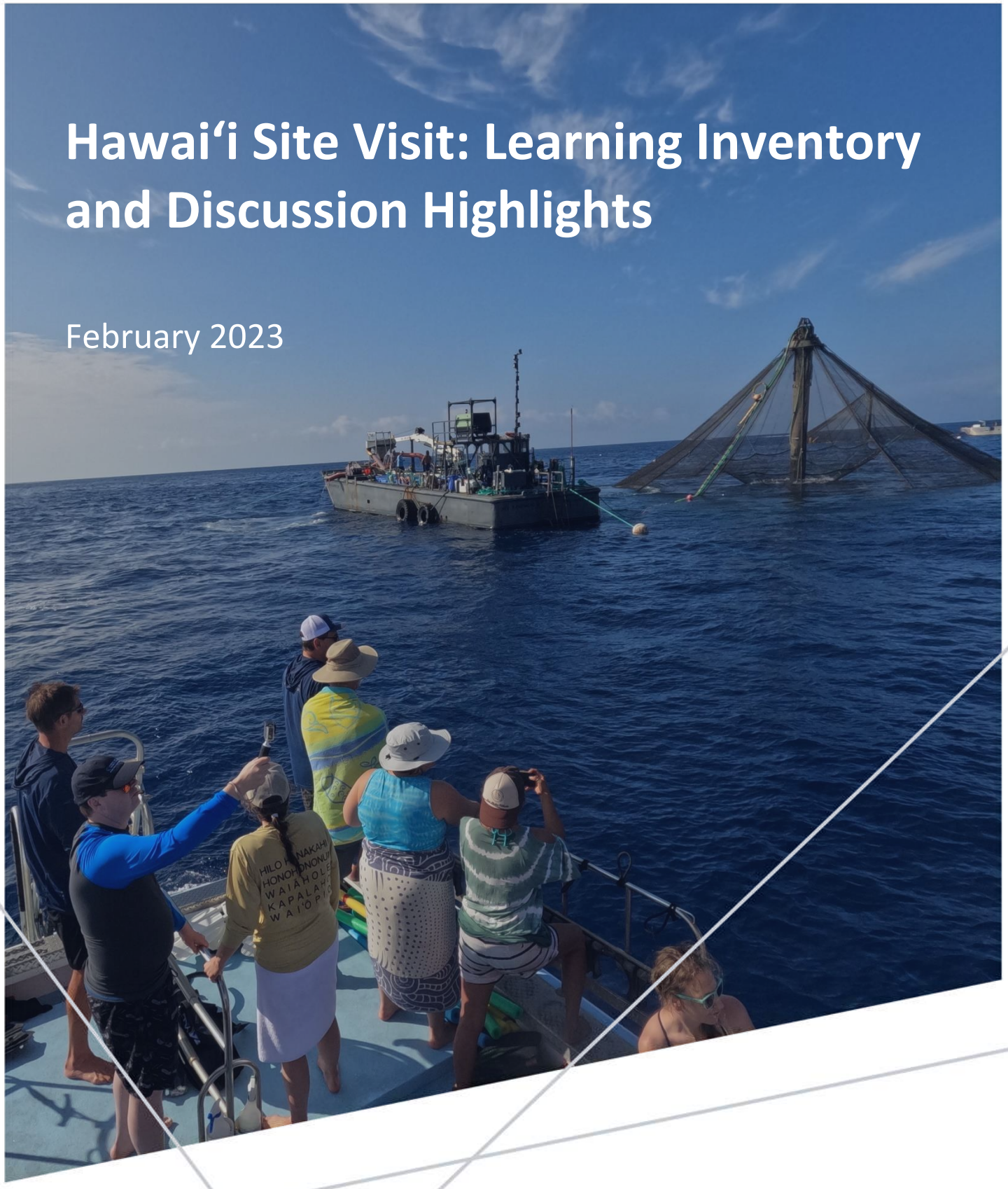
Hawai‘i Site Visit: Learning Inventory and Discussion Highlights

February 2023



MERIDIAN INSTITUTE

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Introduction

Meridian Institute, with support from Builders Initiative, hosted a multi-sector, aquaculture educational site visit on the Big Island of Hawai'i from January 22-25, 2023. The trip brought together representatives from commercial and recreational fishing organizations and environmental NGOs, along with local aquaculture stakeholders, to explore high-priority concerns, opportunities, and questions about aquaculture. During this site visit, the group learned about and experienced both traditional Native Hawaiian aquaculture practices and conventional forms of aquaculture through a series of field trips. Participants then processed the experience together during a facilitated discussion session that closed the group's time together. Appendix A outlines an itinerary of the trip.

