# POSTER PRESENTATIONS

Photograph and caption by Earl Dotter

The fishermen make quick, deft cuts with razor-sharp gutting knives as they dress haddock. On average, each haul-back of the net yielded about 1500 pounds of fish. The catch must be gutted before it is loaded into the fish hold and packed in layers of crushed ice.

# THE INSURANCE SURVEY (C&V) AND ITS IMPACT ON THE SAFETY OF U.S. COMMERCIAL FISHING VESSELS

**Timothy R. McHugh**
**Looney & Grossman, LLP**
**Boston, Massachusetts, U.S.A.**

**Richard C. Hiscock**
**ERE Associates Ltd. &**
**Marine Safety Foundation, Inc.**
**Orleans, Massachusetts, U.S.A.**

---

*This Paper was accepted as a poster submission to IFISH*

Marine surveys are done for buyers, sellers, financial institutions, and insurance underwriters. The Condition & Value (C&V) or Insurance Survey – routinely carried out on Commercial Fishing Vessels for a variety of interests – is subject of this discussion.

Those who perform Condition & Value surveys variously described them as a "visual" examination of the vessel "to determine whether the vessel is an acceptable risk," and to "assist insurance underwriters in making underwriting decisions." There are two purposes of the survey: 1.) identifying the vessel, its equipment, condition and general value, and 2.) identifying defects, damages, or hazardous conditions that pose a potential threat to the safety of the vessel and its crew. C&Vs are not intended to certify that the vessel is built, or conforms to, any standard, nor is there any requirement that the machinery or equipment be tested for proper operation. One Coast Guard Board of Investigation stated, "the surveys (conducted on the subject vessel) were mostly inventories for insurance purposes."[1]

This paper will examine a number of issues regarding C&V surveys, in particular, the performance standard and the legal protections of the disclaimers that are attached to these surveys.

Finally we will explore whether there is a need for a fresh approach to the C&V as it applies to Commercial Fishing Vessels in the 21st Century in order to protect the many interests that rely on them.

## INTRODUCTION

*The Perfect Storm*, in both book and movie form, has rendered readers and viewers alike in awe of the ocean's power and aghast at its dangers. But, for most, that effect is vicarious. For those involved in the marine community the dangers are real. First and foremost, we know the fishermen who set out to sea to earn their living. Second, we know that the sea conditions faced by the crew of the *Andrea Gail*, while dangerous, were not as portrayed in the movie, and that fishing vessels are lost in sea conditions far less extreme. Third, we know that the risks of commercial fishing are manageable, and casualties are preventable, yet they continue at what should be an unacceptably high numbers.

This paper focuses on a document that is a key element of the business of commercial fishing, the Condition and Valuation Survey or "C&V." Insurers and lenders require a vessel owner to provide them with a C&V before issuing a policy of insurance or lending money and using the vessel as collateral, as the case may be. As for any business, the owner's or operator's skill, performance and experience provide the primary basis, apart from the C&V, upon which the business risks can be assessed. In the case of commercial fishing, safety risks take on a dimension far greater than those in any other industry; yet do not receive the necessary attention.

For the reasons we discuss in this paper, we conclude that the C&V survey process as currently conducted not only does not provide an adequate basis for assessing the risks of casualty attendant to a fishing venture, it raises the "comfort level" of those relying on it, particularly a vessel owner, to what should be an unacceptable level. We recommend steps that might be undertaken to remedy this situation.

## AN OVERVIEW

To say that the commercial fishing industry is beleaguered at present is to put the situation mildly. Fishing enterprises today are subject to catch restrictions, including days at sea limitations, fisheries available, closed areas, and gear restrictions. Fishermen have to push harder to stay even financially. The risk of casualty remains the highest of any industry. The tort system, which so often drives change in safety regulations, has not improved matters materially. As independent contractors, fishermen cannot form unions, and, therefore, lack

the organized presence that could be brought to bear on safety issues. Fishermen remain fiercely independent, willing to say, for example, in reference to a stability letter, "I know better how the vessel should be loaded . . . the more water in the hold, the better she rode – as long as you kept her on an even keel."[2]

Improvement in fishing vessel safety can be built on a substantial, existing fund of knowledge. Mountains of material have been published by government – primarily through the U.S. Coast Guard and NIOSH – academia, classification societies, and fishermen's organizations, on steps that can be taken to improve safety on commercial fishing vessels.[3] Potential sources of economic and political pressure to improve fishing vessel safety are not likely to take strong action. A lender's risk of loss due to casualty is ordinarily covered by insurance, thereby reducing its level of concern. Insurers continue to write coverage leading one to conclude that the fishing vessel insurance business remains profitable even in the face of continuing losses. Congress has declined to regulate beyond the Commercial Fishing Industry Vessel Safety Act of 1988 (P.L. 100-424) by arguing, in short, that additional regulation would be too expensive.

While it is fair to say that there has been a statistically significant decrease in casualties after the implementation of the Act, there are still far too many casualties. Is our society willing to say that the risks are acceptable as long fishermen are willing to take them? Or is there a mechanism to raise the standards for fishing vessel safety at a relatively low cost, without additional regulation?

## THE C&V SURVEY

Condition and valuation surveys have long been a component of the commercial fishing matrix. In concept, they are empirical examinations of a commercial fishing vessel conducted to establish its condition and appraise its value at of the time of the survey. C&V surveys are, for the most part, not conducted on a regular schedule. Instead, they are conducted when the vessel owner needs to renew a policy of insurance, or at the request of a lender for the purpose of supporting a new loan or continuing an existing loan facility. In addition, a prospective purchaser of a fishing vessel usually has a surveyor of his choice conduct a C&V on the vessel.

Marine Surveyors are not regulated. Some hold membership in organizations such as the National Association of Marine Surveyors (NAMS) or the Society of Accredited Marine Surveyors (SAMS), or are certified to conduct surveys on behalf of classification organizations such as the American Bureau of Shipping (ABS). Some surveyors are registered professional engineers. But, in the final analysis, there exists no uniform standard for the performance of or reporting on surveys of commercial fishing vessels. As a consequence, the reliability of a C&V survey as a tool for evaluating the risks a vessel presents to its owner, master, crew, and others having an interest is suspect.

There are two features of C&V surveys that are worthy of particular note. The first is that the surveyor generally characterizes him or herself as "independent." Taken in its ordinary sense, the use of the word "independent" suggests that the surveyor has no affiliation with any party to or beneficiary of the survey, and is conducting it without regard to any specific interest in the vessel. In addition, the surveyor almost without exception uses the words "without prejudice" often in combination with others, to conclude the survey report. When read with the word "independent," that phrase reinforces the proposition that the survey is intended to be as objective as its author can make it.

Second, C&V surveys more often than not include a disclaimer, the impact of which is often hard to divine. As an example, a surveyor used the following language after noting that no stability analysis was done:

"This survey sets forth the condition of the vessel including hull, equipment, machinery, fittings and gear to the best of the surveyors ability. This survey was performed without the removal or opening up to expose ordinarily concealed spaces, without taking borings, ultrasonic or audible soundings to determine thickness or soundness of structures or members; the use of moisture testing equipment to determine moisture content; testing for tightness, trying or testing machinery and/or equipment for proper function ad (sic) operation.

