



Sea Grant–NCCOS California Regional Aquaculture Siting and Development Regional Summary

Workshop Report



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Table of Contents

Executive Summary	2
Workshop Summary	3
Project Background and Purpose	3
California Workshop Process Overview	3
Participants of the California Workshop	5
Summary of Findings from the California Workshop	6
Suggestions for Future Workshops	13
Acknowledgements.....	14
References	15
External California Workshop Evaluation	16
Appendix A: Sea Grant-NCCOS California Aquaculture Siting and Development In-person Workshop Briefing Book	19
Appendix B: Sea Grant-NCCOS California Aquaculture Siting and Development Virtual Workshop Briefing Book	38
Appendix C: Participant Responses Table	57



Executive Summary

The third Sea Grant-National Centers for Coastal Ocean Science (NCCOS) Aquaculture Siting and Development Workshop was held in California as part of the [*Connecting Sea Grant, National Centers for Coastal Ocean Science, and Coastal Stakeholders to Improve Aquaculture Siting and Development*](#) project. The workshop was one component of a larger project working to build capacity among Sea Grant, [NCCOS](#), and other coastal-ocean user groups through a series of six regional workshops to aid in the sustainable development of marine and coastal aquaculture in the United States. Specifically, the project objectives are to (1) extend the reach of NCCOS' aquaculture planning tools and resources, (2) improve Sea Grant-NCCOS-coastal-ocean user group connections through the workshop process, and (3) inform broader Sea Grant-NCCOS marine spatial planning efforts.

Given these goals, a one-day, [in-person workshop](#) was held in San Diego, California, on November 2, 2023, to showcase available NCCOS tools and resources relevant to California. The workshop included facilitated small group discussions to solicit feedback on regional applicability, potential tool improvements, and use of co-creation in tool development. Additionally, a three-hour asynchronous, virtual workshop was held on January 22, 2024, to capture feedback on digital aquaculture planning tools from participants who could not attend in person. At both workshops, NCCOS demonstrated [National AquaMapper](#) and [OceanReports](#) where participants learned how both tools can be applied, and their value for empowering users with information about offshore aquaculture siting.

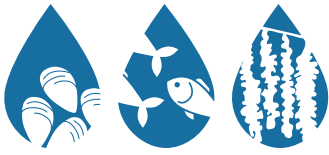
Overall, the workshops successfully brought various professional groups together, increased awareness of NCCOS tools, and collected feedback for tool developers. In total, 75 people attended the two workshops. The majority of participants represented Sea Grant, federal agencies, academia, and state and local government. Participant



feedback, generalized across both NCCOS tools, contained overarching themes related to the complex permitting, regulatory, and social license¹ landscapes in California. Ultimately, despite the complexities, participants want to continue working across various coastal-ocean groups to ameliorate shared concerns related to the growth of aquaculture in California.

Analysis of pre-workshop planning discussions (i.e., steering committee meetings and semi-formal interviews), in-person and virtual workshop discussions, and post-workshop focus groups revealed that participants appreciated the digital tools, especially as a starting point to narrow the scope of potential aquaculture siting locations. Concerns were voiced about whether state regulatory agencies would buy into the tools for use in the permitting process, with data transparency at the core of this concern. Participants suggested ways to improve the tools broadly (e.g., accessibility, additional data layers and functions, etc.), as well as increase trust in the tools with state agencies and regulators (e.g., data governance, proper communication about tool purpose and limitations).

¹ Social license refers to the informal and ongoing community approval of projects or processes impacting natural resources, which can greatly impact project implementation, completion, or success (Whitmore et al., 2022).



Workshop Summary

Project Background and Purpose

In recent years, aquaculture has globally surpassed commercial fisheries in total seafood production and has the potential to be a sustainable method of meeting global protein needs for increasing populations (FAO, 2024). The United States trails the rest of the world in total aquaculture production and depends on imported seafood (between 70–90% of seafood consumed in the US) to meet consumer demands (NMFS, 2022). The seafood production deficit led to the development of the [Executive Order \(EO\) 13921 Promoting American Seafood Competitiveness and Economic Growth](#) in 2020. As part of EO 13921 led by the National Marine Fisheries Service (NMFS) at the National Oceanic and Atmospheric Administration (NOAA), NMFS partnered with the National Centers for Coastal Ocean Science (NCCOS) to conduct a marine spatial planning siting analyses and create tools to identify the most suitable locations for marine aquaculture development in a busy ocean that would minimize conflicts with existing ocean users and the surrounding ecosystem.

As coastal and marine spaces are heavily used by a variety of groups, NCCOS partnered with the National Sea Grant Office (NSGO) on a project, [Connecting Sea Grant, National Centers for Coastal Ocean Science, and Coastal Stakeholders to Improve Aquaculture Siting and Development](#), to broadly associate with coastal-ocean user groups (i.e., stakeholders) directly involved with or impacted by marine aquaculture and mariculture. The project was funded by the NSGO and NCCOS and led by Maryland Sea Grant (MDSG) and their National Aquaculture Extension Coordinator (Coordinator), Dr. Annie Schatz. The goal of the project was to build capacity among Sea Grant (SG), NCCOS, and other coastal-ocean user groups to advance sustainable development of marine and coastal aquaculture in the United States. This project used six regional workshops to achieve three objectives under this goal: (1) extend the reach of NCCOS' aquaculture planning tools and resources, (2) improve SG-NCCOS-coastal-ocean user group connections through the workshop process, and (3) inform broader SG-NCCOS marine spatial planning efforts. Each workshop was part of an iterative process involving an external evaluator to ensure the project goals and objectives were being met through evaluations of workshop participants that led to subsequent workshop improvements.

California Workshop Process Overview

The project implements a five-part workshop process for each region: (1) regional workshop steering committee meetings, (2) semi-formal one-on-one interviews with regional experts, (3) focus group with Sea Grant Extension specialists in the region, (4) asynchronous in-person and virtual workshops, and (5) post-workshop focus groups. Each workshop has a regionally tailored agenda designed to gather regional sentiments on the current and future status of the aquaculture industry, capture feedback on aquaculture planning tools and resources, understand regional aquaculture issues and needs related to tool development, and inform future workshops. The workshop process for the California region was as follows:

Regional Workshop Steering Committee (RWSC)

The RWSC was responsible for guiding the workshop planning process, from identifying people to interview (see *Semi-formal Interviews*) and invite to the workshop to tailoring the agenda for the region. Alongside the workshop invitee list and agenda development, the RWSC informed the planning team of regional cultural characteristics for engagement and key regional topics related to the status of aquaculture and growth of the industry.

The RWSC comprised the Maryland Sea Grant (MDSG) planning team, the regional Sea Grant team (California Sea Grant, CASG), letter of support writers, and regional representatives of various coastal-ocean user groups (e.g., academia, industry, local government, non-governmental organizations, etc.). RWSC members were identified by the regional SG team and selected in partnership with the MDSG planning team, with advisement from NOAA NCCOS partners. Meetings were held virtually beginning at least four months prior to the workshop date with meetings

occurring monthly or bi-monthly depending on timing and need. The RWSC for the California workshop was made up of 12 people in addition to the MDSG and CASG planning teams. A representative from Alaska Sea Grant (AKSG), a member of the next workshop region planning team, joined the group to observe the workshop planning process. The RWSC met bi-weekly starting in August 2023 for a total of four meetings before the November workshop. See the *Participants of the California Workshop* section below for a breakdown of the RWSC members.

Semi-formal Interviews

Semi-formal interviews were conducted by the Coordinator with local representatives from a diversity of coastal-ocean user groups selected by the RWSC with input from our NOAA NCCOS partners. The purpose of these interviews was to understand the status of aquaculture and other key topics in the region from multiple perspectives (e.g., academia, farmers, seafood processors, regulators, etc.) to help inform future RWSC meetings and workshop agenda development. The developed semi-formal interview structure allowed for consistency among regions for comparison purposes and the flexibility to ask follow-up questions to delve deeper into certain regional topics. Most of the interview questions were developed by the MDSG team to be asked across the regions. Additional regionally relevant questions were developed in partnership with the RWSC and the local SG team to ensure relevant information was captured. Specifically, through these interviews we aimed to glean what the baseline knowledge was for aquaculture siting, tools and resources, awareness of NCCOS' tools, and breadth of coastal-ocean groups involved in aquaculture conversations and activities in the region. These interviews also helped identify other coastal-ocean user groups not previously mentioned that should be included in the workshop (i.e., a snowball approach; Naderifar et al., 2017). For the California workshop, the Coordinator interviewed nine regional representatives from five different professional categories prior to the workshop. See the *Participants of the California Workshop* section below for a description of the interviewees.

Regional Sea Grant Extension Focus Group

The purpose of the Sea Grant Extension focus groups is twofold: (1) to develop methods for effective and efficient engagement by Extension with federal partners, and (2) to gain understanding of regional Extension agents' capacity for different types of engagement. There was one Extension focus group meeting (~1.5 hours long) per region. The California Extension Focus Group included Oregon and Washington Sea Grant Extension specialists too (90% attendance of the Aquaculture Extension Specialists in the region).

Workshop

A one-day, [in-person workshop](#) in San Diego, California, took place on November 2, 2023 and an asynchronous, virtual workshop took place on January 22, 2024. Both workshops showcased available NCCOS tools and resources applicable to the region and included small group discussions to get feedback on regional applicability and potential improvements. MDSG, NCCOS, the local SG planning team, and the RWSC co-developed the agenda with advice from the NOAA NCCOS Working Group and National Sea Grant Office program officers. Though the workshop agenda changed across regions, there were similarities, including a project overview, workshop guidelines, regional aquaculture 101, regional IOOS data and resources, overviews of co-creation/co-development, and an NCCOS tool showcase.

Similarly, the questions posed during small group discussions across the regions were focused on co-creation/co-development principals, tool user priorities, data gaps, multi-user conflicts, potential uses or adaptations of NCCOS tools, and identification of groups who are overlooked in most aquaculture discussions. To compare nuances and differences across the regions, there were several core questions encapsulated by the previously mentioned common themes. Small group discussions were led by pre-identified facilitators from MDSG and local SG teams. A facilitator



Modifications from Previous Workshop

An adaptive management approach is used throughout the project to refine subsequent workshops based on what is learned from those held prior. The following feedback received from participants, NCCOS, NSGO, and the project's External Advisory Committee from the first two workshops resulted in several modifications for the California workshop. The suggestions and responses the team implemented at the California workshop are as follows:

Suggestion: Clarify the definition of co-production in the context of the project and more directly connect the concept to aquaculture tool production. **Response:** The SG-NCCOS planning team brought in an expert on co-production to provide an overview presentation on the concept. The team also shifted from using the term “co-production” to using “co-creation” because co-production within aquaculture sometimes refers to multiple aquaculture species being produced together.

Suggestion: Hybrid participants struggled with participating in discussions and remaining online over the course of the full workshop. **Response:** The SG-NCCOS planning team decided on a truncated, asynchronous, virtual workshop.

Suggestion: Build in more opportunities and time for networking. **Response:** Added a networking activity to ensure participants get to know others in their assigned groups. The activity asked participants to discuss their expertise and perspectives on aquaculture in California. Additionally, the workshop team increased the time allotted for breaks.

Suggestion: Participants felt like discussion questions were redundant. **Response:** Removed redundant questions and replaced with more time for networking (including the addition of an activity, see previous *Response*) and tool exploration.

took notes on a flipchart for participants to view, while a notetaker captured detailed notes digitally.

The virtual workshop was similar to the in-person workshop but was shortened to 3 hours to avoid video conferencing fatigue (Appendices A, B). The NCCOS tools and resources showcased were [National AquaMapper](#), [OceanReports](#), and Coastal Aquaculture Planning Portal. Across both workshops, 71 people participated, 43 in-person and 28 virtually. See the Participant Demographics section below for a description of the workshop participants.

Post-workshop Focus Groups

Two focus groups of different audiences were held for no longer than 1.5 hours virtually after each workshop to gauge how the workshop was perceived and consider improvements for upcoming workshops. The first focus group was with the facilitators and notetakers, about 14-20 people, to solicit their impressions of the workshop and any general improvements to the workshops or to their roles as facilitators and notetakers. The second focus group was with self-selected and invited participants, about 5-15 people, to ensure we got a fair representation of participant viewpoints. Beyond gathering feedback about the workshop, the participant focus group also helped the project team get clarification on unexpected topics that arose during discussions. After the in-person and asynchronous virtual workshops, the focus groups convened a total of 18 people, 11 of which were either notetakers or facilitators with the remainder being workshop participants (see *Participants of the California Workshop*).

Participants of the California Workshop

Marine aquaculture includes and affects many coastal-ocean user groups, and one of the project goals is to attain equal representation from a variety of these groups (e.g., Sea Grant Extension, scientists, aquaculture industry, NOAA, non-governmental, etc.) at the workshops. To understand who was attending the workshop, as part of the registration, participants provided their professional affiliations. Table 1 shows a breakdown of these affiliations, excluding the Maryland Sea Grant planning team. Of those participating in the workshop, 18 participated in two or more aspects of the workshop process (e.g., pre-workshop interview or steering committee, etc.). One participant categorized themselves as ‘Other.’ Participation from both the aquaculture and commercial fishing industries was limited at the California workshop.

Table 1. Summary of participation by professional affiliations (categories) and workshop components (e.g. pre-, post- and workshop interactions) throughout the California workshop process.

