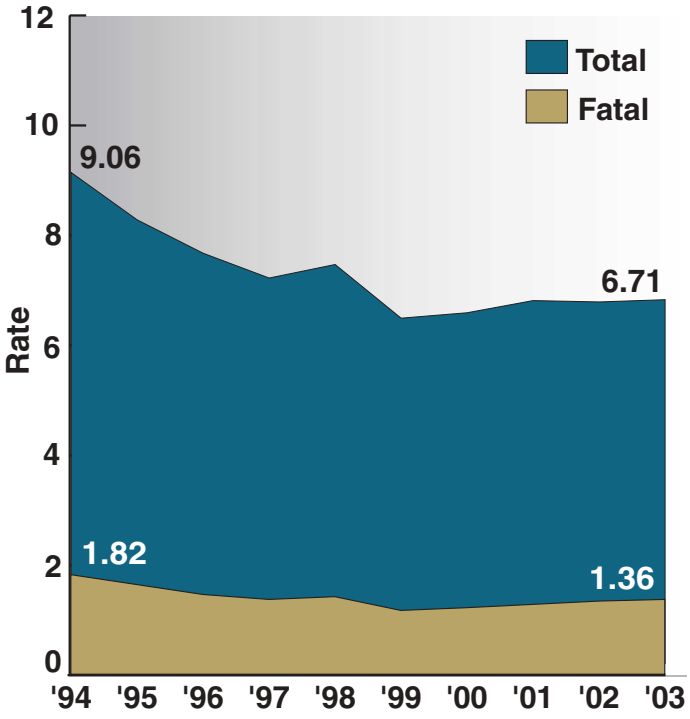
General Aviation Accidents 10-Year Trend

How safe is flight in today's general aviation America and where is it headed? According to the NTSB, 2004 was the safest year on record—but looking at a single year is not descriptive of the safety picture. Even a few years doesn't necessarily tell the full story.

For this special report the AOPA Air Safety Foundation (ASF) looked at ten years of accidents (1994 to 2003) to generate some perspective. There are some things to be pleased about and a few areas that still need work. The numbers are derived from a subset of NTSB reports in the ASF accident database and include only fixed-wing aircraft weighing less than 12,500 pounds or, in other words, the kind of aircraft most GA pilots fly.

Figure 1: Accidents per 100,000 Flight Hours



The total accident rate per 100,000 flight hours decreased 25.3 percent since 1994 (9.06 vs. 6.77) while the fatal accident rate per 100,000 hours also decreased nearly as much—24.7 percent during the same period (1.82 vs. 1.37)(figure 1).

Note: The charts contained in this Special Report contain linear trend lines (green for total and red for fatal). Linear trend lines are meant to show the *general* direction (up or down) that a set of data points is heading.

The hours flown is a best guess derived from an annual survey taken by FAA. However, there has been a slight accident rate increase over the past several years that is measured in hundredths of an accident. This implies a level of accuracy that just doesn't exist with today's tools. The general observation is that accident trends move very slowly—gaining a little here, losing a little there. That's why a long look is really the only way to get an accurate picture and then decide how to invest your safety resources.

Accident Categories

Takeoff

Phase of flight is one way to categorize where accidents occur and then drill down to actual causal factors. There was a slight uptick in takeoff and climb accidents in both fatal and nonfatal categories. In total accidents this accounts for about 20 percent of all accidents and a little less than that for fatals (figure 2).

