

Dungeness crab commercial fishermen's perceptions of injuries inform survey development

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Introduction: The West Coast Dungeness crab fishery is high-risk for occupational fatalities. The Fishermen Led Injury Prevention Program (FLIPP) explored this worker population's nonfatal injuries and safety perspectives.

Methods: Focus groups were held along the West Coast to (a) review reported injuries, (b) discuss risk factors, and (c) identify content to inform future FLIPP research activities, including survey development. Focus group data were transcribed and analyzed qualitatively. The FLIPP survey was pilot tested with groups of fishermen before broad distribution.

Results: Nineteen fishermen participated in focus groups and 21 pilot tested the FLIPP survey. These discussions illuminated injury risk perceptions, crews' current safety provisions, and what survey items would be relevant for fishermen.

Conclusion: To engage fishermen in the process of identifying and developing injury prevention efforts, focus groups, and pilot testing were effective methods for incorporating their ideas into a survey.

KEYWORDS

commercial fishermen, community researchers, focus groups, injury prevention

1 | INTRODUCTION

The United States' West Coast Dungeness crab fishery includes California (CA), Oregon (OR), and Washington (WA), and consistently is the region's most valuable fishery.¹ During the 2016-17 season, fishermen in Oregon landed 20.4 million pounds of Dungeness crab.² An estimated 3200 captains and deckhands work in the West Coast Dungeness crab fishery.³

The Dungeness crab fishery is one of the highest-risk commercial fisheries in the United States. The Fishermen Led Injury Prevention Program (FLIPP) supported fishermen through engaged occupational injury prevention research on the West Coast and began in 2014. It was the first research program to investigate nonfatal injuries in the Dungeness crab fleet. Commercial crab fishermen typically have

strong support from their families and their community as a whole. FLIPP collaborated with members of the fishing communities to identify potential safety factors and sources of nonfatal injury, and perceptions of safety (ie, what keeps fishermen safe while fishing and what causes injuries while fishing). Figure 1 displays the FLIPP research process in steps. This paper fully describes FLIPP Step 2, in which fishermen informed the development of a survey to collect primary injury and safety perception information.

A recent report by the National Institute for Occupational Safety and Health on commercial fishing fatalities in the West Coast region during 2010-2014 showed that the Dungeness crab fleet experienced the highest number of fatalities in the region,⁴ and efforts to date have focused primarily on reducing fatalities. In a previous study of this fleet, 33 fishermen completed dockside surveys, reporting personal flotation device (PFD) use, factors important to PFD use, US Coast Guard (USCG) safety exams, and onboard safety drills. This small study found that additional efforts are needed to encourage PFD use and to expand

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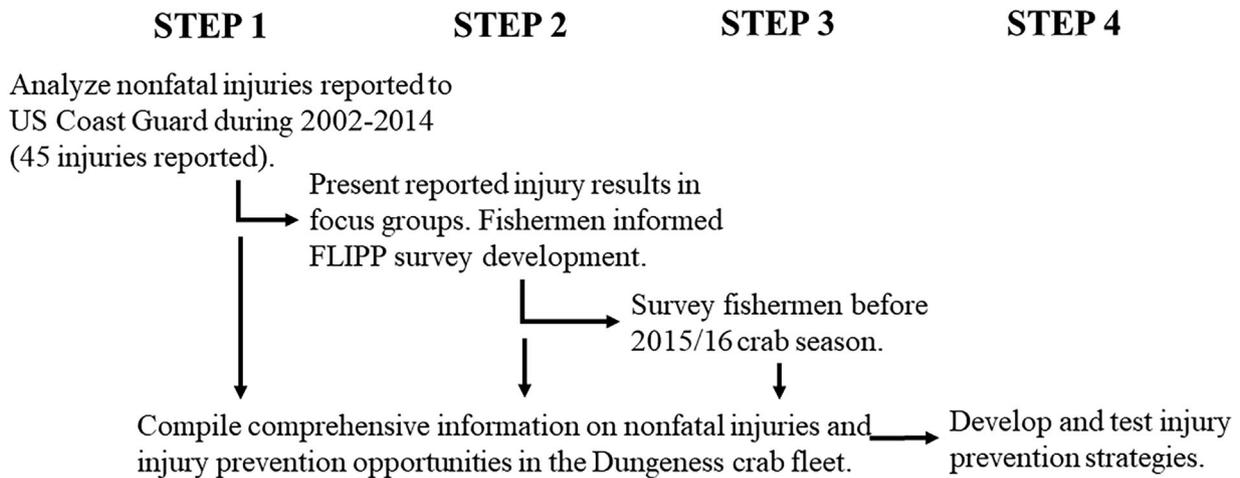


