AQUACULTURE ACCOMPLISHMENTS

FISCAL YEAR 2024

National Marine Fisheries Service
Alaska Aquaculture Program

NOAA FISHERIES
Alaska Region

SEPTEMBER 2024

U.S. Department of Commerce | National Oceanic and Atmospheric Administration | National Marine Fisheries Service

National Marine Fisheries Service

Alaska Aquaculture Program

AQUACULTURE ACCOMPLISHMENTS

Fiscal Year 2024

U.S. DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration
National Marine Fisheries Service

Alaska Regional Office
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
709 West 9th Street, Juneau, AK 99801

Alaska Fisheries Science Center
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
17190 Point Lena Loop Road, Juneau, AK 99801

Acknowledgements

NOAA Fisheries Alaska Regional Office and Alaska Fisheries Science Center would like to thank our university, industry, agency, and tribal partners who provided aquaculture research needs, and enabled this work to move forward.

Credits

Illustrations by Juliana Cornett, NOAA Fisheries.

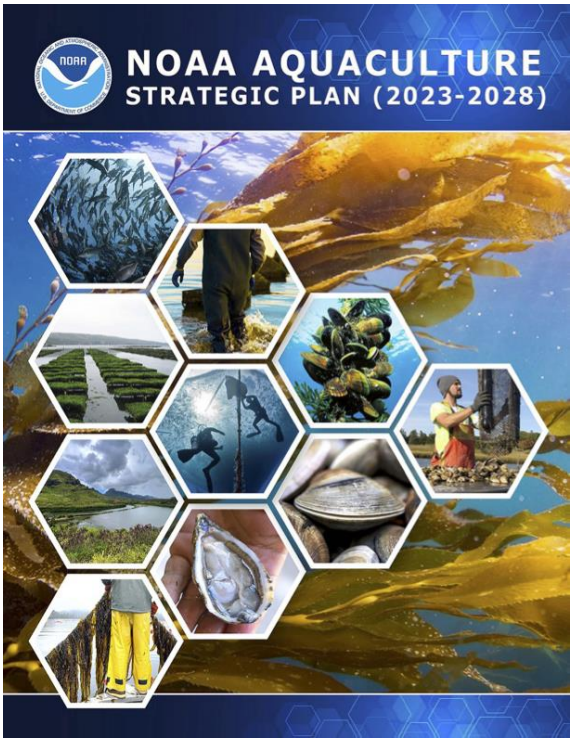
Alaska Region's Fiscal Year 2024 Aquaculture Accomplishments

Strategic Alignment

The NOAA Fisheries Alaska Aquaculture Program aligned its annual activities in support of all four goals identified in the 2023-2028 Aquaculture Strategic Plan: 1) Manage Sustainably and Efficiently, 2) Lead Science for Sustainability, 3) Educate and Exchange Information, and 4) Support Economic Viability and Growth. Each of the projects listed below link back to a NOAA strategic goal and objective. Out of the 17 objectives identified in NOAA's Aquaculture Strategic Plan, the Alaska Aquaculture Program prioritized the following 11 objectives in fiscal year 2024.

The Alaska Region's Aquaculture Program prioritized the following objectives in Fiscal Year 2024 (not in rank order)

1. Work with states and federal agencies to execute directives under existing Executive Orders, policies, plans, and statutes to promote sustainable aquaculture as part of NOAA's seafood portfolio.
2. Identify Aquaculture Opportunity Areas to support planning for commercial aquaculture development in locations that reduce user conflict, maximize compatible uses, and minimize impacts to public trust resources through scientific analysis and public engagement.
3. Provide science-based products and tools, including bolstering the translation of research results into advice that supports regulatory and management decision-making.
4. Conduct coordinated, applied scientific research to support industry development, including innovations to improve industry success.

