

# OFFSHORE AQUACULTURE in the Southern California Bight

Workshop 2 | July 27-28, 2016



*Aquarium  
of the Pacific*



# **Offshore Aquaculture in the Southern California Bight**

This summarizes the discussions, issues or concerns, and science and tools available to inform offshore aquaculture permitting addressed at a workshop held on July 27-28, 2016, in Long Beach, California. Participants and observers are listed in Appendix A. Participation was by invitation only. The meeting agenda and materials from the first workshop can be found at: [www.aquariumofpacific.org/mcri/info/offshore\\_aquaculture\\_in\\_the\\_southern\\_california\\_bight](http://www.aquariumofpacific.org/mcri/info/offshore_aquaculture_in_the_southern_california_bight)

Image courtesy of NOAA



# Acknowledgements

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The workshop organizers would like to thank the many people who have contributed time, expertise, and advice to this project. The workshop would not have been possible without the dedicated efforts of all the participants. In particular, we are grateful to Linda Brown for orchestrating the workshop and

preparation of workshop materials. We give special thanks to Molina Healthcare for providing complimentary event space. Thanks to our rapporteurs, Canon Purdy, Kari Eckdahl, and Jonathan MacKay. We also thank Robert Conrad and Derek Balsillie for audio-visual support. We acknowledge with gratitude Rich Wilson, Seatone Consulting, for his superb facilitation of the workshop.

# The Steering Committee

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## **Participants at Workshop #1**

**Back row from Left to right: Annalisa Batanides, Penny Ruvelas, Kim Thompson, Carol Price, Randy Lovell, Dale Kiefer, Russ Vetter, Don Kent, James Morris, Bryant Chesney, Walt Wilson, Letise LaFeir, Thomas Dempsey, Kevin Amos, Paul Olin, Mark Drawbridge, Michael Rust, Michael L. Van Houten, Linda Brown.**

**Front Row from left to right: Sandra Oh, Dave Caron, Rich Wilson, Amy Rens, Bonnie Rogers, Dan Swenson, Melanie Tymes, Rachel Fuhrman, Jerry Schubel, Diane Windham, Jonathan McKay, Ken Riley, Paula Sylvania.**

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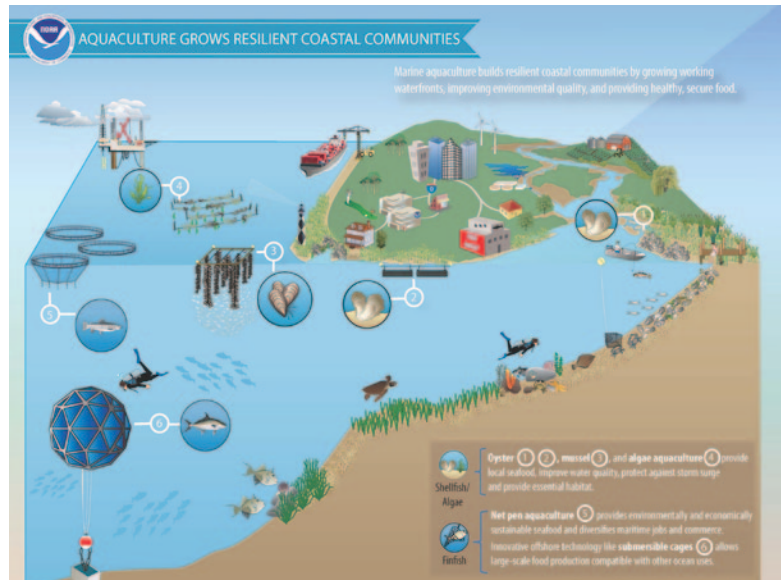




# Introduction

The second Sea Grant Workshop in a two-part series, titled *Offshore Aquaculture in the Southern California Bight*, was convened to bring together federal and state coastal managers with statutory authorities for review and permitting of marine aquaculture in federal waters off the coast of Southern California with scientists and other stakeholders. This facilitated presentations and discussion to address how to build regulatory confidence in understanding and applying best available science and incorporating appropriate tools that can inform decision-making. Models were presented as a potential tool to aid in making sound regulatory decisions. Modeling results from the Rose Canyon Fisheries finfish aquaculture project were presented as a case study.

The workshop was attended by 31 individuals who represented a cross-section of scientists, regulators, and industry practitioners with proven expertise in the fields of aquaculture and environmental science. State and federal agencies with regulatory responsibilities for permitting aquaculture participated; most agencies were represented. On day one, workshop participants, with the guidance of a professional facilitator, discussed issues and concerns and learned more about the latest science and tools available to inform the permitting process. Participation in day



**NOAA National Ocean Service/National Centers for Coastal Ocean Science - Marine aquaculture builds resilient coastal communities by growing working waterfronts, improving environmental quality, and providing healthy, secure food.**

two included primarily the federal and state coastal management agencies with regulatory responsibilities in permitting marine aquaculture. These coastal managers discussed the need to collaborate and potential solutions to improve the environmental review and permit decision-making process. Some points of discussion included: if and how the science and tools presented at the first workshop and from day one better inform decision-making; the role of stakeholder input and how to incorporate it; and identifying outstanding concerns and data gaps and next steps.



The proposed Rose Canyon Fisheries offshore finfish aquaculture project to be sited in federal waters off the coast of San Diego served as a case study to demonstrate modeling tools and results presented at both workshops. The demonstration project, proposed at commercial production levels, represents a partnership between Hubbs-SeaWorld Research Institute and Cuna del Mar, a private equity fund for marine aquaculture development. The proposed project would culture yellowtail jack and possibly white seabass or striped bass in offshore net pens or cages. The production plan extends over eight years, starting with 1,000 MT per year and gradually ramping up to 5,000 MT per year, with harvested product landed along traditional working waterfronts in the region. The farm's proposed site is 4.5 miles (7.2 km) from the San Diego coastline. As of fall 2016, the project team is in continuing discussions with the U.S. Navy and the U.S. Army Corps of Engineers regarding siting the project to avoid navigational conflicts.

