Mr. Chairman and members of the Subcommittee, my name is Jennifer Lincoln, and I am an occupational safety specialist at the National Institute for Occupational Safety and Health (NIOSH), part of the Centers for Disease Control and Prevention (CDC) within the Department of Health and Human Services (HHS). NIOSH is the federal agency responsible for conducting research and making recommendations to identify and prevent work-related illness and injury. I work in NIOSH's Alaska Field Station, where I lead the "Applying Safety Research and Design to the Fishing Industry" research program. I am pleased to appear before you today to testify about NIOSH's efforts to improve the safety of commercial fishing vessels in Alaska and how improvements implemented there could benefit other fishing regions of the United States.

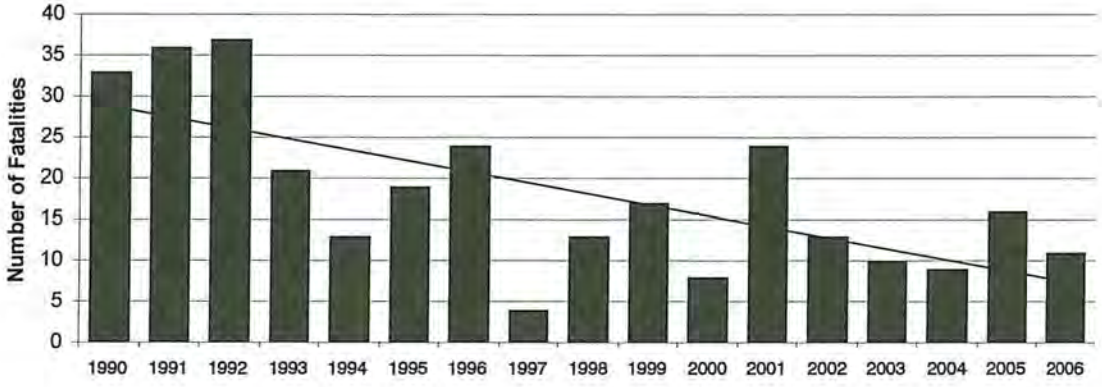
In the early 1990s, Alaska was identified as having the highest occupational fatality rate of any state: five times higher than the average for U.S. workers (34.8/100,000/year for 1980-1989 versus 7.0/100,000/year). In response, NIOSH initiated an injury and fatality prevention effort focused on high risk industries, which included the Alaska commercial fishing industry.

Since that time, safety among the Alaskan fishing fleet has improved (Figure I), with a decline in the number of fatalities and a 51% decline in rate of fatalities from 1990 to 2006. The declining rate indicates that the decrease in fatalities is not simply a function of fewer fishermen in the workforce. We believe that the decline in rate of fatalities is a result of improvements in safety made through NIOSH collaborations with the fishing industry and other stakeholders. The United States Coast Guard (USCG), the Alaska Marine Safety Education Association, the North Pacific Fishing Vessel Owners Association, and NIOSH have collaborated to:

1. track hazards and identify the most dangerous fisheries and situations;
2. understand the changing size of the commercial fishing workforce;
3. establish a solid training infrastructure for quality hands-on safety training;
4. more effectively implement and enforce current regulations;
5. develop unique and tailored interventions; and
6. evaluate progress.

We believe that we can build on past successes at reducing injuries and fatalities in Alaska's commercial fishing fleet and transfer these advances to other fishing regions of the United States.

FIGURE I. Commercial Fishing Fatalities by Year, Alaska, 1990 - 2006 (N=308)



Source: Alaska Occupational Injury Surveillance System. 2006 data provisional

Linear Trend
$X^2 = 17.4$
$p < .001$

NIOSH is encouraged by the progress that has been made in Alaska to improve commercial fishing safety, and we have recently expanded our program of prevention activities to assist in addressing hazards on a national level. I will discuss the work that NIOSH has accomplished in cooperation with our partners, which include commercial fishermen, and the opportunities for further progress in Alaska as well as in the rest of the United States.

I will concentrate on four areas of opportunity for improving fishing vessel safety in the United States:

1. developing tailored interventions to **prevent vessel loss**;
2. developing effective strategies to **prevent fatalities from falls overboard**;
3. developing effective strategies to **prevent severe injuries** resulting from being caught in or struck by deck machinery or fishing gear; and
4. establishing **marine safety training** and refresher training programs for all commercial fishermen.

