

I Mano ka Wai‘oli

*Sustaining the Joyous Waters,
A Cultural Impact Assessment of the Wai‘oli Lo‘i Kalo Irrigation System*

Kaua‘i Mokupuni
Halele‘a Moku, Wai‘oli Ahupua‘a
Hanalei Kalana



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Abbreviations and Glossary of Hawaiian Terms

Abbreviations

Above mean sea level	amsl
Bernice Pauahi Bishop Museum	BPBM
Board of Land and Natural Resources	BLNR
Commission on Water Resource Management	CWRM
Cubic feet per second	cfs
Department of Accounting and General Services	DAGS
Department of Hawaiian Home Lands	DHHL
Division of Aquatic Resources	DAR
Environmental Assessment	EA
Fahrenheit	°F
Flood Insurance Rate Map	FIRM
Gallons per acre per day	gad
Kaua'i Historic Society	KHS
National Wildlife Refuge	NWR
Hawai'i Revised Statutes	HRS
Hawai'i Stream Assessment	HSA
Land Commission Award	LCA
Land Court Application	LCApp
Million gallons per day	mgd
National Register of Historic Places	NRHP
Native Register	NR
Native Testimony	NT
Office of Conservation and Coastal Lands	OCCL
Office of Hawaiian Affairs	OHA
Register Map	RM
Department of Land and Natural Resources	DLNR
State Historic Preservation Division	SHPD
United States Geological Survey	USGS
University of Hawai'i	UH
Wai'oli Valley Taro Hui, Inc.	Hui

Glossary of Hawaiian Terms

ae‘o	Hawaiian stilt, endemic waterbird
‘ai pono	eating of traditional Hawaiian foods
‘āina	land
ahupua‘a	land division
akua	god, deity
‘alae ke‘oke‘o	Hawaiian coot, endemic waterbird
‘alae ‘ula	Hawaiian moorhen, endemic waterbird
ali‘i	chief
‘auwai	irrigation ditch
corm	food-bearing underground stem (see ‘i‘o)
hinana	young ‘o‘opu, formerly caught in nets
hīhīwai	also called wī, freshwater pūpū (mollusk)
ho‘i	out-takes or returns
huli	revegetative portion of kalo that is re-planted, between corm and leaf
kalo	<i>Colocasia esculenta</i> , or taro
kalo pa‘a	cooked table kalo
Kānaka Maoli	Native Hawaiian
kī	<i>Cordyline fructosa</i> , ti, ti leaf, lā‘ī, lau‘ī
kinolau	physical manifestation
mahi‘ai	farmer
moloa maoli	Hawaiian duck, endemic waterbird
kuāuna	bank or border of a kalo patch
kūpuna	ancestors, also grandparent
lā‘ī	<i>Cordyline fructosa</i> , ti, ti leaf, kī, lau‘ī
lawai‘a	fisher
lau	leaf, specifically often kalo leaf
lo‘i	flooded/wetland irrigated field
lo‘i kalo	irrigated wetland field growing kalo
lū‘au	kalo leaf
ma kai	to/towards the ocean
ma uka	to/towards the mountain
mana wai	tributary
mana‘o	thought, idea, belief, opinion
mānowai	traditional intake
manu	bird
mele	song or poetic text
moku	district
mo‘olelo	oral history, historic tale, legend
muliwai	river mouth characterized by brackish water
na‘au	physically the center of your body, metaphorically: gut, heart, feeling
nā‘ū	endemic Hawaiian gardenia
nī‘oi	Hawaiian chili pepper

nūpepa	Hawaiian Language newspapers
‘ōlena	turmeric
oli	chant or chant text
pae ‘āina	archipelago
po‘owai	secondary water diversion
pu‘uone loko i‘a	inter-tidal fishpond
wai	fresh water
wī	short for hīhīwai

Introduction

At the request of the Wai'oli Valley Taro Hui ("Hui"), a 501(c)3 non-profit with federal tax exempt status, Nohopapa Hawai'i, LLC conducted a Cultural Impact Assessment ("CIA") for the Wai'oli Lo'i Kalo Irrigation System. The Hui is applying for a long-term water lease pursuant to Hawai'i Revised Statutes ("HRS") chapter 171; this CIA will be appended to an Environmental Assessment ("EA") for the continued use of water from this system. The Proposed Action seeks legal approval to continue to use water from Wai'oli Stream at its source (TMK 5-6-002:001) for the purpose of wetland kalo cultivation, a Native Hawaiian practice that has been a cultural foundation and has shaped the Indigenous landscape of the greater Wai'oli community since time immemorial. Similar to how the lo'i kalo (wetland taro) irrigation system weaves through the land, the practice of cultivating kalo connects families over generations and is a time-honored part of the community's history and legacy. This CIA seeks to assess the cultural impacts associated with the proposed long-term water lease for continued wetland kalo cultivation within the traditional Wai'oli Lo'i Kalo Irrigation System.

The primary purposes of this study are: to account for historical and archival information; document appurtenant rights to water for traditional use; identify cultural resources, beliefs, and practices in the Project Area; give voice to community 'ike (knowledge) and mana'o (thoughts) on the Proposed Action; and summarize community uses, resources, concerns, and recommendations as they relate to Native Hawaiian traditional and customary practices within the Study Area; specifically, how the Proposed Action might impact these practices, beliefs, and resources, both in the present and in the future.

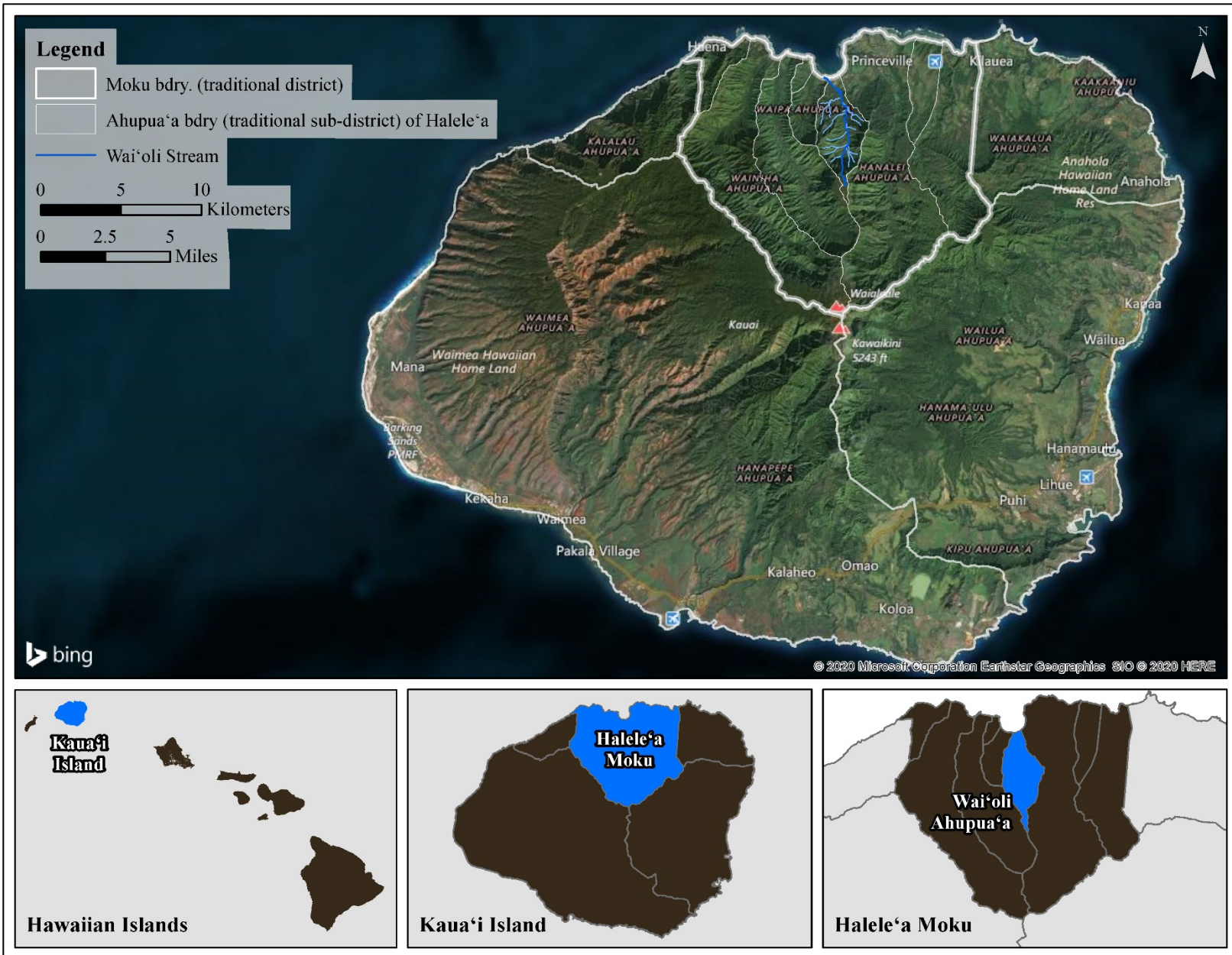


Figure 1. Depiction of Wai'oli Stream in relation to Kauai Island and the main Hawaiian Islands.

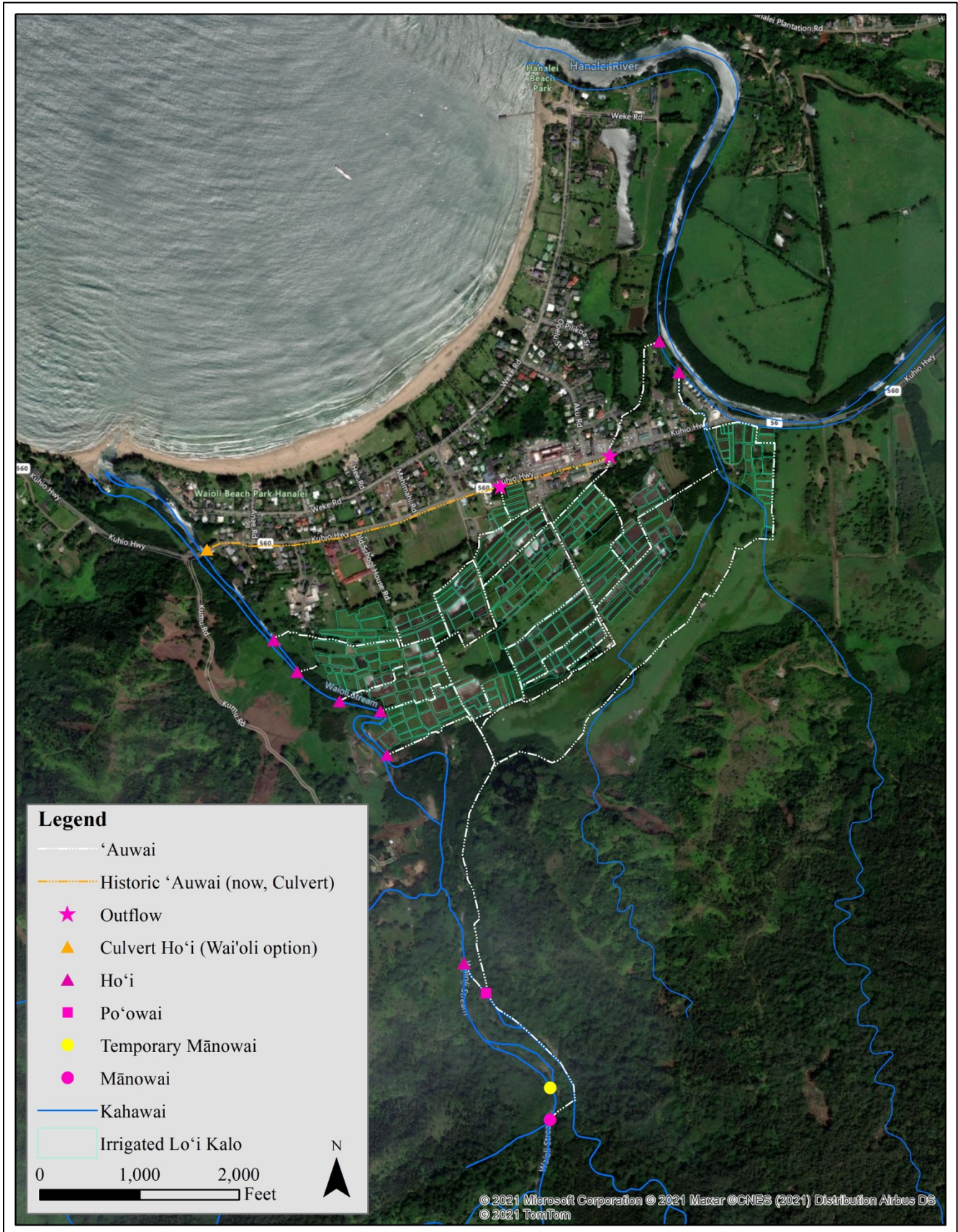


Figure 2. Depiction of Study Area: The Wai'oli Lo'i Kalo Irrigation System.

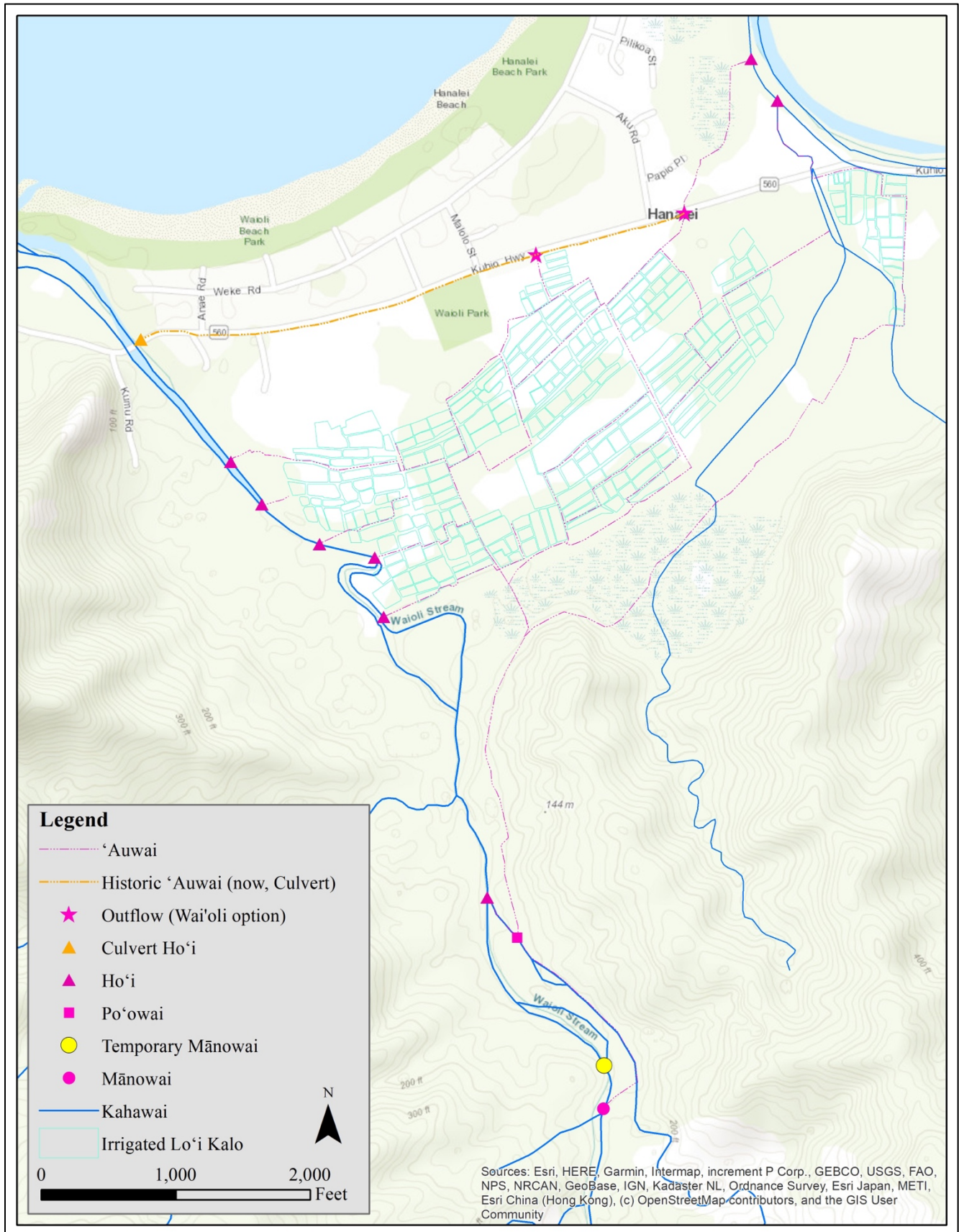


Figure 3. Depiction of Study Area: The Wai'oli Lo'i Kalo Irrigation System.

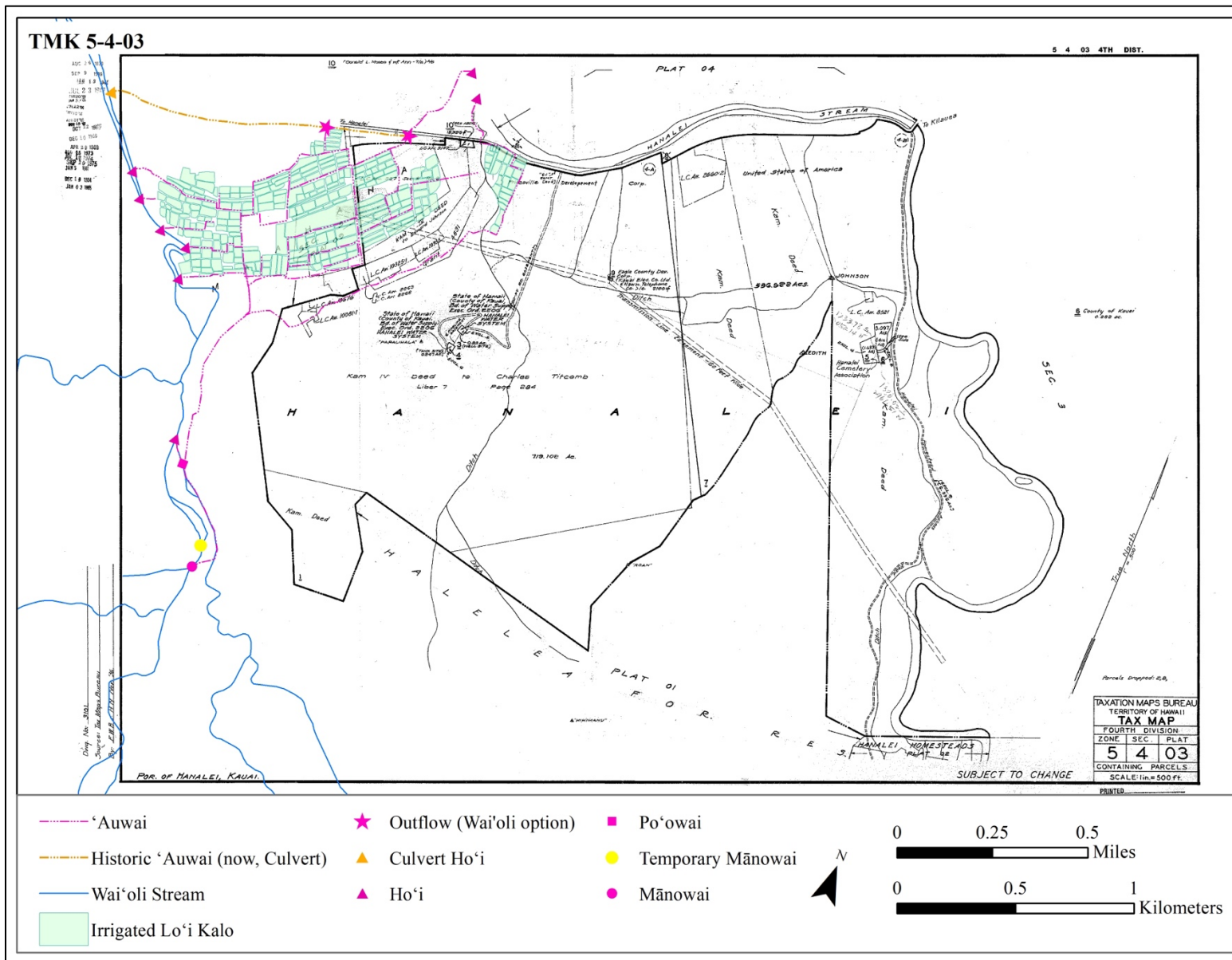


Figure 4. Tax Map Key Plat 5-4-03

TMK Plat 5-5-06

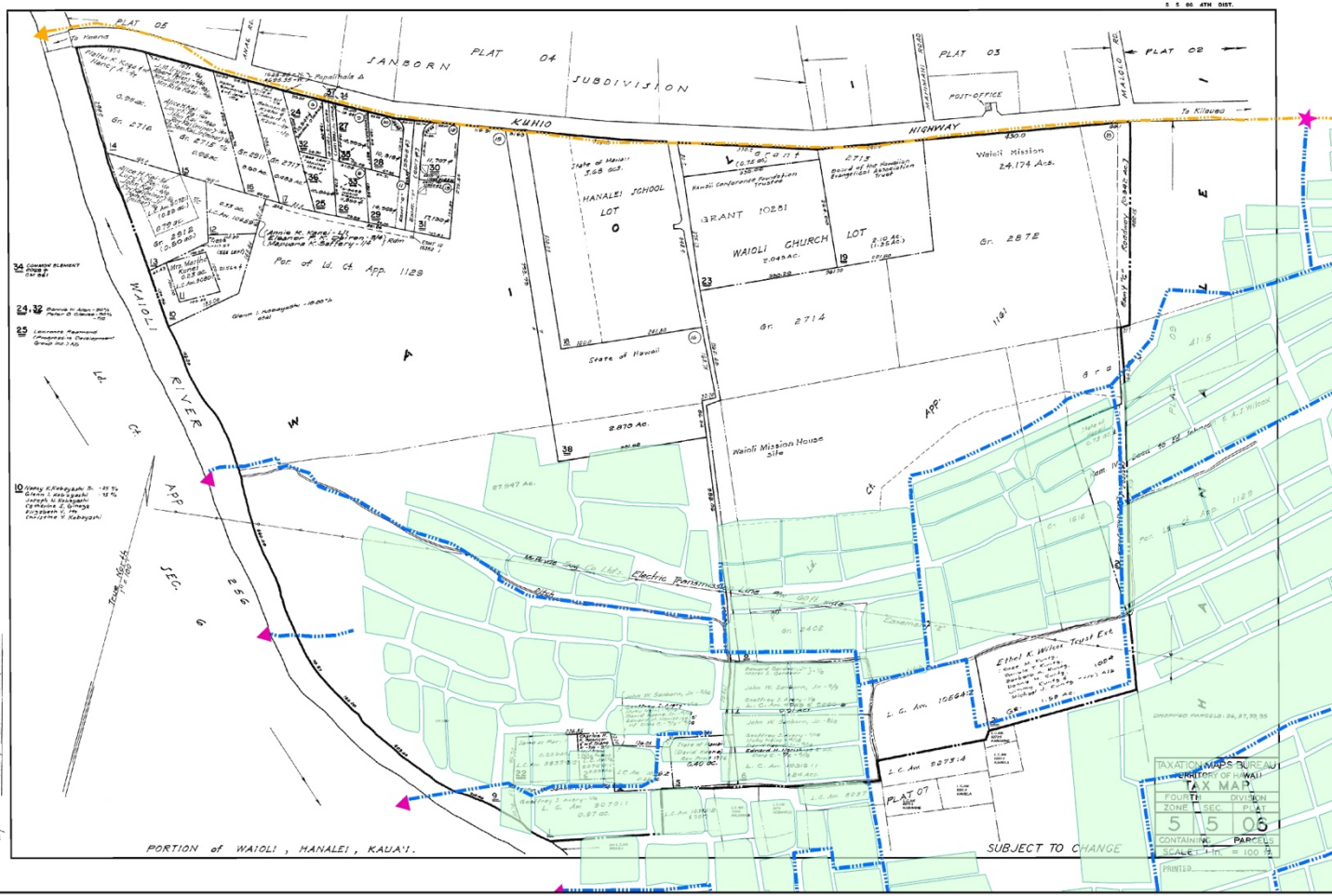


Figure 5. Tax Map Key Plat 5-5-06

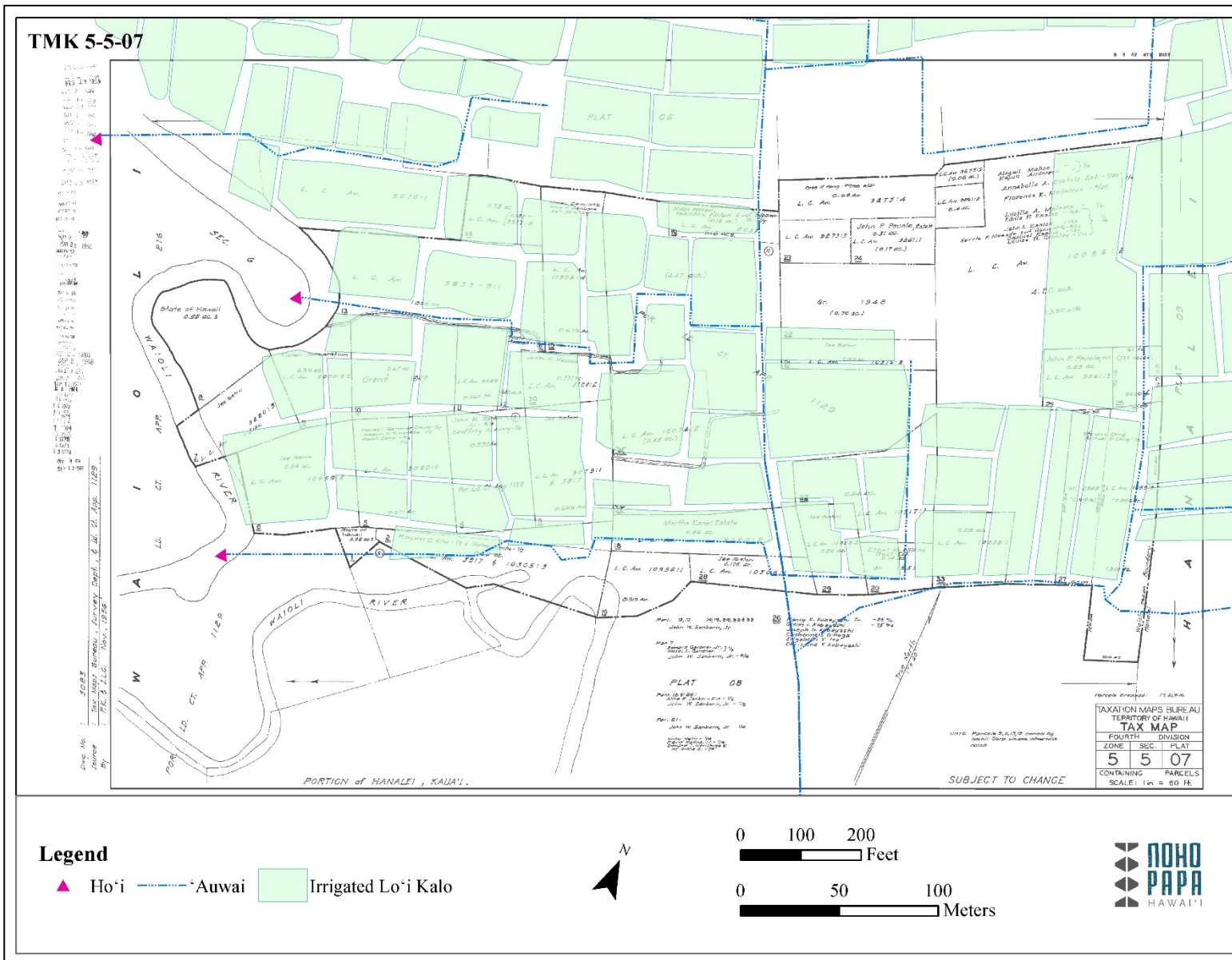


Figure 6. Tax Map Key Plat 5-5-07 depicting location of Wai'oli Lo'i Kalo Irrigation System.

