SOARING SAFETY FOUNDATION

Nov 1, 2016 – Oct 31, 2017

SAFETY
REPORT
SOARING SAFETY FOUNDATION

PREFACE

In 1985 the Soaring Society of America (SSA) formally created the Soaring Safety Foundation (SSF). The SSF was tasked with 2 major objectives, (1) to develop methods and techniques that would promote soaring safety in the United States; and (2) review and disseminate flight training information and material. These tasks had previously been performed by several subcommittees of the SSA Board of Directors. The creation of the SSF allowed these tasks to be focused in a single organization whose main mission is the promotion of soaring safety.

Accident data included in this report was obtained from two primary sources: the National Transportation Safety Board (NTSB) accident reports (http://www.ntsb.gov/ntsb/query.asp) and the Federal Aviation Administration (FAA) daily reporting system. These sources were selected because of the specific reporting requirements specified in the Code of Federal Regulations NTSB Part 830. Although it would be ideal to include all accident and incident reports involving gliders, it becomes extremely difficult to confirm accurate reporting from the various entities involved. Consequently, the SSF elected to take advantage of the standardized reporting requirements of NTSB Part 830 to develop its data base of glider/tow-plane accident information. This data base is then used to develop accident prevention strategies and to continuously improve training methods to reduce the number of glider/tow-plane accidents.

The analysis information contained in this report represents data compiled by the SSF and reported in **Soaring** Magazine, at Flight Instructor Refresher Course, at pilot safety seminars, and on the **SSF web site (http://www.soaringsafety.org)**.

Funding for the SSF is obtained through donations from individuals and organizations interested in the promotion of soaring safety. These funds are then used to develop and promote programs such as soaring safety seminars, flight instructor refresher courses, posters, safety-related articles in *Soaring* Magazine, the SSF web site, and the newsletter of the SSF, *Sailplane Safety*. The Trustees of the Soaring Safety Foundation sincerely hope that this report and the publication of accident data are beneficial in assisting members of the soaring community in developing a greater awareness of current issues and emerging trends in soaring safety.

Additional copies of this report may be obtained from the Soaring Safety Foundation web site http://www.soaringsafety.org. Select the “Accident Prevention – SSF Reports” tab or write to:

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EXECUTIVE SUMMARY

For the twelve-month period ending October 31, 2017, eleven(11) gliders, three (3) motorgliders, and three (3) tow-planes were involved in seventeen (17) separate accidents meeting the reporting requirements of NTSB Part 830 of the Code of Federal Regulation. This represents a 6.3% increase in the number of accidents reported during the previous reporting period. The five-year average for the FY13 – FY17 reporting period is 21.2 accidents per year, representing a 10.9% decrease in the average number of accidents from the previous five-year period.

While the average number of accidents per year has shown a steady decline since 1981 (averaging 45.6/year in the 80's, 38.6/year in the 90's, 33.5/year in the 00's, and 24.4/year for the first 8 years of this decade) the number of accidents each year remains too high. In addition, the average number of fatalities has remained nearly constant, at just under 6 per year since the mid 1990's and is also considered too high. In the FY17 reporting period three (3) accidents resulted in fatal injuries to three (3) pilots. In addition, two (2) pilots and one (1) ground observer received serious injuries while ten (10) pilots and two (2) passengers received minor or no injuries.

A review of the three (3) fatal accidents showed that a private pilot of an AC4 glider in NE was fatally injured during a failed aerotow launch. A pilot of an ASW 28-18E motorglider in WA was fatally injured after impacting terrain for unknown reasons. An ATP rated tow-pilot flying a Pawnee in VA was fatally injured when the glider being towed kited after the CFI pilot was distracted shortly after lift-off. All fatal accidents are still under investigation by the NTSB, more details may be given in this report (http://www.soaringsafety.org/accidentprev/ssfreports.html).

Continuing a long historical trend, the largest number of accidents occurred during the landing phase of flight during this reporting period. In FY17 landing accidents represented 41% of all accidents. As usual only one (1) of the seven (7) landing accidents, or 15%, occurred while the pilot was attempting to land in a field. The remaining six (6) accidents occurred while the pilot was attempting to land on an airport. Details of these accidents are given in this report.

Proper training and an operational focus on safe arrivals can go a long way toward addressing the landing accident problem. The SSF continues to promote that pilots and instructors adopt a 'goal oriented approach' to pattern planning and execution. The 'goal' is to arrive at your selected landing spot, so that you can stop at a predetermined point. This same procedure should be used during every landing, either at an airport or in a field. In addition, for off-airport landings it is important that the pilot mentally transition from cruise flight mode to landing mode with enough altitude to examine the prospective field to determine what obstacles the pilot must deal with. A good rule of thumb is 3-2-1, at 3,000 ft AGL the pilot should have at least one landable field within gliding range. At 2,000 ft AGL the pilot should select a specific field and examine it for obstacles and obstructions. At 1,000 ft AGL the pilot is committed to an out-landing, and mentally switches to landing mode. Making last minute changes while on short final to deal with obstructions is a leading cause of off-airport landing accidents.

Four (4) aborted launch accidents, called PT3 (premature termination of the tow) events, accounted for 23.5% of the FY17 accidents. As noted above a private glider pilot and an ATP rated tow-pilot were fatally injured during separate, failed aerotow launches. In addition, a pilot received serious injuries while attempting to return to the runway with the spoilers open. The left wing of the glider struck the ground while attempting to return to the runway after kiting on tow.

Pilots can, and should, mentally prepare for a failed launch by developing a specific set of action plans to deal with several contingencies. The task is then to execute the proper plan at the proper time. Flight instructors should continue to emphasize launch emergencies during flight reviews, check rides and flight training.

There were thee (3) motorgliders involved in accidents during the FY17 reporting period. In addition to the one (1) fatal accident noted above, the following accidents occurred. A commercial pilot received minor injured after bailing out of his motorglider in NV. A commercial pilot was not injured after the touring motorglider suffered an in-flight failure of the upper rudder hinge due to corrosion.

