

# **Launching an Exploration of Policy & Management Options in California to Address Climate Change Impacts on Fishing Communities**

## **Summary of an OST Guided Learning Workshop**

### **About the workshop**

Changing ocean conditions due to climate change present new and unpredictable challenges that are already resulting in social and economic impacts within California coastal fishing communities. Ocean Science Trust, in partnership with the California Department of Fish & Wildlife, the California Fish & Game Commission, and the California Ocean Protection Council, and with support from the David and Lucile Packard Foundation, convened a learning workshop in July 2019 with state decision-makers, scientists, fishers, NGOs, and other experts to explore how state management tools and policy levers can potentially help address the impacts that fishing communities will face under climate change. This workshop drew from case studies and examples of community-centered solutions, from both within California and elsewhere in the world, to launch discussion about what solutions are tractable in a California-specific context.

This report provides a summary of the key discussion themes, recommendations and outcomes from the workshop discussions. It is not intended as a comprehensive accounting of the discussions and instead integrates across sections of the agenda to illuminate themes and takeaways. A list of discussion participants and a copy of the workshop agenda can be found at the end of this report.

## **Climate-driven challenges for fishing communities**

Workshop participants identified and discussed several climate-driven challenges that will impact, and already are impacting, fishing communities along California's coast:

**Uncertainty in the magnitude and timing of impacts.** One of the most significant challenges repeatedly discussed across a variety of topics in the workshop was the high level of uncertainty that communities face in dealing with climate change, and the need for consideration of this uncertainty when developing policies and investing limited resources into potential solutions. While there are "slow" changes that can be predicted to an extent - such as sea level rise - the most extreme impacts often occur in a single year or season. When big, sudden changes happen in concert with unpredictable events, such as changes driven by El Nino years, sporadic "spikes" of impact can result in ecosystems and species responding differently year to year. This will make timely predictions difficult. Furthermore, the (relatively) slow nature of government makes it exceedingly difficult for legislative and regulatory solutions to nimbly respond to unanticipated crises.

**Range shifts.** As the oceans continue to warm, the ranges of occurrence for marine species are projected to shift significantly along the coast. Participants noted that these migrations will alter the geographic areas fisheries species can be caught, effectively either changing which ports species will be landed in or forcing fishers to travel further and further up and down the coast. These shifts will likely result in significantly increased fuel costs and travel time - in effect, setting up tradeoffs between profitability and community stability.

**Unanticipated closures.** The unpredictable nature of climate-driven impacts was a recurring theme. For example, both the increasing frequency and variability of harmful algal blooms and changes to whale movement patterns - due to prey shifting with changing ocean conditions - have resulted in unexpected fisheries closures that very suddenly leave fishing operators cut off from their primary source of income. These types of unexpected disruptions reverberate through fishing communities, as the economic pinch of lost revenue cascades through other local businesses. Discussions highlighted the need to find solutions that provide short term flexibility without compromising ecosystem health or exacerbating risk in other fisheries.

**Infrastructure impacts of sea-level rise and coastal inundation.** Coastal infrastructure will increasingly be inundated and damaged as sea-levels continue to rise and storm intensity and frequency continue to

grow over the coming decades. These structures include not only ports, processing facilities, ice machines, and even ships - the backbones of a fishing economy - but also homes, grocery stores, roads, and every other type of structure that makes up a functioning fishing community.

**Non-marine climate impacts (e.g. wildfire, drought).** Workshop participants acknowledged that fires, drought, and other terrestrial (or non-marine) climate change impacts could cause business disruption and threaten homes and lives in addition to the marine-related impacts.

**Market and supply chain transitions.** Range shifts and ecosystem variability affect the type, location and volume of fish landings, creating a geographic disconnect between consumer demand, supplier access and local product availability. Participants described the potential for disruption to supply chains, particularly when considering the time horizons necessary for new infrastructure and transportation routes. The resulting market disturbances would have broad impacts on local fish markets, restaurants, and processors.

**Risk, failsafes, and economic vulnerability.** Throughout the workshop, it was noted how few “safety nets” existed for fishing operators and broader communities reliant on their output. With climate change impacts projected to become more severe over time and yet difficult to accurately predict, communities will increasingly be left economically vulnerable to unanticipated short term disasters.