Professional Category	Pre-Workshop		Workshop		Post-Workshop
	Steering Committee	Interviews	In-Person	Virtual	Focus Groups
Sea Grant	3	2	8	7	4
Academia	1	3	9	6	4
State or Local Agency	4	3	8	6	1
Federal Agency	0	0	7	5	1
Aquaculture Industry	3	2	4	1	0
Commercial Fishing Industry	1	1	1	3	0
Nonprofit/Non-governmental Organization	1	0	5	3	4
Other	0	0	1	0	0
Total	13	11	43	31	14

Summary of Findings from the California Workshop

The findings are summarized by common themes drawn from notes collected during the workshop planning phase (i.e., steering committee meetings and semi-formal interviews), the workshop (i.e., breakout discussion notes), and the post-workshop phase (i.e., focus groups with participants as well as notetakers and facilitators). The first section summarizes the various participant perspectives that were engaged throughout the workshop process, and how they fit into the context of California aquaculture. The following section provides a broad overview of the present landscape for aquaculture in California as described by workshop participants. The third section then summarizes participant impressions of and suggestions for modifications to current tools, as well as future tool ideas.

Participant Perspectives of the California Aquaculture Industry

The planning team made efforts were made to reach near-equal perspectives and representation across the diverse professional categories involved in Californian coastal-ocean spaces throughout the workshop process. While that was achieved across several categories (Sea Grants, academia, state and local agencies, and federal agencies), there was lower representation from non-governmental organizations and aquaculture and commercial fishing industries (Table 1). Participants had a variety of experience with aquaculture in terms of time and topics. Several participants had been involved with the aquaculture industry for 15+ years, while others were newer to the industry. Participant areas of expertise spanned across aquaculture operations of different sizes and species, commercial fishing trade organizations, regulators for aquaculture and water quality (including wastewater treatment), program coordinators for nonprofits and government agencies, and researchers working on aquaculture from different disciplines (e.g., physiology, genetics, microbiology, fisheries, economics, etc.).

Participant Experience

Participants were asked about their connection to, and impression of, the aquaculture industry in California during the workshop planning phase (i.e., steering committee meetings and semi-formal interviews), as well as during the workshop itself. When participants described their relationship and present sentiments about aquaculture in California, frustration and confusion were commonly expressed across all groups. Broadly, workshop participants described California aquaculture as a “maze,” “diverse patchwork with many different players,” “the most difficult,” “a really high bar for entry,” and “not dissimilar to getting a nuclear power plant or wind farm [developed].” One participant summarized California aquaculture as being, “in a position to move something forward, but also blocked.” A couple of participants described aquaculture in California as, “abstract, no linear path forward, haven’t seen many advancements

with permitting in California,” while another equated the industry to a foreign language. One participant wondered, “when can it be self-sustaining,” while other participants pointed out siloed regulatory agencies and programs made industry progress difficult. Several participants summarized these depictions as a spider web of social license, state economic priorities, regulatory constraints, and siting challenges, ultimately limiting the growth of the industry.

Despite initial impressions and concerns regarding the complexities and scale of the challenges facing the aquaculture industry in California, participants were open to discussing potential benefits of aquaculture and opportunities for synergy among relevant groups with mentions of the inevitability of aquaculture growth, feelings of some progress, and being fully committed. One participant said, “there is a pathway; we need to find it.” Another mentioned, “navigating systems and processes to figure out how to move the needle.” Several participants spoke of the need for collaborative efforts to find the path forward, and one participant wanted to keep awareness of the “different perspectives and motivations surrounding aquaculture and beneficial uses.” Speaking specifically to the need for commercial fishing and aquaculture to work together, one participant said, “we need many forms of fishing, not just aquaculture, for a sustainable future.”

Community Relationships with Aquaculture

Through the steering committee meetings, semi-formal interviews, and workshop breakout discussions, improving aquaculture knowledge across the state (e.g., public, local and state governments, commercial fishermen, tribal communities, NGOs, etc.) was frequently brought up as necessary for industry growth in California. One participant summarized California’s relationship with aquaculture as, “a very difficult landscape to work within because there’s not a lot of familiarity with what you’re talking about, and there’s not an understanding really why this is important. And so there’s still a lot of education and public outreach that has to happen in order for people to understand, at least from my perspective, you know why we’re trying to do these types of things.” In general, participant discussions about the public’s opinion of aquaculture fell into three areas. In the first group, negative feelings towards aquaculture are entangled with previous impressions of past marine finfish production failures abroad. The second public opinion group has an overall lack of knowledge about aquaculture in California or the US. Finally, a third group supports shellfish and seaweed aquaculture because of their environmental benefits.

Commercial fishing and aquaculture industries’ interactions were discussed often throughout the workshop process. Generally, those working in commercial fishing summarized the relationship as trending positive as more outreach is done to bring the commercial fishing community into aquaculture siting and regulatory conversations. However, there is still a lot of hesitancy towards aquaculture in California and fear of displacement from fishing grounds and jobs. One participant summarized the relationship as, “...just another gear conflict type of situation.” Participants working in, or who have successful relationships with, the commercial fishing industry mentioned the importance of meeting fishers where they are, like conducting outreach at meetings they routinely attend (i.e., fishery management council meetings), using a common language when communicating (e.g., fathoms vs. meters/feet), and explaining the regulatory burdens



of aquaculture. Additionally, participants successfully working with the commercial fishing industry noted the wariness that fishers have when it comes to sharing data publicly. Those participants suggested working with commercial fishers to explore new ways to include fisheries data in aquaculture siting that respects the proprietary nature of their data (e.g., participatory mapping, [SeaSketch](#), etc.). Another suggested strategy for improving the relationship between aquaculture and commercial fishing was to develop co-benefits, as mentioned by a participant: “If you are gonna take away that piece of ocean, it has to be done really carefully, and you have to maximize co-benefits from it with compatible fishery types.” Additionally, a few participants mentioned the co-benefits of supporting working waterfronts between the two industries with one participant mentioning how, “existing working waterfronts are desperate for additional infrastructure,” and another noting that aquaculture

can help, “[maintain] what is there while also adding something that supports the economy.” Lastly, one participant mentioned the importance of showing commercial fishers how their feedback was incorporated into plans, referencing

their experience with the farm siting and permit process.

Relevant Groups to include in Coastal-Ocean Aquaculture Conversations

When participants were asked to reflect on groups not effectively engaged in coastal-ocean aquaculture siting and growth conversations in California during the semi-formal interviews and workshop breakout group discussions, participants mostly focused on groups within the seafood industry and the government, with some suggestions falling into a third category involving coastal and education groups (Table 2). Of the groups discussed, commercial fishers and Tribal and Indigenous communities were mentioned most often, followed by regulators and permitters. Specifically with Tribal and Indigenous communities, participants noted increasing interest in aquaculture among Tribal communities in California, especially with seaweed cultivation, but participants were not aware of the proper protocols for reaching out to Tribal and Indigenous communities. Other participants mentioned that Tribal engagement at the beginning of any aquaculture effort is critical. Permitting and regulatory agencies were brought up specifically in the context of tool development “for buy-in, for familiarity with tool benefits from the get-go.” More broadly, one participant stated that connecting with those on the water (e.g., commercial fishers, recreational boaters, etc.) is necessary since there are “things that are less obvious and less transparent,” giving the example of larval fish distributions that only fishers or fisheries biologists might be aware of. Lastly, one group at the workshop noted identification of unreached groups would likely depend on the tool in discussion.

Table 2. Relevant groups in California identified by workshop participants that could be more effectively engaged in aquaculture siting and growth discussions.

Seafood Industry	Coastal and Education Communities	Government Agencies
Commercial Fishers	Tribal and Indigenous Communities	Department of Defense
Aquaculture Financers	Environmental Non-governmental Organizations (e.g., waterkeepers)	Army Corps of Engineers
Wholesalers	Underserved Communities (e.g., Hispanic Communities)	Regulators and Permitting Agencies (Federal and State)
Processors	Recreational Boating	Stormwater Managers
Seafood Supply Chain	Students (political science, education, etc.)	Wastewater Managers
Working Waterfronts	Fisheries Biologists	CA State Water Resources Board - Ocean Monitoring Unit
Restaurants		Economic Groups
Consumers		

Aquaculture Landscape in California

After hearing from workshop participants during steering committee meetings, semi-formal interviews, workshop breakout discussions, and post-workshop focus groups, the aquaculture landscape in California comes across as very complex. Though the California coastline looks promising and rife with marine aquaculture opportunities, the reality is more convoluted due to oceanographic processes, bathymetric features, and a populous coastline in addition to an already busy ocean space (Morris et. al., 2021; Sievanen, Phillips et al., 2018). Presently, the majority of California’s aquaculture resides inland and produces freshwater species (e.g., sturgeon, tilapia, catfish, etc.). Of California’s marine aquaculture, the majority is nearshore or in bays producing shellfish, with oysters and mussels being the most common products (Fong et al., 2022; California Department of Fish and Wildlife, 2020). Though offshore aquaculture in both state and federal waters in California is limited, interest is growing, especially in federal waters. The complexities of the California coastline (e.g., physical environment, distance to port, etc.) could make managing offshore farms more expensive in addition to the costs already associated with permitting and complying with regulations. One company is in the process of acquiring one of the first federal permits in California to commercially produce seaweed in federal waters, paving the way for future farms.

Regulatory Landscape

While the federal government is calling for national growth in aquaculture, California's aquaculture landscape is experiencing regulatory tension. Participants reflected on strict and stagnant regulatory circumstances, citing a mixture of California's environmentalist leanings, lack of aquaculture knowledge, economic priorities of tourism and real estate in coastal areas, and a damaging history of a few failed aquaculture ventures in the state. Further, participants noted the regulatory landscape (e.g. permitting, review, regulatory compliance) is thought of as complex, inconsistent, slow (i.e., mentions of permit applications taking tens of years to be finalized), expensive for farmers, and generally not supportive of aquaculture growth. One participant noted that it feels like "California is still trying to determine if it is in [the] public's interest to lease state waters to aquaculture farms," and another participant noted that broadly California's aquaculture industry is in a "regulatory gridlock."

Across conversations about farm siting and permitting processes, the public comment period was frequently brought up by participants. Though participants understand the reasons and importance behind community input during the permitting process, there were frustrations about the power certain groups had over the process that could significantly delay the time to approval or change the scope of the original permit. Three community groups were mentioned within this context: commercial fishers, Tribal and Indigenous communities, and environmental non-governmental organizations (NGOs). The first two groups were described as having power in the permitting process because of certain requirements in the lease regulations. The third group was described by one participant as, "NGOs can be contradictory because they seem to want seaweed and shellfish aquaculture, but there's a lot of things they don't want to go along with. So, like it feels like, they want sustainable aquaculture development but also tend to support barriers to getting there, and it seems like trying to come up with a perfect sustainable aquaculture solution is leading to no aquaculture."

Participants mentioned consequences of the stringent state aquaculture regulations in California include annual declines in permits and the industry's offshore interest in federal waters where permitting and regulations are perceived to be less complicated. Participants noted previous attempts to bring groups across the aquaculture industry and government agencies together to develop a state aquaculture plan and more streamlined permitting processes, but the impression from participants is little-to-no follow-up or implementation has been taken. Systemic issues with funding and lack of knowledge seem the likely culprits behind the regulatory complexities. Participants alluded to budget constraints that limit the efforts of regulatory agency personnel, while those in control of the state budget are perceived as not understanding or prioritizing aquaculture.



Though the regulatory landscape is complex, participants still saw opportunities to ameliorate shared concerns across various groups (e.g., public, coastal-ocean groups, regulatory agencies, etc.) to find a sustainable path forward. Beyond general aquaculture education and outreach across the state and streamlining regulations and permitting, some participants mentioned developing a pathway for aquaculture beginners, like a pilot permit, to allow operators to start small and expand their farms with evidence of success and regulatory compliance. One participant also suggested an apprenticeship program to get experience with farm management and operations, then at the end of

the program, if successful, apprentices would get a starter plot of 5–10 acres with the option to expand their acreage after several years with proof of success. Both suggestions were likely built from the impression that participants had about state regulators seeming, "...more amenable to small scale pilot projects."

Aquaculture Siting and Industry Growth

The ocean is already a busy space, especially in California, given shipping activities alone (Sievanen, Phillips et al., 2018), and participants were additionally concerned about increasing interests and conversations around wind and tidal energy and marine protected areas and sanctuaries. Marine spatial planning was discussed as a need in California coastal-ocean spaces throughout the entire workshop process. Additionally, with the confluence of spatial competition, difficult farming environments, and ever-present regulatory requirements in California, participants feel the industry is moving in a direction set to price out individuals in favor of larger corporations, an added frustration to those working to promote aquaculture and/or those in the industry.



Given the lengthy and complex permitting process, the physical siting of an aquaculture farm was of minor concern to participants. Rather, workshop conversations focused more on specifics after site selection, including hiring a consulting firm and just getting out and seeing the site. One participant who had gone through the siting process mentioned, "you basically just wanna be out of the way of everyone and over sand bottom. There's really no magic behind it," while other participants who had used NCCOS' tools noted their use as an initial step and conversation starter. Participants commented that more pressing siting complications arose from user conflicts, environmental reviews for the California Environmental Quality Act (CEQA), community outreach, and public support. Participants also remarked on issues with permits being held up in the public comment period by environmental non-profits or from the lack of support from Tribal and commercial fishing communities (necessary for permit approval), and the need to improve access to basic aquaculture education and to strengthen collaborative efforts.

