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He ‘A‘ali‘i Kū Makani (Kokololio) mai Au:

Reconnecting to Community and Reenvisioning a New Purpose for

Environmental Archaeology

A dissertation submitted in partial satisfaction of the

requirements for the degree Doctor of Philosophy

in Archaeology

by

Danielle Kalani Heinz

2023

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ABSTRACT OF THE DISSERTATION

He ‘A‘ali‘i Kū Makani (Kokololio) mai Au:

Reconnecting to Community and Reenvisioning a New Purpose for
Environmental Archaeology

by

Danielle Kalani Heinz

Doctor of Philosophy in Archaeology

University of California, Los Angeles, 2023

Professor Stephen B. Acabado, Chair

This dissertation focuses on decolonizing the discipline of archaeology through archaeology as activism. It separates archaeology as activism into two specific strategies: vocational activism, or increasing diversity, equity, and inclusion initiatives in archaeological training, and archaeology as activism, or making data useful to modern social activist movements. Borrowing from healthcare, I argue that integrating cultural humility—which emphasizes self-work—into training programs has the potential to help archaeologists challenge their norms, leading to less-biased interpretations of the past. Furthermore, I showcase the unique role and responsibility archaeologists from within a community play in decolonizing archaeology. As a Native Hawaiian archaeologist, I promote vocational activism in this dissertation by integrating Hawaiian studies into my research, calling for the reconceptualization of land in archaeological studies, particularly conceptualizing land as people, land as source, and

land as ongoing connection and care, and rethinking how we interact with her (land). I then transition into my case study on water rights activism in Nā Wai ‘Ehā, Maui. While the community has made significant headway in advancing Native Hawaiian water rights, I highlight how there is still a lack of hydrological data, something that is needed to change water allocation. In my methods, I set a foundation for further analysis by reconstructing the landscape and providing an estimate of taro quantity and water usage prior to the plantation period. I show potential ways that sugarcane plantations negatively impacted the environment by using maps, satellite imagery, and aerial photography to trace hydrological infrastructure changes and changes in the environment in light of the microclimate data from 1920 to 2007. From this analysis, it appears that sugarcane plantations drastically altered the environment by utilizing significantly more water than taro and decreasing the density of woodlands. My research, thus, provides a roadmap for increasing equity within the discipline and integrating Native Hawaiian ways of knowing into archaeology. Furthermore, it highlights the potential and limitations of doing research on Hawai‘i while forced to be off-island as a result of the Covid-19 pandemic.

The dissertation of Danielle Kalani Heinz is approved.

Aradhna K. Tripathi

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Stephen B. Acabado, Committee Chair

University of California, Los Angeles

2023

To all the wāhine mana in my life

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BIOGRAPHICAL SKETCH

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D. Kalani Heinz, 2022 Nānā ka Maka; Ho‘olohe ka Pepeiao; Pa‘a ka Waha: Decentering the Self, Recentring the Community. In *The Community-Based PhD: Complexities, Triumphs, Missteps, and Joys of Community-based & Participatory Action Research as Graduate Students*, edited by Sonya Atalay and Alexandra McCleary, University of Arizona Press, p. 117-129.

Presentations

‘O Wai ‘Oe?: A Critical Re-examination of the Self in the Geosciences, oral presentation, American Geophysical Union, 12/15/2022, Chicago (virtual).

No Hetero!: Making Way for Alternative Ways of Knowing within Archaeology, oral presentation, Theoretical Archaeology Group Conference, 12/16/2019, London (virtual).

We are Mauna Kea: Emotionally-driven Archaeology as a Tool for Decolonization, oral presentation, Theoretical Archaeology Group Conference, 12/16/2019, London (virtual).

Nā Mea Li‘ili‘i: A Hawaiian-Centered Approach to Ecofact Analysis in the Nā Wai ‘Ehā Region of Maui, oral presentation, Society for Hawaiian Archaeology Conference, 10/26,2019, Kona Hawai‘i.

Nā Wahine o nā ‘Āina Kuleana: Assessing the impact of colonization on gender experience in North Kohala, Hawai‘i Island, oral presentation, Society for American Archaeology Conference, 4/13/2019, Albuquerque, New Mexico

Built on Sand: The Historical Roots of Modern Queerphobia within Christianity, oral presentation, Society for American Archaeology Conference, 3/30/2017, Vancouver, Canada.

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- The National Geographic Society Early Career Grant (\$10,000) 02/2021-Present
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- Center for Diverse Leadership in Sciences, Early Career Fellow (\$1,000) 09/2019-Present
- Graduate Dean’s Scholar Award (\$12,000) 04/2016-Present
- Eugene V. Cota-Robles Diversity Fellowship (\$76,000) 04/2016-Present
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CHAPTER ONE:
INTRODUCTION

The only thing constant in life is change—Heraclitus

Lipe (2016) describes the ‘ōlelo no‘eau (Hawaiian wise saying), “he ‘a‘ali‘i kū makani mai au” as the ability to persist through flexibility. If I have learned anything within the past seven years, it is the power of the Hawaiian community to persist through community-centeredness and strategic and creative innovation when met with new obstacles. In the past years, we have stood together as a lāhui¹ (community) to resist the building of the Thirty Meter Telescope on Mauna Kea, both a sacred and environmentally sensitive site. We joined forces to call for better accountability when the military leaked fuel into the primary aquifer at Kapūkakī (Red Hill), poisoning many of the local inhabitants. And, we have figured out ways to cope with and protect each other against a virus that resulted in significant loss within our community both on and off island. But these are just some of the more well-known fights. Every few weeks, there is a new controversy, whether publicly broadcasted or not. Soil has been contaminated at Haleakalā. Hawaiians have been restricted from accessing natural and cultural resources by entities like Moloka‘i Ranch. Water companies and other corporate groups continue to divert water from local kalo (taro) farmers across different islands. Why, you might ask even bring this up in a dissertation about community archaeology and water rights? Because community archaeology is not just about working with a community to learn about the past but recognizing how modern power structures continue to replicate colonial ideals in modernity. It is through

¹ Hawaiian is used frequently throughout this dissertation. A Hawaiian glossary (Appendix A) has been added to assist readers who are unfamiliar with the Hawaiian language.

understanding the connection of the past to the present and the acknowledgment of the presence of sustained colonialism that it becomes possible to generate an archaeology that is more aware of and sensitive to the experiences of modern Hawaiians. Yet, this is not an archaeology that is meant to victimize Hawaiians nor deny their agency, but to be of service to the already strong leadership within the community in their fight against systemic prejudices. For, we as Hawaiians are resilient, but we are also exhausted.

This dissertation is itself an embodiment of the ‘a‘ali‘i kū makani. Although this project was initially centered on ‘āina-based (land-based) research strategies that involved learning and growing on the physical ‘āina of Waikapū, the pandemic created new barriers that led to the need for flexibility. While many of us (Hawaiians) longed to return home during the pandemic, the majority of us, drawing from our historical trauma, chose to stay away to protect our community. For me, what emerged from this longing was an exploration of new ways to connect with ‘āina while off-island. Like the ‘a‘ali‘i, I became more flexible with my methods and research questions to persist with my original research topic.

While the pandemic sparked this line of inquiry by necessity, it also caused me to realize that it had been something that I had been growing towards throughout my entire graduate career. Yet, by only focusing on wanting to be in Hawai‘i, I neglected all the knowledge that I had gained through my attempts to reconnect. Over the last seven years, my decision to reconnect to my culture by learning my language and by being active in the Native Hawaiian community in Southern California has been critical to not only shaping my identity as a Native Hawaiian but as a researcher of Hawai‘i. Just as critical social theory courses often provide many with the language by which to express their lived experiences, being in community with other Native Hawaiians allowed me to identify the parts of me that were a product of my Hawaiian

heritage. It was in doing this that I began to understand why I struggled with some interpretations of the Hawaiian past. Furthermore, it allowed me to realize how Hawaiian epistemologies guided my career choice and research interests. But, more importantly, it was my community's pride in me as a Native Hawaiian scholar that motivated me to continue with my research and that allowed me to understand that what I was doing mattered.

I am not arguing that engagement with the physical 'āina is unnecessary to reconnect with our culture as Native Hawaiians. Rather, I am acknowledging that the presence of sustained colonialism in Hawai'i, which drives many of us from our islands so that we can survive, makes it difficult. It is the value of reconnecting while we are forced to be away that I hope foremost to emphasize in this paper. During a time when roughly half of Hawaiians live off-island (Kauanui 2007), discovering new ways to reconnect with our culture (including 'āina) while off-island serves as a way of pushing back against sustained colonialism. In many ways, this is an ode to my fellow diasporic Hawaiians who struggle with feeling "Hawaiian enough". This is a call to come home—in the metaphorical sense—to those Native Hawaiians who have decided to step away from our culture because it hurt too much to continue caring while having our identities delegitimized, who worried about not being recognized as Native Hawaiian. It might take a lot of unlearning to find our innate Hawaiianess, to let ourselves hear our na'au (gut) and kuleana (responsibility), but it is in this process that we honor our ancestors, becoming the people they envisioned us to be. Mai hilahila (no shame).

Learning through Reconnecting

While many of the things I have learned from being in community with other Hawaiians are similar to some of the postulates made by community-centered research agendas, I would like to articulate them here as a way of giving credit to the community and emphasizing that expertise

exists outside of academia. In Hawaiian culture we ma ka hana ka 'ike or “learn by doing.” Thus, I have learned that:

- 1) *Colonialism still negatively impacts us on multiple levels.*
- 2) *There is strength in emotion.*
- 3) *Research on our community and relearning our culture is painful.*
- 4) *It is important to choose your battles.*
- 5) *Learning our language is key to better understanding our culture.*

Colonialism Still Negatively Impacts Us on Multiple Levels.

Motivation for research

During nearly every visit to Maui when I was a child, I remember my mom saying the same thing, “Groceries are so expensive here! I just paid \$5 for a gallon of milk!” As a child, this statement did not mean much to me, but as an adult, this statement reminds me that it is not economically feasible for me to live in Hawai‘i at this time. In one of our last chats, she just informed me that the current milk price is closer to \$8.²

As a researcher, this dissertation is simultaneously a pushback against and a way of articulating sustained colonialism in Hawai‘i. Lightfoot and Gonzalez (2018: 427) define sustained colonialism as the study of how “indigenous populations negotiated with multiple waves of foreigners who represented a diverse range of colonial programs and interests.” In this same way, I recognize that colonialism still exists and perpetuates itself through multiple different avenues. Thus, this project seeks to combat colonialism at multiple levels.

² Throughout the remainder of the chapter, I choose to illustrate the different tenets of what I have learned from the Hawaiian community by beginning each section with different personal stories, which have been italicized.

First, I focus on the modern colonial policies that still impact Indigenous people within academia. This work is largely influenced by Smith (2013) whose work considers how the idea of Western superiority perpetuates itself in academia. I make recommendations to develop more community-centered practices that simultaneously counter many of the colonial assumptions embedded in research practices, namely that scholars should be distant observers that are both objective and unemotional. Rather, I shed light on the emotional labor research often requires for Indigenous communities.

Secondly, I integrate Native Hawaiian ways of knowing into my research, ways of knowing that are often relegated to the periphery or considered overly superstitious. In doing this, I seek to show that Native Hawaiian ways of viewing the past are equally legitimate, and in most cases, provide an even more nuanced understanding of pasts that become erased when colonial ideals are prioritized. Throughout this discussion, I provide additional evidence for the importance of identity in research, further critiquing the role of the researcher as a distant observer.

Thirdly, I push back against the colonial tendency to prioritize material-dense sites and built environments (Wobst 2004). Rather, I showcase that sites with small quantities of material culture can still provide significant information about Hawaiian pasts. I use maps, aerial photography, and historical documents to illustrate the utility of non-invasive methods for reconstructing landscape and landscape change. As a future direction, I propose ecofact analysis, a minimally invasive method, to derive even more nuanced information about landscape. In doing this, I advocate for more research on spaces with less artifact density because plants were equally important in Hawaiian culture and could themselves be denoted as a place (Pukui 1976).

Fourthly, I advocate for purposeful research. Research should not only be pursued because it is a topic of interest but because it can benefit others. I have chosen environmental justice in Hawai‘i because of its current impact on Native Hawaiians. While environmental change caused by colonizers is not a new phenomenon in Hawai‘i (MacLennan 2013; Pau et al. 2012; Wilcox 1997), its continued impact on Native Hawaiians without significant recourse makes it important to take a stand to help halt environmental neo-colonialism in Hawai‘i. Environmental justice is especially necessary to focus on in light of the negative impacts of current climate change. From a cultural perspective, damage to ‘āina (land) harms our (Hawaiians’) ancestor and our ability to take care of our ancestor. As Haunani Kay Trask (1993:81) writes, “A dead land is preceded by a dying people.” I have focused on water rights because access to water is one of the key barriers to food sovereignty in Hawai‘i. The importation of most food leads to increased food prices and pushes many Native Hawaiians out of Hawai‘i because they can no longer afford to live there (Spencer et al. 2020). In the case of kalo (taro), barriers to its growth, like lack of water, not only prevent Hawaiians from consuming a culturally important food but from connecting with Hāloa³, the eldest brother of all Hawaiians. Through this research, I hoped to gather preliminary data on the impact of colonization on Native Hawaiians’ access to water that could set a foundation for similar studies. By highlighting the lack of hydrological data and research in this region, I hope to inspire more research aimed at data-driven policymaking that supports water rights activists.

³ Hāloa was the still-born child of the gods Wākea and Ho‘ohokukalani that was buried and grew into a kalo (taro). Because of this, kalo is considered the eldest sibling of all Hawaiians (Ritte and Kanehe 2007).

There is Strength in Emotion:

Theoretical Background

When I think of strength in emotion, I think about the number of Hawaiian wāhine (women) I have seen cry in the last seven years and the number of times I have heard “We’re Hawaiian, we’re emotional”. It took me years to unlearn my discomfort with emotion. Yet, I never saw their emotion as a weakness, but as a way of expressing care for our community, whether it was sadness at missing a lost community member or frustration at making sure things were done right so that we would honor our community and ancestors. It is this same care that I saw during every meeting and bereavement donation. “We know what to do” was the constant phrase echoing in our meetings. This translation of care into actionable steps is the way I perceive my research.

This project is part of larger efforts to make archaeology more equitable. Specifically, it aligns with the critiques of archaeology by scholars in Indigenous (Atalay 2006; Claire and Wobst 2004; Colwell-Chanthaphonh et al. 2010; Silliman 2008), Feminist (Conkey 2003, 2005; Gero and Conkey 1991), Queer (Blackmore 2011; Voss 2000), and Anti-racist archaeologies (Flewellen et al. 2021; Franklin et al. 2020), Archaeologies of the Heart (Lyons and Supernant 2020), and Community Based Participatory Research (Atalay 2012). While it proposes different strategies for making archaeological training and archaeological research more equitable as a whole, it also articulates specific strategies for different situations. In particular, it focuses on how researchers’ identities, and relationships to place, as well as the community involved, all contribute to how a researcher designs their research practices.

Archaeologies of the heart have been particularly useful in this research. While archaeologies of the heart draw from many different strands of archaeology, there are four main tenets of it: rigor, care, relationality, and emotion.

Rigor is particularly necessary for this project. Lyons and Supernant (2020) counter the notion that archaeology should be purely objective instead arguing that even science is embedded in a system of norms that obscures disciplinary biases. This dissertation views archaeology through the lens of strong objectivity, or the idea that multiple realities exist, and that self-reflexivity and rigor are needed to develop a conclusion when analyzing these different realities (Lyons and Supernant 2020). This does not mean that all voices need to be given equal weight, but that different perspectives can lead one to a more expansive and less biased way of viewing the past. Rigor is particularly important to this project so that it does not get mistaken for Indigenous propaganda. While I prioritize Indigenous voices, I also analyze them in conjunction with foreign documents to provide a more holistic interpretation of the past. Additionally, I have integrated rigor into my data analysis. In my first data analysis chapter, chapter five, I calculate the amount of lo'i (freshwater taro patches) in this region and use this to estimate water usage. Because I am aware of the dialogue surrounding water rights and the critiques that could be made of my data analysis, I have chosen to be conservative in both my lo'i and water usage estimates.

While care and relationality are viewed as two separate tenets in archaeology of the heart, this research views them as heavily interconnected. Throughout this project, I advocate for cultural humility, a way of learning more about the experiences of People of the Global

Majority⁴. It is this care to learn more about them and to be accountable to them that should drive changes in archaeological training. Care is the initial step in connection. Yet, it is being in community with others that helps strengthen this sense of care. Care is the spark. Relationality is the commitment to growth.

In archaeologies of the heart, emotions are viewed as an innate part of humanity. Therefore, while someone who perceives themselves as being unemotional might declare that they are more logical than someone who is emotional, in actuality what they are declaring is their lack of emotional intelligence. Van der Kolk (2014) argues that emotion and logic are not separate, but that the emotions associated with our experiences give rise to our reasoning. Therefore, this project explores the different, and often complicated, emotions present in research with descendant communities from the experience of the researcher to the experience of the researched. In particular, this dissertation argues that emotional labor, like self-work, is a necessary part of the research process in order to do community archaeology ethically.

Research on our Community and Relearning our Culture is Painful.

Hawaiian-specific Theory and Research Practices:

I entered graduate school with a fervor to learn more about my culture and to advocate for my community. Yet, I did not realize how quickly my deep-seated insecurities about not being “Hawaiian enough” or being the right person for this research would bubble up. It was not until I entered my ‘ōlelo Hawai‘i class that I began to see that many of my fellow haumāna (students) felt the same way. While we all wanted to learn, many of us had mental blocks holding us back. I cringed every time I spoke ‘ōlelo Hawai‘i because it reminded me just how much work I had left

⁴ Throughout this paper, I use People of the Global Majority as a synonym for the term Black, Indigenous, and People of Color. This word choice flips the narrative of how race is talked about, problematizing the assumption of a white majority by highlighting that these communities make up a significantly larger percentage of the world’s population.

to do and I worried that, growing up in California, I would never be able to shake my accent. We all felt the tugging of kuleana (responsibility) to learn, but it did not make it any easier. For me, it was not only practicing my culture but learning the history of my culture that made me feel this way. This was the moment that I realized that dealing with historical trauma was a necessary, but difficult part of my—and many other Indigenous scholars’—research process. Yet, it also allowed me to understand the unique perspective that I brought to community research and motivated me to integrate Native Hawaiian epistemologies into my research process. For, it was in the words of other Native Hawaiian scholars that I found healing.

What is most painful when producing Hawaiian research is that the past, namely colonialism, does not just stay in the past, but relives itself in the present. If we do not take actionable steps to change it, it will continue to harm others. This is what motivates the activist nature of my research. Influenced by Casteñada (2016), I have divided these steps into decolonizing the discipline (vocational activism) and developing research that is useful to communities (archaeology as activism). The specific steps I recommend to change the discipline are a product of my pain and frustration. Likewise, so is the approach I take to my own research. Kamakau (1865) best sums up my frustration when he writes,

Aole o‘u makemake e paio aku, he makemake ko‘u e pololei ka moolelo o ko‘u one hanau, aole na ka malihini e ao mai ia‘u i ka moolelo o ko‘u lahui, na‘u e ao aku i ka moolelo i ka malihini.

[I have no desire to argue, I want the history of my homeland to be accurate; it is not for the foreigner to teach me the history of my people, it is for me to teach it to the foreigner.]

—S. M. Kamakau, “Hooheihēi ka Nukahalale...” *Ke Au Okoa*, 10/16/1865, p. 1

It was my frustration at people not getting Hawaiian histories “quite right”, whether it was reiterating a 2-gender binary system or treating Hawaiians as relics of the past, that motivated my decision to integrate Hawaiian values into my research. Through the work of other Native Hawaiian scholars, I was able to outline Hawaiian-specific actionable steps I could take to develop a research project that was uniquely Hawaiian. Particularly, this work was influenced by Kahakalau (2019), Goodyear-Kā‘opua (2015), and Andrade (2014) who all outline concerns of Hawaiian studies and tangible ways to address them in research. It was through their work that I sought to generate a Hawaiian-centered history of Hawai‘i.

These scholars further encouraged me to understand Hawaiian history as not just about Hawaiian people but about land. In Hawaiian culture, the notion of ‘āina (land) differs drastically from the euro-centric capitalistic notion of land. Specifically, ‘āina is an ancestor that is meant to be respected. Therefore, there are proper and improper ways of navigating through the landscape and engaging with land. Oliveira (2015) provides a reconceptualization of ‘āina as source, people, and ongoing connection and care, which I use throughout my research. Aikau (2019) similarly emphasizes that our genealogical relationship to a place—or lack thereof—is one factor that influences our interaction with ‘āina. It is this genealogical conception of land that ultimately influenced the choice of my project area.

Geographic Location:

This research focuses on Maui, one of the eight Hawaiian Islands. It specifically studies the region of Nā Wai ‘Ehā, a region composed of the ahupua‘a (land division) of Wailuku, Waiehu, Waihe‘e, and Waikapū in Western Maui (Figure 1-1). Waikapū has been my primary ahupua‘a of focus. I have chosen Nā Wai ‘Ehā specifically because it is the region that my

family has inhabited for as far back as I can trace genealogically. In choosing this location, I hoped to give back to a community that had shaped me.

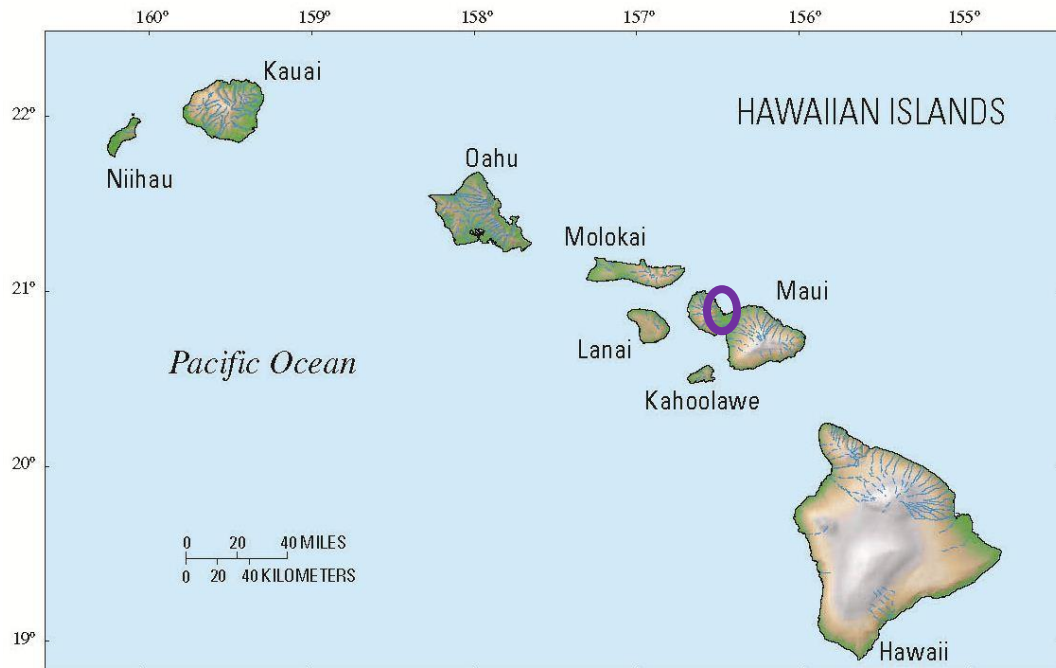


FIGURE 1-1 MAP OF MAUI WITH NĀ WAI ‘EHĀ CIRCLED This map depicts the eight islands of Hawai‘i, with the approximate location of Nā Wai Ehā circled in purple. Image from USGS. Available under Creative Commons Licensing.

Before going into detail about the topic of focus, it is important to provide a cultural history of Waikapū. Waikapū was named after a special conch that could be heard throughout the islands until it was stolen by a supernatural dog (Pukui 1976). While there are not many other references to it in Hawaiian stories, it is mentioned as the location of one of the major battles between Kekuhaupio and Kaliopuu, the former of which was a skilled warrior and high chief of Maui, and Kehekili, the King of Maui. The origin of Puuhele, a hill in Waikapū, is also discussed in the origin story of Kauiki, a hill in Eastern Maui. It is said that Puuhele was birthed as a bloody fetus by Kahinalii, the mother of the famed Pele and Hiiaka (Fornander 1918). Outside of these stories, ‘ōlelo no‘eau name the winds of this region Kokololio (Pukui 1983). While there

are songs that reference this region, they typically do not provide information outside of what has already been mentioned.

Like the other ahupua‘a of Nā Wai ‘Ehā, Waikapū is primarily known for its waters. These waters enabled people living in this area to grow large amounts of kalo (Handy et al. 1972). However, as a result of the Māhele of 1848, which allowed land to be owned, the landscape changed drastically. Much of the kalo was instead replaced with sugarcane.

Choose Your Battles:

As a graduate student early in my career, I had a laundry list nearly a meter long of the things that I wanted to change within the discipline. Yet, the more I became immersed in archaeology and academia as a whole, I realized that for every two steps I gained, I also went one step back. Frustrated by the likelihood of not being able to make a dent in my list by the time I graduated, I relayed this frustration to another Hawaiian scholar. “Choose your battles,” she told me. In some ways, this dissertation is an example of me choosing my battle.

My focus on place led me to seek issues faced by Native Hawaiians in this region and to think about ways that archaeology could help. The main issue that stood out to me was the fight for water by Native Hawaiian kalo farmers, a problem that had persisted since the latter half of the 1800s. When sugarcane plantations began diverting water upstream of taro growers, this impeded Native Hawaiians’ ability to grow taro. While sugarcane plantations have since closed, the descendants of sugarcane plantations⁵ continue to divert water and otherwise interfere with water in ways that negatively harm Native Hawaiians.

⁵ I use the phrase “descendants of sugarcane plantations” here and throughout this paper to refer to the water companies that emerged following the closure of sugarcane plantations. These water companies maintained much of the same leadership as the sugarcane plantations and, thus, served as a way for sugarcane plantations to reinvent themselves.

Legislation:

This research centers on modern water rights activism in Nā Wai ‘Ehā, Maui. In the early 2000s, Hui o Nā Wai ‘Ehā, a group composed of local kalo farmers and water protectors in Maui, successfully petitioned the Commission on Water Resource Management to increase streamflow to Native Hawaiian taro farmers following the closure of Wailuku Sugarcane Plantation. In this petition, they argued that the original streamflow standards had no scientific foundation and that Wailuku Agribusiness, the company that emerged from the closure of Wailuku Sugar Company, was diverting excess amounts of water than was needed leading to water being wasted (Hui o Nā Wai ‘Ehā and Maui Tomorrow Foundation, Inc. 2004). Although these cases resulted in increased streamflow for the local community, the amount the streamflow increased by was only a fraction of what was originally requested (Sproat 2011). As a result, water disparities continue to exist in this region. What this court case makes clear is the need for more scientific research in this region to change temporary streamflow standards and to set permanent streamflow standards.

Scientific Research:

Although the State Water Code requires scientific data to set permanent streamflow standards, hydrological studies in Nā Wai ‘Ehā are few. The studies that exist primarily provide detailed information on how diversions in this region have negatively impacted the habitats of aquatic species. Additional research is still needed to develop a holistic understanding of the negative impact of reduced streamflow on both the community and the environment and, thus, to make a more compelling case for the adjustment of streamflow standards. In addition to this, the existing research only analyzes hydrology from the 1900s to the present, excluding over 50 years of data concerning hydrological changes during the earlier stages of the plantation period (Oki et

al. 2010; Parham 2013). While there may have only been minimal changes to hydrology between 1850 and 1900, failure to study hydrology before the plantation period has additional repercussions. Because there is no baseline understanding of hydrology prior to colonization, it is possible that plantation ditch diversions negatively impacted hydrology to an extent greater than what has been originally suggested. If this is the case, such data can serve as a cautionary tale of the potential impact continued water diversion will have on the environment in the present-day, thus providing additional support for specific types of water management strategies.

Environmental archaeology and paleohydrology, which are better suited for hydrological studies of the distant past, have the potential to provide data that could assist with reallocating water.

Environmental Archaeology:

Environmental archaeology has long been used in Hawai'i to understand how Native Hawaiians altered the landscape. Yet, such studies often seem impersonal and rarely connect the present to the past. As a result, data that could be used to inform modern land and water management strategies often seeps through the cracks. In more recent years, scholars have argued that environmental archaeology has an ethical imperative to serve modern communities, especially amidst climate change and environmental destruction (Kaufman et al. 2018; Riede et al. 2016). The program of historical ecology promises a fruitful form of analysis within environmental archaeology because it combines historical documents and ecological data to reveal information about the past. In this program, landscape and landscape change are the main subjects of analysis.

While initially focused on botanical data, this research had to shift its focus to historical data as a result of the pandemic. It was in this way that I had to “choose my battle”. Although I

do not believe that historical data will be as useful as botanical data to the community, I hope that this can serve as a foundation for additional ecological research.

Geospatial Analysis

Geospatial analysis, a common method in environmental archaeology, has been the focus of this dissertation because it is a non-invasive method that can be accessed online. However, the history of Geographic Information Systems (GIS) has not been without controversy. GIS has been critiqued as a form of positivism that reduces the complexities of past worldviews into datasets that often promote only one correct way of viewing a landscape (Unangst 2023). In this way, GIS has often reiterated the ideologies of dominant groups (Palmer and Rundstrom 2012). To address the political nature of GIS, critical GIS, a sub-focus of critical cartographies, was developed (Crampton and Krygier 2006). Critical GIS advocates for the use of GIS to interrogate systems of power, generate additional ways of conceptualizing a landscape, and map geographies of hope, or ones that provide alternative narratives to the ones that are often dominated by violence (Pavlovskaya 2018). As a result, methods such as participatory mapping, participatory GIS, and countermapping emerged (Alvarez and McCall 2019). More recently, researchers have used GIS as a decolonizing practice. Particularly, studies have focused on detailing Indigenous people's use of mapping to reclaim territories (Peluso 1995), understanding the continuation of Indigenous practices and Indigenous sovereignty despite colonization (Benson et al. 2023; Wegman 2020), outlining the impact of colonization on local communities and their response to colonialism (Acabado 2019; Chenoweth et al. 2021), and developing multiple interpretations of the past (Flexner 2014). Similarly, this dissertation develops a historical ecology of Hawai'i that traces the impact of sustained colonialism while foregrounding Indigenous agency.

Learning our Language is Key to Better Understanding our Culture

Methods:

I got the words “ma ka hana ka ‘ike” tattooed on my arm at the beginning of graduate school because it represented one of the first ‘ōlelo no‘eau I had learned as a researcher of Hawai‘i. The way that I had translated it during that time was “in the work the knowledge”. To me, this meant work hard, learn hard. In this way, the phrase symbolized my commitment to working hard so that I could gain insight that could benefit the Hawaiian community. It was not until Uncle Pono Shim explained hana in a different way that I began to understand another—and more accurate—interpretation of this phrase. He explained to me that hā-na emerged from the sharing of hā (breath). In this interpretation, hana was not emphasizing the capitalistic conception of work, but doing things in community with one another. It was through community-inspired doing that we learned. The nuances were subtle but important.

Translations of Hawaiian documents made up a large component of this research. It was through them that I was able to reconstruct past environments, re-envisioning how my ancestors walked among them, and reconnecting with ‘āina.

The analysis accomplished in this paper was primarily limited to resources that could be obtained online. Thus, Māhele documents, or documents that were submitted to obtain land ownership, aerial photos, satellite imagery, historical climate records, and historical maps were the primary documents consulted. Because of this, there were a limited number of questions that could be answered. Thus, this research focuses on using these documents to reconstruct the landscape during the time of the Māhele, a time before plantations took over, to estimate water usage during this time. After developing a foundational understanding of early Hawaiian landscapes, it then focuses on how water infrastructure and utilization changed as a result of the

plantation period. Through this analysis, it adds further insight into how sugarcane plantations negatively impacted the environment. While this project in itself will not likely be able to be used to support advocacy for a greater water allocation for Native Hawaiians, I hope it will provide foundational data that will spur more paleoethnobotanical research and hydrological modeling to provide more rigorous data to substantiate these claims.

Dissertation Organization:

This dissertation is organized into seven chapters, the first and the last being the introduction and conclusion, respectively.

Chapter 2 outlines the history of community-centered and Indigenous archaeologies while also integrating practices from other fields that have been used to increase diversity, equity, and inclusion. Namely, this chapter focuses on the role cultural humility plays in reshaping archaeological training programs. While I ultimately showcase that community-centered archaeological practices will differ based on the identity of the researcher and the needs of the community, I stress the importance of self-work to challenge one's internalized biases. It is through these practices that it becomes possible to generate an activist archaeology that can serve communities.

Chapter 3 seeks to take a specifically Hawaiian-centered approach. Drawing from the four 'aho (ropes) of resistance, I argue that research must be purpose-oriented. Furthermore, recognizing the inherent focus on land within archaeology, I call for a reconsideration of land that recognizes the familial nature of land to Native Hawaiians. This, I argue, should shape how researchers engage with and develop research projects. In this chapter, I also introduce the multi-faceted conception of 'āina, that is 'āina as source, 'āina as people, and 'āina as ongoing connection and care.

Chapter 4 provides the background for my research project. In this section, I include an overview of changes in land management following colonization as well as review the existing research concerning the impact of sugarcane plantations on the landscape. Throughout the chapter, I focus on changes in water rights legislation in Hawai‘i before concluding with the recent water rights court cases occurring in Nā Wai ‘Ehā, Maui.

Chapter 5 pairs Māhele documents with archival maps to generate an understanding of the landscape of Waikapū prior to sugarcane industrialization. In doing this, I build on the conception of ‘āina as source, ‘āina as people, and ‘āina as ongoing connection and care by reconstructing family and lo‘i distribution and using these data to understand water usage during the time period.

Chapter 6 uses aerial photography, mapping, satellite imagery, and precipitation records to showcase the emergence of sugarcane plantations on the landscape and the impact of their hydrological innovations. By tracing the hydrological and environmental changes caused by sugarcane plantations, I argue that sugarcane plantations had a larger impact on the environment than what has been previously documented. It is this research focus, when paired with modern activist efforts, that can help promote Indigenous futurities in Hawai‘i.

CHAPTER TWO:
CULTURAL HUMILITY AND ITS APPLICATION TO ARCHAEOLOGY

Make your work useful by your meaning and truth...Knowledge that does not heal, bring together, challenge, surprise, encourage, or expand our awareness is not part of the consciousness this world needs now-Manulani Aluli Meyer 2008:7

Anthropology and archaeology are often contentious topics within Indigenous communities. Native Hawaiian scholar Haunani Kay Trask (1991,1993) and Standing Rock Sioux scholar Vine Deloria (1969), particularly, have criticized anthropologists who, they articulate, derive a living from Native cultures. While academics reap rewards like promotions and increased funding, Native people often receive minimal benefits, if any, and, at worst, face negative repercussions by virtue of having histories interpreted by outsiders. Furthermore, when these viewpoints become taught as fact within academic courses, the inculcation of negative Indigenous stereotypes like the “noble savage” or the “disappearing Native” promotes overt racism and policies that oppress Native groups. However, racist generalizations within academia do not stay within academia but have real-world implications. This project seeks to redress inequalities caused by archaeology and anthropology by foregrounding cultural humility within archaeology, especially activist archaeologies, so that archaeology can serve as a space of healing for communities that have been long oppressed by it.

Defining Cultural Humility

The importance of archaeology lies in its ability to produce new narratives about the past that can be beneficial to the present and future. Yet, because the archaeological record is highly

fragmented, there can never be one true interpretation of the past. For archaeologists to generate a narrative about the past, they not only use their critical thinking skills, but draw from their values, backgrounds, and their understanding of what constitutes knowledge. This means that multiple interpretations of the past are possible, none of which are apolitical or objective. While different ways of navigating between multiple interpretations of the past have been proposed such as multivocality (Hodder 2008), relational multivocality (McGuire: 2008), ethnocriticism (Zimmerman 1996), critical multivocality (Colwell-Chanthaponth et al. 2010), reciprocal archaeology (Ferguson 2003), interpretive archaeology (Hodder 1991), mitigated objective knowledge (Wylie 1989), and positioned objectivity (Hale 2008), even these ways do not guarantee that interpretations will be unbiased. Because most archaeologists attend academic programs whose “racial”⁶ demographics reflect the composition of the discipline—where whiteness predominates (Aitchison et al. 2014; Zeder 1997) – biases go unquestioned, becoming indoctrinated into archaeology. At the same time, however, the indoctrination of these biases causes them to appear like commonly accepted facts making it more difficult for other ways of knowing to enter the discipline. When introduced to other ways of knowing, all that cannot be verified by Modern Colonial Standards (MCS)⁷ are immediately dismissed. Rather, to remove MCS from archaeology, archaeologists must deconstruct how knowledge is verified.

The key to evaluating how knowledge is verified in archaeology is recognizing our internalized biases, a process that can be greatly aided by cultural humility. Cultural humility is a concept that originated in healthcare as a way of highlighting how healthcare worker bias

⁶ I acknowledge that race is a problematic social construct while simultaneously arguing that the conception of race produces varying levels of insider and outsiderhood.

⁷ I use MCS here in place of modern Western standards as a way of acknowledging that Indigenous societies live in the West, making terms like modern Western standards a form of erasure. Instead, I have chosen the word colonial as a way of referencing the hegemonic structures resulting from settler colonialism in the United States, Hawai‘i, and elsewhere.

negatively impacts patient health. To reduce bias in the field, healthcare programs have implemented trainings on working with diverse populations to educate healthcare workers on the norms and experiences of those different from themselves in sex, gender, race, ethnicity, ability, sexuality, religion, beliefs, and other manners. These trainings serve as ways of not just accumulating knowledge about diverse communities but using this knowledge to spur self-reflection on personal norms and how these norms have led to internalized biases against certain communities. While these trainings provide the foundational tools to help healthcare workers recognize internalized biases and promote cultural sensitivity, cultural humility is not a singular training. Rather, cultural humility is a lifelong process whereby healthcare workers continue to learn about diverse communities from daily interactions, reading firsthand accounts of their experiences, listening to them, developing relationships with them, and using this knowledge to reduce systemic oppression in their field (Chang et al. 2012; Fisher-Borne et al. 2015; Kirmayer 2012). In this way, cultural humility allows one to embrace, rather than other, differences.

While cultural humility has primarily been applied to healthcare, it holds great promise for archaeology. Much like healthcare, integrating cultural humility into archaeology cannot be accomplished by merely “adding diversity training and stirring”. Rather, to incorporate cultural humility into archaeology, the mentality of the field must first change to one that is concerned foremost with the impact of the discipline on others, especially historically marginalized groups. Cultural humility in archaeology begins with developing a spirit-driven archaeology, or one that is motivated by “the intentionality of process, the value and purpose of meaning, and the practice of mindfulness” (Meyer 2008:3). Meyer (2008) writes,

An epistemology of spirit encourages us all to be of service, to not get drawn into the ego nurtured in academia, and to keep diving into the wellspring of our own awe. In that way,

our research is bound in meaning and inspired by service to others or to our natural environment (4).

When viewed in light of current archaeological literature, this same spirit, which incorporates, rigor, emotion, relationality, and care, is an example of archaeologies of the heart. In this way, I am showcasing how archaeologies of the heart can be applied to archaeological training programs. Because spirit should be the foundational component of cultural humility, cultural humility in archaeology is not a form of virtue signaling but is concerned with making changes within the discipline to respect and honor all identities and relationships. Yet, such changes can only be accomplished by learning about the norms of diverse identities and how they conflict with the norms of the discipline. Therefore, cultural humility is a necessary part of archaeological training that should be done as a precursor to research projects, especially projects done with descendant communities. I propose the integration of cultural humility into the discipline through four main ways: developing more classes that use critical social theory, improving implicit bias training, volunteering with diverse communities, and self-work. While this is not an exhaustive list of all the ways that cultural humility can be integrated into the discipline, the proposed components focus on both structural and personal changes that can address biases at multiple levels. These should, in turn, spark a reconsideration of the research process from the development stages to the methods, to the dissemination of data and findings.

Inherent in these recommendations is the idea that diversity is a continuous process that can never truly be achieved but must always be worked on at both the individual and systemic levels. Thus, while those who hold more privileged identities may have greater work to do, all identities have internalized biases that need to be deconstructed, making these recommendations useful to everyone.

Critical Social Theory:

Before archaeologists begin involving themselves in community initiatives, they need to be educated in critical social theory so that they are provided with the foundational tools to challenge both personal and disciplinary norms. In her work on engaged pedagogy, hooks (1994) notes that the classroom reproduces the norms of dominant groups. Instead, she advocates for teaching through the lens of race, gender, and class to develop a transformative classroom whereby both students and teachers are equipped to fight against oppression. Using hook's (1994) engaged pedagogy as a model, I argue that archaeological classrooms should develop a community that listens to all voices and shares the common goal of fighting against oppression. The integration of critical social theory is a natural part of this process.

While the development of Indigenous, queer, anti-racist, and feminist archaeologies have all been ways that archaeologists have sought to integrate critical social theory into archaeology, these archaeologies are often limited to the periphery. This should not be the case. A foundation in these theories enables archaeologists to understand how to deconstruct MCS within the field and their life. In particular, education in critical social theory allows archaeologists to gain a better understanding of systemic power structures and how other members, especially members from within a community, have sought to address them. By reading the works of critical social theorists, namely theorists with identities different from oneself, it becomes possible for archaeologists to learn about the experiences of communities outside of their own without causing them additional emotional labor. Yet, archaeologists must not limit themselves to revising the theoretical underpinnings of archaeology but must focus on action-oriented steps to make the discipline more inclusive.

Implicit Bias Trainings:

While implicit bias trainings have been one of the primary techniques that have been used to increase cultural humility, I view this as the bare minimum. In many instances, implicit bias trainings allow participants to develop a foundational understanding of the prejudices experienced by diverse groups but do not go further than this. Because most academic programs already require implicit bias trainings, I am not arguing for the inclusion of more of these trainings, but their improvement. Specifically, I argue that it is important to reconsider the way that implicit bias trainings impact historically marginalized groups both in their construction and implementation.

One aspect to think about when developing these trainings is who will be responsible for leading them. While all who lead these workshops should undergo significant training on diversity, equity, and inclusion, the identity of the workshop leader is also important to consider. If leaders are expected to provide a workshop on a topic that they have had no personal experience with, such as racial prejudice, there is the risk that they will deliver workshops that misrepresent the experiences of historically marginalized communities.⁸ To serve as accomplices to members of a community, those outside of it must do considerable and continuous work to gain a better understanding of a community's experiences without demanding additional emotional labor from them.

⁸ For example, I attended a workshop on gender that was led by a cis-gendered person. During this workshop, they suggested that participants use the pronouns "they/them" when they were unsure of a person's pronouns. However, this suggestion is not consistent with the desires of all people. Some members of the trans community that do not go by they/them would instead like to be called by the pronouns that they do go by. In cases like these, using they/them would be seen as an act of misgendering them. In addition to this, certain people with an androgynous appearance (who also do not go by they/them) view the use of they/them as a form of othering. I use the words some and certain in this example intentionally to not homogenize the experiences and desires of all members of the trans community or all those with an androgynous appearance.

On the other hand, choosing a workshop leader that is from within a community also raises other issues. Although leaders from within a community will provide a more accurate representation of the experiences of their community, it is important to recognize that this requires their emotional labor. These trainings place a disproportionate amount of labor on historically marginalized communities, especially when these trainings push them to reveal ways that they have been maltreated because of their identity. Furthermore, there is no guarantee that these trainings will be safe spaces. Leaders from within a community may receive personal attacks from participants who are unable to sit with their own discomfort and challenge their own prejudices. This is not meant to argue that only those from outside of a community should lead implicit bias trainings—as it is not rare for folks from within a community to want to lead implicit bias trainings—but to highlight that those from within a community should not be guilted into leading them. It is not the responsibility of those from within a community to teach people how to be accomplices to them. Rather, it is the responsibility of those outside of the community to educate themselves on experiences outside of their own. The purpose of implicit bias training is to reduce the emotional labor experienced by a given community, not to add to it by forcing them to lead trainings. Therefore, those in charge of organizing implicit bias trainings must navigate between these two tensions when choosing training leaders to develop authentic, but not exploitive, ways of educating people on the experiences of historically marginalized groups.

The way content is presented in implicit bias trainings has also hindered the success of these trainings. Jackson (2018) has highlighted multiple ways that implicit bias trainings fail to be truly anti-racist. These include only addressing overt forms of racism, focusing on white comfort, and prioritizing science over community knowledge. Because many implicit bias

trainings do not spend much time on identifying bias and interfacing with diverse groups, participants are largely kept within their comfort zone (Kim and Roberson 2022). When little time is allocated to identifying one's own biases, participants are not forced to sit in their discomfort nor reflect on ways in which they have contributed to oppression within the field including the ways that they have used microaggressions and reiterated colonial norms and racial biases. Furthermore, because the tools they gain from these trainings assist with deconstructing program norms, if archaeologists do not gain this toolset, the transformation of archaeological programs becomes hindered leading to the reiteration of MCS in the discipline.

The structure of activities is particularly important to consider when developing ways to enhance implicit bias trainings. In their analysis of six implicit bias training programs, Kim and Roberson (2022) found that while sufficient information on implicit bias was present in these programs, they did not result in increased inclusivity. This means that not just the content but the way it is delivered impacts the effectiveness of implicit bias trainings.

Drawing from my first recommendation for improving cultural humility in archaeology, implicit bias trainings in archaeology should expose archaeologists to the practical application of critical social theory. Foremost, rather than passively watching videos and answering questions, implicit bias training can be strengthened through the active engagement of participants. For example, programs can develop trainings that integrate real-world situations and that include questions with free-response answers. Free-response answers allow participants to think through and test out how they would act in a real-world situation without causing direct harm to community members. Rather than clicking through multiple choice answers until the right one is selected, free-response requires participants to pause and think, enabling them to reach a higher

level of Bloom's Taxonomy. In this way, reformatting implicit bias training can help participants move from understanding prejudice to evaluating prejudice in their daily lives.

Volunteering

Volunteering with diverse groups provides another opportunity for archaeologists to deconstruct their biases by increasing cultural humility through experiential learning. Studies have found that volunteering with communities outside of one's own helps volunteers become more accepting of others and helps them to identify their own prejudices (Flangers and Nungsari 2022; Mullings 2013). Yet, volunteering must be done with care so that it does not become another way of extracting emotional labor from historically marginalized communities.

Like implicit bias trainings, the way volunteering is enacted is also important. Studies on service learning courses show that they often do not take into account the need of the community, promote volunteering over changes in social policy, and, at worst, reinforce color-blindness (Becker and Paul 2015; Eby 1998). As a result, I am not arguing for the development of service learning courses in archaeology, but for the promotion of a culture of continuous volunteering⁹. Continuously volunteering with historically marginalized communities differs from service-based learning because the purpose of it is not meant to achieve a singular goal, after which students receive accolades for their "good work." Instead, it is meant to develop a genuine friendship with group members. A natural result from this, just like with any friendship with differences, is self-growth through challenging one's biases. Furthermore, archaeologists should not limit themselves to volunteering with communities only inside their geographical region and theoretical focus. Rather, developing a culture of continuous volunteering encourages

⁹ It is important to note here that I do not suggest mandating volunteering because mandating volunteering could lead to virtue signaling or, at worst, could cause harm to historically marginalized groups if someone who is not driven by cultural humility is forced to volunteer. Rather, I am arguing that volunteering should become a norm in archaeology much like learning different languages is a norm.

archaeologists to understand volunteering as a way of learning from those different from themselves and uncovering their unconscious biases.

The spirit that volunteers bring with them is just as important as the act. As volunteers, archaeologists should come in with open minds to assist the community in ways that are dictated by community needs. This flips the hierarchical relationship between researchers and communities by calling archaeologists to be learners rather than leaders¹⁰. By engaging with communities in this manner, archaeologists can be introduced to other ways of knowing rather than reasserting the primacy of MCS. This exposure should, as it did in healthcare, enhance archaeologists' ability to question their own norms and to reconsider how these norms bias their research lest they reproduce the norms of dominant groups in their interpretations of the past.

Self-Work

Underlying cultural humility is the commitment to self-work. This includes continual critical reflexivity (Nicholls 2009) so that one can recognize areas in which they still need growth. Moreover, because self-work is not as structured as the previous suggestions, this prevents archaeologists from just going through the motions and requires them to be active in bettering themselves and the institution. Commitment to self-work drives people to continue to educate themselves on experiences outside their own so that they can continue to grow as equitable people first and scholars second.

Cultural humility stands in antithesis to virtue signaling. At its core, commitment to cultural humility is a commitment to performing emotional labor. Because of the constant focus on self-improvement in cultural humility, integrating cultural humility into archaeology is not an

¹⁰ Similar sentiments have been expressed by Christensen 2010, Pyburn 2011, Ferris and Welch 2014, McAnany 2016, Maunakea 2016 who focus on indigenous archaeologies and decolonizing practices.

easy task. This is not to suggest that archaeologists are inherently self-centered, but that the way Western universities have been crafted deters one from performing research with cultural humility by promoting individualism. In Western universities, academics are taught to first identify a research area of interest, craft a question, and use carefully researched evidence to make a claim. However, rarely are they reminded to consider if they are the appropriate person to carry out a research project¹¹. Western universities teach entitlement. Yet, academics must remember that they are not automatically entitled to tell the history of a given population or to work with a particular group. Archaeology performed with cultural humility denounces me-centered research, which only values education from Western universities, and promotes we-centered research which incorporates multiple ways of knowing.

The point of introducing cultural humility driven archaeology is not to create a new brand of archaeology to gain citations and accolades. I stray away from imposing strict criteria for promoting cultural humility in archaeology not only because it will look different based on a variety of factors, but because the point of cultural humility is not to prioritize gatekeeping or incessant arguments about definitions coded in inaccessible language. Cultural humility is not about checking boxes, but continuously reevaluating the attitudes and intentions motivating our research. It allows us to be self-critical of how we as archaeologists produce research, causing us to consider the ways in which our research is ego-centered, fetishistic, and colonialist, rather than continuing to pride ourselves for discovering new histories.

Cultural Humility and Research on and with Descendant Communities

Cultural humility takes a specific form when working with Indigenous and descendant communities. Although all archaeologists practicing cultural humility should be engaging with a

¹¹ See Aikau (2020) for more information about understanding the role of identity and responsibility within research.

variety of communities, those engaging with Indigenous and descendant communities must take additional steps to make sure that their research honors both the people and ancestors of these communities. While many archaeologists researching descendant communities already engage with them, what I am calling for is a deeper engagement prior to and throughout the formation of a research project. It is not enough to merely hire community members as workers, one must commit to an experiential engagement with these communities that include “openness, self-awareness, egoless[ness], supportive interactions, and self-reflection and critique” (Foronda et al. 2016: 211) throughout the entire research process. This means that rather than assuming one’s research is ethical by virtue of involving the community, one must be self-critical. Engagement with communities should lead to the uncomfortable recognition of instances where one decides to prioritize their own desires over that of these communities. It is only through interacting with communities in this way that research can be ethical.

Even with ethical forms of engagement, one must still be aware of how archaeological research and researchers affect the community. In particular, one must be cognizant of the ways in which our ignorance and attempts to lessen our ignorance through cultural humility centered engagements put undue stress on communities. While archaeology may provide financial opportunities for these communities, it also demands emotional, physical, and intellectual labor from them. Although some archaeologists have attempted to compensate communities for their labor through volunteering, co-publishing, and community talks, emotional compensation is something often left ignored. There is no universal way that archaeology impacts Native communities from an emotional labor perspective, but there are many forms that it can take. To begin, participating in archaeology can be a form of emotional labor. While it may allow a community to reconnect with and reclaim their culture, it also requires communities to relive

historical trauma by virtue of learning about the experiences of their ancestors. Interactions with archaeologists cause further emotional hardship when communities withstand ignorant assumptions based on improper exposure to their ways of living and must expend additional energy if they choose to correct these assumptions. When archaeological studies challenge a community's long-held beliefs, communities must endure the emotions generated by a challenge to the legitimacy of their culture. To live as a Native is to live with an identity that is constantly challenged, invalidated, and erased. When archaeology exacerbates that, it becomes emotionally dangerous for a community. This is not to suggest that archaeologists deny evidence, but that they must be aware of the experiences of these communities and navigate these situations carefully. Archaeologists must be aware of the potential emotional labor caused by their profession to lessen the exploitation of Indigenous people. The goal of cultural humility driven archaeology, then, is to transform the discipline so that it no longer leads to any form of community exploitation.

Identity and its Impact on Cultural Humility

While I have thus far discussed cultural humility as a way of benefiting archaeology and archaeologists, it is important to stress that there is not one set way of performing cultural humility when working with descendant communities. The way cultural humility is enacted will be contingent on several factors including one's identity and area of focus. In some contexts, cultural humility appears like accepting outsidership and being respectful of knowledge limited to the community. In other contexts, it appears like a deep engagement with descendant communities. And, in still other cases, it means that one should not perform a particular research project. Yet, while cultural humility with descendant communities may look different for a variety of reasons, one thing remains the same: how cultural humility is realized cannot be

dictated by the archaeologist, but must be decided upon by the community. That is to say, while archaeologists might want to help in any way possible, they must also realize that there is a limit to what it is culturally appropriate for them, especially those who are allies, to accomplish. For example, it may be culturally inappropriate to learn an Indigenous language or to participate in cultural traditions in some contexts while in other contexts these same actions will be celebrated. Archaeologists must accept the decisions of these communities even if it is beyond their understanding. Just as Western universities and academic societies like the Society for American Archaeology (SAA) set standards for good archaeology, communities too have their own standards by which good archaeology can be defined. Cultural humility is about understanding our varying levels of responsibility to these communities (Aikau 2019) and making sure one's understanding of a community's way of knowing or being does not ignorantly result in cultural appropriation or cultural homogenization.

In addition to these considerations, researchers who are a member of a community have responsibilities required of them that extends beyond their loyalty to the community of archaeologists. They may have a responsibility to take care of and provide for not only the people from their community but the land from which they emerge. They may also have the responsibility of not only being active within their culture but providing the ladder by which to help younger members excel, especially academically. For them, identity is not a matter of convenience that can be turned on or off on a whim but can be critical to shaping their interpretations of the past and how they engage with the community. The point here is that conducting a research project as a member of a community does not necessarily make the project easier. Even within a community, researchers will experience various degrees of insider and

outsiderness depending on their region of focus, their identity, their upbringing, and their research interests, all of which impact their responsibilities as researchers.

It is in these moments that those of us working within our communities must normalize self-care as part of the research process. Self-care does not have to entail individualism as it does in MCS. Rather, self-care can also look like participating in cultural activities, reading works or listening to podcasts by other community-based scholars, or communing with our natural ancestors. It is only through the practice of self-care that we can maintain the emotional energy required to serve our community.

Cultural Humility and its Application for Activist Archaeologies

Cultural humility sets the foundation for activist archaeologies by enabling the transformation of the field and helping researchers learn how to support activist efforts. Activism within archaeology can be broken down into two components: vocational activism¹² (Casteñada 2016), or deconstructing the discipline in order to change and remove structures that oppress groups, and archaeology as activism (Clauss 2016), or using archaeology to benefit activist efforts. For the full potential of either form of activism to be achieved, a cultural humility foundation is necessary. Cultural humility sets the foundation for change by exposing one to different ways of thinking that inspire the critique of norms whether it is within the discipline or extends to other parts of life.

By its nature, cultural humility sets the foundation for vocational activism within archaeology by introducing people to ways of thinking that are different from their own. Once people are exposed to different ways of doing and different ways of knowing, it becomes possible for them to question norms within the discipline and to deconstruct them in order to

¹² Vocational activism has also been referred to as “activism for archaeology” (Clauss 2016)

improve it. While the way norms are embedded within a discipline might be obvious for anyone with identities or educations outside of MCS, cultural humility is still necessary for greater changes to be made within the discipline, especially when the discipline is dominated by a singular group. Such a foundation takes the onus of decolonizing the discipline off of solely historically marginalized communities, who must fight to have their narratives respected within archaeology, and calls the community of archaeologists as a whole to serve as accomplices to this endeavor. Acting from a privileged position, archaeologists can make archaeology more hospitable to people of varying identities by reducing the amount of emotional labor expected from them simply by taking on the responsibility of making archaeology more equitable and more representative of diverse narratives.

Cultural humility inspires vocational activism by providing the foundational tools for researchers to critique and change the research process. When one is trained in cultural humility, it allows one to be self-critical about their motives and to think holistically about the impact their research has outside of academia. This includes redressing modern colonial biases throughout each step of the research process. Cultural humility driven research, then, represents a reconfiguration of the entire research process, whereby each step intentionally demonstrates care for the community, rather than passively adhering to disciplinary norms. Even with a cultural humility driven foundation, however, it is important to acknowledge that research still benefits the researcher by virtue of it supporting their livelihood. Cultural humility inspired research, therefore, is not self-less research, but goal-oriented research aimed at challenging hegemonic structures that otherwise oppress historically marginalized communities.