"This survey represents the honest and unbiased opinion of the surveyor, but, in submitting this survey, it is understood by all parties that such a survey is not to be considered a guarantee of its accuracy, nor does it create any liability on the part of the surveyor or its agents arising out of reliance on the information contained herein."

Such language presents two questions. The first is, "Why bother with getting a survey at all?" if the report itself disclaims its accuracy. The answer is that it establishes a paper record of some sort, but it is not valuable for anything else.

The second question is, "What if in fact, someone relies on the survey, takes the vessel to sea and suffers a casualty resulting from some reasonably discoverable condition that the surveyor did not report?"

Generally stated, while courts are reluctant to allow the shipowner to evade or pass off their historic primary duty to furnish a seaworthy vessel, a surveyor is charged with the duties of 1.) detecting all perceptible defects of the vessel during the survey; 2.) using due care in making recommendations; and 3.) notifying the owner thereof. In addition, disclaimers made by surveyors or classification societies in survey reports and documents exculpating them from liability are generally not enforceable.[4]

Accordingly, it is quite clear that C&V surveys of commercial fishing vessels do not provide the depth or quality of reports comparable to those in other industries where businesses retain independent evaluators to audit, evaluate, or troubleshoot the financial, operating, or administrative components of the business. As more fully shown below, they ordinarily do not contain sufficient analysis of factors that are material to the safe prosecution of a fishing voyage.

## TODAY'S REPORTS

In the ordinary case, a survey will contain a description of the vessel, describing in general terms the condition of the hull and machinery, list the electronics and safety equipment aboard, and, perhaps report on the skill and competence of the Captain.

The usual C&V survey focuses on the physical condition of the hull, plating, and framing. Recommendations regarding material that needs to be cropped and renewed are prevalent, as are evaluations of the quality of the coatings. In addition, if the vessel is hauled, the survey will report on the condition of stuffing boxes, rudderpost packing, through hull fittings, and other underwater appurtenances.

Machinery will be reviewed for age, general condition, cleanliness, fastening of flanges and couplings, and other tangible or perceptible conditions observed

without tearing down any of the equipment. But, there is no documentation that the machinery operates in accordance with manufacturers' specifications. A similar evaluation is done of fishing equipment, including winches, booms, and other equipment for handling fishing gear.

The survey will provide a listing of electronics for navigation and communications. But, again there usually is no determination made as to the proper operation of the equipment.

Importantly, the survey should (but may not) examine the emergency rescue equipment required by 46 CFR Part 28.[5] And, few surveyors make recommendations regarding compliance with the training and familiarization requirements in those regulations.

Further, in many cases a C&V survey will state that a vessel is "fit for its intended service" without ever having described what the intended service is.

It is fair to say, therefore, that the tangible qualities of the vessel are reviewed. However, both through testimony and anecdotal evidence, there are too many circumstances where either (a) a surveyor will prepare a punch list of work that needs to be done on the vessel and makes conclusions about the fitness of the vessel for sea based on the assumption that the work will be carried out; however, there is no follow-up survey,[6] or (b) a surveyor sees a vessel while it is in a shipyard, either hauled or in the water, undergoing repairs and anticipates the completion of the work in a good and satisfactory manner without reporting that the vessel is, in fact, a work in process.[7] In either case, the survey is not valuable for the purposes of assessing the condition of the vessel, or its fitness to go to sea, or as an insurable risk, because there would be no "independent" evaluation of the vessel as completed.

More importantly, the ordinary survey does not deal with issues of stability or structural integrity. In reviewing the laundry list of those matters that are reviewed by the surveyor, one can ascertain from the survey whether the vessel will operate, and if there is a casualty, whether there is equipment aboard designed both to alert others of the casualty and to enable the crew to withstand it, to some extent. The greatest risk to any fishing vessel at sea is water entering the hull thereby impairing its ability to float, and, because the usual marine survey does not address questions of stability or the adequacy of the scantlings of the

vessel, one can draw no safe conclusions about the seaworthiness of the vessel from such reports.

There is, therefore, no "seaworthiness" report taking into account all relevant factors, there is only a material condition report upon which very serious personal and business judgments are grounded.

Properly done, each vessel should be evaluated for intact, reserve, special conditions, icing, pumped catch, and other conditions that would impair its stability. The surveyor should conduct a comprehensive review to ascertain that there is sufficient compartmentalization, watertight openings are provided for all compartments, and the vessel itself has sufficient capacity to withstand any number of potential impairments of its stability or seaworthiness. The vessel should be provided with a stability book (instructions) that "provide the master or individual in charge of the vessel with loading constraints and operating restrictions which maintain the vessel in a condition which meets applicable (appropriate) stability requirements."[8]

## RECOMMENDATIONS

In considering all of the above it is our recommendation that a Condition & Value (C&V) Survey of a Commercial Fishing Industry Vessel should follow the American Bureau of Shipping (ABS) "Guide for Building and Classing Fishing Vessels" (May 1989), and applicable American Society for Testing and Materials (ASTM) standards: Volume 1.07 "Ships and Marine Technology", Volume 3.03 "Nondestructive Testing" and Volume 3.02 "Wear and Erosion: Metal Corrosion" and other applicable standards.

The survey should pay particular attention to structural integrity, stability, and watertight integrity, and should document the proper operation of all systems, including but not limited to - propulsion, electrical, hydraulic, steering, fuel, water, mechanical, bilge pumping, communications / navigation, alarms (bilge and fire), and fire extinguishing. And the survey should not be considered complete until the vessel is 'ready for sea,' even if that means a 'follow-up' survey to ensure that all recommendations have been completed and all systems are operating properly.

In addition, the survey should document that the vessel is in compliance with all Coast Guard regulations for Commercial Fishing Industry Vessels (46 CFR

Part 28) and other applicable Coast Guard regulations, including but not limited to Pollution Prevention and the Navigation Rules, and pay particular attention to documenting safety training, safety orientation and required drills.

There is no doubt that the cost of this approach will be passed on to the fisherman or vessel owner. But, relative to the risks, the cost is low, and absent governmental regulation, there is no other pressure point to effect change. Once the standard is set, the remedy may "only" be litigation – but it would take only a few cases holding surveyors liable to reshape the surveying process, and the need for improvements in fishing vessel safety would be well served.

## FOOTNOTES

1. Marine Casualty Report, Uninspected Fish Processing Vessel, Aleutian Enterprise, Flooding, Capsizing and Sinking in the Bering Sea on March 22, 1990 with nine persons missing and presumed dead. Report dated, November 6, 1991, page 134.

2. Fishing Vessel Task Force Report, at p. 4-5 (1999).

3. For example: U.S. Coast Guard nvic 5-86, 46 CFR Part 28; North Pacific Fishing Vessel Owners Association Vessel Safety Manual; National Cargo Bureau Stability for Fishermen; niosh, Commercial Fishing Fatalities in Alaska, Current Intelligence Bulletin 58, September 1997.

4. See generally, Miller, Liability of Classification Societies from the Perspective of United States Law, 22 Tul. Mar. L.J. 75 (1997); Beck, Liability of Marine Surveyors for Loss of Surveyed Vessel: When Someone Other than the Captain Goes Down with the Ship, 64 Notre Dame L. Rev. 261 (1982); C. M. Davis, Maritime Law Deskbook, 316-319 (2000 Supp.).

