Commercial Aviation

A disproportionate number of all U.S. aircraft crashes occur in Alaska. Between 1990-1999 there were 915 commuter and air taxi crashes in the U.S. (includes only the 50 states and District of Columbia) of which 234 (26%) were fatal, resulting in 708 deaths. Alaska accounted for 357 (39%) of the total U.S. crashes, 55 of which were fatal (24% of the U.S. fatal crashes), resulting in 149 deaths (21% of all U.S. deaths).[32]Alaska's aircraft crash rate (crashes per 100,000 flight hours) for air taxi and general aviation during 1992-1994 was 2.5 times higher than the U.S. average.[33]

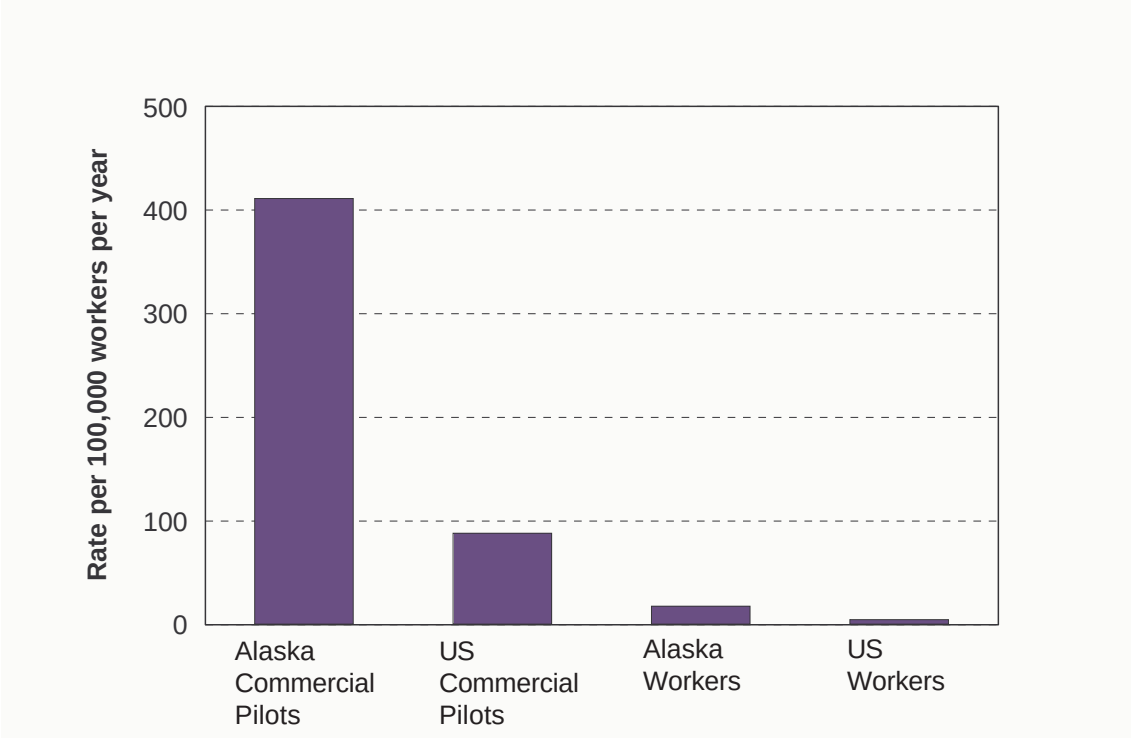
To understand the importance of air transportation in Alaska, some background information on the Alaska environment is needed. With over 586,000 square miles, Alaska has more than twice the land area of Texas and with over 47,000 miles of shoreline, more shoreline than the remaining 49 states combined.[34]It also has 17 of the 20 highest peaks in the U.S., including the highest peak in North America, Mt. McKinley; unfortunately, only 60% of Alaska has radar coverage above 10,000 feet mean sea level.[35]Radar coverage allows aircraft to be seen and followed on a radar screen by air traffic control, and allows for flight in low-visibility conditions.

