142	O8		3		2	90	90	36.5	
N152-U14-L3	NUU152	U14		3			0-10	0-10	155-157	
N152B-AE9-LII-P	NUU152B	AE9			II	Phytolith	0-10	0-10	67-69	
N152D-R6-L3-S2	NUU152D	R6		3	II	2	48	21.5	141	
N152D-R7-L4-S2	NUU152D	R7		4		2	28	33	141.5	
N152D-S6-L3-S3	NUU152D	S6		3	II	3	50	30	139	
N152D-S7-L4-S2	NUU152D	S7		4		2	34	15	142	
N152E-J14-LII	NUU152E	J14			II		0	0	103.5-108	
N153-E10-L3-S2	NUU153	E10		3		2	45	21	181	
N153-K17-L2-S2	NUU153	K17		2		2	52	26.5	580	

N153-O5-L9-S2	NUU153	O5		9		2	60	23	194.5	
N155-M23-L4-S2	NUU155	M23		4		2	51	30	157.5	
N2-N4-L3-S2	NUU2	N4		3		2	61	50	171	
N2-Q5-L3-S2	NUU2	Q5		3		2	58.5	79	167	
N2-R10-L3-S2	NUU2	R10		3		2	52	30	135.5	
N2-R4-LII-S2	NUU2	R4			II	2	54	83	184.5	
N2-R5-L5-S2	NUU2	R5		5		2	64	28	188	
N2-R8-L4-F1-S2	NUU2	R8	1	4		2	41	100	149	Combustion Feature: Circular Hearth
N2-R9-L5-S2	NUU2	R9		5		2	30.5	36	149	
NUU3-H4-L9-SS5	NUU3	H4		9		5	61	49	191.5	
N407-F3-L8-F1-S2	NUU407	F3	1	8		2	19	26	147.5	Charcoal and Ash lens.
N408-E14-L3-S2	NUU408	E14		3		2	48	21	105.5	
N408B-J8-L6-S6	NUU408B	J8		6		6	58	60	148.5	
N420-F10-L3-S2	NUU420	F10		3		2	55	24	161	
N420-H12-L3-S2	NUU420	H12		3		2	46	26	160.5	

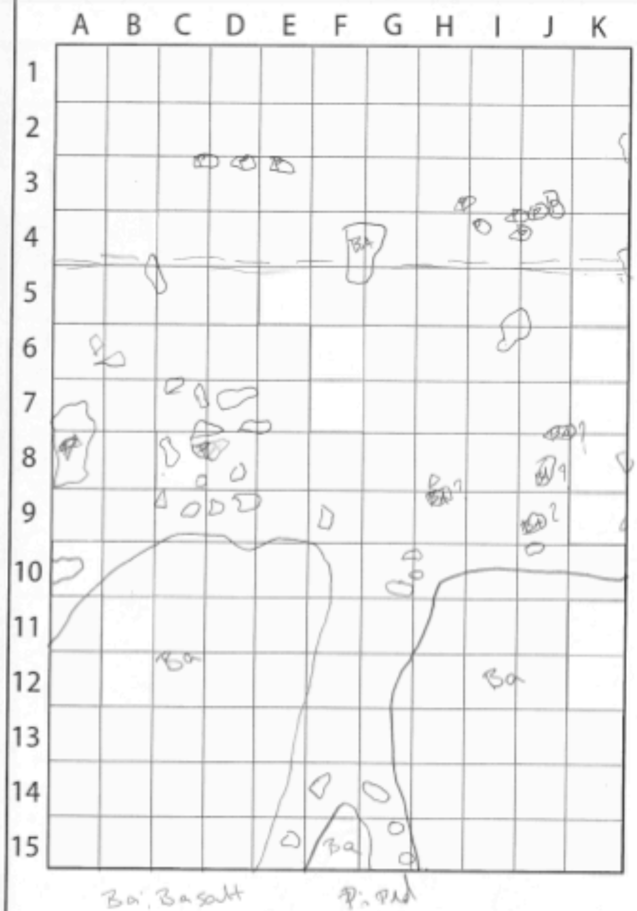
Appendix F: Micromorphology Forms

ANTHRO126M Micromorphological Recording Forms | **Slide Description**

Sample Identification:
Site: NW02
Context and deposit type: Site K8 mm 1 Kaulhall terrace
3D Provenience (profile #, horizon, unit, coordinates):
North wall 121 cmbd - 131 cmbd, x=61-72cm, y=100 cm
Description (overall structure, boundaries, stratigraphy, etc.):
Captures Layer I (BED I) & Layer II (BED II)

Date:
Sample ID: NW02K8 mm1

Notes



BED I: 90% plant tissue w/ moderate amount of fine grain sand size granule peds & insect feces in/ dessicated plants

BED II: Smaller % of plant material, larger rock fragments which increase in size w/ depth. Higher of soil peds & denser fabric

Normal grading (size increases w/ depth)

Similar Beds to NW2NY, but more dense, soil rich top bed in NY this bed I is all organic

Scale (slide size or magnification):

Sample Identification:
Site: NUU2
Context: UNIT K8 MM1 BED II
Deposit type: Kauhale terrace

Date: 20-VII-2018

Summary

Boundary (upper): Diffuse, Smooth
Thickness: 5cm
Particle sizes: mostly medium sand to fine gravel
Fine material: clay, some silt → difficult to ID
Color: Dark brown soil, yellowish brown plant material
Related distribution: Double spaced equal enaulic
Structure: Subrounded peds w/ packing voids, dessicated plant material shows vughs

Boundary (lower): N/A
Bedding:
Sorting:
c/f (coarse: fine) ratio:

Inclusions

Inclusions orientation: basic mdm. axes mod. expressed parallel, referred parallel
Inclusions distribution: basic linear, related random

For inclusions record (where appropriate): type, %, size, color, form, preservation
Plant remains: yes, ~ ≤ 50% of bed, yellowish brown, slightly dessicated
Impressions of plants: n/o
Charred remains: possible charred basalt, but could be highly weathered or poor quality
Calcitic ashes: n/o

Other organic remains (e.g., coprolites/dung, amorphous organic material, other):
insect fecal matter in vughs in plants - light brown, spherical clusters
Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other):
n/o
Micro-artifacts (e.g., lithics, pottery, metal, glass, other):
n/o
Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other):
n/o
Sediment aggregates:
aggregates w/ rounded basalt & fine sand size mineral inclusions - larger denser aggregates have planar voids that run horizontal to groundmass
Rock fragments:
basalt
Minerals:
olivine, quartz (twinning), orange rectangular mineral in XP that could be hornblende or pyroxene or plagioclase feldspar → naturally occuring in basalt
Other inclusions:
N/o

Post-depositional features (type and degree)

Weathering (dessicated, water-logged): minor pellicular weathering on basalt & olivine, minor linear weathering on olivine
Evidence for Soil Formation (clay coatings):
Other:
→ thin clay coatings on basalt & some plants

Void Spaces/Pores

Void Shapes/Types: packing, vughs & planar
Density:
Distribution: ≥ 50%
→ more voids toward top of bed

ANTHRO126M Micromorphological Recording Forms **Slide Description**

Sample Identification:

Site: NUU2

Context and deposit type: UNIT N4 mm 1

3D Provenience (profile #, horizon, unit, coordinates):

162cmbd -171cmbd X: 27cm-42cm Y=100cm North wall?

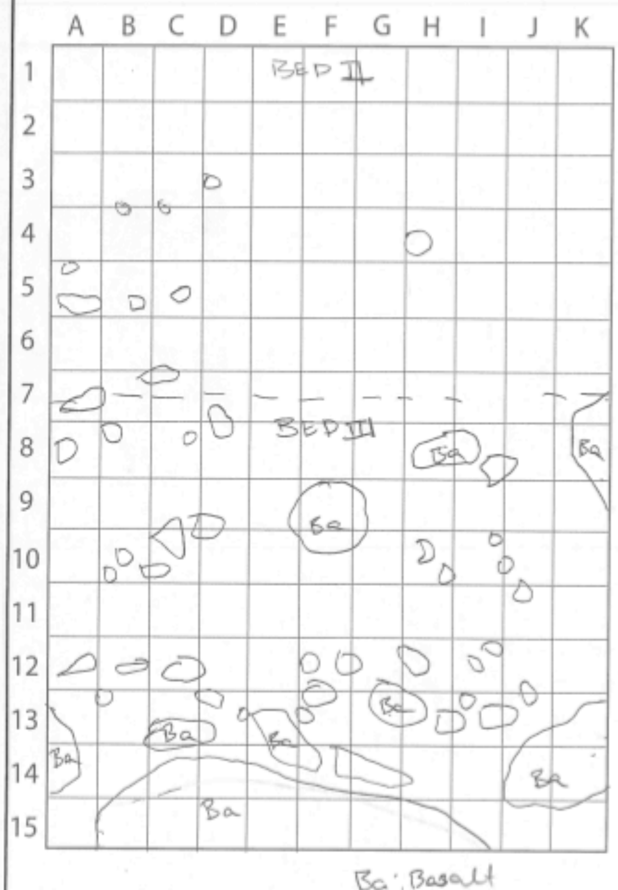
Description (overall structure, boundaries, stratigraphy, etc.):

mm sample captured Layer I, II ; III, thin section looks to be only 2 layers

Date: 20-VII-2018

Sample ID: NUU2N4mm1

Notes



BED 1: patches of dense fine material ; fine sand size peds interspersed w/ less dense patches of sand sediment, w/ only sand size rounded basalt

BED II: Dominated by highly degraded rounded basalt

Similar beds to NUU2K8

but this unit is more compact, less organic material possibly indicating dif. deposition/use of location & more foot traffic in this area

Scale (slide size or magnification):

Sample Identification: **Date:** 20-VII-2018

Site: NW2K8MM1
Context: UNIT K8 MM1 Bed 1
Deposit type: Kawhale terrace

Summary

Boundary (upper): N/A
Boundary (lower): Diffuse, smooth
Thickness: 2 cm
Bedding:
Particle sizes: dominated by very coarse sand to fine gravel
Sorting: poorly sorted
Fine material: silt ; clay
c/f (coarse:fine) ratio: 90:10
Color: Plant material is light yellowish brown, fine material is dark brown
Related distribution: double spaced fine enaulic
Structure: what little structure there is, is crumb ; granular microstructure

Inclusions

Inclusions orientation: parallel distribution (referred), basic linear
Inclusions distribution: referred oblique orientation, random angle mod. expressed basic orientation

For inclusions record (where appropriate): type, %, size, color, form, preservation
Plant remains: 90% of bed - leaves, sticks, stems
Impressions of plants: one void at top of slide where plant material seems to have degraded away
Charred remains: N/O
Calcitic ashes: N/O

Other organic remains (e.g., coprolites/dung, amorphous organic material, other):
Insect feces in plant material vugh voids
Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other):
possible phytoliths - articulated, visible in degrading plant material
Micro-artifacts (e.g., lithics, pottery, metal, glass, other):
N/O
Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other):
N/O
Sediment aggregates:
fine sand size dark brown aggregates ≤ 10% of bed
Rock fragments:
N/O
Minerals:
fine sand size olivine - rare ≤ 1%
Other inclusions:
N/O

Post-depositional features (type and degree)

Weathering (dessicated, water-logged): dessicated plant materials, low degree
Evidence for Soil Formation (clay coatings): N/O
Other:

Void Spaces/Pores

Void Shapes/Types: packing ; vughs in dessicated plants
Density:
Distribution:

Sample Identification:

Site: NU02

Context: UNIT NU MM1 BED III

Deposit type: Kawhale Terrace

Date: 23-VII-2018

Summary

Boundary (upper): Diffuse, Smooth

Thickness: 4cm

Particle sizes: clay through fine gravel

Fine material: clay & silt

Color: dark yellowish brown

Related distribution: Single spaced fine enaulic

Structure: granules; coarse inclusions & subangular blocky peds w/ complex packing voids & vughs around rock fragments

planar voids in peds

Boundary (lower): N/A

Bedding: normal grading

Sorting: poorly sorted

c/f (coarse: fine) ratio: 60/40

Inclusions

Inclusions orientation: basic and. angle not expressed parallel, referred parallel

Inclusions distribution: basic linear, referred perpendicular

For inclusions record (where appropriate): type, %, size, color, form, preservation

Plant remains: moderate amount of grass stem cross section, sparse amount of fibrous plant matter

Impressions of plants: N/O

Charred remains: minimal (rare → ≤ 1%) of microcharcoal available

Calcitic ashes: N/O

Other organic remains (e.g., coprolites/dung, amorphous organic material, other):

N/O

Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other):

Phytoliths – rare, rectangular (spicule)

Micro-artifacts (e.g., lithics, pottery, metal, glass, other):

Some more angular, tabular basalt, but does not look like lithic debitage

Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other):

N/O

Sediment aggregates:

Yes, but not as frequent as other slides (R9 & R10 specifically) – (common) ↳ also tend to be smaller peds – most commonly silt size clay peds

Rock fragments:

numerous basalt rock fragment inclusions

Minerals:

basanite, possible basaltic glass

Other inclusions:

