

Aiding the Reintroduction of Limu Products in Kaneohe



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Abstract

Hawai'i is distanced from global production centers that produce imported goods for most of its food supply. Over time, imports have reduced the prevalence of traditional cuisine and contributed to cultural erosion. Our project goal was to conduct research for the PAF and Sea Grant Hawai'i to facilitate the reintroduction of a locally grown, traditional limu product to the Kaneohe community. Through interviews and surveys, we evaluated distribution methods, community outreach strategies, and consumer interests. Through our findings, we made recommendations that included an expansion plan, community outreach strategies, and limu product ideas to ease our sponsors' entrance into the market with their limu product.

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Authorship

The contents of this report are a result of the collaboration among all authors. Since we completed all writing and editing together, we all share equal authorship of all sections of this report. The views and opinions expressed in this analysis are those of the authors and do not necessarily reflect the official policy or position of the Pacific American Foundation, Sea Grant Hawai'i, or NOAA.

Executive Summary

Hawai'i and other small island states are forced to rely on imported goods for much of their food supply due to their far distances from global production centers (Terrell, 2021). Relying on imported goods has forced Hawai'i to depend on large-scale food importation to feed residents of the islands. Mass food imports have resulted in cultural erosion, a process in which a society's core elements and traditional practices begin to degrade (Nurrie, 2020). Food imports have caused a decline in the expression of traditional Hawaiian cuisines as well as in traditional farming methods (Reppun, 2010). Growing traditional Hawaiian food locally can help reintroduce these cuisines back into the Hawaiian diet and feed the local community (Avalos, 2017). The Pacific American Foundation (PAF) and Sea Grant Hawai'i are collaborating on efforts to produce a limu product grown at Waikalua Loko I'a, an ancient Hawaiian fishpond, using traditional farming methods. The PAF's overarching goal is for Waikalua to become a food source once again for the Kaneohe community.

The goal of this project was to conduct research for the PAF and Sea Grant Hawai'i to facilitate the reintroduction of a locally grown, traditional limu product to the Kaneohe community. This was done with the intention of providing an action plan for our sponsors to transition from the research phase to the startup sales phase of limu production.

The first objective in achieving our project goal was to analyze viable distribution methods for the PAF's limu product. We conducted semi-structured interviews with individuals from multiple types of distribution organizations for local produce. The distribution methods we researched consisted of community supported agriculture organizations (CSAs), farms/ranches, and a local school lunch program to distribute the limu product.

From our semi-structured interviews with these organizations, we determined the viability of each organization's fit for distributing the PAF's limu products. We determined that CSAs operating on Oahu as well as the school lunch program are too large for the sponsor's current limited rate of production. However, farms and ranches that have marketplaces open to the public will be a better fit for a start-up aquaculture organization like the PAF, as they have fewer requirements for partnerships and work on smaller scales. Interviewees from these farms and ranches conveyed that they do not require partnered organizations to meet high demands for product supply, allowing easier entry into markets for new producers. Although CSAs and school lunch programs are not good options at this time due to current production limits, as the PAF increases their limu production rates in the future, these organizations may provide ideal partnerships for the PAF.

The second objective was to develop a strategy for the PAF for outreach to the community of Kaneohe, which is the target demographic for their limu product. To complete this objective, our team created several brochures, as they are quick and inexpensive to produce, to then be dispersed by the PAF amongst members of the community. These different brochures will relay general information about the pond and sponsors, convey the health benefits of limu and how to prepare it, and express cultural significance and quotes from kūpuna (elders). The necessary information was collected through research and semi-structured interviews.

To produce a quality brochure, we conducted research to understand the key components of what made a brochure effective. Therefore, our brochure contains relevant information to invoke the target audience's attention. With the help of the sponsors, who are also members of the Kaneohe community, we selected information regarding the PAF and limu to promote the limu product.

From our research at the food tasting event, we created 3 more brochure designs. Each of these designs allow the sponsors to convey more specialized information including community events, limu recipes, and cultural stories. Brochures are helpful when explaining the mission of an organization, educating the readers, and promoting events (Community Tool Box, n.d).

The third objective of this project was to identify the interests of our sponsor's target demographic. To accomplish this, we conducted consumer interviews at various farmers markets on Oahu and hosted a community food tasting event.

From our consumer interviews, we gathered a general idea of what consumers think about limu, how they consume it, and how they get limu. The general response from most participants that were willing to speak with us was that they have a harder time finding limu at stores and farmers markets than they used to. The same people expressed that they would be interested in purchasing limu grown at the Waikalua fishpond. This demonstrated that people are still interested in limu even though it is less common. The feedback identified that respondents were most likely to consume limu in poke and in a pickled form. Poke is a dish that permeates Hawaiian culture and is usually a rice bowl with fish and other toppings. The team solidified these findings at a food tasting event at Waikalua with PAF docents as well as other Kaneohe community members. The food tasting gauged the participants' opinions on fresh manaua, dried manaua, fresh 'ula 'ula, dried 'ula 'ula, manaua poke mix, and pickled manaua. The surveys allowed the team to determine the limu variants that were most enjoyed by consumers. A picture of the different limu variants offered at the food tasting can be seen in Figure A.



Figure A: Food Tasting Limu.

The data was compiled to inform the recommendations for our sponsors to provide actionable items for the growth of their organization. We recommend that the PAF expand their business partnerships to process and distribute their limu, further their community outreach strategies, and expand their product line alongside gathering more consumer data. For expanding their business partnerships, we recommend they begin processing limu in collaboration with a commercial kitchen, which is a requirement for processing food that will be sold to the public. Furthermore, the sponsors should reexamine their distribution strategy as their business grows. Distribution of limu should start with local farm stands/ranches, expanding to CSAs and finally partnering with large commercial organizations. Additionally, we recommend our sponsors expand their community outreach through brochure distribution and an increase in their social media presence. To help them accomplish this, we provided a specific plan that will allow them to reach the community as well as market their products. Finally, we recommend that our sponsors expand their product line and gather more consumer opinions on their new products. Expanding their product line will diversify their revenue streams as well as reach a larger audience. This would allow the PAF to determine which products are the most successful with their consumer base and reduce waste. It is our hope that our team's research and

recommendations will aid the PAF's entry into the local limu market and help the organization achieve its goal of reintroducing limu products to the Kaneohe region.

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1 Introduction

1.1 Cultural Erosion in Hawai'i

Small island states, such as Hawai'i, that are distanced from global production centers must rely on imported goods for much of their food supply (Terrell, 2021). Large scale importation of food has been a short-term solution to Hawai'i's lack of resources. A consequence of mass food imports is cultural erosion, a process in which a society's core elements and traditional practices begin to degrade (Nurrie, 2020). One aspect of cultural erosion in Hawai'i can be seen in the decline of Hawaiian culinary traditions (Reppun, 2010). Growing traditional Hawaiian food locally can be utilized to combat cultural erosion (Avalos, 2017). The goal of this project was to conduct research for the PAF and Sea Grant Hawai'i to facilitate the reintroduction of a locally grown, traditional limu product to the Kaneohe community.

1.2 Project Sponsors

The Pacific American Foundation (PAF) is a nonprofit organization that serves Hawaiian communities through educational experiences (H. Lee, personal communication, November 9th, 2022). The PAF works with many local schools and has partnerships with various organizations across Oahu. Since 1995, Herb Lee and other volunteers has continued restoration of the pond through the removal of mangroves and rebuilding of the rock wall that encloses the pond (H. Lee, personal communication, January 9th, 2023).



Figure 1: Waikalua Loko I'a.

The U.S. National Sea Grant program is a government program that supports coastal communities through educational experiences and research. The National Sea Grant works with 34 universities across the country to research topics that focus on sustainability, traditional practices, and aquaculture (University of Hawai'i Sea Grant Program, 2018; NOAA, 2018). The University of Hawai'i Sea Grant College Program has since partnered with the PAF to reconnect the Kaneohe region with edible algae.

1.3 Collaboration of Project Sponsors

The PAF and Sea Grant Hawai'i are collaborating to restore Waikalua Loko I'a in an effort to produce an edible algae product that can be used to revitalize a part of the culture within the Kaneohe community. The president and CEO of the PAF, Herb Lee, expressed that “for the next 25 years we want to focus on the original intent of the pond [Waikalua Loko I'a] to grow food to feed the community” (H. Lee, personal communication, November 9th, 2022). The first food product the PAF and Sea Grant Hawai'i grew at Waikalua Loko I'a is edible algae. The PAF and Sea Grant Hawai'i hope to later expand to other food sources including fish and sea cucumbers (Kai Fox, personal communication, January 9th, 2023). To kickstart algae production, the PAF and Sea Grant Hawai'i set up 26 1,000-gallon tanks at Waikalua Loko I'a that grow edible algae. The PAF hopes to expand production into Waikalua Loko I'a once the appropriate growing conditions have been met. The PAF and Sea Grant Hawai'i's overarching goal for this pond is to serve the community with a sustainable food source and reintroduce

Hawaiian culinary traditions (H. Lee, personal communication, November 9th, 2022).

2 Background

2.1 Effects of Colonization in Hawai'i

Hawai'i's discovery by British captain James Cook in 1778 was the catalyst for western influence reaching Hawai'i (Ashley, 2007). After this initial contact, an American investor, William Hooper, opened the first sugar plantation in Kauai on leased land which began the westernization of Hawai'i (Doak, 2003). The rivalry between the United States and the British Empire culminated in the Paulet affair where Britain occupied the islands for a period of five months. It ended with the arrival of US warships to defend Hawai'i (Bryant, 2020). Hawaiian land became the battleground between two world powers that wanted to exploit the islands for cash crops. The rivalry between the British Empire and the U.S. caused significant cultural erosion in Hawai'i. Ultimately, the United States defended the independence of Hawai'i from the British Empire with the goal of expanding U.S. influence over the archipelago (The Polynesian, 2000).

Hawai'i has faced further cultural erosion since its annexation by the United States in 1898. As a result of U.S. annexation, Hawai'i experienced an influx in immigration of haoles¹. This sudden increase in population shocked the Hawaiian economy and strained local resources. An immediate solution to this was to increase imports to Hawai'i to feed the larger population (Rosa, 2010). The United States took more direct control of Hawai'i to match the increased need for imported goods (Ferguson & Turnbull, 2010). In the short term, these actions grew the Hawaiian economy, but started a cycle of cultural erosion (Croix, 2010).

Through its heightened control, the United States took two actions: the subsidization of the military complex in both private military contractors as well as U.S. military organizations and the promotion of Hawai'i as a tourist destination. The U.S.' military presence in Hawai'i increased dramatically following Hawai'i's statehood, thus accelerating the military complex into a prominent industry in Hawai'i. The subsidization of the military industry prevented local industry, like fishponds, from developing due to internal workforce migration. U.S. military jobs offered higher wages for Hawaiian locals, which became more desirable than lower paying local industries (Ferguson & Turnbull, 2010). Westernization transformed fishponds from a sustainable community resource to an unprofitable production method that was replaced by imports (Wyban, 1989).

In the 1920s and 1930s, an expansion in knowledge of Hawaiian culture in the continental United States sparked tourist's curiosity of what the islands had to offer (Laird,

¹ The Hawaiian term for non-native Hawaiians, usually white people (Collins, 2010).

2018). By the 1950s, tourism became the largest industry in Hawai'i (Taum, 2010). This led to the fetishization of Hawai'i as an island paradise instead of a culturally rich archipelago that has its own complex heritage and people (Magraw, 2013). The affluence of the tourism industry led to the creation of artificial experiences for haoles, which saw no wealth transferred to the Kānaka Maoli² (Taum, 2010). As the tourism industry expanded, local industries suffered, which contributed to cultural erosion (Nurrie, 2020). To counter cultural erosion in a sustainable manner, local industry that aids Hawaiian culture must be prioritized.

2.2 Hawaiian Aquaculture & Fishponds

Fishponds were used as a traditional Hawaiian method of aquaculture that fed local communities. Aquaculture is defined as the farming of aquatic species and dates back over six hundred years in Hawai'i (NOAA, 2021; Wyban, 1989). These Hawaiian fishponds were coastal regions enclosed by rock walls and freshwater ponds that housed traditional forms of aquaculture (Figure 2). This project takes place at an ancient fishpond, Waikalua, a coastal region enclosed by rock walls. Hawaiians relied on fishponds, like Waikalua, to produce aquatic species such as mullet, milkfish, and algae (McDaniel, 2018). These fishponds held great cultural significance derived from the Kapu system³. In the Kapu system, fishponds represented the chief's political power. The Kapu system denied commoners from consuming products of these ponds, only allowing people of power to benefit from the ponds (Davidson, 2010). After the Kapu system ended in 1819, Hawaiian fishponds became a sustainable food source for all Hawaiians (Wailana, 2019).

² The Hawaiian term for Native Hawaiian (Wiktionary, n.d.).

³ Laws and regulations that dictated every aspect of life in Hawai'i; often translated as forbidden or prohibited, as in 'keep out' (Wailana, 2019).

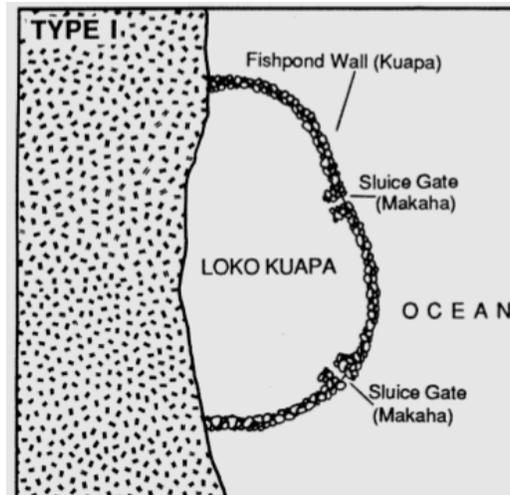


Figure 2: Hawaiian Fishpond Diagram (Kua Hawai'i, 2014).

2.3 Limu

After the Kapu system ended, many products of these traditional fishponds, including limu, became more available to the Hawaiian population. Limu is a Hawaiian term that encompasses marine and freshwater algae, mosses, liverworts, lichens, and corals. Marine algae forms of limu were commonly consumed and are traditional to the Hawaiian diet (Wailana, 2019). Marine limu includes all three major groups of algae: brown, red, and green. The two genera of limu that are being grown at Waikalua are *Gracilaria* (red limu)⁴, and *Halymenia* (red limu)⁵ (K. Fox, personal communication, December 1st, 2022). To reintroduce limu to market, three common methods of limu preparation must be considered, including dried, pickled, and fresh. A combination of limu species and preparation methods create variations in taste, texture, and appearance. These variations in limu preparation methods are important to consider when reintroducing limu products into the market as they cover a broad range of uses in cuisine. Limu can be eaten by itself, but it is most commonly consumed in poke bowls as a topping. Poke bowls are ubiquitous in Hawaiian cuisine and include raw fish, rice, limu, and other toppings (Thapa et al., 2015). Premade poke bag mixes are sold in grocery stores in Hawai'i that include dried limu and other seasonings and herbs.

Edible limu contains important nutrients such as sodium, potassium, and iron. (Circuncisão, 2018). Sodium supports nerve function (Harvard School of Public Health, n.d.a).

⁴ The Hawaiian term for *Gracilaria* is limu manaua (K. Fox, personal communication, January 19th, 2023).

