Hawaiian loko i'a community-based archaeology: Recommending best-practice methodology for archaeology on Hawaiian fishpond structures

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Abstract

This thesis investigates and recommends methodology for conducting archaeology on Native Hawaiian fishponds. At this time, Hawaiian fishponds are in a state of disrepair, with only a fraction being marked as historically relevant. Communities in Hawaii are taking it upon themselves to revitalize these structures by creating organizations and organizing local events, however, more effort is needed. Due to the Hawaiian coastal environment, a lack of both research and restoration could lead to the loss of these pivotal cultural structures.

The proposed solution to the aforementioned issue is the coordination of archaeology through community-based research. Additional research will expand the network of relevant fishponds and enhance the historically recognized structures. Archaeology conducted in Hawaii can benefit from a community approach as the Hawaiian culture was misinterpreted and taken advantage of in the past. To determine recommendations for future archaeology and if a community-based approach is the best option, a comparison was created utilizing successful practices in general archaeology, community archaeology, passive fishing structure archaeology, and fishpond management.

This research reveals that community-based archaeology is the best approach for Hawaiian fishpond archaeology and five significant best-practice methods for implementation. These methods are built on working with and for the native community on native sites. Derived methods include fishpond individuality, building relationships, community consultation and participation, and the use of community-accepted communication methods. Incorporating the findings, future in-field research is necessary as each method will need to be tested and discussed within the Native Hawaiian community.

Student Declaration

I certify that this thesis does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university; and that to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text.

Logan Myers

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Preface

As the author of this thesis my connection to the Hawaiian people lies in my background and upbringing. I have lived in Hawaii since a young age and have grown up experiencing and participating in Hawaiian culture. I am not Hawaiian; I am of Northern European ancestry. I still deeply care for the land, however, as it is the place, I call home. I am currently pursuing a master's degree in maritime archaeology at Flinders University to increase my knowledge on Native Hawaiian history. Being a non-Hawaiian individual, my recommendations come from an outsider perspective. My goal for this thesis is to bring to light the issues present in Hawaiian fishpond archaeology and where it can be expanded to benefit the Hawaiian people.

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Introduction

The Hawaiian land management system or *ahupua'a* was developed with each land section interacting with the next creating a connected network of cultural features (Figure 1) (Levy and Chernisky 2005a:21). Within the system, the highly specialized technology of Hawaiian fishponds and aquaculture were perfected. The design of the Hawaiian fishponds or *loko i'a* are unique to the Hawaiian Islands making them one of the most culturally significant structures in the Pacific region (Kikuchi 1976:296). The Native Hawaiian population have developed strict management practices and ecological knowledge surrounding fishpond for success management (Keala et al. 2007:8–9). Ultimately, fishponds represent a central feature of traditional Hawaiian life, acting as locations where fishing, agriculture, and religious worship were common practices (Wyban 2020:122).

Currently, Hawaiian fishponds are in physical disarray and are owned by private citizens and the State of Hawaii (Keala et al. 2007). Ponds were destroyed due to urbanization, and many are left in ruin in need of repair (DHM inc. 1990b; Wyban 2020). Over the past couple of decades, the Hawaiian culture is being revitalized. The significant part of this process is the ongoing restoration of pond structures. Sites are refurbished and even bought by communities to regain control of native land, though work still needs to be conducted. In response to the revitalization, awareness

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Figure 1. Hawaiian *ahupua'a* system (Image: Kamehameha Schools and Maui Nui Ahupua'a Project, 2018).

and cultural growth have occurred in communities of *Kanaka ʻŌiwi* (Native Hawaiians), the general public, and pivotal organizations, including Hui Mālama Loko Iʻa (HMLI or Hui). Established in 2004, Hui is a network of Hawaiian fishpond practitioners and organizations that have come together to keep ponds alive through restoration efforts and sustainable management. The current focus of the Hui's efforts is fishpond preservation and expansion of knowledge about the sites for the greater public.

Archaeology as a practice was conducted on fishponds by researchers for over the past century focusing primarily on surveying and categorizing structures of well-preserved sites (Kikuchi 1976). As many as 370 fishponds in various conditions are documented throughout Hawaii based on the three primary archaeological studies (Wyban 2020:122). Two hundred of these ponds are location known but are classified as destroyed or buried and are being recommended for future analysis during development (DHM inc. 1990b). Additionally, only a small number of ponds are recognized by the Hawaii State Register of Historic Places or the National Register of Historic Places as historical sites (Wyban 2020). By conducting archaeology research, more sites can be reviewed and protected. Large-scale in-depth archaeological research or excavations rarely occur on fishponds with efforts in Kauai with ʻAlekoko Fishpond coring and Huilua's excavation for buried features on Oahu (Carson 2005; DLNR 1993). For archaeology, even small contributions can lead to increased awareness and understanding of these cultural structures. Altogether, additional archaeological research can lead to expanding community site knowledge, drawing in more individuals to Hawaiian history, and teaching archaeology methods to benefit the community. For this to be successful, one must recognize the position of the Hawaiian people and their desire for the continued protection of their culture due to prior issues with researchers (Kawelu 2015). Communities might not want to conduct or have archaeology conducted on their fishponds. Researchers must honor their decision. However, researchers should still follow up with communities regarding their opinion and to respectfully gather as much as possible about the site. Overall, conducting research in Hawaii must be completed with the blessing of the Hawaiian people.

A possible solution for engagement with communities globally is the incorporation of community-based archaeology. Fishponds, where active are a delicate ecosystem and the

community and owners should be present during all steps of the research process. Community-based archaeology in Hawaii is in its early stages. Kawelu (2014), Kawelu and Pakele (2014), and Kawelu (2015) present the current change in Hawaiian community archaeology discussing methods and issues currently present. Successful implementation of community archaeology in Hawaii is presented in Lima et al. (2019), where researchers worked with community members and students using a collaborative teaching role incorporating participatory archaeology on a terrestrial Hawaiian Heiau. For community archaeology to be successful on Hawaiian fishponds it needs to be more than just documenting physical remains. Anthropological methods including participant observation, engaging with the community, direct community input, and community project direction need to be paramount. By incorporating these methods researchers can work directly in the community and acquire a point of view not possible from the outside. Overall, being in its early stages, community archaeology in Hawaii is lacking a set methodology for practice on Native Hawaiian aquaculture structures. This research aims to fill the gap by proving community-based archaeology as the best option for future research and recommending a best-practice methodology for conducting archaeology on Native Hawaiian fishponds through community-based engagement.

Loko i'a

Passive fishing structures are referenced and used globally for centuries (Higginbotham 1997; Nakajima et al. 2019). In Oceania, early fishing structure variations called weirs and traps were constructed by the Traditional Owners of Australia for aquaculture management (Rowland and Ulm 2011). The Hawaiian Pond variations portray the difference and uniqueness in the fishing structures of Hawaii. Hawaiians traditionally relied on the ocean and its resources for survival (Friedlander et al. 2013:441). As a result, before European arrival and colonization, Native Hawaiians were known to have constructed a sophisticated understanding of natural processes through the usage and management of resources, which included creating and adapting fishpond structures (Jokiel et al. 2011).

The primary themes of Hawaiian resource management are religion, conservation, and sustainable yields (Wyban 2020:87). Water was studied continuously by the Hawaiian people.

The ancient fisherman viewed the water as sacred resource that responds to the fish present in the environment. This response developed the earliest fishing methods in Hawaii with the simplest being hand catching, and the more advance spearing and deep ocean fishing with hooks (Wyban 2020:100). Portable fish traps were developed using cordage in the shape of baskets being placed in streams. Their success sought further trapping methods where then streams were dammed, or a weir was placed forcing fish to move where the fisherman could easily catch them. Large stone trap structures were developed where the opening relied on tide and current to catch fish. Developed from these stone structures were fishponds relying on inlets with gates to regulate the pond. Hawaiian fishpond structures acted as an answer to marine resource sustainability providing a safe place to raise a variety of fish and crustaceans. The creation of fishponds was not random. Fishponds were developed from centuries of history building off the Hawaiian people's ability to understand "fish life cycles, behavior, feeding habits with geology, engineering, and hydrology" creating a unique food production system (Wyban 2020:109).

The primary components of ponds are the *mākāhā* and *kuapā* (Figure 2). *Mākāhā*, or sluice gate, allows for the free movement of fish between the *loko* (pond) and the *kai* (ocean). Fishpond gates were constructed from local materials, including wood from trees called *ohia* and rope from the *olona* and coconut centers. For sustainable harvesting, the gates traps fish up to a certain size through the width of its bars. The *mākāhā* also created a way to maintain water quality as fresh water is consistently allowed through the gate. Without the *mākāhā* the concept of the fishponds would not be possible, and it is one of the primary differing factors from other cultures marine structures. The *kuapā* or stone walls are used for support and are created with basaltic rock, coralline block, coral, and rock rubble sourced from mountain ranges and transferred using a human chain (Keala et al. 2007:9; McAllister 1933:29). For water flow, irrigation channels were constructed from ponds to streams or the ocean (Wyban 2020:90). Fishponds are additionally constructed, developing on, or using natural features including sandbars, lakes or swamps. The sizing of ponds varied depending on location and purpose. Sizing ranges from small one-acre ponds to large six-hundred-acre structures (Wyban 2020:91). The direct origin of Hawaiian fishpond is unknown; archaeological evidence dates the structures from the 14th through the 19th century A.D. majoritively from pre-colonial times (Kikuchi 1976:295).

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Figure 2. Example of a Hawaiian fishpond *kuapā* from Moloka'i **on the left and *Mākāhā* on the right located at He'eia Fishpond (Image: Modified from Cornwall 2020:73).**

The variety of *loko i'a* in Hawaii presents a structure that is a unique feature of the pacific region (Figure 3). Fishpond size, usage, and design range vary from small coastal ponds to structures that are hundreds of meters long, rising 1-2 meters above the water (Keala et al. 2007:7–8). The locations of these ponds were typically coastal, and variation did occur through the use of strictly freshwater and farming variants. Researchers from the University of Hawaii (Keala et al. 2007:9–10) defined the typology of traditional Hawaiian fishponds and categorized them into six separate types, as follows:

- *Loko kuapā*: A pond represented as coastal fishponds constructed on coral flats taking the form of an enclosed semicircle of lava or coral rubble (Type I);
- *Loko pu'uone*: is a brackish water fishpond. Here a freshwater source mixes with the ocean via channels or incoming tides. These can be defined where a sandbar, coastal reef, or where two closed edges of landmass are attached to an enclosed body of water (Type II);
- *Loko wai*: a freshwater pond constructed in a lake, depression, or areas where fresh water was diverted or in the form of natural springs present in the landscape (Type III);

- *Loko i'a kalo*: Is a pond incorporating aquaculture with flooded agriculture. These ponds consolidated irrigation for *kalo*, a Hawaiian staple plant providing nutrients to agriculture through raising fish (Type IV);
- *Loko 'ume iki*: A pond acting as fish traps through the construction of lanes without gates on coral flats for ease of catching fish using the natural movement of fish (Type V);
- *Kaheka and Hapunapuna:* A natural pool or holding pond (Type VI).

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Figure 3. Six types of *loko i'a* present in the Hawaiian landscape (Image: DHM Planners 1989)

According to Native Hawaiian oral histories and beliefs, fishponds were constructed by Native Hawaiians and by tiny beings called the Menehune (Kikuchi 1976). The beings were known as Hawaii's master builders, who, according to mythology, built all fishponds in a singular night, alluding to the importance of the structures to Hawaiian culture. Representing each pond is a

spiritual being called a *mo'o* goddess or water guardian (Kikuchi 1976:298–299). These beings took the form of lizard people and supernatural women being worshiped by Native Hawaiians as protectors of the pond and surrounding water. The gods were said to have provided bounties of fish and resources to the people who worshiped them. Additional worship occurred focusing on Hawaiian culture's major gods, Kū and Hina, each representing important aspects of culture and ocean occurrences to the Hawaiian people. For worshiping and providing offerings including harvest fish and plants to the gods, shrines called *ku'ula* or *koa* were constructed at sites of fishponds (Maly and Maly 2003; US Department of The Interior 2017:41; McAllister 1933:15). Regular offerings to the gods were made at designated times in the lunar cycle for the wellbeing of the pond (Keala et al. 2007:11). Similar shrines are still in use today as seen in (Figure 4) showing a shrine next to Huilua Fishpond. Overall, these religious structures represent another factor of the importance of the fishponds to the Hawaiian people.