This document provides a non-attributional summary of site visit learnings and insights, as shared by those that took part in the experience. This summary is **not** an authoritative document, nor a set of consensus recommendations, nor does it endorse a specific course of actions. Rather, it represents a snapshot of stakeholder discussions held at a specific time among a defined group of participants.

This document consists of two sections: (1) a "Learning Inventory" of selected insights from the various presentations and experiences shared during the site visit, and (2) a "Discussion Highlights" section, outlining takeaways that were raised during the facilitated group discussion on January 25. These selected highlights provide just a glimpse into what was a more encompassing, immersive experience. As such, this document captures impactful observations and ideas but is not wholly comprehensive. In all, this document is intended as a resource for stakeholders who participated in the trip to recall lessons learned and insights gained.

Select, big-picture takeaways from the site visit include:

- **Community Engagement:** When establishing conventional aquaculture operations in a specific geography, building community is key – that is, recognizing the values of those around you, bringing people along, and intentionally making space for all ocean users. Proactive and regular dialogue to connect operations with community values and perspectives is essential throughout the process of developing a new farm.

- **Framework for Aquaculture Development:** Setting up a successful operation requires careful considerations of the science (e.g., local environmental impacts, appropriate species selection), competing uses of the ocean space (i.e., finding a site that is viable), as well as how onshore opportunities support offshore operations (and vice versa). Exact operations in Hawai'i may not be replicable in other areas of the U.S., but good operational processes can be. Careful, calibrated approaches to modeling, monitoring, and management can be a framework on which to build a more robust process for exploring aquaculture development broadly.
- **Accounting for Diverse Knowledge and Contributions**: There is a need to incorporate traditional knowledge as part of the "best available science" that guides aquaculture industry science and development. In addition, there must be a recognition of the contributions of Native people, Black people, and other underrepresented groups in the history and development of the U.S. seafood industry overall.

- **Common Vision**: More dialogue is needed to develop a common vision for a vibrant U.S seafood industry that includes both fishing and aquaculture. It is important to talk about aquaculture from an overall seafood perspective, including how aquaculture development can benefit the commercial fishing sector (e.g., through investments in seafood infrastructure, creating more working waterfront jobs). In short, there is opportunity for the aquaculture and fishing industries to work together to build a stronger U.S. seafood industry.
- **Seafood Communications and Connections**: Narratives around aquaculture need to shift to connect communities to seafood and create pathways of information exchange. Narratives often focus on global economics and the supply chain (e.g., "aquaculture is needed to meet the world's protein demand," "the U.S. has a seafood trade deficit"). However, such messages do not resonate as much as locally focused communications (e.g., having aquaculture celebrate a sense of place, communicating how aquaculture meets or builds on what a community needs). There is an opportunity to create shared communications and messaging that expand community connections to seafood, increase domestic seafood overall, and communicate how the aquaculture industry fits into a vibrant and sustainable U.S. seafood industry.

Learning Inventory

LOCAL ENGAGEMENT AND COMMUNITY PERSPECTIVES

Insights on Community Consultations for New Aquaculture Development

- Aquaculture operations work when there is a close relationship between company and community. This includes operations proactively and regularly initiating dialogue with the communities in which they hope to be located.
    - Ocean Era spent nearly 20 years engaging with local entities around putting net pens into the water. Blue Ocean Mariculture has continued the practice of active, local engagement, particularly when major changes or new developments are proposed. Blue Ocean Mariculture also embraces a mission of being transparent in disclosing its practices and processes, as feasible, welcoming engagement and discussion.
    - It is also notable that Ocean Era did not have full community buy-in when the net pens were first established in the water. Through frequent and open communication, community buy-in has been established and grown over time as the surrounding communities developed experience and knowledge about the farm. One outstanding question is how much community buy-in is acceptable to begin development of a new aquaculture farm, in recognition that trust and relationships develop over time.
- Local facilities can be meaningfully repurposed for aquaculture purposes to benefit local communities. PACRC, for instance, inhabits a former wastewater plant that was built amid local opposition. PACRC represents a reclaiming of this space for a use that is more in line with community values. PACRC thoughtfully considered reclamation: For example, using the former plant's wastewater treatment clarifiers as large outdoor fishponds.

Insights on Loko I'a and Indigenous Approaches to Aquaculture

- Restorative aquaculture is a millennia-old concept in Hawaii. Restorative approaches to aquaculture are embedded in cultural practices. For example, limu is historically cleaned in the ocean so that spores washed off are returned to the environment to establish new seaweed growth. As a PACRC staff member put it, "indigenous people knew how to manage abundance for abundance."
- Fishpond caretakers view their work less as fish rearing and more as water and habitat management.