FIGURE 1 Fishermen led injury prevention program (FLIPP) research process

safety training and drills.⁵ While continued attention is clearly needed to reduce the risk of fatal injuries, nonfatal injuries are an important concern. Such injuries may be life-threatening or result in permanent disability leading to decreased quality of life, lost wages, and lower productivity; measures to prevent and mitigate nonfatal injuries are likely to differ somewhat from measures addressing fatalities.

Our preliminary research (FLIPP Step 1) found 28 fatal and 45 nonfatal injuries in the Dungeness crab fleet reported to the coast guard from 2002 to 2014. Almost half of the nonfatal injuries occurred when fishermen were hauling the gear (47%), with upper extremities most affected (48%), and fractures the most common injury type (40%).⁶ Nonfatal injuries reported to the Coast Guard do not represent the true burden of injuries; however, the injury report results provided discussion topics to further investigate nonfatal injury risk and hazards associated with crab fishing. In Step 2, community researchers were recruited to the FLIPP study team in the major ports along the West Coast, from Washington to California. Focus groups were held with fishermen in major ports to present the results of the reported injuries, gain fishermen's perspectives, and solicit feedback to inform the development of the FLIPP survey. To ensure the content and language of the survey were relevant to the experiences of this group, we pilot tested the FLIPP survey before finalizing. We then administered the FLIPP survey (Step 3) to fishermen along the West Coast during gear preparation before the 2015/2106 crab season.

2 | METHODS

2.1 | Participant recruitment

FLIPP community researchers engaged fishermen in the Dungeness crab fishing communities of Oregon and Northern California to participate in focus groups in the Spring of 2015. This study utilized a purposive sampling approach: community researchers recruited participants in their assigned region by advertising opportunities to participate using personal contacts as well as through community marketing (bulletin boards, fishermen meeting places, fishermen's

wives groups, social media). Recruitment was open to any Dungeness crab commercial fisherman and each focus group was limited to a maximum of 12 participants. All study procedures were approved by the university's Institutional Review Board, and all participants gave informed consent.

2.2 | Focus group methodology

Focus group moderators and observers were comprised of the research team and community researchers, always in teams of two. The focus groups were targeted to last less than an hour and refreshments were provided. The time was split equally to review and discuss the injury data, as well as review and discuss the potential survey items. At the beginning of the meetings, moderators distributed handouts that were a visual summary (graphs and tables) of aggregated data on injuries in the Dungeness crab fishery that were reported to the United States Coast Guard during 2002-2014. The handout also included a list of potential FLIPP survey items to obtain feedback on proposed primary data collection (Table 1). The moderators used the handouts to guide the discussion and asked broad, open-ended questions designed to stimulate responses. Small groups were utilized to encourage discussion, and participants were aware that sessions were being audio recorded and that their identities would remain anonymous.