Figure 2: Takeoff/Climb Accidents

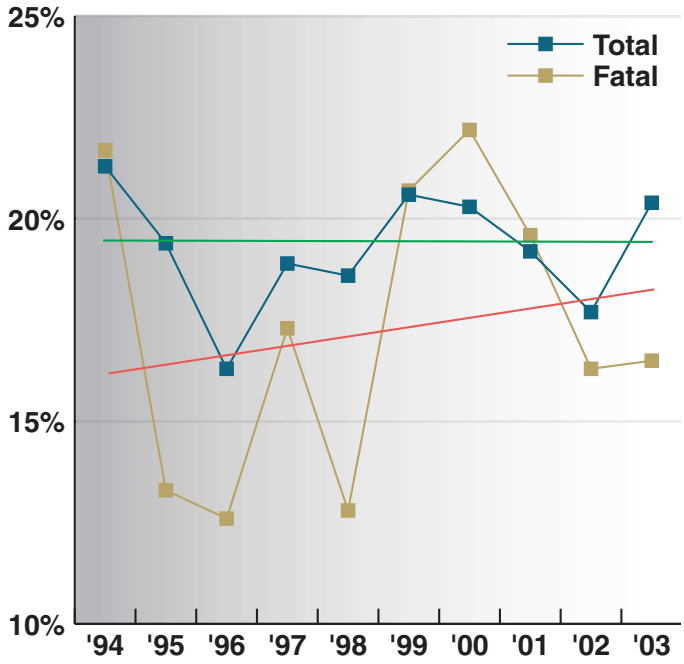
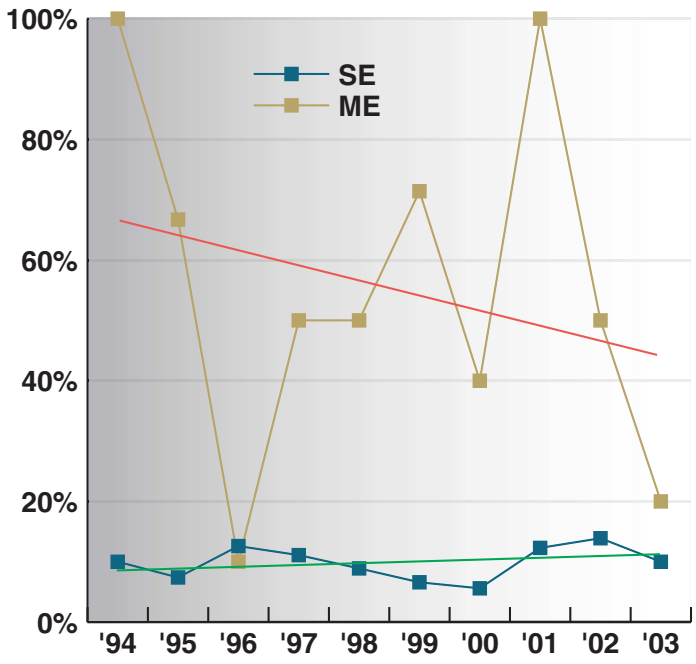


Figure 3: Engine Failure Accident Lethality



It's logical that this would be a problem area because there is frequently little altitude or time to solve a problem or to maneuver. Regardless of whether it is a mechanical failure or pilot-induced, time, airspeed and altitude are all in short supply. In any event, it's essential to have a contingency plan in the event of a power loss at a critical time.

Engine Failures

With engine failures, basic statistics tell the story. There are far more single-engine accidents because a lot more singles are flying and, if the engine stops, an accident or at least an off-airport landing is a high probability. In multiengine aircraft there are very few accidents and we have no record of how many engine failures there are when the aircraft landed safely. However in those incidents where a twin does have an accident it is much more likely to be fatal. The "lethality index" or percentage of accidents that result in death in singles is about one in 10 while in twins it runs in the 50-percent range or one out of two. The bigger they are, the harder they fall, and that's why so much multiengine training is devoted to single-engine operations (figure 3).

Fuel Management

It's amazing that fuel management still occupies a significant line item in the statistics. In 1994, just over 14 percent of the accidents involved attempting to run an engine on pure air, and by 2003 the number had only dropped to 12.8 percent (figure 4). New production aircraft are doing better in this category and the gold star goes to Cessna, whose new production singles—more than 5,000 built since 1995 when they completely redesigned the low-fuel-warning system—have not had a single fuel mismanagement accident.

