Sea Grant–NCCOS Alaska Mariculture Siting and Development Workshop

Sitka, Alaska
February 19, 2025

Sea Grant ALASKA

Sea Grant MARYLAND

Sea Grant

NOAA NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION U.S. DEPARTMENT OF COMMERCE

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Design and layout: Jenna Clark, Maryland Sea Grant

Maryland Sea Grant College
University System of Maryland
5825 University Research Court, Suite 1350
College Park, Maryland 20740
T 301.405.7500
mdsg.umd.edu

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Workshop Background and Purpose

Welcome, and thank you for attending our Sea Grant–National Centers for Coastal Ocean Science (NCCOS) Alaska Siting and Development Workshop. Our overarching priority today and throughout the project is to build capacity and collaboration among coastal-ocean groups for environmentally, economically, and socially equitable aquaculture development. We request that you review our workshop guidelines on page 8, which we rely on to create a safe and welcoming environment for all. We appreciate your participation in this effort.

Background

This workshop is part of a four-year project that connects 15 state Sea Grant programs, the National Sea Grant College Program (NSGCP), NCCOS, and other coastal-ocean groups engaged in mariculture siting and sustainability. Funded primarily by a grant from the NSGCP, this collaboration has three goals: 1) Extend the reach of NCCOS mariculture planning resources; 2) Conduct regional workshops to improve connections among scientists, extension specialists, and other coastal-ocean community groups around the siting and expansion of ocean and coastal mariculture; and 3) Inform broader Sea Grant–NCCOS marine planning efforts.

Purpose

The purpose of the workshop is to increase understanding about tools and resources available for mariculture siting and expansion in the Alaskan region, and opportunities to advance them. Through presentations and discussions, we will explore various mariculture siting tools, data, and resources currently available to the United States mariculture industry, and potential avenues for tool development in Alaska.

While we will not have time to delve into the framework of *knowledge exchange*, a component of *co-creation*, during today's workshop, we wanted to take a moment to define both concepts, as they underpin the purpose of this project and these workshops. Co-creation (also referred to as co-production, collaborative learning, participatory research, or collaborative modeling) can be defined as "iterative and collaborative processes involving diverse types of expertise, knowledge and actors to produce context-specific knowledge" (Norström et al., 2020, p. 183)[1]. In the context of this workshop, knowledge exchange is a process that uses two-way communication and information transfer to build community among diverse interest groups who want to address complex social and environmental challenges around mariculture siting and expansion. This approach is easily identified through its intent to empower all voices in the process. It can be characterized by frequent question asking.

Throughout the day, workshop participants will engage in discussion and apply the tenets of knowledge exchange and co-creation towards informing current and future mariculture tools. We ask workshop participants to be open to fielding thought-provoking questions. How might this tool be useful in your community, your work? Could this tool be useful for a certain type of coastal-ocean user group? The questions intend to spur conversation so that we may listen to and learn from each other.

Key outcomes for today's workshop are for participants to identify ways to make future mariculture siting tools more accessible and applicable for Alaska and to contribute to conversations regarding mariculture siting and expansion. This work will inform our future workshops with participants in the Pacific Islands and the New England regions. Together, the outcomes from these workshops will provide recommendations on how to advance tool development, tool dissemination, and the value to end users of these tools to move sustainable mariculture production in the U.S. forward.

Thank you for your support!

1 Norström, A. V., Cvitanovic, C., Löf, M. F., West, S., Wyborn, C., Balvanera, P., et al. (2020). Principles for Knowledge Co-Production in Sustainability Research. Nat. Sustain. 9, 182–190. doi: 10.1038/s41893-019-0448-2

Workshop Agenda

Agenda

Wednesday, February 19, 2025

Part I: Welcome *(15 minutes)*

Project Team Introductions

Fredrika Moser, *Maryland Sea Grant*
Chuck Weirich, *National Sea Grant Office*
Christopher Schillaci, *NOAA NCCOS*
Annie Schatz, *Maryland Sea Grant*

Workshop Overview, Intent, and Evaluation

Annie Schatz, *Maryland Sea Grant*
Cat Davis, *University of Maryland Center for Environmental Science, Appalachian Laboratory*

Part II: NCCOS and Axiom Mariculture Tool Development Opportunities *(40 minutes)*

NCCOS Tool Development Overview

Christopher Schillaci, *NOAA NCCOS*

Axiom Tool Development and Mariculture Map Overview

Iwen Su, *Axiom*

Part III: Mariculture Tool Discussion *(55 minutes)*

Overview and Background

Annie Schatz, *Maryland Sea Grant*

Breakout Group Introductions and Discussion

Introductions with name, affiliation, and your favorite seafood. See 'Part III' on page 4 for more information for the discussion.

Part IV: Workshop Conclusion and Evaluation *(5 minutes)*

Annie Schatz, *Maryland Sea Grant*

Thursday, February 20, 2025

Part V: Follow-up Survey of Workshop *(5 minutes)*

See 'Part V' on page 5 for questions and more information.

Thursday's Follow-up Survey Link

Workshop Goal and Objectives

Goal

To build capacity and collaboration among the National Oceanic and Atmospheric Administration (NOAA) Sea Grant network, NOAA National Centers for Coastal Ocean Science (NCCOS), and other coastal-ocean community groups for environmentally, economically, and socially equitable mariculture siting and expansion.