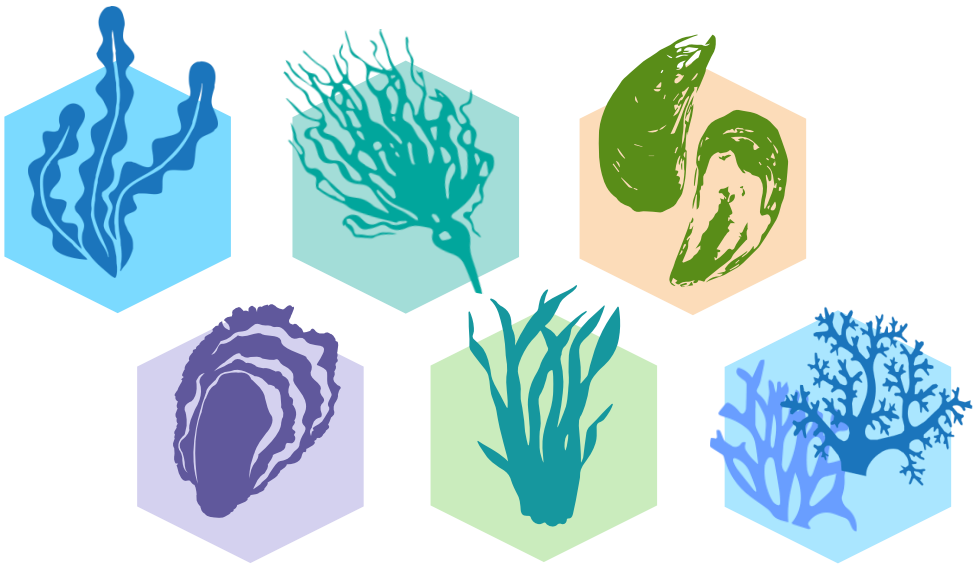


NOAA Aquaculture Strategic Plan 2023-2028. Credit: NOAA Fisheries

5. Strengthen and diversify data collection to support aquaculture industry management and development.
6. Confront climate change proactively, identifying threats and leveraging science-based resilience, mitigation, and adaptation opportunities.
7. Seek, listen to, and incorporate stakeholder needs into decision-making by collecting information and feedback on key aquaculture topics using new and existing collaborative relationships.
8. Improve perception, social license, awareness and understanding of aquaculture by strengthening communication with the general public, external stakeholders, and within NOAA to enhance awareness of available resources, expertise, and the current state of science regarding marine aquaculture.
9. Advance innovative approaches to aquaculture literacy and provide equitable access to education and extension materials. Use these resources to inform the public and other stakeholders on the challenges and benefits of aquaculture and the current state of science and the industry.
10. Support workforce development, with a commitment to diversity, inclusion, and accessibility, based on local communities' needs, interests, and capacities. This may include expanding public-private partnerships and associated accessibility training programs and apprenticeships, or stakeholder-based internships to provide relevant skills to support industry.
11. Work internally to attract, recruit, hire, and retain talented and diverse employees, and promote efforts for similar practices to be followed by the aquaculture industry.

NOAA staff and our project collaborators work to develop aquaculture in Alaska. Credit: NOAA Fisheries.

This report highlights updates on the actions that supported each of the above Alaska aquaculture priorities, as well as updates on other notable accomplishments over the last year.



Goal 1:
Manage Sustainably and Efficiently

Work with states and federal agencies to execute directives under existing Executive Orders, policies, plans, and statutes to promote sustainable aquaculture as part of NOAA's seafood portfolio.

Update ESA Section 7 Informal Consultation Template to Include Marine Aquaculture

The Alaska Region Protected Resources Division continues to work with Federal Action Agencies to improve the efficiency and effectiveness of Endangered Species Act Section 7 consultations. In 2024, they updated the template letter for requesting informal ESA Section 7 consultation to include standard mitigation measures for aquaculture.

NOAA Fisheries Aquaculture staff during a research cruise. Credit: NOAA Fisheries

Identify Aquaculture Opportunity Areas to support planning for commercial aquaculture development in locations that reduce user conflict, maximize compatible uses, and minimize impacts to public trust resources through scientific analysis and public engagement.

State and Federal Engagement in the Aquaculture Opportunity Area Identification Process

The NOAA Fisheries Alaska Regional Office continues to engage with state and federal partners through the Aquaculture Opportunity Area (AOA) Interagency Working Group. This Working Group includes participants from state and federal aquaculture regulators, including:

- Alaska Department of Natural Resources
- Alaska Department of Fish and Game
- Alaska Department of Environmental Conservation
- NOAA Fisheries Alaska Region
- U.S Army Corps of Engineers

The Working Group is chaired by the NOAA Alaska Regional Aquaculture Coordinator. The group's function is to increase coordination and collaboration across aquaculture constituents, gather and review siting data, identify research gaps for the National Environmental Policy Act (NEPA) analysis, provide feedback and suggestions on AOA siting within Alaska to minimize user conflicts and maximize production, and to help identify appropriate locations for AOAs in Alaska. To date, the Working Group has finalized study areas, developed planning goals, and held two AOA spatial planning workshops.

Conduct AOA Spatial Planning Workshops to Increase Public Engagement

NOAA Fisheries, in coordination with the National Centers for Coastal Ocean Science (NCCOS) and the State of Alaska, hosted a series of spatial planning workshops in early 2024 to discuss the ongoing Aquaculture Opportunity Area identification process in Alaska state waters. The first workshop took place on February 26, 2024, in Anchorage. The second was held on March 26 and 27, 2024, in Juneau.

The workshop's goals were:

- Learning more about NOAA's spatial planning approach and discuss available spatial data within Alaska study areas
- Document data gaps and help identify points of contact for additional data
- Increase transparency, local capacity, and resources to support seaweed and invertebrate aquaculture planning
- Further develop an engaged community to inform NOAA's AOA identification process in Alaska state waters

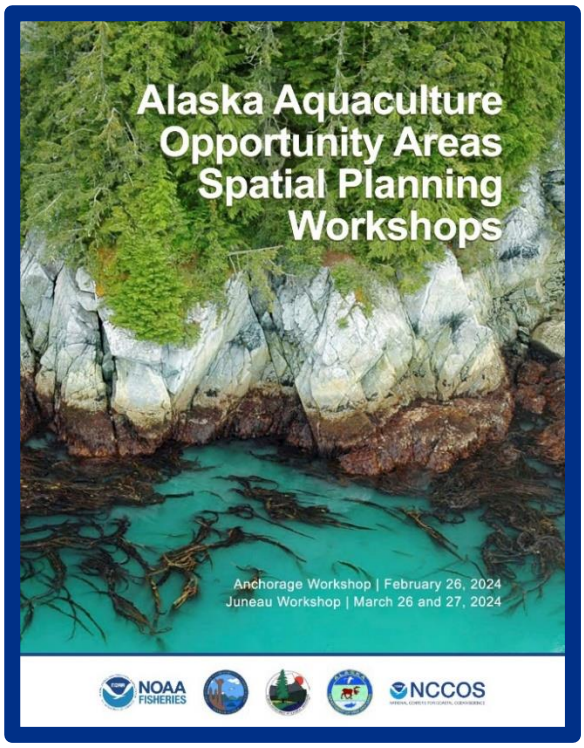
NOAA and the State of Alaska released the Summary Report for the Alaska Aquaculture Opportunity Area Spatial Planning Workshops, which identified data gaps, points of contact, and next steps for AOA engagement and data collection.

The workshops fostered extensive information sharing and discussion of the ongoing AOA identification process in Alaska state waters. Moreover, each event created an opportunity for a wide range of participants to inform future planning efforts. The workshop outcomes synthesized in this report will assist Alaska Native communities, coastal managers, local communities, industry, and other organizations with planning for future aquaculture development in Alaska.

Subsequent workshops may be focused on participatory mapping to help fill in data gaps and better address tribal and stakeholder needs, as well as to share draft AOA spatial analysis results.