Post-depositional features (type and degree)

Weathering (dessicated, water-logged): highly weathered basalt & olivine w/ spongy ← structure & pellicular weathering ↳ pellicular

Evidence for Soil Formation (clay coatings):

Other: all w/ thin clay coating

Void Spaces/Pores

Void Shapes/Types: complex packing, vughs surrounding larger basalt fragments, planar voids in larger peds

Density:

Distribution:

Sample Identification:
Site: NUU2
Context: UNIT N4 MM1 BED II
Deposit type: Kawhale Terrace

Date: 21-VII-2018

Summary

Boundary (upper): N/A
Thickness: 3 cm
Particle sizes: clay to coarse sand
Fine material: Clay & silt
Color: Brown
Boundary (lower): Diffuse, smooth
Bedding:
Sorting: moderately sorted
c/f (coarse: fine) ratio: 50/50
Related distribution: fine to equal single spaced enaulic w/ patches of double spaced
Structure: granular w/ packing voids & some vughs

Inclusions

Inclusions orientation: Basic: small angle moderately expressed parallel, referred parallel
Inclusions distribution: Basic banded, referred random

For inclusions record (where appropriate): type, %, size, color, form, preservation
Plant remains: moderate presence, fibrous, light brown w/ some bark. Some highly dessicated, most preserved
Impressions of plants:
Charred remains: rare pieces of microcharcoal - fine sand size
Calcitic ashes: 1 spot 10's of ash

Other organic remains (e.g., coprolites/dung, amorphous organic material, other):
insect excrement, but no animal dung observed
Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other):
No bone or shell observed. Rare phytoliths - square & spiny
Micro-artifacts (e.g., lithics, pottery, metal, glass, other):
N/O
Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other):
N/O
Sediment aggregates:
inherited peds - smaller than other beds & thin sections. Very few, some appear to be insect excrement.
Rock fragments:
weathered, rounded basalt
Minerals:
Olivine, other yellowish inclusions - no extinction same color in PPL & XPL
Other inclusions:

Post-depositional features (type and degree)

Weathering (dessicated, water-logged): Pellicular weathering on basalt & olivine, cross-linear on olivine
Evidence for Soil Formation (clay coatings): No soil formation (clay coatings) observed
Other:

Void Spaces/Pores

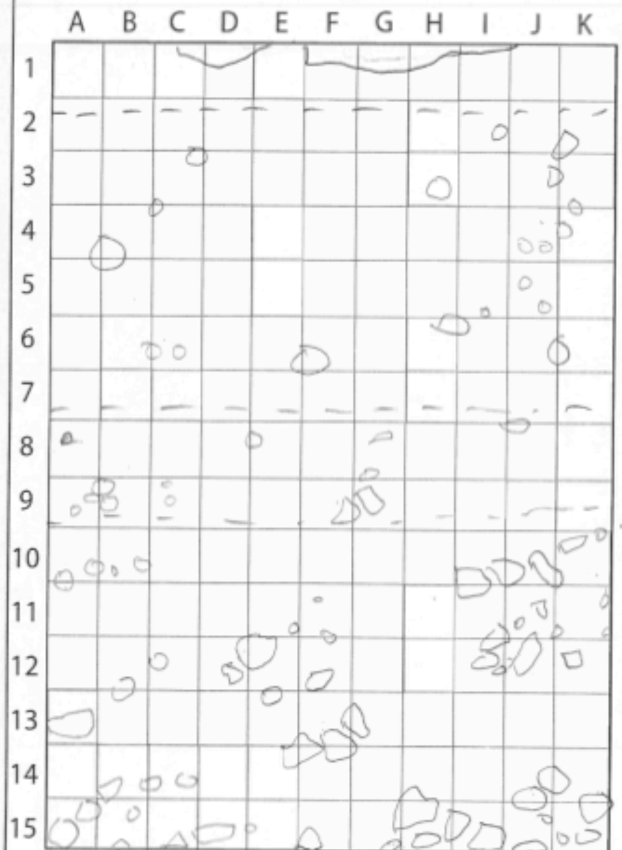
Void Shapes/Types: packing w/ a few vughs
Density: ≤ 20%
Distribution: unevenly distributed → patches of dense fine material next to patches of loose, less dense material. Could be infillings in packing voids?

ANTHRO126M Micromorphological Recording Forms **Slide Description**

Sample Identification:
Site: NUU2
Context and deposit type: UNIT Q5 mm1
3D Provenience (profile #, horizon, unit, coordinates):
157 cmbd - 171 cmbd x: 23-33 cm y: 100 cm North wall
Description (overall structure, boundaries, stratigraphy, etc.):
captures the overburden layer I (Bed 1) Layer II (BED 2 & 3) & Layer III (Bed 4)

Date: 23-VII-2018
Sample ID: NUU2 Q5 mm1

Notes



I: mostly organic material

II: Densely packed (intermittently) & dominated by granules & interstitial grains

IIIA Dominated by plant tissue

IIIB Dominated by subangular blocky peds

Scale (slide size or magnification):

Sample Identification: **Date:** 23-VII-2014

Site: NWZ

Context: UNIT Q5 MM 1 Bed I

Deposit type: Kauhale House floor

Summary

Boundary (upper): N/A

Boundary (lower): Distinct, smooth

Thickness: 0.5cm

Bedding: unstratified

Particle sizes: fine gravel through clay - mostly very coarse sand

Sorting: mod. sorted

Fine material: silt & clay

c/f (coarse: fine) ratio: 95/5

Color: Dark brown

Related distribution: Chitonic & open fine enaulic

Structure: Coarse fraction surrounded by fine coating w/ complex packing voids in b/w

Inclusions

Inclusions orientation: Random

Inclusions distribution: Random

For inclusions record (where appropriate): type, %, size, color, form, preservation

Plant remains: } 80-90% of layer - fibrous, bark, stem

Impressions of plants: }

Charred remains: rare, silt size

Calcitic ashes:

Other organic remains (e.g., coprolites/dung, amorphous organic material, other): N/O

Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other): N/O

Micro-artifacts (e.g., lithics, pottery, metal, glass, other): N/O

Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other): N/O

Sediment aggregates: Small aggregates - silt & fine sand size, moderate to sparse presence

Rock fragments: Basalt fragments, moderate but less than plants

Minerals: olivine - rare

Other inclusions:

Post-depositional features (type and degree)

Weathering (dessicated, water-logged):

Evidence for Soil Formation (clay coatings): pellicular, but not intensive - moderate

Other: Clay coatings typic around 60-70% of basalt & plants

Void Spaces/Pores

Void Shapes/Types: complex packing

Density: 50-60%

Distribution: evenly distributed

Sample Identification: **Date:** 24-VII-2018
Site: NUU 2
Context: Unit Q5 mm 1 BED II
Deposit type: Kauhale House floor

Summary

Boundary (upper): Distinct, Smooth
Thickness: 2.5 cm
Particle sizes: fine gravel through clay - mostly medium to coarse sand
Fine material: clay w/ some silt
Color: dark brown
Related distribution: close equal enaulic
Structure: peds w/ packing voids, vughs around basalt & surrounding some plant tissue

Boundary (lower): Diffuse, wavy
Bedding: unordered fabric, unstratified
Sorting: poorly sorted
c/f (coarse: fine) ratio: 20/80%

Inclusions

Inclusions orientation: parallel orientation (basic & altered)
Inclusions distribution: random

For inclusions record (where appropriate): type, %, size, color, form, preservation
Plant remains: ~ 10-15% of bed - all sorts: fibrous, globular, possible bark
Impressions of plants: some vughs that may have formed around plants that have since degraded away
Charred remains: microcharcoal - are & not diagnostic
Calcitic ashes:
bone "spot" observed
Other organic remains (e.g., coprolites/dung, amorphous organic material, other):
N/O
Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other):
articulated rectangular phytoliths in dessicated plant tissue
Micro-artifacts (e.g., lithics, pottery, metal, glass, other):
N/O
Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other):
N/O
Sediment aggregates:
yes - how many? Subangular blocky & granules. Larger blocky peds are densly packed & have mineral inclusions, some charcoal.
Rock fragments:

Minerals:
Olivine
Other inclusions:
basaltic glass

Post-depositional features (type and degree)

Weathering (dessicated, water-logged): pellicular - basalt & olivine. Irregular linear for olivine
Evidence for Soil Formation (clay coatings): clay coatings on ~50% of plant & basalt
Other: none around charcoal

Void Spaces/Pores

Void Shapes/Types: mostly complex packing, some vughs
Density:
Distribution:

Sample Identification:

Site: NUU2

Context: UNIT Q5 mm1

Deposit type: Kawhale house floor

Date: 25-VII-2018

Summary

Boundary (upper): Diffuse, wavy

Thickness: 1cm

Particle sizes: clay to coarse sand

Fine material: silt & clay

Color: dark brown

Related distribution: Double & sing spaced equal enaulic

Structure: granules, subangular blocky non-accomodating peds; interstitial main complex packing voids w/ vughs & channels interspersed – mostly at top & bottom of bed

Boundary (lower): Diffuse, occluded

Bedding: unstratified, ungraded

Sorting: poorly

c/f (coarse:fine) ratio: 40/60

Inclusions

Inclusions orientation: basic small angle moderately expressed parallel, referred parallel

Inclusions distribution: basic linear referred parallel

For inclusions record (where appropriate): type, %, size, color, form, preservation

Plant remains: ~70% of bed, all sorts, all sizes, well-preserved, fibrous, woody, stems. Some show evidence of being eaten through by insects

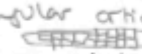
Impressions of plants:

Charred remains: minimal charcoal, (rare) w/ only 1 or 2 pieces showing diagnostic characteristics; vry fine sand size.

Calcitic ashes: N/O

Other organic remains (e.g., coprolites/dung, amorphous organic material, other): insect excrement present in woody material

Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other): Phytoliths present rarely outside of plants. Some desiccated material shows rectangular articulated phytoliths



Micro-artifacts (e.g., lithics, pottery, metal, glass, other): N/O

Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other): N/O

Sediment aggregates: granules are fine sand size, rounded. Blocky subrounded peds are dense w/ mineral inclusions

Rock fragments: basalt – moderately weathered

Minerals: olivine

Other inclusions:

Post-depositional features (type and degree)

Weathering (dessicated, water-logged): pellicular & cross linear in olivine – highly weathered pellicular in basalt

Evidence for Soil Formation (clay coatings): minimal clay coatings

Other:

Void Spaces/Pores

Void Shapes/Types: mostly packing, but also high amount of channels & vughs

Density: ~30%

Distribution: not evenly distributed

Sample Identification: **Date:** 25-VIII-2018

Site: NUU2

Context: Unit Q5 MM1 Bed M

Deposit type: Kauhale floor

Summary

Boundary (upper): Diffuse, occluded

Thickness: 2cm

Particle sizes: fine gravel through clay

Fine material: clay & silt

Color: Dark brown to black

Related distribution: open coarse enaulic (but compact)

Structure: Subrounded Blocky peds, low accomodation, complex packing & planar voids, vughs & channels

Boundary (lower): N/A, low

Bedding: unordered, normal grading

Sorting: poorly

c/f (coarse: fine) ratio: 15/85

Inclusions

Inclusions orientation: basic random & referred

Inclusions distribution: Clustered basic, random referred

For inclusions record (where appropriate): type, %, size, color, form, preservation

Plant remains: fibrous, round w/ diagnostic features, woody. towards top of bed, runs parallel - others are randomly distributed

Impressions of plants:

Charred remains: rare but present in silt size through coarse sand size

Calcitic ashes:

Other organic remains (e.g., coprolites/dung, amorphous organic material, other): excrements in circular (globular) plant tissue

Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other): N/D

Micro-artifacts (e.g., lithics, pottery, metal, glass, other): fine grained basalt, angular but not clearly lithic debitage

Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other): N/D

Sediment aggregates: aggregates are fine fraction, highly compact w/ speckled yellowish & red

Rock fragments:

Minerals: un-ID mineral inclusions throughout. Compact

Other inclusions: Quartz or feldspar (thinning white/clear), olivine. Blocky peds are fine gravel-size, un-ID yellow & red, poss. glass

Post-depositional features (type and degree)

Weathering (dessicated, water-logged): Some minor pellicular & cross linear weathering of olivine & ~5% of basalt

Evidence for Soil Formation (clay coatings): minor clay coatings forming around ~50% of voids,

Other: thin coat around basalt

Void Spaces/Pores

Void Shapes/Types: complex packing, planar through blocky peds, vughs & channels around blocky peds