Objectives

- Present and explore existing mariculture siting tools and data resources for Alaska and the U.S.
- Build recognition among participants of the value of diverse perspectives, knowledge, and expertise present at the workshop
- Identify ways to improve and advance:
  - Community input on the development of mariculture siting tools
  - Existing and future mariculture siting tools
  - Delivery of mariculture siting tools to end users
  - Applicability of mariculture siting tools for end users

Workshop Logistics

The workshop will be a two-hour session within the Alaska Mariculture Conference, including presentations, tool exploration, and discussion, proceeded by a 5-minute follow-up survey on Thursday (see part V below). For the 'Mariculture Tool Discussion' part of the workshop, participants will:

- Turn your chairs around to face into the space between tables to form their discussion groups
- Select a notetaker to record the group's responses to each question (via a paper copy or Google Form—their choice).
    - A paper copy of the questions, containing an assigned group number, will be provided to each group.
    - If your group chooses to use the Google Form, please enter your group number on the Google Form.
- Respond individually to each question using Slido at the beginning of each discussion before turning to your group.
- We want both the individual Slido responses, as well as the recorded group responses, so please contribute to both.

If you have additional questions for the workshop presenters, plesase reach out to Maryland Sea Grant at mdsg-aquaculture@umd.edu.

Part I: Welcome and Background

Maryland Sea Grant will provide a brief welcome, introductions to the project team, a quick overview of the project goals and objectives, and overview of the post-workshop evaluation to be conducted at the end of today's session.

Part II: NCCOS and Axiom Mariculture Tool Development Opportunities

In this part of the workshop session, NCCOS and Axiom will give brief overviews of the various mariculture tools and resources that they have developed for the industry across the country, sharing both draft data products from the Aquaculture Opportunity Area (AOA) process and Mariculture Map as examples. They will also discuss potential opportunities for future tool development in Alaska with time for question and answer session at the end.

Part III: Mariculture Tool Discussion

During Part III, groups will discuss a series of questions about mariculture tool development for Alaska, within the broader context of sustainable mariculture expansion. Participants should reflect on what was learned from previous presentations about tools and resources created to date by NCCOS and Axiom for use in Alaska and/or the U.S., and discuss what tools and resources would be useful to develop for the Alaskan mariculture industry.

Before discussions begin, to hear different perspectives, participants will first **turn their chairs into the space between tables to form their discussion group.** Then, group members will go **around and introduce themselves**, stating their favorite seafood. As groups are going through introductions, a paper copy of the questions, containing an assigned group number, will be provided to each group. Please enter the **group number into the Google Form** if you are responding online.

Participants will first respond individually to each question on Slido before turning to their group to discuss. Groups will then have approximately 10 minutes per question for discussion. The following questions will be discussed:

1. What are your initial impressions of the presented tool examples today? Discuss possible modifications, like additional data layers or other online mapping tools you would like to have? **(10 minutes)**

Additional questions for discussion guidance:

a. Were there any aspects of the tools (e.g., number of data layers, interface design) that felt overwhelming or confusing? If so, please share specifics.

b. If you could prioritize one improvement or feature addition, what would it be and why?

2. How do you see using the tools and data shared today in your day-to-day work? **(10 minutes)**
   Additional questions for discussion guidance:
   a. Do you feel the current tool purposes align with your needs? Why or why not?
   b. Are there specific features, layers, or datasets that you feel are essential but are currently missing?

3. How would you like assistance with using these maps, data, and tools (e.g., accessing and using the tools on your own, collaborative use with tool developers, training from tool experts, site visits, 1:1 discussions, webinars, videos, guides)? **(10 minutes)**
   Additional question for discussion guidance:
   a. How easy is it to navigate and use the tools as they are? What could make it easier?

4. Which user and/or community groups are not usually represented in tool development and why? **(10 minutes)**
   Additional questions that groups can use for discussion guidance:
   a. Who could provide critical feedback on tool functionality, usability, or data layers (to include or remove)?
   b. Who might we involve to make sure the tools are intuitive and practical for different users?

Part IV: Workshop Conclusion and Evaluation

During this part, participants will complete a short evaluation developed by our external evaluator to understand what you learned at the workshop and so we can improve our workshop process.

Part V [Thursday]: Follow-up Survey of Workshop

After participants have had time to explore some of the presented tools on their own and reflect on the session, participants will be asked to respond to a 5-minute follow-up survey to share final impressions and thoughts. Part of the survey will explore common themes and topics summarized from participant and group responses the previous day. Please use the QR code and weblink below to access the survey on Thursday.

bit.ly/AKFollowupSurvey

Next Steps

In March, the workshop team will host a follow-up focus group session. This session is aimed at continuing the conversations from the workshop, providing further feedback to the workshop team, and building capacity and collaboration among coastal-ocean audiences for environmentally, economically, and socially equitable mariculture expansion. If you are interested in participating in this focus group, please sign up here: https://bit.ly/AKPostWorkshop.

After the focus group session, the team will synthesize the findings from our work in the region and create a summary paper to distribute to all participants and others interested in the findings. Additional information on that process and the materials will be also listed on our website:

mdsg.umd.edu/fisheries-aquaculture/siting-development/alaska-workshop

Acknowledgements

We would like to thank our speakers and the following groups for their contributions to the success of this workshop, as well as the Alaska Mariculture Conference for their generous donation of the meeting space and conference time.

Steering Committee/Planning Team Members: Alicia Bishop, Cally Carmello, Jenna Clark, James Crimp, Cat Davis, Ginny Eckert, Missy Good, Fredrika Moser, Annie Schatz, Chris Schillaci, Iwen Su, Jessica Whitney, Hannah Willson

NOAA Partners: Celia Barroso, Alicia Bishop, Anoushka Concepcion, Teri King, Kevin Madley, James Morris, Mark Rath, Andrew Richard, Ken Riley, Chris Schillaci, Tori Spence, Chuck Weirich, and Hannah Willson

External Advisory Board: Rod Fujita, Laura Rickard, Kenny Rose, Kris Sarri, and Kim Thompson

Maryland Sea Grant Communications: Annalise Kenney

Workshop Guidelines

Maryland Sea Grant (MDSG) is committed to providing safe and welcoming environments for all who participate in MDSG events. MDSG prohibits and will not tolerate any form of harassment, bullying, or discrimination. Together, through the following guidelines, we can ensure that this workshop supports free expression and exchange of ideas in environments that are positive and productive for all.