Feature Story:

NOAA and State of Alaska Release Summary Report for Aquaculture Opportunity Area Spatial Planning Workshops

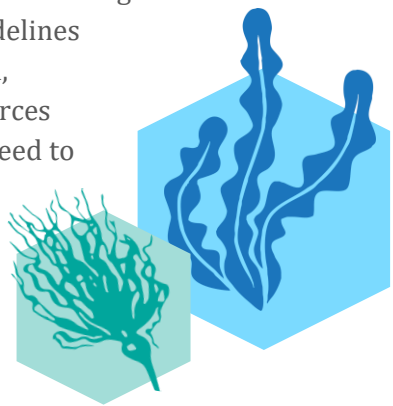


Conduct AOA Seaweed Source Inventory

To maintain genetic diversity, the Alaska Department of Fish & Game requires that, for every kelp farm, spores from at least 50-60 wild kelp plants are gathered within 50 km of the farm each year to seed the farm so that many local plants contribute to the genetic makeup of the annual crop. As a result, any spores released from farm plants will have a diverse and relatively similar genetic makeup to local wild stocks. Also known as the 50-50 rule, this restriction requires that kelp farms be sited within 50 km of natural beds. The Alaska Regional Office's Alaska Sea Grant Fellow is starting work to develop a seaweed source inventory, using best available data (e.g., Shorezone) and interviews with active seaweed farmers. This project will develop updated spatial data on the location of wild seaweed beds within AOA study areas to aid in the AOA spatial and NEPA analyses.

Area Management Plan Analysis and Aquaculture Suitability

As part of the AOA identification process, NCCOS and NOAA Fisheries are working with the Alaska Department of Natural Resources to collect and review all Area Plans overlapping with Alaska AOA Study Areas. An area plan is a regional land use plan that provides for the use and management of state-owned lands. They establish goals, policies, management intent, and guidelines for the use of state land. These plans contain hundreds of pages of information, including discussions of land management policies for each of the major resources affected by the plan (e.g., aquatic farming). Managers and industry members need to read through these plans to locate the appropriate unit and subunit where they want to place a farm and to gather the appropriate information to help with siting determinations. The focus of this project is to make this information more accessible, and build it into the AOA spatial analysis.



Goal 2:
Lead Science for Sustainability

Provide science-based products and tools, including bolstering the translation of research results into advice that supports regulatory and management decision-making.

Assessing the Potential Habitat Provisioning of Kelp Aquaculture Farms in Alaska

This project represents a collaboration between the Alaska Fisheries Science Center, NOAA Restoration Center, Alaska Regional Office, and Alaska kelp farmers to assess the habitat provisioning of kelp farms in Southeast Alaska and the Kodiak Archipelago, with a focus on species of regulatory importance in Alaska. We are applying a three-pronged approach to assess how local kelp farms, natural kelp beds, and control sites provide habitat for fish and invertebrate species, including:

Alaska Fisheries Science Center researchers Dr. Alix Laferriere (center) and Angie Korabik (right) collaborate with Kodiak seaweed farmer Alf Pryor (left) on an aquaculture research project. Credit: NOAA Fisheries

1. Visual surveys with SCUBA divers or GoPro cameras to identify which species are using kelp as habitat in natural kelp beds, non-farm control sites, and farm locations.
2. Standard Monitoring Units for the Recruitment of Fish (SMURFs) to capture specimens and confirm abundance and species composition in natural kelp beds, non-farm control sites, and farm locations.
3. Environmental DNA (eDNA) to further confirm which species are present, and identify species missed by the first two methodologies.

Alaska Fisheries Science Center researcher Dr. Alix Laferriere deploying a SMURF. Credit: NOAA Fisheries

Year 1 work started in 2023 and was focused on visual surveys on Kodiak farms and natural kelp beds. We created a short film highlighting this research framework, and the close collaboration with local kelp farmers. Year 2 expanded to not only include new methodologies (visual surveys, eDNA, and fish recruitment devices), but also expanded in scale covering both Kodiak and Juneau farms. Water column temperature, salinity, and nutrient concentrations were also measured concurrently with ecological sampling. While both project locations applied the three-

pronged assessment approach, they differed in that the Kodiak research project compared local kelp farms and natural kelp beds. The Juneau research project compared local kelp farms with control sites.

Monitoring efforts will take place over the course of 1.5 years to capture the marine communities present before the farm is seeded with kelp in fall, during the winter growing period, and all the way through the summer into the next growing season. Our results will help inform future regulatory consultations, and will help reduce negative impacts and enhance the benefits of Alaskan kelp farms to native species. We are in the process of developing a second short film to highlight some of the findings and the new monitoring methodologies.

Feature Story:

Do Alaska Kelp Farms Provide Habitat for Native Species?

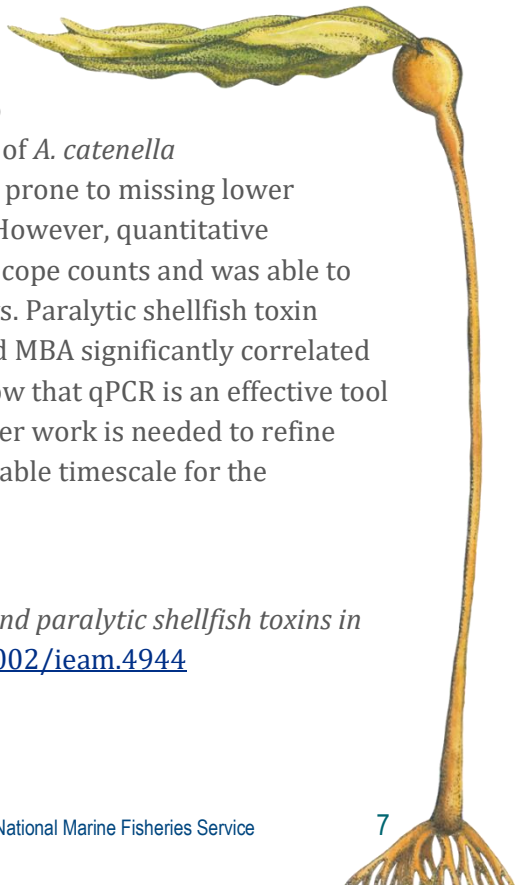
Film:

Looking Under the Canopy: Do Alaska Kelp Farms Provide Habitat for Native Species?