Fishponds were managed as if they were extensions of Hawaiian irrigated farming patches. Ponds were seeded by being stocked with fish fry, fertilized through feedings, weeded by cleaning algae, and harvested (Kikuchi 1976:298). Animals raised in ponds varied from crabs, shrimp, eel, to herbivorous and carnivorous fish. The most common fish were the herbivorous mullet and milk fish as they sustainably ate the algae growing in the pond cycling the harvesting season throughout the year (Wyban 2020:108). Herbivores acted as the primary food source from Hawaiian fishponds and according to Wyban (2020:109) the calculated protein production in ponds is a hundred times more in herbivores than carnivores. To feed the fish, cultivation of algae also occurred in the ponds. Fishponds were constructed usually 2 to 3 feet deep to allow sunlight to penetrate the water to produce algae (Wyban 2020:109). To protect the fishpond from undesired species and from being too full of fish, long seine and gill nets were used to remove large quantities of fish at one time (Keala et al. 2007:9). This created a sustainable food chain in the pond where the pond produced algae, herbivores ate the algae produced, the carnivores ate the herbivores, and the Hawaiian people harvested the fish. Ultimately, the management of fishponds was a well-regulated system successfully farmed by the Hawaiian people.

Figure 4. Photo of a fishing shrine located at Huilua Fishpond (Photo: Logan Myers, 2021).

The traditional practice of fishpond management was organized and put into use by the *ali'i* or chiefs, the conventional nobility of Hawaii (Apple and Kikuchi 1975:80). The *moku (chiefdom)* of Hawaii was under a paramount chief called (*ali'i-'ai-moku*). Each *ahupua'a* was managed by a secondary chief (*ali'i-'ai-ahupua'a*) with the assistance of their land managers *konohiki*. The *ali'i-'ai-ahupua'a* and *konohiki* were responsible for the fishponds not failing understanding the entire organization of the on-site features. On site management, harvesting, and protection was conducted by the *kia'i loko,* the resident keeper of the pond (Keala et al. 2007:8). The position of *kia'i loko* is kept within the family through generations accruing centuries of knowledge on specific ponds. In regard to fishpond management, the *kia'i loko* could hold power higher than the *ali'i*. The amount of knowledge the *kia'i loko* had is the same as a modern doctoral degree in fishery management.

Fishpond construction was a massive undertaking requiring thousands of people encompassing the one or multiple communities (Apple and Kikuchi 1975:80). Regular maintenance was also required. Commoners or the non-nobility were enlisted for fishpond construction and repair under the supervision of the *kia'i loko* (Keala et al. 2007:8). Commoners were barred from partaking in fish due to ownership by the *ali'i*. However, a successful pond led to reduced taxes and possible rewards giving people an incentive to do well. In the Hawaiian culture, the fishpond represented more than just a subsistence method in Hawaii. Fishponds acted as the signature of the village representing all who lived there. A large, well-maintained fishpond provided insight into the strength of the people acting as a deterrent to war and conflict. Additionally, the more

successful and bountiful the harvest, the more status the *ali'i* and pond managers accrued in the Kingdom (Keala et al. 2007:7–9).

For regulation, *Kapu* (taboo) religious systems were put in place by the chiefs under force for the protection of fishponds in ancient Hawaii (Levy and Chernisky 2005b:23). Fishponds were known to be under strict regulation based on designated fishing seasons, spawning periods, migration, and rotations into the pond cycles, making not always active for use (Wyban 2020:86,125–126). Any theft or breaking of these laws was punishable by death or extreme injury. Punishment was intense due to the honorific moral values of Hawaiian culture and to protect the fishponds for future generations. In addition, these systems acted as protection; anyone who went against the *kapu* put in place would be seen as the worst of criminals. Overall, fishponds are a delicate ecosystem responsible for Hawaiian sustenance, and only through strict management were they able to be preserved.

The Hawaiian people

The Hawaiian archipelago consists of eight main islands and numerous islets, atolls, and seamounts. Through dating, it is estimated that the first settlers arrived between A.D. 940 and 1130 from the Southern Pacific Islands (Athens et al. 2014:152). Upon settlement, the Hawaiian people were divided, with separate rulers, clans, and kingdoms named for each Island. Hawaii was a warring nation with feudal land ownership where raids and battles for land were commonplace as *ali'i's* sought more power for their region (Sahlins and Barrere 1973:22). In 1795, after centuries of conflict between the Islands, King Kamehameha I conquered all but a couple opposing kingdoms unifying them into one people called the Kingdom of Hawaii (Goodyear-Kaʻōpua 2018:454). In 1810, all islands were united as Kaua'i and Ni'ihau joined voluntarily. The Kingdom of Hawaii then acted as a sovereign nation ruled under a monarchy until 1893 (Goodyear-Kaʻōpua 2018:454). In 1893, the kingdom was overthrown by the island's plantation owners and the United States government. The Hawaiian people were distraught, seeing that their homeland was taken from them with little hope of retrieval due to the power of the U.S. government. The modern Hawaiian people are still united but are disenfranchised and

fighting through protest and organizations to reclaim what was stolen from them (Trask 2000:376–382).

Hawaiians and colonization

The Hawaiian people's first interaction with European colonists occurred in 1778 with the landing of Captain James Cook on the Island of Kaua'i. Cook left after the initial discovery and returned in 1779 to the Island of Hawai'i. The return of Cook coincided with a Hawaiian festival where it is stated the Hawaiian people perceived Cook as an incarnation of Lono, a Hawaiian god (Williams 2004:95). Obyesekere (1992:51–52) states that Cook took advantage of the situation, pushing his influence on the Hawaiian people by having them worship him and be accompanied by attendants. Tensions eventually rose, leading to conflicts between the Europeans and Hawaiians. Eventually, Cook was killed on the Island of Hawai'i while trying to kidnap one of the island's kings (Obeyesekere 1992:410).

Missionaries first arrived in Hawaii in 1820 from New England (Kauanui 2018:13). Their influence spread throughout the islands with mission houses appearing on each island, with the support of the kings. The mission goal was to help the Native population and support them in government, education, and entrepreneurism (Smith 2019). Prior to the arrival of missionaries, Hawaiian was only a spoken language, and through the mission's efforts, the written form of the language was developed. Acceptance of Christianity as the primary religion by the Hawaiian people occurred in 1839 when King Kamehameha III legalized Catholicism in the Edict of Toleration. Hawaiian traditional beliefs were put aside, which led to the destruction of traditional religion and of multiple religious sites, replacing them with churches (Smith 2019). Missionaries rejected the Hawaiian kinship practices imposing western dominated norms of patriarchal dominance and monogamy (Kauanui 2018:13). It is through these changes to the Hawaiian culture that the downfalls of the church present themselves. The church was and is still not accepted by all in Hawaiian society. According to Smith (2019) many Hawaiians see the church as a symbol of colonialism and how it destroyed their sacred traditions.

In 1848, King Kamehameha III, enacted the Great Mahele. Lands historically controlled by the king and the *ali'i* were divided, giving commoners and foreigners the ability to purchase land, including fishponds for private ownership (Linnekin 1983). The Hawaiian population at first disregarded the system, not understanding the meaning of private land with a petition at the time stating, "objects not made by man cannot be owned" (Linnekin 1983:171). Additionally, the Native population was given the opportunity to claim the land they occupied or cultivate as their own through State Land Commission Awards or *kuleanas*. Due to many factors, including not accepting the new western ideals and claiming based on traditional values, many Hawaiians never received their land commission (Stauffer 2004:1–2). According to Linnekin (1983:173–174), not understanding the system, Hawaiians had the majority of their land taken and most of it was purchased by foreign businessmen for use in development and agriculture.

On the 17th of January 1893 the pro-American Committee of Safety and the U.S. government carried out the overthrow of the Hawaiian Kingdom (Schamel and Schamel 1999). Their goal was to annex Hawaii to the United States as a strategic position for America before the Japanese took control. Queen Lili'uokalani, the current Hawaiian monarch, was imprisoned in her home by the coup. The Republic of Hawaii was established with the power of the U.S. Marines as a standby government. Sanford Ballard Dole, a pineapple plantation owner, was established as the temporary President of Hawaii. Hearing of the overthrow, U.S. President Grover Cleveland investigated and ordered the new government to give power back to Lili'uokalani (Schamel and Schamel 1999:403). Dole rejected the statement, and Hawaii was made a republic in 1894.

Knowing of the imminent annexation, the Hawaiians fought back using a petition marked "Petition Against Annexation." In 1897, two groups collected petition signatures during meetings on all five major islands. According to Schamel and Schamel (1999), the petition collected 21,269 Native Hawaiian signatures out of the total 39,000 Native Hawaiians and mixed-blood individuals present in the census the same year. The petition was successful, though, due to the ensuing Spanish-American War pro-annexation Congress members submitted another annexation proposal by joint resolution. Known as the "Newland Resolution," the annexation of Hawaii passed and was signed into law by President McKinley on July 7, 1898. Hawaii remained a U.S. territory until 1959 when it was awarded statehood marking Hawaii as

the 50th State of the U.S. The American Government eventually issued a formal apology in 1993 for the annexation of Hawaii, though the incalculable loss of their culture cannot be undone (Smith 2019:171–172).

Europeans arriving in Hawaii brought not only their laws and policies but also a variety of deadly diseases (Swanson 2019). Diseases including leprosy, syphilis, measles, chicken pox, polio, and tuberculosis were introduced to Hawaii, and Native Hawaiians had no immunity. The post-contact Native Hawaiian population was devastated by diseases, with estimates showing a pre-contact population of 683,200, and by 1900 the population is estimated to have dropped to 29,336 (Swanson 2019:208–209). In just two years after contact with Captain Cook, the Hawaiian population dropped six percent, leading to a rapid downward spiral in the population (Swanson 2019:213). The loss to the Hawaiian people was called "the Great Dying" presenting colonialism as a form of genocide to the Hawaiian people (Rohrer 2010:17). The population did rebound eventually in a rarely seen upward motion, with the current Hawaiian population estimated to be 619,855 (U.S. Census Bureau 2020).

In modern Hawaii, Hawaiians still fight against hundreds of years of misrepresentation and appropriation of their culture and voices (Rohrer 2010:77). Recorded history uses colonial tactics propagating Hawaiian passivism when facing U.S. colonialism. Americans swiftly rewrote the significance of Hawaiian places, objects, and traditions and obscured the history of colonization for the sake of tourism and business (Smith 2019:171). Historians were denounced noting giving Hawaiian representation and seen as "part of the colonizing horde" (Smith 2019:164). The Hawaiian people were and are by no means silent, static, or passive. Modern Hawaiians fight for their rights as a nation asserting their right to sovereignty against colonialism from paradise-seekers and military paraphernalia (Smith 2019). Non-Natives or *haoles* are seen as outsiders and are not wanted in the islands (Rohrer 2010:77). The Hawaiian Sovereignty Movement is a modern push by multiple pro-sovereignty organizations to reclaim Hawaii and protect the land. The organizations protest developments, governmental scandals, and issues regarding the Hawaiian populace. It is the hope by their efforts that more people are made aware of the struggles of the Hawaiian people and their connection to the *'aina* (land) of Hawaii.

Defining community archaeology

The process of community-based archaeology is not a new term in the archaeological world. Community-run archaeology has occurred throughout the global scene, with examples present in Australia with Native Aboriginal communities, Native American communities in North America, and local Hawaiian communities. Greer et al. (2002) presents an overview of community-based archaeology projects in Australia. Greer et al. (2002) presented a definition that is molded through the interaction of community and archaeologists. Greer defines the community-based approach as any research that "is aimed at empowering communities by contributing to the construction of the local identity." The author shows how through community engagement and action, the field of archaeology can expand for the better. Throughout their work, they empower communities through the use of interactive archaeology methods so communities can incorporate themselves into archaeological work. The goal was to create a discussion on how work should be conducted with communities. Caution is presented in Greer et al. (2002) regarding assumptions not being made on behalf of the community as opinion should be sought directly from cultures. Additionally, one should not assume the community one belongs to.

In North America, Native American tribes have established their presence in the archaeological scene, leading to cooperation regarding fieldwork and the study of Native American sites (Atalay 2012). According to Atalay (2012), Community Based Participatory Research (CBPR) or community-based archaeology allows for a combination of knowledge derived from native cultures, traditions, and experiences. The process aims to be participatory in every aspect only for the benefit of the culture. Unlike the past, the voice of the community will be heard and developed throughout research adding to its validity and the knowledge of the community. A capacity for archaeology is additionally built as the community learns about their history with the correct methodology. Atalay highlights that CBPR requires a partnership between researchers and the community and how too often, researchers have pushed communities aside for their own goals. To counter possible adverse outcomes, Atalay states that CBPR must address any concerns that members of local or descendant.

As for local Hawaiian communities, the practice of community-based research is still in its infancy, with only brief examples of implementation. Lima et al. (2019) provides an example of community engagement in archaeology on a Hawaiian heiau. Local Hawaiian traditions were incorporated into the research to connect to and respect the local community. In Lima's research, the community was brought in for a field school project providing their insight and effort, which according to the authors, provided meaningful information for the betterment of archaeology. A definition from Lima states community-based archaeology as "engaging the local community in an archaeology that honors Hawaiian history and heritage" (Lima et al. 201:69). An in-depth analysis of community-led research in Hawaii was incorporated by Kawelu and Pakele (2014); here, archaeology was deemed necessary from community engagement showing the possible benefit in Hawaii and for the Hawaiian people. According to Kawelu and Pakele (2014) archaeology through community effort could be used in reparation efforts, land claims cases, building local economies through tourism, and the protection of cultural sites.