Flight instructors play an important safety role during everyday glider operations. They need to supervise flying activities and serve as critics to any operation that is potentially unsafe. Their main job is to provide the foundation upon which a strong safety culture can be built. Flight instructors also need to emphasize aeronautical decision making (ADM) and risk management (RM) principles during initial and recurrent training, including flight reviews. The FAA "Wings" program provides an excellent recurrent training platform which also meets the flight review requirements. The emphasis on ADM and RM can be seen in the new Airman Certification Standards (ACS). The FAA is currently revising all Practical Test Standards (PTS) to this new standard which will eventually include glider training and testing.

Other pilots and people involved with the ground and flying activates also need to be trained to recognize and properly respond to any safety issues during the daily activity. Everyone, students, pilots, ground operations staff, and instructors, should continuously evaluate both ground and flight operations at US chapters, clubs, commercial operations and at contests. An operations safety culture should train everyone to raise safety issues with fellow pilots, club officers, and instructors. By addressing issues before they become accidents, we can improve soaring safety. Only by the combined efforts of ALL pilots can we reduce the number if accidents.

The Soaring Safety Foundation offers both anonymous Site Surveys as well as Safety Seminars at your location as a part of our ongoing commitment to safety. The SSF also offers Flight Instructor Refresher Courses for Flight Instructor recurrent training. More information on these and other safety programs can be found on our website. http://www.soaringsafety.org

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SOARING SAFETY FOUNDATION

ANNUAL SAFETY REPORT
FY 2017

This report covers the FY17 (November 1, 2016 to October 31, 2017) reporting period. A review of the NTSB accident database shows a 6.3% increase (17 vs 16) in the number of US soaring accidents during this time period compared to the FY16 reporting period. The number of fatal accidents in FY17 was unchanged (3 vs 3) compared with FY16. It should also be noted that the number of insurance claims increased by 9% in 2017 compared to 2016. While the long term trend in accidents reported to the NTSB continues to decline, there is general agreement that more steps must be taken to continue reducing the number of accidents and to eliminate all fatal accidents.

For many reasons[1], this report represents an incomplete view of the accidents involving US glider pilots. Despite these limitations, this annual report is published to highlight glider/tow-plane accidents listed in the NTSB aviation accident database. Examination of these accidents can help point out trends and issues that need to be resolved. Safety is everyone's business, every pilot must continuously evaluate their flying skills, proficiency, and decision making skills to ensure every flight begins with a safe departure and ends with a safe arrival at the intended point of landing.

Number of Accidents since 1987

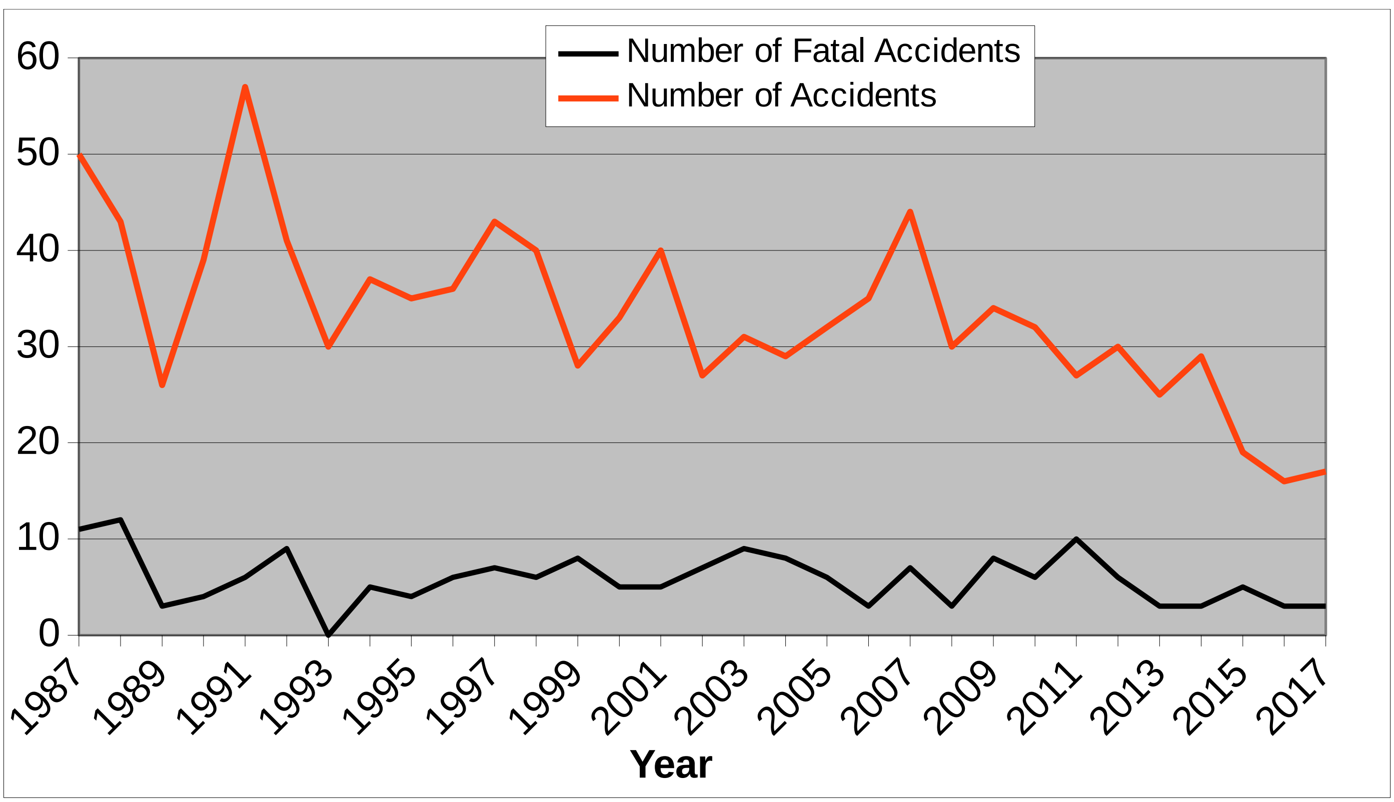

Figure 1 Total number of accidents and fatal accidents on a per year basis.

