

# Occupational Injury Deaths in Alaska's Fishing Industry, 1980 through 1988

## ABSTRACT

**Objectives.** Studies from other countries have identified fishing as a hazardous industry, but little is known about occupational injury mortality related to fishing in the United States. Alaska was chosen for this study because approximately 45 000 people annually participate in Alaska's fishing industry and fishing is thought to be a major contributor to occupational injury mortality in the state.

**Methods.** Work-related injury deaths in Alaska's fishing industry were identified by means of death certificates and US Coast Guard mortality data. Fatality rates were calculated by using average annual fishing industry employment estimates.

**Results.** The 5-year average annual fishing-related fatality rate was 414.6 per 100 000 fishermen. The majority of the decedents were Caucasian men who drowned while fishing.

**Conclusions.** This study emphasizes that fishing is a dangerous industry in Alaska and demonstrates the benefit of using multiple data sources to identify fishing-related deaths in the state. (*Am J Public Health*. 1993;83:685-688)

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### Introduction

Fishing is a hazardous industry. Annual work-related injury death rates ranging between 26 and 260 per 100 000 fishermen have been reported in studies from Great Britain, Canada, and New Zealand.<sup>1-3</sup> Schilling<sup>1</sup> was the first to document the high injury fatality rates of fishermen in Great Britain, noting that the rates were twice as high as those for coal miners and about 20 times as high as those for the manufacturing industries. Little, however, is known about occupational injury deaths in the fishing industry in the United States. Nevertheless, US fishermen are subject to hazards similar to those in other countries, and fatality rates in the United States may also be high.

Commercial fishing is an important industry in the state of Alaska, employing approximately 45 000 people annually.<sup>4</sup> An investigation of occupational injury deaths in Alaska for the years 1980 through 1985 identified fishing as a major contributor to occupational mortality in the state, accounting for approximately 19% of the deaths.<sup>5</sup> This investigation noted problems in identifying fishing-related deaths in Alaska from standard death certificates and workers' compensation claims, and concluded that many fishing-related deaths were not counted because information from presumptive death certificates had not been included. In Alaska, a presumptive death certificate is filed for decedents whose bodies have not been recovered; the certificate is filed by a judge or magistrate after a hearing in which "sufficient evidence is presented from which it may be presumed that the missing person has met death."<sup>6</sup>

The present study was undertaken to (1) evaluate the use of presumptive death certificates and US Coast Guard mortality

data as supplemental sources to the standard death certificate for enumeration of fishing-related deaths in Alaska for 1980 through 1988; (2) estimate fishing-related death rates in Alaska; and (3) summarize descriptive information on these fishing-related deaths.

### Methods

Work-related injury deaths in Alaska's fishing industry during 1980 through 1988 were identified from three sources: Alaska standard death certificates, Alaska presumptive death certificates, and US Coast Guard records.