Reeves (2022:244–245) presents the need for community archaeology to have a "bottom-up strategy," meaning the "goals, questions, and outcomes are determined by the community," and having the community consent and engagement is a priority. Community-based archaeology through community led research should be forefront in the ideals of all new community projects. Mckinnon et al. (2014) references successful community research where community members requested archaeology research due to a research gap in their culture. Here researchers were brought in by the community coming together and following the lead of the community to discover information about their culture. Additionally, it is highlighted that community archaeology can be used as a decolonizing practice for culture damaged by colonization. For future research, projects involving community-based archaeology should strive to define its research as by and for the community.

As referenced in Smith and Waterton (2012), there are two community methods that are relevant today. The methods are referenced by Moser et al. (2002) Quseir, Egypt community archaeology project, and by Greer et al. (2002) Australian community-based project. Moser et al. (2002) work was seen as the first academical grant awarded community-based project. Moser's project created an essential set of methodologies for the process of community archaeology. Firstly, is

the communication and collaboration in all aspects of the project. Second, is the public presentation of site discovered cultural material. The third, is the interview and oral history presented by the community or through researchers as a proxy for the community. Fourth, is the creation of educational resources to help further spread the history of the site. Fifth, is a detailed photographic and video archive to use as a future reference. Lastly, community-controlled merchandising sites allow for profit to go directly back into the community (Moser et al. 2002:229). Overall, though they are descriptive, it is imperative that control lies in the hands of the community.

The definition of what the author counts as community-based archaeological research will be derived from Greer et al. (2002), Moser et al. (2002), and the Hawaiian sources of Kawelu and Pakele (2014) and Lima et al. (2019). For this thesis, the definition of community-based archaeology is: the direct incorporation of the community into the archaeological process. This incorporation includes immediate participation in excavation and other archaeological methods on Native sites with the option of referencing or cooperation of experts in archaeology.

Research questions

This thesis research if conducting community-based archaeology on Hawaiian fishponds is beneficial for Hawaiians and their culture and what methods should be used for its successful implementation. For this research, the following question was focused.

- Will conducting community-based archaeology on fishponds benefit the community and the fishponds?

As a secondary question, to find the best methodology for conducting community archaeology on fishponds asked was: How should community-based archaeological research be conducted on Hawaiian fishpond structures? To resolve these questions, a series of additional questions were focused throughout the text to provide context for the current state of fishponds and recommended methods. These questions look at: How are fishponds being managed currently? What gaps are present in archaeological research on Hawaiian fishponds? What limitations are

present for research on fishponds? How are fishponds used in the past and now? What does the community want for fishpond now and the future?

Literature Review

Fishponds, traps, and weirs

Hawaiian fishponds are the primary aquaculture structure of Hawaii; however, weirs and traps are present, they are just uncommon. Fishponds are favored in Hawaii by acting as a culmination of centuries of work to develop a successful sustainable marine food source by the Hawaiian culture. The defining factor is the advancement of the *mākāhā* a gate-like structure used to filter water, incorporate stocking materials, and harvest fish (Wyban 2020:106-108). Looking at fishponds, each is a large enclosure with multiple inlets to allow for the consistent flow of water and marine life, unlike weirs and traps.

The Hawaii fish traps are called *pā* and are present in coastal environments taking advantage of tides and natural forces (Kikuchi 1973). Hawaiian fish traps as a cultural practice, are assumed to precede fishponds due to historical stories of fish trap on O'ahu. *Loko ʻume iki* is a fish trap similar to the fishpond *loko kuapā* but differs through multiple stone inlets for trapping fish. An example of unique Hawaiian fish traps is seen in Ke Awalau o Puʻuloa (Pearl Harbor) on O'ahu where fish traps portrayed a heavily curved wall and pocket for fish to enter (Figure 5). McAllister (1933:31) references conical-shaped fish traps located at Pearl Harbor; McAllister specifically states these structures have "not been found elsewhere in Hawaii." These traps lined the entrance to the harbor and unfortunately were destroyed to make way for new development.

Hawaiian fishing weirs are called *kahē* and are wooden stakes in permanent streams for filtering and isolating fish (Kikuchi 1973:232). Normally associated with *kahē* is the *hā*, a structure that would divert water from the central weir to a flat area for ease in the collection of fish. Little reference is available for the *kahē*. Luomala (1951:28) provides a record of a weir ten to twenty 'fathoms' long once located in the mountain of Kauai'i. In Hawaiian archaeological research, no

report has noted the discovery of a *kahē* or *hā*, so much is left to speculation regarding their characteristics (Kikuchi 1973:75).

Fishponds are central in Hawaii due to the culture's advancements in marine resource management. Globally, traps and weirs take a more dominant role as cultures in Asia, Oceania, Europe, and the Americas have incorporated them into their subsistence methods. Fish traps differ from weirs and ponds by capturing fish through tidal movement and currents in enclosures with no exits to allow for easy fish capture. Fish traps are defined by Memmott et al. (2008) "as a constructed rock wall enclosing a space for the purposes of trapping fish and other marine animals through the action of tidal movement." Rowland and Ulm (2011:38), who worked with ingenious fish traps and weirs through Australia, presented traps through the definition of "any structure having a length and shape that creates a pen or comprising at least two walls joined at a right angle. It is an artificial object." Traps are additionally described by Gabriel et al. (2005:201) as passive fish gear where fish are guided into an enclosure. Whereas, when looking at weirs, each are defined by Rowland and Ulm (2011:38) as "a wall that seals natural conduits of water such as streams, creeks, coves and so forth. The wall may include natural features." Weirs are also described using tidal movements in Gabriel et al. (2005:200) where a semi-circular stone wall acted as a dam at different levels of the tide to stop fish. These structures ultimately differ from fishponds and traps through their use as a natural or manmade formation in waterways and in the intertidal zone that use tides or currents to direct and stop fish for capture. Altogether, when looking at these variety of aquaculture structures, though similarities might be present, it is important that

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Figure 5. Map of Pakule Fishtrap once located in Pearl Harbor (Image: Wyban 2020:103).

one understands their differences for ease of recognition in the aquatic environment and to respect of uniqueness of Hawaiian fishponds.

Negative impacts on Native Hawaiian fishponds

From their first construction, Hawaiian fishponds are impacted by destruction and degradation. Being constructed in the Hawaii coastal environment, fishponds are impacted by consistent high-energy weather events. These zones are known globally for their storm activity and their large waves crashing against the shoreline. (Figure 6) shows Kō‘ie‘ie Fishpond. Kō‘ie‘ie experienced weathering, which has collapsed the walls of the pond structure. Natural disasters have additionally occurred along the coast, with multiple historical accounts of tsunamis impacting fishponds (Keala et al. 2007:7). (Figure 7) references a 2011 tsunami that hit Anahoomalu Bay on the Island of Hawai’I, showing erosion of an abandoned fishpond called Kuualii. Cobb (1903) refers to the destruction of Kamehameha Fishpond or Pa’aiea. The three-mile, once largest pond in the island, was filled up with lava due to an eruption in 1801. Subsequently, as a replacement, a fishpond called Wainanali`i was constructed by Kamehameha. Said to be a deep-water pond for tuna. The ponds were also destroyed by a lava flow in 1859. These dramatic weather events can cause total destruction and wearing of rock, leading to the collapse of coastal features. An additional dramatic factor was sedimentary deposition and erosion. Being in the coastal environment fishponds were open to the waves as previously stated, which led to the consistent movement of sedimentary material. Depending on the season or environment, this sediment was either built upon the fishpond or removed (Apple and Kikuchi 1975:48). In the case of buildup, a

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Figure 6. Aerial photo of Kō‘ie‘ie Fishpond on Maui showing wall degradation (Photo: NOAA, 2020)

routine was set in place to remove the sand to prevent sedimentation. For the removal of sediment, an effort was put into replacing the lost sediment as a way of strengthening the pond, so a wall collapse did not happen.

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Figure 7. A aerial map of Anaehoomalu Bay showing Kuualii Fishpond tsunami damage (Image: Sea Engineering, Inc. 2015:2).

Damage also occurred from inland events impacting the health and stability of ponds. Droughts and floods are common in Hawaii, each with their effects leading to the destruction of fishponds (Apple and Kikuchi 1975:53). One such account is of Kihei Fishpond where torrential flood water destroyed several faces of the pond walls. The occurrence of droughts is less common though the damage is just as severe. The inner pond water could dry up, leading to a loss of fish stock and premature abandonment of the pond. Based on their history, these structures are under constant stress and have required consistent repair and management. Without the help of individuals who cared for the pond, any lapse of time would lead to the degradation of the structures (Wyban 2020:140).

Wyban (2020:135–150) references post-European contact that marked the time of significant change in the Hawaiian fishponds. The developing western world influence led to the dividing of Hawaiian land and private ownership of these community structures. The community was no longer the focus, and now it was the voice of the foreigners outweighing the Native population. Fishponds without ownership fell into disarray and started to be taken back by the landscape. The yields of the ponds diminished as pond structures were deprioritized. A small number of fishponds were still used post-contact well into the 20th to 21st centuries by either new foreign or traditional ownership (Wyban 2020:135). However, the damage was done to the practice, and the majority of information regarding their history was lost or only present in oral records.

New and less complex fishing methods led to a change in fishing practices post-contact in Hawaii. Commercial fishing uses large boats and nets creating higher yields with less time investment (Wyban 2020:141–142). These methods are not as sustainable as fishponds however, they allowed for less overall effort and vastly increased the profit, which further increased their popularity. No longer was there a need for pond managers to grow fish while masses of fully grown fish have pulled off boats every day. Additionally, individual fishing using either rods or a new method of throw netting from the Japanese took hold in Hawaii (Maly 2003:478). Fishing as a whole swayed away from the community and their needs and only focused on individual subsistence and profit (Maly 2003).

Post-European contact the Hawaiian landscape was rapidly developed. The traditional Hawaiian landscape was low-lying with settlements in key areas of the landscape to acquire resources necessary for survival. Upon meeting with the westernized world, a dramatic change in the landscape occurred in larger, more dense housing structures (Keala et al. 2007:5). Large towns were constructed, and the shoreline environment was prime real estate. Corporations sought to capitalize on the environment by buying up land and transforming it for their benefit. For example, on O’ahu, the island which holds most of the fishponds had many shoreline regions taken over to produce sugarcane and pineapple. People were drawn to Hawaii with the hope of living in paradise, this draw created a very densely packed landscape. The outcome of increased construction led to a prioritization of people over the traditional areas (Wyban 2020:141). As

such, a majority of fishponds were destroyed and buried to expand the land for housing and future developments.

The religious traditions of Hawaii pre-European contact changed and were pushed aside for Western methods (Wyban 2020:137–138). The European methods were seen as better alternatives due to the consistent pushing of western ideals on the Hawaiian people. A major example is seen in Baer (2021) where chiefs were pressured by missionaries to change religions. Missionaries replaced Heiaus with churches using a tactic to transition the culture using 'new' sacred sites (Baer 2021:491). The majority of Hawaiians followed their chiefs and changed beliefs for new methods. These changes occurred rapidly, leading to the Hawaiian people losing portions of their identity by diminishing their traditional religion and cultural sites. Although throughout community's traditional methods were passed down orally through *kupuna* (elders) westernized beliefs became the norm for the Hawaiian people (Wyban 2020).

Hawaiian coastal structures are additionally impacted by human-introduced plant life. Plants were brought to Hawaii from areas around the globe as a tool or remembrance of an individuals' homeland. In terms of fishponds, the primary invasive species is the red mangrove. The plant was brought to Hawaii to help manage coastal erosion; unfortunately, after its introduction, mangroves represented one of the most invasive species in Hawaii, lining most shorelines. Mangroves are present across fishponds and have resulted in rampant adverse effects on their archeological or cultural resources (US Department of The Interior 2017:29). In particular, their extensive root systems have led to enhanced sediment deposition, decreased oxygen supply, and destruction of the pond wall structures.

As a final factor, legislation in Hawaii heavily restricted Hawaiian community access and interaction on fishponds (DLNR 2013). After the American occupation of Hawaii, little legislation is put forward to assist the Hawaiian culture. Only in the past couple of decades have cultural resources in Hawaii been taken seriously. Work conducted on fishponds has undergone a never-ending process where multiple permits were needed, possibly taking several years to complete (Keala et al. 2007). Though the paperwork was simple, issues arose with multiple overlapping regulatory organizations and no guiding process leading to a dissuading labyrinth of

needed information (Keala et al. 2007:13–14). Overall, these extensive restrictions helped protect fishponds; however, their lasting effect is seen as many ponds were unable to have the restoration conducted that they needed.

