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GA Safety Trends: What Should We Worry About?

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FAA regulations are written in blood, according to the cliche, but it doesn't seem like flight training reacts to accidents quite so consistently. That's a mistake. While being a good pilot means more than just avoiding an accident, that goal is certainly a good place to start. An effective flight instructor should teach students how to avoid the mistakes of the past, and a realistic pilot should understand not merely what's scary but what's most likely to go wrong.

That mindset is what makes accident statistics so valuable, and the recently released Nall Report from the AOPA Air Safety Institute is a gold mine for anyone seeking to learn from such data. AOPA is to be congratulated for putting so much effort into this report, which organizes the sometimes-messy NTSB database into a readable format. AOPA presents preliminary data for 2019 and 2020, but the final data is only available through 2018. That delay is frustrating in the age of daily COVID dashboards and real time analytics, but it's the best we have. I urge you to read the report(https://www.aopa.org/training-and-safety/air-safety-institute/accident-analysis/joseph-t-nall-report/nall-report-figure-view?category=all&year=2018&condition=all&report=true).

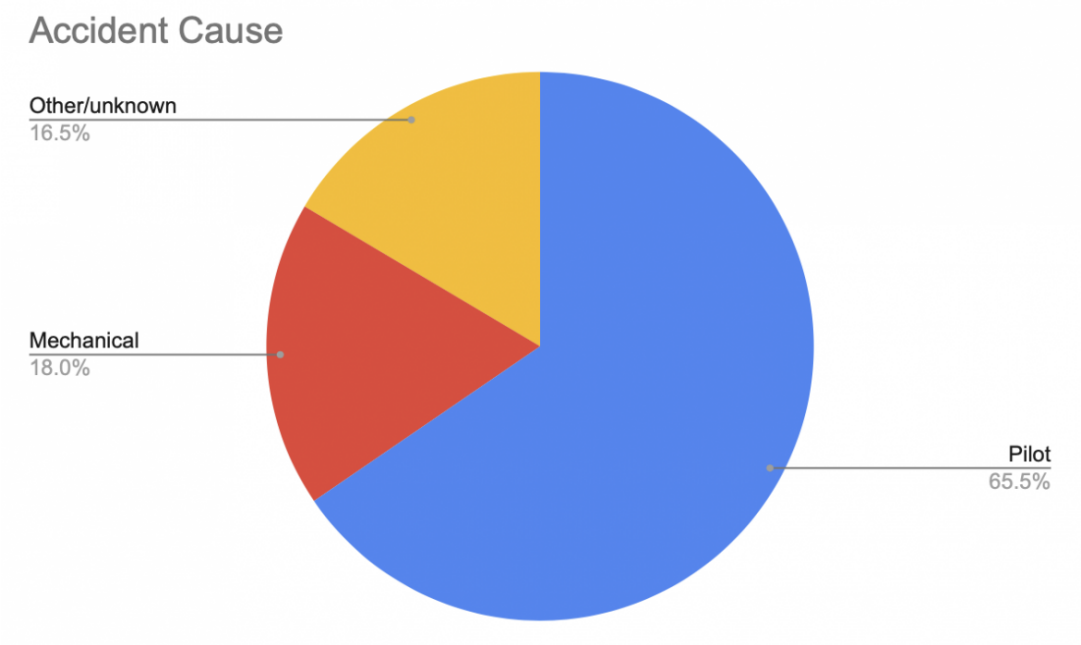
General trends

The good news is that general aviation flying is getting safer. Accidents through 2018 are essentially flat over the preceding four years: about 1200 accidents per year and 200 fatal accidents per year. However, the *rate* of accidents, which adjusts for hours flown, was down 13% over the last five years. This is encouraging, but such calculations depend heavily on that "hours flown" number, which is notoriously noisy.

That overall rate will attract most of the headlines, especially for anyone trying to promote GA to a wider audience, but for active pilots the details are much more informative. In particular, there's a lot to learn by looking at non-commercial fixed wing, the type of flying most Air Facts readers do—and unfortunately where most accidents occur.

