

# **Social & Economic Resilience of the Northern California Commercial Red Sea Urchin Fishery**

## **Summary of an OST Facilitated Workshop**

*February 9th, 2024*

*Town Hall, Fort Bragg, CA*

### **About the Workshop**

Since 2014, kelp forests along the Northern California coast have declined significantly due to changing ocean conditions, with as much as a 93 percent decline in kelp cover. This kelp loss has had significant and detrimental impacts on the marine ecosystem. Further, the people and communities that depend on healthy kelp forests for their livelihood and well-being have experienced social and economic impacts, including the northern California commercial red sea urchin fishery<sup>1</sup>, which was officially declared a federal fishery disaster in 2016–17 and 2018–19.

In 2022, a team led by California Ocean Science Trust (OST) and including experts at UC Santa Cruz (UCSC), the California Sea Urchin Commission, and the Greater Farallones Association was awarded funding from the Department of Commerce passed through the Pacific States Marine Fisheries Commission (PSMFC) via a competitive process resulting from the 2016–17 fishery disaster. The aim of the project is to assess social and economic impacts of the fishery disaster and identify strategies to enhance the fishery’s resilience to environmental disturbances such as kelp loss and resulting red urchin declines.

Using a mixed-methods approach, this project explores the social and economic impacts of this fishery disaster through (1) conducting commercial fishery data analysis and interviews with North Coast red sea urchin fishery participants and fishing community members, (2) convening a workshop to collaboratively identify and evaluate potential strategies to improve resilience to current and future challenges, and (3) engaging and communicating results to the fishing community, resource managers and partners to facilitate their use in local, state, and federal decision-making. The overarching goal of this work is to assist agencies and the fishing community in enhancing responsiveness and resilience to kelp loss and associated fishery impacts.

As part of this project, OST and the project team hosted a half-day, in-person workshop on February 9th, 2024 in Fort Bragg, California. The goal of the workshop was to collaboratively identify and evaluate potential strategies to improve the fishery’s and the fishing community’s resilience to future environmental disturbances. Workshop participants included Fort Bragg commercial red sea urchin divers and processors directly affected by the North Coast fishery collapse, staff from state agencies with jurisdiction in the science and management of the red

---

<sup>1</sup>Throughout this report, “red urchin fishery” or “red sea urchin fishery” are often used as a shorthand and refer to the northern California commercial red sea urchin fishery. “North Coast” is also used synonymously with “northern California.”

urchin fishery<sup>2</sup>, local officials, environmental non-governmental organizations (eNGOs) staff, and community members involved in resilience-building initiatives (see Appendix for a list of workshop attendees). The northern California commercial red sea urchin fishery is composed of divers, handlers and processors with knowledge, experience and perspective concentrated in Mendocino County and extending south to Sonoma and Marin counties.

The workshop included presentations to provide context and set the scene by walking through the federal fishery disaster process, preliminary findings from the ongoing socioeconomic impact assessment, and kelp restoration efforts involving northern California commercial red sea urchin divers (see Appendix for the full agenda and list of talk titles). This was followed by focused brainstorming and discussion of the needs, opportunities, and challenges facing the northern California commercial red urchin fishery and fishing community and ideas for building resilience. The workshop results summarized in this report are being shared with industry, resource managers, and partners to help inform local, state and federal discussions and decision-making to address future disturbances and associated fishery impacts. Workshop participants had the opportunity to review this workshop report. A final project report will provide the results of the socioeconomic impact assessment, a brief summary of this workshop, and a synthesis of ideas and insights for enhancing fishery resilience.

