

Occupational Safety and Compliance in the Maine Commercial Fishing Industry: Status Report and Policy Recommendations



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Abstract

This report presents the results of the Maine Sea Grant funded study ‘Safety and Compliance in the Maine Commercial Fishing Industry’. During a two year period, data were collected on safety equipment and training, captain sociodemographic characteristics, and fishermen risk preferences from a representative sample of inshore fishermen along the coast of the state of Maine. This report explores trends in safety and regulatory compliance and links this information to sociodemographic and risk preferences of the sampled commercial fishing vessel captains. More than 40% of vessels were found to be non-compliant with applicable vessel-specific safety regulations, and that rate was higher among vessels subjected by federal law to more stringent and costly safety requirements. The vast majority of fishermen were not safety trained, and many were not familiar with the proper use and maintenance of life-saving equipment. Fishermen had a tendency to minimize the risks, and for this reason would be unlikely to participate in non-mandated safety training. It is clear that more stringent safety regulations will require a strong education and enforcement effort on the part of regulators to ensure that fishermen comply with the new stronger regulations that were passed at the federal level in October 2010.

Introduction

The dangers associated with commercial fishing are well documented, and fishermen consistently face one of the highest job-related mortality risks of all US occupations (NRC 1991; USCG 2008). Commercial fishing is a very physical occupation, and fishermen must be adequately trained and maintain good physical health to safely complete the tasks necessary to operate, maintain, and repair equipment and fishing gear. However, fishermen typically do not receive any formal job training and are not subject to industry or union training and safety protocols (McDonald and Kucera 2007). There are safety regulations in place to protect fishermen, but the applicable standards currently enforced vary based on vessel and crew size, fishing location and fishery, and federal versus state oversight, among other criteria. Safety regulations for the small-scale fishing fleet (<79ft) are limited primarily to basic lifesaving, communication, and portable firefighting equipment (Dyer 2000).

A US Coast Guard (USCG) analysis covering 1992-2007 found that 23% of the total deaths were due to falls overboard (USCG 2008). A subsequent CDC report attributed one-third of all fishing fatalities to falls overboard, and further noted that more than half of these fishermen were working alone at the time and none was wearing a personal flotation device (CDC 2010). In the vast majority of fatal fishing accidents where causes were identified, casualties could have been prevented with proper safety equipment and training (NRC 1991; USCG 1999, 2006, 2008). Falls overboard represent a particular problem in the Maine lobster fishery, as these workers commonly operate alone, and there are both high risks of entanglement in lobster gear and slick deck conditions (Dyer 2000; Backus et al. 2001).

According to the CDC report (2010), the Northeast fisheries accounted for one-quarter of the commercial fishing fatalities nationally, narrowly surpassed only by the Alaskan region with 26% (CDC 2010). The USCG report (2008) recorded three more fatalities in District 1 (Northeast), where 43 of the 197 fatalities occurred, than in District 17 (Alaska). Due to cold water conditions and the extreme wind and tidal forces along the rocky New England coastline, accident rates are highest in the small-scale fleet operating close to shore (Dyer 2000; Jin and Thunberg 2005).

To reduce the rate of injury and death in the fishing industry, it is essential to understand how fishermen perceive and mitigate the occupational hazards of fishing, whether or not these mitigation strategies are government-mandated. From a regulatory perspective, it is informative to explore compliance with existing federal and state safety regulations to better inform training and enforcement efforts, as well as to understand the potential economic impact on the fishing fleet of increasing safety requirements. This latter objective is especially relevant in the small-scale fishing fleet that is not currently subject to stringent safety standards, but where more stringent safety regulations are imminent as a result of the passage of the Maritime Safety Act of 2010.

Study Approach

A study was designed to solicit, directly from Maine fishermen, information on their safety equipment and practices. These data were matched with sociodemographic characteristics and attitudes towards risk in the Maine commercial fishing fleet. In cooperation with the Maine Marine Patrol, a questionnaire was administered to a randomly selected group of commercial fishing vessel captains operating within the vicinity of the Marine Patrol vessels on days the

surveys were conducted. Study participation was voluntary, although 100% of the captains whom we asked to participate in the study agreed to do so. To ensure the confidentiality of participating fishermen, individually identifiable information was not recorded, i.e., no name, license number, or vessel identification was collected. The study was limited to inshore fisheries and primarily consisted of vessels operating within three miles of the Maine coastline.