Density: ~30%

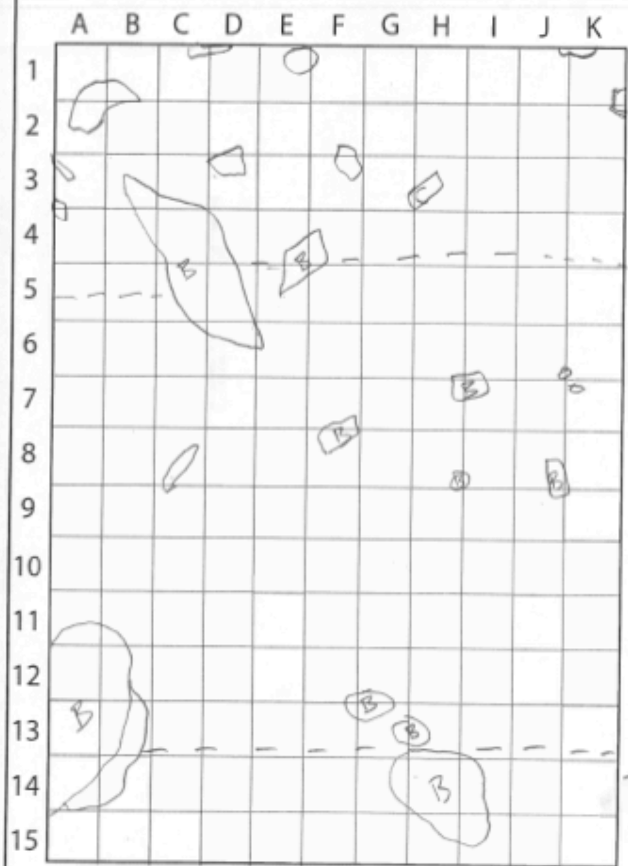
Distribution: uneven, more voids at top of bed

* still need pics of transitions : beds

ANTHRO126M Micromorphological Recording Forms **Slide Description**

Sample Identification:
Site: NUU 2
Date: 26-VII-2018
Sample ID: NUU2 R5 mm1
Context and deposit type: UNIT R5 mm1 House floor charcoal lens. East wall profile
3D Provenience (profile #, horizon, unit, coordinates):
South wall profile unit R5
Description (overall structure, boundaries, stratigraphy, etc.):
micromorph sample captures relationship b/w layers II, III & IV observed in excavation
x: 5lcm – 68cm y: 0cm z: 85-105cmbd, along structure's foundational 192.5cmbd. wall 3cm north of hearth 2, 1m south of hearth 1

Notes



II → characterized by burnt red basalt
all beds appear to have same structure & density, but middle layer has far denser microcharcoal
↳ which makes sense b/c that beds I & III are both associated w/ excavation layer I

III: finer particles
Irregular, diffuse borders
Characterized by darker sediment, more angular, grayish black rocks

IV yellower layer w/ heavily degraded basalt
↳ characterized by w basalt, more Mauw

Scale (slide size or magnification):

Sample Identification: **Date:** 27-VII-2018

Site: NW2

Context: UNIT R5 MM II

Deposit type: Kauhale House floor

Summary

Boundary (upper): N/A

Thickness: 1.5cm

Particle sizes: fine gravel through clay

Fine material: clay & silt → mostly microcharcoal for silt size particles

Color: Dark yellowish brown

Related distribution: Double spaced equal enaulic

Structure: granules & lenticular peds w/ planar voids, complex packing & vughs & channels in b/w. Interstitial grains

Boundary (lower): Diffuse, occluded

Bedding: unstratified, ungraded

Sorting: poorly

c/f (coarse: fine) ratio: 20/80

Inclusions

Inclusions orientation: basic small ang & med. expressed parallel, referred perpendicular

Inclusions distribution: basic clustered, referred parallel.

For inclusions record (where appropriate): type, %, size, color, form, preservation

Plant remains: rare - lenticular, perpendicular

Impressions of plants: voids that preserved structure of plant w/ ashed center still present

Charred remains: common - wood, plant material & pos. bone observed

Calcitic ashes:

Other organic remains (e.g., coprolites/dung, amorphous organic material, other):

N/O

Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other):

rare - phytoliths - rectangular.

Micro-artifacts (e.g., lithics, pottery, metal, glass, other):

finer grained basalt - not weathered, rare, pos. flaking debitage

Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other):

larger fine gravel size aggregates appear burnt - have reddened circular

Sediment aggregates: typic nodules cemented together by finer sediment vs silt & v. fine sand size granules vs look like these seen in micromorph from R9 of all aggregates, some w/ mineral inclusions Typical beds from NW2

Rock fragments:

Basalt

Minerals:

Olivine & unID red, orange & yellow minerals (diff. from other slides)

Other inclusions: Some yellow (magnesium?) staining at top of bed on coarse fraction

Post-depositional features (type and degree)

Weathering (dessicated, water-logged):

Evidence for Soil Formation (clay coatings): clay coatings on rounded weathered basalt, not visible on finer grained basalt & rare to see on charcoal

Other:

Void Spaces/Pores

Void Shapes/Types: mostly complex packing, planar voids through lenticular peds at top, vughs & channels around larger basalt pieces & larger peds.

Density:

Distribution:

Sample Identification:

Site: NUU2

Context: UNIT RS mm1 BEDIII

Deposit type: charcoal lense kauhale floor

Date: 27-VII-2018

Summary

Boundary (upper): Diffuse, occluded

Thickness: 3cm

Particle sizes: fine gravel through clay

Fine material: charcoal (silt) ; clay

Color: Dark brown - black

Related distribution: single spaced equal enaulic

Structure: granules b/w micro charcoal, complex packing voids ; vughs (around basalt)

Boundary (lower): Diffuse, occluded

Bedding: unstratified, ungraded

Sorting: poorly

c/f (coarse: fine) ratio: 60/40

Inclusions

Inclusions orientation: random – some oblique basalt but not consistent

Inclusions distribution: basic clustered, refferred random

For inclusions record (where appropriate): type, %, size, color, form, preservation

Plant remains: rare - lenticular, woody preserved.

Impressions of plants: n/o

Charred remains: Abundant

Calcitic ashes: yes, moderate, interstitial

Other organic remains (e.g., coprolites/dung, amorphous organic material, other):
n/o

Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other):
pos burnt bone, phytoliths (rare)

Micro-artifacts (e.g., lithics, pottery, metal, glass, other):
micro-lithics of fine-grained basalt - rare, burnt basalt (rare, fine gravel piece)

Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other):
2 blocky peds at bottom of bed have some typic red nodules bounded by clay that appear burnt

Sediment aggregates:
granules - fine sand sized - b/w charcoal inclusions

Rock fragments:
basalt

Minerals:
olivine, twinned plagioclase, calcite

Other inclusions:

Post-depositional features (type and degree)

Weathering (dessicated, water-logged):

Evidence for Soil Formation (clay coatings): Clay coatings around basalt ; olivine (; larger peds)

Other: but not charcoal

Void Spaces/Pores

Void Shapes/Types: complex packing w/ vughs

Density: 30%

Distribution: evenly distributed

Sample Identification:
Site: NWZ
Context: UNIT RS mm 1 BED IV
Deposit type: Kauhale floor

Date: 27-VII-2018

Summary

Boundary (upper): Diffuse, occluded
Thickness: 2cm
Particle sizes: fine gravel through clay
Fine material: clay & silt size microcharcoal
Color: dark reddish brown
Related distribution: Double spaced equal enaulic
Structure: granule w/ interstitial sediment

Boundary (lower): N/A
Bedding: unstratified, ungraded
Sorting: moderately
c/f (coarse: fine) ratio: 20/80

Inclusions

Inclusions orientation:
Inclusions distribution: } for fine gravel size → referred oblique orientation, basic clustered, linear distribution, referred random

For inclusions record (where appropriate): type, %, size, color, form, preservation
Plant remains: yellowish brown lenticular, & smashed, rare
Impressions of plants:
Charred remains: common - most small fine sand & silt size unid, some w/ woody characteristics
Calcitic ashes: interstitial, rare
Other organic remains (e.g., coprolites/dung, amorphous organic material, other): N/O
Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other): N/O
Micro-artifacts (e.g., lithics, pottery, metal, glass, other): towards top - some angular fine grained basalt
Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other): N/O
Sediment aggregates: granules have reddish tint - indicating pos. burning. Tightly packed
Rock fragments: Basalt
Minerals: Olivine, plagioclase, calcite
Other inclusions:

Post-depositional features (type and degree)

Weathering (dessicated, water-logged):
Evidence for Soil Formation (clay coatings): clay coating around rounded basalt; about ½ of charcoal & plant poorly formed
Other:

Void Spaces/Pores

Void Shapes/Types: complex packing, vughs around basalt
Density: 20%
Distribution: evenly distributed

ANTHRO126M Micromorphological Recording Forms **Slide Description**

Sample Identification: **Date:** 30-VII-2018

Site: NUU2 Sample ID: NUU2 R5mm2

Context and deposit type: UNIT R5 mm 2 - Kauhale House Floor, west wall

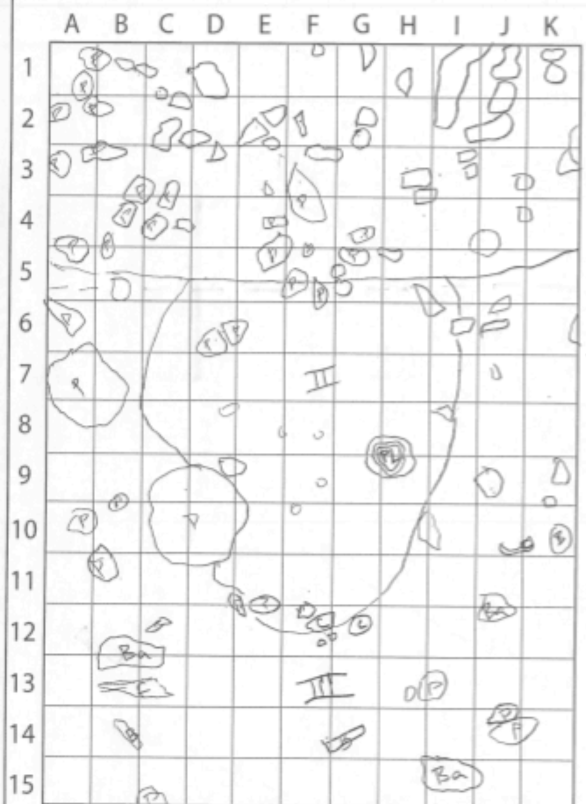
3D Provenience (profile #, horizon, unit, coordinates):

East wall through charcoal lens

Description (overall structure, boundaries, stratigraphy, etc.):

Captured transition from LII to ash lens X: 100cm Y: 18-26cm. Z178.5cmbd - along structure wall - 3m north of marker 2, 1m S of marker 1 192.5cmbd

Notes



II: Filled w/ larger peds, less dense fine material

IIIA: Lighter color but dense, smaller peds more plant material ↳ light sediment

IIIB: Darker color, dense w/ burnt bone

Denser charcoal

Burnt basalt chunks

↳ denser, darker fine material

Ba: Basalt B: Bone C: Charcoal P: Ped PL: Plant material F: Flake

Scale (slide size or magnification):

Sample Identification:

Date: 23-I-2019

Site: NUU 2

Context: UNIT B5 mm2 Bed 2

Deposit type: House Floor

Summary

Boundary (upper): N|A

Thickness: 2cm

Particle sizes: clay to fine gravel. Dominant size: clay to medium sand

Fine material: clay & silt (clay dominant)

Color: very dark brown

Related distribution: single spaced fine enaulic w/ blocky peds

Structure: granules & pourous crumb structure w/ blocky peds. complex packing voids & planar voids b/w blocky peds. vughs

Boundary (lower): Distinct boundary at low mag. Diffuse at high mag.

Bedding: ungraded, matrix supported

Sorting: poorly sorted

c/f (coarse: fine) ratio: 30/70

Inclusions

Inclusions orientation: Basic small angle, Referred parallel orientation for charcoal, plant, lithics. peds are more perpendicular. Sand

Inclusions distribution: Basic linear Referred random for plant, charcoal & lithics. Peds have Basic random distribution, often perpendicular → some perpendicular

For inclusions record (where appropriate): type, %, size, color, form, preservation

Plant remains: medium sand size (dominant → some larger pieces up to fine gravel), yellowish brown. frequent stem cross-section, sparse

Impressions of plants: coarse sand size, rare

Charred remains: fine to coarse sand size burnt bone. Silt size to fine gravel size charcoal → several pieces of Dung charcoal moderate.

Calcitic ashes: rare. fine sand size, in large blocky peds lite gray.

Other organic remains (e.g., coprolites/dung, amorphous organic material, other):

Insect dung (pos. earthworm or termite). Rare, very fine sand size

Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other):

burnt bone, rare, fine sand size. No shell observ. Rod phytoliths, sparse, pos. starches, moderate in voids

Micro-artifacts (e.g., lithics, pottery, metal, glass, other):

Basalt lithics rare, along bottom of Bed, fine gravel size

Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other):

Burnt basalt, pos. burnt aggregates?

Sediment aggregates (include size range, average size, and internal characteristics):

most common sizes are coarse sand, fine sand & fine gravel. most common is fine sand

Rock fragments:

medium grained basalt w/ crystaline structure, more blocky outside of peds, rounded & degraded in peds. Coarse to very coarse sand in peds, coarse sand to fine gravel outside. sparse to moderate.

Minerals: Olivine, clay minerals (pos. oxidized olivine) - silt to very fine sand

Other inclusions:

Post-depositional features (type and degree)

Weathering (dessicated, water-logged): Pellicular & cross-linear of olivine, Pellicular of basalt

Evidence for Soil Formation (clay coatings): Clay coatings (typic).