Prevention of Vessel Loss

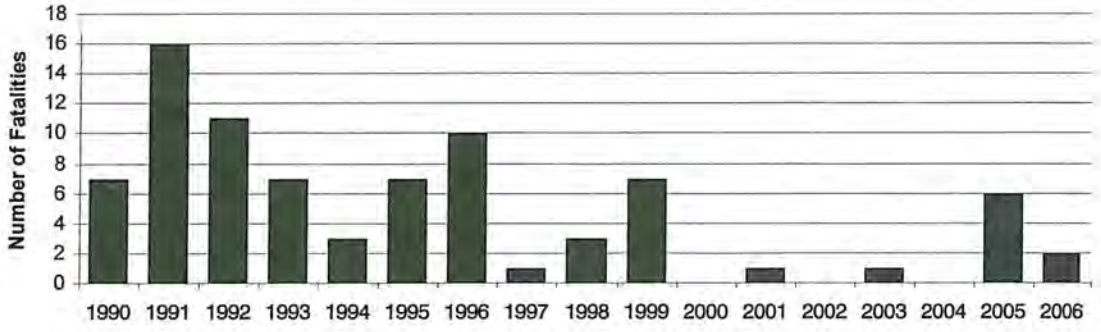
The leading cause of fatalities in the commercial fishing industry is drowning due to the loss of a fishing vessel. According to the 2006 USCG Office of Investigation and Analysis report, "Analysis of Fishing Vessel Casualties: A Review of Lost Fishing Vessels and Crew," from 1994 to 2004, 641 commercial fishermen died in the United States. Of these, 332 (54%) were due to the loss of a fishing vessel. In each of these years, an average of 127 vessels was lost.

NIOSH found that in Alaska, the number of vessels lost per year has stayed relatively constant, but the survival rate for those onboard increased from 73% in 1991 to 93% in 1998. These data suggest that the Commercial Fishing Industry Vessel Safety Act of 1988 has improved survivability and that further improvements in safety could be made through efforts to prevent vessel loss. NIOSH and other safety organizations have recommended that a focus be placed on the prevention of vessel loss, and in Alaska, the USCG responded by implementing the Dockside Enforcement Program in 1999. The program identifies and corrects safety and stability hazards known to exist on vessels

participating in the Bering Sea and Aleutian Island (BSAI) crab fisheries. These fisheries were selected based on NIOSH findings, which identified them as having the highest fatality rate of any fishery in the state.

NIOSH evaluated the effectiveness of the Dockside Enforcement Program to see if it resulted in a measurable decline in fatalities among BSAI crab fishermen. Prior to implementation of the program in 1999, there was an average of 7.2 fatalities per year in this fleet for each of the previous ten years. Since implementation of the program, there have been 10 fatalities in this fleet, an average of 1.4 per year (Figure II). Similar programs could be helpful for other hazardous fisheries across the country and could be expanded with more stability guidelines for certain vessels, such as those recommended in the 1997 NIOSH report, "Commercial Fishing Fatalities in Alaska – Risk Factors and Prevention Strategies." NIOSH is currently working with Jensen Maritime Consulting, Inc. to explore ways to make stability information more accessible and affordable to fishermen.

FIGURE II. Bering Sea/Aleutian Island Crab Fishing Fatalities, 1990 - 2006 (N=82)



Source: Alaska Occupational Injury Surveillance System. 2006 data provisional

In April 2001, during one of the worst fishing vessel disasters in U.S. history, a vessel lost 15 of its crew members when it sank while operating in the Bering Sea. After extensive investigation, the USCG determined that the vessel sank because a watertight door was left open. In response to this tragic incident, NIOSH is working to develop a hatch and door monitoring system for commercial fishing vessels that is inexpensive, easy to install, robust, and able to be retrofitted on existing vessels. We are in the process of installing such a system on a fishing vessel to evaluate it at sea. We expect to begin a year-long evaluation this summer.

Prevention of Fatalities from Falls Overboard

Falls overboard are a major cause of commercial fishing fatalities in the United States. Of the 641 deaths that occurred among fishermen in the United States from 1994 to 2004, 138 (30%) resulted from a fall overboard. In a NIOSH analysis of Alaska fishing fatalities from 1990 to 2005, the rate of fatal falls overboard did not decrease despite a significant decrease in the overall rate of commercial fishing fatalities.

To effectively prevent falls overboard, complete incident information is needed so that interventions can be tailored to specific operations. To better understand these events and to establish tailored prevention strategies, NIOSH identified the location of these fatal falls overboard, the type of fisheries and fishing gear most susceptible to falls overboard, and most importantly, the circumstances implicated in these incidents. With this approach, NIOSH observed that crab fishermen were most likely to be involved in a fatal fall overboard while working, but salmon gillnet fishermen experienced fatal falls overboard when they were alone on deck. Other researchers have shown that tailored strategies are also needed to prevent entanglements leading to falls overboard, such as

means to separate fishermen from lines (i.e., line bins/lockers) and means of freeing oneself from an entanglement (i.e., shut off switch, knives).

NIOSH has made additional recommendations to prevent drowning after a person falls overboard. In the 1994 report, "Preventing Drownings of Commercial Fishermen" as well as the 1997 report on commercial fishing fatalities, NIOSH recommended that all fishermen wear personal flotation devices (PFDs) when on the deck of any vessel. There are more types and styles of PFDs available now than ever before, with several styles to fit the needs of commercial fishermen, including several new slim, lightweight, inflatable PFDs that are worn like suspenders and PFDs that are integrated into raingear. NIOSH is planning a field study in Alaska with commercial fishermen to test the available PFDs to identify the PFDs with the features that fishermen like and will use. NIOSH has also recommended that man overboard alarms be thoroughly evaluated and widely deployed if such evaluations demonstrate that the devices are effective. Man overboard alarms are designed to alert crewmembers when a person falls overboard. Each crewmember wears a small transmitter that is activated when submerged in water. The receiver is installed in the pilot house. Man overboard alarms have recently become small, lightweight, and relatively inexpensive. NIOSH plans to test the wearability of these devices on commercial fishermen in conjunction with the previously mentioned PFD study.