⁵ The Hawaiian term for *Halymenia* is limu lepe 'ula 'ula (K. Fox, personal communication, January 19th, 2023).

Potassium helps the body by maintaining normal levels of fluid outside the cells and supporting healthy blood pressure (Harvard School of Public Health, n.d.b). The best-known benefit of limu is its high iron content, which helps prevent iron deficiency anemia (Miller, 2013). Traditionally, children growing up in Hawai'i were told to eat more limu to prevent iron deficiency anemia (H. Lee, personal communication, November 9th, 2022).

2.4 Limu's Cultural Significance

In addition to its health benefits, limu holds cultural value through its many applications in Hawaiian culture. Limu's cultural importance stems from its fundamental use in Hawaiian cuisine, ceremony, and medicine (Wailana, 2019). *The Limu Eater*, authored by biologist Heather J. Fortner, documents limu's use in Hawaiian cuisine. This book contains traditional and modern limu recipes that range from miso-limu salad, to limu pahe'e snack crisps, a cheesy chip appetizer (Fortner, 1978). Pickled limu, also found in the recipe book, can be seen in Figure 3.



Figure 3: Pickled Limu.

Along with its culinary applications, limu was used in Hawaiian ceremonies. An example of a ceremony that uses limu is Ho'oponopono⁶. In the ceremony, each family member discusses problems afflicting the family followed by prayers and the consumption of limu (Wailana, 2019). Limu was also used in medicinal practices prior to modern medicine. One-way limu was used in medicine was to help women conceive by giving them limu manaua⁷. Another

⁶ A familial healing ceremony that resolves conflict (Wailana, 2019).

⁷ Hawaiian term for a small red seaweed (*Gracilaria coronopifolia*) (University of Hawai'i Hilo, n.d.).

medicinal use consisted of children eating limu to ease oral sores (Nabarro, 2020). Through its applications in cuisine, ceremony, and medicine, limu was once more significant in Hawaiian culture. Cultural erosion in Hawai'i has caused a decrease in both wild harvesting and traditional aquaculture methods (Wailana, 2019; H. Lee, personal communication, November 9th, 2022). As an effect, limu has been harder to find in local Hawaiian communities (H. Lee, personal communication, November 9th, 2022).

2.5 Selling a Limu Product

Direct to consumer (DTC) business models allow local farms to sell products without the use of a middleman. DTC models allow smaller farms to lower prices to compete with wholesalers (Kaplan, 2018). There are many different methods that farms can use as DTC models to sell products. These methods include selling products directly at the farm, selling products at farmers' markets, or using community supported agriculture (CSA) organizations to assist in selling products (H. Lee, personal communication, January 16th, 2023).

Selling products directly at farms allows companies to sell produce with little expense. This model of DTC sales cuts out retail costs of products, resulting in higher profits (Kaplan, 2018). This sales method does have other aspects that can lead to expenses including advertisement, infrastructure, and higher wages for employees (Kaplan, 2018; H. Lee, personal communication, January 9th, 2023). Local farms can benefit if they are well known and have the infrastructure to process, package, and sell products. Farms that lack these aspects will need to put more money into advertising and infrastructure which can reduce profits (Kaplan, 2018). Lastly, this model can require employees to work more hours, resulting in more money spent on wages. However, some farms rely on an honor system where consumers leave money without anyone immediately collecting it to reduce costs (Powell, 2020). Another business model for a producer would be to sell products at farmers' markets. A farmers' market is a public recurring group of farmers that sell their products directly to consumers. These farmers' markets remove the middleman, allowing farmers to increase profits by limiting costs in transportation, handling, and storage. Farmers also gain the opportunity to foster connections with consumers directly, which strengthens relationships within the community (Pinto & Torres, 2018). The number of farmers' markets have quadrupled since 1994 due to a higher demand for local goods (Farmers' Market Coalition, n.d.). It was found that consumers at these farmers' markets are attracted to the availability of fresh produce and local products (Pinto & Torres, 2018).

Community-supported agriculture businesses (CSAs) work with local producers with the goal of transporting produce directly to consumers from farms. CSAs deliver food products to consumers from producers that lack the capability to sell products in stores (Nost, 2014). These

organizations allow consumers to place orders, which are then fulfilled by the farm after the order is placed. This business model limits wasted products as CSAs only require farms to fill consumer orders that have already been placed (M. Johnson, personal communication, January 23rd, 2023). They are a support system within communities that do not have ample access to fresh produce and strengthen existing food systems in a sustainable manner (Forssell & Lankoski, 2015). CSA consumers have access to fresher, more diverse, and more sustainable produce when compared to the produce options at a grocery store (Zervigon, 2022). Reference Table 1 for a summary of direct-to-consumer methods of distribution.

Table 1: Direct-to-consumer (DTC) Methods Comparison.

	Farm Stands	Farmers Markets	CSA's
Advertising	Needs advertisement.	Advertisement done by whoever runs the market.	Uses a pre-existing website, cuts advertisement.
Packaging	Packaging done by the producer.	Packaging done by the producer.	Handles distribution & packaging.
Transportation of Goods	Little to no transportation.	Requires transportation of goods to the location of the market.	Requires transportation.
Consumer Base	Brings consumers to the farm.	Has a previous consumer base.	Already has a consumer base.

Infrastructure	Requires right infrastructure, processing equipment, and possibly employees.	Space and other infrastructure is provided.	Space and other infrastructure is provided.
Other	No outside costs for producers	Offer producers to sell their produce at a given location.	Takes a cut of profits. No cost of workers.

3 Methods

This chapter outlines how the team gathered and interpreted the information to attain the goal of this project, which was to conduct research for the PAF and Sea Grant Hawai'i to facilitate the reintroduction of a locally grown, traditional limu product to the Kaneohe community. The project had three objectives:

1. Analyzing viable distribution methods
2. Developing a strategy for community outreach
3. Identifying interest of the target demographic

3.1 Analyzing Viable Distribution Methods

We conducted semi-structured interviews with several representatives from different agricultural organizations to research possible distribution methods for the reintroduction of a limu product. The local organizations the team contacted were Oahu Fresh, Kāko'o 'Ōiwi, Kualoa Ranch, and the Kamehameha School System.

Oahu Fresh is a community supported agriculture business (CSA) in Oahu that provides consumers with access to locally produced food through a digital subscription service. First, producers tell Oahu Fresh what their production limits are. Oahu Fresh then allows consumers to place an order through their website. Next, Oahu Fresh places an order with producers based on the demand of their consumers. Finally, local producers deliver products to Oahu Fresh who then distributes products once a week to subscribers across Oahu. The team conducted a semi-structured interview with Matt Johnson, the CEO of Oahu Fresh (script in Appendix A). This interview provided the project with critical information regarding Oahu Fresh's distribution methods as well as their interest in the limu product.

Kāko'o 'Ōiwi is a local farm that aims to preserve cultural and spiritual experiences of Native Hawaiians in the Kaneohe region with a goal of providing the community with food security (Kāko'o 'Ōiwi, n.d.). Their roadside farm stand provides locals with the opportunity to buy fresh local produce. Kāko'o 'Ōiwi also has a commercial kitchen where they can process locally grown food products for distribution (H. Lee, personal communication, January 19th, 2023). The team was informed that Kāko'o 'Ōiwi has interest in processing and distributing the PAF's limu (H. Lee, personal communication, January 19th, 2023). We conducted a semi-structured interview with Kanekoa Shultz, the executive director, to learn more about operations at the farm and the assistance they could provide in processing and distributing the limu product (script in Appendix A).

Kualoa Ranch Private Nature Preserve is a sixth-generation ranch owned by descendants of Dr. Gerritt P. Judd. Kualoa Ranch aims to preserve their sacred lands as well as celebrate its history. One specific goal Kualoa Ranch has is to develop a sustainable agriculture and aquaculture enterprise without causing damage to the environment (Kualoa, n.d.). We were informed that Kualoa Ranch has a goal of providing Kaneohe with local produce, as they sell local produce on site (M. Johnson, personal communication, January 23rd, 2023). The team conducted an interview with Taylor Kellerman, the Director of Diversified Agriculture and Land Stewardship, to learn more about the operations at Kualoa Ranch and assess the viability of the distribution of a local limu product (script in Appendix A).

The Kamehameha School System was founded in 1887 resulting from the vision of Bernice Pauahi Bishop, the last direct descendant of King Kamehameha I. She observed the decline in the Native Hawaiian population and was an advocate for Native Hawaiians. She placed over 375,000 acres of land in an endowment for Hawaiian education. After her death in 1884, the land was developed to improve the educational experience of Native Hawaiian children. The school system has deep roots in Hawaiian history and currently educates only Native Hawaiians (Kamehameha Schools, n.d).

The Kamehameha School system is in the process of maximizing the use of local food into their school lunch programs. The state of Hawai'i passed a law in 2021 that requires all schools to have school lunch programs that contain 30% locally produced food by 2030. The Kamehameha School system has a goal of integrating 50% of local foods into their lunch program by 2025 and they are already using over 30% locally grown food in their lunch program as of 2023 (ACT 175 of 2021; H. Lee, personal communication, January 16, 2023). We were informed that the private Kamehameha School system in Oahu serves over 6,500 meals a day (H. Lee, personal communication, January 16, 2023). The team conducted a semi-structured

interview with Anne Marie Matsuzaki, an educational program specialist (script in Appendix A). The purpose of this interview was to assess the viability of distributing limu to the Kamehameha School system. We conducted this interview to determine supply needed, cost limits, and interest the school has in the limu product to analyze the potential distribution method.

3.2 Developing a Strategy for Community Outreach

To assist the PAF and Sea Grant Hawai'i in their efforts to reach the community and increase community awareness regarding the PAF's mission, we created three versions of a brochure for them to utilize, after multiple rounds of revisions. A brochure is helpful when explaining the mission of an organization, educating the readers on new topics, and promoting community events (Community Tool Box, n.d). When making a brochure, it is important to be concise with the information and not contain too much information for the reader to digest (PsPrint, n.d.). Designing a successful brochure requires consideration of the target audience. Stronger brochures are concise and avoid large words, making it easier for the person to read and understand quickly (Jose, n.d.). Before designing the brochures, we created a fact sheet, which can be seen in Appendix B, to gather and organize the necessary information.

Our first draft brochure, seen in Figure 4, contained information regarding the PAF, Sea Grant Hawai'i, Waikalua, the history of limu as a component of traditional Hawaiian cuisine, and limu's health benefits. This first draft brochure contained information researched by the team. This first draft was then presented to the sponsors and based on their feedback, minor changes were made to create a second draft, as seen in Figure 5.

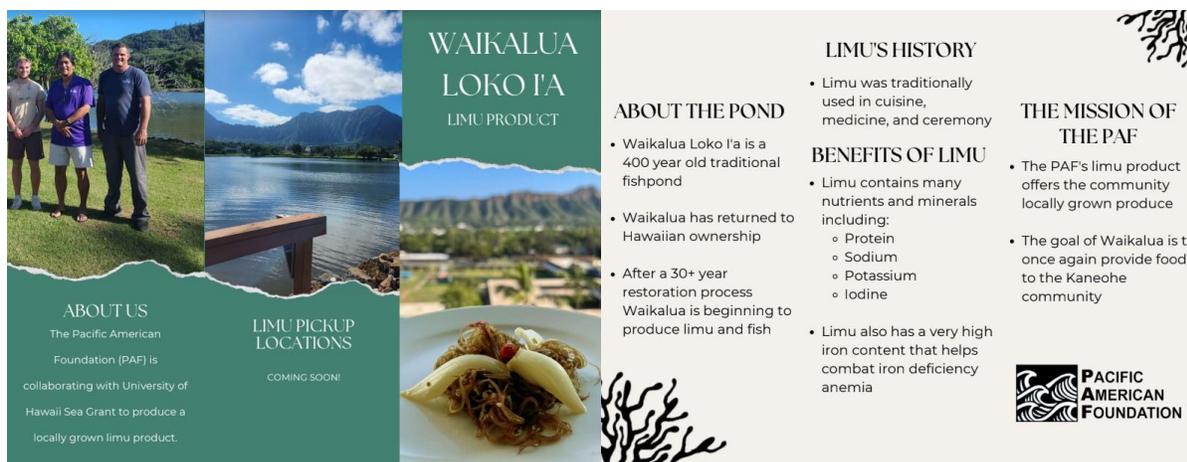


Figure 4: First Draft Brochure.



Figure 5: Second Draft Brochure.

Following the second draft, Herb Lee helped us to connect with different kūpuna (elders) in the Kaneohe community. We were informed that kūpuna have traditional knowledge on limu that is not currently shared with younger generations (H. Lee, personal communication, November 9th, 2022). We asked the kūpuna to share emotionally moving and culturally relevant anecdotes about their experiences and knowledge regarding limu. The interviews captured what limu meant to the elders prior to the decrease in limu's prevalence. Kūpuna's experiences and stories regarding limu were collected using semi-structured interviews (script in Appendix C). The information gathered at these interviews is important to spread throughout the community.

Following kūpuna interviews, we realized that our brochure contained too much information for the reader to digest. The initial brochure contained information regarding the sponsors, Waikalua, limu's health benefit, limu's traditional background, kūpuna quotes, and upcoming PAF events. We determined that the brochures would be more effective if we categorized the information to make them more concise (Jose, n.d.). Our team's research through interviews and surveys as well as feedback from Herb Lee and Dr. Kai Fox, helped us create three new variations of brochures for the PAF's future use.

3.3 Identifying Interest of the Target Demographic

To identify the interest of the target demographic in limu as a culinary ingredient, we conducted a food tasting event and interviewed consumers at farmers' markets. The target demographic for this reintroduced limu product includes the locals of the Kaneohe region.

Food tasting events help in community outreach strategies but are primarily used to identify consumer opinions. Using consumer input to guide the introduction of a product can increase the probability of commercial success (Motamedi, 2019). When designing surveys for

these events, asking broad questions may lead participants to feel guilty if they answer negatively; specific questions about taste, texture, and other qualities allow the consumer to answer more truthfully (Accion, 2022). Food tasting events offer samples of new food products that are entering the market. Certain practices are used to enhance participants' experiences in food tasting events; the practices include respecting the participants, use of positive language, and using proper hygiene and food safety procedures (Healthy Eating, n.d.). Locals of the Kaneohe region and PAF docents were participants in the PAF and Sea Grant Hawai'i's food tasting.

The PAF and Sea Grant Hawai'i's food tasting event was conducted on Saturday, February 18th, during a docent training for the PAF and Sea Grant Hawai'i. Advertising for the event consisted of word of mouth between the team and all of our interview subjects as well as an email sent from Herb to workers of the PAF. The food tasting participants included workers for PAF and Sea Grant Hawai'i, and a few locals from the Kaneohe region. All participants of the food tasting had some connection to the team's project or the PAF and none of the participants were randomly selected from the consumer base. It is important to consider that the participants that were training to work for the PAF could have been biased in favor of all types of limu during the food tasting event.