### **Workshop Charge**

*The goal of the second workshop, in addition to reporting on modeling results from the Rose Canyon Fisheries' farm site, was to build on recommendations from the first workshop while answering the following questions:*

- *What is the process to obtain federal permits for offshore aquaculture?*
- *Where do agencies have confidence in the available science and technologies to make informed regulatory decisions? And conversely, where do they lack such confidence? How do we build regulatory confidence?*
- *What are the challenges agencies face in permitting aquaculture in federal waters?*
- *How do we move forward with a clear, cohesive, and comprehensive permitting system for aquaculture development in federal waters?*

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<sup>1</sup> A complete project description is provided in Appendix 2

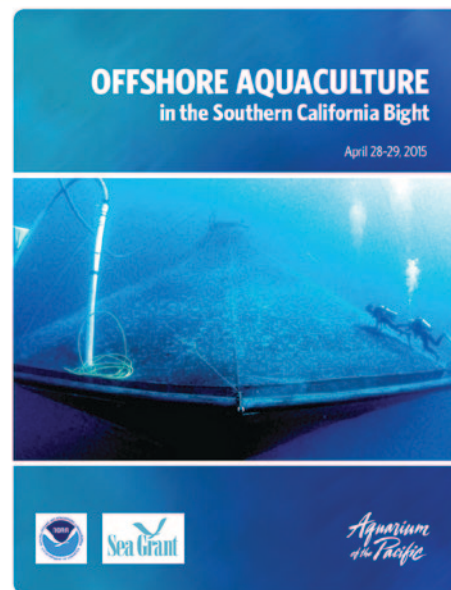
# Summary of Workshop #1 (2015)

The first Sea Grant Workshop, titled *Offshore Aquaculture in the Southern California Bight* (Aquarium of the Pacific, Long Beach, California, April 28-29, 2015), was convened to develop the frames of reference and rationale for creation of an offshore finfish aquaculture industry in Southern California. The workshop was attended by 44 people who represented a cross-section of scientists, regulators, and industry practitioners with proven expertise in the fields of aquaculture and environmental science. All state and federal agencies with regulatory responsibilities for permitting aquaculture were invited to participate, and most agencies were represented. Workshop participants were asked to share and prioritize concerns regarding the complex, high-stakes environmental and marine resource issues often associated with coastal development activities. A professional facilitator guided conversations and consensus-building activities, especially when tough policy questions combined lively politics and differing opinions. While permitting complex offshore aquaculture in California remains challenging, all workshop participants worked together to formulate specific recommendations to improve the process for reviewing permit applications and obtaining approvals for aquaculture development projects.

The report highlights the results of surveys conducted to prioritize the issues and concerns from the perspective of the regulatory agencies before and during the workshop with key findings presented. Key concerns identified include: siting, nutrient enrichment, protected species interactions, chemicals, drugs and therapeutants, feeds, escapes, disease, invasive species, biodiversity, and genetic risks. Along with key concerns, challenges that agencies face to permit aquaculture in federal waters were addressed, including: the adequacy of current science, public perception, proper monitoring plans, scale of farms to minimize any effects, creating a working group, and identifying research needs.

Based on the key challenges a series of recommendations were prepared:

1. Advance the state of knowledge through research
2. Create an offshore permitting interagency working group
3. Link grant research priorities to available funding sources
4. Address public perception
5. Provide feedback from regulators to inform modeling effort



The summary report for the workshop is available at [aquariumofpacific.org/downloads/Aquaculture\\_Workshop\\_WEB.pdf](http://aquariumofpacific.org/downloads/Aquaculture_Workshop_WEB.pdf)



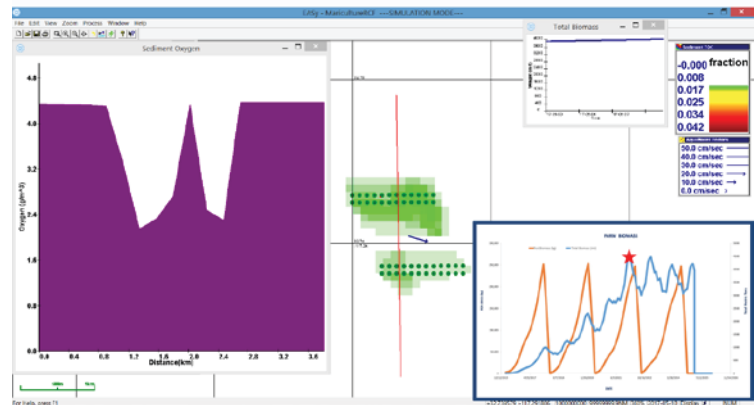
# Key Findings

## Connecting the dots from model output to environmental review (“So What”)

As with the first workshop, the second built familiarity and confidence in the use of models to select sites that are conducive to environmentally responsible production and to analyze potential cumulative effects as part of the permitting process. AquaModel and its application to Rose Canyon Fisheries was presented as a case study. It is one of a handful of models currently being analyzed by NOAA’s National Ocean Service’s National Centers for Coastal Ocean Science (NOS/NCCOS) as potential tools to inform the permitting process. Participants in day one and day two pointed out that models will only be useful to regulators if the results can be interpreted so that decision makers and agency scientists can link the model output to real world environmental effects, essentially addressing the “so what?” question specific to each agencies’ mandate. For example, how do the model results inform operators’ understanding of potential effects to specific protected species in the proposed farm location?

To address this concern, the modeling team, consisting of AquaModel creators Jack Rensel and Dale Kiefer and scientists from NOS/NCCOS, raised the importance of first understanding the model structure in terms of input and output data and the work that goes into operating and validating the model. There was also an effort to build familiarity and reduce the concern associated with complex modeling by demonstrating the simple graphical user interface and movie-type playback of the output. Additionally, a sensitivity analysis of the model provided additional confidence among coastal planners regarding the use of models as a tool to inform decision-making.

