



# K kulu Hou 'Ia Ka Loko I'a o K 'ie'ie (Rebuilding Kō'ie'ie Fishpond)

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## Abstract

Kō'ie'ie Fishpond is located in Kalepolepo Park of Kihei, Maui. It is one of Maui's 44 fishponds and, due to its condition, Kō'ie'ie Fishpond has the potential to be restored. In 1996, it was designated as a historic place. Of those 44 fishponds, ten are considered *loko kuap*, fish ponds that are built on a reef. Kō'ie'ie fishpond is one of the 44 loko kuapā that is about three acres in size. It is unknown who led the original building of the fishpond, but since its destruction over time, many *ali'i* chiefs have led restoration efforts toward rebuilding the fishpond. This fishpond was known for the raising of mullet and milkfish, which served as sustenance for the people of that *ahupua'a* (land division): the Ka'ono'ulu ahupua'a. This fishpond has been steadily uneconomically productive over the years due to the development in the area. Silt and *limu* (seaweed) have been accumulating in the pond, the fishpond currently has more recreational value than traditional value, and it is no longer used for sustenance. Therefore, the main purpose of this internship was to assist in the rebuilding of the Kō'ie'ie Fishpond. Besides this, I conducted a telephone survey and created a brochure. Water quality tests and beach profiles were also conducted. I assisted my partner in creating a video for advertising the restoration project and we were involved in a fundraiser for the restoration project. Educationally, we supervised many summer groups and informed them of the history and importance of the area. Culturally, we danced *hula* (Hawaiian form of cultural dance) weekly and planted *kalo* (taro) and maintained it. The future goals of this restoration project are to continue maintenance of the fishpond and use the area for educational purposes.

## Introduction

### History

In the heart of Kihei, Maui lies a historic landmark called Kō'ie'ie Fishpond (also named Ka'ono'ulu Kai and Kalepolepo), located in Kalepolepo Park. The Kihei area is best suitable for aquaculture instead of agriculture because of the climate

there which is very dry with little rain. This therefore makes fishponds the ideal means of subsistence in the area. There is no documentation of who led the original building of the fishpond, but there are traditional *mo'olelo* (oral history) about *menehune* (mythical race of people) building the wall in the 1400s. However, throughout the years, the original fishpond has been affected by erosion from wave action and other natural events such as hurricanes and earthquakes (*National Register of Historic Places Registration Form* 1990).

In the 1500s, 'Umi a Liloa, a High Chief of Hawai'i Island, also the District Chief of Kula, had the wall rebuilt. Shortly after the first rebuilding of the fishpond, Kō'ie'ie was later renamed Kalepolepo, meaning "the dirt," because the activities of over 10,000 people rebuilding the fishpond caused dust to rise into the air. In the early to mid-1700s, Kekaulike, the *m* ' island chief) of Maui led the second effort of repair work at Kō'ie'ie. During the 1800s, Kamehameha I led the third effort of repair work on the fishpond. The most recent reconstruction was in the 1840s under Governor Hoapili and a penal colony from Kaho'olawe (*National Register* 1990).

Between AD 1500 and 1880, Kō'ie'ie Fishpond was an economic resource that was important for its subsistence value to the people of the Kula District of Maui. Until the nineteenth century, Kō'ie'ie Fishpond was still utilized in raising and cultivating mullet. The fishpond serves as an example of the technological achievements associated with the development of Hawaiian aquaculture (*National Register* 1990).

In 1974, the pond was included in the Hawai'i Register of Historic Places Archaeological Registration Form: "This fishpond is not only a good representative of its type, but it is one of the few remaining fishponds on Maui. This fact adds to its interpretive potential and increases the need for protection of the site." It was then removed from the register in 1980, due to technicalities involving owner notification. It finally became redesignated as a historic place on the register in 1996 (*National Register*, 1990). In 1998, 'Ao'ao o Nā Loko I'a o Maui (the Association of the Fishponds of Maui) was created. This group oversees fishpond restoration projects on Maui.