To collect opinions on the limu product, the team designed an outline (seen in Appendix D) for the PAF to conduct a food tasting event which was consistent with the limitations placed on the team's involvement by the WPI Institutional Review Board. We were present at the food tasting event for consumer data collection purposes only, while the handling of food was done entirely by the PAF staff. The food tasting event offered limu grown exclusively at Waikalua including fresh, pickled, dried, and limu mixed with poke. There were two unexpected variations of limu presented at the food tasting which were sea asparagus and pickled 'ula 'ula. Following the food tasting, participants provided feedback on their opinions of the different types of limu through a survey. The quantitative data collected included numerical scores that participants rated 1-10 for each type of limu offered. Participants scored aspects of limu including appearance, taste, texture, and the respondent's overall impression of the sample. The qualitative data we collected assessed whether a consumer would buy a limu product, whether they believed that its being "traditionally grown" adds value to the product, whether a participant had recipes/stories to share, and whether they had suggestions on how the PAF could improve their limu product. Blank space was allotted under each limu type on the scoring page with a request for more detailed comments of participant's impressions. The template for the survey can be found in Appendix D. These responses were then analyzed to determine which forms of

limu were most enjoyed by the participants (Accion, 2022; Medelyan, n.d.). Calculating the average scores from the surveys allowed us to determine which forms of limu were the highest rated amongst the food tasting participants. Qualitative data was analyzed by grouping similar responses for each question to find trends in the answers.

Another way to identify the interests of the target demographic is interviews with the locals of Oahu. Data was collected throughout Oahu as opinions on limu are expected to be consistent throughout the island (H. Lee, personal communication, January 30th, 2023).

The team visited the Windward Mall Farmers' Market, located in Kaneohe. The market operates on Sundays from 10am-2pm and Wednesdays from 2pm-6pm and offers local produce grown across Oahu (Windward Mall, n.d.). We interviewed consumers at this market on January 28th, 2023. The goal of this visit was to collect consumer opinions regarding how limu is consumed, where consumers purchase limu from, how consumers believe our product will be perceived in the market, and the pricing of the PAF's limu product (script in Appendix D).

Interviews were also conducted at another farmers' market, the Kapi'olani Community College (KCC) Farmers' Market, located in Honolulu. The KCC Farmers' Market hours are Saturdays from 7:30am to 11am (Kapi'olani Community College, n.d.). Local produce along with other goods are sold at this farmers' market. We interviewed visitors to this market on February 11th, 2023. The goal of this visit aligns with the same interview objectives from the Windward Mall Farmers' Market interviews (script in Appendix D).

After consumer interviews and the food tasting were completed, we compiled all of the data, analyzed the data for trends and patterns, and then presented the analysis to the PAF and Sea Grant Hawai'i to aid in their understanding of the opinions of the consumers in Kaneohe.

3.4 Ethics

This project was a part of the Worcester Polytechnic Institute's Interactive Qualifying Project program. The data and research collected for the purposes of this project was not used with any malicious intent. For those that we collected the information of, they were asked if they were comfortable with identifying themselves, otherwise they remained anonymous as well as their responses remained confidential. The opinions stated in this proposal are from us and do not represent the opinions of WPI, the Pacific American Foundation, or Sea Grant Hawai'i. The information collected for this analysis will be used solely in academic research. We understand that we are representatives of Worcester Polytechnic Institute and demonstrated utmost respect and proper behavior while conducting this project. This research was evaluated and approved by WPI's Institutional Review Board under project number IRB-23-0299.

4 Results & Discussion

This chapter outlines our findings for each of the three objectives:

1. Analyzing viable distribution methods
2. Developing a strategy for community outreach
3. Identifying interest of the target demographic

4.1 Analyzing Viable Distribution Methods

We conducted interviews with several representatives from different organizations to research possible distribution methods for the reintroduction of a limu product. Producers in Oahu commonly use local CSAs and farm stands to distribute local produce. Hawai'i has regulations that are requiring schools to have their school lunch programs contain 30% local food by 2030, creating a new distribution option for local producers. The local organizations the team contacted include Oahu Fresh, Kāko'o 'Ōiwi, Kualoa Ranch, and the Kamehameha School System. The following paragraphs contain the team's findings as well as an analysis of each distribution method.

4.1.1 CSAs

There are many CSAs that operate on Oahu, however many of them are run by farms that only offer their own produce to their consumers. Farm Link Hawai'i and Oahu Fresh are two CSAs that allow other farms to use them as a vehicle to get their produce to local consumers (LocalHarvest, n.d.). The two companies' websites allow consumers to place orders for produce grown locally in Hawai'i. Following an order, the CSAs contact the farms that produce the food, and these farms deliver the produce to the CSA. The CSA then packages and delivers the products. This process operates on a weekly or monthly schedule (Farm Link, n.d & Oahu Fresh, n.d).

Partnering with CSAs can be an effective option for local organizations to get their goods in the hands of consumers. These CSAs provide customer acquisition and handle distribution of products. This allows producers to focus more on farming and less on selling their products. CSAs take a percentage of revenue; in return, they bring in customers and distribute products for farms. CSAs also have varying requirements that farms must meet, which can limit smaller farms from working with them (M. Johnson, personal communication, January 23, 2023). CSAs can be useful in providing farms a vehicle to distribute products, but their services come at a cost (LocalHarvest, n.d.).

Farm Link Hawai'i is a large Hawai'i-based CSA organization that connects local growers with local consumers using its online marketplace. Since the start of Farm Link Hawai'i in 2015, Farm Link Hawai'i has generated 2.5 million dollars in the local economy, works with

over 200 farms across the islands, serves over 2,300 consumers, and offers over 500 different products including fresh produce, dairy, meats, bakery items, and more (Farm Link, n.d). Our team reached out to try and secure an interview with Farm Link Hawai'i to discuss their distribution process more but did not receive a reply.

Oahu Fresh is another CSA organization that works on a smaller scale than Farm Link Hawai'i with a goal to build a community-based food system. Oahu Fresh only works with 77 local producers and supplies about 1,600 consumers (Oahu Fresh, n.d). We learned in an interview with Matt Johnson, CEO of Oahu Fresh, that Oahu Fresh works with farms that range in size. Oahu Fresh tries to be adaptable with the demand required from smaller farms; Matt Johnson expressed that if "[Oahu Fresh] needs 200 pounds of [a product] and the farmer only has 40 pounds of it, we try to be adaptable". We also learned that Oahu Fresh can place order limits to avoid consumers being able to order more produce than the farm can provide. Although Oahu Fresh is willing to work with smaller farms, Matt Johnson said that if a farm cannot keep up with the demand the farm promises, Oahu Fresh will stop working with them. In the interview, Matt Johnson did not speak about if Oahu Fresh works on a contract basis. Through the interview, the team also learned the best-selling products Oahu Fresh offers are their subscription boxes, which offer consumers variations of local produce each week. For more information regarding the interview results, see Appendix E.

In researching different CSA models across Oahu, the team analyzed the viability for the PAF to use CSAs as a distribution method for their limu product. Through research conducted on Farm Link Hawai'i, the team concluded that the scale of Farm Link Hawai'i is likely too large for the PAF's current limu production. The PAF is still coordinating production and produces limited amounts of limu per week. The team was unable to schedule an interview with Farm Link Hawai'i so we are not sure of the potential requirements to partner with Farm Link Hawai'i. CSAs like Farm Link Hawai'i who work with many producers and have a large consumer base may not be viable partners for producers in the start-up stage.

CSAs like Oahu Fresh, however, could be a viable distribution method for producers in the start-up stage. Oahu Fresh allows smaller farms opportunities for partnership and the ability to set demand limits on produce sold over a given period. Matt Johnson expressed that Oahu Fresh would have interest in partnering with the PAF to sell their limu. The option for the PAF to set limits on the amount of product they need to produce per week would relieve pressure on meeting high demands. Because the PAF is in the early stages of production, it is necessary that the PAF is able to set limits on the amount of limu they are required to produce when partnering with distributors. Oahu Fresh provides a pre-existing customer base through their

website, which would help the PAF promote their limu to consumers. Overall, the viability of the PAF working with CSAs to distribute their limu comes down to the scale of the company, along with the CSA's willingness to work with and adapt to the PAF's current production capabilities.

4.1.2 Farm Partnerships

Kualoa Ranch

Kualoa Ranch is a 170-year-old family run farm that focuses on sustainable agriculture and aquaculture, although much of its income is generated from agritourism. From our interview with Matt Johnson from Oahu Fresh, we were recommended to contact Taylor Kellerman, the Director of Diversified Agriculture and Land Stewardship at Kualoa Ranch. Kualoa Ranch has a marketplace that is open Thursday through Sunday and sells their own produce as well as produce from other local farms. In an interview, Taylor Kellerman expressed that Kualoa Ranch partners with 25 other local producers that use Kualoa Ranch's marketplace to reach local consumers. Kualoa Ranch has a goal to provide the local community with locally grown produce from across Oahu. For farms to partner with Kualoa Ranch, all produce must be grown in Hawai'i and they must be able to provide quality products and consistently deliver produce.

Taylor Kellerman also advised us on marketing strategies and informed us about how important marketing is when selling Kualoa Ranch's products. He has experience in marketing local produce as Kualoa Ranch had to convert from a wholesale model to a direct-to-consumer marketplace during the Covid pandemic. Taylor Kellerman led the conversion, so he has experience in marketing local produce directly to consumers, and he advised that the biggest selling point of the PAF's limu product is that it is grown at a traditional fishpond. According to him, creating a label and other marketing materials that encapsulate "traditionally grown" and the mission of the PAF would be of great benefit for their limu product. We also learned that an active social media presence is a productive way to help market a product as it can be done with little cost and can reach many consumers. Taylor Kellerman continues to see great success in marketing Kualoa Ranch's products through social media and advised the PAF to hire "someone young to run their social media".

Our interview with Taylor Kellerman provided us data to help analyze the viability of using Kualoa Ranch's marketplace as a distribution method for the PAF's limu product. We found that Kualoa Ranch has a similar mission to the PAF in trying to provide the community with local produce. Taylor Kellerman said the ranch would partner with the PAF "without a second thought" as the PAF's limu upholds all requirements they seek in a partnership. Kualoa Ranch does not currently offer a limu product and Taylor Kellerman said that a limu product is likely to do very well at their marketplace. Another benefit in Kualoa Ranch's marketplace is that

it is located within 12 miles of Waikalua, making it easy to transport limu from the pond to the ranch. If a partnership were to happen, the ranch would allow the PAF to start with selling limu. Taylor Kellerman insisted that starting slow is one of the most important aspects in beginning to sell a new product. Starting slow facilitates a smoother entrance into a market as if a product is unsuccessful, the impact of failure is smaller. This will also avoid putting stress on the PAF to meet high demands and will create a better partnership between the two organizations. Kualoa Ranch seems to be the most viable distribution method for the PAF's limu product in the beginning stages. Their proximity to Waikalua, flexible demand requirements, and Taylor Kellerman's experience in selling local produce makes it a good option for the PAF to distribute their limu product. See Appendix E for more information regarding the interview with Taylor Kellerman.

Kāko'o 'Ōiwi

Kāko'o 'Ōiwi is a 400-acre farm that has a goal to use traditional systems with modern technology to feed the community in a sustainable way. We interviewed Kanekoa Shultz, the executive director at Kāko'o 'Ōiwi, to determine the viability of using the farm as a distribution center. Our interview with Kanekoa Shultz provided us data to help analyze possible distribution methods for the limu product. We learned that although Kāko'o 'Ōiwi does sell some products at their farm stand, most of their distribution is done using other methods. Most of their sales come from their online store along with CSAs they are partnered with, one of them being Farm Link Hawai'i. Kāko'o 'Ōiwi does not seem to be the best fit to distribute the limu product as of now, due to the farmstand not operating on a consistent basis. However, Kāko'o 'Ōiwi's mission aligns with the PAF's mission and Kanekoa Shultz expressed interest in supporting the PAF's limu product. Kāko'o 'Ōiwi has a commercial kitchen that could offer a processing center for the PAF's limu, as Kanekoa Shultz, who is a personal friend of Herb Lee, stated they would be more than happy to help in processing the PAF's limu. When adding value to any food items sold at market, health and safety regulations require that processing must be done in a commercial kitchen (K. Shultz, personal communication, February 8th, 2023). See Appendix E for more information regarding the interview with Kanekoa Shultz. The commercial kitchen at Kāko'o 'Ōiwi would allow the PAF to add value to their limu which is a key factor in distributing any form of processed food. This is important as processed (e.g., pickled) limu is expected to be a large part of the PAF's sales based on our results from the food tasting and interviews. The close proximity (2.7 miles) of Kāko'o 'Ōiwi's commercial kitchen to Waikalua would make it a great processing option for the PAF. Although Kāko'o 'Ōiwi may not be a good distribution option for the PAF, access to a commercial kitchen like the one at Kāko'o 'Ōiwi is necessary.

4.1.3 Oahu School Systems

A recent law passed by Hawaiian legislatures requires all school systems in the state to integrate 30% local foods into their school's lunch programs (ACT 175 of 2021). This law presents an opportunity for local farms in Hawai'i to secure wholesaler contracts with schools, or with food distribution companies that supply schools. Oahu schools would be large commercial partners for local farms as there is a student population of around 175,000 students in public and charter schools (Hawai'i State Department of Education, 2020). Reaching out to private schools would be in the best interest of this project as there are more barriers to entry for supplying food to public schools (Bussiere et al., 2022). While there are 132 private schools across Hawai'i, it was advantageous for us to contact the Kamehameha School System (KSS) as there was a pre-existing relationship between the PAF and the KSS (Private School Review, n.d.).

The data that Anne Marie Matsuzaki, the education program specialist of the KSS, provided in a semi-structured interview allowed the team to determine the viability of wholesale distribution of the PAF's limu product to the KSS. To see the results of our interview with Anne Marie Matsuzaki, reference Appendix E. From this interview, we concluded that the PAF's current and near-future production capabilities will be too low for them to have a viable relationship with Kamehameha Schools. The scale of food production that a school system needs to feed its students surpasses what the PAF currently produces at Waikalua. 50-100 pounds of limu a week is currently produced on the farm without any consistency in production. However, there are many factors that point in the direction of limu being integrated into the school system once the fishpond reaches certain production metrics. School systems in Oahu legally must integrate locally grown food into their school meal plan, and the PAF's limu product could be one of those foods. The KSS can select which foods are used in school lunches by their meal provider, FLIK Independent School Dining (FLIKISD). The KSS could be partial to integrating limu in its meal program as they are a Native Hawaiian school system that wishes to further the education of Native Hawaiians. Limu could be one of the traditional foods that elevates the experience of the students at the KSS. The KSS could choose to integrate locally grown limu into their meals. FLIKISD would need to provide that product to the school, so the PAF could be a producer for FLIKISD. When the PAF is at scale to partner with FLIKISD, there is a partner chef that tests new and indigenous ingredients once a month at the KSS.

Potential bias could exist in our data collection, as some of the distributors we spoke with had pre-existing personal relationships with either Herb Lee or Dr. Kai Fox, the representatives of the PAF and Sea Grant Hawai'i. These personal relationships could bias their

responses as well as present a conflict of interest in any potential future partnerships. We also recognize that personal relationships between distributors and the PAF and Sea Grant Hawai'i could also be beneficial in creating business relationships.

