

The Development and Efficacy of Safety Training for Commercial Fishermen

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5 **ABSTRACT.** Commercial fishing is still the most dangerous occupation in the United States. Efforts to have more stringent safety regulations in this industry beginning in the 1960s, culminated in the Commercial Fishing Vessel Safety Act of 1988. The purpose of this paper is to provide a short history of the development of safety training in the United States and the current training infrastructure. This paper will also review studies available regarding the effectiveness of safety training in reducing fatalities among fishermen. The lack of familiarity and practice with marine survival equipment such as life rafts, immersion suits, and emergency-locating beacons has been noted in National Transportation Safety Board and US Coast Guard casualty reports as a contributing factor in fatalities. These reports have demonstrated the importance of not just having survival equipment onboard, but training in how to use it effectively in an emergency. There is evidence that safety training has made a measurable impact in surviving an emergency at sea and that recent training (within 5 years) is most effective in saving lives. More recently, studies have been completed to understand how skills may diminish over time since initial training.

KEYWORDS. AMSEA, commercial fishing, safety, training

INTRODUCTION

20 Commercial fishing is one of the world's oldest professions. It is also one of the most unique. In no other industry do the workers toil in such a tight space, amongst such complicated machinery and systems while working on a pitching and rolling deck, while exposed to the abuses of storms, waves, and freezing temperatures, and are unable to leave the worksite for days or weeks at a time.

30 Due to the inherent risks of such a “hunter and gatherer” occupation, the coldness of the water, the great distance from help and rescue, and many other factors, fishermen suffer from a high fatality rate when compared to other high-risk occupations. In 2008 the fatality rate for fishermen in the

United States was 128.9/100,000 full-time equivalents (FTEs).¹ However, despite the high present rate, the risks used to be much higher.

In 1971, the Coast Guard conducted a cost-benefit analysis of a fishing safety program. However, despite the fact that the report concluded that it would prevent 72% of fatalities, it also found that the industry could not sustain such a program without causing financial hardship.²

In 1977, the United States expanded its Exclusive Economic Zone (EEZ) out to 200 miles. This pushed foreign fishing vessels outside 200 miles when formerly they could commercially fish to within three miles of the US Coast. This “Americanization” of waters out to 200 miles resulted in overcapitalization and inexperienced crew and vessel owners rushing

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55 in to cash in on a resource that was now avail-
 able just to US fishermen. At the same time, the
 Coast Guard, which regulates US vessels, had
 no regulations on safety in commercial fishing
 that went beyond recreational boating regula-
 60 tions, and safety oversight was minimal.

During the early days of Americanization
 from 1981 to 1984, there was an average of
 25.8 fatalities a year in Alaska commercial fish-
 ing. This was a fatality rate of 320/100,000.
 65 This compares to a rate of 15/100,000 for all
 other industries in Alaska during the same
 period.³

HISTORY OF SAFETY TRAINING

70 By the early 1980s, the negative safety con-
 sequences of this “race to fish” was already in
 evidence, especially in the rich fishing grounds
 off Alaska. When the fishing vessels *Americus*
 and *Altair* were lost with 14 lives in Alaska in
 1983, the negative impacts were felt throughout
 75 the marine insurance industry.⁴ This resulted in
 insurance premium increases. It also became
 harder to get insurance for commercial fishing
 and other vessels.

80 In reaction to these and other losses in
 Alaska, individuals from several agencies such
 as the Coast Guard and Alaska Sea Grant/
 Marine Advisory Program (MAP) started trav-
 eling to rural fishing ports to teach marine
 safety in fishing ports in Alaska. However,
 85 there was no standardized curriculum and no
 network of instructors or other resources to sus-
 tain this effort. By 1985, individuals from other
 agencies joined in this effort and organized the
 Alaska Marine Safety Education Association
 90 (AMSEA). This was a grassroots effort started
 by individuals within agencies who saw a need
 to educate and train commercial fishermen.
 With scarce resources to do this work, collabora-
 tion was a necessity.

