Improving Gear Marking in the U.S. West Coast Sablefish Pot Fleet

Workshop Summary Report
November 16, 2022

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Executive Summary

Oregon Sea Grant (OSG) held a virtual workshop on from 9am – 3:30 pm on November 16, 2022. The workshop was attended by 54 participants, including 12 participants that self-identified as commercial fishing industry members (full participant list in Appendix 1). OSG organized and facilitated the workshop, with assistance and guidance from a fishing advisory committee and NOAA Fisheries West Coast Region (WCR) staff.

The primary goal of the workshop was to engage with and solicit input from the commercial fishing industry on feasible and practical improvements to gear marking in the sablefish pot gear fishery off the U.S. West Coast to improve NOAA's ability to identify the source fishery of large whale entanglements. A secondary goal was to gather ideas and input on potential measures that could reduce whale entanglement risk in this fishery. The workshop included presentations (Section 3.2 and Appendix 3) that provided relevant background information and facilitated discussions and opportunities for submission of additional ideas for the group to consider (Section 3.4.1). Workshop participants were also invited to participate in an iterative rating (Sections 3.3, 3.4.2, Appendix 2, and Appendix 4) and prioritization process (Section 3.4.3 and Appendix 5) to determine gear marking, information resource, and risk reduction concepts with the greatest potential for feasibility and worthy of additional exploration by NOAA Fisheries and the Pacific Fishery Management Council (PFMC). In addition to the prioritization process, during discussions the workshop participants provided additional information and insights about some of the concepts (Section 4).

Workshop participants determined these concepts have the most potential for future consideration:

Gear Marking
- AIS beacons
- Prohibit marks required by other fisheries
- More permanent buoy marking
- Sablefish-specific horizontal line or large patch/shape on poly buoys
- Cattle ear tags for buoys (attached at molded eye)

Information Resources
- Best practices guide for fleet
- Comprehensive guide to gear setup for each individual vessel
- Registration of surface gear setup

Risk Reduction
- Surface gear on just one end of groundline
- Fewer buoys/less line in surface gear set-up

After the workshop, the Fishing Vessel Owner's Association provided additional fishing industry input. In a letter (Appendix 6) submitted to Oregon Sea Grant, the FVOA board of trustees endorsed the following concepts:

1. Mark each surface gear buoy with a USCG number or state permit number

2. Mark the top 50 fathoms of the buoy line, either with a particular line color or some other marker.

3. Give vessels the option of using of a single buoy line to reduce the risk of whale entanglement in vertical lines.

4. Encourage AIS use whenever possible.

We welcome comments on this report or any information that might help inform NOAA Fisheries and the Pacific Fishery Management Council as they consider the feasibility of potential gear marking, information resources, or risk reduction measures to address whale entanglement in the U.S. West Coast sablefish pot gear fishery.

Comments can be submitted to **sablefish.workshop@oregonstate.edu** by January 20th, 2023 and will be conveyed along with this report to the PFMC for consideration at the March 2023 council meeting.

Acknowledgments

We wish to recognize the vision of members of the Pacific Fisheries Management Council Groundfish Advisory Team, who encouraged NOAA Fisheries to organize a workshop to gain meaningful engagement from the fishing industry on this issue. OSG received critical guidance from the Fishing Industry Advisory Committee, which consisted of Bob Alverson, Paul Clampitt, Bob Eder, Scott Hartzell, Gerry Richter. OSG also thanks Pete Sawle, Jeff Middleton, Dick Ogg, Michael Offerman, and Miles Smith for sharing their insights and knowledge during workshop preparation. Rick Price, Jason Jones, Jeremy Ehrman, and Kyle Edwards hosted Amanda Gladics on the F/V Timmy Boy.

This workshop received financial support from NOAA Fisheries WRC. Keeley Kent (NOAA Fisheries WCR, Sustainable Fisheries Division) and Brian Hooper (NOAA Fisheries WCR, Sustainable Fisheries Division) were central advisors to the facilitation team. They both ensured that the team had all the relevant background, understood current discussions among fisheries managers, and ensured that the workshop agenda was well aligned with NOAA WCR objectives. Dan Lawson (NOAA Fisheries WCR Protected Resources Division) provided valuable input during agenda development and critical information as a presenter and participant. Council staff Jessi Doerpinghaus assisted with data requests and background information on the fishery. David Morin (NOAA Fisheries Greater Atlantic Region, Protected Resources Division) provided valuable background information on gear marking approaches used in the Northeast Region.

OSG also wishes to thank West Coast Dungeness Crab state fisheries managers for their active engagement and efforts to increase coordination across West Coast fixed gear fisheries regarding whale entanglement. In particular, OSG thanks Caren Braby, Kelly Corbett, and Brittany Harrington (ODFW), and Heather Hall, Lorna Wargo, and Dan Ayres (WDFW), as well as Ryan Bartling and Joanna Grebel (CDFW) for their preparation of a coordinated approach to line marking in Dungeness crab fisheries and their proactive engagement with the sablefish fleet to keep them informed.

OSG appreciates the contributions from each of the presenters and participants. Their experience and expertise were invaluable. We are also grateful for the notetaking efforts of Maria Heuberger, Morgan Johnston, and Imogen Lucciano.

The engagement of all workshop participants enabled the group to determine feasible potential solutions that are likely to improve our ability to positively identify the source fishery of whale entanglements and prevent entanglements from occurring.

1 Workshop Overview

1.1 Workshop Context and Scope

Whale entanglement reports off the U.S. West Coast have increased since 2013. Humpback whales continue to be the most common species entangled with 17 separate entanglements confirmed in 2021. Pot and trap fisheries generally represent most of the documented fishery interactions with humpback whales along the U.S. west coast. Since 2013, of the 288 confirmed humpback whale entanglement reports on the U.S. west coast, only about 50% have been identified to source (5 in the sablefish pot gear). While incidences of confirmed entanglements in sablefish pot gear on the Pacific Coast are rare, this fishery is known to interact with humpback whales. The dramatic uptick of entanglements across the West Coast poses significant challenges for fisheries management in many different fixed gear fisheries, sablefish included.

As required by a biological opinion, the NOAA Fisheries WCR embarked on a feasibility study to consider whether additional gear marking would increase our ability to attribute humpback whale entanglements to specific fisheries and assist in identifying potential modifications to the pot gear regulations that could reduce incidental take of humpback whales. NOAA Fisheries WCR is required to complete the feasibility study and bring results to the PFMC by March 2023, and Council consideration is required by March 2024.

In June 2021, the PFMC recommended that NOAA

Fisheries WCR hold a workshop with fishing industry members to develop any potential new management measures related to the humpback whales, including gear marking changes. Additionally, a Conservation Recommendation in the Biological Opinion recommends that NOAA Fisheries investigate gear configuration changes and/or gear modifications to potentially reduce the risk of serious injury or mortality for humpbacks from pot gear. This issue continues to be of high interest to tribal and state fisheries management agencies, and various environmental NGOs, including those currently involved in lawsuits on the management of this fishery.

Based on a track record of successful facilitation on whale entanglement and other wildlife fisheries interaction issues, NOAA Fisheries WCR determined that Oregon Sea Grant was well placed as a neutral third party to bring together fishery participants, managers, and other interested stakeholders. A contract was established, and workshop planning commenced in March 2022.

1.2 Workshop Goals, Desired Outcomes, and Ground Rules

The agenda development and facilitation approach of the workshop were guided by the workshop goals that NOAA Fisheries and Oregon Sea Grant (OSG) outlined at the initiation of workshop planning.

The primary goals were to:

- Develop a list of potential sablefish pot gear marking options that are:
  - Operationally feasible for the fleet to implement.
  - Do not present an undue economic burden on fishing operations.
  - Appear likely to increase the probability of sablefish gear being identifiable from the information commonly provided in entanglement reports (descriptions, photographs, etc.).

- Develop a suite of potential options for reducing entanglement risk.

The workshop goals closely aligned with the desired outcomes that NOAA Fisheries and the facilitation team hoped to achieve:

- Assist NOAA Fisheries to fulfill the requirement to conduct a sablefish pot gear marking feasibility study in the Humpback Whale Biological Opinion terms and conditions.

- Obtain meaningful industry engagement to inform NOAA Fisheries about important considerations related to the operational feasibility and potential economic burden of different gear marking concepts.

- The Pacific Fishery Management Council (PFMC) has clear guidance from the fleet on what potential gear marking changes are operationally feasible as they consider updating gear marking requirements through the normal Council process.

When determining and planning the workshop approach, the facilitation team prioritized the primary goal of developing a list of potential gear marking options in order to meet the requirements of the aforementioned Biological Opinion, with a secondary focus on developing options for reducing entanglement risk.

The emphasis for the workshop was on soliciting and gathering industry input, increasing the range of potential gear marking concepts for NOAA and the PFMC to consider, and determining if options exist that could advance our ability to identify the source fishery of gear involved in whale entanglement that were broadly acceptable to industry members for further exploration and refinement. Therefore, the facilitation team framed the workshop discussions as focused on the following guiding principles:

- We are seeking information, input, feedback
- We hope to see some 'low hanging fruit' options emerge.
- Dissenting views and potential concerns are important.
- We probably won't all agree – that's OK!

To ensure a productive and safe discussion for all participants, the following ground rules were observed by all participants:

- Focus on interests and ideas, not positions or single solutions to the problem.
- If you don't like an idea, tell us how it could be improved.
- Respect different viewpoints. We can disagree without being disagreeable.
- Share the airtime. Everyone participates, no one dominates.
- Listen to understand, and ask questions. Look for common solutions.
- Everyone shares responsibility for following the ground rules.

2 Workshop Design

2.1 Consultation with Fishing Industry Advisors

At the beginning of the planning process in April 2022, OSG recruited an industry advisory group. The purpose of the advisory group was to ensure that the facilitation team could get initial feedback on workshop goals, understand the critical questions and information gaps that industry members wanted addressed during the workshop, and to establish an avenue for dialogue throughout the workshop planning. The industry advisory group played a central role to ensure that critical facilitation and process decisions were informed by fishing industry concerns, and OSG engaged with them throughout the planning process through group and individual conversations. OSG also received input on drafts of the proposed agenda and facilitation approaches for the ranking and prioritization processes. Additionally, OSG had numerous individual conversations to gather information to inform the workshop planning as well as encourage participation from members of the West Coast Sablefish Pot Gear fleet.

Core members of the Fishing Industry Advisory Group:

1. Bob Alverson
   (PFMC GAP, Fishing Vessel Owner's Association)
2. Paul Clampitt *(F/V Augustine)*
3. Bob Eder *(F/V Timmy Boy)*
4. Scott Hartzell *(PFMC GAP, F/V Ossian)*
5. Gerry Richter *(PFMC GAP, B & G Seafoods)*

Additional Fishing Industry Engagements that Significantly Informed Workshop Planning

- Pete Sawle
  (Commercial Fisherman & CodCoil 'Slinky' Pots)
- Jeff Middleton *(Commercial Fisherman, uses slinky pots)*
- Dick Ogg *(Commercial Fisherman, longline hooks and traditional pots)*
- Michael Offerman
  (Commercial Fisherman, uses slinky pots)

2.2 Recruitment of Workshop Participants

The strategy for recruitment of workshop participants focused squarely on participants in the federally managed U.S. West Coast Groundfish Fleet targeting sablefish. We created a workshop announcement flier that was mailed out in July 2022 to vessels that landed sablefish under the open access program. The same flier was included in permit renewal mailing to all permit holders in the limited entry fleet, as well as vessels that participated in the Groundfish Trawl Catch Shares Gear Switching program. In total, the mailing was distributed to 1,009 recipients.

As a secondary effort to reach potentially interested parties both within the industry and who track groundfish management and policy issues, NOAA Fisheries converted the workshop announcement to an email and sent it to their entire West Coast Region Groundfish Listserv (3,973 email addresses) in September 2022.

Additionally, OSG made targeted individual outreach to known participants within the sablefish fishery and other West Coast fixed gear fisheries. Announcements were made at several industry meetings for the Dungeness Crab fishery in Oregon and Washington.

2.3 Background Info for Workshop Participants

OSG created an annotated list of relevant background reading (Appendix 1) and distributed it to workshop participants one week prior to the workshop.

2.4 Pre-workshop Feedback on Gear Marking and Entanglement Risk Reduction Concepts

In order to maximize the effectiveness of participant discussions during a short, one day workshop, OSG determined that it would be beneficial to solicit input on known gear marking concepts via an online survey ahead of the workshop. OSG compiled a list of gear marking, information resource, and risk reduction concepts based on input gathered from fishing industry members, NOAA Fisheries personnel, and independent research.

In the initial distribution of the survey, the fishing industry members inadvertently were unable to skip factors that they did not feel qualified to rate. This was corrected after it was brought to the attention of OSG. The email sent to workshop participants, directions for the survey, and full results for these pre-workshop assessments are included in Appendix 2.

2.5 Workshop Agenda

Oregon Sea Grant designed the workshop to engage fishing industry members and other workshop participants to think about potential gear marking, information resource, and risk reduction concepts ahead of the virtual workshop convening. On the day of the workshop, a series of presentations guided workshop participants through relevant background information to ensure all participants understood the context and parallel efforts in other West Coast fixed gear fisheries. Then the group had an opportunity to reflect on the input gathered ahead of the workshop, discuss and expand the list of options, then rate and prioritize potential avenues to improve the identifiability of sablefish gear if it becomes involved in a large whale entanglement and reduce the risk of entanglements occurring. The overall workshop design contained the following stages.

2.5.1 Background & context for workshop participants

Subject matter experts provided a series of background presentations that described the challenge of identifying the source fishery of whale entanglements on the U.S. West Coast. Presenters also provided an overview of the characteristics of the U.S. West Coast sablefish fleet, fishing operations, gear, current gear marking requirements, and enforcement. Updates on gear marking improvement efforts in other West Coast fixed gear fisheries, in particular Dungeness Crab, were also provided.

2.5.2 Facilitated Ranking & Iterative Prioritization

Oregon Sea Grant collected input from workshop participants ahead of the workshop on an initial set of concepts. Using the results, OSG sorted the initial list of concepts into three prioritization categories (Most Potential, Some Potential, and Not Feasible Yet). The initial prioritization was brought to the group to discuss and refine. OSG then compiled a second list of concepts based on suggestions provided in the pre-workshop survey, questions and comments during background presentations and suggestions made during the initial prioritization discussion. Workshop participants then rated the concepts using the same criteria as the pre-workshop assessment, described above, with the exception of cost. Both fishing industry and non-fishing industry participants rated cost using the same survey question, so group level responses cannot be examined separately. During a break, OSG added the additional concepts to the prioritization lists. The full list of prioritized concepts was then presented to the group for further discussion and refinement. The prioritized lists are reflective of the group consensus about general concepts, but were primarily intended as the basis for discussion to elicit additional input and details on more and less feasible ways to implement these approaches to gear marking, information resources, and risk reduction.

3 Workshop Outcomes

3.1 Workshop Participants

There were 49 parties that pre-registered for the workshop, along with six industry advisors, and eight additional presenters. Additionally, 19 people requested to stay informed about the workshop and workshop outcomes. In total, 54 people attended the workshop. The complete list of parties that registered for the workshop, interested parties, workshop attendees can be found in Appendix 1.

3.2 Presentations

Abbreviated highlights from workshop presentations are provided below, and full slide decks are available in Appendix 3.

3.2.1 The Need for Improved Gear Marking

Dan Lawson, NOAA Fisheries WCR, Protected Resources Division

Presentation Highlights:

• The number of reported whale entanglements (primarily humpbacks) has increased since 2014, and only ~50% of 288 confirmed whale entanglements since 2013 have been attributed to a known source.

• From 2013 to 2020, buoys were documented in 2/3rds of entanglements but only ⅓ of the buoys were marked

with legible identifiers.

• An analysis conducted by NOAA PRD indicated that of the reported entanglements that could not be identified to source fishery, an assignment would have been possible in approximately 60% of the cases if line markings had been present in the documentation.

• Fishery-specific buoy markings have strong potential to help increase identifiability. NOAA PRD has observed early success in identifying the source fishery of gear following implementation of additional letter markings associated with specific fisheries in California state managed fixed gear fisheries. In 2021, the source fishery for three separate entanglements were identified using the letter marks on buoys.

• The NMFS West Coast Regional Marine Mammal Stranding Program Groundfish Observer Program has received 5 humpback entanglement reports since 2006 that have been attributed to sablefish pots: 1 in Central CA (Monterey), 2 off OR (Newport), and 2 off No. CA Humboldt/Crescent City. The West Coast Groundfish Observer Program has been responsible for two of those reports.

• East coast fixed gear fisheries provide one example of how line markings could be implemented. Those fisheries have moved to requiring larger and more markings to increase visibility of the marks from the air (aerial survey, drones, etc.).

• Entanglements often involve surface gear and multiple polyform buoys; and we should mark high, often, and (preferably) in a pattern that is readily distinguishable from other marks. It is also worth thinking about how to make the line itself function as the “mark”.

Question / Comment: *There are potentially issues with inexperienced fishermen not adequately marking their gear, using too much line at the surface, or other avoidable fishing practices that make gear harder to identify or increase risk of entanglement. Concerned that line marking will be very expensive with limited benefit.*

Response: *NOAA PRD appreciated the comment and input.*

Question / Comment: *Is the data showing that the last confirmed sablefish entanglement was in 2017 accurate and up-to-date? That would indicate that we have gone roughly 5 years without an entanglement in the sablefish fishery.*

Response: *Yes, that is correct in terms of reported entanglements. More data should be available in Spring 2023.*

Question / Comment: *Marking gear in the 'upper half' of the gear may be difficult in this fishery, because vertical lines may be up to 1200 fathoms (7,200 feet) long. Have you considered marking a shorter length of the line, or only down to some more targeted depth to reduce the potential costs for fishermen to implement?*

Response: *NOAA PRD expressed confidence that line marking on the upper portion of the gear would be most helpful.*

Question / Comment: *Are you aware of any other deep-water fisheries, perhaps internationally, that have to deal with whale entanglements and may have implemented line marking strategies that we could learn from?*

Response: *Lawson thought there might be other international or even some deeper east coast fisheries that might be comparable to sablefish, but was not sufficiently well versed in those to comment further.*

3.2.2 Sablefish Pot Gear & Fishing Operations

Fishing operations on the F/V Timmy Boy
Bob Eder, Commercial Fisherman

Presentation Highlights:

• Shared a series of photographs from a trip on the FV Timmy Boy that showed gear retrieval operations, surface gear, and line marking strategy.

• The F/V Timmy Boy uses a deck mounted king crab hauler operate trapezoidal pots and a drum roller which acts as a large spool to keep line organized and allow for setting gear across current without tangling lines.

• He uses 5/8 sinking line on the top 200 fathoms. The remainder of the line is floating 13/16th". Each set contains 30-40 pots, and extends approximately 1 – 1.5 miles in length on the ocean floor when deployed.

• Surface gear consists of three poly form buoys and a flag pole. Each buoy has a vessel name, ID number, set number, and is marked with reflective tape. The third buoy is useful when the current is running strong and buoys begin to dive.

• Gear can be deployed for several months while the vessel is actively engaged in the sablefish fishery but is never left for more than 7 days without the vessel tending the gear. The average soak time (time between when the vessel tends the gear) is approximately 1.5 days. There is no 'wet storage' of the gear. When they are done actively fishing, they retrieve all fishing gear and

store onshore.

• In Eder's opinion, marking buoys would be an easy fix compared to marking the thick sinking lines. However, they already mark some lines to help the crew know how much line is in the water. Decorative duct tape lasts about one season, and in their experience works well because it does not affect how the line goes through the block. He noted that their set-up does not require the line to go through a 'peeler', which would wear the duct tape off faster.

• Eder believes that even just putting the name and number on each buoy would be a great benefit to help identify entanglements, and is confident his buoys are very easily identifiable and well-marked.

• In general, Eder expressed that he was not thrilled about the prospect of marking lines.

• Eder was very proud of the Oregon Sablefish fishery operations as a clean and highly sustainable fishery.

Question / Comment: *What is the soak time/how often do you tend the gear? How variable is soak time and what influences it?"*

Response: *More than 24 hours to around three days. Sometimes up to five days following a delivery. We typically pull the gear two or three times during 4 day fishing trips. Traps gater fish more slowly than hooks. With our gear however, there is a very low rate of bycatch, usually less than 1 percent of other managed species. There are also escape rings on the trap so that immature fish can escape – time aids this filtration.*

Question / Comment: *How frequently do you re-mark on your buoys?*

Response: *Has had the boat for 11 years- hasn't had to repaint the buoys since then. Vinyl paint is used on the buoys and paint is touched up if they get scuffed, but it is not very often.*

Question / Comment: *Can you elaborate more about the markings you make on the ropes and why that is so important for deploying and retrieving gear?*

Response: *There are probably a variety of ways that fishermen do this. We move around a lot, so we never want to have excessive amounts of buoy line. The markings are roughly 100 fathoms apart. If there are damaged lines, we want to maintain the lines. When we are setting gear, the pots go off the back of the boat, everything is sinking, and we're often fishing on extreme edges- we don't always know what depth we are setting in, and those marks also help us understand/provide a frame of reference for where we are.*

Fishing Operations on the F/V Augustine
Paul Clampitt, Commercial Fisherman

Presentation Highlights:

• Clampitt shared several videos that demonstrated deck equipment and gear hauling and landing.

• The F/V Augustine is a schooner style vessel, so the deck setup requires setting pots over the side. He also uses a large reel to store line onboard, which is located on the port side of the deck.

• They use trapezoidal pots and prefer them to slinky pots. They fish in water up to 900 fathoms deep, meaning that they have a lot of line and gear on deck.