Current and Future Digital Aquaculture Siting and Planning Tools

A diverse array of options for tool assistance were recommended and inclusive of varied learning, accessibility, and language needs (Appendix B). Aside from understanding how to use a tool, several groups also mentioned the confusion of first selecting a tool, stating that many tools are available with little decision support or guidance. Once someone has selected a tool, participants strongly encouraged the development of video tutorials and a manual for guiding tool use, as well as opportunities to have one-on-one assistance and training through a dedicated helpline. Participants also suggested using real-world stories and case studies in training materials to improve users' understanding of how the tool can be applied. Additional suggestions for tool assistance included train-the-trainer events, particularly targeted for Sea Grant Extension agents, and opportunities for in-person trainings for those with limited skills or access to technology. Lastly, participants proposed the inclusion of agency contacts, generally, or within data layers, so users, especially farmers, can get assistance or additional information if any conflicts arose while using the tool. All these suggestions are not without the challenge of funding, which was discussed within some of the breakout groups as something to keep in mind, especially when applying for grants to develop a tool.

Tool Perceptions

Throughout the workshop process, several participants mentioned familiarity with NCCOS and their tools and resources either through individual exploration, the [Aquaculture Opportunity Areas \(AOA\)](#) process in southern [California](#), aquaculture farm siting process, or offshore wind siting conversations. These participants were impressed with the tools and found them useful in the farm siting and planning processes as an initial step to narrow the scope of

locations, which participants who did not have previous experience with the tools agreed with. Participants especially saw the benefit of the NCCOS tools for those new to aquaculture trying to understand where to begin. One participant described the tools as “a first cut” helping to “narrow the zone of analysis” for siting. Additionally, alongside the AOA Atlas for southern California, the tools were described as “very helpful for facilitating a dialog among different interests that may be affected by the introduction of aquaculture.”

Some participants noted that the tools could probably be used for many audiences and specifically use the tools for outreach and education to, “create a safe space for [audiences’] concerns to create better understanding.” However, other participants, who were less familiar with the NCCOS tools, had tried using the tools for educational purposes and found them difficult for students to use without prior knowledge of geographic information systems (GIS). When a subset of participants were surveyed at the post-workshop focus group, all of them agreed or strongly agreed that the workshop did inspire them to use or explore more with marine spatial planning tools.

Though participants saw the broader benefit of the tools, there were hesitations about the tools’ relevance to California’s aquaculture industry due to regulatory and operation-scale challenges. This was illuminated in the post-workshop focus group survey’s unanimous neutral response to how participants see using the tools in their work. Because offshore aquaculture in California requires a lot of capital due to various operational costs, one participant noted that working with these tools and NCCOS is likely more economically feasible than hiring a consultant. Operational scale aside, the bigger concerns discussed by workshop participants related to perceptions of the rigor of the tools, their data, and how using the tools to site a farm would advance the regulatory process. Several participants remarked on the potential skepticism of regulatory agencies with regards to the data used in these tools, especially regarding commercial fishing data. Workshop participants also wanted to ensure strong communication around what these tools could realistically accomplish with permitting and siting a farm in California. For instance, one participant noted that social license is not yet an Ocean Reports data layer but can strongly affect the aquaculture permitting process. Additionally, participants discussed how the tools did not address all the National Environmental Policy Act (NEPA) review requirements, noting, “the tool isn’t missing data, but the quality can improve greatly.” One participant summed this conversation up by saying, “You can have great tools, but if the data sets aren’t appropriate or easy to access then it’s not useful.” Without buy-in from the state agencies and improved near-shore data in state waters, the relevancy of these tools to the development of the California aquaculture industry remains in question. Participants also discussed user accessibility in some depth, noting the difficulty of using the tools without prior GIS experience.

Tool Suggestions

An overarching theme throughout workshop discussions was how to achieve state agency trust and approval of the tools to ease some of the regulatory and permitting complexities in California’s aquaculture industry when applying the tools in state waters. One participant asked, “how can the tool facilitate and strengthen partnerships between industry and regulators?” As participants began to discuss how the tools could be used to help ease permitting application and social license barriers for farmers, one participant noted, “we need to know what the regulators want to know, so the tools give the right output.” Another mentioned there needs to be “recognition of the rigor of the tools” for state agencies to support tool use in permitting and regulatory processes.

Data Governance, Data Layers, and Tool Functions

As breakout group conversations turned towards what information state agencies might need to approve the use of the tools in the permitting process, transparency was a core topic. Specifically, participants focused on data governance, or provenance, and



weighting functionality of the tools. One participant said what is, “most critical for buy-in for the tools’ outputs will be understanding the inputs, assumptions, and weighting decisions incorporated into the model.” Someone brought up differences in anchor point sizes among farm and gear types and the effects to benthic ecosystems as an example, wondering if nuances like these are accounted for since coastal-ocean space is already limited for aquaculture activities. Another person was curious if agency missions influenced weighting criteria in tools and how that would align across different agencies. Aside from understanding aspects of tool functions and formulas, one participant mentioned that state agencies need to assess whether the tools have objective data sources because there likely could be legal challenges, which makes objectivity and transparency into data sources important for state agency buy-in. On the other hand, participants mentioned some unwillingness for proprietary data sources (e.g. oil and gas, commercial fishers) to share their data, and trust must be built with agencies and tool developers that proprietary data will be used fairly and “without regulatory implications, as some people are concerned that their data may result in increased regulations [to them].”

Beyond data governance, participants had recommendations for additional data layers or improvements that would aid the aquaculture community in California. Data layer suggestions from participants encompassed legal, economic, and additional environmental (e.g., wastewater outfall locations, air quality limits) data. In addition, participants wanted improved commercial and recreational fishing data. Participants were also interested in data layers for working waterfront inventories, social science, current farm locations, and moorings for oceanographic/environmental sensors (Appendix C). The lack of data resolution nearshore, where the majority of aquaculture currently exists, was also discussed within some breakout groups. Participants noted several organizations that collect ocean monitoring data in California, with some overlap among them, wondering if data resolution could be improved by collaboration among these groups. With improved data resolution in the nearshore, participants discussed potential efficiencies in farm siting, NEPA reviews, and farm monitoring.



Participants suggested additional functions for either current or future tools related to aquaculture siting and planning in California centered around aiding the permitting process. These suggestions included providing information or links about next steps in the permitting process, overcoming agency conflicts, displaying no-go areas not meeting federal or state agencies’ water quality standards, adding a temporal component of how conflicting spaces are being utilized year-round, and creating an output from the tool to be used with or for the NEPA review. Another recommended functionality concerned accessing the data within the tool like a data repository, which could additionally be pared down to the data within the potential farm location.

Accessibility, Co-Creation, and Future Tools

Tool accessibility is also important for broader tool use. Workshop participants suggested some simple modifications to improve accessibility: (1) easily locating data governance and (2) clearly stating the tool’s purpose and limitations. Other suggestions to improve accessibility were related to making the user interface as simple as possible, providing an obvious place for feedback, ensuring the tool can function in areas with limited internet access, and developing a mobile app version.

The idea of co-creation in tool development came up frequently when discussing tool accessibility to targeted users. One participant defined co-production/co-creation as having “developed and adapted [a tool] over time by a multi-stakeholder group so that it retains its relevance and applicability over time.” Another mentioned the use of an advisory committee to help maintain the tool and recommend updates as needed. Others said that the “ground-up co-creation of future tools would be preferred,” and “we could benefit from co-creation of tools.” Lastly, one participant suggested that

if an entire tool cannot be co-created, then maybe individual data layers or tool functions can. Overall, participants were positive about incorporating more co-creation into tool development and improvement.

Throughout the group discussions, participants brought up ideas for future tools, encompassing decision-support, real-time monitoring, educational, and environmental tools for California's aquaculture industry (Appendix C). The educational and environmental tools were suggested to help improve social license, while the decision-support and real-time monitoring tools were aimed at assisting prospective farmers and established growers, respectively.

Tool Assistance

When participants discussed how they would like to learn about current and future tools, they recommended a diverse array of options, inclusive of varied learning and accessibility needs (Appendix C). One of the main points of conversation was regardless of assistance method, the education about the tools must clearly state the purpose, audience, and types of information the tools can provide. Participants suggested methods to promote tools, including through trusted and popular listservs and newsletters like NOAA Friday Harvest or through various networks like Sea Grant Extension or the Tribal Marine Stewards Network. Another suggestion was to provide tool links on various state and national permitting websites for easy access to those beginning the siting process. When learning how to use the tools, participants frequently suggested workshops, one-on-one meetings, or other in-person trainings with tool developers because they are, "more inclusive, especially to farmers who don't have backgrounds in [the] data field." Aside from in-person trainings, participants recommended having video and pop-up tutorials, manuals, and a "frequently asked questions" page. Additionally, participants suggested making these help pages and resources as clearly located as possible and providing either an email or submission portal where users could reach out with questions.

Suggestions for Future Workshops

Post-Workshop Focus Groups

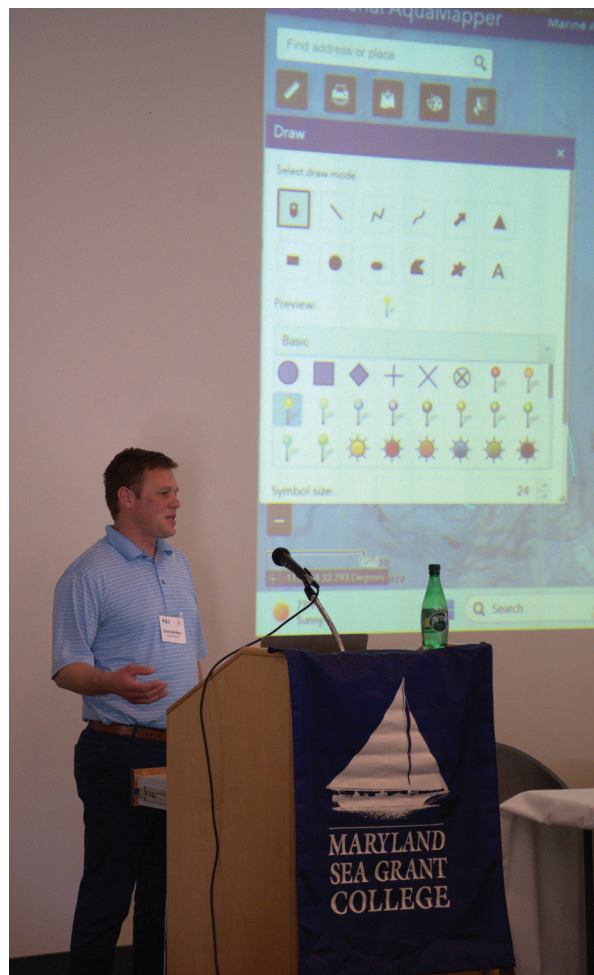
Workshop Content

Participants from the focus groups thought the NCCOS overview and tool demonstration, aquaculture 101, and regional IOOS were the most beneficial presentations, though someone suggested additional background on offshore aquaculture would have helped put the tools into better context. Participants felt the co-creation presentation took up too much time but admitted to already having a background understanding of the concept. While some participants liked the tool demonstration, others felt it was like a video tutorial and mentioned wanting more hands-on time with the tools.

Workshop Logistics

Focus group participants from the in-person workshop felt they had a good sense of what the day would entail and topics to be covered from the start, but those from the virtual workshop would have liked the briefing book sent out earlier in advance to have time to review. Some virtual participants came to the workshop feeling unprepared. Overall, participants felt the workshop format was beneficial and appreciated the small group discussion time. In general, participants wanted more time for networking with other participants and felt that was one of the more valuable aspects of the workshop. Additionally, those online wanted more interactive or engagement elements to the workshop.

Final Considerations for Workshop Improvements



Based on recommendations and suggestions from Dr. Davis' evaluation report (see *External California Evaluation*) and post-workshop focus groups the project team's plans to adjust the next workshop are as follows:

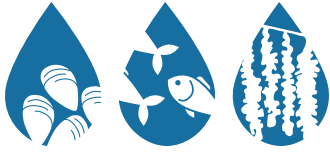
- Continue to:
 - Broaden the audience and be mindful of seasonal timing for industry
 - Include regionally tailored Aquaculture 101 and IOOS presentations
 - Assign participants strategically to breakout group tables
- Send out workshop materials (i.e., briefing book) and tool links earlier in advance of the workshop
- Provide a hands-on tool activity before or at the workshop for participants
- Leave more time for networking and breakout discussions
- If a virtual option is available, make it more interactive and engaging
- Link the concept of co-creation to aquaculture examples
- Clearly state the purpose of the project and how feedback will be used by NCCOS

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External California Workshop Evaluation

At the end of the workshop day, all participants were asked to complete a questionnaire created by the team's external evaluator, Dr. Cathlyn Davis from the University of Maryland Center for Environmental Science's Appalachian Laboratory. The workshop questionnaire collected feedback on the workshop delivery and progress towards the project outcomes, which were revised to better align with changes in the project implementation and focus. These outcomes are listed below:

- Objective 1: A diverse mix of professionals working in different aspects of aquaculture (“community members”) are engaged in discussions about aquaculture siting and development tools.
- Objective 2: Interested partners feel they have a better understanding of aquaculture siting and development tools.
- Objective 3: Interested partners feel they have a better awareness of different perspectives on aquaculture siting and development.
- Objective 4: Interested partners feel better prepared to discuss how to refine existing aquaculture siting/development tools or create new aquaculture siting/development tools.
- Objective 5: Interested partners feel confident that their input will be welcomed and used to help refine existing tools and creating new tools on aquaculture siting and development.
- Objective 6: Interested partners feel it is important to integrate different perspectives in refining or creating aquaculture siting/development tools.
- Objective 7: Interested partners feel that project activities (meetings, interviews, workshops) are responsive to diverse perspectives for refining and creating aquaculture siting/development tools.