The first question to answer is, what is a typical accident? Obviously the details vary widely, but it's important to understand what types of pilots, airplanes, and weather conditions show up most often.

- *Cause:* 66% of accidents are pilot-related, 18% are mechanical, and 16% are other or unknown.
- *Airplane:* 68% of accidents are in single-engine fixed-gear, although retractables and multiengine airplanes are involved in comparatively more fatal accidents.
- *Mission:* personal flights account for 74% of accidents and 81% of fatal accidents.
- *Weather:* day VMC accounts for 86% of accidents and 67% of fatal accidents. IMC and night are more likely to be fatal, but they are still relatively small numbers.
- *Pilot:* This varies more than the others, but Private pilots account for 47%, Commercial for 24%, and ATPs for 15%. 55% of accidents had an IFR pilot on board.



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What are the main takeaways from this raw data? First, safety is up to all of us—accidents are usually caused by the pilot, not the airplane, and that pilot isn't just a student or VFR-only pilot. We are all fallible. Second, we should focus on everyday accidents, which means pilots flying single-engine fixed-gear airplanes in day VMC conditions on personal flights. The "dark and stormy night" happens, but it's relatively rare in the NTSB database.

To me, these two points are a reminder to bring the same safety attitude to the left seat, no matter what the mission or the weather. As Richard Collins always said, "no matter how many hours are in your logbook, it's only the next hour that counts." Amen.

Which phase of flight is most dangerous?

Diving deeper, there are plenty of lessons to be learned and changes to consider for our flight training curricula. When reading the data, I like to ask myself if any of it proves or disproves the various rules of thumb we all carry around in our heads. For example, I've been told to "pay attention on that base-to-final turn because most stalls happen there." Or, "most engine failures are survivable." Are these true?

Looking at 2018 statistics, the first thing that stands out is landing accidents: 47% of pilot-related accidents are in this phase. Fortunately, 99% of these are not fatal, but they destroy airplanes, shatter confidence, and increase insurance premiums

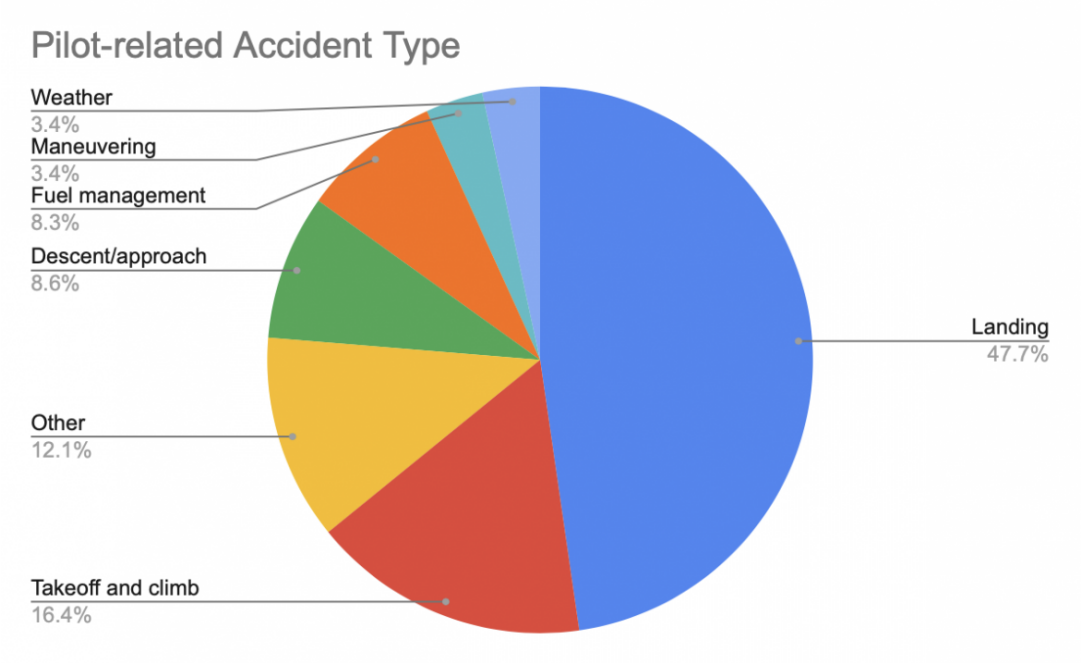
for the rest of us. They are also getting more frequent lately, so I think it's unwise to ignore these "fender benders."

