

Preventing Drownings of Commercial Fishermen

[Español \(Spanish\)](#)

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WARNING! Fishermen are at high risk of drowning if they work on the decks of commercial fishing vessels without wearing personal flotation devices.

The National Institute for Occupational Safety and Health (NIOSH) requests assistance in preventing drownings of commercial fishermen. The U.S. Coast Guard (USCG) has estimated that during the period 1982-87, the annual occupational fatality rate for U.S. commercial fishermen was 47 deaths per 100,000 workers. The major cause of these deaths was drowning [NRC 1991].

Information gathered by the NIOSH Alaska Activity further emphasizes this risk of drowning. In 1991-93, the occupational fatality rate for commercial fishermen in Alaska was 195 deaths per 100,000 workers—nearly 30 times the average annual rate for all U.S. workers [NIOSH 1993,1994a, b]. Of the commercial fishermen who died on the job in Alaska during 1991-93, 91% drowned or were presumed to have drowned.

Recent NIOSH data show that many fishermen are not wearing personal flotation devices (PFDs) when they fall overboard or are forced to abandon

sinking or capsized vessels. These data clearly show that PFDs greatly increase the chances of survival for these fishermen: 63% of fishermen wearing PFDs when they jumped or fell into the water survived, whereas only 12% of those without PFDs survived [NIOSH 1994b]. The purpose of this Alert is to encourage fishermen to wear PFDs while working on the decks of commercial fishing vessels and to take steps to prevent falls overboard.

This Alert focuses on the commercial fishing industry in Alaska. However, the conclusions and recommendations may apply to all commercial fishing operations in the United States.



Fishermen who do not wear PFDs while working on the decks of commercial fishing vessels are at high risk of drowning.

Background

Commercial fishing is a complex industrial process that varies greatly among fisheries. The work is often conducted under adverse weather conditions on unstable work platforms. Fall protection systems such as safety lines and guard rails are often absent because they might interfere with the work or introduce new hazards.

Most fatalities of commercial fishermen are related to vessel casualties such as capsizing, sinking, foundering, grounding, and collision. However, a large number of fatalities result from falls overboard and are not related to vessel casualties. PFDs are known to increase the chances of survival for all fishermen who enter the water for any reason. But many commercial fishermen say that they are unwilling to wear a PFD during routine work on deck because it might interfere with their performance. USCG regulations [46 CFR 28.110] require commercial fishing vessels to be equipped with at least one USCG-approved PFD or immersion suit of the proper size for each person on board. However, the PFD is not required to be worn.

The effectiveness of PFDs in saving the lives of fishermen who fall overboard or abandon sinking or capsized vessels is supported by available information about those who survived such incidents during the period 1991-93 [NIOSH 1994B]. Fishermen who drowned or were presumed to have drowned were compared with those who survived incidents in which at least one fisherman drowned: 63% of those wearing PFDs survived (10 of 16), but only 12% of those without PFDs survived (6 of 50) . Seventeen fishermen fell overboard and drowned during the period 1991-93; none of them were wearing PFDs.

Fishermen who fall overboard in cold water are at risk of hypothermia (the cooling of the core body temperature). This condition causes shivering, loss of muscle coordination, unconsciousness, and possibly death. A well-trained crew and captain have a greater chance of rescuing and reviving a fisherman who has fallen overboard wearing a PFD than one who is not wearing a PFD. Near-drowning victims have been successfully resuscitated after relatively long immersions in cold water (up to 1 hour) [Modell 1993].

Fatality Rates in the Commercial Fishing Industry

Fatality rates for commercial fishermen in the United States are collected by both the NIOSH National Traumatic Occupational Fatality (NTOF) Surveillance System and by the USCG.

The NTOF Surveillance System recorded the deaths of 637 commercial fishermen in the United States during the 10-year period 1980-89 [NIOSH 1994a]. Drownings accounted for 69% of these deaths. The actual number of commercial fishermen who died is higher than reported by NTOF because methods for collecting and reporting data tend to underestimate the total number of deaths [NIOSH 1993].

The USCG recorded 648 deaths of commercial fishermen in the United States during the 5-year Period 1982-87—an annual fatality rate of 47 deaths per 100,000 commercial fishermen [NRC 1991]. The fatalities were distributed nearly evenly among the Atlantic coast, the gulf coast, the west coast, and Alaska.