Yet, the responsibility of archaeology is not only to improve the craft, but the lives of the communities it serves. It is not enough for archaeology to be considered a form of advancing

knowledge for the good of all. Such an idea disregards how certain communities are disproportionately impacted by the results of archaeological studies and conceals how archaeologies have advanced imperialistic, colonialist, and nationalist agendas (Trigger 1984). Rather, archaeology should have a practical and positive impact on communities that extends beyond the discipline of archaeology. Archaeology should not just be limited to vocational activism but is responsible for contributing to the lives of others through archaeology as activism.

The way I view archaeology as activism is through a combination of different social theories, namely translationalism (Zimmerman et al. 2010), archaeology for activism (Claus 2016) theory as liberatory practice (hooks 1991), and archaeology as political action (Christensen 2010; McGuire 2008, Stottman et al. 2010). These perspectives argue that activism within the social sciences should not only consist of refining theories but should find real ways to change the lives of the communities they serve. McGuire (2008) specifically describes the role of archaeology as an emancipatory praxis, or one that critiques the world in order to change it in ways that benefit underserved communities. Indeed, activism within archaeology must not be limited to convincing more diverse identities to enter the field but should extend beyond the discipline of archaeology to enact positive change in the lives of modern people. Yet, we must also remember that in order to assist and advocate for a community, we must first receive their consent lest we reiterate white savior tropes. It is only through a cultural humility driven approach that we can understand how to be the best accomplices in our activism.

Developing archaeological projects with practical outcomes is especially pertinent for archaeological projects done on and with Indigenous communities. As Tuck and Yang (2012) argue, decolonization should not be a metaphor but should contribute to the sovereignty of

Native people in a way that extends beyond intellectual sovereignty and decolonization of the mind. While the notion of sovereignty is controversial because of its MCS origins, their main point is still relevant. Decolonial work, or any work done to advocate for Indigenous and descendant communities, should make a significant and positive contribution to combatting the oppression faced by these people. While archaeologists have done a great job of bringing Indigenous issues and Indigenous narratives to the forefront (Atalay 2006; Colwell-Chanthaphonh et al. 2010; Conkey 2005; McNiven 2016; McNiven and Russell 2005; Nicholas 2010; Silliman 2008; Smith and Wobst 2004; Watkins 2000; Yellowhorn 2002), thereby critiquing and flipping the dominant narratives that have pervaded history, archaeology has the ability to accomplish more than that. When communities that are still impacted by colonial policies are studied, archaeology can produce data that can assist with overturning oppressive policies.

While utilizing quantifiable data to overturn policies reflects a bias toward modern colonial forms of legitimization, such data are needed because legal systems within the United States are governed by modern colonial systems, except those governed by Native Nations. In previous cases advocating for Native Rights like the *Standing Rock Sioux Tribe v. United States Army Corps of Engineers* and *Mauna Kea Anaina Hou and Kealoha Pisciotto v. Board of Land and Natural Resources and TMT*, a Native ethos appeal held little weight when trying to overturn United States' policies. This is not to suggest that quantifiable data reigned supreme in these cases, especially when the environmental impact of both the Dakota Access Pipeline and the Thirty Meter Telescope were ignored. Nor, do I discount the amount of data gathered by Indigenous groups. Rather, I am suggesting that an abundance of quantifiable data, even if it cannot determine an outcome, proves the best strategy for changing policies because it adheres to

MCS while still being able to draw on Indigenous ways of knowing.¹³ Using rigorous quantifiable data, furthermore, reduces the chance that Indigenous rights will be reduced to spirituality, something that has been used to discredit Indigenous advocacy. The importance of quantifiable data is similarly evident in many policies, including the Water Code of Hawai‘i which requires hydrological data to amend Interim Instream Flow Standards (Hawai‘i State Water Code Chapter 174C-71-2C). This does not mean that archaeology should be reduced to quantifiable data, but that archaeologists seeking to redress colonial policies must make sure that their data is especially rigorous, lest it be reduced to a form of propaganda.

Activist archaeological data should be holistic, incorporating not only rigorous quantifiable data but qualitative data from modern descendant communities when possible. This text defines rigorous archaeological data as information collected using appropriate multi-proxy and multi-scalar approaches. Because the archaeological record is incomplete, we must strive as archaeologists to make the archaeological record as complete as possible by focusing not only on the macro but the micro such as microartifacts and microecofacts. Where technologies have advanced far enough, multi-proxy approaches should be incorporated into the research process to develop well-refined interpretations of the evidence. Furthermore, oral histories, traditional stories, writing, and the communications of modern descendant community members should also be analyzed to understand what they reveal about the past and interpretations of the past in the present rather than automatically disregarded because they are not written. Analyzing archaeological data in this way, helps archaeologists develop a more nuanced interpretation of the past rather than only including data that fits MCS.

¹³ According to Cordova (2016), the reason TMT won the aforementioned court case was because of the prioritization of MCS making an appeal to such standards necessary.

In the same way, the absence of material culture and ecofacts may be just as important as its presence.¹⁴ While archaeologists typically acknowledge that sites do not represent a “Pompeii premise” (Schiffer 1985), there is still a tendency within the discipline to prioritize materiality and to discount sites with less material culture (Wobst 2004). This ideal, however, glorifies MCS favoring materialism, a product of Western capitalism. Rather, than prioritizing sites with more material culture, the analysis of absence must be culturally contingent, considering the role of absence within a given community. In instances where there is an absence material culture, archaeologists should seek to understand how cultural beliefs or practices may have led to the absence of material culture in culturally significant spaces. It is through adding this consideration to multiproxy and multiscalar approaches that our understanding of the past can become more complete. Using this form of analysis and integrating it with cultural humility results in a less-biased interpretation of data and data absence by causing one to consider the way different interpretations reiterate particular biases.

Vocational Activism and Environmental Archaeology

Activist environmental archaeologies hold much potential for contributing to modern Indigenous environmental justice movements because of the rigorous data that they contribute. Yet, environmental archaeologies are not inherently Indigenous or activist-focused and must undergo vocational activism before they can be useful to such movements. Before the early 2000s, few studies, if any, connected environmental archaeology to modern activist movements. Previous studies in environmental archaeology have primarily focused on refining methods, site formation processes, paleoenvironmental reconstruction, and the interplay between humans and

¹⁴ Referencing the Mauna Kea versus Thirty Meter Telescope controversy, Ka‘eo (2019), argues that a lack of material culture can serve as a testament to the sacredness of a place. This is because many sacred places were only visited on special occasions.

the environment (Reitz et al. 2008). Yet, most were situated in the far past without much consideration of recent history or the present.

The turn towards historical ecology resulted in more research projects that considered modernity and the recent past. Particularly, this program, which focuses on the dialectical relationship between humans and the environment, set the foundation for the integration of quantitative environmental data with written material and, thus, assisted with bridging multiple disciplines (Balee 2006). Balee (2006) outlines the following four postulates of historical ecology:

- (a) Practically all environments on Earth have been affected by humans ... (Kidder & Balee 1998, Redman 1999, Sauer 1956), ... (b) human nature is not programmed genetically or otherwise to lessen or augment species diversity and other environmental parameters (Crumley 2001, Hayashida 2005); (c) it follows that kinds of societies defined by various socioeconomic, political, and cultural criteria impact landscapes in dissimilar ways ... and (d) human interactions with landscapes in a broad variety of historical and ecological contexts may be studied as a total (integrative) phenomenon (Balee 1998b, Egan & Howell 2001b, Rival 2006, Sutton & Anderson 2004) (76).

Through this program, researchers began studying landscapes, or the projection of human culture onto the environment (Crumley 1994), in ways that interrogated problematic ideas like environmental determinism, Homo Devastans, and Pristine Primitives. These studies have ranged from showing the value of microbotanical and soil data to highlighting past land and climate management strategies to identifying past landscapes (Armstrong et al. 2015, 2023; Balee 1998; Balee 2006; Balee and Erikson 2006; Beller et al. 2020; Douglass and Cooper 2020;

Erickson 2008; Thurston 2022; Pyne 1998). While not all historical ecology studies are necessarily decolonial, by integrating historical methods, like the inclusion of oral histories, historical ecology shifted the focus of environmental archaeology from one that was purely quantitative to one that could incorporate Indigenous ways of knowing.

In more recent years, historical ecology has begun focusing on the relevance of the past to the present. In particular, there has been a greater emphasis on how past environmental management strategies can inform modern ones (Hessberg et al. 2021; Rick 2023; Riede et al 2016; Stein et al. 2020). These studies not only provide methods for coping with modern climate change but a narrative that makes the past relatable and encourages people to care about present-day environmental issues. Moreover, they highlight the unique roles that scientists, policymakers, and the public play in promoting an environmentally conscious future. Rather than divorced from the past, by showcasing how knowledge from the past can be used to help the present, they demonstrate the potential role that historical ecology can play in modern environmental justice movements.

One tangible way archaeology can contribute to activism is through evidence-informed policies. Hegger et al. (2012) articulate that research cannot only assist with generating policies by contributing data and inferences made from data, but by creating concepts, applying these concepts to policy development, and making research relevant to policy. Depending on the nature of the research question, environmental archaeology has the potential to contribute to any of these areas. However, the integration of research into policy can only be accomplished if this data and the conclusions generated from this data are translated into the language of policymakers. Riede et al. (2016) suggest that archaeology has the potential to inform policy but is often limited by the ineffective communication of findings. Rose et al. (2019) provide

additional support for this claim by explaining that problems between researchers and policymakers include a lack of communication about the uncertainties and limitations of research, the presentation of research in overly complicated ways, and a lack of urgency on the part of policymakers to address environmental issues. This makes it crucial for archaeologists to convey their findings in ways that are straightforward rather than jargon-heavy. Research reports must be highly organized, accessible to the general public and policymakers alike, and must highlight the practical implications of research studies (Poot et al. 2018). Likewise, archaeologists aiming to apply their research to policy should be aware of and disclose the limitations of their studies. In this way, environmental archaeology can be utilized to not only learn more about past human-environment relations but can impact them in the present and future.

However, if environmental archaeology is to address environmental injustices equitably, it must also be critical of how colonial tropes pervade the field, particularly in theories and practices. Aikenhead and Ogawa (2007) note that colonial perceptions held by Eurocentric sciences include that nature is knowable, positivism, a concept of rectilinear time, and anthropocentrism among other things. These ideas stand in stark contrast to many Indigenous ways of knowing. For example, the notion that land is a static and separate entity from humans is based on a colonial classification system. In Hawaiian culture, land is something that is not only related to humans, but that guides, inspires, and provides. This notion recognizes that one's familial connection to place influences human action. In such belief systems, the environment is not a form of capital that humans impose themselves upon, but an active agent. When we conceive of the land differently, even when differences are subtle, it allows us to rethink

relationships and the motivations behind human behaviors. Activist environmental archaeologies, therefore, incorporate Indigenous ways of knowing when appropriate.

Yet, we must also be cautious of how we integrate other ways of knowing into environmental archaeology. While previous research has stressed the relevance of Traditional Ecological Knowledge (TEK) and the importance of integrating it into science classrooms as a way of decolonizing science (Burke et al. 2021; Sniveley and Corsiglia 2001), the way this is accomplished must be further scrutinized. Aikenhead (2002) notes that because TEK is a concept generated by colonial academia, it tends to reflect the research agendas of those outside the community. When TEK is utilized in this manner, it becomes a way of exploiting Indigenous ways of knowing for profit rather than contributing to equity within academia. Indigenous ways of knowing should only be integrated into archaeology with the consent of the community and only after proper community collaboration. Incorporating Indigenous ways of knowing into the field, furthermore, cannot be piecemeal. That is, if researchers are granted permission to utilize Indigenous ways of knowing, they must not only use Indigenous ways of knowing that meet MCS. Traditional stories, songs, and names of winds, rains, mountains, and other landscape features (including their proper pronunciation) should be included in addition to environmental data in order to perform cultural humility-based environmental activism. When activist archaeologies are generated based on cultural humility, they can contribute relevant data to not only mitigate environmental impact but to help decolonize environmental management practices.

Conclusion:

Applying cultural humility to archaeology allows for the development of a more equity-informed archaeology by causing archaeologists to become increasingly aware of their internalized biases and the consequences certain interpretations of the past have for these

communities. Such an application puts archaeologists in positions where they can be informed about the experiences of other groups so that they can apply this to their research. To reference a common teaching adage “you don’t know what you don’t know.” By exposing archaeologists to other ways of knowing through cultural humility, archaeologists come face to face with what they do not know which enables them to reflect on their personal biases. When applied to activist archaeologies, cultural humility helps decolonize the discipline, centering other narratives and bringing about practical changes in the lives of modern communities through rigorous data and its application. Archaeologists, when aware of the colonial tropes that pervade the field, cannot only integrate other ways of knowing into the field but can assist modern communities with environmental justice initiatives by working with policymakers to generate data-informed policies. In this way, archaeology transforms from a colonial study of the past to a tool that can be used for present-day advocacy.

CHAPTER THREE:

ENVIRONMENTAL HAWAIIAN ARCHAEOLOGY AS ALOHA ‘ĀINA

Cultural humility in Hawaiian environmental archaeology allows a new perspective to be integrated into the field by encouraging archaeologists to incorporate Native Hawaiian ways of knowing into their research. In particular, cultural humility in Hawaiian archaeology can lead to new ways of engaging with land. In this chapter, I argue that proper ways of engaging with not just the human community, but ‘āina (land), an ancestor of Native Hawaiians, must be considered in the research process. This consideration transforms the discipline by causing archaeologists to think holistically about the ‘āina and the modern impact of projects so that they can co-develop an archaeology as political action that is not rooted in white saviorism.

Cultural Humility and Project Design

When working in Hawai‘i, there are additional ways that scholars should incorporate cultural humility beyond critical social theory, implicit bias training, volunteering, and self-work. Because research in Hawai‘i will affect descendant communities, it is necessary for researchers to be cognizant of what motivates their research so that they do not negatively impact the community. Generating research projects motivated by Hawaiian values can instead assist researchers in developing information that can be beneficial to the community.

To understand the way Hawaiian values can influence environmental archaeology, it is necessary to start with a brief history of environmental archaeologies in Hawai‘i. Environmental archaeologies in Hawai‘i have played a critical role in generating new information about past land management strategies. Its focuses have included dating Hawaiians’ arrival to Hawai‘i (Athens et al. 2014; Graves and Addison 1995; Kirch 2011), understanding the impact of Native Hawaiians on the landscape (Athens 2009; Athens and Ward 1993; Athens et al. 2002; McCoy et

al. 2012; Morrison and Hunt 2007), agriculture including its change, intensification, expansion, limitations to expansion, and its socio-political impact (Allen 2004; Coil and Kirch 2005; Field and Graves 2008; Kirch 2007; Kirch et al. 2005; Ladefoged et al. 1996, 2008, 2009, 2011; Ladefoged and Graves 2010; McCoy et al. 2011b; Quintus and Lincoln 2020; Tuggle and Tomonari Tuggle 1980; Vitousek et al. 2004), the identification of different types of agricultural sites (Horrocks and Rechtman 2009; Kirch 1977; Kurashima and Kirch 2011; McCoy et al. 2011a; Pearsall and Trimble 1984), and the introduction of certain plants to Hawai‘i (Ladefoged et al. 2005; McCoy et al. 2010). While these studies have been crucial to explaining biological systems and have integrated local communities, many of these studies have lacked the explicit culture and Hawaiian value driven focus.

Examples of the integration of Hawaiian values into environmental studies are instead more common in the fields of conservation and geography. One strategy utilized in Hawaiian conservation has been biocultural models (Marshall et al. 2017; Kagawa-Viviani et al. 2018; Kurashima et al. 2017; Langston et al. 2018; Lincoln and Ardoin 2016; Lincoln et al. 2018; Morishige et al 2018; Winter et al. 2018, 2020). These models recognize the reciprocal relationship between land and people and center Indigenous ways of knowing and place-based strategies when developing land-based research practices (Morishige et al. 2018). Critical to these practices is the integration of Native Hawaiian values throughout the entire research process. Similar practices have also been used in fields like geography. Andrade (2014) integrates Native Hawaiian values with current geographical practices to center Native Hawaiians throughout his research. He notes that Hawaiian geographies are about “being Hawaiian”, “our [Hawaiian] genealogy”, “learning from the land”, “aloha ‘āina”, and “cultural autonomy” (Andrade 2014:7). By blending science and Native Hawaiian values, these authors

show that it is not only feasible to integrate Native Hawaiian values with rigorous data, but that they have the potential to contribute to new lines of inquiry that are more relevant to the modern community of Native Hawaiians.

In the case of archaeology, perhaps the most straightforward method of integrating Hawaiian values into the discipline is by considering the four ‘aho of resistance. These ‘aho are broad enough to encapsulate a variety of research questions and lines of inquiry, but specific enough to provide general guidelines on considerations that should be made when doing research in Hawai‘i. Goodyear-Ka‘ōpua (2016) notes that Hawaiian studies should consist of the four ‘aho of resistance. She defines these ‘aho as “*lāhui* (collective identity and self-definition), *ea* (sovereignty and leadership), *kuleana* (positionality and obligations), and *pono* (harmonious relationships, justice, and healing)” (Goodyear-Ka‘ōpua 2016:3). These ‘aho highlight different elements that are important for researchers to consider when doing research on Hawai‘i so that they can develop projects that not only collaborate with but care about the community. Through focusing on these ‘aho, it becomes possible to expand the way we conceive research and the considerations made throughout the research design process. Therefore, the four ‘aho of resistance should be foundational elements of Hawaiian culture humility based archaeological research.

Because the four ‘aho of resistance have meanings that cannot be translated into English with a singular word, it is necessary to explore their meaning as it relates to Hawaiian archaeology.

Lāhui considers how research serves Hawaiians. This includes how it collectively benefits the community, especially in ways that give agency to Native Hawaiians. It recognizes that research should empower Native Hawaiians and should provide them with opportunities to

decolonize the histories of Hawai‘i. In this way, it pushes back against colonialism, which strives to erase Native Hawaiian histories and portrays Hawaiians in ways that are only acceptable to the colonial gaze. Rather, it encourages Native Hawaiians to take a central role in redefining their histories and, by extension, redefining the research process. In Hawaiian archaeologies, this means that Native Hawaiians must be key collaborators throughout the entire research process.

Ea urges us to consider the ways in which we as researchers contribute to Hawaiian sovereignty. Sovereignty used here is defined as both political sovereignty and the restoration of practices that promote the well-being of our ‘āina. Thus, researchers should consider how projects can assist with overturning colonial policies and with reinvigorating Hawaiian practices. Additionally, ea encourages one to only pursue research that is purposeful to Native Hawaiians. As archaeologists, it can be difficult to make a direct connection between our research, which concerns the past, and the present. Yet, ea is what makes our research meaningful by begging us to consider how research about the past can assist with decolonization by restoring past forms of prosperity within the modern context.

Kuleana encourages one to be cognizant of the political nature of research, that is, who our research affects or who it has the potential to affect. Particularly, kuleana necessitates a sense of responsibility to the Hawaiian community. It is this sense of responsibility that should guide research practices rather than a sole commitment to disciplinary norms. Because research is not neutral, kuleana encourages one to use research as a way of creating positive change within the Hawaiian community. Rather than solely profiting from the community, kuleana guides archaeologists to think about how they can give back to the community in long-lasting and sustainable ways.

Pono similarly advocates for research as healing. It is the desire and implementation of practices that promote justice and equity throughout the entire research project. Research as healing is about using research to reduce inequities, including helping restore the relationship between Native Hawaiians and their ‘āina. Thus, reconsidering the way power is reiterated throughout the research process is necessary. This focus allows research practices and questions to be tailored so that they do not reassert hegemonic structures. In an archaeological context, pono encourages researchers to reconsider who holds the power throughout the research process and whose voice predominates. Yet, it is about more than just being aware. Pono encourages researchers to modify research practices so that colonial power structures are not reiterated.

When applied appropriately, these values encourage one to think more broadly about how archaeological research is connected to the lives of the modern population. By providing specific elements for archaeologists to consider, the four ‘aho of resistance encourage them to reflect on how disciplinary norms bias the interpretation process. Through this critical reevaluation, it becomes possible to develop new disciplinary standards that center Native Hawaiians, thus promoting vocational activism within the field. While cultural humility gave me the initial encouragement to integrate Hawaiian values into my studies, it was the four ‘aho of resistance, particularly, that shaped each aspect of the research design process.

‘Āina-centered and ‘Āina-inspired Research

As illustrated by the previous section, cultural humility in Hawai‘i carries with it additional concerns because of its impact on descendant communities. In Hawaiian culture, land is part of this community. Thus, our relationship with it as researchers and the way we interact with it is likewise just as important as how we interact with Native Hawaiians.

It is necessary to articulate the ways in which epistemologies towards land differ between Native Hawaiians and those with MCS because epistemologies determine how one navigates research, what constitutes valid knowledge, what kind of data can be used, and how it is interpreted. While environmental archaeologists already use the landscape as a means of understanding past human-environmental relationships, they often view it as a subject devoid of agency. Yet quite the opposite is true in Hawaiian culture. In Hawaiian culture, the land and the abiotic elements associated with it have agency. This is not only because the land and natural forces can physically impact the lives of humans through flooding, drought, and erosion, but because of the spiritual nature of land. However, it is not currently a common practice to consider a researcher's own relationship to the project area. Meyer (2008) writes,

Indigenous people are all about place. Land/aina, defined as “that which feeds,” is the everything to our sense of love, joy, and nourishment. Land is our mother. This is not a metaphor. For the Native Hawaiians speaking of knowledge, land was the central theme that drew forth all others. You came from a place. You grew in a place and you had a relationship with that place... Land is more than a physical place. It is an idea that engages knowledge and contextualizes knowing. It is the key that turns the doors inward to reflect on how space shapes us. Space as fullness, as interaction, as thoughts planted. It is not about emptiness but about consciousness. It is an epistemological idea because it conceptualizes those things of value to embed them in a context. Land is more than just a physical locale; it is a mental one that becomes water on the rock of our being. Consideration of our place, our mother, is the point here. And she is more than beautiful, or not. She is

your mother... With regard to research, our early spaces help create the topic you choose, the questions you formulate, and the way you respond to data. It is all shaped by space. Not time. Conscious shaping space. Space-shaped consciousness. An epistemological priority (4-5).

By describing “land as our mother,” Meyer demonstrates how the value of place in Hawaiian culture is not reduced to its economic value. Rather, place has value to Native Hawaiians because of its genealogical connection to them. Land is not merely acted upon but acts on us. A similar sentiment resonates in the ‘ōlelo no‘eau: He ali‘i ka ‘āina, he kauwā ke kanaka. The land is chief, people are its servants. This ‘ōlelo no‘eau highlights that land guides, but does not determine, human action. Because land is the foundation of archaeological practices, especially environmental archaeology, researchers must expand their epistemological conceptions of land so that their research practices do not negatively impact or hold little relevance to the community. That is, land and activities done on that land such as agriculture, must not only be considered in regards to intensification and land ownership, but through the ways in which familial relationship to land encourage action. Furthermore, ‘āina’s agency is not limited to the past but is just as impactful in modernity. As Meyer (2008) articulates, places shapes all aspects of research. Thus, a foundational concern of cultural humility in Hawai‘i is the role and contribution of land to the research process.

Archaeological research in Hawai‘i is as much about us learning about a place as it is about place shaping us and our research practices. It is through strengthening one’s relationship with ‘āina that they develop aloha for ‘āina and, thus, ‘āina-inspired research. To form a relationship with ‘āina, one must understand its different components and use this understanding

to shape the research process. Vaughan (2015) suggests that ‘āina can be divided into three strands: ‘āina as source, ‘āina as people, and ‘āina as ongoing connection and care, all of which she uses to guide her environmental sciences research. It is these strands that I draw upon to shape my conception of a cultural humility-based environmental archaeology of Hawai‘i.

‘Āina as source recognizes that knowledge comes from a place itself. Hawaiians accessed (and access) this knowledge through the practice of kilo (observation) and ma ka hana ka ‘ike (learning by doing). In the same way, researchers must develop the tools to listen to ‘āina so that ‘āina can inform their research. Vaughan writes “‘āina should be not only subject but also partner, source, inspiration, and guide” (2015: 48). Rather than imposing oneself on the land, working on it, especially in ways that give back to the land—like through sustainable agriculture practices—allows researchers to learn what it means for ‘āina to be a guide. It is through working on the land and observing its multiple features that archaeologists gain a new respect and a deep appreciation for ‘āina that surpasses mere curiosity.

Furthermore, viewing ‘āina as source should inspire one to educate themselves on its history. Learning a place’s stories, names, winds, rains, chants, ōlelo no‘eau, and histories, among other things, especially in ‘ōlelo Hawai‘i (Hawaiian language) is paramount. While much of this is not new to environmental archaeologies of Hawai‘i, I wanted to reiterate the importance of learning about ‘āina in this way, especially as environmental archaeologists. It is these histories of ‘āina that allow researchers to access ancient and astute observations concerning past environments. Yet, we must also be cautious with what we do with this information so that it is not used in exploitative ways.

Along with knowledge gained from land and its stories, it is also important for researchers to be cognizant of the appropriate and inappropriate ways to interact with land. This

notion of appropriate versus inappropriate interactions with ‘āina includes, but extends beyond notions of sustainability. Hawaiians have developed a multitude of protocols for entering, exiting, and interacting with different spaces. Knowledge of these protocols and the ability to practice them in one’s research is necessary. One might consider archaeological sampling as a parallel to Hawaiian gathering practices. Such practices not only involve specific protocols, but a particular mindset. It was customary to take only what was needed and to leave the rest, a sentiment that should similarly be a guide for researchers (Kawelu 2011). Therefore, the invasiveness of sampling strategies and their impact on ‘āina must be a consideration made during the research development stage. By viewing ‘āina as source, land becomes as much part of the research decision-making process as the human community.

Land as people acknowledges that while Hawai‘i is the mother of all Hawaiians, Hawaiians also have a special relationship to their kulāiwi, or the area in which their ancestors lived and were buried. This relationship is further solidified through the Hawaiian practice of burying one’s umbilical cord and placenta in their kulāiwi, which connects them to this land and their ancestors buried here (Pukui et al. 1972). Yet, it is not just the burial of afterbirth that connects one to a place, but the place-specific ancestral knowledge that is accumulated and refined over generations. Oliveira (2016) discusses this connection in her description of the sense of kulāiwi. She writes,

The sense ability of kulāiwi values our longstanding relationships with our ancestral homelands. It appreciates the unique local knowledge systems that we refine over generations by residing on the same lands. It honors the fact that within the Kanaka community there are subcommunities of people who have

developed local practices and knowledges that differ from those of Kānaka residing elsewhere in the pae moku (81).

This intricate local knowledge allows Hawaiians from this area to share an even deeper connection to this place because they know the proper way to serve and mālama (take care of) the land. Engaging with research on ‘āina, therefore, necessitates getting to know the people who know her best and valuing their knowledge.

In addition to understanding the deep connection Hawaiians from a particular region have with their ancestral lands, recognizing ‘āina as people also includes acknowledging that there are greater limitations for researchers not from this ‘āina. From a Hawaiian standpoint, our relationship to a place determines our kuleana (responsibilities) to it. Even those who are Hawaiian, but who work outside of their kulāiwi, must recognize how their responsibilities differ, lest they be considered maha‘oi (presumptuous). Aikau (2020) notes that those not from a location should instead seek to be hoā‘āina, or a “friend, caretaker, [and] partner who is tied to and bound to ‘āina based on kuleana that is not genealogical but that comes from hanalima, working with our hands in the lepo (dirt, soil)” (87). It is through engaging with ‘āina as people and ‘āina as source that we can identify our kuleana to it.

‘Āina as ongoing connection and care is as much about being aware of the political nature of a project as it is about life after the completion of a project. ‘Āina viewed this way calls one to examine the aims of a research project, especially during the project design process. Because researchers are the primary beneficiaries of a research project, they must consider the way a project benefits them, even in work done in conjunction with communities. Such questions should inform research practices: How do I benefit from this project? Am I using my privilege in this project to equally contribute to the community? Are benefits equal for different partners in

this project? Are there ways in which my benefits from this project might oppress others? These questions will help guide intentional research practices. Researchers should also consider the impact of research practices on the future. This includes prioritizing research questions that help ensure the continuation of the people and the place, especially amidst mass development in modernity. If the purpose of ‘āina is that which feeds, then it is necessary to consider how one’s research is actively contributing to the health of the land by pursuing questions that benefit modern food production and food sovereignty.

Following the completion of a research project, ‘āina as ongoing connection and care serves as a contrast to the extractive nature of research. Rather than moving to a new region of interest once the fieldwork of a project has ended, ongoing connection and care encourage one to honor and maintain all the relationships made during this project through continuously engaging with ‘āina. It calls one to be a hoā‘āina to this place where one’s drive to give back to it is rooted in aloha ‘āina.

Rooted in Cultural Humility

In this section, I demonstrate my experience with cultural humility and its application to Hawaiian archaeology. I specifically outline my experience with critical social theory, volunteering with different communities, and self-work. However, I have chosen to leave out implicit bias training because the majority of the ones that I have attended have been largely ineffective and, thus, they inform the critiques that I have made of implicit bias training in Chapter 2. Furthermore, I showcase how cultural humility drew me to integrate Hawaiian ways of knowing into my research design process. At the same time, I acknowledge that there are many ways of incorporating Hawaiian ways of knowing into archaeology and this represents but one process. My process is a personal reflection of my identity and lived experiences. I do not

wish to make my process into a model, but to instead highlight the benefits of integrating Hawaiian ways of knowing into archaeology.

Critical Social Theory

The way that I have approached this project is a result of cultural humility. Cultural humility is a process that I have inadvertently engaged with since the beginning of college. During the first semester of my undergraduate career, I was introduced to queer theory. My queer theory course provided me with the foundational tools to challenge MCS by allowing me to understand different ways of critiquing dominant power structures and introducing me to concepts like intersectionality, heteronormativity, and reproductive futurity. Because of this class and future classes, which introduced me to feminist and decolonial theory, I became more aware of the ways in which modern colonial norms are embedded in society and gained additional tools to critique them.

These classes meant the world to me because they provided me with a way of making sense of instances where I did not feel like I “fit in” and gave me the language by which to articulate my lived experiences. As a result, I not only began to recognize how norms and dominant power structures pervaded my daily life but gained the confidence to challenge, rather than passively accept, them. It was this constant emphasis on the need to question everything that I believe motivated me to learn about the lived experiences of others and allowed me to listen with open ears rather than making assumptions about other peoples’ experiences.

Volunteering with Communities:

Along with learning theory, I participated in multiple different Diversity, Equity, and Inclusion (DEI) based clubs including ones involving the LGBTQ community and the Pacific Islander community. Much like my entrance into critical social theory, my decision to volunteer

was not motivated by any requirement or the “trendiness” of activism. While I initially entered these spaces to learn more about and to be in solidarity with people holding similar identities, I realized that even as someone from within the community, there were still considerable opportunities for growth. Participating in the LGBTQ community and other DEI groups allowed me to see firsthand how one’s gender and race influenced the way these people were treated by others in multiple different spheres. Unlike in classes, the ways they were treated were no longer theoretical, but were the realities of friends, people I deeply cared about. It was this care that guided me to seek research avenues that, while based in theory, had practical and positive outcomes for others.

My experience in the Pacific Islander community further strengthened my desire to perform advocacy-based research while giving me a deeper understanding of how to perform community engagement appropriately. As the “baby” of my Hawaiian group, a group predominately composed of elders, I took the approach of “nānā ka maka, ho‘olohe ka pepeiao, hana ka lima, pa‘a ka waha” (look with the eyes, listen with the ears, work with the hands, and shut the mouth). Because I came into the space already respecting the members of this organization (since respect for elders is part of Hawaiian culture) and valuing their insight, I was able to learn more about my culture and cultural values. This included learning about ways that I could help the community and how to identify when I needed to speak up and when I needed to step back. Most importantly, I gained the opportunity to listen to the lived experiences of many of our members. Like my experience with the LGBTQ community, this opportunity made the statistics from research studies come to life. However, it also shed light on something that many research studies had failed to mention: the strength of the community. While experiences like the large amount of death and health disparities in the Hawaiian community were tragic, I also

learned about the unwavering leadership in the Hawaiian community, especially the leadership demonstrated by wāhine mana (spiritually strong women). While I have always respected elders within the Hawaiian community, volunteering with them left me in awe of the amount of work that was able to be accomplished despite having a small membership. Participating in my Hawaiian group further strengthened my belief that communities like these do not need outside leaders or researchers to tell them what to do. Rather, these groups already have a strong idea of what needs to be done and the best way to do it. What the community needs instead are researchers who will serve as accomplices to do the work that they cannot do because they are already inundated with kuleana and do not have the time, resources, or emotional capacity to do more. As a result, researchers are helpers, not leaders.

Self-Work

Self-work has been something that I have incorporated throughout my entire research process. For me, self-work has consisted of continuously researching videos and texts created by those with identities and experiences different from mine so that I challenge my preconceived notions. By doing this, I am drawing from the resources already provided by these communities without demanding any additional emotional labor. Moreover, as I develop a project, I go through multiple phases of self-reflection to identify ways in which my biases or interests impact the project. Cultural humility has allowed me to understand how academia has normalized research processes that are self-serving, enabling me to be self-critical of my own motives and research practices and to realize the far-reaching impact research can have outside of academia. It has allowed me to think intersectionally and to understand research as a way of not only rectifying one issue but as a way of redressing modern colonial biases throughout each step of

the research process. Yet, even with a cultural humility driven foundation, I acknowledge that this research project benefits me foremost by virtue of it supporting my livelihood.

Cultural Humility Driven Activist Archaeologies: Identity, ‘Āina, and Kuleana

Kuleana, ea, lāhui, and pono have all significantly influenced my research process. However, perhaps the value that first sparked my research direction was my kuleana to ‘āina. It was this kuleana to ‘āina that not only encouraged me to pursue Hawaiian archaeology but to pursue it in a region that I felt deeply connected to. Although I knew that archaeological projects were more common on other islands, I was determined to pursue research in Maui because of my connection to it. When I think of trips to Maui as a kid, I remember the ‘ala (fragrance) from the plumeria trees in my grandfather’s yard in Kahului welcoming me home. I think of the smell of limu as we drove down Kahului Beach Road and the feel of ‘awapuhi as we made “‘awapuhi shampoo”. While much has changed since I was a kid, it is still the first breath of air as I exit the plane, tinged with the scent of plumeria and droplets of humidity, that allows me to know that I am home.

I initially took interest in Nā Wai ‘Ehā—a section composed of the ahupua‘a of Wailuku, Waihe‘e, Waiehu, and Waikapū—and the Kahului region because it is the first place I consider home when I think of Maui. As a child, I would spend much of my time in Maui visiting my grandfather in Kahului and my aunts and uncles in Wailuku and Waiehu. While we were there, we would hike in ‘Īao Valley, Waiehu, and Waihe‘e and would listen to my mom's stories about going to “Christ the King [school]”, graduating from Maui High, and working at places that no longer existed. This was the landscape that shaped my orientation to place in Maui during my formative years.

As a Native Hawaiian researcher in Hawai‘i, I knew that part of my kuleana was tracing my mo‘okū‘auhau (genealogy) further back so that I could get a better understanding of my responsibility to ‘āina. As part of this process, I learned not only about my connection to the areas that had shaped my formative years but my connection to a variety of different regions. While records of my genealogy are highly fragmented, my family has lived in Central and Western Maui and occasionally in Eastern Maui for as far as I can trace back. Places in which they have resided include Kahului, Wailuku, Waihe‘e, Waiehu, Pu‘unēnē, Hāna, Makawao, and Kula. According to historical records, my great great great grandmother, Carolina Enos (aka Kalalaina Enos aka Carrie Lee Pat aka Carolina Quill) owned land in Puhauohe in Waihe‘e which she later gifted to my great great grandmother, Hattie Lee Pat (aka Hattie Soares Sentinella) who also retained land in Peahi in Hamakualoa and Kawela in Hāna. Their connection to sugarcane plantations and information on how they obtained these lands is still unclear. My Enos ancestry may be related to the Enos of Waikapū, Maui, though the exact relationship is still unknown. The kulāiwi of my great great great great grandmother, Lo‘e is likewise still a mystery, though she lived in Pu‘unēnē in what appears to have been a sugarcane plantation camp for part of her later years likely as a result of the Māhele of 1848. Tūtū (grandma) Lo‘e is the node in my genealogy that I have been stuck on for the last few years. While historical records indicate that she lived for nearly 100 years, there is little else that I can find about her. I constantly say to myself, “E Lo‘e, aia i hea? (Lo‘e where are you?)”. My conception of home and my mo‘okū‘auhau all contributed to my wanting to pursue research in this area.

My understanding of my kuleana as a researcher was also shaped by my experiences as a diasporic Hawaiian. I am a Native Hawaiian¹⁵ who was born and raised in California, but who spent a few weeks of each summer in Maui. While we were brought up in a particular fashion reflective of my mother's upbringing, we were never taught what was specifically Hawaiian or not except as it related to food. In actuality, I spent much of my childhood being confused about which practices coincided with a particular culture as a multiracial individual. It was not until college, where I moved away from my family for the first time, that I began to understand something was missing, something that I could not quite put my finger on. I attempted to join my school's Hawaiian club during my first year of undergraduate but was particularly dismayed when I could not "feel" the culture and decided to quit shortly following that year. Nevertheless, amidst navigating other parts of my identity, a desire to learn more about and grow in my culture remained. After reluctantly taking an archaeology course to fill my interdisciplinary studies major requirement, I became interested in archaeology because it allowed me to think differently by using material culture as sources of evidence. That summer, staring up at the 'Olowalu petroglyphs in Maui, a strong sensation overtook me as I gazed in awe at the depictions of the past that stood right before my eyes. It was then, that I began to consider the possibility of becoming a Hawaiian archaeologist.

Two years and a few graduate school applications later, I entered the world of archaeology with rose-colored glasses. Because I had neither a sufficient background in anthropology or archaeology, I was ignorant of the different ways these disciplines had

¹⁵ I define Native Hawaiian as anyone whose ancestry can be traced to those inhabiting Hawai'i prior to 1778. While Echo-Hawk (2010), Echo-Hawk and Zimmerman (2006), and McGhee (2008) might reduce this to problematically employing the figment of race, my focus is not on biological characteristics of race, but the connection the genealogical connection to 'āina and the kulāiwi knowledge gained from inhabiting a location for a significant amount of time (Oliveira 2015).

negatively impacted Indigenous groups. Rather, I had joined archaeology to learn, perhaps selfishly, about my ancestors, and to preserve and perpetuate Hawaiian culture amidst development and tourism. It was also during this time that I joined a Hawaiian hui (group), started 'ōlelo Hawai'i (Hawaiian language) courses, and began to understand Hawaiian culture and its impact on my research. Sitting between two worlds as a Hawaiian learning their culture, but raised and educated in Western academia, I begin to carve my own understanding of what it means to do research not only as a Native Hawaiian but with the Native Hawaiian community.

My identity is important because it impacts who and how I research and how I am perceived by the community. As a diasporic Native Hawaiian and an archaeologist, I am both an insider and an outsider. While insider and outsider relationships have been discussed primarily in terms of serving as a researcher (outsider) within one's community (insider) (Aikau, 2019; Smith 2013; Tengan 2006), politics in Hawai'i create further divisions. Being Native Hawaiian does not necessarily make me an insider. Kauanui (2007) suggests that growing up outside of or moving away from Hawai'i creates further ideas of otherness, causing some who were raised in Hawai'i to question diasporic Hawaiians' authenticity. Similarly, other notions of Hawaiian authenticity persist within modern-day Hawai'i, regardless of residence. In another work, Kauanui (2008) problematizes notions of blood quantum, which classifies only those who have 50% or more Hawaiian blood as Native Hawaiian. While she notes that this has been a colonial tool to remove Native Hawaiians from their land and, in actuality, Hawaiian identity is determined by one's maternal and paternal genealogy, these notions still persist within parts of the Hawaiian community. Ledward (2007) has also articulated how notions of Hawaiianness have become racialized, noting that darker-skinned Hawaiians and those who possess certain

racial features are often considered more Hawaiian than paler Hawaiians¹⁶. While not every Hawaiian possesses these notions of Hawaiianness, it still creates divisions within the Hawaiian community and ideas of who can be considered Hawaiian, divisions that further serve to promote the colonial agenda. As a relatively pale, diasporic Native Hawaiian who does not meet blood quantum and as a Hawaiian archaeologist, a controversial profession within Hawai‘i (Kawelu 2015), I do this research with the notion that throughout it my authenticity as a Native Hawaiian may be called into question. A great deal of care and carefulness surround this research because it is not only professional but personal.

Yet, even while I am still in the process of relearning¹⁷ my culture and returning to my roots, I have very much been guided by my identity as a Native Hawaiian. As a diasporic Native Hawaiian, I was concerned with producing research that could somehow give back to the community that shaped my formative years. It was through researching my deeper genealogical connections to this place that I began to recognize this pulling as the tug of kuleana. This project is an act of reconnecting to my roots and reclaiming my kuleana to my kulāiwi by remembering its mo‘olelo and mo‘okū‘auhau and avidly practicing aloha (love) and pilina (connection) to ‘āina (Osorio 2018). This project is part of my responsibility to the ‘āina.

Hawaiian Values and My Research Process

Hawaiian values were critical to every step of my research process from beginning to end. They not only shaped how I constructed this project but allow me to hold myself

¹⁶ While it is problematic to associate one’s physical appearance with their dedication to learning their culture, I simultaneously acknowledge that colorism is an issue in modernity and that I have received certain privileges as a result of my skin tone.

¹⁷ I use the word relearning intentionally as a way of recognizing the Hawaiian foundation I had growing up, even minimal.

accountable for things that I should have done better. Moving forward, they will continue to influence the way that I perform research and the products of this project.

Question and Theory

It was my understanding of my own kuleana that first inspired this research project. Kuleana motivated me to get in touch with my roots in order to get a better sense of the modern struggles that were occurring in the Native Hawaiian community. Through kuleana, I not only became aware of community issues but began to understand how research could be used as a tool for positive change. It was also kuleana that allowed me to understand my role as a researcher, that is, not as an expert with a set research topic, but as a guest and listener. While kuleana to ‘āina was ultimately the value that brought me to doing research in Maui, all four ‘aho of resistance, as well as the three components of ‘āina, greatly shaped this project’s formation. Lāhui was the central value guiding my research. For me, lāhui included not only the local community but the community of Hawaiian scholars, which impassioned me to reconsider how history could be told through our own voices, using our own worldviews, to make sense of our ancestors. Through reading texts and listening to other scholars, I began to understand Hawaiian epistemologies as critical elements of the research process. Lāhui also guided me to get in touch with the Hawaiian community both in Maui and in California. Once I began understanding issues faced by the community, pono, specifically led me to focus on activism. The value of pono caused me to think about different ways that this project could be used to fix inequalities faced by the Hawaiian community. It was through my commitment to pono research that I began to see the need to advocate for fixing power differentials between archaeologists and the Hawaiian community and between Hawaiians and colonial policies. Pono specifically influenced me to go beyond decolonizing the discipline and to think about the ways that my dissertation could have a

tangible impact on the lives of community members. This motivated me to think of a research question that could produce a practical and positive outcome for the community, especially because archaeology has had a controversial history in Hawai‘i.

Ea is what led me to think about the connection of my research to sovereignty, particularly what led me to study water rights from a legal perspective. It was ea that allowed me to realize that a practical and positive outcome must aid in the sovereignty of our people. Specifically, ea allowed me to understand the importance of water to our community. Through ea, I was able to connect water diversion to other issues within the Hawaiian community such as the reliance on imported foods, the high cost of living, and the relatively low public health. It was ultimately lack of water that was prohibiting our food sovereignty and driving Hawaiians from our ‘āina. While at times I felt conflicted about participating in a colonial research field like archaeology, these four ‘aho of resistance were what led me to believe that archaeology could be done in ways that benefited the community.

Methods

My methods were likewise shaped by the ‘aho of resistance. In this particular instance, pono and kuleana to ‘āina were the values that most influenced my research. Kuleana to ‘āina and pono encouraged me to become aware of how past archaeologists had mistreated the community and the ‘āina. Thus, it encouraged me to use methods that did little to disrupt the ‘āina. In this case, microbotanical research. My decision to pursue microbotanical research was also influenced by lāhui. Lāhui helped me understand the value of plants to Native Hawaiians and how studying microbotanicals could aid in reconstructing past landscapes. By specializing in microbotanicals, something that is understudied in Hawai‘i, I wanted to serve as a resource to the community, providing my skills to help them answer questions that were unable to be answered

with the current research methods in Hawai‘i. Furthermore, ea allowed me to understand the importance of rigorous quantifiable data to water rights legislation. Because microbotanical analysis can yield rigorous quantifiable data, this further encouraged me to pursue microbotanical research as a method.

Changing the Project

While my initial intention was to perform microbotanical analysis, I was unable to complete this form of analysis due to the Covid-19 pandemic. Yet, four ‘aho of resistance were still critical to my decision to utilize different methods. Kuleana guided me to improve my ‘ōlelo Hawai‘i during the pandemic, ultimately influencing me to use Hawaiian documents in my research. Lāhui guided me to produce research that could tell the tales of those Hawaiians originally inhabiting the landscape. By showcasing the large number of people who lived on the ‘āina prior to colonization, I hoped to help prevent the erasure of the lāhui. While the methods I could perform were limited because I could only use online resources, and thus my ability to use quantifiable data was also limited, ea encouraged me to keep with my original research question and to produce research that might serve as a foundation for future activist-based research studies. Much like how pono influenced my initial choice of methods, pono in this instance similarly guided me to pursue non-invasive methods.

Completion of the Project and the Dissemination of Data

As I complete this project, the four ‘aho of resistance cause me to reflect on my research project and to hold myself accountable for ways that I have not been able to achieve the goals that I initially set out to accomplish during my research design process. When I think of lāhui, I see how I maintained relationships with the Hawaiian community in California. It was also lāhui that caused me to decide that I would not go back to Hawai‘i as long as there were significant

amounts of Covid-19 cases in California. This is because my concern for lāhui made me reflect on how the pandemic mirrored the introduction of foreign diseases in Hawai‘i. In addition to this, lāhui allows me to hold myself accountable for losing connection with the Maui Native Hawaiian community as a result of the pandemic. I failed to reach out to continue this connection throughout and, for the most part, lost touch with them during the completion of my dissertation. Kuleana and pono motivate me to reconnect with the community and ‘āina. Even though this research project has since ended, it allows me to understand that if my research has the potential to do good for the community it must first start with reconnecting. Kuleana also motivated me to continue learning ‘ōlelo Hawai‘i so that I can read Hawaiian newspapers and, thus, serve as a resource to the community in this way. My commitment to ea also makes me reflect on the ways in which I have failed to promote sovereignty in the community. Because I have failed to engage with policymakers, my work does not have the same political impact that I originally intended. Furthermore, while this dissertation might serve as the foundation for more research, it alone does not provide the quantifiable data and interpretations required to influence water rights. Lāhui, kuleana, pono, and ea are all reasons why I will not publish or disseminate my data and findings widely until I have reconnected with the Nā Wai ‘Ehā community.

‘Āina-Inspired Research

While the four ‘aho of resistance provide a general framework for my research, there were more specific considerations that I needed to make in my research because of my relationship to ‘āina. Because the different strands of ‘āina are influenced by Hawaiian values, in some cases they overlap with the four ‘aho of resistance.

‘Āina and theory

‘Āina has been critical to the theoretical lens I bring to this project. It is the significance of ‘āina within Hawaiian culture that ultimately motivated my research focus: understanding new ways to envision her during the pre-plantation period. It is this understanding of landscape prior to colonization that has served, and will continue to serve as the foundation of many activist movements through Hawai‘i. Yet, it is this genealogical connection to place that is often missed in the analysis of Indigenous responses to colonization. While Indigenous responses to colonizing groups have often been analyzed through resistance (Brown and Strega 2005; Steinman 2016), openly combatting other entities, resilience (McGuire–Kishebakabaykwe 2010; Redman 2005), withstanding change, or survivance “an active resistance and repudiation of dominance, obtrusive themes, tragedy, and nihilism” (Vizenor 2008: 11) this project instead considers Native Hawaiians response to eco-colonialism through the Hawaiian-centered ‘a‘ali‘i kū makani framework developed by Lipe (2016). According to Lipe (2016), the ‘a‘ali‘i kū makani framework stems from ‘ōlelo no‘eau 507 “He ‘a‘ali‘i ku makani mai au; ‘a‘ohe makani nana e kula‘i. I am a wind resisting ‘a‘ali‘i plant, no gale can push me over” (Pukui 1983: 390). Like the ‘a‘ali‘i plant, Lipe (2016) argues, Native Hawaiians are strong yet flexible in order to withstand change, especially changes brought about by colonialism. In the same way, I find this metaphor particularly appropriate for understanding Native Hawaiian water rights. Just like the root of the ‘a‘ali‘i plant holds it steadfast in place, I argue that Hawaiians’ rootedness, or their connection, to their kulāiwi (homeland) inspired Hawaiians to continue to survive on their homelands. It is this relationship to place, that informs and informed Hawaiian creativity and inspired new relationships with the ‘āina so that they could continue surviving on their kulāiwi

into modernity. Similarly, it is my rootedness to place that inspires me to try to be of service to this activism.

Creating the Initial Project:

In the beginning stages of my initial project, I sought to form a relationship with ‘āina through my physical presence on it. ‘Āina as people encouraged me to get to know people of the Nā Wai ‘Ehā region, particularly those from Waikapū with genealogical connections to ‘āina. I hoped that by hearing their stories I would understand more about the realities that they were facing as well as the history of the community there. ‘Āina as source encouraged me to learn from the ‘āina in Waikapū. This included volunteering in lo‘i kalo (taro) farms to learn more about her through not only instruction by the local community but through kilo (observation). While I initially planned to spend more time in the landscape so that I could get to know her better, this was cut short because of the pandemic. In addition to this, ‘āina as source encouraged me to learn her stories. ‘Āina as ongoing connection and care led me to develop a project that would involve the community throughout each phase including raising money to provide grants for Hawaiian students from the area to work on this project.

Revising the Project

My relationship with the physical ‘āina shifted as a result of the pandemic. While I was off-island, I could not engage with her in the ways that I originally intended. ‘Āina as people, however, kept me following the works of Hui o Nā Wai ‘Ehā, the local water rights activist group there, including the modern court cases. ‘Āina as source, encouraged me to still get to know her stories even with limited resources. ‘Āina as ongoing connection and care was significantly more limited as touched upon in the previous section. However, it still encourages me to go back to the community now that Covid-19 cases have decreased.

Moreover, these three strands were integral to the way I structured my research questions. ‘Āina as source called me to still focus on landscape change, but through different means. Microbotanicals were instead replaced by aerial photography, landscape descriptions, and maps. I hoped that by studying how kalo growing practices changed I would be able to develop an understanding of water usage prior to the plantation period. ‘Āina as people showed me that Hawaiians are an integral part of the landscape. Thus, it called me to look beyond land claimants to find the traces of those who did not claim land but who were still part of the landscape. While I am still in the process of ‘āina as ongoing connection and care, this strand of ‘āina is currently calling me to come home.

I have sought to develop a cultural humility based archaeology of Hawai‘i by prioritizing Hawaiian values. This has included not only letting these values inform the research design process but integrating the community throughout it. The way I have sought to develop a cultural humility based archaeology of Hawai‘i is largely the result of my identity as a Native Hawaiian. As a Native Hawaiian, I recognize that it is my responsibility to integrate and utilize cultural values, but to do so with care. These values have allowed me to understand activism as a necessary component of Hawaiian cultural humility-based projects, especially archaeologies of Hawai‘i. Recognizing the political nature of research, cultural humility-based archaeologies should have a tangible impact on the community it seeks to serve.

Conclusion:

Throughout this chapter, I have highlighted the significance of Hawaiian values to Hawaiian-based research, especially in fields that have largely been guided by empirical studies. By introducing the four ‘aho of resistance, I have sought to include ways that researchers of Hawai‘i can think more broadly about their research and the multi-faceted impact it has on the

community. In addition to this, I have called for the reevaluation of one's epistemologies to consider how they bias the research process. Focusing on the epistemology of land in the Hawaiian context, I have provided one example of how centering Native Hawaiian values, rather than prioritizing colonial values, expands the amount of information that can be gleaned from research. I have further detailed the ways in which this specific study has used Hawaiian values and relationship with 'āina to inform the research process. This is my attempt to paint a clearer picture of how integrating Hawaiian ways of knowing into the research process leads to the development of research that is concerned with equity at multiple levels.

Chapter Four:

A History of Water Rights in Hawai'i

This chapter provides a general overview of the sugarcane plantation era detailing the socio-political context that led to the rapid spread of sugarcane plantations across the landscape. It focuses specifically on how sugarcane plantations acted as eco-colonists by highlighting the different ways that new technologies and legislation worked hand in hand to increase their access to water while simultaneously diverting water from Native Hawaiians. While sugarcane plantations no longer exist in Hawai'i, the owners of these companies still claim rights to water impacting the amount of water received by the Native Hawaiian population. Thus, this chapter also sheds light on modern Native Hawaiian water rights activism. Using Nā Wai 'Ehā as a case study, it showcases the multiple attempts by local community members to increase streamflow. Gathering information about changes in streamflow standards from court documents, it highlights how water rights activists have succeeded in increasing streamflow while subsequently showcasing the neocolonial mentalities that have acted as barriers to additional increases.

The Māhele of 1848:

To understand how and why water allocation changed, a background of the socio-political context before the sugarcane plantation era is necessary. Following the arrival of Captain Cook in 1778, Hawaiian society underwent significant changes, most noteworthy of which was its rapid depopulation as a result of the introduction of foreign diseases. Kuykendall (1947) estimates that by 1850, the population of Hawai'i had decreased from 300,000 to 80,500. Kame'eleihiwa (1995:141) estimates a greater loss, with original numbers totaling 800,000 at the arrival of Cook, 134,925 in 1823, 84,165 in 1850, and 39,504 in 1896. As a result of this immense loss, ali'i (Hawaiian chiefs) began to look for strategies that would allow the Hawaiian

nation to continue to survive. One major problem that they faced was how to keep Hawaiian lands in Hawaiian hands as the number of foreigners began to increase in Hawai‘i. To assist with this, the 1840 Constitution was developed. This constitution recognized that the mō‘ī’s (king’s) rulership over land was not ultimate. Land instead belonged to the commoner and other chiefs and should be used for their benefit (Roversi 2012). This essentially codified the Hawaiian concept of mālama ‘āina. However, the legal relationship between land and people changed only five years later. Trusting foreign advisors who argued that land ownership would allow them to cultivate agriculture in a Western style, thereby enabling them to remain competitive in the global economy, King Kamehameha III (Kauikeaouli) instituted the Māhele (MacLennan 2014:62). Thus began the shift towards the privatization of land and water.

The Māhele, or the redistribution of land through fee-simple parcels, was not a singular event but was a process that occurred over nearly a decade. In 1845, Kamehameha III developed the Board of Land Commissioners, which was responsible for approving and denying land claims. (Andrade 2008:75). The initial provisions of the Māhele governed how land was allocated, with 1/3 of the land allocated to the government, 1/3 of the land allocated to the mō‘ī, and 1/3 of the land allocated to konohiki (lessers chiefs who served as land managers) (Roversi 2012). King Kamehameha III further split his holdings into his own personal property and governmental lands, the former of which later became known as the “Crown Lands”. To receive the land allotted to them, konohiki had to pay 1/3rd of it back to “purchase” it. However, while konohiki received land, they were not entitled to the same rights as fee-simple parcels and were required to share it with maka‘āinana (commoners). Two years later, changes were made that enabled maka‘āinana to own land through the 1850 Kuleana Act (Kame‘eleihiwa 1995). This act allowed commoners to submit land claims over a 2-year period (though many were accepted

later ((Beamer and Tong 2016)) in order for maka‘āinana to retain their land or to purchase new lands (Kame‘eleihiwa 1995: 295). Only land under cultivation and house plots could be claimed. Land claims were required to follow a specific format that included Native and Foreign Testimonies and a land survey (Sproat 2011). Yet, not all of the original inhabitants of the land submitted land claims. As a result, the lands of these people were returned to the government and could then be purchased as Land Grants by others including foreigners.