TMK Plat 5-5-08

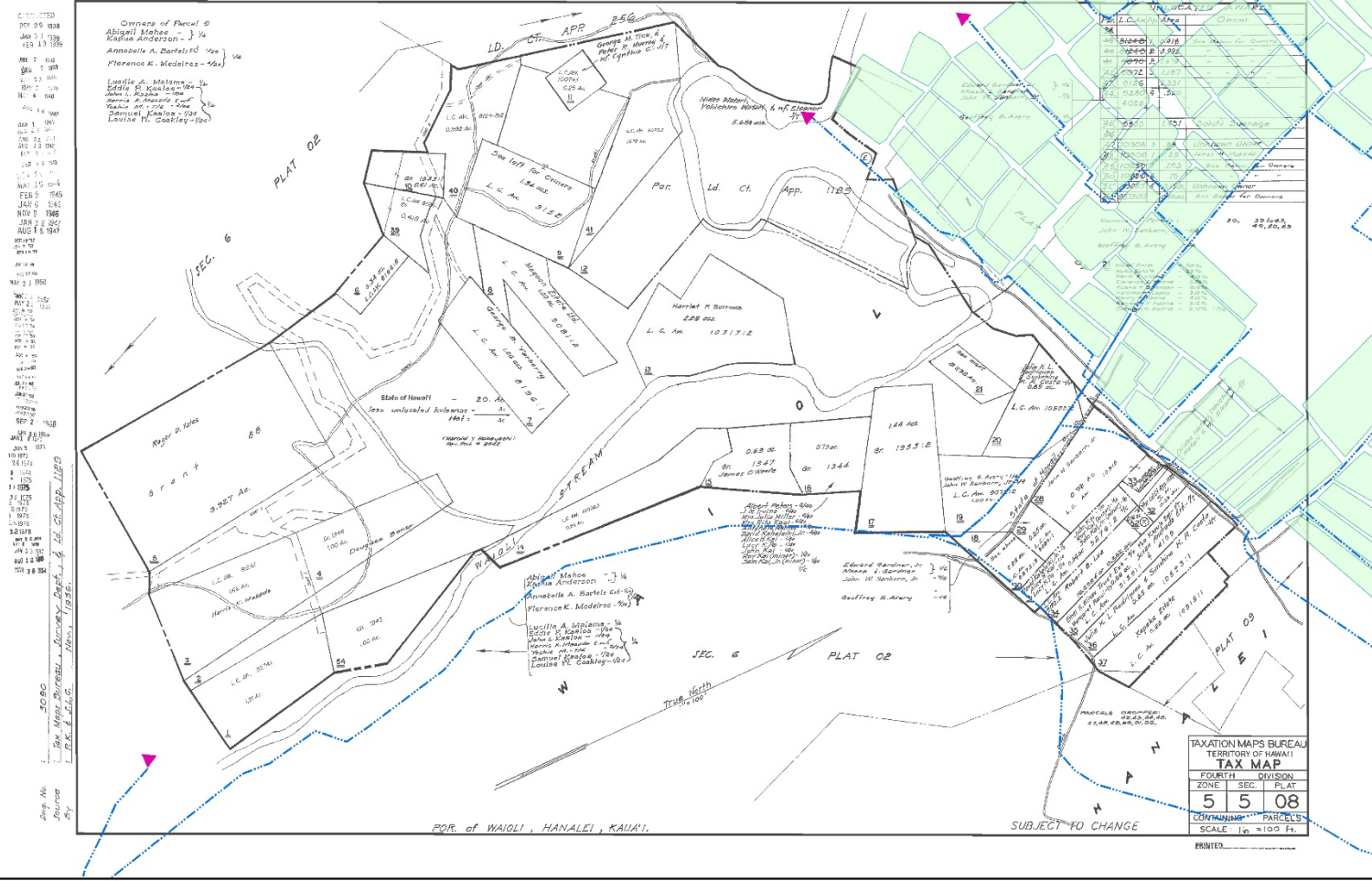
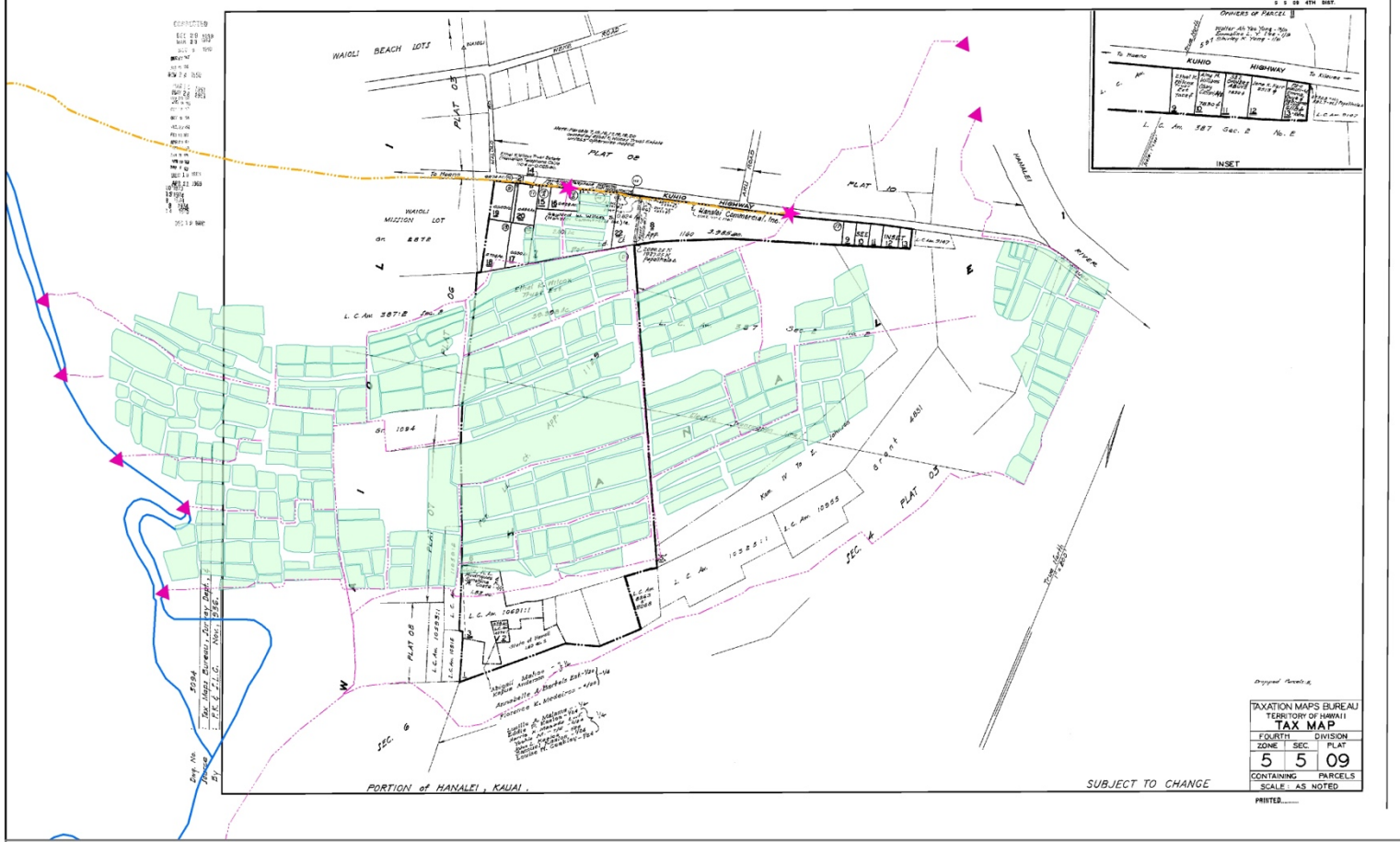


Figure 7. Tax Map Key Plat 5-5-08 depicting location of Wai'oli Lo'i Kalo Irrigation System.

TMK 5-5-09



Legend

- - - - - Historic 'Auwai
- - - - - 'Auwai
- Wai'oli Stream
- ▲ Ho'i
- ★ Outflow (Wai'oli option)
- Irrigated Lo'i Kalo



0 500 1,000
Feet

0 200 400
Meters

Original Survey

TAXATION MAPS BUREAU		
TERRITORY OF HAWAII		
TAX MAP		
FOURTH	DIVISION	
ZONE	SEC	PLAT
5	5	09
CONTAINING PARCELS		
SCALE AS NOTED		
PRINTED.....		

SUBJECT TO CHANGE

Figure 8. Tax Map Key Plat 5-5-09 depicting location of Wai'oli Lo'i Kalo Irrigation System.

Scope of Work and Guiding Principles

The study spanned a three-month period from August to October 2020. Project personnel included: Kelley Uyeoka, M.A., Dominique Leu Cordy, M.A., Lilia Merrin, M.A., and Momi Wheeler, B.S. While conducting this study, Nohopapa Hawai'i's research team incorporated a set of values to guide our research, analysis, behavior, perspective, and overall frame of reference, including:

- **Aloha 'āina** - to have a deep and cherished love for the land that created and sustains us
- **Ha'aha'a** - to be humble, modest, unassuming, and unobtrusive
- **Ho'omau** - to recognize, appreciate, and encourage the preservation, perpetuation, and continuity of our wahi pana (storied places) and lāhui (nation)
- **'Ike pono** - to recognize, feel, and understand righteousness, properness and goodness in all we do
- **'Imi Na'auao** - to seek knowledge or education; be ambitious to learn
- **Kuleana** - to view our work as both a privilege and responsibility
- **Pule** - to open the connection and communication lines to a higher source of power so that this work is intentionally guided

With these values as a kahua or foundation, the project team also looked to guiding documents, including the Hawai'i Environmental Council's Guidelines for Assessing Cultural Impacts (Appendix A: Guidelines for Assessing Cultural Impacts), A Bill for Environmental Impact Statements (Appendix B: A Bill for Environmental Impact Statements), and Act 50 [State of Hawai'i 2000] (Appendix C: Act 50 [State of Hawai'i 2000]). Through multiple planning meetings, Nohopapa and the Wai'oli Valley Taro Hui developed a general scope of tasks to guide this CIA.

1. Project Planning – meetings with the Wai'oli Valley Taro Hui, made up of sixteen (16) kalo farmers and their families, all with genealogical ties to Halele'a, and topic area experts, including D. Kapua Sproat, Director of Ka Huli Ao Center for Excellence in Native Hawaiian Law and the Environmental Law Clinic at the University of Hawai'i at Mānoa's Richardson School of Law, to develop a framework for this important work.
2. Ethnohistorical Research – gathering relevant cultural and historical information on the Wai'oli Lo'i Kalo Irrigation System, as well as the surrounding area and resources; and analyzing mo'olelo (oral histories), mele and oli (songs and chants), 'ōlelo no'eau (poetical sayings), inoa 'āina (place names), historical maps, photographs, documents, and relevant archaeological reports.
3. Community Ethnographic Interviews – conducting ethnographic interviews with topic area experts and cultural practitioners.
4. Report Compilation – compiling accompanying figures and narratives, and crafting recommendations.

Project Area – The Wai‘oli Lo‘i Kalo Irrigation System

Environmental Setting

This Project Area is located on the Island of Kaua‘i, along its north-facing coast, in the moku (traditional Hawaiian land division similar to a district)¹ of Halele‘a. There are four ahupua‘a or traditional Hawaiian land divisions that frame Hanalei Bay. From the mountains of these ahupua‘a, four perennial waters flow their lengths and empty into Hanalei Bay, making up the Hanalei Bay Watershed:

1. Hanalei River
2. Wai‘oli Stream
3. Waipā Stream
4. Waikoko Stream

The ahupua‘a of Hanalei, Wai‘oli, Waipā, and Waikoko share similar environmental landscapes: sandy shores along Hanalei Bay giving way to low dunes. Immediately inland of the dunes are irrigated lo‘i kalo that stretch into the upper valleys, though they span a shorter distance in the shallower valleys on the west. There is great variation in how far inland the upper valleys extend. Hanalei, the easternmost ahupua‘a, extends over 13.5 stream miles from its mouth to the base of Wai‘ale‘ale. Wai‘oli extends over 3.85 miles from its stream mouth to the base of its wai hālau (mountain source): Nāmolo-kama Mountain. Waipā extends a little over 2 miles from its stream mouth to the base of Mamalahoa. Waikoko, the smallest, and westernmost ahupua‘a, stretches a mere 0.75-0.80 miles from its stream mouth to its source along the ridge separating Lumaha‘i and Waikoko.

Wai‘oli Lo‘i Kalo Irrigation System

The Project Area for the purposes of this report follows the path in which the water flows through the Wai‘oli Lo‘i Kalo Irrigation System. The Project Area begins ma uka, in Wai‘oli Stream, 1.8 stream miles from the mouth at Hanalei Bay. Water from the Wai‘oli Stream enters the system here, at the mānowai. A māno wai or mānowai is interchangeable with māno, which is defined as:

n. Dam, stream or water source, headwaters, place where water is obstructed for distribution in channels; *fig.* source of water and of life.²

n. Artificial head of a stream of water; place where water is assembled for distribution through channels; *fig.* the heart.³

A mānowai is also the word used to define the physical heart. It is revealing that the term used to describe the organ that pumps blood through our veins is the same to describe the origin source of any ‘auwai system called a mānowai.

¹ There are five (5) moku on Kaua‘i.

² Pukui 1986: 239.

³ Andrews 1922: 419.

An apt metaphor, the mānowai is the source of water for the entire Wai'oli Lo'i Kalo Irrigation System. As the heart of this system, the mānowai guides water from Wai'oli Stream into a channel 1.8 miles upstream of its mouth. A mere 0.38 miles downstream from the mānowai is the po'owai. From the po'owai, water is split into two paths. The first path returns water to Wai'oli Stream at the first ho'i (return or out-take) of the system and the second path allows water to flow parallel to the stream along the main 'auwai. Close to 0.46 miles down this 'auwai from the po'owai (and approximately 0.84 miles from the mānowai) is the main Wai'oli split. At this split, the waters divide to flow north, into the Wai'oli side of the system and east, towards the Hanalei side of the system.

From the main 'auwai entering the Wai'oli coastal plain, smaller 'auwai branch out, flowing in and out of lo'i kalo before returning to the Wai'oli Stream at various ho'i that mark the terminus of the system. Eventually, the waters from the mānowai flow back into Hanalei Bay. If the mānowai is broken, destroyed or blocked; if it falls into disrepair; if a large flood occurs; or if the rights are lost to collect water at that crucial part of Wai'oli Stream, the entire 'auwai system would dry up. Much like a failed heart that can no longer pump blood, if the mānowai fails or is not permitted, there is no water and, thus, no life.

Kalo (*Colocasia esculenta*), taro

Although kalo is cultivated across the Pacific, Hawai'i is the only place where kalo achieved agricultural dominance and became the primary staple crop of a people. In Hawai'i, kalo is pounded (ku'i) into pa'i 'ai (pounded but undiluted taro) using a papa ku'i 'ai (poi board) and a pōhaku ku'i 'ai (poi pounder). Kalo nourished the bodies of the earliest Kānaka Maoli, and it became a traditional cultural food source. The practice of 'ai pono, the preparing and eating of Native Hawaiian traditional and customary foods, continues today. These foods include many made with kalo: poi, pa'i 'ai, kūlolo, laulau, and lū'au. Of the kalo plant, one can eat the lau (leaf), the 'i'o (corm), and even the stem (hā).



Figure 10. Photograph of kalo fields, Wai'oli ahupua'a, Hihimanu in the background.

In the Native Hawaiian pantheon, kalo is more than a plant or a source of nourishment. Hāloa is the elder brother of Kānaka Maoli and holds a special place in the mythological history of Native Hawaiians. There are several origin stories of Kānaka Maoli, but the story of Hāloa is less biblical than others, and perhaps older.⁴ The akua (god) of the heavens, Wākea, and the akua of the earth, Papa, were with child, and Papa gave birth to Ho'ohōkūkālani, a daughter. Ho'ohōkūkālani became hāpai (pregnant) but her first child, Hāloa, was stillborn. Ho'ohōkūkālani mourned and her tears watered the earth where she buried her child, Hāloa. From that very spot grew a plant, named Hāloanakalaukapalili, the first kalo plant.

Lau-Kapalili. Lau-kapalala.
Tremble leaf. Broad-leaf.⁵

Ho'ohōkūkālani became hāpai again; this child lived, and he too was named Hāloa, in memory of his elder brother. Hāloa went on to be the progenitor of the Hawaiian people and Hāloanaka, the progenitor of kalo.

Through this mo'olelo, Kānaka Maoli and every kalo plant share a mo'okū'auhau, a genealogy, through the line of Ho'ohōkūkālani. It is no wonder that the 12-15 month cultivation of this plant is a traditional and customary Native Hawaiian practice. More than one farmer has spoken of the kalo growing in their lo'i as their children.

I maika'i ke kalo i ka 'ohā.
The goodness of the taro is judged by the young plant it produces.⁶

To honor their kūpuna (ancestors), Hāloa, and to feed their own children, Kānaka Maoli built “complex irrigation ditches to extract (and return) water from permanent streams and closely controlled water flow and circulation within the fields to control stagnation, temperature and prevent disease.”⁷ In almost every windward lowland valley with a perennial water source, kalo was cultivated, until the irrigated lo'i (wetland field) agricultural system that sustained it evolved into a uniquely Native Hawaiian cultural landscape.

Cultivation practices of kalo farmers – both of long ago and today – are rooted in the cultural practice of kilo (observation). At least two of the kalo farming families in Wai'oli observe the moon and plant according to the Hawaiian Moon Calendar, kaulana mahina. In this practice, there are moons for harvesting, moons for planting, and moons for weeding. Irrigated lo'i kalo farming requires the observation of kalo, the seasons, weather, as well as the maintenance of the irrigation system, from ma uka at the mānowai, to the ho'i along the stream, to the muliwai at the stream mouth. Kalo farmers recognize the need to maintain balance throughout the entire system to grow healthy kalo.

The Wai'oli Lo'i Kalo Irrigation System is an extremely interconnected Indigenous Hawaiian agroecosystem⁸ that stretches across the coastal plains of Wai'oli and Hanalei, and is situated

⁴ *Moolelo Hawaii Kahiko: Ka Moolelo o ko Wakea ma Noho ana ma Kalihi – Ka Laa ana o keo Ahua Ulu o Kameha'ikana*, Ka Nai Aupuni, 22 June 1906; *Moolelo Kahiko No Hawaii, Mokuna III, Ka Moolelo o ko Wakea*, Ka Hoku o Hawaii, 9 April 1929.

⁵ These were the names given to the leaves of the very first kalo plant, which according to legend was named Hāloa. Kalo leaves are sometimes referred to poetically by these terms. Pukui, No.1952, 1983: 211.

⁶ Parents are often judged by the behavior of their children. Pukui, No.1232, 1983: 133.

⁷ Kurashima et al. 2019.

⁸ Kurashima et al. 2019.

behind the dune system that stretches from the mouth of Wai'oli Stream to the base of Papalihala. The majority of the Project Area elevation is at sea level to 10 feet above mean sea level (amsl). The elevation of the po'owai is at ≤ 50 feet above mean sea level and the mānowai is between 100-125 feet amsl (GDSI data set, Kaua'i 50-foot contours). The remainder of the 'auwai, the lo'i, and all ho'i are situated within 0-10 feet amsl.

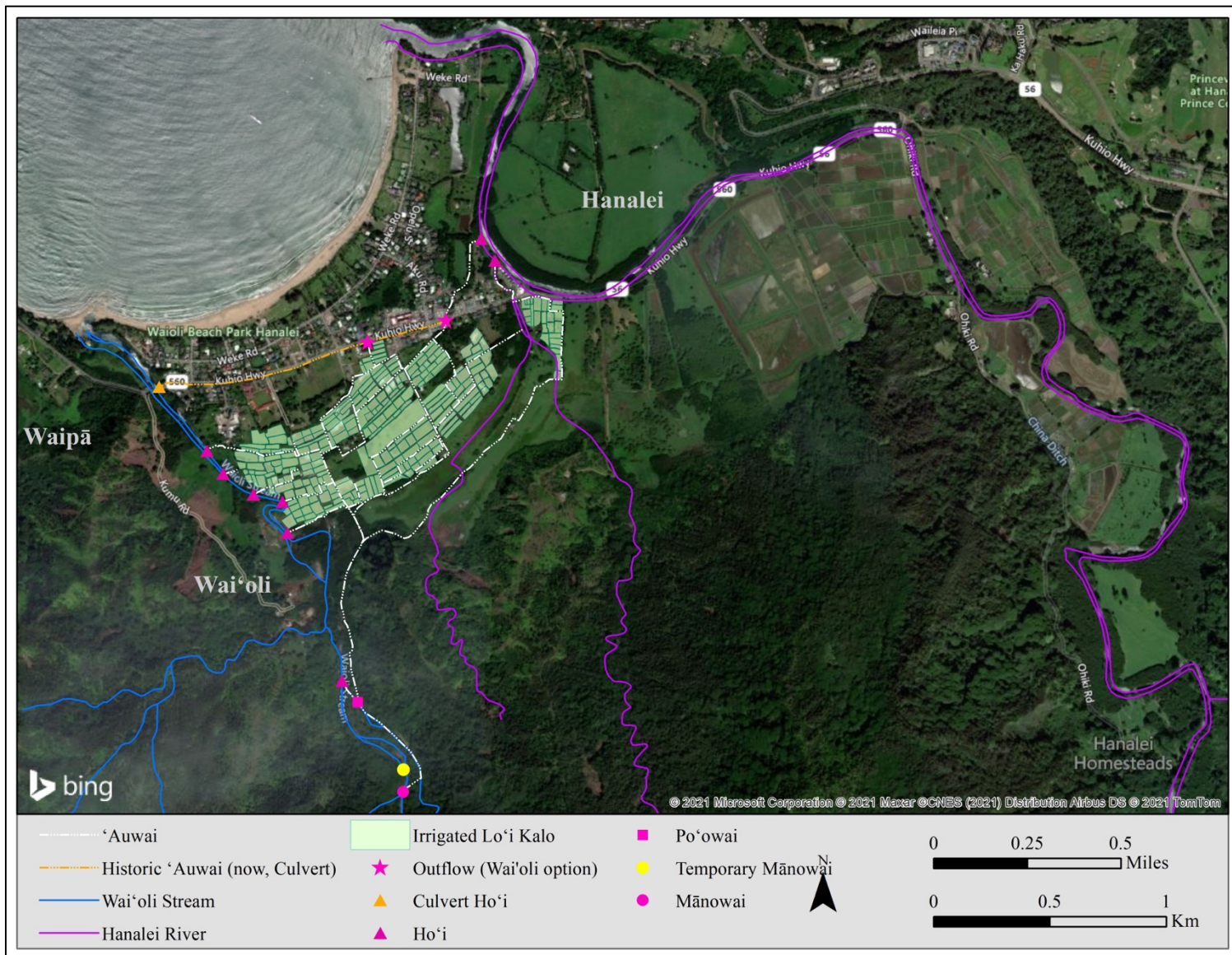


Figure 11. The Project Area, showing the Wai'oli Lo'i Kalo Irrigation System as reconstructed from historical research, community interviews and GIS data.

Archaeological Context

This portion of the report generally discusses previous archaeological studies along or beyond the boundaries of the Project Area to better understand the larger settlement patterns, history, and cultural landscape of the area.

No archaeological work has been conducted within the irrigated fields of the Wai‘oli Lo‘i Kalo Irrigation System. A chronological summary of archaeological work conducted within and nearby the Project Area is presented in the table below. Some archaeological work has been conducted along Kūhiō Highway, in the coastal sand areas seaward of the Wai‘oli Lo‘i Kalo Irrigation System. This seaward archaeological work consists of discrete projects or inadvertent discoveries associated with private home development or public works projects (e.g., pipelines, roadwork, etc.).

The archaeological reports in the coastal sand areas have recorded iwi kūpuna (ancestral remains) along the coastal dunes, which is consistent with where people would have lived and buried their ‘ohana (family members). This corresponds with the pāhale, per Māhele claims, which were the dominant land use in the sand dunes seaward of the Project Area and Kūhiō Highway.

Table 1. Previous archaeology in Wai‘oli ahupua‘a and the surrounding area.

Reference	Location	Type of Study	Results and Comments
1976 Neal (KHS)	North shore Route Hanalei bridge – Hā‘ena	NRHP Nomination Form	
1979 Cleghorn	Hanalei Refuge	Arch Reconnaissance	
1979 Hammatt & Folk	Wai‘oli Mission Hall	Arch Excavations	
1980 Schilt	Hanalei Refuge	Arch Investigations	
1980 Kennedy	Wai‘oli	Arch Reconnaissance	
1991 Kennedy	Hanalei	Arch Data Recovery	
1993 Shapiro, Shapiro, & Cleghorn	Hanalei Refuge	Arch site records from arch field investigations	
1993 Shapiro	Hanalei Refuge	AIS post field summary	
2014 Runyon, Shideler & Hammatt	Hanalei (town)	AIS	
2017 Hazlett & Dega	Wai‘oli-Hanalei	Draft – Arch Monitoring Plan	
2017 Hazlett & Dega	Wai‘oli-Hanalei	Arch Assessment	
2020 McMahan	Hanalei	Arch Field Inspection	
2020 McMahan	Hanalei	“Ka Pa‘akai Analysis”	

Formation of Traditional Irrigation Systems across Hawai'i

Because of the absence of archaeological study specific to Wai'oli, project staff surveyed manuscripts and reports beyond Wai'oli Valley, in neighboring Hanalei as well as other traditional irrigation systems similar in scale, production, and geographic setting to Wai'oli. This is far from a complete review of the development of irrigated kalo cultivation. The purpose of this research, rather, is to better estimate when irrigated lo'i kalo cultivation developed in Wai'oli.

There is no agreement in the archaeological community today on a definitive early settlement date in Hawai'i. The most likely dates for settlement are between AD 300-600 and AD 800-1000.⁹

The traditional irrigated kalo system at European contact usually consisted of lower valley and upper valley patterns. Canals or 'auwai that branch out to multiple lo'i (walled fields) are characteristic of wetland plains in the lower valleys, with water draining back into the valley stream. In upper valleys, there are descending terraces with water flow commonly from an upper valley tributary stream or spring into the uppermost terrace, and then flowing terrace to terrace and back into the stream. The chronology of the formation of these systems is not fully known in most areas of the islands.

All researchers agree that there would have been kalo cultivation in the wetlands of lower valleys during initial settlement of the islands, but likely not in walled irrigated fields. There are dated kalo soils in the lower valley wetlands of Wai'anae, Waikiki, and Honouliuli on O'ahu in the AD 1000-1100 range, which suggest more extensive wetland planting on the leeward side of O'ahu and probably some type of water control, and perhaps walled fields. Kalo evidence within walled fields (root stains, field soils, etc.) has been found in lower- and mid-valley floodplains from several major islands on both windward and leeward sides with dates ranging from AD 1200s-1400s (Kailua on O'ahu, Wailau on Moloka'i, Waipi'o on Hawai'i). A range of dates for upper valley terraces in Maunawili in Kailua and Luluku in Kane'ohe on windward O'ahu span a range of AD 900s-1200s, with Luluku possibly earlier, and one would expect contemporaneous, if not earlier, walled fields in the lower valley wetlands of Kailua and Kane'ohe.

Researchers have not established a complete chronological development of wetland to irrigated fields in any prime early sites throughout Hawai'i. One example is in Waipi'o, Hawai'i Island, where dating of fields found that irrigated fields were present in the mid-valley floor in the AD 1200s-1400s and that the side valley terraces of Hi'ilawe dated in the AD 1600s, suggesting side valley terracing came later than that on the valley floor. Because this sampling did not include the seaward portions of the valley floor behind the coastal dune, it is unknown when this area was put into walled irrigated fields. The researchers noted that this was a wetter area, and thus may have converted to fields with canals later than the mid-valley areas or at the same time.

Early Settlement in Halele'a

Hanalei Bay is likely to have been an early settlement area on Kaua'i. "As with windward O'ahu, the windward coast of Kaua'i would have been a favorable environment to early settling parties,

⁹ Kirch 1979; Cordy 2000; Cordy unpublished manuscript (pending, 2021).

and future work in this region will likely turn up additional indications of lengthy occupation.”¹⁰ Early Kānaka Maoli arriving at Hanalei Bay would have found an optimal environment – high rainfall for rain-dependent crops, wetlands for kalo, and sandy beaches and calm seas for easy access to marine resources. After landing on shore, arriving peoples would have most likely started to establish their “transported landscapes,”¹¹ immediately tending to the animals and plants they had brought with them on the canoe. Kalo would have been one of these important early plants, but would not have been planted in large irrigated field systems at that time, which would come later.

In early settlements, housing along with tree crops and probably rainfall-dependent crops would have been placed along the bay, with kalo in the adjacent wetlands of Hanalei and Wai‘oli, or nearer to the base of the mountains if the seaward-most part of the coastal plain was too wet.¹² In the early years as the population grew, it was likely that more houses appeared on the sandy shore and possibly some up on the dry slopes right behind the wetlands.¹³ For the upper valley of Hanalei, a date range of AD 600s-900s has been determined from deposits under later irrigated kalo soils, suggesting earlier slash-and-burn cultivation and some form of housing just at the beginning of the upper valley, but not a complex irrigation system.¹⁴ If correct, this date would suggest that irrigated wetland kalo was not yet spread into the upper valley of Hanalei, but people were farming near the front of the upper valley less formally. Based on settlement patterns across Hawai‘i, it can be assumed that the inland coastal plain of Wai‘oli would have likely had an established lo‘i kalo system before those in upper Hanalei Valley.

Though the cultural landscape in Wai‘oli and greater Halele‘a would have taken time to establish after early settlement, it is fair to assume that the Wai‘oli area would have been an optimal early settlement area and that most of the coastal wetlands of Wai‘oli were in lo‘i with water coming from canals by AD 1200s-1400s (if not earlier). Still, the exact chronology is not known at this time. The Māhele documentation detailed in the next section on Ethnohistory, specifically the Native Testimony in support of Land Commission Awards, establish lo‘i use from the 1500s.

Soils and Flooding

Wai‘oli has some of the most productive soils for wetland kalo agriculture in the entire State of Hawai‘i, and have supported an extensive irrigated system of lo‘i kalo in the Wai‘oli and Hanalei floodplains for hundreds of years.

¹⁰ Kirch 1985.

¹¹ Kirch 1989.

¹² James W. Gay, *Plain of Waioli, Situated on the Island of Kauai*. Register Map 927, October 7, 1873.

¹³ Griffin et al. 1977.

¹⁴ Schilt 1980.

Table 2. Table of Study Area soils.

