COMMERCIAL FISHING SAFETY: MAGNITUDE OF PROBLEM, RISK FACTORS, AND POTENTIAL SOLUTIONS

Jennifer M. Lincoln, MS
National Institute for Occupational Safety and Health
Alaska Field Station
Anchorage, Alaska, USA

Background

Commercial fishing is one of the most dangerous occupations in the United States. In 2002, commercial fishermen had the second highest traumatic injury fatality rate of all workers—71.1/100,000 workers, which is 16 times the national rate of 4.4/100,000 workers across all occupations (Bureau of Labor Statistics 2003). Only timber cutters had a higher fatality rate of 117.8/100,000 (Bureau of Labor Statistics 2003). Many fishermen work in isolated locations and harsh environments with high winds, cold water, icing conditions, and long work days. They suffer fatigue, physical stress, and financial pressures to push their vessels and crew to make their living (Lincoln and Conway 1997; Conway, Lincoln et al. 2002).

Since 1991, many activities have been implemented to monitor and improve the safety of this industry. The purpose of this paper is to discuss the magnitude of the safety problem and to discuss some particular interventions that could be exported to other parts of the country and to other fishing countries to improve safety. This paper will discuss the problems of vessel sinkings, deck injuries, and falls overboard, and potential interventions for each of these problems.

Vessel sinking

Most fatalities that occur in the commercial fishing industry in the United States are due to the loss of a vessel. From 1994-2000, 907 vessels sank in the United States, resulting in 218 fatalities (Dickey 2003), an average of 130 vessels and 31 lives lost each year.

Accurate workforce estimates are not available for the country to use to calculate trends. However, in Alaska, where such estimates have been made, it has been shown that there has been a significant decline in commercial fishing fatalities. This decline has occurred primarily in events related to vessel sinkings. From 1991-1999, an average of 34 vessels were lost each year in Alaskan waters with 106 people on board these vessels. The case-fatality rate has decreased from an average of 22% in 1991-1993 to 6% in 1997-1999 (Conway, Lincoln et al. 2002).

The US Coast Guard has developed several programs to prevent fatalities due to fishing vessel sinkings. The three that will be discussed include damage control trainers, stability trainers, and dockside enforcement activities.

Damage control trainers

The damage control trainer is used to simulate flooding situations on fishing vessels. Fishermen practice controlling flooding using plugs, rubber, and other miscellaneous items that would be found on a fishing vessel or in a damage control kit on the vessel. Being able to control these flooding situations could allow fishermen to save the vessel long enough to get to port or await aid. These damage control trainers have been used across the United States to train thousands of fishermen (Society of Naval Architects and Marine Engineers 2003).

Stability trainers

Stability trainers are used by the Coast Guard to educate fishermen on the effects of operational decisions on vessel stability. These vessel models are built to 1/16th scale of an existing fishing vessel. There are four cargo holds, a lazarette, and an engine room that can be filled with water, allowing the fisherman to observe adverse effects on vessel stability. The trainer can also be used to show how an increase in the center of gravity affects stability (Kvaerner Masa Marine 2003). These trainers enable the complicated dynamic of stability to be illustrated with a vessel model.

Dockside enforcement

Dockside enforcement strategies have been implemented for specific fleets in the Pacific Northwest. These efforts have been shown to be effective in improving the safety of specific fleets such as the Bering Sea crab fleet (Medlicott 2002) and the Oregon crab fleet (Lawrenson, Farrell et al. 2003). Fishing vessel examiners in Alaska, Washington, and Oregon have developed

targeted operations called "pulse operations." In Alaska, they have boarded Bering Sea crab vessels prior to the crab season opening to review the vessel's stability booklets and make sure they are not overloaded with too many crab pots (700-pound cages that are used to catch crab on the ocean floor). The examiners make sure boats are loaded properly for the predicted weather conditions and look at the safety gear, including the life raft, electronic position-indicating radio beacon (EPIRB), and immersion suits, to ensure there are enough for the crew and that everything is installed properly.

If the examiners find that the pots are loaded incorrectly or if there is a problem with the safety gear, then the vessel may not be allowed to get underway until the discrepancy is fixed (Medlicott 2003). Since implementation in 1998, only one fatality has occurred in this fishery, which was due to a fall overboard. The crab industry strongly supports this initiative (Medlicott 2002).

Washington and Oregon examiners conduct similar operations on the Dungeness crab fleet along their coast. These are smaller vessels that many times do not have stability letters, so in this operation, the examiners just look at safety equipment (see Lawrenson , Farrell, and Hardin, this proceedings). Safety gear suppliers have reported that fishing vessel owners and operators are reacting to this annual operation by getting gear ordered and checked earlier. The Coast Guard believes there has been a change in fishermen's behavior because of these inspections (Lawrenson 2003).