5. Requirements for Commercial Fishing Industry Vessels.

6. Marine Casualty Report, Investigation into the Circumstances Surrounding the loss of the Commercial Fishing Vessel Adriatic, O.N. 579941, Eight NM East of Barnegat Light, New Jersey on January 18, 1999 with the Loss of Four Lives. Report dated August 4, 2000, page 31.

7. U.S. Coast Guard, Investigation into the Sinking of the F/V Two Friends on January 25, 2000, Transcript, Day Two, February 2, 2000, Pages 361-362.

8. 46 CFR Part 28 Subpart E – Stability.

# COMPARISON OF SAFETY DISCREPANCIES FOUND DURING SAFETY EXAMS ON FISHING VESSELS TO CASUALTY INFORMATION ON FISHING VESSELS IN THE WATERS OF SOUTHEAST ALASKA

**Larry Snyder**
**Commercial Fishing Vessel Safety Coordinator U.S.C.G. Marine Safety Office**
**Juneau, Alaska , U.S.A.**

**Tim Clepper**
**Commercial Fishing Vessel Safety Coordinator U.S.C.G. Marine Safety Detachment**
**Ketchikan, Alaska, U.S.A.**

*The United States Coast Guard conducts a voluntary safety program with the commercial fishing fleet in S.E. Alaska waters. This is an extension of a national program being conducted in all United States ports. Mr. Tim Clepper and Mr. Larry Snyder are civilian employees who are assigned to Marine Safety Office Juneau Alaska. Mr. Snyder and Mr. Clepper are unit coordinators for this program in S.E. Alaska. In Southeast Alaska approximately 400 commercial fishing vessels participate annually and request a "Courtesy Dockside Exam".*

---

*This Paper was accepted as a poster submission to IFISH.*

This paper will describe the most common deficiencies found during dockside safety exams in Southeast Alaska during 1999-2000. The deficiency data covers a two-year period, as decals are valid for a two year period.

## CASUALTY DATA

An analysis of 28 commercial fishing vessel casualties that occurred in Southeast Alaska during the past two years was made. Causative factors documented in formal marine investigation reports are utilized in our findings.

1. Striking submerged objects and charted rocks or grounding contributed in 36 percent of these casualties.

2. Fatigue and inattention contributed in 35 percent of these casualties.

3. Down-flooding from unknown sources contributed in 28 percent of these casualties.

4. Fire on board occurred in 17 percent of these casualties

5. Rapid capsize/stability issues contributed in 11 percent of these casualties.

6. Weather was a major factor in 10 percent of these casualties.

7. Improper mounting of safety equipment was a factor in 7 percent of these casualties.

8. Lack of required VHF/radio equipment occurred in 3 percent of these casualties

More than one factor may have contributed in these various casualties.

Factors that contributed to crew survival are also examined in the casualty analysis. Listed below are specific reasons why crewmen managed to survive these marine casualties at sea.

## CREW SURVIVAL FACTORS

1. Adequate VHF radio equipment on board contributed to crew survival in 70 percent of the marine casualties.

2. Rescue efforts by other vessels including Coast Guard search and rescue forces contributed to crew survival in 64 percent of the casualties.

3. Crew training and immediate response, including first aid was a survival factor in 42 percent of the casualties.

4. Immersion suits on board were a survival factor in 25 percent of these marine casualties.

5. Having adequate survival craft on board was a survival factor in 28 percent of the casualties.

6. Having a 406Mhz EPIRB that functioned properly was a survival factor in 14 percent of the casualties.

## COMPARISON OF SAFETY DEFICIENCIES TO CASUALTY DATA AND CREW SURVIVAL FACTORS

Immersion suits were the most common repetitive deficiency in comparisons from 28 commercial fishing vessel casualty investigations. Immersion suits were also a significant factor in crew survival in 25 percent of the reported casualties. This finding helps emphasize the importance of immersion suits in saving lives. It also indicates a need to continue focusing on immersion suit carriage requirements, including their use, care and the proper storage of survival suits. We focus on immersion suits in our examination already. We will now seek additional ways of communicating the importance of immersion suits to commercial fishermen. A policy of 100 percent inspection of immersion suits aboard will be maintained on all dockside exams conducted.

Our findings indicate that various discrepancies were found regarding the 406 Mhz EPIRBs, and were the second most common repetitive deficiency during dockside safety exams. The data shows that functioning 406 Mhz EPIRBs contributed to crew survival in 14 percent of the reported casualties. During our dockside exam efforts we will continue to stress proper 406 Mhz EPIRB mounting, maintenance, and proper registration with NOAA SARSAT center. We will also continue to assure testing of each EPIRB found during courtesy dockside exams. This testing is strictly an internal diagnostic following EPIRB vendor guidelines. We have begun offering more sophisticated EPIRB testing using test equipment that allows us to verify signal strength, and verify hexadecimal codes which are unique for each separate 406 Mhz EPIRB.

Visual distress signals were the third most common repetitive deficiency found during our courtesy dockside safety exams. Usually expired distress signals were the most common finding. Even though distress signals have not been documented to have contributed as survival factors in our documented casualties, distress signals have enormous potential to attract attention to a marine casualty. We will continue our efforts of assuring required distress signals are aboard fishing vessels we examine. A common complaint from fishermen has been

short shelf life of distress signals commonly used. Industry should be encouraged to develop distress signals with longer shelf lives.

The lack of required navigation information was the fourth most common repetitive deficiency. Findings indicate 36 percent of the fishing vessel casualties involved fishing vessels striking submerged objects (primarily charted rocks). Current Coast Guard regulations mandate only U.S. documented fishing vessels on offshore routes be required to have on board the following:

1. Complement of charts for region being fished or being transited;

2. United States Coast Pilot;

3. Coast Guard Light List;

4. Tidal tables; and

5. Tidal current tables.

These publications are essential navigation tools for all commercial fishermen regardless of route. The Coast Guard may wish to consider these navigation tools on all fishing vessels (U.S. documented and state registered). In the interim we will continue to encourage all commercial fishermen to adhere to voluntary compliance of having these navigation aides aboard on all routes. Our goal is to see a reduction in casualties involving fishing vessels hitting charted rocks or going aground due to a lack of knowledge of their positions.

Our fifth most common repetitive deficiency has been with survival craft being in compliance for various reasons. We're finding 10 percent of the canister rafts we examine during courtesy dockside exams are installed incorrectly in some manner. It has been determined that functioning survival craft has contributed to crew survival in seven percent of the documented fishing vessel casualties. We will look for additional ways of emphasizing the importance of survival craft and their proper maintenance to commercial fishermen.

It has also become evident how important VHF radios have been for commercial fishermen who have faced various emergencies at sea in summoning aide. Of the commercial fishing vessel casualties examined, 70 percent reflected VHF radio's contributing to crew survival. Fortunately a lack of VHF radio equipment has been documented in only three percent of the casualties. Our

U.S. commercial fishing vessel regulations mandate that only U.S. Documented commercial fishing vessels on offshore routes be required to have VHF radios aboard. Our findings indicate a need for this equipment to be on all fishing vessels regardless of route. Over 50 percent of the commercial fishing fleet are excluded from mandatory VHF radio carriage requirements. The Coast Guard should explore avenues to close this regulatory loophole. A consideration for all commercial fishing vessel examiners in the future will be to not only encourage carriage of VHF radios on all commercial fishing vessels, but to assure this equipment is fully operable as well.