- Historically, fishpond caretakers were dedicated roles. Caretakers would live near the ponds, monitor and study them, and have an intimate knowledge of environmental systems at play.
- It took many generations and persistence to construct and maintain a thriving fishpond system (compare this to the relatively shorter time it takes for net pens to be placed in the water and become viable and productive).
- The fish in the pond were seen as "food reserves" in times of need rather than stock to utilize regularly.
- Fishponds are fed by natural springs that are connected to the watershed of the area. As such, fishpond caretakers consider their role to encompass care for the entire watershed, not just the fishpond area. When managers restore areas and re-establish the flow of clean spring water, it is a sign that the restored area can start functioning as a fishpond.

- Fishpond caretakers live into, claim, and embrace the tradition and pride of their role.
  - Two Hawaiian words that encompass indigenous approaches to aquaculture include "kuleana" (i.e., right and privileges inherently linked to responsibility – in the context of this work, responsibility for earth and ocean stewardship) and "aloha" (i.e., breath, life -- in the context of this work, understanding one's connection to the ocean, ponds, and fish).
  - The spirit behind such words, in the context of approaches to aquaculture, is one of awe, excitement, and humility. As such, native communities can appreciate approaches to aquaculture that embrace this same spirit – an approach that leans into wonder and respects traditions from generations before. Accordingly, the fish are seen as essential to the community and spiritual connection. One practice ensures that any fish harvested are shared with children and community, not eaten by individuals, to ensure that this tradition lives on in future generations.

CONVENTIONAL AQUACULTURE DEVELOPMENT

Insights on Species and Site Selection

- Ocean Era started as an exploration of which finfish species would be most amenable to offshore growth. The company tested many different species before settling on *Seriola rivoliana* (Hawaiian Kanpachi, known locally as Kahala or Almaco Jack) as the best option. Once a viable model was established, Blue Ocean Mariculture was formed to advance commercial cultivation, while Ocean Era remains dedicated to new frontiers of aquaculture research.
    - Hawaiian Kanpachi is considered a desirable food fish and has been consumed in Hawai'i for a long time. However, there is no commercial, wild-caught market for the species due to internal parasites found in the wild stock. Such parasites do not appear in the farmed stock, as the parasites only take root in the juvenile life stage when the fish feed on wild zooplankton that carry the parasite. In addition, since Hawaiian Kanpachi is a deep-water fish, it is less vulnerable to surface-level water temperature changes that will occur due to climate change.

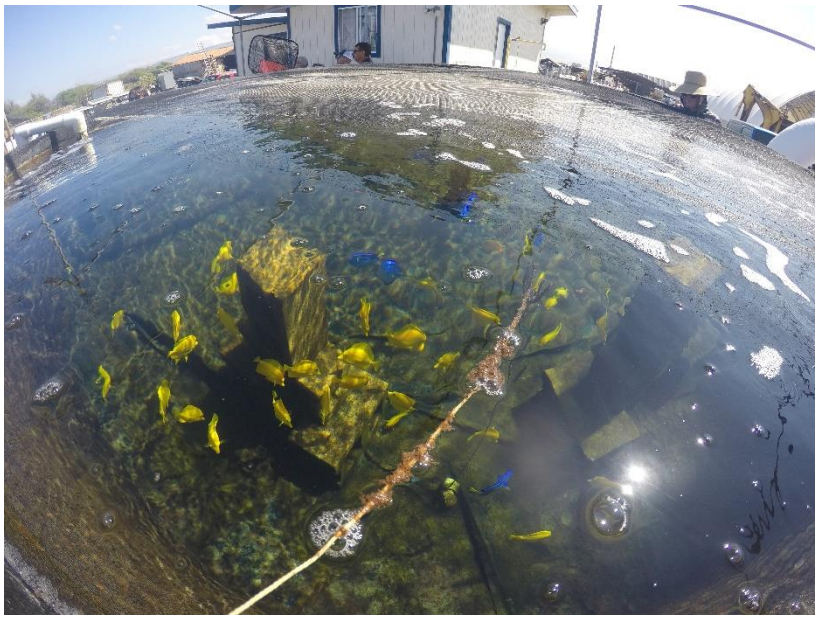
  - Hawaiian Kanpachi are also an ideal species because they are very adaptable. Blue Ocean Mariculture staff found that the fish species "ate from hand" within one week of capture (many other species did not respond to hand feeding until 6 months in) and spawn as early as 3 months after capture.
- Blue Ocean Mariculture has made considerable scientific investments to develop the species. For instance:
  - Development of feed for juveniles and production of zooplankton onsite, while achieving feed conversation ratios of 1.6 to 1.8 over the life cycle of the fish.
  - Domestication of the fish fairly quickly, while sourcing broodstock from wild populations, which are fed a diet of squid, shrimp, sardines and omega supplements.
  - Ability to conduct parentage analysis for health and genetics tracking and to sex the fish.