## **Solutions, tools, and management actions explored**

The workshop discussion around challenges and the few fishing community-focused climate policies that exist outside of the state highlighted just how much California is at the forefront of this issue in convening this discussion. Workshop participants identified the following opportunities for California to be a global leader and explore actions that, while maintaining the conservation goals central to the state's fisheries management, could directly address the needs of fishing communities in the face of climate change:

**Community-owned fishing opportunities.** Allocating some form of fishing opportunity, such as quotas, directly to communities may help sustain local access to the fishery. Creating a tradeable component to the quotas could allow communities to nimbly adapt as changing ocean conditions alter the availability of different species. Examples to explore could include efforts launched by the Monterey Bay Fisheries Trust, the Morro Bay Community Quota Fund, or the Half Moon Bay Commercial Fisheries Trust, which provide an opportunity to build upon an existing foundation and explicitly be designed to address climate impacts.

**Flexible fishing permits.** Fishing permits designed to be flexibly accessible during short term crises may have potential to allow communities to keep fishing elsewhere during unexpected closures. Crafting such a system, for example via leasing or other mechanisms, could be especially advantageous given the unpredictable nature of when and where climate impacts may strike. To ensure that the access is indeed used in the service of that specific community's needs, participants noted it could be beneficial to issue the permit to the community to then distribute to its members. Explicitly tying these temporary permits to a community may necessitate further exploration of mechanisms in California to issue a permit or access to fishery resources to an entity, rather than an individual.

**Emerging fisheries & new opportunities (e.g. aquaculture).** Can allocations for emerging fisheries (perhaps even those resulting from range shifts elsewhere) be made accessible enough to serve as a buffer in the event of climate-driven reduced catch and closures? These new opportunities likely aren't of the right scale to be the primary source of income for communities in the near-term, but could perhaps be utilized as a form of "catch insurance" to accommodate both transitional periods and unexpected crises. Additionally, it was noted by participants that younger generations in California increasingly see aquaculture as an emerging opportunity that is both more flexible and more robust to the uncertainty climate change produces. Further exploration would be needed to understand the roles

that wild capture fisheries and aquaculture can jointly play in bolstering the adaptive capacity in fishing communities.

**Fishing portfolio diversification.** To address climate-driven unpredictability in fish landings, workshop participants discussed diversifying species catch portfolios as a means of decreasing the risk exposure of communities (and/or operators within it) overly-reliant on a sole fishery. However, many practical challenges remain. Barriers to switching between fisheries will need to be examined, as will methods of choosing how to expand portfolios using risk calculations based on future species projections under different climate scenarios. Ideally, fishers would have access to tools and resources to make informed diversification choices that are robust to a variety of different climate stressors, in theory helping to avoid scenarios where the entire portfolio is simultaneously disrupted. Workshop participants also noted that from a state-wide perspective, if portfolios all diversify in the same way (e.g. all expand into the same fisheries), this could actually *increase* the entire California fishing industry's risk, not lower it. This suggests that coordinating mechanisms both within and between communities will need to be developed.

**Insurance.** Exploring the potential for fishing-specific insurance schemes was one mechanism workshop participants highlighted as a plausible tool for combating the unpredictable and extreme nature of climate-driven crises. Looking to crop insurance or disaster relief insurance models and how they have or have not yet incorporated climate change projections is one avenue for further research. To date, almost no industrialized fisheries in the world have dedicated insurance schemes - Iceland and Japan were the only two identified, with a third unsuccessful pilot program tested in Alaska's sockeye salmon fishery also mentioned. Workshop participants recommended better understanding the successes and failures of the Japan/Iceland/Alaska insurance models as a first step in exploring any potential insurance system for California fisheries.

## Information needs identified

Gaps in knowledge - for understanding both threats and solutions - and barriers to subsequent implementation were identified and discussed throughout the workshop. Participants identified the following information needs specific to addressing climate change impacts in fishing communities:

### Anticipation of climate impacts

- Increased predictive modeling (e.g. to provide as much warning to communities about likelihood of disruptions)
- Enhanced real-time monitoring of the state of the ocean, including species interactions at certain times and locations (e.g. to better avoid and respond to whale entanglements)

- A systematic assessment of California fishing community traits associated with vulnerability and adaptability to changing ocean conditions, including:
  - Cultural/social identity
  - Mobility of fishing operations
  - Reliance on particular fisheries
  - Attitudes towards risk

