— Final Report —

Archeological Overview and Assessment and Research Design Hawai‘i Volcanoes National Park

Prepared for:

National Park Service
Pacific West Region—Pacific Islands Support Office
P.O. Box 369
Makawao, Hawai‘i 96768

Under Contract No. C8298030001
Task Order T8306060448

August 2008

ARCHEOLOGICAL OVERVIEW AND ASSESSMENT AND RESEARCH DESIGN, HAWAIʻI VOLCANOES NATIONAL PARK

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August 2008

PROLOGUE

> Nāmakaokeahikaiāea,...a prophetess and diviner made a prophecy. She watched the skies and knew of the secrets of the earth. She told her family, the chiefs, the observers,...diviners, and orators, "A demi-god [kupua] approaches across the sea. It is a demi-goddess [kupua wahine] accompanied by her brothers..She will become a goddess [Akua wahine] of our descendants. She is Pele."
>
> Benjamin K. Nāmakaokeahi, *The History of Kanalu* (1900-1901 [2004]:E 10)

> When Kekuaokalani died, Ku-kailimoku and all the ancient gods, except for Pele, were forever vanquished.
>
> Joseph Feher and Edward Joesting, *Hawaii: A Pictorial History* (1969:158)

> On March 21st, 1925, over two thousand persons, mostly natives, assembled at the rim of the crater to watch and encourage four venerable kahuna (witch doctors) in their efforts by prayers and offerings to induce Goddess Pele of the Volcano to return the molten lava to the pit. The presence of the lava is reassuring that explosions or severe earthquakes are not likely. When the first 92-year-old kahuna stretched his arm over the pit, he was immediately answered by an avalanch [sic] from the distant walls, whose rumble accented by the previous quiet caused a little flurry among the spectators...
>
> *Superintendent's Report*, Hawaii National Park (NPS 1925)

The three individuals mentioned the greatest number of times in Mary Kawena Pukui's '*Ōlelo No'eau*, *Hawaiian Proverbs* (1983) are Kamehameha, Pele (each with 37 entries), and Pele's sister Hi'iaka (36 entries).

ACKNOWLEDGEMENTS

We sincerely appreciate the never-ending assistance provided to us by the staff of Hawai‘i Volcanoes National Park, the archeologists, cultural specialists, and archivist. In particular, Jadelyn Moniz Nakamura supplied critical information and management guidance and offered much appreciated support and encouragement. Laura Carter Schuster took us on an enlightening historical and archeological tour of Kahuku, and gave us insights on the history of archeological research in the park. We also wish to thank Ed and Diane Stasack, who provided the update on their petroglyph research at HAVO. That update is included here as Appendix C.

Unless otherwise credited, photographs in the report were taken by the authors.

PREFACE

A discussion of the archeology of Hawai‘i is hardly possible without incorporating material from the remarkable body of Hawaiian traditions. The detail, quantity, and complexity of the traditions preclude, of course, any possibility of completely understanding them or of grasping with unquestioned certainty the nature of a cultural landscape that can be perceived through them. Further, the presentation of this material in the present report is best considered as interpretive, that is, interpreted through the etic lens of anthropology. There is no intent to suggest that it is an emic representation. In the end, this effort is a limited redaction or, expressed scientifically, a model. However, the intent of a redaction or model is to offer a structure that provides others with an opportunity to see things a little differently.

Hawaiian houses on the arid Ka‘ū coast, 1823 (Ellis drawing)

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I. INTRODUCTION

In American archeology, Hawai‘i is unique. In Hawaiian archeology, Hawai‘i Volcanoes National Park (HAVO) is unique.

About Hawaiian uniqueness: the archeological resources of Hawai‘i are islands in a vast sea of data—traditional cultural and historical data, quantitatively and qualitatively different from those of any other place in the United States. Further, the archeological remains extend across all regions of the islands, but are limited as sources of information by comparison to other cultural-archeological areas because traditional Hawaiian material culture had a remarkably high perishable component. It is senseless to study the islands of physical remains without reference to the context provided by the vast sea of traditional information. At the same time, these two unique aspects, richness of traditional information and single-order complexity of remains, have probably contributed to a degree of methodological and conceptual poverty in archeological research.

About HAVO uniqueness: there is no other place in Hawai‘i (and few places in the world) that has a dynamic landscape like that of HAVO. In many respects, this exacerbates the already extreme characteristics of Hawaiian archeology. Volcanic action has physically destroyed much of the archeological record, and at the same time, traditions about volcanism have made archeology alive and rich with associations.

The present report is a study of this uniqueness. It is an Archeological Overview and Assessment (AOA), a National Park Service (NPS) management document that “describes and evaluates the known and potential archeological resources in an area; [and] identifies the need for additional field surveys to locate, evaluate, and document resources” (NPS 1998: Chapter 6.B.2.c; also see NPS 2004). The HAVO AOA has been prepared by International Archaeological Research Institute, Inc. (IARII) at the request of the National Park Service, Pacific West Region, Hawai‘i Volcanoes National Park—Pacific Islands Support Office.

THE AOA PROJECT AREA

HAVO is located at the southern end of the island of Hawai‘i, which is the southernmost island in the Hawaiian archipelago (Fig. 1). Covering over 323,430 acres, the park encompasses the summits and slopes of two of the world’s most active volcanoes, Kīlauea and Mauna Loa. Kīlauea has been in almost continuous eruption since 1983; the last eruption of Mauna Loa occurred just over 20 years ago in 1984.

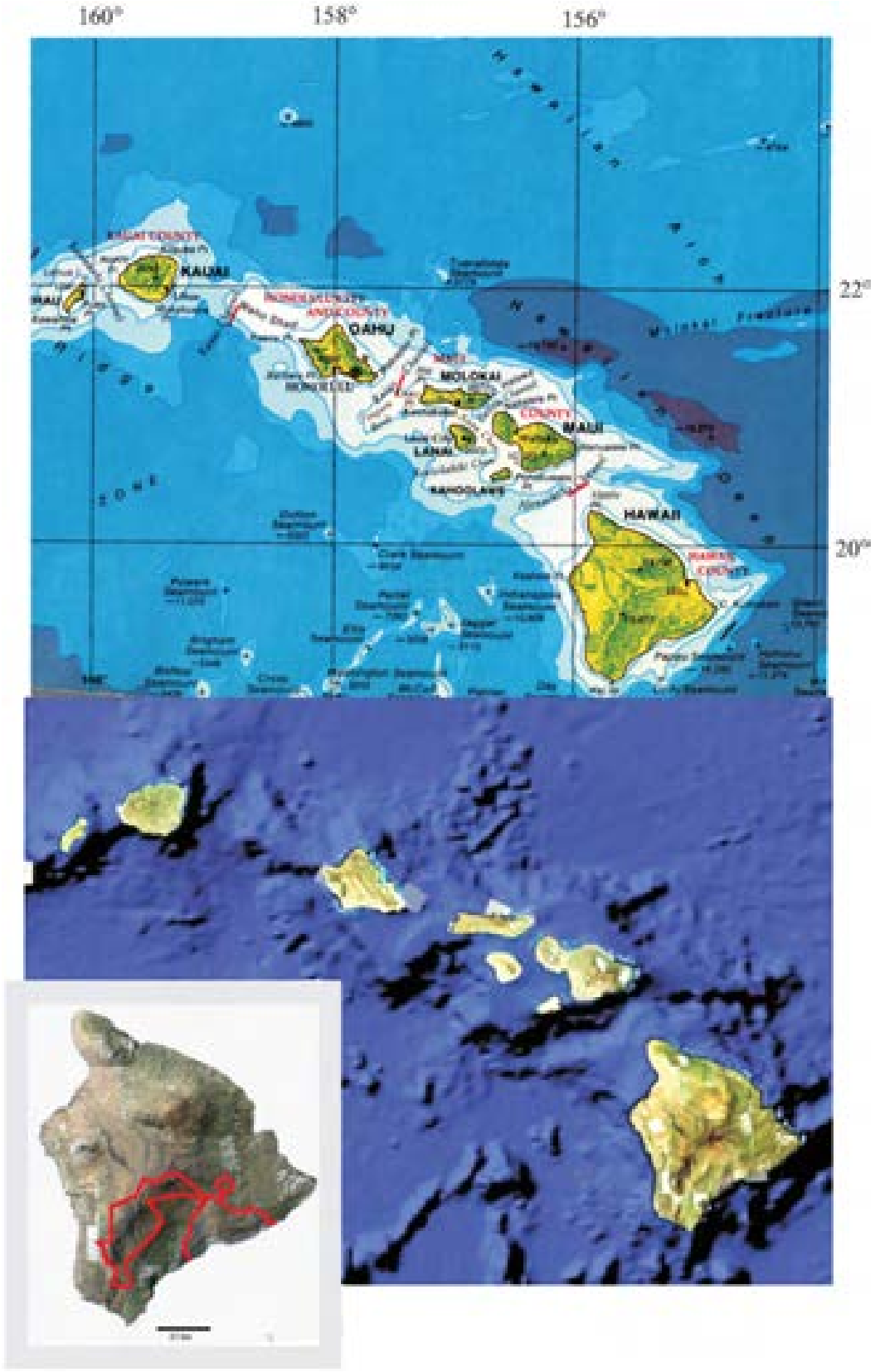

Figure 1. The location of HAVO on the island of Hawai‘i (lower left), and the island of Hawai‘i in the Hawaiian Archipelago (top: shaded relief from Armstrong 1973; bottom: NASA photo).

HAVO was established as Hawaii National Park[1] in 1916 as the 16th national park in the US and its territories.[2] The original park covered only a section of the volcano of Kīlauea. It was subsequently expanded to include much of Kīlauea and the adjacent Mauna Loa, as well as incorporating the coastal area to the south and southeast in 1938 (called the Kalapana Extension).[3] In July 2003, the National Park Service acquired 116,000 acres on the southern slopes of Mauna Loa, in essence doubling the size of HAVO; now called the Kahuku Management Unit (KMU), this land was formerly part of the historic Kahuku Ranch. Figure 2 shows the park boundaries and the dates of parcel acquisition.

Kīlauea Crater is the hub of activity in the eastern portion of the park. It is served by the Hawai‘i Belt Road, which provides access to Hilo to the east and Ka‘ū and Kona to the west. Subsidiary paved park roads encircle Kīlauea Crater and also extend seaward to the Puna-Ka‘ū coast and inland to the lower slopes of Mauna Loa. The Belt Road as it passes through southwestern Ka‘ū marks the seaward edge of the KMU and is the only public access to this part of the park; there are no paved roads within the KMU except in the area adjacent to the Belt Road.

The original mission of Hawaii National Park was to recognize and preserve the geological and natural resources of Kīlauea. Little attention was given to archeology and Hawaiian traditional culture until the effective addition of the Kalapana Extension in 1959. The acquisitions of the Footprints area in the 1930s and the Kalapana Extension offer sharp contrast from an archeological perspective: the Footprints area was brought into the park in recognition of this unique cultural property but with no archeological survey; the Kalapana Extension was acquired after extensive cultural, historical, and archeological study (Emory, Cox et al.1959), particularly in anticipation of the extension of the Chain of Craters Road from the Kīlauea summit to coastal Kalapana (Jackson 1972). Shortly after the initial Emory, Cox et al. (1959) studies, additional survey was carried out to “complete the assessment of the Park’s archeological resources” (Smart et al.1965:Forward; Emory, Soehren, et al. 1965). Subsequently, the passage of the National Historic Preservation Act in 1966 and interest in Waha‘ula Heiau interpretation led to a continuing series of archeological investigations that has continued to the present. Archeological research at HAVO is summarized in Section IV.

GOALS OF THE AOA

An Archeological Overview and Assessment (AOA) is defined in Chapter 2.E.1 of the National Park Service Director’s Order 28 (DO-28; NPS 1998) in the following manner:

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1 The original park included Haleakalā on Maui, which was split off as a separate unit in 1960. HAVO was redesignated Hawai‘i Volcanoes National Park in 1961.

2 With some park units going out of service, HAVO is now recognized as the 15th park. Many histories of the NPS and individual parks have been written (see e.g., Harpers Ferry Center 2005, and its list of readings). One that is of special interest because of its analytical approach to NPS goals and orientation is Anderson (2000), which, although focused on Grand Canyon National Park, provides a useful framework for review of every park’s managerial history.

3 The history of the park and its expansion is presented in Apple (1954), Jackson (1972), and recent park archeology reports.

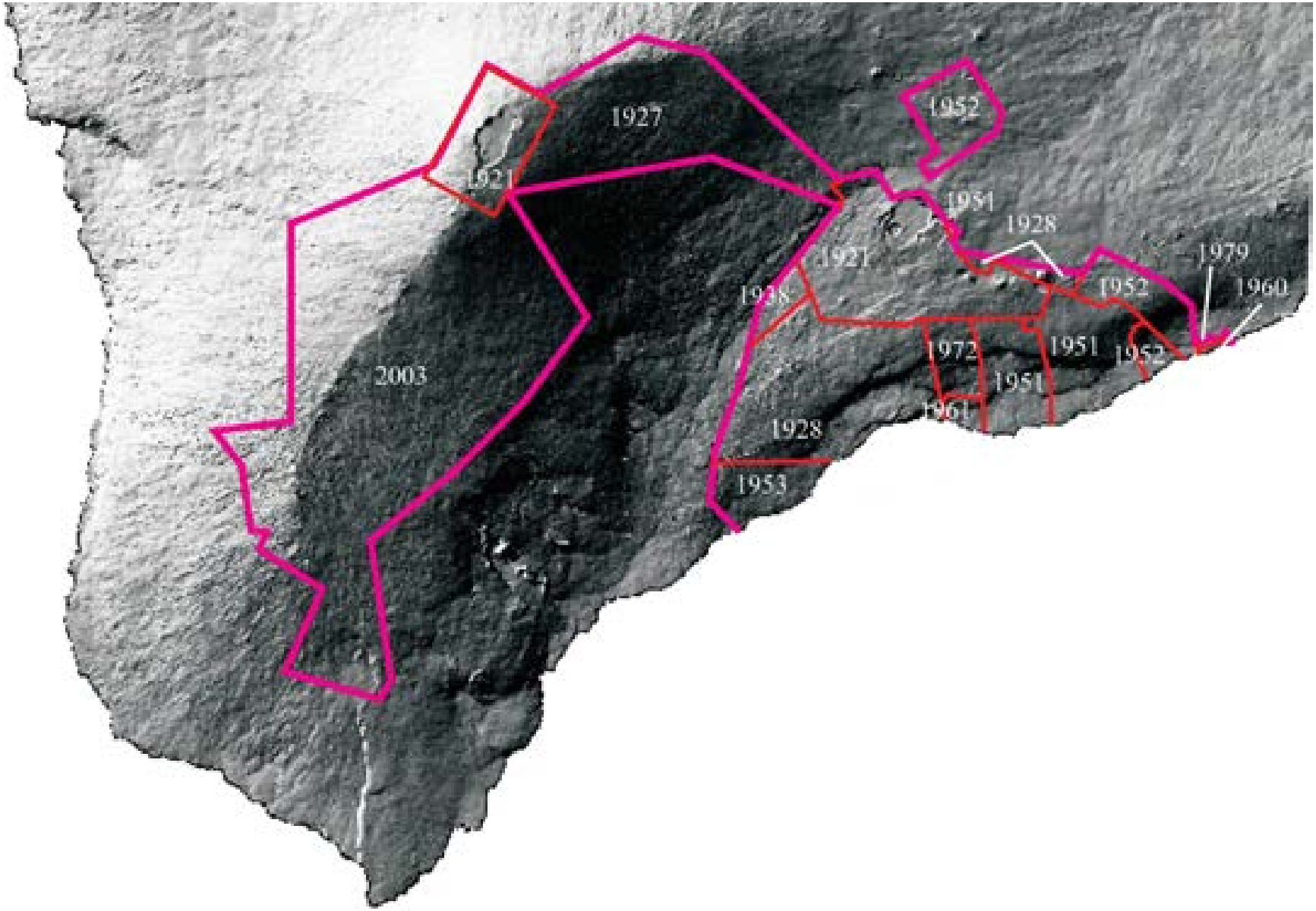

Figure 2. Acquisition history of HAVO parcels.

> This report describes and assesses the known and potential archeological resources in a park area. The overview reviews and summarizes existing archeological data; the assessment evaluates the data. The report assesses past work and helps determine the need for and design of future studies. It is undertaken in a park or regional geographical framework and may be a part of multi-agency planning efforts.

Based on this definition and given the nature of Hawaiian "archeological resources," it is the inherent argument of this report that the following goals of the HAVO AOA are the appropriate way to implement the intent of the AOA as described in DO-28:

1. to provide a general overview of patterns of culture and history

2. to review the archeological information and the status of research at HAVO within the framework of landscape archeology and cultural tradition

3. to use that review as the basis for recommendations for a continuing program of archeological investigation, including development of a Research Design to guide future work

4. to recommend a framework and guidelines for organizing archeological data, information related to archeological data (such as historic maps), archeological site definition, and information recording.

ORGANIZATION OF THE AOA

This report is organized in the following sections. Section I is the introduction to the AOA project. Section II provides a background summary of the environmental, cultural, and archeological framework for the AOA. Section III, titled "Landscapes of Time," discusses analytical conclusions of the background, presented as historical landscapes. Section IV summarizes the history of archeological investigations at HAVO and discusses the site inventory in the context of the historical landscapes. Section V is an assessment of the status of archeological investigations at HAVO. Section VI is a review and set of recommendations concerning matters of archeological-cultural resource management. Section VII is the pragmatic conclusion of the AOA, the proposed Research Design; given what is known and what has been done, the Research Design suggests what more can be known about this cultural landscape and the procedures for acquiring that knowledge. References are presented in Appendix H, which includes all citations in the main text and appendices. A complete site list is provided in Appendix A. Selected photographs from the original Puna-Kaʻu NRHP district nomination form are in Appendix B. Appendix C is a review of the status of petroglyph studies by Edward and Diane Stasack. Appendix D consists of tables of resources for HAVO research, including historical maps, archeological maps, and manuscripts. Appendix E is a list of HAVO burials which can be extracted from the AOA for confidentiality purposes. Appendix F is a gazetteer of place names and glossary of Hawaiian words used in the present report. Appendix G provides definitions and discussion of the terms cultural resource, site, and traditional.

NOTES ON AOA PRESENTATION

The following sections provide information on concepts and conventions used in the HAVO AOA.

ARCHEOLOGICAL TERMS

Archeological terms used in the AOA include *resources*, *landscapes*, and *site*. The brief discussion and definitions below are expanded in Appendix G.

Archeological Resources and Cultural Resource(s)

NPS DO-28 (NPS 1998:Chapter 1.B.2, emphasis added) employs the phrase "archeological resource" to refer to the primary subject of AOA, and defines it as:

> ...any material remains or physical evidence of past human life or activities which are of archeological interest, including the record of the effects of human activities on the environment. They are capable of revealing scientific or humanistic information through archeological research (NPS DO-28, 1998: Glossary), and
>
> ...the remains of past human activity *and records documenting the scientific analysis* of these remains.

The *NPS Management Policies* categorizes "archeological resource" as a kind of cultural resource, and defines "cultural resource"[4] as (NPS 2001:Chapter 5:26, emphasis added):

> ...an aspect of a cultural system that is valued by or significantly representative of a culture, or that contains significant information about a culture. A cultural resource may be a *tangible entity* or a *cultural practice*.

"Archeological resource" is also included in definitions of "tangible cultural resources," which are defined for the National Register of Historic Places (NRHP) as "districts, sites, buildings, structures, and objects" and for NPS management purposes as "archeological resources, cultural landscapes, structures, museum objects, and ethnographic resources."

Archeological Landscapes

The HAVO AOA uses "landscape" as its conceptual armature. The *NPS Management Policies* (NPS 2001:Chapter 5:24, emphasis added) defines "cultural landscape" as:

> a geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person, or exhibiting other cultural or esthetic values. *There are four non-mutually exclusive types of cultural landscapes: historic sites, historic designed landscapes, historic vernacular landscapes, and ethnographic landscapes*.

These categories of cultural landscape are also listed and defined in DO-28 (NPS 1998).

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[4] As indicated in Appendix G, there is no statutory definition of "cultural resource(s)" in regulations at the federal level. This is also true of the State of Hawai'i. For example, the Hawaii Supreme Court decision of *Ka Pa'akai O Ka'aina v Land Use Commission* (2000), refers to "valued cultural, historical, or natural resources," but the court decision explicitly declined to define the "cultural resources," noting that this is a "broad term."

Given the possible confusion of these multiple NPS definitions of "cultural landscape" ("four non-mutually exclusive types"—see definition above) and the fact that the NPS produces reports that deal explicitly with cultural landscapes, this term is not used in the HAVO AOA. However, the concept of *landscape* is critical to the report as a means to keep analytical perspective from becoming too narrowly focused on "sites," a perspective that may be argued is more consistent with the perspective of the people of the past. People did not live or work on "sites," they lived and worked in a landscape that was partitioned in various ways, with structures and activity areas, with boundaries both physical and social. It was also a landscape that was expansive, a space with living things, with horizons, with a sky, with meaning (Photo 1). When a priest stood on a platform at Waha'ula Heiau or a commoner stood in front of a sleeping house at 'Āpua Point, and they looked at the skyline of the great mountain in the distance, each could name a hundred landmarks and could point out where the trails crossed. They were living in a landscape.[5]

Photo 1. A landscape of HAVO, a landscape with cultural meaning.

[5] More academically expressed approaches to defining landscape and landscape archeology may be found in Feinman (1999) and Ladefoged and Graves (2002).

Archeological Sites

HAVO organizes the "material remains or physical evidence of past human life or activities" (in the language of DO-28) into archeological "sites." When definitions and discussion of DO-28 and *NPS Management Policies* are parsed, this seems to be the most appropriate term to use, as opposed to an equivalence of "resource" and "site" as the language of the D0-28 description of the AOA implies. We partition landscape into "sites" or "archeological resources," but, at the same time, if we do so without the perspective of landscape, then how can we discuss *significance* in any meaningful way? This also allows the review to be structured by "site" as defined in the NRHP in its fundamental sense as a place[6] (see discussion in Section VI).

There are two primary sets of site identification numbers that are used at HAVO (not including temporary field numbers). The main set of numbers is based on the State system of unique five-digit numbers preceded by "50-" for the State of Hawai'i, "10-" for the island of Hawai'i, and a two-digit number for the USGS topographic quadrangle in which the site falls. The secondary set of numbers is the system used by the Bishop Museum, which carried out most of the surveys of 1960s and 1970s; this system consists of the prefix "HV-" followed by a unique number. Recent surveys have attempted to replace Museum numbers with State numbers, but not all Museum numbers have been converted to the state system. As noted by Glidden (2006:12): "In some cases sites have been separated, combined, and reassigned site numbers based on increased knowledge developed."

HAWAIIAN WORDS AND NAMES

Definitions of commonly used Hawaiian words are provided in a glossary (Appendix F). Hawaiian words that are critical to a discussion are defined in the text. Hawaiian words are, by policy, not italicized. Diacriticals (macrons and glottals) are used when known (primarily based on Pukui et al. 1974), except when a Hawaiian place name is used in an historical or modern name; for example, 'Āinahou is a traditional land area in Puna district but it was subsequently used as the name of a 19th century ranch, Ainahou Ranch. Translations, provided where available and appropriate, are indicated as *literal* or *interpretive.*

DATES AND NATURE OF TRADITIONAL SOURCES

The 19th and early 20th century sources of traditional history and ethnographic material are generally consulted in reprinted editions or in later translations, which creates a problem for citation. The original publication date may be included in the citation along with the date of the consulted publication (e.g., Kamakau [1868] 1964), but this has been criticized as awkward. Thus, assuming that most scholars are aware of the original date of publication of standard works, this citation method is not used. However, the original date of publication is included in the list of References.

The sources for traditional material are not discussed or evaluated in the present report, but detailed reviews may be found in Valeri (1985) and Cordy (2000).

Working with Hawaiian traditions has many difficulties, including the fact that so many of the texts have been disarticulated, decontextualized, and dehydrated (the water of life having been removed

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[6] For example, Kīlauea Crater (Site 5502) is on the NRHP as a place, i.e., a non-archeological site.

from them).[7] Several publications in recent years have greatly aided in restoring the life to recorded traditional texts by presenting them in their original Hawaiian (e.g., Kamakau 1996 and 2001), or original Hawaiian with new translation (e.g., Malo 1996). In addition, five long Hawaiian texts that are important for the present study have been recently published; they had previously been unknown and/or unavailable in any reasonable form: Stephen L. Desha's *Kamehameha and his Warrior Kekūhaupi'o* (Desha 2000); John Wise and John W.H.I. Kihe's *Ka'ao Ho'oniua Pu'uwai No Ka-Miki (The Heart Stirring Story of Ka-Miki)*[8], *Holo Mai Pele*[9] (Kanahele 2001); Benjamin K. Nāmakaokeahi's *The History of Kanalu: Mo'okūauhau 'Elua* (Nāmakaokeahi 2004), and Ho'oulumāhiehie's *Ka Mo'ololo o Hi'iakaikapoliopele (The Epic Tale of Hi'iakaikapoliopele)* (Nāmakaokeahi 2004). The last title is a version of the story of Hi'iaka and Pele and is of obviously great significance for research at HAVO; this importance is emphasized further by the subtitle of the book:

> Ka wahine i ka hikina a ka lā ka u'i palekoki uila o Halema'uma'u.
> *Woman of the sunrise, lightning-skirted beauty of Halema'uma'u.*

*The History of Kanalu: Mo'okūauhau 'Elua (*literally "Genealogical Succession Two") may be the only comprehensive genealogy of a line of priests ever written in Hawai'i. Incorporated into it is a parallel listing of the names of rulers (probably their sacred names) and a history of dramatic events that reflect the world of the kahuna who are dedicated to the cosmic protection of their kings. This is the Kanalu order of priests, one of the orders of the mo'oKū (*priestly class of Kū*, see Chun 2004:viii), who trace their lineage from the beginning of Hawaiian time to the time of Kamehameha. Kamehameha's Kū kahuna was Hewahewa.

The significance to HAVO of *The History of Kanalu* may not be immediately evident from the title. However, when its text is investigated and its theme recognized, it is clear that the goddess Pele and the priest Pā'ao have a prominent place in this history, and the value of the text to HAVO research is substantial.

TEXT CONVENTIONS AND ABBREVIATIONS

Radiocarbon dates are given as calibrated values at two sigma, unless otherwise indicated. They are also given as BC-AD, rather than the more appropriate and preferred BCE-CE, because the older form remains in common usage in Hawaiian archeology.

The terms "pre-Contact" and "post-Contact" are used for pre- and post-1778, rather than "prehistoric" and "historic."

Archaeology is spelled "archeology" per the convention of the NPS.

The term "king" is used in this report, rather than "ruling chief." This is the best comparative cross-cultural translation of the Hawaiian term "ali'i nui" (see e.g., Valeri 1985; Tuggle 1990).

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[7] See the analysis in Nogelmeier (2003), which refers particularly to the editing and translations of the works of 19th century historian S.M. Kamakau and the resulting numerous misunderstandings of Hawaiian history and culture.

[8] This has been translated and published in installments in various reports by Maly (see e.g., 1993).

[9] This contains a translated version of a Pele tradition that was published in the 19th century newspaper *Ka Hoku o Hawaii.*

Abbreviations that are commonly used in the text include:

HAVO: Hawai‘i Volcanoes National Park
LCS: National Park Service List of Classified Structures
NPS: National Park Service
NRHP: National Register of Historic Places.

II. BACKGROUND

This section of the AOA presents background information on the environment, cultural framework, and archeology of HAVO.

ENVIRONMENT

Information about the environment of HAVO is presented in many reports (including Emory, Cox et al.1959; Yen 1971; Degener 1973; and Williams 1990), as well as in general studies (e.g., Juvik and Juvik 1998). Only a general summary is provided in this section; details relevant to specific research problems are presented elsewhere in the AOA.

HAVO spans over 323,430 acres of southern Hawai‘i Island, encompassing leeward and windward areas from the coast to the highest points of this part of the island. It includes the summits and slopes of two of the world's most active volcanoes, Kīlauea and Mauna Loa.

The eastern portion of HAVO rises from the southeast coast of the island to the summit of Mauna Loa at around 13,680 ft asl. Kīlauea Crater lies at the 4,075 ft elevation, the approximate mid-point (by distance) of the slope to the Mauna Loa summit. Between the coast and Kīlauea Crater are several cliff lines formed by fault action, forming distinctive rises in the landscape. Hilina and Hōlei are the two principal cliffs: Hōlei runs along the 120 to 400 ft elevation across the Puna ahupua‘a from Pānau Nui to ‘Āpua at the Ka‘ū boundary (Photo 2); Hilina falls between 200 and 600 ft asl in Kapāpala ahupua‘a. Lesser fault lines occur between these two (e.g., Poliokeawe, Pu‘u‘eo, and Makahanu); Paliuli is at the east end of the park. The Hilina Pali fault scarp is still active, causing many small and occasionally large earthquakes (Macdonald et al. 1983:40). The coastline of this portion of HAVO is marked by low sea cliffs where lava has poured into the ocean. Small embayments offer small protection from the surging waves.

Kīlauea Crater marks a transition between wet and dry zones. To the east of the crater is a montane rainforest; to the west is a drier montane seasonal environment. The distribution and intensity of rainfall in the volcano region is tied to orographic conditions generated by northeast trade winds. Doty and Mueller-Dombois (1966:47) write:

> As the wind passes over the ridge formed by Kilauea and its east rift, especially near and above the 3000 foot level, the rainfall drops markedly. Thus, while at the Park Headquarters, Station 54, there is an average rainfall of 93 inches, at Halemaumau, Station 52, scarcely a few miles to the southwest over the ridge to the sea and 300 feet lower, the average rainfall is about half that value.

In the western portion of HAVO is the Kahuku Management Unit, which covers 116,000 acres from around 2,000 ft above sea level (asl) to the summit of Mauna Loa. Three-fourths of Kahuku is covered in "rocky land and barren lava flows" (Lockwood 2003, referenced in Quiseng 2006:2). The oldest widespread landform dates from 1,500 to 3,000 years BP (identified as k2 by Wolfe and Morris 1996), and is overlain by a linear mosaic of more recent flows. Pockets of older surface occur in scattered kīpuka, islands of old landforms surrounded by more recent flows. The Southwest Rift of Mauna Loa forms the spine along the central axis of Kahuku.

Photo 2. Hōlei Pali from Kealakomo Waena.

The coastal area of Kahuku (seaward of the KMU) is a barren tract of lava. Pōhue Bay near the center of the ahupua‘a offers limited protection from ocean surges. Archibald Menzies, naturalist on Captain George Vancouver’s 1792 to 1794 expeditions, traveled by canoe from Kealakekua to South Point. His party sailed along the Kahuku shoreline, which he describes (Menzies 1920:181):

> This part of the coast is a dreary rugged tract composed of black porous rock of lava forming here and there grotesque arches, vaults and deep caverns into which the sea pushes in by the violence and agitation of the waves with great force, and frequently gushes up again several yards inland through chinks and crevices with a hissing noise into the form of fountains, which in sunshine reflect all the colors of the rainbow.

In fact, Menzies (1920:181) bypassed the Kahuku shoreline, staying one night at Manukā to the north and anchoring the next day at Pākini to the south. He notes that the conventional Hawaiian method of travel along this coast was by canoe (Menzies 1920:182, brackets added):

> The country between this [Pākini] and Manu-ka, the place we left in the morning, is one continued tract of loose, rough and peaked lava, the most dreary and barren tract that can possibly be conceived, so that it would be a tedious and fatiguing journey to come from thence by land, and such as even the natives themselves seldom attempt. For when they wish to visit the south side of the island, they generally come thus far in canoes from the west side and leave them here [at Pākini] till they return again, so that this forms a common port at which there were several arrivals to and fro in the course of the evening.

THE NATURAL ENVIRONMENT AND HAWAIIAN LIFE

Components of the natural environment that structured basic Hawaiian life in all settings were topography, rainfall (which in turn determined vegetation patterns), and shoreline characteristics. These established the conditions for agricultural productivity, population density, and population distribution. Unevenly distributed natural resources were an overlay that affected the fundamental settlement structure in a number of ways. The most important of these resources were streams suitable for pondfield irrigation and coastal features that allowed fishpond construction.

The general environmental patterns of the island of Hawai‘i are shown in Figures 3 and 4, with an overlay of the HAVO region, providing a general picture of the parks natural features.

VOLCANISM OF HAVO

Volcanic activity distinguishes HAVO from all other areas in Hawai‘ì. The history of surface flows in the region is shown in Figure 5, which is derived from a recently updated map of island volcanic activity (Sherrod et al. 2007) and from articles by Swanson (2007).

Volcanism in East HAVO

The eastern portion of HAVO is the epicenter of volcanism in the park. Flows from the Southwest and East Rifts of Kīlauea Crater have mantled the park in lava. The Southwest Rift roughly forms the western boundary of HAVO below the crater; the East Rift is the inland boundary of the Puna portion of the park. The crater itself has spewed lava as well as pyroclastic explosions, the most notorious being the 1790 eruption that enveloped a large segment of the army of the high chief Keōua as it marched from Hilo to Ka‘ū.

Essentially all of Puna district to the east of HAVO was covered in flows during the time of Hawaiian occupation; new land was created as well. Swanson (2007, reformatted) provides the following summary regarding Kīlauea, notably the ‘Ailā‘au flow that covered much of Puna district:

> …lava flows built the large Observatory shield at Kīlauea’s summit and destroyed surrounding woodlands, between about 1000 and 1350-1400 C.E. (Holcomb, 1987; Neal and Lockwood, 2002; D.A. Swanson and J.P. McGeehin, unpub. data)…Explosive deposits are not interbedded with the lava flows that formed the Observatory shield, the edifice built at the summit of the volcano before the caldera formed...
>
> … Holcomb (1987) identified [a subsequent large lava flow], which he named the ‘Ailā‘au flow... Lava erupted from a vent just east of Kīlauea’s summit and built the ‘Ailā‘au shield…The lava flow (called flows by previous workers, but erupted essentially continuously, so I assume only one flow) covered most of Kīlauea north of the east rift zone and reached all the way eastward to the coastline; one or two streams even spread southward from the shield to the sea.... Clague et al. (1999) estimated its area as about 430 km^2 and its dense-rock-equivalent (DRE) volume as 5.2±0.8 km^3...

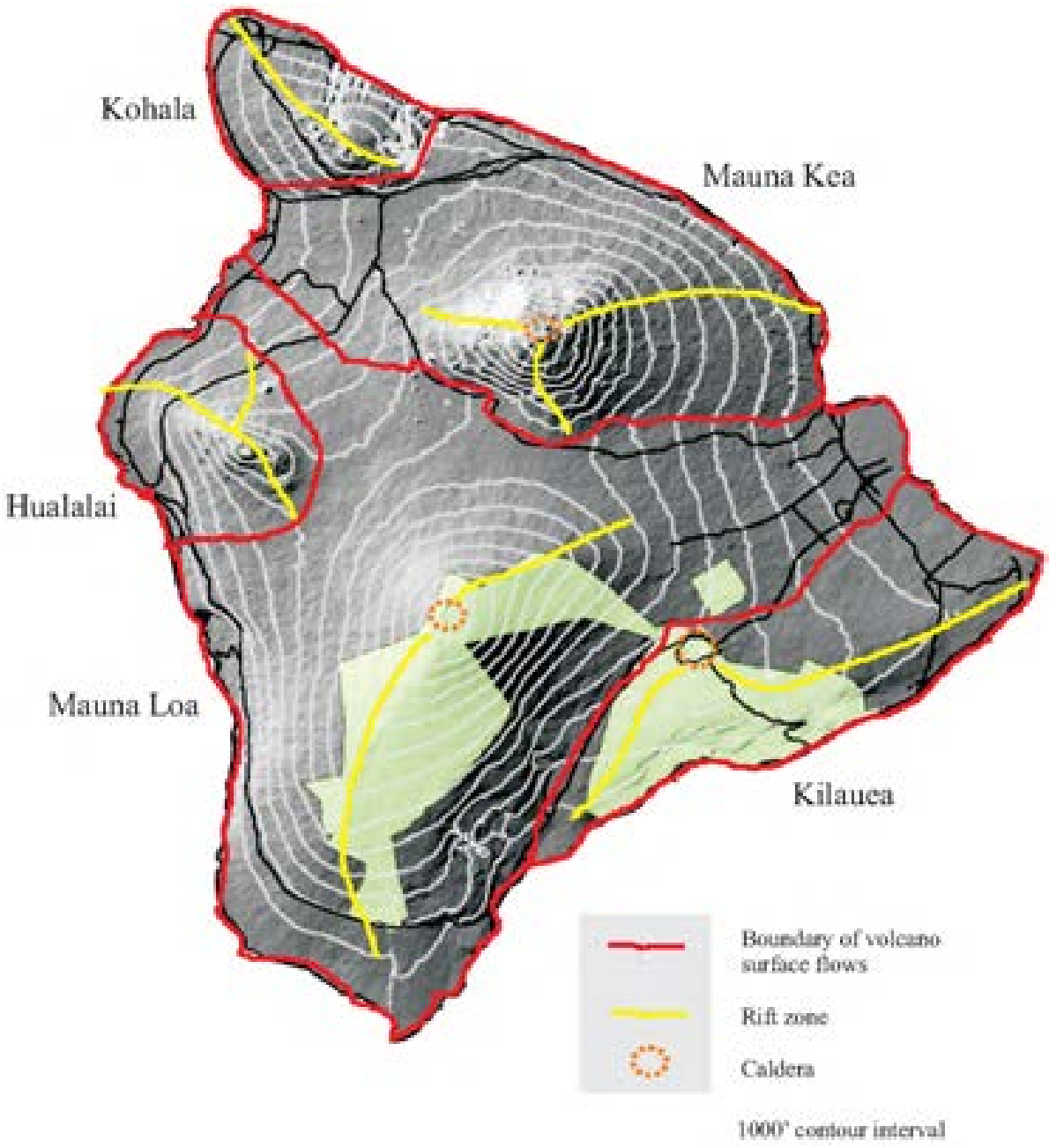

Figure 3. Island of Hawai‘i (with HAVO), showing topography and volcano surface areas.

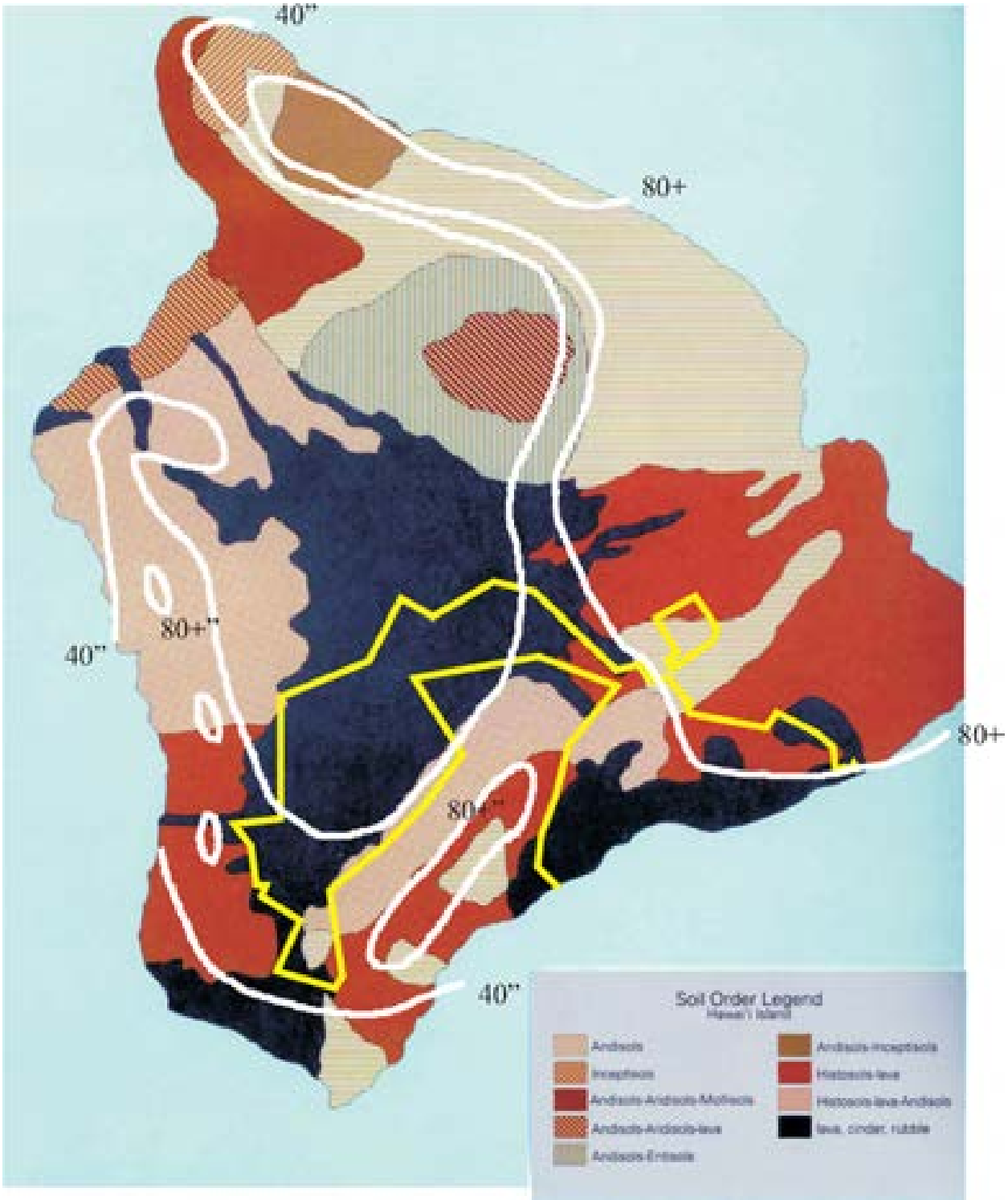

Figure 4. Island of Hawai‘i (with HAVO), showing major soil regions and rainfall (soil map from Juvik and Juvik 1998).

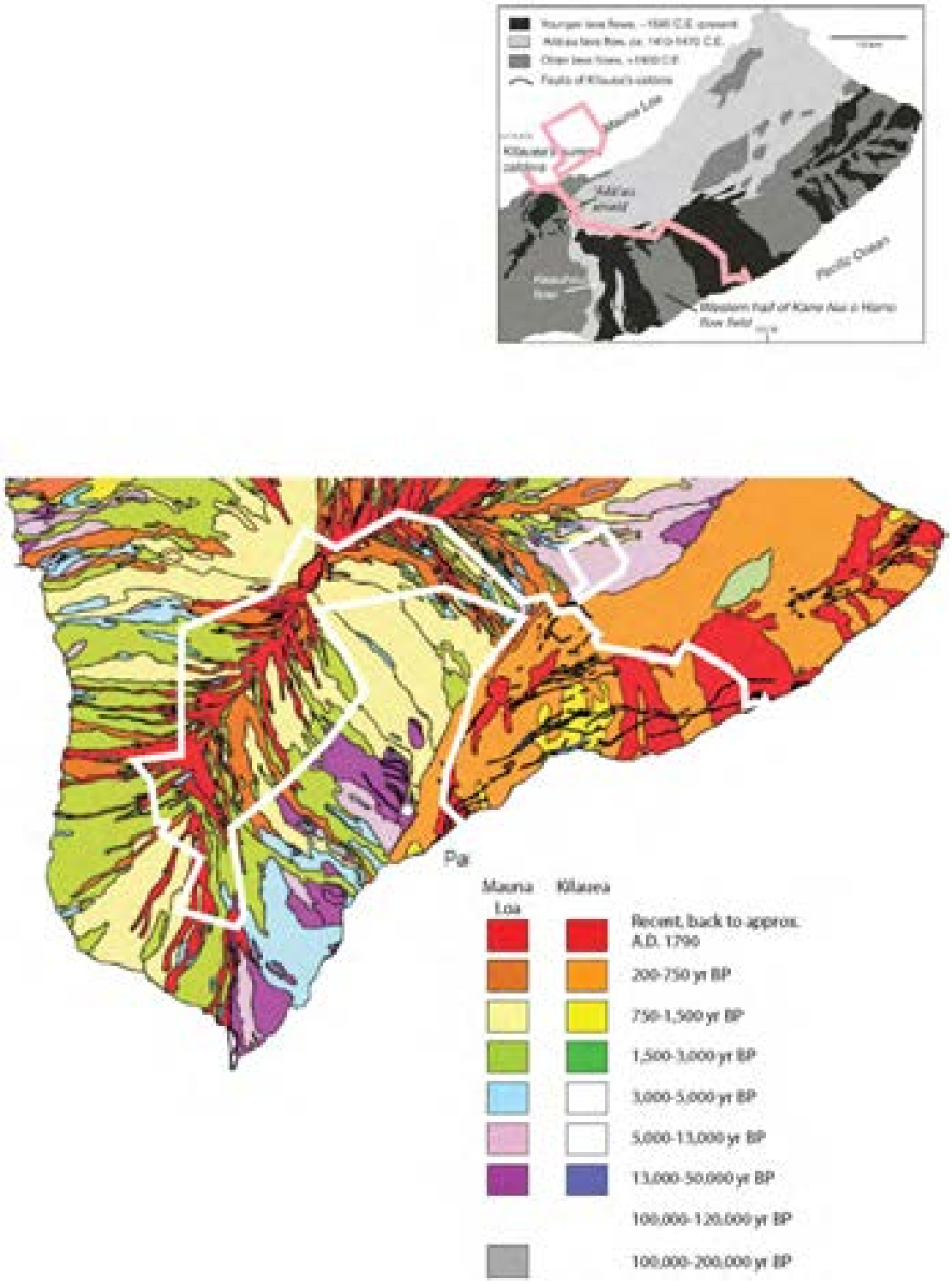

Figure 5. Dates of surface flows in the HAVO area (top: adapted from Swanson 2007:Figure 2; bottom: adapted from Sherrod et al. 2007:Figure 36).

Clague et al. (1999), through careful analysis of calibrated ^{14}C ages and paleomagnetic data, concluded that the eruption of the ʻAilāʻau flow lasted about 60 years and ended in about 1470 C.E.... some 100 years or so after the summit shield had formed (D.A. Swanson and J. P. McGeehin, unpublished ^{14}C ages)…The morphology of the pāhoehoe suggests slow emplacement by lava tubes, and large tubes are known in the flow; one, the Kazumura, is 65.5 km long—one of the longest known lava tubes (Allred, 2001; http://caverbob. com/ usalong.htm).

… Kīlauea's caldera formed between about 1470 and 1500 C.E., as judged from stratigraphic and calibrated ^{14}C evidence (Swanson, 2003; Swanson et al., 2004). The outermost fault on the eastern side of the caldera cuts the ʻAilāʻau shield …and therefore is younger than about 1470, the estimated date that the shield stopped erupting. Vitric and lithic-vitric tephra, dated at about 1500 C.E. on the basis of several calibrated ^{14}C ages, mantles the main caldera faults at several places, so the faults must be older than about 1500... The caldera clearly did not form in 1790, as has been commonly thought (Holcomb, 1987; Decker and Christiansen, 1984), and it is even unlikely that there was substantial downdropping of its major faults then, to judge from the lack of a description of major subsidence or dreadful earthquakes in the stories told to Ellis.

The Keanakākoʻi Ash (McPhie et al., 1990), comprised of vitric, lithic, and mixed vitric and lithic deposits of ash to block size and totaling as much as 13 m in thickness, formed from multiple eruptions during a 300-yr period beginning in about 1500 and ending in about 1790 (Swanson et al., 2004). It is the deposits of the two oldest Keanakākoʻi tephra eruptions that mantle the caldera faults and constrain the minimum age of the caldera.

The evidence for the age of the Keanakākoʻi is developed from numerous calibrated ^{14}C ages as well as from physical stratigraphy, including three or four widespread erosional unconformities between successive deposits, pure ash beds interlayered with reworked windblown vitric ash in sand dunes, and archaeologic evidence that Hawaiians built stone structures during periods of calm between explosions.

The 300 years of episodic explosive activity is much longer than what most late 20th-century workers interpreted (Decker and Christiansen, 1984; McPhie et al., 1990; Mastin, 1997). These researchers believed that most or all of the Keanakākoʻi was the product of a strong eruption during 1790, when the fatal explosion took place. The recognition of three centuries of sporadic explosive activity has come about slowly through careful work during the past decade.

Of the ʻAilāʻau flow, Swanson (2007) writes:

This lava flow is the largest to be erupted from Kīlauea, and probably in all of Hawaiʻi, since Polynesian settlement. If any flow were to be commemorated in oral tradition, this should be the one, because the destruction of such a large area of forest would have impacted Hawaiian life in many ways.

The consequences for the archeological record are enormous. The lava that poured over Wahaʻula Heiau in 1999 represents only one of the most recent and most dramatic destructions of the physical remains of the Hawaiian past at HAVO. However, this is by no means a new phenomenon; as indicated in Figure 5, the vast ʻAilāʻau flow and other pre-modern flows certainly destroyed large areas of

Hawaiian activity. Also, if there was a basalt quarry at the crater of Keanakāko‘i, as suggested by the name (*the adze-making cave*), it was destroyed by a flow in 1877.[10]

Volcanism in the Kahuku Management Unit

The KMU is dominated by the Southwest Rift, a geologically active zone that has seen major lava flows in historic times. The spine of the Southwest Rift is marked by an almost continuous fissure and a line of large cinder cones from the Mauna Loa summit to Pu‘u o Keokeo at around 6,900 ft asl. Near the summit are Sulphur and Red Cones at the head of the ‘Alalā lava flow. At about the 8,000 ft elevation is ‘Alikā Cone, source of the 1919 ‘Alikā flow that spilled lava westward into south Kona. Between 5,000 and 7,000 ft asl are a cluster of cinder cones: Ihuanu, Pōhakuloa, ‘Ōhohio, Kapu‘ala‘ala, and Pu‘u o Ke‘oke‘o. Fissures extend south and downslope of Pu‘u o Ke‘oke‘o along the 1887 flow.

At the east edge of the park just above the Belt Road are ‘Akihi, Pu‘u o Kahuku, and Pu‘u o Lokuana cinder cones. These are situated above Pali o Ka‘eo, the inland extent of the prominent fault line that marks the divide between eastern and western Ka‘ū; just west of the pali is the fissure marking the head of the devastating 1868 eruption. Seaward of the Belt Road, the fault line is called Pali o Māmalu; the prominent craters of Lua Pō‘ai, Lua Palalauhala, and Lua Pū‘ali are just seaward of the Belt Road at the top of the pali.

There have been 39 Mauna Loa eruptions since 1832, and the Southwest Rift has been the source for 25 percent of these events, covering 233 sq km of land (http://www.soest.hawaii.edu/GG/HCV/mloa-eruptions.html) (see Fig. 5). Historic eruptions along the Southwest Rift has sent lavas flowing east into central Ka‘ū, west into southern Kona, and south toward Ka Lae (South Point). Near summit eruptions occurred in 1851, 1926, 1940, 1949, 1950, 1975, and 1984. Flows that originated above Pu‘u o Ke‘oke‘o occurred in 1916, 1919, 1926, and 1950, with the 1926 and 1950 eruptions generating most of the lava streams. Below Pu‘u o Ke‘oke‘o, lava flowed southward in 1868, 1887, and 1907. Lipman (1980:abstract) writes:

> The sequence of historic eruptions along the southwest rift zone, beginning in 1868, shows a general pattern of uprift migration and increasing eruptive volume, culminating in the great 1950 eruption. No event comparable to 1950, in terms of volume or vent length, is evident for at least the previous 1,000 years. Rates of lava accumulation during the historic period were several times higher than the average rate for the preceding few thousand years along the southwest rift zone and adjacent flanks.

Although smaller than the 1950 event, the 1868 eruption and associated earthquakes and tsunami were cataclysmic (Handy and Handy 1991:566). Between March 27 and April 10, Ka‘ū was the scene of earthquakes (an estimated 3,000 temblors), lava flows, and tidal waves that resulted in major damage and disruption to the region. Handy and Handy (1991:566-568) quote a lengthy descriptive account by C.J. Waialoha (*Ka Nupepa Ku‘oko‘a,* April 11, 18, 1868) which details the 15-day disaster. The Kahuku area saw stone houses shifted off their foundations, the collapse of the Kahuku church and, on the evening of April 7, “a shower of ashes [that] fell on the houses from Kahuku to Ninole;” “no less than a thousand cattle and horses” were killed by the lava at “Kahuku and Pakini and all the way to Kama‘oa.”

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[10] There is on-going research at HAVO to determine if basalt used for tools can be associated with this crater.

April 7 also marked the beginning of an eruption of lava along a 4.5 km long fissure just west of Pali o Kaʻeo, pouring lava in multiple streams to the ocean (Waialoha 1868, quoted in Handy and Handy 1991:567):

> Five small craters (puka ahi) opened up at Puʻu-o-loku-ana, between the sea and the mountain. The height of the leaping of the fire in some of these craters reached five hundred feet or more … streams of lava ran from Puʻu-o-loku-ana to the sea. Flashes of lightning were seen in the dark clouds, red, silvery, green and white in color. The explosions heard were louder than the roar of a cannon.

The missionary Titus Coan (1882, brackets added) gives this description of the 1868 eruption at Kahuku:

> On the 7th of April the lava burst out from the ground in Kahuku, nine miles from the sea, and flowed rapidly down to the shore. The place of outbreak was in a wood on one of the foot-hills of Mauna Loa. Travelers bound to Hilo came up to this flow on the west side, and were not able to cross it, but were obliged to return to Kona and come *via* Waimea, a circuit of one hundred and seventy miles. A fissure of a mile long was opened for the disgorgement of this igneous river, and from the whole length of this orifice the lava rushed up with intense vehemence, spouting jets one hundred to two hundred feet high, burning the forest and spreading out a mile wide. The rending, the raging, the swirling of this stream were terrific, awakening awe in all the beholders.
>
> Flowing seaward, it came to a high precipice [the Kahuku Fault] which ran some seven miles toward the shore, varying in height from two hundred to seven hundred feet, and separating a high fertile plain, of a deep and rich soil on the left or eastern side, from a wide field of pahoehoe hundreds of feet below on the right or western side.
>
> Before the flow reached this precipice it sent out three lateral streams upon the grassy plain above, which ran a few miles, and ceased without reaching the sea. But the larger portion of the igneous river, or its main trunk, moved in a nearly straight line toward the shore, pouring over the upper end of the precipice upon the plain below, and dividing into two streams which ran parallel to each other, some hundred feet apart, until they plunged into the sea. These streams flowed four days, causing the waves to boil with great violence, and raising two large tufa cones in the water at their termini. They formed a long, narrow island, on which they enclosed thirty head of cattle, which were thus surrounded before they were aware of their danger, and it was ten days before the lava was hard enough to allow them to be taken out of their prison. During this time they had no water, and were almost maddened by the smoke and heat. Several cattle were also surrounded on the upper grassy plain, where they were lying down to ruminate or to sleep.
>
> The owner of the ranch [Captain Robert Brown of Kahuku Ranch], with his wife and a large family of children, was living in a pleasant house surrounded by a wall, with a fine garden of trees and plants, near the center of this beautiful grassy plain, and while sleeping at night, unconscious of danger, one of these lateral streams came creeping softly and silently like a serpent toward them, until within twenty yards of the house, when a sudden spout of lava aroused them and all fled with frightened precipitation, taking neither "purse or scrip," but leaving all to the devouring fire. The lady was so overwhelmed with terror that had it not been for her husband on one side and another gentleman on the other, she must have fallen and perished in the lava.
>
> The family, crossing a small ravine, rested a few moments on a hill near by. In ten minutes after crossing the ravine it was filled with liquid fire. Their escape was

marvelous. In a few minutes the house was wrapped in flames, the garden was consumed, and all the premises were covered with a burning sea.

A little farther down this green lawn was the hut of a native Hawaiian. As the fiery flood came within fifty feet of it, it suddenly parted, one arm sweeping around one side of the house and the other around the opposite side, and uniting again left the building on a small plat of ground, of some three-quarters of an acre, surrounded by a wall of fusion. In this house five souls were imprisoned ten days with no power to escape. All their food and water were exhausted. Small fingers of lava often came under the house; it was a little grass hut, and they were obliged to beat out the fire with clubs and stamp it with their feet.

Piles of burning scoria were heaped around this house, as high as the eaves, and in some places within ten feet of it. I afterward visited this house, and found its inmates alive and rejoicing in their deliverance.

A little further on, and this lava stream came near the ruins of a stone church, which had been shaken down by the earthquake of April 2d. The walls were a heap of ruins, and the roof and timbers were piled upon the stones. Again the flood opened to the right and left, swept close to the *débris* of the church, and united again below, leaving all unconsumed.

The same earthquake demolished a large stone church in Waiohinu, the central and most important mission-station in Kau, and so rent the house of the pastor, the Rev. John F. Pogue, that he, with his family, fled to the hills, and soon after left the district to return no more. Other homes also were left desolate, the terrified inmates seeking abodes elsewhere.

Volcanism and the Archeological Record

The 19th century drawings in Varigny (1981) of the 1868 eruption and flow in Kaʻū vividly illustrate the nearly incomprehensible destructive power of volcanism (Fig. 6). The 1868 event brought together the dynamic elements of the volcanic environment: lava flows, earthquakes, and tsunami[11] (Fig. 7). This conjunction of elements resulted in one of the most damaging sets of natural disasters to strike Hawaiʻi in the post-Contact period. It had a major impact on the Puna-Kaʻū region. The tsunami wiped out coastal villages: "The houses at Kaʻaluʻalu, Paiahaʻa, Honuʻapo, Hokukano, Kaʻalaiki, the two Hilea, Ninole, Wailua, Punaluʻu and as far as Keauhou, were all swept away by the sea" (Handy and Handy 1991:567). Varigny's (1981:215) description of the effects of the tsunami on ʻĀpua is particularly telling:

The ocean had withdrawn from the normal shoreline for a distance of more than a kilometer. He could see it boiling furiously, covered over with red foam and surging columns of water, tossed hither and thither, propelled upward from the sea's floor by submarine volcanoes. … After its movement of withdrawal, the sea began to flow back coastward again, rolling powerful billows into the shore, piling one wave upon another,

[11] A related destructive element of the environment that cannot be judged by historical writings is a potentially acidic atmosphere. This would affect archeological resources through the disintegration of marine shell on the surface of sites.

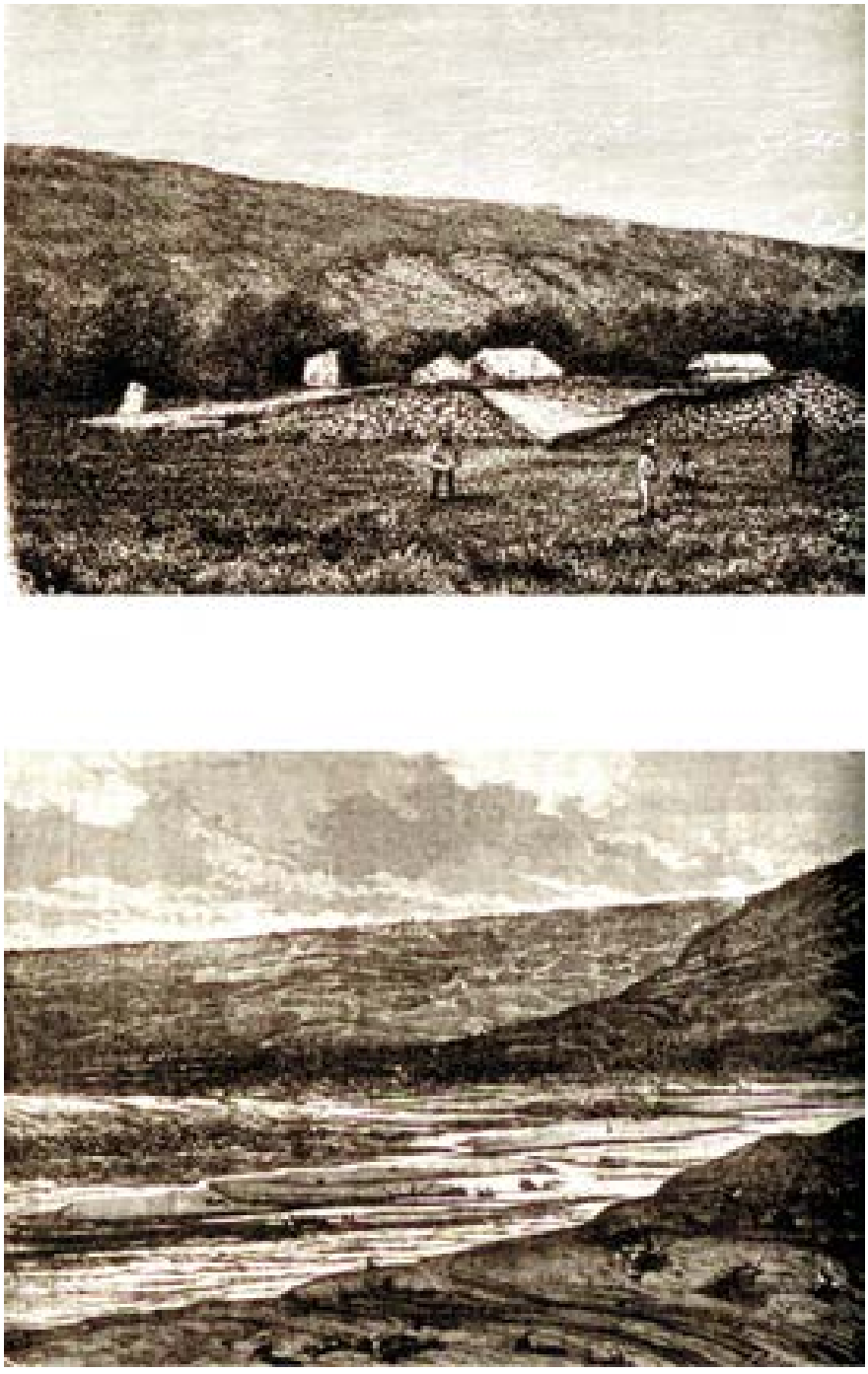

Figure 6. Two drawings of the 1868 lava flow (Varigny 1981 [1873]): “Ruins of the Catholic Church at Keauhou” (top) and “Cattle and goats caught in the lava” (bottom).

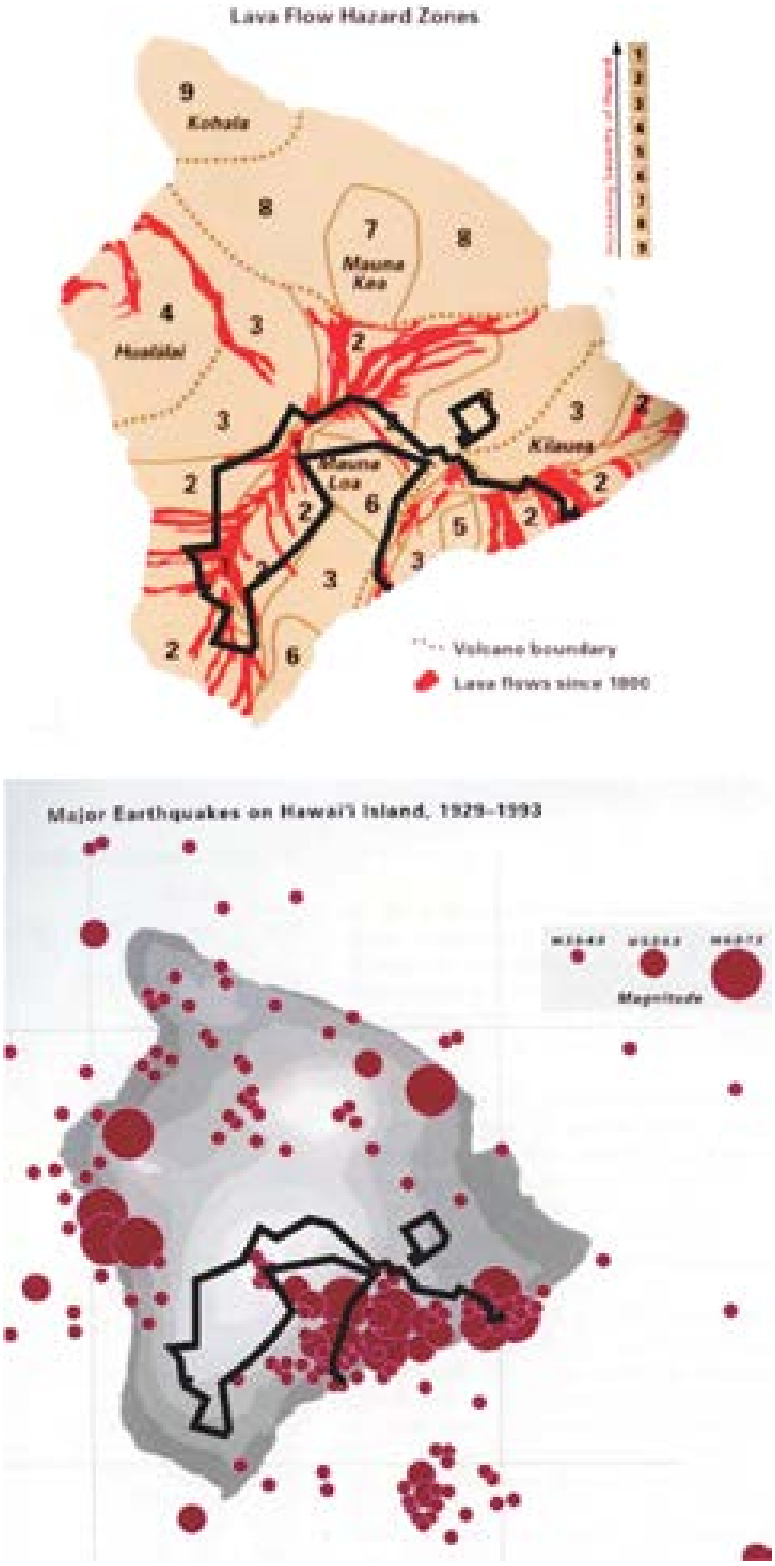

Figure 7. Geological hazards at HAVO: "Lava flow hazard zones" (top, adapted from Juvik and Juvik 1998:72); and "Major earthquakes on Hawai'i Island, from 1929-1993" (bottom, adapted from Juvik and Juvik 1998:69).

> so that, traveling with incredible speed, they finally broke against the island, submerging and engulfing everything. Indeed, this gigantic rush of seawater surpassed by more than ten meters the level of the highest earlier tides. … Men, women, children, canoes, dinghies, houses—all disappeared within the wink of an eye in a confused mass of uprooted trees, collapsing cliffs, boards floating at random, human beings and animals struggling against death like playthings in the grip of an irresistible force. Several times the sea subsided and then returned, hurling here and there all sorts of debris, in which cadavers collided and became locked with the bodies of the dying. Then, little by little, the ocean grew calm. As far as the eye could penetrate, one found no trace of fishing villages. Everywhere one saw only waste, desolation, ruin.

The destructive environmental history presents three obvious concerns for the archeological record. The first is the question of what percentage of the physical remains of human activity are left from the original archeological universe. The second is that the human settlements and structures that were not completely destroyed have to be evaluated in regard to this and similar events as part of site formation analysis. The third is the pragmatic problem of acquiring as much information as possible about this remnant percentage of the archeological record before it too is destroyed.

This factor of drastic past and continuing environmental destruction alone should be sufficient to allow HAVO to determine its needs and establish its priorities independent of general NPS service-wide concerns. The Research Design of the AOA proposes recommendations relevant to this concern (see Section VII).

VEGETATION HISTORY OF HAVO

The pre-Polynesian vegetation of the HAVO area has not been studied in detail, but paleoenvironmental research elsewhere on the island of Hawai‘i suggests that the coastal region probably included *Pritchardia*, *Dodonaea*, *Kanaloa*, *Cibotium*, *Chamaesyce*, and *Chenopodium* (Fig. 8; see Athens et al. 2006). Some pre- or early Polynesian plants have been identified from carbonized plant material used for radiocarbon dating of volcanic flows at HAVO, including ‘ōhia lehua (*Metrosideros polymorpha*) and tree fern (hāpu‘u, *Cibotium glaucum*) (Kelly et al. 1979). It is probable that many more identifications could be made from the archived charcoal of the volcanic-dating studies.

Plants identified from archeological deposits in excavations at HAVO include *Bobea timoniodes*, *Chamaesyce* spp., *Diospyros sandwicensis*, *Dodonaea viscosa*, *Metrosideros polymorpha*, *Myrsine* sp., *Osmanthus sandwicensis*, *Pandanus tectorius*, and *Pritchardia* (Carter and Somers 1990:15; Glidden 2006: Table 3).

RESOURCES IN HAVO

For archeology and history, generalized environmental description has little meaning in itself until it is translated into environment as conditions for life and as culturally perceived resources.

Described from this standpoint, HAVO has four areas of subsistence (that is, food-producing areas): the coastal zone of littoral collection and fishing; a zone of agricultural potential (based on rainfall and elevation); the upland wet forest zone for plant collection; and the alpine region for collection of nesting birds (Fig. 9, constructed from Emory, Cox et al. 1959; Armstrong 1973; McEldowney 1979; Clark 1985; Cuddihy and Stone 1990; Juvik and Juvik 1998). These areas also have potential for resources to be used for tools, construction, medicine, and ornamentation. The following summary is a generalization, with recognition that conditions change a great deal from lava flows and earthquakes. The resource zones (shown in Figure 9; also see Figure 10) are:

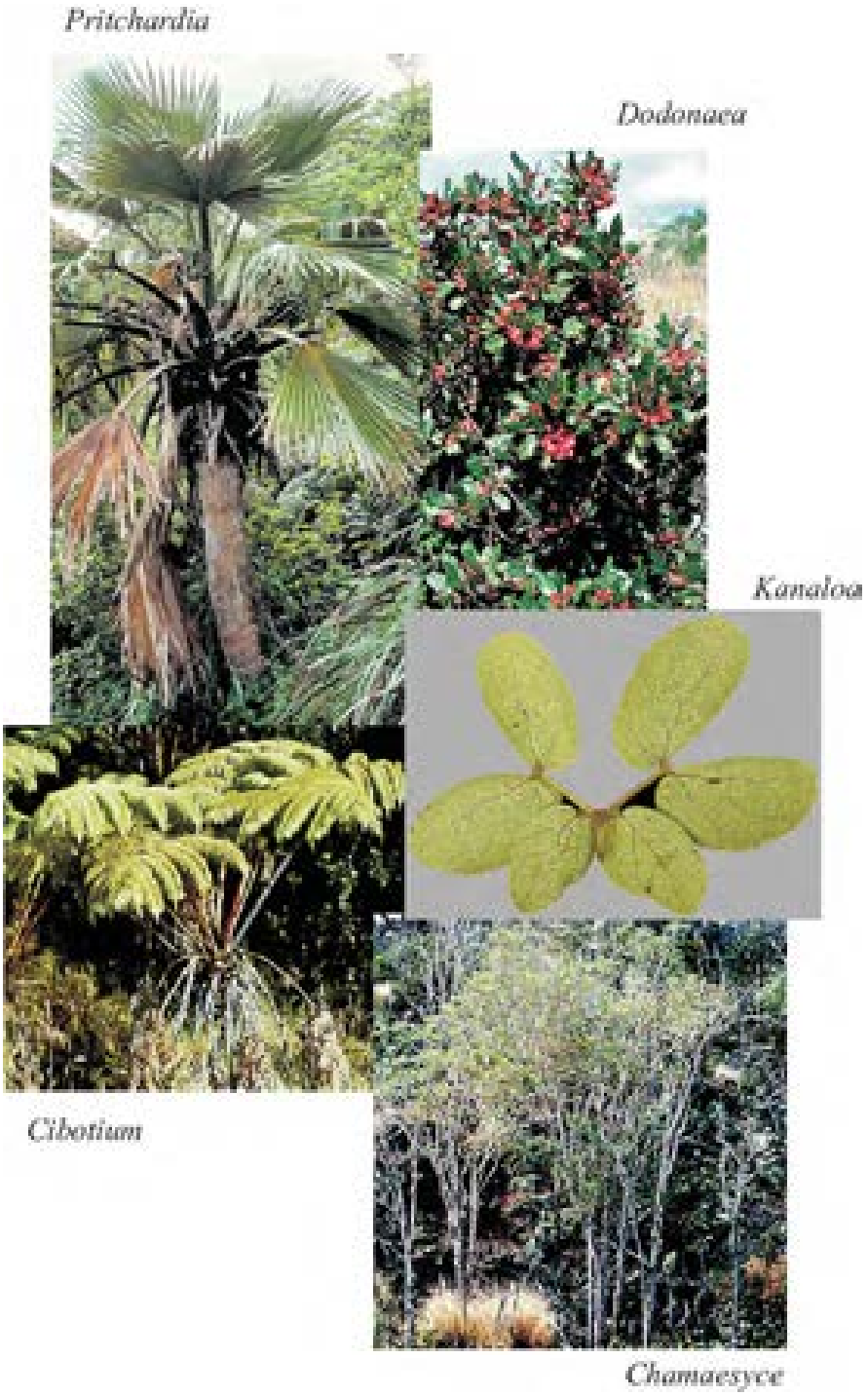

Figure 8. Modern examples of the larger plants found on Hawaiian coastlines in the pre-Polynesian era; paleoenvironmental studies indicate that *Pritchardia* was the dominant species of these plants.

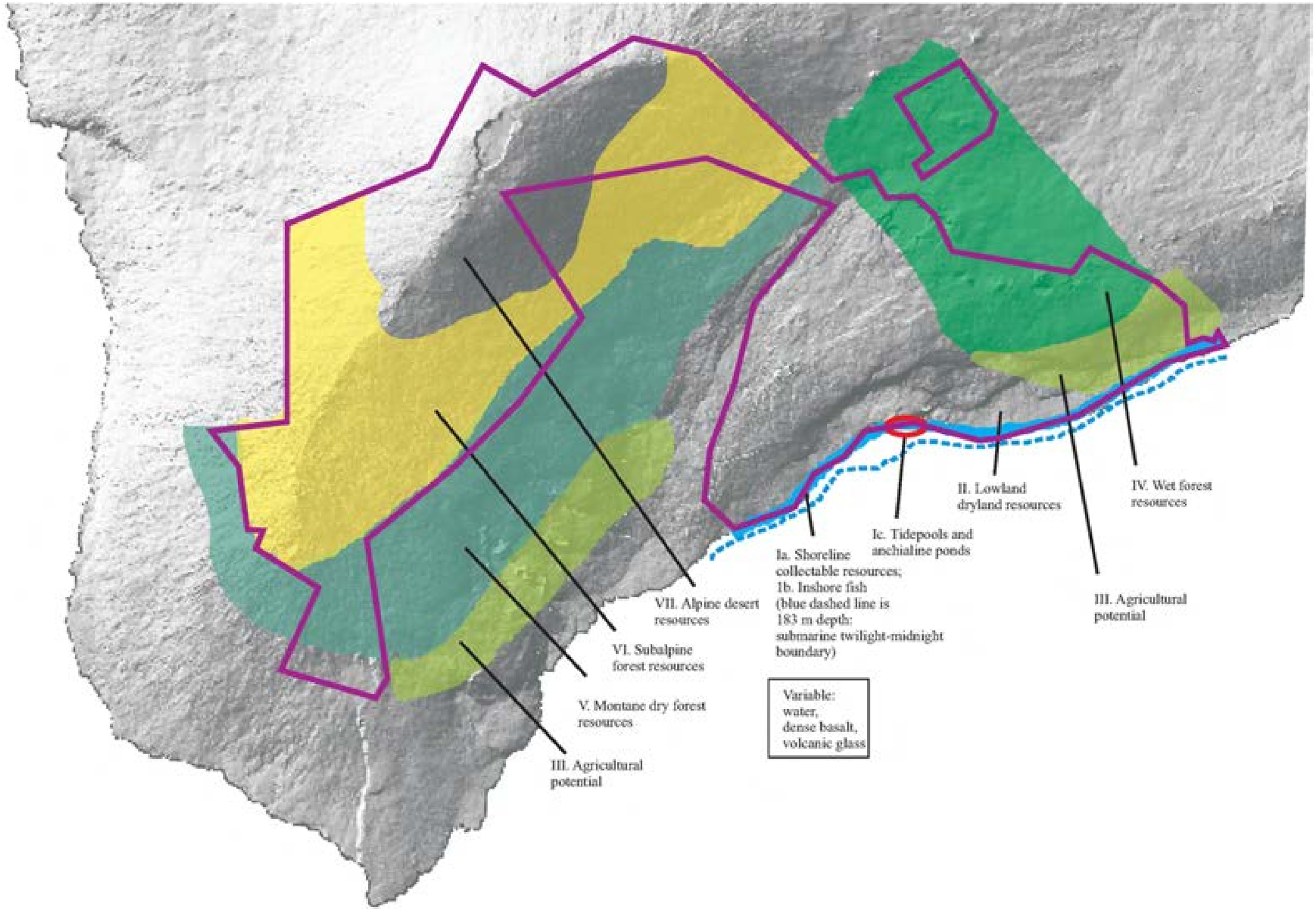

Figure 9. Biogeography (resource areas) of the HAVO region, interpreted for potential for traditional Hawaiian exploitation (based on the map of “Native Ecosystems before Human Settlement” in Juvik and Juvik 1998:122).

I. **Zone of littoral collectables and in-shore and near-shore fish**. This zone consists of predominantly rocky or cliff shorelines, with resources that include mollusks, crustaceans, shore-dwelling birds, coastal plants, and fish. There are no significant reefs on the HAVO coastline, which drops off quickly to the deep ocean; there are no places suitable for construction of fishponds; there are no large dune formations; there is no surface running water (although there may be submarine springs); locations suitable for easy canoe landings and for surfing (primarily ʻĀpua, Keauhou, and Halapē) are limited.

II. **Lowland dryland resource zone**. This is a region of low rainfall (generally under 25 inches annually) that is generally unsuitable for most cultivation, but which could support dryland forest that has usable wood and medicinal plants, and supports bird life. However, the active volcanism in HAVO has limited this form of forest development.

III. **Zone of agricultural potential**. This zone includes areas with over 25 inches of annual rainfall, below an elevation of about 2,000 ft asl, the effective limiting conditions for the primary Hawaiian cultigens, sweet potato and taro.

IV. **Wet forest resource zone**. The wet forests in the HAVO area are generally above the 2,000 ft elevation in areas that receive high rainfall. These are generally dense forests dominated by ʻōhiʻa lehua, with some koa (*Acacia koa*) and ʻōlapa (*Cheirodendron* sp.), but with a great range of other trees, ferns, and shrubs. Lower areas have the potential for small areas of cultivation of taro and banana, but in general they provide a rich resource zone for wood, medicinal plants, fiber and bark; it is also the major region for birds with prized feathers.

V. **Montane dry forest resource zone**. A transitional zone between lower elevation wet forests and the higher, dry sub-alpine zone; this area is one of the main regions of koa growth, along with open-canopy ʻōhiʻa and mesic forest trees. This zone also is habitat for bright feather-producing birds.

VI. **Sub-alpine forest resource zone**. The sub-alpine area is characterized by a thin canopy of dry forest trees such as māmane (*Sophora chrysophylla*) and naio (*Myoporum sandwicense*), with some dwarf ʻōhiʻa. It is thus a resource zone for wood and medicinal plants. Potential animal resources include forest birds and several species of seabird that nest in this region.

VII. **Alpine desert resource zone**. This zone lies above the treeline and has sparse vegetation, generally limited to shrubs, grasses, and lichen. This is a prime habitat for the Hawaiian dark-rumped petrel (ʻuwaʻu, *Pterodroma phaeopygia sandwicensis*).

For Kahuku ahupuaʻa specifically, Handy and Handy (1991:Figure 39) identify zones of land use and resources along elevational gradients, similar to the above described elevation/rainfall zones. Table 1 describes these zones.

Other resources are found scattered throughout the HAVO area, unrelated to vegetation and elevation. Of particular importance for human occupation is water. As noted by Smart (1965:5), "water is a scarce commodity in the park." There is no surface water in the form of permanent streams, although areas at the east edge of the Kaʻū desert around Hilina Pali show evidence of storm water run-off (see e.g., Roper 2005). At the coast, brackish water collects in cracks and fissures; Smart (1965:Figure 1) shows the locations of brackish water sources along the HAVO coastline. Emory, Cox et al. (1959:12) identify waterholes in the area of Kalapana Extension, with names such as ʻIlea ("a hidden water inland of Wahaʻula in a cave named Wai-pouli") and "Ka-ula-wai (The Red Water)."

At upland elevations, rainwater could have been collected, and in the immediate area of the craters, steam vents provide drinkable water. In his 1823 visit to Kīlauea, Ellis (1963:166) found pools of "perfectly sweet, fresh water" near the steam vents at the north end of the crater; he surmised that, from the earthquake cracks, "a volume of steam ascended, which was immediately condensed by the cool mountain air, and driven, like drizzling rain, into hollows in the compact lava on the leeward side of the chasms." In addition, historic and current USGS identify numerous "waterholes" in the sub-alpine and alpine zones, many of which have names. An upland swamp, Na Manua Haalou,[12] is located at the boundary of Kahuku and inland Kaʻalāiki ahupuaʻa.

Caves are another feature of the region that are an important resource. They provided shelter on cross-mountain treks and during resource collecting; they are often a source of water (by seepage). Many named caves were important landmarks on the mountain landscape, as evidenced by native testimonies in the 1870s Boundary Commission proceedings. One of their most important potentials was as a place for burial and for religious ceremony. As argued elsewhere (see Tomonari-Tuggle and Tuggle 2006b), caves were probably not used as wartime "refuge" in the HAVO region or elsewhere in Hawaiʻi.

Table 1. Elevation/Resource Zones in Kahuku Ahupuaʻa.*

Elevation (ft asl)	**Physiographic**	**Cultural**	**Natural Resources**	**Cultivars**
below 500	—	kula kai	—	sweet potato, gourds
500 to 1000	—	kula kai	—	sweet potato, gourds
1000 to 2000	—	kula uka	sugar cane, pandanus	dryland taro, sweet potato
2000 to 3000	—	wao ilima	forest taro, wild banana, wauke, yams, olona, pia	mulched taro, mamake, banana**
3000 to 4000	montane dry forest	wao amaʻu or kanaka	forest taro, wild banana	—
4000 to 5000	montane dry forest	wao nahele or laʻau	fern tree, canoe timber (koa**)	—
5000 to 6000	sub-alpine forest	wao akua	rain forest	—
6000 to 9000	sub-alpine forest	maʻukele	—	—
above 9000	alpine desert	kua lona	—	—

* from Handy and Handy (1991:Figure 39), except as noted.

** from Cordy (1988).

[12] This is the spelling used on the USGS topographic maps. Haupu, a Boundary Commission witness for Kahuku, refers to a place called Na Manu o Haalou that "is the name of the ohia grove, which is on Kaalaiki." It is possible that the name could be "Nā Manu o Haʻalou" (the birds of Haʻalou).

Figure 10. Primary plants of traditional Hawaiian use.

The presence of resources does not necessarily mean that they were exploited by humans. However, the question of exploitation is an empirical one that can be addressed through archeological and ethnographic investigation. For example, information about potential resources can be used as site predictors and as a basis for interpreting site function. Modified rock areas in the alpine zone are interpreted to be related to enhancing petrel nesting areas (Glidden et al. 1997; Moniz Nakamura 1997). Camps in the high forest zones where prized feather birds were abundant have been interpreted as temporary shelters for traditional bird-catchers (Tomonari-Tuggle 1996). In koa forests, there is the question of what cultural remains could be expected from the highly ritualized activity of acquiring koa logs for canoes and images. And as an example of "expectation," many dry areas and rough terrain that look unusable to the modern eye have been found by archeological investigation to be places where Hawaiians found ways to make cultivation successful.

THE CULTURAL ORGANIZATION OF ENVIRONMENT

Differing cultural systems could have organized the HAVO environment in many different ways and it might be instructive to examine the environment through the perspectives of different cultures (game theory could be applied to this setting by modeling how varying cultural systems would have structured this environment—Melanesian, Anasazi, and Australian come to mind as interesting possibilities). At a minimum, it may be valuable to employ this approach to appreciate how Hawaiians used this environment, based on the well-developed Polynesian hierarchical lineage-power structure that was the essence of the first colonizers of the Hawaiian chain. Anthropologists (Goldman 1970 and Kirch and Green 2001, among others) have analytically described this structure as an adaptive mechanism for long-distance voyaging. It has been characterized in a similar manner by Polynesian authors: Peter Buck (Te Rangi Hiroa; 1938) titled his history of Polynesians, *Vikings of the Sunrise*; Herb Kane (1998:98; 2005:35) describes Hawaiian culture as a "canoe culture," where the long-distance sailing canoe symbolically embodies the essence of traditional culture.

SPACE: HAWAIIAN ISLANDS

In the island world, space was hierarchically segregated into discrete units of political control and management (kingdom, district, ahupua‘a, and ‘ili) whose organization at the time of Contact is shown in Figure 11. These units were also integrated by a concept of time that was ritualized in the Makahiki, and by the fact that in Polynesian tradition, essentially all things come to the islands by sailing, by voyaging—or they come by the metaphorical equivalent of sailing (i.e., by flying or by such devices as a bending tree kupua). Space and time thus converge, as expressed in the *Kumulipo*, the Hawaiian creation chant: "horizontal" time and space converge at the horizon, the pillars of Kahiki; and "vertical" time and space also converge where mother earth and father sky approach one another at the peaks of great mountains.

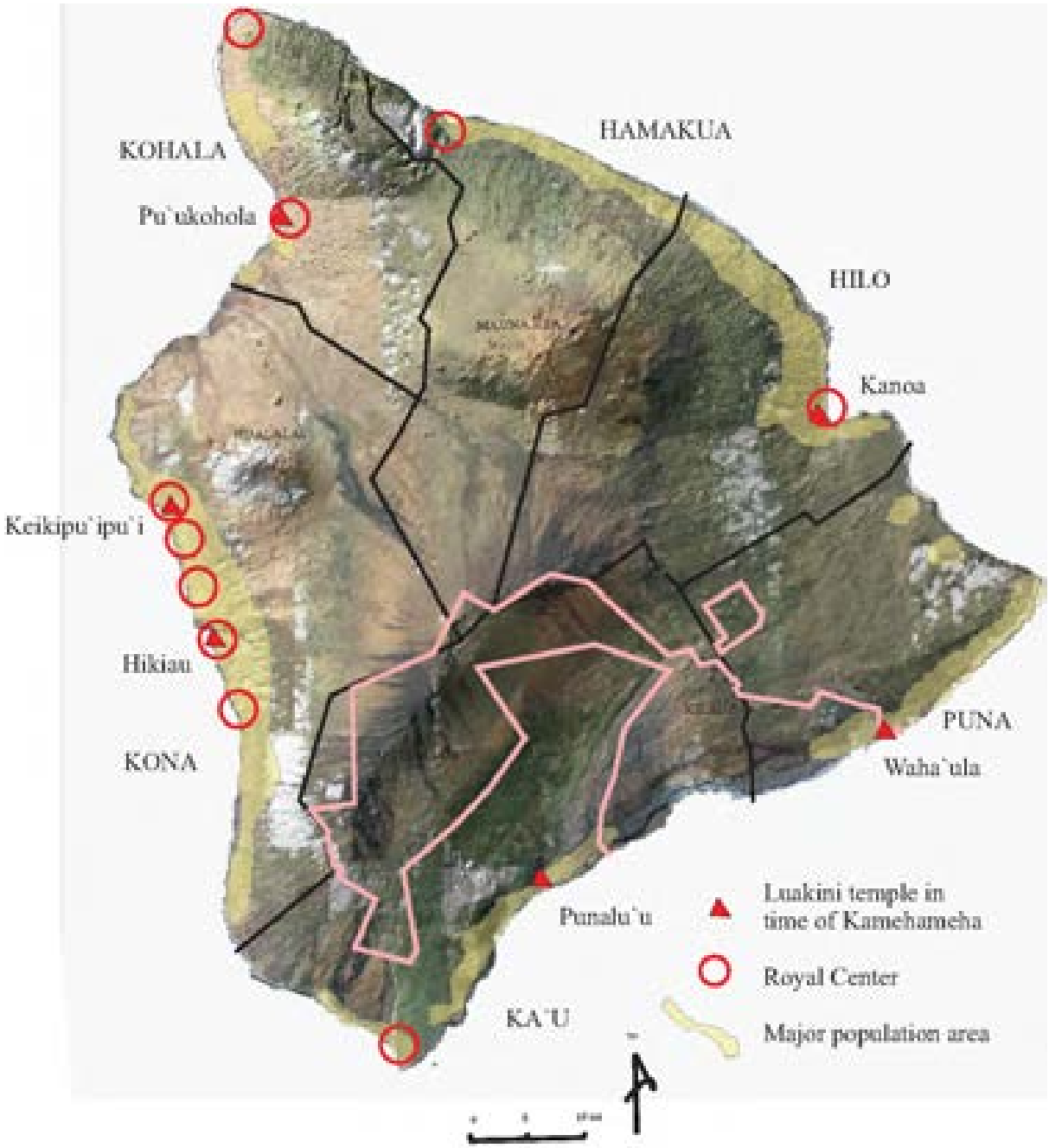

Figure 11. Hawai‘i Island in the late traditional era, showing districts, luakini temples, royal centers, and population density.

SPACE: HAVO AND THE CULTURAL ORGANIZATION OF RESOURCES

HAVO occupies space in the traditional ahupuaʻa of the districts Kaʻū and Puna (Fig. 12). In the eastern section, HAVO encompasses all or portions of (from east to west) Kahaualeʻa, Poupou, Pūlama, Kamoamoa, Laeʻapuki, Pānau, Kealakomo, Kahue, and ʻĀpua in Puna district (Fig. 13), and Keauhou, Kapāpala, and Kaʻalaʻala in Kaʻū. In the KMU in the western section of the park, HAVO occupies almost all of Kahuku ahupuaʻa.

Keauhou, Kapāpala, and Kahuku are large land areas. Kapāpala and Kahuku reach into and across the high alpine zone to meet at the summit of Mauna Loa. Keauhou also extends into the high mountain area but is particularly significant in encompassing the crater of Kīlauea at about the mid-point between the coast and Mauna Loa summit. The three ahupuaʻa also cover lengthy stretches of coastline: Keauhou and Kapāpala together have a coastline that is roughly 21 km (13 miles) long; the Kahuku shoreline (outside the park boundaries) is 10 km (6 miles) long. Of the three land areas, Keauhou has the only good landing along the rugged, lava-strewn shoreline; Handy and Handy (1991:614) describe Keauhou "as the most isolated community in Kaʻu … one and a half miles from the Puna boundary and about three and a half miles from Apua Point. Many miles of barren coast separated Keauhou from Punaluʻu, with no settlements between … not even a fisherman's house;" they add that there was a small, wide bay at Keauhou, good fishing, and possibly springs.

Eight of the nine Puna ahupuaʻa that fall within HAVO are relatively small, linear land units whose inland boundaries range from 1,640 ft asl (Poupou/Pūlama) to 3,600 ft asl (Pānau); the inland boundaries roughly follow the East Rift of Kīlauea. Kahaualeʻa ahupuaʻa, at the eastern border of HAVO, stretches inland to the east edge of Kīlauea Iki crater at around 3,900 ft asl; this ahupuaʻa cuts off inland access for the smaller land areas.

There is no significant traditional reference to the district of Kaʻū until the era of explicit island unification under the king Līloa (nine generations before Kamehameha), whose political center was Waipiʻo Valley in the east coast district of Hāmākua. The district of Puna had little distinction throughout its entire history, which was "bound up with the fortunes of the ruling families on either side"—that is, the families of Kaʻū and Hilo. Mary Pukui (in Barrère 1959:17) notes that Kaʻū was known as "Kaʻū Makaha" (*Kaʻū-the-savage*) and Puna as "Puna Kumakaha" (*Puna-resembling-the-savage*), indicating the ties of the two (see Fig. 12).

The ahupuaʻa pattern[13] of Kaʻū generally follows that of the rest of Hawaiʻi in that land size is roughly correlated to population (that is, the denser the population, the greater the number and the smaller the size of the ahupuaʻa), and population is related to resources (Tuggle 1979; Cordy 1994). The relationship of the land divisions of the HAVO region to the general resource zones is shown in Figure 14, with estimated population density (major temples are also shown). The western section of Kaʻū has two large ahupuaʻa, Manukā and Kahuku. The eastern section of Kaʻū has the ahupuaʻa of

[13] The ahupuaʻa boundaries are generally from 19th century records, and are assumed to represent traditional, late pre-Contract patterns, although there are questions about the specific location of many of these boundaries (see e.g., Carter and Somers 1990:25). This is an important research problem.

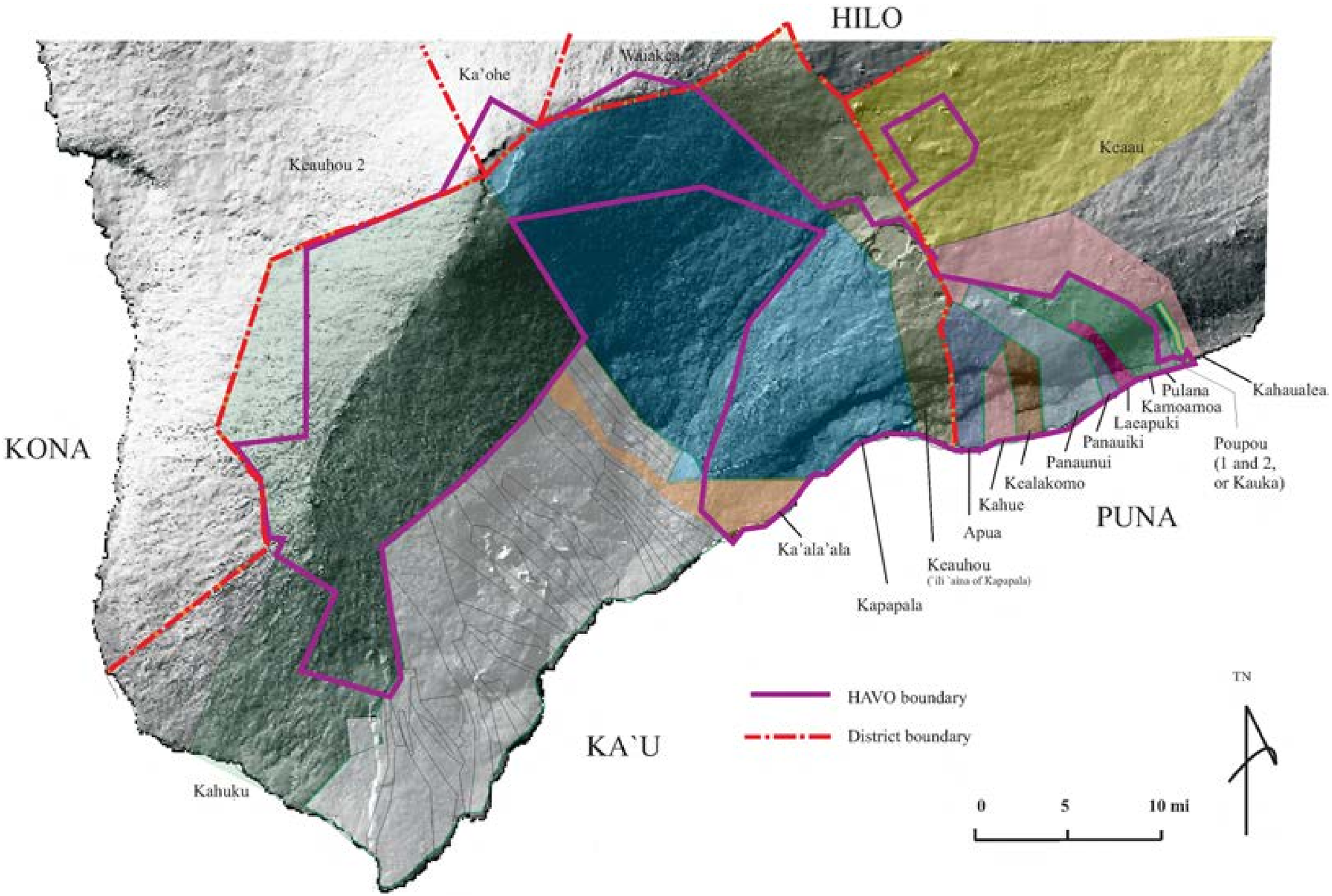

Figure 12. The traditional ahupuaʻa of the districts of Kaʻū and Puna in the HAVO area.

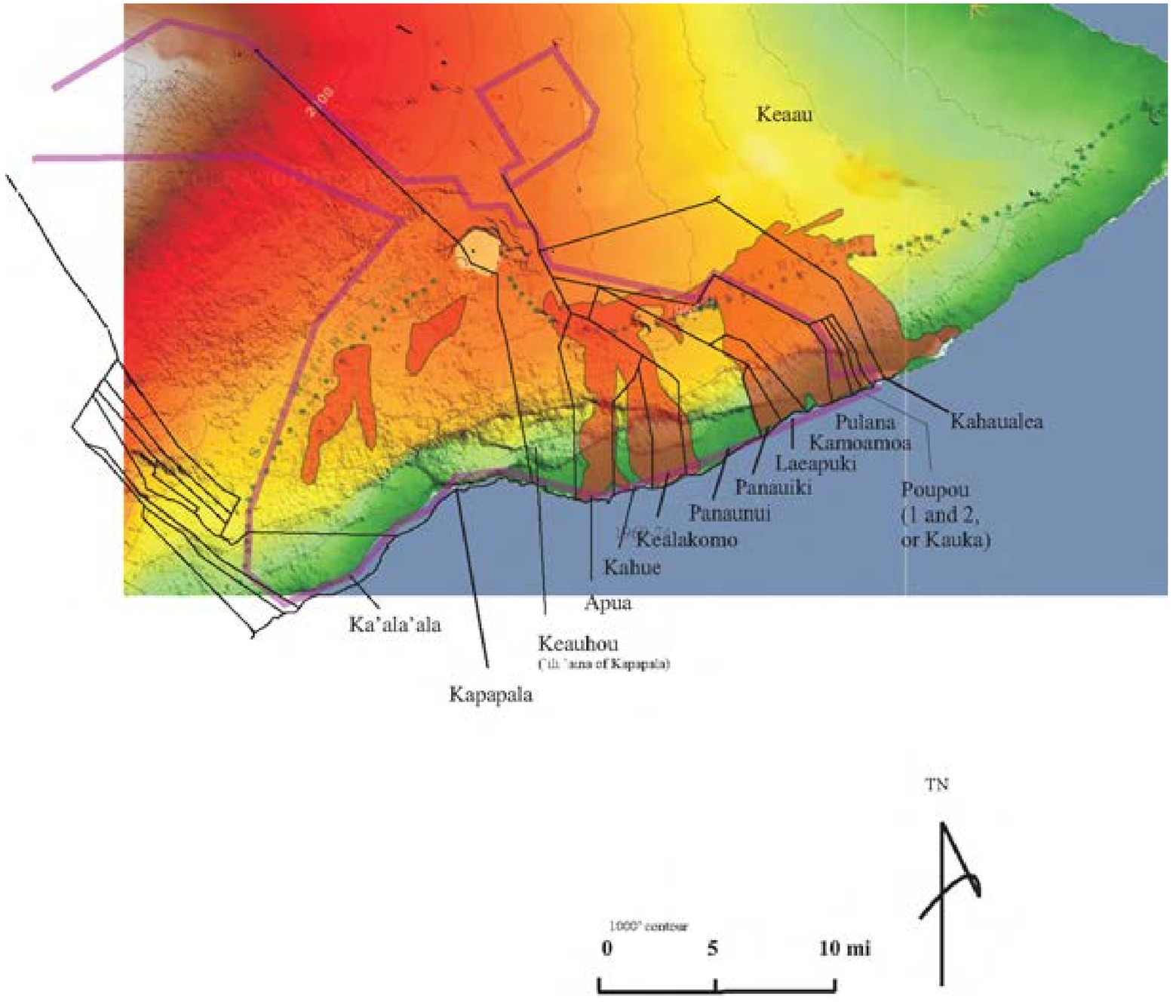

Figure 13. The ahupua‘a of eastern HAVO, shown on schematic landform.

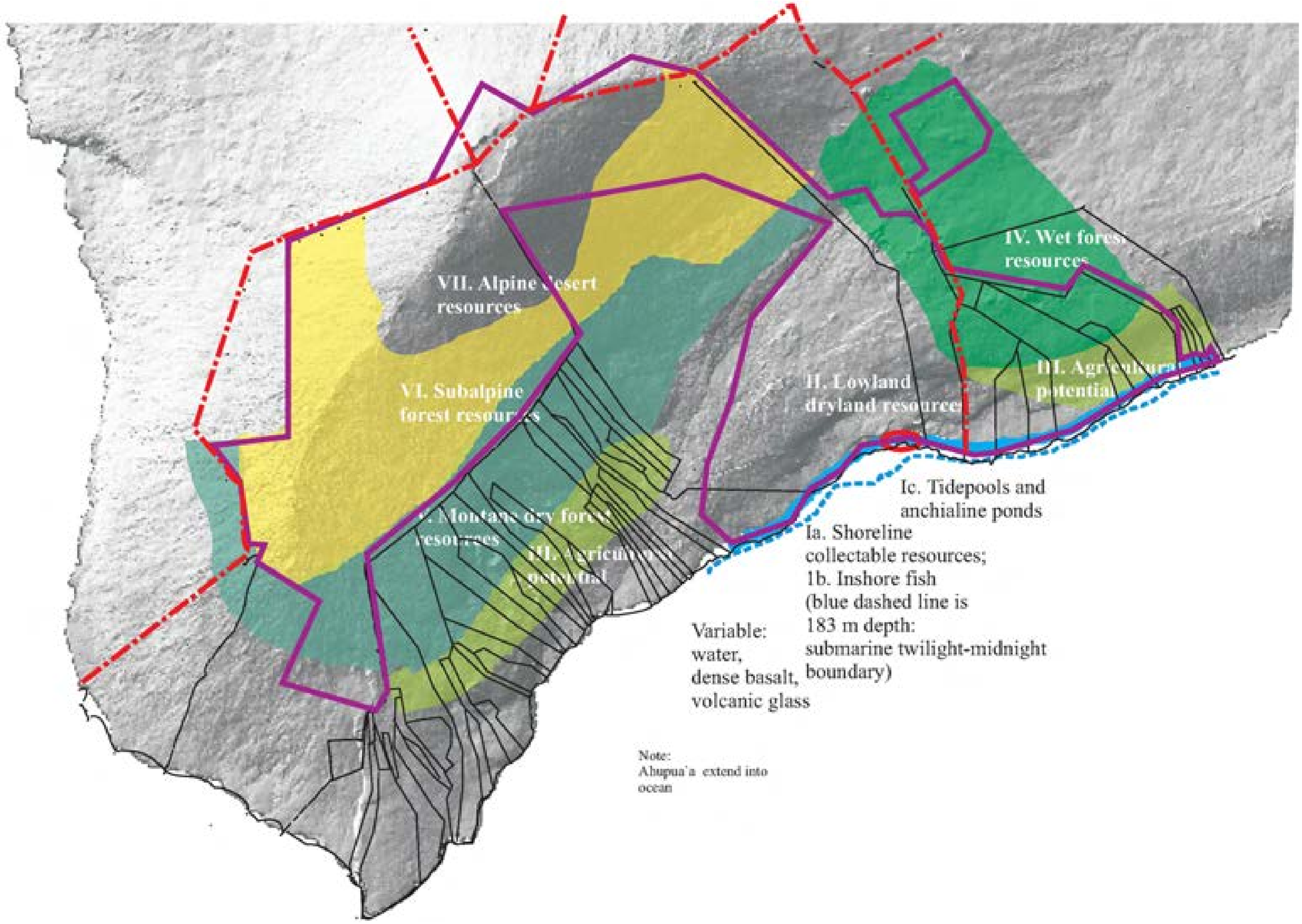

Figure 14. Resource areas of the HAVO area, with ahupua‘a distribution.

Kapāpala and the ʻiliʻāina[14] of Keauhou (the latter containing Kīlauea Caldera). Between these two areas of large ahupuaʻa is the central section of Kaʻū with 70 narrow land units.

One nearly unique aspect of Kaʻū is several clusters of small, inland ahupuaʻa that reflect unusual environmental regions. One of these clusters is in the area of Wood Valley at the eastern end of Kaʻū. Another cluster occurs at the east boundary of Kahuku at Pali o Māmalu (the section of the Kahuku Fault near the present Belt Road). In the area of this cluster, which includes Kīʻao, Mānienie, Nāpuʻulena, and Kekeʻekai ahupuaʻa (Cordy 1988:Table 1), the eastern Kahuku boundary jogs east to encompass Pāhala ash-rich lands at the top of Pali o Māmalu. In 1793, Archibald Menzies, naturalist on George Vancouver's expedition, and his party left their canoes at the coast and scaled the pali to the top of the Kahuku Fault. He describes the contrasting landscapes of barren, lava-covered coast at the base of the pali and upland grasslands at the top of the pali (Menzies 1920:182):

> On gaining its summit, … an extensive tract of the most luxuriant pasture we had yet seen amongst these islands rushed at once upon our sight, extending itself from the south point to a considerable distance inland. It was cropped with fine soft grass reaching up to our knees, and naturally of a thick bottom that would affort excellent feeding for cattle.
>
> … Close by us was a fine plantation belonging to Kamehameha, called Kahuku.

The other common ahupuaʻa pattern is that areas of low population (that is, relatively barren zones) are the regions where district boundaries are located. Thus, the boundary between Kaʻū and Puna falls in the rugged terrain of volcanism. However, a unique aspect of Kaʻū and Puna is that the dividing element is also a focus. Kīlauea and the deity Pele were a dominating factor in the lives of the people of both districts—and there is the possibility that this was not the traditional district boundary. Political structure often overrode district boundaries, and western Puna was under the control of the chiefs and kings of Kaʻū until the time of Kamehameha (see Fig. 12). The district has been called Greater Kaʻū (Cordy 1988) extending to the present Puna ahupuaʻa of Poupou.

At the western edge of Kaʻū, Manukā and Kahuku are large land areas dominated by the Southwest Rift of Mauna Loa, again emphasizing a dividing focus of the district of Kaʻū from Kona to the northwest.

Although the lowland area of eastern HAVO is a region of agricultural potential, it is a largely barren zone that is at the lower end of such potential. This is reflected in the larger ahupuaʻa size and lower population density of Kapāpala ahupuaʻa and the ʻiliʻāina of Keauhou; Kahuku in western Kaʻū is similarly large with low population. What is striking is that all three land units have claim to the uplands, a significant departure from other districts where the uplands are an inland extension of a central, high population, politically important ahupuaʻa (e.g., Keauhou in Kona and Kaʻohe in Hāmākua). These inland extensions "cut off" access to mountain resources for other Kaʻū ahupuaʻa; Kahuku also cuts off access for ahupuaʻa in south Kona. Kapāpala and Kahuku had access to a vast section of the upland forests of Mauna Loa and the alpine region, areas providing the important koa and other woods, as well as birds for feathers and food; these two ahupuaʻa were the only Kaʻū land units with access to the ceremonial focus of Mokuʻāweoweo, the summit crater of Mauna Loa. The ʻiliʻāina of Keauhou contains Kīlauea, the primary home of Pele. This emphasizes the importance of these large boundary ahupuaʻa and raises questions about their role in the overall political and religious system of the district.

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[14] An ʻiliʻāina was a semi-independent land unit within the ahupuaʻa. It can be considered as equivalent to an ahupuaʻa in many respects.

TIME: TRADITIONAL ORGANIZATION OF HISTORY

A sense of historical or linear time[15] pervades Hawai‘i traditions, as expressed in the *Kumulipo* and other creation stories and in royal genealogies. It is also expressed in the manner of presentation of individual events, which nearly always includes a temporal reference point such as the era of a particular king. The traditions are commonly divided into three general eras: the mythic past (the time of creation and the activities of the gods); the voyaging era (which is a period of active long-distance travel between the Hawaiian Islands and other places in the Pacific); and for the island of Hawai‘i, the traditional era of kings—often referred to as the dynastic era—from the time of Lā‘au and Pili to Kamehameha.

This linear time is often characterized as a trajectory of increasing historicity, and while this has a certain analytical value, it should not be taken in an absolute sense. It is perhaps more useful to consider this trajectory as one of multiple layers of metaphorical meaning—that is, the further into the past, the more multi-layered history becomes: Papa and Wākea established the paradigm for society (Kame‘eleihiwa 1992); the *Kumulipo* is an expression of evolution, history, and human realization (Johnson 1981); Pele has a reality as a personification of lava flows and as an ancestor (Pukui, in Handy and Pukui 1958:26); Pā‘ao was a great voyager and a priest (Masse 1995); the kings and their birth stars were intertwined entities (Johnson 1993).

The physical world includes elements of this traditional time in landscape, archeological remains, the record of physical events (such as lava flows and tsunami), and the record of celestial events. This is augmented by the traditional record that provides specific ties to the physical world by means of place names and by reference to physical and celestial events.

Genealogical Time

The primary temporal unit embedded in Hawaiian time is the genealogical generation, of which three referred to for this chronology. Reconciling variations in these genealogies and developing methods to convert the genealogical generations to calendar years have been proposed from the early years of western Contact to the present (see e.g., Fornander 1969; Hommon 1976; Cordy 2000). The average time span assigned to a genealogical generation has ranged from 20 to 30 years. Masse and Tuggle (1998) use an astronomical event that is identifiable in Hawaiian tradition to establish a fixed calendrical point, and thus calculate about 23 years as an average generation span.

Traditional History in the Area of HAVO

Table 2 provides a working framework for the present report that uses the Ulu-Hema genealogy (Fornander 1969:I:188-189) and a 20-year generation span as a means of providing a general estimate of

[15] There are many forms of non-linear time (see e.g., Parmentier 1987).

calendrical time. Included in this table are events from *The History of Kanalu* (Nāmakaokeahi 2004)[16] that are relevant to HAVO. The table is presented in two parts:

> Part 1 is the era before the time of dynastic kings, starting with Wākea, the mythical ancestor of all Hawaiians, and continuing for 45 generations to Lanakawai (just after the arrival of Pāʻao); it includes only the Ulu-Hema genealogy and events from *The History of Kanalu*.
>
> Part 2 covers the dynastic era of Hawaiʻi Island kings from the time of Lāʻau-Pili; it includes the area of rule by island and district, and specifies who ruled Kaʻū and Puna; information on the district chiefs who have been identified in the historical record is also provided; the last column continues the Ulu-Hema and Kanalu events from Part 1.

The information from *The History of Kanalu* (Nāmakaokeahi 2004) in Table 2 has been selected for its relevance to HAVO. The history begins with Kanalu, the first priest after the great flood (that is, the sea or tsunami called Kahina-aliʻi; see Ellis 1963:172), and to the chief of that time; both individuals lived and died in Puna. Kanalu refers to the coming of Pele and Pāʻao and to many events in the history of Pele and her family.

During the dynastic era, Kaʻū was an independent kingdom only twice, once under Kalaniʻōpuʻu and for nearly a decade under Keōua during the war with Kamehameha.

This information establishes the traditional historical-chronological context for HAVO, which is employed in Section III in the discussion of landscapes and sites.

ARCHEOLOGICAL ORGANIZATION OF TIME AND HISTORICAL EVENTS

Correlation of the archeological record with events of traditional Hawaiian history has been attempted with a variety of archeological remains, such as changes in temple construction and the history of rebuilding (e.g., at Puʻuhonua o Hōnaunau), with burn layers and references to "scorched-earth" warfare (e.g., on Kahoʻolawe), and with general archeological patterns of cultural change related to the Hawaiian traditional cultural sequence (e.g., Hommon 1976; Dye and Komori 1992; Cordy 2000). However, except for the parallel of general patterns, these efforts have not produced convincing results. More often than not, the traditional information is used only to identify and supplement archeological remains, such as providing the names of temples and a record of the kings associated with them.

Three archeological patterns that can be understood in relation to Hawaiian traditions are colonization, population growth and expansion, and the intensification of agriculture in leeward areas with associated shift of political power.

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[16] *The History of Kanalu* has a section in Hawaiian and a section that is the English translation. The Hawaiian section has standard pagination; the English section is paginated with the word "English" before each page number. The present document cites the English translation as "E page number" (e.g., Nāmakaokeahi 2004:E 10).

Table 2. Part 1—Pre-Dynastic Genealogy and Chronology for Hawai‘i and the Ka‘ū-Puna Area (Ulu-Hema and *The History of Kanalu*).

Ulu-Hema Genealogy*		
Gene-ration	**King**	**Information from *The History of Kanalu* ****
01	*WAKEA*	—
02-18		—
19	*Kueleimoana*	Pi‘ikuali‘i Kanalu (first chief). Lived in Puna, Hawai‘i, at the opening of a sacred ledge. The opening was “closed” when the Sun appeared. When Pi‘ikuali‘i Kanalu, first chief after the Flood, and Kanalu died, their bodies were taken to “the vast ocean of Lilana. (This is directly upland of Kuki‘i, where there is a secret cave.)” (Nāmakaokeahi 2004:E 8, parenthesis original)
20	*Konohiki*	—
21	*Wawena*	Namakaaokeahikaiakea, sister of high priest: prophecy of Pele (Nāmakaokeahi 2004:E 10)
22	*Akalana*	Pele appears; districts are formed and the chief of Ka‘ū is Kauhikau and his wife is Laukalie; ‘Opoike is the priest and his wife is Kealoali‘i. (Nāmakaokeahi 2004:E 13)
23	*Mauiakalana*	—
24	*Nanamaoa*	Pele and family make their home at Kīlauea. (Nāmakaokeahi 2004:E 13)
25	*Nanakulei*	—
26-28		—
29	*Aikanaka*	—
30	*Puna*	Battle of Pele and Kamapua‘a as prophesied. (Nāmakaokeahi 2004:E 39)
31	*Hema*	—
32	*Kahai*	Pilika‘aka‘a, a prophet arrives. “The prophets and the priests said, ‘We know this person. [What we know of this person is that], the lands he knew of are gone. This is the reason [he is coming]: to bring us his gods, Kū and Lono on that journey here and to live on our islands. Some of his gods are Pele, Kamohoali‘i, and Kahuilaokalani...His stature as a prophet is because he is a guardian of Pele...’” (Nāmakaokeahi 2004:E 62, brackets original)
33	*Wahieola*	About Pilika‘aka‘a, the prophet: “He loved his flesh and blood, Kamohoali‘i, Pele, ...” (Nāmakaokeahi 2004:E 67)
34	*Laka*	—
35-39		—
40	*Huanuikalalailai*	—
41	*Paumakua*	Coming of Pā‘ao as prophesied and realized (Nāmakaokeahi 2004:E 95, 99) [AD 1240])
42	*Haho*	—
43-44		—
45	*Lanakawai*	—

NOTE: Continued in the last column of Part 2 of Table 2.

* Numbered generations and names of kings from Fornander (1969:I:188-189).

** Information from *The History of Kanalu* (Nāmakaokeahi 2004).

Table 2. Part 2—Dynastic Era Genealogy and Chronology for Hawai‘i and the Ka‘ū-Puna Area.*

Gen	Dyn	King	Area of Rule	Greater Ka‘ū	Puna	Generational Date AD	Ulu-Hema Genealogy/History of Kanalu (continued from Table 2, Part 1)
01		LA‘AU	Island**		Pauahilani-nui *(great heavenly fire*), traditional chief of Puna; “convert of priest Pa‘ao” (Barrère 1959:41)	1340-1360	*46. Laau* “Laukahikikupua said to Lanaahaloa and the high priest in charge of the re-population effort, Poki’ikeanahulu, ‘The island is completely full of the worshipers of Pele, who rules as chief [over] Kihawahine and Kunawahine, the guardian angels of Kāne, Kanaloa and Keali‘ikapuhunaikeaouli.’ Poki‘ikeanahulu said to Laukahikupua and the chief, Lana ahaloa, ‘The great Pele’s guardian is Lumahihea, the one who has the adjudgement of life and death’” (Nāmakaokeahi 2004: E 120).
02		PILIKA‘AIEA	Island^			1360-1380	*47. Pili*
							48. Ko 49. Ole “Young Kauhikeali‘i issued his challenge that he had been so carefully taught by his grandparent, the great war chief of Pele. Kauhikeali‘i” (Nāmakaokeahi 2004: E 133).
03		KUKOHOU	Island^			1380-1400	*50. Kukohou* “Pele ordered Kuli’a’ikekaua, her war chief to expel the people of Ho1aniku” (Nāmakaokeahi 2004: E 136).
04		KANIUHI	Island^			1400-1420	*51. Kaniuhi*
05	1	KANIPAHU	Island^			1420-1440	*52. Kanipahu*
05	2	KAMAI‘OLE	Island^			1440-?	—
06	3	KALAPANA	Island^			?-1460	*53. Kalapana*

Table 2. Part 2—Dynastic Era Genealogy and Chronology for Hawai‘i and the Ka‘ū-Puna Area (continued).*

Gen	Dyn	King	Area of Rule	Greater Ka‘ū	Puna	Generational Date AD	Ulu-Hema Genealogy/History of Kanalu (continued from Table 2, Part 1)
07	4	KAHA‘IMOELE‘A (Mahaimoeleaikaaikupou)	Island^			1460-1480	*54. Kahaimoeleaikaaikupou* “The ranks of those in charge of the re-population effort were disgusted with the priests of Pele and Hi’iaka and the lesser gods. Across the land they buried Kamaunuiaola in fiery, glowing underground oven.... While the ranks of the priests were watching, Kamaunuiaola led several warriors to battle the ranks of priests in charge of the re-population effort. ... The chiefs and priests in charge of the re-population effort rose up to battle those who worshiped Pele, the goddess of the earth” (Nāmakaokeahi 2004: E 148-149).
08	5	KALAUNUIOHUA	Island			1480-1500	*55. Kalaunuiohua* “Prayer was chanted by Kaniakauahi, one of the priests of Pele who lived by her yam mounds of La’a. The guardian of Pele used this appeal to worship the fire gods in accordance with the traditions of the many gods” (Nāmakaokeahi 2004:152).
09	6	KUAIWA	Island			1500-1520	*56. Kuaiwa*
10	7	KAHOUKAPU	Island			1520-1540	*57. Kohoukapu*
11	8	KAUHOLANUIMAHU	Island			1540-1560	*58. Kauholaninuimahu*
12	9	KIHANUILULUMOKU	Island			1560-1580	*59. Kiha[nuilulumoku]*
13	10	LĪLOA	Island	‘Imaikalani, a member of the I family line	Huaa	1580-1600	*60. Liloa*
14	11	HAKAU	Island	‘Imaikalani		1600-?	—
14	12	‘UMI A LILOA Kulukulu‘a Hua‘a ‘Imaikalani ‘Ehunuikaimalino	Island Hilo Puna Ka‘ū Kona	‘Imaikalani		1600-1620	*61. Umi [a Liloa]*

Table 2. Part 2—Dynastic Era Genealogy and Chronology for Hawai‘i and the Ka‘ū-Puna Area (continued).*

Gen	Dyn	King	Area of Rule	Greater Ka‘ū	Puna	Generational Date AD	Ulu-Hema Genealogy/History of Kanalu (continued from Table 2, Part 1)
15	13	KELI‘IOKALOA Keawenui a ‘Umi	Island** Hāmākua, Hilo, Puna	Kahalemilo, son of ‘Imikalani	Lililehua, son of Huaa	1620-?	*62. Kealiiokaloa* *63. Kukailani*
				Kahalemilo, slain as rebel by Keawe	Lililehua, slain as rebel by Keawe		*64. Makakaualii*
15	14	KEAWENUI A ‘UMI	Island	Pupuakea, son of king Keawe		?-1640	*65. Keawenuiaumi*
16	15A 15B	*KAIKILANINUI* KANALOAKUA‘ANA LONOIKAMAKAHIKI ‘Umiokalani Makua a Kumalae	Island** Island (Kona, and Kohala?) Island Kona Hilo	Pupuakea, district chief of Ka‘ū, remained loyal to Līloa during major revolt			*66. Kanaloaku[A]Ana*
17	16	KEAKEALANIKANE Keaweakai ‘I	Island** Kohala Hilo		1640-1660	1660-1680	*67. Keakealanikane*
18	17	*KEAKAMAHANA* Kanaloauo‘o/Mahi‘ololi Kua‘ana a ‘I	Island** Kohala Hilo			1680-1700	—
19	18	*KEAKEALANIWAHINE* Kuahu‘ia	Island** Hilo			1700-1720	—
20	19A 19B	KEAWEIKEKAHIALI‘IO KAMOKU KALANIKAULELEIAIWI ^^ Kauauaamahi Mokulani	Island Island^^ Kohala Hilo	Kalaninui‘iamamao son of king Keaweikekahiali‘io kamoku			*68. Iwikauikaua*
21 20 21	20B 20A	KALANINUI‘IAOMAMAO MOKULANI KALANIKE‘EAUMOKU	Ka‘ū Hilo Kona, Kohala	Kalani‘ōpu‘u, son of Kalaninui‘iao mamao	1720-1740		*69. Kanaloakapulehu*

Table 2. Part 2—Dynastic Era Genealogy and Chronology for Hawai‘i and the Ka‘ū-Puna Area (continued).*

Gen	Dyn	King	Area of Rule	Greater Ka‘ū	Puna	Generational Date AD	Ulu-Hema Genealogy/History of Kanalu (continued from Table 2, Part 1)
22	21	ALAPA‘INUI Kalani‘ōpu‘u	Island Ka‘ū and Puna (after Alapa‘i)	*Ka‘ū independent* under Kalani‘ōpu‘u, who later conquered whole island			*70. Kaneikauaiwilani*
23	22	KEAWE‘OPALA	Island **			1760	*71. Keawe[ikehahialiiokamoku]* *72. Keeaumoku*
22	23	KALANI‘OPU‘U	Island	Keōua Kuahu‘ula, son of Kalani‘ōpu‘u (Ka‘ū chief Nuuanu-paahu, from Na‘alehu, joined with Imakakola)	1740-1760 Imakakola (descendant of Imaikalani?), rebelled against Kalani‘ōpu‘u; defeated	1760-1782	*73. Kekela*
23	24	KIWALA‘O	Island			1782	*74. Kalanikupuapaikalaninui*
23 22 23	KEOUA	 KEAWEMA‘UHILI KUAHU‘ULA KAMEHAMEHA	Ka‘ū (Puna, part) Hilo (Hāmākua, Puna, part) Kona, Kohala (Hāmākua, part)	*Ka‘ū independent* for 9 years under Keōua Kuahu‘ula; 1 of 3 independent divisions of the island; remained separate in wars with Kamehameha; finally Keōua gave himself up in sacrifice	1782-1791		—
23	25	KAMEHAMEHA	Island, Kingdom	Keaweaheulu		1791-1819	*75. Kamehameha*
24	26	LIHOLIHO	Kingdom			1819	*76. Liholiho*

NOTE: This table is based primarily on Cachola Abad (2000), with additional information from Hommon (1976), Johnson (1993), and Cordy (2000).

Key to Column Headings: Gen = Generation beginning from Lā‘au

Dyn = Dynastic Sequence from Hommon (1976)

Area of Rule (Cachola Abad 2000): ^ = Increasing authority over time; ** = Nominal ruling authority

King (Cachola Abad 2000): name in CAPS = ali‘i nui; name in Lower Case = ali‘i ‘ai moku

The last column is a continuation of Part 1 of Table 2; italicized information is from the Ulu-Hema genealogy (Fornander 1969:I:188-189) and the non-italicized information is from *The History of Kanalu* (Nāmakaokeahi 2004).

Around AD 800 is the beginning of Hawaiian archeological time; that is, the date of Polynesian colonization of Hawai‘i as based on a number of lines of evidence (Masse and Tuggle 1998; Tuggle and Spriggs 2001; Green 2005). This date is not inconsistent with Hawaiian traditions and a time-line that can be inferred from genealogies. Unfortunately, this conclusion falters from a critical deficiency—there is not a single component of any archeological site in Hawai‘i that can be reasonably identified as an early colonizing settlement, a situation unique among the major island groups of Polynesia (Tuggle and Spriggs 2000).[17] This is a function of two factors:

> Hawaiian coastlines are generally unprotected by reefs and thus more susceptible to natural destruction than most places in Polynesia
>
> the more probable coastal areas for early settlement were largely destroyed by intervening development long before they could be adequately explored for archeological remains.

Rapid population growth and expansion from core areas began to take place around AD 1250 for the Hawaiian archipelago, as shown in Figure 15. This has been attributed to the introduction of the sweet potato, which allowed expansion into dryland regions (as summarized by Green 2005). As indicated below, recent research suggests that population increase on Hawai‘i Island may have occurred somewhat later.

There have been few substantial excavation projects at HAVO, and the analyses of the excavations that have been conducted remain incomplete. Thus, there is limited stratigraphic information and radiocarbon dating available for understanding the chronology of the Hawaiian occupation of this area. The radiocarbon dating that is available for sites, as well as the radiocarbon dates of the lava flows on which sites were built, indicate coastal occupation by around AD 1250 (Holcomb 1987; Carter and Somers 1990:15). However, because of the extent of natural destruction (e.g., tsunami and subsidence) in the coastal areas of HAVO, the chances for identifying and dating early settlement sites is very limited. Nonetheless, this is an important research question and it is addressed in the Research Design (see Section VII).

The general environmental conditions of the HAVO area suggest that agricultural-based settlement was late, and probably date to after the introduction of the sweet potato. A working hypothesis of around AD 1450 is proposed for permanent settlement, although there were certainly fishing camps

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[17] There are some arguments for an earlier date of colonization (see e.g., Cordy 2000:108), but the authors of the present document believe such arguments are based on a misunderstanding of radiocarbon dating (see one discussion of this issue in Tuggle and Spriggs 2001), and there is a great deal of evidence in favor of a late date. Whatever the arguments may be regarding radiocarbon dates, an undeniably early settlement *site* has yet to be found in Hawai‘i (as the comment in the main text indicates). A recent article by Kirch and McCoy (2007) acknowledges this fact as well as the probability of post-AD 800 Hawaiian colonization; it proposes a change in the cultural sequence proposed by Kirch in 1985, eliminating the Settlement Period (AD 300-600) and calling the first period in Hawaiian cultural history the Foundation Period (AD 800-1200).

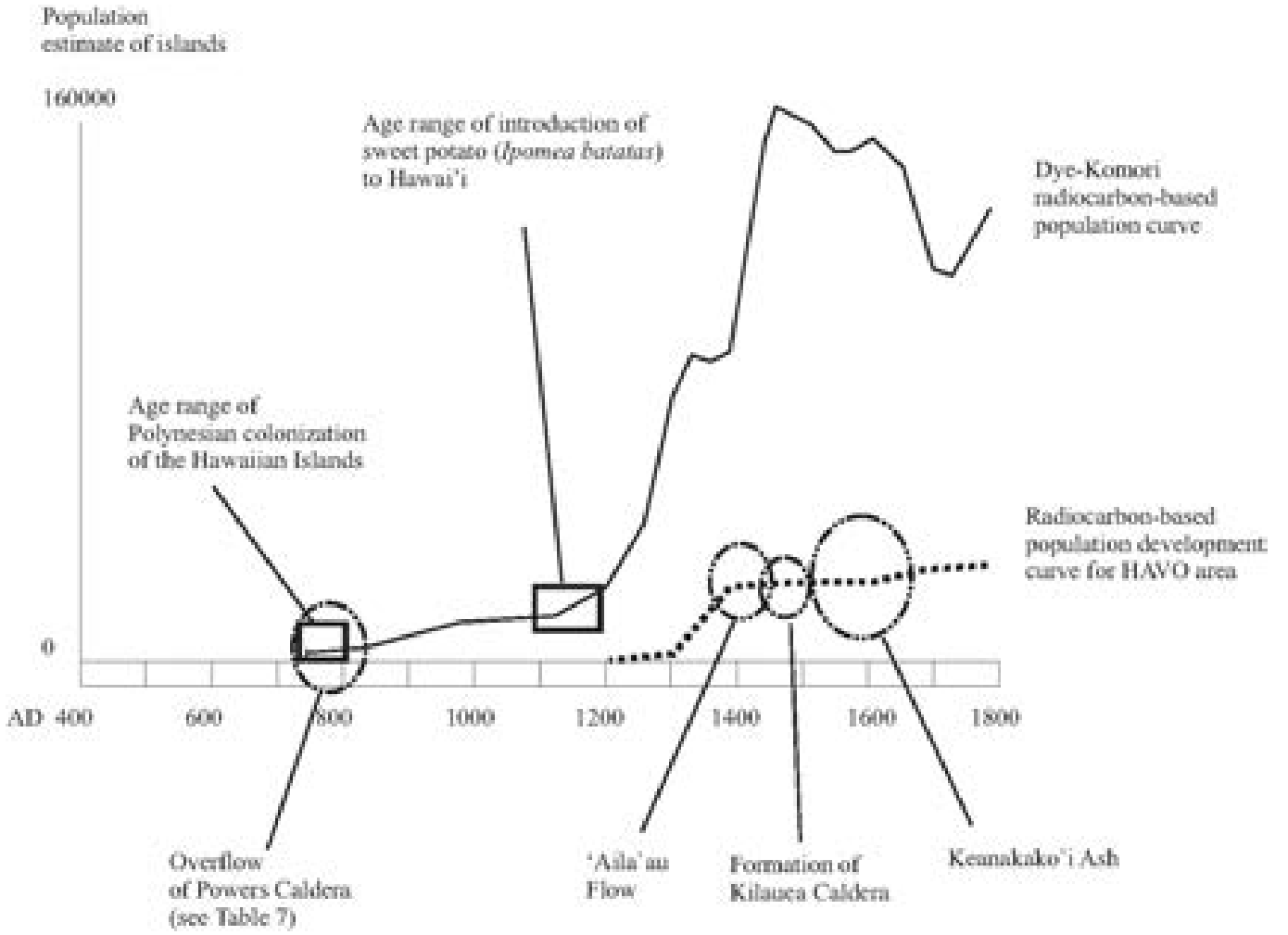

Figure 15. Hawaiian settlement and population growth, with an estimate of the comparative place of the HAVO area. The Hawai‘i radiocarbon-based curve is derived from Dye and Komori (1992); the HAVO curve is based on HAVO radiocarbon dates, plotted relative to the Hawai‘i curve.

along the coastline at a much earlier time.[18] This relatively late date is proposed because evidence accumulating from paleoenvironmental and agricultural field research in Kona indicates that major population growth there did not occur until around AD 1400 (Athens et al. 2006; Tomonari-Tuggle 2006). In Figure 15, radiocarbon dates available for HAVO are superimposed over the Dye and Komori (1992) radiocarbon-based population curve.