As mentioned in this report, crew training played a great part in overall crew survival. The *U.S. Code of Federal Regulations* mandates fishing vessels with a crew of sixteen or more, or fishing vessels that fishes beyond the boundary line must conduct monthly drills. While most fishing vessels in Southeast Alaska mainly fish inside the boundary waters, they are exempt from meeting this regulation. Our research indicates informal training and or casualty pre-planning has saved crewmen's lives in nearly every case. At the time of this writing effort is being made to make monthly drills mandatory for *all* fishing vessels regardless of the size and or the number of persons aboard. Under the auspices of the Fishing Vessel Safety program, a training suite has been deployed for the Coast Guard in Southeast Alaska. The training suite consists of four distinct, but interrelated, training devices [Paitl 1999].

**Interactive Intact Stability Trainer** – Was designed as a device by which to offer commercial fisherman a practical demonstration of a vessel's response to various vessel loading and operating conditions. This trainer facilitates the simple articulation of very complex stability phenomena that are difficult to relay in a lecture-type setting. This trainer is a free floating, scaled fishing vessel (stern trawler) model that replicates the actual operating conditions often experienced at sea, yet while in a nonthreatening, learning environment. The trainer is used to simulate the following commonly experienced on board commercial fishing vessels:

Sloshing liquid in wide slack tanks or holds;

Sloshing liquid in narrow slack tanks or holds;

Loading catch or supplies on, above, and below the main deck; and

Icing conditions.

The Interactive Intact Stability Trainer will improve the performance (decision making process) of mariners who are faced with a variety of hazardous vessel operating and loading conditions. The practical demonstration simplified by this trainer allows fishermen the opportunity to identify similarities between training scenarios and their own vessel operations. The demonstration also encourages fishermen to take the necessary steps to avoid or minimize the duration of these operating conditions in the future.

**Small Vessel Damage Stability Trainer** – Is designed to address concerns that were identified during the investigation of a number of commercial fishing causalities in Northern New England during 1993 and 1994 [Ciampa, 1996]. The combination of poor weather, breached watertight integrity, and compromised transverse bulkheads created down flooding and progressive flooding conditions that resulted in vessel losses, while vessels were in port as well as underway. The small vessel Damage Stability Trainer consists of three models that are constructed of steel or aluminum and fitted with Plexiglas decks. Identical in external dimensions, the three models vary internally as follows:

One is of an open hull construction;

One is subdivided by internal watertight transverse bulkheads; and

One is fitted with compromised transverse watertight bulkheads

Each model is outfitted with identical flooding scenarios. The model may be flooded through the engine compartment or the lazarette space, and may be used to effectively demonstrate the significance of hull subdivision on the damage stability performance of a vessel. The Small Vessel Damage Stability Trainer models are intended to improve a fisherman's awareness of implications of modifying (i.e. drilling or cutting holes) a vessel's watertight bulkheads. Through the use of these models, fishermen are able to readily visualize hazardous effects that are able to often associate with the improper installation of equipment or machinery. The practical demonstration facilitated by Small Vessel Damage Control Trainer models give fishermen an opportunity to identify similarities between the models and their own vessel's internal construction arrangements. More importantly, the practical demonstration prepares and encourages fishermen to make "real-life" corrections to the construction arrangements of their vessels to avoid potential down flooding and progressive flooding events.

**Small Vessel Damage Control Trainer** – This is a multifaceted trainer that is useful for reaching a variety of audiences. This trainer is designed to prepare mariners for a whole host of possible flooding and sinking events. Like the Small Vessel Damage Stability Trainer, this trainer was developed as a result of a study of marine casualties involving commercial fishing vessels in Northern New England waters in 1993 and 1994. During that time period, one third of all Northern New England fishing vessel casualties involved watertight integrity (sinking or flooding) issues. These fishing vessel casualties which ranged from simple "flooding on mooring" to open ocean sinking, all seemed to have a common thread-the crew's limited ability to control flooding [Ciampa, 1996].

The Small Vessel Damage Control Trainer is a towable, appropriately scaled (size and application) version of the U. S. Navy's damage control simulator used to simulate damage conditions aboard much larger military vessels. The trainer is designed to improve the performance of mariners faced with flooding situations. It helps facilitate basic damage control procedural training and serves to increase industry awareness of the *source and effect* of typical flooding risks.

**Best Practices Guide to Vessel Stability** – The *Best Practices Guide to Vessel Stability* [U. S. Coast Guard, 1998] is a thirty-page booklet, jointly developed by the United States Coast Guard and the Commercial Fishing Industry Vessel Safety Advisory Committee (CFIVAC). The booklet was modeled after two similar Canadian publications, *Small Fishing Vessel Safety Manual* and *An Introduction to Fishing Vessel Stability* [Canadian Coast Guard, 1993, Transport Canada, 1993]. This guide capitalizes on the success and popularity realized by the two Canadian booklets in addressing vessel safety and stability.

The *Best Practices Guide to Vessel Stability* provides an introduction to vessel stability along with sound recommendations to help fishermen avoid unsafe operations often encouraged during routine fishing operations. The theme of this guide is "Survive to Fish Another Day," and consequently, the guidance contained in the booklet is preventative in nature. The guide addresses the following areas of interest:

Watertight integrity;

Vessel subdivision;

Vessel loading;

Intact stability;

Damage control;

Vessel cleanliness;

Crew training; and

Prudent seamanship.

The *Best Practices Guide to Vessel Stability* illustrates, through the use of words and graphics, the same concepts that can be demonstrated through the use of the Commercial Fishing Vessel Training Suite. The guide is certainly not intended to be a complete course of study. However, in order to be adequately prepared to brave the dangers of the sea, fishermen should be familiar with the basic concepts contained in the guide, and should completely understand the potential safety implications of the various operating conditions described in the guide. Following the simple guidance contained within this guide will prevent most flooding, sinking and capsizing

## REFERENCES

Canadian Coast Guard [1993]. Small Fishing Vessel Safety Manual. Canada: Minister of Supply and Services.

Ciampa J [1996]. Damage Stability Demonstration Models. Portland, Maine:U.S.Coast Guard Marine Safety Office.

Paitl G Jr. [1999]. Commercial Fishing Vessel Safety. Washington, D.C.:U. S. Coast Guard.

# NEW ENGLAND FISHERMEN AND SAFETY AT SEA: A CASE STUDY

**Ilene M. Kaplan**
**Union College and Woods Hole Oceanographic Institution**
**Boston, Massachusetts, U.S.A.**

**Hauke L. Kite-Powell**
**Woods Hole Oceanographic Institution**
**Massachusetts, U.S.A.**

---

*This Paper was accepted as a poster submission to IFISH.*

The commercial fishing industry in the United States is one of the most highly ranked on all listings of occupational dangers and, according to the United States Coast Guard, is among the highest for fatality rates.[1] Although both the federal government and the commercial fishing industry have acknowledged the high level of danger, legislation for fishing vessel safety has been fraught with controversy. It was not until 1988 that the first safety legislation, specifically targeting commercial fishing vessels, was enacted through the Commercial Fishing Industry Vessel Safety Act.[2] In 1991 the U.S. Coast Guard published the Commercial Fishing Industry Regulations [3] and expanded on their coverage in 1999 with the Fishing Vessel Casualty Task Force Report.[1]

Research findings strongly assert that fishermen's attitudes about their work, particularly with regard to risk, may sharply contrast those of the government.[4,5,6] Unfortunately, there is limited emphasis placed on co-management and the safety process compared with other aspects of safety regulations and fisheries management. This is of particular concern since compliance and effectiveness of the regulatory process is diminished when user groups are not involved in the policy decision-making process.[7,8,9,10,11]

The Fisheries Management Council system, specifically designed under the United States Magnuson-Stevens Fishery Conservation and Management Act, was created with the intention of providing a mechanism for input from members of the commercial fishing industry. The council system, however, has met with mixed responses from the industry, with

criticisms regarding representation and the adequacy of fishermen's input not infrequent comments.[12,13]

Fishermen's perceptions about their work roles is an important area of research since it provides information regarding policy adequacy, effectiveness, and compliance—all essential components for the assessment of safety at sea and the regulations that attempt to promote increased safety.

