California Commercial Fishing Gear Innovations Workshop for Commercial Dungeness Crab Fishermen and Fishermen Involved in State Managed Fixed-gear Fisheries

Summary Report

Summary developed by the National Marine Sanctuary Foundation, California Department of Fish and Wildlife, and the California Ocean Protection Council on September 23, 2022

The California Commercial Fishing Gear Innovations Workshop, co-hosted by the National Marine Sanctuary Foundation, California Department of Fish and Wildlife (CDFW), and California Ocean Protection Council (OPC), was held on August 24, 2022 at the Bay Model Visitor Center in Sausalito, California.

The workshop invited commercial Dungeness crab fishermen, commercial fishermen involved in other state managed fixed-gear fisheries, and fishing gear manufacturers to:

- Explore options and ideas for potential gear innovations to be used when the commercial Dungeness crab fishery is otherwise closed due to elevated entanglement risk.
- Exchange ideas, learn from each other, and generate feedback that can be used to adapt and refine gear.
- Establish a clear understanding of the next steps related to testing gear innovations during the 2022-23 and future fishing seasons.

During the workshop, gear demonstrations were provided by manufacturers and participants asked questions and provided real-time feedback after each presentation. An interactive breakout activity allowed participants additional hands-on interaction with the gear. The workshop wrapped up with a facilitated discussion to explore ideas, questions, and perspectives, and inform next steps.

Nearly 40 participants attended the workshop including Dungeness crab and other fixed gear fishermen, fishing gear designers and manufacturers, and staff from the CDFW Marine Region and Law Enforcement Division, OPC, and National Marine Sanctuary Foundation. Facilitation support was provided by Strategic Earth Consulting.

The purpose of this summary report is to provide a high-level overview of the presentations, discussion highlights, and perspectives/feedback shared during the workshop. The references, handouts, and materials shared at the workshop are available on page 8 of this document.

Gear Demonstrations

The first half of the workshop was structured around short presentations where gear manufacturers demonstrated their technologies. The following gear types were presented (listed in order of presentation, which was selected randomly).

- Ashored Innovations (MOBI) - On-demand gear recovery system consisting of a rectangular release cage that contains the acoustic release, rope, and buoys. A gear marking application, called Automated Tracking and Location Aggregation System (ATLAS), is used to mark and track the location of deployed gear.

- Sub Sea Sonics (TR4RT) - Programmable timed release system. The configuration includes a compact release unit that mounts onto the trap and "pack-less" line handling system with coiled line and buoys secured to the top of the trap using a bungee and release loop. A gear location marking application, called Trap Timer, is used to mark the location of deployed gear. An acoustic release version is also in development.
- Edgetech (5112)- On-demand gear recovery system consisting of a release cage that contains the acoustic release, rope, and buoys. A gear marking application, called Trap Tracker, is used to mark and track the location of deployed gear.
- Ropeless Fishing Systems (Ropless Riser) - On-demand gear recovery system that uses an inflatable lift bag to bring gear to the surface. The configuration includes an acoustic release, rolled lift bag and air cylinder that mounts directly onto traps. An automated gear tracking system with chart plotter integration displays where gear is located on the seafloor.
- Guardian Ropeless Systems (Guardian Crab Pot Retrofit) - A time release gear recovery system that retrofits an existing trap to contain the line coil and buoy on top of the trap until released to the surface. The Guardian has been designed to be triggered by a wide assortment of galvanic timers and mechanical releases.
- Blue Ocean Gear (Farallon Smart Buoy) - Satellite buoy used to monitor the location and movement of deployed gear. The buoy takes data on position, velocity, acceleration, depth, and temperature that is transmitted via satellite when the buoy is on the surface. Smart Buoys can be utilized with pop-up gear systems to communicate when and where the gear surfaced, allowing fishermen to locate and retrieve gear more efficiently.

The following were not able to attend the workshop in person but their gear and/or materials were made available and displayed.