Munsell Symbol	Soil Description	Farmland	Erosion
HmA	Hanalei silty clay loam, 0 to 2 percent slopes	Prime farmland if protected from flooding or not frequently flooded during the growing season	Not highly erodible land
HnA	Hanalei silty clay, 0 to 2 percent slopes	Prime farmland if protected from flooding or not frequently flooded during the growing season	Not highly erodible land
Mta	Mōkūle‘ia clay loam, poorly drained variant	Not prime farmland	Not highly erodible land
MZ	Marsh	Not prime farmland	Not highly erodible land
W	Water > 40 acres	Not prime farmland	Not highly erodible land

These flood prone soils are necessary to support the intensive wetland cultivation that characterizes the Wai‘oli Lo‘i Kalo Irrigation System. Harold Baker’s 1975 study *Agricultural Lands of Importance to the State of Hawaii* provides an appraisal of farmland based on soils across the State (Table 2). Forty-five years later, Baker’s report is still used to categorize and assess soils; it is a companion download to the soils shapefile layer on the Hawai‘i Statewide Geographic Information System (“GIS”) Program website.¹⁵ Baker’s value for prime farmland, however, is measured through the lens of intensive farming. It is curious that such fertile soils would get a conditional farmland classification as prime farmland only “if protected from flooding or not frequently flooded during the growing season.”¹⁶ The very nature of the Wai‘oli Lo‘i Kalo Irrigation System prevents frequent and seasonal flooding. The mānowai is designed to break away during large flood events, preventing inundations of the agricultural system. This flood control mechanism has been in place for centuries in Wai‘oli – well before the State of Hawai‘i or Territory of Hawai‘i farmland typology evolved.

From an agricultural perspective, the cultural cultivation of kalo requires adaptability and a community of practice to maintain over 6.15 miles of ‘auwai. Adaptability is important for a system like Wai‘oli’s, which is situated in a floodplain. Annual rainfall in the Project Area averages about 118.22 inches/year (3,000 mm).¹⁷ Rainfall, however, can vary greatly throughout the year. In addition, in the uppermost reaches of Wai‘oli Valley at its wai hālau, Nāmolo-kama Mountain, the average rainfall in a year has been recorded at 236-275 inches.¹⁸ Extreme weather events in 2018 caused massive damage to the Wai‘oli mānowai, generated landslides along Makaihuwa‘a, the ridge separating Waipā and Wai‘oli, and sent floodwaters across the coastal plains of Wai‘oli and Hanalei, into Hanalei Town. As mentioned previously, the mānowai, the

¹⁵ State of Hawai‘i, Office of Planning GIS Program.

¹⁶ Baker 1975.

¹⁷ Giambelluca et al. 2013; State of Hawai‘i Office of Planning GIS data.

¹⁸ Giambelluca et al. 2013; State of Hawai‘i Office of Planning GIS data.

intake at the top of the system, is designed to fail under large flood events, as is the po'owai; this way, torrential waters aren't forced into the system, possibly destroying the main ditch and the system of 'auwai and fields below.

Although many have referred to the April 2018 flood as a 100-year flood or a 500-year flood, it was actually a 143-year flood. A similar rain event occurred in Wai'oli in May 1877, and was recorded in the following account in a Hawaiian language newspaper (nūpepa).¹⁹

Ka Nupepa Kuokoa: 2 Iune 1877	Ka Nupepa Kuokoa: 2 June 1877
<p>Ma ka lā 16 o kēia mähina, he kuāua ko'iko'i kai hā'ule iho ma nā Mauna uliuli o Hanalei.</p> <p>A ua 'ike 'ia aku ka piha pono o nā awāwa i nā wai e hiolo mai ana ma ke alo o nā pali, a i ka puka 'ana mai o kēia wai i kai, ua hōlapu a'ela 'o ia i nā hale, a me nā 'Āina kokoke i ka lihi kahawai, a ua pa'a pū kekahi mau 'āina i ka lepo, ke a'a me nā paukū lā'au. He nui nō nā waiwai i pohō ma muli o kēia pilikia 'ike mua 'ole 'ia.</p> <p>Eia nā mea i lilo loa aku i ka wai, Pua'a, Moa, Kao, Lio, a me kekahi mau waiwai 'ē a'e, he mau ka'a Hoki kekahi, a he mau ka'a hali ko kekahi, a me nā hale.</p> <p>He nui ka pohō o ka po'e mahi Laiki.</p> <p>'A'ole i ho'olu'ulu pono 'ia ka nui o kēia pohō, 'akahi nō a pili pono kēia inoa iā Hanalei ka ua loku o Hanalei, ka ua loku 'ia ke hele ala a noho pono nā pōhaku a me nā pihā a i loko o nā lo'i kalo. 'A'ole 'o ia wale he pali kekahi ua hiolo 'ia.</p> <p>'Ane'ane piha ka 'Eka i kahi a kēia pali i hiolo ai kona mau lepo. He mau lono kai lohe 'ia mai. Aia ma Anahola kekahi ha'awina o kēia ulia pō'ino. Me ka mahalo.</p> <p style="text-align: right;">R. Pu'uiki</p> <p style="text-align: center;">Hanalei Kaua'i Mei 19, 1877</p>	<p>On the 16th of this month, a large rain bank fell on the dark mountains of Hanalei.</p> <p>And we saw the valleys filling with water that tumbled down the face of the cliffs, and when the water came out toward the ocean, it spread over houses, and on the lands close to the edge of the rivers, and some places were covered with dirt, rocks and large pieces of wood. There was a lot of property that was destroyed because of this disaster that had never been seen before.</p> <p>Here are the things that were completely lost in the flood water; pigs, chickens, goats, horses, and some other kinds of property, some mule carts, and some peoples haul carts, as well as houses.</p> <p>There were a lot of losses for those farming rice.</p> <p>The amount of loss has not been truly summarized, we have just come to understand this name associated with Hanalei, Hanalei in the torrential rain, when torrential rain flows the rocks and other detritus materials end up inside of the taro fields. That was not all, a cliff also tumbled down.</p> <p>The acreage where this cliff fell was filled by its dirt. These are just some things I heard.</p> <p>In Anahola there were also some other things that came from this disaster. With thanks.</p> <p style="text-align: right;">R. Pu'uiki</p> <p style="text-align: center;">Hanalei Kaua'i May 19, 1877</p>

¹⁹ R. Puuiki, *Ka Wai Kahe Nui ma Hanalei*, Ka Nupepa Kuokoa, 2 June 1877. Translated by Devin Kamealoha Forrest.

Although Pu'uiki's account of the May 1877 flood event does not explicitly state that the landslide occurred in Wai'oli, but it can be inferred based on the annotations of the map in Figure 11. This map was made in 1893, and annotations next to the landslide identified two dates: 1875 and 1877. According to exhaustive research in the nūpepa, Pu'uiki's article was the only reference found to date that refers to a major cliff collapse event in the Wai'oli/Hanalei area. It occurred along the slopes of Makaihuwa'a and changed the course of the Wai'oli Stream, altering the riparian zone, and rendering some lo'i un-farmable (too wet). This landslide was recorded on more than one historic map.²⁰

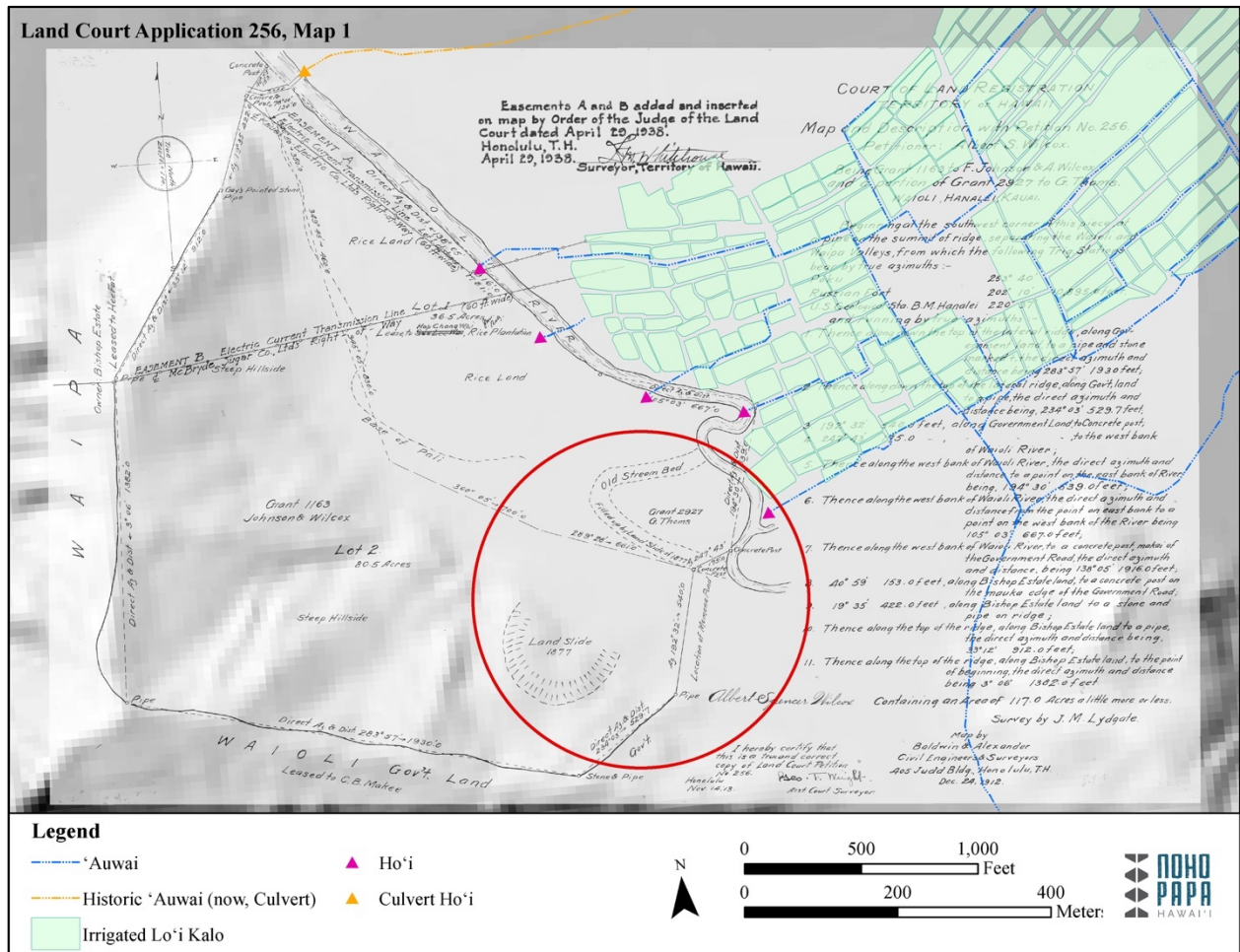


Figure 12. Land Court Application M256, Map 1, situating the Wai'oli Lo'i Kalo Irrigation System with the 1877 landslide and stream course alteration.

In 1877 and again in 2018, intense flooding damaged the Wai'oli Lo'i Kalo Irrigation System and the communities who depend on it. Despite this, both the system itself and the people have managed to adapt and persevere. Given the parallels between these two events, it can be reasonably assumed that there were other massive floods in the past. The coastal plains of Wai'oli and Hanalei, though incredibly fertile and abundant, are harsh environments, prone to

²⁰ Walter A. Wall, *Waioli Kauai*, Register Map Number 1680, 1893; Baldwin & Alexander, Land Court Application 251, Map 1, December 1912; J. M. Lydgate, *Portion of Waioli Kauai*, Register Map Number 2625, May 1922.

flooding and heavy rain in normal times, and intermittent but catastrophic torrential rains, landslides, and floods.

In sum, the Wai‘oli Lo‘i Kalo Irrigation System was designed as the most optimal agricultural system for the Wai‘oli plain given the settlement patterns, soils, and rainfall in this area.

Ethnohistory – From Time Immemorial

Methods

The research team examined a variety of repositories and resources to develop a general description of the natural, cultural, historical, and archaeological background of the Wai‘oli Lo‘i Kalo Irrigation System. Project staff gathered information about the natural landscape by reviewing County, State, and Federal GIS data, atlases, maps, scientific reports, reference books and archaeological investigations. Staff compiled inoa ‘āina, mo‘olelo, oli, and ‘ōlelo no‘eau from both Hawaiian and English language sources in books, newspapers, online databases, and archives. Staff also collected historical accounts of the Wai‘oli ahupua‘a from primary and secondary documents including records, journals, newspapers, and previous reports from various state and private collections such as the Bernice Pauahi Bishop Museum (“BPBM”) Archives, the State Historic Preservation Division (“SHPD”), and Kaua‘i Historic Society (“KHS”). The research team gathered historical land documents and Māhele data from the Buke Māhele, Boundary Commission Records, and the Biennial Report of the Commissioners of Crown Lands, 1894, and retrieved historic maps from the State of Hawai‘i’s Department of Accounting and General Services (“DAGS”) online database. Last, project staff compiled archaeological information from previous archaeological reports and studies available from SHPD. The digital archival repositories utilized include: Ulukau, AVA Konohiki, Hawai‘i Office of Planning GIS repository, Papakilo Database, Kīpuka Database, various Hawaiian language newspapers, and others.

Place Names – Nā Inoa ‘Āina

The thousands of place names recorded and still used today provide a glimpse of how nā po‘e kahiko (people of old) understood the landscape of Hawai‘i. A place name may explain a commemorative event, describe an important person or the physical environment, reveal the function of the land, or do all of these things at once. When explaining the concept of mana that is instilled in a name, Pūku‘i writes:

Once spoken, an inoa took on an existence, invisible, intangible, but real. An inoa could be a causative agent, capable of marshaling mystic elements to help or hurt the bearer of the name. And so went the belief, the more an inoa was spoken, the stronger became this name-force and its potential to benefit or harm.²¹

Wai‘oli literally translates as “joyous water.” It is the land division, a stream, and a channel, encompassing an area of 3,350 acres. The upper portion of Wai‘oli contains three massifs: Māmalahoa, Nāmolokama, and Hīhīmanu. Māmalahoa is in the west, perhaps named after the wife of Kāne; Nāmolokama (“interweaving bound fast”) in the south, which is known for its

²¹ Pukui, Haertig & Lee 1972: 94.

abundant waterfalls and Hihimanu (“sting-ray”) because of its ray-like appearance, that encompasses the back valley of Wai’oli.²²

The lower portion of Wai’oli is bounded to the east by the kalo lands of Kuhimanu (“direction of the birds”), which abuts Kamōkoleaka (“red hued ridge”) a ridge that connects to Hihimanu bordering and branching into the adjoining Hanalei ahupua’a. On the western border, dividing the ahupua’a of Wai’oli from the ahupua’a of Waipā, is a ridge paralleling Wai’oli River named Makaihuwa’a (“eyes for the canoe prow”) which according to Wichman, is the site where menehune fishermen built a platform and placed large torches, creating the first lighthouse in Hawai’i.²³ On Makaihuwa’a is the ‘ōhi’a grove of Kūpākoili, which extends from Wai’oli into the adjoining ahupua’a of Waipā. The wood was used in ancient times to create farming implements and in more recent history, to create a lānai and party area for a visit from King Kalākaua in 1874.²⁴ The grove started to shrink in size in 1913 and very little evidence of the grove exists today.²⁵

In addition to these ancient place names and boundaries, Wai’oli has names that stem from its connection to initial missionary settlement in the early 19th century. For instance, Betelema/Betelehema, founded in 1820 by Whitney, was a religious community that helped William Alexander expand the Wai’oli mission station.²⁶ Another mission-influenced place name is a kukui grove named Kālema, “Salem,” which is where William Alexander would hold church services prior to the construction of the mission meeting house.²⁷

²² Wichman 1998: 136.

²³ Wichman 1998. Akina, however, claims that the menehune in fact built the entire ridge in a single night as a way to “hookaulana mau i ko lakou inoa menehune” or “ensure the fame of the menehune people.” Akina 1913: 18.

²⁴ *Ka Huakai a ka Moi Kalakaua i Kauai*, Nuhou, 24 March 1874.

²⁵ Kamahale, *Ka Ike hou ana o ke Kamahale i ka Mokupuni o Kauai*, Ka Nupepa Kuokoa, 5 December 1913.

²⁶ N. Keoahu, *Waioli Kauai Ian 23, 1835*, Ke Kumu Hawaii, 15 April 1835.

²⁷ *Papa Hoike i na Kula o Waioli*, Ka Nonanona, 15 March 1842; *Ka Anesona Moolelo no Kauai*, Ka Nupepa Kuokoa, 25 May 1865.

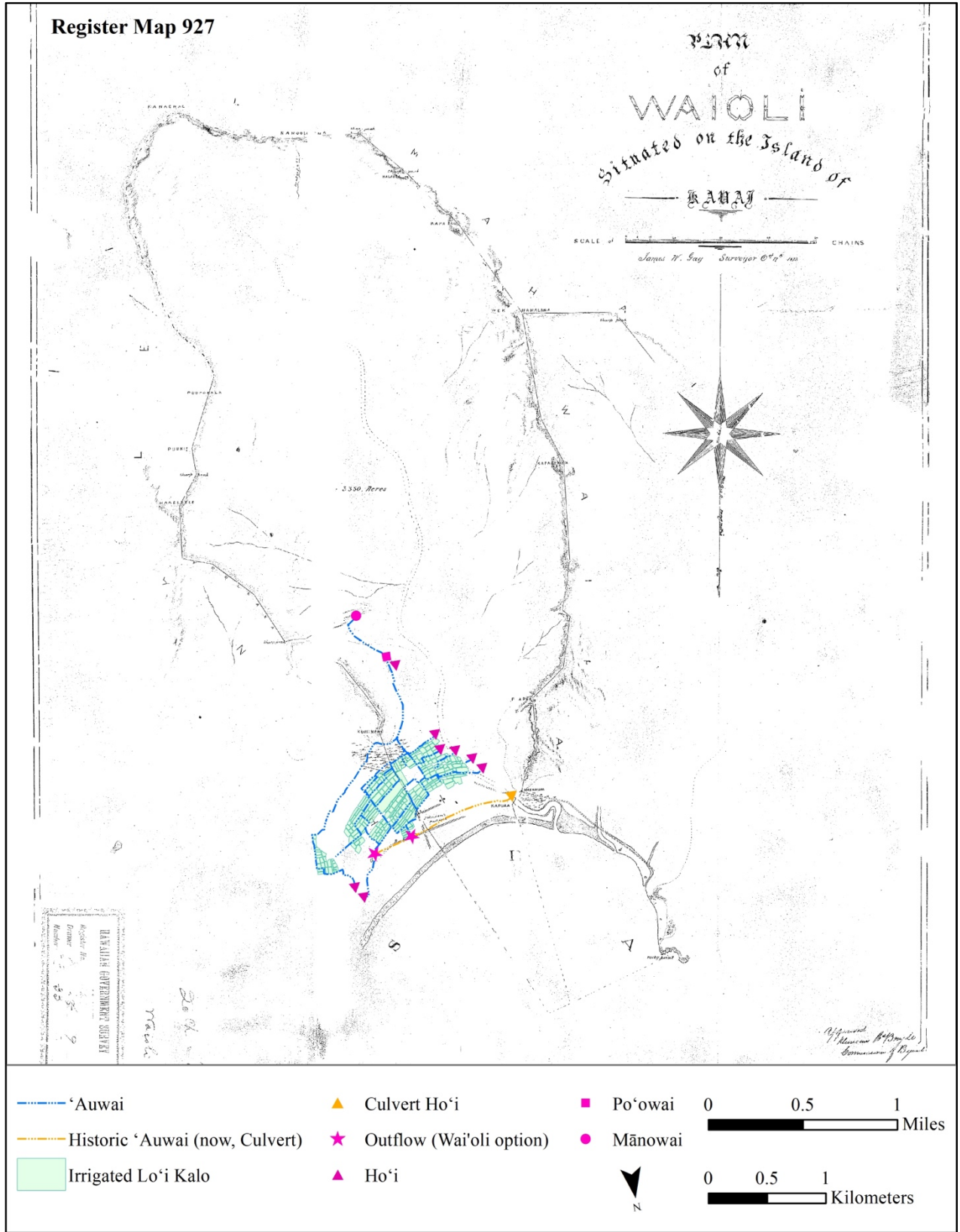


Figure 13. Register Map 927 depicting location of Wai'oli Lo'i Kalo Irrigation System.

Register Map 1833

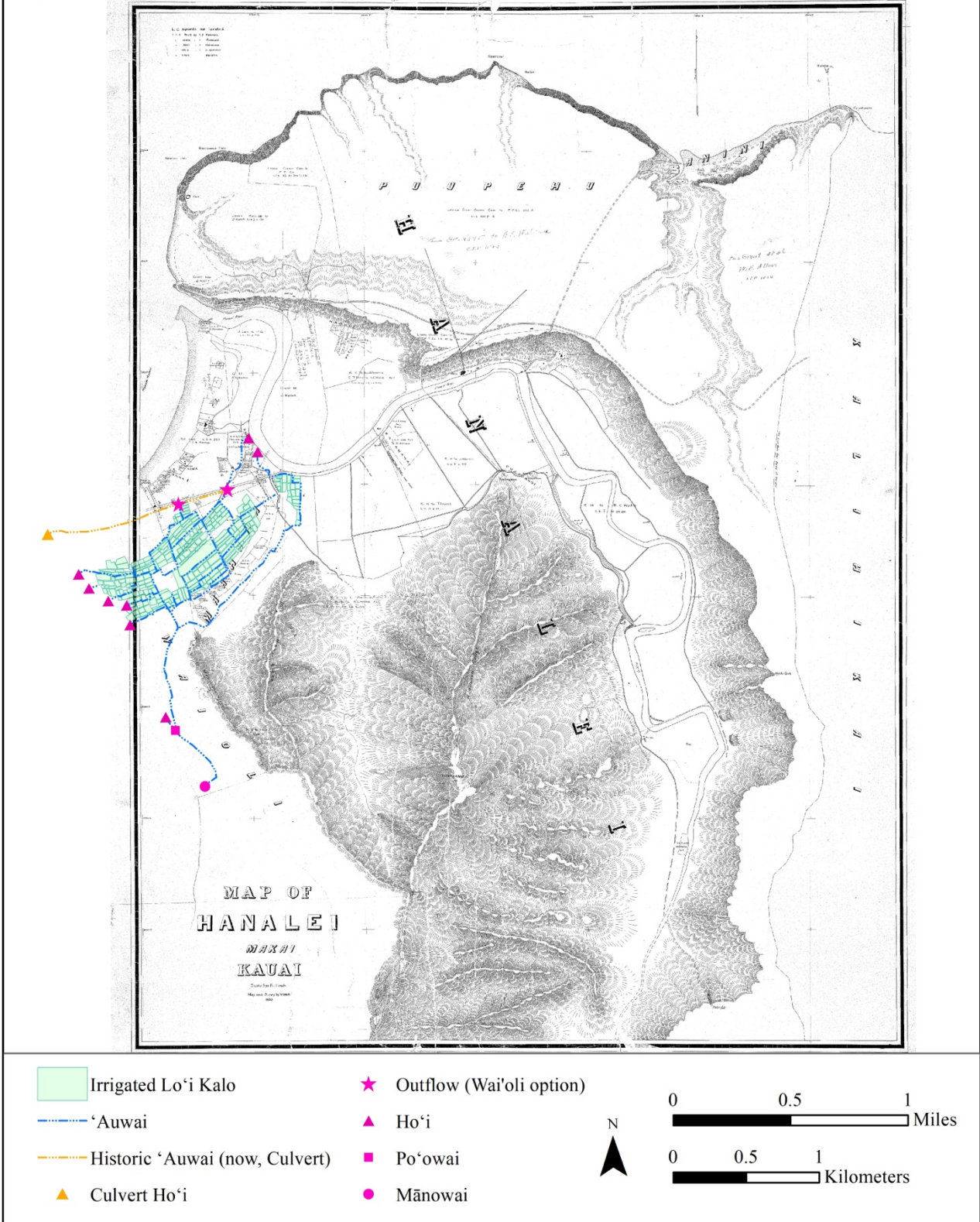


Figure 14. Register Map 1833 depicting location of Wai'oli Lo'i Kalo Irrigation System.

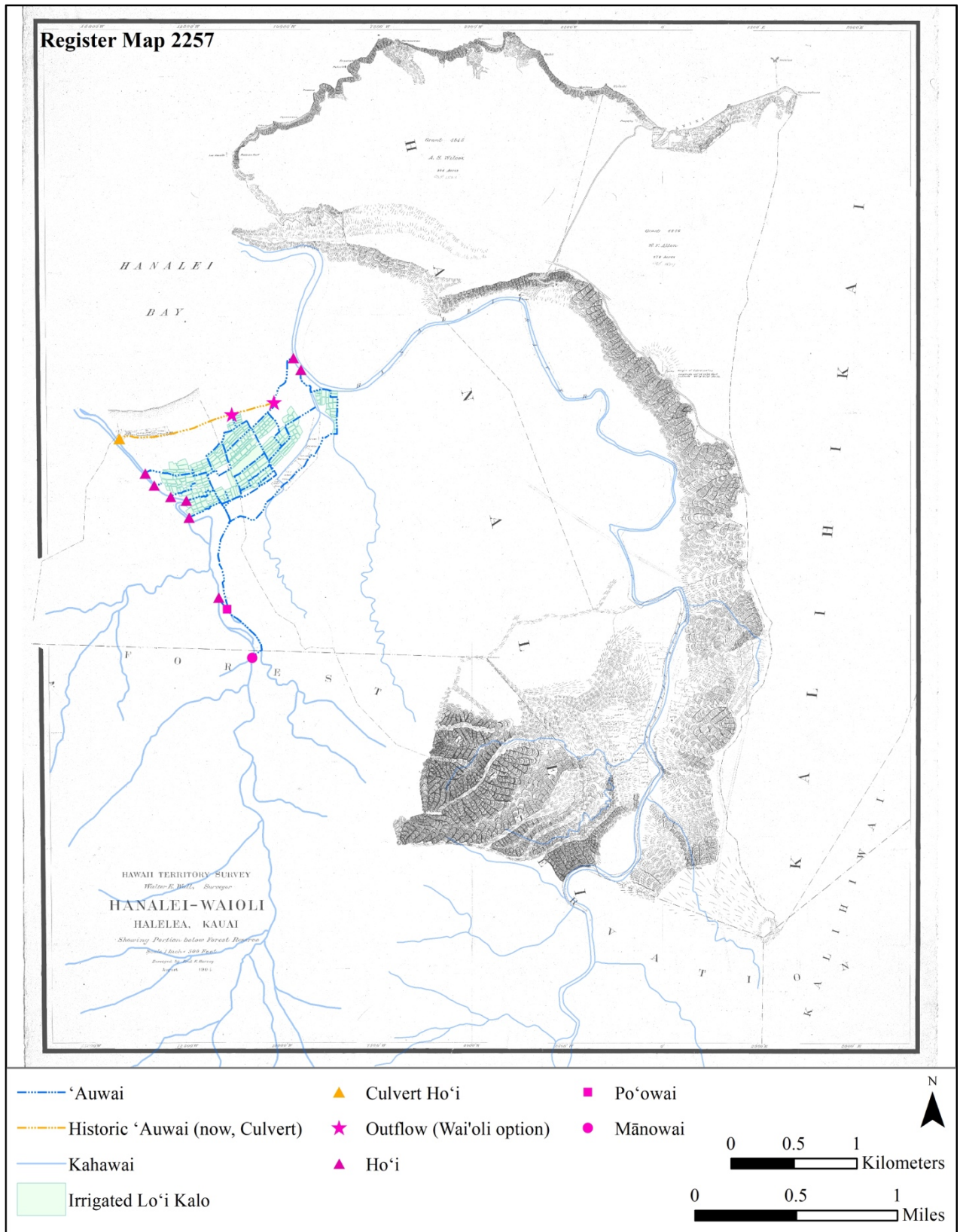


Figure 15. Register Map 2257 depicting location of Wai'oli Lo'i Kalo Irrigation System.

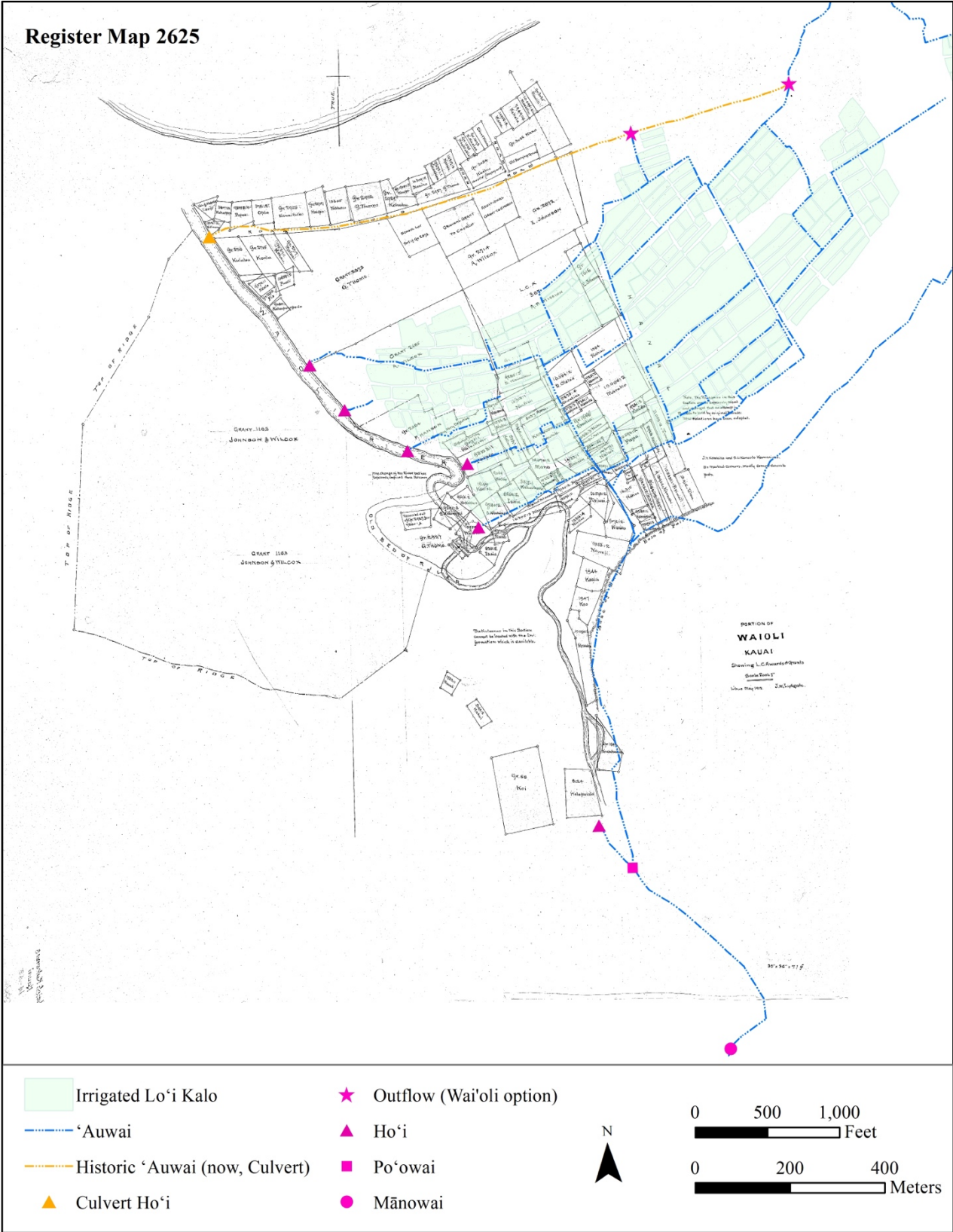


Figure 16. Register Map 2625 depicting location of Wai'oli Lo'i Kalo Irrigation System.