• Clampitt keeps the top buoy lines taught by using long links of chain to act as a bungee cord that keeps the set line down but also fluctuates with the tide and current.

• Clampitt believes it is more likely that whales are becoming tangled in fishing gear with a lot of slack in the buoy line. He says that a lot of newer fishermen will use an extra shot of gear on their buoy line to make sure their buoys don't sink if it is deeper than expected.

• The FV Augustine does not do any 'wet storage' of gear; all gear is stored in the locker back on shore when not being actively fished.

Question / Comment: *Why do you potentially use multiple buoys on the surface? Are there different reasons that you would have multiple buoys on the surface?"*

Response: *The main reason is regulation. In Alaska, one of the regulations is four buoys and a flag buoy, but that regulation has been removed this year. It was introduced because of fear, and now they understand that their fears were unfounded. Now they only want to make sure you have a flag buoy.*

Question / Comment: *Paul, do you mark your line with a specific color? If so, what color? Thanks to you and Bob for the very helpful slides and videos!*

Response: *No, we don't mark our lines at all, we count by beckets (loop in line where the pot gear is snapped onto). I think that gear marking could be easier though! I use the same line as Bob - 13/16ths, it's light blue. I think that if*

gear is generally looser, and it requires 3-5 years of experience to properly set with minimal line at the surface. He is interested in investing in proper education for newer fishermen.

3.2.3 Description of the West Coast Sablefish Fishery

Brian Hooper, NOAA Fisheries WCR, Sustainable Fisheries Division

Presentation Highlights:

• The fishery is managed by the PFMC under the Groundfish Management Plan and harvest takes place in the form of trawling, longlining (hook & line), and pot trapping.

• Four different fishing sectors participate in the sablefish fishery: Limited Entry Tier, Trawl Individual (includes both Catch Shares Trawl and Catch Shares Gear Switchers), Limited Entry Daily Trip Limit, and Open Access.

• The total number of vessels that participate in the sablefish fishery using pots varies, but averages approximately 120 vessels each year.

• The majority of gear in the limited entry fishery is deployed between Astoria and Fort Bragg, with gear from vessels participating in the catch share gear switching program concentrated off Oregon and Washington, as well as areas off San Francisco and Fort Bragg.

• The pots-per-set can range from 15-40 pots, and is usually greater in the non-catch share sectors of the fleet.

Question / Comment: *I think that it just came out that there are more non catch-share participants than catch-share participants. We need to figure out how to get [the] information [from this workshop] to those who are just [participating in the fishery] occasionally. There will likely be less fishing from the trawl IFQ because it appears the Council is looking at limiting this sector.*

3.2.4 Current Gear Marking Requirements and Compliance Observations

Brian Corrigan, Dan Davis, Andrew Torres, NOAA Fisheries Office of Law Enforcement

Presentation Highlights:

• There are differences in the gear marking requirements between open access (50 CFR 660.319), and limited entry (50 CFR 660.219) for fixed gear regulations, but all sectors are required to bear permanent markings on their

we could always make it the same color, we could say that this line belongs to a certain fishery, etc. We have 10,000 fathoms of line on the boat so marking every 100 fathoms would be very difficult.

Question / Comment: *Question for both Bob and Paul – how often do you change out your lines on the buoys, vertical line, and groundlines?*

Response: ***Paul Clampitt:*** *This line is extremely durable. We started pot fishing 5 years ago and just now we've started to change out the lines because it's getting scuffed up and frayed. We've done some splicing, and when necessary, condemn it.*

Bob Eder*: This is consistent with my experience, too. We make that line last as long as possible- we're talking about an oil product. It's crazy expensive. We take good care of it and if it begins to wear, we have to splice it because, just like a chain, we don't want a weak link. This whole season I didn't lose one pot. I'm still using some lines from the boat I got 11 years ago. Fortunately, we don't have to throw much of this plastic stuff away often."*

Question / Comment: *Do you have to change out the line that is closer to the surface first? Or perhaps the groundline?*

Response: *The groundline gets worse first since it's chafing against things (friction with the ground).*

Fishing Operations using 'slinky pots' – Michael Offerman, Commercial Fisherman (in absentia, via written notes and photographs presented by Amanda Gladics)

Presentation Highlights:

• Slinky pots were originally developed to help vessels avoid depredation of the catch by sperm whales and killer whales.

• Slinky style pots are primarily useful because they compress and can be stored in a smaller space. Therefore, they allow smaller boats to participate in the fishery using pot gear.

• Offerman uses 3/8ths inch, neutral buoyancy line, which is lighter weight than traditional pots require.

Question / Comment: *Burkholder started fishing slinky pots two years ago with smaller boats. The gear has a very tight surface line due to a heavy chain anchor on each side to make the gear remain taught. Bernie thinks this would make it very hard for a whale to get stuck in because it wouldn't be able to roll in it. But he acknowledges that slinky*

surface gear. Full text of the applicable regulations can be found in Appendix 3 of this report.

• Fixed-gear limited entry participants must have marks at each end of their pots that include a reflective flag and buoys that identify the owner/operator of the vessel, the vessel number, commercial fishing license number, or the number of the vessel issued by the coast guard or state.

• Open access participants have different regulations for commercial vertical hook and line gear if the vessel continuously attends the gear, defined as being within a quarter nautical mile.

• These same regulations apply to the "gear switchers".

• Both limited entry and open access laws require that the gear be attended to at least once in seven days.

• Overall, enforcement sees very low numbers of violations from the sablefish group related to gear marking, either due to a high rate of compliance or low enforcement emphasis in recent years. Typically, when gear marking violations are detected, officers will provide compliance assistance and have the fishing vessel correct the issue immediately.

• There have only been two violations related to gear marking in the last 5 years. Both occurred in 2019 in the IPHC derby and both resulted in compliance assistance, i.e. they helped the fishermen correctly mark their gear or gave them time to fix their gear.

• Corrigan noted that these compliance results should be interpreted with caution, since deficiencies in gear marking could be corrected quickly and easily and might not even be documented by enforcement officers.

• No slides were used for this presentation.

Question / Comment: *A gear marking issue is very often dealt with right away- most of the time we're not even documenting that. We'll just correct the action on the spot. These are very minor and speedy repairs typically.*

Question / Comment: *OSP enforcement officer relayed that they saw sablefish fishery gear this last year on the coast and it was very well marked.*

Question / Comment: *Vinyl paint is better than sharpies.*

Question / Comment: *Is there some question of how long the markings can remain on the buoys that should be in regulation?These are very minor and speedy repairs typically.*

Response: ***Brian Corrigan:*** *I am hesitant to respond to this without going through PFMC's Enforcement Consultants committee.*

Andrew Torres: *There was mention of buoy branding where the identifying numbers can be melted into the buoys...I just wanted to point out that this [option] is built into the regulations.*

3.2.5 Tri-state Dungeness Crab Line Marking Proposal

Caren Braby, ODFW

Presentation Highlights:

• Whale entanglement continues to be a concern for all fixed gear fisheries on the West Coast. Improved gear marking in the last couple of years has increased positive attribution, enabled negative attribution, and reduced the amount of unidentified gear in entanglements.

• Coordination across fisheries will be essential for the success of a comprehensive strategy for line marking off the West Coast. Marks that are required in one fishery must be disallowed in other fisheries to ensure success.

• Dungeness Crab managers from all three West Coast states have worked together since 2020 to determine goals for a coordinated line marking approach, and in 2022 they developed a coordinated line marking proposal that would require line markings consisting of two different colors (one color to designate Dungeness Crab, the other to designate the state) in 2 foot sections of each color adjacent to one another on both sides of the main buoy, and 1 foot sections of each color adjacent to each other every 10 fathoms between the main buoy and the crab pot (Figure 1).

• The rationale for developing the proposal was based on:

- Large, solid marks using distinct colors near the surface to increase visibility from vessels and small planes and allow for both positive and negative attribution.

- Smaller marks along body of the main line and flexibility in marking method to reduce burden for fishers

• Extensive feedback has been gathered during industry meetings conducted in Fall 2022. Industry members expressed concern about 1) effectiveness at increasing identification of entanglements and 2) financial and environmental costs to implement the proposal. Industry

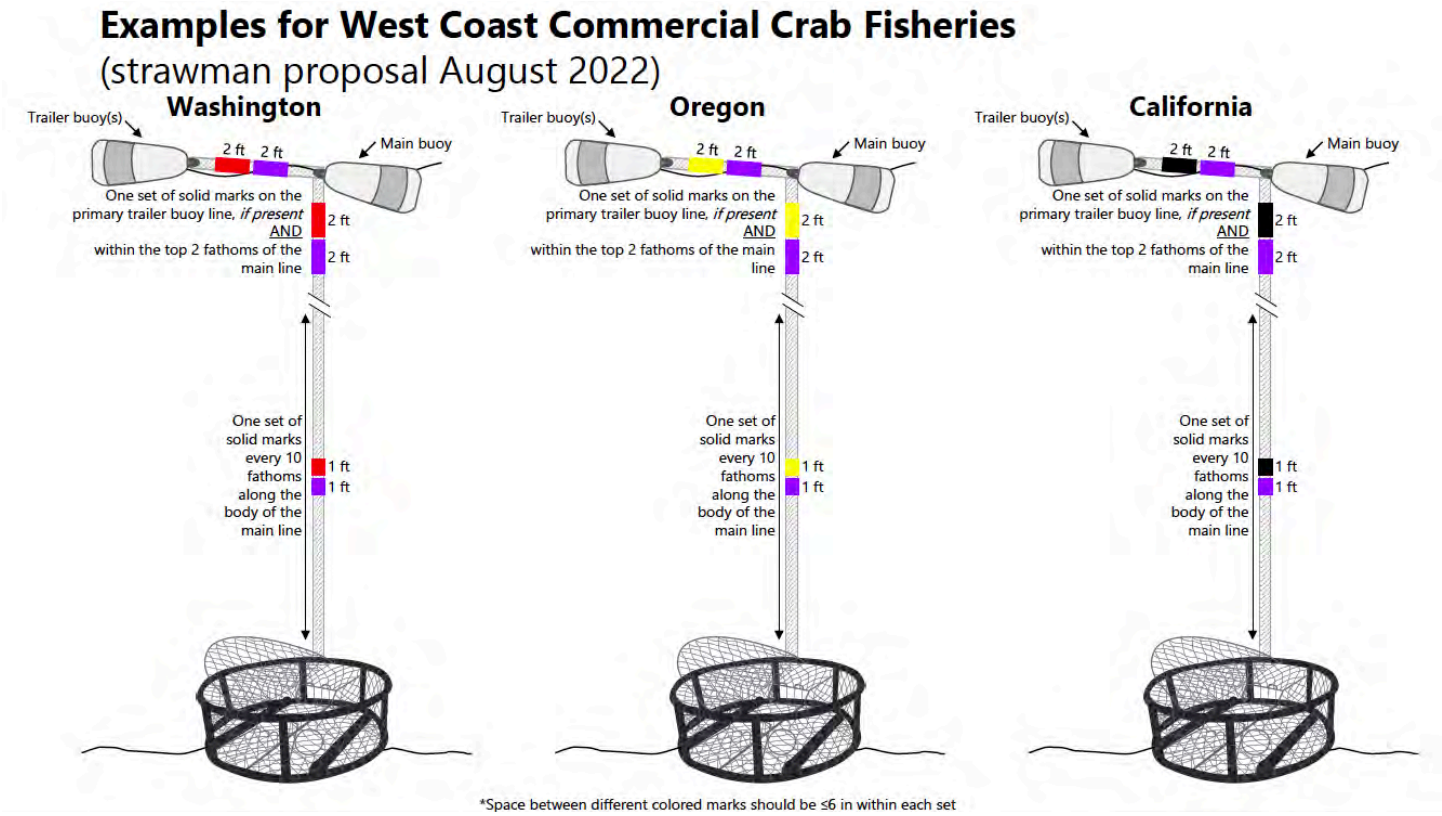


Figure 1. Proposal for line marking in West Coast Dungeness crab fisheries, current as of August 2022.

highlighted the importance of being able to determine negative attribution (i.e. an entanglement does not involve the Dungeness crab fishery) even if no positive attribution is possible.

Questions held until after the presentation from Lorna Wargo and Heather Hall.

3.2.6 WDFW Experience with Implementation of a Line Marking Requirement

Lorna Wargo, Heather Hall, WDFW

Presentation Highlights:

• WDFW implemented a line marking requirement in the 2021 crab season, which required 12" red marks not more than 1 fathom (6 feet) from the buoy and not more than 1 fathom from the pot. The requirements have now been in place 2 seasons, although some fishers implemented line marking voluntarily ahead of the requirement going into effect.

• Original line marking rules were intentionally vague to allow fishermen to use their expertise and experiment to determine which marks worked the best and were cost-effective.

• A variety of materials were used for marking. The longest lasting marks were colored thread woven into the line, the most cost-effective was duct tape, and some did not like using colored paint.

• The crabbers were also interested in knowing the final color schemes as soon as possible because (similar to sablefish) their lines can last up to 10 years.

• Lorna acknowledges that this is a complex process but is hoping to refine the rules by 2023 based on lessons learned.

• The industry in Washington is generally supportive of line marking regulations because they are invested in preventing whale entanglements.

• No slides were used for the presentation.

Question / Comment: *You mentioned a few different methods of marking lines. I think we have maybe one or two years of experience so it's hard to evaluate... Do you think spraypaint is working satisfactorily?*

Response: *I had a chance to review pictures our field staff took. I don't know if it was one season or two seasons, but the spray painted lines did seem to start fading, and lines that had been dipped seemed to last better.*

Question / Comment: *This is such a big project. You are talking about over 1 million marks being made on these lines before even getting to buoy markings in the state of Oregon. Method is important.*

3.3 Pre-workshop Participant Ratings

Participants were asked to rate each gear marking or risk reduction concept based on perceived barriers to implementation (1 = no barrier, 2 = somewhat of a barrier, 3 = moderate barrier, 4 = extreme barrier) on four different feasibility factors (see tables below), depending on whether they self-identified as members of the fishing industry. Emails with the request went out to participants on November 10th, 2022. Responses were received from 12 participants that identified as members of the commercial fishing industry, and 19 participants that identified as being agency, NGO, or academics.

Table 1. Feasibility factors relevant to members of the fishing industry.

Fishing Industry Members
Safety – to both humans and the environment
Time/Labor – to implement initially and ongoing effort to maintain
Ease of Use – in your day-to-day fishing operations
Cost – to implement initially and maintain over time

Table 2. Feasibility factors relevant to agency, NGO, and academic workshop participants.

Non-Fishing Industry Members
Does Not Improve IDs – of the source fishery of whale entanglements or Does Not Reduce Risk – of whale entanglements in this fishery
Regulatory Complexity – to implement initially
Enforcement – to maintain compliance over time
Cost – to management agencies to implement initially and maintain over time

3.3.1 Gear Marking Concepts

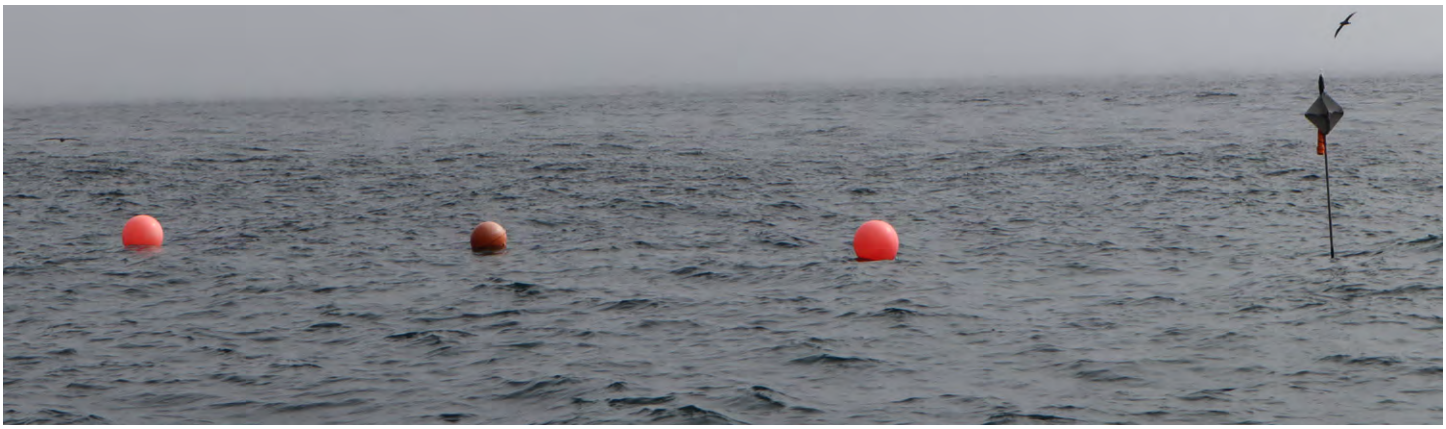
	Average Feasibility Score	
	Fishing Industry	**Agency, NGO, Academics**
More Permanent Buoy Marking Methods	2.02	1.82
Additional Markings on Buoys	2.18	1.77
AIS Beacons	1.48	2.36
Line Marking on Surface Gear	2.28	1.83
Line Marking on Buoy Lines	2.15	2.01
Sablefish Specific Line Color on Surface Gear Lines	2.15	1.94
Sablefish Specific Line Color on Buoy Lines	2.23	2.00
Prohibit Marks That Are Required for Other West Coast Fisheries	1.98	1.81

3.3.2 Information Resource Concepts

	Average Feasibility Score	
	Fishing Industry	**Agency, NGO, Academics**
Expanded Electronic Monitoring	2.33	2.18
Comprehensive Guide to Individual Vessel Gear Set-ups	1.42	1.99

3.3.3 Risk Reduction Concepts

	Average Feasibility Score	
	Fishing Industry	**Agency, NGO, Academics**
Surface gear on just one end of the groundline	1.58	1.76
Limits on Soak Time	1.97	2.45
Weak Links or Reduced Breaking Strength of Lines	2.94	2.32
Pop-up or “Ropeless” Gear	3.28	2.72



3.4 Workshop Facilitated Activities

3.4.1 Solicitation of new concepts or refinements of existing concepts

OSG solicited ideas for new concepts or refinements of existing concepts at several different points ahead of and during the workshop. Respondents to the pre-workshop survey provided some additional ideas, and workshop participants were asked to submit additional ideas for the group to rate and discuss to an online survey just prior to the lunch break. Additionally, the facilitation team monitored the chat and captured ideas suggested there and during the verbal question and answer sessions following workshop presentations. The list below summarizes the additional concepts that workshop participants suggested.

Ideas Included in Iterative Rating Process:

- Cattle Ear Tags to Attach to Buoys, Coordinated with West Coast Dungeness Crab Fisheries
- Line Tracers
- RFID Tags at the Buoy or the Pot
- QR Code Tags on Buoys
- Reduce the Amount of Surface Gear
- Reduce Slack Line / Limits on Buoy Line Scope

Additional Idea Suggested After Iterative Rating Process:

- Large, horizontal line mark placed directly on polyform buoys to differentiate them from polyform buoys used in other fixed gear fisheries (e.g. hagfish).

3.4.2 Rating of concepts solicited during workshop

A rating process very similar to the pre-workshop request for input was used to gather ratings of new concepts contributed by workshop participants. Responses for both fishing industry and non-fishing industry participants were gathered using the same survey. Participants were asked to rate the concepts on only the feasibility factors that were relevant to them (see table 1 and table 2), with the exception of cost, which all respondents were asked to rate. Responses were received from 22 workshop participants.

Gear Marking Concepts

	Average Feasibility Score		
	Fishing Industry	**Cost (All Respondents)**	**Agency, NGO, Academics**
Buoy Cattle Ear Tags – Coordinated w/ D Crab	1.17	1.47	1.4
Line Tracers	1.74	2.72	1.88
RFID tags at the buoy or pot	1.43	1.72	2.11
QR Codes Tags on Buoys	1.5	1.57	2.10

Risk Reduction Concepts

	Average Feasibility Score		
	Fishing Industry	**Cost (All Respondents)**	**Agency, NGO, Academics**
Reduce the amount of surface gear	1.33	1.11	1.87
Reduce slack line / limits on buoy line scope	1.18	1.11	2.43

3.4.3 Prioritization

	Most Potential	**Some Potential**	**Not Feasible Yet**
Gear Marking	• AIS beacons • Prohibit marks required by other fisheries • More permanent buoy marking • Sablefish-specific horizontal line or large patch/shape on poly buoys • Cattle ear tags for buoys (attached at molded eye)	• Line Marking on Surface Gear • Line marking on top shot of Buoy Lines (e.g. top 100 fathoms, every 10 fathoms) • Sablefish Specific Line Color • Line Tracers • RFID or QR Tags	• Line Marking on Entire Vertical Line
Information Resource	• Best practices guide for fleet • Comprehensive guide to gear set-up for each individual vessel. • Registration of surface gear setup	• Expanded Electronic Monitoring	
Risk Reduction	• Surface gear on just one end of groundline • Fewer buoys/less line in surface gear set-up	• Reducing Slack Line • Limits on Soak Time	• Pop-up or Ropeless Gear • Weak Link or Reduced Breaking Strength

4 Workshop Results

4.1 Additional Feedback on Concepts

4.1.1 Highest Priority Concepts

AIS beacons
The group was generally very positive about the use of AIS beacons, and noted that efforts were underway to clarify the legal status of their use. Participants noted that beacons could be purchased for approximately $100, and could be configured to be visible to the public (e.g. on Marine Traffic) or only visible to other vessels equipped with AIS within a specific radius of the beacon. The group thought there was a potential for entanglement reporters to include AIS identification information with their report, if the reporting party had access to AIS at the time of the report (e.g. another commercial fishing vessel). One caveat reported by commercial fishing participants was that the AIS beacons cannot be submerged more than about 10 feet before becoming non-functional.

