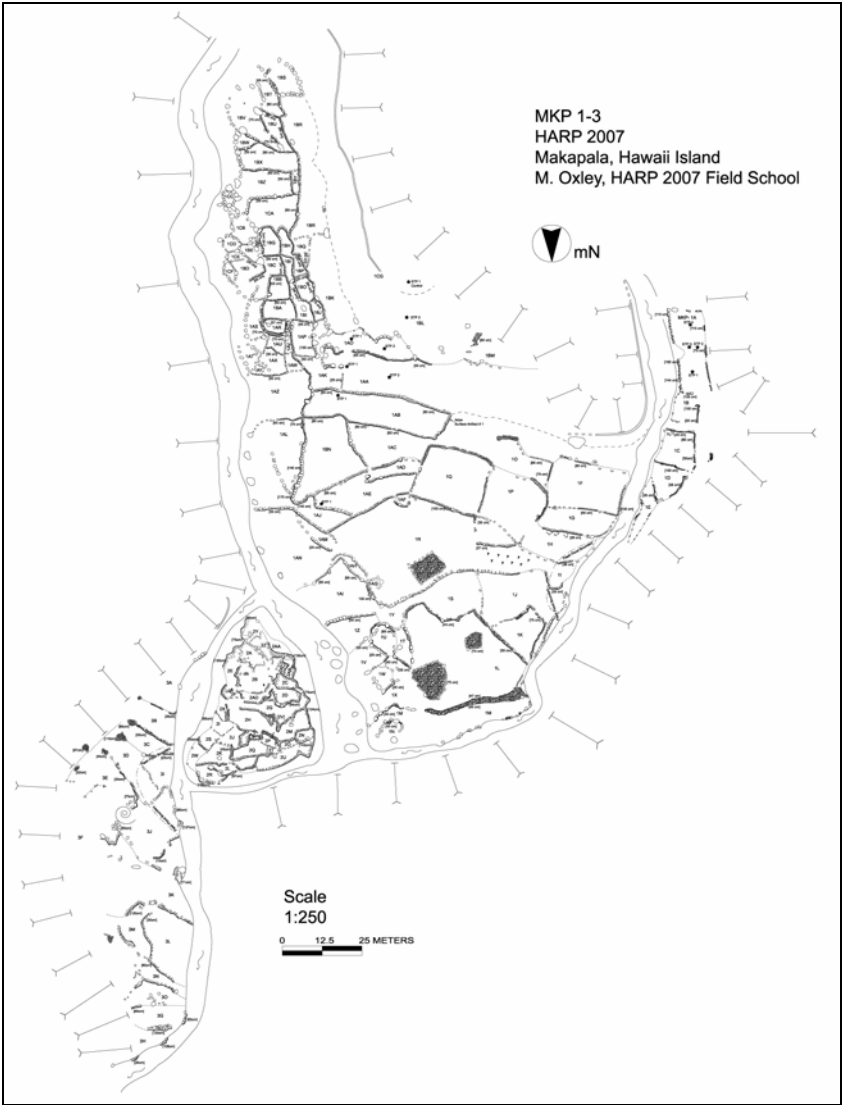


An Archaeological Survey of Halawa and Makapala *Ahupua'a*, North Kohala District, Hawai'i Island: Hawai'i Archaeological Research Project 2007

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Abstract

This report describes research conducted between June 5th and July 17th, 2007 as part of an archaeological field school in windward North Kohala District, Hawai‘i Island directed by Mark D. McCoy and Michael W. Graves and sponsored by the University of Hawai‘i, Mānoa. In this season of the long-term Hawaii Archaeological Research Project (HARP), intensive archaeological survey and limited test excavations centered on sites within 8.14 hectares (20.79 acres) of gulch land primarily located within Halawa and Makapala *ahupua‘a*. In total, 41 complexes and single features comprised of 378 total individual features were recorded. Most of these complexes were made up of irrigated agricultural terraces although the size, construction, and manner of irrigation varied widely. In sum, nine test units and 22 shovel test pits were excavated to recover charcoal for radiocarbon dating, soil samples, and other evidence of prehistoric settlement and agriculture. The results of these laboratory tests will be the center of future publications.

Acknowledgements

We would first like to recognize Surety Kohala Corporation, New Moon Foundation, and George and Alexa Russell for granting us permission to conduct archaeological research on their property and to thank each of them for their support of archaeology and education in Hawai‘i. We also wish to thank Michael Gomes (Surety Kohala) for guiding us to several agricultural complexes described here and for providing us with vital information pertaining to local history and prehistory. In addition, we thank Susan Lofton (New Moon) for her support and for organizing this summer’s public outreach talk. We would also like to recognize and offer our *mahalo* all the special guest lectures who gave up their time to share their *mana* with our students: Fred Cachola, Julie Field, Kathy Kawelu, Patrick Kirch, Thegn Ladefoged, Peter Mills, and Nani Swenson. Thanks also to Vikki Creed of Waihona ‘Aina for her help in locating historic documents and to James Flexner for his help identifying historic period artifacts.

Much of the success of this year’s field school is due to the talent, hard work, and professionalism of our instructors: Alex Baer, Robin Conners, Mark Oxley, and Jesse Stephen. A further special thanks to last season’s co-director Julie Field for helping us reach our research goals and educational goals this season. Finally, we have been fortunate to have a fantastic group of students whose enthusiasm and dedication moved the research forward. We expect great things from them all: Teresa Davan (University of Hawaii, Manoa), Mieko Griffin (California State University, East Bay), Quynh-Chau Ha (Emory University), Kristyn Hara (University of California, Berkeley), Roxy Marsillo (San Jose State University), Eve Okura (Brigham Young University), Alex Perrone (University of California, Santa Barbara), Lilli Richards (University of New Mexico), and Sabreina Slaughter (Lycoming College). This research was supported by the National Science Foundation Research Experience for Undergraduates Program (Award # SES-0552977).

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Chapter 1. Background

Introduction

The following report describes archaeological survey and small scale excavations conducted between June 4th and July 17th, 2007 as part of the Hawaii Archaeological Research Project (HARP) within the North Kohala District of Hawai'i Island (Figures 1 and 2; Appendix I). The research goals of the project center on describing and explaining the region's unique social history through examining long-term changes in traditional Hawaiian agriculture. The educational goals of this work centered on training students in the methods of archaeological fieldwork through participating in an active research program.

Due to the region's history of sugar cane production from the 1880's to 1970's, the best examples of archaeological sites minimally impacted by plantations are currently found within a network of gulches that dissect the eastern flanks of the Kohala Mountains (Figure 3). Our research to date has focused on sections of gulches within two major study areas corresponding to the community territories (*ahupua'a*) of Halawa and Makapala. As we outline below, the majority of features we have encountered and recorded in these gulches were likely used for irrigated agriculture. However, the techniques employed in the prehistoric past to farm these locations are remarkable for their variety, the density of garden plots, and engineering.

The following report is simply a record of work completed and sites recorded this season. Many of the descriptions given are drawn directly from field notes and student papers. We have made an effort to standardize the language used, correct errors, and present it in a format that will be familiar to professional archaeologists. Future publications will present the results of analysis such as radiocarbon dates and soil nutrient analysis and provide a more accessible, synthetic picture of Kohala's past.

Windward North Kohala Environment

There are several key environmental factors relevant to our study of traditional Hawaiian agricultural practices: rainfall, soils, slope gradient, stream flow and springs. Rainfall in the study area is high – 1,500 mm annually in coastal areas to +5,000 mm annually in the uplands – and varies seasonally with most rain in the winter months. In the study area, gulches that feed in to Hapuu, Kapanaiia (also labeled as Kapana on modern maps), Keokea, and Neue Bays – also referred to here as the “eastern gulches” since these are the easternmost of network of gulches on the windward slopes of the Kohala Mountains – have higher average rainfall due to their elevation and the ordination the land in relation to dominate northeastern tradewinds.

The geologic age of the parent material for the volcanic soils has been identified by soil scientists and archaeologists as an important variable considered by ancient farmers in Hawai'i (Figure 4). Soils derived from relatively young volcanics such as the Hawi series (120 to 260 kya) are more likely to have high nutrients whereas soils derived from older series volcanics, such as Pololu (260 to 500 kya), are more likely to have been depleted over time. This pattern is reversed in cases where older soils are rejuvenated by colluvial processes, such as the geomorphologically active gulch network in the study area, or when made unfit for agriculture by dramatically high rainfall, such is the case with Hawi derived soils at the higher elevation range of the North Kohala Field System (Vitousek *et al.* 2003; Vitousek *et al.* 2004). Interestingly, the eastern gulches' watersheds are slightly different from one another with Hapuu and Kapanaiia Bay drainages dominated by Pololu in the lower elevations (0-750 ft asl) and Hawi in upper elevations (+750 ft asl), while Keokea and Neue Bay consistently drain soils capped with Hawi derived deposits.

The slope gradient of the landscape varies across the study area with most falling in to a 6% to 11% grade, with as low as a 4% grade (see Table 1). Not surprisingly, grade tends to increase in the

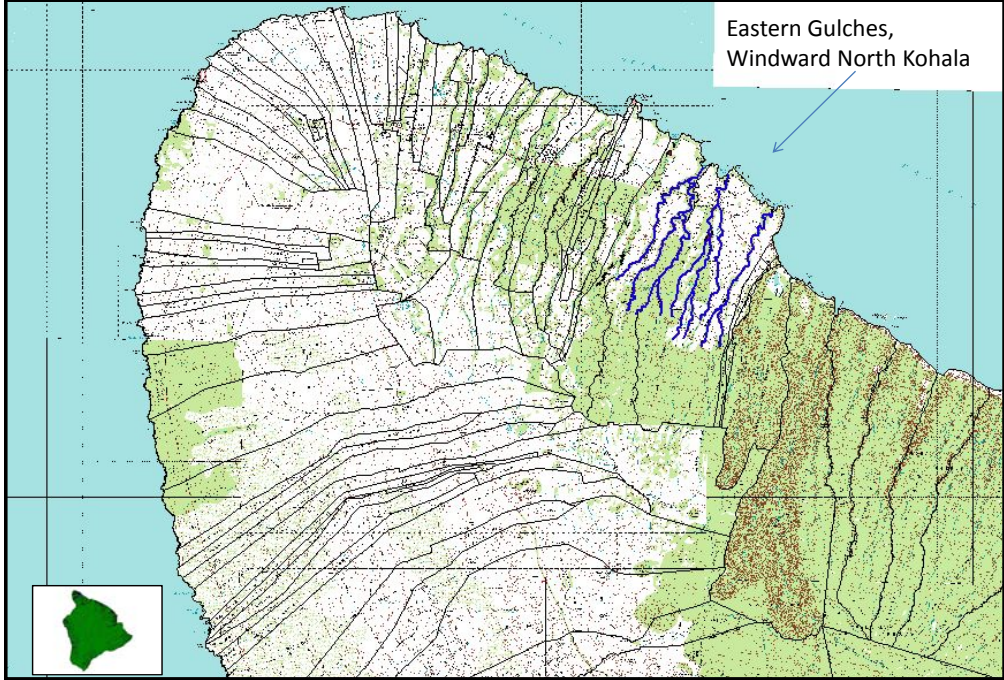


Figure 1. Windward North Kohala District, Hawai'i Island.



Figure 2. HARP 2007 Study Areas, North Kohala District, Hawai'i Island.

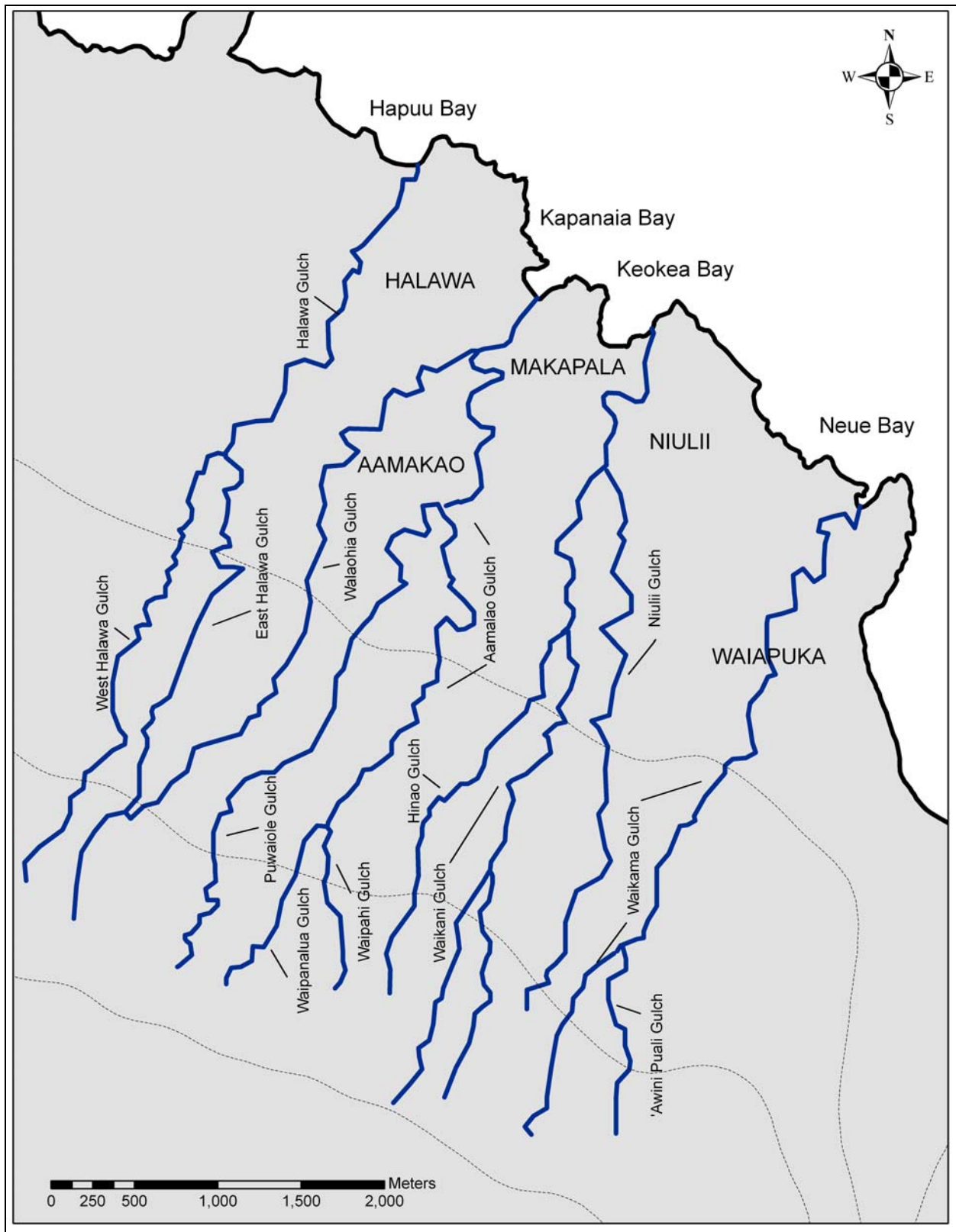


Figure 3. Gulches and Community Territories of Windward North Kohala District, Hawai'i Island. 500' above sea level interval contours shown. Division between "upper" and "lower": 750' asl.

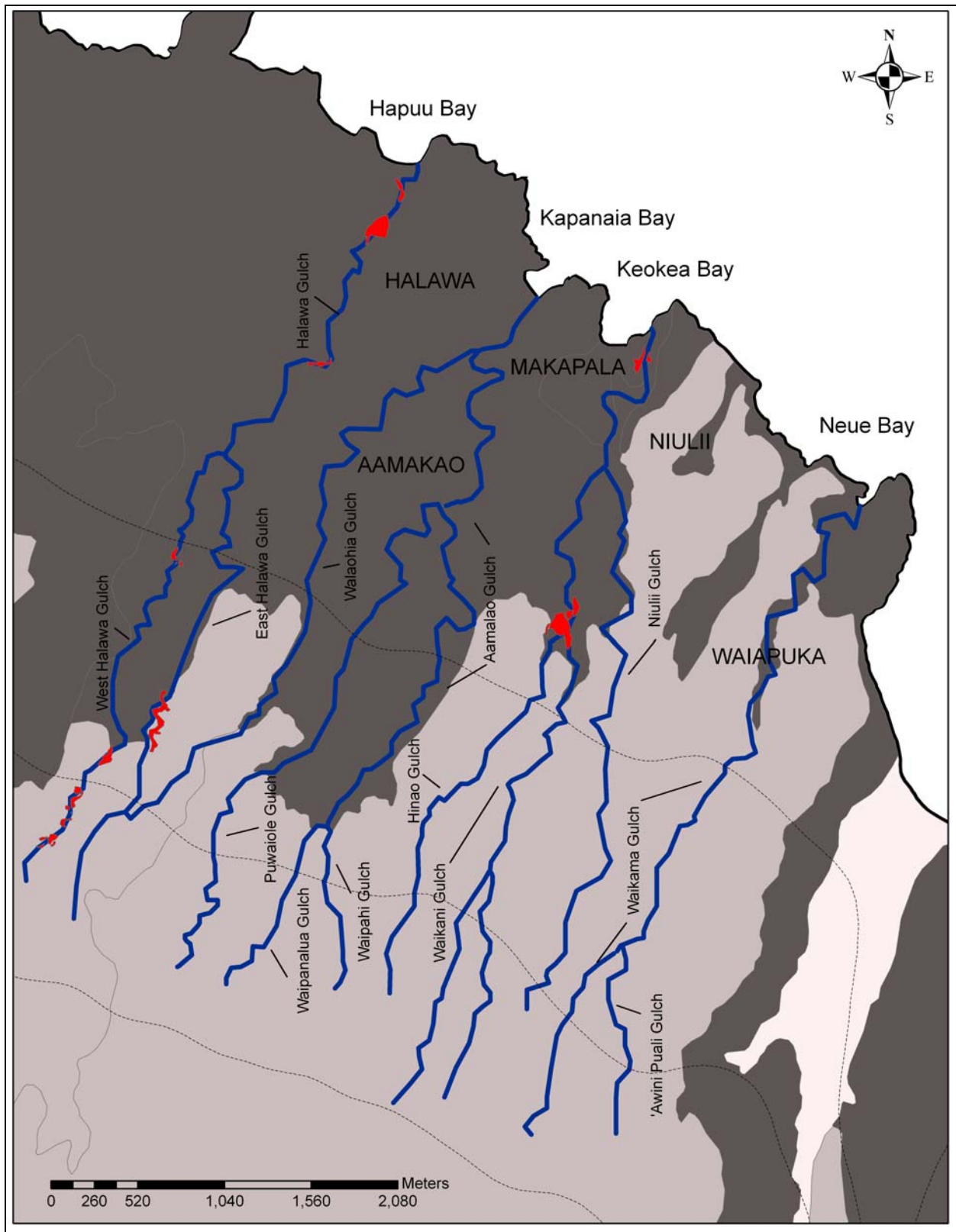


Figure 4. Ages of Geologic Substrates in Study Area. Pololu Series shown in dark grey; Hawi show in light grey.

uplands toward the crest of the Kohala Mountains. Although we have yet to test to relationship between grade and the density of irrigated fields construction over time, it is likely that the gentler grade, lower elevation sections of the gulches would have primary locations for cultivation.

Table 1. Grade of Slope for Eastern Gulches, Windward North Kohala, Hawai‘i. Estimated slope based on length of gulch shown in Figures 3 and 4. Slope is calculated here as ‘rise over run’ (for example 1 m of elevation / 9 m of linear distance = 11% grade).

Gulch Name	Grade	Elevation Range (masl)	Length (m)
Halawa	4%	0-100	2,572
Walaohia	6%	40-300	4,340
Puwaiole	7%	100-400	4,059
Niuli‘i	7%	0-353	4,870
Aamakao	7%	0-400	5,874
Waikani	8%	60-460	4,779
Waikama	8%	0-423	5,217
West Halawa	9%	100-400	3,344
East Halawa	11%	100-400	2,761
Hinao	11%	117-400	2,677
Waipuhi	11%	289-400	1,052

Two factors make it difficult to assess individual streams in terms of intra- and inter-annual variation in flow, or the location and relative importance of springs, based on existing data. First, any measurements taken after 1906 may be influenced by the Kohala Ditch, or may in fact be giving statistics on ditch flow rather than the stream (see for example, USGS 16752000, “Kohala Ditch at Niulii Weir NR Kohala, Hawaii, HI,” National Water Information System, USGS, <http://nwis.waterdata.usgs.gov/hi/nwis/annual>). It is important not to underestimate the ditch’s impact on stream flow, indeed in its heyday the Kohala Ditch Company reported a flow of 4.96 million gallons a day with 1.0 million daily even in dry years (cited in Sterns and McDonald 1946:235). Second, natural springs in the area are likely the result of interbedded soils and thus do not follow a predictable spatial pattern. Major springs are noted on modern maps, but smaller springs, or less predictable springs, that may have been important in the past for fresh water and irrigation are not represented.

Previous Archaeology

The history of archaeology in North Kohala District begins with a turn of the century survey of ritual sites by J.F.G. Stokes of the Bishop Museum (Stokes 1991). This was followed in the 1960’s and 1970’s by a series of University of Hawaii, Mānoa archaeological field schools in leeward North Kohala at Lapakahi (Tuggle and Griffin eds. 1973) and windward North Kohala in Pololu Valley (Tuggle and Tomonari-Tuggle 1980). Unlike Stokes, later researchers recorded the full range of different types of sites encountered in their study areas. However, the windward half of the district has received much less attention compared with leeward Kohala academic research (Newman 1970; Ladefoged and Graves 2000; Ladefoged *et al.* 1996, 1998, 2003, 2005; Vitousek *et al.* 2004) and cultural resource management projects (Allen 1985; Barrera 1984, 1985; Burgett and Rosendahl 1991, 1993; Clark and Rechtman 2003, 2004; Corbin 2001, 2003; Denham *et al.* 1993, 1993; Dunn and Rosendahl 1989; Dye 2003; Dye and Maly 2001; D. Graves 1992; D. Graves and Franklin 1998; Hammatt and Borthwick 1986, 1990; Hammatt and Folk 1980; Kaschko 1982, 1984; O’Hare and Goodfellow 1994, 1995; Rosendahl 1980,

1983; Schilt and Sinoto 1980; Sinoto 1979; Spear and Chaffee 1994; Tonomari-Tuggle 2003; Wulzen and Goodfellow 1995; Yent 2000; see Figure 5). Significant work in the windward area includes an in-depth regional overview completed by Tonomari-Tuggle (1988) as well as several other surveys (Erkelens and Athens 1994; Tonomari-Tuggle 1988; Wolforth 2003). Nonetheless, with few exceptions, windward Hawai'i Island in general has seen much less research than leeward (see for example, see Cordy *et al.* 2005 on Waipi'o Valley). Over the past few years, several new projects – including the one described here – have been initiated to help correct this by conducting new surveys and excavations that will give us a better notion of the complete history of Kohala (Field and Graves in prep. a, in prep. b, in prep. c). This is especially important since North Kohala is one of the best preserved traditional districts (*moku*) in the Hawaiian Islands.

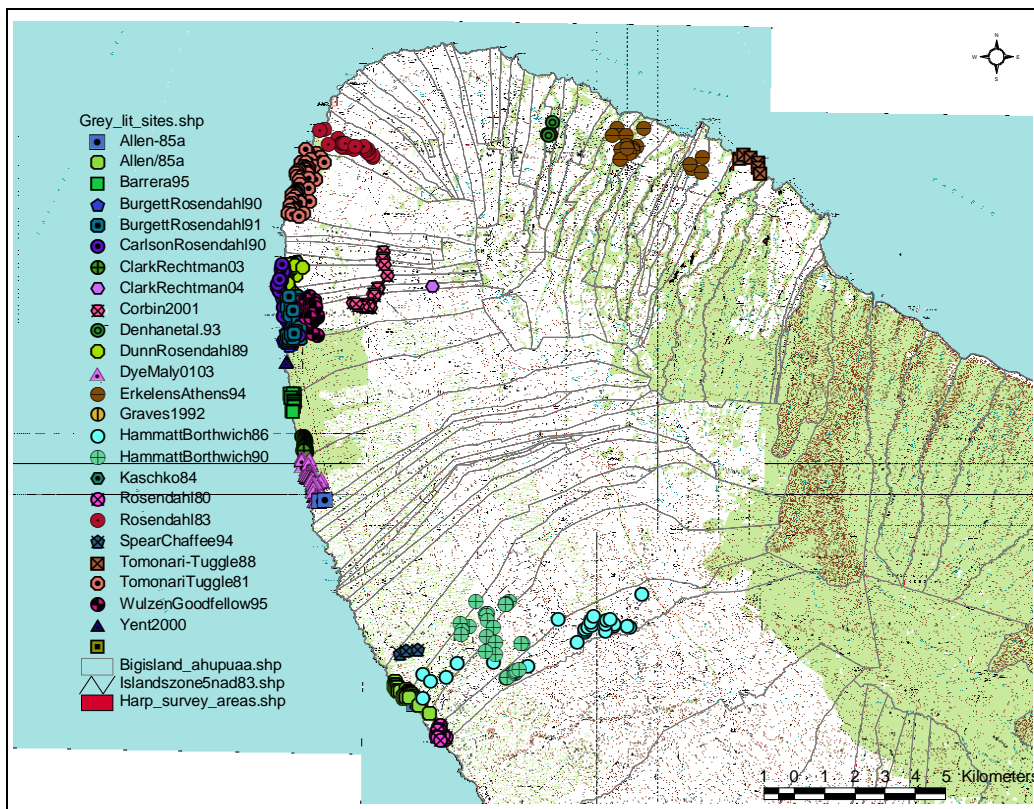


Figure 5. Sites Recorded in Recent Archaeological Studies of North Kohala, Hawai'i.

Historic Era Kohala

As the home of Kamehameha I, Kohala holds a unique place in the early history of the Hawaiian Kingdom and includes a variety of sites associated with the regent himself. In the years following the establishment of the kingdom, Kohala once again rose to prominence as a central place in the cultivation, processing, and export of sugar (see Schweitzer and Gomes 2003). In this project we have found two lines of evidence remarkably useful in detecting how these changes may have impacted the daily lives and fortunes of Kohala's residents: (i) mid-nineteenth century records of the Great Mahele land division and (ii) historic period artifacts and sites found within our study areas. We will discuss the results of the analysis of each in future works.

Project Methodology

Before we describe the results of this summer's surveys and excavations it is necessary to define a few terms used throughout the report. First, when describing architectural remains we use the term "feature" to denote a single structure. Features are mostly found in clusters of related structures called here "complexes." When a new complex was encountered on our survey it was given a designation according to the community territory (*ahupua'a*) it is located within and a number doled out in the order it was recorded. For example, HLW-1 is the first complex recorded within Halawa *ahupua'a* (see Appendix III for a list of *ahupua'a* name codes used in the project). Individual features are given letters, such as HLW-1A, HLW-1B, and so on. In the case of terraces – that is, architecture with three free-standing sides creating a flat surface – a feature designation includes both the retaining wall and the area behind it. Terrace complexes were lettered starting at the uppermost tier. When isolated features were encountered they were given the same kind of field identification designation as complexes (i.e., HLW-1), but no further lettering was necessary. Other common archaeological conventions are used as well, such as referring to arbitrary splits in excavations as "levels" and natural changes in deposits as "layers."