- Blue Ocean Mariculture recognizes that the farm they've developed in Hawai'i can't simply be exported to another geography and expected to work, as local context shaping a farm is critically important.
    - Setting up a successful operation requires careful considerations of the science (e.g., local environmental impacts, appropriate species selection), competing uses of the ocean space (i.e., finding a site that is viable), as well as how onshore opportunities support offshore operations (and vice versa).

    - There is an understanding that while exact operations may not replicable, good operational processes can be. This includes robust processes for species choice, siting location, community engagement, and more.

Insights on Science and Technology

- When it comes to finfish culture, Ocean Era is working on the overarching question "what is the next fish" that is possible to grow efficiently in aquaculture systems. This includes research on mahi mahi, chubb, and soon to be uku, considering efficient growth, spawning cycles, market potential, diet, and more.



- Ocean Era is cultivating a wide variety of seaweed and experimenting with methods to ensure the fastest growth of the highest quality product for a variety of markets, including for biofuel, human consumption, and herbivorous fish culture.
- Hawaii banned the harvest of ornamental fish for the aquarium trade, opening up the potential for culturing these tropical fish. However, many desirable ornamental fish species are very hard to grow, in part due to their environmental and dietary requirements during the larval stage. EcoHarvest is working to perfect the culture methodology for ornamental species, including blue tang and yellow tang, in hopes to provide foundational knowledge that can grow the ornamental and food fish aquaculture industries. PACRC is also advancing research on the culture of

ornamentals as the market could be substantial, help prevent wild poaching, and create local jobs. A single juvenile yellow tang could sell for $500.

Insights on Hatchery and Farm Location

- The location of Blue Ocean Mariculture is advantageous for both the hatchery and net pen farm.
  - For the hatchery, there is access to both surface and deep-sea ocean water (pumped in from just offshore). Additionally, the volcanic rock on which NELHA is built acts as a natural percolator filtration for flow-through water that is discharged from the hatchery.
  - For the net pen farm, the seafloor drops quickly off the Kona coastline, allowing for open ocean conditions close to shore. This allows for easier monitoring and access to the site.
- Blue Ocean Mariculture utilizes innovative design and technologies in its net pens.
  - The nets utilize copper alloy mesh to fight fouling, control parasites, and protect against predation. Additionally, the company raises the net pens each morning to "bake off" algal growth using the sun, thus eliminating the use of chemicals for cleaning.
  - The company recently invested around $1 million in equipment for the net pens, including cameras for biomass and pellet detection and real-time environmental sensors.
- The state's investment in NELHA allows for aquaculture innovation, investment, and collaboration across the site. The fact that activities at NELHA are pre-permitted and water from the surface and at depth is affordable and readily available makes NELHA a unique enabling condition for aquaculture development. This investment means Hawai'i can innovate and export both fish rearing techniques and technologies. The aquaculture industry in Hawai'i has identified a need for more sites like NELHA to further grow the industry in the state and beyond.

POLICY, REGULATION, AND PERMITTING

Insights on Federal Aquaculture Policy

- Aquaculture has been a bipartisan issue raised over the last four U.S. presidential administrations (particularly in the areas of research, development, and marketing).
- Some states have expressed the desire for an "opt-out" provision (i.e., the ability to opt-out of aquaculture permitted in the state) to be included in federal policy. Most notably, Alaska has a provision banning finfish aquaculture in their state constitution.
- Congressional staffers working on aquaculture policy have raised that it is still unclear who big players will be if a clear regulatory pathway is created for offshore aquaculture in federal waters (e.g., will developing good policy create a "build it and they will come" scenario?). Some policy debates are considering the role of the federal government in ensuring that aquaculture companies actually get established in the U.S. and are allowed to scale.
- Some entities support federal policy provisions that invest in aquaculture innovation centers (like the GreenWave aquaculture initiative in Connecticut).

Insights on Aquaculture Regulation and Permitting

- Depending on local regulatory conditions, gaining a permit to work with species for aquaculture can be a long and burdensome process.
    - For many in the aquaculture space, burdensome regulations are seen as the biggest constraint to industry growth (and relate to, or are reflective of, lack of trust between the sector and government).
    - Permitting can be burdensome for even small scale, non-commercial aquaculture operations. PACRC researchers, for instance, have found that even research permits can take years to acquire (e.g., in waiting for one permit to do a native oyster project, they lost funding because they could not proceed with their work). For PACRC, this reality demonstrated a need for more knowledge and expertise around aquaculture, especially among regulatory authorities.
    - Hawaiian fishpond practitioners also face regulatory and permitting hurdles in fishpond restoration efforts. Many fishponds are designated as historical sites, which can restrict restoration activities, while practitioners on the ground advocate that fishpond management is a living cultural practice that needs to adapt to changing conditions.