We value all perspectives. We encourage everyone to share. We are here to listen and understand. If you prefer not to answer, you can say "pass," or "pass for now."

Please note that disagreement is welcome for the purpose of understanding but not for convincing. Critique ideas, not individuals. Please actively listen to everyone. We ask that you avoid interrupting others when speaking. Please try to minimize distractions when possible.

During this workshop we will be developing a shared language. It is always OK to ask what a word or phrase means or to ask for further clarification, as we will be asking the same of you!

If you know that you need to leave the meeting early, please let the project team, facilitator, or notetaker know ahead of time so that we can allot your time first during our breakout sessions.

If you believe that you or someone else is being subjected to inappropriate conduct, or if you have any other concerns, please do not hesitate to contact MDSG event staff who can work with MDSG leadership to resolve the situation. If the project team determines that any behavior is inappropriate or violates the above guidelines, participants will be reminded of these ethics and/or asked to leave the meeting.

Appendix: Additional Materials

Project Overview and Personnel

Connecting Sea Grant, NCCOS, and Coastal Stakeholders to Improve Sustainable Aquaculture/ Mariculture Siting and Development

The National Centers for Coastal Ocean Sciences (NCCOS) have developed tools and resources for aquaculture/ mariculture siting and expansion to begin addressing the complex needs of interested parties utilizing coastal-ocean spaces. The key to successful usage and continual development of NCCOS planning tools and resources is a science-based, community-led approach, which will ideally result in the identification of optimal locations for aquaculture/ mariculture expansion. Because many local groups overlap with aquaculture/mariculture areas in coastal-ocean environments, it is important to deliberately connect and build capacity among users through conversations centered around aquaculture/mariculture tools to improve sustainable aquaculture/mariculture expansion.

Goal

The primary goal of this project is to build capacity and collaboration among the National Oceanic and Atmospheric Administration (NOAA) Sea Grant network, NCCOS, and other coastal-ocean community groups to advance environmentally, economically, and socially equitable aquaculture/mariculture siting and expansion.

Approach

Six regional workshops have and will take place: the Mid-Atlantic (Summer 2022); Gulf of Mexico (Winter 2023); California (Fall 2023); Alaska (Winter 2025); Pacific Islands (Fall 2025); and New England (Spring 2026). The framework of co-creation and knowledge exchange will be introduced and help guide interactions with workshop participants to build a pathway for developing future aquaculture/mariculture siting tools that are accessible and applicable to broad audiences. In addition, the workshops are designed to advance the reach of NCCOS aquaculture/ mariculture planning tools.

Workshop Objectives

To meet the goal and approach outlined above, each workshop has four objectives:

- Present and explore existing aquaculture/mariculture siting tools and data resources
- Introduce methods of knowledge exchange and co-creation in the context of aquaculture/mariculture siting tools
- Expand participant's capacity to understand each other's perspectives and integrate the diversity of aquaculture/ mariculture knowledge and expertise present at the workshop
- Identify ways to advance:
    - Utilization of co-creation in aquaculture/mariculture siting tools
    - Existing and future aquaculture/mariculture siting tools
    - Delivery of aquaculture/mariculture siting tools to end users
    - Applicability of aquaculture/mariculture siting tools for end users

Workshop Outcomes

- Through this workshop, participants gain an understanding of the following in the context of aquaculture/mariculture siting tools and expansion
  - Present status of aquaculture/mariculture in the region
  - The assortment of community groups involved in aquaculture/mariculture expansion in the region
  - Benefits and purpose of NCCOS', and other available, tools and resources
  - Co-creation, collaboration, and knowledge exchange
  - Each other's perspectives
  - The value of including different perspectives on aquaculture/mariculture
- Through this workshop, participants feel more comfortable engaging in
  - Productive discussions to improve current and future aquaculture/mariculture siting tools
  - Identification of gaps (i.e., data, applicability, etc.) with current aquaculture/mariculture siting tools
  - Identification of gaps in the development and delivery processes for a aquaculture/mariculture siting tools
  - Identification of ways to make current and future aquaculture/mariculture siting tools more accessible to other community partners interested in aquaculture/mariculture siting
- Participants feel they and others were heard and contributions valued in advancing the conversation about tool development and use of aquaculture/mariculture siting tools

Project PI

Fredrika Moser
Director, Maryland Sea Grant
(301) 405-7500
moser@mdsg.umd.edu

National Aquaculture Coordinator

Annie Schatz
Aquaculture Projects Coordinator, Maryland Sea Grant
(301) 405-7500
kschatz@mdsg.umd.edu

Project Co-PIs

Ginny Eckert, Director, Alaska Sea Grant
Sherry Larkin, Director, Florida Sea Grant
Beth Lenz, Assistant Director for Diversity and Community Engagement, Hawai'i Sea Grant
Shauna Oh, Director, California Sea Grant
Laura Picariello, Interim Director, Texas Sea Grant
Cat Davis, Principal Agent, University of Maryland Center for Environmental Science
Susan White, Director, North Carolina Sea Grant
Gayle Zydlewski, Director, Maine Sea Grant

Project Collaborators

Jenna Clark, Senior Programs Manager, Maryland Sea Grant
Cally Carmello, Science Management and Policy Intern, Maryland Sea Grant
Christopher Schillaci, NOAA NCCOS

For more information, please visit: mdsg.umd.edu/sustainable-aquaculture-siting

Mariculture Map
Site Plan and Location Map Activity

Prepared by Axiom Data Science

Overview

Part II of the ADF&G Alaska aquatic farm application requires three maps for the proposed farm site:

1- General Location Map using USGS topographical map (Sec D-3a)

2- Detailed Location Map using a NOAA Nautical chart (Sec D-3b)

3- Site Plan Map (Sec D-3c)

In the first exercise you will use the Mariculture Map to create a Detailed Location Map for a farm site. In the second exercise you will assess site sensitivity and explore data layers needed to create the Site Plan Map.