Functional interpretations are given for virtually every complex encountered. In most cases, the use was likely agricultural and in the case of irrigated terrace complexes the Hawaiian terms *lo'i* and *'auwai* are used to denote pondfields and ditches, respectively. Sites of habitation are difficult to identify in the study areas due to the poor preservation of material evidence indicators that signal domestic use like structures and food remains. Indeed, high rainfall and acidic soils mean artifacts made of bone, shell, or wood have little chance of surviving more than a few years in unprotected open-air sites. Thus, without extensive excavations to uncover *in situ* charcoal and stone features, such as hearths, the designation of a feature as habitation is based on a generalization regarding its form and location.

Finally, in this report we use several landform terms that we have found useful in describing the network of drainages in the area (Figure 3). First, we use gulch names given on the most recent USGS maps to refer to individual drainages although we have taken some latitude with the names since it is not always clear what name is appropriate after two gulches have converged. There are also a number of smaller unnamed drainages that do not appear on modern maps; we sometimes refer to these as gullies. Second, we have arbitrarily used 750 feet above sea level to demarcate a "lower" and "upper" elevation on the landscape. In descriptions of study areas approximate elevations are given to further bracket what part of a drainage we are referring to. Also, maps indicate magnetic north which at the time was 9.8° east of true north.

Chapter 2. Halawa Study Area

The Halawa Study Area is described below in four parts: Upper West Halawa, Upper East Halawa, Lower West Halawa, and Lower Halawa Gulch. In each section, the complexes and features found are briefly described followed by a summary of excavations. Appendix II gives a list of all artifacts recovered coded to individual excavation units.

UPPER WEST HALAWA GULCH, HALAWA AHUPUA ‘A

Survey Area: 3.458 hectares (1.4 acres)

Elevation (ft above sea level): 1,000-1,200

Sites Recorded: HLW-1 to -9, -28, -32, and -33

Excavations: HLW-4A-TU 1, HLW-28C-TU 1, HARP 2006 excavations (Field and Graves in prep. a)

Archaeological investigations in Upper West Halawa Gulch were carried out between June 4th and June 15th, 2007 (Figure 6). The geographic coordinates of control points within the study area were recorded using global position (GPS). Work began by assigning each site a field identification number (i.e., HLW-), clearing the area of vegetation, and then surveying the zone. Surveying included establishing datum points, filling out feature forms, and tape-and-compass mapping of the detailed features at each site.

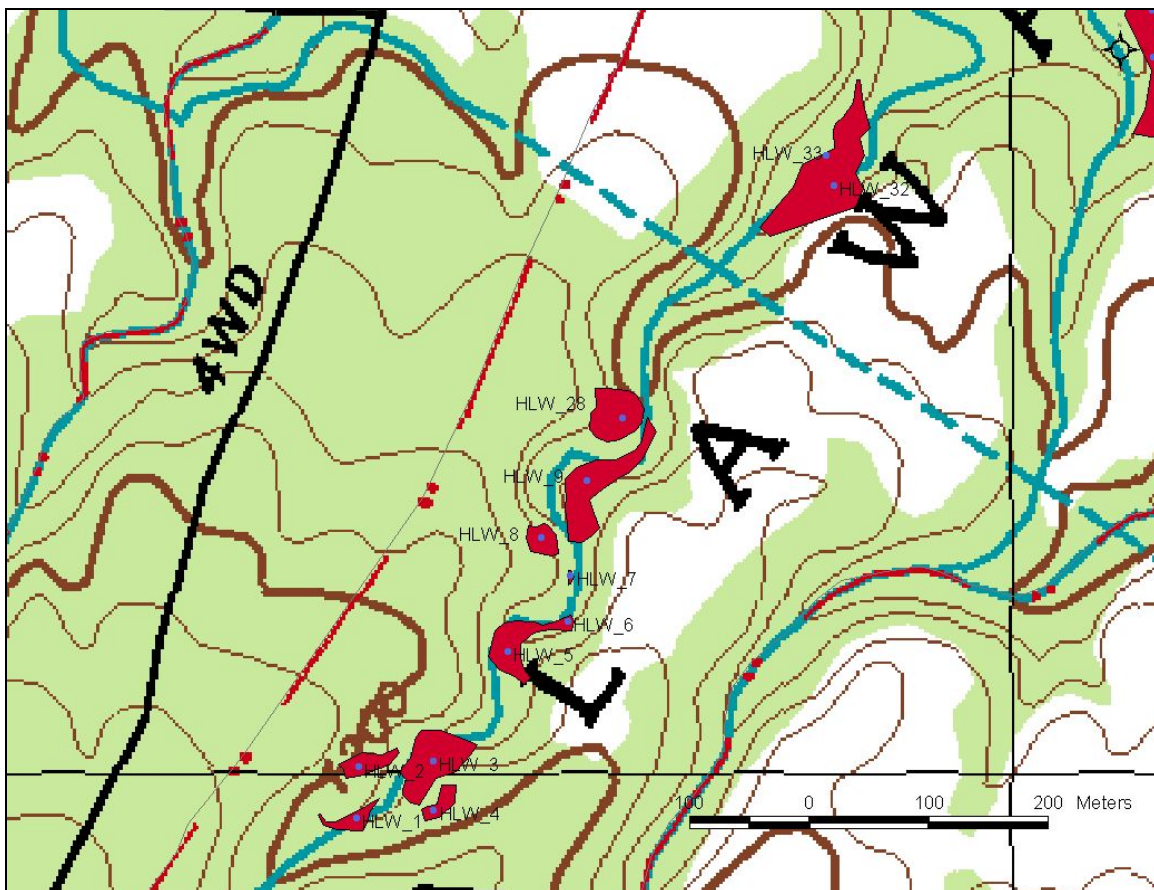


Figure 6. Upper West Halawa Gulch, North Kohala, Hawai‘i.

Three test units and one shovel test pit were completed. A 2 x 2 meter test excavation was undertaken in HLW-4A, (HLW-4A-TU1), a 1 x 1 meter unit at HLW-10A (HLW-10A-TU1), and the third a 1 x 0.50 meter unit at the base of HLW-28B (HLW-28C-TU1). A shovel test pit (STP) was also placed at HLW-28B in order to collect soil samples. The units were excavated with trowels and brushes at arbitrary levels within natural layers. Photos and plan view drawings were taken at the end of each level and any materials recovered *in situ* were plotted on the plan view maps and collected. Soil characteristics were described using Munsell color charts as well as using soil touch tests (Thien 1979) and soil samples were taken from all test units and the STP. All fill materials were screened through 1/8th inch mesh. Once the test pits and STP were completed, all soil was replaced, and all stakes or nails were removed.

In 2006, HARP field school conducted archaeological investigations in Upper Halawa between July 20th and 30th, 2006 (see Field and Graves in prep. a). The team mapped, filled out feature descriptions, and conducted three excavations including a trench at the Upper Halawa sites. This season's re-labeling of these complexes were part of an effort to create a consistent database of features across the North Kohala District. Today the region is covered in dense vegetation including Ironwood (*Casuarina equisetifolia*), guava (*Psidium guajava*), lantana (*Lantana camara*), breadfruit (*Artocarpus altilis*), mango (*Mangifera indica*), ti (*Cordyline fruticosa*), awapuhi ginger (*Zingiber zerumbet*), *Eucalyptus robusta*, hau (*Hibiscus tiliaceus*), kukui (*Aleurites moluccana*) and low growing ferns and vines.

Intensive Survey Results: Upper West Halawa Gulch

Irrigated Terrace Complex (HLW-1A to -1H)

HLW-1 is *lo'i* terrace complex on the west side of West Halawa Stream containing eight stacked stone, earth filled, retaining terraces (HLW-1A to -1H) covering an area of approximately 45.2 meters north-south by 19.3 meters east-west (Figure 7). The complex is located approximately 234 m SW from the entrance gate and is situated 45 m SE of HLW-2. Halawa stream, the likely water source of the *lo'i* complex, runs along the SE side of HLW-1 but no intact water intake was located.

Unique to the complex, HLW-1G and HLW-1H, are terraces located on a raised and leveled area oriented lengthwise at the base of the slope. The *lo'i* complex ends with HLW-1F and a possible *auwai* outtake located at the end of this terrace. This *'auwai* could have fed drainage water back into the stream from this point. The complex was assessed as prehistoric by the survey recorders due to lack of historic disturbance and its association with surrounding similar complexes. Potential for buried agricultural soils as well as charcoal deposits is high. Visibility within the gulch as well as out of the gulch is low due to vegetation.

Stone Mound and Non-Irrigated Terrace Complex (HLW-2A to -2F)

HLW-2 is positioned midway from the top of the western slope of West Halawa Gulch on a naturally level shelf (Figure 8). The complex is approximately 20 m NW from HLW-1B and is made up of six (HLW-2A to -2F) features including mounds and possible retaining walls.

HLW-2A is a stone mound 5 x 5 m and is 70 cm tall located approximately 25 m west of the drop off to the stream in the southeast portion of the site. It is made up of boulders, cobbles and includes some natural outcrop. To the northeast of HLW-2A and -2B lies a naturally level area extending 25.5 m further in the same direction. The flat area has a width of about 8 m with HLW-2D bordering its northwestern edge. HLW-2B is located approximately one meter northwest of HLW-2A. It is a stone mound made of boulders and cobbles measuring 4 m in length, 2.5 m in width and 100 cm in height. Features HLW-2A and -2B are located at the base of a slope which declines to the north. Feature HLW-2C, located 3 meters

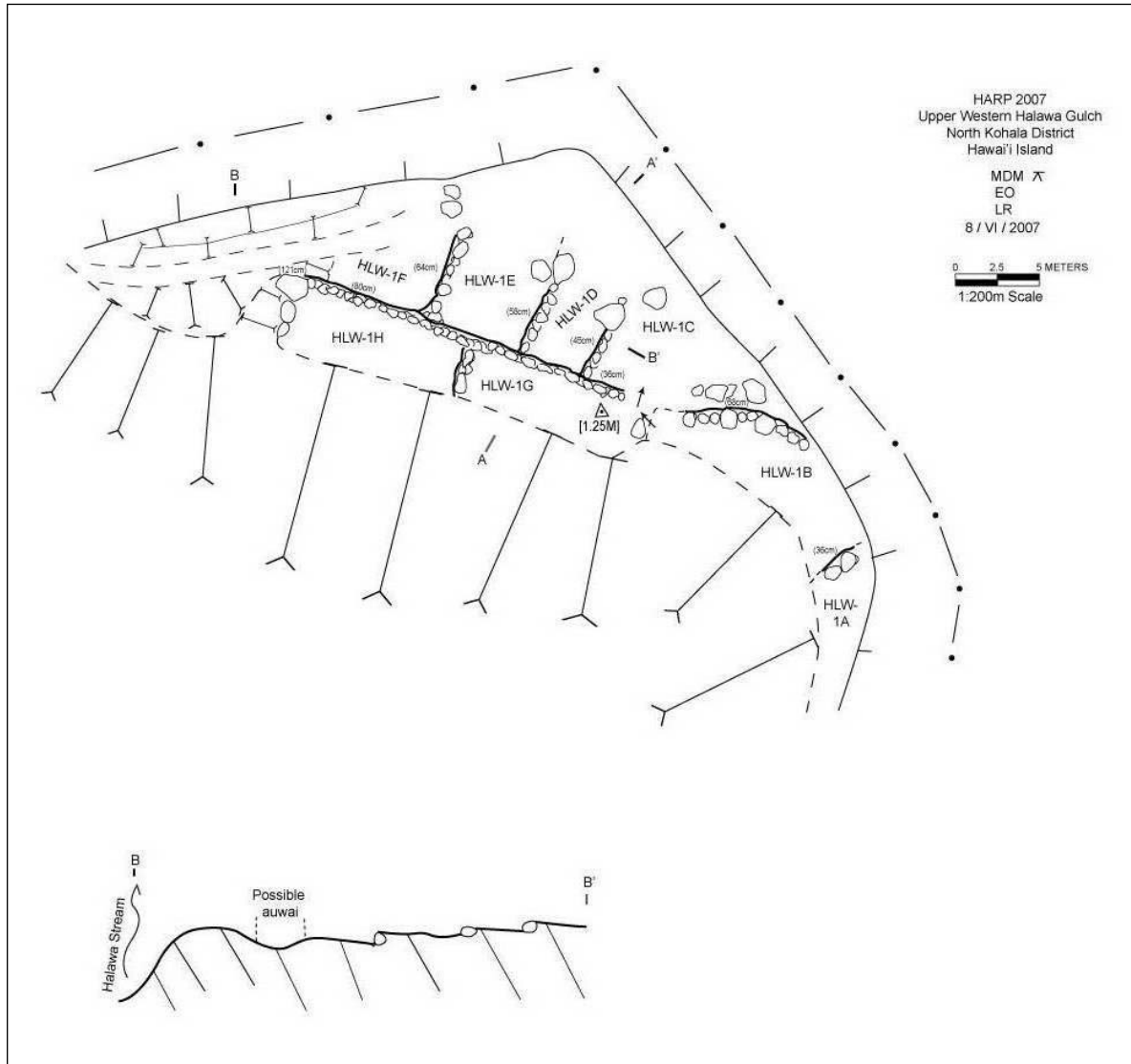


Figure 7. Irrigated Terrace Complex (HLW-1A to -1H), Upper West Halawa Gulch, North Kohala, Hawai'i.

SW of HLW-2B, is a freestanding stone mound on a level ground near the base of the slope. It is 3 x 2 m and 40 cm high, composed of pebbles cobbles and boulders. Feature HLW-2D includes retaining walls and stone mounds. It is approximately 12-15 meters from the drop off. HLW-2D consists of cobbles, boulders and natural outcrops. It measures 12 m in length by 10 m in width. HLW-2E is a large cobble to small boulder mound measuring 2 x 1.6 m with an average height of 35 cm. HLW-2F is a large cobble to small boulder mound measuring 4 x 2 m with an average height of 35 cm. HLW-2E and -2F were not completely cleared due to dense overgrowth. The complex was assessed as prehistoric by the survey recorders due to lack of historic disturbance and its association with the *lo'i* complex below. There is potential for buried agricultural soil and charcoal deposits in the naturally level portion of the complex. Visibility within the gulch as well as out of the gulch is low due to vegetation.

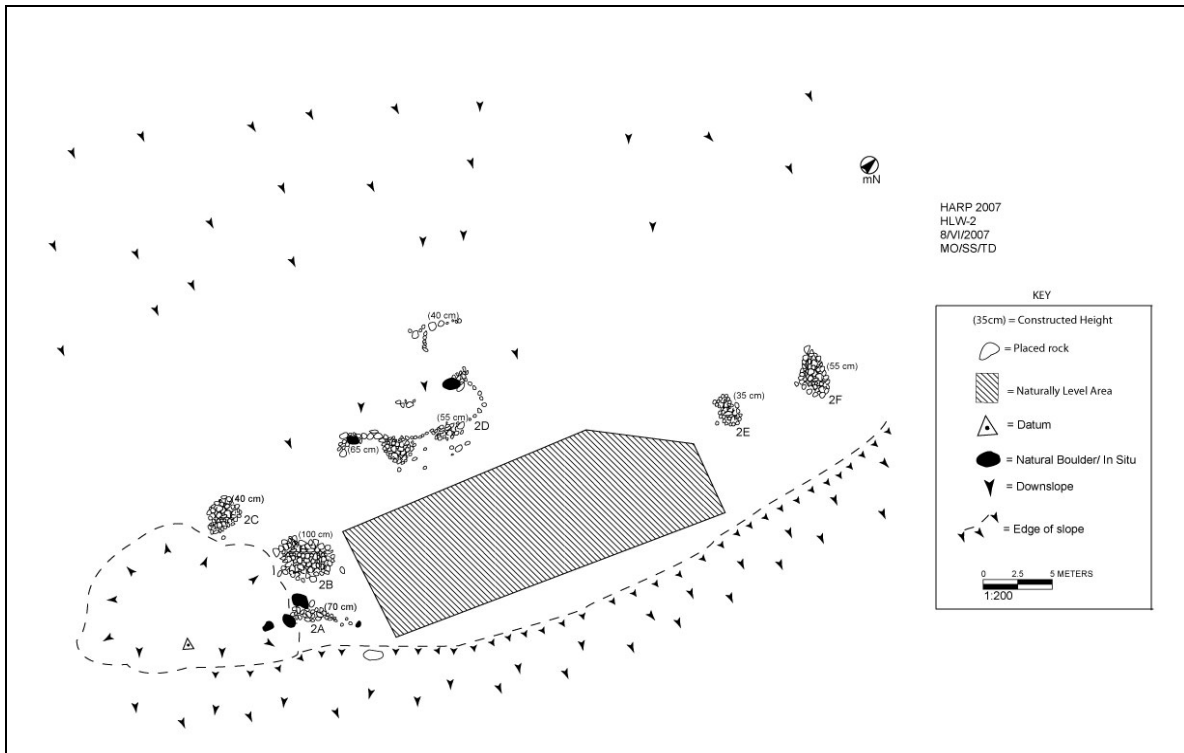


Figure 8. Stone Mound and Non-Irrigated Terrace Complex (HLW-2A to -2F), Upper West Halawa Gulch, North Kohala, Hawai'i.

Irrigated Terrace Complex (HLW-3A to -3I)

HLW-3 is a terrace complex 64 meters north-south by 50 meters east-west located on the east bank of the stream west of HLW-1. Previously recorded in 2006, it contains nine stacked stone, earth filled, retaining terraces (HLW-3A to -3I) (Figure 9). The complex is bordered by the stream on the western end with no apparent modifications to the stream bank. The terrace complex begins with HLW-3A at the south end of the large hemispherical complex, and ends with HLW-3I in the northeastern most point.

HLW-3A through -3E are stone-faced earth filled retaining walls roughly rectangular in shape. Each lacks a wall on the western, or streamside. HLW-5E is a stacked stone, earth filled retaining terrace. The terrace's northern boundary curves ending about seven meters south of terrace HLW-3F's wall. The eastern end of the terrace is closed by a NW/SE stacked stone alignment connecting the most northeastern point of HLW-3D and the northeastern corner of -5E. HLW-3F is an earth filled, stacked stone faced, irregular shaped terrace. The NW end is the largest portion of terrace while the southeastern is the smallest. A stone alignment transects center of terrace in a north-south direction.

HLW-3G is an irregular shaped earth filled, stacked stone retaining terrace. There is significant erosion and deflation at least two spots on the east end of the wall. The middle of the terrace is transected with a north-south section of terrace extending six meters to the north and then continuing west. HLW-3H is an earth filled, stacked stone retaining wall to the north of HLW-3G. The north terrace wall face is disturbed by fauna and erosion. The east boundary does not presently have a visible retaining wall. HLW-3I is an earth filled, stone stacked retaining terrace running east and west, north of HLW-3H. The east wall slopes down to HLW-3I. The south wall of this triangular feature runs east to west while the north wall runs from northeast to southwest and is bordered by a running stream. HLW-3I is the most *makai* in the complex. The east wall slopes slightly downstream incorporating a large boulder at its southern end and abuts the stream at its northernmost edge.

While the water intake location was not discovered, it is likely the system was fed from a short, direct irrigation ditch off the stream and had an internal ditch through the center of the complex to distribute water more evenly over terraces. The complex is likely prehistoric in origin as no historic artifacts or features are noted and construction appears to be pre-contact styled.

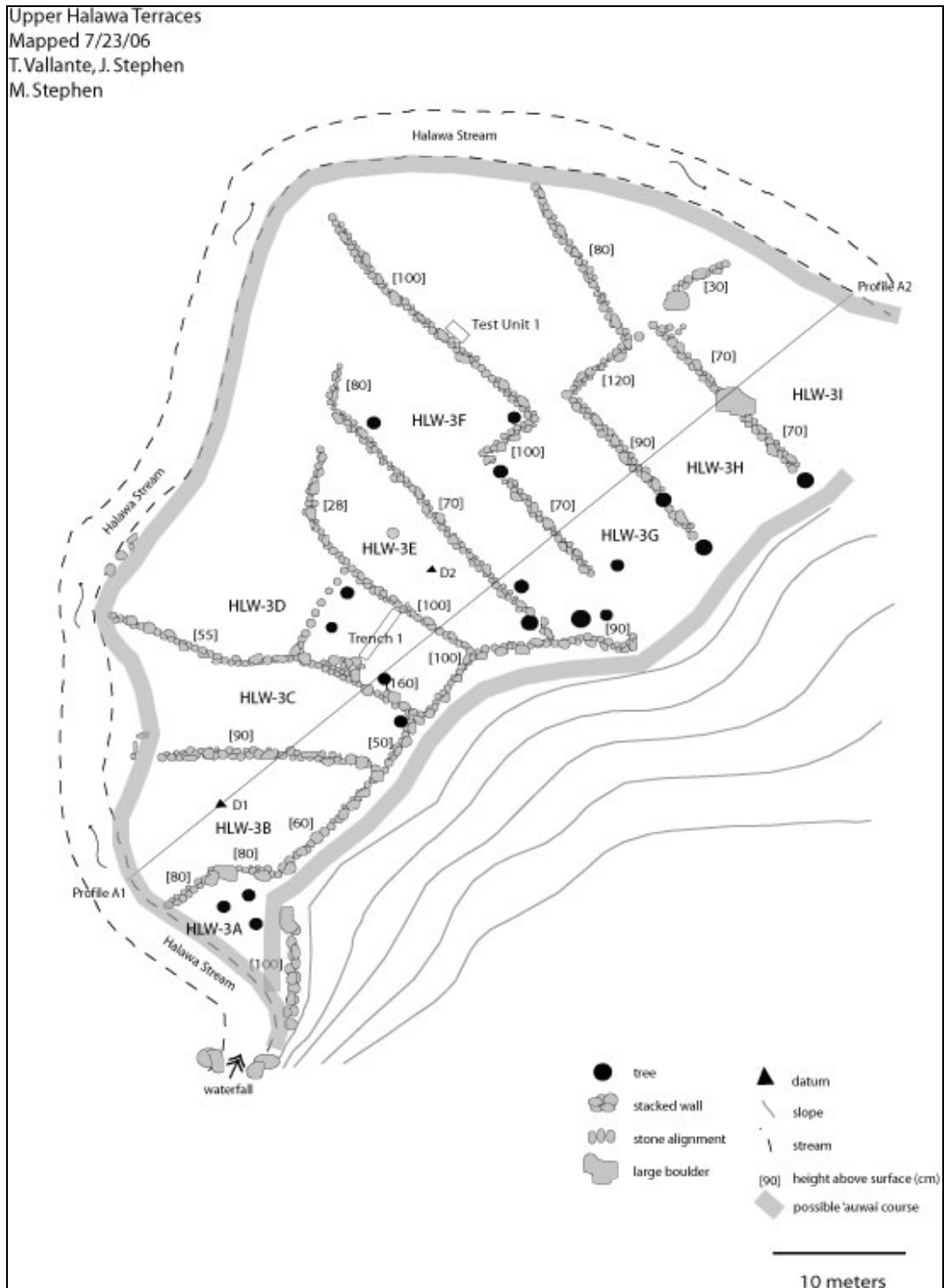


Figure 9. Irrigated Terrace Complex (HLW-3A to -3I), Upper West Halawa Gulch, North Kohala, Hawai'i.

Non-Irrigated Terrace Complex (HLW-4A to -4E)

HLW-4 is a terrace complex located directly above HLW-3 on the eastern slope of West Halawa Gulch and was possibly used for habitation and/or non-irrigated agriculture (Figure 10). The stream it is the west down slope of the complex. HLW-4A is an earthen filled, stacked stone terrace approximately 8 x 6 m with stone stacking incorporating large boulders on its northern side. HLW-4B, -4C, -4D, and -4E are to the east. HLW-4B is an earth filled stacked stone retaining terrace stretching northeast-southwest with a depression on the southwest end. The wall is a retaining feature for the sloped hill backing the HLW-4 complex. HLW-4C is an earth filled stacked stone faced retaining terrace north of HLW-4B with two natural boulders on the northern most end of the wall. HLW-4D is an earth filled, stone-faced retaining terrace north of -4C. HLW-4E is an earthen filled, stacked stone-faced terrace north of -4D. The wall runs roughly northwest and is at the northernmost end of the complex. To the north of the wall the land slopes steeply downward. In 2006, a 50 x 50 cm unit was excavated in HLW-4A. This season excavation was expanded to a 2 x 2 m test unit immediately adjacent. From the site, visibility out into the gulch is good.

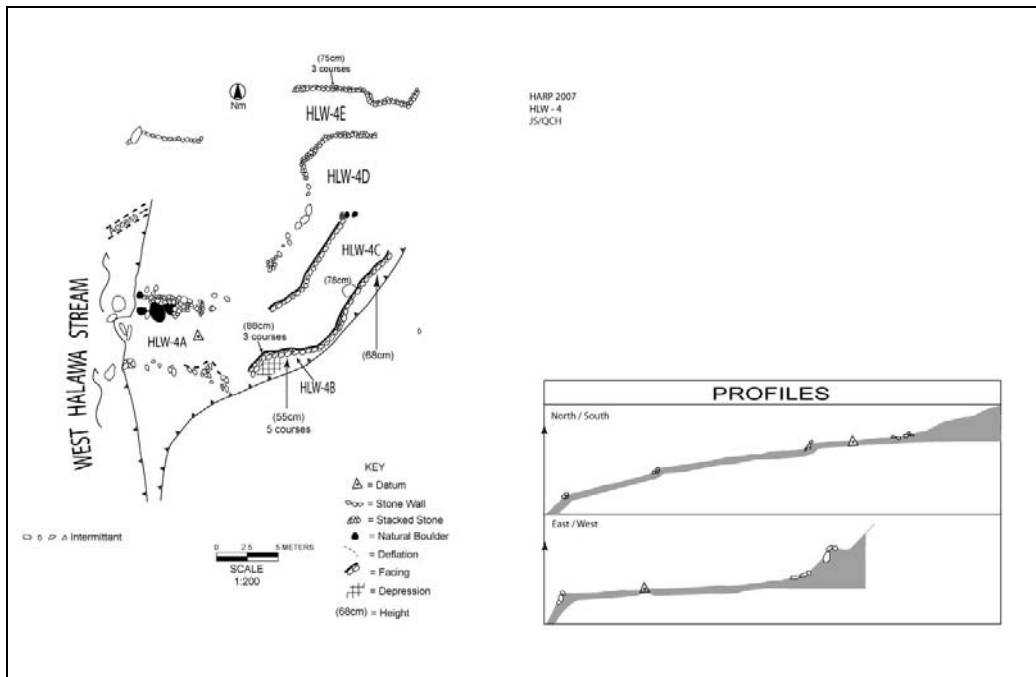


Figure 10. Non-Irrigated Terrace Complex (HLW-4A to -4E), Upper West Halawa Gulch, North Kohala, Hawai‘i.

