Improving the Aquaculture Development Program (ADP) Strategic Plan

For Hawai'i

Department of Agriculture
STATE OF HAWAII

Executive Summary

HATCH
Innovation Services

Photo: Blue Ocean Mariculture

Hatch Innovation Services was commissioned to investigate the state of aquaculture in Hawai'i and make recommendations to the Hawai'i Department of Agriculture (HDOA) on how they can improve the existing Aquaculture Development Program (ADP) Strategic Plan. The objective of the report was to provide recommendations for key areas that local state and federal agencies can focus on to drive the industry forward and develop and grow a robust, sustainable food production industry that will contribute meaningfully to the economy, the community, and the environment.

Driving Hawai'i's ADP Strategic Plan forward

To promote aquaculture in Hawai'i, the Aquaculture Development Program (ADP) has devised a 10-year strategic plan. This plan is aiming to achieve the dual goals of increasing aquaculture food production and supporting initiatives for restorative aquaculture.

HDOA's tactical priority areas for supporting Hawai'i's aquaculture development focus on **Commercial Activity, Environmental Restoration**, and **Support Equipment & Services**. The anticipated result is to create socio-economic benefits for the island communities of Hawai'i. These areas will form the cornerstone of this project's improvement strategy.

Developing a smart, cohesive, forward-thinking plan for Hawai'i's aquaculture will benefit its people, its economy, and its environment. The Hawai'i aquaculture sector is already well established but it needs to attract more industry players, entrepreneurs and investors to stimulate more commercial activity and grow more opportunity to fulfil its ultimate potential.

Research Approach - Using a Multi-component Toolbox

To be able to provide the above mentioned recommendations, Hatch Innovation Services drew on the extensive and diverse experience of its full team. A global scan of 'best in class' institutions, partnerships, and businesses was undertaken to obtain a holistic worldview of proven strategies. The industry ecosystem was mapped, and key gaps and opportunities were identified. Stakeholders across the industry were invited to provide input and commentary either in-person or through an online survey, and the Hatch team immersed itself in the local industry to understand its social, economic, and environmental drivers.

The foundation of this report was based on 6 knowledge pillars and information sources

Information sources to provide recommendations to improve Hawai'i's ADP Strategic Plan

- Literature Review
- Market Data Analysis
- Global Scan of Aquaculture & Innovation Hubs
- Industry Insights Interviews
- Hawai'ian Aquaculture Stakeholder Database
- Online Survey *Challenges in the Hawai'ian aquaculture industry*

The Challenge of Our Food System

With the global population expected to hit 9.7 billion by 2050, food production needs to grow by 70% while also being environmentally sustainable.[9] Currently, food production contributes to nearly a quarter of global greenhouse gas emissions and heavily impacts freshwater usage and habitat degradation, accounting for 70-80%. In light of this development, the ocean's role is becoming particularly significant in addressing global food security and resiliency.

A Shift Towards Blue Food Transformation - Hawai'i's opportunity to lead by example

On a global scale, we are seeing governments develop food strategies for the transition towards blue foods - a term encompassing various types of seafood and aquatic plants that are caught or farmed in freshwater and marine environments. Blue food transformation is increasingly seen as a vital response to global food security, ending human malnutrition and building a healthy, environmental sustainable and resilient food system.

Hawai'i's rich marine biodiversity and strategic Pacific location in the ocean present a unique opportunity to contribute as a solution in advancing the ocean economy sector, addressing climate changes while also scaling up its blue food production. This is also aligned with the existing Hawai'i 2050 Sustainability Plan by complementing its objectives that nurture cultural values and aid in achieving the state's sustainability aims. For Hawai'i, blue food production is deeply rooted in the island's culture and prosperity, with many local communities depending heavily on these resources. By focusing on sustainable practices in blue food production and consumption, Hawai'i is not only preserving its own coastal and marine ecosystems but also setting an example for other regions. Hawai'i's unique cultural and environmental context provides a valuable model for integrating traditional knowledge with modern sustainability practices, showcasing how local actions can have a global impact in the fight against climate change.