- Brooks Trap Mill (In-line Link) - Weak (1,700 lb) link by Maine Mold
- Coastline Cordage Group (Breakaway Release Link) - A 7/16" diameter braided breakaway link (1,700 lb) used to insert weak points in vertical lines
- Fiomarine (F-Series Fiobuoy) - On-demand gear recovery system consisting of a spool-shaped buoy that combines the acoustic release, floatation, and line storage into an all-in-one configuration
- NOAA Tightlines - A self-tensioning system consisting of a basic pulley and a counterweight designed to eliminate excess slack in vertical lines
- Novabraid (Breakaway Sleeve) - Hollow braided polypropylene sleeve (<1,700 lb breaking strength) used to insert weak points in vertical lines
- Nova Robotics
    - (Tag Line Spring Release) - The configuration consists of a weak vertical line (<1,700 lb) used to trigger a spring release mechanism that sends a stronger, hauling line and buoy (stored in a mesh bag at the trap) to the surface for recovery
    - (Sonar Reflector) - A passive reflector that enables deployed gear to be detected using conventional fishing sonar, sounders, and fish finders to prevent gear conflicts and gear loss
- Resqunit (Reserve Buoy with Electronic Time Release) - Programmable backup buoy device designed to prevent lost gear. The devices are also being used by some trap fishermen in Jamaica to protect against poaching.
- Rocky Mount Cord Co (Weak Rope) - Fully formed weak (1,700-lb) rope
- Seaside Inc. (In-line Link) - Weak (1,700 lb) links and weak (600 lb) swivels

Discussion

The presentations stimulated questions, observations, and feedback from participants, which is summarized below.

Cost

Participants remarked that the cost of acquiring innovative gear is very expensive, especially for single trap fishing, which is required in the Dungeness crab fishery. Even if longlining (i.e., connecting multiple traps with a common line) was allowed in combination with pop-up gear, costs would be significant. It was generally agreed that government funding or other assistance (e.g., rebates, subsidies) should be available to help the fleet purchase gear. Gear manufacturers noted that costs are expected to come down due to economies of scale, which is not yet realized because gear is being produced in limited numbers, primarily for testing purposes. It was also pointed out that NOAA manages a gear lending program on the East Coast to support fishermen testing of gear, which could be explored on the West Coast. It was also suggested that since pop-up gear is being explored in East Coast fisheries to address North Atlantic right whales that California fishermen should let the East Coast work out the costs and other issues before using the gear in California.

Time consuming

Pop-up gear systems will be time consuming to operate and will result in decreased efficiency. Participants explained that it takes 60 seconds to rig their traditional setups and the pop-up gears are taking more than double that amount of time to service.

Size of gear

A few participants commented on the large size of the pop-up systems, noting that many would not work for all boat operators. Participants discussed the need to take into consideration small boat operations and characteristics (e.g., limited deck space, single operators) when designing and/or implementing new gear and approaches.

Environmental factors

It was noted that the West Coast experiences high levels of wave action that can move gear on the seafloor. Eliminating lines can help reduce trap movement but pop-up gear may still get buried in the mud during strong weather events, which could lead to gear loss. It was also observed that natural disturbances can cause the entire seabed to turn over, particularly in the north coast, and traps can get buried under feet of sand. This could prevent pop-up release systems from functioning as intended, and increase lost gear.

Enforcement

An issue raised is that CDFW patrol vessels may need to be equipped with multiple recovery systems (transducer, deck boxes) to be able to inspect deployed gear for compliance. Currently, each manufacturer's acoustic communications use different frequencies/codes. It was recognized that an interoperable solution will eventually be needed. For purposes of testing under EFPs, CDFW noted that they may be able to adjust their standard enforcement protocols, such as coordinating with fishermen to schedule gear inspections at the dock or on the water. Findings from EFPs will help inform regulatory and enforcement needs.

CDFW noted that vessels are required to have an electronic monitoring system (e.g. solar loggers) when using alternative gear or operating under a depth constraint. CDFW is currently crafting updates to the current Risk Assessment and Mitigation Program (RAMP) regulations and working with OR, WA and PSMFC to develop a West Coast electronic monitoring program.