### Description

Kō'ie'ie Fishpond is located on a fringing coral reef along the shoreline of Ka'ono'ulu Ahupua'a (also known as Kula Kai), a 5,715 acre ahupua'a. Kō'ie'ie Fishpond is the smallest and northernmost of three documented ponds that were present in Kula Kai (refer to Images 1 & 2). It is a loko kuapā type of fishpond, where the reef provides protection from wave action. This type of fishpond contains brackish water as the sea water

mixes with fresh water springs or nearby streams. For Kō'ie'ie Fishpond, previous freshwater input came from the original wetlands above the fishpond. However those wetlands no longer exist due to development in the area. This type of fishpond is a rock wall that is built higher than the highest tide of the year. It consists of round basalt boulders, coral, and pebble fill, and usually contains one or more *m k h* (sluice grates). These sluice grates contain vertical slates that allow small fish to enter the pond and prevent the larger fish from exiting ( *Maui Fishpond Association*). Kō'ie'ie Fishpond is considered to be of fair to poor condition and has the potential to be restored (*National Register* 1990).

From the deforestation activities that occurred upcountry the pond was filled with silt. This was during the late nineteenth century and caused a decrease in the original size of the pond (*National Register* 1990). As of today, current measurements are as follows: the fishpond wall is about 295 meters in length, five meters wide, and two meters in height. The depth of the fishpond ranges from two to seven feet. The fishpond encloses an area of about three acres. During minus and low tide, most of the wall is visible; during high tide, the center portion, which still needs to be restored, of the wall is submerged.

Currently, the beach area at the northern end of Kalepolepo Park is owned by Maui County. The site is a popular fishing and swimming area, and a portion of the shoreline serves as a base for the National Oceanic and Atmospheric Administration (NOAA) Hawaiian Islands Humpback Whale Sanctuary (HIHWS).

## Importance

Kō'ie'ie Fishpond holds great importance traditionally and culturally as seen through *mo'olelo* and *ali'i* presence and other prominent Native Hawaiian figures in Hawai'i's history. One well-known figure to impact Kō'ie'ie was David Malo, a Native Hawaiian historian. In 1843, he established a Christian Congregationalist Church (*National Register*, 1990). Some *mo'olelo* tell of the menehune who built the wall and Kikau (a *kilokilo* or divining priest), who was skilled in communicating with the menehune. Other *mo'olelo* talk of Mokuhinia, the *mo'o* (gecko) deity that visited the area when a son of Kekūanao'a, Lot Kapuāiwa Kamehameha, passed away (*Ka Po'e Kabiko: e People of Old*, 83). This loko kuapā was mainly reserved for the ali'i and was visited frequently by several high ranking ali'i:

- Kahekili II, a *m* of Maui, used the fishpond as a food source during the late 1700s
- Kekūāiwa, the child of Kamehameha I and Kaheheimālie, died in the area in 1815
- Hapakuka Hewahewa lived and had local control there until he died in 1848

- The area was visited by Kamehameha III, IV, and V between 1850 and 1870

## National Register, 1990

Fishponds in the ancient days were a means of subsistence. It is an aquacultural structure that is designed and built for purposes of raising fish and other aquatic resources. In order for the future to be sustained with food, it is very important to bring back the ancient ways of sustainability and management. Thus, the future generations can also benefit from the rebuilding of the fishpond. Rebuilding the fishpond will allow the area to be replenished with fishes and other marine organisms, as we have seen an increase of organisms in the fishpond over the years. Rebuilding the fishpond will give us the opportunity to use the site as a reference point, where the past and the present can be brought together and be compared.

Recent studies in fishpond dynamics have demonstrated the economic benefits of understanding traditional fishpond technology and its application to modern aquaculture management. The economic, political, and religious importance of aquaculture to the Hawaiian culture is well-represented in the history and setting of Kō'ie'ie Fishpond. The presence of the many ali'i at the fishpond indicates that the pond was royal; in that its produce was the property of the high chief. The political and religious importance of the fishpond was indicated by the presence of two *heiau* (place of worship) inland of the ponds: Kala'ihī and Ke'alalīpoa (*National Register* 1990).