However, the volcanic activity in the HAVO region means that this area does not fit into the general environmental pattern of the island and so raises the question of how the changing volcanic landscape affected Hawaiian occupation. Were the volcano deities (however they may have been conceived in the era of early settlement) addressed with ritual and shrines as soon as this area was explored? And as a related question, how quickly were formal trails established for access to the volcanic mountains?

Answers to these questions may be found in the intensive study of the mountain shrines on Mauna Loa and in ritual caves, one of the most important research problems (in our view) at HAVO.

[18] The chronological data for the once proposed "early" sites at South Point have been re-evaluated (Dye 1992) and are now considered to indicate occupation of these sites as late as the AD 1500s.

III. LANDSCAPES OF TIME AT HAVO

The synthesis of the archeology and culture history of the HAVO area focuses on landscape and sites. The term "synthesis" is used here in reference to data categories: place names, mythopoeic, archeological, historical-traditional, and archival. Except for place names, these categories represent broad, somewhat overlapping time periods. The refinement of the analysis of these sets of data and the related archeological research are the major components of the recommended Research Design (see Section VII), with the ultimate goal being future syntheses that have increasing degrees of integration.[19]

The synthesis of landscape and sites begins with traditional place names, which provide points of spatial reference that are applicable to understanding the entire span of human occupation in the HAVO region. This is followed by landscapes of time. The first landscape of time is the mythopoeic, framed from the traditions and legends of deities and the earliest times of humans in Hawai‘i. This synthesis focuses on three places: Kīlauea (with an extensive treatment of Pele), Mauna Loa and Moku‘āweoweo, and the Pu‘uloa Petroglyph Field (Site 23271). These do not exhaust this category, but are provided as a set of examples of this landscape.

The second landscape of time is that of Pā‘ao and the early voyagers. The transition from Pele (representing the mythopoeic landscape) to Pā‘ao is a transition from the world of deities to the world of humans. These two individuals represent two of the most critical events in the cultural history of the HAVO area that are relevant to landscape and site; each of these events is an arrival, the end point of a journey.

> Pele's arrival and the mythopoeic creation of Kīlauea establishes a relationship between humans and the Puna-Ka‘ū region that dominated life throughout the traditional era; the relationship continues to the present in various ways.
>
> Pā‘ao's arrival is the initiation of an island-wide transformation of political and religious structure that establishes a Hawaiian-specific (as opposed to Polynesian) framework.

The archeology of HAVO, which is the physical distribution of the remains of past human activity, must be explicated by these two events and their ramifications if it is to be understood in a meaningful way.

The third landscape of time is the landscape after Pā‘ao up to the early post-Contact period. This landscape is expressed by the integration of the archeology of HAVO with historical-traditional references.

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[19] Based on present knowledge, the information for a few sites—notably Waha‘ula Heiau and the Footprints area—can be integrated to create site-specific syntheses, but there generally has been insufficient research to allow this degree of analysis for most sites or for the landscape as a whole.

The fourth landscape of time refers to the period after Contact and is the landscape as seen and experienced by the early to mid-19th century western visitors to the islands.

The last landscape of time is one of change, extending the impacts of western Contact to the modern era of the late 19th and 20th centuries. During this period, the landscape of HAVO was affected by the goals and actions of entities with a world agenda: ranching in a global market economy, World War II, and recreation and preservation from a national perspective.

PLACE NAMES

There is an enormous number of place names recorded for the region of HAVO. A detailed study is not possible for the present report, but such a study is recommended in the Research Design (see Section VII). Sources should include archival data (e.g., maps, land documents, Boundary Commission testimonies) and modern ethnographic research (e.g., Langlas 2003a, 2003b).

Following are three tables that present samples of place names in three different manners. Table 3 is a suggested format for compiling a general listing of all place names for HAVO. Table 4, taken from Maly and Maly (2005), is a compilation of names for a single region. Table 5 presents place names of ahupua‘a and associated names based on early accounts. A gazetteer of place names used in the present document is presented in Appendix F.

THE MYTHOPOEIC TRADITIONAL LANDSCAPE

This section discusses three areas in HAVO that have significant relationships to the world of the deities. They can be defined as cultural sites (per the NRHP), but they are also associated with human events that either [1] created remains that are identifiable as archeological sites or [2] are conceptual research directives for the identification and study of archeological sites.

KĪLAUEA: THE LAND OF PELE

> A demi-god [kupua] approaches across the sea...She will become a goddess [Akua wahine] for our descendants. She is Pele. She and her brothers are the chiefly gods [Akua ali‘i] of this earth...They are not evil. They are gods who care...Only if a person does wrong, even if he or she worships them, that person will be put to death.
>
> *The History of Kanalu*
> (Nāmakaokeahi 2004:10, brackets added, with words from the Hawaiian text)

Kīlauea is the land of Pele. The following discussion examines the nature of this being, followed by a consideration of her relationship to the lands of HAVO, and the human behavioral and material expressions of that relationship.

There is an enormous literature about Pele (e.g., bibliographies and documentation in Kanahele 1989 and Nimmo 1992; or inclusions in compilations about Kamapua‘a, such as Charlot 1987). Pele can be described in brief as “the volcano goddess born as a flame in the mouth of Haumea” (Glossary of Hawaiian Gods, in Pukui and Elbert 1971:396), with epithets or variations including:

Table 3. Selected Place Names of the General HAVO Region (see Appendix F for gazetteer of place names).

Name (and Alternate Spellings)	Source	Comment	Handy and Pukui (1958)	Pukui, Elbert, and Mookini (1974)	Other
Apua ʻApua ʻĀpua		Village destroyed by 1868 tsunami (also see Hōlei)		Fish basket	
Kau Kaʻu Kaʻū			The Breast (p. 22); no explanation of this translation is provided	Ancient name, no translation; cognates in Samoan (Taʻū)	Taku: rim, edge (among other things) (Tregear 1898)
Keahialaka	Ellis	The place where Pele first arrived in Puna (Westervelt 1991:3); Hoʻoulumāhiehie (2006:2)		Village in Puna where Pele dug a crater; lit. a fire made by Laka, a hula goddess	
Keauhou				New current or new era	New current/era may refer to movement of Pele (Maly and Maly 2005:9)
Puu Manawalea Puʻu Manawalea	Beckwith, in Emory, Cox et al.1959	On southern boundary of Laeʻapuki; petroglyphs			"Mound meant the bringing of people together with rejoicing" (Beckwith, in Emory, Cox et al.1959:56)
Hale o Lono	Emory, Cox et al.1959	Place where rain cooked, related to Puʻu Kapukapu		House of Lono	
Holei Hōlei	Emory, Cox et al.1959	Pali and village		*Ochrosia sandwicensis* (native tree); supernatural rat (ʻApua) lived there, shot by Pikoi-a-la-ʻalalā	
Laʻa* (possibly Olaʻa, ʻŌlaʻa)		Famed for herbs and kapa of high value (Fornander 1818-1819:V:112, 284); possibly the Laʻa in the *History of Kanalu* (Nāmakaokeahi 2004:156), where a priest of Pele lived and grew yams		Legendary place for the collection of bird feathers	May be the traditional name of ʻŌlaʻa
Puʻu Kapukapu	Emory, Cox et al.1959			Regal Hill	
Puʻuloa	Beckwith, in Emory, Cox et al.1959	"On the line between Kealakomo and Apuki"		Mound with most concentrated complex of petroglyphs in Hawaiʻi (Cox and Stasack 1970); mound used as depository for umbilical cords of infants	

* Emerson (1965:41) evokes the smoke and fumes of Kīlauea hanging over the forests of Laʻa (ʻŌlaʻa) when he writes: "Ka uka holo-kia ahi-manu o Laʻa, I po-ele i ka uahi, noe ka nahele... Nohe-nohea i ka makani luhau-pua..."

Table 4. Kīlauea Crater: Place Names and Cultural Sites (from Maly and Maly 2005).

Place Name/Sites	Translation*	Location	Note	Original Date
Hale Hoʻomaha, site of		N side of Kīlauea Crater		
Hut of Lord G.A. Byron, site of		E side of Kīlauea Crater		
Ka-moho-aliʻi, image of	Demi-god, brother of Pele	W side of Kīlauea Crater		
ʻAmaʻumaʻu, growth of	Sadleria fern (form of Kamapuaʻa)	at Halemaʻumaʻu		
Kapiʻolani's camp, site of		E side of Kīlauea Crater		
ʻAkani-a-kolea ʻAkani-kolea	Song or cry of the plover	Steam vents and location of old hale hoʻomaha (rest house); N side of Kīlauea Crater		
Alele-a-kolea		SW side of Kīlauea Crater		
Haʻa-kula-manu	Low plains of the birds	Sulphur Banks		
Hale-maʻumaʻu (1) Hale-ʻamaʻumaʻu (1) Hale-maumau (2)	(1) Sadleria fern house; "House surrounded by amaʻumaʻu ferns" (interpretive) (2) Everlasting house; House of everlasting fire (figurative)	Volcanic crater	Sadleria fern was a body form of Kamapuaʻa (Maly and Maly 2005)	
Heʻeia	Washed away	?		
Holoholo-kolea Holoholo-a-kolea	Running place of plovers	SE side of Kīlauea Crater		
Kaʻauea (1) Pali-kapu-o-Kaʻauea (2)	(1) The stream currents (2) The sacred cliff of Kaʻauea (Kaʻauea is the name of a priest, companion of Kahawali ma)	Waldron's Ledge		
Kahua-loa	The long field (arena)	?		
Ka-lua-Pele	The volcanic crater or pit of Pele	Kīlauea or Halemaʻumaʻu?		
Lua Pele, Kīlauea				1838
Ka Lua Pele o Kīlauea				1837
Kamohoaliʻi (1) Pali-kapu-o-Kamohoaliʻi (2)	(1) Name of the elder brother of Pele (2) The sacred cliff of Kamohoaliʻi	(07) NW side of Kīlauea Crater (Maly and Maly 2005); (22) Cliff above the east side of the pit (Pukui, in Handy and Pukui 1958:124)		
Ka-waha-o-Pele	The mouth of Pele	Kīlauea Iki Crater		
Kīlauea Iki	Little Kīlauea**	Kīlauea Iki Crater		
Ka-welelau-o-ka-uwahi	The tip of the smoke	Keanakākoʻi Crater		
Ka-lua-ka-koʻi	The adz-making pit	Keanakākoʻi Crater		
Ke-ana-kā-koʻi	The adz-making cave	Keanakākoʻi Crater		
Ke-one-loa	The long sandy (or cinder) area	?		
Kīlauea Nui	Spewing, much spreading (from Pukui et al. 1974, referring to volcanism); Big Kīlauea**	Kīlauea Crater		

Table 4. Kīlauea Crater: Place Names and Cultural Sites (from Maly and Maly 2005) (continued).

Place Name/Sites	Translation*	Location	Note	Original Date
Kū-lili-ka-ua	Kū of the mist rains	N side of Kīlauea Crater, location of old hale hoʻomaha (rest house)		
Lele-kolea; Lele-a-kolea	Plover leap	?		
Nā-hoku	The Protuberances	Thurston Lava Tube		
ʻŌhiʻa-o-ka-lani	ʻŌhiʻa of the heavens	"North peak of the volcano" (Ellis 1963:192); "Ohiaotelani is one corner of her [Pele's] house," said by priestess of Pele (Ellis 1963:216)		
Poli-o-Keawe	Bosom of Keawe	E side of Kīlauea Crater; near Kapiʻolani's camp		
Uwē-aloha (1) Pali-aloha (2)	(1) Cry of love; (2) Cliff of the beloved one, that is, Lohiʻau (interpretive)	E side of Kīlauea Crater		
Uwē-kahuna	Crying priest	NW side of Kīlauea Crater		
Wahine-kapu	Sacred woman	?		

* Translations are literal unless indicated otherwise.

** Maly (1996) notes that Mary Pukui told him that the pronunciation and the origin of the place name were unknown, that there was no specific tradition indicating how the name was given to this locale, and thus the literal translation given in Pukui et al. (1974) is only one possibility.

Table 5. Ahupua‘a and Related Place Names from Early Sources.

Ahupua‘a*	**1825 edition Ellis Map**	**1827 edition Ellis Map**	**Ellis route (1963 text)**	**Kalama 1837**	**Lahainaluna 1838**	**District**	**Geog. Order****
Kahuku						Ka‘ū	01
							x
							x
	Punaruu	Punaruu	Punaluu		Punaluu		x
	Moaula	Moaula					x
	Waimuku (village?)						x
		Kanaio (village)					x
		Pohakuroa (bay?)					?
		Teapuana (inland village)					x
					(upland_		x
					(upland)		x
	Ponahohoa	Ponahohoa (inland, ref to what?)					?
		Makaaka (inland hamlet)	Makaaka				x
Kaalaala Ka‘ala‘ala	Kaaraara Makanau***					Ka‘ū	02
Kapapala Kapāpala	Kapala	Kapalala (inland village)	Kapapala (village)			Ka‘ū	03
			(volcanic area)				?
							?
							?
Keauhou (‘ili‘āina)						Ka‘ū	04
	Kirauea	Kirauea	Crater of Kirauea^	Kalua Pele o Kilauea	Lua Pele, Kilauea		x
			[“Halemaumau” not mentioned by Ellis even though he spent time at Kilauea with many natives]	Kapapala			-
			Kilauea Iti				-

Kanehaki?

Ponahohoa

Kapuahi
Keapuana

Table 5. Ahupuaʻa and Related Place Names from Early Sources (continued).

Ahupuaʻa*	1827 edition Ellis Map	1825 edition Ellis Map	Ellis route (1963, text)	Kalama 1837	Lahainaluna 1838	District	Geog. Order**
Keauhou (ʻiliʻāina)			Oararauo (heiau to Pele)			Kaʻū	
			Keanakakoi				-
			Puuakoki or Puaakokoi***				x
				Kaaha (coastal village)	Kaaha		x
Apua ʻĀpua	Apua	Apua		Apua (village; boundary of Kaʻū-Puna)	Apua	Puna	05
Kahue							06
Kealakomo	Kearakomo	Kearakomo	Kearakomo (junction of inland/coastal trail)	Kealakomo (village)	Kealakomo	Puna	07
Panau Nui Pānau Nui							08
Panau Iki Pānau Iki							09
Laeapuki Laeʻapuki							10
Kamoamoa	Kamoamoa		Kamoamoa		Kamoamoa [sic]	Puna	11
Poupou/ Pulama Poupou/ Pūlama	Pulama	Pulama	Pulana			Puna	12
			Waharua				x
Kahaualea Kahaualeʻa		Punau			Puna	Puna	13
				Keuwaleau (village)			?
					Puna		x
	Kupahua	Kupakua [sic]	Kupahua				x
	Kalapana	Laepuki	Kalapana		Kalapana		x
	Kaimu	Kaimu	Kaimu		Kaimu		x

- Ahupuaʻa are listed with at least two spellings. The first listing is without diacritical marks; this allows alphabetical sorting of the table, and it also provides the spelling that occurs in early original texts (changes in orthography are not included here). The second spelling, with diacritical marks, is a modern rendition that is believed to reflect pronunciation. However, there is not always complete agreement about this; this spelling is from Pukui et al. (1974), where possible. The reader is referred to Appendix F for a gazetteer of place names.

** Geographic Order is the position of the ahupuaʻa (within HAVO) from west to east; x = ahupuaʻa not in HAVO

*** Makanau is the hill where Keōua decided to surrender to Kamehameha after he lost the battle of Puʻuakoki (Fornander 1969) or Puaakokoi (Ellis 1963:144) in Puna. Temple on hill at Makanau (Handy and Pukui 1958).

^ Ellis (1963:180) indicates Kīlauea Crater was in the "district [ahupuaʻa] of Kapapala," not Keauhou as shown today.

Honua-mea (*reddish earth*)

Ka-wahine-ʻai honua (*the earth-eating woman*)

Ka-wahine-o-ka-lua (*the woman of the pit*)

Ka-wahine-o-ka-ʻaʻahu-keʻokeʻo (*the woman with the white garment*).

Pele can also be described as the traditions that have come down to those today in music and dance, notably by the Hālau o Kekuhi and its famous hula *Holo Mai Pele*. *Holo Mai Pele* has also been presented in book form (Kanahele 2001). The version of the Pele tradition and genealogy on which this hula is based was published in the 19th century Hawaiian newspaper *Ka Hoku o Hawaii* (Kanahele 2001:ix).

In the traditions of Kaʻū as recorded in Handy and Pukui (1958:27-29), the following comments about Pele are provided:

> The cycle of the seasons, the unique climate and natural habitat, and the...geological formations of their land, encompassed by oceans and heavens, make up the dynamic Natural Setting of the native cultures of Ka-ʻu. The core of this culture is the family...The ocean, the underworld of vulcanism, the terrain and the heavens all harboured and brought forth elemental Persons embodying natural forces...and generic forms of life. There was first and foremost the clan of Pele, embodied in terrestrial and meteorological phenomena of vulcanism...The most important *kupuna* for all *ʻohana* of Ka-ʻu, greatly loved in spite of her bad temper, was Pele-honua-mea (Pele-the-sacred-earth-person). The Volcano Goddess was also called Wahine-o-ka Lua (Woman of the Crater) because she made her home in the depths of Hale-maʻu-maʻu and other craters on the slopes of Mauna Loa.

The Origins of Pele

Beckwith (1970:168, brackets added) summarizes Pele's origins, associations, and how she came to Mokuʻāweoweo, the summit caldera of Mauna Loa:

> [The] Pele myth is believed to have developed in Hawaii where it is closely associated with aumakua worship of the deities of the volcano, with the development of the hula dance, and with innumerable stories in which old rock or cone formations are ascribed to contests between Pele and her rivals, human or divine. The myth narrates the migration or expulsion from her distant homeland [usually identified as Kahiki or Polapola] and her effort to dig for herself a pit deep enough to house her whole family in cool comfort or to exhibit them in their spirit forms of flame and cloud or other volcanic phenomena...She finally settles at the crater of Moku-a-weoweo (Land of burning).

Beckwith made little or no use of the Hawaiian text of *Moʻokūauhau ʻElua* (*The History of Kanalu*), although she was familiar with it through a study of Polynesian astronomy by Maude Makemson (1940). This text contains a prophecy about the coming of Pele, in which the prophetess says (Nāmakaokeahi 2004:10, brackets added, with words from the Hawaiian text):

> A demi-god [kupua] approaches across the sea...She will become a goddess [Akua wahine] for our descendants. She is Pele. She and her brothers are the chiefly gods

> [Akua ali‘i] of this earth...They are not evil. They are gods who care...Only if a person does wrong, even if he or she worships them, that person will be put to death.

Handy and Pukui (1958:123) present texts that were explicitly written by (or quoted from) Mary Kawena Pukui, and in one of these, Pukui says:

> Pele, sometimes called akua malihini (foreign deity) because she came to Hawai‘i from abroad...after these islands were peopled by the descendants of Wakea and Papa, had but two forms, fire and human, the latter in all stages from childhood to decrepit old age.

The Family of Pele

The family members of Pele who were “embodied in terrestrial and meteorological phenomena” (as noted above by Handy and Pukui) included her brothers Kamohoali‘i and Keoahi- Reconfiguring the Hawaiian Cultural Sequence kamakaua and sister Hi‘iaka, as well as her father Kāne-hoa-lani, her mother Haumea, and her uncle Lono-makua (Handy and Pukui 1958:30-31). Beckwith (1970) describes the “family of fire gods” who inhabit the volcano at Kīlauea, from which Pele “governs the activities of lava flows.” Ellis (1963) and Kalākaua (1990) add other names and variations, and Ellis provides translations indicating that the brothers are associated with thunderstorms as well as volcanic activity, and the sisters have cloud forms (Beckwith 1970:168).

Regarding the famous stories of Pele and her pursuer Kamapua‘a, the hog-man demi-god expression of Lono, Beckwith (1970:206) summarizes their love-hate relationship, which ends with their division of the island of Hawai‘i. Pele takes the dry and/or lava-prone districts of Kona, Ka‘ū, and Puna, and Kamapua‘a takes Hilo, Hāmākua, and Kohala. Their child, Opelu-nui-kauha‘alilo, becomes the ancestor of all Hawaiians.

The Names of Pele

Beckwith (1970:179, italics and brackets added) describes Pele’s names, including an association with Hina:

> Pele’s most common name is *Pele-honua-mea* (Pele of the sacred earth), reminiscent of the Maori Para-whenua-mea, a name Percy Smith interprets as ‘effacement of nature due to flood’... Pele is the name by which the goddess is worshipped in her fire body. Ka-ula-o-ke-ahi (The redness of the fire) is her sacred name as a spirit...Pele’s name as a woman on earth... was *Hina-ai-ka-malama* [as told to Beckwith by Maui native Kilinahi Kaleo].

In her discussion of the *Kumulipo*, Beckwith (1951:123-124, emphasis and brackets added) again refers to a Hina name of Pele:

> *Hina-kawe‘o-a* is named [in Line 1917[20]] ... This Hina is certainly identical with “Hina-of-the-fire” who is mother of Maui in the chant of the fifteenth section. ... The name of

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[20] [Line] 1917 in the *Kumulipo* reads “Ki‘i Wakea moe ia Hina-kaweo‘a” (Beckwith 1951:235). The meaning of this passage is “Wakea as a Ki‘i, image, slept with Hina-kaweo‘a.”

> Hina-of-the-fire, *Hina-a-ke-ahi*, according to one old Hawaiian, is the fire goddess Pele's sacred name as controlling fire from the earth. In Tahiti Pere is called "goddess of the heat of the earth, a blond woman" (*atua vahine no te vera o te fenua, e vahine ʻehu*).

Pele and Sorcery

Beckwith (1970:180, emphasis and brackets added) comments on the nature of Pele and her family, particularly as related to sorcery:

> the Pele family *as gods of generation* are special patrons [of the arts of sorcery and the hula]. Training in the hula does not include the whole art of sorcery but every hula master must know the prayers to ward off sorcery...Even as late as Kalakaua's time[21] kahunas were educated as priests of Pele. Some who wished to study sorcery would stay for a year or more at the volcano, make sacrifices, and dream a chant. This chant they would dedicate to Pele or Hiʻiaka. In offering sacrifice the kahuna must get all four gods to 'work' with him by invoking each in prayer. He must also include ancestral gods [as well as guardian gods, deified gods, original ancestors and the descendants of chiefs].

There were rival schools of sorcery and also associated with "these schools of sorcery was the art of the healer" (Beckwith 1970:116).

Malo (1951:116) includes Pele and her sisters among the akua noho, gods who spoke through their priests in the manner called "possession" in English. Ellis (1963:216, brackets added) refers to one such priestess who described herself during a possession as "I am Pele" and who in that embodiment said she could heal a sick person.

> [one of the forms of the god Kū] Ku-waha-ilo's name is one of those given for the husband of Haumea and father of Pele.[22] Male chiefs worshipped him as a god of sorcery" (p. 30). "Ku-waha-ilo (Ku-maggot-mouth) was by tradition a man-eater and the god responsible for the introduction of human sacrifice...[and in various stories] he has terrible bodies such as a whirlpool, an earthquake, caterpillars, a stream of blood, a moʻo body with flashing eyes...All these manifestations are among the bodies of the Pele family of gods... (p. 29-30).
>
> Local legends abound of the swift retribution visited by Pele upon those who dare to offend her (p. 190).

Many of the references to the priests/priestesses of Pele refer to them as prophets and seers (kāhua and similar terms). There were many categories of priests who performed these functions, but those of Pele seem to have been of substantial importance. Kamakau (1964:3-4, 7, 12) remarks that the

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[21] The Kalākaua reign was from 1874 to 1891, long after Kapiʻolani's breaking of the Pele kapu at Kīlauea in 1824.

[22] There are differing names for the parents of Pele in various traditions. Westervelt's (1991:8) review of the traditions leads him to say that Kū-waha-ilo is the name most frequently mentioned as her father.

first priesthood was created when social order was being established soon after the time Papa and Wākea. This was the priesthood order of Lihau‘ula, the first priest (see Table 2). The “first prophet” was Luhaukapawa, and he was a member of the “priestly order of Lihau‘ula,” one of the papa kāula. Were Kamakaokeakua and other priests devoted to Pele in the priestly order of Lihau‘ula? (Does Liahu‘ula—Līhau‘ula?—imply volcanic ash or splatter?) And what were the orders of the priestesses? (Just for reference, the priestess of Pele mentioned in *The History of Kanalu* was named Kamakauahi.)

Pele and the Larger Context of Hawaiian Gods

In all of the islands, no people lived in such physical presence of a deity as did the people of Ka‘ū and Puna, whose daily lives were in the shadow of two mountains where Pele could erupt at any time. Their cultural landscape was spiritually and physically the body of a deity who was the most powerful and destructive physical force on earth. And this deity was female.

The Mo‘oKū and Mo‘oLono Gods

To place Pele’s nature into the larger context of the gods and of male-female relationships, two reviews of Hawaiian religion are discussed here. These reviews focus on human interaction with deities as expressed in social organization (that is, religious orders or cults[23] and their associated practices) and the material expression of this interaction.

Kamakau (1964:7) refers to the priesthood of the major gods and chiefly class as papa kahuna pule (Table 6) and writes that Kamehameha I “maintained two priesthood orders—the order of Holoa‘e, which had come down from Pa‘ao, and the order of Kuali‘i.”[24] Each order had its set of gods, mo‘oKū and mo‘oLono, respectively. Kamakau (1964:7) continues:

> The ritual (kapu) for the order of Holoa‘e was that of the of Kunuiakea [Kū-nui-ākea, the essence or invisible head of all of the Kū gods], the *kapu ‘ohi‘ako*. The visible symbols of Kunuiakea, the great unseen god in the dark clouds of heaven, were Kuka‘ilimoku, Kuho‘one‘enu‘u, Kukeolo‘ewa, and Kukalani‘ewa. … [The rituals of the order of Kuali‘i] were those of the god Lonoika‘ouali‘i, the *kapu lama* and the *kapu loulu*, which were heiau rituals. Lonoika‘ouali‘i was the visible symbol of the god Lononuiakea, and it was called Lonoikamakahiki.

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[23] The term “cult” here is not used in the pejorative sense (a recent emphasis) but in its traditional sense of a group with an exclusive ideology and set of rites; a cult also often has a focus on one particular entity of veneration.

[24] Kamakau (1964) also notes many other orders of papa kahuna, such as papa kaula—prophets, papa kahikuhi pu‘uone—priests who determined temple location, papa kilo hoku and kilo ‘opua—priests who read the signs in the stars and in the clouds.

Table 6. Papa Kahuna Pule: Priesthood of the Major Gods Kū and Lono (Kamakau 1964).

Papa Kahuna	**Mo‘o/ Lineage**	**Priests by Name**	**Temples/ Places**	**Hawaii Island Lands held by the priesthood ^^**	**Main Deity; Other deities/rituals of the order/meaning**	**Deity Pair**	**Kupua Expression**
order of Lihau‘ula, the papa kahuna pule; also papa kāula	?	Lihau‘ula, founder of the first priesthood (Kamakau 1964:3-4); Luhaukapawa, first prophet of the priestly order of Lihau‘ula (Kamakau 1964:12)	?	?	After Wākea and Papa, the kahuna orders were separated from other people, and the first order was called papa kahuna pule; established long before “government by chiefs” (Kamakau 1964:4)		
[Lihau‘ula? order of Pele priests?]		*Possible* prophets of this order include Kamakaokeakua, who died during time of Kamehameha, and Kapihe, the “last prophet” (Kamakau 1964:7) Kamakaokeakua is identified specifically as a prophet of Pele	Pele temple Oararauo at Kīlauea (Ellis); at Kealakekua, “sacred fish intended for Pele’s altar” (Kupa, in Varigny 1981:17); Pele altar in Ka‘ula (Ellis 1963:25)	—	Offerings to Pele at Kīlauea At Kaula (boundary of Hilo and Hāmākua), Pele altar with stone idols wrapped in yellow and white tapa; also an annual ceremony held by priests and kahu of Pele, for people of Hāmākua, protection against earthquake (Ellis 1963:250) White and yellow kapa suggest Kāne association		
Kanalu class or order	Mo‘oKū	Kanalu was first priest; *The History of Kanalu* provides a long succession of the priests by name (see Malo 1996 re: Hewahewa, last priest; also Papa Ii)	luakini	?	Responsible for ‘aha hulahula (Papa II, Malo) astrologer-prophets (Chun in Malo) Kāne, Kanaloa, and a mysterious deity Ke[ali‘i]po‘okapuhūnāikeaouli (Masse) Pele is “kupua”		
Pā‘ao class, came down from Pā‘ao; called Holoa‘e order in time of Kamehameha (Kamakau, Kepelino)	Mo‘oKū	Holoa‘e^ was the priest class of Pā‘ao as handed down to Pailili, Puou, Hewahewa, and Kaauamoku (Kepelino) Hewahewa was order of Holoa‘e Hewahewa (Kamakau)	Waha‘ula Mo‘okini	priests held land in Puuepa, Kohala [Mo‘okini Heiau] (Kamakau)	Kūnuiākea (great unseen..., with visible Kūkailimoku, other Kū) (Kamakau 1964:7)	Kū and Hina	Pele?

Table 6. Papa Kahuna Pule (Kamakau 1964) (continued).

Papa Kahuna	**Moʻo/ Lineage**	**Priests by Name**	**Temples/ Places**	**Lands held by the priesthood on Hawaii Island^^**	**Main Deity; Other deities/rituals of the order/meaning**	**Deity Pair**	**Kupua Expression**
Kualiʻi order	MoʻoLono	Kuaiwa and Holoiaena were priests, and "there were many chiefs who belonged to this order" including Hoapili (Kamakau 1996)			Lononuiākea MoʻoLono: responsible for ʻaha Hoʻowilimoʻo (Papa Ii). Heiau rituals: kapu lama and kapu loulu Lonoikaoualiʻi was visible symbol of god Lononuiākea and "it was called Lonoikamakahiki" (Kamakau 1996)	Kamapuaʻa	
Paliku order (Malo 1951:239)	MoʻoLono		mapele, unu o Lono (Malo)				
Ka-uahi (Iʻo clan)*	MoʻoLono ?	Kuaiwa and Holoialona (priests of Kauahi and Nahulu: supported the rebellion after end of eating Kapu) (Kamakau 1961:226-227)**	in Kekaha?	priests held land of Kekaha (Kamakau)	revelations, prophecy chants (informant)		
Na Hulu (Iʻo clan)*	MoʻoLono	ʻEhunuikaimalino and son Laeanuikaumanamana ? *** (Pae possible priest in ʻEhu line. Hawaʼe, prophet and priest for ʻEhu may have been in this line but said to have founded his own cult —Hawaʻe was kilokilo, kuhikuhipuʻupone; kahuna ʻanaʻana. Keaweaʻiko, last of the Hawaʻe priests) Hoapili	Waipiʻo Valley at time of origin?; later Kekaha?	priests held land of Kekaha (Kamakau)	Ball/cordage (informant) Ulu-maheihei: astronomy and all the the ancient lore; was proficient in the genealogy of chiefs (Kamakau)		

Table 6. Papa Kahuna Pule (Kamakau 1964) (continued).

Papa Kahuna	Moʻo/ Lineage	Priests by name	Temples/ Places	Lands held by the priesthood on Hawaii Island^^	Main Deity; Other deities/rituals of the order/meaning	Deity Pair	Kupua expression
Na Hulu (Iʻo clan)*		Ulu-maheihei [or Ulu-meheihei], priest of Nahulu, time of Malo Kamakau Kuaiwa and Holoialona (priests of Kauahi and Nahulu: supported the rebellion after end of eating Kapu) (Kamakau 1961:226-227)**					
Hakalau	?		Kona, went to Kaʻū		person or evil line of priests (informant)		

* Iʻo clan/bloodline of kahuna, taught Kauahi and Nahulu: healing and foreseeing, ‘righteous’ (informant)

^ Holoaʻe (and Kaʻakau) were priests of Alapaʻi (Kamakau).

^^ Also Note: Kamakau (1964) writes “When Oahu came under the rule of Kama-puaʻa, he gave the land containing the word *wai* to the kahuna Lono-a-wohi; but later the land was redistributed by Kahiki-ʻula and the older brothers of Kama-puaʻa because the kahunas had a monopoly of the well-watered lands, and the kahuna class were given the lands of Waimea, Pupukea [and others] in perpetuity...”

** These two priests of MoʻoLono orders sided with the priests of MoʻoKū in the rebellion against the end of the old religion. They followed Kekuaokalani, the chief who had been made keeper of the god Kū-kaʻilimoku. The other well-known priest of MoʻoLono at that time was Hoapili, who did not follow Kekuaokalani, and in fact, Hoapili led the army that destroyed the last remnants of the rebellious forces in a battle at Waimea after the battle at Kuamoʻo (Kamakau 1961:228).

*** A son of ‘Ehunuikaimalino named Laeanuikaumanamana is described as a priest during the reigns of Kihanui and Līloa. By the time of Līloa, Laeanuikaumanamana was not simply a priest of Kona, but was “Liloa’s high-priest” in the royal court at Waipiʻo Valley (Fornander 1969:II:76). Laeanuikaumanamana was of such priestly rank that only he was allowed to step in some of the sacred places where Līloa stepped, and he was also responsible for Līloa’s spittoon and kahili (Kamakau 1961:2). There is no specific description of the nature of his priesthood (or his papa, order), or whether he is the first priest in the ‘Ehu line (priests are clearly part of the ‘Ehu lineage, continuing to the time of Kamehameha, as indicated in the identification of Hoapili, an ‘Ehu descendant, as a priest of the papa of Nahulu). Among other things, Laeanuikaumanamana was an astronomer/astrologer (Kamakau 1961:354; Sahlins and Barrère 1973:30). Kamakau (1964:99) also refers to the priesthood orders of Kū, Lono, and Kāne in contrast to the plant-using kahunas of Kū and Hina.

The order of Kanalu (Nāmakaokeahi 2004) is one of the moʻoKū, in which Kanalu is the first priest, preceding Pāʻao. Of the moʻoLono, Kamakau (1961:226) refers to Kuaiwa and Holoialena as being kahuna of the orders of Nahulu and Kauahi. With Kualiʻi, these were all of the moʻoLono class.

Although attended by priests, Pele was not immediately within the papa kahuna framework described by Kamakau (1964), since that framework was devoted to masculine gods.

Kamakau (1964:68) describes Pele as "an *akua* and an *ʻaumakua* and a *kumupaʻa* for the Hawaiian people." He identifies "kumupaʻa" as a form of ʻaumakua, as a source god (all ʻaumakua) who has "given birth in human form, [that is, joining] a person's blood to theirs...a ʻfixed origin'" (Kamakau 1964:66). Further, "the *ʻaumakua*, ancestral deities of the family, were the ancient source gods... The "*akua ʻaumakua*...were Kane, Kanaloa, Ku, and Lono...The female source gods, *kumu ʻaumakua wahine*, were Haumea, Kahakauakoko, Walinuʻu" (Kamakau 1964:28). Individuals are related to these source gods through their own departed ancestors—ʻaumakua who have become connected or part of the entities of the source gods. For the female source gods, Kamakau (1964:28, brackets added) says: "There were worshipped through the [departed ancestors] who were related to the female *ʻaumakua* Pele, Hiʻiaka, Kapo [and others, and through them] are related to Haumea."

Kamakau (1964) provides a long and complex description of the nature of ʻaumakua, emphasizing that the essence of this entity is care and protection on many levels against threats from many sources, including safe conduct into the afterlife. One of the longest explications in traditional text about the nature of Pele is in his discussion of kākūʻai (also kākuaʻai), the deification of a deceased relative, and that person's transfiguration into an ʻaumakua that becomes united with the akua ʻaumakua (Kamakau 1964:64-69). Kamakau (1964:64-65, brackets added) writes:

> For a dead beloved one whom they wish to become a volcanic manifestation...of the crater...of Kilauea on Hawaii, the Hawaiians would...take to the volcano the bones, hair, fingernails, or some other part of the dead body, sacrifices and offerings for the gods (*akua*), gifts for the priests and guardians of the volcano, a pig, ʻawa, and a tapa garment...and they would descend to the pit of Pele. [After a night of ritual and sacrifice] the prophet of Pele, the *kaula* Pele, and the relatives of the dead...would take the corpse and the offerings to the very center of the fire...The prophet stood and pleaded...for the acceptance of the malihini and for his being united with the kamaʻaina of the pit...When the body of the *malihini* was thrown in, it was as though it were being fondly lifted by a procession of people and borne tenderly...into Halemaʻumaʻu, the home of the *kamaʻaina* chiefess of the place.

Within the larger practices of the state religion, Pele and her siblings played an important role in the luakini ceremony and in the general exercises and expressions of power. These deities are identified in the descriptions of traditional custom by many Native Hawaiian writers including Kamakau and Malo, and have been brought together in comparative structural form in the work of Valeri (1985, 1991). This is far too elaborate to present in any detail in the present study, but a brief statement indicates its significance.

First, in the final rites of the luakini ceremony that take place in the Hale o Papa, the female seers and prophets come to worship their goddesses and make sacrifices, and afterwards the priest of the Hale o Papa makes prayers to the gods and the temple is made free (Valeri 1985:328). As expressed by Kelou

Kamakau[25] (Fornander 1916-20:VI:28, 29; Hawaiian and the English translation appear on opposite pages, brackets added):

> Alaila hele mai la ka poe kaula hoomana i ko lakou mau akua wahine, o Pele ke akua o Kahiki, a o Hiiaka o ke kekahi, a o Kapo ko kekahi, a o Pua ko kekahi, a o Kamohoalii ko kekahi.
>
> *Then came certain prophets to worship their goddess [in the Hale o Papa]. Some for Pele, others for Hiiaka, Kapo, Pua and Kamohoalii.*

Second, in the religious and political structure of the island of Hawai‘i, the succession to the prerogatives and power of kingship was commonly divided between two offspring of a king (derived from the mythic charter of Līloa). Kamehameha acquired his total authority when he usurped the power of Keōua, the person who had been designated political ruler. Subsequently, in late 1801, he designated Liholiho as his heir and in so doing also turned over important religious rights and duties: Kamehameha had thus redivided power between himself and his son (Valeri 1991). From that point on, the care of gods of the Kū realm was retained by Kamehameha, with those of the Lono realm given to the care of Liholiho. However, when Kamehameha moved the capital to Kailua, he made another change. He turned over the religious authority for care of all of the gods to Liholiho—all but the deities of sorcery (who in the larger structure are deities of mo‘oKū). He had several houses built for the residence of the gods and their images including ones for the female deities Haumea and Pele and one for the images of the poison gods, the gods of sorcery (collectively called Kālai-pāhoa), one of the main ones being Kapo, the sister of Pele (Kamakau 1961:179, 1964:132; Valeri 1985:144, 1991). In short, Kamehameha's rule in his later years was based on the invisible power of the sorcery deities, including Pele and the sisters of Pele, as well as the sorcery component of a version of Kūka‘ilimoku. This power was certainly exercised in several ways, not the least of which was for supernatural protection against the invisible forces sent by his enemies.[26]

Pele as Female Power

The power and place of Pele in the traditional world has been discussed along a number of dimensions, as ‘aumakua for the people of Ka‘ū and Puna, as a child of gods who is herself a creator, as a devastating force of nature, as the leading member of a family of deities that is associated with positive and negative forces (positive and negative sorcery, protection, healing), and with associated ritualistic expression, including hula. But another aspect of Pele that is critical to consider is her gender. This is a dominating element in her relationship with humans (as in the tales of Hi‘iaka and Lohiau) as well as with other deities (notably with Kamapua‘a), and in her place in state temple ritual. The perception of the world in Hawaiian traditions has many facets, including the Polynesian expression of universal dualism. This dualism has many dyads that contain male and female deities and matching elements of nature, beginning with the origin couple, Papa and Wākea.

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[25] Kelou Kamakau (not the 19th century writer Samuel M.K. Kamakau) was a chief at Ka‘awaloa and is thought to have written his manuscript on religion around 1840 (Valeri 1985:xxvi).

[26] The female sorcery gods were also seen by Kamehameha as essential to his conquest of the islands (see Kamakau 1961).

In the sexual division of the world, Kū and Hina contain elements of all gods (as Hina may be seen as equivalent to Haumea and Papa), and at the same time each represents the essence of his/her human-defined gender. Each of these beings also has both positive and negative expressions. For Hina, as the prototype of the female, the negative is a function of impurity attributed to menstruation, and this negative is expressed as destructive power through various forms of Hina/Haumea, including the goddesses of vulcanism and sorcery (but these goddesses, including Pele, also have dual positive-negative embodiments as well). As discussed above, it is through their communication with the goddesses of vulcanism and sorcery that female priests have one of their most visible roles; that is, priestesses were the mediators between humans and gods, usually in their capacity as kāula-haka, mediums for the voice of the goddesses. For the priestesses of Pele, they also became one with the deity herself (Ellis, in Valeri 1985:131).

The Hawaiian concept of female impurity (as commonly perceived) and its many implications (including serving as the structural reason for the eating kapu, see below) have included views of women as having a diminished or secondary role in Hawaiian culture and history, by Hawaiian writers (such as Malo 1951:82) as well as by modern analysis (such as Goldman 1970 and Valeri 1985).

This view has been re-evaluated in recent decades by writers who point out many of the problems with the sources of information about traditional Hawaiian culture and the filters through which it has been interpreted. One of the earlier studies in this realm examines Polynesian culture in general and argues that female "pollution" has been misperceived and that women had a special, but frequently misinterpreted, relationship with gods (Hanson 1982). About Hawai'i, Linnekin (1990:34) writes that "the logic of Valeri's model works well for...ali'i men. But it is at least possible that women (and for that matter, commoner men) construed the system quite differently from male chiefs," and she reviews the manner in which women held and exercised social and religious power both structurally and historically. Linnekin pays particular attention to the material place of female deities (not simply verbal descriptions about their roles), particularly Pele and Kihawahine, in religious rituals in various contexts to argue that they had a much more prominent place than usually acknowledged.

Kame'eleihiwa (1992) explores male/female relations through the origin metaphor of Papa and Wākea, Sky-mother and Sky-father. One of the social structures (or lessons) from that relationship is the eating kapu, "which prevents the 'unclean' nature of women from defiling male sanctity when they offer sacrifice to the male 'Akua," but this "*haumia (*defiling) nature of women [did not] make them inferior to men; rather, it made them dangerous and thus powerful" (Kame'eleihiwa 1992:33-35, brackets added). She argues that female deities in Hawaiian traditions display enormous power (both creative and destructive) and that the Hawaiian female is the "eternal source of *mana*." Thus, separation via the concept of pollution of sacrifice was a mechanism to create balance and stability in the social order, which in the larger picture was the authority of the highest ali'i as gods on earth (Kame'eleihiwa 1992:36-37).

The arguments of Hanson, Linnekin, and Kame'eleihiwa are much more substantial than expressed here, but they are noted as a means to underscore the fact that very little is known about the details of the religious rituals that women conducted or the world-view that women held. As a result (for our interests), the understanding of Pele and her sisters may be seriously diminished. This in turn diminishes our understanding of the cultural landscape of Ka'ū and Puna, as well as of the specific rituals that took place where offerings and worship were given Pele and of the rituals of the female priests at what must have been the many temples throughout the land of Pele. Would the role of Pele in the luakini rites at the temple Hikiau at Kealakekua have been the same as that in the rites at Waha'ula in the shadow of smoking Kīlauea?

Pele in the Region of HAVO

There are a number of traditions regarding the arrival of Pele and her family from a distant land at a very early time[27] (before Pāʻao) and that the volcanoes Kīlauea and Mauna Loa were a center of religious power throughout traditional Hawaiian history. This is emphasized by a comment in Varigny (1981:42) regarding the aftermath of the breaking of the eating kapu:

> The pagan priests fled for refuge to Hawaii, to the volcanic home of goddess Pele. There they awaited the return of Kamehameha II [from England], upon whose volatile imagination they hoped to have an impact.

Many traditions mention Kahiki, or Polapola of Kahiki, as the place of Pele's origin. Emerson (1993:ix) identifies her homeland as Kuai-he-lani (Supporting heaven), the cloudland at the far horizon, which is the place of the Pillars of Kahiki (Kūkulu o Kahiki), the support that holds the sky up. This commonly refers to the western horizon, which is the ancestral homeland and the home of the gods. There are also traditions that associate Pele with the flood or sea (tsunami) of Kahina-aliʻi. In these traditions, she is born in Kapakuela (equivalent to Kuai-he-lani) and is driven from island to island by the flood. It is this famous flood of Kahina-aliʻi that begins the tradition of Kanalu. In 1823, Ellis (1963:172) was told of this flood (Tai-a-kahinaʻrii), and that Kīlauea was uninhabited until after it took place, when "the present volcanic family came from Tahiti."

Kamakau (1964:68) says that Pele and her family arrived "between the time of Paumakua and Laʻamaikahiki," ca. AD 1250 based on the Ulu-Puna and Ulu-Hema genealogies (see Table 2), and using the 20-year generation span.

However, the genealogy of *The History of Kanalu* (Nāmakaokeahi 2004:13) records that "the earth destroying demi-god Pele" appears 20 generations before Hāmākua (as reconstructed in Table 2), or between AD 850 to 900 by the 20-year generation calculation; this is, very close to the currently estimated date of Hawaiian colonization of about AD 800. Two generations later, Pele reaches Kaʻū and Puna (Nāmakaokeahi 2004:19):

> While the young chiefs were growing up the skies were opened up by the resounding booms of thunder and flashes of lightning. The earth shook and the muddy rain covered the land. These were the omens and signs showing that Pele had made her home at Kilauea Nui according to the prophets. She had taken the form of a demi-god and she had a servant named Kuhaikekaua. Pele made her presence known in Hawaiʻi for there were no other demi-gods who could match her strength except Kamapuaʻa.[28]

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[27] There are also other traditions, not discussed here, that place her arrival at later times.

[28] A "Prayer for Healing" follows shortly after this, but given the many unidentified allusions, it is not clear if this is a prayer directed to Pele or to another deity.

This description of Pele's arrival clearly expresses her power, immediately identified by the signs of the heaven and earth. Another tradition tells of her power by the fact that she replaces the "old volcano god" ʻAi-lāʻau (Wood eater), who "retreats before Pele or surrenders to her in the pit she has dug" (Beckwith 1970:178); this suggests that her priests supplanted those of the old god. Westervelt (1991:3, 13), quoting from tales in Hawaiian newspapers, says that ʻAi-lāʻau lived at Kīlauea Iki, and that this god, who had been the scourge of Puna, ran in fear when he saw Pele approaching.

Traditions indicate that the first place where Pele arrived in Puna was Keahialaka (Hoʻoulumāhiehie 2006:2; Westervelt 1991:1). From there, she went from there via craters or more likely, she created craters as she traveled (Fig. 16).

The History of Kanalu also has other references to Pele that provide information about her priests and her place among deities.

In the time of Lāʻau, the immediate predecessor of Pili (determined by comparison with lineages, not in the Kanalu tradition), and ca. AD 1350, a priest of Kanalu states that "this island is completely full of the worshippers of Pele, who rules as chief [over] Kihawahine and Kunawahine, the guardian angels[29] of Kāne, Kanaloa, and Kealiʻikapuhunaikeaouli" (Nāmakaokeahi 2004:120, brackets original). Kihawahine and Kunawahine are powerful moʻo akua, ʻaumakua who also may be related to Pele. Kihawahine, in particular, occurs as an opponent of Pele in several traditions. This statement indicates that Pele has the dominant sorcery powers over all of the island, including the two moʻo akua.

This statement is followed by a long passage that appears to discuss how to invoke the good will of Pele, including two chants to Pele.[30] Nine generations later, *The History of Kanalu* tells of major conflict between the priests of Pele and those of the priests of Kanalu (Nāmakaokeahi 2004:148-150). The meaning of this passage is unclear, but the text suggests that this was a time when the volcano was particularly active, displaying the power of Pele and thus the equivalent power of her priests.

The final reference to Pele in *The History of Kanalu* occurs in the time of Kalanuiohu (ca. late AD 1400s) and includes a chant to Pele by "Kamakauahi, one of the priests [kahuna] of Pele who lived by her yam mounds [puʻu uhi] of Laʻa. The guardian [kahu] of Pele used this appeal to worship the fire gods in accordance with the tradition of the many gods" (Nāmakaokeahi 2004:156, brackets added with words from the Hawaiian text). The reference to Laʻa may mean the voyager/demi-god Laʻa-mai-Kahiki or it may refer to a place (or to both). Pukui et al. (1974:126) indicate that Laʻa is an old name for ʻŌlaʻa, a "legendary area for collecting bird feathers." The name also shows up in the battle of Hiʻiaka with the demons of Panaʻewa where the "ohiʻa o Laʻa" is mentioned (Emerson 1993:34). This all suggests that this kahuna (a priestess) of Pele lived in or near HAVO in the ʻŌlaʻa forest region.

The History of Kanalu (Nāmakaokeahi 2004) is unusual in many respects and one of these is the inclusion of events involving Pele as a character in a genealogical history, although this is consistent with this narrative as a genealogy of priests.

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[29] The word *angel*, or *guardian angel*, was adopted into Hawaiian as ānela shortly after missionary arrival. It occurs in the works of most 19th century Hawaiian writers, commonly as a synonym for certain types of ʻaumakua.

[30] One of these is a version found in Beckwith (1970:72), translated from an unpublished manuscript.

The 1823 journal of Ellis (1963) provides contemporary observations regarding the beliefs about Pele held by the people of Kaʻū and Kona, and complements the mytho-historical information from *The History of Kanalu*.

As the Ellis party made plans to go to Kīlauea, they were discouraged to do so because their guides and hosts assumed, justifiably, that the foreigners would not conduct themselves appropriately and would thus offend Pele (Ellis 1963:141). As the group was traveling toward Punaluʻu where they would begin the ascent up the mountain, they stopped at Hōkūkano where they found good spring water, and where they also preached. The Preface figure is a detail of an illustration that includes houses in the background; these are probably typical of the houses that were along the entire coast, including the area of HAVO.

When they arrived at Kīlauea, the fears of the guides were confirmed when the foreigners began to eat ʻōhelo berries without making an offering to Pele. The guides made their own offering before eating. Ellis (1963:163) describes this: "They did not use much ceremony; but when they had plucked a branch...they turned their faces towards...the greatest quantity of smoke and vapor issued, and, breaking the branch they held...in two, they threw one part down the precipice...as they made the offering prayer."

As night fell, the party asked the guides to build a hut for shelter, which they did "at the north-east end of the crater, on a pile of rocks over-hanging the abyss below, and actually within four feet of the precipice. When we expressed our disapprobation, they said it was the only place where we might expect to pass the night undisturbed by Pele...being the place in which Pele allowed travelers to build a hut" (Ellis 1963:168). During the night, with the "burning lake" immediately below them, the guides "sat most of the night talking of the achievements of Pele...They considered [the pit] the primeval abode of their volcanic deities. The conical craters...were their houses...the roaring of the furnaces and the crackling of the flames were the kani of their huru...and the red flaming surge was the surf wherein they played" (Ellis 1963:171)

At this point, Ellis (1963:173, brackets added) collected detailed information about Pele from the local guides: a description of the volcano and its geologic history; traditions of Pele (including the many names of her family members, the conflict with Kamapuaʻa, and the destruction of Keōua's army); details about her nature and the ways in which she and her volcano family were worshiped:

> The volcano is represented as having been their principal residence...though they are thought to have many other dwellings in different parts of the island, and not a few on the tops of the snow-covered mountains...[The volcano gods] never journeyed on errands of mercy; to receive offerings or execute vengeance were the only objects for which they left their palace.. 'Great indeed is the number of men slain by them'...Vast numbers of hogs, some alive, others cooked, were thrown into the craters during the time they were in action...and also during an inundation, many were thrown into the rolling torrents of lava... The whole island was considered as bound to pay them tribute, or support their heiaus, and kahu (devotees); and whenever the priests or people failed to send the proper offerings, or incurred their displeasure by insulting them or their priests...[they wrecked vengeance with lava]. If a sufficient number of fish were not taken to them by the inhabitants of the sea-shore, they would go down, and with fire kill the fish, fill up with pahoehoe...the shallow places, and destroy all the fishing grounds.

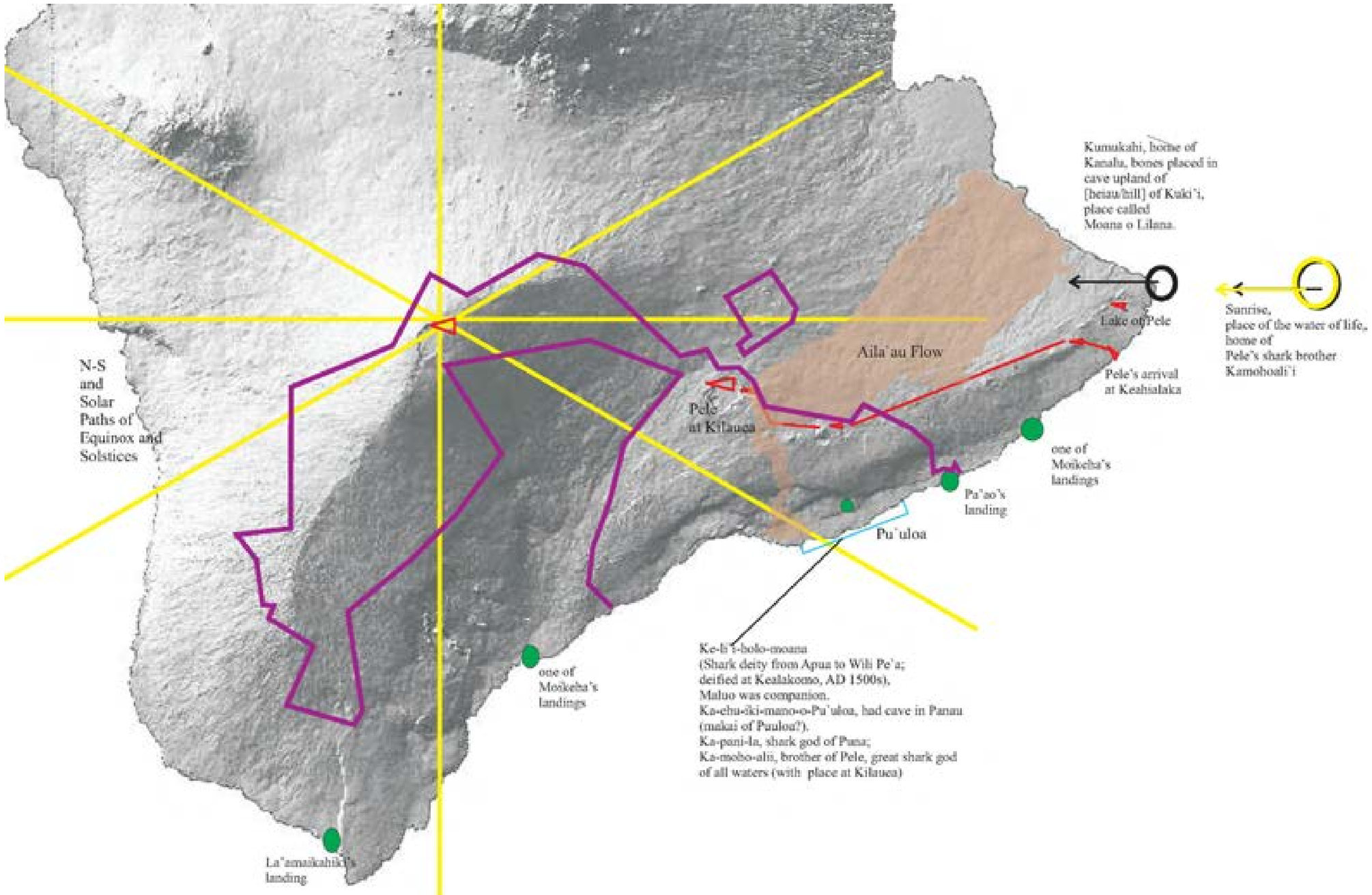

Figure 16. Some traditional places in the HAVO area (including Pa`ao's landing and the path of Pele's arrival) and the astronomical component of the landscape.

Ellis (1963:179-180, brackets added) continues:

> [They] pointed out to us the ruins of Oararauo, an old heiau, which crowned the summit of a lofty precipice on our left. It was formerly a temple of Pele, of which Kamakaakeakua [sic] (the eye of god), a distinguished soothsayer, who died in the reign of Tamehameha, was many years a priest. Large offerings were frequently made of hogs, dogs, fish, and fruits, but we could not learn that human victims were ever immolated on its altars. These offerings were always cooked in the steaming chasms, or the adjoining ground.

The priest Kamakaokeakua was famous as the "kāula o Pele" (*prophet or seer of Pele*) who had been consulted by Kamehameha when the eruption of Hualālai was destroying his great fishponds at the coast. None of the other "kahuna, orators, or diviners were able to check the fire with all their skill" (Kamakau 1961:185), and thus knowing this was the work of Pele, Kamehameha called Kamakaokeakua to come to Kona. The priest told Kamehameha that the king himself had to make the sacrifice, but Kamehameha said that he was afraid to do so, that Pele might kill him. In the end, he made the appropriate sacrifices and the flow ceased.

After his visit to the volcano, Ellis (1963:186) records that a "priestess of Pele" went to the capital in Lāhaina to tell the chiefs that foreigners at Kīlauea were violating the restrictions of the volcano and were damaging the houses (craters) of the deity, and that the foreigners had to be expelled or Pele would destroy the country. The priestess had obtained this instruction when she had been with Pele in a vision; the priestess wore "her prophetic robes, having the edges of her garments burnt with fire, and holding a short staff or spear" (Ellis 1963:186; this was not observed by Ellis, so he is providing information from another source). She was rebuffed.

Pele and the Cultural Landscape

This small selection from the Pele materials demonstrates a number of things of importance for the study of the archeology and cultural landscape of HAVO (Photo 3). This is the land of Pele and probably has been seen as such from very early times. Beginning with those early times, Pele apparently was the most powerful of all of the kupua, equaled only for a period of time by Kamapuaʻa (and thus the division of the islands between the two). However, Kamapuaʻa faded from the world (remaining only in the telling of traditions and a few places), while Pele survived as a vital force, feared by commoners and kings.

The implication of this archeologically is that every site (whether house site, shrine, or agricultural field, and probably even those of the 19th century) has to be seen as a place were some form of sacrifice and offering was given to the Pele family. Beyond that, the landscape itself is the body of Haumea/Pele and thus all of its features had some characteristic relating to her. One type of feature that demands special attention is the cave. Caves were perceived as openings into the body of Haumea/Pele. Caves were seen as means to connect places, and in the greater sense as a means of access to the underworld. Modifications of caves in any manner that indicates a religious or secret function (including blocking entrances) is suggestive of ritual associated with the body of Haumea/Pele and the underworld; they are not defacto indicative of a refuge function (as argued in Tomonari-Tuggle and Tuggle 2006b).

Photo 3. A Hawaiian cultural practitioner's view of the cultural landscape. (Sign at the HAVO Visitor Center.)

Ellis' 1823 interviews document that the people of the region remembered the major eruptions of Pele that created great flows; as Ellis passed Keanakāko'i Crater, he was told that the crater produced the lava on which they were walking "in the day of Riroa [Līloa], king of Hawaii about fourteen generations back" (Ellis 1963:182). It is quite likely that these eruptions are also recorded in traditional history by various devices of allusion. There have been a number of studies to relate traditions to specific flows, most recently by Holcomb (1987), Swanson (2007), and Masse (2007). There is no attempt here to review this line of investigation (although it is recommended as a research topic), but a summary by Masse is presented in Table 7. The flows that produced associated traditions are identified as specific "cultural places."

Table 7. Volcanic Eruptions and Genealogical Stories of Pele.*

Lava Flow or Other Eruptive Feature	**Chronometric Dates (source in parentheses)**	**Associated Story (source in parentheses)**	**Associated Chief in Genealogies and Estimated Beginning Date (AD) of Reign**	**History of Kanalu**
End of summit hiatus of Powers caldera	ca. AD 450-950 for hiatus, thus ca. early 900s for Kīlauea flank flows (Holcomb 1987)	Pele family arrives on Hawai‘i Island [Version 1], and ‘Ai-Lā‘au flees. Pele digs K īlauea Iki crater (Beckwith 1932:187-188, 1970:170; Fornander 1918-1919:V-III:524; Westervelt 1991:7)	Wahieola/Laka ca. AD 900	Pele AD 900
Overflow of Powers caldera	ca. AD 800 or earlier (Neal and Lockwood 2002)			
Kali‘u [hypothesized only]	ca. AD 950-1200 (Holcomb 1987)	Waha‘ula Heiau built after hypothesized destruction of original ‘Aha‘ula Heiau by Kali‘u flows (Masse et al. 1991:47-48)	Pili (and his priest Pā‘ao) ca. AD 1178	
Area inland from Cape Kumukahi, possibly relating to paleomagnetically dated flows along the lower East Rift zone [hypothesized only]	ca. AD 950-1200 (Holcomb 1987)	“Recent” eruption of “wide strip of country near the coast,” inland from Cape Kumukahi; occurring sometime prior to landing by Moikeha at Cape Kumukahi (Kalākaua 1972:123-124)	Event seemingly happened a generation or two prior to the reign of Moikeha [Kukohou] ca. AD 1236 [eruption presumably in the late 1100s]	Pā‘ao AD 1240
Kane Nui o Hamo	ca. AD 1200-1450 (Holcomb 1987)	Kamapua‘a battles Pele (Kalākaua 1972:139-154; Ellis 1963:173-174; Masse et al. 1991:48)	Transition between Kamiole and Kalapana ca. AD 1308	Pā‘ao AD 1240
Unnamed flows surrounding Kapoho Cone	ca. AD 1450-1600 (Holcomb 1987)	Kahawali has holua sledding contest with Pele (Ellis 1963:207-210; Kalākaua 1972:501-507; Westervelt 1991:31, 32, 37-44	Ke[a]li‘ikuku [Kahoukapu] ca. AD 1400	

Table 7. Volcanic Eruptions and Genealogical Stories of Pele (continued).*

Lava Flow or Other Eruptive Feature	**Chronometric Dates (AD)**	**Associated Story**	**Associated Chief in Genealogies and Estimated Beginning Date (AD) of Reign**	**History of Kanalu**
ʻAi-lāʻau	AD 1410-1470 (Clague et al. 1999)	myth of Aukelenuiaiku (Westervelt 1991:1-3; Fornander 1916-1920:IV-I:34)	Kakaʻalaneo [Kaholanuimahu] ca. AD 1420	"The island is completely full of the worshipers of Pele, who rules as chief [over] Kihawahine and Kunawahine" (Nāmakaokeahi 2004:120) [ca. AD 1360] "The ranks of those in charge of the re-population effort were disgusted with the priests of Pele and Hi'iaka and the lesser gods. Across the land they buried Kamaunuiaola in fiery, glowing underground oven" (Nāmakaokeahi 2004:148-150) [ca AD 1460-1480]
Kīlauea caldera formed	ca. AD 1470-1500 (Swanson 2003, 2007)			
Keauhou (Puʻu Huluhulu and/or Keanakākoʻi)	ca. AD 1450-1600 (Holcomb 1987)	Eruption at Keauhou in time of Kaululaʻau, son of Maui King Kakaʻalaneo (Ellis 1963:182; Kalākaua 1972:215-218; Holcomb 1987: 338-339)	Līloa ca. AD 1460 or a generation earlier	
Keanakākoʻi Ash	ca. AD 1500-1790 (Swanson et al. 2004; Swanson 2007)			

* From Masse 2007:Table 16.2, with modifications.

As ultimately with all gods, and specifically with ʻaumakua, Pele was both a great threat and a great protector.[31] This is a volatile, dangerous land and for everyone who lived there, life certainly included a daily awareness of this and the necessary attention to the concerns of the deity and her family. This attention included proper sacrifices, from taking fish to the crater to offering a portion of ʻohelo berries (and one can assume many more types of food offerings). The traditions indicate that there were priests and priestesses devoted to Pele (apart from those associated with Pele's role in the luakini ceremony). Nothing of any significance about the nature of these ceremonies has been identified (with the exception of the transfiguration ritual), but it is clear from statements about the priesthood that there were regular large offerings ("hogs, dogs, fish, and fruit," according to Ellis) as well as special ceremonies and offerings when Pele's actions became a substantial threat (such as offerings of "vast numbers of pigs").

There are a number of difficulties in making an archeological translation of the Pele traditions. Offerings in general are a problem for archeological investigation because much or most are perishable. And for offerings thrown into an active volcano, there is obviously no site formation process. But that aside, so little is known about temple form or temple ritual that might in any way be associated with Pele, that this question becomes an almost completely archeological matter. Ellis mentions the temple to Pele, Oararauo, at the edge of Kīlauea, but he does not describe it except to say that it is "ruins," which suggests it was a stone structure and not a natural formation. In his 1906 survey, Stokes (1991:134) was told of another temple just "north of the crater of Kīlauea," said to have had "walls of earth, not of stone," but he was given no further information; this may also have been a temple of Pele.

Away from HAVO and Puna-Kaʻū, there are also references to shrines to Pele in Kona (presumably in association with Hualālai), with a mention of a "Pele's altar" at Kealakekua. Kupa (in Varigny 1981:17), son of Kapupua, who was a chief at Kealakekua, writes that he was a child living with his father at Kealakekua when Cook arrived there; his specific comment is that men from Cook's ship "seized by force some of the sacred fish intended for Pele's altar."

On Ellis' 1823 trip around the island, he was told that the small valley called Kaʻula was the boundary between the districts of Hilo and Hāmākua. He comments (Ellis 1963:250, emphasis added):

> On descending to the bottom of the valley, we reached a heiau dedicated to Pele, with several rude *stone idols*, wrapped up in white and yellow cloth, standing in the midst of it. A number of wreaths of flowers, pieces of sugar-cane, and other presents, some of which are not yet faded, lay strewed around, and we were told that every passing traveler left a trifling offering before them.
>
> Once in a year, we were also informed, the inhabitants of Hamakua brought large gifts of hogs, dogs, and fruit, when the priests and kahu of Pele assembled to perform certain rites, and partake of the feast.

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[31] Pele and her family were not only dominant ʻaumakua akua on the land, they also held such a position in the ocean. Pele's shark brothers were guardians at each end of the Hawaiian chain, one at Kaʻula Island to the northwest where the winter solstice sun sets, and one at the eastern pit of the rising sun off Kumukahi on Hawaiʻi Island.

> This annual festival, we were told, was designed to propitiate the volcanic goddess, and secure their country from earthquakes, or inundations of lava. Locks of hair were frequently among the offerings made to Pele.

Several things in the passage raise a number of questions. There is an annual temple (or altar) ceremony held by priests and kahu of Pele. Was this held at the time of the Makahiki (note that this temple is also on or near a district boundary)? Does "kahu of Pele" refer to the priest/priestess responsible for an image of Pele? There were stone idols (not wooden ones); were these images of Pele and her family, and if not, who did they represent? It is of course appropriate that Pele be represented in indestructible stone and not in perishable wood. The deity image wrappings were white and yellow tapa, often associated with Kāne. Does this indicate a Kāne-Pele association? (There is a strong connection between Kāne and the Pele family in larger tradition, including an association between Kāne and Pele's sister Kapoʻulakinaʻu/Laka related to solar ceremonies.)[32]

The place of Pele and her family in the luakini ceremony is described above. The question is raised as to whether there was any special attention given to them in leaking ceremonies in Kaʻū and Puna (including special structures that would be archeologically identifiable)?

The preceding discussion has focused on Pele and her family as volcanic deities and does not touch on all of the other dimensions that were or may have been involved, including healing and hula, as well as related astronomical matters. Where and how were the associated activities performed and did any of these involve special structures or other elements that have an archeological residue?

A record of only one temple dedicated to Pele has been found for the HAVO area (Oararauo, the temple at Kīlauea Crater mentioned by Ellis), but how many others may there have been? And how many of these exist today, unrecognized because their archeological signature is unknown?

MAUNA LOA AND MOKUʻĀWEOWEO

The geography of the islands of Hawaiʻi is remarkably configured for mythopoeic cultural perception. The southeast-northwest orientation of the archipelago parallels the tract of the summer sun. On the island of Hawaiʻi, the district of Puna at the eastern point projects toward the rising sun; the sun's passage at solstices and equinox crosses major natural features of the island. In traditions, Puna (and the specific places of Kumukahi, Haʻehaʻe, and Keaʻau) is the land where the sun rises; the sun then passes over the island chain and sets in the northwestern islands (Pukui et al. 1974:xiii):

Mai ka lā ʻōʻili i Haʻehaʻe ā hāliʻi i ka mole o Lehua.
Mai ke kai kuwā e nū ana i ka ulu hala o Keaʻau ā ka ʻāina kā ʻili lā o lalo o Wai-kūau-hoe.

The locale of the rising sun at Kumukahi and eastern Puna thus has an inherent association with life and renewal of life. This is expressed in Hawaiian traditions in a number of ways, including the meaning of the place name (Kumukahi is literally, *first beginnings*) and the imagery as a place where the water of life is found (Beckwith 1970:51, 492).

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[32] The fact that the traditional entry point of Pele and her family into the Hawaiian chain was at the northwestern islet of Kaʻula may be only a coincidence.

From east at Kumukahi, the equinox passage of the sun crosses the great mountain of Mauna Loa, the center of this universe, and then passes to the west at Kealakekua, thus creating a dramatic geographic axis of the island (see Fig. 16). The equinox sun of noontime (a-wakea)—the balance point of the year in spring and fall—casts no shadow in Moku‘āweoweo, which may be perceived as an ‘anu‘u of the island (that is, equivalent of the ‘anu‘u, or tower, on a temple, the connection to the heavens, and possibly an observatory that among other things could be used to determine the position of the noontime sun, see e.g., Valeri 1985:238).

And it is at Moku‘āweoweo where four of the six island districts converge-radiate[33]: Kona, Ka‘ū, Hāmākua, and a slightly offset Hilo (the point of separation for Hilo is called Pohaku Hanalei).[34] Each of the four districts incorporates one or two major geographic features (Hilo Bay for Hilo, Mauna Kea and Waipi‘o Valley for Hāmākua, Hualālai and Kealakekua Bay for Kona, and Kīlauea Crater for Ka‘ū), but no one district claims all of Mauna Loa. There is no known traditional information that addresses this convergence of districts, but there is the appearance of intended access to the sacred crown of the mountain, the closest conjunction of Papa/Haumea and Wākea (female/male principle; earth/sky) in the observable world.[35]

The name Moku‘āweoweo is translated in Pukui et al. (1974:155) as “*Lit*., *‘āweoweo* fish section (the red of the fish suggests volcanic fires).” This seems an unlikely way to perceive this name, as opposed to seeing the same term *‘āweoweo* applied to the crater first and then to the fish. In this sense, weo would be red or “glowing red” (Titcomb 1972:71), and thus a reference to Pele/Haumea.

The *History of Kanalu* (Nāmakaokeahi 2004) incorporates the tradition of the rising sun in an explicit manner. The first priest, Kanalu (see Table 2), lives at Kumukahi, where the pit of the sun is located until it “closes” (and presumably moves to the distant horizon). Thus Kumukahi and the beginnings of the Kanalu line are isomorphic. When Kanalu and his chief die, their bones are taken to a secret cave at a place called the sea of Lilana, upland of Kūki‘i (a hill and temple inland from Kumukahi). From Kumukahi, Kūki‘i is on the bearing of the winter solstice setting sun, the land of the dead and the land of the ancestors. Thus, the first priest, who lived at the place of the first rising sun, was sent after death to the place of the winter solstice setting sun. From Kumukahi, the two coasts of the island (toward Hilo and toward Kapapana) lie along solstice bearings.

Pele and her family are related to Kumukahi in a number of ways, including the chant of Kapo and the rising sun, and through Pele’s shark brother Kamohoali‘i, who lived at the pit of the rising sun and cared for the gourd with the water of life. In one tradition, Kumukahi itself is created by Pele (Westervelt 1991:28).

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[33] The history of the boundaries for these districts has not been researched. It is not certain that this represents the late traditional era boundary positioning.

[34] The northernmost district on the island, Kohala, is a good distance away. Puna does not rise to the Mauna Loa summit, perhaps reflecting its minor political importance as a district.

[35] See discussion in Kame‘eleihiwa (1992:23), Papa and Wākea as the beginning of time, and in Malo (1996:27). On the island of Maui, the districts on the east end of the island also converge-radiate at the edge of a crater, the crater of Haleakalā, at a place called Pōhaku Pālaha. The name Pōhaku Pālaha implies several things, one of which is “spreading” (that is, the spreading of the districts), but it also connotes Papa as an earthly place where Papa and Wākea converge.

The larger view of Puna as a place of origin has many corresponding traditions, including one in which Pele arrives at the Puna coast and digs pits along the east rift zone before reaching Kīlauea Iki and Nui, in effect following the path of the rising sun. The first luakini temple, as told in the Kamakau tradition, was erected by Pāʻao in Puna.

And it is here at the eastern end (i.e., the beginning) of the Hawaiian world where Pele/Haumea is most evidently alive. New land is created in the form of lava, representing Pele being born continuously from the body of Haumea. It is also the bodies of the human ancestors (whose earthly bodies were given to the flames in the ʻaumakua transfiguration process) being re-created as part of that land. Coming to this island could well have been perceived as coming to a new place that was at once a place of origin, a place that came to be named Hawaiki, the ancient homeland.

PUʻULOA: A CASE OF ARCHEOLOGICAL SITE AND HAWAIIAN MYTH

Puʻuloa is a large basalt hummock that lies along a trail between Puna and Kaʻū at the boundary of Kealakomo and Pānau Nui ahupuaʻa. Discussed at length in a number of places (e.g., Emory, Cox et al.1959; Glidden 1995; Lee 1998), what distinguishes this lava rise from all others in the area is the large number of petroglyphs that cover its surface; it is also known as a traditional place where umbilical cords were placed. The focus of the following discussion is on the relationship between this place as an archeological site (Site 23271; Photo 4) and the traditional concept of the place and its landscape, with implications for how the site is defined.

Emory, Cox et al. (1959:13-14) write that "Puʻuloa, Hill-(of)-long-(life), is the name of the pahoehoe mound covered with petroglyphs." Among the petroglyphs at Puʻuloa are hundreds of small holes (cupules) that are said to have been traditionally made or used to place piko (*umbilical cords*). Depending on what happened to the cord, this practice could assure long life; this was recorded by Martha Beckwith in 1914, from an informant who said her cord had been placed there when she was born in 1862 (Emory, Cox et al.1959:56). Sam Konanui, whose father took Beckwith to Puʻuloa in 1914, said that Puʻuloa means "long life," and that people from all the Hawaiian Islands brought the piko of their children to be placed there (Emory, Cox et al.1959:56).

Although the site was used for the placement of piko in the second half of the 19th century, it is curious that a half century earlier, in 1824, when Ellis (1963:203) passed the site, he reports nothing about such a practice (he also does not provide a place name for the locale). Instead, he was told that the circles and marks were made by travelers representing their journeys around the island. There are several possible explanations for this discrepancy between the Ellis account and that of Beckwith's informant. The story given Ellis may have been a fabrication and thus it was always used for piko; both events may have occurred there and Ellis mentioned only one; or the placement of the piko may have been a 19th century re-use of the site that had a different previous function. Lee and Stasack (1999:88) argue for the first explanation.

However, there is a problem with each of the functional explanations of the petroglyphs (that is, for umbilical cord placement or for recording travelers' events). Neither is consistent with the origin myths for the name of the place. There are complexities about traditions and places that can probably never be unraveled, in particular the sequence of events that led to the associations. However, an understanding of this place might be achieved by examining broader cultural patterns and the cultural landscape.

Photo 4. Pu‘uloa petroglyph complex (Site 23271), vapor plume from lava entering ocean, in the background.

Emory, Cox et al. (1959:64-65) quote a “now current” story from their informant Sam Konanui (the son of Beckwith’s informant), which in summary tells of a pregnant woman named Pu‘uloa who went to the ocean (apparently at Pānau) and had a miscarriage[36] while she was in the water. When she later returned to the ocean, a shark came up under her, and this turned out to be her miscarried child transformed; it had become a manō. As quoted by Emory, Cox et al. (1959:65), Konanui ends the story by saying “The shark itself was [also] called Pu‘uloa and so abides the name Pu‘uloa.”

In a discussion of place names, Emory, Cox et al. (1959:14) state that “tradition has this name [Pu‘uloa] derived from the mother of the shark Ka-‘ehu-iki-manō-o-Pu‘uloa,” a statement that is

[36] The Konanui story is presented in Emory, Cox et al. (1959:64) as a quote in English. Following the word “miscarriage” is the parenthesis “(pu‘u koko).” It is not clear if this is the term that Konanui used, or if the editors inserted it. Pukui and Elbert (1971) do not translate *pu‘u koko* as “miscarriage” but rather as “blood clot foetus” (as well as “clot of blood”) and they note that a “foetus lost through miscarriage” is called a *hua hā‘ule* or *keiki he‘e wale*.

presumably based on the story Konanui recounted. However, a close reading of Konanui's story suggests that the name of the petroglyph locale is that of the shark (or possibly both shark and mother), but not "derived [only] from the mother." Konanui does not use the full name for the shark as given by Emory, Cox et al., but certainly his shark name "Puʻuloa" is a shortened form of Ka-ʻehu-iki-manō-o-Puʻuloa, a traditionally well-known shark of Pānau. This tells us that local tradition of the early 20th century regarded the petroglyph mound of Puʻuloa as being named for the shark Ka-ʻehu-iki-manō-o-Puʻuloa. However, in the quotes from Konanui regarding the use of the petroglyph field for placement of umbilical cords to assure the long life of the child, there is no mention of the shark (although Emory, Cox et al. may not have provided all the information that Konanui gave them).

Other traditions about Ka-ʻehu-iki-manō-o-Puʻuloa cast some light on this. Thrum (1923:293-308) and Pukui (n.d.)[37] provide a detailed story about the demi-god shark, Ka-ʻehu-iki-manō-o-Puʻuloa (*The little brown shark of Puʻuloa*, or *The little reddish-haired shark of Puʻuloa)*, whose cave was along the Pānau coast. He was born at Pānau, offspring of the humans Kapukapu and Hōlei, but became a shark being. He was named after the great shark deity Kaʻahupāhau (*Cloak well cared for*), the guardian of the lagoon of Puʻuloa (Pearl Harbor), who was described as ʻehu, or reddish tinged in color. Ka-ʻehu-iki-manō-o-Puʻuloa gave obeisance to all of the district shark gods of the island of Hawaiʻi, including Kepanila of Hilo[38] and Kaneilehia of Kaʻū. Then Ka-ʻehu-iki-manō-o-Puʻuloa met the "king of sharks" Ka-moho-aliʻi, who adopted the "little brown shark," and conducted a ceremony to give him the ability to have a hundred different forms. With other shark deities from Hawaiʻi Island, Ka-ʻehu-iki-manō-o-Puʻuloa traveled to Kauaʻi and Kaʻula to meet the great shark of the northwestern waters, Kū-hai [or hei]-moana (*Kū following ocean*), and then on to other places in the Pacific, before returning to Hawaiʻi. Ka-ʻehu-iki-manō-o-Puʻuloa then took up residence at Pānau, Puna.

One of the problems is that the shark stories contain no reference to piko or the petroglyph hill. Conversely, the piko stories contain no mention of the shark deity. An examination of the cultural landscape of Pānau through the lens of the shark stories provides a clue to the Puʻuloa puzzle. In one of the origin stories, the names of the parents of Ka-ʻehu-iki-manō-o-Puʻuloa, Kapukapu and Hōlei, are also place names of Pānau (Fig. 17). Hōlei is a place on the Hōlei Pali, and (Puʻu) Kapukapu is located on the pali above Halapē. The parents are on the cliffs and the child (Puʻuloa) is on the lowland flats.

In other words, the place of Puʻuloa is not just *named* after the "little brown shark," symbolically it *is* Ka-ʻehu-iki-manō-o-Puʻuloa, and it can also be inferred to be the place where he was born. This provides the conceptual connections of the locale, the name, and the practice of placing umbilical cords there. The piko are being given over to the shark where he was born, so the children, represented by their

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[37] Pukui is quoted in Emory, Cox et al. (1959:65), where there is also mention of another story about this shark (identified as "Ke-ʻehu-iki, the Puna shark"), that appeared in a Hawaiian newspaper in 1911.

[38] Emory, Cox et al. (1959:64) identify Ke-pani-la as the shark god of Puna, not Hilo. The name Ke-pani-la is not translated in any of the published references. According to Rubellite Johnson (pers. comm. 2007), it is not easily understood without diacritical marks; if the la is "lā" the image that is evoked by this name is something blocking the sun, perhaps even a notched shark fin blocking the sun—generally suggesting an eclipse.

piko, are being placed under the protection of this demi-god, who was one of the guardian sharks of Pānau and Puna.[39]

Hōlei and Puʻu Kapukapu are also the central geographic features in the story of "how the rain was cooked" (as told by Sam Konanui, quoted in Emory, Cox et al.1959:59). There was so much rain (in Pānau?) that it washed away crops. So farmers dug an imu (*oven*) on top of Hōlei at the Hale o Lono, and rain was caught and placed in the imu, but the rain escaped through the hollows of the earth where Pele had "eaten" the ground, and then it emerged as clouds out of Puʻu Kapukapu. Although there is no reference to the petroglyph hummock of Puʻuloa, the story indicates another connection between the places of Hōlei and Puʻu Kapukapu.

Did the protection secured under Ka-ʻehu-iki-manō-o-Puʻuloa lead to the "current" (1950s) translation of "Puʻuloa" as *hill-of-long-life*? If the original name of the place was actually Ka-ʻehu-iki-manō-o-Puʻuloa and not simply "Puʻuloa," the translation may be reasonable because of the association with a guardian shark. But further explication may be found in exploring the question of how this small basalt hummock inland from the Puna coast came to have an association with a shark, and with a shark whose name refers to an Oʻahu lagoon and the shark of that lagoon, and, for that matter, with a lagoon that is called a hill ("puʻu") (which, just for fun, is next to a hill that is called a lagoon—Honouliuli). And does this also relate to "long life?"

In the tradition mentioned by Thrum and Pukui, Pearl Harbor is invoked by the fact that the little shark is named in reference to the main guardian shark of that lagoon, Kaʻahupāhau. His name (Ka-ʻehu-iki-manō-o-Puʻuloa) refers to her color (ʻehu) and her residence (Puʻuloa). Thus the meaning of the Puʻuloa of Pearl Harbor becomes important. The traditional name of Pearl Harbor in complete form is Ke-Awa-Lau-o-Puʻuloa. There is also an ʻili adjacent to Pearl Harbor named Puʻuloa. The literal translation of Puʻuloa as given in Pukui et al. (1974) as *long hill*. However, the land known as Puʻuloa is part of the ʻEwa Plain, which is no more a hill than is Pearl Harbor. Johnson (1993) points out that Puʻuloa can also be translated as *distant hill* or *distant hills*, which is geographically more appropriate than *long hill*. The *distant hills* referred to in the name may be those inland, but could also be the

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[39] In addition to Ka-ʻehu-iki-manō-o-Puʻuloa, there are at least three other guardian sharks mentioned for Puna. "Ke-lii [alii]-holo-moana (*The chief who goes about in the ocean*) was a deified human who became the shark god protector of the area from Ka Lae o Kawili in ʻApua to Ka Lae o Wilipeʻa in Panau" (Emerson n.d., quoted in Emory, Cox et al.1959:64, emphasis added). Another shark, Kupanihi, guarded the area from "Hala-aniani to Kaʻiliʻili" (Sam Konanui, quoted in Emory, Cox et al.1959:65). The shark Ke-pani-la is mentioned by Emory, Cox et al. (1959:64) as the overall "shark god (mano aliʻi) of Puna," although Beckwith (1970:240) refers to Kepanila as the shark god of Hilo, and implies that Ka-ʻehu-iki-manō-o-Puʻuloa is the shark god for Puna; she names Kaneilehia as the shark god of Kaʻū.

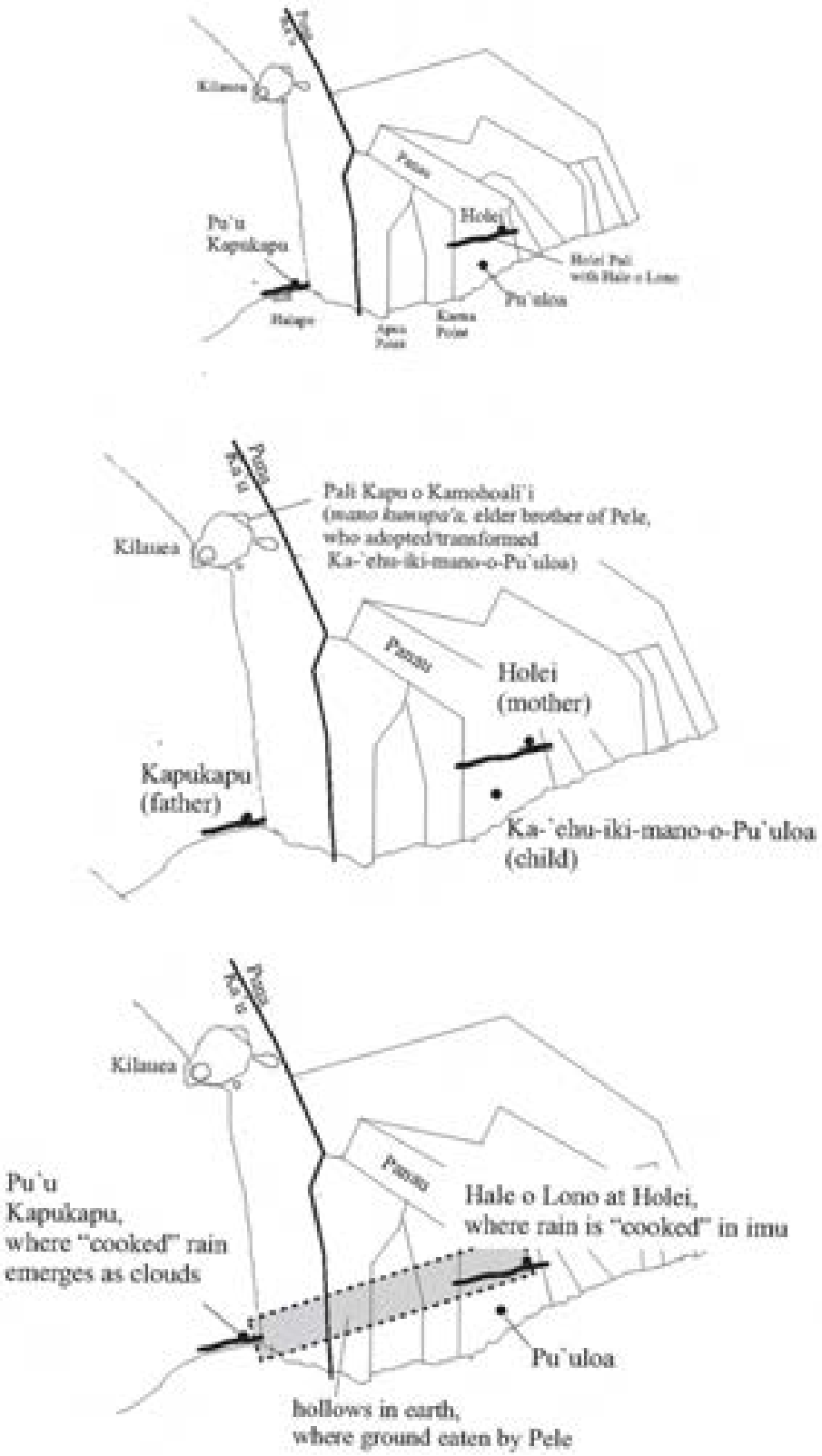

Figure 17. The Pu‘uloa Petroglyph Field in the context of tradition and landscape.

mythical, paradisiacal lands at the ocean horizon, always just at the edge of visual range.[40] Thus, Ke-Awa-Lau-o-Puʻuloa can be translated as *the many branching seas [at the place with] distant hills*, or *the many branching seas [at the* ʻili *called] distant hills*.

The interpretation of loa as *long [life]* has not been found in any of the discussions of the name Puʻuloa in reference to Pearl Harbor. However, it is possible that this meaning existed as an allegorical element of the name.[41] Pearl Harbor was renowned as a place of remarkable richness of food production (called the pōmaikaʻi (*blessings*) of Puʻuloa; Kamakau 1964:83), and as the place where breadfruit was brought to Hawaiʻi, breadfruit being a symbol of fertility, food production, and long life (see Beckwith 1970:280-284). Puʻuloa as a possible reference to the horizon's floating islands (such as Kāne-hunā-moku, *hidden [island] of Kāne*) also has an implication of long life.

But the interconnections do not end simply with this association of names. There is a strikingly powerful element in the story of Ka-ʻehu-iki-manō-o-Puʻuloa: he was adopted by Kamohoaliʻi, the "king of sharks," who was the elder brother of Pele. He was born of humans, but somehow was transformed into a guardian shark—that is, he became an ʻaumakua. Then through his adoption by Kamohoaliʻi, he became a member of the Pele family.

His adoption by Kamohoaliʻi, the elaborate ceremony that was involved with that, and his acquisition of powers of shape-changing—all suggest that this was the process by which a human became a shark ʻaumakua. In Hawaiian ritual, there was a ceremony by which a dead individual could be transformed into a shark ʻaumakua (this is described in great detail in Kamakau 1964:28, 76-78). This involved the dedication of the body to one of the ancestral shark deities (manō kumupaʻa), principally Kamohoaliʻi, and the transformed person (ʻaumakua as akua kākūʻai) took on a form of the ancestral shark. Bodies of such individuals were treated in some manner (such as wrapped in material that would mark or stain) so that once they had become a shark, they could be identified by their human family. The reference to color in Ka-ʻehu-iki-manō-o-Puʻuloa's name suggests this marking identification. Whether Ka-ʻehu-iki-manō-o-Puʻuloa originated in traditions as a result of an ʻaumakua transformation ceremony for an actual person or in some other manner, Kamohoaliʻi became the principal figure by which he acquired his powers.

Kamohoaliʻi (*The royal chosen one*) was born of the earth-mother goddess Haumea in Kuai-he-lani (Emerson 1993:ix; Beckwith 1970:277, 283). He came with his sister Pele and other family members in the migration from Kahiki (Ellis 1963:248; Beckwith 1970:167-173; Pukui and Elbert 1971a:396). One of the edges of Kīlauea Crater carries his name and was sacred to him. His main residence was a pit at the eastern edge of the horizon, the place of the rising sun, and he was the protector of the gourd that held the water of life. The other great shark of Hawaiʻi, Kūhaimoana (*Kū-traversing-the ocean*), was also a brother of Pele. He remained at the northwestern island of Kaʻula (the place of the setting sun) as Pele and her family traveled down the island chain after their arrival. Kūhaimoana was the husband of

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[40] In a tradition told by W.S. Lokai (in Fornander 1917-1921:V:28), two fishermen from Puʻuloa (Pearl Harbor) were blown by a storm to one of these lands, Kanehunamoku, where they secured breadfruit from the gods. They returned to plant this first breadfruit at Puʻuloa, from where it was then spread by Haumea.

[41] The Hawaiian language is, of course, well known for the multiple layers of meaning, word-play, and symbolism (Pukui 1976), which frequently found expression in place names (Pukui et al. 1974).

Ka‘ahupāhau, Pearl Harbor’s guardian shark, the deity for whom Ka-‘ehu-iki-manō-o-Pu‘uloa was named.

The shark as ‘aumakua was a protector and guardian against physical danger and against all of the many forms of sorcery.[42] Survival in the face of all these dangers was called “*life from the ‘aumakua*” (Kamakau 1964:29). Ka-‘ehu-iki-manō-o-Pu‘uloa was an ‘aumakua who had become part of the Pele family, was a form of the great Kamohoali‘i, and who invoked the power of Ka‘ahupāhau through his name.

If Pu‘uloa was seen as the place of the birth of Ka-‘ehu-iki-manō-o-Pu‘uloa, then the piko ritual was a means of obtaining life-long (and life-prolonging) protection from an ‘aumakua of this land.

And for the petroglyph field of Pu‘uloa, there is one other aspect to the story of Ka-‘ehu-iki-manō-o-Pu‘uloa to be considered. Ellis’ reference to the circles and marks representing an individual’s travels around the island has been considered to make little sense (Lee and Stasack 1999). This is certainly true in regard to the specifics of his descriptions about how the travels were represented in the rock carvings. However, it is hard to dismiss information recorded at such an early date in the Hawaiian post-Contact era and it might be surmised that Ellis misunderstood those who were telling him about Pu‘uloa. Perhaps the petroglyphs were made for piko as a symbol of the shark’s journeys, first a round trip to the northwestern islands and then to other places in the Pacific (back-tracking the journey of the Pele family). It is possible then that the circles are a way of representing the journey of a long life.

The Pu‘uloa petroglyphs also raise a question of what is the site? If the cultural landscape is integrated with the archeological landscape, then does the “site” (see Fig. 17) include the geographic features noted in the creation story, as well as the petroglyphs that are part of one of these features?

PĀ‘AO AND THE LANDSCAPE OF EARLY TRADITIONAL HISTORY

In Hawaiian traditions of the voyaging era[43] (see Table 2 and Fig. 16), several early voyagers are recorded as having made landfall in Ka‘ū and Puna, notably La‘amaikahiki, Moikeha, and Pā ‘ao. Of these, Pā‘ao is the most important in many respects, and is the only one who is described as landing in an area that is today part of HAVO.

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[42] There is a parallel between sharks and human ali‘i in hierarchy and associations. Their protection as ‘aumakua mirrored the protection offered individuals by the ruling ali‘i and priests. In some sense, the world of shark ‘aumakua may have been a form of sympathetic magic to maintain chiefs as “protecting sharks” rather than having them become “devouring sharks.”

[43] The historicity of multiple ancient voyages to Hawai‘i that are recounted in Hawaiian traditions has long been debated—a question of whether these voyages were legendary only, a combination of historical and legendary, or were in some way symbolic. However, there is increasing evidence to suggest that such voyages did occur, deriving from modern linguistic studies and studies of plant and animal distribution, including mitochondrial DNA analysis (see e.g., Ballard et al. 2005; Hommon 2007).

THE ARRIVAL OF PĀʻAO

> [Pāʻao was a] priest from Tahiti who landed in Puna, Hawaii [where he built the heiau Wahaʻula, Photo 5]. He built the heiau Moʻo-kini [in Kohala], and is said to have introduced human sacrifice, walled heiaus, red-feather girdles as a sign of rank, taboo songs, the prostrating taboo, and the feather god Kāili.
>
> Glossary of Hawaiian Gods (Pukui and Elbert 1971:395, brackets added)

There is an enormous amount of literature about Pāʻao (some of it summarized in Barrère 1991:120, Masse et al. 1991, and Cordy 2000). The description above combines characteristics from many sources, which have been chronologically segregated by Cordy to indicate an accretion of claims. The early documents make it clear that Pāʻao instituted a major religious change, but the specifics of that change are unidentified. It is much later references that include the walled temples and human sacrifice.

One of the earliest recorded references to Pāʻao is by a member of the 1793 Vancouver expedition (Lt. Peter Puget, quoted in Sahlins 1981:21):

> Their religion underwent a total change by the arrival of a Man from Taitah who was suffered to land. His visit produced the morai & the present established form of worship.

Photo 5. Waha‘ula Heiau from the air, 1967 (see Appendix B).

Ellis (1963:283-4) notes that he heard of Pāʻao at three different places in his 1823 journey around the island, but he speaks of Pāʻao only when he is near the temple of Moʻokini in Kohala, one that Pāʻao is said to have built. He adds little to the information from Lt. Puget, primarily that Pāʻao brought with him "two idols or gods, one large and the other small."

PĀʻAO IN PUNA AND IN THE REGION OF HAVO

Although Malo (1951, 1996) was one of the first Hawaiian writers to mention Pāʻao, it was Kamakau (1991) who later provided the most detail. Kamakau's treatment of Pāʻao suggests that he viewed this priest as one of the most important figures in Hawaiian history. He discusses Pāʻao at length in two different articles: his first[44] long presentation of Hawaiian traditions in *Ka Nupepa Kuakoa* beginning on June 15, 1865 (published in English in Kamakau 1991:3-5) and in one of his major newspaper series "Ka Moolelo o Kamehameha I," beginning in *Na Nupepa Kuokoa* on October 20 1886 (published in English in Kamakau 1991:97-100). The latter series begins with the birth of Kamehamea and provides details of his immediate ancestors; Pāʻao appears in installment nine as the first of the ancient priests and chiefs to be described in this series. In the January 5, 1867 installment of the former series, Kamakau (1991:100) tells of Pāʻao's coming to Hawaiʻi and surviving the trials of a protagonist, including strong winds at sea:

> When the winds blew strongest, the *aku* fish crowded around and the *ʻōpelu* rippled the surface of the sea; the winds quieted down...
>
> That is the origin of the kapu of the *aku* and *ʻōpelu* in the religious services of Pā ʻao and his descendants down to the time of Kamehameha...
>
> Puna on Hawaiʻi island was the land first reached by Paʻao, and here in Puna he built his first heiau for his god Ahaʻula and named it ʻAhaʻula [Wahaʻula] ... It was a luakini. From Puna Pā ʻao went on to land in Kohala [where he built the temple of Moʻokini].

Kamakau's history of Pāʻao in this section includes reference to bringing the chief Pili from Kahiki in order to establish a royal line in Hawaiʻi. The language in this section can be variously interpreted, but the implication is that there were no chiefs (or high chiefs) in Hawaiʻi prior to Pili.[45]

In the genealogy of Kanalu (Nāmakaokeahi 2004:98-101), Pāʻao comes to Hawaiʻi 22 generations after Kanalu. His coming is foretold as an event of great importance, one that would bring blessings to Hawaiʻi. Pāʻao arrives by canoe from Kahiki, first landing at Hilo Bay, and then later moving to Waipiʻo Valley. This tradition refers to Pāʻao as a kaula nui (*great prophet*) and as a makua aliʻi kahuna (*chief priest elder*—Chun translation, in Nāmakaokeahi 2004:101), and he is placed in the line of Kanalu priests. In this priestly order, he acquires such an important position that in later generations, the Kanalu priesthood is much more commonly referred as the Pāʻao priesthood.

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[44] A bibliography of Kamakau's writings in chronological order is provided in the Appendix of Nogelmeier (2003).

[45] The English translation is segmented in a way that makes it difficult to follow the flow and logic of Kamakau's historical presentation, but the original Hawaiian is available in Kamakau (1996).

The Kanalu tradition emphasizes that Pāʻao brought blessings by means of his teachings. Pāʻao brought the proper knowledge for communicating with the gods (that is, how to obtain blessings—food—and protection from the gods) that implies a new cult with a complex of behaviors including proper temple form and accompanying ritual. He taught the chiefs and priests "how to rule as elders" and:

> Paʻao carefully taught Kaʻieʻie [the high priest of the land] the things that would benefit the lives of the people and the way to ensure that the god(s) would know the request of the prophets and priests (Nāmakaokeahi 2004:E 100, brackets added).

> Ua ʻao pono aku la o Paao ia Kaieie i na mea e pono ai ka noho ana lahui me ka hooponopono ana i na mea e hiki ai i ke akua ke nana mai i ke noi a na kaula, me na kahuna (Nāmakaokeahi 2004:110).

Although Kamakau is the primary source for associating Pāʻao with the temple of Ahaʻula/Wahaʻula, the importance of Wahaʻula well matches the importance of Pāʻao, lending strength to this tradition.

The argument can be made from traditions and history that Wahaʻula was not only the first temple of human sacrifice (luakini), but was also the last such temple to be reconsecrated; it was also the last such temple to be dismantled after the end of the ʻai kapu (see summary of evidence in Masse et al. 1991). Further, a detailed argument has been constructed by Masse et al. (1991) that suggests a direct structural relationship between Pele-volcanism-earthquakes on one hand and Pāʻao-Wahaʻula-luakini on the other. The complicated details of this strong argument are not provided here, but the summation is telling: "Wahaʻula is...the *luakini* ritual" (Masse et al. 1991:50): this temple with numberless pits, a ritual of numberless pits, and Kīlauea as a land of the numberless pits of Pele.

The coming of Pele, the most powerful of kupua, may be associated with the collapse of the Powers Caldera and a renewed period of volcanic destruction (ca. early AD 900s). Traditions say the old volcano god ʻAilāʻau fled in fear, and thus his cult fled or abandoned him, to be replaced by the cult of Pele. In this sequence, the timing of the arrival of Pāʻao is critical. Either Pele or Pāʻao could have replaced the ʻAilāʻau cult, or alternatively, sometime after the demise of the ʻAilāʻau cult, the arrival of Pāʻao with a new form of ritual could have initiated conflict with an established Pele cult (one that was associated with Pele's destructiveness).[46]

Whatever the time lapse between Pele and Pāʻao, the luakini ritual, if the core of this new religion, includes propitiation to Pele and is a form of becoming part of her (ultimately overlaid with a complex of ritual elements and deities that obscure this component).

One chief of Puna, Pauahilani-nui, is mentioned for the voyaging period (see Table 2), and is said to have been a "convert" to the religion of Pāʻao (Barrere 1959:41).

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[46] The tradition of Kanalu indicates conflicts between the priests of the Kanalu order and the priests of Pele (Nāmakaokeahi 2004:E 148-150).

AFTER PĀʻAO: THE PRE-CONTACT AND EARLY POST-CONTACT LANDSCAPE

In the centuries after Pāʻao, a basic pattern of settlement was established when population reached its maximum achievable level under the environmental conditions of the region, albeit always subject to interruption by volcanic flows and earthquakes. Figure 11 (see above) shows the ahupuaʻa, population density, political centers, temples, and cultivation areas of this region. Within this context, historical events played out that relate to landscape and site after the time of Pāʻao through the early post-Contact period (Figs. 18 and 19; see Table 2).

Greater Kaʻū was a remote area of the island kingdoms, which were centered first in Waipiʻo and later in Kona. The isolation probably allowed a greater degree of independence for much of the district's history. The district also could have served as a refuge for those escaping central authority. The rulers of Kaʻū fell under the larger political structure of the island, and there were a number of changes in the district's ruling families (see Table 2). During the dynastic era, Kaʻū was an independent kingdom only twice, both during the 18th century: under Kalaniʻōpuʻu and for nearly a decade under Keōua during the war with Kamehameha.

The first known high chief of Greater Kaʻū of the dynastic era (see Hommon 1976) was Imaikalani, during the reign of island king Līloa (10th in the dynastic sequence; see Table 2). Imaikalani, however, did not establish a lengthy ruling lineage for the district. An important action of this chief was the restoration of the temple of Waha'ula (Fornander 1969:II:35), suggesting a major change in political structure of the time, perhaps even that this was the first clear recognition of the district of Greater Kaʻū.

The major historical events of the traditional era that can be placed in the HAVO region were related to warfare. During Kalaniʻōpuʻu's reign, there was a revolt by the Puna chief Imakakaloa around the mid-1760s, but he was defeated and went into hiding in the Puna-Kaʻū area. Kalaniʻōpuʻu went in search of Imakakaloa, going to Punaluʻu and Waiʻōhinu; at Kamāʻoa, he dedicated the temple of Halauwaila at Pākini (on the west side of South Point) for the sacrifice of Imakakaloa. But Imakakaloa remained in hiding, so Kalaniʻōpuʻu sent one of his armies to (Barrère 1959:19):

> ravage the Puna district with fire, i.e., to burn every village and hamlet until Imakakaloa should be found or the people surrender him. Commencing with the land of Apua[47], it was literally laid in ashes.

Imakakaole was captured and taken to Pākini Heiau for sacrifice. It was during this event that the young chief Kamehameha stepped in to perform an act of usurpation that was a prelude to the way he would rise to power after the death of Kalaniʻōpuʻu. At that point, Kamehameha went into temporary exile in Kohala, but he traveled there from Kamāʻoa by "passing through Hilo" (Fornander 1969:II:203). If he went by land and not by sea, this suggests that he took the trail to Punaluʻu and then to Kīlauea, and from there, passed through the district (not the village) of Hilo by crossing the saddle area between Mauna Loa and Mauna Kea, rather than taking the much more circuitous route via the village of Hilo.

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[47] ʻĀpua is the westernmost point of Puna proper and is in HAVO. Thus, this account indicates that all of the villages along the present HAVO Puna coastline were burned.

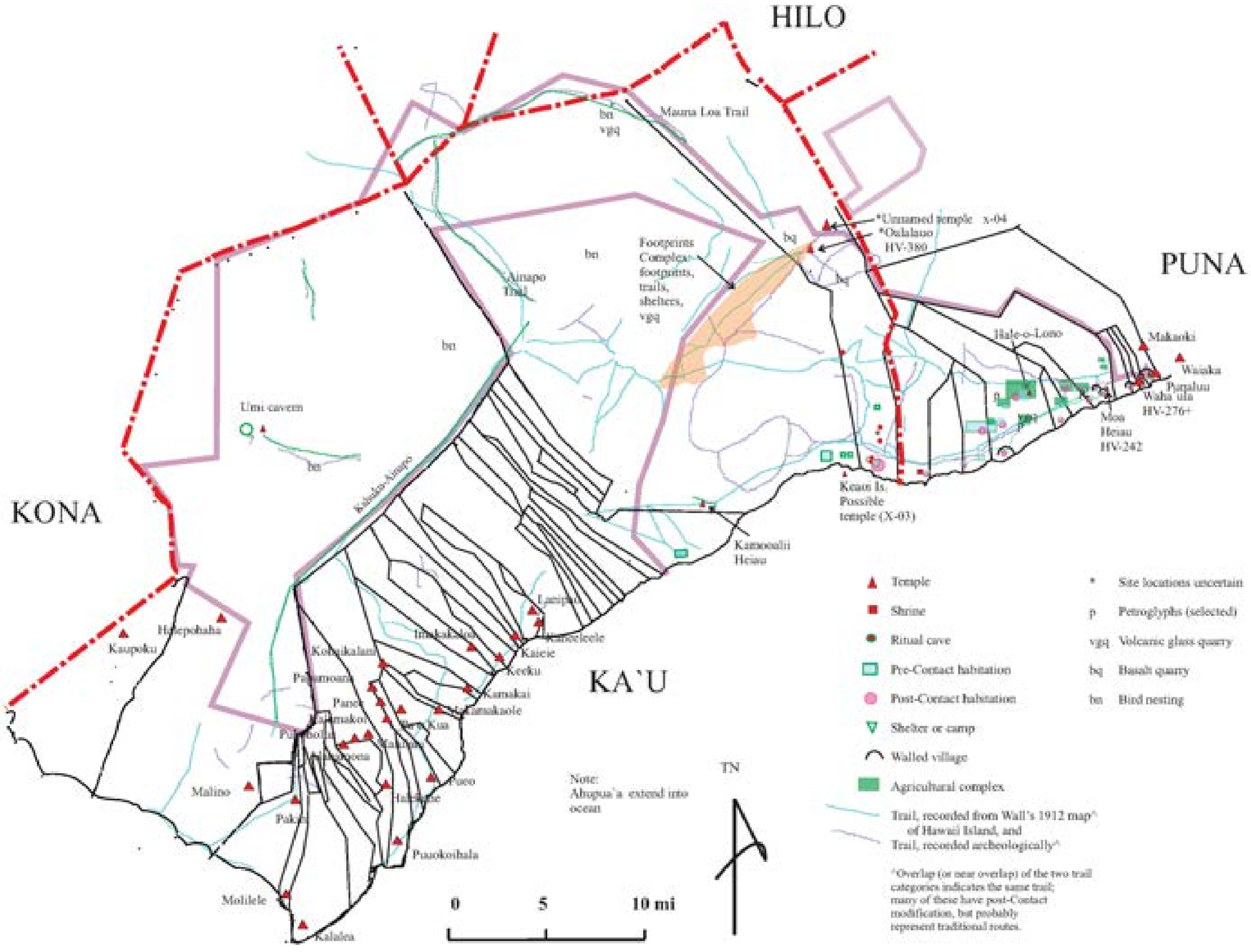

Figure 18. Traditional sites of the HAVO area, identified by function.

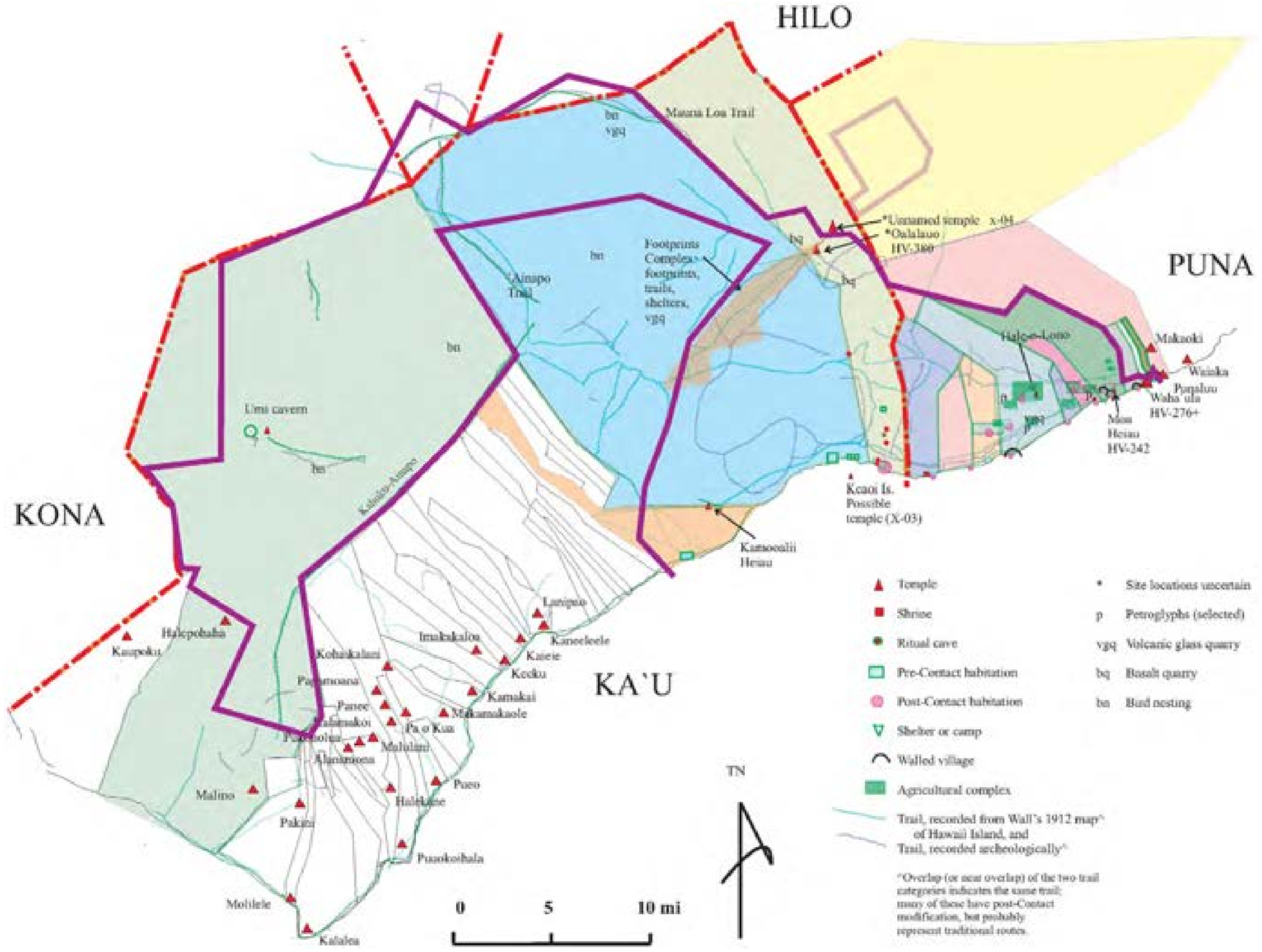

Figure 19. Traditional sites of the HAVO area, identified by function, with emphasis on location in ahupua‘a.

After the death of Kalani‘ōpu‘u, war broke out between Kīwala‘ō and Kamehameha, with Kīwala‘ō defeated at the battle of Moku‘ōhai. Keōua, the third chief involved in the post-Kalani‘ōpu‘u power struggle, established an independent kingdom in Ka‘ū and Puna and a ten-year war with Kamehameha ensued. A number of events took place in the area of HAVO. Around 1784, Kamehameha brought an army across the saddle to Kīlauea Crater, where one engagement took place “beside the pit of Pele,” a battle fought in “rain and chilly fog” that became known as the *Battle of bitter rain* (Kau-ua-‘awa) (Kamakau 1961:125; italics original). The Hawaiian text reads (Kamakau 1996:77): “Ma uka o ka lua o Pele ka hele ‘ana o ke kaua. Ua kapa ‘ia ka inoa o kēia kaua ‘o Kaua‘awa.” Kamehameha retreated from the mountain, but encountered another army, and avoided serious defeat by getting to the coast and escaping in war canoes under the command of Ke‘eaumoku (Kamakau 1961:125).[48]

In subsequent years, Kamehameha was preoccupied with wars against his great Maui opponent, Kahekili. Around 1790, Keōua took advantage of Kamehameha’s absence to expand his kingdom on the island of Hawai‘i. This brought Kamehameha back to the island and after two indecisive battles in the Hilo area, Keōua’s forces withdrew to their stronghold of Ka‘ū by taking the mountain road to Kīlauea and from there to Punalu‘u. They were camped near Kīlauea Crater when earthquakes and eruptions took place. Unsuccessful in placating Pele over a period of two or three days, they continued toward Punalu‘u when a portion of the army was destroyed by toxic gases from an explosive eruption. Shortly after this, Kamehameha sent an army under Ka‘iana (who had guns or cannon of some kind) to attack Keōua in Ka‘ū at Kalaeloa.

After several battles in Ka‘ū (at Kalaeloa, Paiaha‘a, Kamā‘oa, and Nā‘ōhule‘elua) and a general stalemate, Keōua’s army retreated to Puna, probably again passing Kīlauea Crater. Kamakau (1961:153) describes the events: “Keoua retired to Puna, and Ka‘i-ana followed. A battle was fought at Punakoki [sic] in which Ka‘i-ana displayed great valor;” his Hawaiian text (Kamakau 1996:108) reads: “Hele loa akula ‘o Keōuakuū‘ahu‘ula mā i Puna. A lohe ‘o Ka‘iana mā, holo aku lākou a pae i Puna, a ‘o Pua‘akoki ke kahua kaua.”

This was a fierce battle, but Keōua’s men captured the “cannon” and Ka‘iana retreated, and “withdrew to Kona where Kamehameha and his followers were staying” (Kamakau 1961:154).

Fornander (1969:II:327) refers to Ka‘iana following Keōua into Puna where they met in battle “at a place called Puuakoki,” where Keōua was defeated.

Ellis (1963:144) records a different version of this battle, one in which Keōua retreats toward Hilo from a defeat at Kailiki‘i, and Ka‘iana and his army pursue him, and “overtook him at Puakokoki, in the division of Puna, where another battle was fought, in which his [Keōua] forces were totally routed...”

There are several things of interest about this battle. It almost certainly took place somewhere in the uplands not far from Kīlauea Crater, but the name of the place is listed variously as Pua‘akoki, Puuakoki, and Puakokoki.[49] We have been unable to locate a historical source indicating the location of

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[48] The Fornander (1969:II:317) version of these battles vary somewhat from that of Kamakau.

[49] A fourth version, “Punakoki” in the English translation of Kamakau, is presumably a typographic error; the original text reads “Pua‘akoki” (at least in the 1996 Hawaiian edition of Kamakau).

any of these names, although Cordy (2000:337) shows it east of Kīlauea. Another aspect of this is that Ellis was told a version of who won and who lost that is different from that recorded by later writers.

But for HAVO, the most important aspect of this is that it was the last battle between the forces of Kamehameha and Keōua, and that it is associated with the general area of the park, if in fact it was not in the park's locale.

After this battle, Kamehameha renewed the effort to complete the temple of Pu'ukoholā, which was built as the ceremonial means to defeat Keōua and to serve as a temple for Keōua's sacrifice. The success of this effort was the end of the long conflict with Keōua, and consolidated Kamehameha's position for becoming ruler of the island chain.

POST-CONTACT HISTORY: FOREIGN VISITORS, NEW ECONOMIES

With western Contact and the death of Kamehameha some 40 years later, there began an increasingly rapid series of historical events that affected the landscape and the material culture of the HAVO region in innumerable ways.

FOREIGN VISITORS

The observations of foreign visitors are an important part of the record of change, and the written and graphic descriptions of their visits, the routes they took, and sites they left, are key documentation of historical events that affected the HAVO region.

Table 8 lists the early expeditions to the top of Mauna Loa, and Table 9 shows the record of visitors to Kīlauea. It is notable that there is a 40-year span between the first two trips to the Mauna Loa summit, whereas visits to Kīlauea occurred more frequently after the initial trip by William Ellis in 1823. This certainly reflects the relative ease of access to the lower summit, which was connected to other regions by established trails; it emphasizes the character of the western visitors to each destination (tourist to Kīlauea, adventurer to Moku'āweoweo).

The earliest visitors provide a view of the traditional world of the HAVO area, at a time that overwhelming changes were just beginning. This information is shown in "landscape" form in Figure 20, which illustrates the route of the 1823 Ellis journey through the area, as well as the route and camps of two major early trips to Mauna Loa (Archibald Menzies in 1793 and Charles Wilkes in 1840-41).

Table 8. Foreigners' Ascents to Mauna Loa and Moku'āweoweo.* (see Fig. 20)

Date**	Person	Comment	Site
1794	Archibald Menzies	Came from Kapāpala side to the top; no camp at summit	—
1834	David Douglas	Came from Hilo side, camp at Kīlauea; no camp at summit	—
1839	M. Isidor Lowenstern	No camp at summit	—
1840	Lt. Charles Wilkes	Came via Kīlauea; camp at summit	05507
1843	Titus Coan	New trail from Hilo; no camp at summit	—
1851	J.G. Sawkins and F.R. Grist	Route uncertain, but included Kīlauea; probable camp near summit	24349

* Taken primarily from Dougherty 2004.

** At least two unsuccessful attempts were made prior to Menzies' 1794 ascent: one by John Ledyard in 1779, and an earlier attempt by Menzies. Both attempts were made from the west side of the mountain.

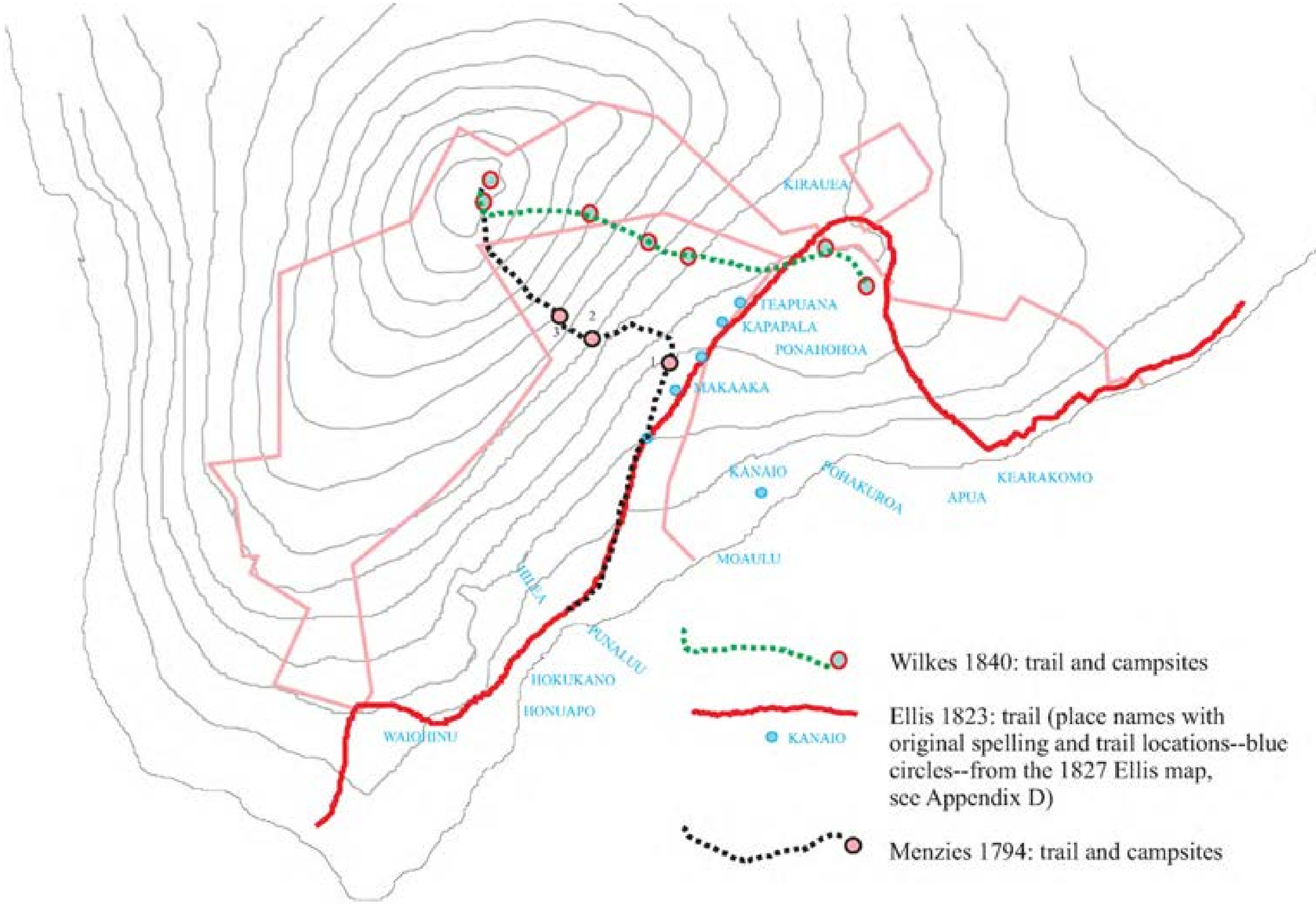

Figure 20. The travel routes of Menzies, Ellis, and Wilkes in the HAVO area.

Table 9. Western Visitors to Kīlauea, 1823-1865.*

Date	Person(s)	Occupation; Purpose	Lodging
1823	William Ellis	missionary; mission survey	grass hut
1824	Elisha Loomis	missionary printer; exploration	grass hut
1824	Chiefess Kapiʻolani	royalty; religious/cultural	Kapiʻolani's Hut (on Byron's Ledge)
1825	Captain George Anson Byron (+ "Large" Party)	ship's captain; scientific (first map of Kīlauea)	Kapiʻolani's Hut (on Byron's Ledge)
1829	Charles Stewart (+ 10 officers and 23 natives)	ship's captain, USS Vincennes; exploration	grass hut
1834	David Douglas (+ 10 natives, guides, and packers)	botanist; scientific	grass hut
1838	Capts. Chase and Parker	ship's captain; exploration	grass hut
1839	Mr. Rees	assistant surgeon, HMS Sparrowhawk; exploration,	grass hut
1840	James Jarvis and J.P. Couthoy	historian and conchologist; exploration	grass hut
1840 - 1841	Charles Wilkes (+ 300 natives)	ship's captain; scientific	pitched tent
1844 - 1845	Henry Lyman	local born doctor; vacation	grass hut
1844	Cochran Forbes	missionary; exploration	"house"
1846	Chester S. Lyman	professor, Yale University; scientific (mapped Kīlauea)	three houses at location of Volcano House
1848	Henry Lyman	local born doctor; vacation	"comfortable" native hut
1848	Samuel F. DuPont	captain, USS sloop Cyan; visitor	"comfortable" native hut
1848	Lieutenants (2) and Midshipmen	shipmates of Capt. Dupont; visitors	"comfortable" native hut
1848	Titus Coan	missionary; guide	"comfortable" native hut
1850	Henry T. Cheever	minister	grass hut
1856	Mr. Goodale	visitor	Volcano House
1857	D. (David) Hitchcock	visitor	Volcano House
1860	Lucy Wetmore	missionary wife; visitor	Volcano House
1863	Rufus Anderson	missionary; visitor	Volcano House
1865	William Brigham	scientific (survey of Kīlauea)	Volcano House

* Taken from Durst and Moniz Nakamura 2005.

Archibald Menzies

Archibald Menzies was the surgeon and naturalist with the 1792-1794 expedition led by George Vancouver. He made two attempts on the summit of Mauna Loa. The first attempt from Hualālai across the saddle between the two mountains and Mauna Kea was thwarted by dense vegetation and rugged terrain.[50] The second attempt was made upon the advice of Kamehameha (Menzies 1920:175):

[50] John Ledyard, who served on James Cook's third expedition to Hawaiʻi, also attempted to ascend Mauna Loa from the west, starting at Kealakekua. Like Menzies, he was stopped by impenetrable vegetation.

> [who] assured me that the most likely way of succeeding was to ascend it from the south side of the island, to which I must go by water in one of his canoes, and that he should take care to send with me a chief well acquainted with the proper route, who should possess sufficient authority to protect me from any ill usage in the journey and have ample power to secure provisions, attendants, or whatever else should be found necessary to accomplish so arduous an undertaking.

Starting from Kealakekua in Kona, Menzies and his party traveled by canoe to Pākini just south of Kahuku. From there, they climbed to the top of the Kahuku Fault and walked to Kīlauea. The ascent of Mauna Loa began from there.

Footnote 132 of Menzies' (1920:199) account states that:

> From the date of Archibald Menzies' ascent on February 16th, 1794, Mauna Loa was not scaled until forty years had elapsed, when Menzies' fellow-countryman, David Douglas, reached the top on January 29th, 1834. Douglas mentions that even after this long interval of forty years, Menzies was still held in remembrance by the natives, who described him as "the red-faced man, who cut off the limbs of men and gathered grass."

William Ellis, First Foreigner at Kīlauea

In 1823, William Ellis (1963) became the first foreigner to circuit the island and the first to visit Kīlauea (but not Mauna Loa). Ellis' route took him south along the Kona coast, where he entered Kaʻū district by canoe. Ellis and his companions bypassed Kahuku, traveling by foot from the base of Pali o Māmalu to the top of the fault scarp, and then inland across the southern point of the island, returning the seashore at Honuʻapo. They followed the shoreline to Punaluʻu and then headed inland toward Kīlauea. After spending time around the crater, the party passed Kīlauea Iki and Keanakākoʻi Craters and made their way to Kealakomo at the coast, from which they walked northeast along the coast to Puna and then to Hilo.

Ellis made numerous observations about villages, agricultural fields, natural features, and what are now archeological remains such as Wahaʻula Heiau (Figure 21a and 21b). He also collected accounts from Hawaiians about legends, history, cultural practices, and ritual behavior.

Charles Wilkes and the US Exploring Expedition

The US Exploring Expedition, led by Lt. Charles Wilkes, was the first US exploring and surveying expedition to the South Seas. Six ships carried 346 naval personnel and scientists, who were charged with the task of providing detailed maps of the region for the American shipping industry (Dougherty 2004:13). The expedition was at sea from 1838 to 1842 in the around-the-world voyage.

Between December 1840 and January 1841, Wilkes took a contingent of scientists to the summit of Mauna Loa. From Kīlauea Crater, the expedition took five days to reach the summit. Once there, a camp was set up with rock walls to buttress tents against the extreme weather conditions, and the expedition could carry out observations and mapping. The expedition mapped the summit region and conducted scientific efforts in the relatively unknown alpine wilderness area. The expedition team was supported by nearly 300 natives who served as porters on the arduous climb to the summit. The contingent broke camp on January 13 and returned to Kīlauea.