### ***Background: Northern California Commercial Red Sea Urchin Fishery Disaster Declaration and Impacts to the Fishery and Fishing Community***

Beginning in 2014 and 2015, a “perfect storm” of events led to the dramatic decline of California’s kelp forests and subsequent impacts to the ecosystem when a sea star wasting disease killed large numbers of sea stars that predate on purple sea urchins. Shortly after, a marine heatwave known as “the blob” in 2014 followed by El Niño events in 2015 warmed nearshore waters, causing massive kelp declines. Without kelp to eat, red sea urchin gonads (reproductive organs) shriveled, rendering them unmarketable, and in some cases causing red urchin mortality. Further exacerbating the issue, the smaller and more robust purple sea urchin voraciously feeds on remaining kelp, resulting in urchin barrens. Ultimately, the kelp collapse and subsequent cascading effects have had significant socioeconomic impacts on the northern California commercial red sea urchin fishery and fishing community, prompting a request for a federal fishery disaster Declaration and disaster relief funds.

In 2017 the California Sea Urchin Commission asked the then-Director of the California Department of Fish and Wildlife (CDFW) for assistance to obtain a disaster declaration for the fishery by compiling evidence to submit to NOAA Fisheries. The Urchin Commission then petitioned then-Governor Jerry Brown to request a federal fishery disaster declaration for the statewide fishery. That request was denied due to the fishery not meeting the required minimum revenue loss of 35 percent compared to the average of the previous five years. Whereas the statewide revenue loss of 15 percent did not meet the criteria for a disaster determination, the

---

<sup>2</sup>Staff from the Ocean Protection Council and California Department of Fish & Wildlife attended virtually due to state policy that prevented travel.

northern fishery's 77 percent loss did. In 2019, Governor Gavin Newsom successfully re-applied for a 2016 and 2017 federal fishery disaster for the Northern Management Zone only, as the northern and southern fisheries are managed distinctly. In 2020, Congress allocated \$3.3 million to the northern commercial red urchin fishery. Funds were allocated based on a spend plan developed by CDFW in consultation with the urchin industry, with 79 percent for affected divers and processors, 20 percent for mitigation and research, and 1 percent for PSMFC overhead. This project, along with projects addressing marketing, alternative uses of purple urchins, and kelp restoration efforts, are supported with the mitigation and research funds. With the fishery continuing to experience losses, Governor Newsom subsequently requested federal fishery disaster assistance for the northern fishery for 2018 and 2019, with the request approved in October 2023 and an allocation of \$1.6 million announced in January 2024. New changes to the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) allow the fishery to apply again. Having received two federal fishery disaster declarations over a 4-year period, the northern commercial red urchin fishery is reevaluating a new application for years 2020-2023 in collaboration with CDFW. Receiving additional federal fishery disaster funding is not a guarantee nor a long-term remedy, highlighting the need for additional and alternative resilience strategies for the fishery and fishing community.

To date, responses to the fishery disaster have focused on kelp restoration with several efforts and research projects underway along the North Coast. These efforts variously involve eNGOs, academic and agency researchers, and recreational dive and commercial red sea urchin fishery organizations, with state, federal, and private funding support, plus volunteer efforts. In addition, the state has created a research program, developed action plans, and announced \$5 million in additional funding for kelp restoration and research.

## **Workshop Results**

The primary goal of the workshop was to convene northern California commercial red urchin fishery participants, including divers and processors, and other community members, as well as key state agency staff to 1) collaboratively identify and evaluate potential strategies to improve the fishery's and the fishing community's resilience to future environmental disturbances, and 2) discuss the opportunities, challenges, and needs for implementing those resilience strategies. For this project, "resilience strategies" include *actions* and *approaches* that could help improve the fishery's and fishing community's ability to cope with or adapt to future environmental disturbances. The workshop and this project were designed so that resilience strategies are identified by fishery participants and fishing community members, and are grounded in and informed by their knowledge and experience.

In preparation for the workshop, OST staff members Dr. Lauren Linsmayer and Dr. Heidi Waite reached out to fishery participants and other fishery- and kelp-connected community members primarily in the Fort Bragg/Mendocino area to begin to learn about their ideas for resilience strategies. These preliminary strategies were combined with those identified by co-PI Dr. Carrie Pomeroy (UCSC) and project partner David Goldenberg (California Sea Urchin Commission) in their ongoing research (interviews, commercial fishery data analysis) to assess the

socioeconomic impacts of the fishery disaster. The resulting preliminary list of resilience strategies provided a basis for discussions at the workshop, though not all of the preliminary strategies were discussed at the workshop (Table 1).

