E Mau Ana Ka Māhua ‘O Puanui

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INTRODUCTION

At the request of Kamehameha Schools, Kumupaʻa Cultural Resource Consultants, LLC conducted cultural resource management research in the ahupuaʻa of Puanui, North Kohala District, Hawaiʻi Island. The overarching goal of the project was to obtain data that expands our knowledge and understanding of Puanui as well as to clarify the nature, diversity, and abundance of cultural resources in the area.

Based off the success of the previous Wahi Kūpuna Internship Programs (WKIP), Kamehameha Schools Land Assets Division continued to support and fund the internship program this summer at their lands in Puanui. The overall goal of the WKIP is to increase the number of Native Hawaiians and kamaʻāina in CRM through scientific and cultural mentoring, education, and field expereinces.

As part of the 2013 WKIP, Kumupaʻa and Huliauapaʻa staff, along with the assistance of program partners from UH Hilo and Ulu Mau Punaui, trained one undergraduate student from UH Hilo, three students from Hawaiʻi Community College, and one recent high school graduate from Kanu o Ka ʻĀina, in cultural resource management research and field techniques.

During the program the interns spent three weeks conducting archaeological field work at Puanui and two weeks conducting research and writing in the classroom at UH Hilo. Along with learning how to conduct archaeological field and research methods, the interns also partook in cultural activities, protocols, kūkākūkā sessions, lani-honua-kai observations, huakaʻi to wahi pana, a community hoʻike, a combined presentation at the 2013 Society for Hawaiian Archaeology conference, and completed a 10-page paper based off of their summer research projects. The interns also worked closely with a number of cultural practitioners, Kohala kamaʻāina, and professional archaeologists to learn about how to mālama Hawaiʻi's cultural resources.

This report highlights the work that was conducted and the data gathered during the internship program. It provides a valuable baseline of information to continue to build on and refine. In addition, the interns research papers are also included in the appendix of the report as well as a disk with the four interns final presentations.

NATURAL LANDSCAPE

Kohala's Natural Landscape

Kohala is the oldest of the five volcanoes comprising Hawai‘i Island, estimated to be approximately one million years old. The Kohala volcano last erupted 120,000 years ago and is now in transition between the postshield and erosional stages (hvo.wr.usgs.gov). The *moku* of Kohala is surrounded by ocean on three sides with its southern boundary located near Opae Point on the leeward coast and its northern boundary near Honoke‘a Stream on the windward coast.

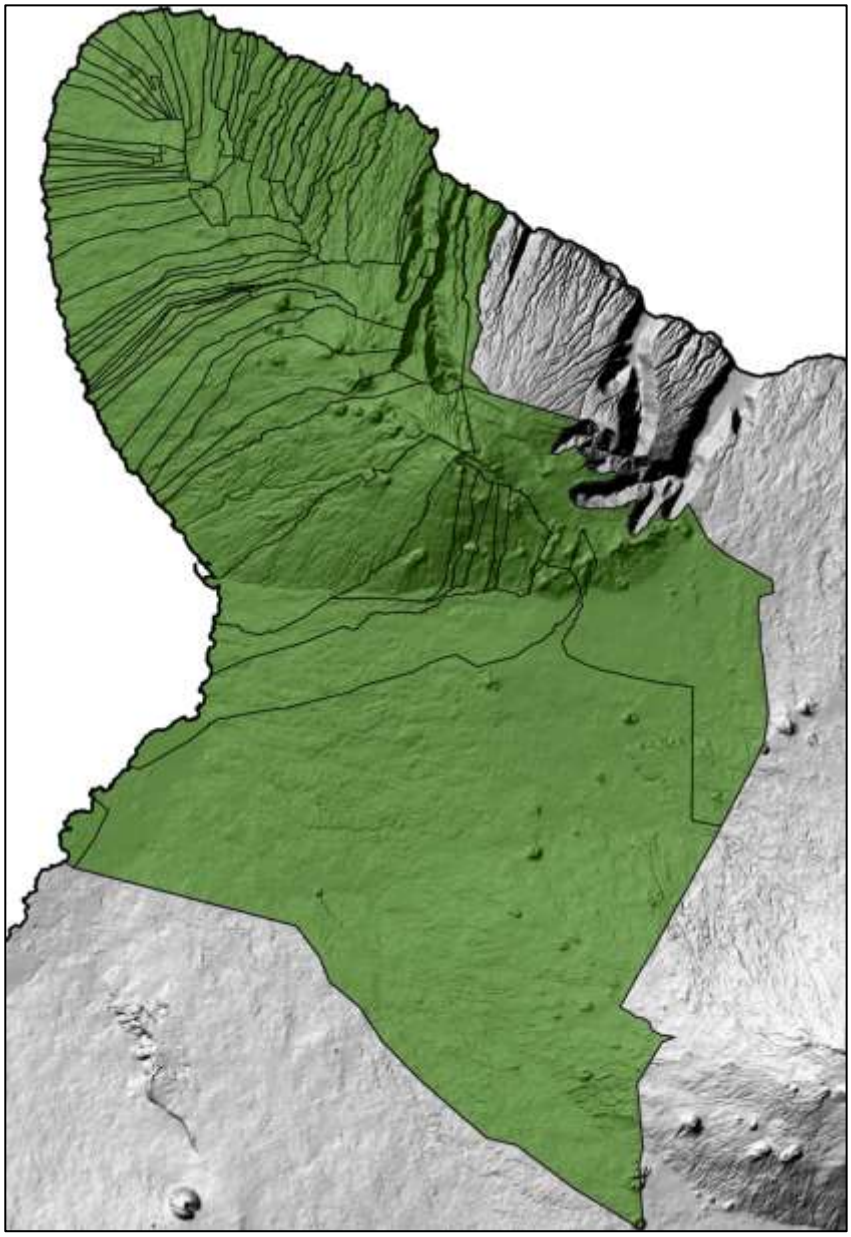


Figure 1. Kohala Moku (North and South Kohala)

Kohala is separated into two major environmental zones: the leeward and windward zones or Kohala Iwaho and Kohala Iloko. The two zones are separated by the 5,500 foot high ridge of the Kohala Mountain summit. Kohala Iwaho (leeward Kohala) extends from the boundary between North and South Kohala at Waikā Ahupuaʻa to the ahupuaʻa of Puʻuepa at the northern point of the island. Its inland boundary follows the summit of the Kohala Mountain along a line of cinder cones from Puʻu Kahone through Puʻu Hue and Lāhikiola to Puʻu Pili. Kohala Iloko (windward Kohala) extends from the boundary between North Kohala and Hamākua at ʻĀwini Ahupuaʻa to Puʻuepa Ahupuaʻa and along the summit of the Kohala Mountain (Tomonari-Tuggle 1988:6).

The Kohala Moku encompasses a range of ecosystems and environments located in an area of 1,020 square miles:

> The environmental variations are generally accountable by the basic geologic foundation of the area, and by the subsequent influence on topography of rainfall, winds, and surface runoff. The land area which is now called the district of North Kohala was formed by two eruption series of the Kohala volcano, the first of five to form the island of Hawaiʻi. Approximately 450,000 years ago Kohala Mountain first emerged above the sea. The older Pololū Series, composed primarily of primitive basalts and olivlne basalts, with ash forming the parent material of much of the present soils, was followed by an erosional period during V-shaped valleys on the windward coast were carved and then filled by subsidence and emergence processes. The Hāwī Volcanic Series occurring from 60,000 to 250,000 years ago, followed this period of erosion and deposited primarily over a portion of the original volcanic dome.
>
> The original caldera of the Kohala volcano was centered near of Waipiʻo Valley, with the primary rift zone running northwest through Honokāne Nui Valley toward Mahukona and ʻUpolu Point. Lavas from the younger Hāwī Series did not overflow this caldera, but rather, poured northwest and southeast, fanning over those slopes of the Pololū Series. This left uncovered a section of the windward coast which graphically illustrates the differential erosion between the two series: the deeply gouged, flat-bottomed valleys from Pololū to Waipiʻo, which formed from the original Pololū Series lavas, and the smaller gulches and wide, rolling kula slopes of the northern windward area, which formed from the later Hāwī Series. (Tomonari-Tuggle 1988:3-4)

The primary topography of North Kohala ranges from smooth to undulating with the topography roughly following the surface of the underlying lava flow. Water and wind are the primary environmental factors responsible for the different erosional patterns and topography found in leeward and windward Kohala. High rainfall is centered over the head of the windward valleys where the average annual rainfall is 200 inches. At the mouth of the Honokāne Nui Valley, the average annual rainfall is 60 to 80 inches. Rainfall measurements decrease as you travel northward toward Hāwī where it rains

around 50 inches per year. On the leeward side, median annual rainfall is approximately 60 inches at Pu‘u Hue, which is 1,900 feet above sea level, and approximately 13 inches at Māhukona on the coast (Tomonari-Tuggle 1988:5).

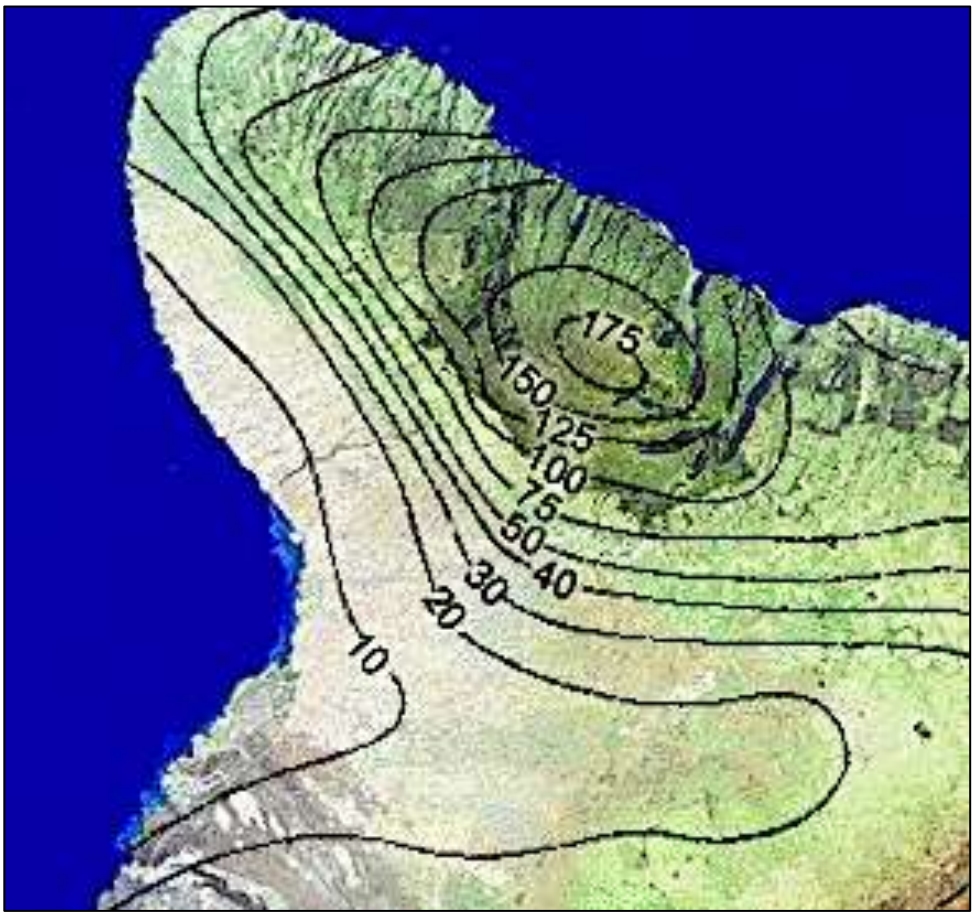


Figure 2. Rainfall in inches for the Kohala area. From Juvik & Juvik (1998).

Water resources in Kohala vary significantly between the wet windward gulches and the dry leeward plains. As illustrated in Figure 7, there are no perennial streams located in Kohala Iwaho compared to numerous year-round streams located in Kohala Iloko. This is a consequence of the rain shadow effect in which the dominant northeast trade winds bring most of the rainfall to the northeastern or windward side of the Kohala Mountains.

Figure 3. Perennial streams of Kohala clearly showing the difference between the dry leeward side and wet windward side. Map from Pacificworlds.com.

The trade winds play a critical role in the climate and environmental conditions of Kohala. According to Tomonari-Tuggle, "The long ridge of Kohala Mountain lies perpendicular to the moisture-laden northeast tradewinds and acts as a deflector, pushing the trades upward, where the resultant cooling condenses the moisture, forming clouds and rain over the summit. The rainfall decreases rapidly on the leeward side as the air warns in its return to lower elevations" (1988:5).

The only wind name of Kohala located during our research was ʻĀpaʻapaʻa, defined as the name of a strong wind at Kohala (Pukui and Elbert 1986). The following article, printed in the Hawaiian language newspaper, Kūʻokoʻa on February 1, 1868, titled, *Na Hiʻohiʻona o Kohala* or *The Features of Kohala*, further describes the ʻĀpaʻapaʻa winds characteristics:

> According to the legend of Pakaa, the wind of Kohala is the Apaʻapaʻa but it also has two sub-names, the ʻAʻa and the Kaomi. The name of this wind to those who live at Ka-pali-iuka is the Apaʻapaʻa because it blows a gale there. It is weak at Kohala-loko, and because of its weakness and lack of strength, it is called the Aa. To those who live in middle Kohala, in such places as Hoea and Upolu, this wind is called the Kaomi, because it blows

> pleasantly for the people of those places. It is neither too strong nor too weak. The best known name is the Apaʻapaʻa. Kohala is a very pleasant land and calm days are rare (HEN, V.1, pp. 2736).

ʻOlelo Noʻeau also describe the prominent ʻĀpaʻapaʻa winds (Pukui 1983):

> **Kuʻi pē ʻia e ka ʻĀpaʻapaʻa.**
> *Pounded flat by the ʻĀpaʻapaʻa wind.*
> Said of a sudden and terrible disaster, or of one who has taken a beating. The ʻĀpaʻapaʻa is a wind of Kohala.
>
> **Ka makani ʻĀpaʻapaʻa o Kohala.**
> *The ʻĀpaʻapaʻa wind of Kohala.*
> Kohala was famed in song and story for the ʻĀpaʻapaʻa wind of that distrct.
>
> **ʻOpeʻope Kohala i ka makani**
> *Kohala is buffeted by the wind.*

The northeast ocean currents also play a significant role in the weathered landscape of Kohala. These ocean currents constantly pound the windward coast and over time have slowly eroded the land to form the distinctive sea cliffs of windward Kohala. In contrast, the relatively calm ocean conditions of the leeward coast are the result of the buffer provided by the Kohala Mountains that blunt the heavy northeast trade winds.

Environmental Zones

Puʻu o Umi, the summit of the Kohala Mountains, reaches and elevation of 5,260 feet. The montane zone, comprising those portions of the Kohala Mountains from 3,000 feet to the summit, is characterized by a wet and cool climate with abundant clouds and rain. This zone is comprised of thick vegetation and forests (including much of the Kohala Forest Reserve) as well as some converted pasture land. At one time, this zone was home to ʻōhiʻa, ʻolapa, kawaʻu, and tree ferns such as hapuʻu. From 1,500 to 3,000 feet lies the montane mesic zone characterized by a more moderate climate. In this zone, an abundant variety of native tress including hoʻawa, ʻōhiʻa, kolea, maua, and naio were probably quite common. Today, this zone consists primarily of pasture land.

From around 500 to 1,500 feet lies the lowland mesic zone with lands that were more open displaying a sparser amount of vegetation. In the past, this zone would have been home to native dryland species such as lama, wiliwili, ʻohe makai, kolea, as well as dry forms of sandalwood and other trees. Below the lowland mesic zone lies the coastal dryland zone that consists mostly of grass and shrubland. In Kohala, the coastal areas of Puanui is located in this zone. Pili grass would have been common in this zone as ʻilima, pukiawe, koʻokoʻolau, and ʻakia.

At the boundary between Puʻuepa and Hukiloa Ahupuaʻa, Kohala Iloko gives way to Kohala Iwaho, the leeward lands of infrequent rain, dusty plains, and dry streams. Kohala Iwaho extends from the boundary between North and South Kohala at Waikā Ahupuaʻa

to the Puʻuepa Ahupuaʻa. Its inland boundary follows the summit of the Kohala Mountain, along a line of cinder cones from Puʻu Kahone through Puʻu Hue and Lāhikiola to Puʻu Pili. These lands are characterized by gentle slopes with a poorly defined drainage system lacking in perennial streams. Rainfall is low at the coast, increasing with elevation. The strong ʻĀpaʻapaʻa winds constantly blow from mauka to makai (Tomonari-Tuggle 1988:5-6).

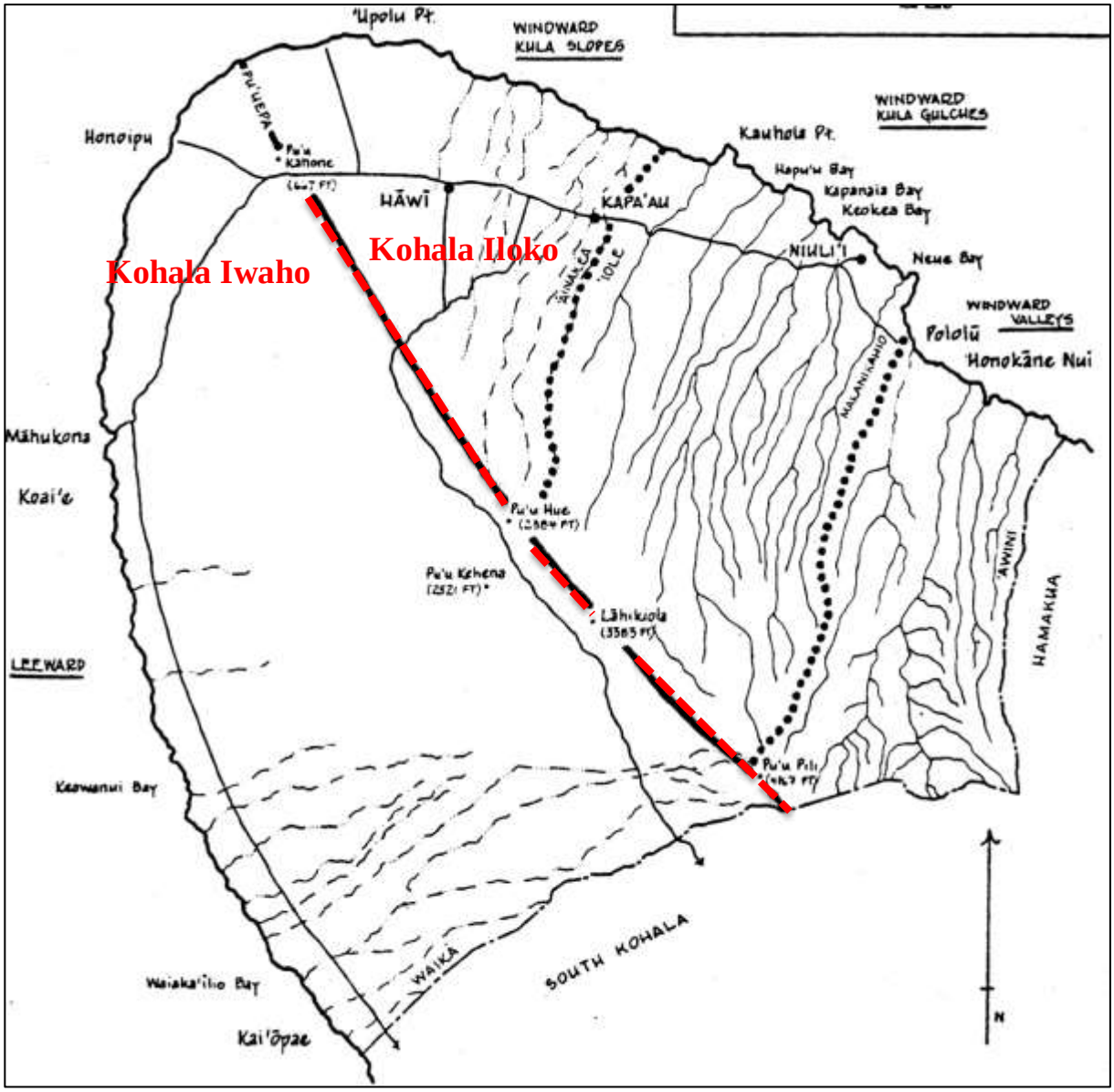


Figure 4. Map adapted from Tomonari-Tuggle (1988) showing the distinction between leeward (Iwaho) and windward (Iloko) Kohala

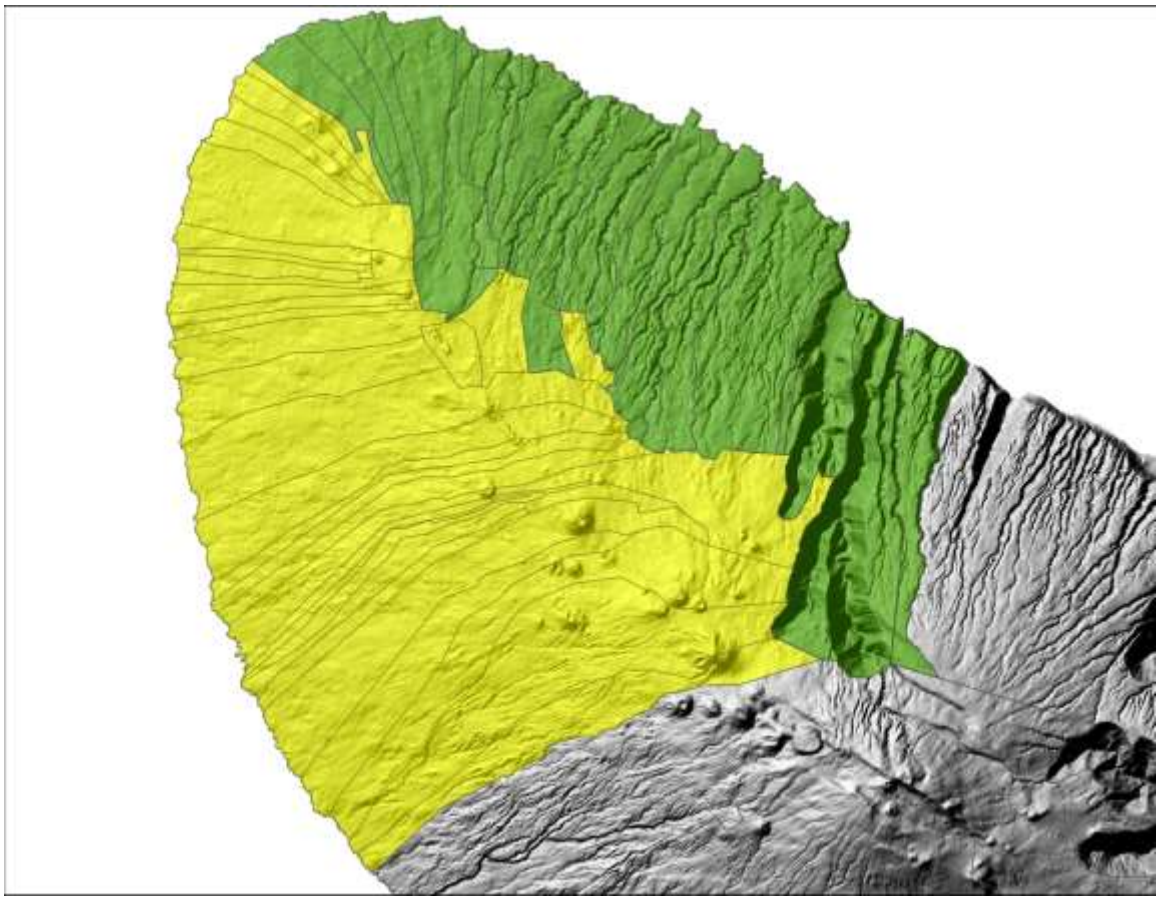


Figure 5. Map showing the division between leeward and windward Kohala

Natural Landscape of Puanui Ahupuaʻa

The ahupuaʻa of Puanui is in Kohala Iwaho. The boundaries of ahupuaʻa start at the coast and extend to the 2,800 ft. elevation; annual rainfall is about 20-60 inches. (Tomonari-Tuggle 1988:18). The soil of Puanui from the coast to about 1,500 ft. has a surface layer of dark reddish-brown, extremely stony very fine sandy loam. The sub soil is dark reddish-brown and dusk-red silt loam. In the coastal plain areas, soil drains quickly due to the medium-textured subsoil (Sato 1973:6).

Puanui sits on the leeward side of the Kohala Mountain and is cooled by the steady ʻĀpaʻapaʻa winds. The ahupuaʻa is part of the expansive Kohala dry land field system that once provided and sustained the armies of Kamehameha. Today, Puanui is covered by grassy cattle land in the uplands and kiawe and buffled grass along the coast. The natural landscape of Puanui includes and incorporates many storied legends such as Hiʻiakaikapoliopele and the love triangle of Kalāhikiola, Pili, and Kehena. These stories parallel the natural environment of leeward upland areas of Kohala.

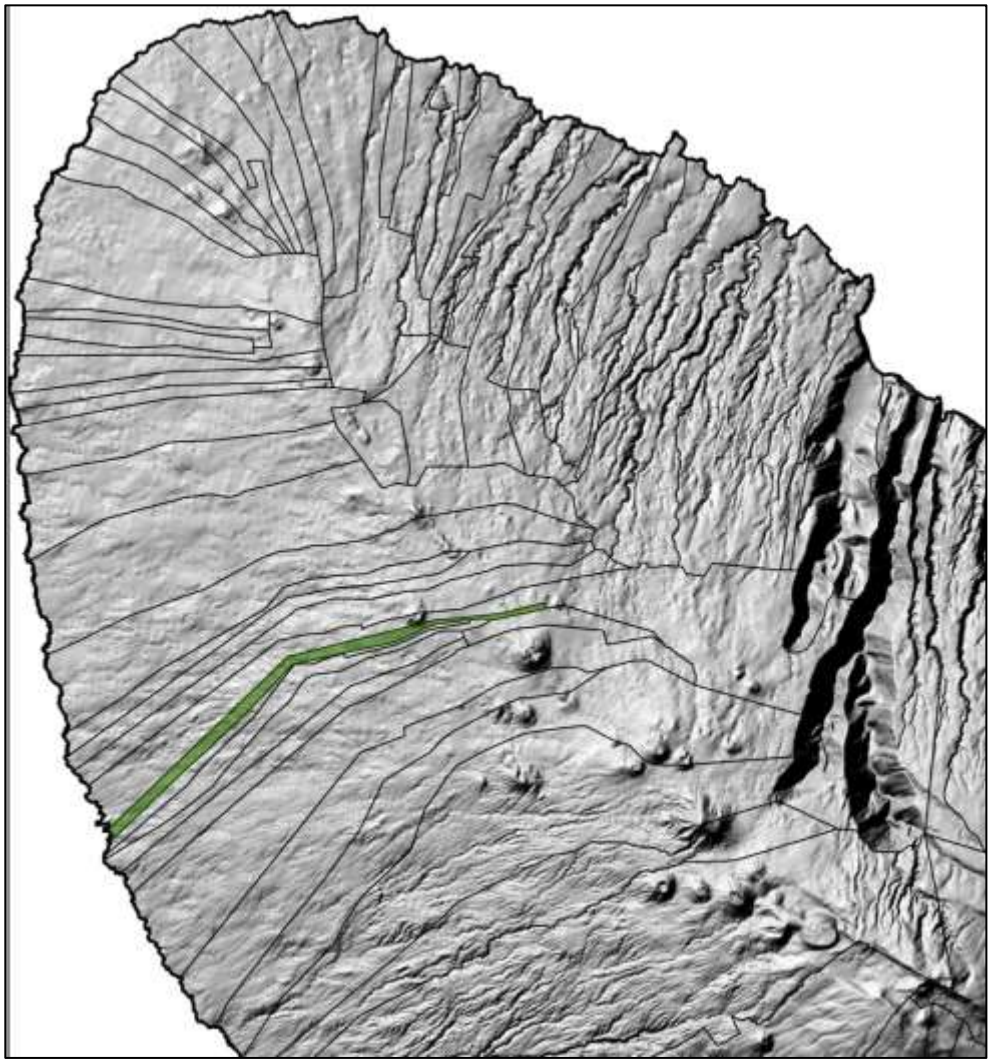


Figure 6. Puanui‘s location within Kohala Moku

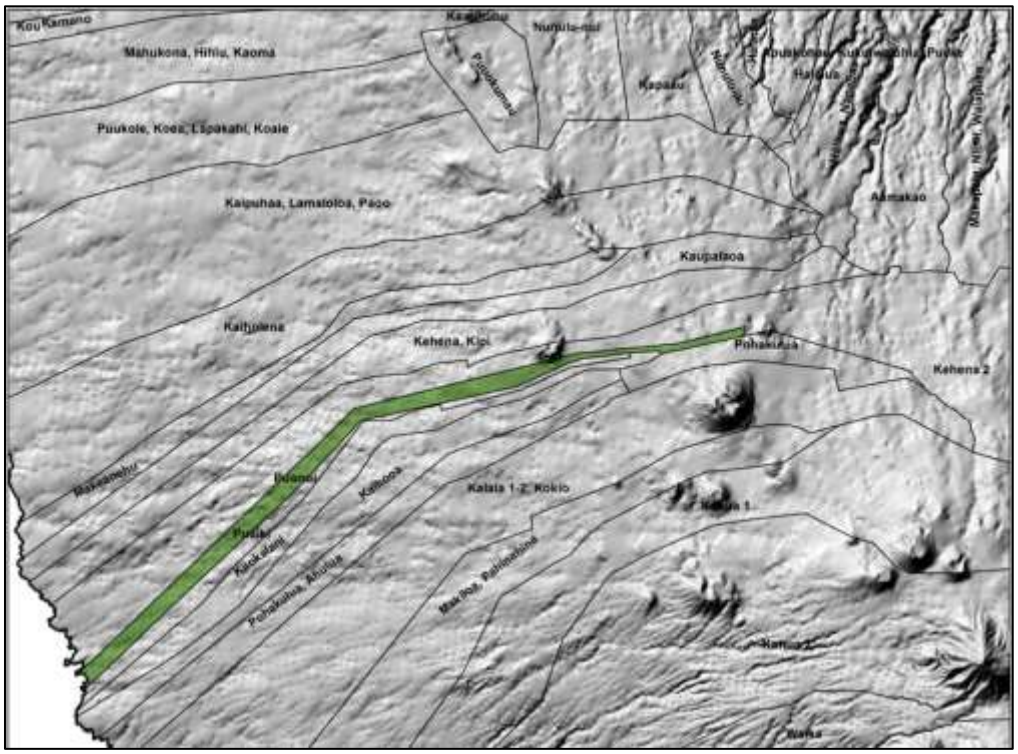


Figure 7. Ahupua‘a surrounding Puanui

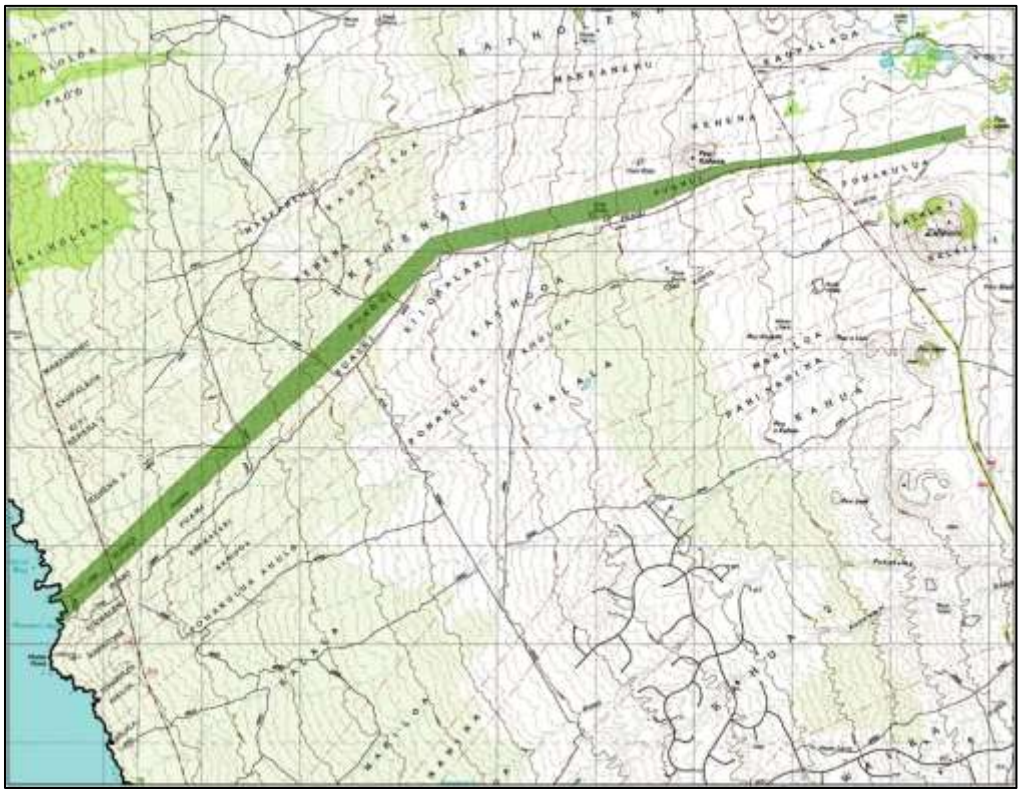


Figure 8. USGS map showing the boundaries of Puanui

Vegetation of Puanui

In an Archaeological Inventory Survey (AIS) report of Puanui makai by T.S. Dye & Colleagues, the authors analyze charcoal from Kaiholena (the ahupuaʻa directly north of Puanui) to infer the types of vegetation located at the neighboring ahupuaʻa of Puanui (2012:14). In Kaiholena, they identified charcoal found in a hearth, and discovered remnants of nine native plants and one Polynesian introduced plant. These plants were from a range of habitational zones including the upland and lowland zones. The plants that they identified in their charcoal samples are listed in the table below (2012:14).

Table 1. Charcoal identifications from Kaiholena

Taxon	Common name	Origin	Habit	Zone
Chamaesyce sp.	ʻAkoko	Native	Shrub	Multi
cf. Cheirodendron trigynum	ʻŌlapa	Native	Tree	Rainforest
Chenopodium oahuense	ʻĀheahea	Native	Shrub	Lowland
Diospyros sandwicensis	Lama	Native	Tree	Lowland
cf. Metrosideros polymorpha	ʻOhiʻa lehua	Native	Tree	Multi
cf. Psychotria hawaiiensis	ʻŌpiko	Native	Tree	Lowland
Acacia koa	Koa	Native	Tree	Upland
cf. Bidens sp.	Koʻokoʻolau	Native and Historic	Shrub	Mid-elevation
Cordyline fruticosa	Kī	Polynesian	Shrub	Multi
Sida cf. fallax	ʻIlima	Native	Shrub	Lowland

Some of the plants that were found in the hearth at Kaiholena are not evident today at either Kaiholena or Puanui, both mauka and makai (2012:14). Thus, these charcoal samples provide valuable information about the traditional landscape of wā kahiko (ancient times) and how it has changed over the years. Traditional uses of these plants range from ceremonial, medicinal, and craft-making uses (woodworking, dyeing, lei making). Some of these plants also spirituality significant as they are kinolau (body forms) of gods and goddess of the land and ocean.

Water Resources in Puanui

The primary source of water in the ahupuaʻa of Puanui remains the regional rain. Because there are no streams in Puanui, the Hawaiians of that area relied on the rain and clouds to sustain their crops. Puanui produces an annual rainfall of about 20 to 60 inches. Knowledge of the rain cycles helped farmers know when and where to plant their crops in Puanui and leeward Kohala. Graves et al. also discuss the importance of rainfall in growing crops in the Kohala field system:

> A key environmental variable for growing sweet potato in this area is the amount of available water, usually in the form of rainfall. Optimum sweet potato production is obtained in areas receiving an annual rainfall of 30-50 in. (762-1270 mm) with approximately 18-20 in. (457-508 mm) being a minimum and over 90 in. (2286 mm) a maximum. The predominant

> rainfall pattern in this area is the result of an orographic effect, with the northeast trade winds releasing large quantities of moisture on the northeastern windward side of the Kohala Mountains' ridgeline and then decreasing to the west and south down slope on the leeward side of the island. There is considerable spatial variability in rainfall even on the drier leeward side. The archaeological walls and trails of the field system are shown here in relation to the contemporary rainfall isohyets. In addition to spatial variation in rainfall, there is a significant inter-annual variation in rainfall. This is a function of overall rainfall totals, with drier areas more likely to experience a greater number of drought conditions on an annual basis in comparison to wetter areas. (2003:924-925)

The ʻōlelo noʻeau, *ua ka ua ʻola ka nohona o ka ʻāina kula*, which translates to the rain pours and life comes to the plains (Pukui 1983:308), is an environmental occurrence that takes place in Puanui. During the winter months, the Kona winds blow the Maui rains over to Puanui, thus causing the land to become lush and fruitful.

The following article titled, *The Water of Kohala,* was printed in the Hawaiian language newspaper, Kūʻokoʻa on February 1, 1868:

> The lands where the waters of Kohala begin at ʻIole and continue all the way to the interior, from Iole to Ka-pali-iuka and vicinity. These were once waterless lands and this was how they obtained water. In the early morning, the person who needed the water awoke, reached for a gourd basin (poʻi) and water bottle (huewai), and went inland where there was much dew on the branches of trees and herbage. Then the gourd basin was tilted against the direction of the wind. With one hand holding the basin and the other brushing hard against the herbage toward the basin. With the force of the brushing, aided by the wind, the drops of water fell into the basin. This was continued until the basin was filled with water. But with the water in the basin were some trash composed of leaves and grass blossoms. Then it was strained through thin cloth and poured into the water bottle. Such were the "streams" that supplied those lands with water. If there was no water among the wild growths, there was some in the hollow rocks which could be dipped up with very small dippers, from one small hollow and from the next (HEN, V.1, pp. 2736-2737).

Puanui's Landscape Today

The landscape of Puanui mauka today is no longer the intensive dry land agricultural system of the past. Activities such as cattle ranching and the sandalwood trade clearly had their effects on the natural environment of Puanui. Standing on Puʻu Kehena today, it's not difficult to visualize the ancient dry land field walls and both understand and appreciate the sustainability of the past. On top of Puʻu Kehena, two small gulches located within Puanui are still visible. However, the names of these gulches no longer exist in available maps or in the memories of the community. Evidence of past activities, such as tool production, can still be seen with pieces of volcanic glass, basalt flakes and

water-worn cobbles scattered on the surface of the pu‘u. Although the traditional landscape is no longer prominent, there remain elements of the past that conjures ones imagination of what this area would have been like in the time of our kūpuna.

The mauka ranch lands of Punaui remain fertile due to the rich soil and the famous ‘Āpa‘apa‘a winds that blow the misty dew from the clouds on to the land. Today, Ironwood trees that act as windbreakers along the road and on top Pu‘u Kehena are the most prominent trees in the ahupua‘a. The few native plants still evident at Puanui mauka include iliahi, and ‘ōhi‘a lehua. Additionally, Uncle Ala Lindsey, the kahu of Puanui mauka, continues the ancient practice of growing ‘uala, kō, kalo, and mai‘a on these lands.

Puanui Lani-Honua-Kai Observations Summary

To better understand our environment we must first ask ourselves “how well do we know our place?” Are we being accountable for our actions when we enter in to a wahi and intend to utilize their resources? These questions are the beginning to a dialogue that we must have not only with others but with ourselves. What is our responsibility as kānaka maoli to our ‘āina and the honua? In order to better understand these questions we must begin that process of observation. In order to strengthen the process it is vital to train ourselves to have constant awareness of our surroundings and the changes in our environment.

The WKIP began the process of observation with the intent to assist in the long-term stewardship of Puanui Ahupua‘a. Utilizing the Pilina Kai “Huli i ka lani! Huli i ka honua! Huli i ke kai!” observation sheet developed by Pelika Bertleman, we collected observations over the course of three field weeks. The purpose of the data sheet is to catalogue a collective perspective of a group. This practice relies on multiple perspectives because each observation has just as much value as the next, and provides a much grander view of the changes occurring daily.

Methods

Facilitation of this exercise was done weekly and the data was collected in the Ahupua‘a of Puanui from mauka to makai. Facilitation and recordation were conducted daily. The responsibility of a facilitator was to ask questions that would pull out valuable information from the group and help to aid in that process. This was a key component to the collection of observations as it helped to connect and correlate the mauka to makai.

Results

The results of our observations have been documented on a data sheet below with the columns indicating the answers to the row that it is in conjunction with. We separated our data by the field week and location that the observations were conducted.