Even though Alaska is very large, it has only 12,200 miles of public roads, approximately the same mileage as Vermont, a state with less than 2% of the land area of Alaska. Furthermore, 90% of Alaska's communities are not connected to a highway system.[36] That is, even if a road is in place, it may not go any farther than the edge of town or may be an ice road (frozen river or stream) that is only usable during winter. Because of this, commuter and air taxi flights must often serve in lieu of a traditional road system. This makes aircraft essential for personal and commercial transportation of passengers, cargo, and mail to outlying communities.

Photo 16: Aerial view of Alaska

Between 1990-1999, aviation crashes in Alaska caused 106 civilian occupational pilot deaths. (One pilot was killed in an occupational homicide and was not included in this crash analysis.) This is equivalent to 410/100,000 pilots/year, approximately 100 times the mortality rate for all U.S. workers. This rate is higher than for any other occupation in Alaska; the next two highest occupational fatality rates are logging (150/100,000/year) and commercial fishing (124/100,000/year). (See Figure 5 on page 10.) During the 1990s there were a total of 1,684 general and commercial aircraft crashes in Alaska, equivalent to a crash every 2 days. Of these crashes, 188 were fatal and resulted in 402 deaths. On average there were 19 fatal crashes per year with 2 fatalities per crash and 40 fatalities per year, equivalent to a fatality every 9 days.[32]

The pilot fatality rate of 410/100,000/year is nearly five times the rate for all U.S. pilots (80/100,000/year).[37](See Figure 11.) This equates to a 12% cumulative risk for a commercial pilot in Alaska being killed in an aircraft crash over a 30-year career.



AK Pilots (Civilian only): FAA Alaska Flight Standards Division, 1998 (n=2600)
US Commercial Pilots: Bureau of Labor Statistics, 2000
All Alaska: Bureau of Economic Analysis, 2000 (n=366705)
US: 1991-1995 Worker Health Chartbook DHHS (NIOSH) Publication number 2000-127, p.30

Figure 11: Occupational Fatality Rates for Alaska and US Pilots and Workers, 1990-1999

Although Alaska has experienced an overall downward trend in occupational fatalities since 1990 (from 82 fatalities in 1990 to 42 fatalities in 1999, a decrease of 49%), occupational aviation fatalities continue to be a major problem. The work-related deaths resulting from aircraft crashes include pilots and copilots, as well as passengers who fly in order to do their jobs, including biologists, health-care workers, and government employees. During the 1990s, there was a proportional change in occupational fatalities with aircraft crash now the leading cause of death to Alaska's workers. (See Figure 12.)