Before going into detail concerning the land claims, it is important to recognize the multiple factors that may have contributed to maka‘āinana not submitting land claims rather than assuming it was due to a lack of desire for land. Andrade (2008) acknowledges that differences in epistemologies surrounding one’s relationship with land may have caused Native Hawaiians to discount the value of land ownership. He further contends that the expediency in which the land claims were required to be made—with most requiring claims to be submitted within a year or less—and the cost of surveying land resulted in many Hawaiians, especially those not taking part in trade, to losing land. Like Andrade (2008), Osorio (2002) argues that a variety of reasons could have accounted for maka‘āinana not claiming land including their concern that claiming land would offend the konohiki and their lack of realization that they would need to claim land to secure their right to use the water on that land. Therefore, the failure of some maka‘āinana to claim land cannot be viewed solely as their willingness to give up land to foreign entities. Rather, it serves as an example of one way that colonial ideologies, which stood in antithesis to Hawaiian worldviews, ended up impacting Hawaiians’ access to land.

There have been multiple different postulates concerning the degree to which Native Hawaiians lost land as a result of the Māhele. While 14,195 maka‘āinana applied for awards (Kame‘eleihiwa 1995:295) only 8,421 (or 8205 citing Roversi 2012:568) Land Claim Awards

were made, with kuleana (lands that Native Hawaiian farmers cultivated) accounting for 7,500 of them. At the time, the Hawaiian population was approximately 88,000. In total, maka‘āinana received 28,658 acres, only 1% of the land that was originally reserved for them, with plot sizes averaging about 2.57 acres each (Andrade 2008; Kame‘eleihiwa 1995: 295; Roversi 2012).

Kame‘eleihiwa contends that during this time foreigners who swore allegiance to the mō‘ī were also considered maka‘āinana, suggesting that even less land was awarded to Native Hawaiians (1995:295). However, Beamer and Tong (2016) argue that more land was retained by maka‘āinana than previously documented, referencing the hui lands, or communal lands purchased by groups of local people. Conversely, Roversi (2012) argues that while hui lands immediately aided in the preservation of Hawaiian practices, namely access to water and resources for growing taro, their lack of legal precedent eventually resulted in their deterioration. Citing the Wainiha Hui, he demonstrates that under the eyes of the law, hui were not corporations and therefore had no legal rights. While hui members were required to sell back their land if they left, there was no way to enforce this given their lack of legal standing. Instead, many individuals ended up leasing their land. Leases of the land to plantations and water companies eventually resulted in the demise of hui, especially when these companies bought up land to monopolize access to resources. This further reiterates that land ownership offered little protection to Native Hawaiians who sought to retain their land.

Hawaiians who did not submit land claims ended up being forced to separate from their homelands. Many moved towards port cities in search of jobs that would provide a new way to sustain themselves (Andrade 2008:98). This separation from their land and the conditions they were forced into, Sproat (2011) argues, led to the demise of the population and set the foundation for the low socioeconomic status experienced by many Native Hawaiian families today. Thus,

while many foreigners profited off of land ownership and colonial agricultural practices, many Hawaiians did not share in their spoils.

The increase in the amount of land owned by foreigners catalyzed the emergence of a plantation economy in the late 1800s. Following the Kuleana Act, the Residency Laws of 1850 gave foreigners who had sworn their allegiance to the king the ability to purchase land (MacLennan 2014; Osorio 2002). Almost instantaneously, land was purchased by foreigners in efforts to exploit land for agriculture. In 1850, William Little Lee and Charles R. Bishop entered into a partnership and formed the Līhu‘e plantation in Hawai‘i (Kame‘eleihiwa 1995: 298-299). Similar companies would follow suit in later years. By 1864, Levy (1975), using statistics compiled from the Commissioner of Public Lands of the Territory of Hawaii Indices of Awards 10, contends that 320,000 acres had been purchased by foreigners and 90,000 acres by Native Hawaiians. Similarly, Preza (2010) notes that land purchases continued to increase into 1893. Using the index of Land Grant Awards, he shows that 485,230 acres had been purchased by foreigners and 167,290 acres by Native Hawaiians by 1893. When comparing Preza’s and Levy’s analysis of land acreage by race, there is a small discrepancy concerning the percentage of acreage that was purchased by Native Hawaiians. Because how Levy identified race is unclear, it is difficult to conclude if one mode of analysis is more reliable than the other. Nonetheless, what both Preza (2010) and Levy (1975) make clear is that while there were more parcels of land purchased by Native Hawaiians, Native Hawaiians ultimately ended up receiving only 2-3% of the acres purchased. In the years that followed, sugarcane plantations would continue to grow in size through the purchase or rental of additional lands and their increased access to water.

The Beginning of Sugarcane in Hawai‘i

Kō or sugarcane was initially cultivated by Native Hawaiians who brought it over as a canoe plant on their voyage to Hawai‘i between 900 and 1000 AD (Kirch 2011). Rather than large monocultures, Hawaiians grew kō along the sides of lo‘i kalo (taro patches), dryland kalo patches, and ‘uala (sweet potato) fields in formations called pae kō or kō a palena. They also designated smaller patches for kō including mala kō (a field of cane), opu kō (a clump of cane), and lalani kō, a row of cane (Abbott 1992; Handy et al. 1972:185). While cane was typically planted in November and December and harvested during the late fall, it could be planted at any time except during droughts. Time to maturation ranged from 12-24 months depending on its growing location. Despite its relatively small presence on the landscape when compared to later years, sugarcane had a variety of uses in Hawai‘i. Although it was not considered a staple food like ‘uala and kalo, it served as an important food supplement during famine times and was used as a type of sweet or dessert. Outside of food, sugarcane juice was used as a teeth cleanser and was thought to have therapeutic value (Abbott 1992; Handy et al. 1972).

Multiple varieties of kō existed in Hawai‘i before the plantation period, each with its own name and use. Certain varieties like the Honua ‘ula or red cane were used as a form of medicine. Other varieties were used in hana aloha (love work) such as the manu lele (“Flying bird”), papa‘a, pili mai, or to counteract hana aloha including the Lau Kona (also known as the Lau Kona-kona) (Handy et al. 1972:185). Thus, Hawaiians’ lack of intensification of sugarcane should not be viewed as a result of their lack of knowledge about the plant, but as a preference to focus their efforts on growing plants that were more culturally important and nutrient dense.

The arrival of foreigners to Hawai‘i lead to significant changes in the landscape. Although Native Hawaiians altered the landscape as they expanded their wet and dry cultivation

into new zones, these alterations were minimal when compared to the environmental changes that ensued following the arrival of foreigners (Pau et al. 2012). As Hawaiians entered into the whale and sandalwood trade, lands that were once forests began to disappear. This impacted hydrology, leading to lower groundwater storage and increased flooding (Wilcox 1997). In addition to this, the arrival of ungulates between the late 1700s and early 1800s greatly devastated the landscape trampling and consuming native species as they roamed freely. This resulted in increased soil erosion, lowering its ability to retain water (MacLennan 2014: 28). The introduction of foreign plants and other animals like black rats (Kessler 2016) further exacerbated soil erosion, replacing deep-rooted plants with shallower ones. It was on this already impacted landscape that sugarcane plantations began to emerge.

The first commercial sugarcane mill was built in Kaua‘i in 1835 by two Americans who named it Ladd and Company. Because this was before the Māhele, their access to land depended on a lease from King Kamehameha III. However, this plantation was largely unsuccessful due to its poor quality (Adler 1959: 5). Nevertheless, the first sugar exports out of Hawai‘i began in 1836 (Adler 1959: 9). The first mills differed significantly from later sugarcane plantations. Mills relied on animal labor and hydropower and were not vertically integrated, resulting in a much smaller output than would be seen decades later. It was not until 1853 that steam engines began to be used in Hawai‘i with the first one being built at Līhu‘e (Kukyendall 1953:145). While initially sugarcane production was limited to small mills, this shifted during the 1860s because of the Civil War which raised the demand for sugar in the Americas and, thus, increased the price, and by extension the profit, of sugarcane (MacLennan 2014:24). This shift can be seen in the increased amount of sugarcane exported following the war. While before the war, exportation averaged about 500,000 pounds of sugarcane per year, the amount of sugarcane

exported in the two years directly following the war (1870-1872) increased to nearly 40 times the amount at 19,000,000 pounds exported per year (Kukyendall 1953:140). Thus, the rapid increase in demand made sugarcane a highly profitable industry during this time period. In efforts to meet the rising demand, more sugarcane plantations were developed.

However, the success of most of these plantations was short-lived. Many plantations merged or took over smaller plantations, leading to a large plantation industry that was controlled by a few people, many of whom structured themselves into corporations (MacLennan 2014: 91). It was this centralized control that allowed these companies to keep sugar at a lower price than their competitors and, thus, to prosper. By the 1900s, the major players in the sugarcane economy were reduced to Alexander & Baldwin, Castle & Cooke, Theo Davies, American Factory, and C. Brewer and Company, collectively known as “The Big Five” (MacLennan 2014). Because of their size and access to ample resources, it was the Big Five that made some of the most drastic changes to the landscape.

A History of Technological Innovations in the Sugarcane Industry

One of the significant technological shifts that allowed these companies to rise to power was the emergence of ditch systems in Hawai‘i. Driven by the idea that all water that ran to the ocean was a waste, planters sought to divert as much water as possible for their own use (Wilcox 1997). Ditch systems consisted not only of ditches themselves, but siphons, tunnels, and flumes (Wilcox 1997:16) that diverted water from local streams and carried water long distances. The first ditch, the Rice Ditch, was opened in 1856 in Līhu‘e, Kaua‘i, and allowed for the transportation of water over longer distances. This ditch was very similar to ‘auwai (ditches), but with a few significant differences. While ‘auwai tended to be shorter in order to bring water to nearby lo‘i kalo, the Rice Ditch, at 10 miles long, was considerably longer and wider.

Consequently, while functional, because it was not lined with anything to prevent water from percolating through the bottom, significant water was lost as it traveled throughout the ditch system (Wilcox 1997: 54). In addition to this, water, once diverted by these ditches would not be returned. This differed significantly from Hawaiian lo‘i systems, which would take water from the stream and return it.

Ditch technologies improved immensely throughout the next quarter of a century. The Hamakua Ditch in Eastern Maui was completed in 1876 by Claus Spreckels, marking the start of the ditch expansion period (1876-1920) (MacLennan 2014:150). The Hamakua Ditch differed significantly from the Rice Ditch. It was constructed through a red clay layer, making the bottom less permeable to water and allowing it to transport water 17 miles. The Haiku Ditch in Eastern Maui and the Waihee Ditch in Western Maui (also known as the Spreckels Ditch), two ditches of similar size to the Hamakua Ditch, followed in 1879 and 1882 respectively. During the early 1900s, the number of ditches in Hawai‘i continued to grow with 20 new ditch projects started between the 1900s and 1920s (Wilcox 1997: 54). Among the advances made during this period, was the introduction of cement to line ditches, which further reduced ditch leakage.

One of the other major hydrological changes made by sugarcane plantations was the development of artesian wells. Influenced by Californian James Ashley’s work in well boring, James Campbell bore the first well at Honouliuli in 1879 (Nellist 1953). Artesian wells gave those living in Hawai‘i access to a lens of fresh to brackish groundwater (Watson 1964) that could further be used for irrigation. By 1975, over 1000 wells had been dug in Hawai‘i (MacDougal 1988). Using groundwater, companies were able to farm the dryer kula regions, providing water to places that had only previously been fed by rain. Irrigation was one of the main factors that resulted in the significant increase in sugarcane production, with over 50% of

all sugarcane irrigated by 1920. At this time, the sugarcane plantation industry was using 400 million gallons of groundwater daily on top of the 800 million gallons that they diverted from streams (Wilcox 1997: 20). However, because water is a limited resource, their ability to divert more water was not without a cost to other stakeholders.

In addition to innovations in irrigation, several other technological innovations allowed Hawai'i to produce some of the largest quantities of sugarcane in the world. By 1851, sugarcane plantations in Hawai'i were using centrifugal separators to accelerate cane processing (Kukyendall 1953). Many of these technologies were brought to Hawai'i by Spreckels following the Reciprocity Treaty of 1876. One of his biggest additions to the harvesting process was his improvement of the steam plow, which allowed him to plow on rocky soils. In addition to this, he expedited sugarcane processing through his integration of the five roller mill, which increased the number of rollers used for processing by two. He was also one of the first plantation owners to use the vacuum pan to help speed the separation of sugar and molasses and his plantation was one of the first places in Hawai'i to have electricity. To power these technologies, he primarily burned green waste, rather than coal, which allowed him to save additional money (Adler 1959). This increased efficiency would later result in additional strain placed on the environment.

Spreckels also changed the landscape for his benefit. In terms of irrigation, he used a process known as controlled irrigation which directed water through sluice gates and required less human power. He also experimented with fertilizers including superphosphate, bone block dust, and dried coral. While his plantation was later taken over by others in the late 1800s, these technologies allowed him to become the largest sugarcane plantation in Hawai'i in 1892, with 40,000 acres of land (25,000 able to grow sugarcane) and a production of 100 tons a day (Adler 1959: 117).

Outside of plantation-specific innovations, the improvement to travel allowed the sugarcane industry to flourish. While during the earlier half of the 1800s, the transportation industry had primarily focused on boating, including the development of and dredging of harbors (Kukyendall 1953), overland transportation became increasingly more important. Horses were introduced in Hawai‘i in 1803, which expedited land travel. However, land travel was still limited due to the lack of a road system, making much of the landscape inaccessible to carriages. While there were developments of roads starting as early as 1837 in O‘ahu and King Kamehameha III instituted a road tax starting in the 1850s to support the development of other roads (MacLennan 2014), the primary changes in infrastructure occurred in 1887 and beyond. It was during this period that sugarcane plantations joined forces with the government to fund roads, bridges, and railroads (Duensing 2015). A decade later, around 1899, Hawai‘i would see its first automobile. Thus, while the Māhele enabled the conditions for sugarcane plantations to emerge on the landscape, it was the development of these technologies, in part, that led to their rapid spread across the islands.

Political Changes during the Plantation Era

While technological changes were part of the reason that sugarcane plantations were able to expand rapidly, perhaps more important changes occurred in Hawaiian politics and legislation. Just as the Māhele spurred the expansion of the sugarcane industry, similar changes to legislation favored an increase in sugar production. The 1875 Reciprocity Treaty, which eliminated the duty on sugar exported to the United States, was one such change. As a result of the increased profit potential, more people turned to sugar. Driven by the desire for the economic benefits that could be obtained by becoming part of the United States, businessmen and lawyers joined together to force King Kalākaua to sign the Bayonet Constitution in 1887, which essentially made him a

figurehead. Through their force, they eventually overthrew Queen Liliu‘okalani in 1893. This further shifted power away from the Hawaiian chiefs to the government which was largely composed of foreigners.

The government that emerged during this period was not composed of neutral parties, but of individuals that tended to favor big business. Many government officials were plantation owners, who despite their conflict of interest, were allowed to develop legislation concerning land management (MacLennan 2014). One such act was the 1895 Land Act, which made it easier for sugarcane plantation owners to gain access to land by increasing the amount of governmental land able to be leased and by making the process in itself easier (MacLennan 2014: 49). During the 40 years of the territorial period, the assignment of justices and governors by the United States further resulted in biases that favored sugarcane plantations (Martin et al. 1996). Although legislation became increasingly concerned with the needs of Native Hawaiians following the 1940s, irreparable damage had already been done. The following section traces the emergence of different water laws following the Māhele to provide a foundation for understanding modern water rights issues.

Changes in Water Legislation

As a result of the Māhele of 1848, water too became ownable. While water had previously been governed by kōnāwai, or water laws, with konohiki (chiefs) serving as the water manager, they were quickly replaced with legislation that embodied foreign practices. Prior to the Māhele, water regulations ensured that nobody took too much water and that water allocation was proportionate to the number of taro plots under cultivation. To maintain an ample enough flow, Hawaiians were given certain times in which water was allowed to flow into their lo‘i kalo. In addition to this, ‘auwai were not allowed to divert more than ½ of the flow of the stream

(Castle and Murakami 1991). In many cases, this often involved a coordinated pattern of water flow. Flow was turned on in certain plots during the day and then turned off during the night to allow water to flow into other plots.

However, following the Māhele water was not as systematically ordered as it had once been by konohiki. The Land Commission left no guidelines for how water was to be allocated resulting in larger-scale water diversions and the leasing of water (Perry 1914). The first license to divert water from streams in Hawai‘i was given in 1876 (Wilcox 1997). From then on, large-scale diversions became commonplace. In certain regions, especially when a singular person or group owned an entire ahupua‘a, konohiki water rights (Martin et al. 1996), or the right of those who owned the ahupua‘a to use water as they saw fit, were claimed. As a result, legal disputes over water commenced only a few years following the Māhele. The forthcoming cases provided further guidelines on who could own water and the amount of water that could be extracted from local streams.

Because water law in Hawai‘i takes into account Hawaiian values, it differs significantly from water law in the United States. While multiple laws in the United States favor non-Indigenous values, the Hawaiian court system has acknowledged that these laws do not quite explain the understanding of law in Hawai‘i, particularly as it pertains to the definitions of private property and common law (Martin et al. 1996). For example, the addition of Article XII, Section 7, at the 1978 Constitutional Convention, reiterated and increased the cultural rights of Native Hawaiians (McGregor 1996) writing,

The State reaffirms and shall 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, subject to the right of the State to regulate such rights (Article XII, Section 7, 1978 Constitution).

Other court cases like *Kalipi v. Hawaiian Trust Co.*, *Pele Defense Fund v. Paty*, and *Public Access Shoreline Hawai‘i and Angel Pilagi v. Hawai‘i County Planning Commission and Nansay Hawaii, Inc.* further expanded on these rights by increasing access to resources for all Native Hawaiians. Where previously Hawaiians were limited to accessing resources from the ahupua‘a that they had resided in, *Pele Defense Fund v. Paty* absolved this requirement. Similarly, *Public Access Shoreline Hawai‘i and Angel Pilagi v. Hawai‘i County Planning Commission and Nansay Hawaii, Inc.*, keeping with the Hawaiian tradition that Hawaiian identity is tied to mo‘okū‘auhau (genealogy), ruled that access to land for customary practices could not be limited by blood quantum (Martin et al. 1996). Thus, because Hawaiian state law takes into account Native Hawaiian rights and because state, rather than federal, water law is responsible for managing water usage by private entities (Trelease 1960), this section focuses on water law at the state level.

A basic understanding of different water rights in Hawai‘i is needed to understand the evolution of Hawaiian water law. Hawaiian law has historically recognized three main types of water rights: appurtenant, riparian, and prescriptive. Appurtenant rights are those that were tied to land awards during the Māhele. The amount of water allocated to those with appurtenant water rights is equal to the amount of water that was being used to water lo‘i kalo just before the Māhele. Prescriptive rights are those given to people who had adversely taken water, through diversion or otherwise, for a particular period of time. Riparian rights, similarly, are those tied to streams abutting land. This right allows for the reasonable use of water by people who own land abutting the stream. However, the rights mentioned previously are only related to the allocation

of surface waters. The development of groundwater infrastructure resulted in laws that further clarified how different forms of surplus water were to be allocated (Castle and Murakami 1991)¹⁸. In modernity, while prescriptive rights are no longer recognized, appurtenant and riparian rights still inform water law.

Water rights changed significantly throughout the 100 years following the Māhele. Initially, legislation reflected kānāwai. For example, *Hawaiian Commercial & Sugar Co. v. Wailuku Sugar Co. (1904)* recognized that the owner of the ahupua‘a—in this case, Hawaiian Commercial and Sugar Co.—had konohiki water rights, or the right to use surplus water how they saw fit. These rights changed substantially following *McBryde Sugar Co. v. Robinson (1973)*. Perhaps the most hotly contested case was *McBryde Sugar Co. v. Robinson (1973)* which was appealed 5 different times at different court levels (*Robinson v. Ariyoshi (1977)*, *Robinson v. Ariyoshi (1977)*, *Robinson v. Ariyoshi (1982)* *Robinson v. Ariyoshi (1985)*, and *Robinson v. Ariyoshi (1987)*) before a final decision was reached. The initial court case was based on a dispute between two sugar companies McBryde Sugar Company and Gay and Robinson, the latter of whom began diverting surplus water (which they owned as a result of *Territory v. Gay 1930*) in larger quantities to areas outside of the watershed. This led to decreased access to water for the McBryde Sugar Company and caused them to sue Gay and Robinson (Castle and Murakami 1991). The 1973 case resulted in three important conclusions:

1). That the state, not the people were the owners of the water, though people had the right to use the water. This, thus, voided konohiki and prescriptive water rights (Martin et al. 1996).

¹⁸ Castle and Murakami 1991 note three different types of surplus waters. Normal surplus was water that was left in the stream following agricultural diversion and domestic use. Freshet surplus was the additional water gained from rain, and storm surplus was the additional water gained from flooding.

2). *That riparian rights were paramount and, thus, those who received water as part of riparian water rights (and appurtenant water rights) could only use the water within the watershed that the stream was connected to. They had “no vested and enforceable right to transfer water to kula lands” (Castle and Murakami 1991:162).*

3). *As a result of the prioritization of riparian water rights, the concept of surplus waters was no longer needed.*

While the following cases argued over the degree to which surplus water had been defined and how this ruling impacted sugarcane plantations’ right to public property, the final court decision echoed the decisions espoused in the initial McBryde court case, albeit with some clarification. A similar court case during this period, *Reppun v. Board of Water Supply (1982)*, further reiterated that water rights were tied to land by arguing that riparian and appurtenant water rights could not be separated from the land that they were associated with. In addition to this, this case clarified the concept of reasonable use, stating that one could not sue another for their reasonable use of a particular amount of water unless it interfered with their own reasonable use. While these cases focused on surface waters, *City Mill Co. v. Honolulu Sewer and Water Commission (1920)*, extended the riparian doctrine to groundwater, allowing those who were located near artesian wells the right to the reasonable use of water (Castle and Murakami 1991). The McBryde court cases not only influenced water rights significantly but showcased how the state played a significant role in determining access to water.

The aforementioned 1978 Constitutional Convention similarly resulted in substantial alterations to water rights. Invoking the rights of the public trust doctrine, this convention identified a need and structure for a Commission on Water Resource Management (CWRM), an organization designed to settle water disputes. The structure that they outlined consisted of a

seven-person committee and included the current chairperson of the Department of Land and Natural Resources, who was appointed as the chairperson of the water commission, the director of the state Department of Health, and five other committee members appointed by the governor (*Commission on Water Resource Management*). However, the commission, as well as the State Water Code of 1987, which outlined their responsibilities and formalized the process for hearing water disputes, was not officially developed until 1987. As part of the Water Code, areas that could be harmed by water diversion became “water management areas,” or areas that received further protections (Martin et al. 1996). In addition to this, the Water Code set the format for requesting permits for water usage. To obtain a permit, applicants had to show that their request

- 1) *[Could] be accommodated by the available water;*
- 2) *[Was] a reasonable-beneficial use which [would] not interfere with any existing legal use;*
- 3) *[Was] consistent with both the public interest and state and county general plans and land use policies;*
- 4) *[Would] not interfere with the rights of the Department of Hawaiian Home Lands (Martin 1996: 113-115).*

Following the establishment of the Water Code, water users who did not have appurtenant rights were given one year to file for a permit before they had to reapply as new users. One significant addition to water legislation was the development of Interim Instream Flow Standards (IIFS), or standards that outlined the minimum amount of water needed to satisfy instream uses (Oki et al. 2011). However, the initial flow standards were set arbitrarily to the “status quo,” or the flow of water in streams on a particular date with dates depending on the region. IIFS were to be used as

temporary flow standards until Instream Flow Standards (IFS) could be established following rigorous scientific research on a stream-by-stream basis.

While the creation of the Water Code might first appear as a win for Native Hawaiians, this legislation was largely performative. Because no numbers were set and IIFS were made without an adequate understanding of the amount of water needed to support life and cultural practices, there was no guarantee that these IIFS were enough to support instream uses. As a result, local groups have worked diligently to increase IIFS, though there are still many IIFS that need to be reviewed. Even so, few if any IFS have been set state-wide, and no IFS have been set for Nā Wai ‘Ehā, my region of focus (Commission on Water Resource Management, 2021; Sproat et al. 2011). Therefore, further scientific research must still be done so that appropriate streamflow regulations can be developed.

Similarly, although the Water Code was designed to preserve Native Hawaiians’ right to water, there have been some notable flaws that often result in rulings that favor big business. Ho‘okano (2014) has argued that in water disputes the public trust doctrine tends to be ignored. Citing the East Maui water cases, they note that the water commission has consisted of people who have vested interests in companies like Alexander and Baldwin, a stakeholder in this water rights case, resulting in rulings that are biased towards big business. Similarly, the Waiāhole cases have also shed light on biases within the committee. Scheuer (2002) notes that three members of the water commission who sat on the Waiāhole trials had vested interests in the companies that originally ran plantations. While two out of these three members recused themselves from the Waiāhole trials, this still points to the predominance of plantation interests within the commission and the potential for case results to be biased toward big business. Two of the four members that reached the final decision on the Waiāhole case still had interests in big

business. In addition to this, Ho‘okano (2014) notes that the water committee often fails to meet the requirement that at least one committee member needs to be an expert in Hawaiian customary water law. Furthermore, the lack of guidance provided by the Water Code on how to deal with competing interests results in rulings that do not give precedence to Native Hawaiians (Martin et al. 1996). Outside of the Water Code itself, the cost of the technical equipment needed to make scientific measurements, like water gages, the current lack of scientific data, and the lack of public access to Water Commission data results in fewer cases being brought to court than actually exist. This is further exacerbated by the cost of legal disputes, which creates an additional barrier that makes it more difficult for community members to address water shortages (Martin et al. 1996). Consequently, efforts to improve Native Hawaiians’ access to water have been hindered by the predominance of legislation that not only supports colonial norms but favors those with access to more resources.

Water Rights in Modernity, Nā Wai Ehā, Maui:

The Nā Wai ‘Ehā region provides a perfect case study to understand changes in hydrology in Hawai‘i. Nā Wai ‘Ehā is a region in Western Maui whose name translates to the “four great waters”. These four great waters consist of ‘Īao, Wailuku, Waikapū, and Waihe‘e streams. Because of the large amount of water in this region, Hawaiians were able to form an extensive lo‘i kalo system. These lo‘i were fed by two famed ‘auwai the Kalani‘auwai and the Kama‘auwai (Tengan et al. 2007). Historically, Nā Wai ‘Ehā was the largest region of continuous lo‘i kalo in all the islands (Sproat et al. 2011). However, access to water in this region took a turn following the Māhele.

Maui proved to be a key place of interest for sugarcane planters in the early days of the plantation era. While the first commercial sugar mill did not start until 1835, the first sugar mills

in Waikapū, Maui were built in 1828 by Antonio Silva (or Antonio Catalina) and in Wailuku by Jung Tai (or Hing Tai) (Cushing 1985:31). The King's Mill, another mill in Maui, followed suit, emerging in 1840 (MacLennan 2014: 126). Shortly thereafter, the construction of the first road in 1862, and the introduction of new technologies like ditches on nearby plantations lead to the rapid expansion of the sugarcane plantation industry in the Nā Wai 'Ehā region. One significant effect was the formation of the Wailuku Sugar Company in 1862 (Cantor et al 2020; MacLennan 2014). Following the Civil War, the number of sugarcane plantations increased by eight (Kukyendall 1953: 142; MacLennan 2014:125). By 1866, Maui contained the largest number of plantations at 12 plantations and, at 7,500 tons, accounted for over half the sugar produced by Hawai'i (MacLennan 2014). As sugarcane became more prosperous, smaller plantations began to be consolidated. Of significance to this study was the formation of the Hawaiian Commercial and Sugar Company in 1876 by Clause Spreckels (Adler 1959). Shortly thereafter, the first artesian well was built in Maui in 1881 (Wilcox 1997). All these changes resulted in significant alterations to the landscape.

The rapid increase in plantations particularly impacted the water supply. In 1866, some of the first complaints were lodged against sugarcane plantations for diverting water away from taro (Tengan et al. 2007). The introduction of artesian wells caused additional issues with water access. These changes allowed for the irrigation of roughly 90% of all sugarcane in Maui. As a result, the region that had initially been known as the "Four Great Waters" gradually became dewatered. Even with reduced water, however, kalo cultivation continued into the 1930s in Waihe'e (Tengan et al. 2007). Nevertheless, water was still a huge point of contention, especially between different stakeholders.

The first major court cases concerning water rights in the Nā Wai ‘Ehā region occurred in the mid-1800s. In *Peck v. Bailey (1867)*, a sugarcane plantation sued a taro and sugar farmer for diverting what they claimed was an excessive amount of water. However, the court found that the farmer could divert as much water as they wanted as long as it did not exceed the amount that was allotted to them as an appurtenant right during the Māhele. *Lonoea v. Wailuku Sugar Co. (1895)* similarly involved a dispute between taro farmers and a sugarcane plantation, the former of which claimed that the plantation had diverted water in excess. Because the plantation had historically diverted water during the daytime, leaving water at night for taro farmers, the court claimed that both the taro farmers and the plantation were entitled to the amount of water each party had received as a result of prescription during this period. Prescriptive rights were further clarified through *Hawaiian Commercial & Sugar Co. v Wailuku Sugar Co. (1902)*. In this case, the court limited the amount of water that could be diverted by those with prescriptive rights to the quantity of water diverted during the period of adverse possession. Prior to this court case, prescriptive right holders had claimed that they were entitled to all the water available during their assigned diversion time (e.g. all the water available during the day time or night time). Rights concerning surplus water received additional nuance in *Hawaiian Commercial & Sugar Co. v Wailuku Sugar Co (1904)*. In this case, Hawaiian Commercial and Sugar Company sued Wailuku Water Company for diverting excess water to kula fields (dryer regions in Maui). The court found that the owner of the ahupua‘a, in this case, HC&S had the “konohiki right” to surplus waters, including the right to divert them to other lands (Castle and Murakami 1991). These cases not only helped refine prescriptive and surplus water rights but highlight that water rights disputes between kalo farmers and plantations are as much part of the history of Maui as they are part of its present.

The dewatering of the Nā Wai ʻEhā region continued long past when the last sugarcane was harvested on Wailuku Plantation in 1988. Despite no longer using the water for sugarcane, Wailuku Sugar Plantation still diverted water to the remaining plantation on Maui, HC&S (Cantor 2020). The Wailuku Sugar Plantation officially closed in 1992 resulting in the need to reallocate water (Sproat et al 2011). Rather than returning water to the stream, the plantation reinvented itself as Wailuku Water Company, LLC in 2005 where they sold water to Maui residents for domestic use (Kyle 2013; Nakanelua 2018). As a result, similar amounts of water continued to be diverted from Nā Wai ʻEhā streams.

During this time period, the Commission on Water Resource Management made significant changes to the status of streams in Maui. In 2003, the ʻĪao Aquifer System was designated a Ground Water Management Area—and in April 2008 Nā Wai ʻEhā (Figure 4-1) became a water management area—which required those who wanted access to water to file permits within a year. This provided the perfect opportunity for community members to request an increase in IIFS. Responding to the continued diversion of large quantities of water by Wailuku Water Co., Hui o Nā Wai ʻEhā was formed by community members, namely local kalo farmers, in 2003 to petition for the restoration of mauka to makai (mountain to ocean) streamflow (Kyle 2013; Nakanelua 2018). This would begin a long period of contested court cases that would continue into the present day.

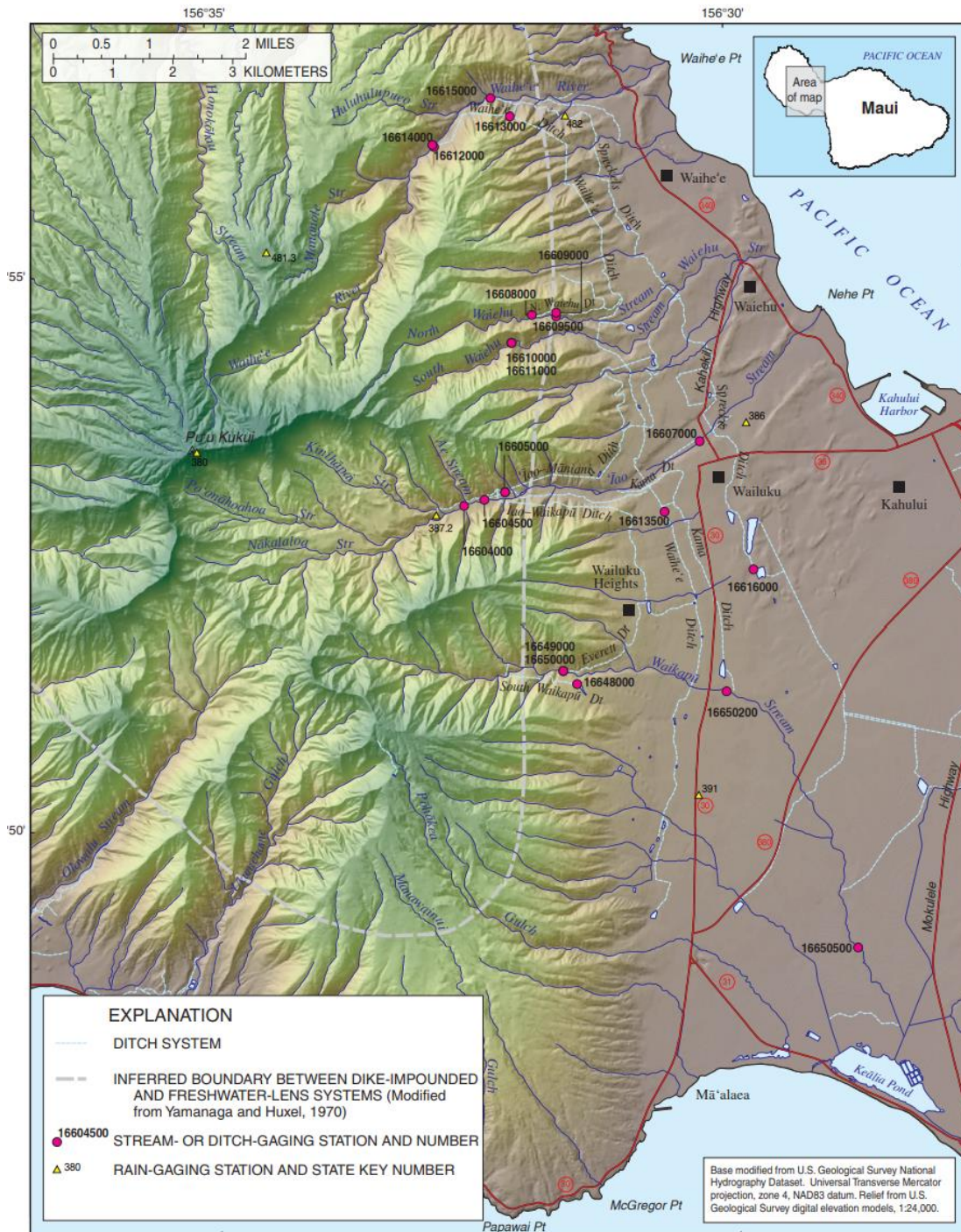


FIGURE 4-1 MAP OF NĀ WAI ‘EHĀ DITCH DIVERSIONS AND STREAMS. This map depicts the Nā Wai ‘Ehā watershed including diversions, streams, and gage stations. Image from USGS report, Oki et al. 2011:12. Available under normal fair-use principles.

Modern water rights court cases have primarily focused on amending Interim Instream Flow Standards (IIFS). This is largely because IIFS were developed for this region without considering the impact of diversions on aquatic species and the Hawaiian community. Instead, IIFS were set in this region in 1988 as the “status-quo,” or the amount of water flowing in streams on October 19, 1988. Because diversions were present at this time, this allowed diversions to continue without quantifying their impact on streamflow (Cheng 2014; Oki et al. 2010). However, the closure of Wailuku Sugar Cane Plantation and Hawaiian Commercial and Sugar Company provided the opportunity to reallocate water. What follows are the court cases that ensued because of these closures. The general timeline of these court cases is summarized in Figure 4-2.

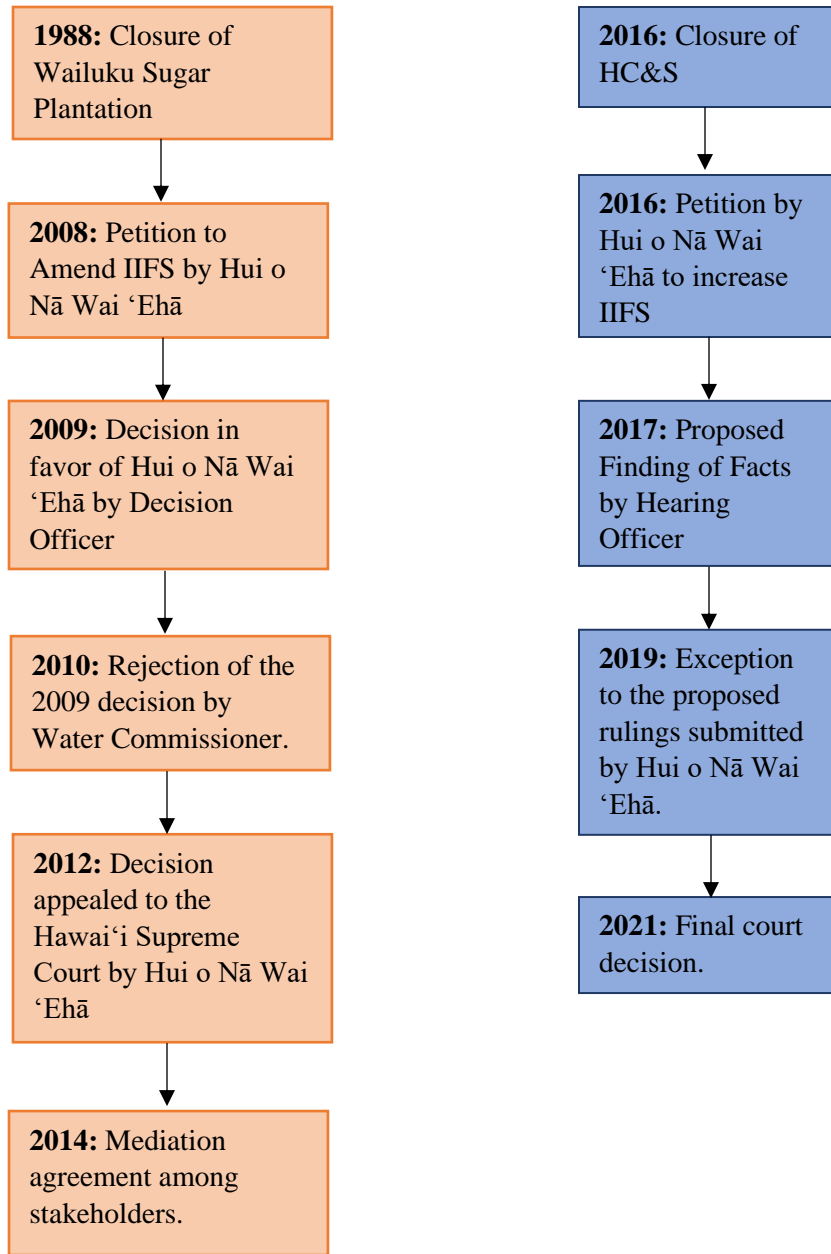


FIGURE 4-2 A TIMELINE OF MAJOR COURT CASES IN NĀ WAI ‘EHĀ, MAUI. The closure of the two main sugarcane plantations in Western and Central Maui sparked multiple court cases that led to the amendment of IIFS in this region.

As a result of Nā Wai ‘Ehā being named a Surface Water Use Management Area on April 30, 2008, 125 water use permits were submitted to the board for review (Commission on Water Resource Management 2013). In addition to this, requests to amend IIFS were made by Maui Tomorrow Foundation and Hui o Nā Wai ‘Ehā to increase streamflow by 53.4 million gallons per day (Sproat et al. 2011 193). Wailuku Water Company and HC&S, users of the water, stood in opposition to their requests, arguing that the water commission needed to take a “balanced approach” to water allocation whereby economic and social interests were balanced with stream restoration. They argued that changing IIFS to support stream restoration would jeopardize their company and the jobs of those who worked there (Hawaiian Commercial and Sugar 2009). HC&S requested the following IIFS:

1) **Waihe‘e:**

- An IIFS of 2-3 mgd below the Spreckels ditch intake.

2) **Waiehu:**

- An IIFS of .15-.25 mgd for North Waiehu below the North Waiehu Ditch Diversion and an IIFS of .15-.25 mgd immediately below the South Waiehu Ditch Diversion.

‘Īao and Waikapū, they argued, should not have amended IIFS because stream restoration was unlikely for these streams, and mauka to makai streamflow was unnecessary to ensure stream restoration (Commission on Water Resource Management 2010).

Finding that water diversion had negatively impacted Native Hawaiians, the April 2009 Decision officer sided with the hui and their partners, Earth Justice, the Office of Hawaiian Affairs, and Maui Time Tomorrow, agreeing to restore 53.4 mgd to the 4 streams (Sproat et al. 2011: 193). Their request was distributed as follows:

1) **Waihe‘e:**

- An IIFS set to 25.5 mgd downstream of the Waihe'e Ditch Diversion.
- An IIFS of 27.5 mgd immediately below the Spreckels Ditch Diversion.
- 1-2 mgd measured at the mouth of the stream to satisfy kuleana holders users and traditional and customary rights.

2) **Waiehu:**

- An IIFS of 2.5 mgd for North Waiehu to be measured below the Waiehu Ditch Diversion.
- An IIFS of 2.5 mgd to be measured immediately below the South Waiehu Ditch Diversion with .07 mgd reserved for kuleana holders and traditional and customary rights.

3) **‘Īao:**

- An IIFS of 18.8 mgd just downstream of the ‘Īao intake.
- 2 mgd at the mouth of the river for Traditional and Customary users as well as kuleana holders.

4) **Waikapū:**

- An IIFS of 4.1 mgd immediately below the Reservoir 6 intake.
- .35 mgd reserved for kuleana holders as well as traditional and customary practices (Hui o Nā Wai ‘Ehā and Maui Tomorrow Foundation, Inc. 2009).

However, that decision was rejected by the Commission on Water Resource Management (CWRM) in 2010. Instead, arguing that offstream use was more important than instream use, they sided with the desires of the former sugarcane plantation owners who claimed that this proposed water reallocation would lead to the shutdown of HC&S. As a result, only 12.5 mgd

were allotted to the Waihe'e and Waiehu streams while the 'Īao and Waikapū streams received no water allotments. The following were the allotments received:

1) **Waihe'e:**

- An IIFS of 10 mgd immediately below the Spreckels ditch
- IIFS at the mouth of the river was set to 6 mgd

2) **Waiehu:**

- The North Waiehu IIFS was set to 1.6 mgd at a point immediately below the North Waiehu Ditch Diversion.
- The South Waiehu IIFS below the Spreckels Ditch Diversion was set at .9 mgd.
- The IIFS for the Waiehu Stream mouth was set at .6 mgd (Commission of Water Resource Management 2010).

The commission justified this allocation by arguing that it was unclear if the Waikapū stream had continuously flowed mauka to makai (historically). They further suggested that features of the 'Īao stream made it uninhabitable to Native species. Reflecting on the Water Code, its lack of structure for defining instream and off-stream uses allowed for continued favoritism towards the descendants of plantations.

The 2010 court case was appealed to the Supreme Court in 2012 on the grounds that the decision violated the public trust doctrine (Cantor 2020). As a result, in 2014 the parties pursued a mediation agreement whereby multiple IIFS were changed and relocated. The following changes were made to the IIFS:

1) **Waihe'e:**

- The Waihe'e River allotments remained the same with the IIFS set at 10 mgd at the Waihe'e Ditch and Spreckels Ditch intakes.

2) **Waiehu:**

- The North Waiehu IIFS was moved lower in elevation to below the Waiehu Ditch Diversion and changed from 1.6 mgd to 1.0 mgd with water allocated to kuleana property owners.
- While the ditch diversion had been set at .9 mgd below the Spreckels ditch in 2010, both parties agreed to a 1 year stream analysis to determine a new IIFS.
- Approximately 250,000 gpd was allotted to kuleana users, the remainder of which would be returned to the stream.

3) **‘Īao:**

- IIFS was set to 10 mgd immediately below the diversion with certain stipulations.
- When streamflow ranged from 10 mgd to 15 mgd, 1/3rd of the flow or 3.9 mgd, depending on which amount was greater, of water could be diverted for off stream use. When the average daily streamflow was 10 mgd or less, 3.4 mgd were allowed to be diverted.
- An IIFS of 5 mgd was also established at the stream mouth.

4) **Waikapū:**

- The IIFS was set at 2.9 mgd and moved to immediately below the South Waikapū Ditch Diversion (Commission on Water Resource Management 2014).

However, despite the amendments to IIFS, the lack of enforcement resulted in many kuleana users receiving less water than they were allotted.

The reallocation of water again became a central focus in the region following the closure of HC&S in 2016. After this closure, HC&S sought to transfer their lands to diversified agriculture, which would require only 6-8 mgd versus the original 45 mgd of water that had been allocated to sugarcane cultivation (Hui o Nā Wai ‘Ehā and Maui Tomorrow Foundation, Inc. 2016). Because they had been one of the primary water users during the 2014 water allocation decision, Hui o Nā Wai ‘Ehā petitioned the Commission on Water Resource Management to increase IIFS. Hui o Nā Wai ‘Ehā and partners proposed to following changes:

1). Waihe‘e:

- An increase in IIFS to 18 just below the Spreckels Ditch.
- An Increase in IIFS to 18 just below the Waihe‘e Ditch.

2). Waiehu:

- An IIFS of 1.3 mgd for the South Waiehu Stream diversion
- An IIFS of 1.5 mgd for the North Waiehu Stream Diversion with special stipulations for kuleana holders.

3). ‘Īao:

- An increase of the IIFS to 13 mgd below the ‘Īao Ditch Diversion.

4). Waikapū:

- The relocation of the IIFS to below the South Waikapū Ditch Diversion whereby the IIFS would be changed to 2.7 mgd (Hui o Nā Wai ‘Ehā and Maui Tomorrow Foundation, Inc. 2017).

Most proposed changes to IIFS had stipulations contingent on streamflow that were similar to those proposed in 2014 for the ‘Īao stream. However, these details are outside the scope of this

study. The Hearings Officer’s proposed Finding of Fact for this case ended with lower IIFS than were requested by the hui. On November 1, 2017, the Hearings Officer proposed the following IIFS:

1) **Waihe‘e:**

- An increase in IIFS from 10 mgd (in the 2014 hearing) to 14 mgd (4 mgd lower than the amount requested by the hui) below the Spreckels Ditch Diversion.
- At the mouth of the river, the IIFS was set to 10 mgd to correspond with the increased IIFS below the ditch diversion.

2) **Waiehu:**

- The IIFS remained the same as the 2014 mediated agreement except that the special provisions made for kuleana holders were no longer upheld and permittees received water based on the priority category of their permits

3) **‘Īao:**

- Much like the Waiehu IIFS, the ‘Īao IIFS remained the same excepting changes in kuleana holders’ priority access to water.

4) **Waikapū:**

- The IIFS remained the same (Commission on Water Resource Management 2017).

Shortly thereafter, the stakeholders in this case shifted as a result of changes in land ownership. In 2019, Mahi Pono, LLC became a major stakeholder in this case when their request to replace HC&S, whose land they had purchased, was approved (Hawaiian Commercial and Sugar Company and Mahi Pono, LLC 2019). Because of the lack of amendments to IIFS, Hui o Nā

Wai ‘Ehā submitted their exceptions to the proposed rulings, reiterating their proposed requests and citing how these requests stood to benefit the stream habitat as well as appurtenant rights. On June 30, 2021, the committee delivered the following amendments:

1) **Waihe‘e:**

- The IIFS was changed to 11.44 mgd below the Spreckels Ditch Diversion (a decrease of 2.56 mgd from the Hearing Officer’s proposed changes).
- The IIFS at the mouth of the river was changed to at least 6 mgd (a decrease of 4 mgd from the Hearing Officer’s proposed changes).

2) **Waiehu:**

- The North Waiehu stream was changed to the natural flow of water without any offstream diversion.
- The South Waiehu stream IIFS immediately below the Spreckels Ditch intake was changed to .3 mgd (a reduction of .6 mgd from the 2014 mediated agreement).

3) **‘Īao:**

- The IIFS remained the same with provisions made to help ensure mauka to makai streamflow.

4) **Waikapū:**

- The IIFS remained the same (Commission on Water Resource Management 2021).

With the final case decision occurring relatively recently (see Table 4-1 for a summary of key decisions), it is still unclear if there will be further appeals to amend IIFS or if a new case to amend IIFS will be filed as additional scientific research is conducted. What remains clear,

however, is that although the water commission recognized that traditional and customary rights were a priority, the increased IFS was only a fraction of what was initially asked for by Hui of Nā Wai 'Ehā (Table 4-2) making the struggle for water an ever-present concern, especially in light of climate change. This highlights the potential scientific research could have for the community, especially in terms of helping them reach their goal of increased streamflow and setting an IFS.

Summary of the Different Changes to IIFS as a Result of Court Cases in Nā Wai ‘Ehā, Maui

	Waiehu			Waihe‘e			‘Īao		Waikapū						
	IIFS Decisions	2009 Decision by Decision Officer	2010 Decision by CWRM	2014 Mediation Agreement	2021 Decision	IIFS Decisions	2009 Decision by Decision Officer	2010 Decision by CWRM	2014 Mediation Agreement	2021 Decision	IIFS Decisions	2009 Decision by Decision Officer	2010 Decision by CWRM	2014 Mediation Agreement	2021 Decision
	North Waiehu	2.5 mgd	1.6 mgd			North Waiehu					North Waiehu (moved lower)				
	South Waiehu	2.5 mgd	.9 mgd	.9 mgd	.3 mgd	South Waiehu									
	Spreckels Ditch	27.5 mgd	10 mgd	10 mgd	11.44 mgd	Spreckels Ditch									
	Waihee Ditch	25.5 mgd		10 mgd		Waihee Ditch									
	Stream Mouth	1-2 mgd	6 mgd	6 mgd	4 mgd	Stream Mouth									
	‘Īao Intake	18.8 mgd		10 mgd	13 mgd	‘Īao Intake									
	Stream Mouth	2 mgd		5 mgd		Stream Mouth									
	Reservoir 6	4.1 mgd				Reservoir 6									
	South Waikapū Ditch			2.9 mgd		South Waikapū Ditch									
	South Waikapū Ditch (moved)				2.7 mgd	South Waikapū Ditch (moved)									

TABLE 4-1 SUMMARY OF IIFS DECISIONS FOR THE NĀ WAI ‘EHĀ COURT CASES. This table illustrates the various changes made to IIFS by different court cases. Each ahupua‘a is further divided into locations with IIFS. In some instances, stream gage locations where IIFS were measured have been moved. This is reflected by the addition of the word “(moved)” in column titles.

Summary of the IIFS Requested by Hui of Nā Wai ‘Ehā

Streams	Ditch	2009 Decision by Decision Officer	2016 Hui o Nā Wai ‘Ehā petition for increased streamflow
Waiehu	North Waiehu	2.5 mgd	
	North Waiehu (moved lower)		1.3 mgd
	South Waiehu	2.5 mgd	1.5 mgd
Waihe‘e	Spreckels Ditch	27.5 mgd	18 mgd
	Waihee Ditch	25.5 mgd	18 mgd
	Stream Mouth	1-2 mgd	
‘Īao	‘Īao Intake	18.8 mgd	13 mgd
	Stream Mouth	2 mgd	
Waikapū	Reservoir 6	4.1 mgd	
	South Waikapū Ditch		2.7 mgd
	South Waikapū Ditch (moved)		2.7 mgd

TABLE 4-2 SUMMARY OF REQUESTS FOR IIFS AMMENDMENTS BY HUI O NĀ WAI ‘EHĀ. This table summarizes the IIFS originally requested by Hui o Nā Wai ‘Ehā. When compared to Table 4-1, Table 4-2 showcases that the IIFS received were significantly lower than the IIFS requested by the group.

Conclusion

While sugarcane plantations emerged relatively recently, they, and the companies that emerged from them, have led to significant changes to the Maui landscape and still continue to impact the Native Hawaiian population. While water legislation has, in more recent years, focused on centering Native Hawaiian concerns through the integration of the public trust doctrine, in reality, kuleana holders often receive less than their share of water. This is perhaps in part due to biases within the water commission itself. Similarly, while Native Hawaiians have succeeded in amending IIFS in their favor, this has been a long-fought battle with minimal gains. In reality, the battle continues because of the need to still enforce IIFS. As recently as October

2021, farmers have noted instances when water has been shut off, leaving their lo‘i kalo dry (Davis 2021). In addition to this, even after the final decision, Wailuku Water Company has failed to prioritize kuleana rights over other stream uses (Dawson 2021). However, even if the IIFS were enforced adequately, the antiquated infrastructure of the diversion system and the deliberate wasting of water by big business leads to significant water loss in the system, preventing additional water from being allocated to kuleana holders (Cerizo 2020). Thus, although sugarcane plantations no longer dominate the landscape there is still much left to be accomplished in regards to combatting eco-colonialism in Maui. As evidenced by the IIFS and the lack of IFS for the region, additional scientific studies must be conducted to better assist with water allocation in the region.

CHAPTER FIVE:
PUTTING THE HISTORICAL IN HISTORICAL ECOLOGY

The Covid-19 pandemic had a significant impact on communities worldwide. Yet, for many Indigenous groups, this was a familiar experience. The colonization of Hawai‘i led to the spread of various diseases that ended up wiping out over 80% of the population (Kame‘eleihiwa 1992). In many ways, Covid-19, with the introduction of a new disease and no antibody resistance, represented a similar phenomenon. While legislation in Hawai‘i shifted from allowing travel with a negative Covid test and a two week quarantine to eventually only requiring a negative Covid test, this did not reflect the reduced risk of Covid-19 to communities. Although Covid cases had been relatively low, decreased restrictions caused Covid cases in Hawai‘i to increase exponentially. As demonstrated by the previous chapter, legislation should not be equated with community concern or community consent.

Moreover, Covid-19 studies provided considerable evidence for the significant impact that Covid-19 had on the Native Hawaiian and Pacific Islander population. Kaholokula et al. (2020) found that Native Hawaiian and Pacific Islanders were more likely to be negatively impacted by Covid-19 than other racial groups largely as a result of socio-environmental factors such as multiple families living under one roof. Similarly, Seto et al. (2022), in a study on Covid cases from a Honolulu hospital, reported that hospitalization rates of those infected with Covid-19 were 8.7% greater among Native Hawaiians when compared to other racial groups. In addition to these studies, my own experience developing Covid-19 resources, attending Pacific Islander Covid-19 vaccination focus groups, and making monthly bereavement donations as part of a Hawaiian-based nonprofit, provided me with even stronger evidence of the negative impact that Covid-19 had on my community. Thus, the pandemic redefined what it meant to do ethical

research in Hawai‘i. Because of the high rates of Covid-19 in Los Angeles and my proximity to those working with Covid-19 patients, equitable research in light of the pandemic meant searching for new avenues to reconnect while staying away. Limited primarily to an analysis of digitized historical documents, namely Māhele documents, newspapers, historical maps, and aerial photography, this chapter aims to showcase how this information, when combined with an understanding of ‘ōlelo Hawai‘i (Hawaiian language) can reveal nuanced details about landscape that allow for the reconstruction of landscape and water usage during the early colonial period in Hawai‘i.

While the intent of this chapter was originally to analyze the usefulness of archaeobotanical-based rigorous data in archaeological activism, this chapter instead focuses on the use of non-invasive measures to promote an activist archaeological agenda. In this chapter, I explore new ways of (re)connecting rather than disconnecting from ‘āina while not being in the same physical location. This shift not only reflects the essence of the ‘ōlelo no‘eau “he ‘a‘ali‘i kū makani mai au, ‘a‘ohe makani nana e kula‘i” or being flexible through change and the importance of flexibility in community-based work, but the importance of understanding community-based work within the larger historical context.

Historical Ecology

This research utilizes a historical ecological approach that integrates Native Hawaiian worldviews to understand the impact of sugarcane plantations on Native Hawaiians. In particular, this dissertation argues that historical documents can and should be used to understand how humans have impacted the landscape over time. Focusing on the ahupua‘a of Waikapū, I showcase the significant amount of detail that can be gleaned using this method while simultaneously highlighting that the experience of colonialism, even within Hawai‘i was place-

specific rather than universal. Thus, this chapter provides a geospatial analysis of sustained colonialism in Waikapū from the time of the Māhele to the present, adding place-based data to complicate the ongoing conversation concerning the Māhele and land loss among Native Hawaiians.

Previous Research

While this chapter is primarily focused on reconstructing landscape during the time of the Māhele, it does so with the impetus of using this reconstruction to generate a better understanding of the drastic impact the plantation era had on water usage. In doing this, it hopes to use a historical ecological approach to provide a better context for existing scientific studies of water in Nā Wai ‘Ehā.