Revitalization of the fishponds

Years of degradation and malpractice have solidified themselves in the archaeological record of fishponds. However, in the past decade, an enthusiasm has occurred in the minds of both Native Hawaiian communities and the public in Hawaii regarding traditional culture. A new goal has arisen, as seen in (Figure 8) focusing on the revitalization and continued operation of fishpond to traditional standards (NOAA 2017:60). These once marked unimportant historical sites are highlighted for their importance in the cultural landscape of Hawaii. Native Hawaiians are spreading the importance to the public and governmental bodies regarding the need for long-lasting management and protection of irreplaceable fishponds structures. The increase of public knowledge and awareness of these cultural structures is hoped to lead to their future preservation and spreading of Hawaiian culture.

The newly found interest in fishponds has led to the creation of multiple Hawaiian community-run organizations throughout the public sphere. The implemented programs promoted Native Hawaii traditions at their forefront with an over-encompassing goal of restoration (Wyban 2020). These community programs are structured as private bodies representing the community as various non-profit organizations and conservation corporations. Each presents a variety of management options with its methodology focusing on development and the structure of fishpond management (Wyban 2020). Fishponds, including He’eia and Huilua have their organizations called Paepae o He'eia and Friends of Kahana, while Kahalu’u Fishpond in the same region is not represented. Unfortunately, due to lack of funding and land rights, not every fishpond is rallied around.

The statewide accepted joint agency for Hawaiian fishponds and management is Hui (Keala et al. 2007:69). The Hui today is facilitated by Kua‘āina Ulu ‘Auamo (KUA), a non-profit organization based in Hawaii. Established in 2003, KUA conducts community-based initiatives

throughout Hawaii for the benefit of Hawaiian culture. Hui represents nearly forty fishponds throughout Hawaii. The program aims to create a healthy, sustainable fishpond system to promote community growth and cultural awareness throughout the Hawaiian Islands (Wyban 2020:152). Currently, the program provides knowledge to communes and future projects for management, acting as a resource to turn to in difficult times. Though a program was developed through Hui the central fact is a universal plan for fishpond management is not decided and varies per organization. A wide variety of in-progress management plans, including community events, workshops, education, and fundraising, are presented in (Wyban 2020:152–169). Whether these variety of practices is positive or negative is not seen, as each pond is managed based on its own needs and the ability of the community to do so.

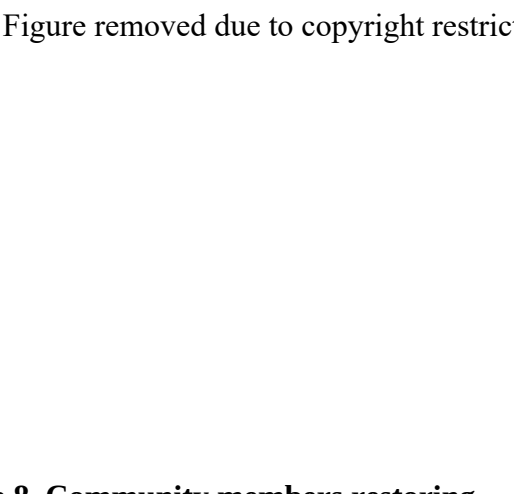

Figure 8. Community members restoring Waiaopae Fishpond (Photo: Lana'i 96763, 2020).

Community involvement is the defining note for the research conducted on pond structures. Since the development of these community organizations, their goal is to revitalize these structures (DLNR 2013). However, it was not only these organizations conducting these projects. When necessary, organizations created a request for action to the greater community calling the public to volunteer. These volunteers are used directly in site restoration, completing tasks for the betterment of the pond. These are not niche events; the restoration of the ponds draws thousands of individuals around the Hawaiian Islands. The fishpond managers use these experiences to create a connection with the community, teaching each other and ensuring that traditional methods are being passed down. Exterior involvement is the center of community organizations. Fishponds

are always looking for volunteers for every aspect of the site, even outside of the large events (DLNR 2013). As long as there is work to be done, managers will be on-site, inviting all who want to learn to help with the process. As a counter-effort to the invasive species presence in fishponds, fishpond managers have organized clean-up projects. These efforts varied based on the fishpond, though their goal was the same: removing non-native plants or having them replaced with their native counterparts (Keala et al. 2007:39). He'eia Fishpond (Figure 9) is an example of successful restorations and site management. He'eia was at one time over-encumbered by red mangrove, occurring in the central pond water, along the coast, and on the pond wall. Years of effort were put into place by Paepae o He'eia and community members. As presented in (Figure 10), the plant life was removed, and the wall was restored. Upon removal, viewed for the first time was the fishpond wall and surrounding shoreline. He'eia Fishpond acts as one of the only fully restored fishponds in Hawaii. Examples of removing invasive species are present all-around Hawaii, and all have led to the betterment of the environment and the visualization of forgotten history.

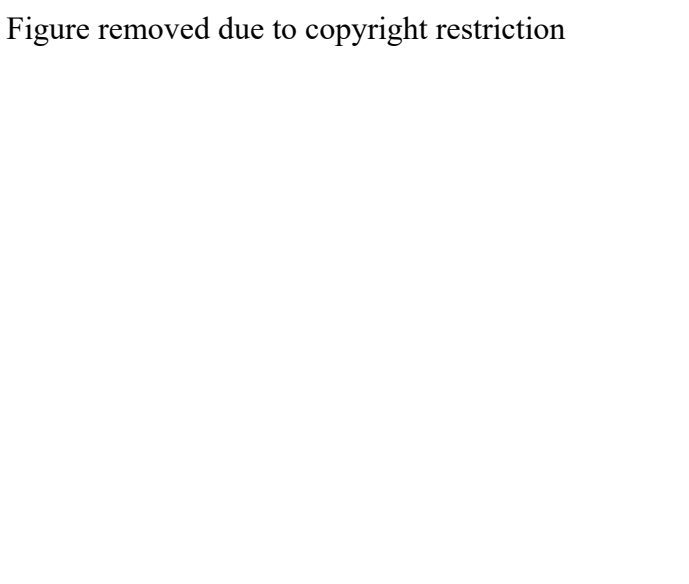

Figure 9. He'eia fishpond aerial view (Photo: Paepae o He'eia, 2022).

Community management with oversight from State-level organizations acts as the current method of management of restored fishponds. No set structured management plan is provided in

present literature for future archaeology projects on fishponds in Hawaii. In use, management presented by Wyban (2020), along with the State-accepted goals, reference the accepted protection of these structures. Fishponds present in the Hui standards referenced a focus on the historical aspect of sites and their ability to enrich the community and promote cultural value through the continued revitalization of ponds, cultural awareness, and community spirit. However, archaeology as a practice is not mentioned in these methods as fishponds prioritize repair and invasive species removal over invasive methods like excavation.

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Figure 10. Community volunteers restoring He'eia Fishpond using a human chain (Photo: Olukai, 2018).

Fishponds are structures and delicate ecosystems that encapsulate the primary aspects of Hawaiian culture, community and connection to the land and spirits. Using the current pond management, communities strive to educate individuals, permit tourism, and spread Hawaiian cultural practices on fishpond sites. DLNR (1994) presents an interpretive plan of Huilua Fishpond proposing the creation of a parking lot and interpretive signage at the pond. These additions will be used to draw more individuals to the sites for the expansion of public knowledge. Success is shown in a couple of the protected fishponds being designated as state parks; however, the majority lack this material due to privatization or differing management strategies. Overall, a small number of fishponds are used for educational or tourism growth, limiting the benefit to the community.

Clashing legislation and restoration activities on sites is a consistent site management issue. A solution was developed by Honua Consulting and implemented through the Hawaii Department

of Land and Natural Resources (DLNR). The plan calls for the direct action of the community and State to provide restoration, repair, maintenance, and reconstruction of fishponds. The Comment Draft Programmatic Environmental Assessment (DPEA-AFONSI) implemented by the DLNR and Hawaii State Government directly eased the process of managing fishponds by providing a streamlined permitting process for conducting management in the form of restoration (DLNR 2013). No longer are extensive waiting times a factor for pond management, and the community can now use the simple process for projects intending to manage fishponds.

Current fishpond status

Cobb (1903) conducted an extensive study of all Native Hawaiian fisheries presenting the current status of fishpond at the dawn of the twentieth century. Cobb's data showed that just thirty years earlier, twice as many fishponds were actively working, from 208 in 1873 to 104 in 1903, showing a rapid degradation of the practice. Cobb's original survey covered each main Hawaiian Island, marking 158 ponds, with 78 on O'ahu, 53 on Moloka'i, 16 on Hawai'i, 7 on Kaua'i, and 4 on Maui. In the early 1970s, Kikuchi produced an extensive study of fishponds incorporating new historical accounts of ponds in the islands totaling 360 ponds. In 1983 the Hawaii Historic Structures Office of the DLNR contracted DHM Inc. to use its database called MINARK and compile a list of fishponds throughout the islands (Wyban 2020:121–122). This study included naturally occurring anchialine ponds and constructed ponds for aquaculture. 370 ponds were discovered: 178 on O'ahu,74 on Moloka'i, 118 on Hawai'i showing no information recorded for Kaua'i and Maui. In addition to these, various estimations are present regarding a total count. According to Fleming et al. (1995), researchers place the number of fishponds at one time from 300 to 500. Overall, based on recorded data, there are still only estimates of the total fishponds in Hawaii.

Though pond structures are present throughout the landscape, the status of these features is concerning for the historical and Native community. Currently, 10% of those documented fishponds are listed on the Hawaii State Register of Historic Places or the National Register of Historic Places (DLNR 2013:38). Historical places and property are listed for their significance to the history of Hawaiian communities. Being a part of either register allows access to benefits,

including grant funding. The other 90% of the discovered ponds are not officially recognized, limiting their ability to receive funding or resources needed for survival and lack tracking for their cultural significance. Based on the State of Hawaii's point of view, one cannot save all these structures. However, due to the Hawaiian cultural revitalization fishponds are starting to be recognized as a valuable cultural resource (Wyban 2020:xxviii). Established ponds are being funded and supported by the community. Overall, though positives are occurring, only through continued effort will unrecognized fishponds be brought into the light for future management and recognition.

Gaps in Hawaiian archaeology

The earliest data on Hawaiian fishponds focuses on fishponds as a cultural resource (Cobb 1903). Cobb highlighted the modern issues fishponds face and their presence in the environment and uses. The subject of cultural resources was followed up by Madden and Paulson (1977) developing the data to match the modern issues facing Hawaii. Cobb (1903) presented the first survey of ponds focusing on ponds still in operation at the time, highlighting Hawaiian aquaculture usage. Kikuchi (1973) provided a synthesis of the known fishpond systems regarding their economics, political influence, and religious importance. Acting as a baseline for future archaeology work, Kikuchi conducted an extensive survey of fishponds in the, 1970s highlighting fishpond classification and current deterioration (DHM 1990:1). Apple and Kikuchi (1975) identified 58 ponds throughout the Hawaiian Islands that, based on features, could be listed in the National Register of Historical Places. Summers (1971) and Estioko-Griffin (1987) focused on the Island of Moloka'i creating detailed site survey plans. According to DHM (1990) in 1989 DHM Planners created an inventory and conducted in-depth research on fishponds present on Islands of Oahu, Hawai'i, and Moloka'i as part of Phase 1 of the Hawaiian fishpond study. The in-depth research was in the form of classification and general surveying to help judge how these cultural structures survive in the environment.

In 1990 Phase 2 of the fishpond study was conducted under the direction of the DLNR Historic Preservation Division (DHM inc. 1990a, 1990b, 1990c). Collaboration was seen between DHM Planners, now called DHM inc., the Bishop Museum, and the Applied Research Group (ARG).

DHM inc. and ARG were responsible for "assessing existing conditions, constraints, and opportunities, and providing recommendations for their respective areas of specialization." (DHM inc. 1990b:II-1). Archaeological excavation or restoration efforts were not conducted. Findings from their research split present fishponds into distinct categories based on their degradation. The data showed O'ahu having the majority of pond structures at 178 out of 488 total ponds. The Island of Hawai'i had the highest number of surviving ponds, with 72.

In the fishpond landscape of Hawaii, rarely have excavations been conducted. Examples are seen in the site of Huilua Fishpond and the DLNR archaeological investigations on O'ahu from the 1980s and 1990s (DLNR 1993; DLNR 1994). In water, stratigraphic coring occurred in the 2000s at 'Alekoko on Kaua'i, recovering biological material at the bottom of the pond (Carson 2005; DLNR 1980). Additional water examples are from work conducted by University of Hawaii students at Kaloko Honokōhau National Historic Park, though the project only focused on surveying a submerged fishpond. According to Van Tilburg and Ball (2014), and based on text evidence, existing archaeological reports are majoritively terrestrial with little to no occurrence of the practice in the water. As fishponds are often totally submerged structures, a lack of in-water research shows that much research is left to be conducted on these structures.