### ***Fishery Disaster Impacts on the Community***

As a result of the reduced abundance and condition of the North Coast red urchin, the fishery and fishing community have experienced significant social and economic impacts. In both informal conversations ahead of the workshop and interviews conducted for the socioeconomic impact assessment, fishery participants shared their responses to the fishery collapse. Some diversified their local fishery-related activities, while others shifted to urchin and/or other fisheries in other regions or states (e.g., sea cucumber in Alaska); and some pursued employment in land-based jobs, whether temporarily or longer-term. Some divers, especially those who are older, retired from the fishery or from fishing entirely. For others, the northern commercial red sea urchin fishery was and still is a family business and involves multiple generations working in the fishery in various capacities. Because North Coast communities like Fort Bragg are small and depend on fisheries, the kelp loss and fishery disaster have caused ripple effects throughout the community.

In response to the fishery disaster, some northern California commercial red sea urchin divers have engaged in kelp restoration efforts, particularly purple sea urchin removals. Financial compensation for their work has helped to offset fishery income losses, although it is not sufficient, nor intended, to replace fishery income. Moreover, funds available are limited and participation is not feasible for some North Coast divers. Workshop participants discussed concerns about the limited amount and inconsistency of funding and dependence on such limited and inconsistent funds to support them in the absence of a recovered fishery.

### ***Resilience Strategies Explored***

This workshop aimed to discuss and identify potential strategies for enhancing the fishery's and fishery community's resilience to future perturbations. Results of interviews and informal conversations prior to the workshop were used to draft a preliminary list of resilience strategies, which provided a foundation for discussions at the workshop (Table 1).

**Kelp restoration.** Much of the workshop discussion centered around kelp restoration, given the multiple ongoing efforts in the region involving commercial urchin divers. Since kelp loss began in 2014, multiple entities have mobilized to fund and test various kelp restoration approaches. Some of these efforts have involved northern California commercial red urchin divers, given their experience, knowledge, and skills removing urchins. Workshop participants discussed restoration tools and methods, appropriate payment for commercial divers, and valuing and making fuller use of diver knowledge and skills in the design and implementation of restoration activities (e.g., site selection, planning and outplanting, as well as purple urchin removal).

*Identifying effective methods.* Kelp restoration efforts to date have focused on either purple urchin removals and/or kelp outplanting. Despite testing and implementing several methods, kelp recovery rates remain very low in the North Coast. Workshop participants discussed the need to find successful methods for supporting kelp recovery, which is foundational to the recovery of red urchins. Among many divers at the workshop, clearing as many purple urchins as possible, in addition to outplanting kelp, remains a priority. Some discussed the importance of safeguarding and protecting remnant kelp areas by focusing on removing purple urchins around those strongholds and continuing removals to maintain those areas.

*New restoration tools.* Some divers have developed purple urchin removal methods and tools such as an “airlift.” (An airlift is a low-pressure vacuum used underwater by divers to transfer the urchins they rake off the seafloor to a collection bag or the vessel they are diving from.) Divers at the workshop who have been involved in developing such methods are interested in securing funding and fishery management support for adoption of those methods. They also are seeking approval for use of those methods in national marine sanctuaries, where they currently are not allowed. Other workshop participants suggested the need to evaluate the effectiveness of these techniques before wider adoption.

*Leverage diver expertise.* Many of the divers have been diving the North Coast for decades and have extensive knowledge of different sites, conditions and local ecology. Those at the workshop noted that while they do not typically share their dive sites with each other when competing for red urchins, they are more inclined to collaborate and share knowledge for kelp restoration. Many divers said they want their knowledge to be utilized in choosing sites for restoration efforts. In addition, many of them have boats that can be utilized for restoration efforts and extensive experience navigating the region’s often challenging weather and ocean conditions.