## Sediment Oxygen Mid Way

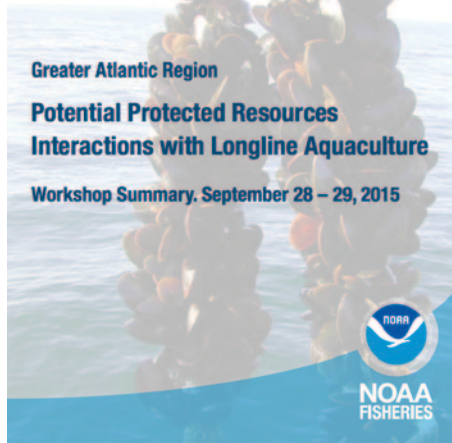


AquaModel is a computational software tool within a 3D GIS used to forecast water column and sea bottom effects of fish aquaculture in nearshore and open ocean locations. It is being used to help design and configure the proposed RCF site offshore of San Diego to avoid adverse impacts, while achieving optimum fish production but avoiding trial and error approaches. AquaModel is being used by NOAA National Ocean Survey in this case and is used elsewhere in the world by government agencies and industry. It can evaluate the cumulative effects of many farms and provide regional carrying capacity estimates by utilizing 3D ocean circulation model data. See [www.AquaModel.org](http://www.AquaModel.org) for more information

Further discussions about the model clarified that understanding how the model output links back to potential environmental impacts that need to be analyzed during the permitting process was equally if not more important than understanding a detailed description of the mechanisms that power the model. Several questions were posed regarding how the model interprets thresholds and standards for discharges at fish farming sites through the U.S. Environmental Protection Agency (EPA) National Pollution Discharge Elimination Systems (NPDES) permit. Another question that was raised is how the monitoring data fit back into the model for validation purposes and determining whether or not it is robust and relevant enough to ensure regulatory confidence. These questions are important, as the permitting process is typically paired with the development and implementation of a monitoring plan. The data collected for the monitoring plan should be robust and relevant enough to validate any modeling results with real-world sampling and also provide coastal managers and the farm managers insights to employ adaptive management.

The development of tools and resources that address many of the questions raised during the discussion on modeling is in progress. NOS/NCCOS will be releasing the results of the sensitivity analysis for AquaModel as part of a modeling report in late 2016. This report will enhance understanding of how the model operates and will address some of the specific questions raised by regulators in the workshop. To address current standards and thresholds for aquaculture discharges, the EPA has guidance documents on NPDES aquaculture permitting available here.

**NOAA Fisheries  
Workshop Summary:  
Potential Protected  
Resources Interac-  
tions with Longline  
Aquaculture.  
September 28-29,  
2015**



## Protected species interaction with Marine Aquaculture

One of the emerging issues of concern among federal and state permitting agencies is the potential for protected species interactions with aquaculture gear. Relative to commercial fisheries technologies, marine aquaculture technologies are newer, and the differences between technologies are not as widely understood. While there are minimal data on species interactions with marine aquaculture gear, NOAA Fisheries is working to better understand such potential interactions so permitting agencies can make informed decisions. In 2015, NOAA's Office of Aquaculture and Protected Resources Division and

NOS/NCCOS held a workshop in the Greater Atlantic region. Experts in aquaculture, commercial fishing gear technology, marine sciences, and protected marine species attended the workshop with the following goals:

- Collectively reviewing a draft NOAA Technical Memorandum on protected species interactions.
- Developing tools and strategies to support the development of aquaculture while conserving protected species.
- Collecting and discussing information with all levels of government, from federal to local, to assess the potential risks that aquaculture gear poses to protected species.

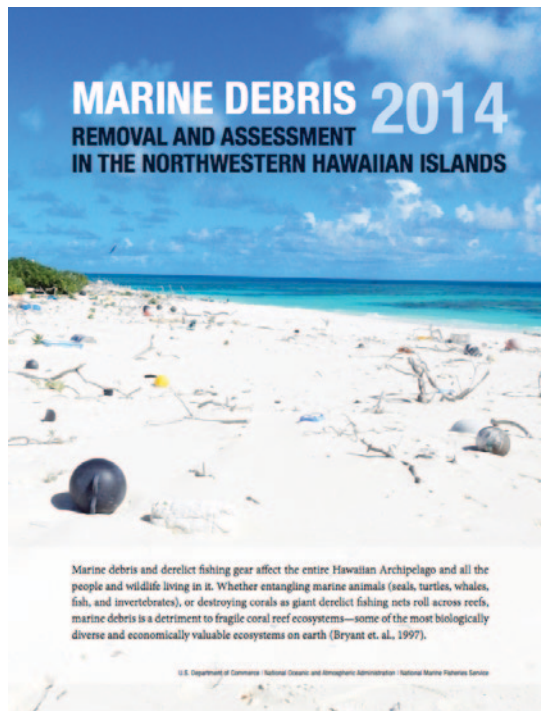
The NOAA Technical Memorandum is the product of a detailed literature review on the topic of protected species interactions with aquaculture gear by NOS/NCCOS that analyzed more than 150 studies on the topic from around the world. The results indicate that species interactions with marine aquaculture gear have occurred, but are very minimal relative to those associated with well-established commercial fisheries. The study underlines the need for more data on all marine aquaculture interactions (positive or negative) to better assess the threat of interactions with aquaculture gear. There may be other non-fatal interactions that warrant further study, including: ecological (habitat exclusions, feeding ecology, population dynamics, and behavioral changes); injury; vessel strikes; marine debris; and potentially positive interactions, such as the removal of excess nutrients and the creation of vibrant, localized ecosystems around the farms. Some of the best management practices that have been tested and implemented around the world to reduce the risk of species interactions at farm sites include:

- Siting farms outside of known migratory routes.
- Monitoring the occurrence, behavior, and outcomes of species presence at farm sites.