There is very high potential for the restoration of the pond because of its historic and archival significance. Through the efforts of 'Ao'ao o Nā Loko I'a o Maui, the fishpond has been able to be rebuilt, however without enough funding, production is sporadic. The area currently provides public education, and will serve this purpose throughout the future. One of the main ideas it teaches is traditional aquaculture as a means of subsistence. Future threats of rebuilding the Kō'ie'ie Fishpond still include natural events such as erosion from wave action and earthquakes. The wall has to be built as strong as possible without machinery so it will be able to withstand the pounding waves and rising tides over time. Regular maintenance is needed for the fishpond to once again become sustainable.

## Methods

Before conducting activities at the Kō'ie'ie Fishpond, we (the restoration crew) participated in protocol. An *oli* chant named "He Mele No Kō'ie'ie" was created for this fishpond by Luana Kawa'a (refer to Fig. 2). Every morning before we started work on the wall we chanted this oli. In rebuilding the Kō'ie'ie Fishpond, one of the things we did was gather *'ili'ili* (coral rubble and small rocks) into buckets and poured them

on top of the wall; this served as a cement, which filled the gaps between the larger rocks and made the wall stronger. We also stacked rocks into piles, then moved those piles through a train of people, to be stacked onto the rock-wall. To conduct these tasks, the proper equipment is needed: tabis, gloves, back-brace, long sleeve shirt, shovels, and buckets. Tabis and gloves protect against certain marine life, such as *wana* (sea urchin), shells, and fire-worms. Long sleeve shirts help protect against scratches and cuts when grabbing rocks, and it helps protect against fire-worms.

As a part of 'Ao'ao o Nā Loko I'a o Maui, we wanted to know, through a random telephone survey, how well aware the Maui residents were about our restoration project. In conducting the telephone surveys, I went through the Maui phone book and randomly selected households. I followed a questionnaire that took about two minutes to complete (refer to Fig. 3). The questionnaire asked people about the Hawaiian culture, preservation of Maui's fishponds, if they had heard of the restoration project at Kō'ie'ie, and if they wanted information about the fishpond and/or the project itself. The results of the survey could also help gain funding for the restoration project.

Another project I conducted was creating a brochure about Kō'ie'ie Fishpond, which will be handed out to visitors of the area. This brochure focuses on Hawaiian values that can be exercised at Kō'ie'ie Fishpond and/or other cultural sites throughout Hawai'i. The brochure includes simple ideas, such as *m lama* (take care), *k kua* (help), *maka'ala* (safety), *laulima* (cooperation), *mahalo* (respect), and *kuleana* (responsibility). It also includes reasons why the fishpond is special and why it's important to respect the values there.

In order for the restoration process to continue, I assisted my partner in creating a few videos of the fishpond to hopefully be broadcasted on Maui's Akakū channel (#54). Our mentor chose one of these videos, which will serve as an advertisement for the fishpond, informing Maui residents of the restoration project at Kō'ie'ie Fishpond and when and/or how they can contribute to the rebuilding of the fishpond. In carrying out this method, the association borrowed video equipment from Akakū.

My partner and I helped Joylynn Paman (our mentor and the association's executive director) with conducting a fundraiser for the fishpond. We have participated in Kamehameha Golf Course's "Closest to the Hole" competition on Maui, with the purpose of raising money for the restoration project. It was a day-long event where we informed golfers of our nonprofit organization. We measured the distance of participants' golf balls from the hole, and the winner would be the person whose ball was closest to the hole.