*Flexible approaches.* Workshop participants also identified a need for more flexibility (or alternative approaches) for removing purple urchins. Currently, kelp restoration teams organize work days at specified sites where divers collect purple urchins. Workshop participants suggested that if they had the flexibility to work at their own pace and at multiple locations identified as priority sites, they could be more efficient in removing urchins. Divers have particular and considerable knowledge and experience of ocean conditions and how they differ across location, time of day, and season, which affect access to sites, safety, viability, and effectiveness of purple urchin removal efforts. Having a flexible system for restoration would allow divers to be less constrained to get on the water when conditions are suitable. Workshop participants also expressed interest in collaborating to develop a “hit list” of priority purple urchin removal sites.

*Involving divers in monitoring.* Some workshop participants expressed interest in using their specialized diving skills and being trained to assist with monitoring. They also noted that they have experience, skills, and equipment that enable them to work effectively and frequently at multiple depths and locations where science teams typically cannot, which

would allow them to collect more data more frequently. Workshop participants discussed whether underwater photographs could be used for monitoring over time, though water column visibility conditions could limit the effectiveness of this approach.

*Equitable payment for divers.* Currently, commercial divers participating in ongoing, externally funded and led kelp restoration efforts are paid a fixed hourly or daily rate for their work. Some workshop participants indicated a preference for paying divers for their output (e.g., pounds of purple urchins removed) rather than for their time. They noted that this is similar to how the commercial fishery works and felt that this would both enhance the incentive to work efficiently and be more equitable. Others disagreed, noting that payment per pound might incentivize divers to only take the largest purple urchins and leave behind smaller urchins. After the workshop, a supporter of the airlift method noted that use of that method, which is suitable only in deeper waters where small urchins are commonly found, could help address this issue.

*Scaling up restoration efforts.* Many workshop participants were interested in expanding kelp restoration efforts, by both increasing the geographic scale and scope and spending more days on the water. It was mentioned that a challenge will be to ensure that regulations are in sync to allow scaled up restoration efforts. While specific regulatory needs were not discussed at the workshop, any proposed changes would be under the jurisdiction of the California Fish and Game Commission and CDFW.

*Increased funding and support for divers.* While state, federal, eNGO, and locally raised private funds have gone to support kelp restoration and research, workshop participants discussed concerns about there being enough consistent, long-term funding for kelp restoration efforts, at appropriate geographic and time scales. With fishery participants' significant loss of income from the fishery disaster, payment for their engagement in kelp restoration activities has been important for those divers. Some workshop participants expressed interest in more direct funding to divers for their involvement in kelp restoration. It was suggested that this could be achieved by directing funding to entities with lower overhead costs, so that a larger proportion of the funds are available for direct costs such as diver effort.

**Alternative or flexible permits.** Some divers at the workshop expressed interest in alternative or more flexible permits. Since 1985, CDFW has required that licensed commercial fishermen have a non-transferable red sea urchin dive permit to dive for red urchins. Additional fishery management measures include minimum size restrictions and multi-day closures at times throughout the year. In response to changing ocean conditions, flexible or alternative fishing permits have been suggested as a way to enable fishermen to adapt in real time. For example, this includes exploring options for permits to be used during times or in areas that are otherwise restricted (e.g., in marine protected areas). There was also interest among workshop participants in special permits for purple urchin removals, as has been done with the recreational fishery, to assist restoration efforts.

**Fishery insurance.** Fishery insurance was mentioned at the workshop, but details were not discussed. Fishery insurance, potentially analogous to crop insurance, could be a risk management tool for fisheries that experience unexpected losses, particularly in the face of climate change impacts, although it has yet to be implemented for wild capture fisheries in the U.S.

**Developing markets for purple urchins.** Given the purple urchin population explosion since 2014, a number of different ideas for developing markets for purple urchin products have emerged. One is urchin “ranching,” which involves fattening up harvested purple urchins (in ocean enclosures or land-based facilities) to marketable size and quality uni for human consumption. Another is looking into using purple urchin spines to create pigment dyes for textiles, fertilizer for growing grapes or other crops, and using the whole shell as a calcium source for chicken feed. Developing new markets may also enable processors to use their facilities, which are tailored for processing urchins, for these and other activities (e.g., converting to ranching). However, according to processors at the workshop, urchin ranching is not sufficiently profitable to justify such an investment. Workshop participants expressed interest in an economic feasibility study of converting their operations for urchin ranching.