Activity #1: Create a Detailed Location map

In this exercise you create a detailed location map for the ADF&G operation permit. Note: this is a hypothetical exercise; names and locations given are for demonstration purposes only. Merperson Farms LLC is interested in submitting an operations application for a new shellfish farm in Southcentral Alaska.This project is a first time application to farm blue mussels using subtidal suspended culture method and grow-out raft gear. The proposed site is in a small bay on the west side of Alitak Bay located in southeast Kodiak Island.

Quick Tip! Watch Tutorial 1 here to get started (LINK).

Steps	Instructions
1. Open portal.	● Go to https://mariculture.portal.aoos.org/
2. Create a user account.	● Click “Log in to Create Custom Map”. ● Sign in with Google or click “Sign Up” to create a new account. ● Log in to your account.
3. Create a custom map.	● Once logged in, click “Create Custom Map”.
4. Enter bounding coordinates for the site in Lazy Bay at the western side of the entrance to Alitak Bay, Kodiak Island.	● In the Print Map window, enter the bounding coordinates for each corner of the grow-out area parcel at the proposed farm site. ○ Northwest Latitude: 56.8993 ○ Southeast Latitude: 56.8981 ○ Northwest Longitude: -154.2516 ○ Southeast Longitude: -154.2555
5. Enter information to appear in map legend.	● Enter information to appear in the map legend: ○ Applicant or business name ○ Water body ○ Area/Region ○ Additional information, such as mariculture and gear type

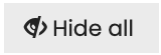
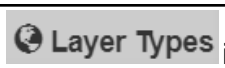
6. View map.	● Click “Save and print or view maps” button. ● In the list of printed map types, click “Load Map” next to the Detailed Location Map. You will be navigated to the main map. ● Zoom into the farm site. The farm site is indicated by a turquoise colored square. Use zoom options on the upper left side of the map:  or  .
7. Locate the nearest community.	● Zoom out on the map to locate the nearest community, identified with a blue dot. ● What is the name of the nearest community and what is its population size?
8. Share and print your map.	● Create a custom url for your map. Click  in the upper toolbar. Click  to copy the url. ● Close the Share window. ● Click “Create custom map”. ● Under Print Maps, click the green “Download map” button next to the Detailed Location Map. A pdf file will download in your web browser: Note: it may take 1-2 minutes to generate the pdf file.
Bonus points:	● What is the distance to the nearest community? (Refer to Measure Distance in the help docs).

Activity #2: Assess site sensitivity and explore Site Plan Map data layers

In Part I, Section C of the permit application, applicants are informed of the sensitive areas that should be avoided when choosing an aquatic farm site. Furthermore, some of this information should also be referenced when creating the Site Plan Map (Part II, Sec D-3c*) or answering questions about site suitability (Part II, Sec E), existing uses (Part II, Sec F), and water quality. In this exercise, you will work through a subset of the ADF&G permit application questions using data available in the Mariculture Map.*

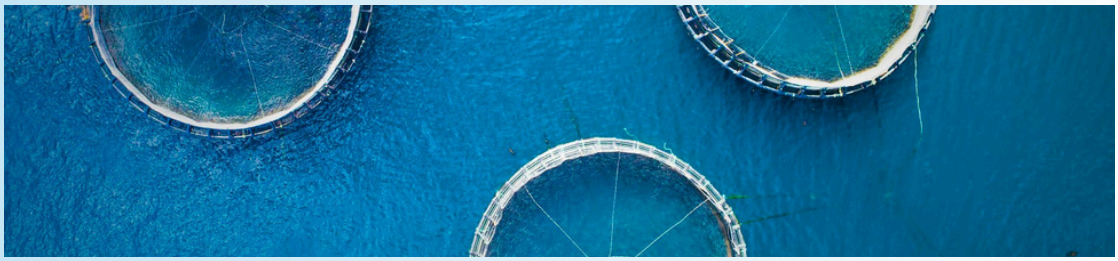
Quick Tip! Watch Tutorial 3 here to get started (LINK).

Steps	Instructions
1. Create Site Plan Map.	● With the map open, toggle the selected map to “Site Plan Map” in the upper left corner.
2. Use default data layers in the Site Plan Map to assess the relative sensitivity of the proposed farm site area in Lazy Bay.	● A series of default data layers will load in the map legend. ● Zoom into the proposed farm site in Lazy Bay and assess the following information by hovering over the data layers in the map. Notes: • Rolling your mouse over a layer title in the legend will isolate it on the map (i.e. make other layers disappear)