Date	July 15 - July 18, 2013	July 22 - July 25, 2013	July 29 - August 1, 2013
Location	Puanui	Puanui	Puanui
Observer(s)	Kūkui ‘A'ā Kū I Ka 'Āpa'apa‘a	Kūkui ‘A'ā Kū I Ka 'Āpa'apa‘a	Kūkui ‘A'ā Kū I Ka 'Āpa'apa‘a
Month:	Iulai	Iulai	Iulai - Aukake
Mahina:	Hinaia'ele'ele	Hinaia'ele'ele	Hinaia'ele'ele
Pō:	‘Olekūkolu, ‘Olepau, Huna, Mohalu	Māhealani, Kulu, Lā'aukūkahi, Lā‘aukūlua	Olepau, Kāloakūkahi, Kāloakūlua, Kāloapau
Kau:	Kauwela	Kauwela	Kauwela
Lani clouds	Clear skies in the morning on Monday, Wednesday and Thursday and cloud coverage in the morning on Tuesday. Clouds converge northwest. Tuesday, dark clouds were coming from mauka near Lahikiola and mostly puffy throughout the day. On Thursday, mid-afternoon the clouds had feather-like patterns.	Monday and Wednesday experienced throughout the day large clusters of clouds from mauka throughout the day with some clear skies. Tuesday was clear skies with feather-like cloud cover down makai. Thursday was heavy cloud cover most of the day from mauka to makai.	Tuesday was mostly overcast and clouds were puffy. The rest of the week clear and with minimal to no cloud cover. Clouds that were visible were puffy, small and slightly transparent.
Lani wind	Dominant wind direction throughout the week was from north//northeast.	Monday and Tuesday experienced none to light winds and coming from the north. Wednesday morning was windy and got stronger on Thursday and drizzled right before lunch.	Winds were coming from northwest on Tuesday. While Wednesday experienced 65 mph gusts from all directions. Winds died down towards end of week and by Friday was calm and blowing from north.
Lani Visibility	Monday was slightly voggy but skies were clear and blue.	Monday, had pockets of sunshine and blue skies, Tuesday and Wednesday was clear and blue skies and Thursday was dark and rare moments of skies and sun.	Minimal visibility on Tuesday due to heavy cloud cover. Clear and blue skies rest of week.
Lani weather	Relatively sunny and clear blue and pink skies most of the week with some slight misty rain on Tuesday morning.	Earlier part of the week was fairly to beautiful weather, ranging from slight cloud cover to clear skies with sun shining. There was strong winds on Thursday and drizzled around noon.	Weather was clear and calm most of week except Wednesday when winds were extremely gusty. Rainbows were seen in the mornings.
Honua flora/fauna	Uala, kō, kiawe, Christmas berry, norfolk pine, ironwood.	Kiawe, Christmas berry and fireweeds.	Kiawe and Christmas Berry
Honua seed/ flowering		Pūkiawe	
Honua fruiting	‘Uala		

Honua animals	Cows, Brown sparrows, egrets, turkeys, chickens/roosters.	Many turkeys (seen on Pu‘u Kehena), ‘iwa birds, pinao, baby wasps.	Cows, brown sparrows, ‘Io‘s (more mauka), roosters/chickens and turkeys
Honua precipitation	Misty rain on Monday morning but rest of week had very dry conditions.	Dry most of the week with slight rain on Thursday and some precipitation.	Dry most of the week with slight precipitation in the morning.
Bird departure/ arrival	Egrets and Brown sparrows heading north and south towards end of day.	‘Iwa heading north	Brown sparrows heading north
Personal thermostat	Slightly cool from prevailing north winds.	Up mauka was slightly humid but cooler then areas in lower elevations.	Hot but cool with prevailing winds but very humid on Friday.
Kai tide	N/A	Wednesday tides were high and slightly rough in deeper waters but a little calmer but still slightly rough on shore. Currents running north to south.	N/A
Kai waves	Waves were choppy/white caps and currents were visible on Monday but calm rest of the week.	Waves were choppy/white caps and currents visible all week.	Tuesday waves were choppy and white caps visible but rest of week was calm and currents visible.
Kai papa'u		Pipipi, ‘opihi, hā‘uke‘uke	
Kai papa		‘a‘ama	
Kai lihikai limu & invert		Coral, manini, yellow tang, kala, pala, mempachi	
Personal feelings	Excited to be outdoors, overwhelming need to cry but not afraid.	Rejuvenated and humbled	
Human Behavior	Upbeat; energetic; excitable	Beginning of week upbeat, energetic, focused, towards end of week couple slightly sluggish due to extreme weather changes.	Sluggish and overwhelmed working in extreme conditions. Energetic and upbeat and end of week.
General Visibility	Pretty clear most of the week except for cloud cover on Tuesday. Visibility to ocean was clear as white caps and currents were visible from mauka. Visibility to ocean was not clear on Monday and was slightly hazy. Rest of week was clear, clear visibility to ocean, all mountains could be seen (Mauna Kea, Mauna Loa, Hualalai, Haleakala), and other islands such as Maui and Kahoolawe. Kona was slightly hazy on Wednesday and Thursday.	On Monday there was no visibility and could not make out the horizon line. The rest of the week was clear and by Thursday all mountains were visible.	Visibility was clear most of the week with Maui and all mountains clearly visible. Friday experienced hazy conditions causing low visibility of horizon and mountains.

Figure 9. Cloudy skies, sun rays and clear visibility of horizon and ocean

Figure 10. Clear visibility to horizon, white wash and rough water on shore but calm out at sea.

Figure 11. Slight cloud cover, calm waters in bay, and rougher waters along rocky shoreline.

Figure 12. Clear skies with clear visibility of moon

Figure 13. Clear visibility of horizon, ocean, and sky.

Figure 14. Clear visibility of Maui and Haleakala from Puanui

Figure 15. View of Hualālai from Puanui with slightly low visibility from vog

Figure 16. View of Mauna Loa with slightly low visibility from vog

Figure 17. View of Puanui and Hualālai with ocean in background and a long white cloud overhead.

Figure 18. View of Puanui with Haleakalā in the distance

Figure 19. Cattle grazing in midland area of Punaui

PLACE NAMES

Puanui Place Names

Each place has a story that is often times communicated through the meaning of its name. A place name may tell of a commemorative event, an important person, may describe the physical environment of a place, or reveal the function of the land. Traditional place names that have persisted through time provide an avenue to understand a landscape and tap into the mana (spiritual power) that is apart of each area. When explaining the concept of mana that is instilled in a name, Pūkuʻi writes, "Once spoken, an inoa took on an existence, invisible, intangible, but real. An inoa could be a causative agent, capable of marshaling mystic elements to help or hurt the bearer of the name. And, so went the belief, the more an inoa was spoken, the stronger became this name-force and its potential to benefit or harm" (Pukui et al. 1974).

Traditional Hawaiian place names often reoccur in oli, mele, moʻolelo, and ʻōlelo noʻeau. Other sources that have documented these names include ethnographic surveys, historic maps, and early historic documents such as Land Commission Award (LCA) claims, Grant claims, and Boundary Commission testimonies. The place names that are presented in the following tables were gathered from research done by Pukui and Elbert (1986), Pukui, Elbert, and Moʻokini (1974), and Lloyd Soehren (2010). There are no diacritical marks (ʻokina and kahakō) used in the list of names because they are rarely used in the original sources. The known misspellings of place names are identified by an asterisk (*) and when a feature is unidentified it is referred to as a "place". In the lexicology section of these tables, the names with documented translations are presented with an equal symbol (=) and those that provide a possible interpretation of a name are accompanied by a tilde (~). The place names that are presented below are associated with the ahupuaʻa of Puanui.

Abbreviations and Symbols used in Place Names Table

AB	Land Commission, Awards Book
BC	Boundary Certificate No. (volume: page)
BCT	Boundary Commission Testimony
bdry	Boundary
BW	Beckwith, Hawaiian Mythology
IN	Indices of Awards, Land Commission
jctn	Junction
LCAw	Land Commission Award
MB	Māhele Book
PE	Pūkuʻi & Elbert, Hawaiian Dictionary
PEM	Pūkuʻi, Elbert & Moʻokini, Place Names of Hawaiʻi
RPG	Royal Patent Grant No.____
TM	Tax Map (zone, section, plat)
TMK	Tax Map Key (zone, section, plat, parcel)
USGS	United States Geological Survey

WH	Wehewehe.org
*	Misspelling of name
=	Translation in written source
~	Possible interpretation

Hawaiian Words used in Place Names Tables

Ahupuaʻa	Land division usually extending from the uplands to the sea, so called because the boundary was marked by a *ahu* (heap) of stones
ʻĀpana	Land parcel, section
Aupuni	Government
ʻIli	Same as ʻili ʻāina
ʻIli ʻāina	Land section, next in importance to ahupuaʻa and usually a subdivision of an ahupuaʻa
Pali	Cliff, precipice, steep hill or slope
Puʻu kaua	Battle hill

Table 2. Puanui Ahupuaʻa Place Names

Name	Feature	Comments	Lexicology	Source
Puanui	Ahupuaʻa	Retained by Leleiohoku, LCAw. 9971:20. "Ancient fishing rights extending out to sea." (BCT) Also known as Poepoe (q.v.) "...kona aina o Puanui (Poepoe) he ahupuaa..." (AB 10:612)	~Pua-nui. The abundant offspring The great arrow The great flower	MB 29; IN 74; AB 10:612; BCT 2:129;WH.
Kihelea	Boundary Point, Place	"...mauka corner of this land [RPG 2503]" at the end of Puaiki on the Puanui/Puaiki bdry. Elev. about 2600 ft.	~Kihe-lea. The joyous sneeze.	BCT 2:129,130; WH.
Kulana o Keoua	Boundary Point, Place	A place on the Puanui/Puaiki bdry "...where Keoua used to stand and see the Kehena hills over the rising ground. This man was twice as tall as the rest of the people." (BCT) Elev. about 1180 ft.	~Kūlana-o-Keōua. The stance of Keōua.	BC 185 (4:142); BCT 2:275; WH.
Poepoe	Ahupuaʻa	Retained by Leleiohoku, LCAw. 9971:20. Although Poepoe and Puanui are both listed in the Mahele Book as retained by Leleiohoku, Poepoe is not found in the Indices or elsewhere. It is equated with Puanui in the Awards Book: "...kona aina o Puanui (Poepoe) he ahupuaa..." Puanui is named in the list of lands awarded to Leleiohoku (IN 74) as in Kohala; but in the Numerical Index to Awards (p.1327) and the	~Poepoe. Round.	MB 29; AB 10:612; WH.

		Index to Patents on Awards (p. 1678) as at Waimea, S. Kohala, obvious errors.		
Wawahonu	Boundary Point, Place	"...a point on the Kona side of the landing place at shore..." is the bdry between Puanui and Puaiki. "...a cove called Wawahonu..." is on the north side of the point. (BC 185) Cf. Wawahonu Bay.	= wawā-honu. ~Talked about turtles.	BCT 2:129,130; BC 185 (4:142).
Wawahonu Bay	Bay	Misspelt "Wawaionu" and misplaced on USGS 1957 and TM 5801. Properly a small cove in Puanui. (BC 185) See 358.67.002.	= wawā-honu. ~Talked about turtles.	BC 185 (4:142);WH.
Wawaionu*	Bay	Misspelt. See Wawahonu. Misplaced in Puaiki by USGS.		USGS 1957; TM 5801.

TRADITIONAL LAND USE

Traditional subsistence included fishing and farming, a lifestyle that incorporated *mauka* and *makai* knowledge of sustainability. This traditional and harmonious lifestyle consisted of the Hawaiians understanding, appreciating, and utilizing available resources from the environment and being deeply and keenly aware of and in tune with the ocean, land, and sky elements around them. In ancient Hawai‘i, the inhabitants of the leeward Kohala coast relied heavily on marine and costal resources for substance and nourishment. Eventually, in concert with the growth in population, the residents developed and extended their agricultural systems to the dryland fields of leeward Kohala to meet growing food demands (Ladefoged and Graves 2008:772).

> **‘Uala ne‘ene‘e o Kohala.**
> *Ne‘ene‘e potato of Kohala.*
> A person who hangs around constantly. *Ne‘ene‘e,* a variety of sweet potato, also means “to move up closer.”

Kohala Dry land Field System

Puanui Ahupua‘a was one of 33 ahupua‘a that made up the Kohala dry land field system. It included both an ahupua‘a and moku (district) relationship and played a critical role in sustaining the people of Kohala. The Leeward Kohala field system, located on the northwest side of Hawai‘i Island, was one of the most intensive and productive pre-contact dry land agricultural systems in the Hawaiian archipelago (Ladefoged and Graves 2008). The field system covered around 60 km^2 of land and was in a zone receiving between 750mm and 1900mm of rain annually. The field system was both affected and limited by rainfall, elevation, soil nutrient levels, and the effects of extremely strong trade winds.

The field system consists of series of agricultural walls and embankments and networks of trails and contains a high density of residential, religious, animal husbandry, and smaller agricultural features (Ladefoged et al. 2003:927). The walls and trails throughout the field system are orientated in a grid pattern of plots that are used to grow a variety of crops, with sweet potato likely dominating this regime. In general, the agricultural walls are orientated perpendicular to the slope, which would have reduced evapotranspiration and provided physical protection for the crops from the strong northeast trade winds. Trails are oriented parallel to the slope, which would have provided access between coastal settlements and the upland agricultural areas, and in some instances would have defined social boundaries (Ladefoged and Graves 2008:776-777).

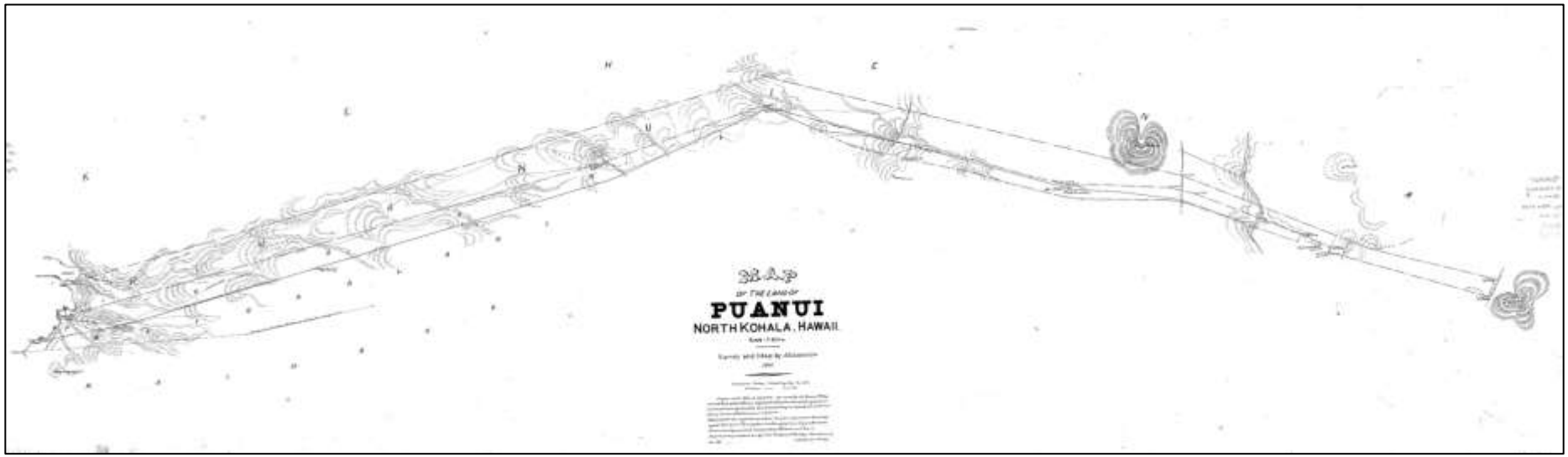


Figure 20. 1901 map showing Puanui Ahupua‘a boundaries and ancient roads by A.B. Lobenstein, (Register Map 2104).

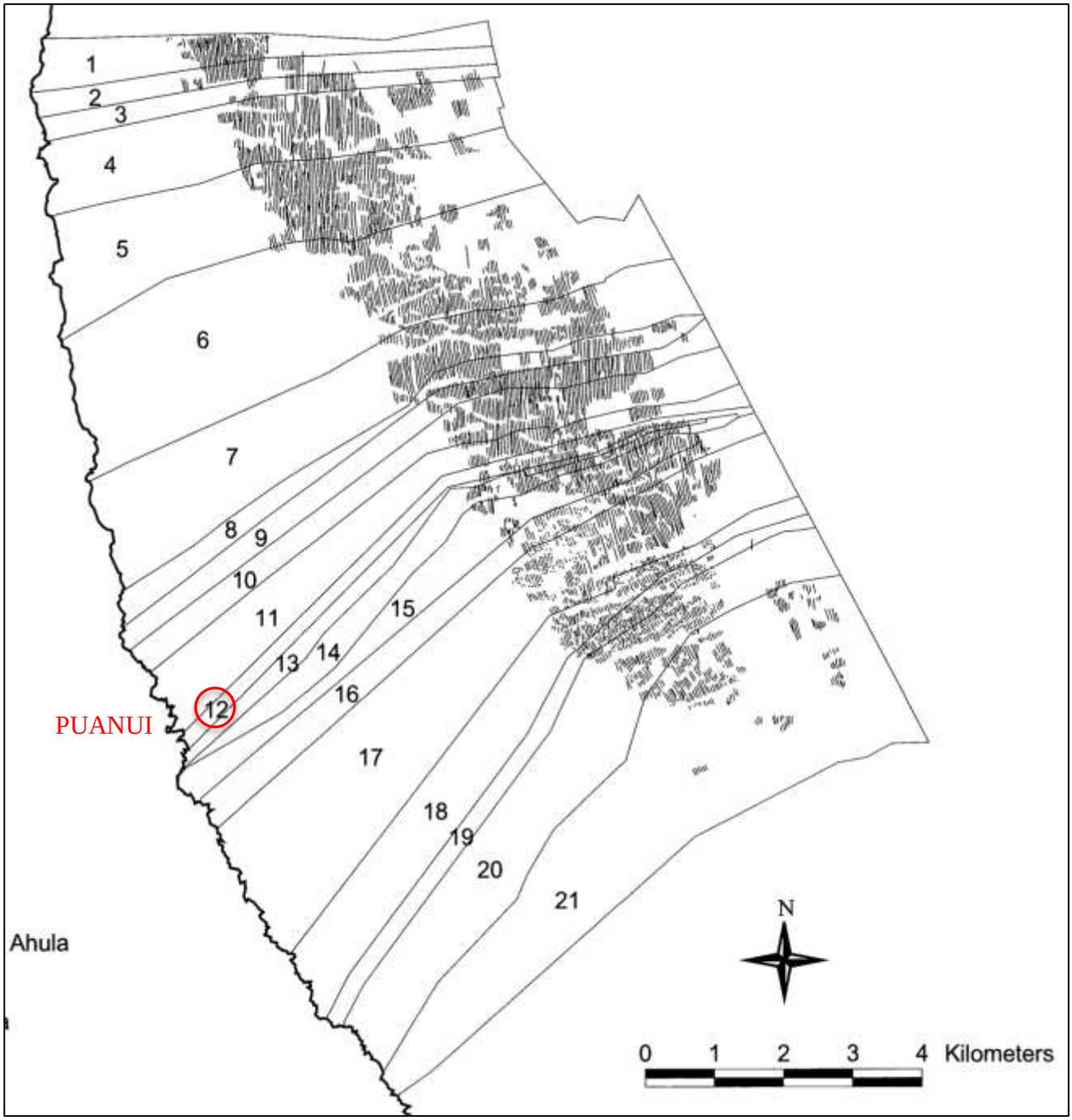


Figure 21. Kohala Dryland Field System walls and trails within Leeward Kohala ahupuaʻa, adapted from Ladefoged & Graves 2000

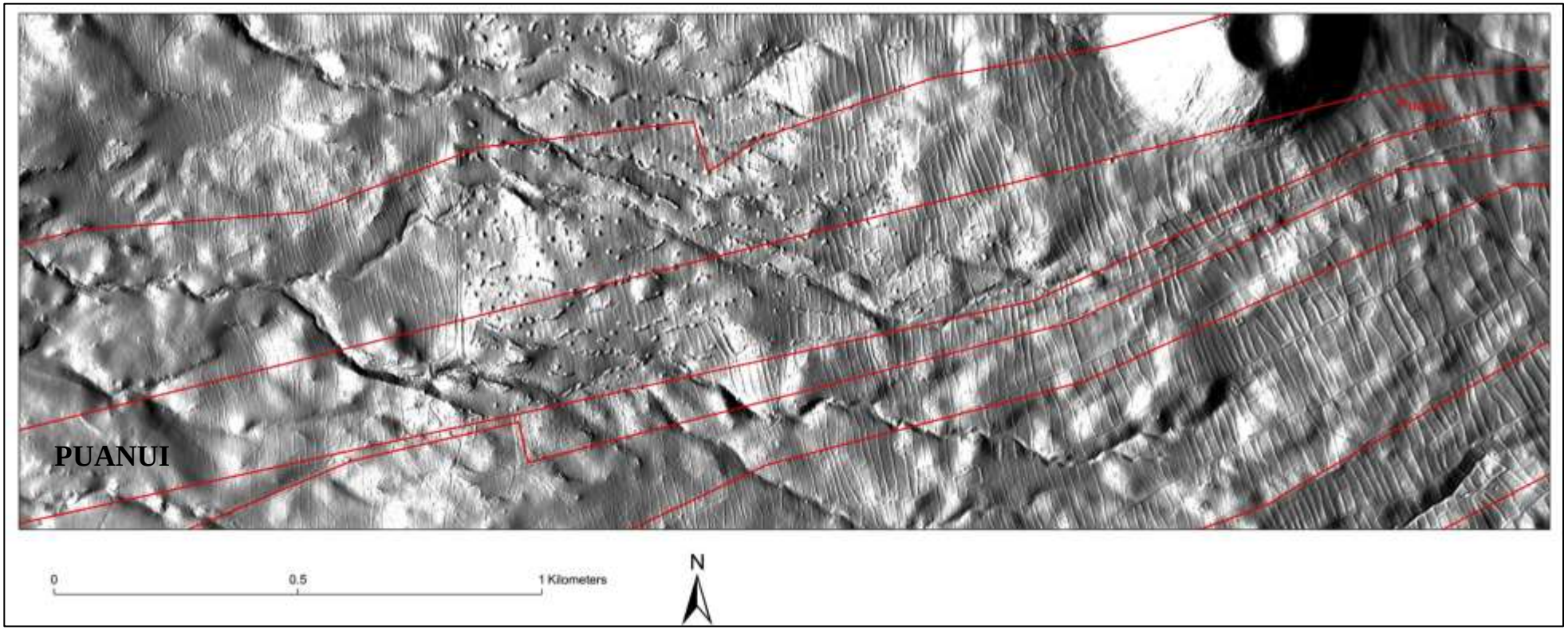


Figure 22. LiDAR image showing Puanui and surrounding ahupua‘a, adapted from Ladefoged 2011

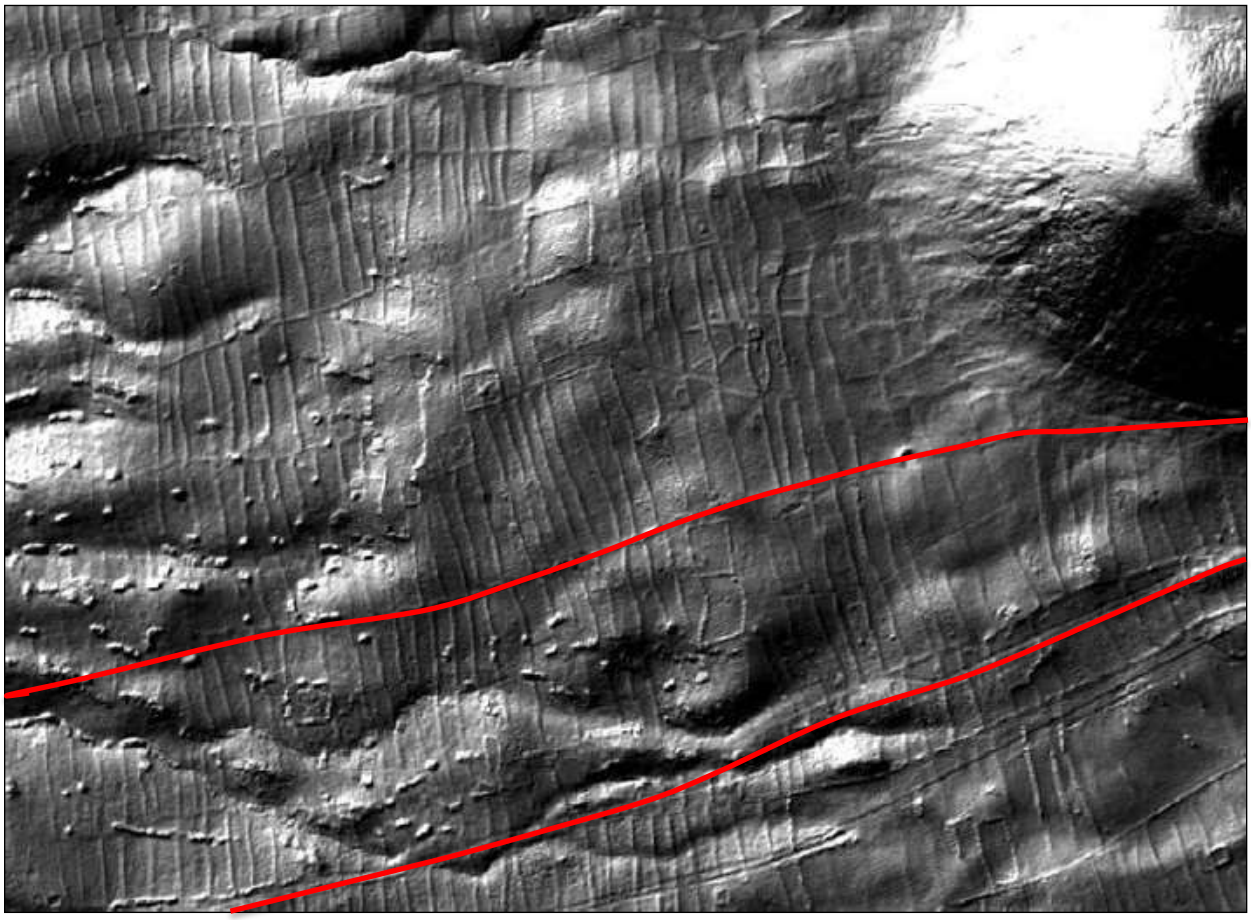


Figure 23. Close up LiDAR image showing the Field System within Puanui and the surrounding ahupuaʻa. Note Puʻu Kehena in the top right corner and the gulch beds on the bottom of the image.

In 2003, Graves, Ladefoged, and McCoy, co-authored an article in *Journal of Archaeological Sciences* titled *Archaeological evidence for agricultural development in Kohala, Island of Hawaiʻi*. This article summarized archaeological development on the practice of dry land fixed cultivation and included a chronological ordering of walls and trails constructed as the main structural features in three areas of the Kohala Dry Land Field System. The three affected areas of the field system included the *ahupuaʻa* of: Lapakahi, Kehena, Kaupaloa, Makeanehu, and Kahua 1 and Pahinahina. Below is a portion of the article describing the Kohala Field System:

> The Kohala Field System consists of a series of more or less contiguous walls and trails spread over an area of approximately 19 by 4 km on the leeward undissected slope of the Kohala Mountains on the northern most tip of the Island of Hawaiʻi. A number of sources provide detailed discussions of the cultigens, environmental setting of the field system, and a review of past work in the area (see [19-22,25,34,35] and Newman [28]). During the later prehistoric period (ca. AD 1400-1800), sweet potato (*Ipomea batatas*) was the main cultigen in the area although yams (*Dioscorea* sp.), dry-land taro (*Colocasia esculenta*), bananas (*Musa*

> *hybrids*), sugarcane (*Saacharum officinarum*), gourds, cucurbits (*Sicyos* sp. and *Momordica charantia*), and other food and industrial crops were also grown. A key environmental variable for growing sweet potato in this area is the amount of available water, usually in the form of rainfall. Optimum sweet potato production is obtained in areas receiving an annual rainfall of 30-50 in. (762-1270 mm) with approximately 18-20 in. (457-508 mm) being a minimum and over 90 in. (2286 mm) a maximum [17,29,p. 248,32]. The predominant rainfall pattern in this area is the result of an orographic effect, with the northeast trade winds releasing large quantities of moisture on the northeastern windward side of the Kohala Mountains' ridgeline and then decreasing to the west and south down slope on the leeward side of the island. There is considerable spatial variability in rainfall even on the drier leeward side. The archaeological walls and trails of the field system are shown here in relation to the contemporary rainfall isohyets. In addition to spatial variation in rainfall, there is a significant inter-annual variation in rainfall [21, p. 429]. This is a function of overall rainfall totals, with drier areas more likely to experience a greater number of drought conditions on a annual basis in comparison to wetter areas. (2003:924-925)

Initial attempts to formulate a model of the agricultural development in North Kohala included analyzing a data set based on a series of aerial photographs displaying over 4500 walls and over 600 trails. They first documented the limits of the field system and later analyzed how agricultural development (both expansion and intensification) varied over time and space.

In 2008 (McCoy and Stephen), as part of the Monumental Architecture Field School- part of the larger Hawai'i Archaeological Research Project (HARP), conducted an archaeological field school to teach students how to document, study, and understand monumental architecture in the Hawaiian Islands. Their efforts focused on two study areas: Pu'ukohola Heiau National Historic Site and the Leeward Kohala Field System. In the Leeward Kohala Field System, investigations centered on collecting material for radiocarbon dating from good archaeological contexts (under the basalt stones of previously recorded ritual architecture). The findings in the Leeward Kohala Field System include the recovery of material for radiocarbon dating from eight recorded sites.

In 2008, McCoy and Graves conducted a study using archaeological and ethnohistoric evidence to model proto-historic period social integration accounting for the influence of existing capital infrastructure, specifically agricultural field systems built in the precontact era. Their findings suggested that scattered small-scaled irrigation fields promoted greater household level economic independence whereas large, geographically continuous, rain-fed and valley systems created opportunities for greater top-down management of production (McCoy & Graves 2008). Their study highlights historical contingencies in social evolution and shows Kamehameha I's remarkable talent in capitalizing on the social, economic, and symbolic contexts of his day.

Planting Methods

Traditional planting methods for the dryland field system required specific planting techniques invented by the Hawaiians of this area based on their intimate understanding of the local environment and weather patterns. The first step in the planting process was burning the grass so that land could be easily cleared. Handy and Pukui note that the grass was burned, stubbles and rocks were removed, soil turned, and then the soil was left alone for a week or two before planting (1991:109). Burning the grass also increased the nutrients within the soil by adding elements such as nitrogen and phosphorous.

The second step was removing stubbles from the ground. The removed stubbles were later used for green manure. Green manure was made from cut grass or other plant matter to enrich and keep moisture in the soil (Handy et al. 1991:89). The leeward uplands of Kohala were filled with green manure to keep moisture in the soil (Handy et al. 1991:109). The third step was rock removal. Removing rocks probably aided in the building of small walls to block the wind. Ladefoged explains that the walls acted as a wind block to slow down wind flow to help keep moisture in the ground for sweet potatoes (2003:927). The next step was resting the soil. Allowing the soil to rest was important not only for farming but also for Hawaiian spirituality. Resting the soil allowed the nutrients to form within the soil as well as allowing Papa (earth mother) to rest and rejuvenate.

The final step in this process was planting. Plants were planted in mounds to keep the moisture in. Another planting method incorporated at Puanui was planting by seasons. Winter months were known to be wetter in the dry and arid areas of leeward Kohala; when winter arrived, crops were planted in the lower elevation of the dry land field system so that rains could feed crops. When the winter months passed, the farmers of Puanui would focus on growing crops in the upper dry land field system areas (Lindsey 2012, personal communication).

The plants chosen to be cultivated in dry land field system had to withstand the ʻĀpaʻapaʻa winds and endure the dry climate. Some of the plants in the dryland field system included ʻuala (sweet potato), kalo (taro), kō (sugar cane), maʻi (banana), and uhi (yam). Specific varieties from each plant were planted based on how they reacted and adapted to the unique environment, in particular, the constant and strong ʻĀpaʻapaʻa winds. ʻUala was the preferred crop in the dryland field system because it can survive in harsher environments and has a faster yield than kalo. The soil moisture levels of leeward Kohala were also ideal for growing ʻuala. Kō sometimes acted as a windbreaker for other planted crops (Lindsey 2012, personal communication).

Bernice Pauahi Bishop Estate Survey Reports for Puanui

On August 14, 1923, the "Special Committee of the Trustees" submitted its report (*Inspection of Bishop Estate Lands on the Island of Hawaii – July 1923*) to the Trustees of the Bernice Pauahi Bishop Estate. The Special Committee was appointed by the Trustees to inspect Estate lands in the North Kohala and they worked in conjunction

with George M. Collins (Superintendent of the Land Department for Bishop Estate). The section on "Puanui" reads as follows:

> Puanui is a long narrow land containing 540 acres lying about half way between Mahukona and Kawaiahae, adjoining the Woods Estate land of Kehena and running from the sea to Puu Liolio at an elevation of 2750 feet above sea level. With the exception of a few remaining scrub Ohias on the upper portion of the land, it is entirely bare of trees. It has been used by the Wight Estate for grazing purposes for many years and marks the Southerly boundary of Puakea (the Wight Estate) Ranch.
>
> That portion of Puanui (168 acres) lying above Puu Kehena, i.e., between the 2250 and 2750 foot contours, is arable and has in the past been planted to corn. It is now used for grazing and is covered with a thick carpet of manienie. The land below Puu Kehena is rocky and shows evidence of intense cultivation by the old Hawaiians. Kuaiwis are to be seen everywhere laid out with much regularity. The pasturage is manienie with a considerable amount of Hilo grass near Puu Kehena. As we were on foot, we did not go below the old Kawaiahae-Mahukona road which crosses the land at an elevation of about 1750 feet above sea level, but we were told that young algeroba was coming in thickly near the sea and that the lower pasture was well covered with ilima.
>
> Korean farmers who are growing corn on the Nawahie land adjoining Puanui on the South, said that they paid a rental of $4.00 to $4.50 per acre per year, and that the land yielded about one ton of corn per acre, for which they were not getting the low price of $40.00 to $45.00 per ton. It is evident that so long as prices remain at this level, there is little likelihood of much expansion in corn planting in this region, but at the same time these facts show that the arable section of Puanui should return to the Estate more than a pasturage rental.

On June 30, 1924, George M. Collins (Superintendent of the Land Department for Bernice Pauahi Bishop Estate) submitted a survey report from James B. Mann (Engineer for Bishop Estate) to the Trustees. The survey report was completed on the Estate lands of Puanui, 'Upolu, and Pu'uepa I in the North Kohala. Mann's survey of Puanui consists of locating previous survey markers and monuments in the ahupua'a:

> The primary object of this survey was to relocate and mark, in a permanent manner, the ahupuaa boundaries, to report on possession and to classify the areas of agricultural and pastoral land.
>
> A triangulation system was laid out using the base line "Ridge" – "Puu-o-Nale", which had been established by the Coast and Geodetic Survey in 1913. The local system consisted of 10 new Stations, one H. T. S. Primary Station and three H. T. S. Secondary Stations, the origin of coordinates

being “Puu Kehena” an H. T. S. Secondary Station, the position of which, in the general system, I carefully re-computed.

Puanui had been carefully marked by A. B. Loebenstein in his survey of 1901 and I was fortunate in locating and identifying 19 out of the 22 monuments called for in Loebenstein’s survey. After computing the positions of the angles in the boundary and the directions and distances of the sides, I discovered that with three exceptions, Loebenstein’s and my own results were so near the same that I did not change his work. The exceptions were the two long courses and a short connecting course makai of “Puu Liolio”. As I found Loebenstein’s marks here I could readily see that his error was caused by an erroneous location of “puu Liolio” Station.

Monuments marking ahupuaa boundaries and triangulation stations are 1-1/4 inch pipes in concrete over the original marks, the names of the stations or boundary points being imprinted in the concrete.

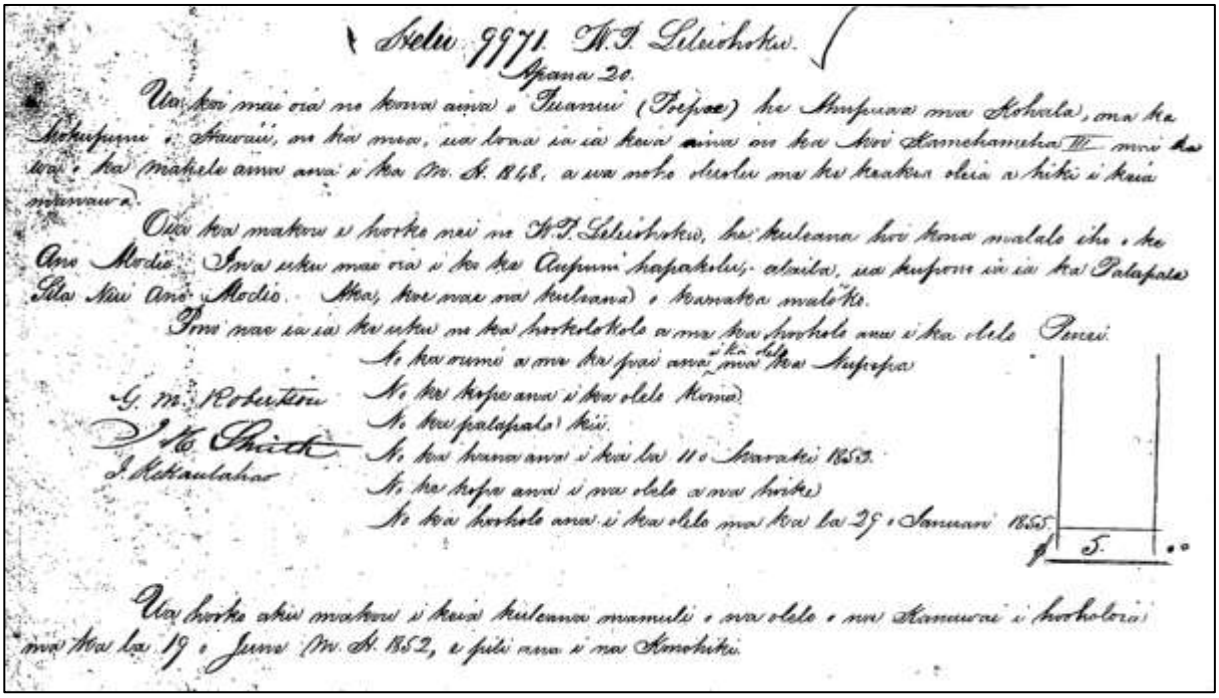
The total area of land in Puanui (549 acres) was determined and classified as:

Agricultural or first class pastoral land	72 acres
Fair class pastoral land	227 acres
Poor pastoral land	250 acres
Total	549 acres

MĀHELE ʻĀINA

W.P. Leleiohoku was awarded ʻĀpana 20 of LCA 9971 covering the land of Puanui on January 28, 1848. This award was one of a number of lands given to W. P. Leleiohoku by Kamehameha III during the Māhele. On December 26, 1903, a Certificate of Boundaries of Puanui was granted by F. S. Lyman (Commissioner of Boundaries) using a survey by A. B. Loebenstein. On March 29, 1904, Land Patent 8161 was granted the Trustees as heirs of W. P. Leleiohoku, using the same description as that given in the Boundary Certificate (Mann 1924:3).

Records indicated that W. P. Leleiohoku died intestate on October 21, 1848. He left behind one child, John Pitt Kinau Leleiohoku, and his widow, Ruth Keelikolani. John Pitt Kinau Leleiohoku died on December 22, 1859, intestate, at the age of 19, leaving his mother, Ruth Keelikolani, as his sole heir. Upon the death of Ruth Keelikolani on May 25, 1883, all her property was willed to her cousin, Bernice Pauahi Bishop. Pauahi died on October 16, 1884, and as indicated in her will, the entire ahupuaʻa of Puanui was given to the Trustees of the Bishop Estate (Mann 1924:3).


Helu 9971 W. P. Leleiohoku.
Apana 20.

Ua hoi mai oia no kona aina o Puanui (Poepoe) he Ahupuaa ma Kohala, ma ka Mokupuni o Hawaii, no ka moo, ua loaa ia ia kona aina on ke Aliʻi Kamehameha IV mai ke ola o ka Makele aina ana i ka M. H. 1848, a ua noho oluolu ma ke keakea olelo a hiki i kona manawa.

Oia ka makua o hooke nei no W. P. Leleiohoku, he kuleana koi kona malale iho o ke Ano Modio. Ina ua uku mai oia i ke ka Aupuni hapakolu, alaila, ua kupono ia ia ka Palapala Ola Nui Ano Modio. Aka, koe nae na kuleana o kamaʻaina malōkē.

Ina nae ia ia ke uku no ka hookolokolo a ma ka hoohala ana i ka olelo Penei:

No ka oumi a ma ka pai ana i ka olelo ma ka Aupapa
No ka kope ana i ka olelo Koma
No ka palapala kii.
No ka hana ana i kia la 11 o Kaaraki 1853.
No ka kopa ana i na olelo a na hoike
No ka hoohala ana i ka olelo ma ka la 29 o Januari 1855.

G. M. Robertson
J. H. Shick
J. Kekaulahao

5.

Ua hooke aku makua i kona kuleana mamuli o na olelo o na Kamaʻaina i hoholoia ma ka la 19 o June M. H. 1852, a pili ana i na Komohiki.

Puanui Boundary Commission Testimonies

Boundary Commission testimony provide detailed evidence on the natural and human-made features used to delineate ahupuaʻa boundaries as well as traditional practices such as land use, resource gathering, trade and travel. In 1862, the Hawaiian government established the Commission on Boundaries, also called the Boundary Commission, to determine and certify boundaries for landowners with no deeds. Surveyors mapped out boundaries that were often described by kamaʻāina and kūpuna who were intimately familiar with the natural and cultural landscapes of particular areas. Reviewing Boundary

Commission testimony today provides information on traditional cultural practices, place names, and locations of significant natural and cultural resources. Consequently, it's recommended that these materials continue to be reviewed to help reconstruct traditional land settlement and land use in the Kohala district.

The boundary commission testimonies for Puanui were completed in 1903. The following resources were noted as being present in Puanui at this time: plants and trees, walls and fences, road/path, cultivation grounds, and fishing rights. The table below lists site and place names that were also mentioned in the testimonies.

Table 3. Puanui Boundary Commission Testimony Summary Table

Bcid	Doc Id#	Site/Place Name	Description	Informant	Translation	Misc
151	16140	Puanui	Ahupuaʻa		Informants note areas used for cultivation as well as ancient road systems. This ahupuaʻa was noted as having fishing rights that extended out to sea.	
151	16140	Kihelea		Kanaha, 1873		Located near a road to Puuhue Hill.
151	16140	Wawahonu	Place name	Kanaha, 1873		A point of the shoreline, near a landing area.
151	16140	Pohakupuloa	Place name	Kanaha, 1873		
151	16140	Luakii	Spring	Kanaha, 1873		Located at the mauka end of this ahupuaʻa.
151	16140	Kaihoa	Place name	Paahao, 1873		
151	16140	Malohaumia	Cultivation area	Kekuaia, 1873		Informant notes that this is his family's cultivation area.
151	16140	Keahomanu	Road	Kekuaia, 1873		Old road to Waimea.

