Sea Grant–NCCOS Hawai‘i Aquaculture Siting and Sustainability Workshop

Honolulu, Hawai‘i
October 28, 2025

Sea Grant
UNIVERSITY OF HAWAI‘I

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NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
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Design and layout: Jenna Clark and Jill Gallagher, Maryland Sea Grant

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Workshop Background and Purpose

Welcome, and thank you for attending our Sea Grant–National Centers for Coastal Ocean Science (NCCOS) Hawai'i Aquaculture Siting and Sustainability 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. Please review our workshop guidelines on page 8. We intentionally foster 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 aquaculture siting and sustainability. Funded primarily by a grant from the NSGCP, this collaboration has three goals: 1) Extend the reach of NCCOS aquaculture 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 aquaculture; and 3) Inform broader Sea Grant–NCCOS marine planning efforts.

Purpose

The purpose of the workshop today is to advance understanding about digital tools and resources available for aquaculture siting and planning in Hawai'i. Through presentations and discussions, we will explore aquaculture siting tools, discuss topics related to aquaculture siting and planning, and introduce ideas around collaboration for developing effective digital tools. We aim to identify ways we can collectively develop sustainable coastal and ocean aquaculture to meet US domestic seafood demands.

In this workshop, we plan to introduce the framework of "knowledge exchange," a component of "co-creation," when discussing aquaculture siting tools. 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. " In the context of this workshop, knowledge exchange is a process that uses two-way communication and information transfer to build community among various interest groups who want to address complex social and environmental challenges around aquaculture siting and planning. 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 toward improving current and future digital aquaculture tools. We ask workshop participants to be open to fielding thought-provoking questions. How might this tool be useful in your area? What type of digital tool would help progress aquaculture in Hawai'i? Are there groups who should be included in digital tool development for Hawai'i but presently are not? These questions are designed to spur conversation so we may listen and learn from each other.

Key outcomes for today's workshop are for participants to identify ways to make future digital aquaculture siting tools more accessible and applicable for broad audiences, contribute to conversations regarding aquaculture siting and expansion, and brainstorm a digital aquaculture planning tool that will benefit and progress the industry in Hawai'i. This work will also inform our future workshops with participants in the Northeast region. Together, the outcomes from these workshops will provide recommendations on how to advance tool development, dissemination, and value to end users to move sustainable aquaculture production in the US forward.

Thank you for your support!

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[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

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 aquaculture siting and development.

Objectives

- Present and explore existing aquaculture siting tools and data resources
- Introduce the concept of knowledge exchange in the context of aquaculture siting tools
- Build understanding among participants of the various perspectives, knowledge, and expertise present at the workshop
- Identify ways to improve and advance:
  - Existing and future aquaculture siting tools
  - The use of knowledge exchange to create aquaculture siting tools
  - The value of aquaculture siting tools to end users
  - The delivery of aquaculture siting tools to end users

Agenda

8:30 a.m. **Check-In**

Campus Center Executive Dining Room at the University of Hawai'i at Mānoa.
Refreshments and light breakfast served.

9:00 a.m. **Welcome and Housekeeping**

Beth Lenz, *Hawai'i Sea Grant*

Fredrika Moser, *Maryland Sea Grant*

9:10 a.m. **Session 1: Introduction and Background**

Introductory Exercises

Fredrika Moser, *Maryland Sea Grant*

Beth Lenz, *Hawai'i Sea Grant*

Sea Grant and NCCOS Collaboration

Chuck Weirich, *National Sea Grant Office*

Workshop Overview and Purpose

Annie Schatz, *Maryland Sea Grant*

Workshop and Project Evaluation

Cat Davis, *University of Maryland Center for Environmental Science, Appalachian Laboratory*