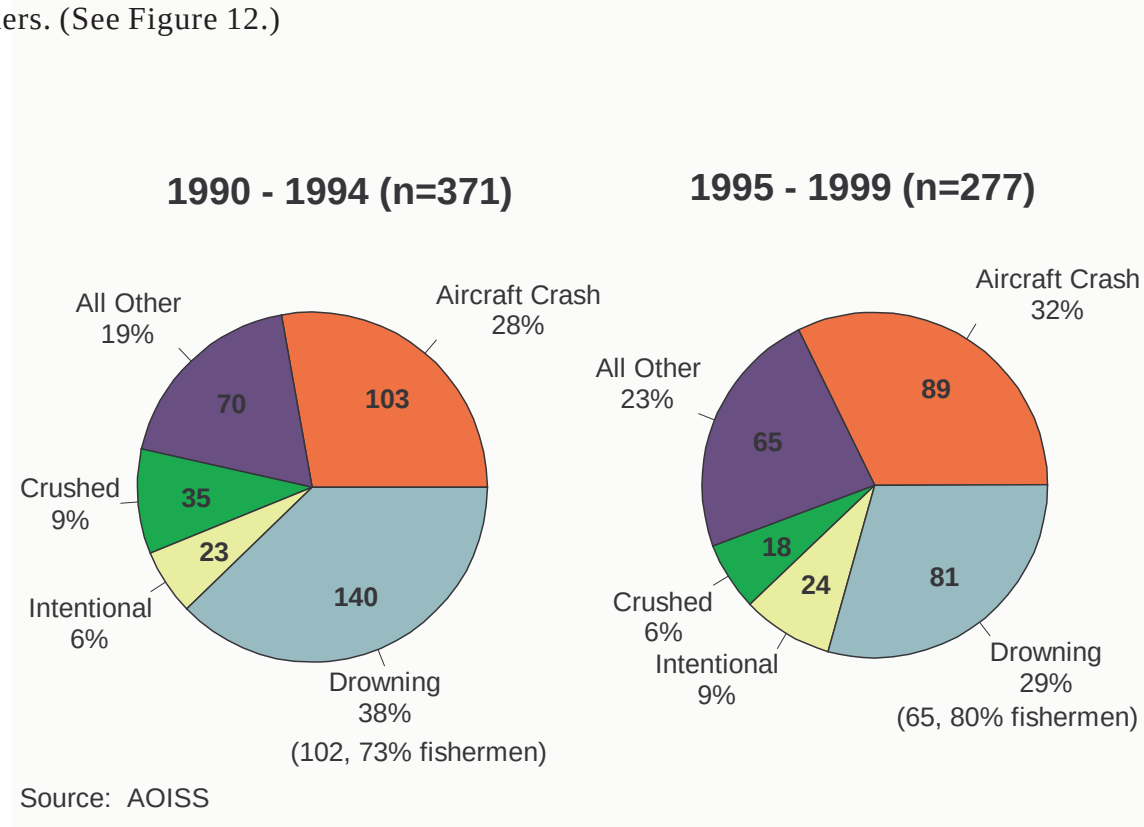


Figure 12: Proportion of Occupational Fatalities in Alaska, 1990-1999

A total of 114 work-related crashes occurred in Alaska from 1990-1999, resulting in 192 fatalities. In this period, 106 civilian pilots and 6 military pilots died in aircraft crashes. Workers from other occupations, who were flying in the course of their work duties, accounted for an additional 80 occupational deaths due to these crashes. Of those, 31 deaths were to military nonpilots and 49 to civilian nonpilots. Twenty-four of the military deaths resulted from one catastrophic crash in 1995. (See Figures 13 and 14.)

