# Aquaculture Development Program
# Strategic Plan
# 2023 - 2033

# Table of Contents

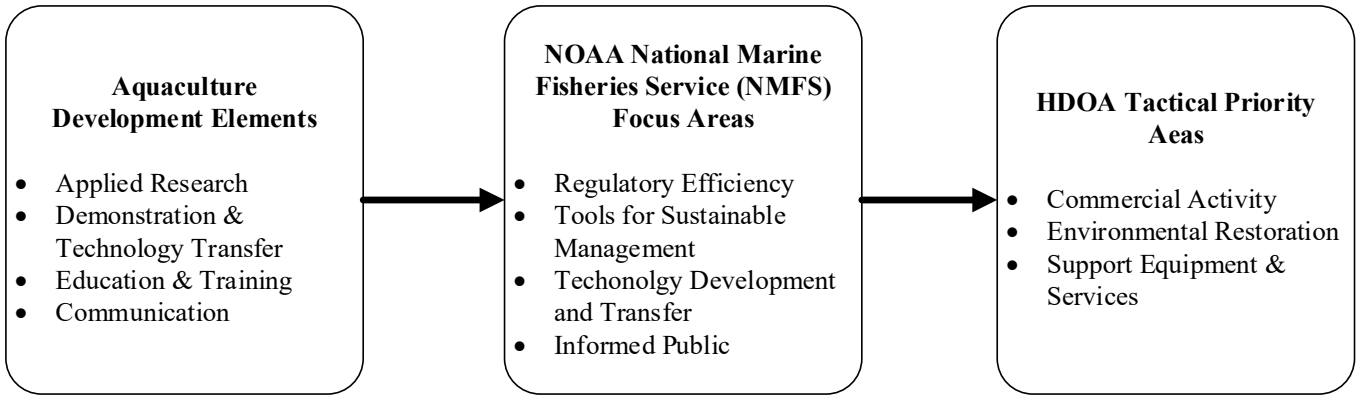
## Introduction

To develop aquaculture in Hawaii, the Aquaculture Development Program (ADP) has developed a 10-year strategic plan supporting the dual goals of increasing aquaculture food production and restorative aquaculture initiatives.

Growth in food production is based on the continued demand for safe seafood and the development of a post-harvest processing industry in Hawaii. Processing will allow Hawaii's operations to reach new markets and smooth seasonal supply fluctuations. Restorative aquaculture is a relatively new field where aquaculture products like seafood and bivalves are used to positively impact the environment through carbon capture and water quality improvement. There is significant global support for restorative aquaculture initiatives and Hawaii will be established as a leader in the Pacific region.

## Strategic Framework

The Aquaculture Development Program's (ADP) Strategic Plan is constructed around three categories that interconnect and build on each other and provide program guidance.




**Aquaculture Development Elements**

This group allows connection and program integration with other agriculture and aquaculture activities regardless of location.

**NOAA National Marine Fisheries Service (NMFS) Marine Aquaculture Strategic Plan FY2016-2020 focus areas**

This group facilitates alignment with the Federal aquaculture and agriculture and conservation efforts. The outcome would be funding and collaboration opportunities, political positioning, and access to the Federal network.

**HDOA Tactical Priorities**

This group identifies planned areas of focus that have been developed using experience with local stakeholders and government and non-profit organizations. They reflect attainable goals and pathways and are formulated to guide immediate and near-term projects.

**Aquaculture Development Essential Elements**

To build a sustainable aquaculture industry, there are four essential elements to the ADP program. Excellence in these general areas will provide a foundation for immediate and future growth of all aquaculture sectors.

**Applied Research** – Applied research refers to scientific study and research that seeks to solve practical problems. ADP will be the conduit between the operators and the researchers to ensure academic research is aligned with industry needs and is conducted in a meaningful way that builds on previous research efforts - expanding collaborations with domestic and international institutions and partners.

**Demonstration / Extension** – Demonstration projects implement the applied research results and show operators how the research can be applied in real world scenarios. The next step would be adoption of the technique or activity in a commercial setting through a network of extension efforts to distribute and promote the new knowledge. ADP will establish demonstration projects to showcase optimized and new technologies that can increase production and economic viability for the State's operators. Extension efforts will be leveraged through the University of Hawaii (UH) and Sea Grant systems.

