

2016 WEST COAST TRAWL GEAR MODIFICATION WORKSHOP SUMMARY

In 2016, the Oregon Trawl Commission and Environmental Defense Fund hosted a Trawl Gear Modification Workshop on July 26th-28th in Newport, OR. This workshop, made possible by grants from the NOAA Saltonstall-Kennedy Program, the Packard Foundation, and Santa Monica Seafood and was comprised of presentations from fishermen, gear experts, researchers and managers involved in the West Coast and Alaskan trawl and groundfish fisheries. Open question and comment periods, as well as a networking reception held at Foulweather Trawl, facilitated conversation and the exchange of ideas between the diverse ranges of experiences represented by the 80 some participants. Attendees included fishermen from the West Coast and Alaska, researchers from around the country, Council staff and members, Groundfish Management Team members, Northwest and Alaska regional and Science Center staff, state agency representatives, as well as NGOs. The hope was to provide a forum for fishermen to ask technical questions, share their experiences, and learn from each other about what's worked and what hasn't.

The primary goal was to help fishermen learn about modification work and decide if modifications that reduce fuel costs, bycatch, and impacts might work for their businesses. Feedback from the workshop shows that this goal was certainly met, and several key points were also consistently made by both panelists and participants, namely:

- Quota limitations and accountability can drive innovation but can also stifle it when quota levels become so low that no risks can be taken (i.e. yelloweye rockfish example)
- One size does not fit all when it comes to excluders, they require at least some level of customization for each vessel/fishery and should be used at the discretion of the skipper, not mandated
- Cameras, low or high tech, have been extremely valuable to fishermen and researchers
- Certain gear regulations or mandates may serve to stifle innovations that may be better suited in achieving management goals, and this may be avoided with better communication between the fishing community and Council or enforcement staff

The steering committee that made this workshop such a success included Sara Skamser from Foulweather Trawl, John Gauvin from the Alaska Seafood Cooperative, Dr. Craig Rose from Fishnext Research, Carwyn Hammond from the NOAA Northwest Science Center, Mark Lomeli from Pacific States Marine Fisheries Commission, Huff McGonigal from Fathom Consulting, Council Member David Crabbe, Brad Pettinger from the Oregon Trawl Commission, and Shems Jud from the Environmental Defense Fund. Video of the complete proceedings can be found on the West Coast Trawlers Network website at www.westcoasttrawlers.net.

THE PANELISTS

Many of the panelists presented in more than one panel discussion, and will be referred to by their last name in the following summary of the workshop. Please refer to this list for the background and expertise of each panelist.

Kelly Ames – [Pacific Fishery Management Council](#) (PFMC); staff officer
Danny Averill - [Marine Stewardship Council](#) (MSC), Senior Fisheries Manager
David Barbee – [Simrad](#); field service engineer
Julie Bonney – [Alaska Groundfish Data Bank, Inc.](#); executive director
David Crabbe – Pacific Fishery Management Council; Council member
Steve Fitz – Fisherman, FV *Mr. Morgan*, Scottish seine San Francisco fishery
John Gruever – Fisherman, Alaska
Carwyn Hammond – NOAA [Alaska Fisheries Science Center](#) (AFSC), research fisheries biologist
Ken Hansen - NOAA [Office of Law Enforcement](#), retired supervisor
Bill Hayes – Fisherman; FV *Vera Dall*, bottom trawl Bering Sea and Gulf of Alaska
Phoebe Higgins – Environmental Defense Fund; [California Fisheries Fund](#), director
Dr. Pinggu He – [University of Massachusetts Dartmouth](#), researcher
Dr. James Lindholm – [Institute for Applied Marine Ecology](#) (IfAME), director; marine ecologist
Mark Lomeli – [Pacific States Marine Fisheries Commission](#) (PSMFC), researcher
Heather Mann – [Midwater Trawlers Cooperative](#); executive director
Scott McEntire – Mac Marine Instruments, owner
Elias Olafsson – [Dantrawl](#), owner
Guiseppe (Joe) Pennisi – Fishermen; FV *Pioneer*, bottom trawl Monterey
Brad Pettinger – [Oregon Trawl Commission](#), director
Dr. Craig Rose – FishNext, researcher
Sara Skamser – Foulweather Trawl; owner
Koji Tamura – [NET Systems](#); engineer
Rob Terry – [Smartcatch](#); owner

Participants

WORKSHOP PANELS

Over the two and a half days of the workshop, 6 panels included a total of 28 individual presentations on gear modification successes and failures, regulations, and research. Developers also shared new technologies that aim to reduce bycatch, reduce costs to fishermen, and improve overall gear performance. Each of the six panels was followed by a question-answer session.

Panel 1: *Minimizing Groundfish Bycatch*

Panelists discussed the use of excluders, the tradeoffs of varying mesh sizes and escape panels, and considerations when using them.

Panelist Presentations

Sarah Skamser shared her experiences as a gear manufacturer from working with fishermen to create, test, and encourage the use of new gears that reduce bycatch. From her interactions with fishermen, she has seen that “a little success goes a long way”, or rather that the fishing community can be slow to respond to innovation but demonstrations or experiences of success with new gears first hand have the power to suddenly shift previously set mindsets. Part of the reluctance to adopt new

technologies is the risk fishermen face from regulations that inadvertently hinder gear experimentation. Regulations on restricted species (called here “chokehold” species) make testing gears or methods that aim to sort them more effectively not worth the potential risk of ending a fisherman’s season by hitting or exceeding available quota. There are also tight regulations on types of gear or gear components, like footrope size, that impede testing new gear types that may be less impactful or better at reducing bycatch.