From the evaluations, Dr. Davis summarized the questionnaire results into a written report for the MDSG planning team and provided recommendations based on the participant feedback and her informal observations throughout the workshop. Recommendations and associated findings are provided with additional details available in the full Evaluation report (see Appendix D).

Recommendations from the California Evaluation Report

Below are summary findings and recommendations for each project outcome based on the questionnaire findings, evaluator observations, and discussions with the MDSG team.

Outcome 1: A diverse mix of professionals working in different aspects of aquaculture are engaged in discussions about aquaculture siting and development tools.

The project is making progress towards Outcome 1 in terms of representation across different sectors of the aquaculture field in California. However, there could be greater representation from industry (aquaculture and commercial fishers), and there is poor diversity in terms of race. Several respondents commented that there was insufficient promotion and recruitment (see *Results for Outcome 7*).

Recommendations: As noted in the Gulf of Mexico report, this finding suggests there should be ongoing efforts to clearly identify the intended audience, and additional strategies should be used to recruit this audience. This effort should include a strong focus on engaging more participants from industry and underrepresented communities.

Outcome 7: Interested partners feel that project activities (meetings, interviews, workshops) are responsive to diverse perspectives for refining and creating aquaculture siting/development tools.

The project shows clear evidence of being responsive to diverse perspectives in the context of aquaculture tools and engaging participants in the workshops (particularly the in-person workshop). There continues to be praise for the workshop format in terms of the large and small group discussions and the facilitator efforts. But some improvements

are needed to allow more time for discussion, to engage online participants more fully, to ensure participants' interests and perspectives are aligned with the workshop purpose (i.e., that buy-in exists before discussing siting), and to integrate, not simply gather, different perspectives.

Recommendations: These findings suggest the following:

- presentation time should be reduced to allow for more discussion (e.g., provide more content as pre-workshop readings and exercises);
- either ensure recruited participants already have buy-in to the value of aquaculture (thus the discussion can focus on siting in consideration of multiple perspectives) or reframe the workshop and other conversations so significant time is devoted to seeking this buy-in;
- clearly state how different perspectives will be used within the workshop and the effort overall (including the culminating report);
- better prepare facilitators and revise the discussion format so that conversations remain focused on key topics and effectively build on participants' input to expand and deepen the discussion on different perspectives; and
- add a "discussant"—that is, an individual to listen and prepare a synthesis of the day's input and perspectives, and gather more feedback using this synthesis.

Outcome 2: Interested partners feel they have a better understanding of aquaculture siting and development tools.

The project shows evidence that partners are gaining an understanding of aquaculture siting tools and associated limitations. Knowledge gains were lower for aquaculture development, and there was some confusion about the difference between siting and development.

Recommendations: These findings suggest that presentations and associated discussion about siting tools should be continued (but, as noted, some presentations could be moved to pre-workshop activities). Given the density of the material covered, the focus on siting, and the confusion about development, the project team should consider dropping discussion and reference to aquaculture tool development.

Outcomes 4 and 5: Interested partners feel prepared to discuss how to refine existing aquaculture siting/development tools or create new aquaculture siting/development tools. Interested partners feel confident that their input will be welcomed and used to help refine existing tools and creating new tools on aquaculture siting and development.

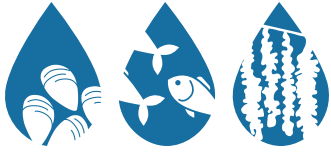
The project did help partners feel better prepared to discuss aquaculture tool creation and refinement, which is an impressive impact for a one-day intervention. Many felt their input was welcome—although this was lower for online respondents. However, most respondents of both offerings were not as confident that their input would be used. Fortunately, most were willing to participate in future discussion.

Recommendations: As recommended under Outcome 2, these results indicate that the mix of presentations and discussions should continue. However, as recommended under Outcome 7, the workshop and other conversations need to be revised to explain and demonstrate how different perspectives will be integrated within the workshop and beyond.

Outcomes 6 and 3: Interested partners feel they have a better awareness of different perspectives on aquaculture siting and development. Interested partners feel it is important to integrate different perspectives in refining or creating aquaculture siting/development tools.

The project is clearly bringing together many relevant community members as there is strong agreement that integrating different perspectives is important to refining/creating aquaculture tools. Many respondents provided important reasons for this integration, including understanding the impact of aquaculture actions, gaining support and buy-in for aquaculture, and ensuring aquaculture tools are useful and used. However, not everyone agreed that this integration was necessary. The workshops also had a moderate impact on increasing attendees' awareness of different perspectives, and, again, respondents provided many examples. These new perspectives centered on data, tool usefulness and use, siting and permitting, mistrust associated with aquaculture, lack of awareness of aquaculture efforts and tools, and the absence of important community members.

Recommendations: Recruitment efforts are clearly reaching and engaging those who value integration of different perspectives. It would be valuable to more deeply understand why some participants do not think this is an important priority. Additionally, California respondents provided a wealth of reasons to gather different perspectives and gave some insight into these different perspectives. This specific input should be used to inform the upcoming implementations in other regions and should be highlighted in the team's report on aquaculture siting.



Appendix A: In-Person Workshop Briefing Book



Sea Grant–NCCOS California Aquaculture Siting and Development Workshop

San Diego, California
November 2, 2023



This workshop was made possible by a grant to Maryland Sea Grant from the National Oceanic and Atmospheric Administration, Department of Commerce, through the National Sea Grant College Program (grant numbers NA21OAR4170327 and NA22OAR4170115). Additional support came from the state of Maryland through the University of Maryland Center for Environmental Science, as well as a generous donation of the meeting space by the Hubbs-SeaWorld Research Institute.

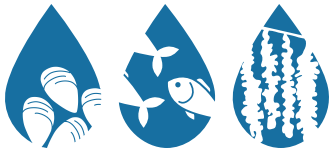
Design and layout: Jenna Clark, Maryland Sea Grant

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Table of Contents

Workshop Background and Purpose	2
Workshop Agenda	3
Workshop Logistics	5
Workshop Guidelines	8
Appendix: Additional Materials	9
Project Overview and Personnel	9
The Coastal Aquaculture Planning Portal: An Overview of Tools for Rules.....	11
California Ocean Observing Systems Overview	12
National AquaMapper	15
OceanReports	16



Workshop Background and Purpose

Welcome, and thank you for attending our Sea Grant–National Centers for Coastal Ocean Science (NCCOS) California 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 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 groups around the siting and development of ocean and coastal aquaculture; and 3) Inform broader Sea Grant–NCCOS marine planning efforts.

Purpose

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

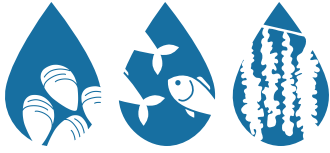
In this workshop, we plan to introduce the framework of “knowledge exchange,” a component of “co-creation,” when discussing aquaculture siting tools. Co-creation (also referred to as co-production, collaborative learning, participatory research, or collaborative modeling) can be defined as “iterative and collaborative processes involving diverse types of expertise, knowledge, and actors to produce context-specific knowledge” (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 aquaculture siting and development. 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 informing current and future aquaculture tools. We ask workshop participants to be open to fielding thought-provoking questions throughout the day. How might this tool be useful in your area? Could this tool be useful for a certain type of coastal-ocean user group? Does it prompt ideas of how you might expand who you work with? The questions intend to spur conversation so that we may listen and learn from each other.

Key outcomes for today’s workshop are for participants to identify ways to make future aquaculture siting tools more accessible and applicable for broad audiences, and to contribute to conversations regarding aquaculture siting and development. This work will inform our future workshops with participants in the Pacific Northwest, the Pacific Islands, and the New England regions. 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 forward in the US.

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

Workshop Goal and Objectives

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 groups to advance environmentally, economically, and socially equitable aquaculture siting and development.

Objectives

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

Agenda

9:00 a.m.	<p>Check-In</p> <p><i>Light refreshments served</i></p>
9:30 a.m.	<p>Welcome</p> <p>Fredrika Moser, <i>Maryland Sea Grant</i> Chuck Weirich, <i>National Sea Grant Office</i> Christopher Schillaci, <i>NCCOS</i></p>
9:35 a.m.	<p>Session 1: Introduction and Background</p> <p>Icebreaker Exercises <i>Fredrika Moser, Maryland Sea Grant</i></p> <p>Workshop Overview and Intent <i>Annie Schatz, Maryland Sea Grant</i></p> <p>Workshop and Project Evaluation <i>Cat Davis, University of Maryland Center for Environmental Science, Appalachian Laboratory</i></p> <p>Principles of Knowledge Exchange and Co-Creation <i>Erin Satterthwaite, California Sea Grant</i></p> <p>Aquaculture in California <i>Luke Gardner, California Sea Grant</i></p>
10:20 a.m.	<p>Session 2: Aquaculture Perspectives</p> <p>Overview and Background <i>Annie Schatz, Maryland Sea Grant</i></p> <p>Breakout Group Activity and Discussions <i>See 'Session 2' on page 5 for more information</i></p>
10:50 a.m.	<p>Break</p>
11:00 a.m.	<p>Session 3: Aquaculture Siting Information and Tools</p> <p>Sea Grant and NCCOS Collaboration <i>Chuck Weirich, National Sea Grant Office</i></p>

- 11:00 a.m. (cont.) NOAA NCCOS Overview and the Coastal Aquaculture Planning Portal (CAPP)
Christopher Schillaci, *NCCOS*
Southern California, and Central and Northern California, Coastal Ocean Observing System (SCCOOS and CeNCOOS) Ocean Data: Introduction and Opportunities
Henry Ruhl, *CeNCOOS*
- 11:30 a.m. **Session 4: Aquaculture Tool Discussion (Part 1)**
Overview and Background
Annie Schatz, *Maryland Sea Grant*
Breakout Group Activity and Discussions
See 'Session 4' on page 5 for more information
- 12:00 p.m. Lunch
- 12:45 p.m. **Session 5: AquaMapper and OceanReports Exercise**
Presentation and Demonstration
Christopher Schillaci, *NCCOS*
Breakout Group Activity and Discussions
See additional handout
- 2:15 p.m. Break
- 2:25 p.m. **Session 6: Aquaculture Siting and Planning Tool-Use Panel**
Moderator: Amalia Almada, *University of Southern California Sea Grant*
Panelists:
Eliza Harrison, *Ocean Rainforest*
Robert Smith, *K&L Gates, LLP*
Paula Sylvia, *Port of San Diego*
Diane Windham, *NOAA Fisheries*
See 'Session 6' on page 6 for more information
- 3:25 p.m. **Session 7: Aquaculture Tool Discussion (Part 2)**
Overview and Background
Annie Schatz, *Maryland Sea Grant*
Breakout Group Activity and Discussions
See 'Session 7' on page 6 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 Logistics

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 and notetaker to help guide, capture, and ensure equal contributions to the conversation.

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

Session 1: Introduction and Background

The introduction session begins with introductory exercises to engage participants, followed by a quick overview of the workshop's purpose and evaluation. Then, there will be an introductory talk about knowledge exchange and co-creation to ensure everyone is clear on the concepts introduced for workshop discussions. Lastly, there will be an overview of the current landscape of aquaculture in California to familiarize participants with the basics of California regional aquaculture and aid later workshop discussions. There will be time for short Q&A sessions following the *Principles of Knowledge Exchange and Co-Creation* and *Aquaculture in California* presentations.

Session 2: Aquaculture Perspectives

Considerable aquaculture expertise is convened at this workshop, and it is vital all participants recognize the value of everyone and listen to the diverse perspectives in the room.

Session 2 will include an activity and subsequent discussions within small groups. Participants will take part in an activity to explain their connection to aquaculture, and their expertise, knowledge, and unique perspectives regarding aquaculture in California. As introduction, each participant will be asked to give a 30-second elevator pitch of their expertise and experience. Then each participant will be asked to select an image they think best represents their response to a the following prompts and give a brief explanation (2-3 minutes) as to why that specific image was chosen.

- Select an image that you think best represents your connection to, knowledge of, and expertise regarding aquaculture in California. Please explain why you chose this image.
- Select an image that you think best exemplifies what the term co-creation means to you and explain why.

Session 3: Aquaculture Siting Information and Tools

In this session, the National Sea Grant Office program manager and the NCCOS collaborators will give introductions followed by an overview of some of the information and tools available for aquaculture siting from NCCOS and the regional Integrated Ocean Observing System program, with time for Q&A.

Session 4: Aquaculture Tool Discussion (Part 1)

Before exploring current aquaculture siting tools, participants will discuss what their ideal aquaculture siting tool would be and why.

- What would be your ideal aquaculture or marine spatial planning tool? What do you want from that tool?
 - Environmental data? Economic data? Cultural landscape? Regulations and permitting information?
 - Is it for initial aquaculture site identification (i.e., strategic) or to begin developing an aquaculture site (i.e., tactical)?

Session 5: AquaMapper and OceanReports Exercise

Participants will use the National AquaMapper and OceanReports tools created by NCCOS. After a presentation by NCCOS on the history and uses of AquaMapper and OceanReports, participants will get to test out the tools by completing a group exercise, followed by a discussion of these questions:

- Would you use these tools for initial aquaculture site identification (i.e., strategic) or to begin aquaculture site development (i.e., tactical)?
- How could 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, 1:1 discussions)?
- Would you be interested in being involved with future tool development? How would you want to be engaged with (e.g., data collection, co-creation of tool, beta testing, focus groups, etc.)?