A landing accident often means loss of control, such as a runway excursion or ground loop. Tailwheel airplanes, as you might expect, are disproportionately represented here (and AOPA has done a great job of splitting this category out). Stalls are the second most common landing accident, followed by hard landings. Relatively few are due to short or contaminated runways.

All of these scenarios sound boring, but that's precisely because they are so common. It's clear that if you had to pick one skill to improve, it should be landing. Practice slow flight, get proficient at flying a consistent airspeed on final, and understand when to go around. More than anything, stay current and don't allow yourself to go months between flights (especially if you fly a tailwheel airplane). Many accident reports involve pilots who were barely proficient, trying to land airplanes in gusty winds or on unfamiliar runways.

By contrast, takeoff accidents are three times less common than landing accidents, but over 20 times more likely to be fatal. In fact, this is statistically the most dangerous phase of flight (according to 2018 data), because there's simply no margin for error and no chance to try again. Takeoff accidents are most often some type of loss of control, either a runway excursion or a stall on takeoff. Density altitude, weight and balance, and pilot technique all come into play here.

Takeoff accidents deserve far more attention than the dreaded base-to-final turn, at least according to the NTSB reports. Some ways to improve this disappointing record include: setting conservative personal minimums for takeoff performance, conducting thorough pre-takeoff briefings on every flight, and focusing on crosswind takeoff skills as much as crosswind landing skills.



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Next up on the list of most common causes of pilot-related accidents is descent and approach, and these are rising—they are at the highest level in 10 years. Stall/spin scenarios account for the most fatal accidents, but note that, as mentioned above, the takeoff and climb phase had more stall accidents than descent and approach. One other threat to consider is collisions, which account for the most overall accidents in this phase of flight. This is a reminder that entering the pattern at a non-towered airport requires standard procedures and eyes outside, maybe even a touch of paranoia.

Fuel management, a persistent problem for general aviation pilots, checks in at number four on the list of pilot-related accident causes. This trend has been improving in recent years, and 2018 had the second-fewest fuel management accidents in the last 10 years, so perhaps newer technology like fuel totalizers, iPad planning apps, and glass cockpits with range rings are helping pilots make better decisions. Still, over 50 pilots bend airplanes and around a half dozen are killed every year due to this eminently preventable problem (fuel contamination is exceedingly rare). In roughly 60% of cases, the pilot simply ran out of fuel, due to poor planning or inadequate in-flight decision-making. Roughly 40% of accidents were caused by fuel starvation, where the airplane had usable fuel but the pilot did not get it to the engine.

Maneuvering flight has received lots of attention over the last few years, both from AOPA and the FAA. That focus might be paying off: accidents in this category are down 50% over the last five years, and fatals are down over 50% as well. But 2018

may be an anomaly here, as it was down dramatically from the previous few years. We'll have to see what future reports show.

Maneuvering flight might not mean what you might think it does. Over half of the accidents involve wires or terrain, and almost half of the airplanes in these accidents were taildraggers. Might this include some "bush pilots" goofing off at low altitude?

Finally, we come to weather accidents, the subject of many articles, videos, and seminars. The good news is the accident rate in this category continues to decline, down 65% from 10 years ago and 41% from 5 years ago. It's possible the wide availability of datalink weather is helping pilots make safer decisions, or it's possible weather forecasts are improving. There certainly are more tools than ever before.