- Keeping anchor lines and nets taut to reduce the risk of entanglement
- Proper garbage disposal to minimize potential attractants for protected species.
- Operating vessels cautiously to reduce the risk of ship strikes.

NOAA Fisheries has released the workshop summary available here. NOS/NCCOS plans to release the technical memorandum on protected species interactions with aquaculture gear in the fall of 2016.

Discussions on this topic during the workshop led to the recommendation that more data be collected at existing farm sites and that the reporting of such interactions should be incorporated into the permitting process. Participants agreed that more research is needed and that research on this topic should be placed higher in national research priorities. Agencies also need to understand the differences and similarities between aquaculture gear and commercial fishing gear to properly and accurately assess the potential impacts to inform permitting decisions. Relative to the well-established commercial fishing industry, marine net pen aquaculture is new to California, and it will likely be subject to additional monitoring requirements as part of any permit to insure potential gear interactions with marine species are minimized or avoided. Potential gear interactions need to be clearly defined and discussed in the context of what is allowed within agency mandates. Further, such discussion should include a comparison to current commercial fisheries regulations. The role of a proactive adaptive management approach as part of permit and monitoring requirements to address species interactions and inform aquaculture operations was discussed as a potential solution to alleviate concerns among permitting agencies. Addressing public perceptions regarding species interactions with commercial fisheries and aquaculture was also recommended to help build agency confidence regarding the permitting of marine aquaculture.



NOAA Fisheries: Marine Debris – Removal and Assessment in the Northwestern Hawaiian Islands, 2014

## Marine Debris and Marine Aquaculture

Marine debris concerns have generally grown over time and have captured media attention. A recent 2014 NOAA report titled *Marine Debris – Removal and Assessment in the Northwestern Hawaiian Islands* found that oyster aquaculture spacers were the fifth most numerous type of marine debris. Marine debris can have varying impacts, including: ingestion by marine life, entanglement, habitat damage, and the transport of non-native species that cling to the debris as it travels throughout the global ocean. While marine debris is not a new issue, there are various international and national environmental laws in place to reduce marine debris by banning the release of plastics and other debris into the marine environment. Despite these laws, marine debris is still an issue. Marine debris from aquaculture is avoidable, and remediation of the site upon farm removal can be a permit requirement to ensure debris isn't left behind. Other forms of marine debris are more challenging to manage, such as marine debris that results from structural damage from storms, failure to institute best manage-

ment practices, or degradation of structures from the environment.

Workshop participants acknowledged the need to prioritize scientific research to better understand the sources of marine debris and how to address aquaculture-related debris concerns. Current efforts and resources that are already in place to reduce marine debris include: the development of farm infrastructure that can better withstand extreme ocean conditions; escrow accounts designated specifically for site cleanup in the event that a farm goes out of business; best management practices to improve the integrity of the farm infrastructure; and outreach and education for both the public and industry. Participants acknowledged that existing regulations require removal of derelict gear and returning the site to its natural state, but these requirements are not consistently enforced. This is largely the result of limited resources available for enforcement to patrol areas and to report non-compliance to regulatory agencies and the aquaculture permit holder. It was once again acknowledged that a proactive and adaptive management plan that addresses these concerns be provided by the applicant to improve confidence among permitting agencies.

## **USDA APHIS program overview and structure**

NOAA Fisheries, U.S. Fish and Wildlife Service (USFWS), and the U.S. Department of Agriculture (USDA) each have regulatory responsibilities for aquatic animal health (including issuance of export health certificates); however, USDA's Animal and Plant Health Inspection Service (APHIS) has oversight of farm-raised aquatic animals. Relative to offshore marine aquaculture, APHIS would exert its role especially in federal waters and in cases of reportable disease incidents in interstate and international transit. However, of the federally and internationally reportable diseases listed for finfish, APHIS can only prevent importations into the U.S. of one, and it is a non-marine disease of carp. Nonetheless, the California Department of Fish

and Wildlife also has a regulatory framework for importation and fish health oversight that coordinates with APHIS, and works with academic specialists and industry representatives through the state's Aquaculture Disease Committee. Thus, APHIS has developed and adopted a cooperative and proactive approach to fish health management with states and the aquaculture industry.

Workshop attendees were presented with an overview of the Commercial Aquaculture Health Program Standards (CAHPS) developed by the National Aquaculture Association (NAA) and APHIS. This non-regulatory program aims to establish a framework of standards for the development of site-specific plans for the formation of an aquatic animal health plan for early disease detection, risk assessment and management protocols, surveillance, reporting, and response to control aquatic animal pathogens. The CAHPS program was developed to implement the National Aquatic Animal Health Plan (NAAHP), which helps the industry and regulators protect public resources and manage the movement of aquatic animals while preventing the spread of pathogens. This program has the potential to provide additional resources supporting research to improve aquatic animal health.

Discussions that followed the presentation explored the status of integrating the CAHPS program with the newly established NOAA Gulf Aquaculture Plan. This type of integration could apply to proposed aquaculture projects in California, where regulators and applicants, struggling with existing permitting and monitoring frameworks, could benefit from the responsive living document approach found in the CAHPS program. Additionally, the economic benefit rather than a regulatory burden of utilizing the CAHPS program has similar examples from the West Coast shellfish industry. Shellfish growers in Humboldt Bay, California, have implemented a Shellfish High Health program, which has similarities to CAHPS in its non-regulatory and yet highly valued aspects. The program increases confidence with agencies, shell-



fish seed purchasers from industry, and the public by taking proactive steps in performing regular surveillance, updating shellfish health documents, and supporting suppliers that promote shellfish health. Together, these steps help ensure the bio-security of waters used for growing shellfish for the benefit of all users and provide a competitive advantage in the marketplace.