Session 6: Aquaculture Siting and Planning Tool-Use Panel

During this session, a panel of industry, local and federal government, and legal members will discuss the successes and challenges of their experiences using various siting and planning tools. Some topics that panelists will address are how the tools were beneficial to their work, how tool outputs were used in the farm permitting process, and next steps following tool use. There will be time for audience questions at the end.

- Moderator: Amalia Almada, *University of Southern California Sea Grant*
- Panelists:
 - Eliza Harrison, *Ocean Rainforest*
 - Robert Smith, *K&L Gates, LLP*
 - Paula Sylvia, *Port of San Diego*
 - Diane Windham, *NOAA Fisheries*

Session 7: Aquaculture Tool Discussion (Part 2)

In this session, participants will think about aquaculture tools within the context of sustainable aquaculture development, keeping in mind what was learned from the previous sessions. They will deliberate on what an ideal tool might look like and how co-creation could aid in the creation of such a tool.

- After today's tool exploration and discussions, would you revise your ideal tool described earlier? Why or why not?
- How would you develop an ideal tool using a co-creation approach?
 - Is that approach different from the current methods for modifying an existing tool? Why or why not?
- Is there a stakeholder group that is not usually included in tool development that should be? Think back to *Session 2* and who you routinely work with. Who is missing?

Session 8: Evaluation

During this session, participants will complete a short evaluation developed by our external evaluator. This will help us to understand what you learned and to improve our workshop process.

Next Steps

In December, the workshop team will host a follow-up focus group session. This session is aimed at continuing the conversations from the workshop and building capacity and collaboration among coastal-ocean audiences for environmentally, economically, and socially equitable aquaculture development. If you are interested in participating in this focus group, please sign up here: bit.ly/Post_Workshop_Discussion.



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 listed on our website (mdsg.umd.edu/CaliforniaAquacultureWS).

Acknowledgements

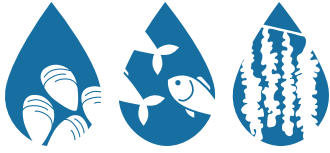
We would like to thank our speakers and the following groups for their contributions to the success of this workshop, as well as the Hubbs-SeaWorld Research Institute for their generous donation of the meeting space.

Steering Committee/Planning Team Members: Amalia Almada, Clarissa Anderson, Jenna Clark, Mike Conroy, Hannah Cooper, Cat Davis, Jenn Eckerle, Luke Gardner, Missy Good, Christine Griffin, Don Kent, Jenny Krusoe, Vivian Le, Michael Lee, Melody Miu, Fredrika Moser, Shauna Oh, Brian Pendelton, Margaret Pilaro, Terry Sawyer, Annie Schatz, Paula Sylvia, Herminia Villalpando, and Madelyn Wampler

NOAA Partners: Gretchen Bath, Alicia Bishop, Kevin Madley, James Morris, Megan Munkacsy, Mark Rath, Andrew Richard, Ken Riley, Chris Schillaci, Tori Spence, Chuck Weirich, and Diane Windham

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

Maryland Sea Grant Communications: Ashley Goetz, Madeleine Jepsen, and 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 Siting and Development

The National Centers for Coastal Ocean Sciences (NCCOS) have developed tools and resources for aquaculture siting and development 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 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

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 groups to advance environmentally, economically, and socially equitable aquaculture siting and development.

Approach

Six regional workshops have and will take place: the Mid-Atlantic (Mid 2022); Gulf of Mexico (Early 2023); Southern California (Late 2023); Pacific Northwest (Mid 2024); Pacific Islands (Late 2024); and New England (Early 2025). 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 siting tools that are accessible and applicable to broad audiences. In addition, the 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 knowledge exchange and co-creation in the context of aquaculture siting tools
- Build understanding among participants of the diverse perspectives, knowledge, and expertise present at the workshop
- Identify ways to improve and advance:
 - Utilization of co-creation in aquaculture siting tools
 - Existing and future aquaculture siting tools
 - Delivery of aquaculture siting tools to end users
 - Applicability of aquaculture siting tools for end users

Project PI

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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

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Maryland Sea Grant
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Maryland Sea Grant

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Cat Davis, Principal Agent, University of Maryland
Center for Environmental Science
Susan White, Director, North Carolina Sea Grant
Gayle Zydlewski, Director, Maine Sea Grant

Christopher Schillaci, NOAA NCCOS

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

Coastal Aquaculture Planning Portal (CAPP)

A Toolbox for Sustainable Aquaculture Coastal Planning and Siting


The Coastal Aquaculture Planning Portal (CAPP) 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.

Tool summary

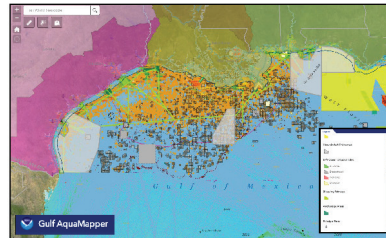
In an effort to obtain global food security, many countries, including the United States, are turning toward the expansion of marine aquaculture. This effort requires a need for support in the decision-making and planning process for future site suitability and development of aquaculture infrastructure. The Coastal Aquaculture Siting and Sustainability (CASS) program—under NOAA/ National Ocean Service (NOS)/ National Centers for Coastal Ocean Science (NCCOS)—has developed a marine aquaculture toolbox composed of coastal aquaculture planning tools.

Tools for the Future...


Managers



Marine Cage Culture and the Environment
Assessment of marine cage culture and environmental interactions
🔗 **Aquaculture application:** This state of science analysis provides information for environmental assessments and consultations for aquaculture permitting of net-pen and other types of marine cage aquaculture.
Contributing Partners: NOAA NOS NCCOS
[View](#)




Industry



Alabama Shellfish Aquaculture Siting Tool
This interactive map viewer allows users to view current shellfish harvests, restrictions along the Alabama coastline.
🔗 **Aquaculture application:** This map viewer can be used for aquaculture screening and risk communication for lease bed harvest closures.
Tutorial: [Download](#) under area selection
Contributing Partners: Alabama Marine Resource Division, Sea Grant
[View Product](#)

Planners



CanVis
NEW TOOLS FOR COASTAL MANAGERS
Visualize seascape from various types of coastal development using your photographs and the CanVis library.
🔗 **Aquaculture application:** Use the aquaculture library to create visions by adding to your seascape aquaculture.
Instructional video: <https://go.gl/1f1mUeP>
Webinar: <https://go.gl/1d0t0P>
Contributing Partners: NOAA OCM, NOAA NCCOS, USDA National Agroforestry Center
[View Product](#)

...Tools for Planning

The [Coastal Aquaculture Planning Portal \(CAPP\)](https://coastalscience.noaa.gov/research/marine-spatial-ecology/coastal-aquaculture-planning-portal-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. 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.

coastalscience.noaa.gov/research/marine-spatial-ecology/coastal-aquaculture-planning-portal-capp/

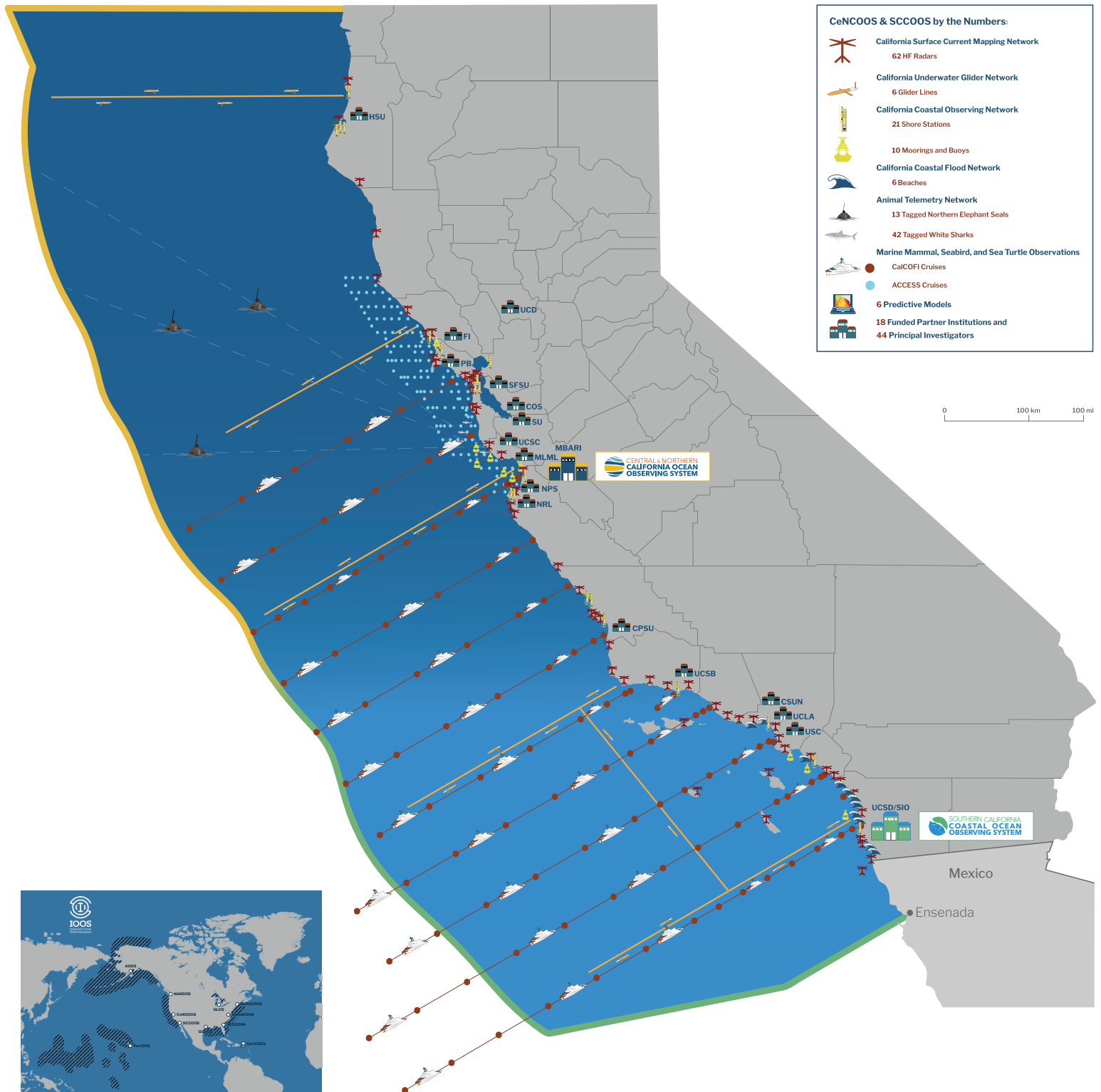
For more information

Christopher Schillaci
NOAA National Ocean Service
National Centers for Coastal Ocean Science
Christopher.Schillaci@noaa.gov

California Ocean Observing Systems

Science-based and Stakeholder-driven

Visit: data.caloos.org



Since 2004, SCCOOS and CeNCOOS have been providing California with sustained long-term, high-quality observations, reliable data, and supporting stakeholder-driven products and tools. We employ a variety of *in situ* and remote sensing technologies to measure physical, chemical, and biological parameters as well as support ocean prediction models in the California Current Ecosystem and stakeholder driven products and tools.

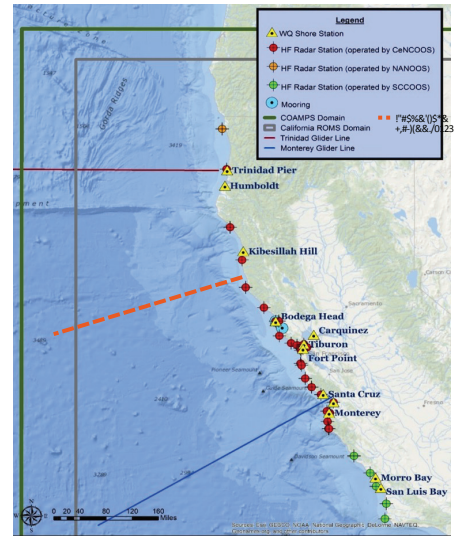


CENTRAL & NORTHERN CALIFORNIA OCEAN OBSERVING SYSTEM

Data, information and expertise to promote ocean health and grow the Blue Economy.

CeNCOOS Strategies 2020 - 2025

- ❑ **Strategy 1.** Observe coastal and ocean physical, biogeochemical, biological and ecosystem variables. [Observations]
- ❑ **Strategy 2.** Streamline access to information including through a publicly accessible Portal. [DMAC]
- ❑ **Strategy 3.** Provide access to improved ocean models and other tools to provide information relevant for policy and management decision-making. [Models & Analysis]
- ❑ **Strategy 4.** Engage marine stakeholders to create integrated and valuable information products to inform decision-making and policy. [Products & Outreach]



Marine Operations, Transportation, and Event Response

CeNCOOS' array of physical ocean observations, data delivery services, models and curated data products informs statewide search and rescue missions, oil spill and water pollution tracking, natural resource management, port and harbor operations, recreational boating activities, and more. CeNCOOS operates a network of 26 High Frequency Radars providing economical and accurate sensors to map ocean surface currents to assess large-scale physical and biological change in the coastal ocean.