- NOAA recognizes the complexity and difficulty of current regulatory processes and is setting goals to establish more streamlined processes (e.g., inter-agency working groups to facilitate regional aquaculture planning, developing comprehensive permitting designed specifically for aquaculture).NOAA is also taking a holistic view of aquaculture as part of the seafood industry through grant support for developing sustainable feed ingredients, closing the life cycle for new species, and restoration of loko i'a.

AQUACULTURE WORKFORCE, ENTREPRENEURSHIP, AND INVESTMENT

- HATCH, a firm that invests in potential new aquaculture companies, is looking for innovation and talent (particularly business building skills) in teams they fund and mentor, not necessarily direct aquaculture experience.
    - 50% of HATCH cohorts do not have previous aquaculture experience. They come from various backgrounds (geneticists, natural scientists, data scientists).
    - HATCH-funded projects span the gamut of focus areas, including nutrition, genetics/biology, health, alternative seafood, production systems, and farm tech.
    - While the large majority of global aquaculture is in Southeast Asia (some estimate upwards of 90%), about 40% of HATCH's projects are in the U.S.
- Shortages in labor can be a major bottleneck to scaling a hatchery. For example, hatcheries may find that if labor does not grow with the hatchery, labor time spent on logistical elements (e.g., carrying feed from one part of the facility to another) will soon overtake the time needed to be spent on duties that inform good operations (e.g., observing and analyzing animal behavior).
- To be profitable, Blue Ocean Mariculture must produce 1200-1500 tons of fish annually. They are not currently producing at this level. Blue Ocean Mariculture has been successful because it has support from flexible investors who are providing patient capital. Accordingly, some participants questioned the how profitable developing an offshore finfish farm actually is, considering the high level of site-specific research, groundwork, and long timeline needed to reach commercial scale.

Discussion Highlights

OVERALL PARTICIPANT TAKEAWAYS FROM THE SITE VISIT

At the start of the January 25 discussion, participants were asked to share key takeaways from the site visit. Below is a synthesis of insights shared.

Respect for Aquaculture Approaches in Hawai'i – Traditional and Modern

- Participants were impacted by the sense of pride they saw in Hawai'i aquaculture operations, both in the traditional practices and conventional operations.
- For traditional practices, participants highlighted a clear dedication to preserving heritage and community approaches to aquaculture. Insights shared include:
    - There is foundational spiritual and emotional connection between people, the water/land, and food.
    - There needs to be recognition that Hawaiian ali'i did not manage the islands in isolation, but rather had the foresight to participate in the global ecosystem and economy. In discussing aquaculture, there is value in uplifting that reality, recognizing that there is a lot that the Hawaiian community and islands can teach the world.
    - Recognizing the contributions of traditional aquaculture approaches to modern practices echoes the importance of also recognizing BIPOC contributions to the commercial fishing industry.
    - Historically, "best available science" has been used to inform approaches to fisheries and aquaculture. There is a need to incorporate traditional knowledge as part of the "best available science."
- For conventional approaches to aquaculture, participants recognized that building community is also key – that is, recognizing the values of those around you, bringing people along, and intentionally making space for all ocean users. Insights shared include:
    - Blue Ocean and Ocean Era have demonstrated what it means to honor one's role as a neighbor and fellow ocean user. They have powerfully demonstrated that being a "good neighbor" is possible.

- While the progress made on aquaculture in Hawai'i is laudable, there is still room for growth, particularly in terms of community benefits (e.g., how is the product being made accessible to the community in which it is being produced?) and workforce DEI (e.g., is the company's workforce and leadership representative of broader demographics beyond white men?).