She also shared what she has learned of the process of improving gear. Two of her main takeaways were the importance of waterflow manipulation and the use of camera technology. Regardless of conditions, water flow is the driving force in sorting fish and operating the net. Cameras may help with this as they allow for real time modifications or troubleshooting when new gear designs are put into use.

Bill Hayes spoke on reducing bycatch as an Alaska trawl fisherman with an older, smaller, horse-power limited vessel. Fast fishing, which can help to reduce some bycatch species, is not an option with his vessel’s limited horsepower, so they made modifications such as significant adjustments to the gear, switching to shorter sweeps, towing slowly and only downwind. The slow tows have been the most effective at reducing halibut bycatch and at preventing his excluder from being clogged with gilled fish. He too emphasized waterflow in his homemade designs, and shared techniques for manipulating it with easy, affordable additions to the net.

He warned that there are no quick fixes with excluders, though, and no device is the solution to the bycatch problem. Almost all excluders have the same downfalls. They increase bottom contact and thereby increase drag, silt, and fuel use. Excluders also stress fish, prolong tows, and frequently fail due to blockages. There have been alternative methods that have successfully reduced bycatch; Hayes believes deck sorting has been much more effective for returning halibut to the water in good condition.

Giuseppe Pennisi also spoke on his experiences with low-budget gear modifications in the California groundfish fishery, much of which has been accomplished through his own observations made from camera footage. He has used them to monitor net behaviors such as waterflow, bottom contact, and the behavior of fish as they enter the net. Cameras have been critical in identifying what works and what doesn’t when modifying gear, and have allowed him to make small adjustments that lead to big changes in bycatch, yield, and quality.

He has also reduced the weight and bottom contact of his nets by getting rid of mud gear and switching to lighter materials. This led to an increase in door spread of more than 150 ft., which has some down sides, but in his experience it’s been overall a positive adjustment: there’s less drag, so fuel is saved, and widening door spread maximizes the herding effect thereby improving efficiency.

Q & A

From Kurt Cochrane to Hayes: Would you have gone to excluders had it not been for Amendment 80?

Hayes: Yes but it would have been because of the punitive threat of the regulations that existed before Amendment 80. Amendment 80 switched it to more of a rewards based system.

From Kurt Cochrane to Hayes: With Amendment 80 can you trade to get yourself out of trouble?

Hayes: Absolutely. Being a co-op allows fishermen in the Amendment 80 fleet to trade fish. It works, but there are a few choke species such as shortraker and roughey that still hold the fleet hostage, as do a small handful of people that aren’t as careful. But overall it is a system that works.

From Stojan Iankov (fisherman) to Hayes: Can you speak on the stress of the target species after passing through the excluder?

Hayes: Excluders do cause damage, they scale fish as they go through it. Targets will have scale loss, there will also be more silt in the codend and the fishes’ gills. This is a nuance, if you’re trying to save a halibut, it causes stress as you are sorting it to save it on deck. Whether or not

you should use the excluder depends on the fishery, on the amount of small halibut versus big halibut. If you pass a regulation that says you MUST use one, it takes away the skippers ability to judge the situation.

Stojan to Hayes: Are you sacrificing quality of final product in order to exclude halibut?

Hayes: No, I don't think so.

Kurt Cochrane asked for more specific details on possible gear modifications from **Hayes** and **G Pennisi**.

Panel 2 - Minimizing halibut and salmon bycatch

Panelists discussed the efficacy of varying halibut excluder designs in Alaska and on the West Coast as well as design strategies for avoiding salmon bycatch in Alaska.

Panelist Presentations

Mark Lomeli gave a review of several halibut excluders that the PSMFC has tested in Northwest bottom trawl fisheries. The first two were designed to retain target flat and roundfish, while the third was only designed for flatfish. The Foulweather Trawl excluder sorted out the most halibut (62%) and retained the highest proportion of target (95%), with the Dantrawl excluder closely following it. The third device excluded halibut well but lost more catch. While the excluders were highly effective at preventing large halibut from entering the codend, small halibut that were similar in size to target species are not easily sorted out by any of the designs. Fewer halibut were caught when illuminated headropes were used in these tests, but the sample size was too small to yield significant results.

Carwyn Hammond presented research from the NOAA Alaska Fisheries Science Center (AFSC) on excluder devices. One of the more successful devices was implemented in the cod fishery, and has since been implemented in Foulweather Trawl's designs, bringing it from Alaska to the rest of the west coast fisheries. It utilized cod's long narrow shape to reduce halibut bycatch by 86% while only losing 10% of the cod; the majority of the cod that were excluded were non-target small size classes.

The AFSC has also worked to provide fishermen with cameras to test new gears themselves so that the information can be passed along to manufacturers to improve their designs. A lot of excluders utilize the same concept, but execute it in different ways, so it's necessary to find which works for each vessel and area. She highlighted the need for patience through the trial and error process, as well as communication with fishermen between manufacturers, to identify what works for each vessel type and fishery.

Elias Olafsson shared one of his company's new excluder mesh designs. Most Dantrawl devices utilize a "hallway" system in the back end of the trawl, just behind the midsection. This location works well, but requires more effort to prevent the net from collapsing. This was remedied by creating the "hallway" entirely out of rigid rubberized mesh that is attached to, but structurally independent from, the rest of the net. The rubber material is also more durable in the event of a clog than traditional netting mesh material, and it doesn't get saturated with silt like woven line does. Its ability to maintain its shape should keep it from dragging on the bottom. Currently there is no quantitative data on its effectiveness at reducing bycatch or preserving target catch.

John Gruver presented on the salmon excluder project for the Alaska Pollock fishery that he participated in. Chinook and chum salmon comprise the majority of the salmon bycatch in this fishery. The excluders were designed to sort fish according to the differences in behavior between groundfish and salmon. Again, waterflow was an issue, so the final device has several high-drag stabilizing components that require significantly more horsepower than a net without an excluder.