Prohibit marks required by other fisheries
Some members of this fleet use markings that correspond to the current proposals for line marking in the West Coast Dungeness crab fleet and would need to adjust if that proposal goes into effect. There was general agreement that the principle of prohibiting marks that are required in other fisheries made sense.

More permanent buoy marking
Industry members lauded the effectiveness of using vinyl paint over sharpies or other marking methods on the polyform buoys. Enforcement participants cautioned that regulations that specified specific marking methods may not be flexible enough to keep up with changing technology, and recommended that the current language, which includes a requirement that gear be marked and that the markings are clearly visible is still probably the safest way to go. In conclusion, several agency participants suggested that the vinyl paint might be included in a best practices outreach document to encourage wider use, rather than using a regulatory approach.

Sablefish-specific horizontal line or large patch/shape on poly buoys
Workshop participants thought this concept had serious potential, but cautioned that it would be best if any newly required mark would not obscure marks already on the buoys so as to avoid the cost of replacing buoys in order to comply. A big gap in information seemed to be how the industry can mark buoys in a way that the whale entanglement teams may identify them through photos or at a distance.

Cattle ear tags for buoys (attached at molded eye)
The cattle ear tags used in the West Coast Dungeness crab fisheries have been very useful in making positive identifications of the source fishery of the entanglement. Industry members thought that the livestock tags could be attached at the molded eye of polyform buoys, and could potentially be more useful than additional letter markings on the polyform buoys themselves. Other participants cautioned that the color and shape of tags would need to be closely coordinated with West Coast Dungeness crab fisheries, because those specifications change every year in order to enable effective derelict gear cleanup programs.

Best practices guide for fleet
There was support for the development of a best practices document. Similar documents exist for whale entanglement in Dungeness crab fisheries in California, Oregon, and Washington and seabird bycatch in longline fisheries that may serve as potential examples. Some of the concepts the group discussed that would be difficult to regulate but might be appropriate for a best practice guide included:

- More permanent buoy marking methods (vinyl paint, etc.)
- Line buoyancy set ups to reduce slack line in the water column
- Anchoring strategies to reduce slack line in the water column

Comprehensive guide to gear setup for each individual vessel.
Perspectives differed between industry members and agency personnel regarding whether there was enough variation among vessels across the fleet in the way gear is set-up to allow for positive identification of source fishery. Industry members thought that there was

significant variability in the specific gear components and that if an entanglement report or recovered gear contained a few elements of the gear that a positive ID would be possible. NOAA PRD personnel cautioned that it would still be difficult to eliminate the possibility that the gear came from another fixed gear fishery that used similar gear.

Registration of surface gear setup
This idea emerged from the discussion of a comprehensive gear guide, as potentially easier to execute and perhaps more immediately useful since surface gear is visible in a large proportion of unidentified entanglements. Oregon Dungeness crab fishery currently requires the registration of the color scheme of surface buoys to aid in whale entanglement identification.

Surface gear on just one end of groundline
There was broad support from industry members for having the option to use surface gear on one end of the groundline rather than the current requirement for surface gear on each end of the groundline.

Fewer buoys/less line in surface gear set-up
The group did not discuss this at length. However, in the course of discussing other topics, several industry participants mentioned that having more buoys in the surface gear enabled keeping the line under higher tension in the water column and avoiding slack line. Frequently the first 'diver' buoy will be taken underwater by strong currents, so having one or two additional buoys ensures that the gear remains visible to other vessels avoid gear conflicts and accessible to the vessel that owns the gear when they return to haul the gear back onboard. There may be tradeoffs between reducing the number of surface buoys in the surface gear and reducing slack in the vertical line.

4.1.2 Potentially Feasible

Line Marking on Surface Gear and/or upper portion of buoy line
Agency members were in favor of, at minimum, line marking near the surface. Some fishing industry members were open to line marking at the top sections, but are unsure of the cost-benefit ratio. Other fishing industry members were very skeptical about the cost of marking lines and questioned whether the return on investment in terms of number of positive identifications could justify the cost to implement line marking of any kind. Industry members do not want to mark the entire line, citing infeasibility of marking potentially thousands of fathoms of line.

RFID or QR Tags
Several participants relayed having negative experiences with attempts to deploy RFID tags in the Dungeness crab fishery. They encountered issues with reliability and therefore abandoned the effort. Others brought up that RFID or QR tags might have limited utility since so few entanglements result in recovered gear in hand where RFID or QR tags could be read.

Reducing Slack Line
The group engaged in a lengthy discussion about different line set ups that industry members use to ensure taut vertical lines, highlighting the fact that reducing slack line is already a priority for the members of the fleet that attended the workshop. Industry participants also mentioned that less experienced fishermen might not have the skills to reduce slack line, so there was likely room for improvement across the fleet as a whole. Most industry participants reported using a sinking line in their surface gear so that the line stayed vertical, and using dual anchors (or anchor chains) on each end of the groundline. Slinky pots may require more anchoring to effectively ensure taut vertical lines, since the pots themselves do not serve as additional anchoring weight like traditional pots do.

Limits on Soak Time
One industry member suggested that limits on soak time might have some benefit. However, several other industry members disagreed. They felt that there would be limited benefit from reducing soak time and potentially serious costs. They highlighted that soak times of 4-5 days were optimal under some conditions, and that reducing soak time could have an unintended consequence of increasing the number of pot days overall because it could reduce the efficiency of the fishery. Current regulations require gear to be tended every 7 days.

4.1.3 Not Feasible Yet

To maximize opportunity for participant input on more feasible options, the facilitation team minimized discussion time spent on concepts that workshop participants indicated were 'not feasible yet'. However, some valuable additional input was provided in the pre-workshop assessments and some of the concepts were touched on briefly in the discussions.

Line Marking on Entire Vertical Line
Fishing industry participants emphasized the sheer volume of line they use as part of their gear. Because they fish in very deep waters (up to 1000 fathoms) some vessels reported that they carry over 10,000 fathoms of line on the vessel. All fishing industry workshop

participants felt that high frequency marking of the full length of vertical lines would not be feasible in this fishery. This sentiment was especially strong in light of the NOAA PRD analysis of the length of visible line in entanglements (majority of entanglements have 0-20 fathoms visible), which suggested that marks at frequent intervals (e.g. every 5-10 fathoms) would be necessary to have a high likelihood of detection in a reported entanglement and therefore serve as an aid in identification of source fishery.

Pop-up or Ropeless Gear
Some Agency, NGO, and academic participants suggested that pop-up or ropeless gear would be the most effective for reducing the risk of entanglement, but others also had concerns about gear loss rates and potential gear conflict. Fishing participants were very opposed to implementing ropeless gear at this time. Fishing industry concerns were primarily focused on the maturity and reliability of the technology, very high cost to implement, and whether the benefits in terms of reduced whale entanglement risk would justify the costs for use in a fishery with relatively low numbers of reported whale entanglements.

Weak Link or Reduced Breaking Strength
There were significant safety concerns from fishing industry participants about reduced breaking strength of line or weak links. Additionally, feedback from agency, NGO, and academic participants highlighted the unproven efficacy of weak links/low breaking strength rope and the potential additional risks presented by the knots or splices in the line that are necessary to install weak links.

4.2 Additional Developments and Input Received After the Workshop

The Fishing Vessel Owner's Association engaged in further discussion following the workshop and developed a proposal for gear marking and risk reduction measures that was endorsed by their board of trustees. Bob Alverson relayed their proposal in a letter, which included the following elements:

1. Mark each buoy in the surface gear with a USCG number or state permit number

2. Mark the top 50 fathoms of the buoy line, either with a particular line color or some other marker.

3. Give vessels the option of using of a single buoy line to reduce the risk of whale entanglement in vertical lines.

4. Encourage AIS use whenever possible.

The full letter can be found in Appendix 6.
Alverson also relayed that the two year moratorium on enforcement of the current prohibition of AIS beacon use in fixed gear fisheries has been included in defense spending bill, and is expected to pass sometime in December 2022.

5 Next Steps

This workshop report will be submitted to the Pacific Fishery Management Council for consideration and discussion during the March 2023 council meeting.

OSG and NOAA West Coast Region recognize that gathering fishing industry input on any management issue is challenging, and it is likely that the input we received in this workshop is not reflective of the full diversity of opinions and perspectives across the fleet. We will distribute this workshop report to all workshop participants, through the NOAA West Coast Region Groundfish email list, and through directed outreach to key fleet members to help distribute further through their networks.

We welcome feedback and comments on the contents of this report, and/or any information that might help inform NOAA Fisheries and the Pacific Fishery Management Council as they consider the feasibility of potential gear marking, information resources, or risk reduction measures to address whale entanglement in the U.S. West Coast sablefish pot gear fishery.

Comments can be submitted to **sablefish.workshop@oregonstate.edu** by January 20th, 2023. A condensed summary of comment themes and the full text of comments will be submitted to the PFMC along with this report.

Appendix 1. Workshop Documents

1.1 Workshop Flier

WEDNESDAY, NOVEMBER 16, 2022

VIRTUAL WORKSHOP

OREGON SEA GRANT WILL HOST A

SABLEFISH GEAR MARKING WORKSHOP

Provide input to NOAA Fisheries about gear marking options that will make sablefish pot gear easier to ID if it is involved in a whale entanglement.

Register at **beav.es/ihe** or use the QR code below.

We want to hear about different ideas for marking gear in the sablefish pot gear fishery from the fishermen who use this gear day in and day out. We will also discuss ways to reduce the risk of whale entanglement in this fishery.

Workshop Goals

Develop a list of potential gear marking options that are:

- Feasible for fishing operations to use
- Are not a major economic burden
- Make pot gear easier to identify

Register at: beav.es/ihe

For more information, contact Amanda Gladics at (541) 207-4463 or Amanda.gladics@oregonstate.edu

Sea Grant Oregon

Oregon State University Extension Service

1.2 Participant Agenda

Sablefish Pot Gear Marking Workshop

Wednesday, November 16, 2022, 9 am – 3:30 pm

Location: Online on Zoom

Zoom Login Information:
https://oregonstate.zoom.us/j/94756982771?pwd=R0tLSGYyMGRxM3V1L3BsNlNPYVFPUT09
Conference Line: (971) 247 1195
Meeting ID: 947 5698 2771
Password: 718467

Workshop Goals

- Develop a list of potential sablefish pot gear marking options that are:
  - Operationally feasible for the fleet to implement.
  - Do not present an undue economic burden on fishing operations.
  - Appear likely to increase the probability of sablefish gear being identifiable from the information commonly provided in entanglement reports (descriptions, photographs, etc.).
- Develop a suite of potential options for reducing entanglement risk.

Workshop Desired Outcomes

- Assist NOAA Fisheries to fulfill the requirement in the Humpback Whale BiOp terms and conditions to conduct a feasibility study of gear marking in the sablefish fishery.
- PFMC has clear guidance from the fleet on what potential gear marking changes are operationally feasible as they consider updating gear marking requirements through the standard Council process.

Workshop Agenda

Note: Agenda times are approximate and subject to change during the workshop

9:00 Welcome, Orientation, Introductions

Amanda Gladics will provide workshop orientation and guide participant introductions. Brian Hooper and Keeley Kent will provide remarks on the motivation for holding this workshop.

9:35 The Need for Improvements in Gear Marking in the West Coast Region

Dan Lawson provides an overview of NOAA Protected Resources perspective on the management challenges posed by entanglements of unidentified origin and the need for improved gear marking in West Coast fixed gear fisheries. Information on confirmed entanglements in sablefish pot gear will also be provided. Time for Q&A and narrowly focused discussion.

10:15 Break (10 minutes)

10:25 Structure and operations of West Coast Sablefish Pot Gear

West Coast commercial fishermen will describe the basic structure and operation of main styles of pot gear: Traditional trapezoidal or conical pots using a take-up reel or coiling line on deck, and 'slinky pots'. Participants will learn how the gear is deployed, soaked, and retrieved and type of surface gear fishermen use and non-required gear markings in use.

10:55 Description of the West Coast Sablefish Pot Gear Fishery

*Brian Hooper will provide an overview of basic characteristics of the West Coast Sablefish Pot Gear Fishery, including sectors (LE Tier, Gear Switching, LE Daily Trip Limit, Open Access), number of vessels, general information about fishing effort, number of pots per set, and number of overall pots in use fleetwide***.**

11:10 Current Gear Marking Regulations & Observations on Compliance

Brian Corrigan, Dan Davis, and Andrew Torres (NOAA West Coast Division Office of Law Enforcement) provide information on the current gear marking requirements and observations and recent trends in enforcement and compliance.

11:45 Tri-State Dungeness Crab Line Marking Proposal & WA Experience with Line Marking

Caren Braby (ODFW) will provide information on the current Tri-state coordinated line marking proposal, and considerations for other West Coast Fixed Gear fisheries. Lorna Wargo (WDFW) will share experiences and lessons learned from Washington's recent implementation of a line marking requirement.

12:05 Review of Morning and Preview of Discussions

Amanda Gladics will wrap up morning presentations and give a preview of the structure for afternoon discussions. Discussions to advance the identifiability of sablefish gear will focus on improvements to gear marking, and improvements to information resources.

12:15 Lunch Break

13:00 Discussion on Improvements to Our Ability to ID Gear

We will start our discussions by reviewing input from workshop participants on the initial set of ideas to help make gear more identifiable. Then the group will propose any refinements to existing ideas and brainstorm to expand the lists of potential gear marking improvements and information resources.

14:15 Break (10 minutes)

14:25 Ranking and Prioritization of Gear Marking & Information Resources

We will conduct a ranking and prioritization exercise to hone in the options that workshop participants think are most feasible. We will discuss the resulting prioritization to gather feedback and make any necessary adjustments.

14:55 Discussion on Efforts to Reduce the Risk of Entanglement in Sablefish Pot Gear

We will discuss existing proposals and brainstorm additional ideas that could reduce the risk of whale entanglement in this fishery or could reduce the uncertainty regarding entanglement occurrence.

15:20 Wrap up and Next Steps

15:30 Conclude

1.3 Facilitation Team

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1.5 Workshop Fishing Industry Advisory Committee

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Bob Eder	Sablefish traditional pot gear	1roberteder@gmail.com
Scott Hartzell	Sablefish traditional pot gear	Ossian108@gmail.com
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1.6 Participants that Registered for the Workshop

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1.7 Interested Parties

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Ryan Bartling	CDFW	Ryan.Bartling@wildlife.ca.gov
Ryan Howell	OSP	rhowell@osp.oregon.gov
Victoria Knorr	WDFW	28atherin.knorr@dfw.wa.gov
Heather Hall	WDFW	Heather.Hall@dfw.wa.gov
Francine Kershaw	Natural Resources Defense Council	fkershaw@nrdc.org
Catherine Kilduff	Center for Biological Diversity	Ckilduff@biologicaldiversity.org

1.8 Workshop Attendees

Name	Affiliation	Email address
Robert Alverson	Fishing Vessel Owners Association	roberta@fvoa.org
Bernie Burkholder	Sablefish traditional pot gear	bernieburkholder@gmail.com
Peter Brownell	Box crab	
Paul Clampitt	Sablefish traditional pot gear	pfishcl@gmail.com
Bob Eder	Sablefish traditional pot gear	1roberteder@gmail.com
Sheila Garber	Gear Supplier	sgarber@englundmarine.com
Scott Hartzell	Sablefish traditional pot gear	Ossian108@gmail.com
Harrison Ibach	Sablefish longline gear	harrison.ibach@yahoo.com
Mark Lomeli	PSMFC, Trawl, longline gear	mlomeli@psmfc.org
Dan Major	Box crab EFP, southern rock crab	danandkelli@san.rr.com
Scott Mazzone	Quinault Tribe, Sablefish 'slinky' pot and longline gear	smazzone@quinault.org
Darian Schramm	Sablefish longline gear	darian@paramountfish.com
Keeley Kent	NMFS WCR SFD	Keeley.Kent@noaa.gov
Grace Ferrara	NMFS WCR PRD	Grace.ferrara@noaa.gov
Brian Hooper	NMFS WCR SFD	Brian.Hooper@noaa.gov
Dan Lawson	NMFS WCR PRD	dan.lawson@noaa.gov
Meg Wallen	NMFS WCR PRD	megan.wallen@noaa.gov
Laura Casali	Saltwater Inc., NMFS WCR PRD	laura.casali@noaa.gov

Lauren Saez	Ocean Associates, NMFS WCR PRD	Lauren.Saez@noaa.gov
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Dan Davis	NMFS OLE WCD	dan.davis@noaa.gov
Andrew Torres	NMFS OLE WCD	Andrew.torres@noaa.gov
Diane Windham	NMFS WCR – Aquaculture	diane.windham@noaa.gov
Laura Duffy	Saltwater Inc., NMFS WCR – Aquaculture	Laura.Duffy@noaa.gov
Maggie Sommer	WCR SFD	maggie.sommer@noaa.gov
Kevin Stockmann	Lead Observer, WCGOP	kstockmann@psmfc.org
Chris German	USCG	Christofer.L.German2@uscg.mil
William Jasper	Makah Tribe	will.jasper@makah.com
Jennifer Hagen	Quiluete Nation	Jennifer.hagen@quileutenation.org
Alan Sarich	Quinault Indian Nation	asarich@quinault.org
Todd Phillips	PFMC	todd.phillips@noaa.gov
Jessi Doerpinghaus	PFMC	jessi.doerpinghaus@noaa.gov
Dave Colpo	PSMFC	dcolpo@psmfc.org
Melissa Mandrup	CDFW, PFMC GMT	melissa.mandrup@wildlife.ca.gov
Lenny Arkinstall	CDFW	Leonard.Arkinstall@wildlife.ca.gov
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Caroline McKnight	CDFW	caroline.mcknight@wildlife.ca.gov
Caren Braby	ODFW	caren.e.braby@odfw.oregon.gov
Troy Buell	ODFW	Troy.V.Buell@odfw.oregon.gov
Kelly Corbett	ODFW	Kelly.C.CORBETT@odfw.oregon.gov
Brittany Harrington	ODFW	Brittany.L.HARRINGTON@odfw.oregon.gov
Lynn Mattes	ODFW	lynn.mattes@odfw.oregon.gov
Katie Pierson	ODFW	katherine.j.pierson@odfw.oregon.gov
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Heather Hall	WDFW	Heather.Hall@dfw.wa.gov
Whitney Roberts	WDFW	Whitney.Roberts@dfw.wa.gov
Lorna Wargo	WDFW	lorna.wargo@dfw.wa.gov
Ryan Howell	OSP	rhowell@osp.oregon.gov
Heather Van Meter	OSP	Heather.VanMeter@osp.oregon.gov
Gway Kirchner	The Nature Conservancy	gway.kirchner@tnc.org
Colin Frank	Graduate Student	colin.frank@mi.mun.ca

1.9 Workshop Background Materials Links

Core Background Documents

2021 West Coast Whale Entanglement Summary Link

PFMC April 2021 Meeting Documents

Humpback Whale Situation Summary Link
Groundfish Endangered Species Workgroup Report: Humpback Whale Excerpted Section Link
Supplemental Report to the GAP Link
Supplemental Report to the GMT Link

Tri-state Dungeness Crab line marking proposal, August 2022 Link

Center for Biological Diversity v. NMFS lawsuit Link

NMFS Letter to FCC about allowing AIS Beacons on Fixed Gear Link

NOAA Fisheries Endangered Species Act (ESA) Section 7(a)(2) Biological and Conference opinion on the Continuing operation of the Pacific Coast Groundfish Fishery (Reinitiation of consultation #NWR-2012-867) – Humpback whale (*Megaptera novaeangeliae*) Link

Relevant Sections

Section 1.3.1 Overview of fisheries covered by the BiOp (pgs 8-10)
Section 1.3.5-7 Description of Fixed Gear and Tribal fisheries (pgs 12 – 14)
Section 2.5.2 Exposure and Response to interactions with the Sablefish Pot Fishery (pgs 43- 52)
Section 2.5.5 Response to Entanglement (pgs 56-57)
Section 2.5.6 Risk for ESA-listed Humpback Whales (pgs 57-58)
Section 2.9 Incidental Take Statement (pgs 62 – 66)
Section 2.10 Conservation Recommendations (pgs 66-67)

These discretionary measures include:

- Encouraging the development of weak links, reduction in breaking strength of lines, and pop-up/on demand gear.
- Logbooks to better understand overlap of fishing effort w/ whales
- Collection of additional information about gear configuration/characteristics
- Further investigation of potential for interactions between whales & trawl fleet.

Note: This workshop is being held to support NOAA in their ability to fulfill T&C 1, which requires NOAA to study the feasibility of implementing additional pot gear marking regulations. Full text of T&C 1 copied below:

(1) NMFS SFD, in cooperation with the PFMC and NMFS PRD as necessary, shall investigate the methods and feasibility associated with implementing additional pot gear marking regulations for the PCGF. The feasibility study shall consider whether additional gear marking would increase NMFS' ability to attribute humpback whale entanglements to specific fisheries and assist in identifying potential modifications to the pot gear regulations that could reduce incidental take of humpback whales. The feasibility study shall be completed by March 2023 and the findings given consideration by the PFMC for potential changes to the pot gear marking regulations by March 2024. Completion dates may be revised by mutual agreement by NMFS SFD, PFMC, and NMFS PRD. The following methods shall be evaluated, as well as any other potential methods identified by NMFS SFD, the PFMC, or NMFS PRD as part of the investigation process:

a. Line marking - as an example, proposed Washington Department of Fish and Wildlife Dungeness crab regulations (October 2, 2019).

b. Additional markings on buoys/surface gear – as an example, California Department of Fish and Wildlife Commercial Trap Gear marking regulations.