Despite the need for more scientific research to set Instream Flow Standards, research on water in Nā Wai ‘Ehā Maui has still been fairly minimal. Most studies focus on the impact of changes to hydrology on aquatic species. Utilizing the Hawaiian Stream Evaluation Procedure Model, Parham (2013) analyzed the impact of different water management scenarios on eight aquatic species. He found that when water was not diverted, around 16-30% of the habitats of aquatic species could be restored. However, under full diversion, less than 1% of habitats could sustain aquatic species. Similarly, he argued that multiple diversions reduced the likelihood of species reproduction.

Oki et al. (2010) also studied the impact of stream diversion on various aspects of the Nā Wai ‘Ehā streams. Using the available gage data from 1984-2007, they calculated the minimum flow for each stream to understand the percentage of time streams flowed continuously prior to being diverted. The study also highlighted the trend towards reduced streamflow in this area in

more recent years and the impact of diversions on aquatic species and stream recharge in the present day.

Much like Parham (2013), Oki et al. (2010) reported a positive correlation between the amount of habitats available to aquatic species and streamflow. Because temperature can negatively impact aquatic species and can lead to taro rot, Oki et al. (2010) measured the stream temperature between 2006 and 2007 but found no extreme changes in temperature. When viewed together, these two studies articulate ways that stream diversions could negatively impact the environment. However, their research is largely focused on the more recent past.

Other studies dive deeper into the past but primarily focus on groundwater. Estimating differences in groundwater recharge from the 1920s to the present, Engott and Vana (2007) note that the periods after 1979 had a 44% decreased groundwater recharge resulting from lower precipitation rates and improved irrigation infrastructure. Their findings improved upon Shade (1997) who calculated lower recharge estimates due to their failure to include fog drip. While these studies point to changes in streamflow, especially with consideration to changes in agriculture, a preliminary understanding of landscape prior to the 1900s is lacking. Therefore, they provide only limited information on the impact of sugarcane plantations on streamflow. Rather than utilizing a purely scientific or model-based approach, historical ecology provides an avenue for developing a deeper understanding of past landscapes by encouraging one to examine the wealth of information contained in historical documents.

Reconstructing the Landscape through Historical Documents

Description of Historical Documents:

While Hawaiians developed their own way of mapping the landscape through oral histories and hula prior to colonization, no printed maps exist for this time. However,

descriptions found in Māhele documents can be paired with post-Māhele maps to provide an approximate image of the landscape prior to colonization. The Māhele documents are divided into seven different types: Native Registers, Foreign Registers, Native Testimonies, Foreign Testimonies, Māhele Awards (also known as Land Claim Awards), Royal Patents, and Land Grants. Native Registers were the initial land claims made by Native Hawaiians. Such land claims include descriptions of the parcel. Things commonly noted in these descriptions were the number of houses and lo‘i on the parcel as well as how the parcel had been inherited. Similarly, Foreign Registers often provided descriptions of lands that were given to foreigners by a member of the royal family of Hawai‘i. Native and Foreign Testimonies were a required part of the land claim process. They were testimonies from the local chief or neighbors that vouched that the person claiming to live on the land lived on the land. Included in this documentation was not only a statement that supported the original recipient’s claim but a description of the location of the parcel as well as the number of apana (sections of land) in each parcel. The primary difference between Foreign and Native testimonies is, as the names would suggest, that Native testimonies were primarily written in ‘ōlelo Hawai‘i by Native Hawaiians, konohiki (managerial chiefs) particularly, and that Foreign Testimonies were written primarily in English by foreigners. Once all these documents were reviewed and approved by the land commission, a Māhele Award was issued. Māhele Awards provide a summary of the different apana and typically included a map as well as map coordinates. After a Māhele Award was received, applicants could submit the required paperwork and commutation fee to receive a Royal Patent. In instances where land was not claimed, land could be purchased. Evidence of this purchase is shown by the receipt of a Land Grant.

I have used the Māhele documents in various ways to reconstruct the landscape of Waikapū and how it changed over time. The following describes the different ways that I grouped and analyzed the data.

Phase 1: Determining the amount of lo‘i belonging to claimants

The first phase of analysis consisted of documenting lo‘i. To complete this analysis, scans of the original Māhele documents were obtained online through the Papakilo Database, a repository of digitized historical documents, which includes Māhele, genealogy, and newspaper records made freely available by the Office of Hawaiian Affairs (Figure 5-1). In instances where these scans were not available, Waihona Aina, a website that contains transcribed and translated Māhele documents for purchase, was consulted. Most awards on the Waihona Aina site contain free previews of the documents, which include translations of most of the Native Registers (Figure 5-2). These previews have been used to double-check translations.

Māhele documents were located on the Papakilo Database by searching for “Waikapu” in the Māhele ‘Āina Index portion of the website. Each entry contained information about the specific Māhele document including the name of the claimant and the number of the claim, the location, and a link to the digitized document. Native and Foreign Registers were the primary documents consulted because it was assumed that claimants would know and be able to describe their land better than those who supported their claims. To facilitate data analysis, information from historical documents was organized into an Excel spreadsheet (Appendix B). In the case of Native Registers, both the original text of the document (written in Hawaiian) and my English “rough translations” were included. To corroborate the Native Register’s claims, Foreign Testimonies were consulted. When Native Testimonies were available, they were included in the analysis to provide further evidence to support the number of lo‘i listed by the Native Register.

However, most Native Testimonies were unable to be located through the Papakilo Database.

While this database did contain records of the testimonies, the historical documents, for the most part, did not match up to their catalog numbers (Figure 5-3). Similarly, Native Testimonies were typically not contained in the Waihona Aina previews. The Māhele Awards were also excluded from analysis during this phase because they did not contain information about claimants' lo'i.

In certain cases, documents that were actually from other ahupua'a of Maui were labeled Waikapū. Once these documents had been categorized by 'ili, it became possible to ascertain that they corresponded to 'ili outside of Waikapū.

It is possible that the prioritization of Native Registers in this analysis resulted in a larger amount of land claimed than claimants actually had a right to. However, this does not seem to be the case. When comparing the Foreign Testimonies to Native Registers, there does not appear to be a large discrepancy between the two. In multiple cases, Foreign Testimonies indicate that the claimant had the right to more land than what was initially claimed by the Native Register. This highlights that using multiple databases and types of historical documents is an effective way to develop a comprehensive understanding of the landscape during the mid-1850s, especially as it pertains to the number of lo'i claimed.

Phase 2: Determining the amount of lo'i belonging to the government

The Māhele Awards were used to locate government-owned lo'i. Because each document contained the name of the recipient and a sketch of the claimed parcel with the government-owned lo'i labeled (Figure 5-4), it was possible to match these sketches to their corresponding location on Monsarrat's 1887 Waikapū Land Claim Award map (Figure 5-5).

Phase 3: Determining other features of the landscape

Similar to Phase 1, both Native Registers and Foreign Testimonies were analyzed to identify built structures and vegetation that were claimed in Waikapū.

Phase 4: Identifying the people who lived in Waikapū that did not submit land claims

To identify people who lived in the surrounding region but did not claim land, Foreign Testimonies were consulted. Only Foreign Testimonies contained references to non-claimants including the approximate location of their land (Figure 5-6).

Phase 5: Tracing land ownership change

Land Grants were obtained from the Waihona Aina website and compiled into an Excel spreadsheet. Because not all land claims were awarded, this helped provide information on how land ownership changed following the Māhele.

Māhele 'Āina Index – Native Register – Helu 2227

Note: Record display *abridged* > [show complete information](#)

> Metadata

Collection

Native Register (KPA)

Claimant

Kahookano

Island	Ili (Location)	Ahupuaa	District
Maui		Waikapu	Wailuku

RelatedHelu

1. Māhele 'Āina Index – Foreign Testimony – Helu 2227
2. Māhele 'Āina Index – Native Testimony – Helu 2227

NextHelu

Māhele 'Āina Index – Native Register – Helu 2228

PreviousHelu

Māhele 'Āina Index – Native Register – Helu 2226

> Related Images



[View Image](#)

Title: Māhele 'Āina
Index – Native Register
– Reel 2 Volume 3
Image 00995
[View Full Image Record](#)

FIGURE 5-1 IMAGE OF PAPAKILO DATABASE. Above is an example of a typical record from Papakilo Database. This record includes the name of the claimant, claim number, location, and an image of the original historical document.

Mahele Record: 02227

Claim Number:	02227
Claimant:	Kahookano, wahine
Other claimant:	Manu, husband
Other name:	
Island:	Maui
District:	Wailuku
Ahupuaa:	Waikapu
Ili:	Palama, Ohia
Misc Notes:	2 taro mo' o plus 3 lo'i
Awarded:	No
Modified Date:	
Maps:	ma02227 - No map(s) found.

No. 2227, Kahookano
N.R. 405v3

Ahupua'a of Waikapu, 'Ili of Palama. To the Land Commissioners: I hereby write for my land claim, a mo' o from Kaina who gave it to my makuas. My makuakane died, leaving my makuahine and my kaikunane and the land was bequeathed to my kaikunane. On his death the land became mine and I have lived here until the present with my makuahine.

I have one lo'i in another place. My witnesses are Kalii and Hika
KAHOOKANO
Waikapu, December 21, 1847

FT. 467v7
Cl. 2227, Kahookano

The Claimant is the wife of M
[Top of record]

FIGURE 5-2 IMAGE OF WAIHONA AINA DATABASE. Above is an example of a Native Register preview from Waihona Aina. The record itself has been translated by the site, but occasionally portions of it are left out as indicated by the “[Top of record]” label.

Māhele 'Āina Index – Native Testimony – Helu 2227

Note: Record display *abridged* > [show complete information](#)

> Metadata

Collection	Claimant		
Native Testimony (KPA)	Manu		
	Island	Ili (Location)	Ahupuaa
	Maui		Waikapu
			Wailuku

- RelatedHelu**
1. [Māhele 'Āina Index – Foreign Testimony – Helu 2227](#)
 2. [Māhele 'Āina Index – Native Register – Helu 2227](#)

NextHelu

[Māhele 'Āina Index – Native Testimony – Helu 2228](#)

PreviousHelu

[Māhele 'Āina Index – Native Testimony – Helu 2226](#)

> Related Images



[View Image](#)
 Title: Māhele 'Āina
 Index – Native
 Testimony – Reel 3
 Volume 9 Image
 01094
[View Full Image](#)

FIGURE 5-3 NATIVE TESTIMONY FROM PAPAHILO DATABASE (CONTINUED ON NEXT PAGE)

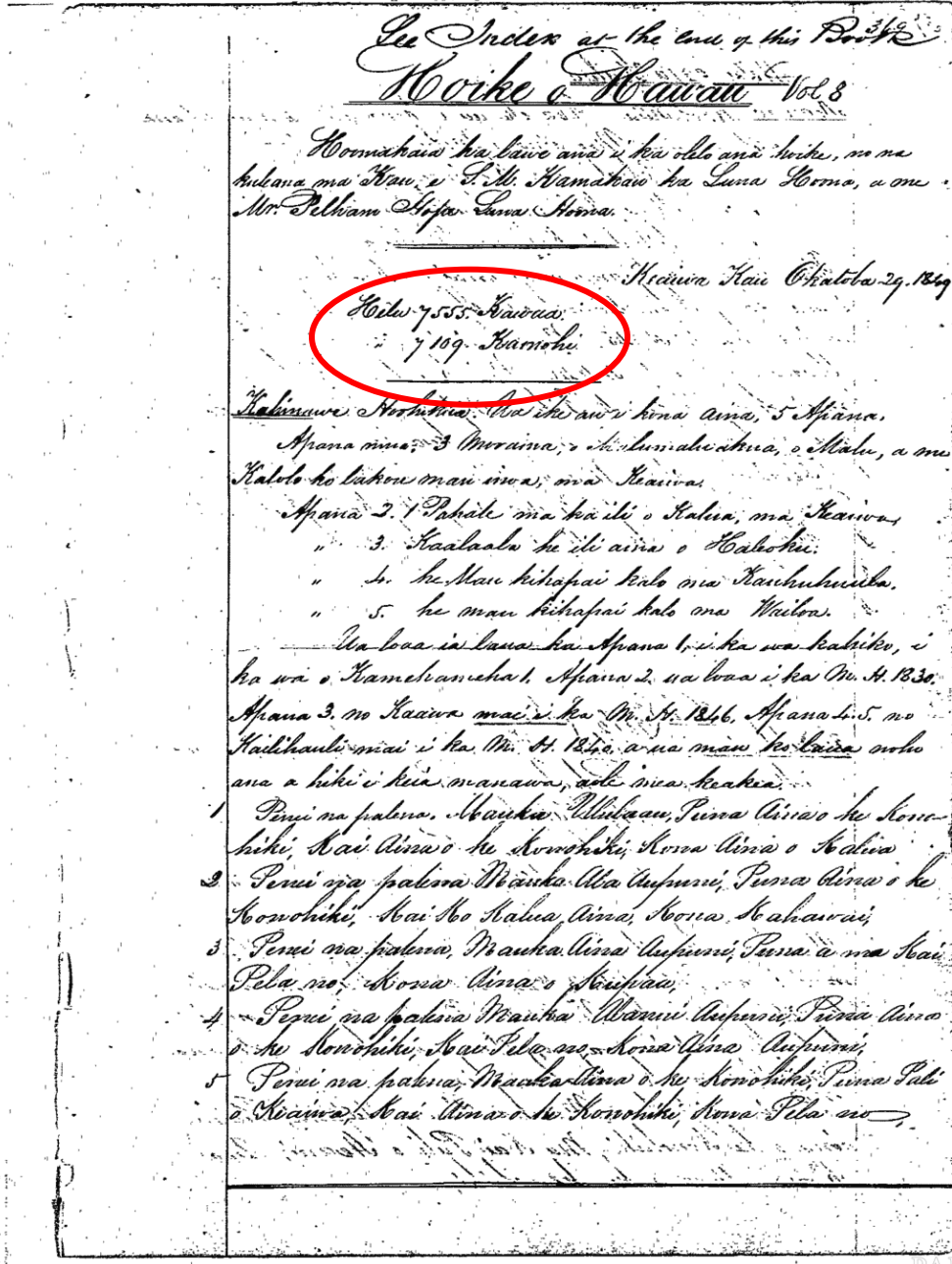


FIGURE 5-3 NATIVE TESTIMONY FROM PAPAHILO DATABASE. Above is an example of a Native Testimony record from the Papanilo Database and the corresponding image (enlarged). As shown by this example, the name and the claim number do not match. The catalog number is 2227 for Manu. However, the image shows the numbers 7555 and 7109 for Kawaia and Kamohi, respectively (circled in red). Image obtained from Papanilo Database. Available under normal fair-use principles.

211

Waikapu Maui

Apāna 1, Kāle o Kūka, mā Pihetua, E hōmāka mā ke kīhi Ake, e pili ana mā ke
 Kahau, a e hōi, hōm. 19¹/₂; hōi. 33¹/₂ Ake, e pili ana mā Keawe, hōm. 62¹/₂; hōi. 15¹/₂ Ake,
 e pili ana mā Keawe, hō. 3¹/₂ hōm. 178 Ake, e pili ana mā Kahakumakāai, hōm. 53¹/₂
 hōm. 57¹/₂ Ake, e pili ana mā Kahakumakāai, hōm. 11¹/₂; hōm. 45¹/₂ Ake, e pili ana mā
 Kahakumakāai, Ake, 70¹/₂ hō. 11¹/₂ Ake, e pili ana mā Chumui, Ake, 11¹/₂; hōi. 18¹/₂ Ake, e
 pili ana mā Chumui, Ake, 51¹/₂; hō. 37¹/₂ Ake, e pili ana mā Chumui, Ake, 10¹/₂; hōi. 8¹/₂ Ake,
 e pili ana mā Chumui, Ake, 7¹/₂; hōm. 48¹/₂ Ake, e pili ana mā Chumui, Ake, 11¹/₂; hōi. 25¹/₂
 e pili ana mā Ka Auwai, Ake, 16¹/₂; hō. 93¹/₂ Ake, e pili ana mā Ka Auwai, hōm. 21¹/₂; hōi. 18¹/₂
 Ake, e pili ana mā Ka Auwai, hōm. 21¹/₂; hōi. 102¹/₂ Ake, e pili ana mā Ka Auwai, hōm. 21¹/₂; hōi. 18¹/₂
 hōm. 50¹/₂; hōi. 148¹/₂ Ake, e pili ana mā Kahawāia, Ake, 23¹/₂; hōi. 176¹/₂ Ake, e pili ana mā Kahawāia,
 Ake, 75¹/₂; hōi. 62¹/₂ Ake, e pili ana mā Kahau, a hōi mā Kahau, hōmāka. 23¹/₂ Ake.

Apāna 2, Kāle mā Pihetua, E hōmāka mā ke kīhi Ake, e pili ana
 mā Kahawāia, a hōi, Ake, 11¹/₂; hō. 3,00¹/₂ Ake, e pili ana mā Kahau, mā Kahawāia,
 Ake, 21¹/₂; hō. 188¹/₂ Ake, e pili ana mā Kahau, mā Kahawāia, hō. 30¹/₂; hō. 21¹/₂ Ake, e pili ana
 mā Kahau, mā Kahawāia, hōm. 73¹/₂; hō. 45¹/₂ Ake, e pili ana mā Palama, hō. 10¹/₂; hōi. 21¹/₂
 Ake, e pili ana mā Kahawāia, hōm. 81¹/₂; hō. 58¹/₂ Ake, e pili ana mā Kahawāia, hō. 61¹/₂
 hōi. 98¹/₂ Ake, e pili ana mā Kahawāia, Ake, 9¹/₂; hōi. 71¹/₂ Ake, e pili ana mā Kahawāia,
 Ake, 11¹/₂; hō. 155¹/₂ Ake, e pili ana mā Kahawāia, hō. 8¹/₂; hō. 291¹/₂ Ake, e pili ana mā
 Kahawāia, hōm. 71¹/₂; hōi. 120¹/₂ Ake, e pili ana mā Kahau, hōm. 53¹/₂; hōi. 160¹/₂ Ake,
 e pili ana mā Kahawāia, hōm. 73¹/₂; hōi. 121¹/₂ Ake, e pili ana mā Kahau, a hōi mā
 Kahau, hōmāka. 1¹/₂ Ake.

3.76
1.76
5.46

Pūpū māke. mā Apāna 2.

Apāna 1, Maui, ke kīhi Kahau o Ap. 2, e ana, Ake, 73¹/₂; hō. 379¹/₂ Ake,
 Apāna 2, hōm. 29¹/₂ Ake, e ke kīhi Kahau, alaila hōi mā Kahau, Ake, 21¹/₂; hōi. 65¹/₂ Ake,
 Ake, 65¹/₂; hō. 169¹/₂ Ake, hōm. 17¹/₂; hō. 33¹/₂ Ake, Ake, 67¹/₂; hōm. 64¹/₂ Ake, Ake, 17¹/₂; hōi. 46¹/₂ Ake,
 Ake, 74¹/₂; hō. 75¹/₂ Ake, hōm. 11¹/₂; hō. 94¹/₂ Ake, hōm. 76¹/₂; hōi. 184¹/₂ Ake, hō. 16¹/₂; hōi.
 38¹/₂ Ake, hōm. 78¹/₂; hōi. 57¹/₂ Ake, hōm. 13¹/₂; hō. 128¹/₂ Ake, hōm. 72¹/₂; hōi. 87¹/₂; a hōi mā ke kīhi
 māke. - 1/5 Ake.

Apāna 2, O Pūpū, E hōmāka mā ke kīhi Kahau, Ake, 7¹/₂; hō. 100¹/₂ Ake, a e hōi, hōm. 100¹/₂
 hōi. 55¹/₂ Ake, e ke kīhi māke, alaila hōi, hōm. 1¹/₂; hōi. 95¹/₂ Ake, mā Kahawāia, hōi. 100¹/₂
 hōi. 100¹/₂ Ake, mā Kahawāia, Ake, 6¹/₂; hōi. 80¹/₂; mā Kahawāia, Ake, 65¹/₂; hō. 24¹/₂ Ake,
 mā Kahawāia, a hōi mā Kahawāia, māke. - 3/100 Ake.

C. Bailey
Maui ana aina

Waikapu, Aug. 27, 1852

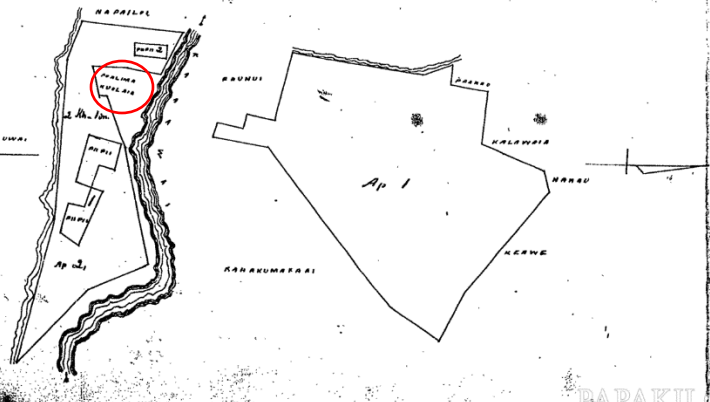


FIGURE 5-4 EXAMPLE OF A MĀHELE AWARD. Māhele Awards contained maps with government lo'i (like lo'i po'alima labeled). These maps made it possible to locate government lo'i on Monsarrat's 1887 Waikapū Land Claim Award map. Image obtained from Papakilo Database. Available under normal fair-use principles.



FIGURE 5-5 MONSARRAT 1887 MAP Depicted on the map are different Land Claim Awards and Land Grants for Waikapū. While the map primarily depicts boundaries, in certain locations it also contains references to other structures like churches. Available under Creative Commons Licensing.

C. 352, 19. Hekeheke.

Mapua Sw. I wrote out this man's Claim in January 1848. and it was sent to Oahu.

Maui Sw. The Ct's land consists of 3 pieces in Waikapu. Maui.
No. 1. is a section of lo'i in Kupaia.

" 2. " 2 lo'i " "

" 3. " a House lot & Salt land in Ahia.

The Ct. rec^d these lands from my father Keahi in the days of Kamehameha I. His title is not nor ever was disputed.

No. 1. is bounded. Maaka, by Opunui's land. Waikae, by my land. Kula, by Opunui's land. Maalaea, by my land.

No. 2. is bounded. Maaka, by Kakuwani's land. Waikae, by Kakuwani's land. Kula, by the Crake of Waikapu. Maalaea, by Kakuwani's land.

No. 3. is bounded. Maaka, by my land. Kula, by Kakuwani's land. Maikai, by the sea. Maunehana, by Kakuwani's land.

FIGURE 5-6 EXAMPLE OF A FOREIGN TESTIMONY AWARD. Foreign Testimonies contained information about the approximate location of each award on the map. This picture highlights how these documents describe location. For example, the words "Kula by Opunui's land" indicate that Opunui's land was approximately east of the land claim. Image obtained from Papanui Database. Available under normal fair-use principles.

Computer programs:

Māhele Award information was documented in Excel spreadsheets, maps were constructed using ArcGIS Pro, and graphs were made in RStudio.

A note on translation:

Rough, rather than direct, translations were made of the Native Registers (Figure 5-7). The purpose of translating texts was to obtain information about the amount of lo'i and other

physical features on the landscape and, therefore, most of the other information contained in these documents is missing from my translations. Translations were checked against those made by Waihona Aina. Because certain translation mistakes were discovered while using Waihona Aina, Waihona Aina was primarily used as a way of checking for and limiting errors in my translations rather than being used for translations. In addition to this, certain names of ‘ili and claimants were assumed to represent the same name because of similarities in pronunciation or because of Hawaiian grammar rules. For example, ka‘i (articles) always precede nouns in ‘ōlelo Hawai‘i. The words ka and ke are used to indicate a singular “the” whereas the word nā represents a plural “the”. Ka‘i can be, but are not always, used, in names. Therefore, ‘ili names like Kaaikanaka, Aikanaka, and Aikanaha were all presumed to represent the same ‘ili. Similarly, kāhulu (adjectives) were also considered when trying to identify singular claimants. For example, Haa and Haawahine (Haa woman) were assumed to be the same person because the word wahine was often listed, where applicable, after claimant names in the Māhele Awards. In certain cases, names were assumed to be abbreviations. For example, Ehu was assumed to be an abbreviation of Ehunui.

In addition to these general guidelines, my translations do not add ‘okina (‘) or kahakō (ā, ē, ī, ō, ū) because they were largely left out of the Māhele documents. This is my attempt to reflect the original writing contained in the Māhele documents.

In total, 124 different land claims were considered. These individual land claims were derived from 123 Native and Foreign Registers and one Native Testimony. Two claims were disregarded because they were letters rather than land claims. An additional four represented disputes. One was between A Paki and Haa. The other was between Mahuka and Kaai. Thus, only 1 claim from each dispute was taken into account for calculations. In addition to this, a few

claims included duplicate information. Claims with the same name, but with different claim numbers were assumed to be different land claims unless the information contained in the claim was the same as, or similar to, other land claims. In certain cases, the Māhele documents indicated that awards were duplicate. Awards that I identified as duplicates included Claim numbers (henceforth LCA#) 5780 and LCA# 5774 for Kaai, LCA# 3102 and LCA# 3103 for Kalawaia, LCA# 3019B and LCA# 3020 for Makaio, LCA# 401 and LCA# 8882 for Kekua, and LCA# 309, LCA# 3702, and LCA# 5410 for D. Malo. When all this was taken into account, only 114 claims were analyzed.

Hele 412 Kaili
Ma

Waikapu Jan. 13. 1847

Aloha olua e na Luna hoona kuleana
aina ke hoopii aku nei au ia
olua no ko'u mau kuleana pono
i lawe ia, he mau loi ekolu aia
ma Palama i Waikapu
na kuu makamaka i hoolimalima
i kana waiwai pono no ke Puu
ke kumu hoolimalima o Kekahi

Rough translation:

Aloha olua e na Luna hoona kuleana aina ke hoopii aku nei au ia olua no ko'u mau kuleana pono i lawe ia, 125awai 125loi ekolu aia ma Palama i Waikapu

Hello head of land claims, I am presenting this legal document to you for my personal kuleana parcels that I have claimed 3 taro patches in Palama in Waikapu

FIGURE 5-7 IMAGE OF A LAND CLAIM AWARD AND TRANSLATION Above is an example of a scanned Native Register. All Native Registers were written in 'olelo Hawai'i and are in cursive. In some instances, Native Registers appear faded and words are unclear. Below the document is an example of how a rough translation would appear in my spreadsheet. Above image obtained from Papakilo Database. Available under normal fair-use principles.

Understanding Location from the LCAs

Additional information about the location of different awards was often contained in Foreign Testimonies. For each apana (piece) claimed, typically the original caretakers of the lands or the names of the ‘ili Waihee (north), Kula (east), Maalaea (south), and Mauka (west) of the apana were included. Occasionally the words akau (north), hikina (east), hema (south) komohana (west) were used to replace these words in the Native Register documents. It is important to take time to note here that Waihee, Kula, Maalaea, and Mauka likely represent place-based ways of indicating direction in Hawai‘i as they are all locations within Maui that correspond roughly to the given directions. This is further evidenced by the use of different locations in land claim awards outside of Waikapū. However, it cannot be ascertained that this is a specifically “Hawaiian” way of indicating directions as these directions were contained in the Foreign Testimonies rather than Native Registers.

‘Āina as Source

Reconstructing the Pre-Māhele Landscape

The purpose of this analysis is to develop the earliest reconstruction of the Waikapū landscape possible through using only archival documents. While connection to land is an important part of Hawaiian culture, Hawaiians were not static before colonization but moved throughout the landscape. Therefore, while it is likely that many families lived in the same location prior to colonization, there is no guarantee that all families lived in the same location during this time. An analysis of the Māhele documents similarly confirms that land parcels changed caretakers before the time of the Māhele. Therefore, the earliest map that can be developed from these Māhele records coincide with the time of the Māhele. Nevertheless, because the industrialization of sugarcane did not occur until after the 1850s, a map dating to

around 1848 can still provide a key foundation to understand landscape change during the plantation period.

To develop a map of the landscape before the Māhele, Monsarrat's 1887 Land Claim Award map of Waikapū was obtained and georeferenced using ArcGIS Pro. This map contained the boundaries of most Land Claim Awards and the names of the claimants associated with them. While most of the land claims could be matched with locations on the map, there were a few land claims that could not be matched. This is primarily because lands that were claimed, but not awarded were not located on this map. In these instances, the approximate location was identified using directions from Foreign Testimonies. Because the 1887 Monsarrat map was located inland and there were not many defining features to assist with georeferencing, after known places were matched with their depictions on the map, existing TMK (Tax Map Key) were further consulted to help refine the location (Figure 5-8). Tax Map Keys depict the boundaries of modern zones, sections, plats, and parcels in Hawai'i with zones being the largest section and parcels being the smallest. TMK-plat maps, specifically, were consulted because they aligned the best with the Monsarrat map.

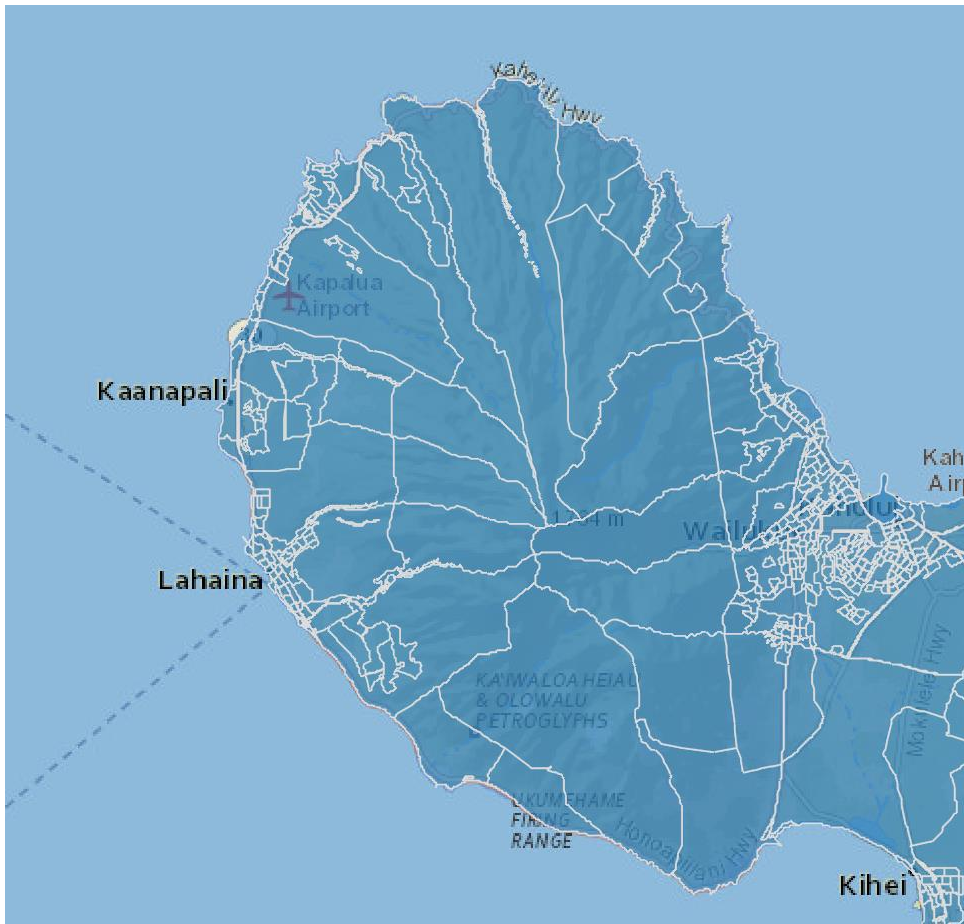


FIGURE 5-8 TMK-PLAT MAP This map showcases the different plat-divisions in Western and Central Maui. Most of these divisions could be matched with LCAs making it possible to georeference the 1887 Monsarrat map with greater accuracy. This map was obtained from <http://geoportal.hawaii.gov>. Available under Creative Commons Licensing.

While the Monsarrat map contained names of LCA and Grant recipients, grant numbers, outlines of most apana, and occasionally apana numbers, vegetation and other physical features on the landscape were largely absent from this map. However, because land use and change in land use have a considerable impact on streamflow, such information is necessary to glean a deeper understanding of changes in the environment and its potential impact on Native Hawaiians. Furthermore, because appurtenant rights are evidenced primarily by lo'i (wet taro) and lo'i malo'o (dry taro), the inclusion of kalo in the landscape has not only the potential to help

one understand water usage but to provide further evidence of present-day appurtenant rights (Commission of Water Resource Management, 2016).

To populate the landscape with vegetation, scans of the Native Register applications was downloaded and information from them were compiled into a spreadsheet. Out of the 114 individual claim numbers analyzed, 13 did not contain information about lo‘i kalo. Thus, only 101 were analyzed for lo‘i kalo. Two of the land claims, LCA # 8465 of Kamakuahoa and LCA# 461 of Aipuhi could not be located. This information included the LCA number, the number of lo‘i, and rough translations. When the number of lo‘i was not mentioned in Native Registers, this information was obtained from Foreign Testimonies and occasionally Native Testimonies, and a note was made in a different Excel spreadsheet (Appendix C). Foreign Testimonies were absent or included no usable information from 23 of the land claims. Out of these 23 instances, three Native Testimonies confirmed 3 of the Native Registers. In 12 instances, Native Registers contained no usable information to identify the amount of lo‘i kalo in the land claim. In one instance, a Native Testimony and a Foreign Testimony were instead used to identify lo‘i kalo. However, the amount of lo‘i kalo identified differed between testimonies. For the 11 other instances, only a single document was used to identify lo‘i kalo, specifically one Native Testimony and 10 Foreign Testimonies.

Similarities and differences between Native Registers and Foreign Testimonies were analyzed to understand how the information included compared to one another. When Native Registers were compared against the Foreign Testimonies, 26 of the accounts differed. While some mentioned the same ‘ili but differed in the amount of lo‘i, which is likely a result of foreign entities not understanding Hawaiian landscapes, others included plots in additional ‘ili. When both Native Registers and Foreign Testimonies were present, there were 26 instances when

Native Register and Foreign Testimonies differed from each other. In 41 cases, both the Native Registers and Foreign Testimony showed the same amount and location of lo‘i kalo. In cases where lo‘i quantity differed, the quantity mentioned in the Native Register was given priority, regardless of whether the number was larger or smaller than that mentioned in the Foreign Testimony. In instances where Foreign Testimonies referenced lo‘i in other ‘ili, they were added to the map in a separate layer named “Added Lo‘i”. Because of the relatively large discrepancy between the Native Register and Foreign Testimonies, this points to the need to analyze these documents in tandem with one another to reconstruct past landscapes.

Because land claims contained multiple apana (parcels of land), once the translations were made, they were further subdivided into different apana and the number of lo‘i for each apana was recorded. In 32 cases only the quantity of mo‘o and paukū, two other types of land divisions, were provided, not the amount of lo‘i. Out of the 33 cases, 22 were labeled paukū and 10 were labeled mo‘o. Once lo‘i from Native Registers were quantified and their apana were articulated, they were added to the georectified Monsarrat map through a feature layer titled “lo‘i”. Only apana that could be matched to their names on the map were included in this layer. In instances where multiple apana were listed for the same ‘ili, descriptions from Foreign Testimonies and maps from the Māhele awards were used to match these apana with the corresponding location on the map. In total, 122 individual polygons and 1489 lo‘i were added to this feature layer (Figure 5-9).

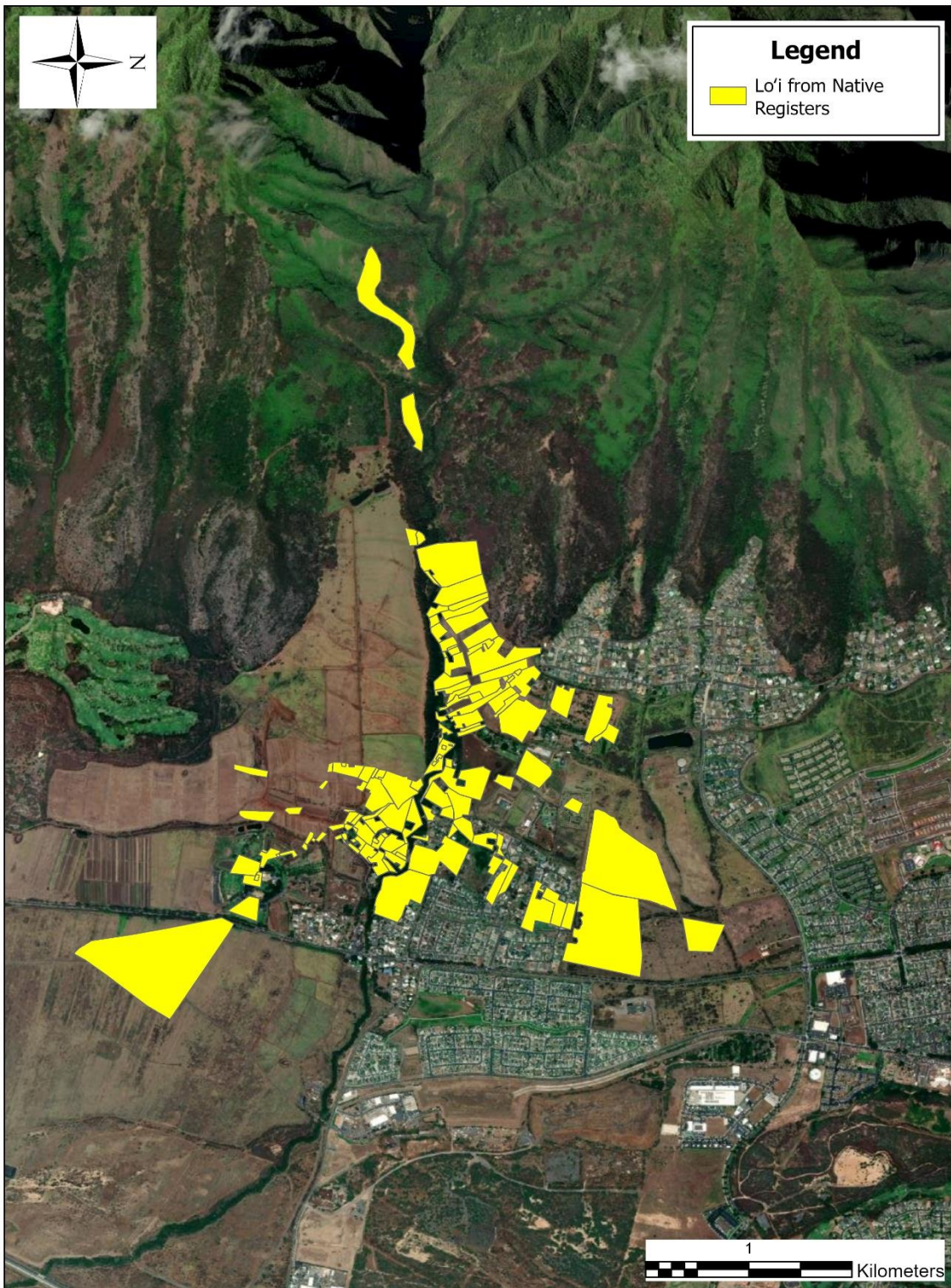


FIGURE 5-9 LO'I FROM NATIVE REGISTERS Polygons pictured here represent land claims with lo'i as determined from analysis of Native Registers.

Additional lo'i that were mentioned in Foreign Testimonies and could be located on the 1887 Monsarrat map were added in a separate feature layer. In total, 111 lo'i from 24 additional apana were added to the map (Figure 5-10).

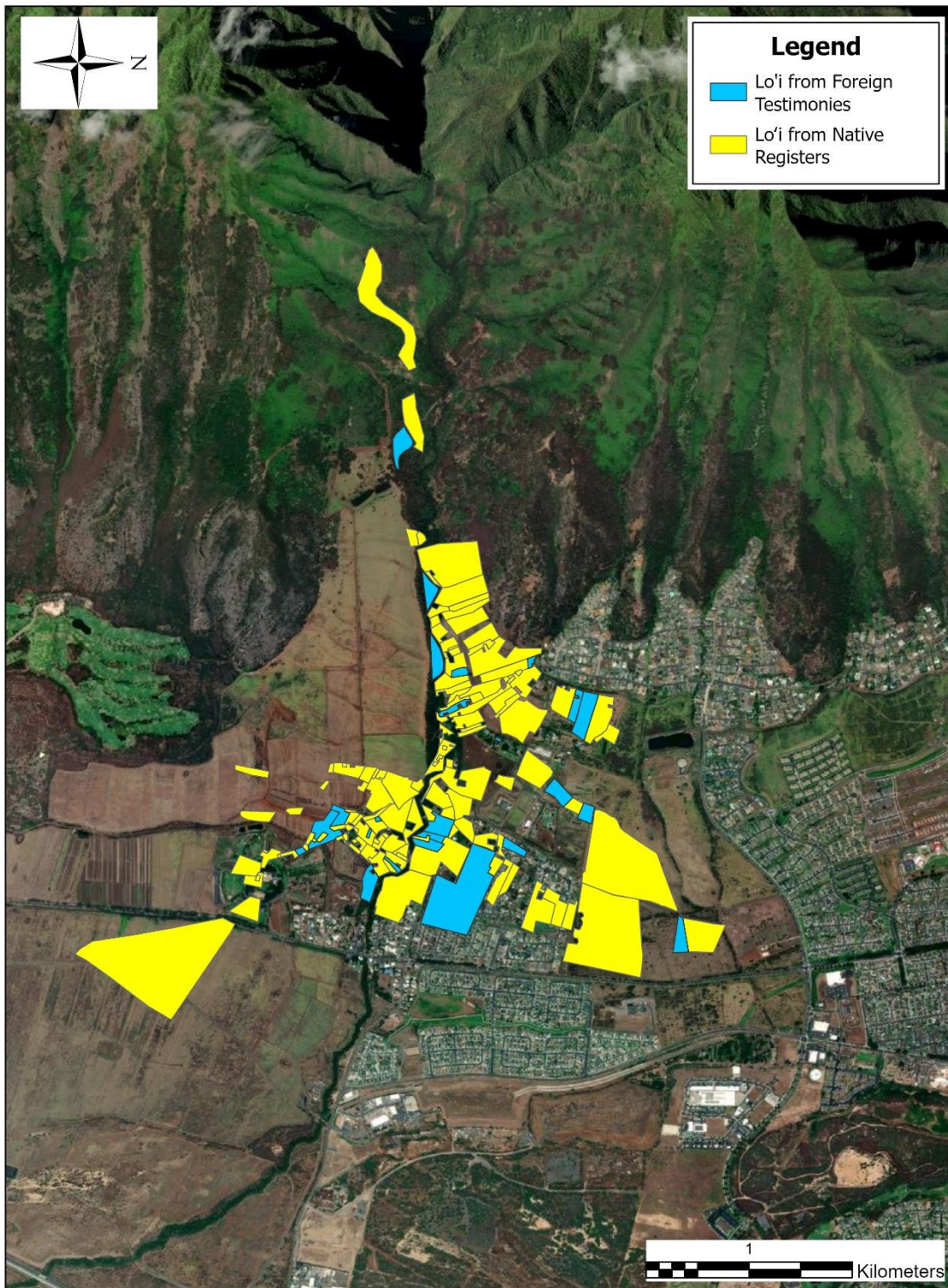


FIGURE 5-10 LO'I FROM NATIVE REGISTERS AND FOREIGN TESTIMONIES The polygons above showcase the distribution of lo'i determined by consulting both Foreign Testimonies (blue) and Native Registers (yellow).

In certain instances, lo‘i could not be located on the Monsarrat map. This is likely a result of the map being published in 1885 after certain parcels of land were lost by their original inhabitants and converted into Land Grants. However, because Foreign Testimonies contained information about the apana that were located roughly north, east, south, and west of each claim, a relative location of each award could be established by triangulation. In instances where Foreign Testimonies could not be used to find the approximate location of apana, ‘ili were instead used to determine location. If the ‘ili could not be located on the map, apana were left out of consideration. Lo‘i that could be located through this method were added to the map in a separate feature layer called “Added Lo‘i” (Figure 5-11). It is important to note that these features were added using a polygon layer, but that the size of these polygons is arbitrary. Using this method, 391 lo‘i were added to the map.

Multiple apana and lo‘i could not be added to this map. The three apana that were not mapped in this analysis included Kupali‘i’s claim for taro land and kula at Keana, Kuaana’s claim for 16 lo‘i at Haua, and Kamakauahoa claim (8465) for lo‘i in Kaluaiki. Additionally, Aipuhi’s claim for 7 lo‘i and 83 lo‘i from Kaai’s claim were left out of the analysis because there was no mention of their location. William Crowningburg’s claim for 7 lo‘i “outside of his ‘ili” and Antoni’s claim for “an increased amount of lo‘i” were also not considered because of their similar ambiguous nature.

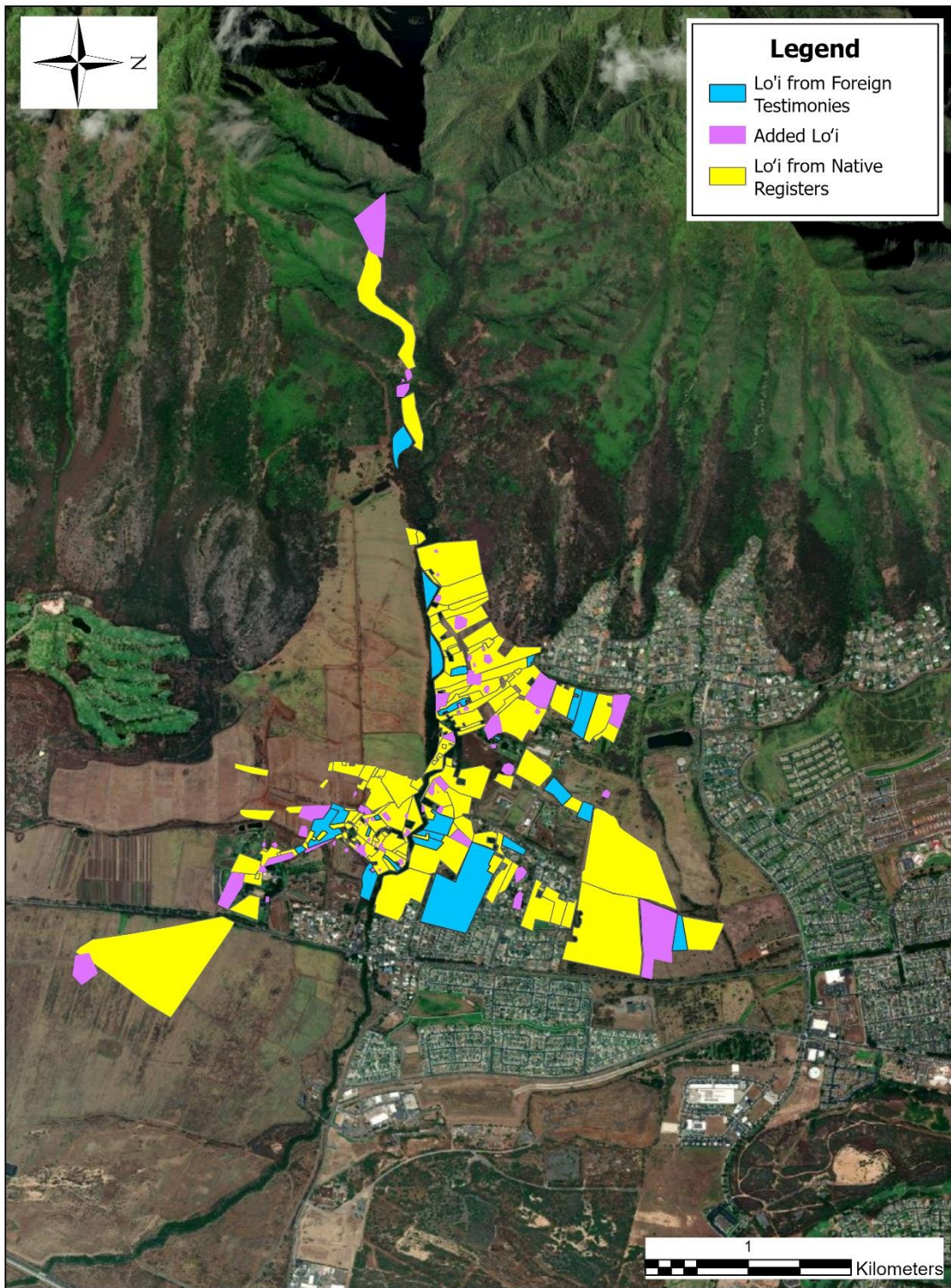


FIGURE 5-11 ALL LO'I FROM LCAS: Depicted above are all lo'i from LCA including those from Foreign Testimonies only (blue), Native Registers (yellow), and additional lo'i extrapolated from comparing different Māhele documents (purple).

In addition to individual claims for lo‘i. The Māhele also contained references to lo‘i po‘alima, lo‘i pa‘ahao, and lo‘i aupuni, or lo‘i that were cultivated to produce kalo for the high chiefs. While references to these lo‘i are made in Native Registers and Foreign Testimonies, their location remains somewhat ambiguous. However, many of these lo‘i were recorded in the maps contained in the Māhele Awards, and, thus, could be added to the existing layers in the map (Figure 5-12). Lo‘i pa‘ahao, lo‘i aupuni, and lo‘i po‘alima all likely reference the same type of lo‘i. Evidence for this can be found in the Māhele Awards. While certain awards refer to specific lo‘i as lo‘i poalima, other awards, referencing these same exact lo‘i, call them lo‘i pa‘ahao. For classification purposes, these lo‘i were labeled by the order in which they were identified and were not renamed if other awards classified them differently.

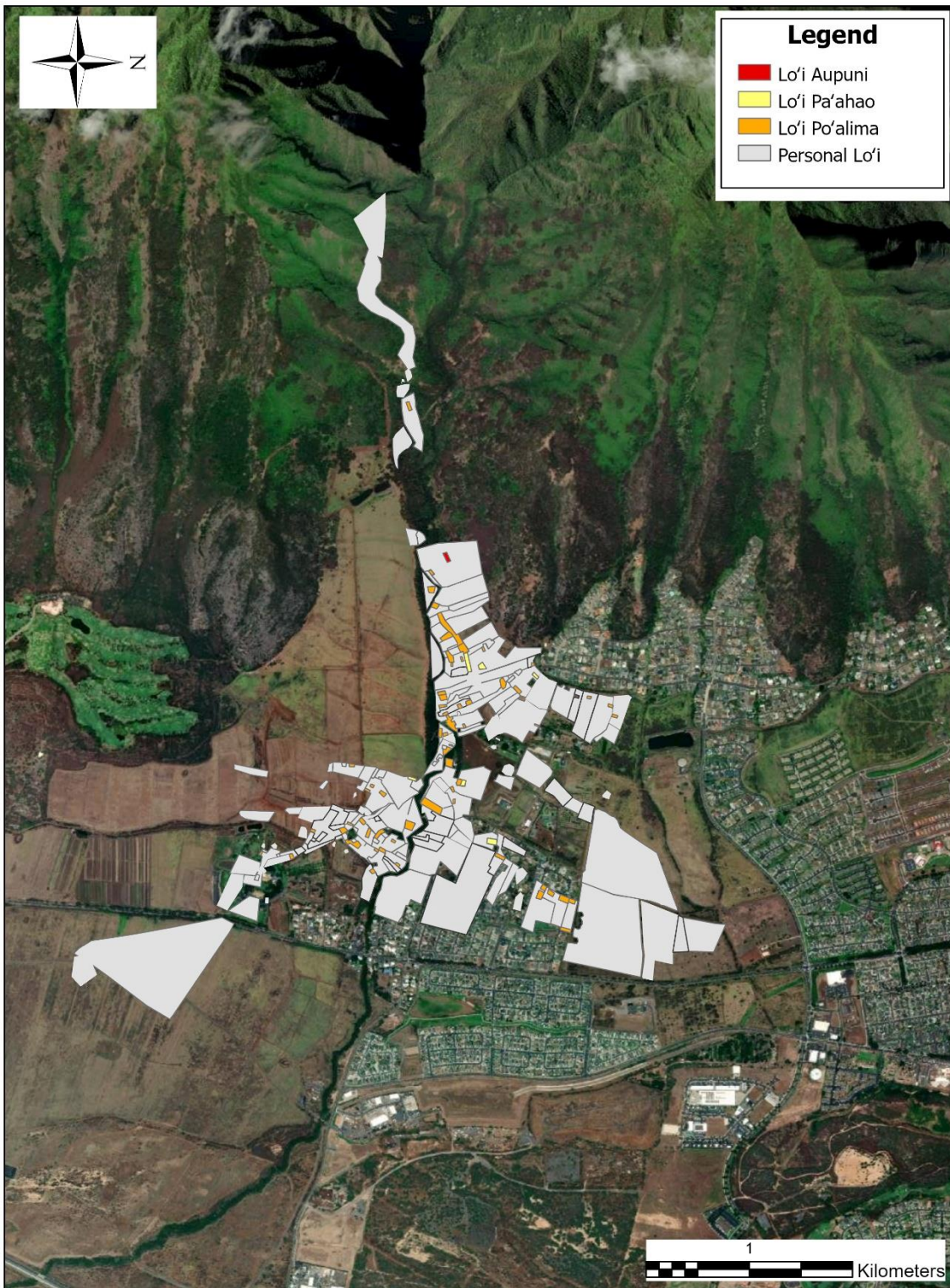


FIGURE 5-12 ALL MAPPABLE LO'I This depiction contains all lo'i that were able to be located using the Māhele documents including government-owned lo'i.

Quantification of Lo‘i:

Using the methods outlined above, 1,489 lo‘i could be located with a high degree of certainty using Native Registers (Appendix D). An additional 111 lo‘i were mapped using Foreign Testimonies (Appendix E). In addition to this, 391 lo‘i were added to the “Added Lo‘i” feature class though their location is less certain (Appendix F). In total 1991 lo‘i were added to the map. Because this dissertation aims to estimate the minimum amount of lo‘i on the landscape so as not to be critiqued for having an Indigenous bias, estimates made are likely less than the actual amount. In certain instances, Māhele documents only referred to some “kekahi mau” lo‘i or to an apana being a kalo land or “wahi kalo”. For these claims, the number two was assigned to the lo‘i count. In addition to this, one lo‘i aupuni, six lo‘i pa‘ahao, and 60 lo‘i poalima were added using the Māhele Awards. This means that there were, at minimum, 2058 lo‘i in Waikapū during this time. However, there were likely significantly more because some lo‘i could not be added to the map.

In addition to this, three lo‘i were labeled mo‘o and eight were labeled paukū in Native Registers, four were labeled mo‘o and eight were labeled paukū in Foreign Testimonies, and an additional three were labeled mo‘o and six were labeled paukū in those added to the Added Lo‘i feature class. Approximations were made for the number of lo‘i contained in mo‘o (a land piece with a large number of lo‘i) and paukū (pieces of kalo land that were slightly smaller than mo‘o). When consulting historical texts to develop a general understanding of the size or number of kalo contained in both mo‘o and paukū, texts only revealed the sizes of these lands when compared to different land types “e.g. smaller than an ‘ili” (Handy et al. 1972).

Because the size of a mo‘o or paukū could be place-specific, known mo‘o and paukū with lo‘i count were obtained from the Native Registers to understand if an average number of lo‘i

could be obtained for mo‘o and paukū. The area of each mo‘o and paukū was also obtained from ArcGIS Pro. Nine apana could be identified as mo‘o and contained a lo‘i count. The number of lo‘i found in lands identified as mo‘o ranged from 12 to 48 with an average of 34.6 lo‘i per mo‘o. However because ranges varied drastically and the sample size is relatively small, assigning 35 lo‘i to each mo‘o might result in an over-representation of lo‘i. Because each Māhele Award was recorded as a polygon that corresponded with the size of the apana, the number of lo‘i were divided by the area of each apana to determine if there was a trend in the number of lo‘i within a given area (Appendix G). No trend could be found. Similar calculations were made to the paukū (Appendix H). Paukū included 19 to 34 lo‘i. However, because the sample size was only two, no conclusions can be made about paukū with any degree of confidence. At most, it can be reasonably assumed that the smallest amount of lo‘i in a mo‘o was 12. Because paukū were smaller than mo‘o, paukū were assumed to be half the size and given the number 6. With these additions, 120 lo‘i were added from lands labeled as mo‘o and an additional 132 were added from lands labeled as paukū, raising the total number of lo‘i to 2310.

Mapping lo‘i by quantity reveals a fairly even distribution of lo‘i across the landscape with slightly greater quantities nearer Waikapū Stream (Figure 5-13).