Other miscellaneous projects we did (which will be

discussed in more detail in the "Results and Discussion" section) were dancing *hula* weekly (to be performed at the end of the summer potluck for our visitors and residents in the area), planting *kalo* to create a *lo'i* (taro patch), landscaping the park and the NOAA HIHWS area twice a month, and daily removing of *limu* from the shoreline. We also assisted in building a storage shed for our equipment and weekly supervised many summer groups of children in elementary to high school. The projects my partner and I worked on alongside the staff at the NOAA HIHWS were conducting weekly water quality tests to monitor bacteria in the pond, monthly examining zooplankton, and monthly conducting a beach profile.

## Results and Discussion

For the main project during this internship which lasted ten weeks, rebuilding the Kō'ie'ie Fishpond, about eighty feet was added to the wall in that short amount of time. However with the daily tides and waves, the wall would fall apart in certain areas, in which we would spend additional time fixing those areas before we could move on to continue rebuilding other parts of the wall.

Conducting the telephone survey (refer to Fig. 3) was very difficult and required much patience. Of course no one wants to participate in a telephone survey, so I got many negative comments. However I did get the information I needed to complete the survey. The first telephone survey was conducted in the year 2002. In that survey, 350 people participated. In the year 2009 telephone survey, 150 people participated. I called 250 people: 150 people took the survey and the other one hundred people were not interested in taking the survey. There were many households that did not accept blocked calls, and a lot that did not answer (which could have been because I was conducting the survey during working hours). After completing the survey, I compared my results with the results of the first survey (refer to Fig. 1).