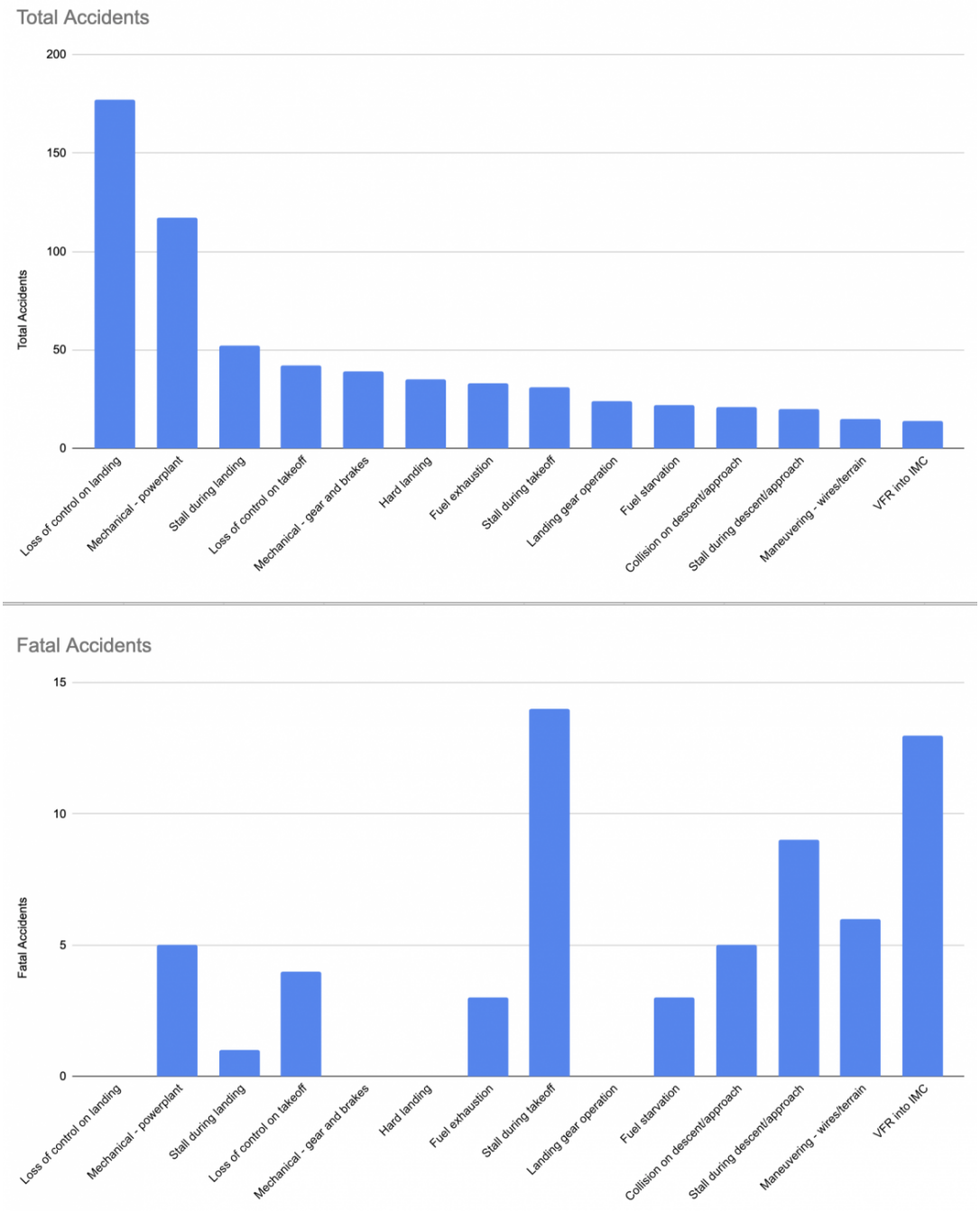
What we know for sure is that VFR-into-IMC is the main threat, accounting for over 60% of weather accidents. Thunderstorms and ice are scary, but accounted for only three fatal accidents in 2018. Another statistic that jumps out is that only 22% of weather accidents involved single-engine fixed-gear airplanes. High performance airplanes travel long distances more often and fly IFR more regularly, and the result is they are involved in fatal accidents at a much higher rate than their raw numbers would suggest. Over 50% of pilots involved in weather accidents had a Commercial or ATP certificate, a reminder that Mother Nature doesn't care about either airplane performance or pilot experience.