**Education / Training** – Educating K-12 teachers and students about aquaculture, its opportunities as a career and its benefits to the sustainability and economic growth of the State is crucial to develop a viable local workforce. Continuing this effort into the UH system also must be maintained. ADP will establish programs to support STEM education in the K-12 system and the development of aquaculture undergraduate and graduate programs in the UH system.

**Communication** – Developing a framework to deliver accurate, reliable, science-based information about aquaculture in Hawaii is a requirement to educate the general public and attract new investors to the industry. Media such as newsletters, brochures, posters, articles, web sites, podcasts and video books will be leveraged to present a balanced and accurate view of aquaculture and its role in the State's economic and social future. ADP will become the aquaculture information hub for the State.

## NOAA NMFS Focus Areas

Beneath the essential elements of the program are strategic focus areas that are tied directly to aquaculture development programs. Each focus area is identified and associated with strategic plans.

### Focus Area: Regulatory Efficiency

Assist in developing coordinated, consistent and efficient regulatory processes for the State aquaculture sector.

### Priority

Improve existing permitting processes for land-based and ocean-based aquaculture.

### Strategy

- Address barriers identified by stakeholders and work with permitting agencies toward regulatory and legal solutions.
- Ecourage federal and state agencies and other governing bodies to implement effective permitting and management procesess.
- Work with permitting agencies to develop user-friendly and service-oriented permit application processes.
- Provide easily accessible and up-to-date information to prospective applicants, including guidance documents and relevant science information.
- Identify information and science gaps that delay permitting decisions and address them through research and collaborations.

**Focus Area: Tools for Sustainable Management**

Encourage environmentally responsible aquaculture using best available science.

**Priority**

Advance the understanding of the interactions of aquaculture and the environment.

**Strategy**

- Develop and refine siting tools and ecological forecasting models to inform aquaculture siting and management decisions.
- Increase the understanding of ecosystem services provided by commercial aquaculture and work with partners to develop effective ways of accounting for these benefits economically and in management plans.
- Develop best management practices to reduce potential negative environmental effects of aquaculture operations.
- Advance the understanding of aquaculture as a tool for recovering protected species, restoring habitats, enhancing stocks of commercially and recreationally important species, and improving stock assessments.
- Assess the impacts of environmental change (including ocean acidification) on marine aquaculture, as well as aquaculture's role in mitigating environmental change.

**Focus Area: Technology Development and Transfer**

Develop technologies and provide extension services for the marine aquaculture sector.

**Priority**
Create a skilled workforce and enhance technology transfer.

**Strategy**

- Expand ADP staff to focus on workforce and technology development with goal of information transfer.
- Develop partnerships to acquire, adapt and transfer aquaculture technologies to Hawaii's aquaculture industry.
- Support efforts to improve aquaculture systems for all stage of the aquaculture production cycle.
- Improve nutrition and develop feeds to increase the availability of complete feeds for aquaculture species with reduced reliance on marine fish meal and fish oil.
- Work with federal and state agencies and industry to improve data collection methods and the quality of aquaculture production statistics.

**Focus Area: Informed Public**

Improve public understanding of marine aquaculture

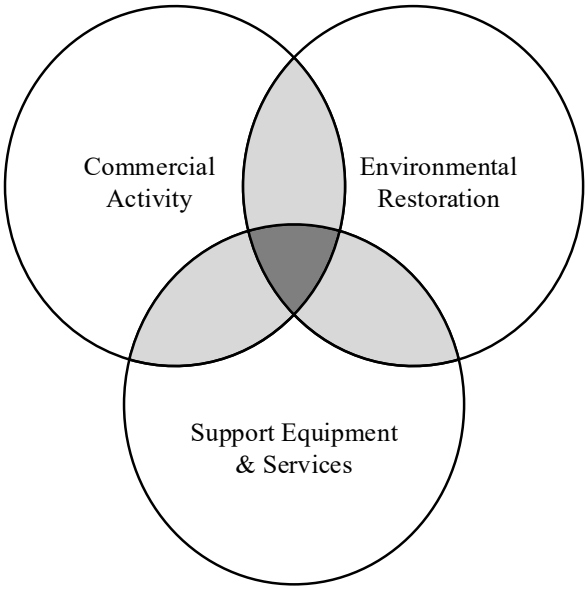
**Priority**

Provide accessible, relevant, and current information on aquaculture to the public.