## **Stakeholder Assessment: Formation of an Offshore Aquaculture Working Group**

As a follow-up to one of the recommendations from the first workshop, a small steering committee was formed to facilitate the formation of an offshore aquaculture permitting interagency working group. It was determined that a stakeholder assessment would help guide the creation of the offshore permitting working group. The assessment was in the form of a questionnaire that was distributed to 100 individuals from a broad cross-section of government, private sector, academia, aquaculture consultants, environmental NGOs, and other stakeholders. The questionnaire had a high response rate, with 45 confidential, non-attributable responses. Results from the survey helped to identify issues and science and data needs, in addition to making recommendations for the formation of the working group in terms of composition and purpose.

One of the findings of this stakeholder assessment echoed the discussion at the first workshop of the need to address public perception about marine aquaculture. Public perception is an important variable that may affect an agency's decision to permit a farm. There is a need to educate the public, and that continues to be a priority for NOAA, which has listed addressing public perception as a goal in the recent *Marine Aquaculture Strategic Plan FY 2016-2020*. Another finding from the assessment that was also discussed at this workshop was the exploration of mechanisms available to permit pilot or demonstration



Attendees at the second workshop: Offshore Aquaculture in the Southern California Bight.

projects that would be phased and expanded over time if in compliance with regulatory permit requirements and employing adaptive management, resulting in economically feasible projects. There was some debate at the workshop as to whether a pilot project at demonstration production levels would be economically feasible. Some suggested that a full-scale project that could phase to full production levels, using adaptive management to inform such expansion and as a condition of the permit, could improve agency confidence to permit a full-scale operation.

The assessment also indicated that determining the lead federal agency for the National Environmental Policy Act (NEPA) and general permitting requirements for offshore aquaculture in federal waters remains unresolved. This was a reoccurring theme in both workshops. The NEPA process must provide neutral and balanced review. The discussion in workshop 2 led to the acknowledgement that the Army Corps and EPA have NEPA expertise, but they have limited experience permitting marine aquaculture facilities and have been reluctant to accept the NEPA lead. It was also acknowledged that NOAA has both NEPA and marine aquaculture expertise and tools, but is not legislatively authorized to issue aquaculture permits for non-federally managed species proposed for aquaculture in federal waters. NOAA has no permitting authority under the Magnuson-Stevens Fishery

Management Act (MSA) unless the species in production is a federally managed species (i.e., Gulf Aquaculture Plan). The species best suited for culture in places like California may be locally native species managed by state instead of federal agencies. A permit applicant for a site in federal waters off California will need permits from the Army Corps and EPA, but not from NOAA. NOAA would be consulted with by the Army Corps and EPA relative to the Endangered Species Act (ESA), MSA, and the Marine Mammal Protection Act (MMPA) to address potential effects to ESA-listed species and their habitat, essential fish habitat, marine mammals, and sea turtles.



Image by Santa Barbara Mariculture.

# Summary Recommendations (Day 1 and 2)

1. **Form an Interagency Offshore Aquaculture Permitting Working Group to focus on California-based offshore aquaculture projects in federal waters.**

The stakeholder assessment and reconvening of the regulatory agencies at the second workshop confirmed the need for and willingness to participate in a working group for offshore aquaculture in Southern California. A similar effort was conducted in Hawaii and has been successful in facilitating a more efficient and informed permitting process for that state. Workshop participants agreed that there is potential value in such a group, but cautioned that it must be productive to sustain their participation. They also discussed the designation of NOAA to lead and coordinate the working group.

2. **Explore the designation of NOAA as lead agency for permitting aquaculture in federal waters.**

There was considerable discussion about determining the lead federal agency for NEPA and general permitting requirements. Please see recommendation number one.

3. **Address public perception as it relates to marine aquaculture.**

A recurring theme that carried over from the first workshop was the need to address public perceptions about marine aquaculture. This was touched upon in the stakeholder assessment, as well. Public perception is important because, even with regulatory confidence in the science and tools available to inform their decisions, perception-based concerns can influence permitting decisions. It is essential that the public has access to the best available information on the science, best management practices, and technologies used for marine aquaculture. It is also important that aquaculture is presented to the public in the context of the global food supply. Specifics on how to address public perception were not discussed.

4. **Link funding opportunities with researchers and increase funding for aquaculture research.**

It was acknowledged by the regulators and scientists in attendance that more data is needed for priority issues, such as aquaculture interactions with protected species and marine debris, and adequate and appropriate monitoring requirements and protocols.



Kampachi Image credit: Kampachi Farms



# Appendix 1

## Participants

NAME	AFFILIATION
Susan Ashcraft	California Fish and Game Commission
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*Kim Thompson	Aquarium of the Pacific/Seafood for the Future
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Canon Purdy	California Department of Fish and Wildlife
Jonathan MacKay	Aquarium of the Pacific/Seafood for the Future

**FACILITATOR**

Rich Wilson	Seatone Consulting
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\*Workshop Planning Committee

### MEETING SUMMARY | July 28, 2016

#### Offshore Aquaculture in the Southern California Bight

##### Meeting in Brief

Building on the spring 2015 aquaculture workshop, a diverse array of stakeholders reconvened to receive and discuss the results of environmental modeling efforts and a variety of other topics. These efforts were designed to assist in understanding aquaculture environmental interactions and permitting requirements for offshore aquaculture in the Southern California Bight (SCB). This document summarizes the second day of the 2016 event, which was designed specifically for agencies with permitting authority for offshore aquaculture in the region.

##### Modeling and Agency Reporting Needs

James Morris, marine ecologist with NOAA's National Centers for Coastal Ocean Science (NCCOS) solicited and received input regarding the potential application of the *AquaModel* as a decision-support tool for offshore aquaculture in the SCB. Attendees asked questions and provided numerous comments and suggestions as to how the model can best support effective, efficient and informed decision-making by permitting agencies.