9:35 a.m. **Session 2: Aquaculture Perspectives**

Overview of Session Activity

Annie Schatz, *Maryland Sea Grant*

Breakout Group Activity

Discussions

See 'Session 2' on page 5 for more information

10:05 a.m. **Session 3: Aquaculture Siting Information and Digital Tools**

Aquaculture in Hawai'i–Past, Present, and Future

Bradley Kai Fox, *Hawai'i Sea Grant*

10:05 a.m. (cont.) Overview of NOAA NCCOS Program and Aquaculture Resources

James Morris and Christopher Schillaci, *NCCOS*

10:45 a.m.	Break
11:00 a.m.	**Session 4: Aquaculture Digital Tools Café** Overview of Session Activity Annie Schatz, *Maryland Sea Grant* Breakout Group Activity *See 'Session 4' on page 6 for more information*
12:30 p.m.	Lunch
1:30 p.m.	**Session 5: Aquaculture Asset and Resource Inventory for Hawai'i** Overview of Session and Discussion Annie Schatz, *Maryland Sea Grant* Breakout Group Discussion *See 'Session 5' on page 6 for more information*
2:20 p.m.	**Break and Gallery Walk**
2:35 p.m.	**Session 6: Developing a Digital Aquaculture Tool for Hawai'i** Overview of Session and Discussion Annie Schatz, *Maryland Sea Grant* Breakout Group Discussion *See 'Session 6' on page 6 for more information*
3:25 p.m.	**Session 7: From Discussion to Development** Overview of Session and Discussion Annie Schatz, *Maryland Sea Grant* Breakout Group Discussion *See 'Session 7' on page 7 for more information*
3:55 p.m.	**Session 8: Evaluation** Cat Davis, *University of Maryland Center for Environmental Science, Appalachian Laboratory*
4:00 p.m.	Workshop Concludes

Workshop Procedure

The workshop will be divided into eight sessions with several opportunities for discussion and tool exploration. Each table will have sticky notes, markers, and flip charts to capture brainstorming discussions. Additionally, each table/group will have a facilitator to help guide and ensure equal contributions to the conversation. Lastly, each table will have two notetakers to capture participant thoughts on flip charts and in a Google Doc for the project team to review and summarize for the final workshop report.

If participants have additional questions for any of the workshop presenters, please feel free to reach out to the workshop organizing committee. We can help connect you with the appropriate panelist to answer your question.

Session 1: Introduction and Background

The introduction session begins with a few questions in Slido[2] to engage and familiarize participants with this software, which will be used throughout the day. Then, the National Sea Grant College Program's aquaculture manager will summarize how the collaboration with NCCOS was established. Maryland Sea Grant will next provide a quick overview of the larger project and the purpose of the workshop. Lastly, the project evaluator, Cathlyn Davis, will briefly introduce the purpose of the evaluation that we hope you will take at the end of the workshop.

Session 2: Aquaculture Perspectives

Considerable aquaculture expertise is convened at this workshop, and it is important to recognize the value of each participant and listen to the varied perspectives in the room.

During this session, participants will explain their connection to aquaculture and their expertise, knowledge, and unique perspectives regarding aquaculture in Hawai'i. Each participant will be asked to select an image from the stack on the table they think best represents their response to the following questions and provide a brief explanation (2- 3 minutes) as to why they chose that image.

- From the stack of images provided, select one or two that you think best represent your connection to, knowledge of, and expertise regarding aquaculture in Hawai'i. Please explain why you chose each image.
- Select another image(s) you think best exemplifies the future of aquaculture in Hawai'i.

Session 3: Aquaculture Siting Information and Digital Tools

This session will provide overviews of the aquaculture industry in Hawai'i, NCCOS, and digital aquaculture tools. First, Hawai'i Sea Grant will give an introductory talk about aquaculture in Hawai'i to familiarize participants with knowledge relevant to workshop discussions. Then, NCCOS collaborators will present an overview of their program, as well as digital tools available for aquaculture siting and planning. After each presentation, there will be time for a short Q&A.

[2] Slido is an online polling software for audience engagement. For more information, review Slido's short introductory video (https://www.youtube.com/watch?v=d0cQ6KXzM_8) or head to their website (www.Slido.com)

Session 4: Aquaculture Digital Tools Cafe

During this session, participants will explore four digital aquaculture planning tools to get a sense of what is currently available. Participants will be split into four groups and rotate through four stations. Each group will have about 15 minutes to explore and interact with the digital tools at each station. A short activity will accompany each tool to help participants consider its purpose, functionality, and accessibility.

The four stations:

1. National Aquamapper developed by NCCOS
2. OceanReports developed by NCCOS
3. Alaska Draft Aquaculture Opportunity Area Interactive Web Map developed by NOAA Fisheries and NCCOS
4. The State of Hawai'i Sea Level Rise Viewer

Questions to consider while exploring these tools:

- Aspects of each tool to examine: user interface, functionality, accessibility (Was it intuitive? Was there guidance, etc.?)
- How would you improve or modify these tools?
- How would you like assistance with using these tools (e.g., accessing and using the tools on your own, collaborative use with tool developers, training from tool experts, site visits, one-on-one discussions)?