Secondary Background Documents

Pacific Fisheries Management Council. Limited Entry Fixed Gear Permit Stacking Program Review Link

Section 1 Introduction (Sections 1.1- 1.2)

Section 2.1.1 Headings:
Fleet participation and attainment
Fleet consolidation
Section 2.1.8 Heading:
Improve product quality and value (Note: price differential between pot & longline)
Section 2.5.3 ESA Bycatch
Appendix B: Enforcement Compliance Report
(Note: Gear was the 4th most cited category for compliance issues, behind License/Permit, Overage – halibut/other spp, and Reporting/Recordkeeping)

Somers, et al. **Fishing Effort in the 2002-19 Pacific Coast Groundfish Fisheries 2020.** Link
Information on West Coast Groundfish fishing effort using pot gear, including estimates of pots per set, total fleetwide pots, and geographic extent and core fishing areas. (pg 14-15 in document, figs 24-31)

Hanson, et al., **Estimated Humpback Whale Bycatch in the U.S. West Coast Groundfish Fisheries**. June 2021 NOAA Fisheries. Link

Summary of the Terms & Conditions in the 2020 BiOp and actions and progress to date through the Council process. (Pgs 17-21)

New England/Mid-Atlantic Gear Marking Requirements Link

Knowlton, Amy R., et al. **Effects of fishing rope strength on the severity of large whale entanglements**. Conservation Biology, vol. 30, no. 2, Jan. 2015, pp. 318–328 Link

Appendix 2. Pre-Workshop Assessment of Concepts

2.1 Emails Sent to Workshop Participants to Solicit Input

From: Gladics, Amanda Jean
To: Gladics, Amanda Jean
Bcc: 1roberteder@gmail.com; Gerry Richter; Paul Clampitt ; Robert Alverson; Scott Hartzell; Ben Clampitt; Bernie Burkholder; Calder Deverle; Cameron Hoefer; Dan Fugere; Dan Maior; Darian Schramm; David Lapchuk; Dick Ogo; Donald Marshall; Garrett Rose; Harrison Ibach; James Johnson; John Crowley Vice Chair; John McHenry (familymchenry@comcast.net); Jonathan Gonzalez; Kristian Olsen; Mark Lomeli; Matthew Rollings; Per Odegaard; Peter Brownell; Romolo Ghio; sgarber@englundmarine.com; smazzone@quinault.org; Wade Bassi
Subject: Sablefish Pot Gear Marking Workshop - Pre-workshop Input from Fishermen
Date: Thursday, November 10, 2022 12:33:00 AM
Attachments: image002.png
image003.png
Importance: High

Hello All,

I'm reaching out to request your initial evaluation of barriers to implementation of 15 different gear marking, information resources, and entanglement risk reduction concepts. We will use this input to inform and focus our discussions during the Sablefish Pot Gear Marking Workshop on November 16, 2022.

The survey asks you to evaluate the how much of a barrier to implement an idea ('not a barrier' to 'extreme barrier') that you anticipate across four basic factors related to overall feasibility:

1. Safety for humans and the environment
2. Labor/Time to initially implement and maintain
3. Ease of Use in your day to day fishing operations.
4. Cost to initially implement and maintain

I know that the way you rate the barriers to implement will likely be impacted by implementation details that are not specified at this point. Please do the best you can to evaluate the degree to which each factor presents a barrier to implementation based on your own understanding of the concept. Your input on the survey will serve as starting point for discussion and refinement of these concepts during the workshop.

Workshop participants that identified as government, NGO, or academics will be receiving a similar survey and asked to rank these concepts on different factors related to increasing our ability to identify the fishery involved in whale entanglements.

You can take the survey by clicking on this link, or using the QR code below to fill in the survey on your phone. It think it should take about 15-20 minutes to complete, depending on how many additional ideas you want the group to think about. You will be able to review the input of others when you have completed the survey.

Please provide your input by noon on November 15th, 2022.

Thanks,
Amanda

Amanda J. Gladics (hear name)
Associate Professor of Practice, Coastal Fisheries Extension
Oregon State University
Extension Service - Clatsop County | Oregon Sea Grant
P: 503-325-8573 | C: 541-207-4463
2001 Marine Drive, Room 210
Astoria, Oregon 97103
Oregon Sea Grant | OSU Extension
Pronouns: She/her or they/them

Sea Grant Oregon

Oregon State University Extension Service Clatsop County

From: Gladics, Amanda Jean
To: Gladics, Amanda Jean
Bcc: Bartling, Ryan@Wildlife; Caroline Mcknight; Chris Yates; Christy Juhasz; Colleen Weiler; Dave Colpo; Diane Windham; Francine Kershaw; Gary Rule; Grace Ferrara; Greg Busch; Gway Kirchner; HARRINGTON Brittany L * ODFW; Heather Hall; Jamie Fuller (jamie.fuller@dfw.wa.gov); Jessi Doerpinghaus; Joanna Grebel; Joel Prickett; Joy Primrose; Kacy Cooper; Katie Pierson; Kelly Cates; Kelly Corbett; Kevin Stockmann; Laura Casali; Laura Duffy; Lauren Saez; Maggie Sommer (maggie.sommer@noaa.gov); Meg Wallen; Melissa Mandrup; Ryan Howell; Santos Cabral; Todd Phillips; Troy Buell (troy.v.buell@odfw.oregon.gov); Victoria Knorr; Whitney Roberts; William Jasper
Subject: FW: Sablefish Pot Gear Marking Workshop - Pre-workshop Input from Fishermen
Date: Thursday, November 10, 2022 5:11:00 PM
Attachments: image002.png
image003.png
Importance: High

Hello All,

I'm reaching out to request your initial evaluation of barriers to implementation of 15 different gear marking, information resources, and entanglement risk reduction concepts. We will use this input to inform and focus our discussions during the Sablefish Pot Gear Marking Workshop on November 16, 2022.

The survey asks you to evaluate the how much of a barrier to implement an idea ('not a barrier' to 'extreme barrier') that you anticipate across four basic factors related to fisheries management feasibility:

1. Does Not Improve IDs or Does Not Reduce Risk
2. Regulatory Complexity
3. Enforcement
4. Cost to Management Agencies

I know that the way you rate the barriers to implement will likely be impacted by implementation details that are not specified at this point. Please do the best you can to evaluate the degree to which each factor presents a barrier to implementation based on your own understanding of the concept. Your input on the survey will serve as starting point for discussion and refinement of these concepts during the workshop.

Workshop participants that identified as part of the fishing industry will be receiving a similar survey and asked to rank these concepts on different factors related to operational feasibility.

You can take the survey by clicking on this link, or using the QR code below to fill in the survey on your phone. It think it should take about 15-20 minutes to complete, depending on how many additional ideas you want the group to think about. You will be able to review the input of others when you have completed the survey.

Please provide your input by noon on November 15th, 2022.

Thanks,
Amanda

Amanda J. Gladics (hear name)
Associate Professor of Practice, Coastal Fisheries Extension
Oregon State University
Extension Service - Clatsop County | Oregon Sea Grant
P: 503-325-8573 | C: 541-207-4463
2001 Marine Drive, Room 210
Astoria, Oregon 97103
Oregon Sea Grant | OSU Extension
Pronouns: She/her or they/them

2.2 Pre-Workshop Survey Directions & Results

Input from workshop participants was gathered using a Menti online survey. Fishing participants and non-fishing participants received slightly different versions of the survey and rated the barriers to implementation of concepts on different factors (see full description in Section 3.3 of workshop report). Full slides that contain directions and result visualizations for both fishing industry and agency, NGO, and academic workshop participants can be found below. Fishing industry directions results are displayed first (top half of each page) and corresponding non-fishing participant ratings are displayed second (bottom half of the page). Results for each group are also provided in table form.

Mentimeter

We need your initial assessments

We are asking the fishing industry participants for input to help the facilitation team prioritize our discussions during the Sablefish Pot Gear Marking Workshop on November 16, 2022.

We have gathered ideas for potential gear marking and information resource improvements from sablefish pot gear fishermen and fisheries managers. Each of these ideas aims to reduce the number of reported whale entanglements where NOAA is unable to positively identify the fishery involved or reduce the risk of whale entanglement in West Coast Sablefish Pot Gear.

You will be asked to evaluate the potential barriers to implementation on four factors related to overall feasibility. You can skip any factor that you do not feel qualified to assess.

1

Mentimeter

We need your initial assessments

We are asking the agency, NGO, and academic participants for input to help the facilitation team prioritize our discussions during the Sablefish Pot Gear Marking Workshop on November 16, 2022.

We have gathered ideas for potential gear marking and information resource improvements from sablefish pot gear fishermen and fisheries managers. Each of these ideas aims to reduce the number of reported whale entanglements where NOAA is unable to positively identify the fishery involved or reduce the risk of whale entanglement in West Coast Sablefish Pot Gear.

You will be asked to evaluate the potential barriers to implementation on four feasibility factors related to effectiveness, regulatory complexity, enforcement, and potential costs to fisheries management agencies.

3

Mentimeter

Feasibility Factors

- Safety - to both humans and the environment
- Time/Labor - to implement initially and ongoing effort to maintain
- Ease of Use - in your day to day fishing operations
- Cost - to implement initially and maintain over time

2

Mentimeter

Feasibility Factors

- Does Not Improve IDs - of the source fishery of whale entanglements
- Does Not Reduce Risk - of whale entanglements in this fishery
- Regulatory Complexity - to implement initially
- Enforcement - to maintain compliance over time
- Cost - to management agencies to implement initially and maintain over time

1

Mentimeter

Please Note

If you think an idea **will significantly improve** IDs of source fisheries or reduce the risk of entanglement, that would **not present a barrier** to implementation.

If you think an idea **will not at all** improve IDs of source fishery or reduce risk to whales, that would constitute **an extreme barrier** to implementation.

You can skip any factor that you do not feel qualified to assess.

1

Mentimeter

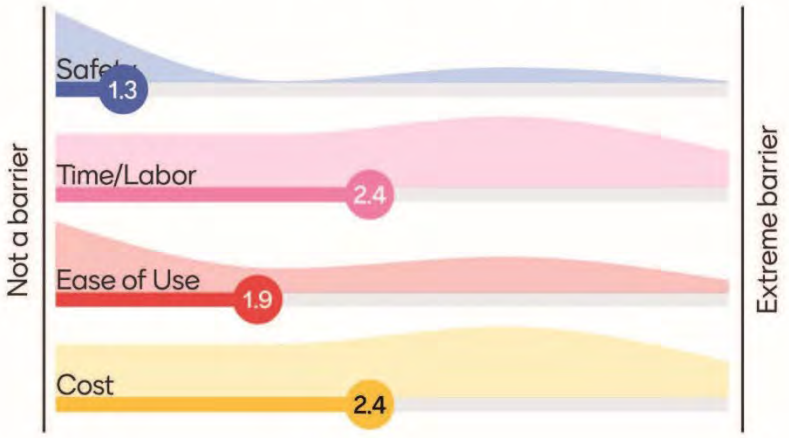
Ranking Scale

- Not a Barrier - This factor is not a barrier to implementing this idea
- Somewhat of a Barrier - This factor is somewhat of a barrier to implementing this idea
- Moderate Barrier - This factor is a moderate barrier to implementing this idea
- Extreme Barrier - This factor presents an extreme barrier to implementing this idea.

2

More Permanent Buoy Marking Methods

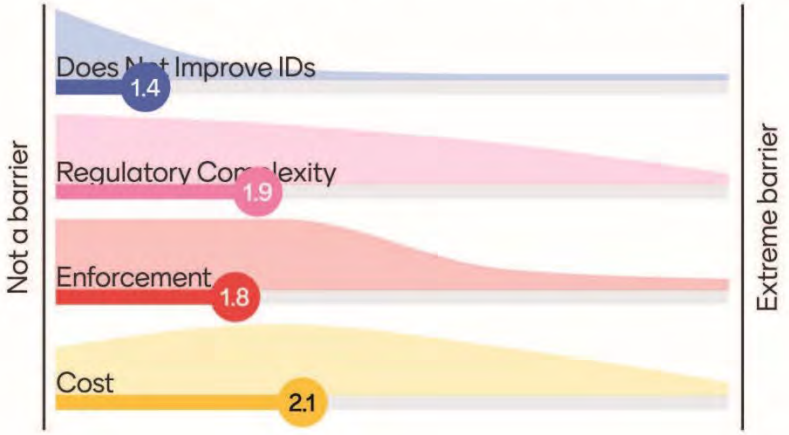
Mentimeter



12

More Permanent Buoy Marking Methods

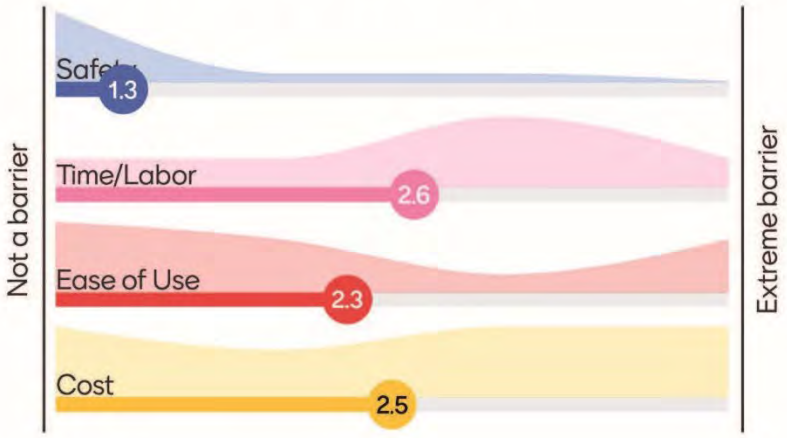
Mentimeter



19

Additional Markings on Buoys

Mentimeter



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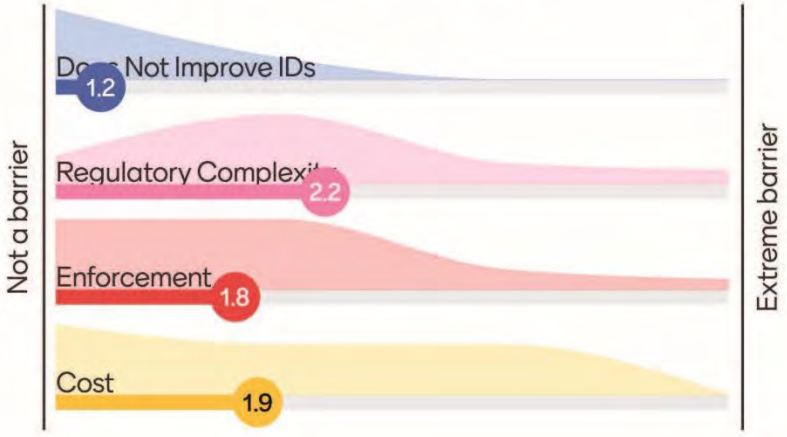
Additional Markings on Buoys

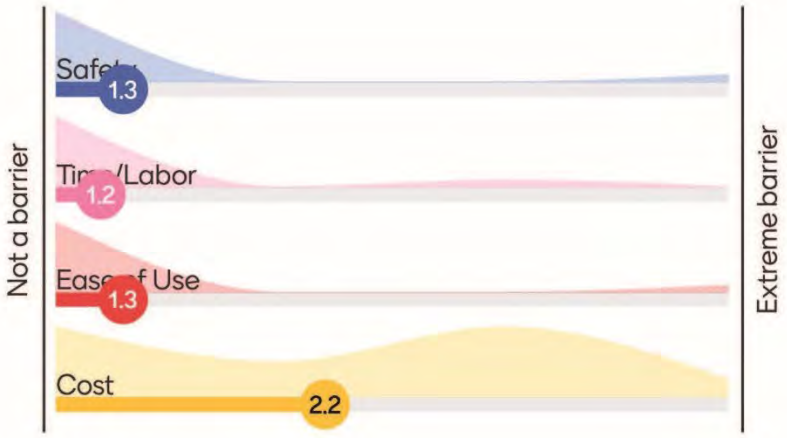
Mentimeter



19

AIS Beacons

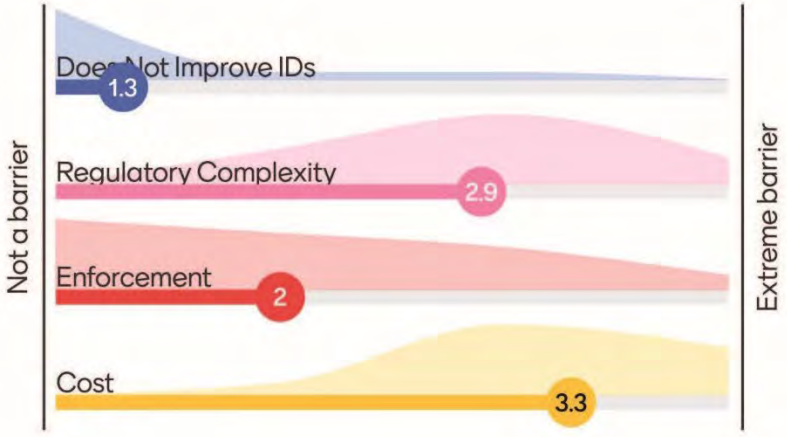
Mentimeter



11

AIS Beacons

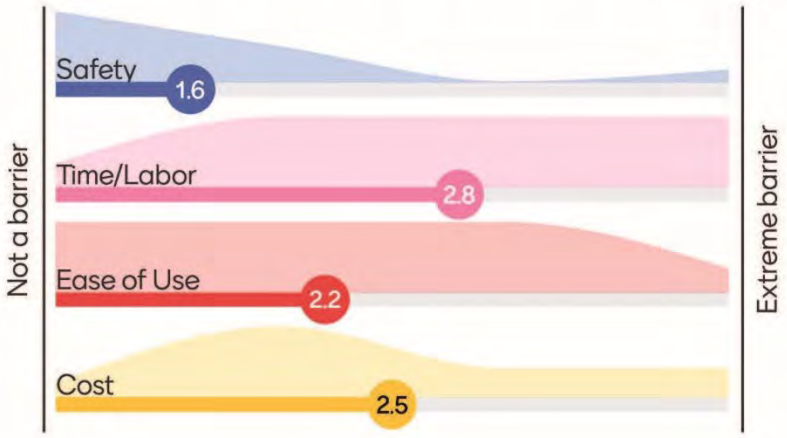
Mentimeter



19

Line Marking on Surface Gear Lines

Mentimeter



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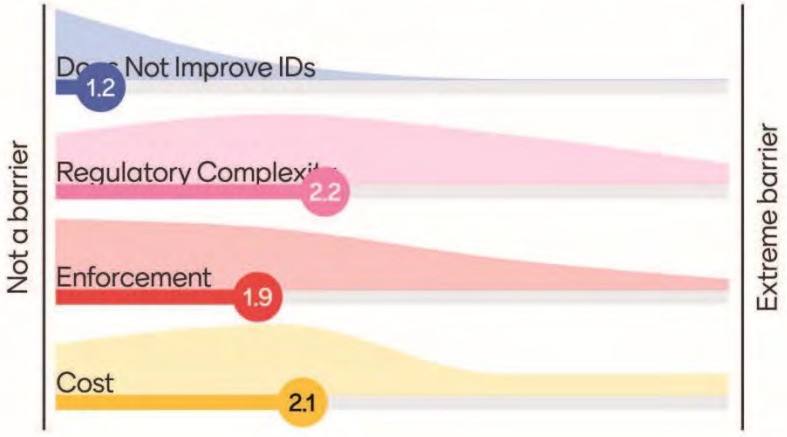
Line Marking on Surface Gear Lines

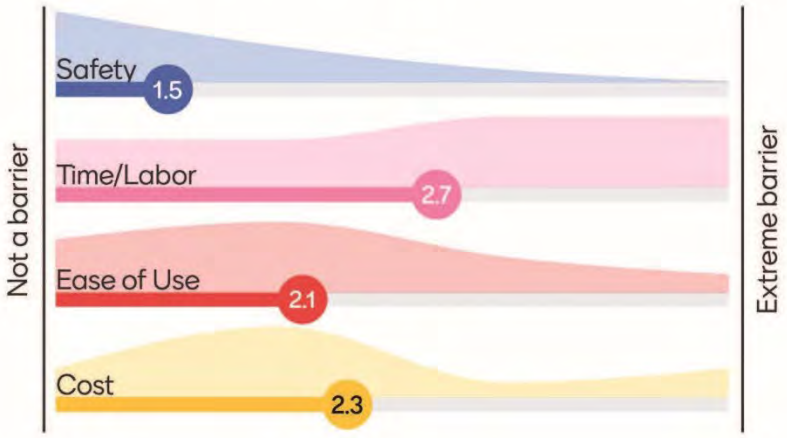
Mentimeter



19

Line Marking on Buoy Lines

Mentimeter



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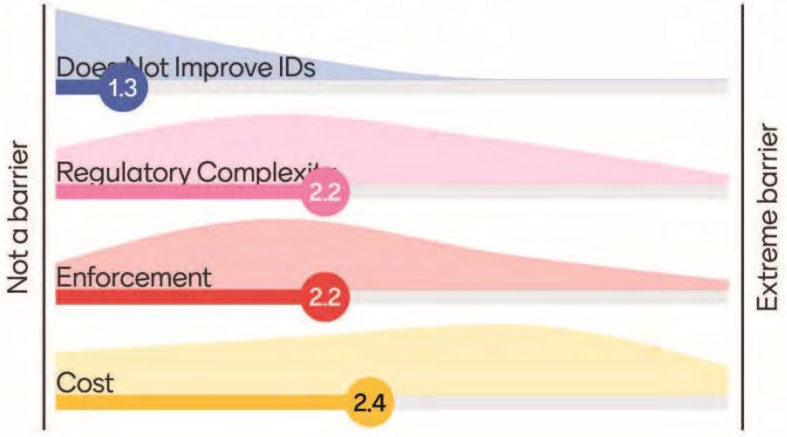
Line Marking on Buoy Lines