Many of the designs failed, but Gruver emphasized the importance of sharing what doesn't work so that future work may be more productive. A few of the more important findings from these failures

were that a tunnel design overcomes the drag issue better than a funnel net design, meshes need to be created to prevent Pollock from clogging, and any design that requires a slow haul-out extends its time in the midwater column and actually increases salmon bycatch as a result. The trial and error process allowed them to better understand salmon behavior and build simpler nets that targeted key behaviors. These nets are now being implemented in northwest vessels, but they require substantial customization from vessel to vessel.

Q & A

Unidentified to all: What is the most common, and/or worst kind of clogging that has put your excluder out of commission? And what kinds of species are the most problematic with clogs?

Lomeli: With sorting grids, skates block them and restrict space. Debris, such as derelict gear and pots have been an issue, too.

Olafsson: The size of escapement holes can be adjusted to mitigate this

Gruver: Midwater gear uses a really long net, so drag, not the doors, is what keeps it open.

From Lindholm to Lomeli: You mentioned increased sedimentation, have you experienced different levels of bottom contact with the excluders?

Lomeli: no we have not specifically looked at bottom contact

From Lindholm to all: If a mid-net excluder is heavy enough, could it be adding more bottom contact behind the footrope?

Olafsson and Lomeli: yes

Olafsson: excluders are not going to be the only solution [to bycatch]. Speed adjustments may work too.

From Skamser: Is there any work being done on a net that doesn't have an excluder?

Olafsson: yes we are interested in [designing nets based on] fish behavior

From Skamser: We are actually now looking just at behavior without actually doing anything to the net. Have you looked at the video to see what's escaping and how [target] might be retained?

Lomeli: We didn't do any video on the light project, but there appears to be an increase in rockfish catches when it's illuminated, but it's not a significant difference.

Several fishermen commented their experience with lights and cameras and behavior.

Panel 3 Part I – Enhancing flexibility in markets: Gear Restrictions, Sustainability Issues and Reducing Bottom Impacts

The speakers on this two-part panel first presented an overview of the rationale for the current trawl gear regulations, the significance of those to the MSC certification, and the habitat impacts of trawl gear generally.

Panelist Presentations

Kelly Ames gave a brief summary of current and changing PFMC groundfish regulations. Current regulations on footrope size and use, minimum mesh sizes, limits on chafing gear and the requirement for selective flatfish (pineapple) trawls were defined. Initially, these rules were created to minimize groundfish bycatch and to protect EFH for depressed species. With the rationalization in fisheries in 2011, fishermen have higher levels of responsibility, so stakeholders requested that these regulations be revisited. Since then the PFMC has proposed lighter regulations to NMFS that are likely to take effect in 2017. These include:

- Removal of the minimum mesh sizes to allow for excluder improvement and reduced gilling

- Removal of all chafing gear rules
- Removal of the requirement for pineapple trawls north of the 40'10 line, now that rockfish stocks are rebuilt

Currently, the PFMC is also considering removal of the RCA, creating a year-round midwater rockfish fishery for the entire coast, and does not anticipate any regulations mandating the use of excluders.

Dan Averill explained the MSC fishery certification for their eco label program, which is available at the MSC website, as well as the results of their latest global impacts report. Of the fisheries certified by the MSC, 40% are trawl fisheries (30% demersal and 10% pelagic). The West Coast North American trawl fishery was certified with a high score of 85, in accordance with MSC criteria that categorize it as highly unlikely to permanently or seriously harm the marine ecosystem. This was based on the fact that large areas are un-trawled, and those that are have demonstrated an ability to recover. Other fisheries certified by MSC are the pink shrimp in OR and WA, and Alaskan cod, Pollock, flatfish and midwater whiting. Some gear modifications have been implemented in fisheries as a direct result of managers' efforts to achieve MSC's certification conditions, such as the use of pelagic doors in the Bering Sea cod and haddock fisheries.

Dr. Pingu He presented an overview of the basic attributes of pelagic, semi-pelagic, and bottom trawls, as well as a summary of his research on minimizing their physical impacts on the seafloor. He emphasized that fishing efficiency is tied to minimizing impacts to the sea floor. The faster fishermen are able to catch their quotas, the less time is spent fishing on the bottom, thereby minimizing impacts. The bulk of his research was centered on identifying modifications that could be made with no loss of catch. For shrimp fisheries, they found that doors and sweeps could be raised without reducing catch because there was no change in the herding effect for shrimp. This did not work for haddock and cod fisheries, which did experience lower catch rates due to raised sweeps being less likely to herd the fish. Another study found that the large, heavy footropes used in Newfoundland could be lightened by removing up to half of their bobbins without affecting the nets' performance, which led to savings in fuel and gear repair expenses for fishermen.

Dr. Craig Rose shared his research modified sweeps designed to reduce bottom contact and biological impacts in Alaska fisheries. Most of the study sites were in soft, muddy habitats with very low lying organisms, so adding just 2-3 inches of clearance allows many of these organisms to pass under the sweeps. Sweeps can be raised in many ways, this study was accomplished by using off-bottom doors with weights on the bridles to lower the sweeps, and small rollers on the sweeps to lift them off the bottom. Sea whips, which provide habitat for many groundfish, were knocked over only 10-12% with raised sweeps compared to 20-25% with ground sweeps, and catch rates of groundfish were only slightly reduced (no numbers given).

These raised sweeps may be difficult to implement, however, as the bobbins wear out quickly and make the nets come onto the reel unevenly. Additional information on their influence on target catch is needed, too. He also highlighted the large amount of time that is required to test and implement new gears like this. This one gear modification required substantial coordination of fishing vessels and with the PMFC for permits and assistance.