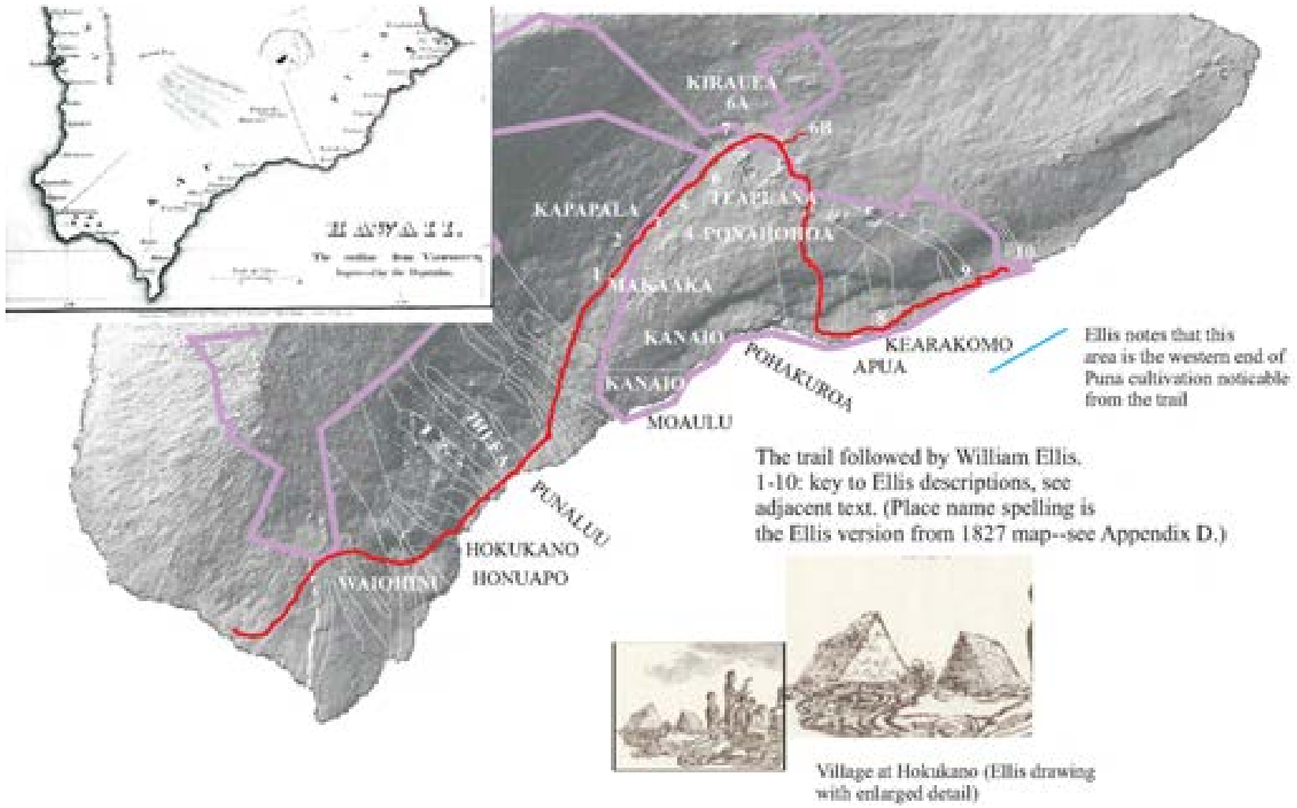

Figure 21a. The Ellis trail in the HAVO area, with place names.

From Ellis (1963 [1822-1823]: 146-190; emphasis added)

1. "After walking up a gentle ascent about eight miles, we came to a solitary hamlet, called **Makaaka**, containing four or five houses, in three or four families were residing." Ellis entered one house, which "was large, and beneath one roof included their workshop, kitchen, and sleeping room, without any intervening partitions. On one side two women were beating native cloth, and the men were at work on a new canoe. In the same place were several larger ones, one upwards of sixty feet long...The workmen told us they were making a pair of that size for Kaikioeva, guardian of the young prince Kauikeouli, whose tenants they were. Near the south end of the house, which was quite open, was their fireplace, where a man was preparing...taro for the oven... The oven was a hole in the earth, three or four feet in diameter, and nearly a foot deep..."

2. "We resumed our journey...over the same verdant country...The land, though very good, was but partially cultivated, till we came to **Kaaraara**, where we passed through large fields of taro and potatoes, with sugar-cane and plantains growing very luxuriantly. Maruae [was] chief of the place...**Kapapala** was four miles distant...and we passed on through a continued succession of plantations..."

3. "...we reached **Kapapala** [and] and the house of Tapuahi, the head man. [In the house] we found a fire very comfortable. It was kindled in a hollow place in the centre of the earthen floor, surrounded by large square stones... In the neighborhood...we noticed a variety of the paper mulberry...which grew spontaneously... Large quantities of the dried bark of this plant, tied up in bundles...were piled up where we lodged. It is used in manufacturing a kind of tapa, called mamake..."[Later, met travellers at Kapapala who were going home to Kealakomo--"**Kearakomo**"--from Kealakekua.]

4. "After travelling about five miles [on a side trip], over a country fertile and generally cultivated, we came to **Ponahohoa** [having crossed] a fertile country and generally cultivated [then returned] through a number of fields of mountain taro." [Ellis estimated this to be 10-12 miles from the shore, and 20 miles from Kilauea. Wiliwili grew in the area, its branches used to make fences.]

5. "W proceeded [from Kapapala] a short distance to a place called **Kapuahi** (the hearth of fire) where we stopped at the entrance of a large cave...Here two or three families...were residing...The women were employed in making mats, and beating tapa; the children were playing...and the men were preparing an oven in which to bake some taro..." [They also had spring water.]

6. "After travelling between three and four miles, we reached **Keapuana**, a large cavern, frequently used as a lodging-place by...travellers." [Outside, they could see the glow from Kilauea to the NE or ENE.] "[From there the path ran through high bush, then a woods, and around a deep chasm.] "Near [the deep chasm] was an extensive cavern [where] drops of water...constantly filtered through the vaulted arch, and fed into calabashes placed underneath..." [They then crossed a "waste of dry sand, about four miles across" and then a stretch of barren basalt. At Kilauea, found it a flood of burning lava. Found water near top and had natives "build a hut in which we might pass the night," then walked less than a mile to the sulphur banks.]

6A. "[At Kilauea] we were told, that though, according to the traditions... **Kirauea** had been burning ever since the island emerged from the night, it was not inhabited till after the Tai-a-kahina'rii, sea of Kahina'rii, or deluge of the Sandwich Islands. Shortly after that event, they say, the present volcanic family [of Pele] came from Tahiti, a foreign country, to Hawaii."
6B. [Ellis' party split up, some going to Hilo "through the villages of **Ora** to **Walakaea**."]

7. "They [the natives] pointed out to us the ruins of **Oararuo**, an old heiau, which crowned the summit of a lofty precipice on our left.. It was formerly a temple of Pele, of which Kamakaokeaikua (the eye of god,) a distinguished soothsayer, who died in the reign of Tamehameha, was many years a priest. Large offerings were frequently made of hogs, dogs, fish, and fruits..."
7A. [Leaving Kilauea, they travelled down the trail to Kealakomo, finding luxurient vegetation, abandoned plantations, and "several plantations of the sweet potato belonging to the inhabitants along the coast," but only one "solitary cottage."]

8. [**Kealakomo** is described as "populous, though desolate-looking," fresh water was scarce, coming from the uplands, and the usual drinking water was brackish.] "The head man of the village...told us that all his provisions were at his farm, which was some distance inland, and that tomorrow he intended to bring us a pig, and some potatoes."

9. "[From Kealakomo along the coast, they saw] quantities of dried salt fish, principally albacores and bonitos [which] with their poi and sweet potatoes, constitutes nearly the entire support for the inhabitants...Besides what is reserved for their own subsistence, they cure large quantities [of fish] as an article of commerce, which they exchange for the vegetable productions of Hilo and Makaenua, or the makane and the other tapas of Ora and the more fertile districts of Hawaii. When we had passed **Punau**, **Laepuki**, and **Kamoamoa**, the country began to wear a more agreeable aspect. Groves of coca-nuts ornamented the projecting points of land, clumps of kou-trees appeared in various directions, and the habitations of the natives were also thickly scattered over the coast."

10. "At noon we passed through **Pulana**, where we saw a large heiau called **Wahaura**, Red Mouth, or Red-feather Mouth, built by Tamehameha, and dedicated to Tairi, his war-god

Figure 21b. Text of Ellis' descriptions of places in the HAVO area, keyed to adjacent figure.

From Kīlauea, the expedition made its way to Hilo on a route that followed the line of craters on the East Rift. Shortly after climbing Puʻuhuluhulu to take measurements and gain a vista of the rift features, Wilkes (1845:181) passed through a cluster of houses at upland Pānau:

> At Panau we found a large clearing in the woods, and a village, consisting of three or four native houses.[51] Here many canoes are built and transported to the sea, the trees in the vicinity being large and well adapted to this purpose. … Panau is two thousand, six hundred and seventy feet from the sea, and was found by observations to be ten miles southeast of Kilauea.

NEW ECONOMIES: SANDALWOOD

Western Contact brought exposure to an economic world beyond the subsistence lifestyle of traditional Hawaiʻi. Foreign goods enticed high chiefs who then exacted labor and products from commoners. In the HAVO area, the aromatic sandalwood was a commodity that was particularly in demand. In the first three decades of the 19th century, sandalwood was collected for trade to China. Initially controlled by Kamehameha, the trade exploded in the 1820s when other chiefs were allowed to become involved. The sandalwood population was nearly devastated, bringing the active trade to an abrupt end by the close of the decade. Boundary Commission testimonies for several HAVO ahupuaʻa (e.g., Kapāpala and Kahuku) indicate that sandalwood was collected in this region:

> When the people used to go after sandalwood the Alii of Kapapala Naihe and Aikanaka took it for Kaahumanu. The Kaalaala people went after sandalwood for their chief but the people of the other lands in Kau used to go after sandalwood on Kapapala and take to their chiefs. This was the last gathering of sandalwood for Kamehameha III to pay the debt.
>
> The sandal wood growing on the aa belongs to Kahuku, the scattering trees in the woods to Waiohinu (witness Kalakalohe).
>
> The sandalwood belonged to Kahuku there was none in Kona except on Kapua, and when the other Kona people came on Kahuku after it, the Kahuku people would take it away (witness Kumauna).

---

[51] Hudson (1932:517) notes a clustering of "six or eight platforms and low pens" at a 2,730-foot benchmark in Pānau Nui: "in an ohia grove north of the Volcano-Kalapana trail … the platforms are built of earth and two of them may be natural. The ground has been leveled off and, in some places, hilled and banked to make a flat surface." Hommon (1982:10) suggests that this cluster may be the same as Wilkes' Panau village and notes its location at the intersection of several trails (including the Kīlauea-Glenwood Trail and the Kalapana-Volcano Trail).

THE CHANGING LANDSCAPE: MID-19TH TO EARLY 20TH CENTURY

The mid-19th century saw the beginnings of drastic changes to the Kaʻū-Puna region, brought about by population decline, the introduction of goats and cattle, and major changes in land management, control, and ownership. Economies changed as commercial interests (by Hawaiians and non-Hawaiians) became a part of life in the region. Figure 22 shows sites in the HAVO area associated with the 19th and 20th century non-traditional activies and events, most by non-Hawaiians.

It should be noted that the year 1868 marked a significant change in settlement along the east HAVO coastline. This was the year of the great eruption, earthquakes, and tidal wave. All of the villages along this coast, including at least Kealakomo, Kahue, ʻĀpua, and Keauhou, were totally destroyed or significantly damaged. Combined with the inherent difficulties of surviving in this region, the introduction of a market economy for which there were few marketable resources in this area, and the enticement of moving to growing commercial centers, this natural disaster may have been the death knell to continued settlement on the coast. G.W.C. Jones, lessee of lands at ʻĀpua wrote to the government in 1872 (quoted in Allen 1979:15, brackets added):

> I leased the land for fishing before [the 1868 eruptive event] and originally there was a large lagoon with a fine sand beach for drawing a seine and 3 or 4 families living on the beach. The 1868 wave totally destroyed the lagoon and ruined the place for fishing purposes. The natives, one member having drowned in the wave, deserted the land and have never returned. I can run a small flock of goats on the place but there is no soil for planting or grazing.

MID-19TH CENTURY LAND REFORM

A major impetus for social and economic change in Hawaiʻi was the passage of laws related to land ownership. In the mid-19th century, the traditional Hawaiian land tenure system based on use rights was replaced by a western system of fee simple ownership. All lands in Hawaiʻi were divided among the king, the high chiefs, and the government through a process called the Māhele (Kameʻeleihiwa 1992). Commoners were allowed to claim lands that they used and occupied through a separate Land Commission process.

Table 10 summarizes the disposition of HAVO lands. In Kaʻū, Kahuku was awarded to William Pitt Leleiōhoku, Kaʻalaʻala was claimed by the government, Kapāpala went to the Crown, and the ʻiliʻāina of Keauhou was awarded to Victoria Kamāmalu. Leleiōhoku died in 1849 and his widow, Ruth Keʻelikōlani surrendered Kahuku in lieu of commutation (taxes to pay for other lands which she retained). In Puna, Āpua was claimed by the Crown, Kealakomo, Pānau Iki, and Poupou/Pūlama went to the government, and Pānau Nui, Kamoamoa, and Kahaualeʻa were awarded to chiefs. Laeʻapuki was awarded to the chief (and future king) William Lunalilo, who surrendered the land in lieu of commutation.

There were no Land Commission awards to commoners within HAVO.

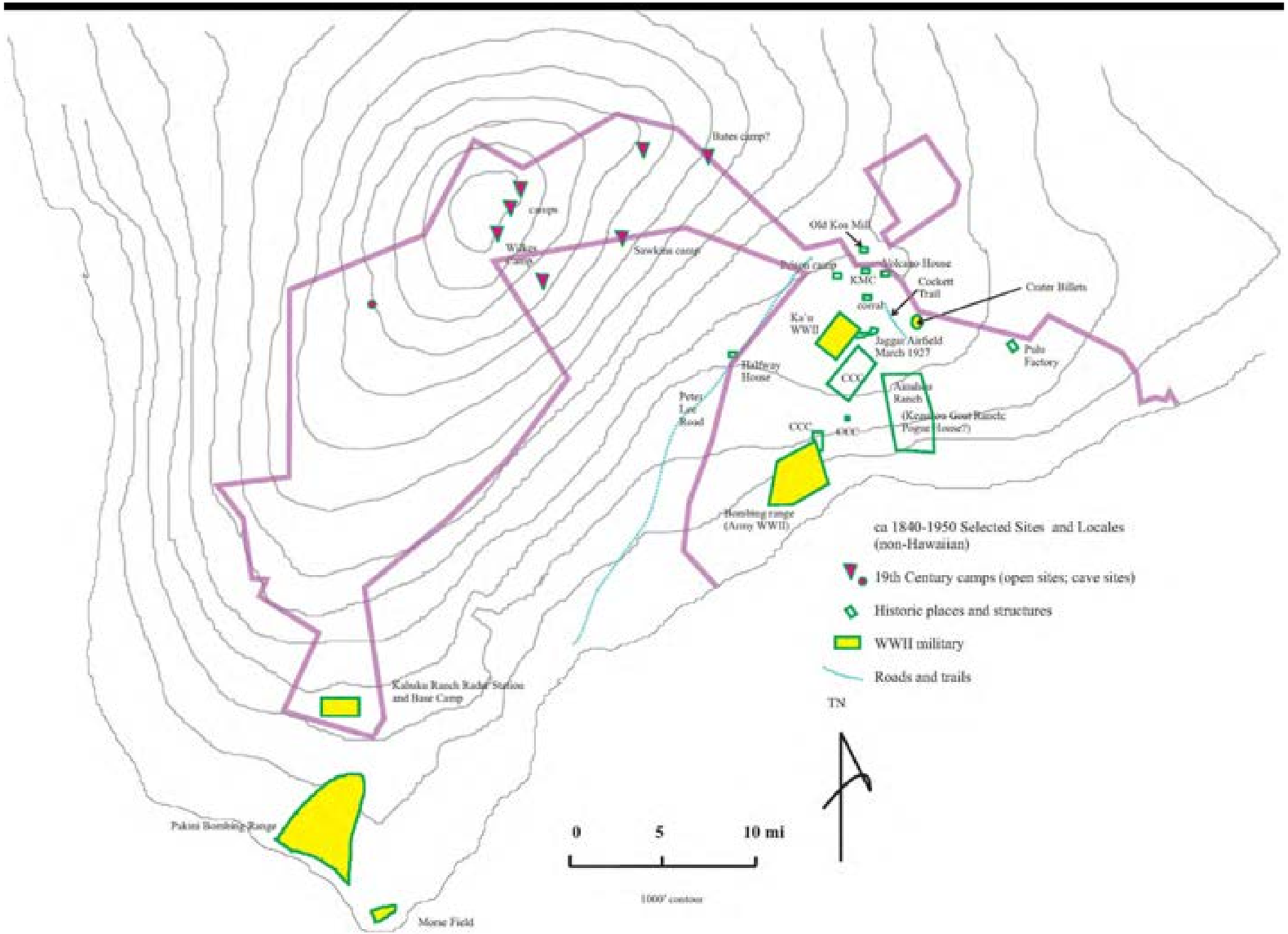

Figure 22. Nineteenth and 20th century sites at HAVO.

Table 10. Summary of Mid-19th Century Land Disposition and Records for the Traditional Ahupua‘a within HAVO.

Ahupua‘a*	District	Māhele Award	Land Commission Award (LCA)	Grants	Boundary Commission	Reference	Geog. Order**
Kahuku	Ka‘ū	William Pitt Leleiōhoku (surrendered to government in lieu of commutation)	9229 to Kaaua+ 8769 to Kepola+ 8771 to Kila+ 9248 to Ku+ 11028-B to Kuula, Samuela+ 10514 to Naohe+ 10842 to Pau+	2791 to C.C. Harris (184,298 acres)	Volume?	Cordy 1988 Quiseng 2006	01
Kaalaala Ka‘ala‘ala	Ka‘ū	government	7109:1 to Kaonohi ^ 7555:1 to Kawaa ^ 7606-B to Keliinui ^ 8032:2 to Awihi ^	1735 to Aua (125 acres) 2386 to Aua (123 acres) 2457 to Kaonohi (179.1 acres) 2456 to Wahahee (166.5 acres) 2598 to Aua (125 acres)		Langlas 2003	02
Kapapala Kapāpala	Ka‘ū	Crown			BC 84 Vol A-1:436-447 Vol 1-3:178	Langlas 2003	03
Keauhou (‘ili‘āina)	Ka‘ū	Victoria Kamāmalu	7713 to Kamāmalu		BC 62 Vol A-1:444-446 Vol B:302-304 Vol 1-3:116-119	Durst/Moniz Nakamura 2003	04
Apua ‘Āpua	Puna	Crown			Volume ?	Allen 1979 Langlas 2003	05
Kahue	Puna	unassigned ***				Allen 1979 Langlas 2003	06
Kealakomo	Puna	government		2893 to Kanaaulani et al. (4,298.4 acres) 2166 to Palapala (3.75 acres) 4:ap. 9 for school (3.42 acres)	Vol B:307	Allen 1979 Durst/Moniz Nakamura 2003 Langlas 2003	07
Panau Nui Pānau Nui	Puna	Kekau‘ōnohi	11216 to Kekau‘ōnohi			Allen 1979 Langlas 2003	08
Panau Iki Pānau Iki	Puna	government				Allen 1979 Langlas 2003	09
Laeapuki Lae‘apuki	Puna	William Lunalilo (surrendered to government in lieu of commutation)		1538 to Pou (78.25 acres) 2751 to P.J. Hafter (2,200 acres)		Allen 1979 Langlas 2003	10
Kamoamoa	Puna	Ka‘ō‘ana‘eha	8515-B to Ka‘ō‘ana‘eha			Allen 1979 Langlas 2003	11

Table 10. Summary of Mid-19th Century Land Disposition and Records for the Traditional Ahupua‘a within HAVO (continued).

Ahupua‘a*	District	Māhele Award	Land Commission Award (LCA)	Grants	Boundary Commission	Reference	Geog. Order**
Poupou/ Pulama Poupou/ Pūlama	Puna	government		1005 to Naehumakua (49.12 acres) 1872 to Kekaula (422 acres) 2652 to Kahoumana (28 acres) 2659 to Naehumakua (109 acres) 2688 to Waiiki (271.7 acres) 2940 to Kaina (1,179 acres) 3681 to J.S. Canario (627.9 acres)		Langlas 2003	12
Kahaualea Kahauale‘a	Puna	William Lunalilo	8559-B to Lunalilo		Vol A-1:208-211 Vol D-5:92-95	Langlas 2003	13

- Ahupua‘a listed with two spellings. The first listing is without diacritical marks; this allows alphabetical sorting of the table, and it also provides the spelling that occurs in early original texts (changes in orthography are not included here). The second spelling, with diacritical marks, is a modern rendition that is believed to reflect pronunciation; however, there is not always complete agreement about this. This spelling is from Pukui et al. (1974), where possible.

** Geographic Order is the position of the ahupua‘a (within HAVO) from west to east.

*** Subsequently taken by the government; Langlas (2003a:footnote to Table 2) notes that “In 1888 a report by the Surveyor General stated the decision that lands unassigned in the Māhele were to be government property.”

\+ Seaward of the Belt Road outside of HAVO.

^ In mauka Ka‘ala‘ala outside of HAVO.

In 1862, the Hawaiian government established the Commission on Boundaries (also called the Boundary Commission) to "determine and certify boundaries for owners of ahupuaa and ili whose lands had not been awarded by the Land Commissioners, patented or conveyed by deed from the King or described by boundaries resulting from an award, patent or deed" (typescript in the Hawai'i State Archives). This essentially allowed land owners with no deeds to have their boundaries formally certified by the government. Surveyors mapped out the boundaries, using informants who were long-time residents of the ahupua'a or 'ili, often bird catchers who were familiar with the remote uplands. Boundary Commission testimonies and/or actions were taken on Kahuku, Kapāpala, Keauhou, Kealakomo, and Kahauale'a.

COMMERCIAL ACTIVITIES

Like sandalwood in the early 19th century, new markets for goods developed that affected the HAVO area in the mid- to late 19th century. Four such markets included goat hunting, cattle ranching, tourism, and the collection and processing of pulu.

Goat Ranching and Hunting

Captain James Cook left goats on the island of Ni'ihau in 1778 (Henke 1929:18), but it was Captain George Vancouver who introduced goats to Hawai'i Island, leaving one male goat and a kid with the chief Ke'eaumoku (Brundage 1971:1).

The use of goats by Hawaiians in the HAVO area is recorded as early as 1846, when Chester Lyman stopped at Kamoamoa Village for a breakfast of bread and goat's milk, "a fine supply of which was furnished by the natives" (quoted in Ladd 1969:28). Goat ranching as a formal activity is documented from 1862 (Allen 1979:11). Phillip Hafner ran a herd of goats in Pānau Nui and Lae'apuki; Hawaiians maintained herds in adjoining Kamoamoa. Tax records from 1889 record C.J. Pea as having a herd of 200 goats at Pānau Iki; a decade later, Pea's herd had increased to 1,000 (Allen 1979:12).

Like the cattle that were introduced to the islands in the late 18th century, goats multiplied, went feral, and became a pest across the countryside. Hunting of feral goats is mentioned by numerous witnesses before the Boundary Commission in the 1870s. Witness Kenao (for Kahuku ahupua'a) said that he had hunted goats since probably the mid-1850s.

Although the traditional ahupua'a system had long since been abandoned, witnesses still described "ownership" of the wild goats by ahupua'a. For example, Boundary Commission witness P. Naihe said that "if the wild goats went beyond the awaawa of Kaheawai we had to let them go as beyond that was on the land of Manukaa." Witness J. Kaulia recalled building a pen at "Hale Pohaku" in Kahuku. Witness Kaiwi also referred to a goat pen "a little beyond Kumualii and close to the woods."

Wild goats continued to be a major problem into the 20th century. On Mauna Loa, periodic goat drives were held with the cooperation of the territorial government, ranchers, and plantation owners in Ka'ū and Puna. A 1929 report to the territorial Board of Commissioners of Agriculture and Forestry (Honolulu Star-Bulletin 1929:37, brackets added) reports that:

> Five goat drives were held on Hawaii during the biennium [1926 to 1928] in cooperation with land owners and with plantation managers who have loaned their men for a day, the pay for their hire being goat meat. In this manner, 1,669 goats were driven from the

lands below Kilauea Volcano, 2,949 goats from the land of Kahuku and 100 from Kapapala, a total of 4,718 goats.[52]

In his archeological survey in the mid-1960s, Smart (1965:32) describes "the huge and well-preserved goat corral which was built only recently and was used until a few years ago" (this structure is Site HV-149 at Kahue).

Cattle Ranching

Like goat hunting, cattle ranching developed out of the need to control feral ungulates. Cattle had been introduced to Hawai'i by George Vancouver in the early 1790s. Kamehameha placed a kapu of 10 years on the cattle, which thrived in the Hawaiian environment and rapidly became a pestilence. By 1852, the cattle population in the islands was estimated to be 40,700, of which at least 12,000 (on Hawai'i island) were wild cattle (Henke 1929:22). Early ranches were off-shoots of efforts to catch and control the wild cattle. Three ranches prospered in the HAVO region: Kapapala, Keauhou, and Kahuku.

Kapapala Ranch

Kapapala Ranch was started in 1860 by W.H. Reed and Charles Richardson. Reed purchased Richardson's share of the ranch in 1873. W.H. Shipman, Reed's son-in-law, managed the ranch for the next three years, when the ranch was bought by the Hawaiian Agricultural Co., Ltd. (the corporate name for what was commonly called Pahala Plantation).

The ranch raised a mix of cattle along with a dairy herd and hogs. The plantation bought livestock on the hoof from the ranch and slaughtered twice a week to supply beef and pork at cost to employees (Campbell and Ogburn 1990:2).

Up until around 1916, the customary route to the summit of Mauna Loa was the 54 km (34 mi) long 'Āinapō Trail, which crossed Kapapala Ranch lands. Kapapala Ranch cowboys were often hired as guides and packers (Apple 2005).

Keauhou Ranch

Keauhou Ranch was started around 1900 by Oliver T. Shipman under the name Kuapaawela. It included lands of the 'ili'āina of Keauhou, which had been awarded to the high chief Victoria Kamāmalu in the mid-19th century Māhele. In a succession of inheritances, the land became part of the B.P. Bishop Estate, Charles Bishop's legacy to his deceased wife Bernice Pauahi (heir to Ruth Ke'elikōlani, who had been Kamāmalu's heir). Shipman leased 35,000 acres of Keauhou from Bishop Estate, with lands extending from the sea to about 7,800 ft elevation (Henke 1929:31).

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[52] The goat pen at 'Āpua is recorded in a 1933 report to the Board of Commissioners of Agriculture and Forestry: "Another well planned drive was held in Kau and Puna in cooperation with neighboring ranches and the National Park Service on May 19, 1931, and 70 mounted persons were successful in driving 3,048 goats into the Apua Point corral by noon."

The ranch was later acquired by Shipman's brother William H., who gave it the name Keauhou Ranch.

Kahuku Ranch

Kahuku Ranch had its origins with Captain Robert Brown, a retired seaman who purchased the ahupua'a of Kahuku from C.C. Harris in 1866 (Photo 6). Brown built up a herd of around 500 head of cattle (Henke 1929:30) and constructed a stone ranch house in the rich grasslands above Pali o Māmalu. Only two years later, however, his home and holdings were destroyed by the 1868 eruption.

Discouraged by the volcanic devastation, Brown sold the ranch to a hui (*group*) that included William Reed, Charles Richardson, George W.C. Jones and L. Kaina; Reed and Richardson were also founders of Kapapala Ranch. Interestingly, Richardson, Jones, and Kaina were active participants in the pulu business, with Kaina being the main figure in the pulu processing facility (Site 21215) at Nāpau. It is not clear if the intentions of the hui were pulu or cattle, although Quiseng (2006:6) notes that the group started the Kahuku Ranch Co.,[53] and built the first ranch houses seaward of the old Kona-Ka'ū road.

Photo 6. Robert Brown family in 1858.

[53] In 1873, Kahuku Ranch Co. applied to the Boundary Commission to settle the boundaries of the ahupua'a. The Boundary Commission proceedings provide a wealth of information on place names, land use, and boundaries for Kahuku.

In 1888, Colonel Samuel Norris paid $28,000 for the ranch, holding the property for 22 years. In 1910, Norris sold the ranch to Charles Gardener MacComber[54] for $1.00; MacComber died two years later (Quiseng 2006:6-7).

After MacComber's death, Kahuku attracted the attention of Alfred W. Carter, manager of Parker Ranch. Carter "looked to Kahuku as a location to expand cattle operations, stay ahead of Hawaii's beef industry, and relinquish the responsibility of renewing expired government land leases. After a brief visit to Kahuku, he reported back to Parker Ranch headquarters that the land was 'absolutely undeveloped and practically untouched'" (Quiseng 2006:7). Parker Ranch took control of Kahuku lands in 1912. Brennan (1974:138) writes:

> Ninety thousand dollars were paid for this land. For so sizeable a parcel, this might sound like very little, but the many lava flows of years gone by had so devastated whole regions that about one hundred and forty thousand acres were considered worthless. The real value of the land lay in *kipukas*—small areas of pasture land surrounded by old and hardened lava flows. These *kipukas* furnished extremely lush pastures.

Cattle were periodically herded across the mountainous center of the island, using an old trail that connected Kahuku with Pu'u O'o Ranch in the saddle between Mauna Loa and Mauna Kea. Fresh stock came from ranch headquarters at Waimea and cattle bound for market were returned along the same route.

Tourism

From the time of the missionaries in the 1820s, Kīlauea was a visitor destination, its attraction being the continuous, yet still accessible volcanic activity. Explorers, scientists, and tourists ventured to the edge of Kīlauea Crater to marvel at nature's fury (between 1823 and 1924, Halema'uma'u, the crater within the Kīlauea caldera, contained an active lava lake about 65 percent of the time). Almost all left some form of documentation of their observations: journal entries, letters to home-bound family, travel books, entries in the Volcano House guest book, and for a few visitors, attempts at scientific inquiry.

Early visitors stayed in rude shelters of branches and ferns that "were built at various locations around the crater near steam cracks for purposes of cooking and warmth, and open along the leeward side" (Blickhahn 1961:45). Martin and Jackson (1995:12, referencing Olson 1941a:14) describe the accommodations of Elisha Loomis in 1824: he "found a small hut at the northeast end of the crater, open on the side nearest the crater. It was cold, they had no fire and the Hawaiian guides' *tapas* (bedclothes) were too small to cover everyone, so dry grass was used as a blanket."

In 1846, Hilo businessman and husband of high chief Kino'ole, Benjamin Pitman, Sr., built a grass structure on the northeast side of the crater and charged a dollar per person per night; he called the hostel "Volcano House" (Blickhahn 1961:45). Even by 1860, however, conditions for visitors were still rustic. Olson (1941a:27) relates the account of Lucy Wetmore, the wife of the missionary physician at Hilo, who found herself and her party camping overnight with "merely some ferns' leaves with a thin mat spread over them for our bed;" the second night at the crater found them with accommodations at the

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[54] In 1873, a "C. Macomber" participated in a Boundary Commission trip to Ohialele (in the uplands on the Kona-Kahuku boundary).

Volcano House: “That night 23 persons slept in the house which I should judge to be about fourteen feet by eighteen or twenty. Don’t you think that pretty close packing?”

The first substantial hotel, albeit still made of thatched grass and ‘ōhi‘a pole supports (Bickhahn 1961:46), was constructed in 1866 by J.C. Richardson and Company; it continued the name “Volcano House.” A larger hotel of boards and timber was constructed in 1877; doors, windows, and building materials were delivered via Keauhou Landing and the Keauhou Road. Some 400 visitors a year were coming to the crater at this time. By the 1880s, the volcano was attracting group tours organized from US mainland cities and led by guides (Martin and Jackson 1995:14).

In 1891, the hotel changed hands and new owners Kilauea Volcano House Company carried out major renovations, building a two-story tower on to the west end of the hotel and bathing facilities that included piped in natural steam vapor (Martin and Jackson 1995:15). The company hired Peter Lee as manager; Lee was proprietor of the Punaluu Hotel, which had also been bought by the new company.

In 1904, George Lycurgus, a stockholder in the Kilauea Volcano House Company, purchased the hotel. He held ownership until 1921, when the hotel was bought by the Inter-Island Steam Navigation Company. A little over a decade later, Lycurgus regained ownership for $300 through a sheriff’s sale (Martin and Jackson 1995:25).

In the mid-1800s, visitors to the volcano transited through Hilo (Lyman 1979:114) or Keauhou village, and later from a landing at Punalu‘u on the southeastern Ka‘ū coast. Hilo offered overnight accommodations, carriages, rental horses, and the requirements for making arrangements at the halfway house and the volcano. Keauhou, on the other hand, offered a shorter but more rugged trip; although the upper 10 miles traversed open forest, the lower four miles zigzagged across the steep lava landscape of coastal Keauhou (Thrum 1886:72). In 1885, a new commercial landing was inaugurated for tourist traffic by the Wilder Steamship Company, which held the lease on Volcano House and also owned the inter-island steamers (Thrum 1886:72). Thrum (1886:73) notes that the cost of a round trip from Honolulu to the volcano was $50, “including steamer fare, charge for horses and conveyance, and for hotel and guide charges at the volcano.”

Transportation to the crater transformed from early foot trails to horse trails, and later to carriage roads. Substantially improved roads were built from Hilo and Punalu‘u to Volcano at the turn-of-the-century. A railroad to Glenwood (mid-way from Hilo) was completed in the early years of the new century.

Pulu

At mid-century, a new industry developed in this mountain region. Like sandalwood harvesting, it involved the collection of a natural resource; this time, it was pulu, which is the soft, downy material that grows around the fronds and fiddleheads of the hāpu‘u fern (tree fern, *Cibotium glaucum*). The first commercial sale of pulu was made in 1847, when a businessman who had acquired some pulu as payment on a debt sent it to San Francisco, where it was found to make an excellent stuffing for pillows and mattresses (Glidden 1998). Pulu became a highly marketable commodity, with demand for the product coming from as far away as Paris. By 1862, over 788,000 pounds of pulu were exported from Hawai‘i. However, by 1884, interest in pulu declined and the industry died.

In 1851, two processing centers for pulu were developed in the Kīlauea region by Judge George Anson Byron Kaina of Hilo: one at Nāpau to the southeast of the crater and the other just north of the present Kilauea Military Camp (KMC) in the vicinity of the Keauhou Ranch headquarters (Olson 1941a).

Families from Kaʻū and Puna were hired to collect the pulu as well as to work at the processing centers, where the pulu was dried and compacted into 100 pound bales for shipment through Keauhou to Honolulu. Pulu collection was a labor intensive operation, which Glidden (1998) describes:

> The actual harvesting of pulu was usually completed by first cutting the stalk of the hapuʻu with a stone tool thus exposing the fronds and fiddleheads. The pulu was then removed with a bone scraper and placed in burlap bags (Hilo Tribune-Herald: July 10, 1932). It probably took a while to fill one bag as each tree fern supplied a mere 5 ounces. This is a trivial amount considering the 30 pounds required to fill just one mattress.

In his description of the volcano area, Brigham (1908, quoted in Olson 1941a:45) notes that pulu pickers had houses of pili grass "scattered here and there through the region." A cluster of house remains identified by Hudson (1932) lies near the intersection of several trails in upland Pānau; informants told Hudson of similar platforms, much overgrown, in the area between this cluster and Nāpau Crater. Brumaghim (in Emory, Cox et al. 1959:110) suggests that these are the remains of shelters for pulu pickers.

Although the pulu trade was associated primarily with Puna and eastern Kaʻū (centered at Nāpau), historical records suggest that the forests of western Kaʻū and south Kona were also sources for this commercial resource. Following the Māhele, the Hawaiian Government began offering grants of government lands to raise money. In 1861, Charles C. Harris purchased 184,298 acres at Kahuku as Grant 2791. Although his intentions for the purchase are not clear, Harris was a key player in the pulu trade on Hawaiʻi, and it is probable that he saw the forests of Kahuku as a rich source for this commodity.

In an account of the 1868 lava flow, Ann Brown Spencer describes her brother-in-law, Nelson C. Haley, as being involved with a "Pulu Station" somewhere in or near Kiolakaʻa, east of Kahuku (Spencer and Rodman 1987, brackets added; see also www.captainbrown.net):

> I went over to Charlotte's and was with her. I found Nelson had just got home from the Pulu Station. When we ran out of Charlotte's house, books, vases, dishes, etc. were falling all about. Charlie [Ann Spencer's husband] was standing on our front verandah; the shock came and he saw our cemented walk and front wall rise and fall in waves. They were full of cracks and seams. Houses were moved off their foundations several feet. Charlotte's was, but I forget the exact number. The Pulu House which was a two-story building 30-by-30 feet was moved westerly 6 feet.

In Boundary Commission testimony for Kahuku ahupuaʻa in 1873, numerous witnesses mention participation in pulu collecting or describe hāpuʻu as a locational marker. For example, witness Nauka recalls a place "called Peahi on Kahuku in the center of the pahoehoe mauka of the koa forest. The hapu is very large there." Witness LE. Swain testified that he lived at Kahuku "over three years catching wild goats and picking pulu;" Swain also said that he picked pulu at Papa and Honomalino in Kona in 1869 and 1870. Witness W.J. Martin stated that he "leased the pulu privilege on Kaalaiki [one of the central Kaʻū *ahupuaʻa*] from the Government Land Agent Kauhane."

The effect of the pulu trade on commoners is described by the missionary W.C. Shipman (1860) of the Waiohinu Mission Station; he reported in 1860 that:

> The greater part of our people are now engaged gathering pulu. The effect on them is not good; not that the pulu is not a source from which might secure comfort for themselves and families, but the actual result is the reverse. They are offered goods to almost any

> amount, to be paid for in pulu, this to a native is a strong temptation to go into debt. Consequently many of them are deeply in debt & almost all to some extent. The policy of the traders is to get them in debt…. once in this condition they are almost entirely under the controll [sic] of their creditors; and are compelled to live in the pulu regions, at the peril of losing their houses and lots, and whatever other property they may possess.

THE MODERN ERA: THE 20TH CENTURY

Enhanced by near-continuous eruptive activity and by creation of the national park, tourism was a mainstay of the Kīlauea economy in the 20th century and a shaper of the landscape. In addition, activities by scientists, the Civilian Conservation Corps (CCC), and by the US military also left their marks on the landscape. Ranching continued at Kapāpala, Kahuku, and Keauhou; a new ranch called Ainahou Ranch emerged on a portion of Keauhou Ranch lands.

TOURISM

Tourism was (and continues to be) the major activity at Kīlauea Crater, one of the most active volcanoes in the world. The two-story Volcano House was built in 1891 and enlarged in 1921. On February 11, 1940, it burned to the ground, only to return in the form of a completely new Volcano House in November 1941. The northeast rim of the crater was the hub of a network of roads and trails, water tanks, steam baths, and all the accoutrements of visitor amenities.

SCIENTIFIC RESEARCH

The 20th century saw the development of a true volcanology research effort, spearheaded by Thomas A. Jaggar, a geologist from the Massachusetts Institute of Technology (MIT). In 1909, Jaggar proposed a multi-purposed volcano observatory program at Kīlauea that would provide for and support: [1] research buildings at the crater's edge, [2] a local museum, [3] a facility for advanced students for special work, [4] a network of stations to study tides, soundings, earthquakes, and coastal movements, [5] expeditions to other volcanic and earthquake belts for comparative studies, [6] research in gravity, magnetism, and latitude variations, and [7] geological surveys. The main objective of this program was the prediction of earthquakes and the development of methods to protect "life and property on the basis of sound scientific achievement" (Jaggar 1917, quoted in Apple 2005).

By 1912, Jaggar, with the aid of Honolulu businessman Lorrin Thurston and support from William Brigham, head of the B.P. Bishop Museum, had raised sufficient funds to build the first facility for studying volcanic activity. Located on the north rim of Kīlauea Crater, the building for what became known as the Hawaiian Volcano Observatory (HVO), housed a seismograph vault that was used until the 1940s.

Jaggar was instrumental in the development of a trail to the summit of Mauna Loa, which he was equally interested in studying. Until 1915, the main access to Mokuʻāweoweo on Mauna Loa was the ʻĀinapō Trail, an arduous route to the summit. With the assistance of the US Army, Jaggar had a trail constructed from Kīlauea to the Mauna Loa summit along the northeast flank of the mountain (Site 05504). With the trail completed, horses and mules could go as far as Puʻu ʻUlaʻula (Red Hill), where a 10-man cabin and 12-horse stable had been built. The remaining 10-mile trail to the summit was pedestrian only.

Jaggar's initial research facility, except for the seismograph vault (Site 05506), was razed in 1940. The HVO occupied buildings on the north rim (shared with the NPS staff) until 1948, when it moved to its present location at Uwēkahuna; a new building was constructed at this location in 1985. As Apple (2005) writes: "At the time of the move in 1948, it was pointed out by volcanologist R.H. Finch, then the Director of HVO, that Uwekahuna had been the first site selected by Jaggar for the Observatory in 1912 but was given up on account of the scarcity of water and its relative inaccessibility at the time."

Initial support for the volcano research program came from MIT and the University of Hawai'i, with considerable support from the privately funded Hawaiian Volcano Research Association. The HVO was later successively sponsored by the US Weather Bureau, the US Geological Survey (USGS), and the National Park Service. Since 1947, the HVO has been sponsored by the USGS.

THE CIVILIAN CONSERVATION CORPS

The Civilian Conservation Corps (CCC) was a Depression-era federal program to provide employment for young men (Roper 2005:1). Between 1933 and 1942, the CCC deployed men to many National Parks across the country to carry out projects such as road and building construction, erosion control, masonry, fire-fighting, trail maintenance, and vegetation and insect control.

In 1934, the CCC began work in HAVO. The men were first housed in a camp located south of the Volcano House but in 1938, a new camp was set up on a site north of Kīlauea Iki and southeast of Volcano House (Roper 2005:21); this is the present Resource Management complex. The new facilities included a recreation hall, barracks buildings, a bath and laundry house, a mess hall, a dormitory, latrines, a garage, and water tanks.

Highlights of CCC work in HAVO include the Park Employee Housing Area, the Visitor's Center interpretive structures, overlook stations, and comfort stations, road and trail improvements, goat eradication, botanical restoration of Kīpuka Puaulu (the present Bird Park area), and construction of a 26-mile long telephone line from Kīlauea to the summit of Mauna Loa (Roper 2005:23). An early project (between 1935 and 1936) was construction of the Mauna Loa "truck trail" to provide improved access for scientists from Bird Park to a seismograph at the 6,650 ft elevation (Dougherty 2004:45). In 1938, the CCC carried out landscape improvements in Kilauea Military Camp, building the four stone entrance portals at the front of the camp, as well as adding native plants to the camp landscape and constructing the lava rock curbed road between the highway (now Crater Rim Drive) and the camp theater (Tomonari-Tuggle and Slocumb 2000:III-45). In 1940, the CCC built erosion control features near Hilina Pali (which included quarrying of rocks to use in the construction of walls and dams) (Roper 2005).

MILITARY PRESENCE

Military interest in the Kīlauea summit area began in 1911, when the US Army and Navy began to send troops on combination recreation/training exercises to the crater area. Army troop visits to the crater continued over the following years, with troops coming by train or marching the entire 32 miles from Hilo. Camps were often set up in the vicinity of the Volcano House.

Kilauea Military Camp

Kilauea Military Camp (KMC) sits on almost 50 acres at the north rim of Kīlauea Crater. In late 1916, a formal 20-year lease was established between the land owner Bishop Estate and a Board of

Trustees consisting of military personnel and private citizens for the use of the property now called Kilauea Military Camp. The camp was to be used by the National Guard for training and by the Army and Navy for recreation, and was to be available to civilians for meetings or conventions when not in use by the military. For a brief period into early 1917, a continuous stream of soldiers came to the camp, but this activity was cut short when the United States declared war on Germany on April 6, 1917, at which time the camp was closed. In 1921, the camp reopened under the authority of the US Army (Photo 7).

Since 1921, KMC has had a continual role in meeting the recreation needs of the active and retired Armed Forces. During World War II, it served as the Command Post for the Army's Hawaii District; very early in the war, it was used to house Japanese-American detainees (who were subsequently sent to internment camps on the mainland US), and late in the war, it was the site of a prisoner-of-war camp. During the Vietnam Conflict, structures at KMC were used as laboratories in research on chemical and biological warfare methods.

Since 1917, the park and the military have co-existed. In the early years, the conflict between the military mission and the park's environmental ethic was a problem. Until the 1940s, the military also pushed to gain complete control of the camp property, but were countered at every attempt by the National Park Service which wanted no military presence at all.

Photo 7. Kilauea Military Camp in 1923.

Landing Fields

In 1924, a landing field was constructed on volcanic sand at the area called Spit Horst located just south of Halemaʻumaʻu crater (Site 23403). But shortly after completion, in May 1924, an explosive eruption of Halemaʻumaʻu bombarded the field with boulders, rendering it useless for landings. A news article in March 1925 reported that a new field was under construction on the bluff between Uwēkahuna and KMC (Hilo Tribune-Herald 1925). The new field was named Boles Field after the park superintendent, Thomas Boles. Although originally anticipated to be in a much more desirable location than the original Spit Horst field, it was almost immediately found to be dangerously short, and was evaluated in a report on landing fields on the island of Hawaiʻi (Hawaiian Department 1925):

> I 'shot' the field and found the wind currents so treacherous and uncertain that it was next to impossible to land short without a good chance of being dashed to the ground prematurely. Personally, I would rather trust my parachute than use this field.

The location of this second field has been variously identified as "outside Kilauea Crater about one half mile NorthEast of Uwekahuna toward KMC, close to the belt road" (Jackson 1972:87) and "west of the great Kilauea Crater" (Hilo Tribune-Herald 1925). Its exact location is not known. In spite of the negative evaluation, the field was used over the following 15 years "for various searches and for volcano watching atop Mauna Loa" (Jackson 1972:87).

World War II

Following the attack on Pearl Harbor and other Oʻahu bases on December 7, 1941, President Franklin Roosevelt declared war on Japan, and martial law was instituted. Preparations for the defense of the island against invaders were immediately begun and all recreational activities at KMC were canceled. Machine gun positions guarded the approaches to KMC and all roads and public utilities were guarded by armed volunteers from the park and Volcano region. Trucks and heavy equipment were placed on the old landing field near Halemaʻumaʻu crater, Boles Field, and on the Volcano Golf Course. KMC was converted into an internment camp for local Japanese men who were arrested shortly after December 7; guard towers were erected, observation posts were established, and roadblocks were manned.

In March 1942, Major General Ralph Pennell assumed command of the Army's District of Hawaii and established his headquarters, under martial law (now the present park headquarters). The adjacent building (now the Volcano Art Center) and associated structures were rented from the Volcano Hotel for use as quarters for officers and staff of the Hawaii District command. Crater Billets near the end of Chain of Craters Road was the only specially built Army camp in the park (Warshauer 1998:ch.15). By October, the headquarters was moved to Hilo, and the park buildings returned to their owners.

In 1940, the Army Air Corps anticipated training needs for war preparation and requested the transfer of a 6,540 acre parcel of Hawaii National Park in the Kaʻū Desert from the Department of the Interior to the US Army to provide a demolition bombing range for the Hawaiian Air Force based on Oʻahu. After much contention over the obvious conflict with park values, the military prevailed and on July 17, a 3,052 acre area was withdrawn from the National Park by President Roosevelt for the Na Puu o Na Elemakule Bombing Range; this area included a number of park roads and trails and the scenic Hilina Pali cliffs (Jackson 1972:90) (Photo 8).

Photo 8. 1938 Army Air Corps photograph of the Kau Desert Bombing Range, showing Hilina Pali on the left.

Following the Battle of Midway, troops in Hawai‘i began to prepare for offense rather than defense. From the very beginning of the war, troops in the Volcano area had been using the National Park for “motorized and infantry maneuvers and firing practice without reference to the Park administration” (Jackson 1972:94). Although they were instructed to avoid causing any serious damage, the fact of martial law gave the military great leeway in its activities. This led to the informal establishment of what became locally known as the Kau Desert Impact and Training Area, where park officials hoped to confine tank and destroyer units to minimize damage. Jackson (1972:94) adds that “the assignment of a range officer at KMC to control Army activity helped, but the roads were still deteriorating badly, minimum restoration costs of damaged areas was already over $50,000 and some sections could never be restored.” The original airfield near Halema‘uma‘u was re-leveled for small spotter aircraft used at the Kau Desert training area.

Martial law in the Territory of Hawai‘i was lifted in October 24, 1944. In January 1945, the Army ceased using the Ka‘ū Desert for training, but the original Army Air Corps bombing range at the Na Puu O Na Elemakule Bombing Range was still being used for bombing practice by Navy pilots from the Hilo Naval Air Station.

In 1944, a prisoner-of-war camp was built on the west side of KMC. In August of that year, 50 Korean POWs arrived, to be used for maintenance and upkeep of the camp. By June of the following year, the number of POWs had doubled; some sources state that they were Korean and Okinawan, while the local newspaper states that only Okinawan prisoners were held on the island of Hawai‘i (Hilo Tribune-Herald 1945). The prisoners were reportedly permitted to work without guards. Approximately 80 to 140 prisoners-of-war still remained at the camp after the war ended, and were used as labor for maintenance and landscaping projects.

During World War II, the US Army took control of lower Kahuku, creating the Pakini Bombing Range. It also used the ranch houses (at the 2,284 ft elevation) for a radar station (Kahuku Ranch Radar Station and Base Camp).

In June 1949, a bomb disposal squad from the Hawaiian Ordnance Depot on O‘ahu began clearing artillery shells, concentrating on the Ka‘ū Desert area. The Na Puu o Na Elemakule Bombing Range was returned to the Park on July 6, 1950 (Tomonari-Tuggle and Slocumb 2000:II-52).

RANCHING CONTINUES

Ranching on the lands of HAVO continued into the 20th century. In 1929, a survey of livestock operations in Hawai‘i listed Kapapala, Keauhou, and Kahuku Ranches (Henke 1929). In 1937, the Ainahou Ranch was started on a portion of Keauhou lands.

Kapapala Ranch

Kapapala Ranch was started in 1860. Through most of the 20th century, the ranch was a subsidiary of Hawaiian Agricultural Company, owners of the sugar plantation at Pāhala; it provided meat and milk for plantation employees, as well as for the commercial market. In 1977, the ranch was bought by J. Gordon Cran as a family operation on 30,000 acres. It is interesting that, in a 2002 interview, Cran stated that rounding up wild cattle was a main focus of the first years of his operations (Zimmerman 2002).

Keauhou Ranch

Started in 1900 by Oliver Shipman, Keauhou Ranch operated under lease from the Bishop Estate. It was managed by W.H. Shipman from about 1913 to 1923 when it was purchased by Arthur M. Brown, a lawyer based in Honolulu (Henke 1929:31). Brown’s son, Arthur M. Brown, Jr., managed the ranch (Nellist 1925:305). In 1937, W.H. Shipman Ltd. acquired the lease on the ranch and purchased the Brown family’s holdings of cattle and improvements.

A 1929 report on livestock in Hawai‘i reported that the ranch provided saddle horses for visitors staying at Volcano House and Kilauea Military Camp, and that three-fourths of the 225 cattle marketed each year were slaughtered for the hotel and the military camp (Henke 1929:31).

An interesting note in Henke (1929:31) is that “no cattle have been kept on the lower land for some years, efforts having been made to first eliminate the goats.”

Kahuku Ranch

Kahuku Ranch had its origins in the late 1800s and had gone through a succession of owners when it was acquired by the Waimea-based Parker Ranch in 1912. Parker Ranch control of Kahuku lasted through World War II. By 1947, however, faced with difficulties in finding adequate management and the long distance from the ranch's main headquarters at the north end of the island, Parker Ranch sold Kahuku to James Wilson Glover, who owned the ranch from 1947 to 1958. Glover continued to utilize the lower section of the ranch but also started a logging operation to harvest koa and ohia; he constructed a lumber mill and developed logging roads into the uplands.

In 1958, James Glover sold Kahuku Ranch to the Samuel Mills Damon Estate for $1.3 million (Quiseng 2006). Freddie Rice managed the ranch for the Damon Estate from 1958 to 1972. There were 2,500 head of cattle, as well as introduced mouflon sheep, turkeys, pheasants, and francolins; feral cattle, probable descendants of original stock brought by George Vancouver in 1793, still roamed the upland swamp lands (Medeiros 2003). During Rice's tenure as manager, forested areas were cleared to develop pasture; Medeiros (2003) recalls that "Kahuku never had too much open land then was lot of trees and so we went… me and one other guy. We practically cleaned out that whole ranch. Bulldozer every day. … [vegetation was] regular ohia and hapuu… thick the ohia. So we go inside with the D-9, go open 'em out."

In 2003, a large portion of Kahuku Ranch was acquired by the National Park Service.

Ainahou Ranch

Ainahou Ranch was a 6,324 acre parcel within Keauhou Ranch. It was acquired by W.H. Shipman, Ltd. in 1937. Herbert C. Shipman, son of W.H. Shipman, built the Ainahou Ranch House (Site 19249) in 1941. Ainahou Ranch was used to raise cattle and supply beef to the military during World War II. After the war, the ranch supplied a commercial market in Hilo stores.

TRANSPORTATION CHANGES

The 20th century saw changes to the nature of transportation to and around the mountain summits. Increasing numbers of tourists required improved roads from Hilo and Ka'ū. Advanced scientific research, primarily represented by the Hawaiian Volcano Observatory, demanded easier and more direct access to points of research interest.

Major Roads

At the turn-of-the-century, work was underway to improve road conditions to Kīlauea from both Hilo and Ka'ū. As early as 1889, the Hawaiian Government's Minister of Interior was inquiring of the sheriff of Hawai'i about the "propriety of using prison labor on the Volcano Road" (Thurston 1889):

> Please let me know how many prisoners you will be able to put to work, and how many more you will probably be able to put on by drawing from the rest of Hawaii. I desire if it is possible, to get the Volcano Road through this period, and if prisoners can be employed on it without undue chances of escape, that available should work there on.

By 1894, the road from Hilo to the volcano was completed. Bishop (1895:68) writes that the trip to Kīlauea could be done in 6-1/2 hours going up and 5-1/2 hours coming down, "including stops, all except a long rest each way at the 'Mountain View House, at Olaa,'" a sharp contrast to the day-and-a-half trip from earlier times. He adds (Bishop 1895:69):

> The road is an excellent one, highly finished, even grade and built to wear. Above the fifteenth mile it runs in long straight lines. There are occasional deep cuttings, disclosing a general depth of rich soil of three or four feet over the tract. ... The old trail to the volcano, a mile or more to the right, lay over a more recent outflow of pahoehoe lava from Kilauea.

A camp was set up in what is now the NPS Namakani Paio campground to house territorial prisoners who were contracted to the county for road construction. In 1910, prisoners were working on the "Halemaumau Road" (Shipman 1910) and the County Board of Supervisors passed a resolution to request that they be used to construct four miles of road on the Kaʻū side of the volcano. The territorial governor, however, was protesting this use of the prisoners since they had already been on Hawaiʻi for three years and were needed on the other islands (Frear 1910). Presumably the prisoners stayed on since in 1912, prisoners helped clear and construct the original Hawaiian Volcano Observatory located adjacent to the Volcano House (Westervelt 1991:204).

Scientific Access

The Mauna Loa Trail was the result of Hawaiian Volcano Observatory efforts to develop a direct route to Mokuʻāweoweo at the summit of Mauna Loa (Dougherty 2004:58). This route would be an alternative to the historic ʻĀinapō Trail that held the potential for restricted access since it crossed private ranch land (Kapapala Ranch). The new trail route was constructed in 1915 by the African-American enlisted soldiers of the segregated Company E, 25th Infantry Division. In the 1930s, the CCC widened and improved a section called the Mauna Loa truck trail. Improvements continued over subsequent years; eventually, the lower section below 6,850 ft asl was paved.

IV. INVENTORY OF ARCHEOLOGICAL RESOURCES AND THE ARCHEOLOGICAL LANDSCAPE

This section discusses the state of archeological research in HAVO and summarizes the known site inventory in the context of the landscapes described in the Chapter III.

ARCHEOLOGICAL RESEARCH IN HAVO

As in most areas of Hawai‘i, archeological research in HAVO has its origin with the island-wide surveys of the Bishop Museum in the early years of the 20th century. John Stokes (1991) carried out survey of the island in 1906 with a focus on locating temples; Hudson’s (1932) survey of east Hawai‘i had a broader orientation. The establishment of the park in 1921 also generated avocational studies (e.g., Jagger 1921) and collateral reports by park staff (e.g., Brumaghim 1933; Fagerlund 1947).

Reports by backcountry rangers noted archeological ruins and relict cultivated plants[55]. Hamilton and Bright (1963) include a map and photographs of Nā‘ulu Village (in inland Pānau Nui) in their backcountry report (Fig. 23); captions note the presence of breadfruit and coconut trees and that “orange trees formerly known from this site are now dead.” Olson (1941b) has a photograph of the village, the caption for which reads: “The rock structure in the foreground of the lower picture, until a few years ago, housed a hermit who lived at this place;” he also has photographs of orange trees in the village. Davis (1947) documents wildlife observations in the area around Nā‘ulu. Field (1953), Hamilton (1963), and Hamilton et al. (1963) report conditions at Kūē‘ē and Kealakomo Waena; in regard to the latter, Hamilton (1963) reports that “here grows the only known keawe tree in the park outside Keauhou Landing.” Fagerlund (1946) and Davis and Hauanio (1947) record ranger visits to outlying areas of the park.

In 1959, plans for the extension of the park to include the Kalapana coastal area were the impetus for a program of natural and cultural research, the primary results of which are reported in Emory, Cox et al. (1959) and Smart et al. (1965). In-house park projects at Waha‘ula Heiau, Moa Heiau, and at the proposed Kamoamoa Campground produced a series of Ruins Stabilization Reports (Ladd 1962c, 1964, 1967, 1968) that were oriented toward public interpretation of the heiau; salvage work in anticipation of campground development was also carried out (Ladd 1962a, 1962b, 1965, 1969, 1972a, 1972b).

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[55] Reports of backcountry trips are housed in a locked case (719.329969 B126) in the HAVO Library. There are numerous photographs accompanying these reports (see, for example, Photo 24).

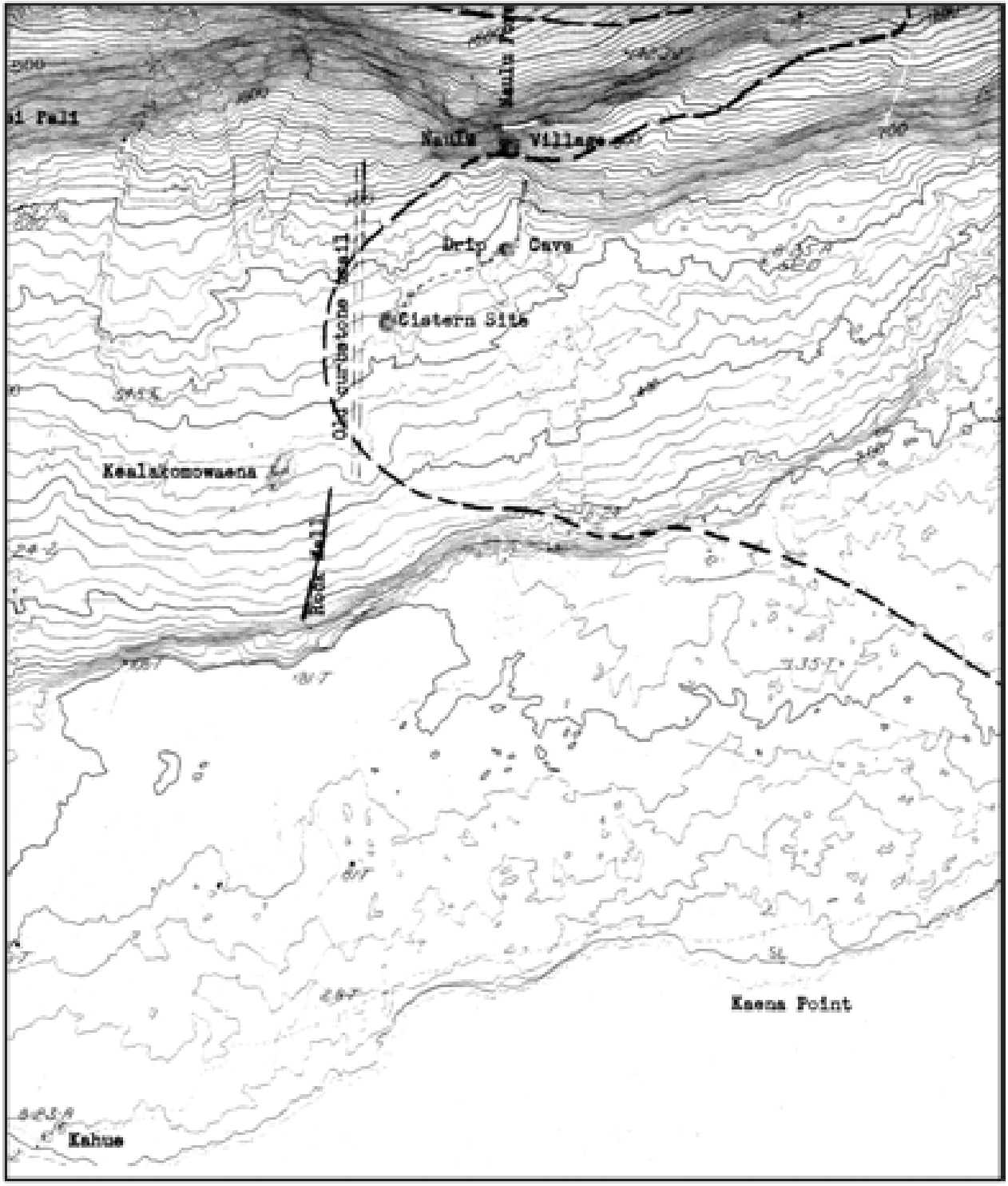

Figure 23. Map from backcountry ranger report on visit to Nāʻulu Village (from Hamilton and Bright 1963).

Similar park projects were carried out in the 1970s and 1980s, with a continuing focus on areas in the Kalapana Extension. A major effort of this period was true salvage work due to devastating lava flows from the Mauna Ulu, Puʻu ʻŌʻō, and Kupaianaha vents. Work carried out between 1974 and 1986 is reported in Ladefoged et al. (1987); intensive survey and excavation conducted between 1987 and 1989 is documented in Carter and Somers (1990). The latter set of work focused in the areas around Wahaʻula Heiau, Kaʻiliʻili Village, and Poupou-Kauka Village, which were threatened by the flows. Carter and Somers (1990:32) note that by 1990, almost all of the areas included in their report had been covered or surrounded by lava. A 1993 survey looked at areas inland of Kamoamoa Village (Kirkendall 1993a, 1993b).

Since 1990, archeological work in the park has combined cultural resource management needs with a research orientation. Geographically, it has encompassed areas of the park that had seen no previous work, primarily inland and high mountain regions. Although investigations continue in the coastal areas, more of the inland areas have been studied, including historic period resources such as Wilkes campsite (Rivoli 1999), the mid-19th century pulu processing area at Nāpau (Glidden 1998), and erosion control features related to 1930s Civilian Conservation Corps activities (Roper 2005). The recent acquisition of the Kahuku area was followed by reconnaissance and inventory surveys to begin understanding the archeological resources of the new management unit (Dougherty 2004; Quiseng 2006).

A major effort beginning in 1996 was the emergency survey and excavation of sites in areas that were threatened by lava inundation in Pānau Nui, Pānau Iki, and Laeʻapuki ahupuaʻa (Glidden et al. 1998; Moniz Nakamura 2002b, 2003b; Maxey and Schuster 2003; Dougherty et al. 2004a; Glidden 2006). Much of this work was carried out in the area above Hōlei and Paliuli Pali, providing a detailed look at this inland area. Survey in Pānau Iki, primarily by transects, provide sample coverage of almost the entire ahupuaʻa (Moniz Nakamura 2002b, 2003b; Dougherty et al. 2004b).

Section 106 compliance surveys (i.e., archeological review of park projects for NHPA Section 106 compliance) have also contributed to survey coverage of the park. These data are incorporated into the Cultural Resources GIS database; surveys predating the GIS database are filed in hard-copy in the CRD office. In compliance surveys, only those sites that are evaluated to be significant are assigned site numbers. Because of the high degree of development in the main Headquarters/Visitor Center area, a major systematic survey "to preempt the onslaught of archeological compliance surveys by taking a proactive approach" was carried out in 1994 (Scheffler and Keswick 1994); over 20 project-specific surveys had been conducted in the 37 acre area between 1978 and 1994.

The history of archeological survey is presented in Table 11, and the areas of survey are shown in Figures 24 and 25. Compliance surveys that identified archeological remains are presented in Table 12. Surveys have varied greatly in intensity, details of site recording, and definition of "site" (a problem discussed at length below). However, the coverage has been such that samples of most of the regions of HAVO, with the exception of areas of the Kahuku Management Unit, have been obtained and a general understanding of occupational patterns has been developoed.

THE ARCHEOLOGICAL SITE INVENTORY AND SITE RECORDING

Appendix A is a listing of all of the identified sites within HAVO boundaries. Site locations are shown in Figure 26, and generalized site function shown in Figures 18 and 19 (see above). Although the detail of recording is highly variable (from intensive to cursory to simply noting site presence), all sites are included in this listing in an attempt to provide a complete compilation of the known site inventory.

Table 11. Archeological Surveys for HAVO, Ordered by Date of Report Publication (see also Appendix D, Table 3).

Map Key*	Report Date	Report Author	Report Title	Status **	Location	Description	RC ^	Repository
x06-S	1906	Stokes	Heiau of the Island of Hawaii	ms	island	survey focused on locating temples; published as Stokes 1991	—	Bishop Museum
32-H	1932	Hudson	Survey of Hawaii	ms	east Hawai‘i	survey of east Hawai‘i	—	Bishop Museum
—	1933	Brumaghim	Report of Heiau Sites, District of Puna	ms	Puna	dated March 29	—	HAVO Library
—	1947	Fagerlund	Petroglyphs in Hawaii National Park	ms	HAVO		—	HAVO CRD
—	1959	Cox and Bonk	A Preliminary Archeological Report of South Puna, Hawaii	ms	Puna		—	HAVO CRD
—	1959	Emory, Cox et al.	Natural and Cultural History Report on the Kalapana Extension of the Hawaii National Park. Volume I. Cultural History Report	final	Kalapana Extension	research on traditions, history, archaeology of area proposed for extension of Chain of Craters road to Kalapana	—	HAVO CRD HAVO Library UH-Hilo
—	1961	Emory	Field trip September 12 to 17, 1961	ms	‘Āpua Keauhou	field trip to collect wooden images from house compound about 1 mile from shore in Keauhou; also stopped at petroglyph cave in ‘Āpua	—	Bishop Museum HAVO Library
—	1962	Ladd	Archeological Survey and Test, Kamoamoa Campgrounds—Hawaii Volcanoes National Park.	ms	Kamoamoa campgrounds	survey of campground, road, and turn-outs, excavation of two mounds	—	HAVO CRD HAVO Archives
—	1962	Ladd	Kalapana Salvage: Preliminary Report to the Superintendent	ms	Kalapana Extension			HAVO CRD
—	1962	Ladd	Ruins Stabilization (Completion Record), Moa Heiau, Kamoamoa Campgrounds, Puna	ms	Kamoamoa campgrounds	description of Moa Heiau and stabilization work carried out	—	HAVO CRD HAVO Archives
—	[1964]	Ladd	Salvage Report. Grave Site 5-A, Kamoamoa Campground	ms	Kamoamoa campground	salvage of one of three grave sites at campsite 5-A	—	HAVO CRD HAVO Archives
—	1965	Ladd	Chain of Craters Road, Hawaii Volcanoes National Park, Puna: Salvage Report	ms	Kalapana Extension	summarizes 3 years of salvage and stabilization work btwn Kamoamoa and Waha‘ula	—	HAVO CRD HAVO Archives
—	1965	Smart	The Archeological Resources of Hawaii Volcanoes National Park. Part I. Volume I. An Archaeological Survey of Parts of Hawaii Volcanoes National Park.	ms	coastal east HAVO	expand on 1959 survey of Kalapana Extension and coastal east HAVO; fieldwork in 1964	yes	HAVO CRD HAVO Library UH-Hilo UH-Manoa
—	1965	Emory, Soehren et al.	The Archaeological Resources of Hawaii Volcanoes National Park. Volume II. Additional Sites, Test Excavations, and Petroglyphs	final	Kalapana Extension	additional survey, excavation in 1964; petroglyph survey by W. Bonk	—	HAVO CRD HAVO Library UH-Hilo

Table 11. Archeological Surveys for HAVO, Ordered by Date of Report Publication (continued).

Map Key*	Report Date	Report Author	Report Title	Status **	Location	Description	RC ^	Repository
—	1967	Ladd	Waha‘ula Heiau, Pre-Stabilization Report	ms	Waha‘ula	pre-stabilization description of heiau	—	HAVO CRD HAVO Archives
—	1968	Ladd	Waha‘ula Heiau, Stabilization Report	ms	Waha‘ula	Job Corps project in 1967; includes topo map of heiau, associated structures	—	HAVO CRD HAVO Archives
—	1969	Emory	Inventory of Archeological and Historical Sites in the Districts of Kona and Ka-u and in Anaehoomalu, South Kohala, Island of Hawaii	final	Ka‘ū	overview of sites in Kona, Ka‘ū, and at Anaeho‘omalu, Kohala	—	UH-Manoa UH-Hilo
—	1969	Ladd	Chain of Craters Road, Hawaii Volcanoes National Park, Puna: Salvage Report	APAS 3	Kalapana Extension	see Ladd 1965	—	HAVO CRD HAVO Archives
—	1972	Ladd	Test Excavations at Waha‘ula: Structure C, Hawaii Volcanoes National Park, Hawaii	ms	Waha‘ula	detailed mapping, excavation to establish chronology of construction	—	HAVO CRD HAVO Archives
—	1973	Ladd	Nomination to the National Register of Historic Sites for Puna-Ka‘ū Historic District	ms	HAVO	nomination form	—	HAVO CRD
—	1974	Cox	Fieldwork Report on Mapping of Pu‘uloa Petroglyph Field, Puna Site Ha-HV-225	ms	Pu‘uloa Petroglyph Field			Bishop Museum HAVO Archives (Shelf M6)
—	1974	unknown (probably E.J. Ladd)	Walk-Through Archeological Survey: Kalapana Extension, Hawaii Volcanoes National Park, Hawaii (portion)	ms	Kamoamoa ahupua‘a	from Chain of Craters Road to 200-400 ft elevation; inland of Kamoamoa Village along ahupua‘a boundary; carried out in Jan-Feb 1974; 156 sites	—	HAVO CRD HAVO Archives
—	1980	Cleghorn	The Hilina Pali Petroglyph Cave, Hawaii Island: A Report on Preliminary Archeological Investigations	ms		see also Cleghorn and Cox 1976 —	—	UH-Hilo HAVO CRD HAVO Library
—	1986	Somers	Preliminary Report: Kamoamoa Picnic Ground, Burial 86-1, Hawaii Volcanoes National Park	ms	Kamoamoa picnic ground	emergency recovery of burial exposed by Hurrican Estelle in 1986	—	HAVO CRD HAVO Archives
—	1987	Ladefoged	Settlement Pattern Analysis and Relational Databases: An Archeological Study in Hawai‘i Volcanoes National Park	MA thesis	Kalapana Extension	see Ladefoged et al. 1987	—	UH-Manoa
—	1987	Somers	Preliminary Report: Kamoamoa Picnic Ground, Burial 87-1, Hawaii Volcanoes National Park	ms	Kamoamoa picnic ground	emergency recovery of burial exposed by Hurricane Estelle in 1986	—	HAVO CRD HAVO Archives

Table 11. Archeological Surveys for HAVO, Ordered by Date of Report Publication (continued).

Map Key*	Report Date	Report Author	Report Title	Status **	Location	Description	RC ^	Repository
87-L	1987	Ladefoged et al.	A Settlement Pattern Analysis of a Portion of Hawaii Volcanoes National Park. Archeology at Hawaii Volcanoes National Park	PIA 44 (WAC C)	Kalapana Extension	continue 1974 survey (author is unknown but probably Ed Ladd); record damage from 1985 flow; 1,154 acres	—	HAVO CRD HAVO Library
—	1987	unknown	Report of Archeological Field Investigations, Hawaii Volcanoes National Park	ms	Kīlauea Summit	summary of B. Withrow work at Keanakāko‘i Crater and Big ‘Ōhi‘a Cave (Site 23006)	—	HAVO CRD
—	1988	McCoy	Field records, map of Wilkes campsite	ms		field visit to Wilkes campsite	—	HAVO CRD
—	1990	Carter and Somers	Here Today Lava Tomorrow: Archeological Work in Hawaii Volcanoes National Park, 1987 to 1989	final	Kalapana Extension	salvage survey and excavations in area threatened by lava, including Waha‘ula	—	HAVO CRD HAVO Library
—	1991	Martin	Native Hawaiian Water Collection Systems in Lava Tubes (Caves) and Fault Cracks – Puna-Ka‘ū District, Hawai‘i	ms			—	HAVO Library
93-K	1993a	Kirkendall	Kamoamoa Ahupua‘a: An Archeological and Historical Picture	ms	Kamoamoa	seven transects btwn Wahaula and Kamoamoa flows, above Paliuli and below Hōlei Pali	—	HAVO CRD
93-K	1993b	Kirkendall	Archeological Inventory Survey Kamoamoa Ahupua‘a	ms	Kamoamoa	seven transects btwn Wahaula and Kamoamoa flows, above Paliuli and below Hōlei Pali	—	HAVO CRD
—	1993	Lee	The Petroglyphs of Pu‘uloa (HV-225), Hawai‘i Volcanoes National Park	ms	Pu‘uloa petroglyphs	Site 23271	—	HAVO Library
94-S	1994	Scheffler	Kamoalii Reconaissance Survey	ms	Ka‘ala‘ala Makai	reconnaissance transects; Kamoali‘i Heiau, petroglyphs	—	HAVO Library
—	1994	Scheffler and Keswick	Survey of Headquarters Area, Hawaii Volcanoes National Park, Hawaii	ms	HQ Area	systematic survey of HQ Area in anticipation of need for compliance surveys	—	HAVO CRD
—	1995	Heilen and Camara	Emergency Survey of Coastal Archeological Features Adjacent to Recent Pu‘u Ō‘ō Lava Flows in Lae‘apuki and Pānau Iki Ahupua‘a	ms	coastal Lae‘apuki, Pānau Iki			HAVO CRD
—	1995	Martin and Jackson	Archeological Data Recovery Site 50-10-52-19248, Hawaii Volcanoes National Park, Island of Hawaii, Hawaii	ms	Headquarters area	data recovery for water tank development; Site 19248	—	HAVO CRD HAVO Library
95-S	1995	Spears	Pānau Iki: Continuities of Residence Through Two Hundred Years	ms	Pānau Iki	sponsored by Hawaii Natural History Assoc.; Site 19460	—	HAVO CRD

Table 11. Archeological Surveys for HAVO, Ordered by Date of Report Publication (continued).

Map Key*	Report Date	Report Author	Report Title	Status **	Location	Description	RC ^	Repository
—	1997	Glidden	The 1995 Paliuli Emergency Archaeological Salvage Project Report, Hawai‘i Volcanoes National Park, Hawaii	ms	Pānau Iki Lae‘apuki	see Glidden 2006	yes	HAVO CRD
—	1998	Stasack and Stasack	reports on petroglyph recording	ms	multiple	see Appendix C	—	HAVO CRD
98-G	1998	Glidden, Waipa, Laqua, and Durst	Results of Phase II of the Pānau Iki Emergency Survey and Mapping Project.	ms	Pānau Nui Pānau Iki	emergency survey and excavation of sites threatened by lava inundation	—	HAVO CRD
—	1998	Glidden	Results of Field Work Conducted at the Pulu Processing Center	ms	Nāpau	emergency excavation of pulu site (Site 21215) in 1997	—	
99-R	1999	Rivoli	An Archeological Survey of the “Wilkes” Site, United States Exploring Expedition 1840-1841	ms	Mauna Loa summit	Site 05507 (Wilkes camp site)	—	HAVO CRD
—	1999	Stasack and Stasack	Reports on petroglyph recording	ms	mulitple	see Appendix C	—	HAVO CRD
see 03-MOa	1999	Wulzen	Footprints 98 Project. Archeological Survey of Site 50-10-61-5505 and Beyond. Kapāpala and Keauhou, Hawaii Volcanoes National Park	draft	Footprints Area; 4,284 acres	Site 05505, and others	—	HAVO CRD
00-G	ca. 2000	Glidden and Rivoli	untitled report on Pulu Processing Site	ms	Nāpau	emergency excavation of pulu site (Site 21215) in 1997	—	HAVO CRD
02-T	2002	Thompson and Roper	Lithic Block Quarry Survey	?			—	
02-M	2002	Moniz Nakamura	Kupukupu Emergency Blackline Fire Reconnaissance.	ms	Kupukupu Fire area	emergency reconnaissance survey	—	HAVO CRM.
02-D	2002	Durst and Moniz Nakamura	Landing Field Survey and Associated Areas Kīlauea Caldera, Hawaii Volcanoes National Park.	final	Kīlauea summit; 113 acres	20th century landing field features (Site 23403)	—	HAVO CRD
03-D	2003	Durst and Moniz Nakamura	Kealakomo. “The Entrance Path.” Hawai‘i Volcanoes National Park. New Interpretive Area Study	draft	Kealakomo Waena; 146 acres	inventory survey west of Chain of Craters Road in 1999-2001, east of road in 2002; testing in Road Cut Cave	yes	HAVO CRD
03-MOa	2003a	Moniz-Nakamura	Keoneheleleiei. The Falling Sands. Hawai‘i Volcanoes National Park Archeological Inventory of the Footprints National Register Site	PIA 2	Footprints Area, inland Kapāpala; 4,284 acres	Survey and test excavations; 55 sites (516 individual features); also 73 isolated artifacts and 1,773 footprints (minimum of 441 individuals)	yes	HAVO CRD HAVO Library

Table 11. Archeological Surveys for HAVO, Ordered by Date of Report Publication (continued).

Map Key*	Report Date	Report Author	Report Title	Status **	Location	Description	RC ^	Repository
03-MO	2003b	Moniz Nakamura	Pili Grassland Prescribed Burn Experiments	ms	Pānau		—	HAVO CRD
03-MA	2003	Maxey and Carter- Shuster	Kupukupu Rehabilitation Compliance Report	ms	Kupukupu Fire area	survey for replanting effort after Kupukupu Fire	—	HAVO CRD
04-Dc	2004	Dougherty	"Giant of the Pacific:" Mauna Loa Reconnaissance 2003	PIA 4	summit and upper elevations of Mauna Loa	aerial and pedestrian survey of high elevation zones on Mauna Loa; Sites 05501, 05504, 05507, 24335-24349	—	HAVO CRD
04-Da	2004a	Dougherty et al.	Pānau Iki Rehabilitation 2003. Archeological Inventory of 665 Acres in Hawaii Volcanoes National Park	final	Pānau Nui, inland of Hōlei Pali; 71 acres	survey and monitoring in replanting nodes in 2003; Sites 24076-24094	—	HAVO CRD
04-Db	2004b	Dougherty et al.	Kupukupu Fire Assessment 2003, Archeological Inventory for the Kupukupu Fire, Hawai'i Volcanoes National Park	final	Kamoamoa, Lae'apuki, Pānau Iki, Pānau Nui	inland area btwn 300 to 2,400 ft asl; monitoring of fire suppression activities in 2003; Sites 23007-24018	—	HAVO CRD
—	2005	Durst and Moniz Nakamura	A Historic Resource Study of the Lower Portion of the 'Ili'Āina Of Keauhou, District Of Ka'ū, Hawai'i Volcanoes National Park.	draft	'ili'āina of Keauhou	historic overview of the ahupua'a with photos and maps; carried out in 2005	—	HAVO CRD
05-R	2005	Roper	Hilina Pali 2005. The Civilian Conservation Corps. An Archeological Inventory Survey of the Hilina Pali Erosion Control Project of 1940	draft	Footprints Area; 4,284 acres	historic background on CCC, inventory survey (w/ GPS) of erosion control features; carried out between 1998 and 2003; Sites 22487, 23026-28, 23030-31, 24523-25	—	HAVO CRD
06-G	2006	Glidden	Paliuli Emergency Salvage Project, Hawai'i Volcanoes National Park.	draft	Lae'apuki Pānau Iki	two transects extending up to 1.1 km seaward of Kalapana Trail; carried out in 1995; Sites 19460-64, 19467-73, 19475, 20414-34, 20436, 20439-41	yes	HAVO CRD

Table 11. Archeological Surveys for HAVO, Ordered by Date of Report Publication (continued).

Map Key*	Report Date	Report Author	Report Title	Status **	Location	Description	RC ^	Repository
06-Q	2006	Quiseng	Kahuku-ʻĀinapō Trail Reconnaissance 2004 (Phase I) and the Kahuku Inventory Survey 2005 (Phase II)	draft	Kahuku-ʻĀinapō Trail and portions of KMU	historic overview of Kahuku Ranch; reconnaissance survey of trail (Site 24121), transect surveys on portions of KMU; carried out in 2004, 2005	—	HAVO CRD
02-T	2006	Moniz Nakamura	Lithic Quarry Presentation	ms		Site 23647 presentation in 2002	—	

* Map Key = ID shown on map of survey areas (Figure 24).

** ms = manuscript only (includes compliance reports, memoranda, notes from public presentations)

= draft report

draftfinal = published report

PIA = Publications in Anthropology (Pacific Islands Cluster publication series)

WACC = Western Archeological and Conservation Center

APAS = Asian and Pacific Archeology (Social Science Research Institute publication series, UH-Mānoa)

^ see Table 13 for radiocarbon data.

Table 12. Compliance Surveys (taken from HAVO Cultural Resources database through 2006).

Date	Project No.	Project Name	Author	No. of Fea.	Total area	Ahupuaa	Remarks
02/12/1988	HAVO 1988 B	Construct 0.5 mile long emergency access road to Royal Gardens subdivision in Kalapana District	Somers	5	corridor = 0.5 miles long, 5-10 ft wide	Kapa‘ahu	three mounds, two small enclosures
05/25/1990	HAVO 1990 D	Reblade fuel break between Ainahou Ranch and Kīpuka Nene Campground	Carter	2	corridor = 5.5 miles long, 10 ft wide	Keauhou Kapāpala	excavated lava blister, lava tube
02/05/1992	HAVO 1991 D	Conduct prescribed burn in 4.2 acre area east of Halape Trail, one mile southeast of Kīpuka Nene campground	Somers	1	4.2 acres	Kapāpala	trail with two ahu markers
05/29/1992	HAVO 1992 D	Construct vehicle turning area at end of Chain of Craters Road	Somers	1		Kamoamoa?	papamū
05/01/1993	HAVO 1993 F	Puuloa petroglyph recording	Lee	see Remarks		ānau Nui	see Lee 1993
00/00/1993	HAVO 1993 G	Kamoamoa survey	Kirkendall	see Remarks		Kamoamoa	see Kirkendall 1993a, 1993b
03/28/1994	HAVO 1994 F	Construct 15-acre nene enclosure/habitat enhancement at Ainahou	Keswick	3	15 acres	Keauhou	water trough, salt lick, iron box (ranching related features)
08/15/1994	HAVO 1994 I	Construct proposed captive propagation facility for endangered forest birds	Keswick	3	145 acres	Keauhou	ash boulder and 2 areas of corrugated roofing and other debris; also Site 19,451 (secondary burial in collapsed lava tube btwn Bird Park, park bndy)
11/21/1994	HAVO 1994 K	Headquarters Area Survey	Scheffler and Keswick	see Remarks	37 acres	Keauhou	see Scheffler and Keswick 1994
00/00/1995	HAVO 1993 K	Panau Iki survey	Spears	see Remarks		ānau Iki	see Spears 1995
03/14/1995	HAVO 1994 O	Survey of the Residential and Utility Areas	Argy	2	30 acres	Keauhou	CCC incinerator 20 m SW of Quarters 4, cement reservoir
04/26/1995	HAVO 1995 B	Construct automobile turn-arounds on the Chain of Craters Road	Schuster	2	9.35 acres	Lae‘apuki?	bullet casings, ahu; project area is on 1790 ash deposits
12/12/1995	HAVO 1996 D	Plant silverswords and build exclosure	Waipa and Keswick	2	74 ha (30 acres)	Kapāpala	ahu, cave with one opihi; near Mauna Loa Trail, just above end of Mauna Loa Road
01/23/1996	HAVO 1990 B	Widen three existing fuel breaks	Keswick	3	37 acres	?	historic buildings and structures

Table 12. Compliance Surveys (taken from HAVO Cultural Resources database through 2006) (continued).

Date	Project No.	Project Name	Author	No. of Fea.	Total area	Ahupuaa	Remarks
01/23/1996	HAVO 1991 A	Widen three existing fuel breaks	Keswick	1	0.25 acres	Pānau Nui	chill glass quarry
06/06/1996	HAVO 1996 B	Replace 2.7 mile section of goat-proof fence at the Great Crack	Waipa	2	corridor = 2.7 miles long, max. 50 ft wide	Kaʻalaʻala Kapāpala	Puna-Kaʻū Trail and Lava Plastered Cone Trail (Site 20,874)
06/20/1996	HAVO 1996 F	Establish a trail along the base of Puueo Pali	Waipa	2	corridor = 1.25 miles long, 30 m wide	Kapāpala	cave about 0.25 miles from Hilina Pali-Halape Trail junction, remains of fence
08/26/1996	HAVO 1993 J	Radiocarbon dating of Puuloa petroglyphs	?	see Remarks		ānau Nui	radiocarbon dating
10/11/1996	HAVO 1996 J	Re-route Halapē Trail around Kīpuka Nēnē campground	Keswick	7	3,500 sq m (0.86 acres)	Kapāpala	5 excavated pits, 1 cave, rock pile
07/21/1997	HAVO 1997 A	Construct 2,700 m of new fenceline on Mauna Loa	Keswick	1	135,000 sq m (13.5 ha)	Kapāpala	cave
03/16/1998	HAVO 1998 A	Install cement slabs under picnic tables and install stationary trash receptacles at Visitor Center, Nāmakani Paio Campground, and Bird Park	Keswick	1	31.75 acres (in three locations)	Keauhou Kapāpala	Site 21,353 in large crack north of cabins in Namakani Paio campground; three small, non-cultural caves in Bird Park
04/16/1998	HAVO 99-016	Replace existing fenceline on Kapāpala/Park boundary between 5,800 ft asl to Power Line Road (at 4,570 ft asl)	Waipa	2	8.2 ha	Kapāpala	trail, possible quarry
07/20/1998	HAVO 1998 E	Build two silversword exclosures in Kīpuka Kulalio on Mauna Loa	Glidden	2	24,133 sq m (in two locations)	Kapāpala	cave with hearth and nearby possible trail; mound
03/21/1999	HAVO 99-015	Restore coastal strand with rare and common coastal natives, Kalue/Kaaha	Houston	see Remarks	2.5 km along coast	Kapāpala	many features observed
04/14/1999	HAVO 4-15-99	Replace two manual fire weather stations with RAWS staions	Rivoli	1	two 15-m circles at each location	Kapāpala Pānau Nui? Kealakomo?	rock-filled pit on makai side of Hilina Pali Road past Kīpuka Nēnē; mauka side of Chain of Craters Road below hair pin turn
06/09/1999	HAVO 99-022	Construct a day-use picnic area near the end of Chain of Craters Road	Waipa	55	31.5 acres	Pānau?	10 alignments, 17 excavated pits or pit sets, 2 pavements, 3 artifacts, 1 trail, 9 mounds, 3 boulders, 1 midden area, 1 enclosure, 1 filled crack, 1 pit, 1 quarry, 1 C-shape, 1 wall, 1 rock concentration
11/28/1999	HAVO 2000-04	Test coastal lowland and Naulu dry forest plant restoration at five locations	Gmirkin	7	5 acres	?	Site 19,466; numerous features in areas adjacent to APE

Table 12. Compliance Surveys (taken from HAVO Cultural Resources database through 2006) (continued).

Date	Project No.	Project Name	Author	No. of Fea.	Total area	Ahupuaa	Remarks
05/24/2000	HAVO 2000 B	Reconstruct Mauna Loa Road	Lentz	see Remarks	corridor=2.6 miles long, 10 m wide	Kapāpala	several related to road
06/26/2000	HAVO 2000 D	Rehabilitate degraded ohia lowland communities at five locations along Hilina Pali Road	Moniz Nakamura	see Remarks	479 acres	Kapāpala	numerous features in Units 3 and 4a; related to CCC erosion control
03/12/2001	—	—	Waipa	6	4.8 ha (11 acres)	?	
03/23/2001	—	—	Waipa	6	58 ha	?	
04/18/2001	—	—	Moniz Nakamura	2	4.8 ha (11 acres)	?	
07/12/2001	—	—	Waipa	14	2.3 acres	Lae‘apuki Pānau Iki	
11/08/2001	HAVO 2002 A	Outplant native plants in Kahue and Kealakomo	Waipa	91	Area 1 = 4.75 ha Area 2 = 1.4 ha	Kahue Kealakomo	8 shovel tests
12/28/2001	HAVO 2002 C	Install hitching rail and horse tieouts at Apua, Keauhou, Halape, Kaaha and Pepeiau	Waipa	15	68,700 sq m (17 acres)	‘Āpua Keauhou Kapāpala	Apua, Halape, Kaaha, Keauhou Upper, Keauhou Lower, and Pepeiau campgrounds
12/07/2001	HAVO 2002 E	Outplant/seed rare plants in Kealakomo Kīpuka	Houston	2	3 ha (7.8 acres); transect to project area = 0.4 ha (1 acre)	Kealakomo	
02/12/2002	HAVO 2002 D	Install composting toilets at Halapē, Keauhou and ‘Āpua	Waipa	5	2,942 sq m	‘Āpua Keauhou Kapāpala	‘Āpua, Keauhou, Halapē, and Pepeiau campgrounds
03/19/2002	HAVO 2002 H	Construct ‘Ainahou Ungulate-proof Fence, Phase II	Waipa	3	0.32 ha (0.79 acres)	Keauhou	
06/04/2002	HAVO 2002 Q	Construct new end of Chain of Craters Rd. parking area at Hōlei Sea Arch pullout	Waipa	5	6,000 sq m (1.48 acres)	Pānau	
06/14/2002	HAVO 2002 L	Establish new turnaround and end-of-road facility location	Waipa	14	4,950 sq m (1.2 acres)	Pānau	
07/16/2002	HAVO 2002 P	Build Predator Exclosure Fence to Protect Dark-rumped Petrel Breeding Habitat	Moniz Nakamura	23	corridor = 1.8 km long, 40 m wide	Kapāpala	
01/23/2003	HAVO 2002 M 2002 N 2002 O	Pili Burn, Phases I, II, and III, Kupukupu Fire Emergency Recon	Moniz Nakamura	see Remarks		ānau Nui Lae‘apuki	see Dougherty et al. 2004b

Table 12. Compliance Surveys (taken from HAVO Cultural Resources database through 2006) (continued).

Date	Project No.	Project Name	Author	No. of Fea.	Total area	Ahupuaa	Remarks
03/05/2003	—	—	Maxey	7	8,000 sq m (2 acres)	?	
03/26/2003	—	—	Waipa	17	233,440 sq m (57.68 acres)	Kapāpala Keauhou	
04/04/2003	—	—	Waipa	5	80 sq m	Pānau	
04/21/2003 08/30/2003	—	—	Maxey/Schuster	63	184 ha (455 acres)	Pānau	see Dougherty et al. 2004b
04/15/2003	—	—	Waipa	2	20,000 sq m (4.94 acres)	Kapāpala	in 1790 Footprints HD
07/10/2003	—	—	Waipa	1	194,782 sq m (48.13 acres)	Kapāpala	along Mauna Loa Trail, three areas in Kīpuka Kulalio, one area in Kīpuka Mauna‘iu
09/24/2003	—	—	Waipa	3	500 sq m	Pānau	
12/24/2003	—	Portulac ca outplanting project	Waipa	3	2,500 sq m	Keauhou	
12/29/2003	—		Waipa	5 (?)	179,500 sq m (44.3 acres)	Kahuku	
03/23/2004 07/06/2004	—	Peter Lee Fence	Waipa	5	76,500 sq m	Kapāpala	plus artifacts
04/01/2004	—	Upper Keauhou Boundary Fence	Waipa	6	33,500 sq m	Keauhou Humu‘ula	
04/16/2004	—	Powerline Rd/Kīpuka Kī Fence	Waipa	4	73,230 sq m	Kapāpala	1 feature is natural
05/07/2004	—	Mouflon Traps	Waipa	4	3,675 sq m	Kahuku	
06/28/2004	—	Replace fence and install test fence in Lower Great Crack area	Waipa	12	33,180 sq m	Ka‘ala‘ala	
09/03/2004	—	Outplant Hibiscadelphus giffardianus and Phyllostegia racemosa	Waipa	1	450 sq m	Keauhou	plus 2 artifacts
11/03/2004	HAVO 2005 B	Install fence along southwest boundary in Kahuku	Waipa	6	96520 sq m (44.3 acres)	Kahuku	
10/06/2005	HAVO 2005 A	Construct 3 mile fence to protect 15,000 acres of forest and former ranch lands	Dougherty	2	28,200 sq m (7.0 acres)	Keauhou	cave is non-cultural
02/02/2005	HAVO 2005 F	Kīpuka Puaulu	Waipa	1	50 sq m	Keauhou	
07/27/2005	HAVO 2005 K	Relocate USGS radio repeater near top of Mauna Loa Strip Road	Waipa	2		Kapāpala	

Table 12. Compliance Surveys (taken from HAVO Cultural Resources database through 2006) (continued).

Date	Project No.	Project Name	Author	No. of Fea.	Total area	Ahupuaa	Remarks
12/27/2005	HAVO 2006 C	Kahuku SS Expansion	Waipa	1		Kahuku	
04/19/2006	HAVO 2006 F	Kahuku fence replacement	Waipa	1		Kahuku	

NOTE: Projects are not listed if no sites were found or if no data are available in CRD database; pre-1988 data not available in database.

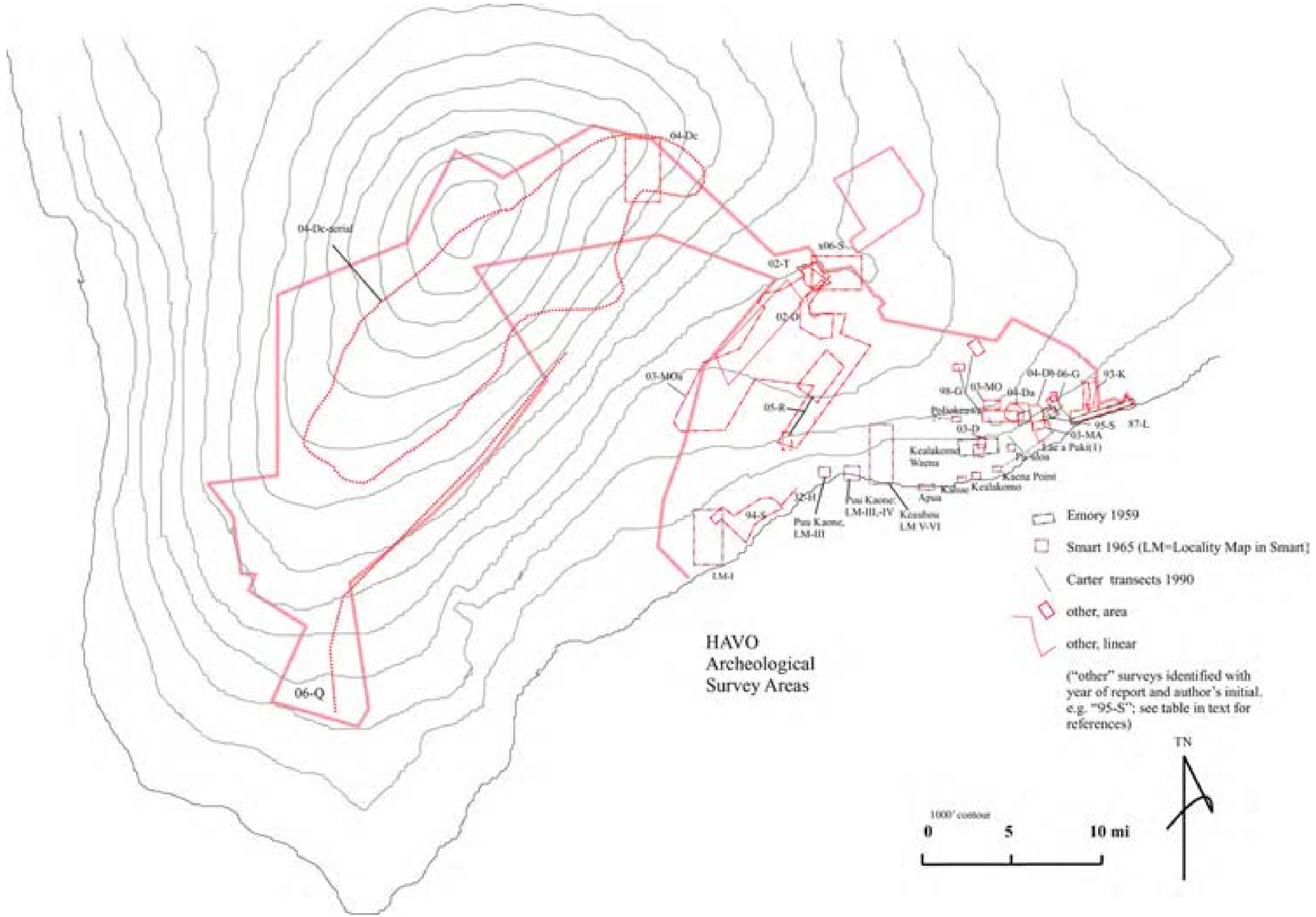

Figure 24. Archeological surveys in the HAVO area, keyed to the table of survey reports (see above).

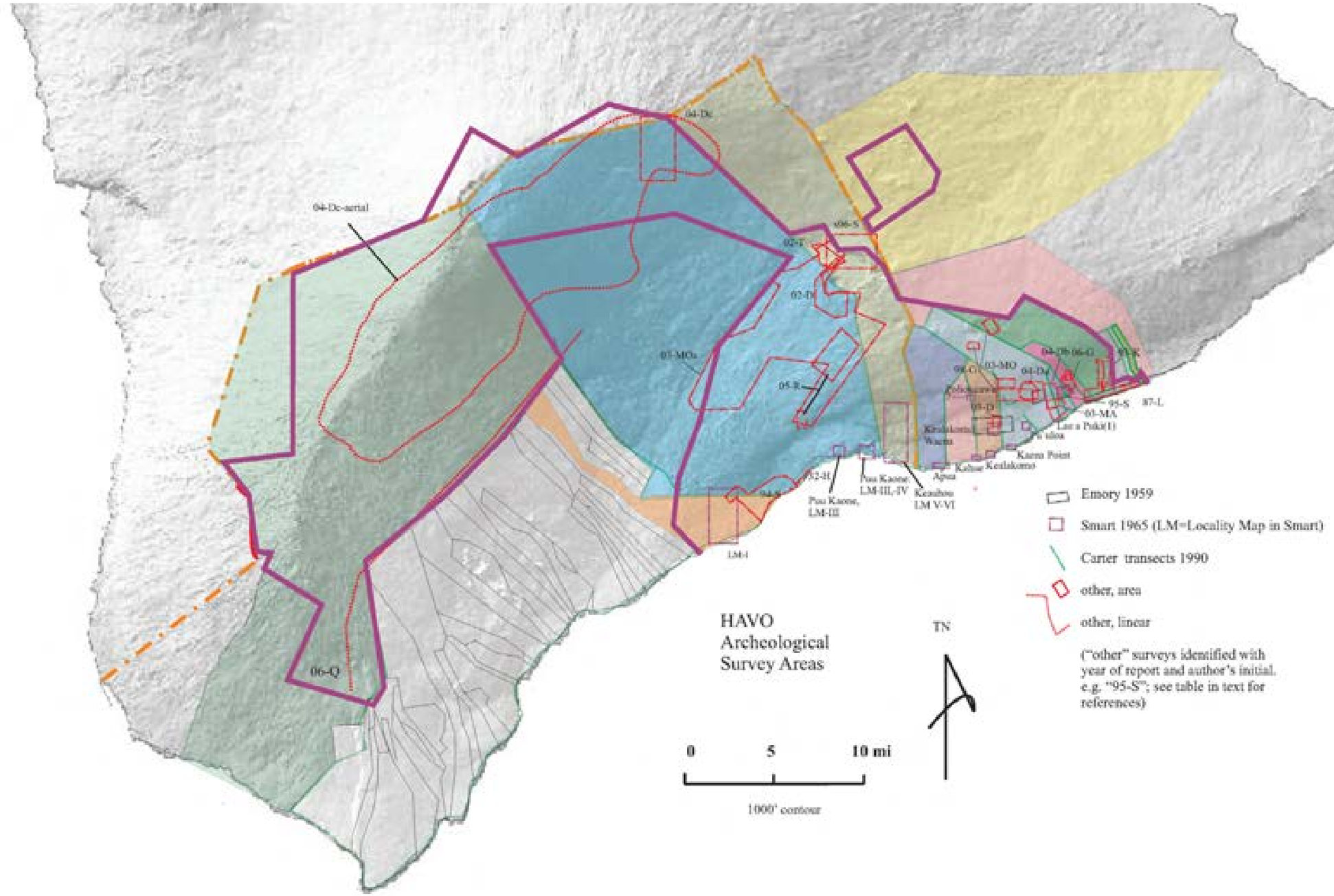

Figure 25. Archeological surveys in the HAVO area, keyed to the table of survey reports (see above), with an emphasis on survey location within ahupua‘a.

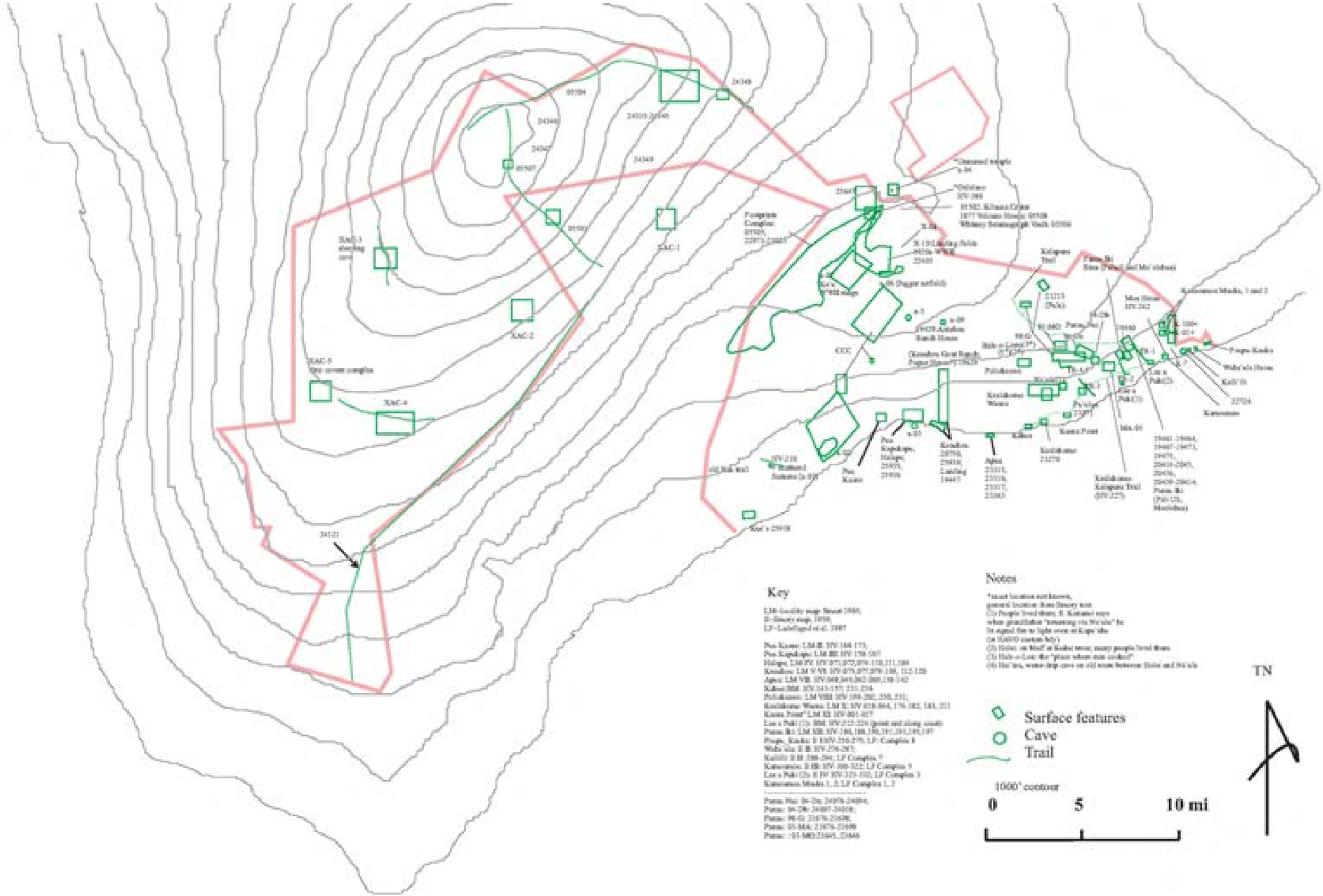

Figure 26. Recorded sites of the HAVO area.

Like all other archeological regions of Hawai‘i, HAVO’s history of site numbering has been one of inconsistency and confusion. In early years of site documentation, numbers were assigned idiosyncratically. This was followed by numbering in the first systematic statewide system, that of the Bishop Museum, which in turn was superceded by the statewide numbering system mandated by the State of Hawai‘i.[56] However, not all Museum numbers have been converted to the state system. More recent surveys have assigned temporary numbers to sites, but these also have not always been converted to state numbers. At least one survey (Ladefoged et al. 1987) attempted to organize information without assigning site numbers, but this resulted in an unwieldy referring system and did not eliminate the problem of “site” definition as it was intended to do. There is an on-going program at HAVO to obtain state numbers for all sites, so that a single numbering system will be in place.

For the present project, the compilation of sites in Appendix A began with an examination of the main site databases and site lists prepared by HAVO.[57] In consultation with HAVO staff, inconsistencies and recording errors were gradually eliminated (to the extent that the existing information would allow). In addition, as reports and other information were reviewed for the AOA, additional sites were added to the list. Appendix A also identifies sites that do not yet have state site numbers; it also lists previously employed numbers that are not in the state system.

ARCHEOLOGICAL EXCAVATIONS AND RADIOCARBON DATES

Table 13 summarizes the record of archeological testing at HAVO, as well as radiocarbon dates that have been processed or have been submitted for processing.

THE ARCHEOLOGICAL LANDSCAPES OF HAVO

The archeological landscapes of HAVO are represented by the recorded archeological sites in the park (Appendix A), and ultimately by all of the remains that will be recorded in future work. Many of the recorded sites have been destroyed by recent lava flows, but all are considered for the purpose of analyzing the landscape distribution.[58]

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[56] Appendix A contains all the known state numbers. However, it is probable that additional state numbers were assigned to HAVO sites in the early years of the state inventory from 1970 through 1979. Many of those early records and site files cannot be located in the State offices.

[57] This required conversion of ASMIS files in PDF format to Excel and Word formats.

[58] For the management of archeological sites as resources, the identification of destroyed sites is a different matter.

Table 13. Excavation Data and Radiocarbon Dating.

Site Name and/or Location	State Site No.	Field Site No.	Description	^{14}C Age*	^{14}C Sample No.**	Report (Author/Date)
—	—	HV-104		—	—	Smart et al. 1965 (Soehren)
—	—	HV-120	Artifact Collection	—	—	Smart et al. 1965 (Soehren)
—	—	HV-229		—	—	Smart et al. 1965 (Ladd)
—	—	HV-238		—	—	Smart et al. 1965 (Ladd)
—	—	HV-239		—	—	Smart et al. 1965 (Ladd)
—	—	HV-240		—	—	Smart et al. 1965 (Ladd)
—	—	HV-241		—	—	Smart et al. 1965 (Ladd)
Moa Heiau	—	HV-242	Excavation	—	—	Smart et al. 1965 (Ladd)
—	—	HV-242		—	—	Smart et al. 1965 (Ladd)
—	—	HV-257	Excavation	—	—	Carter and Somers 1990
—	—	HV-258	Excavation	AD 1486-1650	B-27891	Carter and Somers 1990
—	—	HV-269		Less Than AD 1407-1609 AD 1476-1642 AD 1264-1388	W-6040 W-6024 B-2788 B-27890	Carter and Somers 1990
Poupou-Kauka, Puna District	—	HV-270		AD 1476-1653 Less Than Less Than Pending	B-26888 W-6044 W-6046 4 samples submitted	Carter and Somers 1990 12/16/1987
Poupou-Kauka, Puna District	—	HV-271		Less Than Pending	W-6048 3 samples submitted	Carter and Somers 1990 01/08/1988
Waha‘ula Heiau, Puna District	—	HV-276	Excavation	AD 1640-1955 Pending	W-3017 1 sample submitted	Ladd 1972 Ladefoged et al. 1987 Carter and Somers 1990 07/11/1989
Waha‘ula Heiau, Puna District	—	HV-277	Excavation	AD 1428-1492	B-33639	Carter and Somers 1990
Waha‘ula Heiau, Puna District	—	HV-278	Excavation	AD 1275-1650	W-3018	Ladd 1972 Kelly et al. 1979 Ladefoged et al. 1987 Carter and Somers 1990

Table 13. Excavation Data and Radiocarbon Dating (continued).

Site Name and/or Location	State Site No.	Field Site No.	Description	^{14}C Age*	^{14}C Sample No.**	Report (Author/Date)
Waha‘ula Heiau, Puna District	—	HV-279	Excavation			Carter and Somers 1990
Waha‘ula Heiau, Puna District	—	HV-280	Excavation	AD 1655-1955 AD 1655-1955 AD 1516-1659 Pending	B-33640 B-33641 B-33642 2 samples submitted	Carter and Somers 1990 06/24/1989
Waha‘ula Heiau, Puna District	—	HV-281	Excavation			Carter and Somers 1990
Ka‘ili‘ili Village	—	HV-286	Excavation	AD 1644-1796 AD 1658-1865	B-33643^ B-33644^	Carter and Somers 1990
Ka‘ili‘ili Village	—	HV-287	Excavation	AD 1650-1955 AD 1893-1955 AD 1707-1955 AD 1645-1955 AD 1650-1955 AD 1439-1637 Pending	B-33645 B-33646 B-33647 B-33648 B-33649 B-33650 3 samples submitted	Carter and Somers 1990
Ka‘ili‘ili Village	—	HV-288	Excavation			Carter and Somers 1990
Ka‘ili‘ili Village	—	HV-291	Excavation			Carter and Somers 1990
Ka‘ili‘ili Village	—	HV-294		AD 1864-1955	B-33651^	Carter and Somers 1990
Hilina Pali	—	HV-383		Less Than AD 1525-1955	I-8711 I-8712	Cleghorn and Cox 1976 Carter and Somers 1990
Hilina Pali	—	HV-386		Less Than	I-8714	Cleghorn and Cox 1976 Carter and Somers 1990
Hilina Pali	—	HV-393		Less Than	I-8713	Cleghorn and Cox 1976 Carter and Somers 1990
Ka‘ili‘ili Village	—	No no. (mounds)	Excavation			Carter and Somers 1990
Cave, ‘Āpua Point	—	HV-059	Test Excavations: Habitation			Smart 1965

Table 13. Excavation Data and Radiocarbon Dating (continued).

Site Name and/or Location	State Site No.	Field Site No.	Description	^{14}C Age*	^{14}C Sample No.**	Report (Author/Date)
Cave, Keauhou	—	HV-075	Test Excavations: Habitation (Ritual?)	AD 0031-0247 AD 0676-0890 AD 0898-1146	HRC-56a HRC-56b HRC-56c	Smart et al. 1965 (Smart/ Soehren) Carter and Somers 1990
—	19248	—	Data Recovery, historic site			Martin and Jackson 1995
Pānau Iki	19460	T109	Excavation	Pending	6 samples submitted (for all of 19460)	Glidden 2006 04/15/1995
Pānau Iki	19460	T110	Excavation			Glidden 2006
Pānau Iki	19460	Feas. K, X, H, and M	Excavation			Glidden 2006
Palm Tree Site Lae‘apuku/Pānau Iki	19461	—	Excavation; linear rock terrace	AD 1665-1950	Beta-83630	Glidden 2006
Lae‘apuku/Pānau Iki	19462	HV-194	Excavation; mound in cave, Fea. B	AD 1450-1825 AD 1835-1880 AD 1915-1950	Beta-83632	Glidden 2006
Lae‘apuku/Pānau Iki	19463	—	Surface; charcoal collected	modern	Beta-83631	Glidden 2006
Lae‘apuku/Pānau Iki	20420	—	Excavation; slab-lined pit in enclosure	AD 1640-1950	Beta-83634	04/20/1995
—	20750	HV-076				Smart et al. 1965 (Soehren)
Pulu Processing Site	21215	—	Excavation	AD 1450-1950	Sample 14	Glidden and Rivoli 2000
Pulu Processing Site	21215	—	Excavation	AD 1450-1950	Sample 49	Glidden and Rivoli 2000
Pulu Processing Site	21215	—	Excavation	AD 1310-1625	Sample 60	Glidden and Rivoli 2000
—	21727	—	Excavation: Havo-2003-L-321, hearth			Dougherty et al. 2004a

Table 13. Excavation Data and Radiocarbon Dating (continued).

Site Name and/or Location	State Site No.	Field Site No.	Description	^{14}C Age*	^{14}C Sample No.**	Report/Date
Kamoamoa	22726	HV-228	Excavation	AD 1640-1955 AD 1280-1409	?	Smart et al. 1965 (Ladd) Ladd 1969 Carter and Somers 1990
Footprints Area	—	—	Charcoal removed from "Footprint Impression"	AD 1522-1811	?	Moniz Nakamura 2003a
Footprints area	22973 Fea. 1	—	Excavation: C-shaped structure	—	—	Moniz Nakamura 2003a
Footprints area	22974 Fea. 98-562	—	Excavation: volcanic glass quarry	—	—	Moniz Nakamura 2003a
Footprints area	23026 Fea. 98-42	—	Excavation: enclosure	AD 1642-1950 (2 sig) AD 1662-1950 (2 sig)	WW-2251 WW-2252	Moniz Nakamura 2003a
Pu'uloa Petroglyphs	23271	—	Organic matter collected from under silica glaze	AD 1443-1631 AD 1430-1616 AD 1443-1631 AD 1446-1627 AD 1644-1954 AD 1487-1657	Beta 90199 Beta 93745 Beta 93744 Beta 90200 Beta 90201 Beta 93743	Dorn 1996

* 1 sigma unless otherwise indicated.

** Dated material is charcoal unless otherwise indicated; B=Beta Analytic; I=Teledyne Isotopes; W=USGS Laboratory, Reston, VA. (HRC=Bishop Museum radiocarbon number: "Hawaii Radiocarbon Number"—laboratory unknown, probably Gakashuin).

^ Dated material is shell.

SITES AND LANDSCAPE

As formally described, the archeological features of HAVO are like those found commonly throughout Hawai‘i, that is, stone structures (some with associated cultural deposits or culturally modified soils) including walls, platforms, alignments, pavings, terraces, mounds, modified outcrops, and modified caves, as well as rock art and stone quarries. A rare formal type of feature, a structure made of soil, was described to Stokes (1991:134), but he was unable to locate it (it is listed in Appendix A as Site X-04). Table 14 is a glossary of site types, taken primarily from Dougherty et al. (2004a) and Glidden (2006).

Described by general function, features found at HAVO are the material remains of habitation, agriculture, temples, trails, burial, and ritual behavior. There are no known fortifications, fishponds, or features for animal husbandry dating to the pre-Contact period. Structures built specifically for animal control became important in the post-Contact era.

The general lack of temporally sensitive traditional artifacts and architecture means that this landscape is largely chronologically undifferentiated until the appearance of foreign (post-Contact) artifacts and architectural influences. Detailed archeological excavation may allow some segregation by means of radiocarbon dating, but the poor resolution of radiocarbon dates results in only a gross temporal framework at best.[59] However, for HAVO, the presence of dated lava flows that originated during the period of Hawaiian occupation add another feature of temporal control rarely found elsewhere in the islands. For example, Moniz Nakamura (2003a:7) discusses the chronology of trails in the Footprints area of the Kīlauea Summit, using dated lava flows as a time marker:

> At least two trail systems used during the pre-Contact and post-Contact periods parallel the Ke‘āmoku flow on the east. They are identifiable for nearly 7,786 m (4.84 miles) on the adjacent pāhoehoe flow described by geologists as “p4o” (of Kīlauea origin). These summit flows date to the 14th century, in a period between 1300-1400 A.D., or 600-700 years ago (D. Swanson pers. comm.) The Ke‘āmoku flow is a more recent flow. Thus, assuming all of the the features constructed along or on top of the Ke‘āmoku lava flow are temporally related, they must have been constructed some time after A.D. 1400.

Table 14. Glossary of Major Site Types at HAVO.

Site Type	Definition	Alternate Name	Inferred Function
alignment	linear arrangement of boulders, one to two courses high	—	various
bashed area	area on pahoehoe surface that shows evidence of some kind of pounding activity	—	mortar
cairn	stacked piles of cobbles/boulders, either vertically faced or conical, with a circular footprint; at least three courses high	ahu	trail marker boundary marker

[59] The usual radiocarbon range of 200 years means that there are only five radiocarbon temporal units in pre-Contact Hawai‘i.

Table 14. Glossary of Major Site Types at HAVO (continued).

Site Type	Definition	Alternate Name	Inferred Function
cave	section of a lava tube accessible by a vertical opening or a sinkhole formed by collapsed roof; has a dark zone; sometimes includes interior structures, cleared floor areas, midden deposits, petroglyphs; usually occurs in pahoehoe flows	lava tube	campsite ceremonial water collection
filled crack	natural crack in lava flow that is filled to create a level surface; in historic period, cracks utilized for trash disposal (historic period)	—	habitation concealment trash disposal
cupboard	small, enclosed area in pahoehoe flow; created by either removing rock from flow to form a hollow space or piling rock around a natural hollow space to define/protect the hollow space	—	storage
enclosure	completely enclosed space defined by stacked stone wall; usually encloses a level interior surface that could be soil or rock-paved; wide variation in size presumably based on function	—	habitation animal control
excavated pit	area within pahoehoe flow where surface rock has been removed to create a depression; sometimes edged with pile of rock taken from excavation	—	agricultural storage
firepit	concentration of charcoal, sometimes defined by arrangement of cobbles/boulders	—	cooking heating
modified outcrop	natural tumulus in lava flow that has been modified by piling of loose rock; generally lack formal construction characteristics	—	various
mound	stacked or piled cobbles/boulders; circular or oval plan, convex upper surface	rock pile	various
pavement	prepared horizontal surface of well-sorted small cobbles/boulders; may be formed by filling in ravines or other low places	—	ceremonial habitation
petroglyph	pecked or chiseled image in natural rock surface; anthropomorphic, animal, geometric/abstract image; includes historic writing	—	art boundary marker trail marker
papamū	grid arrangement of small pecked holes in pahoehoe surface; used as the playing surface for game of konanē	—	game
platform	stacked cobbles and boulders forming an elevated surface; raised and faced on at least three sides; prepared surface of soil and/or rock; sometimes incorporates natural bedrock outcrop	platform mound	ceremonial habitation
quarry	natural source of fine-grained basalt for stone tools	—	tool manufacture
rockshelter	level, protected area in cliff face; natural feature defined as a site by the presence of cultural materials reflecting human activity area; usually has soil floor; sometimes has wall built across opening	cave shelter shelter cave overhang shelter	habitation burial
surface scatter	concentration of cultural material (artifacts, faunal remains, charcoal) on ground surface	lithic scatter	tool manufacture habitation
terrace	level, earth-filled surface paralleling natural contours; downslope side has retaining wall of either earth berm or stacked rock	—	ceremonial habitation agricultural

Table 14. Glossary of Major Site Types at HAVO (continued).

Site Type	Definition	Alternate Name	Inferred Function
terraced platform	stacked cobbles and boulders built against a natural landform (e.g., slope, outcrop); faced on two or three sides; prepared horizontal upper surface of pebbles, cobbles, boulders	—	ceremonial habitation
trail	route for travel, defined by linear arrangement of flat paving stones, curbed edges, weathering in lava surface, and/or cairns visible from point to point	—	transportation
wall	stacked or piled structure, also bifaced and core-filled; length exceeds twice the sum of its width and height (i.e., length is primary dimension)	—	land division ranching soil/water control
walled structure	area defined partially by a wall of low, stacked/piled boulders; sometimes incorporates natural ledges; occur in various shapes	C-shape L-shape U-shape	habitation

As discussed in Section VI, the grouping of features into "sites" is a vexing problem in Hawaiian archeology, so the list of features by form and function does not necessarily identify site types. Site types (as used here) include villages, agricultural fields, specialized activity locales (such as quarries, isolated activity areas, and temporary camps), places of ritual, boundaries, and trails. There may also be isolated features that can be isomorphic with site, such as some of the post-Contact animal control walls and enclosures. Site in this sense, that is as an entity representing a complex of integrated behavior, brings the concept of landscape back into play. Sites are divisions of the landscape based on patterns of human interaction and the material remains that result, as well as whatever additional cultural information may be available (including place names, the record of historical events, and so on[60]). The distribution is what is predictable in Hawaiian archeology, that is villages scattered along the coastline, generally with density correlated with inland agricultural intensity, and agricultural fields based on average rainfall. Cultural boundaries (district, ahupua'a, and 'ili) segregate these villages and fields, and transportation (trails and canoe landings) integrate them. There are three elements of the HAVO distribution that are unusual, all related to landscape-geography.

> The first is the intensity of agriculture and habitation on the pali bluffs that are well removed from the coast (Hilina and Hōlei Pali being the most prominent). Inland agriculture and increasingly permanent habitation is a pattern found in many pre-Contact agricultural zones on the island of Hawai'i, but the clusters in the HAVO area are an unusual configuration, resulting from the ways in which micro-environmental zones occur in this faulted terrain.
>
> The second element is a factor of the active volcanic landscape: the occurrence of sites within kīpuku, the vegetated oases preserved by the shifting paths of lava

[60] The National Register of Historic Places identifies "site" very clearly as a "place"—not only in the restricted sense of a place with archeological remains.

flow. The kīpuka contain sites for two reasons: they are optimum areas of use in a formidable lava landscape, and they are remnants of the pre-lava landscape that have been preserved. Photo 9 illustrates the kīpuka as an island of vegetation surrounded by barren lava.

The third unusual element is the set of ritual features in the ʻiliʻāina of Keauhou. This is best proposed as a model: a complex of ritual features (including caves) in the ʻiliʻāina that is related to Kīlauea (and Pele); and a ritual trail that provided access from the landing at coastal Keauhou to the summit.

SITES AND EVENTS: HISTORICAL AND MYTHOLOGICAL

One of the themes of this AOA is that the distinction made among archeology, history, and culture in the identification of sites is a spurious one. Sites, by NRHP definition, include not only archeological remains, but places where events of importance occurred and places that are associated with individuals. In many cases, known historical events at HAVO include places without remains as well as places with archeological remains. For example, the paths taken by 18th and 19th century visitors, (e.g., Menzies, Ellis, and Wilkes, discussed above) are examples of places that should be considered sites with multiple elements, the routes themselves and any archeological remains associated with the routes. As far as is presently known, only the Wilkes trail has known remains.

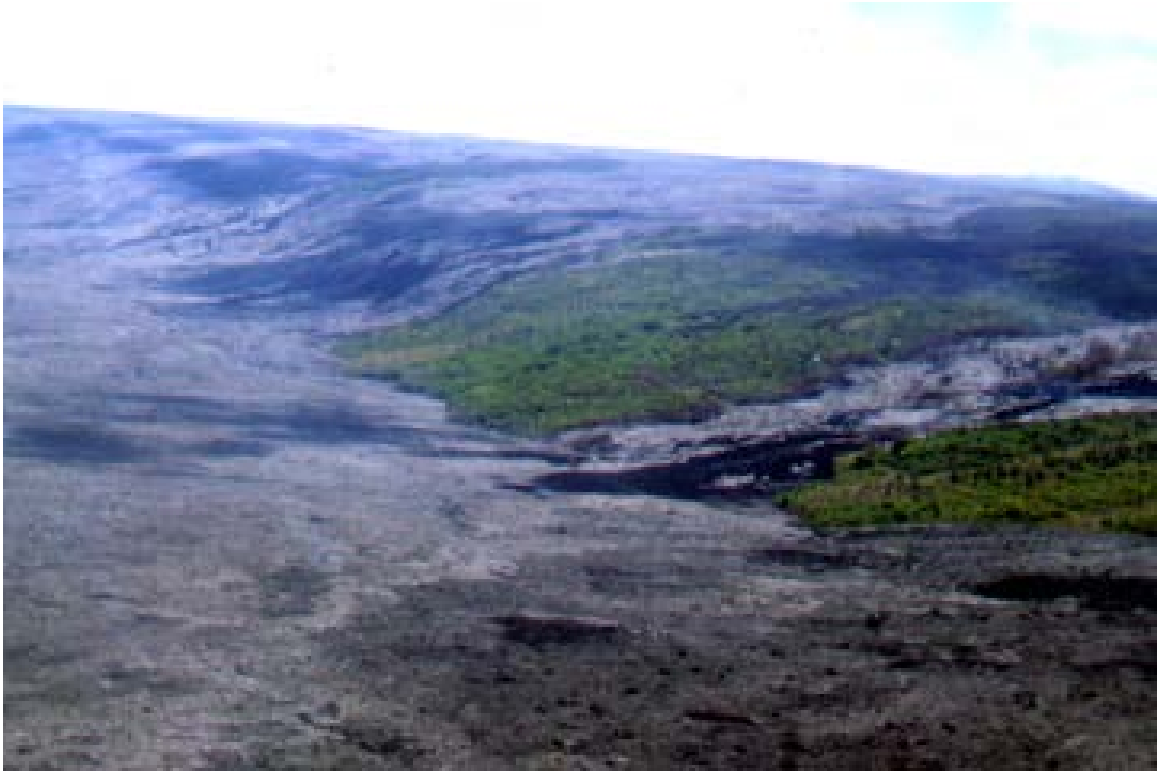

Photo 9. Kipuka in east HAVO.

In addition to sites of historical events and personages, the NRHP recognizes places and characters of myth and legend. This was recognized in early efforts of National Register nomination at HAVO, when Kīlauea Crater (Site 05502) was placed on the Register.

Other places may have archeological remains and associated traditions. The Puʻuloa Petroglyph Field (Site 23271, see discussion above) is an excellent, but certainly not the only, example of this.

SITES OF THE MYTHOPOEIC AND EARLY TRADITIONAL LANDSCAPE: PELE AND PĀʻAO

The landscapes of the mythopoeic and early traditional periods of HAVO are the landscapes of vulcanism and Pele, and as such, every site at HAVO can in some way be linked to Pele or her family. The examples of Kīlauea (Site 05502), Mauna Loa, and the petroglyphs at Puʻuloa (Site 23271) are discussed in detail in Section III. While Kīlauea has been recognized as central to the Pele landscape by its listing on the NRHP, Mauna Loa/Mokuʻāweoweo has not been so recognized, and deserves to be similarly treated.

As noted above, one of the unusual elements of the HAVO archeological landscape is the set of ritual features in the ʻiliʻāina of Keauhou. Of these ritual features, caves are particularly inextricable from the Pele landscape. These caves are interpreted as possible religious and ritual places associated with Pele and the other deities of the volcano. In some sense, perhaps all caves had some symbolic and religious significance, but certainly those associated with burial and those that are commonly referred to as "refuges" (i.e., with elaborate constructed or concealed openings).

Caves were perceived as openings into the body of Haumea/Pele (the volcanic landscape) and they were also seen as a means of access to the underworld. Thus, any modification to caves that indicate a religious or secret function (e..g., blocking entrances) could represent ritual that is associated with the body of Haumea/Pele and the underworld. Site 25939 (Heiau Cave) at coastal Keauhou is a particularly explicit representation of a ritual cave that likely had a religious function; Smart (1965:58) writes:

> A narrow entrance has been constructed in the northeast corner of the paved floor area and permits access down into the intact section of the tube. Within the tube the floor is covered with a tumbled mass of large boulders. Seven or more are long, narrow stones which had been carried into the tube and lay on a pavement of waterworn slabs. Three of these lay together, appearing to have originally stood upright in a line. Hereabouts also were many pieces of branch coral…On the western wall of the tube are markings on the rock surface which may well have been petroglyphs of some sort.