Irrigated Terrace Complex (HLW-5A to -5N)

HLW-5 is a complex made up of thirteen earth filled, stone faced terraces with retaining walls running north-south along the eastern bank of the stream (Figures 11 and 12). The complex stretches about 95 meters in length and ranges from 12 to 28 meters in width. The complex is located *makai* of HLW-1 through 4, separated by a section of gulch with steeply sloped lands on both sides. The features HLW-5A to -5I were previously surveyed, mapped and described in 2006 (see Upper Halawa Second Terrace Series, Field and Graves in prep. a). This year’s survey revealed four further terraces, HLW-5K to -5N. The southernmost terrace (HLW-5N) abuts the southwest corner of HLW-6. The terraces run perpendicular to the stream through the whole complex, however no apparent modifications have been made to the stream bank, with the exception of a modified boulder in the northeastern corner of HLW-5N’s retaining wall. The modified boulder is situated on the bank of the stream, measuring 2 x 2 m. The boulder appears to have been “pecked” and smoothed to create a trough-like apparatus in a north-south

direction. The boulder trough gently slopes directly into the stream. All terraces were described by the survey recorders as being prehistoric, due to lack of historic disturbance as well as being constructed in prehistoric form. The complex has a high potential for buried agricultural soils as well as charcoal deposits. There is medium visibility across the site and limited to low visibility within the gulch due to dense vegetation.

Although an intact intake ditch was not discovered, it is likely there was an internal ditch to bring water to these wide terraces set out in a spoke-and-hub fashion down a steep slope. The boulder trough feature – only the second such feature found in Halawa (see HLW-30) – may represent an outtake location for water.

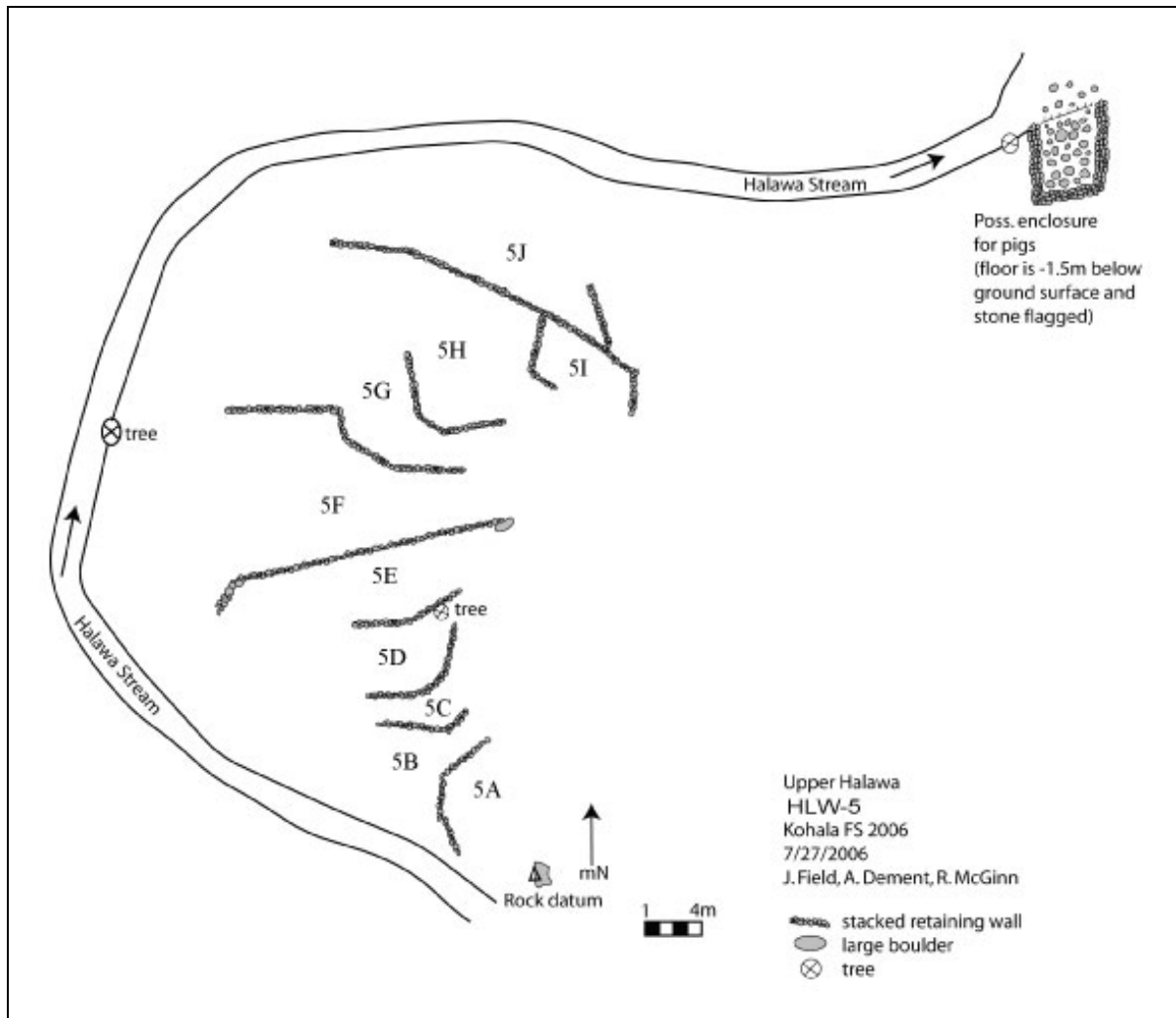


Figure 11. Irrigated Terrace Complex (HLW-5A to -5K), Upper West Halawa Gulch, North Kohala, Hawai'i.

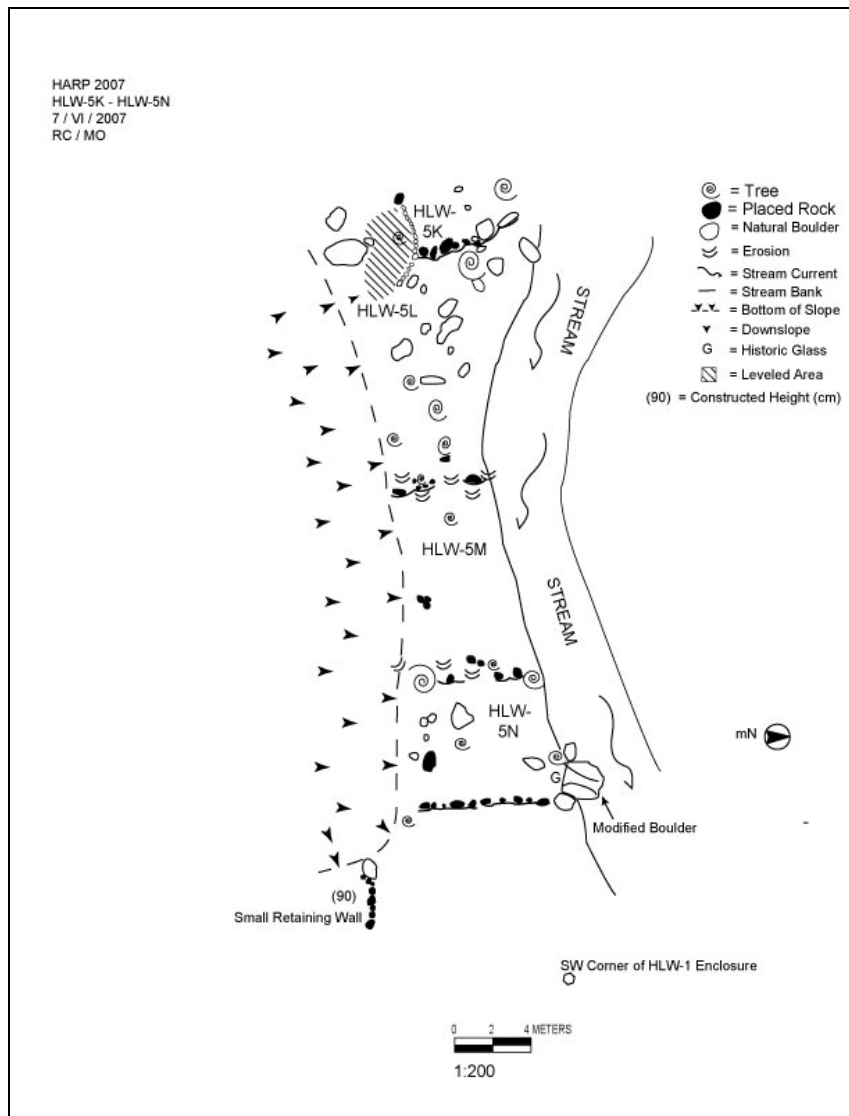


Figure 12. Irrigated Terrace Complex (HLW-5I to -5N), Upper West Halawa Gulch, North Kohala, Hawai‘i.

Sunken Enclosure (HLW-6)

HLW-6 is a three-sided roughly rectangular enclosure with stacked stone walls, open to the stream on the north side (Figure 13). The sunken enclosure is situated directly east of HLW-5 at the downstream terminus of *lo‘i* system (HLW-5). The south wall appears to be the most intact with six to eight courses on stacked small boulders and large cobbles. The east wall retains soil from a step slope that ascends to a pasture. This wall has significant deflation due to run off from slope. Historic period artifacts are strewn across it including bottles, glass, concrete, and an old pot. The west wall consists of two to three courses of stacked stones incorporating a large natural boulder outcrop in the center and a large boulder in the SW corner. The east and west walls culminate in the north at the bank of a running stream. The south wall appears to extend back into small cobble filled terrace/platform. The floor of the enclosure describes an excavated rectangle about 60% of which is covered by either cobble pavement or wall fall. A broken brick lies in the NW quadrant. The floor drops off abruptly on the north onto a cluster of large boulders in the stream.

The function and age of this site is difficult to classify. Without further investigation, we must assume it was used in the historic period due to the remarkable range of historic artifacts across the site although it may be the case that these have washed down from the slope above.

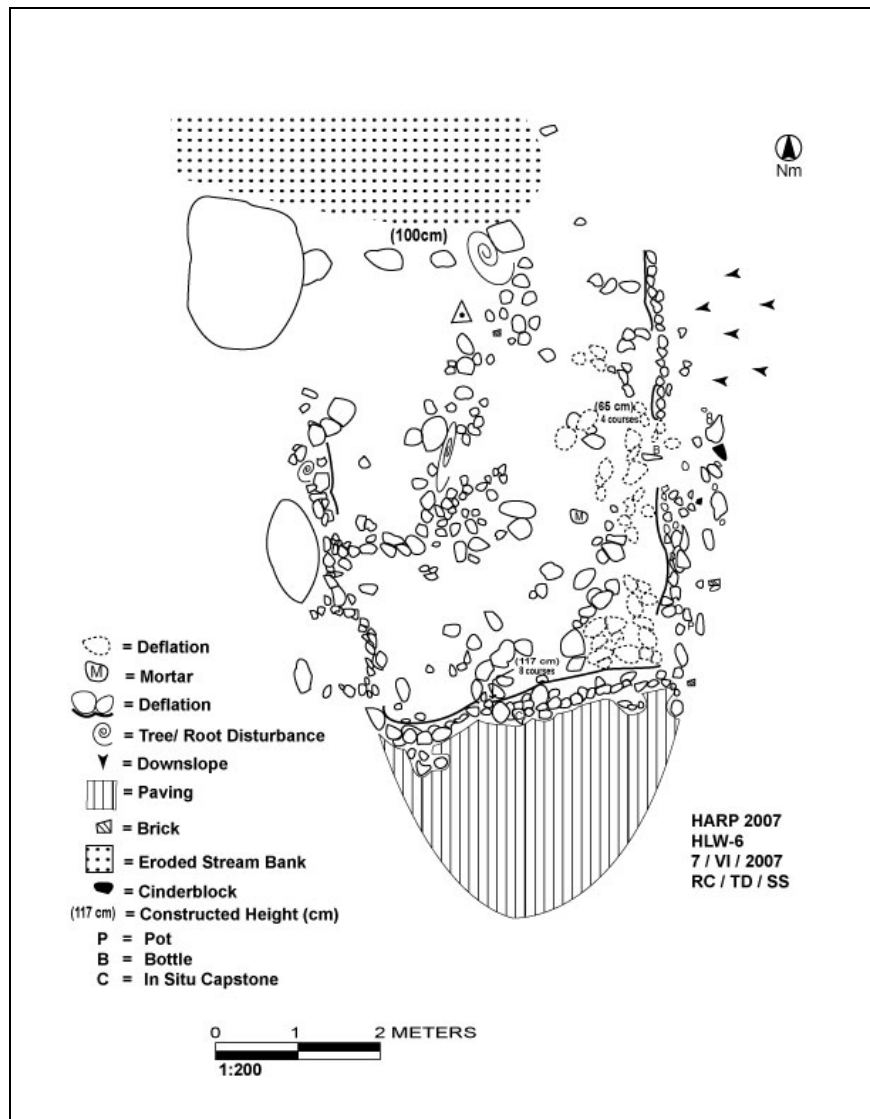


Figure 13. Sunken Enclosure (HLW-6), Upper West Halawa Gulch, North Kohala, Hawai'i.

Irrigated Terrace Complex (HLW-7A and -7B)

HLW-7 is a small two-terrace complex located downstream of HLW-6 and on the west bank of the stream (Figure 14). The main components of the site are stacked stone retaining features. The west wall retains an almost vertical slope, with mature ironwood trees above. There is significant deflation along this wall, with stones scattered on the soil filled floor. Many of the stones are large bedrock outcrops. The average wall height is 1.46 meters. The eastern wall much lower with 2-3 courses of stacked stone, much of which has been knocked down or eroded by the adjacent stream. According to the survey recorders, the site appears to be a traditional prehistoric feature. There is a potential for agricultural soils and charcoal. There is low visibility within the gulch as well as out of the gulch, due to vegetation. No evidence of water intake was found but given its location it may have been fed directly.

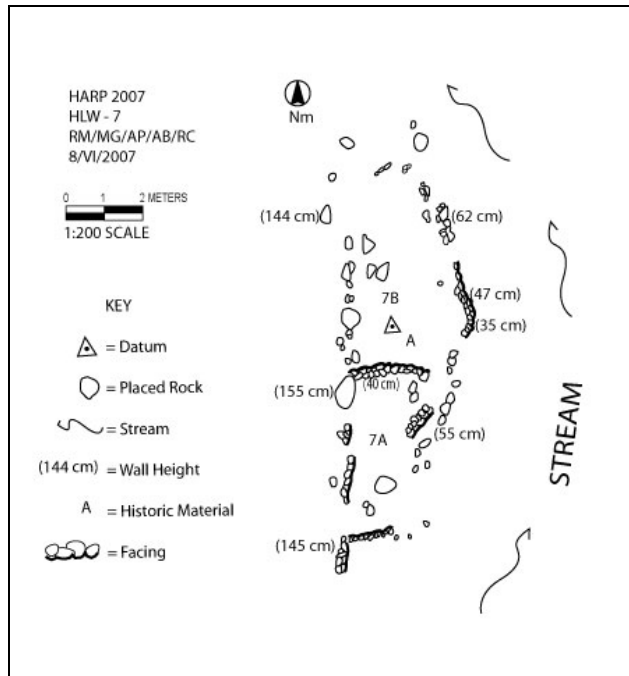


Figure 14. Irrigated Terrace Complex (HLW-7A and -7B), Upper West Halawa Gulch, North Kohala, Hawai'i.

Irrigated Terrace Complex (HLW-8A to -8D)

HLW-8 is an earth filled, stone faced complex of four terraces (8A-D) lying at the bottom of a steep slope, situated downstream from HLW-7 (Figure 15). The stream curves around the complex on the eastern side, flowing round to the northern edge. Deflated sections appear in most of the terrace retaining walls, especially around the northwestern boundary of the complex closest to the stream (HLW-8D), and

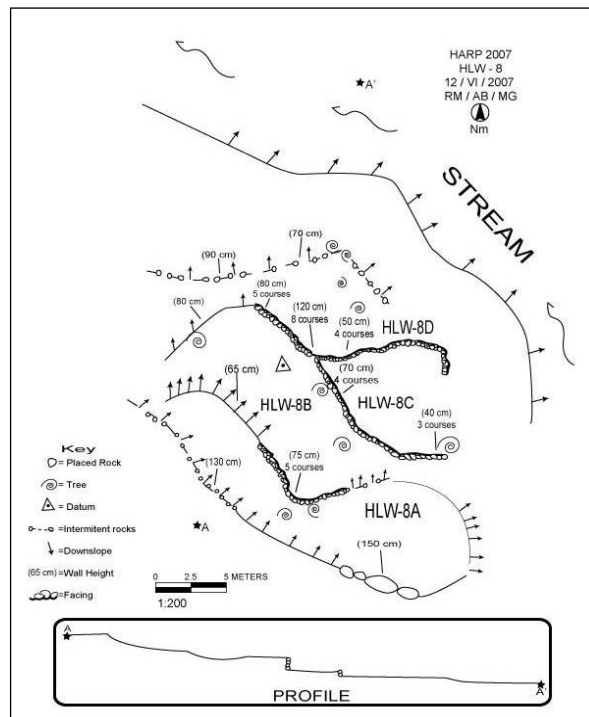


Figure 15. Irrigated Terrace Complex (HLW-8A to -8D), Upper West Halawa Gulch, North Kohala, Hawai'i.

retaining walls ranges from up to eight courses of stone. There is potential for buried charcoal deposits and agricultural soil. There is low visibility across the complex as well as out of the gulch due to thick vegetation.

This complex is remarkably high off the main stream course and could have been fed by an upper irrigation ditch not located during survey.

Irrigated Terrace Complex (HLW-9A to -9I)

HLW-9 is a complex of 11 terraces (HLW-9A to -9H) and one unidentified feature on the far northeastern lowest end, which may be a terrace (HLW-9I) (Figure 16). HLW-9 runs along the east side of the stream, about 30 meters downstream of HLW-8. The *lo'i* system begins at a large bend in stream and is on a slope spanning 100 meters. Heavy soil erosion has been deposited over the entire span of HLW-9I. The terraces are stone-faced soil filled retaining walls. The retaining walls of HLW-9E through -9G are unusually long and several of the complex's walls have an unusually high number of courses (up to 12). Survey recorders labeled the complex as prehistoric due to a lack of historic disturbance with the exception of a fully intact teacup at the base of the steep slope behind HLW-9I. There is potential for buried agricultural soils and charcoal deposits.

Water intake was almost certainly on the upslope (*mauka*) end and may have consisted of two ditches – one running through the center of the small upper terraces and another along the base of the gulch slope. This type of system may have been necessary to feed the large lower terraces (HLW-9E to -9I).

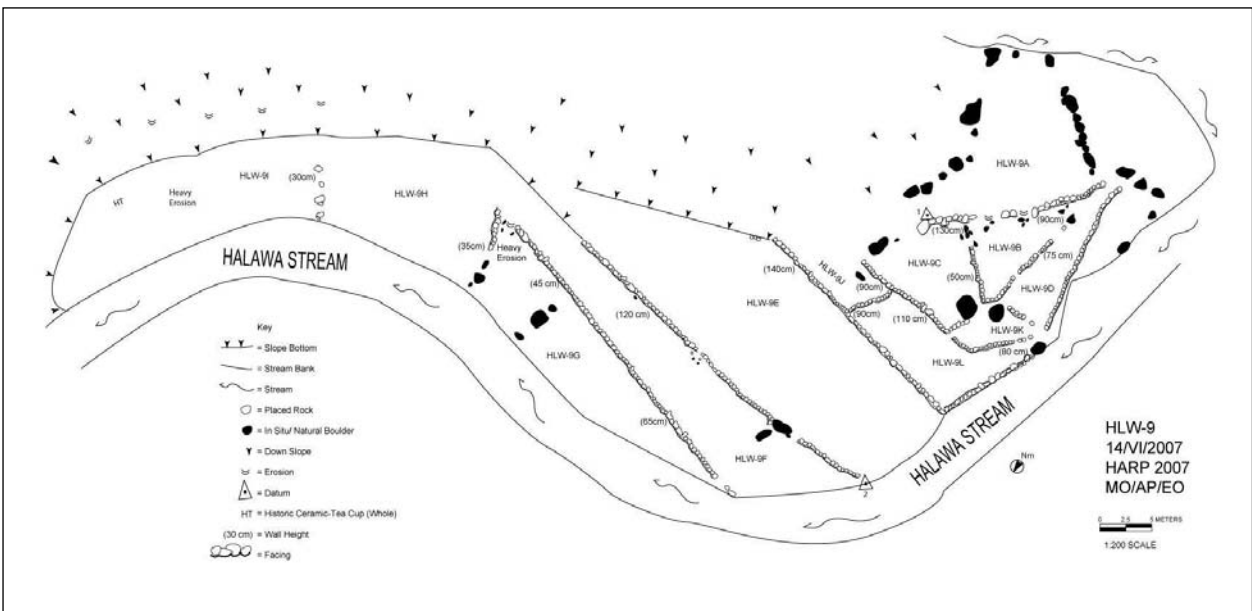


Figure 16. Irrigated Terrace Complex (HLW-9A to -9I), Upper West Halawa Gulch, North Kohala, Hawai'i.

Irrigated Terrace Complex with Single Non-Irrigated Terrace (HLW-28A to -28E)

HLW-28 is a complex of four large earth-filled, stacked stone facing terraces (HLW-28A to -28D) and a single upper small terrace above the complex (HLW-28E) (Figure 17). The stream curves sharply along the east edge of the complex. The walls are high, but have eroded internally, and on the stream's edge, exposing pondfield deposits. Some terraces walls show 'double stack' style with an interior course of stone. Water may have been "pooled" within the stream itself at the top of the system and passed through irrigation ditches along the edge/center of the terraces. HLW-28B is among the

highest in Halawa. Historic artifacts were found across the site, including a metal tool/equipment and whole glass bottles, however construction style indicates that the complex was probably of prehistoric construction. Visibility across the site as well as out of the gulch is low due to heavy vegetation.

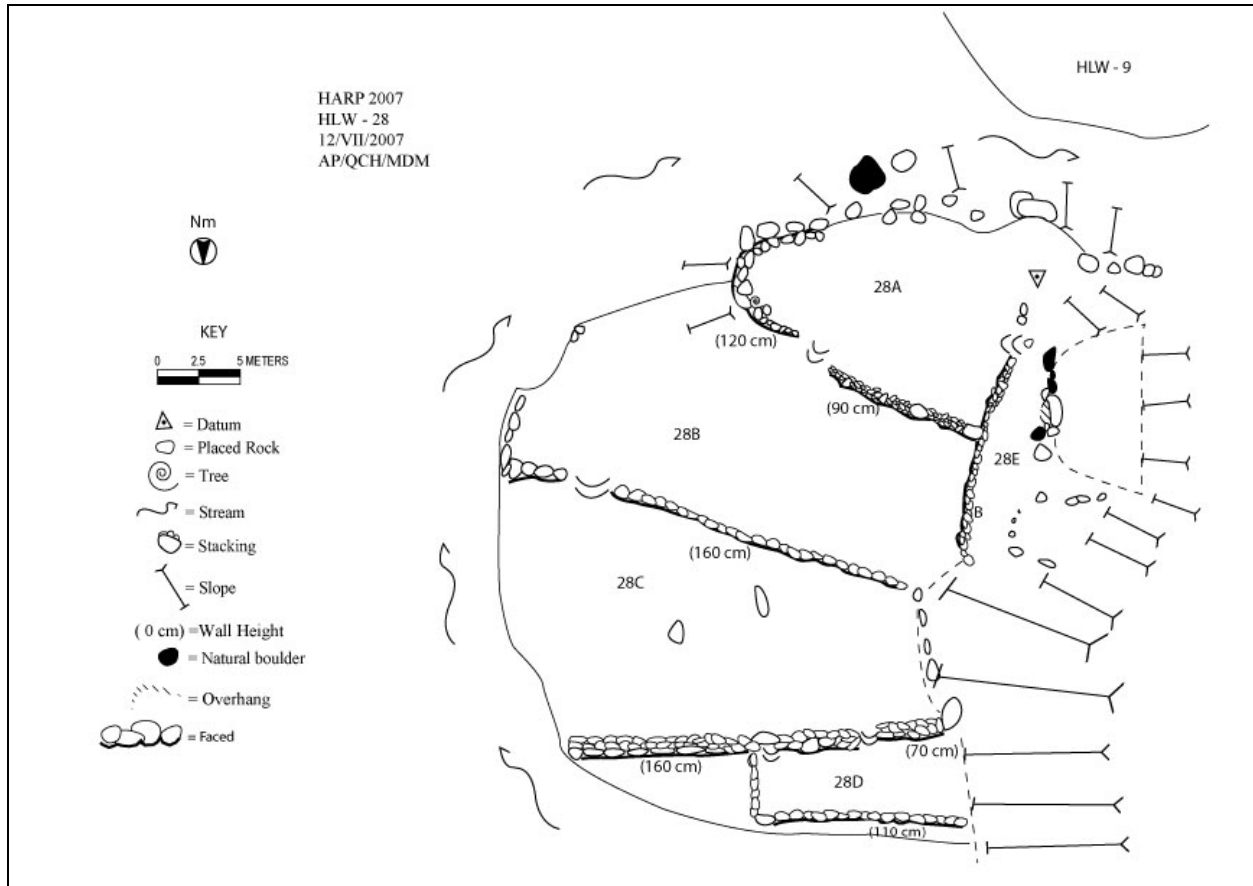


Figure 17. Irrigated Terrace Complex with Single Non-Irrigated Terrace (HLW-28A to -28E), Upper West Halawa Gulch, North Kohala, Hawai‘i.

Restored Irrigated Terrace Complex (HLW-32A-M and HLW-33)

HLW-32 is situated north of HLW-28, and is bounded by the West Halawa stream on the east side. HLW-32 is a 120 meter long complex of 12, (32A-E and G-M) earth filled, stone faced retaining terraces as well as a rock mound (HLW-32F) (Figure 18). The site was previously recorded in 2006 as “Restored Lo‘i.” Since the complex appears to have undergone construction over the past year we have entered its features in to our current database based on data from 2006. Roughly 10 meters southwest of terraces HLW-32L and -32M is a deflated backing wall that is about 13 meters long. All of the terraces except for HLW-32L and -32M run perpendicular to the stream. On the west end of terrace HLW-32C is a continuous stone alignment and connects with the northeast corner of HLW-33. There is potential for buried agricultural soils and charcoal deposits. Vegetation and visibility cannot be determined due to lack of first hand exposure to the site.

HLW-33 is a possible habitation site located within the “Halawa Restoration Lo‘i” complex, to the west of HLW-32D and -32E. It is rectangular in shape (7 x 5 m). The west side is cut into the slope. There is potential for buried agricultural soil and charcoal deposits since the south wall of the feature connects with a terrace wall.