2.3 | Focus group analyses

An inductive approach was used to analyze focus group data for content regarding injury discussion. Audio recordings were transcribed verbatim from all focus group sessions. Three of the authors (LK, VB, and MN) separately reviewed the transcripts for content on injuries to independently derive emergent codes from patterns that arose.⁷ The researchers then met to reach consensus on all of the identified codes. The transcriptions and codes were entered into ATLAS.ti, a web-based qualitative analysis program.⁸ The program identified content related to each code allowing for frequency counts. The codes were then

TABLE 1 Outline of the moderator questions and participant handout used for focus groups

Moderator questions	Participant handout
Review of USCG Injury Data: What do you think about this information? (for each graph/table)	Total of 10 pages of injury information displayed in graphs/tables on individual pages by:
Overall Injury Discussion: Reaction to this information? Examples of injuries not presented? What else is important about injuries?	1. Worker demographics (age, years fishing, position) 2. Year 3. USCG district and state 4. Weather-relatedness (Yes/No) 5. Event or exposure 6. Nature of injury 7. Body part injured 8. Source of injury 9. Work task 10. Vessel activity
Survey Items: What do you think about this information? (for each set of items) What else should be included? What should be removed? Suggestions for improving survey? Would you fill in this survey? If not, what can we do?	Items were displayed that could be included in a survey: 1. Scope of survey: (a) any traumatic injury or musculoskeletal disorder. (b) happened within 12 months. 2. Collect information as in a coast guard report: fishing incident and fisherman information. 3. Collect injury and vessel information. 4. Collect sleep, safety values, risk attitude, and musculoskeletal health information.

grouped by similarity by researcher consensus, producing the code-categories. The results of the analyses were then reviewed by the three researchers independently and discussed in three iterative meetings to reach consensus on the codes.

For survey item discussion during the focus groups, hand-written notes were taken to strike or place comments on the survey item list and to note discussion around specific items. These notes were compiled to determine the items for inclusion in the FLIPP survey and the resulting advice for making the survey successful with fishermen. Additionally, ATLAS.ti was used to code content for "data collection recommendations."

3 | RESULTS

Nineteen fishermen participated in seven focus groups in California (Morro Bay, Trinidad, Moss Landing, and Fort Bragg) and Oregon (Port Orford, Charleston, and Newport). The participants were predominately male (90%) Dungeness crab fishermen (90%), with an average age of 50.4 ± 16.0 years, and 26.9 ± 18.0 years of crab-fishing experience. The two female/non-fishermen

were a local Sea Grant extension agent and a fisherman's wife. They were all white, non-hispanic/latino. Most (80%) were owners and/or captains. While recruitment was not restricted to commercial fishing owners/captain, this group was most responsive. A total of six categories and 46 codes were developed during the qualitative analysis. Table 2 includes the categories and most frequent codes with the associated frequency results.

3.1 | Reflections on injury data

This category was comprised of the participant's general comments upon reviewing the injury data provided in handouts. They most frequently reported that there was *no need for additional regulation*. One fisherman stated: "I really don't think that we need any more intervention. I mean, obviously, by the lack of incidents that have happened in the whole fleet. The idea of putting more rules on ourselves seems silly." Another participant felt that more regulations to prevent injury would impede their ability to work and said, "But look at the record, the injuries, there are 45 in 12 years that is amazing. I think if you want to keep us working, leave us alone and let's all go home." In addition, participants commonly discussed how the injury data were congruent or *incongruent with their own beliefs about injuries* in the fishery. One example of this was when researchers stated that deckhands were the most commonly injured (88% of the reported injuries), the majority of fishermen were "not surprised." On the other hand, another stated, "I'm really surprised at these numbers. I'm thinking that this industry is safer than I thought."

TABLE 2 Categories and most frequent codes

Category (total frequency)	Most frequent codes within each category	Frequency
Reflections on injury data (44)	No need for regulation	21
	Data incongruent	20
Beliefs about injury risk (65)	Low risk	35
Reporting injuries (60)	Severity of injury	15
	Subjectivity	12
Culture of work (66)	Attitude	12
	Minimizing injuries	12
	Overexertion/exhaustion	9
	Evolution of operations	9
Hazards (124)	Weather	22
	High participation in fishery	16
	Transit	11
Safety provisions (44)	Awareness of risk	6
	Promoting safety culture	6
	Training/supervision of new hands	5

3.2 | Injury risk

In this category, we included fishermen's comments on their belief about the risk of injury while fishing. They felt the data demonstrated that the fishery was *low risk* based on the small numbers of nonfatal injuries, but that fatalities are a real risk. Fishermen shared, "We're being pretty safe for the most dangerous job around," and "So you don't get hurt, you die in this fishery."