4.2 Developing a Strategy for Community Outreach

In developing a strategy for community outreach, we created three different brochures in which we grouped together related topics discussed in the second draft. The three brochures categorized information more effectively than one brochure that discusses multiple different topics. The goal of creating three brochures with separate topics is so that the audience has an easier time digesting the information on each brochure (PsPrint, n.d.). The three brochures created include "Limu, Health Benefits, & Recipes", "Culture & Kūpuna Stories", and "Waikalua and Community Events". The new brochures were shared with the PAF and are meant to be updated by the PAF as they deem necessary.

One of the new brochures contains information about limu's traditional value, limu's health benefits, and limu recipes. These three topics all align as they only talk about information regarding limu. Our team decided it is important to teach the community about limu as it is the PAF's first product they plan to sell. In a food tasting survey, three out of the eight responses we received from our questions regarding our draft brochure mentioned that they learned something about limu. We used this to support the creation of a limu specific brochure. Although 3 responses are not sufficient data, it did lead us to believe that there is a need to teach the community about the traditional meaning of limu and its health benefits. The limu recipes section stems from another question seen on the food tasting survey. This question asked participants how to make the PAF's products better. Of the 9 responses to this question, 4 responses as well as Taylor Kellerman suggested adding limu recipes to product labeling. Based on these recommendations, our team decided it would be beneficial to also include limu recipes on the brochure. These recipes are intended to help teach the community new ways to prepare limu. The draft of this brochure can be seen in Figure 6.

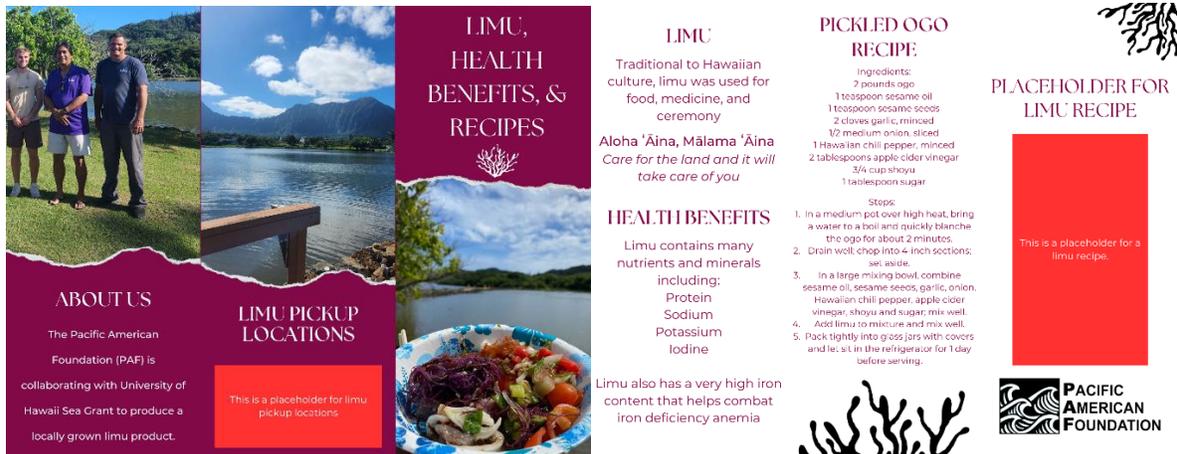


Figure 6: Limu, Health Benefits, & Recipes Brochure.

The next brochure of the three focused on culture and kūpuna stories. The PAF aims to use Waikalua to reintroduce some of these traditional foods to the community. Limu is the first of many traditional aquaculture products they plan to bring back to Kaneohe. Hawai'i's cultural erosion has affected traditional cuisines including limu. Our team decided it is important to inform consumers about the cultural erosion that has occurred over multiple generations. To back up the information, our team interviewed kūpuna who gave us insight on cultural erosion's effect on limu. Aunt⁸ Rocky Kaluhiwa, a kūpuna in the Kaneohe community, told us that she interviewed her aunt 50 years ago about limu. Aunt Rocky learned that even back then, her aunt had already begun to see a decrease in limu from when her aunt was younger. Another kūpuna, Uncle⁸ Glenn Martin, spoke with us about how when he was a kid, over 50% of the food he ate was grown or gathered from Hawaiian lands and water. The interviews with kūpuna help express how cultural erosion has impacted Hawaiian cuisine in just the last 60 years. More quotes from these interviews can be seen in Appendix F. Overall, this brochure is intended to inform the community on the effect cultural erosion has had on cuisine in Hawai'i. This brochure on cultural erosion can be seen in Figure 7.

⁸ Kūpuna are referred to as Aunt and Uncle in Hawaiian culture.

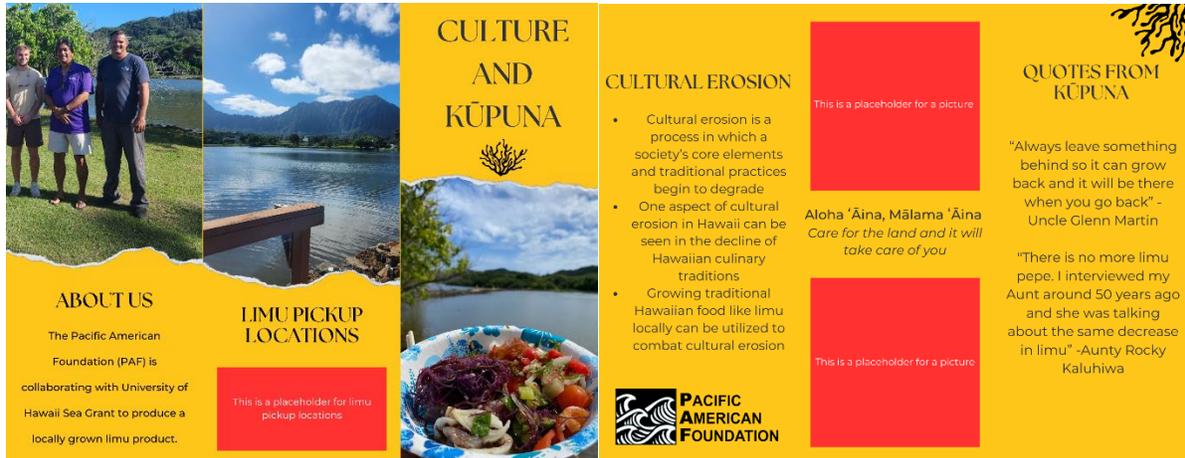


Figure 7: Culture and Kūpuna Brochure.

The final brochure is intended to convey Waikalua’s history, the PAF’s mission, and community events held at Waikalua. Through research, our team determined that an important aspect of marketing is to inform consumers about the limu being traditionally grown. In an interview with Taylor Kellerman, Director of Diversified Agriculture and Land Stewardship at Kualoa Ranch, he stressed that the PAF needs to express to consumers that their products are “traditionally grown”. Matt Johnson, CEO of Oahu Fresh, also suggested the same marketing strategy as Taylor Kellerman. Both Taylor Kellerman and Matt Johnson are experienced in marketing locally grown produce. Our team decided that a brochure intended to inform the community on the PAF’s mission regarding Waikalua would help with marketing the PAF’s products. On top of informing the community on Waikalua and the PAF’s mission, our team decided to add a section to promote community events at the pond. The PAF frequently hosts events including docent training, educational events, and many other events. This brochure will help the PAF engage more of the community in their events. This brochure on Waikalua and the upcoming events can be seen in Figure 8.



Figure 8: Waikalua & Community Events Brochure

These three brochures are intended for the PAF to hand out at the different events held at Waikalua along with other locations in Kaneohe that would grant the PAF access to distribute their limu product. These brochures will be ongoing documents for the PAF to revise as they grow their organization.

4.3 Identifying Interest of the Target Demographic

To identify interest of the target demographic for the limu product, our team conducted a food tasting event that used a survey to collect consumer opinions and conducted interviews with consumers at farmers markets.

4.3.1 Food Tasting Event

The limu food-tasting event was hosted by the PAF and conducted at Waikalua on February 18th. A photo from the food tasting can be seen in Figure 9.



Figure 9: Food Tasting Event Samples

The 29 participants of the food tasting included PAF employees, local community members training to be volunteers, and friends and family of trainees. To see the results from the food tasting survey, reference Appendix G. At the food tasting event, we collected a total of

28 surveys that asked participants to score different qualities of the limu variants from 1-10. The limu qualities the participants rated included appearance, taste, texture, and overall score. The surveys collected from participants varied in the amount of answers filled out for each quality. The number of participants who scored each quality about the limu variations can be seen below in Table 2. From the survey, we were able to determine the most visually appealing limu variant, best tasting limu, best texture, and the favorite overall scores. The answers for each aspect for the different limu variants were pooled and then averaged. Manauaea poke mix was the highest scored sample in every category. The averages found from the participants' scores can be seen in Table 2.

Table 2: Average Scores from Food Tasting Survey Results.

Standard deviation values in parentheses

N = # of responses for each category

	Appearance	Taste	Texture	Overall
Fresh Manauaea	8.68 (1.24) N = 25	8.04 (1.72) N = 25	8.72 (1.34) N = 25	8.33 (1.43) N = 24
Dried Manauaea	7.50 (1.76) N = 18	6.63 (2.11) N = 19	6.40 (1.91) N = 18	6.44 (1.69) N = 18
Fresh 'Ula 'Ula	8.20 (1.65) N = 26	6.31 (2.31) N = 26	7.20 (1.97) N = 26	7.10 (1.74) N = 26
Dried 'Ula 'Ula	7.05 (1.50) N = 20	6.90 (2.17) N = 20	6.30 (1.92) N = 20	6.81 (1.63) N = 21
Manauaea With Poke	9.48 (1.12) N = 25	9.44 (1.19) N = 25	9.52 (1.29) N = 25	9.44 (1.15) N = 26
Pickled Manauaea	9.00 (0.79)	9.00 (0.97)	9.00 (0.73)	9.11 (0.70)

	N = 20	N = 20	N = 20	N = 21
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By averaging all responses, the data showed that the three most enjoyed limu variants at the tasting were manauaea poke mix, pickled manauaea, and fresh manauaea. To view all individual results from the surveys, see Appendix G.

On the survey we asked participants to complete open response questions. Of the 28 surveys collected, 19 participants responded to some or all of the open response questions. The first question determined if participants would be interested in buying the limu and if so which variants. Of the 19 participants, 18 expressed they would be interested in buying the limu and the one other participant left that question blank. The answers aligned with our numerical data, in that participants were most interested in buying manauaea poke mix, pickled manauaea, and fresh manauaea. Out of the 18 responses for this question, the number of participants who had interest in buying each limu variant can be seen in Table 3 (some participants listed multiple variants they had interest in buying).

Table 3: Number of Participants Who Would Buy Each Variation.

	Fresh Manauaea	Dried Manauaea	Fresh 'Ula 'Ula	Dried 'Ula 'Ula	Manauaea With Poke	Pickled Manauaea
# of participants who would buy	7	3	2	2	14	9

The next open-response question asked the participants if they believed that the limu being grown at a traditional fishpond added value to the limu products. From the responses, 19 out of 19 participants expressed that the limu being grown at a traditional fishpond adds value to the products. Of the 19 participants who answered questions on the back, 9 gave feedback on how to make the PAF's limu products better. Four of the participants suggested adding recipes to packaging and two participants suggested adding the "traditional story" about the pond and limu products. Three participants talked about adding the sea asparagus product to the survey. The sea asparagus was a last-minute offering at the event, and we did not have time to add it to the survey. Three participants added that they really enjoyed the sea asparagus as two others verbally told the group that the sea asparagus was the best.

The food tasting surveys allowed the team to determine the limu variants most enjoyed by consumers, the limu variants consumers had most interest in buying, and helpful information

in making the products better. The data is consistent and supports that the most enjoyed limu products aligned with the limu products participants had most interest in buying. However, there were some limitations to this data collection. One limitation was that the participants did not score all the limu variants. Receiving the same amount of scores for each variant could have altered the average scores for the variants who had less participants score them. The fewest number of scores that a variant received was 18 responses and the largest was 26 responses. Participants may have not tried the variants that received fewer scores because of appearance or may have not had interest in scoring them. Another limitation included 9 participants not answering any questions on the back of the sheet. The lack of answers leaves a gap in whether these participants would have been interested in buying these products, if they believe the “traditionally grown” aspect adds value, and if they believe there is anything to do to make the limu products better. Another limitation in the data collection at the food tasting event includes a potential conflict of interest with the participants. As the food tasting was hosted during a docent training at Waikalua, many of the participants were interested in volunteering at the fishpond in the future and may have assigned higher ratings to the limu samples. Furthermore, some of the participants were already workers/volunteers/friends of the PAF and could be biased in favor of limu and thus have higher ratings of samples. While this is not applicable to all participants, it is important to acknowledge the potential bias in our data collection at the food tasting event. A further limitation is that the food provided was free to the participants and could bias their results positively. Although there are limitations, the data collected is enough to support our findings from the survey responses.

4.3.2 Consumers at Farmers’ Markets

Another method we used to identify consumer interest was interviewing consumers at farmers’ markets. Our team chose two farmers’ markets, the Windward Mall Farmers’ Market in Kaneohe, and the Kapi’olani Community College Farmers’ Market in Honolulu. We interviewed consumers at the Windward Mall Farmers’ Market due to their proximity to the fishpond. Due to the limited responses gathered at Windward Mall Farmers’ Market, we also conducted interviews at the Kapi’olani Community College farmers’ market in Honolulu.

We interviewed a total of seven groups of consumers at the Windward Mall Farmers’ Market on January 25th. After approaching further groups and receiving several “no thank you” responses our team decided to stop interviewing. Of the seven groups of consumers that agreed to talk with us, five groups knew what limu was and consumed it at varying frequencies. Four groups reported buying their limu in small quantities from a grocery store or have family members that harvest wild limu from the ocean. Four of the five groups of consumers that we

talked to expressed that they do not normally eat limu by itself, and instead add it to poke bowls. Poke bowls are ubiquitous in Hawaiian cuisine and contain raw fish, limu, onions, rice, and sometimes other ingredients. Three of the five consumer groups that our team talked to expressed high interest in buying Waikalua-grown limu. One consumer stated that “most Hawaiians would be interested in buying it”, and another consumer noted that limu is “tough to find in stores”. A visual summary of the above data can be seen in Table 4.

Table 4: Groups that Knew what Limu was at Windward Mall Farmers’ Market.

	Group 1	Group 2	Group 3	Group 4	Group 5
Buy from the grocery store/family supply?	✓		✓	✓	✓
Eat limu mostly with poke bowls?	✓	✓		✓	✓
Interested in Waikalua-grown limu?		✓	✓		

The information that was collected at the Kapi’olani Community College farmers’ market was not sufficient to examine because of the demographic that was present. We spoke with seven consumers at this farmers’ market. None of the consumers that we talked to were familiar with limu. Given this response and the proximity of the farmers’ market to Waikiki, we inferred that most of the visitors to the market were probably tourists. These factors led to an unsuccessful data collection trip. Another limitation of the consumer data gathered at farmers’ markets is that our team was not provided any identification that we were partnered with the PAF and this may have dissuaded some groups from speaking with us as we may have appeared unofficial.