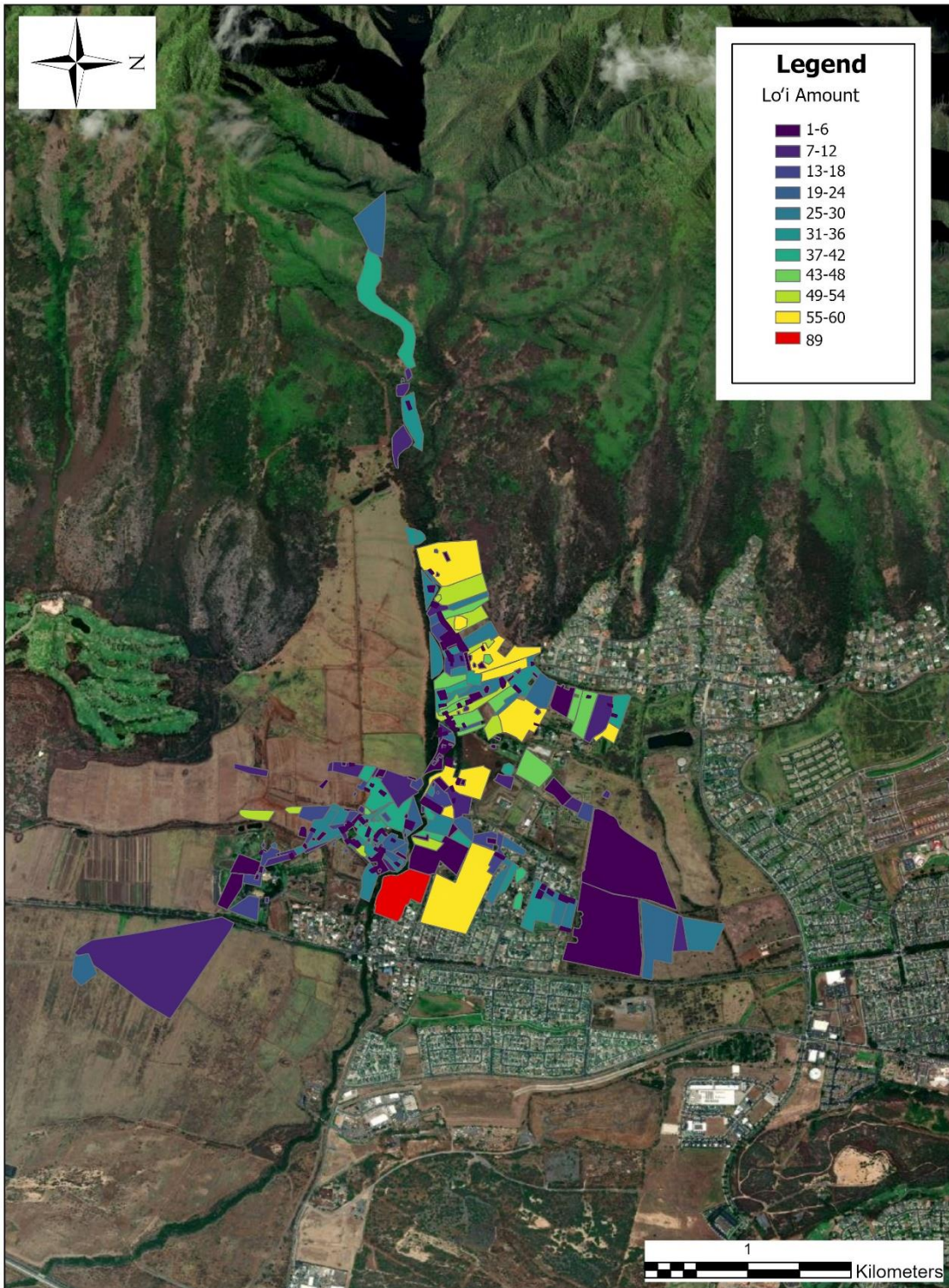


FIGURE 5-13 DISTRIBUTION OF LO'I Depicted above are all lo'i that could be located using the Māhele documents mapped by lo'i density.

Additional Landscape Features:

While kalo (taro) is the most common feature claimed, the Māhele documents also reveal information about other vegetation and features common in this area during this time. To reconstruct the landscape, the 19 land claims which contained no reference to lo‘i kalo, were mapped (Figure 5-14). Once this was done, other physical features were recorded from the Māhele Documents and added to the map either using point feature or polygon feature layers (Figure 5-15). Polygon features were reserved for continuous stretches of land (kula, weed grown place, dryland, dry taro, dry creek, salt land, and kula wauke) to provide a more accurate representation of how the landscape would have appeared. However, because the area of the features was not mentioned in the Māhele document, the size of the polygons is arbitrary. The most common features besides lo‘i were hala trees and kula (open areas of pasture land that were occasionally cultivated). However, other features included bananas, fish, sugarcane, coffee, trees, weed-grown places, kapu plants, kula wauke, dry creek, dry taro, dry land, and salt land.

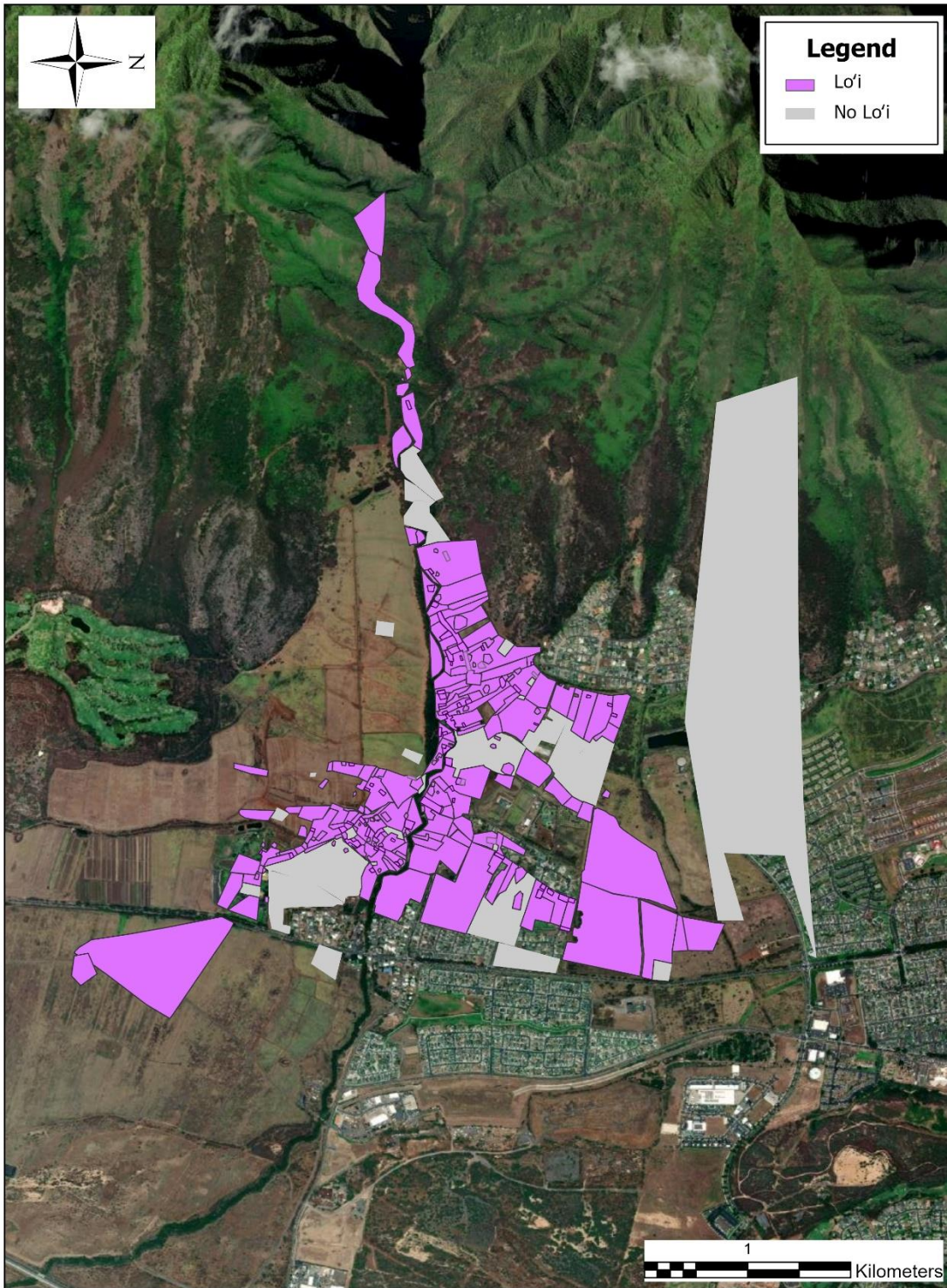


FIGURE 5-14 LCAS WITH AND WITHOUT LO'I Polygons depict LCAs with lo'i (purple) and LCAs without lo'i (grey).

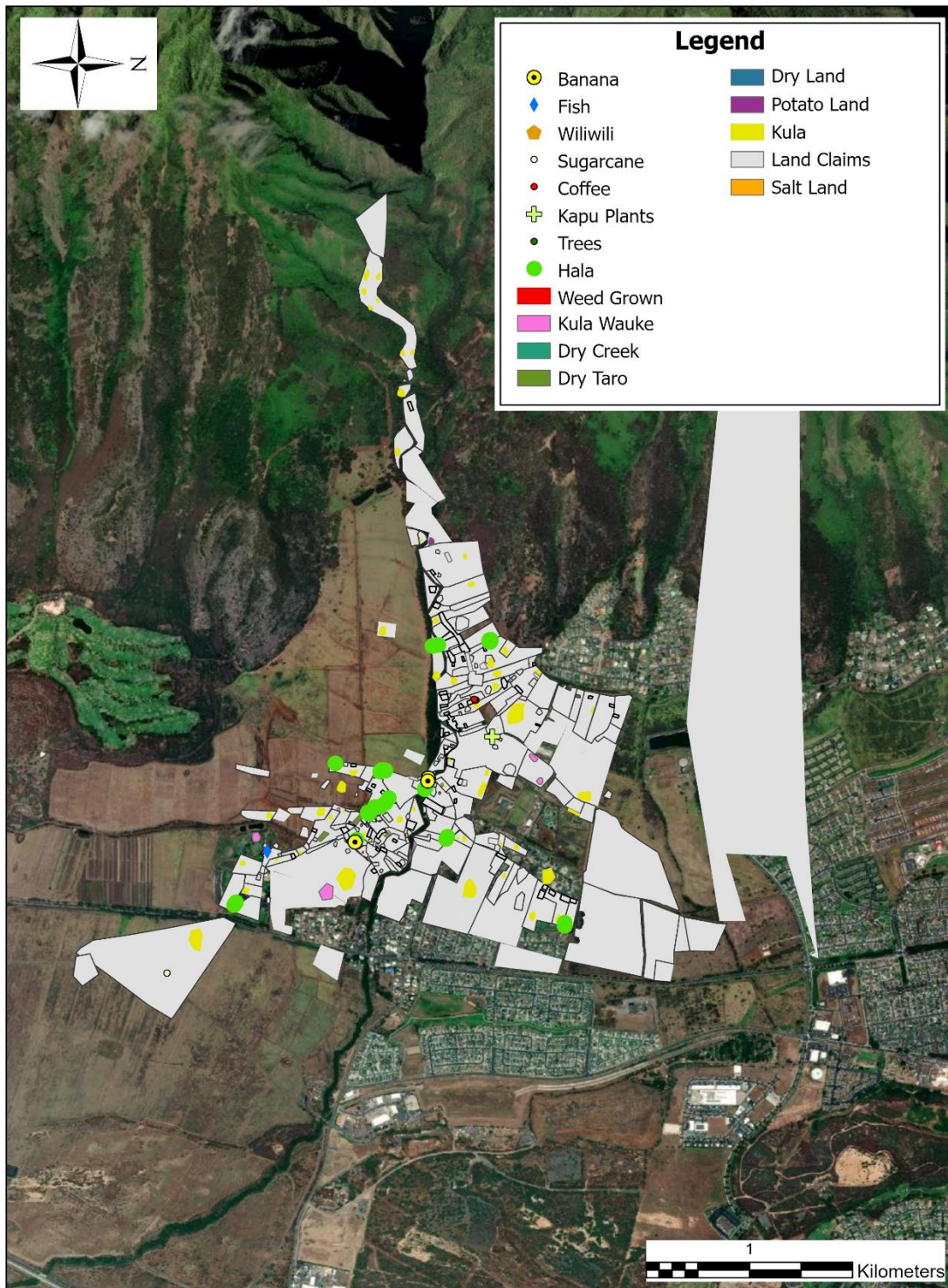


FIGURE 5-15 OTHER LANDSCAPE FEATURES MENTIONED IN LCAS Graphed above are different types of plants, fish, and water features mentioned in the Mahele documents.

In addition to vegetation, built features were spread throughout the landscape. These included houses and pens. In general, houses were evenly distributed across the landscape except for the more mountainous regions where there were no houses (Figure 5-16). While a comprehensive examination of the built landscape and other vegetation is outside the scope of this project, this section showcases different ways that the Māhele documents can provide other details about environments before colonization. In total, 186 more features were added to the map from the Māhele documents (Table 5-1).

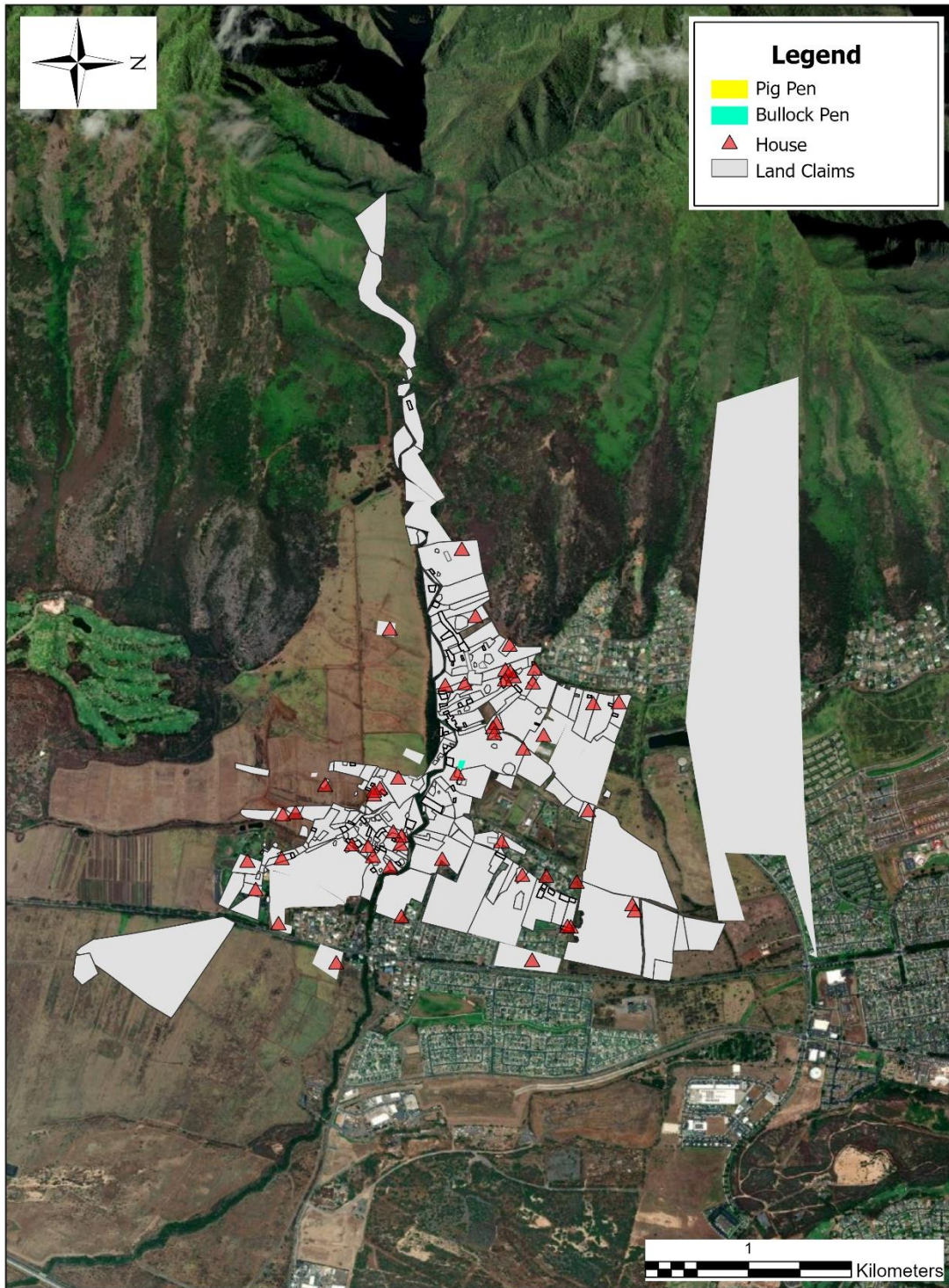


FIGURE 5-16 OTHER LANDSCAPE FEATURES MENTIONED IN LCAS The map portrays the built structures including houses, a pig pen, and a bullock pen mentioned in the Māhele documents.

Quantification of Different Features of the Landscape

Feature	Quantity
Fish	1
Kapu plants	1
Trees	1
Weed grown place	1
Dry creek	1
Dryland	1
Potato land	1
Salt land	1
Pig pen	1
Bullock pen	1
Sugarcane	2
Banana	3
Coffee	3
Dry taro	4
Kula wauke	9
Hala	34
House	50
Kula	71

TABLE 5-1 SUMMARY OF DIFFERENT LANDSCAPE FEATURES Through the consultation of Native Registers, over 100 more landscape features were added to the map.

‘Āina as People:

While the previous section’s purpose was to explore what information could be obtained from ‘āina as source from an off-island and historical perspective, this section focuses on ‘āina as people. As noted in Chapter 4, estimates of how many people retained land following Māhele are still relatively rough, and, thus, place-based analysis of Land Claim Awards may offer key insight to understand how land was retained following the Māhele. Waikapū, particularly, presents an interesting case study because it was a central taro-growing region and, thus, a highly valuable location at that time. Furthermore, because Native Hawaiians are genealogically connected to ‘āina, an analysis of ‘āina without consideration of its main caretakers would not only obscure one’s understanding of the proportion of the population that was displaced following the Māhele but would lead to an incomplete and more colonial-centered conception of land.

Because claimants could make multiple land claims, it was necessary to compare the names from the different awards to identify unique land claimants. Through this method, 95 unique claimants out of 124 land claims were identified. However, Foreign Testimonies also give evidence of people in the surrounding area that did not make land claims. To provide a rough estimate of individuals in this region that did not make land claims, names were located in the portion of Foreign Testimonies containing directional information (e.g. Mauka of ____’s land) and entered into a database. Using this method, an additional 43 unique names were found. Using the directions found in the Foreign Testimonies, the approximate location of each individual was mapped (Figure 5-17). Out of 43 individuals, all except two individuals (Alili and Kuaiwaa) were able to be mapped. When compared to the total number of unique recipients, it appears that at least 31% of people living in this area did not submit land claims. In this analysis,

certain names were assumed to be the same due to similar pronunciation or spelling and relative location. This included Ehu and Ehunui, Hae and Kaai, Makai and Kamakai, Kainoa and Kainoakauhaha, Koma and Komo, Kawawa and Kawana, Nahili and Nalei, Peu and Pau, Niheu and Nika, and Keoni Amaia and John Amara. In addition to this, references to Pa‘ahao were assumed to reference lo‘i pa‘ahao rather than a person.

It is also important to note that just because land was claimed does not mean that it was actually received. Therefore, to understand how many land claims actually received Royal Patents, Royal Patents were located using the Waihona Aina database. Eighteen of the 115 claims could not be located in the Royal Patent database and, thus, these individuals were presumed to not have received land claims. The remaining 97 could be located using the database. In instances where there were duplicate claims, only one of the claims was awarded. Based on this analysis it appears that 84% of claimants received Royals Patents. However, it is important to note that this does not mean that they retained land in perpetuity, but that they retained land merely for the period directly following the Māhele.

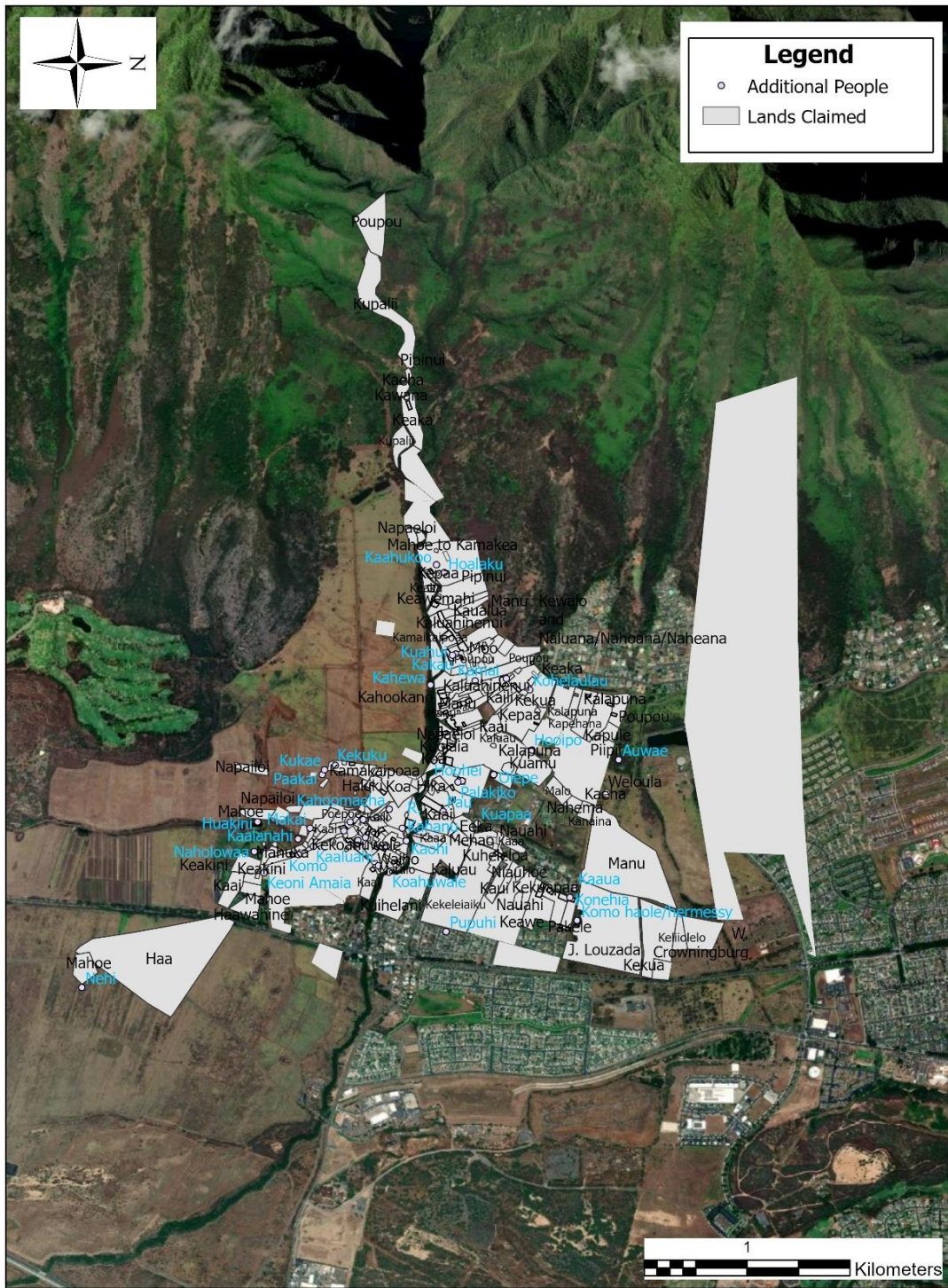


FIGURE 5-17 NAMES OF PEOPLE MENTIONED IN LCAS The image above shows all who made land claims in black. Blue is used to indicate the names of individuals who did not make land claims but who were referenced in Foreign Testimonies.

‘Āina as Ongoing Connection and Care

While the previous two sections have focused on ‘āina as source and ‘āina as people, they provide insight that can contribute to ‘āina as ongoing connection and care. Because many Hawaiians have been displaced, I hope that these maps will help Hawaiians locate their ancestors. On a larger scale, this research also seeks to estimate water usage prior to the industrialization of plantations to better understand the degree to which water availability changed following this time period.

When data from this study are paired with recent scientific studies, it becomes possible to estimate water usage during this period. Penn (1993) notes that the Hawai‘i court system has established 50,000 gad (gallons per acre per day) as an estimate for the amount of water needed to grow taro, though suggests that the number should actually be greater. Therefore, I use 50,000 gad as an estimate of the minimum amount of water needed to sustain lo‘i in Waikapū.

To calculate the total amount of acreage with lo‘i, the area of each government-owned lo‘i was obtained from ArcGIS Pro, which measured the size of each land claim polygon. Because the polygon area was listed in square meters, each value was multiplied by 0.000247105 to convert it to acreage (Appendix I). In total, there were 12.54 acres of government lo‘i. The average size of each lo‘i was .187 acres and the median was .145 acres. To estimate how many acres of land were under cultivation during this time, the number of lo‘i from land claims (2243) was multiplied by .187 and added to the total acreage of government lo‘i (12.54). Based on this calculation, 432.2 acres of lo‘i were under cultivation. Given that the minimum water requirement of 1 acre of lo‘i is 50,000 gad, a reasonable estimate of the amount of water used by these lo‘i is 21,610,000 gad or 21.61 mgd. However, because lo‘i were left fallow for 2-3 months it is possible that a portion of the total acreage did not actually require water (Handy et al. 1972).

It is also possible that the size of government lo‘i was different than personal lo‘i. Therefore, a second, but less reliable, estimate of lo‘i can be obtained by calculating the area of Land Claim Awards. To obtain this estimate, the area of land claims containing lo‘i were added together and converted to acreage (Appendix J). “Added Lo‘i” were excluded from this analysis because their polygon area was set to an arbitrary size. The total acreage of these two feature layers was 379.88. However, this is not likely a good estimate of the amount of lo‘i under cultivation. Because “Added Lo‘i” were excluded, this estimate does not account for 77 apana with lo‘i. In addition to this, the estimate provided insinuates that lo‘i covered the entire apana, which was not the case. Because lo‘i made up a fraction of the apana and some lo‘i were likely fallow, a conservative estimate of the total land under cultivation is 1/4th of the total area. Even if only 1/4th of the acreage calculated was under cultivation at a given time, this would mean that 94.97 acres were under cultivation. Thus, using this method, the estimated water usage during this time is 4,748,500 gad or 4.75 mgd.

Because the second method of estimating water usage is less reliable than the first, the actual water usage is likely significantly greater than 4.75 mgd. However, even 4.75 mgd is more than the present IIFS Waikapū Stream of 2.9 mgd. This suggests that significantly more water is needed to support larger-scale taro cultivation in this region.

Limitations

While these maps generate a more nuanced understanding of the landscape prior to colonization, some limitations exist. One significant limitation is the lack of identification of all ‘ili on the map. Although most ‘ili on the map appear to be located in one place, ‘ili could consist of multiple pieces and could lele or jump. ‘Ili were often comprised of 3 separate pieces located in different environmental regions (Handy et al. 1972). In this project, ‘ili were primarily

identified using the Monsarrat map, which did not identify many jumping ‘ili. Therefore, it is possible that there were more jumping ‘ili than were recorded in the map, and thus, the land claims that relied solely on ‘ili for placement could be located in a slightly different location, though still in Waikapū.

Similarly, population density cannot be obtained from this analysis. While we can assume there were at least 138 people, because claims do not consistently list the number of people per family, it is difficult to generate an estimate of the total population.

Conclusion

Analysis of Māhele documents can provide a foundational understanding of landscape during the early stages of colonization. Because lo‘i were not documented by historic maps, these documents serve as a way of understanding landscape from a Hawaiian perspective by focusing on spaces valued by Hawaiians like lo‘i kalo. However, to accurately decipher the information contained in the Māhele documents a moderate understanding of ‘ōlelo Hawai‘i, Hawaiian directions, and Hawaiian culture is needed. When this information is transferred from documents to maps, it becomes possible to develop not only a general idea of cultivation practices during 1848, but the built environment. Furthermore, this type of analysis prevents the erasure of the original caretakers of this land by revealing the general locations of individuals who did not make land claims. In addition to this, when the Māhele documents are paired with modern data, they allow one to estimate water usage prior to industrialization. Yet, this information is but a foundation for future research concerning landscape change and human impact on climate.

CHAPTER SIX:
A CHANGING CLIMATE

The previous chapter has established a foundation for understanding landscape from a Hawaiian perspective prior to the industrialization period. While it provides an estimate of water usage during this time, it is also necessary to think about the impact of colonization by sugarcane plantations on both the environment and Native Hawaiians. Although there have been some efforts to document landscape change caused by plantations, analysis of landscape change of the more recent past in this region is still relatively rare. Therefore, this chapter walks readers through the available data concerning landscape change in Waikapū particularly as it relates to water. Because this chapter largely consults documents that were not constructed by Native Hawaiians, but by foreigners who had different ways of viewing and navigating their environment, I do not claim to be reconstructing an Indigenous past. Rather, this chapter showcases the initial and continued impact of sugarcane plantations on the landscape to highlight the types of land management strategies that still require change to support Indigenous futures. Specifically, this chapter uses a multi-source analysis to understand the emergence of sugarcane plantations on the landscape following the 1848 Māhele, the expansion of hydrological infrastructure during the plantation period, and their resulting impact on the environment.

Previous Research:

The existing literature on the development of Hawai‘i’s sugarcane plantation hydrological infrastructure primarily focuses on broad trends rather than specific regional developments. State-wide changes in plantation infrastructure are summarized in Alexander (1922), Wadsworth (1933), and Jones and Osgood (2015). While Jones and Osgood (2015) and Kilham (1996) provide specific information about the changes made by HC&S and Wailuku

Sugar Company, information on changes in Waikapū is absent from their analysis. Rather, analysis of hydrological changes focuses on Eastern Maui. Their analyses largely takes a history of technology approach, documenting how plantations altered hydrological infrastructure to increase yields and efficiency.

However, while technological advancements may have increased the amount of water delivered to cane fields, even with these advancements there were still significant flaws in the system. In the beginning stages of ditch construction, ditches had seepage losses of 25-50% (Jones et al. 2015, p. 76). Although ditch technology evolved to include concrete lining, records indicate that continued leakage ensued, sometimes as high as 31% (Jones and Osgood. 2015, p. 96, Wilcox 1997 p. 130). In addition to this, increases in labor costs led to decreases in ditch maintenance following 1925 (Wilcox 1997), likely leading to further leakage in the system. Following this period, water loss was also reported from secondary ditch systems (Jones and Osgood 2015). While the plantations have since closed, and many of the reservoirs have been decommissioned as of 2014 (Perroy et al. 2016), much of the remaining sugarcane hydrological infrastructure is still in use. Kay et al. (2023) note how these dilapidated systems continue to leak in the present-day and would require significant amounts of time and money to repair. While these flaws in the system are noted to have negatively impacted hydrology, namely streamflow, an analysis of the multi-faceted ways in which sugarcane plantations negatively impacted the environment is still absent.

This chapter provides a history of the emergence of sugarcane on the Waikapū landscape, focusing on changes in hydrological infrastructure. Once this has been established, it considers the corresponding environmental changes that occurred during this time in light of climatological data to understand the potential impact of sugarcane plantations on the environment.

The Spread of Plantations on the Waikapū Landscape, 1840-1936:

Pre-plantation Times

To understand changes made by plantations, it is necessary to trace their emergence on the landscape. Land Grants, when compared to LCAs, provide the most immediate record of how land stewardship changed as a result of the Māhele. This analysis, considers Land Grants documented on the 1887 Monsarrat map, which have dates ranging between 1850 and 1875 (Appendix K).

Original documents of the Land Grants could not be obtained online. However, the Waihona Aina database offered transcriptions of these documents that include the name, date, and size of the Land Grant. Because these documents did not contain information about cultivars, the primary information that can be gathered from them concerns how land ownership changed following the Māhele. To obtain this information, all Land Grants from Waikapū were collected and matched with their corresponding labels on the 1887 Monsarrat map. Out of the Land Grants found through Waihona Aina, 103 apana from 71 land grants were added to the map. Ten land grants could not be added to the map. Out of the 103 apana, five could not be assigned to a particular Land Grant. This is because the name and number were hard to decipher. Nevertheless, they have been labeled as a Land Grant because of the presence of a three or four digit number (Figure 6-1). Using this method, all portions of the map represent places that were labeled as either a Land Grant or LCA. The remaining blank spaces on the map represent spaces that were not labeled on the Monsarrat map.

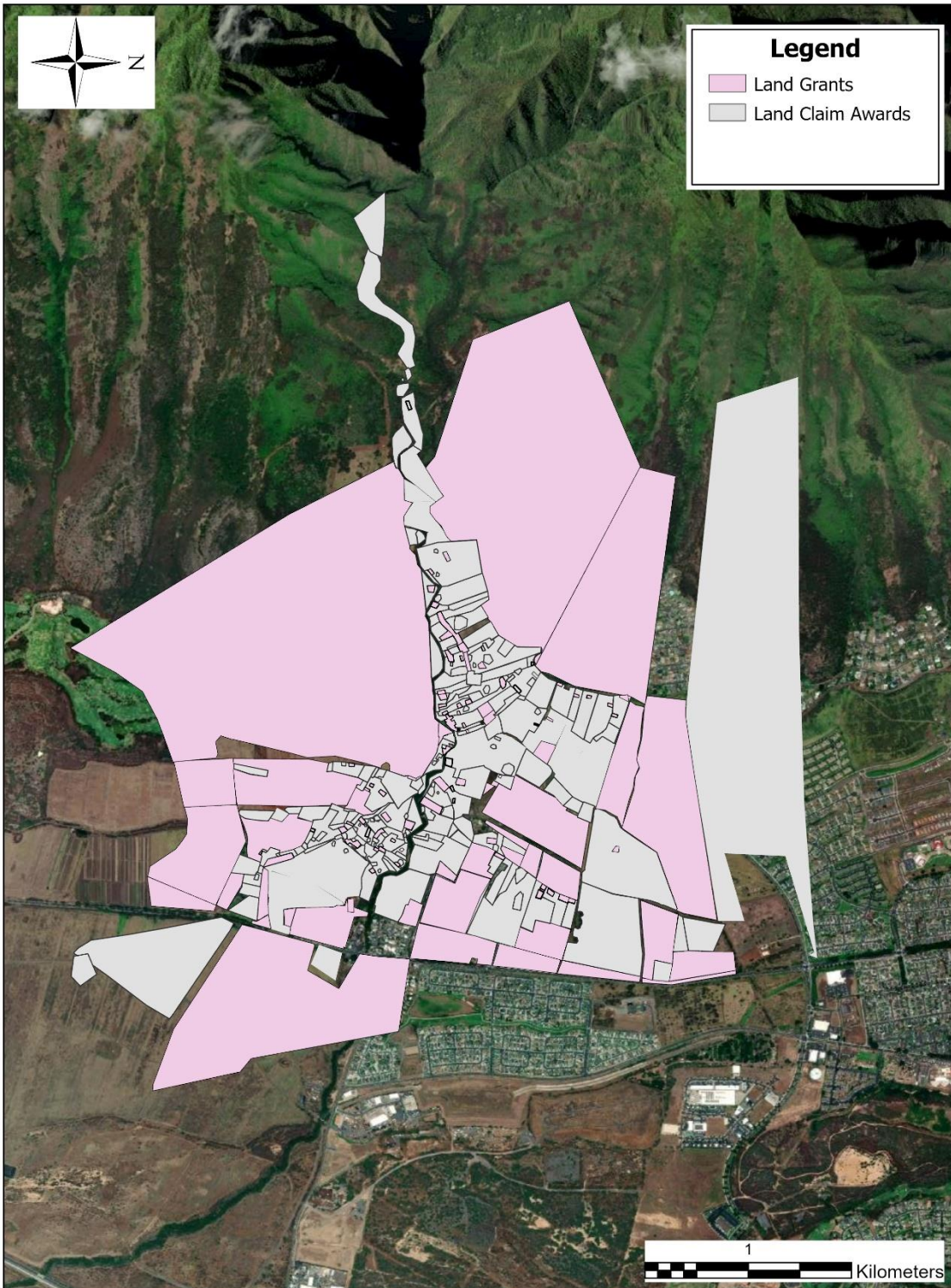


FIGURE 6-1 LAND GRANTS AND LAND CLAIM AWARDS Depicted in pink are Land Grants. As shown by the map, Land Grants tended to be larger than Land Claim Awards.

As demonstrated by the map, grants were often large parcels, significantly larger than LCAs. While many foreigners ended up buying these parcels, some were also purchased by Native Hawaiians. Based on the names listed in the land grants it appears that American and Portuguese colonizers ended up purchasing many of the larger tracks of land (Figure 6-2). However, such a claim must still be substantiated with further evidence. Because Native Hawaiians occasionally took on English names, it is hard to guarantee that the claimants were not Hawaiian without further genealogical research. Similarly, it is also possible that foreigners married into Native Hawaiian families and, thus, integrated with, rather than displaced, Native Hawaiians. What this map does reveal, however, is the presence of Land Grants that would eventually be turned into sugarcane land, namely Louzada's and Humphrey's (Engledow 2009). Following this period, maps that contain information about changes in land ownership are few. While more information on transitions in land ownership can be obtained from deeds in historical newspapers, country, records, and through the Kipuka database, such an analysis is beyond the scope of this study. Rather, the focus of this study is to provide greater details about how sugarcane plantations overtly and less overtly encroached on the lives of Native Hawaiians.

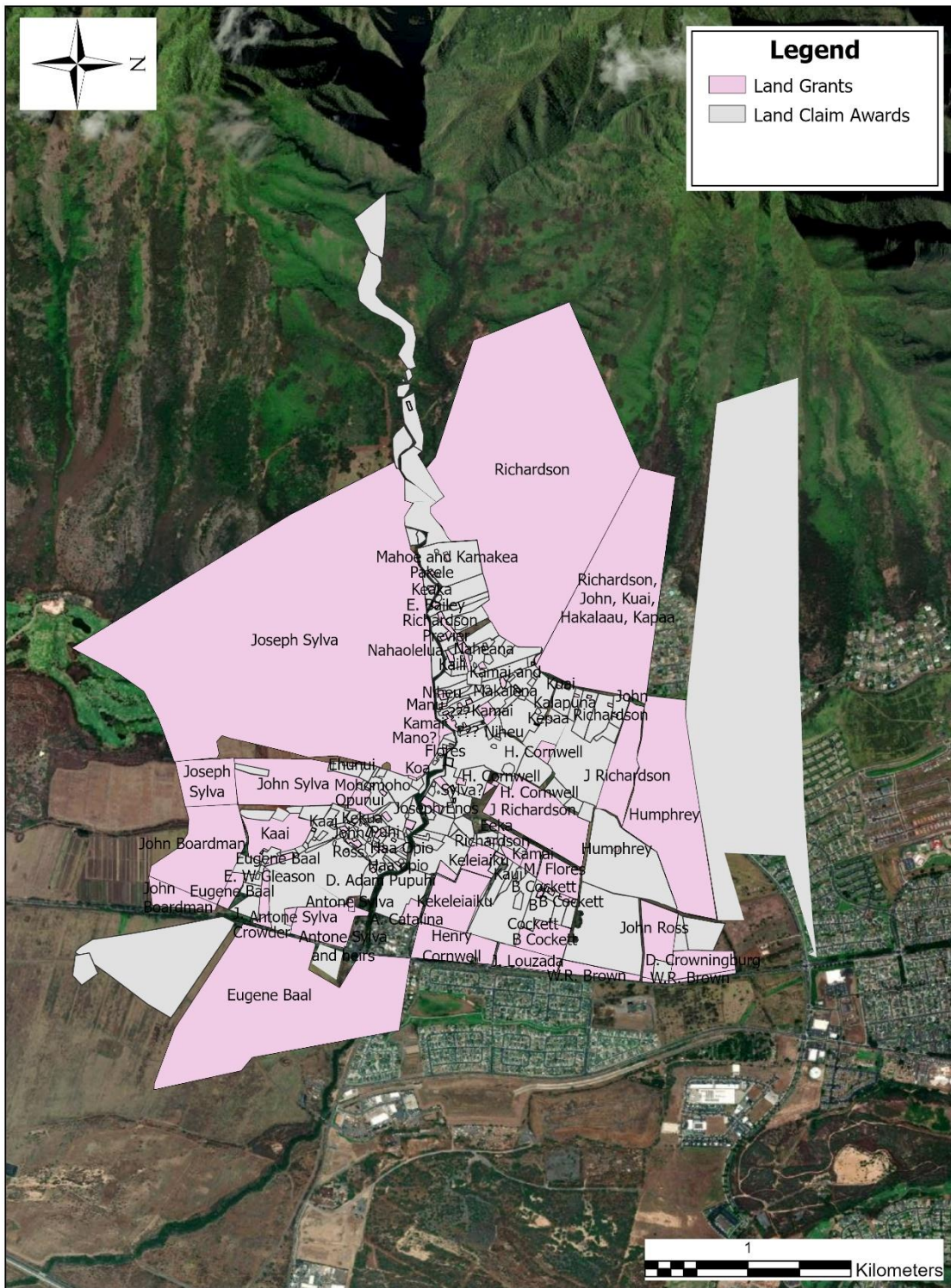


FIGURE 6-2 LAND GRANTS WITH RECIPIENT NAMES The names added to the map show land grantees only.

The Emergence of Sugarcane Plantations

While detailed maps of Maui exist for the periods between 1885 and 1940 they often only focus on major port cities and towns like Lahaina, Kahului, and Wailuku (Moffat and Fitzpatrick 2004; Fitzpatrick 2020). Maps for this period are typically island-wide and thus specific details like house sites, plantations, and other hydrological infrastructure are often not included. In this section, I attempt to synthesize a basic understanding of hydrological change from less-detailed maps between the period of 1885 and 1950. Following 1950, the availability of USGS maps makes it possible to develop a more refined analysis of hydrological changes.

This data is supplemented by sugarcane plantation feature layers obtained from the Hawai'i Statewide GIS program. These feature layers were generated from historical land utilization maps. However, the original maps were not linked to the data and could not be located through online archival research. The layers obtained from the Hawai'i Statewide GIS program contain information concerning sugarcane plantation expansion for the years 1900, 1920, and 1937. These maps showcase the gradual expansion of sugarcane plantations throughout the earliest 20th century. Analysis using the ArcGIS Pro measuring tool provides more specific information on the expansion of sugarcane plantations following 1885. Based on the measuring tool, the original LCAs and Land Grants are spread out over roughly 2,374 acres. Following 1900, however, sugarcane plantation land appears to replace about 353 acres of Land Grants and LCAs, or roughly 15% of the original awards and grants (Figure 6-3).

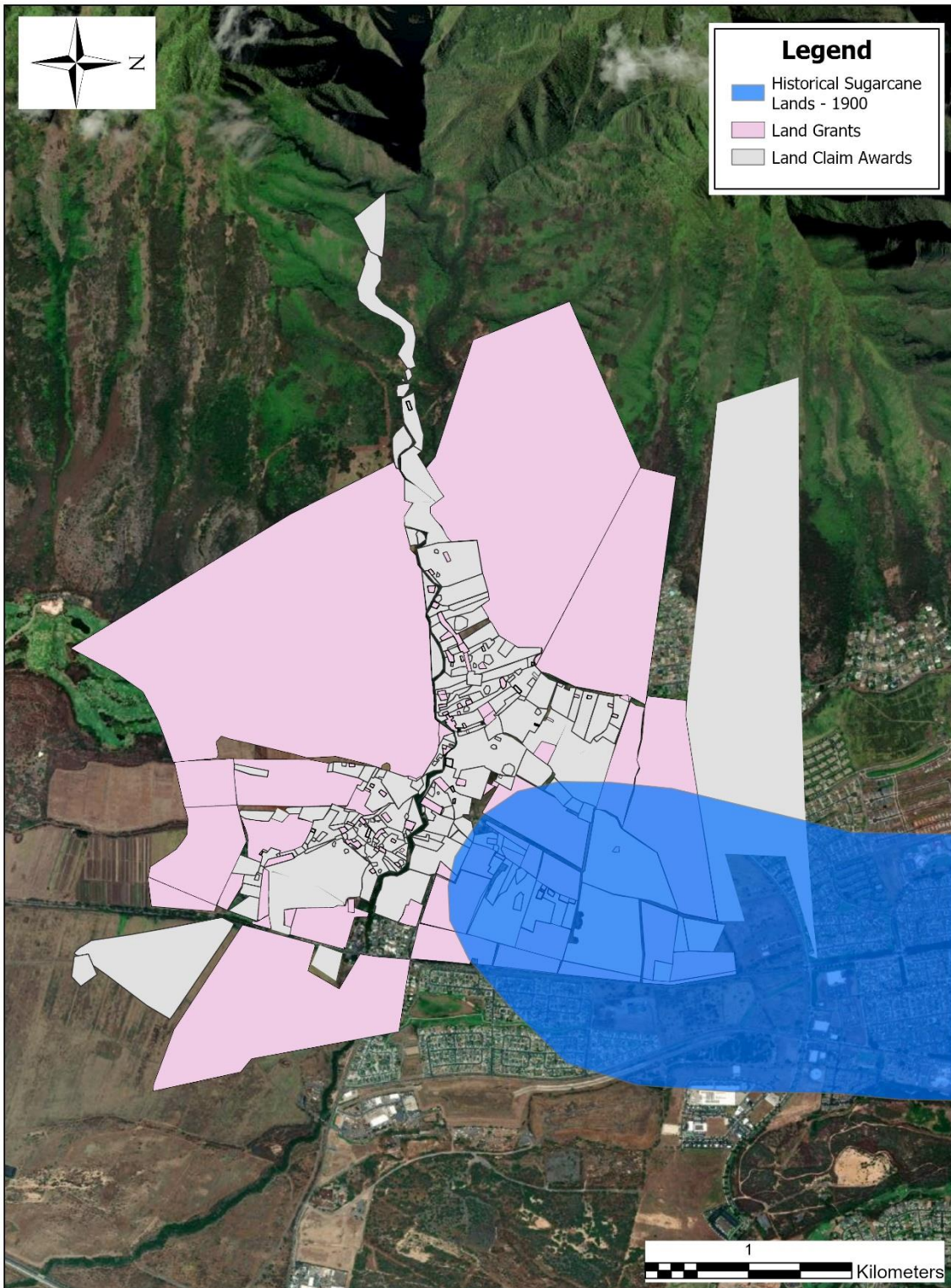


FIGURE 6-3 PLANTATION LAND WAIKAPŪ, 1900 By 1900, sugarcane plantations had begun taking over the Waikapū landscape.

Following 1900, sugarcane plantation land continued to expand southward. By 1920, they had expanded to cover 540 acres, or roughly 23% of the original LCAs and Land Grants (Figure 6-4).



FIGURE 6-4 PLANTATION LAND WAIKAPŪ, 1920 By 1920, nearly all of the eastern portion of LCAs in Waikapū were covered by sugarcane.

Throughout the following years, plantation land continued to expand southward. By 1937, it covered 754 acres, or 32% of the original LCAs and Land Grants (Figure 6-5). However, as depicted on the map, it appears that cane land decreased towards the center of the Land Grants and LCAs. Because smaller plantations began to be consolidated under a few bigger plantations during this time, it is unlikely that this land was sold to other families. Rather, it is more likely that these sugarcane layers represent only land that was under continuous cultivation.

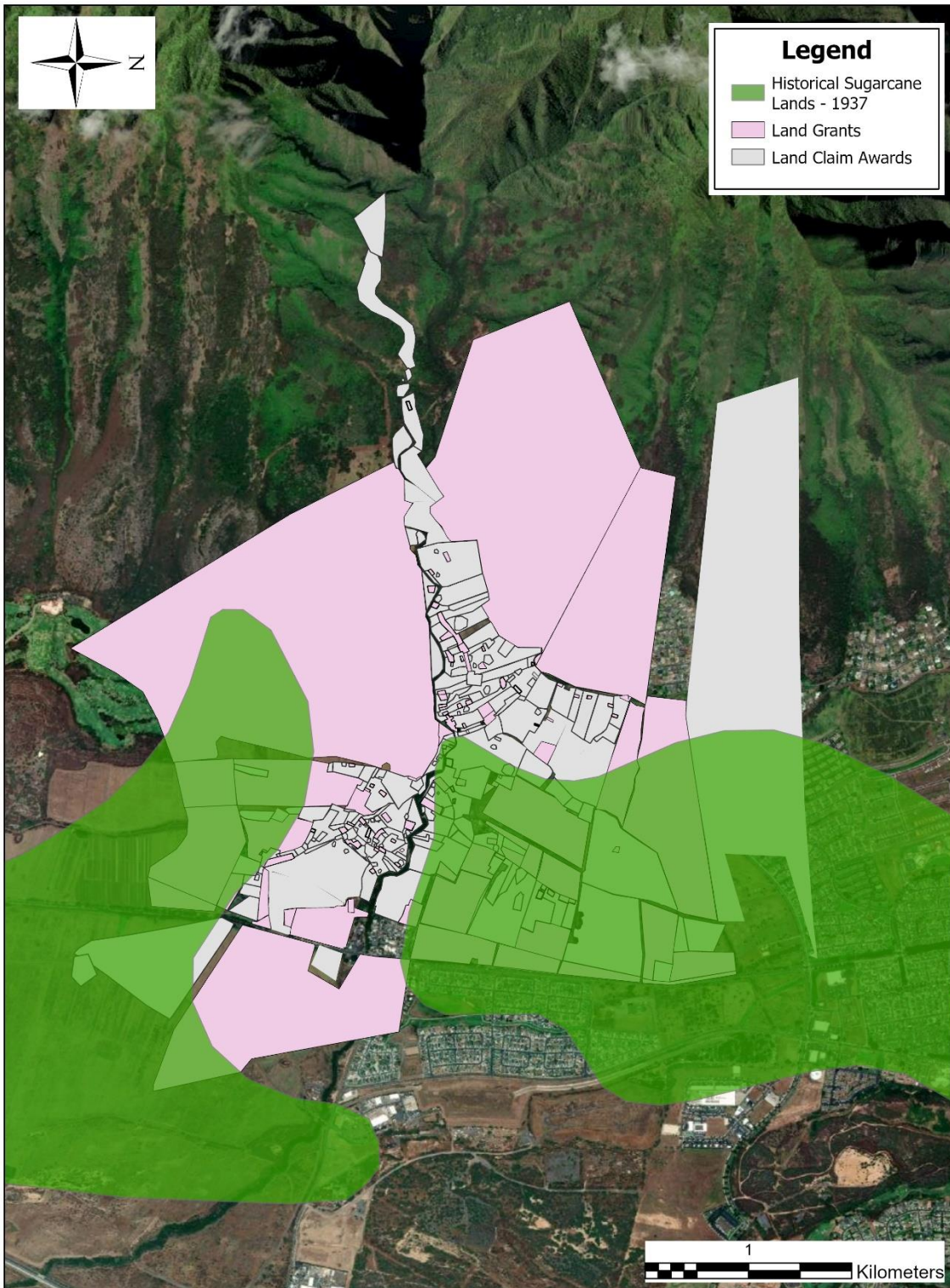


FIGURE 6-5 PLANTATION LAND WAIKAPŪ, 1937 Sugar continued to spread across the Waikapū landscape. The green layer depicts sugarcane plantations as of 1937.

Analysis of aerial photography provides additional details on the emergence of sugarcane plantations in the mid-20th century. The 1950s represents the period when many of Maui's plantations were consolidated (Wilcox 1997), and, thus, when sugarcane began to have an even more dominating presence on the landscape. While plantation maps could not be located for this period, aerial photography provides evidence of sugarcane plantation expansion. A 1950 aerial photograph of Maui (Figure 6-6) shows that much of the land was converted to cane fields or another cultivar. Although, it is possible that some lo'i were interspersed between houses (Hart and Partners 2006).

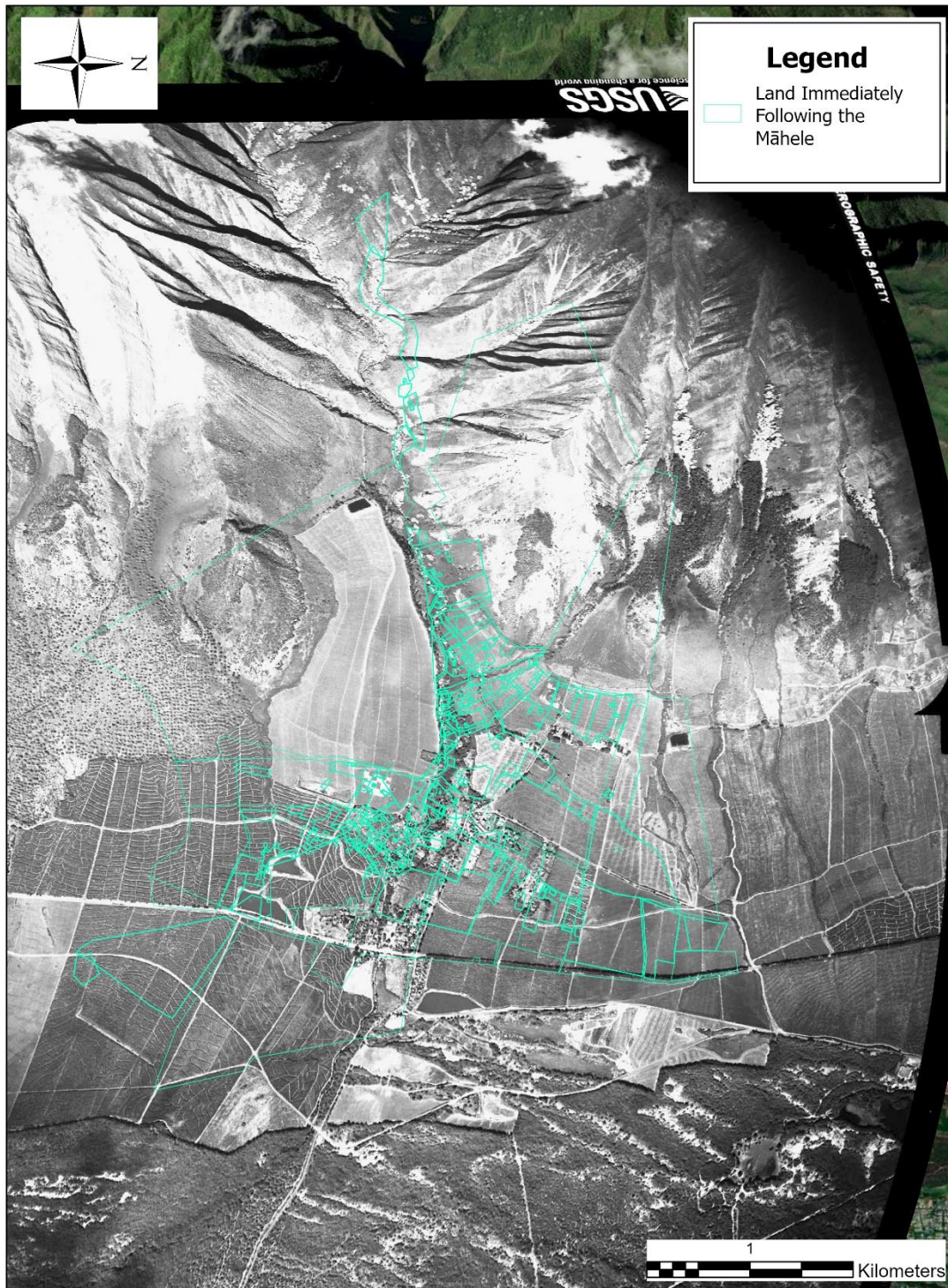


FIGURE 6-6 PLANTATION LAND WAIKAPŪ, 1950 Aerial imagery from 1950 shows that by this time sugarcane plantations covered most of the Waikapū landscape.

Based on the imagery, it appears that all but 179 acres of the original claims were converted into sugarcane or other non lo‘i lands. This means that all but 8% of the original land claimed likely ended up in the hands of big business. While it is possible that some of the houses represent foreign dwellings, based on the picture it is not possible to decipher more specific details.

Plantations and Water

While the maps depicted in the previous section document the spread of sugarcane in Waikapū, they do not provide a complete picture of how sugarcane plantations impacted water resources. Following the 1876 “Act to Aid in Development of Resources of the Kingdom” (Wilcox 1997), water could be rented for periods of up to 30 years. Plantation managers frequently used this act to obtain water from locations upstream. In this region particularly, the completion of ditches in 1913 allowed for the diversion of more water from places upstream of the plantation (Wilcox 1997). Figure 6-7 shows the locations of two such diversions connected to Waikapū Stream: the South Waikapū Ditch and the Palolo Ditch (also known as the Everett Ditch). As depicted in the map, these diversions were upstream of most claimants’ lands, and, thus, their diversions would have impacted downstream taro growers.