Session 5: Aquaculture Asset and Resource Inventory for Hawai'i

In this session, participants will be grouped by the aquaculture sector where they primarily work (e.g., open ocean, coastal/loko i'a, land-based, etc.). Each group will first create a list of aquaculture planning resources, tools, organizations, institutions, companies, etc. within their sectors to understand what already exists in Hawai'i. Then, participants will use the resource lists to help identify any knowledge, resource, or tool needs/gaps. After,groups will choose up to three priority gaps that need to be addressed for their sector to progress in Hawai'i. To close the session, participants will take part in a gallery walk to view each group's flip charts, showing the identified resources, gaps, and top needs to be addressed.

Breakout group discussion questions:

- What assets and resources currently exist for your sector?
- Potential categories to consider community resources, existing organizations, institutions, technological assets, data resources, etc.
- What resources are missing? What knowledge gaps exist?
- Of the gaps and missing resources, what are the top three priorities to address to move your aquaculture sector forward in a meaningful way?

Session 6: Developing a Digital Aquaculture Tool for Hawai'i

In this session, participants will be re-assigned to tables to mix among aquaculture sectors. Participants will begin by discussing shared resources and resource gaps identified as priorities in Session 5. From those shared priorities, groups will again begin to envision a digital tool to help with aquaculture planning in Hawai'i.

Breakout group discussion questions:

- Discuss shared resources across aquaculture sectors.
- Identify shared priority resource gaps that must be addressed.
- From those shared priorities, brainstorm a tool that could start to resolve those gaps.
    - What is the main purpose of the tool? Who is the intended end user for the tool?
    - What functions would you want in that tool? What data or information is needed? (e.g., environmental data, economic data, cultural landscape data, regulations and permitting information)
- Is there a community or user group that is not usually included in tool development but should be?

Session 7: From Discussion to Development

Here, participants will discuss how to bring the tool ideas from Sessions 5 and 6 into development. The first five minutes will be silent brainstorming time, during which participants can type their ideas into Slido. The remainder of the session will open to a full-group discussion. Group discussion questions:

- What are tangible next steps (e.g., joint postdoctoral fellowship, hackathon, etc.) to develop one or more of the digital aquaculture tool ideas from Session 6 for Hawai'i?
  - What potential funding sources or avenues are currently, or might become, available for digital tool development?
  - What types of collaborations or partnerships might be formed to most effectively develop these tools?
- Are there aspects of the tool development process without clear solutions that need to be addressed for tool development to occur?
  - What people or groups might be able to address these unknowns?

Session 8: Evaluation

During this session, participants will complete a short evaluation developed by our external evaluator to share what they learned at the workshop and help us improve future workshops.

Next Steps

In November, Maryland Sea Grant will host a follow-up focus group. This focus group aims to continue conversations from the workshop, expand upon themes that arose, and provide feedback to the project team. If you are interested in participating in this focus group, please sign up here: https://bit.ly/HIFocusGroup.

After the focus group, Maryland Sea Grant will synthesize the findings from the workshop and write a summary report. The report will be distributed to NCCOS, all workshop participants, and others interested in the findings. Additional information on that process and the materials is available on our website (mdsg.umd.edu/HawaiiAquacultureWS).

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 University of Hawai'i at Mānoa for their generous donation of the meeting space.

Steering Committee/Planning Team Members: Caldonia Carmello, Jenna Clark, Cat Davis, Bradley Kai Fox, Cherie Kauahi, Beth Lenz, Brenda Lima, Anthony Mau, Fredrika Moser, Darren Okimoto, Riley Saito, Annie Schatz, Ron Vave, Ron Weidenbach

NOAA Partners: Meghan Balling, Celia Barroso, Alicia Bishop, Kieley Hurff, Kevin Madley, James Morris, Andrew Richard, Ken Riley, Chris Schillaci, Tori Spence, and Chuck Weirich

External Advisory Board: Rod Fujita, Laura Rickard, Kenny Rose, Kris Sarri, and Ian Yue

Maryland Sea Grant Communications: Jill Gallagher, Ashley Goetz

Workshop Guidelines

Maryland Sea Grant (MDSG) and Hawai'i Sea Grant (HISG) are committed to providing safe and welcoming environments for all who participate in Sea Grant events. MDSG and HISG prohibit and will not tolerate any form of harassment, bullying, or discrimination. Together, through the following guidelines, we can ensure that this workshop supports the 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 the purpose of 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 okay 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 you need to leave the workshop early, please let the project team, facilitator, or notetaker know in advance so we can allot time for you first during breakout sessions.

If you believe you or someone else has been subjected to inappropriate conduct, or if you have any other concerns, please do not hesitate to contact MDSG or HISG event staff who will work with MDSG or HISG 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 workshop.

NCCOS

National Centers For Coastal Ocean Science

SPATIAL PLANNING TOOLS

National AquaMapper

OceanReports
A BOEM/NOAA PARTNERSHIP

Marine Cadastre
Your trusted source for ocean geospatial data

National AquaMapper Tutorial

Screening for conflicts and aquaculture siting considerations!