[1] See Appendix A for a detailed list of reasons and steps you can take to address these issues.

Another important point to make is that figure 1 shows the number of accidents, it does not show the accident statistics. To make a statistically significant figure the SSF would need to know the number of flights or the number of hours flown in the US. While this information has been hard to collect at the national level, it is believed that every club and commercial operation have this information (at least they know the number of launches they do). See the **SSF Trustee Action: Glider Flight Data** section for more details. At the February 2018 SSF Board of Trustees meeting the trustees voted to task the SSF chairman to begin asking clubs for number of launch data. The SSF will mail letters and send emails to every club, chapter, and commercial operator in the U.S. asking for flight data information. Please do your part and submit this data to the SSF when you receive this request.

Figure 1 shows the total number of accidents and fatalities from 1987 to the present. The top line is the number of accidents each year, while the lower line is the number of fatal accidents. An analysis of this data shows two trends. One is that the total number of accidents is declining and has been trending down since the SSF began recording this data. The rate of decline is not as rapid as we would like, but the long term trend is in the right direction. The other is that fatal accidents have reached a plateau. There are on average 6 fatal accidents each year. See the **Fatal Accidents** section for more details on this topic.

To continue reducing all accidents and to eliminate all fatal accidents, ALL glider pilots must realize that this is not a problem with individual pilots. These accidents are typically not caused by pilots ignoring the rules or taking incredible risks. Instead we must recognize that pilots are responding to situations in the manner in which they were trained. These Human-Factors errors are symptoms of a deeper systemic problem with our training environment and club/commercial operator safety cultures. In other words, this is a cultural problem within the soaring community.

For the past few years the SSF has been promoting the use of Scenario Based Training (SBT) as a viable method for establishing and maintaining a strong safety culture. The use of SBT in primary training establishes a habit pattern that new pilots will adopt and use throughout their aviation career. The use of SBT with rated pilots during flight reviews and spring check-outs will help them understand how risks are evaluated and mitigated. The more flight instructors use SBT the better we will all be in the soaring community. Using SBT, you can help change the safety culture of your club or commercial operation, and help the SSA membership reach its goal of zero fatal accidents each year. For more details see the **SBT training** section later in this report.

FY17 ACCIDENT SUMMARY

Number of Accidents

For the twelve-month period ending October 31, 2017, eleven (11) gliders, three (3) motorgliders, and three (3) tow-planes were involved in seventeen (17) separate accidents meeting the reporting requirements of NTSB Part 830 of the Code of Federal Regulation. The five-year average for the FY13 – FY17 reporting period is 21.2 accidents per year, representing a 10.9% decrease in the average number of accidents from the previous five-year period.

While the average number of accidents per year has shown a steady decline since 1981 (averaging 45.6/year in the 80’s, 38.6/year in the 90’s, 33.5/year in the 00’s, and 24.4/year for the first 8 years of this decade) the number of accidents each year remains too high. In addition, the average number of fatalities has remained nearly constant, at just under 6 per year since the mid 1990’s. In the FY17 reporting period three (3) accidents resulted in fatal injuries to three (3) pilots. In addition, two (2) pilots and one (1) ground observer received serious injuries while ten (10) pilots and two (2) passengers received minor or no injuries.

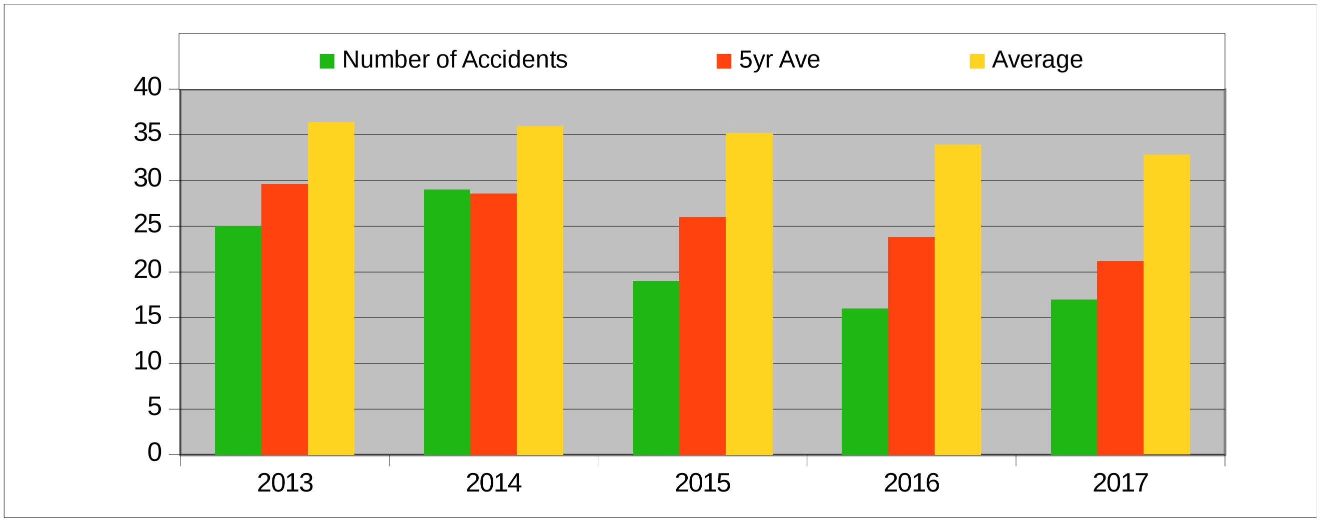

Figure **2 Number of accident, 5 year average 2013 - 2017**

Phase of Flight

The number of accidents that occur during the approach and landing phase of flight again surpass those recorded during any other phase of flight. For the FY17 reporting period, approach and landing accidents were 41.2% of the total number of accidents reported for the year. These accidents are split between pilots landing on an airport (6 or 85%) and pilots landing off-airport (1 or 15%). Historically landing accidents contribute to the largest number of accidents year in and year out. Takeoff accidents accounted for 23.5% of the number of accidents in this reporting period, meaning that 64.7% of the number of accidents occurred during the takeoff or landing phase of flight. The NTSB data show that remaining 36.3% of the accidents occurred while the glider was in cruise flight (29.4%) or for unknown reasons (5.9%).