The purpose of this work is to examine the attitudes of fishermen regarding safety at sea and fishermen's participation in the safety regulatory and fisheries management process; the perceived role of the New England Fisheries Management Council with regard to safety issues is also discussed, and the importance of the relationship between the fishing community and the U.S. Coast Guard is noted.

Twenty two experienced boatowners, captains, and crew in the scallop fishery of New Bedford were interviewed about their attitudes regarding safety at sea and the safety regulatory and fisheries management process.

New Bedford was selected because it is one of the major commercial fishing ports in the United States and the scallop fishery, a significant part of New Bedford commercial revenues, represents a manageable case study of a regulated fishery with important safety concerns. Twenty-one males and one female boatowner participated in the study. All have a minimum of ten years experience in the fishing industry. All are white and their ages range from 29 to 64 years old. Slightly more than half of the respondents worked on boats that experienced a serious accident. One respondent personally sustained a serious injury.

## RISK PERCEPTION:

Two-thirds of the respondents feel comfortable with the level of risk they face. Two respondents expressed serious concern about the level of risk.

## FISHERIES MANAGEMENT

Two-thirds of the respondents regard fisheries management as important in affecting safety. Most commonly cited safety problems with fisheries management include:

1. Reduced crew size regulations result in overworked and tired crew and prevent new or inexperienced crew from being trained.

2. Limited or short term fishing periods pressure fishermen to go to sea or stay at sea in bad weather or when there may be problems with the boat.

3. Transiting around closed/protected areas causes additional exposure in certain weather conditions.

4. Limiting areas for fishing can cause congestion.

## NEW ENGLAND FISHERIES MANAGEMENT COUNCIL

Respondents had trouble distinguishing the practices of the New England Fisheries Management Council from those of the National Marine Fisheries Service. Furthermore, the majority felt that the Council did not adequately take safety into consideration during the management process.

Participants in the study had interesting suggestions for improving the management process. They suggested that fishermen be included in the early stages of the regulatory development process and that communication between the government and members of the fishing community needed to be increased. They also felt that fishermen needed to have more flexibility while boats were at sea during bad weather. In addition, they suggested a revision of crew size limits to help reduce fatigue and to allow for training of new crewmen.

The results of this study, although preliminary, suggest that regulations that are designed to reduce pressure on fish stocks may result in greater risk to fishermen and reduced safety at sea. Cooperative efforts from all groups, including the diverse fishing community, Management Council, National Marine Fisheries Service, and U.S. Coast Guard are needed to improve safety at sea and effective fisheries management.

## ACKNOWLEDGEMENTS

This work was supported by the Massachusetts Humane Society, the Union College Subcouncil on Research and Grants, the WHOI Marine Policy Center, and the Marine Biological Laboratory. The authors are grateful for the

contributions of Dr. Di Jin, WHOI. A paper on this work is forthcoming in *Marine Policy*.

## REFERENCES

1.United States Coast Guard [1999]. Fishing Vessel Casualty Task Force Report.

2. Commercial Fishing Industry Vessel Safety Act [1988]. Public Law 100-424.

3. Commercial Fishing Industry Regulations [1991]. 46 CFR 28.

4. Havold JI [2000]. Culture in maritime safety. Marit. Pol. Mgmt. *27*(1):79-88.

5. Poggie JR, Pollnac RB,Van Dusen C [1996]. Intracultural variability in the cognition of danger among southern New England fishers. Marine ResourceEconomics. *11*:23-30.

6. McCay BJ, Gordon WG, Levine EB, Gatewood JB, Thompson B, Creed C [1989]. From the waterfront: Interviews with New Jersey fishermen about marine safety and training. Project Report for New Jersey Marine Sciences Consortium. NJMSC-SK_89-1.

7. Kaplan IM [1998]. Regulation and compliance in the New England conch fishery: a case for co-management. Marine Pol. *22:*(4/5)327-35.

8.Jentoft S [1989]. Fisheries co-management: delegating government responsibility to fishermen's organizations. Marine Pol. *13*(2)137-54.

9.Jentoft S [2000]. Legitimacy and disappointment in fisheries management. Marine Pol. *24:*141-48.

10.Kaplan IM [1999]. Suspicion, growth and co-management in the commercial fishing industry: the financial settlers of New Bedford. Marine Pol. *23*(3):227-41.

11. Kaplan IM [2000]. Seafood auctions, market equity and the buying and selling of fish: lessons on co-management from New England and the Spanish Mediterranean. Marine Pol. *24*:165-77.

12. Hanna SS [1995]. User participation and fishery management performance within the Pacific Fishery Management Council. *Ocean and Coastal Mgmnt*. *128*:(1-3)23-44.

13. Cloutier TM [1996]. Conflicts of interest on regional fisheries management councils: corruption or cooperative management. Ocean and Coastal Law J. *2*:101-52.

# INTERNATIONAL COMPARISON OF OCCUPATIONAL INJURIES AMONG COMMERCIAL FISHERS OF SELECTED NORTHERN COUNTRIES AND REGIONS

**Peter P. Abraham, M.D., M.P.H**
**National Research Council Research Fellow (1998-2000)**
**CDC/NIOSH/Division of Safety Research,**
**Alaska Field Station,**
**4230 University Dr. #310,**
**Anchorage, Alaska U.S.A.**
**E-mail: peter.abraham@usa.net**

*This paper was previously published in the Barents Newsletter, January 2001.*

**Objectives:** This study evaluates the occupational injury trends and the safety and health practices in the commercial fishing industry of selected countries and regions of the North.

**Methods:** Data on occupational injuries and fatalities occurring in the fishing industry of different countries were analyzed and compared.

**Results:** International injury data show the commercial fishing industry as one of the most dangerous jobs worldwide. Fishing fatality rates are higher than the respective national occupational fatality rates, and in many countries are higher than the world average for fishing (80/100,000/year). The highest rates were observed in Denmark, the U.S.A. and UK. Drowning and hypothermia are the leading causes of death in many countries. Eighty percent of vessel-related fatalities were associated with smaller vessels under 80ft/24m due to two leading causes, capsizings and founderings. International examples demonstrate that local, industry-oriented safety strategies, safety training for fishermen, interagency collaboration - among other preventive initiatives - contributed to declining injury trends, (e.g. in Norway (declined by 41%) and in Alaska the fatality rate declined by 42 percent (200 /100,000/ year 1991-1992[1] compared to 116/100,000/year from 1991-1998.[2])

**Conclusions:** Study confirmed similar causes and circumstances responsible for fishermen's occupational traumatic injuries worldwide, though many limitations exist for research due to differences in country guidelines, registration, surveillance standards, etc. Increased international cooperation and data exchange should be continued with the purpose of closing the gap between injury databases and making a more accurate public health diagnosis and cross-country monitoring of the problem in future research.