**Improving port and harbor infrastructure.** Currently, North Coast ports and harbors associated with the commercial urchin fishery face various challenges in providing and maintaining fishery-support infrastructure, goods, and services. Infrastructure needs for Mendocino County ports include hoists for deploying and retrieving small vessels used in the fishery and unloading urchin (Point Arena, operated by the city), a fuel dock (in Noyo Harbor), and affordable, accessible slips and unloading facilities (e.g., Albion, a private site). Workshop participants expressed the need for basic infrastructure maintenance and efficient access to ports, especially in areas closest to kelp restoration and urchin diving sites. A workshop participant noted that Port Arena has become expensive and unreliable. It was discussed that more funding and resources for making these basic infrastructure improvements is needed.

**Table 1:** Preliminary list of resilience strategies identified in pre-workshop conversations and interviews with fishery participants and other fishing community members.

<p><b>Human (Socioeconomic) Resilience</b></p>
<ul style="list-style-type: none"> <li>● Address infrastructure needs (e.g., docks, unloading facilities, processing facilities, fuel dock)</li> <li>● Change permits to expand access to fishing areas/times (i.e., flexible fishing permits) or gear types (e.g., trapping methods)</li> <li>● Change permit system to increase entry into fishery (i.e., transferable permits or lottery permit system)</li> <li>● Explore developing fishery insurance</li> <li>● Avoid closing nearshore diving areas (to reduce cost and overnights)</li> <li>● Open up some marine protected areas to the fishery allowing for adaptive fishery management</li> <li>● Diversify fishing portfolio (e.g., participate in other fisheries) or move into new fishery</li> <li>● Move between northern and southern commercial red sea urchin fisheries or deeper depths</li> <li>● Transition into land-based careers</li> <li>● Equip next generation of divers with fishery knowledge and skills</li> </ul>
<p><b>Ecological Resilience</b></p>
<ul style="list-style-type: none"> <li>● Increase funding for kelp restoration efforts</li> <li>● Proactively invest in research to be more responsive to future environmental disturbances</li> <li>● Promote information-sharing among kelp restoration projects (e.g., southern and northern sites, between different groups)</li> <li>● Test new methods for kelp restoration / purple urchin removal</li> <li>● Restore sunflower sea star (<i>Pycnopodia</i>) populations</li> </ul>
<p><b>Both</b></p>
<ul style="list-style-type: none"> <li>● Continue funding / expansion of kelp restoration activities (e.g., more geographic coverage, additional sites)</li> <li>● Encourage diver participation in kelp restoration / equitable pay</li> <li>● Coordinate / consult with divers to utilize expertise (e.g., site selection), boats, equipment, and dockside facilities for restoration and monitoring</li> <li>● Increase collaboration among agencies, fishery participants, and scientists (e.g., management, research, restoration)</li> <li>● Develop markets for purple urchin products / ranching purple urchins</li> <li>● Provide opportunities with the urchin fishery representatives to explore adaptive management strategies in real time within a defined area</li> </ul>



## Opportunities, Challenges, and Needs Discussed

**Sense of urgency / prioritizing action.** Workshop participants expressed a sense of urgency about the state of the northern California red urchin fishery and kelp restoration. While some were skeptical, others expressed hope about the possibility of the fishery recovering. A need to clarify the community's long term goals for the fishery and kelp restoration was identified as well. Continuing conversations to explore fishing community members' goals and desired outcomes for both the future of the fishery and kelp restoration will help clarify and prioritize specific actions, coordinate efforts, and identify funding opportunities.