The focus needs to be drawn toward the known location of 200 ponds that are classified as destroyed or buried due to urbanization. No archaeological work has been conducted on these ponds and remnants of historical structures could be beneath the surface of modern developments. DHM inc. states that though there are no visible surface markers for these ponds, archaeology is recommended (DHM inc. 1990b:IV–21). Additionally, a separate 126 ponds were in fair to poor condition with visible submerged structures, heavy siltation, and encroachment of vegetation. Recommended for these structures were restorative methods, and to be used as areas of preservation of nature and culture (DHM inc. 1990b:IV–21). Archaeology could be conducted on these structures as a way of connecting local communities with the cultural objects buried or abandoned due to urbanization. Overall, through the presented archaeology work on Hawaii's fishponds, one can see an immediate need for new research to be conducted, which is where community-based archaeology could take the forefront.

Hawaiian fishpond future

In the current cultural landscape of Hawaii the future of fishponds lies in the structures becoming a sustainable food source for the Hawaiian people. As it stands, food prices in Hawaii are extravagantly high, leading to the cost of living being one of the highest in the United States (Hsu et al. 2008). Hawaii has the highest rate of elder couples in poverty at 6.3%, and also Hawaii has the highest cost of living for couples in the United States at $41,244 (Mutchler et al. 2016:1–4) According to Grandinetti (2017:236) Hawaii's high cost of living has forced many Native Hawaiians off of the Hawaiian Islands, with over 40% of the United States Native Hawaiian population residing outside of Hawaii according to the 2000 United States census. Unfortunately, this data is difficult to measure, as Hawaiians moving out of Hawaii do not cross-documentable boundaries (Grandinetti 2017:236). To relieve economic tension, communities have used fishponds as a food resource as seen at He'eia Fishpond presented in Möhlenkamp et al. (2019). Fish, oysters, crabs, and edible sea plants are commonly raised in modern Hawaiian fishponds following traditional methods of stocking and raising till harvest (Wyban 2020:162–164). From this, fishponds can be viewed as a way to sustainably catch fish in harmony with the marine environment. He'eia's success can act as a goal for future ponds connecting communities through sustainable management. As more ponds get revitalized, the benefit of these community-based food sources will increase. While it has yet to be seen, communities, to a certain extent, will not need to worry about food costs. These ponds will function as a resource providing a variety of fish and shellfish to the local people. However, there will be people that will choose to monetize this practice. Pond owners can choose to charge for the final product or the stocking of the ponds with fish of the buyer's choice. As an encompassing goal of stocking the fishponds, the Hawaiian people will be creating a future investment in food stock and as a source of traditional culture for the next generation.

The next step in Hawaiian fishpond management will be collecting and recording sites as historical resources. As stated previously, most fishponds are not recorded as historical sites. These facts are not due to their destruction but due to the neglect and disappearance in the archaeological record (Wyban 2020). As more sites are recognized by communities, discovered by land-based survey, and investigated archaeologically, this record will expand. The research

will involve both the community and archaeologists' interaction and need private and State land use. The final output will be a complete historical record of Hawaiian fishponds, allowing for an accurate picture of the pond landscape. It needs to be highlighted that the archaeology and all other research conducted connect with the Hawaiian people. Researchers must understand the importance of fishponds to the local community, their connection to nature, and the Hawaii culture.

Limitations to fishpond research

When working with Hawaiian archaeology, multiple limitations are present. These limitations are in the form of public opinions, extended hardship for conducting research, and legislation, each impacting or stopping the research process. The first issue present is the lack of trust in the Hawaiian community toward researchers. According to Graves and Erkelens (2006:1), researchers in Hawaii do not have a golden record. There are multiple cases of researchers prioritizing their paycheck over the community's livelihood (Kawelu 2015). This issue has spawned a monotony of mistrust. Numerous organizations, including He'eia fishpond's Paepae o He'eia have required researchers to conduct a probationary period. This period entails coming to the site and learning its history through the community members. In some cases, Paepae o He'eia requires individuals to stay on-site and help with current site research or programs.

Watson (2013) presents another limiting factor in the form of the excessive cost of conducting archaeological research in Hawaii. In addition to the high cost of doing any business in Hawaii, the cost of specialized tools, the salary of any researchers, general upkeep, and restoration requires successful fishpond sites to have consistent funding. Financial support is often hard to garner as most community organizations lack depth. Organizations are funded through either private individuals, community donations, and, if possible, state-level funding, which can be a rigorous process to obtain. As a basis for the cost factor, in the past, restoration efforts have easily cost up to $50-$80,000.00, with restoration primarily focused on the traditional methods of construction involving manual labor (Watson 2013:14). In addition, excavation-based archaeology will include multiple exterior tools that increase the budget needed, leaving communities at a disadvantage.

Methodology

Community-based archaeology and defining the best practice

The goal of the methodology is to first determine if conducting community-based archaeology will positively benefit the Hawaiian people and fishponds and second to derive the best-practice techniques for the implementation of community-based archaeology on Native Hawaiian fishponds. The term best-practice is subjective, being only a recommendation to the Hawaiian people based on previously successful techniques from community research in Hawaii and globally. To discover answers, reviewed broadly and globally will be comparative subjects relating to community archaeology on fishponds. This process was to function as a sign of respect for Hawaiian culture, which is ignored and taken advantage of in the past.

Community archaeology

Community archaeology being a well-developed discipline, tool kits are designed for integrating researchers and communities. These tool kits were viewed from a global perspective to derive methodology for community archaeology. Aldenderfer (1993), Moser et al. (2002), Friend and Cook (2003), Budhwa (2005), Welch et al. (2011), Atalay (2012), Klassen (2013), and Guilfoyle and Hogg (2015) each create an over encompassing perspective of the field of community research and steps for interacting with communities. The articles presented the history of the field, discussing issues that appear when interacting with cultures and the benefits of archaeology for cultures. Each article recommended research design steps and how to successfully engage communities with their history. Tully et al. (2022) proposed a standardized approach to community archaeology. Here Tully and other researchers showed a model for interacting and conducting research with the community and what topics should be confronted to create the best outcome for all parties. Atalay's and Tully's research will function as a basis for conducting research in communities and defining steps that should be taken during the process.

The current global methodology of community archaeology is advanced through multiple successful and unsuccessful interactions. Greer et al. (2002), Lewis et al. (2022), Schmidt and

Pikirayi (2016), McKinnon et al. (2014), Smith and Waterton (2012), and Wei (2015) provided examples of outcomes showing elevated levels of community engagement benefiting the community. In 2022 Sue Jackson from the Australian Rivers Institute presented the ongoing community research and restoration engaging Aboriginal people with their history (Jackson 2022). Greer et al. (2002:268–273) highlights community-based research in the Northern Cape York Peninsula, Queensland, Australia. The project involved the excavation of shell middens at Freshwater Beach, also known as Sandago, by the Aboriginal community. The involvement of the community was enabled through a speaker who represented the local country. Fuary's (1991) research in the Torres Strait is highlighted for their use of a community speaker. Fuary had a familiarity with the Strait through kin and language, thus becoming a catalyst connecting archaeologists to the local people. Using a speaker in Cape York, Greer and McIntyre conducted ethnographic interviews, community workshops, and visiting with community members, particularly elders, with the goal of obtaining a community perspective (Greer et al.2002:269–271). The community was additionally involved in the excavation process giving the community a firsthand interaction with their history which, "community perspectives were becoming entangled with archaeological practices and interpretations" (Greer et al.2002:272). According to Greer et al. (2002:272), the project was a success and the area of Sandago surfaced as a contemporary cultural landscape focused by community stories, practices, and beliefs. McKinnon et al. (2014) research in Saipan presented a case where archaeologists conducted research at the lead of the community. McKinnon's approach to community archaeology is fully community-led where the community is the deciding factor in methodology and the impact of research on their culture. Sayer (2022) and Rivera-Collazo (2020) show how issues present themselves and how and where improvement can be made. These sources were viewed with the goal of looking into separate methods of community engagement and how the process succeeded or failed. Methods were compared, looking for which approaches suit the Hawaiian people and the issues they are facing.

Passive fishing structures archaeology

Examples of passive fishing structures were viewed globally through multiple separate articles describing past research. Throughout these articles, various up-to-date technologies were

identified such as, 3D modeling, mapping, and site identification methodologies to use in the maritime landscape. Methodologies presented were compared to each other in reference to Hawaiian archaeology, highlighting successful methods. Region-specific examples were identified by Roberts et al (2016) for Australia and aboriginal issues, Dubois et al. (2019) and Baltrix et al. (2018) in South America, Cooper et al. (2017) from the UK, Faught (2014) from North America, Gandois et al. (2018) in France, Jeffery (2013) in Micronesia and globally, White (2011) for British Columbia, and Caporizzo et al. (2020) and Higginbotham (1997) looking at Roman fish traps in Italy. While each article is essential to the field, a couple are noteworthy and expand archaeology for passive fishing structures. Caporizzo et al. (2020) is significant due to the use of 3D modeling of fish trap structures. The data collected provided virtual access to the fish trap and objects previously only accessible by specialized personnel. Another significant source is Jeffery (2013), presenting the reinvigoration of fishing structures through reconstruction methods in Yap, Micronesia, and globally. For the global aspect, the researcher conducted a comparative analysis of fishing weirs and traps globally, viewing the possible revitalization of fishing structures. Jeffery's work will act as an example of where fishponds are thriving and failing within their community and of methodologies to draw from for Hawaiian research. A final source is Faught (2014), where the researcher created a predictive model for discerning the location of passive fishing structures. The project creates possible global use of computer technology to determine the most likely areas for structures, saving years of necessary research. Overall, these discussed sources each show how archaeology is developed for passive fishing structures and the importance of research in this field.

To understand these structures in the maritime landscape, specific characteristics were defined from multiple sources regarding their environmental position. Bannerman and Jones (1999), discusses fish-trap variations and their place in the marine environment. Bannerman and Jones present an outline for possible landscape locations and the role of fish-trap structures in this landscape. Faught (2014) and Caporizzo et al. (2020) add on to this, referencing the maritime landscape and fish structure location. Altogether, these three sources create an understanding of where passive fishing structures are located and how they interact or are molded by their environment.

Hawaiian archaeology

Archaeology literature is significantly diverse in Hawaii, with data ranging from Hawaiian, military, and colonial history. In defining a current methodology for Hawaiian archaeology, multiple aspects need to be looked at, including who is conducting the archeology, the site's importance, and what is being completed. It is not a simple task, as it is a diverse field. To simplify, the subject looked at will be current relevant discussions in Hawaiian research, who is conducting the research currently and what their goals are.

The Bishop Museum, the Society for Hawaiian Archaeology, and the University of Hawaii are leaders in Hawaiian archaeology. Professor Patrick V. Kirch is commonly referenced with his book *Feathered Gods and Fishhooks.* Kirch's book presents Hawaiian culture discussing archaeology and artifacts discovered in Hawaii. Due to conflicting factors between archaeologists and the Native Hawaiian people, Graves and Erkelens (1991) presented a perspective of Hawaiian archaeology and its implementation regarding who is in control of archeology in Hawaii and its narrative, the Hawaiian people or foreigners.

Viewing Hawaiian fishponds as a part of the maritime landscape is conducted in Van Tilburg and Ball (2014) and US Department of The Interior (2017). Here the authors look at fishponds in Hawaii along with all other man-made objects present in Hawaii's marine environment. The sources provide information on fishpond positions, their typical locations, and how to determine what fishpond is present in the environment. Additionally, fishpond research and archaeological features are highlighted to understand placement and fishpond importance in the Hawaiian marine environment.

To view Hawaiian archaeological sites, Sterling and Summers (1978) and Becket and Singer (1999), presented a collection of literature on the archaeological sites of Hawaii. Here the authors broke down multiple archaeological sites, including fishponds, based on their description, type, and location through mapping and characterization of site features which gives the readers a sense of their layout. The authors presented the history of the archaeology on Hawaiian sites, including a basis for early research to compare later fishpond studies. Finally, for understanding

and overview of archaeology conducted in Hawaii, studied was James (2010, 2015, 2018), which highlights a combination of Hawaiian fishponds and archaeological sites. Although more touristic in nature, James' work discussed sources of past historical work and value for ancient Hawaii sites. The books provide a brief historical overview of each site providing analysis of the site's position and its cultural value in the archaeological record.

DHM Inc. (1990a, 1990b, 1990c) and DHM Planners (1989) provided an overview of fishpond sites and insight into work conducted. Their work functioned as a, at the time, culmination of research that occurred on Hawaiian fishponds. The researchers provided their own diverse survey researching pond structures and health. The project viewed the diversity of ponds within Hawaii and how they are portrayed in the natural environment. Overall, these publications provided the work conducted and information collected on the fishponds in Hawaii.