Aquaculture can be the solution for a sustainable & climate resilient food system

Aquaculture is rapidly growing globally with the benefit of a lower carbon footprint compared to other animal proteins. Currently, it provides over half of the blue foods consumed globally and with a growing global population, its growth is projected to continue.[16] Aquaculture is essential for global food supply in a changing climate. Increasing consumer demand for responsibly sourced blue foods is steering the industry towards sustainable practices. Retailers, NGOs, and nonprofits are actively raising awareness about eco-friendly blue food. Recent surveys show a strong consensus on blue foods' benefits: over 80% of consumers acknowledge blue food' health advantages, and 75% to 89% believe in the industry's ability to sustainably and responsibly operate. This reflects the growing trend towards environmentally-friendly, health-conscious dietary choices.[18]

Hawai'i's Market Opportunity

In 2021, global aquaculture production, including seaweed, surpassed 120 million tonnes (live weight), with an annual growth rate of about 4.5% from 2010 to 2021. However, the contribution of the United States to this production is minimal on a global scale, and its output has been stagnant in recent years.[26] Several studies and organizations (such as NOAA) are promoting the regular consumption of seafood for health benefits, especially in the light that the United States has one of the highest meat demand per capita in the globe. In the past years, there was already a slight growth in US seafood consumption, but any further increase means the US will need to either rely even more on foreign trade or increase domestic seafood production, thereby presenting an attractive market opportunity. In the case of Hawai'i, its unique status as a major tourist destination, attracting far more visitors than its residential population, opens up additional markets for its local seafood producers beyond just its residents.

Current practice and future sustainable pathway for Hawai'i aquaculture sector

Hawai'i holds significant promise for a sustainable ocean economy transformation. A sustainable pathway for Hawai'i's aquaculture promises environmental benefits, economic growth, social well-being, biodiversity conservation, innovation, and enhanced tourism experiences. The table below provides a comparative analysis of current practices and the emerging sustainable pathway, considering aquaculture´s environmental, social, and economic dimensions:

	Aspect	Current Landscape	Sustainable Expansion Pathway with Aquaculture
Environmental Impact	**Carbon Footprint**	High due to current dependency on imports and air freight transportation of seafood products: Importing seafood by air involves significant carbon emissions, making Hawai'i´s seafood consumption environmentally unfriendly.	Significantly reduced with local aquaculture production: local aquaculture production reduces the need for transportation and long distance air freight, decreasing significantly the overall carbon footprint of the value chain.
	Ecosystems	Potential negative impacts on local ecosystems: wild fisheries practices can lead to habitat degradation and pollution.	Positive or neutral impact on ecosystems: Adoption of restorative aquaculture methods aimed to restore ecosystems: Focus on generative and regenerative farming practices.
	Biodiversity & Habitat Provision	Limited range of species: conventional practices often focus on a few species. Not yet maximize the benefits of endemic regenerative and generative species.	Diversify species, tailored to local environment and climate adaptation: programs and methods to promote species diversity for expansion of aquaculture.
Economic Impact	**Benefit Technology & innovation**	Limited funding and permitted space on/offshore for testing of new technology and innovations for aquaculture development	Innovative methods i.e precision farming, or novel farming systems, can enhance production efficiency, lower environmental impact, reduce costs, and potentially open up new markets for sustainable aquaculture products.
	Viability & Profitability	Vulnerable to market fluctuations: price volatility can affect profitability.	Market development to secure more stable, sustainable profitability for farmers: all year production with sustainable practices aim for consistent profits and premium prices.
	Viability & Local Development	Limited local economic impact: a significant portion of profits may leave the local economy from importing seafood out-of-state and internationally.	Supporting more local farmers in island communities to boost local economy and job creation: local production generates jobs and economic benefits.
Social Impact	**Food Security**	High reliance on imports: increased dependency on imports raises concerns about long term food and nutritional security.	Decreased reliance, increased local supply: a sustainable approach enhances food nutritional security.
	Community Benefits	Limited local benefits: profits may not always directly benefit local communities.	Direct benefits like job creation and education, technology advancement. Sustainability generates local benefits.Integration of eco-aquaculture with tourism for educational experiences: sustainability enhances tourist experiences.
	Community Health	Limited or only seasonal access to locally produced seafood.	Improved access to nutritious local seafood: sustainability supports community health through local food sources.
	Cultural Identity	Only a moderate focus on local pride in seafood consumption	Locally Hawai'ian produced identity branding, encapsulates the essence of local seafood production rooted in Hawai'ian culture and sustainability.