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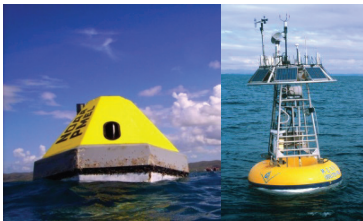


CENTRAL & NORTHERN CALIFORNIA OCEAN OBSERVING SYSTEM

Climate Change & Variability

CeNCOOS Technologies Improve Preparedness

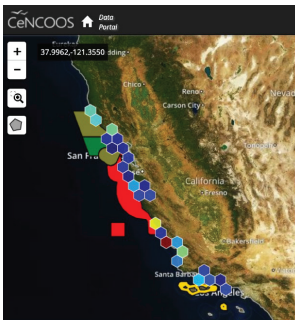
Emerging technologies collect real-time measurements in the ocean that are needed for weather and climate prediction. CeNCOOS gliders are underwater robots that relay information about deep ocean temperatures to the public. Buoys and mooring measure temperature and other essential oceanographic information at fixed depths and over long timescales. Emerging technologies are revolutionizing ocean observing by being



Data from gliders, buoys, and ships can be assimilated into forecasts for California farmers and families. Output from model forecasts improve preparedness for all of Central and Northern California. CeNCOOS provides easy access to high quality, reliable ocean information through the CeNCOOS Data Portal (data.cencoos.org).

Harmful Algal Blooms, Acidification & Hypoxia

CeNCOOS partners with academic researchers and industry members to deliver site-specific, real-time, actionable information (data, indicators, and forecasts) to sustain and aid industry operations and expansion by providing timely and accessible information.

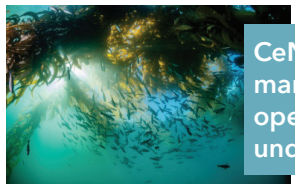


Increasing Safety and Security of Food Supply

Fisheries and aquaculture industries face several challenges from episodic events such as Harmful Algal Blooms (HABs) to longer term change from ocean warming, acidification (OA) and hypoxia. California is especially susceptible to OA through the a combination of the accumulation of carbon dioxide from the atmosphere and the upwelling of naturally lower pH waters from the deep ocean. CeNCOOS works closely with aquaculture and fishing communities to provide information to support operations.

Integrating Biological & Ecosystem Observations Ocean Health Indicators for California Managers

Marine resource managers are increasingly reliant on fit-for-purpose updates on changing ecological conditions that incorporate near real-time data. Automated ecosystem indicator products can target specific or multiple management requirements by providing timely information on living resources in the CCLME.



CeNCOOS is building consensus and regional strengthening coordination among marine researchers and observing practitioners to develop and implement an operational biological ecosystem monitoring program to promote improved understanding and management of our most valuable marine ecosystems.

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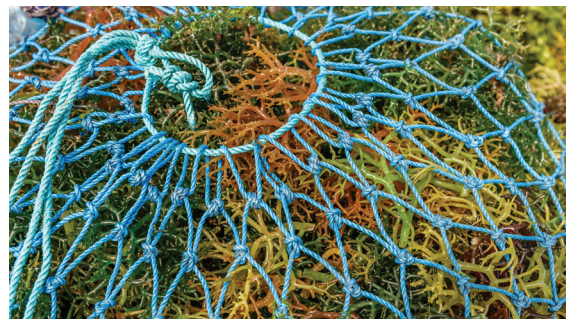
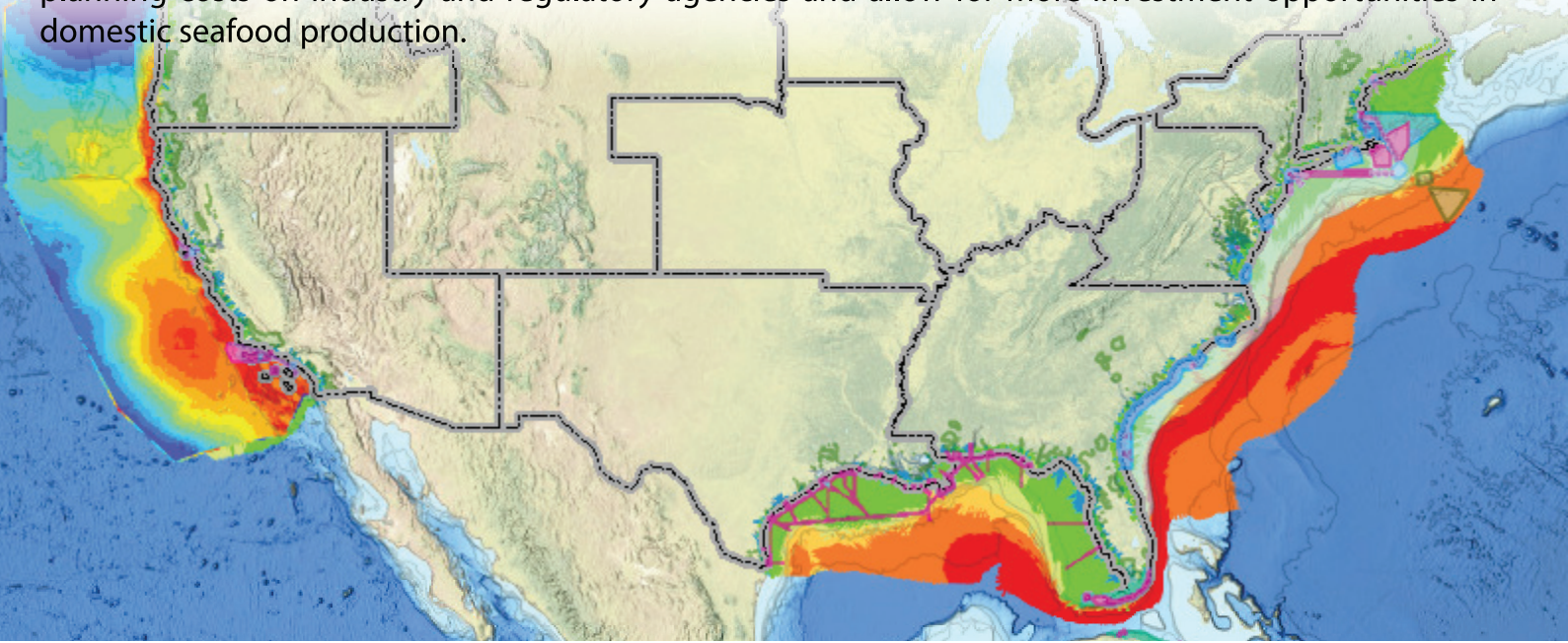
Alex Harper, Program Manager
aharper@mbari.org
(831) 775-1987



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.



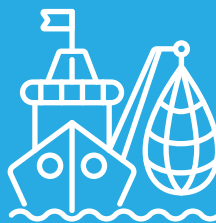
Minimize user conflicts with:



Military



Navigation



Industry



Oceanographic



Natural &
Cultural
Resources



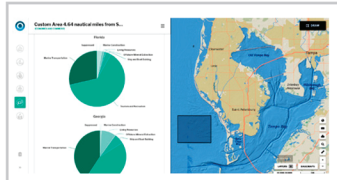
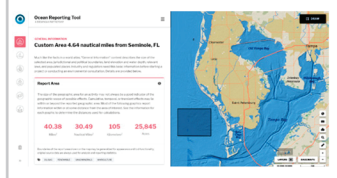
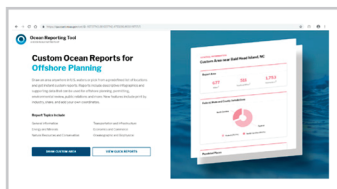
NOAA National Ocean Service
National Centers for Coastal Ocean Science
For questions contact Christopher.Schillaci@noaa.gov
<http://coastalscience.noaa.gov>



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

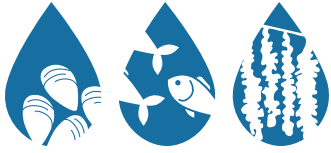


SCAN ME

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 Christine.Taylor@boem.gov

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



Appendix B: Virtual Workshop Briefing Book



Sea Grant–NCCOS California Aquaculture Siting and Development Workshop

Virtual
January 22, 2024



This workshop was made possible by a grant to Maryland Sea Grant from the National Oceanic and Atmospheric Administration, Department of Commerce, through the National Sea Grant College Program (grant numbers NA21OAR4170327 and NA22OAR4170115). Additional support came from the state of Maryland through the University of Maryland Center for Environmental Science, as well as a generous donation of the meeting space for in the in-person meeting by the Hubbs-SeaWorld Research Institute.

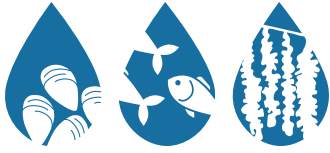
Design and layout: Jenna Clark, Maryland Sea Grant

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Table of Contents

Workshop Background and Purpose	2
Workshop Agenda	3
Workshop Logistics	5
Workshop Guidelines	8
Appendix: Additional Materials	9
Project Overview and Personnel	9
The Coastal Aquaculture Planning Portal: An Overview of Tools for Rules.....	11
California Ocean Observing Systems Overview	12
National AquaMapper	15
OceanReports	16



Workshop Background and Purpose

Welcome, and thank you for attending the virtual Sea Grant–National Centers for Coastal Ocean Science (NCCOS) California 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 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 groups around the siting and development of ocean and coastal aquaculture; and 3) Inform broader Sea Grant–NCCOS marine spatial planning efforts.

Purpose

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

Though we will not have time in this shortened, virtual workshop, we hope that you will watch the pre-recorded presentation from the complimentary, in-person workshop on the framework of “knowledge exchange,” a component of “co-creation,” to aid in our discussions of 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” (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 aquaculture siting and development. 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 discussions and apply the tenets of knowledge exchange and co-creation toward informing current and future aquaculture tools. We ask workshop participants to be open to fielding thought-provoking questions throughout the day. How might this tool be useful in your area? Could this tool be useful for a certain type of coastal-ocean user group? Does it prompt ideas of how you might expand who you work with? The questions intend to spur conversation so that we may listen and learn from each other.

Key outcomes for today’s workshop are for participants to identify ways to make future aquaculture siting tools more accessible and applicable for broad audiences, and to contribute to conversations regarding aquaculture siting and development. This work will inform our future workshops with participants in the Alaskan, the Pacific Islands, and the New England regions. 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 forward in the US.

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

Workshop Goal and Objectives

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 groups to advance environmentally, economically, and socially equitable aquaculture siting and development.

Objectives

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

Recommended Pre-recorded Workshop Presentations

<https://bit.ly/RecordedPresentations>

See 'Recommended Pre-recorded Workshop Presentations' on page 5 for more information

Aquaculture in California

Luke Gardner and Kevin Johnson, *California Sea Grant*

Principles of Knowledge Exchange and Co-Creation

Erin Satterthwaite, *California Sea Grant*

Sea Grant-NCCOS Aquaculture Siting and Development Project Overview

Annie Schatz, *Maryland Sea Grant*

Southern California, and Central and Northern California, Coastal Ocean Observing System (SCCOOS and CeNCOOS) Ocean Data: Introduction and Opportunities

Henry Ruhl, *CeNCOOS*

Sea Grant and NCCOS Collaboration

Chuck Weirich, *National Sea Grant Office*

NOAA NCCOS Overview and the Coastal Aquaculture Planning Portal (CAPP)

Christopher Schillaci, *NCCOS*

Aquaculture Siting and Planning Tool-Use Panel

Moderator: Amalia Almada, *University of Southern California Sea Grant*

Panelists:

Eliza Harrison, *Ocean Rainforest*

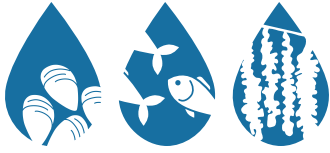
Robert Smith, *K&L Gates, LLP*

Paula Sylvia, *Port of San Diego*

Diane Windham, *NOAA Fisheries*

Agenda

- 9:25 a.m. Zoom Room Open
Zoom link: <http://bit.ly/VirtualCaliWorkshop>
Zoom Meeting ID: 895 690 7621
Passcode: MDSG
- 9:30 a.m. **Session 1: Introduction and Background**
Welcome and Icebreaker Exercises
Fredrika Moser, *Maryland Sea Grant*
Workshop Overview and Intent
Annie Schatz, *Maryland Sea Grant*
- 9:45 a.m. **Session 2: Aquaculture Perspectives and Ideal Tool Activity**
Overview and Background
Annie Schatz, *Maryland Sea Grant*
Breakout Group Activity
and Discussion
See 'Session 2' on page 6 for more information
- 10:25 a.m. Break
- 10:35 a.m. **Session 3: AquaMapper and OceanReports Exercise**
Presentation and Demonstration
Christopher Schillaci, *NCCOS*
Breakout Group Activity and Discussions
See 'Session 3' on page 6 for more information
- 11:30 a.m. **Session 4: Aquaculture Tool Discussion**
Overview and Background
Annie Schatz, *Maryland Sea Grant*
Breakout Group Discussion
See 'Session 4' on page 6 for more information
- 12:20 p.m. **Workshop Evaluation and Conclusion**
Post-Workshop Evaluation
Annie Schatz, *Maryland Sea Grant*
- 12:30 p.m. Workshop Concludes



Workshop Logistics

The virtual workshop will be divided into four sessions with several opportunities for discussion and tool exploration. Each breakout group will have access to Google Jamboard to capture brainstorming discussions. Additionally, each group will have a facilitator and note taker to help guide, capture, and ensure equal contributions to the conversation.

If participants have additional questions or comments for any of the workshop presenters, please feel free to reach out to the workshop organizing committee, and we can help connect you with the appropriate panelist.

Pre-recorded Workshop Presentations

Aquaculture in California

Luke Gardner and Kevin Johnson, *California Sea Grant*

This presentation provides workshop participants with a broad overview of the current landscape of aquaculture in California as it compares to aquaculture production nationally and globally from economic, employment, and environmental viewpoints.