Overall, we have identified through analysis of consumer interviews and food tasting data that premade poke mixes and pickled manaua would be the most successful products for the PAF to sell. The popularity of poke is nearly ubiquitous among consumer data we collected, which is supported by it having the largest number of respondents saying they would buy it in stores and was rated the highest by consumers at the food tasting. The second-best option based on consumer data opinion is pickled manaua. In the food tasting, pickled manaua had a smaller standard deviation than poke mix, suggesting the ratings were more consistent than poke’s ratings. All of our data suggests poke mix and pickled manaua are the two most popular among consumers.

5 Recommendations

The overarching goal of this project was to conduct research for the PAF and Sea Grant Hawai'i to facilitate the reintroduction of a locally grown, traditional limu product to the Kaneohe community. In this investigation, we used semi-structured interviews to complete the following three objectives:

1. Analyzing viable distribution methods
2. Developing a strategy for community outreach
3. Identifying interest of the target demographic

The compiled results of these three objectives were used to inform the recommendations we provided to our sponsors, the PAF and Sea Grant Hawai'i on how to reintroduce a locally grown limu product to the Kaneohe community. The following section describes these recommendations, goals for the project, and future work to be completed. The timescale of our sponsors' joint goal allows for progress to be made gradually.

5.1 Distribution Methods

Due to the limited production capabilities of Waikalua and the planned expansion of production, any recommendations must be made considering the farm's current production and the eventual growth of the farm. In this section, we propose recommendations for specific actions that can be taken to prepare limu for distribution and to distribute products at various scales. We also present potential entry strategies at each level of scale. This path from small scale to large scale outlines the chronological steps the PAF can take to expand their business. Our recommendations include the following:

1. Use the commercial kitchen at Kāko'o 'Ōiwi for value added products.
2. Test products with small scale distribution at Kualoa Ranch and establish regular sales.
3. Establish sales with local Community Supported Agriculture organizations.
4. Test products with the Kamehameha School System through their monthly indigenous ingredient meal test.

5.1.1 Using the Commercial Kitchen at Kāko'o 'Ōiwi

The commercial kitchen at Kāko'o 'Ōiwi is a very important resource for the PAF to utilize. Kanekoa Shultz expressed to us that he would welcome the PAF as a user of the commercial kitchen at Kāko'o 'Ōiwi. **We recommend the PAF communicate with Kanekoa Shultz to negotiate logistics and potential cost of the commercial kitchen at Kāko'o 'Ōiwi.** Using this commercial kitchen will expand product options, allowing the PAF to sell a variation of

limu products as they do not have a commercial kitchen at Waikalua. It would be of interest for the PAF to use this commercial kitchen to process different variations of limu including pickled limu, poke mix bags with limu, and dried limu. The pickled limu and poke mix bags would require the PAF to purchase other ingredients in making which is outside the scope of this project. Poke mix bags include dried poke along with other seasoning ingredients found in poke bowls. The dried poke is rehydrated when the mix is placed in water. These processed variations will have longer shelf lives than fresh limu and have more interest from distributors (G. Martin, personal communication, February 18, 2023). According to our interviews with consumers and distributors, we expect that these will be the best-selling variations of limu. Further investigation would need to be done to determine the most profitable option. There are various costs when creating value-added limu when sourcing other ingredients. It is important to take those into account. **We recommend the PAF complete a cost-analysis of their limu products before bringing their product to market to determine the price of their products.** Kāko'o 'Ōiwi is also building infrastructure to store limu for longer periods of time. Kanekoa Shultz mentioned possibly using this new infrastructure to also hold the PAF's limu product. **We recommend the PAF to utilize this storage option as their production increases.** Limu's short shelf life forces the PAF to currently only harvest limu as it is sold. Due to the PAF's lack of storage, having a place to store limu would allow them to harvest more frequently and empty the tanks faster, which would allow for more limu production (K. Fox, personal communication, January 16, 2023). **Kāko'o 'Ōiwi has a farmstand at which they occasionally sell their products, but because of the inconsistency of the farmstand's operations, we recommend that the PAF go elsewhere to sell their products.** There are more viable options for the PAF to sell their limu product than at Kāko'o 'Ōiwi. Although Kāko'o 'Ōiwi may not be a distribution center, we believe it is a key factor in their business operations, as they will provide opportunity for the PAF to sell an abundance of limu products.

5.1.2 Test Products with Kualoa Ranch and Establish Regular Sales

Kualoa Ranch is a great option for the PAF to begin distributing their limu product to the local community. **We recommend the PAF partner with Kualoa Ranch as a place to enter their product into the market.** Kualoa Ranch has many tourist and local visitors and Taylor Kellerman of Kualoa Ranch believes that limu would sell very well there. The ranch will also not ask the PAF to supply more limu than they are able to, which will accommodate PAF's currently unpredictable supply and ease the PAF's entrance into the market. **We recommend beginning selling the most positively rated variants of limu, which were pickled limu or a poke mix**

with limu. We believe these prepared products will appeal to more consumers because they are easier to use than fresh limu. These limu products have a longer shelf life than fresh limu, which is important when finding distributors, as many are not interested in products with a low shelf life. **As the PAF begins to increase production and gain a better understanding of their profits from different products, we recommend that they start experimenting with selling fresh limu along with any other variants they would like to explore.** With each batch of limu grown, the PAF should determine how much pickled limu or poke mix bags they need to saturate the market. **Once the PAF begins to outproduce consumer demand of their initial limu products, we recommend that the PAF test different limu variants using the excess limu to see how well they sell to consumers.** Testing products slowly is key to not wasting resources or losing money. Kualoa Ranch is a great starting spot for limu distribution as well as a possible long term distribution center for the PAF.

5.1.3 Establishing a Relationship with CSAs

Oahu Fresh, or another CSA, is a viable distribution option as the PAF begins to have more consistency and success in growing their limu. **We recommend that after determining that their products are successful at Kualoa Ranch, the PAF should begin to create a relationship with Oahu Fresh as production increases.** Oahu Fresh has more requirements in demand and product transportation than Kualoa Ranch. Because of this, it is important that the PAF should have a smooth processing chain, an understanding of the cost of production, and a consistency in production rate per week before partnering with Oahu Fresh. These requirements will mitigate any issues that the PAF may run into with Oahu Fresh or other CSAs. **We recommend our sponsors hire a business consultant to help them plan their transition to selling with Oahu Fresh.** They will need to have estimates of how much product they would need to supply to Oahu Fresh to make a profit, and will need a clear plan for handling production variability. This will further their confidence in successfully selling their limu. Oahu Fresh also has a larger customer base than Kualoa Ranch so it is important that the PAF waits until their distribution rate is sufficient before selling through Oahu Fresh. **Once the PAF is ready to partner with Oahu Fresh, we recommend that they sell pickled limu, poke mixes, and whichever value-added products they choose, because these processed products will have a longer shelf life and higher margin than fresh limu.** Oahu Fresh is uninterested in products with short shelf lives as they deliver products once a week. Pickled limu and poke mixes will have a longer shelf life and are of more interest to Oahu Fresh as well as consumers. When the partnership is made between Oahu Fresh and the PAF, we believe the

PAF should be very conservative in the quantity of product they promise Oahu Fresh each week, and likely should negotiate the smallest weekly amount that Oahu Fresh will accommodate. Missing demand with a CSA like Oahu Fresh would ruin the partnership between the PAF and Oahu Fresh. As the PAF continues to grow their rate of limu production, they could begin to supply Oahu Fresh with greater amounts of their limu products.

In the long term, once the PAF reaches large production rates, we recommend they try to also partner with Farm Link Hawai'i. Farm Link Hawai'i is another CSA that works on a larger scale than Oahu Fresh. Farm Link Hawai'i has over 2,000 customers and could be a very large distributor for the PAF's limu product. We were unable to secure an interview with Farm Link Hawai'i to learn more details regarding their distribution processes. It is worth noting they are the largest CSA on Oahu, and we believe they may also be a good distributor for the PAF's products. This would also provide advertising for the PAF alongside expanding their consumer base to those that prefer Farm Link Hawai'i over Oahu Fresh.

5.1.4 Testing Limu with the Kamehameha School System

As the PAF enters its end goal of scaling their production capacity high enough to provide food for the Kaneohe region and has consistent sales with Kualoa Ranch and a CSA, we recommend exploring options for a large commercial partner that aligns with the PAF's mission. A large commercial partner that we believe is culturally significant and renowned throughout Hawai'i is the Kamehameha School System (KSS). **We recommend testing the viability of limu at the Kamehameha School System in their school lunch program.** The school has interest in integrating locally grown produce, as they fulfilled recent legislation in Hawai'i that requires a certain percentage of food in school meals to be locally grown. A test of the PAF's limu products could be accomplished through the school's meal pilot program. The school pilots new meals using indigenous ingredients once a month with local chef Kealoha Domingo; this program would provide an entrance for the PAF's limu into the KSS. This event is hosted through the school's meal provider FLIKISD. The purpose of this test will assess the viability of the PAF wholesaling limu to the KSS. The amount of limu necessary for this test would depend on the dish prepared. The PAF would need to contact Kealoha Domingo to determine the quantity of limu needed to perform this test.

In Table 5, we list the organizations and people that would be points of contact for the PAF to begin testing limu in the KSS. These contacts are at different levels of the school's meal provider, FLIKISD. These contacts were found through public knowledge on the internet and have been included compilation for our sponsors.

Ideally, the school would request limu as one of the monthly meals tested at the school from FLIKISD. After the test, the school would further request limu to be integrated into school meals as PAF would become a producer for FLIKISD. If the PAF were to get involved in the KSS's meal program, their first step would be to contact the school and the KSS would aid them through the process.

Table 5: Contact List for Initiating Limu Testing with KSS.

Organization/ Individual	Contact Information	Significance
Compass Group	Contact Page: https://www.compass-usa.com/contact-us/	Parent company of FLIK Independent School Dining
FLIK Independent School Dining	Contact Page: https://www.flik-usa.com/contact-us Sales Inquiries: Donna.wang@compass-USA.com General Inquiries: Nicole.immediato@compass-usa.com	Current meal provider of the Kamehameha School System.
Nui Kealoha/Kealoha Domingo	Contact Page: https://www.canva.com/design/DAEdpcyL64I/3zIRAUjtvhxgbichP1WYGA/view Email: nuikealohaHawai'i@gmail.com Phone: (808) 753-3132	Contractor chef that hosts a once-a-month special meal event at the schools using indigenous ingredients.

5.2 Developing a Strategy for Community Outreach

With the PAF's limited budget, community outreach should be inexpensive but also effective. In this section, we propose recommendations for actions that the PAF should take into consideration to reach out to the community. Our recommendations include the following:

1. Build on our existing brochures and continue finding new ways to distribute these brochures.
2. Start utilizing social media platforms.
3. Host a product launch event to show the Kaneohe community the range of limu products that the PAF is producing.

5.2.1 Building on our Existing Brochures

Brochures are cheap and proven to be an effective form to convey information (Community Tool Box, n.d). **The brochures that our team created is a good starting point, but as the PAF expands, we recommend that they update it accordingly.** Revisions to our brochures must be made to reach more of the target demographic and to provide more effective communication with that demographic. **We recommend that the PAF continuously revise our drafts to keep the brochures up to date and to increase its effectiveness.** Some revisions would include adding pick-up locations where consumers can purchase the PAF's limu products once they are offered for sale. Another suggestion is to put more relevant facts on the brochure about the PAF's limu being hyperlocal and grown on Hawaiian owned land because these are important selling points.

In addition to building on the existing brochures, we recommend that the PAF finds more places to hand out these brochures. Only disseminating the brochures at the fishpond puts a limit on the demographic of people that the brochure reaches. To further elaborate, the people receiving these brochures at the fishpond likely already know about the PAF's mission and limu. Therefore, the brochures would not be as effective as opposed to those that have never visited the fishpond. Brochures that are distributed away from the pond should include upcoming dates for different events at Waikalua would bring new people to the fishpond. With the many resources and contacts that the PAF has, our team is sure that finding new places to hand out these brochures would not be difficult. Places like Kualoa Ranch and Windward Mall would likely provide the PAF a place to hand out the brochures. Table 6 is a list of locations and corresponding addresses that could be possible places to handout brochures.

Table 6: Locations for Dissemination of Brochures.

Name	Address
Kualoa Ranch	49-560 Kamehameha Hwy, Kaneohe, HI
Windward Mall	46-056 Kamehameha Hwy, Kaneohe, HI
Hawaiian Civic Club of Honolulu	46-005 Kawa St #104, Kaneohe, HI
Kaneohe Community Center	45-613 Puohala St, Kaneohe, HI
Windward Community College	45-720 Keaahala Rd, Kaneohe, HI

5.2.2 Start Utilizing the PAF’s Social Media Platform to Market Limu

As Taylor Kellerman expressed in his interview, regarding cheap and effective community outreach, social media is one of the best methods for marketing. **We recommend that the PAF uses social media to spread knowledge about their mission and the limu product. We also recommend that the social media for the PAF be run by a young employee with experience in social media management.** Through an interview with Taylor Kellerman, we learned that Kualoa Ranch hired a young person to run their social media accounts, and this benefited them greatly. Both recommendations from Taylor are highly encouraged by our team as they will help further develop the PAF’s outreach. The PAF should create and maintain Facebook, Instagram, Twitter, and TikTok accounts for the products produced at Waikalua. **We recommend that the information on our brochure be conveyed on all the PAF’s social media platforms. In addition to the information on our brochure, we recommend that the PAF post excerpts from the kūpuna interviews and dates for upcoming events at the fishpond on their social media accounts as well.** Relevant information about the PAF and limu along with upcoming events should be posted on their social media accounts. Having this updated information on the PAF across multiple social media platforms will increase the number of people reached.

5.2.3 Hosting a Product Launch Event

After the PAF is ready to sell their products, we recommend that they conduct a product launch event. The goal of a product launch event would be to generate publicity,

showcase the new products that will be sold to the community, and attract more members of the community to consider purchasing the products. This event should emphasize where the PAF plans to distribute their limu products to educate interested consumers. A product launch event is a great way to gain publicity and get consumers excited about a new product (Smart Works Events, 2020). **We recommend this event should offer samples of the products they are beginning to sell and include a presentation on the limu product. We further recommend that they connect with Uncle Walt to have a live musical performance to increase the draw of the event in the community.** As a part of our project process, we met with Uncle Walt Keale, another kūpuna in Oahu who is a local musician that plays at various venues across the island. Though our discussion with Uncle Walt was largely unrelated to our research objectives, we did reach the idea of a musical event at the pond. Either Uncle Walt could perform, or he could connect our sponsors with other local musicians. The results from our interview with Uncle Walt can be seen in Appendix F. Ideally, the event will spread knowledge of limu's cultural traditions, limu's health benefits, and will help strengthen connections between the PAF and the community.

5.3 Identifying Interest of the Target Demographic

As the PAF exits its research stage and begins to market its limu product to the Kaneohe community, we recommend they expand upon our research of their target demographic as well as expand their product line. To expand their product line, we recommend they further research consumer opinions to determine which products to release.