#### Tool and solution development

- For each climate stressor, identification of the suite of options available and the extent to which each solution can contribute to mitigation
- Development of a methodology, tools, and resources for selecting a diversified (risk-weighted) portfolio, based on what species are likely to be reliable or expanding into fishing areas under future climate scenarios
- An exploration of critical elements for use in designing fishery-focused insurance schemes, including from fisheries elsewhere in the world (e.g. Iceland, Japan, and Alaska) and crop insurance systems
- Development of strategies to maintain market access and supply chain stability in the face of changing species distributions and productivity

#### Adaptability in fisheries management

- Development of a matrix of parameters and traits (e.g. permitting structures, ease of entry/access, etc.) that provide flexibility within fisheries, and an assessment of state fisheries based on these criteria
- Identification of options to accommodate temporary/short term access opportunities as a means for mitigating unexpected closures or disruptions
- An understanding of how new and shifting fisheries resources can be utilized to ease the transition of climate-driven changes to fisheries catch
- Exploration of existing understanding and tools for adapting flexibility and access in fisheries to address climate-motivated needs

## Recommendations & moving forward

Over the course of the workshop, several themes and potential next steps emerged from the conversation. Workshop participants identified the following opportunities for California to continue the momentum of this discussion and move forward in helping fishing communities grapple with climate change impacts:

**Establishment of a flexible permit working group.** Integrating across the recurring themes of unpredictability of impacts and the need for rapid and flexible management responses, workshop discussion of potential next steps coalesced around the value of a deeper exploration of the merits and risks in flexible permits. As participants highlighted, any potential system of flexible permits, such as an emergency leasing option, immediately raises questions on a number of topics: Is it the individual's permit to lease out, or is it the state's right to access the resources and issue short term permits? Should there be controls in place to limit consolidation? Will permits always be available to a community, or only under certain triggers? What is the relationship to existing fishing permits? And to what extent can a flexible permit system help mitigate climate-driven impacts? Workshop participants identified that focused discussions on this topic, such as through a working group, would be a valuable next step, a point underscored and supported by representatives from the California Department of Fish & Wildlife and the California Fish & Game Commission.

**Explore the creation of a model for port climate vulnerability assessments.** Ports were highlighted throughout the workshop as obvious proxies for place-based fishing communities, as well as a key intersection of several fishing-related activities - including processors, local markets, and launch points for multiple commercial and recreational fisheries. Participants articulated that a better understanding of the unique needs of California's ports in addressing climate-driven impacts is a critical knowledge gap. Some ports have already undertaken assessments of climate change readiness and future infrastructure needs; adapting such efforts into a consistent, comprehensive template to assist the state in understanding port-specific priorities and goals throughout California could be a logical next step.

**Need for fishing communities to articulate needs and objectives.** Throughout the workshop discussions, the conversation continually returned to the notion that effective solutions are most successful when co-created with a foundational understanding of local needs, and with local stakeholder participation. Participants stressed that, due to the variation in climate change effects that different communities will face and differing social goals held by each community, the solution set for addressing climate change in California's fishing communities will not be one-size-fits-all. An appropriate and coordinated approach between state and local interests can be fostered by creating venues and opportunities for multiple individual communities to articulate their own adaptation goals, and associated information needs.

Some of this effort has already been underway. Between 2016 and 2018, the California Fish & Game Commission held a series of stakeholder conversations in coastal communities across the state, with the goal of informing the Commission of issues facing coastal fishing communities, including those related to climate change. Building upon this previous effort, Fish and Game Commission staff expressed interest

in advancing the conversation - which has historically been focused on climate impacts - into an evaluation of solutions. Next steps could include an exercise in matching community-specific climate stressors to potential options for addressing them, with enough detail to allow each fishing community to weigh in on acceptability, feasibility, and prioritization. Workshop participants noted the opportunity to engage community organizers and federal partners, the latter of which are especially well-positioned to provide science support to communities who already know their ecosystem objectives.