Other:

Void Spaces/Pores

Void Shapes/Types: complex packing, vugh, planar

Density: ~30%

Distribution: Random

Sample Identification: **Date:** 23-I-2019

Site: NUU2

Context: UNIT R5 MM2 BED IIIA

Deposit type: House floor Ash lens

Summary

Boundary (upper): Indistinct, occluded

Thickness: 3.25 cm

Particle sizes: varied → all sizes

Fine material: clay ; silt

Color: reddish yellowish brown

Related distribution: Double spaced fine enaulic w/ blocky peds (close porphyric)

Structure: granules

Boundary (lower): Indistinct, occluded

Bedding: matrix supported polymodal

Sorting: poorly sorted in strata bed

c/f (coarse: fine) ratio: 20/80

Inclusions

Inclusions orientation: Basic Broadangle, parallel returned

Inclusions distribution: Basic linear for basalt ; organic notional, broadangle. random returned

For inclusions record (where appropriate): type, %, size, color, form, preservation

Plant remains: 10% yellowish red ; range in size from length of large peds to fine sand

Impressions of plants: yes - where some plants have eroded (5%?) well preserved

Charred remains: yes, common (~40%)

Calcitic ashes: rare, mostly in peds ~ 1-2%

Other organic remains (e.g., coprolites/dung, amorphous organic material, other): n/o

Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other): phytoliths ~ rare

Micro-artifacts (e.g., lithics, pottery, metal, glass, other): n/o

Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other): Aggregates that appear to be deposited w/ ash ; charcoal

Sediment aggregates (include size range, average size, and internal characteristics): Rubification of peds w/ iron nodules - water moving through

Rock fragments: yes - basalt fragments but do not appear to be eroded.

Minerals: Olivine, red minerals

Other inclusions:

Post-depositional features (type and degree)

Weathering (dessicated, water-logged):

Evidence for Soil Formation (clay coatings): typic around peds ; basalt fragments

Other:

Void Spaces/Pores

Void Shapes/Types: packing, vughs, planar

Density: ~ 40%

Distribution: random

Sample Identification: **Date:** 27-III-2019

Site: NWZ

Context: UNIT R5mm2 Bed III B

Deposit type: House floor

Summary

Boundary (upper): Irregular – bounded by larger peds

Boundary (lower): N/A

Thickness: Bed: 4cm, boundary 2-5 cm

Bedding: matrix supported

Particle sizes: ~~silt/clay~~ All – silt to gravel

Sorting: poorly sorted

Fine material: clay & silt

c/f (coarse: fine) ratio: 30/70

Color: dark reddish brown

Related distribution: single spaced fine enaulic & concave gefuric

Structure: moderate granular

Inclusions

Inclusions orientation:
Inclusions distribution: linear orientation random distribution of debitage – random orientation & dis of charcoal, bones are perpendicular orientation

For inclusions record (where appropriate): type, %, size, color, form, preservation

Plant remains: ~~[illegible]~~ mostly greyish brown or

Impressions of plants: dark yellowish brown, in voids (suggesting most has rotted away)

Charred remains: yes – common. Bone, basalt & charcoal all evidence burning. Black basalt & red bone ↳ well preserved

Calcitic ashes: yes – rare but visible – light grey.

Other organic remains (e.g., coprolites/dung, amorphous organic material, other):

N/O

Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other):

phytoliths likely but N/O. Burnt bone observed. 3 pieces – all long

Micro-artifacts (e.g., lithics, pottery, metal, glass, other):

N/O

Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other):

~~[illegible]~~ trampled aggregates? Top of layer bounded by subangular blocky peds

Sediment aggregates (include size range, average size, and internal characteristics):

clay aggregates

Rock fragments:

Basanite basalt both cylindrical inherited & angular debitage

Minerals: olivine – small-fine silt. frequent & less frequent than other slides. white degraded

Other inclusions: minerals – weathered olivine?

Post-depositional features (type and degree)

Weathering (dessicated, water-logged): minerals are highly weathered as are plants in voids

Evidence for Soil Formation (clay coatings): clay coatings around cylindrical basalt & minerals

Other: No clear rubification

Void Spaces/Pores

Void Shapes/Types: vughs, packing, planar

Density: 10%

Distribution: random

plow chicha plan
most – tiq ni'i'a free

ANTHRO126M Micromorphological Recording Forms **Slide Description**

Sample Identification: NUU2R9MM1
Site: NUU2
Context and deposit type: House floor
3D Provenience (profile #, horizon, unit, coordinates):
East wall 131cmbd – 147cmbd x: 100cm y = 90-99cm
Description (overall structure, boundaries, stratigraphy, etc.):
Captures Layer II (BED II) & Layer III (BED III) from excavation

Date:
Sample ID: NUU2R9MM1

L4 - better sorted than other samples

degraded olivine?

L2 (thin section likely ...) columnar peds

L4 – ... olivine

L4-5 microstrata, most fragmented & olivine in bottom layer

L5

Notes

* peds likely inherited w/ fine fraction deposited either anthropogenically or through weathering
- microcharcoal fragment
* peds show lenticular shape highly compact w/ horizontal cracks which indicate trampling (Rentzel et al. 2017 p. 29)
← peds dominate w/ little fine fraction in voids b/w peds (no infilling)
Small fragments of basalt occur w/in soil peds. Larger pieces are outside of soil peds, w/ lower occurrence
→ Fine particles fill in voids b/w soil peds
w/ far more dense, reddish sediment
Plant remains in void
Small pieces of basalt w/ & w/out weathered cortex outside of peds in fabric
Same type of plant remains continued to appear in each slide (rubification?)

Scale (slide size or magnification):

* phyto sample taken from L5
↳ recovered palms, spherical yellow cost, Lus gass, sdgs pfeet
Transition into redder sediment (could change thickness of slide)

Sample Identification: NUU2R9mm1 Bed1 **Date:** 7-May-2018
Site: NUU2R9
Context: L II & L III Boundary
Deposit type: House floor

Summary

Boundary (upper): NA
Thickness: ~3mm
Particle sizes:
Fine material:
Color: reddish brown
Related distribution: coarse enaulic
Structure: peds - crumbs
↳ smaller peds → granules. Packing voids. Subangular & rounded peds. Loosely packed

Boundary (lower): diffuse
Bedding:
Sorting: poorly sorted
c/f (coarse:fine) ratio: 20/80 ?

Inclusions

Inclusions orientation: oblique
Inclusions distribution: parallel

For inclusions record (where appropriate): type, %, size, color, form, preservation
Plant remains: stems, roots, tissue, pieces are well-preserved - Largest piece 375 × 375 μm ~2% of layer (rare)
Impressions of plants: no
Charred remains: - charcoal pieces → fan shaped wood fragments - <5% of layer (sparse)
Calcitic ashes: ↳ some deposits of ash, ≤10%

Other organic remains (e.g., coprolites/dung, amorphous organic material, other): none observed

Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other): yes, phytoliths most visible in voids → elongate, fan shaped ↳ potentially ; squared? present in all voids but could be artifact of slide or crystals forming in voids?

Micro-artifacts (e.g., lithics, pottery, metal, glass, other):
↳ lithics, charcoal → elongated ; oblique orientation

Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other):

Sediment aggregates: yes → 90% of bed

Rock fragments: yes → basalt (olivine) → small inherited pieces in peds & larger deposited likely ?

Minerals: olivine, kyanite, zircon, calcite

Other inclusions: ↳ only minerals that appear to not be inherited are olivine grains → anthropogenic origin

Post-depositional features (type and degree)

Weathering (dessicated, water-logged): weathering of olivine → Alteration pattern A, → pellicular Class 1 to 2
Evidence for Soil Formation (clay coatings): → clay coatings on larger basalt pieces → mostly capping - some pendant, some complete
Other:
Pattern B, class 1 - irregular linear
Pattern E class 4 → complete

Void Spaces/Pores

Void Shapes/Types: complex packing void, vugh
Density: ~40%
Distribution: random

Sample Identification:

Site: NUU2 R9 MM 1 Bed 2
Context: NUU2 R9 Bed 1 111
Deposit type: House floor

Date:

Summary

Boundary (upper): Diffuse, occluded
Thickness: ~1 cm
Particle sizes: clay aggregates, fine sand coarse fraction
Fine material: clay aggregates
Color: dark reddish brown
Related distribution: close prophyric
Structure: crumbs & granules. Packing voids

Boundary (lower): n/A
Bedding:
Sorting: moderately sorted (3/5)
c/f (coarse: fine) ratio: 15/85

boundary has bits of charcoal that appear to have been a larger piece that has broken up

Inclusions

Inclusions orientation: oblique at bottom, parrallel w/in boundary
Inclusions distribution:

For inclusions record (where appropriate): type, %, size, color, form, preservation
Plant remains: yes, monocot stem (very fine), plant tissue in void, yellowish brown. Majority of plant remains are of stem
Impressions of plants:
Charred remains: charcoal - oblique orientation at bottom of bed (cross-cuts)
Calcitic ashes: yes, black circular ash residue
Other organic remains (e.g., coprolites/dung, amorphous organic material, other): & w/in boundary (possibly remnants of mat)

Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other): → oblique orientation at bottom, parral at top, small pieces of bone throughout layer, no phytoliths or shell observed
Micro-artifacts (e.g., lithics, pottery, metal, glass, other):
debitage (basalt) (sparse), charcoal (sparse)
Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other):
none observed
Sediment aggregates:
throughout - dominates layer. fine crumbs & granules dominated w/ blocky peds along boundary
Rock fragments:
round basalt inherited, weathered olivine, Basanite basalt
Minerals: No observed basalt flakes
Olivine, other inherited minerals
Other inclusions:

Post-depositional features (type and degree)

Weathering (dessicated, water-logged): pellicular alteration, class 1
Evidence for Soil Formation (clay coatings): sparse clay coatings along inherited basalt
Other:

Void Spaces/Pores

Void Shapes/Types: packing, planar along boundary, vugh
Density: ~20%
Distribution: random

ANTHRO126M Micromorphological Recording Forms **Slide Description**

Sample Identification:

Date:

Site: NUU2

Sample ID: NUU2R9mm2

Context and deposit type: House floor, Archaeological interpretation

3D Provenience (profile #, horizon, unit, coordinates):

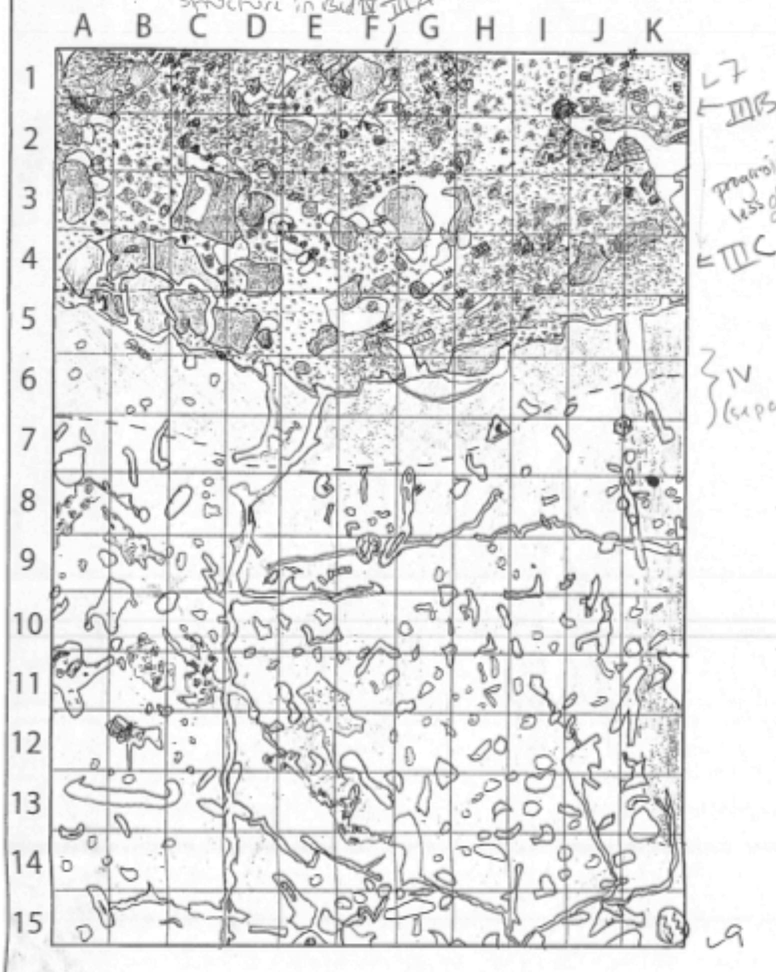
East wall 156cmbd - 169cmbd x = 100cm y: 65cm - 72cm

Description (overall structure, boundaries, stratigraphy, etc.):

~~[illegible]~~ captures Layers II (BEDS I, II, & III) & Layer III (BED IV) from excavation