In Alaska alone, the fatality rate among commercial fishermen was 195 deaths per 100,000 fishermen during 1991-93 [NIOSH 1994b]. During the same period in Alaska, 233 workers died of occupational injuries; 91 (39%) of these workers were commercial fishermen, and 83 of the 91 fishermen (91%) drowned [NIOSH 1994B].

Federal Regulations

PFDs

All commercial fishing vessels must be equipped with at least one USCG-approved immersion (survival/exposure) suit or wearable PFD (Type I, II, III, or V) of the proper size for each person on board [46 CFR 28.110]. Immersion suit and PFD requirements are based on vessel location, temperature of the water, type of operation, and length of the vessel. In addition, requirements for Type IV PFDs (throwable devices) depend on the length of the vessel. Each wearable PFD or immersion suit must be stowed so that it is readily accessible to the person for whom it is intended from both the normal work station and berthing area. If no location is accessible to both the normal work station and the berthing area, an appropriate PFD or immersion suit must be stowed in both locations [46 CFR 28.110].

Cardiopulmonary Resuscitation

All commercial fishing vessels must have a minimum number of persons on board who are certified in first aid and cardiopulmonary resuscitation (CPR) [46 CFR 28.210]. The requirements are as follows:

- 3 to 16 persons on board–1 certified person
- 17 to 49 persons on board–2 certified persons
- 50 or more persons on board–4 certified persons

Case Reports

The NIOSH Alaska Activity investigated all fatal incidents during the period 1991-93 that resulted in the drowning or presumed drowning of a fisherman who fell overboard while working on the deck of a commercial fishing vessel. Representative cases are described briefly as follows.

CASE No. 1

On February 9, 1991, a 30-year-old male fisherman on board an 82-foot crabbing vessel slipped on ice and fell overboard while securing crab pots. Attempts to rescue him were unsuccessful and he is presumed drowned. He was last sighted in the water 75 feet behind the vessel. The victim was not wearing a PFD [NIOSH 1994B].

CASE No. 2

On August 20, 1991, a male fisherman of unknown age on board a 32-foot fishing vessel is believed to have fallen overboard and is presumed drowned. Ten minutes before the victim was reported missing, he had been observed baiting longline gear for groundfish. The last time the victim was seen on deck, he was not wearing a PFD [NIOSH 1994B].

CASE No. 3

On November 4, 1991, a 25-year-old male fisherman on board an 86-foot crabbing vessel lost his footing and fell overboard while stacking crab pots. Attempts to rescue him were unsuccessful and he is presumed drowned. The victim was not wearing a PFD [NIOSH 1994b].

CASE No. 4

On January 22, 1992, a 23-year-old male fisherman on board a 113-foot crabbing vessel was thrown overboard when a crab pot line he was straddling suddenly tightened. Attempts to rescue him were unsuccessful and he is presumed drowned. The victim was not wearing a PFD [NIOSH 1994b].

CASE No. 5

On November 23, 1992, a 31-year-old male fisherman on board a 133-foot crabbing vessel was knocked overboard by a wave while attempting to retrieve crab pots. He was last observed floating face down in the 25-foot seas and is presumed drowned. The victim was not wearing a PFD [NIOSH 1994b].

Conclusions

Fishermen who work on the decks of commercial fishing vessels can significantly reduce their risk of drowning by wearing a PFD. In the five incidents described, the fishing vessels did not sink, capsize, catch fire, or run aground, yet commercial fishermen died in the water.

If the commercial fishermen who fell overboard had been wearing PFDs, their risk of drowning would have been significantly reduced. The use of PFDs could have kept these fishermen afloat long enough to increase their chances of being retrieved from the water alive.

Recommendations

Summary of Recommendations

NIOSH recommends the following measures to help prevent commercial fishermen from falling overboard and drowning.

Take the following steps to prevent falls overboard:

- Use safety lines (also known as guy lines, jack lines, jill lines, and dog lines) when possible.
- Install or extend guard rails where possible.
- Keep decks as clean and clear as possible to prevent slipping or tripping.
- Use liberal amounts of nonskid material on deck.

Take these steps to increase the chances for successful rescues from the water:

- Ensure that vessels are equipped with at least one USCG-approved PFD or immersion suit of the proper size for each person on board [46 CFR 28.110].
- Always wear a PFD while on the deck of a commercial fishing vessel (see the following section on types of PFDs available).
- Have a rescue system in place for a quick retrieval from the water.
- Conduct and document man-overboard drills.
- Permit no one to be on deck alone.
- Ensure that more than one person on board is familiar with and can operate the vessel in an emergency (proficiency in maneuvering a vessel is essential to a successful rescue).
- Carry on board the required number of persons certified in first aid and cardiopulmonary resuscitation (CPR) [46 CFR 28.210].