## INTRODUCTION

Commercial fishing represents the oldest and one of the most important economies in countries with northern fishing grounds, along with a high occupational safety and health risk for those involved in it. Indicators of this risk were surveyed and analyzed in earlier studies in Alaska and northern countries.[3-13] Fishing related occupational fatalities in Alaska always were higher due to specific, and rapidly changing weather conditions, the far and isolated fishing grounds, and many other circumstances. Earlier studies observed a fatality rate of 414.6 per 100,000 workers for Alaskan fishermen in 1980-84.[3] As a result of prevention oriented regulations and interagency safety collaboration, rates have dropped significantly from 200/100,000/year for 1991-1992[1] compared to 116/100,000/year from 1991-1998.[2] High rates of fatal traumatic injuries have been observed among commercial fishermen of other countries too (Norway 1961-75: 150/100,000;[13] Sweden 1975-86: 110/100,000;[11] Denmark 1989-96: 140/100,000;[12] Iceland 1966-86: 89/100,000.[8]) Our study has focused on international comparison of the recent occupational safety and health status during the 1990s and fishing safety activities in countries with northern fishing grounds, including Canada, Denmark, the Faroe Islands, Greenland, Iceland, Ireland, Norway, Sweden, Russia, the United Kingdom and the U.S.A.

## METHODS

Data on fishing vessel casualties and fishing-related occupational injuries and fatalities from Alaskan, U.S., international and other national data sources were collected, compared and analyzed for the 1990s. This included different variables, such as frequencies and fatality rates, death causes and circumstances, nature, type and causes of casualties. Alaskan data were derived from the Alaska Occupational Injury Surveillance System (AOISS), which is maintained

by the NIOSH/Division of Safety Research/Alaska Field Station. Access to information of such type in other countries is somewhat limited. Statistical information, reports and descriptions were obtained from appropriate foreign agencies: the Search & Rescue Branch of the Canadian Coast Guard; the Transportation Safety Board of Canada, the Icelandic Maritime Authority, the UK Marine Accident Investigation Branch (MAIB), the Health and Safety Authority of Ireland, the Maritime Authorities (Denmark, Sweden) and fisheries safety research institutions of Scandinavian countries (Sintef/Marintek in Norway) and Russia (Kaliningrad State University). Fishing death rates were obtained either from existing country reports for comparison or were calculated based on the number of registered fishermen. Circumstances and major causes of fishing casualties and fatalities were also compared and analyzed as available data permitted. In addition, fishing vessel safety materials, policy reports and relevant regulations were studied to identify the countries' capability and preparedness to prevent injuries and fatalities in the commercial fishing industry.

## RESULTS

Occupational safety and health records concerning the fishing industry and fishermen's injuries and fatalities vary from country to country. The main results are summarized as follows:

1. National and international data show fishing as one of the most dangerous jobs in most countries based on various sources of fatality frequencies among fishermen.[14-22] (See table 1.)

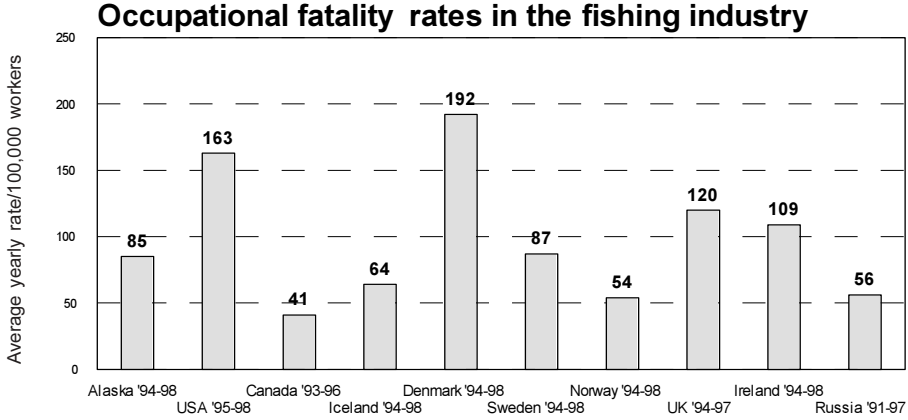
2. Fishing related fatal occupational injury rates range from 41 per 100,000[23] to 192 per 100,000[24] between 1994-98 in countries with northern fishing grounds. (See figure 1.) About half of the countries, analyzed for 1994-98 had rates higher than the world average: 80/100,000 estimated by the ILO.[25] During the 1990s, fishing fatality rates were substantially higher compared to the national average occupational fatality rates in all observed nations.

3. Foundering, capsizings, and grounding were the 3 most frequent, leading risk factors for fishermen's deaths according to international casualty statistics for 17 countries, including in part northern ones as well.[26]

**Table 1:** Number of occupational injuries among commercial fishermen by area, 1994-98

| Year | Alaska | USA | Canada | Iceland | Denmark* | Norway | Sweden | United Kingdom | Ireland |
|---|---|---|---|---|---|---|---|---|---|
| 1994 | 13 | 75 | 32 | 3 | 19 | 14 | | 26 | 1 |
| 1995 | 19 | 64 | 17 | 1 | 9 | 7 | | 19 | 19 |
| 1996 | 25 | 83 | 17 | 9 | 8 | 10 | 4** | 20 | 8 |
| 1997 | 4 | 62 | 16 | 2 | 8 | 15 | 3 | 29 | 5 |
| 1998 | 13 | 73 | 18 | 1 | 7 | 15 | 6 | 26 | 6 |
| **Total** | **74** | **357** | **100** | **16** | **51** | **61** | **13** | **120** | **39** |
| Source: | Alaska Occupational Injury Surveillance System | US Coast Guard | Transportation Safety Board, Marine Occurence Statistics | Intersessional Correspondence Group, University of Iceland | Danish Maritime Authority | MARINTEK/ SINTEF | Swedish Maritime Administration | Marine Accident Investigation Board | Health and Safety Authority |

*Note: *Denmark Data Include the Faroes and Greenland.*
*** 4 cases occurred between 1994-96, no seperate data per year available.*




Sources:
1. Alaska: CDC/NIOSH/DSR/Alaska Field Station: AOISS database for numerators (n = 17,400 FTE fishers)
2. United States: US Coast Guard data (Spitzer: Fishing Vessel Casualty Task Force Report 1999). For 1994: n/a
3. Canada: ILO Statictical Yearbook 1998 (fishing inlcudes the whole sector as defined by ISIC 3). Data N/A for 1994-98.
4. Iceland: Icelandic Marine Accident Investigation Committee and Maritime Administration for numerators; Statistics Iceland and the Icelandic Maritime Administration for denominators (full time and part time fishers)
5. Denmark: Institute of Maritime Medicine and the Danish Maritime Administration for rates including Greenland and the Faroe Islands (full-time and part time fishers).
6. Sweden: The Swedish Maritime Administration (numerators and denominators).
7. Norway: MARINTEK/SINTEF - The Norwegian Marine Technology Research Institute, Division of Fisheries and Aquaculture, Trondheim, Norway for numerators and Statistics Norway for full-time and part-time fishermen.
8. United Kingdom: UK Dept. of Transport, Marine Accident Investigation Board (MAIB) for numerators and MAFF (registered total fishermen). For 1998: n/a
9. Ireland: Health and Safety Authority for numerators; Central Statistics Office for the number of total fishermen
10. Russia: Kaliningrad State Technical University, Fisheries Safety Research Project (separate data N/A for 1994-98)

**Figure 1:** Occupational fatality rates in the fishing industry

4. Eighty percent of vessel related fatalities were associated with medium size and small vessels under 24m/80ft due to capsizing and foundering.[26] Fatal incidents are more likely to have involved small vessels in every country. For example, analysis found that about 80 percent of fatal occupational injuries among British fishers in 1992-97,[21] 80 percent in Canada in 1993-98,[27] and 50 percent in Iceland in 1993-98 [28] occurred on vessels under 24m/80ft.