## **Conclusion**

As discussed throughout this workshop, we are entering an era where uncertainties and unpredictable impacts of climate change will become more prevalent. Addressing these impacts will require novel partnerships, developing and applying new and existing tools, and strategic decision-making under uncertainty. This workshop launched a critical conversation exploring the management tools and policy levers that may help address impacts fishing communities face under changing ocean conditions. It was designed to align with a number of related initiatives on the West Coast, including the completion of the California Fish and Game Commission's Draft Final Staff Synthesis Report on California Coastal Fishing Communities Meetings, the continued development of climate factors to inform the prioritization of state-managed fisheries in California, and an ongoing scenario planning exercise of the Pacific Fishery Management Council's Climate and Communities Initiative. Some of these efforts have already begun to incorporate comments and thinking from this workshop as they continue to develop, while others are poised to work in tandem with the recommendations and next steps identified here. While there is still considerable work to be done in navigating the complex interplay of rapidly changing ecosystems and fishing community durability, this workshop provided a first opportunity for decision-makers, fishers, NGOs, and other experts to productively confront a challenging topic and explore the role the State of California can play in crafting innovative solutions.



## Workshop Participants

Debbie Aseltine-Neilson	California Department of Fish and Wildlife
Susan Ashcraft	California Fish and Game Commission
Paige Berube	California Ocean Protection Council
Travis Buck	California Department of Fish and Wildlife
Hayley Carter	Ocean Science Trust
Mike Conroy	West Coast Fisheries Consultants
Jenn Eckerle	California Ocean Protection Council
Chad English	The David and Lucile Packard Foundation
Sherry Flumerfelt	Monterey Bay Fisheries Trust
Kathryn Frens	NOAA Fisheries
Mark Gold	California Ocean Protection Council
Chris Harvey	NOAA Fisheries
Kate Kauer	The Nature Conservancy
Jessica Kauzer	Ocean Science Trust
Justine Kimball	California Ocean Protection Council
Gway Kirchner	The Nature Conservancy
Heather Ludemann	The David and Lucile Packard Foundation
Nate Mantua	NOAA Fisheries
Maggie McCann	California Fish and Game Commission
Huff McGonigal	Fathom Consulting
Melissa Miller-Henson	California Fish and Game Commission
Noah Oppenheim	PCFFA
Carrie Pomeroy	California Sea Grant
Elizabeth Pope	California Fish and Game Commission
Bryn Power	Ocean Science Trust
Kirsten Ramey	California Department of Fish and Wildlife
Corey Ridings	Ocean Conservancy
Anthony Rogers	Ocean Science Trust
Jim Sanchirico	University of California, Davis
Kim Selkoe	Commercial Fishermen of Santa Barbara (CFSB)
Craig Shuman	California Department of Fish and Wildlife
Valerie Termini	California Department of Fish and Wildlife
Tom Weseloh	Joint Committee on Fisheries and Aquaculture
Liz Whiteman	Ocean Science Trust

## WORKSHOP AGENDA

# LAUNCHING AN EXPLORATION OF POLICY & MANAGEMENT OPTIONS IN CALIFORNIA TO ADDRESS CLIMATE CHANGE IMPACTS ON FISHING COMMUNITIES: A LEARNING WORKSHOP

8:30 AM - 4:30 PM

July 16, 2019

Stanley Mosk Library & Courts Building, Room 500  
914 Capitol Mall, Sacramento, CA 95814

## PARTICIPANTS

D. Aseltine-Neilson (CDFW), S. Ashcraft (FGC), P. Berube (OPC), T. Buck (CDFW), H. Carter (OST), M. Conroy (WCFC), J. Eckerle (OPC), C. English (Packard Foundation), S. Flumerfelt (Monterey Bay Fisheries Trust), K. Frens (NOAA), C. Harvey (NOAA), K. Kauer (TNC), J. Kauzer (OST), A. Kellum (OPC), J. Kimball (OPC), H. Ludemann (Packard Foundation), G. Kirchner (TNC), N. Mantua (NOAA), M. McCann (FGC), H. McGonigal (Fathom Consulting/RLF), M. Miller-Henson (FGC), N. Oppenheim (PCFFA), C. Pomeroy (CA Sea Grant), E. Pope (FGC), B. Power (OST), K. Ramey (CDFW), C. Ridings (Ocean Conservancy), A. Rogers (OST), J. Sanchirico (UC Davis), K. Selkoe (CFSB), C. Shuman (CDFW), V. Termini (CDFW), T. Weseloh (JCFA), L. Whiteman (OST)

## WORKSHOP OVERVIEW

Changing ocean conditions as a result of climate change present new and unpredictable challenges that are already resulting in social and economic impacts within California coastal fishing communities. This workshop will focus on how state management tools can potentially help address the impacts that fishing communities, specifically, will face under climate change. To spark conversation, we'll draw from potential case studies or examples of management-oriented solutions, centered on communities, from both within California and elsewhere in the world, and try to understand what they can offer in a California-specific context.