	• You can toggle data layers on/off in the map by clicking  to the right of the layer title in the legend. • Click on  at the very top to hide all data layers. • You may also need to zoom in/out of the map using the  buttons in the upper left. • See the Customize Layers help docs for more information. Question 1: *In what bay is the nearest herring spawn area to Lazy Bay? (ADF&G Part I, Sec C; Part II, Sec E-11)* Question 2: *Are you aware of any eelgrass or kelp beds near your proposed farm site? If yes, describe (Part I Sec C; Part II Sec E-12)* Question 3*: Were there any sources of past pollution or contamination at the site (such as shore-based seafood processor, log transfer or industrial facility, oil spill contamination, or town)? If yes, identify (Part II, Sec I-3, I-4).*
3. Using additional data layers in the “Layer Types” to assess characteristics of the proposed farm site.	• Click on  in the upper map legend. Layer Types are thematic compilations of data layers. • Scroll through the list to select relevant Layer Types to further assess site sensitivity for the questions below. Question 1: *Is there an anadromous stream flowing into Lazy Bay? (Part I, Sec B; Part II, Sec E-11)* Question 2: I*s the proposed location protected from wave (current) exposure*? *(Part I, Sec B; Part II, Sec E-1)* Question 3: *Is there a nearby seal/sea lion haul out or pupping area? (Part I, Sec B; Part II, Sec F)* Question 4: *Are there any nearby seafood processing plants in Lazy Bay (Part II, Sec F)?*
4. Bonus points.	• What is the current water temperature and wind speed in Lazy Bay? (Refer to Add Layers in the help doc and use the search term “real time”).

NCCOS Coastal Aquaculture Planning Portal

A Toolbox for Sustainable Aquaculture Coastal Planning and Siting



National Center for Coastal Ocean Science

The Coastal Aquaculture Planning Portal is a toolbox of coastal planning tools designed to assist managers, planners, and industry with sustainable aquaculture development. This toolbox was developed in partnership with Digital Coast, a product of the NOAA National Ocean Service Office for Coastal Management.

In an effort to obtain global food security, many countries, including the United States, are turning toward the expansion of marine aquaculture. This effort requires a need for support in the decision-making and planning process for future site suitability and development of aquaculture infrastructure.

The Coastal Aquaculture Siting and Sustainability program has developed a marine aquaculture toolbox composed of coastal aquaculture planning tools. The Coastal Aquaculture Planning Portal (CAPP) is a toolbox of coastal planning tools designed to assist managers, planners, and industry with sustainable aquaculture development.

CAPP is a consolidation of a wide range of existing tools and applications created to assist managers, planners, and industry in the development of sustainable aquaculture. Private universities, state and federal government agencies, and global organizations have developed these tools to provide the most accurate and up-to-date data and environmental analysis possible.

Shellfish/Algae Planning and Siting

Finfish Planning and Siting

Environmental Interactions

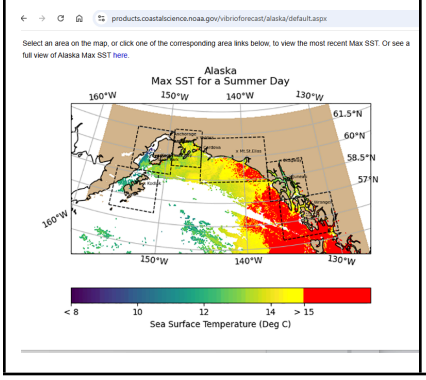
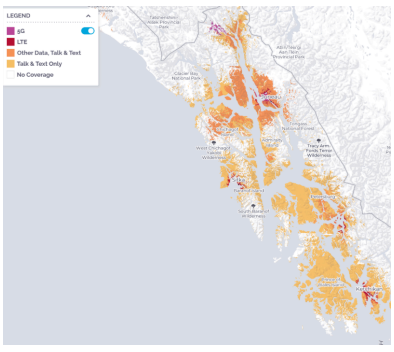
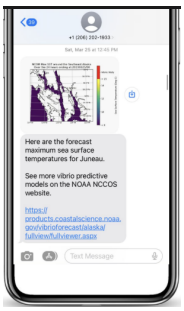
Environmental Modeling

These tools range from state-specific shellfish mappers to global geospatial ecology overviews. The portal is organized into four subcategories, each of which pertain to marine aquaculture and/or environmental interactions. The CAPP was developed in partnership with Digital Coast, a product of the NOAA/ NOS Office of Coastal Management, in efforts to support the growth and expansion of resilient and sustainable marine aquaculture within the United States and abroad.

Vibrio Shellfish Guidance - Alaska

Max Sea Surface Temperature *Vibrio* Tools

Vibrio predictive products provide the most recent Maximum Sea Surface Temperature (SST) for early warning of potential coastal hazards in Alaska. Temperature is a major driver of *Vibrio* growth. In general, once water temperatures exceed 15°C, or 59°F growth will occur, with faster replication at higher temperatures. Because of the strong dependence on temperature for growth, SST is used in some cases to trigger harvest restrictions. The SST passive outreach tools on the left below (figure A) show both the most recent maximum SST from satellites and the future predicted SST over the next few days. An active outreach tool (below right, figure B), under development, will alert subscribers via cellphone of local SST's that have exceeded 15°C so they can better manage harvesting risks.

Passive Outreach is completed.	Great, but most Alaskans (white area) have no coverage. The largest area in pale orange is the coverage for 2G, "Talk&Text".	We have a working number but it works **only in Alaska.**
		 Text: 808-670-1570

NCCOS

Science Serving Coastal Communities

Aquaculture Planning Tools Feedback

We want your thoughts, ideas, and improvements on our MSP Tools

National Centers for Coastal Ocean Science

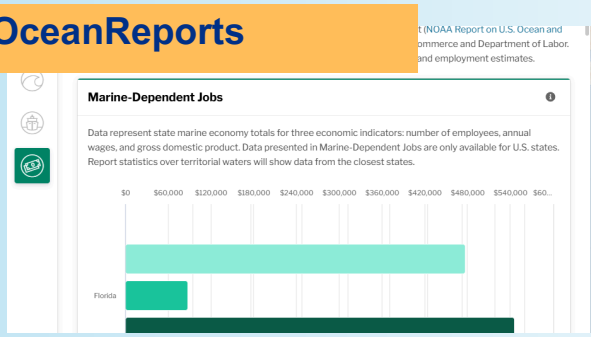
NCCOS provides numerous Marine Spatial Planning Tools to the public.