3.3 | Reporting injuries

It was commonly acknowledged that there were a variety of reasons for reporting or not reporting injuries to the Coast Guard, including: compliance, liability, subjectivity about what should be reported, and the severity of the injury. One participant described their *subjectivity* in regard to reporting by saying, "The crew is required to report injuries to the skipper. There's a threshold where you have to submit it to the Coast Guard," indicating that *severity of injury* is a potential factor in what injuries get reported and which do not. One participant summed up feelings about *liability* involved with reporting: "You're putting yourself out there; as soon as you [report an injury] then all of the sudden you're liable. They want to do an investigation, you know." The following examples demonstrate two perspectives on the *subjectivity* in reporting: "I think if there's a question on how to treat the person, the victim, then you're probably going to call the Coast Guard. . .," and "You might take a beating, but you're not going to report any of this."

3.4 | Culture of work

We grouped (a) the social norms of working on a vessel, and (b) work organizational factors as the culture of work. Common comments about the culture of working on a vessel that related to safety were about cavalier *attitudes*. One fishermen said, "I think a lot of these deckhands think that they're macho and they're working the most deadly job in the world." Another commented, ". . .all they're looking for is the next buoy and the next pot of crab and they're on the phone wondering how much they're getting paid. They could care less, as long as there's, what's that saying? As long as there's light in the block, everything's good." It was common for the fishermen to *minimize the impact* that work-related injuries would have on a fishermen relative to other aspects of their lives. One participant commented, "You're not going to take the risk and the death and the injury factor out of fishing or life in general." Another said, "You're talking about a guy that sprains his back crabbing. Do you think he elk hunts in the fall after he sprains his back? Yes he does. He goes home and does lawn work and limbs his trees with a sore back he might not have got or probably did get from fishing."

Other discussions were related to *exhaustion/overexertion*, referring to the heavy physical labor and fatigue. One fisherman stated, "I would think the biggest causation of all accidents is probably sleep deprivation. People are tired and don't know when to quit, before your crew hurts themselves." Another summarized, "Well you're crab fishing, you're always tired and you're always rushed."

The participants also discussed how *fishing operations* have evolved over time. Crew selection and safety compliance were also discussed as important for safety but not as frequently. Comments from one fisherman included, "You know actually education over the years has changed a lot. When I first started fishing, [personal flotation devices] were the old orange ones that you could get off the old World War II surplus and that was the safety equipment on the boat. Maybe a fire extinguisher. Period," and "So now, through the Coast Guard's regulations we have come up to speed on a lot of that. Survival rate has increased a lot. And the awareness, and wife, encouraging us to go through safety instructor drills and survival drills and this type of thing." Related to navigation improvement, one fishermen commented, "We [now] all have radars and GPSs and [in the past] we had a compass and maybe a CB radio. That was it."

3.5 | Hazards

A wide range of hazards were discussed when reviewing the different summaries of the injury information including in order of frequency: weather, high participation in fishery, transit, slips/trips/falls, inexperience, knife handling, block operations, timing/duration of the crab season, monetary motivation, vessel size, fatigue, intoxication, stacked pots, and crab pot handling. Regarding *weather* and the relation to reported injuries (84% were not related to weather), many were not surprised. One fishermen commented that ". . .most guys aren't on in tough weather. 90% of the time you're fishing in good weather." However, weather was brought up as a precursor to other hazards such as being *struck by gear* and *physical exertion*. Fishermen reported: "I can think of where [pot] stacks that were bucking in the weather and the whole stack came forward, tipped over and hurt people's backs," and "There's nothing that gets you more tired than being at sea. Because you're constantly fighting the motion, all the time. . . and that kind of comes back to the weather."