Ken Hansen spoke on his experiences of how the gear industry and fishermen can work with and find support from OLE officers. One example given was from a time when NOAA and the Coast Guard were going to implement a trawl gear compliance monitoring program that would have been highly burdensome to fishermen. This was prevented when representatives from the trawl fishing industry came forward with research they had done demonstrating that fishermen had the same goals as the managers, so the threat of non-compliance was very low. Because the industry recognized enforcement concerns, the gear implementation process was improved, and he hopes that this example shows people within the fishing industry that there are things they can do to improve fisheries enforcement. He believes managers have a lot to learn from simply spending time on and observing a

fishing vessel in action, and he has seen enforcement slowly beginning to shift towards a non-adversarial approach.

Q & A

Skamser to Rose: Do you see any new deck gear or innovation in how [modified sweeps] are brought on board?

Rose: Some of the larger boats are using two independent reels, but those are really expensive. If these modifications [I presented] become common enough, we do need to modify the reel process.

Hayes to Ames: How many Council members have been on fishing trips? And why did they require the poorly defined pelagic trawls rather than performance standards route for management?

Ames: Most PFMC staff have experience as researchers or observers on vessels, but its agency members are more mixed. To the second question, there were overfished species and the fishery had been declared a disaster, so gear requirements were the only alternative to massive area closures.

Unidentified to Averill: What percentage of fish caught in MSC fisheries is from trawl fisheries? Because I think it's larger than 40%.

Averill: Offhand I don't know, but I would guess a lot, 50-60% maybe.

Unidentified: It seems we are starting with a preconceived notion that trawling is bad for the environment, which, my experience as a fisherman shows me, is not true. I am open to the scientific process, perhaps it is possible that trawling is good.

Hansen: When the closures were made, we found that many different fishing groups have been fishing all in the same areas for over 50 years. They wouldn't keep coming back and catching fish if there weren't fish there anymore.

He: We cannot deny that bottom trawls will effect physical aspects of the seafloor. We don't say "trawls are bad", but "how can we improve them and make them better for fishermen too"? I did not say [trawling is bad] and I am not prepared to say that.

Unidentified to Hansen: Do you see the observer program changing at all? Fishermen complain that they don't know much and they get in our way, what will OLE do about it?

Hansen: I don't see them going away in the future. I acknowledge the difficulties with observers, we (OLE) do not go in to receiving statements from observers with any kinds of pre-conceived ideas because we've been burned by them too. Do not assume that OLE does not know what's going on with observers. I encourage you to go talk to enforcement if you see observers reporting things that are not true. Lone observers complaining against boats that have otherwise stellar records are not taken seriously. I don't see a way around observers. If there was a better way, we would do it.

Kurt Cochrane to Ames: Do you think the council will consider getting rid of some closures to prosecute fisheries more efficiently?

Ames: The biggest initiative is the RCA and rockfish EFH, but those don't impact midwater trawl closures. EFPs may be used in the future to better inform regulatory development. I found your earlier comment [from Panel 2] interesting because I hadn't thought that the rationalized fishery program was stifling innovation because of individual accountability. Since rationalization, the EFPs have shown that fishermen have said that they're going to all use our own quota. I think there still is an opportunity for the fishermen to come in and say that for the greater good they're willing to set aside a certain amount of fish for experimentation. I think even with that route, though, yelloweye will continue to be a choke species. But I think to the extent that it could be providing a greater good, there could be buyoff and progress forward.

G Pennisi credited Rose with inspiring some of the modifications he's made on his vessel, and Lori Swanson commented on fishermen's frustration with not being able to fish cleanly with the minimum footrope size.

Panel 3 Part II - Enhancing Flexibility and Markets: Gear Restrictions, Sustainability Issues, and Reducing Bottom Impacts

The second half of the panel was focused on understanding the varying impacts across gear configurations such as elevated sweeps and lighter gear.

Panelist Presentations

Olafsson presented specifications of another new Dantrawl device, the sigma trawl gear, designed to work within the regulations for non-bottom trawls required for the Bering Sea Pollock fishery. While they were able to create a net that has a slightly improved catch efficiency, he said that the definition of a midwater trawl and its requirement in the Pollock fishery is hindering the innovations that would better meet management and fishing goals. Like Dr. He, he claimed that allowing for efficient nets would reduce impacts to the sea floor.

Dr. James Lindholm presented preliminary findings from his recent trawl gear modification study with G. Pennisi, as well as background on the complexities of seafloor impacts as interpreted through landscape ecology. A background study out of Morro Bay showed that there was no difference between soft bottom areas that were not trawled, those trawled with light frequency, and those trawled with heavy frequency. This suggested that there are situations in which trawling with particular gear may have little to no impact, and that areas of similar habitat to the study site might be re-opened with little ecological consequence.

Preliminary findings from the modified gear tested off Santa Cruz with G. Pennisi suggest that soft habitats trawled by gear modified with pelagic doors and a footrope with elevating rollers experience significantly lower reductions in habitat complexity than areas trawled with typical small footrope gear. The modified gear was also significantly more fuel efficient. He emphasized the fact that impacts from trawling can differ widely between hard and soft habitats, the need for non-normative perspective when discussing impacts, and that scientists don't aim to make decisions but rather inform those that do.

Brad Pettinger shared how the Oregon trawl fishery went from being declared a disaster in the early 2000's and stigmatized as environmentally unfriendly, to attaining multiple eco-friendly seafood certifications in the past two years. The fishery's gear modifications, area closures and bycatch reductions helped them attain high scores from the MSC program as well as a place on the Monterey Bay Aquarium's Seafood Watch green list. One of the main lessons he learned from his experience with the recovery of the trawl fishery is that managers need to have realistic expectations. Gear modifications are rarely silver bullets, especially when the goal is an eco-certification, and there is a point in diminishing returns when it comes to bycatch and impact reduction.