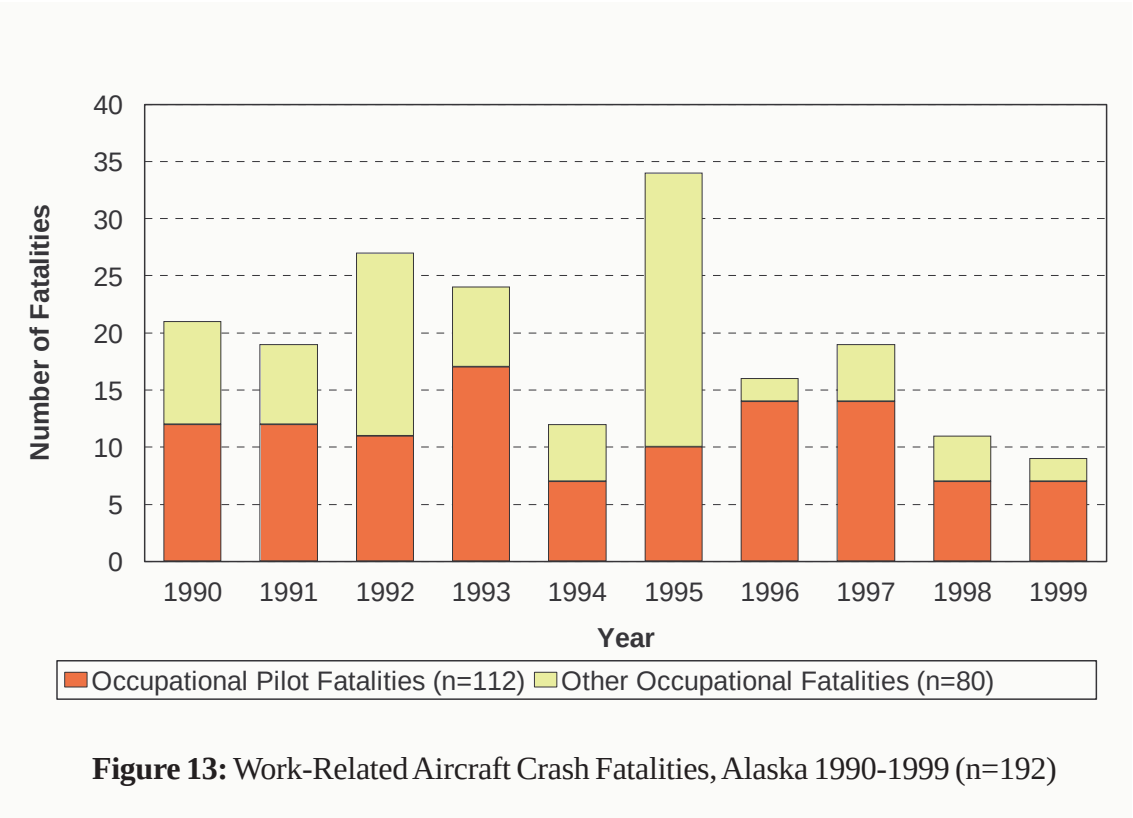


Figure 13: Work-Related Aircraft Crash Fatalities, Alaska 1990-1999 (n=192)

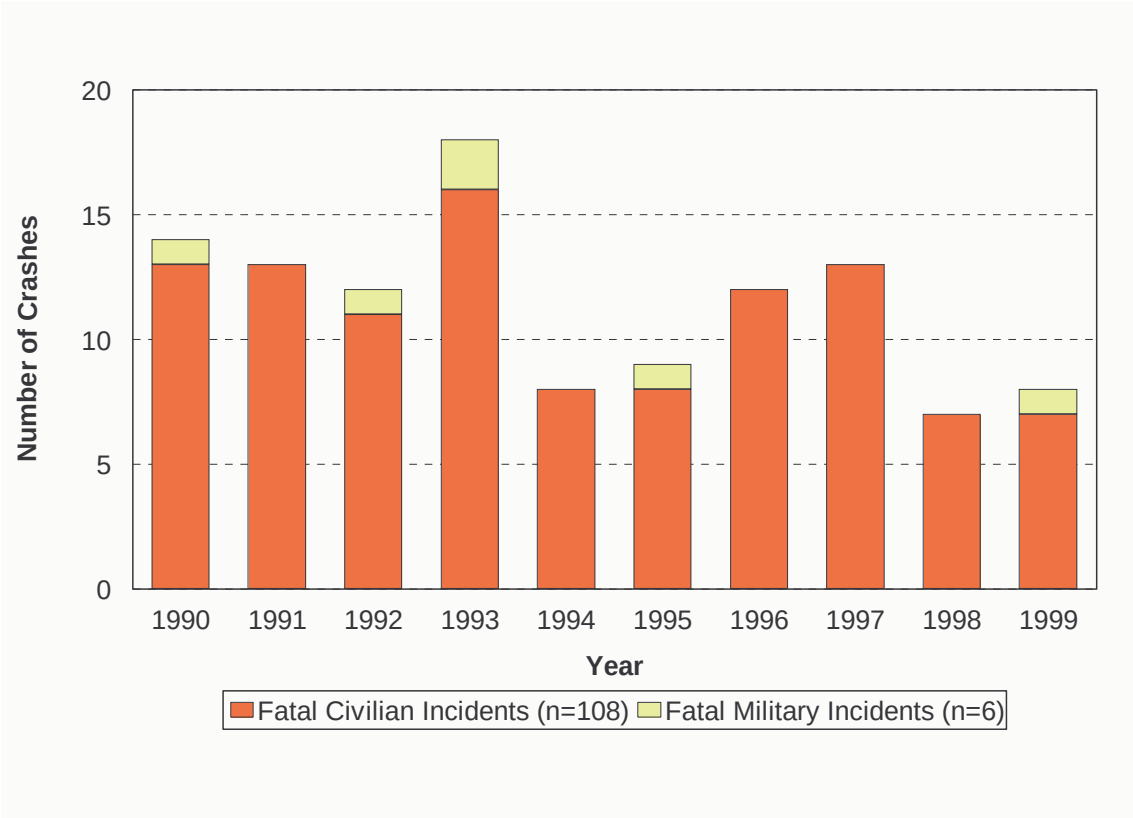


Figure 14: Civilian and Military Work-Related Fatal Aircraft Crashes, Alaska 1990-1999 (n=114)

In addition to the human tragedy which any fatal crash entails, the financial cost to society from these work-related deaths is substantial. For example, with an average of 11 occupational pilot deaths per year in Alaska, the total cost to society is estimated at more than $18 million per year. (Using the cost of injury method includes lost future wages, direct and indirect costs, etc. The total would be much higher if calculated by the more commonly used "willingness to pay" method.)[7]Reducing pilot deaths would also indirectly forestall the costs and increased hazards resulting from the continual loss of experienced and trained pilots in Alaska.