##### Exploration of Regulatory Confidence

Attendees then explored what is meant by "regulatory confidence" among agencies involved in the permitting review process. Several themes and common interests emerged from the conversation. In addition, agency representatives discussed current levels of confidence in the process and identified needs for improving communication, providing appropriate data, and fostering collaboration moving forward.

##### Formation of an Offshore Aquaculture Working Group

Attendees revisited and discussed the option of forming an interagency working group. Everyone present generally expressed support for the concept, with the caveat that aquaculture represents a small fraction of the workload for many agencies. Diane Windham, NOAA's West Coast Regional Aquaculture Coordinator for California, offered to coordinate the effort, and, as desired or warranted, share coordination with other agencies. She committed to working with key players to find a date/time for the first meeting, and identify key issues that may inform the agenda.

## Action Items

<i>Action</i>	<i>Responsible Party</i>	<i>Timeline</i>
Outreach re: tailoring model results to address agency specific needs and questions	James Morris	August
Share information with permitting agencies about Gulf of Mexico Aquaculture FMP and NEPA process	James Morris	August/September
Share aquaculture permit pre-application form with permitting agencies	Diane Windham	August/September
Coordinate with permitting agencies and interested parties on initial working group date/time and important agenda items	Diane Windham	August/September

## Meeting Summary

Building on the spring 2015 aquaculture workshop, a diverse array of stakeholders reconvened to receive and discuss the results of environmental modeling efforts and a variety of other topics. These efforts were designed to assist in understanding aquaculture environmental interactions and permitting requirements for offshore aquaculture in the SCB. This document summarizes the second day of the 2016 event, which was designed specifically for agencies with permitting authority for offshore aquaculture in the region.

### Welcome, Agenda Review and Introductions

Facilitator Rich Wilson with Seatone Consulting welcomed everyone, reviewed the meeting agenda and then a round of introductions by all attendees followed. No attendees or project team members offered any suggestions or revisions to the agenda.

### Modeling and Agency Reporting Needs

James Morris, NCCOS marine ecologist, thanked everyone for attending the aquaculture workshop. He opened discussion by asking for initial reactions to the model presentations shared on the previous day. Several attendees offered candid commentary, including the following:

- Need to match modeling output with regulator information needs.
- Helpful hearing “what’s under the hood” of the model, but a lot of questions remain regarding why the results matter to management.
- Interest in more information on the validation process, where the model has fallen short and why, as this affects regulatory confidence in the model.
- Need to distinguish between what is meant by “regulatory confidence” and confidence in the model.
- Lack of clarity on the day one meeting goal—was it to inform decision



making processes or set up a framework for addressing and reviewing aquaculture permit applications?

- Model developers are open to entertaining questions from regulators.

NCCOS is working to finish the modeling report associated with this 2015/2016 *Offshore Aquaculture in the Southern California Bight* workshop series. NCCOS will work with the modeling team to tailor modeling results and reporting on questions and information needs put forward by agencies with permitting authority in the SCB.

Thoughtful discussion of the various issues and concerns surrounding offshore aquaculture in the SCB will help NCCOS refine its modeling work and will inform the final modeling report for this California case study. James asked meeting attendees what questions, comments or concerns remained about the model. He also acknowledged receiving comments prior to the workshop, and noted that these comments would be addressed in the report. A number of suggestions, questions and comments followed, as well as responses offered:

- **SUGGESTION:** Ensure the report specifically addresses the type and quality of data needed to validate modeling results (i.e., monitoring and validation of assumptions). A permit typically includes a monitoring component, but oftentimes data collected falls short of what is needed for validation. **Response:** NCCOS is working to figure out standards for data needs and outputs on active aquaculture cases. Hearing what California agencies need (e.g., species/habitat consultations, water quality etc.) is essential for building a modeling framework going forward. NCCOS is interested to see modeling inform both monitoring and adaptive management.

- **COMMENT:** It is unclear if the model is operating in a real system. For example, taking into account baseline information beyond currents. A model operating in a false system (e.g., not the aquaculture site under consideration) may be less useful than needed. **Response:** NCCOS feels *AquaModel* is one of the best models for predicting what happens around aquaculture facilities. The model includes an array of real life baseline data beyond currents. Although it is an expensive and labor intensive approach, NCCOS set out to test the model by going painstakingly through each parameter. This is important work for producing a scientifically and legally defensible model.
- **COMMENT:** The presentation of data did not make clear what cumulative or synergistic effects might be occurring. **Response:** NCCOS chooses the most conservative parameters. In addition, the report will describe total organic deposition in milligrams per liter in order to match units the Environmental Protection Agency (EPA) uses for its National Pollution Discharge Elimination System (NPDES) permits.
- **COMMENT:** The model presentations did not make it clear how much sampling and real world data collection from the Rose Canyon Fishery (RCF) site went into informing the model. **Response:** A year of flow data, quarterly dissolved oxygen samples, temperature profiles and information from the Point Loma discharge station among other information was collected from this site. **Additional response:** Jack Rensel's presentation described how the model has been validated five times, largely in Hawaii

and Puget Sound. These data sets helped improve the model.