Need for Further Aquaculture Sector Engagement with Commercial Fishermen

- Participants noted that the relationship between the aquaculture and commercial fishing communities has been historically fraught at best. It was anecdotally noted that the relationships forged on this trip are beneficial to both industries, though they are dependent on individuals, rather than reflective of broader industry spaces. It was suggested that perhaps new common ground can be forged, if the industries can develop a less adversarial relationship. Insights and questions shared include:
  - When it comes to aquaculture development, what is considered a "win" for the commercial fishing sector? Maintenance of the status quo? Or something more? There is a desire to find ways for aquaculture to fit well into the lives of commercial fishermen.
  - The aquaculture industry has historically felt attacked by the commercial fishing industry, while commercial fishing has felt overlooked, threatened, and undervalued when it comes to interactions with aquaculture. This has created an adversarial dynamic; a reset in these dynamics to "get out of the trenches" could create more opportunities for collaboration and innovative problem solving. For example, discussions on how aquaculture livelihoods may be compatible with some who have experience in the commercial fishing space, who are looking for greater stability and the ability to "go home at night."
  - There are concerns about aquaculture expanding the "corporatization of ocean space," given that scalability often relates to profitability.
    - Commercial scaling of aquaculture farms can be a scary prospect for fishermen as well as local community members. Given how expensive it is to build and monitor aquaculture farms at a profitable level, there are concerns that larger corporate interests will not respect or consider local context.
    - Many fishermen may come from small family-run businesses, so aquaculture growth may be seen as corporate interests coming in and pushing small groups out.
    - Wild capture fisheries can be successful and efficient but not always sustainable – which is what the public demands (and is a contributing factor to conversations around aquaculture).
    - Some aquaculture stakeholders may feel the corporatization of space is inevitable (e.g., "How else do you feed a growing population?").

- Emphasizing the importance of community can help the aquaculture sector connect and resonate with fishermen, who themselves believe strongly in their role providing for their communities. As such, perhaps a more helpful conversation is one framed around "supporting our community" (through food production, job creation, retaining working waterfront heritage, etc.) rather than "feeding the world."

Need for Further Cross-Sectoral Dialogue and Identification of Process to Move Forward

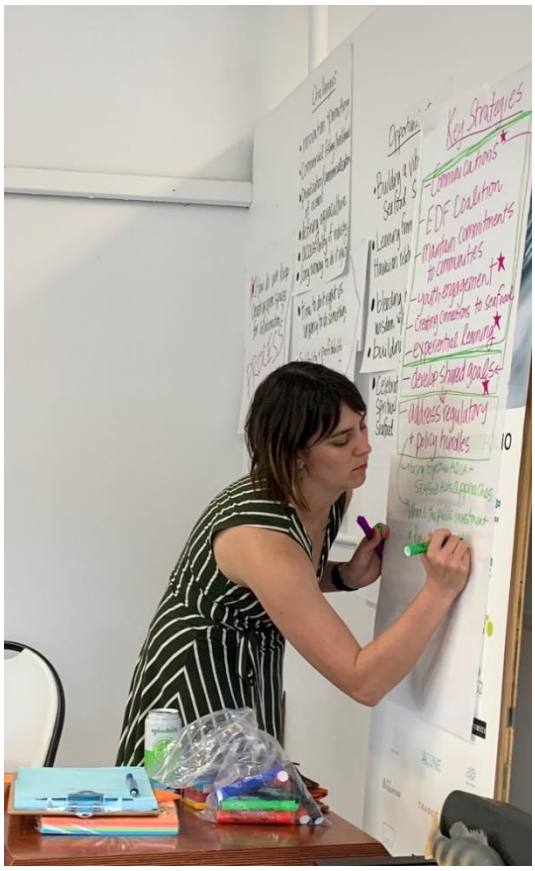
- Sitting down and having honest and direct conversation across sectors resulted in an increase in trust and understanding. Discussion led to agreement that robust modeling, monitoring, and management approaches are one potential framework upon which to build a more robust process for exploring aquaculture collectively. It is also essential to have aquaculture companies connect community values and perspectives in the process of developing a new farm.
- Still, several key questions remain around the future of aquaculture, including:
  - How do we define what the U.S. aquaculture industry should look like in the U.S.?
  - If operations can't exactly be replicated from the Hawaiian context, how can lessons be transferrable? What process could we construct based on key learnings from the site visit?
  - Many conversations in fisheries and food systems today revolves around the concept of "scarcity." Yet, conversations during this site visit (particularly around Kanpachi) have been around "abundance." What would abundance look like not just in terms of production but in terms of overall benefits across sectors and society?
- Participants expressed the value in having in-person conversations on aquaculture. Insights shared include:
  - It is important to talk about aquaculture from an overall seafood perspective, as all U.S. seafood consumers are affected by the large seafood deficit in the U.S.. Aquaculture and fishing tend to fight one another over market share of a slim proportion of domestic seafood consumption, when there is an opportunity to work together to build a stronger U.S. seafood industry overall.
  - We need to learn from one another – not only from the experts but from fellow learners in process.

- It takes time to do things right, whether that be R&D or building relationships. How do we do that in a moment where there is urgency to find solutions quickly?