Q & A

Kurt Cochrane to Lindholm: Fish are coming back to areas that are trawled, not closed areas. Is trawling responsible for the recovery?

Lindholm: There are studies that show un-trawled areas have demonstrably more invertebrates than trawled areas, and that's the habitat small fish use. What we need to think about are the trade-offs that are inherent in the problems with fishing. It's a nuanced situation. Strategic science, communication and collaboration can provide answers for that.

Kurt Cochrane to Pettinger: We've lost processing infrastructure, what do we do?

Pettinger: Part of the struggle is because we haven't had the rockfish suite to offer, so 2017 will be a new situation. It is important that we keep the working water fronts open. We understand that in Oregon, but fishing is just a small part to California so it's different down there.

John Pennisi: commented on a study that was done without the experiential knowledge of local fishermen and said that was then used to criticize the local trawl fishing. He also claimed that trawling has no impact because they wouldn't be able to keep fishing in the same areas if it did, and that the areas that people like James are saying they can't fish because it's important juvenile habitat are in the shallow waters where they aren't allowed to fish anyway.

Lindholm: Right, I take your point. I brought up the point of important habitat because not everyone everywhere will always be excluded from those areas as you are, and I was trying to make your exact point that if you look at the shelf things are different north to south, shallow to deep.

John Pennisi: I've seen multiple studies, even from TNC that prove there's no impact. Also there's no more boats left to impact [the ocean].

Unidentified fisherman: I agree with John, there very few boats fishing. We need to collaborate [with scientists?] to build up the market and then get more people fishing

Lindholm: As the PI on that TNC study, I saw evidence that could convince managers to open more areas to trawling. I think it would make a great study to look at where fishing is happening now and where it has happened in the past

Unidentified: The original reason for the pelagic trawl definition was for crab and halibut bycatch. Will your design be better or worse for this?

Olafsson: I expect it to do better. It has a relatively light touch on the bottom.

Julie Bonney: I haven't heard anything about how to balance gear modification and adjustments to move away from the paradigm of just closing areas. I'm also concerned because the areas around Kodiak have been closed for decades, so how do you form the science on what it looks like before and after fishing?

Lindholm: That could be solved with marine spatial planning. So you take the gear and you match it to the habitat. In a perfect world that would work, it just needs to be implemented. Monitoring is critical to understanding closed areas, but unfortunately no one has money for it. If we did, we could look at an area and look at an area and say "these impacts haven't matched with any human activity", but we can't because we haven't had the monitoring. Our ability to get the answers to your questions is severely hampered by the lack of funding.

Panel 4 - Reducing Fuel Costs: Innovative Designs and Deployment Strategies

Panelists discussed the evolution of efficient trawl door designs and future directions as well as new strategies for reducing net drag which is the biggest source of fuel consumption. There was also a presentation on the mechanics, gear, and markets associated with Scottish seining.

Panelist Presentations

Koji Tamura gave an overview of Net Systems high performance doors and the computer based modelling strategies that have been used in the innovation of new designs. Their newest door design utilizes double foils and a classic v form with a higher aspect ratio so it is highly fuel efficient. It is also

capable of maintaining net spread without requiring shear force on the bottom, and it is impossible to knock over when properly rigged.

Elias Olafsson shared Dantrawl's work on improving trawl doors, primarily midwater trawl gears. He argued that focusing on door size alone when considering drag and whether a boat has enough horsepower puts unnecessary limitations on a boat's ability. If the trawl system as a whole is adjusted, especially the net, then the size of a trawl door can be increased significantly without adding very much drag. The primary adjustment he recommended was removing meshes at the front of the net that collapse and create drag. This, however, does not apply to bottom trawls.

Steve Fitz shared his experiences with Scottish seine fishing, described the market that is available to his low-impact fishery, and gave the advantages and disadvantages of this method. Fish are only caught in the final minutes before the net is brought on board, so the quality is very high which has allowed him to find consistent high paying markets for all the fish he lands. The advantages to Scottish seine gear include the fuel efficiency of the gear, the quality and profitability of the catch, its minimal bottom impact and its ability to work even when winds are strong. The disadvantages include frequent gear failure as it easily snags on shale or even small derelict fishing gears or rough bottom currents, the fact that it's limited to 100 fathoms or less, and the intense labor and knowledge required to use it.

Q & A

Hayes to Olafsson: You said that the resistance of the door is in the order of 5% of the total drag, what about when the door has bottom contact?

Olafsson: It goes up to 20-25%, they are heavy and create more resistance with the bottom

Hayes to Tanmura: Do the higher aspect and lower aspect doors have differences in righting behavior when they get hung up?

Tanmura: Higher aspect doors have a very strong lifting force that rights them.

Skamser to Tanmura and Olafsson: When you're fishing, you're catching fish and water. What are your feelings on when the codend fills and the waterflow stops? Do we need to get rid of that water?

Olafsson: Yes, one way to get rid of water is using T90 to open the meshes.

Tanmura: Net Systems sells Ultracross netting for this, it has become very popular

Skamser: It's been said longer nets fish better, but we have short shrimp nets that are performing well. General opinion?

Olafsson: Longer trawls and longer backends are better, you retain more of your catch. The longer the backends, the more space you give the fish as they fight for that space so they have less opportunity to stress each other.

Tanmura: I agree, a longer taper is better. But balance is also important.

Unidentified to Olafsson: Your main point was that if you remove certain meshes you remove drag and save fuel. Where's the point though where you don't herd the fish anymore?

Olafsson: You can still herd. Also, keep in mind you can fish this way with a bigger net that covers more area so you don't need those bars to herd them.