The questionnaire was designed to take approximately five to ten minutes to complete, and the safety equipment portion of the survey was adapted from the USCG's *Commercial Fishing Vessel Safety Examination Checklist*. The safety equipment questions were applied uniformly across all vessels sampled, and were not chosen based on their applicability, according to existing regulatory requirements, to the vessel being surveyed. The captain's responses were confirmed by the surveyor with a brief check of the visible safety equipment onboard. For example, the captains were asked to show the location of their survival suits, to test the horn, and to display the contents of their first aid kit. It should be noted that the questionnaire focused on the physical presence of the safety equipment onboard and excluded a detailed examination of equipment quality and functionality. Only observational evidence related to equipment quality was noted in narrative form on the questionnaires. It is very likely that some of the equipment noted as present on the vessel would have been cited as failing by the USCG during a more thorough safety examination.

In addition to the safety equipment information, data were collected on safety training, vessel characteristics, and captain sociodemographics. The questionnaire also solicited information on perceptions of risks associated with fishing and more generally with daily life. The following sections summarize the results of this safety study; a more detailed presentation of these analyses can be found in Davis 2011a and Davis 2011b.

Study Results

Description of Study Population

A total of 259 vessels were surveyed over a two-year period between October 2007 and August 2009. A map of the geographic locations of the fishermen surveyed is provided in Figure 1, and Table 1 provides a breakdown by fishery and season. The surveyed vessels were generally representative of the inshore fisheries in Maine, with some underrepresentation of the primary inshore fishery, lobster. Although lobster is by far the largest fishery in terms of dollar value, the study disproportionately focused on smaller fisheries operating in the northern half of the Maine coastline (known as Downeast) to obtain a more geographically diverse picture of the industry. Denominator data for the inshore fisheries was obtained from the Maine Department of Marine Resources and is current to 2008.

The typical commercial fishing vessel in this study was owner operated, 35 feet long, and nearly 20 years old. The typical crew consisted of two middle-aged Caucasian men out on a single day fishing trip. Nearly half of the captains reported engaging in multiple fisheries depending on the season and economic viability of the individual fisheries. This appeared to be an increasing trend as fishermen cope with declining fish stocks and increasing fisheries management regulations. Women were present on 12% of the vessels, with the majority of those women being related to the captain. One-third of the crews were biologically related in some way and most captains reported having been raised in a fishing family. Most fishermen were highly experienced, with nearly 30 years of fishing on average. Many reported fishing with family members as toddlers, and 75% had become fulltime fishermen by the age of 21. Nearly one-third reportedly pursued some postsecondary education, although that typically did not include graduation from college. Nearly half of the vessels sampled in this study were federally

documented, which is above the national average for the small-scale fleet [29% federally documented nationwide (Dyer 2000)].