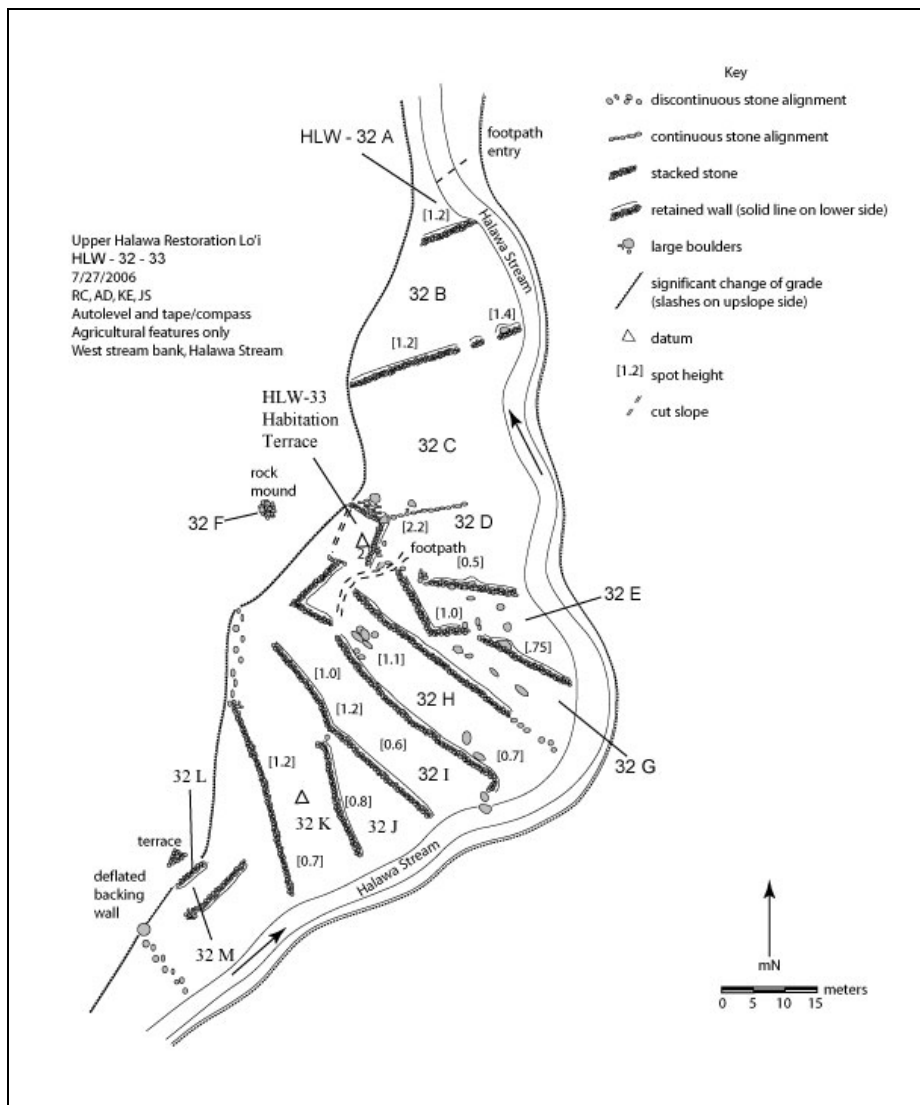


Figure 18. Restored Irrigated Terrace Complex (HLW-32A-M and HLW-33), Upper West Halawa Gulch, North Kohala, Hawai‘i.

Excavation Results: *Upper West Halawa Gulch*

There were two excavations conducted in the Upper West Halawa Gulch during the 2007 field season: a 2 x 2 m unit was excavated in a possible habitation site (HLW-4A-TU1) and a unit 1 x 0.5 m was excavated at the base of HLW-28B (HLW-28C-TU1). This last excavation was matched with a shovel test pit within agricultural deposits nearby to collect soil samples. The goal of the excavations in HLW-4A was find evidence of habitation in the gulches in the form of buried cultural materials, such as flaked stone artifacts, and features, such as abandoned hearths. The goal of the excavation in the deposits of an irrigated terrace (HLW-28C) was the collection of charcoal from beneath an adjoining retaining wall (HLW-28B).

HLW-4A-TU 1

In sum, this 2 x 2 m test unit excavated to 60 cmbd consisted of a single layer and the only cultural material present was charcoal. Indications that HLW-4A was a habitation are so far inconclusive.

Level 1 revealed topsoils predominantly comprised of organic matter and roots that persisted throughout the level. Directly below the O horizon patches of clay appeared in 3-6 mm conglomerations and small amounts of thin black plastic were removed. Level 2 contained several *kukui* nuts and small amounts of charcoal. The level depth was increased starting with the third layer due to the absence of cultural material in excavations to that point. Increasing amounts of charcoal were encountered as well as *in situ* rock with high density along the western wall. No movement or modification of these stones by humans was evident. Level 4 was characterized by highly compacted silt with clay inclusions and large bedrock. A trench was also added, reaching a depth of 60 cmbd revealing a charcoal lens.

HLW-28AC-TU 1

In sum, this 1 x 0.5 m unit located within the deposits of HLW-28C, at the base of the 2-meter high terrace wall of -28B, was excavated to 60 cmbd and a horizontal south extension beneath the basal stones of the retaining wall provided soil and charcoal samples.

Level 1 revealed highly organic soil dominated by clay with a high level of mixing due to water drainage through the area. The soil in Level 2 was consistent in color and composition with Level 1. Some charcoal was collected from this level. Level 3 continued to display a soil of consistent color and slightly siltier composition than Layers 1 and 2. Charcoal continued to be removed thorough this level, some portions large enough for taxonomic identification. Level 4 soil color and composition was consistent with Level 3. Numerous small pebbles and some charcoal were extracted. The soil in Level 5 continued to be consistent with Level 3 and 4 and once again charcoal was extracted. Level 6 soil was once again consistent with Levels 3, 4 and 5, no charcoal or other materials were found. Reaching 60 cmbd, the excavators decided to begin horizontal excavation in Level 6, identifying the *lo'i* wall basal stones. The horizontal south extension, beneath the basal stones of the retaining wall was screened for charcoal with no results. As such, 4-gallon bags of soil were extracted for closer inspection in the lab, which revealed one piece of charcoal.

HLW-28-STP 1

A shovel test pit (STP) revealed a profile of four layers of soil with the top dark organic layer, the second a deep layer yellow clay, the third a relatively thin layer with numerous pebbles and cobbles, and beneath that another dark layer. Excavations beyond this last layer were not attempted.

UPPER EAST HALAWA GULCH, HALAWA AHUPUA'A

Survey Area: 3.124 hectares (1.264 acres)

Elevation (ft above sea level): 750-900

Sites Recorded: HLW-13 to -27

Excavations: HLW-13J, HLW-13K, HLW-14

Archaeological investigations conducted by the 2007 HARP field school in East Halawa Gulch between July 5th and July 17th, 2007 (Figures 19 and 20). The first few days in East Halawa Gulch were spent clearing features to make features more visible. The area was then mapped and two test units and a shovel test pit were strategically placed, as to maintain the goal of minimally invasive excavation. Mapping was done using the tape and compass technique. Excavations were done using shovels, trowels, and were screened with a 1/8th inch screen. Artifacts and soil samples were carefully bagged and recorded

during excavation. Representative pictures were taken of each level and entered into a database. After excavation, the units and pits were backfilled and all datums and corner stakes were removed.

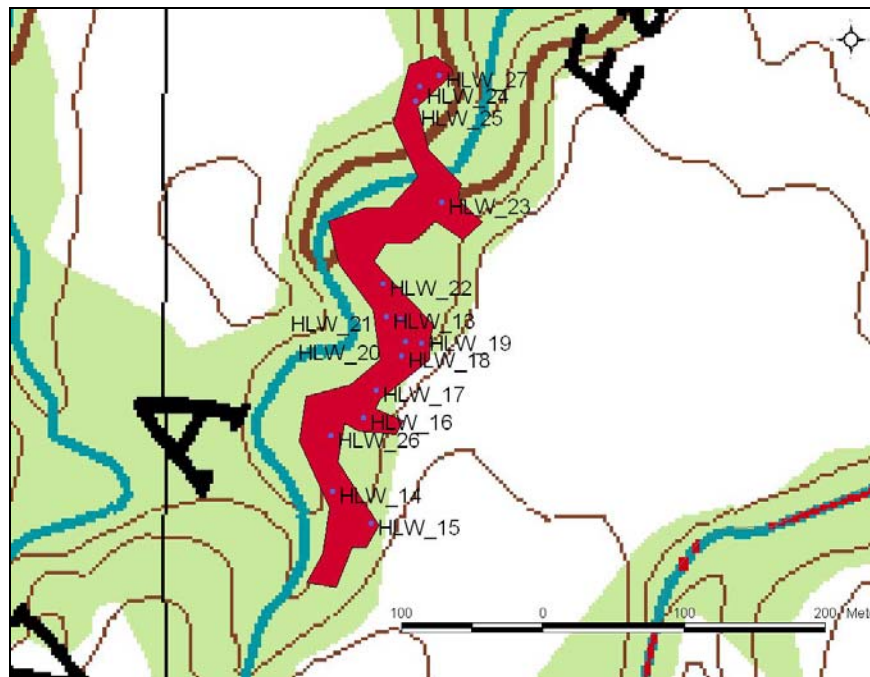


Figure 19. Upper East Halawa Gulch, North Kohala, Hawai'i.

The features investigated in the East Branch of Halawa Gulch lie in the upper physiographic zone 750 to 900 feet above sea level. Vegetation within the East Halawa Gulch includes guava, cinnamon tree, eucalyptus, ginger, *ki*, *'ape*, bracken fern and *hau*. Visibility in East Halawa Gulch outside of the individual complexes is mired by vegetation, bends in the stream, and the location within a gulch. Most of the features are likely to be prehistoric due to their wall construction. However, there are signs of historic disturbances in the surrounding areas. All features described in this paper were considered prehistoric unless otherwise noted. The habitation features could yield artifacts and the agricultural terraces were considered to have a high potential for agricultural remains and charcoal.

Survey Results: Upper East Halawa Gulch

Barrage-Styled Irrigated Terrace Complex (HLW-13A to -13AM)

HLW-13 is a barrage style *lo'i* terrace complex in East Halawa Gulch (Figure 20). The source of water for the stream is rainfall and a natural spring. Water is not continuously flowing throughout the terraces; however, the soil is still moist in the terraces with no flowing or standing water present. Due to the placement of the terraces at the bottom of the gulch and the lack of necessity for irrigation ditches, most of the terraces are currently flooded with thriving *'ape*, or swamp taro.

The barrage *lo'i* complex consists of 37 terraces forming the main barrage (HLW-13C to -13AM) and two that may have been used for habitation or dryland agriculture (HLW-13A and 13B). Other than the fact that it is built at the bottom of the gulch, HLW-13 is like other terraces in the area with stone retaining walls separating each terrace. The walls are made up completely of cobbles and boulders, with deflation throughout the terraces. The walls range from a single course across an entire terrace to as many as eight courses retaining walls.

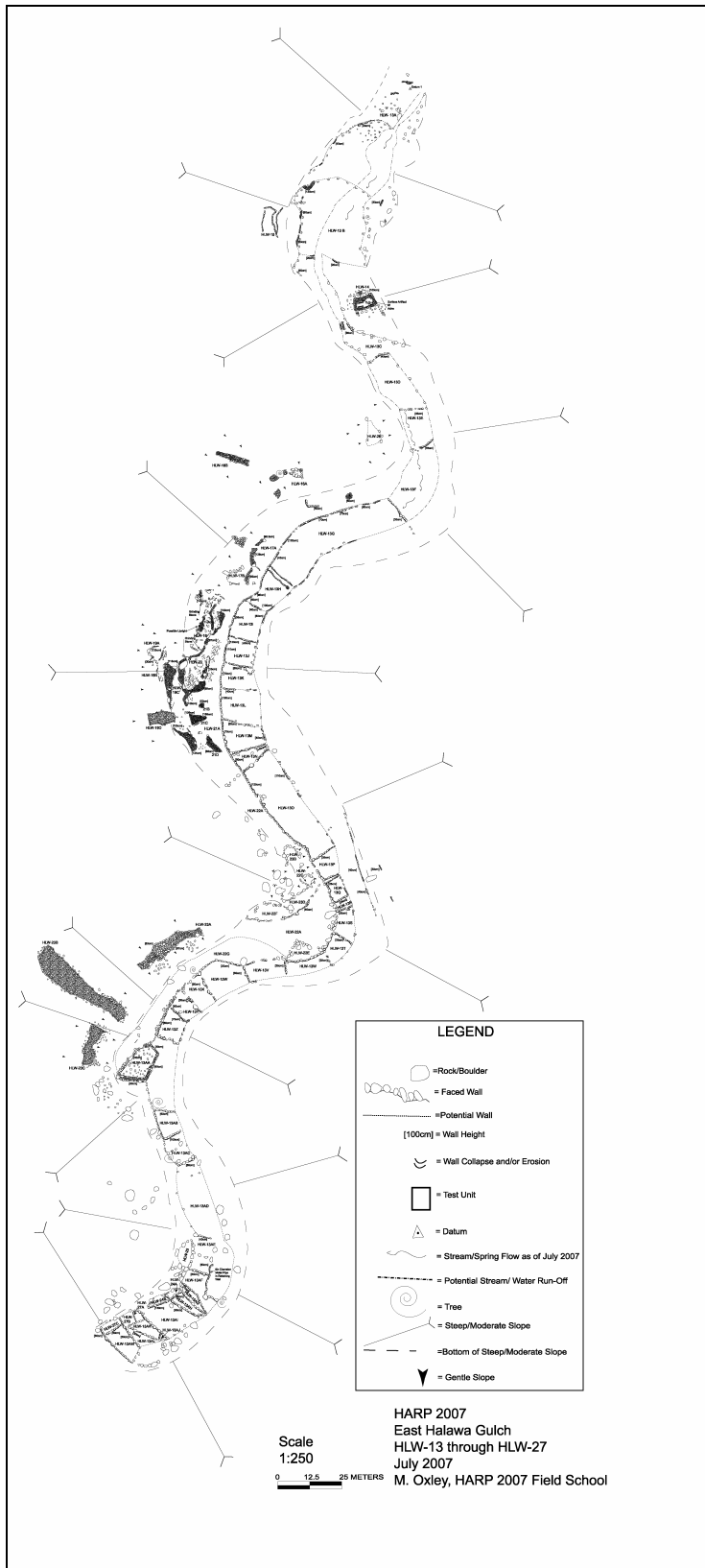


Figure 20. Complexes Associated with Barrage-Styled Pondfields (HLW-13 to -27), Upper East Halawa Gulch, North Kohala, Hawai'i.

Feature HLW-13A, located at the *mauka* portion of the complex, is a leveled area with minor retaining features. The soil in this terrace, as well as in HLW-13B, is much drier than that of the rest of the terraces in the barrage system. In the prehistoric time period, HLW-13A may have been used for either habitation or agriculture. If used for agriculture, it would have either been used for dryland agriculture or fed by the perennial stream that is located directly to the west. The presence of glass bottles and an iron wok suggest that this terrace may have been used in historic times as well.

HLW-13C is the first of the formal barrage terraces. From the moistness of the soil it appears likely that the spring begins to reach the surface at this point. HLW-13D also has moist soil, however no flowing water. HLW-13E is the first terrace in the complex with flowing water. The water continues to flow rather continuously throughout the remainder of the system; however some of the larger terraces have swampy conditions which have temporarily slowed the flow of water. Historic artifacts are found throughout the complex including a large metal pipe in the west end of a retaining wall of HLW-13AE. However, major historic disturbance appears less frequent in the *makai* section of the complex. A test pit was placed on HLW-13K at the HLW-13J retaining wall in order to obtain charcoal from underneath the wall. Several pieces of charcoal were successfully extracted from underneath the wall.

Rectangular Enclosure (HLW-14)

HLW-14 is a rectangular enclosure, roughly 9 x 5 m, located the gulch's center near the edge of the stream course (Figure 21). Its primary use is undetermined; however, the enclosure may have been used for either habitation or animal husbandry. The walls are stacked as high as eight courses and are core-filled, but there is deflation in parts. The deflation is heaviest along the north wall. The walls are mostly made up of pebbles and boulders with only some cobble. Historic bottles and a piece of metal were found in the north wall. Charcoal and historic ceramics were found in a test unit excavated in to floor deposits.

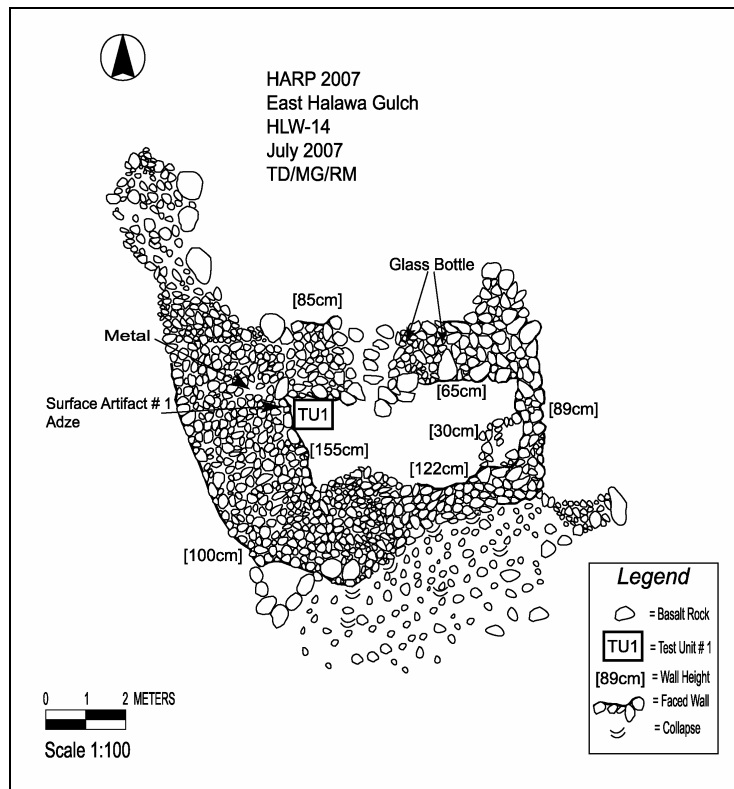


Figure 21. Rectangular Enclosure (HLW-14), Upper East Halawa Gulch, North Kohala, Hawai'i.

Non-Irrigated Terrace (HLW-15)

This terrace has with an L-shaped, retaining wall on northeast side stacked one to three courses high (Figure 20). The northeast corner is demarcated by a large tree and natural outcropping on an uphill slope. The west wall runs parallel to the stream which is a few meters away. The north wall is in poor condition with a long gap in the center. The north wall has been disturbed by a large tree. Towards the west of the terrace interior are two large natural boulders with pebbles and cobbles wedged in between to form a barrier in between the boulders. Due to its location on a slope and the distance from a constant source of water, it was most likely used for habitation.

Non-Irrigated Terrace and Wall Complex (HLW-16A and -16B)

HLW-16 is located on the gulch's eastern slope *mauka* of HLW-17. HLW-16A is a stone-faced earth-filled non-irrigated agricultural terrace with a stone mound that is northwest of the main retaining wall (Figure 22). The condition of the site is fair and there is a tree that has knocked down a portion of the wall. HLW-16B is a collapsed core-filled wall built perpendicular to the eastern slope and is located immediately above HLW-16A. The wall is unusual for both its orientation and its thickness. Without more information on the function of this particular feature, the interpretation of this and other similar walls in the area is as boundary markers possibly dating to the historic period.

Non-Irrigated Terrace Complex (HLW-17A and -17B)

HLW-17A and HLW-17B are dryland agricultural terraces that run parallel to the stream on the eastern slope of the gulch (Figure 22). HLW-17A has two retaining walls, one against the eastern side and a retaining wall against the streambed on the western side. The eastern wall begins with a large 1.5 x 1.5 m boulder on the upstream southern wall. Three meters to the *makai* side of the boulder there is a one meter long gap in the wall. Rocks from this eroded portion of the wall are scattered in front of this gap. HLW-17B is continuous with part of HLW-17A's retaining wall and ends at a large natural outcrop. The southern end of the wall is mostly collapsed.

Free-Standing Wall on Non-Irrigated Terrace (HLW-18)

HLW-18 is a terraced area located on the east bank of a barrage style *lo'i* complex (HLW-13). A freestanding wall with an average height of 50 cm separates the terrace from HLW-13I and HLW-13J, along with several meters of bank in-between (HLW-21A) (Figure 22). The wall continues up the steep slope at the north end of the terrace until it reaches a large *in situ* boulder. The wall consists mainly of large cobbles; however, several large boulders compromise the bottom. Courses range from two to four high. The wall is in fair condition with several areas of collapse. The interior of the terrace has numerous *in situ* boulders which would have made habitation and agriculture difficult and unlikely. The east end of the terrace is comprised of large boulders and slope. A boulder located at the center of the east end may be a possible upright which has fallen over. A flat surface, presumably the bottom of the upright, is visible. Two sides of the boulder appear to be dressed. A grinding stone is located at the southeast portion of the terrace several meters upslope.

This feature may have been part of a larger ritual complex that included HLW-19 and -20.

Irregularly-Shaped, Non-Irrigated Terraces and Mound Complex (HLW-19A to -19D)

HLW-19 consists of a group of irregular shaped terraces and a mound immediately above HLW-18, -20, and -21 (Figure 22). The incorporation of large boulders, such as an almost two meter tall boulder

on the eastern side of HLW-19A, and the small size of terraces suggests these features were used for ritual or perhaps as a special, non-irrigated gardening area. The northern and southern walls of HLW-19A are single to double course and create an enclosed space. HLW-19B is a small, stone-faced terrace that is located about halfway down the gulch slope. The retaining wall below consists mostly of cobbles. The eastern and western walls of HLW-19C are heaped against the slopes. The western wall of HLW-19C acts as a retaining wall for HLW-19B. The southern end of the terrace has a single layer of small cobbles on the surface. There are two large boulders at the south wall. HLW-19D is a mound that is un-faced and lacks a clear shape. The down slope end of it is deflated. This mound may, like HLW-16B, have been used as a historic boundary marker.

Non-Irrigated Terrace (HLW-20)

HLW-20 is a terraced area on the east bank of the barrage style *lo'i* system, nearest to HLW-13J (Figure 22). There is a thin portion of HLW-21A between HLW-20 and HLW-13J. The exterior portions of this feature are composed mainly of modified slope; however, the northwest portion of the terrace has cobbles piled seven to ten courses high along the slope. The interior portion of the feature consists of several large boulders along with large cobbles covering most of the interior portions creating a paving that is not level. The east end of the feature has several retaining walls ranging in height from 70 to 100 centimeters. Several large boulders are also incorporated into the retaining features. The interior boulders along with the cobble paving prevent suggest some other use than agriculture.

Non-Irrigated Terrace and Mound Complex (HLW-21A to -21D)

HLW-21 includes 6 meter wide terrace running along the eastern edge of the stream for about 60 m (HLW-21A) and three stone mounds (HLW-21B to -21D) (Figure 22). The terrace likely formed a kind of pathway, habitation, or dryland agricultural area above the barrage terrace system (HLW-13). HLW-21B, HLW-21C, and HLW-21D may contain burials. The majority of the walls are piled; however, where there are stacked walls, the courses range from three to five high. Small boulders and cobbles, which originate from the east wall, are dispersed throughout the feature. HLW-21B, HLW-21C, and HLW-21D are located within HLW-21A. They are well faced mounds ranging in size from approximately 2 m to 5 m in diameter. The remainder of the interior is relatively devoid of stone.

Non-Irrigated Terrace Complex (HLW-22A to -22G)

The HLW-22 complex to the east side of the stream consists of seven terraces that, like HLW-21, likely formed a kind of pathway, habitation, or dryland agricultural area above the barrage terrace system (HLW-13) (Figure 20). HLW-22 appears to be prehistoric in origin with little historic use, most clearly seen through the presence of historic glass bottles. Fallen leaves throughout HLW-22 have made it hard to determine surface midden.

HLW-22A is an L-shaped terrace measuring nearly 100 meters in length (Figure 20). Three glass bottles laying on the ground surface of this feature. HLW-22B, -22C, -22D, -22F, and -22G are all adjacent to the east of HLW-22A. HLW-22E is adjacent to HLW-22A on the north. HLW-22B is predominately constructed with large boulders and incorporates natural outcrops. The terrace has stone-faced retaining wall of one to two stacked courses and is earth filled. The overall facing of the retaining wall appears to be distorted due to deflation. HLW-22C is an irregularly shaped terrace located on the east bank at the bend in the stream. This feature is about 12 x 6 m and is located 6 m from the stream south of, and directly adjacent to, HLW-22D. Large cobbles and boulders are dispersed throughout the ground surface possibly from the deflated east wall. The walls are constructed entirely of large boulders and incorporated natural outcrop.

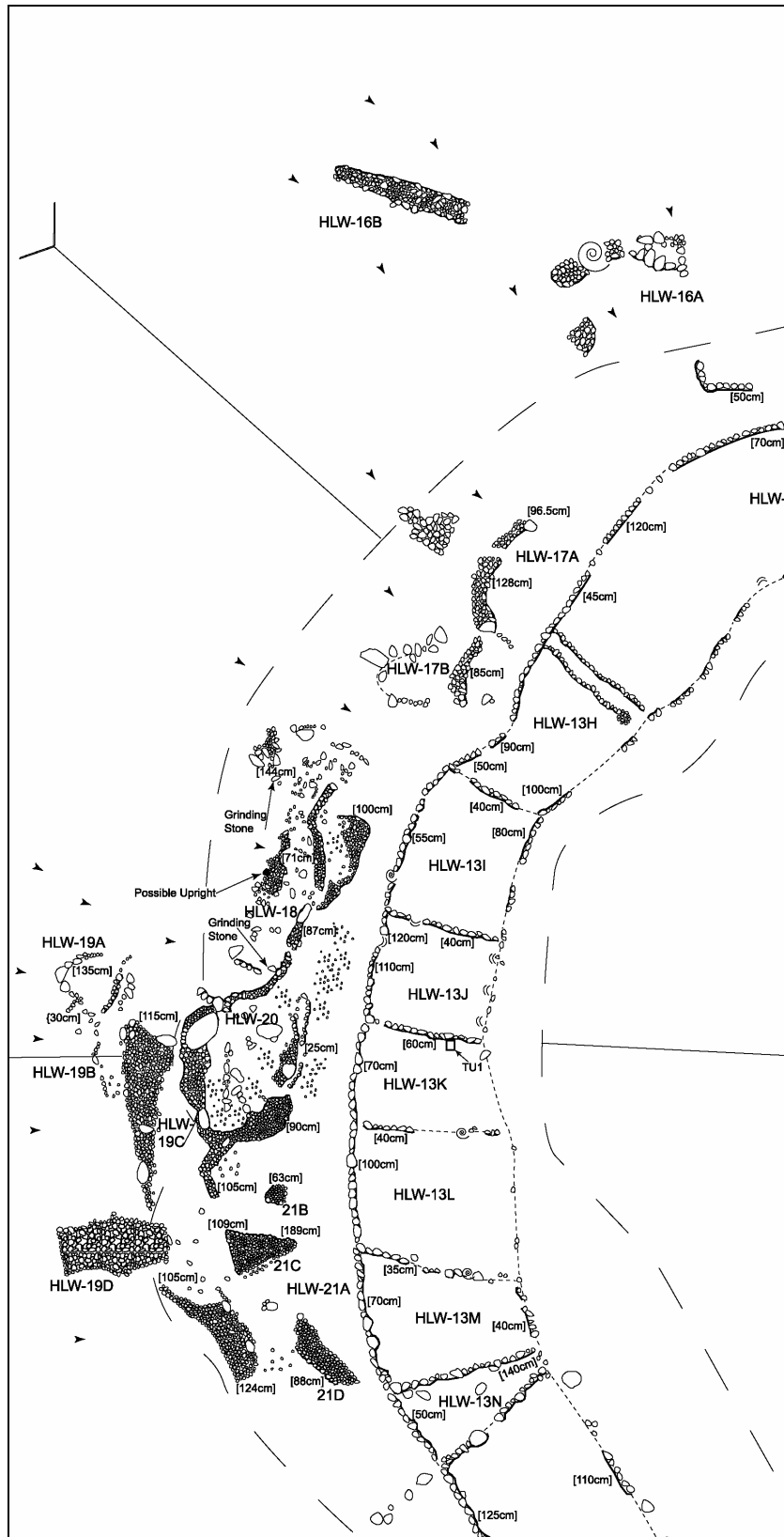


Figure 22. Complexes Associated with Barrage-Styled Pondfields (HLW-16 to -21), Upper East Halawa Gulch, North Kohala, Hawai'i.