Land Court Application 1129, Map 1

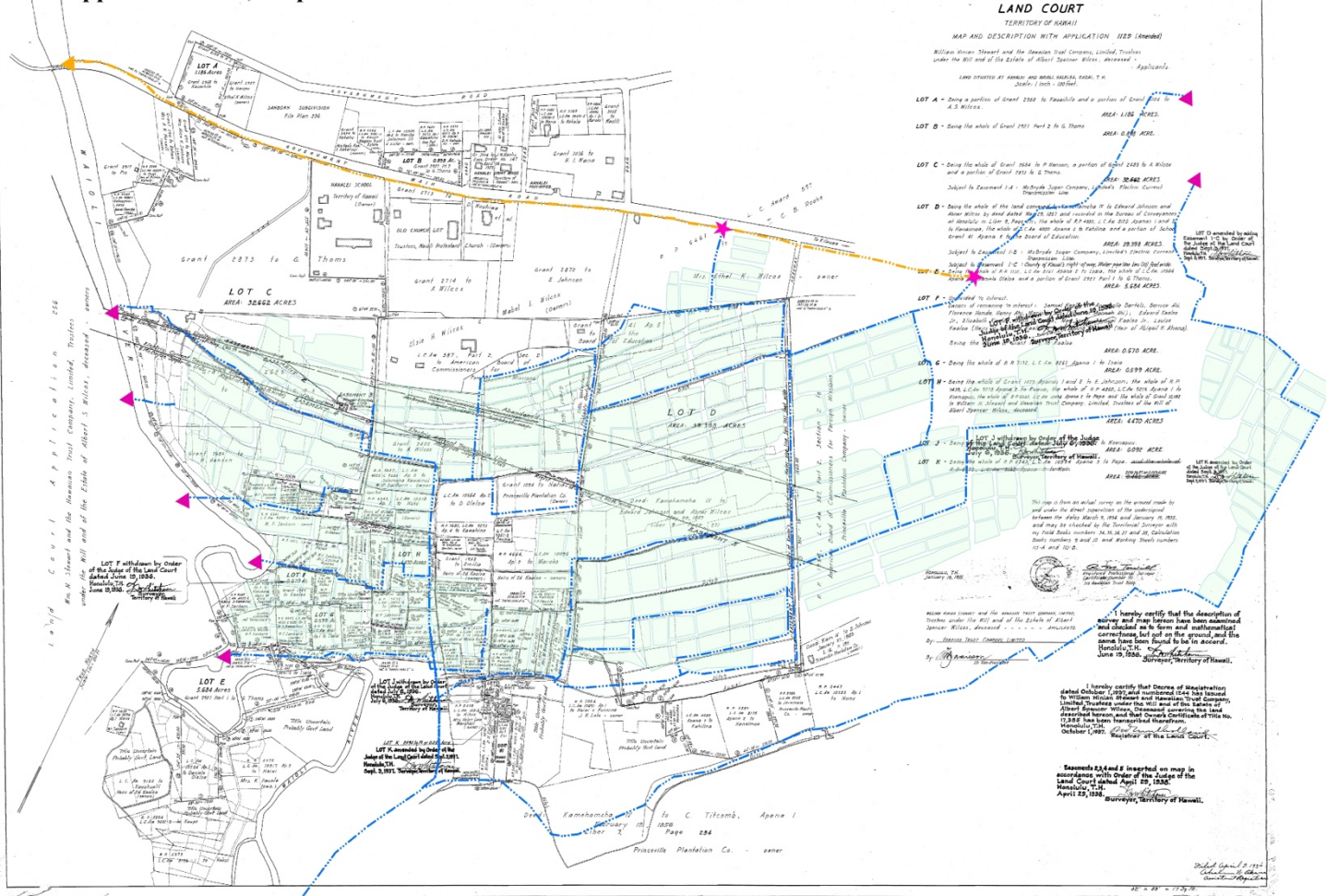


Figure 17. Land Court Application 1129, Map 1 depicting location of Wai'oli Lo'i Kalo Irrigation System.

Ka Wā Kahiko

Hawaiian oral traditions have been passed down from one generation to the next for hundreds of years, and have been written and recorded in contemporary times. There is no written record of Wai‘oli prior to the advent and proliferation of writing in the Hawaiian Islands. Hawaiian oral traditions, however, such as full mo‘olelo, mele, and oli, started to be documented and distributed in the mid-1830s via the nūpepa.²⁸ These mo‘olelo and mele provide a glimpse into the early settlement of Kaua‘i as well as life in Wai‘oli and the surrounding Halele‘a moku.

Nā Mo‘olelo a me Nā Ka‘ao

The terms mo‘olelo and ka‘ao (legend) have been used interchangeably to refer to legends or historic tales, with ka‘ao sometimes referring to a fictional legend or fanciful tale. Pūku‘i describes the tradition of storytelling as “a principal source of entertainment while simultaneously providing instruction in the many interwoven aspects of life – ancestry, history, religion, human relations, crafts, and the natural world.”²⁹ Before Hawaiian became a written language in the 1820s, cultural knowledge was perpetuated through various forms of oral repetition and passed down from generation to generation through mele, hula, kū‘auhau (genealogy), ka‘ao, or mo‘olelo.³⁰

Mo‘olelo, like mele, are also very valuable in offering a more descriptive account of the evolution of an area. One of the oldest nūpepa articles identifies Kauhane as the chief of Hanalei during the reign of Lono.³¹ The article does not include an in-depth narrative, it only notes that Lono’s rule over Kaua‘i was just and peaceful. Two of the most noted residents of Wai‘oli were Pīkoiaka‘alalā and Puapualenalena.³² Pīkoiaka‘alalā was born to his father ‘Alalā and his mother Ko‘uko‘u. Pīkoi’s parents were accomplished pana‘iole, rat shooters, who passed this skill on to their son. Ko‘uko‘u gave birth to seven keiki akua, supernatural children, before finally giving birth to Pīkoiaka‘alalā and his sister Kau‘iomānoa, who were born in human form. During his childhood, Pīkoi would often compete with other pana‘iole, no one being able to best him except Puapualenalena, a supernatural dog belonging to a prominent family in Wai‘oli. Pana‘iole was both a sport and a profession, as the mo‘olelo explains, and it is because of Pīkoi’s skill that he is called throughout the islands to shoot mischievous creatures that are pestering various ali‘i. Though rats and mice may seem like a common nuisance that can be easily remedied today, they were a very real problem in the Wai‘oli mission — Mrs. Alexander wrote in 1834 that they were numerous and enormous in size.³³

The mo‘olelo of Pīkoi and Lonoikamakahiki provide insight and strong inference that a Native population was living in the Wai‘oli area before the arrival of westerners in Hawai‘i. ‘Alalā and Ko‘uko‘u resided in and raised eight children in Wai‘oli. Their Pīkoi befriended a supernatural dog of another resident, leading to the strong inference that more than one family resided in the Wai‘oli area during that time. Especially because it is Pīkoi’s childhood acclaim that leads to the rest of his island travels.³⁴ In the mo‘olelo of Lonoikamakahiki and its mele, Lono and Kapaihi

²⁸ Nogelmeier 2003: 107.

²⁹ Pukui & Green 1995: xii.

³⁰ Kalākau & Daggett 1888.

³¹ *No Lono*, Ke Kumu Hawaii, 30 March 1836. This is a different Lono than that of Lonoikamakahiki from Hawai‘i Island.

³² S. Kauī, *He Kaa No Pikoikaalala*, Ka Nupepa Kuokoa, 16 December 1865.

³³ Alexander 1834.

³⁴ S. Kauī, *He Kaa No Pikoikaalala*, Ka Nupepa Kuokoa, 16 December 1865.

did not interact with people but would feed off the scraps or raw vegetables from Wai'oli while wandering in the cold uplands, meaning that there were others in the area.³⁵ The time period can be established based on the ali'i in the mo'olelo as well as other genealogical scholarship. According to Abraham Fornander and Esther Mo'okini, who researched ali'i genealogies, Kākuhihewa and Keawenuia'umi, who were main characters in both mo'olelo, ruled in the mid to late 1500s.³⁶

Nā Oli a me Nā Mele o Wai'oli

Mele and oli, while not being a full historical narrative, provide succinct descriptions of place, weather, and common day occurrences. These mele convey important ideas and happenings about the people, places, and events of their time.³⁷ Many of the mele use similar poetic references to the Wai'oli area, most referring to the amount of rain and the cold. These themes are so synonymous with the area that they are repeated from the earliest record in the nūpepa, through the literary apex in 1860, and until the end of the nūpepa in 1940.³⁸

The winds commonly associated with Wai'oli include Wai'ama'u³⁹ for the entire valley, Makaihuwa'a⁴⁰ ("eyes at the prow of the canoe") coming from the west, and Ualanipili ("rain that brings low the heavens") from Nāmolo-kama. Common descriptive terms of Wai'oli in mele include: ko'eko'e (frigid cold), anuanu (cold), ua loku (torrential rain), ho'opala (to cause wilting), ho'o'iloli (to cause change), and many more. Abundant rain, water and cold are thematic in many of the mele relating to this area. A mele from the mo'olelo of Lonoikamakahiki, son of Keawenuia'umi, recounts his voyage to Kaua'i to escape his misdeeds on Hawai'i Island. Lono and his 'aikāne Kapaihihilina, whom he befriends on Kaua'i, wander through Wai'oli where they eat raw plants and experience constant rains that are so heavy and persistent that it causes the lehua blossoms to wilt and change color.⁴¹

The mountains of Hīhīmanu, Nāmolo-kama, and Māmalahoa are also known for their rain and waterfalls, adding to the abundance of water in the Wai'oli ahupua'a. Kaliko, the central waterfall of Nāmolo-kama and the source of Wai'oli's water, is noted in mele as the po'owai, headwater. One mele notes, "kūmano ke po'owai a Kaliko," or a source of a multitude of water is the headwater of Kaliko, again speaking to the abundance of water that flows through the Wai'oli Valley and stream system.⁴²

Wai'oli in the Early Historic Era

The Wai'oli Lo'i Kalo Irrigation System at European contact (1778) would have been similar to that described and depicted in the Māhele records. The lo'i and 'auwai would have been in the

³⁵ *No Lonoikamakahiki*, Ke Auokoa, 19 January 1871.

³⁶ According to Abraham Fornander, Kākuhihewa was born around 1540 and was the 15th Ali'i'aimoku of O'ahu. Fornander 1880: 272-73. Esther Mookini puts Keawe's birth some time in the 16th century. *Translation Makes Hawaiian Treasure Accessible*, Honolulu Advertiser & Star Bulletin, 20 January 1991.

³⁷ Nathaniel B. Emerson states that "The most telling record of a people's intimate life is the record which it unconsciously takes in its songs. This record which the Hawaiian people have left of themselves is full and specific." 1903: 271.

³⁸ Nogelmeier 2003: 116.

³⁹ Kuapuu, *Ka Moolelo o Pakaa me Kuapakaa Home Rula Repubalika*, 15 March 1902.

⁴⁰ J. Poepoe, *Ka Moolelo o Hiiakaikapoliopole Ka Na'i Aupuni*, 22 June 1906.

⁴¹ *No Lonoikamakahiki*, Ke Auokoa, 19 January 1871.

⁴² Emerson 1907: 155.

same place in the early 1800s as they were in the mid-1800s, as would be the permanent houses (pāhale, kahuahale, kauhale), generally on the coastal dunes, but sometimes scattered among high points among the wetland fields⁴³ or dryland slopes. This section establishes a solid chronological timeline for the depth and breadth of the Wai‘oli Lo‘i Kalo Irrigation System.

As literacy rates in the Kingdom of Hawai‘i increased, so too did the number of nūpepa. These nūpepa announced important government news, featured political commentary, and also documented everyday life throughout the Kingdom. An article about a new law could be followed by an article about a new garden plot in a neighbor’s yard with the sweetest vegetables. Some of these articles relating everyday life were sometimes serials done over many years, and give us a glimpse into the evolution of an area.

One of the first articles pertaining to Wai‘oli was in *Ke Kumu Hawaii* entitled, *No ke Emi Ana o Na Kanaka*, in which a Kaua‘i island census taken in 1835 showed the decline in population.⁴⁴ This article was submitted by the mission to address possible mitigating action to deal with the decline. This article was written by W. P. Alexander, a missionary who founded the Wai‘oli Mission in 1834, fourteen years after the arrival of missionaries in the islands in 1820.

Mr. Alexander not only wrote articles for the nūpepa, but also kept records of life in Wai‘oli through his letters, journals, and yearly station reports. When Alexander arrived, he noted that the Wai‘oli’s mission was “well supplied with fish, fowl, bananas and melon etc.” A year after Alexander’s arrival, an article expressed how lush and fertile the land in Wai‘oli was, as well as the ease with which everything grew due in part to the pure clean waters.⁴⁵

From the founding of the mission in 1834, letters, reports, and nūpepa articles continued to document the agricultural wonders of the people in Wai‘oli. In the early years of the mission, Alexander connected his property to the main stream through an ‘auwai system to water the crops on his homestead. These crops supplemented what he was receiving or trading with the Native population.

During the early years of Alexander’s tenure, the Bible was being translated into ‘ōlelo Hawai‘i. The Native people in Wai‘oli were so eager for the written word that, according to Alexander’s account, they could be seen farming into the evening, with the glow of their campfires lighting the mountains, so that they could farm enough pia (Hawaiian arrowroot) to buy books from the missionaries.⁴⁶ The land is so abundant that Alexander bemoaned the nearly 100 barrels of yams that he could not dispense of, and attempted to have them sent to the mission in Honolulu.⁴⁷ He also sent calabashes of oranges, tamarinds, and sometimes paddles, all of which he acquired from his own farm or from the Native people trading for books.⁴⁸

The agricultural benefits of the valley were also used by the mission in its efforts to increase education amongst its congregants. In 1837, when the school in Wai‘oli expanded, it required its students to work a parcel of land in Wai‘oli to fund their teachers. Testimony recorded by the

⁴³ Such as the pāhale of several kuleana lands awarded in 1851: LCA 10316 ap2 to Nuku, LCA 9070 ap1 to Kokokaia, and LCA 9833 ap2 to Pepee.

⁴⁴ W. P. Alexander, *No Ke Emi Ana o Na Kanaka*, *Ke Kumu Hawaii*, 14 October 1835.

⁴⁵ N. Keoahu, *Waioli Kauai Ian 23, 1835*, *Ke Kumu Hawaii*, 15 April 1835.

⁴⁶ Alexander 1934: 187.

⁴⁷ Alexander 1934: 185.

⁴⁸ Alexander 1934: 186.

mission documented that the school had 4-5 acres of cultivated farmland dedicated to that use, some of which was lo'i.⁴⁹

From the mid-1840s into the 1850s near the end of the Māhele, Wai'oli experienced agricultural expansion and an increase in foreign crop production. New crops included coffee on the mountainsides closer to the center of Hanalei Valley, indigo in some of the kula areas, and plants to feed the new silk-worm production. These new crops were successful for a time, but would not survive beyond the 1860s.⁵⁰ At this point in Wai'oli's history on into the 1890s, only a few sources recorded observations of farming in the area relating to kalo cultivation. Nūpepa and other records instead tended to focus on the transfers and conversions of larger tracts of land around the Project Area, to new owners or into different uses.⁵¹

⁴⁹ Foreign Testimonies, no. 387: 37.

⁵⁰ *No ka Hele ana o Polepe i Kauai*, Ka Nonanona, 3 March 1843; Coffee Times, The History of Coffee in Hawaii, no. 79: 3; Palmer 1913.

⁵¹ *Olelo Hoolaha*, Ka Leo o ka Lahui, 5 September 1889; *Hoolaha Hooko Moraki*, Ka Nupepa Kuokoa, 25 November 1893; Palmer 1913.

Table 3. A Wai'oli timeline, through a selection of nūpepa articles.

Inoa Nūpepa Nūpepa Name	Mea Kākau Author(s)	Po'omana'ō Source	Lā Date	Mana'ō Hō'ulu'ulu Notes
Ke Kumu Hawaii	N. Keoahu	Waioli Kauai Ian 23, 1835	15 April 1835	13 homes have been built by David Papohaku for the settlement of Betelehema. The land is very fertile and all things grow easily and all the flowers bloom because there is such clean water. There are many deaths on the island as well as people attempting to burn down the mission house.
General Meeting of the Sandwich Island Mission		Station Reports pg. 12	May and June 1839	The congregation has planted seven acres of sugar cane to help fund the building of the meeting house.
Ka Nonanona		He Ipu Pu!	15 March 1842	Wai'oli is a very fertile place to grow all kinds of plants. Mr. Ioane has grown one of the largest pumpkins.
Ka Nonanona		Papa Hoike i na kula o Waioli	15 March 1842	A feast was made for the performance of the school at Wai'oli under the kukui grove called Salema on the bank of Wai'oli River.
Ka Nonanona		Ka Ahaolelo Misionari	9 July 1844	Wai'oli Select school started by Johnson, the students work/farm for their supplies/food. They are also supported by the congregants.
Ka Nonanona		Laau Kanu	15 October 1844	Planting coffee is successful in Wai'oli.
Ka Hae Hawaii	John U. Kuapuu	Nu Hou Ma Waioli	20 May 1857	Cannons recovered from the Ha'aheo wreckage from April 1824.
Ka Nupepa Kuokoa		Ahahui Mahiai o Waioli Kauai	16 November 1861	October 30, farmers of Hanalei, Anahola and Wai'oli came together to form a Farming Organization whose goal is to find ways to make farming more successful because of the decline of whaling, leaving people without enough money for their taxes. They want to try rice and tree fern wool and other plants. A copy of their constitution is posted.
Ka Hoku o ka Pakipika	A.S. Nuuanu (Waipa)	Pilikia! Pilikia ka Lahui Hawaii!	24 February 1862	Divorce/Adultery rates are 2/3 in Wai'oli.

Inoa Nūpepa Nūpepa Name	Mea Kākau Author(s)	Po'omana'ō Source	Lā Date	Mana'ō Hō'ulu'ulu Notes
Ka Hoku o ka Pakipika	J.W. Kapuailiau	Hoike Kulahui a me ka Ahaaina ma Waioli	29 May 1862	A lanai and school were built and a feast was prepared for a show by the congregation school. Grass from the riverbanks was used for roofing and the place was decorated with Native and foreign plants of the area.
Ka Nupepa Kuokoa		Na Mea Hou o Hawaii Nei	18 April 1863	Price of poi increasing, perhaps because most people are farming rice.
Ka Nupepa Kuokoa		Ka Anesona Moololo No Kauai	25 May 1865	A brief history of Wai'oli Mission starting in 1834 under a kukui grove. At the time of this article there were 421 congregants. The author sees the abundance of this area and that the residents are growing all types of food plants.
Ka Nupepa Kuokoa	E.J.	Make Emoole!	26 August 1865	Kauai dies from a landslide while digging an irrigation ditch to run Mr. Thom's sugar mill in Waipā.
Ka Nupepa Kuokoa		Maloo loa o Hanalei, Kauai	14 July 1866	All the lands in Hanalei and the sugar plantations are dry from two months of no rain. The lands closest to the ocean are especially dry.
Ka Nupepa Kuokoa		Hele Kaapuni Ana Ia Kauai	31 October 1868	Author visits the mission at Wai'oli. Over 200 congregants come to services all heralded by the Wai'oli church bell.
Ka Nupepa Kuokoa	S. P. Ahiona	Palapala Hoike Hana mawaena o na Pake ma ka Mokupuni o Kauai	24 July 1869	Ahiona meets with Chinese who live in Wai'oli to evangelize. 70 come to services at Wai'oli Hui 'ia and he meets with some at their stores in Wai'oli.
Ka Leo o ka Lahui		Olelo Hoolaha	5 September 1889	Tai Lee Wai restricting access to his rice farm in Wai'oli from 6pm on and in the mornings only those that are allowed may cross through.
Ka Nupepa Kuokoa		Hoolaha Hooke Moraki	25 November 1893	Re-auction of mortgaged rice land in Wai'oli. 45 acres to Ah Fat from George Wilcox from January 1888.
Ka Nupepa Kuokoa	Kamahele	Ka Ike hou ana o ke Kamahele i ka Mokupuni o Kauai	19 December 1913	Hanalei Valley is filled with rice fields.

Wai‘oli Changes in Land Tenure – The Māhele

The Māhele records of the 1840s and 50s provide a wealth of information about Wai‘oli and its agricultural system, including a baseline for the systems’ extent. Through Native Registers (“NRs”), Native Testimonies (“NTs”), Foreign Testimonies (“FTs”), and Land Commission Awards (“LCAs”), Wai‘oli land claimants and other witnesses who provided testimony, delineate the scope and use of the land during their or their ancestors’ land tenure in Wai‘oli.

Kuleana are a type of Land Commission Award claimed by Kānaka Maoli tenants during the Māhele. Native tenants who were seeking to claim their kuleana would submit testimony to explain the extent of their land claim, which would then be recorded in a Native Register; a witness would support a claim, which would then be recorded in the Native or Foreign Testimony. Typically, the Native Register included how many ‘āpana (land parcels) the applicant was claiming, what type of property, and what, if anything, was being cultivated at the time. Historically, there were at least 41 separate kuleana ‘āpana that consisted of lo‘i kalo and 13 kuleana ‘āpana that referred to the ‘auwai in its metes and bounds.⁵²

The Native Register would sometimes detail from whom the applicant derived his or her interest (i.e., who gave the claimant the right to cultivate those lands), such as a konohiki (head manager of an ahupua‘a) or ali‘i, as well as a year or time period. Some would give a period relating to when an ali‘i was in power, typically in the form of “I ke au iā” or “during the time of” followed by the name of the ali‘i. For example, the NR for LCA 8196 to Hakui notes,

*E ho‘ike imua o oukou no ko‘u kuleana I make known before you my interest [in this land]
mai ka wa mai ia Kaikioewa a hiki i keia la from the time that Kaikioewa ruled until today*

Kaikioewa died in 1839, and was a contemporary and kuhina (advisor) of Kamehameha I (1758-1819).⁵³ The NR 9080 to Kahooponopono, whose kuleana includes lo‘i and parts of the ‘auwai, explains that his kuleana is “He kuleana kahiko mai ko‘u” or “His kuleana is an old one” and also that “Mai ka hiki ‘ana mai o na misionari oia ka MH 1820 a hiki i anei ko‘u noho ana” or “he has been there since the arrival of the missionaries in 1820 until now.” Other similar descriptions of kuleana that are “kahiko” (old) or “mai mua loa mai” (from long before) are described in the Native Testimonies and Native Registers; these references would pre-date the Kamehameha dynasty.⁵⁴

Kaumuali‘i, also a contemporary of Kamehameha I, is referenced many times in these documents as he was the ali‘i nui of Kaua‘i during that period. For example, the NR for LCA 9276 for Kiolea notes, “Penei ke kuleana ana mai a Kaumualii mai a hiki i ka makahiki 1848,” translated as “Such is the interest in this land from Kaumuali‘i until the year 1848.” Kaumuali‘i, who died in 1824, was the mō‘ī of Kaua‘i and negotiated a treaty with Kamehameha I during his campaign to unite the islands under one rule. Similarly, the NR for LCA 9275 to Koenapuu explains, “Penei ke kuleana ana mai a Kaumuali‘i mai a ia keia manawa” or “Such is my interest from Kaumuali‘i until now.” As yet another example, the NR for LCA 11059 to Timoteo proclaims, “I ka manawa ia Kaumualii o Kaua‘i nei, mai ko‘u mau makua mai a hiki mai ia‘u i keia wa ka pili ana o keia wahi me au,” translated as “During the time of Kaumualii’s rule on Kaua‘i, from my parents until me during this time, is my connection with this place.” It is

⁵² Tong 2019.

⁵³ Tong 2019.

⁵⁴ Kamakau 1961: 55.

reasonable to conclude that if lands in Wai'oli were given during the reign of Kaikioewa and Kaumuali'i, both contemporaries of Kamehameha I who lived through and experienced "contact" with Captain Cook in 1778, that the mānowai, po'owai, and 'auwai system required to support the lo'i kalo claimed by those Native tenants were also in place prior to western contact.⁵⁵

Wai'oli and Rice

Though the nūpepa, mission reports, and journals describe the abundance of Wai'oli and the success of the agricultural system, farmers began to feel the hardship from the decline of whaling in the 1860s.⁵⁶ This coincided with the discovery of a new type of rice crop, which led to an increased demand to convert lo'i kalo into rice.⁵⁷ In 1861, the farmers created an 'Ahahui Mahi'ai (Farm Association) to explore new cash crops such as the new rice cultivar.⁵⁸ The kalo lands eventually transitioned, like much of Kaua'i, into rice or sugar cultivation, which caused a shortage and decrease in the consumption of kalo and poi as well as an increase in poi prices in 1863.⁵⁹ Through the late 1860s and into the 1880s, the lands of konohiki and other large landowners in Wai'oli transitioned into rice, which is a trend that occurred across Halele'a.⁶⁰ Some Wai'oli residents, especially those farming kuleana land, stayed in kalo.

1893 Overthrow – Present

Post-1893 overthrow and into the 1900s: Hawai'i's cultivation of rice began to decline due in part to competition from California's rice production, as well as problems with pests.⁶¹

1940s: In Wai'oli, there was a return to kalo production for those lo'i that had been converted to rice earlier.

1972: In an interview by Larry Kimura on the Ka Leo Hawai'i broadcast, Rachel Mahuiki, an elder of the Halele'a area, spoke about how all people in the Hanalei area, both foreign and Hawaiian, returned to farming kalo, though primarily the older and adult children of the older generation. The younger generation had not taken up kalo because it was too difficult.⁶²

1984: In the August OEQC Bulletin, the Hawai'i State Department of Land and Natural Resources, Division of Water and Land Development announced proposed repairs and improvements to the "East Wai'oli Ditch" as a negative declaration, that is, a "determination made by proposing agencies that certain proposed actions will not have significant effects on the environment and therefore do not require EISs [Environmental Impact Statements]."⁶³ Improvements to the system included reconstructing the lower intake, the po'owai, and repairs to the "lower system" (ma kai of the po'owai). According to the OEQC Bulletin, the mānowai, the "upper intake is the true diversion on Wai'oli stream and it is not being renovated."⁶⁴ At this

⁵⁵ Tong 2019.

⁵⁶ Haraguchi 1987.

⁵⁷ Haraguchi 1987: xiii.

⁵⁸ *Ahahui Mahi'ai o Waioli Kauai*, Ka Nupepa Kuokoa, 28 November 1861.

⁵⁹ *Na Mea Hou o Hawaii Nei*, Ka Nupepa Kuokoa, 18 April 1863.

⁶⁰ Monsarrat, Map of Rice Plantation Kalihiwai, Hanalei, Kauai, November 1885.

⁶¹ Haraguchi 1987: xv.

⁶² Ka Leo Hawai'i HV 24:14, 1972.

⁶³ OEQC Bulletin, Vol.1 No.14, August 23, 1984.

⁶⁴ OEQC Bulletin, Vol.1 No.14, August 23, 1984.

time, between the po'owai and the main ditch feeding irrigated kalo fields on the Wai'oli side of the system, the flume and trestle were replaced and permanent pebble trap structures were installed as overflow controls to prevent breaches in the main ditch. The DLNR Division of Water and Land Development recorded these improvements at the boundary of the taro fields as necessary to ensure water flow to "some of the most productive plots in the State."⁶⁵

Late 1980s: Kalo farmers filed Declarations of Water Use with the Commission on Water Resource Management; during this time of heightened development, kalo farmers sought to ensure that the practice of irrigated kalo cultivation continued in Wai'oli.⁶⁶

2015: The Hawaiian Islands Land Trust ("HILT") acquired two conservation easements on almost 40 acres of wetland kalo in Wai'oli. Donated by Gaylord and Carol Wilcox and their daughters Nicole Pedersen, Darcie Gray, and Eliza Wilcox, the conservation easements placed permanent restrictions on this important active farm land, protecting it from future development and degradation. The easements not only ensured the land could not be developed, but also identified certain conservation values such as agricultural resources, cultural and historical values, wildlife habitat, and scenic beauty, which will prevent it from being compromised or threatened by future uses of the land.