- **QUESTION:** Has flow data only been taken at preferred locations or also other areas along the SCB? **Response:** NCCOS applied a general model for the region. But in situ data is just on the site for the permit. Concerns about locating the farm near Point Loma discharge were also considered. **Additional comment from questioner:** The Army Corps of Engineers (USACE) mentioned the broad context of their permitting process; the process has 21 public interest factors it must consider, such as navigation, economics, water quality, etc.
- **COMMENT/QUESTION:** In some ways the proposed RCF site has a robust data set due to its proximity to the Point Loma discharge station. However, one year of data collection for this model may not be enough, as the RCF project will be a long-term endeavor. What range was considered for sampling variables? **Response from other permitting agency:** The SCB has been well studied; permitting agencies should not make applicants collect all existing data in the region. At the same time, it is important to ensure the model takes into account the broader set of regional data in existence.
- **COMMENT:** Need to know all model inputs. **Response:** NCCOS will provide a printout of the parameters.
- **COMMENT:** Jack Rensel's day one presentation described how the model was run at 5,000 metric tons per year and did not reveal adverse impacts. **Response:** It is indeed important to look at the big picture and impacts like changes in carbon deposition over time. NCCOS is conducting a safety factor analysis to better understand when impacts will occur. Ideally, the model will demonstrate what the production level would be before concerning impacts occur.
- **COMMENT/QUESTION (from an attendee not present on day 1):** Per the previous comment, it sounds like we are talking about a sensitivity analysis. Has this been a part of the modeling effort to date? **Response:** Yes, Barry King gave a sensitivity analysis presentation on day one. NCCOS has identified the most sensitive parameters, and plans to do more analysis. This information will be laid out in detail in the report.
- **COMMENT:** As proposed aquaculture projects enter the permitting process in the future and are potentially sited, it will be important to have a model that looks at cumulative impacts to the larger area. This is a tougher issue for regulators to address. **Response:** NCCOS is also interested in this kind of "far-field" modeling. Researchers are studying the issue in the Mediterranean and Chile and elsewhere. It is an important issue but NCCOS is not yet engaged in this kind of research.
- **COMMENT:** The day one modeling presentations did not discuss climate change scenarios. From a decision-makers' perspective, there is likely interest in planning for or modeling potential impacts linked to changes in conditions associated with climate change. Harmful algal blooms, for example, are a very real consideration in California. **Response:** NCCOS researchers will soon publish a study on the impacts of climate change on aquaculture. This work can perhaps be linked to the model.
- **QUESTION/COMMENT:** Can we extract equations from sub-models that are used within the model? Some equations may get more scrutiny than others, while at the same time these equations may build confidence in the model. **Response:** Large portions

of the equations can be pulled out. Some of *AquaModel* is similar to the European model *DEPOMOD*, however, some of it is not open source equations. NCCOS will describe how the model works in the report. Again, it is important to have a legally defensible science case. **ADDITIONAL QUESTION:** Is this why NCCOS is considering various modeling approaches? **Response:** NCCOS struggled with this issue for the last year. *DEPOMOD* is a widely used operational model; its release has been delayed. However, Scotland's Environmental Protection Agency is currently reviewing and approving it.

- **COMMENT:** Consider sharing your published work with the Gulf of Mexico Fisheries Management Plan (Gulf FMP) for Aquaculture working group.
- **QUESTION:** What is the status of the mock aquaculture permitting process conducted by NOAA for the Gulf FMP? **Response:** NOAA used this process to develop sample documents for how a permit applicant might develop their application. It was a great exercise that California regulators may want to replicate.

James concluded the conversation by noting that NCCOS does not have the capacity to run models for every aquaculture farm in the U.S. This burden will largely fall on industry. That said, NCCOS is interested in developing standardized monitoring protocols. In the Gulf of Mexico, NCCOS provided general recommendations for the development of a fishery management plan for offshore aquaculture, but has not yet engaged regulators regarding modeling requirements. As California faces its first permit application, NCCOS hopes to provide technical support and help build a robust science case, then back away as permitting confidence is built through agencies conducting environmental reviews and

making decisions to permit or not permit aquaculture farms in the SCB.

### Exploration of Regulatory Confidence

The conversation then turned towards the issue of building “regulatory confidence,” and how, in the context of considering offshore aquaculture in the SCB, agencies might define what is meant by this phrase. Regulators and other government authorities present went around the table and, one-by-one, offered a range of definitions. As the conversation proceeded many attendees acknowledged support for statements mentioned by others. Attendees described regulatory confidence as when:

- A decision-maker has sufficient information available to assess confidence, or lack thereof, in the data that informs agency specific permitting requirements.
- Decision-makers have confidence that conditions in a permit ensure environmental protections and that follow-up monitoring confirms permit conditions are maintained.
- Decisions are based on sound, defensible science. Mechanisms that support both accountability and adaptability are built into the permit. Risk for uncertainty has been articulated so decision-makers can decide their respective tolerance levels. A legally defensible record of information is produced.
- Defensibility is important. If requests come from the public, agencies can synthesize data and provide a satisfactory response, thereby creating public trust.
- Confidence is built over time and experience. Decision-makers have a comprehensive understanding of the issues and ramifications associated with a particular activity. It also

means understanding the information provided, knowing what it means for the resources an agency is charged to protect, and having enough of it to feel confident about a decision.

- Confidence means transparency, uniformity and authenticity in the permit application and documentation process. Applicants understand agencies are treating them fairly.
- Confidence is something built over time. Decision-makers have access to information and understand which environmental impacts are acceptable and which are not. If conditions surrounding a proposed project are acceptable, agencies issue a permit; if not, no permit is issued.
- Confidence is facilitated by a thorough understanding of the type and likelihood of impacts, and how those impacts relate to regulations and standard of review.
- Confidence means integrated monitoring systems which include all environmental and social concerns.
- Confidence means adequate and accurate data/information; all issues identified and addressed; appropriate monitoring identified and agreed to by the applicant; analysis and predictions with transparent assumptions; and understanding of the cumulative context for a project.
- Confidence means sufficient understanding to make justifiable permitting decisions; new farm types (e.g. RCF) will have a heavier lift than later farms.
- A permit applicant may define regulatory confidence as a streamlined process.
- Confidence is built by facilitating a process that is reasonable and fair to industry; needs to include key stake-

holders and users up front so all parties involved do not run into troubles at the end of a process.

- Risk, and how it is managed by agencies, needs to be more explicitly defined; standard review methods are applied that enable better communication; accountability and transparency; decisions consider marine resources that agencies are charged to protect.