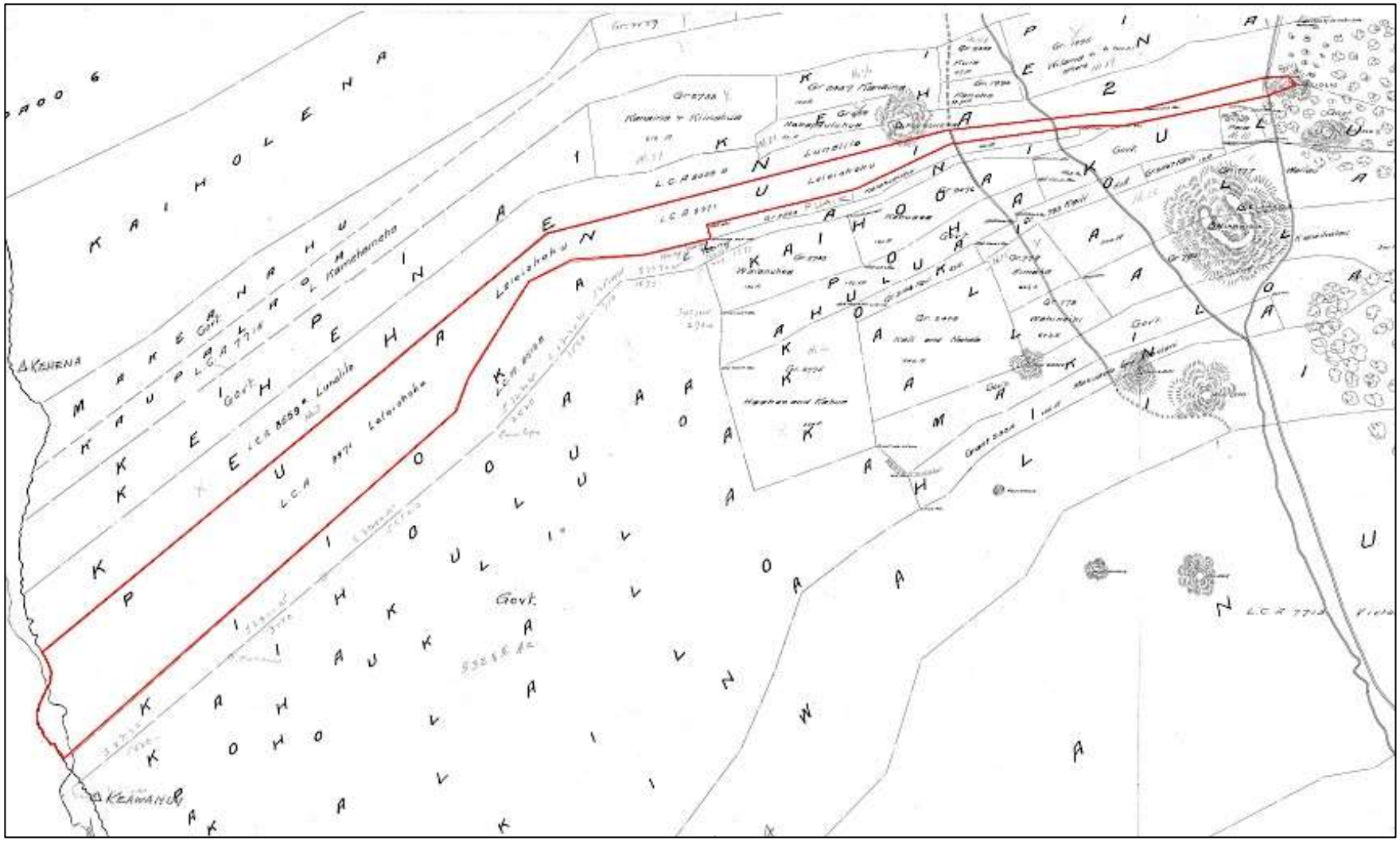


Figure 24. 1910 map by Jos. Iao, showing Puanui awarded LCA 9971 to Leleiohoku (Register Map 1706).

Puanui Ahupuaʻa, District of North Kohala, Island of Hawaiʻi,
Boundary Commission, Hawaiʻi, Volume A; pg. 242-244

Honorable R.A. Lyman, Boundary Commissioner for Island of Hawaii
The undersigned would herewith make application for the settlement of the boundaries of the following Ahupuaas or lands belonging to Her Excellency, R. Keliikolani; viz.

Kikala, Hilo Hawaii, bounded by Maumau adjoining lands unknown
Haiku, Hilo Hawaii, bounding lands unknown
Kauniho, Hilo, Hawaii bounding lands unknown
Waikaumalo, Hilo Hawaii, bounding lands unknown
Lepoloa, Hilo, Hawaii, bounding lands unknown
Piha, Hilo, Hawaii, bounding lands unknown
Kaulakailio, Hilo, Hawaii, bounding lands unknown
Kaiwiki, Hamakua, Hawaii Humuula & other lands
Kalakalaula, Hamakua, Hawaii, bounds unknown
Kapoaula, Hamakua, Hawaii, adjoining lands unknown
Kemau, Hamakua, Hawaii, adjoining lands unknown
Pohakuhaku, Hamakua, Hawaii, adjoining lands unknown
Waikaloa, Hamakua, Hawaii, adjoining lands unknown
Paalaea, Hamakua, Hawaii, adjoining lands unknown
Kaala, Hamakua, Hawaii, adjoining lands unknown
Manowaialei, Hamakua, Hawaii, adjoining lands Humuula &c
Keahua, Hamakua, Hawaii, adjoining lands not known
Kana, Hamakua, Hawaii, adjoining lands not known
Kapaaula, Hamakua, Hawaii, adjoining lands not known
Waialeale, Hamakua, Hawaii, adjoining lands not known [page 243]
Niulii, Kohala, Hawaii, adjoining lands not known
Puanuipoepoe, Kohala, Hawaii
Puanui, Kohala, Hawaii
Hamanamana, Kona, Hawaii
Opea, Kona, Hawaii
Keopu 3rd, Kona, Hawaii
Kailua, Kona, Hawaii
Kulihee, Kona, Hawaii
Kaaipuhi, Kona, Hawaii
Niumalii, Kona, Hawaii
Naheana, Kona, Hawaii
Kalehanaole, Kona, Hawaii
Puuloa, Kona, Hawaii or Kohala
Kapaula, Kona, Hawaii or Kohala
Honokahauike, Kona, Honokahaunui & Kealakehe, Government lands adjoining
Moeauoa, Kona, Hawaii, Lanihaunui & Moeauoa, belonging to Government adjoining
Kaumalumalu, Kona, Hawaii, adjoining lands Holualoa 1 & Pahoehoe, Government
Laloa 1, Kona, Hawaii, adjoining lands Laaloa & Pahoehoe Government
Kealia 2d, Kona, Hawaii , adjoining lands Kealia & Hookena

Keokea, Kona, Hawaii, adjoining lands Hoonaunau, C.R. Bishop & Kiilae G. Hueu
Hookena, Kona, Hawaii, adjoining lands Kealia & Kauhako, Government
Ninole 2, Hilo, Hawaii [page 244]
Pahoehoe, Kona, Hawaii, adjoining lands Pahoehoe, Government
Haukalua, Kona, Hawaii, adjoining lands Haukalua & Alae Government
Kapualeiholaike, Kona, Hawaii, adjoining lands Okoe, Kaulanamauna, Government & Keauhou, Estate Kamehameha V.
Hinalole, Kona, Hawaii, adjoining lands Honuaula and Hinaloleliiilii
Kahilipalinui, Kau, Hawaii, adjoining lands unknown
Hilea nui, Kau, Hawaii, adjoining lands unknown
Kawela, Kau, Hawaii, adjoining lands unknown
Hionomoa I, Kau, Hawaii, adjoining lands unknown
Hionomoa II, Kau, Hawaii, adjoining lands unknown
Mohokea, Kau, Hawaii, adjoining lands unknown
Kauhukuula, Kau, Hawaii, adjoining lands unknown
Paakaa, Puna, Hawaii, adjoining lands unknown
Keekee, Puna, Hawaii, adjoining lands unknown
Hulunanae, Puna, Hawaii, adjoining lands unknown
Mauluaiki, Hilo, Hawaii.

Your Honor will therefore please appoint a day for the hearing the above application & grant a Certificate in accordance therewith.
(Signed) R. Keliikolani by F.H. Harris, attorney at law
Hilo, August 16, 1873

Puanui Ahupuaʻa, District of North Kohala, Island of Hawaiʻi,
Boundary Commission, Hawaiʻi, Volume B; pg. 129-131

The Ahupuaa of Puanui, District of North Kohala, Island of Hawaii, 3d Judicial Circuit

On this, the 24th day of November A.D. 1873 the Commission of Boundaries for the Island of Hawaii, 3rd Judicial Circuit, met at the house of James Woods, Kohala ranch, on the application of J.O. Dominis, acting for Her Excellency, the Governess of Hawaii, for the settlement of the boundaries of Puanui, situated in the District of North Kohala, Island of Hawaii.

Notice of hearing for the settlement of boundaries of lands in Hamakua and Kohala, at the Waimea Court House, South Kohala, on the [left blank].

Served by publication in Hawaiian Gazette of [left blank] and Auokoa of [left blank] 1873, and continued at Kohala Ranch on the 24 instant. Due notice personally served on owners or Agents of adjoining lands, as far as known.

Present: James Woods for applicant

For Petition see Folio 242, Book A.

Testimony

Kanaha, kane, sworn, I was born on Kipi, Kohala, at the time of Okuu and have always lived near here; know the land of **Puanui** and a part of its boundaries; the old people told me all I know. **Puaiki** bounds **Puanui** on the Kona side at a place called **Wawahonu**, a point on the Kona side of the landing place at shore; thence mauka across a pili until you come to the kula where you find the iwi; thence along the iwi to a small hill at Pumai´s on **Puaiki**; thence along that land Patent No. [left blank] to the mauka corner of a place called **Kihelea** above the road to **Puuhue** hill; thence bounded by the land of **Kiiokalani**, now owned by Nawahie of Kawaihae; thence along the kuahiwi; the land being very narrow to **Kaihoa**; thence along **Pohakupuloa** to a spring called **Luakii**, which is at the mauka end of **Puanui**, on the border of **Kehena**. I can point out where the boundary runs on the iwi, but not on the pili. Bounded makai by the sea. Ancient fishing rights extending out to sea.

Paahao, kane, sworn, I was born at **Kiokalani** but do not know when. (Kanaha says he was born soon after the arrival of the first missionaries 1820). Have lived there most of my life. Know the boundaries of **Puanui**. Naai, my father, told them to me. The boundary at shore is at **Wawahonu**, a point on the Kona side of the landing place; thence mauka along **Puuiki**. They did not show me boundaries across the kula and pili. Thence along Puamai´s land to **Kihelea**, an ahua. Thence along the iwi aina to **Kiokalani**; thence along **Kaihoa** to makai of **Kaluakii**, where Puanui is cut off by **Kehena** and **Pohakuloa**. Bounded makai by the sea. Ancient fishing rights extending out to sea.

Cross-examined.

Kekuaia, kane, sworn, I was born in Kona, came to Kohala when I was quite small, and have lived here ever since; was born in the time of Kamehameha III. I am kamaaina of Puanui, had charge of it for five years. Old kamaaina now dead told me the boundaries. Bounded at shore on the south side by **Puuiki**. **Wawahonu**, the point on the Kona side of the landing place is the boundary, thence mauka along the pili to a place where we used to cultivate food, where there is an iwi aina; thence mauka along the iwi aina to **Malohaumia**, a cultivating ground; thence to the makai corner of land sold to Naluwaa (Puamai´s) on **Puaiki**; thence to the mauka corner of this land, **Kihelea** and **Puuiki**; thence along **Kiokalani** a short distance to **Kaihoa**; thence to **Keahomanu**, an old road to Waimea; thence to makai of **Kaluakii**, where **Kaihoa** ends; thence bounded by the land of **Pohakuloanui** to **Kaluakii**, where **Puanui** ends being cut off by **Pohakuloanui** and **Kehena**. Bounded makai by the sea. Ancient fishing rights extending out as far as you can see bottom.

Cross-examined.

Case continued until further notice to all interested parties.
R.A. Lyman, Commissioner of Boundaries, 3d Judicial Circuit.

Costs: 1 day hearing 10.-; 6 folio testimony 1.50; $11.50 paid.

Notes of survey to be filed previous to Certificate of Boundaries being issued.
R.A. Lyman, Commissioner of Boundaries, 3d Judicial Circuit.

For Certificate see No. 46, Folio 48, Liber 1 or No. 3

Puanui Ahupuaʻa, District of North Kohala, Island of Hawaiʻi,
Boundary Commission, Hawaiʻi, Volume D; No. 5, pg. 587-590

Puanui, North Kohala

The Boundary Commission met in the Court House, at Kapaau, North Kohala, at 9 a.m. December 19, 1903, according to Notices published in the Hilo Tribune and Ku Okoa, for a hearing November 14, and a continuance to November 21, and to December 19, and notices of the hearing, and continuances, having been sent by mail by the Commissioner of Boundaries, to each owner of the adjoining lands; viz.; J.F. Woods for Kehena, and others not known,

There being present, A.B. Loebenstein for the applicants, for the Bernice Pauahi Bishop Estate; J.W. Pratt, Commissioner of Public Lands; L.P. Weaver, attorney for Public Lands; J.F. Woods, and J.B. Kaohi & others.

Application of the Trustees of the Bishop Estate for settlement of the boundaries of this land of Puanui, filed September 1, 1903, presented by A.B. Loebenstein, also the published notices of hearing, and continuances, in the Hilo Tribune, and Ku Okoa, newspapers, in due form.

Also the testimony taken before R.A. Lyman, the former Commissioner of Boundaries, on Record in Book B, page 129.

Also a description of the land, by metes and bounds, as surveyed by A.B. Loebenstein, October 1901, endorsed as approved by W.E. Wall, Surveyor for the Territory of Hawaii, and by E.S. Boyd, commissioner of Public Lands,

Also the Stipulation of J.W. Pratt, the present Commissioner of Public Lands, dated December 8, 1903, consenting to settlement of the boundaries as set forth in the application.

Also Land Commission Award 9971, to Leleiohoku, [page 588] by name, and now surveyed

(Application)
Honolulu, June 2d, 1902
Honorable Rufus A. Lyman, Commissioner of Boundaries, 3d Judicial Circuit, Hilo, Hawaii

Sir:
On behalf of the Trustees under the Will of Bernice Pauahi Bishop, I hereby make application for the settlement of the boundary of the Land of Puanui, North Kohala, Hawaii, Land Commission Award 9971, Apana 20, to Leleiohoku.

Puanui is bounded on the North by the land of **Kehena** on the South by **Kiiokalani**, mauka by **Kehena**, and makai by the sea, owners unknown to the applicant.

Enclosed you will please find notes of survey of Puanui, made by A.B. Loebenstein, surveyor, of Hilo, Hawaii, and duly approved by the Bureau of Survey of the Territory of Hawaii.

Mr. A.B. Loebenstein has been authorized to represent me in the presentation of the case, and to furnish all information needed.

Yours very Respectfully,
Frank S. Dodge, Superintendent, Estate of B.P. Bishop

(Stipulation)
Before the Boundary Commissioner of the third Circuit, Territory of Hawaii
F.S. Lyman, Esquire, Commissioner

In the Matter of the Boundaries of the Land of Puanui, North Kohala, Hawaii

Return of Territory of Hawaii,
Now comes J.W. Pratt, Land Commissioner of the Territory of Hawaii and in answer to the application herein says:

That the boundaries as set forth in the application herein are correct in so far as those adjoining the lands of the Territory, and he herein consents to a settlement of said boundaries as set forth in the application.

Honolulu, Territory of Hawaii, December 1903
James W. Pratt, Commissioner of Public Lands

Testimony
A.B. Loebenstein, sworn, I surveyed this land, during the year 1901, having for guidance the bound of Keeokalani on south, settled by Boundary Certificate; Kehena 2d on north; Certificate 17 on East; various government remainders, and certain grants by patent above head of Kiiokalani, found the surveys to agree with the testimony on record; had no unusual difficulty in locating points on the boundaries; no disputed, or uncertain point; in making the survey.

Cross-examined

No one appearing to contest the application, and all being satisfied, the matter is closed, and decision to be given later.

Decision
I do hereby decide that the Boundaries of the Land of Puanui, District of Kohala, Island of Hawaii, Territory of Hawaii, are, and hereafter shall be as described in the survey on file, made by A.B. Loebenstein, October, 1901.

Certificate of Boundaries to be issued on payment of costs and expenses of the Commission of Boundaries
December 22, 1903
Frederick S. Lyman, Commissioner of Boundaries, Fourth Judicial Circuit, Territory of Hawaii

Costs
The Estate of Bernice Pauahi Bishop
To F.S. Lyman, Commission of Boundaries, Tr
Puanui, To Certificate of Boundaries, $2.00; 13 folio description in Certificate @ 50c; 6.50; 8 folio testimony records @ 25c, 2.00; 2 days settling boundaries, 20.00;
Notices, Hilo Tribune, 6.65; Ku Okoa, 7.00; Travel Expenses, 5.35; 49.50

Upolu - to Certificate of Boundaries 2.00; 11 folio description in Certificate, 5.50; 17 folio testimony record, 4.25; 2 days settling boundaries, 20.00;
Notices, Hilo Tribune, 6.65; Ku Okoa, 7.00; Travel Expenses, 5.10; 50.50
Total, $100.00

(E. & O. Ex.) Hilo, Hawaii, December 31, 1903
Paid by order on F.S. Dodge, agent of the B.P. Bishop Estate
F.S. Lyman, Commission of Boundaries

Certificate of Bounds $2.-; 12 folio description in ditto {certificate] 6.-; 9 folio testimony 2.25; 1 day settling bounds; 10.-; Notices 0 Hilo Tribune 7.15; Notices Ku Okoa 7.00; $34.40
December 22 cash received $30.00

<u>Puanui Ahupuaʻa, District of North Kohala, Island of Hawaiʻi,</u>
<u>Boundary Commission, Hawaiʻi, Volume C, No. 4; pg. 142-145</u>

No. 185
Certificate of Boundaries of the Land of Puanui, District of Kohala, Island of Hawaii, Leleihoku, L.C. Award 9971

Commission of Boundaries, third Judicial Circuit, Territory of Hawaii, U.S.A.,
Frederick S. Lyman, Commissioner

In the Matter of the Boundaries of the Land of Puanui, District of Kohala, Island of Hawaii.

Judgment

An application to decide and certify the Boundaries of the land of Puanui, District of Kohala, Island of Hawaii, having been filed with me on the first day of September, 1903, by F.S. Dodge, on behalf of the trustees under the Will of Bernice Pauahi Bishop, the owner of said land, in accordance with the provisions of an act to facilitate the settlement of boundaries now, therefore, having duly received and heard all the testimony offered in reference to the said boundaries and having endeavored otherwise to obtain all information possible to enable me to arrive at a just decision, which will more fully appear by reference to the records of this matter by me kept in Book No. 5. D. page 587 and it appearing to my satisfaction that the true, lawful and equitable boundaries are as follows; viz.:

Beginning at the southwest angle of this land at a + cut in the rock at the sea bluff on the south side of a cove called Wawahonu and bearing North 29° 02´ West true, from the Keawanui [triangle = Triangulation] Station and distant 1301.3 feet from the same, the boundary runs by the true meridian:

1. North 45° 40´ East 13387.0 feet along Puaike to a [Triangle] under mound of stones at Kulanao Keoua, the coordinates of this point, being South 6 495.5 West 11146,0 feet referred to the Puu Kehena Triangulation Reference Station.
2. North 42° 09´ East 4190.0 [smudged] feet along Puaiki to a + mark on perpendicular face of a large rectangular stone by mound of stones on edge of ancient roadway, the coordinates of this point being South 3388.6 - West 8334.1 ft, referred to as the Puu Kehena Triangulation Station.
3. North 76° 40´ East 3675.0 feet along Puaiki to a + mark on stone set in the ground at Northwest angle of Grant 2503, Kalahumoku, the coordinates of this point being south 2541.1 - West 4758.0 feet referred to the Puu Kehena Triangulation Reference Station.
4. North 74° 51´ East 1520.0 feet along North boundary of Grant 2503 to a + mark on stone under mound of stones.
5. North 77° 20´ East 1478.0 feet along north boundary of Grant 2503 to a + mark on stone under mound of stones, the coordinates of the point being South 1819.7 - West 1848.5 feet referred to the Puu Kehena Triangulation Station.
6. North 74° 16´ East 728.9 feet along same to + mark under mound of stones.
7. North 64° 08´ East 2587.0 feet along same to + mark under mound of stones. The coordinates of this point being South 494.1 - East 1181.1 feet referred to the Puu Kehena Triangulation Station.
8. North 77° 16´ East 726.0 feet along same to + mark under mound of stones.
9. North 82° 16´ East 2638.0 feet along same to + mark, under mound of stones at northeast angle of said Grant, the coordinates of said point being North 20.9 - East 4503.0 referred to the Puu Kehena Triangulation Station.
10. North 87° 49´ East 777.0 feet along Kiiokalani, Certificate #122 to + mark on stone at northeast angle of said land.

11. South 01° 22´ East 100.0 feet along mauka or east boundary of Kiiokalani to a + mark on stone under mound of stones at common angle Puanui, Kiiokalani and Kaihooa, the coordinates of said point being South 47.6 East 5279.0 feet referred to the Puu Kehena Triangulation Station.
12. North 77° 23´ East 3966.0 feet along Kaihooa to a + mark on stone at foot of ohia tree also marked with a [triangle], near the southwest slope of Puu Liolio hill, the coordinates of said point being South 297.6 West 678.8 feet referred to the Puu Liolio Reference Station, this being the southeast angle of Puanui.
13. North 06° 23´ West 460.8 feet along mauka or east boundary of this land adjoining Kehena, Certificate #17, to a [triangle with + in it] marked on a stone at foot of an ohia tree marked [triangle with + in it], this being the northeast boundary of Puanui, the Puu Liolio reference Station, bearing North 76° 16´ 45 East distant 751.5 feet.
14. South 75° 18´ West 3072.0 feet along the south boundary of Kehena, Certificate #17 to a + mark on stone under mound of stones on low hill called Koehomama Ahua, the coordinates of the said point being North 478.9 East 6130.7 feet referred to the Puu Kehena Triangulation Reference Station. (Note: given as two courses and distances in Wiltse Survey of Certificate #17, Distance however to Kehomana Ahua as above, A.B.L.)
15. South 83° 01’ 30" West 4867.0 feet along the south boundary of Kehena, Certificate #17 to a + mark on stone under mound of stones at west edge of old Kawaihae Uka and Mahukona road, and near foot of southeast slope of Puu Kehena, the coordinates of said point being South 103.1 East 1299.7 feet referred to the Puu Kehena Triangulation Reference Station (Note: actual relation of Keohomana Ahua to pile of stones at west edge old Kawaihae Uka road as per Wiltse Survey, A.B.L.)
16. South 75° 06 West 10285.0 feet along south boundary Kehena Certificate #17 to a [Triangle] mark on stone under mound of stones by large pile of rocks, the coordinates of said point being South 2747.5 West 8643.0 feet referred to the Puu Kehena Triangulation Reference Station.
17. South 45° 00´ 30" West 17289.0 feet along South boundary Kehena, Certificate #17, to a + cut in the naked rock by road at sea bluff known as Kahunalehu on south side of the cove known as Keawanui and from which point the Keawanui Triangulation Station bears south 21° 08´ East true distant 2165.8 feet; thence along and down the sea bluff to the extreme point of a spur or projecting cape called Kaunanahu, on which is cut a + just above high water mark bearing South 81° 45´ West distant 366.0 feet from the last station; thence following the windings of the seacoast at high water mark to a point opposite the initial point of this survey; thence up the sea bluff South 54° 48´ East 202.0 feet to said initial point, the direct bearing and distance from the Kahumalehu station being
18. South 09° 35´ East 898.3 feet to said initial point

Containing an area of 540.4 acres, more or less
So surveyed by A.B Loebenstein, October 1901
(13 folio, survey compared, o.k.)

It is therefore adjudged, and I do hereby certify and decide that the boundaries of said land of Puanui, are, and hereafter shall be as hereinbefore set forth.
Given by my hand at Hilo, Island of Hawaii, the 26th day of December, A.D. 1903
Frederick S. Lyman, Commissioner of Boundaries, third and Fourth Judicial Circuits, Territory of Hawaii, U.S.A.

HISTORIC MAPS

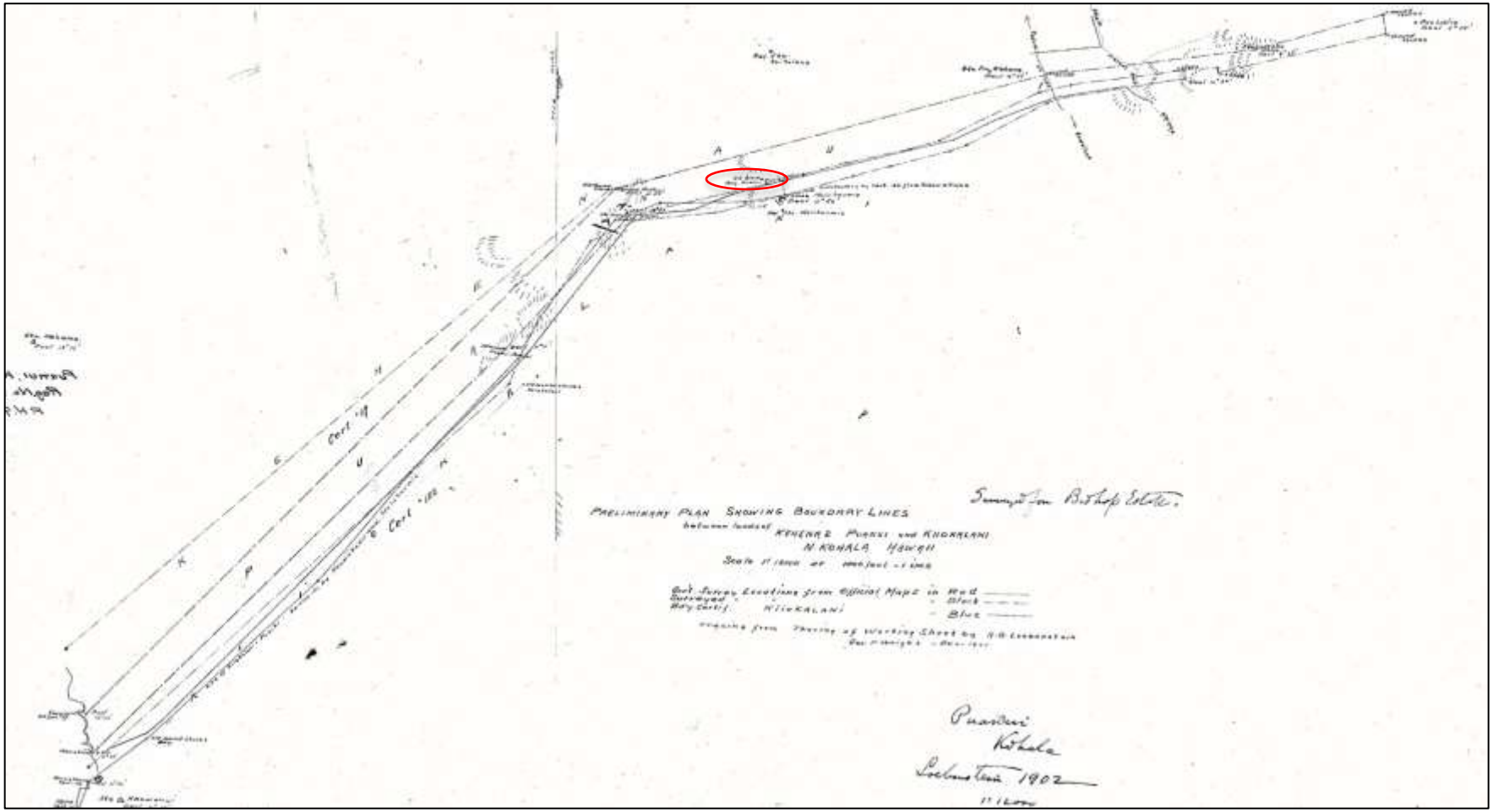


Figure 25. 1902 Loebenstein Map, showing boundary lines between Kehena, Puanui, and Ki‘iokalani. A note indicating “old graves” on the boundary between Puanui and Puaiki is circled in red (Register Map No. 2150)

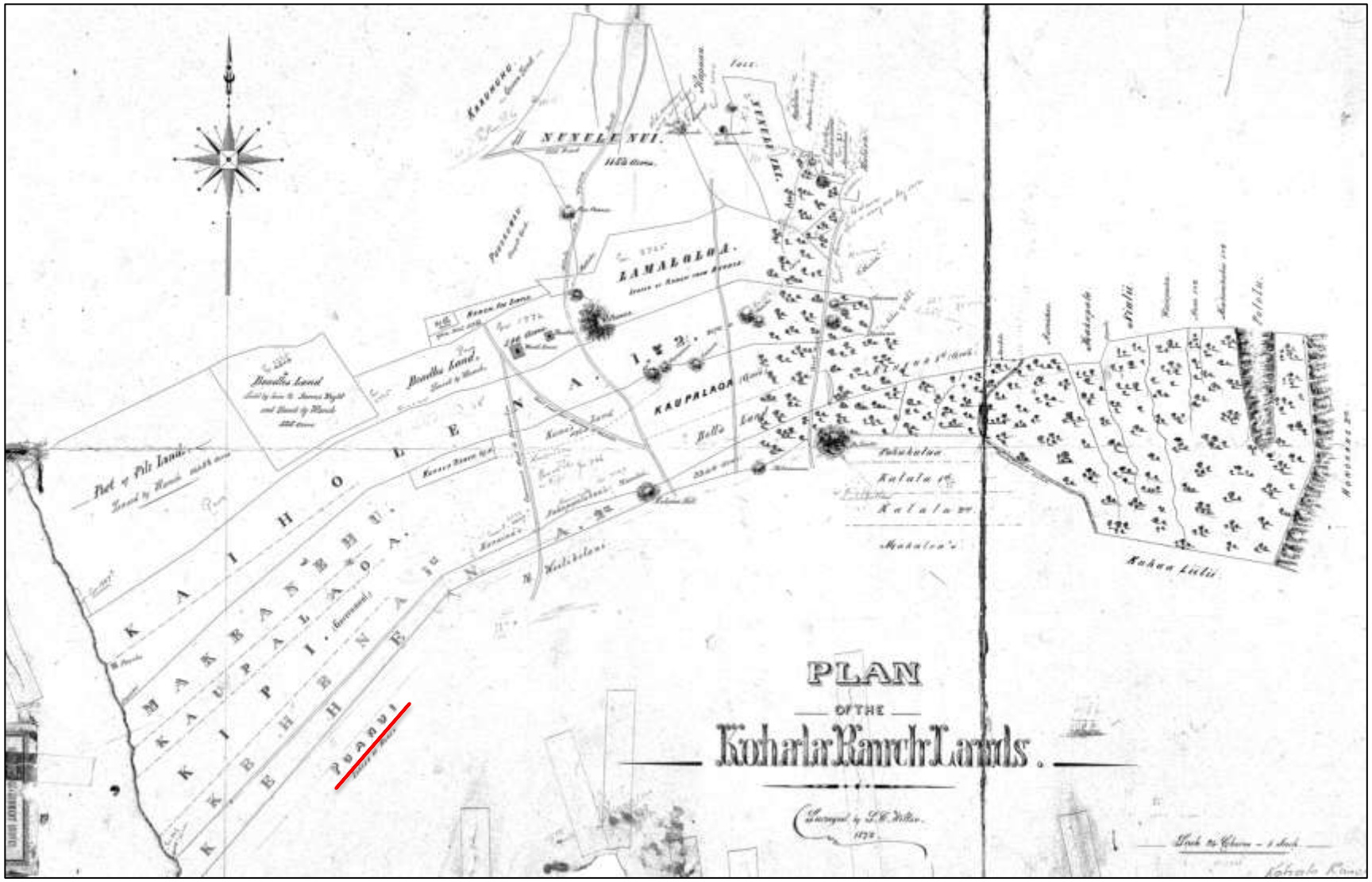


Figure 26. 1872 map of Kohala Ranch Lands (Register Map 370)

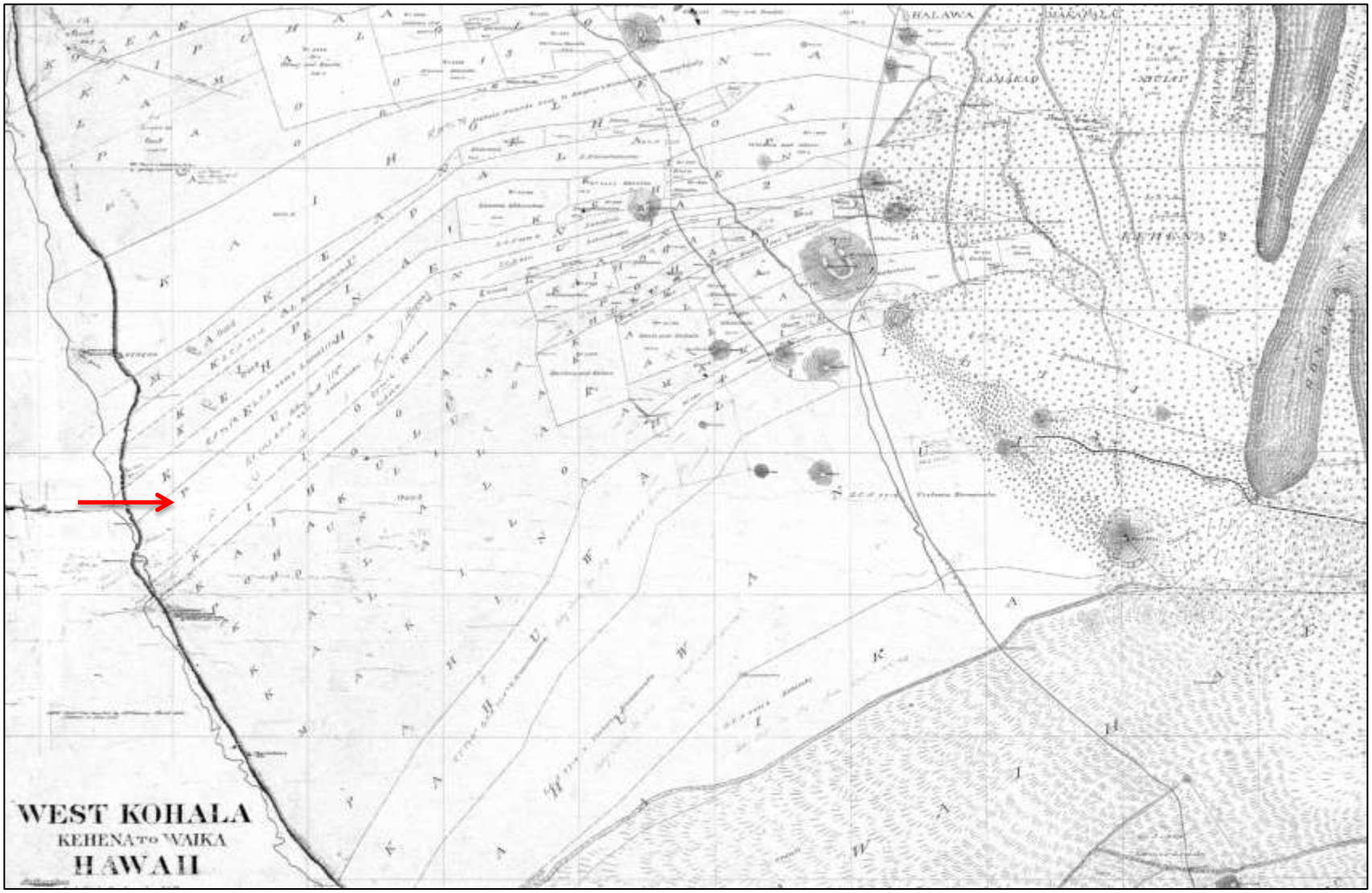


Figure 27. 1894 map of West Kohala, Kehena to Waika (Register Map 1706)

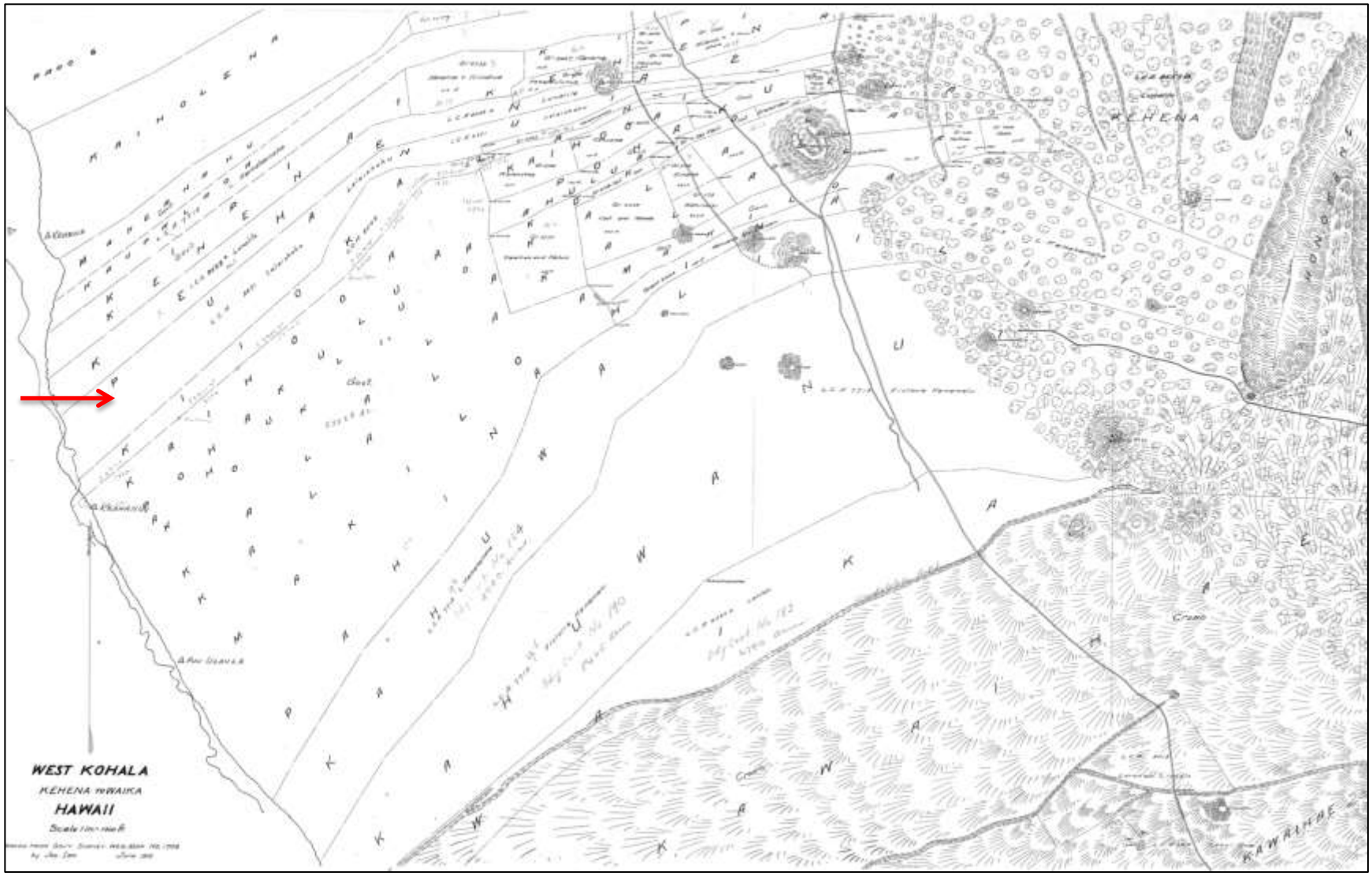


Figure 28. 1910 Tracing of 1894 map of West Kohala, Kehena to Waika (Register Map 1706)

PREVIOUS ARCHAEOLOGICAL STUDIES

Although numerous archaeological inventory studies have been conducted in Kohala Iwaho, within the ahupuaʻa of Puanui, only two previous archaeological studies have been conducted, and they both were located on the coast. These two studies were conducted by T.S. Dye & Colleagues, Archaeologist, Inc. in 2006 and 2012. A brief summary of each study is described below.

Puanui Makai

In 2006, at the request of Kamehameha Schools Land Assets Division, T. S. Dye & Colleagues, Archaeologists, Inc. completed an archaeological survey of the seaward portion of Puanui Ahupuaʻa (TMK:5-8-1:8 and 14), North Kohala, Hawaiʻi Island. The study identified a total of 57 archaeological sites that included: 33 habitation related sites, 3 shrine sites, 8 marker sites, a single fishing related site, a single modern fortified site, a hōlua slide, and 10 burial sites. A single test pit was excavated during the study.

According to Dye and Komori (2006), the hōlua is the dominant site at Puanui. Its position on the hill overlooking the coast makes it the focal point of the traditional Hawaiian landscape in an area where traditional villages appear to have been absent. This site is significant for numerous reasons. They recommend that preliminary plans to restore the hōlua to a useable condition be finalized and that the site be restored for "adaptive re-use."

Additionally, Dye and Komori (2006) found that most of the sites on the property are small structures that represent relatively little expenditure of energy and were probably used for a short period of time. Also, Puanui has experienced the severe erosion characteristic of the leeward coast of North Kohala. This erosion has eliminated archaeological excavation opportunities at most sites, which greatly limits the types and amounts of information that can be recovered. These sites are evaluated as significant for criterion D, the important information on Hawaiian history and prehistory that they have yielded or are likely to yield.

A single test pit was excavated with pick and shovel in a small hollow near the coast. The primary objective of the excavation was to determine if the hollow served as a depositional basin that collected sediments and other materials from the nearby hōlua, (located on the hill above hollow) and may once have extended to the base of the hill near the hollow. A secondary objective was to determine if a buried cultural deposit is present.

Their excavation revealed a simple two-layer stratigraphic section with no cultural deposit indicative of traditional Hawaiian activities present in the test excavation.

At the request of Kamehameha Schools, Land Assets Division, T. S. Dye & Colleagues, Archaeologists completed an archaeological inventory survey of the makai portion of Puanui, North Kohala, Hawaiʻi. The archaeological inventory survey report was prepared to support an educational initiative. Ka ʻIke O Ka ʻĀina, a Hawaiʻi 501(c) nonprofit

corporation, proposed to build a coastal heritage center where kupuna, teachers, and students could gather to: (1) restore and take care of the Puanui Ahupuaʻa; (2) provide educational experiences for children through interaction with kupuna; (3) share traditional knowledge and skills related to subsistence, healing, planting, and caretaking of the land and sacred places; (4) encourage and nurture the mental, physical, and spiritual capabilities of all individuals; (5) perpetuate the concept of ʻohana; and (6) respect the kupuna.

Fieldwork for the inventory survey was carried out intermittently over a period of six years. The initial phases of fieldwork in 2006 were not designed to yield an inventory survey report but instead focused on other requirements of the client. The final phase of fieldwork in 2012 was carried out to complete the field record to inventory survey standards.