ACTIVITY DESCRIPTION

The aim of this activity is to explore the functionality of the NOAA **National AquaMapper** (webmapper) and to screen coastal and ocean areas for potential aquaculture development in Hawai'i. This activity will show the types of uses and conflicts NCCOS considers when helping coastal managers grow sustainable U.S. aquaculture.

TUTORIAL INSTRUCTIONS

Launch the National AquaMapper!

Zoom to your region of interest by using the ***Bookmarks*** tool

- Practice zoom (+/-) and pan (drag) with your mouse

Go to the ***Layers*** list and toggle on/off for each category of data layers:

- Oceanographic & Biophysical
- Navigation & Infrastructure
- Energy & Minerals
- National Security / Military
- Natural Resources & Conservation
- Administrative Boundaries & Basemaps

View the ***Legend*** for active data layers

- Click on data layers to see more information

Practice ***Additional Tools***

- Use the Measurement Tool
- Print your map to share with colleagues
- Add Data to your map
- Draw shapes or features on the map
- Select features within active data layers

QUESTIONS

Where is the risk?

Where is the opportunity?

What species – gear could be used based on thresholds & constraints?

What were the challenges in this screening process?

What other ocean activities can be informed by this data?

NCCOS

National Centers For Coastal Ocean Science

Siting Aquaculture in Hawai'i: A Tool Demonstration Activity

Use NOAA marine spatial planning tools to site your own aquaculture farm!

SPATIAL PLANNING TOOLS

National AquaMapper

OceanReports
A BOEM/NOAA PARTNERSHIP

Marine Cadastre
Your trusted source for ocean geospatial data

ACTIVITY DESCRIPTION

The aim of this activity is to explore and use the NOAA **OceanReports** (automated spatial analysis tool) for evaluating coastal and ocean spaces for aquaculture siting in Hawai'i. This activity will use a scenario where an aquaculture company seeks to identify sites for development.

SITING GUIDELINES

Siting requirements: 250 acres in state or federal waters; at least 5 miles from a harbor; minimum depth is 25 m and maximum depth is 200 m.

Constraints to consider: military zones, navigation fairways, vessel traffic, ocean industries, sensitive habitats, protected species, fishing, recreation/diving (artificial reefs), and others.

Recommended buffer distances: 500 m (0.3 mi) for navigation channels, infrastructure, pipelines, submarine cables, shipwrecks, and artificial reefs.

ACTIVITY INSTRUCTIONS

- Name your company and pick a species to grow (bonus points for puns!).
- Identify an Area of Interest (AOI). This requires using the measure tool.
- Explore your areas of interest using OceanReports and Marine Cadastre.
- Explore the depth requirements for your operation within the AOI. This requires using the depth contours, bathymetry, or navigation charts.
- Evaluate siting constraints beginning with military and navigation.
- Assess environmental data, sensitive habitats, and protected resources.
- Identify your preferred site and record the latitude and longitude.
- Run a report for this location in OceanReports by inputting the coordinates in the coordinates tool. You will need to input at least four coordinates with the first and last coordinates being the same.
- Evaluate the siting process, what went well, what was a challenge?

NCCOS | NATIONAL CENTERS FOR COASTAL OCEAN SCIENCE

NCCOS

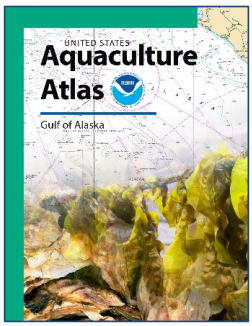
National Centers For Coastal Ocean Science

Explore the Draft Alaska AOA Digital Atlas

NOAA uses spatial modeling as a powerful tool to understand ocean ecosystems and plan for mariculture in the Gulf of Alaska!

OVERVIEW

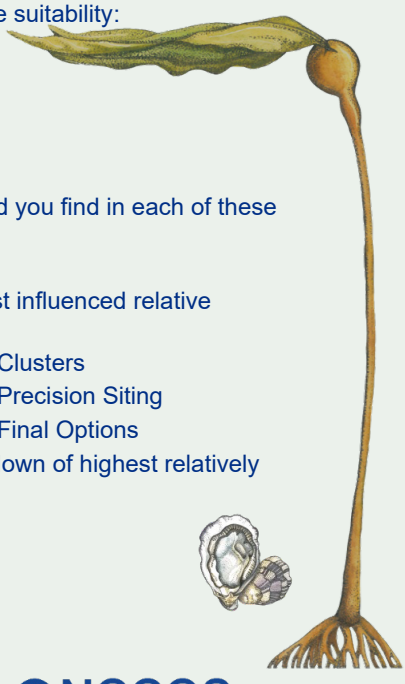
This activity provides an overview of the spatial modeling study to inform Aquaculture Opportunity Area development in state waters of Alaska followed by a demonstration of the draft Alaska AOA Digital Atlas. AOAs are defined geographic areas evaluated through both spatial analysis and National Environmental Policy Act (NEPA) review processes that may be environmentally, socially, and economically appropriate to support multiple commercial aquaculture operations. The size and location of potential AOAs is determined through spatial analysis, Indigenous Knowledge, and public engagement.