HLW-22D is a terrace with stacked, stone facing, of about three courses (Figure 20). Deflation along the corner of the terrace's retaining wall distorts the stone facing. HLW-22E is an oval shaped terrace that is about 13 x 6.5 m and is located at a bend of the stream. There are small cobble to large boulder sized stones within the terrace; some of which may have been caused by deflation, while others, like a 110 x 120 cm stone by the eastern wall, are *in situ* boulders.

HLW-22F is an oval shaped terrace that measures about 11 x 4 m (Figure 20). The west boundary is not clearly defined; two boulders and a slight change in elevation mark this feature. Large cobbles and boulders are scattered throughout most likely due to the deflation of the southern boundary wall. HLW-22G measures 58.5 m in length by 6.8 m in width. Large cobbles, which probably originated from the features above (HLW-23A through -23C), are scattered throughout HLW-22G. Large boulders scattered throughout the feature likely lie in their naturally placed locations and were too large to move. The southern boundary is defined by a change in elevation rather than by a formal wall.

Stone-Filled Terraces and Long Stone Mound Complex (HLW-23A to -23C)

The HLW-23 complex is located on the eastern slope between the top of the gulch and the streambed (Figure 20). HLW-23A is a long stone-filled terrace, parallel to the streambed. The retaining wall ranges from 80 cm to 210 cm in height, with larger boulders at the base. The feature's width varies, ranging from 2.5 meters to 4.9 meters. There is deflation at the west end of the wall that has caused this side to completely collapse. The middle of the feature has a rounded pile of rock.

HLW-23B is an elongated, faced rock mound. It is located on a steep slope and is perpendicular to the stream. The southern boundary of the feature is located about 7 m from the top of the slope and is bounded by natural outcrop. This feature could possibly be a boundary marker like HLW-16B and HLW-19D however it is much larger than either.

HLW-23C is a second long, stone-filled terrace made of large boulders at the base and cobbles on top. It is almost identical to HLW-23B in form however it is somewhat shorter. HLW-23A and HLW-23C were not likely used for habitation because they are both primarily made up of boulders.

Overall, the function of HLW-23 is difficult to say definitively, however these features may have served a ritual function.

Non-Irrigated Terrace Complex (HLW-24A to -24C)

HLW-24 is a series of small, irregularly shaped terraces at the edge of the main barrage-styled irrigation terrace system (HLW-13) (Figure 20). The retaining wall of HLW-24A is stacked three to five courses high with larger boulders placed at the base. Areas of deflations, possibly due to erosion, has scattered rocks *makai*, towards the stream. The relatively high wall of 80 cm to 105 cm above the streambed suggests that constant irrigation would have been difficult. HLW-24B is located south of HLW-13AI. The north retaining wall sits within the stream and bounds one edge of the barrage. It is stacked with three to seven courses and incorporates natural boulders. The terrace is at the base of a steep slope with the north wall 140 cm high above the streambed, thus making constant irrigation difficult. The north wall of HLW-24C is well-faced with no deflation; it incorporates natural outcrop and is stacked two courses high in some areas. The south wall has a little deflation at the east end and looks as if it is entirely made up of natural outcrop. If this feature functioned as an agricultural terrace, it is unlikely that this feature was irrigated due to the fact that it is located about 150 cm above the stream. These terraces were likely used for dryland agriculture terrace.

Non-Irrigated Terrace (HLW-25)

HLW 25 is a modified slope which has been leveled into a terrace (Figure 20). Natural boulders along with several cobbles comprise the retaining features. The feature is located just to the east of HLW13A-E and is high enough to exclude it from irrigation. The feature would have likely been utilized for dryland agriculture or habitation.

Non-Irrigated, Modified Natural Terrace (HLW-26)

HLW-26 is a level terrace on the edge of a steep slope (Figure 20). The slope appears to have been modified by soil leveling and placement of several boulders. The terrace measures 9.2 meters east to west by 7.6 meters north to south. There is no stone facing, only level earth. The feature is located approximately 12 meters from east bank of feature HLW-13F on the edge of an undulating slope. The placement of this terrace suggests that it was used for habitation.

Irrigated Terrace Complex (HLW-27A to -27C)

HLW-27A through HLW-27C is a series of three *lo'i* terraces located on the east side of the barrage style *lo'i* (HLW-13AK through HLW-13AM) (Figure 20). HLW-27 is raised approximately 50 to 90 cm above the barrage. HLW-27A is level with HLW-13AI and is likely a source for irrigation all three terraces. The terraces appear to be cut into the east slope while the west edges are retained with stacked cobble/boulder retaining walls. The terraces are separated from each other with smaller retaining walls. HLW-27 does extend some distance beyond HLW-27C however survey ended at this terrace due to time constraints and thick vegetation.

Excavation Results: *Upper East Halawa Gulch*

This season two test units and one shovel test pit were placed in Upper East Halawa features. One test unit was excavated in the barrage *lo'i* system (HLW-13K), a matching shovel test pit was placed in HLW-13J to collect soil samples, and one test unit was excavated within an enclosure (HLW-14).

HLW-13K-TU 1

The HLW-13K test unit (1 x 0.50 m) was located within the barrage terrace HLW-13K and at the base of HLW-13J's retaining wall. The soil in Levels 1 and 2 were highly organic and dominated by clay. A few large rocks were removed from the surface of the unit but within the first level. There were few rocks or roots. Charcoal was found in the level and collected.

The moisture and clay in Level 2 combined to make easily removable "slices" of mud. There were no rocks and only a small number of thin roots at this level. Only two pieces of charcoal were recovered from Level 2. Level 3 followed Level 2 in composition although some signs of a red soil mixing in with the matrix appeared. Similar to Level 3, Level 4 was an organic matrix of clay with a small amount of silt. Some large pieces of charcoal were found in this level.

Level 5 marked the transition between Layers I and II as the soil became distinctly and dominantly red. At around 45 cmbd large boulders and rocks appeared in a layer which likely represents the older streambed. Charcoal and volcanic glass were found in Level 5.

A south extension was added to this unit that went beneath the southern retaining wall of feature HLW-13J. The wall's basal stones were identified and soils below were collected in 1-gallon bags and removed for screening. Charcoal and a piece of volcanic glass were uncovered. One gallon bag full of soil

was kept for nutrient analysis. The extension was excavated between 22 to 41 cmbd, 47 cm across, and 24 cm in to the sidewall beneath the basal stones.

HLW-13J-STP 1

The shovel test pit in HLW-13J consisted of two layers. Layer I (5YR3/2) consisted of about 90% clay and 10% silt. Layer II (2.5YR3/2) was similar in color and composition. Soil samples were taken from both layers.

HLW-14-TU 1

The HLW-14 test unit (1 x 0.5 m) was placed in the corner of a walled enclosure measuring approximately 7 x 2.5 m (Figure 21). Prior to excavation, numerous cobbles and boulders were removed from the surface. These were likely the result of wall-fall from above. After removal of the debris, the excavation began in 10 cm units. Soils from Level 1 were dark brown, highly organic, and dominated by clay. There were numerous small and medium sized roots throughout the soil. Only a single land snail shell was found in Level 1. Like Level 1, Level 2 consisted of dark, organic soils filled with roots and both pebbles and cobbles. A number of *kukui* nuts were found in this level, but due to surface proximity they were not collected.

Historic artifacts were discovered within Level 3. The soil remained dominated by clay with some roots and pebbles. The northern half of the unit located within the corner of the stone walls had a higher amount of charcoal, although charcoal was still found throughout. A piece of blue and white ceramic along with bottle glass and a twisted metal bar were found within this level. Level 4 was made up of dark brown soils and was the last level to be dominated by clay. Roots became more infrequent and boulders and other small rocks were still found throughout. Charcoal was still common within the matrix, including a lens which was point provenienced and bagged separately. Level 5 was the final level recorded within the unit, because a number of large rocks impeded further downward progress. The soil remained dark brown, dominated by clay and devoid of roots. Only charcoal was found and collected from Level 5.

The HLW-14-TU1 southwest extension soils were taken back horizontally beneath the stacked stone in an attempt to identify the basal stones. During this process no materials were collected since this placement directly under the wall could not be verified. Following the removal of dirt, basal stones were located and soil samples were taken from beneath. These samples were then carefully screened and charcoal was removed.

LOWER WEST HALAWA GULCH, HALAWA AHUPUA‘A

Survey Area: 0.599 hectares (0.242 acres)

Elevation (ft above sea level): 600-750

Sites Recorded: HLW-10 to -12

Excavations: HLW-10A-TU 1

A brief survey and excavation in the uppermost section of Lower West Halawa Gulch were carried out in June 2007 (Figure 23). This location was chosen after a possible habitation site was located on reconnaissance survey (HLW-10). Many of the sites below this study area show signs of heavy use during the historic era.

Intensive Survey Results: Lower West Halawa Gulch

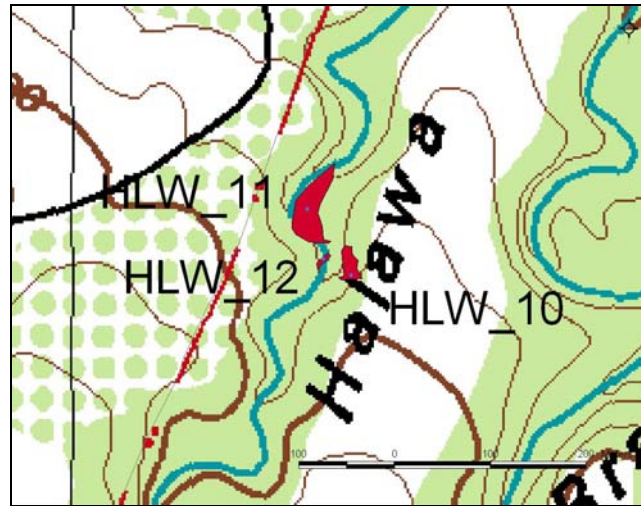


Figure 23. Lower West Halawa Gulch, North Kohala, Hawai'i.

Non-Irrigated Terrace with Small Rockshelter (HLW-10A and -10B)

HLW-10 is a terrace and natural bedrock outcrop rockshelter on the eastern bank of Lower Halawa Gulch located just above the stream across from HLW-12 and immediately southeast of HLW-11 (Figure 24). Much of the eastern slope of the gulch consists of bedrock outcrops, thus creating a small shelter with a low ceiling (HLW-10A), while the retaining walls to the west facilitate the formation of a flat terrace along the bend in the stream (HLW-10B). To the north is a natural vertical niche with one piece of possible fire cracked rock. The shelter's deposits were test excavated revealing a large amount of charcoal deposits as well as several historic artifacts.

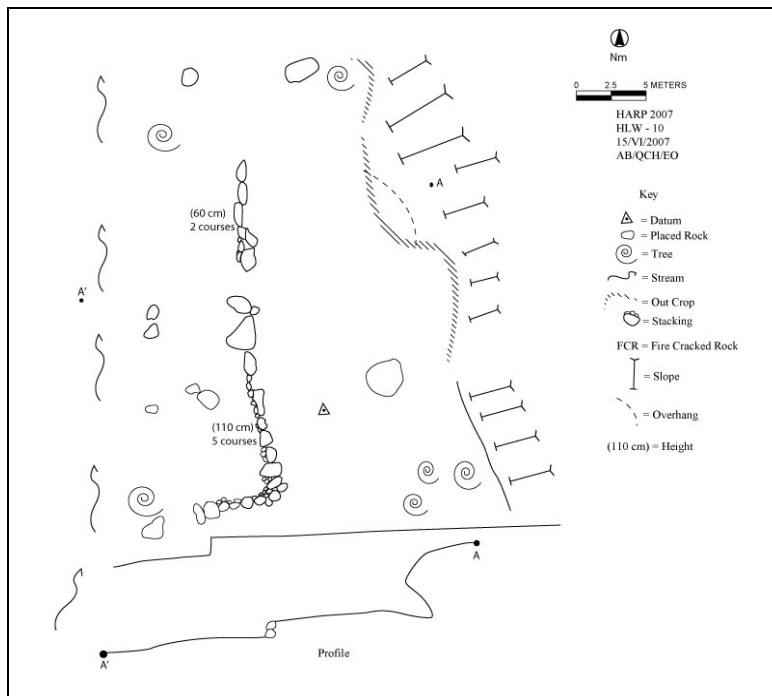


Figure 24. Non-Irrigated Terrace with Small Rockshelter (HLW-10A and -10B), Lower West Halawa Gulch, North Kohala, Hawai'i.

Irrigated Terrace Complex (HLW-11A to 11O)

HLW-11 is a *lo'i* agricultural system located on the eastern bank of the stream consisting of 14 terraces (HLW-11A to -11O) that begin northwest of HLW- 12 and stretch for close to 100 meters at 10-50 meters in width (Figure 25). The terraces in the system range from less than 10 x 10 m to 16 x 27 m. The stone-faced retaining walls range from 15 cm to 110 cm in height, and one to five courses. The survey recorders assessed the probable age of the site as prehistoric due to lack of historic artifacts as well as the construction style typical of prehistoric *lo'i* systems. There is potential for buried deposits including charcoal and agricultural remains. Visibility within the complex is low due to fallen trees.

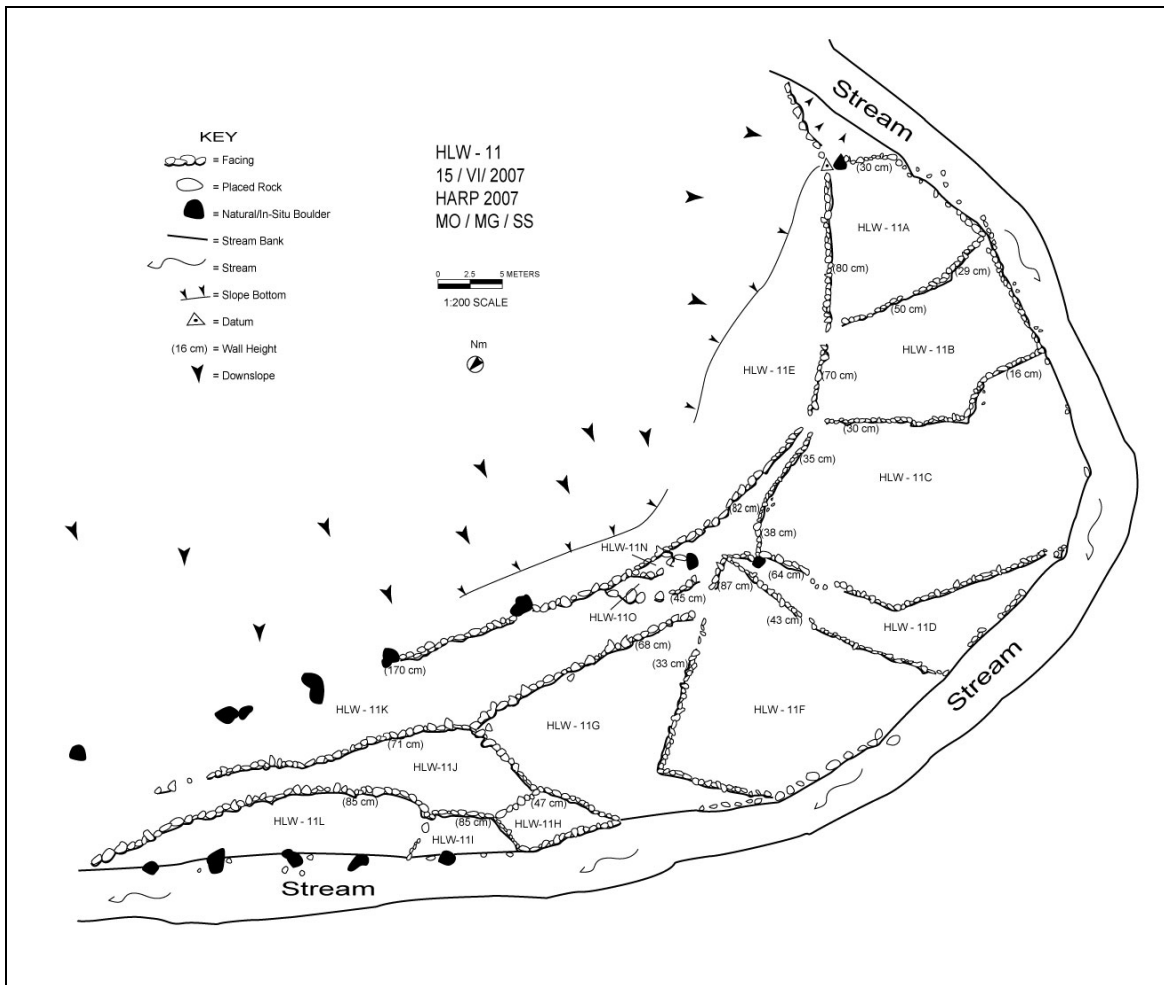


Figure 25. Irrigated Terrace Complex (HLW-11A to 11O), Lower West Halawa Gulch, North Kohala, Hawai'i.

Non-Irrigated Terrace (HLW-12)

HLW-12 is the low, stacked stone retaining wall on the west bank of the stream across from HLW-10 and slightly to the northwest. HLW-12's south end bends at a right angle towards the stream (Figure 26). Several large boulders are incorporated into the wall, while the shorter northern end is primarily cobbles. Sections of the wall are in very good condition, reaching five-to-six courses in height,

while other parts have slumped into the streambed. The retaining wall creates a terrace between stream and a steep slope behind the rock shelter. It is possible that HLW-12 is a later construction supported by the fact that it is on the edge of the water flow, yet remains in good preservation. There is limited potential for buried deposits due to the small size of the area.

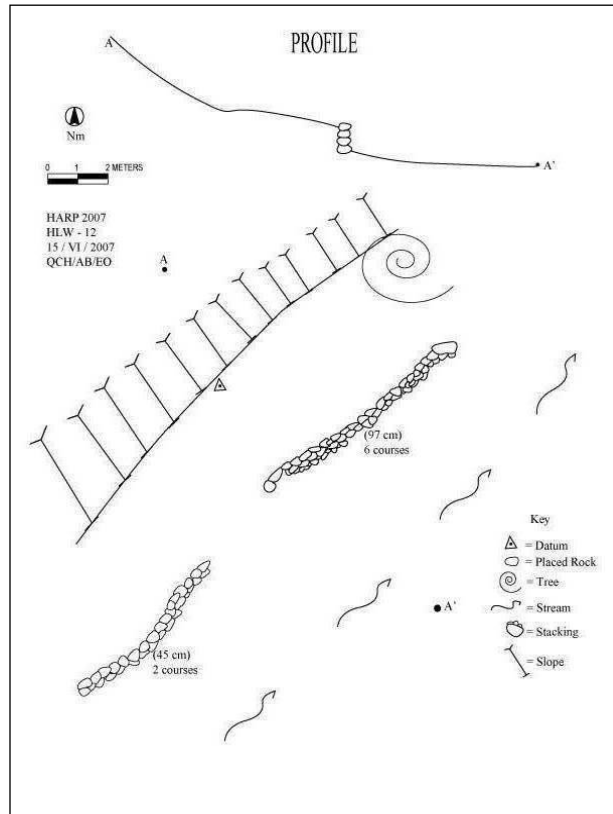


Figure 26. Non-Irrigated Terrace (HLW-12), Lower West Halawa Gulch, North Kohala, Hawai‘i.

Excavation Results: Lower West Halawa Gulch

A single 2 x 1 m unit was placed under a rock overhang at HLW-10A (HLW-10A-TU1) within the Lower West Halawa Gulch study area.

HLW-10A-TU 1

In sum, this 2 x 1 m test unit consisted of a single cultural layer with a thick deposit of charcoal. HLW-10A appears to have been used in the historic era as a small shelter to light fires. It seems likely there is some prehistoric component of the site, but this remains to be tested.

Level 1, dug in 10 cm increments, revealed charcoal pockets in the middle half of the southern wall. Soils were mixed but generally dark with a high quality of organics. Little to no change was noted at the drip-line in either soil attributes or composition. Level 2 revealed a generally consistent unit with regard to soil and sediment composition. Large amounts of charcoal were recovered from throughout the unit, and one fragment of volcanic glass. Level 3 revealed extremely dense pockets of charcoal occurring with increasing frequency, scattered cobbles, and large amounts of roots. Although rock continued to be encountered, there was no signature for any kind of archaeological feature. Level 4, at 30 cmbd, large amounts of cobble-sized rock persisted. In some areas, densely packed lighter colored silt was encountered, appearing to be sterile. However, elsewhere in the unit the darker soils continued downward,

still containing sizable but less frequent charcoal. At the bottom of Level 4 a heavily rusted, metal nail was recovered as well as two small chips of volcanic glass.

The quantity of charcoal, often in large (5-10 cm in diameter) carbonized chunks of wood, confirms that multiple fires have been made at HLW-10. The continued presence of charcoal in Level 4 at 30 cmbs and below, coupled with the quantity of rock, as well as the size and correlating age of the trees suggest that this deposit is likely historic. A significant amount of rock was also unearthed, but in no configuration that resemble a hearth or intentional placement by humans. The metal nail recovered at the bottom of the test unit indicates that this particular feature was used in historic times.

LOWER HALAWA GULCH, HALAWA AHUPUA‘A

Survey Area: 4.919 hectares (1.99 acres)

Elevation (ft above sea level): 0-200

Sites Recorded: HLW-29 to -31

Excavations: HARP 2006 excavations in HLW-29A

We briefly revisited a HARP 2006 survey area in the lowermost section of Halawa Gulch in July 2007 and recorded a new site not far from the modern road (HLW-31). We further noted that sites in this study area show increasing signs of heavy use during the historic era as one approaches the region’s main road.

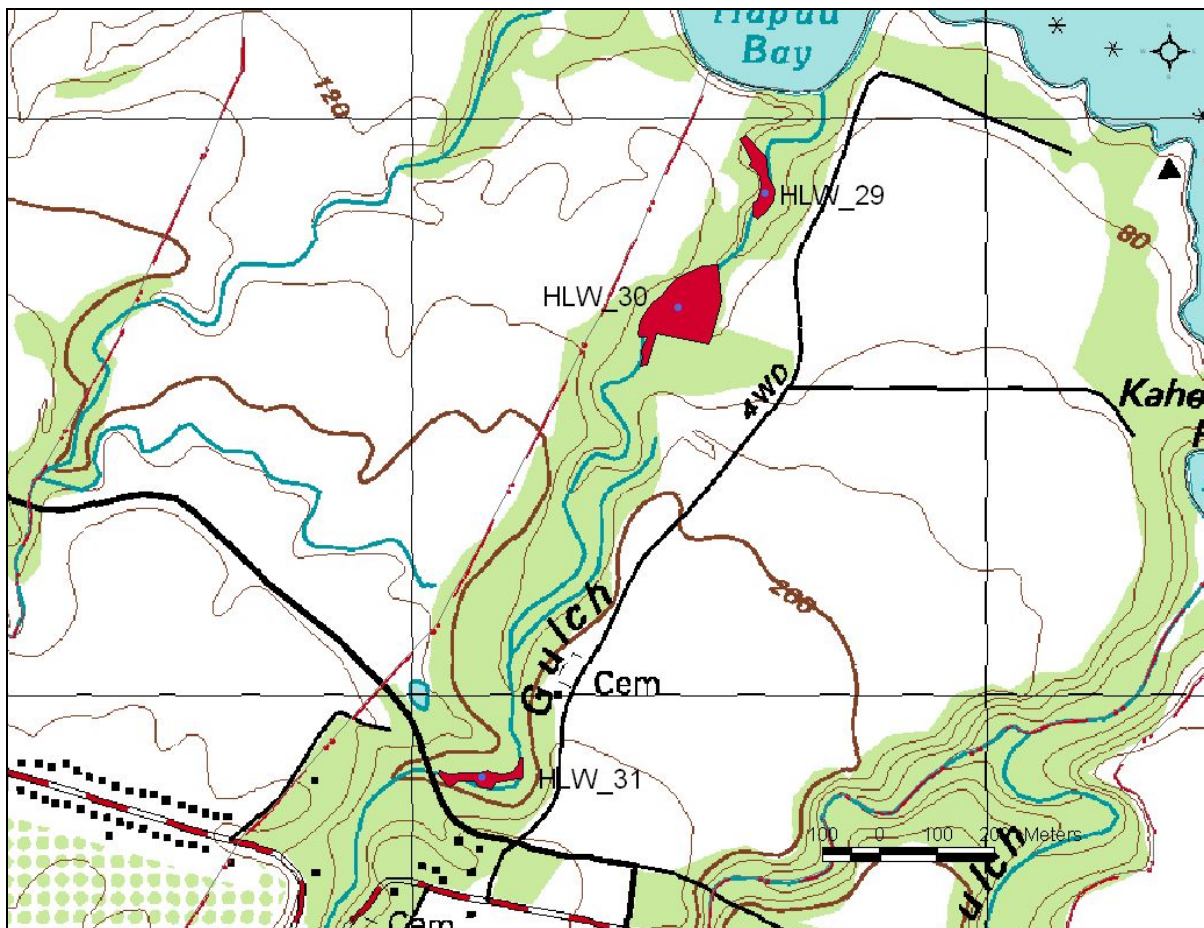


Figure 27. Lower Halawa Gulch, North Kohala, Hawai‘i.

Intensive Survey Results: Lower Halawa Gulch

The section of Lower Halawa Gulch described below stretches from the coast to 200 feet above sea level (Figure 27). However, it should be noted that the area between HLW-30 and -31 was not intensively surveyed. The terraces studied in this group are mainly of prehistoric origin; however, there are many features that are historic, such as ovens, a bridge, and a substantial historic midden. Lower Halawa's vegetation consists mostly of banana, bamboo, ginger, pandanus, taro, banyan, low growing vegetation, coffee, bread fruit, ti, mango, ground ferns, and vines. Visibility in Lower Halawa is good within the complexes, with the exception of HLW-30. HLW-30 has less visibility within the complex because it is much larger and there are more trees. Visibility outside of the complexes is hindered by vegetation, bends in the stream, and the fact that the complexes are located within a gulch. All the agricultural terraces were considered to have a high potential for agricultural remains and charcoal, that could be used for radiocarbon dating. No clearing was required in Lower Halawa. Mapping was done using tape and compass. The test unit in HLW-29A was done by the 2006 HARP field school.