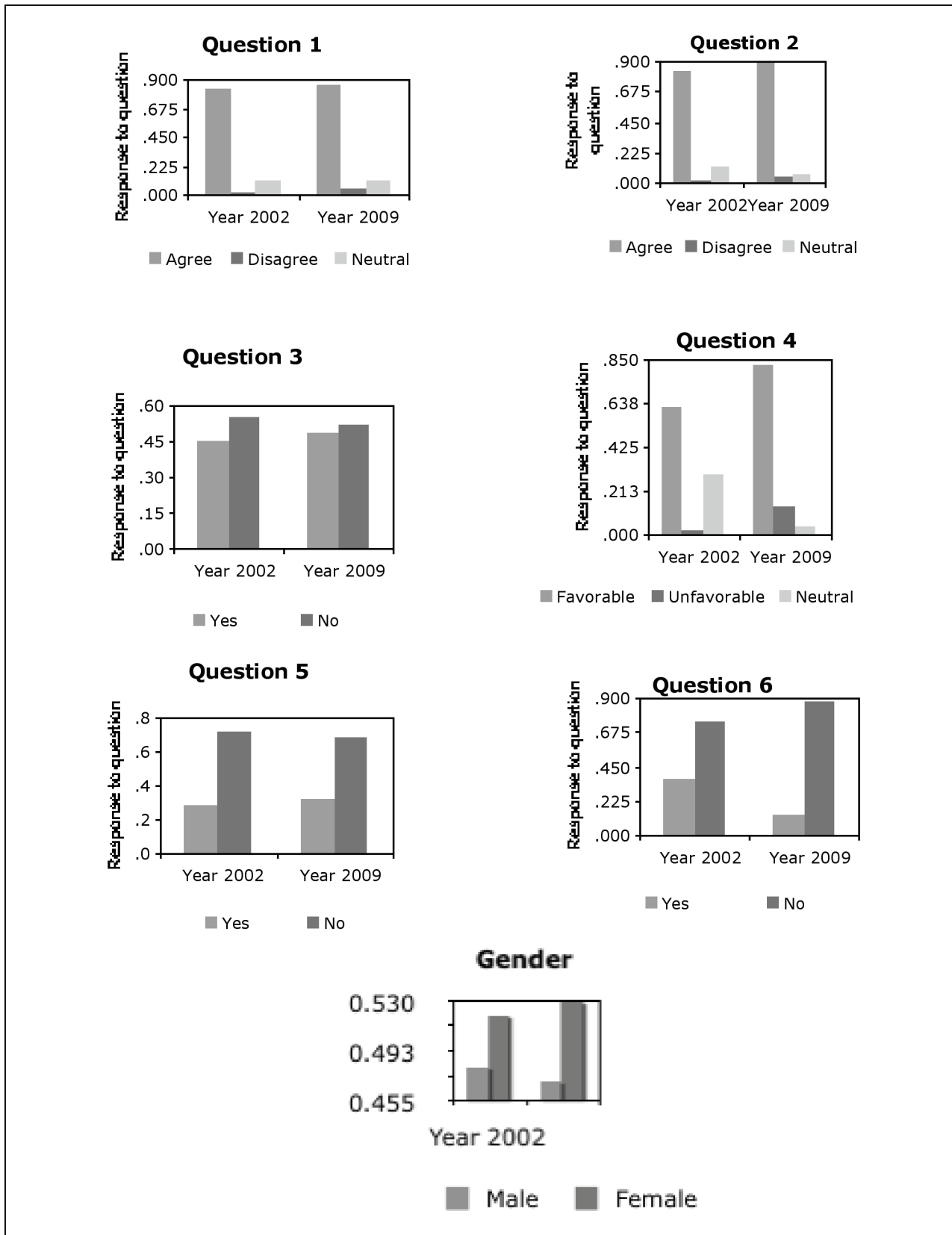


Figure 1. The graphs respond to the 'Ao'ao o Nā Loko I'a o Maui Telephone Survey.

In comparing the first survey's results to my results, more people agreed to question 1 and 2: 1) that the Hawaiian Culture should be preserved and 2) that Native Hawaiian fishponds on Maui should be preserved for Hawaiian culture and education purposes. More people said yes for question 3 and 5: 3) if they were aware of the Kō'ie'ie Fishpond restoration project and 5) if they had heard of the nonprofit, 'Ao'ao o Nā Loko I'a o Maui; yet, the majority said they did not agree in both. In question 4, more people had a favorable impression of the fishpond restoration project. In question 6, less people said yes for more information on the Kō'ie'ie Fishpond restoration project. Also, more females participated this year.

As stated earlier, the results of the surveys help to gain funding for the restoration project. For example, the results for questions 3 and 5 showed that currently, more people are aware, however, the majority is not aware. According to these results, we need to advertise more to reach those whom are unaware of the restoration project.

The brochure has been completed since my departure from the internship in Maui, and is currently in the printing process. My partner and I made a substantial amount of money for the association during the golf fundraiser because of participation in the competition, where participants paid a fee. The *hula* we learned could not be used for the end of the summer potluck because of time restraint. The *lo'i* we created was watered and maintained daily.

Due to the formation of the current fishpond (the opening on the North side of the wall), *limu* accumulates daily in the pond; therefore we gathered the *limu* and placed it offshore. It is important to do this not only because it is an eyesore and creates a stench when the tide goes down, but also because of its marine importance. Since the fishpond is surrounded by residential and commercial areas, many extra nutrients (nitrogen, phosphorus, and bacteria) are added into the water this therefore creates more *limu*; which is not a problem, unless there is enough herbivorous fish to eat it. The *limu* then smother coral reefs, which will eventually cause a decline in coral abundance of the area.

For days when the weather was unfavorable for rebuilding the wall (high tide, strong wind or rain), we spent the afternoon landscaping the park area and the NOAA HHHWS area. At the start of the internship, there was no storage room on site for the equipment. Later in the internship the association bought a storage shed; which we all assisted in building.