The process and outcomes of this study represent a transparent and inclusive community engagement process coupled with comprehensive, reproducible spatial planning methods that could be applied to other geographic regions or pioneering ocean industries given available data.

ACTIVITY INSTRUCTIONS

- Launch the Digital Atlas and view the 10 Alaska AOA Study Areas
- Zoom into the Juneau Study Area
- Click on Constrained Study Area
  - **Q:** Why do you think this area reduced in size from the original study area?
- Toggle on/off for each Submodel to see relative suitability:
  - Cultural Resources
  - Aquaculture & Fisheries
  - Industry
  - National Security
  - Natural Resources
  - **Q:** What important considerations would you find in each of these categories?
- Toggle on/off Final Suitability
  - **Q:** What types of data do you think most influenced relative suitability?
- Zoom in and toggle on/off Subtidal & Intertidal Clusters
- Zoom in and toggle on/off Subtidal & Intertidal Precision Siting
- Zoom in and toggle on/off Subtidal & Intertidal Final Options
- **Q:** What factors or data drove this winnowing down of highest relatively suitable area?



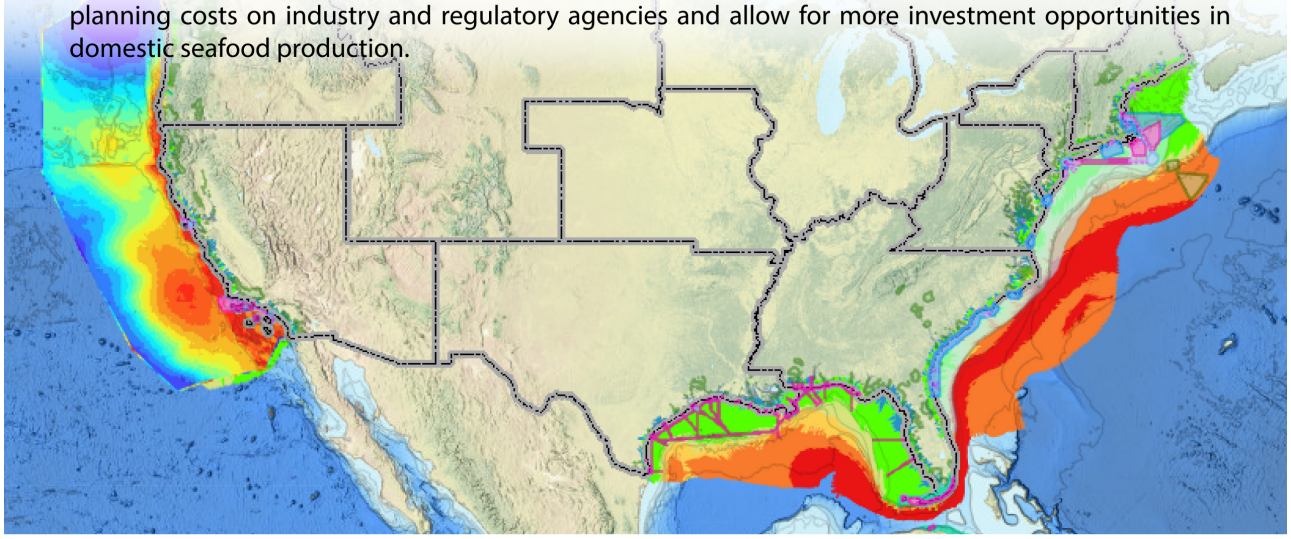
NCCOS NATIONAL CENTERS FOR COASTAL OCEAN SCIENCE

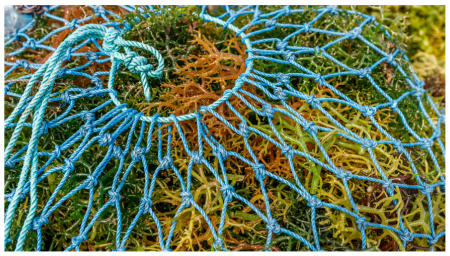
Workshop Tools and Resources

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:

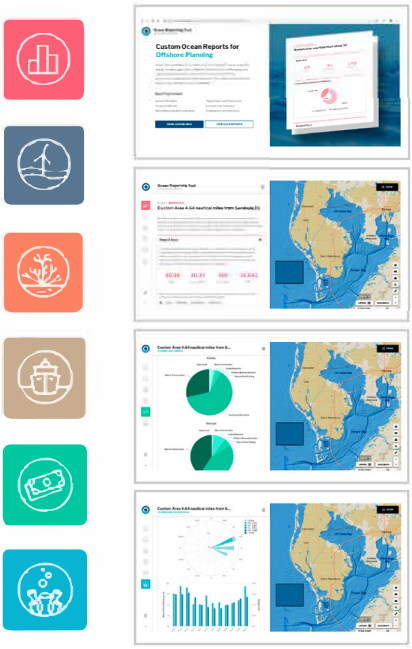
- Military
- Navigation
- Industry
- Oceanographic
- Natural & Cultural Resources

NOAA National Ocean Service
National Centers for Coastal Ocean Science
For questions contact James.Morris@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

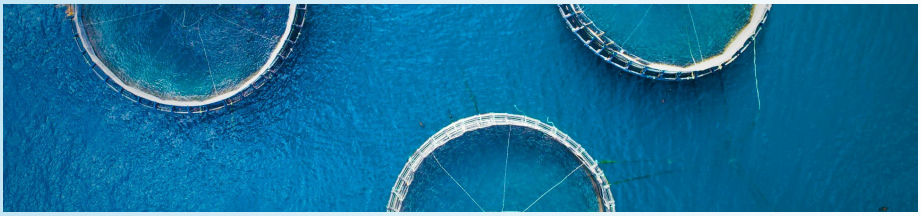
NOAA National Ocean Service
National Centers for Coastal Ocean Science
Office of Coastal Management
http://coastalscience.noaa.gov

NCCOS

Science Serving Coastal Communities

Coastal Aquaculture Planning Portal

A Toolbox for Sustainable Aquaculture Coastal Planning and Siting



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 Marine Spatial Planning Team 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 for Coastal Management, in efforts to support the growth and expansion of resilient and sustainable U.S. marine aquaculture.

National Centers 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.

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

Appendix: Additional Materials

Project Overview and Personnel

Connecting Sea Grant, NCCOS, and Coastal-Ocean Communities to Improve Sustainable Aquaculture Siting and Development Processes

The National Centers for Coastal Ocean Science (NCCOS) have developed tools and resources for aquaculture farm siting and development to begin addressing the complex needs of interested parties using 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 development. Because many local groups overlap with aquaculture areas in coastal-ocean environments, it is important to deliberately connect and build capacity among users through conversations centered around aquaculture tools to improve sustainable aquaculture development.

Goal

To build capacity and collaboration among the Sea Grant network, NCCOS, and other coastal-ocean groups to advance environmentally, economically, and socially sustainable aquaculture siting and development.

Approach

Six regional workshops will take place: the Mid-Atlantic (summer 2022); Gulf (winter 2023); California (fall 2023); Alaska (winter 2025); Hawai'i (fall 2025); and Northeast (winter 2026). The process of co-creation guides interactions with workshop participants to build a pathway for developing future aquaculture siting tools that are accessible and useful to broad audiences. In addition, workshops are designed to advance the reach of NCCOS aquaculture planning tools.

Workshop Objectives

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

- Present and explore existing aquaculture siting tools and data resources
- Introduce methods of co-creation in the context of aquaculture siting tools
- Build an understanding among participants of diverse perspectives, knowledge, and expertise present at the workshop
- Identify ways to advance and improve:
    - Existing and future aquaculture siting tools
    - The use of knowledge exchange to create aquaculture siting tools
    - The value of aquaculture siting tools to end users
    - The delivery of aquaculture siting tools to end users

Workshop Outcomes

- Participants will gain an understanding of the following in the context of aquaculture siting tools and development:
  - Present status of aquaculture in the region
  - Assortment of community groups involved in aquaculture development in the region
  - Benefits and purpose of NCCOS, and other available, tools and resources
  - Co-creation, collaboration, and knowledge exchange
  - Various perspectives and the value of including them in aquaculture discussions
  - Digital tool development needs for aquaculture in the region
- Participants will feel more comfortable engaging in productive discussions to improve aquaculture siting tools and identifying:
  - Gaps with current aquaculture siting tools (i.e., data, applicability, etc.)
  - Gaps in the development and delivery processes for aquaculture siting tools
  - Ways to make current and future aquaculture siting tools more accessible to other community partners interested in aquaculture siting
- Participants will feel that their contributions—and those of others—were heard and valued in advancing the conversation about development and use of aquaculture siting tools