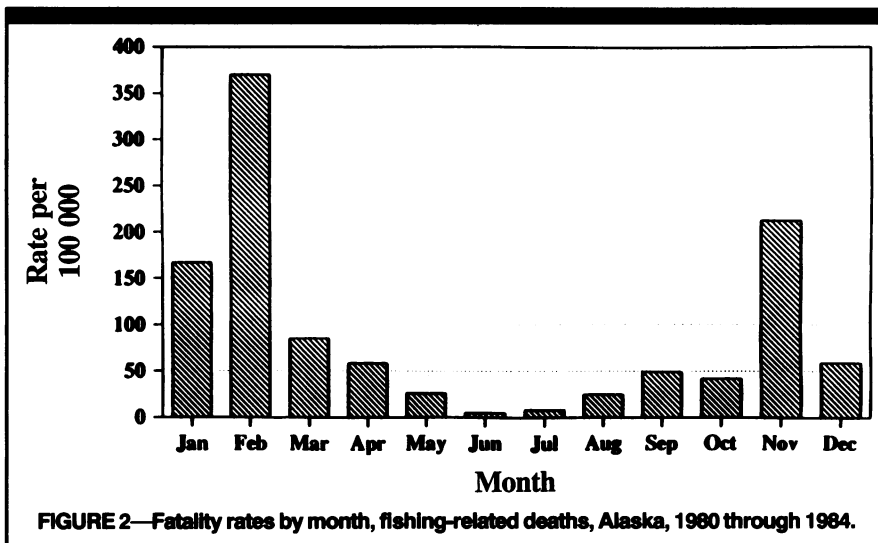
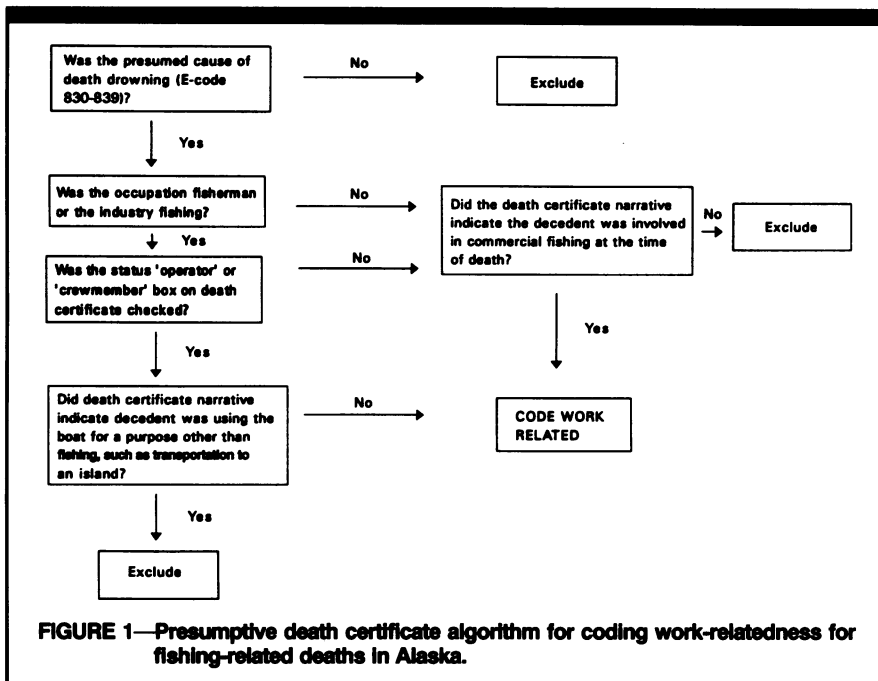
All standard and presumptive death certificates for work-related fatalities during the years 1980 through 1988 were manually selected for inclusion from Alaska state records by one of the authors (P.G.S.). The standard death certificate case definition included (1) International Classification of Disease, 9th revision (ICD-9) external cause of injury (E) code between E800-E949 or E960-E999; (2) a positive response to the "injury at work" item on the death certificate; and (3) fishing listed as usual industry (or an indica-

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tion in the death certificate narrative that the incident occurred aboard a fishing vessel).

For presumptive death certificates, the case definition was based on an algorithm that assigned work-relatedness based on information found on the presumptive certificate (Figure 1). The certificates do not have an “injury at work” designation but do have a section detailing the events of transportation-related deaths as well as an extensive narrative portion in which specific details of the presumed death are recorded.

Our case definition for Coast Guard records included all deaths in Alaskan waters reported by the Coast Guard during the years 1980 through 1988 in which the decedent was a crew member of a fishing

vessel. The Coast Guard has regulatory responsibility for investigating all “marine casualties that involve a loss of life” and maintains a computerized database of these investigations.<sup>7</sup>

To identify records of decedents that were included in both the death certificate and Coast Guard files, the death certificates were computer-matched to the Coast Guard data by date of death, last name, and date of birth. Once a match was identified, it was verified by visual inspection of the death certificate.

The population at risk included all persons who fished commercially in Alaska’s waters, whether or not they were Alaska residents. Commercial fishing employment is not included in Alaska’s standard labor statistics, but annual employ-

ment estimates for the years 1977 through 1984 have been published from a special survey based on commercial fishing permits issued by the state.<sup>8</sup> These estimates include all persons employed in the fishing industry, regardless of state of residence or whether the employment was full- or part-time. Estimated employment data from this survey were available only by month, type of fishing, and geographic area. Data after 1984 were not available, so fishing-related death rates were estimated for the 5 years from 1980 through 1984 only.

**Results**

For the years 1980 through 1988, a total of 278 fishing-related deaths were identified, an average of 31 deaths per year (median: 32). The number of fatalities varied by year, with no consistent increasing or decreasing trend. The year with the most fatalities (48) was 1983, and the fewest deaths (17) occurred in 1986.

The 5-year average annual fishing-related fatality rate was 414.6 per 100 000 fishermen. Annual fatality rates for the years 1980 through 1984 ranged from a low of 219.7 in 1982 to a high in 1983 of 597.9 per 100 000 fishermen.

To examine seasonal trends, we calculated the frequency of deaths for each month of the year summed over the 9-year period. The average number of deaths per month was 23 (median: 22). The most deaths for a single month (46) occurred in February and the fewest (8) in December. February also had the highest fatality rate of any single month (Figure 2). The lowest fatality rates occurred in the 3 months with peak fishing employment: June, July, and August.