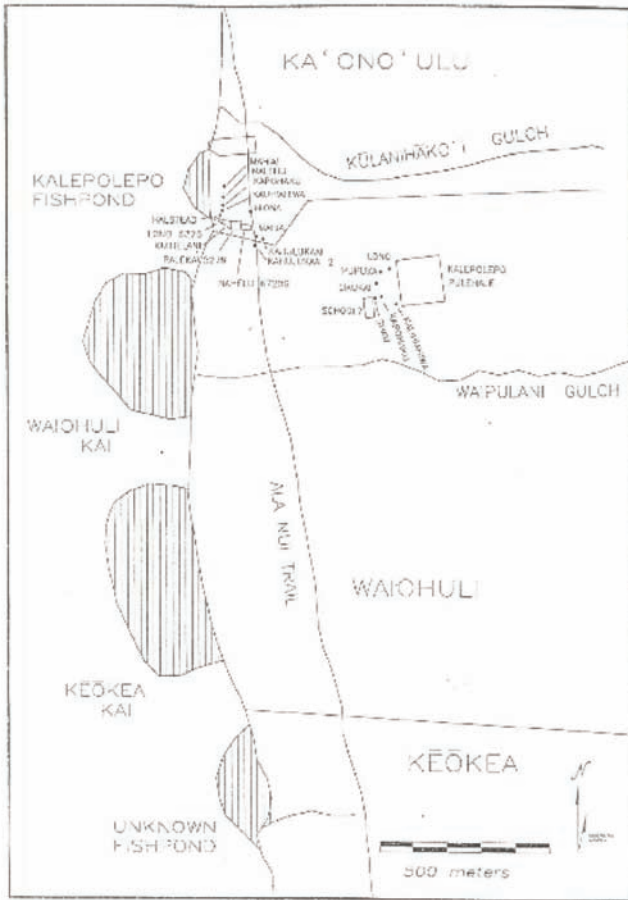
Throughout the internship there were many summer groups of children that assisted in rebuilding the fishpond. On days when we supervised those groups, they were split into smaller groups in which they could spread out to find rocks, then pass and place them into a pile, where the piles could be later passed to the rock wall for stacking. Other groups would

gather *'ili'ili* into buckets and pass those buckets to the stacking area.

The water quality tests had to be postponed for a while because we used Menehune Water Co. water. This water is ozonated, meaning that it kills bacteria; therefore, killing the bacteria we were testing for. The purpose of conducting the water quality tests was to find out if fecal bacteria was present. There were a hundred counts of fecal bacteria in the fishpond at one time, but not during our study there. This bacteria was tested in the lab and presence of the bacteria was identified by a fluorescence color.

My partner and I also assisted the NOAA HHHWS in examining zooplankton. The water quality test samples were also used in this method, however, here we observed the bacteria under a microscope to identify certain the types and counted their abundance. The main zooplankton that we were looking for was not present in the fishpond, which is very good information because it was a harmful bacteria.

Since the beach profiles were only conducted once a month, the only trends we saw were through natural observation of the shoreline; in which the wind would accumulate the sand into dunes, and the ocean would recede to the sand. Generally, all the projects (big and small) were successful in that my partner and I learned from the experiences and could create conclusions based off of them. For future goals, continual maintenance needs to be conducted so the purpose of rebuilding the fishpond (cultural and educational purposes) can be fulfilled.



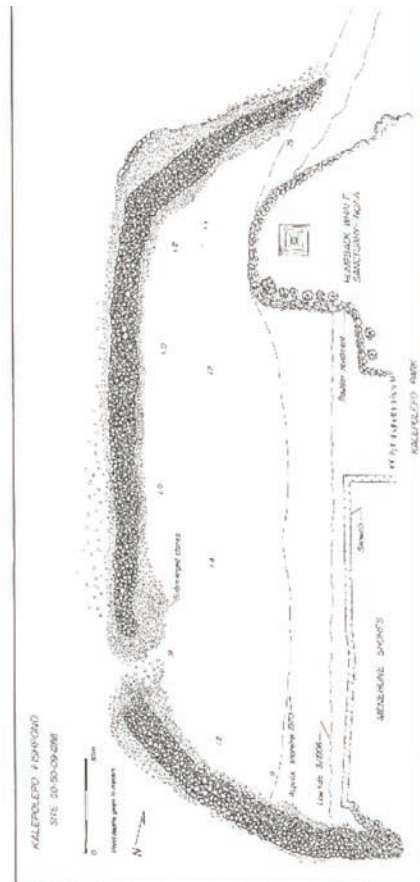
Kalepolepo in the Nineteenth Century (Kolb 1995:63)