95 The founding agencies of AMSEA were the
 Coast Guard, Sea Grant/MAP, Emergency
 Medical Services, State Troopers, and others.
 The most immediate objectives of this group
 were to create a standardized hands-on perfor-
 100 mance skill-based training curriculum, conduct
 train-the-trainer courses so that fishing ports

would have locally based marine safety instruc-
 tors, and supply these instructors with marine
 safety equipment such as life rafts and immer-
 sion suits for training. 105

In 1986, the Coast Guard reacted to these
 losses by announcing a voluntary fishing vessel
 safety program.⁴ This program encouraged
 more safety equipment onboard vessels as well
 as training in the use and maintenance of this 110
 equipment. It was hoped that insurance under-
 writers would recognize the value of safety
 training by reducing insurance premiums, but
 this did not occur.

Some fishermen bought survival gear, even 115
 though it was not required. But with no formal
 safety training, fishermen did not always use
 this equipment to its best efficiency.⁵ Simple
 things such as learning how to turn on an emer-
 gency beacon or failure to properly size or 120
 maintain an immersion suit were often cited in
 casualty reports⁶ as the cause of fatalities.

By 1985, the National Ocean and Atmo-
 spheric Administration (NOAA) and others
 provided funds to start up regional safety train- 125
 ing programs for commercial fishermen. In
 Alaska, AMSEA was funded to train trainers in
 fishing ports. In the Northwest, funding
 allowed the Vessel Safety Training program to
 start within the North Pacific Fishing Vessel 130
 Owners Association (NPFVOA), and the
 Vessel Safety Manual was developed. In the
 Gulf of Mexico, Sea Grant within Texas A&M
 University started training and developed a
 vessel safety manual for their area. In the 135
 Northeast, the University of Rhode Island,
 McMillan Offshore Survival Training, and the
 New Jersey Marine Science Consortium also
 started safety training programs for fishermen.

These programs taught fishermen how to use 140
 survival equipment such as life rafts, immersion
 suits, emergency radios, and other equipment in
 case of an emergency at sea. The training
 emphasizes hands on experience with survival
 equipment in the water, fighting small fires, and 145
 conducting emergency drills on fishing vessels.
 Although most of the programs bring safety
 training directly to fishermen, AMSEA is the
 only organization that conducts train-the-trainer
 workshops so that far flung fishing communi- 150
 ties can have their own port-based instructors.

155 These early programs trained hundreds of
 people. However, because it was a voluntary
 program, it tended to draw fishermen who
 already had a "safety conscience" and may not
 have been at the highest risk. Nonetheless,
 anecdotal stories by survivors told of the value
 of the training they had received in helping save
 their lives. Some of the most successful training
 160 programs such as AMSEA and NPFVOA have
 survived to the time of this writing despite the
 ending of funding by NOAA many years ago.
 These programs have trained thousands of fish-
 ermen. Other Drill Conductor training efforts
 165 on the East Coast and Gulf of Mexico have also
 been successful.

Due to continued losses in commercial fish-
 ing, Congress passed the Commercial Fishing
 Industry Vessel Safety Act (CFIVSA), which
 170 was signed into law (46 CFR Part 28) in late
 1988.⁷ This Act gave authority to the USCG to
 develop basic lifesaving regulations for com-
 mercial fishing vessels. In addition it created
 the Commercial Fishing Industry Vessel Safety
 175 Advisory Committee (CFIVSAC).

From 1989 through 1991, the CFIVSAC
 gave recommendations to the Coast Guard to
 further develop and detail the regulations. The
 Act significantly raised the amount and types of
 180 survival equipment required to be on commer-
 cial fishing vessels. In addition, it led to limited
 training requirements. The Act stated that cer-
 tain fishing vessels would be required to have
 regulations for the installation, maintenance,
 185 and use of survival equipment. This wording
 provided the legal basis that allowed required
 safety training to be part of the final regulation.