Hawaiian community archaeology

Hawaiian community archaeology is in the preliminary stages, and a small number of examples are documented of its implementation (Lima et al. 2019:69). Lima et al. (2019) presents an example of community-based archaeology on Kupopolo Heiau. The research brought local and Native community members, college students, and researchers together. Archaeological research techniques were used to instruct students and benefit the Native and local community. The community was consulted, and Native Hawaiian traditions were adapted into the field curriculum out of respect for the Hawaiian people. The field program acts as an outline for successful future research, engaging with the Hawaiian people, and steps to take when conducting archaeology in Hawaii. One of the earliest sources of community engagement is seen in MBA International (1990) presenting an unpublished report of community restoration on a Moloka'i fishpond. In 2022, new field school efforts are in progress. As recently presented in the Archaeological Institute of America, Stanford University and Foothill College is running a community-based archaeological field school in Honoka'a, Hawaii. While the needs of the Hawaiian people will decide the purpose of the field school, this shows the continuation and emergence of community-based research.

Kawelu and Pakele (2014) and Kawelu (2014) present the change in the trajectory toward a collaborative approach in Hawaiian Archaeology. The authors highlight current concerns and steps necessary for successful community archaeology. Issues present in engaging the community with archaeology are highlighted in Kawelu (2015). Here Kawelu breaks down current and past tensions as well as examples of archaeologists taking advantage of the Hawaiian people and their history. These examples presented methodology, including a lack of Hawaiian voice, to avoid and embrace community-based archaeology scenarios in Hawaii.

Hawaiian passive fishing structures heritage management

To define current successful methods for the management of Hawaiian fishing structures, reviewed were articles and guidebooks published by present researchers. *LOKO I'A* written by Keala et al. (2007) acts as the gold standard for management of archaeology related to fishponds. The book describes in detail the steps for restoration and management of fishponds and provides forums to help pond workers collect accurate data. Wyban (2020) presents the account of fishpond practitioners spanning twenty years as a basis for discussion. Cornwell (2020) expands on this research by introducing accounts of fishpond practitioners, Indigenous activists, oral history curators, government participants, and academics. Cornwell's goal was to create a model to make adaptive cultural resource management possible in Hawaii, presenting the Hawaiian identity, physically and spiritually, the Hawaiian communities, and ways to further education.

A guidebook was presented by Watson (2013) highlighting the issues present in management and the Hawaiian community's fight for culture. The author presented an updated permitting process, significantly speeding up the time for restoration and managing fishponds. Additionally, presented is an agreement for the restoration, repair, maintenance, and reconstruction of fishponds as a call to action for both legislators and community members. Watson (2016) presents a guidebook for the permitting process. Watson described how to fill out permits and the methodology that should be followed. Watson (2016) is used as the basis for the successful management on Hawaii fishpond structures.

Friedlander et al. (2013), Jokiel et al. (2011), Hurley et al. (2020), Möhlenkamp et al. (2019), and Lewis et al. (2019) presented additional management strategies, including food production in Hawaiian traditional management systems, and in the case of Jokiel et al. (201l), comparing it to western methods. Since colonial contact fishponds have changed management methods away from traditional values. To understand the change Mills and Kawelu et al. (2013) looked at the colonial impact to decolonize heritage management in Hawaii. Mills and Kawelu et al. (2013) and Jokiel et al. (201l) were used to visualize the viewpoint on foreigners and how changes were made to fishpond management for better or worse.

Results

Methods in community archaeology

Community archaeology is diverse, and a theoretical outline needs to be set for successful implementation. Aldenderfer (1993), Atalay (2012), Moser et al. (2002), Welch et al. (2011), Guilfoyle and Hogg (2015), Budhwa (2005), Klassen (2013), and Friend and Cook (2003) present characteristics leading to the success of community-based archaeology. To present a representation of community-based research globally discussed are multiple articles. Aldenderfer (1993) describes community control of archaeology and the benefit of community input. Displayed in Aldenderfer are three characteristics research should work toward for successful archaeology. First is the use of communication and information sharing between archaeologists and community members. It is important that researchers are on the same page regarding research so data can be collected and understood in a respectable manner. Second, is the allowing for community control in the project. Since research focuses on the community's history, control should be given to the Native people, so data is collected in line with their values, cultural and natural relationships. Lastly, researchers should acknowledge the different knowledge systems including oral histories which might be present in cultures. Since the history of a culture might focus aspects aside from written documentation, to be able to acquire the true point of view of the community, all research must consider other methods of information transfer and incorporate them into research.

The next article is Budhwa (2005), who created six necessary characteristics for successful archaeology in the community. The first step toward success is community control of the research conducted. Community control is pivotal as data is collected based on the need of the community and their set standards. Second, are the building of meaningful relationships between project participants. The term participants include researchers and community members. Having meaningful relationship will hopefully lead to continued cooperation as trust is developed. Third, participants need to have a set method for exchanging information. Without a communication method, information can lead to data issues and opinions not being respected. Fourth, is the shared responsibility of participants allowing the community and researchers to depend on each other and hold each other accountable. Fifth, focuses on the building of capacity in the community. Creating capacity will help communities conduct their own research, successfully empowering the community. The final characteristic is for project participants to be openminded and of tolerant cultural differences. Since conducting research will involve individuals with multiple cultures and practices being tolerant of different ideals acts as a sign of respect.

Atalay (2012) created five principles for community archaeology. These principles are similar to Aldenderfer (1993) and Budhwa (2005) presented methods however, Atalay's research seeks to simplify the process by building on past research. Atalay's first principle highlights the use of a community-based partnership process. A successful partnership between researchers and the community must be created for a project to be successful. Second is the community being participatory in all aspects of the project. Participation act as a for culture to gain hands-on experience with their history. The third principle is the building of the capacity of the local community. Increasing capacity, as seen in Budhwa (2005) is directly derived from community participation and will eventually lead to the community conducting their own research. The fourth principle is the engagement in a spirit of reciprocity. In community research, both parties should mutually benefit, and neither should be taken for granted. Atalay's final principle is for the researcher to recognize the contributions of multiple knowledge systems. This final principle matches Aldenderfer's outline characteristics, highlighting the importance of viewing alternative methods of communication and historical recording.

Tully et al. (2022) research acts as a new standard of practice in participatory archaeology. Tully created an evaluation table which provides a flexible framework for good practices when conducting archaeology with communities. The table covers evaluation categories, aims, methods, potential risks, obstacles, quantitative evidence, qualitative evidence (including anecdotal evidence), outcomes, challenges, timescale, recommendations, and new proposals. With each subject, the authors hope archaeologists can be held accountable and use an all-encompassing methodology to follow when dealing with communities.

Greer et al. (2002) presents the change in Archaeology to incorporate community-based research highlighting the need for interactive research rather than reactive. Greer stresses the need for community involvement in setting the agenda of research for archaeology projects and that communities value archaeological sites for more than their technical significance. Lewis et al. (2022) presents Community Archaeology in Rural Environments (CARE), the project centers around the creation and implementation of community archaeology throughout Europe in both urban and rural environments. The project proposes an evaluation method for success, including post-participation feedback forms, before and after surveys, and in-depth interviews. When dealing with indigenous communities, one must be aware of the pitfalls of colonialism and its impact on traditional culture. Schmidt and Pikirayi (2016) present the detriment of using Western methods to understand traditional culture. When working alongside Indigenous people, the methodology should be created around the culture and their traditions for better representation.

Community-based archaeological approaches are full of challenges when dealing with researcher and culture integration. In the past, researchers have taken advantage of the Hawaiian people, misinterpreting sites and not allowing the Hawaiian people to be recognized in their history. In recent times, Covid-19 and similar viral strains have caused stressors when dealing with archaeology. Viral infections can, as seen throughout history, be detrimental to Native communities. Lewis et al. (2022) shows Covid-19 severely impacting or stopping the progress of archaeological research due to safety reasons. Successful methods in community archaeology should involve precautions for Covid-19 for archaeological work to be conducted in a safe manner. Additional issues are seen in community conflict, with researcher needs being prioritized at the expense of community concerns (Atalay 2012:79). Resolving issues comes

down to communication. As such, researchers must strive to be as transparent as possible and understand that the community should have the final say regarding their history.

Based on previous research, a successful methodology for community archaeology should incorporate multiple aspects. First, success involves setting a partnership of communication and information sharing. Without communication avenues including community representatives and viewpoints can be lost. The communication can be set using community meetings and the use of a set speaker or team as seen in Fuary's (1991), Greer et al. (2002) and Atalay (2012). This vital communication process should involve the setting of goals and the creation of meaningful relationships and trust. The researcher's consultation should highlight the risks, aims, consent, and needed control of the affected community. Second, is the shared responsibility and accountability of both the researchers and community. Third, is the act of participation in every aspect of the project. The community should be given the chance to participate in every level of the project including any excavation techniques. Fourth, is the creation of community capacity for archaeology. The community should be taught archaeological methods so more independent community research can be conducted. Lastly, a project evaluation should be conducted to give feedback to researchers and the community. Feedback will provide a reflection on the challenges and successes of the project, allowing future research to be completed with less issues.

Methods in passive fishing structures archaeology

Success in passive fishing structure archeology depends heavily on the environment and access to the site. Data, as seen in Gandois et al. (2018), Dubois et al. (2019), and Cooper et al. (2017) focuses on the surveying of these large features. Surveying, where available, uses a physical-based methodology. However, most research relies on GPS and remote sensing technology. Due to remoteness of their location in the maritime landscape, typical surveying may not be possible. Passive fishing structures are located offshore, in river inlets, and, depending on age, deep underwater. Technology, including satellites and drones, are used to view the structures allowing researchers ease of access and the ability to create high-quality images of the site. These processes allow for information and data collection to be conducted off-site and can even provide underwater views for the researchers. The use of 3D reconstruction is seen in Caporizzo (2020).

Caporizzo created a 3D model of a roman fish tank using underwater photogrammetry. 3D modeling allowed for studying the fish tank outside the marine environment, creating a picture in time of the site for ease of use in viewing degradation and changes in the structure. Predictive modeling using remote sensing data along with geological features is a successful method that is present in Faught (2014). Faught predicted the location of fishing structures in a submerged ocean environment creating detailed location maps marking possible areas for the location of structures.

Reconstruction and preservation are a priority for fishing structures and is general good practice, as it preserves the site for future generations. The degradation of structures is seen in Dubois et al. (2019), Cooper et al. (2017), Gandois et al. (2018), and Jeffery (2013). Preservation to limit future damage acts as a best-case scenario for management. Pitfalls are seen in site reconstruction for preservation in Jeffery (2013). Due to the chaotic nature of the marine environment, these structures are prone to destruction. Jeffery (2013) refers to community reconstruction of a fishing structure failing due to continuous site weathering. Additional pitfalls are seen in the dating of stone passive fishing structures. Gandois et al. (2018) and Jeffery (2013) both present dating issues due to the lack of organic material present on stone structures. Stone being inorganic leads to dating issues when they are the only reference for the site unless steps are taken to date other relative material.

Balrix et al. (2018) created a successful excavation plan based on a remote sensing survey. The excavation included the creation of trenches to identify three stratigraphic units of pond history. Success is additionally seen in non-scientific approaches to fish trap research in White (2011). White worked with a Native Heiltsuk community discussing their stone fish traps. Physical-based archaeology was conducted in the past, though White highlights the need for the community's opinions and history to be presented. White, also a Heiltusk community member, met and interviewed community elders, discussing fish traps. Overall, presented is a never-before-seen perspective of fishpond history, proving the methods to be a viable practice and highlighting the importance of ethnography and oral histories.

Methodology for passive fishing structure archaeology should first focus on incorporating remote sensing technology. Sonar, LiDAR, and drones for object identification will help when dealing with submerged structures. Land-based surveys should be conducted where applicable, and drones should be used. The goal of research should have the preservation of these structures at the forefront. All excavation techniques should be conducted at the request, in consultation with the community, and in the site's best interest. Most importantly, to provide data which might not be present in archaeological records, the community should be consulted for their oral history.

Methods in Hawaiian archaeology

Hawaiian archaeological methods have dramatically changed over the past couple of decades. Researchers in Hawaiian archaeology is made up of the University of Hawaii, Hawaii's primary museum The Bishop Museum, the Society for Hawaiian Archaeology, and private individuals. There is a high diversity of researchers and opinions in Hawaii, leading to multi-viewed interactions with the Native people. Initially, western ideals and practices dominated the Hawaiian people and negatively impacted Hawaiian culture. Graves and Erkelens (1991) presented the western dominated archaeology and how, at one time, Hawaii was seen as a holistic culture, not accounting for historical changes or island differences. Prior researchers' actions have led to mistrust in the Hawaiian community. Archaeologists' necessity and if they should be allowed on Native sites is debated in Hawaii. According to Kawelu (2014:51), a proportion of Hawaiians are against archaeology and do not like others dealing with their history. This conflict highlights a need for a holistic approach to archaeology emphasizing the need to understand the Hawaiian people's point of view and their connection to their history and the natural resources of Hawaii. To resolve previous conflicts, Patrick V. Kirch helped successfully initiate the connection between researchers and the Hawaiian community bringing in community ideals and traditional methods to research sites (Kawelu and Pakele 2014). Throughout his research, Kirch has developed a sustained relationship with the Hawaiian people, acting as a proxy and as an example for all future researchers in Hawaii.