Conduct coordinated, applied scientific research to support industry development, including innovations to improve industry success.

Assessing Methods for Detecting Harmful Algal Blooms Responsible for Paralytic Shellfish Toxins in Oysters.

Blooms of *Alexandrium catenella* threaten to disrupt subsistence, recreational, and commercial shellfish harvests in Alaska, as paralytic shellfish toxins (PSTs) pose a serious public health risk and can lead to costly shutdowns for shellfish farmers. Current methods of PST detection in the region range from monitoring programs utilizing net tows to detect *A. catenella*, to direct shellfish tissue testing via mouse bioassay (MBA) for commercial aquaculture harvest, as well as various optional testing methods for subsistence and recreational harvesters. The efficacy and feasibility of these methods vary, and they have not been directly compared in Southeast Alaska. In this study, we sought to assess and compare *A. catenella* and PST early detection methods to determine which can provide the most effective and accurate warning of *A. catenella* blooms or PST events. We found microscope counts to be variable and prone to missing lower numbers of *A. catenella*, which may be indicative of bloom formation. However, quantitative polymerase chain reaction (qPCR) significantly correlated with microscope counts and was able to effectively detect even low numbers of *A. catenella* on all sampling days. Paralytic shellfish toxin concentrations measured by enzyme-linked immunosorbent assay and MBA significantly correlated with each other, qPCR, and some microscope counts. These results show that qPCR is an effective tool for both monitoring *A. catenella* and serving as a proxy for PSTs. Further work is needed to refine qPCR protocols in this system to provide bloom warnings on an actionable timescale for the aquaculture industry and other shellfish harvesters.



Publication:

Assessing methods for detecting Alexandrium catenella (Dinophyceae) and paralytic shellfish toxins in Southeast Alaska. https://setac.onlinelibrary.wiley.com/doi/full/10.1002/ieam.4944

Advancing Production of Pacific Oysters in Alaska through Field Testing, Hatchery Research, and Farmer Collaboration

Henry Fleener (NOAA AFSC, right) displaying experimental oyster spat with collaborators Alf Prior (Alaska Ocean Farms, left) and Arron Jones (Alaska Sea Grant, middle). Credit: NOAA Fisheries

In 2024, work continued to develop the Alaska Fisheries Science Center's Mariculture Research Hatchery (MRH) at the Auke Bay Laboratories in Juneau, Alaska. The MRH and Kodiak Lab now hold the necessary hatchery permits to conduct Pacific oyster research, which will support sustainable industry growth. Both of these Alaska Fisheries Science Center facilities serve as a place for regulatory and industry-driven shellfish research, with a strong reliance on collaboration between researchers, management, universities, and industry. Once construction is complete, the MRH will be the first publicly-funded research hatchery focused on Pacific oyster research in Alaska. Its capabilities will range from physiology studies, breeding for Alaska-specific traits, to distribution of research oysters to partnering commercial farms. To date, over $1.6 million has been procured through external funding to support personnel, infrastructure, and collaborative research projects. Collaborative projects that have been funded focused on using existing laboratory and field operations infrastructure in Kodiak, Juneau, and Little Port Walter, and included developing improved Pacific oyster seed, innovating farm gear and hatchery systems to be better adapted for Alaska's harsh conditions, and evaluating the ecosystem services provided by oyster aquaculture in Alaska. We will seek future funding to support 1) Continued upgrades to hatchery systems at the MRH; 2) compensation for farmers to collaboratively grow-out hatchery-reared seed, contribute to the design and maintenance of innovative gear, and to collect data on the farm; and 3) partially support staff salary for field work and hatchery research.

Develop Improved Pacific Oyster Seed

The goal of this project is to resolve the scientific barriers and identify cost efficiencies in order to produce oyster larvae and seed within Alaska hatcheries that are optimized for growth, but not reproduction, in Alaska waters. Alaska Fisheries Science Center researchers sourced oysters from the U.S. Department of Agriculture Pacific Shellfish Research Unit (USDA-PSRU) and private industry partners including Pacific Hybreed that specialize in oyster selective breeding. The development of improved seed includes two main efforts:

1. Hatchery production of genetically distinct lines at partnering research hatcheries (USDA-PSRU and Pacific Hybreed) and subsequent field testing of those genetic lines in Alaska.

Becca Cates, Henry Fleener, and Heather Fulton-Bennett (NOAA AFSC) with collaborators Francis Pan and Melissa Dellatorre (Pacific Hybreed) with experimental oyster racks at the Little Port Walter Research Station. Credit: NOAA Fisheries

2. Developing technology and techniques to produce of seed at the Mariculture Research Hatchery using broodstock originating from Alaska waters.

Alaska Fisheries Science Center researchers have been developing systems and techniques for housing, conditioning, and spawning the broodstock and subsequent generations at the Mariculture Research Hatchery.

Alaska Fisheries Science Center researchers Henry Fleener and Dr. Jordan Hollarsmith (left) working with juvenile oysters (right). Credit: NOAA Fisheries

In FY24, the Alaska Fisheries Science Center Mariculture Research Hatchery staff and Pacific Hybreed (located at NOAA Manchester) produced 24 families of Pacific oysters and deployed them at the Alaska Fisheries Science Center's Little Port Walter Research Station for field assessment. This is the initial step for establishing an oyster broodstock repository. Our collaborations with Pacific Hybreed will focus on genetic improvement (survival and growth) of oyster seed using controlled genetic crosses and rigorous field assessments of seed performance at the Little Port Walter Research Station and partnering industry farm sites. While our selection will focus on improving survival and growth of oysters in controlled farm environments, we will also assess fecundity to prevent selected lines from increasing any risk of naturalization in the state. This collaboration will contribute to improving our understanding of seed performance in specific cold-water ocean conditions, which could aid in the selection of genetic lines suitable for the Alaska shellfish industry. Once developed, this technology and the broodstock can then be transferred to the industry.