Weather

Accidents involving poor weather decision making remain essentially flat, accounting for about four percent of the total and 14 percent of the fatal mishaps. Much has been

Figure 4: Fuel Management Accidents

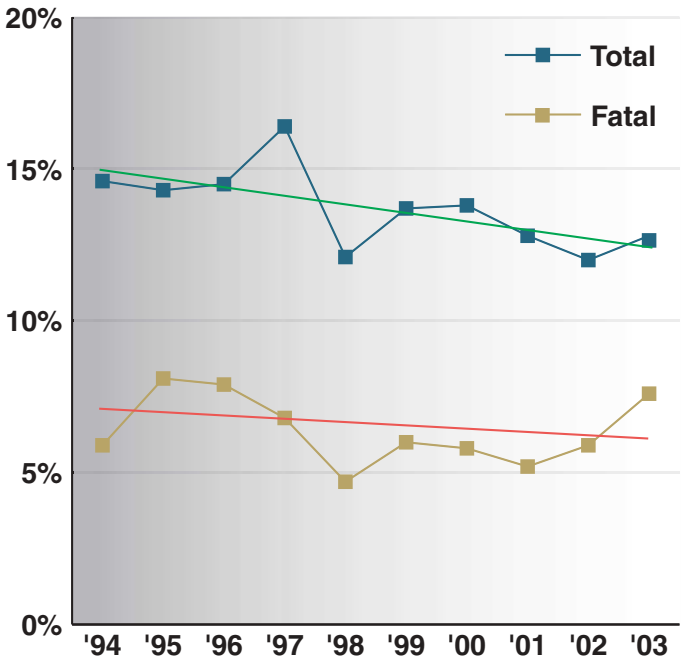
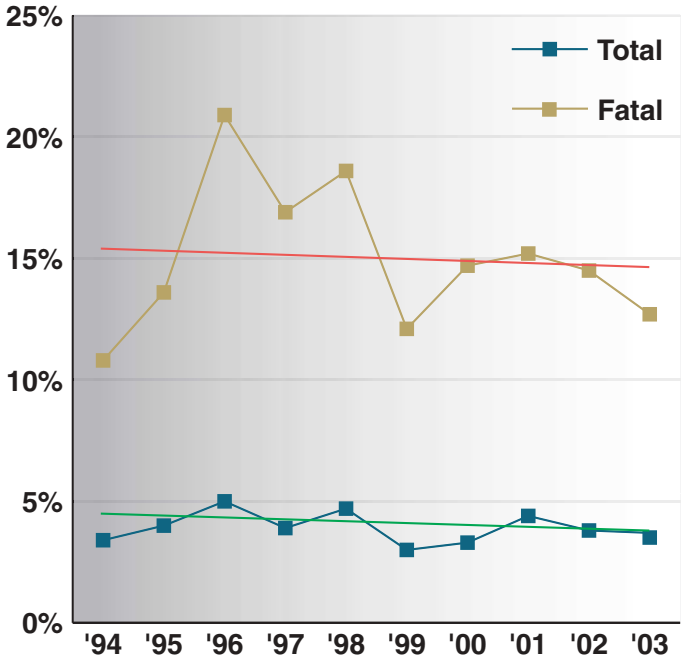


Figure 5: Weather Accidents



written about this, and while weather information has been gradually getting better, weather is still a major impediment to reliable cross-country flight. The FAA, National Weather Service, AOPA Air Safety Foundation, and NTSB have, and will continue to, put emphasis on improving forecasts, education, and pilot decision making. For GA pilots, there is much to learn since most of our aircraft—or for many, our pilot skills—are just not very weather tolerant (figure 5).