Principles of Knowledge Exchange and Co-Creation

Erin Satterthwaite, *California Sea Grant*

Participants are introduced to the framework and process of co-creation through this presentation, while focusing more specifically on knowledge exchange, which is a component of the co-creation process inherent to this workshop. Co-creation is a process using two-way communication and information transfer to build community among diverse interest groups to address complex social and environmental challenges, like aquaculture siting and development.

Sea Grant-NCCOS Aquaculture Siting and Development Project Overview

Annie Schatz, *Maryland Sea Grant Office*

In this presentation, participants will learn more in-depth about the goals, objectives, and outcomes of both this workshop and the greater Sea Grant-NCCOS project.

Southern California, and Central and Northern California, Coastal Ocean Observing System (SCCOOS and CeNCOOS) Ocean Data: Introduction and Opportunities

Henry Ruhl, *CeNCOOS*

Participants are given an overview of the Southern California, and Central and Northern California, Coastal Ocean Observing Systems along with a summary of the data they collect and their resources and products that may be useful to the aquaculture community.

Sea Grant and NCCOS Collaboration

Chuck Weirich, *National Sea Grant Office*

This presentation is an overview of the Sea Grant network, original intent of the Sea Grant-NCCOS project, and overarching project goals.

NOAA NCCOS Overview and the Coastal Aquaculture Planning Portal (CAPP)

Christopher Schillaci, *NCCOS*

In this presentation, participants learn about the National Centers for Coastal Ocean Science within the National Oceanic and Atmospheric Administration, their spatial suitability modeling process as part of the Aquaculture Opportunity Area (AOA) assessments, and what resources and tools they provide to the aquaculture community through the Coastal Aquaculture Planning Portal.

Aquaculture Siting and Planning Tool Use Panel

During this session, a panel of industry, local and federal government, and legal members discuss the successes and challenges of their experiences using various siting and planning tools. Some of the topics that panelists address are how the tools were beneficial to their work, how tool outputs were used in the farm permitting process, and next steps following tool use.

Moderator: Amalia Almada, *University of Southern California Sea Grant*

Panelists:

- Eliza Harrison, *Ocean Rainforest*
- Susan Ashcraft, *California Fish and Game Commission*
- Paula Sylvia, *Port of San Diego*
- Robert Smith, *K&L Gates, LLP*

Session 1: Introduction and Background

The first session begins with introductory exercises to start engaging participants, followed by a quick overview of the workshop's purpose and its evaluation. The [recorded presentations](#), to be viewed prior to today's workshop, on knowledge exchange and co-creation as well as an overview of the current landscape of aquaculture in California are aimed to familiarize participants with the basics of California regional aquaculture and the concept of co-creation to aid participants in workshop discussions later.

Session 2: Aquaculture Perspectives and Ideal Tool Activity

Considerable aquaculture expertise is convened at this workshop, and it is vital all participants recognize the value of everyone and listen to the diverse perspectives in the room.

During session 2, an activity and subsequent discussion will happen within breakout groups to gain a better understanding of each other's unique perspectives and expertise. Participants will first go around and introduce themselves by sharing their names and affiliations. Participants will then be asked to select an image that they think best represents their response to the following question and give a brief explanation (2- 3 minutes) as to why that specific image was chosen. Lastly, participants will discuss what their ideal aquaculture siting tool would be and why through an online questionnaire before exploring two current aquaculture siting tools.

Breakout Group Activity

- Select an image(s) that you think best represents your connection to, knowledge of, and expertise regarding aquaculture in California. Please explain why you chose the image that you did.

Virtual Questionnaire

- What would be your ideal aquaculture or marine spatial planning tool? What do you want from that tool?
 - Environmental data? Economic data? Cultural landscape? Regulations and Permitting information?
 - Is it for initial aquaculture site identification (i.e., strategic) or to begin developing an aquaculture site (i.e., tactical)?

Session 3: AquaMapper and OceanReports Exercise

Participants will explore the National AquaMapper and OceanReports tools created by NCCOS. After a presentation by NCCOS giving an overview of the organization, their resources, and history of AquaMapper and OceanReports, participants will be given a demonstration of each tool.

Session 4: Aquaculture Tool Discussion

In this session, participants will think about aquaculture tools within the context of sustainable aquaculture development. Keeping in mind what was learned from the previous sessions, participants will deliberate on the relevancy of the tools within aquaculture siting, how the tools align with their ideal tool from Session 2, and potential avenues for

future tool development and outreach.

Zoom Poll Questions

- Would you use these tools for initial aquaculture site identification or to begin aquaculture site development?
- 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, 1:1 discussions)?

Breakout Group Discussions

- How could you improve or modify these tools?
 - After the various tool exploration and discussions today, would you revise your ideal tool described earlier today? Why or why not?
- Would you be interested in being involved with future tool development? How would you best want to be engaged with (e.g., data collection, co-creation of tool, beta testing, focus groups, etc.)?
- Is there a stakeholder group that is not usually included in tool development that should be (e.g., think back to Session 2 and who you stated routinely working with, who is missing?)

Workshop Evaluation and Conclusion

Participants will use this time to 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.

Next Steps

In next couple of weeks, the workshop team will host a follow-up focus group session. This session is aimed at continuing the conversations from the workshop and building capacity and collaboration among coastal-ocean audiences for environmentally, economically, and socially equitable aquaculture development. If you are interested in participating in this focus group, please sign up here: bit.ly/Post_Workshop_Discussion.



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 listed on our website (mdsg.umd.edu/CaliforniaAquacultureWS).

Acknowledgements

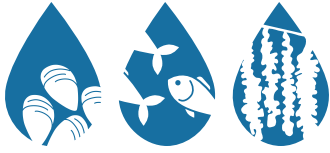
We would like to thank our speakers and the following groups for their contributions to the success of this workshop, as well as the Hubbs-SeaWorld Research Institute for their generous donation of the meeting space for the in-person workshop.

Steering Committee/Planning Team Members: Amalia Almada, Clarissa Anderson, Jenna Clark, Mike Conroy, Hannah Cooper, Cat Davis, Jenn Eckerle, Luke Gardner, Missy Good, Christine Griffin, Don Kent, Jenny Krusoe, Vivian Le, Michael Lee, Melody Miu, Fredrika Moser, Shauna Oh, Brian Pendelton, Margaret Pilaro, Terry Sawyer, Annie Schatz, Paula Sylvia, Herminia Villalpando, and Madelyn Wampler

NOAA Partners: Gretchen Bath, Alicia Bishop, Kevin Madley, James Morris, Megan Munkacsy, Mark Rath, Andrew Richard, Ken Riley, Chris Schillaci, Tori Spence, Chuck Weirich, and Diane Windham

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

Maryland Sea Grant Communications: Ashley Goetz, Madeleine Jepsen, and 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 Siting and Development

The National Centers for Coastal Ocean Sciences (NCCOS) have developed tools and resources for aquaculture siting and development 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 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

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 groups to advance environmentally, economically, and socially equitable aquaculture siting and development.

Approach

Six regional workshops have and will take place: the Mid-Atlantic (Mid 2022); Gulf of Mexico (Early 2023); Southern California (Late 2023); Pacific Northwest (Mid 2024); Pacific Islands (Late 2024); and New England (Early 2025). 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 siting tools that are accessible and applicable to broad audiences. In addition, the 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 knowledge exchange and co-creation in the context of aquaculture siting tools
- Build understanding among participants of the diverse perspectives, knowledge, and expertise present at the workshop
- Identify ways to improve and advance:
 - Utilization of co-creation in aquaculture siting tools
 - Existing and future aquaculture siting tools
 - Delivery of aquaculture siting tools to end users
 - Applicability of aquaculture siting tools for end users

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Christopher Schillaci, NOAA NCCOS

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

Coastal Aquaculture Planning Portal (CAPP)

A Toolbox for Sustainable Aquaculture Coastal Planning and Siting


The Coastal Aquaculture Planning Portal (CAPP) 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.

Tool summary

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 (CASS) program—under NOAA/ National Ocean Service (NOS)/ National Centers for Coastal Ocean Science (NCCOS)—has developed a marine aquaculture toolbox composed of coastal aquaculture planning tools.

Tools for the Future...

Managers



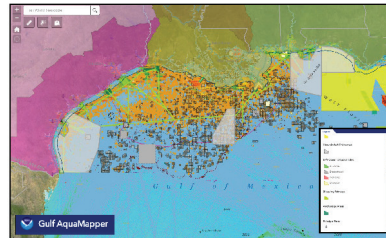
Marine Cage Culture and the Environment

Assessment of marine cage culture and environmental interactions


Aquaculture application: This state of science analysis provides information for environmental assessments and consultations for aquaculture permitting of net-pen and other types of marine cage aquaculture.

Contributing Partners: NOAA NOS NCCOS

[View](#)



Industry



Alabama Shellfish Aquaculture Siting Tool

This interactive map viewer allows users to view current shellfish harvests, restrictions along the Alabama coastline.


Aquaculture application: This map viewer can be used for aquaculture screening and risk communication for lease bed harvest closures.

Tutorial: [Download](#) under area selection

Contributing Partners: Alabama Marine Resource Division, Sea Grant

[View Product](#)

Planners



CanVis

Visualize seascape from various types of coastal development using your photographs and the CanVis library.

Aquaculture application: Use the aquaculture library to create visions by adding to your seascape aquaculture.

Instructional video: <https://go.gl/1FrmUeP>

Webinar: <https://go.gl/1Jd0t0P>

Contributing Partners: NOAA OCM, NOAA NCCOS, USDA National Agroforestry Center

[View Product](#)

...Tools for Planning

The [Coastal Aquaculture Planning Portal \(CAPP\)](https://coastalscience.noaa.gov/research/marine-spatial-ecology/coastal-aquaculture-planning-portal-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. 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.

coastalscience.noaa.gov/research/marine-spatial-ecology/coastal-aquaculture-planning-portal-capp/

For more information

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NOAA National Ocean Service
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California Ocean Observing Systems

Science-based and Stakeholder-driven

Visit: data.caloos.org



Since 2004, SCCOOS and CeNCOOS have been providing California with sustained long-term, high-quality observations, reliable data, and supporting stakeholder-driven products and tools. We employ a variety of *in situ* and remote sensing technologies to measure physical, chemical, and biological parameters as well as support ocean prediction models in the California Current Ecosystem and stakeholder driven products and tools.

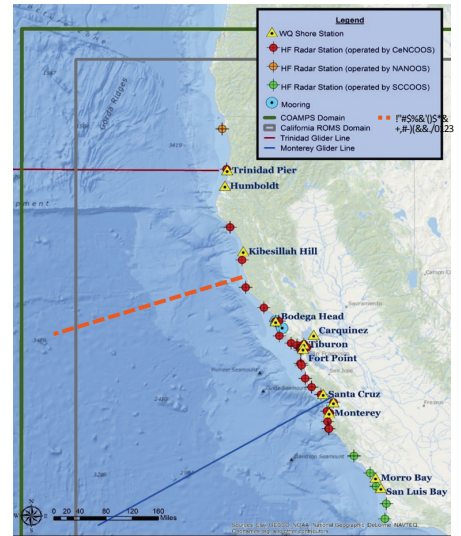


CENTRAL & NORTHERN CALIFORNIA OCEAN OBSERVING SYSTEM

Data, information and expertise to promote ocean health and grow the Blue Economy.

CeNCOOS Strategies 2020 - 2025

- ❑ **Strategy 1.** Observe coastal and ocean physical, biogeochemical, biological and ecosystem variables. [Observations]
- ❑ **Strategy 2.** Streamline access to information including through a publicly accessible Portal. [DMAC]
- ❑ **Strategy 3.** Provide access to improved ocean models and other tools to provide information relevant for policy and management decision-making. [Models & Analysis]
- ❑ **Strategy 4.** Engage marine stakeholders to create integrated and valuable information products to inform decision-making and policy. [Products & Outreach]



Marine Operations, Transportation, and Event Response

CeNCOOS' array of physical ocean observations, data delivery services, models and curated data products informs statewide search and rescue missions, oil spill and water pollution tracking, natural resource management, port and harbor operations, recreational boating activities, and more. CeNCOOS operates a network of 26 High Frequency Radars providing economical and accurate sensors to map ocean surface currents to assess large-scale physical and biological change in the coastal ocean.



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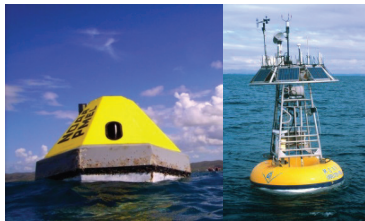


CENTRAL & NORTHERN CALIFORNIA OCEAN OBSERVING SYSTEM

Climate Change & Variability

CeNCOOS Technologies Improve Preparedness

Emerging technologies collect real-time measurements in the ocean that are needed for weather and climate prediction. CeNCOOS gliders are underwater robots that relay information about deep ocean temperatures to the public. Buoys and mooring measure temperature and other essential oceanographic information at fixed depths and over long timescales. Emerging technologies are revolutionizing ocean observing by being



Data from gliders, buoys, and ships can be assimilated into forecasts for California farmers and families. Output from model forecasts improve preparedness for all of Central and Northern California. CeNCOOS provides easy access to high quality, reliable ocean information through the CeNCOOS Data Portal (data.cencoos.org).

Harmful Algal Blooms, Acidification & Hypoxia

CeNCOOS partners with academic researchers and industry members to deliver site-specific, real-time, actionable information (data, indicators, and forecasts) to sustain and aid industry operations and expansion by providing timely and accessible information.