Pinto Abalone Mariculture Potential

Aquaculture operations in Alaska, and the interest in diversifying them by adding high-market value shellfish products, have rapidly increased over the past decade. However, an important concern for lucrative aquaculture in Alaska is the low water temperatures, which impede animal growth. Knowing the energetic demands and growth rates of animals cultured in Alaska's seasonally changing environment is imperative for science-based decisions on aquaculture development.

This project investigates the viability of farming pinto (or northern) abalone (*Haliotis kamtschatkana*) to support commercial opportunities in Alaska. In FY24, University of Alaska Fairbanks Master's student James Crimp assessed the growth of pinto abalone as a function of temperature and a composite seaweed diet, and found that growth and tissue composition differed little across diets. FY24 also included two successful abalone spawns and settlement. The oldest spawned cohort is currently eating a mix of micro- and macroalgae. Our overarching goal is to increase the resiliency of Alaskan aquaculture by providing a new species for cultivation and a potential market for local kelp aquaculture as abalone feed. In FY24, we proposed to develop a simple web-based decision tool parameterized to assess the biological and commercial feasibility of supplementing seaweed farming with pinto abalone farming. We envision that the modeling approaches developed in this project can later expand to include other valuable shellfish such as blue mussels and geoduck. This proposal aligns with University of Alaska Fairbanks Alaska Blue Economy Center and AFSC research priorities. It is a strong collaboration between UAF and an Alaskan oyster farmer (Shikat Bay Oysters Inc.).

Pinto Abalone at the Alutiiq Pride Shellfish Hatchery. Credit: NOAA Fisheries

Strengthen and diversify data collection to support aquaculture industry management and development

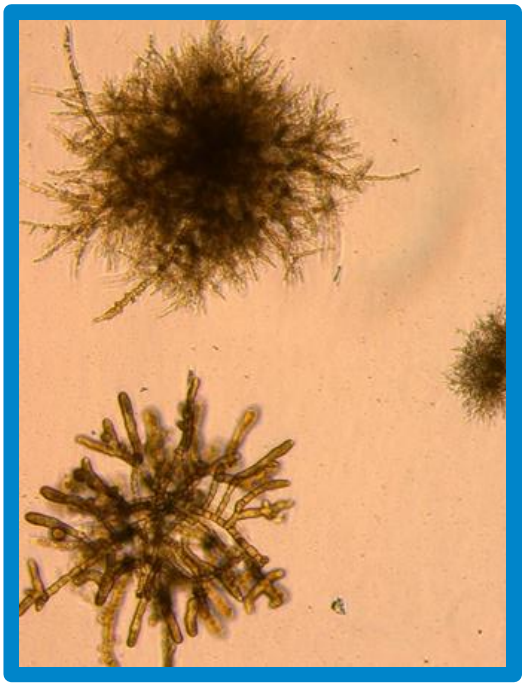
Water Column Interactions and Regional Variation in Oyster and Sugar Kelp Production (Mariculture ReCon)

Intertidal zone near an oyster farm in Juneau, Alaska. Credit: NOAA Fisheries

In collaboration with industry, academic, and non-profit partners, the Alaska Fisheries Science Center is helping to develop a growing kelp farming industry in Southwest and Southcentral Alaska (Kodiak Island, Kachemak Bay, and Prince William Sound). This project is collecting information to examine the environmental and ecological effects of kelp and oyster farms in the region, as well as how oceanographic context influences the productivity of these farms. Alaska Fisheries Science Center researchers will evaluate the environmental effects of farming by determining its effects on fish and macrobenthic invertebrate assemblages. Divers will collect information on large and mobile animals by transect counts, while smaller organisms will be assessed in quadrat counts, and infaunal assemblages will be assessed using benthic cores. Farmed sites will be compared to other farm sites and a nearby control site and, where possible, a before-after-control-impact design will be used. This work will be part of a larger, 5 to 10-year collaboration between Alaska Fisheries Science Center, University of Alaska Fairbanks, Prince William Sound Science Center, Tribal entities, and farmers funded through the Exxon-Valdez Oil Spill Trustee Council. This collaboration is titled the Mariculture Research and Restoration Consortium (Mariculture ReCon). The goal is to support aquaculture efforts in the Gulf of Alaska. The long-term nature of the funding will allow us to collaborate with new farms as the industry develops. This information will be used to inform permitting and promote sustainable industry growth.

Multiple Stressor Impacts on the Early Life Stages of Commercially Grown Kelp Species

Kelp forests worldwide are threatened by both climate change and localized human impacts. Gaps in our understanding of how cold-temperate kelp species respond to climate stressors have limited our ability to forecast the status of kelp forests and the potential of kelp aquaculture in future oceans.



Microscopic male and female Alaria marginata *gametophytes. Credit: Veronica Farrugia Drakard*

In particular, the impacts of such stressors, including temperature, on the early life-stages of high-latitude kelp species are poorly understood. In this study, led by Dr. Veronica Farrugia Drakard, we aim to investigate the combined effects of future climate change (temperature) and local environmental pressures (salinity and sedimentation) on the reproduction and growth of major Alaskan kelp species, specifically ribbon kelp (*Alaria marginata*) and bull kelp (*Nereocystis luetkeana*). Spores of each species were germinated and grown under different levels of each individual stressor, in three separate fully-replicated experimental designs, in order to investigate the impacts of each stressor on germination rates, gametophyte growth, and sporophyte production. Current efforts involve germinating and growing spores of each species under different stressor combinations, in order to gain insights into how stressors might interact in the wild to impact the reproduction and growth of these kelp species.