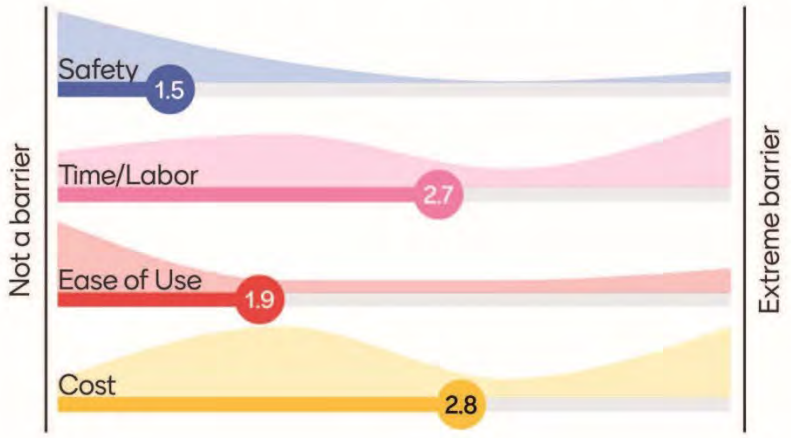
Mentimeter



19

Sablefish Specific Line Color on Buoy Lines

Mentimeter



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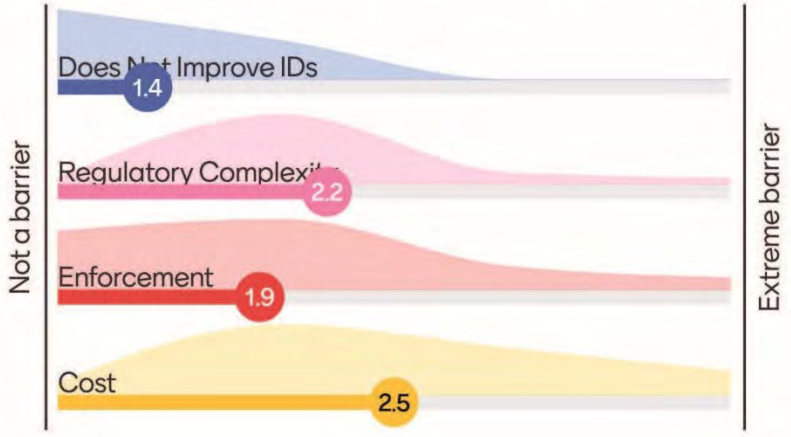
Sablefish Specific Line Color on Buoy Lines

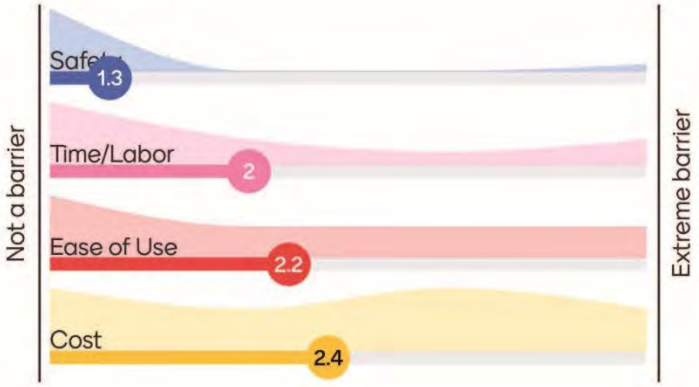
Mentimeter



17

Prohibit Marks That Are Required for Other West Coast Fisheries

Mentimeter



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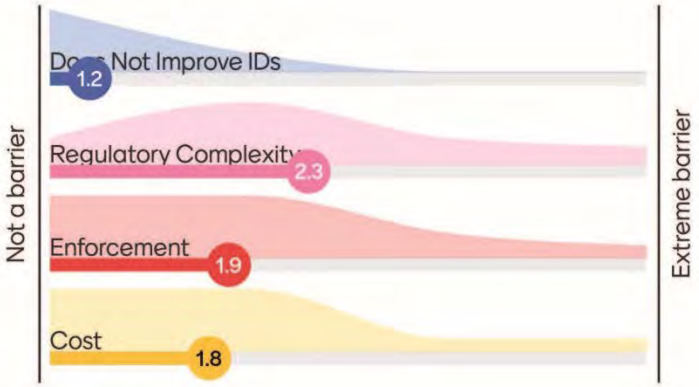
Prohibit Marks That Are Required for Other West Coast Fisheries

Mentimeter



17

Do you have other gear marking ideas? Or refinements of these ideas for gear marking?

Mentimeter

Please keep in mind it is very difficult to mark lines horizontally and have a mark be somewhat permanent. It is much easier to mark lines vertically.

When it comes to making buoy lines a specific color. The cost and labor time to implement depend on what you have in mind and what is available. If you want fishermen to put marks on miles of line, that will be prohibitive.

Data base of detailed photos of each fisher's complete longline set

Not enough detail to answer first question. Intended 'no answer'. Don't interpret as 'no barrier'.

A single proprietary line color for each fishery. Dyed the entire length of the line by the manufacturer. Proportionally allocated to allow time to implement the change in regulation. (Say 5 years) Along find grant funding to support replacement.

I believe I addressed my ideas in the last question, my apologies.

same

With multiple buoys, a flag pole with an approved AIS beacon I'm not sure what else is necessary without creating foolish redundancy.

I would like to see all one color line and a designated letter for Sablefish.

7

Do you have other gear marking ideas? Or refinements of these ideas for gear marking?

Mentimeter

repeat line markings from buoy and surface - X distance from terminal end - pursue non plastic alternatives, i.e. metal crimps

Engage with gear producers as well for their expert opinion/input.

Defining and requiring a single line color for vertical line.

RFID Tags embedded in the buoys or buoy line which identify vessel and/or fishery associated with the gear.

Gear marking itself does not reduce risk of whale entanglements but provides information for further regulations. Line tracers can be used in combination w/ markers for better ID. Buoy & surface gear marking should be visible from aerial platforms.

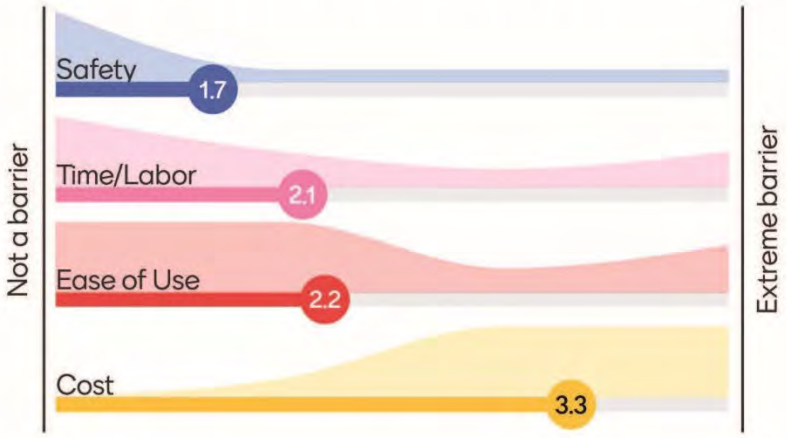
Buoy line marking should be at least every 40 feet to maximize identification ability.

No.

6

Expanded Electronic Monitoring

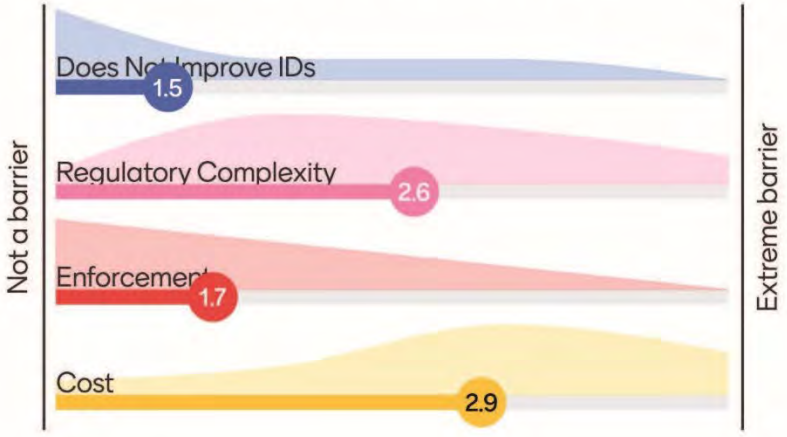
Mentimeter



9

Expanded Electronic Monitoring

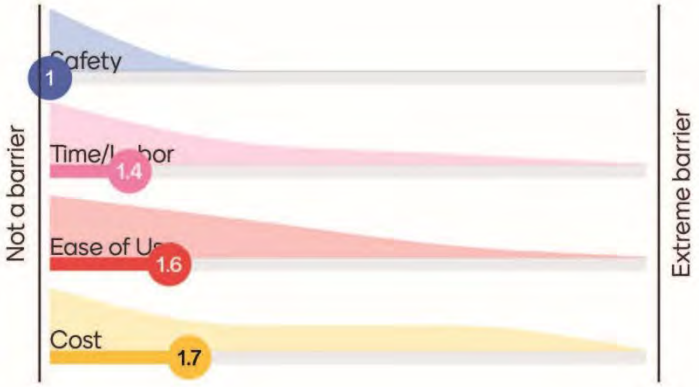
Mentimeter



12

Comprehensive Guide to Individual Vessel Gear Set-ups

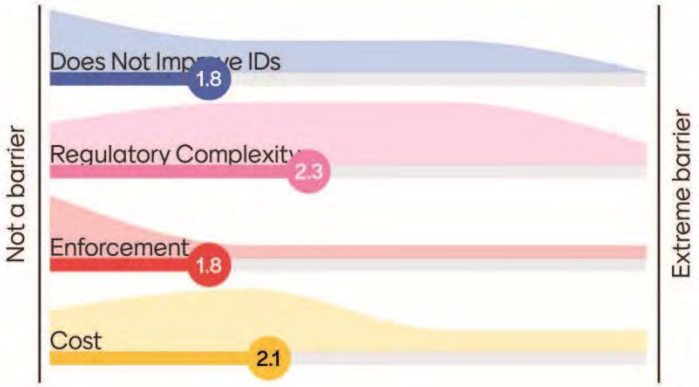
Mentimeter



9

Comprehensive Guide to Individual Vessel Gear Set-ups

Mentimeter



11

Do you have other ideas for improving information resources? Or refinements of these ideas?

Mentimeter

There is a significant learning curve to long-lining hooks. But in truth, there is no "one size fits all" for any method. These are hard-learned skills and need to be teased out gently.

I have always liked face-to-face interviews.

1

Do you have other ideas for improving information resources? Or refinements of these ideas?

Mentimeter

Well covered by current suggestions

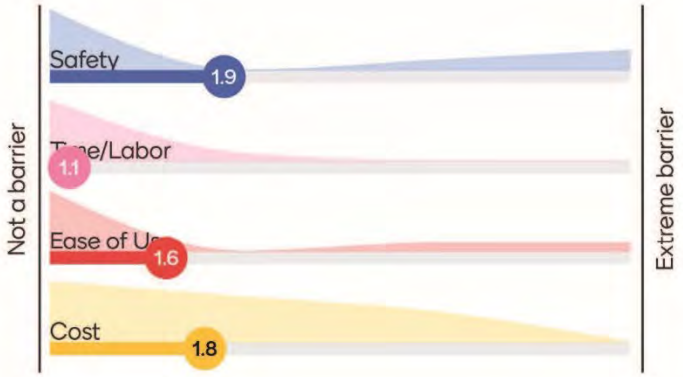
Integrate monitoring and marking of pop-up/on-demand systems as well.

No

3

Surface gear on just one end of the groundline

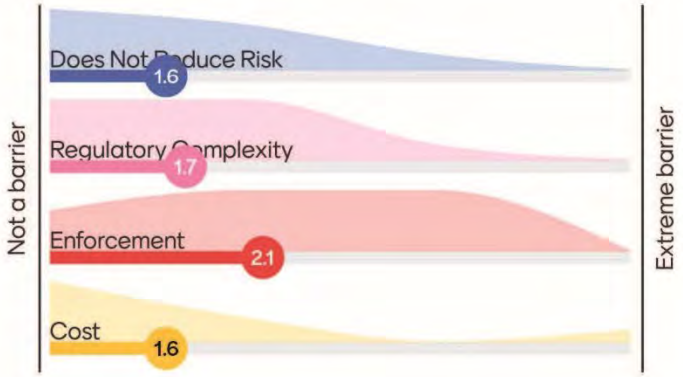
Mentimeter



9

Surface gear on just one end of the groundline

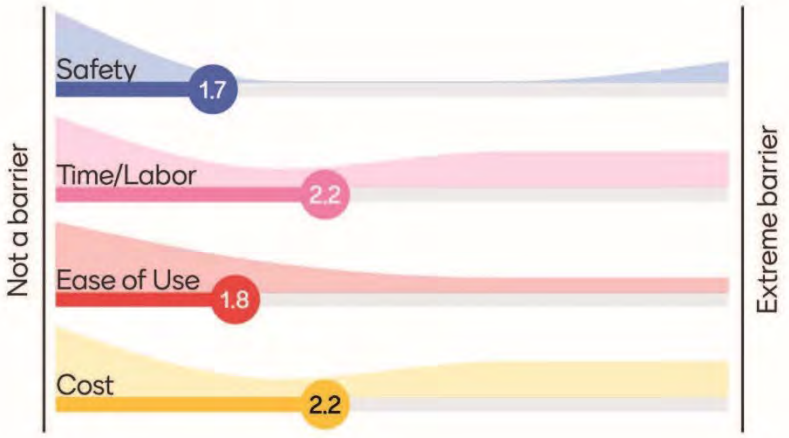
Mentimeter



11

Limits on Soak Time

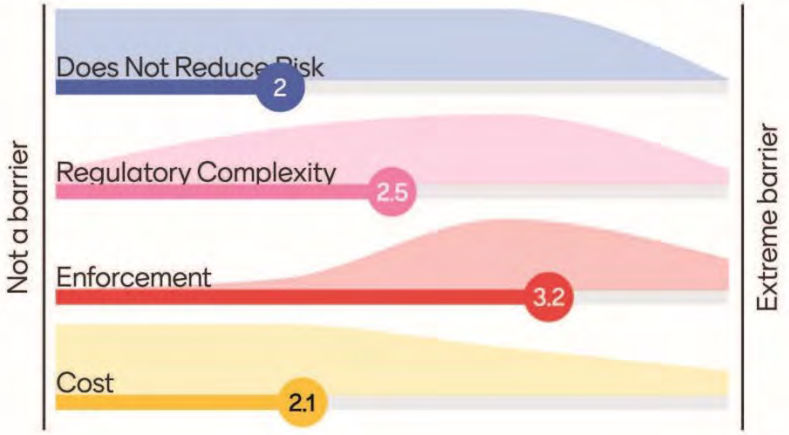
Mentimeter



9

Limits on Soak Time

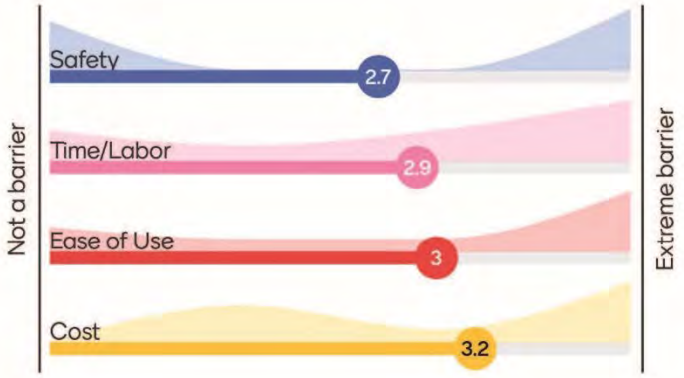
Mentimeter



11

Weak Links or Reduced Breaking Strength of Lines

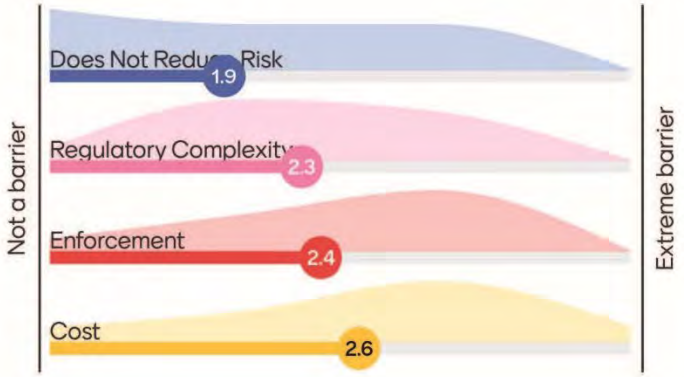
Mentimeter



9

Weak Links or Reduced Breaking Strength of Lines

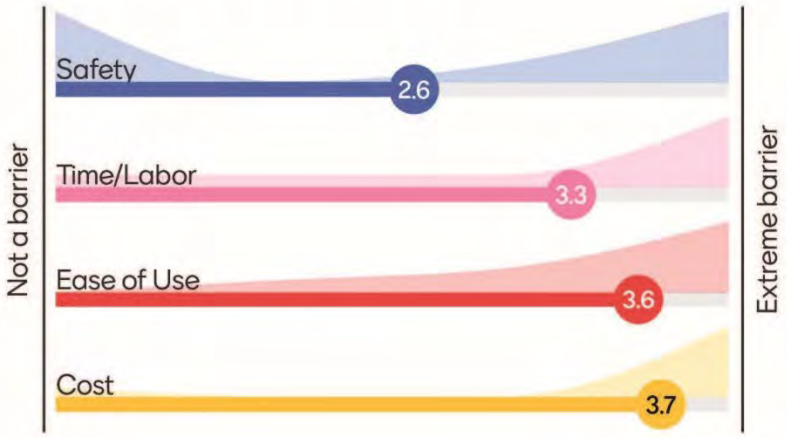
Mentimeter



11

Pop-up or "Ropeless" Gear

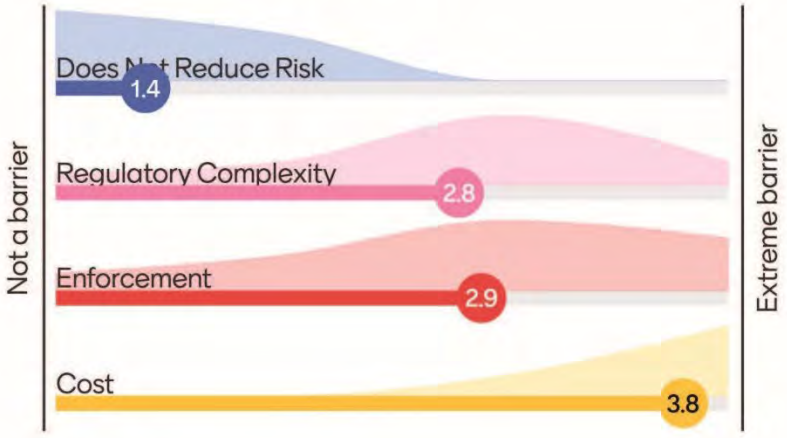
Mentimeter



9

Pop-up or "Ropeless" Gear

Mentimeter



11

Do you have other ideas for reducing the risk of whale entanglement in sablefish pot gear?

Mentimeter

No slack line

Limit soak time.

2

Do you have other ideas for reducing the risk of whale entanglement in sablefish pot gear?

Mentimeter

Curious about gear loss rates with rope lift/pop-up gear

NMFS has seen entanglements with both the vertical and groundlines. I would suggest a review of the groundline set up used to see if there are any entanglement risks that could be reduced.

pop-up/on-demand gear is the most effective for reducing risk; weak links and "breckable" rope do not prevent entanglements from occurring, and additional factors (knots or splices in line where those are attached) present added risk.

the efficacy of weak links/low breaking strength rope is unproven and will still result in entanglements.