**Strategy**

- Enhance the content and usability of program websites and social media, particularly for science information, permitting information, and grant opportunities.
- Design communications tools (e.g., infographics, fact sheets) to communicate scientific and regulatory information to the public and targeted audiences.
- Translate scientific information for varied audiences, including non-scientists and those unfamiliar with technical aquaculture information.
- Work with partners to facilitate public access to environmental information on aquaculture operations.
- Partner with other governmental agencies, industry groups, NGOs, and international partners to develop collaborative communications approaches for aquaculture.

**HDOA Tactical Priority Areas**



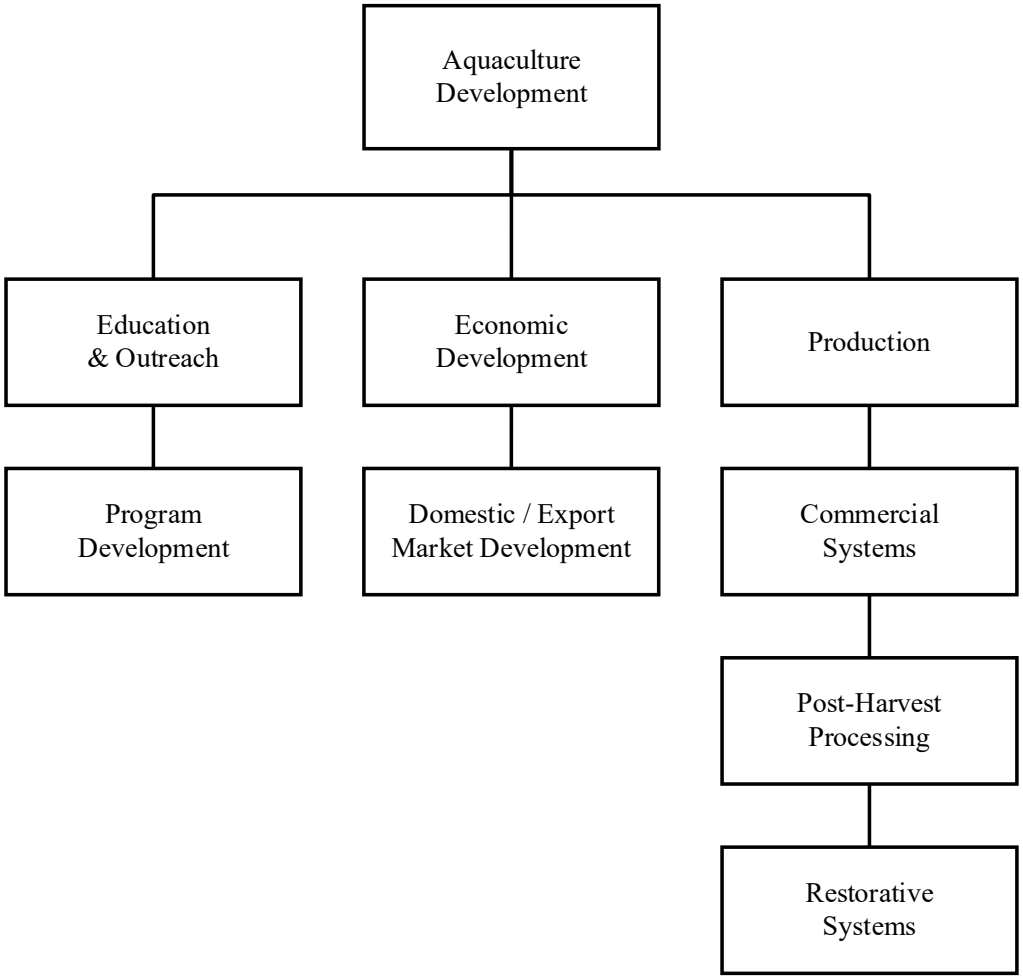

**Commercial Production**
The farming of aquatic organisms including fish, mollusks, crustaceans, and aquatic plants. Farming implies some form of intervention in the rearing process to enhance production, such as regular stocking, feeding, protection from predators, etc. and implies individual or corporate ownership of the stock being cultivated. (UN Food and Agriculture Organization).

**Environmental Restoration (Restorative Aquaculture)**
Aquaculture of certain species, when farmed in the right way, can serve as a tool to help address water quality degradation, habitat loss, and climate pressures. Nearly all continents and most coastal countries have the potential for restorative aquaculture in marine environments when considering enabling environmental, socio-economic, and human health factors for development (The Nature Conservancy).