On March 22, 1990, the Seattle-based fish
 trawler Aleutian Enterprise capsized and sank
 190 with the loss of nine lives. This loss encouraged
 the Coast Guard to use the authority given to it
 in the CFIVSA to require monthly emergency
 drills on fishing vessels. The emergency drills
 required the entire crew to practice using sur-
 195 vival equipment and emergency procedures in
 what to do in case of a man overboard, fire,
 flooding, or abandon ship situation. It also
 required the person leading the drills to take
 formal training to become an Emergency Drill
 200 Conductor. The Drill Conductor is the person
 who would be formally trained in leading

Emergency drills on a fishing vessel. The Coast
 Guard allowed 3 years, September 1991 to Sep-
 tember 1994, for thousands of Drill Conductors
 to be trained. 205

A national curriculum was needed to train
 Emergency Drill Conductors. The US Marine
 Safety Association (USMSA) drew heavily
 from the AMSEA Marine Safety Instructor-
 Trainer (MSIT) manual for the development of 210
 this curriculum. The MSIT manual is an
 instructor curriculum that had been developed
 under the previous voluntary safety training ini-
 tiative. Thus the training of thousands of fisher-
 men that had taken place under the voluntary 215
 training regime greatly aided in the develop-
 ment of training curriculum, materials and
 instructors for the required training regime.

CURRENT STATUS OF SAFETY TRAINING

220

Most of the safety training in commercial
 fishing today is supported by grants and con-
 tracts from the Coast Guard, National Institute
 for Occupational Safety and Health (NIOSH),
 course fees, and a number of other locally 225
 raised sources. There is no single source of
 funding to support all of the training that is
 required or desired.

The training requirement was not without
 difficulties in terms of enforcement. First, the 230
 Drill Conductor was not required to be a mem-
 ber of the crew or onboard the vessel. This
 made it difficult to enforce the training regula-
 tion during a random at sea Coast Guard
 enforcement boarding. It also did not give the 235
 crew the benefit during an emergency of having
 the person with the most emergency safety
 training, the Drill Conductor, onboard to more
 effectively deal with the problem.

Secondly, the Drill Conductor requirement 240
 was not equally enforced around the nation due
 to the unequal availability of safety training
 infrastructure. Alaska, the Pacific Northwest,
 the Gulf of Mexico, and to a lesser extent, the
 Northeast have Drill Conductor training work- 245
 shops available. Thousands of fishermen were
 trained before the deadline of September 1994.
 However, the Southeast and Southwestern parts

of the nation had no, or very little, training
 250 available. The Coast Guard was thus reluctant
 to enforce these parts of the regulation when
 training was unavailable in these regions.

As a result of the lack of trainers in parts of
 the nation, and the fact that AMSEA had the
 255 only Marine Safety Instructor-Training (MSIT)
 available, by the early 1990s, AMSEA was
 asked to deliver this training to other parts of
 the nation to help build training infrastructure.
 260 AMSEA brought MSIT workshops to many
 parts of the nation such as Maine, Virginia,
 New Jersey, Florida, Texas, Washington, and
 Oregon. As a result of these efforts, more Drill
 Conductor training is now available in the
 United States, although without additional
 265 funding, it is likely that underserved areas will
 continue to exist.

An important boost to the enforcement of
 training has been due to the National Marine
 Fisheries Service (NMFS) fishery observer
 270 training program. By the early 1990s, some
 fisheries were required to have these fish
 observers onboard to monitor catch and provide
 data to help manage fisheries. These Observers
 are not members of the crew, yet are at risk in
 275 case of an emergency at sea. NMFS requires
 vessels that carry Observers to have a Dockside
 Safety Exam sticker. This sticker is given to the
 vessel when qualified Coast Guard personnel
 examine a vessel and find it in compliance with
 280 the fishing vessel safety regulations. If the
 vessel is required to conduct monthly emer-
 gency drills, then the owner must verify they
 have a Drill Conductor to lead the monthly
 drill. This has caused many fishing vessel own-
 285 ers to take the training themselves, since they
 cannot fish without an Observer onboard. The
 incidence of fisheries that are required to have
 an Observer onboard is growing, and thus it can
 be expected that this will continue to be a lever
 290 for enforcement.