Prevention of Severe Injuries

From 1994 to 2004, 51 (8%) of the 641 deaths in the U.S. fishing industry were attributed to injuries while working on deck, including 16 specifically coded as "caught in winch." NIOSH has shown that the most severe non-fatal injuries were caused by deck

machinery and fishing gear such as bait choppers and crab pots in Alaska. These types of injuries and fatalities can be gruesome. For example, the *Anchorage Daily News* reported on October 23, 2005, about an injury on a fish processor in which "a pregnant woman had both legs mangled so badly in a piece of equipment they had to be amputated." In another example, the NIOSH Fatality Assessment and Control Evaluation program in Alaska investigated a fatality in 1995 in which a skipper on a fishing vessel died after being pulled into a deck winch.

NIOSH reviewed data from the Alaska Trauma Registry to understand the nature of severe injuries sustained on commercial fishing vessels in Alaska. From 1991 to 2002, there were 798 fishermen hospitalized for severe injuries. This means that on average, a fisherman was hospitalized for an injury once every 10 days. Of these injuries, 23% were attributed to being entangled or struck by lines or gear, or being trapped in a winch, pulley, or other deck equipment. The most severe type of injury was amputation. Of the 41 amputations, 54% were attributed to machinery such as bait choppers.

These data show that further efforts are required to prevent injuries on deck, including the redesign of machinery or the retrofitting of safety features on existing fishing machinery and equipment. To meet this need, NIOSH started the Deck Safety Project to work with fishermen to identify practical improvements to deck safety such as better equipment design and safer work practices. These were collected in a "Deck Safety Handbook for Crab Fishermen." In addition, we are currently working with purse seine fishermen on the design of an emergency stop switch that will shut down the deck winch if someone becomes entangled. The fishermen are particularly interested in this intervention.

NIOSH continues to measure the magnitude of severe injuries and to identify emerging deck hazards with the intention of engineering safer designs.

Marine Safety Training

Knowing how to maintain and use survival equipment is vital to survival during an emergency at sea. NIOSH collaborates with two marine safety training organizations that focus primarily on training commercial fishermen—the Alaska Marine Safety Education Association (AMSEA) in Sitka, Alaska, and the North Pacific Fishing Vessel Owners Association (NPFVOA) in Seattle, Washington.

Supported by NIOSH funding, AMSEA has held over 1,000 classes training more than 15,000 fishermen since the early 1990s. NIOSH and AMSEA also have joined forces to organize fishing safety conferences and to address hazards such as those found in dive harvesting fisheries and deck machinery. In collaboration with NPFVOA, we have focused on deck safety and sponsored a training seminar on lock out/tag out procedures and applications in commercial fishing activities.

Research suggests that individuals involved in a disaster are more likely to respond appropriately to save their lives if they have had emergency training. Therefore, NIOSH evaluated whether training increases the likelihood of survival after vessel sinkings. In our analysis of Alaska fishing vessel sinkings from 1992 to 2004, the data showed that victims were 1.5 times less likely to have had safety training than survivors (95% Confidence Interval 0.9-2.4; p=.14). We also determined that victims were 7 times less likely to have worn an immersion suit than survivors and 15 times less likely to have

used a life raft. We are working closely with the USCG to gather more information on these cases so that we can update this analysis.

NIOSH has recommended that basic fishing safety training be completed before an Alaskan (state) crew license or a commercial fishing permit is issued. In addition to having the survival equipment, it is important to emphasize that the equipment must be maintained and everyone must know how to use it. Survival experts agree that initial training must be supplemented by periodic and relevant refresher training.

Summary

Substantial progress has been made in Alaska's most hazardous industry through the thoughtful application of the public health model. Surveillance, training, intervention, and evaluation of progress provide a useful blueprint for prevention of similar deaths elsewhere in the United States.

NIOSH plans to continue to support the safety of the commercial fishing industry by assisting with research and evaluation of interventions in the areas of preventing vessel losses, fatalities, and severe injuries. NIOSH will strive for strong surveillance and thorough data gathering so that we can better understand the issues, mitigate the worst problems, and identify emerging hazards. Our efforts are most effective through collaboration, and we look forward to continuing our partnerships with fishermen, industry, USCG, and marine safety organizations.

Commercial fishing continues to be one of the most dangerous occupations in our country; however, progress has been made in saving lives since the passage of the

Commercial Fishing Industry Vessel Safety Act of 1988. Fishermen and all stakeholders should be complimented for these efforts. NIOSH looks forward to continuing our work with stakeholders to improve safety for fishing vessel workers.

Thank you for the opportunity to testify today. It is an honor to share our research findings and recommendations with you. I am happy to respond to any questions that you might have.

Testimony
Committee on Transportation and Infrastructure
Subcommittee on Coast Guard and Maritime Transportation
United States House of Representatives

Commercial Fishing Vessel Safety

Statement of

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Centers for Disease Control and Prevention
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