During the course of their work, a total of 55 individual sites were recorded and identified with a State Inventory of Historic Places number. The site numbers were given to individual surface architectural features and to surface deposits of cultural materials. The surface architectural features were generally in fair to poor condition, with walls marked by piles of stones rather than by formally constructed and faced features. In addition, erosion at Puanui, as elsewhere along the Kohala coast, has left most of the surface deflated. Potentially intact cultural deposits are rare, confined to the interior of a rockshelter and possibly beneath the basalt stones of the larger structures. They recommend that test excavations at structures are necessary to demonstrate the presence of intact deposits, but these were not carried out during the inventory survey fieldwork.

The individual sites were recorded and given SHIP numbers, assigned a feature form, and evaluated for significance and recommendations for treatment. These sites are shown in table below.

Table 4. Sites identified during Dye's 2012 AIS

Site	Function	Form	Significance	Recommendations
50-10-04-29276	Habitation	Enclosure	D	No Further Work (NFW)
50-10-04-29277	Habitation	Enclosure	D	NFW
50-10-04-29278	Burial	Mound	D, E	Preserve
50-10-04-29279	Burial	Mound	D, E	Preserve
50-10-04-29280	Burial	Mound	D, E	Preserve
50-10-04-29281	Burial	Mound	D, E	Preserve
50-10-04-29282	Modern fortification	Enclosure	D	NFW
50-10-04-29283	Habitation	Remnant structures	D	NFW
50-10-04-29284	Marker	Mound	D	NFW
50-10-04-29285	Marker	Ahu	D	NFW
50-10-04-29286	Marker	Ahu	D	NFW
50-10-04-29287	Marker	Ahu	D	NFW
50-10-04-29288	Habitation	Enclosure	D	NFW
50-10-04-29289	Habitation	Modified outcrop or possible enclosure	D	NFW

50-10-04-29290	Habitation	Enclosure	D	NFW
50-10-04-29291	Habitation	Enclosure	D	NFW
50-10-04-29292	Habitation	Enclosure	D	NFW
50-10-04-29293	Habitation	Pavement	D	NFW
50-10-04-29294	Habitation	Enclosure	D	NFW
50-10-04-29295	Burial	Mound	D, E	Preserve
50-10-04-29296	Burial	Mound	D, E	Preserve
50-10-04-29297	Burial	Mound	D, E	Preserve
50-10-04-29298	Burial	Mound	D, E	Preserve
50-10-04-29299	Burial	Mound	D, E	Preserve
50-10-04-29300	Burial	Cairn	D, E	Preserve
50-10-04-29301	Habitation	Midden and waterworn basalt cobble	D	NFW
50-10-04-29302	Habitation	Enclosure	C, D	Data recovery
50-10-04-29303	Habitation	Terrace	C, D	Data recovery
50-10-04-29304	Habitation	Platform	D	NFW
50-10-04-29305	Shrine	Mound	D, E	Preserve
50-10-04-29306	Habitation	Enclosure	D	NFW
50-10-04-29307	Shrine	Waterworn basalt cobble and branch coral	D, E	Preserve
50-10-04-29308	Marker	Cairn	D	NFW
50-10-04-29309	Habitation	C-shaped enclosure	D	NFW
50-10-04-29310	Habitation	Enclosure and coral concentration	D	NFW
50-10-04-29311	Habitation	L-shaped alignment	D	NFW
50-10-04-29312	Habitation	Enclosure	D	NFW
50-10-04-29313	Habitation	Rockshelter	D	NFW
50-10-04-29314	Habitation	Enclosure	D	NFW
50-10-04-29315	Habitation	Platform	D	NFW
50-10-04-29316	Marker	Mound	D	NFW
50-10-04-29317	Habitation	Terrace or paving	D	NFW
50-10-04-29318	Habitation	Enclosure	D	NFW
50-10-04-29319	Habitation	Enclosure	D	NFW
50-10-04-29320	Habitation	Enclosure	D	NFW
50-10-04-29321	Habitation	Enclosure and wall	D	NFW
50-10-04-29322	Habitation	Enclosure and mound	D	NFW
50-10-04-29323	Habitation	Enclosure	D	NFW
50-10-04-29324	Shrine	Coral and basalt cobble	D, E	Preserve
50-10-04-29325	Habitation	Midden	D	NFW
50-10-04-29326	Fishing	C-shaped enclosures	D	NFW
50-10-04-29327	Habitation	Enclosure	D	NFW
50-10-04-29328	Marker	Mound	D	NFW
50-10-04-29329	Habitation	Waterworn basalt and coral	D	NFW
50-10-04-29330	Holua	Holua slide	C, D, E	Preserve

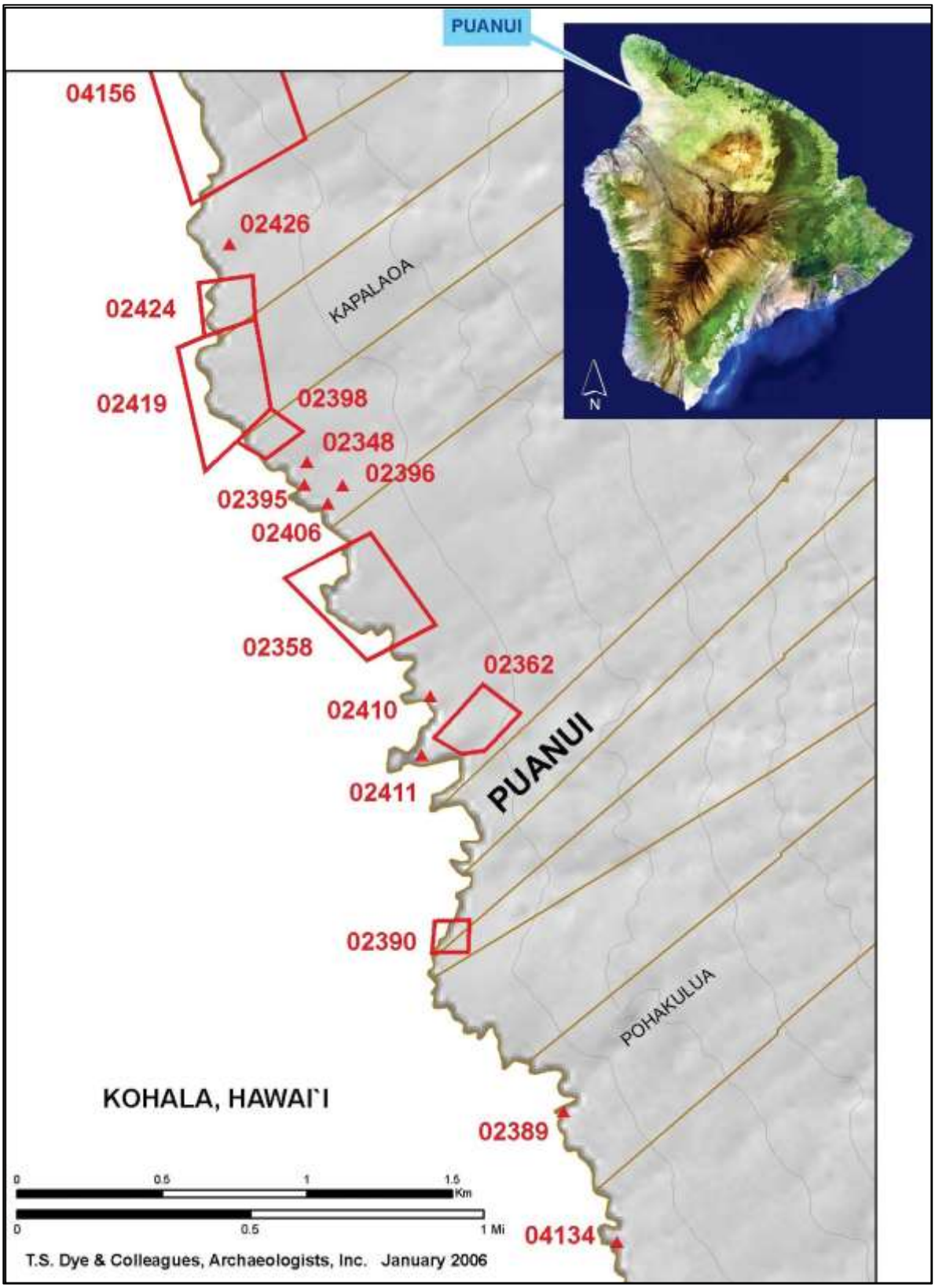


Figure 29. SIHP sites at Puanui and the surrounding ahupuaʻa, from Dye 2006.

PREVIOUS INTERVIEWS

Ulu Mau Puanui

On June 8, 2012, Kumupaʻa staff met with Kehau Marshall and Ala Lindsey of Ulu Mau Puanui at Puanui mauka. Ulu Mau Puanui is a non-profit organization and an ʻĀina Ulu collaborator with Kamehameha Schools --ʻĀina Based Education Division. The group's mission is to hoʻomau a hoʻolu: to perpetuate and grow communities through culturally-centered sciences including participatory restoration, research, and education focusing on the traditional Hawaiian cultivation system in the uplands of Kohala. In particular, Ulu Mau Puanui focuses on the mauka areas of Puanui Ahupuaʻa to study the once productive and creatively engineered rain-fed Kohala Field System.

Uncle Ala Lindsey, a kamaʻāina of Waimea, was a Parker Ranch employee for many years. His kuleana now is to mālama the three mala that he helped established at Puanui and to teach interested youth about plants and the planting techniques unique to the area. Uncle Ala also maintains the land by clearing invasive species and constructing protective fencing to keep out unwanted animals. Aunty Kehau Marshall's kuleana is to develop and implement the educational curriculum for visiting Kohala and Waimea students. Aunty Kehau continuously researches relevant land information/history, moʻolelo, place names, and kamaʻāina stories to enhance her curriculum.

Puanui's Landscape

Uncle Ala and Aunty Kehau shared that Puanui Ahupuaʻa's mauka boundary is at Puʻulio (Puʻu Lio or Puʻuliolio). Uncle Ala mentioned that there is a spring near Puʻulio, but it is located outside of Puanui's boundaries. They noted that the location of Puʻulio is what some people refer to as the "crest" of the Kohala Mountains.

Puʻu Kehena is the other well-known puʻu located near Puanui's northern boundary. During the site visit, we walked up Puʻu Kehena and could clearly see remnants of the ancient dry land field walls. Standing on Puʻu Kehena today, it's not difficult to visualize the ancient dry land field walls and both understand and appreciate the sustainability of the past. On top of Puʻu Kehena, one can see two small gulches that are also located within Puanui. However, the names of these gulches no longer exist in available maps or in the memories of the community. According to Uncle Ala, the area of Puʻu Kehena was previously swampland; however, the changing land use and environment has caused the swamp lands to dry up.

Figure 30. The peak of Pu‘ulio, the mauka boundary of Puanui Ahupua‘a, viewed from Pu‘u Kehena. View to northeast.

Evidence of past activities, such as tool production, can still be seen in pieces of volcanic glass, basalt flakes and water-worn cobbles scattered on the surface of the pu‘u. Although the traditional landscape is no longer prominent, there remain elements of the past and one can easily imagine what this area was like in our kupuna’s time.

Figure 31. Waterworn pebble and basalt flake located on Pu‘u Kehena

Uncle Ala also shared that not too long ago one could see schools of fish from the uplands. Consequently, it was relatively easy for area fishermen to determine the best fishing locations along the coastal areas of Leeward Kohala.

Cultural Sites & Trails

The most prominent cultural features of Puanui Ahupuaʻa are the old walls of the Kohala Field System. Puanui is just one of the 33 ahupuaʻa from ʻUpolu to the north and Puʻu Kahua to the south that comprised the Kohala Field System. Uncle Ala believes that the field system walls were concentrated in the mauka portions of the ahupuaʻa, where as the central area of the ahupuaʻa was open dry land and the village and habitations areas was located along the coast. A sharp bend is situated along the boundary of Puanui Ahupuaʻa, and Uncle Ala explained that no field walls are located makai of this bend. Uncle believes that the land zones were utilized in this manner because the mauka portions of the ahupuaʻa were the most highly prized and contained rich, fertile soils while the midlands were dry and the coast was ideal for living do to the rich marine resources.

Figure 32. Outlines of field system walls as viewed from Puʻu Kehena. View to south.

Uncle Ala further explained that the kamaʻāina of Puanui probably traveled frequently throughout the area and routinely utilized resources from the coastal, midland, and mauka zones. Travel within the ahupuaʻa is evident by the extensive trail system that spanned mauka to makai. The trail characteristics found in Puanui include cleared, worn-down paths running mauka to makai and typically designated ahupuaʻa boundaries.

Figure 33. Clear division of the moist and wet mauka lands verses the dry midlands and coastal lands within Puanui Ahupuaʻa

Uncle Ala believes that when the fields were cleared prior to planting, rocks would be removed, piled, and used to build walls – an extremely useful, practical, and efficient system. Uncle also shared that the poʻe kahiko would use the horizon to build and level the walls within the field system. He believes this because this technique is still practiced today when the cowboys build walls.

Kiʻi Pōhaku

During the site visit to Puanui, Kumupaʻa helped document a kiʻi pohaku that was previously discovered by, Aurora Kagawa, a former staff member. Kumupaʻa documented the feature with photos, GPS, and tape and a sketch map. The kiʻi pohaku is located on the flat lands to the south of Puʻu Kehena and its GPS coordinates are 0204938 by 2230697. The kiʻi pohaku is associated with an alignment that was likely the foundation of a traditional terraced enclosure that could possibly be a ritual site due to its size, location, and the presence of the kiʻi pohaku.

The kiʻi pohaku measures 0.35m long and 0.23m wide and is located on a single boulder and appears to be pecked into the boulder. The kiʻi pohaku resembles an akua loa, which is a cross staff with a carved head at the top, and adorned with pala ferns and feather leis, associated wth the god Lono and the Makahiki rituals. The associated terraced enclosure was not recorded, however, it is recommended that additional archaeological work be conducted to record the surface features that were located during this site visit.

Figure 34. Overview shot of the *ki'i pohaku* and associated enclosure and c-shape. Note Pu‘u Kehena in the upper left corner. View to northeast.

Figure 35. Height measurement of ki'i pohaku. View to northeast.

Figure 36. Close up view of the ki'i pohaku. View to northeast.

Figure 37. Foundation of enclosure associated with ki‘i pohaku. View to east.

Figure 38. GPS point of Puanui ki‘i pohaku.

Puanui Mala & Planting Techniques

There are currently three mala, or dry-land gardens being utilized at Puanui. In these mala, Uncle Ala and the visiting students grow ipu (gourd), ‘uala (sweet potato), kō (sugarcane), and kalo (taro). However, the most dominant crop at Puanui is ‘uala, with over 20 different varieties currently growing in the three mala. Lanikeha, a white variety of ‘uala, is one of the most productive varieties at Puanui.

Uncle Ala took us to the mauka mala to show us the ‘uala crops that he is currently growing. Uncle explained that the most productive way to grow ‘uala is to plant the cuttings (or vines). This produces the most productive yields compared to planting the ‘uala tuber, which takes a lot longer to grow. It takes about 3-4 months to grow a good size ‘uala at the Puanui mala. To plant ‘uala, Uncle tills the soil, shapes it in long mounds, and then plants the cuttings. Planting the ‘uala in mounds helps the water drain down and moisten the potatoes. However, because of intrusive turkeys and pheasants digging in the mounds to get to the ‘uala, much of the ‘uala are currently being planted in flat rows.

Figure 39. Uncle Ala Lindsey harvesting ʻuala in the mala. A healthy Lanikeha variety ʻuala is located in the foreground.

An interesting and unique planting characteristic of the Puanui ʻuala is the "hibernation effect." Uncle explained that this hibernation effect occurs during the dry season when the ʻuala leaves and other plants disappear into the earth only to "magically" reappear and continue to grow when the wet season comes.

Today kō is planted and used as a windbreak in Puanui. The tall kō shoots deter the wind, collect water from the air moisture, and distribute the water to the plantings below. The kō at Puanui came from Kanu o Ka ʻĀina Charter School in Waimea. Planting dryland kalo has also been attempted at Puanui; however, these attempts have been unsuccessful as the kalo appears too weak to withstand the harsh northeast winds.

Rain is the primary water source for Puanui. The "Maui Rains" are the predominant rains in the area and appear annually around November through March. Although Uncle Ala refers to this rain as the "Maui Rain," the rain actually comes from Kona in a southeasterly direction. However, Uncle refers to them as the "Maui Rains" because he notices that they come from Maui and circle around from Kona before the hitting Puanui. The "Maui Rains," noted for being steady and consistent, remain critical for the growth and production of Puanui ʻuala.

Education programs

The curriculum for the Ulu Mau Puanui program is place-based and focuses on the natural and cultural resources of the area. Aunty Kehau and Uncle Ala blend cultural knowledge of place with western scientific data to teach visitors about the traditional and modern significance of this ahupuaʻa. Students conduct protocols when they arrive and depart the site, learn moʻolelo relevant to the area, weed and plant in the mala, learn

about the planting techniques of ‘uala, and when they are pau for the day, the students can take plant cuttings and food home to eat or replant.

Recommendations

Aunty Kehau and Uncle Ala are extremely appreciative of the land base, support, and financial help provided by Kamehameha Schools. Their program has serviced hundreds of visitors from Kohala and Waimea as well as college students from around the world, enhancing awareness of and interest in traditional dry land and rain-fed systems in Hawai‘i.

Aunty Kehau shared that their efforts are now focusing primarily on the Kohala community. Aunty also recommended that KS should make a greater and more sustained effort to reach out to and involve the Kohala community. According to Aunty Kehau, Kohala should be a key community for KS to target because of Kamehameha Nui’s very close and traditional connection to the moku. Kehau suggested that more KS students and staff should come to Kohala, in particular Puanui, to learn first-hand about Kamehameha’s one hānau.

Another recommendation that Uncle Ala shared was the need to highlight and acknowledge the critical importance played by ‘uala as a principal crop that helped nourish and sustain our kūpuna. Uncle strongly believes that it is essential today to have ‘uala fields and mala to teach people how to grow and harvest ‘uala. “There are so many lo‘i that we visit today, but people rarely learn about planting and harvesting ‘uala, even though so much of our ancient communities relied on ‘uala as their main food source.” Ulu Mau Puanui is doing just that, and many of their visitors now understand the unique role ‘uala played in the past, especially on the dry leeward coast.

Ulu Mau Puanui will continue to mālama, plant, harvest, and educate the community at Puanui with the support of KS. The program hopes to continue collaborating with KS and developing additional opportunities to educate and empower the local community. It remains incumbent upon all of us to remember, recognize, and utilize the traditional and worthy achievements of our kūpuna. Incorporating the best from yesterday with today’s new, innovative, and inclusive initiatives can only help us to become more informed and responsible stewards of our ‘āina.

FIELD WORK METHODS AND FINDINGS

Objectives and Methods

During the period of July 15 – August 1, 2013, Kumupaʻa Cultural Resource Consultants, LLC conducted an archeological assessment of selected portions in the ahupuaʻa of Puanui. Under the guidance and supervision of Kelley Uyeoka, M.A., principal archaeologist of Kumupaʻa Consultants, archaeological fieldwork training was provided for five undergraduate student interns. This archaeological assessment of Punaui was undertaken for Kamehameha Schools Land Assets Division.

A critical component of the training program consisted of developing and establishing an understanding and appreciation of the "sense of place" concept or hoʻolauna. The first day in field the group met with the members of Ulu Mau Puanui, Kehau Marshall and Ala Lindsey. Prior to entering the grounds we offered a pule oli komo to ask for permission to enter Punaui as well as taking some quite time to observe our surroundings before beginning our work. Ulu Mau Puanui took us to the summit of Puʻu Kehena where they shared the history, moʻolelo and landscape of Puanui and Kohala mā. We then visited the three experimental gardens and learned about the methods used to plant ʻuala and kō at the different elevations. We finished our day at the most mauka of the three experimental gardens and helped harvest and prepare ʻuala cuttings for future harvests.

During the first week in the field a survey was conducted to provide technical field training south of the most mauka experimental garden (Mala 1) and northwest of the second most mauka garden (Mala 2). The site nearest Mala 1 was given the site name PUANUI 1. This area was the training ground for the interns to learn how to properly conduct a pedestrian survey, use a compass, fill out feature forms, take photographs and measurements, draw sketch maps and use a GPS.

Visibility was excellent as most of the region comprised of low lying shrubs and grass, which made an ideal learning environment for accurate descriptions and measurements of features. Once the interns became familiar and comfortable with the various components of feature documentation, they then applied the technical skills learned to all five archeological sites. Documentation of archaeological features included written descriptions on site forms, GPS documentation, photographic documentation, and length, width, height, and depth measurements. GPS documentation was conducted with Garmin Rino hand held devices with accuracy ranging from 2-3m. Features were numbered sequentially and marked with red flagging tape that was removed from the sites.

Another component of the interns training was learning various mapping techniques. The mapping techniques that we conducted during field work included tape and compass, point to point, GPS and plane table mapping. All mapping methods were applied using relevant measuring tools and were hand drawn for all five sites. Once the maps were drawn and fieldwork was complete the maps were taken back to the lab and digitized using the iDraw program on the iPad.

Findings

Prominent features that were documented during our survey were mounds and agricultural walls. Majority of the mounds were heavily concentrated at site PUANUI 5 and the agricultural walls were observed at both PUANUI 2 and PUANUI 5. Site PUANUI 3 is the location of the only known ki‘i pōhaku, or petroglyph, in the mauka region of Puanui. A polished adze and various debitage collected from Pu‘u Kehena were also documented and analyzed.

Table 5. Puanui feature types

Feature Type	Number of Feature
Agricultural Walls	17
Alignment	2
C-Shape	11
Enclosure	5
L-Shape	2
Mound	153
Platform	2
Terrace	3
Trail	2
U-Shape	1
Petroglyph	1
Polished Adze	1
Polished Adze Flake	1
Polished Basalt Flake	4
Adze Blank (no polish)	1
Basalt shatter	1
Basalt Flake (no polish)	9
Total Features	**216**

PUANUI 1

Site 1 consists of three features located to the southwest of Puʻu Kehena and the most mauka experimental garden, also known as Mala 1. This site comprises of an enclosure, a platform and a mound. The region of which these features are situated suggests that this site was a possible ceremonial and burial ground as there was no archaeological evidence of agricultural features in the surrounding area. In comparison to Site 2 and Site 5, Site 1 is a unique cluster of features due to its location and elevation within the ahupuaʻa. The site is in relatively fair to excellent condition with evidence of rock fall and collapse scattered throughout various parts of the features as well as intact and well-preserved sections.

The most evident threat to the site is cattle and ranching animals and possibly humans due to the close proximity of the site to the main access road of the ahupuaʻa and nearby residence in the neighboring ahupuaʻa. Therefore, in order to preserve and protect these sites, interpretive signage should be placed near the features to provide awareness to anyone unfamiliar to the area. Also, extensive research needs to be conducted to determine site function, such as looking at the larger field system and comparing and contrasting similar features to help assist with site interpretation.

PUANUI 1 Feature Descriptions

Site #: PUANUI 1
Feature Letter: A
Feature Type: Enclosure
GPS Coordinates: Northing: 0205169; Easting 2230905, Accuracy: 2m
Artifacts: None Observed
Midden: None Observed
Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: Pastureland enriched soil and grass
Possible Age: Traditional and/or Historical
Possible Function: Ceremonial (Religious)
Condition: Good
Association with Other Features: Located approximately 32.5m west from PUANUI 2B and PUANUI 2C. Also, about 22.3m south from Mala 1 and 8.9m north of fence line (possibly marking ahupuaʻa boundary line). Located at the base of Puʻu Kehena on the south end.
Description of Location: Surrounding area consists of open planes with no trees surrounding features. Soil not visible below thick grass. Site on a natural sloping landscape and there was evidence of cattle grazing near and around features.
Description of Feature: Feature is of stacked construction with core-fill and ranging from 2 – 5 courses. Main walls are constructed with stone sized pōhaku and core filled with gravel and cobble. The enclosure measures 7.9m x 8.0 x .88m x 1.2m. Lichen covered stones compose a continuous walled enclosure in a square shape with defined corners in the interior of feature and rounded corners on the exterior, due to collapse. The south end possesses the most intact and highest wall of the feature, measuring .88m high. Feature is located on a slight natural slope with the steepest at south end and most gradual at north end. Interior of feature is leveled therefore in comparison to exterior, which defines sloping landscape. There is collapse on both interior and exterior and extends up to 2m on both ends. Interior height on leeward wall is lower than on windward wall.

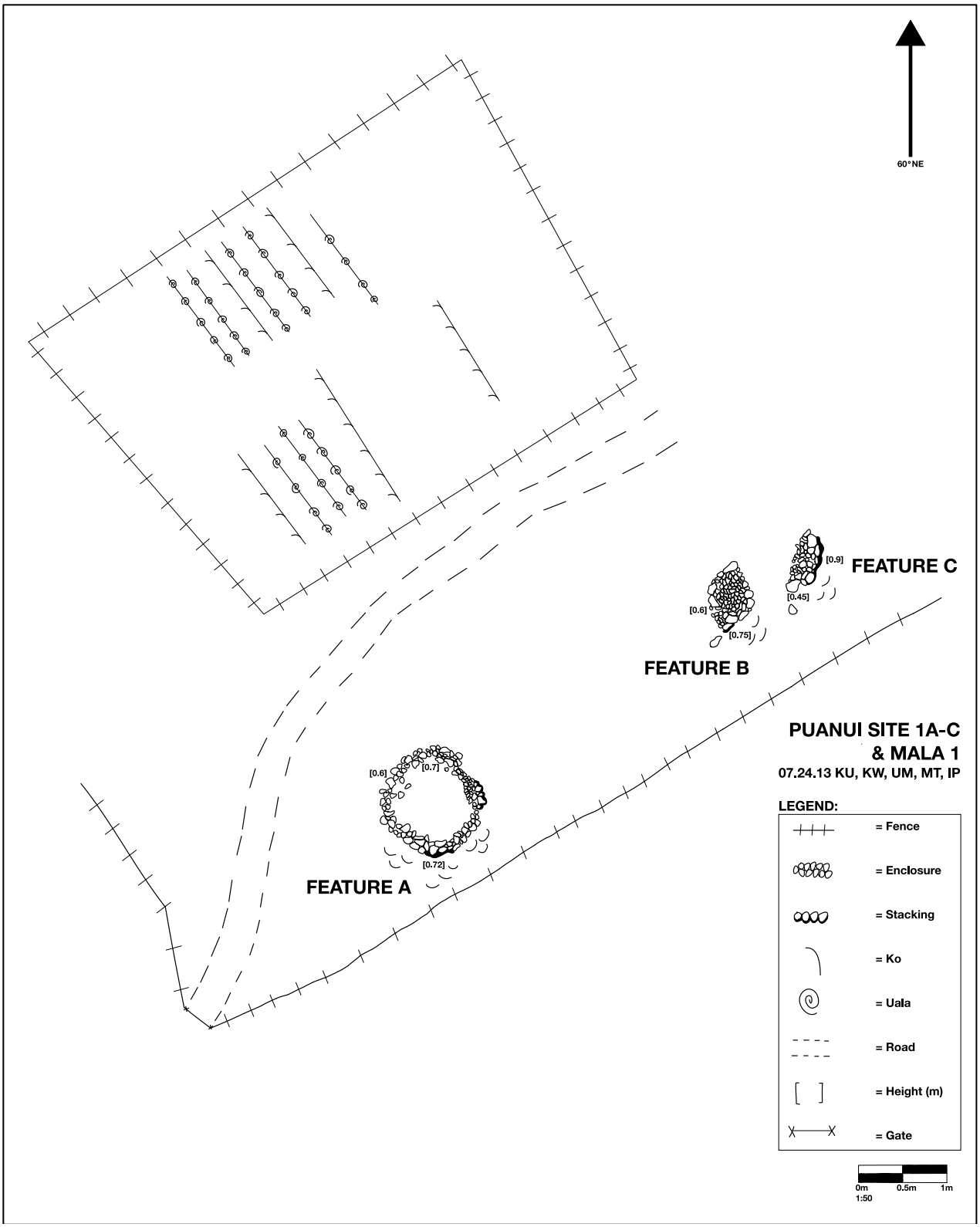


Figure 40. Plan view map of PUANUI 1

Figure 41. PUANUI 1A, Overview of enclosure. View to east.

Figure 42. PUANUI 1A, Profile of portion of south wall. View to north.

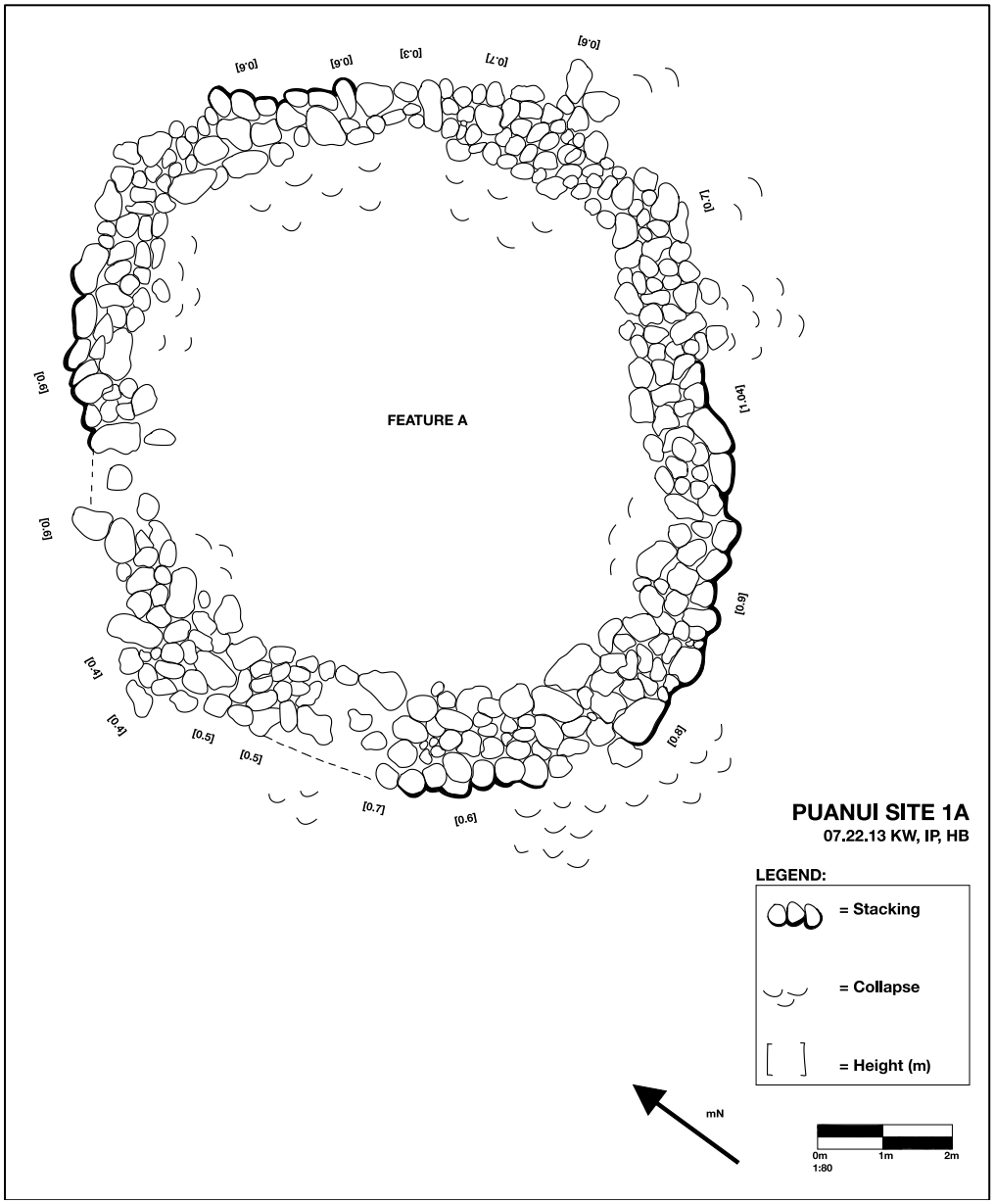


Figure 43. Plan view map of PUANUI 1A, enclosure.

Site #: PUANUI 1
Feature Letter: B
Feature Type: Platform
GPS Coordinates: Northing: 0225974, Easting: 2217145, Accuracy: 2m
Artifacts: None Observed
Midden: None Observed
Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: Pastureland enriched soil and grass
Possible Age: Traditional
Possible Function: Burial
Condition: Excellent
Association with Other Features: Located approximately 4m west of PUANUI 1C and approximately 32.5m northeast of PUANUI 1A. Fence line is 8.2m southeast to feature.

Description of Location: Area consists of pasturelands and very thick grass. Low lying grass growing within center of feature prominently on north end of feature .

Description of Feature: Feature is of stacked construction approximately 2-4 courses high built with cobbles, stones and boulders. The feature measures 4.6m x 3.8m .72m and is oval shaped. Corners of feature are defined and are slightly rounded on the northwest end of feature. The bottom course on the northeast end of feature consists of large boulders and the top of platform is filled with cobbles. Not much disturbance on most of the feature with only slight collapse evident on north end of feature. South end of feature is in excellent condition.

Figure 44. PUANUI 1B, West end of feature with PUANUI 2C in background. View to northeast.

Figure 45. PUANUI 1B, North face of platform with MALA 1 and Pu‘u Kehena in background. View to north.

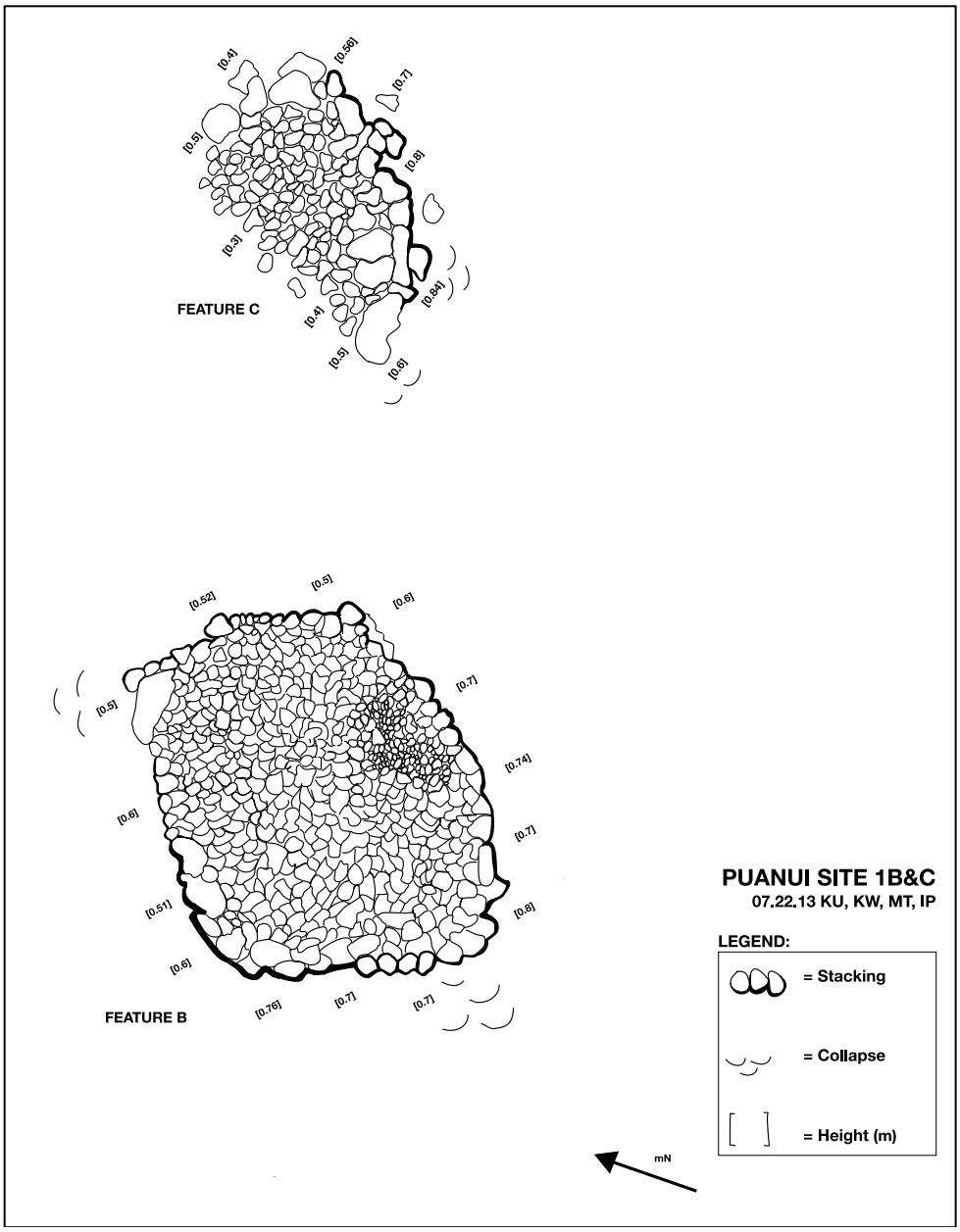


Figure 46. Plan view map of PUANUI 1B (platform) and 1C (mound)

Site #: PUANUI 1
Feature Letter: C
Feature Type: Mound
GPS Coordinates: Northing: 0205211, Easting: 2230543 Accuracy: 2m
Artifacts: None observed
Midden: None observed
Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: Pastureland enriched soil and grass
Possible Age: Traditional
Possible Function: Burial
Condition: Excellent
Association with Other Features: Located approximately 4m west of PUANUI 1B and fence line

(possible boundary marker) is 5.7m southeast of feature.

Description of Location: Situated on a natural slope of open planes and thick grass. Evidence of grazing cattle

Description of Feature: The most northeastern and furthest upslope feature within the site, this mound is roughly stacked of 2-3 courses high and a piled construction on the north end. Feature has an irregular shape and measures 4.74m x 2.32m x .91. There is a large boulder located approximately .5m south of feature and a large boulder on bottom course of south end with two large irregular sized boulders placed on top. North end of feature consists of piled cobbles and stones on northeast end of feature. One large boulder and three stones are situated 3-4m southeast of feature and a large boulder of irregular size is located on the west end of feature. South end of feature is in excellent condition.

Figure 47. PUANUI 1C, West end of mound. View to northeast.

Figure 48. PUANUI 1C, Overview of mound with fence line in background. View to southwest.

PUANUI 2

Site 2 is located west of Puʻu Kehena and Mala 2 (the middle experimental garden at Puanui). This site consists of one trail, one mound, one linear alignment, two circular alignments, three enclosures and three agricultural walls. The location of this site is situated makai and west of Puʻu Kehena. Due to the features locality and construction it is concluded that this area was used for agriculture and possible habitation and/or ceremonial functions. This site is a portion of the larger Kohala dryland field system. The trail represents the boundary of two ahupuaʻa, Puanui and Kehena, running mauka to makai, or vertically on the landscape. In correlation to the trail, the agricultural walls are situated on both sides of the trail running horizontally along the landscape (north to south). The site is comprised of two massive enclosures, which might have been constructed in historical times, and may have been used for habitation or ceremonial purposes. The features range in condition from poor to excellent with many areas well-preserved and intact while other areas showed evidence of rock fall or lack there of causing obscure definition.

Threats to the site are definitely cattle and ranching animals and possibly humans due to its close proximity to Mala 2 and the main access road. As suggested for Site 1, similar actions should be taken to ensure the preservation of this site that includes interpretive signage and further research to support current documentation and findings. Long term future goals and recommendations could include restoration in an effort to repurpose and revitalize dryland agricultural methods and use of ancient trail systems connecting mauka regions to the coastal areas of the ahupuaʻa.

PUANUI 2 Feature Descriptions

Site #: PUANUI 2
Feature Letter: A
Feature Type: Enclosure
GPS Coordinates: Northing: 0204642, Easting: 2230532, Accuracy: 2m
Artifacts: None Observed
Midden: None Observed
Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: Pastureland enriched soil and grass
Possible Age: Traditional
Possible Function: Agricultural
Condition: Good
Association with Other Features: Southeast of PUANUI 2C and approximately 6m adjacent to PUANUI 2A and south end of PUANUI 2A abuts PUANUI 2B. Site PUANUI 2I is located within interior of feature towards west corner.
Description of Location: Site is situated on a natural slope of open planes and thick grass. Fireweeds present and located southwest of Puʻu Kehena. Evidence of grazing cattle.
Description of Feature: This feature is a massive rectangular enclosure measuring 45m x 31m x 1m. Built of stacked construction approximately 2-4 courses high is largely comprised of cobbles, stones and boulders. Located on the northern wall segment is an opening, which measures 1.8m wide and is approximately 5m from the northwest corner. This opening is a possible wall collapse with a scatter of pōhaku around opening. North and east wall segments comprises of 2-3 courses with evidence of collapse within interior of structure. Feature is situated on natural sloping landscape and abuts another large enclosure on the south wall segment (north segment of feature 2B). The entire west wall segment has

evidence of collapse but is in relative good to fair condition. This feature is approximately 11.2m south of trail head.

Figure 49. PUANUI 2A, Overview of north wall from northwest corner of enclosure. View to northeast.

Figure 50. PUANUI 2A, Overview of Northeast wall from north corner of enclosure. View to southeast.