At this time, it is estimated that 25,000 Drill
 Conductors have been trained for what is esti-
 mated to be more than 30,000 fishing vessels
 that are required to have monthly drills and for
 295 another 80,000 vessel that may voluntarily wish
 to conduct emergency drills with qualified Drill
 Conductors.⁸ Most of these trained Drill Con-
 ductors are found in Alaska and the Pacific

Northwest. Many other fishermen have taken
 part in other types of safety training around the 300
 country, even though the training did not result
 in a Drill Conductor certificate.

SAFETY TRAINING EFFICACY RESEARCH DATA

Trainers and newspaper accounts provide 305
 anecdotal reports from survivors of how the
 skill-based training they received in a Drill
 Conductor course helped them survive an emer-
 gency at sea. AMSEA has a database of Drill
 Conductors it has trained. If these trainees have 310
 subsequently been involved with an emergency
 at sea, interviews are conducted with them. As
 a result, we can document that at least 50
 AMSEA trained Drill Conductors have stated
 that the training helped them survive their 315
 emergency. In addition, it should be noted that
 the knowledge and skills of a Drill Conductor
 would also not just help themselves, but that of
 their crew, which most frequently is composed
 of three to six other fishermen. Although the 320
 total number of such saves would be hard to
 estimate—and probably would be underesti-
 mated—it can be reasonably assumed that in
 the past 20 years, several hundred lives have
 been saved by this training on all coasts of the 325
 United States.

Another figure that is impossible to docu-
 ment is the number of emergencies that have
 been prevented as a result of what was learned
 in training. During Drill Conductor workshops, 330
 fishermen get experience using survival equip-
 ment such as cold water immersion suits, life
 rafts, and radio equipment. They also experi-
 ence conducting an emergency drill on a vessel
 and thus learn the procedures needed in an 335
 emergency. After the course, numerous fisher-
 men have been observed purchasing additional
 safety equipment and taking specific preventive
 measures as a result of what they learned during
 the training. 340

In an effort to better quantify the effective-
 ness of training, in 1995 a study was conducted
 to compare the survival rate of all AMSEA trained
 Drill Conductors and compare it to fishing fatali-
 ties in the previous four years. A four-box table 345

was developed using the number of deaths, number of survivors, and whether or not they were AMSEA trained. The Fisher exact two-tailed test was used to determine the probability that the difference in survivability was random. It was found that of the 114 deaths commercial fishing in Alaska from 1991 through 1994, none was an AMSEA trained Drill Conductor ($p = .034$). Of the 227 identified survivors, 10 were AMSEA trained Drill Conductors.⁹ This study was the first time a statistical approach had been taken to quantify the effectiveness of safety training in preventing fatalities.

Research in Alaska comparing victims of vessel losses to those who survived, also examined the effect of safety training. The study found that survivors were 1.5 (95% confidence interval CI 0.9, 2.4) times more likely to have had safety training from either AMSEA or NPFVOA.¹⁰

To study the need for refresher training, AMSEA has recently worked with the University of Washington, Pacific Northwest Agriculture Safety and Health (PNASH) center, to examine the retention rate of skills acquired in the Drill Conductor workshop. There is no refresher training required of Drill Conductors by the Coast Guard. Coupled with this is the fact that some Drill Conductors were trained almost 20 years ago. Further, there is evidence that only 29% of fishing vessel crews are being given the opportunity to practice emergency drills.¹¹

Phase I of an unpublished AMSEA/PNASH study demonstrated that there was a “significant difference” between the 100% baseline scores in those not previously Drill Conductor trained one month from baseline training ($85.9\% \pm 11.6$ [SD]) and 3 months from baseline (86.6 ± 10.1 [SD]). These both had p values of $<.001$. This demonstrates that there is a significant loss of skills in just one month. This skills loss, however, remains essentially unchanged out to 3 months.