* microcharcoal throughout but for more dense in Bed I & II

Horizontal cracks in peds in Bed I & in massive structure in Bed ~~IV~~ IIIA



Notes

- First step that will guide how to procede w/ identification of slides.
  - ↳ overall arrangements, presence/absence, comparison w/ other slides
- This section for annotating the drawing
- Describe bed in few words
- provide legend
- Draw @ least 1 per site
- import scan into illustrator, annotate image

Scale (slide size or magnification):

Sample Identification:
Site: NVU2
Context: UNIT R9 Bed IIA
Deposit type: House

Date: 2-April-2018

Summary

Boundary (upper): Top of slide supposed to be
Thickness: 6.4mm - 0.5mm thickness of boundary
Particle sizes: 977.87μm — 130.40μm
Fine material: yes -
Color: reddish brown & black
Related distribution: unrelated/random. Interpedal clay coatings random arrangement; pellicular grain microstructure; crumb microstructure
Structure: large peds - crumbs (porous) dominant; smaller peds → granules; single-spaced Enaulic. Lower boundary has subangular peds, loosely packed. Peds are moderately separated → complex packing voids, vughs; primary (40% total void space, 90% type of voids) → rough void walls

Boundary (lower): Diffuse, faint
Bedding:
Sorting: poorly sorted
c/f (coarse: fine) ratio:
→ serrated surface, rough; → unaccomodated; → moderately devel. pedality

Inclusions

Inclusions orientation: oblique orientation
Inclusions distribution: random distribution

For inclusions record (where appropriate): type, %, size, color, form, preservation
Plant remains: rare - one dicot stem, one possible dessicated (burnt) tissue, fine
Impressions of plants:
Charred remains: possible charred plant tissue
Calcitic ashes: yes, clumps of greyish-black charcoal. round, medium sand size. sparse

Other organic remains (e.g., coprolites/dung, amorphous organic material, other):
Charcoal - moderate to common in many different sizes. Dominated by very fine, smooth rounded pieces but some are fan shaped & some are oblong & elongated → oblique orientation
Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other):
phytoliths - rare, circular w/ central depression
Micro-artifacts (e.g., lithics, pottery, metal, glass, other):

Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other):
none observed
Sediment aggregates:
yes blocky, granules & crumbs - dominated by clay aggregates (crumb structure)
Rock fragments:

Minerals: yes, mostly inherited in peds

Other inclusions:

Post-depositional features (type and degree)

Weathering (dessicated, water-logged):
Evidence for Soil Formation (clay coatings):
Other:

Void Spaces/Pores

Void Shapes/Types: complex packing, vugh
Density:
Distribution: random

Sample Identification:
Site: NUU2 RAmm2
Context: NUU2 RA mm2 BED [illegible] 111B
Deposit type: House Floor

Date: 25-VI-2018

Summary

Boundary (upper): indistinct, occluded - most visible at x2
Thickness: ~ 200 µm
Particle sizes: clay & silt aggregates
Fine material: clay & silt
Color: dark brown w/ Black charcoal & ash specks
Related distribution: Double spaced coarse enaulic,
Structure: crumbs, subangular blocky peds & packing voids intrapedal vughs & nodules w/ planar voids, partially accomodated

Boundary (lower): Distinct w/ Bed 3, abrupt w/ Bed 4
Bedding: ?
Sorting: moderately sorted
c/f (coarse: fine) ratio: 40/60

Inclusions

Inclusions orientation: basic orientation: random
Inclusions distribution: basic distribution: random

For inclusions record (where appropriate): type, %, size, color, form, preservation
Plant remains: in voids - rare. Some tissue remains - opaque w/ greenish hue & dark flecks
Impressions of plants:
Charred remains: - charcoal is abundant - largely round pieces - very fine sand size
Calcitic ashes: Some ash infilling - almost appears as hypo-coatings. Ash circles as well - sparse to moderate

Other organic remains (e.g., coprolites/dung, amorphous organic material, other):
none observed

Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other):
possible bone (only 1-2 pieces total observed in this bed), Phytoliths likely present inside voids, but not diagnostic & not abundant
Micro-artifacts (e.g., lithics, pottery, metal, glass, other):
Sparse lithic debitage (only 1 piece thus far observed). oblique
Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other): related distribution
charcoal flecks in aggregates
Sediment aggregates:
Abundant - crumb structure made up of smaller particles, charcoal, nodules, & inherited minerals & basanite
Rock fragments:
Basanite basalt - sparse → random dis & orientation
Minerals:
~~Feldspar, olivine - random distribution & orientation~~
Other inclusions: mysterious bright red minerals - very fine sand size, equant. Acicular red yellow mineral - tabular. blue mystery inclusion (photograph taken)

Post-depositional features (type and degree)

Weathering (dessicated, water-logged): Pellicular - moderate weathering, irregular linear (moderate) of olivine
Evidence for Soil Formation (clay coatings): clay coatings, pendants on charcoal & complete coverage of minerals
Other:

Void Spaces/Pores

Void Shapes/Types: Vughs & packing voids, Planar around blocky peds, [illegible]
Density: 50% ?
Distribution:
Random

Sample Identification:
Site: NUU2 R9 mm2
Context: NUU2 UNIT R9 mm2 BED3C
Deposit type: HOUSE FLOOR

Date: 25-VI-2018

Summary

Boundary (upper): indistinct, occluded
Thickness:
Particle sizes: clay to fine sand w/ coarse sand
Fine material: clay anthropogenic inclusions
Color: Dark Brown
Related distribution: single spaced coarse enaulic, gefuric w/ coarse material at least 90%
Structure: granules & crumbs w/ packing voids

Boundary (lower): Sharp smooth
Bedding:
Sorting: moderately sorted
c/f (coarse: fine) ratio: 20/80

microcharcoal

Inclusions

Inclusions orientation: random
Inclusions distribution: random

For inclusions record (where appropriate): type, %, size, color, form, preservation
Plant remains: none observed
Impressions of plants:
Charred remains: moderate % density, black (plant or coral?), black plant charcoal, reddish orange bone, microcharcoal throughout
Calcitic ashes: none observed

Other organic remains (e.g., coprolites/dung, amorphous organic material, other):
none observed
Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other):
possible charred coral
Micro-artifacts (e.g., lithics, pottery, metal, glass, other):
charcoal, possible coral, burnt bone
Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other):
reddish-dark brown crumb & granule aggregates, possibly burnt
Sediment aggregates:
some peds w/ inherited minerals
Rock fragments:
rare pieces of olivine
Minerals:
olivine - rare
Other inclusions: none observed

Post-depositional features (type and degree)

Weathering (dessicated, water-logged): low level pellicular alteration, irregular linear
Evidence for Soil Formation (clay coatings): low level weathering, highly weathered olivine (Dotted)
Other: clay coatings (small, thin) surrounding bone & minerals
~~no clay coating around larger charcoal piece~~

Void Spaces/Pores

Void Shapes/Types: complex packing, vughs
Density: 30%
Distribution:

Sample Identification:

Site:

Context:

Deposit type: Bed4

Date:

Summary

Boundary (upper): Abrupt

Thickness: < 2 cm

Particle sizes: clay & silt

Fine material: majority clay

Color: yellowish red-brown

Related distribution: random

Structure: fine monic

Boundary (lower): N/A

Bedding:

Sorting: well-sorted

c/f (coarse: fine) ratio: 2/98

Inclusions

Inclusions orientation: random

Inclusions distribution: random

For inclusions record (where appropriate): type, %, size, color, form, preservation

Plant remains: present – material is yellowish brown; present in majority of chanel voids, highly degraded

Impressions of plants: N/O → organ residue

Charred remains: charcoal dots but throughout

Calcitic ashes: possible ?

Other organic remains (e.g., coprolites/dung, amorphous organic material, other): N/O

Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other): possible phytoliths

Micro-artifacts (e.g., lithics, pottery, metal, glass, other): N/O

Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other): N/O

Sediment aggregates: Clay aggregates → weakly separated, amorphous

Rock fragments: N/O

Minerals: ~~olivine~~

Other inclusions: red mineral, yellow mineral that could be degraded olivine

Post-depositional features (type and degree)

Weathering (dessicated, water-logged): olivine is highly weathered – pellicular & cross linear, yellow mineral shows extensive alteration

Evidence for Soil Formation (clay coatings): yes → infillings & hypo-coatings in channel voids.

Other: possible crystal formation (but could be phytoliths)

Void Spaces/Pores

Void Shapes/Types: equal amount of channels, compound packing, vessicles, & vughs

Density: 20-30%

Distribution: more voids on left half & bottom half of bed

ANTHRO126M Micromorphological Recording Forms **Slide Description**

Sample Identification: NUU 2R10 mm1

Date:

Site: R10

Sample ID: NUU2R10MM1

Context and deposit type: House floor

3D Provenience (profile #, horizon, unit, coordinates):

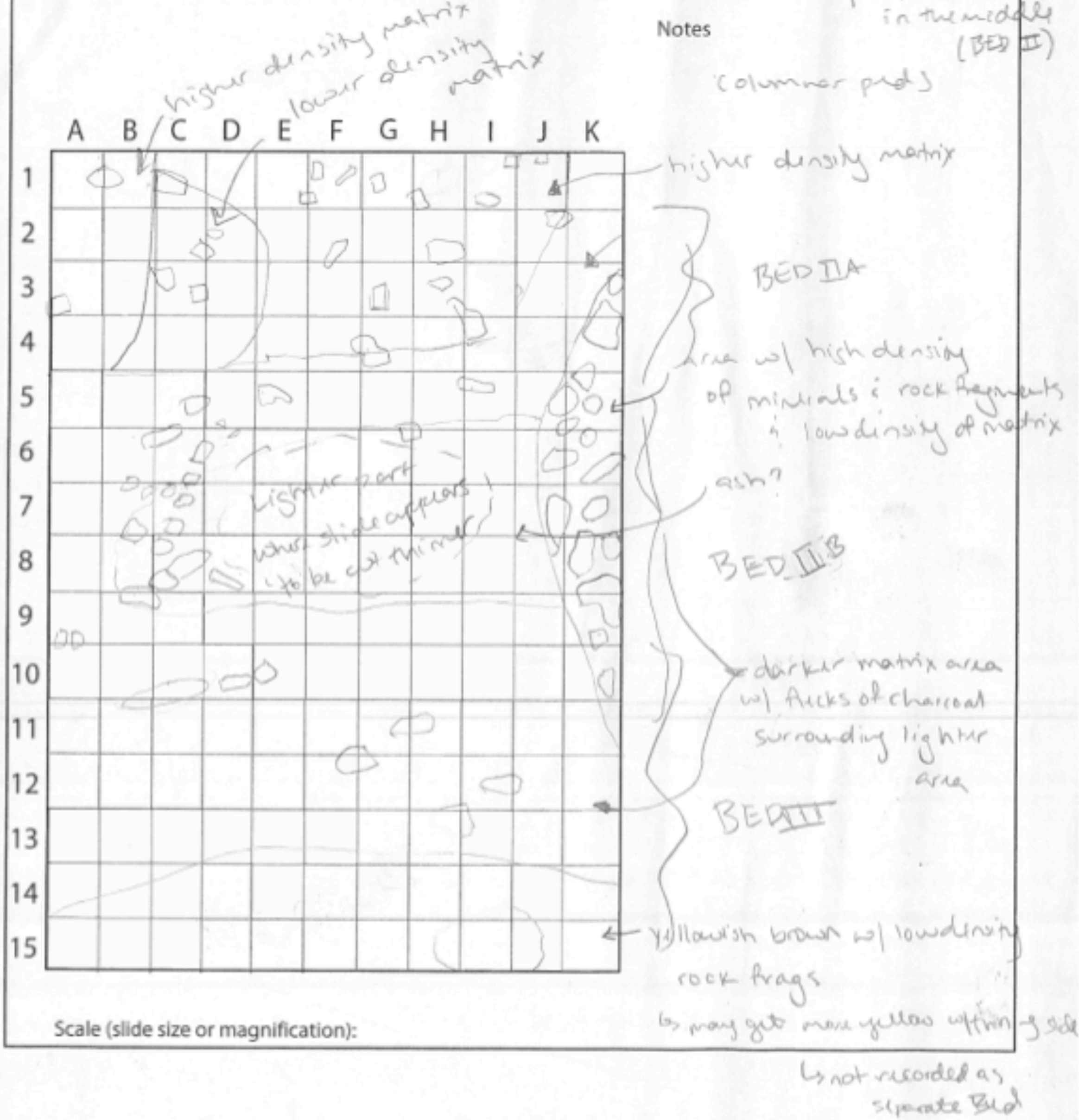
Southern wall (which is N. wall of R9) 140cmbd to 159cmbd x: 47cm – 56cm y: 0cm

Description (overall structure, boundaries, stratigraphy, etc.):

Looks to have captured L-II (BED II) & L-III (BED III) from excavation w/ an ash lens in the middle (BED II)

Notes

(columnar peds)



Scale (slide size or magnification):

Sample Identification:
Site: NWZR10MM1
Context: UNIT R10 BED II A
Deposit type: HOUSE FLOOR

Date: 12-VII-2018

Summary

Boundary (upper): N/A
Thickness: 1.75cm
Particle sizes: Clay & silt soil peds, silt bridging peds & silt-size microcharcoal. ↳ inclusions of fine sand to fine gravel present → fine & coarse sand most common → fine gravel rare in this level (1 piece of ...)
Fine material: ↳ clay & silt
Color: dark reddish brown mottled w/ black (microcharcoal)
Related distribution: double spaced coarse enaulic ↳ alternating pattern of single spaced coarse enaulic from left to right
Structure: ↳ crumbs, granules & subangular peds w/ horizontal planar voids in blocky peds (& some lenticular peds) & packing voids ...