Figure 1: Sampling Locations

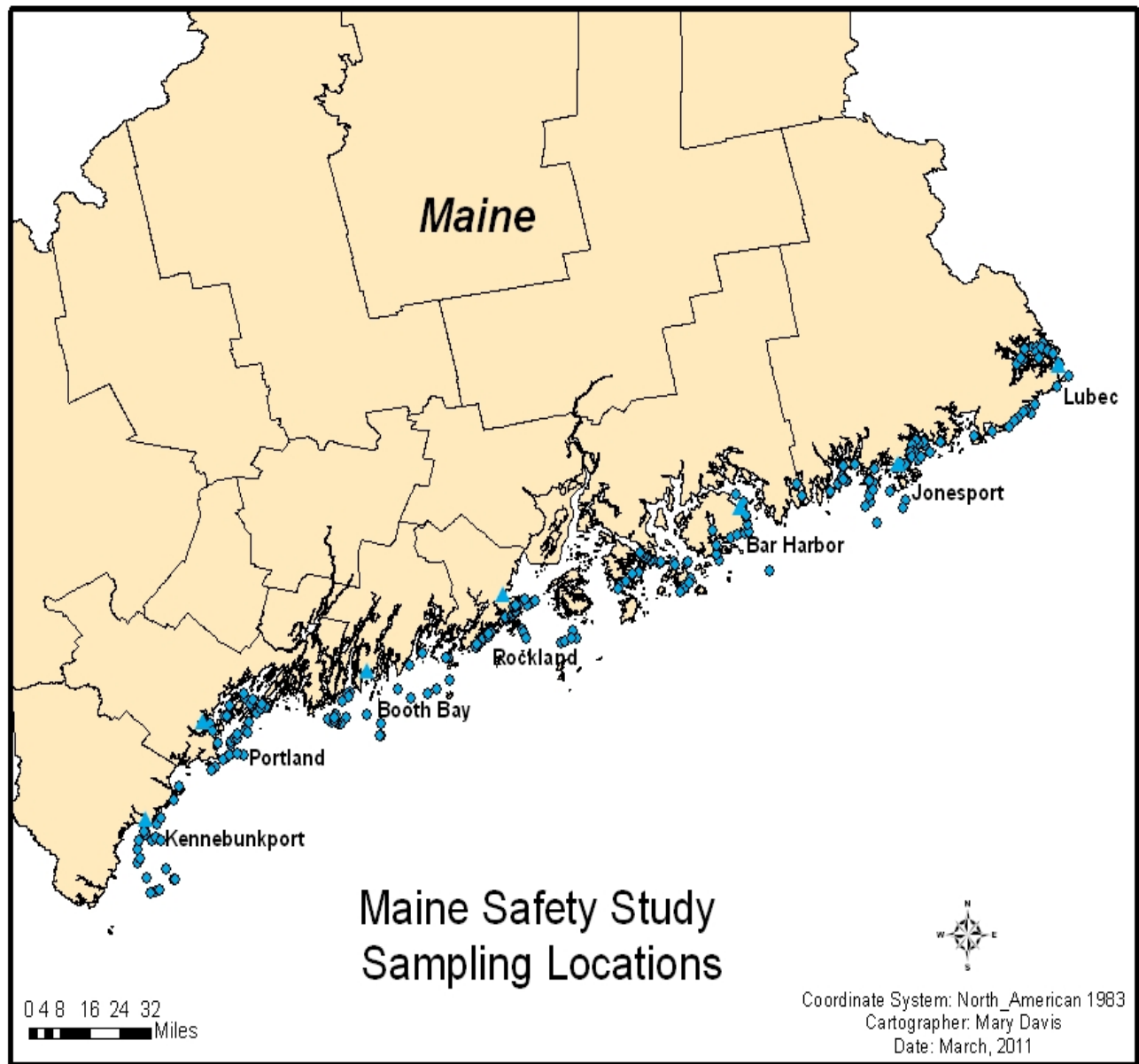


Table 1: Summary of Boarding Data by Fishery

Fishery	Number of Boardings	% of Total Boardings	% of Actual In-Shore Fishery
Lobster	206	79.5%	96.8%
Scallop	9	3.5%	0.4%
Shrimp	4	1.5%	1.0%
Urchin and Sea Cucumber	37	14.3%	1.8%
Other	3	1.2%	-
Total	259	100%	100%
Season			
Summer	96	37%	
Fall	73	28%	
Winter	20	8%	
Spring	70	27%	

Safety Training

In most cases, safety training is not required to obtain a commercial fishing license. It is therefore not surprising that fewer than 25% of the fishermen surveyed had recent safety training in First Aid or CPR, and most reported not having been exposed to these training courses since high school (see Table 2 below). The majority of fishermen had never participated in any organized marine safety training, which included training in the use of survival suits and life rafts, as well as cold water survival and the drill instructor course.

However, despite this general lack of safety training in the industry, we found a clustering pattern of safety education in coastal locations where the USCG had conducted organized training sessions in the local area free of charge. Also, a newly-instituted lobster

apprentice program that requires fishermen seeking lobster licenses for the first time to participate in safety training has made a large impact on the younger generation, with anecdotal evidence of spillover to other crewmembers who attended the training alongside the apprentice.

Table 2: Level of Captain Safety Training

Safety Training	Received training within the last 5 years	Received training more than 5 years ago	Never trained
First Aid	24%	42%	34%
CPR	24%	50%	26%
Drill Conductor Course	13%	9%	78%
Life Raft Training	17%	17%	66%
Survival Suit Training	19%	22%	59%
Cold Water Training	13%	11%	76%

Safety Equipment

The safety equipment results are provided below in Table 3, along with an estimate of the cost of acquisition and maintenance of each equipment item in 2007. As noted previously, the safety equipment survey was not limited to the items required by federal and state safety regulations, but instead represents a broad survey of the items currently maintained onboard Maine fishing vessels. Nearly all fishing vessels had basic safety equipment such as life preservers, radios, compass, ring buoys, flares, fire extinguishers, and bilge pumps. Over 85% also had a first aid kit, anchor, horn, functioning navigation lights, and GPS unit. The majority of these items are relatively inexpensive to acquire and maintain and represent a one-time cost to fishermen. Less common onboard were survival suits (75%), emergency beacons (54%), and survival craft (36%), equipment that is comparatively more expensive and requires maintenance. Nearly 25%

of the vessels surveyed had participated in the voluntary USCG safety inspection program, which provides fishermen with a free safety exam and sticker certifying regulatory compliance.