Publications:

1. *High-latitude kelps and future oceans: A review of multiple stressor impacts in a changing world* https://onlinelibrary.wiley.com/doi/full/10.1002/ece3.10277
2. *Examining the reproductive success of bull kelp (Nereocystis luetkeana, Phaeophyceae, Laminariales) in climate change conditions* https://pubmed.ncbi.nlm.nih.gov/37540062/

Confront climate change proactively, identifying threats and leveraging science-based resilience, mitigation, and adaptation opportunities

Optimizing the Tumble Culture Method to Improve Pacific Oyster Quality, and Reduce Labor for Shellfish Farms in Southeast Alaska

Optimizing aquatic farm gear to reduce labor and increase oyster growth and yield is a goal for many Alaskan oyster farms. Tumble cages have become a popular culture method in other oyster growing regions, as they improve oyster shape, size, and yield while reducing labor for farmers. The tumble cage method has numerous advantages including:

A tumble culture array (left) being tested (right) in the intertidal zone near Juneau, Alaska. Credit: NOAA Fisheries

1) harnessing tidal and wave movement to improve oyster shape, 2) mixing oysters within the cages to prevent uneven growth or crowding without the energy requirement of mechanized tumblers, 3) creating an unfriendly environment for sea stars which reduces predation, and 4) reducing labor by lowering the frequency of removing oysters from the water. Previous trials of tumble culture methods in Alaska, however, have been unsuccessful due to the turbulent conditions found at many Alaskan oyster farms. These conditions create an "over tumbling" effect where oysters and gear can be damaged.

In this project, our collaborative team of engineers, oyster farmers, and biologists designed, fabricated, and deployed research-scale tumble culture gear at intertidal and subtidal farms across Southeast Alaska in 2024. The gear deployed in 2024 was outfitted with sensors to record temperature and acceleration of cages to better understand the variables impacting growth within and across farm sites. Initial results show success in rearing oysters within the intertidal tumble cages and has generated further design ideas for future gear testing in Alaska. This collaboration with the Alaska Fisheries Development Foundation is important to determine the viability of an oyster growing method that is novel to Alaska.

Evolutionary Underpinnings of Stress Response in Pacific Oysters

Alaska Fisheries Science Center researchers aim to experimentally investigate different Pacific oyster genetic groups to characterize the genomic and phenotypic signals in growth and survival that can be teased out in response to two stressors of concern to the Alaska aquaculture industry: heat stress and toxic algal exposure. Teasing apart possible impacts of these stressors at different life stages is informative across multiple stages of Alaska's oyster aquaculture supply chain, from hatcheries to nurseries to farms. We thus propose to quantify strain-specific responses to stressors early on in oyster development, as well as how sub-adults respond to non-lethal exposures, by conducting experiments in the laboratory and in the field. Prior studies on both heat stress and *Alexandrium* exposure have identified gene regions that respond to these stressors, which we will target in our study. This work is led by Professor Jessica Glass, with the University of Alaska Fairbanks.

Oysters are tested in experiments conducted by the Alaska Fisheries Science Center. Credit: NOAA Fisheries

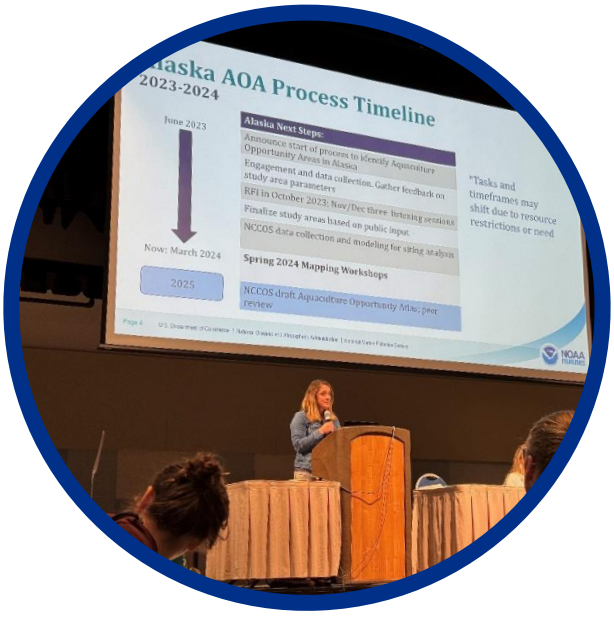
Goal 3: Educate and Exchange Information

Seek, listen to, and incorporate stakeholder needs into decision-making by collecting information and feedback on key aquaculture topics using new and existing collaborative relationships.

Alaska Aquaculture Action Plan Development and FY24 Priorities

The Alaska Regional Office and Alaska Fisheries Science Center coordinated on updating the Five-Year Joint Aquaculture Action Plan. We also developed FY24 priorities which support the Alaska Mariculture Development Plan's Five-Year Action Plan and align with NOAA's 2023-2028 Aquaculture Strategic Plan. We used the Action Plan to prioritize both regional office and science center work, and to support funding for oyster selective breeding work, projects assessing the potential habitat provisioning of kelp aquaculture, bull kelp research and engagement, and kelp mapping projects.

NOAA Fisheries Aquaculture staff discussing oyster farming strategies with stakeholders near Juneau, Alaska. Credit: NOAA Fisheries



NOAA Fisheries Alaska Regional Aquaculture Coordinator Alicia Bishop presents at an AOA Identification Spatial Planning Workshop in March 2024, which devoted an entire day to Alaska Native engagement. Credit: NOAA Fisheries

Aquaculture Opportunity Area Tribal Engagement

The National Centers for Coastal Ocean Science (NCCOS) and the NOAA Fisheries Alaska Regional Office are working independently and in collaboration with Ecotrust on developing an outreach and engagement strategy with Alaska Native communities, tribes, and corporations in order to meaningfully build support for AOA identification. Both NOAA and Ecotrust are engaging with Alaska Native Entities to facilitate the inclusion of spatial data across AOA study areas on locations that may be important subsistence harvest, fishing, and cultural areas, and to help with the NEPA review.