**Support Equipment and Services (Innovation)**
An inclusive category that encompasses value-added processing and other services to increase the efficiency of aquaculture operations and the effectiveness of related processes. A primary focus is developing new opportunities through cross industry innovation.

**Organizational Structure**

While the descriptions emphasize the areas of expertise of each position, the small staff will need to work closely together to achieve program success. ADP will be split into three topic areas of focus: Education and Outreach, Economic Development and Production. The staff in each topic area will collaborate with internal and external partners to implement aquaculture development programs.



**Project Categorization and Description**

**Commercial Activity**

**Improve the efficiency and effectiveness of existing aquaculture operations, create opportunities for new operations and support the expansion into new markets.**

- Support research on permitting processes and provide tools that inform State and local regulators developing guidance on potential new locations for aquaculture facilities on land and in marine waters.
- Develop risk assessment frameworks that include realistic science-based expectations for implementing genetic improvement programs, particularly selective breeding, while minimizing risk to wild populations from escapes.
- Support or conduct research to provide feed manufacturers with cost-effective choices in feed ingredients suitable for marine and freshwater aquaculture production.
- Inform consumers that seafood is safe and demonstrate the health benefits local farm-raised seafood products
- Develop and implement environmental impact statements to evaluate the effects of broad aquaculture initiatives. Focus will be on collaboration among Federal, State, County agencies and stakeholders to examine the interaction among proposed projects or plan elements and to assess cumulative effects - allowing for informed decision-making among planning-level alternatives and to develop broad mitigation strategies.

**Environmental Restoration**

**Develop the infrastructure for indigenous seaweed and bivalve ecosystem services and deploy a scalable demonstration unit.**

- Improve existing technologies, through innovation, that enable the cost-effective, large-scale farming and harvesting of seaweed & bivalve biomass
- Build and test a demonstration-scale system for seaweed & bivalve cultivation and sequestration carbon dioxide reduction (CDR) that in principle can be scaled up to 0.1-Gt $CO_2$/yr levels
- Validate and monitor the CDR performance of the demonstration-scale seaweed & bivalve farming and sequestration systems at local scales.
- Develop “best practices” and perform spatial planning exercises to assess the best places for conducting seaweed and bivalve cultivation CDR.

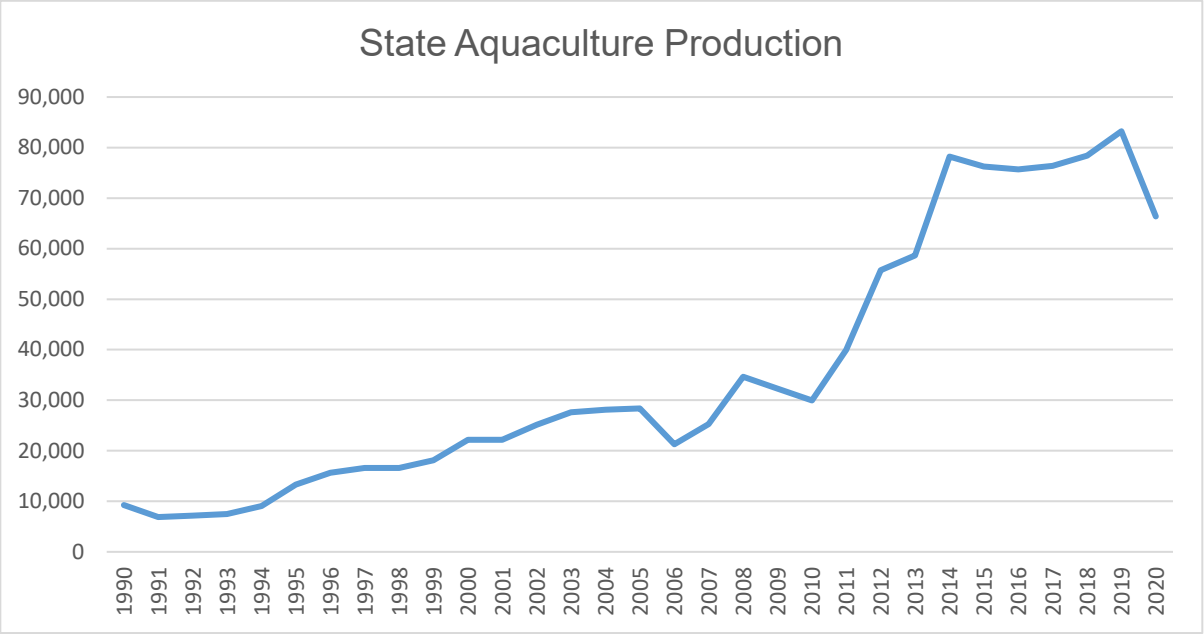
**Understand the baselines for carbon removal associated with protecting and restoring marine ecosystems including incorporating seaweed and bivalve components.**