Unidentified to Fitz: We have a lot of flatfish and a very smooth shelf in the Bering Sea, so I've been wondering what Scot seining would be like there. But most of our flatfish fishing is limited by species like halibut or crab. What are your thoughts?

Fitz: We have gotten some crab, but I think it's only those that are just what's right in front of the net. We have CA halibut but we've always assumed they can outswim that mud cloud so we rarely see them.

Unidentified to Olafsson: When you remove all that web at the front of the net, how does that affect the durability and the size of the headrope and footrope? There's so much strain, is there a compromise there?

Olafsson: There's a learning curve. We had to use stiff rope to retain the rigidity, and we've also had to change some of the materials we used in the front end. But it's easy to fix this
Kurt Cochrane to Olafsson: When you get rid of all that webbing in the front end, what happens to the back of that trawl?

Olafsson: It opens more. What is happening is that the power and the tension is also transferred to the center of the top panel, which balloons out the meshes on the side and creates more opening in the backend. We saw this in flume tank.

A representative from Northeast Fisheries Management Council (NEFMC) asked Ftiz for more specifics on Scottish seine use and his thoughts on their potential use in those fisheries. Kurt Cochrane questioned Tanmura and Olafsson on their products that have the ability to self-monitor bottom contact with cameras and sensors.

Panel 5 – Optimizing Time on the Water: Electronics and Cameras

Discussion was framed around four levels of camera systems, ranging from homemade GoPro systems for \$1,000, to commercially available, real-time systems for over \$150,000. The discussion made it clear that at all levels, cameras have been invaluable in allowing fishermen to understand how their gear is operating and the adjustments that may be needed to save fuel, reduce bycatch, and increase quality.

Panelist Presentations

Scott McEntire shared his innovations with underwater camera and housing systems for use on fishing vessels. All of Mac Marine's cameras are for video recording, and the camera's housings are designed to allow for frequent opening to access the memory card and battery. Using as little light as possible, as well as the proper frequency of light, is important in preventing altered fish behavior. Their newest housing is made from titanium, making it very long lasting, and he hopes to incorporate new technologies as they become available, such as fisheye globe lenses, smaller cameras, and sonar components.

David Barbee presented Simrad's electronic monitoring systems and their potential uses within trawl fisheries. Echo-sounder imaging software used with live stream video to can help find fish on the bottom and monitor net and fish behavior during tows. Net components can also be rigged with cabling systems that self-adjust to correct issues such as tilting doors or skewing of the net. Newer developments with their sonar imaging allows for real-time imaging of the mouth of the net and seafloor, rather than the scans that create a time lag. This has given fishermen very precise control over where the net moves, allowing them to fish right along banks or rocky areas. Customizations are available for nets of all sizes and lengths.

Guiseppe Pennisi shared his successes with low tech, but innovative, and affordable homemade camera systems. He has welded several different housings from scrap metal for GoPro cameras that are very durable and easy to deploy. Significant improvements to his fishing have been made due to observations from trial and error adjustments monitored by his cameras. Finding the ideal camera positioning can take trial and error too, but with enough creativity and persistence, even small boat fishermen with limited budgets can experience benefits from camera systems.

Rob Terry presented the new and developing products from Smartcatch's digital catch monitoring systems. These products were designed to give fishermen more knowledge and control over what gets hauled up in their nets. The cameras provide real-time digital video feed to the wheelhouse, where the camera angles and lights can be adjusted. Software for species identification, biomass

calculation, and removal of background particles in video are currently under development. All the data recorded from the video feed, as well as digital catch logs and GPS tracks, can be stored in a cloud system that offers catch analyses for fishermen.

Q & A

Unidentified to Barbee: Is there any progress towards getting real time to be wireless?

Barbee: Unfortunately there's so much noise and reverberation with acoustics that available bandwidth is limited. One frame every 30 seconds is possible, but 25 frames per second is not. Frequency will be an issue too, it may be possible to communicate between codend and headrope wirelessly, but to the vessel will be difficult.

Terry: I've seen some cutting edge work that shows that it is possible. I think it will be available, of course depth will be dependent, and it will be costly.

Unidentified comment: choosing when to record live-stream is better than having thousands of hours of footage to weed through

Terry: There are a couple features we will include so that instead of having to watch empty space, it will just give you an alert when there's a fish or object of interest, and it will have replay and allow you to put automatic comments in type or audio. Real time systems create the environment for a living laboratory, which could serve our lack of data on fish behavior inside of the net.

Barbee: our parent company has tech that reads telemetry from tagged fish that enter the net.

Unidentified comment: I want to use Terry's system to look at my footrope when flatfish come into the net so that if halibut come into the net I can just stop. I think that is the first line of defense. Recognition software will need to be very sophisticated to do this.

Barbee: It's easy to tell the difference [visually], I saw a system in use that led the fisherman to stop the vessel we were on from going into a school, the vessel next to us didn't, and they destroyed their excluder and spent hours repairing it. Instances like these show that monitoring systems don't actually cost that much because of all the money you save. I heard from another fisherman that they were able to fish longer into the season because they would pull early when they started to fish dirty, so they didn't reach their restricted species quota too fast.

Skamser: What kind of mechanical system could be sent down [in the net] to respond to observations with these monitoring systems?

Barbee: There is potential for adding devices like that, there are many possibilities, but they are still in development. We just provide the infrastructure that you can use to add anything with Ethernet controls. Some people are interested in opening the cod end when they hit bycatch.

Terry: We actually have a computer that's built into our system so that allows you a little more control.

NEFMC staff: what is the range of cost for these entire systems?

G. Pennisi: I'm at the low end, the camera, housing and set up are all \$1500. They take a couple hours to make, but I have my own welder setup, so that helps.