Figure 6: Descent/Approach Accidents

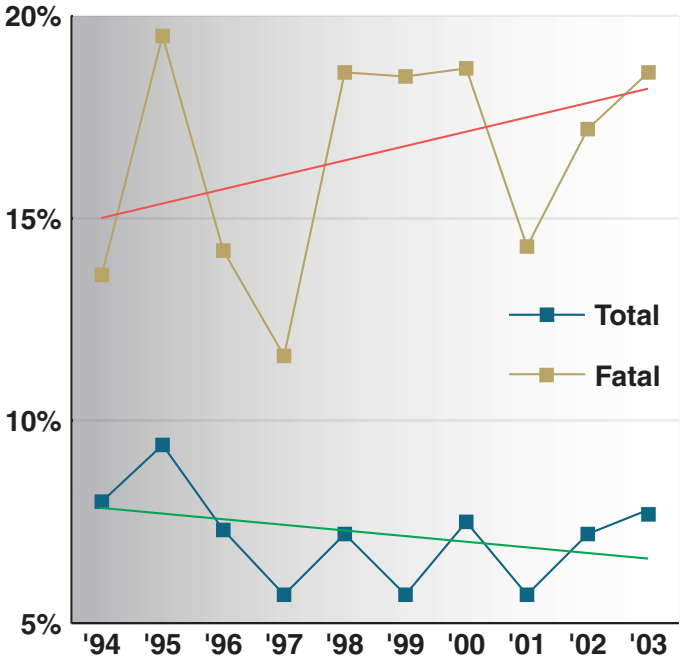
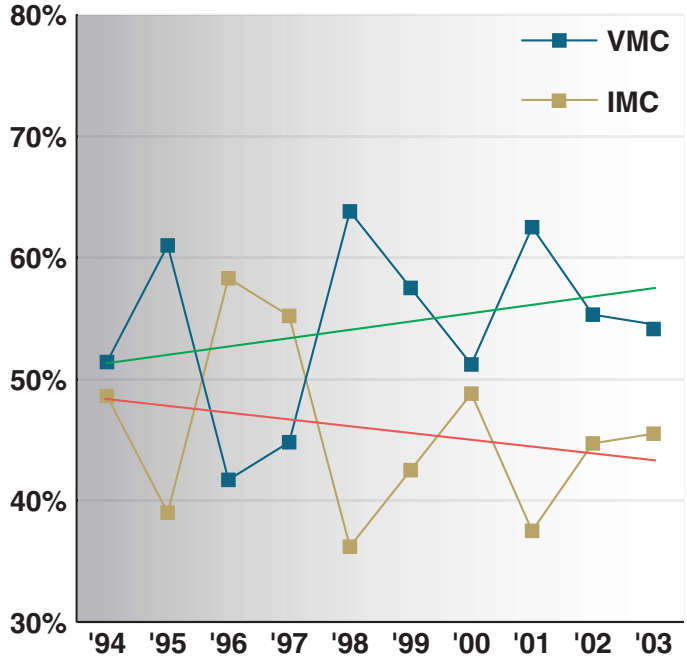


Figure 7: Descent/Approach Accidents: Basic Weather



Bad approaches, both VFR and in instrument meteorological conditions (IMC) continue (figure 6).

While VFR accident numbers and percentages have always been the higher of the two, there are relatively few IFR approaches as a denominator, so this has to rank as a high-risk category. Failure to follow procedures, and difficulty in believing that minimums really mean just that, are frequent probable causes. The