This work has included public meetings and small group discussions to build relationships with Alaska Native entities and ensure they have an equitable voice in the AOA process in Alaska. The work has facilitated the inclusion of data on existing uses during the site suitability analysis conducted by NCCOS in year one, while ensuring privacy of sensitive information that communities and tribes do not wish to be made public.

Improve perception, social license, awareness and understanding of aquaculture by strengthening communication with the general public, external stakeholders, and within NOAA to enhance awareness of available resources, expertise, and the current state of science regarding coastal, marine, and Great Lakes aquaculture

Advancing Aquaculture Communications and AOA Outreach

A key focus of our Alaska Aquaculture Program is to provide accessible, relevant, and up-to-date information on marine aquaculture to the public. In FY24, we significantly increased aquaculture communications with the assistance of an Alaska Sea Grant Fellow. With the launch of the AOA identification process in Alaska, a number of our efforts have focused on increasing communication and engagement with constituents including:

Sea Grant Fellow James Currie interviews Dr. Jordan Hollarsmith about Alaska Fisheries Science Center aquaculture research, as part of an initiative to develop new communication products. Credit: NOAA Fisheries

- Alaska AOA identification webpage
- Publication of a Request for Information in the Federal Register
- Alaska AOA one-pager
- Listening sessions for public comment and posting transcripts
- Final AOA Study Areas in Alaska webpage
- Hosting two AOA Spatial Planning Workshops and Publishing Summary Report

In addition, the Alaska Regional Office and Alaska Fisheries Science Center staff have worked to improve aquaculture curriculum in Alaskan schools, participated in events at local schools, and developed new curriculum and teaching aids. A paper about the project "Bringing Seaweed Cultivation into the Classroom: A Case Study in Rural Alaska" was published in the Journal of STEM Outreach. We have also developed a new educational seaweed tumble culture for a local Juneau school, published a new public-facing document about the current state of the Alaskan aquaculture industry, and launched a series of science communication video projects to further educate the public about aquaculture and the work being done by the NOAA Fisheries Alaska Aquaculture Program. In August 2024, the Alaska Regional Office added a Media and Communications specialist position to help facilitate this increase in outreach. Our annual accomplishments reports highlight the strategic alignment of our work with NOAA goals and objectives and how we have accomplished them at a regional level.

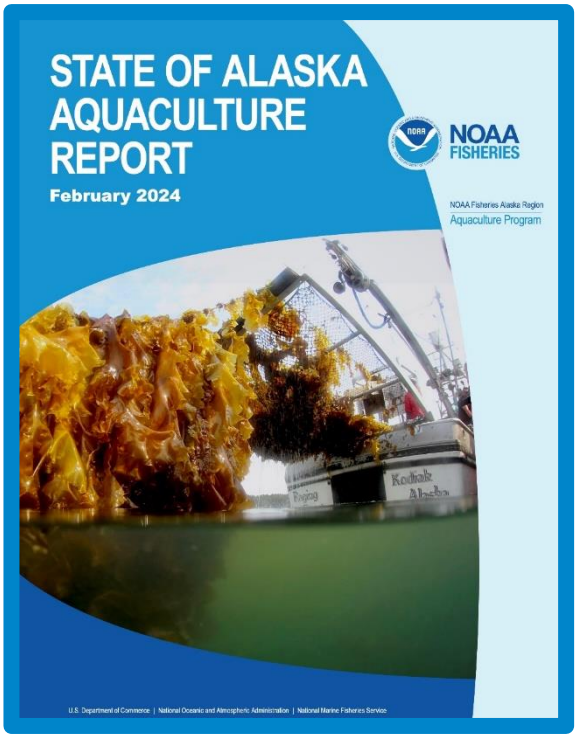
Publication:

Bringing Seaweed Cultivation into the Classroom: A Case Study in Rural Alaska
https://www.jstemoutreach.org/article/123164-bringing-seaweed-cultivation-into-the-classroom-a-case-study-in-rural-alaska

An AOA stakeholder engagement workshop in February, 2024. Credit: NOAA Fisheries

State of Alaska Aquaculture Report

NOAA Fisheries Alaska Region, in collaboration with the Alaska Mariculture Alliance and Alaska Sea Grant, created a science communication product summarizing the current status of aquaculture industry development in Alaska. The final product is a short, easily digestible report with infographics, intended for the general public, displaying the scope of current aquaculture work in the state of Alaska. Some of the topics included seaweed and shellfish production history, number and acreage of farms permitted by region, and new opportunities for the aquaculture industry. The report also contains resources for new farmers, and testimonials from experts, hatchery managers, farmers, economic development organizations, and state officials. The intent of this project was to elevate public awareness about aquaculture in Alaska, and to promote continued growth of Alaskan aquaculture research and business.



Measuring Social Acceptance for U.S. Aquaculture

This project uses a systematic participatory approach to understand social acceptance of aquaculture. Focusing on communities near AOA study areas, a combination of virtual focus groups, virtual and in-person semi-structured interviews (FY24), and a survey (FY25) targeting a diverse range of community members will take place and complement the analysis of public comments. This mixed method approach to data collection enables a greater likelihood of participation and meaningful dialogue that may capture perspectives beyond those voiced in a public comment period.

In FY24, 47 interviews were completed with community members in seven Alaskan communities, with individuals selected to represent a range of possible connections to and impacts from aquaculture development. Interviews will continue during the first half of FY25. Focus groups targeting a diverse sample of the general public from seven communities were also completed. Focus group and interview data will be analyzed and synthesized and complemented by a regional survey of the general public to take place in FY25. Ultimately, the project aims to 1) better understand the current status of social acceptance of aquaculture in the US, 2) identify barriers to acceptance of aquaculture, 3) identify the strengths of US aquaculture, 4) evaluate distinctions related to social acceptance (e.g., by species or gear type), and 5) improve social acceptance of aquaculture based on the results.