The arrival of Pāʻao to Hawaiʻi was a major event of change in Hawaiian history, marking the introduction of a royal (dynastic) line, a new temple form, and new ritual. But Masse et al. (1991) make a direct structural relationship between Pele and Pāʻao through Wahaʻula Heiau (Site HV-276). Although now buried by lavas from the Kupaianaha flows of the Kīlauea East Rift, the place of the heiau remains a physical convergence of the duality.

ARCHEOLOGICAL SITES OF THE POST-PĀʻAO LANDSCAPE

The traditional Hawaiian landscape reflects the historical period that follows the arrival of Pāʻao to Hawaiʻi. Figure 18 (see above) represents the distribution of traditional sites by function, and these are discussed in the following sections. Recorded archeological sites (Appendix A) fall into seven major

functional categories with many overlapping categories at specific sites: ceremonial (20 sites); agricultural (30 sites); caves of various function, but predominately shelter (85 sites); habitation (55 sites); trails or trail segments (25 sites); stone quarries (18 sites); and sites that have a significant petroglyph component (70 sites). There are also unique sites, notably the Footprints complex (Photo 10), which in addition to the eponymous footprints, includes basalt and volcanic glass quarries, shelters, shrines, caves, and trails.

One of the obvious elements of this traditional inventory is the extent to which occupation into the post-Contact era left a significant mark on the archeological remains. This is particularly notable in the habitation complexes, shelters, petroglyphs, and trails.

CEREMONIAL SITES

The pattern of ceremonial sites throughout HAVO and surrounding areas is striking. Of the numerous named temples recorded for Kaʻū and Puna, there are only six that possibly fall within the boundaries of HAVO, five in the eastern portion of the park and one in Kahuku. Their locations, as well as the locations of other temples of the region whose names have been recorded, are shown in Figure 18.

Photo 10. A "footprint impression in hardened desert ash" at the Footprints complex, Site 05505 (from Moniz Nakamura 2003a:38).

Two of the seven temples (Moa and Waha‘ula) are at the far eastern end of HAVO, in the settlement area of increasing population and productive agriculture of Puna. Now buried under the hardened flows of post-1983 eruptions, Waha‘ula was the most significant ceremonial structure of this region (Photo 11); the nearby Moa is also covered by lava. Makoloa Heiau stood on the boundary between Keauhou and Kapāpala, just west of Keauhou Village (Boundary Commission witness Kenoi for the land of Keauhou, 1873). Oararauo Heiau was pointed out to Ellis (1963:179) at the edge of Kīlauea Crater but no remains have ever been identified. Ellis describes it as “formerly a temple of Pele, of which Kamakaakeakua, a distinguished soothsayer, who died in the reign of Tamehameha, was many years priest.” If indeed a temple of Pele, this may have been, after Waha‘ula, the most important heiau in the HAVO area. Kamo‘oali‘i temple (Site HV-210) near the boundary of Kapāpala and Ka‘ala‘ala Makai is a minor structure. Another temple referred to as Hale o Lono at Hōlei in Pānau Nui (Emory, Cox et al. 1959:13, 59) has never been located.

Two temples[61] were identified by Stokes (1991) in Kahuku, one of which (Halepōhāhā Heiau) is likely within the KMU. Halepōhāhā is “described as being on the west of the lava flow of 1887, 3 or 4 miles north of the Kona-Ka‘ū road. Said to have been used for human sacrifices and to have been built by ‘Umi” (Stokes 1991:113). Stokes did not see the structure, and it is uncertain if it still exists or what its exact location was; using Stoke’s description, it may have been near the present boundary of the KMU and Hawaiian Oceanview Estates. Boundary Commission witnesses for Kahuku refer to “Halepohaha” as a place name; witness P. Naihe says that the “Heiau of Umi is at Halepohaha on Umi road.”

Photo 11. Waha‘ula Heiau in 1889 (photograph from Emory, Cox et al. 1959:Photo 2).

[61] Malino Heiau is “described as located above Kaunakaumaha, near the boundary of Pākini nui, and south of the Kona-Ka‘ū road” (Stokes 1991:113). This location would place the temple outside of HAVO boundaries.

There are a number of other possible shrines and religious sites that have been identified archeologically, based primarily on structural characteristics. Heiau Cave (Site 25939) is a highly modified lava tube located south of the Puna-Kaʻū Trail in the ahupuaʻa of Keauhou. The surface of the sinkhole that provides entrance to the lava tube is paved (Photo 12), the cave opening has been narrowed by the construction of an boulder entryway, and there are several large, elongated, upright waterworn boulders on the interior floor (Smart et al. 1965:58).

Of particular note are shrines on Mauna Loa in the Kahuku area that have been identified but not investigated in detail (see Dougherty 2004:Figure 28 for a low level aerial photograph). These features appear to have the same structural characteristics (referred to as the Necker Island form) as shrines found on Mauna Kea and in Haleakalā Crater (Photo 13).

Heiau, however, do not tell the full story of religious organization and sacred sites in the HAVO area. Both Kīlauea and Mauna Loa (or certainly their craters) must be considered as sacred places (and thus heiau in a larger sense).

Photo 12. Pavement fronting the entrance to Heiau Cave (Emory, Cox et al. 1959:Photo 44).

Photo 13. Shrine in inland Kahuku.

AGRICULTURAL COMPLEXES AND OTHER SUBSISTENCE-RELATED SITES

The agricultural features of the HAVO area cluster in the eastern section of the park and are generally in the form of rocky-land sweet potato cultivation features. These features tend to lack the formal structure of "field systems" such as those found in Kohala and Kona, but they nonetheless exemplify a major form of horticultural adaptation in the islands. Carter and Somers (1990:20) describe the "fields" as a combination of pits and mounds; "quarrying pahoehoe blocks from cracks to create planting pits within the excavated cracks and the rock mounds on barren was probably one of the most intensively managed agricultural systems in practice in Hawai‘i:"

> This type of planting method necessitated the collection of plant materials that were used to heap around the vines of sweet potatoes to facilitate retention of moisture in the pit gardens (Handy and Handy 1991:129). Many of these pits were found in association with low walls or mounds situated on the windward end of the pit. These walls and mounds were interpreted as wind breaks to provide shelter from the prevailing winds during the planting season as well as providing limited shade to the pit and plant.

Agricultural complexes cover extensive areas of inland Pānau Nui, Pānau Iki, Lae‘apuki, and Kamoamoa (see e.g., Dougherty et al. 2004a, 2004b; Glidden 2006). An example is Site 21698, located above Hōlei Pali to the north of the hairpin turn on the Chain of Craters Road in Pānau Nui; this complex includes 541 excavated pits (Photo 14), 299 pit/mound features, 118 mounds, 38 pit/rock scatters eight filled cracks, two alignments, two walls, two terraces, and two rock shelters (Glidden et al. 1998). As summarized by Dougherty et al. (2004b:15), however, this site is just one part of a settlement pattern that indicates “extensive agricultural features distributed throughout the upland regions.” Glidden (2006:133-134), working in inland Pānau Iki and Lae‘apuki, poses three observations on the distribution of agricultural features in her survey area:

1. Agricultural features are more frequent in areas that are not densely vegetated. “The transect swath is moderately vegetated overall and the incidence of agricultural features in this area is fairly consistent. However, in the more mauka section of the transect where the vegetation is denser, and soil development greater, the number of agricultural features drops off dramatically. This reduction in the density of agricultural features is evident above the elevation of 600 feet.”

Photo 14. Example of an excavated pit.

2. Cobble mounds are more predominant in areas with less soil development. "Perhaps the cobbles were used in addition to mulch material in areas where soil development was too minimal for the growth of crops. The use of gravel would not have been necessary in areas with deeper soil deposits."

3. Steep slopes, particularly those on aa flows tend to have terraces or linear mound features as opposed to smaller mounds and modified outcrops, which are found along more gradual slopes. Also, there is more soil development and vegetation on steep ʻaʻā slopes.

Quarried areas or excavated pits in pahoehoe surfaces in high mountain zones[62] are believed to have functioned to enhance nesting localities for the Hawaiian dark-rumped petrel. An example with specific petrel evidence is Feature 11 in Site 24337, where a dark-rumped petrel carcass and features were found within a quarried pit; Dougherty (2004:75) notes that "The pit was previously identified by biological technicians and was assigned nest number C-52A." This site type is an important contribution to the knowledge of subsistence resources, and raises a number of questions for further research (see Research Design, Section VII).

In the arid coastal area of low agricultural potential, other resources may have enhanced settlement. Salt was one such resource. ʻĀpua was well-known for its naturally produced salt (Emory, Cox et al. 1959:14). Chester Lyman, who stopped at Kealakomo Village in 1846, remarked on the salt-making, which probably had not changed much from traditional methods (in Emory, Cox et al. 1959:25):

> Their salt works are on the naked lava near the sea, the water of which is evaporated in little cups or vessels made of the Ki leaf, and holding of course but a minute quantity of water. These are laid in parallel rows over several acres, and the water poured into them a little at a time from calabases. The process is an extremely slow one, though the salt is said to be excellent for the table.

Ellis (1963:190, brackets added) comments that the inhabitants of this area of Puna produced:

> quantities of dried salt fish, principally albacores and bonitos … besides what is reserved for their own subsistence, they cure large quantities as an article of commerce, which they exchange for the vegetable productions of Hiro [Hilo] and Mamakua [Hāmākua], or the mamake and other tapas of Ora [ʻŌlaʻa] and the more fertile district of Hawaii.

Evidence of salt-making occurs in at least three coastal sites: Sites 19460, 19466, and 23796.

HABITATION COMPLEXES

The main habitation complexes occur along the coast, with a few located inland in association with agricultural areas (e.g., Site 21698, above) and resource collection sites (e.g., Charles Wilkes' description of the canoe makers' houses at Pānau, above).

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[62] Some of these sites on Mauna Loa have been erroneously recorded as "agricultural" in ASMIS.

Coastal Villages

Most of the main habitation complexes are villages or parts of villages, many of which were visited by Ellis in 1823 and a number of other travelers in later years. The names of most of these villages are known through the records of these visitors; these include (from west to east) Kūēʻē, Keauhou, ʻĀpua, Kahue, Kealakomo, Kaʻena, Laeʻapuki, Kamoamoa, Kaʻiliʻili, Poupou, and Kauka.

The great majority of the villages were in areas of marginal subsistence and many had poor sources of drinking water. Kūēʻē is a typical settlement concentration (Smart 1965:25):

> The most striking feature of the Kuee ruins is their location in such an arid and desolate area. With the exception of a small patch of soil derived from a littoral cone deposit, the entire area is nothing but barren lava, supporting scarcely a few tufts of grass. … Even the shore line itself is steeply cliffed, and access to the sea is only possible in a few isolated places. The Waiwelawela spring provides a source of warm, brackish basal water, but this could hardly be considered as offsetting the inhospitable character of the area.

On the other hand, the sea and its resources were an attraction for settlement. In 1872, G.W.C. Jones, lessee of the lands of ʻĀpua, described the coastal village with "a large lagoon with a fine sand beach for drawing a seine" (quoted in Allen 1979:15).

Coastal habitation complexes have been seriously disturbed or destroyed by acts of nature. Villages in coastal Kalapana-Keauhou were destroyed by tidal wave in the 1868 volcanic event. Most of the villages in the more densely populated Puna section of the park (from Kealakomo to Poupou-Kauka) have been buried by lava.

Pali Clusters

As noted above, there is an unusual clustering of habitation features on the pali bluffs like Hilina and Hōlei Pali. Smart (1965:30) describes two clusters of habitation features, one on the edge of Hōlei Pali overlooking Keauhou, and another further inland just below the top of Poliokeawe Pali; he found a wooden image "of a style usually associated with the pre-European period" in one of the Hōlei Pali structures. Lyman's 1853 map of Pānau Nui shows a line of houses at the top of Hōlei Pali, along what is probably the Kalapana Trail; although this map is seven decades into the post-Contact period, it is possible that these houses reflect a long-term use of the pali bluffs.

Dougherty et al. (2004b:6) describe a large concentration of habitation and agricultural features in the area above Hōlei Pali in Pānau Nui, just east of the hairpin turn in the Chain of Craters Road. This concentration is the remains of Hōlei Village (including Sites 21699 to 21737, but focusing around 21737):

> The area was first analyzed by examining topographic and aerial photographs to aid in locating specific site clusters of the village. Subsequent field inventory efforts identified dense clusters of archeological features that include 30 terraces, 24 caves, 22 enclosures, 15 C- and L-shapes, eight platforms, and six terraced platforms. Other feature types noted during the survey include two *papamu* boards, three cairns (*ahu*), one cistern, one hearth, 17 petroglyph sites, five walls, and three trail segments.

West of Hōlei Village is another inland concentration of habitation features in an area called Nāʻulu in Kealakomo ahupuaʻa. It is described by Emory, Cox et al. (1959:13, brackets added):

> Naʻulu, the breadfruit trees, is the lower plateau inland from Kaʻena, probably so named because of possessing several breadfruit trees, ʻulu. The mother of Reverend Samuel Keala of Kawaiahao church was born there. Samuel Konanui said that when his grandfather was returning [from his inland taro gardens at ʻŌlaʻā] via Naʻula that he lit a signal fire there for them to light their ground oven at Kapaʻahu [at the coast]. Holei is on top of the bluff[63] on the face of which cling groves of kukui trees. This name extended to the bottom of the grove. Samuel Konanui claimed many people lived at Holei. Hale-o-Lono, which, according to Konanui, was "the place where the rain was cooked,"…is directly on top of the Holei bluff.

Emory, Cox et al. (1959:106) add that Nāʻulu "was mentioned often by our informants at Kalapana and it no doubt was an active village in the early 1800's."

Chiefly Residences

There are no known, important high-ranking residences (or the associated temples) in the main coastal region of HAVO. However, the fact that the two main land units of this area (Kapāpala and Keauhou), as well as Kahuku in the western portion of HAVO, had access to the upland forests of Mauna Loa and to its sacred crown at Mokuʻāweoweo, and for Kapāpala and Keauhou, to the home of Pele at Kīlauea, raises the question of whether this settlement pattern is deceiving. Who, for example, controlled the acquisition of koa logs and bird feathers, and did any of the priests or priestesses of Pele live in this lowland area? Further, habitation in upland areas associated with both of these elements also should be considered.

There is one historical reference to a chiefly residence area within the present HAVO boundaries. After Kamehameha had constructed Puʻukoholā Heiau as a temple of sacrifice for his rival Keōua, he sent emissaries to entreat Keōua to come to the temple. These men "set out for Kahuku in Kau, where Keoua then held his court. [The men] landed at Kailikii [coastal village at the base of the Kahuku Fault pali], and, passing over the upland of Keekeekai, arrived at Keoua's abode[64]" (Fornander 1969:331, brackets added). This was a wooden palisade, a kapu enclosure (see Kamakau 1961:155). Based on the Fornander's description, this residence would have been located at the top of Pali o Māmalu near the present Belt Road, which means that it was likely destroyed by the 1868 lava flow.

Expedient Shelters

Associated with upland trails and resource-collecting features such as lithic quarries (see below) are complexes of walled structures built against raised lava flows. These appear to have served as

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63 It is interesting that Konanui uses the name Hōlei for only the top of the bluff and not for the entire length of the pali as it is used today.

64 Keōua's most well known royal residence in Kaʻū was at Punaluʻu; it was associated with the luakini heiau of Punaluʻunui (Kamakau 1961:152).

expedient shelters to protect from the brutal high mountain conditions of strong winds and intense sun. Moniz Nakamura (2003a:74) notes that "in some areas along the Keʻāmoku flow features are virtually continuous along the edge of the flow." For example, Site 22973 is a complex of 20 features (six C- and U-shaped structures, two enclosures, four mounds, three rock piles, and five walls) located within a recessed area of the Keʻāmoku flow.

CAVES: FOR SHELTER AND WATER

Caves constitute a major feature of the HAVO inventory. In general, they probably represent short-term occupation associated with trails or near-by activity areas, such as for cultivation and bird catching (as opposed to ritual caves described above). Ellis (1963:155-156) describes a cave used by travelers[65]:

> We reached Keapuana, a large cavern frequently used as a lodging-place by weary or benighted travellers. The sun was nearly down, and the guides proposed to halt for the night in the cave, rather than proceed any further, and sleep in the open air. The proposal was agreed to, and when we had gathered a quantity of fern leaves and grass for our bed, and collected some fuel for the evening fire, we descended about fourteen feet to the mouth of the cavern, which was probably formed in the same manner as those we had explored in the vicinity of Kairua. The entrance, which was eight feet wide and five high, was formed by an arch of ancient lava, several feet in thickness.
>
> The interior of the cavern was about fifty feet square, and the arch that covered it, ten feet high. There was an aperture at the northern end, about three feet in diameter, occasioned by the falling in of the lava, which admitted a current of keen mountain air through the whole of the night.
>
> While we were clearing out the small stones between some of the blocks of lava that lay scattered around, a large fire was kindled near the entrance, which, throwing its glimmering light on the dark volcanic sides of the cavern, and illuminating one side of the huge masses of lava exhibited to our view the strange features of our apartment, which resembled, in no small degree, scenes described in tales of romance.
>
> When we had cleared a sufficient space, we spread our beds of fern-leaves and grass on the rough floor of the cavern, and then mingled with the cheerful circle who were sitting round the fire.

The premier example of a culturally-used cave is the Ainahou Ranch Cave (Site 25715), the longest surveyed cave within HAVO with a total passage length of 7.11 km and a vertical range of 352 m; it has 23 known entrances. Formed from the 350 to 500 year old ʻAilāʻau lava flow, the cave contains petroglyphs, temporary habitation sites, water catchment systems, terraces, and one burial. Other examples of shelter caves include Roadcut Cave (Site 24950, Photo 15) and Kupukupu Water Cave (Site 23645; Photo 16) in east HAVO and the Big ʻŌhiʻa Cave (Site 23006) in the Footprints area.

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[65] Although located to the southeast of Kīlauea Crater and therefore outside of HAVO, Ellis' account is a vivid description of cave use.

Numerous witnesses during Boundary Commission proceedings for Kahuku mention named caves in the mountain region of the ahupua‘a. Witness Kumauna states the “boundary between Manukaa and Kahuku runs toward Kona to ana Ohialele (a cave where natives used to live) Kapua on the makai side and Kahuku on the mauka side.” Ohialele cave is also mentioned by witnesses Kamakana, Kenau, J. Kaulia, Kaiwi, and Awakamanu. Boundary Commission representatives made a trip to Ohialele in March 1873; on the 18th, the journal entry reads:

> Went from camp to Ohialele on foot over a road of rough pahoehoe covered with bushes and grass. Ohialele is a rocky knoll, of scrub ohia with a number of caves on it, a short distance below the koa woods. There is a clump of koa trees a few hundred feet makai. Erected a pile of rocks and cut the name *Ohialele* on the makai side. Elevation 5900 feet.

Photo 15. Roadcut Cave (Site 24950), 2006.

Photo 16. Kupukupu Water Cave (Site 23646), 2006.

Other caves named in the Kahuku testimonies are Kumualii, Kanahua, Kauupa (or Kanupa), Keanaohua, and Kaanapaakai.

Caves were also a source for water through drip collection. In the 1987-1989 salvage work around Waha‘ula Heiau and Poupou-Kauka Village, Carter and Somers (1990:3) describe a water cave as one of the “most impressive of the almost 9,800 recorded features in the 1987 survey:”

> The water cave was in the pahoehoe and may have been the cave referred to in Emory, et al. (1959:12). According to that reference “‘Ilea is the name of a hidden water inland of Waha‘ula in a cave named Wai-pouli, Dark-water.” The cave was in a large east-west running crack in dense basalt. It was about 10 meters (32.8 feet) down from the opening of the cave to the water level. Three large *alā* stones had been placed at the edge of the water, probably for a smooth kneeling surface.…Water was found in three pools, the largest of which was 12 meters (39.4 feet) long, 3 meters (9.8 feet) wide and from 2.0 to 2.7 meters (6.6 to 8.9 feet) deep.

The salinity of the water in this cave was very low, measured at only 0.75 parts per thousand, which compares to 32 to 35 parts per thousand for ocean water (Chai et al. 1989:3, in Carter and Somers 1990:7).

Subsequent survey above the Paliuli fault scarp in inland Pānau Iki identified numerous lava tubes with continuous drips of water from ceilings, as well as two caves containing the remains of gourd water catchment vessels (Sites 19463, 19464). Glidden (2006:34) describes the water collecting system in Site 19464:

> A number of large ʻopihi were found upturned, presumably to collect water from ceiling drips. Pecking on the pāhoehoe shelf on the SE wall appears to have functioned to hold the "cups" in place.
>
> …A stone wall, 0.3 to 0.35 m high, separates the lower (southern) part of the cave. This partitioned area appears to have served the purpose of water collection. A large gourd (34 cm high) was found just to the south of the interior stone wall. This gourd was found upside down with the top cut off, perhaps for use in water collection.

Ladefoged et al. (1987:73) describe a water-catchment experiment carried out by Cleghorn and Cox (1976:50) in a Hilina Pali cave. Over a five-day period in March 1975, a "mean of 235 ml (7.9 oz) of water per day was collected from a single roof drip. In a large lava tube in their own survey area in the Kalapana Extension, Ladefoged et al. observed numerous continuous roof drips, under some of which were small piles of rocks that may have served to hold gourd containers upright.

TRAILS

The trails of HAVO are a vital element in understanding the patterns of use of the region, including settlement, resource collection, and island communication. Many sections of trails have been archeologically mapped, and major trails are known from both archeological and historical sources, but a complete and integrated trail study has not yet been completed.

As is currently known, trails in HAVO express a wide range of characteristics, although trails that are consistent with Apple's (1965:Appendix 2) trail type "A" are generally identified as pre-Contact and early post-Contact transportation routes. These are single file foot trails, characterized by one-man width, linear sections of pavings, use of flat pahoehoe slab or cobble stepping stones, and/or a combination of these features. At HAVO, trails across open lava flows vary depending on the character of the lava. Across smooth pahoehoe, trails are often defined only by the worn marks from the continuous tread of footfalls or by spaced ahu that mark a point-to-point route; an excellent example of the latter is Site 21700 in inland Pānau Nui above Hōlei Pali, which is described by Dougherty et al. (2004a:20) as:

> The trail route consists primarily of an ill-defined track with no worn tread or other trail modifications except for low lying cairns spaced at relatively close intervals. The trail generally contours the existing slope and ascends upwards to the northeast. Numerous cairn (*ahu*) are placed along the trail at regular intervals and generally consist of low lying mounds (20-40 cm height) and range from 2-4 courses of stacked pahoehoe cobbles.

On the aa flows, trails take many forms, including worn pathways, stepping stones (large slabs set equi-distant for each footstep), and linear pavings (slabs set like flagstone flooring in a linear arrangement).

Photos 17, 18, and 19 are examples of trails across lava flows.

Photo 17. Stepping stone trail outside Entrance 6 of Road Cut Cave (Site 25940).

Photo 18. Worn path across an aa lava flow (along the Puna-Kaʻū Trail east of ʻĀpua).

Photo 19. Worn path across a pahoehoe flow (along the Puna-Kaʻū Trail in Kealakomo.

Major Trails

Major trail routes across HAVO are known from historical, oral historical, and archeological data. They parallel the shoreline and cross over the mountain summit, serving as cross-island routes connecting districts, ahupuaʻa, and villages. As its name indicates, the Puna-Kaʻū Trail (a contributing element of the Puna-Kaʻu Historic District, Site 05503) traversed the Puna-Kaʻū shoreline. The Kalapana-Volcano Trail (Site 20443) extended from the Kīlauea Summit to Punaluʻu Heiau on the Puna coastline; best known as a historic period route, it likely had its origins before western Contact. Emory, Cox et al. (1959:91-92) describe the trail from the east end:

> This trail…connects with the end of the State road just beyond the Village of Kapaʻahu and continues almost due west for six miles along the gradually ascending mountain slope and then enters the steeper area and becomes a winding mountain path ending at the

> terminus of the Chain-of Craters Road. The lower straight section takes no particular advantage of the changing terrain, but goes from one point to another in the shortest distance. The hollows in the pahoehoe are filled to the level of the high points with stones. These fills are usually faced on the surface to keep the stones from shifting. The roadbed is six to eight feet wide and is bordered on each side with curbstones.

Similarly, the Keauhou Trail (Site 23314) is a historic period route that was probably built on the alignment of a pre-Contact mauka-makai trail through the ʻiliʻāina of Keauhou.

Trails across the mountain saddles (between Mauna Loa and Kīlauea, and between Mauna Loa, Hualālai, and Mauna Kea) linked districts. A commonly used trail from Hilo to Kaʻū passed in the vicinity of Kīlauea Crater (the Kaʻū-Volcano Trail, Site 22982). One of the most famous transits of this route was in 1790 when the army of Keōua was decimated by an explosive eruption from Kīlauea. Site 05505 (the Footprints area) covers approximately 4,284 acres and contains an unknown number of fossil footprints and hoofprints in a superficial ash deposit laid down by this eruption.

The Wilkes expedition in 1840 traveled from Kīlauea to Hilo along a route that followed the craters of the East Rift to upland Pānau and then to the northeast (probably the Kīlauea-Makaopuhi-Glenwood Trail). Wilkes (1845:170) notes their fortune in hiring as carriers "a body of fine young men that had come up from Kapoho at the southeast point of the island…they were all well acquainted with the road we were about to travel."

Local Trails

Local trails linked the shoreline villages to inland resource areas (e.g., between Kealakomo Village and Kealakomo Waena, see Durst and Moniz Nakamura 2003) and connected residential complexes to each other (e.g., stepping stone trail Site 19468 in Pānau Nui connects residential areas Sites 19642 and 19472).

Spears (1975b:78-79) discusses a branch trail of the Kalapana-Volcano Trail that extends southwestward to the coastal point of land called Wilipea. This trail would have connected the kīpuka agricultural area above the Paliuli fault scarp with the coast. In 1889, C.J. Peʻa, owner of Grant 1538 (this area) and resident at a homestead above the fault scarp, was taxed on canoes. Spears (1975:76) suggests that Peʻa may have launched his canoes from Wilipea, where a canoe shed is the largest structure in the coastal archeological complex (Site 19460); she also posits a connection between the name Peʻa and the place name Wilipea. Interesting to note is the shoreline configuration at Wilipea that does not appear conducive to canoe launchings; i.e., it is a low sea-cliff.

High Mountain Trails

Whereas the summit of Kīlauea was along the route of a commonly used inter-district trail, the upper reaches of Mauna Loa were less frequented, probably limited primarily to expeditions for resource collection or for propiating the volcano god Pele during times of eruptions. Apple (1973) suggests that the historically documented Ainapo Trail (Site 05501, see below) had pre-Contact origins.

Although dating from the 1870s, Boundary Commission records give an indication of traditional lifeways, including travel. The records document travel (if not specific trails) into the mountain region. For Kahuku ahupuaʻa, witnesses describe a road toward the saddle area between Mauna Loa, Hualālai, and Mauna Kea. Witness J. Kauila described "Umi's road" above Puʻu o Keokeo as being "very distinct

in olden times," witness Kaoio described a road from the Ka'ala'ala/Kahuku boundary to Humu'ula [the saddle between Mauna Kea and Mauna Loa], and in a journal of a trip by the Boundary Commission, the party "proceeded up the mountain to Umi's road elevation 7,100 feet."[66] The USGS Mauna Loa topographic quadrangle, surveyed in 1920 and 1925-1926, shows two "ancient trails," one of which could be "Umi's road" (extending west from Umi Caverns) and the other could be the Humu'ula trail (extending north-south at around the 9,800 ft elevation); the map shows a "sleeping cave" adjacent to the latter cave at 9,941 ft asl.

QUARRIES AND WORKSHOPS

A substantial number of quarry areas for volcanic glass have been found at HAVO, the majority in the Footprints area, which covers about 1,000 acres and includes some 277 glass workstations (Moniz Nakamura 2003a). Twenty-eight quarries have been found in this area and appear to be associated with the Ka'ū-Volcano Trail (Site 22982). Moniz Nakamura (2003a:79) suggests that "Hawaiians were purposefully gathering this material as they traveled through the area along known trail routes." In addition, there are two adz-quality basalt quarries at HAVO. The first known quarry was in the crater of Keanakāko'i, which was partially filled by an eruption in 1877; the lava is said to have covered the quarry area. A second basalt quarry (Site 23007) is located near Kīlauea Crater and consists of worked lithic blocks that were ejected from an explosive eruption (Moniz Nakamura 2003a:79, 2006).

In addition to the ejecta quarry, two lithic workshops (Sites 23000 and 23022) and a cave containing lithic debris are also found in the Footprints area. Of the workshops, Moniz Nakamura (2003a:79) writes: "These sites are remnants of flake reduction of dense black basalt. …and are likely remnants of 'testing' of local materials rather than repeated use." The Big 'Ōhi'a Cave (Site 23006) contains lithic debris combined with evidence of habitation. The cave measures 12 by 4 m with a ceiling 100 cm high; a hearth is located immediately inside the entrance and lithic debris is scattered on the interior floor and outside the entrance (Moniz Nakamura 2003a:221).

Unlike some of the other major volcanoes in Hawai'i, Mauna Loa and Kīlauea have no known flows of dense basalt that were suitable for traditional tools. This makes the ejecta quarry of Site 23007 of substantial value. This site raises questions of control distribution of the resource. Study of geochemical composition is on-going for purposes of analysis of distribution.

PETROGLYPHS

The petroglyphs of HAVO, which occur as independent complexes or as components in a variety of types of sites, constitute one of the park's most valuable archeological categories. They are critical to an understanding of aspects of ceremony and tradition, and are also indicators of land boundaries and trail markers (Carter and Somers 1990; Glidden 1995; Lee and Stasack 1999; also see Appendix C). The Pu'uloa Petroglyph Field (Site 23271), which is an extensive area of petroglyphs on a raised pahoehoe pressure dome, is discussed in detail in Section III. This concentration of carved images contrasts with isolated images or small clusters in caves and open sites.

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[66] A well-known mountain trail across the saddle area is called Umi's Road. Whether the Kahuku trail connects with this famous route is not clear.

Petroglyph images include anthropomorphic, abstract and geometric figures, circles, concentric circles, and cupules, and animal figures, as well as historic writing (Photo 20).

In addition to ceremonial, ritual, or artistic functions, petroglyphs may also have served as land boundaries and trail markers. Carter and Somers (1990:25) note the presence and variety of petroglyphs marking the boundary between Pānau Iki and Pānau Nui. At Site 19475 in Pānau Iki, a line of 13 mostly anthropomorphic petroglyphs follow a foot-worn trail in the pahoehoe, thus appearing to mark a trail route (Glidden 2006:38). Emory, Cox et al. (1959:103) describe the trail from Kahue to Kealakomo:

> As the trail from Kahue enters the village wall it is bordered by an alignment of stone sixteen feet apart forming a curbed street for about 100 yards….There are a few petroglyphs along the way and these line up roughly with another group of petroglyphs along a wall opposite the church. These petroglyphs no doubt mark the old trail into the village.

Papamū, which are grid-like arrangements of small depressions, are the "board" or playing surface for the game of konanē. They occur most frequently in association with habitation sites. Emory, Cox et al. (1959:2), however, note an unusual clustering of 70 papamū at Kealakomo Village, including 17 papamū in a cluster associated with a house enclosure (although the fact that the house enclosure incorporates a papamu stone in its construction suggests that the house post-dates the papamū) (Emory, Cox et al. 1959:Map VI-E).

Photo 20. Petroglyphs along the Puna-Kaʻū Trail (near the Chain of Craters Road trailhead).

ARCHEOLOGICAL SITES OF THE 19TH AND EARLY 20TH CENTURY LANDSCAPE

After western Contact, the world of the people of the HAVO area began to change in ways that are well-documented for Hawai‘i as a whole. Population declined and many coastal villages were abandoned. The mid-century land reforms brought a new order to residential organization and resource collection. Feral goats and cattle ran uncontrolled across the landscape. Economies changed as a world market introduced new commodities to the former subsistence lifestyle and generated market-based resource gathering; sandalwood and pulu collection and herding of goats and cattle became a part of life in the region.

Over time, these changes had significant archeological consequences. Despite population loss, the continued occupation of the HAVO region resulted in an archeological landscape that has an added and significant “layer” of post-Contact change, an archeological horizon marker of introduced artifacts along with architectural changes (as well as new archeological forms). Many archeological features found in the dry lands of HAVO today are remnants of the herding era, and the great majority of habitation sites have a substantial 19th century component.

VILLAGE ORGANIZATION

One of the major architectural changes of this period was an increased emphasis on wall building: around individual houses, around houselots (see the aerial photograph of a house site in Appendix B), and around whole villages. Many villages in the HAVO area, as well as other places on the island, were enclosed by a newly constructed wall on the inland side of the entire village (as shown in Figure 27, comparing Ka‘ili‘ili Village at HAVO with a site on the leeward coast of Kohala). In some cases, natural features were used as an extension of the wall. Kamoamoa Village, for example, was enclosed by walls on its east and west sides that extended inland to the Paliuli fault scarp, which formed the inland side of the village enclosure. Poupou-Kauka Village was “bounded on its inland side by a core-filled wall, and in places, a geologic fault crack which has lifted the shore area above the hinterlands” (Ladefoged et al. 1987:26).

Although there were new elements to the cultural system, such as schools and churches, the archeological remains of these are difficult to distinguish from the post-Contact-modified house sites. For example, in the now destroyed village of Kealakomo, a platform that may have been interpreted as a residential site was identified by an informant as the remains of a church (Emory, Cox et al. 1959:101).

Water in this arid area continued to be a problem for habitation. Some of the brackish water sources used in the traditional fashion were enhanced in the historic period by the construction of windmills. Emory, Cox et al. (1959:111) record two wells at Kamoamoa and Lae‘apuki; these were deep, circular pits that were faced with large stones, to which windmills were attached. They note that “it is uncertain to what extent the facing is ancient, but old Hawaiian wells do exist similarly lined with stones. They add that they “were told by Maria Roberts that the windmill at Kamoamoa was used to pump salt water for the manufacture of salt in the adjacent rock salt pans.”

Hamilton (1966, in Durst and Moniz Nakamura 2003:27) notes the presence of concrete water cisterns at Nā‘ulu, Hōlei, Paliuli, “Pea’s Place on the old Kalapana Trail” (see below), and Kealakomo Waena.

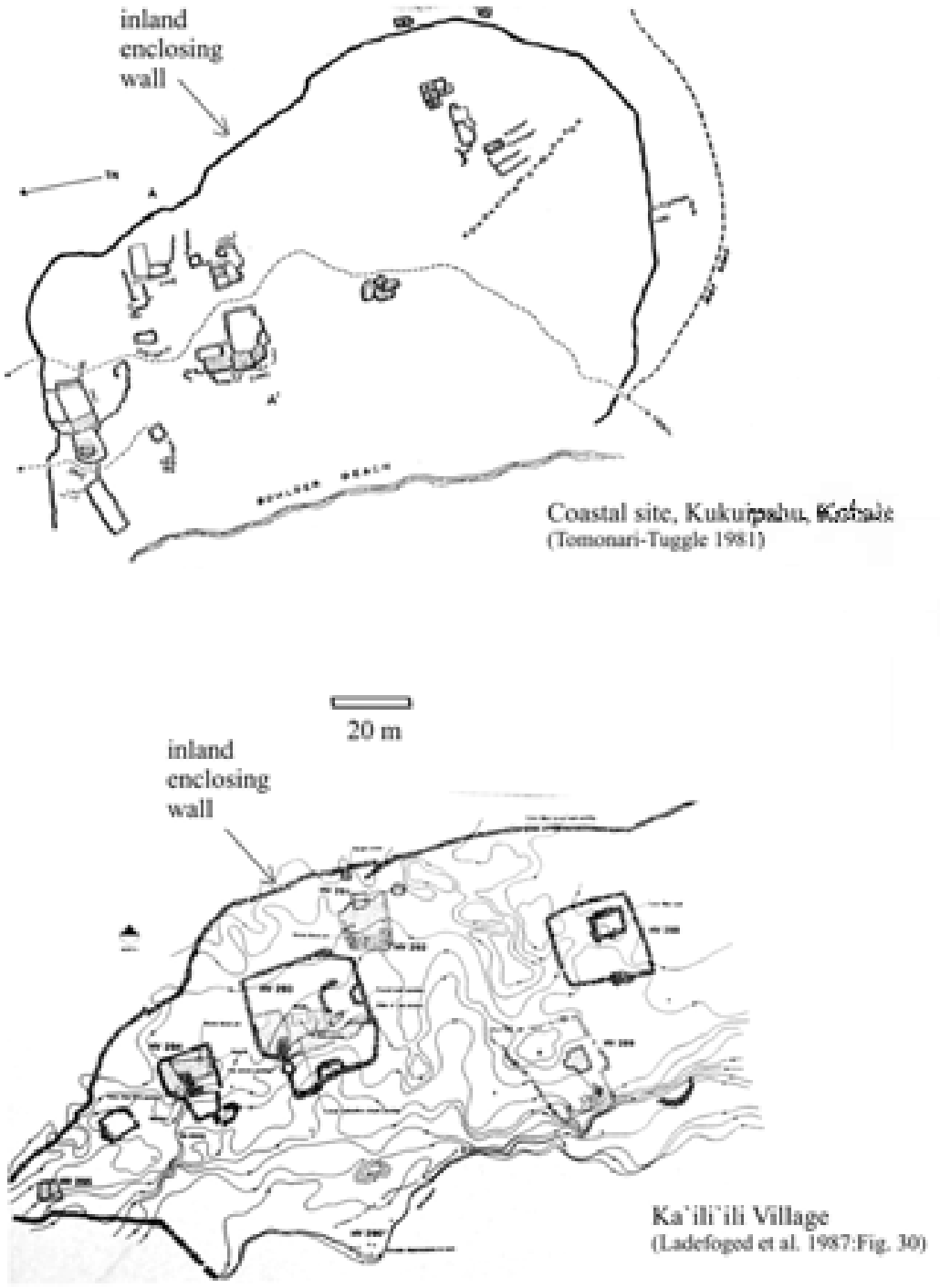

Figure 27. Comparative examples of walled villages at HAVO and in the district of Kohala.

The inland residential pattern of the traditional period (i.e., associated with kīpuka above the pali scarps) appears to have continued into the historic period. Dougherty et al. (2004b:12) describe Hōlei Village, which is interpreted as a traditional Hawaiian habitation complex associated with inland agriculture, as:

> … utilized for both agricultural and grazing pursuits: landscape modifications extend throughout the area as evidenced by dense clusters of agricultural features, and multiple large enclosures are distributed throughout the area indicating possible historic grazing and ranching activities.

There is also a distinct association with major trails; for example, the mid-19th century Peʻa homestead (Site HV-376) along the Volcano-Kalapana Trail (Site 20443). Olson (1941a:57) writes that in the late years of the 19th century, a frame house on the Kalapana Trail offered shelter to travelers:

> This place was then, and still is, owned by a Hawaiian family named Pea. The house served as a stopping-over place for many years. Although now long deserted and in poor repair, the house is still standing along, what is today, the Kalapana Trail.

The Peʻa family, led by C.J. Peʻa, held Grant 1538 in Pānau Iki from 1875; but the Peʻa name appears earlier in tax records for the ahupuaʻa from 1869 (Allen 1979). In 1889, four members of the Peʻa family, including C.J. Peʻa, paid taxes on 78.75 acres of land, several houses, 200 goats, 40 head of cattle, 24 horses, 20 pigs, five donkeys, five mules, and crops including ʻawa (Spears 1995b:74).

TRAILS AND TRAIL SHELTERS

Another common pattern of architectural change is seen in the trails, where all over the island of Hawaiʻi, earlier footpaths were reconstructed as curbed horse trails; many were later transitioned to carriage roads. Apple (1965:Appendix 2) presents a typology of historic trails:

> Trail type "AB." Modification of Type A trails to accommodate horses; primarily widening (where possible) and adding kerbstones; possibly some ramping. Developed in the post-1820 period.
>
> Trail type "B." New trails built for horse transport; characterized by straight lines (where possible), kerbstone edging, both one- and two-horse width. Developed after horses became a more common method of transportation, post-1820 period.
>
> Trail type "C." New two-horse trails, "built as straight as possible between two major points." Constructed in the post-1840 period.
>
> Trail type "D." Modification and re-alignment of Type "C" trails to accommodate wheeled vehicles.

An exceptional example of the post-Contact transformation of trails is the Keauhou Trail (Site 23314), which in traditional times connected the coast with the uplands (Trail type "A").[67] In the late 19th century, the trail, which was the primary route to bring tourists to Volcano House lodging before

[67] As discussed above under traditional trails, the Trail type "A" is a single file foot trail, characterized by one-person width, linear sections of pavings, use of flat pahoehoe slab or cobble stepping stones, and/or a combination of these features (see Aple 1965:Appendix 2).

1894, was developed into a horse path in its lower section (Trail types “B” and/or “C”) and a road in the upper portion near the volcano (Trail type “D”).

Trails for Mounted Travelers

The Kalapana-Volcano Trail (Site 20443) is an example of a typical trail route of late 19th century construction for mounted travelers (Trail types “B” and “C”) (Photo 21). Emory, Cox et al. (1959:91-92) describe the trail as beginning at the east end near the village of Kapaʻahu, from which it then:

> continues almost due west for six miles along the gradually ascending mountain slope and then enters the steeper area and becomes a winding mountain path ending at the terminus of the Chain-of Craters Road. The lower straight section takes no particular advantage of the changing terrain, but goes from one point to another in the shortest distance. The hollows in the pahoehoe are filled to the level of the high points with stones. These fills are usually faced on the surface to keep the stones from shifting. The roadbed is six to eight feet wide and is bordered on each side with curbstones.”

Photo 21. Kalapana Trail, looking west toward Kīlauea (Emory, Cox et al. 1959:Photo 16).

Nearer the coast, travel across the lava fields of west Ka‘ū had always been treacherous, inviting canoe travel rather than an overland route. However, with the increasing use of pack animals in the 19th century, improvements were made to roads in this region. The missionary Henry Kinney (1851:3) of the Waiohinu Mission Station reported in 1851 that “this year the people have made a horse road to the borders of Kona, over the famed lava district, never forgotten by those who have once traveled over it.”

Like the Keauhou Trail, the ‘Āinapō Trail was also used by mounted visitors. The NRHP site form notes that abraded spots along the trail occur on the lava surfaces that are subject to “pockmarking by metal blows,” indicating wear from iron-shod horses and mules. Apple (1973:3) writes that “in 1913, Julian Monsarrat and men of the Kapapala ranch converted the Ainapo Trail to almost a bridle path in contrast to its former footpath condition.” The 1921 and 1928 USGS topographic quadrangle labels the route of the ‘Āinapō Trail as “Menzies Trail” (Archibald Menzies was surgeon and naturalist with the 1792-1794 expedition led by George Vancouver).

Pulu Trail

A unique variation on historic trail construction, and one which may not have left any apparent physical remains, are trails built by pulu pickers. Brigham (1909:94) describes a pulu trail of the early 1860s:

> At the height of eighteen hundred feet we entered the fern forest … As we came to the fern region, we turned into a path cut through the jungle, and, as the soil was a soft black mould, it had been paved with the items of the tree ferns about six inches in diameter. This “corduroy” road was constructed with great labor by the natives, and we calculated that forty thousand piece of fern were used to build it. The fern are cut in lengths of six feet, and many of them sprout and make a green edging to the roadway.

High Mountain Trails

In the high mountain areas, where travelers ventured off the major transportation routes, trails continued as foot and pack animal routes. The ascent of Mauna Loa was a grail to adventurous visitors in the 19th century. But successful ascent was possible only from the east and south. Dougherty (2004:10-34) describes the numerous attempts to the summit beginning in 1779. The only attempts from the west were made by John Ledyard in 1779 and Archibald Menzies in 1794; both failed due to impenetrable thickets and undergrowth in the steep, high mountain region. After these early attempts, explorers and visitors took the Kīlauea and Kapapala routes to the summit, primarily using the ‘Āinapō Trail (Site 05501). The ‘Āinapō Trail route is described as (NRHP nomination form):

> A narrow, single-file, twisting, and occasionally slightly abraded trail over fields of cooled, hard, tough lavas; some fields being rough and scoriaceous and other smooth and billowy; above 11,600-foot elevation; leading up the broad southeast flank of Mauna Loa volcano to and along the east side of Mokuaweoweo, the major summit crater.

Trail Shelters

Trail shelters, especially in the Mauna Loa summit region, were necessities to protect from high winds, intense sun, and freezing cold (Photo 22). The Wilkes’ Campsite (Site 05507) dates from the 1840-1841 US Exploring Expedition to Mauna Loa and consists of a complex of low rough walls that

were expediently built to provide shelter for the brief stay of the expedition contingent; each individual structure consisted typically of a tent that was encircled with a drylaid wall as high as the tent eaves. When the camp was abandoned in January 1841, the tents and portable house were dismantled, leaving only the standing walls.

Caves and cracks in the lava flows were also used for shelter; they were readily accessible and required small modification. One example is Site 24349, a cave located at the 9,700 ft elevation on the eastern slopes of Mauna Loa. On the surface near the cave opening was a metal lid inscribed "Sawkins 1851" (Dougherty 2004:102), clearly ascribing the cave to the 1851 James Gay Sawkins expedition to the summit of Mauna Loa. A fatal attempt at taking shelter is represented by the remains of two individuals in a partially collapsed lava blister at the southeast edge of Moku'āweoweo. Dougherty (2004:36) writes:

> Study of the remains revealed both individuals to be male, one middle-aged (35-45) and one younger, fully mature adult (aged 20-25) (Pietrusewsky 1976). The positioning of the remains suggested the two were embraced in the low shelter with the elder male sheltering the younger. The presence of historic-era artifacts firmly places the site in the post-contact era; the remains may represent an ill-fated high altitude expedition where the two were forced to seek crude shelter, eventually succumbing to the elements.

Photo 22. C-shaped structure in upland Mauna Loa (photo courtesy of Jade Moniz Nakamura).

COMMERCIAL ACTIVITIES

Commercial activities in the HAVO region were divided among tourism, ranching, and market-based resource collection. Each activity left a distinct mark on the landscape.

Tourism

In the upper regions of Kīlauea, various commercial activities resulted in a new style of architecture. At the crater, early iterations of visitor accommodations mimicked traditional stone and thatched structures, albeit larger and with western guests in mind; the 1866 hotel built by J.C. Richardson and Company was a large "thatch house which had three tiny bedrooms, an indoor fireplace, and a semi-permanent staff (Martin and Jackson 1995:13). The first formal western-style hotel was built 1877,[68] when some 400 visitors a year were coming to the crater (Martin and Jacson 1995:14, brackets added):

> This [wood] structure had six small bedrooms off a central hall, a large parlor with brick fireplace, and a dining room. It also had a permanent staff consisting of a live-in manager, sometimes with family, and a cook, usually Chinese. Associated with the hotel were stablemen and volcano guides, usually Hawaiian but some were Europeans, who apparently lived in the neighborhood.

At the coast, Keauhou Landing was a key link in the tourist itinerary, being one of the main access points for visitors bound for the crater. The Keauhou Road (Site 23314) from the landing to the Volcano House was started in 1885 by the Wilder Steamship Company and was completed in 1886; visitors traveled "four miles by horseback up the pali from the landing before being transferred to the more comfortable carriages" for the seven miles from Hilina Pali to the volcano (Blickhahn 1961:47). Keauhou Landing apparently fell out of use after 1894 when improvements on the road from Hilo made that route convenient and comfortable (four-horse stagecoaches could make the former two-day trip in just six and a half hours; Blickhahn 1961:48). The remains of the landing (Site 19447) cover 10,200 square feet and consist of enclosures, walls, a rectangular cistern, walkways, stairs, and pahoehoe quarries.

Ranching

The introduction of large domesticated animals resulted in a distinctive form of archeological remains, and may have been a factor in the increase of general wall-building (noted above) as houselots and villages were enclosured for protection (also certainly related to property privatization). Management of livestock resulted in a functionally new type of structure, specifically animal enclosures and pasture walls. Smart (1965:32) describes "the huge and well-preserved goat corral which was built only recently and was used until a few years ago;" this structure (Site HV-149) at Kahue is part of the interpretive Puna-Kaʻū Coastal Trail. Other similar corrals are at coastal Laeʻapuki (Site HV-328) and inland Kahue (Site HV-199).

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[68] This building (Site 05508) is presently used as the Volcano Art Center.

For inland Pānau Nui, Pānau Iki, and Laeʻapuki, Dougherty et al. (2004a:12) note the presence of "multiple large enclosures…distributed throughout the area indicating possible historic grazing and ranching activities."

Resource Collection

Market-based resource collection during this period focused on the acquisition of pulu. A major pulu processing area (Site 21215) is located at the upland boundary of Pānui Nui and Kahauale'a ahupua'a at an elevation of 2,800 feet (Glidden 1998; Glidden and Rivoli 2000). The pulu processing site, which is situated on an 1840 lava flow, is located along the Nāpau Trail between Makaopuhi and Nāpau Craters. It was built in 1851 for the purpose of drying and baling pulu for commercial sale.

Trails made of cut hāpu'u fern stalks in a "corduroy" pattern are described above.

Traditional salt-drying areas may have been modified or enhanced to provide salt and salted fish for a commercial market. Spears (1975b:87) notes that "extensive stone salt drying trays, identified in and around sites H.V. 212-220 [renumbered Site 19460] were increased in number for commercial enterprise. …It has been recently observed that some salt drying trays are built on top of a coastal foot trail." Lyman (1846, in Emory, Cox et al. 1959:25) writes that the residents of Kealakomo Village sold salt at "the exceedingly low price of 25 cents a bag, which will contain I should judge ½ a bushel or more."

It is possible that many of the traditional agricultural areas were used for commercial crops during this period. Glidden (2006) identified numerous agricultural features in inland Pānau Iki and Laeʻapuki that were in close proximity to habitation sites with historic components (as expressed by copious amounts of post-Contact artifacts).

PETROGLYPHS

Another of the changes that occurred across the island and in much of Hawai'i was the introduction of new elements to petroglyph complexes, not simply representations of introduced artifacts and animals, but personal names and other words (Photo 23).

SITES OF THE 20TH CENTURY

The recorded sites in Appendix A (see Fig. 22) include some 38 that represent major western activities in the HAVO region, including ranch structures, military activities, CCC construction, roads, pulu processing, airfields, volcano visitor facilities, and scientific facilities related to volcano research.

TOURISM

Most 20th century visitors to the mountain stayed in the comfort of the Volcano House, which in the early years of the century underwent alterations with each change of ownership. Guest support went beyond accommodations alone and included water supply, food preparation, waste disposal, and guest activities. Martin and Jackson (1995) describe gardens and livestock areas that supported the hotel

Photo 23. Historic period petroglyph on the Puna-Kaʻū Trail.

restaurant, riding stables and pasture for guest trail rides, steam bath houses, rainwater storage and pumps, and garbage dumps. Although much of the main visitor area has been developed and there is little trace of 19th and early 20th century use, some sites remain. Subsidiary sites related to the volcano and tourist activity include bath houses that took advantage of natural steam vents (e.g., Site 19456, Steam Crack Bath House) and dump sites in volcanic cracks (e.g., Site 19248, Catchment Dump Site). Site 19458 (the HQ Crack Dump) measures up 10 m wide and 20 m deep, and was reportedly the main dump for Volcano House (Scheffler and Keswick 1994:3).

The Volcano House offered luxury services when compared to accommodations at the summit of Mauna Loa. Buffeted by high winds, beaten by intense sun, subject to freezing temperatures and thin air, the Mauna Loa summit was a particularly difficult environment for casual visitors (as well as experienced mountaineers). Until it was replaced in 1934 by the Summit Rest House, Jaggar's Cave (Site 24346) was the main shelter for visitors to the summit of Mauna Loa. The cave sat on the north rim of Mokuʻāweoweo and was first used by Jaggar and his companions on a 1920 expedition, the first pack animal trip to the summit (Dougherty 2004:87).

RANCHING

In spite of the widespread impacts of ranching on the HAVO landscape, the remains of ranching activity have not been systematically or formally documented, with the exception of the Ainahou Ranch Cultural Landscape Inventory (CLI 2004). Ranch-related archeological sites include water tanks (recorded for Ainahou Ranch as Sites 19446, 19450, and 19452 through 19454), trails used for herding cattle (Kahuku-Ainapo Trail, Site 24121), corrals and goat pens (e.g., Site HV-149 at Kahue, HV-328 at coastal Lae'apuki, and HV-199 in inland Kahue), and extensive networks of walls.

A bronze tablet monument constructed in 1956 commemorates the 1868 lava flow and its destruction of the ranch house of Captain Robert Brown, founder of Kahuku Ranch. Located on the seaward side of the Belt Road, the plaque is enscribed "Site of the Home of Captain Robert Brown, Whaler, Rancher, Destroyed April 7, 1868 by Lava." It was set in place in 1956 by Brown's descendants. In a letter to her daughter, Mary Louise Rothwell[69] (1956) describes the ceremony:

> Tuesday early we left for the 1868 flow. Frank had arranged with a Hilo contractor to set the bronze tablet in a concrete block, and to have it taken to the spot in Kau where it was to be placed. Frank & Blair did not get over, as they could not get seats on any commercial planes for the early flight, and Frank couldn't get the small plane he wanted to fly over.
>
> Well, anyway, the timing of the contractor with the monument, and us, and the truck with the crane on it was perfect. We all met at Waiohino at 10 A.M. and proceeded to Kau. We were going pretty fast, Rhodes driving, and finally reached the tourist sign of the 1868 flow, but could not find the old original sign. (We had passed it.) We went back & forth and then decided that time was getting short (the Spencers had to take a plane for Maui at 3 P.M.) so we selected a likely spot and had the thing set. (It weighted 1300 lbs.) The concrete foundation was spread on the lava, the crane lifted the stone up and set it down in place, and we draped it with orchid leis and took pictures.
>
> The crane truck departed for Waiohino, and we were still standing in the road admiring the thing, when the crane man dashed up in a little old jeep station wagon driven by the Portugee foreman of Glover's ranch. They said "Hey you guys! You got da wrong place! Dis not da place!!! Da sign one mile half over odder side!" Well! So the crane truck came back, lifted the plaque off its bed of wet concrete, and we all went a mile & a half towards Hilo, and there was the original sign. But anyway, it was a simple matter to lay some more concrete, and lift the thing off and place it where it belonged.

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[69] Mary Louise Rothwell was the wife of the great-grandson of Captain Robert Brown. Her husband, Guy Rothwell, was the son of May Haley Rothwell, daughter of Nelson Haley and Charlotte Brown.

HISTORIC TRAILS AND ROADS

In the early 20th century, travel continued by foot and horseback (Photo 24), but as the century progressed, graded and paved roads were necessary to accommodate motorized vehicles. The transformation of transportation routes through HAVO reflect the needs of the evolving technology.

Moniz Nakamura (2003a:74) notes the convergence of early 20th century roads in the area near the western HAVO boundary near the Kīlauea Summit, "the start of a major transportation network that links the Kaʻū District to Kīlauea, Hilo, the upland resources of Mauna Loa and the mid-elevation communities." In addition to the trails discussed below are the Old Puna-Kaʻū Trail (Site 23021), the Keʻāmoku Cross Trail (Site 23033), and the Halfway House Trail (Site 23032). All routes except the Halfway House Trail are interpreted to have a pre-Contact component, primarily based on the occurrence of mounds and rock mounds as markers along the routes (Moniz Nakamura 2003a:74).

Kaʻū-Volcano Trail

As its name indicates the Kaʻū-Volcano Trail (Site 22982) connected Kaʻū with the volcano region. Its alignment on a 1907 map matches archeological remains of the trail, which consists of two parallel worn areas in the pahoehoe surface and 33 associated features, including 26 mounds, four walls, a C-shape, modified outcrop, and modified overhang. The mounds were likely used as trail markers. Trail remains can be traced over a distance of six miles.

Photo 24. Party of Kalapana Hawaiians on Puʻu Kaone, traveling to Punaluʻu (from backcountry ranger report, in HAVO Archives).

Mauna Loa Trail

The Mauna Loa Trail (Site 05504) from 6,650 to 13,200 ft asl was nominated to (but not listed on) the National Register in August 1973. At that time, it was described as:

> A single-file foot and horse trail, approximately 19-miles long starting at the end of the paved road at the Hui-o-Pele shelter at the 6,650-foot elevation; proceeding uphill 9 miles to the Red Hill Shelter at the 10,000 foot elevation; then proceeding uphill an additional 10 miles to Jaggar's Cave at the 13,000 foot elevation; twisting over fields of cooled, hard pahoehoe and aa lavas. Intermittently, and in places infrequent, stacks of loose lava boulders line its sides as trail markers. Occasional carved posts give altitude marks.

In 1915, the route of the foot and horse trail was developed to accommodate improved scientific and public access to Moku'āweoweo. The new trail route was constructed by the African-American enlisted soldiers of the segregated Company E, 25th Infantry Division. The first pack train ascent of Mauna Loa via the Mauna Loa Trail left Keauhou Ranch on June 29, 1920; members of the party included scientists T.A. Jaggar and R.H. Finch, guide John Kama, and packer Joseph Kaipalaoa (Dougherty 2004:87).

In the 1930s, the CCC widened and improved a section called the Mauna Loa truck trail. Improvements continued over subsequent years. Eventually, the lower section below 6,850 ft asl was paved (Photo 25).

Peter Lee Road (Site 22997)

The Peter Lee Road was a late 19th century/early 20th century transportation route. It was built in 1891 to service the community of Pāhala, in particular the Punaluu Hotel owned by entrepreneur Peter Lee, as well as visitors who stayed at the Volcano House. Nearly 24 miles long, the road was designed to accommodate carriages and was later modified for motorized vehicles. By 1927, the road had been replaced by the Kau Road (Site 23034).

Kau Road (Site 23034)

Site 23034 is a 31.95 km (19.9 mile) long segment of the Kau Road, which was built by the Territory of Hawai'i in the late 1920s. This road was built by and parallels much of the alignment of the Peter Lee Road (Site 22997), which it replaced. Today, only a short section of the Kau Road remains, as the existing Māmalahoa Highway now covers much of the same route.

Ainahou Road (Keauhou Trail) (Site 23314)

Called the Ainahou Road, Site 23314 consists of a portion of the historic Keauhou Trail. The 2-mile long road follows the upper end of the alignment of the earlier Keauhou Trail, which linked Keauhou Landing with Kīlauea Crater. The Pulu Factory (Site 21215) is near the trail. The 'Āinahou Road is presently in good condition and is maintained and used by the NPS road crew.

Photo 25. Mauna Loa Road.

Kahuku-ʻĀinapō Trail (Site 24121)

Unlike the trails and roads used by the general public, the Kahuku-ʻĀinapō trail is a 35 km (21.7 miles) long segment of a trail system that was used for driving cattle between various ranching operations associated with Parker Ranch. It included stopover locations at Kapapala Ranch, Keauhou Ranch, Humuula Sheep Station, and Puu Oo Ranch. As illustrated on the 1928 USGS Honuapo topographic quadrangle, from the west, the trail within the HAVO boundary climbs inland through the southern central section of Kahuku to about the 5,000 ft elevation, where it turns to northeast into the upper eastern section of Kahuku ahupuaʻa (parallel to the present eastern park boundary).

Currently, the trail courses over aa and pahoehoe lava flows, and through various vegetation types that include pastureland, ʻōhiʻa and koa forests, and pūkiawe scrublands. It has been obscured by vegetation in many locations.

MILITARY USE

The military has had a presence in HAVO since before the inception of the park. Troops were coming to the Kīlauea area from 1911 for combination recreation and training exercises. In 1915, Company E, 25th Infantry Division constructed the Mauna Loa Trail (Site 05504) as part of a joint effort

with the Hawaiian Volcano Research Association to enable scientists the ability to access the summit of Mauna Loa. In 1916, Kilauea Military Camp was established, although it was not until the 1920s that full use of the recreation facility was attained; KMC presents a cohesive landscape of military structure and orderliness within a "wild volcanic landscape" (Tomonari-Tuggle and Slocumb 2000:viii). In 1924, a landing field (Site 23403) was constructed on volcanic sand at the area called Spit Horst located just south of Halemaʻumaʻu crater (Photo 26).

In the early years of World War II, martial law was instituted and the Army established headquarters in what is now the park headquarters. The adjacent building (now the Volcano Art Center) and associated structures were rented from the Volcano Hotel for use as quarters for officers and staff of the Hawaii District command.

In 1940, after much contention over the obvious conflict with park values, the Army Air Corps acquired 3,052 acres at the southwestern corner of the park for the Na Puu o Na Elemakule Bombing Range. In 1950, the bombing range was returned; terms of the original transfer required that the Army return the parcel to the NPS, cleaned of all traces of its use. Scheffler (1994b, brackets added), however, reports military ordnance in the remote location:

Photo 26. 1924 Spit Horst Landing Field (Site 23403), showing small piles laid out as a defensive measure in the early years of World War II.

> This was a dense accumulation of military ordnance scattered across a wide area between the transect location points b4 and b5 [mauka-makai transect]. The debris seen ranged from small and large caliber rifle shells to mortar and rocket round fragments as well as mangled metal debris.

SCIENCE

Scientific inquiry has played a large role in human activity within the park.

The successful efforts of Thomas Jaggar to establish the Hawaiian Volcano Observatory is memorialized in Site 05506, the Whitney Seismographic Vault (Site 05506), the only remaining structure from the original HVO construction. Incorporated in the landscaping on the crater side of the Volcano House, this 5.8 by 5.3 m underground room, with reinforced concrete walls and roof, rests on a solid ledge of basalt. It was constructed in 1912 by digging 1.67 m through ash and pumice.

The site known as Jaggar's Cave (Site 24346) is located along the northern rim of Moku'āweoweo. It is directly related to the continued pursuit by the Hawaiian Volcano Observatory to further the field of volcanology (Dougherty 2004:45, 87):

> The site consists of multiple features, the principle being the rock shelter itself. The shelter was improvised first by Thomas A. Jaggar as a temporary shelter and was selected for its close location to the summit and its close proximity to a water cave. The lack of summit shelter prompted Jaggar to modify the natural formation to provide protection from the extreme summit conditions while monitoring volcanic activity at the summit caldera.

First used in 1920, the cave continued to provide shelter for summit visitors until 1934, when the NPS built a summit structure.

CCC SITES

In the 1930s, the Civilian Conservation Corps was an important Depression-era work program. The CCC was active at HAVO from 1934 until the beginning of World War II. Sites that represent this activity include housing and support facilities (Site 19445, the CCC camp foundations in the area of the present Resource Management offices, and Site 19459, water tank foundations) and CCC projects (Site 22487), erosion control features on Hilina Pali Road (Roper 2005), and stone portals and landscaping features in Kilauea Military Camp (Tomonari-Tuggle and Slocumb 2000) (Photo 27).

Photo 27. Civilian Conservation Corps entry portal at Kilauea Military Camp.

V. ARCHEOLOGICAL ASSESSMENT

The management of archeological resources at HAVO is a daunting task. HAVO is a large area with a rugged, dangerous landscape, one in which the archeological remains are under constant threat of natural destruction. HAVO is not categorized as a "historical park," but it has a large number of archeological sites (recorded and unrecorded) and as the land of Pele, it is a setting of unique cultural value. Interviews with the cultural resource staff and review of the archeological program make it clear that the staff meet the challenge of the "daunting task" with enthusiasm and creativity, and as effectively as the limited resources allow. The following assessment reviews the status of the archeological resources in this framework.

ARCHEOLOGICAL INVENTORY AND POTENTIAL FOR AS-YET-UNIDENTIFIED ARCHEOLOGICAL RESOURCES

Figure 24 (see above) indicates the areas where archeological surveys have been carried out. The surveys, however, vary in intensity of coverage and detail of recording. Figure 28 shows areas where additional archeological inventory survey needs to be conducted to complete coverage at equivalent levels of recording, with a general assessment of the potential for unidentified archeological sites. Recommendations for continuing inventory survey are included in the Research Design (see Section VII).

ARCHEOLOGICAL SITES AND THE CONDITION THEIR CONDITION IS IN

At HAVO, the "condition of archeological sites" is an oxymoronic phrase that may seem like bureaucratic black humor. Over the past 20 years, a significant number of recorded sites have been buried under lava—they have no *condition*: they have become one with the landscape. Appendix A contains the entire list of recorded sites at HAVO; following an assessment by park staff, the final version of this list should have a category "destroyed."

For recorded sites that have not been destroyed by lava, "site condition assessment" has been an on-going program at HAVO and the summary information is being prepared by park staff.

RESEARCH, ANALYSIS, AND REPORT PREPARATION

The majority of the archeological investigations at HAVO have been site survey and inventory and associated Section 106 actions. The inventory site records are maintained in paper form as well as in GIS and ASMIS. Inventory reports have also been produced for most projects. Early inventory efforts were conducted by the B.P. Bishop Museum (Emory, Cox et al.1959; Smart et al. 1965), but over the last three or four decades, most of the work has been conducted in-house. The overall quality of the inventory reports from the early work of Ladd (e.g., 1972a) to the present has been good, but gradually improving with increased attention to analysis and in recent years, with advances in production methods and presentation quality (e.g., Moniz Nakamura 2003a).

The focus on analysis of the archeological remains (not simply site inventory) should be noted as an outstanding aspect of HAVO reports. Examples of excellent archeological research include Ladefoged

et al. (1987), Carter and Somers (1990), Moniz Nakamura (2003a), Durst and Moniz Nakamura (2003), and Glidden (2006). In fact, one of the exemplary analytical reports in Hawaiian archeology in general is the study of Waha‘ula Heiau by Masse, Carter, and Somers (1990), which combines information from excavations, lava flow research, and Hawaiian traditions to formulate a remarkable model of site development and associated ritual behavior.

Not all inventory research has been published, nor all excavations analyzed and published, but there is an on-going program with the goal of completing these projects.

PUBLIC INTERPRETATION

The great majority of the public certainly comes to HAVO to see volcanoes and volcanic activity, and if they have any interest in the cultural aspect of the park, it takes the form of some bowdlerized version of Pele. The park itself has given little attention to cultural interpretation for the public, the main exceptions being access to and interpretation of Waha‘ula Heiau (now destroyed) and the Pu‘uloa Petroglyph Field (Site 23271). Recognizing that HAVO is not categorized as a historical park, this has nonetheless been a major deficiency, but one that park staff is working to improve. The park website now has a valuable cultural summary and there are several planned projects for public interpretation.

A MATTER OF PRIORITIES

In the non-experimental sciences like archeology, recording and description can never be complete. But unlike many other non-experimental sciences, archeology cannot count on its subject matter being indefinitely accessible for continuing study. For most national parks, this tends to be a long-range problem because site deterioration and destruction is a relatively slow process of natural deterioration, weathering, vandalism, and occasional natural disaster such as flooding. But for parks that have sites in dynamic environments, such as rapidly eroding coastlines or active fault lines, this is an immediate concern. For HAVO, with active volcanism and associated natural disasters, the question of recording site information is an urgent concern that can be expressed as a question of priorities. How can the limited effort be most effectively focused and most efficiently conducted? The comments on survey and related research address this, but the larger framework also involves balancing such things as Section 106 compliance versus Section 110 responsibilities, giving only the minimally necessary attention to minor ARPA matters, and carefully reviewing how the effort required to record and maintain site information can be conducted so that the usefulness of the information matches the cost of producing it. “Universal” recording forms for sites, features, and excavations that categorically demand highly detailed information represent the epitome of inefficiency and wasted effort. This is the altar of SELGEM, where sacrifices are made to the deities of spurious accuracy.

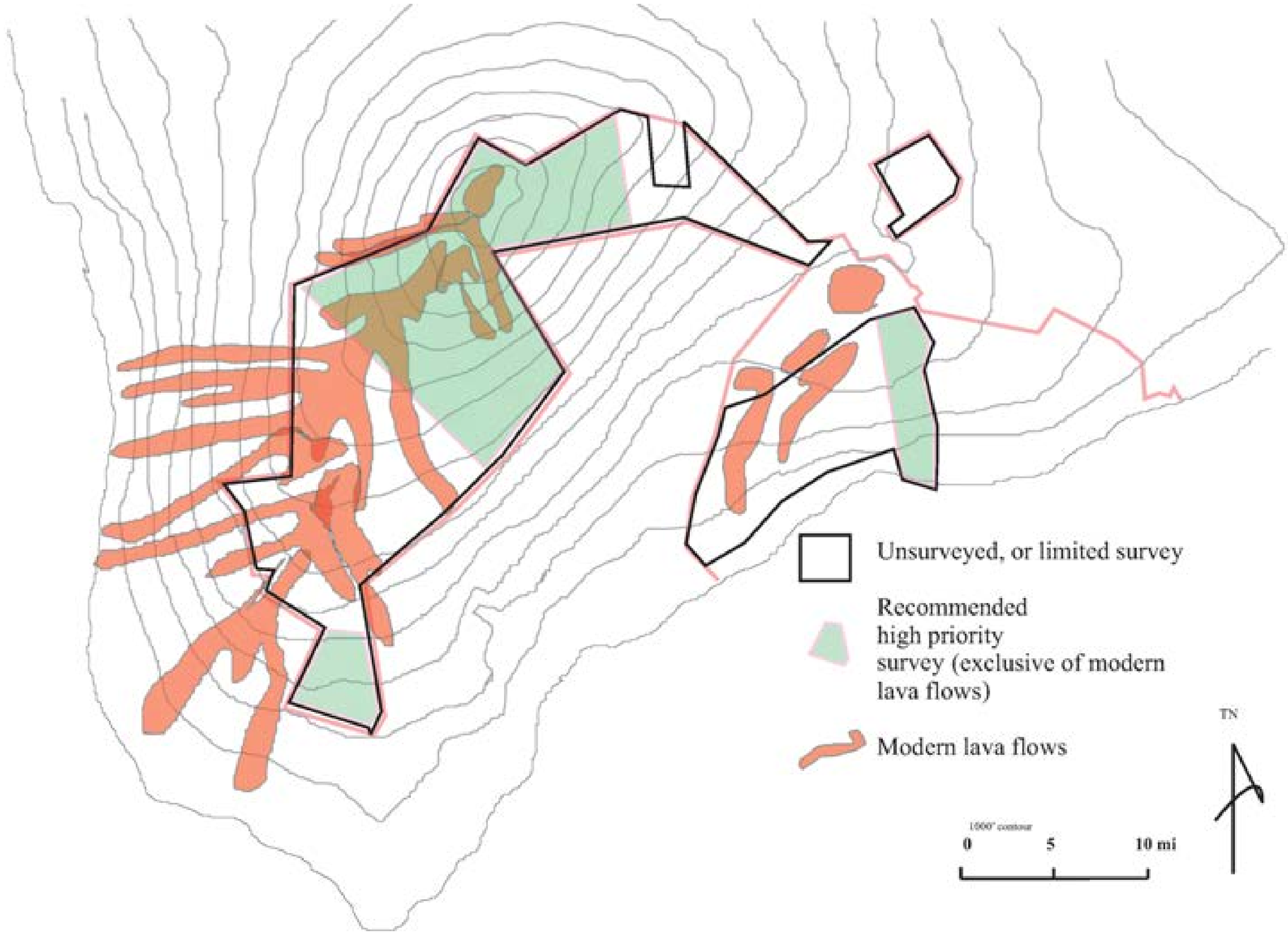

Figure 28. Areas of HAVO without survey or with limited survey, showing areas recommended for high priority survey based on site potential.

VI. CULTURAL RESOURCES AND ARCHEOLOGICAL "SITE" IDENTIFICATION AND INFORMATION MANAGEMENT

As discussed in Section I and summarized in Appendix G, the NPS categorizes archeological sites within a complex framework of cultural resources, and at the same time individual sites are included in several recording systems, including the LCS, the NRHP (under a number of possible categories: eligible, nominated, and listed), and ASMIS (which is used to list all "sites" for a park regardless of LCS or NRHP classification). The present section is a discussion and set of recommendations regarding archeological site definition and identification, and associated information management. (The subject addressed here does not include concerns about the physical management of sites.)

ARCHEOLOGICAL "SITE": CONCEPTUAL AND PRACTICAL CONCERNS

Archeologists do not find sites. Archeologists find material remains of human activity and then segregate these into spatial units called "sites." There are two different goals or purposes that drive site identification. The traditional purpose that guides analytical site identification is scientific analysis and interpretation. A more recent purpose that guides site identification is the pragmatics of cultural resource management, that is, how to partition the material remains on the landscape in some way that is practical for the actions of historic preservation compliance.

Within the framework of scientific research, the archeologist uses a set of criteria to segregate the physical remains as constructs (that is to "create sites") related to patterns of human behavior.[70] To "create a site" in an analytical manner is to identify a pattern of material remains and deposits on the landscape, delineate that pattern with a physical boundary, and then assign some form of discrete identification (a site name, or more commonly today a site number). Thus, an *archeological site* is a *construct* that refers to the location of the physical remains of identifiable human behavior. However, even given a similar set of criteria for relating behavior and remains, archeological identification (creation) of sites will vary depending on the criteria of scale for site definition. Scale, and thus site definition and identification, can vary, ranging from recognition of (1) the material results of a single human activity or event, to (2) material results of an integrated set of related human activities, to (3) material results of an integrated cultural system. Site identification and bounding thus reflects an understanding of the coherence and patterning of behavior that produced the material remains, and/or an understanding of the research potential of the material remains.

Archeological "site" creation or definition for purposes of cultural resource management is commonly framed in terms appropriate for NRHP eligibility review, with concern for how Section 106 will be addressed. This is discussed in detail below.

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[70] Casual site identification may be based solely on clustering of physical remains without reference to behavior, usually based on prevailing convention of what a site is.

In Hawai‘i, a common set of precepts by which sites are “created” has never developed and there is seldom a recognition of the purposes, analytical or managerial, for site definition. There are many consequences of this, including inconsistency, sometimes meaningless groupings of features, and residual areas of cultural remains that are not included as or within sites. This complicates the scientific and the management goals. Further, for the national parks in Hawai‘i, each park has a unique history of how archeological sites have been recorded and numbered, but common to these histories is a confusion of multiple recording and numbering (for HAVO, this is discussed in Section IV; also see, e.g., Tomonari-Tuggle and Tuggle 2006a). The problems of site numbering and recording in Hawai‘i (and elsewhere) derive in part from the evolution of what is recorded as a site. There has been increasingly detailed recording (based on concepts such as settlement pattern, site catchment systems, and landscape archeology) that has not been accompanied by a complementary evolution of the means to define sites.

In sum, it can be argued that “site” is the basic unit of archeology and historic preservation. It should be carefully “created” for analytical purposes and its significance carefully described for management purposes.

“SITES” AT HAVO

Review of HAVO archeological reports and ASMIS files indicates that (in addition to numbering problems) there is no prevailing concept or standard for “site definition,” which has resulted in a great deal of variation in what is called a site and in determining boundaries of sites.

Recording of information about sites in ASMIS files is also inconsistent and involves questions of source of information, dates of site inventory, and NRHP status. A review of reports and site files also indicates uncertainty regarding the NRHP status of many sites. Some reports describe a site as “eligible” for the NRHP, but it is unclear if this is a recommendation or if it based on a formal determination of eligibility, and statements in some reports regarding site eligibility to the NRHP indicate a lack of familiarity with the NRHP process. Further, for the NRHP, what constitutes a site involves more than archeological sites (see NRHP discussion below), which emphasizes the need for clear conceptualization of “site.”

The review of site matters also involves specific practical matters at HAVO, such as how destroyed sites are to be categorized, how to deal with the re-recording of sites and recognition of unrecorded features and potential boundary change, how to many historic features (such as those on the LCS but not in ASMIS), and how to recognize traditional places. Recommendations regarding these matters are proposed below.

NATIONAL REGISTER OF HISTORIC PLACES

For federal agencies, managements of historic properties (including archeological sites) is mandated by the NHPA and supporting regulation. The core of this management is the identification of “significant” sites, that is sites listed on or eligible for listing on the NRHP.

NRHP AND THE DEFINITION OF SITE

The property categories for the NRHP are as "districts, sites, buildings, structures, and objects" which are defined in 36 CFR Part 60 (*National Register of Historic Places*) and in National Register Bulletin 15 (*How to Apply the National Register Criteria for Evaluation*).

> A **district** "possesses a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united historically or aesthetically by plan or physical development" (NR Bulletin 15:5).
>
> A **building** is a constructed facility intended to shelter human activity. However, "If a building has lost its basic structural elements, it is usually considered a 'ruin' and is categorized as a site" (NR Bulletin 15:4), specifically an archeological site (see below).
>
> A **structure** is a constructed facility that is not a building or an object, including such things as bridges, dams, roads, and fences. This category also includes aircraft and ships, although these are often mistakenly called objects. Like a deteriorated building, a deteriorated structure is categorized as an archeological site (NR Bulletin 15:4).
>
> An **object** is a constructed feature that is "primarily artistic in nature or …relatively small in scale and simply constructed" (NR Bulletin 15:5). It is designed and set in a specific locale, such as a monument or a fountain.
>
> A **site** is "the *location* of a significant event, a prehistoric or historic occupation or activity, or a building or structure, *whether standing, ruined, or vanished, where the location itself possesses historic, cultural, or archeological value regardless of the value of any existing structure*" (NR Bulletin 15:5, emphasis added).

NRHP is a listing of historic properties, not just archeological sites and in fact the definition of site includes much more than the archeological. By the NRHP definition, a site is a *place* of cultural value and significance. Although this may confound an "archeological" inventory of sites, this is a definition ideally suited to the landscape of Hawai'i and its cultural resource management in that the traditions provide a remarkably detailed cultural overlay of *places*, by means of culturally defined space (from the smallest cultivation plot to the kingdom), by means of the naming of an innumerable number of places, and by means of the traditions and histories associated with those places. Archeological remains are part of the landscape that has this cultural overlay.

Analytically, there are three sub-categories of site as employed in the HAVO AOA:

> an *archeological site*: physical remains of human activity**,** such as old villages, rock shelters, abandoned gardens, artifact scatters, and petroglyphs (and including deteriorated buildings, structures, and objects, that is categories of property that have become ruins)

an *historic event site*: the geographic location of an historically important event or events, regardless of whether there are any physical remains (archeological sites are also historic event sites)[71]

a *traditional place*: a legendary place or a place with a traditional place name. Such a place may be a natural feature and it may or may not have any archeological remains. If this is identified as a "significant site" to an ethnic group, particularly a native population, it has come to be called a TCP (traditional cultural place or property) as coined by Parker and King (1990).[72]

For the purposes of the NRHP, a site is a physical space and thus has to have a boundary. However, this does not constrain the potential boundaries of the "effect" in a Section 106 review. That is determined by how the significance and value of the site are described, and carelessness regarding this is a major failing of most site descriptions for Section 106 purposes. An action is evaluated for effect on *significance*, not on the site per se. Thus regarding boundaries, if a site is significant, for example, as a traditional place for observing sunrise, then any action that results in blocking that view plane may be a negative effect, even though the action is outside the boundary of the site itself.

NRHP SITES AT HAVO

Eight historic properties (sites, structures, and buildings) and one historic district are listed on the NRHP (Table 15, Fig. 29). The Puna-Kaʻū Historic District includes eleven site complexes and one general category for eligible sites within the district. This district was created for HAVO in the early years of compliance with the NHPA, but because of the limitations of survey at the time, it did not include the whole area of HAVO. Sites identified with the district may be added to the district as contributing features. A number of sites in the HAVO ASMIS files are identified as "listed/documented" on the NRHP as contributing members to the district, but it is not clear if these have been formally recognized. There is no clear record of eligibility evaluations for other sites at HAVO.

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[71] The term "historic event site" is not commonly used, but is employed here to distinguish it from other types of sites.

[72] The Parker and King definition of a TCP is idiosyncratic (for example, the reference to "continuous" use in their definition) and despite the fact that their definition is frequently quoted, it should not be used as a guide to the listing of traditional places as NRHP sites As King has later clarified, a TCP is not a NRHP category, it is simply a kind of site, equivalent to house site or rockshelter.

Table 15. HAVO Properties Listed on the National Register of Historic Places.*

State Site Number	NRHP Name	NRHP Property Type	NRHP Criteria
05501	ʻĀinapō Trail (aka Menzies Trail)	Structure	Information Potential, Architecture/Engineering, Event
05502	Kīlauea Crater (aka Ka Lua o Pele)	Site	Information Potential, Event
05503	Puna-Kaʻū Historic District **	District	Information potential, Event
05504	Mauna Loa Trail	Site	[no information]
05505	1790 Footprints	Site	Information Potential, Event
05506	Whitney Seismograph Vault No. 29	Building	Event
05507	Wilkes Campsite	Site	Person, Information Potential, Event
05508	Old Volcano House No. 42 (aka 1877 Volcano House)	Building	Event, Architecture/Engineering
19429	Ainahou Ranch	Building	Architecture/Engineering, Person

* NRHP Name, Property Type, and Criteria are taken from the records of the NRHP.

** Formally recognized contributing sites are Poupou-Kauka Village (HV-250+), Wahaʻula Heiau (HV-276+); Kaʻiliʻili Village (HV-288+); Fisherman's Cave (Site 22726); Kamoamoa Village (HV-300+); Laeʻapuki Village (HV-323+); Puʻuloa Petroglyph Field (Site 23271); Puna-Kaʻū Coastal Trail (Site 21316); Keauhou Landing (Site 19447); Kūēʻē Ruins (Site 25938); Pulu Factory (Site 21215).

"SITES" AND SPATIAL INFORMATION AND MANAGEMENT

A common element of all of the definitions of site (in archeological terms and in NRHP terms) is *place*, physical, map-able space in the real world.[73] Thus the solution to problems of site delineation and data management may be found in the management of space and spatial information.

[73] For analytically defined archeological sites this involves more than simply drawing a line around archeological features, the identification of boundary is part of the analytical problem. Identifying a site boundary as an analytical process is even more obvious for historic event sites and for traditional sites.

In the past, the accuracy and precision[74] of archeological spatial data have been of a low order because of the complexity and cost of acquiring such data—in practical terms, high quality spatial data had to be obtained by professional engineering surveys. Further, manipulation of spatial data has been difficult, relying largely on drafted maps and photographs. The development of GPS and GIS has now changed these conditions and archeological spatial data of high quality can now be obtained and analyzed as a routine part of archeological investigation and site management, although the level of use of these methods remains relatively low as the discipline experiments with the best ways to employ them for archeological purposes.

HAVO has GIS and GPS technology and thus is in a position to be able to make major advances in spatial management of archeological information.[75] Archaeological and cultural data can now be mapped in great detail and with high accuracy against landscape imagery (high-resolution aerial/satellite photographs, as well as detailed flow maps). These data can be controlled by a combination of GPS-based coordinates and a spatial referencing system (such as a grid, lava flows, or a combination of the two[76]). Initial efforts in the use of GIS for management, display, and manipulation of spatial data are contained in the existing HAVO GIS system, and these are reflected in the recent HAVO reports, and this can be taken in a direction of spatial management that allows archeologists to have control of their spatial data equivalent to that of astronomers, for example.

GIS-managed archeological data provides the opportunity for archeological analysis that has previously been difficult or impossible, but it also provides the means to "create" sites for specific purposes, with one of the important purposes being the bureaucratic management of archeological information (such as ASMIS recording and Section 106 reviews). In other words, the problem of the conflict between the analytically-defined "site" and the bureaucratically-defined "site" can be eliminated because "site" does not have to be the primary unit of archeological recording and investigation. The primary unit can be geographic space.

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74 These terms are used here in their scientific sense, accuracy referring to the reliability of data, precision to the scale within which measurement error is calculated.

75 This of course requires the resources (human and technological) to do so, and these should be a HAVO priority.

76 In the 1960s and 1970s, NPS archeologist Ed Ladd employed a grid system for archeological mapping within the parks, and Stell Newman expanded this system in the research design for investigations at Lapakahi, Hawai'i. These efforts were limited and never completely developed because of the limitations of ground control of spatial data and graphic management at the time, as discussed in the main text above. Currently, archeologists at PUHO are experimenting with using spatial management areas, but to what extent this is GIS-based is not known to us.

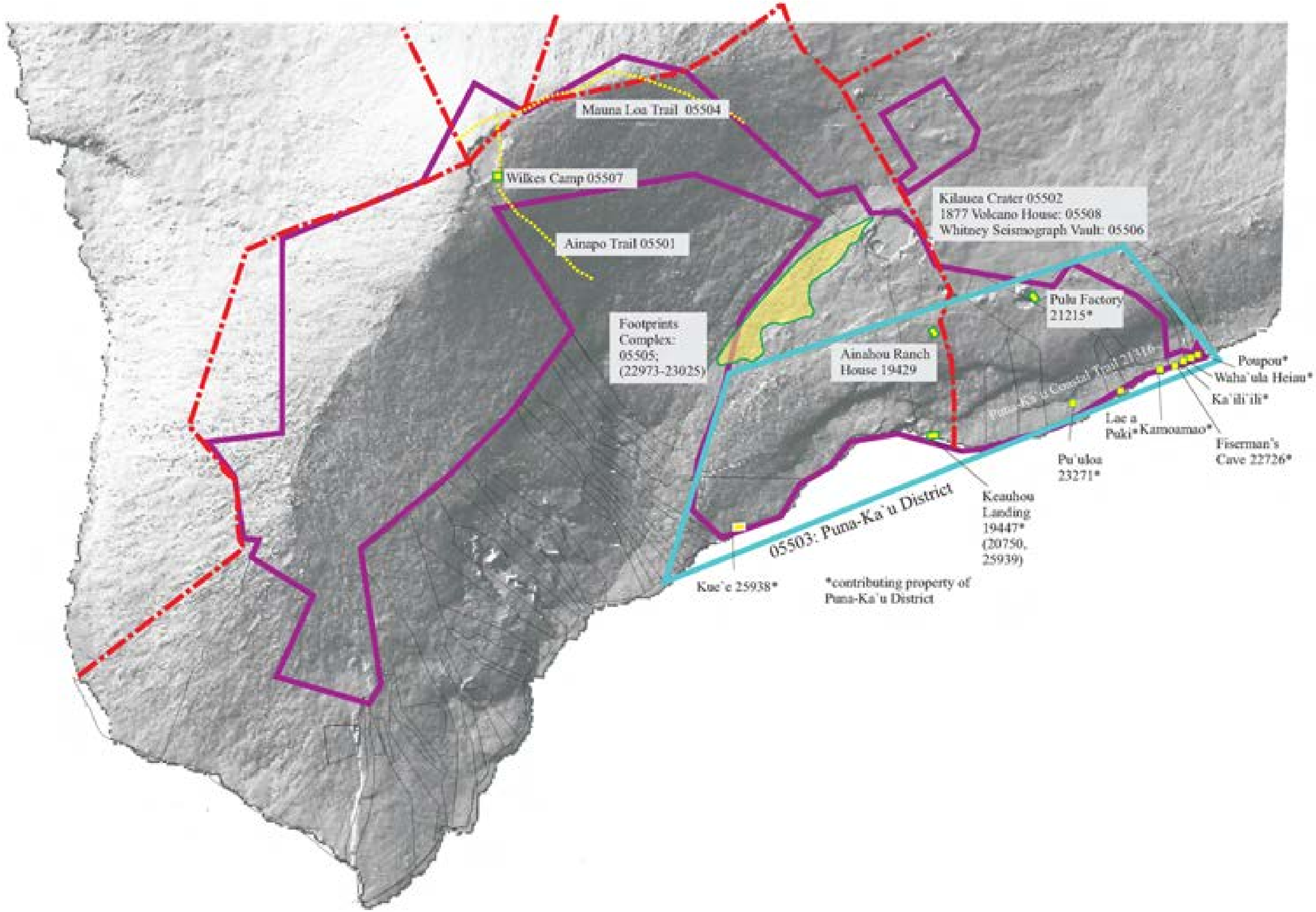

Figure 29. Historic properties in HAVO that are listed on the National Register of Historic Places.

RECOMMENDATIONS REGARDING SITE INFORMATION MANAGEMENT

RECORDING AND NUMBERING OF HISTORIC PROPERTY

Consider revising the boundary of the Puna-Kaʻū Historic District to include all of HAVO. Review the historic preservation process to determine if such a revision will facilitate the determination of eligibility by recording historic properties as contributing elements to the District.

For purposes of Section 106 and Section 110, complete the integration of recorded and known historic properties into the state numbering system, employing NRHP definition of historic property and NRHP criteria for eligibility. As noted above in the discussion of the NRHP, one of the main purposes of the NRHP is identification if historic places for management, with special attention to the question of "effects" and thus site listing should have clear statements about why a site is "significant," which established the baseline for what may be affected. Also note that, per the NRHP, historic properties represent a range of categories. This completion of recorded and known properties should include:

All "historic" (post-Contact) features including roads and trails. Properties that are listed in the LCS, but not assigned state site numbers, should be evaluated by NRHP standards and property categories, and included if they meet these standards.

All HV sites. If "sites" are created for bureaucratic management purposes, as discussed above, the re-numbered HV sites should also have redefined boundaries to include all related features, but this can be done by defining a "site" as an area—a space—incorporating all cultural elements within that space.

All traditional places. These places should be identified through a cultural place inventory (as recommended in the Research Design) and evaluated for recognition as numbered "sites" per the NRHP criteria.

Destroyed sites. Sites whose locations should be re-established and re-marked after their destruction include those that are significant under eligibility Criteria A and/or B, when the integrity of location is not substantially affected (e.g., village sites and temple sites). The location of Waha'ula Heiau is a primary example: the significance of the location, the place, can still be appreciated if one stands on the lava flow that covered the heiau, with the view of the general landscape, the skyline, and the sky that existed prior to the destruction of the physical structures. (For comparable examples of such places that are on the NRHP, see Parker and King 1990; also note the definition of "site" per the NRHP, quoted above).

DATA ENTRY

Develop a set of guidelines that will allow consistent data entry into the various databases, including ASMIS. This should include standardized abbreviations, descriptive terms, and citation format. Information should include a reference to source (e.g., quotation or summary from an existing report, or derivation from field inspection); reports should be cited by bibliographic reference (not by project), which may be standard from (authors and date) or a unique HAVO report coding system (see below). Guidelines should also include instructions on NRHP-related categories; reviews of ASMIS forms suggest that some of these categories may be misunderstood, and are not consistently completed.

Review the entries for NRHP status and correct any errors or inconsistencies.

INFORMATION RESOURCE MANAGEMENT

Consider developing systematic resource inventories for all basic reference materials such as reports and manuscripts (see Appendix D). This may be an unnecessary duplication of the existing library and map inventory systems. However, dedicated inventories for internal use may make research and citation much more efficient. (For example, a dedicated coding system for all HAVO reports and manuscripts would allow easy tracking, management, and citation.)

GIS INFORMATION MANAGEMENT

Review the structure and content of the GIS and conduct a methodological study or studies in how the information can be manipulated for purposes of archeological "site" management and archeological research.[77] For the long-term, this is considered to be the most important of the data information management recommendations.

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[77] This is a complex task and might be considered for a specific, funded research project (see Research Design) or for a volunteer research project. One of the problems that may need to be resolved is integration of ASMIS with GIS.

VII. RESEARCH DESIGN

The Research Design is organized by questions regarding substantive information, cultural-historical and behavioral patterns, and methodological problems—with the recognition that there are questions that crosscut these categories.

SUBSTANTIVE CONCERNS: BASELINE DATA

Substantive problems are those that deal with largely factual matters, usually data collection and analysis related to basic patterns of information; what is also called baseline data. This are not posed in a theoretical vacuum, but reflect either the consensus concerning data that are significant for prevailing problems and conventional data classification, or categories of data created for theoretical and methodological problems.

SITE INVENTORY

There are areas of HAVO that have had little or no site inventory (see Fig. 28). Considering the always imminent threat of site destruction from lava flows and earthquakes, execution of site inventory has been and should continue to be an extremely high priority in the archeological program. The following recommendations include a distinction between reconnaissance survey and intensive survey. Although sometimes defined by intensity of coverage, the distinguishing difference used here is intensity of recording. An important aspect of this recommendation is how the concept of "site" is approached.

Reconnaissance Inventory

The recommended first phase of reconnaissance inventory is a program that establishes the broad distribution and boundaries of complexes, notably those for agriculture, habitation, and resource utilization. At the same time, features with more restricted boundaries (such as trails, caves, petroglyphs, and religious structures) may be noted. It is recognized that conditions of HAVO (difficult access, rough terrain, dense vegetation) do not allow field inventory to be easily conducted, but a comprehensive program should be considered a necessity under the always imminent threat of destruction.

The essence of an effective reconnaissance program is a sense of the level of detail to be recorded and the manner in which generalized statements about sites/features are to be made. The position argued here is that in site/feature recording there is often too much emphasis on detail and too little on generalization (this is also true of excavation)—a case of "not seeing the forest for the trees." The problem is that generalizing requires more experience than does recording detail, and thus crew training and leadership are critical for such a program. The minimal level of recording for reconnaissance may simply be "presence/absence" and can be done in the form of "siteless" survey (a process of continuous recording during field sweeps with information transmitted verbally to a field recorder). Combined with modern GPS recording, this allows rapid and effective survey in difficult field circumstances, including dense vegetation.

The second phase of reconnaissance inventory may entail either one or both of two strategies. Depending on field conditions, selected individual sites/features may be recorded in detail after the first phase, or an area or areas may be selected as sample areas for detailed recording as a means of characterizing the survey area.

Intensive Inventory

An overview of the archeological landscape of HAVO suggests four areas that should have the highest priority for intensive survey—areas that contain cultural remains fundamental to the understanding of the HAVO region. These areas are the ʻiliʻāina of Keauhou, the summit of Mauna Loa, the pali bluff areas (primarily Hōlei and Hilina), and a possible habitation area in the ahupuaʻa of Kahuku (in the southeastern corner of the KMU).

Intensive inventory often includes some amount of archeological "testing." Often this testing is intended to accomplish such things as determining site age and "function" (a peculiar concept when considered in historical-analytical terms). The perspective taken here is that such testing is often useless and counter-productive. Rather, it is argued that testing is appropriate to determine the *potential* for future intensive excavation and the types of questions that might be answered by such excavation. This involves such things as the depth, extent, and nature of deposits (that is, stratified or not, disturbed or not, conditions of preservation, datable materials, and so on). In this context site or feature "function" is replaced by an analysis of events and history of activity.

ʻIliʻĀina of Keauhou

Because of the general nature of the Kaʻū-Puna landscape, as well as the changing conditions resulting from volcanic activity, many of the ahupuaʻa are unique, not archetypal "sea-to mountain resource units." This is certainly true of the ʻiliʻāina of Keauhou, which has (and had) very poor resources for subsistence living, but has two important features: Kīlauea Crater and a coastal landing. A survey of the entire area of Keauhou should be conducted; research should focus on the land area as a means of access to the crater and on the entire land unit (ʻiliʻāina) as a possible ritual zone. Several possible ritual sites have been recorded (see Fig. 18), and a substantial amount of background information has been compiled (e.g., Maly 2005; Durst and Moniz Nakamura 2005). The evaluation of this land area as a possible ritual zone moves the detailed survey inventory into the theoretical problem field (as noted below). An important part of such a survey would also include research on the problem of identification of ahupuaʻa boundaries and possible changes to those boundaries.

Mauna Loa Summit

An intensive survey of the summit of Mauna Loa also involves the question of ritual zones. The Mauna Loa summit may have been a ritual zone, perhaps one involving astronomical observations or celestial-related ritual, and is perhaps one of the most important such places in Hawaiʻi.

Pali Bluffs

The focus of pali bluff survey should be on the nature of upland community, age, and settlement structure.

Kahuku

Regarding Kahuku, the seaward portion of the KMU should be considered for survey to identify any settlement associated with the historically documented intensive habitation areas, including the area of royal residence, above Pali o Māmalu near the present Belt Road. In addition, a temple named Haleopōhāhā was recorded by Stokes somewhere in the vicinity of the seaward border of the Kahuku Management Unit west of the 1887 flow; this should be investigated.

EXCAVATION AND EXCAVATION DATA ANALYSIS

As a continuing effort for obtaining basic information on occupational history, excavation of a sample of sites and associated analyses is an important part of the research program. This involves two general aspects: completion of analysis of existing materials and a strategy for conducting the additional sampling. Excavation related to other research questions is considered under the section on theoretical problems.

Analysis of Archived Excavated Materials

A review of archeological investigations at HAVO from 1987 to 1989 (Carter and Somers 1990) indicates that substantial quantities of materials collected from excavations have yet to be analyzed; there are materials from other excavations that are also unanalyzed. There is a continuing program to complete this work. As a part of this effort, XRF element determinations are being conducted on worked lithics for sourcing, and additional charcoal samples are being analyzed for wood species identification and will be submitted for radiocarbon dating.

The detailed analysis of collections (artifacts and food remains) from individual excavations is a necessary first step in post-field research, but ultimately a regional comparative review is needed so that the larger patterns of occupational history and resource use can be developed. As a part of this, it is also critical to have the methodological means of making these comparisons, an aspect of Hawaiian archeology that is poorly developed and is discussed in the methodological section below.

These materials also contain significant potential for paleoenvironmental research (see below).

Radiocarbon Re-analysis

The existing set of HAVO radiocarbon dates is a disparate collection of data (see Table 13). The dates were obtained by runs from several different laboratories, and processed by differing sets of standards (such as calibration curves, one or two sigma, carbon ratios, and type of material). All of these dates should be re-processed in a standardized manner. This should also include an evaluation of the processing laboratory (some of which are known to have generated unreliable dates), as well as a review and evaluation of the provenience.

The question should also be asked as to whether or not the large number of radiocarbon determinations obtained from the extensive geological dating program of lava flows might be profitably reviewed by archeologists. Further, the archived charcoal from the geological dating program should also be submitted for wood identification; a cooperative arrangement with the volcano geologists might be considered for this. Based on the dates obtained, and if the charcoal comes from pre-Polynesian and Hawaiian eras, the wood identification would contribute to the reconstruction of vegetation history.

Excavation Sampling for Chronological Information

Establishing the settlement history of regions in Hawai‘i is a complex problem because of the nature of Hawaiian remains and the inadequacy of present chronometric methods. The substantive question in this regard is the geographic location of the site components of various ages. The methodological question is the appropriate strategy for excavation.

Given the environmental circumstances at HAVO, there may be no surviving early coastal occupations, except possibly coastal cave deposits. However, cave deposits have to be evaluated carefully regarding the information they provide on local settlement because of the possibility of short-term or specialized activity within such features. The occupational history of the region may come primarily from research in the inland settlements. Such research should involve a deductive review of the most probable areas for early inland settlement and a sampling of these areas. This may be conducted as part of the larger inventory program.

PALEOENVIRONMENTAL INVESTIGATIONS

In Hawai‘i, paleoenvironmental research based on wetland coring has proved to be one of the most valuable means of obtaining information about long-term regional patterns of human occupation (see e.g., Athens 1997). This type of research also has the potential to reveal unexpected aspects of change after human occupation, such as the role of the introduction of the Pacific rat to Hawai‘i (Athens et al. 2002). It is not known if there is any potential for wetland coring in the HAVO area, but the possibility should be investigated and research carried out if it appears feasible. There are a few “lakes” identified in the Ka‘ū-Puna region, but it is not known if any fall within the park. Paleoenvironmental research in the HAVO area would have special problems because the charcoal from natural fires would compromise the charcoal evidence for human activity; however, the information from pollen profiles and depositional data would nonetheless provide critical data on environmental change.

As indicated above in the section on Radiocarbon Re-analysis, the wood identification of charcoal archived in the geological program of flow dating could also make a substantial contribution to paleoenvironmental reconstruction. Further, the organic materials from archeological excavations (archived and future) hold great potential for paleoenvironmental reconstruction, landscape change, and human modification of the landscape, and such materials should be included in any general paleoenvironmental research program.

PLACE NAME AND CULTURAL PLACE INVENTORY

Place name research is an absolutely necessary component of archeological investigation in Hawai‘i, and it is recommended that the HAVO archeological research program incorporate a focus on a detailed place name inventory. There are several hundred place names that can probably be compiled from existing archival data (maps, land documents, Boundary Commission testimonies, travel accounts, ethnographic collections, and so on) and many more that can certainly be obtained from discussions with cultural consultants today (see Langlas 2003a, 2003b for an example of modern ethnographic research).[78]

[78] The park had an opportunity in the 1930s to obtain such information from an earlier generation, but unfortunately chose not to take advantage of that (Emory, Cox et al.1959).

Such an inventory should include a "history" of each place name, including when and how it was first documented, subsequent appearances or uses, variations in spellings, any interpretations, and occurrence in traditions (see Tables 3, 4, and 5).

In addition, as a part of the place name research, an inventory of cultural places should also be carried out. Such places should be included as sites in the on-going development of an NRHP site inventory (see discussion in Section VI).

PATTERNS OF CULTURE, HISTORY, AND BEHAVIOR

The term "theoretical" is employed here in a general sense to refer to problems of interpretation of site patterning, analysis of behavior, and study of cultural change. These problems may be approached as individual research questions or as questions integrated into a larger research program (including site inventory).

SUBSISTENCE

Subsistence at HAVO has had significant attention due to the success in identifying horticultural field areas, but much more research should be conducted, including detailed reviews of subsistence remains from excavations, such as marine shell, bone, and pollen. Detailed artifact analysis is also a contributing study for this subject. Further, subsistence studies need to be carried much further than they usually are. They commonly end at simple quantification and perhaps a comparison of subsistence remains with known available resources. However, questions of variability, occupation events and duration, discard patterns, social patterns, catchment, distribution, social control of items, and many more dimensions of subsistence need to be addressed.

DEFINING TEMPORAL PERIODS

Segregating temporal periods of the archeological landscape needs to address patterns of change, not just the shift from pre-Contact to post-Contact periods. Patterns of change include change involving population increase; adaptation to lava flows; change associated with political dynamics and power centers; comparative architecture (early, pre-Contact, and post-Contact); changes due to post-Contact population decline; effects of changing economies (e.g., introduction of sweet potato; sandalwood and pulu collection, and goat herding).

VILLAGE AND HOUSEHOLD PATTERNING

Despite the ethnographic models, as well as some excavation that has focused on this research question, village and household patterning remains a poorly understood aspect of the archeological record. For example, one of the peculiarities of Hawaiian archeology is the lack of information about the location of imu (*ovens*) in village organization, despite the fact that this was a central feature of Hawaiian habitation and an essential component of Polynesian household organization in general. (In Ellis' early 19th century description of life in this region, ovens are mentioned numerous times—see e.g., Fig. 21b). Village patterning analysis can be addressed through extensive areal excavations to determine subsurface feature distribution.

BOUNDARIES

A question related to village patterning is one of boundaries in settlement; that is, the nature of the social and functional boundaries in settlements. This in part is a question of how a site is defined; when the effort is made to identify such boundaries in structure complexes, it is distance between structures, rather than function, that is more often than not used as the primary variable (see for example, Ladefoged et al. 1987).

The history of walls as barriers and as boundary markers is a boundary-related question that relates to the post-Contact period. The development of the pattern of wall construction needs to be investigated archeologically and by archival-historical records. The use of enclosing walls around individual houselots is mirrored in enclosing walls around whole village; how this pattern of wall-building diffused and on what time-line are important research questions.

The question of boundaries also needs to be addressed at higher levels of organization, including the identification of ahupuaʻa (and ʻili) boundaries. Most of the time, archeologists work with the assumption of static ahupuaʻa boundaries (practically speaking, those recorded on USGS maps, or on occasion recorded in Boundary Certificates and related testimony or other archival sources), but they seldom do anything to verify those boundaries or to consider the possibility of boundary creation and change. For the HAVO area, the question of changing district and ahupuaʻa boundaries has been raised, and this needs to be a significant research question.

PETROGLYPHS

Petroglyphs are a major feature of the lands of HAVO, and are associated with trails, ahupuaʻa boundaries, and ritual (see Appendix C, and section on Puʻuloa; also Glidden 1995, Lee 1998, Stasack and Stasack 2007). Completion of the inventory survey and recording of all petroglyph areas is recommended as the highest priority for future research. In many respects, the detailed information about these archeological remains might be more important for understanding the overall cultural history, ritual, and behavioral pattern of the HAVO region than nearly any other type of site.

This research should also include a continuing study of the detailed distribution patterns, not only of complexes, but of individual types of petroglyphs, including figure variation, pecked areas, and kōnane boards. Kōnane boards, for example, are often casually recorded as "recreation," but although these were gameboards, they also served other functions, as has been pointed out in Stasack and Stasack (2007). One function is noted in traditional references for augury and divining (Fornander 1916-20:VI:86; Nāmakaokeahi 2004: E 63). Further, their distribution is not coterminous with petroglyph fields in general. For example, there are no kōnane boards among the thousands of carved images at the Puʻuloa Petroglyph Field (Stasack and Stasack 2007).

THE ARCHEOLOGY OF PELE AND PĀʻAO

Hawaiian traditions tell of two major cultural changes, the coming of Pele and the coming of Pāʻao. The archeological question is how did these two events affect the archeological landscape. How and when did the temples for Pele develop and how did they change what existed before? Are there "archeological signatures" of attention to Pele or of local Pele cults in any of the settlements? Where did the priests and priestesses of Pele live?

The study of caves with the hypothesis of their use as ritual sites is related to the question of the influence of Pele cults on the archeology of the region.

For Pāʻao, there is the archeological record of Wahaʻula Heiau (complex though it is; it may also tell about Pele as well), but this is only one point in space and time. In what other ways, if any, did the arrival of Pāʻao change the archeological landscape—other temples and forms of temples, new rituals and related material culture, and of course, the great question, new DNA (i.e., the replacement of an older population with a new one that is archeologically identifiable in their physical remains)?[79]

THE ARCHEOLOGY OF MAUNA LOA

Finally, it can be argued that Mauna Loa is one of the most important cultural places in all of Hawaiʻi (as suggested above), and the fact that there are probable ritual sites on the mountain emphasizes the need for a detailed study of the upper region. Such a study should consider all the possible ranges of activities, from ritual and possible astronomical components, to that of the bird hunting (and possible relationships between these things). There is also the question of the features that relate to survival on the upper reaches of the mountain.

METHODOLOGICAL PROBLEMS

Methodological problems focus on chronological methods, diversity analysis (midden and artifacts), excavation sampling, and archeological "signatures" of behavior. In general, this is a poorly developed aspect of Hawaiian archeology, and any research conducted should include methodological questions.

Regarding problems of innovative dating methods, collaboration with volcano research scientists might be productive. Such collaboration might also be helpful in methodological questions related to site formation processes (including, for example, identification of earthquake and tsunami effects on sites).

Experimental archeological efforts should also be considered. Examples include studies of acid rain on exposed midden and experimental cultivation of sweet potato and other plants in the agricultural sites.

Finally, perhaps the methodological problem that might be considered of most immediate importance is the investigation of GIS to develop the best methods for the organization, structure, and manipulation of archeological data for purposes of archeological "site" management and archeological research. (The framework for this recommendation is discussed in Section VI.)

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[79] Archeologists are often uncertain about how to interpret Pāʻao in historical terms, but there are Hawaiian historians who have no difficulty reading the tradition of Pāʻao as a literal replacement of the earlier Hawaiian population, the menehune, by the conquerors from Kahiki (see e.g., Kane 1998, 2005).

APPENDIX A. SITES

This appendix consists of two tables generated out of the ASMIS data base.

Table A-1 is a listing of all known sites in HAVO, with a brief description and bibliographic reference. It also identifies sites that are in the GIS database, the HAVO ASMIS number (if any), and the ahupua‘a location based on Emory, Cox et al. (1959).

Table A-2 contains expanded information on selected sites from the ASMIS database (sites are marked with an asterisk in Table 1); only those sites in the database that have lengthy descriptions are included in this secondary table. The text in the last column (“Description”) is extracted nearly verbatim from the ASMIS database, except for minor editing.

Table A-1. Inventory of HAVO Archeological and (Selected) Cultural Sites (note: burial sites removed).

Site No.	Name/description (modified from HAVO records)	ASMIS Description (in CAPS: ARC DBF DESC)* (in parentheses, added information)	InArc GIS DB	Reference	Condition (not complete)	Park ID (ASMIS)	Ahupuaʻa
05501	ʻĀinapō Trail	Narrow, single-file, twisting, occasionally abraded trail over lava fields; above 11,600 foot elevation; leads up broad SE flank of Mauna Loa to and along E side of Mokuʻāweoweo*		NRHP form HAVO Dougherty 2004			Kahuku Kapāpala
05502	Kīlauea Crater	Summit of Kīlauea volcano has collapsed to form a broad, shallow caldera, within which is Kīlauea Crater; within Kīlauea Crater is Halemaʻumaʻu Crater*					Keauhou
05503	Puna-Kaʻū Historic District	The human occupation of the Puna/Ka'ū district , as nearly as can be determined, covers a span of nearly 600 years*	HAVO				multiple
05504	Mauna Loa Trail	Trail on lava that leads to the summit of Mauna Loa Volcano, with ahu	HAVO	Glidden and Rivoli 2000 Dougherty 2004			Kapāpala
05505	Footprints Area	* FOOTPRINT IMPRESSIONS, PETRO	x	Moniz Nakamura 2003a			Kapāpala
05506	Whitney Seismographic Vault	*		HAVO		B-29	Keauhou
05507	Wilkes' Campsite	*	x	NRHP form McCoy 1988 Dougherty 2004	HAVO-2003	M-69	Kapāpala
05508	Old Volcano House	Old Volcano House					Keauhou
19248	Catchment Dump Site 19270 (Acc 354)	Historic trash dump*	x	Keswick HVASR			Keauhou
19429	Ainahou Ranch House	Ainahou Ranch House (also possible location of Keauhou Goat Ranch and Pogue House)	x	Keswick HVASR	HAVO-2003-		Keauhou
19445	CCC Camp Foundations at Res Mgmt	*		Keswick HVASR			Keauhou
19446	1942 Ainahou Tank Foundation	1942 Ainahou tank foundation	x	Keswick HVASR			Keauhou
19447	Keauhou Landing	Complex of enclosures, walls, a rectangular cistern, walkways, stairs, and pahoehoe quarries, dating from late 1800s to the 1940s.*	x	Keswick HVASR			Keauhou
19448	Shed by Nene Pen and by 19446	3.15 x 3.83 m redwood storage shed, 3 m high	x	Keswick HVASR			Keauhou
19450	Lower Water Tank [Rusty Tank by Nene Pen: Excel]	Lower Water Tank	x	Keswick HVASR			Keauhou
19452	Ainahou Upp W. Tank #1	Ainahou Upper Water Tank #1	x	Keswick HVASR			Keauhou
19453	Ainahou Monster Tank	Ainahou Monster Tank	x	Keswick HVASR			Keauhou
19454	Ainahou Upp W. Tank #2	Ainahou Upper Water Tank #2	x	Keswick HVASR			Keauhou
19455	Steam Flats Dump 3900 (Acc. #356)	Historic trash dump*	x	Keswick HVASR			Keauhou
19456	Steam Crack Bath House	Historic structure	x	Keswick HVASR			Keauhou
19457	Ginger Patch Dump (Acc. #355)	Historic trash dump*	x	Keswick HVASR			Keauhou
19458	Headquarters' Crack Dump	Said to be the main dump site for the 1877 Volcano House and other buildings of the area*	x	Keswick HVASR			Keauhou
19459	CCC Water Tank Foundations	*	x	Keswick HVASR			Keauhou

Site No.	Name/description (modified from HAVO records)	ASMIS Description (in CAPS: ARC DBF DESC)* (in parentheses, added information)	InArc GIS DB	Reference	Condition (not complete)	Park ID (ASMIS)	Ahupuaʻa
19460	House site complex	Enclosures, platforms, caves, fishermans shelter, salt drying areas, filled cracks, ahu, ca 17,000 petroglyphs. Permanently Sealed		Spears 1995		HV-198 HV-212 HV-225 HV-375 HV-376	Pānau Iki
19461	Palm Tree Site, Paliuli	House site, pre-Contact, post-Contact*	x	Smart et al. 1965 Glidden 2006	dest. by lava	HV-189 (A-E) HV-190 (A-C)	Laeʻapuki Pānau Iki
19462	ʻAʻa site	Caves, enclosures, terraces, petroglyphs (Wall and platforms; Smart et al. 1965)	x	Smart et al. 1965 Glidden 2006	dest. by lava	HV-194	Laeʻapuki Pānau Iki
19463	Petroglyph Cave	Cave with petroglyphs and water collection*	x	Glidden 2006	dest. by lava	#360	Laeʻapuki Pānau Iki
19465	1930s Power Plant	Structure, historic	x	Keswick HVASR			
19466	Salt Drying Areas	Eleven salt drying area and 13 other features. Destroyed*	x	Morlock, L.			
19467	Enclosure, cave	Enclosure, wall (Long wall and structures; Smart et al. 1965)	x	Smart et al 1965 Glidden 2006	dest. by lava	HV-194	Laeʻapuki Pānau Iki
19468	Trail	Stepping stone trail that connects Sites 19462 and 19467 *		Emory, Cox et al.1959 Smart et al. 1965 Glidden 2006	dest. by lava	HV-194	Laeʻapuki Pānau Iki
19469	Ag. features and ahu	Petroglyphs, ahu, agricultural complex MANY PETROS AND AHU; PETROGLYPHS (Cairns; Smart et al. 1965)	x	Smart et al. 1965 Glidden 2006	dest. by lava	HV-188 (A-H)	Laeʻapuki Pānau Iki
19470	Ag. terraces	Mounds, terraces, petroglyphs MANY PETROGLYPHS (Cairns and terraces; agricultural strustures; Smart et al. 1965)	x	Smart et al. 1965 Glidden 2006	dest. by lava	HV-191	Laeʻapuki Pānau Iki
19471	House site	Enclosure ENCLOSURE (House site; Smart et al. 1965) Permanently Sealed	x	Smart et al. 1965 Glidden 2006	dest. by lava	HV-187	Laeʻapuki Pānau Iki
19472	House site w/ ag. features	Agricultural features; platform PLATFORM (Enclosure; Smart et al. 1965)	x	Smart et al. 1965 Glidden 2006	dest. by lava	HV-192	Laeʻapuki Pānau Iki
19473	Long J-shaped wall	Long wall		Smart et al. 1965 Glidden 2006	dest. by lava	HV-194	Laeʻapuki Pānau Iki
19474	Papalehau Cave	*		Waipa HVASR			
19475	Petroglyph Trail	13 petroglyphs along a worn trail MANY PETROGLYPHS (Enclosures; house site, shelter cave, petroglyph; Smart et al. 1965) [listed in Pānau Iki in ASMIS General) (HAVO-103 in ASMIS general, not located] Some permanently sealed?	x	Glidden 2006	dest. by lava		Laeʻapuki Pānau Iki

Site No.	Name/description (modified from HAVO records)	ASMIS Description (in CAPS: ARC DBF DESC)* (in parentheses, added information)	InArc GIS DB	Reference	Condition (not complete)	Park ID (ASMIS)	Ahupuaʻa
20414	C-shape and pavement	C-shape, papamu CSHP	x	Glidden 2006	dest. by lava	T101 T229	Laeʻapuki Pānau Iki
20415	C-shape	C-shape in a lava bubble SHELTER	x	Glidden 2006	dest. by lava	T103	Laeʻapuki Pānau Iki
20416	petroglyph	PETROGLYPH	x	Glidden 2006	dest. by lava	T104	Laeʻapuki Pānau Iki
20417	C-shape	C SHAPE, PITS	x	Glidden 2006	dest. by lava	T105	Laeʻapuki Pānau Iki
20418	petroglyphs	Four petroglyphs PETROGLYPHS	x	Glidden 2006	dest. by lava	T106+	Laeʻapuki Pānau Iki
20419	Cupboard; petroglyph	Cupboard and Petroglyph PETROGLYPH	x	Glidden 2006	dest. by lava	T108 T138	Laeʻapuki Pānau Iki
20420	Enclosure, J-shaped wall	Walls, enclosures L SHAPE, ENCLOSURE, TERRACES	x	Glidden 2006	dest. by lava	T109 T110	Laeʻapuki Pānau Iki
20421	Enclosure	Enclosure TERRACE, PETROS, C SHAPE	x	Glidden 2006	dest. by lava	T111	Laeʻapuki Pānau Iki
20422	C-shape, terrace, petroglyphs	C-shape, terrace, petroglyphs AHU	x	Glidden 2006	dest. by lava	T112+	Laeʻapuki Pānau Iki
20423	ahus	Ahu	x	Glidden 2006	dest. by lava	T113	Laeʻapuki Pānau Iki
20424	enclosures, petroglyph	Enclosure, petroglyh PETROGLYPH, +	x	Glidden 2006	dest. by lava	T119+	Laeʻapuki Pānau Iki
20425	C-shape	C-shape L SHP	x	Glidden 2006	dest. by lava	T122	Laeʻapuki Pānau Iki
20426	Mound	Mound CBL\BLDR MOUND	x	Glidden 2006	dest. by lava	T123	Laeʻapuki Pānau Iki
20427	C-shape	C-shape SHELTER	x	Glidden 2006	dest. by lava	T125	Laeʻapuki Pānau Iki
20428	Terrace, wall	Terrace WALLED STRCT	x	Glidden 2006	dest. by lava	T126 T128	Laeʻapuki Pānau Iki
20429	C-shape	C-shape	x	Glidden 2006	dest. by lava	T127	Laeʻapuki Pānau Iki
20430	Wall	L-shape L SHP	x	Glidden 2006		T131	Laeʻapuki Pānau Iki
20431	C-shape	C-shapes C SHAPE	x	Glidden 2006		T132	Laeʻapuki Pānau Iki
20432	cave	Cave CAVE	x	Glidden 2006		T133	Laeʻapuki Pānau Iki
20433	Terrace, enclosure	Terrace, enclosure TERRACE	x	Glidden 2006		T134 T135	Laeʻapuki Pānau Iki
20434	T143 and T144a,b,c petroglyphs	Four petroglyphs PETROGLYPHS	x	Glidden 2006	partially dest. by lava	T143	Laeʻapuki Pānau Iki
20436	Agricultural complex	Agricultural mounds and related features MANY AG MOUNDS	x	Glidden 2006	dest. by lava	T102+	Laeʻapuki Pānau Iki

Site No.	Name/description (modified from HAVO records)	ASMIS Description (in CAPS: ARC DBF DESC)* (in parentheses, added information)	InArc GIS DB	Reference	Condition (not complete)	Park ID (ASMIS)	Ahupuaʻa
20439	Filled cracks, mounds	Filled cracks, mounds		Glidden 2006		T375-T380	Laeʻapuki Pānau Iki
20440	Filled cracks, mounds	Filled cracks, mounds		Glidden 2006	partially dest. by lava	T381+	Laeʻapuki Pānau Iki
20441	Filled cracks, mounds	Filled cracks, mounds		Glidden 2006	dest. by lava	T383+	Laeʻapuki Pānau Iki
20443	Kalapana Trail	Trail illustrated on 1912 Territorial survey map as extending east/southeast from Keauhou Ranch Road to the Puna coastline* MOUNDS, BENCHMARK +	x	Emory, Cox et al.1959 Glidden 2006 Dougherty et al. 2004b Kirkendahl 1993a		B-33	Laeʻapuki Pānau Iki
20750	Petroglyph Cave	(Shelter cave, petroglyphs; Smart et al. 1965)	x	Smart et al. 1965 Stasack		HV-076	Keauhou
20874	Lava Plastered Cone Trail	Trail	x	Waipa HVASR	HAVO-2002-		
20875	Hot Cave Trail			Waipa HVASR			
21146	Enclosure	Very large enclosure*		Smart et al. 1965 Keswick HVASR		HV-196	Laeʻapuki (Pānau Nui)
21215	Pulu Factory	Mid-late 1800s, timbers and walls*		Glidden 1998 Glidden and Rivoli 2000		HV-377	Pānau Nui
21230	Jim's Pen complex	Jim's Pen complex by Keʻāmoku Flow		Keswick HVASR			
21276	Rainshed Crack Dump	Historic dump in large volcanic crack, approx. 10 x 200 m; 1877 Volcano House (current Volcano Art Center) located about 100 m to SE	x	Keswick HVASR			Keauhou
21316	Coastal Trail through SDA (19,466)	Coastal trail*		Abrams, S.?			
21353	Namakani Paio Crack Dump	Historic dump in a geological crack; just W of cabin # 1 in the Namakani Paio Campground	x	Keswick HVASR			Keauhou
21676	Terrace (Fea. 10)			Glidden et al. 1998			Pānau Nui
21677	C-shape (Fea. 55)	C-SHAPE	x	Glidden et al. 1998			Pānau Nui
21678	Cave (Fea. 61)	Cave with midden* CAVE	x	Glidden et al. 1998			Pānau Nui
21680	Cave (Fea. 86)	North-south oriented cave; relatively small; interior contains rock mound, with octopus lure, sea urchin spine and kukui nut shell fragments CAVE	x	Glidden et al. 1998			Pānau Nui
21681	Terrace	TERRACE	x	Glidden et al. 1998		Feature 180	Pānau Nui
21682	Caves	Cave with north section that ends in a natural pahoehoe plug; kukui nut fragments in cave CAVES	x	Glidden et al. 1998		Feature 246? (Fea. 256a, 256b)	Pānau Nui
21684	Cave (Fea. 283)	Cave contains goat bones, kukui nut fragments, sea urchin spines, shell midden, large chunks of charcoal; 80 m long, narrow with low ceiling CAVE	x	Glidden et al. 1998			Pānau Nui
21685	Alignment (Fea. 348b)	Alignment		Glidden et al. 1998			Pānau Nui
21686	Cave (Fea. 396)	CAVE	x	Glidden et al. 1998			Pānau Nui

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21687	Walls (Fea. 413a and b)	WALL	x	Glidden et al. 1998			Pānau Nui
21688	Cave (Fea. 445)	CAVE	x	Glidden et al. 1998			Pānau Nui
21689	Cave (Fea. 481)	CAVE	x	Glidden et al. 1998			Pānau Nui
21690	C-shape (Fea. 504)	* MOUND	x	Glidden et al. 1998			Pānau Nui
21691			x				Pānau Nui
21692	Cave (Fea. 514)	Entrance consists of a skylight with an approx. depth of 3 m, with weak pahoehoe edges; needs to be revisited with rappeling equipment in order to access it. CAVE	x	Glidden et al. 1998			Pānau Nui
21693	Cave (Fea 554)			Glidden et al. 1998			Pānau Nui
21694	Cave (Fea. 525)	3.6 m x 0.5 m stepping stone trail constructed of 4 pahoehoe slabs placed over the aa lava and running in northeast-southwest direction TRAIL	x	Glidden et al. 1998			Pānau Nui
21695	Trail (Fea. 584a and b) from Excel CAVE	10 x 0.5 m stepping stone trail constructed of 10 pahoehoe slabs placed over the aa lava and running in north-south direction. TRAIL	x	Glidden et al. 1998			Pānau Nui
21696	Hearth (Fea. 620)	Hearth	x	Glidden et al. 1998			Pānau Nui
21697	Ki Cave (Fea. 638)	Entrance is a collapsed skylight; cultural material includes large opihi shell, petrogylphs, wood fragments, and charcoal; rock mounds and petroglyphs outside of the cave CAVE	x	Glidden et al. 1998			Pānau Nui
21698	Ag. Area (Fea.#1-652)	Agricultural complex* MOUND, PITS, TRAILS, CAVES, ETC	x	Glidden et al. 1998 Dougherty et al. 2004a Dougherty et al. 2004b		B-23	Pānau Nui
21699	Cave (Fea. 1)	Shelter cave with some cultural material* CAVE	x	Glidden et al. 1998		Feature 1	Pānau Nui
21700	Trail (Fea. 2)	Trail* TRAIL, TRAIL CAIRNS	x	Glidden et al. 1998 Dougherty et al. 2004a Dougherty et al. 2004b	HAVO-2002-	L-187	Pānau Nui
21701	C-shape (Fea. 4)	C-SHAPE	x	Glidden et al. 1998			Pānau Nui
21702	Cave (Fea. 12)	Cave with cultural material* ROCK SHELTER	x	Glidden et al. 1998		HAVO-2003-L-318	Pānau Nui
21703	Platform (Fea. 37)	PLATFORM	x	Glidden et al. 1998	HAVO-2005-		Pānau Nui
21704	Cave (Fea. 38)	ROCK SHELTER	x	Glidden et al. 1998 Dougherty et al. 2004a		L-249	Pānau Nui
21705	Petroglyphs (Fea. 49)	PETROGLYPH	x	Glidden et al. 1998		49	Pānau Nui
21706	Trail (Fea. 52)	TRAIL	x	Glidden et al. 1998		52	Pānau Nui
21707	Cave (Fea. 53)	Petroglyph cave*	x	Glidden et al. 1998 Dougherty et al. 2004a	HAVO-2003-	L-319	Pānau Nui

HAVO-2003-

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21708	Wall (Fea. 59)	WALL	x	Glidden et al. 1998		59	Pānau Nui
21709	Ahu (Fea. 87)	AHU	x	Glidden et al. 1998		87	Pānau Nui
21710	Platform (Fea. 88)	platform* PLATFORM	x	Glidden et al. 1998 Dougherty et al. 2004a		L-330	Pānau Nui
21711	C-shape (Fea. 89)	C-SHAPE	x	Glidden et al. 1998		89	Pānau Nui
21712	Cave (Fea. 90)	CAVE	x	Glidden et al. 1998		90	Pānau Nui
21713	Trail (Fea. 105)	Trail?		Glidden et al. 1998	HAVO-2003-		Pānau Nui
21714	Petroglyphs (Fea. 108)	PETROGLYPH	x	Glidden et al. 1998			Pānau Nui
21715	Cave (Fea. 109)	PETROGLYPHS, SHELTER, CAVES	x	Glidden et al. 1998			Pānau Nui
21716	Cave (Fea. 110)	ROCK SHELTER	x	Glidden et al. 1998 Dougherty et al. 2004a		L-256	Pānau Nui
21717	Cave (Fea. 120)	CAVE	x	Glidden et al. 1998		120	Pānau Nui
21718	Terrace (Fea. 121)	TERRACE	x	Glidden et al. 1998		121	Pānau Nui
21719	Cave (Fea. 122)	CAVE	x	Glidden et al. 1998		122	Pānau Nui
21720	Platform (Fea. 123)	PLATFORM	x	Glidden et al. 1998		123	Pānau Nui
21721	Enclosure (Fea. 130)	Enclosure* ENCLOSURE	x	Glidden et al. 1998 Dougherty et al. 2004a	HAVO-2003-	L-384	Pānau Nui
21722	Cave (Fea. 143)	ROCK SHELTER	x	Glidden et al. 1998 Dougherty et al. 2004a		L-334	Pānau Nui
21723	C-shapes (Fea. 56 and 57)	C-SHAPES	x	Glidden et al. 1998		56 and 57	Pānau Nui
21724	Petroglyphs (Fea. 6 and 144)	PETROGLYPHS	x	Glidden et al. 1998	HAVO-2003-		Pānau Nui
21725	Terrace (Fea. 103) and C-shape (Fea. 104)	TERRACE	x	Glidden et al. 1998		Feature 103 and 104	Pānau Nui
21726	Terraces (Fea. 125 and 1260	TERRACES	x	Glidden et al. 1998	HAVO-2003-	Feature 125 and 126	Pānau Nui
21727	Wall (Fea. 13) and Terrace (Fea. 14)	Habitation complex with 7 features (terraces, platforms, and petroglyphs) ENCLOSURE, PLATFORMS, PETROS	x	Glidden et al. 1998 Dougherty et al. 2004a			Pānau Nui
21728	Enclosure (Fea. 40), Terrace (41), Cave (15)	Habitation complex* WALL, PLATFORMS, MOUNDS	x	Glidden et al. 1998 Dougherty et al. 2004a		L-326	Pānau Nui
21729	Petroglyphs (Fea. 7,8,10,11) and Ahu	PETROGLYPHS	x	Glidden et al. 1998			Pānau Nui
21730	Cave (Fea. 98) Terraced Platforms (Fea. 99 and 100), Mound (101)	Habitation complex* CAVE, PLATFORMS, C-SHAPES	x	Glidden et al. 1998 Dougherty et al. 2004a	HAVO-2003-		Pānau Nui
21731	C-shapes, Caves, Terraces	C-SHAPE, TERRACE, CAVE	x	Glidden et al. 1998			Pānau Nui
21732	Petroglyphs and Terraces	PETROGLYPHS, TERRACES	x	Glidden et al. 1998			Pānau Nui
21733	Wall, Platform, Terrace, Enclosure, Cistern	Habitation complex* CISTERN, TERRACES, PLATFORMS	x	Glidden et al. 1998 Dougherty et al. 2004a		L-385	Pānau Nui
21734	Enclosures, Cave, Terraces, Platform and Petroglyphs	Habitation complex (enclosures, platforms, terraces, caves, and petroglyphs) ENCLOSURE, TERRACES. PETROGLYPH (96), CAVES, PETROGLYPHS	x	Glidden et al. 1998 Dougherty et al. 2004a	HAVO-2003-		Pānau Nui