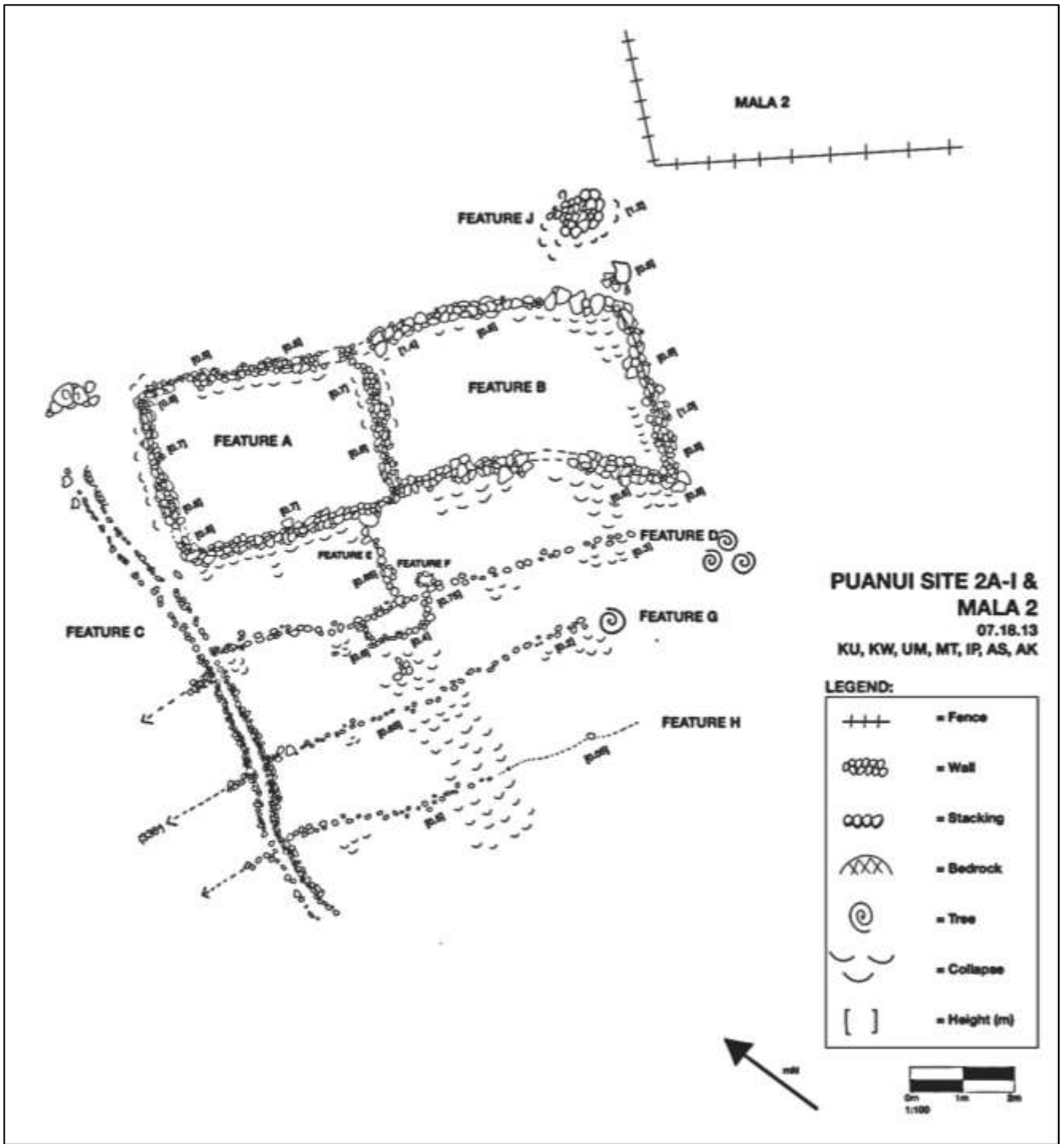


Figure 51. Plan view of Site 2 features A-H, agricultural complex

Figure 52. PUANUI 2A and PUANUI 2B, Overview of 2A south wall/2A north wall. View to west.

Site #: PUANUI 2
Feature Letter: B
Feature Type: Enclosure
GPS Coordinates: Northing: 0204591, Easting: 2230607, Accuracy: 2m
Artifacts: None Observed
Midden: None Observed
Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: Pastureland enriched soil and grass
Possible Age: Traditional
Possible Function: Agricultural
Condition: Good to excellent
Association with Other Features: Abutting PUANUI 2A on northern wall segment. Approximately 9 meters west of PUANUI 2J from eastern most corner of feature. Mala 2 located 19 meters east from eastern most corner of feature.
Description of Location: Site is situated on a natural slope of open planes and thick grass. Fireweeds present and located southwest of Pu‘u Kehena. Evidence of grazing cattle. A large patch of Christmas berry trees located at the west corner of feature.
Description of Feature: This feature is a massive enclosure constructed on a slope. The feature is made up of stacked and piled construction and has a rectangular plan view. This features measures 56m x 33m x 1m and consists of 2-4 courses of cobbles, stones and boulders. A large mound of boulders is situated at the east corner and north wall of feature. Northeast wall is terraced up against the natural sloping landscape. Adjacent to eastern corner are large scattered boulders, which includes one large upright boulder. South wall segment is of piled construction with evidence of collapse within the interior of feature. The west end of the south wall is of stacked and piled construction. The southwest corner is comprised of large upright boulders. The terraced agricultural walls are located directly west and run parallel to feature. West wall is in poor condition with evidence of collapse. West wall curves with center curving inward of enclosure midway of wall segment and curving outwards at corners. Large scatter of large boulders are located on the northwest end of feature with grooves and holes within and around the pōhaku.

Figure 53. PUANUI 2B, Overview of west wall with southeast wall in background. View to southwest.

Figure 54. PUANUI 2B, Portion of west wall near southwest corner with southeast wall in background. View to east.

Site #: PUANUI 2
Feature Letter: C
Feature Type: Trail
GPS Coordinates: *GPS Track
Artifacts: None Observed
Midden: None Observed
Historic Material: None Observed

Substrate: Pastureland enriched soil and grass
Possible Age: Traditional and Historic
Possible Function: Agricultural, Religious, and Trail
Condition: Good to Fair
Association with Other Features: PUANUI 2A northernmost corner is located 11.2m southwest from trailhead. Approximately eight agricultural terraces abut the north and south trail walls/alignments.
Description of Location: Site is situated on a natural slope of open planes and thick grass. Fireweeds present and located southwest of Pu‘u Kehena. Evidence of grazing cattle.
Description of Feature: The trail runs from mauka to makai and is of stacked and piled construction. A GPS track was taken from trailhead, which is marked by a large upright boulder and a scatter of large boulders to the fence line. Although trail continues makai there are a cluster of rocks towards the end which blocks the trail. The width of the trail ranges from 1.4 meters to 2.5 meters with a height ranging from 0.4 meters to 0.5 meters and wall thickness ranging from 0.5 meters to 1.64 meters. At the most mauka/northeastern end of the trail there is a sparse alignment of rocks defining pathway and is the widest section of the feature. A defined linear alignment is evident approximately midway of trail with terraced agricultural walls on the north and south ends of the trail walls. North end of trail walls are approximately 0.4 meters high and 0.5 meters high on south end of trail walls.

Figure 55. PUANUI 2C. Overview of trail. View to west.

Figure 56. PUANUI 2C, Profile of large upright boulder marking trailhead. View to northwest.

Site #: PUANUI 2
Feature Letter: D
Feature Type: Agricultural wall
GPS Coordinates: *GPS Track
Artifacts: None Observed
Midden: None Observed
Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: Pastureland enriched soil and grass
Possible Age: Traditional
Possible Function: Agricultural
Condition: Fair to Poor
Association with Other Features: Feature is located approximately 15 meters southwest of the southeast corner of PUANUI 2B. Site PUANUI 2F is located approximately one meter northeast of feature and 10 meters south of PUANNUI 2E.
Description of Location: Site is situated on a natural slope of open planes and thick grass. Fireweeds present and located southwest of Pu‘u Kehena. Evidence of grazing cattle.
Description of Feature: The feature is of piled construction consisting of cobbles, stones and boulders with a linear plan view. A GPS track was used to measure the length of the feature and measures 0.9 meters high and 1.8 meters wide. A large concentration of scattered boulders is near the center of feature and abuts and runs perpendicular to PUANUI 2E. Sections of the terrace walls are in poor condition but elevation changes and ridges define the extent and direction the feature was constructed. The feature abuts the trail on the north end.

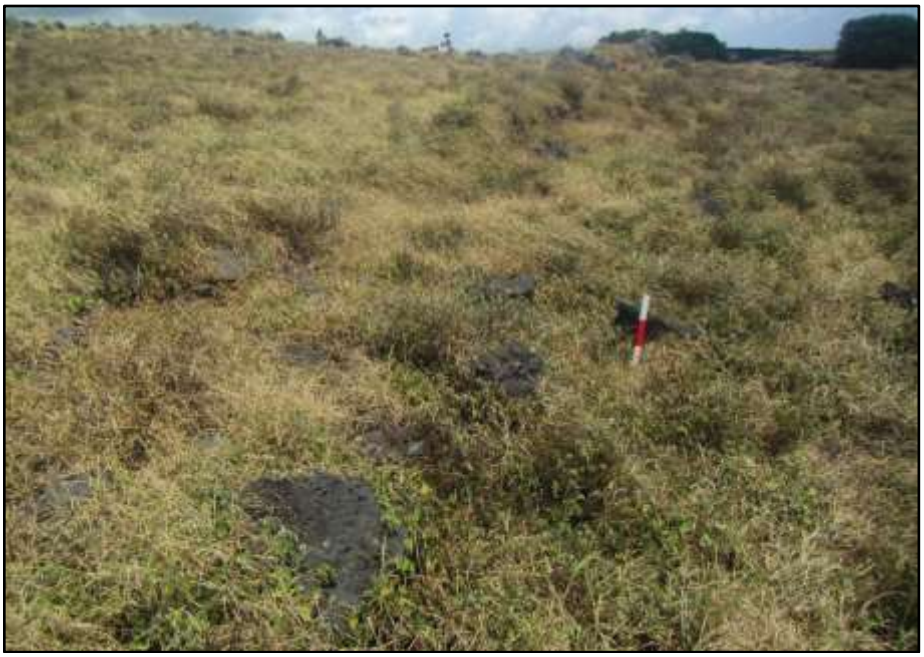


Figure 57. PUANUI 2D, Overview of agricultural wall. View to southeast.

Figure 58. PUANUI 2D, Portion of agricultural wall with Pu‘u Kehena and Site 2 in background. View to northeast.

Figure 59. PUANUI 2D, Portion of agricultural wall with PUANUI 2A, 2B, 2E and 2F in background. View to northeast.

Site #: PUANUI 2
Feature Letter: E
Feature Type: Circular Alignment and Linear Alignment
GPS Coordinates: Northing: 0204556, Easting: 2230641, Accuracy: 2m
Artifacts: None Observed
Midden: None Observed
Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: Pastureland enriched soil and grass
Possible Age: Traditional
Possible Function: Religious
Condition: Good
Association with Other Features: Feature connects to down slope of PUANUI 2A on the west end. Also, connects to east end and up slope of PUANUI 2D.
Description of Location: Site is situated on a natural slope of open planes and thick grass. Fireweeds present and located southwest of Pu‘u Kehena. Evidence of grazing cattle.
Description of Feature: The feature consists of a circular alignment and linear alignment consisting of cobbles, stones and boulders. The circular alignment measures 2.4m x 1.5m x 1.7m and comprises of nine basalt stones with three collapsed stones. The linear alignment is comprised of 23 stones running from east to west and is situated towards the center of PUANUI 2D and approximately 50 meters south of PUANUI 2C. The linear alignment intersects with the circular alignment creating a slight gap in the linear alignments continuity.

Figure 60. PUANUI 2E, a circular alignment. View to west.

Figure 61. PUANUI 2E, Overview of circular alignment within linear alignment. View to northeast.

Site #: PUANUI 2
Feature Letter: F
Feature Type: Circular Alignment
GPS Coordinates: Northing: 0204553, Easting: 2230631, Accuracy: 2m
Artifacts: None Observed
Midden: None Observed
Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: Pasturelands enriched soil and grass

Possible Age: Traditional
Possible Function: Religious
Condition: Fair
Association with Other Features: Located approximately 7.1m south of PUANUI 2E.
Description of Location: Site is situated on a natural slope of open planes and thick grass. Fireweeds present and located southwest of Pu‘u Kehena. Evidence of grazing cattle.
Description of Feature: The feature is a small circular alignment comprised of 13 stones. Situated on the southwest side of the alignment are stones buried below the substrate, which is almost completely covered by grass. Also, there are a prominent protrusion of stones at the northeast corner of feature. The feature measures 2.3m x 1.65m x 0.2m.

Figure 62. PUANUI 2F, an overview of circular alignment. Plan view.

Site #: PUANUI 2
Feature Letter: G
Feature Type: Terraced Agricultural Wall
GPS Coordinates: *GPS Track
Artifacts: None Observed
Midden: None Observed
Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: Pastureland enriched soil and grass
Possible Age: Traditional
Possible Function: Agricultural
Condition: Fair
Association with Other Features: PUANUI 2D is parallel to feature and approximately 15m apart. Feature abuts PUANUI 2C on north end and south end runs into a scatter of boulders.
Description of Location: Site is situated on a natural slope of open planes and thick grass. Fireweeds present and located southwest of Pu‘u Kehena. Evidence of grazing cattle. South end of feature ends near grove of Christmas Berry trees.
Description of Feature: Feature is of piled construction and is built of stones and boulders. This agricultural feature is of linear plan view and measures 0.5m high and 1.9 meters thick. A GPS track was taken for length of feature. From the north end to approximately 10 meters south is evidence of piled stones and boulders forming an elevated surface landscape indicating an agricultural terrace. Slight elevation

towards the south end shows clear connection to piled stones with a few stones scattered throughout the west end of feature.

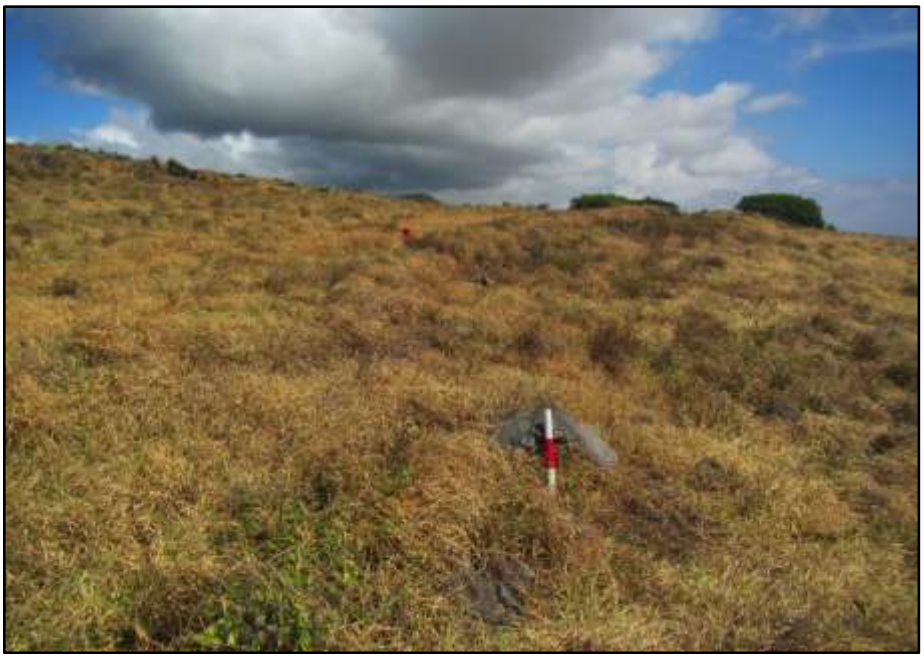


Figure 63. PUANUI 2G, Overview of agricultural wall from north end. View to east.

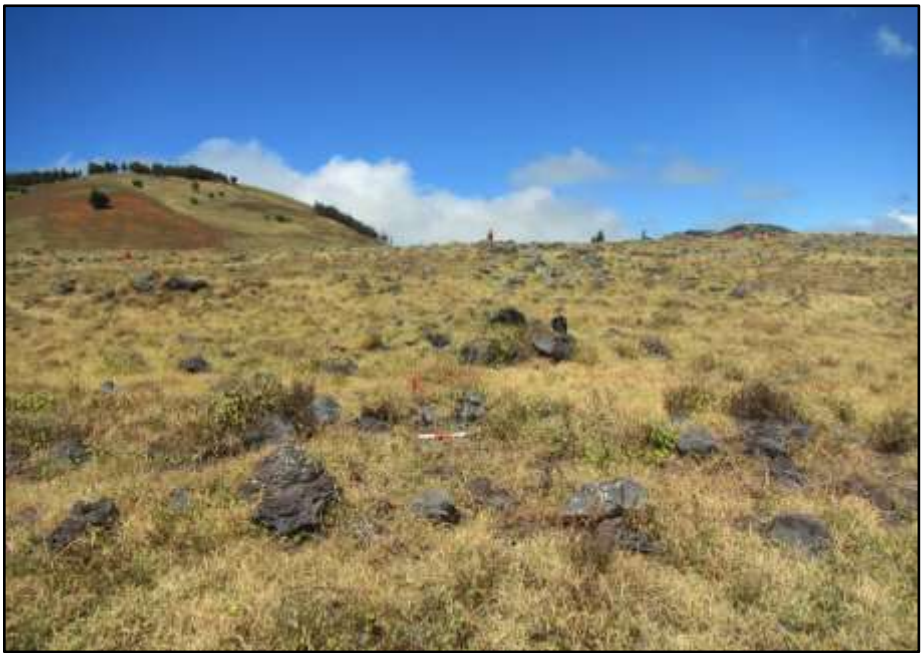


Figure 64. PUANUI 2G, Portion of wall with PUANUI 2A, 2B, 2D, 2E 2F and Pu‘u Kehena in background. View to northeast.

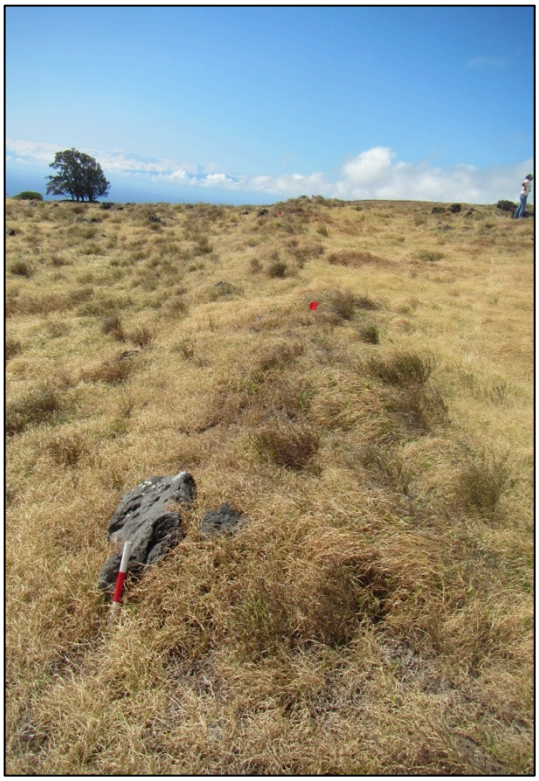


Figure 65. PUANUI 2G, Overview of agricultural wall from north end. View to southeast.

Site #: PUANUI 2
Feature Letter: H
Feature Type: Terraced Agricultural Wall
GPS Coordinates: (GPS Track)
Artifacts: None Observed
Midden: None Observed
Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: Pastureland enriched soil and grass
Possible Age: Traditional
Possible Function: Agriculture
Condition: Fair
Association with Other Features: Feature is parallel to PUANUI 2D and PUANUI 2G and north end abuts PUANUI 2C.
Description of Location: Site is situated on a natural slope of open planes and thick grass. Fireweeds present and located southwest of Pu‘u Kehena. Evidence of grazing cattle.
Description of Feature: Feature is of piled construction and is built of cobbles, stones and boulders. This agricultural feature is of linear plan view, measuring 0.3m high and 1.7 meters thick and is orientated north to south running horizontal on the landscape. A GPS track was taken for length of feature. On north end

there is a slight curve down slope towards trail. Very minimal rock evidence but elevated landscape and surrounding features indicates agricultural terrace.

Figure 66. PUANUI 2H, Overview of agricultural from north end. View to southeast.

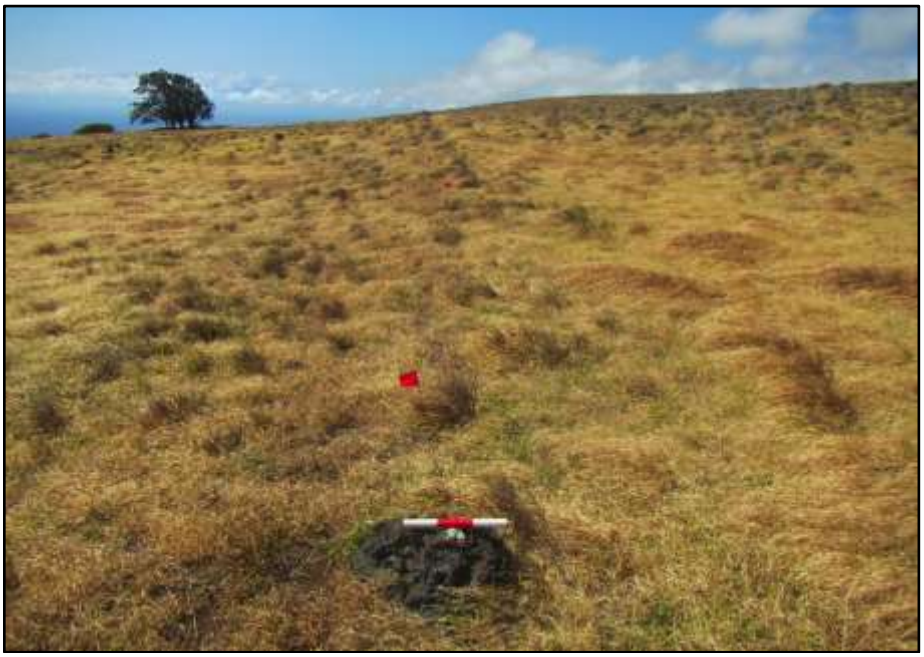


Figure 67. PUANUI 2H, Overview of agricultural wall. View to northwest.

Site #: PUANUI 2
Feature Letter: I
Feature Type: Enclosure/Possible Platform
GPS Coordinates: Northing: 0204521, Easting: 2230594, Accuracy: 2m
Artifacts: None Observed
Midden: None Observed

Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: Pastureland enriched soil and grass
Possible Age: Traditional and Historic
Possible Function: Habitation and/or Religous
Condition: Poor
Association with Other Features: Located within the interior of PUANUI 2A approximately 16 meters north from south corner.
Description of Location: Site is situated on a natural slope of open planes and thick grass. Fireweeds present and located southwest of Pu‘u Kehena. Evidence of grazing cattle.
Description of Feature: The feature is an squared enclosure with an alignment of cobbles, stones and boulders. The feature measures 8.2m x 5.8m x 0.28m x 0.8m. The south wall is 11 meters from interior wall of PUANUI 2A south wall segment and the west wall is 8.2 meters from the interior of PUANUI 2A west wall segment. Feature is in poor condition and may be a possible platform. The southeast corner is slightly elevated in comparison to other corners of feature. Large concentration of stones are situated on the south wall to create a leveled platform.

Figure 68. PUANUI 2I, North wall of possible platform with northeast wall of PUANUI 2A and Pu‘u Kehena in background. View to northeast.

Figure 69. PUANUI 2I, View of north wall of possible platform. View to northwest.

Site #: PUANUI 2
Feature Letter: J
Feature Type: Mound
GPS Coordinates: Northing: 02204618, Easting: 2230591, Accuracy: 2m
Artifacts: None Observed
Midden: None Observed
Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: None Observed
Possible Age: Traditional
Possible Function: Agricultural
Condition: Fair
Association with Other Features: Located approximately 10 meters west of Mala 2 and is approximately 5 meters east of PUANUI 2B.
Description of Location: Site is situated on a natural slope of open planes and thick grass. Fireweeds present and located southwest of Pu‘u Kehena. Evidence of grazing cattle.
Description of Feature: This feature consists of stacking and piled construction of cobbles and stones with areas ranging from 1 to 6 courses high. The feature measures 6m x 5.5m x 1m with a rectangular plan view, which indicates it, could have been a possible platform due to evidence of collapse on southwest corner. There is a well-defined alignment on the western end of feature.

Figure 70. PUANUI 2J, North/Northeast face of mound with PUANUI 2A and 2B in background. View to west.

Figure 71. PUANUI 2J, West/Southwest face of mound with Puʻu Kehena and MALA 2 in background. View to north.

PUANUI 3

Site 3 is comprised of three features, an L-shape partial enclosure, an enclosure and the only known kiʻi pōhaku within the ahupuaʻa. Situated near the base of Puʻu Kehena, in between Site 1 and Site 2, this area along with the details of the features suggests that this site was used for religious purposes. An engraving on a large upright boulder, located

within the center of an enclosure, has been identified as the Hawaiian deity, Lono who is associated with agriculture. The site ranges from poor to good condition with rock fall and collapse being the main cause of obscurity.

Threats to the site are cattle, ranching animals and humans due to its very close proximity to Pu‘u Kehena and the main access road. Similar recommendations suggested for Site 1 should be considered for this site as well. Further research should include investigating similar features in other ahupua‘a to compare and contrast location and purpose in correlation to nearby or surrounding sites. Interpretive signage would also be useful for this area and an important educational tool.

PUANUI 3 Feature Descriptions

Site #: PUANUI 3
Feature Letter: A
Feature Type: L-Shape
GPS Coordinates: Northing: 02204618, Easting: 2230705, Accuracy: 2m
Artifacts: None Observed
Midden: None Observed
Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: Pastureland enriched soil and grass
Possible Age: Traditional
Possible Function: Agricultural
Condition: Poor
Association with Other Features: Located approximately 20 meters west of PUANUI 3B.
Description of Location: Site is situated on a natural slope of open planes and thick grass. Located south of and near the base of Pu‘u Kehena and approximately 19 meters south of vehicle access road. Evidence of grazing cattle.
Description of Feature: Feature is an L-Shape roughly stacked with two courses and comprised of stones, boulders and bedrock. The feature measures 19m x 12.5m x .7m and is mainly an alignment of rocks with some stacking. Most of the feature is in poor condition, however the northwest corner and west wall segment is in fair condition. North wall curves slightly towards southeast and is comprised of bedrock and large boulders with a scatter of boulders throughout feature.

Figure 72. PUANUI 3A, Overview of L-Shape with PUANUI 3B in background. View to northeast.

Figure 73. PUANUI 3A, View of west wall of L-Shape with large boulder. View to southeast.

Site #: PUANUI 3
Feature Letter: B
Feature Type: Enclosure
GPS Coordinates: Northing: 02204934, Easting: 2230698, Accuracy: 2m
Artifacts: None Observed
Midden: None Observed
Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: Pastureland enriched soil and grass
Possible Age: Traditional

Possible Function: Religious
Condition: Fair
Association with Other Features: PUANUI 3C is located within interior of feature and is approximately 20 meters east of PUANUI 3A.
Description of Location: Site is situated on a natural slope of open planes and thick grass. Located south of and near the base of Pu‘u Kehena and due south of vehicle access road. Evidence of grazing cattle.
Description of Feature: Feature is a roughly stacked oval enclosure two courses high. The enclosure measures 9m x 3.7m x 0.8m and is constructed with cobbles, stones and boulders. West wall comprises of large boulders and is in relatively good condition. The east end of the feature is the furthest upslope and measures 0.4m high on the exterior and interior walls. While the west end wall, the furthest down slope, measures 0.8m high on the exterior and 0.2m high on the interior. The southeast corner of feature is in good condition with the north wall and south end in poor condition. Rocks are scattered throughout feature and bedrock slightly defines wall edge. A ki‘i pōhaku is located in the center of feature.

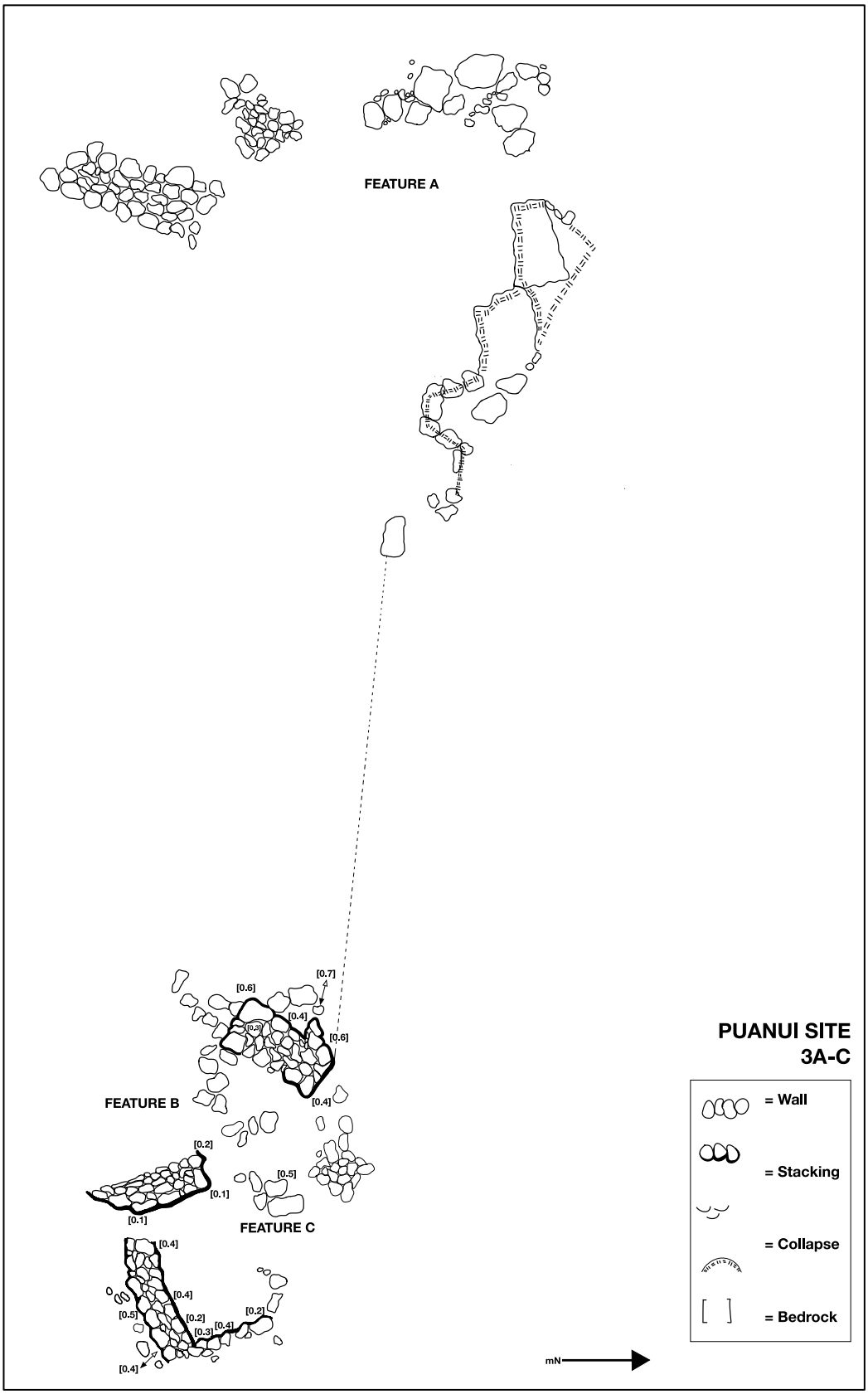


Figure 74. Plan map of Site 3, Features A-C

Figure 75. PUANUI 3B, Overview of enclosure with close-up of ki‘i pōhaku. View to east.

Figure 76. PUANUI 3B, Overview of enclosure with ki‘i pōhaku. View to south.

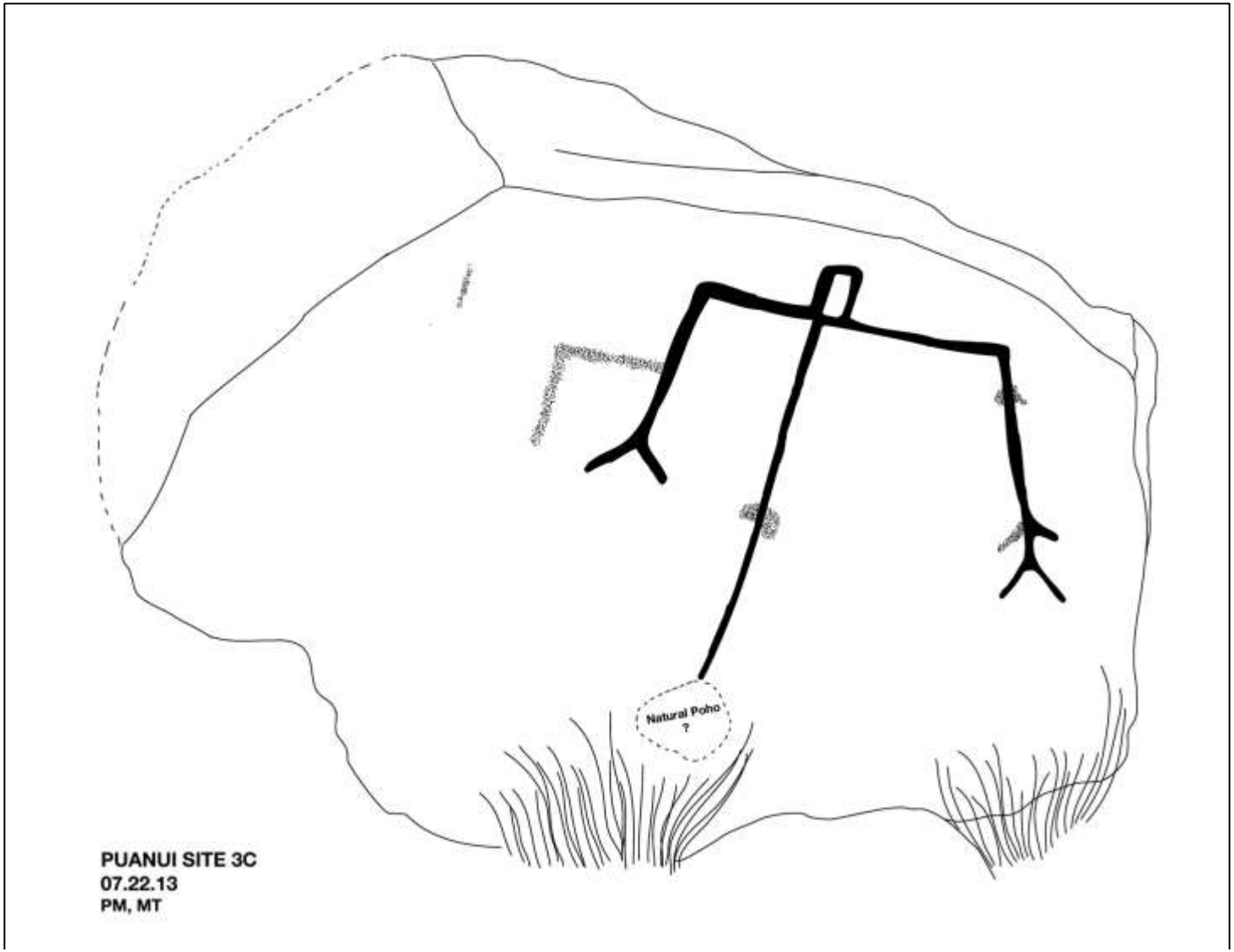


Figure 77. Profile map of Site 3C, ki‘i pohaku

Site #: PUANUI 3
Feature Letter: C
Feature Type: Ki‘i Pōhaku/Petroglyph
GPS Coordinates: Northing: , Easting: , Accuracy: 2m
Artifacts: None Observed
Midden: None Observed
Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: Pastureland enriched soil and grass
Possible Age: Traditional
Possible Function: Religious
Condition: Good to Fair
Association with Other Features: Located within interior of PUANUI 3B.
Description of Location: Site is situated on a natural slope of open planes and thick grass. Located south of and near the base of Pu‘u Kehena and south of vehicle access road. Evidence of grazing cattle.
Description of Feature: The feature is a single petroglyph inscribed into a slightly vesicular upright boulder. The boulder measures 0.75m x 0.49m and is in good to fair condition. Weathering suggests that petroglyph is not recent, as main outline of ki‘i are clear but become obscure on the right and bottom areas. Pecking is on average of 1.5cm wide x 0.5cm deep. Panel face is oriented at 240° magnetic north and is tilted 10° east. Boulder has relatively flat face, unlike surrounding boulders. The main image lines are relatively clear, however many surrounding depressions remain obscure. Pecking damage appears fairly weathered suggesting the glyph is not recent. Image appears to be oriented around a central vertical line with a perpendicular horizontal line across the top. There are two arms, each bearing a downward facing “V” while the right arm has a possible second vertical downward facing “V” above the first. Bottom area of glyph is obscured by the changing natural light but may possibly have a downward facing “V” at base or may also be a natural groove in the rock. The center of top horizontal line bears a box-shape.

Figure 78. PUANUI 3C, Profile of Ki‘i Pōhaku/Petroglyph. View to north.

PUANUI 4

Site 4 is a trail that serves as a boundary marker for Puanui and Kehena. This site is connected to Site 5 and Mala 3 (the most makai experimental garden). This site is similar to the trail in Site 2, this feature runs mauka to makai with agricultural walls abutting

both sides while positioned horizontally on the landscape. The trail also abuts the northwest end of Mala 3. The site is in poor to fair condition and is relatively obscure throughout due to rock fall and collapse.

Main threats to the site are cattle and ranching animals. This site should be considered for restoration as most of the site is in poor condition. Further research should include the complex trail systems within the ahupuaʻa and investigate the connection, if any, of this site to PUANUI 2C. Most importantly this site requires a great deal of restorative efforts due to its current state.

PUANUI 4 Feature Descriptions

Site #: PUANUI 4
Feature Letter: A
Feature Type: Trail/Boundary Marker
GPS Coordinates: *GPS Track
Artifacts: None Observed
Midden: None Observed
Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: Soil/Dirt
Possible Age: Traditional
Possible Function: Agricultural
Condition: Good to Poor
Association with Other Features: Approximately 10+ agricultural walls abut the features north and south walls. The portion of the feature runs parallel and abuts the north end of MALA 3.
Description of Location: Very dry environment with dead grass and kiawe trees in surrounding area. There are Christmas berries to the north of site. Evidence of cattle.
Description of Feature: The feature is a trail with linear walls running parallel and vertically (mauka to makai) along landscape. Feature is mostly of stacked construction ranging from one to three courses high and comprised of cobbles, stones and boulders. Measurements of trail widths ranges from 0.3m to 0.5m wide from interior of north wall to interior of south wall. The wall heights ranged from 0.02m to 0.4m, which ranged in thickness from 0.2m to 1.83m. A kiawe tree demarcates the west end, furthest down slope, of what was documented. Trail width gets narrower heading northeast, upslope, towards Puʻu Kehena and continues through a natural gulch. The east end of feature leads to a cluster of enclosures and agricultural walls abut the trail walls on the north and south ends running horizontally along the landscape. The trail leads into a natural gulch, measuring 3 meters wide and as it ascends towards the northeast it narrows and has evidence of a possible stepping-stone. Towards the west, the trail becomes obscure as the as it approaches the north end of Mala 2 but becomes discernible at approximately 30 to 40 meters from Mala 2 and are the most defined walls of the feature measuring approximately 15 meters long.

Figure 79. PUANUI 4A, Overview of trail heading mauka. View to northeast.

Figure 80. PUANUI 4A, Overview of trail heading makai. View to west.

PUANUI 5

Site 5 consists of a large agricultural complex consisting of 17 agricultural walls, a singular wall segment, one documented mound, a C-shape, an enclosure and a double partial enclosure. This site is also connected to Mala 3, with a few agricultural walls running into the garden. Most of the features are situated west of Mala 3 and consists mainly of agricultural walls. Due to the site location and feature types this site was inarguably an agricultural complex. The condition of this site is in poor to good condition

with rock fall and collapse evident in every feature. The walls were obscured but were identified by the elevation in landscape that assisted in defining wall direction and length.

The main threats to the site are cattle and ranching animals. Similar to PUANUI 4, this site should be considered for restoration as majority of the site is in poor condition. This site requires a great deal of restorative efforts due to its current state. As suggested for PUANUI 1 and PUANUI 2, further research to support current documentation and findings is necessary in considering restoration, which could assist in long term future goals to repurpose and revitalize dryland agricultural methods.

PUANUI 5 Feature Descriptions

Site #: PUANUI 5
Feature Letter: A
Feature Type: Agricultural Wall
GPS Coordinates: *GPS Track
Artifacts: None Observed
Midden: None Observed
Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: Gravel and Dirt
Possible Age: Traditional and Historic
Possible Function: Agricultural
Condition: Fair
Association with Other Features: Located adjacent to PUANUI 5B on the south end and continues north in to MALA 3. PUANUI 5C is located 3 meters west and runs parallel to feature.
Description of Location: Very dry environment with dead grass and kiawe trees in surrounding area. There are Christmas berries to the north of site. Evidence of cattle.
Description of Feature: This feature is a linear wall of piled construction consisting of cobbles and stones. The feature measured 7.7m x 1.0m x .4m. The length of the feature was measured from the north end abutting the south end of MALA 3, although the feature continues into the modern experimental garden. There is a meter wide opening between the south end of feature and PUANUI 5B with slight evidence of wall disruption near and around opening.

Figure 81. PUANUI 5A, Overview of agricultural wall with MALA 3 in background. View to northwest.

Site #: PUANUI 5
Feature Letter: B
Feature Type: Agricultural Wall
GPS Coordinates: *GPS Track
Artifacts: None Observed
Midden: None Observed
Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: Soil/Dirt
Possible Age: Traditional
Possible Function: Agricultural
Condition: Good to Poor
Association with Other Features: Located perpendicular to PUANUI 5A and PUANUI 5C.
Description of Location: Very dry environment with dead grass and kiawe trees in surrounding area. There are Christmas berries to the north of site. Evidence of cattle.
Description of Feature: The feature is an agricultural wall that is built of stacked construction and is approximately 2 to 3 courses. The wall measures 48.3m x .45m x .5m from the northeast end to the west end. The feature is located perpendicular and abuts several agricultural walls on the north end. There is a modern vehicle access road that separates wall continuity and is approximately 5 meters wide. The wall to the west of the access road measures 30.3m long and 18m long east of the access road. The eastern portion of wall is in fair to poor condition while the west portion is in relatively good condition. The west end runs into PUANUI 5G and possibly continues but is undeterminable due to a large surface area of scattered rocks.

Figure 82. PUANUI 5B, View of agricultural wall from Northeast end. View to west.

Figure 83. PUANUI 5B, View of agricultural wall heading mauka. View to northeast.