No.

lack of surface gear underminds pot limits

5

Sablefish Gear Marking Workshop
Pre-Workshop Survey Results
Fishing Industry Participants

Scale
Not a Barrier = 1
Somewhat of a Barrier = 2
Moderate Barrier = 3
Extreme Barrier = 4

Question 1

Question More Permanent Buoy Marking Methods
Respondents 12

Choices	Weighted average	1	2	3	4
Safety	1.333333333	10	0	2	0
Time/Labor	2.416666667	3	3	4	2
Ease of Use	1.916666667	6	2	3	1
Cost	2.416666667	3	3	4	2

Question 2

Question Additional Markings on Buoys
Respondents 11

Choices	Weighted average	1	2	3	4
Safety	1.272727273	9	1	1	0
Time/Labor	2.636363636	2	2	5	2
Ease of Use	2.272727273	4	3	1	3
Cost	2.545454545	3	2	3	3

Question 3

Question AIS Beacons
Respondents 11

Choices	Weighted average	1	2	3	4
Safety	1.272727273	10	0	0	1
Time/Labor	1.181818182	10	0	1	0
Ease of Use	1.272727273	10	0	0	1
Cost	2.181818182	4	2	4	1

Question 4

Question Line Marking on Surface Gear Lines
Respondents 10

Choices	Weighted average	1	2	3	4
Safety	1.6	6	3	0	1
Time/Labor	2.8	1	3	3	3
Ease of Use	2.2	3	3	3	1
Cost	2.5	1	5	2	2

Question 5

Question Line Marking on Buoy Lines
Respondents 10

Choices	Weighted average	1	2	3	4
Safety	1.5	6	3	1	0
Time/Labor	2.7	2	2	3	3
Ease of Use	2.1	3	4	2	1
Cost	2.3	2	5	1	2

Question 6

Question Sablefish Specific Line Color on Surface Gear Lines
Respondents 10

Choices	Weighted average	1	2	3	4
Safety	1.4	7	2	1	0
Time/Labor	2.5	2	2	5	1
Ease of Use	1.9	5	2	2	1
Cost	2.8	1	2	5	2

Question 7

Question Sablefish Specific Line Color on Buoy Lines
Respondents 10

Choices	Weighted average	1	2	3	4
Safety	1.5	7	2	0	1
Time/Labor	2.7	2	3	1	4
Ease of Use	1.9	6	1	1	2
Cost	2.8	1	4	1	4

Question 8

Question Prohibit Marks That Are Required for Other West Coast Fisheries
Respondents 10

Choices	Weighted average	1	2	3	4

Safety	1.3	9	0	0	1
Time/Labor	2	5	2	1	2
Ease of Use	2.2	4	2	2	2
Cost	2.4	3	2	3	2

Question 9

Question Do you have other gear marking ideas? Or refinements of these ideas for gear marking?
Respondents 7

Responses

Please keep in mind it is very difficult to mark lines horizontally and have a mark be somewhat permanent. It is much easier to mark lines vertically.

When it comes to making buoy lines a specific color. The cost and labor time to implement depend on what you have in mind and what is available. If you want fishermen to put marks on miles of line, that will be prohibitive.

Data base of detailed photos of each fisher's complete longline set

Not enough detail to answer first question. Intended 'no answer'. Don't interpret as 'no barrier'.

I recommend use of "L" number, a "B" for blackcod gear, and phone number for operator. Anything else is useless and difficult to maintain compliance. If you see a phone number, L number , and gear letter identification and still have trouble u suck

A single proprietary line color for each fishery. Dyed the entire length of the line by the manufacturer. Proportionally allocated to allow time to implement the change in regulation. (Say 5 years) Along find grant funding to support replacement.

I believe I addressed my ideas in the last question, my apologies.

same

I would like to see all one color line and a designated letter for Sablefish.

With multiple buoys, a flag pole with an approved AIS beacon I'm not sure what else is necessary without creating foolish redundancy.

Question 10

Question Expanded Electronic Monitoring
Respondents 9

Choices	Weighted average	1	2	3	4
Safety	1.666666667	6	1	1	1
Time/Labor	2.111111111	4	2	1	2
Ease of Use	2.222222222	3	3	1	2
Cost	3.333333333	0	1	4	4

Question 11

Question Comprehensive Guide to Individual Vessel Gear Set-ups

Respondents 9

Choices	Weighted average	1	2	3	4
Safety	1	9	0	0	0
Time/Labor	1.444444444	6	2	1	0
Ease of Use	1.555555556	5	3	1	0
Cost	1.666666667	5	2	2	0

Question 12

Question Do you have other ideas for improving information resources? Or refinements of these ideas?
Respondents 1

Responses

There is a significant learning curve to long-lining hooks. But in truth, there is no "one size fits all" for any method. These are hard-learned skills and need to be teased out gently.
I have always liked face-to-face interviews.

Question 13

Question Surface gear on just one end of the groundline
Respondents 9

Choices	Weighted average	1	2	3	4
Safety	1.888888889	6	0	1	2
Time/Labor	1.111111111	8	1	0	0
Ease of Use	1.555555556	7	0	1	1
Cost	1.777777778	4	3	2	0

Question 14

Question Limits on Soak Time
Respondents 9

Choices	Weighted average	1	2	3	4
Safety	1.666666667	7	0	0	2
Time/Labor	2.222222222	4	1	2	2
Ease of Use	1.777777778	5	2	1	1
Cost	2.222222222	4	1	2	2

Question 15

Question Weak Links or Reduced Breaking Strength of Lines
Respondents 9

Choices	Weighted average	1	2	3	4
Safety	2.666666667	4	0	0	5
Time/Labor	2.888888889	2	1	2	4
Ease of Use	3	2	1	1	5
Cost	3.222222222	0	3	1	5

Question 16

Question Pop-up or "Ropeless" Gear
Respondents 9

Choices	Weighted average	1	2	3	4
Safety	2.555555556	4	0	1	4
Time/Labor	3.333333333	1	1	1	6
Ease of Use	3.555555556	0	1	2	6
Cost	3.666666667	1	0	0	8

Question 17

Question Do you have other ideas for reducing the risk of whale entanglement in sablefish pot gear?
Respondents 2

Responses

No slack line
Limit soak time.

Sablefish Gear Marking Workshop
Pre-Workshop Survey Results
Non-Fishing Participants

Scale
Not a Barrier = 1
Somewhat of a Barrier = 2
Moderate Barrier = 3
Extreme Barrier = 4

Question 1

Question More Permanent Buoy Marking Methods
Respondents 19

Choices	Weighted average	1	2	3	4
Does Not Improve IDs	1.388888889	14	2	1	1
Regulatory Complexity	1.944444444	7	6	4	1
Enforcement	1.823529412	7	7	2	1
Cost	2.133333333	4	6	4	1

Question 2

Question Additional Markings on Buoys
Respondents 19

Choices	Weighted average	1	2	3	4
Does Not Improve IDs	1.235294118	13	4	0	0
Regulatory Complexity	2.157894737	4	10	3	2
Enforcement	1.823529412	7	7	2	1
Cost	1.882352941	7	5	5	0

Question 3

Question AIS Beacons
Respondents 19

Choices	Weighted average	1	2	3	4
Does Not Improve IDs	1.25	10	1	1	0
Regulatory Complexity	2.933333333	0	4	8	3
Enforcement	2	5	4	3	1
Cost	3.272727273	0	1	6	4

Question 4

Question Line Marking on Surface Gear Lines
Respondents 19

Choices	Weighted average	1	2	3	4
Does Not Improve IDs	1.176470588	14	3	0	0
Regulatory Complexity	2.210526316	5	7	5	2
Enforcement	1.882352941	7	6	3	1
Cost	2.0625	5	7	2	2

Question 5

Question Line Marking on Buoy Lines
Respondents 19

Choices	Weighted average	1	2	3	4
Does Not Improve IDs	1.266666667	11	4	0	0
Regulatory Complexity	2.166666667	4	8	5	1
Enforcement	2.1875	3	8	4	1
Cost	2.428571429	3	4	5	2

Question 6

Question Sablefish Specific Line Color on Surface Gear Lines
Respondents 18

Choices	Weighted average	1	2	3	4
Does Not Improve IDs	1.266666667	11	4	0	0
Regulatory Complexity	2.235294118	3	9	3	2
Enforcement	1.857142857	5	7	1	1
Cost	2.384615385	1	7	4	1

Question 7

Question Sablefish Specific Line Color on Buoy Lines
Respondents 17

Choices	Weighted average	1	2	3	4
Does Not Improve IDs	1.357142857	9	5	0	0
Regulatory Complexity	2.1875	1	12	2	1
Enforcement	1.928571429	5	6	2	1
Cost	2.538461538	1	6	4	2

Question 8

Question Prohibit Marks That Are Required for Other West Coast Fisheries

Respondents 17

Choices	Weighted average	1	2	3	4
Does Not Improve IDs	1.230769231	10	3	0	0
Regulatory Complexity	2.266666667	3	7	3	2
Enforcement	1.923076923	5	5	2	1
Cost	1.833333333	5	5	1	1

Question 9

Question Do you have other gear marking ideas? Or refinements of these ideas for gear marking?

Respondents 6

Responses

repeat line markings from buoy and surface - X distance from terminal end - pursue non plastic alternatives, i.e. metal crimps

Engage with gear producers as well for their expert opinion/input.

Defining and requiring a single line color for vertical line.

RFID Tags embedded in the buoys or buoy line which identify vessel and/or fishery associated with the gear.

Gear marking itself does not reduce risk of whale entanglements but provides information for further regulations. Line tracers can be used in combination w/ markers for better ID. Buoy & surface gear marking should be visible from aerial platforms.

Buoy line marking should be at least every 40 feet to maximize identification ability.

No.

Question 10

Question Expanded Electronic Monitoring

Respondents 12

Choices	Weighted average	1	2	3	4
Does Not Improve IDs	1.545454545	7	2	2	0
Regulatory Complexity	2.583333333	1	5	4	2
Enforcement	1.666666667	6	4	2	0
Cost	2.909090909	1	2	5	3

Question 11

Question Comprehensive Guide to Individual Vessel Gear Set-ups
Respondents 11

Choices	Weighted average	1	2	3	4
Does Not Improve IDs	1.75	4	2	2	0
Regulatory Complexity	2.333333333	2	3	3	1
Enforcement	1.75	5	1	1	1
Cost	2.142857143	2	3	1	1

Question 12

Question Do you have other ideas for improving information resources? Or refinements of these ideas?
Respondents 3

Responses

Well covered by current suggestions
Integrate monitoring and marking of pop-up/on-demand systems as well.
No

Question 13

Question Surface gear on just one end of the groundline
Respondents 11

Choices	Weighted average	1	2	3	4
Does Not Reduce Risk	1.625	4	3	1	0
Regulatory Complexity	1.666666667	4	4	1	0
Enforcement	2.125	2	3	3	0
Cost	1.625	5	2	0	1

Question 14

Question Limits on Soak Time
Respondents 11

Choices	Weighted average	1	2	3	4
Does Not Reduce Risk	2	3	3	3	0
Regulatory Complexity	2.545454545	1	4	5	1
Enforcement	3.181818182	0	1	7	3

Cost	2.111111111	3	3	2	1

Question 15

Question Weak Links or Reduced Breaking Strength of Lines

Respondents 11

Choices	Weighted average	1	2	3	4
Does Not Reduce Risk	1.9	4	3	3	0
Regulatory Complexity	2.3	1	5	4	0
Enforcement	2.444444444	1	3	5	0
Cost	2.625	1	2	4	1

Question 16

Question Pop-up or "Ropeless" Gear

Respondents 11

Choices	Weighted average	1	2	3	4
Does Not Reduce Risk	1.4	6	4	0	0
Regulatory Complexity	2.818181818	1	2	6	2
Enforcement	2.9	1	2	4	3
Cost	3.777777778	0	0	2	7

Question 17

Question Do you have other ideas for reducing the risk of whale entanglement in sablefish pot gear?

Respondents 5

Responses

Curious about gear loss rates with rope lift/pop-up gear

NMFS has seen entanglements with both the vertical and groundlines. I would suggest a review of the groundline set up used to see if there are any entanglement risks that could be reduced.

pop-up/on-demand gear is the most effective for reducing risk; weak links and "breakable" rope do not prevent entanglements from occurring, and additional factors (knots or splices in line where those are attached) present added risk.

the efficacy of weak links/low breaking strength rope is unproven and will still result in entanglements.

No.

Lack of surface gear undermines pot limits

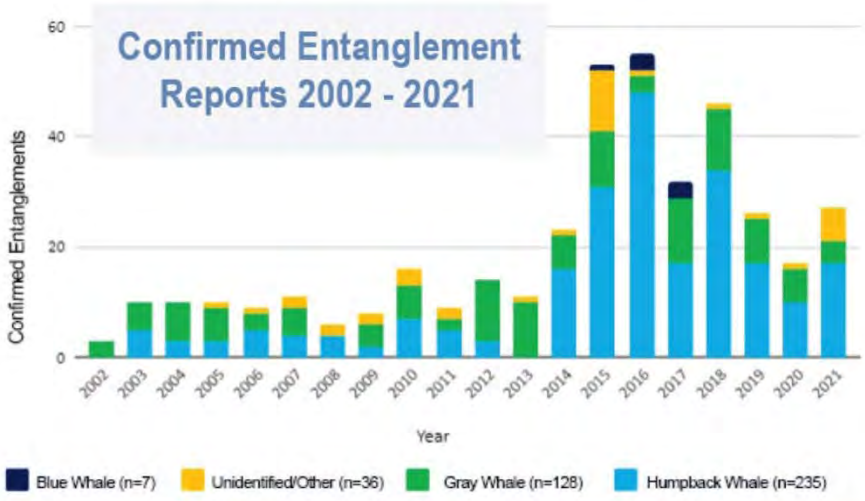
Appendix 3. Workshop Presentations

This appendix contains slide decks for the workshop presentations. Several presenters did not use slides. In these cases, notes or materials that the presenter referenced (e.g. current gear marking regulations) have been provided.

Slide decks are available as full resolution PDF files upon request (Amanda.Gladics@oregonstate.edu).

3.1 The Need for Improved Gear Marking
Dan Lawson, NOAA PRD

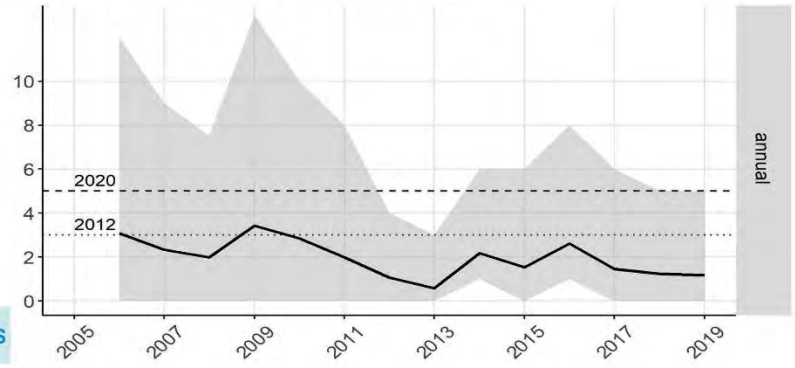
The Need for Improved Gear Marking
Sablefish Gear Marking Workshop
NMFS WCR Protected Resourced Division



NOAA FISHERIES

Known Sablefish Pot Entanglements

- five humpback reports since 2006 - 2 by WCGOP (2014-LE, 2016-OA)
  - 1 in 2006, 1 in 2014, 2 in 2016, 1 in 2017*
  - 1 of Cen. CA (Monterey), 2 off OR (Newport), 2 off No. CA Humboldt/Crescent City



NOAA FISHERIES

What was involved in the entanglement?

- 2006 – buoy line?
- 2014 – groundline (obs.)
- 2016 (1st) – buoy line
- 2016 (2nd) – vertical line, near buoys
- 2017 - mess

NOAA FISHERIES

Why Are We Talking About Marking

- Only ~50% of 288 confirmed whale entanglements since 2013 have been attributed to a known source.

NOAA FISHERIES

Forensics and Line Marking

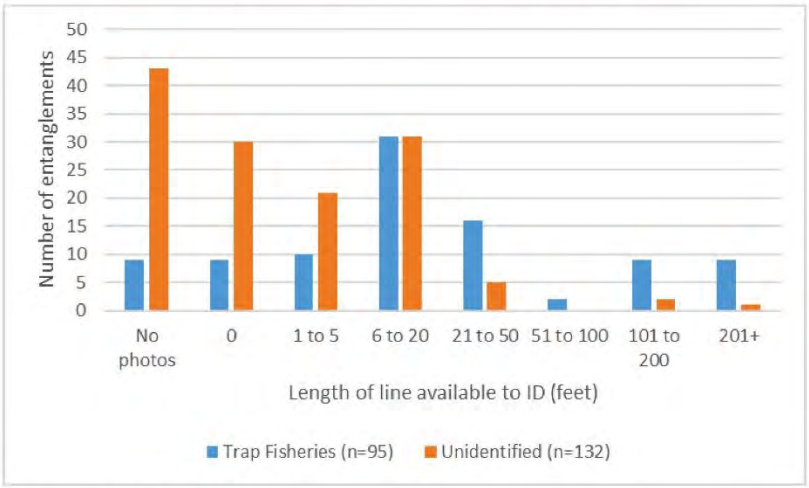
- Buoys documented in ~2/3rds of entanglement reports (2013-2020)
  - Only ~1/3rd of those had "some" legible markings that could be used to facilitate gear ID.
  - Without the presence of buoys, usually only ID gillnets/nets due to webbing. Nets have lines too!
  - Only 4 reports attributed to pot/trap fishery without buoys/surface gear.

NOAA FISHERIES

Could Line Marking Be Effective?

- Reviewed documentation for "prospect" of ID line marks (2013-2020)
  - "high" quality provide an opportunity to being able to detect markings (if theoretically present in the field of view), vs "low" quality if doubts
  - 59% had high quality documentation when photos/videos available.
  - 47% of reports not attributed to any known origin **and** photos were available had high quality documentation
  - Best chance when response is initiated

Estimated Line Available to ID



Estimates of the amount of line available to ID line marks from confirmed whale entanglements that were: (A) attributed to a pot/trap fishery vs (B) not identified to a source from 2013-2020.

What Part of Gear/Line Do We See?

Area of line	Pot/trap fishery (n= 95)	Unidentified (n=132)	Total (n=227)
Top	64 (67%)	14 (11%)	78 (34%)
Upper	53 (56%)	16 (12%)	69 (30%)
Middle	27 (28%)	15 (11%)	42 (19%)
Bottom	12 (13%)	0 (0%)	12 (5%)
No photos	10 (11%)	44 (33%)	54 (24%)
Unknown	2 (2%)	24 (18%)	26 (11%)
No line	7 (7%)	26 (20%)	33 (15%)

Segment of line available to ID line marks from confirmed whale entanglements that were: (A) attributed to a pot/trap fishery vs (B) not identified to a source from 2013-2020.

October 8 2022

- Humpback entanglement reported off Dana Point
- Fishery: Unidentified (line only)
- Entanglement description: 500 ft+ of line wrapped around the left pectoral flipper, multiple wraps around the tail stock, with a large knot of line on the trailing line
- Outcome: Partially disentangled off Dana Point; minimal amount of line left on pectoral flipper

October 8 2022 recovered gear

NOAA FISHERIES

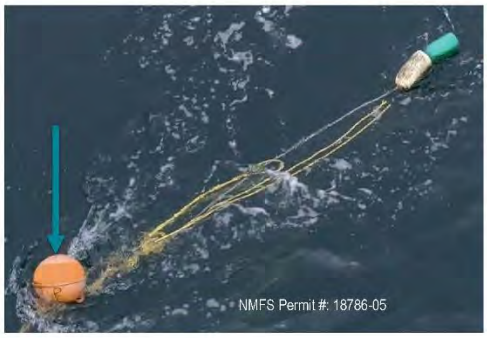
Line Marking Key Points

- **Line marking offers a logical avenue for improving the ability to ID the origin of entanglements.**
  - could be possible to pursue "negative attribution" for those fisheries with at least some reported entanglements.
- There is **good potential for detecting line marks** from documentation imagery that has been available
  - expect that there may be limited amounts of line available for reviewers to work with in the majority of cases.
  - **As a result, line marking success will likely depend on having numerous/prominent marks to increase the probability of detection.**
- **Marking line at least every few fathoms, especially in the "top half" of the gear,** would give you the highest chance to detect the presence/absence of line marking.
  - **Having the line serve as the mark would provide the optimal capability** to positively identify the origin of gear, as well as negative attribution.