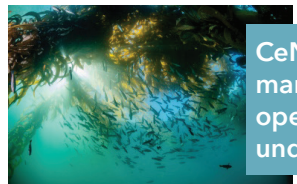


Increasing Safety and Security of Food Supply

Fisheries and aquaculture industries face several challenges from episodic events such as Harmful Algal Blooms (HABs) to longer term change from ocean warming, acidification (OA) and hypoxia. California is especially susceptible to OA through the a combination of the accumulation of carbon dioxide from the atmosphere and the upwelling of naturally lower pH waters from the deep ocean. CeNCOOS works closely with aquaculture and fishing communities to provide information to support operations.

Integrating Biological & Ecosystem Observations Ocean Health Indicators for California Managers

Marine resource managers are increasingly reliant on fit-for-purpose updates on changing ecological conditions that incorporate near real-time data. Automated ecosystem indicator products can target specific or multiple management requirements by providing timely information on living resources in the CCLME.



CeNCOOS is building consensus and regional strengthening coordination among marine researchers and observing practitioners to develop and implement an operational biological ecosystem monitoring program to promote improved understanding and management of our most valuable marine ecosystems.

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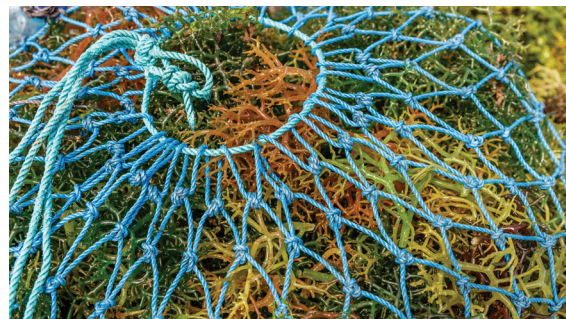
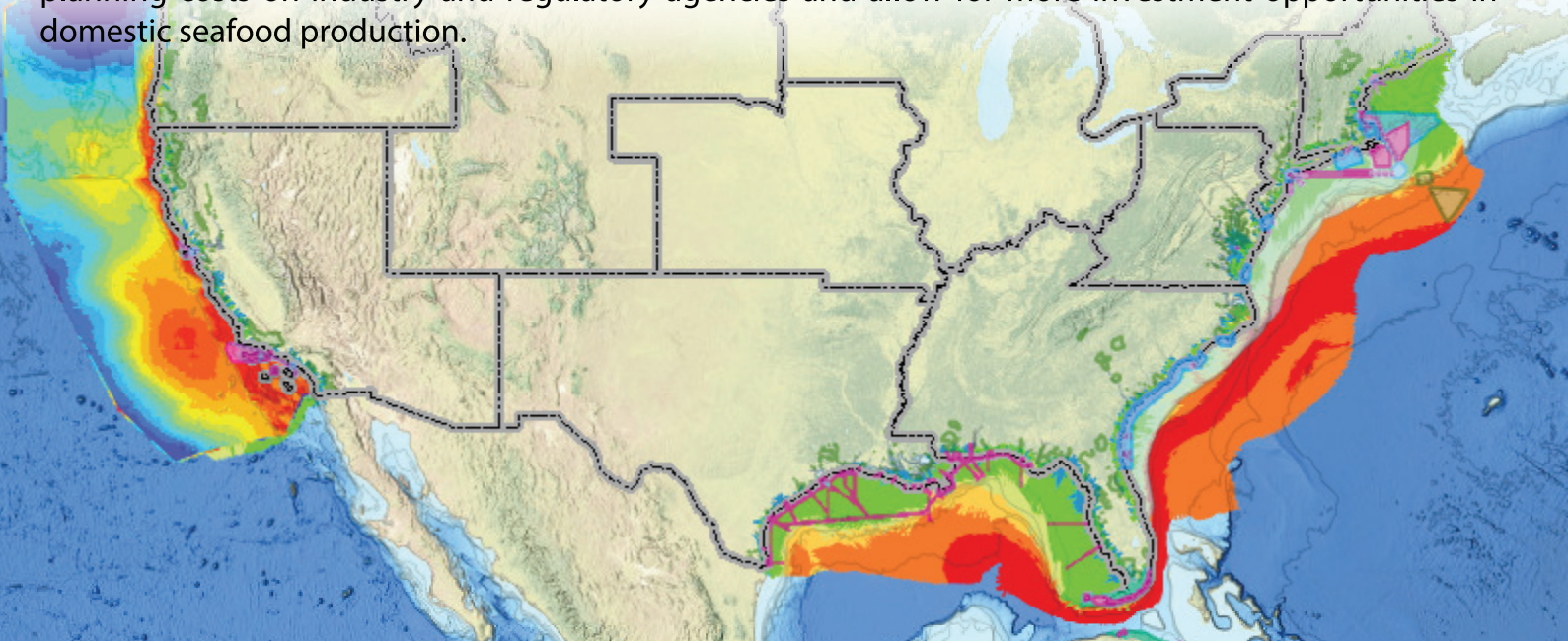
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National AquaMapper

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.



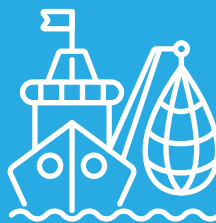
Minimize user conflicts with:



Military



Navigation



Industry



Oceanographic



Natural & Cultural Resources



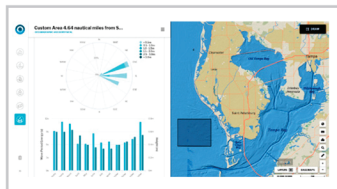
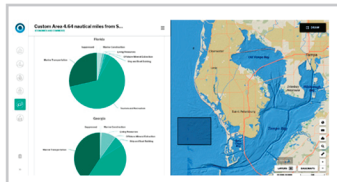
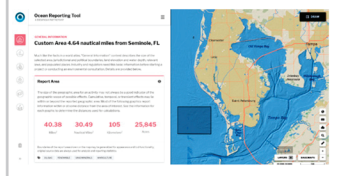
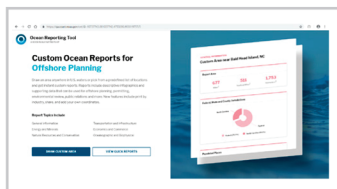
NOAA National Ocean Service
National Centers for Coastal Ocean Science
For questions contact Christopher.Schillaci@noaa.gov
<http://coastalscience.noaa.gov>



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



SCAN ME

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 Christine.Taylor@boem.gov

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



Appendix C: Participant Responses Table

Table 3. *Unique participant responses from the NCCOS tool discussion.*

Summarized, unique participant responses to breakout discussion questions pertaining to ideal tool features, development, and assistance from the California Aquaculture Siting and Development Workshop.	
Impressions of the Tools	<p>Tool navigation and functionality</p> <ul style="list-style-type: none"> • AquaMapper seemed hard to navigate without previous ArcGIS/ GIS experience • It is clunky • The resolution of the tool is rough, especially nearshore, it needs to be more detailed • The tool isn't missing data, but the quality of the data can improve greatly <p>Relevance to potential tool users</p> <ul style="list-style-type: none"> • Probably a lot of audiences that the tool could be used for • Helps to narrow the zone of analysis [for siting] and is more of a first cut • This is a learning tool mostly • Benefit to those new to farming to help them understand what looks like a blank canvas really is not • The NOAA Aquaculture Atlases are a good start at a planning and siting tool. They are very helpful for facilitating a dialog among different interests that may be affected by the introduction of aquaculture. • Companies interested in offshore aquaculture usually hire someone to work through the siting process, and because your average person cannot get involved with aquaculture development, there is not really a need to understand how these tools work • Difficult for smaller-scale operations to get started in California, so tool is not as relevant • There aren't enough data layers to help accurately explain what is happening in the selected area • The tool is better for eliminating conditions, but it doesn't get to all NEPA requirements <p>Working with NCCOS on siting is economical compared to working with a consultant How does the tool balance what the data conveys with different participating communities' needs and privacy?</p>

Summarized, unique participant responses to breakout discussion **questions pertaining to ideal tool features, development, and assistance** from the California Aquaculture Siting and Development Workshop.

Opportunities for Tool Improvements

Buy-in from state agencies to ensure data are acceptable for issuing permits

- Most critical for buy-in for the tool’s outputs will be understanding the inputs, assumptions and weighting decision incorporated into the model (i.e., BOEM).
- How can the tool be supplemented by more nuanced guidance to help applicants navigate complex social license challenges (e.g., tribal engagement, stakeholder concerns)?
- How can the tool facilitate and strengthen partnerships between industry and regulators?

Transparency

- Clearly identify tool purpose, context with which to use it, and limitations (e.g., use in nearshore vs. offshore planning)
- Improve data governance with easily accessed metadata containing information like where data were collected from and how often they are updated
- Provide the necessary information even when the map layers show “no” for a location
- Conduct participatory mapping for sensitive data types (i.e., commercial fishing grounds)

Engaging data providers in developing a relationship/trust building to have more accurate data. Any tool like this is only as good as data that is accessible.

Accessibility

- Make tool more user friendly for non-tech savvy users (e.g., intuitive user interface) as well as dynamic and interactive
- Make tool function in limited internet access areas
- Request feedback on products made available to stakeholders (i.e., is each map: 1. accurate, 2. representative, and 3. relevant?)
- Link a feedback/question form directly in the tool
- Develop a mobile app version

New functionalities

- Incorporate push notification to farmers to advise when there could be changes that could influence farms
- Incorporate AI
- Pick out spaces and download that data that you need, like with other NOAA tools
- Access to data repository for researchers
- Recommend methods to overcome agency conflicts (e.g., military)
- Displays what areas won’t work due to water quality not meeting FDA (or similar) standards

Summarized, unique participant responses to breakout discussion **questions pertaining to ideal tool features, development, and assistance** from the California Aquaculture Siting and Development Workshop.

<p>Opportunities for Tool Improvements (cont.)</p>	<p>New functionalities (cont.)</p> <ul style="list-style-type: none"> • Combine National Aquamapper with updated state and local laws, regulations, rules, and contact information <ul style="list-style-type: none"> ○ Link to online resources like Permitting Guide to Aquaculture in CA • Include important best management/ mitigation practices for industry • Output a template for protected species interactions for Environmental Impact Statements / Environmental Assessment work • Add a temporal component (e.g., used seasonally, year-round, etc.) of how spaces are being utilized
<p>Suggested Data to Include</p>	<p>An overview of what data populated the various NCCOS tools</p> <p>A lot of overlap between ocean monitoring data, can entities stretch what they are collecting without compromising integrity or mission?</p> <p>More granularity of the data, especially in state waters</p> <p>Potentially integrate with SCCOOS/ CeNCOOS, MarineBIOS, ROMS-NEMUCSC, NOAA Marine Heatwave Tracker, and FARM models</p> <p>More ecosystem moorings for baseline and monitoring data are needed for siting farms along the shelf</p> <p>Data types</p> <ul style="list-style-type: none"> • Legal - legal frameworks might help for understanding what challenges might exist, including jurisdictional boundaries • Economic • Oceanographic (e.g., bathymetry, wave energy, currents, etc. to help with mooring systems) • Essential fish habitat analyses <ul style="list-style-type: none"> ○ Green sea turtle • Environmental - generally necessary, especially to speak to environmental non-governmental organizations concerns (e.g., fish waste removal from farms) <ul style="list-style-type: none"> ○ Wastewater outfall locations • Commercial and recreational fisheries - include current and past species/ locations <ul style="list-style-type: none"> ○ Inclusion of smaller vessel traffic not required to have automatic identification systems • Existing land-based industry support (e.g., hatcheries, feed production, processing, distribution, etc.) versus what needs to be developed to help farmers access investment opportunities • Gear breakage sensor data • Social science – include cultural areas of significance from tribal and indigenous communities and other communities • Include indigenous and traditional ecological knowledge • Climate change impacts • Pending area restrictions (e.g., marine protected area expansions, sanctuaries, wind energy, etc.)

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Suggested Data to Include (Cont.)	<p>Data types (cont.)</p> <ul style="list-style-type: none"> • Air quality limits – can impact vessel size • Current aquaculture farm locations • Proximity to current monitoring sites/moorings • Protected resources data layer – migration corridors, sensitive habitats, breeding areas, etc.
Suggestions for Tool Assistance	<p>Education about what the tool is, who is it for, information within the tool</p> <p>The messaging of the tool’s purpose is very important</p> <p>Tool delivery and outreach</p> <ul style="list-style-type: none"> • NOAA’s Friday harvest newsletter • Trusted messengers (e.g., Sea Grant Extension) • California Department of Fish and Wildlife • Linked on NOAA’s aquaculture permitting pages for region and states • Tribal marine stewards network <p>Tool assistance methods</p> <ul style="list-style-type: none"> • Email/ call tool developers • Workshops/focus groups/in-person trainings with tool developers • One-on-one trainings with experts/tool developers • User manual/ video tutorials/ pop-up tutorial within the tool • FAQ guide that includes the ability for users to ask technical questions. Would involve someone to maintain the FAQ as needed. • A more accessible ‘help’ box/menu pop-up in the tool
Co-Production in Tool Development	<p>We could benefit from co-creation of tools</p> <p>Ground-up co-creation of future tools would be preferred</p> <p>If the entire tool can’t be co-created, then maybe individual layers can be</p> <p>Involvement of co-creation depended on organization person was from with some wanting to share data, participating in a focus group, beta testing the tool, providing feedback overtime on the tool, etc.</p> <p>Dynamic and iterative tool designed to adapt over time, with a dedicated group to maintain and recommend updates as needed. Advisory committee?</p> <p>Freedom to share data without regulatory implications. Some people are concerned that their data may result in increased regulations</p> <p>A tool that is developed and adapted over time by a multi-stakeholder group so that it retains its relevance and applicability over time</p>