The costs and impacts of these events are not limited to pilots. There are currently an average of 10 nonpilot occupational aircraft crash deaths per year in Alaska, which result in a yearly cost of more than $10 million. There is also an average of 20 nonoccupational aircraft crash deaths per year in Alaska, for a cost of more than $25 million per year. The costs of pilot fatalities, nonpilot occupational fatalities, and nonoccupational fatalities from aviation crashes result in a total yearly cost in Alaska of over $53 million, or over $1.3 million per fatality (using the cost of injury method).

Photo 17: Small aircraft crash site in Alaska

One of the most lethal types of aviation crash is Controlled Flight Into Terrain (CFIT).[38] CFIT is a leading cause of commuter and air taxi aircraft fatalities in Alaska. CFIT crashes are aircraft collisions with land or water in which the pilot was in control of the aircraft (i.e., no detectable mechanical failure or emergency), but had lost situational awareness (i.e., unaware of altitude, terrain elevation, and/or latitude and longitude). Although CFIT represented only 17% of all crashes for 1991-1998 in Alaska, it was responsible for 59% of all commuter and air taxi fatalities. Neither the annual number of commuter and air taxi crashes nor the annual number of CFITs has improved significantly over the past decade.[38] (See Figure 15.)

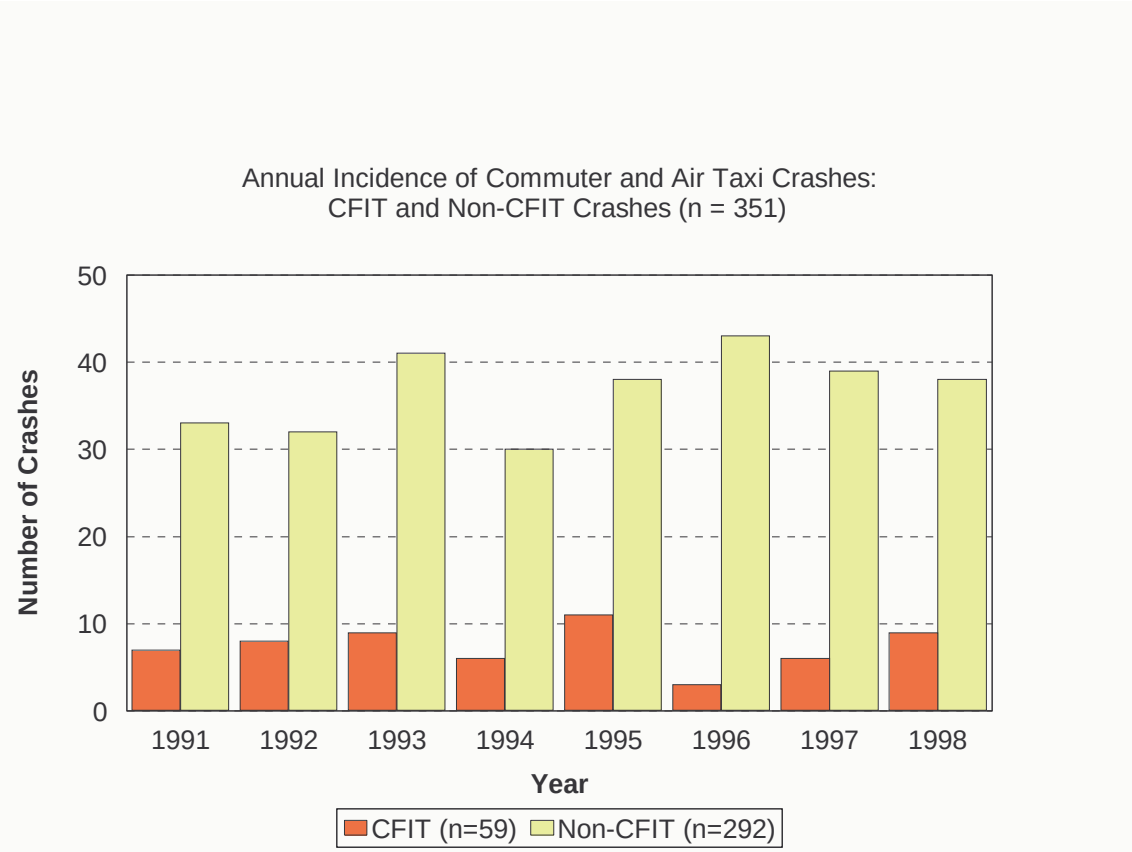


Figure 15: Fixed-Wing, Commuter and Air Taxi Crashes, Alaska 1991-1998

Recent evaluation by NIOSH of work-related crashes occurring in Alaska from 1990-1999 found that 108 nonmilitary work-related crashes resulted in 155 work-related deaths; 106 of these deaths were nonmilitary pilots; 47 (44%) of these pilot deaths were attributed to CFIT.

One contributing factor to CFIT crashes in Alaska is that pilots continue flying itineraries under visual flight rules (VFR) despite poor visibility weather conditions that call for instrument navigation. Visual flight rules pertain when weather conditions allow for a pilot to navigate without instrumentation. The majority of flights in Alaska take place under these conditions. However, operating under instrument flight rules (IFR) may be needed if a pilot flies into reduced visibility weather in instrument meteorological conditions (IMC). Legal instrument flying requires advanced training, an instrument rating, and sophisticated avionic equipment. It further requires that a pilot file a flight plan, and that while in transit, he or she stay in communication with air traffic control. Of the 49 fatal CFIT crashes that occurred from 1990-1999, 29 (59%) were attributed to pilots on VFR-only flights entering instrument meteorological conditions. These 29 crashes resulted in 47 (63%) of the work-related deaths.