5.3.1 Product Line and Further Researching Consumer Opinions

Based on results from the consumer interviews, the team concluded that poke and pickled limu were most popular among the target demographic. **We recommend that the PAF sell poke mixes with limu and pickled limu as their initial products.** The data collected at the food tasting event showed that the poke mix and the pickled limu were the participants' favorite variants. These were variants that consumers expressed the most interest in purchasing from stores. **After considering consumer opinions, we recommend that the PAF examine other product options to diversify their revenue streams and expand their customer base. For example, we recommend trying to sell fresh sea asparagus.** Although the survey from the food tasting did not ask participants to score the sea asparagus, five participants commented that it was one of their favorite variants. This suggests that it may be a product consumers are interested in purchasing. **Furthermore, we recommend researching several**

new limu recipes to expand their product line as seen in Table 7. The reasoning behind including manauaea recipes is that the PAF is already producing manauaea at Waikalua and these products would make an easy shift into diversification of their product line. Snack crisps could be marketed as a snack product which were found to be more profitable than other large food products (Peters, 2007). Responses from the food tasting also supported adding recipes to a limu product’s labeling to help consumers come up with ideas to prepare it.

Table 7: Suggested limu recipes from “The Limu Eater” by Heather Fortner.

Recipe name	Page in the book	Ingredients required
Limu pahe’e snack crisps	Page 50	Limu pahe’e, wheat crackers, maui onion, grated cheddar cheese
Ogo kim chee	Page 51	Limu Manauaea, kim chee mix, water, and cider vinegar
Ogo cucumber salad	Page 59	Limu Manauaea, Hawaiian rock salt, cucumbers, maui onion, cider vinegar, sour cream, shoyu
Candied ogo	Page 77	Limu Manauaea, vanilla extract, sesame seed oil, sesame seeds, water, brown sugar
Raw Sea Asparagus	N/A	N/A

After selecting which products that the PAF believes will perform best on the market, we recommend they collect more consumer data by offering taste tests at different farmers markets. The recipes of samples we tested in our taste test may differ from the actual recipes they decide to use for the products they sell. Further researching consumer opinions will aid the PAF in fine-tuning their insight into consumer preferences. Once the most profitable forms of limu are identified, the PAF can cater to those consumer opinions and create more successful products.

When collecting consumer opinions at farmers’ markets, we recommend the PAF does not go far from Kaneohe. After our team’s attempt at data collection in Honolulu, we found that the Kapi’olani Community College farmers’ market on the leeward side of the island contained mostly tourists. Farmers’ markets on the windward side of the island would allow the

PAF to sell their limu product while also screening further relevant consumer opinions. Farmers' markets on the windward side of the island can be seen in Table 8. **We recommend our sponsors consult an online search for upcoming food-related events on Oahu.**

Table 8: Farmers' markets on the windward side of the island.

Name	Address	Proximity to Waikalua	Frequency
Kailua Town Farmers' Market	640 Ulukahiki St., Kailua	6 miles	Sundays, 8am-12pm
Lōkahi Kailua Market	340 Uluniu Street, Kailua	6 miles	Sundays, 9am-1pm
Hau'ula Farmers Market	54-160 Hanaimoa St, Hau'ula	21.1 miles	Saturdays, 10am-2pm

6 Conclusion

In this project, our team conducted research for the PAF and Sea Grant Hawai'i to facilitate the reintroduction of a locally grown, traditional limu product to the Kaneohe community. We analyzed viable distribution methods, developed strategies of community outreach, and identified interests of the target demographic. We used the results of this research to make recommendations on a step-by-step distribution plan, recommended methods for community outreach, and provided a plan on further identification of the interest of the target demographic. It is our hope that our recommendations will help the PAF organization thrive and that their mission to reconnect Kaneohe with a traditional limu product is successful.

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Appendix A: Sales Methods Interview Scripts

These interviews were with representatives from agriculture & agriculture distribution companies that provided essential information regarding the future sale, processing, and distribution of the PAF's limu product.

Matt Johnson of Oahu Fresh

Hello, our names are Lauren Abraham, Riley Bent, Alexander MacDonald, Jacob Sledge, and we are a student team from Worcester Polytechnic Institute. We are working with the Pacific American Foundation (PAF) and Sea Grant of Hawai'i for our junior year project. The PAF has asked us to conduct a business consultation to assist in reintroducing locally grown edible algae to the community. To do this, we have been gathering information from the community. If you are willing, we would like to ask you a few questions about limu and the current market there is for limu. Your answers will be kept completely confidential and anonymous if requested. If you wish to leave at any point or skip questions during this interview you are free to do so.

- 1) What is your role at the CSA?**
- 2) What experiences do you have with newly entering farms/businesses bringing products to the CSA?**
- 3) What are common challenges that this CSA has faced with its producers?**
- 4) How does a new farming business join this CSA?**
 - a) What requirements does a business have to meet to maintain membership?**
 - b) Are there any penalties that a business could face when it comes to missing deliveries or not meeting demand?**
- 5) What are the most successful products in this CSA?**
 - a) What makes these products successful?**
 - b) The PAF is planning on delivering limu, are there any other limu products sold at this CSA?**
 - i) (yes from 5B) What are the products?**
 - ii) (yes from 5B) How are they produced/who are they produced by?**
 - iii) (yes from 5B) What do you think the Kaneohe community would think of a traditionally and locally grown limu product from the PAF?**
 - iv) (no from 5B) Would this CSA benefit from a limu product?**
- 6) What kind of demand do you think a limu product that is grown so locally may have at CSAs around the region?**

- 7) **What is done with leftover products, especially products with short shelf life (Like lepe ula ula)?**
- 8) **How price-conscious do you think your consumers are? What factors do they take into effect when purchasing your products?**

Kanekoa Shultz of Kāko‘o ‘Ōiwi

Hello, our names are Lauren Abraham, Riley Bent, Alexander MacDonald, Jacob Sledge, and we are a student team from Worcester Polytechnic Institute. We are working with the Pacific American Foundation (PAF) and Sea Grant of Hawai‘i for our junior year project. The PAF has asked us to conduct a business consultation to assist in reintroducing locally grown edible algae to the community. To do this, we have been gathering information from the community. If you are willing, we would like to ask you a few questions about limu and the current market there is for limu. Your answers will be kept completely confidential and anonymous if requested. If you wish to leave at any point or skip questions during this interview you are free to do so.

- 1) What is your role at Kāko‘o ‘Ōiwi and what does Kāko‘o ‘Ōiwi do?**
- 2) Could you tell our team about your experience with sourcing of foods, food processing, and distribution?**
 - a) What other local vendors does Kāko‘o ‘Ōiwi work with and what products do they sell?**
 - b) Does Kāko‘o ‘Ōiwi have experience with limu?**
- 3) What place does limu have in your company’s interest?**
- 4) What impact would a deal/partnership between Kāko‘o ‘Ōiwi and the PAF have on the Kaneohe Community?**
 - a) How can our sponsors best support a partnership between Kāko‘o ‘Ōiwi and the PAF?**
 - b) Our sponsor's end goal is expanding greatly to eventually feed the Kaneohe community, how does Kāko‘o ‘Ōiwi’s goals compare?**

Taylor Kellerman of Kualoa Ranch

Hello, our names are Lauren Abraham, Riley Bent, Alexander MacDonald, Jacob Sledge, and we are a student team from Worcester Polytechnic Institute. We are working with the Pacific American Foundation (PAF) and Sea Grant of Hawai'i for our junior year project. The PAF has asked us to conduct a business consultation to assist in reintroducing locally grown edible algae to the community. To do this, we have been gathering information from the community. If you are willing, we would like to ask you a few questions about limu and the current market there is for limu. Your answers will be kept completely confidential and anonymous if requested. If you wish to leave at any point or skip questions during this interview you are free to do so.

- 1) What is your role at Kualoa and what does Kualoa do?**
- 2) Could you tell our team about your experience with sourcing of foods, food processing, and distribution?**
 - a) What other local vendors does Kualoa work with and what products do they sell?**
 - b) Does Kualoa have experience with limu?**
- 3) What place does limu have in your company's interest?**
- 4) Matt Johnson from Oahu Fresh expressed that Kualoa has a goal to provide the Kaneohe region with local food, can you tell us a little more about your overall goal?**
 - a) How can our sponsors best support a partnership between Kualoa and the PAF?**

Anne Marie Matsuzaki of Kamehameha School System

Hello, our names are Lauren Abraham, Riley Bent, Alexander MacDonald, Jacob Sledge, and we are a student team from Worcester Polytechnic Institute. We are working with the Pacific American Foundation (PAF) and Sea Grant of Hawai'i for our junior year project. The PAF has asked us to conduct a business consultation to assist in reintroducing locally grown edible algae to the community. To do this, we have been gathering information from the community. If you are willing, we would like to ask you a few questions about limu and the current market there is for limu. Your answers will be kept completely confidential and anonymous if requested. If you wish to leave at any point or skip questions during this interview you are free to do so.

- 1) What is your role in the Kamehameha School system?**
- 2) How did the Kamehameha school system manage to integrate 30%+ local produce so quickly into their school meals program?**
- 3) What local food companies work with the Kamehameha School system?**
 - a) What challenges have the food companies faced when working with the school?**
 - b) What are the requirements for producers to join the system?**
 - c) If the PAF were to provide 50lbs-100lbs of limu for you to test out in school meals, would that be of interest?**
 - d) If the PAF continues to scale their operation, would the school be interested in them as a long term local limu producer?**

Appendix B: Brochure Resources

Fact Sheet

Intro:

- 85% of the food in Hawai'i is imported (Terrell, 2021)
- Our limu offers the community locally grown produce
- Aquatic fishponds food production dates back over 600 years (NOAA, 2021; Wyban, 1989)

Waikalua' Loko I'a Facts:

- 400 yr old ancient Hawaiian fishpond, owned by PAF
- "The first ancient Hawaiian fishpond to come back into Hawaiian hands and produce food for the community"

Limu Historical Facts:

- Food
 - *The Limu Eater*, authored by biologist Heather J. Fortner documents limu's use in Hawaiian cuisine. This book contains traditional and modern limu recipes that range from miso-limu salad, to limu pahe'e snack crisps, a cheesy chip appetizer (Fortner, 1978).
- Medicine
 - Limu was used in medicine was to help women conceive by giving them Manauea
 - Medicinal use consisted of children eating lipoa that eased oral sores.
- Ceremonial
 - Ho'oponopono, a familial healing ceremony that resolves conflict. In the ceremony, each family member discusses problems afflicting the family followed by prayers and the consumption of limu (Wailana, 2019)

Health Benefits:

- Iron content - Herb's story
 - Traditionally, children growing up in Hawai'i were told to eat more limu to prevent iron deficiency anemia (H. Lee, personal communication, November 9th, 2022)
- Mineral/nutrient content
 - Contains sodium, potassium, iodine, and protein.

Kūpuna Quotes:

- **Quotes from Uncle Glenn**

- “Always leave something behind so it can grow back and it will be there when you go back”
- “Lots of living off the land” when describing his childhood
- “Limu was in a lot more meals back then”
- “As a kid at least 50% of their foods came from nature”
- “my education is from observation, what we [did] as kids and what I see through observation”
- “Bring the bag put it down and grandmother would go through it, if any rocks in it you’d get hell” - if limu’s “roots” were taken out of the ground there would be rocks in their bag his grandmother knew it was picked wrong
- It is worth noting that algae do not have roots- they have a “holdfast” that attaches the algae to a hard surface or rock so it can stay in place.

- **Quotes from Auntie Rocky**

- “Manauea is no longer the original limu as it is far less crunchy and flavorful”
- “There is no more limu pepe. I interviewed my Aunt around 50 years ago and she was talking about the same decrease in limu”
- “The decrease in limu is big time and it is hard to find”

Appendix C: Kūpuna Interview Script

Hello, our names are Lauren Abraham, Riley Bent, Alexander MacDonald, Jacob Sledge, and we are a student team from Worcester Polytechnic Institute. We are working with the Pacific American Foundation (PAF) and Sea Grant of Hawai'i for our junior year project. The PAF has asked us to conduct a business consultation to assist in reintroducing locally grown edible algae to the community. To do this, we have been gathering information from the community. If you are willing, we would like to ask you a few questions about limu and the current market there is for limu. Your answers will be kept completely confidential and anonymous if requested. If you wish to leave at any point or skip questions during this interview you are free to do so.

- 1) What traditional Hawaiian foods are your favorite?**
 - a) (if limu is said) What are your favorite ways to consume limu?**
 - b) (If limu is not mentioned) Is limu at all in your diet?**
 - i) (Yes) Where do you normally buy the limu?**
- 2) Has limu had any significance to you(r life?)**
 - a) (Yes) What is that significance?**
 - b) Are there any memorable stories that you have regarding limu?**
 - c) Are these memories from when you were younger or is it more recent?**
 - i) (If younger) Have you seen a decrease in the cultural significance of limu?**
- 3) Has limu been incorporated into your diet in recent years?**
 - a) If a traditionally grown limu were to become more available, would you be interested in buying it?**

Appendix D: Identifying Consumer Interest

Target Demographic Interview Scripts

These interviews were with farmers' market consumers that provided essential information regarding consumer interest in a future PAF limu product.

Farmers' Markets

Hello, our names are Lauren Abraham, Riley Bent, Alexander MacDonald, Jacob Sledge, and we are a student team from Worcester Polytechnic Institute. We are working with the Pacific American Foundation (PAF) and Sea Grant of Hawai'i for our junior year project. The PAF has asked us to conduct a business consultation to assist in reintroducing locally grown edible algae to the community. To do this, we have been gathering information from the community. If you are willing, we would like to ask you a few questions about limu and the current market there is for limu. Your answers will be kept completely confidential and anonymous if requested. If you wish to leave at any point or skip questions during this interview you are free to do so.

- 1) Do you enjoy eating limu?**
- 2) Where do you normally purchase this limu?**
- 3) Our sponsors are growing hyperlocal limu in Kaneohe, would you be interested in buying their product at local farm stands?**
 - a) (Yes) would you be willing to pay a little extra for a hyperlocal limu product?**
- 4) Do you have any questions about our hyperlocal limu?**

Thank you for your time, the information is greatly appreciated by us and our sponsors.

Sidenote - The reason for paying more is because our limu is of higher quality and hyper locally grown produce is more expensive to grow than mass-produced, grocery variety products.

Food Tasting Event Outline

This is a recommended outline on how we believe the sponsors should run their food tasting event. It contains the steps on how the sponsors should run it and materials needed to perform the food tasting.

Materials Needed:

- Disposable paper cups and paper bowls, chopsticks, napkins, Fresh Manauaea, Dried Manauaea, Poke Manauaea mix, pickled Manauaea, Fresh 'Ula 'Ula, Dried 'Ula 'Ula, water jug, surveys, brochures, tables, rubber gloves for food handling

Outline:

- The PAF will conduct a food tasting sampling their 2 species of edible algae, Manauaea and 'Ula 'Ula, in different variants
- This food tasting will be conducted at a Waikalua Loko I'a, the traditional fishpond the limu is grown at
- Samples will be placed into individual paper bowls
- The participant will come up to the table the samples are laid out at and receive each of the 6 samples
- Our group will be handing out surveys and informational brochures to the participants
- After sampling, the participant will be asked to fill the survey seen below
 - The survey will ask participants to score appearance, taste, texture, and overall opinion for each of the 6 samples.
 - The back of the survey consists of open ended questions to help gain an understanding about consumers likeliness to purchase the limu, what they believe "traditionally grown" adds to the product, and how to make the products better
- The brochures are meant to teach participants about Waikalua's history, Limu's history and health benefits, as well as the sponsors mission
- After completing the survey participants will give the responses to us and we will then analyze the data according to each specific answer

Food Tasting Event Survey

Hello, our names are Lauren Abraham, Riley Bent, Alexander MacDonald, Jacob Sledge, and we are a student team from Worcester Polytechnic Institute. We are working with the Pacific American Foundation (PAF) and Sea Grant of Hawai'i for our junior year project. The PAF has asked us to conduct a business consultation to assist in reintroducing locally grown edible algae to the community. To do this, we have been gathering information from the community. If you are willing, we would like to ask you a few questions about limu and the current market there is for limu. Your answers will be kept completely confidential and anonymous if requested. If you wish to leave at any point or skip questions during this interview you are free to do so.