5. Casualty indicators taken by selected countries demonstrate that vessel-related causes are the predominant causes of occupational fatalities in more than or around half of the cases in many countries. Of the vessel-related events, capsizing is usually the leading cause for fishermen's death. Non-vessel related causes are dominated by man-over-board events according to various casualty sources[19,22,24,28,29] from the analyzed countries. (See table 2.)

6. Some fishing technologies, especially crabbing, lobster fishing, are the most dangerous types of fishing, responsible for about 18 percent[30] to - 40 percent[2] of fatalities.

**Table 2:** Leading causes and circumstances of fishing fatalities in selected countries in the 1990s, by nature of casualty:
(percentage as a proportion of all vessel-related and non-vessel related causes)

| | USA | ICELAND | IRELAND | DENMARK | NORWAY |
|---|---|---|---|---|---|
| **Leading vessel-related cause** | 49% capsize/sink | 25% foundering | 33% capsize | 40% capsize | 26% capsize |
| **Man-over-board** | 25% | 33% | 20% | 30% | 27% |
| **Source:** | USCG, 1994-98 | Icelandic Marit. Adm. 1996-98 | Health & Safety Authority 1994-98 | Inst. Marit. Medicine 1990-98 | Norw.Marin. Technol. Research Inst.1990-97 |

7. Drowning, presumed drowned and hypothermia are the predominant death causes for fishers (e.g. 91 percent in Canada,[27] 88 percent in Alaska,[2] and 78 percent in Ireland.[22])

8. Human factors have a substantial impact on the occurrence and outcome of casualties and injuries (e.g. Nordic countries: ~46 percent[31]; U.S.A.: ~80%.[32])

9. Limitations exist for cross-country data comparison due to differences in casualty and injury reporting systems and definitions.

## DISCUSSION

Our ability to make meaningful international comparison of occupational injury statistics is limited, because of the differences in national guidelines, registration and surveillance standards, in the ways countries collect information, the use of definitions, the coding practice, and many other factors. The number of reported fatalities varies from country to country depending on the size of the population and the work force involved in fishing. This study attempted to reconcile numerator data derived from different sources, because more often country statistics on the number of fishing deaths included not only fishing operations and technologies, but also other activities with regard to the entire industry as defined in the sector definition as a whole. Some sources included even traffic and leisure time accidents in fishermen's injury statistics. Denominator definitions may also differ within one country: Alaska uses full time equivalent number of fishers to express the rates. Overall U.S. estimates on the number of fishermen are based on annual average estimates of total number of workers employed in fishing occupations; Sweden provided data for fishermen as they are registered by the Swedish Fishermen's Federation, Norway describes full time and part time fishermen in statistical yearbooks, Icelandic data may include both full time and part time fishers, Denmark showed full-time and part- time workers, also full-time equivalent indicator for fishers in the 1990s was found. Different approaches by countries in identifying and categorizing occupations in the fishing industry should influence the final rate results, thus comparison and conclusions should be interpreted cautiously. Similar methodologic problems in investigating data on traumatic injuries were found in other international studies on comparability of general injury statistics as well , which demonstrates the different experience by countries, and the problem of quality and reliability of international statistics.[33]

## DEVELOPING FISHING VESSEL SAFETY PROGRAMS

By the 1990s, many major fishing countries established their basic regulations for fishing safety. Different government agencies and organizations were assigned to take the primary lead for fishing vessel safety. Fishermen's associations also started to focus on safety and health issues associated with their work. Despite these increasing efforts in prevention, the fishermen's job still represents one of the most dangerous occupations. In recent years interagency actions were activated in response to major casualties and increased fatalities in different countries (e.g. the U.S. Coast Guard Fishing Vessel Casualty Task Force of 1999,[34] the UK Safe Fishing Campaign 1998,[35] development of a joint casualty database (the Nordic Dama) by Iceland and Scandinavian countries; operating the United Nations University Fisheries Training Center in Iceland, focusing on fishermen's safety education and coordinating minimum inter-Nordic requirements for safety training,[36] introducing compulsory basic safety training for fishermen associated to license certification in Norway,[37] monitoring the fishing industry by different government bodies and providing special occupational safety courses, followed by yearly examinations in Russia.[25] On the international level, the ILO Sectoral Activities Program is one of the most important stakeholders for facilitating fishing industry safety in close collaboration with the IMO, FAO, and WHO, who issue different codes and guidelines for the industry.[25] Table 3 gives a brief summary of the most important steps and activities by countries. (See table 3.)

## CONCLUSIONS

Results from this international comparison of northern countries and regions confirm that fishing-related workplace death is a major occupational safety and health problem in many northern nations. There are similar causes and circumstances responsible for fishermen's occupational traumatic injuries in each country, but close comparison is not always possible because categories may be different for each countries (i.e., capsize vs. foundering vs. sinking). Results however, may indicate the major problem area and should be useful in for establishing safety priorities. Industry-oriented interagency safety programs can decrease fishing fatalities (e.g., Alaska,[38] Norway.[37]) Both national and international fishing safety data require more coordination and improvement in each country. Also there is a need for more international collaboration, detailed data exchange and further in-depth studies to better understand etiology,

**Table 3:** Fishing Safety strategies

| Country | Major agencies | Preventive programs, activities |
|---|---|---|
| Canada | Canadian Coast Guard Office of Boating Safety; Transport Canada Marine Safety Branch; Workers' Comp. Board | Coordination for safety, annual marine emergency workshops for fishers, safety check list for small vessels, etc. Regulations: Canada Shipping Act; Canada Labor Code, Marine OS&H Regulations; Fishing Vessel Inspection Regulations, etc. |
| Denmark, Faroe Islands, Greenland | Danish Maritime Authority;Fishing Safety Councils; Maritime Authority of the Faroes; Greenland Fisheries Licence Control (GFLC) | Activities for implementation of the Danish Safety at Sea Act and its Technical Regulations for protection of the crew and working environment, safety courses at fishing schools, etc. |
| Iceland | Icelandic Maritime Administration; National Lifesaving Association; Ministry & Directorate of Fisheries | Vessel stability projects, Weather and sea state information system; vessel renewal programs, Inter-Nordic fishing vessel safety education program. Regulations: Ship Survey Act of 1993; Icelandic Maritime Administration Act 1996, etc. |
| Ireland | Health and Safety Authority; Department of the Marine | Fishing vessel safety survey in the 1990s; recommendations for new comprehensive safety regulations and requirements for fishing safety, e.g. mandatory EPIRBs, Programs for improving safety culture, etc. |
| Norway | Norwegian Maritime Directorate,Tromso Maritime School | Control of seaworthiness, certification for skippers, mandatory basic and advanced safety course for fishers |
| Russia | Federal Inspectorate of Labor; Fishing Fleet Academy | Monitoring safety & health in fishing; safety course during vocational training; regular safety instructions for the crew |
| Sweden | Swedish Maritime Administration; National Board of Fisheries | Implementation of the Swedish Maritime Code, registration, licensing, safety training; maintains national ("SOS") and international (Nordic Dama) casualty data system, etc. |
| United Kingdom | Maritime and Coast Guard Agency; Sea Fisheries Inspectorate; MAIB | Safe Fishing Campaign 1998; Developing Code of Safe Practice for smaller vessels; other joint initiatives with the Fishing Industry Safety Group |
| USA | US Coast Guard | Fishing vessel safety task force of 1999; PTP - Prevention Through People (human factor); Commercial Fishing Industry Vessel Safety Act of 1988 |

determinants and prevention of fishing injuries and to learn more from each other's safety experience.