Hawai'i has an opportunity to take a leading position for the development of warm water aquaculture focusing on restorative and open ocean farming

Hawai'i's aquaculture industry is already well-established, and the islands offer a competitive edge over mainland USA and other areas in a number of ways:

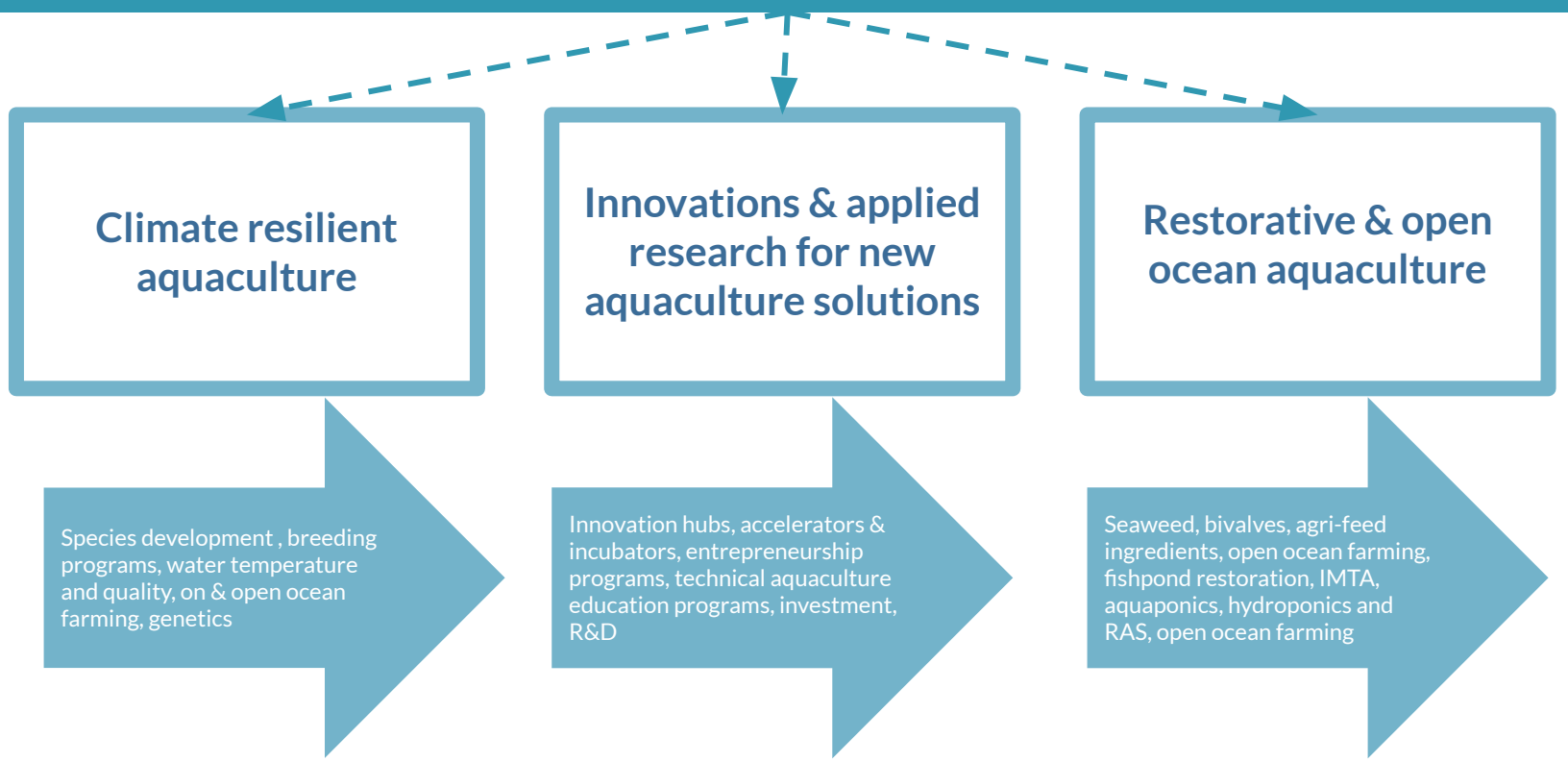
- The Hawai'i Islands have a favorable climate with critical biosecurity through natural isolation. The islands also have access to varied water temperatures - from warmer tropical water to pristine, deep, cold water. This gives Hawai'i the unique advantage of being able to farm a much wider variety of species compared to the mainland and elsewhere.

- An open ocean aquaculture license has recently been awarded in Hawai'i - the first such license to be awarded in the US - positioning the state at the forefront of open ocean aquaculture. This provides a unique opportunity to set a precedent for sustainable open ocean aquaculture that nurtures the environment, the community, and the economy.

- Hawai'i's fishponds are a unique part of the Hawai'i culture and identity. Restorative aquaculture at these sites, as well as regenerative projects such as limu and bivalve farming, are already ongoing in the state and have the support of the community at large. Initiating further projects and/or securing investment, infrastructure development, marketing, and research to augment and stimulate these areas of aquaculture ticks all the boxes in terms of climate, community, and culture.