It should come as no surprise that a majority of accidents occur during the takeoff and landing phase of flight, where the tolerance for error is greatly diminished and opportunities for pilots to overcome errors in judgment and decision-making become increasingly limited. Pilots need to become proficient in dealing with launch emergencies, having a pre-planned set of actions that they will execute if the launch starts to go wrong. Pilots should conduct a proper pre-launch checklist and use a pre-launch briefing to mentally prepare for contingencies. Pilots should also learn how to deal with problems and emergencies in the landing phase of flight. The SSF Goal Oriented Approach, described below, provides guidance on how to accomplish this task.

Take-off scenarios can help students and pilots mentally walk though numerous failed launches. What would you do if the launch failed while the glider was still on the ground, just lifting off, somewhere above 500 ft, or just prior to release? What would you do if the tow-plane pilot fanned the rudder during tow (Check Spoilers!)? How would a cross-wind affect the tow-plane and glider (weather-vane on the ground, drift downwind in the air), or what would you do in the self launching glider who's engine just sputtered (pitch to a best glide speed attitude)? Can you explain to your instructor why these answers are correct? How can you and your instructor develop a realistic scenario to safely practice these potentially hazardous events? NTSB accident reports are also an excellent resource for creating these scenarios. Remember, the better the learning the more the pilot will get out of the training.

Figure 3 shows the percentage of accidents that occur in the various phases of flight. TO/Tow accidents are classified as an aborted launch up until the time/altitude the pilot intended to end the tow. Landing accidents are classified as those where the pilot is clearly attempting to land, eye witness reports or other indications such as a retractable gear being extended or GPS trace data are used to validate this decision. Cruise accidents are classified as those where the pilot had released and it is not apparent that there was an intent to land. Unknown accidents are classified as such by NTSB reports providing little or no factual data.

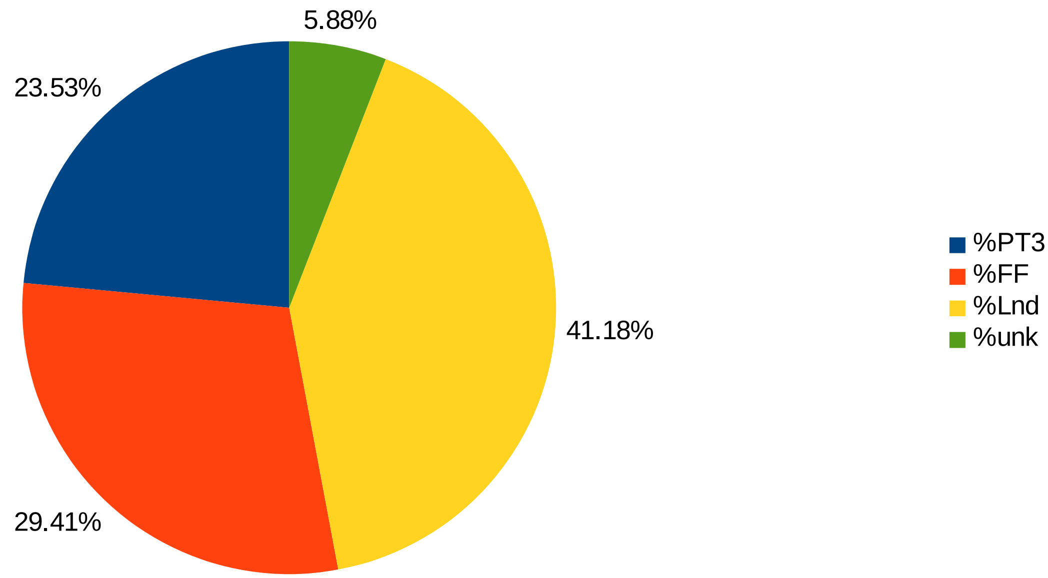

Figure 3 Percentage of FY17 Accidents in defined phase of flight

Launch Accidents

Two (2) non-fatal and two (2) fatal aborted launch accidents, called PT3 (Premature Termination of The Tow) events, accounted for 23.5% of the FY17 accidents. All four (4) of the accidents involved the glider being aerotowed.. Pilots must be mentally prepared for a failed launch by developing a specific set of action plans to deal with several contingencies. The task is then to execute the proper plan at the proper time. Flight instructors should continue to emphasize launch emergencies during flight reviews, club check rides and initial flight training.