Figure 8: Descent/Approach Accidents: Light Conditions

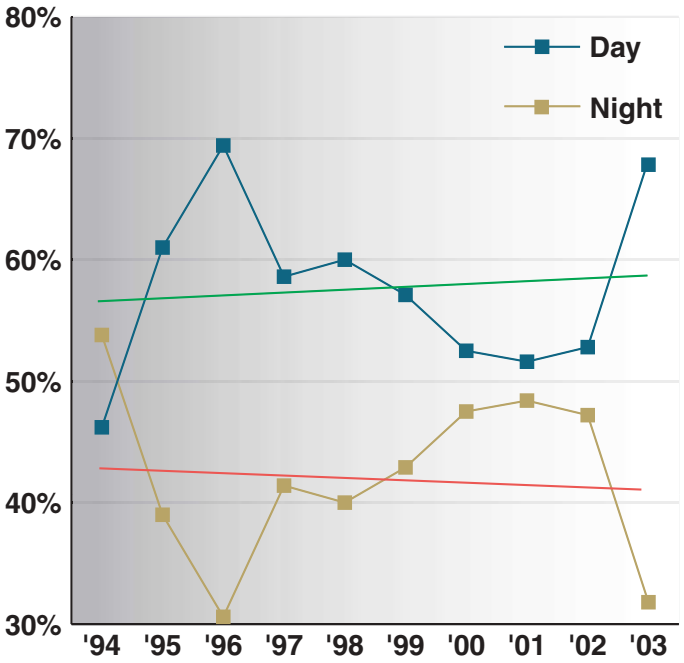


Figure 9: Go-around Accidents

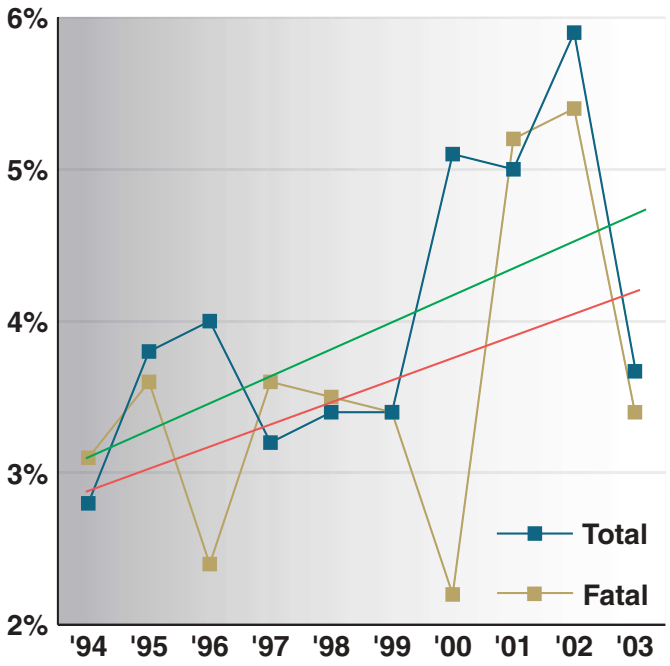
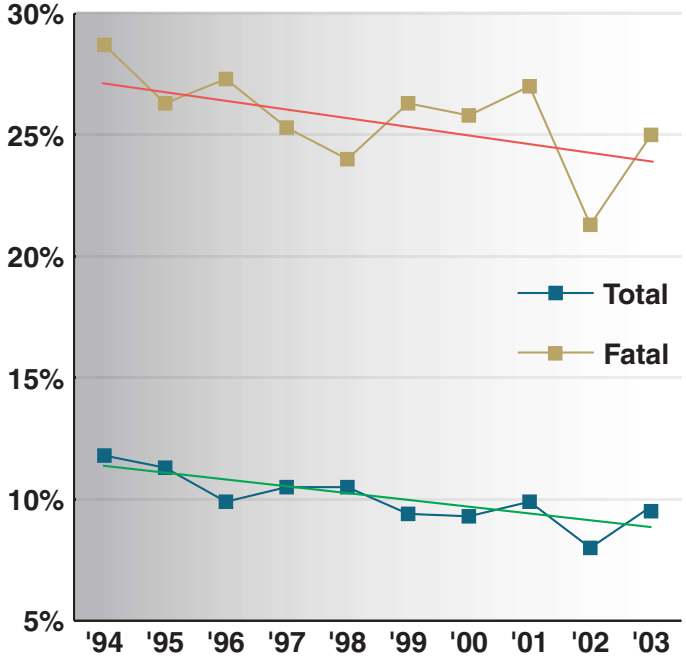


Figure 10: Maneuvering Accidents



regression lines since 1994 show a marginal improvement in IFR but this is an area where ASF will put additional resources (figure 7).