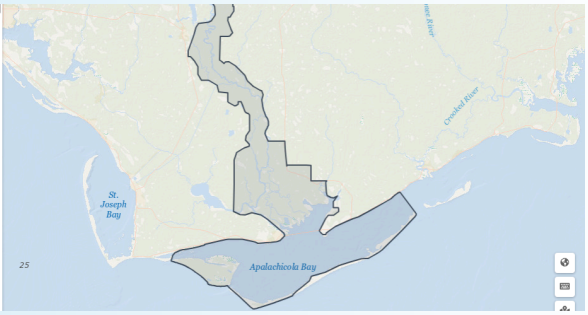
These tools compile hundreds of data layers into a web-based, automated geospatial platform to visualize ocean space. that can be used to support spatial planning and increase transparency and efficiency for offshore planning and permitting within the U.S.

We are asking for feedback on our existing Aquaculture Tools.

Please scan the QR Code to be taken to the Tools Review Form.

OceanReports





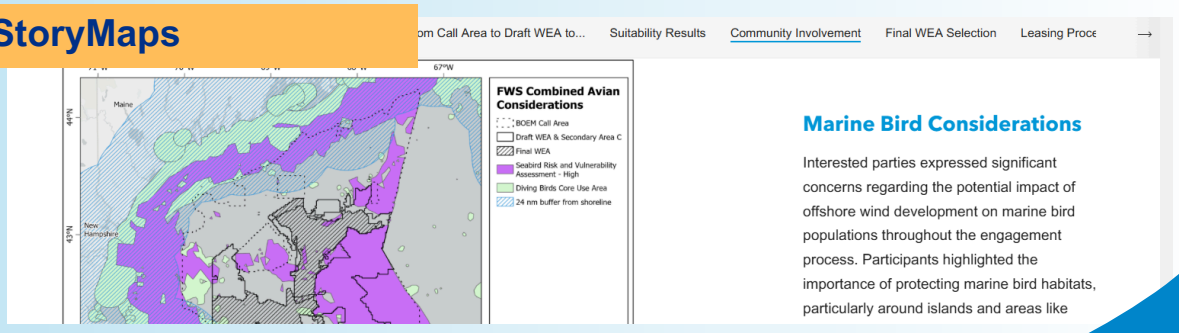
OceanReports include descriptive infographics and supporting data that can be used for aquaculture planning, permitting, environmental review, public relations, and more.

Note: Many of the datasets in OceanReports are no longer being updated. Please visit the Marine Cadastre data catalog at www.marinecadastre.gov to find trusted and up-to-date ocean GIS data.

National Aquamapper

This easy-to-use map viewer allows coastal managers and aquaculture farmers to visualize many of the necessary considerations for proper siting and permitting in the U.S.

StoryMaps

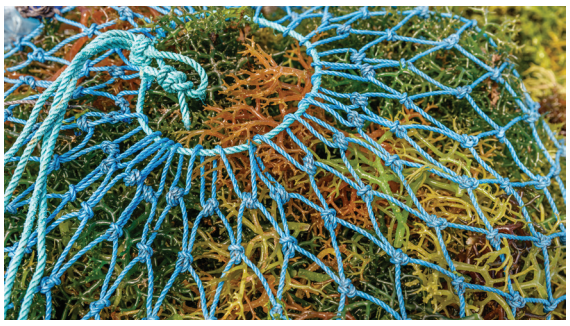


NCCOS StoryMaps provide an interactive narrative of how MSP is used in real world applications. With mapping layers and descriptive text, we tell the story of how our data is used to advance the New Blue Economy.

National AquaMapper

Helps industry and coastal managers find the right space for offshore aquaculture opportunities.

The National AquaMapper is a web-mapping application designed to assist managers in identifying suitable areas for aquaculture development in U.S. federal waters. The application provides high resolution maps to improve the coordination and transparency of permits and siting, which in turn reduce planning costs on industry and regulatory agencies and allow for more investment opportunities in domestic seafood production.



Minimize user conflicts with:

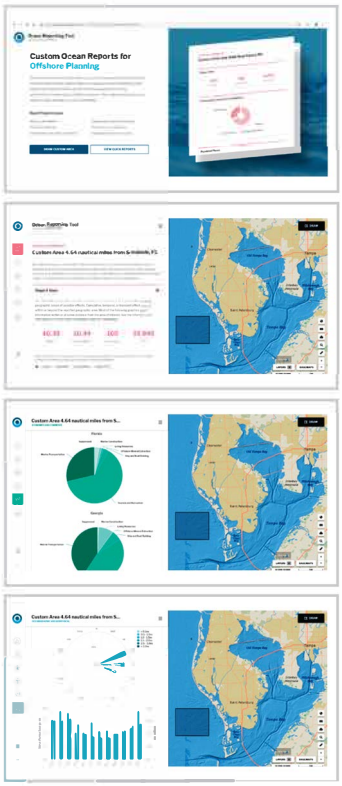
- Military
- Navigation
- Industry
- Oceanographic
- Natural & Cultural Resources

NOAA National Ocean Service
National Centers for Coastal Ocean Science
For questions contact Christopher.Schillaci@noaa.gov
http://coastalscience.noaa.gov

A trusted one-stop tool for custom automated spatial analyses for authoritative ocean data to streamline permitting, decrease costs, and increase transparency for all ocean industries

OceanReports

Explore Your Ocean with OceanReports



OceanReports Quickfacts

- Over 100 data sets including energy and minerals, natural resources, transportation and infrastructure, oceanographic and biophysical conditions, and the local ocean economy
- Provides custom automated geospatial analyses for exploring the entire U.S. ocean
- Made for all ocean industries including energy, shipping and transportation, aquaculture, fisheries, and seabed mining
- Users include ocean industries, permitting agencies, consultants, marine planners, physical scientists, policy analysts, and the general public
- The only tool that generates comprehensive spatial reports for the entire U.S. ocean

This tool was developed by NOAA, the Bureau of Ocean Energy Management, the Department of Energy, and Esri.