Archaeology of Native Hawaiian sites has encompassed both large-scale projects and small surveys. One of the largest projects was conducted by DHM Inc. (1990a, 1990b, 1990c) and DHM Planners (1989) fishpond survey marking fishpond locations. In comparison, smaller projects and site descriptions can be seen in Sterling and Summers (1978), Becket and Singer (1999), and James (2010, 2015, 2018). Relevant discussions in Hawaiian archaeology are brought up in Van Tilburg and Ball (2014) and US Department of The Interior (2017) regarding the term maritime cultural landscape. US Department of The Interior (2017) states community stakeholders seek cultural recognition beyond the historic shipwrecks in Hawaiian waters. The Hawaiian cultural landscape is diverse, with multiple evolving marine practices throughout Native Hawaiian history, and it is important that each is recognized and understood. Van Tilburg and Ball (2014) and US Department of The Interior (2017) present good practice for researchers, as one of the first resources, for discussing aspects of the Hawaiian cultural marine landscape and the growing knowledge of the field.

To be successful Hawaiian archaeology should encompass the needs of the Hawaiian people at their discretion. As conflicting opinions are still present, the benefits of archaeology should be communicated between researchers and the Native population in recognition of Hawaiian history. When dealing with Hawaiian cultural sites, archaeologists should not impose outside methodology. Instead, archaeology should be built around the Hawaiian people, for their benefit, and with their feedback. For success, it is imperative archaeologists work to immerse themselves in the community through hands-on participation to acquire a community point of view and understand cultural sites and practices.

Methods in Hawaiian community archaeology

Successful community archaeology in Hawaii needs to have the Hawaiian people as the main priority. As stated in Lima et al. (2019), the Hawaiian people raised concern, questioning if they would be able to provide meaningful input to research. Pitfalls have presented themselves in the past, with the Hawaiian people being silenced regarding their own history Kawelu (2014). The voice of the Hawaiian people needs to be heard by researchers. Ultimately, the local community should have authority over the interpretations of Hawaii's cultural resources. Community

approaches to archaeology should work toward justice and discipline sustainability, as issues with site destruction and misinterpretations have led to past mistrust in the Native community.

Kawelu and Pakele's (2014) central values act as a base point for community archaeology in Hawaii, highlighting four significant aspects of success. To practice community-based archaeology, one should be aware of "kuleana (responsibility), respect, sustainability, and cooperation" Kawelu and Pakele (2014:63). First, each researcher has a responsibility to both their practice and the Hawaiian people to provide accurate and unbiased data. Community members have a responsibility to the land and their people, and researchers should be aware of their opinions. Second, respect should be shown regarding traditional practice encompassing archaeology, opinions, and religious beliefs. Third, any work conducted should have the site in mind and be sustainable. Lastly, archaeology work should focus on cooperation between all parties.

Successful implementation of community archaeology is seen in Ho'opakele Heaiu presented in Kawelu and Pakele (2014) and Kupopolo Heiau in Lima et al (2019). These two studies act as examples where community members worked directly with researchers on Native Hawaiian sites. Lima created a new teaching-based approach giving back to the community through education. While at Ho'opakele, research was community-initiated, acting as a model for future projects. Both projects saw success in the use of community speakers representing the Hawaiian community's opinions. Through these leaders' researchers were able to address issues and opinions through a select group of people reducing complexity.

Invested scholars are necessary for community-based archaeology to succeed in Hawaii (Kawelu and Pakele 2014). Sites are abandoned by researchers following data collection. It is vital that researchers stay and work with communities and not desert them. Patrick V. Kirch acts as an example of a dedicated individual staying with the Hawaiian community for several decades, pioneering community research in the region. This level of dedication is ideal but not always possible. However, new researchers should show dedication to the Hawaiian people and their history, creating beneficial relationships and not abandoning them in their time of need (Kawelu 2014).

Ultimately, to be successful in community archaeology in Hawaii, researchers and community members need to create a shared relationship with Hawaiian history (Kawelu and Pakele 2014). Therefore, when archaeology is conducted, each aspect should strive for community participation. As seen in Kawelu and Pakele (2014) and Lima et al (2019), to clear up any discrepancies and to successfully communicate the community's needs effectively, community speakers should be used as proxies for the voice of the Hawaiian people. Overall, researchers should work directly with the Native community making sure the opinions of community members are respected as it is their history.

Methods in Hawaiian passive fishing structures heritage management

Successful methods of managing Hawaiian passive fishing structures were developed over centuries. According to Keala et al. (2007), modern fishpond management starts with the permitting process. Permits help create the management process. Included are details regarding pond health, deterioration, and what steps will be taken regarding reconstruction and operation. Though recently streamlined, a permit must be approved by the Hawaii State Government to begin any work on fishponds.

Watson (2013) shows the now simplified permitting process and how management has changed for the better. According to the guidebook for *loko i'a* permitting produced by Watson (2013), fishpond permits are broken down into three tiers depending on the conditions on the site. Tier one permits are for general fishpond maintenance and should follow traditional methods. Tier two involves projects where large-scale effort is needed for site revitalization. Tier three involves large-scale projects with site-specific conditions. The methodology of pond restoration is broken down by the author between tiers one, two, and three. Tiers are based on three pond projects Huilua, Waiaʻōpae, and Koʻieʻie Fishponds. Here practice involves the use of rocks sourced only from the pond area for wall construction, no mechanical equipment, use of cultural practitioners with training in Hawaii stone masonry, wall construction only during calm weather, restoration based around a set zone to protect adjacent water formations, and the use of cultural and archaeological site monitors. Tier two and three methods involve similar aspects, focusing more

in-depth on water quality monitoring, endangered species monitoring, cultural monitoring, archaeological monitoring, and special conditions focusing on mechanical dredging or the mechanical removal of vegetation.

Wyban (2020) presents future fishpond management strategies in line with Watson while providing methods for future fishpond use. These future usages were updated from Wyban (1992) volume to bring in modern solutions. The practices involve traditional fish culture methodology, hatchery, nursery, science-video centers, hands-on education centers, snorkel pools, removal of predators, shrimp stocking raceways, clam beds, oyster racks, seaweed culture, and pen culture of fish.

Lewis et al. (2019) uses management strategies for dealing with non-native species through optimization of ecosystem management. To understand and streamline management, Lewis et al. created a framework to act as good practice when dealing with invasive material in the Hawaii marine environment. The steps for management are to identify the project scope regarding priorities and stakeholders, to understand stakeholder attitudes, ecosystem services, and disservices, and additional considerations, including removal, land use, the implementation of management, and education. Jokiel et al. (2011) and Mills and Kawelu et al. (2013) present pitfalls with current westernized management techniques. In cases of fishpond usage, western management draws heavily on the need for economic gain and conservation, while traditional management was more sustainable, limiting, and based around the community. Cornwell (2020) presents the use of both the Hawaiian identity and local communities as key aspects of fishpond management and good practices for the success of projects. Conducting ceremonies and prayer before working on ponds should be conducted as signs of respect. Community involvement on fishponds varies based on age group. In Cornwell's research, there is little community involvement from adults, and managers should focus on including the youth as a priority for future community support. Youth can be drawn from the local community schools and organizations. Educating the younger generations is important, as these individuals will lead future fishpond research.

Passive fishing structure archaeology research should be conducted as projects based around the local community, their needs, and the preservation of native resources. To start management projects, contact should be made with Native and local communities, and permitting from each needed source should be prioritized to meet the standards of successful methodology. Incorporating youth on the site should be seen as a necessity, as they will be conducting future fishpond conservation and represent the public showing interest in these sites. Additionally, management should focus on traditional factors and the Hawaiian identity using Watson's updated methodology based on project scale developing sustainable resources over profit. Once established, Wyban's research can guide the use and basis for expansion to create ponds that give back to the local community.

Recommendations

Community-based archaeology is the best option

Connecting the results, globally community archaeology has shown multiple successful occurrences of helping communities connect directly with their cultural sites. As presented previously, Lewis et al. (2022), Schmidt and Pikirayi (2016), Smith and Waterton (2012), Greer et al. (2002), and Wei (2015) each show benefits to communities through community engagement. Greer et al. (2002) research in Queensland shows community archaeology through excavation allowing the community to get hands-on with their historic areas creating a deeper connection to their culture. In Bubhwa (2005) archaeology in the community allowed the community to benefit by creating a capacity for them to conduct their own research. Here researchers taught the native population about the correct archaeological procedures to conduct on their cultural structures. Ongoing research presented by Jackson (2022) shows continued success in the field and proves that the field is continuing to evolve. However, one must recognize the issues of community archaeology as seen in recent work from Sayer (2022) and Rivera-Collazo (2020). Community archaeology is not a perfect science, misinterpretation, assumptions, and tension can rise among researchers and the community, as everyone has their own moral and ethical values. Considering community archaeology's shortcomings and successes, presented throughout the discipline are tool kits for proper implementation. These tool kits are diverse and are project dependent, acting as culminations of data conducted by

researchers. Each kit outlines steps that should be taken for success in the research process. Researchers should be flexible and mold kits in consultation with their community. Ultimately, significant development of the discipline has allowed for multiple successful applications of community archaeology benefiting communities making it a valuable resource when conducting future archaeology.

To show a community connection it is important to reiterate that the community in Hawaii is highly valued. In early Hawaiian history, the building of fishponds was a large-scale community undertaking as each fishpond represented the community and its connection to Hawaii's natural resources (Apple and Kikuchi 1975:80). In modern times the community is again drawn to the Hawaiian fishponds and its natural resources through community organizations including Hui, a conglomerate of current fishpond practitioners. These organizations have paved the way for fishpond revitalization drawing in local communities for rebuilding events and educating them on these historic structures. Focusing on community-based archaeology and its benefits, a recent example of community archaeology in Hawaii is seen in Lima et al. (2019). Lema et al. (2019) presents an account of where the local community was brought in for a field school project on a Native Hawaiian site. The project was ultimately successful in increasing site awareness and incorporating local traditions into the archaeology process. An important takeaway stated by Lima et al. (2019) is that community-based archaeology in Hawaii acts as a way to honor Hawaiian history and heritage. Additionally, according to Kawelu and Pakele (2014), archaeology through community integration is deemed necessary in Hawaii for the benefit of the Hawaiian people. Finally, as a way of showing the dedication of the discipline, in 2022 Stanford University and Foothill College are continuing research in community archaeology through new field schools in Hawaii.

A final determining factor of why community archaeology is the best option is the protection of the Hawaiian culture. For far too long, the Hawaiian people were taken advantage of for the gain of others. Historically researchers in Hawaii have misrepresented Hawaiian culture and the American people have rewritten the significance of Hawaiian cultural practices for economic gain (Smith 2019). Modern Hawaiians fight to reverse old and prevent new damage to their culture through multiple facets including protests, organizations, and educating local

communities. The fight for their cultural rights emphasizes the importance of a holistic anthropological approach to all future research in Hawaii. Community-based archaeology allows for the Hawaiian people's voices to be heard throughout the research process. As seen successfully in Lima et al. (2019) research, the process allows for local communities to be hands-on with their history and allow community members to share their opinion and stories of sites. Additionally, it allows the community to take the lead and control all aspects of the project to mold research around their needs. Based on the information discussed and to answer the proposed research question, community-based archaeology would benefit both the fishponds and the community. Altogether, it is recommended that community-based archaeology should be used as the primary research method when conducting archaeology on Native Hawaiian fishponds.

Best-practice methodology in community-based archaeology

For future research to be successful community-based research on Hawaiian fishponds needs to be as anthropological as possible. Archaeology on fishponds should not only document the physical structures but should involve the community observing, participating, and providing feedback during the research process. To understand the opinion of Hawaiian people the incorporation of ethnographic communication through interviews should be used to recognize the importance of Hawaiian oral history. Additionally, researchers must embrace and understand the Hawaiian culture and their natural heritage connection. Overall, only through dedication and methodology centered around the Hawaiian people will archaeology be successful on fishponds.