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21735	Enclosures, Cave, Terraces, L-shape, and Papamu	Habitation complex* TERRACE, CAVE, ENCLOSURE, PETROGLYPH (118)	x	Glidden et al. 1998 Dougherty et al. 2004a			Pānau Nui
21736	Enclosures, Terraces, Platforms, Ahu, L-shapes, Petroglyph	TERRACES, AHU, ENCLOSURES	x	Glidden et al. 1998			Pānau Nui
21737	Caves, Papamu, Enclosures, Terraced platforms, wall, Petroglyphs, C-shapes, Hearth	Habitation complex, with largest concentration of habitation features recorded during Glidden 1998 survey.* TERRACE, CAVES, PLATFORMS, PETROGLYPHS AND KONANE, PETROGLYPHS	x	Glidden et al. 1998 Dougherty et al. 2004a			Pānau Nui
21751	Ainahou Ranch Cave System	Complex tube with 23 known entrances; as of 1994 is the longest surveyed cave within HAVO, with many cultural features* CAVE (Shelter cave, petroglyphs; Smart et al. 1965)	x	Smart et al. 1965 Dougherty et al. 2004a		HV-185	Keauhou
22487	CCC features on Hilina Pali Rd. (LCS#101791)	Historic site* ROCK MOUND, QUARRIES, WALLS, PETROGLYPH (D-55)	x	Wulzen 1999 Roper 2005		000	Kapāpala
22726	Fishermen's Cave	Cave (Shelter cave; Smart et al. 1965)	x	Smart et al. 1965 Ladefoged et al.1987 Waipa, J./Laqua, T.		HV-228 (Site 911)	Kapāpala
22738	Keauhou Trail Cave	Cave	x		HAVO00276.		
22973	C-shapes in Footprints area	20 features*	x	Moniz Nakamura 2003a		(Fea. 1-14)	Kapāpala
22974	Shelter and volcanic glass quarry in Footprints area.	Shelter and volcanic glass quarry*	x	Moniz Nakamura 2003a			Kapāpala
22975	Shelters and volcanic glass quarry in Footprints area	*	x	Moniz Nakamura 2003a			Kapāpala
22976	Shelters and volcanic glass quarry in Footprints area.	*	x	Moniz Nakamura 2003a		18	Kapāpala
22977	Shelters, petroglyphs, and volcanic glass quarry in Footprints area.	*	x	Moniz Nakamura 2003a		24	Kapāpala
22978	Structures in Footprints area.	May be functionally associated with the Kaʻū - Volcano Trail (Site 22982) but are not spatially associated.*	x	Moniz Nakamura 2003a		26	Kapāpala
22979	Structures, volcanic glass quarry in Footprints area,	High density of features (8 enclosures, 6 overhangs, 5 C-shapes, 5 U-shapes, 3 mounds, 3 walls, 1 volcanic glass quarry) along edge of the Keʻāmoku flow; site is approximately 70 m south of the Keʻāmoku Cross Trail (Site 23033)*	x	Moniz Nakamura 2003a		31	Kapāpala
22980	Structures in Footprints area	Structures associated with two trails*	x	Moniz Nakamura 2003a		52	Kapāpala
22981	Structures in Footprints area	Dense cluster*	x	Moniz Nakamura 2003a		63	Kapāpala
22982	Structures and trails in Footprints area	*	x	Moniz Nakamura 2003a		(Fea. 53, 69, 98-111, 112, 116, etc)	Kapāpala

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22983	Cave in Footprints area	*	x	Moniz Nakamura 2003a		98-624	Kapāpala
22984	Structures in Footprints area	*	x	Moniz Nakamura 2003a		78	Kapāpala
22985	Structures in Footprints area	*	x	Moniz Nakamura 2003a		85	Kapāpala
22986	Overhangs in Footprints area	*	x	Moniz Nakamura 2003a		96	Kapāpala
22987	Structures in Footprints area	* Largest site in the area, with 47 structures	x	Moniz Nakamura 2003a		101	Kapāpala
22988	Structures in Footprints area	* C SHAPES	x	Moniz Nakamura 2003a			Kapāpala
22989	Cave in Footprints area	*	x	Moniz Nakamura 2003a		152	Kapāpala
22990	Cave in Footprints area	*	x	Moniz Nakamura 2003a		155	Kapāpala
22991	Cave in Footprints area	*	x	Moniz Nakamura 2003a		154	Kapāpala
22992	Structures in Footprints area	*	x	Moniz Nakamura 2003a		153	Kapāpala
22993	Structures in Footprints area	* C SHAPES, ENCLOSURES, ETC.	x	Moniz Nakamura 2003a		164	Kapāpala
22994	Structures in Footprints area	*	x	Moniz Nakamura 2003a		190	Kapāpala
22995	Structures in Footprints area	*	x	Moniz Nakamura 2003a		202	Kapāpala
22996	Structures in Footprints area	48 features, most built on Keʻāmoku flow*	x	Moniz Nakamura 2003a		212	Kapāpala
22997	Peter Lee Road in Footprints area	Road built for the Punaluʻu hotel owned by Peter Lee and for visitors staying at Volcano House; the first official road built in this area, completed in 1891*	x	Moniz Nakamura 2003a		Peter Lee Road	Kapāpala
22998	Structures in Footprints area	16 features (10 C-shapes, 3 walls, 1 terrace, 1 modified overhang, 1 enclosure), built primarily on the Keʻāmoku flow* C SHAPES, ENCLOSURES	x	Moniz Nakamura 2003a		254	Kapāpala
22999	Structures in Footprints area	three features (C-shape, terrace, possible cupboard)	x	Moniz Nakamura 2003a		264	Kapāpala
23000	Structures, lithic workshop in Footprints area	* C SHAPE, ENCLOSURES, CAIRNS (A), 10-19	x	Moniz Nakamura 2003a		269	Kapāpala
23001	Structures in Footprints area	* C SHAPE, ENCLOSURES NEAR 117	x	Moniz Nakamura 2003a			Kapāpala
23002	Structures in Footprints area	11 features (6 C-shapes, 4 walls, 1 enclosure) C SHAPE, WALLS, ENCLOSURES	x	Moniz Nakamura 2003a			Kapāpala
23003	Structures in Footprints area	in the Kaʻū Desert area* SURVEY MONUMENT, WALLS	x	Moniz Nakamura 2003a			Kapāpala
23004	Structures in Footprints area	4 features (enclosure, wall, two C-shapes); in close association with Kaʻū-Volcano Trail (Site 22982) C SHAPES, 11-24	x	Moniz Nakamura 2003a			Kapāpala
23005	Structures in Footprints area	Structures along the Peter Lee Road* N OF 77C	x	Moniz Nakamura 2003a			Kapāpala
23006	Big ʻŌhiʻa Cave, in Footprints area	* BIG ʻŌHIʻA CAVE	x	Withrow 1987 Moniz Nakamura 2003a		Feature 98-32	Kapāpala
23007	Structures, lithic workshops in Footprints area	Lithic workshops may be the outer extent of a large cluster of lithic block quarries identified in 2001 and surveyed in 2002* LITHIC WORKSHOPS	x	Moniz Nakamura 2003a			Kapāpala
23008	Cave in Footprints area	* BY CRATER RIM RD, LIKE BIG ŌHIA CAVE	x	Moniz Nakamura 2003a			Kapāpala

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23009	Cave in Footprints area	* BY HWY 11	x	Moniz Nakamura 2003a			Kapāpala
23010	Volcanic glass quarry in Footprints area	Located next to Mauna Iki Trail CG BY MAUNA IKI TRAIL, 5-24	x	Moniz Nakamura 2003a			Kapāpala
23011	Structures in Footprints area	Four features (C-shape, mound, wall, enclosure) C-SHAPES, ENCLOSURES	x	Moniz Nakamura 2003a			Kapāpala
23012	Volcanic glass quarry in Footprints area	Four features (2 volcanic glass quarries, enclosure, wall); just east of Footprints interpretive trail ENCLOSURES. 10-20	x	Moniz Nakamura 2003a			Kapāpala
23013	Structures in Footprints area	Seven features (4 enclosures, C-shape, terrace); located along and just SW of Footprints interpretive trail. Shrine. C SHAPE, ENCLOSURES	x	Moniz Nakamura 2003a			Kapāpala
23014	Volcanic glass quarry in Footprints area	Single volcanic glass quarry located very close to existing Footprints Shelter		Moniz Nakamura 2003a			Kapāpala
23015	Structures, petroglyphs in Footprints area	Pre-Contact and post-Contact* WALLS, C-SHAPES, ALIGNMENTS, MOUNDS, HISTORIC LETTERS, 11-16; CORRALS	x	Moniz Nakamura 2003a			Kapāpala
23016	Structures in Footprints area	12 features (1 wall, 4 enclosures, 5 volcanic glass quarries, 2 C-shapes); located SSW of Site 23015 near the Ka‘ū-Volcano Trail (Site 22982) 4 ENCLOSURES 10-06; CG QUARRY, 10-06	x	Moniz Nakamura 2003a			Kapāpala
23017	Volcanic glass quarry in Footprints area	11 features (8 volcanic glass quarries, 2 enclosures, 1 terrace); located SE of Site 23015 at base of the Ke‘āmoku lava flow	x	Moniz Nakamura 2003a			Kapāpala
23019	Footprints		x	Moniz Nakamura 2003a			Kapāpala
23020	Structures in Footprints area	Two wall features near the Ka‘ū-Volcano Trail (Site 22982) ENCLOSURE, 10-06		Moniz Nakamura 2003a			Kapāpala
23021	Trail in Footprints area	Section of Old Puna-Ka‘ū Trail* B ON AA 315, 10-14	x	Moniz Nakamura 2003a			Kapāpala
23022	Structures, volcanic glass quarry in Footprints area	* ENCLOSURE, 10-07	x	Moniz Nakamura 2003a			Kapāpala
23023	Footprints		x	Moniz Nakamura 2003a			Kapāpala
23024	Footprints	1868 TUBE, 10-14	x	Moniz Nakamura 2003a			Kapāpala
23025	Footrpints						Kapāpala
23026	Enclosure	290 x 310 cm enclosure, 80 cm high; constructed with pahoehoe cobbles and small boulders stacked 2 courses high	x	Roper 2005		HAVO-2005-D-121	Kapāpala
23027	Cairns, C-shape, quarry	Cairns, C-shape, quarry, etc.	x	Roper 2005		HAVO-2005-D-127	Kapāpala
23028	Hilina Pali Road	Portions of old Hilina Pali Road; plus CCC OLD ROADS; PLUS NON-CCC TRAIL, TRAIL, ROCK PILE,	x	Roper 2005		HAVO-2005-D-138	Kapāpala
23029	Footprints (Enclosure 11-23)	?					Kapāpala

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23030	Trail and features	Trail fragments, ahu, etc	x	Roper 2005		HAVO-2005-D-140	
23031	Rock pile	*	x	Roper 2005		HAVO-2005-D-153	
23032	Halfway House Trail, in Footprints area	Trail segments leading to Ka‘ū Halfway House (rest station for visitors traveling from Hilo to Ka‘ū in late 19th, early 20th centuries)* CAIRN		Moniz Nakamura 2003a		98-472	Kapāpala
23033	Ke‘āmoku Cross Trail, in Footprints area	Trail across the Ke‘āmoku flow just south of the beginning of the largest concentration of structures along the lava flow*	x	Moniz Nakamura 2003a			Kapāpala
23034	Kau Road, in Footprints area	Road built by the Territory of Hawai‘i, paralleled much of the then existing Peter Lee Road (Site 22997)*		Moniz Nakamura 2003a		75	Kapāpala
23035	Footprints	2 feas: Pu‘u Ohale survey		Moniz Nakamura 2003a			Kapāpala
23049	Crater Rim Road Wall	Wall heads in an E-W direction with the west and possibly east ends disrupted by the Crater Rim Road.*	x	Waipa, J.			
23269	Kahue Coastal Features	Mounds, enclosures, petroglyphs, historic artifacts	x	Waipa, J.		#2	Kahue
23270	Kealakomo Coastal Features	Habitation complex*	x	Waipa, J.			Kealakomo
23271	Pu‘uloa Petroglyph Field	*		Smart et al. 1965 Emory 1965, in Smart et al. 1965 Lee and Stasack 1999 Schuster, L.		HV-225	Pānau Nui
23275	Keanakāko‘i Crack Dump	*	x	Waipa, Schuster			Keauhou
23314	‘Āinahou Road/Keauhou Trail	This site consists of both the Keauhou Trail and the ‘Āinahou Road. These features were lumped together as a single site due to the fact that the ‘Āinahou Road used to be a section of the Keauhou Trail*		Waipa, J.			Keauhou
23315	‘Āpua Point	Habitation complex* (House sites; Smart et al. 1965)	x	Smart et al. 1965 Waipa, J.		HV-045	‘Āpua
23316	‘Āpua Point	Enclosure* (Enclosure; Smart et al. 1965)	x	Smart et al. 1965 Waipa, J.		HV-046	‘Āpua
23317	‘Āpua Point Spring	* (Spring; Smart et al. 1965)	x	Smart et al. 1965 Waipa, J.		HV-050	‘Āpua
23362	Pepeiau Shelter Cabin	Park cabin, probably 1930s*	x	Waipa, J.			
23363	Platform and shelters, shrine?	* (Platform and shelters; Smart et al. 1965)	x	Smart et al. 1965 Waipa, J.		HV-047	‘Āpua
23399	Hilina Pali Road	Date?*	x	Schuster, L.			Kapāpala
23400	Road marker with benchmark		x	Schuster, L.			
23401	Bore Hole for Steam experiments			Schuster, L.			
23402	Byron Ledge Lithic Scatter	Lithic scatter	x	Schuster, L.			Keauhou
23403	1924 Landing Field	Military landing field	x	Durst/Moniz Nakamura 2002			Kapāpala

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23645	Kupukupu Water Cave			Moniz Nakamura 2002b Dougherty et al. 2004b		B-426	Pānau Nui
23646	Agricultural complex	* ROCK PILES, PITS, PETROGLYPH; EXCAV PITS	x	Moniz Nakamura 2002b Dougherty et al. 2004b		B-143	Pānau Iki
23647	Lithic Block Quarry Features	Site consist of 277 individual quarry locales*	x	Thompson/Roper 2002 Moniz Nakamura 2006			
23794	Highway 11 Chute Dump	Historic dump site	x	Waipa, J.	~~HAVO-2002-~~		
23795	CCC Incinerator		x	Waipa, J.			
23796	Salt Drying Area	Rock alignments	x	Schuster, L.	~~HAVO-2002-~~		
23797	Kapāpala /Keauhou Rock Wall	Rock wall	x	Waipa, J.			Kapāpala Keauhou
23975	Kupukupu Feature KA1	Rock pile.*	x	Maxey/Schuster 2003 Dougherty et al. 2004b		F-01	Pānau Nui
23976	Kupukupu Features KB1-3	Rock shelter, wall, excavated pit	x	Maxey/Schuster 2003		HAVO 2003 F-02	Pānau Nui
23977	Kupukupu Features KC2-8	Excavated pits, rock piles	x	Maxey/Schuster 2003		HAVO 2003 F-05	Pānau Nui
23978	Kupukupu Features KD1-5	Excavated pits, rock piles	x	Maxey/Schuster 2003	~~HAVO-2003-~~	HAVO 2003 F-12	Pānau Nui
23979	Kupukupu Features KE1-5	Rock walls, caves,mounds	x	Maxey/Schuster 2003		HAVO 2003 F-17	Pānau Nui
23980	Kupukupu Features KF1-4	Excavated pits and mounds	x	Maxey/Schuster 2003		HAVO 2003 F-22	Pānau Nui
23981	Kupukupu Features KG1-3,6-8	Excavated pits, walls	x	Maxey/Schuster 2003		HAVO 2003 F-26	Pānau Nui
23982	Kupukupu Features KH1-4	Enclosure, excavated pits, walls	x	Maxey/Schuster 2003		HAVO 2003 F-32	Pānau Nui
23983	Kupukupu Features KI1-4	Rock shelter, pits	x	Maxey/Schuster 2003		HAVO 2003 F-36	Pānau Nui
23984	Kupukupu Features KK1-8	Excavated pits, walls, mounds, rock shelters	x	Maxey/Schuster 2003			Pānau Nui
23985	Kupukupu Features KL1A-C	Excavated pits, mounds	x	Maxey/Schuster 2003		HAVO 2003 F-47	Pānau Nui
23987	Kupukupu Features KN1-2	Pits, rock sheleter	x	Maxey/Schuster 2003		HAVO 2003 F-57	Pānau Nui
23988	Kupukupu Features KO1-2	Rock shelters, two	x	Maxey/Schuster 2003		HAVO 2003 F-59	Pānau Nui
23989	Kupukupu Features KP1-2	Pits	x	Maxey/Schuster 2003		HAVO 2003 F-61	Pānau Nui
23990	Kupukupu Feature KQ1	Pit	x	Maxey/Schuster 2003		HAVO 2003 F-63	Pānau Nui
24007	Kupukupu Ag complex	Agricultural complex* MOUNDS	x	Dougherty et al. 2004b		HAVO-2002-B-47	Pānau Nui
24008	Kupukupu rock shelter	ROCK SHELTER	x	Dougherty et al. 2004b			Pānau Nui
24009	Kupukupu cave	CAVE, PLATFORM	x	Dougherty et al. 2004b			Pānau Nui

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24010	Kupukupu trail		x	Dougherty et al. 2004b			Pānau Iki
24012	Kupukupu	ROCK SHELTER	x	Dougherty et al. 2004b			Pānau Nui
24013	Kupukupu	MOUNDS. ENCLOSURE	x	Dougherty et al. 2004b		HAVO-2002-B-541	Pānau Iki
24014	Kupukupu	PLATFORM	x	Dougherty et al. 2004b			Pānau Iki
24015	Kupukupu	ROCK SHELTER	x	Dougherty et al. 2004b			Pānau Nui
24016	Kupukupu	ROCK SHELTER	x	Dougherty et al. 2004b			Pānau Nui
24017	Kupukupu platform	* PLATFORM	x	Dougherty et al. 2004b			Pānau Nui
24018	Complex	COMPLEX	x	Dougherty et al. 2004b			Pānau Nui
24076	Habitation complex	Habitation complex TERRACE, ENCLOSURES	x	Dougherty et al. 2004a		HAVO-2003-L-1	
24077	TERRACE	TERRACE	x	Dougherty et al. 2004a		HAVO-2003-L-19	
24078	ENCLOSURE	ENCLOSURE	x	Dougherty et al. 2004a		HAVO-2003-L-48	
24079	TERRACE, C-SHAPE	TERRACE, C-SHAPE	x	Dougherty et al. 2004a		HAVO-2003-L-59	
24080	CAVE	CAVE	x	Dougherty et al. 2004a		HAVO-2003-L-64	
24082	ENCLOSURE	ENCLOSURE	x	Dougherty et al. 2004a		HAVO-2003-L-84	
24083	ROCK SHELTER	ROCK SHELTER	x	Dougherty et al. 2004a		HAVO-2003-L-93	
24084	ROCK SHELTER	ROCK SHELTER	x	Dougherty et al. 2004a		HAVO-2003-L-94	
24085	ROCK SHELTER	ROCK SHELTER	x	Dougherty et al. 2004a		HAVO-2003-L-117	
24086	ENCLOSURE	ENCLOSURE	x	Dougherty et al. 2004a		HAVO-2003-L-123	
24087	PETROGLYPH	PETROGLYPH	x	Dougherty et al. 2004a		HAVO-2003-L-138	
24088	Rock wall	Rock wall		Dougherty et al. 2004a		HAV0-2003-L-169	
24090	Platform	Platform		Dougherty et al. 2004a		HAVO-2003-L-213	
24091	Platform	Platform		Dougherty et al. 2004a		HAVO-2003-L-226	
24092	PETROGLYPH	PETROGLYPH	x	Dougherty et al. 2004a		HAVO-2003-L-270	
24093	ENCLOSURE	ENCLOSURE	x	Dougherty et al. 2004a			
24094	Agricultural complex	Large agricultural complex* ROCK PILES, TERRACES, PITS	x	Dougherty et al. 2004a		HAVO-2003-L-5	

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24121	Kahuku-‘Āinapō Trail	Segment of an “old trail system” used in historic times for driving cattle between various cattle ranching operations associated with Parker Ranch (ca. 1912-1947); located in Kahuku Management Unit*		Quiseng 2006 Waipa, J.			Kahuku
24335	Historic Trail-side Complex	Complex with C-shapes, rock shelters, wall, trail (77 m); temporary habitation	x	Dougherty 2004		HAVO-2003-	Kapāpala
24336	Complex	Excavated pits, bird nesting	x	Dougherty 2004		HAVO-2003-	Kapāpala
24337	EXCAVATED PITs	Excavated pits, bird nesting	x	Dougherty 2004		HAVO-2003-	Kapāpala
24338		Cluster of excavated pits utilized by dark-rumped petrel for nesting	x	Dougherty 2004		HAVO-2002-	Kapāpala
24339	EXCAVATED PITs	Three excavated pits, three quarries, one rock pile Quarries, mounds, pits; Bird nesting pits	x	Dougherty 2004		HAVO-2003-	Kapāpala
24340	Excavated pits, quarry	Quarries, mounds, pits	x	Dougherty 2004		HAVO-2003-	Kapāpala
24341	Excavated pits	Excavated pits, bird nesting	x	Dougherty 2004		HAVO-2003-	Kapāpala
24342	Excavated pits	Excavated pits, bird nesting	x	Dougherty 2004		HAVO-2003-	Kapāpala
24343	Excavated pits	Excavated pits, bird nesting	x	Dougherty 2004		HAVO-2003-M-66	Kapāpala
24344	Excavated pits	Excavated pits, bird nesting	x	Dougherty 2004		HAVO-2003-M-27	Kapāpala
24345	Excavated pits ROCK PILE (AHU)	Excavated pits, bird nesting ROCK PILE (AHU)	x	Dougherty 2004		HAVO-2003-M-26	Kapāpala
24346	Jagger’s Cave, Rock shelter	Rock shelter	x	Dougherty 2004		HAVO-2003-M-81	Kapāpala
24347	ENCLOSURES	ENCLOSURES	x	Dougherty 2004		HAVO-2003-	Kapāpala
24348	Bates Camp? Campsite	Campsite; 1915?		Dougherty 2004		HAVO-2003-M-82	Kapāpala
24349	Sawkins Camp	Cave, 1851	x	Dougherty 2004		HAVO-2003-M-83	Kapāpala
24355	TRAIL	TRAIL	x				
24356	EXCAVATED PIT	EXCAVATED PIT	x				
24523	Petroglyph	Historic petroglyphs consisting of initials “JM,” “ECH,” and “HML;” also “CCC Camp” PETROGLYPH	x	Roper 2005			
24524	Shelter	Overhang/rock shelter formed in the natural pāhoehoe flow; in interior is a table constructed from a large pāhoehoe slab (approx. 1 x 1.5 m); two CCC petroglyphs nearby ROCK SHELTER	x	Roper 2005			
24525	Petroglyph	Historic petroglyph pecked on an open slab of pāhoehoe bedrock; letters “R.E.D. DENISON, CCC 1940” PETROGLYPH	x	Roper 2005			
25093	Enclosure			Dougherty et al. 2004a		HAVO-2003-L-208	

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25935	Halapē Ruins	Habitation complex* (House site; Smart et al. 1965)	x	Smart et al. 1965 HAVO		HV-073	Kapāpala
25936	Halapē Ruins	Enclosure, house site? * (House site? Smart et al. 1965)	x	Smart et al. 1965 HAVO		HV-070	Kapāpala
25937	Kalue Ruins	Five historic structures*	x	HAVO		LCS 07540	
25938	Kūē‘ē Ruins	Remote village site; used as a fishing camp up to the 1970s* (Multiple features/sites; Smart et al. 1965) [HV-121,HV-122, HV-123, HV-124,HV-125, HV-126, HV-127,HV, 128, HV-129, HV-130, HV-133, HV-134, HV-137]	x	Smart et al. 1965 HAVO		HV-121-130. 133, 134, 135	Ka‘ala‘ala makai
25939	Keauhou Ruins-Heiau Cave	*	x	Emory, Cox et al.1959 Smart et al. 1965 HAVO		HV-078 LCS 07519	Keauhou
25940	Road Cut Cave	Cave with 9 entrances, lots of cultural material, outside trail*				CV017	
25941	Mel's Ahu	Ahu and petroglyphs*					
25942	Petroglyph Grotto	Site consists of rock shelter, petroglyphs, and possible agricultural features; located 25 m west of Pu‘uloa Petroglyph Field*		HAVO			
25943	Hilina Pali Cave	Deposits and petroglyphs*				HV-386	
25944	Earthquake Cave	Cave with depoits*	x				
25945	Kahuku K1 Cave	Bird bones and deposits*					
25946	Charcoal Cave	Substantial deposits*					
25947	Calabash Cave	Cave for water collection*				CV15B	
25948	Hilina Pali Cave					HV-393	
25949	Hilina Pali Cave					HV-383	
25950	Pen #9						
25951	?			Waipa, J.			
25952	?			Waipa, J.			
CLG-1	Inland agriculture and habitation			Ladefoged et al. 1987			
CLG-2	Inland agriculture and habitation			Ladefoged et al. 1987			
HV-001	Shelters and spring	Shelters and spring	x	Smart et al. 1965		HV-001	Pānau Nui
HV-002	House, walled	House, walled	x	Smart et al. 1965		HV-002	Pānau Nui
HV-003	Papamū	Papamū	x	Smart et al. 1965		HV-003	Pānau Nui
HV-004	Platforms	Platforms		Smart et al. 1965		HV-004	Pānau Nui
HV-005	House site	House site		Smart et al. 1965		HV-005	Pānau Nui
HV-006	House site, papamū	House site, papamū		Smart et al. 1965		HV-006	Pānau Nui
HV-007	House site	House site		Smart et al. 1965		HV-007	Pānau Nui
HV-008	Enclosure and platforms	Enclosure and platforms		Smart et al. 1965		HV-008	Pānau Nui
HV-009	Platforms	Platforms		Smart et al. 1965		HV-009	Pānau Nui
HV-010	Enclosure	Enclosure		Smart et al. 1965		HV-010	Pānau Nui
HV-011	Cairn	Cairn		Smart et al. 1965		HV-011	Pānau Nui
HV-012	Platform	Platform		Smart et al. 1965		HV-012	Pānau Nui

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HV-013	Shelters	Shelters		Smart et al. 1965		HV-013	Pānau Nui
HV-014	Platform and enclosure	Platform and enclosure		Smart et al. 1965		HV-014	Pānau Nui
HV-015	Platform	Platform		Smart et al. 1965		HV-015	Pānau Nui
HV-016	Stone alignments	Stone alignments	x	Smart et al. 1965		HV-016	Pānau Nui
HV-017	Stone alignements	Stone alignements		Smart et al. 1965		HV-017	Pānau Nui
HV-018	Enclosure	Enclosure	x	Smart et al. 1965		HV-018	Kahue
HV-019	Enclosure	Enclosure	x	Smart et al. 1965		HV-019	Kahue
HV-020	Enclosure	Enclosure	x	Smart et al. 1965		HV-020	Kahue
HV-021	Enclosure	Enclosure	x	Smart et al. 1965		HV-021	Kahue
HV-022	Enclosure	Enclosure	x	Smart et al. 1965		HV-022	Kahue
HV-023	Wall	Wall		Smart et al. 1965		HV-023	
HV-024	Enclosure	Enclosure	x	Smart et al. 1965		HV-024	Kahue
HV-025	Platform	Platform	x	Smart et al. 1965		HV-025	Kealakomo
HV-026	Cairn	Cairn	x	Smart et al. 1965		HV-026	Kealakomo
HV-027	Cairn	Cairn	x	Smart et al. 1965		HV-027	Kealakomo
HV-028	Cairn	Cairn	x	Smart et al. 1965		HV-028	Kealakomo
HV-029	House site ?	House site ?	x	Smart et al. 1965		HV-029	Kealakomo
HV-030	House site	House site	x	Smart et al. 1965		HV-030	Kealakomo
HV-031	Cairns?	Cairns?	x	Smart et al. 1965		HV-031	Kealakomo
HV-032	Enclosure and cave	Enclosure and cave	x	Smart et al. 1965		HV-032	Kealakomo
HV-033	Enclosure	Enclosure	x	Smart et al. 1965		HV-033	Kealakomo
HV-034	Wall	Wall	x	Smart et al. 1965		HV-034	Kealakomo
HV-035	Enclosure	Enclosure	x	Smart et al. 1965		HV-035	Kealakomo
HV-036	Enclosure	Enclosure	x	Smart et al. 1965		HV-036	Kealakomo
HV-037	Corral	Corral	x	Smart et al. 1965		HV-037	Kealakomo
HV-038	Enclosure	Enclosure	x	Smart et al. 1965		HV-038	Kealakomo
HV-039	Enclosure	Enclosure	x	Smart et al. 1965		HV-039	Kealakomo
HV-040	Shelter and cave	Shelter and cave	x	Smart et al. 1965		HV-040	Kahue
HV-041	Wall and cave	Wall and cave	x	Smart et al. 1965		HV-041	Kahue
HV-042	Enclosure	Enclosure	x	Smart et al. 1965		HV-042	Kahue
HV-043	Enclosure and cave	Enclosure and cave	x	Smart et al. 1965		HV-043	Kahue
HV-044	Enclosure	Enclosure	x	Smart et al. 1965		HV-044	Kahue
HV-048	House site	House site		Smart et al. 1965		HV-048	
HV-049	‘Āpua Point Cross Trail Cave	Shelter cave; deposit, pre-Contact, post-Contact		Smart et al. 1965 HAVO 2007		HV-049	
HV-051	House sites	House sites		Smart et al. 1965 HAVO 2007		HV-051	
HV-052	House sites	House sites, platforms; recently damaged by tidal action		Smart et al. 1965		HV-052	
HV-054	House sites	House sites		Smart et al. 1965		HV-054	
HV-055	Petroglyphs	Petroglyphs		Smart et al. 1965		HV-055	
HV-056	petroglyphs	Petroglyphs		Smart et al. 1965		HV-056	
HV-057	Enclosure	Enclosure		Smart et al. 1965		HV-057	
HV-058	Shelters	Shelters		Smart et al. 1965		HV-058	
HV-059	Shelter cave	Shelter cave		Smart et al. 1965		HV-059	‘Āpua

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HV-060	Shelter cave	Shelter cave		Smart et al. 1965		HV-060	
HV-061	Cairn	Cairn	x	Smart et al. 1965		HV-061	‘Āpua
HV-062	Shelters	Shelters	x	Smart et al. 1965		HV-062	‘Āpua
HV-063	Shelters	Shelters	x	Smart et al. 1965		HV-063	‘Āpua
HV-064	Grave	Grave	x	Smart et al. 1965		HV-064	‘Āpua
HV-066	Enclosure	Enclosure	x	Smart et al. 1965		HV-066	‘Āpua
HV-067	Wall	Wall	x	Smart et al. 1965		HV-067	‘Āpua
HV-068	Wall and pavement	Wall and pavement	x	Smart et al. 1965		HV-068	‘Āpua
HV-069	?			Smart et al. 1965		HV-69	
HV-071	Halape Ruins: Platforms	Platform and terrace	x	Smart et al. 1965 HAVO 2006		HV-071	Kapāpala
HV-072	Halape ruins Shelter cave	Shelter cave, deposit	x	Smart et al. 1965 HAVO 2006		HV-072	Kapāpala
HV-074	House site	House site	x	Smart et al. 1965		HV-074	Kapāpala
HV-075	Shelter cave, petroglyph	Shelter cave, petroglyph	x	Smart et al. 1965		HV-075	Keauhou
HV-077	Shelter cave, petroglyph	Shelter cave, petroglyph	x	Smart et al. 1965		HV-077	Keauhou
HV-079	Shelter cave	Shelter cave		Smart et al. 1965		HV-079	Keauhou
HV-080	Shelter cave	Shelter cave		Smart et al. 1965		HV-080	Keauhou
HV-081	Shelter cave	Shelter cave		Smart et al. 1965		HV-081	Keauhou
HV-082	Shelter cave	Shelter cave		Smart et al. 1965		HV-082	Keauhou
HV-083	Shelter cave	Shelter cave		Smart et al. 1965		HV-083	Keauhou
HV-084	Shelter cave	Shelter cave		Smart et al. 1965		HV-084	Keauhou
HV-085	Shelter cave	Shelter cave		Smart et al. 1965		HV-085	Keauhou
HV-086	Shelter cave	Shelter cave		Smart et al. 1965		HV-086	Keauhou
HV-087	Shelter cave	Shelter cave		Smart et al. 1965		HV-087	Keauhou
HV-088	Shelter cave	Shelter cave		Smart et al. 1965		HV-088	Keauhou
HV-089	Wall, clearing	Wall, clearing		Smart et al. 1965		HV-089	Keauhou
HV-090	Shelter cave	Shelter cave		Smart et al. 1965		HV-090	Keauhou
HV-091	Shelter cave	Shelter cave		Smart et al. 1965		HV-091	Keauhou
HV-092	Shelter cave	Shelter cave		Smart et al. 1965		HV-092	Keauhou
HV-093	Shelters	Shelters		Smart et al. 1965		HV-093	Keauhou
HV-094	House site and cave	House site and cave		Smart et al. 1965		HV-094	Keauhou
HV-095	Shelter cave	Shelter cave		Smart et al. 1965		HV-095	Keauhou
HV-097	Papamū	Papamū		Smart et al. 1965		HV-097	Keauhou
HV-098	Shelter cave	Shelter cave		Smart et al. 1965		HV-098	Keauhou
HV-099	Shelter	Shelter		Smart et al. 1965		HV-099	Keauhou
HV-100	Shelter cave	Shelter cave		Smart et al. 1965		HV-100	Keauhou
HV-101	Shelter cave	Shelter cave		Smart et al. 1965		HV-101	Keauhou
HV-102	Shelter cave	Shelter cave	x	Smart et al. 1965		HV-102	Keauhou
HV-104	Shelter cave	Shelter cave	x	Smart et al. 1965		HV-104	Keauhou
HV-105	Platform	Platform	x	Smart et al. 1965		HV-105	Keauhou
HV-106	Platform	Platform	x	Smart et al. 1965		HV-106	Keauhou
HV-107	Enclosure	Enclosure	x	Smart et al. 1965		HV-107	Keauhou
HV-108	Shelter cave, petroglyph	Shelter cave and petroglyph	x	Smart et al. 1965		HV-108	Keauhou

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HV-109	Shelter cave and spring	Shelter cave and spring	x	Smart et al. 1965		HV-109	Keauhou
HV-110	Enclosure	Enclosure	x	Smart et al. 1965		HV-110	Kapāpala
HV-111	House site	House site	x	Smart et al. 1965		HV-111	Kapāpala
HV-112	Enclosure	Enclosure	x	Smart et al. 1965		HV-112	Keauhou
HV-113	Petroglyphs	Petroglyphs	x	Smart et al. 1965		HV-113	Keauhou
HV-114	Shelter cave	Shelter cave	x	Smart et al. 1965		HV-114	Keauhou
HV-115	Shelter cave	Shelter cave	x	Smart et al. 1965		HV-115	Keauhou
HV-116	Shelter cave	Shelter cave	x	Smart et al. 1965		HV-116	Keauhou
HV-117	Shelter cave	Shelter cave	x	Smart et al. 1965		HV-117	Keauhou
HV-118	House sites	House sites	x	Smart et al. 1965		HV-118	Keauhou
HV-119	Shelter cave	Shelter cave	x	Smart et al. 1965		HV-119	Keauhou
HV-120	Refuge cave	Refuge cave	x	Smart et al. 1965		HV-120	ʻĀpua
HV-138	Platforms and enclosures	Platforms and enclosures	x	Smart et al. 1965		HV-138	Kahue
HV-139	House site	House site, platform	x	Smart et al. 1965 HAVO 2007		HV-139	Kahue
HV-140	Platform	Platform	x	Smart et al. 1965 HAVO 2007		HV-140	Kahue
HV-141	Shelter	Shelter	x	Smart et al. 1965		HV-141	Kahue
HV-142	Wall and clearing	Wall and clearing	x	Smart et al. 1965		HV-142	Kahue
HV-143	Wall	Wall	x	Smart et al. 1965		HV-143	Kahue
HV-144	Platform	Platform	x	Smart et al. 1965		HV-144	Kahue
HV-145	House site	House site	x	Smart et al. 1965		HV-145	Kahue
HV-146	Enclosures	Enclosures	x	Smart et al. 1965		HV-146	Kahue
HV-147	House sites	House sites	x	Smart et al. 1965		HV-147	Kahue
HV-148	House sites, petroglyhs	House sites, petroglyhs	x	Smart et al. 1965		HV-148	Kahue
HV-149	Corral	Corral	x	Smart et al. 1965		HV-149	Kahue
HV-150	Petroglyphs	Petroglyphs	x	Smart et al. 1965		HV-150	Kahue
HV-151	House site, papamū	House site, papamū	x	Smart et al. 1965		HV-151	Kahue
HV-152	Platform	Platform	x	Smart et al. 1965		HV-152	Kahue
HV-153	Wall	Wall	x	Smart et al. 1965		HV-153	Kahue
HV-154	House site, papamū	House site, papamū	x	Smart et al. 1965		HV-154	Kahue
HV-155	House site	House site	x	Smart et al. 1965		HV-155	Kahue
HV-156	Cairns	Cairns	x	Smart et al. 1965		HV-156	Kahue
HV-157	House site and spring	House site and spring	x	Smart et al. 1965		HV-157	Kahue
HV-158	Platform	Platform	x	Smart et al. 1965		HV-158	Kapāpala
HV-159	Enclosure	Enclosure		Smart et al. 1965		HV-159	Kapāpala
HV-160	Enclosure	Enclosure		Smart et al. 1965		HV-160	Kapāpala
HV-161	Enclosure	Enclosure	x	Smart et al. 1965		HV-161	Kapāpala
HV-162	Wall	Wall	x	Smart et al. 1965		HV-162	Kapāpala
HV-163	Shelter cave	Shelter cave		Smart et al. 1965		HV-163	Kapāpala
HV-164	Shelter cave	Shelter cave	x	Smart et al. 1965		HV-164	Kapāpala
HV-165	Enclosure	Enclosure	x	Smart et al. 1965		HV-165	Kapāpala
HV-166	Enclosure	Enclosure	x	Smart et al. 1965		HV-166	Kapāpala
HV-167	Enclosure	Enclosure	x	Smart et al. 1965		HV-167	Kapāpala

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HV-168	Corral	Corral	x	Smart et al. 1965		HV-168	Kapāpala
HV-169	Enclosures	Enclosures	x	Smart et al. 1965		HV-169	Kapāpala
HV-170	Shelter cave and wall	Shelter cave and wall	x	Smart et al. 1965		HV-170	Kapāpala
HV-171	Enclosure	Enclosure	x	Smart et al. 1965		HV-171	Kapāpala
HV-172	Enclosures	Enclosures	x	Smart et al. 1965		HV-172	Kapāpala
HV-173	Petroglyphs	Petroglyphs	x	Smart et al. 1965		HV-173	Pānau Nui
HV-174	Corral	Corral	x	Smart et al. 1965		HV-174	Kealakomo
HV-175	Shelter cave	Shelter cave	x	Smart et al. 1965		HV-175	Kealakomo
HV-176	Shelter	Shelter	x	Smart et al. 1965		HV-176	Kealakomo
HV-177	Trails	Trails	x	Smart et al. 1965		HV-177	Kealakomo
HV-178	Shelter	Shelter	x	Smart et al. 1965		HV-178	Kealakomo
HV-179	House site	House site	x	Smart et al. 1965		HV-179	Pānau Nu
HV-180	Wall and palm trees	Wall and palm trees	x	Smart et al. 1965		HV-180	Pānau Nui
HV-181	Wall and cave	Wall and cave	x	Smart et al. 1965		HV-181	Pānau Nui
HV-182	Stone outline	Stone outline	x	Smart et al. 1965		HV-182	Kealakomo
HV-183	Enclosure	Enclosure	x	Smart et al. 1965		HV-183	Pānau Nui
HV-184	Spring, petroglyphs	Spring, petroglyphs	x	Smart et al. 1965		HV-184	Kapāpala
HV-186	Platform	(Platform; Smart et al. 1965); Permanently Sealed	x	Smart et al. 1965		HV-186	Laeʻapuki (Pānau Nui)
HV-191		Cairns and terraces				HV-191	Pānau Nui
HV-193		Shelter cave				HV-193	Pānau Nui
HV-195	Enclosures	Enclosures; Permanently Sealed	x	Smart et al. 1965		HV-195	Laeʻapuki (Pānau Nui)
HV-197	Enclosures	Enclosures	x	Smart et al. 1965		HV-197	Laeʻapuki (Pānau Nui)
HV-199	Corral?	Corral?	x	Smart et al. 1965		HV-199	Kahue
HV-200	Enclosures	Enclosures	x	Smart et al. 1965		HV-200	Kahue
HV-201	Enclosures	Enclosures		Smart et al. 1965		HV-201	ʻĀpua
HV-202	Enclosure	Enclosure		Smart et al. 1965		HV-202	ʻĀpua
HV-203	Platform	Platform	x	Smart et al. 1965		HV-203	Kealakomo
HV-204	Platform	Platform	x	Smart et al. 1965		HV-204	Kealakomo
HV-205	House site and cave	House site and cave	x	Smart et al. 1965		HV-205	Kealakomo
HV-206	Trail	Trail		Smart et al. 1965		HV-206	Kealakomo
HV-207	Trial	Trial		Smart et al. 1965		HV-207	Kealakomo
HV-208	trails	trails	x	Smart et al. 1965		HV-208	Kealakomo
HV-209	House site	House site	x	Smart et al. 1965		HV-209	Kealakomo (Pānau Nui)
HV-210	Heiau, Kamooalii; Petroglyphs	Petroglyphs		Baker 1922 Smart et al. 1965 Scheffler 1994b		HV-210	Kaʻalaʻala Makai
HV-211	Petroglyphs	Petroglyphs	x	Smart et al. 1965		HV-211	Kahue
HV-213	House site	House site; Permanently Sealed	x	Smart et al. 1965		HV-213	Laeʻapuki
HV-214	Platform	Platform; Permanently Sealed	x	Smart et al. 1965		HV-214	Laeʻapuki
HV-215	Shelter	Shelter; Permanently Sealed	x	Smart et al. 1965		HV-215	Laeʻapuki

Site No.	Name/description (modified from HAVO records)	ASMIS Description (in CAPS: ARC DBF DESC)* (in parentheses, added information)	InArc GIS DB	Reference	Condition (not complete)	Park ID (ASMIS)	Ahupuaʻa
HV-216	Stone alignments	Stone alignments; Permanently Sealed	x	Smart et al. 1965		HV-216	Laeʻapuki
HV-217	Filled cracks	Filled cracks	x	Smart et al. 1965		HV-217	Pānau Nui
HV-218	Occupation refuse	Occupation refuse	x	Smart et al. 1965		HV-218	Pānau Nui
HV-219	Cairn	Cairn	x	Smart et al. 1965		HV-219	Pānau Nui
HV-220	Walls and caves	Walls and caves	x	Smart et al. 1965		HV-220	Pānau Nui
HV-221	Stone alignments	Stone alignments	x	Smart et al. 1965		HV-221	Pānau Nui
HV-222	Shelter cave	Shelter cave	x	Smart et al. 1965		HV-222	Pānau Nui
HV-223	Shelter cave	Shelter cave	x	Smart et al. 1965		HV-223	Pānau Nui
HV-224	Shelters	Shelters	x	Smart et al. 1965		HV-224	Pānau Nui
HV-226	Wall and clearings	Wall and clearings	x	Smart et al. 1965		HV-226	Pānau Nui
HV-227	Trail and cave	Trail and cave	x	Smart et al. 1965		HV-227	Pānau Nui
HV-230	Shelter cave	Shelter cave	x	Smart et al. 1965		HV-230	Kahue
HV-231	House site	House site	x	Smart et al. 1965		HV-231	Kahue
HV-232	Shelter cave	Shelter cave	x	Smart et al. 1965		HV-232	Kahue
HV-233	Petroglyphs	Petroglyphs	x	Smart et al. 1965		HV-233	Kahue
HV-234	House site	House site	x	Smart et al. 1965		HV-234	Kahue
HV-235	House site and petroglyph	House site and petroglyph	x	Smart et al. 1965		HV-235	Kahue
HV-236	Shelter cave	Shelter cave	x	Smart et al. 1965		HV-236	Kahue
HV-237	Shelter cave and Petros	Shelter cave and petroglyphs	x	Smart et al. 1965		HV-237	ʻĀpua
HV-240	Stone mound (No. 7)	Stone mound (No. 7)		Smart et al. 1965		HV-240	Kamoamoa
HV-241	Stone Mound (No. 8)	Stone Mound (No. 8)		Smart et al. 1965		HV-241	Kamoamoa
HV-242	Moa Heiau	Moa Heiau		Smart et al. 1965 Ladefoged et al. 1987		HV-242	Kamoamoa
HV-243	House site	House site		Smart et al. 1965		HV-243	Kamoamoa
HV-244	Petroglyphs	Petroglyphs	x	Smart et al. 1965		HV-244	Kahue
HV-245	Meeting place?	Meeting place?	x	Smart et al. 1965		HV-245	Kealakomo
HV-246	Petroglyphs	Petroglyphs		Smart et al. 1965		HV-246	Pānau Nui
HV-250	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-250	Pūlama
HV-251	Platform- Heiau?	Platform- Heiau?		Smart et al. 1965 Ladefoged et al. 1987		HV-251	Pūlama
HV-252	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-252	Pūlama
HV-253	Platform- Shrine?	Platform- Shrine?		Smart et al. 1965 Ladefoged et al. 1987		HV-253	Pūlama
HV-254	pen	pen		Smart et al. 1965 Ladefoged et al. 1987		HV-254	Pūlama
HV-255	House site and platform	House site and platform		Smart et al. 1965 Ladefoged et al. 1987		HV-255	Pūlama
HV-256	Enclosures	Three enclosures		Smart et al. 1965 Ladefoged et al. 1987		HV-256	Pūlama
HV-257	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-257	Pūlama

Site No.	Name/description (modified from HAVO records)	ASMIS Description (in CAPS: ARC DBF DESC)* (in parentheses, added information)	InArc GIS DB	Reference	Condition (not complete)	Park ID (ASMIS)	Ahupua‘a
HV-258	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-258	Pūlama
HV-259	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-259	Pūlama
HV-260	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-260	Pūlama
HV-261	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-261	Pūlama
HV-262	Pens	Two pens		Smart et al. 1965 Ladefoged et al. 1987		HV-262	Pūlama
HV-264	Enclosure	Enclosure		Smart et al. 1965		HV-264	Pūlama
HV-265	Enclosure	Enclosure		Smart et al. 1965 Ladefoged et al. 1987		HV-265	Pūlama
HV-266	Platform	Platform		Smart et al. 1965 Ladefoged et al. 1987		HV-266	Pūlama
HV-267	Platform	Platform		Smart et al. 1965 Ladefoged et al. 1987		HV-267	Pūlama
HV-268	Platform	Platform		Smart et al. 1965 Ladefoged et al. 1987		HV-268	Pūlama
HV-269	Pen	Pen		Smart et al. 1965 Ladefoged et al. 1987		HV-269	Pūlama
HV-270	Canoe shed?	Canoe shed?		Smart et al. 1965 Ladefoged et al. 1987		HV-270	Pūlama
HV-271	Shrine or House site	Shrine or House site		Smart et al. 1965 Ladefoged et al. 1987		HV-271	Pūlama
HV-272	Shrine	Shrine		Smart et al. 1965 Ladefoged et al. 1987		HV-272	Pūlama
HV-273	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-273	Pūlama
HV-274	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-274	Pūlama
HV-275	Trail	Trail		Smart et al. 1965		HV-275	Pūlama
HV-276	Wahaula Heiau	Wahaula Heiau, Permanently Sealed	x	Smart et al. 1965 Ladefoged et al. 1987; Masse et al. 1991		HV-276	Poupou, Puna (Pūlama)
HV-277	Enclosure and house site	Enclosure and house site		Smart et al. 1965 Ladefoged et al. 1987		HV-277	Pūlama
HV-278	Enclosure	Enclosure		Smart et al. 1965 Ladefoged et al. 1987		HV-278	Pūlama
HV-279	Enclosure	Enclosure		Smart et al. 1965 Ladefoged et al. 1987		HV-279	Pūlama
HV-280	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-280	Pūlama
HV-281	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-281	Pūlama

Site No.	Name/description (modified from HAVO records)	ASMIS Description (in CAPS: ARC DBF DESC)* (in parentheses, added information)	InArc GIS DB	Reference	Condition (not complete)	Park ID (ASMIS)	Ahupua‘a
HV-282	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-282	Pūlama
HV-283	Platform	Platform		Smart et al. 1965 Ladefoged et al. 1987		HV-283	Pūlama
HV-284	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-284	Pūlama
HV-285	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-285	Pūlama
HV-286	Pen	Pen		Smart et al. 1965 Ladefoged et al. 1987		HV-286	Pūlama
HV-287	Pavement	Pavement		Smart et al. 1965 Ladefoged et al. 1987		HV-287	Pūlama
HV-288	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-288	Pūlama
HV-289	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-289	Pūlama
HV-290	Mortars	Mortars		Smart et al. 1965 Ladefoged et al. 1987		HV-290	Pūlama
HV-291	Platform	Platform		Smart et al. 1965 Ladefoged et al. 1987		HV-291	Pūlama
HV-292	Platform	Platform		Smart et al. 1965 Ladefoged et al. 1987		HV-292	Pūlama
HV-293	House site and pens	House site and pens		Smart et al. 1965 Ladefoged et al. 1987		HV-293	Pūlama
HV-294	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-294	Pūlama
HV-297	Footprint of Niheu	Footprint of Niheu		Smart et al. 1965		HV-297	Pūlama
HV-298	Petroglyphs	Petroglyphs		Smart et al. 1965		HV-298	Pūlama
HV-299	Spear hole	Spear hole		Smart et al. 1965		HV-299	Pūlama
HV-300	Petroglyphs	Petroglyphs		Smart et al. 1965 Ladefoged et al. 1987		HV-300	Kamoamoa
HV-301	Canoe shed	Canoe shed		Smart et al. 1965 Ladefoged et al. 1987		HV-301	Kamoamoa
HV-304	Enclosure	Enclosure		Smart et al. 1965		HV-304	Kamoamoa
HV-305	Pavement	Pavement		Smart et al. 1965		HV-305	Kamoamoa
HV-306	Pavement	Pavement		Smart et al. 1965		HV-306	Kamoamoa
HV-307	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-307	Kamoamoa
HV-308	Well	Well		Smart et al. 1965 Ladefoged et al. 1987		HV-308	Kamoamoa
HV-309	Mortars	Mortars		Smart et al. 1965 Ladefoged et al. 1987		HV-309	Kamoamoa
HV-310	Enclosure, platforms	Enclosure, platforms, 3		Smart et al. 1965		HV-310	Kamoamoa
HV-311	Enclosure	Enclosure		Smart et al. 1965 Ladefoged et al. 1987		HV-311	Kamoamoa

Site No.	Name/description (modified from HAVO records)	ASMIS Description (in CAPS: ARC DBF DESC)* (in parentheses, added information)	InArc GIS DB	Reference	Condition (not complete)	Park ID (ASMIS)	Ahupua‘a
HV-312	Platform	Platform		Smart et al. 1965		HV-312	Kamoamoa
HV-313	Platform	Platform		Smart et al. 1965		HV-313	Kamoamoa
HV-314	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-314	Kamoamoa
HV-315	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-315	Kamoamoa
HV-316	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-316	Kamoamoa
HV-317	House site	House site		Smart et al. 1965		HV-317	Kamoamoa
HV-318	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-318	Kamoamoa
HV-319	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-319	Kamoamoa
HV-320	Pen and platforms	Pen and platforms		Smart et al. 1965		HV-320	Kamoamoa
HV-321	House site	House site		Smart et al. 1965		HV-321	Kamoamoa
HV-322	Circular structure	Circular structure		Smart et al. 1965 Ladefoged et al. 1987		HV-322	Kamoamoa
HV-323	Petroglyphs	Petroglyphs		Smart et al. 1965 Ladefoged et al. 1987		HV-323	Lae‘apuki
HV-324	Pens and petroglypns	Pens and petroglypns		Smart et al. 1965 Ladefoged et al. 1987		HV-324	Lae‘apuki
HV-325	House site and pens	House site and pens		Smart et al. 1965 Ladefoged et al. 1987		HV-325	Lae‘apuki
HV-326	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-326	Lae‘apuki
HV-327	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-327	Lae‘apuki
HV-328	Goat pen	Goat pen		Smart et al. 1965 Ladefoged et al. 1987		HV-328	Lae‘apuki
HV-329	House site	House site		Smart et al. 1965		HV-329	Lae‘apuki
HV-330	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-330	Lae‘apuki
HV-331	Platform	Platform		Smart et al. 1965 Ladefoged et al. 1987		HV-331	Lae‘apuki
HV-332	Shrine	Shrine		Smart et al. 1965 Ladefoged et al. 1987		HV-332	Lae‘apuki
HV-374	?	Permanently Sealed	x			HV-374	Kamoamoa
HV-375	?	Permanently Sealed	x			HV-375	Lae‘apuki
HV-376	?	Permanently Sealed	x			HV-376	Lae‘apuki
HV-380	Oararauo Heiau	(never relocated after Ellis identified it near the crater)		Ellis 1963 Stokes 1991 Emory et al 1965:II:33			Keauhou?
K-?	Kamoamoa Trail	Curbstone trail connecting with Kalapana Trail		Kirkendall 1993a, b			Kamoamoa
K-01-56	Habitation, with some agriculture	Multiple platforms, enclosures, etc		Kirkendall 1993a, b			Kamoamoa

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K-100+	Agriculture with some habitation, trails	Mounds, terraces, enclosures		Kirkendall 1993a, b			Kamoamoa
LCS 058266	Mauna Loa Observation Shelter	Built in 1937, probably by CCC		Dougherty 2004			Kapāpala
LCS 058267	Mauna Loa Truck Trail Seismographic Vault	Date?		Dougherty 2004			Kapāpala
LCS 058268	Mauna Loa Pit Toilets	Date?		Dougherty 2004			Kapāpala
LCS 058269	Mauna Loa Summit Rest House	Built in 1934		Dougherty 2004			Kapāpala
LCS 058430	Mauna Loa Truck Trail	Built in 1935		Dougherty 2004			Kapāpala
LCS 05844	Red Hill Rest House	Built in 1915, by US Army, 25th Infantry, Co. E		Dougherty 2004			Kapāpala
TR-1	agriculture and habitation			Carter and Somers 1990			Laeʻapuki
TR-2	habitation, caves, petroglyphs; possible ahupuaʻa boundary; evidence of 1868 earthquake			Carter and Somers 1990			Laeʻapuki Pānau Iki Pānau Nui
TR-3	habitation; agriculture, volcanic glass quarry			Carter and Somers 1990			Pānau Nui
TR-4	agriculture, petroglyphs			Carter and Somers 1990			Pānau Nui
TR-5	agriculture, petroglyphs, wet cave			Carter and Somers 1990			Pānau Nui
X-?	Umi Cavern?	Is this an archeological site?		Dougherty 2004			Kahuku
X-01	Scattered features"	(Scattered small features, caves, petroglyphs)		Baker 1922 Smart 1965 Scheffler 1994b			Kaʻalaʻala
X-02	Na Puu o Na Ele Makule bombing reange; WW II practice bombing area	(WW II training ordnance; Note: area on map with solid line identified in Scheffler; area in dashed line from general maps; area used 1940-1950)		cf. Jackson 1972 Scheffler 1994b			Kaʻalaʻala
X-03	Keaoi Island	(May have been a large stone platform: Smart 1965:29)		Smart 1965			Kapāpala
X-04	Heiau (unnamed)	Earth temple reported in Shipman pasture; not relocated by Stokes		Stokes 1991			Keauhou?
X-05	Ritual (?) cave	("Large sleeping cave at Pali-lele-o-kalihi-paa")		on 1912 map of Kīlauea			Keauhou Kapāpala
X-06	Jagger Airfield	"March 1927" marked by hand on USGS (also see Site 22403)					
X-07	Kau Impact area ("Bombing Range, Army")	(ca. 1940-1945)					Kapāpala
X-08	Keanakāköʻi Quarry	(location of Keanakāköʻi Quarry, buried by lava in 1877)					Keauhou
X-09	Keauhou Goat Ranch and Pogue House	(Location uncertain; probably general vicinity of the Ainahou Ranch House, Site 19429)					Keauhou
X-10	Early airfields			survey			
X-11	Kapiʻolani's rejection of Pele						

Site No.	Name/description (modified from HAVO records)	ASMIS Description (in CAPS: ARC DBF DESC)* (in parentheses, added information)	InArc GIS DB	Reference	Condition (not complete)	Park ID (ASMIS)	Ahupua‘a
X-12	place where Keoua’s army + track						
X-13	Track of Kapi‘olani and scortched earth						
X-14	Track of William Ellis						various
X-15	Kahuku Military Camp			Dougherty 2004			Kahuku
XAC-1	Upland features, Mauna Loa			Dougherty 2004			Kapāpala
XAC-2	Upland features, Mauna Loa			Dougherty 2004			Kahuku
XAC-3	Upland features, Mauna Loa	Trail, sleeping cave		Dougherty 2004			Kahuku
XAC-4	Upland features, Mauna Loa	Trail, other features		Dougherty 2004			Kahuku
XAC-5	‘Umi cavern complex, Mauna Loa	Features near ‘Umi cavern, including upland shrine		Dougherty 2004			Kahuku
X-Misc	Features variously documented in Section 106 reports	Incompletely reviewed, site/feature numbers undetermined		HAVO Section 106 reports			

Note: Feature numbers from Ladefoged et al. (1987) not provided in table.

X: Added as “working sites.”

* Indicates that a detailed description is provided in Appendix A. Table 2.

(1) Listed as agricultural pits in ASMIS; these are bird nesting pits, corrected in the table.

Table A-2. Detailed Information On Selected Sites in Table 1.*

Site No.	Site Name	Description
05501	ʻAinapō Trail	A narrow, single-file, twisting, and occasionally slightly abraded trail over lava fields (some fields are rough and scoriaceous, others are smooth and billowy) above 11,600 ft elevation; leads up the broad SE flank of Mauna Loa to and along the E side of Mokuʻāweoweo. The trail along the crater's edge is above the 13,200 ft elevation. Intermittent, and in places infrequent, stacks of loose lava boulders (ahu) line the sides of the trail. Abraded spots occur only on the rare surface types subject to pockmarking by metal blows; this was done by iron-shod hooves since 1870s, when horses and mules began to be used.
05502:	Kīlauea Crater	The summit of Kīlauea volcano has collapsed to form a broad, shallow caldera within which is Kīlauea Crater; within Kīlauea Crater is Halemaʻumaʻu, an historically active lava vent (in the past, Halemaumau has contained a boiling lake of lava, which at times rose and overflowed onto adjacent crater floor). Kīlauea eruptions are typically mild and nonexplosive activity; on rare occasions, water has filtered into the volcano's "plumbing" and the resulting steam pressure has caused explosions. One of these occurred in 1790 and is noted in Hawaiian history because the hot blast of rock and dust overwhelmed and killed part of a native army marching near the crater. Kīlauea Crater is one of the world's most active volcanoes; its floor often tilts differentially and in total, rises and falls as much as five feet in a short period of time. Earthquakes are numerous.
05503	Puna-Kaʻū Historic District	The human occupation of the Puna-Kaʻū Historic District, as nearly as can be determined, covers a span of nearly 600 years and is represented by a variety of archeological-historical remains, including prehistoric fishing-farming, and historic goat-cattle ranching and pulu harvesting.
05505	Footprints Area	An area of approximately 4,284 acres bounded on the NW by the Keʻāmoku lava flow and the SE by the Kaʻū Desert Trail; contains an unknown number of fossil footprints and hoofprints in a superficial ash deposit from 1790 phreatic explosions of Kīlauea Crater.
05506	Whitney Seismographic Vault	A 5.8 by 5.3 m (inside dimensions) underground room, with reinforced concrete walls (0.45 m thick), concrete floor (ext. 0.15 m thick), and reinforced concrete slab (8 inches thick) roof. The floor rests on a solid ledge of basalt, reached by digging 1.67 m from the 1912 natural ground level through ash and pumice. The top of the vault makes a mound that is covered by topsoil; it is incorporated in the lawn on the crater side of the Volcano House. The cut pahoehoe block stone steps and walkway that lead to the entrance of this structure are partially dug into the ash layer. This structure is not in original form: the first documented modifications took place in 1941 and involved extending the ceiling height, creating a cement roof, installing ceiling light outlets, covering the roof with top soil, andconstructing the exterior access steps as well as timing circuit outlets.
05507	Wilkes' Campsite	Remains of camp constructed by US Exploring Expedition party led by Captain Charles Wilkes in 1841; adjacent to the E rim of the Mauna Loa summit crater, at 13,240 ft above sea level; built on surface of pahoehoe lava. The principal building was a pre-fabricated portable house, carried in pieces to and assembled in the camp; it contained a pendulum for scientific experiments. There was an officer's tent, three tents for others in the expedition, tents for storage, cooking and for study of magnetism, astronomy, temperature, and barometric pressure changes. Each individual structure consisted typically of a tent that was encircled with a drylaid wall as high as the tent eaves; walls were built for protection from high winds, blizzards, and intense cold. "Pendulum Peak, January 1841/US Ex.Ex." was cut into the bedrock at the campsite, but has not been re-located. At abandonment in January 1841, the tents and portable house were dismantled; walls were left in place but soon began to deteriorate from earthquakes, violent storms, and some disturbances by artifact hunters and the curious. The rubble of the fallen walls was probably the principal source for the rocks used in the construction of the nearby summit shelter built by the National Park Service in 1934.
19248	Catchment Dump Site 19270 (Acc. 354)	This site is an historic trash dump in three loci. Artifacts range from about 1890 to 1940 and most likely originate from the pre-1940 Volcano House; most of the ceramics are marked "K.V.H." (Kilauea Volcano House). The site has been bulldozed and no longer exists.

Site No.	Site Name	Description
19445	CCC Camp Foundations at Resource Management	The site consists of two areas: Feature A is the remains of a cement slab from the old CCC Camp that was destroyed in 1994; Feature B is a stone-lined depression and cement and stone walk-ways. This general area is where the CCC Camp was located in the early 1940s; it is located next to the Resource Management Administrative Office (Building 322). The area is densely vegetated, with a thick layer of soil.
19447	Keauhou Landing	The Keauhou Landing site covers 10,200 square feet and consists of enclosures, walls, a rectangular cistern, walkways, stairs, and pahoehoe quarries. This was one of the major access points for tourists traveling to Kīlauea Crater. The Keauhou Road from the landing to the Volcano House was started in 1885 by the Wilder Steamship Company and was completed in 1886. It apparently fell out of use after 1894 when the road from Hilo was completed.
19455	Steam Flats Dump 3900 (Acc. 356)	This dump site was likely associate with the Volcano House operations. Site disturbances include five unauthorized excavations that have been made into the deposits. The persons involved in this activity must have been looking for complete bottles, as discards of metal, and ceramic fragments surround the hole.
19457	Ginger Patch Dump (Acc. 355)	This dump site was likely associated with Volcano House operations. It is now buried under gravel fill and grass. Artifacts from the dump site are in the Park collections.
19458	Headquarters' Crack Dump	This dump site is located in a large crack about 80 m north of the Park Headquarter's building and the 1977 Volcano House (Art Center). It may have been the main dump site for the 1877 Volcano House and other buildings of the area. Now covered in dense vegetation and is difficult to access.
19459	CCC Water Tank Foundations	This site consists of the old CCC water tank foundations and related features. It is comprised of eight features, six of which are related to water distribution; one was possibly an incinerator and one was associated with the production of curbing stones.
19460	House site complex	This site encompasses enclosures, platforms, caves, a fisherman's shelter, salt-drying areas, filled cracks, ahu, petroglyphs (approximately 17,000 glyphs), a cistern, heiau, mounds, walls, terraces, and a stepping stone trail. Permanently sealed.
19461	Palm Tree Site, Paliuli	This site consists of nine features on a mixed pahoehoe/aa rise: five enclosures, a platform, petroglyphs, and two walls, plus numerous agricultural features (mostly mounds). Numerous historic artifacts are present. The site is currently in a kīpuka and surrounded by new lava flow. The western part of the site was covered by the February 1995 flow (Jason flow). (Smart et al. 1965: house site; platform and enclosure;)
19463	Petroglyph Cave	This site consists of a large, partially paved lava tube with petroglyphs within and outside the entrance. Part of the cave floor is paved with flat pahoehoe stones. A number of opihi shells and charcoal areas are within the cave. Charcoal was identified and was composed of native species including koa (*Acacia koa*).
19466	Salt Drying Areas	This site consists of eleven salt drying areas and 13 other features including rock-filled depressions, rock mounds, quarried areas, a temporary habitation with a small cave, and an anthropomorphic petroglyph. Destroyed; permanently sealed.
19468	Trail	Site is a pahoehoe stepping stone trail on an aa flow. It connects Sites 19462 and 19467. It is relatively intact in areas, with stepping stones still in place. A portion of the trail is covered by the February 1995 lava flow. (Emory, Cox et al.1959; Smart et al. 1965: stepping stone trail)
19474	Papalehau Cave	This site is the entrance to a "subcave" located on the SW end of a large collapsed skylight, one of a series of very large skylights; part of a large lava tube system that is aligned in mauka-makai fashion. The tube system was created by a lava flow that dates between 400-1500 B.P.

Site No.	Site Name	Description
20443	Kalapana Trail	This trail route is most commonly known as the Kalapana Trail. As illustrated on the 1912 Territory of Hawaii survey map, it extends E/SE from Keauhou Road to Punalu‘u Heiau on the Puna coastline. Emory, Cox et al. (1959:91-92) describe the trail from the E end: “This trail … connects with the end of the State road just beyond the Village of Kapa‘ahu and continues almost due west for six miles along the gradually ascending mountain slope and then enters the steeper area and becomes a winding mountain path ending at the terminus of the Chain-of Craters Road. The lower straight section takes no particular advantage of the changing terrain, but goes from one point to another in the shortest distance. The hollows in the pahoehoe are filled to the level of the high points with stones. These fills are usually faced on the surface to keep the stones from shifting. The roadbed is six to eight feet wide and is bordered on each side with curbstones.” Allen (1979:78) excerpts a Public Lands and Surveyors Office (Hilo Branch) report dated July 31, 1942 (report contained in Land Court File 1374): “The Kalapana-Volcano road across Kamoamoa is a built road and must have been built by the government sometime before 1900. It is well defined with lines of rocks on both sides and with rock fill over depressions. It … is ten feet wide.” In the late 1990s, portions of the Kalapana trail were inventoried as the trail was being utilized as a fuel break. Trail segments observed ranged from a single track worn into the pahoehoe ground surface to a 2 m wide trail with kerbstone lining and filled depression areas with faced retaining walls. Portions of the trail that extend into forested areas are overgrown with dense vegetation. A total of nine features were identified along the Kalapana trail route and consist of trail side modifications, trail signs, and surveyor markers. These features were combined with the existing Kalapana Trail based on their spatial association with the trail route and on their association with trail activity.
21146	Enclosures and platforms	A very large enclosure of irregular plan and roughly made walls, a small stone platform and traces of smaller, rectangular walled constructions are attached to its lower end. (Smart et al. 1965: enclosures and platforms)
21215	Pulu Factory	The Pulu Factory is located between Nāpau and Makaopuhi Craters. Pulu was a marketable item during the mid- to late 1800s; its production was discontinued around 1890. All that is left of this processing area are fallen timbers and stone walls of three structures.
21316	Coastal Trail (19,466)	Site 21316 is a coastal trail route that is not indicated on any maps. Emory, Cox et al. (1959:96) state: “The coast trail from Lae‘apuki and Ka‘ena and the trail from Pu‘uloa meet within the (Kealakomo) compound and continue west along the coast.” Emory suggests it is part of the Puna-Ka‘ū Trail. Along most of its length, the trail is a narrow ribbon of abraded surface across smooth pahoehoe. Occasional low sections are filled with dirt in which vegetation grows, covering the pathway. Along the trail are various structural features, including several C-shapes that appear to be fairly recent in construction and were likely built by fisherman (fishing is allowed along this section of coast in the park by those ‘ohana from Kalapana who have exclusive fishing rights in the area); the creation of temporary shelters is a continued practice for the fishermen.
21678	Cave (Fea. 61)	This site consists of a 14 x 5.5 m pahoehoe tumulus cave; the interior is 80 cm high; the opening is located on the northwest edge of the cave; the entrance is heavily vegetated with ti plants. The entrance of this cave has a shallow ceiling and a level floor lacking rock fall. Opihi shells as well as a large tooth were found on the cave floor. Site is in good condition; vegetation in the area consists of a‘ali‘i, ūlei, and ‘ōhi‘a.
21690	C-shape	This C-shape is constructed out of medium to large pahoehoe cobbles stacked 4-6 courses high on a pahoehoe tumulus. The wall of the C-shape is collapsed; the C-shape opens to the west.
21698	Agricultural Area (Fea. 1-652)	This site is an agricultural complex consisting of 541 excavated pits, 299 pit/mound features, 118 mounds, 38 pit/rock scatters and eight filled cracks. The current assessment identified 27 additional features: 10 excavated pits, eight rock pile/scatters, two alignments, two walls, two terraces, two rock shelters, and one mound.
21699	Cave (Fea. 1)	Site 21699 is a small rock shelter in a natural blister; it has a low ceiling. Goat bones are dispersed on the floor; kukui nut shells and pahoehoe cobbles are the only other cultural material in the shelter. Cultural features surrounding the shelter consist of a 3-4 course high rock mound located on the top of the blister, a 1.16 x 0.9 m rock wall, and several rock mounds.

Site No.	Site Name	Description
21700	Trail (Fea. 2)	This trail route consists primarily of an ill-defined track with no worn tread or other trail modifications except for relatively closely spaced cairns (131 identified). The trail generally contours the existing slope and ascends toward the northeast. Numerous cairns are placed along the trail at regular intervals; they are generally low-lying mounds (20-40 cm height; two to four courses of stacked pahoehoe cobbles). The trail was first identified during the Pānau Emergency Survey and Mapping Project (Glidden 1998) and designated Feature 2. Spears (1995b:78) provides information concerning trail routes and the Pea Homestead (HV-376) based on a March 29, 1933 letter from E. Brumaghim to E.P. Leavitt, the Hawaii National Park Superintendent (the letter discusses a field inspection from Makaopuhi Crater to Kalapana related to possible acquisition of park land in lower Puna District): Brumaghim mentions several trail intersections encountered along the Kalapana trail route and references the Pea homestead. Although Site 21700 intersects with the Kalapana Trail approximately 600 m west of the Pea Homestead, it is not mentioned in the letter. The lack of previous documentation and the current condition of the trail (limited tread wear and no stepping stone segments in areas of aa lava) indicate that the trail was most likely recently constructed. The trail may have been constructed to improve hunter access to this portion of the park (Tunison, pers. comm., 2004) as it nearly adjoins a recently constructed "hunter's trail."
21702	Cave (Fea. 12)	Site 21702 consists of a temporary habitation that consists of a modified lava blister formation. It was previously recorded by Glidden (1998) as a cave (Feat. 12). Cultural material includes scattered opihi in the NW and SE corners of the chamber, and goat bones throughout the chamber.
21707	Cave (Fea. 53)	Site 21707 is a relatively small petroglyph cave site; there are no other modifications The petroglyph images are pecked in three areas: Panel A consists of a series of anthropomorphic figures located on the vertical surface of the southern wall; Panel B is located on the relatively flat floor of the cave below Panel A and consists of a series of anthropomorphic figures; and Panel C is located on the vertical surface of the western wall near the cave entrance and consists of a single anthropomorphic figure. Cultural material in the cave consists of one opihi shell (Cellana sp.) and one Drupa shell, both located in the roof fall S of the petroglyphs.
21710	Platform (Fea. 88)	Site 21710 consists of a single platform feature that is interpreted as a temporary habitation platform. The platform is constructed with small, medium, and large pahoehoe and aa cobbles stacked 3-5 courses high. No cultural material was observed on the platform surface or in the surrounding area.
21721	Enclosure (Fea. 130)	A rectangle-shaped enclosure measures 8.0 m x 10.0 m. The enclosure wall is constructed of aa and pahoehoe cobbles stacked 4-6 courses high. The basal courses are small to medium boulders with the remaining courses consisting of smaller cobbles. The west side of the enclosure is bounded by a natural pahoehoe rise. One hearth feature within the enclosure is constructed from 4 pahoehoe slabs placed on edge forming a square; the remaining interior area consists of level soil. Cultural material observed in the surrounding area includes one mule shoe located adjacent to and S of the enclosure.
21728	Enclosure (Fea. 40) Terrace (Fea. 41) Cave (Fea. 15)	Site 21728 is a habitation complex located in the western central portion of the project area (Quad III). The site was previously identified during the 1998 Pānau Emergency Survey and Mapping Project (Glidden 1998) and consists of two enclosures (Feats. 40 and 97) and one terrace (Feat. 41). One feature (L-96) was located during the current survey and appears to be a portion of the previously recorded enclosure (Feat. 40). The enclosure is mostly collapsed and dense vegetation obscures portions of the enclosure wall and the feature is described below.
21730	Cave (Fea. 98) Terraced Platforms (Fea. 99 and 100) Mound (Fea. 101)	Site 21730 is a habitation complex, previously identified (Glidden et al 1998) and consists of two terraced platforms and other features. The features were interpreted as serving either a religious function or as possible burial features. The current survey identified these existing features plus one additional C-shape. Because no excavation occurred during either the previous or current survey to confirm the "possible burial" functions, the sites' function was re-assigned to a habitation complex based on the features' formal type and size.

Site No.	Site Name	Description
21733	Wall, Platform, Terrace, Enclosure, Cistern	Site 21733 is a habitation complex located in the southeastern portion of the project area (Quad IV). The site was previously identified during the 1998 Pānau Emergency Survey and Mapping Project (Glidden 1998) and consists of a wall (Feat. 16), one platform (Feat. 17), two terraces (Feats. 18 and 61), one enclosure (Feat. 58), and one cistern (Feat. 60). Two features identified during the current survey correspond with the previously recorded features and consist of a platform (L-385) and one terrace (L-386). The features are part of the large habitation complex area and are described below.
21735	Enclosures, Cave, Terraces, L-shape, and Papamu	Site 21735 is a habitation complex located in the southeastern portion of the project area (Quad IV). The site was previously identified during the 1998 Pānau Emergency Survey and Mapping Project (Glidden 1998) and consists of four enclosures (Feats. 50, 114, 115, and 116), two terraces (Feats. 111 and 118), one L-shape (Feat. 112), and one petroglyph (papamu) (Feat. 117). Three features identified during the current survey were correlated with this site designation and include one enclosure (L-209), one wall (L-264) and one platform (L265).
21737	Caves, Papamu, Enclosures, Terraced Platforms, Wall, Petroglyphs, C-shapes, Hearth	Site 21737 is a habitation complex located in the southeastern portion of the project area (Quad IV). The site was previously identified by Glidden (1998) and is the largest concentration of habitation features recorded by that previous survey. Enclosures, platforms, petroglyphs.
21751	Ainahou Ranch Cave System	The Ainahou Ranch Cave is a complex tube with 23 known entrances. As of 1994, this resource was the longest surveyed cave within HAVO with a total passage length of 7.11 km, a vertical range of 352 m, and an average gradient of 4 degrees. This vertical range classifies the tube as the fifth deepest cave in the US. It also holds the record as the most important biological cave in the state of Hawai‘i with 19 endemic obligate cave-adapted species as of 1994. The cave is also very important archeologically, housing outstanding petroglyphs, temporary habitation sites, water catchment systems, terraces, and one burial. The cave was formed from the 350-500 year old ‘Ailā‘au lava flow. Due to the fact that this cave has so many unique and valuable resources, and because there is a burial present, the tube is closed to the public.
22487	CCC features on Hilina Pali Road (LCS 101791)	Site 22487 is an historic site and the features it includes were built by the CCC in 1940. The job was referred to as CCC project number 327. The sitespans about 2 kilometers lengthwise and is located along the intermittent streams of the area. The CCC was working here to deter the erosion in the area that occurs during heavy rains. To do this the CCC locally quarried the pahoehoe bedrock of the area and used the rocks to construct walls along the drainages. These retaining walls were built to help contain the water flow into these gullies and by doing this the soil and vegetation would not be washed away and eroded. The site consists of a total of 78 walls, 2 historic petroglyphs, 3 mounds, 13 dams, and 1 cairn.
22973	C-shapes in Footprints area	This site consists of 20 features: five C-shapes, two enclosures, four mounds, three rock piles, one U-shape, and five walls. Features 1 through 4 and 7 through 11 are all located within a recessed area of the Ke‘āmoku aa lava flow. This inlet represents an area where the lava has flowed in such as way as to create a natural area protected from the prevailing, and at times strong, winds. The Ke‘āmoku flow also provided most of the building material for the structures. Loose cobbles and boulders are utilized to create structure walls, mounds, and rock piles. None of the structures showed evidence of cultural deposits. Most of the C-shapes and enclosures show evidence of ash buildup in the interior of the feature that may contain some subsurface cultural remains.
22974	Shelter and volcanic glass quarry in Footprints area	This site consists of nine features: one overhang shelter, six volcanic glass quarry areas, one wall and one modified outcrop. Unlike Site 22973, only a single structure at 22974 is located along the Ke‘āmoku and flow. The other features are located to the east of the Ke‘āmoku flow boundary on the undulating p4o pahoehoe flow. Due to the survey method used in 1998, it is unknown at this time whether other structures or features located on the p4o flow could potentially contribute to this site. Although these features represent a dispersed group, at least the quarries are likely functionally related.
22975	Shelters and volcanic glass quarry in Footprints area	This site consists of four features: two overhang shelters, a C-shaped structure, and a volcanic glass quarry. One large quarry. All of the features were found along the flow edge. Due to the survey method used in 1998, it is unknown at this time whether other structures or features on the p4o flow could potentially contribute to this site complex.

Site No.	Site Name	Description
22976	Shelters and volcanic glass quarry in Footprints area	This site consists of four features: two overhang shelters, a C-shaped structure, and a volcanic glass quarry. All of the features were found along the flow edge. Due to the survey method used in 1998, it is unknown at this time whether other structures or features on the p4o flow could potentially contribute to this site complex.
22977	Structures in Footprints area	This site consists of six features: a rock pile, two enclosures, a petroglyph, a U-shaped structure and a volcanic glass quarry. Three of the features are locatedon the Keʻāmoku flow while the other three were found on the p4o flow. Only one feature (25) is located within a recessed area of the Keʻāmoku flow. Features 98-92 and 98-92a are located nearly adjacent to the Kaʻū-Volcano Trail (Site 22982).
22978	Structures in Footprints area	This site consists of five features: two rock piles, a mound, and two enclosures. Three of the five features that comprise this site are located on the Keʻāmoku lava flow. The mounds and rock piles may be functionally associated with the Kaʻū-Volcano Trail (Site 22982) but are not spatially associated. Along the Keʻāmoku flow, between sites 22973 and 22978, there is a paucity of features (<10); the edge of the Keʻāmoku flow was not used intensively along this section of the flow.
22979	Structures in Footprints area	This site consists of a high density of features, a majority of which are located along or near the edge of the Keʻāmoku flow. Thirty-one features comprise this site. They include: six overhangs, eight enclosures, five C-shapes, five U-shaped structures, one volcanic glass quarry, three mounds and three walls. It is the first large cluster of features located north of Site 22973. This site is approximately 70 m south of the Keʻāmoku Cross Trail (Site 23033). The concentration of features beginning in this area may be related to the Keʻāmoku Cross Trail (Site 23033) that runs perpendicular to the Keʻāmoku flow. The trail may have provided quick access to and from the Kaʻū-Volcano Trail (Site 22982) and resource procurement and habitation sites in the Kaʻū Desert. Thirty of the 31 features that comprise Site 22979 are located on the Keʻāmoku flow.
22980	Structures in Footprints area	This site consists of eight features - five C-shaped structures, and a single terrace, U-shaped structure and overhang. All of the features except Features 55 and 62 are located on top of the Keʻāmoku flow. None of the features are located within a natural recessed area of the Keʻāmoku flow, but they are close to two trail systems, Sites 23033 (Keʻāmoku Cross Trail) and 22982 (Kaʻū-Volcano Trail)..
22981	Structures in Footprints area	This site consists of 17 features – four C-shape, one cupboard, one enclosure, four modified overhangs, a terrace, four U-shapes, a blister cave and a single wall. This relatively dense cluster of features is located 175 m southeast of the Keʻāmoku Cross Trail. All of the features are located on the Keʻāmoku flow.
22982	Kaʻū-Volcano Trail	Site 22982 is comprised of two parallel trail segments and 33 associated features. Identified as two worn areas across the p4o pahohoe flow, these trail segments are located east of the Keʻāmoku flow. The segments run in a northeast/southwest direction. The trails were identified over a six mile (9,656 m) distance. The location of the field data collected by GPS matches the location of the Kaʻū-Volcano Trail on a 1907 digitized map. Along these trail segments, 33 features were identified in close spatial association. Of the 33 features there is one C-shape, one modified outcrop, one modified overhang, 26 mounds and four walls. The mounds were likely used as trail markers by travelers using the area. Mounds are useful trail markers in an area like the Kaʻū Desert because trails worn into the pāhoehoe are often hard to see.
22983	Cave in Footprints area	Feature 98-624 is a cave that extends under the edge of the Keʻāmoku lava flow. The shelter is 12 m x 8 m x 300 cm high. No information on cultural modifications such as associated walls or deposits is provided. Thus, this feature could possibly be natural and deserves further evaluation.
22984	Structures in Footprints area	This site consists of 10 structures - two C-shapes, four mounds, one rock pile, one modified overhang, and two terraces. Features 78, 79, 83, and 84 are locate on the Keʻāmoku lava flow, while features 80, 81, and 82 are located at the base of the Keʻāmoku flow. None of the structures showed any evidence of cultural deposits. Most of the structures show evidence of ash buildup in the interior that may contain some subsurface cultural remains.
22985	Structures in Footprints area	This site consists of 15 structures - six walls, two overhangs, four C-shapes, two enclosures, and one associated possible hearth. Features 85, 89, 92, 93, 94, and 95 are located on the Keʻāmoku lava flow, while Features 86, 87, and 88 are located at the base of the flow. None of the structures showed any evidence of cultural deposits. Most of the structures show evidence of ash buildup in the interior that may contain some subsurface cultural remains.

Site No.	Site Name	Description
22986	Structures in Footprints area	This site consists of four overhangs and one wall. All features in this site with the exception of two, (Features 98 and 99), are located on the Keʻāmoku lava flow. None of the structures of the structures showed any evidence of cultural deposits.
22987	Structures in Footprints area	This site consists of 47 features and one isolated marine shell fragment. The features include: nine enclosures, four terraces, 14 walls, eight C-shapes, five overhangs five U-shapes, and two L-shapes. *This is the largest site in the project area and contains the most features.* Features within this site are found both on and off the Keʻāmoku lava flow.
22988.	Structures in Footprints area	This site consists of one overhang, two enclosures, and five C-shapes. Most of the features are located at the base of the Keʻāmoku flow. Thus, the flow edge is utilized as part of the structure construction.
22989	Cave in Footprints area	Feature 152 is a 2 x 3 m and 150 cm high cave. It is located on a southeastern facing slope of the Keʻāmoku lava flow. There is an alignment of aa boulders immediately outside of the entrance, aligned from east to west that is filled with ash on its northern side to form a terraced area.
22990	Cave in Footprints area	Feature 155 is a 1.80 x 1.80 m and 95 cm high cave. It is located at the base of the Keʻāmoku lava flow. There is some stacking of basalt boulders and cobbles at the southwestern and northeastern ends of the cave entrance.
22991	Cave in Footprints area	Feature 154 is a 3.20 x 2 m and 40 cm high cave. This feature is located at the base of the Keʻāmoku lava flow.
22992	Structures in Footprints area	This site consists of nine features: one wall, three C-shapes, three terraces, one overhang, and one enclosure. Unlike Site 22988, a majority of the features tha comprise this site complex are constructed on the Keʻāmoku flow itself. All of the features are found north/northwest of a natural inlet area in the Keʻāmoku flow
22993	Structures in Footprints area	This site consists of 28 features: seven terraces, eight C-shapes, four walls, three overhangs, three L-shapes, one rock pile, one platform, and one mound. A majority of the features are located on the Keʻāmoku flow with several features constructed on the adjacent pahoehoe. None of the features are located within recessed areas of the Keʻāmoku flow.
22994	Structures in Footprints area	This site consists of four C-shapes, one L-shape, two U-shapes and five walls. A majority of the features abut the base of the Keʻāmoku flow, while three are located on the Keʻāmoku flow and one south of the flow on the p4o flow. A rather small cluster of features, Site 22994 is located just northeast of Site 22993.
22995	Structures in Footprints area	This site consists of 12 features: three C-shapes, two terraces, one L-shape, one modified overhang, three enclosures, one wall and one petroglyph. A majority of features within this site cluster are located on the Keʻāmoku flow. Feature 202 is the only structure built within a protected inlet area of the Keʻāmoku flow.
22996	Structures in Footprints area	This site consists of 48 features: four terraces, 27 C-shapes, eight walls, one cupboard, five mounds, one modified overhang, one possible cupboard, and one historic dump. A majority of the features are built on the Keʻāmoku flow. Less than a half-dozen of the features that comprise this site are located either at the base of the Keʻāmoku flow or on the p4o flow. The style of construction of all of the features excluding the glass bottles suggest they are either pre-Contact or early historic in nature.
22998	Peter Lee Road	The Peter Lee Road was built to service the community of Pāhala, in particular the hotel owned by entrepreneur Peter Lee at Punaluʻu and visitors who stayed at the Volcano House. The Peter Lee Road was the first official road built in this area. It was completed in 1891 (Olson 1941a:46). The road was nearly 24 miles long and was designed to accommodate carriages and later modified for motorized vehicles. A 1921 USGS map shows a junction in the Peter Lee Road at the 3,363 foot elevation. The north spur of the road leads to a watershed and tanks at Kawikohoni. The map suggests this spur ends near the Mauna Loa Trail. None of this spur road was identified during the current project. By 1927 the Peter Lee Road was replaced by the Kau Road (Site 23034).
23000	Structures, lithic workshop in Footprints area	This site consists of 15 features: one overhang, four enclosures, three C-shapes, one U-shape, one cave, one terrace, two rock piles, one mound and one lithic workshop. This large site complex consists primarily of features constructed on the Keʻāmoku flow. This is the last large (>10 features) site complex found along the Keʻāmoku flow.
23001	Structures in Footprints area	This site consists of eight features: five C-shapes, one terrace, one mound, and one enclosure. Of these eight features, only one Feature, 277, is located on the Keʻāmoku flow; the remainder are on the p4o pahoehoe.

Site No.	Site Name	Description
23003	Structures in Footprints area	Site 23003 consists of a complex located in the Kaʻū Desert area of Hawaiʻi Volcanoes National Park. This site consists of four discontinous features along the Keʻāmoku flow. Features consists of rock walls, a C-shape, a rock mound and a single rock feature. Two features were relocated while the other two could not be relocated. Positioned on an a'a flow as well as volcanic sand and duff, this site is positioned in an area prone to flooding and shifting sands. Vegetation present in this area is sparse and consists of a'ali'i, pukiawe, ohia as well as an unidentified shrub. This site is in relatively poor condition and is threatened by flooding, volcanic activity, weathering and seismic activity.
23005	Structures in Footprints area	This site is comprised of four features: three mounds and one platform. All the features that make up site 23,005 are located along the historic Peter Lee Road This site is comprised of four sub-features which includes three ahus (98-551, 98-607, and 98-621) which are likely markers for the historic roads and a platform (98-613). Ahu 98-551 was relocated and has the dimensions 0.8 m X 0.7 m X 0.4 m high. The platform has the dimensions 6.1 m X 3.7 m X 0.55 m high and the feature is of a different character and time period than the others. The platform appears to be a type of temporary habitation.
23006	Big ʻŌhiʻa Cave	Feature 98-32 is Big Ohia Cave. Barbara Withrow formally identified this cave in 1987. Withrow located the cave, mapped it, and recorded basic information (HAVO Cave Files). Wulzen revisited the cave in 1998 and 2001 and a site number was also assigned at this time. Wulzen described the site as containing lithics, wood, hearth, and pig bone. Sourcing of the material proved inconclusive.
23007	Structures, lithic workshops in Footprints area	This site consists of eight features: one platform, six lithic workshops, and a cache of waterworn stones. The lithic workshops may be the outer extent of a large cluster of lithic block quarries identified in 2001 and surveyed in 2002 (Moniz Nakamura in prep).
23008	Cave	Feature 98-567 is a cave located 35 m west of Crater Rim Drive. The entrance to the cave is 1.2 m wide by 170 cm high. The sole cultural modifications associated with this cave are some rocks inside which appear to be placed. This site is a single cave feature identified in 1998 by Wulzen.
23009	Cave	This site consists of a single cave. No information was provided by Wulzen (1999). The cave needs to be revisited and formally recorded. Feature 98-568 is a cave located 10 m east of Highway 11 near the Kīlauea Military Camp (KMC) baseball field. No reference to cultural material or modifications have been described for this feature.
23015	Structures, petroglyphs in Footprints area	This site consists of 29 features: seven mounds, six C-shapes, seven walls, one historic petroglyph, three enclosures, two terraces, one platform, two modified overhangs. This cluster of features is located at the base of the Keʻāmoku lava flow. The presence of the corrals and historic petroglyph suggest some of these features may be historic in nature. This site is bisected by Kaʻū-Volcano Trail (Site 22982).
23021	Trail in Footprints area	This site is comprised of a segment of trail and six associated mounds that were likely used as trail markers. The location of this trail matches nearly perfectly with the location of a trail identified on a digitized 1907 map as the "Old Puna-Kaʻū Trail." Therefore, the author is confident that the section of trail identified by Wulzen in 1998 is the remnant of this trail system. The Old Puna-Kaʻū Trail appears to link with the Āinapo Trail which is a trail that leads to the summit of Mauna Loa.
23022	Structures, volcanic glass quarry in Footprints area	This site consists of nine features: one modified outcrop, one terrace, one volcanic glass quarry, an enclosure, two walls and three lithic quarries. The site is comprised of a disparate group of features located just south of the Old Puna-Kaʻū Trail (Site 23021). During Site Condition Assessment 2006 we found additional footprints in the ash flow. The area has experienced recent flooding by the appearance of downed ohia trees and dead trees that surround the feature. Approximately 10 footprints are visible and well preserved inspite of the erosion from water movement.
23031	Rock pile	Feature 98-54 is 1.75m long x 1.15m wide x .7m high rock pile is made of dry stacked pahoehoe boulders and cobbles and is stacked one to three courses high. The feature is built on top of pahoehoe bedrock and is near a small opening in the pahoehoe bedrock (a blister) which is feature 98-66. This blister could possibly be big enough for a human to fit inside if lying down.

Site No.	Site Name	Description
23032	Halfway House Trail	This site consists of a segment of trail that forks into two parallel trail segments. The right fork is 733 m (0.5 mi.) long while the left fork is only 340 m (0.2 mi.) long. Both trail segments lead toward the Kau Halfway House. The Kau Halfway House was a rest station constructed for visitors who were traveling from Hilo to Kaʻū in the late nineteenth and early twentieth century. Because of its apparent association with the Halfway House, the trail has been so named. The Halfway House Trail diverges to the west from the Kaʻū-Volcano Trail (Site 22982) near the base of the Keʻāmoku lava flow. Feature 98-472 is the temporary field number assigned to the trail segment identified as the Halfway House Trail.
23033	Keʻāmoku Cross Trail	This site consists of five features: one trail segment, two rock piles, and two mounds. The trail (see description below) crossed the Keʻāmoku lava flow just south of the beginning of the largest concentration of structures that have been identified along the lava flow. The Keʻāmoku Cross Trail is unlike most of the other trails (except the Old Puna-Kaʻū Trail) because lies in an east/west direction. The rock piles and mounds likely served as trail markers for travelers who used it.
23034	Kau Road in Footprints area	Feature 75 is a 3,195 m (1.99 mi.) segment of the Kaʻū Road. This road replaced the Peter Lee Road (Site 22997) by 1927. The Kaʻū Road was built by the Territory of Hawaii and paralleled much of the then existing Peter Lee Road (Site 22997). Today, only a small section of the Kaʻū Road remains, as the existing Māmalahoa Highway now covers much of the same route.
23049	Crater Rim Road Wall	The site consists of a free-standing, dry-stacked rock wall. It is constructed 2-8 courses high of blocky pahoehoe boulders, possibly core-filled and placed upon undulating pahoehoe terrain in a wet rainforest. It heads in an E-W direction with the west and possibly east end disrupted by the Crater Rim Road.
23270	Kealakomo Coastal Features	Enclosures, platforms, mounds, petroglyphs. Historically, large waves and goat activity have impacted the area. Several features, particularly those near the shore, have been affected by wave action, and are partially buried in sand and beach rubble.
23271	Puʻuloa Petroglyph Field	Puʻuloa Petroglyph Field is a very extensive area covered with a dense concentration of petroglyphs. The area is characterized by a long pressure dome hill that rises above the surrounding area. On this hill there are many petroglyphs as well as surrounding this hill. The types of petroglyphs found in this area include pikos or cupuoles, anthropomorphs, zig zag lines including many other shapes. It is said that Hawaiians came here to bury the umbilical cord in a cupuole with a rock over it to ensure a long life. The word “Puʻuloa” translates to hill of long life. There is a trail leading to the petroglyphs with a viewing boardwalk so that people do not trample on the petroglyphs and inflict wear and tear on them. Several old trails intersect this petroglyph field. (Puʻuloa Petroglyphs; Smart et al. 1965)
23275	Keanakākoʻi Crack Dump	This site is located against the north base of a large crack extending eastward from Keankako'i Crater. The site consists of three unauthorized excavation pits and is positioned on soil and medium black cinder. White ware shards, glass bottle fragments and metal apparatus are present.
23314	ʻĀinahou Road/ Keauhou Trail	This site consists of both the Keauhou Trail and the ʻĀinahou Road. These features were lumped together as a single site due to the fact that the ʻĀinahou Road used to be a section of the Keauhou Trail. The historic Keauhou Trail provided access from the Keauhou Landing to upper elevations (the Pulu Factory and the early Volcano House) of Hawaii Volcanoes National Park. The portion of the trail converted into a dirt road (ʻĀinahou Road) provided and continues to provide access to the secluded Ainahou Ranch House. The Keauhou Trail is approximately 6.2 miles long while the Ainahou Road is approximately 2.0 miles long. Both features meander through myrica faya and broomsedge landscapes in one of driest areas in the Park. The Keauhou Trail is relatively narrow (1-6 feet in width) and is shows signs of erosion. The ʻĀinahou Road is in good condition and is maintained by road crew.

Site No.	Site Name	Description
23315	Platforms and Enclosures at ʻĀpua Point	This site comprises a combination of three platforms and two enclosures, a single platform and enclosure, a stone tower, and another small enclosure. The main structure has three platforms joined side by side, each faced with boulders, paved with small stones, and each with its own stone hearth. The central (largest) and western platform share a common, boulder paved strip running along their southern edge, and this continues eastward as a wall before turning back to the third platform. The platform facings are thick and show clearly on the surface of the small stone paving and the boulder paving of the two western platforms. Against the southeast corner of the platform structure is a small rectangular walled enclosure, and against the southwest corner is another small, but oval, walled enclosure. This house site was identified and mapped in 1964 by Colin Smart. After the 1975 earthquake and tidal wave the site took considerable damage. The platforms are still structured and definable however the edges of the site are rubbly and blown out. The hearth and post holes in the far eastern platform are distinct, the hearth in the far southern platform is well defined and visible.
23316	Enclosure at Āpua Point	A small square enclosure of roughly made, low stone walls, is located just beside the Apua-Kahue trail a few meters east of the Apua shelter. The enclosed area is of bare rock surface. This site is now in a very disturbed condition. The enclosure is in such bad condition that no map was made because the feature is so haphazard and disturbed.
23317	ʻĀpua Point Spring	A fissure allowing access to brackish water some 3.25 m. below ground surface and 40 m. from the shore line on the western side of Apua Point seems to have had its opening enlarged or modified. This is the only water source located at Apua Point. Immediately inland from this water source is situated the present overnight shelter at Apua Point (with site No. 47). Opihi shells cove the floor of the cave and there is a large deposit of shells on the northwest surface of the cave. It is used a bathing spot for visitors.
23362	Pepeiau Shelter Cabin	This shelter cabin is a 5.1 m X 3.1 m X 2.3 m high cabin constructed of wood and built in 1946 or prior, the exact date has yet to be determined. The cabin consists of one room and is rectangular in shape. The construction of the cabin exhibits the Park style developed for HAVO in response to available materials and the implementation of the 1930s Park Master Plan.
23363	Platform and shelters, shrine?	This site consists mostly of jumbled rock and waterworn stones due to tsunami action in 1868 and 1975. There are occasional patches of pavement and a few alignments still exist. A 1964 record of this site suggests it may have been used for religious purposes. The site blends into an area on the southwest that was known as a fisherman's shelter and was also used by park rangers from 1950's through to 1975. Possible shrine?
23399	Hilina Pali Road	This road is located on the right hand side of Chain of Craters Road and is 8.2 miles long. The road consists of a one lane road that has been resurfaced several times over the years. This lovely road provides access to the Ka'aha Trail Head as well as the trail leading to Halape and the Peipeia'u Shelter.
23646	Coastal Complex	Site 23646 is complex of features located along the coastal lowlands. The features were identified during the Pili Grassland Prescribed Burn Experiment project and that was conducted in two phases. A total of 61 features were located during phase I and consisted of 34 rock piles, 14 excavated pits, 3 alignments, 2 petroglyphs, 2 mounds, one cave, one enclosure, one slab lined hearth, and one wall. An additional 143 features were identified during phase I but were laterdetermined to be non-cultural. Fewer features were located during phase II. A total of 90 features were located, and 10 of those were determined to be noncultural.The remaining 80 features consisted of 57 excavated pits, 18 rock piles, 2 excavated pits with walls, one alignment, one overhang shelter, and oneisolate marine shell.During the current assessment a total of 252 features were included with Site 23646. Of this total, 133 were subsequently inundated by lava, 91 features wererelocated, 17 newly identified features were clustered with Site 23646, six previously located features were not relocated, and five features were determined tobe non-cultural. The predominant feature types identified are excavated pits and mounds (both feature types generally associated with agricultural activity) but also included: rock scatters, alignments, walls, one possible lithic scatter/y, cairns, and petroglyphs and each is described below.
23647	Lithic Block Quarry Features	This site consists of 277 individual quarry locales. A single cave was identified in this project area. Cave (Lithic Block Cave) will be receiving a separate site number. In the original work done on the site an excavation of one of the quarries took place, collection of some adze preforms and lithic flakes, as well as some collection and testing of charcoal from the Lithic Block Cave. Thompson and Roper Lithic Block Quarry Survey 2002, GIS data available but currently there is no written report for this survey.

Site No.	Site Name	Description
23975	Kupukupu Feature KA1	Feature KA1 is a 198 X 130cm and 30cm in height rock pile. The feature is constructed of loosely piled and scattered pahoehoe boulders and cobbles. The feature is in a loosely circular arrangement. It is located at 1000-1500 feet in elevation
24007	Kupukupu Agricultural Features	Site 24007 consists of agricultural features identified in the western central portion of the project area and includes one mound, one pile/scatter, one excavated pit with mound, and one excavated pit, and each is described below. The site designation was created to encompass the agricultural features in this portion of the project area. Numerous agricultural features (mounds) were identified in this area during the current assessment; however, due to time constraints these features were not formally recorded. If surveys are conducted in this area in the future, then these features should be included with Site 24007 and the current site boundary amended to reflect the broader feature distribution in this area.
24010	Platform	HAVO-2002-488 is an 8.7 x 6.4 m an 95 cm in height rectangular platform (Fig. 22). The platform is constructed on the southern teminus of an aa flow andconsists two separate levels (the northern, mauka, level was designated Level 1; the southern level was designated Level 2). The platform is constructed from stacked pahoheo and aa cobbles and small boulders. The northern platform area (Level 1) consists of a rectangular area delineated on the northern andsouthern edges by a low lying wall. The wall is mostly collapsed (no verticle facing remains) and appears to be dry stacked constructed (non corefilled). The waranges from 35-50 cm in height and is 0.7 m in width. Both the southern and western edges of Level 1 are defined by a single course alignment of both aa andpahoehoe cobbles and small boulders. The interior floor area of Level 1 is relatively level and consists predominately of crushed aa gravels (Fig. 23). Level two is south and ajoins Level 1. The rectangular portion of the platform consists of a relatively level area paved with both pahoehoe cobbles and slabs (inlaid in the platform surface) surrounded by crushed aa gravels (Fig. 24). Several coral fragments were observed on the platform and consists of largerpahoehoe cobbles and boulders. The mound formation combined with the branch coral remains may indicate a possible burial function for this feature. No othercultural material was identified on the plaform surface or in the surrounding area.
24017	Kupukupu platform	The platform is rectangular in shape and is constructed on a south facing slopewith the long axis oriented N/S (Fig. 38). The platform is constructed from stacked pahoehoe cobbles and small boulders and the platform edges are mostlycollapsed.. The platform surface appears to dip slightly toward the slab pavement area; this dip, ordepression area, may represent a crypt structure constructed within the platform. The central platform area is roughly 3 meters in length (N/S) and consists of arough pahoehoe cobble pavement mixed with soil and duff accumulation. This pavement area is not as intact as the southern pavement area. The northern halfof the platform consists of level soil and a duff layer; these accumulations may overlie a buried cobble pavement surface (Fig. 40). No cultural material was observed on the platform surface or in the surrounding area. The platform most likely served as a permanent habitation feature based on its formal type and on its size. The feature may also represent a possible burial platform; this function is most likely a secondary feature function where anindividual was interred post habitation. The feature is in good condition and is located 510 meters (1,673 feet) a.m.s.l.
24081	Cave	The Site 24081 cave is located southeast of Node H26. One adult cranium was observed in the cave, and the remains were designated Human Remains 1 (HR1). HAVO-2003-L-67 is a cave of undetermined length. The cave trends north/south and the cave interior is accessed by a 2.0 wide by 0.7 m in height openingalong the eastern edge of the tube. The opening is situated within a relatively small sink formation that measures approximately 4.0 m N/S by 3.0 m E/W. The floor of the sink formation is littered with a thick layer of burned organic material that overlies pahoehoe cobbles (collapsed sink edge material). The opening provides access to both the northern and southern cave extensions. A second opening is located approximately 5 m northwest of the main opening but was not examined. One human cranium (HR1) was observed in the cave interior from the cave opening. The remains are located approximately 5.0 m south of the opening and are situated on the eastern edge of the cave. An unidentified bone fragment (possibly a lower lumbar spine or a sacrum fragment) is located withina pahoehoe cobble concentration at the main opening. Petroglyphs are located on the flat pahoehoe surface immediately west of the tube opening; the motifsare weathered and exact figures could not be accurately discerned because of the deteriorated state of the panel and due to poor lighting conditions.

Site No.	Site Name	Description
24094	Agricultural Features	Site 24094 consists of 338 agricultural features distributed throughout the current project area. The features were designated one site number based upon their apparent affiliation with agricultural activities in this area and on the similar construction materials and methods. The site consists predominately of rock piles (n=237) and rock mounds (n=67); the physical characteristics that differentiate between the two feature types was based primarily on substantive construction and was determined by the individual surveyor. The remaining features of the site include 2 C-shape planting areas (non-habitation), 16 excavated pits, 13 excavated pits within associated mounds, and three agricultural terraces, and each is described below.
24121	Kahuku-ʻĀinapō Trail	The Kahuku-ʻĀinapō trail is a segment of an "old trail system" that was used in historic times for driving cattle between various cattle ranching operations associated with Parker Ranch (ca. 1912-1947) and is located in the Kahuku Management Unit of the National Park. The trail route included stopover locations at Kapapala Ranch, Keauhou Ranch, Humu'ula Sheep Station, and Pu'u O'o Ranch. (Loyal to the Land, Bergin, ref.). The Kahuku-ʻĀinapō trail illustrated on the 1928 USGS Honuapo quadrangle map is a pathway leading north/south through the southern central section of Kahuku to approximately 5,000ft elevation, where it turns to lead northeast/southwest into the upper eastern section of the Kahuku Unit, parallel to the eastern park boundary. The total length of the Kahuku-ʻĀinapō trail located within the Kahuku Unit of the national park boundary is 35,000 meters (21.7 miles). The remainder of the trail extends beyond the northeast park boundary, into the state Kau Forest Reserve and Kapapala Ranch. Currently, the trail courses over a'a and pahoehoe lava types, and bisects various vegetation types that include pastureland, ohia and koa forests, and pukiawe scrublands. A portion of the Kahuku-ʻĀinapō trail equal to 24,600 meters (~15 miles), from Pu'u Nanaia (2,000' elevation) to Punalu'u Kahawai (6,167' elevation) was surveyed during the archeological investigations of 2004. The survey identified 24 features associated with the Kahuku-ʻĀinapō trail that consist of trail segments, trail/road segments, and cairns. The trail segments range from winding single file width pathways to bulldozed road segments wider than two meters. Significant sections of the trail have been impacted by historic lava flows, vegetation overgrowth, ungulate trampling, and ranch development activities (i.e., modern roads, water system development, and logging). Surveyors experienced difficulty in identifying many of the trail segments in the upland forests, which coincides with earlier attempts to locate upland mountain trails on Mauna Loa's slope region. The majority of trail segments identified and recorded within the pasture land area (2,000ft 5,000ft), have sustained a moderate to high level of disturbance through pasture development fence line construction, and road system development and improvements (i.e., bulldozing, widening, rerouting). A condition assessment of the site was obtained on 11/14/06 by relocating and observing 8 of the subsites which include H4,H5, H6, H8,H9, H11,H18, and H19. The site can be seen as a pathway through various terrain, including aʻa and soil. It has been obscured by vegetation in many locations. In at least one location rock walls are located in the vicinity and are probably associated with the trail and trail activities.
25935	Halapē Ruins	This site is a habitation complex consisting of a large house platform with four associated enclsoures, a windbreak wall, some small pavedareas, quarried edges and petroglyphs. House Platform: There is a paved platform ca. 8 m by 7 m with a ca. 0.7 square slab lined hearth of water worn basalt boulders near the center of the paving.The platform is outlined by slabs and cobbles level with the paving on all four sides.There are low walls/alignments outlining the edges on the northeast and southeast sides of the east corner of the platform. This platform has been built on the upper quarried surface of a prominent tumulus well inland from the coast and on the east edge of the village area. There are three probable postholes visiblenear the edges of the cobble alignments. These indicate the structure of about 7 m by 6.5 meters. There is a slightly lower terrace along the southeast andnortheast sides of the platform that appears to have been robbed to build adjacent enclosures 1 and 2. The large size of the house along with the size of the slablined hearth, the quality of the construction and prominent position of the feature overlooking the village and the coast of Kaʻū suggest that this is a high status dwelling.
25936	Halapē Ruins	This site is a 9.0m x 18.0m x 1.5 m high large rectangular enclosure with some paved areas, breakdown on the north corner and on the southern side.Vegetation has inundated the interior of the platform. There is a small enclsosure within the large enclosure that is approximatley 3 m x 3m. The hammerstone that was previously identified in the southern corner of the enclosure was not relocated, probaly due to the dense vegetation. There is a paved terrace on thesoutheast corner of the platform that is approximaltey 4m X 5 m long.

Site No.	Site Name	Description
25937	Kalue Ruins	This site consists of five historic structures positioned on a sloping pahoehoe lava flow in the southwest region of Hawaii Volcanoes National Park. Labeled as Features A-E on the provided map, features consists of terraces, enclosures, platforms, papamu, and c-shapes. Features associated with this site are described in the provided features forms (Features G and H) and consists of a fishing shrine as well as an enclosure complex. This site is in good condition with little impacts being present. Vegetation is scarce in this area which rest on the edge of a cliff and sea arc.
25938	Kūēʻē Ruins	This site consists of a remote village site in the park used as a fishing camp up to the 1970s. Area was used by opihi pickers which is evident by mass concentration of ʻopihi shell middens. These ruins are part of the Puna-Kaʻū Historic District. A series of C-shaped enclosures, excavated areas, house platforms, multi-room rectangular enclosures and cave features compose this site. In all, there are 17 sites, all of which include stone strucutres, petroglyphs, some small cave sites, two paved areas and the only example of a crop-mark site recordedin the park.The entire site stands upon the surface of an aa flow and pahoehoe flows. The ocean is located approximately 100 meters south of the site which may be described as being extremely barren, dry with occaisional tuffs of natal redtop and sourbush.This site is a cluster of many features which include a large ahu that at one time marked a brackish water spring that was not identified on this trip (although acrack is nearby that the water may have once been in), an enclosure, a C-shape, and a petroglyph panel pecked into the pahoehoe. Around these features there is shell midden scattered throughout as well as metal fragments, glass fragments and glass bottles.
25939	Keauhou Ruins-Heiau Cave	This site is located south of the Puna-Kaʻū Trail in the ahupuaʻa of Keauhou. “This site is the most complete modification of a lava tube recorded in this area. The lava tube comprises the usual sections—a collapsed section which permits entry into an intact portion of tube leading northwards (and eventually opening to the surface again through another collapse). The collapsed section has a level paved floor, almost 2m below the surrounding ground surface and near vertical walls for the most part. In places the wall of the collapse has been made vertical with carefully placed stones... On several of the paving stones are petroglyphs...” These petroglyphs are in good condition. “A narrow entrance has been constructed in the northeast corner of the paved floor area and permits access down into the intact section of the tube. Within the tube the floor is covered with a tumbled mass of large boulders, several of which are clearly waterworn and must have been carried into the tube...” (Smart et al. 1965:58). Two large, elongated, water-worn boulders are placed upright in the floor, and at least one additional boulder of similar size and shape lies on the floor in line with the othetwo. The original recordation of this resource notes only these three upright waterworn stones in this resource but the 05/18/2006 visit to the site revealed 20 upright waterworks within the immediate entrance of HV-078. Due to these additional modifications, it may be inferred that this resource continues to be used in a possible religious manner.
25940	Road Cut Cave	Road Cut Cave is a large, 500 m long lava tube with nine entrances. Cultural material is abundant and consists of hearths, charcoal, stepping stone trails, rock walls, gourd cradles, terraces, gourd remains, barrel fragments and a wooden cache of possible sandalwood sticks. This cave is associated with Kealakomo Village and is believed to have been used as a water collection resource.
25941	Mel’s Ahu	This site consists of an ahu, a rock shelter, and four petroglyphs located in the southwest region of the Kahuku unit. The ahu measures 1.5 x 1.7 m and 133 cm high, and is constructed of large basalt cobbles. It is positioned on a large pahoehoe tumulus. This ahu has been damaged recently [within the last year] with its interior being partially gutted. The ahu is currently stacked (very symmetrical) eight courses high. A rock shelter is located directly to the east of the ahu. This feature is relatively small [2.7m x 1.1m] and is partially filled with angular basalt rock rubble. Due to the positioning of the rocks, it appears to be a possible burial. There is a green patina on the rocks giving the impression this feature has not been disturbed for many years. There are four anthropomorphic petroglyphs in this site. Two on the western edge of the tumulus are large (1 meter long). One appears to resemble a moʻo o lizard, the other is shaped like a kane or man. On the interior slope the anthropomorphic glyph is crowned with horns that could be representative of the long horn cattle that arrived with Captain Vancover in 1896. In addition to these four petroglyphs there is a small pecked circle 6 cm in diameter and 3 cm deep, 50 cm north of the ahu.

Site No.	Site Name	Description
25942	Petroglyph Grotto	Petroglyph Grotto consists of a rock shelter, petroglyphs, and possible agricultural features. Located 25 meters west of the Pu'uloa Petroglyph Field, this site is positioned in a low depression or sink in a pahoehoe lava flow. The agricultural features consists of C-shapes, excavated areas as well as rock walls. This site was determined to be in good condition during the January 1, 2006 but has been disturbed and is threatened by visitor use.
25943	Hilina Pali Cave	This lava tube is a complex maze system with tiered passages and branches. There is very extensive archeology in this cave including several petroglyphs, water catchments, and charcoal deposits. This cave not only houses signifigant archeological remains but also has intricate and rare geological formations, paleontological deposits, and some biological resources.
25944	Earthquake Cave	The lower or makai entrance of Earthquake Cave is located on the southwest end of the pahoehoe sink. This entrance is 5.2 meters wide and 4.2 meters in height and is heavily vegetated with invasive and native species. The cave entrance slopes down into the main body of the cave. Charcoal as well as a stepping stone trail, rock alignment, metal fragments and gourd cradles were the only cultural materials present within this resource.
25945	Kahuku K1 Cave	This site is comprised of a small (three) cluster of features located at the southeast tip of the Keʻāmoku lava flow. The site is near the edge of the Mauna Iki lava flow which may have covered adjacent features in the area. The mauka section of the resource contains scattered petrel bones, charcoal and ash deposits. Two concentrations of petrel bones were designated as Feature One and Feature two. This section of the cave also contained geological and biological resources.
25946	Charcoal Cave	This site is a lava tube located off of the Hilina Pali Road. The cave has a large sink and a grove of trees that grow in and around the sink. The cave has a lot of sediment and charcoal deposits. These may contain signifigant cultural and paleontological resources. There is abundant charcoal throughout the cave, some water catchments, and some paleontological and geological resources.
25947	Calabash Cave	The entrance is steep and almost plugged by vegetation. Sediment and ash cover the floor. There are many gourd cradles on the floor of the cave. Charcoal also covers the cave floor as well as goat bones. The geological features present in this resource consist of cave coral. This cave is believed to have been used for water collection by ancient Hawaiians.

* This table is an expansion of Table 1 and presents information, with some modification, from ASMIS. Sites were selected for listing in this table based on the availability of expanded description in the ASMIS files. Sites marked with an * in Table 1 are included in this table.

APPENDIX B.
PUNA-KAʻŪ HISTORIC DISTRICT PHOTOGRAPHS

Figure B-1. Holei Pali, from near Naulu forest, Chain of Craters Road, 1972.

Form No. 10-301a (7/72)

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES

PROPERTY PHOTOGRAPH FORM

(Type all entries - attach to or enclose with photograph)

STATE: Hawaii
COUNTY: Hawaii
FOR NPS USE ONLY
ENTRY NUMBER: JUL 1 1974
DATE:

SEE INSTRUCTIONS

1. NAME
COMMON: Puna-Ka'u Historic District
AND/OR HISTORIC:

2. LOCATION
STREET AND NUMBER: Puna-Ka'u District, Hawaii Volcanoes NP
CITY OR TOWN: Volcanoes
STATE: Hawaii 96718
CODE: 15
COUNTY: Hawaii
CODE: 001

RECEIVED FEB 1 8 1974 NATIONAL REGISTER

3. PHOTO REFERENCE
PHOTO CREDIT: National Park Service
DATE OF PHOTO: September, 1972
NEGATIVE FILED AT: Hawaii Volcanoes NP Neg. No. 691

4. IDENTIFICATION
DESCRIBE VIEW, DIRECTION, ETC.:
Looking SE along the ridge formed by Holei pali from near Naulu forest on the Chain of Craters road.

Figure B-2. Text for Figure B-1.

Figure B-3. Waha‘ula Heiau from the air, 1967.

Form No. 10-300a
(7/72)

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES

PROPERTY PHOTOGRAPH FORM

(Type all entries - attach to or enclose with photograph)

STATE: Hawaii
COUNTY: Hawaii
FOR NPS USE ONLY
ENTRY NUMBER: JUL 1 1974
DATE:

SEE INSTRUCTIONS

1. NAME
COMMON: Puna-Ka'u Historic District
AND/OR HISTORIC:

2. LOCATION
STREET AND NUMBER: Puna-Ka'u District, Hawaii Volcanoes NP
CITY OR TOWN: Volcanoes
STATE: Hawaii 96718 CODE: 15 COUNTY: Hawaii CODE: 001

RECEIVED FEB 18 1974 NATIONAL REGISTER

3. PHOTO REFERENCE
PHOTO CREDIT: National Park Service
DATE OF PHOTO: October , 1967
NEGATIVE FILED AT: Hawaii Volcanoes NP Nsg. No. 178

4. IDENTIFICATION
DESCRIBE VIEW, DIRECTION, ETC.
Aerial view of Wahaula temple site after construction of interpretive trails. Looking makai, toward the ocean.

INT: 1584-78

Figure B-4. Text for Figure B-3.

Figure B-5. Keauhou Landing, 1972.

Form No. 10-300a
(7/72)

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES

PROPERTY PHOTOGRAPH FORM

(Type all entries - attach to or enclose with photograph)

STATE: Hawaii
COUNTY: Hawaii
FOR NPS USE ONLY
ENTRY NUMBER: JUL 1 1974
DATE:

SEE INSTRUCTIONS

1. NAME
COMMON: Puna-Ka'u Historic District
AND/OR HISTORIC:

2. LOCATION
STREET AND NUMBER: Puna-Ka'u District, Hawaii Volcanoes NP
CITY OR TOWN: Volcanoes
STATE: Hawaii 96718
CODE: 15
COUNTY: Hawaii
CODE: 001

RECEIVED
FEB 4 1974
NATIONAL REGISTER

3. PHOTO REFERENCE
PHOTO CREDIT: National Park Service
DATE OF PHOTO: 1972
NEGATIVE FILED AT: Hawaii Volcanoes NP, Neg. No. 59-56

4. IDENTIFICATION
DESCRIBE VIEW, DIRECTION, ETC.:
Keauhou landing is an important site in connection with the ranching and pulu harvesting periods. The stone walled enclosures and house site are mostly late historic. Some sites in the vicinity are of prehistoric age. Looking toward Halape from Keauhou.

Figure B-6. Text for Figure B-5.

Figure B-7. Ruins at Kue‘e, from the air, 1972.

Form No. 10-301a
(7/72)

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES

PROPERTY PHOTOGRAPH FORM

(Type all entries - attach to or enclose with photograph)

STATE: Hawaii
COUNTY: Hawaii
FOR NPS USE ONLY
ENTRY NUMBER: Jul 1 1974
DATE:

SEE INSTRUCTIONS

1. NAME
COMMON: Puna-Ka'u Historic District
AND/OR HISTORIC:

2. LOCATION
STREET AND NUMBER: Puna-Ka'u District, Hawaii Volcanoes National Park
CITY OR TOWN: Volcanoes
STATE: Hawaii 96718
CODE: 15
COUNTY: Hawaii
CODE: 001

3. PHOTO REFERENCE
PHOTO CREDIT: National Park Service
DATE OF PHOTO: Sept. 25, 1972
NEGATIVE FILED AT: Hawaii Volcanoes NP Neg. No. CIRE-HAVO 813

RECEIVED FEB 19 1974 NATIONAL REGISTER

4. IDENTIFICATION
DESCRIBE VIEW, DIRECTION, ETC.
Kuee ruins from the air. The white areas in and near the stone enclosures are shell midden from the opihi collecting. The area is still in use by modern day fishermen and shellfish collectors.

NPS: 184-72

Figure B-8. Text for Figure B-7.

V. ARCHEOLOGICAL ASSESSMENT

The management of archeological resources at HAVO is a daunting task. HAVO is a large area with a rugged, dangerous landscape, one in which the archeological remains are under constant threat of natural destruction. HAVO is not categorized as a "historical park," but it has a large number of archeological sites (recorded and unrecorded) and as the land of Pele, it is a setting of unique cultural value. Interviews with the cultural resource staff and review of the archeological program make it clear that the staff meet the challenge of the "daunting task" with enthusiasm and creativity, and as effectively as the limited resources allow. The following assessment reviews the status of the archeological resources in this framework.

ARCHEOLOGICAL INVENTORY AND POTENTIAL FOR AS-YET-UNIDENTIFIED ARCHEOLOGICAL RESOURCES

Figure 24 (see above) indicates the areas where archeological surveys have been carried out. The surveys, however, vary in intensity of coverage and detail of recording. Figure 28 shows areas where additional archeological inventory survey needs to be conducted to complete coverage at equivalent levels of recording, with a general assessment of the potential for unidentified archeological sites. Recommendations for continuing inventory survey are included in the Research Design (see Section VII).

ARCHEOLOGICAL SITES AND THE CONDITION THEIR CONDITION IS IN

At HAVO, the "condition of archeological sites" is an oxymoronic phrase that may seem like bureaucratic black humor. Over the past 20 years, a significant number of recorded sites have been buried under lava—they have no *condition*: they have become one with the landscape. Appendix A contains the entire list of recorded sites at HAVO; following an assessment by park staff, the final version of this list should have a category "destroyed."

For recorded sites that have not been destroyed by lava, "site condition assessment" has been an on-going program at HAVO and the summary information is being prepared by park staff.

RESEARCH, ANALYSIS, AND REPORT PREPARATION

The majority of the archeological investigations at HAVO have been site survey and inventory and associated Section 106 actions. The inventory site records are maintained in paper form as well as in GIS and ASMIS. Inventory reports have also been produced for most projects. Early inventory efforts were conducted by the B.P. Bishop Museum (Emory, Cox et al.1959; Smart et al. 1965), but over the last three or four decades, most of the work has been conducted in-house. The overall quality of the inventory reports from the early work of Ladd (e.g., 1972a) to the present has been good, but gradually improving with increased attention to analysis and in recent years, with advances in production methods and presentation quality (e.g., Moniz Nakamura 2003a).

The focus on analysis of the archeological remains (not simply site inventory) should be noted as an outstanding aspect of HAVO reports. Examples of excellent archeological research include Ladefoged

et al. (1987), Carter and Somers (1990), Moniz Nakamura (2003a), Durst and Moniz Nakamura (2003), and Glidden (2006). In fact, one of the exemplary analytical reports in Hawaiian archeology in general is the study of Waha‘ula Heiau by Masse, Carter, and Somers (1990), which combines information from excavations, lava flow research, and Hawaiian traditions to formulate a remarkable model of site development and associated ritual behavior.

Not all inventory research has been published, nor all excavations analyzed and published, but there is an on-going program with the goal of completing these projects.

PUBLIC INTERPRETATION

The great majority of the public certainly comes to HAVO to see volcanoes and volcanic activity, and if they have any interest in the cultural aspect of the park, it takes the form of some bowdlerized version of Pele. The park itself has given little attention to cultural interpretation for the public, the main exceptions being access to and interpretation of Waha‘ula Heiau (now destroyed) and the Pu‘uloa Petroglyph Field (Site 23271). Recognizing that HAVO is not categorized as a historical park, this has nonetheless been a major deficiency, but one that park staff is working to improve. The park website now has a valuable cultural summary and there are several planned projects for public interpretation.

A MATTER OF PRIORITIES

In the non-experimental sciences like archeology, recording and description can never be complete. But unlike many other non-experimental sciences, archeology cannot count on its subject matter being indefinitely accessible for continuing study. For most national parks, this tends to be a long-range problem because site deterioration and destruction is a relatively slow process of natural deterioration, weathering, vandalism, and occasional natural disaster such as flooding. But for parks that have sites in dynamic environments, such as rapidly eroding coastlines or active fault lines, this is an immediate concern. For HAVO, with active volcanism and associated natural disasters, the question of recording site information is an urgent concern that can be expressed as a question of priorities. How can the limited effort be most effectively focused and most efficiently conducted? The comments on survey and related research address this, but the larger framework also involves balancing such things as Section 106 compliance versus Section 110 responsibilities, giving only the minimally necessary attention to minor ARPA matters, and carefully reviewing how the effort required to record and maintain site information can be conducted so that the usefulness of the information matches the cost of producing it. “Universal” recording forms for sites, features, and excavations that categorically demand highly detailed information represent the epitome of inefficiency and wasted effort. This is the altar of SELGEM, where sacrifices are made to the deities of spurious accuracy.

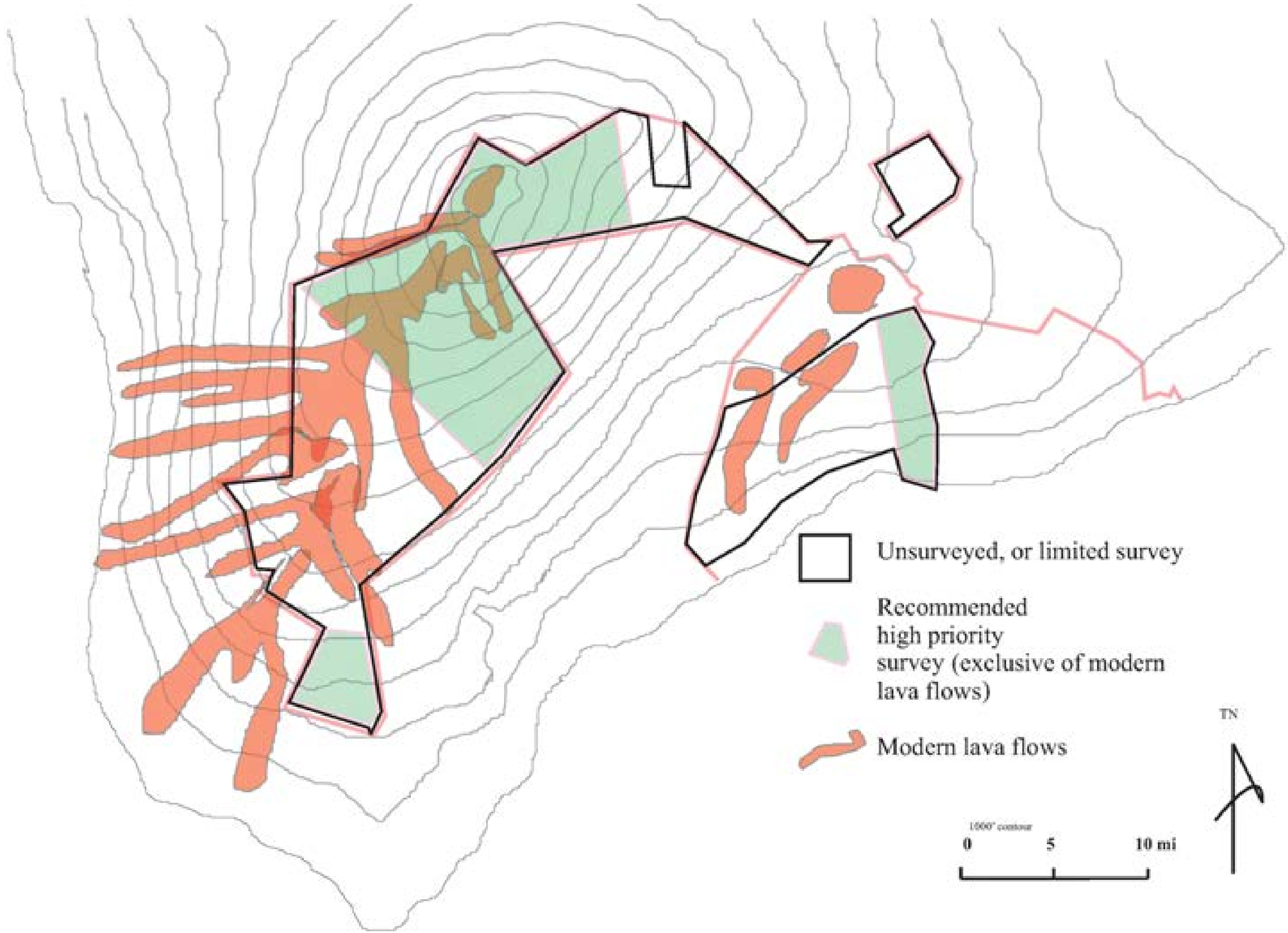

Figure 28. Areas of HAVO without survey or with limited survey, showing areas recommended for high priority survey based on site potential.

VI. CULTURAL RESOURCES AND ARCHEOLOGICAL "SITE" IDENTIFICATION AND INFORMATION MANAGEMENT

As discussed in Section I and summarized in Appendix G, the NPS categorizes archeological sites within a complex framework of cultural resources, and at the same time individual sites are included in several recording systems, including the LCS, the NRHP (under a number of possible categories: eligible, nominated, and listed), and ASMIS (which is used to list all "sites" for a park regardless of LCS or NRHP classification). The present section is a discussion and set of recommendations regarding archeological site definition and identification, and associated information management. (The subject addressed here does not include concerns about the physical management of sites.)

ARCHEOLOGICAL "SITE": CONCEPTUAL AND PRACTICAL CONCERNS

Archeologists do not find sites. Archeologists find material remains of human activity and then segregate these into spatial units called "sites." There are two different goals or purposes that drive site identification. The traditional purpose that guides analytical site identification is scientific analysis and interpretation. A more recent purpose that guides site identification is the pragmatics of cultural resource management, that is, how to partition the material remains on the landscape in some way that is practical for the actions of historic preservation compliance.