McIntire: Mine's at the next level, we're at the \$5000 [retail] range, acrylic housings are slightly below and titanium is slightly above.

Terry: With the cables added and the computer, the whole deep set up is \$80-90,000. We'll have a shallower version that will be for less.

Barbee: It's \$80,000 for the camera alone. But you'd need to supply your own typical 11m cable system so you'd need a winch, which is about \$50,000, and the cable itself can be \$18 per meter. I don't see any of us as in any kind of competition, we fill different needs.

Fitz: for \$900 I have about the same equipment as Joe

Unidentified fisherman commented that he appreciated G. Pennisi's work on low tech affordable gear because the fishermen that are the most at risk are the small boat fishermen.

Panel 6 - Encouraging Adoption

Drawing on lessons from the West Coast and Alaska, this panel was focused on how to encourage the adoption of various gear modification strategies and how to overcome the financial and regulatory barriers.

Panelist Presentations

Phoebe Higgins gave an overview of the CFF and the impact of investing in the fishing community. The CFF was created to provide much needed capital for fishermen that are unable to obtain it through regular means. Since its launch in 2008, the CFF has issued 35 loans totaling \$4.2 million, with 21 (about \$2 million) loans currently outstanding. Vessel participation in the groundfish IFQ program has been a main top priority for the CFF. In order to prevent issuing bad loans that are not possible to be repaid, CFF makes sure borrowers meet the following criteria:

- Experience in your business is critical
- Responsive and collaborative attitudes
- Understanding and communication of how you will generate revenue to pay off the loan

These loans have allowed fishermen to purchase or upgrade vessels, permits, meet compliance standards, and increase profitability.

Heather Mann shared her insight on compliance gained from her work with the MTC. As director of the cooperative, Mann represents the interests of 23 trawl catcher vessels, all small vessels with limited horsepower. Their main objective is to push for policies that protect boats' access to fishing grounds. She shed light on the main burdens that the cooperative fishermen are struggling with, which include:

- Fees required to fish within the Individual Fishing Quota program, which can put operating costs at 20% of total profits (not including gear and fuel costs)
- Stifling regulations that come from an inefficient bureaucratic regulatory system
- The inability to innovate when the fishery may be shut down at any moment by another vessel's bycatch

If regulations aren't feasible for fishermen, they'll be forced to walk away from the fishery. She shared the frustrations of fishermen that have worked hard to meet the bycatch reduction goals set by management, only to have their success used as a reason to set the bar even higher, effectively punishing them for their effort. Healthy fisheries are only possible through cooperation, and she hopes to see more of it in the future.

Julie Bonney shared some stories from the Alaska Groundfish Data Bank (AGDB) that have demonstrated what makes implementation successful and what inhibits it. Many of the fisheries the AGDB represents are in a race to fish, so they work to broker agreements between fishermen that allow

them to function more like a rationalized fishery. This work has shown her what kinds of decisions produce sweeping agreements and compliance among fishermen.

One big success came from implementing slotted halibut excluders. Managers changed the fishing season for Alaskan cod, resulting in higher catch rates of halibut bycatch. Industry researchers came up with an excluder that pleased the fishermen with its ease of use and readily apparent benefits. It's now popular in the fishing community and used widely. Another success came from a conflict with the crab fishery that was about to lead to area closures if sweeps weren't modified to reduce crab damage. Again, they were saved by research that demonstrated that sweep modifications were possible to achieve these goals instead of closures. Managers were convinced by the research and the closures were avoided.

A significant failure came from the catch share program for the rockfish fisheries AGDB represents. The fishermen dramatically reduced their bycatch so that the bycatch savings could be rolled into other fisheries that were struggling. The Council responded by reducing their allowable halibut bycatch even more, effectively punishing the rockfish fishermen for their work and demoralizing their innovative efforts. She concluded that rewards go much farther than punitive approaches that attempt to get fishermen to "do more" for sustainable fisheries.

John Gauvin shared insights from his work with the Alaska Seafood Cooperative to facilitate implementation of gear modifications. His first step is to always question whether the issue really is best resolved with gear modification, which can save a lot of time struggling with problems that are better answered in other ways. He also stressed the importance of thinking ahead, primarily by defining a successful outcome for all parties involved, anticipating how research on gear modification may be interpreted in the future, and adjusting these goals as new information becomes available.

Q & A

Unidentified to Heather: I had the impression from your talk that if there's less halibut being caught it's more due to less fish overall being caught rather than bycatch avoidance. I'm curious as to your thoughts on that.

Mann: Yes, that's accurate. I've testified to that in the North Pacific [Fisheries Management Council]. Down here halibut is allocated as an individual bycatch quota. We've had incredible reductions in bycatch, but that's because we're leaving 70% of our [target] catch in the water.

Kurt Cochrane: How can you define success when the goals/target keep changing?

Gauvin: That's a good point. It's probably impossible if bycatch targets are defined species by species as their number fluctuate. These sometimes inaccurate stock assessments lead to switches from crisis, to OK, to crisis again. You can't put in place anything programmatic with this, you may need something more categorical.

Mann: We actually did with canary, with an organization that's funded with industry dollars and OSU. We went out on a boat with a net that had an open codend and filmed more canary going through the net than the Council said even existed, and the Council just ignored it. Now they're paying attention because canaries have rebuilt about 20 years ahead of schedule. Every different Council meeting there's a new crisis, and as soon as we've fixed one crisis they've already moved on to a new one so that the successes you do achieve aren't recognized as accomplishments. That's what it feels like.

Cochrane: Canaries are an issue for me, research becomes a way I can protect myself and survive. How do we get better research out there to know what's going on and to keep our fisheries open?