STRATEGIES FOR TACKLING UNRESOLVED QUESTIONS AND ISSUES

In building on overall takeaways, participants were asked to think about questions and issues that remain top-of-mind and strategies for addressing them. Below is a synthesis of ideas shared.

Communications, Common Vision, Education



- Participants largely agreed that the U.S. aquaculture sector, broadly speaking, has a "communications problem."
  - In the U.S., the industry has struggled with unifying messaging what they are about and what they need – and communicating the science of why their industry is a "safe" one.
  - A major missing piece is showing the opportunities and advancements that have been made. It is critical for the aquaculture industry to communicate this in a way that resonates with multiple audiences. Also, linking these opportunities and advancements to an understanding of what responsible ocean use looks like.
  - Narratives around aquaculture may need to shift to bring people to seafood and create pathways of information exchange. Narratives often focus around global economics and the supply chain (e.g., "aquaculture is needed to meet the world's protein demand," "the U.S. has a seafood trade deficit"). However, such messages do not resonate as much as locally focused communications (e.g., having aquaculture celebrate a sense of place, communicating how aquaculture meets or builds on what a community needs).
  - A symptom of poor communication is the fact that there are negative connotations with the words "aquaculture" and "fish farming."
  - Historically, there are valid reasons for why many are hesitant toward aquaculture (e.g., net pen collapses). However, the response of the aquaculture industry can be one of defensiveness. Additionally, it can appear like the aquaculture industry is trying to "slide" permits in with minimal community consultation to avoid opposition, which can be seen as a lack of transparency.
  - Initiatives, such as the EDF-supported Coalition for Sustainable Aquaculture, can be used to help provide education on responsible approaches to aquaculture. Beyond formal membership, there are multiple opportunities to engage with the Coalition.

  - Additional place-based learning and information exchanges can improve understanding and foster solution-oriented discussion. As one participant reflected afterwards, "It is only when we are able to live it do we appreciate the full value of each and every life experience."
  - Communication is also needed to help think through what the future of aquaculture looks like (e.g., legislative and regulatory frameworks).
- While more effective communication around aquaculture is needed, a big remaining question is, "What do we hope to achieve with that communication? To what end?" Several participants asked the question of what is it that we are working towards, what might a common vision be for a vibrant U.S. seafood sector that includes both aquaculture and wild-caught seafood. Some considerations include:
  - Is there actually a pathway to building a profitable, sustainable aquaculture industry? Who are the future leaders who will take a more considerate, and intentional approach to developing farms, similar to the path laid out by Blue Ocean Mariculture?
  - What is seen as the "acceptable" aquaculture industry we are working towards? Small-scale boutique farms?
  - Do we see a pathway to a streamlined, efficient regulatory systems that is both expeditious and encouraging to new investments in the industry?
  - How can aquaculture industry development occur in a way that puts a priority on valuing local contexts and supporting a community's seafood sector overall?
  - A communications campaign can only work as well as the infrastructure in place to help it take root, particularly a system that better connects people to seafood – not necessarily just through the food systems space, but also through, for example, technology.

Challenges and Reservations about the Future of Aquaculture

- The world's appetite for marine protein is only growing, and it's only realistic to assume that the path forward involves aquaculture. With this assumption in place, larger discussions need to be had now around:
  - How to integrate aquaculture in a way that respects legislation and treaties already in place (e.g., Magnuson-Stevens Act, tribal agreements).

  - Creating broader community connections to fish and seafood:
    - Introduce fish to communities, not only to build acquired tastes but also build understanding of how marine resources work and relate to collective responsibilities around sustainability.
    - Involving youth in discussions around the future of seafood (e.g., ways to grow food, ways to include seafood as part of their community/way of life). This involves being innovative: understanding both the need to be profitable but also reciprocal in considering the needs of future generations.
    - Connecting seafood back to people's everyday experiences in genuine ways – learning and seeing seafood, understanding its importance to one's life (e.g., relationships with the water, stewardship ethics).
    - Engage in discussions around who owns and benefits from aquaculture (e.g., lessons learned from the Ventura Shellfish Enterprise). Will it actually be the local community?
- Participants raised concerns about the need to scale to be profitable and related implications.
  - The words "scale" and "profit" infer capitalism, which has been a major contributor the climate and justice issues society is facing today.
  - What are we actually scaling towards? Making more money? Feeding people? There is a need for equitable processes to deliberate and wrestle through these questions.
  - Aquaculture in Norway demonstrates that large-scale, commercial aquaculture can work. However, there is a cultural connection to aquaculture in Norway (including an environmental ethic) that is lacking in the U.S.
  - Scaling requires significant financial backing, which benefits those who have access to such capital. One solution is to create aquaculture innovation centers to help people get started in the industry. However, this would place a financial responsibility on taxpayers – so conversation will need to be had around whether such an approach is acceptable to society.