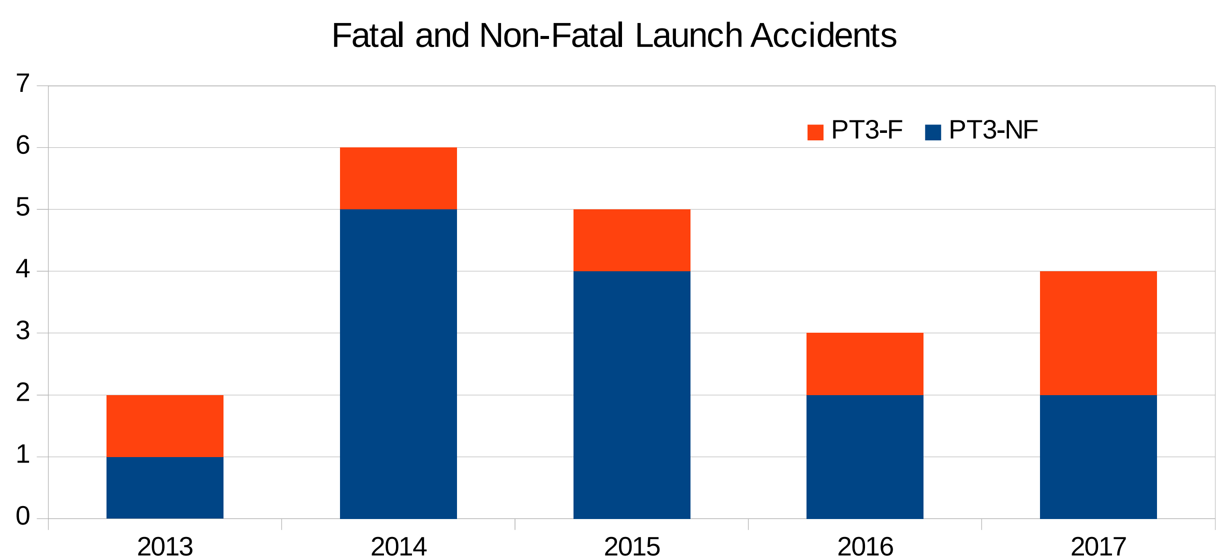

Figure 4: Number of fatal and non-fatal launch accidents

Soaring operations (clubs and commercial operators) should evaluate their training syllabus to ensure that this training is provided to both students and rated pilots. It should also be noted that just 'pulling the release' to simulate a rope break is not sufficient. Accident reports indicate that over 60% of PT3 accidents occur after the pilot intentionally pulled the release. A better approach is to have the instructor evaluate and critique the pilots decision making skills in addition to the in-flight piloting skills.

Aerotow Launch Accidents

The pilot of a LAK 12 was not injured, but the glider was substantially damaged after the left wingtip struck the ground after the pilot released. The pilot reported being distracted by something in the cockpit during the early part of an aerotow. The pilot looked outside and noticed that he was about 100 ft higher than the tow-plane. He attempted to return to the normal tow position, but the rope released on it’s own. The pilot turned left, causing the left wingtip to strike the ground. *NTSB GAA17CA340*

The pilot of a Grob G-102 received serious injuries, and the glider was substantially damaged after glider clipped trees while attempting to return to the runway. A witness reported seeing the glider begin the takeoff roll with the spoilers open. The tow-plane was unable to climb and the glider released between 150 and 200 ft AGL. The pilot attempted to make a 180 degree turn to return to the runway but never closed the spoilers. The glider struck a tree and crashed in a bean field short of the runway. *NTSB CEN17LA305*

The fatal launch accident will be discussed below in the fatal accident section.

As can be seen by the above accidents, every pilot should be prepared for a failed launch. This includes making sure the launch area is free of obstructions, the aircraft is properly assembled and rigged, the pilot/passenger is briefed on possible actions, and the pilot is operating within their abilities. Every glider pilot must have a predetermined plan of action that can be executed immediately if the launch does not go as planned.

One question every pilot needs to be able to answer is “how much altitude do I loose in 2-3 seconds”? In an aborted launch the pilot needs to assess the situation and make a decision to land straight ahead or if a turn can be successfully completed. However, the 1st thing a pilot needs to do is to pitch the nose down below the horizon and establish a pitch attitude that will keep the glider flying. While on aerotow the nose of the glider is on the horizon and airspeed will bleed off rapidly without this action.

Once the pitch attitude is established the pilot has time to think. This is where the question about altitude loss comes in. Imaging you are in a SGS 2-33 and sinking at 240 ft/minute. That means you are sinking at 4 ft/sec (240 ft/min / 60 min/sec = 4 ft/sec). That means in 2-3 seconds you lose 8-12 feet. Now if you can’t afford to lose 10 ft of altitude when you release, then your decision is clear. Land straight ahead. If you are in a Grob 103 or ASK-21 the altitude loss will be slightly less, but 10 ft is a good reference number. Of course this is not true if you are launching with the spoilers open. In that case the altitude loss will be much greater as the sink rate is naturally much higher.

The point is that you have time to collect your thoughts and remember what the launch abort plan you reviewed 60 seconds ago, just before the launch started. Fly that plan. Also remember, that it is better to land off airport and spend the rest of the day getting the glider back on the flight line than to crash while trying to turn around and have the glider out of service for the rest of the season. If a decision to turn back toward the field is made, the most important skill to concentrate on in that turn is the **quality** of the turn, pitch attitude and proper coordination. DO NOT SKID THE TURN!

Using SBT techniques pilots can be taught to deal with these situations. Pilots and instructors can practice these scenarios at a safe altitude and with the full knowledge and involvement of the tow pilot. Using a guided discussion format the instructor can ensure the pilot recognizes all of the internal and external factors that must be accounted for. The pilot and instructor should then develop an initial plan to safely practice this maneuver.

With this initial plan in place, the pilot and instructor must then talk with the tow-pilot to get agreement between all 3 pilots that the plan can be safely executed. The final step is to fly this flight. The instructor can now evaluate the pilots flight skills and his/her decision making skills.

Finally, but most importantly, it is critical for pilots to understand that a pilot's most basic responsibility is control of the aircraft. Loss of Control is the leading cause of fatal Glider and General Aviation accidents in the US. Remember, Regardless of the circumstances, FLY THE AIRCRAFT!!

Ground Launch Accidents

There were no ground launch accident during the FY17 reporting period.

Self-Launch Accidents

There were no self-launch accident during the FY17 reporting period.

Cruise Flight Accidents

There were five (5) non-fatal and zero (0) fatal cruise flight accidents reported during the FY17 reporting period.