2018: Close to 141 years after the last recorded massive flood in the area, a record 24-hour rainbomb dropped 49.69 inches of rain on the north shore of Kaua'i.⁶⁷ Resulting floods swelled north shore rivers and streams, inundating the valleys and coastal plains of Wai'oli, Hanalei, Waipā, Waikoko, Lumaha'i, and Wainiha.

⁶⁵ OEQC Bulletin, Vol.1 No.14, August 23, 1984.

⁶⁶ Strauch, Ayrton. Field Investigation Report for Wai'oli, FI2019020901, Commission on Water Resource Management, Feb. 2019; Kaona, Kobayashi, Masada, Miike, Mitsui, Omo, Spencer, Reyes, Tai Hook, Tasaka, Watari, Yagihara, Registrations of Stream Diversion Works and Declarations of Water Use, DLNR-CWRM, 1989.

⁶⁷ Arndt et al. 2018.

Appurtenant Rights

The lo'i kalo in Wai'oli are appurtenant, riparian, and traditional and customary Native Hawaiian uses of water and public trust purposes, which have some of the highest levels of protection under Hawai'i's Constitution and Water Code, HRS chapter 174C. The purpose of this section is to explore the appurtenant rights of the Wai'oli Valley Taro Hui.

Project staff selected, surveyed, and translated Māhele documents to establish the locations and some of the earliest written records of lo'i in Wai'oli. Although not always explicitly stated in each document, these lo'i are lo'i kalo, as this is often emphasized in the use of metes and bounds describing an applicant's "kalo lands." At the time of the Māhele, commercial rice had not yet encroached into this area; no mention of rice was noted during our survey, only kalo.

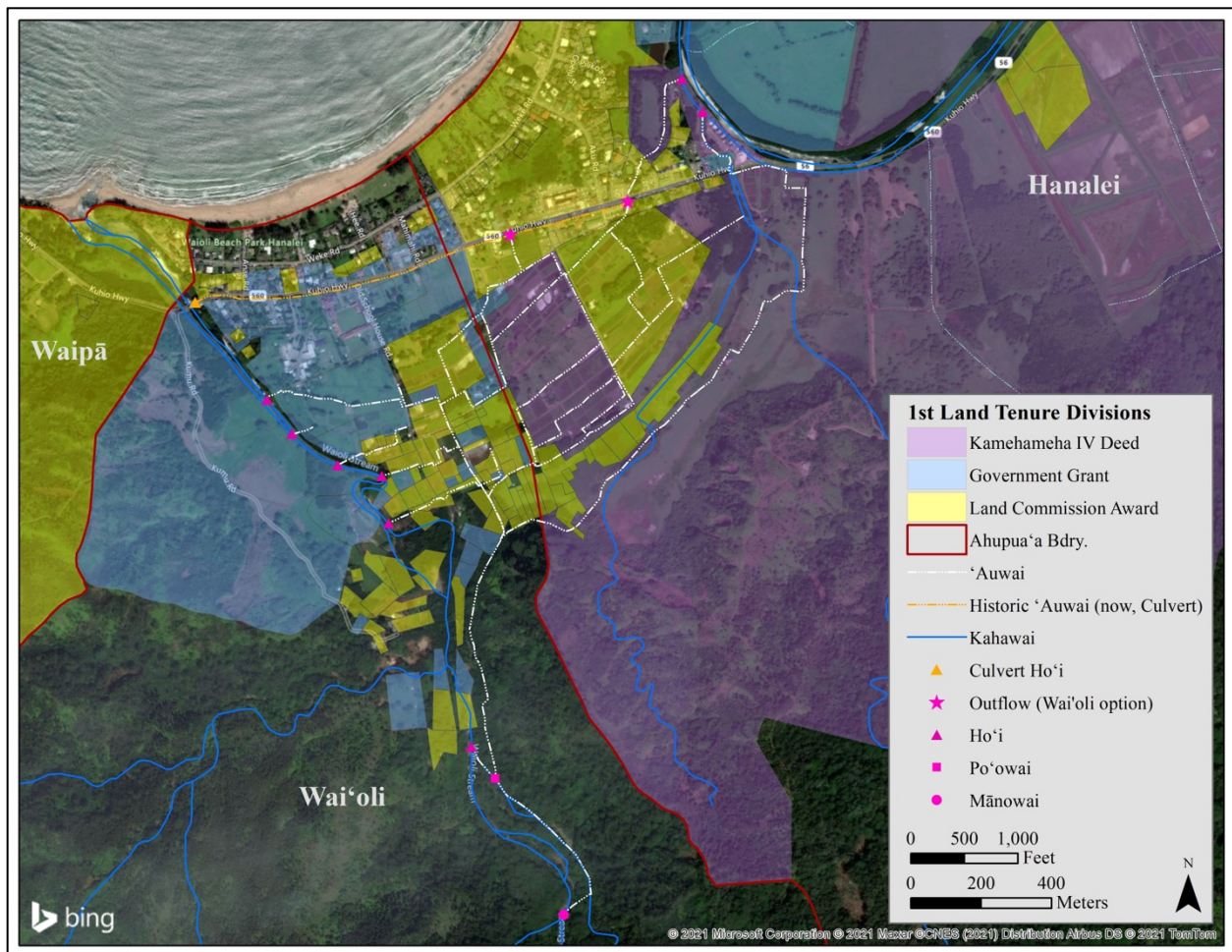


Figure 19. Map depicts the Project Area over the locations of the first land tenure divisions along the Wai'oli-Hanalei coastal plain at the time of the Māhele.

Following the Māhele, the Wai'oli ahupua'a was retained by the Government whereas the neighboring Hanalei ahupua'a was retained by the Crown, excepting kuleana, Grants, and Kamehameha Deeds. Within the Wai'oli Lo'i Kalo Irrigation System, there are LCAs, Government Grants, Crown lands and a few Kamehameha IV Deeds. Although many of these lands were cultivated and lived on by the same families for generations, it was after the 1840

Constitution, and during the Māhele, that distinctly Kānaka Maoli, hybridized, fee-simple land tenure was established. The Hawaiian Kingdom enjoyed a phenomenal literacy rate early in history, and the detail and breadth of government documentation reflect this. A great many surveys, claims, documents, and testimonies were generated for all of the land parcels that were sold, awarded, exchanged, or gifted between 1840 and 1893.⁶⁸ Table 4 provides details about the provenance of these different land types.

Table 4. Table of Hawaiian Kingdom land types as formally acknowledged and conveyed by the Hawaiian Kingdom Government.

Land Type	Dates	Notes
Land Commission Awards	1848-1855	LCAs as awarded during the Māhele. LCAs comprise less than 1% of land in Hawai‘i and are often split into two types; 1) konohiki awards, those awarded to the ali‘i, and 2) kuleana awards, those awarded to the native tenants, or maka‘āinana. ⁶⁹
Government Grants	1846-1893	Land Grants taken from the Government body of land; includes Royal Patent Grants, Public Works Grants and School Grants.
Kamehameha Deeds	1848-1865	Lands sold from the Crown inventory by Kamehameha III & IV up until Crown lands became inalienable by the 1865 Act.
Government lands	1840-1893	Those lands managed by the monarch and the Government as the public domain.
Crown lands	1848-1893	Managed by the monarch via the Board of Commissioners of Crown lands, as personal property, made inalienable by the 1865 Act, passed on to sitting monarchs, not to lineal descendants. ⁷⁰

In the ahupua‘a of Wai‘oli there are forty-one (41) Royal Patent Grants; grants of land sold from the Government body of land (prior to the illegal overthrow). There are fifty-five (55) Land Commission Awards documented in the Buke Māhele for Wai‘oli ahupua‘a.⁷¹ A 2019 Office of Hawaiian Affairs (“OHA”) report found that forty-one (41) kuleana awards had at least one ‘āpana that was lo‘i, although that survey was not exhaustive.⁷² Based on a thorough review of these and other documents, a significant majority of LCAs have more than one ‘āpana; some, up to six.

To refine the document survey, project staff indexed the earliest land documents within the footprint of the Wai‘oli Lo‘i Kalo Irrigation System, and then further narrowed the study sample for the purposes of this report and in the interest of time. This section focuses on a portion of the Wai‘oli Lo‘i Kalo Irrigation System that falls within Wai‘oli ahupua‘a. Although not a complete inventory of appurtenant rights within the whole system, this sampling provides a clear picture of established lo‘i distribution and related water uses at the time of the Māhele and into the present.

⁶⁸ Excepting the Crown lands which were held in the Crown inventory until they were made alienable and sold post-overthrow, Iaukea 1894.

⁶⁹ Chinen 1958.

⁷⁰ Van Dyke 2008. The body of the Crown lands was about 1,000,000 acres during the Kingdom period. In a time of shifting roles, the Crown, by managing these lands, retained some of its position and obligation as ali‘i of old.

⁷¹ One of these LCA claims is crossed out in the Buke Māhele, at least two LCAs have duplicate helu (two numbers for the same award), and of course most LCAs have multiple ‘āpana, ranging from 1-6 parcels.

⁷² Tong 2019.

We created a table of land use based on information found within the following primary source archival documents:

- Buke Māhele (Land Commission Awards)
- Native Register
- Native Testimony
- Foreign Testimony
- Royal Patent notes of survey (original legal metes & bounds for LCAs)
- Government Grants

Using ESRI ArcGIS software, project staff compared a map of the Hui's potential lo'i today with shapefile layers of LCAs, Government Grants, etc. The result is a geospatial color coded map of modern Hui lo'i depicting traditional land use: a map of Wai'oli land with appurtenant rights.

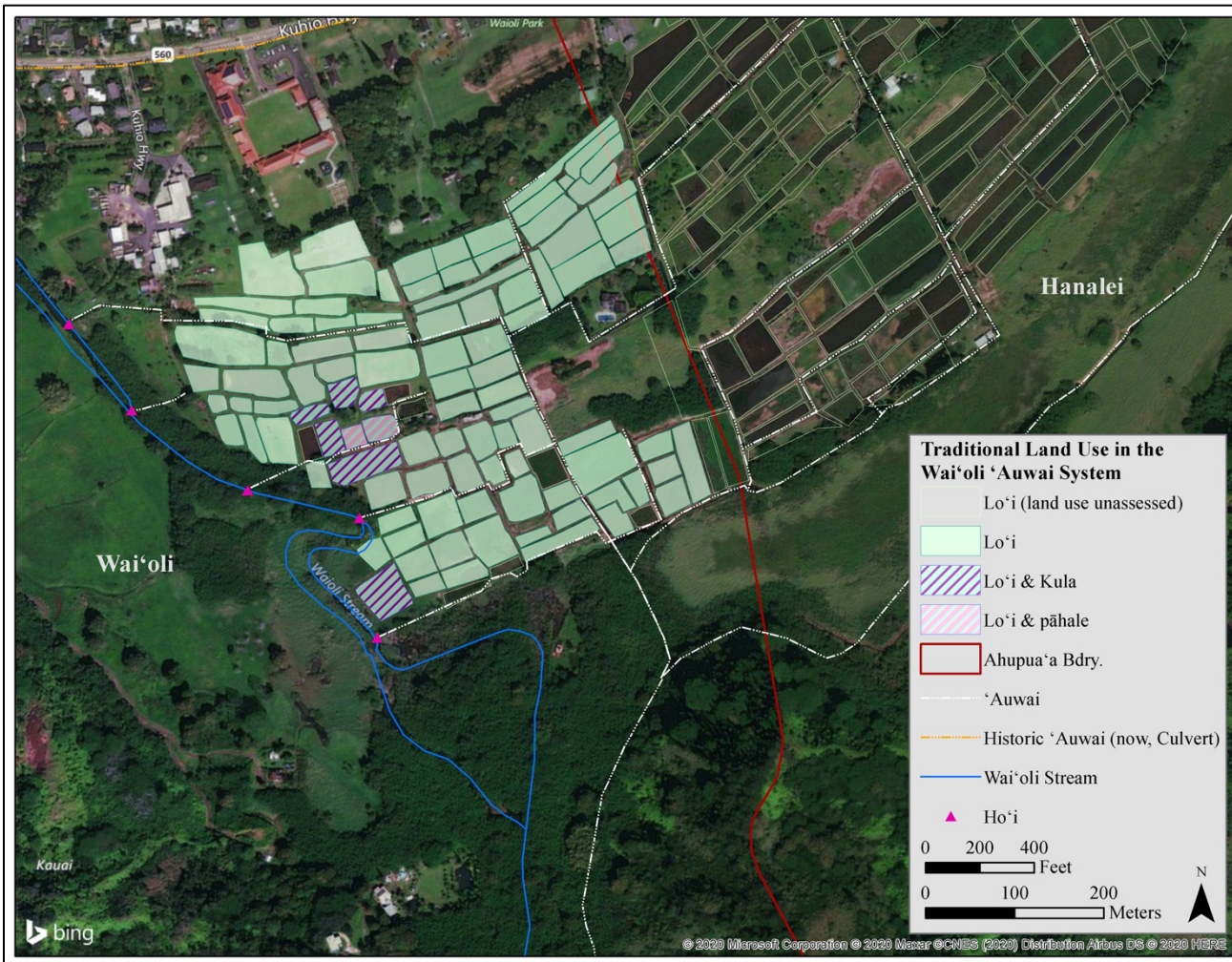


Figure 20. Depicts appurtenant right land use over modern lo'i in Wai'oli ahupua'a.

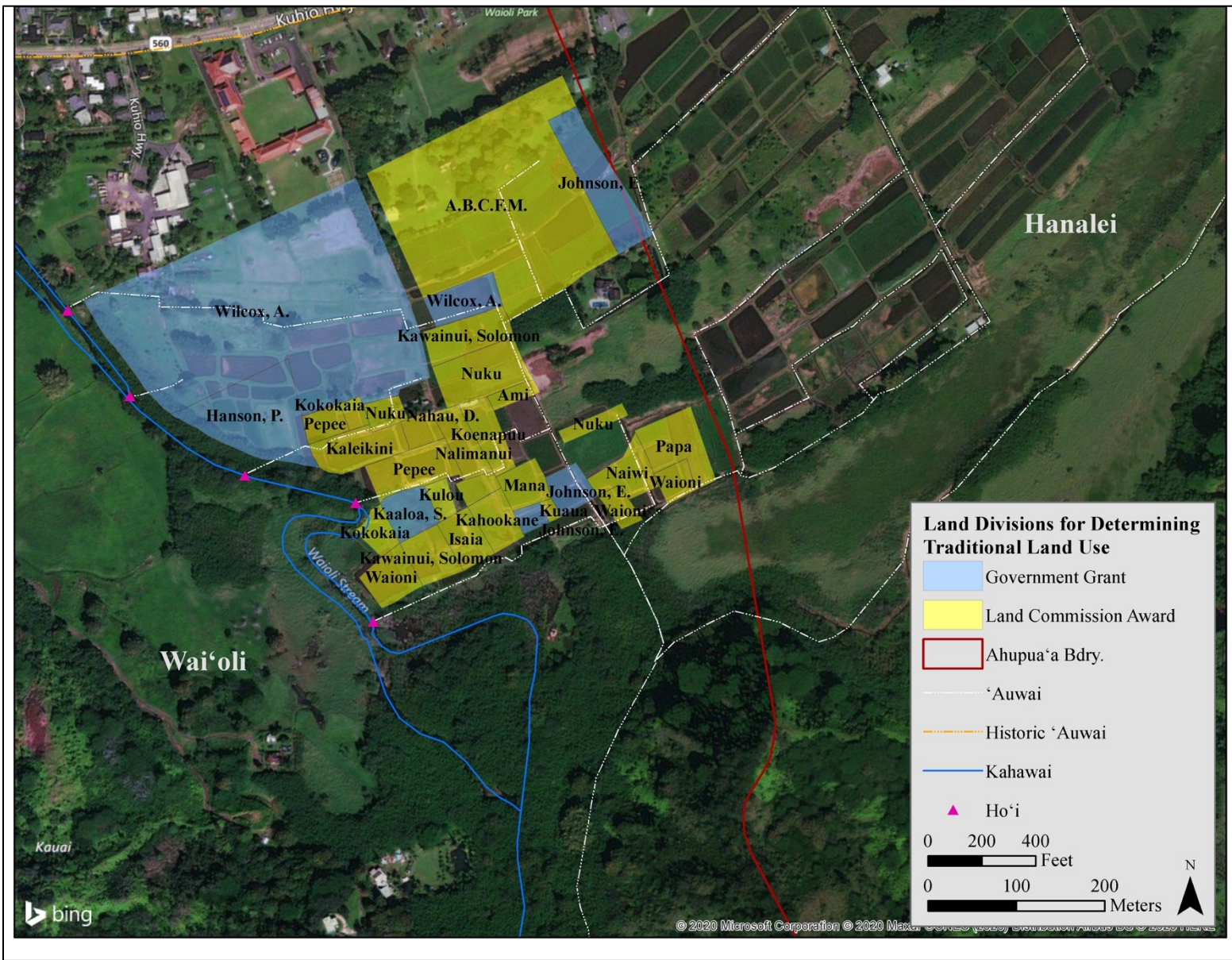


Figure 21. Depicts the LCAs and Grants researched to determine appurtenant rights for irrigated kalo.

Table 5. Selected parcels within the Study Area with solely lo'i land use.

TMK	Land Type	Awardee/ Grantee	Reference Date	Land Use	Source
455006009	Grant	Hanson, P.	1857	lo'i	Gr2685
455007030	LCA	Helepalala	1844	1 lo'i named Waiiau	LCA, NR, NT,
455007004	LCA	Isaia	1851	2 lo'i	LCA, NR, NT,
455007016	Grant	Johnson, E	1854	the lo'i of Johnson	Grant, neighboring LCA (Kahookane)
455006008 (por)	Grant	Johnson, E	1855	"kalo lands"	neighboring LCA (A.B.C.F.M.) "surrounded by kalo"
455007010	Grant	Kaaloa, S	1856	2 lo'i	Grant
455007003	LCA	Kahookane		the lo'i [4] named Uhikiko	LCA, NR, NT
455007018	LCA	Kahooponopono	1820	2 lo'i starting at the 'auwai and the lo'i of Nalimanui	LCA, NR, NT
455006007	LCA	Kawainui, Solomon	1851	1 lo'i	LCA, Gr2402
455007005	LCA	Kawainui, Solomon	1840	1 lo'i named Koele	LCA, NR, NT
455007016	LCA	Koenapuu	1848	kalo, beginning at the lo'i of Mana	LCA, NR, NT
455007009	LCA	Kokokaia	1851	lo'i	LCA
455007016	LCA	Kuaua	1841	1 lo'i named Kamanui (ap1 is along the highway in Hanalei)	LCA, NR, NT
455007011	LCA	Kulou	1846	1 lo'i beginning at the lo'i named Paele	LCA, NR, NT
455007016	LCA	Mana	"...ever since until now 1848"	1 lo'i named Kaumaunui	LCA, NR, NT
455007014	LCA	Nahau, D.	1851	1 lo'i starting at the corner of Kaleikini's lo'i	LCA, NR
455007032	LCA	Naiwi	1851	1 lo'i	LCA
455007015	LCA	Nalimanui	1848	1 lo'i in Waiiau	LCA, NT
455006006	LCA	Nuku	1830	1 lo'i named Puhaunui	LCA, NR
455007021	LCA	Nuku	1830	1 lo'i	LCA, NR
455007016	LCA	Papa	1834	3 lo'i bordered by the lo'i of Pipiwai, Koi, Naiwi, Mareko	LCA, NR, NT
455007013	LCA	Pepee	1847	1 lo'i named Kuloko	LCA, NR, NT
455007029	LCA	Waioni	1833	lo'i in the 'ili of Ukiuki	LCA, NR
455007033	LCA	Waioni	1833	lo'i	LCA, NR
455007016	LCA	Ami	1843	2 lo'i in Kalema	LCA, NR

Table 6. Selected parcels within the Study Area with mixed land use, lo'i and other undetermined uses.

TMK	Mahele Land Type	Awardee/ Grantee	Reference Date for Lo'i	Land Use	Source
455006003	LCA	Nuku	1860	lo'i & pāhale	LCA, NT, Gr2625
455006001	LCA	Kaleikini	1851	kalo & dry-land area	LCA, NT
455006022	LCA	Pepee	1860	lo'i & pāhale	LCA, Gr1616 (c1860), Gr2684 (c1860)
455007006	LCA	Waioni	1833	ap2 lo'i & kula	LCA, NR
455006002	LCA	Kokokaia	1860	lo'i & pāhale	LCA, Gr1616
455006008	Grant	Wilcox, A	1857, 1860	"kalo lands" & kula	LCA387, LCA9070
455006008	LCA	A.B.C.F.M.	1855, 1857	lo'i & house/Mission "bounded by kalo" "along kalo patch" "kalo corner"	Gr2403, 2625

Calculating Acreage

There are thirty-two (32) Māhele-era parcels used as a sampling to establish rights to water (Table 5 and Table 6): five (5) Government Grant parcels, and twenty-seven (27) LCA parcels,⁷³ totaling roughly 45.82 acres.

Of the land parcels depicted in Figure 20 and Figure 21, we have established twenty-five (25) as being in solely lo‘i, or in kalo, in the early-mid 1800s (Table 5). Here are a total of 16.953 acres of solely lo‘i land use (Table 7). The additional seven (7) mixed use parcels inventoried in Table 6 are slightly more complicated for calculating acreage in lo‘i during the 19th century. The first five (5) kuleana parcels indicated a mixed use of lo‘i and pāhale or lo‘i and kula. For those, project staff generally subtracted at least 0.25 acres for the pāhale and/or kula portions.

A Government Grant (Grant 2685) to A. Wilcox (Table 6), was in kalo with some kula, but the extent of either was not established. The estimated acreage for the Wilcox Grant (Table 6), was calculated by gathering information relating to: 1) total acreage when the fee was created, 2) details on land use based on neighboring parcels, and 3) mapping onto the current field system to get a real world unit for measurement⁷⁴ (Figure 20). First, the original grant describes its boundary and approximate acreage as 15.5 acres. Second, details on the property’s use were available in neighboring LCAs and Native Testimonies. As was typical with these awards, several large neighboring awards to Grant 2685 reveal the use on lands on their boundaries (such as LCA 9280) as in lo‘i, in kalo, “kalo lands,” surrounded by kalo, etc.⁷⁵ Additionally, three (3) small LCAs describe their northern boundary as having kula.⁷⁶ Figure 20 depicts these kula lands on the map, they total 0.52 acres. Project staff summed up the remaining modern lo‘i fields, which are 10.5 acres. This is a reasonable estimate for lo‘i based on the extent of the ho‘i (including one farther ma kai at the bridge), the proximity of ditches to these lands, as well as testimonies explaining that there were lo‘i bounding their properties near or in the outer sections of the parcel. The research team notes that the system is equipped for more lo‘i than are in kalo or fallow rotations today. Moreover, when calculating the extent of cultivation, this property did not likely have a homestead on it, as the houselot for A. Wilcox was still on mission property in the ma kai section of the kalo lands where it stands today. Therefore, this extensive research yields a reasonable calculation of 10.5 acres of lo‘i, 0.52 acres of mixed kula, and a remaining 4.48 acres of mixed use within the Wilcox Grant. Mixed use could include lo‘i, kula, or other purposes.

The seventh parcel (Table 6) an LCA to the American Board of Commissioners for Foreign Missions (“A.B.C.F.M.”), includes a large lot that has mixed use of lo‘i, farming, and activities associated with the mission. The acreage for LCA 387 ‘āpana 2, to the A.B.C.F.M. was calculated using the same reference materials and methods as for Grant 2685. The A.B.C.F.M. LCA measures around 10.75 acres. Project staff know that the lot consisted of extensive lo‘i and included bounding ‘auwai because of the descriptions from the Grant document itself, LCA387:2, neighboring parcels, and historic maps.⁷⁷ Based on research into the mission,

⁷³ Three (3) LCAs from Wai‘oli ahupua‘a were found in the Buke Māhele, but were unlocated on maps. Project staff were not able to determine if these awards were near the ocean or within the Wai‘oli Lo‘i Kalo Irrigation System. They are: LCA 1001 to Levi, LCA 7670 to Kalili, and LCA 10659 to Puali.

⁷⁴ Many of the fields have changed little, some have merged or been separated, or the kuāuna have widened, but the field shapes and distributions align to the existing ‘auwai and still serve as a good measurement tool.

⁷⁵ Grant 2684, Grant 2403, and LCA 387:2.

⁷⁶ LCA 1031:2, LCA 9070:1, LCA 9833:2.

⁷⁷ Grant 2402, Grant 1616, and Grant 2685, RM 1680.

however, we know there was a church, out buildings, and other uses. We used the modern lo'i fields and calculated a total of 5.75 acres of lo'i and 'auwai. The remaining 5.00 acres is a conservative estimate for undetermined use, which could have also included more lo'i and 'auwai depending on the mission's needs.

Based on the research and mapping detailed above, we have determined that of the lands surveyed and depicted, these are the totals for land use:

Table 7. Analyzes the acreage for lo'i land use using the acreage of LCAs and Government Grants, which could have corresponded to locations of 'auwai as established in 1893 by RM1680.⁷⁸

Total Acreage	Acres in Lo'i	Land Use	Notes	# of Parcels
16.953	16.953	Solely lo'i	Lands with just lo'i land use as established above and based on LCA & Grant acreage	25
0.903	0.153	Lo'i and pāhale	Subtracting 0.25 acres/parcel for pāhale	3
1.712	1.212	Lo'i and kula	Subtracting 0.25 acres/parcel for kula	2
10.5	10.5	Lo'i	In Wilcox Grant 2685	1
0.52	0	Kula		
4.48	0	Other undetermined use		
5.75	5.75	Lo'i	LCA 387:2 A.B.C.F.M.	1
5.00	0	Other undetermined use		
~45.82	~34.57			32

This data yields a conservative estimate for lo'i in cultivation at the time of the Māhele on the parcels surveyed in this study (Figure 20, Table 5, and Table 6), as it is possible that the 4.48 of other undetermined uses in Wilcox Grant 2685 and the 5.0 acres of other undetermined uses in the A.B.C.F.M. LCA could have included more lo'i. In conclusion, in the study area in the Wai'oli ahupua'a alone, not including its sister watershed of Hanalei, at least **34.57 acres** were in lo'i kalo cultivation in the early-mid 1800s, with all the rights and access to water needed to irrigate those fields. Even with this reasonable figure, we note that the 1990 Hawai'i Stream Assessment identified Wai'oli Stream as one of only six throughout Hawai'i that historically supported more than fifty (50) acres of kalo.

Mānowai, Po'owai, and 'Auwai

In addition to looking at archival Māhele records, project staff examined historic maps to survey additional documentation of the 'auwai system. In 2019, research by the Office of Hawaiian Affairs' Specialist Wahine'aipōhaku Tong identified twelve kuleana LCAs that referenced this 'auwai.⁷⁹ The Wai'oli Lo'i Kalo Irrigation System is first depicted in part within surveys for Māhele documents between 1851-1852. Then, 42-60 years later, ahupua'a level maps were made by the Hawaiian Government Survey,⁸⁰ which depicted features of the Wai'oli Lo'i Kalo Irrigation System in relation to the larger landscape.

⁷⁸ Undetermined use area would have almost certainly contained portions of 'auwai and lo'i lands, but this is a conservative estimate based on existing data.

⁷⁹ Tong 2019.

⁸⁰ Hawaiian Government Survey was founded in 1870.

Table 8. Kuleana Land Commission Awards in Wai‘oli that are comprised of lo‘i and mention ‘auwai (from Tong 2019).

LCA No.	Awardee	Date	Description	Description
8037	Ami	1851	“Akahi loi”	“e pili ana i ka auwai ”
8261	Isaia	1851	ap1 “alua loi”	ap1 “e pili ana i ke auwai o Kaupaia/Kaupana”
9072	Keolo	1852	ap2 “aina kalo” ap3 “ehiku loi”	ap2 “E hoomaka ana ma ka auwai o Waioli”
9079	Kahookane	1851	ap1 “Na loi”	ap1 “e pili ana i ka auwai Kaupana”
9080	Kahooponopono	1851	ap2 “alua loi”	ap2 “E hoomaka ana ma ka auwai ” “e pili ana i ka auwai ”
9273	Kawahine	1852	ap3 & 4 “akahi loi”	ap3 “e hoomaka ana ma kahi auwai ” ap4 “e pili ana i kahi auwai ”
9275	Koenapuu	1851	ap 1-3 “akahi loi”	ap1 “e pili ana i kahi auwai ” ap3 “e pili ana i ka auwai o Waioli”
9276	Kiolea	1852	ap2 “aina kalo”	ap2 “e hoomaka ana ma kahi auwai ”
10096	Mareko	1851	ap2 & 4 “alima loi”	ap3 “e hoomaka ana ma ka auwai ” [apana was cancelled]
10308	Nalimanui	1852	ap1, 4, 5 “akahi loi”	ap1, 5 “e hoomaka ana ma ka auwai ”
10308	Nalimanui	1851	ap1, 4, 5 “akahi loi”	ap 1 “e hoomaka ana ma ka auwai o Waioli” ap5 “e hoomaka ana ma ka auwai ”
10959	Waioni	1851	ap2, 3 & 4 “akahi loi”	ap3 “e hoomaka ana ma ka auwai ”

The importance of placing the ‘auwai system in time, and in the same footprint as it is today, not only reaffirms, but proves the general cultural understanding that lo‘i are wetland fields, and that lo‘i kalo, wetland taro patches, were fed by these ‘auwai. Further, these ‘auwai would, in turn, have been fed by a po‘owai from a mānowai on a nearby stream; based on geography, it would have clearly been on Wai‘oli Stream.