There was agreement about the sources of injury around a variety of common situations/circumstances: slips, trips, falls, inexperience, timing/duration of season, and monetary motivation. There was also agreement about certain work tasks on a vessel that can be hazardous: knife handling, block operations, and crab pot handling. One fishermen described *handling the pots*: "What you have basically is a wrecking ball on the end of a rope that you're bringing out of the water, sometimes at high speeds, that crab pot, it's 100-120 pounds coming out of the water, the boats taking a roll and if the guy isn't used to the movement of the boat then that pot can be going many different directions."

Fishermen also discussed how environmental and *topographical hazards* contribute to injuries. By state, 55% percent of reported injuries were in Oregon. Participants talked about how the commercial fishing ports located at the mouth of rivers in Oregon created a hazard. Fishermen must transit to fishing grounds across dangerous mouth bars in these ports where the river flows into the ocean. One fishermen indicated the Coast Guard District 13, which covers the coasts of Washington and Oregon, is "at the mouth of the Columbia River. That is the fiercest bar on the Pacific coast."

3.6 | Safety provisions

When discussing what can be done to improve safety the most common ideas included increasing awareness of risk, Coast Guard training/drills, improving safety compliance, promoting safety culture, and the training/supervision of new deckhands. Regarding how *supervision and training* may be different on different sized vessels, one fishermen stated, "What happens in a big boat, is sometimes the captain is driving the boat and the block guy gets to teach the new guy what to do. So the information he gets is not as up to date." Another fishermen provided insight on *compliance* and frustration with safety gear: "I've tried to be prudent and give [a crewmember] every opportunity to have safety equipment available to him. But he chooses

not to use it because it's uncomfortable for him. I don't know what else to do."

3.7 | Survey items and data collection

Survey and data collection recommendations from the focus group were compiled to inform the development of the FLIPP survey. The participants frequently discredited questions pertaining to musculoskeletal health, considering symptoms all too common. Therefore, we decided to restrict the scope to traumatic injuries. One fishermen stated: "Aches and pains are a part of everyone's life at some point. In the last year, have you had pain in any part of your body? I mean come

TABLE 3 Survey questions reviewed in focus group and actions taken (included or removed) for Final FLIPP survey

Survey question	Resulting action
What were you doing immediately before this accident happened?	Indicated by work process
What was the date of the injury?	Included
What was the time of the injury?	Removed
How many miles from shore did the incident take place?	Removed
Was the injury weather related?	Included
Can you describe the weather at the time of the injury?	Removed
In which fishery were you working at the time of the incident?	Included
What is your gender?	Included
What is your position?	Included
How many years have you been working in the fishing industry?	Included
Was the incident intentional or unintentional?	Removed
How much time was spent in the water?	Removed
What was the nature of the injury?	Included
What body part(s) was/were injured during the incident?	Included
What was the source of the injury?	Removed
What was the severity of the injury?	Removed
What was the vessel name?	Removed
What was the vessel type?	Removed
What was the vessel activity at the time of injury?	Included
During the 4 weeks prior to your injury, how often did you wake up in the middle of the night or early morning?	Removed
Were you tired when the injury occurred?	Included/rephrased
The captain places a strong emphasis on health and safety	Removed
It is worthwhile to put in effort to maintain/improve my personal safety	Removed
It is important to reduce the risk of accidents and injuries	Included
I use all the necessary safety equipment to do my job	Included/rephrased
I use the correct safety procedures for carrying out my job	Included/rephrased
How dangerous do you think fishing is?	Included/Rephrased
Are you able to swim?	Removed
Do you fish alone?	Removed
Was the vessel in compliance with applicable safety regulations?	Removed
Have you at any time during the last 12 months been prevented from doing your normal work because of trouble in (list of body parts)	Removed