  - Beyond scaling, profitability can also be achieved through innovating and exporting aquaculture technology. However, the infrastructure is needed to develop such technology.
- Participants also raised concerns about the interaction and cumulative impacts of aquaculture development with other issues.
  - For commercial fishermen, offshore wind is seen as the single biggest threat to livelihoods. Development is happening so quickly that it is difficult to fully understand the full impacts to fishermen. All in all, commercial fishermen feel in a very vulnerable and threatened position. As such, discussions around aquaculture need to focus on mutually beneficial development (e.g., processing plants, working waterfronts).
  - For ENGOs, there are continued concerns around marine protected species, particularly as it relates to aquaculture-species interactions in a changing climate. For example, there are concerns that climate modeling that went into the Aquaculture Opportunity Area (AOA) process is not robust enough in some areas.

PARTICIPANT COMMITMENTS

The January 25 discussion concluded with participants reflecting on what they can commit to doing post-site visit to bring learnings back to their communities. Below is a synthesis of themes raised across participant responses.

- Educate constituents on learnings from the site visit.
  - Share blogs, photos, and videos of the site visit with subject matter expert colleagues and the public.
  - Communicate that the goals and practices of aquaculture are diverse.
  - Communicate that when done well, aquaculture can be compatible/synergistic with commercial fishing and has the potential to increase consumption of seafood locally and regionally.
  - Communicate aquaculture's potential to contribute to equity in food systems and help address the climate crisis.
- Lean into a spirit of reciprocal teaching and learning.
  - Allow learnings from this site visit to inform one's local aquaculture position statement and one's actions in engaging with aquaculture stakeholders going forward.
  - Consider the tension between kuleana vs. profit to inform socioeconomic discussions.
  - Apply the framing of public works for financial and regulatory pathways for loko iʻa, and potentially broader conversation about equity in aquaculture benefits.
  - Being open to understanding possibilities while leaving space to agree to disagree.
- Continue to engage in cross-sectoral discussions.
  - Determine strategies for replicating this model of exchange and trust-building (including funding), particularly in one's own aquaculture engagement strategies.

  - Encourage broader aquaculture industry participation in such discussions.
  - Invite additional constituents/interested parties to see the net pens in Hawai'i for themselves.
  - Help broaden discussions around aquaculture beyond just salmon.
- Center diversity and inclusion in further engagement.
  - Push the boundaries for deliverables in one's work to advocate for inclusion in decision-making, including traditional knowledge integration with Western science.
  - Continue to uplift and support entities that want to enhance seafood for everyone, equitably into the future.
  - Continue to build dialogues and create opportunities for historically underrepresented demographics to become stewards of their local environment.

Appendix A: Site Visit Itinerary

Below is an "at a glance" look at the site visit, which took place January 22-25, 2023.

DATE	AGENDA SESSIONS	
Sun, January 22 *All activities in Kailua-Kona, HI*	**Welcome Reception and Dinner**	
	5:30pm – 8:30pm	Royal Kona Resort, Alii Terrace
Mon, January 23 *All activities in Kailua-Kona, HI*	**Facilities Tours @ Natural Energy Laboratory of Hawaii Authority (NELHA)**	
	8:00am – 9:30am	Keahole Point Hatchery Facility Tour
	9:30am – 11:00am	Ocean Era Research Facility Tour
	11:00am – 12:00pm	EcoHarvest Hawaii Facility Tour
	Presentations, Group Discussion, and Networking Dinner	
	1:00pm – 4:00pm	Presentations and Group Discussion: Aquaculture Policy, Entrepreneurship, and Community Engagement
	5:00pm – 7:30pm	Networking Dinner
Tue, January 24 *All activities in Hilo, HI*	**Facilities Tour @ Pacific Aquaculture and Coastal Resources Center (PACRC)**	
	10:00am – 1:30pm	PACRC for Facilities Tour and Networking Lunch
	Loko I'a Tour and Service Project @ Kumuola Marine Science Education Center	
	2:00pm – 5:00pm	Kumuola for Loko I'a Tour and Service Project
Wed, January 25 *All activities in Kailua-Kona, HI*	**Net Pen Snorkel Tour @ Blue Ocean Mariculture**	
	7:30am – 10:45am	Blue Ocean Mariculture Net Pen Tour (offshore)
	Group Discussion and Closing Reception @ HATCH	
	1:15pm – 5:30pm	Discussion: Reflections & Opportunities for Collaborative Solution
	5:30pm – 7:30pm	Closing Reception