However, half of those safety stickers had expired.

Despite the existence of the safety equipment items noted in the questionnaire, conversations with the captains revealed that in many cases the captains were unfamiliar with the proper use of that equipment. Some also had a difficult time locating it. Although present onboard, the safety equipment would neither have been accessible nor useful during the emergency situations for which they were intended. There was also a problem with broken or expired safety equipment, such as leaky survival suits, malfunctioning flares and horns, and first aid kits with few useable items remaining in them. As noted earlier, a thorough USCG dockside examination would have identified these problems.

Regulatory Compliance

Regulatory compliance was determined based on the actual requirements of the individual fishing vessels observed, taking into account the fishing location at the time of boarding, documented versus state registered status, and other relevant vessel and crew characteristics. Analysis of the survey results shows that 42.4% of the sampled vessels were technically non-compliant with their vessel-specific safety regulations. Although there were no clear trends in compliance across the demographic categories or fisheries, non-compliance was higher among vessels subjected to more stringent (and costly) safety requirements. For fishermen observed operating outside of the 'Boundary Line,' (beyond which 1988 federal regulations require more survival equipment) the rate of non-compliance was worse (59%) compared to fishermen

operating inside the Boundary Line (36%). This suggests that cost plays an important role in the individual decision by captains to comply with existing safety regulations.

Table 3: Safety Equipment on Surveyed Vessels

Safety Equipment	Approximate Cost of Equipment (Routine Servicing Costs)	Percentage of Vessels with Equipment
Personal Flotation Device (PFD)	\$38-\$130	99%
Survival Craft ¹	\$3,060 (annual service cost \$650-\$950)	36%
EPIRB	\$650 (2-year service cost \$150; 5-year service cost \$200)	54%
Radio	\$52-\$400	99%
Compass	\$330	98%
First Aid Kit ²	\$78	89%
Survival Suit ³	\$318	75%
Anchor	\$438-\$773	94%
Ring Buoy	\$49	99%
Flares	\$50-300 (replaced every 3 years)	99%
Fire Extinguisher	\$190	99%
Horn	\$20-\$238	90%
Working Navigation Lights	\$180-\$412	90%
Bilge Pump	\$145-\$223	99%
GPS	\$270-\$3,000	96%
USCG Safety Decal ⁴	Free	24%
Vessel-specific non-compliance rate		42.4%

¹84% of survival craft were packed with the proper lifesaving equipment (typical cost \$53)

²Only 35% of first aid kits included appropriate manual

³97% of survival suits had the required reflective tape

⁴51% of the USCG decals were expired

Risk Attitudes

The Maine captains surveyed generally reported being risk-loving rather than risk-averse in their daily lives. Approximately 30% smoked tobacco compared to 22% of men more generally in Maine in 2008 (ME CDC 2010). Nearly half of all captains reported wearing seatbelts while driving a car, an average that is substantially lower than the national rate of 81% for US males (NHTSA 2009). Many fishermen reported second jobs in other well-known risky occupations, such as logging, trucking, and firefighting. A surprising 12% of fishermen reported being unable to swim and 17% of fishermen were observed fishing alone, both of which represent important occupational risk factors for fishing.

Overall, the surveyed captains rated the risk of fishing compared to other jobs at the mid-range of 5.5 on a 10 point scale despite consistent evidence of fishing as a high risk occupation. In reality, fishing mortality risks are 60 times higher than other occupations [200 deaths per 100,000 workers in fishing compared to 3.3 per 100,000 workers for all occupations (BLS 2010)]. Smokers and non-seatbelt wearers perceived fishing as less risky when compared to their non-smoking and seatbelt wearing counterparts. Also, fishermen who could not swim, were less educated, and came from a family history of fishing, also rated fishing risks lower than their counterparts rated them. Those captains with crew (not fishing alone) tended to rate the risks associated with fishing lower, as did the captains whose vessels were in compliance with existing safety regulations. The overwhelming majority (88%) thought that driving a car was more dangerous than fishing, although in reality fishing fatalities are much more common than automobile-related fatalities.