Gear location marking

Participants also discussed how the location of pop-up gear would be marked and shared with other fishermen and CDFW. Several manufacturers have developed their own gear location marking systems, however participants highlighted the need for a single application that can provide location information of all deployed pop-up gear. A gear manufacturer responded that a group of manufacturers are in the process of developing a solution that would function across multiple systems. It was noted that CDFW can't favor a particular system but can consider available options when crafting regulatory requirements.

Limits and conditions on use

Some noted that innovative gear would not be appropriate during the beginning of the season when trap density and the potential for gear conflict is highest. CDFW pointed out that under current regulation, innovative gear types could only be authorized for use in the spring, after April 1. However, concern was raised that innovative gear could be applied more broadly if it's shown to work for fishermen during the spring. CDFW noted that there are no innovative gear types currently authorized as Alternative Gear[1] and highlighted the need for more investment in testing and development. A gear manufacturer commented that the use of innovative gear has been incentivized on the East Coast through implementation of vertical line closures. Manufacturers encouraged fishermen to try the gear and give feedback on how it can be improved, recognizing that trap fisheries on the West Coast are different from the East Coast.

Other issues

Another issue is that trust has been degraded between fishermen and managers because there have been legislative efforts to require pop-up gear in the fishery without the testing that is currently being discussed.

President of the California Coastal Crab Association (CCCA) requested the opportunity to share their views on the issue of whale entanglement and gear innovation.

- The CCCA representative felt it was important for resource managers to take a step back and look at other ideas/tools to address the issue of entanglement (e.g., vessel-based surveys on whale distribution and movements over a broader spatial scale, switching to non-leaded lines and neutral buoyancy rope, utilizing other tools in RAMP, such as depth constraints, amending gear retrieval program rules to make it less complicated and incentivize fishermen to recover lost gear.
- He added that the crab season has been substantially shortened under the RAMP and said if alternative gear is the only way to bring back fishing opportunities in the spring/summer then CCCA would support longlining traps. He felt that pop-up gear is unworkable for the fleet and expressed concern about it becoming a requirement rather than an option due to pressure from outside groups.

Participants continued to reflect on what they learned, exchanged views and brainstormed on gear innovation needs, challenges, and opportunities. For the purpose of this report, discussion topics were subdivided into the following: testing gear innovations, longlining, other management tools, and vertical line and risk reduction targets.

Testing gear innovations

- A participant pointed to the potential polarizing effect of testing gear and a concern that fishermen would be discouraged from exploring innovative gear based on their own operational and business

[1] Alternative Gear means gear modifications and other gear innovations, including but not limited to pop-up technologies, which are authorized by CDFW per Section 132.8(h), Title 14, California Code of Regulations.

needs. A concern expressed was that innovative gear, like pop-up gear, could become a requirement (rather than an option during closures, as is currently the case). As one participant put it, once the door to pop-up gear is opened, it will be difficult to close given the pressure from outside groups who continue to push for its implementation. Participants were largely in agreement that fishermen should have the option and opportunity to test innovative gear under an Experimental Fishing Permit (EFP) issued by the state.

- It was asked how CDFW would assess a gear's ability to reduce entanglement if there are not many using the gear. CDFW responded that many of the gear innovation options are designed to fish without the use of vertical buoy lines, which is anticipated to reduce entanglement risk.
- CDFW added that there is likely not a single gear solution and emphasized the importance of exploring a variety of options. California is early in this process and shouldn't be closing the door to ideas we haven't tried or don't want to hear about.