One attendee inquired as to how closely the permitting process is linked to achieving confidence among decision-makers. In response, one representative of a regulatory agency noted the importance of early stakeholder engagement. Another pointed to the importance of putting an equal amount of effort into considering different issues and options as a means to satisfy regulatory burdens (i.e., not just farm location but also science and applied techniques).

Overall themes from the conversation on regulatory confidence included the following:

- Risk tolerance and management.
- Transparency of the permitting process.
- Demonstrated trust founded on different information sources.
- Relevancy (i.e., applicability of a regulatory framework to decision-maker needs); not just unnecessarily prescriptive.
- Adequacy and defensibility of decisions.
- Standardized approaches.

After discussing the meaning of regulatory confidence, each attendee that represented a permitting agency briefly described his/her current level of confidence in the offshore aquaculture permitting process. Some expressed concerns based on limited experience with the National Environmental Policy Act (NEPA) process and lack of

needed resources to oversee this process. Others noted that the level of confidence in the process can be affected by the scope and scale of a project, the ability to engage and respond to key stakeholders, and the quality of the applicant's science and data. Still others highlighted the importance of interagency consultations and usability of information provided during the permit review process. Several agencies expressed confidence in their own internal review processes.

Finally, James Morris acknowledged the importance of each agency building a science case and explaining its position on any given permit application. NCCOS, he noted, is interested in learning about what resources agencies are using, the scientific basis for decision-making, and how challenging it is to acquire the resources needed to make effective decisions. NCCOS will continue supporting agencies in their respective efforts to make an efficient science case for permitting offshore aquaculture in the SCB.

### **Formation of an Offshore Aquaculture Working Group**

At the culmination of the spring 2015 aquaculture workshop, all attendees agreed on the need to continue working together to improve the process for reviewing permits and potentially obtaining approvals for offshore aquaculture projects in the SCB. Diane Windham, NOAA's West Coast Regional Aquaculture Coordinator, revisited the concept of an interagency working group in order to gauge the interest of attendees present at day two of the 2016 meeting, discuss potential leadership roles and identify important issues that could guide initial meetings.

Diane acknowledged that many wish to see NOAA play a lead role on aquaculture issues in the SCB. That said, the current legislative framework precludes NOAA

from serving as lead agency on aquaculture projects in federal waters that must go through the NEPA review process. Moreover, representatives from both USACE and the EPA noted that determination of the lead agency role for projects in the SCB remains unresolved. Diane suggested that NOAA could play a lead role in coordinating the working group, and that agencies such as USACE and EPA could, if desired, play a co-coordination role.

As the previous discussion on regulatory confidence wrapped up, several attendees stressed the importance of pre-permit application meetings amongst permitting agencies and applicants due to challenges around the lack of clarity on leasing issues and siting of offshore projects. Diane cited this as one example of an important issue that could be explored and addressed through the mechanism of an interagency working group. She emphasized the importance of different agencies creating shared understanding of these and other important issues. The working group, she noted, could serve as an effective platform to foster collaboration and address each agency's needs related to the permit review process.

Several attendees weighed in and made the following suggestions about the working group's potential goals and activities:

- Address key components of what agencies with permitting authority need to do during the permitting process.
- Focus on high-level process issues, understanding agency roles, and enumerating fundamental science and data needs.
- Develop aquaculture tools and guidance in the absence of projects to consider.

- Ensure aquaculture is addressed within the framework of marine spatial planning.
- Link the working group purpose and activities to larger national ocean planning efforts around aquaculture as this begins to unfold in the future.
- Define other ocean activities (e.g., military operations, recreational fishing) in the SCB so that aquaculture does not confine or negatively affect other user groups.
- Consider additional groups with authority in state waters (e.g., State Water Resources Control Board).
- Start with a small group and then consider expanding membership.
- Build on the experience of the Hawaii interagency working group.
- Bring in experts to increase the working group's knowledge and build agency capacity.
- Balance the time commitment for participation with a recognition that aquaculture represents a small fraction of the current workload for many agencies.
- Identify and secure resources based on shared priorities held by multiple agencies.
- Exercise caution in moving forward if not all key players are willing and have the capacity to participate; success requires dedicated commitment.

Diane thanked everyone for their input. In general, it appeared that all attendees support the working group concept, with some acknowledging that the work to “get it off the ground” may be the most challenging step. She encouraged the group to email her pressing needs and issues that could inform the first meeting agenda. In turn, she and her team will send a poll around to identify potential future meeting dates. Finally, she emphasized that the working group would be collaborative in nature, and thus issues of process, agenda development and methods for making recommendations would be driven and decided upon by the group as a whole.

## **Meeting Attendees – Day 2**

Bryant Chesney.....NOAA Fisheries – Office of Protected Resources

Cassidy Teufel .....California Coastal Commission

Dan Swenson .....US Army Corps of Engineers

Elizabeth Sablad .....Environmental Protection Agency

Jim Moore .....California Department of Fish and Wildlife

Kat Starzel.....US Department of Agriculture – Animal and  
Plant Health Inspection Service

Melanie Tymes .....US Army Corps of Engineers

Penny Ruvelas .....NOAA Fisheries – Office of Protected Resources

Susan Ashcraft.....California Fish and Game Commission

Robert Cole .....US Coast Guard

## **Project Staff**

Canon Purdy .....California Department of Fish and Wildlife/California  
Sea Grant Fellow – Aquaculture Program

Diane Windham.....NOAA Fisheries – West Coast Region Aquaculture Program – CA

James Morris.....NOAA/NOS/NCCOS Aquaculture

Barry King .....NOAA/NOS/NCCOS Aquaculture

Kari Eckdahl .....NOAA Fisheries/CA Sea Grant Fellow – West Coast Re-  
gion Aquaculture Program – California

Najat El Moutchou.....NOAA/NOS/NCCOS Aquaculture


Paul Olin .....California Sea Grant

Randy Lovell .....California Department of Fish and Wildlife, Aquaculture Program

Rich Wilson.....Seatone Consulting (Facilitator)



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