Take the following steps to promote PFD use:

- Encourage manufacturers to promote the development and use of PFDs that are comfortable to use and easy to work in.
- Encourage regulatory agencies to require fishermen to use PFDs at all times on the decks of commercial fishing vessels.

Types of PFDs

USCG-Approved PFDs

Types III and V

PFD types III and V are suitable for comfortable wear while on the deck of a commercial fishing vessel.

Type III PFDs (flotation aids such as vests and float coats) are any approved wearable devices so that wearers can place themselves in a vertical or slightly backward position in the water.

Some fishermen find that wearing Type III vests (Figure 2) over or under rain gear allows fairly good mobility. Unfortunately, these vests will not turn an unconscious person face up in the water, nor do they offer much protection from hypothermia [ASGCP 1992].



Figure 2: Type III PFD vest. (Source: ASGCP [1992]. Reprinted with permission. Drawing by V. Culp)

The float coat (Figure 3) is a Type III PFD with built-in insulating and bouyant foam around the trunk. Some models have an attached hood , insulated arms, and a neoprene beaver tail to reduce heat loss from the groin area. When secured, the beaver tail also helps keep teh coat from floating up around the wearer's neck. The good hypothermia protection of the float coat often makes it too warm to wear while working on deck. However, it may be

appropriate for fishing in skiffs in near-coastal areas or rivers, or for use in transit to and from fishing grounds [ASGCP 1992].

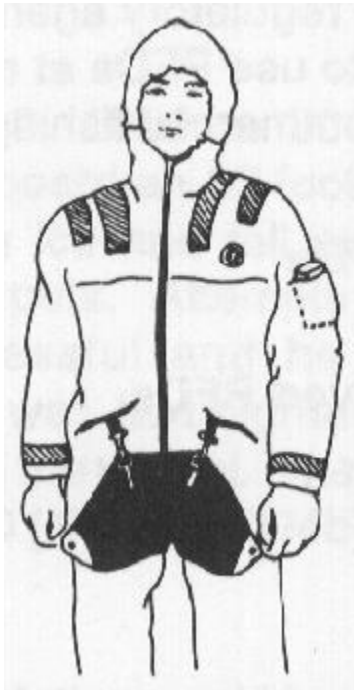


Figure 3: Type III PFD float coat with beaver tail. (Source: ASGCP [1992]. Reprinted with permission. Drawing by V. Culp)

Type V PFDs (work vests, commercial white water vests, pullover vests, coveralls, work suits, and deck suits) are a broad category of PFDs restricted to certain uses or conditions. Coveralls (Figure 4), work suits, and deck suits provide fair hypothermia protection, especially if the waist straps, leg straps, and velcro around the wrists and ankles are snug. Most coveralls have an inflatable pillow that will keep the wearer's head out of the water. However, the coveralls will not turn an unconscious person face up in the water. They are a good choice for cold weather, but they tend to make the wearer hot during strenuous tasks [ASGCP 1992].

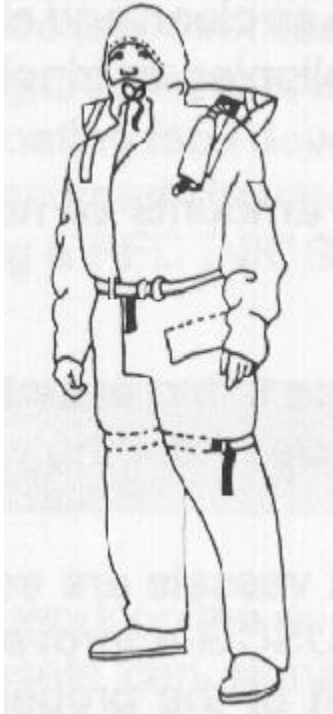


Figure 4: Type V PFD coveralls. (Source: ASGCP [1992]. Reprinted with permission. Drawing by S. Laurie.)

Type V hybrid (Figure 5) is an approved wearable device. It combines limited inherent bouyancy with an air bladder designed to be inflated by a CO₂ cartridge or by mouth. Designed for people weighing more than 90 pounds, the Type V hybrid may be the most comfortable USCG-approved PFD to wear while working. This PFD provides minimal hypothermia protection. Maintenance and care of the inflating devices are critical if the PFD is to perform as intended [ASGCP 1992].