Longlining

- The potential for longlining in combination with pop-up gear was discussed. It was reasoned that longlining would reduce the cost of acquiring new gear and provide better efficiency because vessels could use two devices per multiple connected traps (i.e., one for the first trap and another for the last trap in the string). However, there would need to be additional set-up considerations to identify/recover longlined gear and prevent operators from setting longlines of traps on top of one another. CDFW explained that longlining is not currently allowed in the Northern portions of the Dungeness crab fishery under the Fish and Game Code. CDFW is exploring the ability to longline under the RAMP (i.e., as a tool in the management measures toolbox) using the Director's authority in the Central Management Area. An EFP would be needed to allow longlining in the Northern Management Area unless there is a statutory change in the future. A participant remarked that hauling multiple traps on a longline can be dangerous, noting that traps are 80-100 lbs each. Another concern is the potential for gear conflict between vessels, i.e., multi-trap longlines set on top of one another and increasing gear loss.
- Participants exchanged views on the number of traps that should be allowed per longline for operational and safety reasons. Another concern expressed was that longlining could increase the severity of entanglements due to the weight and drag of multiple traps. Participants generally agreed that the decision to longline - and number of traps per string - should be voluntary and determined by each vessel based on vessel size and other considerations. It would not be a one size fits all approach.
- Participants also questioned the enforceability of longlining, noting that patrol boats may have limited capacity to inspect longlined gear. CDFW enforcement acknowledged the potential for longlining, noting that it is currently allowed in other (i.e., non-Dungeness crab) state-managed fisheries. One idea shared was to have all buoy tags attached to the main buoy line to facilitate enforcement inspections.
- A participant said that conflicts over gear placement could be minimized or avoided through fishermen cooperation and communication, similar to the trap fisheries in Alaska where longlining is commonly practiced. A gear manufacturer added that gear location marking systems can be used to mark both ends of a longline (with or without pop-up gear or buoyed vertical lines) to aid enforcement and prevent gear conflicts.

Other tools

- Participants expressed the need to have more conversations with CDFW about other management tools that could be adopted to reduce entanglement risk, e.g., reducing the amount of slack rope, use of a

single buoy (no trailer buoys) when entanglement risk is elevated, vertical line reduction, and zonal management (i.e., more targeted management of risk and entanglements beyond what is in the RAMP)

- One participant stressed how important it is to have better and more timely information on the presence of whales, referencing a situation during the 2021-22 season when a large concentration of whales quickly moved into Monterey Bay. He suggested using depth restrictions on fishing activity or other measures that haven't been tried in the RAMP toolbox to manage risk.
- Another participant suggested actively tending gear (i.e., setting traps in the morning and recovering them at night) as an option to reduce entanglement risk and increase fishing opportunities, especially in the fall, but recognized this might not be popular with larger fishing boats.
- It was also asked if innovative gear would be necessary if the fishery stays below federal entanglement thresholds. A participant noted that entanglements in crab gear have declined since 2016 due to the fishery's efforts to reduce the risk of entanglements (i.e., RAMP, best practices and gear modifications). A few participants reasoned that the West Coast is not in the same situation as the East Coast, where they are dealing with the North Atlantic right whale, a critically endangered species. The species here, particularly humpback whales, are not dwindling but growing and thriving.
- Concerning gear modifications, a participant asked if there was any information/evidence showing that breakaways (e.g., sleeves, weak rope, weak links) work as intended, i.e., whales able to self-release from entanglements. CDFW noted that to date, most testing has occurred on the East Coast. Additional testing in the Dungeness crab fishery would provide better information on how weak links perform both on their own and in conjunction with other gear set ups, including longlining.
- CDFW noted they are applying for an incidental take permit (ITP) from NOAA and expect submission late this year or early 2023. To secure a permit, CDFW is required to develop a Conservation Plan that specifies how it will reduce entanglement risk. CDFW added that they are taking a toolbox approach to expand the available options that can be utilized under the RAMP. Current tools include zone closures/delays, gear/vertical line reduction, and depth restrictions. Testing is needed to add innovative gear options into the toolbox.