The pilot a Grob G 109B was not injured but the Touring Motor Glider (TMG) was substantially damaged after the rudder upper hinge failed in flight. The pilot reported that while in cruise flight the rudder pedals suddenly became unusable. Looking aft the pilot noticed that the rudder had detached from the top of the vertical stabilizer. The TMG was controllable so the pilot continued to a landing area. During the landing roll the rudder completely separated from the fuselage. A post flight inspection showed extensive corrosion on the rudder hinges and a clean fracture on the upper hinge. *NTSB GAA17CA179*

The pilot a SGS 1-26 was not injured but the glider was substantially damaged after it struck trees while ridge soaring. The pilot reported that while in cruise flight he was unable to find sufficient lift to cross a gap in the ridge line. The pilot altered course with the intent of landing at an alternate airport, but continued ridge soaring in poor conditions. The pilot finally left the ridge and headed down into the valley with the intention of landing in a field. The glider struck and came to rest in trees while attempting to reach a suitable field. *NTSB GAA17CA196*

The pilot a PA-25 Pawnee received minor injuries while the tow-plane was substantially damaged after it struck trees and terrain while attempting to glide back to the airport. The pilot reported that he took over towing from another pilot with the fuel indication reading 2/3 full but no visual inspection of the fuel status. On the 10th tow, which was about 2 hours of flight time, the low fuel warning light came on just prior to the glider releasing. After release and about 2 miles from the runway at 1,900 ft AGL the engine lost power. The pilot did not think he could make the runway and instead headed for an open pasture. The plane struck trees and terrain about 50 yards short of the pasture. *NTSB GAA17CA331*

The pilot a Discus 2B received minor injuries while the glider was substantially damaged after it struck trees while searching for thermals in mountainous terrain. The pilot reported that while searching for thermals close to steeply rising terrain the glider stalled. The pilot attempted to recover by pointing the nose down at a steep angle, but the glider struck trees and terrain before it could regain flying speed. *NTSB GAA17CA368*

The pilot an ASH 31 MI motorglider received minor injuries while the motorglider was destroyed after it impacted terrain at a high rate of speed. The pilot reported that he was maneuvering about 10,000 ft MSL when he lost control of the aircraft. The motorglider entered a spin which evolved into a high speed spiral. The pilot bailed out and deployed his parachute. The glider impacted terrain and was destroyed. *NTSB GAA17CA386*

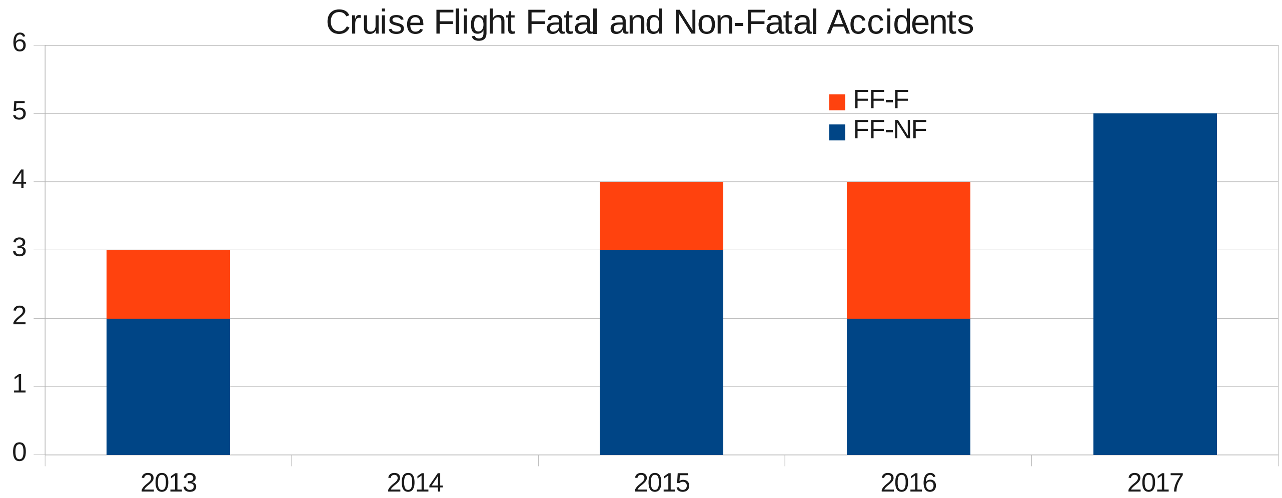

Figure **5: Number of Fatal and non-Fatal Cruise flight Accidents**

Landing Accidents

Accidents occurring during the landing phase of flight again accounted for the majority of injuries to pilots and damaged or destroyed gliders. During the FY17 reporting period, gliders hitting objects on final or during the landing roll accounted for the majority of the landing accidents. This was followed by hard landings, long/short landings, and stall/spin accidents. Continuing what appears to be a normal trend, only one of the seven landing accidents (15%) of the reported landing accidents occurred while the pilot was landing at in a field instead of on an airport.

Figure 6 shows the total number of landing accidents from 2013 – 2017 broken down by fatal and non-fatal accidents. This figure shows that the vast majority of landing accidents do not result in fatal injuries to the pilot. A deeper analysis of the landing accidents in FY17 indicate pilots continue to strike objects during the final approach (2 accidents) or while on the ground roll (1 accident). See figure 7 for a complete breakdown of landing accident factors.

