



Bulletin No. 13

July 12, 1985

## The Causes of Accidents in General Aviation in Alaska 1963-1981

In 1983 with the support of the Federal Aviation Administration (FAA) and National Transportation Safety Board (NTSB), the Epidemiology Office initiated a major investigation to describe the epidemiology of general aviation accidents in Alaska, 1963-1981. During this 19-year period, the FAA and NTSB investigated and reported on 3,887 general aviation accidents in Alaska, 513 of them fatal, that involved 11,072 individuals and 1,366 fatalities.

Aircraft accidents showed a striking seasonal distribution with the majority of accidents occurring in the months of June through September. Although the largest numbers of accidents and fatalities occurred in pilot age groups 25-29 through 35-39, accident and fatality rates did not vary greatly between pilot age groups 20-24 through 55-59. Older pilots had a greater proportion of fatal accidents.

Accidents occurred most frequently in and near Anchorage (11.8%), Fairbanks (5.5%), Kenai (3.1%), Palmer (2.1%), and Talkeetna (1.9%). Fatal crashes occurred most frequently in and near Anchorage (11.4%), Fairbanks (4.9%), Palmer (3.3%), Kenai (3.1%) and Juneau (3.0%). However, the proportion of fatal crashes to total accidents was highest in and near Juneau (30.6%), followed by Ketchikan (22%), Palmer (20.5%), Cordova (16.7%), and Bettles (15.9%). The top 25 locations accounted for 238 of the 513 (46%) fatal crashes and 1,900 of the 3,883 (48.9%) of the total accidents.

Of the major risk factors associated with general aviation accidents, total number of flying hours and total number of flying hours in the type of aircraft that crashed were of striking importance. Of 3805 aviation accidents, 1332 (35.0%) occurred in the first 500 hours of total flight time of the pilot and 348 (9.2%) occurred during the first 100 hours of flight time. Of 3623 accidents, 1893 (52.3%) occurred in the first 500 hours in type and 1367 (37.7%) occurred in the first 100 hours in type. Of 360 fatal accidents, 167 (46.4%) occurred in the first 50 hours in type.

Analysis of accident experience taking into account both number of hours in type and number of total hours of flying time strongly suggests that experienced pilots are at high risk of accidents when flying a new aircraft regardless of the total numbers of hours of aviation experience. A striking correlation was found between accident index and number of total hours and number of hours in type, suggesting a very narrow margin separating fatal crashes from crashes with damage to the aircraft but no injury. The proportion of fatal accidents increased as the total flight hours of experience increased ( $p=2.418 \times 10^{-4}$ ).

A total of 12,426 cause factors were identified as contributing to the 3,887 accidents. For both fatal accidents and total number of accidents the leading cause factor categories were similar - pilot, weather, terrain, and miscellaneous. Pilot factors were most frequently cited in fatal (41.8%) and total (41.2%) accidents. From all categories, the leading cause factors were: selected unsuitable terrain (5.2%), inadequate pre-flight preparation and/or planning (4.4%), and failure to obtain/maintain flying speed (4.2%), overload failure (3.5%), aircraft came to rest in water (2.5%).

Fixed-winged aircraft accounted for 3,567 (91.8%) of all accidents. Fixed-winged aircraft with fixed tail wheels accounted for 1,241 (31.9%), with tricycle gear-fixed 533 (13.7%), with floats for 505 (13.0%), with skis for 313 (8.1%). Rotorcraft accounted for 313 (8.1%) of all accidents. Of all accidents 2,352 (62.5%) involved noncommercial flying, 2,284 (60.7%) aircraft were privately owned, and 938 (24.5%) were owned by airtaxi operators. Among all accidents, 1,979 (52.6%) involved pleasure flying, 697 (18.5%) were airtaxi passenger operations, and 158 (4.2%) involved airtaxi cargo.

Flying at night was strongly associated with an increased risk of a fatal accident compared to other light conditions ( $p=1.0 \times 10^{-9}$ ). Helicopter flying was more strongly associated with injury than flying with floats or skis ( $p=4.39 \times 10^{-4}$ ). Flying associated with hunting was more likely than other types of flying to be associated with a fatal accident ( $p=1.374 \times 10^{-6}$ ). Toxicology data from postmortem examination were available on only 309 of the 3,887 pilots during the 19 year time period; 13 pilots had carboxyhemoglobin levels of greater than 10%, 9 had drugs present, and 36 had alcohol present.

Private owners had a lower fatality rate, (11.2%) than airtaxi operators (15.5%  $p=0.001$ ). Cause factors differed in their distribution between airtaxi and pleasure operators. Pilot factors and terrain factors were significantly less frequently associated with accidents among air taxi operators than pleasure operators. Weather and personnel were more significantly associated with accidents among airtaxi operators than pleasure operators.

Accident rates and fatality rates by make and model of aircraft have been determined. As a group, rotorcraft have higher fatality and accident rates than fixed-wing aircraft. Additional analyses will be performed on this data base in the future as the investigation continues. The identification of risk factors associated with general aviation accidents will allow for targeted strategies to reduce injuries, fatalities, and damage. Aviation accidents are not distributed randomly and unpredictably; they are associated with identifiable risk factors that hold the key and promise of successful intervention and prevention.

(Acknowledgements: Dorothy Henning, Carol Floyd, Aviation Accident Data Officers, NTSB, Washington, D.C.; Gene Morris (retired), Tom Westall, Frank Cunningham, Don Keil, Jack Hepler, M.D., FAA, Anchorage; Dr. Charles F. Booze, Jr., Chief, Medical Statistics Section, Jim Yoder, Systems Analyst, FAA, Oklahoma City; Curvin Metzler, Diane Ingle, Eitel Dunaway, Epidemiology Office)

	FATAL		SERIOUS		MINOR		NO INJURY		TOTAL
Crashes	513	(13.2)	294	(7.6)	525	(13.5)	2,555	(65.7)	3,887
Persons	1,366	(12.3)	653	(5.9)	1,038	(9.4)	8,015	(72.4)	11,072
People/Crash	2.7		2.2		2.0		3.1		2.8

**General Aviation, Alaska 1963-1981  
Cause Factors By Accident Index**

Fatal (N=1,765)			Total (N=12,426)	
Pilot	(41.8)		Pilot	(41.2)
Weather	(22.0)		Miscellaneous	(21.8)
Miscellaneous	(18.8)		Weather	(10.8)
Terrain	(4.5)		Terrain	(10.4)
Personnel	(4.4)		Airports/Airways, Facilities -	(4.6)
Miscellaneous	(4.1)		Powerplants (Reciprocating)	(3.1)
Powerplants (Reciprocating)	(1.6)		Personnel	(3.0)
Airframe	(0.8)		Miscellaneous	(1.9)
Rotorcraft	(0.7)		Airframe	(1.9)
Airports/Airways, Facilities -	(0.6)		Systems	(0.4)
Systems	(0.3)		Rotocraft	(0.4)
Dual Student	(0.2)		Dual Student	(0.3)
Co-pilot	(0.2)		Co-pilot	(0.2)
Instruments/ Equipment and Accessories -	(0.2)		Instruments/ Equipment and Accessories -	(0.2)
Check Pilot	(0)		Check Pilot	(0.1)