For questions contact: James.Morris@noaa.gov, Dave.Stein@noaa.gov, and John.Wieber@boem.gov

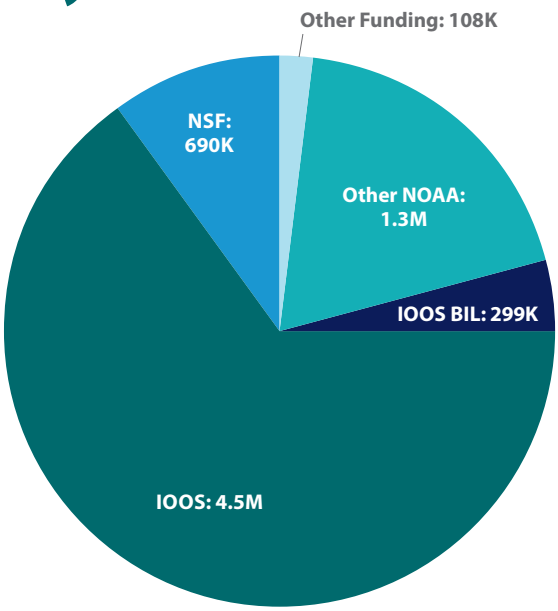
NOAA National Ocean Service
National Centers for Coastal Ocean Science
Office of Coastal Management
http://coastalscience.noaa.gov

AOOS

Alaska Ocean Observing System

The Alaskan Ocean Observing System (AOOS) is one of 11 regional organizations in NOAA's Integrated Ocean Observing System (IOOS). We assist in monitoring Alaska's marine and coastal environments, sharing information, and offering tools to enhance the understanding of ecosystem changes. This aids in decision-making processes and supports the ocean economy.

As a nonprofit, AOOS collaborates with Tribal entities, state and federal agencies, research entities, environmental non-governmental organizations, and industry. Our Governance Board is composed of members from 19 such organizations, with plans to add three additional Alaska Native seats in 2024. With the guidance of our Board, AOOS excels in leveraging almost seven million dollars annually by funding over 70 organizations working throughout the state.



AOOS income from federal funding sources
FY23 Total: $6,973,805

Key Aspects of Our Base Funding

Sustaining ocean observations that support research and management

- Ecosystem moorings that collect year-round data in areas of rapid change
- Gliders that conduct real-time underwater surveys
- High-frequency radars (HFRs) that map surface currents
- Ship-based surveys for oceanographic data collection
- Shore-based stations that gather weather information

Sharing ocean information

- A public data portal that holds the largest collection of ocean data in Alaska
- Developing new low-bandwidth and user-friendly data tools and products

Connecting researchers and residents to address issues crucial to Alaskans

- Alaska Harmful Algal Bloom Network (AHAB)
- Alaska Ocean Acidification Network (AOAN)
- Alaska Water Level Watch (AWLW)

Photo by Sheyna Wisdom

With funding from the National Science Foundation, AOOS partnered with the Alaska Eskimo Whaling Commission to deploy 20 wave buoys across the Arctic coast to help with navigation during subsistence activities. This program will be continued with IRA funding.

Photo by Allison Heaslet

In a partnership with the Alaska Native Science and Engineering Program (ANSEP), AOOS provides internship and scholarship support for undergraduate students to enhance local workforce development in Alaska.

Photo by Bethany Goodrich

AOOS supports monitoring and research for threats to food security and sovereignty in Alaska such as marine harmful algal blooms and ocean acidification.

Bipartisan Infrastructure Law (BIL) funding

The BIL funding has been instrumental in revitalizing aging infrastructure for our observing assets that have diligently operated in Alaska's harsh environments. Assets such as gliders, HFRs, and moorings have all benefited from this funding. Additionally, the Regional Ocean Partnership (ROP) funds, also allocated through BIL, have been utilized to forge new partnerships with existing community-led observing programs, including:

- Alaska Arctic Observatory & Knowledge Hub (AAOKH)
- Sea Ice for Walrus Outlook (SIWO)
- Community-led salmon estimates using drones through Nalaquq, LLC
- Skipper Science Partnership Program
- Internships for college students in the Alaska Native Science & Engineering Program (ANSEP)
- Travel support for Indigenous Arctic Watch partners

Inflation Reduction Act (IRA) funding

AOOS is strategically using IRA funding to help fortify coastal resilience against climate change impacts. Coastal communities in Alaska, particularly those on the frontlines of climate change, are often remote and historically underserved. Projects that bolster local workforce development and community-led initiatives include:

- Supporting safe Arctic maritime operations through Arctic Watch
- Backyard Buoys providing real-time wave data to subsistence hunters
- An Alaska Sea Grant marine advisory program agent stationed in Bethel
- A Yukon River Drainage Fisheries Association (YRDFA) biologist
- Collection of baseline environmental data by Qawalangin Tribe of Unalaska

With your continued support, we are able to sustain our efforts in delivering essential ocean information for the benefit of coastal communities, fishermen and mariners, resource managers, researchers, incident responders, and other ocean users.

In partnership with the University of Alaska Fairbanks, AOOS supports a fleet of autonomous underwater vehicles that transmit underwater data in real-time.