The pilot and passenger of a Duo-Discus were not injured while a bystander was seriously injured after being struck by the left wing of the glider. The pilot reported that he touched down uneventfully and the glider was rolling to a stop near his predetermined stopping point when he felt a ‘thump’. After exiting the glider he reported seeing a bystander lying on the ground. The passenger, reported that the bystander was taking photographs and had moved onto the runway surface during the landing roll. Neither the pilot nor the passenger reported seeing the bystander before the collision. *NTSB GAA17CA063*

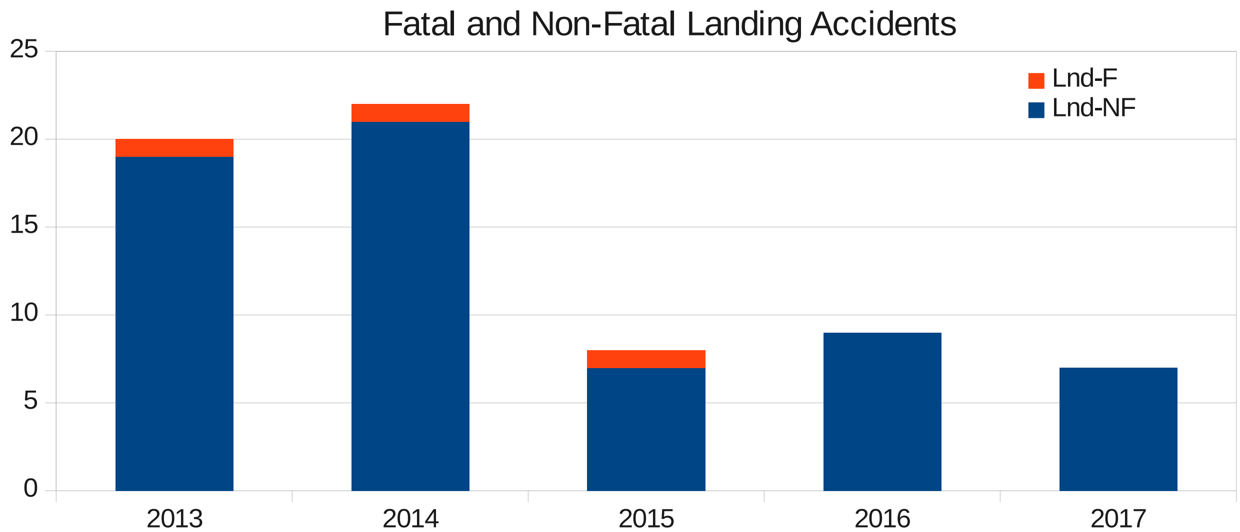

Figure **6: Number of Fatal and non-Fatal Landing Accidents**

The ATP rated pilot of a SGS 1-26E was seriously injured while the glider was substantially damaged after striking a tree while landing at an airport. A witness observed the glider make a 360 deg left turn while on base leg during the landing approach. After the turn the glider appeared to stall and spun into trees from about 100 ft AGL. *NTSB ERA17LA048*

The pilot of a SGS 1-34 was not injured but the glider was substantially damaged after striking a soccer goal post short of the runway. The pilot reported encountering heavy sink on downwind while executing a landing at his home airport. On final the glider encountered gusting headwind conditions (wind shear) and was too low to make the runway. The pilot reported overflying one goal post on a soccer field off the end of the runway, but was unable to clear the 2nd goal post. *NTSB GAA17CA255*

The student and CFI were not injured but the glider was substantially damaged after the left wing struck trees while attempting to land. The flight instructor reported that the glider appeared to be above glideslope so the student opened the dive brakes to increase the descent rate. Once the glider had returned to the normal glideslope the dive brakes were partially closed, but the glider continued to descent at a higher than normal rate. The CFI took control but was unable to make the runway landing short in trees. *NTSB GAA17CA298*

The student pilot of a LET L-23 received minor injuries while the glider was substantially damaged after it struck trees and power lines while attempting to land on a neighborhood street. The chief safety officer for the operator reported that he observed a solo student pilot was returning to the airport and that the glider seemed to be sinking quickly. The student spoke with his instructor by radio while scanning for an open field. The student finally decided to land on a neighborhood street. The glider struck tree tops and a power line before rolling right and having the right wing strike the ground.. *NTSB GAA17CA427*