The earliest map depiction of part of the system is from 1873 on Register Map 927 (Figure 22).⁸¹ Even though faint, one can make out the main curve of the ‘auwai system; it is in the same dotted line that defines the stream, curving around the base of Kamoo Koleaka. No other details were drawn of the system, this depiction of the main ‘auwai before the main split is the earliest outside of Buke Māhele claims.

An early Hawaiian Government Survey map, covering an area that ends within a few dozen feet of the po‘owai, notes the age of the integrated systems in Wai‘oli lo‘i kalo. Register Map 1680 (circa 1893) clearly depicts the main ‘auwai coming from the exact same location it does today, along the base of Kamoo Koleaka (same segment as on RM 927).⁸² This map even depicts the main split where the ‘auwai divides, with one branch flowing into the Wai‘oli ahupua‘a side of the system, and the other branch flowing into the Hanalei ahupua‘a portion of the system. The 1893 map and the GIS map are so similar, reflecting a system that has been in place for almost 130 years since the date that the map was made (Māhele documents establish an earlier date).

⁸¹ Gay 1873.

⁸² W. A. Wall, *Waioli Kauai*. Register Map 1680, 1893.

(Figure 24). This map establishes that the Hui's system is itself a traditional and customary Native Hawaiian resource and practice.

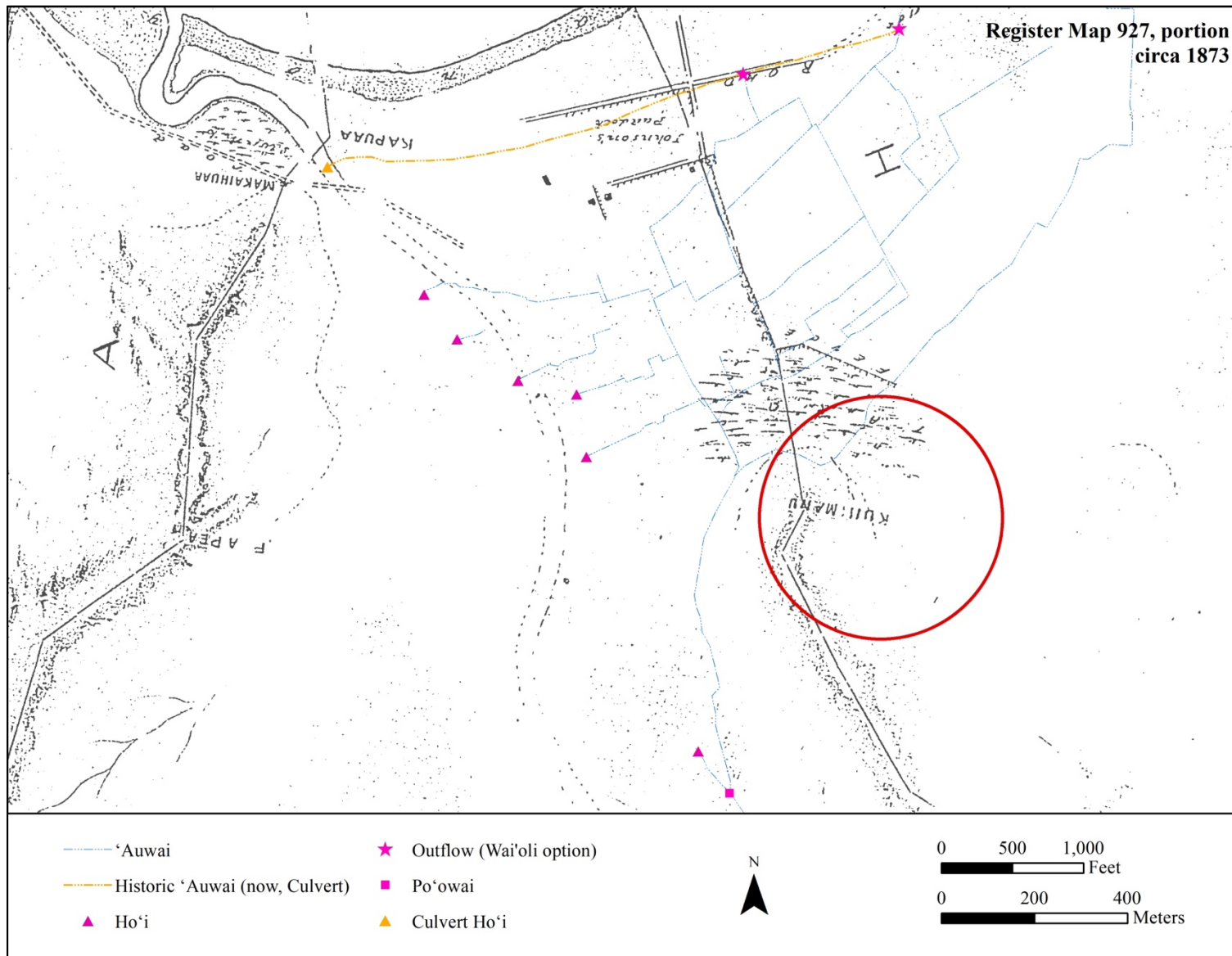


Figure 22. Detailed portion of Register Map 927, circa 1873. The red circle shows where a portion of the main 'auwai flows along the base of the ridge.

Register Map 1680

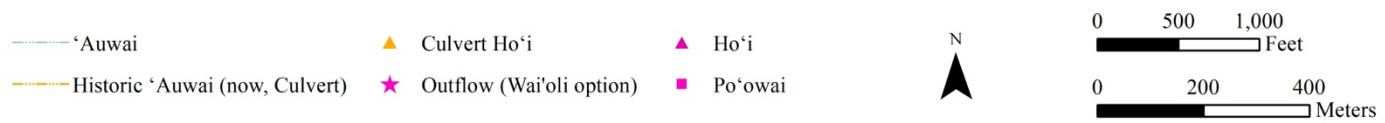
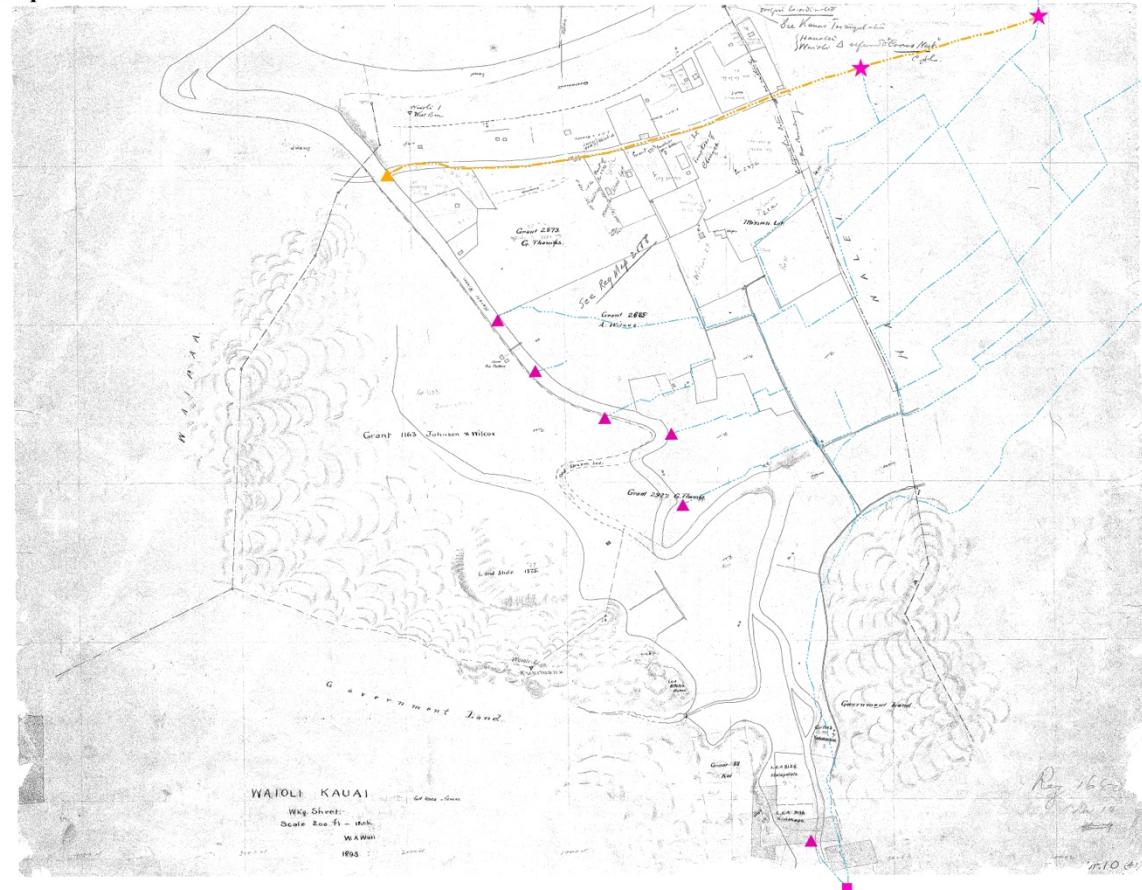


Figure 23. Register Map 1680, circa 1893, depicting the modern Wai'oli Lo'i Kalo Irrigation System over the same system depicted in 1893. Note that the 'auwai layer was not warped to fit this map, this is an accurate geospatial overlay

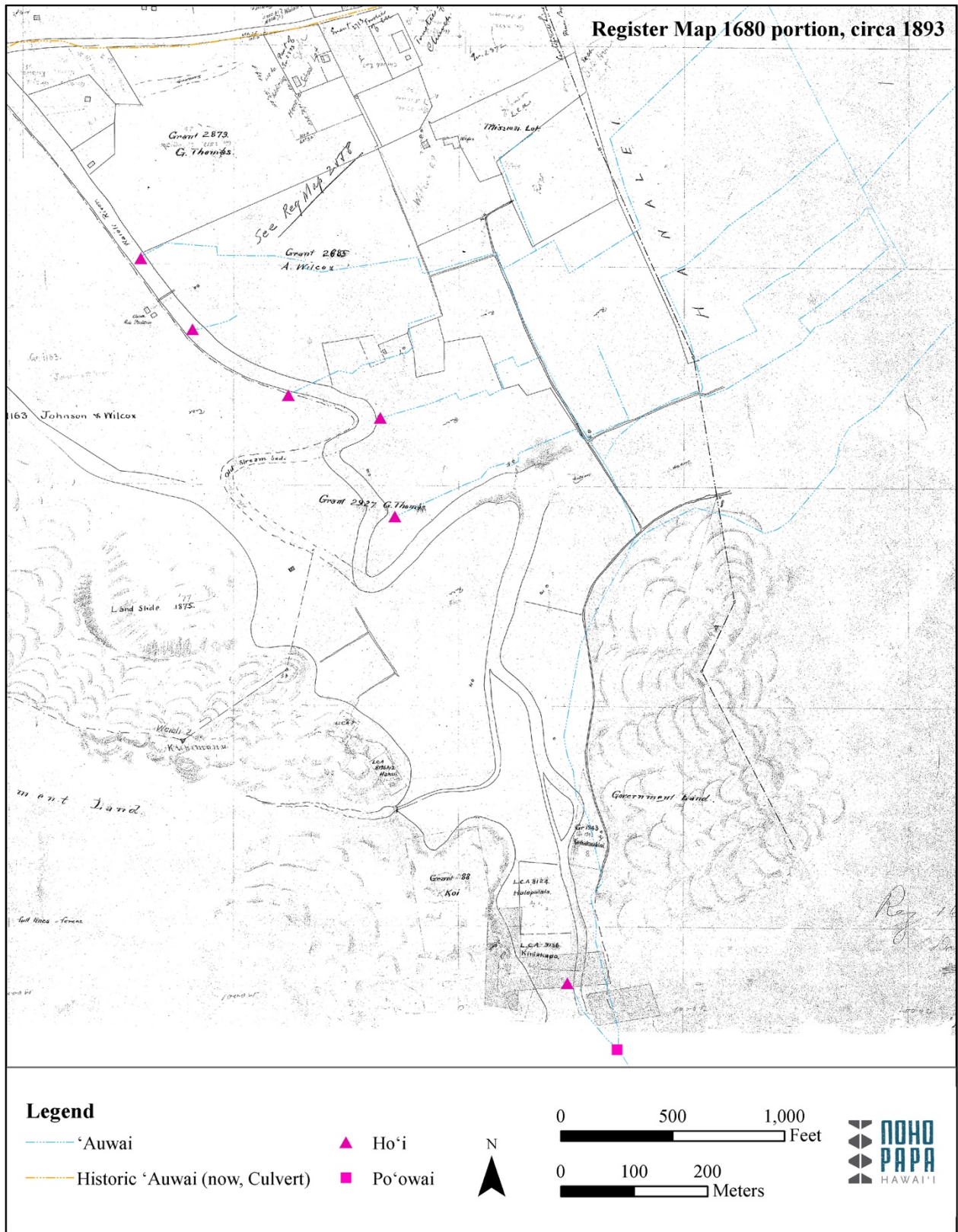


Figure 24. Portion of Register Map 1680, circa 1893, depicting the modern Wai'oli Lo'i Kalo Irrigation System over the same system depicted in 1893. Note that the 'auwai layer was not warped to fit this map, this is an accurate geospatial overlay.

Summary of Appurtenant Rights

Research for this section was based solely on primary source archival materials in English and ‘ōlelo Hawai‘i and the use of ESRI ArcGIS software to contextualize the geospatial locations of historic maps and land features.⁸³

Based on this research, project staff determined that, *at minimum*, 34.57 acres of the Wai‘oli Lo‘i Kalo Irrigation System was in lo‘i between 1830-1860, with all the rights and access to water necessary to irrigate those fields. The documentation provided is contemporaneous with the use of lo‘i on these various parcels today.

Historic maps establish that the ‘auwai system was partly surveyed and depicted 147 years ago, then in greater detail 20 years later. Using ESRI ArcGIS software to georeference old maps to their real world geospatial locations, project staff clearly established that the ‘auwai system has changed little over the last 127 years. In fact, these extremely early depictions confirm the existence of the mānowai and po‘owai per the extent of the ‘auwai system. When coupled with Māhele claims (discussed above), this attempt to quantify appurtenant rights to a sample acreage is reasonable based on an exhaustive survey of Māhele and other data.⁸⁴

All of this underscores the extent and interconnectedness of the Wai‘oli Lo‘i Kalo Irrigation System at the time of the Māhele. Comparing Figure 20 and Figure 24, it is remarkable how little the system has changed over the last 170 years. The Hui’s continued use of water from Wai‘oli Stream is grounded in both traditional and customary Native Hawaiian, riparian, and appurtenant rights, which have the highest protection under that law, as well as historic and contemporary instream and in-watershed use.

⁸³ Project staff did not attribute kalo or lo‘i use without examining multiple records. All cases of possible mixed use were noted and discussed in detail above.

⁸⁴ By the published date of Register Map 1680, the Office of Hawaiian Government Survey had only been in existence for 23 years.

Ethnography – Traditional & Customary Native Hawaiian Beliefs, Practices, and Resources

Methods

With the goal of identifying and understanding the importance of, and potential impacts to, Native Hawaiian historic and cultural resources and cultural practices of Wai‘oli, project staff conducted ethnographic interviews with community members who are knowledgeable about the Project Area. Utilizing a multi-phase study between August and October 2020, the ethnographic process consisted of identifying appropriate and knowledgeable individuals, reaching out to them with an invitation to participate, conducting oral history interviews in person, summarizing the digitally recorded interviews, analyzing the oral history data, and preparing a summary of findings (Summary of Community Ethnography).

Scoping for this project began with contacting knowledgeable individuals recognized as having genealogical, cultural, and/or historical connections to the project ahupua‘a and knowledge of watershed management, lo‘i kalo farming, and other traditional and customary Native Hawaiian practices, especially within the Project Area. Project staff selected participants who met one or more of the following criteria: 1) were referred to Nohopapa Hawai‘i; 2) possessed genealogical ties to the Project Area or vicinity; and/or 3) were considered Native Hawaiian cultural practitioners. Nine (9) individuals were contacted to participate, eight (8) individuals participated in the consultation process, and one (1) could not participate due to scheduling issues. Project staff then called and emailed individuals with a Community Contact Letter (Appendix D) to inform them of the project, followed up by telephone, and then met with individuals in person to discuss the project.

During the study, project staff learned that interview participants obtained their knowledge about the project ahupua‘a from three primary sources:

1. Knowledge and information passed on within the ‘ohana from one generation to the next.
2. Knowledge obtained from individuals outside their ‘ohana such as teachers, cultural practitioners, and kūpuna.
3. Knowledge gathered through personal observations and practices (such as knowledge acquired through cultural work and practices within the Project Area).

All of the individuals interviewed acquired their knowledge about Wai‘oli through personal experience or observations and from older family and community members who shared with them personal, historical, and/or genealogical information about Wai‘oli and the Wai‘oli Lo‘i Kalo Irrigation System.

The study utilized semi-structured interviews that followed a general script covering a pre-determined list of topics while allowing for open-ended discussion. The interviews were conducted in a “talk story” format to allow for a more informal dialogue and free-flowing sharing. Project staff utilized information gathered during the initial phases of archival research and scoping to construct the open-ended interview questions. The primary themes guiding the interviews included:

- ‘Ohana and individual connections and relationships to the area
- Mo‘olelo, place names, mele, oli, and hula
- Past and present cultural practices and protocols
- Knowledge of natural and cultural resources
- Traditional and historic land use and ownership
- Information about the traditional lo‘i kalo irrigation system
- Traditional and historic events affecting practice (‘auwai, rivers, storms)
- Concerns and suggestions regarding future management of this area
- What does water mean for kalo or kalo farming?

Project staff audio recorded each interview, and later transcribed and summarized some portions. Staff then sent the summaries to each interviewee for review, accuracy checks, and to confirm they were comfortable with the thoughts and information shared. Throughout the study, project staff remained committed to ensuring that the voices of community members were honored and respected, correctly heard, and properly conveyed.

Throughout the study, and particularly before any type of meeting or interview, project staff explicitly and carefully explained to all participants that involvement in the study was strictly voluntary. All participants completed a comprehensive informed consent process, which included receiving project background information, as well as the Participant Informed Consent Forms (Appendix E: Participant Informed Consent Forms), which notifies participants that they can choose to remain anonymous. After proper notification and discussion, some interview participants voluntarily provided verbal, written, emailed, and even texted consent for the researchers to use their mana‘o for this study. Throughout the project period, all participants had open access to the interviewer. All of the interviews were scheduled and arranged for the participant’s convenience, and none of the interviews or meetings were initiated until participants felt comfortable with the process. During the course of researching and conducting the ethnographic interviews, no sensitive or confidential information was revealed, and no confidential information was withheld from the current report.

Identification of Topic Areas

In Wai‘oli, many kūpuna and kama‘āina have maintained close connections to their ‘āina and have kept the stories and practices of their culture alive; continuing the cultivation of this Native Hawaiian cultural landscape since time immemorial. Ethnographic research for this report included conducting interviews with community members to record and acknowledge participants’ cultural and historical connections to the Wai‘oli Lo‘i Kalo Irrigation System.

The following sections include extended quotations from these in-person interviews as well as testimonies provided by some of our interviewees and other kalo farmers and submitted to BLNR in May 2019 and February 2020, organized by topic area. Four general themes emerged from the mana‘o shared during these interviews and from these testimonies: 1) Individuals’

Connections to the Wai‘oli Lo‘i Kalo Irrigation System; 2) Kalo Farming and the Wai‘oli Lo‘i Kalo Irrigation System; 3) Traditional and Customary Practices and Resources Dependent on the Wai‘oli Lo‘i Kalo Irrigation System; and 4) Concerns and Recommendations. The following sections explain these themes in greater detail.

Individuals’ Connections to the Wai‘oli Lo‘i Kalo Irrigation System

Project staff contacted nine (9) individuals regarding this CIA. Of the nine, eight (8) individuals participated in ethnographic interviews. The following section includes background information for each interviewee, including information on their ‘ohana and/or individual connections to Wai‘oli and Halele‘a, and their continuation of kalo farming.

Clarence Eli Kaona, also known as “Uncle Shorty,” was born in Honolulu and raised on Kaua‘i. He is a third generation kalo farmer in Wai‘oli Valley, 100% Native Hawaiian, and a member of the Wai‘oli Valley Taro Hui. He has been farming the same kuleana land in Wai‘oli since he was a young child. His grandfather farmed kalo in Hanalei Valley in the 1930s, and when he passed away, Uncle Shorty’s father took over and then acquired land in Wai‘oli Valley in the 1940s. Uncle Shorty went to Hanalei School and remembers walking from Hanalei up into Wai‘oli Valley to work in his father’s taro patch: “I’ll be 85 (years young) in November and all those years I’ve been working in the taro patch. This is the same kuleana that I continue to farm and that will be passed down to my daughter, JoAnne Kaona, and to the generations yet to come.” Uncle Shorty took over kalo farming from his father in 1987 and in 1989, filed a Declaration of Water Use with the Commission on Water Resource Management.

Diana Kahiki Spencer (“Aunty Diana” Kaona) is Uncle Shorty’s sister and was married to the late Charles Spencer. Like Uncle Shorty, she is 100% Native Hawaiian, was born on O‘ahu and raised on Kaua‘i, first living at Kalihikai and then moving to Hanalei with the family. Their mother, Miriam Puakina Nahulu, was born on Ni‘ihau and later adopted. Their father, David Kawika Kaona, was born on Hawai‘i Island, raised on Kaua‘i, and later started to farm kalo. For Aunty Diana and Uncle Shorty, growing kalo is a family tradition. Today, Aunty Diana has lo‘i kalo up in Hanalei Valley, about almost three acres where she continues to grind, plant, and weed.

JoAnne Kaona is the daughter of Uncle Shorty and a fourth generation kalo farmer. Her father has farmed their family kuleana along with a handful of other small parcels for decades. She is one of five children and is the only one who helps her father farm their lo‘i. For JoAnne, kalo farming defines her ‘ohana: “it is what we do.” She enjoys helping her father farm and has an appreciation for it as something special that they share together. Even in his 80s, her father still works hard as a kalo farmer and knows that the kuleana will fall upon her to ‘auamo (shoulder) when he is no longer able. She considers farming kalo her kuleana, a way to feed her community, and something that makes her happy. She explained, “After four generations of this work, it would be impossible for me to turn away from a practice that has been with my ‘ohana for so many generations. In fact, there is no other alternative for me, I just have to do it.”

Kimo Inanod was born on Kaua‘i, has lived in Wai‘oli Valley across from the Hanalei School his entire life, and is a fourth generation Native Hawaiian kalo farmer. Kimo is also an avid hunter, fisher, and gatherer, and regularly accesses the ma uka and ma kai reaches of the Wai‘oli Watershed to exercise traditional and customary Native Hawaiian rights and practices. He is intimately connected with this ‘āina and feels an obligation to ensure responsible use of this land and its resources. For Kimo and his ‘ohana, “this is about protecting and restoring our quality of life as Native Hawaiian practitioners and small family farmers.”

Lillian Watari grew up on the North Shore of Kaua‘i, living in Wainiha, then Kīlauea and currently in Wai‘oli. She shared “To say kalo farming has been a longstanding custom and tradition in our family would be an understatement. Growing up, I was the eldest of 5 children. As soon as we were physically able, we were out in the lo‘i helping our parents and grandparents maintain and cultivate the kalo. At such a young age, the commitment it takes to farm kalo was a burden I did not quite understand. Our lives revolved around the kalo’s needs. Our routine consisted of coming home after school, having enough time to grab a snack, and loading up the truck to head down to the lo‘i. Looking back now, the value of the lessons I learned working in the lo‘i is hard to put into words. I am proud of my family’s tradition of farming kalo and the person it has made me. It taught me the value of hard work and the importance of being able to spend time with nature.”

Lily Tai Hook (“Aunty Mieko”) was raised in Wainiha, later moved to Kīlauea and now lives in Kalihiwai. Her grandfather grew kalo in Lumaha‘i and her father (Allen Harada) also had lo‘i kalo in Wainiha. She has farmed kalo in many parts of the Halele‘a moku. Currently, she and her husband (Wilbert Tai Hook or “Ah Fook”) farm kalo up the river in Hanalei as well as within the Wai‘oli Lo‘i Kalo Irrigation System. These lo‘i are leased from Princeville Agriculture LLC. Just as she was raised in the kalo patch, her children were also all raised in the kalo patch.

Wilbert Tai Hook (“Ah Fook”) is married to Aunty Mieko. He has been planting kalo in Wainiha Valley since 1964 and now within the Wai‘oli Lo‘i Kalo Irrigation System.

Christine Kobayashi (“Aunty Chris”) and her ‘ohana have been living and farming in Wai‘oli Valley for three generations and over one hundred years. Her father was born in 1920 on the same land where she was born and raised and continues to farm today in Wai‘oli. Her father lived here and farmed throughout his life, as has Aunty Chris. When she was young, Aunty Chris would do simple tasks like pulling grass and harvesting. As her father got older, he spoke to her one day “realizing that there may be no one left to carry on and maintain our kalo farm. Though I never told him, it was at that very moment that I made the decision and commitment to take over the farm and carry on his legacy. I knew how much he and my mom had struggled to raise five children while farming, and I thought of all of his blood, sweat, and tears that had gone into clearing, preparing, planting, maintaining, and taking care of the kalo and the land. I thought: I can’t let all that he put into our farm be for nothing.” She currently farms about 3.5 acres of lo‘i.

In addition to the above named interviewees, eight (8) Native Hawaiian and/or kalo farming community members provided testimony to BLNR in May 2019 and February 2020. The information below describes their ‘ohana and/or individual connections to Wai‘oli and Halele‘a.

Demetri Rivera (“Dimi”) farms with Chris Kobayashi in Wai‘oli. Dimi farms about 5.13 acres of lo‘i, kuāuna (banks), and roads and has been farming kalo full-time for over 25 years.

Dwight Morishige is a third generation kalo farmer and has been farming in Wai‘oli Valley for over 40 years. He grew up in this community and learned how to grow kalo from his family, his father-in-law, and other farmers in this area.

Bobby Watari is a third generation kalo farmer and has been farming kalo full-time for the past 40 years. Farming kalo is Bobby’s life’s work and passion. He learned to farm from his father, who moved to Hanalei in the 1950s to farm kalo. Bobby cultivates the kuleana land that his family owns and leases other lo‘i from Wai‘oli Corporation. For Bobby, “Farming is so much more than planting and harvesting. We work hard to preserve the land for taro, and to steward

the lo'i kalo system that has been in place long before I started farming. In Wai'oli, we use a traditional Hawaiian water and lo'i system that researchers have documented as having been in place since before the arrival of Captain Cook in the 1700s. We are honored to be a part of the handful of farmers that continue this important practice – one that has been our way of life in Wai'oli for hundreds of years.” For Bobby, kalo farming is woven into his family life, “We enjoy and are proud of being able to farm as family. The vision I have of farming the same land with my wife, Lillian, stepson, Kaisen, and his kids gives me the strength needed to continue during these difficult times. Knowing our future 'ohana will have access to water and the access needed to maintain our water system would give me hope that they will be able to continue our family tradition of farming taro.”

Kaisen Carrillo comes from multiple generations of kalo farmers on both sides of his 'ohana. He is in his 20s, and a fifth generation Native Hawaiian kalo farmer in Wai'oli and Lumaha'i Valleys. He is one of only three farmers in Wai'oli younger than 35 years old. He shared, “I have just started my own family and I am raising my 3-year-old daughter to farm this land as well. I also have another child on the way [born in 2020] who I will also raise in the same way. They will be sixth generation Wai'oli kalo farmers.” He continues, “as difficult as things have been, I love what I do. This is my culture. It is what my family has been doing for generations. I feel a deep sense of pride and honor to 'auamo my kuleana and perpetuate this practice – especially now when many of my generation are becoming less interested in taro farming. To be honest, there are more lucrative ventures for some. But, what we do goes beyond monetary value; this is about kuleana. It is our way of life and we will continue to farm taro on these lands for as long as we are physically able.”

Nathaniel Temanu Tin-Wong is Native Hawaiian, comes from generations of farmers, and has family roots across Kaua'i. With a young 'ohana Hawai'i, he recently moved back to Wai'oli Valley to farm. He explains: “we strive towards a lifestyle devoted to exemplifying those values and traditions passed on to us by our ancestors: living with the land and farming kalo.” Although in relation to fellow Wai'oli Valley Taro Hui members, he is relatively new to farming, he understands the importance of growing kalo. He shared, “Farming kalo feeds not only my physical self, it feeds my na'au. My practice, as a kalo farmer, keeps me grounded, and without it, it is easy to get lost. I consider my practice and work important not only to my community, but to humanity as a whole.”