Image 1. (National Register 1990)

Figure 2. (Luana Kawa'a, 2005)

## He Mele No K 'ie'ie

Mālie 'o Maui i ke ahehe makani 'o Haleakalā,  
 He makani onaona i ke 'āla lipoa  
 'O Ka'ono'ulu la i ka 'āina 'o Kula la'i e, ie, ie  
 He kai mālino, kai 'olu'olu, kai mā'oki'oki lā  
 He kai kapu a Kanaloa  
 Kū lālani nā 'ao'ao o ke kuapā,  
 I nā pōhaku hō'eu'eu i ka lepo o Kalepolepo lā e  
 Wili 'ia ko 'ie a pa'a, ko 'ie'ie 'o ka uka  
 Eia ka loko i'a kapu a nā alii, nā alii kaulana, wiwo'ole lā  
 Nā alii pio'ole  
 Pi'i a'e ke kapu, ka welo alii 'o Maui nui a Kama  
 E komo mai e nā hoa, nā kūkulu, nā paepae e  
 E komo mai, e hānai ai a hewa ka waha  
 Eia no ka uku lā, a he leo, he leo wale nō e



Scaled Plan View Map of Kalepolepo Fishpond (SHPP 1996)

Image 2. (National Register 1990)

Calm and serene is Maui in the gently wafting breeze  
 A wind made fragrant by scent of lipoa  
 Ka'ono'ulu in the tranquility of Kula  
 A calm sea, a refreshing sea, a sea streaked by various colors  
 The sea consecrated to the God Kanaloa  
 Lined are the sides of the fishpond,  
 The sides of the kuapā are aligned  
 By the stones passed hand to hand, stirring up the dirt of  
 Kalepolepo  
 The 'ie vines are firmly fastened, the 'ie vines gathered in the  
 uplands  
 Here is the sacred fishpond of the royals, the famous royal,  
 the brave  
 The royal ones who live on, inextinguishable  
 Their sacred status is elevated, the royal heritage of Maui  
 Nui a Kama  
 Enter, friends, builders, supporters  
 Enter and feed until the mouth can take no more  
 Here is the fee, a voice, a simple voice.

### Figure 3. 'Ao'ao o Nā Loko I'a o Maui Telephone Survey

Aloha, my name is \_\_\_\_\_, and I'm calling from a nonprofit organization on Maui. We are doing a quick survey to get a better understanding of our community in relation to our project and we would like to ask for two minutes of your time to complete this survey.

1. Do you agree or disagree that the Hawaiian Culture should be preserved?

- Agree
- Disagree
- Neutral

2. Do you agree or disagree that Native Hawaiian fishponds on Maui should be preserved for Hawaiian culture and education purposes?

- Agree
- Disagree
- Neutral

3. Are you aware of the Kō'ie'ie Fishpond restoration project in Kihei? If yes, ask Q. 4.

- Yes
- No

4. Do you have a favorable or unfavorable impression of the fishpond restoration project?

- Favorable
- Unfavorable
- Neutral

5. Have you heard of the nonprofit, 'Ao'ao o Nā Loko I'a o Maui also known as the Association of the Fishponds of Maui?

- Yes
- No

6. Would you like more information on the Kō'ie'ie Fishpond restoration project? If yes, get participants information.

- Yes
- No

## Acknowledgements

'Ao'ao o Nā Loko I'a o Maui President Uncle Bully Kimokea Kapahalehua and Executive Director Joylynn Paman.

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## Works Cited

Kamakau, Samuel M. *Ka Po'e Kabiko: e People of Old*. Honolulu: Bishop Museum Press, 1964.

Kawa'a Luana. *He Mele No Kō'ie'ie*. 2005

*e Maui Fishpond Association*. 2004. 'Ao'ao o Nā Loko I'a o Maui. June 2009 <<http://www.mauifishpond.com>>.

United States Department of the Interior, National Park Service. *National Register of Historic Places Registration Form*. Maui County, Hawai'i: October 1990.