Mann: Money. We've lobbied for higher NOAA budget, but it goes into a black hole and we don't know how that's used. We need to money for science. Policy isn't keeping up with science, and science isn't keeping up with reality, because it all costs money. We could really use John's work influencing our Council, and you could really use our NGO connections.

Gauvin: I had an idea, we have huge areas closed in the Aleutian Islands that have got to be a huge buffer [for threatened species] because it's rockfish EFH. I think it's probably true that you're not really getting any credit and you should have a bigger buffer on those choke species because those closed areas where the choke species live aren't being fished. So maybe we should explore closed areas, since they're going to keep being used.

Dooley: I really think the fishery can stay healthy with more research that corrects misconceptions surrounding the population assessments of stocks and choke species.

Mann: And I'd be interested in how we could get managers to give us credit for our closure areas. But this is against a backdrop of nonsensical management right now.

Jeff: Fishermen are encountering more and more POP, but the [managers'] trawl surveys are reporting lower numbers. That just can't be. How can we come up with a way to statistically say, yes there is more fish?

Gauvin: Camera surveys would make total sense, especially for indexing the non-trawlable survey sites.

Bonney: Alaska uses a submarine transect.

Dooley: There are vast closed areas and fishermen are not getting [enough] credit for those areas. I agree that the Council process is stuck. It's not anyone's fault, it's just overloaded and procedurally there's no room for flexibility. Answers will lie in thinking outside the box. I would like to see a groundfish fisheries forum retreat where people from all over in this [regulatory] process can free think how to change the ways we do business

NEFMC staffer: (shared their process for managing gear) We have a research steering committee and standards for gear approval. If a fishery decides on gear modification, they go through the EFP process, bring results to steering committee, then they are reviewed and recommendation are forwarded to the Council, which can take action to approve the new gear type. NOAA makes the official rules and regulations. In some cases we have closed area that may be fished if fishermen can prove that their excluders will consistently reduce bycatch by at least half.

Open Discussion on Next Steps, Barriers, and New Directions

Summary

Seasoned fishermen and gear designers said that they benefitted from hearing from the broad range of experiences from different regions and perspectives, and that they either learned something new or were encouraged that they were on the right path with their own gear modifications. Younger individuals newly entering trawl fisheries were excited about the gears presented at the workshop and plan on implementing some. Many attendees were also pleased with the networking opportunities provided through the workshop, and expressed interest in continuing to meet with additional workshops or conferences, or privately through email.

Several people also commented that they were thankful for the Council presence at the workshop, and that they hope their perspective will continue to be brought before the Council. Many fishermen and researchers were worried that regulations made without input from their experiential knowledge may have unintended consequences that stifle further innovation.

Summarized Transcript

Skamser: I thought it was a great workshop, our crew members learned so much and they had no idea that there was such a community of people that are concerned for gear modification. I know we have young skippers here and I was wondering what they might think of how this [workshop] is good or how we can improve?

“Young skipper”: I liked it, I already knew a bit about some of this stuff. We have one of the Simrad cameras, we got it as a preventative measure. We haven’t used it yet, but we’re developing ways to. I liked Dantrawl’s ideas on removing those meshes, I’d never thought of before, it’s been a great workshop.

Kristin Ruther: Seeing all these designs and companies in one place was great. I’d say this has been good for young people that have been around for a while and that are familiar with the industry but are just now starting to use this.

Crabbe: One benefit [of this workshop] that entered my mind is all the information on the modifications that improve drag and fuel consumption, things that everyone could benefit from. Kurt you have a lot of previous experience, was there anything that you were able to benefit from here?

Kurt Cochrane: Yes, this is much better than some that I have been to. It’s helpful to have a broad range of people that fish different areas with different rules, gear, and species. It gives young people something to learn from, too, which will move [the fishery] forward faster. Having people from the Council process has put faces to the names that you hear about, too.

Unidentified: Are you planning on making reports to the council? Is there any anticipated follow up?

Crabbe: I think the main intent, of this was for you guys to talk, which is what has been happening. It wasn’t that we had any policy plan, just strictly networking and sharing.

Hammond: Is there any plan to continue to do this every year but maybe at a time that more fishermen are available, like November December, or at different ports between CA and WA?

Crabbe: Yes, that type of feedback will drive those future possible meetings. We need more meetings, things change so quickly, and these networking relationships take time to develop. I’m hoping this will lead to additional workshops

Unidentified: It would have been great to have more Council members or Agency people here to hear this perspective. My take away from this is that the gear innovation that’s going on is aided by the catch share program, the individual quotas, and even though I agree with Kurt’s assessment of the stocks being a [slight] detriment to it because of restricted areas and species. But I know that it has replaced the race to fish with more individual accountability and incentives to reduce your bycatch. Also, cameras, from GoPro to Simrad, have totally changed the game, and have allowed us to understand what our nets are doing. Another takeaway is that not one size or excluder fits all, or any two boats. It’s the innovation of individuals that has been making them work. If a device is regulated, it comes with a description, and then all our imagination and innovation is gone. We need to get word back to the people making regulations, we have a lot of devices like risk pools and other methods that can be used to regulate gears without having a mandated description.

Barbee: Most fishermen and managers don't understand the types of technologies that are available to help achieve their management goals, I'm happy to help through educating people.

He: Even as a fishing tech with years of experience, I learned a lot here, especially about the West Coast. I am very impressed at the fishermen participation here, and the level of effort given to innovate.

Crabbe: You're a very knowledgeable net builder and longtime fisherman, is there anything from your experience here that you will take away and incorporate in your net building process?

Kevin: It gets people talking. I knew a lot about some of these things, I'm interested in cameras and I have some avenues for incorporating that now.

Rose: I've noticed a theme of concern over the need to get this information to managers so that they can understand how innovation has been and may be stifled in the future by the unintended consequences of regulations.