Waikalua's Limu Food Tasting Survey

Please rate every sample tried on a scale of 1-10. We appreciate any additional answers to questions found on the back of this survey. Hope you enjoy it!

Fresh Manauaea/Ogo: Appearance __ / 10 Taste __ / 10 Texture __ / 10 Overall __ / 10 Comments: _____ _____	Dried Manauaea/Ogo: Appearance __ / 10 Taste __ / 10 Texture __ / 10 Overall __ / 10 Comments: _____ _____
Fresh 'Ula 'Ula: Appearance __ / 10 Taste __ / 10 Texture __ / 10 Overall __ / 10 Comments: _____ _____	Dried 'Ula 'Ula: Appearance __ / 10 Taste __ / 10 Texture __ / 10 Overall __ / 10 Comments: _____ _____
Poké with Manauaea/Ogo: Appearance __ / 10 Taste __ / 10 Texture __ / 10 Overall __ / 10 Comments: _____ _____	Pickled Manauaea/Ogo: Appearance __ / 10 Taste __ / 10 Texture __ / 10 Overall __ / 10 Comments: _____ _____

Waikalua's Limu Food Tasting Survey

Would you buy any of these products? If so, which ones?

Knowing that these products come from a local traditional fishpond, does this add more value to our limu products?

How could we make our limu products better?

Are there any recipes you would like to share or limu stories?

Additional to the survey: What did you learn from our brochure?

For more information, questions, or comments, please leave your contact information here:

Name: _____ Email: _____

Phone: _____



Appendix E: Sales Methods Interview Notes & Summaries

Summary of Jan. 23 Interview with Matt Johnson of Oahu Fresh

This section describes the interview we had with Matt Johnson of Oahu Fresh. The interview took place in person at an Oahu Fresh processing center in Honolulu.

We collected data through a semi-structured interview with Matt Johnson, the founder and CEO of Oahu Fresh, a community supported agriculture (CSA) business. The business model for Oahu Fresh is direct to consumer, meaning that the goal of the company is to work as a vessel for moving produce from the farm to the consumer. Their business allows a customer to order produce in a specified quantity and is very adaptable to the farmer's output. After a consumer orders produce, Oahu Fresh communicates to the farm the amount of produce they need for that period of time. We learned from Mr. Johnson that if a farm were to only have a limited supply during a harvest, Oahu Fresh would only offer the amount of crop that the farm can produce. If a farm were to constantly not meet their promised output, Oahu Fresh will no longer work with those producers. Currently, Oahu Fresh does not have a farm that supplies them with limu, and Mr. Johnson told us they would be interested in working with the PAF and Sea Grant Hawai'i. Oahu Fresh made it clear that they would not be interested in a limu product that has a short shelf life. As a side note, Mr. Johnson believed that a "traditionally" grown "hyper local" limu product could be sold at higher prices when compared to a non-traditional and local limu product as long as it was well.

Interview Notes

What Oahu Fresh Does:

- Oahu Fresh's goal is to create different pathways for farmers to move their products.
- "We work with small and big farms; we also have value-added producers who process ingredients into jam or cookies. full variety of customers and suppliers"
- "Help local farmers access local markets."
- Consumers order from Oahu Fresh Website > Oahu Fresh notifies farm about orders > Farm gets it to Oahu Fresh > Oahu Fresh distributes to consumers.

What challenges do Oahu Fresh and their partners face?

- Lots of challenges for sure. Sometimes we'll offer products to the customers, and the farm may not have the product available. We also do the home delivery model- that's really challenging too especially in the Honolulu area
- "We need 200 pounds of it and the farmer only has 40 pounds of it but we try to be adaptable"
- If a farm does not meet demand, we wouldn't work with them.

- There are signals coming out more, talking about the FDA going around to all farms, big and small, and checking at more of a macro level, that's an issue with meeting those regulatory requirements.

How does a new farm join Oahu Fresh?

- More of an email, phone call, we'd like you guys to carry it. What's your availability, what's the scale, but also talking about their food safety regulations. We're trying to get ahead of that, it's throughout the entire process.
- Matt stressed on the food safety part as he believes the FDA is starting to pay attention much more.

What are your most successful products?

- We sell the most bundles of produce and fruit. Our model works by you entering as a customer by subscribing, farmers market box based on what's in season and what's available. We have subscription boxes then you can add on meats, eggs, jams, all different kinds of things.

What algae products do you currently sell?

- We don't have any of that on our website right now.

Would Oahu Fresh benefit from a limu product?

- Sure. Anyone who has a product can easily put it up on our website.

What do you think that demand may be?

- Depends on how it would be sold on your guy's end. If it's just a pound of limu, it may be popular, but it would be more interesting if it was a poke mixed bag- all the ingredients to make poke.

What is done with the leftover products that you have that aren't sold? especially with products with a short shelf life?

- Most of the stuff we order has already been ordered from us. we don't have too much waste. we'll donate it to a women's shelter or composting. we're pretty good at having a limited amount of waste.

Are there other companies with similar missions you recommend we talk to?

- Kualoa ranch would be a good place for us to go check out located in Kaneohe. They want to sell to locals too.

Are you island wide?

- Just island wide. If lots of people were ordering I could see them struggling. We can cap it too, once it sells out it sells out.
- Do not do sales on other islands but work with farms from different Hawaiian Islands

Important information from Matt:

- Farms have to hit a certain size before they become profitable.
- Make sure to stress that limu is traditionally grown at traditional farm > This is what adds value to the product.

With smaller scale farms, do you tell the consumers every Friday? Is it weekly?

- Yes, it depends on the shelf life of the product.
- The lettuce-y one is a day, the stringy one is longer.
- There's gotta be a process that extends the shelf life 24h shelf life isn't going to work, that's too short there's gotta be something else that they're doing.
- "I wouldn't touch it with a 10-foot pole."

Summary of Feb. 8 Interview with Kanekoa Shultz of Kāko'o 'Ōiwi

This section describes the interview we had with Kanekoa Shultz of Kāko'o 'Ōiwi. The interview took place in person at Kāko'o 'Ōiwi.

We collected data through a semi-structured interview with Kanekoa Shultz, the executive director at Kāko'o 'Ōiwi, a 400-acre reservation and farm. Kāko'o 'Ōiwi's main objective is to use traditional systems with modern technology to feed the community in a sustainable way. Kāko'o 'Ōiwi distributes their produce through different methods including a CSA called Farm Link Hawai'i, roadside stands, a nursing home, and a women's shelter. Kāko'o 'Ōiwi has a commercial kitchen used to add value to their products. Kanekoa expressed that if the PAF needs a commercial kitchen, Kāko'o 'Ōiwi would gladly be of service. When asked about experience with growing and selling limu, Kanekoa expressed that Kāko'o 'Ōiwi worked with a fishpond nearby that grows limu, but they do not currently sell limu for human consumption. He expressed that he is supportive of a partnership between Waikalua and Kāko'o 'Ōiwi. Overall, the goals of Waikalua and Kāko'o 'Ōiwi align well as both organizations are on a mission to feed their local communities using traditional methods.

Interview Notes

What is your role at Kāko'o 'Ōiwi and what does Kāko'o 'Ōiwi do?

- I'm the executive director to move the pieces forward
- The goal here is to bring back fertility and life how it was in the early 20th century. We want to provide food economy, culture and services to the community
- We have a similar population now as we did pre-contact and can't support the same population now through only island agriculture

Could you tell our team about your experience with sourcing of foods, food processing, and distribution?

- We have 400 acres, 30 acres in production
- A lot of conservation work necessary within Kāko'o 'Ōiwi.
- They have the poi mill and use the commercial kitchen to process some of what they produce

How do you distribute your products?

- Roadside signs and stands
- Farm Link Hawai'i (CSA)
- The Key Project (Kualoa Ecumenical Youth Project)
- Lunalilo Home
- Women's Shelter

Does Kāko‘o ‘Ōiwi have experience with limu?

- Shultz has a background in seaweed (phycology)
- Paepae o He'eia is a fishpond across from Kāko‘o ‘Ōiwi that grows Limu

What place does limu have in your company's interest?

- Very interested in Limu, thinks it will be great for community
- Uses limu as food, fertilizer, and soil filtration
- Building a tank system that would allow for limu storage

What impact would a deal/partnership between Kāko‘o ‘Ōiwi and the PAF have on the Kaneohe Community?

- PAF is great, lots of community connections (lots of seeding of *Gracilaria* from them)
- "if Herb needs anything, tell us"

How can our sponsors best support a partnership between Kāko‘o ‘Ōiwi and the PAF?

- A partnership would be awesome, "if Herb needs a kitchen we have it"

Our sponsor's end goal is expanding greatly to eventually feed the Kaneohe community, how does Kāko‘o ‘Ōiwi's goals compare?

- Both their goals align with each other
- Both on a mission to feed the community using traditional means

Summary of Jan. 31 Interview with Taylor Kellerman of Kualoa Ranch

This section describes the interview with Taylor Kellerman of Kualoa Ranch. This interview took place in person at the Kualoa Ranch visitor center.

We collected data through a semi-structured interview with Taylor Kellerman, the Director of Diversified Agriculture and Land Stewardship at Kualoa Ranch. Kualoa is a 170-year-old, family run farm that focuses on sustainable agriculture and aquaculture, although much of its income is generated from the tours they offer. The farm was originally focused on wholesale before Covid but switched to a direct-to-consumer model. They opened a store front that runs Thursday through Sunday where they offer their own produce along with local produce from 25 other partners. Taylor expressed that being grown locally is the biggest criteria producers must meet to work with them. In the past, Kualoa has worked with limu, but the profits were not worth the time spent growing and processing the product. Taylor showed great interest in the PAF's limu product as he said Kualoa would work with them "without a second thought" as the farm does not offer any limu products currently. He recommended that the PAF try to sell a gauntlet of products but thought that pickled limu would be most successful. If the PAF were to partner with Kualoa, Taylor said it is best to start in small quantities of product and slowly work up to more volume. He stressed the two most important requirements to work with Kualoa besides being grown locally are quality and consistency. Partners must grow quality products and be consistent in delivering products each week. Overall, Taylor expressed great interest in selling limu grown at Waikalua in a variety of ways as he believed the product would do very well at Kualoa.

Interview Notes

What is your role at Kualoa and what does Kualoa do?

- Taylor works as the property manager/Director of Diversified Agriculture and Land Stewardship
- Most of Kualoa's revenue comes from their ag tours, but their primary footprint is agriculture and aquaculture

Could you tell our team about your experience with sourcing of foods, food processing, and distribution?

- Value added would be best- we have experimented with a limu product in the past.

What other local vendors does Kualoa work with and what products do they sell?

- Partner with 25 other producers- "made in Hawai'i", because it needs to be grown here too

Does Kualoa have experience with limu?

- Not selling any limu currently. Struggled to sell it as a raw product. Cleaning it was difficult- other organisms, not pollutants.
- Limu kits, pickled and raw Kualoa has the most interest in selling

What place does limu have in your company's interest?

- Would absolutely do PAF limu without a second thought
- Be way more interested in being able to pick from a gauntlet of products from them, fresh, pickled, and ready to go poke mix
- For regular consumer, people don't know how to prep limu

Matt Johnson from Oahu Fresh expressed that Kualoa has a goal to provide the Kaneohe region with local food, can you tell us a little more about your overall goal?

- Needs to be "made in Hawai'i" because that is a main mission of Kualoa.

How can our sponsors best support a partnership between Kualoa and the PAF?

- We start small and see how it sells
- Marketing is important. Social media is free, people want to try new safe and legitimate things.
- We want producers to meet quality and consistency
- We are seasonal and our consumers know that
- We will swing with you when harvests are low

Additional Notes

- There's a lot of federal money floating around for those types or projects right now.
- This is simplistic and repetitive- but the most important thing to do is find \$\$/Oz of produce.
- The hat trick to agriculture is consistency, price, and quality.

Summary of Jan. 26 Interview with Anne Marie Matsuzaki of the Kamehameha School System

This section describes the interview with Anne Marie Matsuzaki of the Kamehameha School System. The interview took place virtually on zoom.

The interview with Anne Marie Matsuzaki of the Kamehameha School System (KSS) provided data points regarding the schools' meal provider FLIK Independent School Dining (FLIKISD). FLIKISD provides the school with a myriad of services consisting of meal prep, chefs, and other catering services. The school system has the ability to choose what local products FLIKISD provides them when meals are being prepped for students. Matsuzaki spoke on the demand that the school would need from their meal providers as the high school alone can consume up to 800 lbs of rice in a day. Anne Marie Matsuzaki spoke on the three most important factors that FLIKISD looks for in a producer: quality, consistency, and price. FLIKISD employs Armstrong Produce, a production and distribution company that operates across Hawai'i, as a wholesaler for the KSS. She also mentioned that FLIKISD contracts a local chef, Kealoha Domingo, who works with new or indigenous foods when making dishes for school lunches once a month.

Interview Notes

What is your role in the Kamehameha School system?

- Works as project manager and on community partnerships for Kamehameha School System

How did the Kamehameha school system manage to integrate 30%+ local produce so quickly into their school meals program?

- Originally school lunches were run by school employees, about 5 years ago changed to a contractor.
- Work with a contractor called Flik
- Flik:
 - Large international corporation
 - Handle food prep ordering delivery
 - Train staff to cook
 - Schools pick their choice of products
 - Huge purchasing power buy food and plan for meals 6 weeks ahead
- Work with Hawai'i association of nonprofit schools
- Logistically better for school than previous system
- The company does everything for them

What local food companies work with the Kamehameha School system?

- Armstrong distribution works with Flik - big partner
 - They tell Armstrong they want all local products
 - Armstrong is local wholesale business
- Scale of Flik example:
 - 16, 50-pound bags of rice in one day

What challenges have the food companies faced when working with the school?

- No challenges - benefited greatly during covid
 - Meal prep and delivery to rural communities
 - Was able to keep partnership alive with continuing deal during covid
 - Pivitable with school requirement
 - Every 5 years they have to bid for partnership
 - Important to maintain good relationship
 - If loose bid select different vendor

Appendix F: Kūpuna Interview Notes & Summaries

Summary of Feb. 20 Interview with Aunt Rocky Kaluhiwa

This section describes the interview(s) with Aunt Rocky Kaluhiwa. This interview took place in person at the Waikalua fishpond during the PAF hosted food tasting event.