- Estimate the change in carbon storge between natural and present-day marine ecosystems.
- Improve understanding of the life cycle of macroalgal carbon, the range of different species and habitats, and the socioeconomic levers and costs of restoring kelp and other macroalgal habitats.
- Improve understanding of the impacts of human disturbance on benthic communities and the potential rate of change under different protection scenarios.
- Understand what institutions, policies, and cultural practices lead to community support and engagement in marine ecosystem recovery; why efforts might fail and what can make them successful.

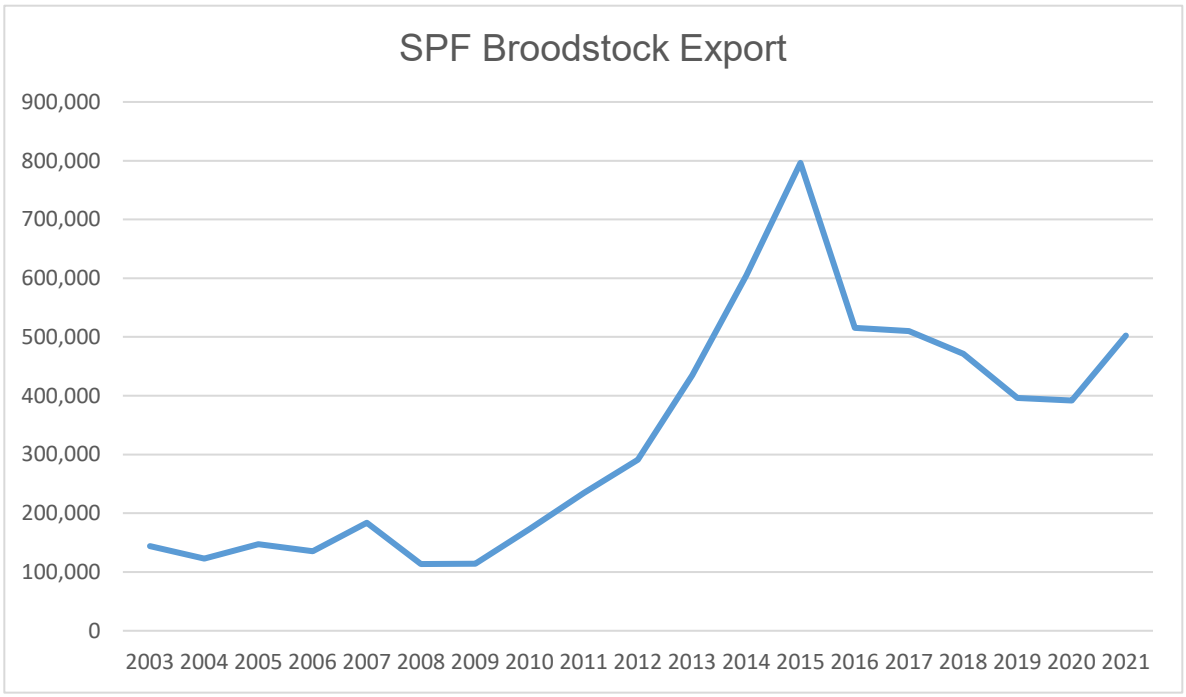
# APPENDIX

**Current Aquaculture Industry in Hawaii**

Hawaii aquaculture sales totaled $66.4 million in 2020, according to USDA's National Agricultural Statistics Service. The industry continues to be affected by the supply chain issues and food service demand fluctuations due to the COVID-19 Virus.




Included in the Other category are the shellfish, finfish and shrimp broodstock sector. Specific-pathogen Free (SPF) shrimp are shipped to Asia for breeding. The table below illustrates the total SPF broodstock exports from Hawaii.



Being disease resistant, SPF broodstock perform better than the local broodstock and command a much higher price. Constant disease pressure overcomes the progeny and creates the need for clean broodstock for the next season. Markets for SPF shift as the host country gains expertise in broodstock production and develops their own programs to meet domestic demand.