In response to an open-ended question that asked captains to describe their views towards fishing risks, there was an overwhelming tendency for them to perceive the fishing risks as

isolated to those fishermen who are not careful, while rating their own personal activities as low risk. Many reported that the occupational hazards did not apply to small vessels, or that the risk was isolated to certain off-shore fisheries. The fishermen consistently cited ‘common sense’ as the primary means for staying safe on the job. The use of common sense to avoid dangerous situations was generally viewed as paramount to safety training and equipment. There was a general failure to recognize the role that accidents, weather, and other elements outside of their control play in fishing risk. This is despite the fact that many fishermen reported having survived a life-threatening accident, or knew someone who had perished on the job. Anecdotally, many fishermen also blamed fisheries management regulations and catch limits for increasing the risks of fishing.

Experiencing and surviving accidents appeared to reinforce the tendency to minimize these risks, i.e., since it happened to them and they survived, there’s no need to worry about it. As one example, one captain reported that his father had been in two sinking accidents over the past 10 years, but then rated the risk as average. In a separate example, a captain was missing a finger from a fishing-related accident and reported that he would have likely died had there not been a second person on the vessel at the time of the accident, but when asked to rate his occupational risk he declared it was ‘not risky.’

Study Conclusions and Policy Recommendations

The results of this study suggest that there is much room for improvement in the current safety training and awareness programs targeting Maine fishermen. More than 40% of the surveyed vessels were not compliant with applicable safety regulations. This number would have likely been much higher had we conducted a full-scale USCG dockside safety exam. Non-compliance

was an even greater problem in those vessels observed operating outside the Boundary Line (59%) where federal safety requirements are both more stringent and the safety equipment required, more expensive.

Although most fishermen had the basic low cost safety equipment onboard, this was not the case with the more expensive life-saving equipment that would be necessary in an emergency situation such as a vessel capsizing or sinking. Also, there were many cases in which, despite having the necessary equipment onboard, the captains were not familiar with the proper use of that safety equipment, it was not readily accessible in the event of an emergency, and/or there were issues with equipment quality and functionality. These results suggest that additional safety equipment mandates will only be effective if they are accompanied by safety training and education efforts targeted at their proper use and maintenance. Equipment mandates will only be successful at limiting occupational accidents and fatalities if fishermen understand how to use and maintain the equipment.

In general, fishermen did not have the proper safety education that would be required in case of an emergency, such as marine safety training or basic First Aid and CPR. This is not surprising given the fact that safety training is not required to obtain a commercial fishing license for small-scale commercial operators. An important exception to this in Maine is the newly-instituted lobster apprentice program, which requires all lobstermen seeking a first license to complete marine safety training. However, the apprentice program does not currently apply to other fisheries or to previously licensed lobstermen. Despite this general lack of safety training in the industry, there was a pattern of strong safety education in coastal locations where the USCG had conducted free, organized training sessions. Based on the results of this study, safety education and awareness would be more effective if targeted at the local level, taking advantage

of the cultural and family ties that exists within these fishing communities. Localized and repeated training of all fishermen, not just those obtaining first licenses, would help ensure that vital safety skills are passed down to subsequent generations.

It is clear from the results presented here that fishermen underrate their true occupational risks. From a policy perspective, this suggests that widespread voluntary participation in organized training and safety awareness programs is unlikely since the majority of fishermen surveyed believed that fishing risks were not relevant to their own activities. For this reason, there is a strong need for safety training mandates similar to the lobster apprentice program that require safety training as a prerequisite to obtaining and renewing commercial fishing licenses.

Safety training and risk communication efforts should be designed with an understanding of the fishermen's attitudes towards risk. Based on the results of this study, the groups most in need of improved safety awareness and targeted training efforts, i.e., those more likely to underrate their occupational risk, include state registered vessels and captains of vessels that are not compliant with existing safety regulations, as well as less educated fishermen that come from a fishing family.

The Maritime Safety Act of 2010 was passed by Congress and subsequently signed into law by President Obama in October 2010. The new regulations strengthen safety requirements for equipment and training and provide funding for research and training efforts. The legislation replaces the Boundary Line as a delineator of safety requirements with the 3-mile line and eliminates the distinction between federally documented and state registered vessels. These two changes will result in parity across the fishing fleet with respect to safety training and equipment requirements. However, practically speaking, these changes mean that fishermen who are now subject only to minimal safety requirements will have to comply with the stricter and more costly

safety regulations. Given the already low compliance rate in this industry, it is clear that more stringent safety regulations will require a strong education and enforcement effort on the part of regulators to ensure that fishermen comply with the revised 2010 regulations. Subsidies for the initial purchase as well as long-time maintenance of more expensive equipment pieces may be necessary to maintain the economic vitality of the industry and ensure participation.

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