Site #: PUANUI 5
Feature Letter: C
Feature Type: Agricultural Wall
GPS Coordinates: *GPS Track
Artifacts: None Observed
Midden: None Observed
Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: Soil/Dirt

Possible Age: Traditional
Possible Function: Agricultural
Condition: Fair to Poor
Association with Other Features: Located adjacent to PUANUI 5B on the south end and continues north in to MALA 3. PUANUI 5A is located to 3 meters east and runs parallel to feature.
Description of Location: Very dry environment with dead grass and kiawe trees in surrounding area. There are Christmas berries to the north of site. Evidence of cattle.
Description of Feature: Feature is an agricultural wall of piled construction consisting of gravel, cobbles and stones. The feature has a linear plan view and measures 8.4m x 0.9m x .4m. The length of the feature was measured from the northernmost end which abuts the south end of MALA 3. The feature continues into the modern experimental garden similar to PUANUI 5A. There is a meter wide opening between the south end of feature and PUANUI 5B.

Figure 84. PUANUI 5C, Overview of agricultural wall from southeast to northwest end. View to northwest.

Site #: PUANUI 5
Feature Letter: D
Feature Type: Agricultural Wall
GPS Coordinates: (GPS Track)
Artifacts: None Observed
Midden: None Observed
Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: Soil/Dirt
Possible Age: Traditional
Possible Function: Agricultural
Condition: Fair to Poor
Association with Other Features:
Description of Location: Very dry environment with dead grass and kiawe trees in surrounding area. There are Christmas berries to the north of site. Evidence of cattle.
Description of Feature: In a series of agricultural walls, feature PUANUI 5D is situated 7 meters east and parallel to MALA 3 and measures 46m x 1m x .4m. The north end adjoins trail wall and the south end adjoins PUANUI 5B. There is a convex/concave shaped curve that begins 15 meters from south end of

feature and gradually curves down slope heading northwest and intersecting with PUANUI 4A and PUANUI 5F.

Figure 85. PUANUI 5D, View of agricultural wall from southeast end. View to Northwest.

Site #: PUANUI 5
Feature Letter: E
Feature Type: Mound
GPS Coordinates: Northing: , Easting: , Accuracy: 2m
Artifacts: None Observed
Midden: None Observed
Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: Soil/Dirt
Possible Age: Traditional
Possible Function: Agricultural
Condition: Good
Association with Other Features: Located near the southwest corner of MALA 3 and approximately 4 meters east of PUANUI 5D.
Description of Location: Very dry environment with dead grass and kiawe trees in surrounding area. There are Christmas berries to the north of site. Evidence of cattle.
Description of Feature: Feature is a large mound of piled construction built of gravels, cobbles and stones. The mound measures 3.7m x 0.8m x 0.6m and is of oval plan view and orientated north to south. The mound is adjacent to the west fence line of MALA 3. This feature is one of the largest mounds within site PUANUI 5 and in good condition.

Figure 86. PUANUI 5E, Profile of west face of agricultural mound. View to northeast.

Site #: PUANUI 5
Feature Letter: F
Feature Type: Agricultural Wall
GPS Coordinates: *GPS Track
Artifacts: None Observed
Midden: None Observed
Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: Soil/Dirt
Possible Age: Traditional
Possible Function: Agricultural
Condition: Poor
Association with Other Features: Located west and parallel of PUANUI 5D and abuts PUANUI 5B and PUANUI 4A. A high concentration of mounds is located to the west of feature.
Description of Location: Very dry environment with dead grass and kiawe trees in surrounding area. There are Christmas berries to the north of site. Evidence of cattle.
Description of Feature: The agricultural wall is of linear plan view and is roughly piled consisting of gravel, cobbles and stones. The feature is in poor condition and obscure throughout with heavy collapse and rubble on north and west ends of possible wall but slight rock alignment directs possible orientation of feature which runs northwest to south. The northwest end of feature intersects with trail and PUANUI 5D and a large mound is situated to the west and adjacent to feature.

Figure 87. PUANUI 5F, View of Agricultural wall from Southeast end. View to northwest.

Site #: PUANUI 5
Feature Letter: G
Feature Type: Agricultural Wall
GPS Coordinates: *GPS Track
Artifacts: None Observed
Midden: None Observed
Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: Soil/Dirt
Possible Age: Traditional
Possible Function: Agricultural
Condition: Good to Poor
Association with Other Features: Feature is directly west of PUANUI 5F. Feature abuts trail at the north end and PUANUI 5B is perpendicular to feature on south end.
Description of Location: Very dry environment with dead grass and kiawe trees in surrounding area. There are Christmas berries to the north of site. Evidence of cattle.
Description of Feature: The feature is an agricultural wall of stacked construction and approximately 2-3 courses high. The length of the feature was measured using GPS track and measures 0.6 meters high and 0.4 meters thick. The feature has a curvy plan view and is constructed of gravel, cobbles and stones. At the junction where the feature intersects with PUANUI 5B, the wall continues south but becomes obscure at approximately 20 meters.

Figure 88. PUANUI 5G, Portion of Agricultural wall with PUANUI 5D, 5F and MALA 3. View to northeast.

Site #: PUANUI 5
Feature Letter: H
Feature Type: Agricultural Wall
GPS Coordinates: *GPS Track
Artifacts: None Observed
Midden: None Observed
Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: Soil/Dirt
Possible Age: Traditional
Possible Function: Agricultural
Condition: Fair to Poor
Association with Other Features: Located directly west PUANUI 5G and perpendicular to PUANUI 4A.
Description of Location: Very dry environment with dead grass and kiawe trees in surrounding area. There are Christmas berries and a large kiawe tree to the northwest of site. Evidence of cattle.
Description of Feature: The agricultural wall, PUANUI 5H, is of piled construction, two courses high and consists of gravel, cobbles and stones. The feature measures 0.4m high and 0.3m thick and is of linear plane view. The feature runs perpendicular of PUANUI 4A and continues northwest and ends at large kiawe tree. There is evidence of collapse throughout feature and is relative in poor condition.

Figure 89. PUANUI 5H, View of Agricultural wall with large kiawe tree at northwest end and PUANUI 5G to the north. View to northwest.

Site #: PUANUI 5
Feature Letter: I
Feature Type: Agricultural Wall
GPS Coordinates: Northing: , Easting: , Accuracy: 2m
Artifacts: None Observed
Midden: None Observed
Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: Soil/Dirt
Possible Age: Traditional
Possible Function: Agricultural
Condition: Poor
Association with Other Features: Located directly west of PUANUI 5H and directly east of PUANUI J.
Description of Location: Very dry environment with dead grass and kiawe trees in surrounding area. There is christmas berries and large kiawe tree to the northwest of site. Evidence of cattle.
Description of Feature: Feature is an agricultural wall that is roughly stacked, two courses high consists of cobbles and stones measuring 11m x 1.4m x 0.25m. With a northwest to southeast orientation, the feature intercepts and runs perpendicular to the trail and parallel to PUANUI 5H, which is located approximately 5 meters west of feature. Collapse is evident throughout entire feature and therefore wall definition is obscure.

Figure 90. PUANUI 5I, agricultural wall.

Site #: PUANUI 5
Feature Letter: J
Feature Type: Agricultural wall
GPS Coordinates: Northing: 0202877, Easting: 2230253, Accuracy: 2m and GPS track
Artifacts: None Observed
Midden: None Observed
Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: Soil/Dirt
Possible Age: Traditional
Possible Function: Agricultural
Condition: Fair
Association with Other Features: Located 15m west of PUANUI 5I.
Description of Location: Very dry environment with dead grass and kiawe trees in surrounding area. There are Christmas berries and a large kiawe to the northwest of site. Evidence of cattle.
Description of Feature: Feature PUANUI 2I is an agricultural wall running north to south and measures 22m x 1.2m x 0.4m with a linear plan view. The feature is of piled cobbles and stones and is in fair condition. High grass covers wall segment with soil development on southwest portion of wall. The northeast portion of wall there are multiple mounds. Evidence of collapse and possible damage to do evidence of nearby grazing cattle. Seventeen mounds are located on northeast portion of wall. Wall continues to the southeast with three mounds adjacent to southwest end.

Figure 91. PUANUI 5J, View of agricultural wall heading southeast. View to southeast.

Site #: PUANUI 5
Feature Letter: K
Feature Type: Agricultural Wall
GPS Coordinates: Northing: 0202871, Easting: 2230260, Accuracy: 2m
Artifacts: None Observed
Midden: None Observed
Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: Soil/Dirt
Possible Age: Traditional
Possible Function: Agricultural
Condition: Poor
Association with Other Features: Located 4.3 meters west and parallel of PUANUI 5I.
Description of Location: Very dry environment with dead grass and kiawe trees in surrounding area. There are Christmas berries and a large kiawe tree northwest of site. Evidence of cattle in surrounding area.
Description of Feature: Feature is an agricultural wall of piled construction orientated northwest to southeast with a linear plan view. The wall is constructed of cobbles and stones and measures 20.9m x 0.45m x 0.80m. The wall is a component of the field system and is one of walls furthest west within the site. Feature adjoins trail and is in poor condition with large areas of collapse throughout.

Figure 92. PUANUI 5K, Overview of agricultural wall. View to northwest.

Site #: PUANUI 5
Feature Letter: L
Feature Type: Agricultural Wall
GPS Coordinates: Northing: 0202871, Easting: 2230260, Accuracy: 2m
Artifacts: None Observed
Midden: None Observed
Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: Soil/Dirt
Possible Age: Traditional
Possible Function: Agricultural
Condition: Fair
Association with Other Features: PUANUI 5J is located on the northeast end and is perpendicular to feature.
Description of Location: Very dry environment with dead grass and kiawe trees in surrounding area. There are Christmas berries to the north of site. Evidence of cattle in surrounding area.
Description of Feature: Feature is an agricultural wall that is of piled construction measuring 5.1m x 3.3m x .35m x 1.2m. The feature is of linear plan view and is oriented northeast to southwest comprised of cobbles and stones. There is heavy evidence of collapse on north and south end of feature. The northeast end is adjacent and perpendicular to PUANUI 5J.

Figure 93. PUANUI 5L, Northwest face of agricultural wall with adjacent PUANUI 5J. View to east.

Site #: PUANUI 5
Feature Letter: M
Feature Type: Double Partial Enclosure / L-Shape and U-Shape
GPS Coordinates: Northing: 0202860, Easting: 2230252, Accuracy: 2m
Artifacts: None Observed
Midden: None Observed
Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: Soil/Dirt
Possible Age: Traditional
Possible Function: Agricultural and Habitation
Condition: Fair
Association with Other Features: Located to northwest and adjacent is PUANUI 5N and southeast and adjacent is PUANUI 5S. Located northeast of PUANUI 5P.
Description of Location: Very dry environment with dead grass and kiawe trees in surrounding area. There are Christmas berries to the north of site. Evidence of cattle.
Description of Feature: This feature is a double-partial enclosure consisting of a U-Shape on the northwest end and an L-Shape on the southwest end adjoined by a wall on the northeast end of feature. The feature measures 24m x 0.65m x 1.3m and is of stacked construction ranging from 3 to 4 courses built of cobbles and stones. The interior walls of the U-shape portion measures 2.4m x 1.8m. There is evidence of collapse on the exterior of U-Shape but is the most intact portion of the feature. The northeast wall connects the dual features and is in good condition. The south wall of L-Shape measures 4.3m x 0.4m and is in good condition with some evidence of collapse. There is a gap between the south wall and an adjoining wall segment connected to PUANUI 5P. The opening measures 1.3 meters.

Figure 94. PUANUI 5M, Northwest face of double-partial enclosure. View to west.

Figure 95. PUANUI 5M, View of C-Shape and L-Shape with field system in background. View to east.

Site #: PUANUI 5
Feature Letter: N
Feature Type: Agricultural Wall
GPS Coordinates: Northing: 0202857, Easting: 2230266, Accuracy: 2m
Artifacts: None Observed
Midden: None Observed
Historic Material: None Observed
Skeletal Remains: None Observed

Substrate: Soil/Dirt
Possible Age: Traditional
Possible Function: Agricultural
Condition: Fair
Association with Other Features: Feature is adjacent and northwest of PUANUI 5M.
Description of Location: Very dry environment with dead grass and kiawe trees in surrounding area. There are Christmas berries to the north of site. Evidence of cattle.
Description of Feature: Feature is an agricultural wall and is roughly piled with a linear plan view. Heavy collapse throughout length of wall and becomes very obscure approximately 20 meters northwest. The wall measures 21.3m x 0.3m x 1.7m. The wall curves slightly upslope and is visible through elevation changes in landscape. Feature is adjacent to PUANUI M and is approximately a meter from feature.

Figure 96. PUANUI 5N, Overview of agricultural wall. View to northwest.

Site #: PUANUI 5
Feature Letter: O
Feature Type: Agricultural Wall
GPS Coordinates: Northing: 0202879, Easting: 2230225, Accuracy: 2m
Artifacts: None Observed
Midden: None Observed
Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: Soil/Dirt
Possible Age: Traditional
Possible Function: Agricultural
Condition: Fair
Association with Other Features: Located northeast and parallel to PUANUI 5S.
Description of Location: Very dry environment with dead grass and kiawe trees in surrounding area. There are Christmas berries to the north of site. Evidence of cattle.
Description of Feature: Feature is an agricultural wall and is roughly piled with a linear plan view. The wall measures 25.4m x 0.7m x 1.7m and is oriented northwest to southeast. The wall curves slightly downslope towards south. Heavy collapse and disruption is evident along length of wall with the northeast end in relative fair condition. Elevation changes in landscape outline wall direction and placement.

Figure 97. PUANUI 5O, Overview of agricultural wall. View to southeast.

Site #: PUANUI 5
Feature Letter: P
Feature Type: Enclosure and C-Shape
GPS Coordinates: Northing: 0202848, Easting: 2230251, Accuracy: 2m
Artifacts: None Observed
Midden: Yes
Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: Soil/Dirt
Possible Age: Traditional and Historic
Possible Function: Habitation
Condition: Fair
Association with Other Features: PUANUI 5M is located 20 meters, 40° northeast. PUANUI 5R abuts northwest end.
Description of Location: Very dry environment with dead grass and kiawe trees in surrounding area. There are Christmas berries to the north of site. Evidence of cattle.
Description of Feature: The enclosure is of piled construction consisting of cobbles, stones and boulders with an oval plan view. The feature measures 10.4m x 7.7m x .7m with the length orientated north to south. There is evidence of collapse on the east/southeast end of enclosure. Within the interior of the enclosure is a C-Shape feature located near the north end and four huge boulders in the center. There is a wall segment that adjoins at the southeast portion of feature, which is orientated east to west, and is possibly associated with PUANUI 5M.

Figure 98. PUANUI 5P, Overview of enclosure. View to north.

Site #: PUANUI 5
Feature Letter: Q
Feature Type: Wall
GPS Coordinates: *GPS Track
Artifacts: None Observed
Midden: None Observed
Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: Soil/Dirt
Possible Age: Traditional
Possible Function: Habitation
Condition: Fair to Poor
Association with Other Features: PUANUI 5P is located 0.5m southeast of feature.
Description of Location: Very dry environment with dead grass and kiawe trees in surrounding area. There are Christmas berries to the north of site. Evidence of cattle.
Description of Feature: The feature is a wall segment that is of linear plan view and is of piled constructed of stones and cobbles. The feature measures 8m x .3m x 1m and is orientated from north to south. There are three mounds to the west of feature approximately 3-10 meters and two mounds located adjacent to the east end.

Figure 99. PUANUI 5Q, West face of wall segment with PUANUI 5P in background. View to northeast.

Site #: PUANUI 5
Feature Letter: R
Feature Type: Agricultural Wall
GPS Coordinates: Northing: 0202837, Easting: 2230246, Accuracy: 2m
Artifacts: None Observed
Midden: None Observed
Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: Dirt/Soil
Possible Age: Traditional
Possible Function: Agricultural
Condition: Fair to Poor
Association with Other Features: Adjacent and abuts west end of PUANUI 5P.
Description of Location: Very dry environment with dead grass and kiawe trees in surrounding area. There is Christmas berries and kiawe to the north/northwest of site. Evidence of cattle in surrounding area.
Description of Feature: Feature consists of a two curvy wall segments that are of piled and stacked construction. On the south wall there is approximately 2 to 3 courses and measures 14m x 0.65m x 0.8m. The wall begins abutting the west wall of PUANUI 5P (enclosure) and curves slightly northwest for about 10 meters, then curves west for 4 meters and then bends sharply to northwest and continues for 11.7 meters until wall becomes obscure. Approximately 3m northwest from southeast wall is a mound measuring 1.6mx 0.9m x 0.3m.

Figure 100. PUANUI 5R, Overview of south wall segment. View to west.

Site #: PUANUI 5
Feature Letter: S
Feature Type: Agricultural Wall
GPS Coordinates: Northing: 0202862, Easting: 2230241, Accuracy: 2m
Artifacts: None Observed
Midden: None Observed
Historic Material: None Observed
Skeletal Remains: None Observed
Substrate: Dirt/Soil
Possible Age: Traditional
Possible Function: Agricultural
Condition: Fair to Poor
Association with Other Features: Adjacent to southeast end of PUANUI 5P and parallel and west of PUANUI 5O.
Description of Location: Very dry environment with dead grass and kiawe trees in surrounding area. There is Christmas berries and kiawe trees to the north/northwest of site. Evidence of cattle in surrounding area.
Description of Feature: Feature is an agricultural wall and is roughly piled with a linear plan view. The wall measures 31.3m x 0.7m x 1.7m and is oriented northwest to southeast. The wall curves slightly downslope towards south. Heavy collapse and disruption is evident along length of wall causing wall to be in poor condition. Heavy grass cover but elevation changes in landscape outline wall direction and placement, therefore visibility of wall is good.

Figure 101. PUANUI 5S, Overview of agricultural wall. View to east.

Pu‘u Kehena Artifact Descriptions

On July 22, 2013, a total of 18 basalt flakes and one basalt ko‘i were collected from two areas of debitage on Pu‘u Kehena in the ahupua‘a of Kehena which borders Puanui to the north. The gathered samples were then taken back to UH Hilo and ran through the energy dispersive x-ray fluorescence spectrometer (EDXRF) machine to determine the geochemical composition, or “volcanic fingerprint” of the debitage and ko‘i.

The EDXRF machine is a non-destructive analytical technique used to identify the geochemical source of pōhaku. The spectrometer is used to generate an elemental spectra also known as a “geochemical fingerprint”. In the Hawai‘i, each volcanic eruption has its own “fingerprint”, and the EDXRF machine can calculate the amount of x-ray energy that is produced by the elements in each pōhaku (Mills et al 2008). Data on the elemental composition of the pōhaku can then quantified.

The spectrum works by using a stable non-radioactive Rhodium (Rh) x-ray tube to excite the electron orbits of elements in the pōhaku. In the machine there is a vacuum pump used to remove most of the air from the sample chamber during analyses to prevent contaminating the readings. The analyses data is processed on the Wintrace TM software. The software focuses on 19 elements that are best for measuring the geochemical composition of Hawaiian basalts. The 19 elements range in atomic weight from Sodium (Na) to Barium (Ba), however, the best elements to measure for are Rubidium (Rb), Strontium (Sr), Yttrium (Y), Zirconium (Zr), and Niobium (Nb) because they are less likely to be affected by chemical weathering, contamination from phosphates, surface morphology, or textural variation on archaeology basalt (Lundblad et al. 2010).

Table 6. Pu‘u Kehena basalt artifacts

Sample Name	Description
P1	Small adze blank no polish
P2	Basalt flake fine grain dorsal surface
P3	Polished basalt flake ventral surface
P4a	Basalt flake dark black FG ventral surface
P4b	Basalt flake grey brown FG ventral
P4c	Polished basalt flake coarse grain dorsal surface
P4d	Basalt flake medium grain ventral surface
P4e	Basalt flake fine grain ventral surface
P4f	Basalt flake fine grain ventral surface
P5	Basalt flake medium grain ventral surface
P6	Basalt shatter possible cobble cortex
P7	Basalt flake medium grain dorsal surface
P8	Basalt flake ventral surface
P9a	Polished basalt ventral surface
P9b	Polished coarse grain
P9c	Polished flake fine grain off adze bit
Ko‘i	Complete polished adze from surface survey

Figure 102. Basalt artifacts collected from Pu‘u Kehena

Figure 103. Koʻi collected from Puʻu Kehena

EDXRF Findings

Below is a brief discussion on the results of running the Puʻu Kehena samples through the EDXRF machine and then analyzing the data. For a more complete data analysis discussion, please refer to intern, Heather Bailey's, research project in Appendix A.

Figure 104 is a scatter plot analyzing Sr (Strontium) in ppm (parts per million) and Zr (Zerconium) in ppm. This graph illustrates that none of the Puʻu Kehena samples come from Neue Bay or the Pololū quarry, but might be closer to the Hāwi volcanic series. On this graph it appears that the Puʻu Kehena samples might match up more with the Mauna Kea samples, however, when we zoom in on this graph (Figure 105) it actually shows that the Puʻu Kehena samples do not clearly align with the Mauna Kea basalt. While it is possible that these samples may have originated from Mauna Kea, due to chemical weathering, they no longer match with the Mauna Kea data set.

Figure 106 provides even more evidence that the Puʻu Kehena basalt does not match with the Mauna Kea samples. This graph shows the levels of Copper (Cu) and Strontium (Sr) in the samples and it illustrates that the Puʻu Kehena materials match up more to basalt collected by Fields in areas throughout Kohala then with Mauna Kea basalt.

The EDXRF results show that the basalt artifacts gathered at Puʻu Kehena are close in their geochemical makeup to the Mauna Kea basalt. However, the basalt samples do not match up close enough to conclusively say that the samples are from the Mauna Kea quarry. Though, we can conclusively state that based on these results none of the basalt samples originated from the Pololū quarry. This is interesting when looking at the relative distance of the Pololū and Mauna Kea quarries to Puʻu Kehena. It is more likely that the basalt used to construct the artifacts found at Puʻu Kehena originated from the Hāwī volcanic series, which is still located in the Kohala Moku.

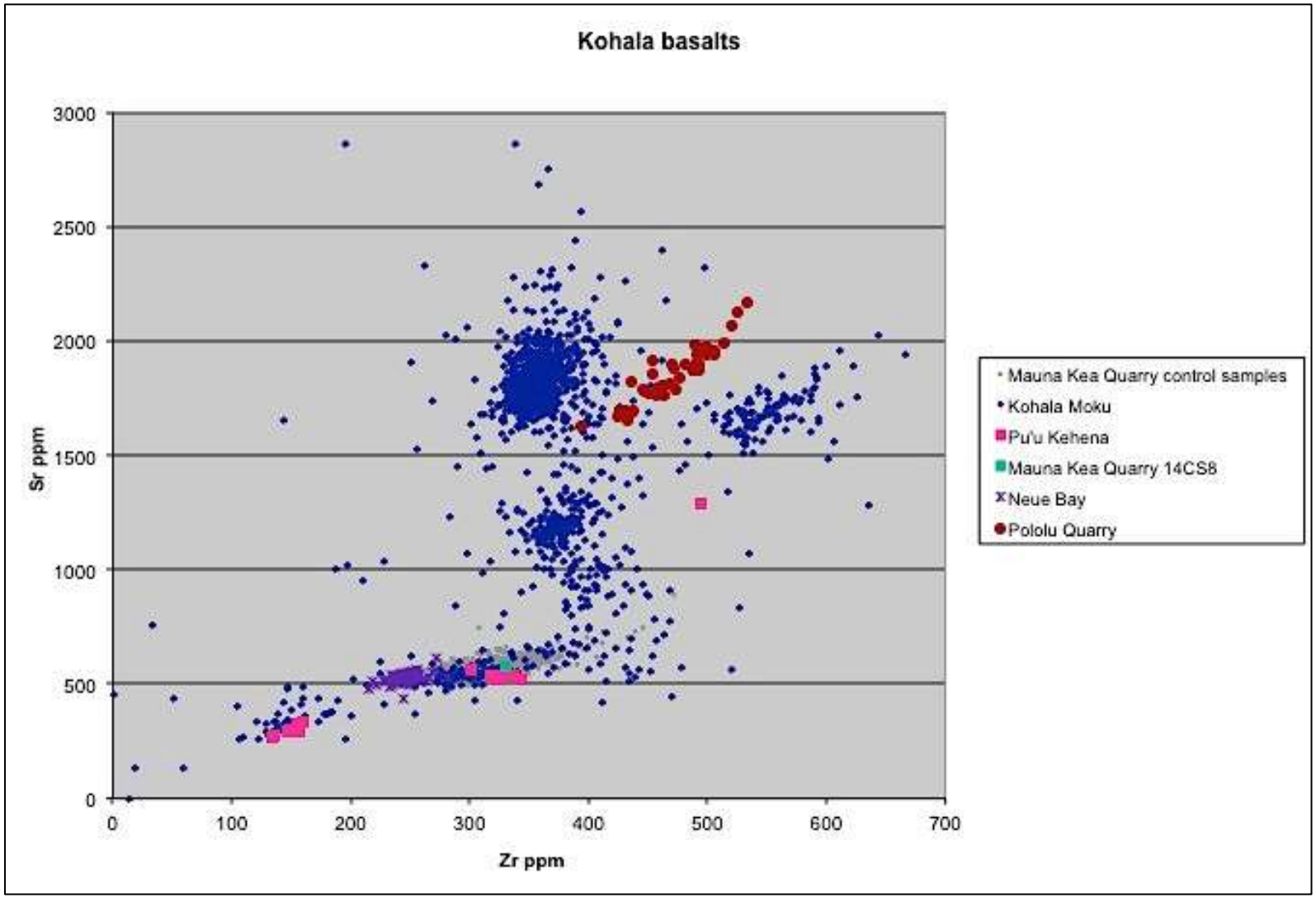


Figure 104. Scatter plot graph showing Serconium (Sr) and Ztrontium (Zr) levels of the Pu‘u Kehena basalt samples

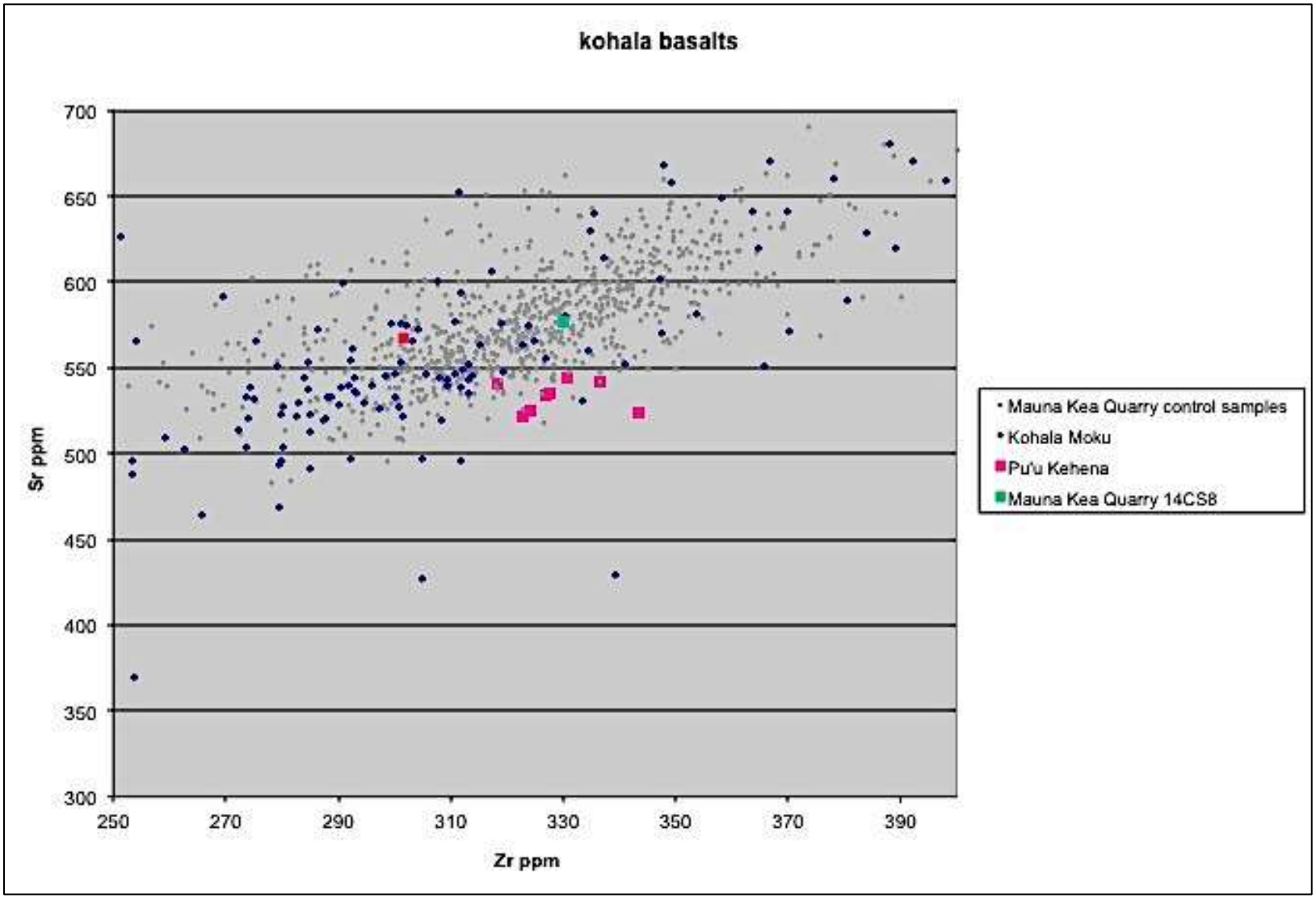


Figure 105. Close up of the scatter plot graph showing Serconium (Sr) and Ztrontium (Zr) levels of the Pu‘u Kehena basalt samples

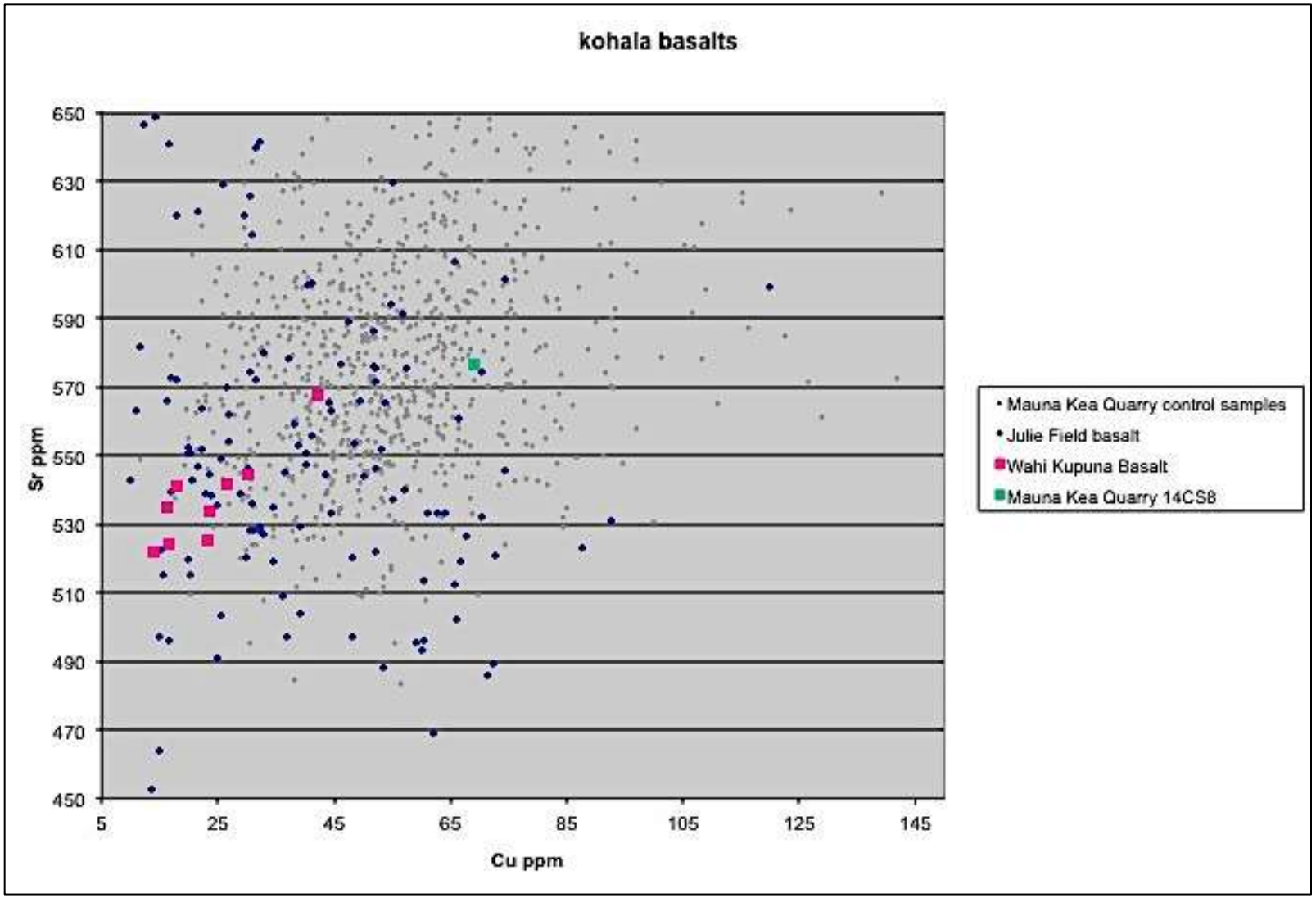


Figure 106. Scatter plot graph of Copper (CU) and Strontium (Sr) levels of the Pu‘u Kehena basalt samples

RECOMMENDATIONS & CONCLUSION

Site Specific Recommendations

Specific site recommendations primary focus on educational and interpretive signage that can inform visitors to Puanui of the significance of the place and how to mālama the existing cultural resources. Many of the cultural sites that were documented this summer are in close proximity to the main access road, so efforts should be taken to protect these sites from vehicle and human traffic. Site restoration is also a potential next step for certain cultural features at Puanui. In the three experimental gardens, the Ulu Mau Puanui hui are already utilizing the historic agricultural walls and mounds to grow ʻuala and kō in the gardens. This type of restoration and reuse could also be expanded to other areas of Puanui to increase the local production of traditional food crops.

Further research should also be conducted to better determine site function. Examining previous research that has been conducted in the Kohala dryland field system and comparing and contrasting similar features would help assist with site interpretation. Additionally, collaborating with archaeologists that have conducted work in the Kohala dryland field system such at Thegn Ladefoged, Michael Graves, and Tom Dye, to look specifically at the sites in Puanui could provide further insight to these features.

At Puanui Site 1, the most evident threat to this site are cattle and humans due to the close proximity of the site to the main access road in Puanui and the road to the residence houses in the neighboring ahupuaʻa. Therefore, in order to preserve and protect these sites, interpretive signage should be placed near the features to provide awareness to anyone unfamiliar to the area.

Threats at Puanui Site 2 also include cattle and humans due to its close proximity to Mala 2 and the main access road. As suggested for Site 1, similar actions should be taken to ensure the preservation of this site including interpretive signage and further research to support current documentation and findings. Long range efforts could include site restoration in order to repurpose and revitalize dryland agricultural methods and use of the ancient trail systems connecting mauka regions to the coastal areas of the ahupuaʻa.

Puanui Site 3 threats include cattle and humans due to its close proximity to Puʻu Kehena and the main access road. Similar recommendations suggested for Site 1 should be considered for this site as well. Further research should include investigating similar features in other ahupuaʻa to compare and contrast location and purpose in correlation to nearby or surrounding sites. Interpretive signage would also be useful for this area as an important educational tool.

The primary threat to Puanui Site 4 is cattle ranching. This site should be considered for restoration as most of the site is in poor condition. Further research should include the complex trail systems within the ahupuaʻa and investigating the connection, if any, of this

site to PUANUI 2C. Most importantly this site requires a great deal of restorative efforts due to its current state.

Cattle ranching is also the main threat to Puanui Site 5. Similar to Site 4, this site should be considered for restoration as majority of the site is in poor condition. Further research to support current documentation and findings is necessary in considering restoration, which could assist in long term goals to repurpose and revitalize Kohala's unique dryland agricultural methods.

Future Archaeological Work

The archaeological reconnaissance survey and mapping conducted at Puanui was part of a larger five week internship-training program. The survey and documentation focused on the areas directly adjacent to the three experimental mala's as these locations are the most used and accessed by the Ulu Mau Puanui staff and community learners. Over 120 features were identified and recorded, and an additional 50 or more features were observed but not recorded. Additional recordation of these sites is recommended for future work within this area to help acquire a better and more complete understanding of Puanui's cultural landscape. Archaeological work such as detailed recording, mapping, and possibly subsurface testing would provide data on the age, function, and association of sites.

Because only five selected areas were surveyed and mapped during the internship program, we strongly recommend that a more complete archaeological survey be conducted of the entire parcel that Ulu Mau Puanui manages. Conducting an archaeological survey of this area should include a 100 percent ground cover survey, site identification, and documentation. This survey will provide valuable information on newly discovered cultural sites and will provide more of a complete picture of the Kohala dryland field system in Puanui. Determining the current condition of sites is also important for assessing both the real and potential impact (natural and human) on these sites. In turn, this information can be utilized by the Ulu Mau Puanui staff to properly identify, categorize, and inventory the various cultural sites and determine how best to care for, protect, and preserve these wahi kūpuna.

After a survey of the parcel is completed, the next step would be to conduct tape and compass and plane-table mapping of any newly located features so they are thoroughly documented. After mapping selected sites, they could be further examined through excavations to better determine the function, use, age, and construction styles of these resources. Puanui consists of adequate soil development that could be easily excavated for charcoal, artifacts, ecofacts, and to determine subsurface feature construction. Excavating a range of different feature types should be completed. These feature types could include agricultural walls and mounds, c-shapes, enclosures, platforms, terraces, and alignments.

Cultural Resource Management Plan and Procedures

Another recommendation includes developing a cultural resource management plan (CRMP) for Puanui to help Ulu Mau Puanui better manage the area. The CRMP should include a resource inventory, management recommendations and protocols, and procedures to minimize damage to cultural resources. Another component of the CRM plan should include procedures for when newly discovered cultural sites and artifacts are found in the area. The recommendations and procedures of the CRM plan should be established with input and assistance from the KS cultural resources division and the Ulu Mau Puanui staff.

Educational Opportunities

Continued educational and internship opportunities, especially training in natural and cultural resource management, are also recommended for Puanui. This ahupuaʻa is an ideal training laboratory and outdoor classroom allowing students to learn about the unique resources of Leeward Kohala and how nā poʻe kahiko utilized the land and environment to survive and flourish. Year-round programs with schools in Kohala and Waimea as well as UH Hilo and Hawaiʻi Community College can establish long-term partnerships providing local students with easy access to Puanui, an opportunity to learn more about the history and resources of the area, and a mind-set to properly appreciate, preserve, and mālama this special ahupuaʻa.

Additionally, cultural resource curriculum (specific to archaeology, artifacts, and culture resource management) should be developed for a place-based educational program at Puanui. Curriculum could be taught initially in the schools prior to the students visiting the area. Subsequently, additional instruction and actual hands on, “field” activities, all geared toward encouraging student learning, could be conducted on site.