Don't ignore mechanicals

So much for pilot-related accidents. While these account for the majority of accidents—and are mostly under our direct control—that doesn't mean mechanical problems don't occur. In fact, these accidents have risen noticeably over the last few years, to the highest level in over 10 years. It's possible that as the fleet of general aviation airplanes ages, mechanical problems are becoming more common, but drawing such direct correlations is tricky. Whatever the reason, it's important to understand what can go wrong with the airplane itself.

And what can go wrong mostly means the engine. Airplane engines may be a lot more reliable than they were 75 years ago, but they are still the number one cause of mechanical accidents—over 60% in 2018. To put that in perspective, a powerplant problem is the behind only loss of control on landing on the list of top accident causes (see chart below). Remember, this excludes fuel management

problems, so we're talking about true power loss, either partial or complete. This happened 117 times in 2018, accounting for roughly 10% of all non-commercial fixed-wing accidents.



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Reading the NTSB reports shows a wide variety of specific causes. Some engine failures seemed to be simply bad luck, but a decent number happened soon after major maintenance was completed. That's a reminder to seek out good mechanics, and to be skeptical on your first flight after any cylinder work. Proactive habits like regular oil changes, oil analysis, and borescope inspections really pay off too—if you

can detect engine trouble before flight, you can prevent a serious problem.

The only good news here is that roughly 6% of mechanical accidents are fatal, far better than the 13% of pilot-related accidents. Engine failures don't have to be fatal.

What to do?

That's a lot of data, and a lot of "what ifs" to consider. To go from theory to practice, it's important to focus on both the most likely accidents and the ones that are easiest to prevent. The standout statistic to me is that 72% of accidents happen on takeoff, approach, or landing, usually when the pilot loses control. That means any time spent practicing basic airmanship skills is a smart investment, whether it's touch and gos or slow flight. Anecdotally, pilots seem to have the most problems after a long layoff or when the wind is gusting. Try to commit to a regular flying schedule, and instead of avoiding those windy days, find a flight instructor and learn how to excel under those conditions. Finally, pick an abort point for every takeoff and a go-around point for every landing; if it doesn't feel right, don't push it.

Next on the smart pilot's list should be maintenance. Regular flying helps here as well, in this case by preventing corrosion, as does regular maintenance and smart operating habits. If you're a renter, you may not control the maintenance but you can get to know your rental fleet: what is a normal oil burn rate for the airplanes you fly and what is your school's approach to maintenance? If you're planning a long cross country, it might not be wise to take the airplane fresh out of annual.

For more experienced pilots, weather accidents should get a lot of attention. These are relatively rare, but they skew towards higher time pilots and they are almost always fatal (VFR into IMC is the second-leading cause of fatal accidents overall). If you're not instrument rated, seriously consider adding the rating before making regular cross country flights. Even if you are instrument rated, it's only useful if you are proficient, so commit to regular training.

Finally, avoid two types of accident that are simply stupid. In a world of sophisticated (and cheap) flight planning apps, more accurate forecasts, GPS navigators, and self serve fuel pumps, running out of gas is entirely avoidable. Likewise, low altitude buzz jobs are a preventable mistake, even if you have a terrain warning system on board.

We're all human, so mistakes are inevitable. But with an understanding of the mistakes other pilots have made, we can at least stack the deck in our favor.