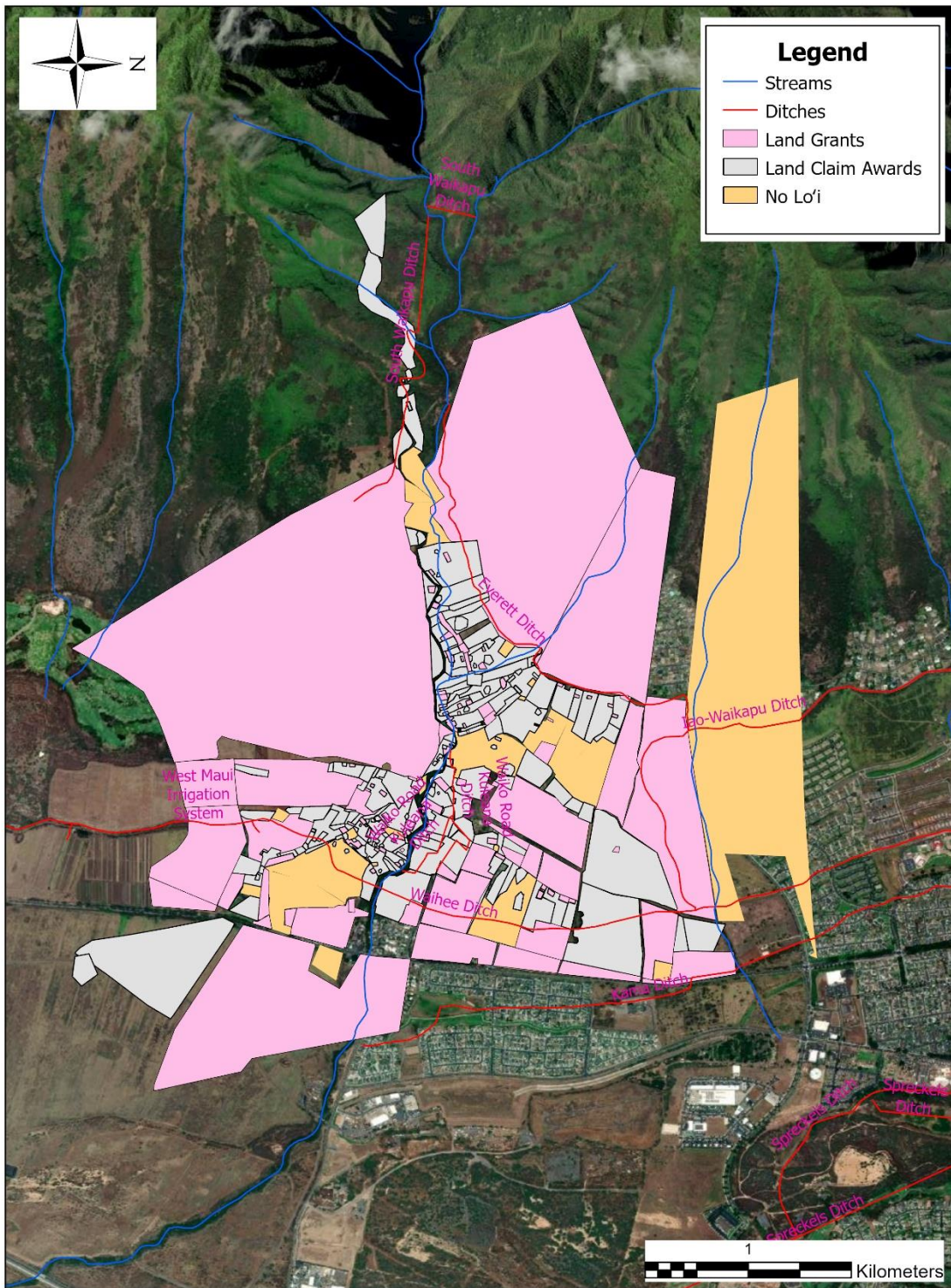


FIGURE 6-7 WAIKAPŪ DITCH DIVERSIONS The two main ditches diverting water from Waikapū Stream are depicted in red. The South Waikapū Ditch is more mauka while the Palolo Ditch (also known as the Everett Ditch) lies further downstream.

Based on these data, it is possible to estimate sugarcane plantation water usage during this period. Jones and Osgood (2015) argue that the standard water usage for 100 acres of cane was 1 mgd. When viewed in light of the recently established sugarcane land usage, if all areas pictured were under cultivation, sugarcane would have required 3.53 mgd, 5.4 mgd, and 7.54 mgd for 1900, 1920, and 1937, respectively. While this might at first seem like a minimal amount of water when compared to the water usage of taro calculated in the previous chapter, it is important to note that sugarcane covered only a fraction of the lands that were originally part of LCAs until they spread out further on the landscape. Therefore, this does not provide evidence that sugarcane had a lower water requirement than taro. In addition to this, water that was used for irrigation by sugarcane plantations was not returned to the stream like in the case of lo'i meaning that the total water loss to the system and, thus, decreases in streamflow was likely significantly greater than pre-plantation times.

The Evolution of Plantation Infrastructure

Sugarcane plantations continued to change as new hydrological infrastructure emerged. To understand this change, historical maps were consulted. Maps from the years 1885, 1929, 1940, 1955, 1983, and 1999 were obtained from the Library of Congress, Territory survey records, and USGS and georeferenced to allow for cross-comparison. The existing lo'i and Land Grant layers were added to maps to allow for a better understanding of how the Land Claim Award and Land Grant region of focus changed over time.

Aerial photos from 1950, 1965, and 1976 obtained from USGS corroborate the identification of changes to hydrological infrastructure in the historical map analysis and provide additional support for landscape change. Because aerial photography cannot be obtained freely

online for the 2000s, satellite imagery obtained from Google Earth is used to show changes in hydrological infrastructure up to 2019 after the final closure of sugarcane plantations in Maui.

Although there is still relatively little information contained on early historical maps, they do offer some insight into how sugarcane plantation hydrological infrastructure changed over the years. Dodge et al.'s 1885 map, which provides minimal information except for plantation names, roads, and streams shows a small pond or reservoir directly east of the LCA and Land Grant portion (Figure 6-8). The map of Hawai'i territory of 1929 adds very minimal information to this except for the inclusion of railroads. In this map, it appears that the 1885 pond has disappeared. However, because it appears on later maps, it is more likely that this pond was simply not included. Alternatively, it may have disappeared with the merger of Waikapū Sugarcane Plantation with Wailuku Sugar Company in 1894 but reappeared later (Engledow 2009). Instead, the only body of water included in the 1929 map is a reservoir near Wailuku (Figure 6-9), a reservoir that is also contained in the 1885 map. Based on a comparison of these two maps, it appears that reservoirs were already being built on the landscape as early as 1885.

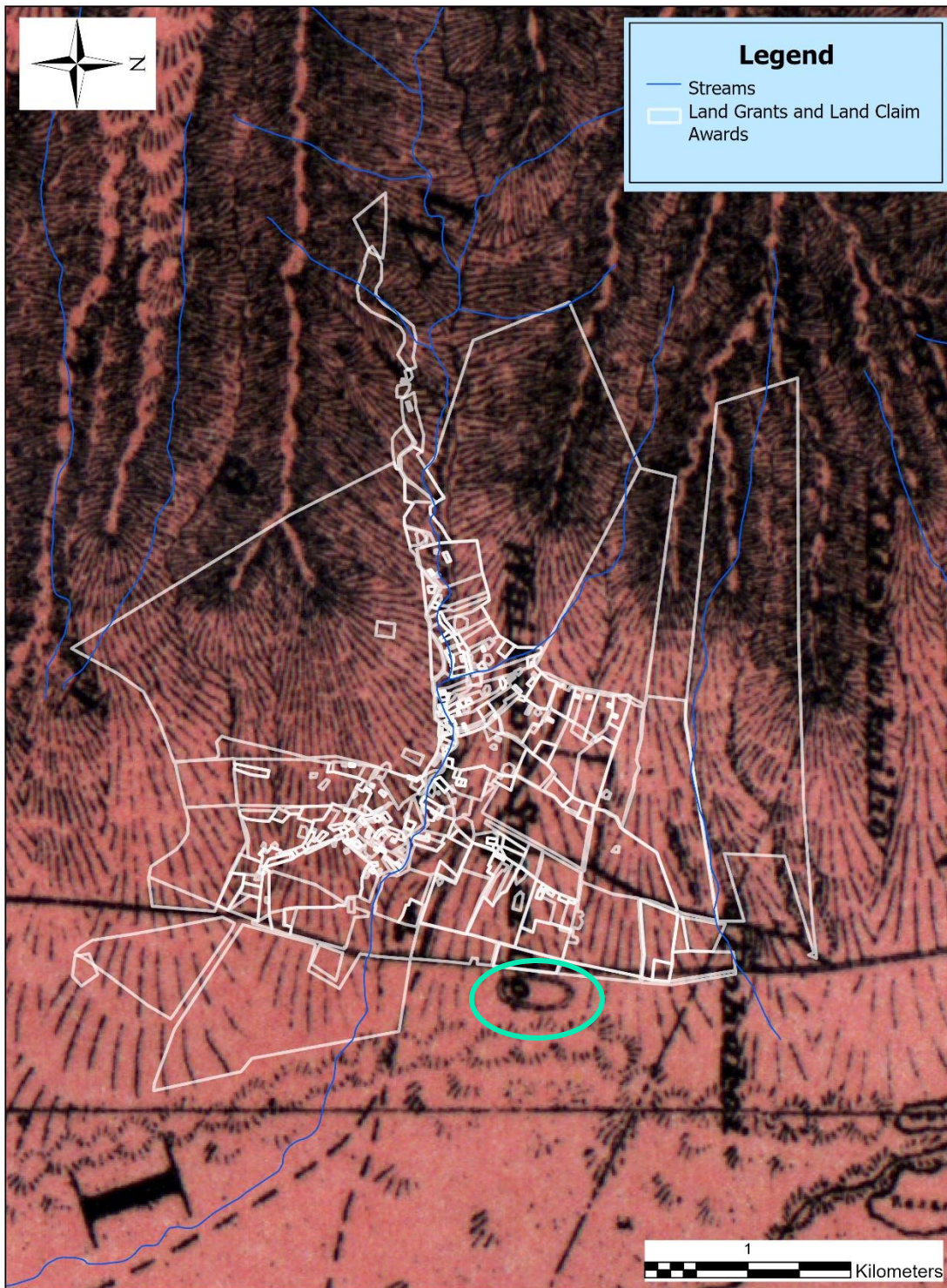


FIGURE 6-8 WAIKAPŪ HYDROLOGY, 1885 Dodge et al.'s map reveals a reservoir near the easternmost point of the Waikapū LCAs

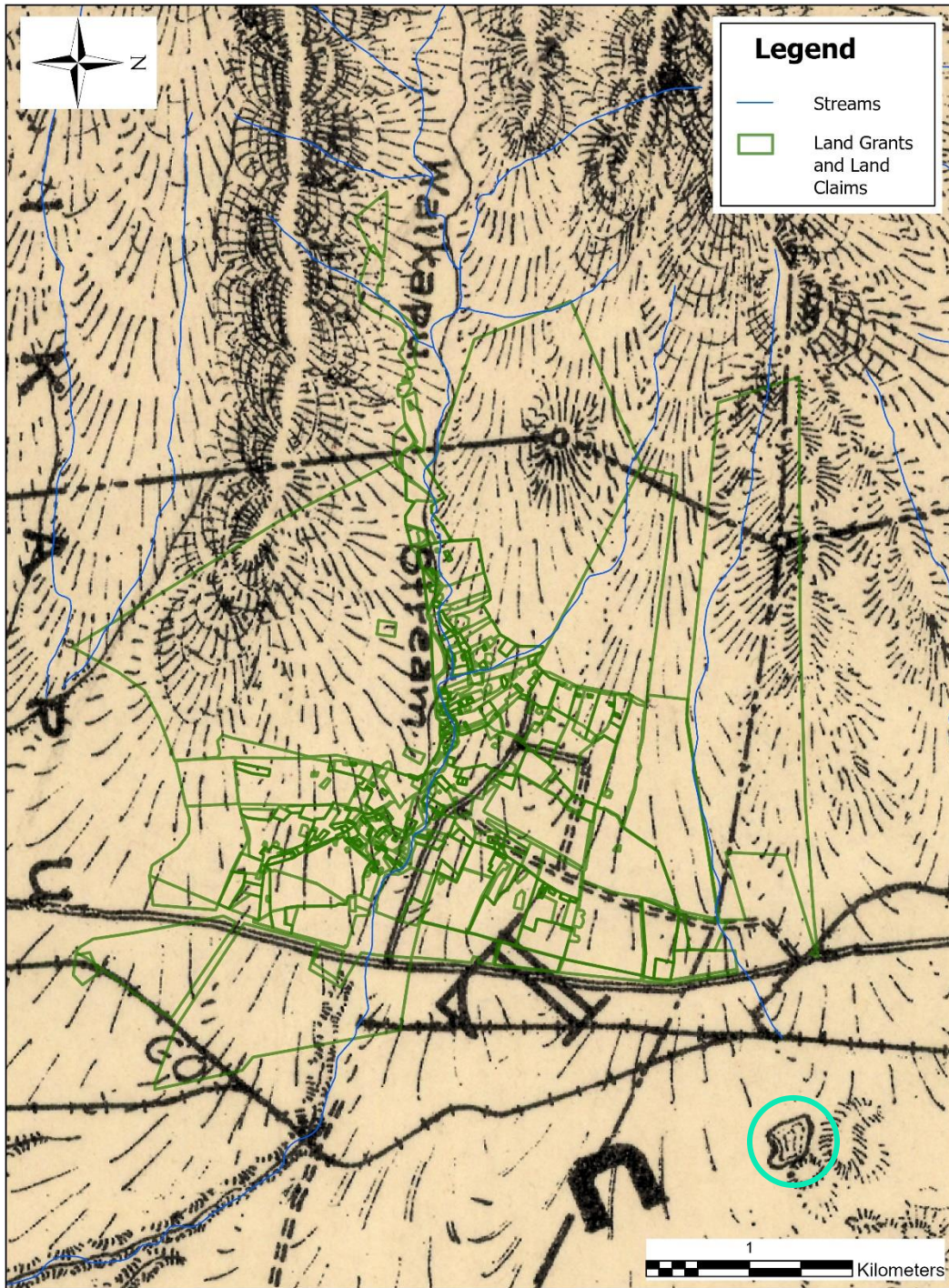


FIGURE 6-9 WAIKAPŪ HYDROLOGY, 1929 The territory of Hawai‘i map of 1929 reveals few hydrological features except a small pond.

Maps with greater detail appear following 1940. In addition to buildings, roads, and railroads, Danforth et al.'s 1940 Census Enumeration Map also includes ditches. These maps allow for a better understanding of how water was organized on the landscape. However, they should not be thought of as a way of documenting the emergence of ditch systems on the landscape as the two main ditches in this region were completed much earlier by 1913 (Wilcox 1997). The absence of these ditches in the 1929 map, rather, reflects the illustrator's perspective of what type of information was important to include. During this time period, the number of reservoirs also increased from 1 to 8 with many of them concentrated towards the southern portion of the land grants (Figure 6-10).

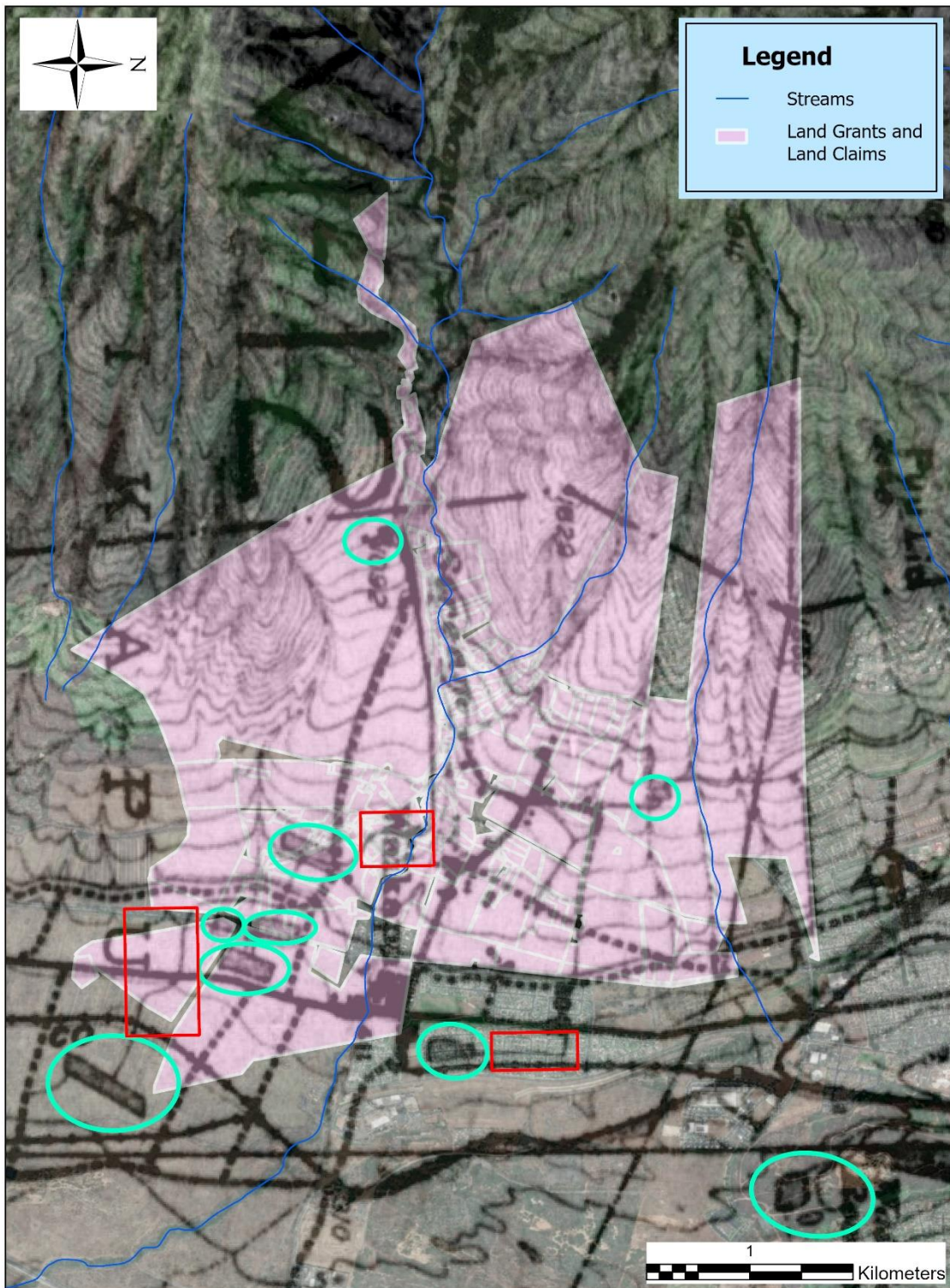


FIGURE 6-10 WAIKAPŪ HYDROLOGY, 1940 Above, ditches are outlined in red squares, and reservoirs are outlined in aqua circles to assist with identification.

When compared to earlier maps, the USGS maps from 1955 to 2000 provide more details about hydrological infrastructure change as a result of the plantation period (Figure 6-11). In addition to reservoirs and ditches, they also include the locations of cisterns, tunnels, flumes, and water tanks. Comparing the 1940 map to the 1955 map reveals the consolidation of three of the reservoirs into one. The other reservoirs and ditch systems appear to remain the same. This map also shows the presence of new hydrological features including a water tank directly under the Everett Ditch, which may have served as another reservoir for water.

USGS maps also provide insight into groundwater development. The 1955 topographic map shows the presence of a well just upwards of both the South Waikapū and Everett Ditch intakes. This is significant because it highlights that sugarcane plantations did not just divert water from the streams but extracted groundwater upstream of lo‘i kalo. Because groundwater extraction negatively impacts streamflow, especially in perennial streams (Wilcox 1997), this suggests that there was a reduction in streamflow during this period.

Of particular significance is the mapping of cisterns. While cisterns appear throughout the region, there are greater concentrations near the northern portion of the 1955 map, an area of the map that largely represents the sugarcane cultivation region. While this high density of cisterns likely reflects the large population in this region, it may also be a way of showcasing reduced streamflow during this time and the need to collect water by other means e.g. rainfall.

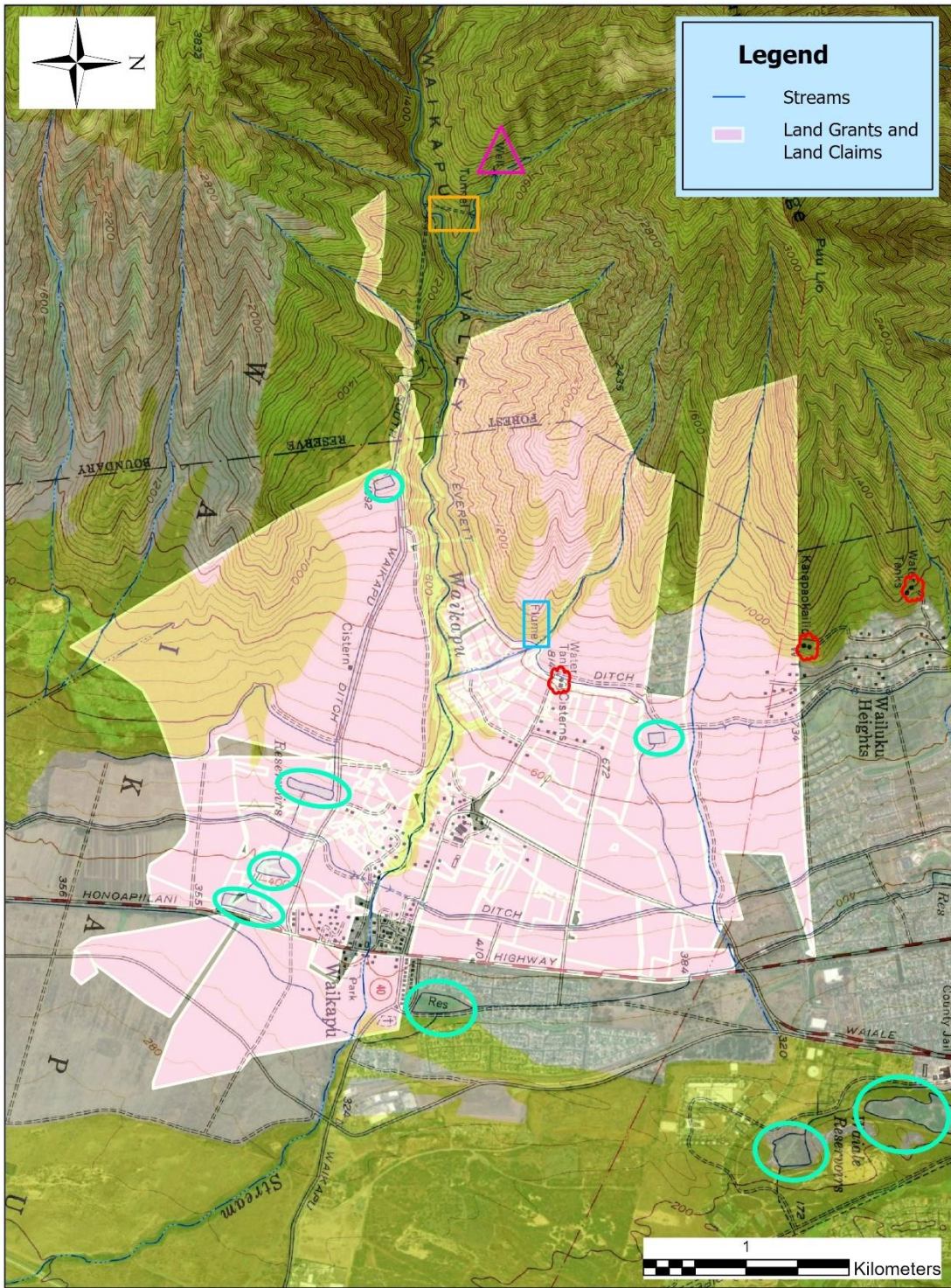


FIGURE 6-11 WAIKAPŪ HYDROLOGY, 1955 The USGS map of 1955 adds considerably more hydrological features than previous maps including cisterns, flumes, wells, and water tanks.

Following 1955, the 1983 (Figure 6-12) map shows considerable shifts in hydrological organization. Particularly, the reservoirs more mauka (up the mountain) appear to double in size. Conversely one of the reservoirs near the central east of the map nearly disappears. Another pool of water instead appears south of this reservoir nearby the ditch. Based on the map, it does not appear to be a pool that is meant to hold diverted water. Rather, because of its proximity to the ditch, it could instead indicate ditch leakage. All other reservoirs remain the same.

In addition to this, this map showcases that ditch location changed following 1955. Particularly, a ditch that connected water to a reservoir appears to have disappeared (indicated by the pink square in Figure 6-12). It is also possible that, much like in the case of earlier maps, the ditch was just not mapped. In addition to this, the water tank previously identified in the 1955 map instead becomes labeled as a cistern. However, this may merely indicate a change in definition during this time and that what was originally labeled a water tank was actually a water catchment.

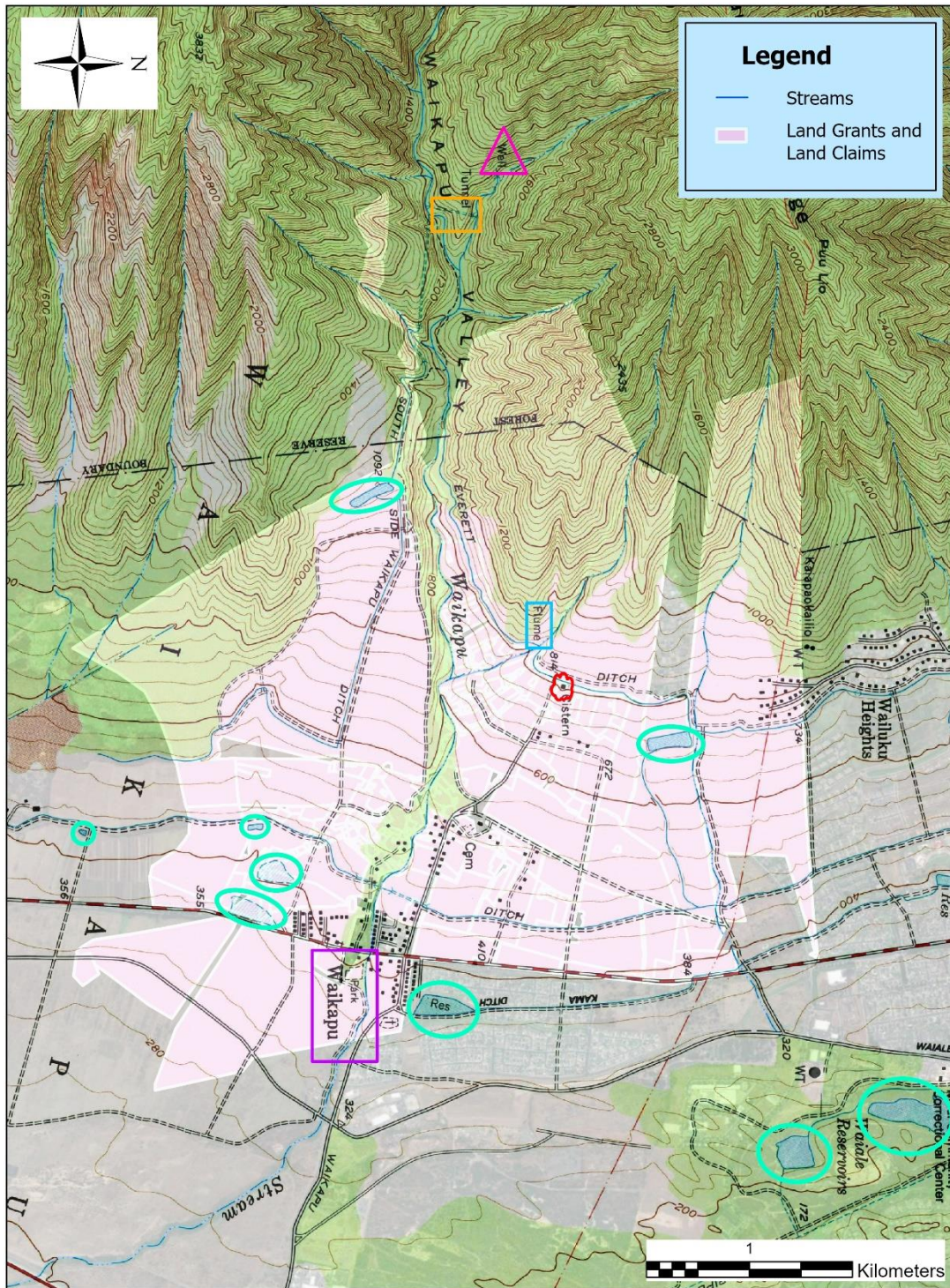


FIGURE 6-12 WAIKAPŪ HYDROLOGY, 1983 The USGS map of 1983 depicts a ditch disappearing (as highlighted by the pink box) as well as the growth of the westernmost reservoir.

Between 1983 and 1997, water storage appears to change even more drastically. What were once originally large reservoirs in the eastern portion of the map have since disappeared (Figure 6-13). Instead, significantly smaller pockets of water near ditches appear. This could be the result of Wailuku Sugar Company transitioning away from sugarcane in 1988 (Cantor et al. 2020).

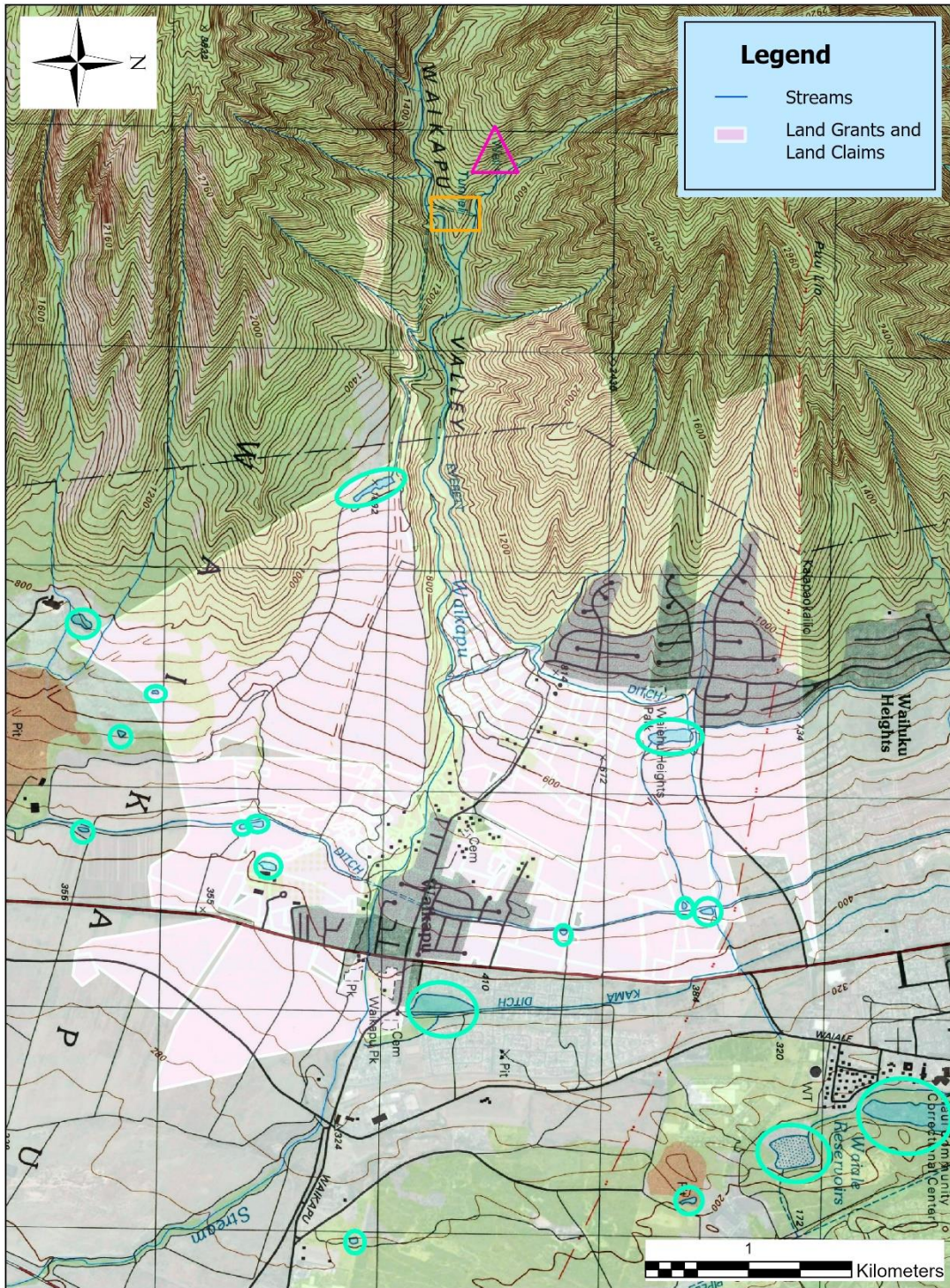


FIGURE 6-13 WAIKAPŪ HYDROLOGY, 1997 In the 1997 USGS map, most large reservoirs seem to have disappeared. Instead, they are replaced by smaller ponds.

Reservoirs continue to decrease into 2014 (Figure 6-14). Except for smaller bodies of water, only the reservoirs more mauka and the ones closest to the Waihe'e Ditch appear to have remained in use as indicated by their relatively small decrease in size. The reservoirs closest to the Waihe'e Ditch appear to have been utilized by different companies during this time including the Maui Tropical Plantation, which opened in 1984 (Ha 2017). Two reservoirs slightly west of the first also appear to have been added during this time. Small bodies of water seem to be primarily associated with the golf course towards the south side of the image. Most noteworthy is the closure of the reservoir connected to the Kama Ditch (outlined in orange).

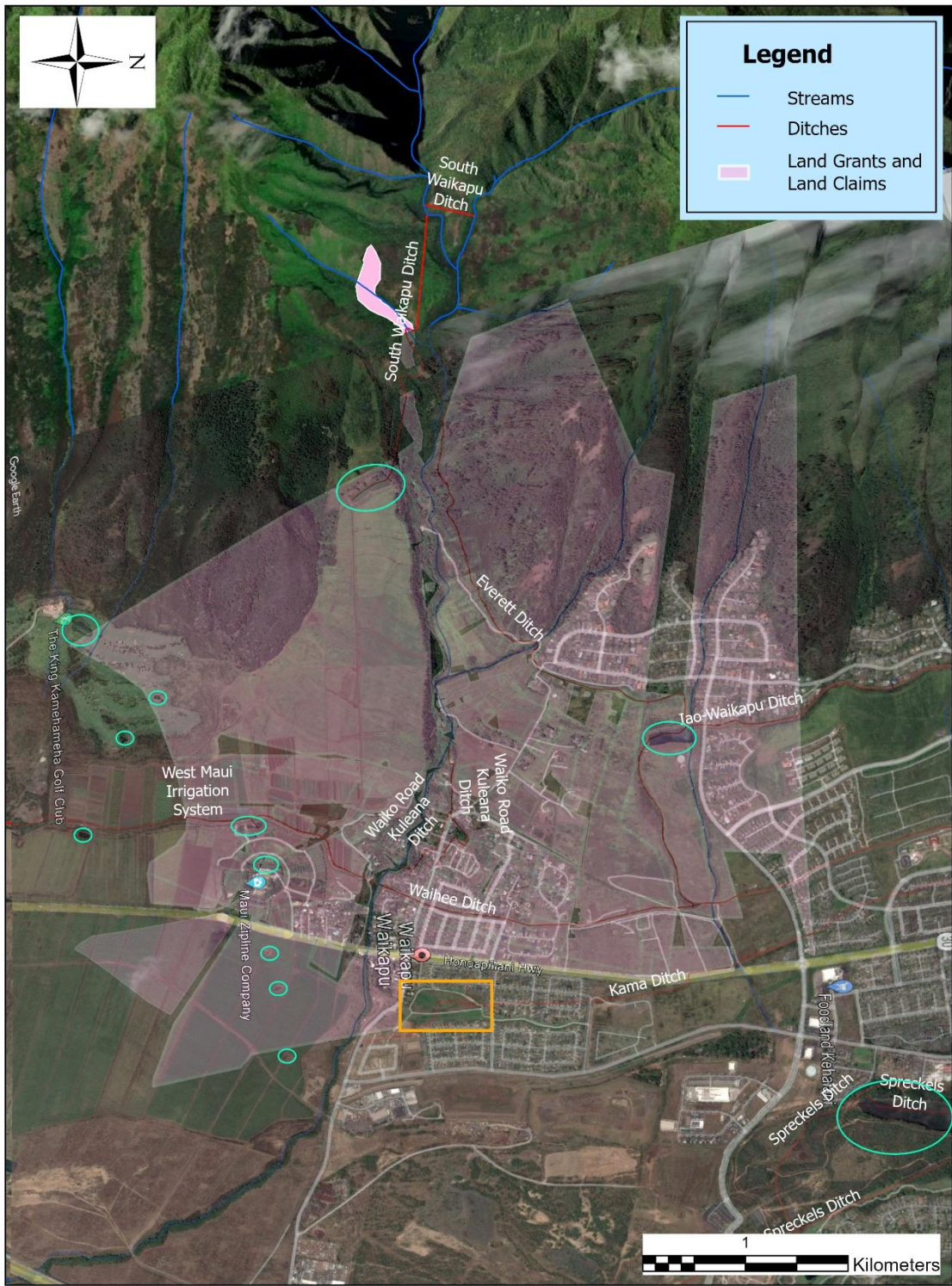


FIGURE 6-14 WAIKAPŪ HYDROLOGY, 2014 Satellite imagery obtained from Google Earth shows a similar decrease in pond size in 2014.

Satellite imagery shows the disappearance of bodies of water except for the two reservoirs near the mountains (Figure 6-15) following the closure of the last sugarcane company in 2016. While this may be a result of the closure of the final sugarcane plantation, it is more likely a result of climate change and water conservation legislation since the golf course, which still contained many ponds, was not affiliated with the sugarcane plantations.

When viewed together, these maps show that reservoir and pond size steadily decreased (Figure 6-16) from 1983 to the early 2000s (Table 6-1) with a simultaneous increase in pond or reservoir number. In 2014, Pond 1 appears to have increased in size likely due to changes made to the layout of Maui Tropical Plantation. Following this period, reservoirs and ponds appear to all but disappear from the landscape except the two most mauka reservoirs.

Change in Pond Size Between 1983 and 2019

Year	Pond 1 Area (m ²)	Pond 2 Area (m ²)	Pond 3 Area (m ²)
1983	1901	13,415	15,991
1997	528, 1,599	2,276	
2014	823, 1539	2023	
2019	667, 1,663	2,287	

TABLE 6-1 CHANGE IN WAIKAPŪ POND SIZE FROM 1983-2014 Between 1983 and 2014, ponds in Waikapū gradually decreased in size. However, starting in 2014 there appears to be a slight increase in pond size. The area of Pond 1 has been divided into two measurements because two separate ponds appeared following 1983. The first measurement corresponds to the pond on the south side of the image while the second measurement corresponds to the pond on the north side. Pond 3 disappears following 1983.

Of the two reservoirs, the southernmost one, or the one connected to the South Waikapū Ditch (henceforth Reservoir 1) warrants further analysis. Because this is one of the two ditches connected to diversions on the Waikapū Stream and the only reservoir receiving water solely from the Waikapū Stream, measurements of Reservoir 1 reveal how the amount of water diverted changed during the latter half of the 20th century. While the reservoir connected to the Palolo Ditch does extract water from the Waikapū stream, it is difficult to quantify how much water it diverts from this stream because it also extracts water from another source. In addition to this, the Palolo Ditch was eventually abandoned due to a rockslide following 1933 (Wilcox 1997). Therefore, it is possible that the water depicted in the aerial photos of this ditch does not represent the water that it diverted from Waikapū Stream.

Using ArcGIS Pro measuring tool and georectified aerial and satellite photographs, it was possible to measure the degree to which the size of Reservoir 1 changed over time (Figure 6-17). Aerial and satellite photography have been chosen for this analysis to reduce any biases that can

be attributed to the observations of a map maker. However, it is also possible that distortion from the georectification of aerial photos may contribute to slight differences in Reservoir 1 size.

Using this method, Reservoir 1 started with a measurement of 4555 m² in 1950 and decreased to 4053 m² in 1965. Because this photo does not identify the month that it was taken, it is likely that these changes represent seasonal variation, a slight reduction in size due to climate change, or distortion of this image during georectification. The size of Reservoir 1 increased significantly in 1976, doubling in size to 8261 m². This seems unlikely to be a natural phenomenon due to the large increase in size.

To understand if this observation could be a result of climate, another body of water in the general region, Keālia Pond was measured. While Keālia lies closer to the ocean and, thus, microclimate could have impacted differences in precipitation between Keālia pond and Reservoir 1, it was assumed that these differences were negligible. Measurements of Keālia Pond (6-18), which decreased in 1976, additionally support that the increase in Reservoir 1's size is due to a human-made change rather than an increase in precipitation.

The growth of Reservoir 1 is likely due to decreased water utilization by sugarcane plantations following the 1960s. Engledow (2009) shows that the amount of land under sugarcane cultivation decreased following the 1960s suggesting that less water should have been extracted from reservoirs. In addition to this, the emergence of drip irrigation in the 1970s may have also led to increased efficiency in water usage, though Wilcox (1997) argues that the same, rather than less, water was used. Nevertheless, what is important to note is that even though sugarcane plantations appear to be using less water, they were still extracting similar amounts of water from Waikapū stream just storing it in Reservoir 1. As a result, local inhabitants likely did not notice a significant increase in streamflow despite lower water usage.

Following 1976, the size of Reservoir 1 appears to decrease slightly to 7731 m² in 2014 and to 7000 m² in 2019. While this reduction may be associated with the closure of Wailuku Sugarcane Plantation in 1988 and the closure of Alexander and Baldwin in 2016, because this change is subtle, it is more likely due to differences in precipitation. As discussed in Chapter 4, even though Wailuku Sugarcane Cane shut its doors in 1988, it remade itself into Wailuku Water Company and continued to divert water.

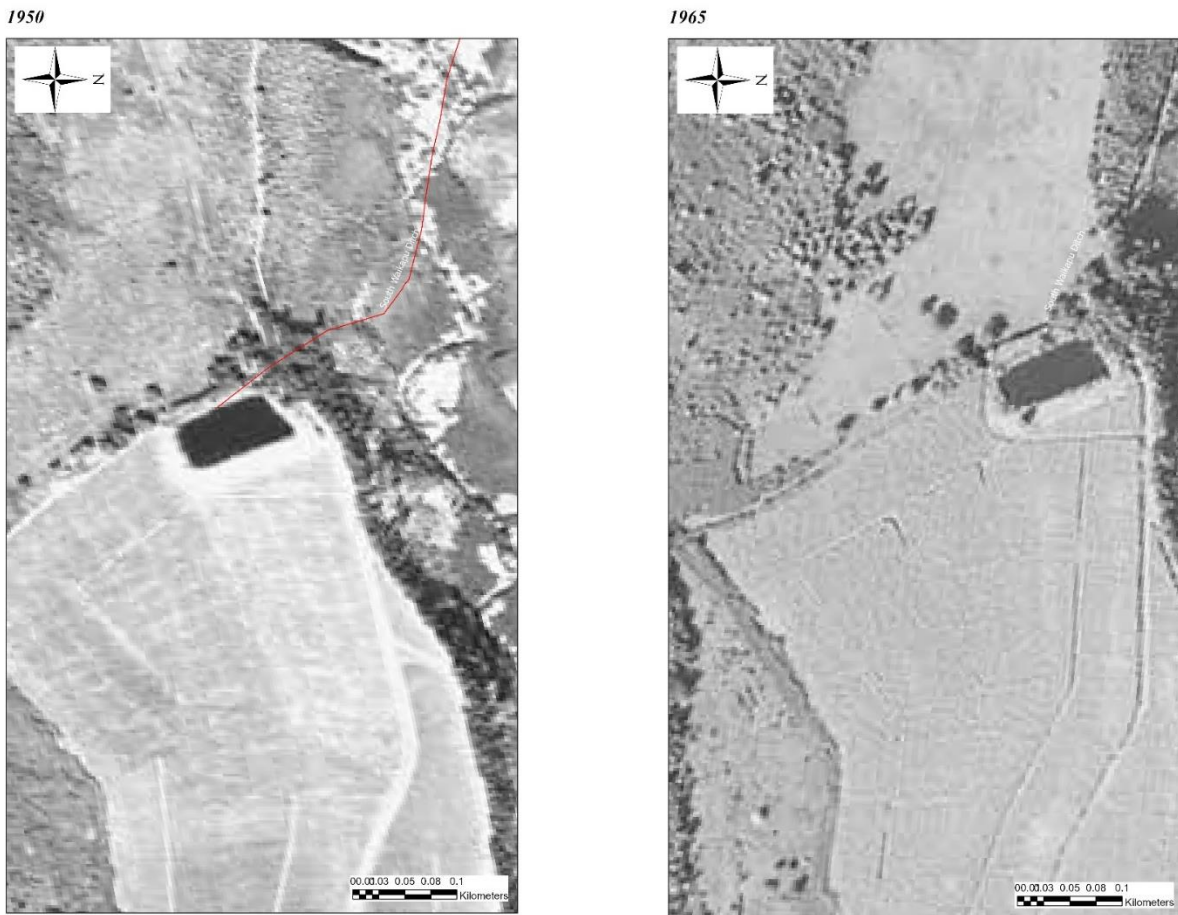
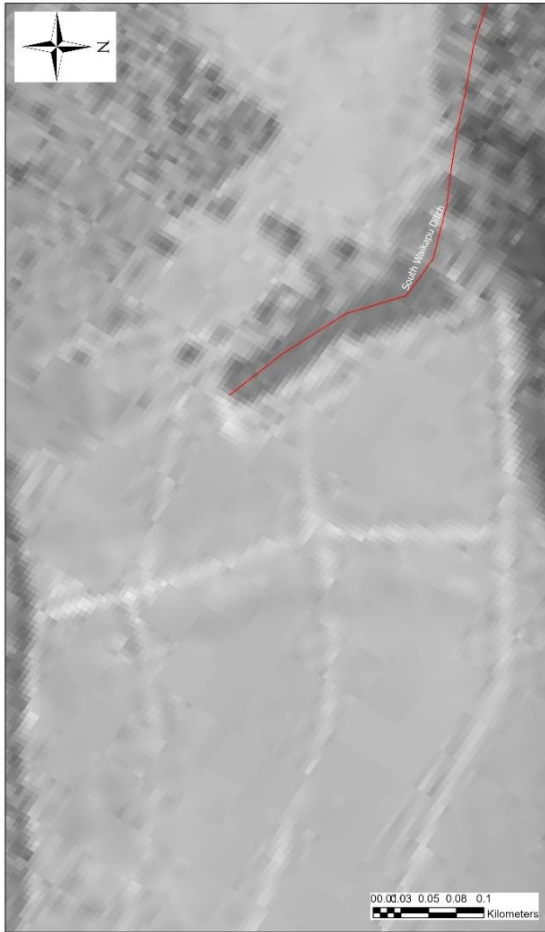


FIGURE 6-17 CHANGE IN RESERVOIR 1 SIZE OVER TIME (CONTINUED ON THE NEXT PAGE)

1976



2014



FIGURE 6-17 CHANGE IN RESERVOIR 1 SIZE OVER TIME (CONTINUED ON THE NEXT PAGE)

2019



FIGURE 6-17 CHANGE IN RESERVOIR 1 SIZE OVER TIME These images indicate that the size of Reservoir 1 decreased between 1950 and 1965, but nearly doubled by 1976. Following that period, the size of Reservoir 1 decreased slightly.



FIGURE 6-18 DIFFERENCE IN KEĀLIA POND SIZE BETWEEN 1965 AND 1976 Mapping the area of Keālia Pond in 1965 (blue) and 1976 (magenta) shows that Keālia Pond began to decrease in size between this period. This suggests that the growth in size of Reservoir 1 cannot be attributed to increased precipitation.

Together these analyses highlight the different ways in which sugarcane plantations changed hydrology. Even with the closure of sugarcane companies, the original hydrological infrastructure remains and continues to be part of the water diversion process. With the emergence of Wailuku Water Company, water now becomes sold to local and diverted away from the local inhabitants of Waikapū.

Mapping Changes in the Environment:

While the previous analysis reveals the changes in infrastructure that occurred in Maui in the late 20th century, it is also necessary to consider how these changes could have impacted the environment. To understand landscape change from 1950-2000, USGS topographic maps were georeferenced and compared to aerial and satellite imagery. Following 2000, satellite imagery is primarily utilized because they have a higher quality than past aerial photographs making landscape change easier to decipher. Because no map contained the entire area of interest, maps from Mā‘alaea and Wailuku were combined. These include the Mā‘alaea 1954 and Wailuku 1955 maps (henceforth the 1955 map), the Mā‘alaea 1983 and Wailuku 1984 maps (henceforth the 1984 map), and the Mā‘alaea 1996 Wailuku 1997 maps (henceforth the 1997 map). Although these maps are dated a year apart, this year difference can be assumed to represent an insignificant, if any, difference in environmental change especially because the maps fit together cohesively.

This analysis focuses on the potential impact of sugarcane plantations on Waikapū Stream because its diversion has been the source of controversy. The 1955 map (Figure 6-19), depicts Waikapū Stream surrounded by woodlands throughout its entire stretch. Comparison of these maps to aerial photographs from 1950 (Figure 6-20) and 1976 (Figure 6-21) provide a more vivid understanding of changes in landscape. In place of what was originally woodlands,

the 1976 photograph shows cane fields. As time progresses, the woodlands surrounding Waikapū Stream appear to decrease as the stream turns south towards Keālia Pond (Figure 6-22). By 1997, woodlands have been reduced even more significantly, especially in the lower reaches of Waikapū Stream (Figure 6-23).

Aerial photos from 2014 (Figure 6-24) and 2019 (Figure 6-25) further reflect a decrease in woodlands. When compared, 2014 and 2019 show the same extent of woodlands. Although, the landscape in 2019 appears significantly drier potentially as a result of the closure of sugarcane plantations. This is mostly likely not a result of seasonal variation because the 2014 image was taken in August of that year and the 2019 image was taken in June of that year, both months that are part of the dry season in Hawai‘i.

While these images provide evidence that sugarcane plantations altered the landscape even until the latter half of the 20th century, it is also necessary to look at the existing climatological data. Because microclimates impact the environment in Hawai‘i, only data from Waikapū has been selected. Data was obtained from the *Rainfall Atlas of Hawai‘i* which contains digitized records of Wailuku Sugarcane Plantation’s Waikapū Village precipitation gage from 1920-2007 (Figure 6-26). These records have been graphed and compared to the georeferenced maps to understand if a significant portion of landscape change could be attributed to climate change. Based on the yearly average precipitation (Figure 6-27), it appears that while precipitation varied over time, there is not a decreasing trend in precipitation until the late 1980s. Graphing precipitation data by its dry (April-October) and wet (November-March) seasons (Figure 6-28) similarly indicates a decrease in precipitation during the late 1980s with a more drastic rate of decrease during the dry months.

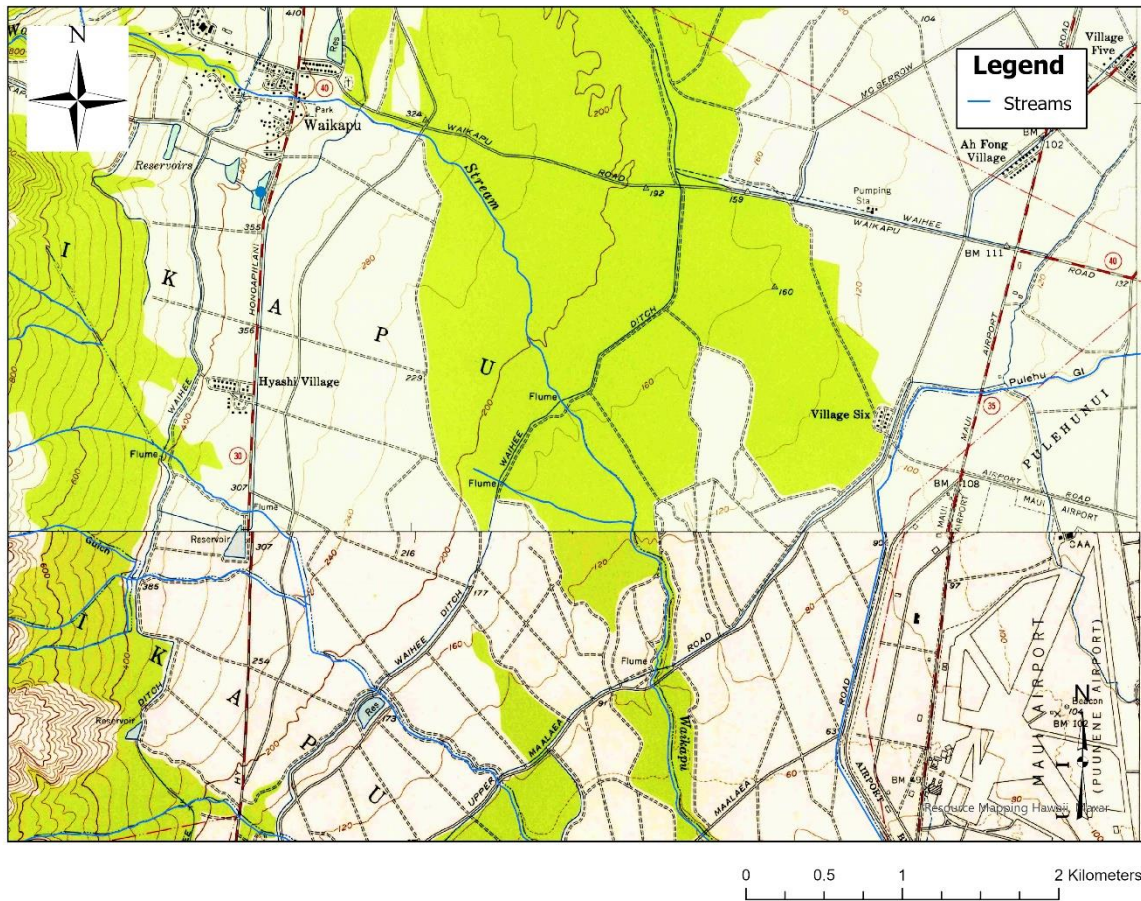


FIGURE 6-19 MAP OF THE WAIKAPŪ ENVIRONMENT, 1955 The USGS map of 1955 shows that the Waikapū landscape was covered in woodlands (indicated by the lime green color), especially along the stretch of the Waikapū Stream.

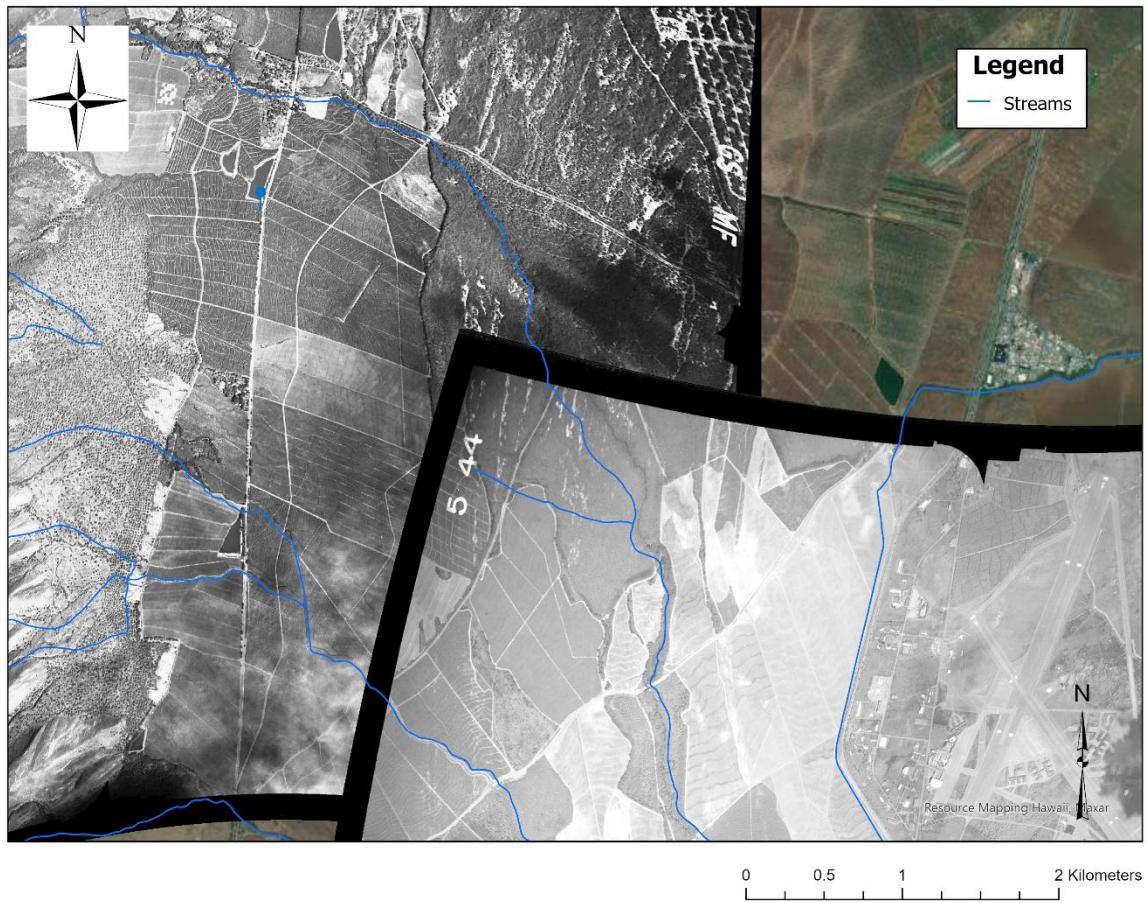


FIGURE 6-20 AERIAL PHOTOGRAPH OF THE WAIKAPŪ LANDSCAPE, 1950 Aerial photography from 1950 showcases that changes in landscape during this time are a result of the emergence of cane fields.