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APPENDIX A – PUANUI SITE DESCRIPTION TABLE

Table 7. Puanui Site Table

Site #	Feature Letter	Type	GPS Coordinates	Accuracy	Condition	Possible Age	Possible Function	Dimension in meters (length, width, height)	Association with other sites	Surface Remains	Modern Debris	Historical Material	Human Remains	Artifacts	Midden
1	A	Enclosure	E 2230905	2m	Good	Traditional and/or Historical	Ceremonial (Religious)	7.9 x 8.0 x .88 x 1.2	2B, 2C	None	None	None	None	None	None
1	B	Platform	E 2217145	2m	Excellent	Traditional	Burial	4.6 x 3.8 x .72	IA. 1C	None	None	None	None	None	None
1	C	Mound	E 2230543	2m	Excellent	Traditional	Burial	4.74 x 2.32 x .91	1B	None	None	None	None	None	None
2	A	Enclosure	E 2230532 N 0204642	2m	Good	Traditional	Agricultural	45 x 31 x 1.0	2A. 2B, 2C, 2I	None	None	None	None	None	None
2	B	Enclosure	E 2230607	2m	Good to Excellent	Traditional	Agricultural	56 x 33 x 1.0	2A, 2J	None	None	None	None	None	None
2	C	Trail	GPS Track	N/A	Fair to Good	Traditional & Historical	Agricultural, Religious & Trail	Refer to site description	2A	None	None	None	None	None	None
2	D	Agricultural wall	GPS Track	N/A	Poor to Fair	Traditional	Agricultural	Refer to site description	2B, 2F, 2F, 2E	None	None	None	None	None	None
2	E	Circular Alignment & Linear Alignment	E 2230641 N 0204556	2m	Good	Traditional	Religious	2.4 x 1.5 x 1.7	2A, 2D	None	None	None	None	None	None
2	F	Circular Alignment	E 2230631	2m	Fair	Traditional	Religious	2.3 x 1.65 x 0.2	2E	None	None	None	None	None	None
2	G	Terraced Agricultural Wall	GPS Track	N/A	Fair	Traditional	Agricultural	Refer to site description	2C, 2D	None	None	None	None	None	None
2H	H	Terraced Agricultural Wall	GPS Track	N/A	Fair	Traditional	Agricultural	Refer to site description	2C, 2D, 2G	None	None	None	None	None	None
2	I	Enclosure (Possible Platform)	E 2230594 N 0204521	2m	Poor	Traditional and Historic	Habitation & Religious	8.2 x 5.8 x 0.28 x 0.8	2A	None	None	None	None	None	None
2	J	Mound	E 2230591 N 02204618	2m	Fair	Traditional	Agricultural	6 x 5.5 x 1	2B	None	None	None	None	None	None
3	A	L-Shape	E 2230705 N 02204618	2m	Poor	Traditional	Agricultural	19 x 12.5 x 0.7	3B	None	None	None	None	None	None
3	B	Enclosure	E 2230698	2m	Fair	Traditional	Religious	9 x 3.7 x 0.8	3A, 3C	None	None	None	None	None	None
3	C	Ki‘i Pōhaku (Petroglyph)	N/A	N/A	Fair to Good	Traditional	Religious	Refer to site description	3B	None	None	None	None	None	None

4	A	Trail (Boundary Marker)	GPS Track	N/A	Poor to Good	Traditional	Agricultural	Refer to site description	Mala 3 and 5	None	None	None	None	None	None
5	A	Agricultural Wall	GPS Track	N/A	Fair	Traditional and Historical	Agricultural	7.7 x 1.0 x 0.4	5B, 5C	None	None	None	None	None	None
5	B	Agricultural Wall	GPS Track	N/A	Poor to Good	Traditional	Agricultural	48.3 x 0.45 x 0.5	5A, 5C	None	None	None	None	None	None
5	C	Agricultural Wall	GPS Track	N/A	Poor to Fair	Traditional	Agricultural	8.4 x 0.9 x 0.4	5A, 5B	None	None	None	None	None	None
5	D	Agricultural Wall	GPS Track	N/A	Poor to Fair	Traditional	Agricultural	46 x 1 x 0.4	4A, 5B, 5D, 5F	Artifacts, midden & historical material	None	None	None	None	None
5	E	Mound	N/A		Good	Traditional	Agricultural	3.7 x 0.8 x 0.6	MALA 3, 5D	None	None	None	None	None	None
5	F	Agricultural Wall	GPS Track	N/A	Poor	Traditional	Agricultural		4A, 5B, 5D	None	None	None	None	None	None
5	G	Agricultural Wall	GPS Track	N/A	Poor to Good	Traditional	Agricultural	Refer to site description	5B, 5F	None	None	None	None	None	None
5	H	Agricultural Wall	GPS Track	N/A	Poor to Fair	Traditional	Agricultural	Refer to site description	4A, 5G	None	None	None	None	None	None
5	I	Agricultural Wall	N/A	N/A	Poor	Traditional	Agricultural	11 x 1.4 x 0.25	5H	None	None	None	None	None	None
5	J	Agricultural Wall	E 2230253 N 0202877 & GPS Track	2m	Fair	Traditional	Agricultural	22 x 1.2 x 0.4	5I	None	None	None	None	None	None
5	K	Agricultural Wall	E 2230260 N 0202871	2m	Poor	Traditional	Agricultural	20.9 x 0.45 x 0.80	5I	None	None	None	None	None	None
5	L	Agricultural Wall	E 2230260 N 0202871	2m	Fair	Traditional	Agricultural	5.1 x 3.3 x 0.35 x 1.2	5J	None	None	None	None	None	None
5	M	Double Partial Enclosure / L-Shape & U-Shape	E 2230252 N 0202860	2m	Fair	Traditional	Agricultural & Habitation	24 x 0.65 x 1.3	5N, 5P, 5S	None	None	None	None	None	None
5	N	Agricultural Wall	E 2230266 N 0202857	2m	Fair	Traditional	Agricultural	21.3 x 0.3 x 1.7	5M	None	None	None	None	None	None
5	O	Agricultural Wall	E 2230225 N 0202879	2m	Fair	Traditional	Agricultural	25.4 x 0.7 x 1.7	5S	None	None	None	None	None	None
5	P	Enclosure & C-Shape	E 2230251 N 0202848	2m	Fair	Traditional & Historical	Habitation	10.4 x 7.7 x 0.7	5M, 5R	Yes	None	None	None	None	None

5	Q	Wall	GPS Track		Poor to Fair	Traditional	Habitation	8 x 0.3 x 1	5P	None	None	None	None	None	None
5	R	Agricultural Wall	E 2230246 N 0202837	2m	Poor to Fair	Traditional	Agricultural	14 x 0.65 x 0.8	5P	None	None	None	None	None	None
5	S	Agricultural Wall	E 2230241 N 0202862	2m	Poor to Fair	Traditional	Agricultural	31.3 x 0.7 x 1.7	5P, 5O	None	None	None	None	None	None

APPENDIX B – INTERN RESEARCH PAPERS

Tracing Trade through Basalt Collected from Puanui and Kehena

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Wahi Kūpuna Internship Program 2013
2013 Cohort Kukui aʻā ku i Āpaʻapaʻa
July 8, 2013 – August 10, 2013
Puanui, North Kohala

Abstract

Using UH Hilo's Energy Dispersive X-Ray Fluorescence (EDXRF) spectrometer machine, to source a basalt *ko'i* (adze) and basalt flakes from Puanui and Kehena. It is important to conduct this study for the community of Kohala to connect them with their history and to further in-rich learning experiences for those visiting the site of Puanui. The following paper gives a brief background on Pu'u Kehena and its importance of the site. Additionally covered is the EDXRF machine; how it works, and what we are looking for. The hope is that this project, and its corresponding paper are the start of further conversation and investigation to this culturally significant site in Kohala.

Introduction

It's no question that stone tools take a great deal of precision and control to create. Long hours of practice are needed to become a master in the art of stone tool making. Of the stone tools made by man, the Hawaiian stone adze is one of the hardest to make because of its shape. The Hawaiian stone tool craftsman was truly a master.

Ko'i are ancient stone tools that were very important to the Hawaiian people as they assisted in the construction of many possessions. For example, *ko'i* were used to chop down trees for the construction of hale's, or houses, and canoes. *Ko'i* were also utilized to carve wood bowls and *ki'i* (carved images). In the process of crafting a canoe, many *ko'i* would be used because the edges would become blunted: therefore, many *ko'i* flakes from damaged, rejuvenated, or newly created *ko'i* would be produced. As a result many *ko'i,* and *ko'i* flakes, would be left behind as evidence of tool use.

Debitage (waste material left from making stone tools, typically basalt flakes), and one basalt *ko'i* from Pu'u Kehena was collected for this project. Pu'u Kehena is a prominent hill in the *ahupua'a* of Kehena, and is commonly used to landmark the *ahupua'a* Puanui. UH Hilo's energy dispersive x-ray fluorescence (EDXRF) spectrometer machine was used to determine the geochemical composition, or "volcanic fingerprint" of the debitage and *ko'i* to establish from which quarry, district, or even island the adze tool, and adze flakes, may have originated from.

These findings will prove to be important because they could possibly determine if there were trade routes, or migration, that occurred within the *ahupua'a* of Kehena and Puanui. Determining where these artifacts originated from could also help illustrate a social economical complexity between individuals of different districts, or even different islands.

The EDXRF spectrometer is a non-destructive machine that uses x-ray technology to find the geochemical finger print of a stone (*pohaku*) in order to determine its location (Macabio: 2010). The EDXRF machine is a culturally sensitive tool because does not destroy the artifact as older methods did. Older methods of tracing geochemical composition were to either smash, or drill a hole in the *pohaku*, to grind it into a powder for readings. An example of an older method of dating is Petrographic analysis. Petrographic analysis is the preparation of thin-sections of stone for microscopic examination. A thin-section is a piece of stone that has been cut thin off of an artifact, it is then washed and ground to remove pits (Lass: 1991). This method was clearly, very destructive. The reasons behind using the EDXRF spectrometer to study *ko'i* from Pu'u Kehena are simple. First, keeping the artifacts intact was of great importance to keep in line with a cultural sensitivity while doing research. Second, this site has hardly been studied before. This information will be almost completely new and beneficial to not only the land owners of Puanui, Kamehameha Schools, but it will also be beneficial to individuals connected to Puanui and North Kohala.

Background

Puʻu Kehena is located in the *moku* (district) of North Kohala on the Big Island of Hawaiʻi. It lays primarily in the *ahupuaʻa* system of Kehena and lies on the border of Puanui. From the top, you have a great view of Mauna Kea, Hualālai, Mauna Loa, and on clear days, Haleakala. Puʻu Kehena serves as a significant landmark, holding archaeological evidence that may provide information about possible trading routes to and from Kehena and Puanui.

It is likely that the natural environments of Puanui, and Puʻu Kehena were once covered in a very diverse forest environment, afterwards cleared for the purpose of agriculture. Puanui has been a heavily farmed site having produced in the past sweet potatoes, sugar cane, yams, dry land *kalo*, and bananas. In the days of ancient Hawaiians, before the expansion of agriculture, the diverse forest would have consisted of a variety of plants and trees ranging from *wiliwili, iliahi, mamane, meʻa, ʻōhiʻa, kolea, olapa*, and many others. This forest would evidently be a very dense forest due to the thick overlapping of larger trees like *ohia* or *kolea*. This type of forest is called a mesic forest; a tropical moist forest that is usually found at elevations between 750-1,250m. These forests are usually the richest in biodiversity and endemic plants (P. Vitousik, personal communication, July 25, 2013).

Photo of Puʻu Kehena showing erosion: Photo by Aloha Kapono; 2013

Puʻu Kehena is also mentioned in one very important, and famous *moʻolelo* (legend) of Hiʻiaka and her sister Pele. The epic tale *Hiʻiakaikapoliopele,* tells of Hiʻiaka, while on her travels, reaches Pili and Kalahikiola, also known as the "companion hills." In the story the "companion hills" are husband and wife, Pili being the husband and Kalahikiola being the wife. Hiʻiaka at this time, having reached the hills, says to her *aikane* (close companion of same sex), "Here is a women who is one of us, Kalahikiola is her name. Her husband is Pili, but her true love is actually Kehena, standing there above." *Moʻolelo* are important to look at because they tell us a lot about the background of a place, and how a place received its name. This part of the *moʻolelo* in Hiʻiakaikapoliopele mentioning Kehena doesn't seem to give us much information on the *puʻu*, but we can get that there must have been some connection between Puʻu Kehena

and the "Companion hills", perhaps specifically Kahaikiola. It is also a place of great significance if it is a place visited by Hi'iaka.

Energy Dispersive X-Ray Fluorescence

UH Hilo has the only EDXRF spectrometer in the state of Hawaii fully committed to cultural research (Macabio: 2010). Lab methods conducted by Dr. Peter Mills and Dr. Lundblad are culturally sensitive and non-destructive. As mentioned before, EDXRF is a non-destructive analytical technique used to identify the geochemical source of the *pohaku*. The spectrometer is used to generate an elemental spectra also known as a "geochemical fingerprint". In the Hawaiian islands, each volcanic eruption has its own "fingerprint", and the EDXRF calculates that amount of x-ray energy that is produced by the elements in each *pohaku* (Mills et al 2008). Data on elemental composition of *pohaku* is then quantified.

The spectrum works by using a stable non-radioactive Rhodium (Rh) x-ray tube to excite the electron orbits of elements in the *pohaku*. In the machine there is a vacuum pump used to remove most of the air from the sample chamber during analyses to prevent contaminating the readings. The analyses data is processed on the Wintrace TM software. The software focuses on 19 elements that are best for measuring the geochemical composition of Hawaiian basalts. The 19 elements range in atomic weight from Sodium (Na) to Barium (Ba). The best elements to measure for are Rubidium (Rb), Strontium (Sr), Yttrium (Y), Zirconium (Zr), and Niobium (Nb). These elements are the best elements to measure because they are less likely to be affected by chemical weathering, contamination from phosphates, surface morphology, or textural variation on archaeology basalt (Lundblad et al. 2010). The EDXRF supports the cultural sensitivity in the Hawaiian community by using those non-destructive methods of science to better understand sites like Puanui and Kehena.

Methods

For this project I utilized two types of methods for gathering *pohaku*; and for understanding our project site, these included field techniques and lab data analysis.

My fieldwork methodology included background research of our study area and the *ko'i* making process. I looked at scholarly articles and read research reports previously done by past interns and professors from UH Hilo. I also included *mo'olelo* that mentioned places relevant to Puanui or Kehena, as well as *mo'olelo* that mentioned the construction of *ko'i*.

The biggest component of my research was fieldwork. For three weeks four other interns and I learned proper archaeological techniques for surveying, documenting, and mapping archaeological sites. This training brought us closer to the cultural features of Puanui, which would eventually be helpful in our research.

For my individual project I conducted a reconnaissance survey, which included photo documentation with the use of a photo stick and a north arrow. Before collecting our samples, we conducted cultural protocol by asking for permission through *oli* and *pule* (chants and prayers), given by U'ilani Macabio, and I silently sought permission to take on this *kuleana* (responsibility), promising the land I would take care of the artifacts, making sure they were safely returned. Following the protocols I collected our samples, with supervision of Dr. Peter Mills and U'ilani Macabio. We tied pink ribbons to rocks in the exact location they were found, so relocating the areas would be easy. For good measure we took GPS points of each sample location. The artifacts were then returned back to their original location on the last day of the program.

Ethnographic methods involved-"talking story" with Dr. Peter Mills, Uilani Macabio, as well as other mentors who were able to provide their professional expertise and knowledge. Other valuable interviews included *kamaʻāina* of the area, such as Uncle Ala Lindsey and Aunty Kehau Marshall, who shared their personal and professional knowledge of our research area.

Once samples and research information had been successfully gathered, I ran the samples through the EDXRF spectrometer. Of the nine basalt flake samples collected only two were clean enough to be run through the spectrometer the first time. The other seven samples had fine red dust sediment on them that would alter the readings of the geochemical composition of the basalt stone. The seven samples had to be cleaned in a machine called a hydro-sonic cleaner, where you place the sample in a metal cage that is then immersed in water. The machine gives off a high-pitched sound that then "shakes" the sediments free from the sample.

Once the samples were cleaned, they were then ready to be analyzed in the EDXRF machine. My P4 and P9 samples of basalt flakes were both gathered from what was presumed to be sites of rejuvenation; so, multiple flakes were gathered and placed in order according to their weight. P4 had flakes A-F, and P9 had flakes A-C.

Photo of Hydro-sonic cleaner: taken by Makana Taveres

Results

A total of 18 basalt flakes from two areas of debitage, (some with polish and some without), and one basalt *koʻi* from Puʻu Kehena were collected on collected on July 22, 2013. The gathered data was analyzed through the Wintrace TM software and scatter plots were created to quantify the data and help us better understand the relationships between elements such as Strontium (Sr) and Zirconium (Zr).

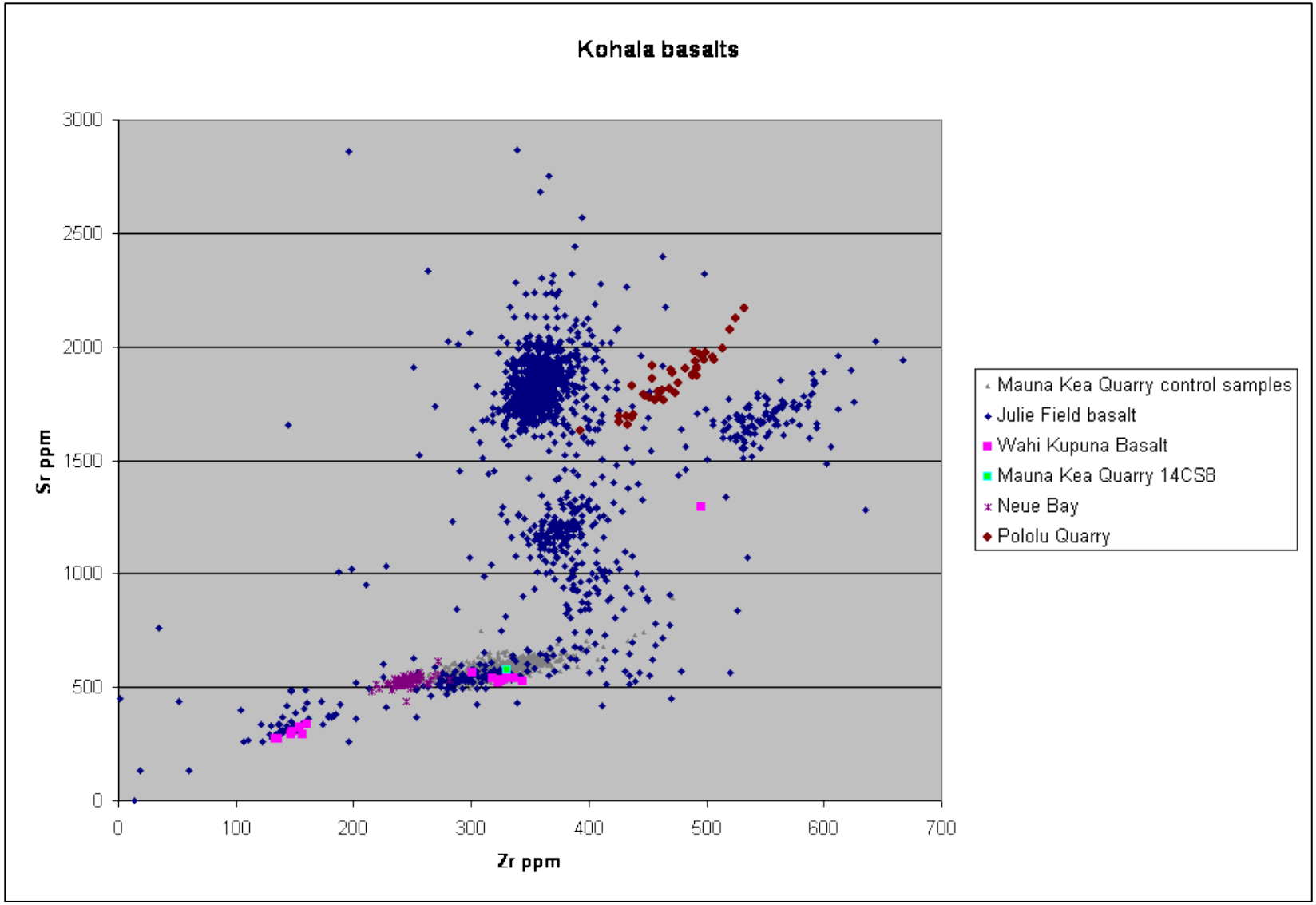

Figure 1.1 Scatter plot showing Strontium (Sr) and Zirconium (Zr) levels

Figure 1.1 is a scatter plot showing on its y-axes Sr (Strontium) in ppm (parts per million), and on its x-axes Zr (Zerconium) in ppm. Small grey triangles show Mauna Kea controlled samples. These are samples of quarried basalt known to have come from the Mauna Kea quarry. In blue diamonds are samples taken from a collection of Kohala basalt collected by Julie Fields. All blue samples are known to have originated from the Kohala area. The bright pink points are the samples I gathered from Pu‘u Kehena, and from here on out be referred to as Wahi Kupuna samples. The bright green point is a Mauna Kea control sample that is kept in the lab to make sure that the machine is running properly and that samples are read accurately. This sample along with the BHVO-2 control sample (Basalt, Hawaii Volcanic Observatory-2) is used to ensure that the EDXRF runs correctly. The purple stars represent Neue Bay which is located on the Windward side of Kohala. These samples were also placed on the plot graph to show hat samples collected by the Wahi Kupuna Program either did, or did not come from this place.

The EDXRF machine, unfortunately, is not accurate enough to tell us exactly where samples are from, but it is much better at telling us where samples are not from. As we can see from this plot graph (Fig. 1.1) none of the samples came from Neue Bay, but some samples are close, a bit higher in Zr then Neue Bay samples.

The same goes for the Pololū samples in red. These samples are fairly tightly clustered and are both high in Sr and Zr. The samples I collected range from 400ppm-1400ppm for Sr and 100ppm-500ppm for Zr. The reason for such a wider range in Sr is because one sample, a small adze blank that has both been polished is both high in Sr and Zr (1400ppm for Sra ns 500ppm for Zr). This sample does not fit with either samples from Kohala or the Pololū quarry, but might be closer to the Hāwi volcanic series. At 500ppm Sr and about 300-350ppm for Zr a small cluster of Pu‘u Kehena basalt samples seem to fall in with the cluster of Mauna Kea quarry samples. But in Figure 2.2 this proves to be untrue.

Figure 2.2 shows us that samples gathered by Wahi Kupuna are very close in geochemical make-up with those collected from Mauna Kea, but they are not close enough to be called Mauna Kea basalt. It is possible these samples originated from Mauna Kea but due to chemical weathering no longer match with that set. A sample gathered from Wahi Kupuna matches closely with other samples gathered in Kohala. The Julie Fields samples are samples taken from Kohala *moku* (district), but are not guaranteed to be local Kohala material. The Wahi Kūpuna samples do not match with material gathered at the Mauna Kea quarry or the sample of Mauna Kea basalt that is kept in the lab at UH Hilo.

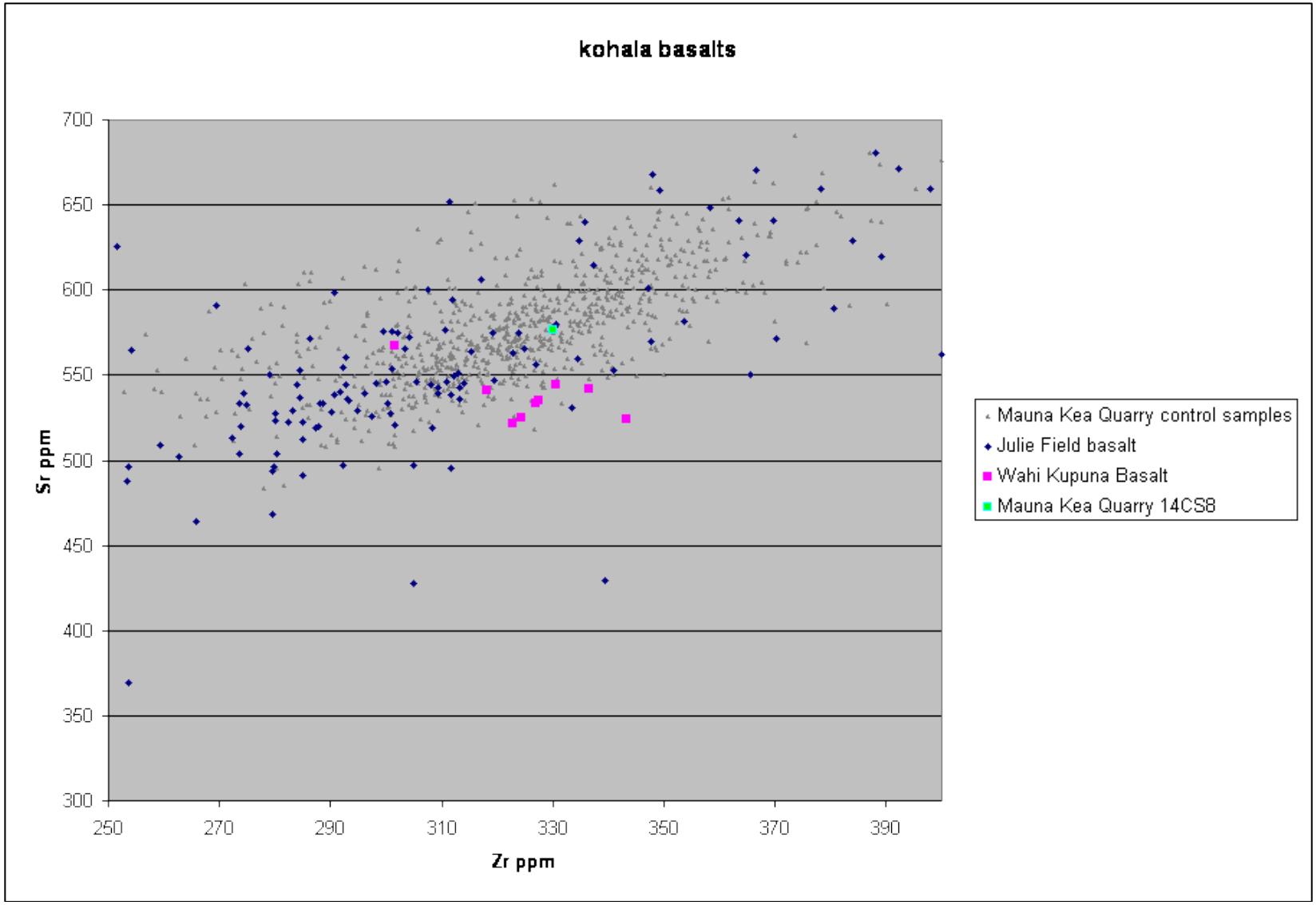

Figure 2.2 Zoomed in scatter plot of Serconium (Sr) and Ztrontium (Zr) levels

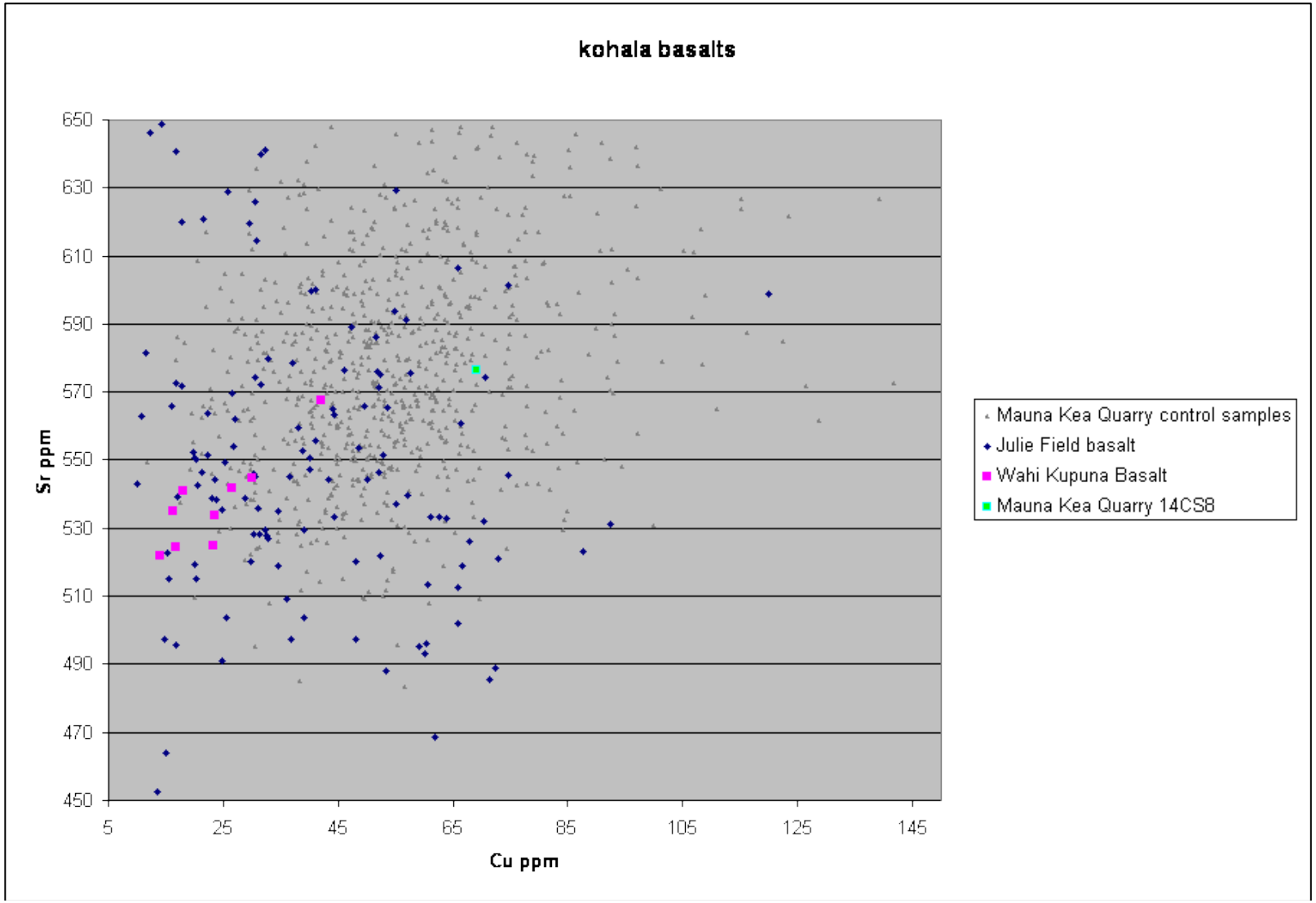

Figure 3.3 Scatter plot graph of Copper (CU) and Strontium (Sr) levels show a definitive difference.

For a greater visual showing that samples gathered during the Wahi Kupuna Program do not match with samples gathered from the Mauna Kea samples. The flakes and adze are graphed showing their Copper (Cu) and Strontium (Sr) levels. From this graph, the Wahi Kupuna Program materials are a closer match to basalt collected by Fields in a variety of areas throughout Kohala.

Discussion

My research results show that the basalt artifacts gathered at Pu‘u Kehena are close in their geochemical makeup to the Mauna Kea basalt. However, the basalt samples didn’t match up close enough to conclusively say that the samples were from the Mauna Kea quarry. We can conclusively state that based on these results none of the basalt samples originated from the Pololū quarry. This is interesting when looking at the relative distance of the quarry to the *pu‘u*. It is more likely that the basalt used to construct the artifacts found at Pu‘u Kehena originated from the Hāwī volcanic series. The Hāwī volcanic series is located in the Kohala *moku* (district). What seems to be showing here is that the residents of Puanui and Kehena were not traveling very far to get their material.

Again, it is important to mention that in order to keep the integrity of the basalt artifacts a non-destructive culturally sensitive machine, the EDXRF, was used to help with the research. While doing this research the primary question was: were there trade routes to, and from Puanui and Kehena, and if so where were materials such as basalt coming from? This question has only just begun to be answered with this research, and quite a bit more needs to be done. When more samples can be gathered and are run against these samples, it will widen our sample size and provide more evidence for or against what has been previously stated.

As an undergraduate student there has been an incredible amount of knowledge to gain from the internship and the corresponding research project. Personally, I have learned so much more about the social, political, and economic systems of traditional Hawaiians. It was interesting to learn that in a society of supposed simplicity, (thought of by some) there’s actually a much more complex system of politics and economics involved in the idea of self-sufficient system of the *ahupua‘a.* The simple system of the *ahupua‘a* which was taught to me from an early age, turns out to be just that. A simple way to explain something far more complex. Not all *ahupua‘a* are created equally, with some *ahupua‘a* being cut off from some resources such as the coastline. A more complex system of trade would have to be set in place to account for such *ahupua‘a*.

This research has brought up more questions besides my original research questions (that has yet to be answered). I began to question the trade system of the traditional Hawaiians as it was between *ahupua‘a*, districts, or islands. What was it like? How was it regulated, if it even was? Why are some basalts found more abundantly in one *ahupua‘a* then in others? These are thought provoking questions for now.

This research is important for me because I get to understand the history of Hawai‘i better than I have in the past. Finding connections between the past and the present help bring more meaning to what is going to happen, and what must happen in Hawai‘i, and to make a connection to the past is what must happen, so that communities can have more appreciation for their individual histories, and more of a desire to preserve their histories for the future.

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Ma uka a hiki a i kahakai

Tressie Aloha Kapono

2013 Wahi Kūpuna Internship Program

Kukui ‘A‘ā Kū i ka ‘Āpa‘apa‘a Hui

12/13/2013

Introduction:

The term *ahupuaʻa* is commonly used by the Hawaiian people relating to a strip of land connecting from the mountain side to the coast. Ancient Hawaiians understood the importance of utilizing all resources of an *ahupuaʻa* from the highest elevations to the lowest. The profound abundance of food that a single *ahupuaʻa* was able to provide was significant to the populations that lived there. This is true even today. *Ma uka* refers to the mountain region of an *ahupua'a* and *ma kai* refers to the ocean and coastal regions. The connections between *ma uka* and *ma kai* are evident in both an ecological perspective as well as in a social/community perspective, which proved to be beneficial to the inhabitants of those areas. Examples of these commonalities include shared behaviors and life cycles between land and ocean species, indicators of ecosystem health and functions, and balanced production of necessary resources for people.

The *ahupuaʻa* of Puanui is located in the district of Kohala. This area of land is considered to be drier than other areas in Kohala because it receives less rainfall being in the rain shadow of the Kohala Mountain. The abundance of land combined with ideal growing conditions for certain agricultural crops (i.e., sweet potato) within the Puanui *ahupua'a* allowed for a largely sustainable population of Hawaiians within Kohala. Food production was high and was enough to support the entire Kohala area, including visiting and travelling warriors, as well as neighboring *ahupua'a* along the Hāmākua coastline.

Puanui is just one of 33 other *ahupua'a* systems in the Kohala region which form a diverse field system network from the *ma uka* to the *ma kai*. Agriculture was, and is still today, an important component of life in Hawai'i. Up towards the mountains Hawaiians planted *ʻuala*, sugar cane, yams, bananas, and *kalo*. The *ʻuala* grew more abundantly in the Kohala field system than anywhere else on the island. These field systems were also characterized by strong winds, aptly named ʻĀpaʻapaʻa. Many cultural practices were formed around the production and harvesting of food. Many hours were typically spent performing hard labor, which was generally rewarded with trips from the mountain fields to the cool ocean. This walking journey from *ma uka* to *ma kai* was done through a well maintained trail system carefully preserved by the Hawaiians that can still be seen today. Along the coastline Hawaiians built fishing villages where families could live during fishing seasons to reduce travel.

Past studies in the area have discovered archeological evidence of trail systems for walking, irrigation ditches and conduits, signs of sophisticated farming and fishing techniques, etc. The purpose of this research is to continue to investigate the largely unexplored areas, which ancient Hawaiians lived and worked within the Puanui *ahupua'a*. Specifically, we want to uncover evidence that may provide insight into how the ancient Hawaiians stewarded this land and capitalized on the inherent connections between the *ma uka* and *ma kai*.

Background research: previous reports and articles & historical maps.

There are 33 *ahupuaʻa* that make up the Kohala field system. Puanui sits between two *ahupua'a* Kehena and Puaiki and contains a significant hill slope named Puʻu Kehena, which serves as a keystone landmark for the area. Archeological artifacts such as small sharp edge tools, river cobbles and *koʻi* (old Hawaiian carvers) have been found

there during past excavations. Our analyses of historical and prehistoric features throughout Puanui were based on Dye's recent work (2013) in the area.

In the *ma kai* region of Puanui, there are a few features that have appeared throughout the project. Those features are burial sites, markers, shrines and habitation features. Some features that were only found once were, a fishing site and *Holua* path. Puanui *ma kai* has a rich history of habitation including an old fishing village. Flat shallow stones are an expected feature of archaeological landscape in coastal Kohala. According to recent studies:

> These features are most likely to have been established around the old Hawaiian expansion period from AD 1280-1419 to AD 1640-1720. This is especially the case for habitation structures, which appear to have had a use life measured in decades, rather than centuries. Possible exceptions to this generalization are the foundations of temples, which might have been established in the Expansion period, from AD 1280–1419 to AD 1640–1729.
> (Dye 2013)

One of the most rare archaeological findings is that of a *holua* slide. A *holua* slide is a Hawaiian ramp used to slide down a mountainous or hilly slope and sometimes ending in the ocean. The word *holua* means, "to slide together as one entity". These slides are believed to have been used by many different types of people in the community. However, special slides were constructed for the *ali'i,* or high chiefs, and were called *Papaholua. Holua* slides are believed to have been able to reach speeds of over 50 mph. They were constructed from wood and bound together with fibrous ties. The *ahupuaʻa* of Puanui *ma kai* (ocean side), leeward of the Kohala coast is home to such a *holua* structure.

Methods:

An initial land survey of the Puanui area in Kohala was done with the Wahi Kūpuna Internship Program and the University of Hawaiʻi at Hilo during a 5-week period in June and July 2013. Our team was taken to the Puanui area, which is privately guarded and maintained by Kamehameha Schools Land Legacy Trust. Historical information was provided and lessons in basic archeological practices and Hawaiian along with Western worldviews were shared to educate our team. Experts in the fields of archaeology and Hawaiian studies accompanied us through our survey. My research project was divided into three sections: 1) literature review of the Puanui area and Kohala region, 2) ethnographic survey of Kohala community members, and 3) archaeological survey of a section within the Puanui *ahupua'a.*

Literature Review

1. Published information on Puanui including peer-reviewed journal articles, academic reports, archeological documents, historical maps, historical archeology, and historical documents were gathered, analyzed, compared, and discussed with team members and project leaders. These significant documents were found using search keywords such as, "archaeology in Hawaiʻi", "Kohala field systems", and

"historical documents of Puanui" on the Internet using academic journal search databases, Google Scholar, or basic web browsing. Direct information from experts and team leaders was strongly considered during the literature review process.

Ethnographic Survey

2. Ethnographic surveys were conducted with volunteer community members that have been living in the Kohala area for more than half their life (25+ years). Qualifications were that the person must have been born in Hawai'i and raised in Kohala for more than half their life, and knowledgeable in the history of the area. These "talk story" interviews were recorded using a tape recorder. The interviewees were asked about traditions, stories they heard over the years, legends, or any type of knowledge they were willing to share. Interviewees were encouraged to share place names they have heard or identify places on maps, which they had visited.

Archaeological Survey

3. Archeological surveying and mapping were completed in the field. A land survey was completed within a specific section of the Puanui *ahupua'a*. Our team explored the geographic and climatic conditions of the area and made qualitative assessments of climate and weather, land quality, past disturbance, current usage, and visible ancient archaeological remnants while learning about past archaeological research done in the area.

   Qualitative and quantitative measurements were collected on significant historical structures. Our teams measured rock wall dimensions, path widths, etc. I have collected data through mapping specific features through my favorite method called tape and compass. I also took pictures and recorded personal observations while out on the field. I mapped in significant features that were located around the three modern experimental gardens within Puanui *mauka*.

   The first step I used for tape and compass is determining the proper scale for my featured map. After I set up my scale I made sure I created a "buffer zone," or an extra space, in case future investigations expanded outward. Creating maps, I learned it is critical to convert measurements from inches and feet to centimeters and meters. After I set up my scale I created a baseline, which helped to orient myself on my map. Using a 30 and 50 meter flexible tape measure I was able to map all features that were significant. I made sure that I kept a leveled baseline that was able to reach across the longest area of the site. After I drew in my baseline I filled in the measurements according to scale to serve as a reference on the corner of my map. It was my goal to map all features relatively accurate to scale, keeping in mind that I must only have a level of error of about 5 centimeters because usually maps are not exactly accurate. I created a center point of the objects by measuring its dimensions and then drew it in as best as I could.

   With the help of my team members we were able to have one person positioned at the baseline and drawing in the features (recording) while the other person was positioned over the object giving measurements. We continued this process until all identified features were mapped. After I finished mapping I then orientated my map to the north, creating my north arrow. I used a compass that was fixed to magnetic north, and then placed it directly in line with my baseline. Then I drew in my north

arrow by making sure all points were in line with the bearings located on the compass. After mapping the site I included the names, date, and site number.

The end product was a map that served as a broader viewpoint of the landscape and how it looks to scale. I also used photos to help as another visual aid. To document measurements in a photo I used a photo stick, compass, camera, photo log and writing implement. Photo logs were very helpful to keep track of all the photos that we took while we were out on the field. Using the photo log I was able to document detailed information about a specific picture. I recorded information such as camera details (brand, type, etc.), frame number, subject, and orientation (using compass).

Results and Findings

During our three field weeks we documented features concentrated near the three experimental gardens. Based on our feature forms and maps, our team found a total of 153 mounds, of various sizes, near and around the third experimental garden (also known as Mala 3) identified as Site 5. These mounds, as mentioned from Uncle Ala Lindsey of Ulu Mau Puanui, were used primarily for agricultural purposes to contain any moisture, which are limited to these drier areas, to aid in plant irrigation and growth. We also found 17 agricultural walls, two alignments, eleven C-shaped features, five enclosures, two L-shaped platforms, three terraces, two trails, one U-shape feature and a petroglyph.
The map drawn of Site 1 (Figure 1.1), located at the most *ma uka* of the three experimental gardens (Mala 1) within Puanui. This site was located at the base of Puʻu Kehena on the Southwest end of the *puʻu*. A closer look at Site 1A, demonstrated in Figure 1.2, is of an enclosure. Site 1B (Figure 1.3) is a platform while Site 1C (Figure 1.3), in speaking with local residents of Puanui and previous archeologist, expresses characteristics likely found as burial site.

Further down in elevation near the second experimental garden, we surveyed Site 2 (referenced as Mala 2) and observed more features that showed evidence of agriculture. We documented two massive enclosures; one being a trail that is said to mark the *ahupuaʻa* boundary of Puanui, and Puʻu Kehena along with several agricultural walls that ran horizontally across the landscape, shown in figure 2.

Site 3 is located between Sites 1 and 2 and near the base of Puʻu Kehena on west end of the Puʻu. This area was special as it held the only petroglyph *(kiʻi pōhaku)* we identified during our survey. We collectively agreed that the image is of the deity god Lono who is associated with agriculture.

The last analyzed sites were documented as a trail and multiple features near the third experimental garden, or as previously mentioned *Mala* 3. Site 4 and Site 5 (Figure 4) experiences extremely dry weather conditions in comparison to *Mala* 1 & *Mala* 2. However, there are many successful agricultural features that indicate there was mass production there as well as shown in our map (Figure 4).

Discussion

Based on the findings of what we found in the area it is highly likely that the Hawaiians living in the Puanui *ahupuaʻa* developed a unique, complex, and sustainable community. It is also apparent that the people living in Puanui desired to create positive

relationships with neighboring *ahupua'a* communities. The most obvious evidence for this can be seen in the amount of dedicated land utilized to growing plentiful amounts of food, which most likely provided more than enough for the people living there as well as other communities. It is likely that people from Puanui gave away excess food to strengthen relationships with their neighbors through trading for needed goods or services.

Based on the habitation along the coastline it seems that the people of Puanui shared a popular perspective that life was more easily sustained near the ocean. Most of the residential structures seem to have been near the ocean most likely for the purpose of ease of fishing and gathering, boating, hygiene, and recreation. It is possible that Hawaiians living along the coastline were able to make keen observations, which inevitably would lead to a deep understanding of the connections between changes in weather and seasons along the ocean, which translated to changes on the land for planting and harvesting.

Hawaiians of Puanui utilized every resource possible in order to be self-sufficient. Evidence of different planting techniques was visible and also changed with elevation making these agriculture productions complex. The landscape of leeward Puanui experienced several different weather patterns, which the people had to study and understand. It was a requirement that Hawaiians incorporated different styles of planting to accommodate various elevations. This shows complexity, flexibility, and resilience with changes in climate, weather, and quality of the land.

In conclusion, Puanui serves as a model in understanding the agricultural and community structures that were maintained in ancient times. Studies conducted in this *ahupua'a* can be used to compare and contrast with modern day land and social issues in the Kohala area and Hawai'i Island. This study provides further insight into the lifestyles of ancient Hawaiians demonstrating their values towards sustainability, resourcefulness, and environmental stewardship. Research has shown that the communities of Puanui and the North Kohala region were able to be self-sufficient and agriculturally sustainable despite comparatively limited resources and large populations.

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Punaui's Rain-fed Agricultural System

Jonah Ikaika Kapu

Wahi Kūpuna Internship Program 2013

2013 Cohort Kukui aʻā ku i Āpaʻapaʻa

July 8, 2013 – August 10, 2013

Puanui, North Kohala

Introduction

Many of years ago, *ahupuaʻa*, or land divisions, deemed crucial in the time of our ancestors. Land played a key role in being a self-sustainable resource for the Hawaiian people, which provided an abundance of staple foods for the districts of Kohala and Hāmākua. The Hawaiian people knew that "without land, there is no life" for reasons which is why they had such a *pono* relationship with the *ʻāina*, or that which feeds.