Within the framework of scientific research, the archeologist uses a set of criteria to segregate the physical remains as constructs (that is to "create sites") related to patterns of human behavior.[70] To "create a site" in an analytical manner is to identify a pattern of material remains and deposits on the landscape, delineate that pattern with a physical boundary, and then assign some form of discrete identification (a site name, or more commonly today a site number). Thus, an *archeological site* is a *construct* that refers to the location of the physical remains of identifiable human behavior. However, even given a similar set of criteria for relating behavior and remains, archeological identification (creation) of sites will vary depending on the criteria of scale for site definition. Scale, and thus site definition and identification, can vary, ranging from recognition of (1) the material results of a single human activity or event, to (2) material results of an integrated set of related human activities, to (3) material results of an integrated cultural system. Site identification and bounding thus reflects an understanding of the coherence and patterning of behavior that produced the material remains, and/or an understanding of the research potential of the material remains.

Archeological "site" creation or definition for purposes of cultural resource management is commonly framed in terms appropriate for NRHP eligibility review, with concern for how Section 106 will be addressed. This is discussed in detail below.

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[70] Casual site identification may be based solely on clustering of physical remains without reference to behavior, usually based on prevailing convention of what a site is.

In Hawai‘i, a common set of precepts by which sites are “created” has never developed and there is seldom a recognition of the purposes, analytical or managerial, for site definition. There are many consequences of this, including inconsistency, sometimes meaningless groupings of features, and residual areas of cultural remains that are not included as or within sites. This complicates the scientific and the management goals. Further, for the national parks in Hawai‘i, each park has a unique history of how archeological sites have been recorded and numbered, but common to these histories is a confusion of multiple recording and numbering (for HAVO, this is discussed in Section IV; also see, e.g., Tomonari-Tuggle and Tuggle 2006a). The problems of site numbering and recording in Hawai‘i (and elsewhere) derive in part from the evolution of what is recorded as a site. There has been increasingly detailed recording (based on concepts such as settlement pattern, site catchment systems, and landscape archeology) that has not been accompanied by a complementary evolution of the means to define sites.

In sum, it can be argued that “site” is the basic unit of archeology and historic preservation. It should be carefully “created” for analytical purposes and its significance carefully described for management purposes.

“SITES” AT HAVO

Review of HAVO archeological reports and ASMIS files indicates that (in addition to numbering problems) there is no prevailing concept or standard for “site definition,” which has resulted in a great deal of variation in what is called a site and in determining boundaries of sites.

Recording of information about sites in ASMIS files is also inconsistent and involves questions of source of information, dates of site inventory, and NRHP status. A review of reports and site files also indicates uncertainty regarding the NRHP status of many sites. Some reports describe a site as “eligible” for the NRHP, but it is unclear if this is a recommendation or if it based on a formal determination of eligibility, and statements in some reports regarding site eligibility to the NRHP indicate a lack of familiarity with the NRHP process. Further, for the NRHP, what constitutes a site involves more than archeological sites (see NRHP discussion below), which emphasizes the need for clear conceptualization of “site.”

The review of site matters also involves specific practical matters at HAVO, such as how destroyed sites are to be categorized, how to deal with the re-recording of sites and recognition of unrecorded features and potential boundary change, how to many historic features (such as those on the LCS but not in ASMIS), and how to recognize traditional places. Recommendations regarding these matters are proposed below.

NATIONAL REGISTER OF HISTORIC PLACES

For federal agencies, managements of historic properties (including archeological sites) is mandated by the NHPA and supporting regulation. The core of this management is the identification of “significant” sites, that is sites listed on or eligible for listing on the NRHP.

NRHP AND THE DEFINITION OF SITE

The property categories for the NRHP are as "districts, sites, buildings, structures, and objects" which are defined in 36 CFR Part 60 (*National Register of Historic Places*) and in National Register Bulletin 15 (*How to Apply the National Register Criteria for Evaluation*).

> A **district** "possesses a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united historically or aesthetically by plan or physical development" (NR Bulletin 15:5).
>
> A **building** is a constructed facility intended to shelter human activity. However, "If a building has lost its basic structural elements, it is usually considered a 'ruin' and is categorized as a site" (NR Bulletin 15:4), specifically an archeological site (see below).
>
> A **structure** is a constructed facility that is not a building or an object, including such things as bridges, dams, roads, and fences. This category also includes aircraft and ships, although these are often mistakenly called objects. Like a deteriorated building, a deteriorated structure is categorized as an archeological site (NR Bulletin 15:4).
>
> An **object** is a constructed feature that is "primarily artistic in nature or …relatively small in scale and simply constructed" (NR Bulletin 15:5). It is designed and set in a specific locale, such as a monument or a fountain.
>
> A **site** is "the *location* of a significant event, a prehistoric or historic occupation or activity, or a building or structure, *whether standing, ruined, or vanished, where the location itself possesses historic, cultural, or archeological value regardless of the value of any existing structure*" (NR Bulletin 15:5, emphasis added).

NRHP is a listing of historic properties, not just archeological sites and in fact the definition of site includes much more than the archeological. By the NRHP definition, a site is a *place* of cultural value and significance. Although this may confound an "archeological" inventory of sites, this is a definition ideally suited to the landscape of Hawai'i and its cultural resource management in that the traditions provide a remarkably detailed cultural overlay of *places*, by means of culturally defined space (from the smallest cultivation plot to the kingdom), by means of the naming of an innumerable number of places, and by means of the traditions and histories associated with those places. Archeological remains are part of the landscape that has this cultural overlay.

Analytically, there are three sub-categories of site as employed in the HAVO AOA:

> an *archeological site*: physical remains of human activity**,** such as old villages, rock shelters, abandoned gardens, artifact scatters, and petroglyphs (and including deteriorated buildings, structures, and objects, that is categories of property that have become ruins)

an *historic event site*: the geographic location of an historically important event or events, regardless of whether there are any physical remains (archeological sites are also historic event sites)[71]

a *traditional place*: a legendary place or a place with a traditional place name. Such a place may be a natural feature and it may or may not have any archeological remains. If this is identified as a "significant site" to an ethnic group, particularly a native population, it has come to be called a TCP (traditional cultural place or property) as coined by Parker and King (1990).[72]

For the purposes of the NRHP, a site is a physical space and thus has to have a boundary. However, this does not constrain the potential boundaries of the "effect" in a Section 106 review. That is determined by how the significance and value of the site are described, and carelessness regarding this is a major failing of most site descriptions for Section 106 purposes. An action is evaluated for effect on *significance*, not on the site per se. Thus regarding boundaries, if a site is significant, for example, as a traditional place for observing sunrise, then any action that results in blocking that view plane may be a negative effect, even though the action is outside the boundary of the site itself.

NRHP SITES AT HAVO

Eight historic properties (sites, structures, and buildings) and one historic district are listed on the NRHP (Table 15, Fig. 29). The Puna-Kaʻū Historic District includes eleven site complexes and one general category for eligible sites within the district. This district was created for HAVO in the early years of compliance with the NHPA, but because of the limitations of survey at the time, it did not include the whole area of HAVO. Sites identified with the district may be added to the district as contributing features. A number of sites in the HAVO ASMIS files are identified as "listed/documented" on the NRHP as contributing members to the district, but it is not clear if these have been formally recognized. There is no clear record of eligibility evaluations for other sites at HAVO.

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[71] The term "historic event site" is not commonly used, but is employed here to distinguish it from other types of sites.

[72] The Parker and King definition of a TCP is idiosyncratic (for example, the reference to "continuous" use in their definition) and despite the fact that their definition is frequently quoted, it should not be used as a guide to the listing of traditional places as NRHP sites As King has later clarified, a TCP is not a NRHP category, it is simply a kind of site, equivalent to house site or rockshelter.

Table 15. HAVO Properties Listed on the National Register of Historic Places.*

State Site Number	NRHP Name	NRHP Property Type	NRHP Criteria
05501	ʻĀinapō Trail (aka Menzies Trail)	Structure	Information Potential, Architecture/Engineering, Event
05502	Kīlauea Crater (aka Ka Lua o Pele)	Site	Information Potential, Event
05503	Puna-Kaʻū Historic District **	District	Information potential, Event
05504	Mauna Loa Trail	Site	[no information]
05505	1790 Footprints	Site	Information Potential, Event
05506	Whitney Seismograph Vault No. 29	Building	Event
05507	Wilkes Campsite	Site	Person, Information Potential, Event
05508	Old Volcano House No. 42 (aka 1877 Volcano House)	Building	Event, Architecture/Engineering
19429	Ainahou Ranch	Building	Architecture/Engineering, Person

* NRHP Name, Property Type, and Criteria are taken from the records of the NRHP.

** Formally recognized contributing sites are Poupou-Kauka Village (HV-250+), Wahaʻula Heiau (HV-276+); Kaʻiliʻili Village (HV-288+); Fisherman's Cave (Site 22726); Kamoamoa Village (HV-300+); Laeʻapuki Village (HV-323+); Puʻuloa Petroglyph Field (Site 23271); Puna-Kaʻū Coastal Trail (Site 21316); Keauhou Landing (Site 19447); Kūēʻē Ruins (Site 25938); Pulu Factory (Site 21215).

"SITES" AND SPATIAL INFORMATION AND MANAGEMENT

A common element of all of the definitions of site (in archeological terms and in NRHP terms) is *place*, physical, map-able space in the real world.[73] Thus the solution to problems of site delineation and data management may be found in the management of space and spatial information.

[73] For analytically defined archeological sites this involves more than simply drawing a line around archeological features, the identification of boundary is part of the analytical problem. Identifying a site boundary as an analytical process is even more obvious for historic event sites and for traditional sites.

In the past, the accuracy and precision[74] of archeological spatial data have been of a low order because of the complexity and cost of acquiring such data—in practical terms, high quality spatial data had to be obtained by professional engineering surveys. Further, manipulation of spatial data has been difficult, relying largely on drafted maps and photographs. The development of GPS and GIS has now changed these conditions and archeological spatial data of high quality can now be obtained and analyzed as a routine part of archeological investigation and site management, although the level of use of these methods remains relatively low as the discipline experiments with the best ways to employ them for archeological purposes.

HAVO has GIS and GPS technology and thus is in a position to be able to make major advances in spatial management of archeological information.[75] Archaeological and cultural data can now be mapped in great detail and with high accuracy against landscape imagery (high-resolution aerial/satellite photographs, as well as detailed flow maps). These data can be controlled by a combination of GPS-based coordinates and a spatial referencing system (such as a grid, lava flows, or a combination of the two[76]). Initial efforts in the use of GIS for management, display, and manipulation of spatial data are contained in the existing HAVO GIS system, and these are reflected in the recent HAVO reports, and this can be taken in a direction of spatial management that allows archeologists to have control of their spatial data equivalent to that of astronomers, for example.

GIS-managed archeological data provides the opportunity for archeological analysis that has previously been difficult or impossible, but it also provides the means to "create" sites for specific purposes, with one of the important purposes being the bureaucratic management of archeological information (such as ASMIS recording and Section 106 reviews). In other words, the problem of the conflict between the analytically-defined "site" and the bureaucratically-defined "site" can be eliminated because "site" does not have to be the primary unit of archeological recording and investigation. The primary unit can be geographic space.

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74 These terms are used here in their scientific sense, accuracy referring to the reliability of data, precision to the scale within which measurement error is calculated.

75 This of course requires the resources (human and technological) to do so, and these should be a HAVO priority.

76 In the 1960s and 1970s, NPS archeologist Ed Ladd employed a grid system for archeological mapping within the parks, and Stell Newman expanded this system in the research design for investigations at Lapakahi, Hawai'i. These efforts were limited and never completely developed because of the limitations of ground control of spatial data and graphic management at the time, as discussed in the main text above. Currently, archeologists at PUHO are experimenting with using spatial management areas, but to what extent this is GIS-based is not known to us.

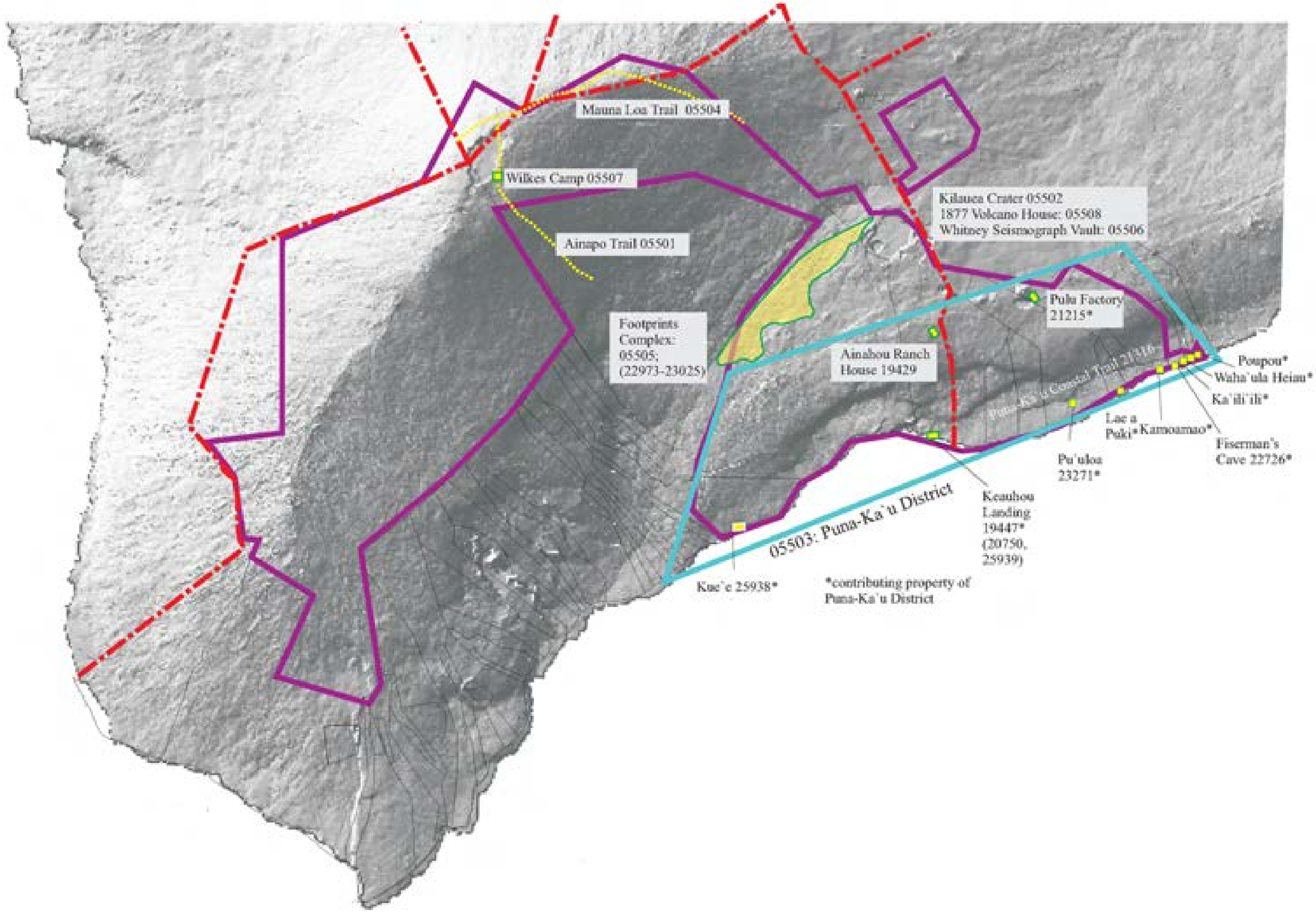

Figure 29. Historic properties in HAVO that are listed on the National Register of Historic Places.

RECOMMENDATIONS REGARDING SITE INFORMATION MANAGEMENT

RECORDING AND NUMBERING OF HISTORIC PROPERTY

Consider revising the boundary of the Puna-Kaʻū Historic District to include all of HAVO. Review the historic preservation process to determine if such a revision will facilitate the determination of eligibility by recording historic properties as contributing elements to the District.

For purposes of Section 106 and Section 110, complete the integration of recorded and known historic properties into the state numbering system, employing NRHP definition of historic property and NRHP criteria for eligibility. As noted above in the discussion of the NRHP, one of the main purposes of the NRHP is identification if historic places for management, with special attention to the question of "effects" and thus site listing should have clear statements about why a site is "significant," which established the baseline for what may be affected. Also note that, per the NRHP, historic properties represent a range of categories. This completion of recorded and known properties should include:

All "historic" (post-Contact) features including roads and trails. Properties that are listed in the LCS, but not assigned state site numbers, should be evaluated by NRHP standards and property categories, and included if they meet these standards.

All HV sites. If "sites" are created for bureaucratic management purposes, as discussed above, the re-numbered HV sites should also have redefined boundaries to include all related features, but this can be done by defining a "site" as an area—a space—incorporating all cultural elements within that space.

All traditional places. These places should be identified through a cultural place inventory (as recommended in the Research Design) and evaluated for recognition as numbered "sites" per the NRHP criteria.

Destroyed sites. Sites whose locations should be re-established and re-marked after their destruction include those that are significant under eligibility Criteria A and/or B, when the integrity of location is not substantially affected (e.g., village sites and temple sites). The location of Waha'ula Heiau is a primary example: the significance of the location, the place, can still be appreciated if one stands on the lava flow that covered the heiau, with the view of the general landscape, the skyline, and the sky that existed prior to the destruction of the physical structures. (For comparable examples of such places that are on the NRHP, see Parker and King 1990; also note the definition of "site" per the NRHP, quoted above).

DATA ENTRY

Develop a set of guidelines that will allow consistent data entry into the various databases, including ASMIS. This should include standardized abbreviations, descriptive terms, and citation format. Information should include a reference to source (e.g., quotation or summary from an existing report, or derivation from field inspection); reports should be cited by bibliographic reference (not by project), which may be standard from (authors and date) or a unique HAVO report coding system (see below). Guidelines should also include instructions on NRHP-related categories; reviews of ASMIS forms suggest that some of these categories may be misunderstood, and are not consistently completed.

Review the entries for NRHP status and correct any errors or inconsistencies.

INFORMATION RESOURCE MANAGEMENT

Consider developing systematic resource inventories for all basic reference materials such as reports and manuscripts (see Appendix D). This may be an unnecessary duplication of the existing library and map inventory systems. However, dedicated inventories for internal use may make research and citation much more efficient. (For example, a dedicated coding system for all HAVO reports and manuscripts would allow easy tracking, management, and citation.)

GIS INFORMATION MANAGEMENT

Review the structure and content of the GIS and conduct a methodological study or studies in how the information can be manipulated for purposes of archeological "site" management and archeological research.[77] For the long-term, this is considered to be the most important of the data information management recommendations.

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[77] This is a complex task and might be considered for a specific, funded research project (see Research Design) or for a volunteer research project. One of the problems that may need to be resolved is integration of ASMIS with GIS.

VII. RESEARCH DESIGN

The Research Design is organized by questions regarding substantive information, cultural-historical and behavioral patterns, and methodological problems—with the recognition that there are questions that crosscut these categories.

SUBSTANTIVE CONCERNS: BASELINE DATA

Substantive problems are those that deal with largely factual matters, usually data collection and analysis related to basic patterns of information; what is also called baseline data. This are not posed in a theoretical vacuum, but reflect either the consensus concerning data that are significant for prevailing problems and conventional data classification, or categories of data created for theoretical and methodological problems.

SITE INVENTORY

There are areas of HAVO that have had little or no site inventory (see Fig. 28). Considering the always imminent threat of site destruction from lava flows and earthquakes, execution of site inventory has been and should continue to be an extremely high priority in the archeological program. The following recommendations include a distinction between reconnaissance survey and intensive survey. Although sometimes defined by intensity of coverage, the distinguishing difference used here is intensity of recording. An important aspect of this recommendation is how the concept of "site" is approached.

Reconnaissance Inventory

The recommended first phase of reconnaissance inventory is a program that establishes the broad distribution and boundaries of complexes, notably those for agriculture, habitation, and resource utilization. At the same time, features with more restricted boundaries (such as trails, caves, petroglyphs, and religious structures) may be noted. It is recognized that conditions of HAVO (difficult access, rough terrain, dense vegetation) do not allow field inventory to be easily conducted, but a comprehensive program should be considered a necessity under the always imminent threat of destruction.

The essence of an effective reconnaissance program is a sense of the level of detail to be recorded and the manner in which generalized statements about sites/features are to be made. The position argued here is that in site/feature recording there is often too much emphasis on detail and too little on generalization (this is also true of excavation)—a case of "not seeing the forest for the trees." The problem is that generalizing requires more experience than does recording detail, and thus crew training and leadership are critical for such a program. The minimal level of recording for reconnaissance may simply be "presence/absence" and can be done in the form of "siteless" survey (a process of continuous recording during field sweeps with information transmitted verbally to a field recorder). Combined with modern GPS recording, this allows rapid and effective survey in difficult field circumstances, including dense vegetation.

The second phase of reconnaissance inventory may entail either one or both of two strategies. Depending on field conditions, selected individual sites/features may be recorded in detail after the first phase, or an area or areas may be selected as sample areas for detailed recording as a means of characterizing the survey area.

Intensive Inventory

An overview of the archeological landscape of HAVO suggests four areas that should have the highest priority for intensive survey—areas that contain cultural remains fundamental to the understanding of the HAVO region. These areas are the ʻiliʻāina of Keauhou, the summit of Mauna Loa, the pali bluff areas (primarily Hōlei and Hilina), and a possible habitation area in the ahupuaʻa of Kahuku (in the southeastern corner of the KMU).

Intensive inventory often includes some amount of archeological "testing." Often this testing is intended to accomplish such things as determining site age and "function" (a peculiar concept when considered in historical-analytical terms). The perspective taken here is that such testing is often useless and counter-productive. Rather, it is argued that testing is appropriate to determine the *potential* for future intensive excavation and the types of questions that might be answered by such excavation. This involves such things as the depth, extent, and nature of deposits (that is, stratified or not, disturbed or not, conditions of preservation, datable materials, and so on). In this context site or feature "function" is replaced by an analysis of events and history of activity.

ʻIliʻĀina of Keauhou

Because of the general nature of the Kaʻū-Puna landscape, as well as the changing conditions resulting from volcanic activity, many of the ahupuaʻa are unique, not archetypal "sea-to mountain resource units." This is certainly true of the ʻiliʻāina of Keauhou, which has (and had) very poor resources for subsistence living, but has two important features: Kīlauea Crater and a coastal landing. A survey of the entire area of Keauhou should be conducted; research should focus on the land area as a means of access to the crater and on the entire land unit (ʻiliʻāina) as a possible ritual zone. Several possible ritual sites have been recorded (see Fig. 18), and a substantial amount of background information has been compiled (e.g., Maly 2005; Durst and Moniz Nakamura 2005). The evaluation of this land area as a possible ritual zone moves the detailed survey inventory into the theoretical problem field (as noted below). An important part of such a survey would also include research on the problem of identification of ahupuaʻa boundaries and possible changes to those boundaries.

Mauna Loa Summit

An intensive survey of the summit of Mauna Loa also involves the question of ritual zones. The Mauna Loa summit may have been a ritual zone, perhaps one involving astronomical observations or celestial-related ritual, and is perhaps one of the most important such places in Hawaiʻi.

Pali Bluffs

The focus of pali bluff survey should be on the nature of upland community, age, and settlement structure.

Kahuku

Regarding Kahuku, the seaward portion of the KMU should be considered for survey to identify any settlement associated with the historically documented intensive habitation areas, including the area of royal residence, above Pali o Māmalu near the present Belt Road. In addition, a temple named Haleopōhāhā was recorded by Stokes somewhere in the vicinity of the seaward border of the Kahuku Management Unit west of the 1887 flow; this should be investigated.

EXCAVATION AND EXCAVATION DATA ANALYSIS

As a continuing effort for obtaining basic information on occupational history, excavation of a sample of sites and associated analyses is an important part of the research program. This involves two general aspects: completion of analysis of existing materials and a strategy for conducting the additional sampling. Excavation related to other research questions is considered under the section on theoretical problems.

Analysis of Archived Excavated Materials

A review of archeological investigations at HAVO from 1987 to 1989 (Carter and Somers 1990) indicates that substantial quantities of materials collected from excavations have yet to be analyzed; there are materials from other excavations that are also unanalyzed. There is a continuing program to complete this work. As a part of this effort, XRF element determinations are being conducted on worked lithics for sourcing, and additional charcoal samples are being analyzed for wood species identification and will be submitted for radiocarbon dating.

The detailed analysis of collections (artifacts and food remains) from individual excavations is a necessary first step in post-field research, but ultimately a regional comparative review is needed so that the larger patterns of occupational history and resource use can be developed. As a part of this, it is also critical to have the methodological means of making these comparisons, an aspect of Hawaiian archeology that is poorly developed and is discussed in the methodological section below.

These materials also contain significant potential for paleoenvironmental research (see below).

Radiocarbon Re-analysis

The existing set of HAVO radiocarbon dates is a disparate collection of data (see Table 13). The dates were obtained by runs from several different laboratories, and processed by differing sets of standards (such as calibration curves, one or two sigma, carbon ratios, and type of material). All of these dates should be re-processed in a standardized manner. This should also include an evaluation of the processing laboratory (some of which are known to have generated unreliable dates), as well as a review and evaluation of the provenience.

The question should also be asked as to whether or not the large number of radiocarbon determinations obtained from the extensive geological dating program of lava flows might be profitably reviewed by archeologists. Further, the archived charcoal from the geological dating program should also be submitted for wood identification; a cooperative arrangement with the volcano geologists might be considered for this. Based on the dates obtained, and if the charcoal comes from pre-Polynesian and Hawaiian eras, the wood identification would contribute to the reconstruction of vegetation history.

Excavation Sampling for Chronological Information

Establishing the settlement history of regions in Hawai‘i is a complex problem because of the nature of Hawaiian remains and the inadequacy of present chronometric methods. The substantive question in this regard is the geographic location of the site components of various ages. The methodological question is the appropriate strategy for excavation.

Given the environmental circumstances at HAVO, there may be no surviving early coastal occupations, except possibly coastal cave deposits. However, cave deposits have to be evaluated carefully regarding the information they provide on local settlement because of the possibility of short-term or specialized activity within such features. The occupational history of the region may come primarily from research in the inland settlements. Such research should involve a deductive review of the most probable areas for early inland settlement and a sampling of these areas. This may be conducted as part of the larger inventory program.

PALEOENVIRONMENTAL INVESTIGATIONS

In Hawai‘i, paleoenvironmental research based on wetland coring has proved to be one of the most valuable means of obtaining information about long-term regional patterns of human occupation (see e.g., Athens 1997). This type of research also has the potential to reveal unexpected aspects of change after human occupation, such as the role of the introduction of the Pacific rat to Hawai‘i (Athens et al. 2002). It is not known if there is any potential for wetland coring in the HAVO area, but the possibility should be investigated and research carried out if it appears feasible. There are a few “lakes” identified in the Ka‘ū-Puna region, but it is not known if any fall within the park. Paleoenvironmental research in the HAVO area would have special problems because the charcoal from natural fires would compromise the charcoal evidence for human activity; however, the information from pollen profiles and depositional data would nonetheless provide critical data on environmental change.

As indicated above in the section on Radiocarbon Re-analysis, the wood identification of charcoal archived in the geological program of flow dating could also make a substantial contribution to paleoenvironmental reconstruction. Further, the organic materials from archeological excavations (archived and future) hold great potential for paleoenvironmental reconstruction, landscape change, and human modification of the landscape, and such materials should be included in any general paleoenvironmental research program.

PLACE NAME AND CULTURAL PLACE INVENTORY

Place name research is an absolutely necessary component of archeological investigation in Hawai‘i, and it is recommended that the HAVO archeological research program incorporate a focus on a detailed place name inventory. There are several hundred place names that can probably be compiled from existing archival data (maps, land documents, Boundary Commission testimonies, travel accounts, ethnographic collections, and so on) and many more that can certainly be obtained from discussions with cultural consultants today (see Langlas 2003a, 2003b for an example of modern ethnographic research).[78]

[78] The park had an opportunity in the 1930s to obtain such information from an earlier generation, but unfortunately chose not to take advantage of that (Emory, Cox et al.1959).

Such an inventory should include a "history" of each place name, including when and how it was first documented, subsequent appearances or uses, variations in spellings, any interpretations, and occurrence in traditions (see Tables 3, 4, and 5).

In addition, as a part of the place name research, an inventory of cultural places should also be carried out. Such places should be included as sites in the on-going development of an NRHP site inventory (see discussion in Section VI).

PATTERNS OF CULTURE, HISTORY, AND BEHAVIOR

The term "theoretical" is employed here in a general sense to refer to problems of interpretation of site patterning, analysis of behavior, and study of cultural change. These problems may be approached as individual research questions or as questions integrated into a larger research program (including site inventory).

SUBSISTENCE

Subsistence at HAVO has had significant attention due to the success in identifying horticultural field areas, but much more research should be conducted, including detailed reviews of subsistence remains from excavations, such as marine shell, bone, and pollen. Detailed artifact analysis is also a contributing study for this subject. Further, subsistence studies need to be carried much further than they usually are. They commonly end at simple quantification and perhaps a comparison of subsistence remains with known available resources. However, questions of variability, occupation events and duration, discard patterns, social patterns, catchment, distribution, social control of items, and many more dimensions of subsistence need to be addressed.

DEFINING TEMPORAL PERIODS

Segregating temporal periods of the archeological landscape needs to address patterns of change, not just the shift from pre-Contact to post-Contact periods. Patterns of change include change involving population increase; adaptation to lava flows; change associated with political dynamics and power centers; comparative architecture (early, pre-Contact, and post-Contact); changes due to post-Contact population decline; effects of changing economies (e.g., introduction of sweet potato; sandalwood and pulu collection, and goat herding).

VILLAGE AND HOUSEHOLD PATTERNING

Despite the ethnographic models, as well as some excavation that has focused on this research question, village and household patterning remains a poorly understood aspect of the archeological record. For example, one of the peculiarities of Hawaiian archeology is the lack of information about the location of imu (*ovens*) in village organization, despite the fact that this was a central feature of Hawaiian habitation and an essential component of Polynesian household organization in general. (In Ellis' early 19th century description of life in this region, ovens are mentioned numerous times—see e.g., Fig. 21b). Village patterning analysis can be addressed through extensive areal excavations to determine subsurface feature distribution.

BOUNDARIES

A question related to village patterning is one of boundaries in settlement; that is, the nature of the social and functional boundaries in settlements. This in part is a question of how a site is defined; when the effort is made to identify such boundaries in structure complexes, it is distance between structures, rather than function, that is more often than not used as the primary variable (see for example, Ladefoged et al. 1987).

The history of walls as barriers and as boundary markers is a boundary-related question that relates to the post-Contact period. The development of the pattern of wall construction needs to be investigated archeologically and by archival-historical records. The use of enclosing walls around individual houselots is mirrored in enclosing walls around whole village; how this pattern of wall-building diffused and on what time-line are important research questions.

The question of boundaries also needs to be addressed at higher levels of organization, including the identification of ahupuaʻa (and ʻili) boundaries. Most of the time, archeologists work with the assumption of static ahupuaʻa boundaries (practically speaking, those recorded on USGS maps, or on occasion recorded in Boundary Certificates and related testimony or other archival sources), but they seldom do anything to verify those boundaries or to consider the possibility of boundary creation and change. For the HAVO area, the question of changing district and ahupuaʻa boundaries has been raised, and this needs to be a significant research question.

PETROGLYPHS

Petroglyphs are a major feature of the lands of HAVO, and are associated with trails, ahupuaʻa boundaries, and ritual (see Appendix C, and section on Puʻuloa; also Glidden 1995, Lee 1998, Stasack and Stasack 2007). Completion of the inventory survey and recording of all petroglyph areas is recommended as the highest priority for future research. In many respects, the detailed information about these archeological remains might be more important for understanding the overall cultural history, ritual, and behavioral pattern of the HAVO region than nearly any other type of site.

This research should also include a continuing study of the detailed distribution patterns, not only of complexes, but of individual types of petroglyphs, including figure variation, pecked areas, and kōnane boards. Kōnane boards, for example, are often casually recorded as "recreation," but although these were gameboards, they also served other functions, as has been pointed out in Stasack and Stasack (2007). One function is noted in traditional references for augury and divining (Fornander 1916-20:VI:86; Nāmakaokeahi 2004: E 63). Further, their distribution is not coterminous with petroglyph fields in general. For example, there are no kōnane boards among the thousands of carved images at the Puʻuloa Petroglyph Field (Stasack and Stasack 2007).

THE ARCHEOLOGY OF PELE AND PĀʻAO

Hawaiian traditions tell of two major cultural changes, the coming of Pele and the coming of Pāʻao. The archeological question is how did these two events affect the archeological landscape. How and when did the temples for Pele develop and how did they change what existed before? Are there "archeological signatures" of attention to Pele or of local Pele cults in any of the settlements? Where did the priests and priestesses of Pele live?

The study of caves with the hypothesis of their use as ritual sites is related to the question of the influence of Pele cults on the archeology of the region.

For Pāʻao, there is the archeological record of Wahaʻula Heiau (complex though it is; it may also tell about Pele as well), but this is only one point in space and time. In what other ways, if any, did the arrival of Pāʻao change the archeological landscape—other temples and forms of temples, new rituals and related material culture, and of course, the great question, new DNA (i.e., the replacement of an older population with a new one that is archeologically identifiable in their physical remains)?[79]

THE ARCHEOLOGY OF MAUNA LOA

Finally, it can be argued that Mauna Loa is one of the most important cultural places in all of Hawaiʻi (as suggested above), and the fact that there are probable ritual sites on the mountain emphasizes the need for a detailed study of the upper region. Such a study should consider all the possible ranges of activities, from ritual and possible astronomical components, to that of the bird hunting (and possible relationships between these things). There is also the question of the features that relate to survival on the upper reaches of the mountain.

METHODOLOGICAL PROBLEMS

Methodological problems focus on chronological methods, diversity analysis (midden and artifacts), excavation sampling, and archeological "signatures" of behavior. In general, this is a poorly developed aspect of Hawaiian archeology, and any research conducted should include methodological questions.

Regarding problems of innovative dating methods, collaboration with volcano research scientists might be productive. Such collaboration might also be helpful in methodological questions related to site formation processes (including, for example, identification of earthquake and tsunami effects on sites).

Experimental archeological efforts should also be considered. Examples include studies of acid rain on exposed midden and experimental cultivation of sweet potato and other plants in the agricultural sites.

Finally, perhaps the methodological problem that might be considered of most immediate importance is the investigation of GIS to develop the best methods for the organization, structure, and manipulation of archeological data for purposes of archeological "site" management and archeological research. (The framework for this recommendation is discussed in Section VI.)

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[79] Archeologists are often uncertain about how to interpret Pāʻao in historical terms, but there are Hawaiian historians who have no difficulty reading the tradition of Pāʻao as a literal replacement of the earlier Hawaiian population, the menehune, by the conquerors from Kahiki (see e.g., Kane 1998, 2005).

APPENDIX A. SITES

This appendix consists of two tables generated out of the ASMIS data base.

Table A-1 is a listing of all known sites in HAVO, with a brief description and bibliographic reference. It also identifies sites that are in the GIS database, the HAVO ASMIS number (if any), and the ahupua‘a location based on Emory, Cox et al. (1959).

Table A-2 contains expanded information on selected sites from the ASMIS database (sites are marked with an asterisk in Table 1); only those sites in the database that have lengthy descriptions are included in this secondary table. The text in the last column (“Description”) is extracted nearly verbatim from the ASMIS database, except for minor editing.

Table A-1. Inventory of HAVO Archeological and (Selected) Cultural Sites (note: burial sites removed).

Site No.	Name/description (modified from HAVO records)	ASMIS Description (in CAPS: ARC DBF DESC)* (in parentheses, added information)	InArc GIS DB	Reference	Condition (not complete)	Park ID (ASMIS)	Ahupuaʻa
05501	ʻĀinapō Trail	Narrow, single-file, twisting, occasionally abraded trail over lava fields; above 11,600 foot elevation; leads up broad SE flank of Mauna Loa to and along E side of Mokuʻāweoweo*		NRHP form HAVO Dougherty 2004			Kahuku Kapāpala
05502	Kīlauea Crater	Summit of Kīlauea volcano has collapsed to form a broad, shallow caldera, within which is Kīlauea Crater; within Kīlauea Crater is Halemaʻumaʻu Crater*					Keauhou
05503	Puna-Kaʻū Historic District	The human occupation of the Puna/Ka'ū district , as nearly as can be determined, covers a span of nearly 600 years*	HAVO				multiple
05504	Mauna Loa Trail	Trail on lava that leads to the summit of Mauna Loa Volcano, with ahu	HAVO	Glidden and Rivoli 2000 Dougherty 2004			Kapāpala
05505	Footprints Area	* FOOTPRINT IMPRESSIONS, PETRO	x	Moniz Nakamura 2003a			Kapāpala
05506	Whitney Seismographic Vault	*		HAVO		B-29	Keauhou
05507	Wilkes' Campsite	*	x	NRHP form McCoy 1988 Dougherty 2004	HAVO-2003	M-69	Kapāpala
05508	Old Volcano House	Old Volcano House					Keauhou
19248	Catchment Dump Site 19270 (Acc 354)	Historic trash dump*	x	Keswick HVASR			Keauhou
19429	Ainahou Ranch House	Ainahou Ranch House (also possible location of Keauhou Goat Ranch and Pogue House)	x	Keswick HVASR	HAVO-2003-		Keauhou
19445	CCC Camp Foundations at Res Mgmt	*		Keswick HVASR			Keauhou
19446	1942 Ainahou Tank Foundation	1942 Ainahou tank foundation	x	Keswick HVASR			Keauhou
19447	Keauhou Landing	Complex of enclosures, walls, a rectangular cistern, walkways, stairs, and pahoehoe quarries, dating from late 1800s to the 1940s.*	x	Keswick HVASR			Keauhou
19448	Shed by Nene Pen and by 19446	3.15 x 3.83 m redwood storage shed, 3 m high	x	Keswick HVASR			Keauhou
19450	Lower Water Tank [Rusty Tank by Nene Pen: Excel]	Lower Water Tank	x	Keswick HVASR			Keauhou
19452	Ainahou Upp W. Tank #1	Ainahou Upper Water Tank #1	x	Keswick HVASR			Keauhou
19453	Ainahou Monster Tank	Ainahou Monster Tank	x	Keswick HVASR			Keauhou
19454	Ainahou Upp W. Tank #2	Ainahou Upper Water Tank #2	x	Keswick HVASR			Keauhou
19455	Steam Flats Dump 3900 (Acc. #356)	Historic trash dump*	x	Keswick HVASR			Keauhou
19456	Steam Crack Bath House	Historic structure	x	Keswick HVASR			Keauhou
19457	Ginger Patch Dump (Acc. #355)	Historic trash dump*	x	Keswick HVASR			Keauhou
19458	Headquarters' Crack Dump	Said to be the main dump site for the 1877 Volcano House and other buildings of the area*	x	Keswick HVASR			Keauhou
19459	CCC Water Tank Foundations	*	x	Keswick HVASR			Keauhou

Site No.	Name/description (modified from HAVO records)	ASMIS Description (in CAPS: ARC DBF DESC)* (in parentheses, added information)	InArc GIS DB	Reference	Condition (not complete)	Park ID (ASMIS)	Ahupuaʻa
19460	House site complex	Enclosures, platforms, caves, fishermans shelter, salt drying areas, filled cracks, ahu, ca 17,000 petroglyphs. Permanently Sealed		Spears 1995		HV-198 HV-212 HV-225 HV-375 HV-376	Pānau Iki
19461	Palm Tree Site, Paliuli	House site, pre-Contact, post-Contact*	x	Smart et al. 1965 Glidden 2006	dest. by lava	HV-189 (A-E) HV-190 (A-C)	Laeʻapuki Pānau Iki
19462	ʻAʻa site	Caves, enclosures, terraces, petroglyphs (Wall and platforms; Smart et al. 1965)	x	Smart et al. 1965 Glidden 2006	dest. by lava	HV-194	Laeʻapuki Pānau Iki
19463	Petroglyph Cave	Cave with petroglyphs and water collection*	x	Glidden 2006	dest. by lava	#360	Laeʻapuki Pānau Iki
19465	1930s Power Plant	Structure, historic	x	Keswick HVASR			
19466	Salt Drying Areas	Eleven salt drying area and 13 other features. Destroyed*	x	Morlock, L.			
19467	Enclosure, cave	Enclosure, wall (Long wall and structures; Smart et al. 1965)	x	Smart et al 1965 Glidden 2006	dest. by lava	HV-194	Laeʻapuki Pānau Iki
19468	Trail	Stepping stone trail that connects Sites 19462 and 19467 *		Emory, Cox et al.1959 Smart et al. 1965 Glidden 2006	dest. by lava	HV-194	Laeʻapuki Pānau Iki
19469	Ag. features and ahu	Petroglyphs, ahu, agricultural complex MANY PETROS AND AHU; PETROGLYPHS (Cairns; Smart et al. 1965)	x	Smart et al. 1965 Glidden 2006	dest. by lava	HV-188 (A-H)	Laeʻapuki Pānau Iki
19470	Ag. terraces	Mounds, terraces, petroglyphs MANY PETROGLYPHS (Cairns and terraces; agricultural strustures; Smart et al. 1965)	x	Smart et al. 1965 Glidden 2006	dest. by lava	HV-191	Laeʻapuki Pānau Iki
19471	House site	Enclosure ENCLOSURE (House site; Smart et al. 1965) Permanently Sealed	x	Smart et al. 1965 Glidden 2006	dest. by lava	HV-187	Laeʻapuki Pānau Iki
19472	House site w/ ag. features	Agricultural features; platform PLATFORM (Enclosure; Smart et al. 1965)	x	Smart et al. 1965 Glidden 2006	dest. by lava	HV-192	Laeʻapuki Pānau Iki
19473	Long J-shaped wall	Long wall		Smart et al. 1965 Glidden 2006	dest. by lava	HV-194	Laeʻapuki Pānau Iki
19474	Papalehau Cave	*		Waipa HVASR			
19475	Petroglyph Trail	13 petroglyphs along a worn trail MANY PETROGLYPHS (Enclosures; house site, shelter cave, petroglyph; Smart et al. 1965) [listed in Pānau Iki in ASMIS General) (HAVO-103 in ASMIS general, not located] Some permanently sealed?	x	Glidden 2006	dest. by lava		Laeʻapuki Pānau Iki

Site No.	Name/description (modified from HAVO records)	ASMIS Description (in CAPS: ARC DBF DESC)* (in parentheses, added information)	InArc GIS DB	Reference	Condition (not complete)	Park ID (ASMIS)	Ahupuaʻa
20414	C-shape and pavement	C-shape, papamu CSHP	x	Glidden 2006	dest. by lava	T101 T229	Laeʻapuki Pānau Iki
20415	C-shape	C-shape in a lava bubble SHELTER	x	Glidden 2006	dest. by lava	T103	Laeʻapuki Pānau Iki
20416	petroglyph	PETROGLYPH	x	Glidden 2006	dest. by lava	T104	Laeʻapuki Pānau Iki
20417	C-shape	C SHAPE, PITS	x	Glidden 2006	dest. by lava	T105	Laeʻapuki Pānau Iki
20418	petroglyphs	Four petroglyphs PETROGLYPHS	x	Glidden 2006	dest. by lava	T106+	Laeʻapuki Pānau Iki
20419	Cupboard; petroglyph	Cupboard and Petroglyph PETROGLYPH	x	Glidden 2006	dest. by lava	T108 T138	Laeʻapuki Pānau Iki
20420	Enclosure, J-shaped wall	Walls, enclosures L SHAPE, ENCLOSURE, TERRACES	x	Glidden 2006	dest. by lava	T109 T110	Laeʻapuki Pānau Iki
20421	Enclosure	Enclosure TERRACE, PETROS, C SHAPE	x	Glidden 2006	dest. by lava	T111	Laeʻapuki Pānau Iki
20422	C-shape, terrace, petroglyphs	C-shape, terrace, petroglyphs AHU	x	Glidden 2006	dest. by lava	T112+	Laeʻapuki Pānau Iki
20423	ahus	Ahu	x	Glidden 2006	dest. by lava	T113	Laeʻapuki Pānau Iki
20424	enclosures, petroglyph	Enclosure, petroglyh PETROGLYPH, +	x	Glidden 2006	dest. by lava	T119+	Laeʻapuki Pānau Iki
20425	C-shape	C-shape L SHP	x	Glidden 2006	dest. by lava	T122	Laeʻapuki Pānau Iki
20426	Mound	Mound CBL\BLDR MOUND	x	Glidden 2006	dest. by lava	T123	Laeʻapuki Pānau Iki
20427	C-shape	C-shape SHELTER	x	Glidden 2006	dest. by lava	T125	Laeʻapuki Pānau Iki
20428	Terrace, wall	Terrace WALLED STRCT	x	Glidden 2006	dest. by lava	T126 T128	Laeʻapuki Pānau Iki
20429	C-shape	C-shape	x	Glidden 2006	dest. by lava	T127	Laeʻapuki Pānau Iki
20430	Wall	L-shape L SHP	x	Glidden 2006		T131	Laeʻapuki Pānau Iki
20431	C-shape	C-shapes C SHAPE	x	Glidden 2006		T132	Laeʻapuki Pānau Iki
20432	cave	Cave CAVE	x	Glidden 2006		T133	Laeʻapuki Pānau Iki
20433	Terrace, enclosure	Terrace, enclosure TERRACE	x	Glidden 2006		T134 T135	Laeʻapuki Pānau Iki
20434	T143 and T144a,b,c petroglyphs	Four petroglyphs PETROGLYPHS	x	Glidden 2006	partially dest. by lava	T143	Laeʻapuki Pānau Iki
20436	Agricultural complex	Agricultural mounds and related features MANY AG MOUNDS	x	Glidden 2006	dest. by lava	T102+	Laeʻapuki Pānau Iki

Site No.	Name/description (modified from HAVO records)	ASMIS Description (in CAPS: ARC DBF DESC)* (in parentheses, added information)	InArc GIS DB	Reference	Condition (not complete)	Park ID (ASMIS)	Ahupuaʻa
20439	Filled cracks, mounds	Filled cracks, mounds		Glidden 2006		T375-T380	Laeʻapuki Pānau Iki
20440	Filled cracks, mounds	Filled cracks, mounds		Glidden 2006	partially dest. by lava	T381+	Laeʻapuki Pānau Iki
20441	Filled cracks, mounds	Filled cracks, mounds		Glidden 2006	dest. by lava	T383+	Laeʻapuki Pānau Iki
20443	Kalapana Trail	Trail illustrated on 1912 Territorial survey map as extending east/southeast from Keauhou Ranch Road to the Puna coastline* MOUNDS, BENCHMARK +	x	Emory, Cox et al.1959 Glidden 2006 Dougherty et al. 2004b Kirkendahl 1993a		B-33	Laeʻapuki Pānau Iki
20750	Petroglyph Cave	(Shelter cave, petroglyphs; Smart et al. 1965)	x	Smart et al. 1965 Stasack		HV-076	Keauhou
20874	Lava Plastered Cone Trail	Trail	x	Waipa HVASR	HAVO-2002-		
20875	Hot Cave Trail			Waipa HVASR			
21146	Enclosure	Very large enclosure*		Smart et al. 1965 Keswick HVASR		HV-196	Laeʻapuki (Pānau Nui)
21215	Pulu Factory	Mid-late 1800s, timbers and walls*		Glidden 1998 Glidden and Rivoli 2000		HV-377	Pānau Nui
21230	Jim's Pen complex	Jim's Pen complex by Keʻāmoku Flow		Keswick HVASR			
21276	Rainshed Crack Dump	Historic dump in large volcanic crack, approx. 10 x 200 m; 1877 Volcano House (current Volcano Art Center) located about 100 m to SE	x	Keswick HVASR			Keauhou
21316	Coastal Trail through SDA (19,466)	Coastal trail*		Abrams, S.?			
21353	Namakani Paio Crack Dump	Historic dump in a geological crack; just W of cabin # 1 in the Namakani Paio Campground	x	Keswick HVASR			Keauhou
21676	Terrace (Fea. 10)			Glidden et al. 1998			Pānau Nui
21677	C-shape (Fea. 55)	C-SHAPE	x	Glidden et al. 1998			Pānau Nui
21678	Cave (Fea. 61)	Cave with midden* CAVE	x	Glidden et al. 1998			Pānau Nui
21680	Cave (Fea. 86)	North-south oriented cave; relatively small; interior contains rock mound, with octopus lure, sea urchin spine and kukui nut shell fragments CAVE	x	Glidden et al. 1998			Pānau Nui
21681	Terrace	TERRACE	x	Glidden et al. 1998		Feature 180	Pānau Nui
21682	Caves	Cave with north section that ends in a natural pahoehoe plug; kukui nut fragments in cave CAVES	x	Glidden et al. 1998		Feature 246? (Fea. 256a, 256b)	Pānau Nui
21684	Cave (Fea. 283)	Cave contains goat bones, kukui nut fragments, sea urchin spines, shell midden, large chunks of charcoal; 80 m long, narrow with low ceiling CAVE	x	Glidden et al. 1998			Pānau Nui
21685	Alignment (Fea. 348b)	Alignment		Glidden et al. 1998			Pānau Nui
21686	Cave (Fea. 396)	CAVE	x	Glidden et al. 1998			Pānau Nui

Site No.	Name/description (modified from HAVO records)	ASMIS Description (in CAPS: ARC DBF DESC)* (in parentheses, added information)	InArc GIS DB	Reference	Condition (not complete)	Park ID (ASMIS)	Ahupua‘a
21687	Walls (Fea. 413a and b)	WALL	x	Glidden et al. 1998			Pānau Nui
21688	Cave (Fea. 445)	CAVE	x	Glidden et al. 1998			Pānau Nui
21689	Cave (Fea. 481)	CAVE	x	Glidden et al. 1998			Pānau Nui
21690	C-shape (Fea. 504)	* MOUND	x	Glidden et al. 1998			Pānau Nui
21691			x				Pānau Nui
21692	Cave (Fea. 514)	Entrance consists of a skylight with an approx. depth of 3 m, with weak pahoehoe edges; needs to be revisited with rappeling equipment in order to access it. CAVE	x	Glidden et al. 1998			Pānau Nui
21693	Cave (Fea 554)			Glidden et al. 1998			Pānau Nui
21694	Cave (Fea. 525)	3.6 m x 0.5 m stepping stone trail constructed of 4 pahoehoe slabs placed over the aa lava and running in northeast-southwest direction TRAIL	x	Glidden et al. 1998			Pānau Nui
21695	Trail (Fea. 584a and b) from Excel CAVE	10 x 0.5 m stepping stone trail constructed of 10 pahoehoe slabs placed over the aa lava and running in north-south direction. TRAIL	x	Glidden et al. 1998			Pānau Nui
21696	Hearth (Fea. 620)	Hearth	x	Glidden et al. 1998			Pānau Nui
21697	Ki Cave (Fea. 638)	Entrance is a collapsed skylight; cultural material includes large opihi shell, petrogylphs, wood fragments, and charcoal; rock mounds and petroglyphs outside of the cave CAVE	x	Glidden et al. 1998			Pānau Nui
21698	Ag. Area (Fea.#1-652)	Agricultural complex* MOUND, PITS, TRAILS, CAVES, ETC	x	Glidden et al. 1998 Dougherty et al. 2004a Dougherty et al. 2004b		B-23	Pānau Nui
21699	Cave (Fea. 1)	Shelter cave with some cultural material* CAVE	x	Glidden et al. 1998		Feature 1	Pānau Nui
21700	Trail (Fea. 2)	Trail* TRAIL, TRAIL CAIRNS	x	Glidden et al. 1998 Dougherty et al. 2004a Dougherty et al. 2004b	HAVO-2002-	L-187	Pānau Nui
21701	C-shape (Fea. 4)	C-SHAPE	x	Glidden et al. 1998			Pānau Nui
21702	Cave (Fea. 12)	Cave with cultural material* ROCK SHELTER	x	Glidden et al. 1998		HAVO-2003-L-318	Pānau Nui
21703	Platform (Fea. 37)	PLATFORM	x	Glidden et al. 1998	HAVO-2005-		Pānau Nui
21704	Cave (Fea. 38)	ROCK SHELTER	x	Glidden et al. 1998 Dougherty et al. 2004a		L-249	Pānau Nui
21705	Petroglyphs (Fea. 49)	PETROGLYPH	x	Glidden et al. 1998		49	Pānau Nui
21706	Trail (Fea. 52)	TRAIL	x	Glidden et al. 1998		52	Pānau Nui
21707	Cave (Fea. 53)	Petroglyph cave*	x	Glidden et al. 1998 Dougherty et al. 2004a	HAVO-2003-	L-319	Pānau Nui

HAVO-2003-

Site No.	Name/description (modified from HAVO records)	ASMIS Description (in CAPS: ARC DBF DESC)* (in parentheses, added information)	InArc GIS DB	Reference	Condition (not complete)	Park ID (ASMIS)	Ahupuaʻa
21708	Wall (Fea. 59)	WALL	x	Glidden et al. 1998		59	Pānau Nui
21709	Ahu (Fea. 87)	AHU	x	Glidden et al. 1998		87	Pānau Nui
21710	Platform (Fea. 88)	platform* PLATFORM	x	Glidden et al. 1998 Dougherty et al. 2004a		L-330	Pānau Nui
21711	C-shape (Fea. 89)	C-SHAPE	x	Glidden et al. 1998		89	Pānau Nui
21712	Cave (Fea. 90)	CAVE	x	Glidden et al. 1998		90	Pānau Nui
21713	Trail (Fea. 105)	Trail?		Glidden et al. 1998	HAVO-2003-		Pānau Nui
21714	Petroglyphs (Fea. 108)	PETROGLYPH	x	Glidden et al. 1998			Pānau Nui
21715	Cave (Fea. 109)	PETROGLYPHS, SHELTER, CAVES	x	Glidden et al. 1998			Pānau Nui
21716	Cave (Fea. 110)	ROCK SHELTER	x	Glidden et al. 1998 Dougherty et al. 2004a		L-256	Pānau Nui
21717	Cave (Fea. 120)	CAVE	x	Glidden et al. 1998		120	Pānau Nui
21718	Terrace (Fea. 121)	TERRACE	x	Glidden et al. 1998		121	Pānau Nui
21719	Cave (Fea. 122)	CAVE	x	Glidden et al. 1998		122	Pānau Nui
21720	Platform (Fea. 123)	PLATFORM	x	Glidden et al. 1998		123	Pānau Nui
21721	Enclosure (Fea. 130)	Enclosure* ENCLOSURE	x	Glidden et al. 1998 Dougherty et al. 2004a	HAVO-2003-	L-384	Pānau Nui
21722	Cave (Fea. 143)	ROCK SHELTER	x	Glidden et al. 1998 Dougherty et al. 2004a		L-334	Pānau Nui
21723	C-shapes (Fea. 56 and 57)	C-SHAPES	x	Glidden et al. 1998		56 and 57	Pānau Nui
21724	Petroglyphs (Fea. 6 and 144)	PETROGLYPHS	x	Glidden et al. 1998	HAVO-2003-		Pānau Nui
21725	Terrace (Fea. 103) and C-shape (Fea. 104)	TERRACE	x	Glidden et al. 1998		Feature 103 and 104	Pānau Nui
21726	Terraces (Fea. 125 and 1260	TERRACES	x	Glidden et al. 1998	HAVO-2003-	Feature 125 and 126	Pānau Nui
21727	Wall (Fea. 13) and Terrace (Fea. 14)	Habitation complex with 7 features (terraces, platforms, and petroglyphs) ENCLOSURE, PLATFORMS, PETROS	x	Glidden et al. 1998 Dougherty et al. 2004a			Pānau Nui
21728	Enclosure (Fea. 40), Terrace (41), Cave (15)	Habitation complex* WALL, PLATFORMS, MOUNDS	x	Glidden et al. 1998 Dougherty et al. 2004a		L-326	Pānau Nui
21729	Petroglyphs (Fea. 7,8,10,11) and Ahu	PETROGLYPHS	x	Glidden et al. 1998			Pānau Nui
21730	Cave (Fea. 98) Terraced Platforms (Fea. 99 and 100), Mound (101)	Habitation complex* CAVE, PLATFORMS, C-SHAPES	x	Glidden et al. 1998 Dougherty et al. 2004a	HAVO-2003-		Pānau Nui
21731	C-shapes, Caves, Terraces	C-SHAPE, TERRACE, CAVE	x	Glidden et al. 1998			Pānau Nui
21732	Petroglyphs and Terraces	PETROGLYPHS, TERRACES	x	Glidden et al. 1998			Pānau Nui
21733	Wall, Platform, Terrace, Enclosure, Cistern	Habitation complex* CISTERN, TERRACES, PLATFORMS	x	Glidden et al. 1998 Dougherty et al. 2004a		L-385	Pānau Nui
21734	Enclosures, Cave, Terraces, Platform and Petroglyphs	Habitation complex (enclosures, platforms, terraces, caves, and petroglyphs) ENCLOSURE, TERRACES. PETROGLYPH (96), CAVES, PETROGLYPHS	x	Glidden et al. 1998 Dougherty et al. 2004a	HAVO-2003-		Pānau Nui

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21735	Enclosures, Cave, Terraces, L-shape, and Papamu	Habitation complex* TERRACE, CAVE, ENCLOSURE, PETROGLYPH (118)	x	Glidden et al. 1998 Dougherty et al. 2004a			Pānau Nui
21736	Enclosures, Terraces, Platforms, Ahu, L-shapes, Petroglyph	TERRACES, AHU, ENCLOSURES	x	Glidden et al. 1998			Pānau Nui
21737	Caves, Papamu, Enclosures, Terraced platforms, wall, Petroglyphs, C-shapes, Hearth	Habitation complex, with largest concentration of habitation features recorded during Glidden 1998 survey.* TERRACE, CAVES, PLATFORMS, PETROGLYPHS AND KONANE, PETROGLYPHS	x	Glidden et al. 1998 Dougherty et al. 2004a			Pānau Nui
21751	Ainahou Ranch Cave System	Complex tube with 23 known entrances; as of 1994 is the longest surveyed cave within HAVO, with many cultural features* CAVE (Shelter cave, petroglyphs; Smart et al. 1965)	x	Smart et al. 1965 Dougherty et al. 2004a		HV-185	Keauhou
22487	CCC features on Hilina Pali Rd. (LCS#101791)	Historic site* ROCK MOUND, QUARRIES, WALLS, PETROGLYPH (D-55)	x	Wulzen 1999 Roper 2005		000	Kapāpala
22726	Fishermen's Cave	Cave (Shelter cave; Smart et al. 1965)	x	Smart et al. 1965 Ladefoged et al.1987 Waipa, J./Laqua, T.		HV-228 (Site 911)	Kapāpala
22738	Keauhou Trail Cave	Cave	x		HAVO00276.		
22973	C-shapes in Footprints area	20 features*	x	Moniz Nakamura 2003a		(Fea. 1-14)	Kapāpala
22974	Shelter and volcanic glass quarry in Footprints area.	Shelter and volcanic glass quarry*	x	Moniz Nakamura 2003a			Kapāpala
22975	Shelters and volcanic glass quarry in Footprints area	*	x	Moniz Nakamura 2003a			Kapāpala
22976	Shelters and volcanic glass quarry in Footprints area.	*	x	Moniz Nakamura 2003a		18	Kapāpala
22977	Shelters, petroglyphs, and volcanic glass quarry in Footprints area.	*	x	Moniz Nakamura 2003a		24	Kapāpala
22978	Structures in Footprints area.	May be functionally associated with the Kaʻū - Volcano Trail (Site 22982) but are not spatially associated.*	x	Moniz Nakamura 2003a		26	Kapāpala
22979	Structures, volcanic glass quarry in Footprints area,	High density of features (8 enclosures, 6 overhangs, 5 C-shapes, 5 U-shapes, 3 mounds, 3 walls, 1 volcanic glass quarry) along edge of the Keʻāmoku flow; site is approximately 70 m south of the Keʻāmoku Cross Trail (Site 23033)*	x	Moniz Nakamura 2003a		31	Kapāpala
22980	Structures in Footprints area	Structures associated with two trails*	x	Moniz Nakamura 2003a		52	Kapāpala
22981	Structures in Footprints area	Dense cluster*	x	Moniz Nakamura 2003a		63	Kapāpala
22982	Structures and trails in Footprints area	*	x	Moniz Nakamura 2003a		(Fea. 53, 69, 98-111, 112, 116, etc)	Kapāpala

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22983	Cave in Footprints area	*	x	Moniz Nakamura 2003a		98-624	Kapāpala
22984	Structures in Footprints area	*	x	Moniz Nakamura 2003a		78	Kapāpala
22985	Structures in Footprints area	*	x	Moniz Nakamura 2003a		85	Kapāpala
22986	Overhangs in Footprints area	*	x	Moniz Nakamura 2003a		96	Kapāpala
22987	Structures in Footprints area	* Largest site in the area, with 47 structures	x	Moniz Nakamura 2003a		101	Kapāpala
22988	Structures in Footprints area	* C SHAPES	x	Moniz Nakamura 2003a			Kapāpala
22989	Cave in Footprints area	*	x	Moniz Nakamura 2003a		152	Kapāpala
22990	Cave in Footprints area	*	x	Moniz Nakamura 2003a		155	Kapāpala
22991	Cave in Footprints area	*	x	Moniz Nakamura 2003a		154	Kapāpala
22992	Structures in Footprints area	*	x	Moniz Nakamura 2003a		153	Kapāpala
22993	Structures in Footprints area	* C SHAPES, ENCLOSURES, ETC.	x	Moniz Nakamura 2003a		164	Kapāpala
22994	Structures in Footprints area	*	x	Moniz Nakamura 2003a		190	Kapāpala
22995	Structures in Footprints area	*	x	Moniz Nakamura 2003a		202	Kapāpala
22996	Structures in Footprints area	48 features, most built on Keʻāmoku flow*	x	Moniz Nakamura 2003a		212	Kapāpala
22997	Peter Lee Road in Footprints area	Road built for the Punaluʻu hotel owned by Peter Lee and for visitors staying at Volcano House; the first official road built in this area, completed in 1891*	x	Moniz Nakamura 2003a		Peter Lee Road	Kapāpala
22998	Structures in Footprints area	16 features (10 C-shapes, 3 walls, 1 terrace, 1 modified overhang, 1 enclosure), built primarily on the Keʻāmoku flow* C SHAPES, ENCLOSURES	x	Moniz Nakamura 2003a		254	Kapāpala
22999	Structures in Footprints area	three features (C-shape, terrace, possible cupboard)	x	Moniz Nakamura 2003a		264	Kapāpala
23000	Structures, lithic workshop in Footprints area	* C SHAPE, ENCLOSURES, CAIRNS (A), 10-19	x	Moniz Nakamura 2003a		269	Kapāpala
23001	Structures in Footprints area	* C SHAPE, ENCLOSURES NEAR 117	x	Moniz Nakamura 2003a			Kapāpala
23002	Structures in Footprints area	11 features (6 C-shapes, 4 walls, 1 enclosure) C SHAPE, WALLS, ENCLOSURES	x	Moniz Nakamura 2003a			Kapāpala
23003	Structures in Footprints area	in the Kaʻū Desert area* SURVEY MONUMENT, WALLS	x	Moniz Nakamura 2003a			Kapāpala
23004	Structures in Footprints area	4 features (enclosure, wall, two C-shapes); in close association with Kaʻū-Volcano Trail (Site 22982) C SHAPES, 11-24	x	Moniz Nakamura 2003a			Kapāpala
23005	Structures in Footprints area	Structures along the Peter Lee Road* N OF 77C	x	Moniz Nakamura 2003a			Kapāpala
23006	Big ʻŌhiʻa Cave, in Footprints area	* BIG ʻŌHIʻA CAVE	x	Withrow 1987 Moniz Nakamura 2003a		Feature 98-32	Kapāpala
23007	Structures, lithic workshops in Footprints area	Lithic workshops may be the outer extent of a large cluster of lithic block quarries identified in 2001 and surveyed in 2002* LITHIC WORKSHOPS	x	Moniz Nakamura 2003a			Kapāpala
23008	Cave in Footprints area	* BY CRATER RIM RD, LIKE BIG ŌHIA CAVE	x	Moniz Nakamura 2003a			Kapāpala

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23009	Cave in Footprints area	* BY HWY 11	x	Moniz Nakamura 2003a			Kapāpala
23010	Volcanic glass quarry in Footprints area	Located next to Mauna Iki Trail CG BY MAUNA IKI TRAIL, 5-24	x	Moniz Nakamura 2003a			Kapāpala
23011	Structures in Footprints area	Four features (C-shape, mound, wall, enclosure) C-SHAPES, ENCLOSURES	x	Moniz Nakamura 2003a			Kapāpala
23012	Volcanic glass quarry in Footprints area	Four features (2 volcanic glass quarries, enclosure, wall); just east of Footprints interpretive trail ENCLOSURES. 10-20	x	Moniz Nakamura 2003a			Kapāpala
23013	Structures in Footprints area	Seven features (4 enclosures, C-shape, terrace); located along and just SW of Footprints interpretive trail. Shrine. C SHAPE, ENCLOSURES	x	Moniz Nakamura 2003a			Kapāpala
23014	Volcanic glass quarry in Footprints area	Single volcanic glass quarry located very close to existing Footprints Shelter		Moniz Nakamura 2003a			Kapāpala
23015	Structures, petroglyphs in Footprints area	Pre-Contact and post-Contact* WALLS, C-SHAPES, ALIGNMENTS, MOUNDS, HISTORIC LETTERS, 11-16; CORRALS	x	Moniz Nakamura 2003a			Kapāpala
23016	Structures in Footprints area	12 features (1 wall, 4 enclosures, 5 volcanic glass quarries, 2 C-shapes); located SSW of Site 23015 near the Ka‘ū-Volcano Trail (Site 22982) 4 ENCLOSURES 10-06; CG QUARRY, 10-06	x	Moniz Nakamura 2003a			Kapāpala
23017	Volcanic glass quarry in Footprints area	11 features (8 volcanic glass quarries, 2 enclosures, 1 terrace); located SE of Site 23015 at base of the Ke‘āmoku lava flow	x	Moniz Nakamura 2003a			Kapāpala
23019	Footprints		x	Moniz Nakamura 2003a			Kapāpala
23020	Structures in Footprints area	Two wall features near the Ka‘ū-Volcano Trail (Site 22982) ENCLOSURE, 10-06		Moniz Nakamura 2003a			Kapāpala
23021	Trail in Footprints area	Section of Old Puna-Ka‘ū Trail* B ON AA 315, 10-14	x	Moniz Nakamura 2003a			Kapāpala
23022	Structures, volcanic glass quarry in Footprints area	* ENCLOSURE, 10-07	x	Moniz Nakamura 2003a			Kapāpala
23023	Footprints		x	Moniz Nakamura 2003a			Kapāpala
23024	Footprints	1868 TUBE, 10-14	x	Moniz Nakamura 2003a			Kapāpala
23025	Footrpints						Kapāpala
23026	Enclosure	290 x 310 cm enclosure, 80 cm high; constructed with pahoehoe cobbles and small boulders stacked 2 courses high	x	Roper 2005		HAVO-2005-D-121	Kapāpala
23027	Cairns, C-shape, quarry	Cairns, C-shape, quarry, etc.	x	Roper 2005		HAVO-2005-D-127	Kapāpala
23028	Hilina Pali Road	Portions of old Hilina Pali Road; plus CCC OLD ROADS; PLUS NON-CCC TRAIL, TRAIL, ROCK PILE,	x	Roper 2005		HAVO-2005-D-138	Kapāpala
23029	Footprints (Enclosure 11-23)	?					Kapāpala

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23030	Trail and features	Trail fragments, ahu, etc	x	Roper 2005		HAVO-2005-D-140	
23031	Rock pile	*	x	Roper 2005		HAVO-2005-D-153	
23032	Halfway House Trail, in Footprints area	Trail segments leading to Ka‘ū Halfway House (rest station for visitors traveling from Hilo to Ka‘ū in late 19th, early 20th centuries)* CAIRN		Moniz Nakamura 2003a		98-472	Kapāpala
23033	Ke‘āmoku Cross Trail, in Footprints area	Trail across the Ke‘āmoku flow just south of the beginning of the largest concentration of structures along the lava flow*	x	Moniz Nakamura 2003a			Kapāpala
23034	Kau Road, in Footprints area	Road built by the Territory of Hawai‘i, paralleled much of the then existing Peter Lee Road (Site 22997)*		Moniz Nakamura 2003a		75	Kapāpala
23035	Footprints	2 feas: Pu‘u Ohale survey		Moniz Nakamura 2003a			Kapāpala
23049	Crater Rim Road Wall	Wall heads in an E-W direction with the west and possibly east ends disrupted by the Crater Rim Road.*	x	Waipa, J.			
23269	Kahue Coastal Features	Mounds, enclosures, petroglyphs, historic artifacts	x	Waipa, J.		#2	Kahue
23270	Kealakomo Coastal Features	Habitation complex*	x	Waipa, J.			Kealakomo
23271	Pu‘uloa Petroglyph Field	*		Smart et al. 1965 Emory 1965, in Smart et al. 1965 Lee and Stasack 1999 Schuster, L.		HV-225	Pānau Nui
23275	Keanakāko‘i Crack Dump	*	x	Waipa, Schuster			Keauhou
23314	‘Āinahou Road/Keauhou Trail	This site consists of both the Keauhou Trail and the ‘Āinahou Road. These features were lumped together as a single site due to the fact that the ‘Āinahou Road used to be a section of the Keauhou Trail*		Waipa, J.			Keauhou
23315	‘Āpua Point	Habitation complex* (House sites; Smart et al. 1965)	x	Smart et al. 1965 Waipa, J.		HV-045	‘Āpua
23316	‘Āpua Point	Enclosure* (Enclosure; Smart et al. 1965)	x	Smart et al. 1965 Waipa, J.		HV-046	‘Āpua
23317	‘Āpua Point Spring	* (Spring; Smart et al. 1965)	x	Smart et al. 1965 Waipa, J.		HV-050	‘Āpua
23362	Pepeiau Shelter Cabin	Park cabin, probably 1930s*	x	Waipa, J.			
23363	Platform and shelters, shrine?	* (Platform and shelters; Smart et al. 1965)	x	Smart et al. 1965 Waipa, J.		HV-047	‘Āpua
23399	Hilina Pali Road	Date?*	x	Schuster, L.			Kapāpala
23400	Road marker with benchmark		x	Schuster, L.			
23401	Bore Hole for Steam experiments			Schuster, L.			
23402	Byron Ledge Lithic Scatter	Lithic scatter	x	Schuster, L.			Keauhou
23403	1924 Landing Field	Military landing field	x	Durst/Moniz Nakamura 2002			Kapāpala

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23645	Kupukupu Water Cave			Moniz Nakamura 2002b Dougherty et al. 2004b		B-426	Pānau Nui
23646	Agricultural complex	* ROCK PILES, PITS, PETROGLYPH; EXCAV PITS	x	Moniz Nakamura 2002b Dougherty et al. 2004b		B-143	Pānau Iki
23647	Lithic Block Quarry Features	Site consist of 277 individual quarry locales*	x	Thompson/Roper 2002 Moniz Nakamura 2006			
23794	Highway 11 Chute Dump	Historic dump site	x	Waipa, J.	~~HAVO-2002-~~		
23795	CCC Incinerator		x	Waipa, J.			
23796	Salt Drying Area	Rock alignments	x	Schuster, L.	~~HAVO-2002-~~		
23797	Kapāpala /Keauhou Rock Wall	Rock wall	x	Waipa, J.			Kapāpala Keauhou
23975	Kupukupu Feature KA1	Rock pile.*	x	Maxey/Schuster 2003 Dougherty et al. 2004b		F-01	Pānau Nui
23976	Kupukupu Features KB1-3	Rock shelter, wall, excavated pit	x	Maxey/Schuster 2003		HAVO 2003 F-02	Pānau Nui
23977	Kupukupu Features KC2-8	Excavated pits, rock piles	x	Maxey/Schuster 2003		HAVO 2003 F-05	Pānau Nui
23978	Kupukupu Features KD1-5	Excavated pits, rock piles	x	Maxey/Schuster 2003	~~HAVO-2003-~~	HAVO 2003 F-12	Pānau Nui
23979	Kupukupu Features KE1-5	Rock walls, caves,mounds	x	Maxey/Schuster 2003		HAVO 2003 F-17	Pānau Nui
23980	Kupukupu Features KF1-4	Excavated pits and mounds	x	Maxey/Schuster 2003		HAVO 2003 F-22	Pānau Nui
23981	Kupukupu Features KG1-3,6-8	Excavated pits, walls	x	Maxey/Schuster 2003		HAVO 2003 F-26	Pānau Nui
23982	Kupukupu Features KH1-4	Enclosure, excavated pits, walls	x	Maxey/Schuster 2003		HAVO 2003 F-32	Pānau Nui
23983	Kupukupu Features KI1-4	Rock shelter, pits	x	Maxey/Schuster 2003		HAVO 2003 F-36	Pānau Nui
23984	Kupukupu Features KK1-8	Excavated pits, walls, mounds, rock shelters	x	Maxey/Schuster 2003			Pānau Nui
23985	Kupukupu Features KL1A-C	Excavated pits, mounds	x	Maxey/Schuster 2003		HAVO 2003 F-47	Pānau Nui
23987	Kupukupu Features KN1-2	Pits, rock sheleter	x	Maxey/Schuster 2003		HAVO 2003 F-57	Pānau Nui
23988	Kupukupu Features KO1-2	Rock shelters, two	x	Maxey/Schuster 2003		HAVO 2003 F-59	Pānau Nui
23989	Kupukupu Features KP1-2	Pits	x	Maxey/Schuster 2003		HAVO 2003 F-61	Pānau Nui
23990	Kupukupu Feature KQ1	Pit	x	Maxey/Schuster 2003		HAVO 2003 F-63	Pānau Nui
24007	Kupukupu Ag complex	Agricultural complex* MOUNDS	x	Dougherty et al. 2004b		HAVO-2002-B-47	Pānau Nui
24008	Kupukupu rock shelter	ROCK SHELTER	x	Dougherty et al. 2004b			Pānau Nui
24009	Kupukupu cave	CAVE, PLATFORM	x	Dougherty et al. 2004b			Pānau Nui

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24010	Kupukupu trail		x	Dougherty et al. 2004b			Pānau Iki
24012	Kupukupu	ROCK SHELTER	x	Dougherty et al. 2004b			Pānau Nui
24013	Kupukupu	MOUNDS. ENCLOSURE	x	Dougherty et al. 2004b		HAVO-2002-B-541	Pānau Iki
24014	Kupukupu	PLATFORM	x	Dougherty et al. 2004b			Pānau Iki
24015	Kupukupu	ROCK SHELTER	x	Dougherty et al. 2004b			Pānau Nui
24016	Kupukupu	ROCK SHELTER	x	Dougherty et al. 2004b			Pānau Nui
24017	Kupukupu platform	* PLATFORM	x	Dougherty et al. 2004b			Pānau Nui
24018	Complex	COMPLEX	x	Dougherty et al. 2004b			Pānau Nui
24076	Habitation complex	Habitation complex TERRACE, ENCLOSURES	x	Dougherty et al. 2004a		HAVO-2003-L-1	
24077	TERRACE	TERRACE	x	Dougherty et al. 2004a		HAVO-2003-L-19	
24078	ENCLOSURE	ENCLOSURE	x	Dougherty et al. 2004a		HAVO-2003-L-48	
24079	TERRACE, C-SHAPE	TERRACE, C-SHAPE	x	Dougherty et al. 2004a		HAVO-2003-L-59	
24080	CAVE	CAVE	x	Dougherty et al. 2004a		HAVO-2003-L-64	
24082	ENCLOSURE	ENCLOSURE	x	Dougherty et al. 2004a		HAVO-2003-L-84	
24083	ROCK SHELTER	ROCK SHELTER	x	Dougherty et al. 2004a		HAVO-2003-L-93	
24084	ROCK SHELTER	ROCK SHELTER	x	Dougherty et al. 2004a		HAVO-2003-L-94	
24085	ROCK SHELTER	ROCK SHELTER	x	Dougherty et al. 2004a		HAVO-2003-L-117	
24086	ENCLOSURE	ENCLOSURE	x	Dougherty et al. 2004a		HAVO-2003-L-123	
24087	PETROGLYPH	PETROGLYPH	x	Dougherty et al. 2004a		HAVO-2003-L-138	
24088	Rock wall	Rock wall		Dougherty et al. 2004a		HAV0-2003-L-169	
24090	Platform	Platform		Dougherty et al. 2004a		HAVO-2003-L-213	
24091	Platform	Platform		Dougherty et al. 2004a		HAVO-2003-L-226	
24092	PETROGLYPH	PETROGLYPH	x	Dougherty et al. 2004a		HAVO-2003-L-270	
24093	ENCLOSURE	ENCLOSURE	x	Dougherty et al. 2004a			
24094	Agricultural complex	Large agricultural complex* ROCK PILES, TERRACES, PITS	x	Dougherty et al. 2004a		HAVO-2003-L-5	

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24121	Kahuku-‘Āinapō Trail	Segment of an “old trail system” used in historic times for driving cattle between various cattle ranching operations associated with Parker Ranch (ca. 1912-1947); located in Kahuku Management Unit*		Quiseng 2006 Waipa, J.			Kahuku
24335	Historic Trail-side Complex	Complex with C-shapes, rock shelters, wall, trail (77 m); temporary habitation	x	Dougherty 2004		HAVO-2003-	Kapāpala
24336	Complex	Excavated pits, bird nesting	x	Dougherty 2004		HAVO-2003-	Kapāpala
24337	EXCAVATED PITs	Excavated pits, bird nesting	x	Dougherty 2004		HAVO-2003-	Kapāpala
24338		Cluster of excavated pits utilized by dark-rumped petrel for nesting	x	Dougherty 2004		HAVO-2002-	Kapāpala
24339	EXCAVATED PITs	Three excavated pits, three quarries, one rock pile Quarries, mounds, pits; Bird nesting pits	x	Dougherty 2004		HAVO-2003-	Kapāpala
24340	Excavated pits, quarry	Quarries, mounds, pits	x	Dougherty 2004		HAVO-2003-	Kapāpala
24341	Excavated pits	Excavated pits, bird nesting	x	Dougherty 2004		HAVO-2003-	Kapāpala
24342	Excavated pits	Excavated pits, bird nesting	x	Dougherty 2004		HAVO-2003-	Kapāpala
24343	Excavated pits	Excavated pits, bird nesting	x	Dougherty 2004		HAVO-2003-M-66	Kapāpala
24344	Excavated pits	Excavated pits, bird nesting	x	Dougherty 2004		HAVO-2003-M-27	Kapāpala
24345	Excavated pits ROCK PILE (AHU)	Excavated pits, bird nesting ROCK PILE (AHU)	x	Dougherty 2004		HAVO-2003-M-26	Kapāpala
24346	Jagger’s Cave, Rock shelter	Rock shelter	x	Dougherty 2004		HAVO-2003-M-81	Kapāpala
24347	ENCLOSURES	ENCLOSURES	x	Dougherty 2004		HAVO-2003-	Kapāpala
24348	Bates Camp? Campsite	Campsite; 1915?		Dougherty 2004		HAVO-2003-M-82	Kapāpala
24349	Sawkins Camp	Cave, 1851	x	Dougherty 2004		HAVO-2003-M-83	Kapāpala
24355	TRAIL	TRAIL	x				
24356	EXCAVATED PIT	EXCAVATED PIT	x				
24523	Petroglyph	Historic petroglyphs consisting of initials “JM,” “ECH,” and “HML;” also “CCC Camp” PETROGLYPH	x	Roper 2005			
24524	Shelter	Overhang/rock shelter formed in the natural pāhoehoe flow; in interior is a table constructed from a large pāhoehoe slab (approx. 1 x 1.5 m); two CCC petroglyphs nearby ROCK SHELTER	x	Roper 2005			
24525	Petroglyph	Historic petroglyph pecked on an open slab of pāhoehoe bedrock; letters “R.E.D. DENISON, CCC 1940” PETROGLYPH	x	Roper 2005			
25093	Enclosure			Dougherty et al. 2004a		HAVO-2003-L-208	

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25935	Halapē Ruins	Habitation complex* (House site; Smart et al. 1965)	x	Smart et al. 1965 HAVO		HV-073	Kapāpala
25936	Halapē Ruins	Enclosure, house site? * (House site? Smart et al. 1965)	x	Smart et al. 1965 HAVO		HV-070	Kapāpala
25937	Kalue Ruins	Five historic structures*	x	HAVO		LCS 07540	
25938	Kūē‘ē Ruins	Remote village site; used as a fishing camp up to the 1970s* (Multiple features/sites; Smart et al. 1965) [HV-121,HV-122, HV-123, HV-124,HV-125, HV-126, HV-127,HV, 128, HV-129, HV-130, HV-133, HV-134, HV-137]	x	Smart et al. 1965 HAVO		HV-121-130. 133, 134, 135	Ka‘ala‘ala makai
25939	Keauhou Ruins-Heiau Cave	*	x	Emory, Cox et al.1959 Smart et al. 1965 HAVO		HV-078 LCS 07519	Keauhou
25940	Road Cut Cave	Cave with 9 entrances, lots of cultural material, outside trail*				CV017	
25941	Mel's Ahu	Ahu and petroglyphs*					
25942	Petroglyph Grotto	Site consists of rock shelter, petroglyphs, and possible agricultural features; located 25 m west of Pu‘uloa Petroglyph Field*		HAVO			
25943	Hilina Pali Cave	Deposits and petroglyphs*				HV-386	
25944	Earthquake Cave	Cave with depoits*	x				
25945	Kahuku K1 Cave	Bird bones and deposits*					
25946	Charcoal Cave	Substantial deposits*					
25947	Calabash Cave	Cave for water collection*				CV15B	
25948	Hilina Pali Cave					HV-393	
25949	Hilina Pali Cave					HV-383	
25950	Pen #9						
25951	?			Waipa, J.			
25952	?			Waipa, J.			
CLG-1	Inland agriculture and habitation			Ladefoged et al. 1987			
CLG-2	Inland agriculture and habitation			Ladefoged et al. 1987			
HV-001	Shelters and spring	Shelters and spring	x	Smart et al. 1965		HV-001	Pānau Nui
HV-002	House, walled	House, walled	x	Smart et al. 1965		HV-002	Pānau Nui
HV-003	Papamū	Papamū	x	Smart et al. 1965		HV-003	Pānau Nui
HV-004	Platforms	Platforms		Smart et al. 1965		HV-004	Pānau Nui
HV-005	House site	House site		Smart et al. 1965		HV-005	Pānau Nui
HV-006	House site, papamū	House site, papamū		Smart et al. 1965		HV-006	Pānau Nui
HV-007	House site	House site		Smart et al. 1965		HV-007	Pānau Nui
HV-008	Enclosure and platforms	Enclosure and platforms		Smart et al. 1965		HV-008	Pānau Nui
HV-009	Platforms	Platforms		Smart et al. 1965		HV-009	Pānau Nui
HV-010	Enclosure	Enclosure		Smart et al. 1965		HV-010	Pānau Nui
HV-011	Cairn	Cairn		Smart et al. 1965		HV-011	Pānau Nui
HV-012	Platform	Platform		Smart et al. 1965		HV-012	Pānau Nui

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HV-013	Shelters	Shelters		Smart et al. 1965		HV-013	Pānau Nui
HV-014	Platform and enclosure	Platform and enclosure		Smart et al. 1965		HV-014	Pānau Nui
HV-015	Platform	Platform		Smart et al. 1965		HV-015	Pānau Nui
HV-016	Stone alignments	Stone alignments	x	Smart et al. 1965		HV-016	Pānau Nui
HV-017	Stone alignements	Stone alignements		Smart et al. 1965		HV-017	Pānau Nui
HV-018	Enclosure	Enclosure	x	Smart et al. 1965		HV-018	Kahue
HV-019	Enclosure	Enclosure	x	Smart et al. 1965		HV-019	Kahue
HV-020	Enclosure	Enclosure	x	Smart et al. 1965		HV-020	Kahue
HV-021	Enclosure	Enclosure	x	Smart et al. 1965		HV-021	Kahue
HV-022	Enclosure	Enclosure	x	Smart et al. 1965		HV-022	Kahue
HV-023	Wall	Wall		Smart et al. 1965		HV-023	
HV-024	Enclosure	Enclosure	x	Smart et al. 1965		HV-024	Kahue
HV-025	Platform	Platform	x	Smart et al. 1965		HV-025	Kealakomo
HV-026	Cairn	Cairn	x	Smart et al. 1965		HV-026	Kealakomo
HV-027	Cairn	Cairn	x	Smart et al. 1965		HV-027	Kealakomo
HV-028	Cairn	Cairn	x	Smart et al. 1965		HV-028	Kealakomo
HV-029	House site ?	House site ?	x	Smart et al. 1965		HV-029	Kealakomo
HV-030	House site	House site	x	Smart et al. 1965		HV-030	Kealakomo
HV-031	Cairns?	Cairns?	x	Smart et al. 1965		HV-031	Kealakomo
HV-032	Enclosure and cave	Enclosure and cave	x	Smart et al. 1965		HV-032	Kealakomo
HV-033	Enclosure	Enclosure	x	Smart et al. 1965		HV-033	Kealakomo
HV-034	Wall	Wall	x	Smart et al. 1965		HV-034	Kealakomo
HV-035	Enclosure	Enclosure	x	Smart et al. 1965		HV-035	Kealakomo
HV-036	Enclosure	Enclosure	x	Smart et al. 1965		HV-036	Kealakomo
HV-037	Corral	Corral	x	Smart et al. 1965		HV-037	Kealakomo
HV-038	Enclosure	Enclosure	x	Smart et al. 1965		HV-038	Kealakomo
HV-039	Enclosure	Enclosure	x	Smart et al. 1965		HV-039	Kealakomo
HV-040	Shelter and cave	Shelter and cave	x	Smart et al. 1965		HV-040	Kahue
HV-041	Wall and cave	Wall and cave	x	Smart et al. 1965		HV-041	Kahue
HV-042	Enclosure	Enclosure	x	Smart et al. 1965		HV-042	Kahue
HV-043	Enclosure and cave	Enclosure and cave	x	Smart et al. 1965		HV-043	Kahue
HV-044	Enclosure	Enclosure	x	Smart et al. 1965		HV-044	Kahue
HV-048	House site	House site		Smart et al. 1965		HV-048	
HV-049	‘Āpua Point Cross Trail Cave	Shelter cave; deposit, pre-Contact, post-Contact		Smart et al. 1965 HAVO 2007		HV-049	
HV-051	House sites	House sites		Smart et al. 1965 HAVO 2007		HV-051	
HV-052	House sites	House sites, platforms; recently damaged by tidal action		Smart et al. 1965		HV-052	
HV-054	House sites	House sites		Smart et al. 1965		HV-054	
HV-055	Petroglyphs	Petroglyphs		Smart et al. 1965		HV-055	
HV-056	petroglyphs	Petroglyphs		Smart et al. 1965		HV-056	
HV-057	Enclosure	Enclosure		Smart et al. 1965		HV-057	
HV-058	Shelters	Shelters		Smart et al. 1965		HV-058	
HV-059	Shelter cave	Shelter cave		Smart et al. 1965		HV-059	‘Āpua

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HV-060	Shelter cave	Shelter cave		Smart et al. 1965		HV-060	
HV-061	Cairn	Cairn	x	Smart et al. 1965		HV-061	‘Āpua
HV-062	Shelters	Shelters	x	Smart et al. 1965		HV-062	‘Āpua
HV-063	Shelters	Shelters	x	Smart et al. 1965		HV-063	‘Āpua
HV-064	Grave	Grave	x	Smart et al. 1965		HV-064	‘Āpua
HV-066	Enclosure	Enclosure	x	Smart et al. 1965		HV-066	‘Āpua
HV-067	Wall	Wall	x	Smart et al. 1965		HV-067	‘Āpua
HV-068	Wall and pavement	Wall and pavement	x	Smart et al. 1965		HV-068	‘Āpua
HV-069	?			Smart et al. 1965		HV-69	
HV-071	Halape Ruins: Platforms	Platform and terrace	x	Smart et al. 1965 HAVO 2006		HV-071	Kapāpala
HV-072	Halape ruins Shelter cave	Shelter cave, deposit	x	Smart et al. 1965 HAVO 2006		HV-072	Kapāpala
HV-074	House site	House site	x	Smart et al. 1965		HV-074	Kapāpala
HV-075	Shelter cave, petroglyph	Shelter cave, petroglyph	x	Smart et al. 1965		HV-075	Keauhou
HV-077	Shelter cave, petroglyph	Shelter cave, petroglyph	x	Smart et al. 1965		HV-077	Keauhou
HV-079	Shelter cave	Shelter cave		Smart et al. 1965		HV-079	Keauhou
HV-080	Shelter cave	Shelter cave		Smart et al. 1965		HV-080	Keauhou
HV-081	Shelter cave	Shelter cave		Smart et al. 1965		HV-081	Keauhou
HV-082	Shelter cave	Shelter cave		Smart et al. 1965		HV-082	Keauhou
HV-083	Shelter cave	Shelter cave		Smart et al. 1965		HV-083	Keauhou
HV-084	Shelter cave	Shelter cave		Smart et al. 1965		HV-084	Keauhou
HV-085	Shelter cave	Shelter cave		Smart et al. 1965		HV-085	Keauhou
HV-086	Shelter cave	Shelter cave		Smart et al. 1965		HV-086	Keauhou
HV-087	Shelter cave	Shelter cave		Smart et al. 1965		HV-087	Keauhou
HV-088	Shelter cave	Shelter cave		Smart et al. 1965		HV-088	Keauhou
HV-089	Wall, clearing	Wall, clearing		Smart et al. 1965		HV-089	Keauhou
HV-090	Shelter cave	Shelter cave		Smart et al. 1965		HV-090	Keauhou
HV-091	Shelter cave	Shelter cave		Smart et al. 1965		HV-091	Keauhou
HV-092	Shelter cave	Shelter cave		Smart et al. 1965		HV-092	Keauhou
HV-093	Shelters	Shelters		Smart et al. 1965		HV-093	Keauhou
HV-094	House site and cave	House site and cave		Smart et al. 1965		HV-094	Keauhou
HV-095	Shelter cave	Shelter cave		Smart et al. 1965		HV-095	Keauhou
HV-097	Papamū	Papamū		Smart et al. 1965		HV-097	Keauhou
HV-098	Shelter cave	Shelter cave		Smart et al. 1965		HV-098	Keauhou
HV-099	Shelter	Shelter		Smart et al. 1965		HV-099	Keauhou
HV-100	Shelter cave	Shelter cave		Smart et al. 1965		HV-100	Keauhou
HV-101	Shelter cave	Shelter cave		Smart et al. 1965		HV-101	Keauhou
HV-102	Shelter cave	Shelter cave	x	Smart et al. 1965		HV-102	Keauhou
HV-104	Shelter cave	Shelter cave	x	Smart et al. 1965		HV-104	Keauhou
HV-105	Platform	Platform	x	Smart et al. 1965		HV-105	Keauhou
HV-106	Platform	Platform	x	Smart et al. 1965		HV-106	Keauhou
HV-107	Enclosure	Enclosure	x	Smart et al. 1965		HV-107	Keauhou
HV-108	Shelter cave, petroglyph	Shelter cave and petroglyph	x	Smart et al. 1965		HV-108	Keauhou

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HV-109	Shelter cave and spring	Shelter cave and spring	x	Smart et al. 1965		HV-109	Keauhou
HV-110	Enclosure	Enclosure	x	Smart et al. 1965		HV-110	Kapāpala
HV-111	House site	House site	x	Smart et al. 1965		HV-111	Kapāpala
HV-112	Enclosure	Enclosure	x	Smart et al. 1965		HV-112	Keauhou
HV-113	Petroglyphs	Petroglyphs	x	Smart et al. 1965		HV-113	Keauhou
HV-114	Shelter cave	Shelter cave	x	Smart et al. 1965		HV-114	Keauhou
HV-115	Shelter cave	Shelter cave	x	Smart et al. 1965		HV-115	Keauhou
HV-116	Shelter cave	Shelter cave	x	Smart et al. 1965		HV-116	Keauhou
HV-117	Shelter cave	Shelter cave	x	Smart et al. 1965		HV-117	Keauhou
HV-118	House sites	House sites	x	Smart et al. 1965		HV-118	Keauhou
HV-119	Shelter cave	Shelter cave	x	Smart et al. 1965		HV-119	Keauhou
HV-120	Refuge cave	Refuge cave	x	Smart et al. 1965		HV-120	ʻĀpua
HV-138	Platforms and enclosures	Platforms and enclosures	x	Smart et al. 1965		HV-138	Kahue
HV-139	House site	House site, platform	x	Smart et al. 1965 HAVO 2007		HV-139	Kahue
HV-140	Platform	Platform	x	Smart et al. 1965 HAVO 2007		HV-140	Kahue
HV-141	Shelter	Shelter	x	Smart et al. 1965		HV-141	Kahue
HV-142	Wall and clearing	Wall and clearing	x	Smart et al. 1965		HV-142	Kahue
HV-143	Wall	Wall	x	Smart et al. 1965		HV-143	Kahue
HV-144	Platform	Platform	x	Smart et al. 1965		HV-144	Kahue
HV-145	House site	House site	x	Smart et al. 1965		HV-145	Kahue
HV-146	Enclosures	Enclosures	x	Smart et al. 1965		HV-146	Kahue
HV-147	House sites	House sites	x	Smart et al. 1965		HV-147	Kahue
HV-148	House sites, petroglyhs	House sites, petroglyhs	x	Smart et al. 1965		HV-148	Kahue
HV-149	Corral	Corral	x	Smart et al. 1965		HV-149	Kahue
HV-150	Petroglyphs	Petroglyphs	x	Smart et al. 1965		HV-150	Kahue
HV-151	House site, papamū	House site, papamū	x	Smart et al. 1965		HV-151	Kahue
HV-152	Platform	Platform	x	Smart et al. 1965		HV-152	Kahue
HV-153	Wall	Wall	x	Smart et al. 1965		HV-153	Kahue
HV-154	House site, papamū	House site, papamū	x	Smart et al. 1965		HV-154	Kahue
HV-155	House site	House site	x	Smart et al. 1965		HV-155	Kahue
HV-156	Cairns	Cairns	x	Smart et al. 1965		HV-156	Kahue
HV-157	House site and spring	House site and spring	x	Smart et al. 1965		HV-157	Kahue
HV-158	Platform	Platform	x	Smart et al. 1965		HV-158	Kapāpala
HV-159	Enclosure	Enclosure		Smart et al. 1965		HV-159	Kapāpala
HV-160	Enclosure	Enclosure		Smart et al. 1965		HV-160	Kapāpala
HV-161	Enclosure	Enclosure	x	Smart et al. 1965		HV-161	Kapāpala
HV-162	Wall	Wall	x	Smart et al. 1965		HV-162	Kapāpala
HV-163	Shelter cave	Shelter cave		Smart et al. 1965		HV-163	Kapāpala
HV-164	Shelter cave	Shelter cave	x	Smart et al. 1965		HV-164	Kapāpala
HV-165	Enclosure	Enclosure	x	Smart et al. 1965		HV-165	Kapāpala
HV-166	Enclosure	Enclosure	x	Smart et al. 1965		HV-166	Kapāpala
HV-167	Enclosure	Enclosure	x	Smart et al. 1965		HV-167	Kapāpala

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HV-168	Corral	Corral	x	Smart et al. 1965		HV-168	Kapāpala
HV-169	Enclosures	Enclosures	x	Smart et al. 1965		HV-169	Kapāpala
HV-170	Shelter cave and wall	Shelter cave and wall	x	Smart et al. 1965		HV-170	Kapāpala
HV-171	Enclosure	Enclosure	x	Smart et al. 1965		HV-171	Kapāpala
HV-172	Enclosures	Enclosures	x	Smart et al. 1965		HV-172	Kapāpala
HV-173	Petroglyphs	Petroglyphs	x	Smart et al. 1965		HV-173	Pānau Nui
HV-174	Corral	Corral	x	Smart et al. 1965		HV-174	Kealakomo
HV-175	Shelter cave	Shelter cave	x	Smart et al. 1965		HV-175	Kealakomo
HV-176	Shelter	Shelter	x	Smart et al. 1965		HV-176	Kealakomo
HV-177	Trails	Trails	x	Smart et al. 1965		HV-177	Kealakomo
HV-178	Shelter	Shelter	x	Smart et al. 1965		HV-178	Kealakomo
HV-179	House site	House site	x	Smart et al. 1965		HV-179	Pānau Nu
HV-180	Wall and palm trees	Wall and palm trees	x	Smart et al. 1965		HV-180	Pānau Nui
HV-181	Wall and cave	Wall and cave	x	Smart et al. 1965		HV-181	Pānau Nui
HV-182	Stone outline	Stone outline	x	Smart et al. 1965		HV-182	Kealakomo
HV-183	Enclosure	Enclosure	x	Smart et al. 1965		HV-183	Pānau Nui
HV-184	Spring, petroglyphs	Spring, petroglyphs	x	Smart et al. 1965		HV-184	Kapāpala
HV-186	Platform	(Platform; Smart et al. 1965); Permanently Sealed	x	Smart et al. 1965		HV-186	Laeʻapuki (Pānau Nui)
HV-191		Cairns and terraces				HV-191	Pānau Nui
HV-193		Shelter cave				HV-193	Pānau Nui
HV-195	Enclosures	Enclosures; Permanently Sealed	x	Smart et al. 1965		HV-195	Laeʻapuki (Pānau Nui)
HV-197	Enclosures	Enclosures	x	Smart et al. 1965		HV-197	Laeʻapuki (Pānau Nui)
HV-199	Corral?	Corral?	x	Smart et al. 1965		HV-199	Kahue
HV-200	Enclosures	Enclosures	x	Smart et al. 1965		HV-200	Kahue
HV-201	Enclosures	Enclosures		Smart et al. 1965		HV-201	ʻĀpua
HV-202	Enclosure	Enclosure		Smart et al. 1965		HV-202	ʻĀpua
HV-203	Platform	Platform	x	Smart et al. 1965		HV-203	Kealakomo
HV-204	Platform	Platform	x	Smart et al. 1965		HV-204	Kealakomo
HV-205	House site and cave	House site and cave	x	Smart et al. 1965		HV-205	Kealakomo
HV-206	Trail	Trail		Smart et al. 1965		HV-206	Kealakomo
HV-207	Trial	Trial		Smart et al. 1965		HV-207	Kealakomo
HV-208	trails	trails	x	Smart et al. 1965		HV-208	Kealakomo
HV-209	House site	House site	x	Smart et al. 1965		HV-209	Kealakomo (Pānau Nui)
HV-210	Heiau, Kamooalii; Petroglyphs	Petroglyphs		Baker 1922 Smart et al. 1965 Scheffler 1994b		HV-210	Kaʻalaʻala Makai
HV-211	Petroglyphs	Petroglyphs	x	Smart et al. 1965		HV-211	Kahue
HV-213	House site	House site; Permanently Sealed	x	Smart et al. 1965		HV-213	Laeʻapuki
HV-214	Platform	Platform; Permanently Sealed	x	Smart et al. 1965		HV-214	Laeʻapuki
HV-215	Shelter	Shelter; Permanently Sealed	x	Smart et al. 1965		HV-215	Laeʻapuki

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HV-216	Stone alignments	Stone alignments; Permanently Sealed	x	Smart et al. 1965		HV-216	Laeʻapuki
HV-217	Filled cracks	Filled cracks	x	Smart et al. 1965		HV-217	Pānau Nui
HV-218	Occupation refuse	Occupation refuse	x	Smart et al. 1965		HV-218	Pānau Nui
HV-219	Cairn	Cairn	x	Smart et al. 1965		HV-219	Pānau Nui
HV-220	Walls and caves	Walls and caves	x	Smart et al. 1965		HV-220	Pānau Nui
HV-221	Stone alignments	Stone alignments	x	Smart et al. 1965		HV-221	Pānau Nui
HV-222	Shelter cave	Shelter cave	x	Smart et al. 1965		HV-222	Pānau Nui
HV-223	Shelter cave	Shelter cave	x	Smart et al. 1965		HV-223	Pānau Nui
HV-224	Shelters	Shelters	x	Smart et al. 1965		HV-224	Pānau Nui
HV-226	Wall and clearings	Wall and clearings	x	Smart et al. 1965		HV-226	Pānau Nui
HV-227	Trail and cave	Trail and cave	x	Smart et al. 1965		HV-227	Pānau Nui
HV-230	Shelter cave	Shelter cave	x	Smart et al. 1965		HV-230	Kahue
HV-231	House site	House site	x	Smart et al. 1965		HV-231	Kahue
HV-232	Shelter cave	Shelter cave	x	Smart et al. 1965		HV-232	Kahue
HV-233	Petroglyphs	Petroglyphs	x	Smart et al. 1965		HV-233	Kahue
HV-234	House site	House site	x	Smart et al. 1965		HV-234	Kahue
HV-235	House site and petroglyph	House site and petroglyph	x	Smart et al. 1965		HV-235	Kahue
HV-236	Shelter cave	Shelter cave	x	Smart et al. 1965		HV-236	Kahue
HV-237	Shelter cave and Petros	Shelter cave and petroglyphs	x	Smart et al. 1965		HV-237	ʻĀpua
HV-240	Stone mound (No. 7)	Stone mound (No. 7)		Smart et al. 1965		HV-240	Kamoamoa
HV-241	Stone Mound (No. 8)	Stone Mound (No. 8)		Smart et al. 1965		HV-241	Kamoamoa
HV-242	Moa Heiau	Moa Heiau		Smart et al. 1965 Ladefoged et al. 1987		HV-242	Kamoamoa
HV-243	House site	House site		Smart et al. 1965		HV-243	Kamoamoa
HV-244	Petroglyphs	Petroglyphs	x	Smart et al. 1965		HV-244	Kahue
HV-245	Meeting place?	Meeting place?	x	Smart et al. 1965		HV-245	Kealakomo
HV-246	Petroglyphs	Petroglyphs		Smart et al. 1965		HV-246	Pānau Nui
HV-250	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-250	Pūlama
HV-251	Platform- Heiau?	Platform- Heiau?		Smart et al. 1965 Ladefoged et al. 1987		HV-251	Pūlama
HV-252	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-252	Pūlama
HV-253	Platform- Shrine?	Platform- Shrine?		Smart et al. 1965 Ladefoged et al. 1987		HV-253	Pūlama
HV-254	pen	pen		Smart et al. 1965 Ladefoged et al. 1987		HV-254	Pūlama
HV-255	House site and platform	House site and platform		Smart et al. 1965 Ladefoged et al. 1987		HV-255	Pūlama
HV-256	Enclosures	Three enclosures		Smart et al. 1965 Ladefoged et al. 1987		HV-256	Pūlama
HV-257	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-257	Pūlama

Site No.	Name/description (modified from HAVO records)	ASMIS Description (in CAPS: ARC DBF DESC)* (in parentheses, added information)	InArc GIS DB	Reference	Condition (not complete)	Park ID (ASMIS)	Ahupua‘a
HV-258	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-258	Pūlama
HV-259	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-259	Pūlama
HV-260	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-260	Pūlama
HV-261	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-261	Pūlama
HV-262	Pens	Two pens		Smart et al. 1965 Ladefoged et al. 1987		HV-262	Pūlama
HV-264	Enclosure	Enclosure		Smart et al. 1965		HV-264	Pūlama
HV-265	Enclosure	Enclosure		Smart et al. 1965 Ladefoged et al. 1987		HV-265	Pūlama
HV-266	Platform	Platform		Smart et al. 1965 Ladefoged et al. 1987		HV-266	Pūlama
HV-267	Platform	Platform		Smart et al. 1965 Ladefoged et al. 1987		HV-267	Pūlama
HV-268	Platform	Platform		Smart et al. 1965 Ladefoged et al. 1987		HV-268	Pūlama
HV-269	Pen	Pen		Smart et al. 1965 Ladefoged et al. 1987		HV-269	Pūlama
HV-270	Canoe shed?	Canoe shed?		Smart et al. 1965 Ladefoged et al. 1987		HV-270	Pūlama
HV-271	Shrine or House site	Shrine or House site		Smart et al. 1965 Ladefoged et al. 1987		HV-271	Pūlama
HV-272	Shrine	Shrine		Smart et al. 1965 Ladefoged et al. 1987		HV-272	Pūlama
HV-273	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-273	Pūlama
HV-274	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-274	Pūlama
HV-275	Trail	Trail		Smart et al. 1965		HV-275	Pūlama
HV-276	Wahaula Heiau	Wahaula Heiau, Permanently Sealed	x	Smart et al. 1965 Ladefoged et al. 1987; Masse et al. 1991		HV-276	Poupou, Puna (Pūlama)
HV-277	Enclosure and house site	Enclosure and house site		Smart et al. 1965 Ladefoged et al. 1987		HV-277	Pūlama
HV-278	Enclosure	Enclosure		Smart et al. 1965 Ladefoged et al. 1987		HV-278	Pūlama
HV-279	Enclosure	Enclosure		Smart et al. 1965 Ladefoged et al. 1987		HV-279	Pūlama
HV-280	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-280	Pūlama
HV-281	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-281	Pūlama

Site No.	Name/description (modified from HAVO records)	ASMIS Description (in CAPS: ARC DBF DESC)* (in parentheses, added information)	InArc GIS DB	Reference	Condition (not complete)	Park ID (ASMIS)	Ahupua‘a
HV-282	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-282	Pūlama
HV-283	Platform	Platform		Smart et al. 1965 Ladefoged et al. 1987		HV-283	Pūlama
HV-284	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-284	Pūlama
HV-285	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-285	Pūlama
HV-286	Pen	Pen		Smart et al. 1965 Ladefoged et al. 1987		HV-286	Pūlama
HV-287	Pavement	Pavement		Smart et al. 1965 Ladefoged et al. 1987		HV-287	Pūlama
HV-288	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-288	Pūlama
HV-289	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-289	Pūlama
HV-290	Mortars	Mortars		Smart et al. 1965 Ladefoged et al. 1987		HV-290	Pūlama
HV-291	Platform	Platform		Smart et al. 1965 Ladefoged et al. 1987		HV-291	Pūlama
HV-292	Platform	Platform		Smart et al. 1965 Ladefoged et al. 1987		HV-292	Pūlama
HV-293	House site and pens	House site and pens		Smart et al. 1965 Ladefoged et al. 1987		HV-293	Pūlama
HV-294	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-294	Pūlama
HV-297	Footprint of Niheu	Footprint of Niheu		Smart et al. 1965		HV-297	Pūlama
HV-298	Petroglyphs	Petroglyphs		Smart et al. 1965		HV-298	Pūlama
HV-299	Spear hole	Spear hole		Smart et al. 1965		HV-299	Pūlama
HV-300	Petroglyphs	Petroglyphs		Smart et al. 1965 Ladefoged et al. 1987		HV-300	Kamoamoa
HV-301	Canoe shed	Canoe shed		Smart et al. 1965 Ladefoged et al. 1987		HV-301	Kamoamoa
HV-304	Enclosure	Enclosure		Smart et al. 1965		HV-304	Kamoamoa
HV-305	Pavement	Pavement		Smart et al. 1965		HV-305	Kamoamoa
HV-306	Pavement	Pavement		Smart et al. 1965		HV-306	Kamoamoa
HV-307	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-307	Kamoamoa
HV-308	Well	Well		Smart et al. 1965 Ladefoged et al. 1987		HV-308	Kamoamoa
HV-309	Mortars	Mortars		Smart et al. 1965 Ladefoged et al. 1987		HV-309	Kamoamoa
HV-310	Enclosure, platforms	Enclosure, platforms, 3		Smart et al. 1965		HV-310	Kamoamoa
HV-311	Enclosure	Enclosure		Smart et al. 1965 Ladefoged et al. 1987		HV-311	Kamoamoa

Site No.	Name/description (modified from HAVO records)	ASMIS Description (in CAPS: ARC DBF DESC)* (in parentheses, added information)	InArc GIS DB	Reference	Condition (not complete)	Park ID (ASMIS)	Ahupua‘a
HV-312	Platform	Platform		Smart et al. 1965		HV-312	Kamoamoa
HV-313	Platform	Platform		Smart et al. 1965		HV-313	Kamoamoa
HV-314	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-314	Kamoamoa
HV-315	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-315	Kamoamoa
HV-316	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-316	Kamoamoa
HV-317	House site	House site		Smart et al. 1965		HV-317	Kamoamoa
HV-318	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-318	Kamoamoa
HV-319	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-319	Kamoamoa
HV-320	Pen and platforms	Pen and platforms		Smart et al. 1965		HV-320	Kamoamoa
HV-321	House site	House site		Smart et al. 1965		HV-321	Kamoamoa
HV-322	Circular structure	Circular structure		Smart et al. 1965 Ladefoged et al. 1987		HV-322	Kamoamoa
HV-323	Petroglyphs	Petroglyphs		Smart et al. 1965 Ladefoged et al. 1987		HV-323	Lae‘apuki
HV-324	Pens and petroglypns	Pens and petroglypns		Smart et al. 1965 Ladefoged et al. 1987		HV-324	Lae‘apuki
HV-325	House site and pens	House site and pens		Smart et al. 1965 Ladefoged et al. 1987		HV-325	Lae‘apuki
HV-326	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-326	Lae‘apuki
HV-327	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-327	Lae‘apuki
HV-328	Goat pen	Goat pen		Smart et al. 1965 Ladefoged et al. 1987		HV-328	Lae‘apuki
HV-329	House site	House site		Smart et al. 1965		HV-329	Lae‘apuki
HV-330	House site	House site		Smart et al. 1965 Ladefoged et al. 1987		HV-330	Lae‘apuki
HV-331	Platform	Platform		Smart et al. 1965 Ladefoged et al. 1987		HV-331	Lae‘apuki
HV-332	Shrine	Shrine		Smart et al. 1965 Ladefoged et al. 1987		HV-332	Lae‘apuki
HV-374	?	Permanently Sealed	x			HV-374	Kamoamoa
HV-375	?	Permanently Sealed	x			HV-375	Lae‘apuki
HV-376	?	Permanently Sealed	x			HV-376	Lae‘apuki
HV-380	Oararauo Heiau	(never relocated after Ellis identified it near the crater)		Ellis 1963 Stokes 1991 Emory et al 1965:II:33			Keauhou?
K-?	Kamoamoa Trail	Curbstone trail connecting with Kalapana Trail		Kirkendall 1993a, b			Kamoamoa
K-01-56	Habitation, with some agriculture	Multiple platforms, enclosures, etc		Kirkendall 1993a, b			Kamoamoa

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K-100+	Agriculture with some habitation, trails	Mounds, terraces, enclosures		Kirkendall 1993a, b			Kamoamoa
LCS 058266	Mauna Loa Observation Shelter	Built in 1937, probably by CCC		Dougherty 2004			Kapāpala
LCS 058267	Mauna Loa Truck Trail Seismographic Vault	Date?		Dougherty 2004			Kapāpala
LCS 058268	Mauna Loa Pit Toilets	Date?		Dougherty 2004			Kapāpala
LCS 058269	Mauna Loa Summit Rest House	Built in 1934		Dougherty 2004			Kapāpala
LCS 058430	Mauna Loa Truck Trail	Built in 1935		Dougherty 2004			Kapāpala
LCS 05844	Red Hill Rest House	Built in 1915, by US Army, 25th Infantry, Co. E		Dougherty 2004			Kapāpala
TR-1	agriculture and habitation			Carter and Somers 1990			Laeʻapuki
TR-2	habitation, caves, petroglyphs; possible ahupuaʻa boundary; evidence of 1868 earthquake			Carter and Somers 1990			Laeʻapuki Pānau Iki Pānau Nui
TR-3	habitation; agriculture, volcanic glass quarry			Carter and Somers 1990			Pānau Nui
TR-4	agriculture, petroglyphs			Carter and Somers 1990			Pānau Nui
TR-5	agriculture, petroglyphs, wet cave			Carter and Somers 1990			Pānau Nui
X-?	Umi Cavern?	Is this an archeological site?		Dougherty 2004			Kahuku
X-01	Scattered features"	(Scattered small features, caves, petroglyphs)		Baker 1922 Smart 1965 Scheffler 1994b			Kaʻalaʻala
X-02	Na Puu o Na Ele Makule bombing reange; WW II practice bombing area	(WW II training ordnance; Note: area on map with solid line identified in Scheffler; area in dashed line from general maps; area used 1940-1950)		cf. Jackson 1972 Scheffler 1994b			Kaʻalaʻala
X-03	Keaoi Island	(May have been a large stone platform: Smart 1965:29)		Smart 1965			Kapāpala
X-04	Heiau (unnamed)	Earth temple reported in Shipman pasture; not relocated by Stokes		Stokes 1991			Keauhou?
X-05	Ritual (?) cave	("Large sleeping cave at Pali-lele-o-kalihi-paa")		on 1912 map of Kīlauea			Keauhou Kapāpala
X-06	Jagger Airfield	"March 1927" marked by hand on USGS (also see Site 22403)					
X-07	Kau Impact area ("Bombing Range, Army")	(ca. 1940-1945)					Kapāpala
X-08	Keanakāköʻi Quarry	(location of Keanakāköʻi Quarry, buried by lava in 1877)					Keauhou
X-09	Keauhou Goat Ranch and Pogue House	(Location uncertain; probably general vicinity of the Ainahou Ranch House, Site 19429)					Keauhou
X-10	Early airfields			survey			
X-11	Kapiʻolani's rejection of Pele						

Site No.	Name/description (modified from HAVO records)	ASMIS Description (in CAPS: ARC DBF DESC)* (in parentheses, added information)	InArc GIS DB	Reference	Condition (not complete)	Park ID (ASMIS)	Ahupua‘a
X-12	place where Keoua’s army + track						
X-13	Track of Kapi‘olani and scortched earth						
X-14	Track of William Ellis						various
X-15	Kahuku Military Camp			Dougherty 2004			Kahuku
XAC-1	Upland features, Mauna Loa			Dougherty 2004			Kapāpala
XAC-2	Upland features, Mauna Loa			Dougherty 2004			Kahuku
XAC-3	Upland features, Mauna Loa	Trail, sleeping cave		Dougherty 2004			Kahuku
XAC-4	Upland features, Mauna Loa	Trail, other features		Dougherty 2004			Kahuku
XAC-5	‘Umi cavern complex, Mauna Loa	Features near ‘Umi cavern, including upland shrine		Dougherty 2004			Kahuku
X-Misc	Features variously documented in Section 106 reports	Incompletely reviewed, site/feature numbers undetermined		HAVO Section 106 reports			

Note: Feature numbers from Ladefoged et al. (1987) not provided in table.

X: Added as “working sites.”

* Indicates that a detailed description is provided in Appendix A. Table 2.

(1) Listed as agricultural pits in ASMIS; these are bird nesting pits, corrected in the table.

Table A-2. Detailed Information On Selected Sites in Table 1.*

Site No.	Site Name	Description
05501	ʻAinapō Trail	A narrow, single-file, twisting, and occasionally slightly abraded trail over lava fields (some fields are rough and scoriaceous, others are smooth and billowy) above 11,600 ft elevation; leads up the broad SE flank of Mauna Loa to and along the E side of Mokuʻāweoweo. The trail along the crater's edge is above the 13,200 ft elevation. Intermittent, and in places infrequent, stacks of loose lava boulders (ahu) line the sides of the trail. Abraded spots occur only on the rare surface types subject to pockmarking by metal blows; this was done by iron-shod hooves since 1870s, when horses and mules began to be used.
05502:	Kīlauea Crater	The summit of Kīlauea volcano has collapsed to form a broad, shallow caldera within which is Kīlauea Crater; within Kīlauea Crater is Halemaʻumaʻu, an historically active lava vent (in the past, Halemaumau has contained a boiling lake of lava, which at times rose and overflowed onto adjacent crater floor). Kīlauea eruptions are typically mild and nonexplosive activity; on rare occasions, water has filtered into the volcano's "plumbing" and the resulting steam pressure has caused explosions. One of these occurred in 1790 and is noted in Hawaiian history because the hot blast of rock and dust overwhelmed and killed part of a native army marching near the crater. Kīlauea Crater is one of the world's most active volcanoes; its floor often tilts differentially and in total, rises and falls as much as five feet in a short period of time. Earthquakes are numerous.
05503	Puna-Kaʻū Historic District	The human occupation of the Puna-Kaʻū Historic District, as nearly as can be determined, covers a span of nearly 600 years and is represented by a variety of archeological-historical remains, including prehistoric fishing-farming, and historic goat-cattle ranching and pulu harvesting.
05505	Footprints Area	An area of approximately 4,284 acres bounded on the NW by the Keʻāmoku lava flow and the SE by the Kaʻū Desert Trail; contains an unknown number of fossil footprints and hoofprints in a superficial ash deposit from 1790 phreatic explosions of Kīlauea Crater.
05506	Whitney Seismographic Vault	A 5.8 by 5.3 m (inside dimensions) underground room, with reinforced concrete walls (0.45 m thick), concrete floor (ext. 0.15 m thick), and reinforced concrete slab (8 inches thick) roof. The floor rests on a solid ledge of basalt, reached by digging 1.67 m from the 1912 natural ground level through ash and pumice. The top of the vault makes a mound that is covered by topsoil; it is incorporated in the lawn on the crater side of the Volcano House. The cut pahoehoe block stone steps and walkway that lead to the entrance of this structure are partially dug into the ash layer. This structure is not in original form: the first documented modifications took place in 1941 and involved extending the ceiling height, creating a cement roof, installing ceiling light outlets, covering the roof with top soil, andconstructing the exterior access steps as well as timing circuit outlets.
05507	Wilkes' Campsite	Remains of camp constructed by US Exploring Expedition party led by Captain Charles Wilkes in 1841; adjacent to the E rim of the Mauna Loa summit crater, at 13,240 ft above sea level; built on surface of pahoehoe lava. The principal building was a pre-fabricated portable house, carried in pieces to and assembled in the camp; it contained a pendulum for scientific experiments. There was an officer's tent, three tents for others in the expedition, tents for storage, cooking and for study of magnetism, astronomy, temperature, and barometric pressure changes. Each individual structure consisted typically of a tent that was encircled with a drylaid wall as high as the tent eaves; walls were built for protection from high winds, blizzards, and intense cold. "Pendulum Peak, January 1841/US Ex.Ex." was cut into the bedrock at the campsite, but has not been re-located. At abandonment in January 1841, the tents and portable house were dismantled; walls were left in place but soon began to deteriorate from earthquakes, violent storms, and some disturbances by artifact hunters and the curious. The rubble of the fallen walls was probably the principal source for the rocks used in the construction of the nearby summit shelter built by the National Park Service in 1934.
19248	Catchment Dump Site 19270 (Acc. 354)	This site is an historic trash dump in three loci. Artifacts range from about 1890 to 1940 and most likely originate from the pre-1940 Volcano House; most of the ceramics are marked "K.V.H." (Kilauea Volcano House). The site has been bulldozed and no longer exists.

Site No.	Site Name	Description
19445	CCC Camp Foundations at Resource Management	The site consists of two areas: Feature A is the remains of a cement slab from the old CCC Camp that was destroyed in 1994; Feature B is a stone-lined depression and cement and stone walk-ways. This general area is where the CCC Camp was located in the early 1940s; it is located next to the Resource Management Administrative Office (Building 322). The area is densely vegetated, with a thick layer of soil.
19447	Keauhou Landing	The Keauhou Landing site covers 10,200 square feet and consists of enclosures, walls, a rectangular cistern, walkways, stairs, and pahoehoe quarries. This was one of the major access points for tourists traveling to Kīlauea Crater. The Keauhou Road from the landing to the Volcano House was started in 1885 by the Wilder Steamship Company and was completed in 1886. It apparently fell out of use after 1894 when the road from Hilo was completed.
19455	Steam Flats Dump 3900 (Acc. 356)	This dump site was likely associate with the Volcano House operations. Site disturbances include five unauthorized excavations that have been made into the deposits. The persons involved in this activity must have been looking for complete bottles, as discards of metal, and ceramic fragments surround the hole.
19457	Ginger Patch Dump (Acc. 355)	This dump site was likely associated with Volcano House operations. It is now buried under gravel fill and grass. Artifacts from the dump site are in the Park collections.
19458	Headquarters' Crack Dump	This dump site is located in a large crack about 80 m north of the Park Headquarter's building and the 1977 Volcano House (Art Center). It may have been the main dump site for the 1877 Volcano House and other buildings of the area. Now covered in dense vegetation and is difficult to access.
19459	CCC Water Tank Foundations	This site consists of the old CCC water tank foundations and related features. It is comprised of eight features, six of which are related to water distribution; one was possibly an incinerator and one was associated with the production of curbing stones.
19460	House site complex	This site encompasses enclosures, platforms, caves, a fisherman's shelter, salt-drying areas, filled cracks, ahu, petroglyphs (approximately 17,000 glyphs), a cistern, heiau, mounds, walls, terraces, and a stepping stone trail. Permanently sealed.
19461	Palm Tree Site, Paliuli	This site consists of nine features on a mixed pahoehoe/aa rise: five enclosures, a platform, petroglyphs, and two walls, plus numerous agricultural features (mostly mounds). Numerous historic artifacts are present. The site is currently in a kīpuka and surrounded by new lava flow. The western part of the site was covered by the February 1995 flow (Jason flow). (Smart et al. 1965: house site; platform and enclosure;)
19463	Petroglyph Cave	This site consists of a large, partially paved lava tube with petroglyphs within and outside the entrance. Part of the cave floor is paved with flat pahoehoe stones. A number of opihi shells and charcoal areas are within the cave. Charcoal was identified and was composed of native species including koa (*Acacia koa*).
19466	Salt Drying Areas	This site consists of eleven salt drying areas and 13 other features including rock-filled depressions, rock mounds, quarried areas, a temporary habitation with a small cave, and an anthropomorphic petroglyph. Destroyed; permanently sealed.
19468	Trail	Site is a pahoehoe stepping stone trail on an aa flow. It connects Sites 19462 and 19467. It is relatively intact in areas, with stepping stones still in place. A portion of the trail is covered by the February 1995 lava flow. (Emory, Cox et al.1959; Smart et al. 1965: stepping stone trail)
19474	Papalehau Cave	This site is the entrance to a "subcave" located on the SW end of a large collapsed skylight, one of a series of very large skylights; part of a large lava tube system that is aligned in mauka-makai fashion. The tube system was created by a lava flow that dates between 400-1500 B.P.

Site No.	Site Name	Description
20443	Kalapana Trail	This trail route is most commonly known as the Kalapana Trail. As illustrated on the 1912 Territory of Hawaii survey map, it extends E/SE from Keauhou Road to Punalu‘u Heiau on the Puna coastline. Emory, Cox et al. (1959:91-92) describe the trail from the E end: “This trail … connects with the end of the State road just beyond the Village of Kapa‘ahu and continues almost due west for six miles along the gradually ascending mountain slope and then enters the steeper area and becomes a winding mountain path ending at the terminus of the Chain-of Craters Road. The lower straight section takes no particular advantage of the changing terrain, but goes from one point to another in the shortest distance. The hollows in the pahoehoe are filled to the level of the high points with stones. These fills are usually faced on the surface to keep the stones from shifting. The roadbed is six to eight feet wide and is bordered on each side with curbstones.” Allen (1979:78) excerpts a Public Lands and Surveyors Office (Hilo Branch) report dated July 31, 1942 (report contained in Land Court File 1374): “The Kalapana-Volcano road across Kamoamoa is a built road and must have been built by the government sometime before 1900. It is well defined with lines of rocks on both sides and with rock fill over depressions. It … is ten feet wide.” In the late 1990s, portions of the Kalapana trail were inventoried as the trail was being utilized as a fuel break. Trail segments observed ranged from a single track worn into the pahoehoe ground surface to a 2 m wide trail with kerbstone lining and filled depression areas with faced retaining walls. Portions of the trail that extend into forested areas are overgrown with dense vegetation. A total of nine features were identified along the Kalapana trail route and consist of trail side modifications, trail signs, and surveyor markers. These features were combined with the existing Kalapana Trail based on their spatial association with the trail route and on their association with trail activity.
21146	Enclosures and platforms	A very large enclosure of irregular plan and roughly made walls, a small stone platform and traces of smaller, rectangular walled constructions are attached to its lower end. (Smart et al. 1965: enclosures and platforms)
21215	Pulu Factory	The Pulu Factory is located between Nāpau and Makaopuhi Craters. Pulu was a marketable item during the mid- to late 1800s; its production was discontinued around 1890. All that is left of this processing area are fallen timbers and stone walls of three structures.
21316	Coastal Trail (19,466)	Site 21316 is a coastal trail route that is not indicated on any maps. Emory, Cox et al. (1959:96) state: “The coast trail from Lae‘apuki and Ka‘ena and the trail from Pu‘uloa meet within the (Kealakomo) compound and continue west along the coast.” Emory suggests it is part of the Puna-Ka‘ū Trail. Along most of its length, the trail is a narrow ribbon of abraded surface across smooth pahoehoe. Occasional low sections are filled with dirt in which vegetation grows, covering the pathway. Along the trail are various structural features, including several C-shapes that appear to be fairly recent in construction and were likely built by fisherman (fishing is allowed along this section of coast in the park by those ‘ohana from Kalapana who have exclusive fishing rights in the area); the creation of temporary shelters is a continued practice for the fishermen.
21678	Cave (Fea. 61)	This site consists of a 14 x 5.5 m pahoehoe tumulus cave; the interior is 80 cm high; the opening is located on the northwest edge of the cave; the entrance is heavily vegetated with ti plants. The entrance of this cave has a shallow ceiling and a level floor lacking rock fall. Opihi shells as well as a large tooth were found on the cave floor. Site is in good condition; vegetation in the area consists of a‘ali‘i, ūlei, and ‘ōhi‘a.
21690	C-shape	This C-shape is constructed out of medium to large pahoehoe cobbles stacked 4-6 courses high on a pahoehoe tumulus. The wall of the C-shape is collapsed; the C-shape opens to the west.
21698	Agricultural Area (Fea. 1-652)	This site is an agricultural complex consisting of 541 excavated pits, 299 pit/mound features, 118 mounds, 38 pit/rock scatters and eight filled cracks. The current assessment identified 27 additional features: 10 excavated pits, eight rock pile/scatters, two alignments, two walls, two terraces, two rock shelters, and one mound.
21699	Cave (Fea. 1)	Site 21699 is a small rock shelter in a natural blister; it has a low ceiling. Goat bones are dispersed on the floor; kukui nut shells and pahoehoe cobbles are the only other cultural material in the shelter. Cultural features surrounding the shelter consist of a 3-4 course high rock mound located on the top of the blister, a 1.16 x 0.9 m rock wall, and several rock mounds.

Site No.	Site Name	Description
21700	Trail (Fea. 2)	This trail route consists primarily of an ill-defined track with no worn tread or other trail modifications except for relatively closely spaced cairns (131 identified). The trail generally contours the existing slope and ascends toward the northeast. Numerous cairns are placed along the trail at regular intervals; they are generally low-lying mounds (20-40 cm height; two to four courses of stacked pahoehoe cobbles). The trail was first identified during the Pānau Emergency Survey and Mapping Project (Glidden 1998) and designated Feature 2. Spears (1995b:78) provides information concerning trail routes and the Pea Homestead (HV-376) based on a March 29, 1933 letter from E. Brumaghim to E.P. Leavitt, the Hawaii National Park Superintendent (the letter discusses a field inspection from Makaopuhi Crater to Kalapana related to possible acquisition of park land in lower Puna District): Brumaghim mentions several trail intersections encountered along the Kalapana trail route and references the Pea homestead. Although Site 21700 intersects with the Kalapana Trail approximately 600 m west of the Pea Homestead, it is not mentioned in the letter. The lack of previous documentation and the current condition of the trail (limited tread wear and no stepping stone segments in areas of aa lava) indicate that the trail was most likely recently constructed. The trail may have been constructed to improve hunter access to this portion of the park (Tunison, pers. comm., 2004) as it nearly adjoins a recently constructed "hunter's trail."
21702	Cave (Fea. 12)	Site 21702 consists of a temporary habitation that consists of a modified lava blister formation. It was previously recorded by Glidden (1998) as a cave (Feat. 12). Cultural material includes scattered opihi in the NW and SE corners of the chamber, and goat bones throughout the chamber.
21707	Cave (Fea. 53)	Site 21707 is a relatively small petroglyph cave site; there are no other modifications The petroglyph images are pecked in three areas: Panel A consists of a series of anthropomorphic figures located on the vertical surface of the southern wall; Panel B is located on the relatively flat floor of the cave below Panel A and consists of a series of anthropomorphic figures; and Panel C is located on the vertical surface of the western wall near the cave entrance and consists of a single anthropomorphic figure. Cultural material in the cave consists of one opihi shell (Cellana sp.) and one Drupa shell, both located in the roof fall S of the petroglyphs.
21710	Platform (Fea. 88)	Site 21710 consists of a single platform feature that is interpreted as a temporary habitation platform. The platform is constructed with small, medium, and large pahoehoe and aa cobbles stacked 3-5 courses high. No cultural material was observed on the platform surface or in the surrounding area.
21721	Enclosure (Fea. 130)	A rectangle-shaped enclosure measures 8.0 m x 10.0 m. The enclosure wall is constructed of aa and pahoehoe cobbles stacked 4-6 courses high. The basal courses are small to medium boulders with the remaining courses consisting of smaller cobbles. The west side of the enclosure is bounded by a natural pahoehoe rise. One hearth feature within the enclosure is constructed from 4 pahoehoe slabs placed on edge forming a square; the remaining interior area consists of level soil. Cultural material observed in the surrounding area includes one mule shoe located adjacent to and S of the enclosure.
21728	Enclosure (Fea. 40) Terrace (Fea. 41) Cave (Fea. 15)	Site 21728 is a habitation complex located in the western central portion of the project area (Quad III). The site was previously identified during the 1998 Pānau Emergency Survey and Mapping Project (Glidden 1998) and consists of two enclosures (Feats. 40 and 97) and one terrace (Feat. 41). One feature (L-96) was located during the current survey and appears to be a portion of the previously recorded enclosure (Feat. 40). The enclosure is mostly collapsed and dense vegetation obscures portions of the enclosure wall and the feature is described below.
21730	Cave (Fea. 98) Terraced Platforms (Fea. 99 and 100) Mound (Fea. 101)	Site 21730 is a habitation complex, previously identified (Glidden et al 1998) and consists of two terraced platforms and other features. The features were interpreted as serving either a religious function or as possible burial features. The current survey identified these existing features plus one additional C-shape. Because no excavation occurred during either the previous or current survey to confirm the "possible burial" functions, the sites' function was re-assigned to a habitation complex based on the features' formal type and size.