In addition, there was a significant difference in previously trained fishermen who overall had a mean score of 70.5 compared to a baseline of 100. This demonstrates that fishermen had an

even greater loss of skills several years out from initial training. This fact, along with a question that asked about the frequency of monthly drills actually conducted (6.3% in the previously trained group and 6.5% in the trained group), implies that the lack of drills not being conducted on a regular basis contributes to the decay of skills.

The Phase II part of this study looked at the decay of skills out from 18 to 24 months of initial training. It was found that the skills retention scores dropped even further to a mean of 76%. Thus, there was another 10% to 11% drop in skills performance over time. It was also significant that less than 7% of this study group reported conducting emergency monthly drills as required. Thus, onboard “refresher” training that might be reinforced during monthly drills was not taking place as intended by the Coast Guard regulations.

CONCLUSION

Safety training has demonstrated its effectiveness in reducing fatalities. As of this writing in 2010, there is a Coast Guard proposed rulemaking in the process that would further positively affect safety training. The rulemaking, if it becomes law, would require that the Drill Conductor be a member of the crew. This would have two advantages. One, it would make the law more enforceable, since an at sea random boarding could easily determine if a certified Drill Conductor was onboard. Secondly, in case of an emergency at sea, the entire crew would benefit by having the person with the emergency response training onboard the vessel. The proposed rule would also require periodic refresher training for Drill Conductors.

Until safety training is more institutionalized by regulations and universally available, training in commercial fishing will be difficult to enforce and will suffer from poor skills retention. In addition, the protective nature of this training will remain unavailable in many parts of our nation’s coastline without the building of additional infrastructure.

REFERENCES

1. US Department of Labor, Bureau of Labor Statistics. Injuries, illnesses and fatalities: Census of Fatal Occupational Injuries (CFOI)—current and revised data. Washington, DC: US Department of Labor, Bureau of Labor Statistics; 2010. Available at: <http://www.bls.gov/iif/oshcfoi1.htm>.
2. Committee on Fishing Vessel Safety, Marine Board, Commission on Engineering and Technical Systems, National Research Council. *Fishing Vessel Safety: Blueprint for a National Program*. Washington, DC: National Academy Press; 1991:7–8.
3. Knapp G, Ronan N. *Fatality Rates in the Alaska Commercial Fishing Industry*. Anchorage, AK: University of Alaska, Institute of Social and Economic Research; 1991. Alaska Sea Grant College Program Publication No. AK-SG-90-03.
4. Committee on Fishing Vessel Safety, Marine Board, Commission on Engineering and Technical Systems, National Research Council. *Fishing Vessel Safety: Blueprint for a National Program*. Washington, DC: National Academy Press; 1991:136.
5. *Sinking of the U.S. Fishing Vessel Wayward Wind in the Gulf of Alaska Kodiak Island, Alaska, January 18, 1988*. Washington, DC: National Transportation Safety Board; 1989. National Transportation Safety Board 465 Report Number MAR-89-01.
6. *Uninspected Commercial Fishing Vessel Safety*. Washington, DC: National Transportation Safety Board; 1987. National Transportation Safety Board Report Number SS-87-02.
7. Commercial Fishing Industry Vessel Safety Act of 1988. Public Law 100-424, 100th Congress. 102 STAT 1585. September 9, 1988.
8. Committee on Fishing Vessel Safety, Marine Board, Commission on Engineering and Technical Systems, National Research Council. *Fishing Vessel Safety: Blueprint for a National Program*. Washington, DC: National Academy Press; 1991:20.
9. Perkins R. Evaluation of an Alaskan safety training program. *Public Health Rep.* 1995;10:701–702.
10. Lincoln J. *Fresh Seafood at a Price: Factors Associated with Surviving Fishing Vessel Sinkings in Alaska, 1992–2004* [unpublished doctoral dissertation]. Baltimore, MD: Johns Hopkins University; 2006.
11. Cullenberg P. Fisheries observers, researchers and guests: strategies for the safety of visitors onboard. In: *Proceedings of the International Fishing Industry Safety and Health Conference*; Oct 23–25, 2000; Woods Hole, MA: 379–388.