Reid Yoshida has had family in Hanalei for 125 years. His great-grandfather came to Kaua'i to work on the plantations and lived in Hanalei since the late 1800s. His grandfather was born in Hanalei in 1896, and Reid shared that he is fortunate enough to live in the same home that his great-grandfather finished building in 1933. In the 1920s, his great-grandfather started raising rice and then slowly started to plant kalo as a supplemental crop in the 1940s. By the 1950s, due to the competitive rice prices in California, he decided to leave that crop and move towards farming taro. For years, his grandfather continued to farm until his uncle eventually took over the farm. He described his childhood: “Growing up, I spent my time split between O'ahu where I went to school, and Hanalei where I spent my summer/spring breaks, long weekends, and holidays. Every time that I was in Hanalei, we always worked the farm. When my friends were out playing sports and going to the beach, we were either pulling grass, planting huli, or using the tiller to prep the fields.” Reid's family kuleana is the foundation for him continuing to farm kalo, “Many people have questioned my decision to walk away from my career as an engineer to farm taro, but I do it because it is gratifying. I do it because I am able to farm on the same land that my grandfather did and this gives me pride in what I do. I am carrying on my grandfather's legacy and it will not end with me; it will keep going.”

Sierra-Lynn Boro-Harada is a Native Hawaiian kalo farmer whose family has been farming kalo for generations. She was raised in the fields where she learned and grew to enjoy the culture of cultivating kalo, the various aspects of hard work, and how to have fun while working. Her dream is to carry on this tradition and lifestyle, and to teach her children and future generations of her family to love it as she does. She shares, “My love for farming is limitless – it is hard to put into words. The opportunity to love what you do, and do what you love, is an experience that I hold dear. It is priceless and I plan to continue my family’s tradition of farming here on the North Shore of Kaua’i.”

Wayne Tanji has been farming in Wai’oli Valley for over 30 years and currently leases 1.8 acres of land where, prior to the flood, he maintained seven (7) wetland kalo patches.

Kalo Farming and the Wai’oli Lo’i Kalo Irrigation System

This section documents the different aspects of Wai’oli Kalo Farming as shared by participants, specifically regarding 1) The Need for Flowing Water from the Wai’oli Lo’i Kalo Irrigation System and the Absence of Alternatives, 2) Changes to the Lo’i Kalo Irrigation System and Wai’oli Water Over Time, 3) The Importance of Maintaining the Wai’oli Lo’i Kalo Irrigation System, 4) Impacts of Heavy Rain and Flooding on the System and Lo’i Kalo, and 5) Supporting ‘Ai Pono and Sharing with the Community. These various facets of caring for the Wai’oli Lo’i Kalo Irrigation System demonstrate that this traditional system and the Wai’oli community are inextricably intertwined—that the system relies on the community to maintain it, and that the community depends on the system and the resources it supports to sustain cultural practices and put food on their dinner tables.

The Need for Flowing Water from the Wai’oli Lo’i Kalo Irrigation System and the Absence of Alternatives

The continuous flow of water is essential to grow wetland kalo. Without constant flowing water, this Native Hawaiian traditional and customary practice will be extinguished. Participants all noted that if they did not have enough cold, flowing water, their wetland kalo would not grow properly. Importantly, flowing water plays a vital role in maintaining the temperature of lo’i, which ultimately affects the growth and quality of the kalo. Participants shared their thoughts about whether there are other viable alternatives to the current ‘auwai system, and agreed that all other alternatives, including well water, would be impracticable. Moreover, stewarding this system – rebuilding the mānowai after floods and maintaining the ‘auwai – is part of these farmers’ Native Hawaiian traditional and customary practice of kalo farming in Wai’oli.

Kimo put it simply: “If you don’t have water, the taro isn’t going to grow. The grass is going to come out and overtake the crop. And you’re only going to have little bit taro or the taro is going to cook from the heat if there’s no water.” Wai’oli kalo is grown wetland because it is used for poi. This necessitates throughflow – having water flow into the lo’i and return to the river to carry heat away. Without “a constant flow of water . . . the water fill up and it just sits . . . and the water comes hot. So the taro matures faster. It won’t grow as good if you don’t have running water. Cold running water.” Kimo explained that water from the Wai’oli River is the lifeblood for both his lo’i kalo and his culture and way of life as a Native Hawaiian practitioner: “If something should happen to the Wai’oli ditch, there is no other source of water. That’s it right there. Pau.”

Demetri shared, “I know that you cannot farm wetland kalo without good, fresh, flowing water from the mountains. If there is a lack of water or inconsistent water, you will get lots of weeds growing and your kalo quality can be so bad, that sometimes, you just gotta plow under. If water

flow is low in the summer and the other hot months, the water is warm and the kalo will rot due to diseases and a poor environment. No sense plant.” Aunty Chris echoed the importance of maintaining optimal water temperature, “Taro wasn’t made to grow in hot, standing water or murky, mucky stuff.”

Aunty Diana reiterated the need for flowing water: “Water is the main thing we need. We need that Wai’oli water to flow steady.” She insisted there is no other alternative to flowing water from the mānowai. “As long as you have the water, that’s all you need, is water and your lima.”

Changes to the Lo’i Kalo Irrigation System and Wai’oli Water Over Time

Although the physical system itself has changed little over time, inhabiting the same footprint since at least 1893 (Figure 24), there was a period of about 50-100 years, when rice threatened to replace kalo in Wai’oli, and across Hawai’i. This shift never took hold in Wai’oli, and the Wai’oli Lo’i Kalo Irrigation System has been 100% back in kalo since the 1950s.

All of the interviewees mentioned at least one major shift in the system they could recall. No one remembered the main ditch or māno being in a different location, but Kimo did recall when a historic ‘auwai with a ho’i was later piped by the government, although it still runs to Wai’oli Stream (see Project Area maps). Aunty Diana remembered this same ‘auwai, when it was open, in front of the Hanalei School, “when get heavy flooding, the water is coming back the same place originally where it was.” Uncle Dimi has video from the 2018 flood and you can see the back flow of water flooding the side of the road where this old ‘auwai, now a drain, flows.

Several interviewees also noticed that the water has changed over time. For instance, Aunty Chris observed that “the water up mauka at the māno in the river is much warmer than it used to be when I was growing up as a kid” and described her efforts to make the water cooler by making her fields smaller. She also remembered that a drought sometime in the late 1980s or early 1990s caused diseases and rot in kalo plants because of warm water.

The Importance of Maintaining the Wai’oli Lo’i Kalo Irrigation System

Sustaining flow into and out of the Wai’oli Lo’i Kalo Irrigation System is essential to the health of the watershed and kalo. Participants all underscored the importance of maintaining the Wai’oli Lo’i Kalo Irrigation System, including the methods used to clean the different parts of the system and the potential effects of negligence. One collective theme throughout the farmers’ interviews was that maintenance of this system is a kākou effort.

Bobby shared, “Restoring and maintaining our existing lo’i kalo system is so critical, not only for my family’s livelihood and the livelihood of the other famers, but also to perpetuate our way of life and the community here in Wai’oli that we are all a part of. We use a mānowai, a traditional, Native Hawaiian breakaway dam, to take some water from Wai’oli Stream. That water flows through our ‘auwai, then into our taro patches, then back to either Wai’oli Stream or the lower reaches of Hanalei River. Like other taro farmers, we need throughflow, water flowing through our taro patches, but we don’t ‘consume’ water like most off-stream users because it goes back to the stream. All of our use is within the watershed where our water supply originates. So, any seepage, for example, also goes back to feed our water cycle in Wai’oli.” He continues, “Our responsible water use and efforts to maintain the watershed and stream system not only benefit us, but so many others. Having worked with these resources for generations, we take care of them and they take care of us. The maintenance work we do on the lo’i kalo system is not only

essential for productive crop yields, but it also ensures a healthy watershed and stream. Regular maintenance is critical to prevent blockages that might result in flooding.”

Uncle Shorty and Aunty Diana discussed how the farmers have always worked together to clean the ditch. Aunty Diana shared that hand clearing is the best method because “[t]here’s no road or anything. You have to walk along the side of the river” and that “[w]hoever owned property would go up because they used the same water. The water comes from the same place, the same ditch, and so all the farmers go up and work together.”

Kimo shared how farmers cleaned different sections of the ditch system, “To me, there’s a lower section and the upper section. The lower section, where everybody gets their immediate water. Usually like for me, I would clean from where my pipe intake stay, I would clean so far up, like to where Aunty Chris’ guys one cuts off. Me and my uncle usually clean all that probably 20 to 30 times a year. You just go and dig the silt out, cut the hau roots and stuff.”

Aunty Lilian, Ah Fook and Aunty Mieko agreed that when cleaning and maintaining the ‘auwai, the most difficult part is clearing the hau bush roots growing into the sides of the ‘auwai.

Aunty Chris stressed the necessity of cleaning the ditch regularly, “...the ditch system will deteriorate [if we don’t maintain it] and we have to take care of it. We got to go up there, take care of the invasive [species].” She also shared her experiences cleaning the ditch and the importance of maintaining tradition, “...it’s best if whoever shares that particular portion, that they help and they do it. I think in the old days, that’s how the system worked before. Going up to clean, they would clean at least couple times a year. It was a given all the way to the māno. You look at the pictures of how productive this place is, but we need to take care of it, you know? It might be just a few families that do this, but it’s part of the culture of this place.”

Impacts of Heavy Rain and Flooding on the System and Lo’i Kalo

In addition to regular maintenance of the irrigation system, the Hui also comes together in times of heavy rain and flooding to check on and repair the system, on which they all depend.

Demetri shared, “As a Hui, we have been maintaining the mānowai, po’owai, and ‘auwai on a regular basis and especially during times of emergencies, which happens to be every time there is a big rainfall. In the winter months, we brace ourselves for big rains and storms, hoping that there won’t be any more flooding. The 2018 flood, however, was really unlike any other rainfall event we’ve seen. We need to restore the māno, clear the stream of debris, and fix the ‘auwai quickly, so that we will have enough water to start planting again. Other farmers in our Hui are also not getting as much water as they currently need, and summer is almost here. Having low water flow will further limit the amount farmers can plant and produce.”

Uncle Shorty talked about the devastation of the 2018 flood, “In all of my years here in Wai’oli, I have never seen a flood like that. The damage was devastating. It ruined my equipment and tools, most of the banks that border my patches, and the ‘auwai. The ‘auwai needs further maintenance and restoration. The mānowai that feeds the ‘auwai was completely destroyed. This led to a lack of water that has suffocated our ability to continue farming at the capacity needed to feed our families.”

JoAnne also shared about the effects of the 2018 floods on the entire ‘auwai system, “After the 2018 floods, our mānowai, po’owai, and entire ‘auwai system were completely devastated. Our river changed course and some suspect that it was due to a thousand-year flood event. Of the 3.5

acres of kalo that my ‘ohana normally farms, we are now able to farm only 2 acres. A year after the floods, and for the first time in my father’s decades of farming, he was not able to produce any kalo. This was due to many factors, including a shortage of water due to damage to our mānowai and ‘auwai, equipment ruined by the floods, and debris and silt clogs in our lo‘i. Nevertheless, we Wai‘oli farmers have persevered together through all of these challenges because of our kuleana to our community and our love for farming.”

Aunty Chris shared that they are not on a regulated water system which is often unpredictable and that flooding impacts their lo‘i and future use, “So there’s these two fields that are down there that we never farmed long time purposely because we had to throw both fields away. It was impacted from the floods. We would harvest and then the thing was so loli. Because it got flooded. It’s almost like being a farmer, it’s hard to keep taking the same risks as we get older and older.”

Supporting ‘Ai Pono and Sharing with the Community

Kalo is the staple food of a traditional Hawaiian diet, and making and eating poi is a cultural practice. The farmers all support the perpetuation of ‘ai pono, or the eating of traditional foods, by sharing and giving kalo away as well as sending it out to be made into poi in the neighboring ahupua‘a of Waipā, across Kaua‘i, and the pae ‘āina. Participants shared their experiences preparing, eating, and sharing kalo.

Aunty Diana highlighted the need for kalo and the different ways it can be prepared, “That’s our staple food. We need poi. We need taro. One thing about taro, you can cook it anyway you like. You can eat by itself. You can bake it. . . We make stew. I make patties. I grate them and then I put condensed milk and then I put meat and then deep fry it. That’s my father’s recipe.”

All participants shared about the many varieties of kalo grown in Wai‘oli over the years, and described their favorite varieties. For instance, Aunty Meiko and Ah Fook favor the Kāi variety; Aunty Lilian hopes the Kaua‘i Lehua and Pi‘iali‘i varieties come back. Aunty Chris grows over 20 Hawaiian varieties “to see how they grow in this environment in the field, in the lo‘i. And you can just see side by side growing them, which ones are strong and which ones don’t seem to be too strong, but we just keep growing it to see, give them a few seasons to grow and see what comes out of it.” The table below is an inventory of some of the kalo varieties grown by the Hui at the time of this study.

Table 9. Inventory of kalo varieties cultivated by the Wai'oli Valley Taro Hui.

Hawaiian Kalo Varieties	Non-Hawaiian Varieties
1. Elepaio Hauliuli	25. Bun Long
2. Eleele Makoko	26. Faa Fausi
3. Eleele Naioea	27. Iliuaua
4. Kapaalooa	28. Paakala
5. Kaiala	29. Palau var.
6. Kaikea	30. Number 6
7. Kaiuliuli	
8. Lehua Maoli	
9. Lehua Palaii	
10. Lauoloa Eleele Omao	
11. Lauoloa Palakea Eleele	
12. Lauoloa Palakea Papamu	
13. Lihilihimolina	
14. Manalaulooa	
15. Manaulu	
16. Manini Kea	
17. Manini Owali	
18. Manini Uliuli	
19. Maui Lehua	
20. Nihopuu	
21. Paakai	
22. Piko Keokeo	
23. Uahiapele	
24. Moi	

They also highlighted the importance of sharing and feeding the larger community. For instance, Aunty Lilian allows people to pick kalo leaves from her lo'i for special events and Aunty Diana enjoys giving kalo away to family and people visiting from other islands. "It wasn't to make money. We just help people. It was fun." Aunty Chris described the "balance between growing food for ourselves and supplying good kalo to small poi millers who make poi or pa'i'ai for their communities; to 'āina-based programs on different islands who teach and bring together many young children; and to students and families who do traditional ku'i with their traditional food. It has been a heartfelt honor to have been part of this and we hope to continue to be a source for these friends and others."

Bobby also spoke about giving to the greater community, "We feed our community by supplying this staple to small non-profits like the Waipā Foundation and others throughout Hawai'i. My son Kaisen also provides lū'au leaf so local families can again make laulau and other Hawaiian food."

Dwight shared, "This community has always been close and centered around kalo cultivation. Kalo is a very nutritional food that we grow right in our own town. Culturally, it is important for our younger generation to continue farming."

JoAnne echoed that sentiment, "Farming kalo teaches us how to act; it teaches us how to mālama our 'āina. In my work at the Waipā Foundation, a non-profit in the neighboring ahupua'a, I work with children and teach them about aloha 'āina, sustainability, natural resource management, and traditional and customary Native Hawaiian practices. I see it as an opportunity for me to instill a

sense of kuleana in this younger generation to take the teachings of our kūpuna and apply them to our practices today.” She continued, “A mission of the Waipā Foundation is to create a healthier community by educating our people about an Indigenous diet while also keeping it affordable. One way to maintain this is by ensuring that our community has local kalo and poi to eat. The Waipā Foundation gets 90% of our kalo from the Wai‘oli farmers, including my father. The Foundation processes kalo and poi at our certified kitchen with volunteer labor and provides pa‘i‘ai for our community, at or below cost. For example, Waipā’s pa‘i‘ai price for kūpuna is \$1 per pound.” Last she shared, “Within the greater scheme of things, I see my own kuleana as helping to sustain a healthy lifestyle for our entire community, from keiki to kūpuna. We in Hanalei, and more particularly the farmers in Wai‘oli, have been blessed to be able to farm kalo on ‘āina that has been stewarded in this same way for many, many hundreds of years. The ‘āina is well-suited for wetland kalo cultivation and the ‘ohana who have been farming, like my own, for multiple generations, have taken on this kuleana to ensure that accessibility to our lāhui’s most basic and essential food is met. This heavy kuleana is a burden to carry, especially when our water needs are not met.”

Native Hawaiian Traditional and Customary Practices and Resources Dependent on the Wai‘oli Lo‘i Kalo Irrigation System

Participants detailed important resources and cultural (e.g., subsistence) practices reliant upon them in the Project Area. In addition to kalo, participants identified the type of resource(s) collected, their location in relation to the Wai‘oli Lo‘i Kalo Irrigation System, and the practices and methods associated with those resources or the protocols observed. The most prevalent subsistence practices in Wai‘oli mentioned during the interviews include 1) Fishing, 2) Hunting, and 3) Gathering. Note that while religious or spiritual practices were not a focus of this study, they persevere. For example, some gather fresh water for ho‘okupu (offering) and others mentioned the importance of pule (prayer). Apart from established traditional and customary Native Hawaiian practices, because many endemic and endangered manu (birds) are also dependent on the Wai‘oli Lo‘i Kalo Irrigation System, participants also shared their 4) Manu Interactions.

Table 10. Inventory of traditional and customary practices and resources dependent on the Wai'oli Lo'i Kalo Irrigation System.

Traditional Cultural Practice	Cultural Resource	Area/Location in Wai'oli System	Shared by
Lawai'a (Fishing)	'o'opu	'auwai	Kimo Inanod
		in stream	Diana Spencer
	wī	in stream / ma uka	Kimo Inanod
	prawn	'auwai and in stream	Kimo Inanod, Diana Spencer
	'ōpae	muliwai (stream mouth)	Kimo Inanod, Diana Spencer, Joanne Kaona
	'anae (mullet)	stream	Kimo Inanod, Diana Spencer, Shorty Kaona, Ah Fook Tai Hook
	Samoan crab		Ah Fook Tai Hook, Kimo Inanod
	hinana	muliwai	Kimo Inanod
Gathering & Lawai'a	'ohe (bamboo) to make trap	ma uka	Diana Spencer
Gathering	pōhaku to make papa ku'i 'ai	ma uka along stream	Diana Spencer, Shorty Kaona
	wai, for ho'okupu, i.e. for Makahiki	ma uka	Nathaniel Temanu Tin-Wong
	maile		Kimo Inanod
	mokihana		
Gathering & Lā'au Lapa'au (Hawaiian medicine)	'ōlena	ma uka & along lo'i kūauna	Diana Spencer, Christine Kobayashi
	koali	Wai'oli	Kimo Inanod
	kukui	ma uka	Kimo Inanod, Diana Spencer, Shorty Kaona
	noni	ma uka & along kuāuna	Kimo Inanod, Diana Spencer, Christine Kobayashi
	nī'oi	along kuāuna	Christine Kobayashi
	lā'i (ti leaf)	along kūauna & Wai'oli	Christine Kobayashi, Lilian Watari, Mieko Tai Hook, Kimo Inanod, Diana Spencer
Lei	palapalai	ma uka	Lilian Watari
	nā'ū (native gardenia)		Mieko Tai Hook
	hāpu'u		
Mea'ai	pepeiao	along kuāuna	Mieko Tai Hook, Lilian Watari
	'uala		
	mai'a		
	'ulu		
	kō		Christine Kobayashi
Hunting	pua'a	ma uka	Kimo Inanod, Glenn Kobayashi (per Christine)

Fishing Practices

Participants detailed a wide range of traditional and customary fishing practices within Wai'oli. They also documented the change in fishery resources and practices over time, including where species occur (or occurred), what was caught where, and in what quantities. It is worth noting that the Hui recently drafted a community-based watershed management plan in partnership with DLNR to better steward and restore these ma uka and riparian cultural resources.

Kimo shared about his family practice of catching 'o'opu in the 'auwai and river. He recalled seeing hinana "down at the river mouth" when he was young and observing an abundance of baby 'o'opu with his grandparents. When asked about present day 'o'opu fishery and fishing practices he noted, "'O'opu definitely not as much as before in this river [Wai'oli]. Definitely. From when I was young until now there's a definite depletion of that. And really I don't think, here in the Wai'oli system, it's from overfishing. Because there's not too many guys that go in this river." When asked about other fishing practices in certain parts of the river, Kimo shared, "We used to go to the river mouth and catch the transparent 'opae. We would catch mullet, Samoan crab, all in Wai'oli River." When asked about any differences in fish populations over time, Kimo also said, "I would say maybe the lower section from the ocean, maybe up to the bridge, might be overfished. You know what I mean? I mean Samoan crab is actually invasive so get plenty people do that kind of stuff. Mullet, always get plenty. I don't really think too many people eat mullet, āholehole, and that kind of stuff."

Aunty Diana also reminisced about catching 'opae and 'o'opu and making kahe, which is "like a ramp made with bamboo. When the water goes over, it goes through the bamboo and the fish get stuck on the bamboo." Aunty Diana said today, "Now no more that kind of fish anymore. Now its tilapia, not 'o'opu. Now there's prawns and no 'opae. It's not like how it used to be before."

Aunty Lilian shared that the ditch once had an abundance of 'opae, but now "You can hardly find 'opae." Another practice she shared was "only take enough to eat. Don't take and then waste."

Hunting Practices

Hunting in Wai'oli is focused on the feral Hawaiian mountain pig. Pig hunting is a cultural practice for at least two kalo farming families in Wai'oli, and is also an important part of how the kalo farmers manage the Wai'oli Watershed and control the invasive ungulate population. Both participants explained that they never sell the meat, only share it with their families and others, as was taught to them.

Kimo described hunting and gathering in Wai'oli Valley during his childhood, "From when I was probably 10, 11, I started to hunt with my grandpa and my dad guys back here [mauka Wai'oli]. But basically, only get mountain pig back here for hunt in Wai'oli. My grandpa was the first, then my uncle and my dad, and then me. So third generation for hunting."

Aunty Chris shared about hunting pigs, a practice her brother continues today and her father used to do before he passed. Aunty Chris values hunting because the pigs have a negative impact on the lo'i; she explained that pigs love kalo, especially the Hawaiian varieties. "The pigs come, you lose your whole crop. You wait six, seven, eight months or however long. And then it's all taken away overnight." In trying to prevent pigs from ruining crops, Aunty Chris says they hunt them or set traps on their land.

Gathering Practices

Participants described gathering cultivated and uncultivated resources in ma uka portions of Wai'oli and along the kuāuna for a range of practices, including lā'au lapa'au, making lei, and subsistence. They also documented previous generations' practices and the change in gathering activities and resources over time.

For example, Kimo shared about plants his 'ohana would gather in Wai'oli Valley, including maile, kukui, and koali. He shared that his grandmother would gather “[f]rom the taro patch, on the banks. Used to have and she used to go pick. The noni leaf my grandmother used to put same thing like for boils or if I get something infected, they would use that. The kukui nut when you get sick, they put them in your mouth. The sap.”

Aunty Diana also described gathering kukui and noni for lā'au lapa'au up ma uka and how “every Saturday my mother used to give us kukui.” She recalled growing ti, or lā'i, near their lo'i when she was young and that her father grew other lā'au for food and medicine, “My father used to have a garden up there [Wai'oli]. He planted some vegetables. Beans, onion . . . lemongrass, 'ōlena, noni.”

Aunty Chris shared about the different plants she cultivates, along with their uses, along the kuāuna banks between the Wai'oli Stream and the whole lo'i kalo system, including noni, nī'oi, 'ōlena, 'uala, and kō.

Aunty Lilian and Aunty Meiko also plant and use ti from Wai'oli. They also grow mai'a (banana) and 'ulu (breadfruit) on the kuāuna. Up ma uka Aunty Lilian gathers palapalai to make lei and Aunty Meiko also looks for hāpu'u, nā'ū (baby gardenia), and pepeiao.

Manu Interactions

Habitat loss and degradation have perhaps been the most pervasive threats affecting many endemic bird populations across Hawai'i. As participants shared, many of these endemic birds (some of which are federally listed endangered or protected species) frequent their lo'i within Wai'oli. These manu rely on the Wai'oli kalo fields for habitat, utilizing the alternating stages of watered and fallow kalo fields during a season of cultivation. The many fields that make up the Wai'oli Lo'i Kalo Irrigation System can be considered pu'u honua (refuge) for several endangered endemic Hawaiian waterbirds.

The nēnē, or native goose, is not a waterbird, but is a federally protected species. From the kalo farmers' perspective, the nēnē are so abundant within this area that they are almost considered pests; like the mountain pig, nēnē like to eat kalo. For example, Kimo sees so many endemic manu at his lo'i kalo, he joked about how many there are, “You get Hawaiian stilt, every day. Nēnē goose, every day. The coot ['alae 'ula], every day. The 'auku'u, I see it every day. Koloa duck, every day. They're not endangered. They can take them off the endangered list, for sure.” More seriously he said, “they live there. Or they make their route through my lo'i and what not.”

Aunty Diana, JoAnne and Uncle Shorty have all observed nesting nēnē, 'alae 'ula, and 'ae'o within the Wai'oli Lo'i Kalo Irrigation System.

Aunty Chris had a nesting pair of 'ae'o in one of her lo'i kalo this year, two hatchlings successfully fledged and have been seen in the nearby patches of two other kalo farmers.

Ah Fook also emphasized the abundance of birds in the area and their reliance on this habitat, “I don’t care where you plant taro, the birds are going there. Where get water, they like and they know what kind of fish; and [koloa] ducks around.”

Concerns and Recommendations

Potential Impacts of No Water or Tampering with Water

Participants shared their thoughts about the potential impacts of not having any or enough water and of others tampering with the current water system. For the farmers, any threat to water flowing into the mānowai and through the irrigated lo’i kalo system is a serious concern.

Reid expressed the difficulties in recovering from the 2018 floods, “After the devastating floods in 2018, our small taro farming community has struggled. The damage to our water system has created a lot of stress and has left many of us wondering if there is even a future for taro farming in Hanalei. Immediately after the flood, our water supply was completely cut off. Luckily, we were able to restore some flow to our system, which allowed us to continue farming, but in no way was the volume close to what it was during pre-flood conditions. Over the last couple of years, we have continued to have weather events that cut off the water supply because the overall system was so heavily damaged. This has compounded problems as the low water flow has made it hard for me to replant as much as I would like, which in turn makes it even harder to recover from the April 2018 flood.”

Kimo also described what could happen if the system was shut down or “if the State would stop it, I would say within two, three weeks, maybe a month, your crop is dying. Probably 70% would be lost because all your young ones [kalo] up to like six, seven months would either be total loss or the younger ones would probably be total loss, if you cannot get water. ... [it] would probably take two years or three years to restart and to get back to normal. If water would stop even for that long.”

Uncle Shorty, Aunty Diana, and JoAnne shared their thoughts about the potential impacts of not having enough water. Aunty Diana warned that without sufficient water, the grass would start growing. “The kalo needs water. They get dryland kalo, too. But the kalo still needs water. Without water, you won’t be able to have good taro.” JoAnne summed up the importance of water in Wai’oli succinctly: “No water, no farming. No farming, no food.”

Both Kimo and Aunty Diana talked about one event, 20 or more years ago now, when someone tried to tap the main ‘auwai directly, which cut off the farmers’ water. To fix it the taro farmers hauled in materials and hand dug and patched the system. Kimo recalled that when the system was tampered with, there was a big flood which “blew out our whole ditch. So if guys do that illegally or try and tap in without doing it properly, stuff like that can happen again.”

Ensuring the Community’s Cultural Identity Perseveres

Several participants observed rapid changes in the community in recent years, especially the stresses of tourism and development on traditional ways of life, like kalo farming.

JoAnne shared, “we were blessed to have been afforded a lifestyle that allowed us to enjoy the luxuries of knowing the amenities of our ‘āina. I see the kids that I work with every day and they are consumed with technology and have little opportunity to experience our ‘āina like I did while growing up. Our Hanalei is not the same anymore; I don’t recognize the same safe community

that I grew up knowing, and often feel frustrated because our town has become so crazy and inundated with faces that are not kama‘āina. The shops and restaurants that cater to tourists sit only a few dozen feet across the road from illustrious lo‘i kalo, which give our Wai‘oli its joyful name.”

Nathaniel also highlighted that “Despite the rapid changes in our community on Kaua‘i with regard to tourism and the slow, but steady, change in demographics, it is important for me that [others] know that ‘we are still alive’ and that ‘we are still here.’”

Bobby noted that “Our network of farms is also under threat from people who want to use the land differently. Wai‘oli is so beautiful and we have so many who bought land in our community and are now trying to build illegally. It’s dangerous when they are building illegally upstream from our lo‘i because they contaminate the water that feeds our fields and the larger community.”

Kimo observed that “Kaua‘i’s North Shore has changed dramatically in recent years, and [our] sleepy farming community has been transformed into a bustling tourist destination and construction zone.” While a long-term water lease will not repair the mānowai, lo‘i, or equipment devastated by the 2018 historic floods, it “will provide an important assurance and semblance of hope that we will be able to persevere into the future and maintain this way of life for our children and the generations yet to come.”

Aunty Lillian remarked, “we are resilient, and just want to be able to get back on our feet and continue to practice the culture we love in our small community. Hanalei has changed so much over the years. Yet, what holds together the identity of our community is the kalo farming that has been here since the beginning of time in these islands. It is a true testament to our community that we work together and help each other get through challenges like this. We are proud of who we are and what we do, and hope to continue to pass down this tradition to future generations.”

Summary of Community Ethnography

Participants in this study all share a deep connection to and love for Wai‘oli and kalo farming, many coming from generations of kalo farmers. All are committed to perpetuating this cultural practice, providing for the community, and farming the same lands as their kūpuna.

All participants expressed that the continuous flow of water in the Wai‘oli Lo‘i Kalo Irrigation System is absolutely necessary for the perpetuation of kalo farming and the many traditional and customary Native Hawaiian practices that depend on the maintenance of the system and the overall health of the watershed. We learn that this system is an intimately interconnected one, and because of this, has changed very little over the last several centuries. The farmers consistently restore the mānowai, clear the stream of debris, and fix the ‘auwai. This monitoring and maintenance is a vital part of their cultural practice; they actively mālama the watershed, and not just during and after storm events. Cleaning and maintaining the Wai‘oli Loi Kalo Irrigation System is a community practice; it is when families gather and share time, food, and fellowship.