Site No.	Site Name	Description
21733	Wall, Platform, Terrace, Enclosure, Cistern	Site 21733 is a habitation complex located in the southeastern portion of the project area (Quad IV). The site was previously identified during the 1998 Pānau Emergency Survey and Mapping Project (Glidden 1998) and consists of a wall (Feat. 16), one platform (Feat. 17), two terraces (Feats. 18 and 61), one enclosure (Feat. 58), and one cistern (Feat. 60). Two features identified during the current survey correspond with the previously recorded features and consist of a platform (L-385) and one terrace (L-386). The features are part of the large habitation complex area and are described below.
21735	Enclosures, Cave, Terraces, L-shape, and Papamu	Site 21735 is a habitation complex located in the southeastern portion of the project area (Quad IV). The site was previously identified during the 1998 Pānau Emergency Survey and Mapping Project (Glidden 1998) and consists of four enclosures (Feats. 50, 114, 115, and 116), two terraces (Feats. 111 and 118), one L-shape (Feat. 112), and one petroglyph (papamu) (Feat. 117). Three features identified during the current survey were correlated with this site designation and include one enclosure (L-209), one wall (L-264) and one platform (L265).
21737	Caves, Papamu, Enclosures, Terraced Platforms, Wall, Petroglyphs, C-shapes, Hearth	Site 21737 is a habitation complex located in the southeastern portion of the project area (Quad IV). The site was previously identified by Glidden (1998) and is the largest concentration of habitation features recorded by that previous survey. Enclosures, platforms, petroglyphs.
21751	Ainahou Ranch Cave System	The Ainahou Ranch Cave is a complex tube with 23 known entrances. As of 1994, this resource was the longest surveyed cave within HAVO with a total passage length of 7.11 km, a vertical range of 352 m, and an average gradient of 4 degrees. This vertical range classifies the tube as the fifth deepest cave in the US. It also holds the record as the most important biological cave in the state of Hawai‘i with 19 endemic obligate cave-adapted species as of 1994. The cave is also very important archeologically, housing outstanding petroglyphs, temporary habitation sites, water catchment systems, terraces, and one burial. The cave was formed from the 350-500 year old ‘Ailā‘au lava flow. Due to the fact that this cave has so many unique and valuable resources, and because there is a burial present, the tube is closed to the public.
22487	CCC features on Hilina Pali Road (LCS 101791)	Site 22487 is an historic site and the features it includes were built by the CCC in 1940. The job was referred to as CCC project number 327. The sitespans about 2 kilometers lengthwise and is located along the intermittent streams of the area. The CCC was working here to deter the erosion in the area that occurs during heavy rains. To do this the CCC locally quarried the pahoehoe bedrock of the area and used the rocks to construct walls along the drainages. These retaining walls were built to help contain the water flow into these gullies and by doing this the soil and vegetation would not be washed away and eroded. The site consists of a total of 78 walls, 2 historic petroglyphs, 3 mounds, 13 dams, and 1 cairn.
22973	C-shapes in Footprints area	This site consists of 20 features: five C-shapes, two enclosures, four mounds, three rock piles, one U-shape, and five walls. Features 1 through 4 and 7 through 11 are all located within a recessed area of the Ke‘āmoku aa lava flow. This inlet represents an area where the lava has flowed in such as way as to create a natural area protected from the prevailing, and at times strong, winds. The Ke‘āmoku flow also provided most of the building material for the structures. Loose cobbles and boulders are utilized to create structure walls, mounds, and rock piles. None of the structures showed evidence of cultural deposits. Most of the C-shapes and enclosures show evidence of ash buildup in the interior of the feature that may contain some subsurface cultural remains.
22974	Shelter and volcanic glass quarry in Footprints area	This site consists of nine features: one overhang shelter, six volcanic glass quarry areas, one wall and one modified outcrop. Unlike Site 22973, only a single structure at 22974 is located along the Ke‘āmoku and flow. The other features are located to the east of the Ke‘āmoku flow boundary on the undulating p4o pahoehoe flow. Due to the survey method used in 1998, it is unknown at this time whether other structures or features located on the p4o flow could potentially contribute to this site. Although these features represent a dispersed group, at least the quarries are likely functionally related.
22975	Shelters and volcanic glass quarry in Footprints area	This site consists of four features: two overhang shelters, a C-shaped structure, and a volcanic glass quarry. One large quarry. All of the features were found along the flow edge. Due to the survey method used in 1998, it is unknown at this time whether other structures or features on the p4o flow could potentially contribute to this site complex.

Site No.	Site Name	Description
22976	Shelters and volcanic glass quarry in Footprints area	This site consists of four features: two overhang shelters, a C-shaped structure, and a volcanic glass quarry. All of the features were found along the flow edge. Due to the survey method used in 1998, it is unknown at this time whether other structures or features on the p4o flow could potentially contribute to this site complex.
22977	Structures in Footprints area	This site consists of six features: a rock pile, two enclosures, a petroglyph, a U-shaped structure and a volcanic glass quarry. Three of the features are locatedon the Keʻāmoku flow while the other three were found on the p4o flow. Only one feature (25) is located within a recessed area of the Keʻāmoku flow. Features 98-92 and 98-92a are located nearly adjacent to the Kaʻū-Volcano Trail (Site 22982).
22978	Structures in Footprints area	This site consists of five features: two rock piles, a mound, and two enclosures. Three of the five features that comprise this site are located on the Keʻāmoku lava flow. The mounds and rock piles may be functionally associated with the Kaʻū-Volcano Trail (Site 22982) but are not spatially associated. Along the Keʻāmoku flow, between sites 22973 and 22978, there is a paucity of features (<10); the edge of the Keʻāmoku flow was not used intensively along this section of the flow.
22979	Structures in Footprints area	This site consists of a high density of features, a majority of which are located along or near the edge of the Keʻāmoku flow. Thirty-one features comprise this site. They include: six overhangs, eight enclosures, five C-shapes, five U-shaped structures, one volcanic glass quarry, three mounds and three walls. It is the first large cluster of features located north of Site 22973. This site is approximately 70 m south of the Keʻāmoku Cross Trail (Site 23033). The concentration of features beginning in this area may be related to the Keʻāmoku Cross Trail (Site 23033) that runs perpendicular to the Keʻāmoku flow. The trail may have provided quick access to and from the Kaʻū-Volcano Trail (Site 22982) and resource procurement and habitation sites in the Kaʻū Desert. Thirty of the 31 features that comprise Site 22979 are located on the Keʻāmoku flow.
22980	Structures in Footprints area	This site consists of eight features - five C-shaped structures, and a single terrace, U-shaped structure and overhang. All of the features except Features 55 and 62 are located on top of the Keʻāmoku flow. None of the features are located within a natural recessed area of the Keʻāmoku flow, but they are close to two trail systems, Sites 23033 (Keʻāmoku Cross Trail) and 22982 (Kaʻū-Volcano Trail)..
22981	Structures in Footprints area	This site consists of 17 features – four C-shape, one cupboard, one enclosure, four modified overhangs, a terrace, four U-shapes, a blister cave and a single wall. This relatively dense cluster of features is located 175 m southeast of the Keʻāmoku Cross Trail. All of the features are located on the Keʻāmoku flow.
22982	Kaʻū-Volcano Trail	Site 22982 is comprised of two parallel trail segments and 33 associated features. Identified as two worn areas across the p4o pahohoe flow, these trail segments are located east of the Keʻāmoku flow. The segments run in a northeast/southwest direction. The trails were identified over a six mile (9,656 m) distance. The location of the field data collected by GPS matches the location of the Kaʻū-Volcano Trail on a 1907 digitized map. Along these trail segments, 33 features were identified in close spatial association. Of the 33 features there is one C-shape, one modified outcrop, one modified overhang, 26 mounds and four walls. The mounds were likely used as trail markers by travelers using the area. Mounds are useful trail markers in an area like the Kaʻū Desert because trails worn into the pāhoehoe are often hard to see.
22983	Cave in Footprints area	Feature 98-624 is a cave that extends under the edge of the Keʻāmoku lava flow. The shelter is 12 m x 8 m x 300 cm high. No information on cultural modifications such as associated walls or deposits is provided. Thus, this feature could possibly be natural and deserves further evaluation.
22984	Structures in Footprints area	This site consists of 10 structures - two C-shapes, four mounds, one rock pile, one modified overhang, and two terraces. Features 78, 79, 83, and 84 are locate on the Keʻāmoku lava flow, while features 80, 81, and 82 are located at the base of the Keʻāmoku flow. None of the structures showed any evidence of cultural deposits. Most of the structures show evidence of ash buildup in the interior that may contain some subsurface cultural remains.
22985	Structures in Footprints area	This site consists of 15 structures - six walls, two overhangs, four C-shapes, two enclosures, and one associated possible hearth. Features 85, 89, 92, 93, 94, and 95 are located on the Keʻāmoku lava flow, while Features 86, 87, and 88 are located at the base of the flow. None of the structures showed any evidence of cultural deposits. Most of the structures show evidence of ash buildup in the interior that may contain some subsurface cultural remains.

Site No.	Site Name	Description
22986	Structures in Footprints area	This site consists of four overhangs and one wall. All features in this site with the exception of two, (Features 98 and 99), are located on the Keʻāmoku lava flow. None of the structures of the structures showed any evidence of cultural deposits.
22987	Structures in Footprints area	This site consists of 47 features and one isolated marine shell fragment. The features include: nine enclosures, four terraces, 14 walls, eight C-shapes, five overhangs five U-shapes, and two L-shapes. *This is the largest site in the project area and contains the most features.* Features within this site are found both on and off the Keʻāmoku lava flow.
22988.	Structures in Footprints area	This site consists of one overhang, two enclosures, and five C-shapes. Most of the features are located at the base of the Keʻāmoku flow. Thus, the flow edge is utilized as part of the structure construction.
22989	Cave in Footprints area	Feature 152 is a 2 x 3 m and 150 cm high cave. It is located on a southeastern facing slope of the Keʻāmoku lava flow. There is an alignment of aa boulders immediately outside of the entrance, aligned from east to west that is filled with ash on its northern side to form a terraced area.
22990	Cave in Footprints area	Feature 155 is a 1.80 x 1.80 m and 95 cm high cave. It is located at the base of the Keʻāmoku lava flow. There is some stacking of basalt boulders and cobbles at the southwestern and northeastern ends of the cave entrance.
22991	Cave in Footprints area	Feature 154 is a 3.20 x 2 m and 40 cm high cave. This feature is located at the base of the Keʻāmoku lava flow.
22992	Structures in Footprints area	This site consists of nine features: one wall, three C-shapes, three terraces, one overhang, and one enclosure. Unlike Site 22988, a majority of the features tha comprise this site complex are constructed on the Keʻāmoku flow itself. All of the features are found north/northwest of a natural inlet area in the Keʻāmoku flow
22993	Structures in Footprints area	This site consists of 28 features: seven terraces, eight C-shapes, four walls, three overhangs, three L-shapes, one rock pile, one platform, and one mound. A majority of the features are located on the Keʻāmoku flow with several features constructed on the adjacent pahoehoe. None of the features are located within recessed areas of the Keʻāmoku flow.
22994	Structures in Footprints area	This site consists of four C-shapes, one L-shape, two U-shapes and five walls. A majority of the features abut the base of the Keʻāmoku flow, while three are located on the Keʻāmoku flow and one south of the flow on the p4o flow. A rather small cluster of features, Site 22994 is located just northeast of Site 22993.
22995	Structures in Footprints area	This site consists of 12 features: three C-shapes, two terraces, one L-shape, one modified overhang, three enclosures, one wall and one petroglyph. A majority of features within this site cluster are located on the Keʻāmoku flow. Feature 202 is the only structure built within a protected inlet area of the Keʻāmoku flow.
22996	Structures in Footprints area	This site consists of 48 features: four terraces, 27 C-shapes, eight walls, one cupboard, five mounds, one modified overhang, one possible cupboard, and one historic dump. A majority of the features are built on the Keʻāmoku flow. Less than a half-dozen of the features that comprise this site are located either at the base of the Keʻāmoku flow or on the p4o flow. The style of construction of all of the features excluding the glass bottles suggest they are either pre-Contact or early historic in nature.
22998	Peter Lee Road	The Peter Lee Road was built to service the community of Pāhala, in particular the hotel owned by entrepreneur Peter Lee at Punaluʻu and visitors who stayed at the Volcano House. The Peter Lee Road was the first official road built in this area. It was completed in 1891 (Olson 1941a:46). The road was nearly 24 miles long and was designed to accommodate carriages and later modified for motorized vehicles. A 1921 USGS map shows a junction in the Peter Lee Road at the 3,363 foot elevation. The north spur of the road leads to a watershed and tanks at Kawikohoni. The map suggests this spur ends near the Mauna Loa Trail. None of this spur road was identified during the current project. By 1927 the Peter Lee Road was replaced by the Kau Road (Site 23034).
23000	Structures, lithic workshop in Footprints area	This site consists of 15 features: one overhang, four enclosures, three C-shapes, one U-shape, one cave, one terrace, two rock piles, one mound and one lithic workshop. This large site complex consists primarily of features constructed on the Keʻāmoku flow. This is the last large (>10 features) site complex found along the Keʻāmoku flow.
23001	Structures in Footprints area	This site consists of eight features: five C-shapes, one terrace, one mound, and one enclosure. Of these eight features, only one Feature, 277, is located on the Keʻāmoku flow; the remainder are on the p4o pahoehoe.

Site No.	Site Name	Description
23003	Structures in Footprints area	Site 23003 consists of a complex located in the Kaʻū Desert area of Hawaiʻi Volcanoes National Park. This site consists of four discontinous features along the Keʻāmoku flow. Features consists of rock walls, a C-shape, a rock mound and a single rock feature. Two features were relocated while the other two could not be relocated. Positioned on an a'a flow as well as volcanic sand and duff, this site is positioned in an area prone to flooding and shifting sands. Vegetation present in this area is sparse and consists of a'ali'i, pukiawe, ohia as well as an unidentified shrub. This site is in relatively poor condition and is threatened by flooding, volcanic activity, weathering and seismic activity.
23005	Structures in Footprints area	This site is comprised of four features: three mounds and one platform. All the features that make up site 23,005 are located along the historic Peter Lee Road This site is comprised of four sub-features which includes three ahus (98-551, 98-607, and 98-621) which are likely markers for the historic roads and a platform (98-613). Ahu 98-551 was relocated and has the dimensions 0.8 m X 0.7 m X 0.4 m high. The platform has the dimensions 6.1 m X 3.7 m X 0.55 m high and the feature is of a different character and time period than the others. The platform appears to be a type of temporary habitation.
23006	Big ʻŌhiʻa Cave	Feature 98-32 is Big Ohia Cave. Barbara Withrow formally identified this cave in 1987. Withrow located the cave, mapped it, and recorded basic information (HAVO Cave Files). Wulzen revisited the cave in 1998 and 2001 and a site number was also assigned at this time. Wulzen described the site as containing lithics, wood, hearth, and pig bone. Sourcing of the material proved inconclusive.
23007	Structures, lithic workshops in Footprints area	This site consists of eight features: one platform, six lithic workshops, and a cache of waterworn stones. The lithic workshops may be the outer extent of a large cluster of lithic block quarries identified in 2001 and surveyed in 2002 (Moniz Nakamura in prep).
23008	Cave	Feature 98-567 is a cave located 35 m west of Crater Rim Drive. The entrance to the cave is 1.2 m wide by 170 cm high. The sole cultural modifications associated with this cave are some rocks inside which appear to be placed. This site is a single cave feature identified in 1998 by Wulzen.
23009	Cave	This site consists of a single cave. No information was provided by Wulzen (1999). The cave needs to be revisited and formally recorded. Feature 98-568 is a cave located 10 m east of Highway 11 near the Kīlauea Military Camp (KMC) baseball field. No reference to cultural material or modifications have been described for this feature.
23015	Structures, petroglyphs in Footprints area	This site consists of 29 features: seven mounds, six C-shapes, seven walls, one historic petroglyph, three enclosures, two terraces, one platform, two modified overhangs. This cluster of features is located at the base of the Keʻāmoku lava flow. The presence of the corrals and historic petroglyph suggest some of these features may be historic in nature. This site is bisected by Kaʻū-Volcano Trail (Site 22982).
23021	Trail in Footprints area	This site is comprised of a segment of trail and six associated mounds that were likely used as trail markers. The location of this trail matches nearly perfectly with the location of a trail identified on a digitized 1907 map as the "Old Puna-Kaʻū Trail." Therefore, the author is confident that the section of trail identified by Wulzen in 1998 is the remnant of this trail system. The Old Puna-Kaʻū Trail appears to link with the Āinapo Trail which is a trail that leads to the summit of Mauna Loa.
23022	Structures, volcanic glass quarry in Footprints area	This site consists of nine features: one modified outcrop, one terrace, one volcanic glass quarry, an enclosure, two walls and three lithic quarries. The site is comprised of a disparate group of features located just south of the Old Puna-Kaʻū Trail (Site 23021). During Site Condition Assessment 2006 we found additional footprints in the ash flow. The area has experienced recent flooding by the appearance of downed ohia trees and dead trees that surround the feature. Approximately 10 footprints are visible and well preserved inspite of the erosion from water movement.
23031	Rock pile	Feature 98-54 is 1.75m long x 1.15m wide x .7m high rock pile is made of dry stacked pahoehoe boulders and cobbles and is stacked one to three courses high. The feature is built on top of pahoehoe bedrock and is near a small opening in the pahoehoe bedrock (a blister) which is feature 98-66. This blister could possibly be big enough for a human to fit inside if lying down.

Site No.	Site Name	Description
23032	Halfway House Trail	This site consists of a segment of trail that forks into two parallel trail segments. The right fork is 733 m (0.5 mi.) long while the left fork is only 340 m (0.2 mi.) long. Both trail segments lead toward the Kau Halfway House. The Kau Halfway House was a rest station constructed for visitors who were traveling from Hilo to Kaʻū in the late nineteenth and early twentieth century. Because of its apparent association with the Halfway House, the trail has been so named. The Halfway House Trail diverges to the west from the Kaʻū-Volcano Trail (Site 22982) near the base of the Keʻāmoku lava flow. Feature 98-472 is the temporary field number assigned to the trail segment identified as the Halfway House Trail.
23033	Keʻāmoku Cross Trail	This site consists of five features: one trail segment, two rock piles, and two mounds. The trail (see description below) crossed the Keʻāmoku lava flow just south of the beginning of the largest concentration of structures that have been identified along the lava flow. The Keʻāmoku Cross Trail is unlike most of the other trails (except the Old Puna-Kaʻū Trail) because lies in an east/west direction. The rock piles and mounds likely served as trail markers for travelers who used it.
23034	Kau Road in Footprints area	Feature 75 is a 3,195 m (1.99 mi.) segment of the Kaʻū Road. This road replaced the Peter Lee Road (Site 22997) by 1927. The Kaʻū Road was built by the Territory of Hawaii and paralleled much of the then existing Peter Lee Road (Site 22997). Today, only a small section of the Kaʻū Road remains, as the existing Māmalahoa Highway now covers much of the same route.
23049	Crater Rim Road Wall	The site consists of a free-standing, dry-stacked rock wall. It is constructed 2-8 courses high of blocky pahoehoe boulders, possibly core-filled and placed upon undulating pahoehoe terrain in a wet rainforest. It heads in an E-W direction with the west and possibly east end disrupted by the Crater Rim Road.
23270	Kealakomo Coastal Features	Enclosures, platforms, mounds, petroglyphs. Historically, large waves and goat activity have impacted the area. Several features, particularly those near the shore, have been affected by wave action, and are partially buried in sand and beach rubble.
23271	Puʻuloa Petroglyph Field	Puʻuloa Petroglyph Field is a very extensive area covered with a dense concentration of petroglyphs. The area is characterized by a long pressure dome hill that rises above the surrounding area. On this hill there are many petroglyphs as well as surrounding this hill. The types of petroglyphs found in this area include pikos or cupuoles, anthropomorphs, zig zag lines including many other shapes. It is said that Hawaiians came here to bury the umbilical cord in a cupuole with a rock over it to ensure a long life. The word “Puʻuloa” translates to hill of long life. There is a trail leading to the petroglyphs with a viewing boardwalk so that people do not trample on the petroglyphs and inflict wear and tear on them. Several old trails intersect this petroglyph field. (Puʻuloa Petroglyphs; Smart et al. 1965)
23275	Keanakākoʻi Crack Dump	This site is located against the north base of a large crack extending eastward from Keankako'i Crater. The site consists of three unauthorized excavation pits and is positioned on soil and medium black cinder. White ware shards, glass bottle fragments and metal apparatus are present.
23314	ʻĀinahou Road/ Keauhou Trail	This site consists of both the Keauhou Trail and the ʻĀinahou Road. These features were lumped together as a single site due to the fact that the ʻĀinahou Road used to be a section of the Keauhou Trail. The historic Keauhou Trail provided access from the Keauhou Landing to upper elevations (the Pulu Factory and the early Volcano House) of Hawaii Volcanoes National Park. The portion of the trail converted into a dirt road (ʻĀinahou Road) provided and continues to provide access to the secluded Ainahou Ranch House. The Keauhou Trail is approximately 6.2 miles long while the Ainahou Road is approximately 2.0 miles long. Both features meander through myrica faya and broomsedge landscapes in one of driest areas in the Park. The Keauhou Trail is relatively narrow (1-6 feet in width) and is shows signs of erosion. The ʻĀinahou Road is in good condition and is maintained by road crew.

Site No.	Site Name	Description
23315	Platforms and Enclosures at ʻĀpua Point	This site comprises a combination of three platforms and two enclosures, a single platform and enclosure, a stone tower, and another small enclosure. The main structure has three platforms joined side by side, each faced with boulders, paved with small stones, and each with its own stone hearth. The central (largest) and western platform share a common, boulder paved strip running along their southern edge, and this continues eastward as a wall before turning back to the third platform. The platform facings are thick and show clearly on the surface of the small stone paving and the boulder paving of the two western platforms. Against the southeast corner of the platform structure is a small rectangular walled enclosure, and against the southwest corner is another small, but oval, walled enclosure. This house site was identified and mapped in 1964 by Colin Smart. After the 1975 earthquake and tidal wave the site took considerable damage. The platforms are still structured and definable however the edges of the site are rubbly and blown out. The hearth and post holes in the far eastern platform are distinct, the hearth in the far southern platform is well defined and visible.
23316	Enclosure at Āpua Point	A small square enclosure of roughly made, low stone walls, is located just beside the Apua-Kahue trail a few meters east of the Apua shelter. The enclosed area is of bare rock surface. This site is now in a very disturbed condition. The enclosure is in such bad condition that no map was made because the feature is so haphazard and disturbed.
23317	ʻĀpua Point Spring	A fissure allowing access to brackish water some 3.25 m. below ground surface and 40 m. from the shore line on the western side of Apua Point seems to have had its opening enlarged or modified. This is the only water source located at Apua Point. Immediately inland from this water source is situated the present overnight shelter at Apua Point (with site No. 47). Opihi shells cove the floor of the cave and there is a large deposit of shells on the northwest surface of the cave. It is used a bathing spot for visitors.
23362	Pepeiau Shelter Cabin	This shelter cabin is a 5.1 m X 3.1 m X 2.3 m high cabin constructed of wood and built in 1946 or prior, the exact date has yet to be determined. The cabin consists of one room and is rectangular in shape. The construction of the cabin exhibits the Park style developed for HAVO in response to available materials and the implementation of the 1930s Park Master Plan.
23363	Platform and shelters, shrine?	This site consists mostly of jumbled rock and waterworn stones due to tsunami action in 1868 and 1975. There are occasional patches of pavement and a few alignments still exist. A 1964 record of this site suggests it may have been used for religious purposes. The site blends into an area on the southwest that was known as a fisherman's shelter and was also used by park rangers from 1950's through to 1975. Possible shrine?
23399	Hilina Pali Road	This road is located on the right hand side of Chain of Craters Road and is 8.2 miles long. The road consists of a one lane road that has been resurfaced several times over the years. This lovely road provides access to the Ka'aha Trail Head as well as the trail leading to Halape and the Peipeia'u Shelter.
23646	Coastal Complex	Site 23646 is complex of features located along the coastal lowlands. The features were identified during the Pili Grassland Prescribed Burn Experiment project and that was conducted in two phases. A total of 61 features were located during phase I and consisted of 34 rock piles, 14 excavated pits, 3 alignments, 2 petroglyphs, 2 mounds, one cave, one enclosure, one slab lined hearth, and one wall. An additional 143 features were identified during phase I but were laterdetermined to be non-cultural. Fewer features were located during phase II. A total of 90 features were located, and 10 of those were determined to be noncultural.The remaining 80 features consisted of 57 excavated pits, 18 rock piles, 2 excavated pits with walls, one alignment, one overhang shelter, and oneisolate marine shell.During the current assessment a total of 252 features were included with Site 23646. Of this total, 133 were subsequently inundated by lava, 91 features wererelocated, 17 newly identified features were clustered with Site 23646, six previously located features were not relocated, and five features were determined tobe non-cultural. The predominant feature types identified are excavated pits and mounds (both feature types generally associated with agricultural activity) but also included: rock scatters, alignments, walls, one possible lithic scatter/y, cairns, and petroglyphs and each is described below.
23647	Lithic Block Quarry Features	This site consists of 277 individual quarry locales. A single cave was identified in this project area. Cave (Lithic Block Cave) will be receiving a separate site number. In the original work done on the site an excavation of one of the quarries took place, collection of some adze preforms and lithic flakes, as well as some collection and testing of charcoal from the Lithic Block Cave. Thompson and Roper Lithic Block Quarry Survey 2002, GIS data available but currently there is no written report for this survey.

Site No.	Site Name	Description
23975	Kupukupu Feature KA1	Feature KA1 is a 198 X 130cm and 30cm in height rock pile. The feature is constructed of loosely piled and scattered pahoehoe boulders and cobbles. The feature is in a loosely circular arrangement. It is located at 1000-1500 feet in elevation
24007	Kupukupu Agricultural Features	Site 24007 consists of agricultural features identified in the western central portion of the project area and includes one mound, one pile/scatter, one excavated pit with mound, and one excavated pit, and each is described below. The site designation was created to encompass the agricultural features in this portion of the project area. Numerous agricultural features (mounds) were identified in this area during the current assessment; however, due to time constraints these features were not formally recorded. If surveys are conducted in this area in the future, then these features should be included with Site 24007 and the current site boundary amended to reflect the broader feature distribution in this area.
24010	Platform	HAVO-2002-488 is an 8.7 x 6.4 m an 95 cm in height rectangular platform (Fig. 22). The platform is constructed on the southern teminus of an aa flow andconsists two separate levels (the northern, mauka, level was designated Level 1; the southern level was designated Level 2). The platform is constructed from stacked pahoheo and aa cobbles and small boulders. The northern platform area (Level 1) consists of a rectangular area delineated on the northern andsouthern edges by a low lying wall. The wall is mostly collapsed (no verticle facing remains) and appears to be dry stacked constructed (non corefilled). The waranges from 35-50 cm in height and is 0.7 m in width. Both the southern and western edges of Level 1 are defined by a single course alignment of both aa andpahoehoe cobbles and small boulders. The interior floor area of Level 1 is relatively level and consists predominately of crushed aa gravels (Fig. 23). Level two is south and ajoins Level 1. The rectangular portion of the platform consists of a relatively level area paved with both pahoehoe cobbles and slabs (inlaid in the platform surface) surrounded by crushed aa gravels (Fig. 24). Several coral fragments were observed on the platform and consists of largerpahoehoe cobbles and boulders. The mound formation combined with the branch coral remains may indicate a possible burial function for this feature. No othercultural material was identified on the plaform surface or in the surrounding area.
24017	Kupukupu platform	The platform is rectangular in shape and is constructed on a south facing slopewith the long axis oriented N/S (Fig. 38). The platform is constructed from stacked pahoehoe cobbles and small boulders and the platform edges are mostlycollapsed.. The platform surface appears to dip slightly toward the slab pavement area; this dip, ordepression area, may represent a crypt structure constructed within the platform. The central platform area is roughly 3 meters in length (N/S) and consists of arough pahoehoe cobble pavement mixed with soil and duff accumulation. This pavement area is not as intact as the southern pavement area. The northern halfof the platform consists of level soil and a duff layer; these accumulations may overlie a buried cobble pavement surface (Fig. 40). No cultural material was observed on the platform surface or in the surrounding area. The platform most likely served as a permanent habitation feature based on its formal type and on its size. The feature may also represent a possible burial platform; this function is most likely a secondary feature function where anindividual was interred post habitation. The feature is in good condition and is located 510 meters (1,673 feet) a.m.s.l.
24081	Cave	The Site 24081 cave is located southeast of Node H26. One adult cranium was observed in the cave, and the remains were designated Human Remains 1 (HR1). HAVO-2003-L-67 is a cave of undetermined length. The cave trends north/south and the cave interior is accessed by a 2.0 wide by 0.7 m in height openingalong the eastern edge of the tube. The opening is situated within a relatively small sink formation that measures approximately 4.0 m N/S by 3.0 m E/W. The floor of the sink formation is littered with a thick layer of burned organic material that overlies pahoehoe cobbles (collapsed sink edge material). The opening provides access to both the northern and southern cave extensions. A second opening is located approximately 5 m northwest of the main opening but was not examined. One human cranium (HR1) was observed in the cave interior from the cave opening. The remains are located approximately 5.0 m south of the opening and are situated on the eastern edge of the cave. An unidentified bone fragment (possibly a lower lumbar spine or a sacrum fragment) is located withina pahoehoe cobble concentration at the main opening. Petroglyphs are located on the flat pahoehoe surface immediately west of the tube opening; the motifsare weathered and exact figures could not be accurately discerned because of the deteriorated state of the panel and due to poor lighting conditions.

Site No.	Site Name	Description
24094	Agricultural Features	Site 24094 consists of 338 agricultural features distributed throughout the current project area. The features were designated one site number based upon their apparent affiliation with agricultural activities in this area and on the similar construction materials and methods. The site consists predominately of rock piles (n=237) and rock mounds (n=67); the physical characteristics that differentiate between the two feature types was based primarily on substantive construction and was determined by the individual surveyor. The remaining features of the site include 2 C-shape planting areas (non-habitation), 16 excavated pits, 13 excavated pits within associated mounds, and three agricultural terraces, and each is described below.
24121	Kahuku-ʻĀinapō Trail	The Kahuku-ʻĀinapō trail is a segment of an "old trail system" that was used in historic times for driving cattle between various cattle ranching operations associated with Parker Ranch (ca. 1912-1947) and is located in the Kahuku Management Unit of the National Park. The trail route included stopover locations at Kapapala Ranch, Keauhou Ranch, Humu'ula Sheep Station, and Pu'u O'o Ranch. (Loyal to the Land, Bergin, ref.). The Kahuku-ʻĀinapō trail illustrated on the 1928 USGS Honuapo quadrangle map is a pathway leading north/south through the southern central section of Kahuku to approximately 5,000ft elevation, where it turns to lead northeast/southwest into the upper eastern section of the Kahuku Unit, parallel to the eastern park boundary. The total length of the Kahuku-ʻĀinapō trail located within the Kahuku Unit of the national park boundary is 35,000 meters (21.7 miles). The remainder of the trail extends beyond the northeast park boundary, into the state Kau Forest Reserve and Kapapala Ranch. Currently, the trail courses over a'a and pahoehoe lava types, and bisects various vegetation types that include pastureland, ohia and koa forests, and pukiawe scrublands. A portion of the Kahuku-ʻĀinapō trail equal to 24,600 meters (~15 miles), from Pu'u Nanaia (2,000' elevation) to Punalu'u Kahawai (6,167' elevation) was surveyed during the archeological investigations of 2004. The survey identified 24 features associated with the Kahuku-ʻĀinapō trail that consist of trail segments, trail/road segments, and cairns. The trail segments range from winding single file width pathways to bulldozed road segments wider than two meters. Significant sections of the trail have been impacted by historic lava flows, vegetation overgrowth, ungulate trampling, and ranch development activities (i.e., modern roads, water system development, and logging). Surveyors experienced difficulty in identifying many of the trail segments in the upland forests, which coincides with earlier attempts to locate upland mountain trails on Mauna Loa's slope region. The majority of trail segments identified and recorded within the pasture land area (2,000ft 5,000ft), have sustained a moderate to high level of disturbance through pasture development fence line construction, and road system development and improvements (i.e., bulldozing, widening, rerouting). A condition assessment of the site was obtained on 11/14/06 by relocating and observing 8 of the subsites which include H4,H5, H6, H8,H9, H11,H18, and H19. The site can be seen as a pathway through various terrain, including aʻa and soil. It has been obscured by vegetation in many locations. In at least one location rock walls are located in the vicinity and are probably associated with the trail and trail activities.
25935	Halapē Ruins	This site is a habitation complex consisting of a large house platform with four associated enclsoures, a windbreak wall, some small pavedareas, quarried edges and petroglyphs. House Platform: There is a paved platform ca. 8 m by 7 m with a ca. 0.7 square slab lined hearth of water worn basalt boulders near the center of the paving.The platform is outlined by slabs and cobbles level with the paving on all four sides.There are low walls/alignments outlining the edges on the northeast and southeast sides of the east corner of the platform. This platform has been built on the upper quarried surface of a prominent tumulus well inland from the coast and on the east edge of the village area. There are three probable postholes visiblenear the edges of the cobble alignments. These indicate the structure of about 7 m by 6.5 meters. There is a slightly lower terrace along the southeast andnortheast sides of the platform that appears to have been robbed to build adjacent enclosures 1 and 2. The large size of the house along with the size of the slablined hearth, the quality of the construction and prominent position of the feature overlooking the village and the coast of Kaʻū suggest that this is a high status dwelling.
25936	Halapē Ruins	This site is a 9.0m x 18.0m x 1.5 m high large rectangular enclosure with some paved areas, breakdown on the north corner and on the southern side.Vegetation has inundated the interior of the platform. There is a small enclsosure within the large enclosure that is approximatley 3 m x 3m. The hammerstone that was previously identified in the southern corner of the enclosure was not relocated, probaly due to the dense vegetation. There is a paved terrace on thesoutheast corner of the platform that is approximaltey 4m X 5 m long.

Site No.	Site Name	Description
25937	Kalue Ruins	This site consists of five historic structures positioned on a sloping pahoehoe lava flow in the southwest region of Hawaii Volcanoes National Park. Labeled as Features A-E on the provided map, features consists of terraces, enclosures, platforms, papamu, and c-shapes. Features associated with this site are described in the provided features forms (Features G and H) and consists of a fishing shrine as well as an enclosure complex. This site is in good condition with little impacts being present. Vegetation is scarce in this area which rest on the edge of a cliff and sea arc.
25938	Kūēʻē Ruins	This site consists of a remote village site in the park used as a fishing camp up to the 1970s. Area was used by opihi pickers which is evident by mass concentration of ʻopihi shell middens. These ruins are part of the Puna-Kaʻū Historic District. A series of C-shaped enclosures, excavated areas, house platforms, multi-room rectangular enclosures and cave features compose this site. In all, there are 17 sites, all of which include stone strucutres, petroglyphs, some small cave sites, two paved areas and the only example of a crop-mark site recordedin the park.The entire site stands upon the surface of an aa flow and pahoehoe flows. The ocean is located approximately 100 meters south of the site which may be described as being extremely barren, dry with occaisional tuffs of natal redtop and sourbush.This site is a cluster of many features which include a large ahu that at one time marked a brackish water spring that was not identified on this trip (although acrack is nearby that the water may have once been in), an enclosure, a C-shape, and a petroglyph panel pecked into the pahoehoe. Around these features there is shell midden scattered throughout as well as metal fragments, glass fragments and glass bottles.
25939	Keauhou Ruins-Heiau Cave	This site is located south of the Puna-Kaʻū Trail in the ahupuaʻa of Keauhou. “This site is the most complete modification of a lava tube recorded in this area. The lava tube comprises the usual sections—a collapsed section which permits entry into an intact portion of tube leading northwards (and eventually opening to the surface again through another collapse). The collapsed section has a level paved floor, almost 2m below the surrounding ground surface and near vertical walls for the most part. In places the wall of the collapse has been made vertical with carefully placed stones... On several of the paving stones are petroglyphs...” These petroglyphs are in good condition. “A narrow entrance has been constructed in the northeast corner of the paved floor area and permits access down into the intact section of the tube. Within the tube the floor is covered with a tumbled mass of large boulders, several of which are clearly waterworn and must have been carried into the tube...” (Smart et al. 1965:58). Two large, elongated, water-worn boulders are placed upright in the floor, and at least one additional boulder of similar size and shape lies on the floor in line with the othetwo. The original recordation of this resource notes only these three upright waterworn stones in this resource but the 05/18/2006 visit to the site revealed 20 upright waterworks within the immediate entrance of HV-078. Due to these additional modifications, it may be inferred that this resource continues to be used in a possible religious manner.
25940	Road Cut Cave	Road Cut Cave is a large, 500 m long lava tube with nine entrances. Cultural material is abundant and consists of hearths, charcoal, stepping stone trails, rock walls, gourd cradles, terraces, gourd remains, barrel fragments and a wooden cache of possible sandalwood sticks. This cave is associated with Kealakomo Village and is believed to have been used as a water collection resource.
25941	Mel’s Ahu	This site consists of an ahu, a rock shelter, and four petroglyphs located in the southwest region of the Kahuku unit. The ahu measures 1.5 x 1.7 m and 133 cm high, and is constructed of large basalt cobbles. It is positioned on a large pahoehoe tumulus. This ahu has been damaged recently [within the last year] with its interior being partially gutted. The ahu is currently stacked (very symmetrical) eight courses high. A rock shelter is located directly to the east of the ahu. This feature is relatively small [2.7m x 1.1m] and is partially filled with angular basalt rock rubble. Due to the positioning of the rocks, it appears to be a possible burial. There is a green patina on the rocks giving the impression this feature has not been disturbed for many years. There are four anthropomorphic petroglyphs in this site. Two on the western edge of the tumulus are large (1 meter long). One appears to resemble a moʻo o lizard, the other is shaped like a kane or man. On the interior slope the anthropomorphic glyph is crowned with horns that could be representative of the long horn cattle that arrived with Captain Vancover in 1896. In addition to these four petroglyphs there is a small pecked circle 6 cm in diameter and 3 cm deep, 50 cm north of the ahu.

Site No.	Site Name	Description
25942	Petroglyph Grotto	Petroglyph Grotto consists of a rock shelter, petroglyphs, and possible agricultural features. Located 25 meters west of the Pu'uloa Petroglyph Field, this site is positioned in a low depression or sink in a pahoehoe lava flow. The agricultural features consists of C-shapes, excavated areas as well as rock walls. This site was determined to be in good condition during the January 1, 2006 but has been disturbed and is threatened by visitor use.
25943	Hilina Pali Cave	This lava tube is a complex maze system with tiered passages and branches. There is very extensive archeology in this cave including several petroglyphs, water catchments, and charcoal deposits. This cave not only houses signifigant archeological remains but also has intricate and rare geological formations, paleontological deposits, and some biological resources.
25944	Earthquake Cave	The lower or makai entrance of Earthquake Cave is located on the southwest end of the pahoehoe sink. This entrance is 5.2 meters wide and 4.2 meters in height and is heavily vegetated with invasive and native species. The cave entrance slopes down into the main body of the cave. Charcoal as well as a stepping stone trail, rock alignment, metal fragments and gourd cradles were the only cultural materials present within this resource.
25945	Kahuku K1 Cave	This site is comprised of a small (three) cluster of features located at the southeast tip of the Keʻāmoku lava flow. The site is near the edge of the Mauna Iki lava flow which may have covered adjacent features in the area. The mauka section of the resource contains scattered petrel bones, charcoal and ash deposits. Two concentrations of petrel bones were designated as Feature One and Feature two. This section of the cave also contained geological and biological resources.
25946	Charcoal Cave	This site is a lava tube located off of the Hilina Pali Road. The cave has a large sink and a grove of trees that grow in and around the sink. The cave has a lot of sediment and charcoal deposits. These may contain signifigant cultural and paleontological resources. There is abundant charcoal throughout the cave, some water catchments, and some paleontological and geological resources.
25947	Calabash Cave	The entrance is steep and almost plugged by vegetation. Sediment and ash cover the floor. There are many gourd cradles on the floor of the cave. Charcoal also covers the cave floor as well as goat bones. The geological features present in this resource consist of cave coral. This cave is believed to have been used for water collection by ancient Hawaiians.

* This table is an expansion of Table 1 and presents information, with some modification, from ASMIS. Sites were selected for listing in this table based on the availability of expanded description in the ASMIS files. Sites marked with an * in Table 1 are included in this table.

APPENDIX B.
PUNA-KAʻŪ HISTORIC DISTRICT PHOTOGRAPHS

Figure B-1. Holei Pali, from near Naulu forest, Chain of Craters Road, 1972.

Form No. 10-301a (7/72)

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES

PROPERTY PHOTOGRAPH FORM

(Type all entries - attach to or enclose with photograph)

STATE: Hawaii
COUNTY: Hawaii
FOR NPS USE ONLY
ENTRY NUMBER: JUL 1 1974
DATE:

SEE INSTRUCTIONS

1. NAME
COMMON: Puna-Ka'u Historic District
AND/OR HISTORIC:

2. LOCATION
STREET AND NUMBER: Puna-Ka'u District, Hawaii Volcanoes NP
CITY OR TOWN: Volcanoes
STATE: Hawaii 96718
CODE: 15
COUNTY: Hawaii
CODE: 001

RECEIVED FEB 1 8 1974 NATIONAL REGISTER

3. PHOTO REFERENCE
PHOTO CREDIT: National Park Service
DATE OF PHOTO: September, 1972
NEGATIVE FILED AT: Hawaii Volcanoes NP Neg. No. 691

4. IDENTIFICATION
DESCRIBE VIEW, DIRECTION, ETC.:
Looking SE along the ridge formed by Holei pali from near Naulu forest on the Chain of Craters road.

Figure B-2. Text for Figure B-1.

Figure B-3. Waha‘ula Heiau from the air, 1967.

Form No. 10-300a
(7/72)

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES

PROPERTY PHOTOGRAPH FORM

(Type all entries - attach to or enclose with photograph)

STATE: Hawaii
COUNTY: Hawaii
FOR NPS USE ONLY
ENTRY NUMBER: JUL 1 1974
DATE:

SEE INSTRUCTIONS

1. NAME
COMMON: Puna-Ka'u Historic District
AND/OR HISTORIC:

2. LOCATION
STREET AND NUMBER: Puna-Ka'u District, Hawaii Volcanoes NP
CITY OR TOWN: Volcanoes
STATE: Hawaii 96718 CODE: 15 COUNTY: Hawaii CODE: 001

RECEIVED FEB 18 1974 NATIONAL REGISTER

3. PHOTO REFERENCE
PHOTO CREDIT: National Park Service
DATE OF PHOTO: October , 1967
NEGATIVE FILED AT: Hawaii Volcanoes NP Nsg. No. 178

4. IDENTIFICATION
DESCRIBE VIEW, DIRECTION, ETC.
Aerial view of Wahaula temple site after construction of interpretive trails. Looking makai, toward the ocean.

INT: 1584-78

Figure B-4. Text for Figure B-3.

Figure B-5. Keauhou Landing, 1972.

Form No. 10-300a
(7/72)

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES

PROPERTY PHOTOGRAPH FORM

(Type all entries - attach to or enclose with photograph)

STATE: Hawaii
COUNTY: Hawaii
FOR NPS USE ONLY
ENTRY NUMBER: JUL 1 1974
DATE:

SEE INSTRUCTIONS

1. NAME
COMMON: Puna-Ka'u Historic District
AND/OR HISTORIC:

2. LOCATION
STREET AND NUMBER: Puna-Ka'u District, Hawaii Volcanoes NP
CITY OR TOWN: Volcanoes
STATE: Hawaii 96718
CODE: 15
COUNTY: Hawaii
CODE: 001

RECEIVED
FEB 4 1974
NATIONAL REGISTER

3. PHOTO REFERENCE
PHOTO CREDIT: National Park Service
DATE OF PHOTO: 1972
NEGATIVE FILED AT: Hawaii Volcanoes NP, Neg. No. 59-56

4. IDENTIFICATION
DESCRIBE VIEW, DIRECTION, ETC.:
Keauhou landing is an important site in connection with the ranching and pulu harvesting periods. The stone walled enclosures and house site are mostly late historic. Some sites in the vicinity are of prehistoric age. Looking toward Halape from Keauhou.

Figure B-6. Text for Figure B-5.

Figure B-7. Ruins at Kue‘e, from the air, 1972.

Form No. 10-301a
(7/72)

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES

PROPERTY PHOTOGRAPH FORM

(Type all entries - attach to or enclose with photograph)

STATE: Hawaii
COUNTY: Hawaii
FOR NPS USE ONLY
ENTRY NUMBER: Jul 1 1974
DATE:

SEE INSTRUCTIONS

1. NAME
COMMON: Puna-Ka'u Historic District
AND/OR HISTORIC:

2. LOCATION
STREET AND NUMBER: Puna-Ka'u District, Hawaii Volcanoes National Park
CITY OR TOWN: Volcanoes
STATE: Hawaii 96718
CODE: 15
COUNTY: Hawaii
CODE: 001

3. PHOTO REFERENCE
PHOTO CREDIT: National Park Service
DATE OF PHOTO: Sept. 25, 1972
NEGATIVE FILED AT: Hawaii Volcanoes NP Neg. No. CIRE-HAVO 813

RECEIVED FEB 19 1974 NATIONAL REGISTER

4. IDENTIFICATION
DESCRIBE VIEW, DIRECTION, ETC.
Kuee ruins from the air. The white areas in and near the stone enclosures are shell midden from the opihi collecting. The area is still in use by modern day fishermen and shellfish collectors.

NPS: 184-72

Figure B-8. Text for Figure B-7.

APPENDIX C.
STATUS OF HAVO ROCK ART RECORDING

The following information was provided by Ed and Dianne Stasack in 2006.

Table C-1. Status of Rock Art Recording at HAVO.

Site	Data Pending	Report Pending (1)	Final Completed
PĀNAU IKI AND NUI Ahupua'a			
Lae'apuki/Pānau Iki			March 1999
Kāheka and West			June 1998 Addendum May 2000
Paliuli Cave		X	
Paliuli Surface Sites	X (2)		
Pu'uloa Part II		X	
Pu'uloa Trail Sites:			
West of Pu'u		X	
East of Pu'u		X	
Makai of Pu'u		X	
Transect 3	X (3)		
Transect 6	X (4)		
Chain of Craters Road near Pu'uloa trailhead		X	
Kaena Point		X	
Feature 396			June 1998
Ki Cave (Hairpin Turn Cave)			August 1999
Hōlei Pali Sites:			
Feature 90		X	
Feature 53		X	
Feature 10		X	
Feature 11		X	
KEALAKOMO Ahupua'a			
Roadcut Caves: Locus 1 Locus 2 Locus 3 Locus 4 Locus 5			September 1999
Nā'ulu Cave		Locus 3 addendum	July 1998 (Loci 1 & 2)

Site	Data Pending	Report Pending (1)	Final Completed
Kealakomo mauka (surface and cave)		X	
KAHUE Ahupua'a			
Kahue	X (5)		
'ĀPUA Ahupua'a			
'Āpua Point	(X)	X (6)	
'Ainahou Cave			June 1999
Keauhou Trail Cave	X (7)		
KEAUHOU Ahupua'a			
Keauhou Sites:			
HV-75		X	
HV-76			February 1997
HV-78		X	
HV-113			January 2001
Shore pu'u		X	
Cistern area		X	
KAPĀPALA Ahupua'a			
Halapē	X (8)		
Hilina Pali Sites:			
HV-383-C		X	
HV-386-C		X	
HV-387-S		X	
HV-388-S		X	
HV-389-S		X	
HV-392-S		X	
HV-393-C		X	
Trailside Cave			January 2003
Kamo'oali'i Sites:			
Heiau Site		X	
Pali Site	X (9)		
Trail Site	X (10)		
Benchmark	X (11)		
Misc. Sites	X (12)		
KA'ALA'ALA MAKAI Ahupua'a			
Ku'e'e	X (13)		

Site	Data Pending	Report Pending (1)	Final Completed
OTHERS (exact location unknown to rock art recording project)			
HV-120	X (14)		
Kaukau Cave	X (15)		

Endnotes:

(1) All of the sites listed under the "Report Pending" column have had field data collected and ready to have final reports prepared. Funds for the final year of the Hawai'i Community Foundation (HCF) grant are primarily for recording as many of the HAVO sites as possible. The Stasacks continue to prepare final reports for all sites under the "Report Pending" column.

(2) Fieldwork for these sites could be completed by HAVO personnel.

(3) This site needs to be relocated and assessed for recording in the future.

(4) This site needs to be relocated and assessed for recording in the future.

(5) Kahue cannot be recorded at this time. The restrictions on the amount of vegetation that could be removed, i.e., limiting cutting of naupaka to only the lower branches, made recording of this area (very thick in vegetation) unrealistic. Possibly, in the future, recording efforts could be coordinated with the botanical replanting efforts. Much of the vegetation is exotic and planned for replacement with native species. When this occurs, then rock art recording of this area could occur.

(6) The area around the tumulus is recorded up to about 100 feet mauka of the trail. From this point to the shore, and the area around ʻĀpua Point itself, have yet to be recorded. These unrecorded areas contain relatively smaller loci of petroglyphs.

(7) This site has a few petroglyphs (estimated at 15-20) on one wall of a small cave near the Keauhou Trail. HAVO personnel know of its location, and this site can be recorded by them, using the techniques taught them.

(8) Data have been collected but more work may be needed to complete the recording.

(9) This site is approximately 1 mile from the heiau site, off the trail and facing away from the trail.

(10) This is a small site on the old Hawaiian trail mauka and west of the heiau site. This site can be recorded by HAVO personnel using techniques taught them.

(11) This is a small site on the old Hawaiian trail mauka and west of the heiau site. This site can be recorded by HAVO personnel using techniques taught them.

(12) There are a number of sites, possibly of individual petroglyphs, located throughout the forested area which are known to the vegetation maintenance crew. Recording of these petroglyph sites can be completed by HAVO personnel.

(13) This area apparently is a very difficult access for long-term camping (i.e., a 7-day camp-out) and on a site (very windy area) that would not allow for staking tent pegs due to lack of soil. It would have required importation of all water and equipment (by helicopter) for a relatively large number of people. The logistics of this fieldwork out-weighed the information that would been obtained from the recording, based on information from previous surveys. This does not preclude, however, the importance of this area being recorded in the future. It would require considerable in-kind commitment and support on the part of HAVO to complete this recording.

(14) We inquired about this cave and pali area about 1-2 years ago during the planning process. At that time, we were informed that there were just a few petroglyphs. Given this area would have required helicopter access and an extended camp-out, we decided not to record this area (i.e., the financial commitment to record just a few petroglyphs could not be justified). In October of 2000 we were informed that this site may have 100-200 petroglyphs over a number of sites in the area. Given this new information, it would be an important area to record, especially given its location on/near the Puna-Kaʻū border. However, since the grant monies were reallocated to other sites during the original planning process, this site cannot be recorded with the existing grant. This area probably has

significant connections relative to cultural history and should be recorded. If HAVO takes on this project, we can be available to assist in the future.

(15) Recording of this site probably cannot be completed because of nene wilderness restrictions for area (personal communication with Bobby Camara, December 1999).

APPENDIX D.
INVENTORIES OF RESOURCE MATERIALS
(HISTORICAL MAPS, ARCHEOLOGICAL MAPS, AND DOCUMENTS)

Mangaement of archeological inventory data may involve more that site records. It is often useful to maintain inventories of source materials for research. The following three tables are preliminary inventories of historical maps, archaeological maps, and documents relating to the HAVO area.

Table D-1. Historical Maps Relating to the HAVO Region (see Figures following).

ID	Surveyor	Date	Title	Scale	Notes	Repository/ Source
HM001	?	?	Bishop Estate to Territory of Hawaii, Keauhou, Kau, Hawaii	1 inch = 4000 feet		HAVO Library ***
HM002	Map in Ellis	1825	Hawaii [island]		American edition	Fitz:87
HM002a	Malden	1825	Kilauea			Fitz:89
HM003	Map in Ellis	1827	Hawaii [island]		English edition	M&F:I:86
HM003a	Kalama	1837	Islands			M&F:III:10
HM003a _detail	Kalama	1833	Hawaii		Detail from 1833 map	-
HM004	Lahainaluna Seminary	1838	Hawaii, detail from "A Map of the Hawaiian Islands"		One of the most important maps in history of Hawaii, notable for many ahupua'a names	
HM005	US Exploring Expedition	1840	Island			Fitz:99
HM006	US Exploring Expedition	1841	Island			
HM006a	US Exploring Expedition	1841	Mokuaweoweo			
HM007		1843	Island			Fitz:145
HM008	unknown	1846 Aug	Kilauea Summit	1 inch = 0.67 miles (estimated)	sketch map of Kilauea and Kilauea Iki, note says "found in the Interior Department Books in 1881 and deposited in Survey Office. C.J. Lyons"	State Archives
HM010	Lyman, F.S.	1850	map of Pānau Nui		referenced in Durst and Moniz Nakamura 2003 (Kealakomo report)	
HM011	Lyman, H.M.	1853	map of Pānau Nui		Hawaiian Government Survey, GRM No. 33; section of map reproduced in Langlas 2003	SSO
HM012	Lyman, F.S.	1860	map of Grant 2893, Pānau Nui		referenced in Durst and Moniz Nakamura 2003 (Kealakomo report)	

ID	Surveyor	Date	Title	Scale	Notes	Repository/ Source
HM013	Lydgate, J.M.	1874	Āpua	1 inch = 2,000 ft	GRM No. 12; watercolor on vellum; notes that red line marks "real boundary" and blue line marks "straightened boundary;" affects mauka boundaries above Poliokeawe pali; real boundary is makai side of Puu Huluhulu; shows Puna coast trail, Keauhou trail, Kau-Puna road, and road along mauka Apua boundary going to Kilauea, Puna, and Olaa (this is the Kalapana road)	SSO
HM014	Lydgate, J.M.	1874	Plan of Keauhou, Kau, Hawaii	1:48,000	Hawaiian Government Survey, GRM No. 27	SSO
HM015	Lydgate, J.M.	1874	Kapapala		Hawaiian Government Survey, GRM No. 510	SSO
HM016	Lydgate, J.M.	1874	Crater of Kilauea		Hawaiian Government Survey, GRM No. 5; attached to Lydgate 1874	SSO
HM017	Lydgate, J.M.	1874-75	Crater of Mokuaweoweo		Attached to Hawaiian Government Survey, GRM No. 5	
HM018	Lydgate, J.M.	1875	Crater of Mokuaweoweo and Crater of Kilauea	1:24000	Copy became GRM No. 5	M&F:71
HM019	Lydgate, J.M.	1875	Map of Puna	1:60,000	Hawaiian Government Survey, GRM No. 568; watercolor on linen; fragile; shows Keauhou trail, trail from Kilauea crater to Kalapana (same trails as shown on Lydgate's map of Apua)	SSO
HM020	Lydgate, J.M.	1875	Crater of Kilauea	1:24,000	Hawaiian Government Survey, GRM No. 5; shows east 1/3 of crater edge with tree symbol, west 2/3 of crater edge in gravel plain; shows extent of 1868 flow within crater; attached to Lydgate 1874 map of crater	SSO
HM021	Dodge, F.S.	1882 Aug 21	Halemaumau	1 inch = 500 feet	map 3 of a series of 10 maps made between 1865 and 1906	State Archives
HM022	Alexander	1885	Craters of Mokuaweoweo			M&F:73
HM023	Wall	1886	Island			M&F: 61
HM024	Dodge, F.S.	1886	The Crater of Kilauea, Hawaii.	1:12,000	"Triangulation and Details of Sunken Portion are from Survey of April 1886 by J.S. Emerson of the Hawaiian Government Sruvey. Outlines of Kilauea and the Small Craters from Wm. T. Brigham Survey of 1865."	SSO

ID	Surveyor	Date	Title	Scale	Notes	Repository/ Source
HM025	Dodge, F.S.	1886 Nov	The Crater of Kilauea, Hawaii.	1:6,000	Hawaiian Government Survey, GRM No. 1275; "Survey in Sept-Oct 1886, by Frank S. Dodge. Outlines of Halemaumau and New Lake and a Portion of the Triangulation by J.S. Emerson."	SSO
HM026	Lyons, C.J.	1891	Kaohe and Humu'ula	1 inch = 5,000 ft	GRM No. 1641; detailed map of Mauna Kea but shows info at boundary of Kaohe and Keauhou/Kapapala (see notes below)	SSO
HM027	Dodge, F.S.	1894 July 30	Halemaumau	1 inch = 200 feet	map 4 of a series of 10 maps made between 1865 and 1906	State Archives
HM028	Donn, John M.	1901	Hawaii, Hawaiian Islands	?	Hawaii Territorial Survey; "specially prepared map of the County of Hawaii for Governor's Annual Report, Illustrating Conditions as of June 30, 1906" (base map is dated 1901); in color, showing public lands, homestead settlement tracts, grazing pineapple, sugar plantations, forest reserves, forests not in reserves, rice and taro wetlands, schools, post offices	SSO
HM029	Baldwin, E.D.	1903	Plan of Keauhou, Kapapala. Upper boundary line	1:5,000		
HM030	Baldwin, E.D.	1906 Dec 29	Halemaumau	1 inch = 500 feet	"From survey made by triangulation and stadia measurements with 5" transit. Outlines of 1888 and 1892 from Mr. F.S. Dodge's surveys;" map 5 of a series of 10 maps made between 1865 and 1906	State Archives
HM031	Baldwin, E.D.	1907 Jan 8	Kapapala, Kau, Hawaii. Survey and Map of Makai Portion, including Kau-Volcano Road and Bluffs just above same	1 inch = 2,000 feet	Hawaii Territory Survey; traced from GRM No. 2388, H.E. Newton, January 1907	SSO HAVO CRD BPBM
HM032	Wright, Geo. F.	1907 Jan 8	Kapapala, Kau, Hawaii. Survey and Map of Mauka Portion, including Ohaikea to Ainapou – Forest Reserve and Cane Areas	1 inch = 2000 feet	Hawaii Territory Survey; traced from GRM No. 2388, H.E. Newton, January 1907	SSO HAVO CRD BPBM
HM033	Campbell, Marston	1910	Proposed Volcano National Park (on HTS 1910 base map)	—	Hawaii Territory Survey; traced by George Podmore	reproduced in Durst and Moniz Nakamura 2002

ID	Surveyor	Date	Title	Scale	Notes	Repository/ Source
HM034	Cook, Thomas E.	1910	Plan of Proposed National Park at Kilauea Volcano, Hawaii, T.H.	1 inch = 2,000 feet	Hawaii Territory Survey, GRM No. 2514; compiled from various maps and surveys	SSO
HM035	USGS	1912	Proposed Kilauea Volcano National Park; Special Map, Advance Sheet. Hawaii (Hawaii County)	1:31,680	Surveyed in 1912; USGS and Territory of Hawaii	BPBM
HM036	Pierce	1914	Kapapala, Kau	1 inch = 5000 ft	Reduced from GRM No. 2388	
HM037	O'Neill, R. and J. Iao	1915	Puna Government Tracts, Puna, Hawaii.	1 inch = 5,000 feet	Hawaii Territory Survey; traced from Government Survey Map, January; blueline showing grnts, LCAs, schematic pali, vegetation lines, roads, topographic lines	State Archives
HM038	?	1920	Addition to Hawaii National Park. Portion of Kau Desert. Kapapala, Kau, Hawaii.	?	Survey Department of the Territory of Hawaii.	HAVO CRD *
HM039	USGS	1922	Kilauea Crater Quadrangle	1:31,680	Surveyed 1913-1922; Note: this copy is marked with handwritten note "Jaeger Field" and the caption "showing bore hole location...1922"	BPBM
HM040	USGS	1922	Kapapala Quadrangle	1:31,680	Surveyed 1920 and 1921	BPBM
HM041	USGS	1922	Kau Desert Quadrangle	1:31,680	Surveyed 1912 and 1921; Note "Edition of 1930"	BPBM
HM042	USGA	1922	Keauhou Quadrangle	1:31,680	Surveyed 1912-1922	BPBM
HM043	unknown	1928	Kau Forest Reserve, Kau, Hawaii	1 inch = 4,000 feet	Hawaii Territory Survey	BPBM
HM044	unknown	1928	Addition to Hawaii National Park. Kilauea Crater Section, Puna and Kau, Hawaii	1:10,000		
HM045	Wall, Walter	1928	Map of the Island of Hawaii.	1 inch = 20,000 feet	Hawaii Territory Survey.	
HM046	USGS	1930	Topographic quadrangles: Glenwood; Keauhou; Kau Desert	1:31,680	Surveyed 1913-1922	
HM047	Murray, C.L.	1930 May	Kapapala Forest Reserve, Kapapala, Kau, Hawaii	1 inch = 4,000 feet	GRM 2838	BM

ID	Surveyor	Date	Title	Scale	Notes	Repository/ Source
HM048	Copp, Henry B.	1930 June	Kapapala Forest Reserve, Kapapala, Kau, Hawaii	1 inch = 4,000 feet	Hawaii Territory Survey, HTS Plat 119, traced from GRM No. 2838; only about ¼ of map falls within park (includes Bird Park, Keamoku flow, Mauna Loa trail, Old Kau-Puna trail, old Prison Camp, Halemaumau crater)	HAVO CRD (map drawer)
HM049	USGS	1933	Hawaii National Park (Kilauea – Mauna Loa Section) Island of Hawaii; Topographic Map	1:62,500	Surveyed in 1912-1927; edition of 1933	BPBM
HM050	USGA	1940	Mauna Loa Quadrangle	1:62500	Surveyed 1920 and 1925-1926; This is a 15' quad, with 1940 date	BPBM
HM051	Department Engineer, Ft. Shafter; US Army	1942	Southeast Quadrangle, Island of Hawaii	1:125000		BPBM
HM052	Department Engineer, Ft. Shafter; US Army	1942	Southwest Quadrangle, Island of Hawaii	1:125000		BPBM
HM053	Medeiros, A.B.	1942 Sep	Roads and Trails, Hawaii National Park.	1 inch = 1 mile	hand-drawn, hand lettered map; approximately 24x36 inches; showing trails and roads in park	HAVO Archives (MC2D1F1)
HM054	?	1943	Land Court Map of Kamoamoa with survey lines. Royal Patent 1665 LCA to Kaonaeha	?		HAVO CRD **
HM055	Murray, Chas. L.	1943 Oct	Addition to Hawaii National Park. Keauhou to Kahaualea	3 inches = 800 feet	Hawaii Territory Survey, HTS 863; shows grants, LCAs, coast trail, Keauhou trail, Volcano-Kalapana trail, Ainahou Ranch	HAVO CRD HAVO Archives (MC2D1F1)
HM056	?	1950	Pasture Lease, Kapapala, Kau	?	Survey Department of the Territory of Hawaii; dated July 28.	HAVO CRD *
HM057	TMK	1950?				
HM058	?	1952 Dec 22	Hawaii National Park and Additions. Showing land status	?		HAVO CRD **
HM059	NPS Branch of Plans and Designs	1953 July	Kilauea CCC Camp. Part of the Master Plan for Hawaii National Park	1 inch = 40 feet	Drawing No. 2011-F, Sheet 10; inset shows camp on the north side of Kilauea Iki crater;	HAVO Archives (MC2D2F1)
HM060	?	1954	Addition to Hawaii National Park. Portions of the Land of Kahaualea.	?	Survey Department of the Territory of Hawaii; dated December.	HAVO CRD **

ID	Surveyor	Date	Title	Scale	Notes	Repository/ Source
HM061	?	1954	Addition to Hawaii National Park. Kealakomo.	?	Survey Department of the Territory of Hawaii; dated December.	HAVO CRD *
HM062	?	1954	Addition to Hawaii National Park. Poupou and Pulama, Puna, Hawaii.	?	Survey Department of the Territory of Hawaii; dated December.	HAVO CRD *
HM063	Murray, Chas. L.	1954 Dec	Addition to Hawaii National Park. Portion of Panau Iki and All of Grants 9163:1 and 9163:2. Apua, Panau Nui, and Laeapuki, Puna, Hawaii.	1 inch = 0.5 miles	Hawaii Territorial Survey, HTS Plat 863-D.	HAVO CRD (map drawer)
HM064	Murray, Chas. L.	1954 Dec	Addition to Hawaii National Park. Portion of the Land of Keauhou	1 inch = 0.5 miles	Hawaii Territory Survey; includes Ainahou Ranch.	HAVO CRD
HM065	Murray, Chas. L.	1954 Nov	Addition to Hawaii National Park. Grant 2893 to kenaaulani and Grant 2166 to Palapala. Kealakomo, Puna, Hawaii.	1 inch = 0.5 miles	Hawaii Territorial Survey, HTS Plat 863-C. Shows Puna Trail, area at coast outlined and labeled “Village Site” (presumably Kealakomo village).	HAVO CRD (map drawer)
HM066	?	1955	Addition to Hawaii National Park. Panau Iki. Grant to Pou.	?	Survey Department of the Territory of Hawaii; dated January 14.	HAVO CRD *
HM067	[Hitchcock, D.H.]	n.d.	Notes and plan of Waha‘ula heiau. Copied at Volcano House by W. T. Brigham in 1890		handwritten note on the ms. reads “Brigham’s handwriting—copying Hitchcock’s notes.”	BPBM Hawn Sources Coll II, pp. 383–4, Emory Coll, Grp 10, Box 2

ID=temporaty id number assigned to cross-reference illustrations in the AOA.
Repositories/Sources: SA=State Archives
SSO=State Survey Office
HAVO CRD=HAVO Cultural Resources Office

BPBM = B.P. Bishop Museum
Fitz = Fitzpatrick 1986
M&F = Moffat and Fitzpatrick 2004

* listed on “Drawer 4. Inventory of Maps Inherited from Maintenance;” this is an inventory contained in a black 3-ring binder in the Cultural Resources Devision’s library. Only those maps for which there is no other information or known repository are marked with *.

** listed on “Drawer 5. Inventory of Maps Inherited from Maintenance;” this is an inventory contained in a black 3-ring binder in the Cultural Resources Division’s library. Only those maps for which there is no other information or known repository are marked with **.
*** information taken from listing titled “Maps in HAVO Library;” in black 3-ring binder in the Cultural Resources Division’s library.

Notes on Lyons 1891 map of Kaohe and Humuʻula:
cone in Mokuaweoweo Crater has label “first adopted as a corner by Lydgate for the land Kapapala.”
Point called Naohuleelua at the corner of Keauhou, Puuanahulu, and Kaohe has label “Scene of battle between Hamakua and Kau birdcatchers. Located by J.M. Alec [unreadable] on Keauhou survey. Settled as … [unreadable];” point is on north side of “Lava Flow of 1859.”

FIGURES FOR APPENDIX D, TABLE D-1

The following figures are reproduced as well as printing resolution will allow. In several cases details cannot be resolved. In these instances the maps in the appendix can be used as a guide for the general information available, but the source used for map duplication or the original map will need to be consulted for greater detail.

In general, for any research that involves critical map study an examination of original maps is recommended. Experience has shown that important details may be lost in even the best of published reproductions. Further, archival map research will on occasion result in the discovery of maps that have hand-written notes which are of historical value.

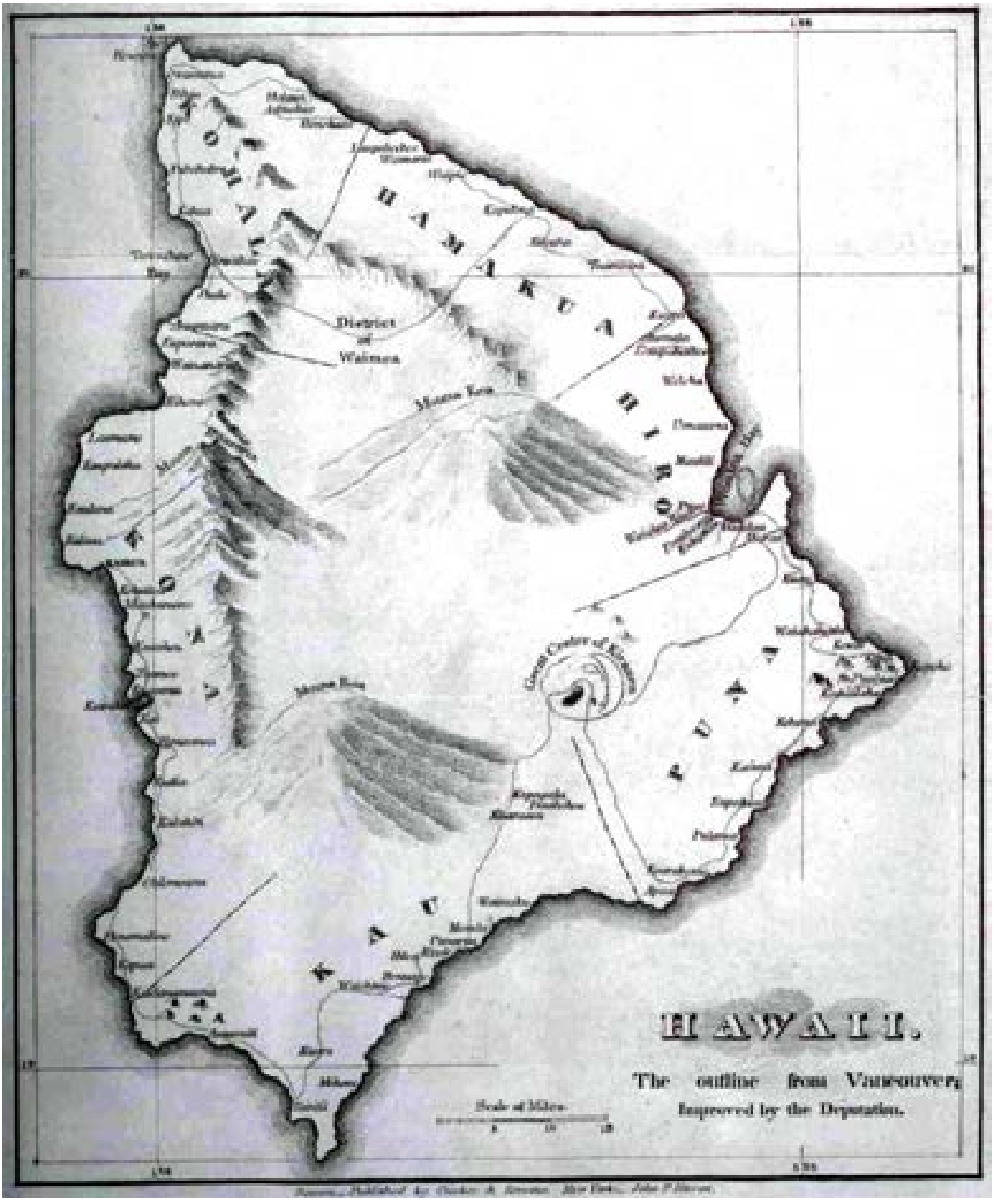
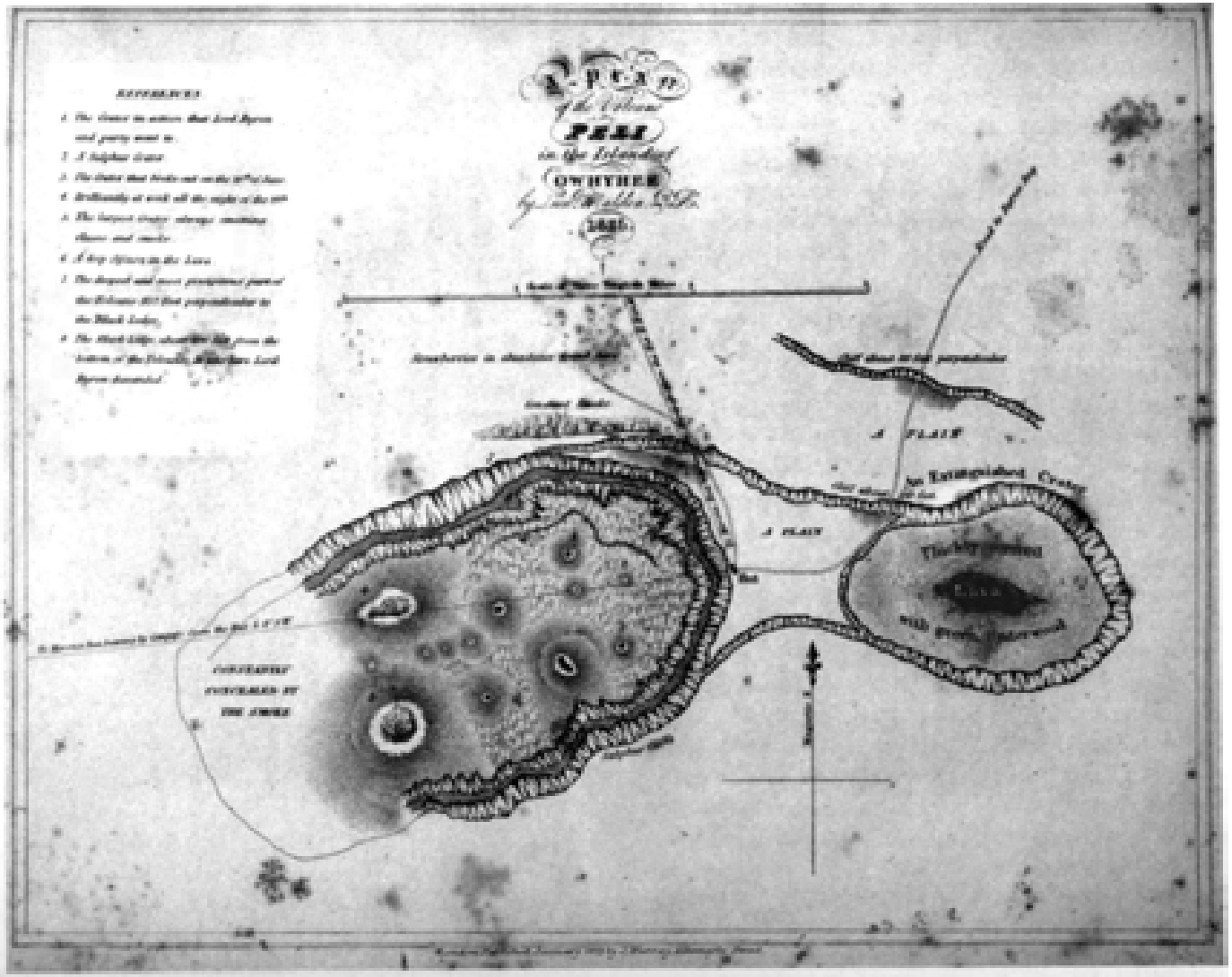


Figure D-1. HM002_1825.



50 *Kilauea, Charles Malden, 1825*

Published in 1827, this map drawn in 1825 is a result of the first survey of the famous volcano. Scientific study of the volcanoes of Hawai'i essentially began with Malden's survey.

Figure D-2. HM002a_1825.

Figure D-3. HM003_1827.

Figure D-4. HM003a_1837.

Figure D-5. HM003a_1837_HI.

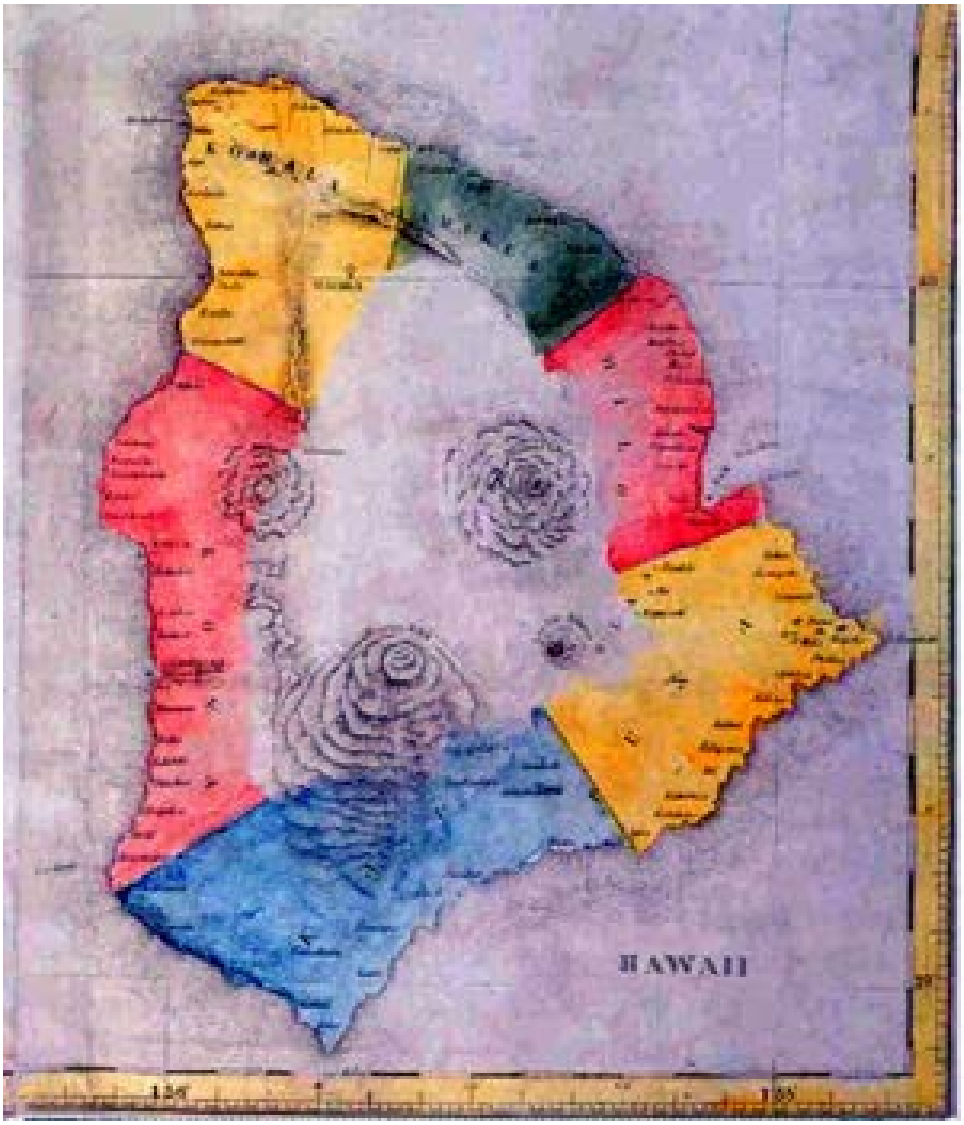


Figure D-6. HM004_1838.

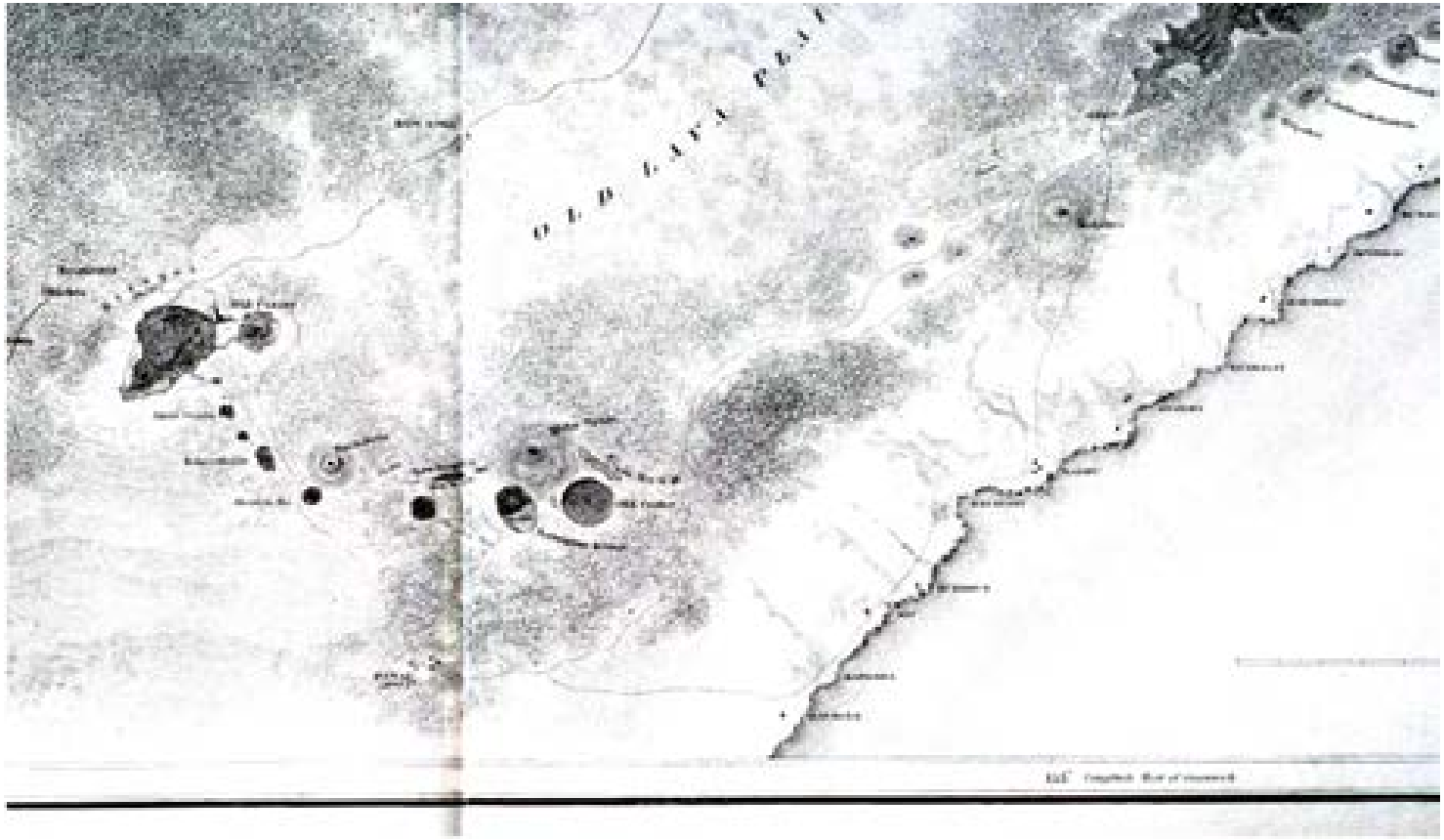


Figure D-7. HM005_1840.

Figure D-8. HM006_1841.

Figure D-9. HM006a_1841.

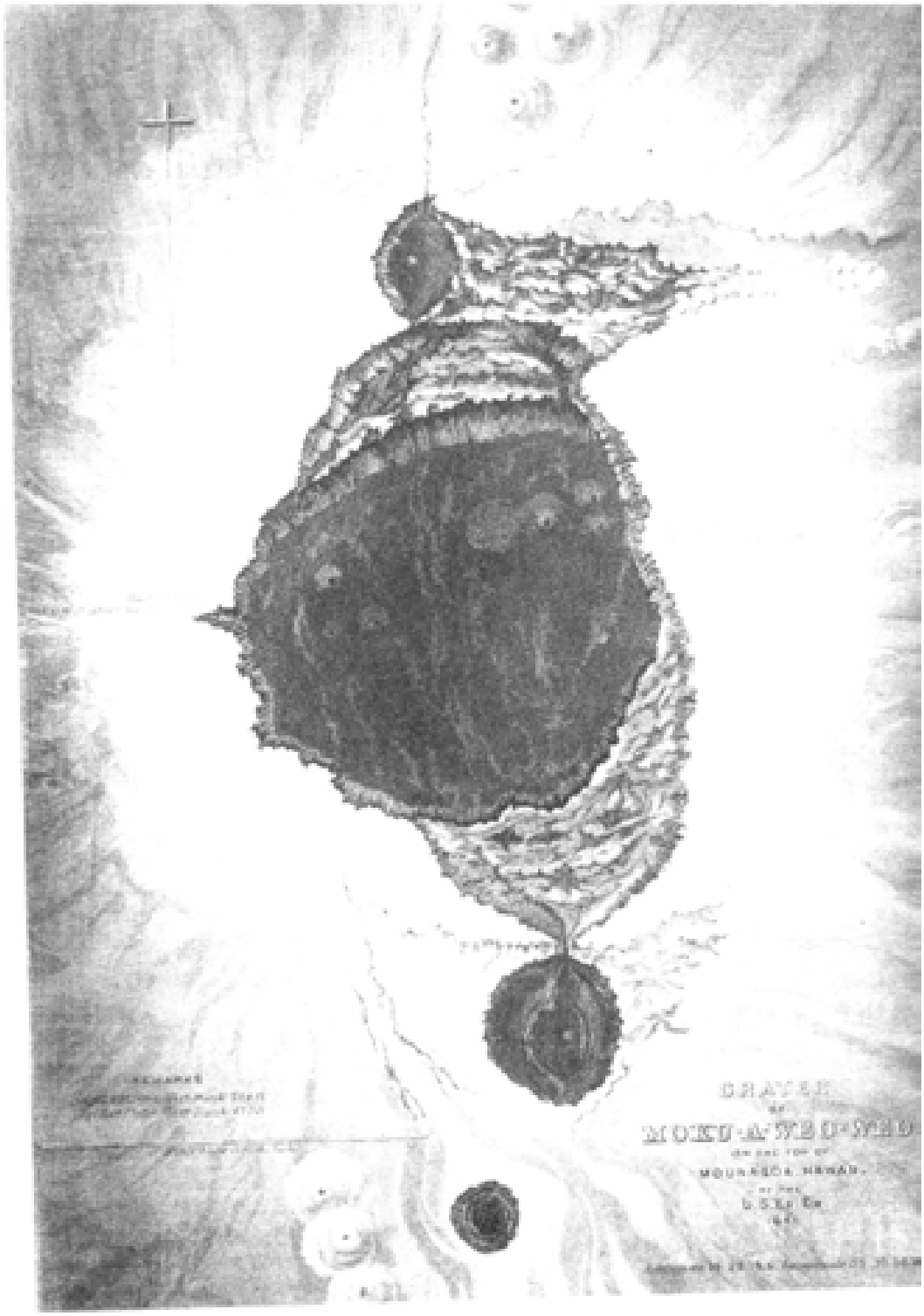


Figure D- 10. HM006a1_1841.

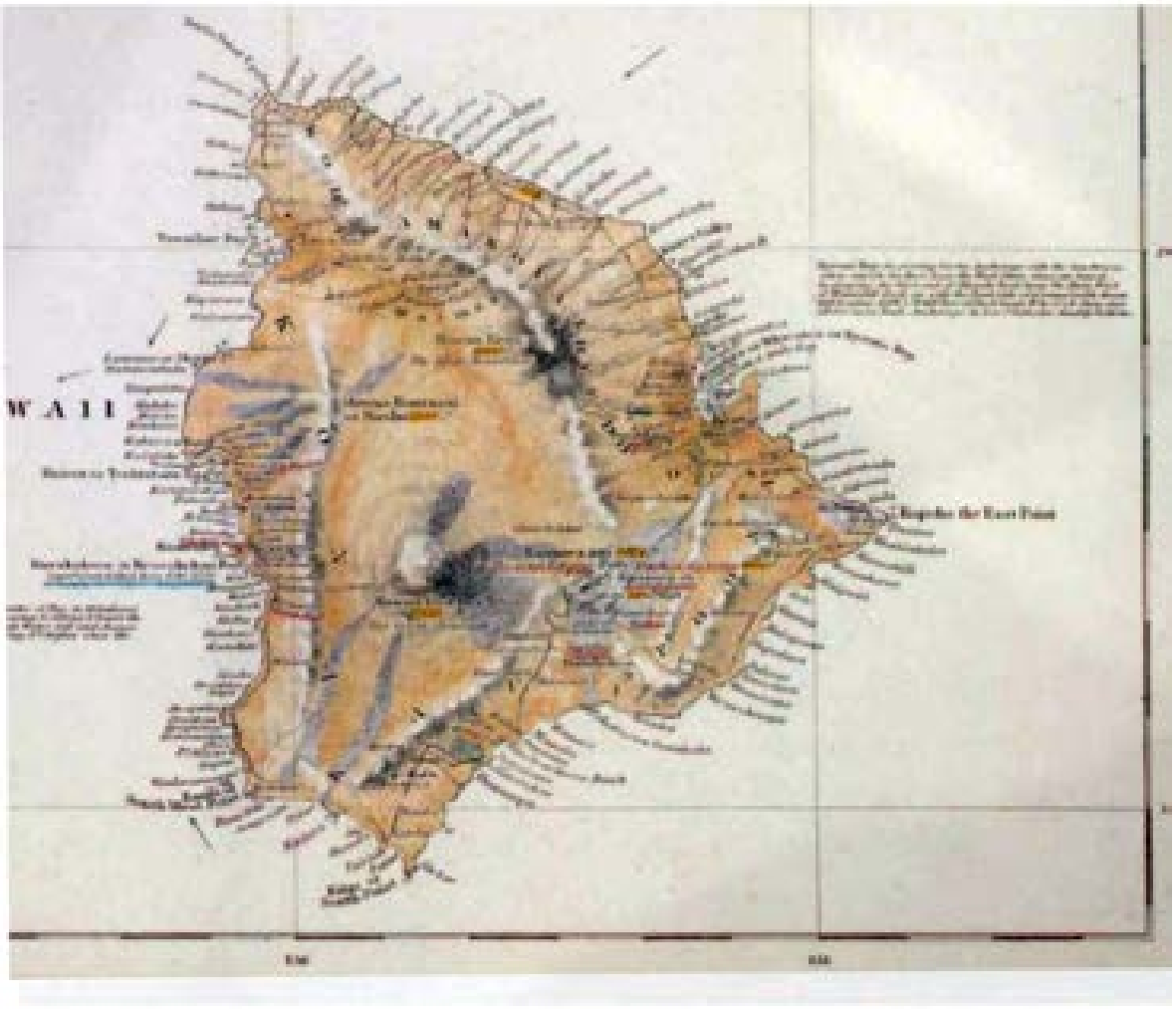


Figure D-11. HM007_1843.

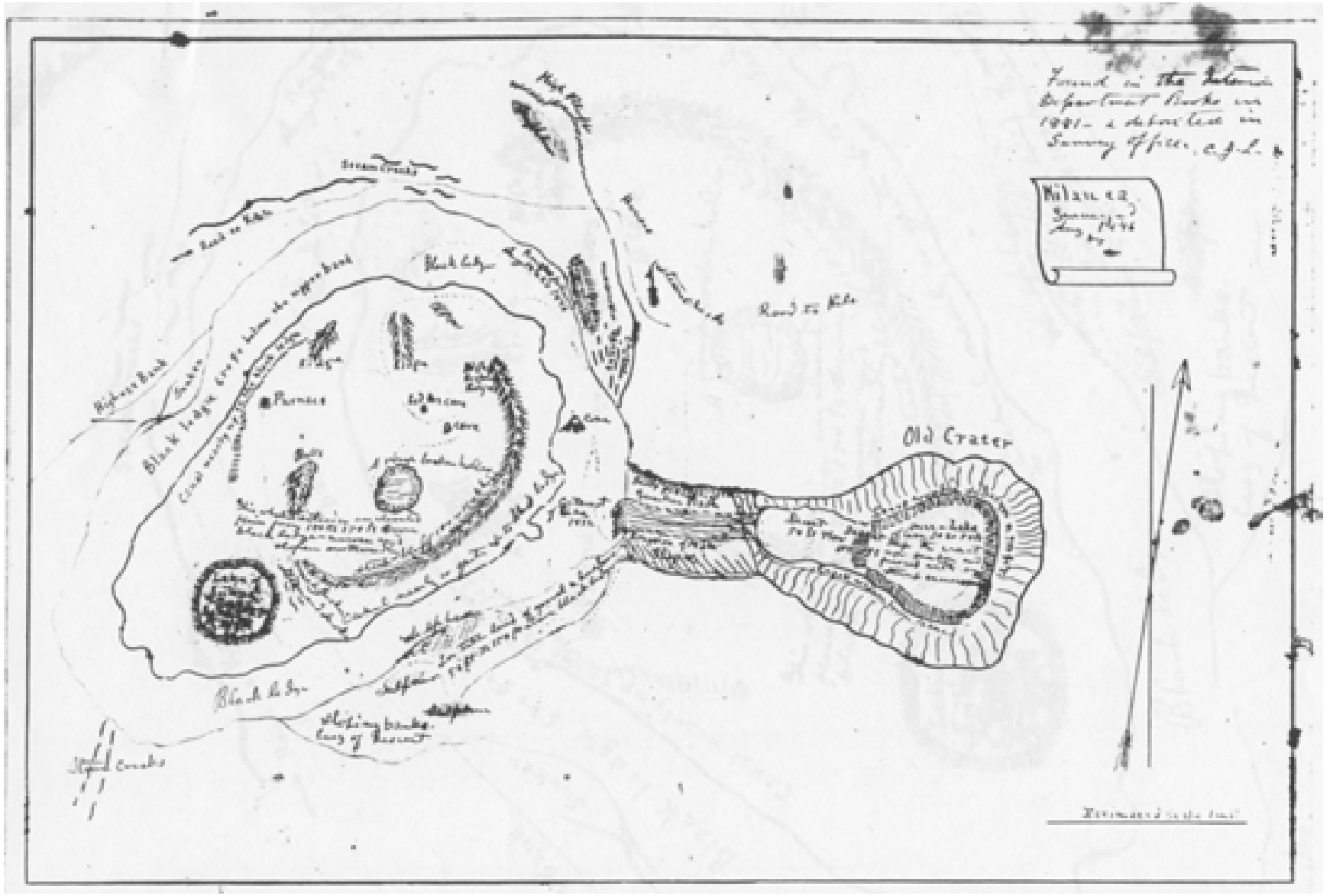


Figure D-12. HM008_1846.

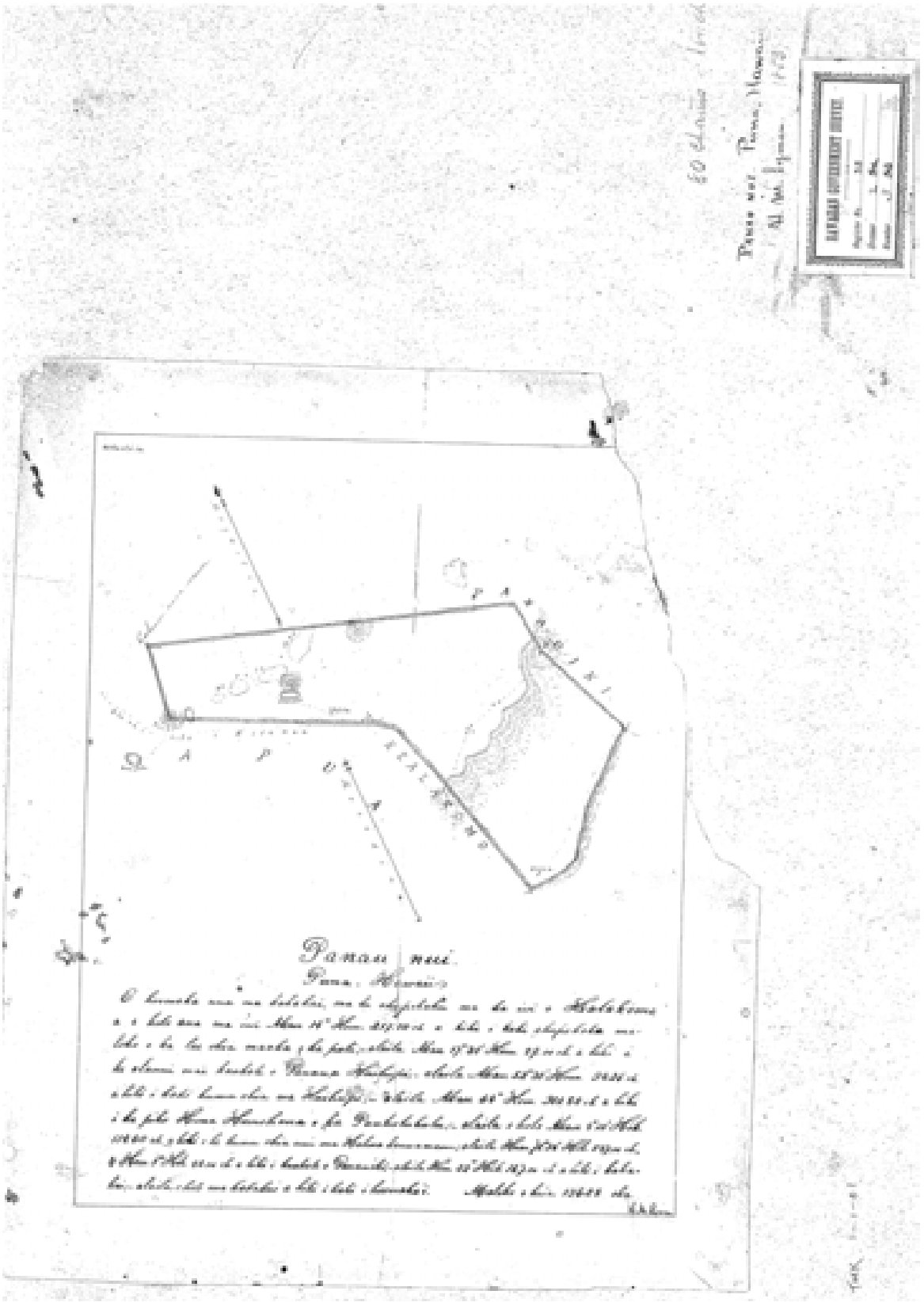


Figure D-13. HM011_1853.

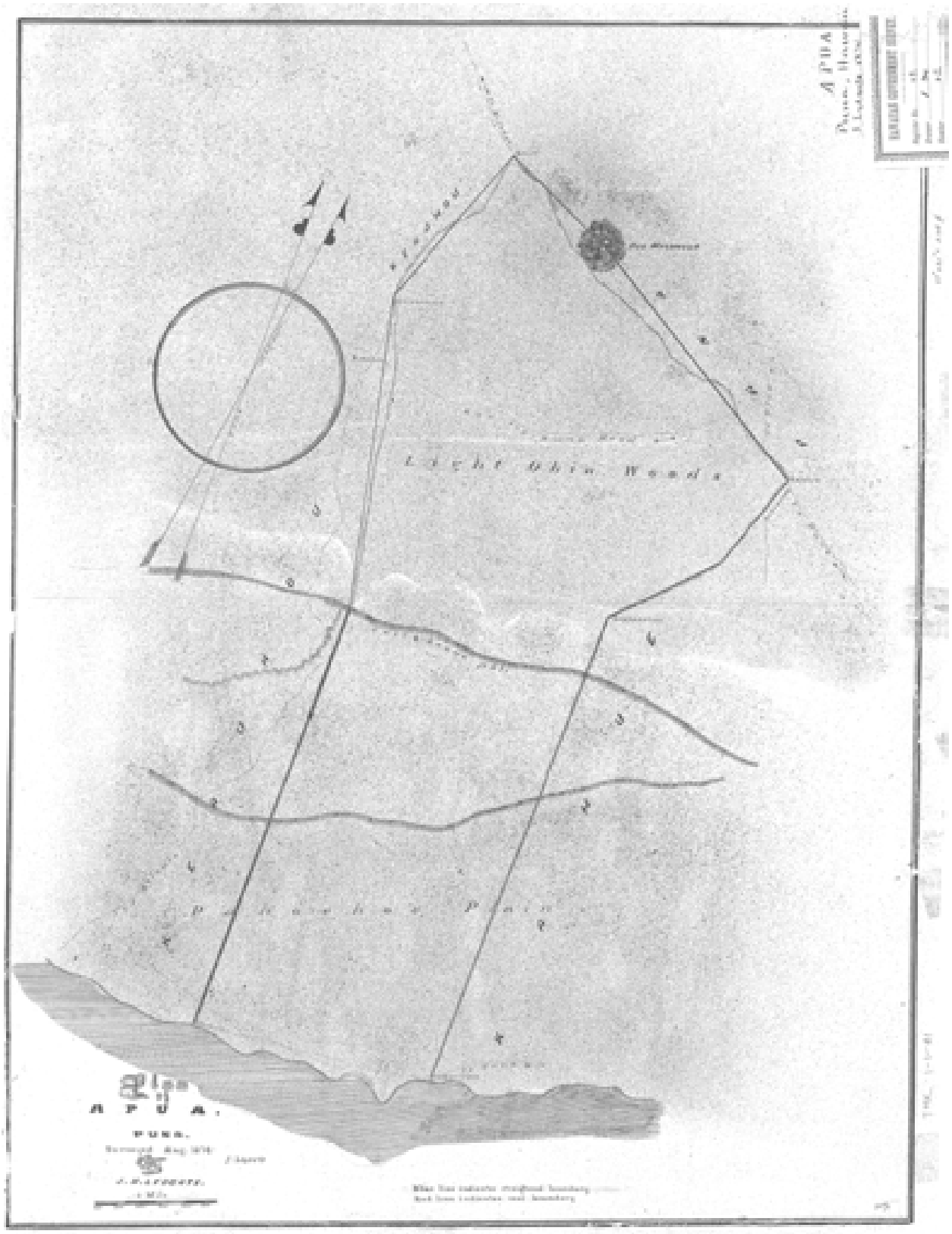


Figure D-14. HM013_1874.

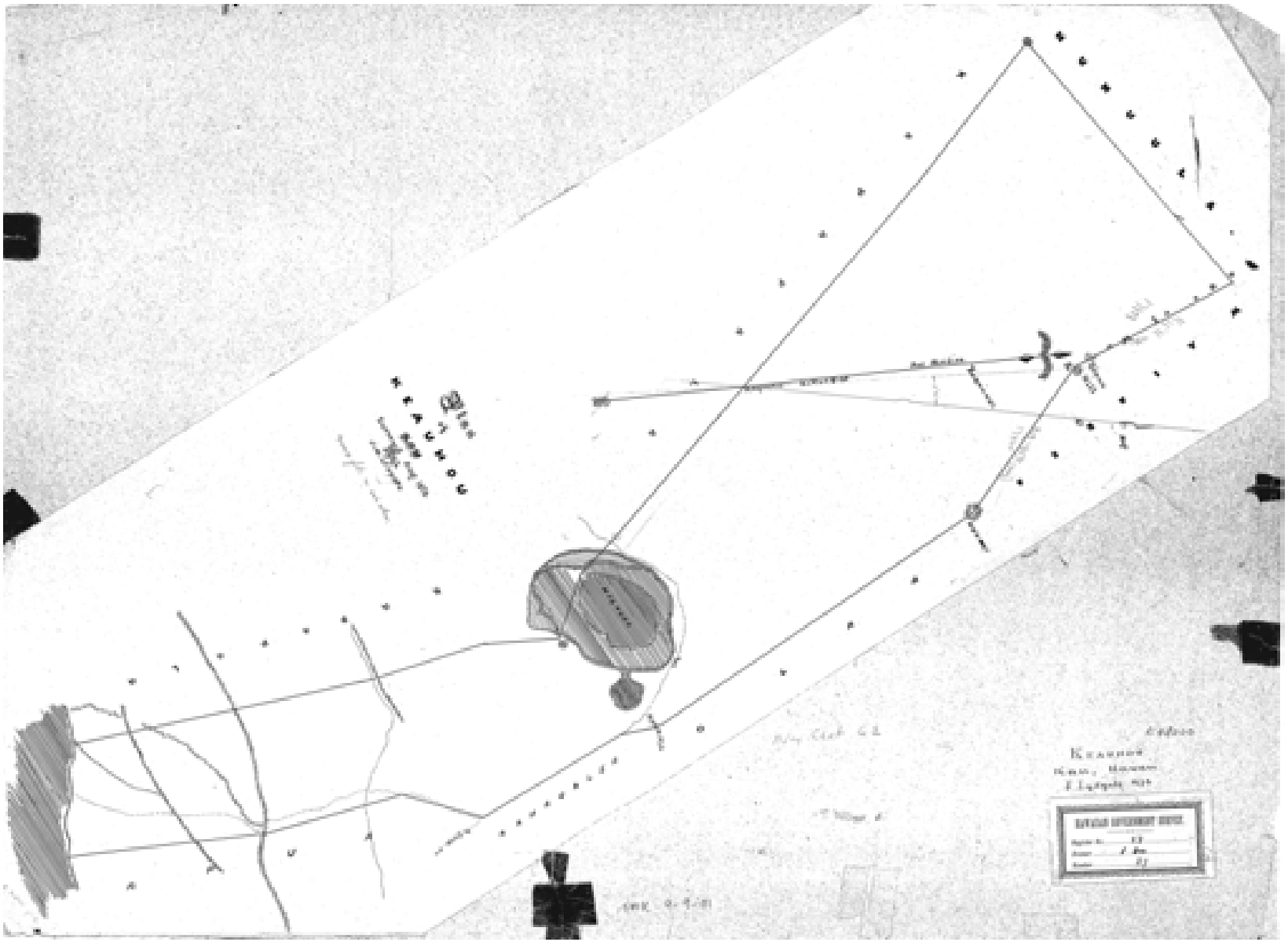


Figure D-15. HM014_1874.

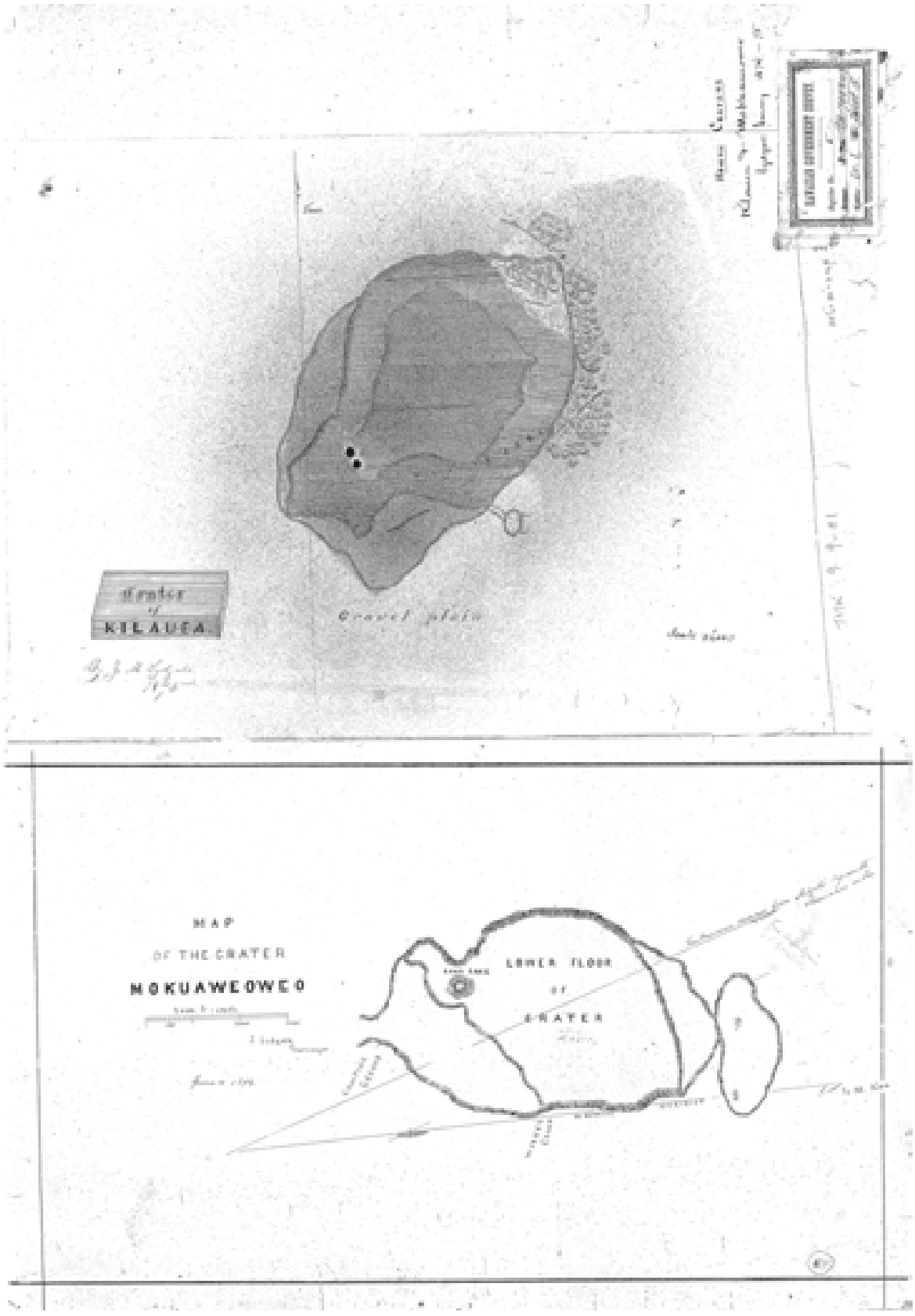
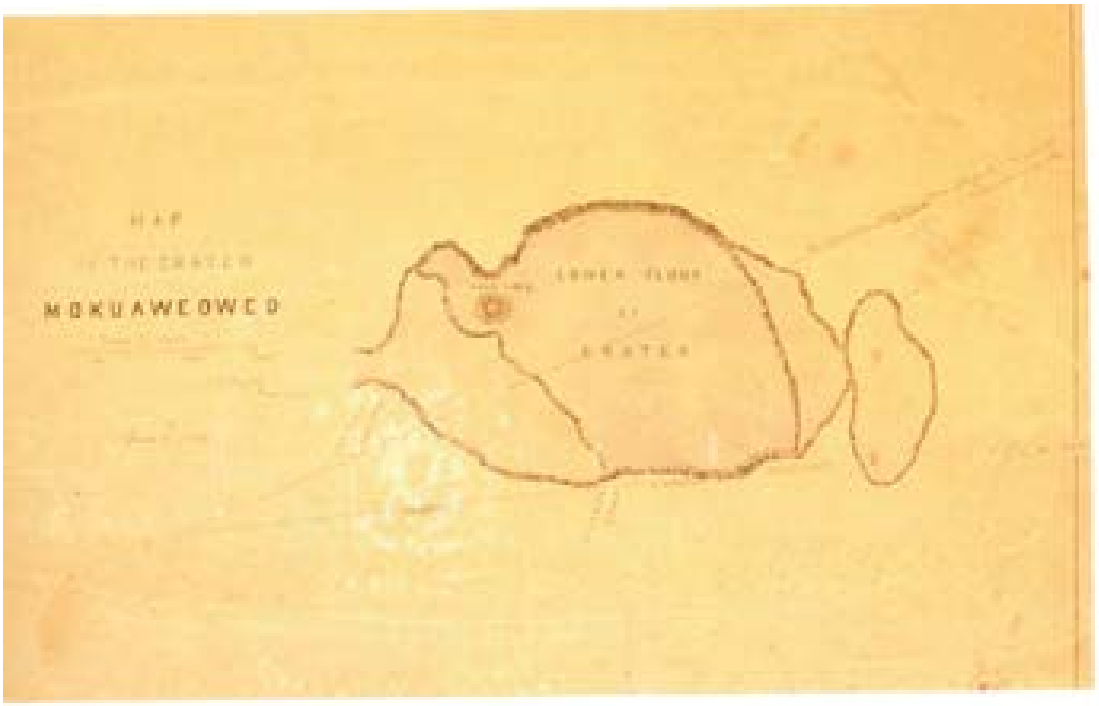


Figure D-16. HM016_1875.



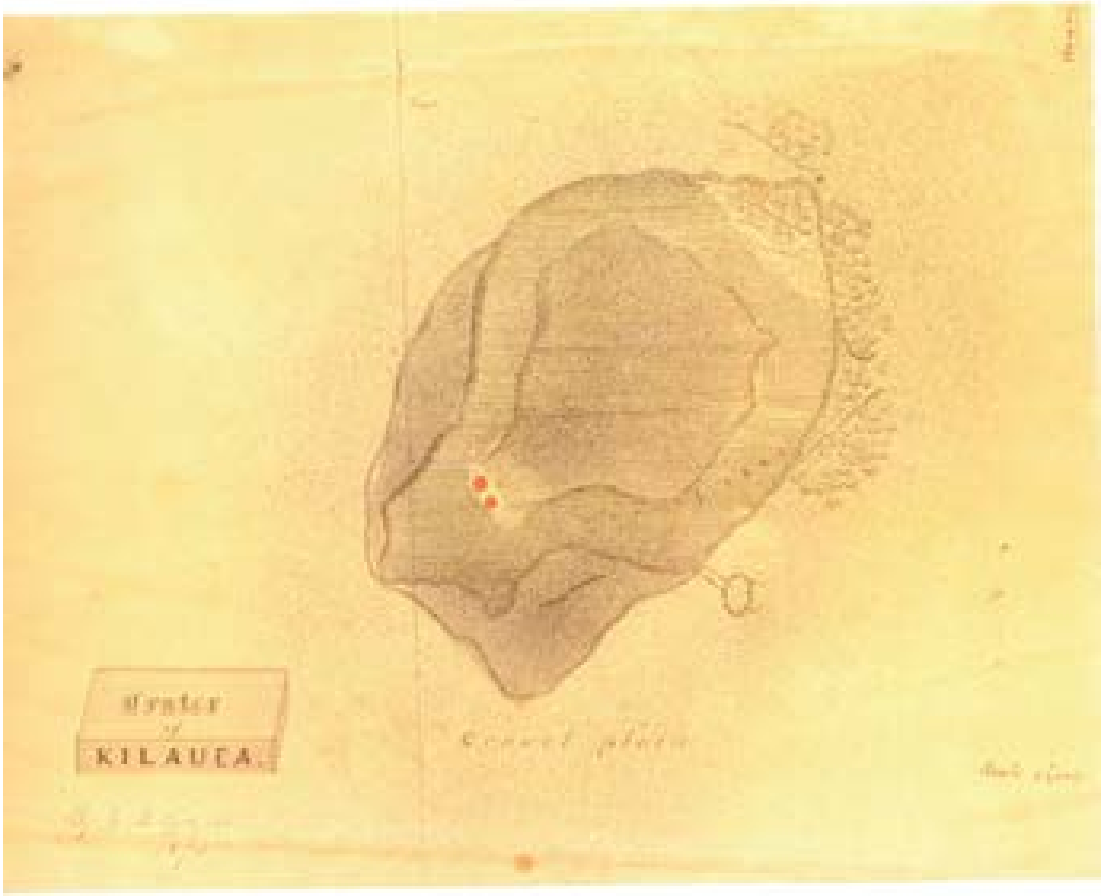


Figure D-17. HM018_1875.

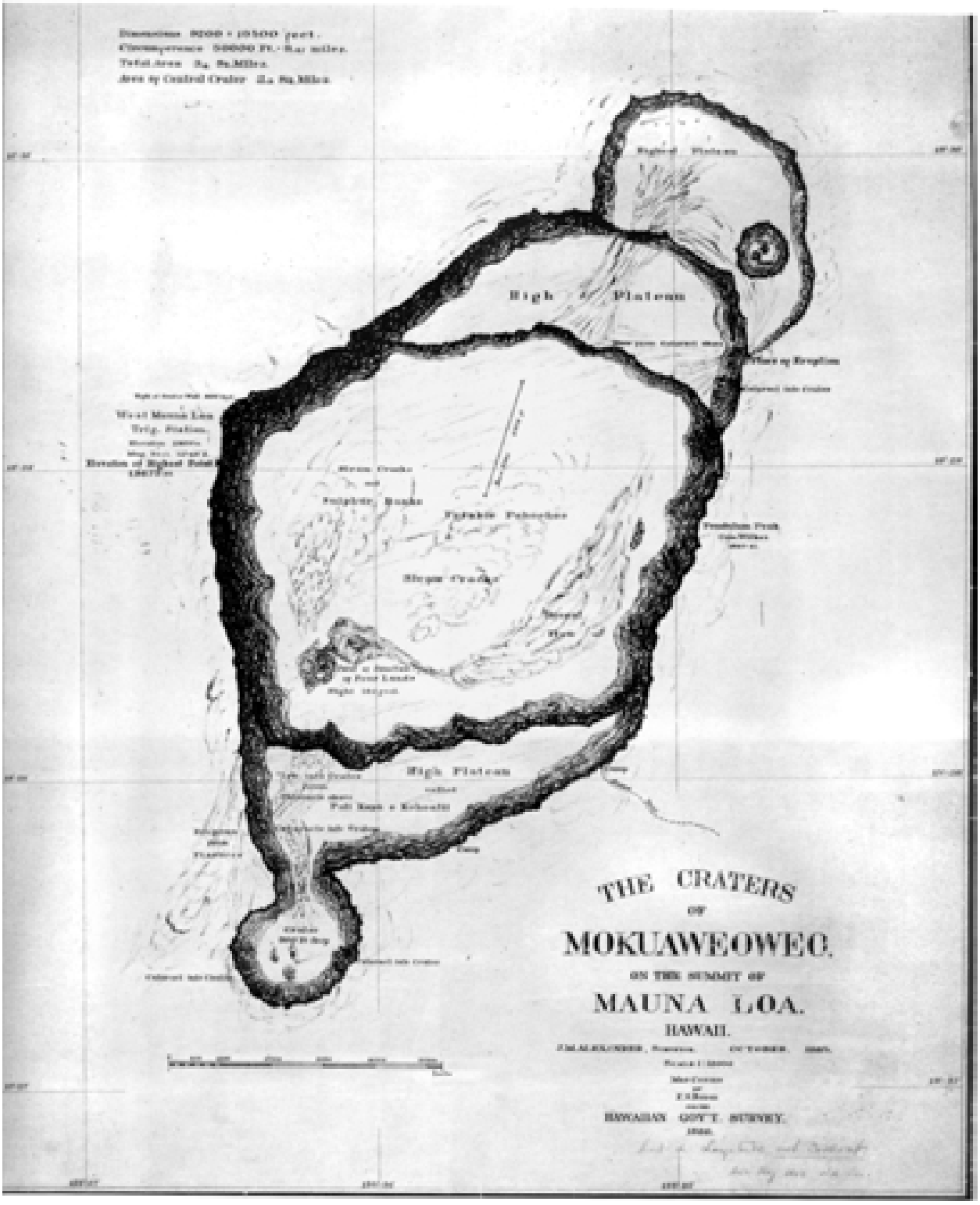


Figure D-18. HM022_1885.

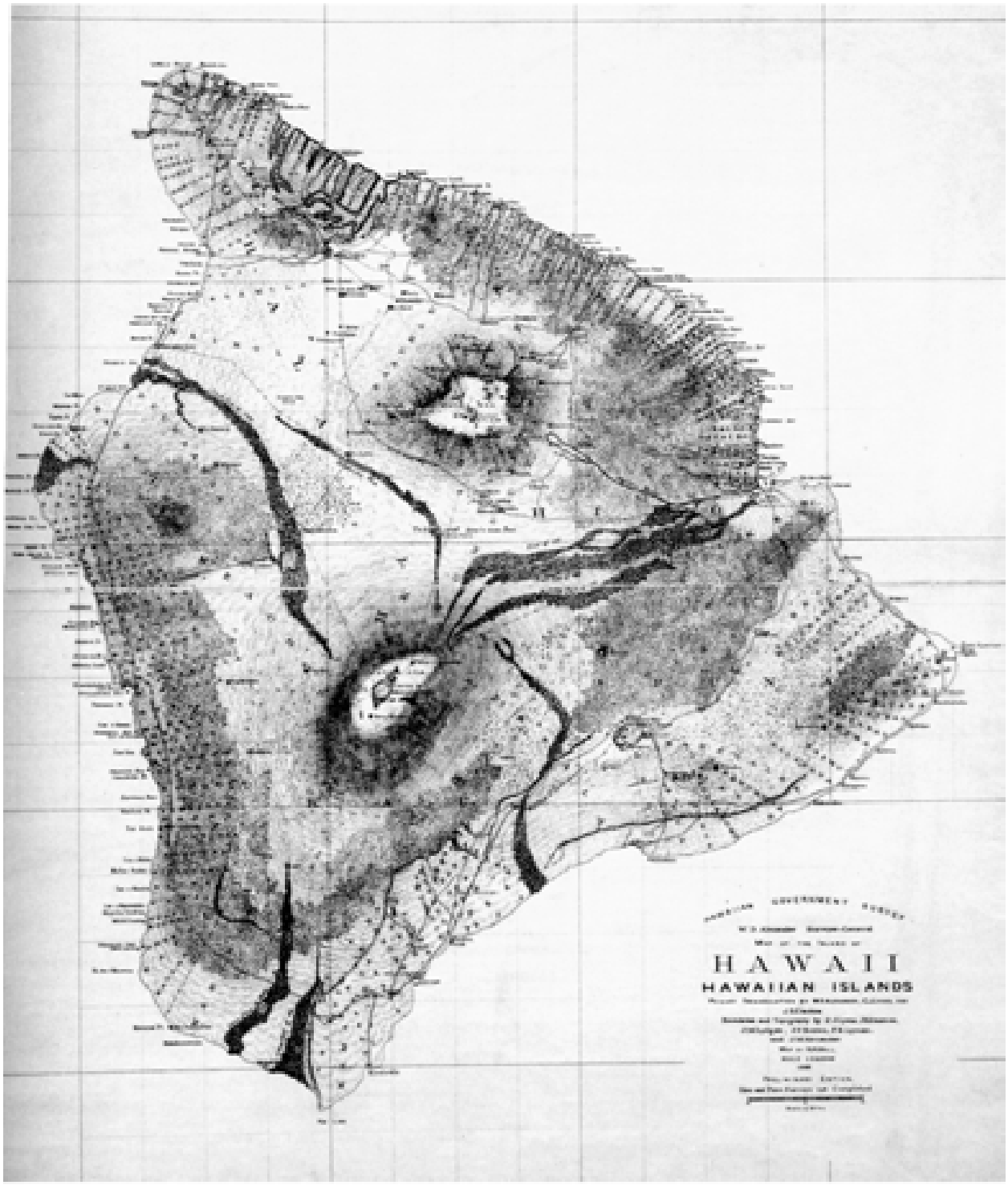


Figure D-19. HM023_1886.

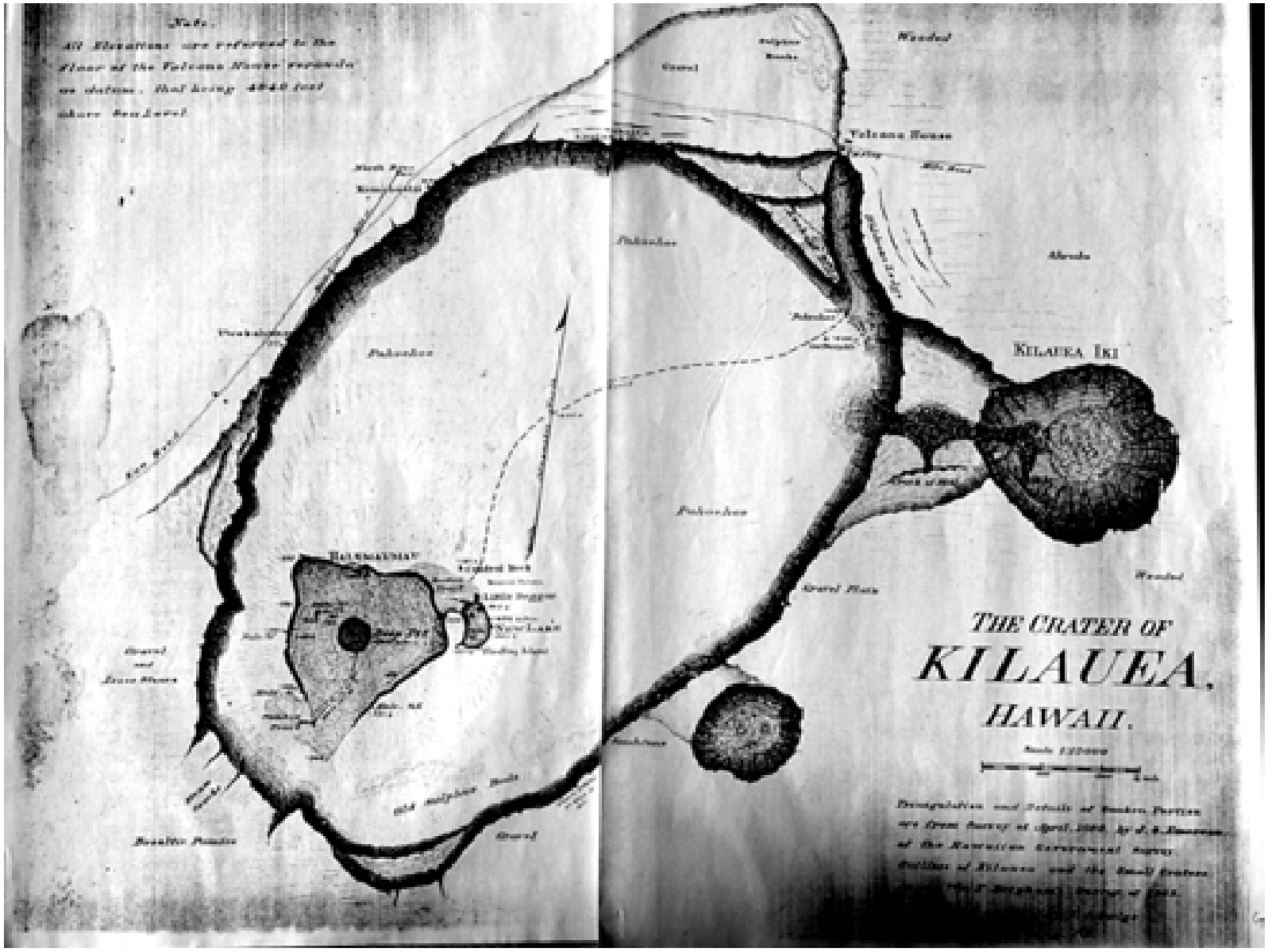


Figure D-20. HM024.

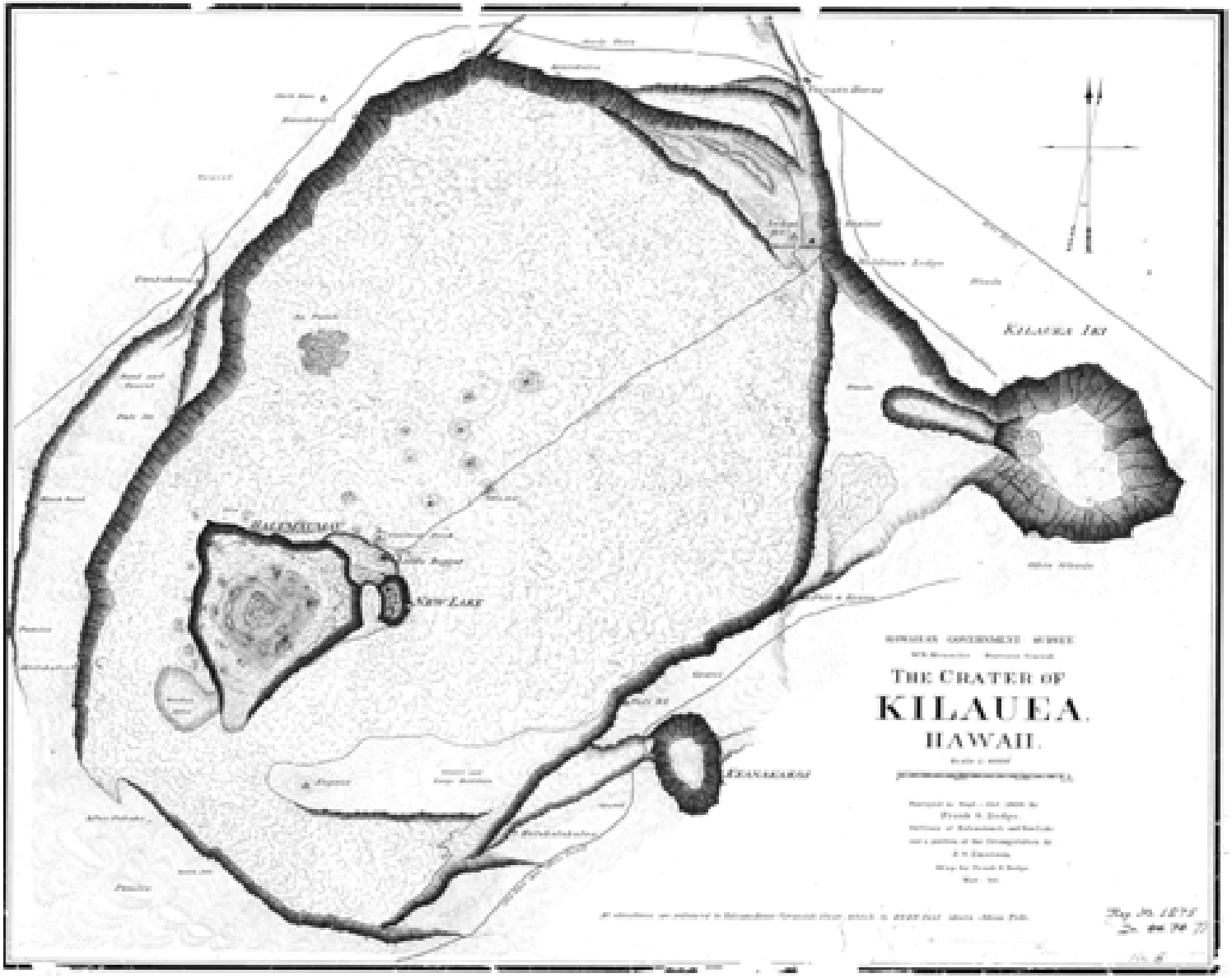


Figure D-21. HM025_1886.