Through this interview, we learned about the impact her family has had on limu harvesting on Oahu. Her husband spearheaded the Limu Project in the 1970s for the KEY Project which taught people how to sustainably harvest limu to prevent it from being no longer available in Oahu. Her husband's efforts impacted across Oahu, and he was able to farm 15 types of limu across the island which is presented at a farm stand. Currently Aunt Rocky gets her limu from her sons and grandson's collections on their boats. She explained one of her favorite limu recipes that her husband used to make which was a sweet limu salad with kalo. Her husband would combine limu, sweet onions, tomatoes, and sweet vinegar to make a sort of limu namasu. She described the loss of limu pepe which she hasn't seen in quite some time. Furthermore, she expressed the déjà vu she felt with this interview as she had a similar discussion with her aunt over half a century ago. This interview taught her that limu in Oahu was running out and her aunt explained that limu was becoming harder to find. She expressed that this has only been exacerbated over the last half century and limu has become ever increasingly hard to find. Aunt Rocky further commented that limu Manaua is no longer the same limu that it once was when she was a child as it's less crunchy than she remembers.

Interview Notes

What traditional Hawaiian foods do you consider to be your favorite?

- Taro/Kalo is very favorite traditional Hawaiian food due to its healing properties as well as richness in vitamins, cited that she healed faster because the care facility didn't provide fresh foods and her kids brought kalo for her
- Family owned land at Kāko'o 'Ōiwi where they grew Kalo

(if limu is said) What are your favorite ways to consume limu?

- Her favorite limu dish is limu mixed w/ kalo, her husband loved limu & cooked it often, used sweet onions, tomatoes and the limu. Her mother didn't like limu but she was mainly raised by her father.
- Dump the limu in hot water for a couple seconds then in cold water, add sweet vinegar with the previous mentioned ingredients, it was namasu

(Yes) Where do you normally buy the limu?

- Currently Rocky gets her limu from her sons and grandson on their harvests with a boat far from the coasts. Sometimes she buys it.

Has limu had any significance to you(r life?)

- There is no more limu pepe. Around 50 years ago she did a similar thing and interviewed her aunt and half a century ago she was talking about the diminishing amount of limu and this has only worsened as time has gone on, an interesting point of comparison, problem has gone on for generations.
- Her husband was at the forefront of the limu project and had a display of 15 types of limu from all over the island that people have not seen in years. Worked with the legislature to pass a bill restricting the collection of wild limu. One guy had 3 trash bags of limu and in modern day you can't even find one trash bag.
- Her husband taught people how to pick limu and leave it growing.
- <https://www.youtube.com/watch?v=jjqTIW-EaXY>
- The decrease in limu is "big time" and it can't be found anymore. People didn't care about sustainability, they needed the money. Hulahula limu with raw squid was a popular dish.
- Manauea is no longer the original limu as it is far less crunchy and flavorful.

If a traditionally grown limu were to become more available, would you be interested in buying it?

- She would be very interested in buying limu from the PAF. Previously her family attempted to restore a fishpond but couldn't be done due to the high salinity levels in the pond.

Summary of Feb. 20 Interview with Uncle Glenn Martin

This section describes the interview(s) with Uncle Glenn Martin. This interview took place in person at the Waikalua fishpond during the PAF hosted food tasting event.

In an interview with kūpuna, Glenn Martin, our team learned about some of the traditional culinary and family traditions he experienced growing up. Uncle Glenn talked to us about how 50% of their food source came from the things they hunted and gathered. When he was growing up he expressed that limu was everywhere. Kids in his family would go to the shore and pick limu at least once a week. He expressed that back then limu was everywhere along the coast line. As different polynesian cultures migrated to Hawai'i he said they picked it all away. The new migrants would take the root out and it would not grow back, Uncle Glenn said they did not know how to pick it the right way. When he would pick it if there were roots or rocks in the back they would give to their grandmother he said "you would get hell". This shows that the Native Hawaiians cared a lot about picking limu in a way they knew would grow back. Other information from the interview can be seen below.

Interview Notes:

What traditional Hawaiian foods do you consider to be your favorite?

- Does not have any favorite traditional Hawaiian foods. Father was a hunter and fisherman so growing up he ate fish, limu, lobsters, crabs, pig, deer, pigeons, goat

What are your favorite ways to consume limu?

- Limu was in many dishes when he was young
- Grandmother would have him and his siblings go farm limu from the ocean 3-4 times a week

Has limu had any significance to you(r life?)

- They would go camping every summer and one day they camped the kids were responsible to go into the reef and gather the resources for a full meal to feed everyone.
 - Limu was always included in this tradition he had
- When younger limu was prevalent on shorelines, kids would farm on a weekly basis
- However as different culture arrived in Hawai'i they did not properly pick limu and would take the roots out with it
 - This led to limu becoming very hard to find anywhere on the coast line where it used to grow a lot
- "Limu was in a lot more meals back then"

If a traditionally grown limu were to become more available, would you be interested in buying it?

- Yes

Additional Quotes:

- “Bring the bag put it down and grandmother would go through it, if any rocks in it you’d get hell” - if limu roots were taken out of the ground there would be rocks in their bag his grandmother knew it was picked wrong
- When talking about how they preserved food sources from ocean and hunting “Always leave something behind so it can grow back and it will be there when you go back”
- when he was a kid he said there was “Lots of living off the land”
- “Limu was in a lot more meals back then”
- “As a kid at least 50% of their foods came from nature”
- “my education is from observation, what we [did] as kids and what I see through observation”

Summary of Feb. 23 Interview with Uncle Walt

This section describes the interview(s) with Uncle Walt. This interview took place in person at the Waikalua fishpond.

We collected data through a semi-structured interview with Aunt Rocky Kaluhiwa, a kūpuna in Oahu. Through this interview we learned about the impact that Uncle Walt has had on the community. He is a local musician and has blessed several openings of organizations across the Hawaiian Islands. He has volunteered at various organizations such as being a ranger or at a local church in Kailua. We got some powerful quotes about limu from this interview as well. Walt stated that he “Can’t find that (limu) at Safeway”. We received some advice on different recommendations we will extend to our sponsors as well. This interview was more of a conversation at Waikalua with a lot of information regarding various topics unrelated to the scope of this project.

Additional Notes:

- A big company called gather- do all the food concessions for Yellowstone. Have 500 big restaurant deals.
- Moving to Maui- bought a hali'i mai'i general store/coffee shop/bar, and another place called Gannon's. two totally different worlds. gannon's is a golf course, very uppity
- He's gonna build three or 6 more restaurants. and he has money! you don't wanna sell only to aunties and uncles. you wanna sell to guys with the big bucks
- Traditional knowledge and modern technology. That's what Hawaiians would do- fix it. ancient Hawaiians would use modern tech if they had it
- We are so used to having to think way ahead and plan because of our resources. this is not just about my time, it's about all the time behind me and all the time in front
- We interviewed kanekoa from kako'o 'oiwi- integrating new methods with traditional methods to preserve the land. it's all generations.
- "can't find that at Safeway"
- did you have limu when you were growing up?
- I didn't discover it until I moved back here. we would go to luaus, family gatherings- if it wasn't al pastor or carnitas I was like"what's that"
- I came home, I was 35, I figured I had some ground to make up. I was ashamed that I didn't like poi.
- I love it now
- Do you have any other recs for places around here?
- Another place that has a processing kitchen is Ho'okua'āina

- I'm a musician so I 'm thinking of a limu festival. right at the pond. One of our recs is for them to do a product launch event. we could get musicians, You guys are on Oahu mainly,
- Kauai has a foundation- they do the biggest taro farming, going to be developed by hotels but they fought it, and they farm taro. Waipa foundation- not only been clearing and getting
- land into production, they've also done fantastic community work. they get the community to buy into everything they do
- mango festival, kalo festival, "eat the invasives"- goat, limu, snail escargot. it educates people on invasive species, we can do something with them while we bring back native plants
- That's a big educational program, everybody goes to it. It's fun. those kinds of things are gonna be a big draw
- Festivals, you know, farmers markets, that's the slog. If there's some partnerships with people that have their own business that could buy and promote limu from here, that would be easy partnership. they could draw attention
- castle high school- not only a cafeteria, but they have a culinary arts building where they have a commercial kitchen
- they may be able to get the students involved too who are in the culinary arts program.
- When I think of those gather guys- the sell is not just how we can sell it, it's education. at risk youth- they're buzz-wordy but if you can really do it, it makes sense
- It's Department Of Education but if it's in their culinary program, they can do it underground and skirt around the rules.
- that would be cool to teach the kids about limu and it would help the farm out as well

Appendix G: Identifying Consumer Opinion

Summary of Feb. 18 Food Tasting Event

Individual Results from Fresh Manauaea Scoring

Response #	Appearance	Taste	Texture	Overall
1	7	7	6	7
2	9	9	9	9
3	7	6	7	7
4	8	8	8	8
5	9	8	8	9
6	8	9	10	8
7	9	10	10	10
8	9	9	9	9
9	10	10	10	10
10	8	8	9	8
11	9	9	9	9
12	10	10	10	10
13	10	5	9	7
14	7	6	8	7
15	10	10	10	10
16	10	5	9	7
17	8	8	9	
18	8	8	5	7
19	10	9	9	9
20	10	10	10	10
21	8	7	9	9
22	10	9	10	9
23	7	6	8	5
24	10	10	10	10
25	6	5	7	6

Individual Results from Dried Manauaea Scoring

Response #	Appearance	Taste	Texture	Overall
1	6	8	5	7
2	9	5	6	6
3	7	6	7	6
4	8	9	6	7
5	6	5	6	5
6	4	6	5	5
7	7	3	4	4
8	9	8	8	8
9	7	7	7	7
10	10	10	10	10
11	10	6	8	8
12	8	9	7	
13	5	5	5	5
14	9	8	8	8
15	8	9	7	7
16	8	6	5	6
17		6		6
18	9	8	9	8
19	5	2	2	3

Individual Results from Fresh 'Ula 'Ula

Response #	Appearance	Taste	Texture	Overall
1	9	9	9	9
2	5	5	5	5
3	7	5	6	6
4	6	8	8	8
5	10	8	9	8
6	10	7	8	9
7	9	7	5	6
8	9	8	8	8
9	10	10	10	10
10	5	5	5	5
11	9	10	9	9
12	8	4	5	5
13	6	1	4	5
14	8	5	7	6
15	6	6	6	6
16	10	8	10	10
17	10	8	9	9
18	10	6	7	7
19	8	6	9	7.8
20	8	4	4	5
21	9	7	6	
22	6	1	4	5
23	9	7	8	8
24	8	7	7	7
25				5
26	10	8	10	9

27	8	4	8	6
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Individual Results from Dried 'Ula 'Ula

Response #	Appearance	Taste	Texture	Overall
1	7	7	7	7
2	9	9	9	9
3	7	6	7	6
4	6	6	6	6
5				5
6	9	9	9	9
7	7	9	8	8
8	8	7	7	7
9	5	5	5	5
10	6	6	6	6
11	6	7	6	6
12	7	0	3	3
13	6	8	5	8
14	5	9	5	7
15	7	7	7	7
16	10	10	10	10
17	10	5	5	7
18	6	6	6	6
19	8	8	8	8
20	6	8	4	8
21	6	6	3	5

Individual Results from Manaua Poke Mix

Response #	Appearance	Taste	Texture	Overall
1	10	10	10	10
2	10	10	10	10
3	9	8	8	9
4	10	6	10	8
5	10	10	10	10
6	10	10	10	10
7	5	6	4	5
8	9	10	10	10
9	10	9	9	9
10	10	10	10	10
11	8	9	9	8.5
12	8	8	8	8
13	10	10	10	10
14	10	10	10	10
15	9	10	10	10
16	10	10	10	10
17	10	10	10	10
18	10	10	10	10
19	10	10	10	10
20	10	10	10	10
21	10	10	10	10
22	10	10	10	10
23	9	10	10	10
24	10	10	10	10
25				8
26	10	10	10	10

Individual Results from Pickled Manauea

Response #	Appearance	Taste	Texture	Overall
1	8	9	9	9
2	10	10	10	10
3	8	7	8	8
4	10	6	8	8
5	9	10	10	10
6				10
7	10	10	10	10
8	9	9	9	9
9	9	9	9	9
10	9	9	9	9
11	9	9	9	9
12	9	9	9	9
13	8	9	8	9
14	9	9	9	9
15	8	9	9	9
16	10	10	10	10
17	10	9	9	9.5
18	8	9	8	8
19	9	10	10	9.9
20	8	9	8	8
21	10	9	9	9

Summary of Jan. 25 & Feb. 11 Interviews with Target Demographic

This section describes the interviews that were conducted in person at Windward Mall farmers' market in Kaneohe and in person at Kapi'olani Community College farmers' market in Honolulu. Our team interviewed consumers at Windward Mall on January 25th and interviewed consumers at Kapi'olani Community College farmers' market on February 11th.

We conducted interviews with consumers at the Windward Mall farmers' market in Kaneohe to collect consumer data on January 25th. We interviewed a total of ten groups of consumers at that event. Of the ten groups of consumers, five groups had the time to talk with us. The five groups of people that we interviewed were made up of ten individuals. Of those ten individuals, two did not know what limu was. The remaining eight interview subjects knew what limu was and consumed it.

Of the five groups of consumers that knew what limu was and consumed limu, four groups reported buying their limu in small quantities from a grocery store or have family members that farm limu themselves. Four of the five groups of consumers that we talked to expressed that they do not normally eat limu by itself, and instead add it to poke bowls. Poke bowls are ubiquitous in Hawaiian cuisine and contain raw fish, limu, onions, and rice. Four of the five consumer groups that our team talked to were very interested in buying Waikalua-grown limu. One consumer stated that "most Hawaiians would be interested in buying it", and another consumer noted that limu is "tough to find in stores".

We also conducted interviews with consumers at farmers' markets in Honolulu at Kapi'olani Community College to collect consumer data. The interviews took place on February 11th. We talked to seven groups of consumers total. Of the seven groups of consumers, three did not have the time to speak with us, and four did not know what limu was or did not consume it. It appeared that this farmers' market's demographic was made up of mostly tourists when compared to the Windward Mall farmers' market. No other data was collected at the Kapi'olani Community College farmers' market.

Windward Mall Interview Statistics

- We talked to a total of 10 different groups of people shopping at the farmers market in which only of 5 those groups had the time to talk with us
- The 5 groups of people who talked to us combined to a total of 10 individuals
- Of these 10 people only 2 did not know what limu is
- Of the other 8 people interviews everyone consumed and knew what limu is

Interview Notes

Important Takeaways first consumer group

- Use limu in mostly in making poke bowls
- Normally buys it in small bags
- Would definitely consider buying limu grown at Waikalua
- Does not commonly see it in markets “tough to find”
- Referenced Nikos in Kailua a French chef
 - He uses a lot of local produce

Important Takeaways second consumer group

- Thought limu is great, uses mostly in poke bowls
- Was very interested in limu at Waikalua
- Said that "most Hawaiians would be interested in buying it"
- She said she would also buy it

Important Takeaways third consumer group

- Eat and enjoy limu
- Their uncles picks it and that is normally how they obtain it
- Would love to buy it if it was locally grown and affordable

Important Takeaways fourth consumer group

- They normally have it in poke
- Again do not buy it but is given to them by family
- “Especially on this side of the island people would buy it at local markets”
- Would be willing to pay slightly more for the fresh limu

Important Takeaways fifth consumer group

- Loves limu, normally consumes it in his own poke bowls
- Buys it dehydrated/dried and rehydrates it
- Said he “puts it in some water for a couple minutes and it comes out great”