In addition to these Coast Guard projects, training programs are available where fishermen get appropriate emergency training on how to react to emergencies at sea. These courses cover several topics including MAYDAY calls, EPIRBs, immersion suits/personal flotation devices (PDFs), life rafts, flares, emergency drills, and firefighting. The North Pacific Fishing Vessel Owners Association, based in Seattle, Washington, has classes on safety equipment and survival procedures, emergency drill instruction, fire prevention, and vessel stability and damage control (North Pacific Fishing Vessel Owners Association 2003). The Alaska Marine Safety Education Association (AMSEA), with instructors around Alaska, also offers emergency drill instructor courses. A study evaluating the effectiveness of AMSEA's marine safety training showed that these courses were effective in preventing drownings among Alaskan commercial fishermen (Perkins 1995).

Deck injuries

Not all fatalities are due to vessel sinkings. The fishing vessel is often a congested work area with hydraulic machines and fishing gear. About 10% of the fatalities in this industry nationwide are due to these types of deck hazards (Dickey 2003). Nonfatal injuries are also primarily due to deck injuries. Surveillance for nonfatal injuries in the commercial fishing industry is problematic. Although there is a requirement that severe injuries (loss of work for 3 or more days) be reported to the Coast Guard, they do not investigate or necessarily keep track of nonfatal injuries among fishermen. In Alaska, however, the state's Department of Health and Social Services maintains the Alaska Trauma Registry. This registry contains information on all hospitalized injuries, including those that occurred in the commercial fishing industry. A paper by B. Husberg, J. Lincoln, and G. Conway in these proceedings gives a thorough description of these data.

Based on these findings, the Deck Safety Project was established to examine the relationship between the vessel, fishing equipment, and the fishermen. We have many partners on this project, including Jensen Maritime Consultants. Many interventions have been identified to reduce the risk of injury at sea. These are discussed more in E. Blumhagen's paper in these proceedings. The solutions highlighted include ways of controlling fishing gear, identifying hazards on deck, and visibility. The Deck Safety Project is continuing to study the causes of these deck injuries and appropriate strategies to prevent them.

Falls overboard

Falls overboard are caused by being washed overboard by waves, slips, trips and falls on deck, or being pulled over by fishing gear. From 1994-2000, 135 fishermen were killed due to falls overboard in the United States (Dickey 2003). Falls overboard accounted for 29% of all commercial fishing fatalities. To prepare this description of the falls overboard problem in the US commercial fishing fleet, I reviewed these 135 cases. Events were categorized by fishing gear, geographic location, number of crew on board, length of vessel, and fishery.

Fatalities due to falls overboard occurred most often along the Gulf Coast (49, 36%), followed by Alaska (24, 18%), and New England (23, 17%). The

highest number of falls overboard fatalities occurred using towed or dragged gear (55, 41%), followed by static gear (34, 25%). The most common fisheries involved were the shellfish fisheries: shrimp (42, 31%), crab (23, 17%), and lobster (17, 13%). In 36 of the fatalities (28%), the victims were fishing alone.

Several factors associated with preventing deaths from falls overboard have been identified. Strategies to prevent fatalities related to falls overboard include (1) avoiding becoming entangled in fishing gear by line lockers, bins, and fairleads, (2) interrupting the force of being pulled over by cutting the engine or cutting the line, (3) re-entry into the vessel after entering the water, and (4) use of personal flotation devices to aid persons in the water (Backus et al. 2002). Other interventions include shelter decks or seawalls to protect fishermen from weather, barriers between fishermen and gear to prevent entanglements, and practice with rescue gear for quick retrieval of victims in the water. Clearly, further investigation is needed of fatal events, as well as additional studies that help identify protective factors for fishermen who were successfully rescued from falls overboard.

The Seventeenth Coast Guard District in Alaska lists "wearing PFDs at all time while on deck" as one of their "Ready for Sea" checklist items that all fishermen should meet before going out to sea. "The practice of wearing PFDs while working on deck ... is a standard-of-care vessel crews should adopt" (p. 2002). A survey by the Coast Guard and NIOSH's Alaska Field Station showed that 88% of the skippers on crab boats require their crew to wear PFDs when climbing on the stack (stack of crab pots on the back of the deck), but only 13% of them require wearing PFDs while working the gear (Thomas, Lincoln et al. 2001). A review of all drowning incidents subsequent to commercial fishing vessel losses showed the effectiveness of PFDs and survival suits. The study found that survivors of events in which at least one person drowned were 8.3 times more likely to have been wearing a PFD or immersion suit than were those who died (95% CI 3.59-19.24) (Conway, Lincoln et al. 2002).

Summary

Several projects and ideas have been identified as ways to improve safety in the commercial fishing fleet. Interpreting surveillance data to help develop such programs is important. Collaborations have proven to be effective in developing ways to increase safety in the industry. Fishery-specific approach-

es such as the Dockside Enforcement Project and the Deck Safety Project can be applied to other areas. It is important to identify more programs, tools, and training programs to continue progress in making this industry safer.

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