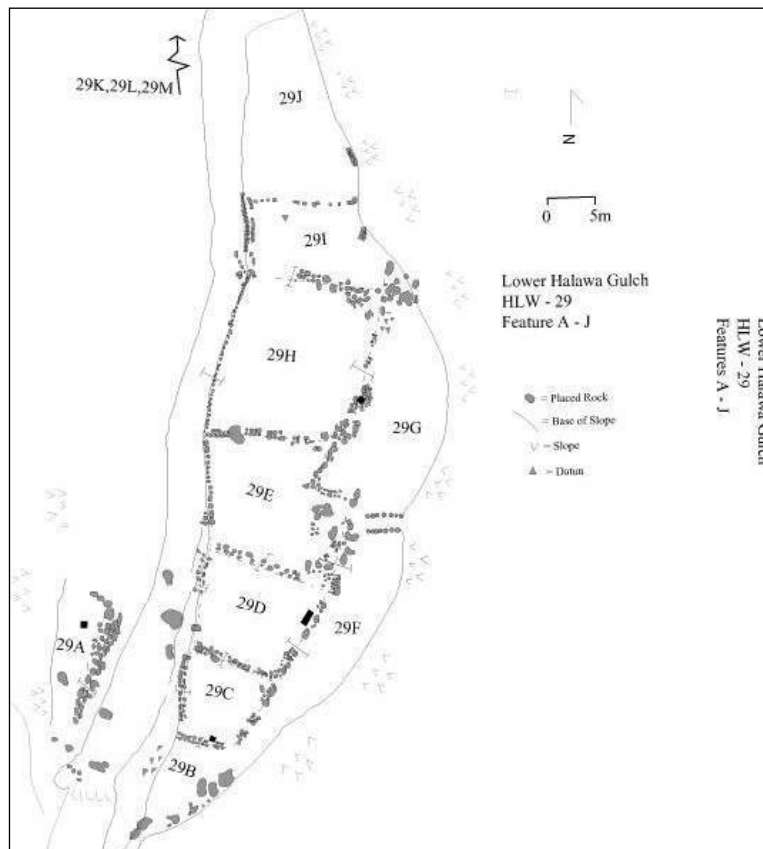


Figure 28. Irrigated Terrace Complex (HLW-29A to -29J), Lower Halawa Gulch, North Kohala, Hawai'i.

Irrigated Terrace Complex (HLW-29A to -29M)

HLW-29 is a series of terraces running south to north on the eastern banks of Halawa Stream (Figures 28 and 29). While most were likely irrigated, possibly from a natural pool of water at the top of the system, several terraces on the edges of the main system appear to have been used for habitation (i.e., HLW-29A).

On the *makai* end the system, HLW-29A and HLW-29B border the stream to the west and east respectively. Both features are at the base of the slope and contain large natural outcrops ideal for protection against erosion. The bottom retaining wall of HLW-29A and the side retaining wall of HLW-29B are in good condition with clear stacking and facing with larger boulders at the base.

HLW-29A, HLW-29B, and HLW-29F are possible habitation sites due to their flat interior, high retaining walls above the stream and subsequent terraces, and locations near large natural outcrops at the base of the steep slope running parallel to the stream. HLW-29F contains an alignment of large boulders above a high west retaining wall and rise approximately 50 cm above surface of the terrace, and appears to be up-right in position. The north and west retaining walls of HLW-29F through HLW-29H border the dry streambed. HLW-29H contains large cobbles and boulders, possibly from a collapse. HLW-29C through HLW-29J run parallel to the stream and along a modern beach access road. The dried streambed closes off the northern edge of HLW-29J.

The beach access road separates HLW-29K through HLW-29M from the rest of the terraces. HLW-29J to -29M are in the poorest condition, possibly from modern disturbances caused by the beach access road use. HLW-29C to -29E and -29I to -29M appear to be agricultural terraces due to their construction of relatively lower retaining walls creating step-like stratification from terrace to terrace, possibly for guiding the movement of water. The retaining walls of HLW-29A through HLW-29I are best preserved with clear stacking and facing.

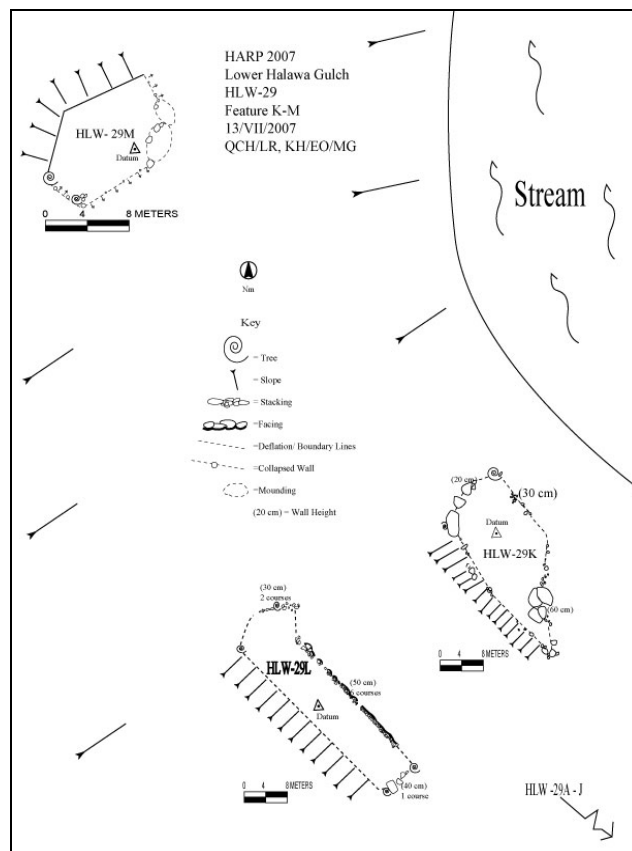


Figure 29. Irrigated Terrace Complex (HLW-29K to -29M), Lower Halawa Gulch, North Kohala, Hawai'i.

Terrace Complex (HLW-30A to -30X)

The HLW-30 complex consists of both agricultural and habitation terraces of prehistoric and historic origin (Figure 30). HLW-30A through HLW-30I, HLW-30K through HLW-30M, HLW-30Q,

HLW-30S, and HLW-30T are agricultural terraces. HLW-30J is the 16 meter long remains of a historic bridge. HLW-30N is a historic cut in the land that may have been used for ritual. HLW-30O is a brick oven of definite historic origin and it is similar in construction to a Portuguese bread oven. HLW-30P is the terrace associated with HLW-30O and was either used for agriculture or habitation. HLW-30R and HLW-30U through HLW-30X are terraces that were probably used for habitation because of their distance from the streambed.

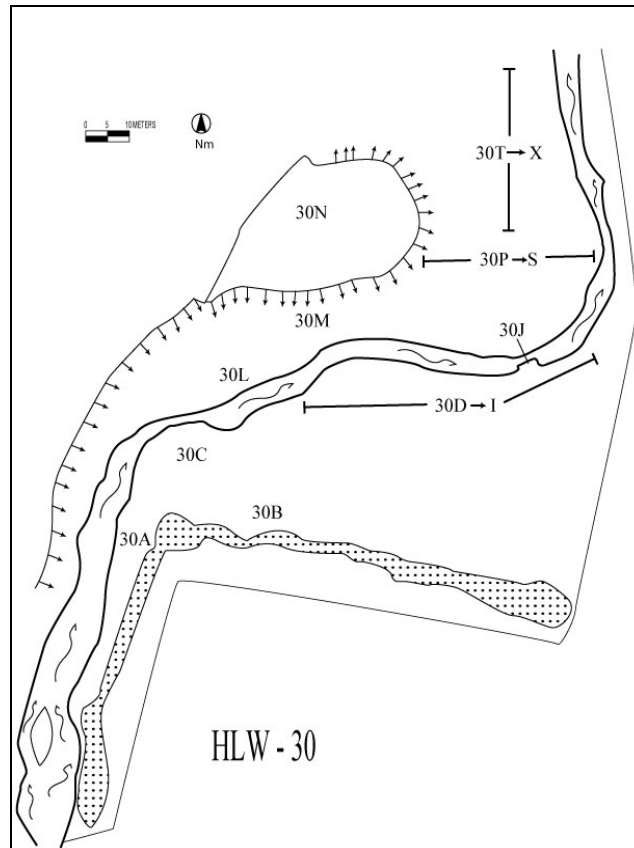


Figure 30. Terrace Complex (HLW-30A to -30X), Lower Halawa Gulch, North Kohala, Hawai‘i.

Terrace Complex (HLW-31A to -31H)

HLW-31A to -31E is a complex of agricultural terraces in Halawa Gulch bordering the south side of the stream (Figure 31). The terrace walls range from rock faces to changes in elevation as markers of terrace boundaries. The terrace walls range up to six courses of stone and 110 cm high. The complex is 161 meters from the beginning to the end. There are many historic materials present. HLW-31 abuts a historic cooking site as well as a possible habitation site to the south of the complex along the slope. Potential for buried agricultural soil and charcoal is high. The terraces have moderate visibility from one to another and low visibility out of the gulch.

HLW-31F is a set of two historic ovens constructed of cement and stone. They are situated next to each other on the slope above terrace HLW-31B. They are in fair to good condition, with historic metal present including a pickax and other unidentified metal object.

HLW-31G is a terrace; stone faced with an undetermined interior. There are three carved stone steps leading up to it on the west side. The east side of the structure is hard to determine due to poor construction and collapse; there is no definitive wall. There is historic metal present in and around feature, as well as porcelain and glass artifacts. The north wall is stacked then collapses to east side.

sections: MKP-1 including 85 features; MKP-2 including 30 features; and MKP-3 including 15 features (Figures 33 and 34). Mapping was completed with tape and compass. Excavation was completed with three separate test units and shovel test pits (STP) throughout. Excavations were done with shovels, trowels, brushes, and 1/8th inch screens. An *o'o* and auger were used to aid in the excavation.

Intensive Survey Results: Lower Waikani Gulch

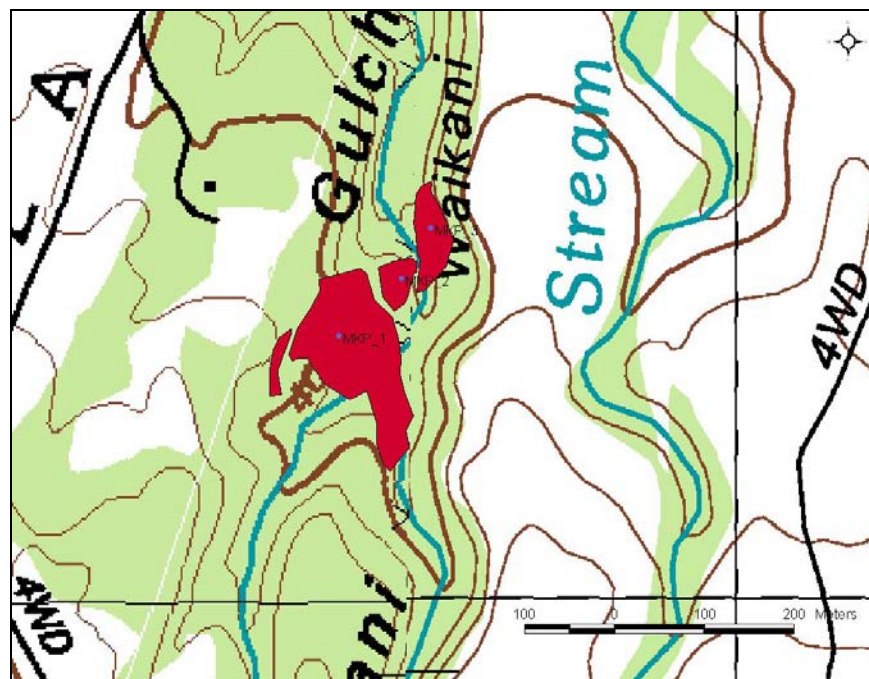


Figure 33. Lower Waikani Gulch, Makapala ahupua'a, North Kohala District, Hawaii'i.

Irrigated Terrace Complex (MKP-1A to 1CG)

MKP-1 is a complex of 85 features including 83 terraces and walls and two irrigation ditches. The complex is bordered by two converging streambeds: Hinao and Waikani. The ages of the terraces are likely to be prehistoric with some historic use. MKP-1A, Q, and BN have unusually high retaining walls. MKP-2 is to the north and MKP-3 is to the northeast.

MKP-1CG is an *'auwai* that could have been used to feed water to MKP-1F through to MKP-1CF. The *'auwai* is located at the eastern portion of the gulch on the upper west slope and is fed approximately 200 meters south of feature MKP-1BS (southern most feature of MKP-1). The *'auwai* appears to end, and hence feed both feature MKP-1CK and MKP-1CL. It was constructed by a cut slope approximately 30-50 cm in width with a length of 235 meters.

The second *'auwai* is located in the western portion of the gulch on the east slope. The ditch hugs the east slope and travels past MKP-1A and MKP-1B. It then curves along the east slope and most likely fed the western terraces of MKP-1. No feature letter was assigned to this *'auwai*.

The terraces in MKP-1 appear to be exclusively agricultural terraces. The arrangement of the terraces seems to be similar to the agricultural *lo'i* that can be found in the other gulches on the windward side of the island. The two *'auwai* are thought to water the inner terraces which would otherwise have been impossible to feed directly from the streams that border MKP-1. The *'auwai* are characteristic of wetland agriculture but can only be depended on if there is plentiful rain.

Non-Irrigated Terrace Complex (MKP-2A to -2AD)

MKP-2 is a complex of small irregular shaped, stone-faced, earth-filled terraces (MKP-2A through to MKP-2AD) built on an isolated section of land at the confluence of Waikani and Hinao streams. It is *mauka* of MKP-3 and *makai* of MKP-1. Although surrounded on all sides by streambeds the complex was unlikely to have been irrigated given its height above the streams. Indeed the terraces on this “island” are remarkably similar to those in upper arm of Waikani Gulch section of MKP-1. While most features were used for agriculture there are a few unusual features that may have had other uses including a niche (MKP-2V), a small shelf (MKP-2Q), and upright stones. The vegetation on MKP-2 includes *hau*, *hala*, and vines. The only direct evidence of historic use is a small piece of porcelain found on the surface of MKP-2R.

Irrigated Terrace Complex (MKP-3A to -3O)

MKP-3 is an irrigated terrace system beginning at a bend in the Waikani stream with an ‘*auwai* at the top used to flood the complex. It is bounded on the west side by the stream and on the east by a steep slope which extends throughout the entire *lo'i* complex. *Hau*, *heliconia*, ginger, and large banyan trees dominate the vegetation. The overgrowth throughout the *lo'i* system is relatively thick making visibility difficult in some areas.

The complex itself contains 15 irregularly sized and shaped features as well as an ‘*auwai* that is south of MKP-3A. Terraces in this complex were built on a flatter gradient than the above terraces and thus retaining walls are lower with smaller stones. Concentrations of stone rubble are located intermittently throughout the complex, which may be indicative of a flash flood. This rubble forms a thin layer of cobbles in areas, which may be the result of fluvial deposition. The retaining walls for MKP-3B, -3C, and -3D all terminate at the base of the slope with stone mounds. Two more stone mounds are located at the base of the slope within feature MKP-3E. While the majority of the site appears to be prehistoric there are historic artifacts including; glass bottles, metal, and a concrete cube with a basin. There are no indications of habitations within the complex.

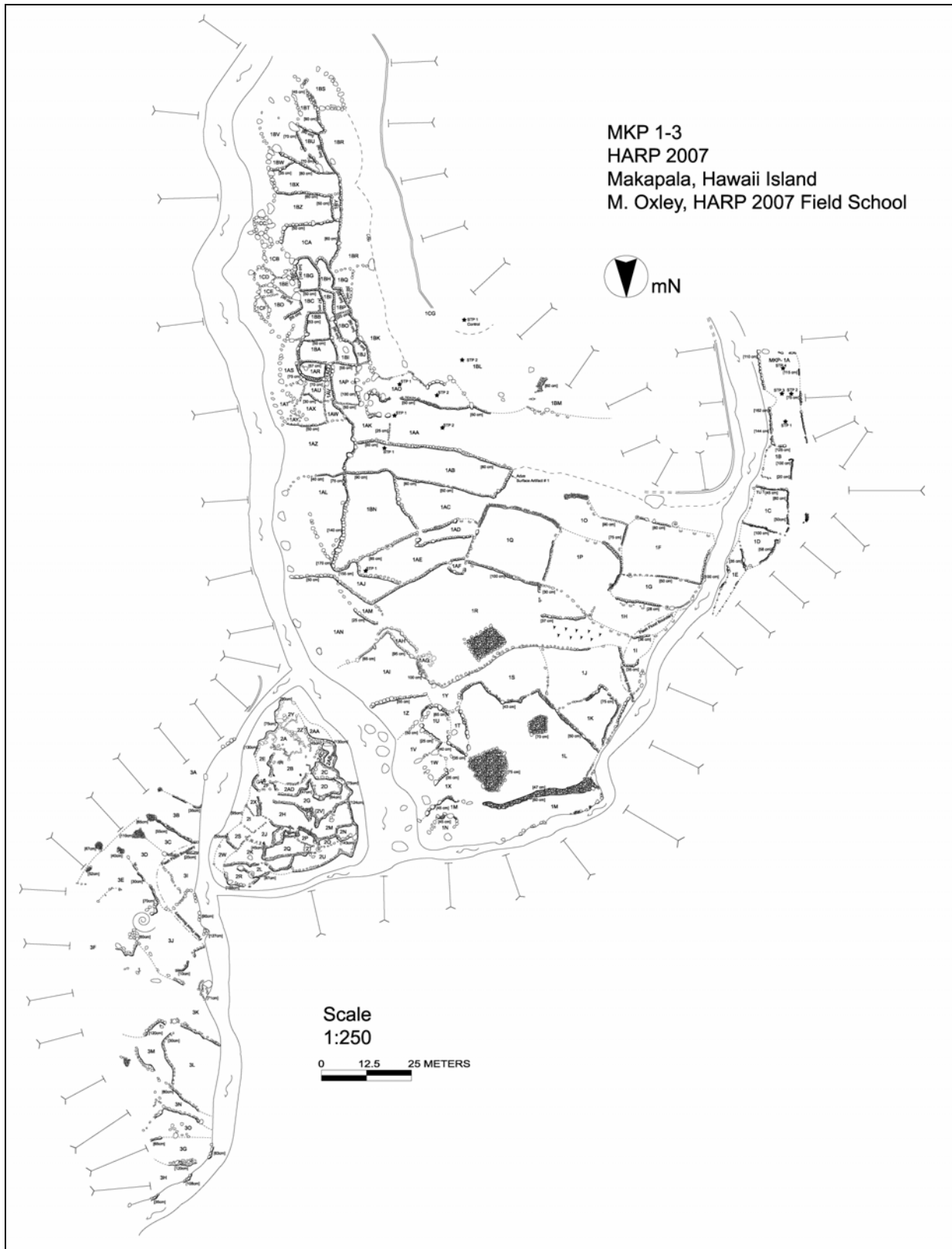


Figure 34. Lower Waikani Gluch (MKP-1 to -3), Makapala ahupua‘a, North Kohala District, Hawai‘i.

Excavation Results: *Lower Waikani Gulch*

Test Units

MKP-1D-TU 1

Test Unit 1 (50 x 50 cm) was placed at the base of a *lo'i* wall (MKP-1C) within MKP-1D. The unit was beneath a large boulder in the center of the wall. Level 1 (0-15 cmbd) featured numerous small roots and some larger roots within a very dark brown matrix. The soil itself was predominately clay with some silt. One small piece of charcoal was found and collected while one fragment of un-carbonized *kukui* nut was also found, but not collected.

The soil within Level 2 (15-30 cmbd) remained primarily organic. Roots became less common, but at a depth of about 20 cm there was a layer of pebbles measuring about 5-10 cm in diameter. This pebble layer extended to the end of Level 2 and continued into Level 3. Additional elements found include a small piece of volcanic glass, charcoal and *kukui* nut fragments. Soil was slightly lighter than Level 1 but of similar composition.

Level 3 (30-45 cmbd) showed a silt increased but there was still more clay than silt within the deposit. Also, there was a high volume of suspended pebbles and cobbles in the sediment. Some charcoal and volcanic glass was collected.

Excavation continued with Level 4 (45-60 cmbd) in order to attempt getting under basal *lo'i* stone on the south wall of the unit. The soil matrix remained consistent with levels above - a light brown clay/silt mixture suspending a large volume of pebbles and cobbles. However, on this level the frequency of boulders increased, with one set in the western face and one in the eastern face. Tree roots continued throughout this level.

Test Unit 1 had an extension that was to the west of the original test unit. This excavated area was similar in composition to Levels 1-4 within the adjacent half of the test unit. Organic soils dominated throughout, although depths below about 50 cm tended towards more orange soil with a lower organic content. The top 20 cm contained many roots, pebbles and small cobbles. A number of boulders were also found throughout. Historic glass and porcelain as well as volcanic glass and charcoal were found between 30-35 cmbd. The southern wall of the unit abuts a large *lo'i* wall which seems to extend well sub-surface with continued faced stones to a depth of at least 50 cm below surface.

Excavation in TU 1 also had a south extension that yielded three 1-gallon bags of soil that were collected from beneath what was determined to be the basal layer of a *lo'i* wall from depths between 18 and 45 cm with the deeper ranges stopping before hitting the sterile, reddish soil of Layer II.

Test Unit 1 continued another level deeper along with the west extension. This was considered Layer II and Level 5. The soils in this level became more orange and less clumpy and developed into 40% clay and 60% silt. A small amount of charcoal was collected from this level.

MKP-2M-TU 1

A 50 x 50 cm test unit was also placed within MKP-2M abutting the retaining wall of MKP-2G. Level 1 (0-15 cmbd) had numerous large roots throughout, which made excavation difficult. Some large rocks were also exposed at the lower depths. Soil itself was dark brown and highly organic. One small piece of charcoal was tentatively identified in screening, but subsequently destroyed. The northern sidewall was been damaged during root removal.

The test unit continued downward into Level 2 (15-30 cmbd), but was blocked by a large rock. This boulder extended from Level 1, through all of Level 2 and into Level 3. Compacted silt occurred within the unit, generally around 25 cmbd. Fewer roots appeared and there were fewer rocks. The *lo'i*

wall itself did not seem to continue down below the basal stone identified on the surface, although roots did occur and may have disrupted any subsurface stones. Charcoal and volcanic glass were both found as well as a piece of historic glass.

Level 3 (30-45 cmbd) had a large rock in the west portion of the unit that made excavation difficult. Within the limited soil removed from this level we found a single piece of charcoal and a piece of historic glass. It was determined that going any deeper in the small area available for excavation would be almost impossible so the unit ended at 45 cmbd.

After completing Level 3 excavation began on a south extension digging beneath the basal stones. While getting samples another basal stone was found beneath what had previously been believed to be foundation of the retaining wall. This stone was fully sub-surface but it was directly touching the stone above it. As such there are two bags of charcoal samples. The first sample is from a larger area and may not be the most appropriate for dating. The south extension sample contained only charcoal from below the lowest basal stone.

MKP-3C-TU 1

One final test unit was placed in MKP-3C and at the base of a low, stacked *lo'i* wall running northwest to southeast (MKP-3B). The unit was situated against two large flat stones at the base of the wall. The soil was dark and full of organic material and roots. The wall's stones extended subsurface below this level. No artifacts were uncovered either from the unit itself or while screening.

In Level 2 soil began to grow drier and compacted around 20 cmbd. Roots were not as prevalent as within Level 1, but were still relatively common. The *lo'i* wall continued down below the bottom of Level 2 in the form of large faced stones. One small piece of charcoal was found while screening along with a land snail shell.

The soil within Level 3 became more silty and granular. Roots remained throughout the unit until about 40 cmbd. Around this depth the soil became more compacted, took on a reddish hue, and had a higher proportion of rocks, likely indicating a new layer. Pieces of charcoal, some possibly large enough for species identification were found both within the unit and in the screen.

Level 4 began as above levels, continuing the move towards sterile, compacted soil. Larger numbers of rocks were found throughout the matrix, including some boulders. Upon reaching an average depth of approximately 55 cmbd the level was stopped due to a determination that no more subsurface stones within the *lo'i* wall would be found, and that sediment beneath the walls basal stones could be adequately accessed. Within this level charcoal fragments were found although screened soil below an approximate depth of 50 cmbd yielded no more samples. Soil was taken from an area 46 cm wide and 28 cm high and reaches 30 cm into the wall. The midpoint of the sampled area measures 37 cm below datum. A small amount of charcoal was collected in the field.

Shovel Test Pits

Along with the test units that were placed in Makapala we also used shovel test pits (STP's) to examine agricultural soils.

MKP-1A-STP 1

The first STP was placed in MKP-1A. The O Horizon of STP 1 ended at 8 cmbs. Layer I was from 8-32 cmbs and the first soil sample was taken at 21 cmbs. Layer II was 33-51+ cmbs. The second soil sample was taken at 42 cmbs. There were three areas of charcoal and one was taken *in situ* at 49 cmbs. There was also potential rodent turbation at 43 cmbs on the north wall.

MKP-1A-STP 2

STP 2 was also placed in MKP-1A. The O Horizon ended at 5 cmbs. Layer I extends from 5-21 cmbs and the first soil sample was taken at 17 cmbs. Layer II extends from 22-48+ cmbs. The second soil sample was taken at 32 cmbs. The layers on the west wall of the pit were more visible than the other walls. There are multiple areas of compacted silt throughout the wall but there is a distinct change in the matrix. Charcoal was also noted.

MKP-1A-STP 3

STP 3, placed in MKP-1A, had an O Horizon that ended at 5 cmbs. Layer I extended from 5-19 cmbs and the first soil sample was taken at 19 cmbs. The second soil sample was taken from Layer II at 26 cmbs. Layer II extends from 20-28 cmbs. The third soil sample was taken at 41 cmbs and Layer III extends from 29-48 cmbs. Within the pit the matrix was clearly defined and all three layers were visible. Layer II had a large amount of compacted silt within it. There was charcoal within Layer III but the amount of charcoal found in STP 3 is less than the amount found in STP1 and STP 2.

MKP-1A-STP 4

STP 4 was the last STP placed in MKP-1A. The O Horizon ended at 7 cmbs. Layer I extends from 7-37 cmbs and the second soil sample was taken at 21 cmbs. The third soil sample was taken at 42 cmbs from Layer II, which extends from 38-46 cmbs. The first soil sample was charcoal that was taken at 34 cmbs. Charcoal was found *in situ* at 21 cmbs. While digging this pit there were large roots and rocks. Layer I is much deeper than in the previous three pits. There have not been any signs of Layer II as was found in STP 3, but it could remain unexcavated.

MKP-1C-STP 1

One STP was located in MKP-1C. It was located in the center of the feature. There were two layers. The first layer extends to 39 cmbs and consisted of brown soil and infrequent small rocks. The second layer started at about 39 cmbs and extends to the bottom of the pit (77 cmbs). This layer had much redder soil and was siltier than the first layer. It also contained larger, more rocks.

MKP-1BL-CONTROL STP

After the STP's in MKP-1A were completed testing focused on another section of this large complex - MKP-1BL. Two STP's were placed in MKP-1BL: one was a control STP and the other was STP 1. The control STP was located south of STP 1 outside of the gardened area of the site. In this pit, a dark brown soil with high root content and minimal rocks was encountered below the O horizon. At 37 cmbs, Layer II was encountered; a dark brown sediment with a slightly reddish tint. The two layers had a diffuse boundary over about 10 cm. Layer II had few roots. The auger was used at the base of the STP at 57 cmbs down to 80 cmbs. Auguring revealed small quantities of compacted silt at 71 cmbs and contained higher clay composition than that sampled in Layer II. Sifting gave us a small collection of charcoal.