Figure 5: Type V hybrid PFD. (Source: ASGCP [1992]. Reprinted with permission. Drawing by S. Laurie.)

Types I, II, and IV and Immersion Suits

PFD types I, II, and IV and immersion suits would not be suitable for constant, comfortable use but would provide excellent buoyancy.

Type I PFDs (offshore life jackets, Figure 6) are any approved wearable devices designed to turn most users face-up in the water. They provide minimal thermal protection, and many fishermen find Type I PFDs too bulky for working on deck [ASGCP 1992].

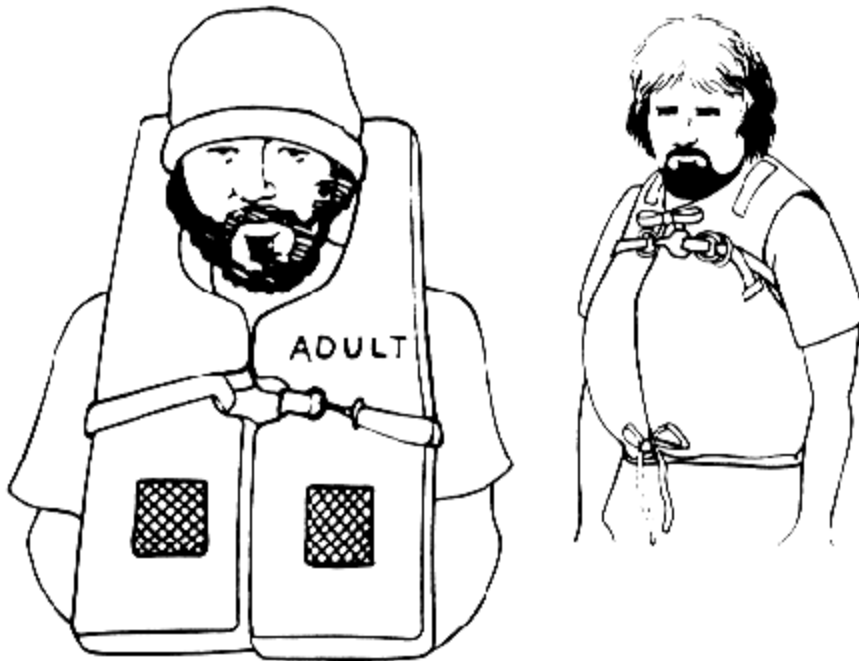


Figure 6: Type I PFD offshore life jackets. (Source: ASGCP [1992]. Reprinted with permission. Drawing by V. Culp.)

Type II PFDs (nearshore buoyant vests, Figure 7) are any approved wearable devices designed to hold the wearer in an upright, slightly backward position in the water with no tendency to turn the wearer face down. These PFDs offer little hypothermia protection and are awkward to wear during many work situations [ASGCP 1992].



Figure 7: Type II PFD nearshore buoyant vest. (Source: ASGCP [1992].
Reprinted with permission. Drawing by V. Culp.)

Type IV PFDs (throwable devices such as life rings or cushions, Figure 8) are any approved devices designed to be thrown to persons in the water for them to grasp and hold until rescued. Throwable devices should have a line attached for retrieving. These devices offer no thermal protection, but they allow individuals to pull themselves partially out of the water. Life rings should be kept within easy reach to throw to overboard crew members. The addition of a flagpole, floating line, PFD light, and reflective tape will make it easier for persons overboard and crew members to see the life ring [ASGCP 1992].

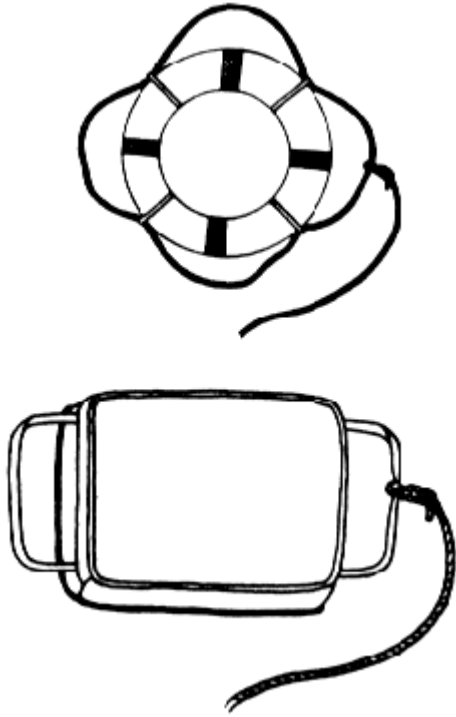


Figure 8: Type IV throwable devices—life ring and cushion. (Source: ASGCP [1992]. Reprinted with permission. Drawing by V. Culp.)