Identical comments apply to day and night approaches, although in 2003 there was real percentage spike in daylight accidents. Night flying is much more dangerous on a per-approach basis. There is no explanation for the spike, which confirms our belief that looking at single year is almost guaranteed to mislead (figure 8).

Go-around

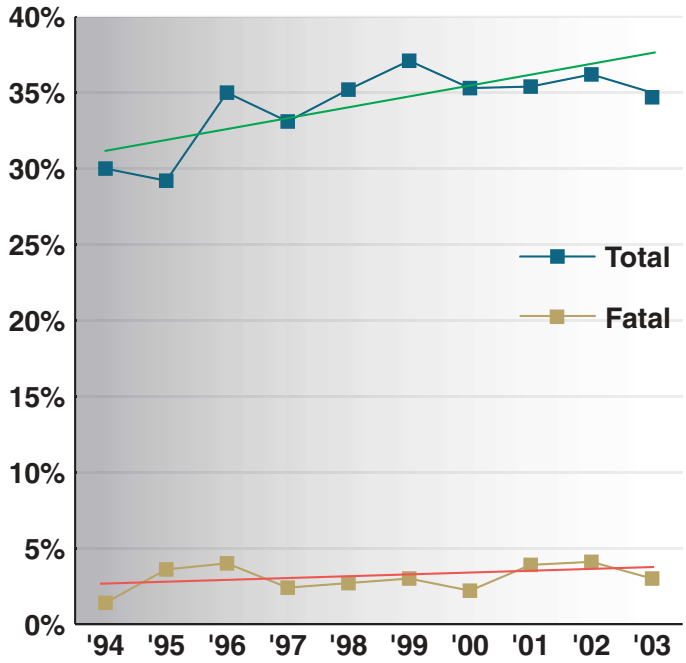
Accidents that occur during go-around remain stubbornly at roughly four percent for both total and fatal mishaps. Our observation is that some pilots lack basic physical aircraft handling skills and this maneuver is seldom practiced (figure 9).

Maneuvering Flight

Low-level maneuvering flight is a catch-all category for stall-spin accidents, the low pass, an attempt to return to the runway after an engine failure, poorly-executed aerobatics, and the like. It accounts for nearly 30 percent of the fatal accidents and around 10 percent of the total accidents. It is the leading phase of flight for fatal mishaps. ASF has produced several seminars and a DVD program on the topic to educate pilots on the hazards and the common sense approaches to avoid becoming a victim. This category is gradually declining with fatal maneuvering accidents down from 28 percent in 1994 to 25 percent in 2003. This is an area that clearly needs more emphasis (figure 10).

Every flight ends in a landing and some just aren't very successful. Unfortunately, the total trend is up and landing accidents continue to account for more than 30 percent of the total but only about three percent of the fatals (figure 11). (See "Safety Pilot: Unhappy Landings," AOPA Pilot, March 2005.) More accidents occur

Figure 11: Landing Accidents



during landing than any other phase of flight. It's been said that perfect landings are easy; it's just that nobody knows the secret. Low-time pilots and those new to a particular model of aircraft are the most vulnerable.

There are no surprises when pitting man against machine. Machine wins every time and, in rough terms, pilot-causal factors compared to equipment failure average three or four to one. Stated another way, between 70 and 80 percent of all accidents are attributed to the pilot. The hardware is very reliable, if you maintain it properly. The reason is simple—when a particular part of an aircraft consistently malfunctions, it gets fixed or replaced through service bulletins or airworthiness directives. Unfortunately, we can't re-engineer pilots nearly as efficiently. Human problem areas are consistent and persistent, with slow improvement.

GA safety continues an evolutionary improvement. Technology and training are gradually improving the record. Arrival of new technologically advanced aircraft and some of the retrofit equipment may make a difference, although it's too soon to tell. Pilot proficiency remains essential: So, in the meanwhile, fly as though your life depends upon skill and judgment—it does.

Safe Pilots. Safe Skies.

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