MKP-1BL-STP 1

STP 1 was located north of the control STP. Layer I consisted of a dark brown soil and showed a diffuse boundary with Layer II through a gradation of about 10 cm. Layer II soil was of a much finer

grain and had a slightly red tint and higher clay content. Small charcoal samples were found while screening. Auguring revealed a change in soil color at a depth of 74 cmbs. Some inclusions of silt were present.

MKP-1AO-STP 1

Two STP's were excavated in MKP-1AO, north of MKP-BL. STP 1 had an O Horizon that ended at 6 cmbs. Layer I extended from 7-23 cmbs; Layer II extends from 24-47 cmbs. STP 1 showed two distinct soil layers and the matrix had a distinct color change. There was a root level that divided the two layers. Compacted silt did not show up until the second layer. No charcoal was found. The auger was used in this STP and went to a depth of 70 cmbs. The augured soil was lighter and more clay like.

MKP-1AO-STP 2

STP 2 in MKP-1AO had a stratigraphy that started with an O Horizon (0-5 cmbs); Layer I from 6-22 cmbs; and Layer II from 23-48 cmbs. There were no areas of compacted silt. There was a small amount of charcoal found in the screen. The auger was used in this STP as well and went to a depth of 60 cmbs. Augured soil was lighter in color.

MKP-1AA-STP 1

Two additional STP's were placed in MKP-1AA located north of MKP-1AO. The O Horizon of STP 1 ended at 6 cmbs; and Layer I extended from 7-49 cmbs marking the end of excavations. No charcoal was found but there was a small amount of compacted silt throughout the pit. The auger was used and went down to 80 cmbs. A change in soil color was noted and a soil sample was taken.

MKP-1AA-STP 2

STP 2 in MKP-1AA also showed a shallow O Horizon (0-9 cmbs) and single layer of sediment (Layer I, 10-46 cmbs). There was a small amount of compacted silt towards the bottom of the pit. A small amount of charcoal was collected from the screen. The auger was then used to excavate to a depth of 61 cmbs where a light colored soil with rock was found. The auger was then used to dig further to a depth of 75 cmbs to reveal a darker soil at the base of excavations.

MKP-1AB-STP 1

One STP was placed in MKP-1AB. Layer I (2-28 cmbs) was a dark brown soil composed of equal parts clay and silt. Layer II was uncovered at about 29 cmbs and was also classified as a dark brown with a slightly higher ratio of clay. A boulder, black soil, and compacted silt were encountered around 55 cmbs. Auguring at the base of the STP (57 cmbs) down to 72 cmbs revealed compact silt containing a higher clay/silt composition. Sifting revealed a volcanic glass fragment as well as several boulder-sized rocks. Small gray clumps of clay were also found near the bottom of the STP.

MKP-1BN-STP 1

North of MKP-1AB was another STP that was located in MKP-1BN. Layer I was a dark brown color composed of 65% clay and 35% silt. Layer II, beginning around 23 cmbs, marked a distinct change in soil color from brown to reddish-brown, although the scientific color classification for each was the same. There was quite a bit more clay in the soil in Layer II than in Layer I. Auguring at the base of the

STP (48 cmbs) revealed a soil with slightly more clay content and of a dark yellowish brown color. We were not able to auger any further down due to the presence to compacted silt and rocks. Small clumps of gray clay were found.

MKP-1AE-STP 1

There was one final STP for MKP-1 placed in MKP-1AE. Directly beneath the O horizon cobble sized rock were uncovered that continued to be found throughout the excavation. The cobbles became increasingly concentrated toward the base of excavation. Layer I began at 3 cmbs where a very dark grayish brown soil composed of 65% clay and 35% silt was encountered. Layer II began at 34 cmbs, the soil was a dark brown composed of a slightly higher concentration of clay to silt than Layer I. Auguring at the base of the STP, 58.5-77 cmbs, revealed a soil of a dark yellowish brown composed of slightly more clay to silt ratio than Layer II. There was some compacted silt as well as rock present in the auger core.

MKP-2G-STP 1

MKP-2 had one STP in MKP-2G. The STP had two layers. Layer I was very dark brown and was silty clay. Layer II was a dark yellowish brown.

MKP-3A-STP 1

MKP-3A was tested with two STP's. In STP 1, Layer I began beneath a 2 cm O-Horizon. We found a layer of dark brown (Munsell 10YR 3/3) soil composed of about 65% clay and 35% silt. Cobbles were also present. About 48 cmbs, we uncovered a dark yellowish brown soil composed of about 75% clay and 25% silt (Layer II, 10YR 3/4). Layer II also had cobbles, pebbles, and compacted silt. Soil from Layer I was coarser and in thick, dry clumps. Layer II soil much softer and finer grained. When we augured, soil was still dark yellowish brown (Munsell 10 YR 3/6) and the same ratio of clay to silt as the soil from Layer II. Auguring was brief and ended at 70 cmbs only 12 cm below bottom of the STP (58 cmbs) due to rock. We found a small amount of gray clay in the auger soil.

MKP-3A-STP 2

STP 2, also in MKP-3A, had a lot of cobble and pebble beginning from 10-15 cmbs. The entire STP consisted of one dark brown layer. STP 2 was located on MKP-3A between the slope and the streambed; the slope lies to the east and the streambed lies to the west. The STP is closer to the streambed than it is to the slope. The auger soil was finer, but still dark brown.

MKP-3B-STP 1

The next excavations were placed near the retaining wall of MKP-3B, about four meters east from the streambed. The slope was about 15 meters to the east from STP 1. When we dug the unit, two distinct types of soil became evident: one dark brown with a chunky texture and the other dark yellowish brown with a finer texture. However, it was difficult to discern where Layer I (dark brown) ended and where Layer II began.

MKP-3D-STP 1

One last STP was excavated in MKP-3D. The pit in MKP-3D was dug to 70 cmbs. Layer I extended from 3 to 48 cmbs and was a dark grayish brown, 65% clay and 35% silt. Layer II extended from 49 to 70 cmbs and was brown with 75% clay and 25% silt.

MKP-3D- CONTROL STP

A control pit was aborted a shallow depth due to impenetrable rock and a lack of deposited sediments that would suggest it to be comparative in relation to the other pits.

LOWER NIULI‘I, MAKAPALA AHUPUA‘A

Survey Area: 1.24 hectares (0.502 acres)

Elevation (ft above sea level): 0-30

Sites Recorded: NIU-1 to -3

Excavations: see HARP 2006, Field and Graves in prep. b

An irrigated terrace complex located in Keokea Beach Park originally recorded last summer was revisited this summer (Figure 35). Although these features are labeled here as being in Niuli‘i *ahupua‘a*, recent analysis of Mahele era documents suggests they were part of Makapala *ahupua‘a*.

Intensive Survey Results: Lower Niuli‘i Gulch

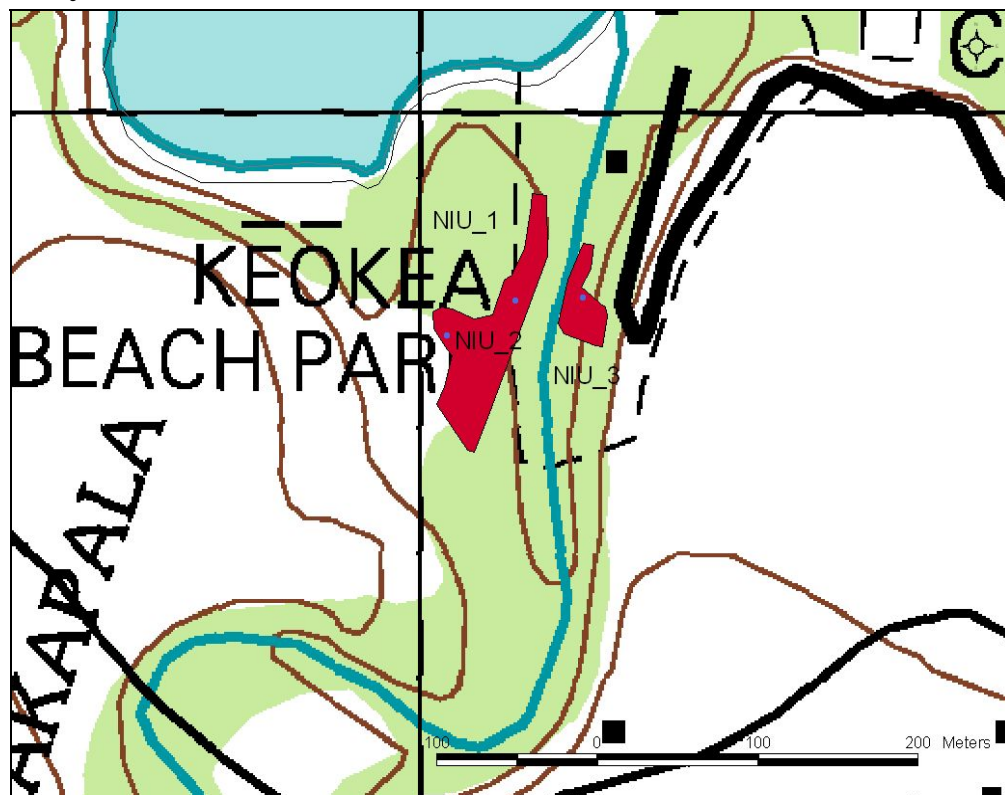


Figure 35. Lower Niuli‘i Gulch, Makapala ahupua‘a, North Kohala District, Hawai‘i.

Irrigated Terrace Complex (NIU-1A to -1G)

NIU-1 is a complex of five agricultural terraces, one *'auwai* and one other feature (Figure 36). The retaining walls range in size from 40-160 cm in height and are stacked two-to-seven courses high. Some walls are in poor to fair condition due to proximity to Keokea beach while others are in good condition. Three test units, multiple shovel test pits, and mapping of this complex was completed in 2006 (Field and Graves in prep. b). The site could be prehistoric with historic use and modification. There is a *heiau* on a ridge to the northwest of the complex (see NIU-2). There are no unique architectural components excluding high walls and one undetermined use area (NIU-1G) at the bottom. Potential for buried agricultural soils and charcoal is high; as was demonstrated by the 2006 excavations.

Terraces and Upright Stone Alignment (NIU-2A to -2D)

NIU-2 are a group of features associated with a previously recorded temple site called Kuapalaha Heiau (State No. -4149; see Figures 36 and 37). A series of terraces and walls were uncovered extending to ridge top summit of the *heiau*. The upper-most part is walled. A 20 m wide hole to the sea below

appears to be widening due to erosion. The wall first intersecting NIU-1D's east retaining wall has 2-3 uprights. It intersects with another wall that has 8-10 uprights. Overall, it appears the temple site is, architecturally speaking, continuous with the irrigated terraces below (NIU-1). Only a sketch map was completed this season.

Irrigated and Non-Irrigated Terrace Complex (NIU-3A to 3F)

NIU-3 is a multi terrace complex, made up of agricultural terraces and one possible house feature, stretching 40 m along the east bank of lower Niuli'i stream (Figure 38). There is an historic trail/road on the north end leading up and out to a beach pavilion. NIU-3 is less formal than NIU-1. Walls are between two-to-four courses and at the highest point the wall is 158 cm. The possible house feature is 3 x 10 m in the lower middle section of the complex (NIU-3B). Feature 3E and 3F are not completely mapped and probably extend 30 m south up the stream (*mauka*). Site is prehistoric with historic use and modification. NIU-1 is to the west of the complex across the stream. The road leading into the beach parking lot is to the east of the complex and Nani Svenson's garden is to the south. There is potential for buried agricultural soil as well as charcoal deposits.

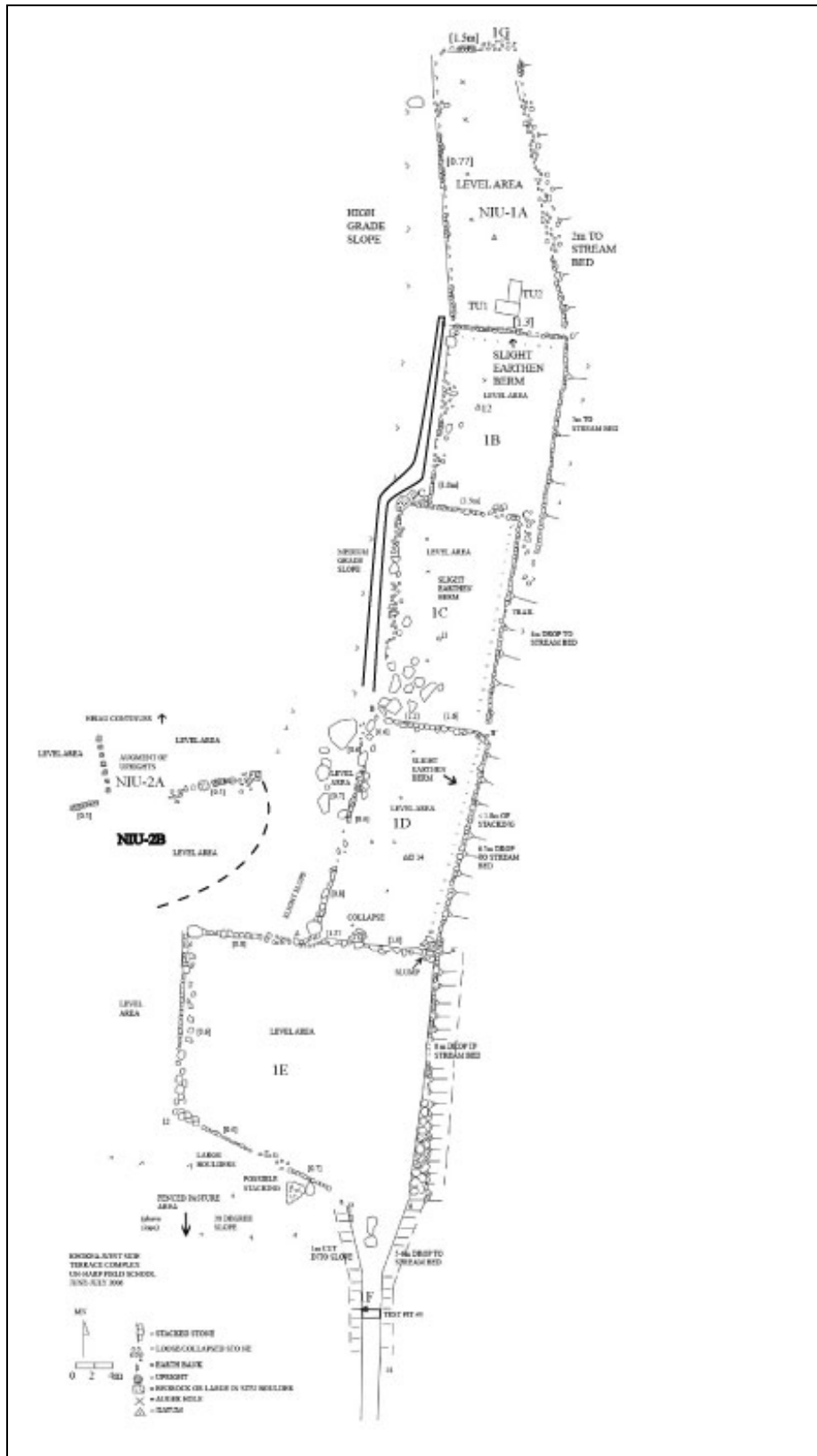


Figure 36. Irrigated Terrace Complex (NIU-1), Lower Niuli'i Gulch, Makapala *ahupua'a*, North Kohala District, Hawai'i.

FIGURE 9.
 KUAPĀLAHA HEIAU AND
 SITE WK-17 (4149)

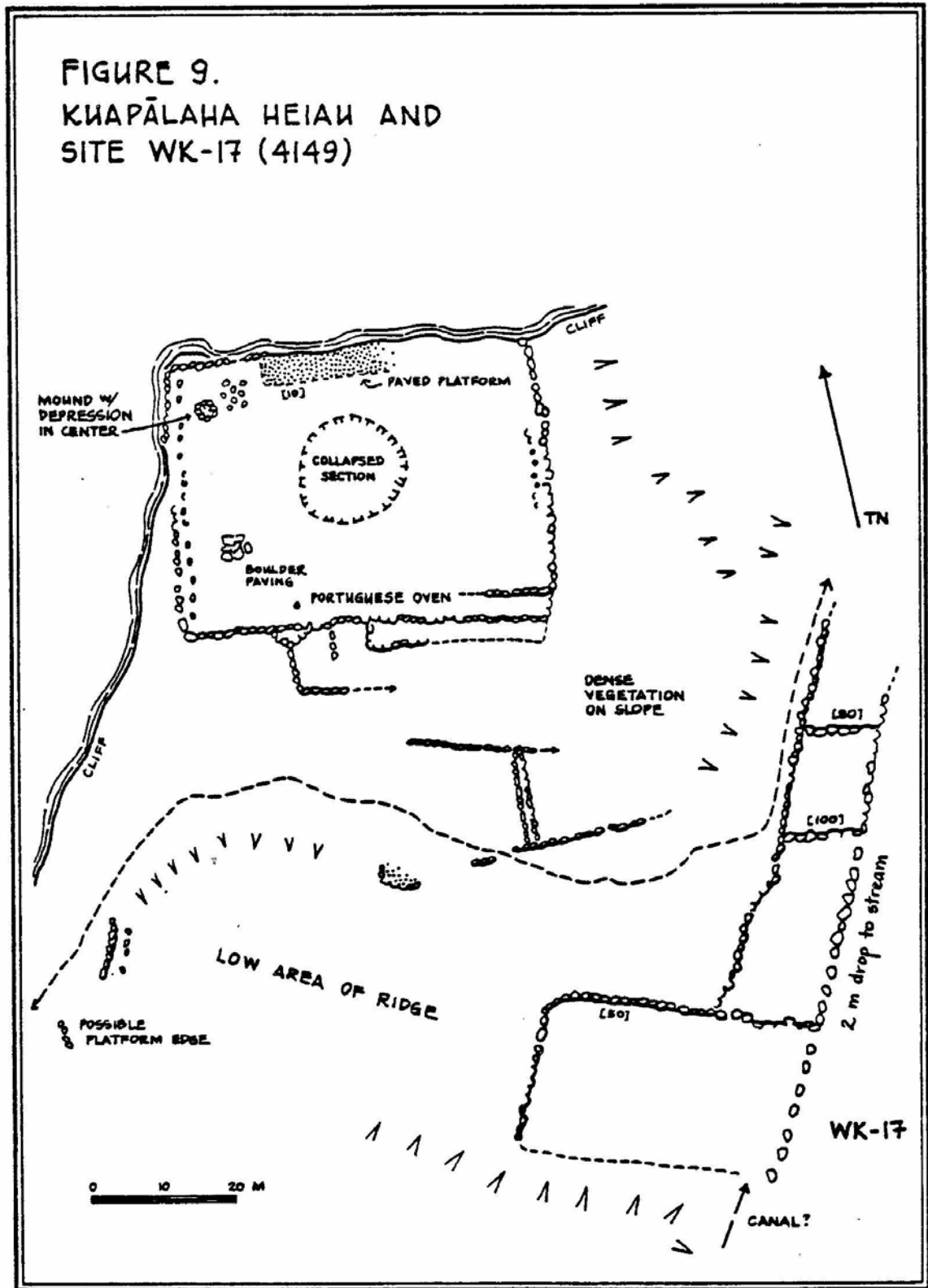


Figure 37. Kuapalaha Heiau, Lower Niuli'i Gulch, Makapala *ahupua'a*, North Kohala District, Hawai'i (Source: Tomonari-Tuggle 1988).

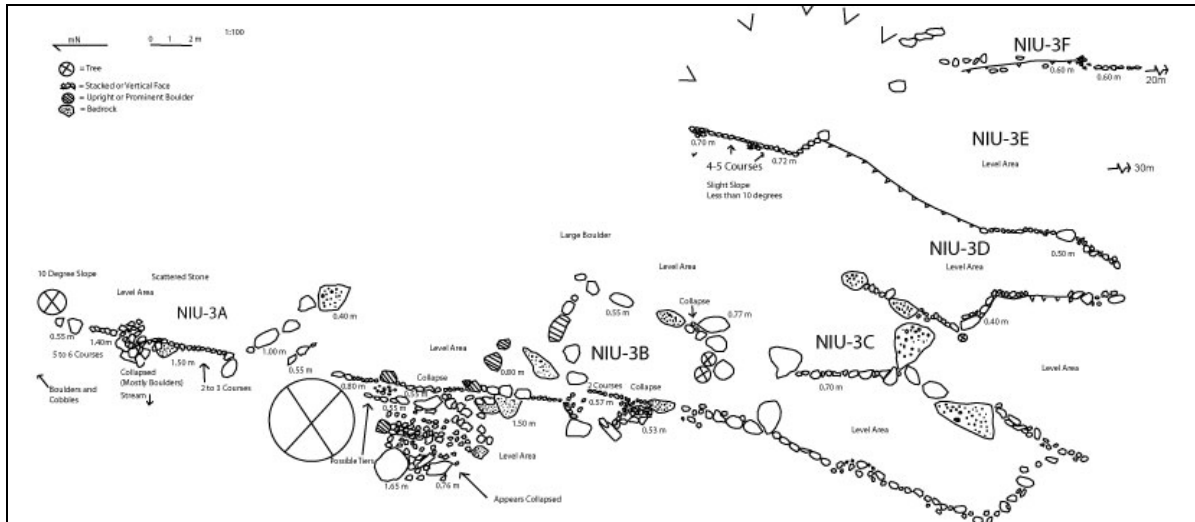


Figure 38. Terrace Complex (NIU-3), Lower Niuli'i Gulch, Makapala ahupua'a, North Kohala District, Hawai'i.

LOWER WAINAIA GULCH, HALAULA AHUPUA'A

Survey Area: 2.406 hectares (0.974 acres)

Elevation (ft above sea level): 400-600

Sites Recorded: IOL-1 and -2

Excavations: N/A.

The features surveyed in Wainaia Gulch are located in the lower physiographic zone between 400 and 600 feet above sea level. Although these sites were originally placed in 'Iole ahupua'a they are likely

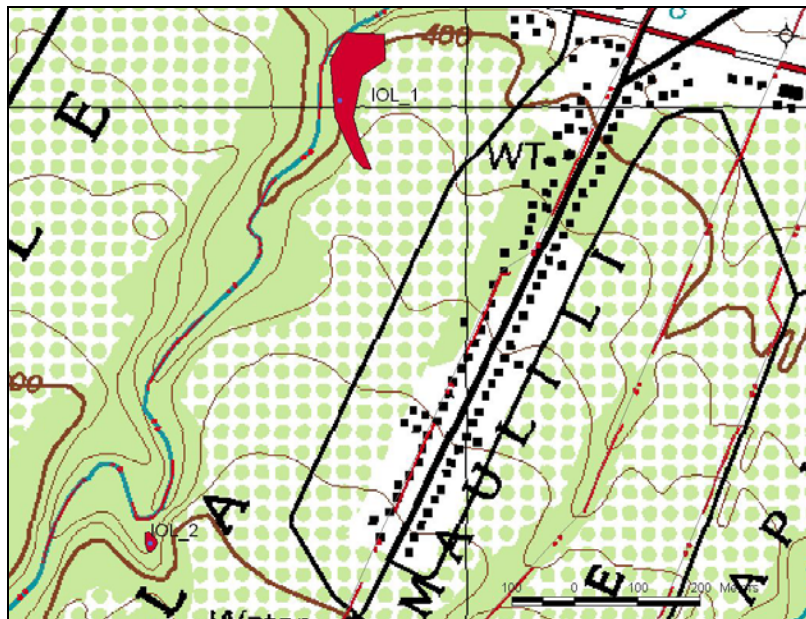


Figure 39. Lower Wainaia Gulch, North Kohala District, Hawai'i.

located in Halalua *ahupua'a* (Figure 39). Work was only done in the area for part of one day (16 July 2007), since these sites were mapped previously (Field and Graves in prep. c).

Historic Bridge Foundation (IOL-1)

IOL-1 is a roadway or bridge (Figure 40). It was built during the historic time period. Four concrete pylons remain to the west of the stream and ten are still present to the east of the same stream. There is a hearth nearby.

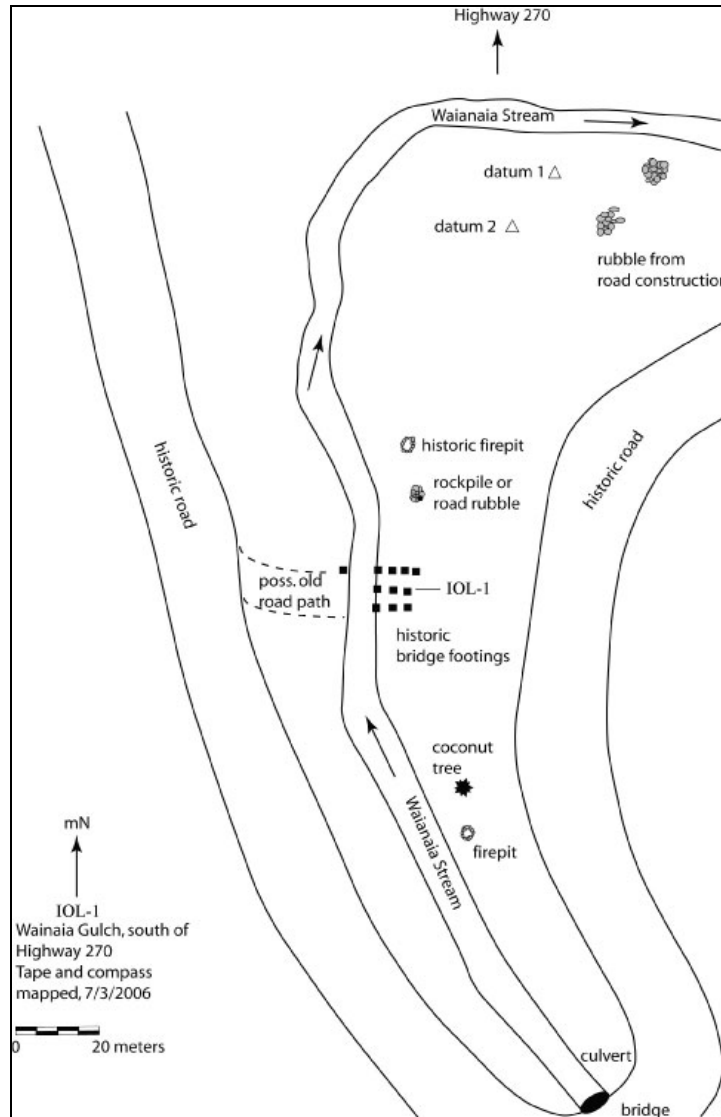


Figure 39. Historic Foundation (IOL-1), Lower Wainaia Gulch, Makapala *ahupua'a*, North Kohala District, Hawai'i.

Terraces (IOL-2A and IOL-2B)

The two terraces of IOL-2 are of undetermined function (Figure 41). IOL-2A is made up primarily of boulders with some cobbles. There is a scattering of pebble and cobble within the feature. IOL-2B has a wall made up of equal parts of boulder and cobble and has a height ranging between 40 cm and 60 cm. A *ti* plant is growing on the feature.