**Future funding.** Workshop participants expressed a desire for consistent, long-term funding to support rebuilding the fishery and kelp restoration efforts. However, it has been difficult for the urchin dive community to obtain grant funding for leading kelp restoration work, with funding tending to go to organizations. Non-governmental sources of funding or emerging blue carbon credit schemes for kelp restoration were identified as potential sources of funding to be explored further. Since the most recent disaster declaration for this fishery, an update to the Magnuson-Stevens Act that excludes fishery disaster years when evaluating economic loss opens the possibility for additional federal disaster relief for the red urchin fishery. However, future, and repeated, fishery disaster requests may not be granted or the total appropriations may be reduced amid increasing numbers of requests from this fishery and others across the country.

**Scientific research needs.** Workshop participants discussed some of the science needed to inform efforts to restore kelp and rebuild the northern California commercial red urchin fishery, and potential opportunities for divers to become more involved in some of these efforts and/or utilize their firsthand knowledge. Two key research topics identified were where and how thorough urchin removals need to be to make a meaningful improvement in kelp recovery and identifying and evaluating the most effective methods for restoration.

**Limited entry permit system and supporting the next generation.** Since the fishery collapse, the future of the northern California commercial red urchin fishery has been uncertain. Workshop participants expressed concern about the next generation of urchin divers, given there are few opportunities for young people to become involved in the urchin fishery. The fishery is managed using a limited entry system, with about 230 urchin dive permits and a capacity goal of 150 permits set by the Fish and Game Commission in 2017. Urchin dive permits are non-transferable with a CDFW-managed lottery that requires 11 permits to be retired before a new permit can be offered. This has all but eliminated access to the fishery for new (and typically younger) entrants. Workshop participants discussed concerns about the loss of knowledge and skills in the fishery, its durability, and the viability of markets. Beyond ensuring access to the fishery for future divers, other ideas for supporting the next generation were not discussed at the workshop.

**Other concerns.** Workshop participants also raised concerns about proposed sea otter reintroduction and impacts of the 2011 Fukushima nuclear accident on the marine environment.

However, these were tabled for future discussion as they were beyond the scope of the workshop.

## **Summary and Next Steps**

Fisheries in a changing climate and other environmental disturbances face many unprecedented challenges and uncertainties. Federal fishery disaster relief has helped to mitigate some of the negative impacts on fishery participants and communities. However, this funding is not ensured for the long-term, as environmental conditions continue to change and demands on that support system increase. There is a need to understand the economic and social impacts of fishery disasters and explore new tools, management practices, and strategies for coping and adapting to them. This workshop launched a conversation among fishery participants, government agencies, NGOs, and other community members to build shared understanding and explore opportunities, challenges, and strategies to help enhance the resilience of the northern California commercial red sea urchin fishery and fishing community under changing ocean conditions. Ongoing interviews and socioeconomic data analysis for this project will further inform these efforts. A final project report will provide the results of the socioeconomic impact assessment, a brief summary of this workshop, and a synthesis of ideas and insights for enhancing the northern California commercial red sea urchin fishery resilience. Results of the workshop and final results from all components of the project will be shared with industry, affected communities, legislators, resource managers, NGOs, and others to spur further collaboration on new tools and practices for a resilient fishery.

## Appendix Workshop Participants

<b><u>Project Team</u></b>	
Heidi Waite	Ocean Science Trust
Lauren Linsmayer	Ocean Science Trust
Anthony Rogers	Ocean Science Trust
David Goldenberg	California Sea Urchin Commission
Carrie Pomeroy	UC Santa Cruz
Tyler Mears	Greater Farallones Association
Gina Contolini	Greater Farallones Association

<b><u>Participants</u></b>	<b>#</b>
Divers (past & present) & deck hands	8
Processors & associated fishery community	6
Harbor master	1
Kelp restoration NGOs	1

<b><u>Agency Participants</u></b>	
Derek Stein	California Department of Fish and Wildlife
Kirsten Ramey	California Department of Fish and Wildlife
Joanna Grebel	California Department of Fish and Wildlife
Mike Esgro	Ocean Protection Council
Pike Spector	Ocean Protection Council
Katie Cieri	Ocean Protection Council, Sea Grant Fellow

## Agenda



UC SANTA CRUZ



## Red Sea Urchin Fishery Social & Economic Resilience Workshop

*February 9, 2024 12 pm - 4:30 pm*

*Town Hall, Fort Bragg, CA*

**Background:** The California Ocean Science Trust (OST), California Sea Urchin Commission, Greater Farallones Association (GFA), and experts at UC Santa Cruz are partnering on a project that seeks to understand the social and economic response and resilience of the North Coast red sea urchin fishery and fishing community to kelp forest collapse. This project is funded by a Pacific States Marine Fisheries Commission grant resulting from the federal fishery disaster declaration for the commercial red urchin fishery in 2016 and 2017.