Advance innovative approaches to aquaculture literacy and provide equitable access to education and extension materials. Use these resources to inform the public and other stakeholders on the challenges and benefits of aquaculture and the current state of science and the industry.

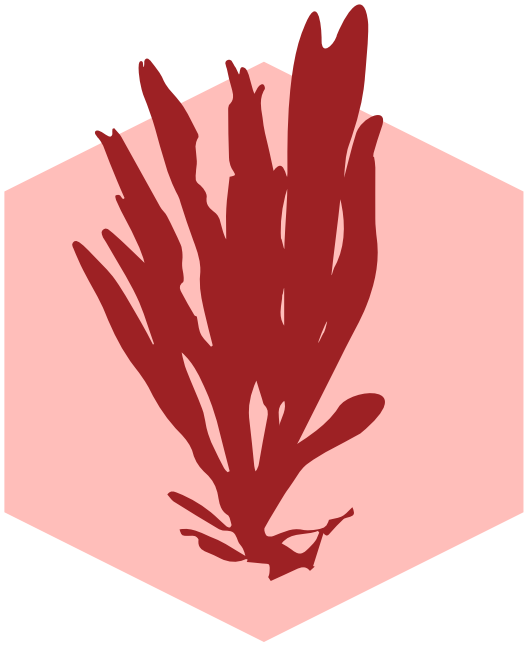
Juneau Classroom Seaweed Tumble Culture

Following the success of the 2021 tumble culture for K̲'aach' (Dulse, Red ribbon algae, *Devaleraea mollis*), which was originally constructed for a classroom in Klukwan, the Alaska Regional Office's Sea Grant Fellow redesigned the mobile seaweed aquaculture unit for a Juneau classroom. This new tumble culture was designed for a more compact, quieter classroom operation, with the potential to grow additional seaweed species. The tumble culture was installed in a classroom in Harborview Elementary School, and members from the Alaska Regional Office and Alaska Fisheries Science Center attended several classes to teach 3rd and 4th grade students about the science of aquaculture. We also expanded on the curriculum that was developed in 2021 and are developing a construction manual with videos detailing aspects of construction and maintenance. The Alaska Regional Office will be placing the manuals and new curricular content online in FY25.

A seaweed tumble culture unit installed in a local classroom. Credit: NOAA Fisheries

Publication:

Bringing Seaweed Cultivation into the Classroom: A Case Study in Rural Alaska
https://www.jstemoutreach.org/article/123164-bringing-seaweed-cultivation-into-the-classroom-a-case-study-in-rural-alaska



Goal 4: Support Viability and Growth

Support workforce development, with a commitment to diversity, inclusion, and accessibility, based on local communities' needs, interests, and capacities. This may include expanding public-private partnerships and associated accessible training programs and apprenticeships, or stakeholder-based internships to provide relevant skills to support industry.

Little Port Walter Aquaculture Externship

To expand education and training opportunities in aquaculture, we hosted a student from the University of Alaska Southeast Applied Fisheries program for their required externship at Alaska Fisheries Science Center's Little Port Walter Research Station. This internal NOAA grant covered their travel, room, and board to offer financial support to students who might not otherwise be able to participate, as well as broadening their exposure to different career paths in aquaculture. The student spent two weeks at Little Port Walter working on oyster aquaculture, kelp ecology, water quality monitoring, and salmon broodstock development alongside researchers from NOAA Fisheries (Auke Bay Laboratories and the Alaska Regional Office), Alaska Department of Fish & Game, and the Northern Southeast Region Aquaculture Association. The student will present their experience to the University of Alaska Southeast and NOAA audiences and provide feedback on this trial externship alongside the University of Alaska Southeast program lead, to enhance the experience for potential future students.

Student Alex Smith uses a Niskin bottle to sample nutrients at the Little Port Walter Research Station. Credit: NOAA Fisheries

Work internally to attract, recruit, hire, and retain talented and diverse employees, and promote efforts for similar practices to be followed by the aquaculture industry

Assistant Regional Aquaculture Coordinator

In order to successfully support the Executive Order to identify AOAs in Alaska, and advance sustainable aquaculture development, the Alaska Regional Office required additional capacity. We were able to recently hire a term position to serve as an Assistant Regional Aquaculture Coordinator (Assistant RAC).

The Assistant RAC supports the RAC in the AOA identification process in a variety of ways. Some of these include coordination of outreach information and facilitation of meetings, establishing working groups with state and federal partners, contributing to AOA-based communication products, supporting data requests and other needs of NCCOS during the spatial analysis portion of the process, and tracking and assisting in the review of NEPA-related documents and action items. Beyond the AOA identification process, the Assistant RAC will work with the RAC to achieve regional aquaculture priorities including supporting communication and outreach efforts with constituents, and the general public with trainings, conferences, and web products. The Assistant RAC will also work closely with the RAC to help facilitate and coordinate various projects with partners including state and federal regulatory agencies, Alaska Fisheries Science Center, Alaska Sea Grant, Alaska Mariculture Alliance, and other entities.

NOAA Fisheries Assistant Regional Aquaculture Coordinator Hannah Wilson visits a Juneau oyster farm. Credit: NOAA Fisheries

U.S. Secretary of Commerce
Gina M. Raimondo

Under Secretary of Commerce
for Oceans and Atmosphere
Dr. Richard W. Spinrad

Assistant Administrator for Fisheries
Janet Coit

September 2024

www.fisheries.noaa.gov

OFFICIAL BUSINESS

National Marine
Fisheries Service
NMFS Alaska Region
709 West 9th Street Juneau, AK 99802