## ACKNOWLEDGMENTS

This work was performed while the author held a National Research Council - CDC/NIOSH/DSR/AFS Research Associateship. The author thanks Dr. George Conway, Chief of NIOSH Safety Research, Alaska Field Station and Jennifer Lincoln, Occupational Safety & Health Specialist at the NIOSH Alaska Field Station for professional advice and supervision during research. All contributions from collaborators in foreign countries are appreciated very much.

## REFERENCES

1.CDC (Centers for Disease Control and Prevention) [1993]. Commercial fishing fatalities -Alaska, 1991-92. MMWR *42*:18

2. Lincoln JM, Conway GA [1999]. Preventing commercial fishing deaths in Alaska. Occup Environ Med *56*: 691-695

3.Schnitzer PG, et al [1993]. Occupational injury deaths in Alaska's fishing industry, 1980 through 1988. Am J Public Health 83(*5*):685-8

4.Kennedy RD, Lincoln JM [1997]. Epidemiology of fatal injury in the U.S. commercial fishing industry. In Langley RL et al. Safety and Health in Agriculture, Forestry, and Fisheries, ch 34.

5. NIOSH [1997]. NIOSH Current Intelligence Bulletin 58: Commercial fishing in Alaska, Risk factors and prevention strategies. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 97-163.

6. NIOSH [1994]. NIOSH Alert: Preventing drownings of commercial fishermen.Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 94-107.

7. Hasselback P et al [1990]. Risk for commercial fishing deaths in Canadian Atlantic provinces. Br J Ind Med. 7(*7*):498- 501.

8. Rafnsson V et al [1992].Fatal accidents among Icelandic seamen: 1966-86.Br J Ind Med. *49*(10):694-9.

9. Reilly MS [1985]. Mortality from occupational accidents to United Kingdom fishermen 1961-80. Br J Ind Med 42(12):806-14.

10. Hopper D. Safety engineering and equipment for vessels under 20m: results of trials on two vessels. Sea Fish Industry Authority, UK: Mandalia and Silverline, pps. 278-289.

11.Torner et al [1995]. Analysis of serious occupational accidents in Swedish fishery. Safety Sci *21*:93-111.

12. Jensen OC et al [1996]. Occupational injuries among Danish fishermen. Bull Inst Marit Trop Med Gdynia. *47*(14):118.

13. Aasjord H [1980]. Occupational safety in fishery. FTFI-nytt, Institute for Fishery Technology Research, Trondheim, Norway, 1980

14. NIOSH/DSR/AFS - Alaska Occupational Injury Surveillance System data

15. USCG [1999]. Fishing Vessel Task Force Casualty Analysis –Highlights, 16721/15 November 1999. [http: www. uscg.mil/d11/msosf/dprtmnts/fishboat/ 9498casfollowrpt.doc].

16. Transportation Safety Board Canada [1998]. Marine Occurrence Statistics, Annual Report. Ottawa, Canada: Transportation Safety Board.

17. IMO/Intersessional Correspondence Group on Fishing Vessel Safety, Casualty data for Iceland, 1996-98 [http: www.sigling.is/imo/imofishing.htm].

18. Danish Maritime Authority [1998]. Fishing vessel casualty statistics report 1998. Copenhagen, Denmark: Danish Maritime Authority.

19. Asjord H [2000]. Registration and statistics of accidents in the Norwegian fishing fleet. Private email message, Februrary 2000.

20. Swedish Maritime Administration [1999]. Summary of reported marine casualties and incidents and accidents to persons - Swedish merchant and fishing vessels 1997 and 1998. Norköpping, Sweden: Marine Casualty Investigation Staff.

21. Department of Transport [1999]. Marine Accident Investigation Branch (MAIB) Annual Reports 1996 – 1998. London, UK: Marine Accident Investigation Branch.

22. Health and Safety Authority [1999]. Annual Reports 1994-98. Dublin, Ireland: Health and Safety Authority.

23. United Nations [1999]. Statistical Yearbook 1998, Occupational Fatalities in the Fishing Industry, Canada. Geneva: International Labor Organization.

24. F/V Casualty Statistics database of the Institute of Maritime Medicine and the Danish Maritime Administration, Denmark, 1990-98 [1999].

25. United Nations [1999]. ILO Report for the discussion at the Tripartite Meeting on safety and health in the fishing industry. Geneva: International Labor Organization.

26. IMO casualty statistics and investigations [1999]. Collection and analysis of casualty statistics of fishing vessels and fishermen. FSI 7/6/2.

27. IMO/Intersessional Correspondence Group on Fishing Vessel Safety, Casualty data for Canada, 1993-98. [http: www. sigling.is/imo/imofishing.htm].

28. Icelandic Marine Accident Investigation Committee, fishing vessel casualty data 1993-98 [www. sigling.is/skipamal.html].

29. U.S.C.G. [1999]. Analysis of Fishing Vessel Casualties 1994-98. USCG HQ: Office of Investigation and Analysis, Marine Safety and Environmental Protection Directorate.

30. F/V SAR Statistics 1990-98 [1999]. Ottawa, Canada: Search and Rescue Branch of The Canadian Coast Guard.

31. The Nordic Dama [1995]. Stockholm, Sweden: Swedish Maritime Administration.

32. Summary of the meeting of the Commercial Fishing Industry Vessel Advisory Committee (CFIVAC) [1996]. Seattle, Washington [http:www.uscg.mil/hq/g-m/advisory/cfivac/min0496.htm].

33. CDC National Center for Health Statistics [1994]. Proceedings of the International Collaborative Effort (ICE) on Injury Statistics. Vol. 1.

34. Spitzer J [1999]. Dying to fish - Living to fish, Fishing Vessel Casualty Task Force Report 1999; by U.S. Coast Guard [http: www .uscg.mil/hq/g-m/moa/docs/fishing.htm].

35. The UK Maritime and Coast Guard Agency [2000]. Annual report and accounts 1998-99 [http: www .mcagency.org.uk/annualreport].

36. Pettursdotir G [1999]. The University of Iceland, Fisheries Research Institute, Reykjavik, private e-mail message, June 1999.

37. Aasjord H [2000].SINTEF/MARINTEK - The Norwegian Marine Technology Research Institute, Trondheim, Norway, private e-mail message, March 2000.

38. Conway, et al [1999]. Alaska's Model Program for Surveillance and Prevention of Occupational Injury Deaths. Pub Health Rprts *114*:550-558.