Fishing-related deaths occurred in three geographic regions of Alaska (Figure 3): the southwest (119 deaths), the gulf coast (78 deaths), and the southeast (43 deaths). Region of death was not available in 38 cases. Region-specific fatality rates per 100 000 fishermen for 1980 through 1984 were 617.5 in the southwest, 271.9 in the gulf coast, and 213.7 in the southeast.

Demographic information was reported for decedents with death certificates but not for the 28 decedents identified only by the Coast Guard. The majority of the decedents were Caucasian men who drowned while fishing and whose usual occupation was listed as fisherman on the death certificate (Table 1). The average age at death was 31 years (range: 9–75; median: 29). Slightly fewer than half were Alaska residents.

There were two distinct patterns that resulted in the 278 fishing-related deaths. In the first pattern, 188 deaths occurred in 74 incidents involving the loss of the vessel (capsizing, foundering, etc.). Thirty-two of these incidents resulted in a single death; each of the remaining 42 vessel-loss incidents resulted in multiple deaths (156 total). In the second pattern, 79 deaths were not precipitated by vessel loss; these were usually crew members who fell or were swept overboard. For 11 deaths, it was not possible to determine whether a vessel loss occurred.

Of the 278 deaths identified, 109 (39.2%) were identified by standard death certificates, 141 (50.7%) were identified by presumptive death certificates, and 181 (65.1%) were identified by Coast Guard records. Of the 181 cases found in Coast Guard records, 153 were also identified by either a standard or presumptive death certificate. For 28 cases (10.1%), Coast Guard records were the only source of information about the death.

The 5-year average annual fishing-related fatality rate determined from standard death certificate data was 62% lower than that determined from all three sources (Table 2). The greatest difference in rates during a single year occurred in 1983, in which the rate determined from standard death certificates was 81% lower than that determined from all three sources.

**Discussion**

The case ascertainment results indicate that fishing-related deaths in Alaska are severely underestimated by standard death certificates, and that presumptive death certificates and Coast Guard records are useful complementary sources. The use of standard death certificates alone to enumerate fishing-related deaths leads to underestimation for two reasons. First, the "usual" occupation listed on the death certificate may not be fishing-related, as fishing is largely a seasonal occupation in Alaska, and part-time fishermen may have another "usual" occupation (Table 1). Second, many fishing-related deaths are recorded on presumptive death certificates.

Other data sources commonly used to identify occupational injury deaths, such as workers' compensation records, Occupational Safety and Health Administration (OSHA) records, and coroner's reports, were not evaluated in this study for the following reasons: (1) Commercial fishermen are specifically exempt from Alaska's Workers' Compensation Act;<sup>9</sup>

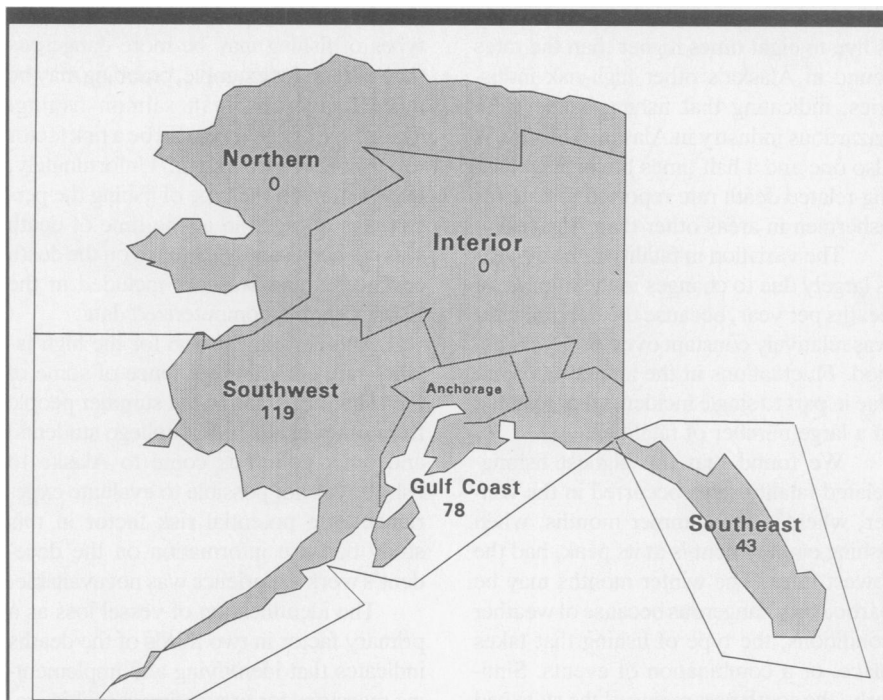


FIGURE 3—Frequency of fishing-related deaths, by region, Alaska, 1980 through 1988.