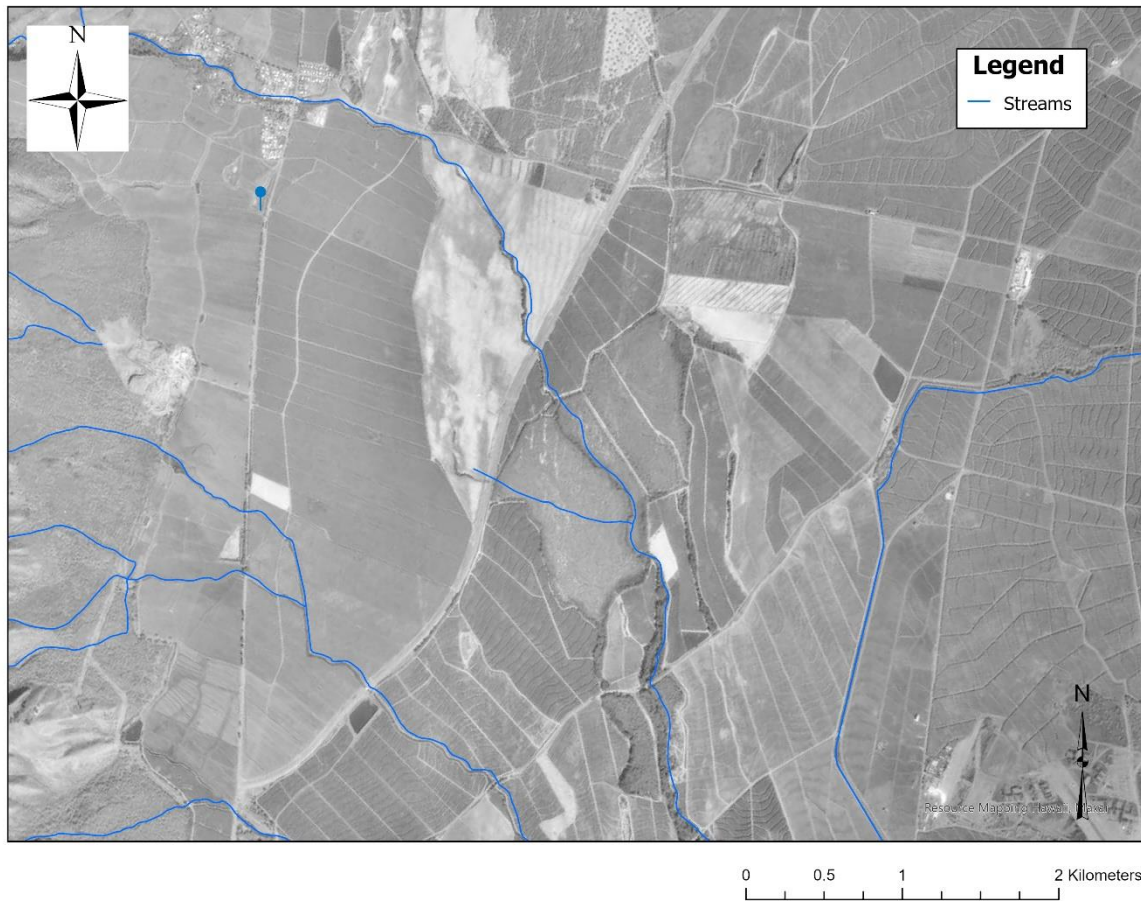


FIGURE 6-21 AERIAL PHOTOGRAPH OF THE WAIKAPŪ LANDSCAPE, 1976 Similar to aerial photographs from 1950, 1976 aerial photography confirms an increase in cane land between 1950 and 1976.

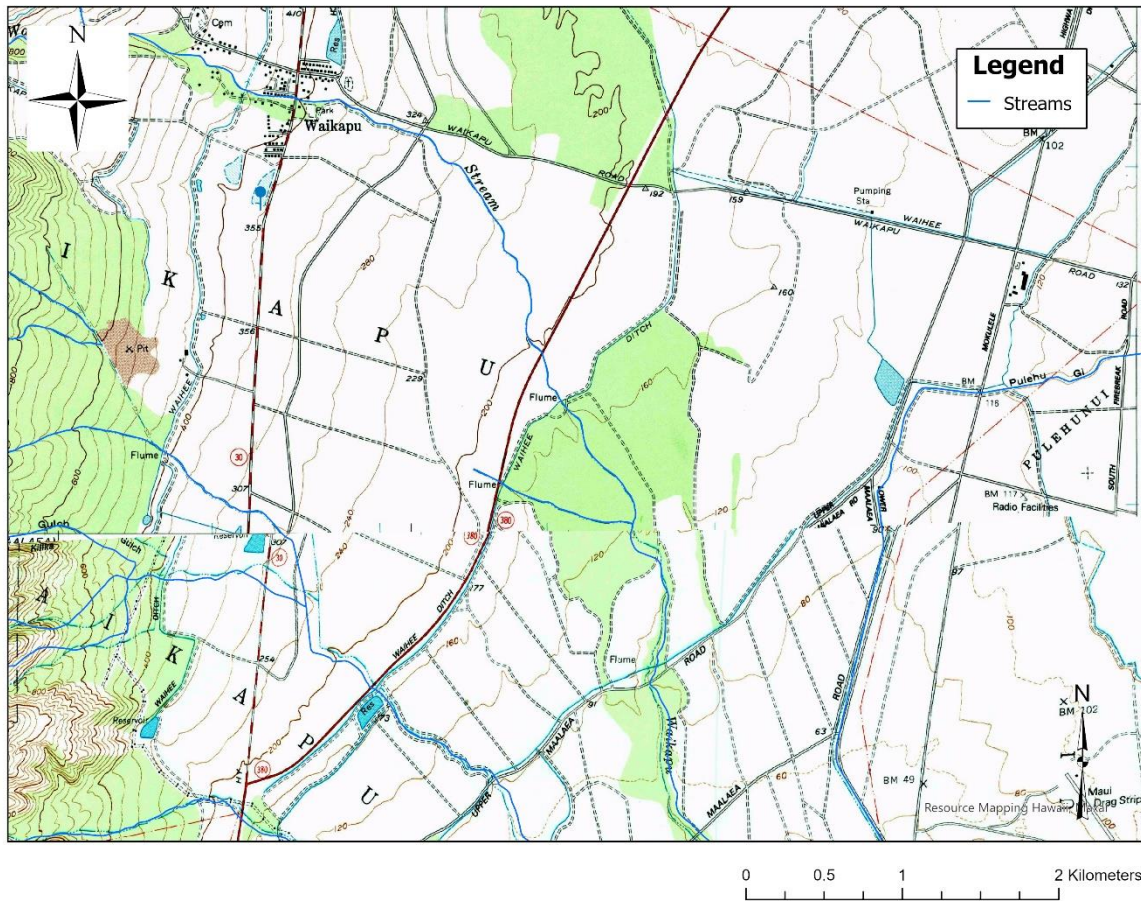


FIGURE 6-22 MAP OF THE WAIKAPŪ ENVIRONMENT, 1984 Between 1950 and 1984, the most noticeable decrease in woodlands occurs as the Waikapū Stream turns south towards the ocean.

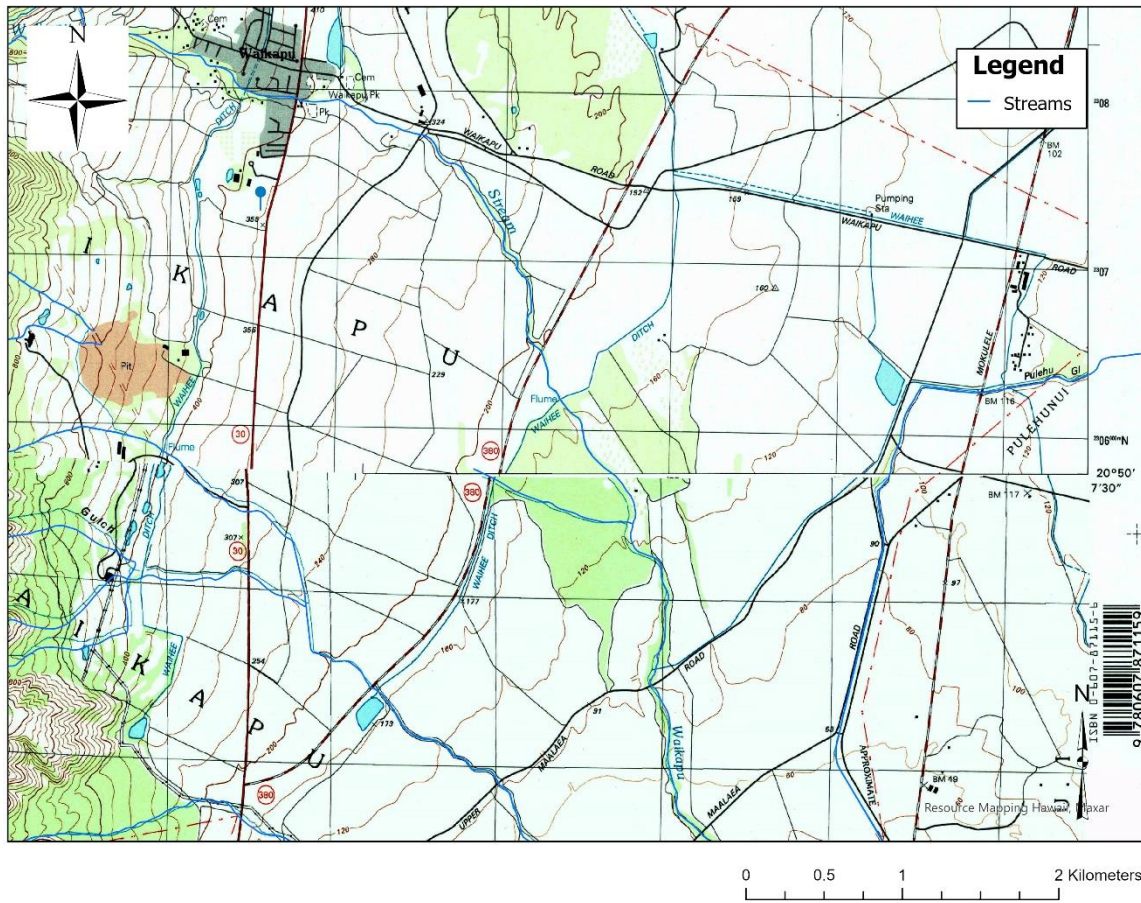


FIGURE 6-23 MAP OF THE WAIKAPŪ ENVIRONMENT, 1997 By 1997, most of the woodlands that were along the Waikapū Stream have since disappeared.



FIGURE 6-24 SATELLITE IMAGERY OF THE WAIKAPŪ ENVIRONMENT, 2014 Satellite photography from 2014 confirms the decrease in woodlands.

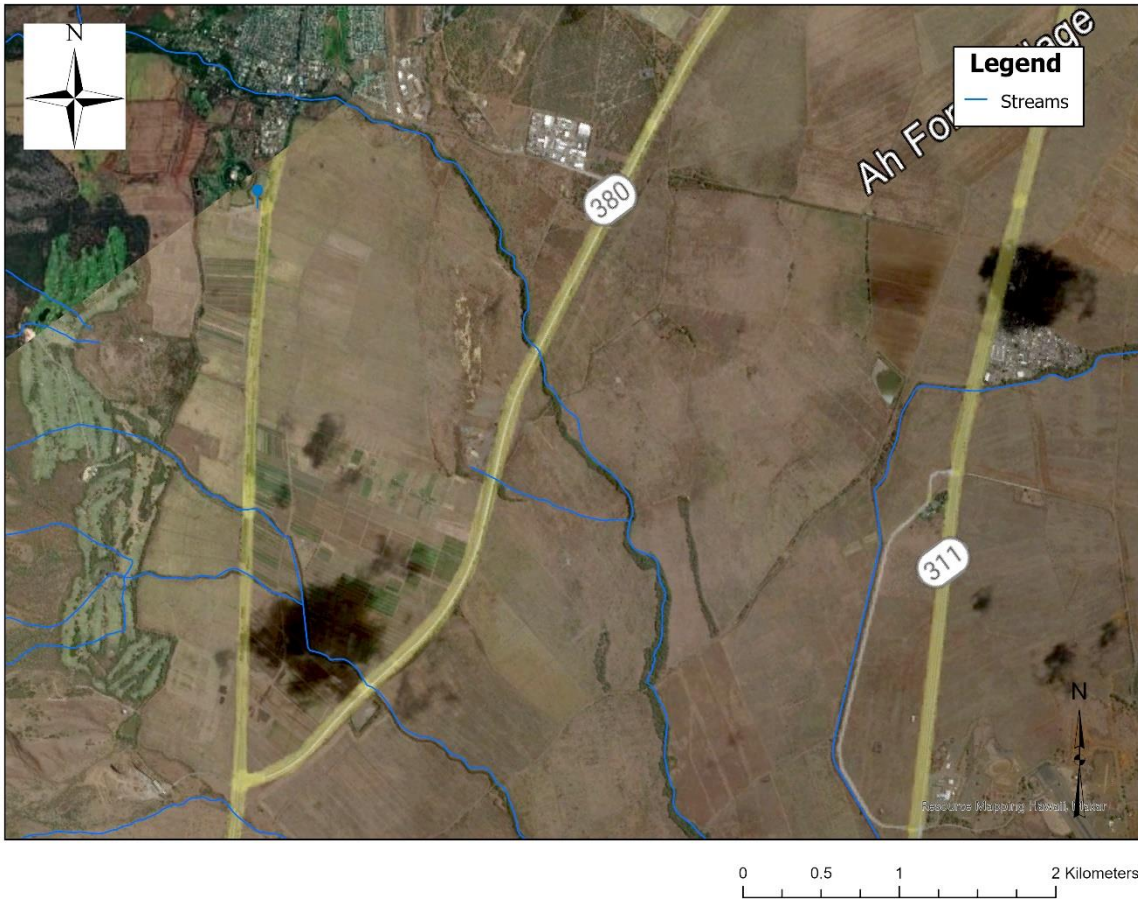


FIGURE 6-25 SATELLITE IMAGERY OF THE WAIKAPŪ ENVIRONMENT, 2019 Woodlands along the Waikapū stream continue to decrease into 2019.



FIGURE 6-26 WAIKAPŪ PRECIPITATION GAGE LOCATION The blue pin shows the location from which precipitation data for Waikapū was collected.

Waikapu Annual Average Precipitation, 1950-2007

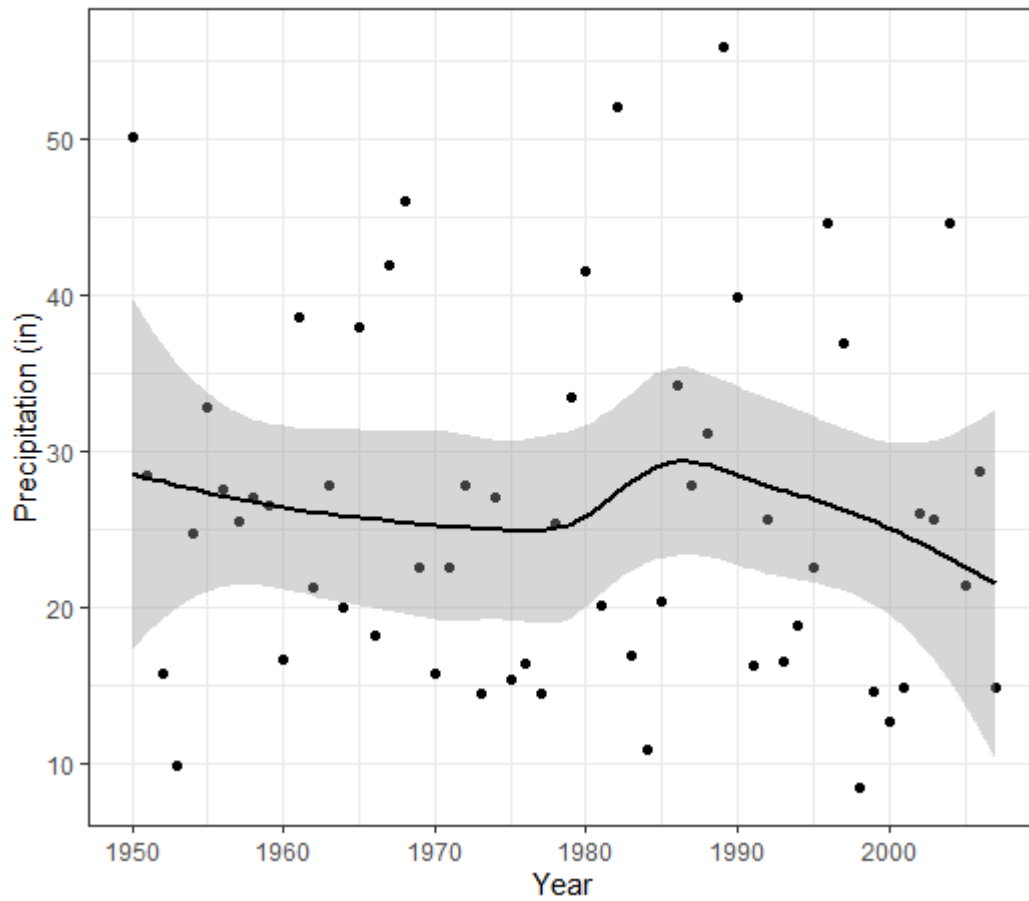


FIGURE 6-27 WAIKAPŪ ANNUAL PRECIPITATION, 1950-2007 Waikapū precipitation appears to oscillate seasonally, only showing a decreasing trend towards following 1980.

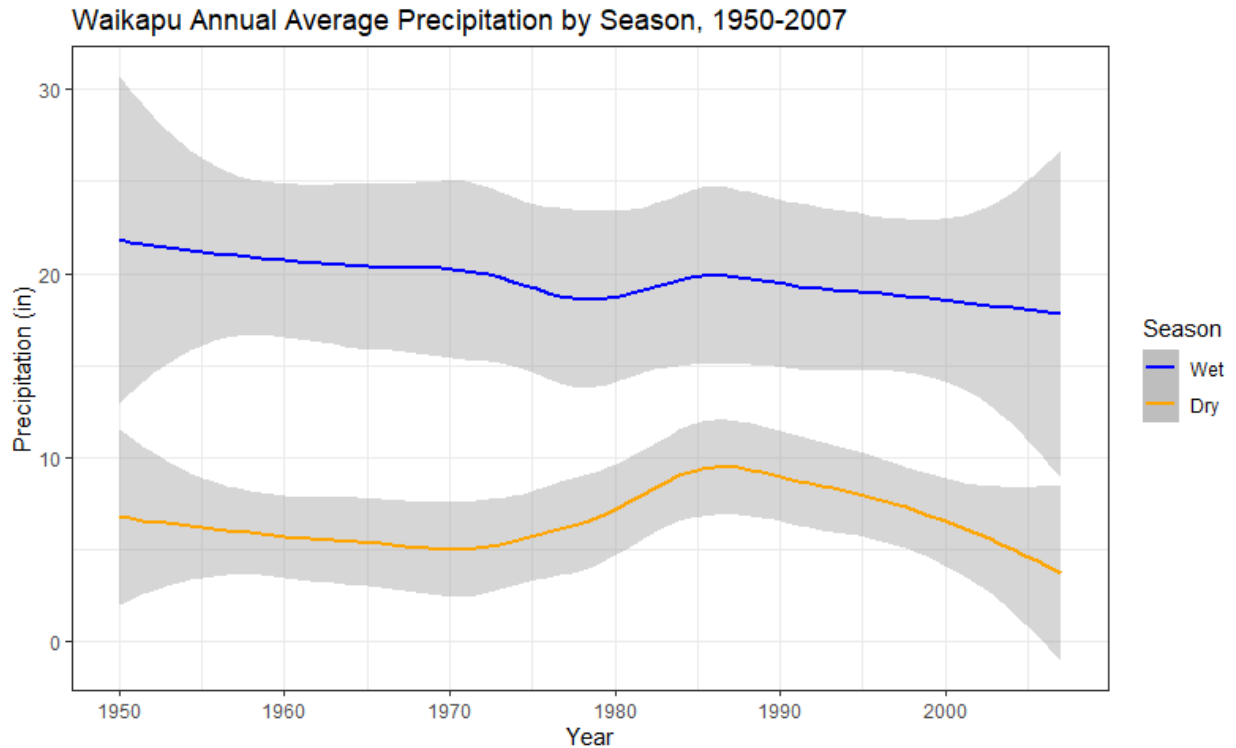


FIGURE 6-28 WAIKAPŪ DRY AND WET SEASON PRECIPITATION, 1950-2007 When separated by the dry and wet seasons, precipitation trends appear similar to the annual precipitation.

Conclusion

The previous analysis tracks the emergence of sugarcane plantations and changes in their hydrological infrastructure in Waikapū, Maui. Reservoirs, particularly, underwent significant change, increasing in number until the mid-1980s before most began to fade from existence. Only the two reservoirs that were connected to the main diversion ditches remained until present-day. Reservoir 1, particularly, increased in size in 1976 and continued to stay roughly the same size even following the closure of sugarcane plantations.

While additional research needs to be done to develop a stronger correlation between changes in hydrological infrastructure and its impact on the environment, preliminary analysis shows a decline in woodlands directly near Waikapū Stream. Although the decrease in

woodlands is likely a result of the direct removal of trees by sugarcane plantations, changes in woodland distribution might also be a result of reduced streamflow. It is not likely the result of climate change, since precipitation levels in Waikapū do not appear to decrease during this time.

What is evident from this analysis is that sugarcane plantations greatly changed the landscape in ways that persist to the present and that may impact future generations if no interventions are made. Reservoirs particularly have posed, and continue to pose, a threat to Maui because of their negative impact on hydrology. Ye et al. (2003) showcase that reservoirs increase flooding during the wet season but decrease streamflow during the dry season. Akbas et al. (2020) similarly found that reservoirs decrease soil water storage increasing the chance of drought and increasing water loss in the system due to surface evaporation. This claim is further substantiated by Baldassare et al. (2018). This suggests that as long as reservoirs exist on the landscape, they have the potential to negatively impact hydrology. While I am not suggesting that all reservoirs be decommissioned, as they may be necessary for domestic use, I am highlighting how plantations have harmed, and continue to harm the landscape of Waikapū. Furthermore, as long as poorly maintained plantation infrastructure remains on the landscape, it will continue to persist as a barrier to Indigenous futurities despite the hard-won fight for water by Native Hawaiians.

CHAPTER SEVEN:

CONCLUSION

Through this dissertation, I have showcased how participating in the Hawaiian community, especially the Hawaiian community off-island, has been critical to shaping my research process. Foremost, I have called for changes in archaeological training to provide archaeologists with the tools to work with communities and to engage with the past in ways that are less clouded by their own biases. Self-work through cultural humility, I argue, is the necessary first step that needs to be taken before engaging with community members. Furthermore, I outline different considerations that need to be made when working with descendant communities. I conclude Chapter 2 with a discussion of how identity also dictates how we interact with communities. It is through these considerations that archaeologists can generate activist archaeologies, or archaeologies that adhere to vocational activism (Castañeda 2016) and archaeology as activism (Stottman 2010). Activism, I argue, is needed to reform the discipline so that it is more equitable, and so that it can, by extension, contribute to greater equity within society. This project promotes vocational activism by showing how Hawaiian epistemologies can inform the research process. Particularly, it demonstrates how Hawaiian values led to the development of this project. It further focuses on the Hawaiian conception of ‘āina, arguing that such a conception is relevant to archaeology because archaeologists are always engaging with land. This conception of land, I argue, should promote research that seeks to engage with the modern community, not just generate an understanding of past environmental change. I then transition into a case study of how my research promotes archaeology as activism. Because I am addressing an issue that extends back to the 1850s, some foundational information is needed. To accomplish this, I provide a brief history of water rights in Hawai‘i including a history of land ownership, infrastructural changes by plantations, and a summary of the water

legislation in Waikapū, my region of focus. Once this has been established, I use Māhele documents to reconstruct the landscape. This reconstruction provides a general picture of kalo distribution and land stewardship during the time of the Māhele, which is then used to estimate water usage. By generating a map of the landscape during the time of the Māhele, this part of the project sets the foundation for identifying landscape change. Using Land Grants, historical maps, aerial photography, and satellite imagery, I depict how the landscape changed over time. Firstly, I map land grants to portray how land stewardship changed as a result of the Māhele. Secondly, I connect land grants to the rise of sugarcane plantations and demonstrate how sugarcane plantations gradually took over Native Hawaiian lands. Thirdly, I examine changes in hydrological infrastructure along with environmental changes to infer how sugarcane plantations transformed the landscape and negatively impacted Native Hawaiians. Through this analysis, I provide a qualitative examination of how sugarcane plantations and their descendants have negatively changed the landscape of Waikapū. I hope this analysis will form the foundation of more research that will eventually lead to changes in water management policies.

Contributions:

Theory:

This research advocates for communicating across disciplines. Specifically, I argue that cultural humility, a term typically used in healthcare, can be beneficial to understanding how to navigate human interactions ethically. Cultural humility provides a framework on which to build to develop greater equity in archaeology. I use this framework to argue that specific steps like volunteering and self-work should be undergone as part of a typical archaeological training program to challenge biases.

This project is also one of the first examples of integrating Native Hawaiian epistemologies into a dissertation-level archaeological research study. Integrating ‘āina into Hawaiian environmental archaeology provides a new way of conceiving the past that goes beyond the common themes of intensification and expansion. Rather, it showcases the potential environmental archaeology can have for supporting modern environmental justice movements.

Methods:

Through my research, I demonstrate the importance of learning ‘ōlelo Hawai‘i as a scholar of Hawai‘i. Not only does ‘ōlelo Hawai‘i allow one to grasp a deeper understanding of cultural nuances, but it enables one to use more sources that are not as biased by colonial entities. As shown by this study, Māhele documents, particularly, are useful to reconstructing landscape in Hawai‘i because they not only provide qualitative, but quantitative data.

Furthermore, I apply geospatial analysis to the study of sustained colonialism. Through mapping, I connect the past to the present by articulating how colonizing entities impacted the landscape historically and how they continue to impact the landscape in modernity. Colonialism is not a thing of the past, but something that continues to negatively impact present-day Hawaiians. Thus, this research also aims to encourage others to become accomplices to modern Indigenous activism movements.

Community:

Because many Hawaiians have been displaced from their land and some struggle with retracing their genealogy, I hope my landscape reconstruction can help community members with tracing their genealogy. Specifically, by developing a map that contains the names of the different inhabitants of Waikapū (even the ones that did not make land claims) I establish that

these families lived in Waikapū during this time even if their precise location is not always as evident.

Limitations:

The pandemic challenged my ability to do community-centered work. While I initially spent the first few years of this research project returning to Maui, volunteering, and running my ideas by community members, I was unable to continue this following the summer of 2019. Although I still followed the modern court cases, I failed to keep in touch with the community and had difficulty reconnecting with them by the time I had to complete my project. I am forever indebted to them for their willingness to help and guide me throughout this process, but I know as a community-based researcher I can and should have been better. Therefore, it is difficult for me to classify this as truly community-based work. Perhaps community-inspired is a better name for it.

While I have spent many years learning ‘ōlelo Hawai‘i, I am still not fluent in the language. Greater proficiency in the language will enable the use of more diverse sources that may reveal more information about changes in land stewardship. Furthermore, not all material from Hawaiian archives could be accessed freely online. It is possible that plantation-specific documents that indicate changes in hydrological infrastructure, more detailed maps, and additional place-specific material for Waikapū exist. If they do, this material may provide additional insight into changes in plantations and hydrological infrastructure.

Because deeds were difficult to locate, they were excluded from this study. The integration of deeds could provide further insight into how land ownership changed hands and the reason for this change. For example, they could showcase if the death of Hawaiian

landowners was a primary reason for ownership change. Similarly, more genealogical work could assist with understanding landscape change.

Environmental data was limited to precipitation records from the 1920s-2007s, which is a relatively short period for climate data. To provide greater insight into how climate and other environmental changes impacted hydrology, additional research utilizing environmental data must be conducted.

The focus of this paper was infrastructural changes by sugarcane plantations. However, additional research on anthropogenic changes made in this region would provide further insight into which hydrological changes can be attributed to sugarcane plantations as opposed to other factors.

Future Directions

If I am to continue with this line of research, my focus will foremost be reconnecting with the community. Now that Covid-19 cases have dropped significantly, I feel more comfortable returning to Maui to continue research and hope to collaborate with the community to pursue additional research questions. One avenue that I think could be beneficial to this project is the integration of hydrological modeling. I hope to work with a hydrologist to generate a hydrological model of streamflow using the Soil and Water Assessment Tool (SWAT). This will provide more information on how streamflow changed and to what degree changes in streamflow can be attributed to climate versus anthropogenic changes.

In addition to this, the integration of microbotanical analysis would be particularly useful. Diatom analysis, specifically, would provide further insight on how streams, lakes, and reservoirs changed as a result of the plantation period including changes in water quality, and quantity. Another way to further explore landscape change is through calcium oxalate, phytolith,

and starch analysis. By taking soil samples, it becomes possible to look for and identify these microbotanicals to understand if taro was present during this time. While these methods are still relatively understudied in Hawai‘i, it has the potential to provide greater insight into the exact location of lo‘i and potentially the different types of kalo that were present in each lo‘i.

Outside of environmental research, I plan to expand my research on decolonizing academia. Particularly, I will explore the degree to which integrating Native Hawaiian-based teaching practices into classrooms outside of Hawai‘i impacts students’ retention of the material. I also plan to study how the integration of other activities like ungrading and self-work influences student motivation and interest in the subject. I hope that this will assist with developing teaching practices that are more sensitive to the needs of diverse identities.

A Hui Hou

I close by reiterating all that I have learned from being part of the Hawaiian community.

- 1) *Colonialism still negatively impacts us on multiple levels.*
- 2) *There is strength in emotion.*
- 3) *Research on our community and relearning our culture is painful.*
- 4) *Choose your battles.*
- 5) *Learning our language is key to better understanding our culture.*

Yet, there is one more key insight that I have gained from this experience.

- 6) *There is healing in relationality.*

Just a week ago, I sat down to re-learn how to make pua hulu (feather flowers) for an upcoming funeral. It was one of the first community gatherings that I had been to since the start of the pandemic. As I sat at that table, I reflected on how just 6 years prior there had

been a similar group of people sitting together learning ‘ōlelo Hawai‘i. Since then, 4 of these people, including the owners of the house, had passed on. Yet, while the moment was tinged with sadness as I realized that I had never given myself the chance to grieve because I had normalized death as part of the Hawaiian experience, there was an underlying warmth emanating from the people there. I realized that it was this palpable feeling of aloha that drew me back to the community every time my life got hectic. It was this aloha that caused me to grow from someone who had spent the drive home from their ‘ōlelo Hawai‘i class crying their eyes out because they worried that they would never be “Hawaiian enough” to someone a little more confident in their identity as a Hawaiian. And, it was this aloha that would continue to drive me back to the community as a Hawaiian foremost and as a community-driven researcher second. In the words of the Hawai‘i’s Daughters Guild of California’s motto: Imua, first, last, and always.

APPENDIX A: HAWAIIAN GLOSSARY

ahupua‘a: one of the larger types of land divisions in Hawai‘i. They are typically in the shape of a pie piece and encompass resources from both the mountainous and shore regions.

‘āina: the general name for land in Hawaiian culture. It also translates to that which feeds.

aloha: love

aloha ‘āina: love for the land

apana: different parcels of land claimed as part of the Māhele of 1848

‘auwai: Hawaiian ditches typically used for watering taro

ea: sovereignty, including research concerned with advancing Hawaiian sovereignty

‘ili: a larger area of land within an ahupua‘a. Sometimes, ‘ili were made up of multiple parcels. For the purpose of this analysis, multiple land claims were often included in a singular ‘ili.

kalo: taro including both the dry and wet varieties

konohiki: a managerial chief. Konohiki were responsible for managing water allocation and land.

kulāiwi: the place or places in Hawai‘i that a Hawaiian has a genealogical connection to.

kuleana: responsibility, including a conscious concern for how research impacts a community, also used to refer to a land claim.

paukū: a section of land containing taro. Paukū were smaller than mo‘o

pono: righteousness including a concern with who research serves

makai: towards the sea

mālama ‘āina: To take care of the land

mauka: towards the mountain

mo‘o: a piece of land containing taro. The approximate size of mo‘o has not been recorded. All that is known is that they were larger than paukū

mo‘okū‘auhau: genealogy

lāhui: the Hawaiian community, also refers to research that is concerned with its impact on the Hawaiian community

lo‘i: the general name for a plot of irrigated taro

lo‘i aupuni: government taro patch, probably the same as lo‘i po‘alima and lo‘i pa‘ahao

lo‘i po‘alima: taro patches that were farmed on Fridays. Kalo from these lo‘i were paid to a high chief as a form of taxation, probably the same as lo‘i aupuni and lo‘i pa‘ahao.

lo‘i pa‘ahao: a taro patch that provided kalo that was paid to a high chief as a form of taxation, likely the same as lo‘i po‘alima and lo‘i pa‘ahao

APPENDIX B: LAND CLAIM AWARD DATABASE

Claim Number	Name	'Ili	Mo'o	Paukū	Lo'i	Hawaiian	English
205	A Catalena/Katelena				0	N/A	N/A
206	A Catalena/Katelena				0	N/A	N/A
300 B	Abner Paki	NA			6	Ke ho'o komo aku nei au i ko'u wahi kuleana mahi he mau loi 6 a he wahi kula aia ma waikapu, no Kapolohau mai keia wahi o'u ua loa ia'u mai a Kapolohau mai i ka la 8 o Mei 1831	I have 6 lo'i and a kula land given to me by Kapolohau on may 8 1831)
461	Aipuhi	NA			7	Aloha olua e na Luna Hoona. Ke hoopii aku nei au I ko'u kuleana mau loi ehiku	hello leader. I am requesting my kuleana 7 loi
432	Antoni Silva	Lehuapueo			doesn't say, just says increased loi because there were few	I kona wa I haawi mai ai iau I keia Amai? he kakaikahi ma loi ua pau I ka maloo a mau e hoolimlima a hana hou I na loi a no laila he lehulehu ma loi I kue wa,he maloo kahi mau loi a he wai no kahi a pela no I keia wai a mamuli ou? Ka ??	During this time I was given this Aina sparse the loi, dried up, I worked and rented that loi and so I increased the loi during this time
499	Auwae	Auwaiolimu			0	doesn't seem to mention loi, only potential house lot	
236I/g	Charles Copp	Kaluapuaa			0	doesn't seem to include kalo land	

Claim Number	Name	'Ili	Mo'o	Paukū	Lo'i	Hawaiian	English
309	D. Malo				0	doesn't seem to say, might be konohiki, only mentions an ili in waikapu in maui	N/A
3702	D. Malo	Palailaiha			1 Poalima	Appendix-J.pdf (hawaii.gov)	source mentions malo had kalo lands
5410	D. Malo				0	doesn't seem to say, might be konohiki, only mentions an ili in waikapu in maui	
6041	Eeka	Makahelahela, Kuaiwa		calls 19 loi a Pauku	21	He mau loi he 19 aia ma ka ili aina o Makahelahela, he pauku okoa no nau keia o'u a na palena of keia wahi pauku aina, ...he mau loi e ae no kekahi ou aia ma ka ili aina o Kuawa elua loi he mau puhale kekahi aia ma ka ili aina o Pilipili elua	19 loi in the ili of Makahelahela, a piece of mine this of the boundary of this piece of pauku aina.....some other loi of mine in the ili of Kuawa 2 loi.....
2499	Ehunui	Olohe, Pikoku			21	he mau loi aia I Olohe he 18 loi, aia I Pikoku e 2 loi, aia I Nohoana koo/hoo? 2 loi, hoike Haeha no	18 loi in olhe 2 loi in Pikoku and 2 in Nohoana
455	Haa	Aikanaka			some, but dried up	mentions loi but not clear how many	
491	Haawahine	Kaoloaopelu			10	Eia kekahi 9 loi aia no ia? Aina nei, I hoolimali, aia I kaia kekahi he puaa kekeahii mahi....	9 loi I hoolimali

Claim Number	Name	'Ili	Mo'o	Paukū	Lo'i	Hawaiian	English
446	Hakapau	Ohia	1		none listed but calls a moo aina says poalima in it so insinuates lo'i kalo	eia kekahi na kou lima iho no I hana a me kuu kane a me na keiki a maua Eia kekahi Eia ka mea a ke konohiki I lawe ai I kuu Mooaina o kuu hele ole I ka poalima	here some?? My husband worked and keiki...here the thins of the knohiki were taken from? My moo of mine (not going??) to the poalima.
2577	Hakiki	Kaopala, Olohe, Waialulu			24	...he mau lo'i aia i Waihalulu e 4? Lo'i aia i olohe e 9 lo'i , aole ma kahi hookahi e hiki ai ke hai aku ina aoaoa, aia i Kaopala, 11 lo'i ke pili la no ko'u hale ma kekahi mau lo'i	4? Lo'i in Waihalulu, in olohe 9 lo'i, not in one place? In kaopala 11 lo'i
2959	Hika	Nohoana	(label s as moo)		14	..he mau 10 lo'i no Keaho mai ko'u, mai a Kamehameha I, akahi mai ko'u noho ana a hiki i keia manawa e noho nei o Nohoana ka ili aina eha lo'i e ae o'u....	10 lo'i in Keaho from Kam I, in this time I am living in Nohoana 4 lo'i
920	Ioane Richardson	Haanui			0	not reported	
225	J Louzada	Pualinaapau				mentions taro when aquired land but not how much in foreign testimony	
416	J. Crowder				0	none listed	
3105	Kaaa	Pilipili II			15	From FT	

Claim Number	Name	'Ili	Mo'o	Paukū	Lo'i	Hawaiian	English
456	Kaai	Punia, Mohoana (Nohoana is part of ili), Ahukolea)			3	Auheha ohea e na luna hoona kula ana. He kuleana hou, he mau loi ekolu o aikao o aiopelei o Kumu honua o Maluae o noho ana, he loi hou iho nei kekahi a wailuloi oia ko'u mau kuleana	Where are you luna (some form of greeting to the luna. Another kuleana . 3 loi of Aikao, Aipolelei, Kumu, Maluae living. Another loi, some of Wailuloi. It is my kuleana
488	Kaai	Kaloapelu			6,seems to be a dispute between Kaai and Mahuka	he hoopii ko'u no mahuka ma ka aina o Kealoupelu a me na loi eono, he loi poalima ma kou hoopii no'u no ka aina a me ma loi eono au? A? kou hoopii ia olua	A litigation of mine for mahuka in the aina of Kealoupeku and the 6 loi 6 loi poalima of mine my litigation? For the land and the 6 loi this is my litigation to you
5774	Kaai	Kaopala, Luapuaa, Olohe			116 (57 reg, 47 loi poalima, 12 leased loi)	He kanalima loi me kumamahiku, he mau loi poalima kekahi au I hana ai, he kanaha kumamaha, a he kula kekahi, a he alia paakai kekahi, he laau kapu kekahi a me ka ia kapee a he mau loi hoolima lima kekahi, he umi kumamalua loi.	57 loi, They are lo'i poalima that I worked, 44
5780	Kaai	Palama			30	He ?? ?? Aia ma kekahi Waikapu, Palama ka inoa o ua kula la, he kanakolu loi o'u, he kula no, he laau kanu, he wahi	in Waikapu, Palama the name of the kula, 30 lo'i of mine, a kula, a plant/planting spot?, a planting space, a town, kapu

Claim Number	Name	'Ili	Mo'o	Paukū	Lo'i	Hawaiian	English
						kulanakauhala, a he laau kapu? A me ka ia kapu?	plants, and kapu fish?
8820	Kaaoao	Ohia			6	aia na kuunahawelu ma Ohia 1 loi, ma paalaelae elima loi	in Ohia, 1 loi, in Palaelae, 5 loi
2394	Kaeha	Olohe		1	4	Aia i Pakoloa elua loi. Aia I Waihalulu elua loi	In Pakoloa 2 loi, In Waihalulu 2 loi
3104	Kaelemakule	Ohia			35	No Hapuupuu mai ko'u aina...He 33 loi...aia ma ka ili aina o Nohoana kekahi mau loi o'u elua	From Hapuupuu my land, 33 loi, in the ili of Nohoana some lo'i of mine 2
438	Kahakumakaai	Kaopala			7	E na luna hoouna e. Ke hoopii aku nei au I ko'u kuleana aina no Ku mai ko'u mau loi ehiku	To the chief sender. I am legislating my kuleana land of Ku? My 7 loi
6389	Kahalelole	Loaloa			0	doesn't mention any loi	
2227	Kahookano	Palama, Ohia	1			I ka makahiki 53? I make ai kuu kaikunane, lilo mai ka aina ia'u a hiki I keana manawa, ke make pu? Nei no au me kuu makuahine hookahi loi a'u ma kahi eae?	In the year 53? My sibling died, the aina was absorbed me in this time. In the dying of my mother 1 lo'I was given to me, only one
5284/5280	Kahuhu	Kaopala			10	Aloha oukou. Ke hai aku nei au ia oukou ko'u kuleana , he mau loi he 10, aia ma ka ili aina I Kapaia o Kaopala ma Waikapu I mau	I am presenting my kuleana, 10 loi in the ili aina in Kapaia of Kaopala in Waikapu n mau

Claim Number	Name	'Ili	Mo'o	Paukū	Lo'i	Hawaiian	English
412	Kaili	Palama			3	Aloha olua e na Lima hoona kuleana aina ke hoopii aku nei au ia olua no ko'u mau kuleana pono i i lawe ia he mau loi ekolu aia ma palama I waikapu na kuu makamaka I hoolimalima I kona waiwai hanai no ke puaa ke kumu hoolimalima o kekahi loi eha Ulua he ia o kekahi loi a mau no i hana hanai o kekahi loi a na'u i hana i kekahi loi o ka ha ea o na loi a i ka wa i make au	Hello you two and the head claims person of the kuleana lands, I'm litigating to you my birth kuleana, given 3 loi in Palama in Waikapu...
3107	Kaili	Palama Ohia	calls moo aina		46	he wahi moo aina kekahi he 15 loi aia ma ka ili aina o Ohia, he 31 loi o na palena o kuu pahale, he auwai mai ka hema	There is a moo aina with 15 loi, In the ili of Ohia 31 loi
8586	Kaina	Palama	2 (2 moo with 13 loi total?)		13	He hai aku nei au i ko'u kuleana ma ka ili aina ma Palama, elua moo aina, he umi kumamakolu loi ma Loaloa no'u no ia, aole mea nana i kuakea?	Here is my claim in Palama, 2 moo with 13 loi at Loaloa
3544	Kainoakauhaha	Punia, Kaalaea			10	aloha oukou. Ke hai aku nei au I ko'u kuleana aina, aia ma ka aina I	aloha to you, I am presenting my kuleana the land in Kapana of Punia in

Claim Number	Name	'Ili	Mo'o	Paukū	Lo'i	Hawaiian	English
						kapana o Punia ma Waikapu nei mokupuni o Maui, aia malaila kekahi mau wahi loi o'u 7?. Eia na poalima? Akahe he kahawai hikina a oa kaopolau he mau kaalaua homohana o Naohi. Aia hoi kekahi mau loi o'u ma Kaalaea ma Waikapu nei ekolu loi malaia.	Waikapu island of Maui, over there there is some lo'I of mine,my other lo'I are in Kaalaea in Waikapu, 3 lo'I there
3523	Kalahouka	Kaopala			20	he mau loi 20, aia ma ka ili aina I kapaia o Kaopala ma Waikapu I Maui e pili ana me Puni a me Leeapuaa.	20 loi in the ili aina in Kapaia of Kaopala in Waikapu in Maui
8806	Kalapuna	Haliipalapala	2 (in Kapa laala ea and Huan ui)		1	From FT	says one loi in the ili of Hiliipalele
3102	Kalawaia	Pikoku and Nohoana		2	36 loi, 9 moo in including lands in Olohe, if just pikoku 16 loi making up 2 pauku	Nohoana ka aina he mau 5 loi no Hika mai kou moo aina hookahi loi ma ka hika moo aina 2 loi ma ko Kualaiia moo hui pu ma loi a pau e 8 pikoku ka aina he pauku aina okoa no ia o'u ewalu loi he wahi kula no kekahi no Kualaiia mai ko'u kalaiwai. Kamaahale ka	Nohoana the land. 5 loi to (from?) the east of my mo'o land, 1 lo'i in the east of my mo'o land, 2 loi in Kualaiia's mo'o uniting all the lo'i by? 8, Pikoku the land. A separate unrelated land of mine 8 loi, a kula land some of Kuoloia my Kalawaiu,

Claim Number	Name	'Ili	Mo'o	Paukū	Lo'i	Hawaiian	English
						<p>aina he iwakalua loi he wahi kula no kekahi eiwa moo a pau loa he uluhala kekahi he auwai ma ka hema ma ke honioha ma ili aina Olohe ma ka Akau ili aina o Pikoku i ka Makahiki o ka Haku 1820 i loa mai ai ia'u ko'u mau loi a me ke kula no ku mai ko'u ekolu a'u loi ma Pikoku no Upai mai keia mau lo'i o'u i ka makahiki o ka haku 1840 loa mai kei mau loi iau ma nohoana kekahi loi o'u hookahi no na limu mai keia loi o'u 35 pau aela o haa wae ha Kahakumakaai</p>	<p>Kamaahali the land, 20 loi, a hula place, some of the eiwa moo, some ulu?, an auwai (stream) in the left in the Konioha the ili aina Olohe in the right ili aina of Pikoku in the year of the leader 1820 given to me my loi with the kula?? 3 (rest talks about when given)</p>
3103	Kalawaia	Pikoku, Nohoana		says pauku has 8 loi	17	<p>he mau loi elima, hookahi loi ma Keahika moo elua loi ma ka Kenoloia moo, hui pu ewalu loi no Kenolaia mai kekahi mau loi o'u. Aia ma ka ili aina o Pikoku, he pauku aina okoa no ia o'u, ewalu loi,</p>	<p>5 loi, 1 loi in Keahika moo, 2 loi in kenoloia moo, 8 loi of Kenolaia, some loi of mine. In the ili aina of Pikoku, a rented land of mine 8 loi.</p>
5742	Kaluahinui	Ohia, Palama			32 (31 Pauku land in Ohia and	<p>No Kahuhu mai he 16 loi, no Kamai kekahi mau loi o'u</p>	<p>of kahuhu 16 loi, of kamai, some loi of mine, 5 loi, of</p>

Claim Number	Name	'Ili	Mo'o	Paukū	Lo'i	Hawaiian	English
					1 in Palama)	elima loi. No Kuheleloa mai kekahi mau loi o'u he 10, o ka wa I loaai mai ai keia mau kuleana o'u, o ka wa e noho luna ma o kaawai ia Maui	kuheleloa some loi, 10.
8672	Kaluau	Kuaiwa, Haliipala, Mokahelahela			11	He hai aku nei au i kou kuleana aina, aia ma ka aina i kapaia o Kuainoa mokupuni o Maui aia ma laila kekahi mau aina 11 loi	I present my kuleana in the aina in Kapaia o Kuainoa mokupuni of Maui, over there 11 loi
3506	Kamakai	kaopala (jumping loi)			14	he mau loi, he 14 aia ma waikapu I maui, he lelele nae 3 loi ona kaopala, 10 kaopala 1 loi ma kaapala. He mau ili aina keia ekolu...	some loi 14 in waikapu in Maui, at intervals eastwards, 3 in Kaopala, 10 Kaopala, 1 loi in Kaopala
6385	Kamakaipoa	Pikoku, Kaloapelu, Maluapuaa			11	Eono o'u loi ma Pikoku no kuu wahine mai ia mau loi o'ua mamua aku o ka Papee o Lahaina ka loaana mai o keia aina. Elima loi o'u ma Kaloapelu ua like ka olelo mahina me ko keia mau loi elima, Eia kekahi ekolu loi ma Maupuaa ma Makole mai ia mau loi ou a nau no i hana elua moo uala malaia.	6 loi in Pikoku of my woman these loi of mine....5 loi of mine in KaloapeluThere are 3 loi in Maapuaa, mentions potato lands so looks like might be in different ahuapuaa

Claim Number	Name	'Ili	Mo'o	Paukū	Lo'i	Hawaiian	English
8465	Kamakauahoa	Kaluaiki			just says some loi	He mau loi kou kuleana aia ma ka ili aina I Kapaia o Kaluaiki ma Waikapu I Maui malalo aku o ma haku aina no kekahi kana mai nau ka loa ana mai	mentions some loi
3301	Kamakea and Mahoe	Olohe			43	He hai aku nei au i ko maua kuleana aina, aia ma ka aina I kapaia o olohe ma waikapu nei, mokupuni o maui, aia malaila kekahi moo aina, he 43 loi, he wahi kula kekahi	43 loi in Kapaia in waikapu island of maui
3527	Kamohai	Kaalaea, Kaopala (FT also adds a section of loi in Punia)			8	ke hai aku nei au I kou kuleana he mau loi 6 ma ka ili aina o Haalaea a elua loi ma Kaopala, 1 moo paakai ma Kealia	I give to you my kuleana 6 loi in Haalaea and 2 loi in Kaopala
8875	Kanaina	Kalailaiha			4	mentions in foreign testimony, a little unclear if loi or section of loi	
8874	Kaneae	Kalaopelu		(1 pauku with 24 loi)	24	He palapala aku nei au ia oukou I na Luna Hoona Kuleana aina I kou kuleana aina, he pauku aina, iloko o keia pauku aina he 24 loi, ekolu loi malalo he wahi kula no kekahi, he pahale ono	I am presenting this document to director of the kuleana lands, my kuleana land is a pauku land, within this pauku land, 24 loi, 3 loi underneath a kula land.

Claim Number	Name	'Ili	Mo'o	Paukū	Lo'i	Hawaiian	English
						kekahi I loko o keia pauku aina	
5282	Kanepuahewa	Auwaiolimuiki			16	He mau loi kou he 15 aia ma ka ili aina I Kapaia o Auwaiolimu iki ma Waikapu ...	15 loi in Kapaia in Auwaiolimu in Waikapu
2416	Kapehana	Kapalaalea	1		1 moo not sure if might be in kula	From FT	
3106	Kapuaaiawa	Kaopala			6	ili aina o Kaopala...he mau loi eono o Kaopala ka aina	in Kaopala... 6 loi of Kaopala the land
3539	Kapule	Palama, Haanui	called moo aina		96	...ke hai aku nai au I kou kuleana aina aia I Palama ma Waikapu nei mokupuni o Maui, malaila kekahi moo aina o'u he 48 loi I loko o ia moo aina,Aia no kekahi moo aina o'u ma Haanui I Waikapu nei mokupuni o Maui nei he 48 loi o kona palena Akau o Ohia Hikina	I present to you my kuleana in Palama in Waikapu island of maui. Over there is a moo aina with 48 loi inside... There is another moo aina of mine in Haanui in Waikapu, island of maui with 48 loi
3547	Kaualua	Ohia		calls moo land, ft calls pauku	33	hard to read, From FT	in Ohia in Waikapu island of maui 33 loi
5280	Kaui	Auwaiolimuiki			13	he mau wahi loi kou kuleana he 13 loi, aia ma ka ili aina I Kapaia o Auwaiolimu	13 loi in the land of Kapaia of Auwaiolimu

Claim Number	Name	'Ili	Mo'o	Paukū	Lo'i	Hawaiian	English
3522	Kawana	Punia, Palama, Waikahalulu		(1 separate Pauku land in Waikahalulu), FT says more loi, 4 in punia, 4 in punia, 5 in punia, 9 in Palama, 1 in Palama	20	a me 19 loi ma Punia a me akahi loi ma Palama Waikapu	19 loi in Punia and one in Palama Waikapu
3549	Keaka	Kapuhau (says Puhau and Olohe in FT)			33	Ke hai aku nei au I kou kuleana aina he ili ma Kapuhau ma Waikapu nei mokupuni o Maui aia malaila kekahi maui ili aina he 33 loi	in Kapuhau, Waikapu 33 loi
5324	Keakini	Kaaiakanaka, Kaawalee, Kaloapeleu, Kaopala, Kapalaalaea			8	Elua o'u loi ma Waaikanaka, a hookahi ma Kaawalee, huipu?, akolu o'u loi no Haa mai ko'u mau loi. Eia keia elua o'u loi ma Kaloapeleu no Ku mai ko'u a me na loi I Kaopala, hui puia keia mau loi elua me kela lua? Aka....hookahi o'u loi ma Kapalaalaea; no puhele mai ia loi o'u a me	Two of my loi in Waaikanaka and 1 in Kaawalee,, 3 of my loi from Haa my loi,...Here these two loi of mine in Kaloapeleu from Ku mine and the loi in Kaopala, together these are my two loi with two kula....one loi of mine in Kapalaalaea from Puhele this loi of mine

Claim Number	Name	'Ili	Mo'o	Paukū	Lo'i	Hawaiian	English
						Kainoa Hui puia no'u mau kuleana a pau	and Kainoa together with all my 3 kuleana
2226	Keawe	Palailaiha	says 2 moo with 15 loi, given to haole witho ut onse nt		15	15 lo'i kalo	
3520	Keawe Wahine	Punia			20	he hai aku nei au I kou kuleana, he mau loi 20, aia ka ili aina I Kapaia o Punia ma Waikapu I Maui, he lelele, a hookahi loi ma Palama a me kulana hale ma Kaopala Waikapu	20 loi in the ili aina I Kapaia of Punia in Waikapu in Maui, jumping??, and one loi in Palama and a? hale in Kaopala Waikapu
3545	Keaweamahi	Palama		moo with 36 loi in palam a, moo at olohe with 29 loi	65	Ke hai aku nei au I kou kuleana aina, aia ma ka aina I Kapaia o Palama ma Waikapu nei mokupuni o Maui, Aia malaila kekahi moo aina 36 loi...aia hoi kekahi moo aina ma Olohe I Waikapu nei no he 29 loi...	36 loi in Palama, in Olohe 29 loi
8464	Keaweehu	Punia			3	...he mau wahi loi ekolu ko'u ma ka ma ka ili aiana I Kapaia o Punia ma Waikapu Maui	some 3rd (or 3) loi land of mine in the ili of Kapaia of Punia in Waikapu Maui

Claim Number	Name	'Ili	Mo'ō	Paukū	Lo'i	Hawaiian	English
3508	Keheleloa/Kuheleloa	Ohia	1.5 moo			lists mooaina part, From FT	
8808	Kekeleiaiku	Makahelahela			59	Ke hai aku nei au I kou kuleana aina aia no ma Waikapu nei mokupuni o Maui ma ka aina hoi I kapaia o Makahelahela, he 59 o'u mau loi kalo...	I present my kuleana in Waikapu island of maui, in the aia in Kapaia o Makahelahela 59 of my loi kalo
3526	Kekoahewale	Kaopala		pauku loi included in the 7, made up of 5 loi	7	pa oukou ana luna hooona. Aloha. He hai aku nei I ko'u kuleana he mau loi eono ma Kaaopala, 1 loi ma kahi Haopala, mai ke au ia HI, 5 moo	I am giving (presenting) my kuleana, 6 loi in Kaaopala, 1 loi in haopala
401	Kekua	Awakamanu, Kapaalaea				same as 882	
3538	Kekua	Palama, Loaloa		calls 21 loi in Palama a Pauku	26	Ke hai aku nei au I kou kuleana aina, aia ma Palama I Waikapu nei mokupuni o Maui malaila kekahi moo aina ou, he 21 loi malaila, he wahi kula no hoi kekahi. Eia ma palama Akau o Hapuhau Hikini o Kaliipalala Hema Ke kahawai Komohana o Ohia. Aia no hoi ma Laloa Kekahi mau wahi loi o'u elima. Eia na	in Palama in Waikapu island of mau some moo aina, 21 loi over there, a kula land too. Here in North Palena of East Hapuhau of Kaliipalala south the stream...In Loaloa some kalo land of mine 5

Claim Number	Name	'Ili	Mo'o	Paukū	Lo'i	Hawaiian	English
					O ko'u kuleana ma Loaloa, no Puupahoehe ke konohiki. O hoi ka noho hale oia ka makuakane o kau wahine a haawi i keia mau loi elima o ka'u wahine a make...	
8882	Kekua	Awakamanu, Kapaalaea			section	3 apana ma keia mau ili ma Waikapu a Kula, AP 1 Pa kalo ma Awakamanu, 2. pauku kalo ma Kapalaalaea	In waikapu some lo'I in Awakamanu, a taro pauku in Kapalaalaea
5551	Kekua/Keakua	Kamauhali, Kaalaea	calls 15 moo in Kamauhali		17	he mo'o hookahi ma ka ili aina o Kamauhali ka inoa he 15 loi me ka wai, elua kepoho maloo, elua loi ma ka ili aina o Kaalaea. Penei ke ano o na loi 15 me ma Kepohielua o Punia ma ka Akau o Punia a me Kaalaea ma ka Hikina o Kumauhali ka aina a me Pikoku ma ke Komohana	one moo in the ili of Kamauhali the name, 15 loi with the water, two dried ponds, two loi in the ilia of Kaalaea.....
3521	Kekuapaa	Kaaa			14	he mau loi, he 14 ma ka ili aina I kapaia o Kaaa ma Waikapu I Maui, ao na palena ma ka akau, na loi o Pakele Hikini he pa aina	14 loi in the ili aina in Kapaia of Kaaa in Waikapu in Maui...talks about different loi of different people

Claim Number	Name	'Ili	Mo'ō	Paukū	Lo'i	Hawaiian	English
3525	Keliiolelo	Nohoana,	claim s whol e ili of Awa kama nu whic h FT says is kalo land		3	a ekolu loi ma kekahi ili aina o Nohoana ma Waikapu	3 loi in the ili aina of Nohoana
492	Kepaa	Loaloa, Olohe, Punia			51	Eia kekahi ma kou kuleana ponoi no au e hai aku nei na kou waiwai ponoi no I hana a nau no I hoolimalima aku I hana kou I mau loi hou akua olua loi I ma? Na hou ia he 15.50 umi kumamalima dala a me ka hapalua . Ua keakea ia nae kekahi lihi o keia kuleana aiana e ke konohiki o ka nui o na loi i koe iau, he kanalima kumamakahi loi i koe iau i keia manawa e noho nei	Here is my private kuleana ...I present to you? My famous worked and rented again and again my loi... two loi repeatedly worked at \$15.50? Some small part of this land is disputed by the konohiki. Lots of extra loi 51 loi extra of mine in this time living
3548	Kewalo and Naluana	Ohia			49	ke hai aku nei au I kou kuleana, aia ma ka aina I kapaia o Ohia ma waikapu nei mokupuni o mau aia malaila kekahi mau moo aina he 49 loi	49 loi in Kapaia of Ohaia in Waikapu island of maui, some moo aina

Claim Number	Name	'Ili	Mo'o	Paukū	Lo'i	Hawaiian	English
3528	Koa	Pikoku			8	From FT	
3108	Konohia	Pilipili III (claim for entire ili)	2		1	ili aina o pilipili alua.... **doesnt mention loi	
8463	Kuaana	Haliipalala, Olohe			28	? Oukou e na Luna Hoona, he 12 loi ma ka ili I Kapaia o Halupalala, ma ka ili in Kapaia o Haua 16 loi	hello to you legislator, 12 loi in the ili in Kapaia of Haluapalala, in the Ili of Kapaia o Haua 16 loi
2225	Kuamu				4 kalo lands in palailaila	From FT	
3109	Kuheleloa	Olohe and Kuaiwa			11	aia nae makai o na loi poalima, eiwa loi ma ka akau nae o na loi ou. Aia ma ka ili aina o Ohia, hookahi loi	9 poalima loi, in ohia 2 loi
5228	Kuihelani				89	Aia kekahi ma Waikapu.... O ka po'e mahi ai ma loko o ua pahale me keia pa aina, eia ko lakou mau inoa a me ko lakou mau kuleana, Nauai 32 lo'i, Kanehailua 8 lo'i, Mo'okini 17 lo'i, Laa 19 lo'i, Pinai 13 lo'i.	Also in Waikapu, the people who farm inside of my gate, here is their name and kuleana, Nauai 32 lo'i, Kanehailua 8 lo'i, Mo'okini 17 lo'i, Laa 19 lo'i, Pinai, 13 lo'i
8807	Kuihono	Kapalaalaea, Loaloa			1 (as interpreted by waihona aina)	Eia hoi o'u loi ma Loaloa i Waikapu nui no, Eia no hoi keia aina ia'u a waiho nei i keia wa malalo o ke konohiki me ka malu	Here my loi in Loaloa in Waikapu nui. Here this land of mine and presented in this time under the konohiki with the shelter?