Damage caused by the heavy rains and flooding in 2018 continue to impact the farmers’ ability to grow kalo. Lastly, all participants highlighted that they take pride in feeding the larger community and supporting ‘ai pono, either through sharing kalo with other ‘ohana or providing kalo to small community-based non-profit organizations.

Participants identified several historic and ongoing traditional and customary practices in Wai'oli, including fishing, hunting, and gathering. Many of the resources gathered are located not only within the Wai'oli Lo'i Kalo Irrigation System, but are also dependent on the healthy flow of the stream above and below the intake and out-takes. Other types of species dependent on this system, as shared by participants, include some federally listed endangered or protected manu who rely on Wai'oli's lo'i kalo for shelter, feeding, and breeding habitat.

Participants were concerned about sufficient water availability in the future, including the potential effects of not having any or enough water and of others tampering with the current water system. Because kalo farming is a communal system, tampering or removing water has the potential to harm everyone farming within this system, leaving folks without enough water, losing crops, and leaving the entire community without a food source. They also worried about their ability to continue kalo farming in Wai'oli without the water lease. Lastly, many participants shared concerns about the rapidly changing landscape in Hanalei, including stresses due to tourism and overdevelopment.

Summary and Recommendations

Wai'oli Valley and its Lo'i Kalo Irrigation System have a deep history of abundance; an abundance that flowed from the Wai'oli Stream and fed an intricate system of irrigated fields that have been cultivated continuously for hundreds of years. From 1834 to the present, the continuous flow of water through the Wai'oli Lo'i Kalo Irrigation System has been unusually well documented. A detailed survey of the body of the 'auwai system, in the same footprint as it exists today, was mapped 127 years ago.⁸⁵ A photograph from the slopes of Kamoo Koleaka shows the entire Wai'oli plain in irrigated kalo cultivation 128 to 130 years ago. The earliest depictions of water in the Wai'oli Lo'i Kalo Irrigation System appear on a map surveyed and drafted 147 years ago.⁸⁶ Surveyed depictions of the 'auwai and recorded descriptions and testimonies of lo'i kalo in the Wai'oli System, by Hawaiian farmers, date back 169 years.⁸⁷ The written history of Wai'oli and records of irrigated kalo extend back 185 years.⁸⁸ This research reveals not just the presence, but the abundance, of irrigated lo'i kalo cultivation for hundreds of years in this specific area.



Figure 25. Photo taken in 1890-1892 from Kamoo Koleaka, looking out across the Wai'oli Lo'i Kalo Irrigation System.⁸⁹

⁸⁵ W. A. Wall, Register Map 1680, 1893.

⁸⁶ James W. Gay, Register Map 927, 1873.

⁸⁷ Buke Mahele.

⁸⁸ N. Keoahu, *Waioli Kauai Ian 23, 1835*, Ke Kumu Hawaii, 15 April 1835.

⁸⁹ Photo Courtesy of Wai'oli Mission Collection, negative in possession of David Forbes, photo circa 1890-1892. Also in the Bernice Pauahi Bishop Museum archives collection, Kaua'i, Hanalei, pre-1900, folder 2, CP 96254.

This study documents the unique history of Wai‘oli and the many Native Hawaiian traditional and customary practices that depend on the Indigenous irrigation system, both to the Hui and the greater community.

Cultural Resources, Practices, and Beliefs Identified

This report identified numerous cultural practices that rely on the continued health of the Wai‘oli Lo‘i Kalo Irrigation System. Both the Ethnohistorical and Ethnographic research undertaken in this study have established that 1) wetland kalo is central to Native Hawaiian cultural identity, beliefs, and practices; 2) the management of the Wai‘oli Lo‘i Kalo Irrigation System is, in and of itself, a traditional and customary Native Hawaiian practice; 3) cold stream water from the mountains, constantly flowing through the system, is critical to the cultivation of wetland kalo as well as the traditional and customary Native Hawaiian practices that depend on it; 4) many lo‘i kalo were in cultivation at the time of the Māhele and retain appurtenant rights, which have a high level of protection under Hawai‘i’s Constitution and Water Code; and 5) the existing lo‘i kalo irrigation system is the best and only option for the cultivation of wetland kalo in Wai‘oli. Without a long-term water lease ensuring water flow to the lo‘i kalo, it would be incredibly difficult, if not next to impossible, for the Hui to continue growing wetland kalo in this area. For the first time in 400 years or more, a continued connection to place and practice would be severed.

Potential Effects of the Proposed Action

All participants concluded that the Proposed Action would produce significant beneficial impacts on Native Hawaiian traditional and customary practices as well as the natural systems and species that they are reliant upon.

The extensive research and community interviews conducted indicate that a “No Action” Alternative to the Proposed Action does not exist. There is no viable alternative to Wai‘oli Stream water, and the continuous flow of fresh water is necessary for the cultivation of kalo, which feeds the larger community. The No Action Alternative would therefore violate the State’s duties under Article XI section 7 to “assur[e] appurtenant rights and existing correlative and riparian uses” as well as under Article XII section 7 to “protect all rights, customarily and traditionally exercised for subsistence, cultural and religious purposes and possessed by ahupua‘a tenants who are descendants of native Hawaiians who inhabited the Hawaiian Islands prior to 1778[.]”

In sum, Nohopapa Hawai‘i recommends that a long-term water lease would enable Hui members to continue providing for the larger community through kalo farming, restoring the health of the stream and watershed, and perpetuating vital cultural practices, passing them on to future generations.

Kalo kanu o ka ‘āina. Taro planted on the land. “Natives of the land from generations back.”⁹⁰

⁹⁰ Pukui, No. 1447, 1983: 157.



Figure 26. Nathaniel Tin-Wong with his daughter Poliahu, planting her first huli.

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Appendix A: Guidelines for Assessing Cultural Impacts

INTRODUCTION

It is the policy of the State of Hawai'i under Chapter 343, HRS, to alert decision makers, through the environmental assessment process, about significant environmental effects which may result from the implementation of certain actions. An environmental assessment of cultural impacts gathers information about cultural practices and cultural features that may be affected by actions subject to Chapter 343, and promotes responsible decision making.

Articles IX and XII of the State Constitution, other state laws, and the courts of the state require government agencies to promote and preserve cultural beliefs, practices, and resources of native Hawaiians and other ethnic groups. Chapter 343 also requires environmental assessment of cultural resources, in determining the significance of a proposed project.

The Environmental Council encourages preparers of environmental assessments and environmental impact statements to analyze the impact of a proposed action on cultural practices and features associated with the project area. The Council provides the following methodology and content protocol as guidance for any assessment of a project that may significantly affect cultural resources.

BACKGROUND

Prior to the arrival of westerners and the ideas of private land ownership, Hawaiians freely accessed and gathered resources of the land and seas to fulfill their community responsibilities. During the Māhele of 1848, large tracts of land were divided and control was given to private individuals. When King Kamehameha the III was forced to set up this new system of land ownership, he reserved the right of access to privately owned lands for Native Hawaiian ahupua'a tenants. However, with the later emergence of the western concept of land ownership, many Hawaiians were denied access to previously available traditional resources.

In 1978, the Hawaii constitution was amended to protect and preserve traditional and customary rights of Native Hawaiians. Then in 1995 the Hawaii Supreme Court confirmed that Native Hawaiians have rights to access undeveloped and under- developed private lands. Recently, state lawmakers clarified that government agencies and private developers must assess the impacts of their development on the traditional practices of Native Hawaiians as well as the cultural resources of all people of Hawaii. These Hawaii laws, and the National Historic Preservation Act, clearly mandate federal agencies in Hawaii, including the military, to evaluate the impacts of their actions on traditional practices and cultural resources.

If you own or control undeveloped or under-developed lands in Hawaii, here are some hints as to whether traditional practices are occurring or may have occurred on your lands. If there is a trail on your property, that may be an indication of traditional practices or customary usage. Other clues include streams, caves and native plants. Another important point to remember is that, although traditional practices may have been interrupted for many years, these customary practices cannot be denied in the future.

These traditional practices of Native Hawaiians were primarily for subsistence, medicinal, religious, and cultural purposes. Examples of traditional subsistence practices include fishing, picking opihi and collecting limu or seaweed. The collection of herbs to cure the sick is an example of a traditional medicinal practice. The underlying purpose for conducting these traditional practices is to fulfill one's community responsibilities, such as feeding people or healing the sick.

As it is the responsibility of Native Hawaiians to conduct these traditional practices, government agencies and private developers also have a responsibility to follow the law and assess the impacts of their actions on traditional and cultural resources.

The State Environmental Council has prepared guidelines for assessing cultural resources and has compiled a directory of cultural consultants who can conduct such studies. The State Historic Preservation Division has drafted guidelines on how to conduct ethnographic inventory surveys. And the Office of Planning has recently completed a case study on traditional gathering rights on Kaua'i.

The most important element of preparing Cultural Impact Assessments is consulting with community groups, especially with expert and responsible cultural practitioners within the ahupua'a of the project site. Conducting the appropriate documentary research should then follow the interviews with the experts. Documentary research should include analysis of Māhele and land records and review of transcripts of previous ethnographic interviews. Once all the information has been collected, and verified by the community experts, the assessment can then be used to protect and preserve these valuable traditional practices.

Native Hawaiians performed these traditional and customary practices out of a sense of responsibility: to feed their families, cure the sick, nurture the land, and honor their ancestors. As stewards of this sacred land, we too have a responsibility to preserve, protect and restore these cultural resources for future generations.

CULTURAL IMPACT ASSESSMENT METHODOLOGY

Cultural impacts differ from other types of impacts assessed in environmental assessments or environmental impact statements. A cultural impact assessment includes information relating to the practices and beliefs of a particular cultural or ethnic group or groups.

Such information may be obtained through scoping, community meetings, ethnographic interviews and oral histories. Information provided by knowledgeable informants, including traditional cultural practitioners, can be applied to the analysis of cultural impacts in conjunction with information concerning cultural practices and features obtained through consultation and from documentary research.

In scoping the cultural portion of an environmental assessment, the geographical extent of the inquiry should, in most instances, be greater than the area over which the proposed action will take place. This is to ensure that cultural practices which may not occur within the boundaries of the project area, but which may nonetheless be affected, are included in

the assessment. Thus, for example, a proposed action that may not physically alter gathering practices, but may affect access to gathering areas would be included in the assessment. An ahupua'a is usually the appropriate geographical unit to begin an assessment of cultural impacts of a proposed action, particularly if it includes all of the types of cultural practices associated with the project area. In some cases, cultural practices are likely to extend beyond the ahupua'a and the geographical extent of the study area should take into account those cultural practices.

The historical period studied in a cultural impact assessment should commence with the initial presence in the area of the particular group whose cultural practices and features are being assessed. The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs.

The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both man-made and natural, including submerged cultural resources, which support such cultural practices and beliefs.

The Environmental Council recommends that preparers of assessments analyzing cultural impacts adopt the following protocol:

1. Identify and consult with individuals and organizations with expertise concerning the types of cultural resources, practices and beliefs found within the broad geographical area, e.g., district or ahupua'a;
2. Identify and consult with individuals and organizations with knowledge of the area potentially affected by the proposed action;
3. Receive information from or conduct ethnographic interviews and oral histories with persons having knowledge of the potentially affected area;
4. Conduct ethnographic, historical, anthropological, sociological, and other culturally related documentary research;
5. Identify and describe the cultural resources, practices and beliefs located within the potentially affected area; and
6. Assess the impact of the proposed action, alternatives to the proposed action, and mitigation measures, on the cultural resources, practices and beliefs identified.

Interviews and oral histories with knowledgeable individuals may be recorded, if consent is given, and field visits by preparers accompanied by informants are encouraged. Persons interviewed should be afforded an opportunity to review the record of the interview, and consent to publish the record should be obtained whenever possible. For example, the precise location of human burials are likely to be withheld from a cultural impact assessment, but it is important that the document identify the impact a project would have on the burials. At times an informant may provide information only on the condition that it remain in confidence. The wishes of the informant should be respected.

Primary source materials reviewed and analyzed may include, as appropriate: Māhele, land court, census and tax records, including testimonies; vital statistics records; family histories and genealogies; previously published or recorded ethnographic interviews and oral histories; community studies, old maps and photographs; and other archival documents, including correspondence, newspaper or almanac articles, and visitor journals. Secondary source materials such as historical, sociological, and anthropological texts, manuscripts, and similar materials, published and unpublished, should also be consulted. Other materials which should be examined include prior land use proposals, decisions, and rulings which pertain to the study area.

CULTURAL IMPACT ASSESSMENT CONTENTS

In addition to the content requirements for environmental assessments and environmental impact statements, which are set out in HAR §§ 11-200-10 and 16 through 18, the portion of the assessment concerning cultural impacts should address, but not necessarily be limited to, the following matters:

7. A discussion of the methods applied and results of consultation with individuals and organizations identified by the preparer as being familiar with cultural practices and features associated with the project area, including any constraints or limitations which might have affected the quality of the information obtained.
8. A description of methods adopted by the preparer to identify, locate, and select the persons interviewed, including a discussion of the level of effort undertaken.
9. Ethnographic and oral history interview procedures, including the circumstances, under which the interviews were conducted, and any constraints or limitations which might have affected the quality of the information obtained.
10. Biographical information concerning the individuals and organizations consulted, their particular expertise, and their historical and genealogical relationship to the project area, as well as information concerning the persons submitting information or interviewed, their particular knowledge and cultural expertise, if any, and their historical and genealogical relationship to the project area.
11. A discussion concerning historical and cultural source materials consulted, the institutions and repositories searched, and the level of effort undertaken. This discussion should include, if appropriate, the particular perspective of the authors, any opposing views, and any other relevant constraints, limitations or biases.
12. A discussion concerning the cultural resources, practices and beliefs identified, and, for resources and practices, their location within the broad geographical area in which the proposed action is located, as well as their direct or indirect significance or connection to the project site.
13. A discussion concerning the nature of the cultural practices and beliefs, and the significance of the cultural resources within the project area, affected directly or indirectly by the proposed project.
14. An explanation of confidential information that has been withheld from public disclosure in the assessment.
15. A discussion concerning any conflicting information in regard to identified cultural resources, practices and beliefs.
16. An analysis of the potential effect of any proposed physical alteration on cultural resources, practices or beliefs; the potential of the proposed action to isolate cultural

resources, practices or beliefs from their setting; and the potential of the proposed action to introduce elements which may alter the setting in which cultural practices take place.

17. A bibliography of references, and attached records of interviews which were allowed to be disclosed.

The inclusion of this information will help make environmental assessments and environmental impact statements complete and meet the requirements of Chapter 343, HRS. If you have any questions, please call 586-4185.

Appendix B: A Bill for Environmental Impact Statements

A BILL FOR AN ACT RELATING TO ENVIRONMENTAL IMPACT STATEMENTS
[UNOFFICIAL VERSION] HOUSE OF REPRESENTATIVES H.B. NO. 2895 H.D.1
TWENTIETH LEGISLATURE, 2000, STATE OF HAWAII

A BILL FOR AN ACT RELATING TO ENVIRONMENTAL IMPACT STATEMENTS. BE IT
ENACTED BY THE LEGISLATURE OF THE STATE OF HAWAII:

SECTION 1. The legislature finds that there is a need to clarify that the preparation of environmental assessments or environmental impact statements should identify and address effects on Hawai'i's culture, and traditional and customary rights.

The legislature also finds that native Hawaiian culture plays a vital role in preserving and advancing the unique quality of life and the "aloha spirit" in Hawai'i. Articles IX and XII of the state constitution, other state laws, and the courts of the State impose on government agencies a duty to promote and protect cultural beliefs, practices, and resources of native Hawaiians as well as other ethnic groups.

Moreover, the past failure to require native Hawaiian cultural impact assessments has resulted in the loss and destruction of many important cultural resources and has interfered with the exercise of native Hawaiian culture. The legislature further finds that due consideration of the effects of human activities on native Hawaiian culture and the exercise thereof is necessary to ensure the continued existence, development, and exercise of native Hawaiian culture.

The purpose of this Act is to: (1) Require that environmental impact statements include the disclosure of the effects of a proposed action on the cultural practices of the community and State; and (2) Amend the definition of "significant effect" to include adverse effects on cultural practices.

SECTION 2. Section 343-2, Hawai'i Revised Statutes, is amended by amending the definitions of "environmental impact statement" or "statement" and "significant effect", to read as follows:

"Environmental impact statement" or "statement" means an informational document prepared in compliance with the rules adopted under section 343-6 and which discloses the environmental effects of a proposed action, effects of a proposed action on the economic [and] welfare, social welfare, and cultural practices of the community and State, effects of the economic activities arising out of the proposed action, measures proposed to minimize adverse effects, and alternatives to the action and their environmental effects.

The initial statement filed for public review shall be referred to as the draft statement and shall be distinguished from the final statement which is the document that has incorporated the public's comments and the responses to those comments. The final statement is the document that shall be evaluated for acceptability by the respective accepting authority.

“Significant effect” means the sum of effects on the quality of the environment, including actions that irrevocably commit a natural resource, curtail the range of beneficial uses of the environment, are contrary to the State’s environmental policies or long-term environmental goals as established by law, or adversely affect the economic [or] welfare, social welfare[.], or cultural practices of the community and State.

SECTION 3. Statutory material to be repealed is bracketed. New statutory material is underscored.

SECTION 4. This Act shall take effect upon its approval. Approved by the Governor as Act 50 on April 26, 2000.

Appendix C: Act 50 [State of Hawai‘i 2000]

Act 50 [State of Hawai‘i 2000]. H.B. NO. 2895 H.D.1 was passed by the 20th Legislature and approved by the Governor on April 26, 2000 as Act 50. The following excerpts illustrate the intent and mandates of this Act:

The legislature also finds that native Hawaiian culture plays a vital role in preserving and advancing the unique quality of life and the “aloha spirit” in Hawai‘i. Articles IX and XII of the State constitution, other State laws, and the courts of the State impose on government agencies a duty to promote and protect cultural beliefs, practices, and resources of native Hawaiians as well as other ethnic groups.

Moreover, the past failure to require native Hawaiian cultural impact assessments has resulted in the loss and destruction of many important cultural resources and has interfered with the exercise of native Hawaiian culture. The legislature further finds that due consideration of the effects of human activities on native Hawaiian culture and the exercise thereof is necessary to ensure the continued existence, development, and exercise of native Hawaiian culture.

The purpose of this Act is to: (1) Require that environmental impact statements include the disclosure of the effects of a proposed action on the cultural practices of the community and State; and (2) Amend the definition of “significant effect” to include adverse effects on cultural practices.

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Appendix D: Community Contact Letter



September 23, 2020

Welina mai me ke aloha,

On behalf of the of the Wai'oli Valley Taro Hui (WVTH), Nohopapa Hawaii is gathering community mana'o for inclusion in a Cultural Impact Assessment (CIA).

The CIA will document Hawaiian traditional cultural features and practices in the project area to inform the Environmental Assessment (EA). The primary purpose of this project is to summarize and give voice to some of the community's 'ike and mana'o; as a source to develop strategies, make informed decisions, and recommendations specific to the WVTH EA for a long term water lease.

The study area for these interviews is the Wai'oli Lo'i Kalo System; which begins mauka, where water enters the system at the mānowai, where it flows into the po'owai, through the 'auwai and lo'i kalo in the Wai'oli and Hanalei plain, to the terminus of the system at various ho'i along Wai'oli stream and Hanalei River (see attached maps).

The Wai'oli Valley Taro Hui is seeking a long-term water lease to continue water flow to the Wai'oli Lo'i Kalo System. This system of 'auwai pre-dates European Contact (1778) and has been in continual use since; it includes:

- 5.95 miles of 'auwai, ditches (Straunch 2019)
- Over 260 individual fields, totalling \leq 84-acres of farmable lo'i.
- One mānowai on Wai'oli Stream, ~1.8 miles upstream from its mouth.
- Six ho'i, two on Wai'oli Stream, and two on Hanalei River
- One storm drain outflow to Wai'oli Stream (formerly an open 'auwai) on the makai side of Wai'oli bridge.

We would like to engage with individuals, 'ohana, and organizations that have relationships to this specific wahi, to kalo farming and the 'auwai system in Wai'oli. In particular, we would like to gather information relating to:

- Personal relationships to this place personal, historical, or organizational.
 - Any mo'okū'auhau of 'ohana or 'āina you would like to share
- 'Ina Mauli Ola – natural resources and ecosystems & changes over time, as well as traditional management practices
 - Mauka to makai, wao kele and near shore.
 - River mouth observations
 - Changes in the waterways, ho'i, lo'i, mānowai.
 - Origins, modifications and maintenance of any historic 'auwai system improvements, gates, flumes, pebble traps, tunnel, new ditches, stone monuments, etc.
- Any mo'olelo, wahi inoa, oli, hula, mele, traditions, akua, 'ohana, or people associated with this place.
- Cultural protocols and practices (both traditional and contemporary) specific to this place.
 - Gathering practices: mauka, in stream, in 'auwai, near shore, riparian, mauka.



- All things kalo
 - growing, preparing, and eating kalo.
 - The shift from rice farming, back to kalo farming.
- Cultural preservation concerns and recommendations such as:
 - Educational opportunities
 - Restoration opportunities of cultural resources and practices
 - Continued practice
- Recommendations and/or concerns regarding the continued and future stewardship of the Wai'oli Lo'i Kalo System.
 - Any potential project impacts negative and/or positive
- Referrals to other 'ohana and individuals who are connected to the project area

Our community consultation team members, Dominique Cordy and Devin Kamealoha Forrest, will be contacting you shortly. We look forward to collaborating with you to document your mana'o for this Cultural Impact Assessment.

Dominique Cordy	(808) 346-1585	liveinthenaau@gmail.com
Devin Kamealoha Forrest	(808) 652-4336	dforrest@hawaii.edu

Me ka ha'aha'a,

Nohopapa Hawai'i, LLC

Appendix E: Participant Informed Consent Forms

NOHOPAPA

INFORMED CONSENT FORM

Aloha mai, Nohopapa Hawai'i appreciates your willingness to share your knowledge of the Wai'oli and the Wai'oli Lo'i Kalo System. The information you share with us will be used to guide and inform Nohopapa Hawai'i's Cultural Impact Assessment (CIA) for the Wai'oli Valley Taro Hui (WVTH). The CIA is a contributing component of an Environmental Assessment (EA) for a long term water lease application.

Nohopapa Hawai'i understands our responsibility in respecting the wishes and concerns of the interviewees participating in this study. Here are the procedures we promise to follow:

1. The interview will not be recorded without your knowledge and explicit permission.
2. You will have the opportunity to review the written transcript and summary of your interview. At that time, you may make any additions, deletions or corrections you wish.
3. You will be given a copy of the interview transcript and/or summary for your records.
4. You will be given a copy of this release form for your records.
5. You will be given a copy of any photographs taken of you during the interview.

For your protection, we need your written confirmation that (*circle* yes or no below):

1. You consent to the use of the complete transcript and/or interview quotes for the purposes of this study. Yes No
2. If a photograph is taken during the interview, you consent to the photograph being included in this study. Yes No

I, Christine Kobayashi, agree to the procedures
(Please print your name here)

outlined above and, by my signature, give my consent and release of this interview and/or photograph to be used as specified.

Christine Kobayashi 9-30-20
(Signature) (Date)

Nohopapa Hawai'i, LLC nohopapa.hawaii@gmail.com

<https://mail-attachment.googleusercontent.com/attachment...UHSJHdr5WdcNJGwtpX1duhO67MOM0yQXJOWgHvMx3kIE> 9/26/20, 8:14 AM
Page 1 of 2



INFORMED CONSENT FORM

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- 5. You will be given a copy of any photographs taken of you during the interview.

For your protection, we need your written confirmation that (circle yes or no below):

- 1. You consent to the use of the complete transcript and/or interview quotes for the purposes of this study. Yes No
- 2. If a photograph is taken during the interview, you consent to the photograph being included in this study. Yes No

I, Clarence Kaona, agree to the procedures
(Please print your name here)

outlined above and, by my signature, give my consent and release of this interview and/or photograph to be used as specified.

Clarence Kaona

(Signature)
Nohopapa Hawai'i, LLC nohopapa.hawaii@gmail.com

9-26-20

(Date)



INFORMED CONSENT FORM

Aloha mai, Nohopapa Hawai'i appreciates your willingness to share your knowledge of the Wai'oli and the Wai'oli Lo'i Kalo System. The information you share with us will be used to guide and inform Nohopapa Hawai'i's Cultural Impact Assessment (CIA) for the Wai'oli Valley Taro Hui (WVTH). The CIA is a contributing component of an Environmental Assessment (EA) for a long term water lease application.

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For your protection, we need your written confirmation that (circle yes or no below):

- 1. You consent to the use of the complete transcript and/or interview quotes for the purposes of this study. Yes No
- 2. If a photograph is taken during the interview, you consent to the photograph being included in this study. No Yes

I, JoAnne Kaona, agree to the procedures

(Please print your name here)

outlined above and, by my signature, give my consent and release of this interview and/or photograph to be used as specified.

(Signature)

Nohopapa Hawai'i, LLC nohopapa.hawaii@gmail.com

JK
9/26/2020

(Date)



INFORMED CONSENT FORM

Aloha mai, Nohopapa Hawai'i appreciates your willingness to share your knowledge of the Wai'oli and the Wai'oli Lo'i Kalo System. The information you share with us will be used to guide and inform Nohopapa Hawai'i's Cultural Impact Assessment (CIA) for the Wai'oli Valley Taro Hui (WVTH). The CIA is a contributing component of an Environmental Assessment (EA) for a long term water lease application.

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- 1. You consent to the use of the complete transcript and/or interview quotes for the purposes of this study. Yes No
- 2. If a photograph is taken during the interview, you consent to the photograph being included in this study. No Yes

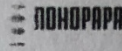
I, DIANA K. SPENCER, agree to the procedures
(Please print your name here)

outlined above and, by my signature, give my consent and release of this interview and/or photograph to be used as specified.

Diana K. Spencer

(Signature)
Nohopapa Hawai'i, LLC nohopapa.hawaii@gmail.com

9-26-20
(Date)



INFORMED CONSENT FORM

Aloha mai, Nohopapa Hawai'i appreciates your willingness to share your knowledge of the Wai'oli and the Wai'oli Lo'i Kalo System. The information you share with us will be used to guide and inform Nohopapa Hawai'i's Cultural Impact Assessment (CIA) for the Wai'oli Valley Taro Hui (WVTH). The CIA is a contributing component of an Environmental Assessment (EA) for a long term water lease application.

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For your protection, we need your written confirmation that (circle yes or no below):

1. You consent to the use of the complete transcript and/or interview quotes for the purposes of this study. Yes No
2. If a photograph is taken during the interview, you consent to the photograph being included in this study. Yes No

I, Conrad Kim Inanoh, agree to the procedures

(Please print your name here)

outlined above and, by my signature, give my consent and release of this interview and/or photograph to be used as specified.

Conrad Kim Inanoh

(Signature)

Nohopapa Hawai'i, LLC nohopapa.hawaii@gmail.com

9/28/20

(Date)



INFORMED CONSENT FORM

Aloha mai, Nohopapa Hawai'i appreciates your willingness to share your knowledge of the Wai'oli and the Wai'oli Lo'i Kalo System. The information you share with us will be used to guide and inform Nohopapa Hawai'i's Cultural Impact Assessment (CIA) for the Wai'oli Valley Taro Hui (WVTH). The CIA is a contributing component of an Environmental Assessment (EA) for a long term water lease application.

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- 5. You will be given a copy of any photographs taken of you during the interview.

For your protection, we need your written confirmation that (*circle* yes or no below):

- 1. You consent to the use of the complete transcript and/or interview quotes for the purposes of this study. Yes No
- 2. If a photograph is taken during the interview, you consent to the photograph being included in this study. No Yes

I, William Watani, agree to the procedures
(Please print your name here)

outlined above and, by my signature, give my consent and release of this interview and/or photograph to be used as specified.

William Watani

(Signature)
Nohopapa Hawai'i, LLC nohopapa.hawaii@gmail.com

9/26/20

(Date)



INFORMED CONSENT FORM

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- 5. You will be given a copy of any photographs taken of you during the interview.

For your protection, we need your written confirmation that (circle yes or no below):

- 1. You consent to the use of the complete transcript and/or interview quotes for the purposes of this study. Yes No
- 2. If a photograph is taken during the interview, you consent to the photograph being included in this study. Yes No

I, Lily Tai Hook , agree to the procedures
(Please print your name here)

outlined above and, by my signature, give my consent and release of this interview and/or photograph to be used as specified.

 Lily Tai Hook

(Signature)
Nohopapa Hawai'i, LLC nohopapa.hawaii@gmail.com

 9/26/20

(Date)



INFORMED CONSENT FORM

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- 5. You will be given a copy of any photographs taken of you during the interview.

For your protection, we need your written confirmation that (*circle* yes or no below):

- 1. You consent to the use of the complete transcript and/or interview quotes for the purposes of this study. Yes No
- 2. If a photograph is taken during the interview, you consent to the photograph being included in this study. Yes No

I, WILBERT TAIHOOK, agree to the procedures

(Please print your name here)

outlined above and, by my signature, give my consent and release of this interview and/or photograph to be used as specified.

Wilbert Taihook

26 Sept 20

(Signature)

(Date)

Nohopapa Hawai'i, LLC nohopapa.hawaii@gmail.com