## GOALS

- Launch an exploration of how (and to what extent) state management tools can potentially be used to address the impacts that fishing communities will face under climate change
- Use ideas and examples from outside the state to identify potential policy levers, and management processes and tools, with a focus on applicability to the California context
- To identify initial options and management tools that can potentially be discussed and refined with fishing communities along California's coast

# AGENDA

**8:30 - 9:00 AM**

## **Welcome and Introductions**

*Purpose: coffee, get settled, (re)introduction, short opening discussion*

**9:00 - 9:30 AM**

## **Framing this workshop and the challenges in CA**

*Purpose: Set the scene for this discussion, including workshop need, scope and focus: fishing community-level impacts of climate change, and the management tools and policy levers available to meet such challenges.*

*Note where possible we will explore the scientific inputs and management tools that other regions/countries are using or exploring to address: 1) community resilience/adaptation, and 2) management responsiveness/adaptation. The expectation is that the conversation will be centered on usefulness and applicability to a California management context. Weave in Q/A and discussion.*

**9:30 - 11:00 AM**

## **Range shifts & ecosystem variability**

**9:30 - 9:40** Overview of climate change effects & community-level impacts

**9:40 - 9:50** Case study: Australian rock lobster (Noah Oppenheim)

**9:50 - 10:00** Case study: Monterey Bay Fisheries Trust (Sherry Flumerfelt)

**10:00 - 11:00** Discussion

**11:00 - 11:15 AM**

## **BREAK**

**11:15 - 12:15 PM**

## **Sea level rise & intensifying storms**

**11:15 - 11:25** Overview of climate change effects & community-level impacts

**11:25 - 12:15** Discussion

**12:15 - 1:00 PM**

## **LUNCH**

**1:00 - 2:00 PM**

## **Other environment-driven challenges**

*What is the community impact of each of these issues? Are solutions already discussed today applicable to these challenges as well, or are there fundamentally different management and policy levers needed to address them? What does (policy/management) uncertainty look like for each of these challenges, and how does that affect potential decisions?*

**1. Changing ocean chemistry (OA, O<sub>2</sub>, etc.)**

**2. HABs**

**3. Non-marine/coastal climate impacts/changes (e.g., drought, wildfire)**

**2:00 - 3:20 PM**

**Discussion: Cross-cutting themes**

**2:00 - 2:10** Case study: Rhode Island fishing communities (Kathryn Frens)

**2:10 - 3:20** Discussion

*Purpose: While some of these challenges may come up at several points throughout the day, this dedicated agenda space will ensure that we discuss a) overarching issues that present themselves across the discussed challenges so far, and b) critical cross-cutting challenges that haven't yet been touched on at this point.*

**1. Social challenges (2:10 - 2:45)**

e.g. Lack of adequate insurance/loan availability; supply chain vulnerability under climate change; "graying of the fleet" and sense of community under climate change.

a. cultural

b. economic

**2. Uncertainty and risk management (2:45 - 3:20)**

**3:20 - 3:30 PM**

**Break**

**3:30 - 4:00 PM**

**Discussion (continued): Cross-cutting themes**

**4:00 - 4:30 PM**

**Discussion: Moving forward**

*Purpose: Step back, take stock and think about opportunities to advance our thinking. Digest everything learned about the existing tools available to address the challenges communities will face. Attempt to highlight where management tools can play a role in adaptation, and where new tools and initiatives will be needed.*

**Potential discussion questions:**

- *For each of the climate change-driven impacts that fishing communities will face, what tools are available now to help address them?*
- *Are there impacts that other public or private entities may be better equipped to handle?*
- *What information do we have - or not have - that could help us think this through more?*
- *What are the roadblocks holding back some of these proposed solutions?*
- *Is there something you've heard today that seems to be a re-occurring theme, idea, or need?*

**4:30 - 5:30 PM**

**Drinks**



NOTES