Boundary (lower): Diffuse & wavy
Bedding:
Sorting: moderately sorted at low mag, poorly sorted at high mag (10x)
c/f (coarse: fine) ratio: 30/60 (coarse material mostly charcoal)

Inclusions

Inclusions orientation: } coarse inclusions (coarse sand) (& peds) seem to be stacked on top of each ... subrounded rectangular coarse sand size
Inclusions distribution: } clustered & linear - parallel distribution & perpendicular ...

For inclusions record (where appropriate): type, %, size, color, form, preservation
Plant remains: rare - fibrous material - coarse sand size - yellowish brown w/ whiter edge & yellower center - ...
Impressions of plants: rare - evidence of interior fibrous material that has rotted away but outline remains
Charred remains: microcharcoal is abundant throughout ↳ several coarse sand-size pieces ↳ rare but small "grains" present - gray & ... that are rectangular & ribbed w/ reddish color on ribbing - could be wood, bone or potentially ... Also same type of rounded charcoal w/ cross-hatch structure seen in all other slides from NW7R9
Calcitic ashes:
Other organic remains (e.g., coprolites/dung, amorphous organic material, other):
None observed
Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other):
potential charred bone (medium sand size) - right shape & structure but difficult to tell b/c inclusions are so charred
Micro-artifacts (e.g., lithics, pottery, metal, glass, other):
two pieces of possible lithic debitage - angular ... coarse sand & fine gravel - not weathered
Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other):
possible clay aggregates due to burning - iron rich (reddened) w/ microcharcoal throughout
Sediment aggregates:
↳ nucleic nodules w/ minerals, inherited round basalt - highly weathered
Rock fragments:
Basalt - round & highly weathered
Minerals: Feldspar (?), olivine dominant mineral, other red unknown mineral
Other inclusions:

Post-depositional features (type and degree)

Weathering (dessicated, water-logged): dessicated plant material, weathered minerals
Evidence for Soil Formation (clay coatings): clay coatings surrounding inherited basalt & mineral (weathered)
Other: Cracks in peds ↳ horizontal ↳ infillings are minor

Void Spaces/Pores

Void Shapes/Types: complex packing & primary voids, planar voids in square peds, vughs
Density: 30-40% (?)
Distribution: random throughout

14230 = 3650 + 5290 + 5290

Sample Identification: **Date:** 13-VII-2018

Site: NUU2 R10 MM1
Context: NUU2 Unit R10 Bed 2B
Deposit type: House Floor

Summary

Boundary (upper): Indistinct, smooth
Boundary (lower): Indistinct, smooth
Thickness: 3.5 cm
Bedding:
Particle sizes: Clay through fine gravel
Sorting: poorly sorted
Fine material: Clay & silt w/ fine sand through fine gravel
c/f (coarse: fine) ratio: 40/60
Color: Dark reddish brown
Related distribution: single spaced coarse
Structure: crumb & granular, enaulic, subangular peds w/ packing voids; slight yellow portion in center of layer, but I believe this is an artifact of the thin section - this part was cut thin. Large beds have planar voids (horizontal cracks)

Inclusions

Inclusions orientation: Very coarse sand to fine gravel peds & anthropogenic inclusions
Inclusions distribution: are clustered together but randomly oriented. Everything else is randomly oriented & distributed

For inclusions record (where appropriate): type, %, size, color, form, preservation
Plant remains: highly degraded fibrous plant remains - yellowish, very few. Better preserved greyish yellow remains w/ fibrous exterior, internal characteristics, c layered w/ ...
Impressions of plants: n/o
Charred remains: multiple types, all sizes. Larger pieces are burnt/charred plant, burnt wood? look like seeds inside (very fine ...
Calcitic ashes: possibly - square greyish pieces, very fine sand size. High relief so may ... burnt shell - no ... in xpl
Other organic remains (e.g., coprolites/dung, amorphous organic material, other):
None observed
Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other):
Burnt, charred bone - black edges, red center (high temp heat)
Micro-artifacts (e.g., lithics, pottery, metal, glass, other):
Silver microlithic debitage flakes, clustered together w/ lenticular peds & charcoal in center, along the ...
Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other):
Possibly anthropogenic aggregates - silty ash bound w/ clay w/ microcharcoal sprinkled throughout & along right ... reddish staining (from burning?)
Sediment aggregates: nodules & more clay dominated aggregates look inherited - less microcharcoal
Rock fragments:
rounded, weathered basalt, angular basalt (anthropogenic)
Minerals:
olivine
Other inclusions: large very coarse sand size peds are clustered / stacked on each other running along right side; no or very few interstitial grains & smaller ...

Post-depositional features (type and degree)

Weathering (dessicated, water-logged): heavy pellicular weathering of olivine, dessicated ... (hollow center)
Evidence for Soil Formation (clay coatings): clay coatings around basalt grains - thin coatings, not all around
Other:

Void Spaces/Pores

Void Shapes/Types: complex packing & primary, planar cracks in peds & some vertical cracks, vughs
Density: more dense & different than other layers, accomodating voids (less dense voids) 20-30% void?
Distribution: unevenly distributed - some areas w/ more interstitial grains than others w/in bed - patchy

Sample Identification: **Date:** 13-VII-2018
Site: NUU2 RIO mm1 BED3
Context: UNIT RIO mm 1 BED3
Deposit type: House floor

Summary

Boundary (upper): Diffuse, smooth
Thickness: 1cm
Particle sizes: clay through coarse sand
Fine material: silt clay (w/ the large very coarse sand size-ped
Color: reddish brown
Related distribution: double spaced fine enaulic
Structure: granule w/ complex packing voids; planar voids through one large!

Boundary (lower): N/A
Bedding:
Sorting: moderately sorted
c/f (coarse: fine) ratio: 10/90

Inclusions

Inclusions orientation: random
Inclusions distribution: clustered along edges ; in center

For inclusions record (where appropriate): type, %, size, color, form, preservation
Plant remains: very few – possibly only 1 highly degraded piece of fibrous plant tissue yellowish brown, nonfraction
Impressions of plants: N/O
Charred remains: N/O
Calcitic ashes: N/O

Other organic remains (e.g., coprolites/dung, amorphous organic material, other): N/O

Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other): N/O

Micro-artifacts (e.g., lithics, pottery, metal, glass, other): N/O

Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other):
Sediment aggregates: silt aggregates could be, with flower charcoal ↳burnt? pieces ~~charcoal~~ on inside peds
Rock fragments: Basanite – rounded, highly weathered
Minerals: olivine – highly weathered
Other inclusions:

Post-depositional features (type and degree)

Weathering (dessicated, water-logged): pellicular ; cross lines weathering of basalt ; olivine ↳highly weathered
Evidence for Soil Formation (clay coatings): ↳sand size
Other: ↳thin clay coatings on sand size rounded basalt

Void Spaces/Pores

Void Shapes/Types: complex & primary packing, planar, vugh
Density: more voids than previous layer; 30-40%?
Distribution: evenly distributed along most of bed. Large ped ; more interstitial grains on right hand side means fewer voids

ANTHRO126M Micromorphological Recording Forms **Slide Description**

Sample Identification:
Site: NUU2 UNIT R10 mm2
Date: 16-VII-2018
Sample ID: NUU2R10MM2
Context and deposit type: NUU2 UNIT R10 House floor
3D Provenience (profile #, horizon, unit, coordinates):
Eastern wall, capturing Layers II, III & IV, from 135 to 154 cmbd
Description (overall structure, boundaries, stratigraphy, etc.):
Looks to have captured dark brown soil stain, Layer II (BED II) & (BED I) L III (BED III) from Accounts
↳ appears that transition to Layer IV is just visible at the bottom of side

Notes: Columnar peds

Fine Root runs from top to bottom of thin section w/ some plant residue preserved in void through

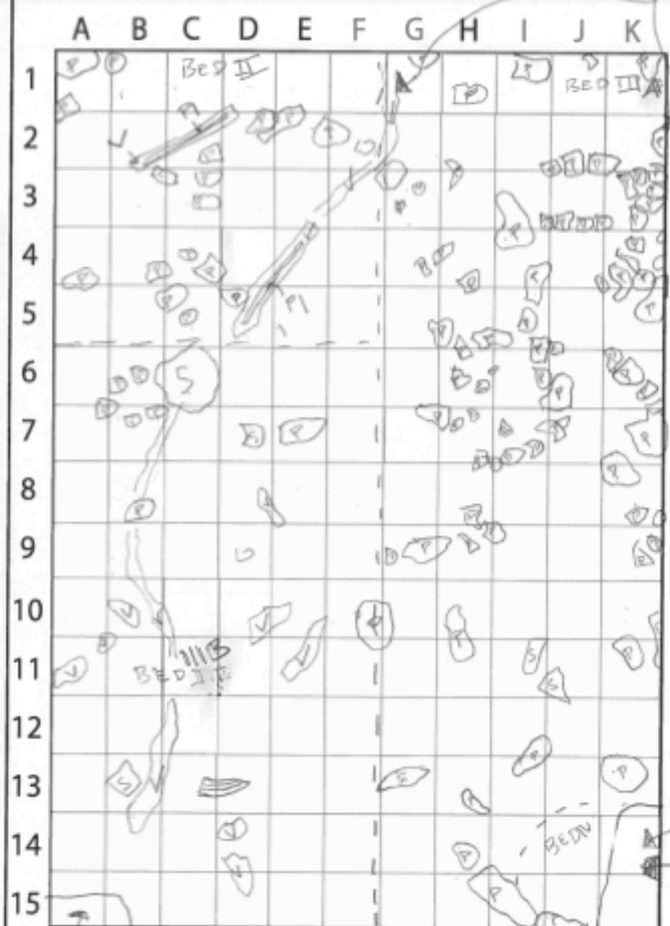
Peds seem to be clustered in circular formations & densest (& largest) along right side in Bed II

- The corners on bottom of the section appear to have broken off in impregnation & cutting process

- Possible 4th bed in bottom right corner - strike lo

- Anthropogenic material seems to be densest in Bed II at just
↳ Definitely mag. but still rare

Bed IV in right corner, visible @



Broken corner

Broken corner
Bone P: Ped S: Stone Pl: Plant material
C: charcoal V: Void
Scale (slide size or magnification):

Sample Identification: **Date:** 15-VII-2018

Site: NU02 R10 mm2
Context: housfloor east wall unit R10 Bed II
Deposit type: House floor

Summary

Boundary (upper): N/A
Thickness: 2.5cm
Particle sizes: ranges from clay to medium sand
Fine material: silt & clay
Color: dark red-yellowish brown
Related distribution: Double-spaced coarse Enaulic
Structure: granule w/ packing voids

Boundary (lower): Diffuse, smooth
Bedding:
Sorting: moderately sorted @2.4x poorly
c/f (coarse: fine) ratio: 10/90

Inclusions

Inclusions orientation: } minerals are randomly oriented & distributed.
Inclusions distribution: } charcoal is clustered together w/ ash, often in dense peds. Moderately expressed medium parallel angle w/ each other, oblique to perpendicular orientation in matrix

For inclusions record (where appropriate): type, %, size, color, form, preservation

Plant remains: very low% fine roots (2) that run down through bed w/ some yellow plant material left, → where plant material has degraded away, a void remains

Impressions of plants:

Charred remains:

Calcitic ashes: yes, small sparse clumps of pinkish gray inclusions that may be charred, ashy shell. same types of charcoal as mm1 but far less dense - most gray, some pinkish

Other organic remains (e.g., coprolites/dung, amorphous organic material, other):
None observed

Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other):
possible phytoliths but sparse - rod w/ ribs, fan shaped. no bones observed. possible charred shell or coral

Micro-artifacts (e.g., lithics, pottery, metal, glass, other):
None observed

Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other):
yes - dense aggregates that are medium to coarse sand are reddish & full of charcoal that indicate anthropogenic aggregates from trampling or burning

Sediment aggregates:
yes - inherited aggregates w/ silt & minerals

Rock fragments:
highly weathered basalt

Minerals:
mostly olivine

Other inclusions:

Post-depositional features (type and degree)

Weathering (dessicated, water-logged): minerals w/ pellicular weathering/highly weathered
Evidence for Soil Formation (clay coatings): cross-linear weathering for blocky olivine
Other: ↳ thick clay coatings on rounded minerals, thin clay coatings on weathered basalt, peds

Void Spaces/Pores

Void Shapes/Types: packing, vughs
Density: ~40%
Distribution: evenly distributed

Sample Identification:
Site: NUU2 R10mm2
Context: UNIT R10mm2 BED III A
Deposit type:

Date:

Summary

Boundary (~~upper~~ left): (runs perpendicular to other layers)
Thickness: 6.5cm
Particle sizes: clay, silt, sand
Fine material: clay, silt
Color: dark reddish yellow at 10x, more red toward right edge
Related distribution: single spaced coarse enaulic
Structure: sub angular blocky peds with planar & packing voids, higher density vugh voids ...