The importance of land is a theme of my paper, which will be presented through my research on the *ahupuaʻa* in the North Kohala district called Puanui. Families like the Kahaialiʻi ʻOhana learned from their *kūpuna* that Puanui and 32 other *ahupuaʻa*, that are also located in the Kohala district, were used as agricultural lots in the 1700s to sustain Kamehameha's elite.

In the historical era, this *ahupuaʻa* was used heavily for ranching (Uyeoka 2013:9). Today, Kamehameha Schools Bishop Estate is the present owner of Puanui, while the other neighboring *ahupuaʻa* are privately owned or leased by ranchers.

To better understand the historical significance of Puanui, I will be analyzing the land and boundary configurations as well as natural and cultural resources of this *ahupuaʻa*. Data for my research will come from oral histories and *moʻolelo*, historical documents and maps, and archaeological fieldwork.

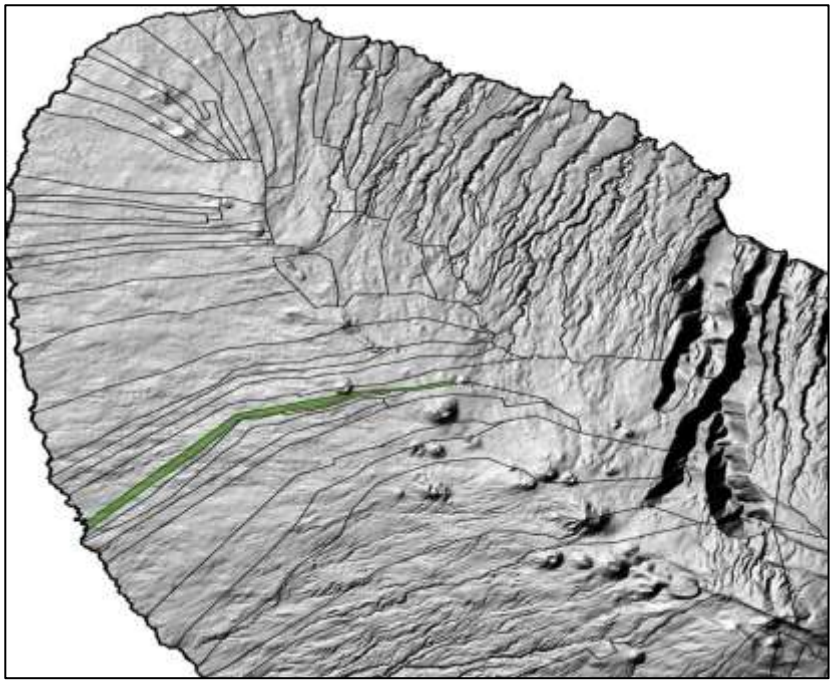

Figure 1. Puanui's location within North Kohala.

For my research, I will be focusing on two main topics. The first topic will be on the *ahupuaʻa* system of Puanui and comparing the size, structure, and resources. The second topic will focus on the agricultural system of Puanui. I will be looking at the production of food that was produced, availability of water, and environmental factors. I will also determining if Puanui shared food and water resources amongst each other. Water is extremely scarce in this region of the island; so I will be researching how Puanui

harnessed and gathered water, and if there were ditches and spring/wells located in the *mauka* area.

As I carried out my research I looked towards my *kūpuna* for guidance and protection as I kept this question in my mind; why is the *ahupuaʻa* system so significant to the Hawaiian people?

Historical Background

The name Puanui means "the abundant offspring, the great arrow, and the great flower" (Uyeoka 2013:10). Puanui is located in the Kohala District of Hawaiʻi and the runs from the coastline and extends to a 2,800 ft elevation that receives about 20-60 inches of rain per year (Ladefoged 2003). This *ahupuaʻa* is made up of many cultural sites including agriculture walls and trials. These agricultural walls run in a north and south direction and the trails runs from east to west. During Kamehameha's rule on the island of Hawai'i in the 1700s, Puanui was one of the 33 *ahupuaʻa* located in Kohala that feed his elite warriors (John Kahaialiʻi, personal communication). During the late 1800s, William Pitt Leleiohoku became the heir and owner of Puanui, which was handed to him by his mother Ruth Keʻelikolani (Uyeoka 2013). After Leleiohoku's death, Puanui was then passed down to Bernice Pauahi Bishop where it then became part of Kamehameha Schools Bishop Estate lands. Today, Kamehameha Schools are the owners but are leasing the land to Parker Ranch who is using the property for cattle.

Methods

In order to complete my research objectives, I had to conduct my research in three phases. The first phase was to review and summarize books, maps, and reports that talk about the Kohala rain-fed agriculture systems and the *ahupuaʻa* of Puanui. The next phase was to conduct fieldwork at Puanui such as surveys, site descriptions, and mapping of the *ahupuaʻa* and visible historical and modern sites. The last phase was to interview of people with ties to the area and who know history of the traditions and legends of Puanui.

Review and Summarize Documents and Reports

I have reviewed and summarized documents and reports that have been researched in the past about Puanui and the agriculture rain-fed system that is relevant to my research. I looked at past and recent books, journal publications, historical maps, and historical, archaeological, and ethno-historical reports. The purposes of this review was to: 1) understand and explain the history of Puanui and the rain-fed agriculture fields; 2) discuss the agriculture features and how they work under the conducts of the water resources available; 3) identify and locate the agriculture field system that are relative to the *ahupuaʻa*.

To guide this summary, keywords like "Puanui, Kohala, rain-fed agriculture field systems, *ahupuaʻa*, or dry-land agriculture features" were used to search online and for searching hardcopy books and reports about similar aspects that I have found in my research. Similar materials were collected and used to gain information and to discuss the purpose of the Puanui *ahupuaʻa* system.

Mapping and Surveying

Surveying and mapping took place at four locations (MALA 1, 2, and 3) with in Puanui. The purpose of the survey was to: 1) to understand and explain the landscape of the *ahupuaʻa*; 2) to locate potential evidence of archaeological features that were not previously documented. The purpose for mapping was to: 1) update any maps of Puanui; 2) to include accurate measurements of agricultural features in Puanui; 3) provide a current description of the agriculture fields in Puanui.

Methods like tape and compass, point-point mapping, GPS mapping, leap mapping, and plane table mapping are what used to map features in the *ahupuaʻa*. Each map provided a visual outline of the site or feature. And each mapping method can be done in a different way. Tape and compass mapping takes a data point as the center part of the feature and measures each point of the feature and transfers it on a sheet of paper. Point-point and leap mapping are similar but they do not use a data point. This type of mapping starts from a point on the feature and measures about five to ten meters (all depends on how big the site is) from point to point and then you transfer the measurements on a sheet of paper. GPS mapping is using a GPS to pin point each location of the feature and then you map it on a sheet of paper. Plane table mapping uses a data point of a feature where a table is setup to map the site. Flags are placed at significant parts of the site to map in. Then each flag is measured and mapped on the table.

Interviews

For this method, I interviewed people who are from Kohala or have worked in the area and also knew traditions and legends about Puanui or Kohala. A family member of mine by the name of John Kahaialiʻi Jr., was told by his *kūpuna* that Puanui was one of the *ahupuaʻa* that feed Kamehameha the great and his elite. I also spoke to Uncle Ala Lindsey, who was a *paniolo* rancher in the neighboring *ahupuaʻa*, and who now works for an organization called Ulu Mau Puanui. In addition, I talked story with Aunty Kehau Marshall whose family is from Kehena and also works for Ulu Mau Puanui. The purpose of the interviews was to: 1) document oral history that is not recorded in books; 2) gain a first hand perspective of how the landscape changed over time; 3) compare and contrast each individual's traditions and legend.

Results

In this section, I will present the results and findings during our three field weeks. The first part will be on the boundaries of Puanui. The second part will be on the agricultural field system and sites we mapped. Lastly, this section will look at the water resources in the area.

Ahupuaʻa System and Boundaries

Puanui is just one of the 33 *ahupuaʻa* from ʻUpolu to the north to Puʻu Kahua to the south that comprises the Kohala Field System (Uyeoka 2013:31). The *ahupuaʻa* of Puanui is located along the west region of North Kohala and borders Kehena 2 *ahupuaʻa* to the north and Puaiki *ahupuaʻa* to the south. According to Ladefoged and Graves, Puaili (Puaiki) is grouped with Puanui based on the common name. However, on the basis of an area being cut off of another, Puaili is grouped with Kiʻiokalani and Puanui is grouped with Kehena 2 (Ladefoged and Graves 2007: 270). In our interview with Uncle Ala and

Aunty Kehau, they stated that the boundaries of Puanui starts from Wawahonu Bay (*makai*) and ends in front of Pu‘u Lio (*mauka*).

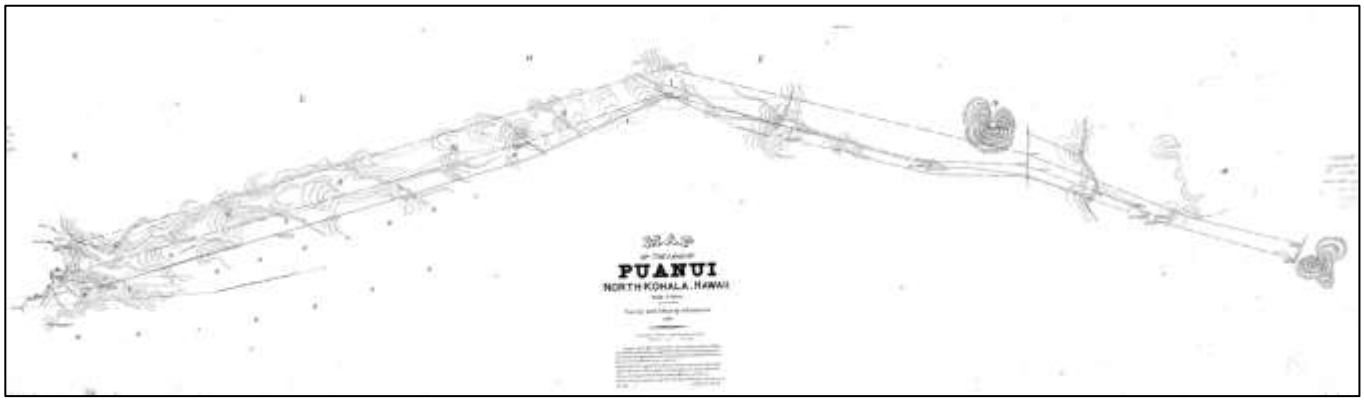

Figure 2. 1901 map showing Puanui Ahupua‘a boundaries and ancient roads by A.B. Lobenstein, (Register Map 2104).

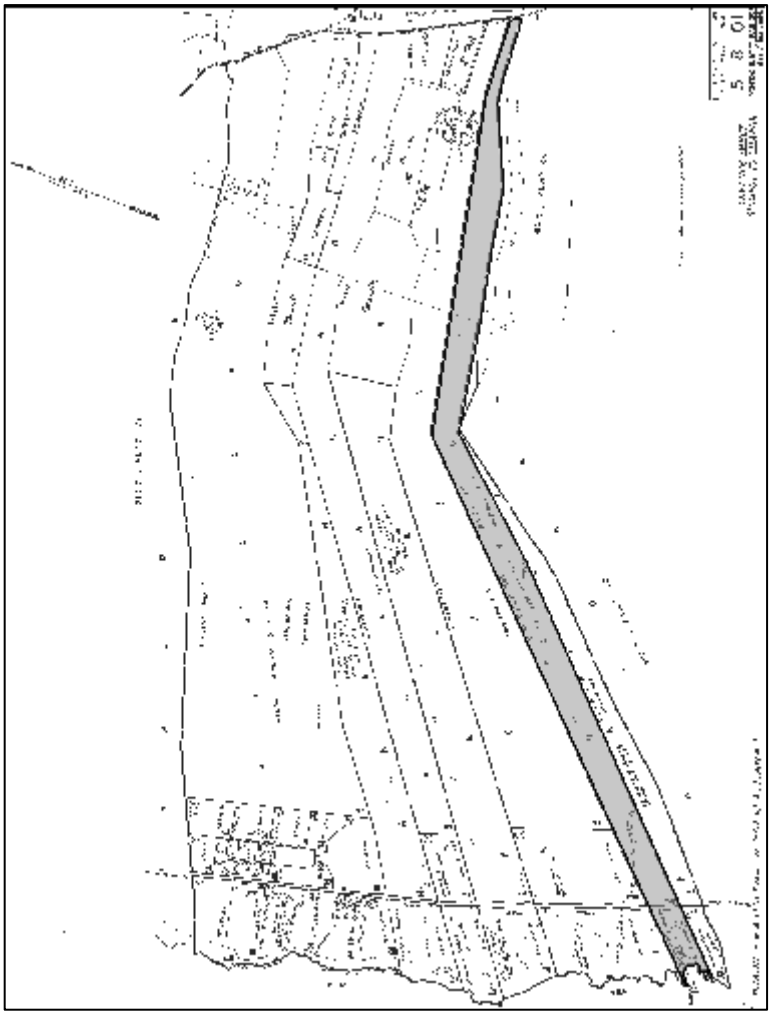

Figure 3. TMK map with the *ahupua‘a* of Puanui highlighted in grey.

They also confirmed that Pu‘u Kehena is located within the *ahupua‘a* of Kehena 2 and is not in the same *ahupua‘a* as Puanui. The natural features that are boundaries for Puanui are Wawahonu Bay, which was stated earlier, Pu‘u Kehena, a cinder cone located further up *mauka* bordering Puanui and then the most *mauka* boundary of Puanui ends at the front and base of Pu‘u Liolio. Lastly, Uncle Ala stated that the *mauka* boundary of Puanui might include a spring near Pu‘u Liolio. Presently there are metal pipes that could be also indicating the boundary lines of Puanui.

Puanui Resources

The most common cultural resource in this *ahupua‘a* is the agricultural field systems. Previous research conducted by Ladefoged identifies, through the use of aerial photographs, 4500 agricultural walls and over 600 trails within 33 *ahupua‘a* in North Kohala (Ladefoged et al. 2003:927). Through our survey within Puanui we observed that these field systems are made up of terraced agricultural walls, mounds, and trails. Previous research has supported our findings that the agricultural walls run from north to south. These walls varied in length but were generally constructed two to five courses high and with measurements of 0.5 meters to 2.0 meters wide and 1.0 to 2.0 meters in height.

During our interview with Uncle Ala, he shared that the weather stations located at each experimental garden provided information on the amount of rainfall in that particular region of the ahupua‘a. The results of the stations have shown that Mala 1 and Mala 2 receive the most rain and Mala 3 receives the least amount. Uncle Ala also shared that due to the lack of rain and water resources near the lower and drier region of the *ahupua‘a,* mounds were used, to keep the moisture in the soil. Uncle Ala believes that the process of dryland planting required clearing the land of rocks, which were then piled on the side to be used to construct the agricultural walls. During this process, some of the mounds we indentified could have possibly been formed during the building of the agricultural walls as well. While the other mounds we identified looked purposefully constructed for agricultural uses. He also stated that our *kūpuna* used the horizon to build and level the walls as this method is still used by cowboys and other rock wall builders in Hawaii. In addition, Uncle Ala explained that the agricultural walls were made to block the strong winds from damaging the crops.

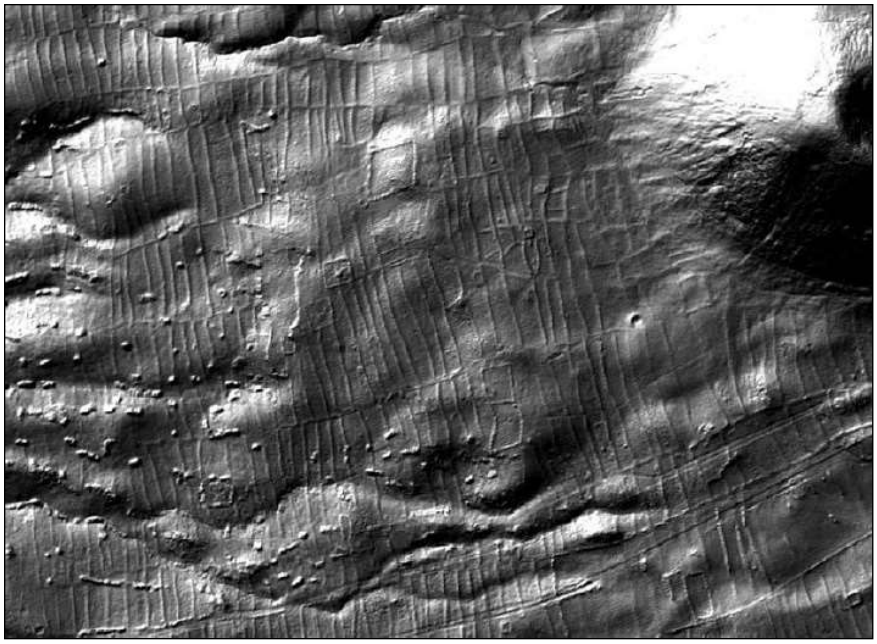

Figure 4. LiDAR image showing the Leeward Kohala Field System in a portion of Puanui and surrounding *ahupua‘a*.

Another important resource in the *ahupua‘a* of Puanui is the trails. During our survey we documented two trails (PUANUI 2C and PUANUI 4A). The trails run *mauka* to *makai* (east to west) and, through research, the trails serve as the boundary lines between two *ahupua‘a*.

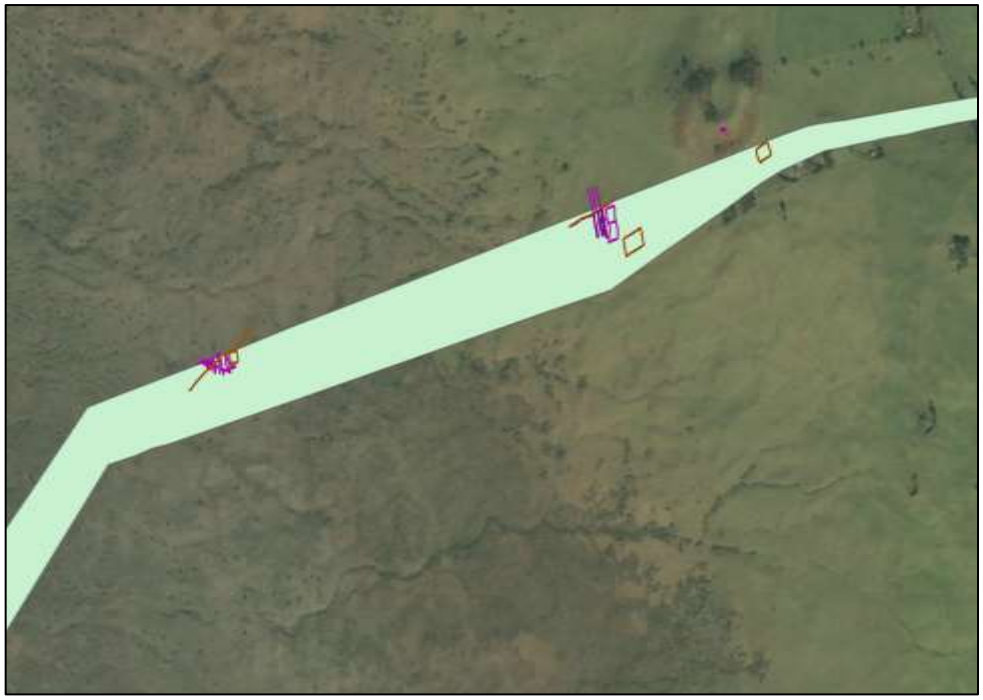

Figure 5. GIS map made by Isaac Pang of the three *mala* in Puanui.

The trail (PUANUI 2C) was very visible to the naked eye and measured 1.4 to 2.5 meters wide with each alignment measuring 0.1 to 0.5 meters wide. The walls were approximately 0.5-1.64 meters thick and 0.4 to 0.55 meters high. Through our survey we identified eight terraces that were situated and abutting both sides of the trail walls. However, the walls did not align with one another beyond the trail walls indicating two separate agricultural complexes.

The most *makai* region of our second documented trail (PUANUI 4A) began at a *kiawe* tree, which was situated in the middle of trail way. The trail is widest near the *makai* end and becomes narrower as it travels up *mauka*. There are many agricultural walls along both side of the trail, similar to site PUANUI 2. As the trail heads into a gulch and back up into site PUANUI 5, there are stones that are situated that form steps along the face of the gulch. The trail is clear and visible at the *makai* end and as it heads *mauka* it becomes obscure. The trail walls measure from approximately 15 meters long, 0.3 to 0.4 meters wide and 0.3 to 0.5 meters high.

Puanui Water Resources

During our three field weeks, we did not find any springs wells or ditches. However, through research, a historical map shows a spring that is near the base of Pu‘u Liolio, and as mentioned previously, may possibly be the *mauka* boundary for Puanui.

Figure 6. Historical maps showing water resources around Puanui

During our talk story with Uncle Ala, he mentioned that during the ranching days he would horseback to the spring because cars could not drive to it, it was wettest part of the *ahupua‘a* and the rains would pour heavily in the area creating a grassy swamp. Rain is the main water resource for Puanui and according to Uncle Ala, the winds from the northeast would bring the rains from Maui to water the fields of North Kohala. In the article of Ladefoged and Graves, it states that the leeward Kohala field system gets 750-1900 mm of rainfall annually and that the ridgeline of the Kohala Mountains affects the rainfall (Ladefoged and Graves 2000:429,776). Climate and elevation plays an integral part in the rainfall of Puanui and when temperatures decrease, rainfall increases rapidly (Kagawa and Vitousek 2012:166).

Discussion

In conclusion, North Kohala was once a productive resource for the people of Kohala and its chiefs. Also, it is a unique place and holds a lot of energy that I felt while our three weeks out in the field. These field systems were engineered to mass-produce crops on an extremely large scale and from our observations we were able to identify the complexities of the field systems within Puanui. The evident construction of agricultural walls and mounds indicates the ingenuity in dryland agriculture. During our survey, the agricultural walls and mounds within sites PUANUI 2 and PUANUI 5 showed similar and diverse qualities. In site PUANUI 2, the agricultural walls were a prominent feature, which indicates the walls were mainly utilized to grow crops. In comparison, site PUANUI 5 also had agricultural walls but was comprised of a large amount of mounds scattered through the site. This observation confirms Uncle Ala's statement regarding the use and function of mounds for planting methods in drier regions.

During my research, I have found that the 33 *ahupuaʻa* the dryland field systems comprised of walls and trails that run in the same direction and the trails were actually the boundaries of each *ahupuaʻa*. During the making of our GIS map of Puanui and the GPS maps we made on the trails (PUANUI 2C and PUANUI 4A), the results showed that the trails lined up with the boundaries. Also, PUANUI 2C shows that the walls on each side of the trail were different and didn't line up together. These results lead me to conclude that the walls were in different *ahupuaʻa*.

Also, with limited water resources, methods were utilized to compensate for dry conditions making it possible to grow crops in these regions. Therefore, the construction of mounds, we found in site PUANUI 5, helped to keep the moisture in the ground because these areas experienced very little rainfall, according to the weather station data and personal experiences shared by Uncle Ala. The mauka region that experiences more rainfall, such as site PUANUI 2, utilized terraced walls to serve as wind breakers to protect the crops from damage.

But the biggest question about Puanui is the *kiʻi pōhaku* site between mala 1 and 2. Research at this site leads us to believe that this site is significant because it is connected to the god Lono, the god of agriculture. At this site, we found an image on the *pōhaku* that looks like the *akua loa*, which is associated with Lono and *Makahiki* season. However, more research needs to be conducted about this site, so it would be a suitable research project in the future.

Throughout my research at Puanui, I have held a great respect for the place and was very proud of the work we have done there. I feel that this was not only important for me but also the community of Kohala. The reason why I say this is because our history is being lost and by doing the projects, it can bring back all that we have lost and pass it down to our future generation.

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Revivifying Ancestral Concepts in Hopes of Present Day Fruition

Isaac Pang

Wahi Kūpuna Internship Program 2013

2013 Cohort Kukui aʻā ku i Āpaʻapaʻa

July 8, 2013 – August 10, 2013

Puanui, North Kohala

INTRODUCTION:

Have you ever thought about how your ancestors obtained food? Before grocery stores and corporations, how do you think they ate? Today, we find the concept of field systems to be a relevant explanation, as these agricultural field systems were intensely cultivated and harbored produce for their communities. Recent research has shown that the Kohala Field System fed thousands of people across Hawai‘i. This field system inspires the concept of contemporary self-sustainability.

‘Āina was/is perceived as “the land that feeds.” It is with this mind-set that ancient Hawaiians utilized their resources to the fullest extent. In order to learn more about the engineering feats of our ancestors and how they constructed and utilized dryland field systems, our *hui*, Kukui a‘ā ku i Āpa‘apa‘a, conducted archaeological field work on Kamehameha Schools land in Kohala. The area we documented is situated towards the southern side of the Kohala Field System. Specifically, the *ahupua‘a* we worked in was Puanui, which can translate to mean “big flower”, which could represent the mass amounts of food being produced in the area, particularly *‘uala,* which has a purple flower that grows on the vine. This crop was, and still is, a staple to the Hawaiian diet. Also, because of the dry rain-fed climate, ‘*uala* was an abundant crop grown in Puanui.

In order to better understand the Kohala Field System and its significance both in the past and today, my research project examines maps and other historical documents which display changes in the landscape over time in Puanui. I compared historical maps to present day maps in in order to gather evidence of a traditional, historic, and modern ways of life. I will also present brief history of the land through boundary descriptions, and changes in natural and cultural resources in Puanui.

By using the Kohala Field System as an example, I hope to show our communities how we can use this concept of self-sustainable today. Through this dream, communities can generate curriculum based on teaching *keiki* to utilize the natural and cultural resources in Hawai‘i to help live in harmony with the *‘āina*.

METHODS

Methods included in my project were: background research, ethnographic research, archaeological methods, and lab methods. Background research consisted of examining historical maps from different time periods (traditional and historic). This included using online databases such as USGS and DAGS. Understanding these maps provided insight on how important landmarks have changed over the century.

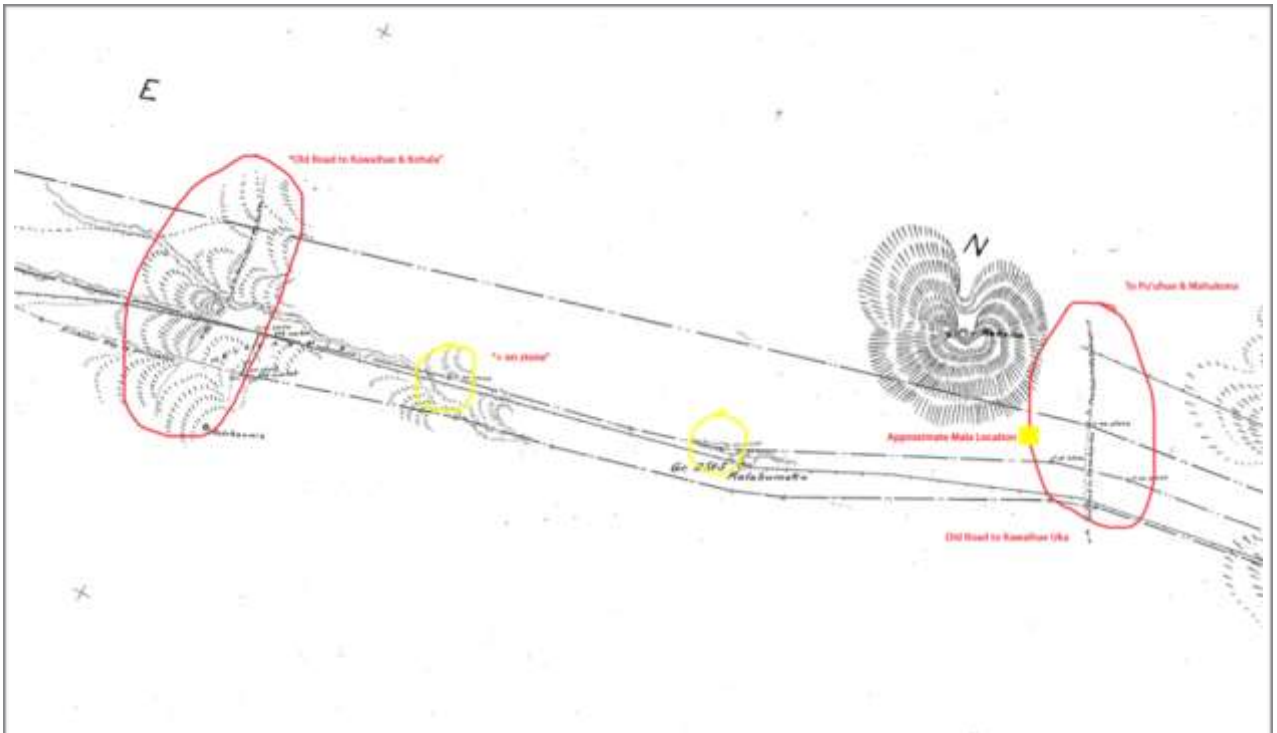
Ethnographic methods, is a process that includes interviewing and talking story with *kama‘āina* or people who are familiar with Puanui. These people included, Uncle Ala Lindsey, Aunty Kehau Marshall, and Peter Vitousek. Having this view of the land gave an “inside” point of view, that only the people familiar with the area could testify to.

Archaeological methods used included mapping of features surrounding *mala* areas where there are experimental plots that simulate terraces and growing techniques from this land. Every feature mapped was given a name that correlates to the nearest *mala* or trail. Some sites were modern, and some were traditional. Mapping methods included: GPS, point to point, plane table, tape and compass, and profile mapping.

Lab methods in my project were straightforward. I used the GIS program to overlay GPS points (that were taken in the field) and put them on a base map of Puanui.

Then, I highlighted the *ahupua'a* of Puanui to compare features and the boundaries. This method created a modern map of Puanui and proved useful in comparing historical maps. Another lab method used was Photoshop. With this program, I was able to circle historical features and highlight them effectively. In addition, the program proved useful in rewriting place names that were misspelled or hard to read.

RESULTS:



- Figure A: Lobensteins 1901 Map

USGS and DAGS websites provide the public with access to maps from both the historic and traditional eras. The maps included in my project were: a 1901 Survey and Map of Puanui and a 1902 Tracing of a 1901 map, both done by Lobenstein. The last map included in my project was from a program called Geographic Information Systems (GIS). I was most interested in seeing how the land has changed over the past 100 years. In Figure A, you will see a zoomed in portion of Lobensteins 1901 map with my results in red and yellow. In red, I circled the historic roads that ran through Puanui. One was the old road to Kawaihae and Kohala, the other, a road to Kawaihae Uka. These roads have not been used in years as there are no visual remains of them in Puanui. Another road shown on this map (Figure B) was a top road that lead to Halawa. The yellow was to

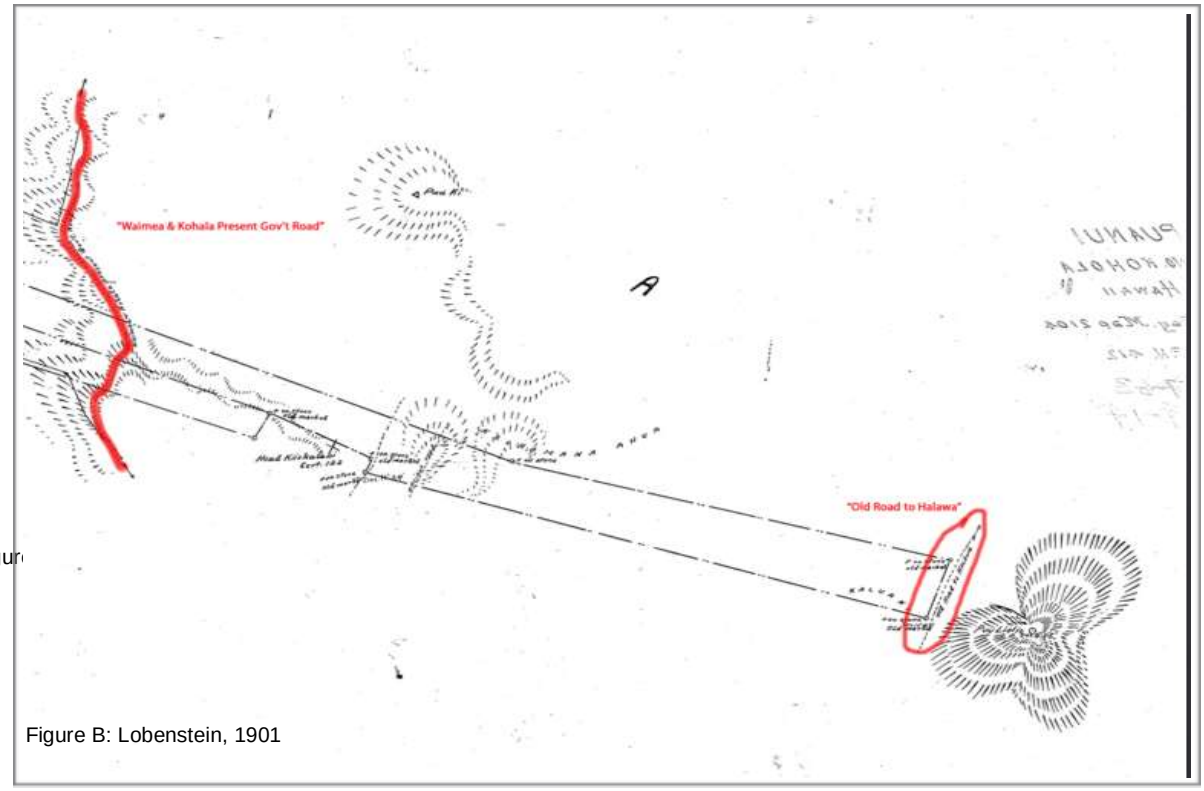


Figure B: Lobenstein, 1901

show boundaries or landmarks that could still be there today. These boundaries come in forms of rocks. Another item highlighted in yellow is the experimental *mala* that is situated nearest the Old road to Kawaihae/Kohala. I added this feature as a reference to show how close the present day *mala* is to the historic road.

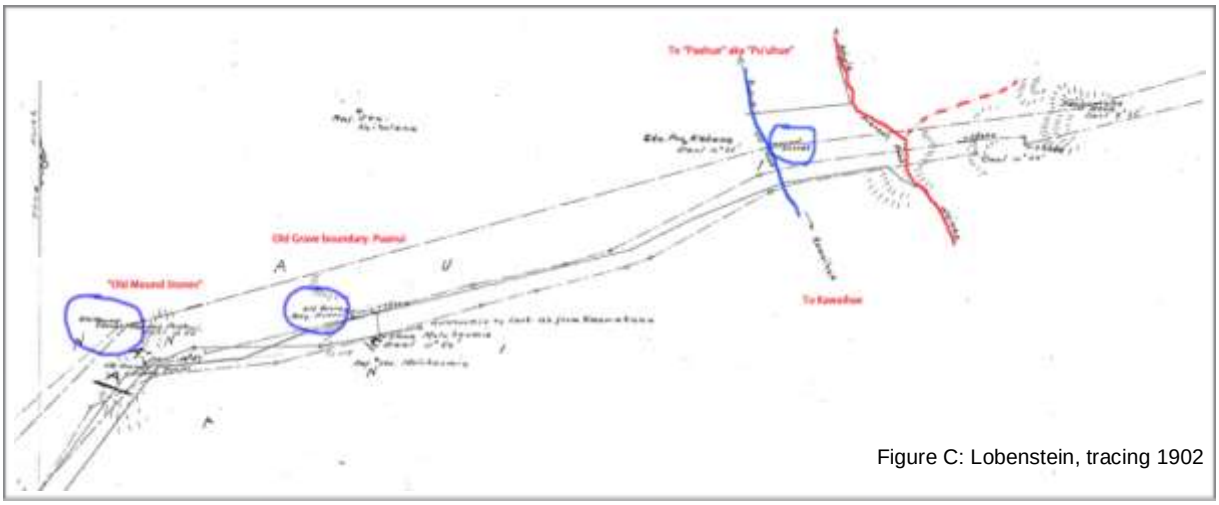


Figure C: Lobenstein, tracing 1902

The next map I analyzed was a 1902 tracing of a 1901 map done by Lobenstein (Figure C). In blue, I circled important boundary markers that could or could not still be there today. These boundary markers differed from that of the first map in that they were more precise with actual locations. Although most of the boundary markers were represented by mound stones, one marker was represented by an old grave. This grave was, and could possibly still be, located on the eastern border between Puanui and Puaiki. Other things I did on this map was found in red, mainly dealing with rewriting hard to read items like "Old Mound Stones" and "Old Grave Boundary". Another valuable insight maps can show us are mistakes. On this map, it shows a road leading to "*Paahue*". This is a mistake as that road leads to "Pu'uhue" which is a ranch north of Puanui.

What I was most interested in was using GIS software to effectively show how the land has changed as compared to the 1900 maps (Figure D). For this part of our research we obtained GPS points based on boundaries of sites and features that we mapped. These points were then uploaded to the GIS program and georeferenced

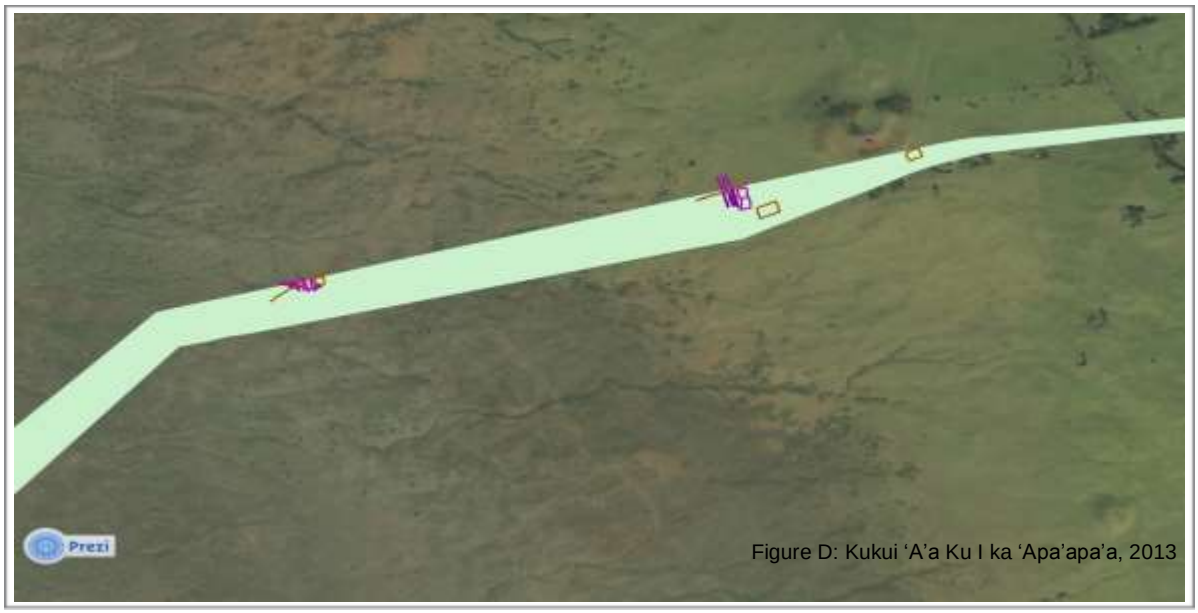


Figure D: Kukui 'A'a Ku I ka 'Apa'apa'a, 2013

accordingly. After this, I brought up the base map that the program already had and made it show the *ahupuaʻa* surrounding Puanui. I then highlighted only Puanui and gave colors to the GPS shapes. The brown rectangles represent the *mala* I mentioned before. The line next running northeast to southwest positioned next to the middle *mala* represents the trail. Also, the purple rectangular enclosure north of it represents features associated with the closest *mala.*

DISCUSSION:

Interpreting my data comes in form of answered questions. Some questions that arose dealt with old land marks, boundaries and features. Learning about them can re-inspire contemporary self-sustainability in our communities. Also other questions dealing with what was on the land in the historic, traditional, and present day eras. Figure A showed us the old roads to Kawaihae and to Halawa. This was interesting because the only way to get to Halawa today would be to go completely through Kapaʻau, Halaʻula and cut back towards the southeast. Although there were three or four roads cutting horizontally through Puanui, there are no remnants of them today. In fact, one of the roads is within feet of the experimental *mala*

Puanui. However, there are reasons why the old roads are no longer visible. For instance, by taking into consideration the age of the sites and what was on the land since then can help us better understand why we do not see them. In the ranching era we found that many of the enclosures, mounds, burial sites and even Puʻu Kehena have been blighted by cattle. This was evident even today as there are cattle still roaming around in Puanui and Kehena. Sometimes we would go out in the field and cows would be walking over all the sites and features we were mapping. For these reasons, much of the sites were likely to have been altered by cattle. Having this information known to us gives a perspective on the usage of the land over 100 years ago.

The "take home lesson" from my project is the importance of knowing the land you live on. It's important to stress the idea of maps and how much we can learn from old maps, new maps, and even maps we create. In modern society, we take advantage of our land by not treating it with the proper respect that it needs. We find that our ancestors that lived here prior to western influence were completely self-sustainable and independent from outside help. Since then we have gone to being fully dependent on imported goods. Understanding how the Hawaiians utilized the land in the past can help us return to this way-of-life by using their methods and knowledge in our everyday life.

In this research I learned a wide array of skills and techniques, along with the important history of the Kohala Field System. Skills and techniques were directly learned through the process of using Photoshop and GIS. I learned about the good that can be done by mastering these programs and using it to save our ancestral sites. This research opened my eyes on the history of the *ahupuaʻa* of Puanui and the past features that are overlooked because we can no longer see them. This leads into the next question of what could we find out with future research?

Some questions I've wondered about relates to water resources and *ahupuaʻa* boundaries. Being in the sun everyday lead us to question where the *kamaʻāina* got water to keep them hydrated. There are no streams for miles around Puanui so we believed that they carried a load of water from the mountains or the coast. I also wondered about why

the *ahupua‘a* boundaries in Kohala are configured the way they are and hope to research this question in the future.

Again, revivifying this concept of self-sustainability can help the community immensely with bringing back traditions that were used by the early inhabitants of Kohala. These practices deemed extremely successful in supporting the lives of thousands of Hawaiians. This was important to me for the same reasons, in hopes of creating more conscious community members and also teaching the *keiki* these ways. The next generation is a top priority as they hold the future of the land. Mahalo for this opportunity to help keep the history of Kohala alive!

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