Prior to the workshop, project partners Dr. Carrie Pomeroy of UC Santa Cruz and David Goldenberg of the California Sea Urchin Commission are conducting interviews with fishery participants and others to assess the social and economic impacts of the North Coast red sea urchin fishery disaster on the fishery participants and the fishing community. These results will inform discussions at the workshop.

**Objectives:** This half-day workshop, organized by OST, is designed to convene a small group of red urchin fishery participants, processors, and community members as well as key agency staff and government officials to 1) collaboratively identify and evaluate potential strategies to improve the fishery's and the fishing community's resilience to future environmental disturbances, and 2) discuss the opportunities, challenges, and needs for implementing those resilience strategies.

**Outputs:** OST will provide workshop results to the industry, resource managers, and partners to facilitate their use in local, state, and federal decision-making and to assist in developing a more responsive framework to minimize kelp loss and associated fishery impacts.

**Contacts:** Lauren Linsmayer ([lauren.linsmayer@calost.org](mailto:lauren.linsmayer@calost.org)), Heidi Waite ([heidi.waite@calost.org](mailto:heidi.waite@calost.org))

## Agenda

### 12:00 - 12:15 | Welcome & Introductions

- Overview of workshop goals and agenda, *OST*
- Round Robin introductions, *all*

### 12:15 - 1:35 | Fishery Disaster Impacts & Responses // LUNCH (provided)

- “Red Sea Urchin Disaster: High-Level Overview of the Disaster Process”, *CDFW (10 min)*
  - *Brief overview of process and timeline for disaster funds for the red sea urchin industry*
- “Red Sea Urchin Fishery Social & Economic Resilience Workshop: Overview of 2016, 2017 Red Urchin Fishery Disaster Declaration”, *Dave Goldenberg (10 min)*
  - *Set context of the North Coast collapse and where funding was allocated in the community, overview of types of projects being funded from disaster declaration, and updates on the 2018-2019 disaster declaration*
- “The Northern California Sea Urchin Fishery & Disaster: Brief history, assessing impacts of 2016-17 fishery disaster, and potential strategies for resilience”, *Carrie Pomeroy (20 min)*
  - *Summary of the fishery’s complex history and list of potential strategies that emerged from interviews*
- “Urchin Removals for Kelp Restoration in Greater Farallones National Marine Sanctuary”, *Greater Farallones Association (10 min)*
  - *Recap of GFA-led kelp restoration efforts, techniques, and impact on red sea urchin fishery*
- “Overview of Mendocino Kelp Recovery Efforts with the California Sea Urchin Fishery”, *Kelp restoration NGO (10 min)*
  - *Recap of kelp restoration efforts, techniques, and impact on red sea urchin fishery*
- Audience Q&A (20 min)

### 1:35 - 1:45 | Break

### 1:45 - 3:00 | Small Group Discussions - Identify Resilience Strategies & Needs

- Set goals and guidelines, *OST*
- Small groups discussions
  - *Provide feedback and refinement of compiled preliminary strategies list that emerged from surveys and add additional strategies. Begin to identify opportunities/challenges of advancing or implementing potential strategies*

### 3:00 - 3:15 | Break

### 3:15 - 4:20 | Full Group Discussion - How to Advance Resilience Strategies

- Facilitated group discussion, *OST*
  - *Share and discuss strategies, key actors to engage, challenges, and next steps to advance or implement each identified strategy*

**4:20 - 4:30 | Wrap Up, Next Steps & Close**

**4:40 - 6:00 | Informal Happy Hour**