Boundary (lower): N/A – runs along ... right si...
Bedding:
Sorting:
c/f (coarse: fine) ratio:

Inclusions

Inclusions orientation: peds are banded, perpendicular (basic & refined) other beds in ground.
Inclusions distribution: microcharcoal, is randomly oriented, clustered mostly in block ...

For inclusions record (where appropriate): type, %, size, color, form, preservation
Plant remains: rare, highly degraded fine sand size fibrous tissue) 2 pieces of ... parallel to one another perpendicular to ground
Impressions of plants: voids where degraded plant material is still present at center, void likely represents ... plant is ge...
Charred remains: micro charcoal abounds, but much smaller pieces than other beds (fine sand) w/ less diagnostic pieces
Calcitic ashes:
N/O
Other organic remains (e.g., coprolites/dung, amorphous organic material, other):
N/O
Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other):
N/O
Micro-artifacts (e.g., lithics, pottery, metal, glass, other):
micro-charcoal, 2 fine gravel size basalt flakes – fine grained → at border of Bed II & Bed III
Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other):
burnt aggregates → magnesium rich reddish brown blocky soil peds w/ micro charcoal throughout (may actually be in ...)
Sediment aggregates:
→ dense clay rich peds lacking microcharcoal
Rock fragments:
rounded & subangular basalt, some w/ charcoal staining
Minerals:
Olivine, quartz, magnetite groundmass in basalt, hornblende
Other inclusions: sub-rounded blocky peds are columnar & several of the grouped peds form cir...

Post-depositional features (type and degree)

Weathering (dessicated, water-logged): heavy pellicular weathering of olivine that in
Evidence for Soil Formation (clay coatings): some may have taken over intra grain
Other: linear weathering typical of olivine, minerals & weathered round basalt covered w/ clay coatings

Void Spaces/Pores

Void Shapes/Types: packing & vugh in equal density, planar voids across 90% of subrounded bloc... p...
Density: together, ~30% of bed
Distribution:
vughs more common toward bottom 1/3 of bed, packing more common toward top. Planar voids only occur in blocky peds in top half of bed.

Sample Identification: **Date:** 18-VII-2018
Site: NUU2 RIO MM2
Context: UNIT RIO MM2 BED III B
Deposit type: House floor

Summary

Boundary (upper): indistinct, but begins w/ banded peds → lenticular peds w/ planar voids
Boundary (lower): indistinct, also banded peds
Thickness: 4.5 cm
Bedding: ?
Particle sizes: clay, silt, sand, very fine gravel
Sorting: moderately sorted
Fine material: clay, silt
c/f (coarse:fine) ratio: 10:90
Color: dark reddish brown
Related distribution: Single spaced equal enaulic ; single spaced fine enaulic
Structure: sub angular blocky & granule peds w/ packing & vugh voids · channel from fine root system running through

Inclusions

Inclusions orientation: majority of antropogenic ; coarse / fine gravel size basalt (that appears fire cracked) is oblique to groundmass, parallel one another
Inclusions distribution: planar voids in peds

For inclusions record (where appropriate): type, %, size, color, form, preservation
Plant remains: Same as elsewhere – fibrous long thin orangish tissue → fine roots
Impressions of plants: rounded remains w/ circular structure inside
Charred remains: voids surrounding degraded material, some voids connected to microcharcoal throughout those w/ material, but lacking tissue
Calcitic ashes:
bugs – rare
Other organic remains (e.g., coprolites/dung, amorphous organic material, other): n/o

Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other): 2 bones observed – one sig larger – triangular (broken) ashy (gray & pinkish gray) ← parallel referred orientation; pinkish grey rectangle possible shell in x
Micro-artifacts (e.g., lithics, pottery, metal, glass, other): lithics – 2 largest – fine grained pieces (fine gravel size) along border w/ Bed II perpendicular to ground
Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other): burnt aggregates w/in peds (blocky peds)
Sediment aggregates: granules dominate bed, fewer pieces of microcharcoal w/in
Rock fragments: Basalt
Minerals: olivine, hornblende, plagioclase feldspar, quartz
Other inclusions: lenticular peds banded, referred perpendicular distribution, parallel

Post-depositional features (type and degree)

Weathering (dessicated, water-logged): Predominately pellicular weathering around rounded sand size basalt ; very fine sand
Evidence for Soil Formation (clay coatings):
Other: clay coating around weathered basalt & minerals

Void Spaces/Pores

Void Shapes/Types: packing & vughs w/ some planar
Density: 20-30%
Distribution: evenly distributed throughout.

Sample Identification:
Site: NUU155
Context: UNIT M23 MM1 LAYER II
Deposit type: House Floor

Date: 30-III-2019

Summary

Boundary (upper): N/A
Thickness: Whole slide (7cm)
Particle sizes: polymodal - clay to gravel
Fine material: silt & clay
Color: Dark yellowish brown
Related distribution: open coarse enaulic
Structure: ↳ although microcharcoal is sig. smaller but is silt size
↳ moderately to weakly formed granular microstructure
↳ small peds are weakly formed

Boundary (lower): N/A
Bedding: N/A ?
Sorting: moderately sorted
c/f (coarse:fine) ratio: 10/90

Inclusions

Inclusions orientation: basalt & bone fragments are mostly parallel oriented & randomly
Inclusions distribution: distributed w/ one piece perpendicular

For inclusions record (where appropriate): type, %, size, color, form, preservation
Plant remains: yes → rare, fibrous long, or round dicot cross cut stem, matter in vughs or channels, greyish or yellowish brown, highly degraded. fine to md. sand size.
Impressions of plants: some vughs w/ remnants of plants appear to have formed around plants that used to be there
Charred remains: yes - micro charcoal - silt size but only burnt bones outside of that
Calcitic ashes: yes but very rare (small silt size) splotches
Other organic remains (e.g., coprolites/dung, amorphous organic material, other):
N/O

Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other):
yes - large, gravel & very coarse sand size orange fragments. No shell or other
Micro-artifacts (e.g., lithics, pottery, metal, glass, other):
yes - common basalt debitage fine grained, clear micro flakes. Gravel size
Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other):
N/O
Sediment aggregates (include size range, average size, and internal characteristics):
mostly (avg) silt size but ranges from fine gravel to silt size. Internally not pourous. many seem to exhibit microcharcoal fragments
Rock fragments:
weathered basalt, coarse grain irregular large mineral inclusions that range from gravel to md. sand & is rounded & md to high sphericity
fine-grained basalt is angular w/ low sphericity & mostly gravel size w/ a few md sand size. Internally homogenous
Minerals:
olivine → moderate (10%)
Other inclusions:
N/O

Post-depositional features (type and degree)

Weathering (dessicated, water-logged): limited pellicular weathering; parallel linear. but only observed on a few larger minerals (coarse sand size)
Evidence for Soil Formation (clay coatings): small (~20mm) but complete coating around basalt
Other:

Void Spaces/Pores

Void Shapes/Types: vughs around basalt w/ loose continous & discontinuous infilling (10% of voids)
↳ channels w/ loose discontinuous infilling (70% of voids)
↳ complex packing (20% of voids)
Density: 20-30% (?)
Distribution: Random

Sample Identification:
Site: NDAU 407
Context: UNIT F3 MM1 Bed #11
Deposit type: Floor 1

Date:

Summary

Boundary (upper): N/A
Thickness: Bed thickness ~1cm
Particle sizes: varied - polymodal
Fine material: Silt ; clay - charcoal silt
Color: very dark brown
Related distribution: single space fine enaulic
Structure: moderately devel. granular slightly porous

Boundary (lower): Distinct, wavy
Bedding: unsorted, matrix supported
Sorting: poorly sorted polymodal
c/f (coarse:fine) ratio: 80/20

Inclusions

Inclusions orientation:
Inclusions distribution: random w/ parallel large piece of debitage separating Bed N°2

For inclusions record (where appropriate): type, %, size, color, form, preservation
Plant remains: yes, rare. fibrous yellowish brown ; red
Impressions of plants:
Charred remains:
Calcitic ashes:

Other organic remains (e.g., coprolites/dung, amorphous organic material, other):
No

Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other):
rare phytoliths in voids - amorphous

Micro-artifacts (e.g., lithics, pottery, metal, glass, other):
burnt debitage along Boundary

Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other):
burnt? ground granules

Sediment aggregates (include size range, average size, and internal characteristics):
range in size but mostly very fine to fine sand. dark brown

Rock fragments: moderately formed slightly porous
Basanite - large gravel size pieces highly weathered,

Minerals: olivine
larger pieces are angular burnt

Other inclusions:

Post-depositional features (type and degree)

Weathering (dessicated, water-logged): pellicular weathering, clay coating (typic)
Evidence for Soil Formation (clay coatings): (basalt)
Other:

Void Spaces/Pores

Void Shapes/Types: complex packing, vughs
Density: 15-20%
Distribution: random

Sample Identification: **Date:**

Site: NUU417

Context: UNIT F3 MM1 BED E1A

Deposit type: Charcoal lens

Summary

Boundary (upper): Distinct, wavy

Thickness: 5cm

Particle sizes: polymodal

Fine material: silt ; clay

Color: Black

Related distribution: close, fine enaulic

Structure: weakly ... dense, granular, non-porous

Boundary (lower): Diffuse, ...

Bedding: matrix supported

Sorting: poorly sorted

c/f (coarse:fine) ratio: 90/10

Inclusions

Inclusions orientation:

Inclusions distribution: random w/ banded distributed basalt on top ; bottom (debitage is oblique at bottom, parallel at top)

For inclusions record (where appropriate): type, %, size, color, form, preservation

Plant remains: yes very rare w/ decayed whitish yellow tissue

Impressions of plants: N/o

Charred remains: yes – abundant

Calcitic ashes: N/o but possible

Other organic remains (e.g., coprolites/dung, amorphous organic material, other): N/o

Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other): N/o

Micro-artifacts (e.g., lithics, pottery, metal, glass, other): burnt debitage along upper ; lower boundary

Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other): burnt charcoal granules

Sediment aggregates (include size range, average size, and internal characteristics): average size very fine to fine sand, not porous weakly formed

Rock fragments:

Minerals: Basanite – highly weathered burnt w/ black – rounded – w/ angular pieces at top ; bottom. Olivine

Other inclusions:

Post-depositional features (type and degree)

Weathering (dessicated, water-logged): pellicular weathering (basalt)

Evidence for Soil Formation (clay coatings): clay coating typic

Other:

Void Spaces/Pores

Void Shapes/Types: Complex packing, vughs

Density: 5-10%

Distribution: random

Sample Identification:
Site: NUU417
Context: UNIT F3 mm Bed 2B
Deposit type: ~~[illegible]~~ Sterile

Date:

Summary

Boundary (upper): Distinct, wavy
Thickness: ~~[illegible]~~ 1.5cm bed
Particle sizes: polymodal
Fine material: silt & clay (dominantly silt?) then silt
Color: ~~black~~ dark reddish brown
Related distribution: ~~[illegible]~~
Structure: Moderately developed granular equal single spaced [illegible]
slightly ~~[illegible]~~ porous

Boundary (lower): Diffuse, occluded
Bedding: matrix supported
Sorting: poorly sorted
c/f (coarse: fine) ratio: ~~50/50~~ 50/50

Inclusions

Inclusions orientation: } random w/ banded basalt at border
Inclusions distribution:

For inclusions record (where appropriate): type, %, size, color, form, preservation
Plant remains: yes, rare w/ fibrous tissue; crosscut stems, preservation moderate
Impressions of plants:
Charred remains: yes - ~~[illegible]~~ very common
Calcitic ashes: yes - more common than any other slide but sparse

Other organic remains (e.g., coprolites/dung, amorphous organic material, other):
N/O

Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other):
N/O but possible

Micro-artifacts (e.g., lithics, pottery, metal, glass, other):
yes - along border b/w Bed 2 & 3

Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other):
N/O

Sediment aggregates (include size range, average size, and internal characteristics):
average size → very fine to fine sand. slightly porous, moderately formed

Rock fragments: Basaltic - gravel size. burnt weathered, crystal inclusions & flaws. one unburnt square piece in corner

Minerals: olivine

Other inclusions: ~~[illegible]~~

Post-depositional features (type and degree)

Weathering (dessicated, water-logged): pellicular weathering, clay coating basalt
Evidence for Soil Formation (clay coatings):
Other:

Void Spaces/Pores

Void Shapes/Types: complex packing, vughs
Density: 15-20%
Distribution: random

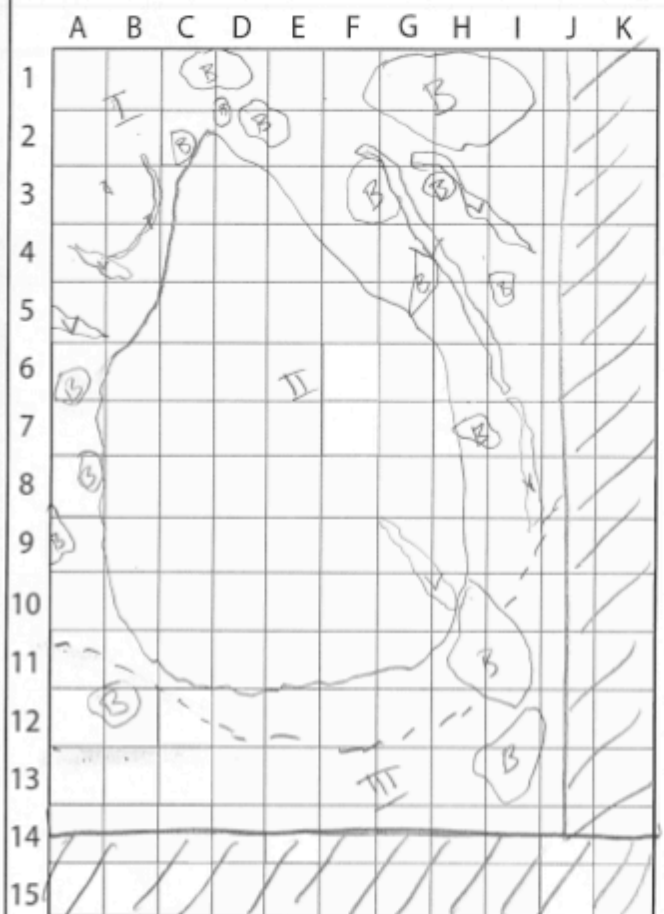
ANTHRO126M Micromorphological Recording Forms **Slide Description**

Sample Identification: NUU408E14 mm 1
Site: NUU408
Context and deposit type: UNIT E14 MM 1
3D Provenience (profile #, horizon, unit, coordinates):

Date:
Sample ID:

Description (overall structure, boundaries, stratigraphy, etc.):
Cultural layer

Notes



B: Basalt
V: Void

Scale (slide size or magnification):

Sample Identification: **Date:** 30-III-2019

Site: NUU408

Context: UNIT E14MM1 Context 2B

Deposit type: House floor?

Summary

Boundary (upper): Diffuse, occluded

Boundary (lower): Diffuse, occluded

Thickness: 3.5cm thickness of context

Bedding: ?

Particle sizes: coarse to very fine (polymodal)

Sorting: well-sorted

Fine material: Silt : clay (mostly clay?)

c/f (coarse: fine) ratio: 5/95

Color: Dark reddish brown

Related distribution: Double spaced enaulic (b/c so few coarse components)

Structure: Strong granular structure → granules are slightly porous, ↳ undulating surface, most commonly high to md sphericity & rounded.

Inclusions

Inclusions orientation:

Inclusions distribution: Random but basalt surrounds this context along the outer edge

For inclusions record (where appropriate): type, %, size, color, form, preservation

Plant remains: N/O

Impressions of plants: N/O

Charred remains: – yes, some small pieces found in above context – sparse (7-10%)

Calcitic ashes: yes – one small fine size deposit observed to very fine sand but also 2 larger coarse sand size pieces that appear to be burnt plant tissue.

Other organic remains (e.g., coprolites/dung, amorphous organic material, other): N/O

Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other): N/O difficult to see

Micro-artifacts (e.g., lithics, pottery, metal, glass, other): N/O

Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other): N/O

Sediment aggregates: Yes – surface smooth to undulating – clay fine material w/ charcoal bits w/ some silt inclusions

Rock fragments: gravel – 5% Basanite along the edges but none w/in context. Other md sand size to smaller basanite ↳ subrounded, md. sphericity (as pieces get smaller they are more rounded w/ higher sphericity

Minerals: Olivine – Angular – silt to fine sand size ↳ low sphericity

Other inclusions: N/O

Post-depositional features (type and degree)

Weathering (dessicated, water-logged): pellicular weathering of minerals & cross linear

Evidence for Soil Formation (clay coatings): limited clay coatings – thin, visible on only some minerals (~ 2 μm)

Other:

Void Spaces/Pores

Void Shapes/Types: complex packing, vughs, limited channels w/ loose discontinuous infilling.

Density: 15-20%? 20-30%?

Distribution: random (channels are parallel & distributed perpendicular to one another) referred oriented

Sample Identification:
Site: NUU 408
Context: Unit E14mm1
Deposit type: Context 2C (terrace?)

Date: 30-III-2019

Summary

Boundary (upper): Diffuse, occluded
Thickness: 3-4cm thickness (Bed)
Particle sizes: Polymodal.
Fine material: clay & silt
Color: reddish brown
Related distribution: double spaced enaulic (only b/c so few coarse units, mostly soil peds)
Structure: weak granular structure, not generally porous, undulating to smooth ~~circular structure~~, smaller peds high sphericity which decreases w/ size

Boundary (lower): N/A
Bedding: ?
Sorting: well-sorted
c/f (coarse: fine) ratio: 5-10 | 90-95

Inclusions

Inclusions orientation:
Inclusions distribution: } random. Basalt is clustered in bottom right corner

For inclusions record (where appropriate): type, %, size, color, form, preservation
Plant remains: rare & degraded – a dark yellowish brown – fibrous. One dicot stem visibly
Impressions of plants: → some fibrous material left in vughs
Charred remains: → same very fine to fine charcoal - moderate (15%) angular → subrounded mid sphericity
Calcitic ashes: → Same as other layers – rare places of silt size ash deposits

Other organic remains (e.g., coprolites/dung, amorphous organic material, other):
N/O
Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other):
N/O
Micro-artifacts (e.g., lithics, pottery, metal, glass, other):
N/O
Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other):
N/O
Sediment aggregates (include size range, average size, and internal characteristics): → smooth to undulating surface
(rare) Silt size to coarse sand size. Average size is very fine sand internally consisting of clay, charcoal bits slightly porous (not including dirts)
Rock fragments: Weathered basalt – one piece is black → burnt? The other is weathered, brown & gray both low sphericity & subrounded (gravel size pieces).
Minerals: Olivine - I think red minerals are degraded olivine w/ heavy pellicular to twist weathering (not very coarse sand size)
Other Inclusions: One smooth, rounded piece of basalt. Become more rounded as they get smaller.
possibly crystal formation?

Post-depositional features (type and degree)

Weathering (dessicated, water-logged): → heavy pellicular & cross-linear weathering of basalt & olivine.
Evidence for Soil Formation (clay coatings): – thin, limited – Not fully formed on basalt. Same as previous bed
Other:

Void Spaces/Pores

Void Shapes/Types: Complex packing, channels, vughs. Loose discontinuous infilling
Density: ~10%
Distribution: Random

Sample Identification:

Site: NUU 408

Context: UNIT H13 mm1 LAYER II

Deposit type: House floor

Date: 29-III-2019

Summary

Boundary (upper): N/A

Thickness: 6.5cm Bed (only one layer on slide)

Particle sizes: Polymodal - dominant coarse component, is basalt

Fine material: - dominant - clay?? fine

Color: very dark orangish brown

Related distribution: Double spaced fine enaulic

Structure: moderate granular nonporous

Boundary (lower): N/A

Bedding: matrix supported

Sorting: moderately sorted

c/f (coarse:fine) ratio: 20/80

Inclusions

Inclusions orientation:

Inclusions distribution: Random but basalt debitage is mostly oriented parallel to groundmass

For inclusions record (where appropriate): type, %, size, color, form, preservation

Plant remains: Rare, fibrous material - straw-like. Long; thin (very fine), mostly

Impressions of plants: → channel voids indicating degraded plants in vugh voids. degraded

Charred remains: sparse charred remains - very fine sand size to fine

Calcitic ashes: N/O

Other organic remains (e.g., coprolites/dung, amorphous organic material, other):

N/O

Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other):

pos. burnt bone at top of slide but could be charred/degraded wood

Micro-artifacts (e.g., lithics, pottery, metal, glass, other):

sparse lithic debitage - fine gravel size

Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other):

N/O

Sediment aggregates (include size range, average size, and internal characteristics):

clay sediment aggregates - average size, fine to md sand

Rock fragments:

Basalt mostly subrounded to angular, weathered (pellicular weathering), md. to low sphericity

Minerals:

Angular olivine, low sphericity, sparse, fine sand size. Pellicular, cross linear weathering

Other inclusions:

Post-depositional features (type and degree)

Weathering (dessicated, water-logged): evidence of typic clay coatings starting to form on

Evidence for Soil Formation (clay coatings): Pellicular weathering of minerals; basalt; rare charcoal pieces; more rounded basalt; cross linear olivine weathering

Other: evidence of pos termites b/w organic matter at top of slide

Void Spaces/Pores

Void Shapes/Types: complex packing; vughs, channels

Density: 20-25% (compact)

Distribution:

random

ANTHRO126M Micromorphological Recording Forms **Slide Description**

Sample Identification: NUU142 04mm1 **Date:** 9-X-2018

Site: NUU142 LAYER II Sample ID:

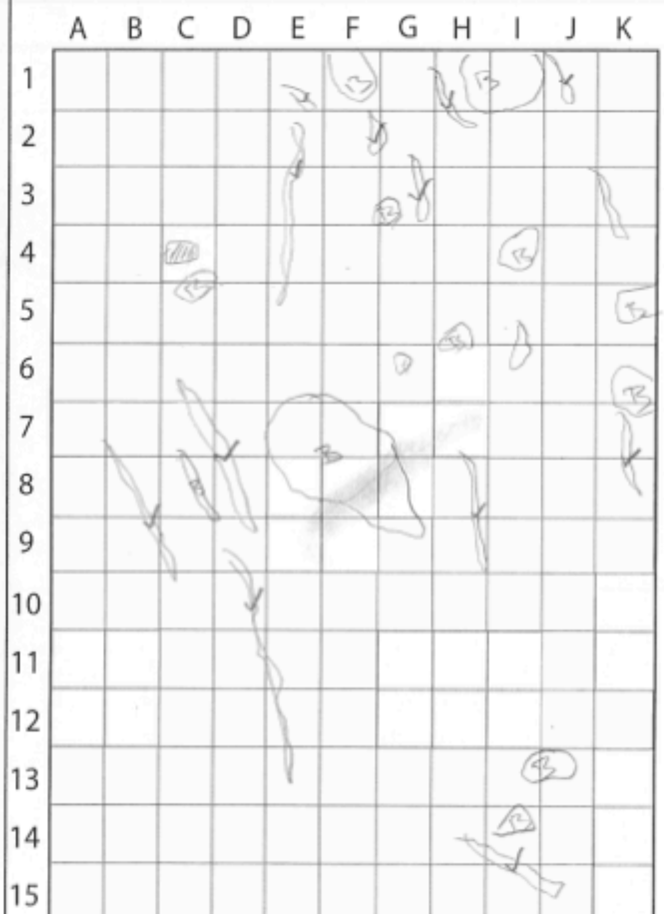
Context and deposit type: UNIT 04 House floor

3D Provenience (profile #, horizon, unit, coordinates):

Description (overall structure, boundaries, stratigraphy, etc.):

Notes

No transitions observed in field or on slide



Charcoal B: Basalt ✓: VOID

Scale (slide size or magnification):

* for pictures - RSU = right side up

Sample Identification: **Date:** 9-X-2018

Site: NUU142

Context: UNIT 04 LAYER II

Deposit type: House floor near combustion feature

Summary

Boundary (upper): None

Thickness: N/A

Particle sizes: clay through gravel

Fine material: clay & silt

Color: yellowish brown (dark)

Related distribution: equal enaulic

Structure: granules in lenticular plates

Boundary (lower): N/A

Bedding: unstratified, ungraded - matrix supported

Sorting: moderately sorted

c/f (coarse: fine) ratio: 30/70

Inclusions

Inclusions orientation: oblique (referred)

Inclusions distribution: clustered, perpendicular (referred)

For inclusions record (where appropriate): type, %, size, color, form, preservation

Plant remains: Yes - sparse, well preserved, yellowish brown

Impressions of plants: No

Charred remains: yes - common - medium sand size

Calcitic ashes: yes - rare pinkish gray

Other organic remains (e.g., coprolites/dung, amorphous organic material, other): N/0

Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other): pos. shell in ash & burnt bone

Micro-artifacts (e.g., lithics, pottery, metal, glass, other): burnt, fire-cracked basalt

Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other): burnt soil aggregates

Sediment aggregates (include size range, average size, and internal characteristics): yes - medium sand to fine sand

Rock fragments: yes - basalt - gravel to sand size

Minerals: yes - mostly olivine

Other inclusions:

Post-depositional features (type and degree)

Weathering (dessicated, water-logged): yes - heavily weathered basalt (lenticular some olivine w/ minimal cross-linear weathering)

Evidence for Soil Formation (clay coatings): thin clay coating on some basalt

Other:

Void Spaces/Pores

Void Shapes/Types: vughs, complex packing, planes, channels (dominant?)

Density: ~30%

Distribution: random - planes run verticle (parallel to one another), consistent throughout vughs & planes very common