- Hawai'i's current aquaculture research environment provides an excellent infrastructure to test and validate new aquaculture concept. The universities of Hawai'i and the community colleges on the islands offer exceptional support to aquaculture R&D and capacity building. Strengthening these relationships with the education sector could catapult Hawai'i to the forefront of aquaculture technology and innovation.

Based on preliminary research, Hawai'i is well-placed to position itself as a leader in:



Overview of Hawai'i's Aquaculture Roadmap

HATCH Innovation Services

To Improve the Aquaculture Development Program (ADP) Strategic Plan

ADP Strategic Plan

GOALS

The ADP has developed a 10-year strategic plan supporting the dual goals of increasing aquaculture food production and restorative aquaculture initiatives.

TACTICAL PRIORITY AREAS

COMMERCIAL ACTIVITY	ENVIRONMENTAL RESTORATION	SUPPORT EQUIPMENT & SERVICES

Roadmap for Improving Hawai'i's aquaculture development plan

IMPROVEMENT AREAS

1 REGULATORY DEVELOPMENT & EFFICIENCY	2 APPLIED RESEARCH & ENTREPRENEURSHIP	3 WORKFORCE DEVELOPMENT	4 ECONOMIC VIABILITY & GROWTH
Simplify and consolidate regulation and regulatory processes and pathways for permit applications, streamline monitoring services by agencies	Develop a dynamic innovation ecosystem to build a pipeline of applied commercial solutions for warm water aquaculture	Build the future workforce, capacity building initiatives, aquaculture technical education and certificate programs and training	Support more public & private investment in commercial aquaculture production and supply chain services, market development and foster commercial partnerships

IMPROVEMENT ACTION AREAS

1	2	3	4
• Streamlining permitting process for aquaculture • Exploration of new aquaculture development zones • Research permits • Environmental reporting and public communication	• Commercialization programs for emerging species and technologies • Stock enhancement program for loko i'a • Investing in applied research infrastructure	• Specialized higher learning education programs in aquaculture • Raise awareness of aquaculture careers • Educational tours in partnership with farmers	• Innovation Cluster Program for the growth and development of Hawai'i´s aquaculture • Market activities • Assessment of the Blue Carbon Market • Access to Capital and funding

MARKET ACTORS

Government & Agencies	Industry & Producers	Educators	Investors & Funders	Associations Community NGO's	Entrepreneurs

NETWORK & RESOURCES

Funding & Incentives
Public Private Partnerships & Collaborations
Market Development
Collaboration and Networking
Community Engagement

Recommendations for short-mid and long-term priorities of tactical actions

Short Term Priority-recommendations for the next three years

- Streamline aquaculture permitting by promoting coordination and harmonization among regulating agencies.
- Stock enhancement program, including the development of state of the art multi-species hatcheries for stock enhancement recovery targeted for loko i'a and small-scale farmers
- Strengthen environmental data collection and public communication around environmental, economic, and societal sustainability from aquaculture production.
- Seek opportunities with private stakeholders to develop a centralized diagnostic lab
- Incentivize funding for more applied research and commercialization, as well as collaboration with industry on research topics.
- Secure more flexible permits for staff housing and leased land for staff, seasonal workers, and interns and develop low-cost housing options
- Support funding for entrepreneurship, accelerator and incubation programs to attract and grow new businesses and scale innovative aquaculture solutions
- Market insights and market development activities to incentivize investment to scale aquaculture production in Hawai'i, in recognition of the role aquaculture can play in reaching state food security, environmental and economic impact targets.

Medium Term Priority-recommendations for the next five years

- Quantify the social, economic, and environmental benefits and ecosystem services and products from restorative aquaculture (carbon sequestration, carbon dioxide removal (CDR), nitrogen uptake, etc.)
- Investigate the viability of a public-private partnership for a centralized processing facility together with cold storage for value-added seafood products
- Develop tailored aquaculture training programs and secure long-term funding to ensure continuity and effectiveness to the industry.
- Support funding for educational tours to the general public, schools, and researchers.
- Secure long term funding to expand local aquaculture research infrastructure and capabilities for new species and technology development onshore, open ocean farming, and restorative farming

Long Term Priority-recommendations for the next ten years

- Evaluate opportunities to establish research permits (time limited) for testing and validation of new species and technology commercialization.
- Develop a ten year applied research plan to grow and expand Hawai'i's aquaculture industry.
- Increase funding for career awareness activities to attract and retain future workforce.
- To provide funding and/ or other tax incentives to attract more private funding in the commercialization of new aquaculture farming concepts.