on." Also asking about being tired at time of injury and about sleep was also commonly discredited. "Okay, I mean, get the 'were you tired when the injury occurred?' Who cares? Everybody's tired." In general, the participants found the potential survey items on the fishing incident, fishermen, injury, and vessel information to be acceptable. Also, in general, the items included for assessing the safety values and risk attitude were deemed relevant. One key item added to the survey, based on the discussion, was to ask fishermen what they do to stay safe and prevent injuries. A participant offered, "They might give you input, like, ideas to share with other fishermen on how we are preventing injuries." The final FLIPP survey is included in the Appendix and see Table 3 for examples of items in an original survey and resulting action from the feedback from fishermen for final FLIPP survey.

Finally, participants provided recommendations on the survey dissemination. They recommended meeting fishermen on the docks and gear yards before the season and delivering the survey face-to-face, which we did. They also noted that free gloves would be "loved" since hand protection is needed when prepping gear, which we did provide. These recommendations paid off when we did implement the FLIPP survey collection.

4 | CONCLUSION

The FLIPP study is the first to investigate nonfatal injuries in the West Coast Dungeness crab fleet. Working with community members as research partners enabled FLIPP to engage more rapidly and thoroughly with fishing crews and communities. Conway⁹ recommends that researchers step outside the "academic as expert" mentality and build effective partnerships within commercial fishing communities, particularly for complex issues with the potential to transform the industry. The FLIPP research process is actively working to build an effective partnership by engaging commercial fishermen as the experts in their industry. These focus groups were part of the process and the beginning of the engagement of fishermen for the future FLIPP activities.

Using injury information reported to the US Coast Guard provided a first step to characterizing patterns of injuries in this fleet. Conducting focus groups of fishermen in the Pacific Northwest provided us relevant information on their perspectives. The participants' interpretation that this reported injury information show a safe industry make clear a potential shortcoming of the data. As with other occupational safety and health surveillance systems, especially for nonfatal injury information, underreporting likely results in an incomplete picture of the risk of nonfatal injuries. The focus groups helped open a challenging dialogue between the researchers, community researchers, and fishermen. Despite no mention in any of the study materials of regulation development, the participants expressed concern that discussing injuries and injury prevention with researchers would ultimately result in more government oversight and safety regulations. Based on the discussions, we learned that the fear of liability and investigation reduces the likelihood of fishermen reporting nonfatal injuries; however, if the crew determines it is a severe injury and if treatment is needed, then a report would be made.

When asked about barriers to having crab fishermen fill in a survey, participants said it was a sensitive topic and that "no one wants their participation to lead to increased regulations."

We also learned about the relative acceptance of minor injuries, in particular overuse injuries, as being part of the work. Further work exploring ergonomic solutions to reduce the risk of cumulative trauma in this fleet could incorporate participatory approaches. Participants acknowledged that technology has improved vessel operations, navigation, and safety. This indicates that perhaps there are opportunities to continue improving operations and safety. Participants indicated that fishermen have ideas to stay safe, which could be shared. Their positive comments for wanting to improve safety were encouraging. For example, one fisherman stated: "Well we'd all love to see it a lot safer; we all put our sons on the boat."

Beginning with survey items and experiences from research with other fisheries, we had a good starting point to collect the safety attitudes and beliefs in the Dungeness crab fleet. To engage fishermen in this fleet in the process of identifying and developing injury prevention efforts, focus groups were an effective start and allowed for incorporating their ideas into a survey. We feel this was an important step, along with pilot testing the survey, to tailor a survey to collect relevant injury information and include other safety-related aspects that could inform injury prevention efforts. While we did not compare collecting surveys in the original form and final FLIPP survey, asking participants about how to collect data and obtaining the recommendation of going to the docks and handing out gloves, worked out very well for successful survey implementation.