**TABLE 1—Demographic Characteristics for Decedents with Death Certificates, Fishing-Related Deaths, Alaska, 1980 through 1988 (n = 250)**

	No.	%
<b>Sex</b>		
Male	242	96.8
Female	8	3.2
<b>Race</b>		
Caucasian	191	76.4
Alaska Native	26	10.4
Asian	23	9.2
Other	10	4.0
<b>Residence state<sup>a</sup></b>		
Alaska	123	49.2
Washington	59	23.6
Other state	36	14.4
Other country	27	10.8
<b>Occupation</b>		
Fisherman	202	80.8
Other	48	19.2
<b>Cause of death</b>		
Drowning, submersion, hypothermia/exposure	226	90.4
Other	24	9.6

<sup>a</sup>Missing on five certificates.

**TABLE 2—Annual Fatality Rates Determined from All Sources vs Standard Death Certificates Only, Fishing-Related Deaths, Alaska, 1980 through 1984**

Year	Rate per 100 000 Fishermen	
	All Sources	Standard Death Certificates Only
1980	421.6	92.2
1981	359.6	179.8
1982	219.7	85.4
1983	597.8	112.1
1984	475.5	304.8
5-year average	414.6	155.8

(2) the Coast Guard, not OSHA, has record-keeping responsibilities for occupational injuries on fishing vessels; and (3)

like standard death certificates, coroner's records do not include deaths in which a body is not recovered.

Alaska has the highest occupational injury death rate in the United States, 34.2 deaths per 100 000 workers.<sup>10</sup> The rate for all 50 states combined is 7.8 per 100 000 workers.<sup>10</sup> The three industries with the highest work-related injury death rates in Alaska are transportation, communication, and public utilities (73.1/100 000); mining (53.1/100 000); and construction (49.1/100 000).<sup>5</sup> The average annual fishing-related fatality rate of 414.6 per

100 000 fishermen identified in this study is five to eight times higher than the rates found in Alaska's other high-risk industries, indicating that fishing is the most hazardous industry in Alaska. This rate is also one and a half times the highest fishing-related death rate reported to date for fishermen in areas other than Alaska.<sup>3</sup>

The variation in fatality rates by year is largely due to changes in the number of deaths per year, because the denominator was relatively constant over the 5-year period. Fluctuations in the annual rates are due in part to single incidents that resulted in a large number of fatalities.

We found that the highest fishing-related fatality rates occurred in the winter, whereas the summer months, when fishing employment is at its peak, had the lowest rates. The winter months may be particularly dangerous because of weather conditions, the type of fishing that takes place, or a combination of events. Similarly, the southwest region of the state had a higher fatality rate than the southeast and gulf coast regions. Again, the weather and the type of fishing may work together to make the southwest, which includes the Aleutian Islands and the Bering Sea, more hazardous. Not only does the southwest have severe, unpredictable weather, but this region supports an active crab fishery, which is harvested in the winter.

The high fishing-related fatality rate may result from environmental conditions unique to Alaska that work in concert with the hazards inherent in the fishing industry to produce an extremely dangerous work environment. Short fishing "openings" for particular species of fish may be a factor. Vessels and gear with poor safety design are also possible explanations.

On the basis of an understanding of the intricacies of Alaska's fishing industry and the results from this descriptive study,

one hypothesis proposed is that some types of fishing may be more dangerous than others; for example, crabbing may be more dangerous than salmon fishing. Thus, type of fishing would be a risk factor for fishing-related death. Unfortunately, information on the type of fishing the person was engaged in at the time of death was not consistently included on the death certificates and was not included in the Coast Guard's computerized data.

Another explanation for the high fatality rate is the inexperience of some of the fishermen. During the summer people from other states (often college students) and other countries come to Alaska to fish. It was not possible to evaluate experience as a potential risk factor in this study because information on the decedent's work experience was not available.

The identification of vessel loss as a primary factor in two thirds of the deaths indicates that identifying and implementing measures for preventing casualties related to vessel loss should be a priority. These measures should be directed at ensuring the seaworthiness of vessels and the availability of survival equipment for the crew. Some of these issues are now being addressed by the Commercial Fishing Industry Vessel Safety Act of 1988.<sup>11</sup> This act became effective in 1991 and will continue to be phased in through 1995. The continued compilation of surveillance data on fishing-related deaths will be necessary to help evaluate the effectiveness of this act.

This study emphasizes that fishing is a dangerous industry in Alaska and demonstrates the benefit of using multiple data sources to enumerate fishing-related deaths in the state. The high fishing-related death rates in Alaska warrant further study. The type of fishing and the decedent's work experience may be risk fac-

tors for fishing-related deaths, and future studies should address these issues. In addition, future studies would benefit from updated and detailed denominator data to assist with specific risk identification. □

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