Surface Gear

- Previous/current buoy marking requirements have been difficult to detect:
  - Not all buoys deployed are required to have markings
  - Not all buoys may be visible/documented.
  - Markings may only be present on one aspect

- **Therefore, additional/improved markings of all buoys deployed that clearly indicate the origin from multiple perspectives** would increase the ability to ID origins, as well as negative attribution.
  - In 2021 - 3 reports origins identified using the new CA letter markings



May 20 2022

- Humpback entanglement reported Monterey
- Fishery: unidentified
- Entanglement description: One orange and one white/yellow buoy trailing approx 30 feet behind animal. Likely fluke entanglement.
- Outcome: not resighted, presumed still entangled

Wrap Up Thoughts

- Entanglement risk reduction – surface gear?
- General gear marking ideas to consider:
  - Mark often, mark high – require line marks that are "patterned"
  - Long term – make the line the mark
  - Add additional marking to buoys
  - Bring all lines along

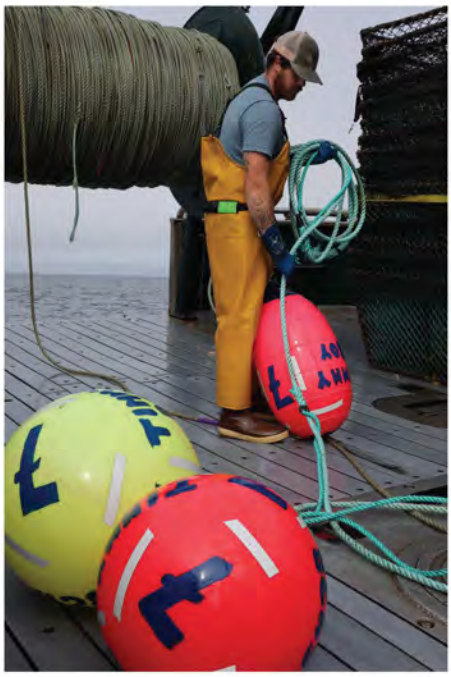
Ketchum Supply

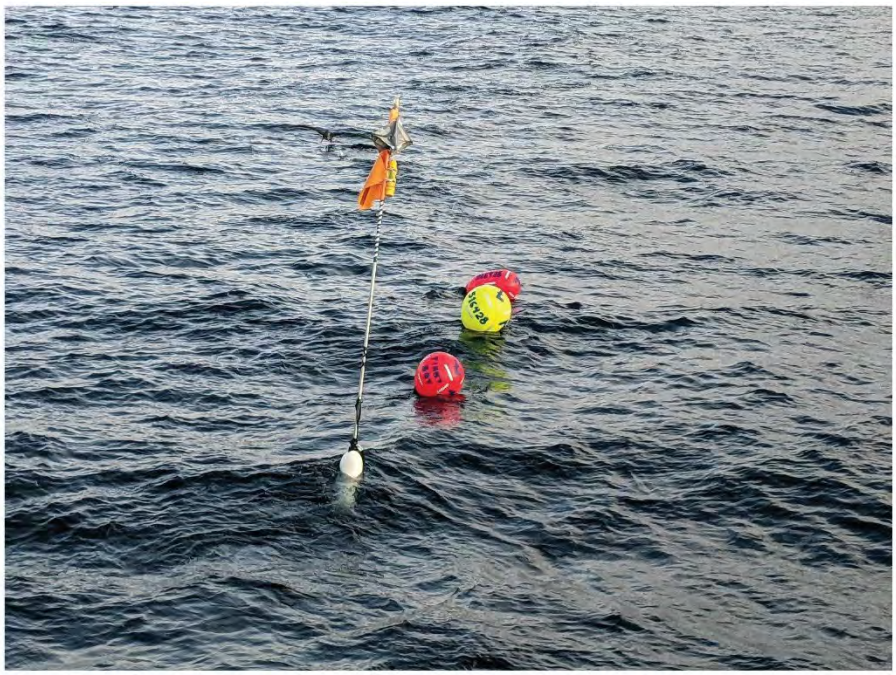
3.2 Fishing Operations using Traditional Pot Gear
Bob Eder & Paul Clampitt, Commercial Fishermen

Sablefish Traditional Pot Gear

Bob Eder
Paul Clampitt


TIMMY
BOY

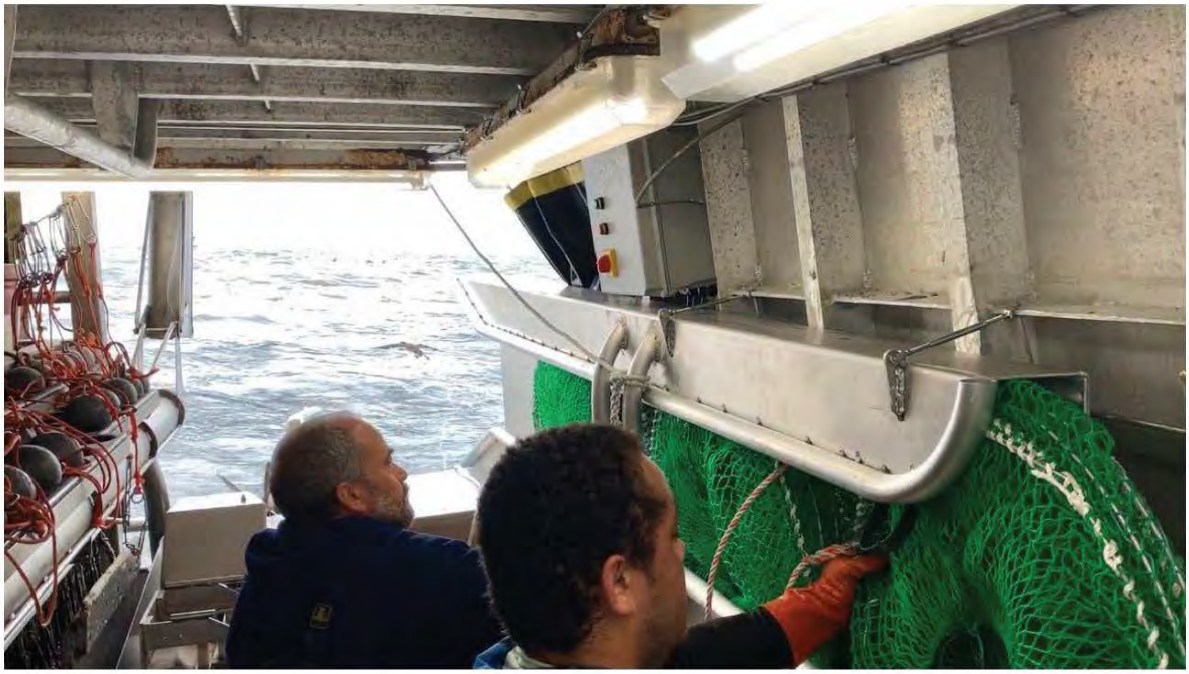




3.3 Fishing Operations using Slinky Pots
Michael Offerman, Commercial Fisherman

Sablefish Slinky Pot Gear

Michael Offerman



How is the gear deployed, soaked, and retrieved?
For setting the gear we had to put in a pot launcher that can hold up to 4 pots at once. This was due to us having an auto baiter and not have it lots of extra room on the stern.

We set up [the surface gear on] each end just like we did for hooks. [The surface gear consists of a] flag pole, blue ocean hard ball a round bag and a diver bag.

We would typically let the gear soak a minimum of 12-24 hours.

We added a picking boom to lift the pots out of the water. We changed out [the] gurdy motor to the next size up and changed out the planetary gears to allow us to easily haul in 600 fathoms.

What is the setup of the surface gear?
It's a typical longline set up. Buoys, buoy-line, 50-60lb longline anchor then ground line.

What thickness and length of lines are used in the surface gear, buoy lines, and groundlines?
We use 3/8" everson aqualine. Medium lay for buoy-line and medium soft for ground line. The buoy-line is made into 50 and 100 fathom shots.

The ground line is left as a 300 fathom coil.

We place the first beckett and gangion at 15 fathoms, then each Beckett and gangion are placed at 30 fathom intervals after that. That allows 10 pots per 300 fathom length of groundline.

When hauling back we coil 300 fathoms of ground line into a 32-gallon garbage can and hang the gangion on a pin on the can.

Is gear is generally left out to soak while the vessel goes in to deliver or is gear retrieved after each trip?
We typically bring the gear to town. Some factors to consider are weather and [if] is the gear in a highly trafficked area.

3.4 Description of the West Coast Sablefish Fishery
Brian Hooper, NOAA SFD

Fishery Management

- NOAA Fisheries and the Pacific Fishery Management Council manage the sablefish fishery on the West Coast
- Managed under the Pacific Coast Groundfish Fishery Management Plan
  - Harvested with trawls, longlines, and pots
  - Catch limits among different fishing groups and gear types.
    - Individual fishing quota (catch shares) for the trawl fishery and some of the fixed gear fishery
    - Trip limits for other vessels (non-catch shares)
  - Full observer coverage in the trawl fishery, partial coverage in the fixed gear fishery

Fishing Groups and Gear Types - Catch Shares

Limited Entry Tier

- Sablefish-endorsed permit holders receive an annual share of the sablefish catch or "tier limits"
- Longline and or pot/trap gear

Trawl Individual Fishing Quota (IFQ)

- Receive quota share of sablefish
- Trawl gear with gear switching
  - Using non-trawl gear (ex. pots) to fish against trawl allocations

NOAA FISHERIES

Fishing Groups and Gear Types - Non-catch shares

Limited Entry Daily Trip Limit (DTL)

- Federal limited entry permit
- Sector specific cumulative trip limits
- Pot and/or longline gear

Open Access

- Do *not* hold a Federal groundfish limited entry permit
- Target groundfish or catch them incidentally in other fisheries
- Sector specific cumulative trip limits
- Variety of gear (ex. longline, pot, hook-and-line, troll)

NOAA FISHERIES

Permits/Participation

LEFG Sablefish-Endorsed Permits (2022)

Longline gear only	132
Pot/trap gear only	28
Both longline and pot/trap gear	4
Total	164

Source: Public Permits Database. Accessed 2022.11.04

Gear Switching Vessels

	Average Number (Range)
2011-2021	14 (7-20)
2016-2019	16 (15-16)
2020-2021	8 (7-9)

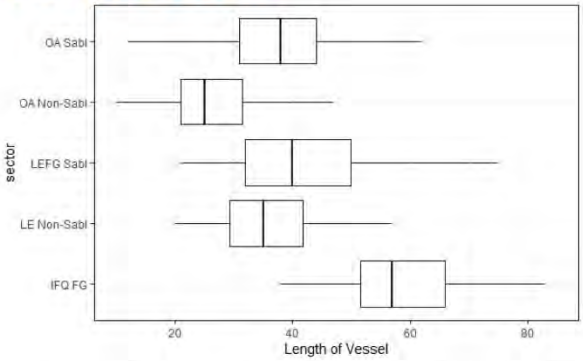
Source: Table 4 of Initial Analysis of the Gear Switching Alternatives (PFMC Agenda Item H.3 Attachment 3; November 2022)

Open Access Participation

- Varies between years and with the changes in the non-groundfish fisheries
- Between 125-261 open access vessels landed sablefish (average of 192, 2016-2021)
  - Average of 40% of those vessel used pot gear

NOAA FISHERIES

Size of Vessels



Boxplot of vessel lengths by sector (coastwide), 2017-2020. Vessels may be present in multiple sectors. Outliers removed for confidentiality. (Source: PacFIN)

	Average (ft)	min (ft)	max (ft)
Sablefish-Endorsed LEFG Permits with pot gear	59	34	138

Vessel lengths, 2022. (Source: Public Permits Database, accessed 2022.11.04)

NOAA FISHERIES

Location of Pot Gear Effort and Season

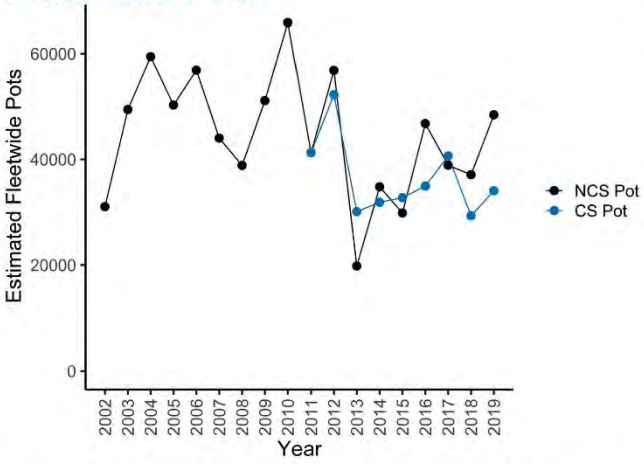
Catch Share

- Concentrated off WA & OR (half landings in Astoria and Newport)
  - Also concentrated areas off San Francisco and Fort Bragg
- Majority of effort between 150–600 fm
- Tier fishery: April 1 - October 31
    - Proposed December 31 end date starting in 2023

Non-Catch Share

- Majority of landings between Astoria and Fort Bragg
- Primarily in depths from 100–300 fm
- Year round season

Fleetwide Pots

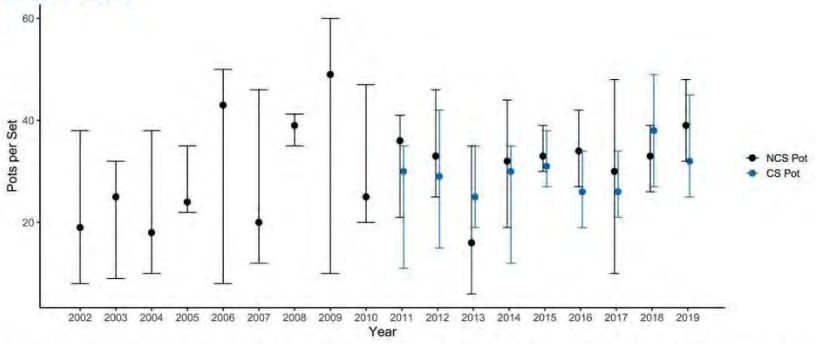


Annual total fleetwide number of pots in the pot sectors.

2015-2019 Average Fleetwide Pots

- Catch Share = 34,340
- Non-Catch Share = 40,208

Pots Per Set



Number of pots per set in pot sectors, summarized as median, first, and third quartiles, in each year.

- Median number of pots per set between ~15 and ~40 since 2011
- Median number of pots per set typically greater in non-catch share

Fishery Comparison: Sablefish vs. Dungeness Crab

- Sablefish mortality = ~ 12.6 million lb in 2021
- Dungeness crab harvests = 8 million to 54 million pounds, peaking approximately every 10 years.

- Sablefish participants = ~ 300-400
- Dungeness crab participants= ~ 1,200

- Sablefish - 2 lines per string of pots
- Dungeness crab - 1 line per pot

Federal Non-trawl Logbook

- Effective January 1, 2023
- Directed open access, limited entry fixed gear sectors, & gear switching
- Set-level information on catch, discards, fishing location, fishing depth, and gear configuration
- Helps reduce uncertainty by providing better estimates on:
  - bycatch of protected species
  - location-specific effort
  - total effort overall
    - number pots set in the year
    - number of line days

Questions

3.5 Current Gear Marking Regulations and Compliance Observations
Brian Corrigan, Dan Davis, Andrew Torres, NOAA Office of Law Enforcement West Coast Division

The following regulations already exist specific to groundfish gear marking for limited entry fixed gear and open access gears in 50 CFR 660.219 and 660.319.

§660.219 Fixed gear identification and marking

(a) *Gear identification.* (1) Limited entry fixed gear (longline, trap or pot) must be marked at the surface and at each terminal end, with a pole, flag, light, radar reflector, and a buoy.

(2) A buoy used to mark fixed gear must be marked with a number clearly identifying the owner or operator of the vessel. The number may be either:

(i) If required by applicable state law, the vessel's number, the commercial fishing license number, or buoy brand number; or

(ii) The vessel documentation number issued by the USCG, or, for an undocumented vessel, the vessel registration number issued by the state.

§660.319 Open access fishery gear identification and marking

(a) Gear identification. (1) Open access fixed gear (longline, trap or pot, set net and stationary hook-and-line gear, including commercial vertical hook-and-line gear) must be marked at the surface and at each terminal end, with a pole, flag, light, radar reflector, and a buoy.

(2) Open access commercial vertical hook-and-line gear that is closely tended as defined at §660.311 of this subpart, may be marked only with a single buoy of sufficient size to float the gear.

(3) A buoy used to mark fixed gear under paragraph (a)(1) or (a)(2) of this section must be marked with a number clearly identifying the owner or operator of the vessel. The number may be either:

(i) If required by applicable state law, the vessel's number, the commercial fishing license number, or buoy brand number; or

(ii) The vessel documentation number issued by the USCG, or, for an undocumented vessel, the vessel registration number issued by the state.

§ 660.311 Open access fishery - definitions.

General definitions for the Pacific Coast groundfish fisheries are defined at § 660.11, subpart C. The definitions in this subpart are specific to the open access fishery covered in this subpart and are in addition to those specified at § 660.11, subpart C.

Closely tended for the purposes of this subpart means that a vessel is within visual sighting distance or within 0.25 nm (463 m) of the gear as determined by electronic navigational equipment.

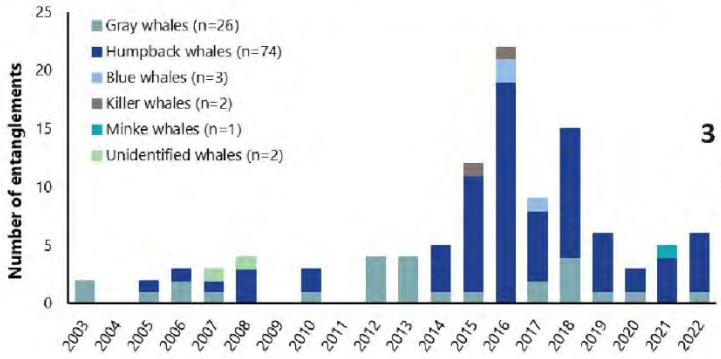
3.6 Tri-state Dungeness Crab Line Marking Proposal
Caren Braby, ODFW

Gear Marking in Fixed Gear Fisheries
Dungeness Crab Update

Lorna Wargo (WDFW)
Caren Braby (ODFW)
Joanna Grebel (CDFW)

November 16, 2022

D-Crab entanglement record



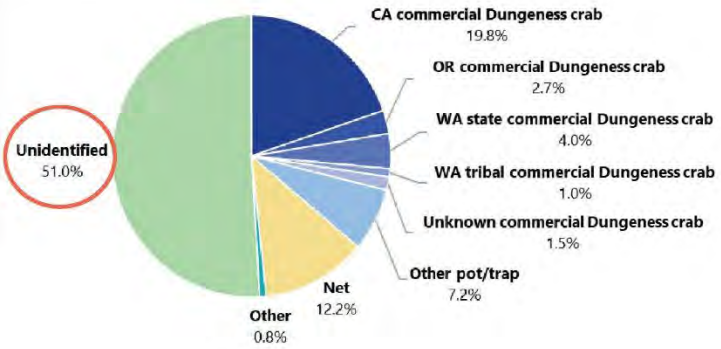
3 states combined
(as of 9/30/22)

- Sharp increase in entanglements has leveled off, but remains elevated
- Driven largely by humpback whale entanglements
- First documented crab gear entanglements involving killer, blue, and minke whales in recent years

Why line marking?

- **Improve gear attribution**
  - Increase positive attributions
  - Enable negative attributions
  - Reduce % of unidentified
  - Improve understanding of how entanglements occur

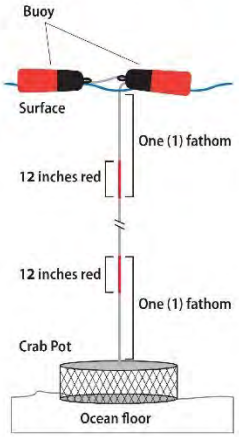
West Coast entanglement record 2013 – 2020



Line marking Tri-State coordination

- **2020 Tri-State line marking goals for regulations**
  - Identifiable and accurate
  - Visible (primarily in photographs)
  - Reasonable and cost-effective
  - Coordinated across West Coast D-crab
  - Expandable to other fixed gear fisheries
  - Environmentally friendly
- **2020 State line marking regulations implemented**
  - WDFW implemented red marking scheme
  - ODFW prohibited marks required in another fishery
- **July 2022 Tri-State working group**
- **Fall 2022 State meetings with industry**

WA current line marking
(prohibited in OR)

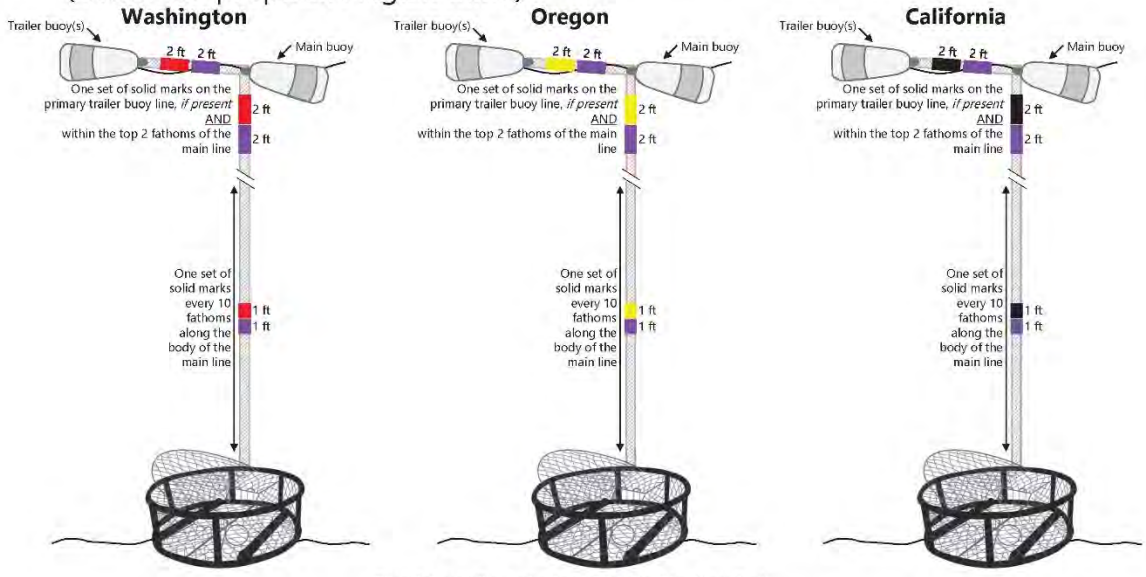


NMFS line marking analysis: Summary conclusions (April 2022)

- With sufficiently marked gear including line marking in fixed fisheries, it could be possible to pursue **"negative attribution"** for those fisheries with at least some reported entanglements
- Line marking success will likely depend on having **multiple marks** present to increase the probability of detection
- **More (and probably much larger) marks** than currently required in WA Dungeness crab fishery would be necessary to provide a high likelihood for the detection of marks (or the potential for negative attributions)
- The **top and upper portion of the gear** is the most frequently documented part of the gear during entanglements (surface gear, including trailer buoy lines, up to 5 fm of vertical line)
  - However, when buoys are not present to assist with identification, **other portions of the gear** (line) may be more commonly documented and will likely be necessary to mark to create a high likelihood for the detection of marks
- Marking line **at least every few fathoms**, especially in the "top half" of the gear, would give you the best chance to detect a line marking and/or determine negative attribution for reported entanglements

Examples for West Coast Commercial Crab Fisheries

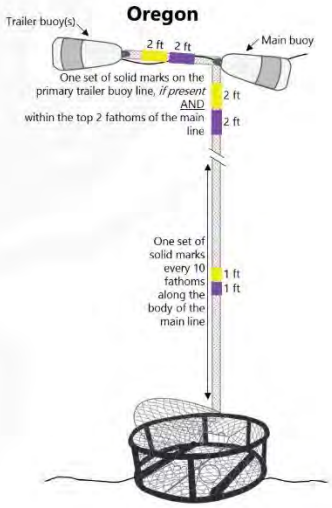
(strawman proposal August 2022)



*Space between different colored marks should be ≤6 in within each set

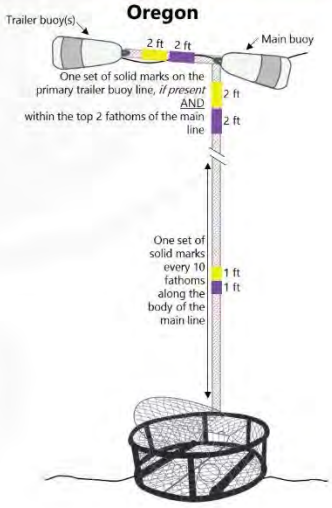
Line marking proposal rationale

- **Size**
  - Larger marks at surface
    - Increase visibility from vessels, small planes, etc.
  - Smaller marks along body of main line
    - Reduce burden (materials + labor) for fishers
- **Color**
  - Distinct state colors
    - Increases ability to (+/-) attribute
- **Solid marks**
  - Solid marks
    - Increase visibility from vessels, small planes, etc.