Project PI

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National Aquaculture Coordinator

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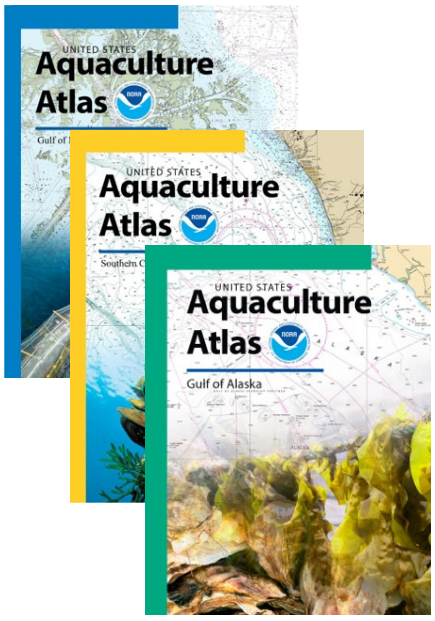
For more information, please visit: mdsg.umd.edu/sustainable-aquaculture-siting

The National Centers for Coastal Ocean Science (NCCOS) provides foundational science and services supporting the U.S. aquaculture industry. NCCOS' contribution to the growth of aquaculture builds on a long history of using ocean intelligence to guide coastal development and directly supports the President's Executive Order 14276, "Restoring American Seafood Competitiveness."

NCCOS informs aquaculture development by implementing a data-driven marine spatial planning process. Marine spatial planning identifies optimal locations for farming by identifying coastal areas that have minimal conflicts with other industries and services (such as oil and gas wells, commercial fishing, and shipping lanes) and ideal environmental conditions for farming. This process has improved regulatory efficiencies, enhanced interagency and intergovernmental collaboration, reduced costs and delays in commercial development, and engaged stakeholders in a transparent regulatory process.

Developing Aquaculture Opportunity Areas

At a regional scale, NCCOS conducts marine planning to inform siting of Aquaculture Opportunity Areas (AOAs) which are defined geographic areas containing relatively suitable sites for sustainable commercial aquaculture. AOA development is a multi-year process that involves engaging stakeholders, identifying important data and conflicts, and developing a comprehensive data inventory for the coastal ecosystem. This inventory includes data layers relevant to administrative boundaries, national security (i.e., military), navigation and transportation, energy and industry infrastructure, commercial and recreational fishing, natural and cultural resources, and oceanography.



NCCOS' Aquaculture Atlases are comprehensive spatial studies that identify options for siting AOAs. NCCOS has led regional spatial studies for the Gulf of America, the Southern California Bight, and state waters of Alaska, constituting the most comprehensive spatial studies to site coastal industries to date. This work is done in partnership with NOAA's National Marine Fisheries Service (NMFS) Office of Aquaculture, NMFS Regional Offices, state and federal management agencies, tribes, foundations, regional associations, and private sector stakeholders.

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The Science to Grow Aquaculture in the U.S.

Supporting Business Development and Permitting

On a local scale, NCCOS uses spatial data and models to inform individual projects, assisting industry by informing business planning and making federal and state permitting more efficient. These detailed site assessments identify environmental parameters involved in siting, including physical (e.g. coastal topography, bathymetry, sediment type), chemical (dissolved oxygen, turbidity, organic matter) and biological (chlorophyll, harmful algal blooms, predators) factors, as well as the nutrient discharge and environmental effects of the fish farm. NCCOS is currently supporting:

- Finfish aquaculture in New Hampshire, New York, Florida, and California
- Kelp and shellfish farm development in Southern California, and Rhode Island
- Shellfish aquaculture in New England
- Siting framework development for Hawaii

Aquaculture projects supported by NCCOS throughout the U.S.: (from left) Net pen farming in Hawaii, kelp farming in California, and clam harvesting in Florida.

Providing Planning Tools

NCCOS has developed The Coastal Aquaculture Planning Portal, a suite of coastal planning tools designed to assist managers, planners, and industry with sustainable aquaculture development. Some successful tools include:

- OceanReports, an automated spatial planning tool
- National AquaMapper, a web mapping interface with relevant data for aquaculture planning
- Entanglement simulator, a simulation tool to assist in engineering and risk assessment
- Region-specific aquaculture siting tools for Alaska, New England, the Mid-Atlantic, the Southeast, the Gulf of America, the Pacific Coast, the U.S. Caribbean, and Hawaii

NCCOS has also developed many issue-specific studies (e.g., protected species interactions) and recommendations for best management practices for many different regions and types of aquaculture approaches.