Claim Number	Name	'Ili	Mo'ō	Paukū	Lo'i	Hawaiian	English
3110	Kulaia/ Kulaiaia	Ohia, Pikoku	called moo aina		47	i loko o na moo aina nei o'u he 40? Loi kalo m ke komohana o kuu moo aina.....ma ka ili aina o Ohia elua loi kalo ma na ili aina o Pikoku eha loi no ai mai kou mau loi. Kiupu? na loi kalo a pau loa, he 47 ka nui o ko'u mau loi.	inside the moo 40 loi kalo, in the ili of Ohia 2 loi in the ili of Pilkoku 4 loi.
3546	Kupalii	Mokaelelu			18, ft also claims taro land at Keana	Ke hai aku nei au I kou kuleana aina I Kapaia o Mokuelelu ma Waikapu nei mokupuni o Maui aia malaila kekahi ili aina 18 loi, he mau wahi kula kekahi ehiku	in Kapaia of? In Waikapu 18 loi
73	M. J. Nowlein	track of land			0	N/A	N/A
10160	Mahoe	Ahuakolea, Kananaha, Kikia		(1 pauku with 34 loi)	40	Aloha oukou na luna hoona he pauku aina okoa no ko'u I loko o keia pauku aina he 34 loi a he kula no hookahi o na palena o kou wahi pauku aina ua noiaaia ma Aikanaka kekahi mau loi o'u eono loi malaila I ka makahiki 1846 I kona mai ia'u ia mau loi no Haa mai ko'u. Ua lawe i	aloha to the luna hoona, a piece of pauku land of mine below of this pauku aina 34 loi and a kula (just one?) ?? Of the boundary of my pauku land???? In Aikanaka some lo'i of mine, 6 loi here in the year 1846 i was given the loi of Haa. I received from Auwai my 2

Claim Number	Name	'Ili	Mo'ō	Paukū	Lo'i	Hawaiian	English
						Auwai i kekahi mau loi o'u elua a me kuu ae ali aku oia hoi ka lima a me ke ono, na loi hoi i oleloea maluna o na hoike o kou kuleana o Wahinealii a me Moo	loi???? for rent?
462	Mahuka	Kaloapelu			6, but land was taken by Kaai at Kaopala	he mau loi eono I ka wa 1840	6 loi in 1840
3020	Makaio/Mataio	Komoliana?	9			no Native Register, appears to be the same as 3019b	
3019 B	Makaio/Mataio	Komoliana?	9		20	Eiwa moo he 20 loi, he mau lauhala kekahi, he mau hale no kekahi, he auwai ma ka hema me ke komohana ili aina o olohe nia ka akau ili aina o Pikoku	9 mo'ō with 20 loi, some lauhala, some houses, an auwai to the left of Komohana an ili aina of olohe near the right ili aina of pikoku
2522	Makuakane	Punia, Pikoku, Kaopala			16	he mau loi aia I pikoku e 3 loi, aia I kaopala e 2 loi, aia I Punia he 11 loi	3 loi in pikouku, 2 loi in kaopala and 11 loi in Punia
408	Manu	Pohakuloa			3	He wahi hoopii kou ia olua no na loi kalo ua lawe a e ka haole no laila hoopii au I ka Lunaauhau e hoopoupou? I keia mau loi ekolu a me ka liki aina, ia ka la 11 o Januari hele mai ka Lunaauhau a	A document I give to you for the loi kalo given to me by the haole there. I am the tax collector and ??? 3 loi

Claim Number	Name	'Ili	Mo'o	Paukū	Lo'i	Hawaiian	English
2208	Manu	Palama, Ohia	called moo aina		2 loi + moo aina (FT says 1 moo in Palama, 1 loi in Palama, 1 moo in Ohia, 2 loi in Ohia)	E na Luna Hoona kuleana. Ke hai aku nei au ia oukou i kou kuleana aina ma waikapu nei, he wahi moo aina no Napuupahoeho e mai, ko'u wahi moo aina i na makahiki 39 i haawi mai ai o Napuupahoeho e iau, he mau loi e ae no kekahi ou no ka makuahine mai o kau wahine ia mau loi elua. Oia ho'i kuleana i koe i kela palapala a'u mamua. Ona hoike o'u	I have some other lo'i from the mother of my wife (2)
3017	Manu					letter, no lo'i mentioned	
700	Maunahina					no lo'i mentioned, doesn't want to live under Kekauluohi	
3019	Mehao	Makahelahela, Ohia	1		32 (5 in Ohia, 12 in Mokahelahela, 14 prob consists of the moo, ft says 5 in ohia)	He aina o makahelahela... ..e na Luna hoona i kou kuleana, he moo a me na loi he 12, he wahi kula kekahi..... he aina o Ohia, eono loi o'u.	a land of Makahelahela, 12 loi in the moo...in the land of Ohia 6 loi of mine
10122	Moo	Olohe, Kamehanu, Makailima, Ohia, Keapalaalaea, Punia			11	Ke hai aku nei au i kou kuleana aina ma ka ili aina o Olohe 5 loi, ma kamehanue 1 loi, 1 lo'i i Makailimia, 1	given to me a kuleana in the aina of Olohe 5 loi, in kamehanue, 1 loi, 1 loi in makailima, 1 loi in ohia, 2

Claim Number	Name	'Ili	Mo'o	Paukū	Lo'i	Hawaiian	English
						loi i Ohia, 2 i Kaapalaalaea, 1 loi ma Paua? Ua noa ia'u, aole mea keakea?	loi in keapalaalaea, 1 loi in Paua.
3296	Mumuku	Kuaiwa			10	..he mau loi ko'u he 10, aia ma ka ili aina o Kuaiwa ka inoa ma waikapu I Maui	10 loi in the ili aina of kuaiwa in waikapu maui
3337	Naanaa	Kaalaea, Punia			25	Aloha, he mau loi hoi he 25, aia ma Punia a me Kaalaea ma Waikapu I Maui. Ma Punia he 19 loi no ko'u ma makua mai a ia'u, he 17 ko'u	25 loi in punia (explaining where got the loi from, one being parent)
3340	Nahau/ Nahauna	Nohoana			8	Eia mai ka nui o na loi o'u 8 a me ma Apuleuhalaa..2 oia kou mau kuleana loi	8 loi in Apuleuhalaa, 2 my kuleana loi
2203	Nahema	Palailaiha		1	Section	says he mau loi but doesn't mention how much in R	
10460	Nalei	Olohe			30	He palapala aku nei au ia oukou I kou kuleana he pauku aina okoa no kou he 28 loi me kahi nahelehele ma ka Hema he Loko ma ka Komohana he mau moo?? Ma ka Akau ili aina a Keapala ma ka Hikina he mau moo ko no Makole mai kou makahiki 1849	I present this paper of my land to you, my land a pauku land piece, of my land 28 loi with weeds in the south a pond in the west moo, in the north ili aina of Keapala in the east moo of From Maole in the year of 1849

Claim Number	Name	'Ili	Mo'o	Paukū	Lo'i	Hawaiian	English
10481	Napaeloi/ Napailoi	Paalae			42	E na Luna Hoona Kumu kuleana aina, he mahalo ia oukou. He hai aku nei au I kou kuleana aina ma Paalae he ili aina ia, he 31 loi iloko. Aia ma Kamauhali kekahi mau loi o'u hookahi. Aia ma Haopala kekahi mau loi o'u hookahi. Aia ma Waiahalee kekahi mau loi o'u ewalu a he Wahahale kekahi malaila. Aia ma Paalae kekahi mau loi ou me kahuahale. No Haa mai kou mau loi ma Paalae a me ka loi hookahi ma Kamauhali a me ka loi hookahi ma Haapala. Ma Mahuka mai kou mau loi ewalu ma Waihalulu a o na Kahuahale elua mai a Haa mai aole hiki iau ke hai aku i komo mau palena na ka muku a kahi papa	Hi Luna of the land distribution, thanks to you. I present my kuleana aina in Paalae a ili aina it, 31 loi down below. In Kamauhali some lo'i of mine, one. In Haopala some lo'i of mine one. In Waiahalee some loi of mine 8 and over there Waiahalee. In Paalae some loi with a house. Of Haa my loi in Paalae and one loi in Kamauhali and only one loi in Haapala. In Mahuku my 8 loi in Waihalulu other 2 house bases of Haa. I cannot give the boundaries of this land?
3342	Nauahi	Kuaiwa, Auwailimu			22	...he mau loi he 14 aia na auwaiolimu I waikapu mau	14 loi in auwaiolimu

Claim Number	Name	'Ili	Mo'o	Paukū	Lo'i	Hawaiian	English
3341	Niauhoe	Auwaiolimu			15	he hai aku nei au I kou kuleana ia oukou, he mau loi ko'u he 15 me ...	15 loi
3343	Niheu	Palama	called moo aina		18	ina luna hoouna kumu kuleana a me o ko hawaii pae aina, Aloha oukou ke hai aku nei au I ko'u kuleana aina aia ma ka aina I kapaia o Palama ma Waikapu nei mookupuni o maui , aia ma laila kekahi moo aina he 18 loi	I have some mo'o aina, 18 loi in kapaia of Palama
3224	Opunui	Kaalaea, Kaopala, Punia			38	he mau loi kuleana he 38 he lelele nae ma ke kauwahi ku aia wahi waku..aia ma Loaloa he 16 loi a ma Kaalaea 7 loi a ma Kaopala 14 loi a ma Punia 1 loi	38 kuleana loi, in Loaloa 16 loi in Kaalaea 7 loi in Kaopala 14 loi in Punia 1 loi
2199	Pahoa	Kuaiwa		some loi and kula, called pauku land, says poalima in waikapu	1	calls it a pauku aina and says he mau loi	
2980	Pakele	Olohe, Pulinapau, kaaa	(label s as moo in Kaaa	Pauku in olohe	26+ labels some loi paahao on the south	i ko'u mau kuleana, ekolu moo, he 12 loi....he mau loi paahao ma ka Hema, ...he loi poalima ma ka akau....he 13 loi	12 loi.....some taxed loi and some poalima loi....13 loi from kamai to me

Claim Number	Name	'Ili	Mo'o	Paukū	Lo'i	Hawaiian	English
						no kamai mai ko'u	
434	Palakiko	Kuaiwai			41	Aloha olua e na luna hoona, ke haawi aku ??? Wau I kou kuleana Aina aia ma waikapu ma loko o ka Aina I Kapaia o Kuaiwa 41 loi kalona'u penei? I hana ka nui o keia mau loi ??ko'u wai penei??I present to you my land In waikapu inside of this aina in Kapaia of Kuaiwa 41 loi kalo of mine, I work hard on this loi, it's very valued
2610	Pehu	Luahinepi			15	...aia ma waikapu nei, aia hoi mauka o Pau??? he 15 no loi o'u pono, aia ...	15 loi in waikapu
2607	Piipii	Kapalaalaea, Pikooku			10	Aia hoi kekahi mau loi kalo o'u he umi, aia ma ka ili aina i kapaia o Pikoku no mino mai ko'u ma loihi no ka waiho ana o ia mau loi ia'u	some kalo was given to me, 10, in the ili of Kapaia of Pikoku of mine long the leaving of the loi to me
2981	Pipinui	Olohe	2 moo with 34 loi		35	ili aina o olohe he mau loi no kekahi...he 34 loi...aia ma ka ili aina o mahaelelu hookahi loi	34 loi in Olohe, 1 inf Mahaelelu
2609	Poepoe	Pikoku, Olohe, Kaalaea			3+ section of loi	From FT	
3398	Pohano	Kaalaea, Nohoana			8	He hai aku nei au I kou kuleana ia oukou, he mau loi ewalu Kelelele penei, 7 loi ma Haalaea e pili ma ne	I am giving my kuleana to you 8 loi Kelelele thus, 7 loi in Haalaea touch with Kaloapelu, 1 loi in Nohoana

Claim Number	Name	'Ili	Mo'o	Paukū	Lo'i	Hawaiian	English
						kaloapelu, 1 loi ma Nohoana e pili ana me kuaiwa	touching Kuaiwa
411	Poonui (seems like just a house lot)				0	eia ua kulana la he pahale no'u he wahi kawale ma waiho o ka paaina	I have a house
3402	Poupou	Palama, FT says also sections of loi in Haanui, Ohia, Mokailima, and another in Palama			13	he mau loi aia ana ka aina I kapaia o Palama ma Waikapu nei moku-puni Maui, aia malaila kekahi wahi loi, he 13 loi	some loi in the aina in Kapaia of Palama in Waikapu, 13 loi
3397	Puhi	Paapala/Kaopala			15	Aloha na luna hoona. Ke hai aku nei au I ko'u kuleana he 15 loi, aia ma Paapala e pili ana me Punia a me Luapuaa 3 moo paakai ma kealia, no puupahoehe maik ko'u waikapu me ke aloha	15 loi in paapala bordering Punia and Luapuaa, 3 salt lands in Kealia of Puupahoehe from Waikapu?
460	Puupahoehe	Hoopahelo, pilipilo			some	He aina o Pilipili, he mau loi a he kula kona... ma loko o ka pa aina o Olohe, he loi no malaila a he kula no	In Pilipili some loi and a kula, in Olohe a loi and a kula
443	Richardson J.	Kukuialaimaka			0	none listed	
11022	Wahinealii	Palama	3 based on NR, 4 based on FT	seems that moo might contain the 88 loi	88	He ili aina kou no Kahikona mai kou ili aina o na loi a pau maloko he 88 ma ko'u pono i au e hai aku nei, a koe no ka	in the ili I received from Kahikona all the loi, 88 loi of my own given to me by my hoa aina? 3 of my moo

Claim Number	Name	'Ili	Mo'o	Paukū	Lo'i	Hawaiian	English
						na hoa aina...ekolu no o'u moo aina, ewalu moo no loi poalima no loko mai o ke 88 loi, a koe ke 80, he wahi kula no kekahi a o kona mau poalima	aina, 8 loi poalima inside and left the 80
3277	Waiho	Kaopala, Luapuaa			14	he mau wahi loi, he 14 aia ma Kaopala a me Luapuaa, on na loi ma Kaopala oia ko'u kuleana kahiko mai ka moi HI a eha loi ma Luapuaa ona Charles Copper Mai ko'u a ke lele nei au ia ko le alii ea ma ko ke konohiki.	14 loi of Kaopala...4 of the loi pf Luapuaa of Charles Copper (essentially speaking of where got 4 of the 14 loi from)
3275	Weloula				20	aia ma Ohia 20 loi, na pohakuloa kekahi mau loi	in Ohia 20 loi, in Pohakuloa some loi
433	William Crowningburg	Kapalaalaea, Oawakamanu, Pohakoi			21	Na'u no i haawi aku ia william I kahi a ia nei e hoopii mai nei I oukou Oawakamanu ka inoa no Waikapu he umi loi a me kumamama ha iloko o ka pa Ehiku mawaiho a ke pa ehiku14 loi inside and 7 loi beyond
326	William Humphrey	Wikiwiki, Puhiaawaawa			0	N/A	N/A
3201	William McClane	Auwakamanu			0	N/A	N/A

Claim Number	Name	‘Ili	Mo‘o	Paukū	Lo‘i	Hawaiian	English
76	William Shaw				0	N/A	N/A

APPENDIX C: COMPARISON OF SOURCES

Claim Number	Name	Difference	No FT	FT Confirms	NT Used	NT Confirms	FT Used	NT and FT Differ	NR and FT Differ
461	Aipuhi	No FT	1						
432	Antoni Silva	NT confirms	1			1			
3702	D. Malo	from FT					1		
6041	Eeka	FT confirms loi in Kuaiwa, but says 16 loi in Mohalelehela instead of 19							1
2499	Ehunui	FT says 7 loi in Pikoku not 2							1
455	Haa (taken from A Pake claim)	No FT	1						
491	Haawahine	differs in loi in Kaloapelu, says 7							1
446	Hakapau	No FT	1						
2577	Hakiki	FT says 10 loi at Olohe not 9							1
2959	Hika	FT confirms		1					
225	J Louzada	FT confirms		1					
3105	Kaaa	From FT					1		
8820	Kaaaoao	No FT	1						
456	Kaai	from NT, FT confirms Ahuakolea, but says patch in Nohoana instead of Punia						1	
5774	Kaai	113 from NR, but unclear the location, FT 1 section of loi in Kaopala, 6 loi in Luapuaa, and Kalo land in Olohe							1
2394	Kaaha	FT says section of loi and 4 loi both in Olohe, not what NR mentions							1
3104	Kaelemakule	FT confirms		1					
438	Kahakumakaai	No FT	1						
2227	Kahookano (waihona claims 2 taro moo and 3 loi)	No FT	1						
5284/ 5280	Kahuhu/Kahulu	FT confirms		1					

Claim Number	Name	Difference	No FT	FT Confirms	NT Used	NT Confirms	FT Used	NT and FT Differ	NR and FT Differ
412	Kaili	No FT	1						
3107	Kaili	FT confirms loi in Ohi and palama but also includes 8 more loi in Pania/Punia?							1
8586	Kaina	FT confirms		1					
3544	Kainoakauhaha	FT says 8 loi at Punia, not 7							1
3523	Kalahouka	FT confirms		1					
8806	Kalapuna	from FT					1		
3103	Kalawaia	FT confirms		1					
5742	Kaluahinui	FT confirms		1					
8672	Kaluau	adds 1 loi at Haliipalala							1
3506	Kamakai	FT confirms		1					
6385	Kamakaipoa	FT confirms land in Pikoku, but doesn't include Kaloapelu or Maluapuaa, instead includes a section of kalo in Kamauhalii							1
8465	Kamakauhoa	FT confirms		1					
3301	Kamakea and Mahoe	FT confirms		1					
3527	Kamohai	FT confirms 2 loi in Kaopala and sections of loi in Kaalaea, and includes 2 loi in Punia, section of loi in Punia, and section of loi in Kaloapelu							1

Claim Number	Name	Difference	No FT	FT Confirms	NT Used	NT Confirms	FT Used	NT and FT Differ	NR and FT Differ
8875	Kanaina	from FT					1		
8874	Kaneae	location taken from FT		1					
5282	Kanepuahewa	FT confirms		1					
2416	Kapehana	from FT					1		
3106	Kapuaaiawa	FT confirms		1					
3539	Kapule	FT confirms		1					
3547	Kaualua	FT confirms		1					
5280	Kaui	FT confirms		1					
3522	Kawana	FT says 13 ili in Punia and 10 loi in Palama							1
3549	Keaka	FT confirms sections of loi in Pukau/Puhau/Kapuhau, but also adds pauku in Olohe							1
5324	Keakini	FT confirms		1					
2226	Keawe	FT confirms		1					
3520	Keawe Wahine	FT confirms		1					
3545	Keaweamahi	FT confirms land in Palama, says disposed of other piece		1					
8464	Keaweehu	FT says 6 loi in Punia, not three							1
3508	Keheleloa/Kuheleloa	FT confirms		1					

Claim Number	Name	Difference	No FT	FT Confirms	NT Used	NT Confirms	FT Used	NT and FT Differ	NR and FT Differ
8808	Kekeleiaiku	FT confirms		1					
3526 (and 3544 b)	Kekoahewale	Says 1 pauku and 2 loi in Kaopala, verses 6 loi in Kaopala and 1 loi in another Kaopala from NR							1
401/8882	Kekua	From NT	1		1				
3538	Kekua	FT confirms		1					
5551	Kekua/Keakua	FT confirms		1					
3521	Kekuapaa	FT confirms		1					
3525	Keliiolelo	FT doesn't say	1						
492	Kepaa	FT says 1 loi in Olohe, 1 in Punia							1
3548	Kewalo and Naluana/Nahoana	FT confirms		1					
3528	Koa	FT confirms	1						
3108	Konohia	From FT					1		
8463	Kuaana	FT doesn't mention	1						
2225	Kuamu	location taken from FT					1		
3109	Kuheleloa	FT confirms loi in Kuaiwa		1					
5228	Kuihelani	FT confirms		1					
8807	Kuihono	FT confirms, one piece of kalo land		1					

Claim Number	Name	Difference	No FT	FT Confirms	NT Used	NT Confirms	FT Used	NT and FT Differ	NR and FT Differ
3110	Kulaia/ Kualaia	FT confirms		1					
3546	Kupalii	FT confirms taro land at Makaelelu, but also includes taro land at Keana							1
10160	Mahoe	FT mentions 3 loi in Kanaha instead of 6, 2 loi in Kikia							1
462/488	Mahuka/Kaai	NT confirms	1			1			
3019 B	Makaio/Mataio	No FT	1						
2522	Makuakane	FT doesn't mention loi in Kaopala							1
408	Manu	No FT	1						
2208	Manu	FT includes loi and moo in Palama in addition to the moo in ohia and the 2 loi in ohia							1
3019	Mehao	FT says 5 loi instead of 6 in Ohia							1
10122	Moo	No FT	1						
3296	Mumuku	FT confirms		1					
3337	Naanaa	FT confirms		1					
3340	Nahau/ Nahauna	FT confirms		1					
2203	Nahema	used ft to label as pauku					1		
10460	Nalei	FT confirms		1					
10481	Napaeloi/ Napailoi	FT says 2 sections of loi in Kaopala, 3 loi in Kamauhuli, section of							1

Claim Number	Name	Difference	No FT	FT Confirms	NT Used	NT Confirms	FT Used	NT and FT Differ	NR and FT Differ
		loi in Paholoa and does not mention loi in Paalae							
3342	Nauahi	FT only confirms loi in Kuaiwa							1
3341	Niauhoe	FT doesn't say	1						
3343	Niheu	FT doesn't say	1						
3224	Opunui	FT confirms		1					
2199	Pahoa	says one poalima in taro loi in waikapu					1		
2980	Pakele	FT confirms		1					
434	Palakiko	No FT	1						
2610	Pehu	confirms 7 outside patches		1					
2607	Piipii	FT confirms		1					
2981	Pipinui	NT confirms	1			1			
2609	Poepoe	from FT					1		
3398	Pohano	No FT	1						
3402	Poupou	FT confirms section of loi in Palama but also adds section of loi in Ohia, Mokailima, and Haanui							1
3397	Puhi	FT confirms but calls it Kaopala		1					
460	Puupahoe	No FT	1						

Claim Number	Name	Difference	No FT	FT Confirms	NT Used	NT Confirms	FT Used	NT and FT Differ	NR and FT Differ
11022	Wahinealii	FT confirms loi in Palama, but also includes 3 loi in Kamauhalii							1
3277	Waiho	FT only mentions loi in Kaopala (taro pauku and 2 loi)							1
3275	Weloula	no FT	1						
433	William Crowningburg	confirms 7 outside patches		1					
		TOTAL:	23	41	1	3	10	1	26

APPENDIX D: LO‘I COUNT, NATIVE REGISTERS

Shape_Area	Claim Number	Name	Lo‘i	Mo‘o	Paukū	‘Ii
2622.19728501000	6041	Eeka	19	0	0	Makalehaleha
1616.62979273000	6041	Eeka	2	0	0	Kuaiwa
4099.00482289000	2499	Ehunui	18	0	0	Olohe
1598.26275141000	2499	Ehunui	2	0	0	Pikoku
189058.93867300000	455	Haa	6	0	0	Aikanaka
634.02926801000	491	Haawahine	1	0	0	Kaloapelu
258.43392766000	491	Haawahine	1	0	0	Kaopala
206.54879913600	491	Haawahine	1	0	0	Kaloapelu
10595.96831680000	491	Haawahine	7	0	0	Kaloapelu
6256.15892654000	2577	Hakiki	11	0	0	Kaopala
1481.81181423000	2577	Hakiki	9	0	0	Olohe
1009.92246585000	2577	Hakiki	4	0	0	Waihalulu
121035.41920500000	225	J. Louzada	2	0	0	Pualiwapau
7322.09845352000	2394	Kaeha	6	0	1	Olohe
2063.31009445000	2394	Kaeha	4	0	0	Olohe
7589.17400139000	3104	Kaelemakule	22	0	0	Ohia
2053.81601883000	3104	Kaelemakule	11	0	0	Ohia
2457.74319939000	5284/5280	Kahuhu	10	0	0	Kaopala
2452.36196396000	412	Kaili	3	0	0	Palama
2603.61287880000	3107	Kaili	15	0	0	Palama
4325.46585554000	3107	Kaili	8	0	0	Ohia
6759.21937051000	3107	Kaili	8	0	0	Ohia
3459.98510212000	8586	Kaina	13	1	0	Palama
605.12190430500	8586	Kaina	3	0	0	Loaloa
1466.80927634000	8586	Kaina	10	0	0	Loaloa
6309.79084630000	3523	Kalahouka	3	0	0	Kaopala
1720.91580395000	3523	Kalahouka	16	0	0	Kaopala No. 1
858.78006970500	3523	Kalahouka	1	0	0	Kaopala No 2.
2420.11317577000	3103	Kalawaia	8	0	0	Nohoana
613.39504448600	5742	Kaluahinui	1	0	0	Palama
3349.20368881000	5742	Kaluahinui	31	0	0	Ohia
2043.96045939000	5742	Kaluahinui	16	0	0	Ohia
1263.89468372000	8672	Kaluau	5	0	0	Kuaiwa
4438.19479457000	8672	Kaluau	6	0	0	Kuaiwa
2158.28319357000	3506	Kamakai	14	0	0	Kaopala
748.72553489700	6385	Kamakaipoaa	6	0	0	Pikoku, Ap 1
541.72052610400	3527	Kamohai	2	0	0	Kaopala
1287.53430616000	3527	Kamohai	3	0	0	Kaalaea

Shape_Area	Claim Number	Name	Lo'i	Mo'o	Paukū	'Ili
1220.24665227000	3527	Kamohai	3	0	0	Kaalaea, Ap 2
4756.92028739000	8874	Kaneae	8	0	0	Kaloapelu
1409.33101931000	8874	Kaneae	8	0	0	Kaloapelu
4481.85888512000	8874	Kaneae	8	0	0	Kaloapelu
5770.43508643000	5282	Kanepuahewa	16	0	0	Auwaiolimu
1634.43996764000	3106	Kapuaaiawa	6	0	0	Kaopala
10900.70885360000	3539	Kapule	48	0	0	Palama
5850.85614512000	3539	Kapule	48	0	0	Haanui
13287.51823030000	3547	Kauaia	33	0	0	Ohia
8941.13001607000	5280	Kauai	13	0	0	Auwaiolimu
4360.90266748000	3522	Kawana	19	0	0	Punia
11701.75558110000	3549	Keaka	17	0	0	Pukau/Kapuhau
16590.76796680000	3549	Keaka	16	0	0	Pukau/Kapuhau
10129.18316570000	5324	Keakini	2	0	0	Kaloapelu
344.94091841900	5324	Keakini	2	0	0	Kaopala
274.86090954200	5324	Keakini	2	0	0	Kaaikanaka
14450.94758740000	3520	Keawe	20	0	0	Punia
19547.52296250000	2226	Keawe	15	0	0	Kaaa
10401.12651090000	3545	Keawemahi	36	0	0	Palama
710.81864881100	3526	Kekoahewale	6	0	0	Kaopala
8004.31225874000	3538	Kekua	21	0	0	Palama
592.01878886000	3538	Kekua	5	0	0	Loaloa
544.94757467500	5551	Kekua	2	0	0	Kaalaea, Ap 2
2374.25628051000	5551	Kekua	15	0	0	Kamauhali, Ap 1
10619.50477470000	3521	Kekuapaa	14	0	0	Kaaa
383.12215145400	492	Kepaa	1	0	0	Punia
30355.48048980000	492	Kepaa	51	0	0	Loaloa
29046.62201800000	2548	Kewalo and Naluana/Nahoana/Naheana	49	0	0	Ohia
17700.62692930000	3528	Koa	4	0	0	Kapikoku
9233.20060658000	3528	Koa	2	0	0	Kapikoku, ap 2
3078.07630427000	3110	Kualaia	40	0	0	Nohoana
18494.42723260000	2225	Kuamu	24	0	4	Palailaiha
6779.11302677000	3109	Kuheleloa	9	0	0	Kuaiwa
3625.70107596000	3109	Kuheleloa	1	0	0	Ohia
10435.38627460000	3508	Kuheleloa	12	1	0	Ohia
42383.96439910000	5228	Kuihelani	89	0	0	Wahineomaili
12322.22328370000	8807	Kuihono	1	0	0	Loaloa/Kapalaea
369.20138471400	3110	Kuolaia	4	0	0	Pikoku

Shape_Area	Claim Number	Name	Lo'i	Mo'o	Paukū	'Ii
45762.54790270000	3546	Kupalii	18	0	0	Makaelulu
7064.63799724000	10160	Mahoe	34	0	0	Ahuokolea
51440.09301200000	3301	Mahoe to Kamakea	43	0	0	Olohe
1533.55589536000	462/488	Mahuka	6	0	0	Kaloapelu
491.35800063200	462	Mahuka	1	0	0	Kaloapelu
8327.62398879000	2522	Makuakane	11	0	0	Punia
5525.38587307000	2208	Manu	12	1	0	Ohia
515.90322003600	2208	Manu	2	0	0	Ohia
120795.74234200000	408	Manu	3	0	0	Pohakuloa
13972.05591800000	3020	Mataio	20	0	0	Kamauhalii
3289.46005484000	3019	Mehao	6	0	0	Ohia
6856.13814809000	3296	Mumuku	10	0	0	Kuaiwa
6481.85240630000	3337	Naanaa	19	0	0	Punia
2340.78380962000	3337	Naanaa	8	0	0	Kaalaea
9294.82638842000	3340	Nahauna	8	0	0	Kaalaea
4217.12954925000	2203	Nahema	6	0	1	Palailaiha
377.24893551500	10460	Nalei	2	0	0	Olohe
1004.13251327000	10481	Napaeloi	1	0	0	Kaopala
3762.83631283000	10481	Napaeloi	16	0	0	Kaloaloe/ Loalola
1061.19762030000	10481	Napaeloi	2	0	0	Waikalulu
5290.77614953000	10481	Napailoi	6	0	0	Waikalulu
2407.02601526000	10481	Napailoi	31	0	0	Paalaea
5875.11684932000	3342	Nauahi	8	0	0	Kuaiwa
4570.53100031000	3343	Niheu	18	0	0	Palama
553.14133593600	3224	Opunui	1	0	0	Punia
1936.90365671000	3224	Opunui	16	0	0	Loaloe
1604.48097236000	3224	Opunui	7	0	0	Kaalaea
2021.42326385000	3224	Opunui	14	0	0	Kaopala
10647.40230480000	2199	Pahoa	6	0	1	Kuaiwa
6121.81686832000	2980	Pakele	12	0	0	Kaaa
1303.25325016000	2980	Pakele	13	0	0	Olohe
26639.46823450000	434	Palakiko	41	0	0	Kuaiwa
18189.55708210000	2607	Piipii	6	0	1	Kapaalaea
120.87222619500	2607	Piipii	5	0	0	Kapikoku, Ap 2
875.85241869400	2607	Piipii	5	0	0	Kapikoku, Ap 2
21870.16106450000	2981	Pipinui	34	0	0	Ohia
10109.78338560000	3402	Poupou	13	0	0	Palama
3975.11163835000	3397	Puhi	15	0	0	Kaapala
33649.41460570000	460	Puupahoehoe	3	0	0	Pilipili
1280.50232300000	460	Puupahoehoe	1	0	0	Olohe

Shape_Area	Claim Number	Name	Lo'i	Mo'o	Paukū	'Ii
24346.01082070000	433	W. Crowningburg	14	0	0	Pohakoi/ Oawakamanu
2823.07906165000	11022	Wahinealii	22	0	0	Palama
8177.37130776000	11022	Wahinealii	22	0	0	Palama
2602.46979972000	11022	Wahinealii	22	0	0	Palama
7327.55800743000	11022	Wahinealii	22	0	0	Palama
3923.75860129000	3227	Waiho	10	0	0	Kaopala
			1573	3	8	

APPENDIX E: LO‘I COUNT, FOREIGN TESTIMONIES

This table includes the lo‘i count in cases where only Foreign Testimonies were used to determine lo‘i count and in cases where additional lo‘i were mentioned in Foreign Testimonies but were not included in Native Registers.

Shape_Area	Name	LCA	Lo‘i	Paukū	Mo‘o	‘Ili
3724.21676986000	Kaaa	3105	10	0	0	Pilipili II
4703.14255407000	Kaaa	3105	5	0	0	Pilipili II
9354.05677186000	Kaai	5774	6	1	0	Kaopala
13701.81820390000	Kaai	5774	6	1	0	Olohe
639.10441346400	Kaai	5774	1	0	0	Luapuaa
568.66833748500	Kaili	3107	8	0	0	Punia
5808.27050026000	Kalapuna	8806	12	0	0	Huanui
367.04131256400	Kaluau	8672	1	0	0	Haliipalala
8964.53807053000	Kamaikaipoaa	6385	6	1	0	Kamauhali
1326.74716714000	Kamohai	3527	6	1	0	Kaloapelu
5276.81623962000	Kanaina	8875	4	0	0	Kalailaiha
15420.88083060000	Kapehana	2416	12	0	1	Kapaalaea
6898.20445685000	Keaka	3549	6	1	0	Olohe
84771.39350930000	Kekeleiaiku	8808	53	0	0	Makahelahela
10003.43750050000	Kekeleiaiku	8808	6	0	0	Makahelahela
8438.13271604000	Keliiolelo	3525	2	0	0	Awakamanu
5457.64600309000	Konohia	3108	24	0	2	Pilipili III
10497.65918100000	Kupalii	3546	2	0	0	Keana
8546.64358967000	Malo	3702	1	0	0	Kalailaiha
3857.59401077000	Manu	2208	12	0	1	Ohia
1693.24895188000	Mataio	3020	6	0	0	Kaopala
5241.51462422000	Poepoe	2609	6	1	0	Kaalaea
1511.30908700000	Poupou	3402	6	1	0	Ohia
2968.05129479000	Poupou	3402	6	1	0	Pouhou
Total			207	8	4	

APPENDIX F: LO‘I COUNT, ADDED LO‘I

Lo‘i included in these tables were those that were mentioned in the Māhele awards, but that did not have a precise location on the Monsarrat 1887 Land Claim Map. This includes land claims that were made but not awarded.

Shape_Area	Name	LCA	Lo‘i	Paukū	Mo‘o	‘Ili
46195.41889020000	Kekua	401/8882	6	1	0	Aueakamanu
15216.45664290000	Kekua	401/8882	6	1	0	Kapaalaea
604.95186221000	Moo	10122	2	0	0	Kapaalaea
12050.42538040000	Kaai	456	1	0	0	Ahuokolea
347.42894343100	Kaai	456	1	0	0	Nohoana
526.18725293800	Pohano	3398	7	0	0	Kaalaea
2444.58859884000	Pohano	3398	1	0	0	Nohoana
3982.55207282000	Kainoakauhaha	3544	3	0	0	Kaalaea
1181.82140361000	Kainoakauhaha	3544	4	0	0	Punia
852.33341549100	Kainoakauhaha	3544	3	0	0	Punia
480.55977855500	Kahuhu	5284	3	0	0	Kaopala
2589.04449445000	Kuaana	8463	12	0	0	Haluapalala/Halepalala
354.85147760600	Keaweehu	8464	1	0	0	Punia
680.99589419200	Keaweehu	8464	2	0	0	Punia
455.65445638100	Kalapuna	8806	1	0	0	Haluapalala/Halepalala
296.45430144900	Napailoi	10481	1	0	0	Kamauhali
4510.62364287000	Hakupau	446	12	0	1	Ohia
847.02548883700	Kaeha	2394	2	0	0	Pohakuloa
288.47497571700	Makuakane	2522	2	0	0	Kaopala
586.87748635000	Piipii	2607	10	0	0	Kaopala
200.11219558800	Poepoe	2609	1	0	0	Pikoku
302.57970314900	Poepoe	2609	2	0	0	Olohe
1241.72507299000	Hika	2959	10	0	0	Nohoana
1391.85099775000	Pipinui	3981	2	0	0	Makaehelulu or Wakalulu
4259.87238989000	Mehao	3019	12	0	0	Makahelahela
474.42349511200	Kaelemakule	3104	2	0	0	Nohoana
216.60357934300	Konohia	3108	1	0	0	Pilipili III
344.73026249600	Waiho	3277	4	0	0	Luapuaa
2853.18679116000	Niauhoe	3341	15	0	0	Auwaiolimu
2932.43221173000	Nauahi	3342	14	0	0	Auwaiolimu
182.74513285800	Kawana	3522	1	0	0	Palama
776.61151479400	Keakini	5324	1	0	0	Kaalaea, Kapalaea
286.70993642600	Kamakaipoaa	6385	5	0	0	Kaloapelu
296.79538527400	Kamakaipoaa	6385	5	0	0	Luapuaa
224.77730674900	Moo	10122	1	0	0	Ohia
4113.55291052000	Kahookano	2227	12	0	1	Palama

Shape_Area	Name	LCA	Lo'i	Paukū	Mo'o	'Ili
478.53783183200	Kaluau	8672	1	0	0	Makahelahela
235.92940567200	Kepaa	492	1	0	0	Olohe
1774.05883377000	Napaeloi	10481	6	1	0	Paholoa
1779.22276324000	Kaai	5774	2	0	0	Luapuaa
12756.71448120000	Mahoe	10160	6	0	0	Aikanaka
10232.36894150000	Kalapuna	8806	12	0	1	Kapaalaea
452.14472573600	Mahoe	10160	2	0	0	Kikia
347.89283798800	Manu	2208	1	0	0	Palama
208.84149385500	Kaeha	2394	2	0	0	Waihalulu
28636.05967800000	Poupou	3402	6	1	0	Mokailima
359.15704363900	Poupou	3402	6	1	0	Haanui
292.88172786100	Kamohai	3527	8	1	0	Punia
91.97598769870	Kamohai	3527	2	0	0	Punia
264.98471411900	Wahinealii	11022	3	0	0	Kamauhalii
93.52945379950	Ehunui	2499	1	0	0	Nohoana
6765.69973715000	Kaai	5780	30	0	0	Palama
111.87783516400	Kahakumakaai	438	7	0	0	Kaopala
476.02042489100	Kalawaia	3103	8	0	0	Pikoku
3550.55445180000	Kaluahinenui	5742	47	0	0	Ohia
913.19542355900	Kaluahinenui	5742	1	0	0	Palama
841.92538492500	Keawemahi	3545	29	0	0	Olohe
274.10533813900	Kuheloa	3109	1	0	0	Ohia
551.17441887000	Kuolaia	3110	2	0	0	Ohia
292.12029618900	Makuakane	2522	3	0	0	Pikoku
299.85955446600	Moo	10122	5	0	0	Olohe
95.57188517120	Moo	10122	1	0	0	Punia
1871.04143212000	Nalei	10460	28	0	0	Luapuaa
540.75939503900	Kaaoao	8820	1	0	0	Ohia
8646.19855163000	Kaaoao	8820	5	0	0	Palaalae
866.10687083700	Kalawaia	3102	20	0	0	Kamaahali
448.38452405800	Kawana	3522	9	0	0	Palama
3150.96839477000	Kawana	3522	2	0	0	Waihalulu
325.78689953000	Keliiolelo	3525	3	0	0	Nohoana
270.83875256000	Wahinealii	11022	3	0	0	Kamauhalii
265.99660194200	Kekoahuwale	3526	1	0	0	Kaopala
291.58661829400	Kahuhu	5284	2	0	0	Kaopala
1900.26959195000	Napaeloi	10481	1	0	0	Kaopala
982.78835541900	Hakiki	2577	3	0	0	Olohe
133.22325231900	Waiho	3277	2	0	0	Kaopala
1575.97863137000	Weloula	3275	20	0	0	Ohia
1038.49006146000	Weloula	3275	2	0	0	Pohakuloa
Total:			463	6	3	

APPENDIX G: INFORMATION AVAILABLE FOR ESTIMATING THE NUMBER OF LO‘I PER MO‘O

Because there was a small sample size, a reliable estimate for the number of lo‘i per mo‘o could not be obtained. Rather, the lowest number of lo‘i (12) listed was selected to be used for all apana labeled as mo‘o.

Claimant	Number of Lo‘i	Area of Apana	Number of Lo‘i per m²
Kamakea and Mahoe	43	51440.09301	0.000835924
Kewalo	49	29046.62202	0.001686943
Keawe	15	19547.52296	0.000767361
Pakele	12	6121.816868	0.001960202
Kualaia	40	3078.076304	0.012995129
Keakua	21	8004.312259	0.002623586
Keawemahi	36	10401.12651	0.003461164
Kapule	48	10900.70885	0.004403383
Kapule	48	5850.856145	0.008203928
	312		
Average lo‘i/mo‘o:	34.66666667		

APPENDIX H: INFORMATION AVAILABLE FOR ESTIMATING THE NUMBER OF LO‘I PER PAUKŪ

Because there was a small sample size, a rough estimate for the number of lo‘i per paukū could not be obtained.

Claimant	Number of Lo‘i	Area of Apana	Number of Lo‘i per m²
Mahoe	34	13972.05592	0.002433429
Eeka	19	2622.197285	0.007245832
	53		
Average Lo‘i per Paukū:	26.5		

APPENDIX I: LO‘I ACREAGE CALCULATION FROM GOVERNMENT LO‘I

Shape Area	Acreage
170.76709866200	0.0421974
171.08825802600	0.0422768
189.72754940400	0.0468826
194.77258575200	0.0481293
219.63502049400	0.0542729
219.94812151200	0.0543503
224.86996561700	0.0555665
227.81819315400	0.056295
234.13944357200	0.057857
234.21041009600	0.0578746
244.25815565600	0.0603574
251.32920497100	0.0621047
278.72013603100	0.0688731
296.54706574400	0.0732783
300.20237038500	0.0741815
311.49246634900	0.0769713
316.96824715800	0.0783244
318.45270423000	0.0786913
332.97961335600	0.0822809
338.38993808100	0.0836178
341.70347235800	0.0844366
348.16620502000	0.0860336
354.44514021900	0.0875852
360.39009215700	0.0890542
404.11493711800	0.0998588
415.25930866100	0.1026127
428.94591799000	0.1059947
524.69432168200	0.1296546
535.87440224700	0.1324172
542.12172152500	0.133961
561.88237922300	0.1388439
593.93013200600	0.1467631
596.01728587800	0.1472789
624.29701687600	0.1542669
644.79107506800	0.1593311
653.88125099800	0.1615773
657.30509424400	0.1624234
662.10497727600	0.1636095
680.06170958400	0.1680466

Shape_Area	Acreage
691.70493133000	0.1709237
758.15760065300	0.1873445
785.88807778800	0.1941969
786.47156390700	0.1943411
813.04089561700	0.2009065
851.11379171700	0.2103145
884.62538592700	0.2185954
918.95469244300	0.2270783
985.49234467100	0.2435201
1028.15038760000	0.2540611
1100.04903155000	0.2718276
1228.22572453000	0.3035007
1259.79730990000	0.3113022
1282.90296229000	0.3170117
1357.25760613000	0.3353851
1469.17574677000	0.3630407
1514.95862698000	0.3743539
1636.42047477000	0.4043677
2149.92391694000	0.5312569
3693.16442462000	0.9125994
4164.54442062000	1.0290797
846.33029400000	0.2091324
1743.12058600000	0.4307338
585.14662800000	0.1445927
1275.97867100000	0.3153007
452.74793400000	0.1118763
905.24664400000	0.223691
554.98226300000	0.1371389
12.535606	0.1870986 419.66215

APPENDIX J: LO'I ACREAGE CALCULATION FROM LAND CLAIMS

Shape Area	Acre
2622.19728501000	0.6479581
1616.62979273000	0.3994773
4099.00482289000	1.0128846
1598.26275141000	0.3949387
189058.93867300000	46.717409
634.02926801000	0.1566718
258.43392766000	0.0638603
206.54879913600	0.0510392
10595.96831680000	2.6183168
6256.15892654000	1.5459282
1481.81181423000	0.3661631
1009.92246585000	0.2495569
121035.41920500000	29.908457
7322.09845352000	1.8093271
2063.31009445000	0.5098542
7589.17400139000	1.8753228
2053.81601883000	0.5075082
2457.74319939000	0.6073206
2452.36196396000	0.6059909
2603.61287880000	0.6433658
4325.46585554000	1.0688442
6759.21937051000	1.6702369
3459.98510212000	0.8549796
605.12190430500	0.1495286
1466.80927634000	0.3624559
6309.79084630000	1.5591809
1720.91580395000	0.4252469
858.78006970500	0.2122088
2420.11317577000	0.5980221
613.39504448600	0.151573
3349.20368881000	0.827605
2043.96045939000	0.5050728
1263.89468372000	0.3123147
4438.19479457000	1.0967001
2158.28319357000	0.5333226
748.72553489700	0.1850138
541.72052610400	0.1338619
1287.53430616000	0.3181562
1220.24665227000	0.301529

Shape Area	Acre
4756.92028739000	1.1754588
1409.33101931000	0.3482527
4481.85888512000	1.1074897
5770.43508643000	1.4259034
1634.43996764000	0.4038783
10900.70885360000	2.6936197
5850.85614512000	1.4457758
13287.51823030000	3.2834122
8941.13001607000	2.2093979
4360.90266748000	1.0776009
11701.75558110000	2.8915623
16590.76796680000	4.0996617
10129.18316570000	2.5029718
344.94091841900	0.0852366
274.86090954200	0.0679195
14450.94758740000	3.5709014
19547.52296250000	4.8302907
10401.12651090000	2.5701704
710.81864881100	0.1756468
8004.31225874000	1.9779056
592.01878886000	0.1462908
544.94757467500	0.1346593
2374.25628051000	0.5866906
10619.50477470000	2.6241327
383.12215145400	0.0946714
30355.48048980000	7.500991
29046.62201800000	7.1775655
17700.62692930000	4.3739134
9233.20060658000	2.28157
3078.07630427000	0.760608
18494.42723260000	4.5700654
6779.11302677000	1.6751527
3625.70107596000	0.8959289
10435.38627460000	2.5786361
42383.96439910000	10.47329
12322.22328370000	3.044883
369.20138471400	0.0912315
45762.54790270000	11.308154
7064.63799724000	1.7457074
51440.09301200000	12.711104
1533.55589536000	0.3789493
491.35800063200	0.121417

Shape Area	Acre
8327.62398879000	2.0577975
5525.38587307000	1.3653505
515.90322003600	0.1274823
120795.74234200000	29.849232
13972.05591800000	3.4525649
3289.46005484000	0.812842
6856.13814809000	1.694186
6481.85240630000	1.6016981
2340.78380962000	0.5784194
9294.82638842000	2.2967981
4217.12954925000	1.0420738
377.24893551500	0.0932201
1004.13251327000	0.2481262
3762.83631283000	0.9298157
1061.19762030000	0.2622272
5290.77614953000	1.3073772
2407.02601526000	0.5947882
5875.11684932000	1.4517707
4570.53100031000	1.1294011
553.14133593600	0.136684
1936.90365671000	0.4786186
1604.48097236000	0.3964753
2021.42326385000	0.4995038
10647.40230480000	2.6310263
6121.81686832000	1.5127316
1303.25325016000	0.3220404
26639.46823450000	6.5827458
18189.55708210000	4.4947305
120.87222619500	0.0298681
875.85241869400	0.2164275
21870.16106450000	5.4042261
10109.78338560000	2.498178
3975.11163835000	0.98227
33649.41460570000	8.3149386
1280.50232300000	0.3164185
24346.01082070000	6.016021
2823.07906165000	0.697597
8177.37130776000	2.0206693
2602.46979972000	0.6430833
7327.55800743000	1.8106762
3923.75860129000	0.9695804
3724.21676986000	0.9202726

Shape Area	Acre
4703.14255407000	1.16217
9354.05677186000	2.3114342
13701.81820390000	3.3857878
639.10441346400	0.1579259
568.66833748500	0.1405208
5808.27050026000	1.4352527
367.04131256400	0.0906977
8964.53807053000	2.2151822
1326.74716714000	0.3278459
5276.81623962000	1.3039277
15420.88083060000	3.8105768
6898.20445685000	1.7045808
84771.39350930000	20.947435
10003.43750050000	2.4718994
8438.13271604000	2.0851048
5457.64600309000	1.3486116
10497.65918100000	2.5940241
8546.64358967000	2.1119184
3857.59401077000	0.9532308
1693.24895188000	0.4184103
5241.51462422000	1.2952045
1511.30908700000	0.373452
2968.05129479000	0.7334203
1486592.50143956000	367.34444
Total:	379.8844

APPENDIX K: LAND GRANTS

Name	Claim Number	Size	Year
James Louzada	282	26.1	1850
Edward Bailey	483	286	1850
Richardson, John, Kuai, Hakalaau, Kapaa	877	134.95	1852
Kaili	1144	0.03	1853
Naheana	1145	0.19	1853
Antone Sylva	1146	32	1853
E Bailey	1153	0.14	
Keaka	1511	0.17	1854
Pakele	1512	0.07	1855
Ehunui	1513	0.05	1855
Mahoe and Kamakea	1514 (related to 1681?)	0.14	
Antone S	1515	0.73	1855
Koa	1516	0.1	1855
Kuheleloa	1517	0.31	1855
Kekua	1518	0.11	1855
J. Richardson	1519	0.86	1855
Keakini	1520	0.1	1855
J. Richardson	1673	1.79	1855
E. W. Gleason	1674	1.8	1855
Keoni Laka	1675	0.68	1855
Antone Sylva	1679	0.73	1855
Manuel Flores	1680	7.07	1855
Mahoe and Kamakea	1681	2.01	1855
P. Nahaolelua	1698	0.56	1855
Mark Previer	1699	0.28	1855
Kekua	1700	0.11	1855
Keakini	1701	0.1	1855
Keaka	1702	0.11	1855
Manu S.	1703	0.22	1855
Opunui	1704	1.94	1855
Ehunui	1705	0.05	1855
Kamai 2	1706	2.35	1855
Kauai	1707	1	1855
Koa	1708	0.1	1855
Kuheleloa	1709	0.31	1855
Puhi	1710	0.27	1855

Name	Claim Number	Size	Year
Mohomoho	1711	0.12	1855
Ihu/John	1712	0.16	1855
John Ross	1713	0.28	1855
Francis Sylva	1714	0.76	1855
William Humphreys	1838	0.15	1855
Kuai	1839	0.16	
Kapehana	1840	0.04	1855
Kepaa	1841	0.07	1855
Kalapuna	1842	0.315	1855
Kekeleiaiku	1843	12.64	1855
Joseph Sylva	1844	578	1855
Niheu	1845	84	1855
John Ross	2005	9.1	1856
John Richardson	2007	285.57	1856
Eeka	2017	1.69	1856
Kaai	2069	10.64	1856
John Richardson	2070	15.1	1856
A. Catalina	2107	2.32	1856
Beke Cockette, wife of C. Cockett	2108	7.73	1856
Joseph Enos	2109	73	1856
Eugene Bal	2342	129.8	1857
Kamai and J. W. Makalena	2354	1.34	1857
Eugene Bal	2747	129.8	1861
Mano	2899	0.84	1863
John Crowder	2904	0.57	1863
James Louzada (and H. Cornwell?)	2931	0.15	1863
James Louzanda and H. Cornwell	2951	17.1	1864
D. Crowningburg	2952	7.44	1864
W.R. Brown	2953	2.25	1864
John Boardman	2960	23.5	1864
Antone Sylva Sr. and Heirs	3041	1	1867
D. Adam Pupuhi	3042	1.26	1867
John Boardman	3043	4.25	1867

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