Line marking proposal rationale (con't)

- **Number, frequency, & placement**
  - Marks in surface system & upper main line
    - Most documented in observed entanglements
  - Marks along body of main line
    - If surface gear is not present
  - Marks in/near surface system & along body of main line
    - Negative attribution
  - Minimal space between marks
    - Increases ability to attribute
- **Other considerations**
  - Flexibility in marking techniques
  - Trailer line marking
  - Manufactured line for body of main line marks



Feedback from industry meetings

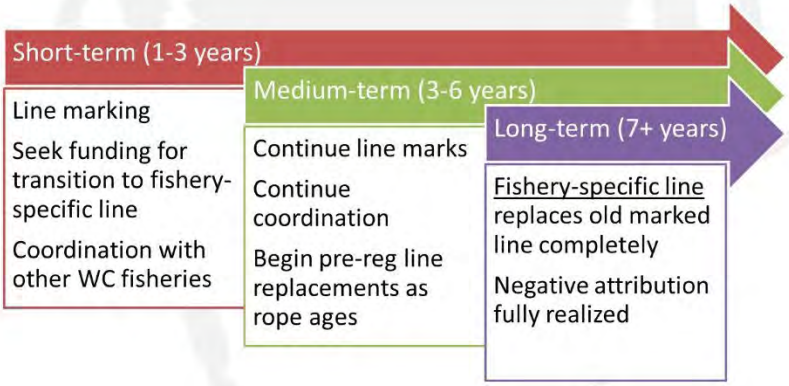
- **Negative attribution** (from all gear marking improvements) is top priority
- Is this proposal going to be **effective**?
  - Will marks be seen? How many cases would this proposal have helped ID gear in recent years?
  - Will NMFS make negative attributions if this was implemented?
- This proposal is **overly burdensome/costly**
  - Desire for manufactured line (over applying marks), if phased in over time
  - Desire for a single color mark/line for Dungeness crab (unless manufactured)
- Painting lines is **environmentally costly** (aerosols, spray can waste)
- Concerns over **durability** of applied marking techniques (paint, tape)
- If top part of line/gear is **most visible**, then why mark to the body of the line down to the pot?
- Desire for state agencies to seek out **financial support** for marking/manufactured line

Status & Plans

	Line marks	Prohibit other marks	Limit surface gear	Buoy marks & tags	Register buoy color patterns
CA crab	?	?	✓	✓	?
OR crab	June 2023 (initial phase)	✓	June 2023	✓	✓
WA crab	Dec 2023 (updates)	Dec 2023	?	✓	✓
Sable	?	?	?	?	?

Back-up slides

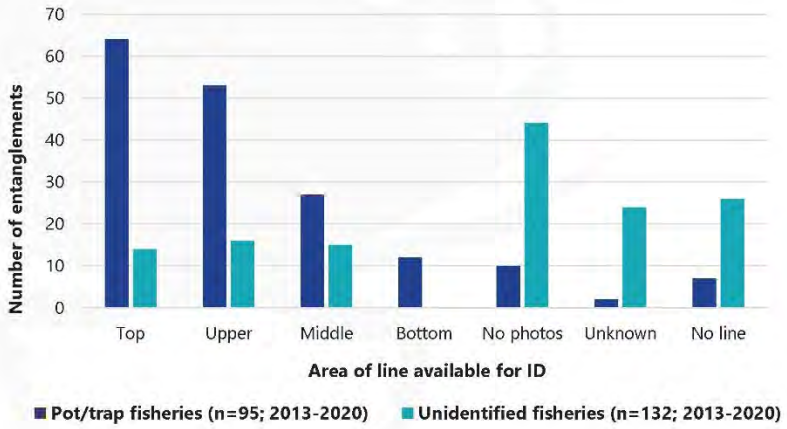
WDFW Line Marking Roadmap



NMFS line marking analysis: Area of line

Location

- Top & upper portion of gear is most frequently documented during entanglements
- Marks in the "top half" of line will be critical



Note – some entanglements are counted in multiple categories based on the line available

OR prohibition of "other" marks

OAR 635-005-0480

Dungeness Crab Buoy Tag and Gear Marking Requirements

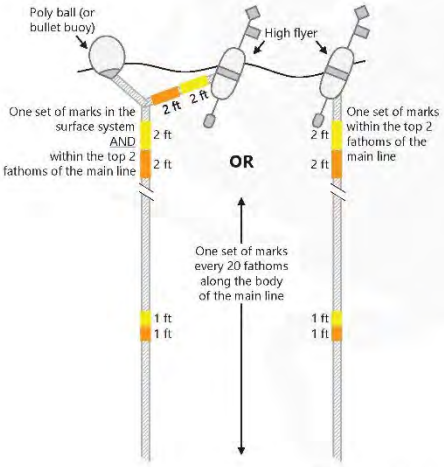
"It is unlawful for commercial purposes to:

> **...(3)** Use commercial Dungeness crab gear in the Columbia River or Pacific Ocean with a line mark that is required for any state or federal fishery, other than the Oregon Dungeness crab fishery, operating in the U.S. West Coast EEZ, or the state waters of Washington, Oregon, or California."

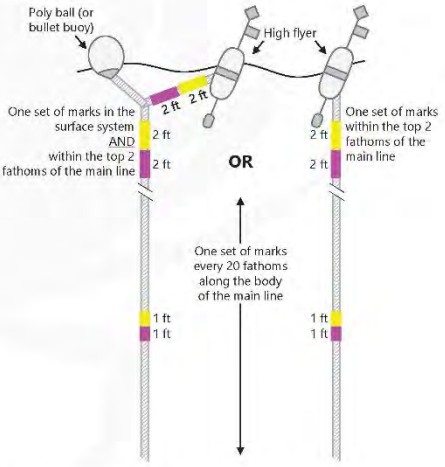
Examples for Other State-Managed Fixed Gear Fisheries

Just to get the discussion started...

Hagfish



Spot and Coonstripe Shrimp



*Space between different colored marks should be ≤6 in within each set

Poly-line

Polypropylene

- Can be brightly colored, yellow is standard
- Synthetic fiber line
- Floats and does not absorb water
- Not UV stable
- Used for individual traps, strings of traps

Polysteel™, Blue Steel™

- Brightly colored, blue is common
- Floats but is slightly heavier than polypropylene
- High strength
- UV stable
- Used for individual traps and long-lines

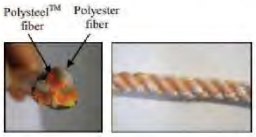
Polyester

- Usually white in color
- Soft fiber
- Negatively buoyant
- Can be mixed with polypropylene to create neutral or negative buoyancy (i.e., Esterpro™ & Ice Blue™)

Hydropro™ Neutral Buoyancy

- Orange colored
- Polysteel™ fibers mixed with polyester
- Originally designed for use by crab and lobster fishermen on the east coast to reduce right whale entanglements; available on west coast

Easier to dye main line
Tracers available in most colors
No additional cost to add multi-colored tracers

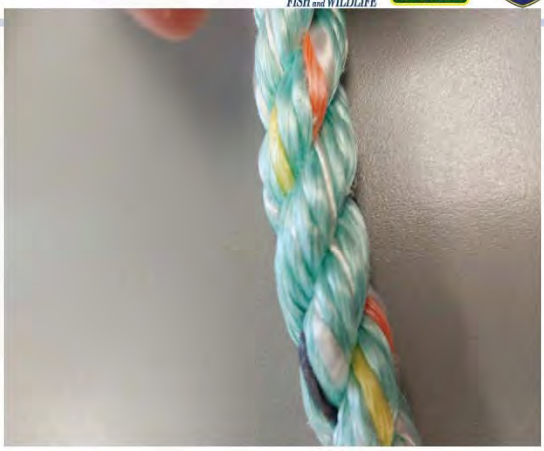


Difficult to dye main line comprehensively
Tracers available in most colors – but must avoid white tracer
No additional cost to add multi-colored tracers

Dyed Strands example

Dyed yellow Hydropro (neutral Buoyancy) and dyed purple Polysteel (floating) strands twisted together

Dyed Tracers example



Dyed Hydropro (neutral Buoyancy) with yellow, black and orange tracers

Appendix 4. Ratings for Concepts Generated During the Workshop

Mentimeter

Instructions

Go to

www.menti.com

Enter the code

Or use QR code

5

Mentimeter

Instructions

We are assessing the level of barriers to implement each idea.

Fishermen should provide input on:
- Safety
- Time/Labor
- Ease of Use
- Cost

Agency, NGO, and other workshop participants should provide input on:
- Cost
- Does not Improve IDs / Reduce Risk
- Regulatory Complexity
- Enforcement

8

Buoy Cattle Ear Tags - Coordinated w/ D Crab

Mentimeter

22

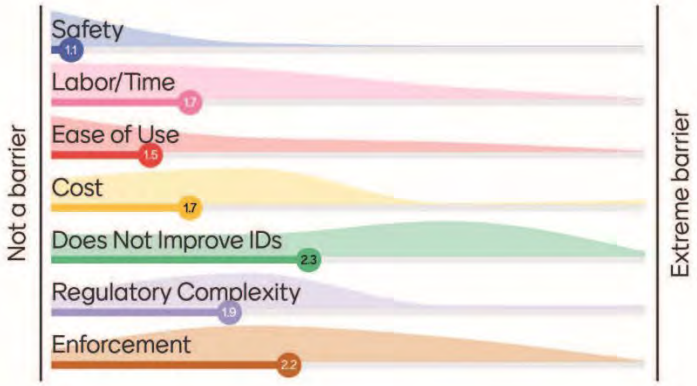
Line Tracers

Mentimeter

21

RFID tags at the buoy or pot

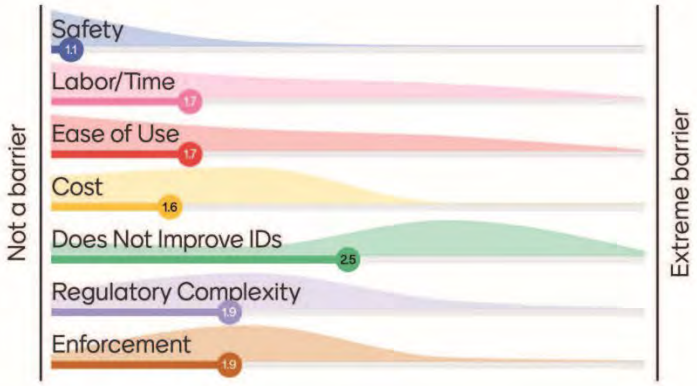
Mentimeter



21

QR Code tags

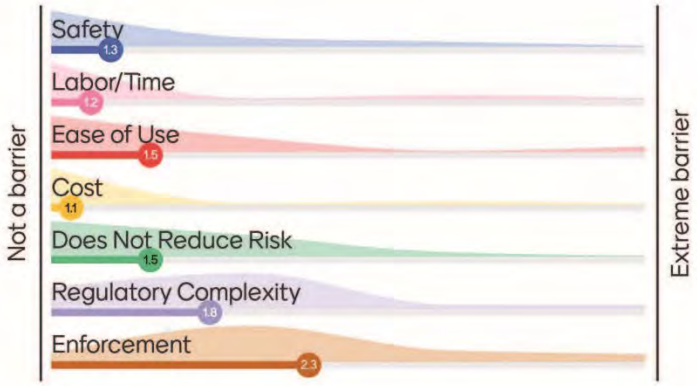
Mentimeter



18

Reduce the amount of surface gear

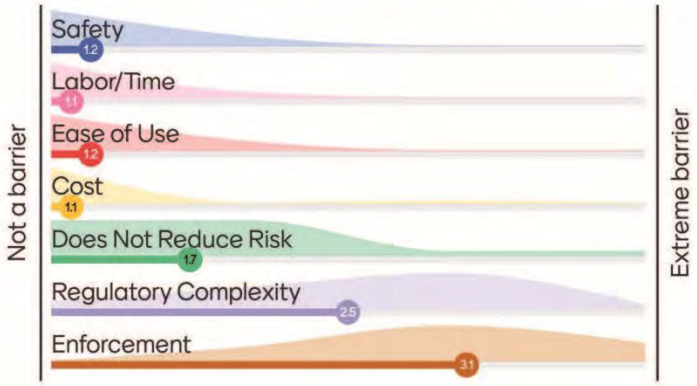
Mentimeter



19

Reduce slack line / limits on buoy line scope

Mentimeter



20

Sablefish Gear Marking Workshop
Workshop New Concept Rating Survey Results
Open to All Participants

Scale
Not a Barrier = 1
Somewhat of a Barrier = 2
Moderate Barrier = 3
Extreme Barrier = 4

Question 1

Question	Buoy Cattle Ear Tags - Coordinated w/ D Crab
Respondents	22

Choices	**Weighted average**	**1**	**2**	**3**	**4**
Safety	1	14	0	0	0
Labor/Time	1.357142857	9	5	0	0
Ease of Use	1.142857143	12	2	0	0
Cost	1.473684211	10	9	0	0
Does Not Improve IDs	1.277777778	15	2	0	1
Regulatory Complexity	1.7	7	12	1	0
Enforcement	1.235294118	13	4	0	0
Fishing Overall Average Score	1.166666667				
Both	1.473684211				
Non-Fishing Overall Average Score	1.404357298				

Question 2

Question	Line Tracers
Respondents	21

Choices	**Weighted average**	**1**	**2**	**3**	**4**
Safety	1.071428571	13	1	0	0
Labor/Time	2.285714286	5	3	3	3
Ease of Use	1.857142857	8	1	4	1
Cost	2.722222222	1	6	8	3
Does Not Improve IDs	1.388888889	11	7	0	0
Regulatory Complexity	2.368421053	2	10	5	2
Enforcement	1.894736842	5	12	1	1
Fishing Overall Average Score	1.738095238				
Cost (All Respondents)	2.722222222				
Non-Fishing Overall Average Score	1.884015595				

Question 3

Question	RFID tags at the buoy or pot
Respondents	21

Choices	Weighted average	1	2	3	4
Safety	1.071428571	13	1	0	0
Labor/Time	1.692307692	6	5	2	0
Ease of Use	1.538461538	8	3	2	0
Cost	1.722222222	7	10	0	1
Does Not Improve IDs	2.263157895	5	5	8	1
Regulatory Complexity	1.9	5	13	1	1
Enforcement	2.166666667	3	9	6	0
Fishing Overall Average Score	1.434065934				
Cost (All Respondents)	1.722222222				
Non-Fishing Overall Average Score	2.10994152				

Question 4

Question QR Code tags
Respondents 18

Choices	Weighted average	1	2	3	4
Safety	1.1	9	1	0	0
Labor/Time	1.7	5	3	2	0
Ease of Use	1.7	5	3	2	0
Cost	1.571428571	6	8	0	0
Does Not Improve IDs	2.5	3	2	8	1
Regulatory Complexity	1.866666667	4	9	2	0
Enforcement	1.928571429	2	11	1	0
Fishing Overall Average Score	1.5				
Cost (All Respondents)	1.571428571				
Non-Fishing Overall Average Score	2.098412698				

Question 5

Question Reduce the amount of surface gear
Respondents 19

Choices	Weighted average	1	2	3	4
Safety	1.333333333	9	2	1	0
Labor/Time	1.166666667	11	0	1	0
Ease of Use	1.5	8	3	0	1
Cost	1.117647059	16	0	1	0
Does Not Reduce Risk	1.470588235	10	6	1	0
Regulatory Complexity	1.833333333	6	10	1	1
Enforcement	2.294117647	2	10	3	2
Fishing Overall Average Score	1.333333333				
Cost (All Respondents)	1.117647059				

Non-Fishing Overall Average Score	1.866013072

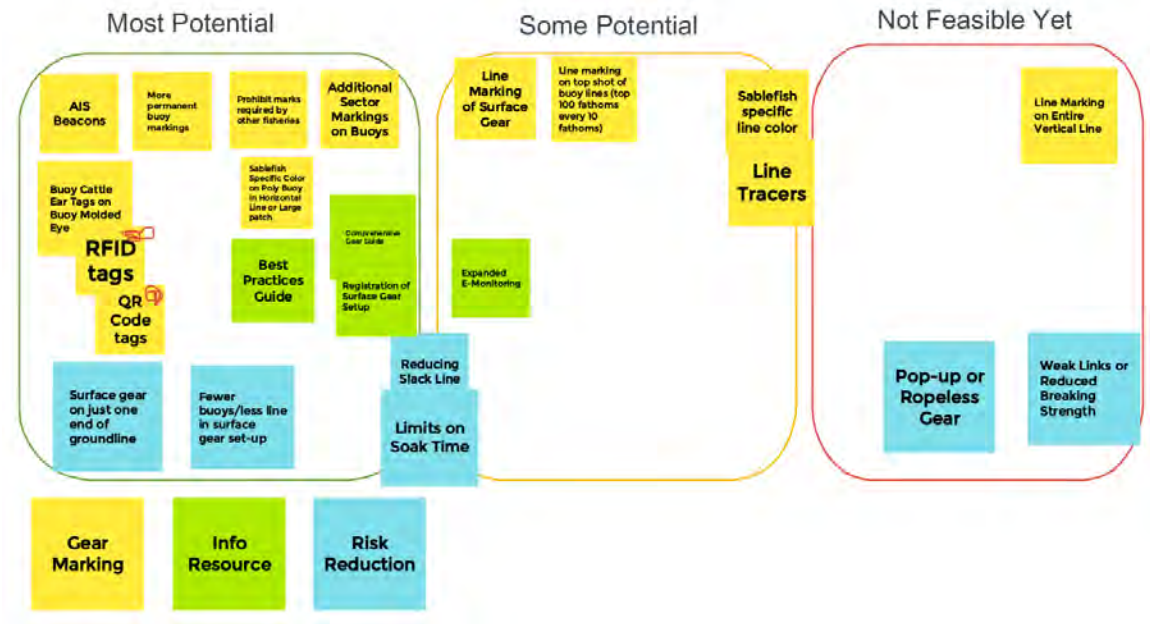
Question 6

Question	Reduce slack line / limits on buoy line scope
Respondents	20

Choices	**Weighted average**	**1**	**2**	**3**	**4**
Safety	1.2	12	3	0	0
Labor/Time	1.133333333	13	2	0	0
Ease of Use	1.2	12	3	0	0
Cost	1.111111111	17	0	1	0
Does Not Reduce Risk	1.722222222	8	8	1	1
Regulatory Complexity	2.526315789	2	6	10	1
Enforcement	3.052631579	0	4	10	5
Fishing Overall Average Score	1.177777778				
Cost (All Respondents)	1.111111111				
Non-Fishing Overall Average Score	2.433723197				

Appendix 5. Prioritization

During the workshop, an online collaboration board (Jamboard) was used to display prioritization of gear marking, information resources, and risk reduction concepts and prompt discussion. During the discussion, several concepts were split and/or described more specifically to capture the progression of the ideas within the group. In the screen capture shown below, gear marking concepts are yellow, information resources are green, and risk reduction measure are blue. Cards that are touching denote similar ideas. Red marks free drawn on the cards denote less preferred versions of similar concepts.



Appendix 6. FVOA Letter to OSG

FISHING VESSEL OWNERS' ASSOCIATION
INCORPORATED

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SINCE 1914

Professor Amanda Gladics
Sea Grant Oregon, Coast Fisheries Extension
Oregon State University

November 18, 2022

RE: Sablefish Pot Gear Marking Workshop 11.16.2022

Professor Gladics,

On behalf of the members of Fishing Vessel Owners' Association I want to thank you for the sablefish pot gear marking workshop you conducted on November 16, 2022. The attendance was inclusive of many agency and industry participants attempting to address the marking of sablefish pot gear and its relativity to whale interactions.

Some of the fixed gear participants discussed the ideas presented after the conclusion of the meeting. There was a consensus among them about what would be functional actions to address gear making and limit interactions with whales. These were presented to our board of Trustees who agree to the following.

1) Each buoy would be marked with a USCG number or state permit number.

2) The buoy line from the flag pole down 50 fathoms would be marked in some fashion. This could be a particular color of buoy line or some other marker. We believe that we could work with gear manufactures on this to accommodate some form of marking.

3) If there is concern with the buoy line interacting with the whales, amend the groundfish regulation to allow a sablefish pot vessel to have the choice of using one or two buoy lines at the end of the gear. Depending on the type of buoy line used, some vessel owners would choose to only use one buoy line.

4) Encourage the use of AIS gear marking beacons whenever possible (assuming it will become legal for use).

Thank you again for the workshop and for including the vessel owners\operators to comment on the different aspects of feasibility of different gear marking ideas.

Sincerely,

Robert Alverson, Manager