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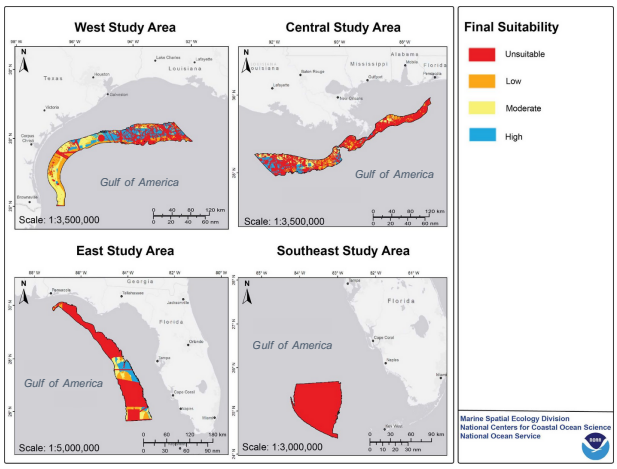

Spatial suitability for aquaculture in the Gulf of America.

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Aquaculture Planning Tools Feedback

We want your thoughts, ideas, and improvements on our Marine Spatial Planning Tools

National Centers for Coastal Ocean Science

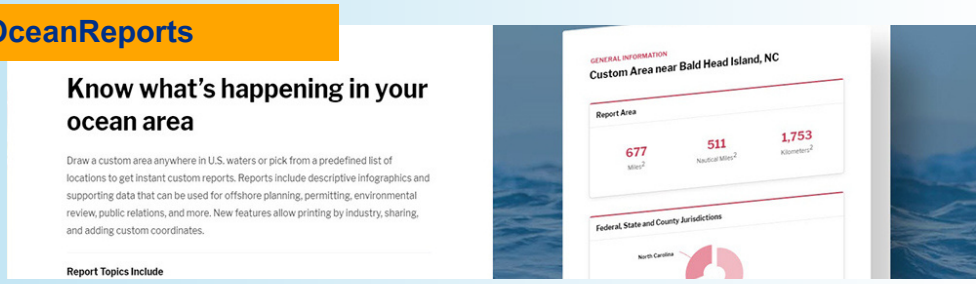
NCCOS provides numerous Marine Spatial Planning (MSP) Tools to the public.

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 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.

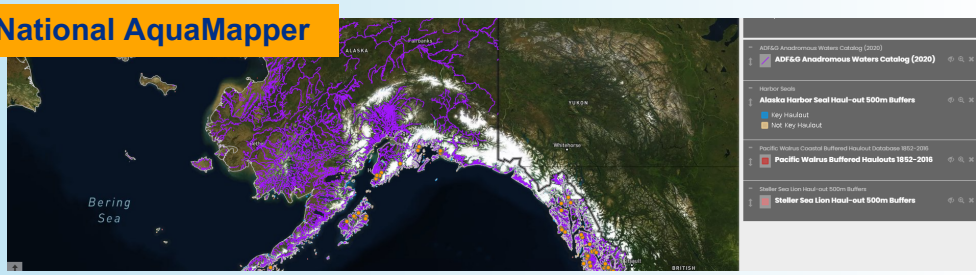
OceanReports



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

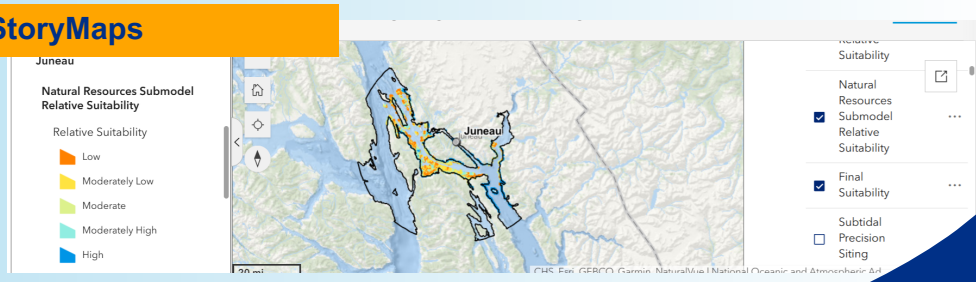
Note: Some of the datasets in OceanReports are no longer being updated. Please visit the Marine Cadastre data catalog at www.marinecadastre.gov to find trusted and up-to-date ocean GIS data.

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 Blue Economy.

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