Survival or immersion suits (Figure 9) are nearly totally encapsulating suits that insulate the body and provide considerable hypothermia protection and buoyancy. However, they will not turn an unconscious person face-up in the water. Immersion suits are constructed so that the wearer will float even if the suit is full of water. Immersion suits are not practical to wear all the time, but they are preferable when abandoning ship into cold water and are credited with the saving of many lives [ASGCP 1992].

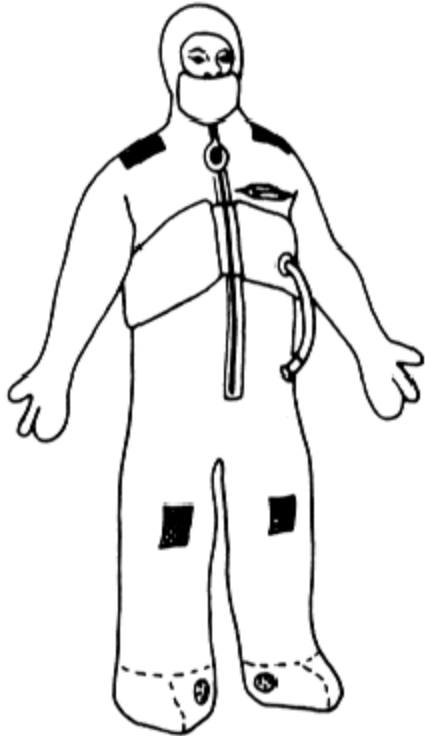


Figure 9: Immersion suit. (Source: ASGCP [1992]. Reprinted with permission. Drawing by J. Schmitts.)

USGC-Nonapproved PFDs

Several available PFDs are not approved by the USCG. Nonapproved devices include those that rely on inherent buoyancy, inflation, or both. The jackets, vests, coats, and suspenders described in this section are examples of nonapproved PFDs that provide buoyancy when properly inflated, are very comfortable, and could supplement currently required equipment. In the absence of a USCG-approved device, it is of course prudent to use any device to keep afloat until rescued.

Jackets (Figure 10) and vests are manufactured with an air bladder that can be inflated by a CO₂ cartridge or by mouth. These jackets and vests are not buoyant unless they are inflated by the wearer; but they are very comfortable to work in, and they keep the wearer afloat in an emergency if inflated properly.



Figure 10: Inflatable jacket (uninflated)—not USCG approved. (Source: ASGCP [1992]. Reprinted with permission. Drawing by S. Laurie.)

Rain coats are also manufactured with an inflatable air bladder that can be detached to insert into new rain gear. These PFDs are not secured to the wearer's legs or crotch, so they tend to ride up when inflated [ASGCP 1992].

Inflatable suspenders (Figure 11) are another nonapproved PFD. These models can be secured with a belt or strap. The suspenders are inflated either by a CO₂ cartridge or by mouth. They offer no thermal protection, but they are comfortable to work in and will keep one afloat in an emergency if inflated properly [ASGCP 1992].



Figure 11: *Suspenders (uninflated)–not USCG approved. (Source: ASGCP [1992]. Reprinted with permission. Drawing by S. Laurie.)*

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We greatly appreciate your assistance in protecting the lives of U.S. workers.

Richard A. Lemen, Ph.D.
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References

ASGCP (Alaska Sea Grant College Program) [1992]. Beating the odds on the North Pacific: a guide to fishing safety. Fairbanks, AK: University of Alaska Fairbanks, pp. 49-62.

CFR. Code of Federal Regulations. Washington, DC: U.S. Government Printing Office, Office of the Federal Register.

Modell JH [1993]. Drowning (review article). N Engl J Med 328(4):253-256.

NIOSH [1993]. Fatal injuries to workers in the United States, 1980-1989: a decade of surveillance; national profile. 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. 93-108.

NIOSH [1994a]. National Traumatic Occupational Fatality (NTOF) Surveillance System. Morgantown, WV: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, Division of Safety Research. Unpublished data base.

NIOSH [1994b]. Alaska Occupational Injury Surveillance System. Anchorage, AK: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, Division of Safety Research, Alaska Activity. Unpublished data base.

NRC [1991]. Fishing vessel safety: blueprint for a national program. Washington, DC: National Academy Press.

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