Photo by Hank Statscewich

Contact Darcy Dugan, dugan@aoos.org

Alaska Ocean Acidification Network

Working to Understand Ocean Acidification to Help Alaskans Adapt

Why is Ocean Acidification a Concern for Alaska?

Scientists estimate that the ocean has increased in acidity by 30% over the last 300 years due to increased carbon dioxide in the atmosphere from human activities. Higher acidity water affects the ability of shell-building organisms to develop and maintain their shells, and may also affect the behavior of some fish species. Since the most susceptible species are often key components of the food chain, researchers expect the effects of ocean acidification (OA) to be felt throughout the ecosystem. Alaska is predisposed to OA due to its colder water temperature, making it likely that we will feel the effects sooner and more intensely than other regions. This could dramatically affect the lives and livelihoods of Alaskans, including the $6 billion Alaska seafood industry.

What is the Network?

The Alaska Ocean Acidification Network was developed to expand the understanding of OA processes and consequences in Alaska, as well as potential adaptation and mitigation actions. The network helps connect scientists and coastal communities to identify knowledge gaps, recommend regional priorities, share data, and disseminate information throughout Alaska.

What You Can Do

- Learn more on the network website
- Join the list serve
- Connect with OA experts using the 'Expertise Database'
- Host a speaker in your community
- Let your elected officials know you care about these issues
- Support the transition to clean energy to drive down carbon emissions

Partners

- Alaska Bering Sea Crabbers
- Alaska Marine Conservation Council
- Alaska Marine Highway System
- Alaska Longline Fishermen's Association
- Alaska Sea Grant
- Alaska Shellfish Growers Association
- Aleut Community of St. Paul
- Alutiiq Pride Marine Institute
- Bering Sea Fisheries Research Foundation
- Hakai Institute
- Kachemak Bay Research Research
- Kodiak Area Native Association
- Meridian Institute
- NOAA Alaska Fisheries Science Center
- NOAA Kasitsna Bay Lab
- NOAA Ocean Acidification Program
- North Pacific Research Board
- Northern Latitudes Partnership
- North Slope Wildlife Dept
- Oregon State University
- Prince William Sound Science Center
- Renewable Energy Alaska Program
- Sitka Sound Science Center
- Sitka Tribe of Alaska
- University of Alaska
- United Fishermen of Alaska
- 20 communities collecting water samples
- And more!

Share ideas or feedback with the Network

AOOS
Alaska Ocean Observing System

https://aoan.aoos.org/

Kesten Bozinovic

August 2024

How and Where are We Monitoring?


UAF OARC

Fixed Moorings: OA sensors tethered to the ocean floor are located in the northern Gulf of Alaska, Bering Sea, Chukchi Sea, and Beaufort Sea. Short-term sensors have also been installed in kelp and shellfish farms.

UAF

Autonomous Gliders: Gliders can cover large geographic areas throughout the water column for weeks at a time at relatively low cost.


NOAA

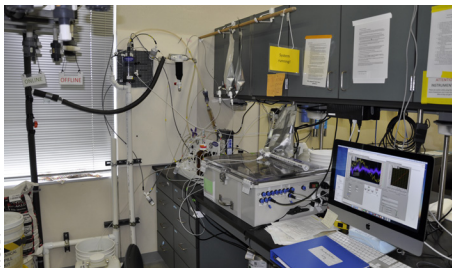
Ship-based Water Samples: Repeat water samples have been taken on a transect extending from Seward out into the Gulf of Alaska. NOAA also conducts ship-based monitoring every few years.


AMHS

Sensor-equipped Vessels: Between 2017 and 2019, the Alaska Marine Highway ferry M/V *Columbia* collected OA data during its 1,854 mile weekly roundtrip run between Bellingham, WA and Skagway, AK.


CRRC

Shoreside Sampling: Community-based sampling, primarily led by Tribes, is creating in baseline carbon chemistry data in nearly 20 communities across the state.


NOAA

Burke-o-Lators: Often co-located at hatcheries, these high-accuracy systems analyze multiple OA parameters and provide a clear picture of real-time conditions. Burke-o-Lators are located in Seward, Kodiak, and Sitka.

What Are We Learning?

- The Gulf of Alaska, the Chukchi Sea and Bering Sea are currently experiencing seasonally corrosive conditions, and the Beaufort Sea is starting to experience sustained corrosive conditions. These conditions mean there is a decreasing amount of water favorable for species like shell builders.
- Year round monitoring shows large seasonal fluctuations in carbon chemistry due to temperature, glacial runoff, phytoplankton blooms and circulation. Fall and winter tend to be more acidic than spring and summer, and bottom water tends to be more acidic than surface water.
- Studies show most Alaska crab species are sensitive to a rise in acidity, with red king crab and Tanner crab showing the strongest responses. These species consistently exhibited decreased growth and increased mortality at multiple life-history stages.
- Research on salmon is still in the early stages but also shows negative impacts. In higher acidity water, coho salmon exhibited a reduced sense of smell and were unable to distinguish the smell of a predator. A 6-week study on juvenile pink salmon showed salmon exposed to more acidic water grew more slowly, had smaller body length, increased metabolism, and elevated cortisol (meaning they were undergoing stress).
- For many fish, including salmon, ocean acidification is expected to be a multi-stressor. The impacts may be sublethal – the acidity won't kill the fish – but the added stress is likely to reduce their ability to rebound from factors such as warming.
- Long term lab studies are challenging to conduct and may not reflect natural conditions. Additionally, there is large natural variability in OA drivers in Alaska waters. A commitment to long-term monitoring and research is needed to understand trends and guide future responses.

Alaska Ocean Acidification Network

A program of the Alaska Ocean Observing System

https://aoan.aoos.org/