While our study's community researchers were instructed to recruit any fishermen or commercial fishing stakeholder, owners/captains were the most common to respond to recruitment, likely due to the hierarchy on vessels. We recognize these focus groups did not represent all of the perspectives of the different positions on vessels, the perspective of the captains and owners provides overall knowledge of the commercial fishing industry/operations/safety. Additionally, due to the hierarchy of the crew on vessels, having both deckhands and captains in the same focus groups would not facilitate open discussions. With our broad dissemination of the subsequent survey, we were able to collect perspectives of deckhands, however for this report, it is restricted to the owner/captains. If perspectives from different positions are needed, we recommend separate sessions for captain/owners and deckhands. Also, while it was challenging to schedule fishermen to attend a focus group, once there, the conversations were lively and informative.

Engaging fishermen in these focus groups and pilot testing the survey made possible subsequent work in the Fishermen Led Injury Prevention Program (FLIPP). For the next step, we effectively disseminated the FLIPP survey along the West Coast (published elsewhere).

AUTHOR'S CONTRIBUTION

LK substantial contributed to the conception and design of the work, collection of data, analysis and interpretation of the data, drafting the work, final approval to be published and agreement to be accountable

for all aspects of the work. MN contributed to the analysis and interpretation of the data, editing of work, final approval to be published. LS contributed to the conception and design of the work, collection of data, editing of work, final approval to be published. VB contributed to the substantial conception and design of the work, analysis and interpretation of the data, editing of work, final approval to be published. KJ contributed to the design of the work, collection of data, final approval to be published.

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ETHICS APPROVAL AND INFORMED CONSENT

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DISCLOSURE (AUTHORS)

The authors report no conflicts of interest.

DISCLOSURE BY AJIM EDITOR OF RECORD

Paul Landsbergis declares that he has no competing or conflicts of interest in the review and publication decision regarding this article.

DISCLAIMER

None.

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REFERENCES

1. Oregon Department of Fish and Wildlife. 2017. *Oregon's Ocean Commercial Fisheries*. Marine Resources Program. Available online at: https://www.dfw.state.or.us/MRP/docs/Backgrounder_Comm_Fishing.pdf. (accessed on May 16, 2018).
2. Oregon Department of Fish and Wildlife. 2017. *9th Annual Dungeness Crab Fishery Newsletter*. Marine Resources Program. Available online at: https://www.dfw.state.or.us/mrp/shellfish/commercial/crab/docs/2017CrabNewsletter_Final_web.pdf (accessed on May 16, 2018).
3. Hughes SE, Goodman SE. 2013. Update of fishery employment estimates for workers on U.S. commercial fishing vessels, West coast and Alaska (1994–2012), East coast (2000–2012) and Gulf of Mexico shrimp (2000–2012). Seattle, WA, National Resource Consultants.
4. Syron L, Case S, Kloczko D, Lucas D, Mason, K, Teske T. 2017. *Commercial Fishing Fatality Summary: West Coast Region (2010–2014)*. Department of Health and Human Services. Centers for Disease Control and Prevention. National Institute for Occupational Safety and Health. DHHS (NIOSH) Publication Number 2017–172.
5. Croteau G, Zoller E. 2011. Oregon Crab Fishing Safety Assessment, University of Washington.
6. Case S, Bovbjerg V, Lucas D, Syron L, Kincl L. Reported traumatic injuries among west coast dungeness crab fishermen, 2002–2014. *Int Marit Health*. 2015;66:207–210.
7. Tolley EE, Ulin PR, Mack N, Succop SM, Robinson ET. 2016. *Qualitative methods in public health: a field guide for applied research*. John Wiley & Sons.
8. ATLAS.ti version 7.1. (2013). Berlin, Germany: ATLAS.ti Scientific Software Development GmbH.
9. Conway FD. Sharing knowledge, power, and respect: keys in bringing communities together to improve science, practice, and relationships. *J High Educ Outreach Engagem*. 2007;11:133–143.

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