The high occupational pilot fatality rate in Alaska and the high fatality rate associated with CFIT crashes reinforce the importance of addressing this type of crash and examining the associated risk factors. Understanding the factors that result in a pilot flying a well-functioning aircraft into the ground due to inappropriate or poor decision making and/or inadequate situational information could help in the design of appropriate training programs and other interventions. This could ultimately result in a major reduction of commercial aviation fatalities.

Other possible interventions for human factors that could help reduce the number of occupational aviation fatalities in Alaska include expanded decision-making training for pilots; strengthened company operational procedures, including management involvement in go/no-go decision making; improved methodology to assess personal and operational pressures to proceed in poor flight conditions; Alaska-specific training for pilots new to the area; and flight schedules that allow for adequate rest for all flight staff.

Technological improvements that could result in fewer aviation deaths for Alaska workers include expansion of navigational aids and weather reporting systems to reduce the likelihood of encountering unexpected weather. Improvements can also be made in the area of aviation technology to aid navigation in reduced visibility weather, through global positioning systems, ground proximity warning systems, and ground collision avoidance systems.

Unfortunately, although mortality due to crashes of fixed-wing aircraft showed modest decreases for Alaska workers in 1997-1999, it persists as the leading cause of death for Alaska workers and is now a major area of concentration. Investigative and interagency efforts among the Federal Aviation Administration, National Transportation Safety Board, and NIOSH have clarified some of the major risk factors for these events: while a single catastrophic crash of a United States Air Force E3 Airborne Warning and Control Systems (AWACS) aircraft at Elmendorf Air Force Base in September 1995 cost 24 lives, the great majority of aviation-related occupational mortality occurs in small, fixed-wing single-engine aircraft flying unscheduled (air taxi, CFR Part 135) itineraries. The Alaska Interagency Working Group for the Prevention of Occupational Injuries Aviation Committee is currently working on collaborative studies of crashes of single-engine, fixed-

wing aircraft, and is mounting a major initiative in this area. The FAA also implemented the Capstone Program in Southwestern Alaska to determine if the application of global positioning system technologies can be effective in preventing some of these incidents. To help confront the issues associated with aviation in Alaska and to establish interventions, detailed analyses of crash data, collaborations with aircraft operators, and evaluation of new technologies are currently underway.

Photo 18: Aerial view over Alaska illustrating VFR conditions at lower altitudes, IMC above