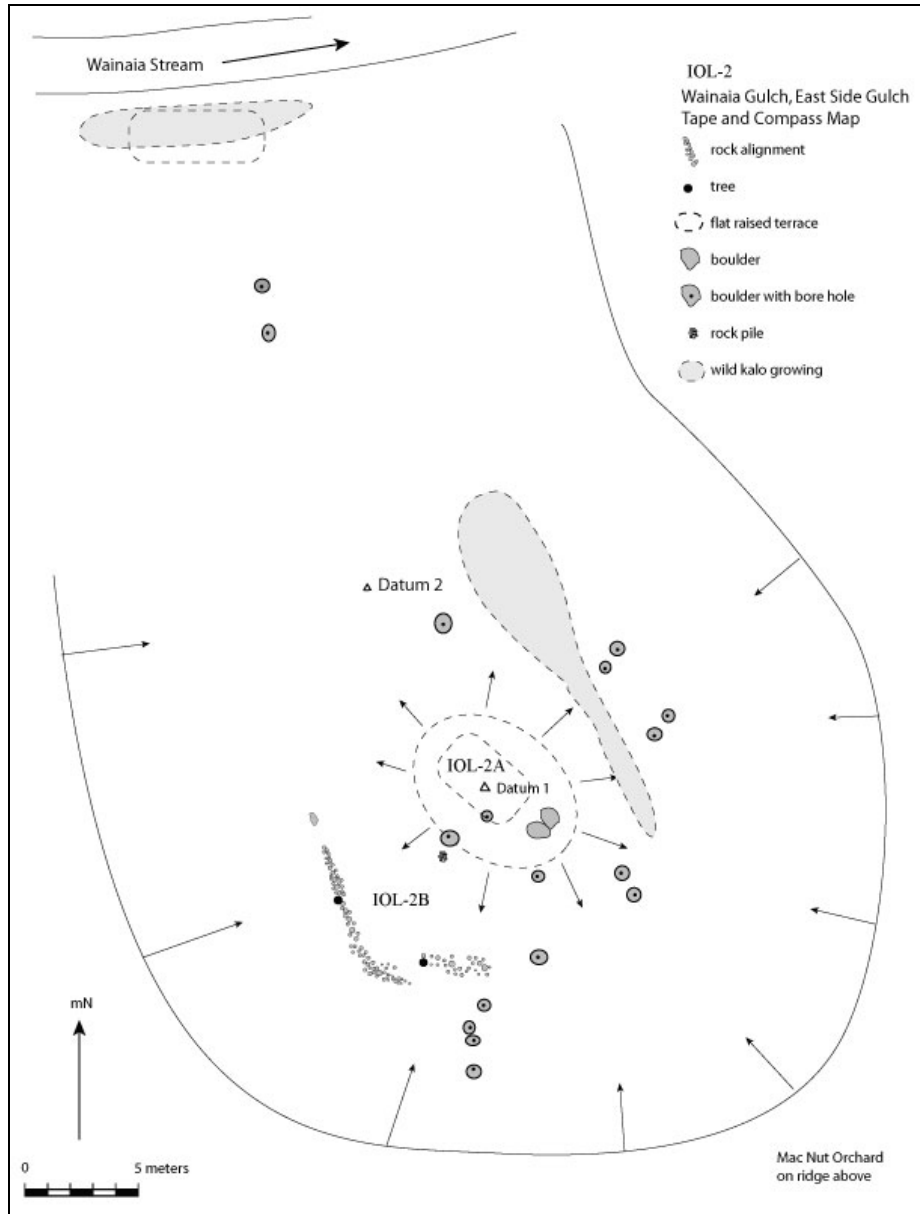


Figure 40. Terrace Complex (IOL-2), Lower Wainaia Gulch, North Kohala District, Hawai'i.

Chapter 4. Summary

Surveys and excavations undertaken as part of the HARP 2007 field school have resulted in several key discoveries regarding the adaptability of Native Hawaiian farmers to the environmental conditions in North Kohala.

In the Halawa Study Area, we find two types of irrigated agricultural complexes distinguished from one another primarily by their source of irrigation: (1) wetland *lo'i* complexes constructed on sharply curved sections of streams that are fed at the top by *'auwai* and (2) barrage-styled *lo'i* build directly within the stream course and fed by springs. The former are much more commonplace, although the total complex size and the size of individual terraces vary widely and are likely dictated by local topography, especially the amount space available between steep gulch slopes. The barrage-styled complex described in Upper East Halawa Gulch (HLW-13) takes advantage of a local spring and a relatively gentle slope. It is probably not coincidental that this complex with its dependable water source has the largest number, and variety, of features build on the gulch slopes above any complex recorded to date. Other similar centers of prehistoric activity are likely preserved throughout the network of gulches that dissect the Kohala Mountains.

In the Makapala Study Area, we find evidence of a remarkable degree of labor and planning invested in irrigated agriculture. Indeed, the complexes recorded at the confluence of Waikani and Hinao Gulches (MKP-1 to -3) are unlike any others previously described by archaeologists in the North Kohala District. In an area that might have easily lain undeveloped due to the high grade of the slope and unpredictability of the streams, we find a landscape completely transformed by 128 terraces and several hundred meters of irrigation ditches diverting water to the central gardens. Equally interestingly, at the seaward end of these drainages we find a large temple site with a series of high, large terraces (NIU-1). Certainly, these are strong indicators of an infrastructure that would have supported production beyond local subsistence needs.

We have only begun to describe the variety of adaptations Native Hawaiians employed in farming in windward North Kohala. Future studies will focus on the geographic distribution of fields, terrace construction, and irrigation methods as well determining the age of features using radiocarbon dating.

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Appendix I. Survey Summary

Field ID	Description	No of features	Acres	Hectares
HLW_1	Complex	8	0.116	0.047
HLW_2	Complex	5	0.157	0.064
HLW_3	Complex	9	0.525	0.212
HLW_4	Complex	5	0.103	0.042
HLW_5	Complex	14	0.363	0.147
HLW_6	Single feature	1	-	-
HLW_7	Complex	2	0.008	0.003
HLW_8	Complex	4	0.133	0.054
HLW_9	Complex	12	0.588	0.238
HLW_10	Complex	2	0.123	0.05
HLW_11	Complex	15	0.455	0.184
HLW_12	Single feature	1	0.021	0.008
HLW_13	Complex	39	3.124	1.264
HLW_14	Single feature	1	-	-
HLW_15	Single feature	1	-	-
HLW_16	Complex	2	-	-
HLW_17	Complex	2	-	-
HLW_18	Single feature	1	-	-
HLW_19	Complex	4	-	-
HLW_20	Single feature	1	-	-
HLW_21	Complex	4	-	-
HLW_22	Complex	7	-	-
HLW_23	Complex	3	-	-
HLW_24	Complex	3	-	-
HLW_25	Single feature	1	-	-
HLW_26	Single feature	1	-	-
HLW_27	Complex	3	-	-
HLW_28	Complex	5	0.383	0.155
HLW_29	Complex	13	0.812	0.328
HLW_30	Complex	24	3.416	1.382
HLW_31	Complex	21	0.691	0.28
HLW_32	Complex	13	1.082	0.438
HLW_33	Single feature	1	-	-
MKP_1	Complex	85	3.814	1.544
MKP_2	Complex	30	0.413	0.167
MKP_3	Complex	15	0.813	0.329
IOL_1	Single feature	1	2.293	0.928
IOL_2	Complex	2	0.113	0.046
NIU_1	Complex	7	0.981	0.397
NIU_2	Complex	4	-	-
NIU_3	Complex	6	0.259	0.105
		378	20.786	8.412

Appendix II. Artifact Inventory

Catalog Number	Site	Unit	Level	Layer	Material	Bag Size
HLW-10A-TU1-1-1	HLW-10A	1	1		charcoal	
HLW-10A-TU1-2-1	HLW-10A	1	2		charcoal	
HLW-10A-TU1-2-10	HLW-10A	1	2		fire cracked rock fragment	
HLW-10A-TU1-2-11	HLW-10A	1	2		charcoal	
HLW-10A-TU1-2-12	HLW-10A	1	2		charcoal	
HLW-10A-TU1-2-2	HLW-10A	1	2		shell (land snail)	
HLW-10A-TU1-2-3	HLW-10A	1	2		chipped stone (natural)	
HLW-10A-TU1-2-4	HLW-10A	1	2		volcanic glass	
HLW-10A-TU1-2-5	HLW-10A	1	2		stone flake (natural)	
HLW-10A-TU1-2-6	HLW-10A	1	2		stone flake (natural)	
HLW-10A-TU1-2-7	HLW-10A	1	2		water worn cobble	
HLW-10A-TU1-2-8	HLW-10A	1	2		charcoal	
HLW-10A-TU1-2-9	HLW-10A	1	2		charcoal	
HLW-10A-TU1-3-1	HLW-10A	1	3		charcoal	
HLW-10A-TU1-3-10	HLW-10A	1	3		charcoal sample	
HLW-10A-TU1-3-11	HLW-10A	1	3		charcoal	
HLW-10A-TU1-3-2	HLW-10A	1	3		charcoal	
HLW-10A-TU1-3-3	HLW-10A	1	3		charcoal	
HLW-10A-TU1-3-4	HLW-10A	1	3		charcoal sample	
HLW-10A-TU1-3-5	HLW-10A	1	3		charcoal sample	
HLW-10A-TU1-3-6	HLW-10A	1	3		charcoal	
HLW-10A-TU1-3-7	HLW-10A	1	3		charcoal	
HLW-10A-TU1-3-8	HLW-10A	1	3		charcoal sample	
HLW-10A-TU1-3-9	HLW-10A	1	3		charcoal	
HLW-10A-TU1-4-1	HLW-10A	1	4		charcoal	
HLW-10A-TU1-4-2	HLW-10A	1	4		charcoal	
HLW-10A-TU1-4-3	HLW-10A	1	4		charcoal	
HLW-10A-TU1-4-4	HLW-10A	1	4		charcoal	
HLW-10A-TU1-4-5	HLW-10A	1	4		volcanic glass	
HLW-10A-TU1-4-6	HLW-10A	1	4		nail	
HLW-10A-TU1-4-7	HLW-10A	1	4		volcanic glass	
HLW-10A-TU1EXT-8	HLW-10A	1	4		charcoal	
HLW-13J-STP1-I	HLW 13J	STP1		I	soil sample	
HLW-13J-STP1-II-2	HLW-13J	STP1		II	soil sample	
HLW-13K-TU1-I-1	HLW-13K	TU1		I	charcoal	
HLW-13K-TU1-I-1	HLW-13K	TU1		I	charcoal	
HLW-13K-TU1-II-1	HLW-13K	TU1		II	charcoal	
HLW-13K-TU1-IV-1	HLW-13K	TU1		IV	charcoal?	
HLW-13K-TU1-Sext-I-1	HLW-13K	TU1			charcoal	
HLW-13K-TU1-Sext-I-2	HLW-13K	TU1		I	volcanic glass	

HLW-13K-TU1-SOUTH EXT-SS1	HLW-13K	TU1- SOUT HEXT			soil sample	
HLW-13K-TU1-V-2	HLW-13K	TU1		V	volcanic glass	
HLW-14					adze in niche from free standing wall	
HLW-14-TU1-EXT1	HLW-14	TU1				
HLW-14-TU1-I-1	HLW-14	TU1		IV	land snail	
HLW-14-TU1-III-1	HLW-14	TU1		III	charcoal	
HLW-14-TU1-III-2	HLW-14	TU1		III	ceramic	
HLW-14-TU1-III-3	HLW-14	TU1		III	glass	
HLW-14-TU1-III-4	HLW-14	TU1		III	charcoal	
HLW-14-TU1-III-5	HLW-14	TU1		III	metal bar	
HLW-14-TU1-IV-1	HLW-14	TU1		IV	charcoal	
HLW-14-TU1-IV-2	HLW-14	TU1		IV	charcoal	
HLW-14-TU1-V-1	HLW-14	TU1		V	charcoal	
HLW-14-TU1-V-2	HLW-14	TU1		V	kukui	
HLW-28B-STP1-SS1-1	HLW-28B	STP1		I	soil sample	
HLW-28B-STP1-SS2	HLW-28B	STP1		II	soil sample	
HLW-28B-STP1-SS3	HLW-28B	STP1		II	soil sample	
HLW-28B-STP1-SS4	HLW-28B	STP1		III	soil sample	
HLW-28B-STP1-SS5	HLW-28B	STP1		IV	soil sample	
HLW-28C-TU1-II-1	HLW-28C	TU1		II	charcoal	
HLW-28C-TU1-III-1	HLW-28C	TU1		III	charcoal	
HLW-28C-TU1-IV-1	HLW-28C	TU1		IV	charcoal	
HLW-28C-TU1-Sext-I-1	HLW-28C	TU1		I	charcoal	
HLW-28C-TU1-V-1	HLW-28C	TU1		V	charcoal	
HLW-4A-TU1-2-1	HLW-4A	1	2		Kukui nut shell frag	
HLW-4A-TU1-2-2	HLW-4A	1	2		Kukui nut	
HLW-4A-TU1-2-3	HLW-4A	1	2		charcoal	
HLW-4A-TU1-2-4	HLW-4A	1	2		charcoal	
HLW-4A-TU1-2-5	HLW-4A	1	2		soil sample	4 oz
HLW-4A-TU1-3-1	HLW-4A	1	3		Kukui nut shell frag	
HLW-4A-TU1-3-2	HLW-4A	1	3		charcoal	
HLW-4A-TU1-3-3	HLW-4A	1	3		charcoal, 30-40 cmbd	
HLW-4A-TU1-3-4	HLW-4A	1	3		Kukui nut shell frag carbonized	
HLW-4A-TU1-3-5	HLW-4A	1	3		charcoal	
HLW-4A-TU1-3-6	HLW-4A	1	3		kukui nut shell frag	
HLW-4A-TU1-3-7	HLW-4A	1	3		soil sample	4 oz
HLW-4A-TU1-4-1	HLW-4A	1	4		ash lens	
HLW-4A-TU1-4-2	HLW-4A	1	4		charcoal	
HLW-4A-TU1-EXT-SS1	HLW-4A	1	1		soil sample	4 oz
HLW-4A-TU1-EXT-SS2	HLW-4A	1	1		soil sample	4 oz
HLW-4A-TU1EXT-SS3	HLW-4A	1	1		soil sample	4 oz
HLW-4A-TU1-SS1	HLW-4A	1	1		soil sample	4 oz

MKP-1AB-AUG1-SS3	MKP-1AB	AUG1			soil sample	4 oz
MKP-1AB-STP1-1	MKP-1AB	STP1			volcanic glass	
MKP-1AB-STP1-EXT-SS1	MKP-1AB	STP1		I	soil sample	4 oz
MKP-1AB-STP1-EXT-SS2	MKP-1AB	STP1		II	soil sample	4 oz
MKP-1AB-SURFACE	MKP-1AB				adze frag	
MKP-1AE-AUG-SS3	MKP-1AE	AUG			soil sample	4 oz
MKP-1AE-STP1-EXT-SS1	MKP-1AE	STP1		I	soil sample	4 oz
MKP-1AE-STP1-EXT-SS2	MKP-1AE	STP1		II	soil sample	4 oz
MKP-1A-STP1-EXT-SS1	MKP-1A	STP1			soil sample	4 oz
MKP-1A-STP1-EXT-SS2	MKP-1A	STP1			soil sample	4 oz
MKP-1A-STP1-SS1	MKP-1A	STP1			charcoal	
MKP-1A-STP1-SS2	MKP-1A	STP1			charcoal	
MKP-1A-STP1-SS3	MKP-1A	STP1			historic glass frag	
MKP-1A-STP2-EXT-SS1	MKP-1A	STP2			soil sample	4 oz
MKP1A-STP2-EXT-SS2	MKP-1A	STP2			soil sample	4 oz
MKP-1A-STP2-EXT-SS3	MKP-1A	STP2			charcoal	
MKP-1A-STP2-SS1	MKP-1A	STP2			soil sample	gallon
MKP-1A-STP3-EXT-SS1	MKP-1A	STP3			soil sample	4 oz
MKP-1A-STP3-EXT-SS2	MKP-1A	STP3			soil sample	gallon
MKP-1A-STP3-EXT-SS3	MKP-1A	STP3			soil sample	4 oz
MKP-1A-STP3-EXT-SS4	MKP-1A	STP3			charcoal	
MKP-1A-STP3-SS1	MKP-1A	STP3			soil sample	4 oz
MKP-1A-STP4-EXT-SS1	MKP-1A	STP4			charcoal	
MKP-1A-STP4-EXT-SS2	MKP-1A	STP4			soil sample	4 oz
MKP-1A-STP4-EXT-SS3	MKP-1A	STP4			soil sample	gallon
MKP-1A-STP4-SS1	MKP-1A	STP4			charcoal	
MKP-1A-STP4-SS2	MKP-1A	STP4			soil sample	4 oz
MKP-1A-STP4-SS3	MKP-1A	STP4			charcoal	4 oz
MKP-1BL control-AUG1-SS1	MKP-1BL	AUG1			soil sample	4 oz
MKP-1BL control-STP1-EXT-SS1	MKP-1BL	STP1		I	soil sample	4 oz
MKP-1BL control-STP1-EXT-SS2	MKP-1BL	STP1		II	soil sample	4 oz
MKP-1BL control-STP1-SS2	MKP-1BL	STP1			charcoal	4 oz
MKP-1BL-STP1-AUG1-SS1	MKP-1BL	STP1			soil sample	4 oz
MKP-1BL-STP1-EXT-SS1	MKP-1BL	STP1		I	soil sample	4 oz
MKP-1BL-STP1-EXT-SS2	MKP-1BL	STP1		II	soil sample	4 oz
MKP-1BL-STP1-SS1	MKP-1BL	STP1			charcoal	
MKP-1BN-AUG1-SS3	MKP-1BN	AUG1			soil sample	4 oz
MKP-1BN-STP1-EXT-SS1	MKP-1BN	STP1		I	soil sample	4 oz
MKP-1BN-STP1-EXT-SS2	MKP-1BN	STP1		II	soil sample	4 oz
MKP-1C-STP1-1	MKP-1C	STP1			charcoal from fill	
MKP-1C-STP1-EXT-SS1	MKP-1C	STP1		I	soil sample	gallon
MKP-1C-STP1-EXT-SS2	MKP-1C	STP1		II	soil sample	gallon
MKP-1D-TU1+WESTEXT-5-1	MKP-1D	TU1+ WEST EXT			charcoal lense	

MKP-1D-TU1-1-1	MKP-1D	TU1	1		charcoal	
MKP-1D-TU1-2-1	MKP-1D	TU1	2		charcoal	
MKP-1D-TU1-2-2	MKP-1D	TU1	2	I	volcanic glass	
MKP-1D-TU1-3-1	MKP-1D	TU1	3		charcoal	
MKP-1D-TU1-3-2	MKP-1D	TU1	3		volcanic glass	
MKP-1D-TU1-4-1	MKP-1D	TU1	4		charcoal	
MKP-1D-TU1-4-2	MKP-1D	TU1	4		glass fragment	
MKP-1D-TU1-SEXT BAG1 screened for charcoal	MKP-1D	TU1				gallon
MKP-1D-TU1-Sext-I-1	MKP-1D	TU1			charcoal from under lo'i wall	
MKP-1D-TU1-Sext-I-II	MKP-1D	TU1			volcanic glass	
MKP-1D-TU1-WESTEXT-1	MKP-1D	TU1			ceramic	
MKP-1D-TU1-WESTEXT-2	MKP-1D	TU1			glass from fill	
MKP-1D-TU1-WESTEXT-3	MKP-1D	TU1			charcoal from fill	
MKP-1D-TU1-WESTEXT-4	MKP-1D	TU1			charcoal from fill	
MKP-1D-TU1-WESTEXT-5	MKP-1D	TU1			volcanic glass from fill	
MKP-1D-TU1-WESTEXT-6	MKP-1D	TU1			land snail shell	
MKP-2G-STP- EXT-SS2	MKP-2G	STP			soil sample	4 oz
MKP-2G-STP1-EXT-SS1	MKP-2G	TU1			soil sample	4 oz
MKP-2M-TU1-II-1	MKP-2M	TU1		II	charcoal	
MKP-2M-TU1-II-2	MKP-2M	TU1		II	historic glass	
MKP-2M-TU1-II-3	MKP-2M	TU1		II	volcanic glass	
MKP-2M-TU1-III-1	MKP-2M	TU1		III	historic glass	
MKP-2M-TU1-III-2	MKP-2M	TU1		III	charcoal	
MKP-2M-TU1-SouthEXT-I-1	MKP-2M	TU1		I	charcoal	
MKP-2M-TU1-SouthEXT-II-1	MKP-2M	TU1		II	charcoal	
MKP-3A-STP1-1	MKP-3A	STP1			charcoal	
MKP-3A-STP1-AUG1-SS3	MKP-3A	AUG1			soil sample	4 oz
MKP-3A-STP1-EXT-SS1	MKP-3A	STP1		I	soil sample	4 oz
MKP-3A-STP1-EXT-SS2	MKP-3A	STP1		II	soil sample	4 oz
MKP-3A-STP2-AUG1-SS2	MKP-3A	AUG1			soil sample	4 oz
MKP-3A-STP2-EXT-SS1	MKP-3A	STP2		I		4 oz
MKP-3C-STP1-1	MKP-3C	STP1			charcoal in fill	
MKP-3C-STP1-Bag1-I	MKP-3C	STP1		II	soil sample	gallon
MKP-3C-STP1-Bag2-II	MKP-3C	STP1		II	soil sample	gallon
MKP-3C-STP1-EXT-SS1	MKP-3C	STP1		I	soil sample	4oz
MKP-3C-STP1-EXT-SS2	MKP-3C	STP1		II	soil sample	4 oz
MKP-3C-TU1-II-1	MKP-3C	TU1		II	snail shell from fill	
MKP-3C-TU1-II-2	MKP-3C	TU1		II	charcoal from fill	
MKP-3C-TU1-III-1	MKP-3C	TU1		III	charcoal from fill	
MKP-3C-TU1-IV-1	MKP-3C	TU1		IV	charcoal	
MKP-3C-TU1-SWext-I-1	MKP-3C	TU1		II	charcoal	
MKP-3C-TU1-Swext-I-2	MKP-3C	TU1		I	volcanic glass	
MKP-3C-TU1-Swext-SS1 (SCREENED)	MKP-3C	TU1			soil sample	gallon

MKP-3D-STP1-1	MKP-3D	STP1			charcoal in fill	
MKP-3D-STP1-EXT-SS1	MKP-3D	STP1		I	soil sample	4 oz
MKP-3D-STP1-EXT-SS2	MKP-3D	STP1		II	soil sample	4 oz
MKP-Control1-STP1-1	MKP-Control1	STP1			charcoal from fill	
MKP-Control1-STP1-EXT-SS1	MKP-Control1	STP1		I	soil sample	4oz
MKP-Control1-STP1-EXT-SS2	MKP-Control1	STP1		II	soil sample	4oz
MKP-1AO-STP2-SS3	MKP	AUG2			soil sample	4 oz
MKP-1AO-STP1-SS2	MKP	AUG			soil sample	
MKP-1AO-STP1-Ext-SS1	MKP	STP1			soil sample	4 oz
MKP-1AO-STP2-SS1	MKP	STP2			charcoal	4 oz
MKP-1AO-STP2-EXT-SS1	MKP	STP2			soil sample	4 oz
MKP-1AO-STP2-SS2	MKP	AUG2			soil sample	4 oz
MKP-1AA-STP2-Ext-SS1 LOWER	MKP-1AA	STP2			soil sample	4 oz
MKP-1AA-STP1-Ext-SS1 LOWER	MKP-1AA	STP1			soil sample	4 oz
MKP-1AA-STP2-SS1	MKP-1AA	STP2			charcoal	
MKP-1AA-STP1-SS1	MKP-1AA	AUG			soil sample	4 oz
MKP-1AA-STP1-Ext-SS2 LOWER	MKP-1AA	STP1			soil sample	4 oz
MKP-1AA-STP2-SS2	MKP-1AA	AUG			soil sample	4 oz
MKP-1AA-STP2-Ext-SS2 LOWER	MKP-1AA	STP2			soil sample	4 oz
MKP-3D-STP1-Ext-SS2	MKP-3D	STP1		II	soil sample	
MKP-3D-STP1-I	MKP-3D	STP1			charcoal from fill	
HLW SA 1	Surface collection, see GPS, 13/VII/07					

Appendix III. Project Codes for North Kohala District *Ahupua'a*

AAM	Aamakao	Windward
AIN	Ainakea	Windward
APU	Apuakohau	Windward
AWA	Awalua	Leeward
HAE	Haena	Leeward
HUL	Halaula	Windward
HLW	Halawa	Windward
HLL	Halelua	Windward
HAW	Hawi	Windward
HON	Honoipu	Leeward
HOK	Honokane	Windward
HOM	Honomakau	Windward
HOP	Honopueo	Windward
HU1	Hualua 1	Windward
HU2	Hualua 2	Windward
HUK	Hukiaa	Windward
IOL	Iole	Windward
KAA	Kaauhuhu	Windward
KAH	Kahei	Leeward
KA1	Kahei 1	Windward
KA2	Kahei 2	Windward
KA3	Kahei 3	Windward
KH1	Kahua 1	Leeward
KH2	Kahua 2	Leeward
KHL	Kaiholena	Leeward
KHO	Kaihooha	Leeward
KAL	Kalala	Leeward
KAM	Kamano	Leeward
KP1	Kapaa 1-2	Leeward
KPN	Kapaanui	Leeward
KPU	Kapaau	Windward
KAP	Kapua	Windward
KPP	Kapunapuna	Leeward
KPL	Kaupalaoa	Leeward
KEA	Kealahewa	Windward
KE1	Kehena 1	Leeward
KE2	Kehena 2	Leeward
KOL	Kiiokalani	Leeward
KOK	Kokoiki	Windward
KKI	Kokoili	Leeward
KOU	Kou	Leeward
KPH	Kukuiipahu	Leeward
KUK	Kukuiwaluhia	Windward
LAA	Laaumama	Windward
LAM	Lamaloloa	Leeward
LAP	Lapakahi	Leeward
MAH	Mahukona	Leeward
MA1	Makanikahio 1	Windward

MA2	Makanikahio 2	Windward
MKP	Makapala	Windward
MKE	Makeanehu	Leeward
MKI	Makiloa	Leeward
MAU	Maulili	Windward
NAP	Napapaa	Windward
NIU	Niulii	Windward
NUK	Nunulu-iki	Windward
NUN	Nunulu-nui	Windward
OHA	Ohanaula	Windward
OPI	Opihipau	Windward
PHH	Pahinahina	Leeward
PAH	Pahoa	Windward
PHK	Pohakulua	Leeward
PHA	Pohakulua Ahula	Leeward
POL	Pololu	Windward
PUI	Puaili	Leeward
PUK	Puakea	Leeward
PUN	Puanui	Leeward
PUH	Puehuehu	Windward
PAO	Pao	Leeward
PUK	Pueke	Windward
PU1	Puu Epa 1	Windward
PU2	Puu Epa 2	Windward
POK	Puu o Kumau	Windward
UNK	unknown	Windward
UPO	Upolu	Leeward
WAI	Waiapuka	Windward