Vertical line and risk reduction targets

- A suggestion was to establish a percentage-based vertical line reduction target and let individual fishermen decide how to achieve it based on their individual business models (e.g., removing traps from the water, using pop-up gear, and/or longlining traps).
- A gear manufacturer shared that the degree of entanglement risk reduction achieved depends on the amount of time the vertical line is removed from the water column and said it would be helpful to know the target risk reduction so gear can be devised or adapted to meet those targets.
- A participant questioned whether intent is to reduce vertical lines or stay under marine mammal take thresholds. CDFW is focused on reducing entanglements by reducing the number of vertical lines in the water.
- A participant asked what level of reduction of vertical lines would allow fishermen to fish in the spring when entanglement risk is elevated. CDFW said there is not sufficient information to come up with a specific vertical line reduction at this time. For now, CDFW will start with a minimum of 50% reduction, but as with all management actions taken under RAMP the specifics will be informed by all available data. A participant pointed out that without more data to manage risk, fishermen and managers will need to be more proactive instead of reactive to transition to a safer fishery.
- A participant commented that it's not realistic to expect that a full-scale fishery will never have an interaction. CDFW stated that the fishery should not be entangling whales but acknowledged that

getting to zero interactions may not be possible. CDFW added that the state is looking to find a balance between protecting marine life and the needs of the fishing industry.

Experimental Fishing Permits

CDFW provided an overview of California's EFP program, including the process for application submission, CDFW review, public notice and comment, Fish and Game Commission approval, and CDFW issuance of permits. The process is anticipated to take 4-6 months. CDFW explained that an EFP is an opportunity to test innovative gear types and explore and answer questions as to whether the gear meets the conditions/criteria for authorization as Alternative Gear under the RAMP.

- It was asked if EFPs were limited to the fishing season. CDFW explained that the permit is good for a single year and can be renewed for up to 4 years.
- It was also asked whether testing is still needed under an EFP if a gear type meets all the criteria defined in the RAMP. CDFW explained that EFPs provide an opportunity to test a new gear or method to see if it checks all the boxes. Conducting testing under an EFP is not required prior to submitting a request for authorization as Alternative Gear, but is one way to collect the information needed for CDFW to evaluate requests for authorization.
- A participant noted the need for more conversations to identify/clarify the criteria necessary to approve Alternative Gear. CDFW responded that a future rulemaking process (i.e., RAMP 2.0) will help clarify those criteria.
- CDFW also clarified that testing may occur during the open fishing season without an EFP as long as the activities and gear meets the regulatory requirements of the fishery. An EFP is only needed if carrying out fishing activities that would otherwise be prohibited.

Next Steps

The following activities/actions were discussed during the workshop as potential next steps.

Collaboration on gear testing and refinement

The following opportunities within the Dungeness crab fishery were announced. It is anticipated that there will be testing needs and opportunities as other gear types and methods are identified.

- Sub Sea Sonics received funding to test a timer release system that was tested with good results last year. Sub Sea Sonics is applying for an EFP and looking for interested fishermen to test the system at scale. Stipends are available. Contact: Bart Chadwick, bart.chadwick@subseasonics.com
- The National Marine Sanctuary Foundation is supporting the testing of a variety of innovative gear types and plans to apply for an EFP in collaboration with fishermen. Stipends are available. Contact: Greg Wells, gwells@marinesanctuary.org

Management actions

- Sign up for the Whale-Safe Fisheries Newsletter and visit CDFW's webpage to learn more about the EFP process and opportunities to weigh in on RAMP and Conservation Plan related updates.
- Dungeness Crab Fishing Gear Working Group will meet with CDFW to inform their continued efforts.
- The California Dungeness Crab Task Force meetings are open to the public and comment opportunities will be available on whale, Alternative Gear, and related conversations.

Contacts for Additional Information

- Greg Wells, Gear Innovations Manager, National Marine Sanctuary Foundation, gwells@marinesanctuary.org
- CDFW Whale Safe Fisheries Program, whalesafefisheries@wildlife.ca.gov
- Noah Ben-Aderet, Ocean Protection Council, noah.ben-aderet@resources.ca.gov

References and Materials

- CDFW Guidance for Testing Trap Gear Modifications (2022)
- CDFW Experimental Fishing Permit Program Information
- The Nature Conservancy's Experimental Fishing Permit Program User Guide
- CDFW Whale Safe Fisheries webpage
- California Dungeness Crab Task Force
- National Marine Sanctuary Foundation Gear Innovation webpage
- National Marine Sanctuary Foundation Gear Testing Flyer

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