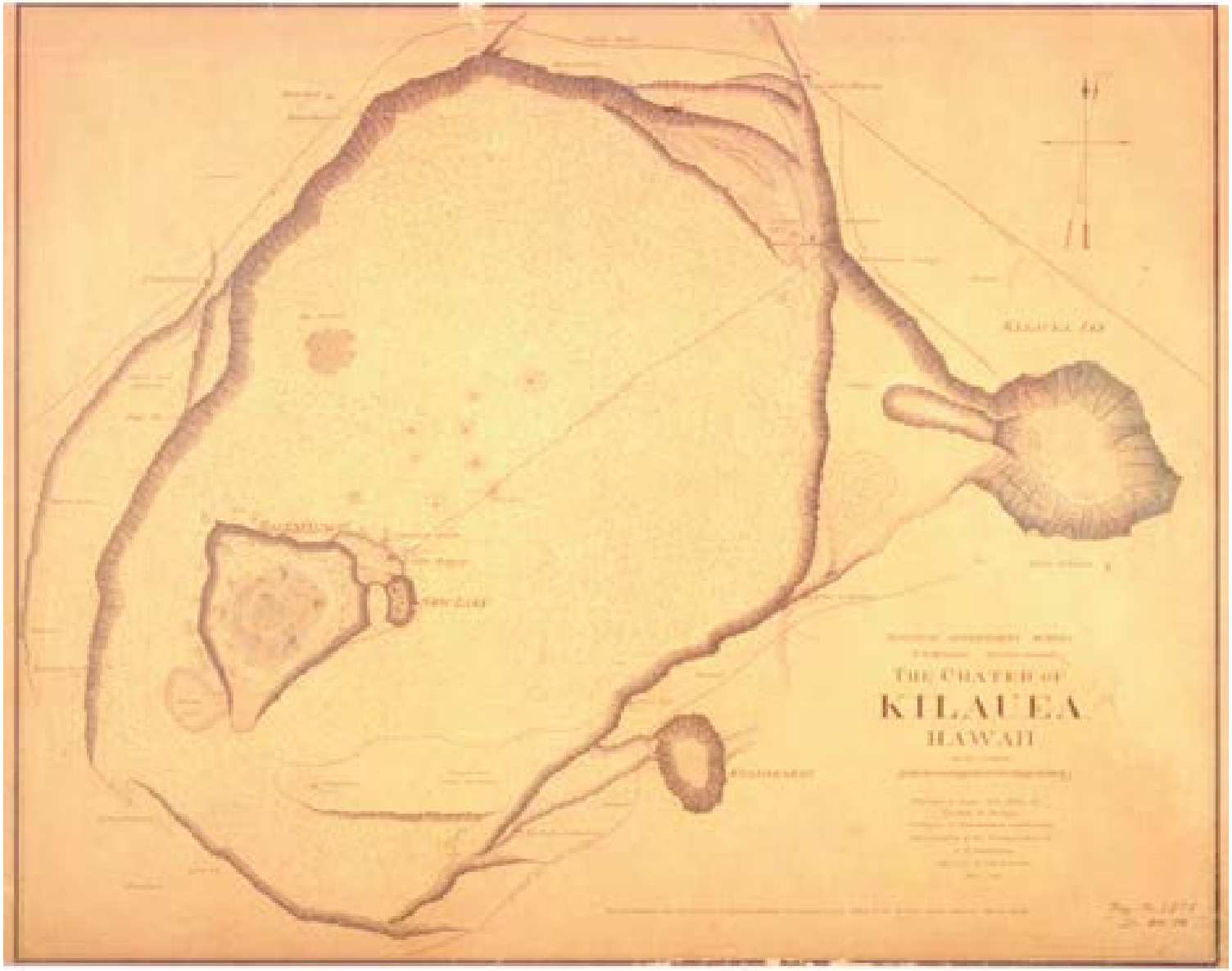


Figure D-22. HM025_1886_Kil.

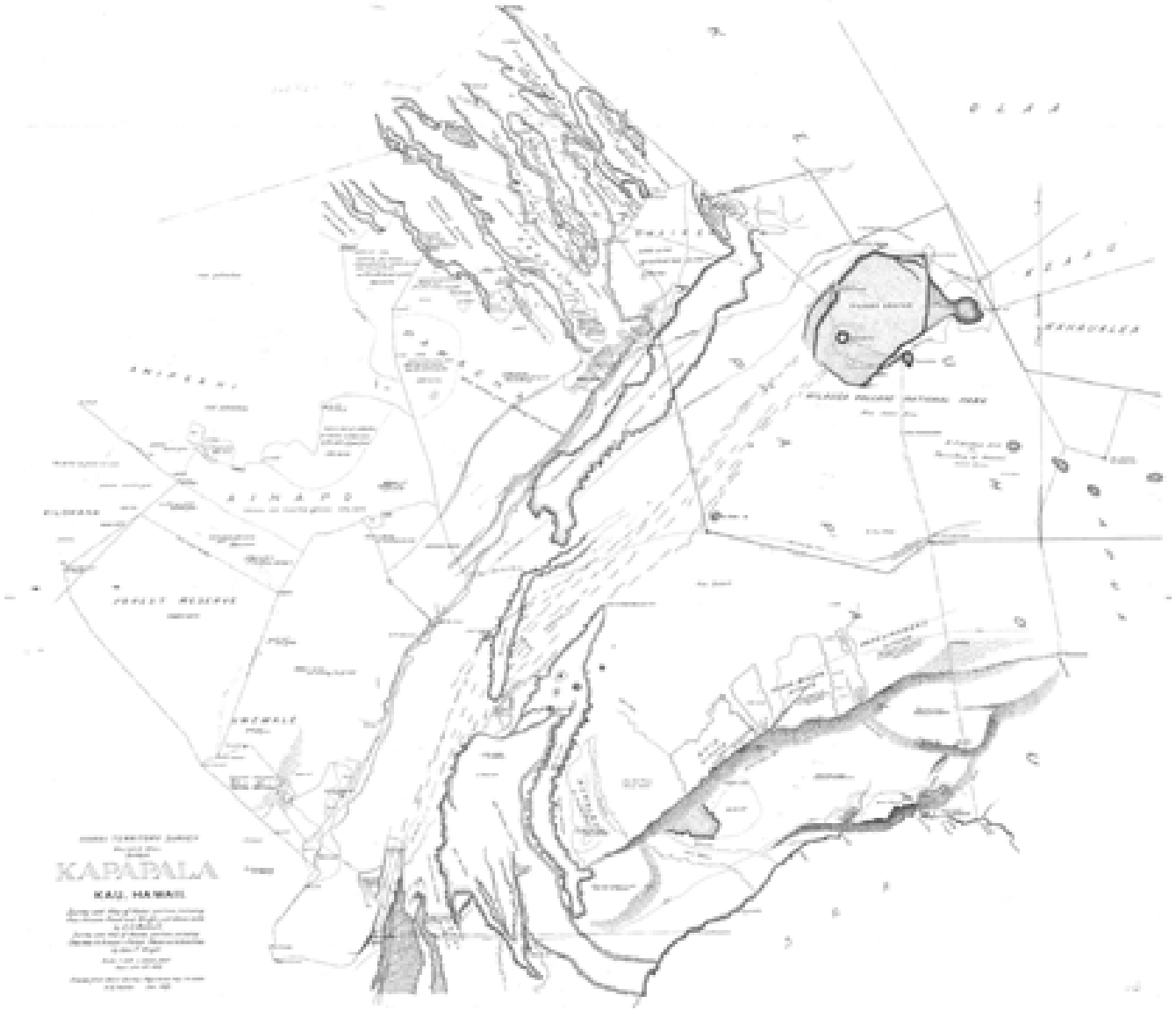


Figure D-23. HM032_1907.

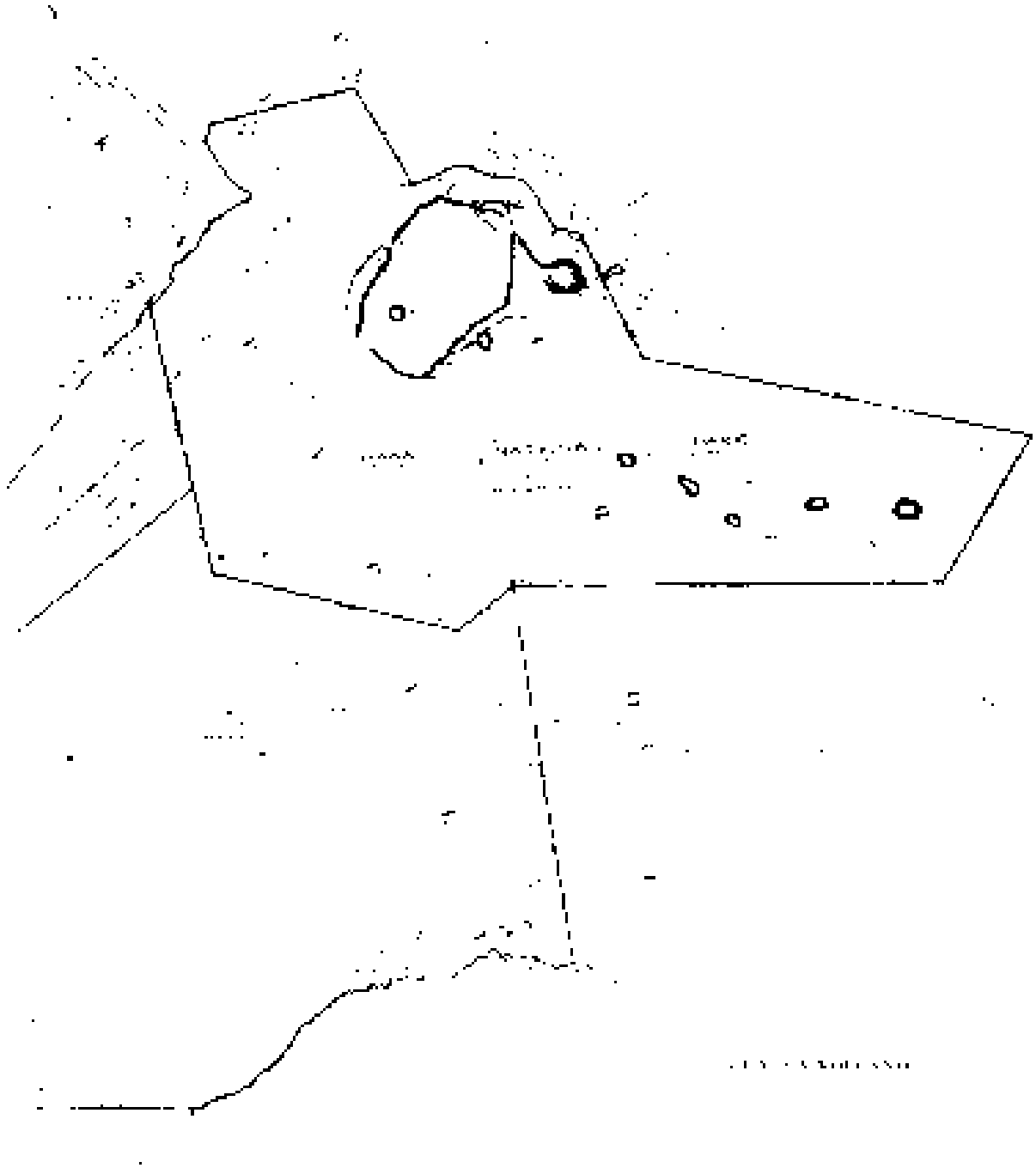


Figure D-24. HM034_1910.

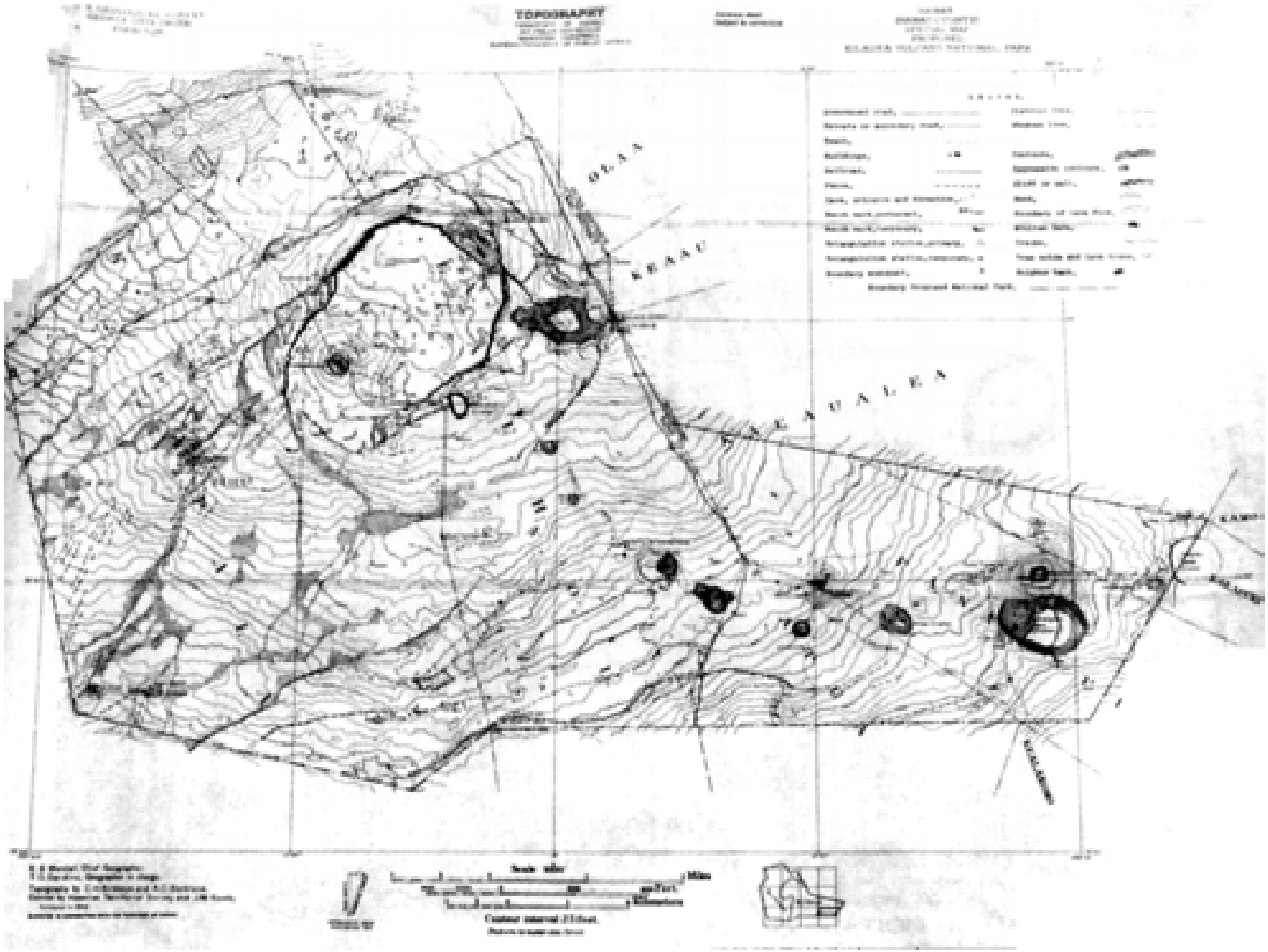


Figure D-25. HM035.

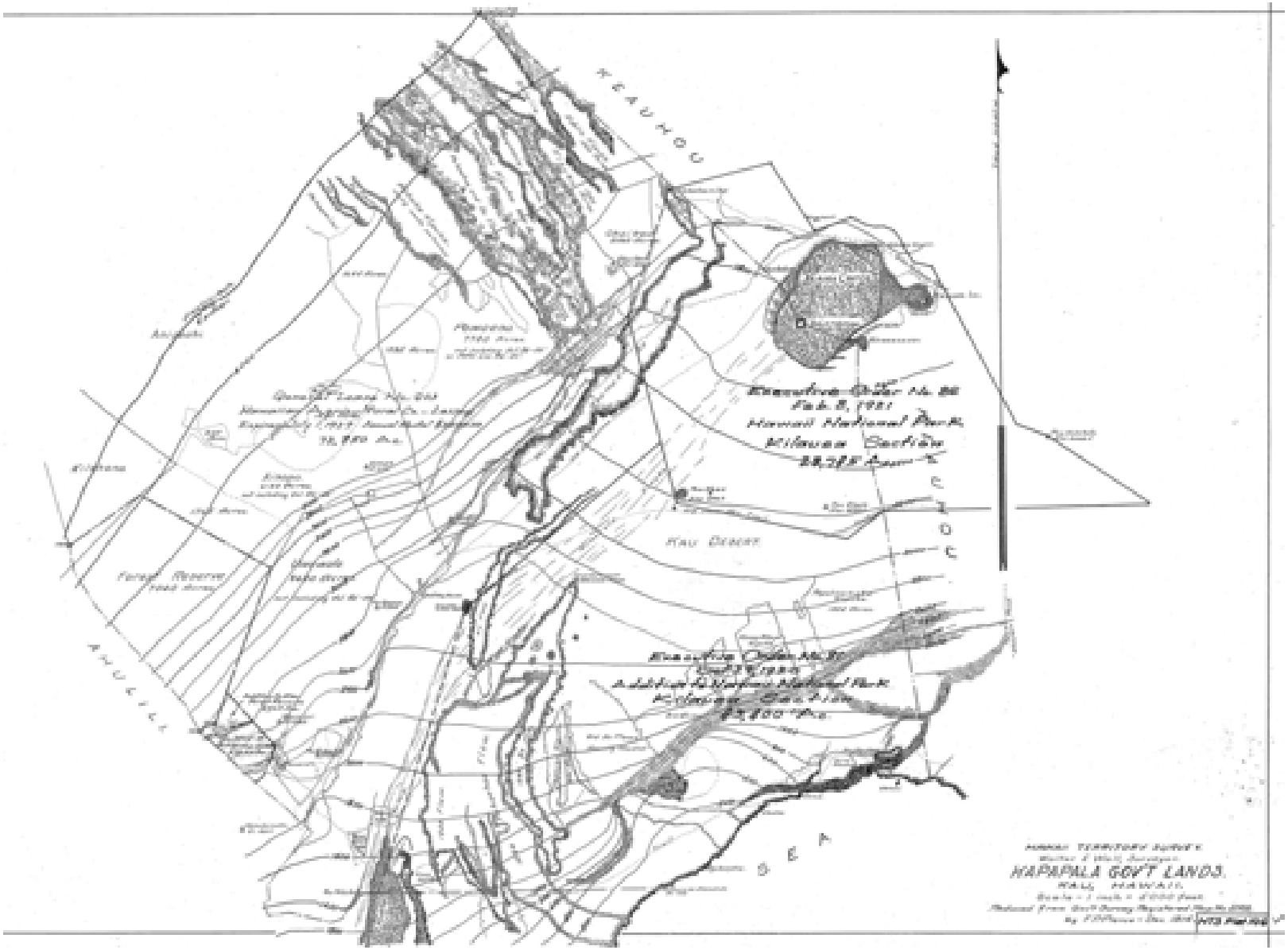


Figure D-26. HM036_1914.

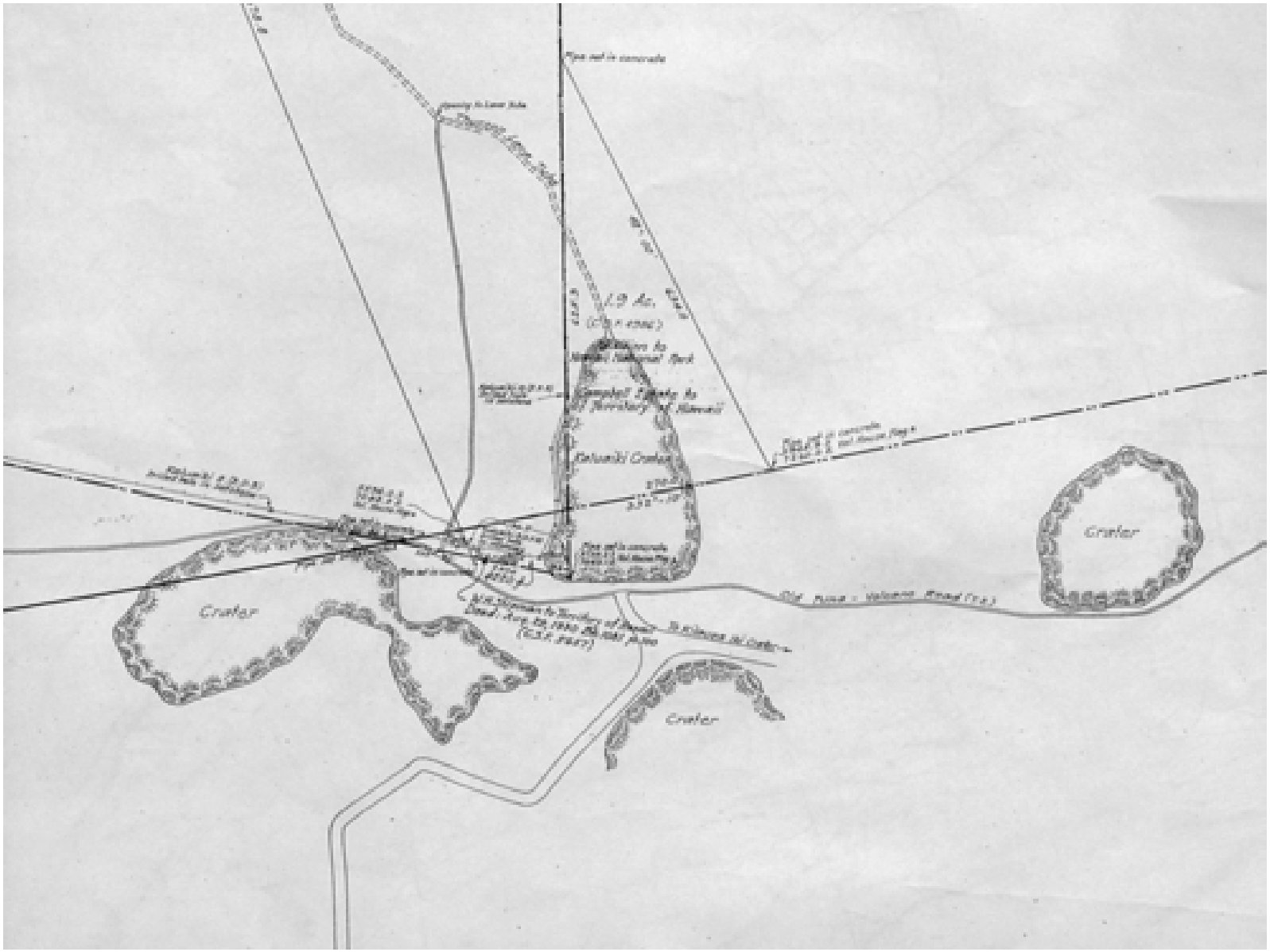


Figure D-27. HM044_detail.

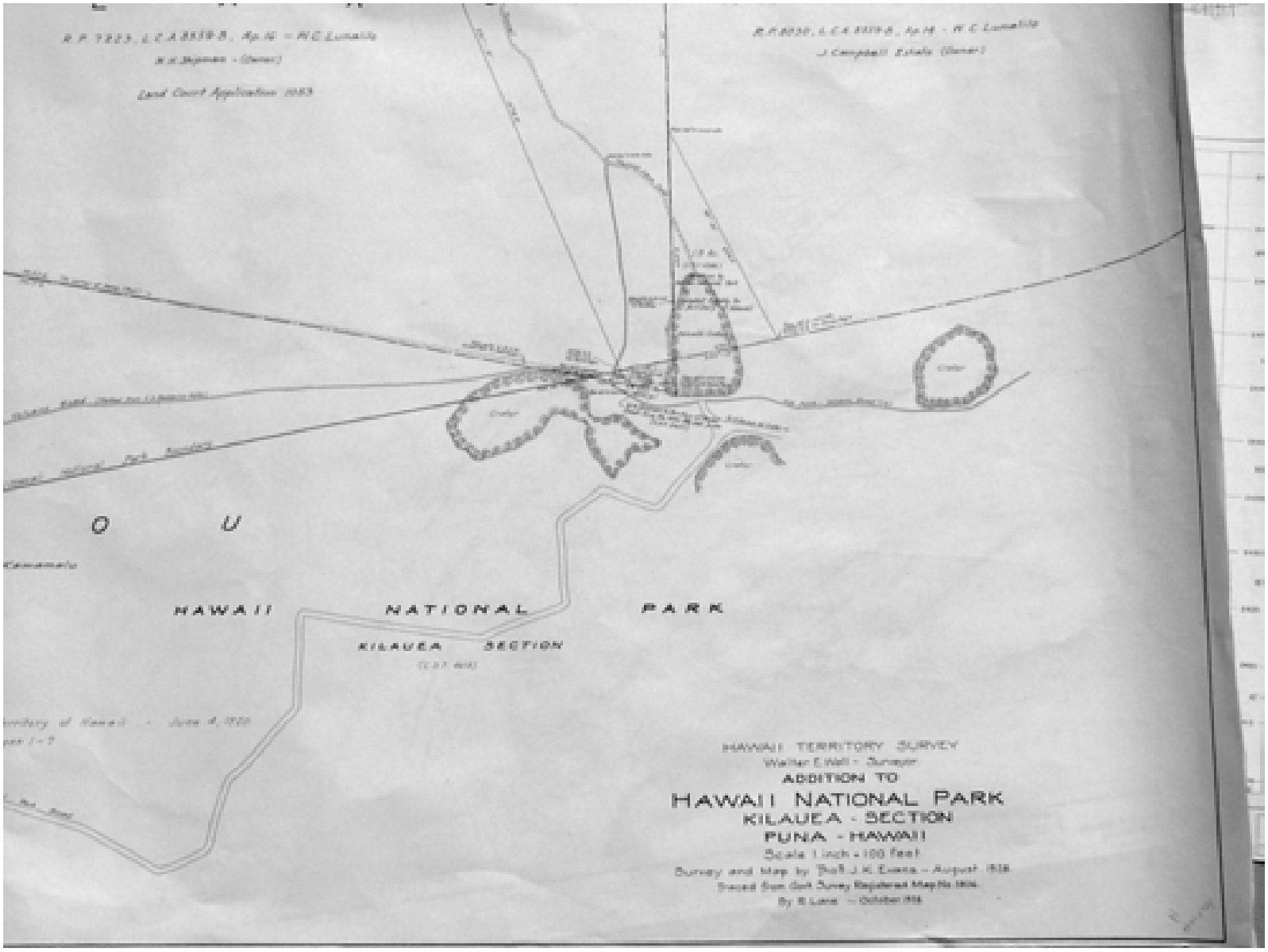


Figure D-28. HM044_detail2.

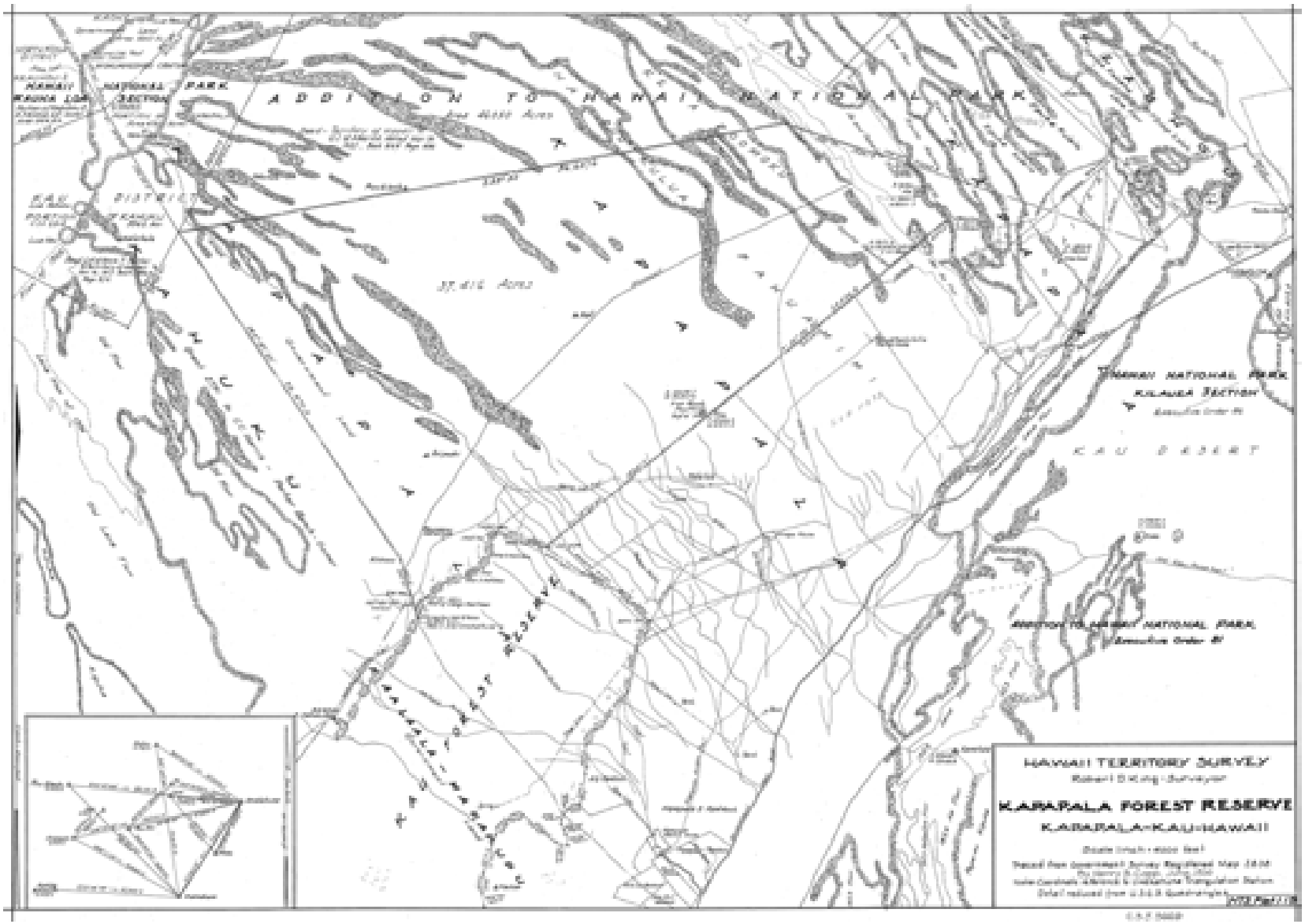


Figure D-29. HM047_1930.

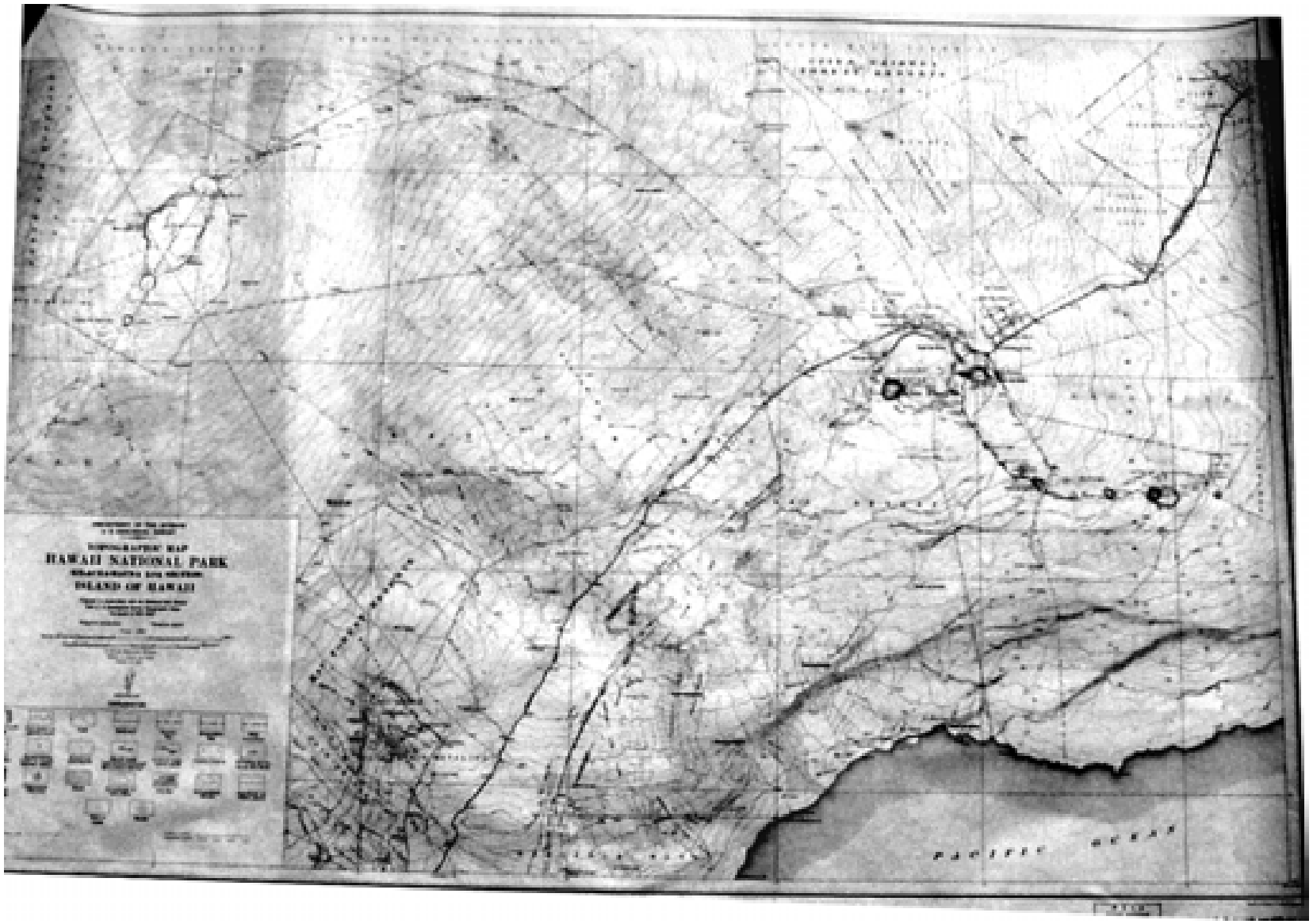


Figure D-30. HM049.

Figure D-31. HM049_detail.

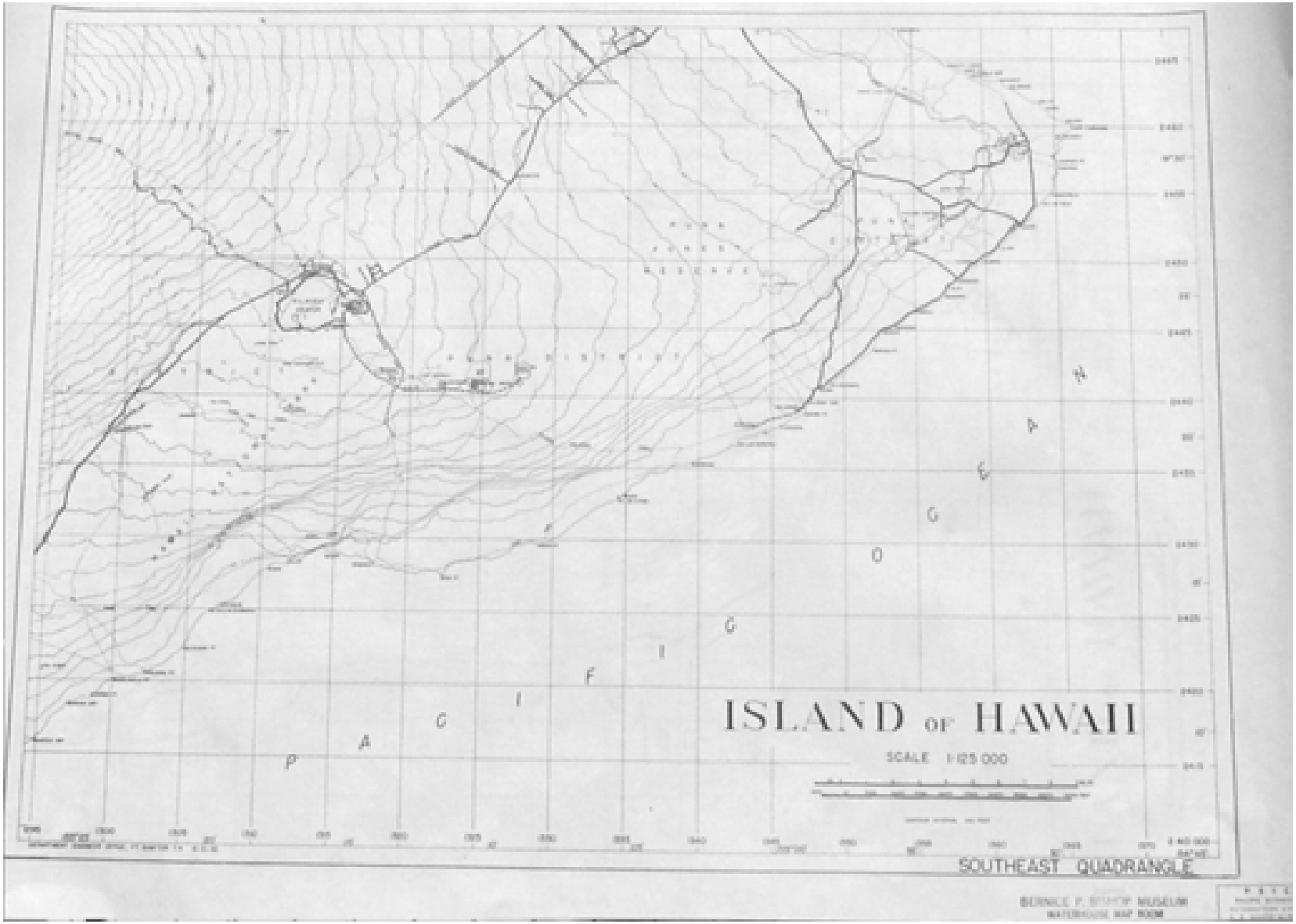


Figure D-32. HM051_1942.

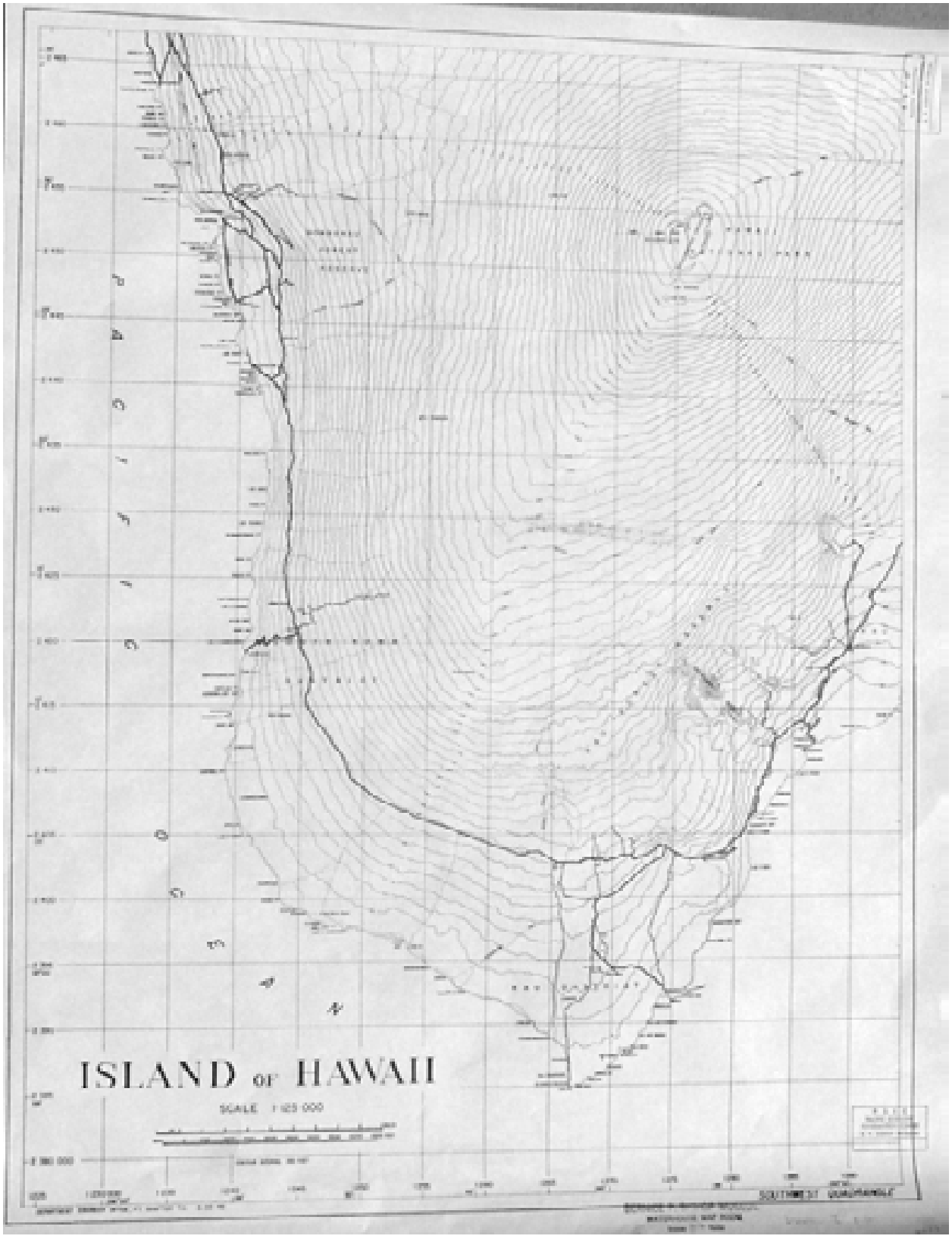


Figure D-33. HM052_1942.

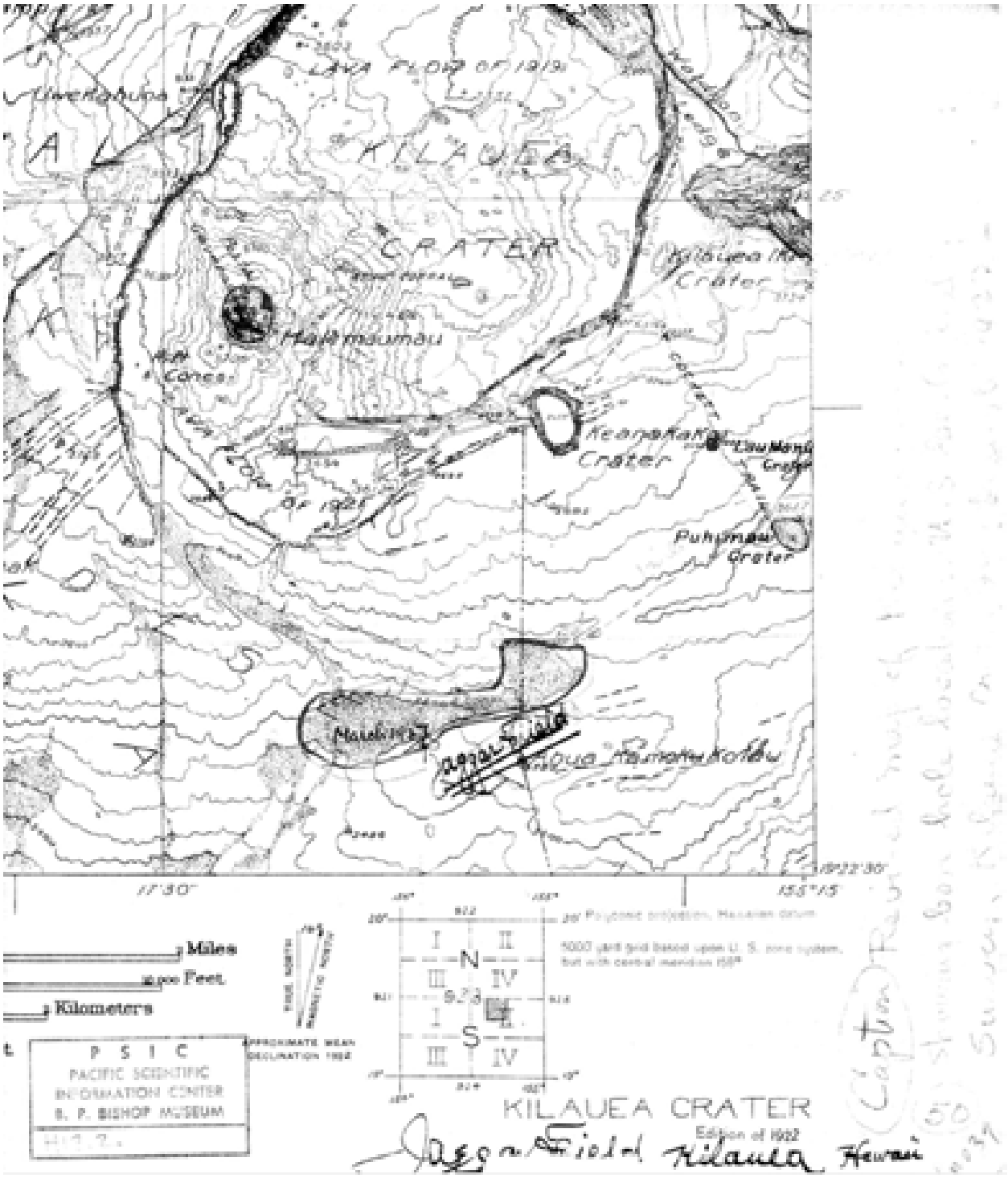


Figure D-34. HMO_USGS_Jaggar.

Table D-2. Archeological Maps Relating to the HAVO Region.

Surveyor	Date	Title	Scale	Notes	Repository
BPBM	1959	South Puna, Hawaii, Archeological Sites, Keauhou to Kahaualea	1 inch=2,500 feet	Survey by BPBM for Hawaii Volcanoes National Park; shows mapped sites in Pulama, Kamoamoa, Laeapuki east, Puuloa, Kealakomo makai; unmapped sites in Panau Iki, Panau Nui, Naulu, Kealakomo Waena, Kaena, Kahue, Apua, and Keauhou; Ainahou Ranch boundaries; call no. 50	HAVO Archives (MC1D1F1)
BPBM	1959	Moa Heiau, Kamoamoa. Sheet III-A	?	Survey by BPBM for Hawaii Volcanoes National Park; call no. 80	HAVO Archives (MC1D1F1)
BPBM	1959	Petroglyphs on Boundary, Laeapuki. Sheet IV-A	?	Survey by BPBM for Hawaii Volcanoes National Park; call no. 110	HAVO Archives (MC1D1F1)
BPBM	1959	Petroglyphs Kealakomo. Sheet VI-D	?	Survey by BPBM for Hawaii Volcanoes National Park; call no. 100	HAVO Archives (MC1D1F1)
BPBM	1959	House Site, Kealakomo. Sheet VI-F	?	Survey by BPBM for Hawaii Volcanoes National Park; call no. 90	HAVO Archives (MC1D1F1)
BPBM	1959	Kealakomo, Puna. Sheet VI	1 inch=100 feet	Survey by BPBM for Hawaii Volcanoes National Park; call no. 40	HAVO Archives (MC1D1F1)
BPBM	1959	Wahaula Heiau Area. Sheet II-A	1 inch=25 feet	Survey by BPBM for Hawaii Volcanoes National Park; call no. 30	HAVO Archives (MC1D1F1)
BPBM	1959	Petroglyphs Kamoamoa. Sheet III-B	?	illustration from Emory et al. 1959	HAVO CRD **
BPBM	1959	House site with petroglyphs, papamu and holes, Kealakomo. Sheet VI-E	?	illustration from Emory et al. 1959	HAVO CRD **
BPBM	1959	Main Compound, Kealakomo. Sheet VI-A	?	illustration from Emory et al. 1959	HAVO CRD **
BPBM	1959	Puuloa, Puna. Petroglyph area. Sheet V	?	illustration from Emory et al. 1959	HAVO CRD **
BPBM	1959	Petroglyphs Puuloa. Sheet V-A	?	illustration from Emory et al. 1959	HAVO CRD **
BPBM	1959	Laeapuki, Puna. Arch. Sites. Sheet IV	?	illustration from Emory et al. 1959	HAVO CRD **
BPBM	1959	Kamoamoa, Puna. Arch. Sites. Sheet III	?	illustration from Emory et al. 1959	HAVO CRD **
BPBM	1959	Poupou, Puna. Arch. Sites. Sheet I	?	illustration from Emory et al. 1959	HAVO CRD **
BPBM	1959	Wahaula-Kailiili, Puna. Arch. Sites. Sheet II	?	illustration from Emory et al. 1959	HAVO CRD **
BPBM	1959	Kailiili Village. Sheet II-B	?	illustration from Emory et al. 1959	HAVO CRD **

Surveyor	Date	Title	Scale	Notes	Repository
BPBM	n.d.	Puuloa	1 inch=2.5 feet	16 maps; 22 x 22 inches; missing sheets 2, 6, 12, 14, 15, 16; includes cut and tape map of physical layout of petroglyphs	HAVO Library *
HAVO	?	Archeological Base Maps. Completed Project Area Index (to 4/85), Wahaula, Kamoamoa, Kalapana (123-82004, 82026, 82031)	1 inch=250 feet	Drawing 124/82032; 1 sheet; call no. 190	HAVO CRD HAVO Archives (MC1D1F2)
HAVO	?	Archeological Base Maps. Completed Project Area Index (to 7/87), Wahaula, Kamoamoa, Kalapana (123-82004, 82026, 82031, 82044)	?	Drawing 124/82032; 1 sheet; Figure 1 in Ladefoged et al. 1987	HAVO CRD
HAVO	?	Archeological Base Maps. Waha‘ula Series	3 inches=500 feet	Drawing 124/82027; 1 sheet; call no. 200	HAVO CRD HAVO Archives (MC1D1F2)
HAVO	?	Archeological Base Maps. Kamoamoa Mauka Phase 2	1:5	Drawing 124/82044; 2 sheets; used in Ladefoged et al. 1987	HAVO CRD
Nordgren, D.	1967 July	Wahaula Heiau and Vicinity, Hawaii Volcanoes National Park.	1 inch=30 feet	topography by E.G. Wingate; base map used in Ladd reports on Waha‘ula; call no. 180	HAVO Archives (MC1D1F1)
HAVO	1976	Archeological Base Map. Kalapana Extension.	1 cm=100 m	Drawing 124/82003; 1 sheet (cover sheet index for 124/82004; drawn by CNH; used in Ladefoged et al. 1987; call no. 230	HAVO CRD HAVO Archives (MC1D1F3)
HAVO	1976	Archeological Base Maps. Kalapana Extension.	1 cm=5 m	Drawing 124/82004; 42 sheets; drawn by CNH; fieldwork by PH Rosendahl, Ed Ladd, MLK Rosendahl between 1974 and 1976; used in Ladefoged et al. 1987; call no. 230, 240	HAVO CRD HAVO Archives (MC1D1F3)
HAVO	1978	Archeological Base Maps. Kamoamoa Village Complex, Kalapana Extension, Hawaii.	1 cm=20 m	Drawing 124/82030; 1 sheet (cover sheet for 124/83031); drawn by CNH; call no. 220	HAVO Archives (MC1D1F3)
HAVO	1978	Archeological Base Maps. Kamoamoa Village Complex, Kalapana Extension, Hawaii.	1 cm=20 m	Drawing 124/82031; 62 sheets; drawn by CNH; call no. 220	HAVO Archives (MC1D1F3)
HAVO	1980	Archeological Base Map. Index to Drawing Number 124/82023 (1-7). Pulu Factory. Hawaii Volcanoes National Park, Hawaii	1 cm=4 m	Drawing 124/82022. Sheet 1 of 1. Drawn by CNH.	HAVO CRD (map drawer)

Surveyor	Date	Title	Scale	Notes	Repository
HAVO	1980	Archeological Base Map. Pulu Factory. Hawaii Volcanoes National Park, Hawaii	1 cm=1 m	Drawing 124/82023. Seven sheets. Drawn by CNH.	HAVO CRD (map drawer)
HAVO	1983, 1985	Archeological Base Maps. Kalapana Extension-Wahaula	1 inch=5 m	Drawing 124/82026; 44 sheets; Sheets 1 to 5 drawn by MML in 1985; Sheets 6 to 44 drawn by FS in 1983; used in Ladefoged et al. 1987	HAVO CRD HAVO Archives (MC1D1F2)
Kekahuna, HEP	1951 June 28	Makaiwa Heiau in Kahaualea, Puna, Hawaii, with Brief Descriptive Notes.	—	No. Archeo-Puna-5; call no. 120 (reduction); full size blueline in MC1D1F5 (call no. 3780)	HAVO Archives (MC1D1F1)
Kekahuna, HEP	1951 July 13	Kikoa Heiau in the land of Kikoa, Kalapana section, district of Puna, island of Hawaii.	—	No. Archeo-Puna-6; call no. 130 (reduction); full size blueline in MC1D1F5 (call no. 3780)	HAVO Archives (MC1D1F1)
Kekahuna, HEP	1951 July 14	Kuʻula Heiau, Fishermen's Shrine, land of Ki, Kapaahu section, district of Puna, island of Hawaii.	—	No. Archeo-Puna-7; call no. 140 (reduction); full size blueline in MC1D1F5 (call no. 3780)	HAVO Archives (MC1D1F1)
Kekahuna, HEP	1951 July 6	Hakuma Cave, Kupahuʻa, Puna, Hawaii, with Brief Descriptive Notes.	—	No. Archeo-Puna-8; call no. 150 (reduction)); full size blueline in MC1D1F5 (call no. 3780); cave has narrowed refuge-type entrance (similar to Honokohau cave)	HAVO Archives (MC1D1F1)
Kekahuna, HEP	1951 June 27	Wahaʻula Heiau and adjoining grounds in Pulama, Puna, Hawaii, with Brief Descriptive Notes	—	No. Archeo-Puna-9; call no. 160 (reduction); full size blueline in MC1D1F5 (call no. 3780)	HAVO Archives (MC1D1F1)
Kekahuna, HEP	1951 June 24	Punaluu Heiau, Punaluu Pool and Adjoining Grounds, Kahauʻaʻlea, Puna, Hawaii, with Brief Descriptive Notes	—	No. Archeo-Puna-10; call no. 170 (reduction); full size blueline in MC1D1F5 (call no. 3780)	HAVO Archives (MC1D1F1)
Ladd	1972 July	Historic Village of Keauhou Landing, (portion) Hawaii Volcanoes National Park.	1 inch=20 feet	Drawing 124/40,006; 2 foot contours; surveyed by Youth Conservation Corps (YCC), under direction of Pacific Archaeologist (Ed Ladd); call no. 60	HAVO Archives (MC1D1F1)
Partee, R.A.	1971 September	Plan and Topography, Kailiili Village, Puna District, Hawaii Volcanoes National Park.	1 inch=20 feet	Drawing 124/40,006; 2 foot contours; call no. 70	HAVO Archives (MC1D1F1)
Medville, D. and H. Medville	1996	Roadcut Cave, Hawaiʻi Volcanoes National Park. Cave Survey of October 8, 1996			HAVO CRD

Surveyor	Date	Title	Scale	Notes	Repository
Metcalf, D.S.	1960 June	Archeological Base Map. Part of the Master Plan, Hawaii National Park.	1 inch=1.5 miles	Drawing No. NP-HAW/3117, Sheet 1; map of park showing site locations based on BPBM survey	HAVO CRD (map drawer) HAVO Archives (MC2D2F1)
Metcalf, D.S.	1960 June	Archeological Base Map. Part of the Master Plan, Hawaii National Park.	variable	Drawing No. NP-HAW/3117, Sheet 2; inset maps at variable scales showing detailed plans of sites shown on Sheet 1	HAVO CRD (map drawer) HAVO Archives (MC2D2F1)
Neller, Earl	1990 Sept 30	Pe‘a Homestead	1:250	field map of homestead; about 24 x 36 inches	HAVO CRD (rolled)
HAVO	?	Archeological Base Map. Puuloa Working Maps, Hawaii Volcanoes National Park.	1 cm=1 m	12 sheets; drawn by MLR in 1975; call no. 210	HAVO Archives (MC1D1F2)
PAR	1978	Puuloa Working Maps	1 cm=1 m	shows very general layout (grass, ohia, and petroglyph area)	HAVO Library *
Partee, R.A.	1971 September	Plan and Topography, Kealakomo Village Before 1971 Lava Flow, Puna District, Hawaii Volcanoes National Park.	1 inch=40 feet	Drawing 124/40,005; note on map says “village destroyed by 1971 lava flow”	HAVO CRD (map drawer)
unknown	n.d.	Archeological Survey Areas, Hawaii Volcanoes National Park, Kalapana, Hawaii	1 inch=2,000 feet	shows surveyed areas from 1974 to 1988; total 1,360 acres; drawn on a plotter (AutoCad?)	HAVO CRD (map drawer)
unknown	n.d.	Archeological Resources of Hawaii Volcanoes National Park, Site HV-225, Puu Loa Petroglyphs	1 inch=100 feet	16 sheets; call no. 10, 20	HAVO Archives (MC1D1F1)

* Information taken from listing titled “Maps in HAVO Library;” in black 3-ring binder in the Cultural Resources Division’s library.

** Listed on “Drawer 4. Inventory of Maps Inherited from Maintenance;” this is an inventory contained in a black 3-ring binder in the Cultural Resources Division’s library. Only those maps for which there is no other information or known repository are marked with **.

Table D-3. Documents Relating to the HAVO Region (with selected annotation).

Author	Date and Title	Selected Annotation
Allen, Melinda Sue	1979. The Kalapana Extension in the 1800s: A Research of the Historical Records	ms in HAVO CR Division. Summary of historical research on Kalapana area of HAVO
Anonymous	1996. List of Classified Structures, Hawaii Volcanoes National Park.	ms in HAVO CR Division
Apple, Russell	1954. A History of Land Acquisition for Hawaii National Park to December 31, 1950.	ms in HAVO Library
Apple, Russell	1973. HAVO Archeological Site Record (Kilauea Crater).	site record form in HAVO CR Division
Apple, Russell	1973. HAVO Archeological Site Record (Whitney Seismographic Vault).	site record form in HAVO CR Division
Apple, Russell	1973. Mountain Trails: The Ainapo and Mauna Loa.	ms in HAVO Library
Argy, Eleni	1994. HAVO Archeological Site Record (CCC Water Tank Foundations).	site record form in HAVO CR Division
Argy, Eleni	1994. HAVO Archeological Site Record (Steam Flats Dump).	site record form in HAVO CR Division
Argy, Eleni and Tim Scheffler	1994. HAVO Archeological Site Record (Lower Water Tank)	site record form in HAVO CR Division
Argy, Eleni and Tim Scheffler	1994. HAVO Archeological Site Record (Upper Water Tank1).	site record form in HAVO CR Division
Argy, Eleni and Tim Scheffler	1994. HAVO Archeological Site Record (Shed by Nene Pen)	site record form in HAVO CR Division
Argy, Eleni and Tim Scheffler	1994. HAVO Archeological Site Record (Ainahou Monster Tank).	site record form in HAVO CR Division
Argy, Eleni and Tim Scheffler	1994. HAVO Archeological Site Record (Upper Water Tank 2).	site record form in HAVO CR Division
Baker, Albert S.	1922. Petroglyphs of Kau	ms in HAVO Archives
Baker, Albert S.	1931. "Puna Petroglyphs," Hawaiian Annual for the Year 1933, pp. 62-67.	publication
Bevens, Darcy	1992. Volcano House Register, Hawaii Natural History Association	
Blickhahn, Harry Miller	1961. Uncle George of Kilauea: the Story of George Lycurgus.	publication
Brumaghim, Everett	1933. Report of Heiau Sites, District of Puna. March 29.	ms in HAVO Library
Burrell, Jahkotta	2004. Analysis of a Hawai‘i Lithic Cave	ms in HAVO CR Division
Carey & Co. Inc.	2002. Hawai‘i Volcanoes and Haleakala National Parks the Early Years (1916-1945).	ms in HAVO Library. Historical Resource Study identifies, documents, and evaluates early National Park Service, Civilian Conservation Corps and World War II structures within HAVO
Carter, Laura A. and Gary F. Somers	1990. Here Today Lava Tomorrow: Archeological Work in Hawaii Volcanoes National Park 1987 to 1989.	publication. Salvage survey and excavations in area threatened by lava, including Waha‘ula
Cleghorn, Paul L.	1980. The Hilina Pali Petroglyph Cave, Hawaii Island: A Report on Preliminary Archaeological Investigations.	archaeology report in HAVO CR Division; B.P. Bishop Museum
Cox, David W.	1974. Fieldwork Report on Mapping of Pu‘uloa Petroglyph Field, Puna Site Ha-HV-225.	ms in HAVO CR Division
Cox, J.H., and W.J. Bonk	1959. A Preliminary Archaeological Report of South Puna, Hawaii.	archaeology report in HAVO CR Division
CRM	2003. HAVO Archeological Site Record (Keanakako‘i Historic Dump).	site record form in HAVO CR Division
CRM Cave Files	CRM Cave Files.	records in HAVO CR Division

Author	Date and Title	Selected Annotation
Dorn, Don	1996. Letter report on radiocarbon dates for Pu‘uloa Petroglyphs	ms in HAVO CR Division
Dougherty, D., S. Roper, and N. Thompson	2004. Kupukupu Fire Assessment 2003, Archeological Inventory for the Kupukupu Fire, Hawai‘i Volcanoes National Park.	archaeology report in HAVO CR Division. Monitoring and recording of effects of fire suppression activities on cultural resources during the 2002 Kupukupu Fire. Monitoring included examining fire line construction along the fire perimeter and within the burn interior.
Dougherty, D., S. Roper, and N. Thompson	2004. Panau Iki Rehabilitation 2003. Archeological Inventory of 665 Acres in Hawaii Volcanoes National Park.	archaeology report in HAVO CR Division. Survey of 409 replanting nodes within 655 acres of the Pānau Iki burn area in August and September 2003; 402 archeological features in 19 new sites and 16 previously documented sites was identified, of which 338 features fall within one site. Features indicate extensive agricultural exploitation of the uplands integrated with both temporary and permanent habitation structures; includes Hōlei Village.
Dougherty, Dennis	2004. “Giant of the Pacific:” Mauna Loa Reconnaissance 2003. Edited by Jadelyn J. Moniz Nakamura.	archaeology report in HAVO CR Division. Survey in high elevation zones of Mauna Loa, including archival research, reconnaissance survey along existing known trails, the Wilkes Camp site, and on the SE slopes of Mauna Loa, and aerial reconnaissance of the SE and SW slopes of Mauna Loa. Survey recorded 83 new features and collected data on 23 previously recorded features.
Dougherty, D., S. Roper, and N. Thompson	2004. Kupukupu Fire Assessment 2003: Archeological Inventory for the Kupukupu Fire, Hawai‘i Volcanoes National Park.	archaeology report in HAVO CR Division. Survey of inland area btwn 300 to 2,400 ft asl and monitoring of fire suppression activities in 2003; Sites 23007-24018
Durst, Mara, and Jadelyn J. Moniz Nakamura	2002. [draft] Landing Field Survey and Associated Areas Kīlauea Caldera, Hawai‘i Volcanoes National Park.	archaeology report in HAVO CR Division. Survey of 113 acres at Kīlauea summit in area of 1924 landing field which was modified by construction of sediment mounds; mounds are believed to have been created at beginning of WWII by NPS and Army to prevent possible enemy use of the field.
Durst, Mara, and Jadelyn J. Moniz Nakamura	2003. [draft] Kealakomo. “The Entrance Path” Hawai‘i Volcanoes National Park New Interpretive Area Study.	archaeology report in HAVO CR Division. Two inventory surveys of Kealakomo Waena: inventory of kīpuka west of the Chain of Craters road (1999-2001); and of 46-acre kīpuka east of the road (2002). Purpose of surveys was to document archeological features to provide baseline data for development of plan to interpret the area for public visitation; also to document the impacts of fire on archeological features. Included testing in Road Cut Cave.
Durst, Mara, and Jadelyn Moniz Nakamura	2005. A Historic Resource Study of the Lower Portion of the ‘Ili ‘Āina Of Keauhou, District Of Ka‘ū, Hawai‘i Volcanoes National Park.	archaeology report in HAVO CR Division. Historic resource study of ‘ili ‘āina of Keauhou; provides a synthesis of known resources and historic properties within Keauhou.
Emory, Kenneth P.	Field Trip to Kalapana, September 12 to 17, 1961	ms in HAVO Archives, B.P. Bishop Museum Archives. Description of field trip to collect wooden images from house compound about 1 mile from shore in Keauhou; also stopped at petroglyph cave in ‘Āpua.
Eaton, J.P. and C.K. Wentworth	1962. The Hawaiian Volcano Observatory. In Thrum’s All About Hawaii, pp. 35-44	publication
Emory, K. P., J. H. Cox, W. J. Bonk, Y. H. Sinoto and D. B. Barrere	1959. Natural and Cultural History Report on the Kalapana Extension of the Hawaii National Park. Volume I, Cultural History Report.	archaeology report in HAVO CR Division; B.P. Bishop Museum. Research on traditions, history, and archaeology of area proposed for extension of Chain of Craters road to Kalapana.

Author	Date and Title	Selected Annotation
Emory, K. P., L. J. Soehren, and E. J. Ladd	1965. The Archeological Resources of Hawaii Volcanoes National Park, Hawaii. Part II, Additional Sites, Test Excavations and Petroglyphs.	archaeology report in HAVO CR Division; B.P. Bishop Museum. Report on additional survey, excavation in 1964 in Kalapana Extension; petroglyph survey by W. Bonk.
Emory, Kenneth P.	1969. Inventory of Archaeological and Historical Sites in the Districts of Kona and Ka-u and in Anaehoomalu, South Kohala, Island of Hawaii.	archaeology report in HAVO CR Division; B.P. Bishop Museum
Fagerlund, Gunnar O.	1946. Chief Rangers Report of Horse-back Patrol of Outlying Parts of Kilauea Section.	ms in HAVO Archives
Fagerlund, Gunnar O.	1947. Petroglyphs in HI National Park. February 14.	ms in HAVO Archives
Friends of Hawai‘i Volcanoes National Park, Volcano, Hawaii.	2003. The Oral Histories of ‘Ainahou Ranch.	ms in HAVO Library and CR Division. Report summarizes the history of ‘Ainahou Ranch, with emphasis on Herbert Shipman’s interest in conservation and preservation; includes transcripts of oral history interviews with people who were related to, worked for, and were friends of Shipman.
Glidden, C., J. Waipa, T. Laqua, and M. Durst	1998. Results of Phase II of the Panau Emergency Survey and Mapping Project.	archaeology report in HAVO CR Division. Emergency survey and excavation of sites threatened by lava inundation
Glidden, Catherine	1994. “Lines of Descent: of Umbilical Cords, Ancestors, and Ahupuaa.”	ms in HAVO CR Division
Glidden, Catherine	1997. The 1995 Paliuli Emergency Archaeological Salvage Project Report, Hawai‘i Volcanoes National Park, Hawaii	archaeology report in HAVO CR Division. Survey of area above Paliuli Pali in Pānau Iki and Lae‘apuki ahupua‘a. See Glidden 2006 for final report.
Glidden, Catherine	1998. “Results of Field Work Conducted at the Pulu Processing Center in Hawaii Volcanoes National Park.”	ms in HAVO CR Division. Paper presented at the Society for Hawaiian Archaeology conference, Hilo, Hawaii.
Glidden, Catherine	2006. Paliuli Emergency Salvage Project, Hawai‘i Volcanoes National Park.	archaeology report in HAVO CR Division. Survey initiated due to the threat of lava from Puu Ō‘ō crater; fieldwork between February 27 and April 21, 1995, with initial emphasis on features near the flow. Once these areas were documented, the project area was extended to include a 20 m wide and 1,000 m long transect to the west of the flow. Latter effort involved testing of features within mauka-makai transect, with the explicit focus on mauka areas in Pānau Iki and Lae‘apuki ahupua‘a. All sites identified have been covered by lava flows, except Sites 20430-20433, 20439, and portions of Sites 20434 and 20440.
Glidden, Catherine, and Jill J. Rivoli	2000. Untitled report on Pulu Processing Site.	archaeology report in HAVO CR Division. Emergency excavation of the Pulu Processing Site in 1997; also archival research. Fieldwork included mapping, GPS locations, subsurface testing, and photography.
Hawaiian Volcano Observatory	Weekly and/or monthly reports, 1912-1925.	ms in HAVO Library and Archives
Heilen, M., and B. Camara	1995. Emergency Survey of Coastal Archaeological Features Adjacent to Recent Pu‘u Ō‘ō Lava Flows in Lae‘apuki and Panau Iki Ahupua‘a.	Information incorporated into Waipa (1999?) Kāheka report.
Howarth, F., F. Stone, E. Pearthree, and J. Lippert	1993. Hawai‘i Volcanoes National Park Cave Inventory, Apua Point 1-4 Caves.	ms in HAVO CR Division
Jackson, Frances	1972. An Administrative History of Hawaii Volcanoes National Park. Haleakala National Park, Honolulu, Hawai‘i.	ms in HAVO Library

Author	Date and Title	Selected Annotation
Jaggar, T.	1921. Ancient Rock Pictures	ms in HAVO Library
Keswick Janet	1998. HAVO Archeological Site Record (Namakani Paio Dump).	site record form in HAVO CR Division
Keswick, Janet	1994. HAVO Archeological Site Record (Ginger Patch Dump)	site record form in HAVO CR Division
Keswick, Janet	1994. Archeological Clearance Survey Form: Construct Ainahou Nene Enclosure/Habitat Enhancement (Mowing)	archaeology report in HAVO CR Division
Keswick, Janet	1994. HAVO Archeological Site Record (CCC Camp Foundations)	site record form in HAVO CR Division
Keswick, Janet	1994. HAVO Archeological Site Record (Keauhou Landing)	site record form in HAVO CR Division
Keswick, Janet	1995. HAVO Archeological Site Record (Power Plant)	site record form in HAVO CR Division
Keswick, Janet	1997. HAVO Archeological Site Record (Rainshed Crack Dump)	site record form in HAVO CR Division
Kirkendall, M.A.	1993b. Archeological Inventory Survey Kamoamoa Ahupuaʻa. Prepared for Hawaiʻi Volcanoes National Park	archaeology report in HAVO CR Division
Kirkendall, M.A.	1993a. Kamoamoa Ahupuaʻa: An Archaeological and Historical Picture	archaeology report in HAVO CR Division
Ladd, Edmund J.	1962. Kalapana Salvage: Preliminary Report to the Superintendent.	archaeology report in HAVO Archives
Ladd, Edmund J.	1962. Archaeological Survey and Test, Kamoamoa Campgrounds—Hawaiʻi Volcanoes National Park.	archaeology report in HAVO Archives. Survey of Kamoamoa Campground, road, and turn-outs; excavation of two mounds, one of which is burial
Ladd, Edmund J.	1962. Ruins Stabilization, Moa Heiau, Kamoamoa Campgrounds, Puna.	archaeology report in HAVO Archives. Description of Moa Heiau and stabilization work carried out
Ladd, Edmund J.	1962. Ruins Stabilization Record, Pre-stabilization Report (Wahaʻula Heiau). Ms. on file, HAVO Archives.	archaeology report in HAVO Archives. Description of Wahaʻula Heiau.
Ladd, Edmund J.	1964. Salvage Report. Grave Site 5-A, Kamoamoa Campground	archaeology report in HAVO CR Division. Salvage of one of three grave sites at campsite 5-A
Ladd, Edmund J.	1965. Chain of Craters Road, Puna, Hawaii, Hawaii Volcanoes National Park. Salvage Report.	archaeology report in HAVO Archives. Summarizes 3 years of salvage and stabilization work in area between Kamoamoa and Wahaʻula
Ladd, Edmund J.	1969. Chain of Craters Road, Hawaii Volcanoes National Park, Puna: Salvage Project. In Archaeology on the Island of Hawaii, edited by Richard Pearson, pp. 26-73.	publication. See Ladd 1965
Ladd, Edmund J.	1972. Test Excavations at Waha'ula: Structure C.	archaeology report in HAVO CR Division. Detailed mapping, excavation to establish chronology of construction of heiau
Ladd, Edmund J.	1973. Nomination to the National Register of Historic Sites for Puna-Kaʻu Historic District.	ms in HAVO CR Division
Ladd, Edmund J.	1977. Archeological Clearance Survey Form: Visitor Use Trail at Puuloa Petroglyph Field	archaeology report in HAVO Archives
Ladefoged, Thegn	1987. Settlement Pattern Analysis and Relational Databases: An Archaeological Study in Hawai`i Volcanoes National Park.	MA thesis, Department of Anthropology, University of Hawaii, Honolulu. See Ladefoged et al. 1987
Ladefoged, Thegn, Gary F. Somers, and M. Melia Lane-Hamasaki	1987. A Settlement Pattern Analysis of a Portion of Hawaii Volcanoes National Park. Archeology at Hawaii Volcanoes National Park.	Publications in Anthropology No. 44. Western Archeological and Conservation Center. National Park Service. Survey continues, expands on 1974 survey of Kalapana Extension (see Unknown 1974); also to record damage from 1985 flow.

Author	Date and Title	Selected Annotation
Langlas, Charles	2003. Ethnographic Studies at Hawai‘i Volcanoes National Park.	ms in HAVO Library and CR Division. Report contains supporting documentation for *Native Hawaiian Use of Hawai‘i Volcanoes National Park: A Historical and Ethnographic Overview*. Part A covers HAVO coastal zone with description of historic marine resource use by Native Hawaiians from 1930 to 1985 (including current use) and an ethnographic landscape of the coast; Part B contains a description of current Native Hawaiian use of plant resources in the Park under the Park's collection permit program. Part C is list of Native Hawaiian place names and place name stories taken from documentary sources.
Langlas, Charles	2003. Native Hawaiian Use of Hawai‘i Volcanoes National Park: A Historical and Ethnographic Overview.	ms in HAVO Library and CR Division. Ethnographic study on past and present traditional Native Hawaiian use of resources on HAVO; examines relationship between resource use and HAVO management; makes recommendations for Park management to better accommodate Native Hawaiian desires regarding traditional resource use in the Park, while still protecting those resources. Phase 1 was a preliminary survey of documentary ethnographic sources and records concerning Park policy. Phase 2 focused on Native Hawaiian use of Park resources between 1930 to 1980, based on oral history interviews with older Hawaiians who could describe their use of the Park for subsistence or ritual purposes. Phase 3 focused on current use of the Park, mainly use of marine resources, use of ritual sites, and collection of plants; information gathered primarily by interviews with Native Hawaiian resource users and with Park personnel.
Lee, Georgia	1993. The Petroglyphs of Pu‘uloa (HV-225), Hawai‘i Volcanoes National Park.	ms in HAVO CR Division
Lee, Georgia and Edward Stasack	1999. Spirit of Place, Petroglyphs of Hawai‘i	publication. Includes section on Pu‘uloa Petroglyph Field.
Lippert, Jill	1993. Road Cut Cave	archaeology report in HAVO CR Division
Maly, Kepa and Onaona Maly	2005. *He Wahi Mo‘olelo no Keauhou a me Na Wahi Pana ma Laila.*	oral history report prepared for Kamehameha Schools, Land Assets Division; copy in HAVO CR Division
Martin, James F.	1991. Native Hawaiian Water Collection Systems in Lava Tubes (Caves) and Fault Cracks – Puna-Kau District, Hawaii.	ms in HAVO Library
Martin, Jean, and Frances Jackson	1995. Archaeological Data Recovery Site 50-10-52-19248, Hawaii Volcanoes National Park, Island of Hawaii, Hawaii.	archaeology report in HAVO CR Division. Report documents results of monitoring of water catchment basin excavation, and subsequent laboratory analysis of collected materials; includes a narrative of historical uses of the general Park Headquarters area and a history of water supply in this area; project area is general location of trash deposition from pre-1940 Volcano House operations (stables, garden, poultry yard).
Masse, W.B., L.A. Carter, and G.F. Somers	1991. Waha‘ula Heiau – The Regional and Symbolic Context of Hawai‘i Island's "Red Mouth Temple."	publication: Asian Perspectives 30(1):19-56
Maxey, Jessica and Laura A. Schuster	2003. Rehabilitate 455 acres of fire-damaged transitional mesic ohia and sword fern forest, Hawaii Volcanoes National Park, Hawaii	archaeology report in HAVO CR Division
Medville, Doug and Hazel Medville	1996. Roadcut Cave, Hawaii Volcanoes National Park. Surveyed on October 8, 1996.	map in HAVO CR Division
Melloy, Kilian	1995. Apua Notes	ms in HAVO CR Division

Author	Date and Title	Selected Annotation
Moniz Nakamura, Jadelyn	2002. Build Predator Exclosure Fence To Protect Dark-rumped Petrel Breeding Habitat, Hawaii Volcanoes National Park.	Section 106 Clearance report.in HAVO CR Division
Moniz Nakamura, Jadelyn	2003. Pili Grassland Prescribed Burn Experiments.	archaeology report in HAVO CR Division
Moniz Nakamura, Jadelyn	2003. Keoneheleleiei. The Falling Sands. Hawai‘i Volcanoes National Park Archeological Inventory of the Footprints National Register Site. Publications in Anthropology 2, Pacific Island Cluster, National Park Service, U.S. Department of the Interior.	archaeology report in HAVO CR Division. Inventory survey between 1998 and 2001 of the 1790 Footprints National Register parcel (approx. 4,284 acres) in Kapāpala, Ka‘ū district. Two test excavations were dug and monitoring program was started. Fifty-five sites consisting of 516 individual features identified; also 73 isolated artifacts and 1,773 footprints representing a minimum of 441 individuals. At least two pre- and post-contact trail systems parallel the Ke‘āmoku flow on the east; several other trails and road segments identified.
Moniz Nakamura, Jadelyn	2004. Out of the Ashes: The Discovery of Lithic Block Quarry Workstations on the Slopes of Kilauea Caldera, After Dark in the Park Program	ms in HAVO CR Division
Moniz Nakamura, Jadelyn	2005. Memorandum to Files Re. Replacement of Cap Rocks for Burial Site 21679	memo to file in HAVO CR Division
Morlock, L, J. Waipa, and J. Keswick	1995. HAVO Archeological Site Record (Salt Drying Area)	site record form in HAVO CR Division
CLI	2004. Ainahou Ranch House and Gardens, Hawai‘i Volcanoes National Park	cultural landscape inventory report in HAVO CR Division.
Olsen, Gunder	1941. The Story of the Volcano House. Hilo Tribune Herald, Hilo	publication. Popular history of Volcano House.
Pearthree, E. and Laura A. Carter	1991. Re-evaluation of Sites Along the Puna-Ka'u Coast Trail within the Ahupua'a of Kaena, Kealakomo, Kahue, Apua, Keauhou, and Halape.	ARPA report in HAVO CR Division
Pietrusewsky, Michael	1976. Letter report to Pacific Archaeologist at City of Refuge National Historic Park, re: Mauna Loa Skeletons.	ms in HAVO CR Division. Osteological analysis of human remains found in lava shelter near summit of Mauna Loa; two male individuals.
Pietrusewsky, Michael	1987. An Osteological Report on a Human Skeleton (87-01) from Kamoamoa Picnic Ground. March.	archaeology report in HAVO CR Division. Osteological analysis of human remains found at Kamoamoa picnic grounds (Somers 1987); individual is an adult Polynesian female, about 30 to 40 years old; burial did not include the skull.
Quiseng, Christopher L.	2006. [draft] Kahuku-Ainapo Trail Reconnaissance 2004 (Phase I) and the Kahuku Inventory Survey 2005 (Phase II). Kahuku Management Unit, Hawaii Volcanoes National Park.	archaeology report in HAVO CR Division. Surveys in Kahuku Management Unit from July 2004 to March 2006. Phase I focused on identifying and recording ground location and associated features of the Kahuku-Ainapo trail (Site 24, 121). Phase II was inventory survey over a broad geographical area carried out in collaboration with the HAVO Natural Resources vegetation management staff.
Rivoli, J.J.	1999. An Archeological Survey of the Wilkes Site, United States Exploring Expedition 1840-1841.	archaeology report in HAVO CR Division
Roper, Summer	2003. Cave Monitoring 2003-2004, Book One	field notes in HAVO CR Division
Roper, Summer	2005. [draft] Hilina Pali 2005. The Civilian Conservation Corps. An Archeological Inventory Survey of the Hilina Pali Erosion Control Project of 1940.	archaeology report in HAVO CR Division. The Hilina Pali Civilian Conservation Corps (CCC) project took place in three phases between 1998 and 2003. A total of 201 features was located and recorded, mostly retaining walls and dams. The majority of these features are related to the CCC erosion control project of 1940.

Author	Date and Title	Selected Annotation
Scheffler, Timothy	1994. HAVO Archeological Site Record (Steam Crack Baths).	site record form in HAVO CR Division
Scheffler, Timothy	1994. Kamooali‘i Reconnaissance Survey, “Ahupua‘a Written in Stone.”	archaeology report in HAVO CR Division. Reconnaissance survey of seven transects within an area of approximately 15 square miles over period less than a week. Eight sites identified: three large clusters of petroglyphs, two shelter-type enclosures, a single petroglyph and ahu, a shell midden scatter, and a cluster of five enclosures and associated platforms and terraces.
Scheffler, Timothy	1994. Archaeological Survey Report. Panau Iki: “Paliuli GPS Survey.”	archaeology report in HAVO CR Division. Feature forms for structures in the Paliuli area of Pānau Iki and Lae‘apuki.
Scheffler, Timothy and Janet Keswick	1994. Survey of Headquarters Area, Hawaii Volcanoes National Park, Hawaii	ms in HAVO CR Division. Systematic survey of Headquarters Area “to preempt the onslaught of archeological compliance surveys by taking a proactive approach”
Smart, C., K. Emory, L. Soehren, and E. Ladd	1965. The Archaeological Resources of Hawaii Volcanoes National Park. Parts I and II. Department of Anthropology, B.P. Bishop Museum, Honolulu.	archaeology report in HAVO CR Division. Survey expands on 1959 survey of Kalapana Extension and coastal east HAVO; Smart’s field book and a draft of the report are in the HAVO Archives (Shelf O4; HAVO-608)
Somers, Gary	1986. Preliminary Report: Kamoamoa Picnic Ground, Burial 86-1, Hawaii Volcanoes National Park.	ms in HAVO CR Division and Archives. Emergency removal of burial from Kamoamoa picnic grounds (in black sand between pahoehoe sea cliff and coconut trees in picnic area; makai of the parking lot); burial exposed by high surf during Hurricane Estelle in July 1986. At the request of the Kalapana Hawaiian community, the remains were reburied near by.
Somers, Gary	1987. Preliminary Report: Kamoamoa Picnic Ground, Burial 87-1, Hawaii Volcanoes National Park.	ms in HAVO CR Division and Archives. Emergency removal of burial from Kamoamoa picnic grounds (in black sand between pahoehoe sea cliff and coconut trees in picnic area; about 20 m southwest of Burial 86-1 (see Somers 1986); burial was exposed by high surf during Hurricane Estelle in July 1986. No evidence of burial pit, although this could be due to the erosional damage from the hurricane. See Pietrusewky 1987 for description of individual.
Sommers, Gary	1993. Archeological Clearance Survey Form: Rehabilitate Park Water System, Phase II, Headquarters Area, Hawaii Volcanoes National Park, Hawaii	ms in HAVO CR Division
Spears, Patricia	1995. Panau Iki: Continuities of Residence Through Two Hundred Years. Reconnaissance Survey of a Portion of Site 50-10-63-19460 and Historical Source Review of the Panau Iki Area.	ms in HAVO CR Division. Detailed mapping of a portion of Site 19460; includes discussion of the Pe‘a homestead; prepared for the Hawai‘i Natural History Association.
Spears, Patricia	1995. HAVO Archeological Site/Survey Record (Panau Iki)	site record form in HAVO CR Division
Stasack, Edward and Diane Stasack	1997. Petroglyph Recording Project, Cave HV-76 (State Site No. 50-10-62-22750). Keauhou, Puna-Ka‘u Historic District, Hawai‘i Volcanoes National Park.	archaeology report in HAVO CR Division
Stasack, Edward and Diane Stasack	1998. Kaheka and West of Kaheka. Rock Art Recording Project. Panau Iki Ahupua‘a, Hawai‘i Volcanoes National Park.	archaeology report in HAVO CR Division
Stasack, Edward and Diane Stasack	1998. Nāulu Locus 1 and Locus 2 Rock Art Recording Project: Kealakomo Ahupua‘a, Puna District, Hawai‘i Volcanoes National Park.	archaeology report in HAVO CR Division

Author	Date and Title	Selected Annotation
Stasack, Edward and Diane Stasack	1998. Feature 396 Rock Art Recording Project. Panau Nui Ahupuaʻa, Hawaiʻi Volcanoes National Park.	archaeology report in HAVO CR Division
Stasack, Edward and Diane Stasack	1999. Roadcut Cave Rock Art Recording Report: Kealakomo Ahupuaʻa, Puna District, Hawaiʻi Volcanoes National Park.	archaeology report in HAVO CR Division
Stasack, Edward and Diane Stasack	1999. Ki Cave Rock Art Recording Project. Panua Nui Ahupuaʻa, Puna District, Hawaiʻi Volcanoes National Park.	archaeology report in HAVO CR Division
Stasack, Edward and Diane Stasack	1999. Laeʻapuki/Panau Iki (Transect 2) Rock Art Recording Project. Laeʻapuki/Panau Iki Ahupuaʻa, Puna District, Hawaiʻi Volcanoes National Park.	archaeology report in HAVO CR Division
Superintendent Reports	Multiple	in HAVO Archives and Library
Suzuki/Morgan Architects, Ltd.	2003. Historic Structures Report for the Ainahou Ranch House at Hawaiʻi Volcanoes National Park	ms in HAVO Library
Swanson, Donald	in press; paper on Hawaiian oral tradition	—
unknown (probably E.J. Ladd)	1974. Walk-Through Archaeological Survey-Kalapana Extension, Hawaii Volcanoes National Park, Hawaii (Portion).	archaeology report in HAVO CR Division and Archives. Survey of the portion of the Kalapana Extension inland of Chain of Craters Road, just west of Wahaʻula Heiau to 200 to 400 ft asl; 156 sites identified.
unknown	1987. untitled	ms in HAVO CR Division and Archives. Report summarizes research project by B. Withrow at Keanakākoʻi Crater and Big ʻŌhiʻa Cave (reconnaissance survey for doctoral research on prehistoric production, distribution, and use of Hawaiian adzes).
Waipa, Jennifer	1996. HAVO Archeological Site Record (Lava Plastered Cone Trail).	site record form in HAVO CR Division
Waipa, Jennifer	1997. HAVO Archeological Site Record (HV47)	site record form in HAVO CR Division
Waipa, Jennifer	1998. HAVO Archeological Site Record (Papalehau Cave)	site record form in HAVO CR Division
Waipa, Jennifer	2001. HAVO Archeological Site Record (Kahue Coastal Features)	site record form in HAVO CR Division
Waipa, Jennifer	2001. HAVO Archeological Site Record (Hwy. 11 Dump Chute)	site record form in HAVO CR Division
Waipa, Jennifer	2001. HAVO Archeological Site Record (Keanakakoʻi Crack Dump)	site record form in HAVO CR Division
Waipa, Jennifer	2001. HAVO Archeological Site Record (Poliokeawe Platforms)	site record form in HAVO CR Division
Waipa, Jennifer	2002. HAVO Archeological Site Record (Pepeiau Shelter Cabin)	site record form in HAVO CR Division
Waipa, Jennifer	2002. HAVO Cultural Survey Form, PROJECT HAVO 2002 H	site record form in HAVO CR Division
Waipa, Jennifer	2003. HAVO Archeological Site Record (Crater Rim Road Wall)	site record form in HAVO CR Division
Waipa, Jennifer	2003. HAVO Archeological Site Record (Kahuku-ʻAinapo Trail)	site record form in HAVO CR Division
Waipa, Jennifer	2003. HAVO Archeological Survey Form, PROJECT HAVO 2003 B (see Feature 10, LCS-20)	site record form in HAVO CR Division
Waipa, Jennifer	2004. Replace/Modify Sections of the Peter Lee and Kipuka Ki Fencelines, Hawaiʻi Volcanoes National Park, Hawaiʻi	ms in HAVO CR Division
Waipa, Jennifer	2005. [draft] Kāheka: A Study of a Small Coastal Settlement	ms in HAVO CR Division

Author	Date and Title	Selected Annotation
Waipa, Jennifer and Taylor Houston	2001. HAVO Archeological Site Record (Kealakomo Coastal Features)	site record form in HAVO CR Division
Warshauer and Jacobi	1973. A Biological Survey	ms in HAVO Library
Wingate, Edward G.	1939. A Photographic Report Covering Some of the Natural Features, Physical Construction Improvements, Conservation Activities, Etc.	ms in HAVO CR Division. Document appears to be a justification for park improvements, with photographs of infrastruction problems. Caption to Photo 13 says: "Kipuka Puaulu had long been used as a picnic ground. It had previously been farmed as a homestead. Following Dr. E.P. Meinecke's inspection of the park, his suggestion regarding making this a sacred area has been carried out. Picnic grounds, formerly located inside the kipuka were removed to an adjacent area."
Wulzen, Warren	1999. [draft] Footprints 98 Project. Archeological Survey of Site 50-10-61-5505 and Beyond. Kapāpala and Keauhou Ahupua'a, Hawai'i Volcanoes National Park	archaeology report in HAVO CR Division. Information from this draft report was incorporated into Moniz Nakamura (2003).
Yen, D.	1971. An Ethnobotanical Survey of the National Parks at Honaunau and Kalapana on the Island of Hawaii, and Kipahulu, Maui	ms in HAVO CR Division
Zabrok, Pete	1986. Aloha Caving. In the Toronto Caver	publication; copy in HAVO CR Division

APPENDIX E.
BURIAL INFORMATION

Table E-1. Burial Site Inventory.

Site No.	Name/Description (modified from HAVO records)	ASMIS Description (in CAPS: ARC DFB DESC) (in parentheses, added information)	In Arc GIS	Source	Park_ID ASMIS
19449	Puʻu ʻIwi Makule	Burial		Keswick HVASR	
19451	Horse Corral Burial	Burial		Keswick HVASR	
19464	Gourd Cave Burial	Burial, water collection features (destroyed by lava)	x	Glidden 2006	Gourd Cave
21679	Cave (Fea. 70)	Burial cave. CAVE	x	Glidden et al. 1998	
21683	Cave (Fea. 253)	Burial cave. Seismic activity as well as flooding could and may be affecting this site. CAVE	x	Glidden et al. 1998	
23793	Poliokeawe Platforms	Burial	x	Waipa, J.	
23986	Kupukupu Features KM1-6	Pits, hearth, burial		Schuster, L.	
24010	Kupukupu Platform	Burial? Shrine? PLATFORM	x	Dougherty et al. 2004b	HAVO-2002-488
24011	Kupukupu	Burial LAVA BLISTER	x	Dougherty et al. 2004b	HAVO-2002-B-498
24081	Cave	Burial cave, petroglyphs.* CAVE	x	Dougherty et al. 2004a	HAVO-2003-L-67
24089	Burial	Burial		Dougherty et al. 2004a	HAVO-2003-L-176
HV-053	Graves	Graves		Smart et al. 1965	HV-053
HV-096	Grave, cairn, papamu	Grave, cairn, papamu (in Keauhou)		Smart et al. 1965	HV-096
HV-103	Grave	Grave (in Keauhou)	x	Smart et al. 1965	HV-103
HV-229	Burial	Burial site, 948+35, permanently sealed (in Poupou, Kaʻiliʻili Village)	x	Ladd 1965 Smart et al. 1965 Ladefoged et al. 1987	HV-229
HV-238	Burial (Site 5-A)	Burial (Site 5-A) (in Kamoamoa)		Ladd [1964], 1965 Smart et al. 1965 Ladefoged et al. 1987	HV-238
HV-239	Burial (Mound 3)	Burial (Mound 3) (in Kamoamoa)		Ladd 1962a, 1965 Smart et al. 1965 Ladefoged et al. 1987	HV-239
HV-263	Platform — Graves?	Platform — Graves? (in Pūlama)		Smart et al. 1965	HV-263

Site No.	Name/Description (modified from HAVO records)	ASMIS Description (in CAPS: ARC DFB DESC) (in parentheses, added information)	In Arc GIS	Source	Park_ID ASMIS
HV-295	Burial platform	Burial platform (in Pūlama)		Smart et al. 1965 Ladefoged et al. 1987	HV-295
HV-296	Burial platform	Burial platform (in Pūlama)		Smart et al. 1965 Ladefoged et al. 1987	HV-296
HV-302	Grave	Grave (in Kamoamoa)		Smart et al. 1965 Ladefoged et al. 1987	HV-302
HV-303	Grave	Grave (in Kamoamoa)		Smart et al. 1965 Ladefoged et al. 1987	HV-303
no no.	Mauna Loa	(2 adult males in lava shelter near summit)		Pietrusewsky 1976	—
86-1	Burial	(burial in sand in Kamoamoa picnic grounds, exposed by high surf during Hurricane Estelle)		Somers 1986	—
87-1	Burial	(burial in sand in Kamoamoa picnic grounds, exposed by high surf during Hurricane Estelle)		Somers 1987	—

APPENDIX F.
GAZETTEER OF PLACE NAMES AND GLOSSARY OF HAWAIIAN WORDS

Table F-1. Gazetteer of Place Names Used in HAVO AOA.

Basic Name	Name with Diacriticals	Description	Location
Ailaau	ʻAilāʻau	lava flow	Kīlauea East Rift, Puna district
Ainahou	ʻAinahou	ranch	lower to mid-elevation Keauhou
Ainapo	ʻAinapō	trail	upland Mauna Loa, Kahuku
Akihi	ʻAkihi	cinder cone (Mauna Loa)	Kahuku, Kaʻū district
Alala	ʻAlalā	lava flow (Mauna Loa)	upland Kahuku, Kaʻū district
Alika	ʻAlikā	cinder cone (SW Rift of Mauna Loa)	Kahuku, Kaʻū district
Apua	ʻĀpua	ahupuaʻa, point, coastal village	Puna district
Halape	Halapē	place, coastal village	Kapāpala; Kaʻū district
Halemaumau	Halemaʻumaʻu	caldera at Kīlauea summit	Keauhou, Kaʻū district
Hamakua	Hāmākua	district	east Hawaiʻi
Hilina	Hilina	pali	Kapāpala, Kaʻu district
Hokukano	Hōkūkano	village	coastal southeast Kaʻū district
Holei	Hōlei	pali, inland village	Puna district; village is in Pānau Nui
Honuapo	Honuʻapo	coastal village	central Kaʻu district
Hualalai	Hualālai	mountain	western Hawaiʻi Island
Humuula	Humuʻula	saddle between Mauna Loa and Mauna Kea	Hilo and Hāmākua districts
Ihuanu	Ihuanu	cinder cone (SW Rift of Mauna Loa)	Kahuku, Kaʻū district
Kaalaala	Kaʻalaʻala	ahupuaʻa	central Kaʻū district
Kaalaiki	Kaʻalāiki	ahupuaʻa, village	central Kaʻū district
Kaalualu	Kaʻaluʻalu	village	central Kaʻū district
Kaena	Kaʻena	point, village	Pānau Nui, Puna district
Kahaualea	Kahaualeʻa	ahupuaʻa, village	Puna district
Kahue	Kahue	ahupuaʻa, village	Puna district
Kahuku	Kahuku	ahupuaʻa, ranch	western Kaʻū district
Kailiili	Kaʻiliʻili	village	Pūlama, Puna district
Kalaeloa	Kalaeloa	site of 1790 battle between Keōua and Kaʻiana	Kaʻū district
Kalapana	Kalapana	ahupuaʻa, village	Puna district
Kamaoa	Kamāʻoa	ahupuaʻa; site of battle btwn Keōua and Kaʻiana	Kaʻū district; South Point
Kamoamoa	Kamoamoa	ahupuaʻa, village	Puna district
Kaohe	Kaʻohe	ahupuaʻa	Hāmākua district
Kapapala	Kapāpala	ahupuaʻa, inland village, ranch	eastern Kaʻū district
Kapualaala	Kapuʻalaʻala	cinder cone (SW Rift of Mauna Loa)	Kahuku, Kaʻū district
Kau	Kaʻū	district	southern Hawaiʻi
Kealakomo	Kealakomo	ahupuaʻa, village	Puna district
Keamoku	Keʻāmoku	lava flow (Kīlauea)	NNW of Kīlauea crater
Keanakakoi	Keanakākoʻi	crater (south of Kīlauea crater)	Keauhou, Kaʻū district
Keauhou	Keauhou	iliʻaina, landing, village	eastern Kaʻū district
Kekeekai	Kekeʻekai	inland ahupuaʻa	western Kaʻū district
Kiao	Kīʻao	inland ahupuaʻa	western Kaʻū district
Kilauea	Kīlauea	volcano, crater	Keauhou, Kaʻū district
Kiolakaa	Kiolakaʻa	ahupuaʻa	central Kaʻū district
Kipuku Nene	Kīpuka Nēnē	kīpuka	Kapāpala, Kaʻū district
Kuee	Kūēʻē	village	Kaʻalaʻala Makai, Kaʻū district
Kumukahi	Kumukahi	point	easternmost point of Hawaiʻi Island
Laeapuki	Laeʻapuki	ahupuaʻa, point, village	Puna district
Lua Palalauhala	Lua Palalauhala	crater	above Pali o Māmalu, Kaʻū district
Lua Poai	Lua Pōʻai	crater	above Pali o Māmalu, Kaʻū district
Lua Puali	Lua Pūʻali	crater	above Pali o Māmalu, Kaʻū district
Makahuna	Makahuna	fault scarp	Kapāpala, Kaʻū district
Makaopuhi	Makaopuhi	crater on Kīlauea East Rift	Pānau Nui, Puna district
Manienie	Mānienie	inland ahupuaʻa	western Kaʻū district
Mauna Kea	Mauna Kea	volcano	central Hawaiʻi Island
Mauna Loa	Mauna Loa	volcano	southern Hawaiʻi Island
Mauna Ulu	Mauna Ulu	crater on Kīlauea East Rift	Pānau Nui, Puna district

Basic Name	Name with Diacriticals	Description	Location
Mokuaweoweo	Mokuʻāweoweo	caldera at Mauna Loa summit	Kahuku, Kapāpala, Kaʻu district
Naohuleelua	Nāʻōhuleʻelua	site of 1790 battle between Keōua and Kaʻiana	Kaʻū district
Napau	Nāpau	inland place, crater on Kīlauea East Rift	Kamoamoa, Puna district
Napuulena	Nāpuʻulena	inland ahupuaʻa	western Kaʻū district
Naulu	Nāʻulu	village on Hōlei Pali	Kealakomo, Puna district
Ohohio	ʻŌhohio	cinder cone (SW Rift of Mauna Loa)	Kahuku, Kaʻū district
Olaa	ʻŌlaʻa	ahupuaʻa, inland village	Puna district
Pahala	Pāhala	ahupuaʻa, village	Puna district
Paiahaa	Paiahaʻa	site of 1790 battle between Keōua and Kaʻiana	Kaʻū district
Pakini	Pākini	ahupuaʻa, village	western Kaʻū district
Pali o Kaeo	Pali o Kaʻeo	fault scarp; inland section of Pali o Māmalu	western Kaʻū district
Pali o Mamalu	Pali o Māmalu	major fault scarp; also called Kahuku Fault	western Kaʻū district
Paliuli	Paliuli	fault scarp	Pānau and Laeʻapuki, Puna district
Panau	Pānau	inland settlement near Makaopuhi Crater	Pānau Nui, Puna district
Panau Iki	Pānau Iki	ahupuaʻa	Puna district
Panau Nui	Pānau Nui	ahupuaʻa	Puna district
Pohaku Hanalei	Pōhaku Hanalei	inland point of Hilo district	Hilo district
Pohakuloa	Pōhakuloa	cinder cone (SW Rift of Mauna Loa)	Kahuku, Kaʻū district
Poliokeawe	Poliokeawe	fault scarp	Puna and Kaʻū districts
Poupou	Poupou	ahupuaʻa	Puna district
Poupou Kauka	Poupou Kauka	village	coastal Puna district
Pulama	Pūlama	ahupuaʻa	Puna district
Puna	Puna	district	eastern Hawaiʻi Island
Punaluu	Punaluʻu	ahupuaʻa, bay, village	central Kaʻū district
Puu Kaone	Puʻu Kaone	hill	coastal Kapāpala, Kaʻū district
Puu Kapukapu	Puʻu Kapukapu	hill	coastal Kapāpala, Kaʻū district
Puu o Kahuku	Puʻu o Kahuku	cinder cone (Mauna Loa)	Kahuku, Kaʻū district; above Belt Rd
Puu o Keokeo	Puʻu o Keʻokeʻo	cinder cone (SW Rift of Mauna Loa)	Kahuku, Kaʻū district
Puu o Lokuana	Puʻu o Lokuana	cinder cone (Mauna Loa)	Kahuku, Kaʻū district; above Belt Rd
Puu Oo	Puʻu ʻŌʻo	cinder cone, vent (Kīlauea)	Kamoamoa, Puna district
Puu Ulaula	Puʻu ʻUlaʻula	cinder cone (near Mauna Loa summit)	Kapāpala, Kaʻū district
Puueo	Puʻueʻo	fault scarp	Keauhou, Kapāpala, Kaʻū district
Puuloa	Puʻuloa	place, petroglyph field	Pānau Nui, Puna district
Uwekahuna	Uwēkahuna	cliff in Kīlauea crater	Keauhou, Kaʻū district
Wahaula	Wahaʻula	heiau	Pūlama, Puna district
Waiohinu	Waiʻōhinu	ahupuaʻa, inland village	central Kaʻu district
Wilipea	Wilipea	coastal village, point	Laeʻapuki, Puna district

Table F-2. Glossary of Hawaiian Terms.

ʻaʻā	Stony lava.
ahu	Heap, pile, collection, mound, mass; altar, shrine, cairn.
ahupuaʻa	Land division usually extending from the uplands to the sea, so called because the boundary was marked by a heap (ahu) of stones surmounted by an image of a pig (puaʻa), or because a pig or other tribute was laid on the altar as tax to the chief.
ʻāina	Land, earth (Pukui and Elbert 1986:11).
akua	God, goddess, spirit, ghost, devil, image, idol, corpse.
akua loa	Also termed Lono-makua; this is the idol termed the "Makahiki god" that was carried around the island during the Makahiki (Malo 1951:144-145). Other gods involved with this ceremony are the akua poko (short god) and akua paani (god of sports) (Malo 1951:145).
akua paani	"God of sports" that accompanied the akua loa during the Makahiki (Malo 1951:145); described as "consisting of spears, the heads of which were surrounded with a sort of basket work intertwined and decorated with lei and streamers of white and yellow tapa. It is said that the games of the festival were directed by gestures made with these poles." (Malo 1951:154).
akua poko	"Short god" carried only as far as the district boundary and taken back, during the Makahiki (Malo 1951:145); Malo also describes what he believed to be an akua poko as "a staff of kauila, having a small figure in the form of a man arrayed with the mahi-ole, feather helmet. The lower end of the staff is sharpened as if for thrusting into the ground … The length of the staff is about three feet four inches (sic)." (Malo 1951:155).
ʻalā	Dense waterworn volcanic stone, as used for poi pounders, adzes, hula stones; hard lava, basalt (Pukui and Elbert 1986:16).
aliʻi	Chief, chiefess, officer, ruler, monarch, peer, headman, noble, aristocrat, king, queen, commander.
ʻanāʻanā	Black magic, evil sorcery by means of prayer and incantation; to practice this.
ʻaumakua	Family or personal gods; deified ancestors who might assume the shape of a variety of animals, plants, rocks, and clouds; mortals did not harm ʻaumakua and ʻaumakua warned mortals in dreams, visions and calls.
hale	House, building, station, hall.
heiau	Hawaiian term for a pre-Christian place of worship, shrine.
hōlua	Ancient sled used on grassy slopes.
ʻili	Land section, next in importance to ahupuaʻa and usually a subdivision of an ahupuaʻa.
imu	Underground oven.
ipu hula	Dance drum made of two gourds sewed together.
iwi	Bone; carcass; core; bone of the dead.
kāʻai	Sash, belt, girdle or any king; sennit casket …; protective cloth wrapped around an object; to bind, tie around, encircle, gird on; to put on, as armor or a mourning garment.
kahu	Honored attendant, guardian, nurse, keeper of ʻunihipili bones, regent, keeper, administrator, warden, caretaker, master, mistress; pastor, minister, reverend, or preacher of a church … one with a personal relationship between a god and its guardian or keeper.
kahuna	Kāhuna, plural; priest, sorcerer, magician, wizard, minister, expert in any profession (whether male or female); in the 1845 laws doctors, surgeons, and dentists were called kahuna.

kanalu	Priest of Kū serving in the *luakini* temple, said to be named for the first such priest (Pukui and Elbert 1986:127).
kapu	Taboo; prohibition; special privilege or exemption from ordinary taboo; sacredness; forbidden; holy; consecrated; no trespassing.
kauhale	Group of houses comprising a Hawaiian home; Hawaiian home.
kiawe	Introduced leguminous tree, Prosopis pallida.
ki‘i	Image, statue, picture, photograph, drawing, diagram, illustration, likeness, cartoon, idol, doll, petroglyph.
kino lau	The forms taken by a supernatural being.
kipuka	A calm place in a high sea, deep place in a shoal, opening in a forest, openings in cloud formations, and especially a clear place or oasis within a lava bed where there may be vegetation.
koa haole	Introduced leguminous shrub, Leucaena leucocephala.
kōnane	Hawaiian term for an ancient game resembling checkers, played with pebbles placed in even lines on a stone or wood board called papa kōnane or papamū.
kukui	Candlenut tree, Aleurites moluccana.
kumu	Hawaiian term for bottom, base, foundation …. teacher, tutor, manual, primer, model, pattern.
kumulipo	Origin, genesis, source of life, mystery; name of the Hawaiian creation chant (Pukui and Elbert 1986:182).
kupua	Demigod, or culture hero, especially a supernatural being possessing several forms; one possessing mana; to possess kupua (magic) powers.
kupuna	(kūpuna, plural) Grandparent, ancestor, relative or close friend of the grandparent’s generation, grandaunt, granduncle (Pukui and Elbert 1986:186).
lua iki	A term the recorders previously used to describe a poho or cupule; lua is a hole that has a bottom, contrasting with puka, a perforation; iki means small, little, slightly; the recorders have since replaced this term with poho.
luakini	Temple, church, cathedral, tabernacle; large heiau where ruling chiefs prayed and human sacrifices were offered …; a belief was that building of a luakini heiau caused a famine since the inner bark of the ohia (which was used in a luakini heiau) was red (Malo 1951:189).
mahele	Portion, division, section, zone, lot, piece, quota, installment, bureau, department, precinct, category, scene or act in a play; share, as of stocks; measure in music; land division of 1848 (the great *mahele*) (Pukui and Elbert 1986:218).
Makahiki	“Ancient festival beginning about the middle of October and lasting about four months, with sports and religious festivities and taboo on war” (Pukui and Elbert 1986:225). A more in depth description of the Makahiki can be found in Malo (1951:141-159), which provides a better understanding of this ceremony.
makai (or kai)	On the seaside, toward the sea, in the direction of the sea.
mana	Supernatural or divine power, mana, miraculous power; a powerful nation, authority; to give mana to, to make powerful; to have mana, power, authority …
mapele	A heiau (temple) built for worshipping after the rite of Lono (Malo 1951:160); a king might build a mapele after building a luakini since the belief was that a mapele would bring prosperity to the land because the lama wood used in its construction was black (Malo 1951:189).
mauka (or uka)	Inland, upland, towards the mountain.

moa	Chicken; red jungle chicken fowl (Gallus gallus), as brought to Hawai‘i by Polynesians; an ‘aumakua to some. Parts of the chicken are named as follows: comb (lepe); beak (nuku); wattles (lepelepe); eye (maka); ear (pepeiao); breast (umauma); tail (puapua or pupua); wing (eheu or pekekeu); feet and legs (wawae); spurs (kakala or kokala); long tail feathers (hulu ko‘o); and fluffy underfeathers (hulu weuweu). Mother hen (kumulau or kinana moa); peeping chick (‘io‘io moa); young child chick (moa keiki); young chicken [piopio moa (from ‘opio mean young)]; and young pullet or young cock (ohi moa). (Pukui and Elbert 1986:248; Handy and Handy 1991:256).
moku or moku ‘āina	District, island, islet … a State (as in United States).
mo‘olelo	Story, tale, myth, history, tradition, literature, legend, journal, log, yarn, fable, essay, chronicle, record, article.
‘ohana	Family, relative, kin group; related.
‘opihi	Limpets. Hawaiians recognize three kinds: kō‘ele (Cellana talcosa, the largest); ‘ālinalina (C. sandwicensis; and makaiauli (C. exarata). Scientists also recognize C. melanostoma.
pāhoa	Short dagger; sharp stone, especially as used for a weapon.
pāhoehoe	Smooth, unbroken type of lava, contrasting with ‘a‘ā.
pali	Cliff, precipice, steep hill … full of cliffs.
pana or **wahi pana**	Celebrated, noted, or legendary place.
paniolo	Cowboy (sometimes called *paniolo pipi* to distinguish from *paniolo*) (Pukui and Elbert 1986:315).
papa	Flat surface, stratum, plain, reef, layer, level, foundation, story of a building, floor, class, rank, grade, order, table …; native born, especially for several generations.
papamū	“Checkerboard” or similar array of pits. At times, these have been considered to be the base upon which the game kōnane is played. For our recording purposes, the recorders do not automatically assume that all papamū are for this purpose and that they may represent “grids” or a framework for other functions, activities or purposes.
piko	Navel, navel string, umbilical cord.
pōhaku	Rock, stone, mineral, tablet, sinker (Pukui and Elbert 1986:334).
poho	Hollow...depression; receptacle, pouch; mortar (Pukui and Elbert 1986:336); a Hawaiian word used for cupule. These are classified differently than mortars (see “processing areas”); and there are poho on vertical surfaces which preclude a functional purpose and which may have a metaphorical or symbolical purpose. There are poho which may have had a functional purpose, and there are deep poho which may serve as mortars.
wahi kapu	Sacred place, location, setting.
wahi pana	See pana.

APPENDIX G.
DEFINITIONS OF "CULTURAL RESOURCES," "SITE," AND "TRADITIONAL"

CULTURAL RESOURCES AND SITES

A general definition of cultural resources is found in *Caring for the Past, Managing for the Future* (2001, Advisory Council on Historic Preservation):

> Cultural resources are generally defined by federal agencies to mean the same thing as historic properties, although there is no consistent legal definition, and individual agencies and organizations use different emphases. Under *10 U.S.C. § 2684*, which deals with *Department of Defense*'s responsibilities to manage "cultural resources," such resources are defined to include properties included in or eligible for inclusion in the *National Register of Historic Places*, cultural items defined by the *Native American Graves Protection and Repatriation Act*, archaeological resources as defined by the *Archaeological Resources Protection Act*, and archaeological artifact collections and associated records. The *National Park Service* lists archaeological resources, cultural landscapes, structures, museum objects, and ethnographic resources in its management guidance and definition of "cultural resources." Use of the term "cultural resources" by other agencies may be confusing because arts agencies and cultural endowments may use it to refer to art, performance, music, and other forms of cultural expression.

The accompanying table provides a number of definitions of cultural resources and types of sites taken from NPS management documents.

Table G-1. NPS Cultural Resource Definitions.

Subject	Definitions
Archeological resource	[see Cultural Resource, archeological resource]
Cultural Landscape	[see Cultural Resource, cultural landscape]
CULTURAL RESOURCE:	an aspect of a cultural system that is valued by or significantly representative of a culture or that contains significant information about a culture. A cultural resource may be a tangible entity or a cultural practice. *Tangible cultural resources* are categorized as districts, sites, buildings, structures, and objects for the National Register of Historic Places and as archeological resources, cultural landscapes, structures, museum objects, and ethnographic resources for NPS management purposes. **[DO 28 Glossary]** an aspect of a cultural system that is valued by or significantly representative of a culture, or that contains significant information about a culture. A cultural resource may be a tangible entity or a cultural practice. Tangible cultural resources are categorized as districts, sites, buildings, structures, and objects for the National Register of Historic Places, and as archeological resources, cultural landscapes, structures, museum objects, and ethnographic resources for NPS management purposes. **[NPS Management Policies]** To focus attention on *management requirements* within these property types, the NPS *Management Policies* [2001] categorizes cultural resources as archeological resources, cultural landscapes, structures, museum objects, and ethnographic resources. **[DO-28, Chapter 1.B.2]**
Cultural Resource: ARCHEOLOGICAL RESOURCE	...any material remains or physical evidence of past human life or activities which are of archeological interest, including the record of the effects of human activities on the environment. They are capable of revealing scientific or humanistic information through archeological research. **[DO 28 Glossary]** **Archeological resources** are the remains of past human activity *and records documenting the scientific analysis* of these remains. Archeological resources include stratified layers of household debris and the weathered pages of a field notebook, laboratory records of pollen analysis and museum cases of polychrome pottery. Archeological features are typically buried but may extend above ground; they are commonly associated with prehistoric peoples but may be products of more contemporary society. **[DO-28:Chapter 1.B.2]** any material remains or physical evidence of past human life or activities which are of archeological interest, including the record of the effects of human activities on the environment. An archeological resource is capable of revealing scientific or humanistic information through archeological research. **[NPS Management Policies]**

Cultural Resource: CULTURAL LANDSCAPE	a geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person, or exhibiting other cultural or esthetic values. There are four non- mutually exclusive types of cultural landscapes: historic sites, historic designed landscapes, historic vernacular landscapes, and ethnographic landscapes. **[NPS Management Policies]** **Cultural landscapes** are settings we have created in the natural world. They reveal fundamental ties between people and the land–ties based on our need to grow food, give form to our settlements, meet requirements for recreation, and find suitable places to bury our dead. Landscapes are intertwined patterns of things both natural and constructed: plants and fences, watercourses and buildings. They range from formal gardens to cattle ranches, from cemeteries and pilgrimage routes to village squares. *They are special places: expressions of human manipulation and adaptation of the land.* **[DO-28 Chapter 1.B.2]** a geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values. There are four general kinds of cultural landscape, not mutually exclusive. **[DO 28 Glossary]**
Cultural Resource: CULTURAL LANDSCAPE 1 *HISTORIC SITE*	**Historic site**: a landscape significant for its association with a historic event, activity, or person. **[DO 28 Glossary]**
Cultural Resource: CULTURAL LANDSCAPE 2 *HISTORIC DESIGNED LANDSCAPE*	**Historic designed landscape**: a landscape significant as a design or work of art; was consciously designed and laid out either by a master gardener, landscape architect, architect, or horticulturist to a design principle, or by an owner or other amateur according to a recognized style or tradition; has a historical association with a significant person, trend or movement in landscape gardening or architecture, or a significant relationship to the theory or practice of landscape architecture. **[DO 28 Glossary]**
Cultural Resource: CULTURAL LANDSCAPE 3 *HISTORIC VERNACULAR LANDSCAPE*	**Historic vernacular landscape**: a landscape whose use, construction, or physical layout reflects endemic traditions, customs, beliefs, or values; in which the expression of cultural values, social behavior, and individual actions over time is manifested in physical features and materials and their interrelationships, including patterns of spatial organization, land use, circulation, vegetation, structures, and objects; in which the physical, biological, and cultural features reflect the customs and everyday lives of people. **[DO 28 Glossary]**
Cultural Resource: CULTURAL LANDSCAPE 4 *ETHNOGRAPHIC LANDSCAPE*	**Ethnographic landscape**: areas containing a variety of natural and cultural resources that associated people define as *heritage resources,* including plant and animal communities, geographic features, and structures, each with their own special local names. **[DO 28 Glossary]** an area containing a variety of natural and cultural resources that traditionally associated people define as heritage resources. The area may include plant and animal communities, structures, and geographic features, each with their own special local names. **[NPS Management Policies]**

Cultural Resource: ETHNOGRAPHIC RESOURCE	a site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it [i.e., a TCP] **[DO 28 Glossary]** objects and places, including sites, structures, landscapes, and natural resources, with traditional cultural meaning and value to associated peoples. Research and consultation with associated people identifies and explains the places and things they find culturally meaningful. Ethnographic resources eligible for the National Register of Historic Places are called traditional cultural properties. **[NPS Management Policies]** **Ethnographic resource**s are basic expressions of human culture and the basis for continuity of cultural systems. A cultural system encompasses both the tangible and the intangible. It includes traditional arts and native languages, religious beliefs and subsistence activities. Some of these traditions are supported by ethnographic resources: special places in the natural world, structures with historic associations, and natural materials. *An ethnographic resource might be a riverbank used as a Pueblo ceremonial site or a schoolhouse associated with Hispanic education, sea grass needed to make baskets in an African-American tradition or a 19th-century sample of carved ivory from Alaska.* Management of ethnographic resources acknowledges that culturally diverse groups have their own ways of viewing the world and a right to maintain their traditions. **[DO-28, Chapter 1.B.2]** Ethnographic resources are variations of natural resources and standard cultural resource types. They are subsistence and ceremonial locales and sites, structures, objects, and rural and urban landscapes assigned cultural significance by traditional users. The decision to call resources "ethnographic" depends on whether associated peoples perceive them as traditionally meaningful to their identity as a group and the survival of their lifeways. Some such resources may be designated by other terms and cross-listed in other NPS inventories. Sites defined as archeological for preservation purposes, for example, are ethnographic if traditional religious practitioners consider them significant sources of spiritual power. Members of associated groups may also ascribe meaning to properties in park collections perceived as sacred or as items of cultural identity and heritage. Groups also assign their own cultural meanings to natural landscapes and localities... Ethnographic resource types...*Sites... Objects... Structures...Landscapes* **[DO-28, Management, Chapter 7]**
Cultural Resource: MUSEUM OBJECTS	**Museum objects** are manifestations and records of behavior and ideas that span the breadth of human experience and depth of natural history. They are evidence of technical development and scientific observation, of personal expression and curiosity about the past, of common enterprise and daily habits. Museum objects range from a butterfly collection to the woven fragments of a prehistoric sandal. They include the walking cane of an American president, a blacksmith's tools, and the field notes of a marine biologist. They encompass fossilized dinosaur bones and business journals, household furnishings and love letters bound with a faded ribbon. They are invaluable– samples and fragments of the world through time and the multitude of life therein. **[DO-28 Chapter 1.B.2]**

Cultural Resource: STRUCTURE (Prehistoric and Historic Structure)	a constructed work, usually immovable by nature or design, consciously created to serve some human activity. Examples are buildings of various kinds, monuments, dams, roads, railroad tracks, canals, millraces, bridges, tunnels, locomotives, nautical vessels, stockades, forts and associated earthworks, Indian mounds, ruins, fences, and outdoor sculpture. *In the National Register program "structure" is limited to functional constructions other than buildings.* **[DO 28 Glossary]** **Structures** are material assemblies that extend the limits of human capability. Without them we are restricted to temperate climates, the distances we can walk, and the loads we can carry. With them we can live where we choose, cross the continent in hours, and hurl a spacecraft at the moon. Structures are *buildings* that keep us warm in winter's worst blizzard and *bridges* that keep us safe over raging rivers; they are *locomotives* that carry us over vast prairies and monuments to extend our memories. They are *temple mounds and fishing vessels, auto factories and bronze statues*–elaborations of our productive ability and artistic sensitivity. **[DO-28 Chapter 1.B.2]**
CULTURAL RESOURCE MANAGEMENT:	the range of activities aimed at understanding, preserving, and providing for the enjoyment of cultural resources. It includes research related to cultural resources, planning for actions affecting them, and stewardship of them in the context of overall park operations. It also includes support for the appreciation and perpetuation of related cultural practices, as appropriate. **[DO 28 Glossary]**
Cultural Sites	[not defined, see Archeological Resource and Ethnographic Resource under Cultural Resource, and also see DO-28 service-wise Inventory column]
Ethnographic resource	[see Cultural Resource, Ethnographic Resource]
HISTORIC PROPERTY	a district, site, building, structure, or object significant in the history of American archeology, architecture, culture, engineering, or politics at the national, state, or local level. **[NPS Management Policies]**
HISTORIC RESOURCES	[not defined, see HRS in DO-28 Baseline Reports Column]
HISTORIC SITE:	the site of a significant event, prehistoric or historic occupation or activity, or structure or landscape whether extant or vanished, where the site itself possesses historical, cultural, or archeological value apart from the value of any existing structure or landscape; see *cultural landscape.* **[DO 28 Glossary]** [definition taken from National Register]; [the term is also used for a category of Cultural Landscape, q.v.]
Historic Structure	[see Structure]
INTEGRITY:	the authenticity of a property's historic identity, evidenced by the survival of physical characteristics that existed during its historic or prehistoric period; the extent to which a property retains its historic appearance. **[DO 28 Glossary]** [different from National Register]
Museum Objects	[see Cultural Resource, Museum Objects]
Prehistoric Structure	[see Structure]
SACRED SITES	certain natural and cultural resources treated by American Indian tribes and Alaska natives as sacred places having established religious meaning, and as locales of private ceremonial activities. **[NPS Management Policies]**
SPIRITUAL ACTIVITY FIELD	a spiritually important area identified by traditional religious practitioners around a place with traditional sacred significance. **[DO 28 Glossary]**
Structure	[see Cultural Resource, Structure]

TRADITIONAL CULTURAL PROPERTY	a property associated with cultural practices, beliefs, the sense of purpose, or existence of a living community that is rooted in that community's history or is important in maintaining its cultural identity and development as an ethnically distinctive people. Traditional cultural properties are ethnographic resources eligible for listing in the National Register. **[NPS Management Policies]** [from Parker and King]
TRADITIONALLY ASSOCIATED PEOPLES	...For purposes of these Management Policies, social/ cultural entities such as tribes, communities, and kinship units are "traditionally associated" with a particular park when (1) the entity regards park resources as essential to its development and continued identity as a culturally distinct people; (2) the association has endured for at least two generations (40 years); and (3) the association began prior to establishment of the park. **[NPS Management Policies]**

Table is compiled from NPS *Cultural Resource Management Guideline* (1998) and NPS *Management Policies* (2001). [Items in brackets are added.]

DEFINITION AND DISCUSSION OF THE CONCEPT OF "TRADITIONAL" (FROM STATE OF HAWAIʻI BURIAL SITES PROGRAM 2003)

The following is quoted from the document: Burial Sites Program 2003 *Assessment of Traditional Cultural Practices Related to Burial Sites, Hōkūliʻa Project, South Kona, Hawaiʻi Island.* Prepared by Burial Sites Program, History and Culture Branch, State Historic Preservation Division, Department of Land and natural Resources, State of Hawaii. The document was written regarding traditional burial practice, but the discussion of" traditional" is relevant to the study of cultural resources, beliefs, and practices.

What is traditional?

The term "traditional practice" is highly subjective given an estimated 1500 to 2000 year habitation of the Hawaiian Islands by native Hawaiians. What may have been traditional in 500 AD may have evolved into a very different practice in 1300 AD and into a completely new practice in the year 1750. In the year 2003, a traditional practice may cover an expanse of time and evolving culture to the extent that it is difficult to absolutely include or exclude any given generalized cultural practice in the category of "traditional."

It is also generally known that in addition to the changes in protocol, ceremony, beliefs and practices over the centuries of Hawaiian occupation of the Hawaiian islands, that often these beliefs and practices could vary considerably from island to island, *ahupuaʻa* to *ahupuaʻa* and family to family. Arguably, notwithstanding issues relative to social status and societal rank, beliefs and practices could vary, within calculated reason, from individual to individual.

Continuity of Traditional Practices

In looking at traditional practices on a continuum throughout Hawaiian recorded history, both oral and written, the concept of .what is traditional can often be easier to digest in terms of a "snapshot" in time. Notwithstanding differences from island to island or even family to family, often cited observations of cultural inclinations of the Native Hawaiian people, whether it be in an oral chant handed down through a family, the observations of a turn of the century missionary or modern day recordation of archaeological evidence, are truly a characterization of an act or belief practiced for an unknown duration and for reasons often only known to the actual practitioner.

Nonetheless, recurring or similar practices observed or recorded across a relatively large portion of Hawaiian history can provide insight into more commonly accepted practices, which appear to fit the definition of "traditional practices." Such continuity in the usage or description of a practice adds both internal and external validity to that particular practice.

Abandonment and Revival of Practices

The issue of whether a practice deemed traditional must have been constantly practiced by an individual in order for that individual to claim rights to that practice, in light of the K*a Paʻakai* decision, has never really been substantively addressed by this department as it pertains to burial sites.

In recent times, some traditional practices of the Hawaiian culture, such as those relating to *hula kahiko*, have experienced a resurgence among younger generations cultivating a connection to the cultural practices of their past. While the debate continues regarding the "true" forms of *hula* as a strict religious

practice with often onerous training versus the sometimes more open and interpretive performances of some modern *halau*, one can begin to see the difficulty in defining a practice as traditional and continuous in this particular area.

In the passing of a particular chant through a family along with an associated *hula*, the information regarding the cultural integrity of the practice, as it relates to that particular family, remains fairly consistent. Even when a generation is skipped, if the primary source holder within the family is able to transmit this information to another person successfully, the integrity of the practice would still remain somewhat constant.

Once the transmission of such information loses the direct transference from primary source to learner, then changes inevitably occur in the transmitted information. Such would be the case where someone comes across cultural information, either orally or in writing, and attempts to interpret it in their own way to implement it, based upon their own beliefs, training, understandings and perceptions. It wouldn't matter how sincere such an individual was in trying to remain true to the intent of the source, inevitable changes would infiltrate the practice and lead to substantive evolutionary changes as the information continued to be passed down through successive generations.

Even noted Hawaiian scholar, Mary Kawena Pukui, observed:

> *Gradually Hawaiians concealed their practice or forgot their knowledge of much of their ancient culture. What was remembered would be recalled with increasing distortion. For when a specific practice was discarded or forgotten, there went with it the enduring, often wise concept from which the practice evolved (Pukui, Nana I Ke Kumu, Vol. I, p. 303)*

This is not to say that a practice based upon an indirect source preceding the practitioner's generation could not be classified as “traditional.” This would have to be assessed based upon many factors such as the source of the information regarding the practice, the completeness of the information, the understanding of the practitioner and a general comparison to more universally and documented understandings of the practice as it would pertain to the Hawaiian culture.

A particular practice could then skip several generations and yet remain classified as traditional when it appears years or decades later in a successive generation and in an evolved form. Thus, the abandonment of a particular practice or custom, whether intentional or unintentional, should not necessarily equate to the extinguishment of that particular practice should it be resurrected in a future generation, provided it fits in with general assessments of cultural knowledge widely accepted by the Native Hawaiian community.

With regards to burial disposition, and perceived difficulties of trying to carry the strict practices of the past into today, it is noted:

> *Today, one family may yet obey the old edicts. Another may have discarded or forgotten kapus against bone burning. The ashes of one Hawaiian surfer or fisherman may be scattered at sea; anther's corpse may be dropped deep in the water. (Pukui, Vol. I, p. 110)*

There should be some latitude to consider the great many of Native Hawaiian individuals living today who are partially or completely removed from practices associated with their culture or who are dispersed throughout the world. Some who know and understand aspects of their culture choose not to practice any aspects of it. Others feign to know aspects of traditional Hawaiian cultural practices and utilize this

against those who may not know enough to tell the difference between credible information and a smooth coherent presentation peppered with 'olelo Hawaii. Yet others find a balance in the new and the old, constantly shaping their actions and expanding their understanding of core issues affecting their identity.

(From Burial Sites Program 2003:5-7)

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