Centering the results on the Hawaiian culture and fishponds, five key factors are recommended as best-practice methodology for community-based archaeological research. First is building relationships and trust between the Hawaiian people and researchers. Archaeology in Hawaii has failed in the past due to researcher abandonment, misinterpretation, and a lack of voice from the Hawaiian people (Kawelu 2015:35–36). Lima et al. (2019) states that a partnership needs to be created between researchers and the local Hawaiian community where goals for the proposed projects can be discussed and have consent granted. In cases of development and private ownership, the Hawaiian people should be consulted as it is their history. Reviewing previous

successful projects globally, including Smith and Waterton (2012), Lewis et al. (2022), Pikirayi and Schmidt (2016), Greer et al. (2002), and Wei (2015), researchers involved in archaeology need to be invested in the community and cultural sites. For Hawaii, this involves researchers not abandoning fishponds and the Hawaiian community with which they are engaging. When possible, archaeological research should be initiated by or with the help of the Hawaiian community, and the voices of the community should be followed as they are a living culture (Kawelu 2015:57–58). Researchers, when incorporated, need to act as sources of knowledge for methodology in the marine environment and ensure their availability when their assistance is needed. Upon conducting research, the community and researchers have a shared responsibility for the fishpond, and a system of checks and balances should be enacted to keep track of each other. Overall, successful research on fishponds will be a joint effort on behalf of investigators and the Native Hawaiian community.

Second, is the consultation of the community throughout the research process. The benefit of the archaeology must be presented to the community during the meetings and weighted with the community's priorities. Research should only be conducted at the request of or in consultation with the local owners of the fishpond and the Hawaiian people. The project direction should ultimately be outlined by the community in consultation with archaeologists. This process would allow for the community to take the lead while receiving help from professionals. In preliminary meetings, community speakers should be established to communicate the needs of the fishpond environment and concerns of the local community or organization regarding archaeological impacts (Greer et al. 2002), (Fuary 1991), and (Atalay 2012). Atalay's idea of community research teams can be established to provide a set group to speak and act on behalf of the community. A research team would reduce the stress on a singular individual and allow for a more variety of opinions.

Focusing on the research process, the researchers need to work directly with Hawaiian community members and fishpond stakeholders, ensuring to always ask for feedback. To judge project success, researchers can use surveys, feedback forms, and interviews similar to Lewis et al. (2022) to gauge the opinion of the local population. In addition, it is crucial to conduct progress reviews not only to keep the project on track but to ensure the community's opinions are

heard and make updates if necessary. Altogether, by consulting directly with the community, researchers allow the Hawaiian people's point of view to be presented and honored throughout the research process.

Third, is the use of community participation in every aspect of archaeology conducted on fishponds. As seen in (Kawelu 2015:35–37), the Hawaiian people portray worry over archaeology and its contribution to their history creating the need to make all future research as anthropological as possible. Using community, participation, as seen in Lewis et al. (2022), leads to a sense of community responsibility and opinion of making a valued contribution to history. To create this opportunity for the Hawaiian people, research conducted in Hawaii should strive to include the Hawaiian people in researching Hawaiian aquacultural history. Community participation can be from community members, individuals with direct ties to the site, and with permission, outside volunteers. Communities can additionally be connected through local youth programs, schools, and families. Local programs in Hawaii should be met with and invited to join sites as an educational opportunity and learn about Hawaiian culture and archaeology. Lima et al. (2019) had recent success by including students and the community in Hawaii, providing a basis for future projects through educating volunteers.

Cornwell's (2020) data shows the importance of engaging the youth in Hawaiian and the need to focus on them during research. By participating in archaeology, the youth can be educated on Hawaiian history, building a relationship with local pond owners and their community. During the projects, youth will be under the supervision of elder community members and researchers for the successful completion of the project. Creating hands-on experiences for the youth will allow them to gain a deeper understanding of these preserved sites spreading knowledge of fishpond through the community. Excavation methods, if conducted, should be conducted by the community with the supervision of researchers. The goal of research should be to allow communities to engage with their history as much as possible. Engaging the community builds a capacity for the Hawaiian people to conduct their own archaeological research and be responsible for their history (Kawelu and Pakele 2014:63–69). Ultimately, allowing for participation is fundamental for bringing archaeology to fishponds, as it not only gets the

community connected with the site but also shows them how they can take charge of their history.

Fourth, is recognizing the multiple knowledge systems present in Hawaii. In Hawaii, pre-colonization, there was no form of writing aside from drawing petroglyphs, so most history was in the oral record. Hawaiian petroglyphs are symbols and depictions of events carved into stone. The petroglyphs marked areas of significance for religion and worship acting as symbols representing the knowledge of the carver (Lee 2002:79–81). Areas marked with petroglyphs were usually *kapu* due to their presence creating "power" locations where *mana* (spiritual power) was gained from the carving (Lee 2002:81). Petroglyphs usually mark caves, lava tubes, and cracks, possibly due to their connection to the underworld. Additionally, petroglyphs also marked area boundaries and safe trails for travel. Unfortunately, due to not knowing the minds of the artist, the meaning behind petroglyphs is still up for speculation (McCoy and Codlin 2015:3). However, using early anthropology work, researchers can identify meaning at least in the recent past (Lee 2002:79–81). Due to their significance to the Hawaii culture, petroglyphs should be recognized as a knowledge system when conducting archaeology on Hawaiian fishponds. If possible, when conducting archaeology, researchers should be vigilant to spot their presence and record their location. Furthermore, where petroglyphs are present during fieldwork, researchers should incorporate them in their data as they could connect to other areas and allude to the history of the site.

Hawaiian oral history acts as the primary system of historical knowledge for the region. The history of Hawaii is passed down from generation to generation through personal accounts of events and stories of ancient Hawaii. The *kupuna* are the primary oral historians of knowledge and traditions in Hawaii. As seen in Dooley and Mowat (1979), *kupuna* can provide historical accounts not present in any other area of recorded Hawaiian history. For the Hawaii people, *kupuna* connect them to "those who are no longer living" so that their ancestry and teachings can never be lost (Holmes 2012:1). On fishponds, the pond managers can offer insight into its history, providing information on historical management and how the structure changed over generations. In addition, to acquire a larger point of view, community members can be met and consulted for their personal and historical accounts of the fishpond. When selecting speakers to

represent the Hawaii community, these oral historians should be consulted to provide a voice for the people of Hawaii, past and present. Overall, Hawaii has multiple systems of cultural knowledge, and out of respect for the Hawaiian people, researchers of Hawaii fishponds should incorporate these systems in their research.

Lastly, methodology, including excavation techniques, surveying techniques, and community outreach needs to be constructed around each individual Native Hawaiian fishpond site. As Schmidt and Pikirayi (2016), Jokiel et al. (2011), and Mills and Kawelu et al. (2013) highlighted western techniques could be detrimental outside of the correct context. Hawaiian fishponds represent unique structures in the marine environment, and each fishpond is distinctively constructed compared to the next. Research should strive to be in line with Hawaiian traditional management practices, including religion and sustainability of resources. The proposed project should connect the Hawaiian people with the site. The pond's importance in the local history and future research needs to be presented in an understandable manner. Due to the destroyed and endangered state of pond structures, as alluded to in Apple and Kikuchi (1975:53), (Keala et al. 2007:7), and (Wyban 2020:140), the focus should be on the preservation of the fishpond, only using destructive methods at the discretion of the local community.

What happens to the pond after the project is just as important as the research being conducted. Methods, including new management practices, modification to the site, and community programs, need to be outlined for pond activities following fishpond research. Additionally, a post-action plan should be laid out focusing on preservation, reconstruction, new research, and any future needs. If possible, so history is not lost, management of ponds should be under the Hawaiian people's discretion showcasing Hawaiian traditions to draw the community together. Wyban's (2020:172–175) recommendations of future uses for fishpond can be used to give back to the community and provide a source of income for site maintenance. The history of Hawaii should be showcased, presenting the importance of the fishponds to Hawaiian culture. Lewis et al. (2022) should be used as an example of contagious disease and archaeology for the safety of the Hawaiian community and researchers. Precautions, including social distancing, wearing masks, sanitation, and testing, should be conducted following the present local safety guidelines.

Overall, the methods conducted on the fishpond should be to mold ponds into areas that give back to the community through engagement, cultural practices, and tourism.

Conclusion

Community-based research is a well-accepted and developed methodology for archaeology worldwide. In the Hawaiian environment, community research is in its early stages and in need of a tested methodology. Success was seen recently in Lima et al. (2019), where researchers conducted community-based archaeology with students and community members on a Hawaiian Heiau. Most Native Hawaiian fishpond structures were abandoned and destroyed following the urbanization and colonialism of the Islands (DHM inc. 1990b; Wyban 2020). Due to the recent Hawaiian cultural resurgence, management has expanded, and these pivotal structures are coming into the view of communities and researchers. Discussed throughout the text is if community archaeology will truly benefit the fishpond and the community and if so, how should it be conducted. To discover these answers looked at were comparative subjects relating to community archaeology on fishponds as a sign of respect for the Hawaiian culture.

Focusing on the primary research question, addressed was community research and its successful examples around the world. In addition, examples in Hawaii were discussed showing a beneficial outcome for the community. To review, the benefit to the Hawaiian community comes from the community working hands-on with their history and determining how research should be implemented to match their goals. Unlike other physically based archaeology, community-based archaeology can allow for a holistic approach through interviews and the direction of the Hawaiian people. The Hawaiian community can voice their opinion to avoid the misrepresentation of the past and as a way to honor Hawaiian history (Lema et al. 2019). Looking at the successful example of Lima et al. (2019) community-based archaeology can help the Hawaiian people incorporate local traditions into the archaeology process thus molding research around the Hawaiian people for their benefit. For fishponds, the benefit comes from increasing site awareness and pond revitalization. The majority of ponds were destroyed due to urbanization with many being left in ruin (Wyban 2020). The community wants fishponds to be revitalized, historically recognized, and used as a future sustainable food source due to the high

cost of living in Hawaii (Hsu et al. 2008; NOAA 2017:60; Wyban 2020:152). Community-based archaeology can bring the ponds into public view allowing them to be revitalized and increase their historic recognition. Following the current fishpond management practice, more community organizations can be created for ponds allowing fishpond practitioners to increase the spread of education for Hawaiian cultural practices. Overall, using the presented data, conducting community-based archaeology on Hawaiian fishponds will benefit both the community and the fishponds.

Reviewing the secondary question on how community-based archaeology should be implemented, five critical factors of best-practice are recommended to be used for community-based archaeology on fishponds. These best-practice methods are seen in (Table 1). The first method is having an established and trusting relationship as both the researchers and the community have a shared responsibility for fishponds. Second is that during research, using consultation and discussed communication strategies with the Hawaiian people is necessary as it will minimize errors and misinterpretations. Third, incorporating community participation in every aspect of the project will help build a capacity for the community to conduct archaeology on fishponds. Fourth, is the need for fishpond research to recognize the systems of knowledge in Native Hawaii to acquire additional knowledge. Lastly, building methodology around fishponds sites should be conducted to meet its individual needs, including environment, structure, and community opinion. Altogether, using these methods, it is hoped communities and researchers can study Hawaiian fishpond structures while being respectful of the desires and concerns of the Hawaiian people.

Table 1. Recommended methods for community-based archaeology on Hawaiian fishponds.

Number	**Methods**
1.	Establishing a trusting relationship between researchers and the Hawaiian community
2.	Consultation of the Hawaiian people throughout the research process using accepted communication methods

3.	Incorporating community participation in every aspect of fishpond research
4.	Recognizing multiple knowledge systems in Hawaii
5.	Building of methodology around fishponds

The significance of the research lies in the fact that as the Hawaiian cultural resurgence occurs, methodology needs to be established for the success of projects and the protection of Hawaiian culture. The presented recommendations act as a culmination of community research from successful projects, considering the pitfalls of past researchers interacting with the Hawaiian community and globally. Though significant, the presented research is limited due to its lack of input from the local community in Hawaii. To present the best outcome, the research reviewed what has currently been conducted in Hawaii and around the world, judging the collected information to create an outcome. Though the Hawaiian people's opinions should be paramount, there were limited academic articles and documents from groups or individuals in the Native community. Ultimately, Native opinions were judged alongside outside researchers to present an overall perspective of the state of research in Hawaii and create methods that fit the needs of all parties.

This research succeeds in reviewing and creating best-practice methodology for community archaeology on fishponds, though continued research is needed. Future projects should meet with Native Hawaiian communities proposing the recommended methods of community research. Updating should be made to the recommended methods based on feedback given by the Hawaiian people. The recommendations should then be tested in the field on new community-based archaeology projects. Any pitfalls and successes should be highlighted, and then the recommended methods should be updated for future use.

As a final note, youth programs, including the local YMCA and Kamaaina Kids, private and public schools, and families should be incorporated into archaeological research to connect to local communities. These programs will help build a foundation for a new generation that respects Hawaiian cultural heritage and archaeology. Pond managers recommend the use of

youth for community restoration as older generations abandoned the fishponds. As such, archaeology should follow suit and focus on individuals who will continue to care for the ponds for the next generation (Cornwell 2020:77–79). Overall, the presented recommendations only act as the beginning of the process of bringing community archaeology to Hawaiian fishponds. In-depth research is necessary, and it is up to the Hawaiian community and researchers to come together to discuss how fishponds will be studied.

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