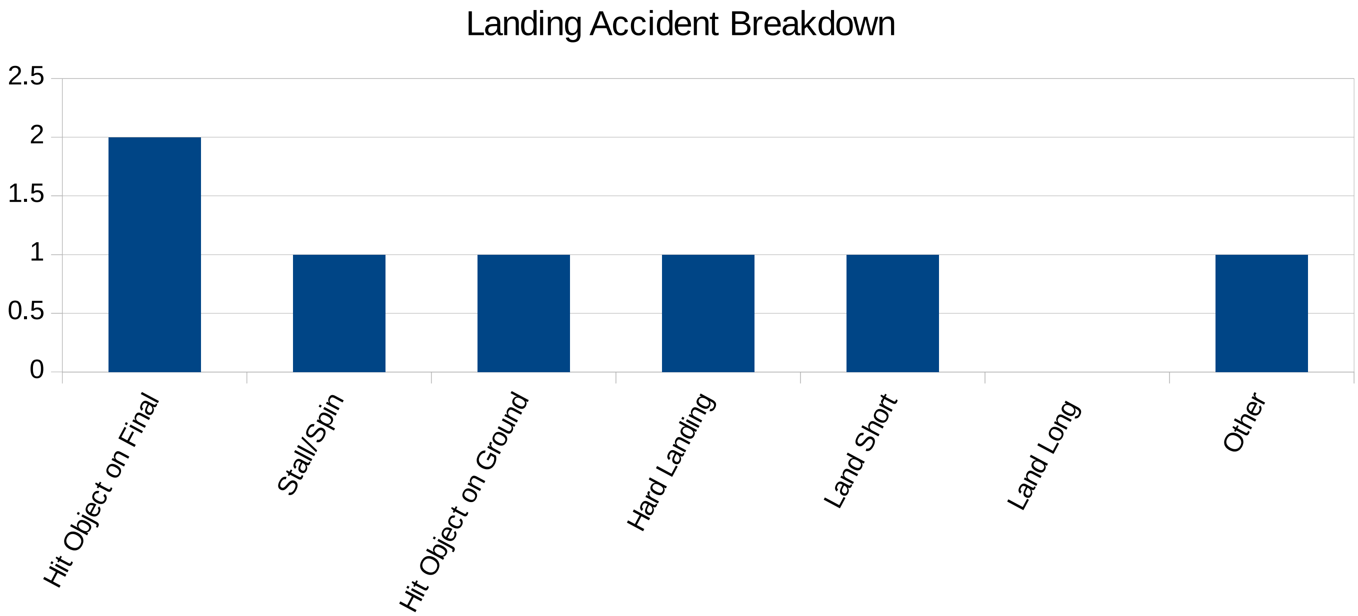

Figure 7: Reported factors in landing accident

The pilot SZD 55-1 was not injured while the glider was substantially damaged while landing in gusty wind conditions. The pilot reported that the glider bounced on the 1st landing so he added more spoilers to settle the glider back on the ground. At that point a gust of wind rotated the glider to the left causing it to bounce 3-4 ft into the air again. The glider subsequently landed hard with the nose yawed to the left, causing substantial damage to the fuselage. *NTSB GAA17CA456*

The pilot Cessna 305 (L-19 Bird dog) was not injured while the tow-plane was substantially damaged after flipping over during the landing roll. The pilot reported that he had completed 5 glider tows prior to the accident flight. During the 6th landing the pilot reported feeling a severe vibration before the plane stopped and flipped over. An examination revealed that the left main gear had separated from the axle. *NTSB ERA17LA298*

One point that should be made is that many pilots report encountering ‘heavy sink’ on short final. There are numerous reasons for this, and one of the most insidious is a condition known as wind gradient. It is well know that wind speeds can, and do, vary with altitude. A wind gradient is a change in wind speed and/or direction with altitude.

When a gradient, or shear, is encountered the forces acting on the glider change and the glider responds to those changes. One noticeable change is an increase in the gliders sink rate with a reduction in wind speed, resulting in a tendency to land short. This occurs as the glider attempts to maintain its trimmed airspeed or as the pilot pushes forward on the control stick to maintain the desired airspeed. An analysis shows that a glider approaching at 60 kts will land 53% shorter than expected when landing into a 20 Kt decreasing wind gradient. The exact decrease in glide distance will depend on the gliders initial and final airspeed as it descends through the gradient. The mass of the glider has a small effect in this situation[2] (in other words a 1-26 and Nimbus 4 will both fall just as short). All pilots need to be trained to recognize and respond to wind gradient/shear conditions. The SSF’s goal orientated approach (see below) can help pilots accomplish this task.

[2]The mass (weight) of the glider will have a small effect as a heaver glider will have more momentum allowing it to continue on its original flight path than a lighter glider. The initial airspeed of the glider has a much larger impact than the weight.

Fatal Accidents

Three (3) glider pilots were involved in fatal accidents during the FY17 reporting period. This represents no change in the number of fatal accidents (3 vs 3) from previous reporting period. Two (2) accidents occurred during the launch phase of flight (aerotow) and the remaining accident occurred for unknown reasons.

Fatal Accidents 2013-2017

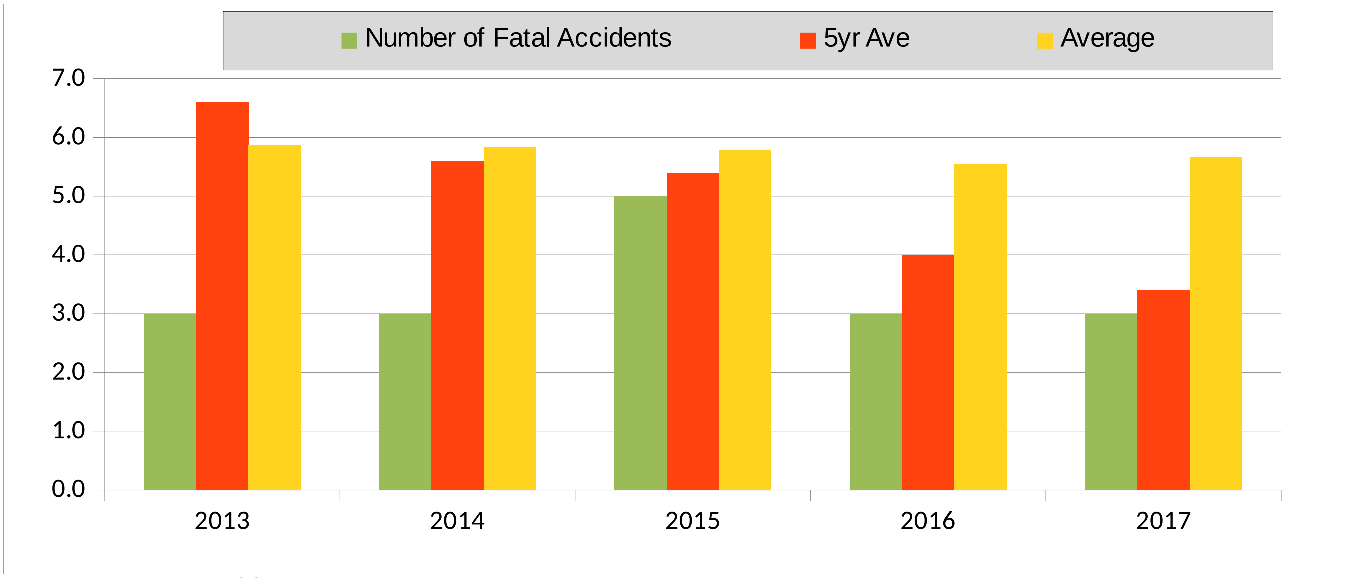

Figure 8: Number of fatal accidents, 5 year average, and average since 1987

It should also be noted that this report continues showing the breakdown of fatal and non-fatal accidents in the launch, cruise, and landing phase of flight. Figures 4, 5, and 6 (above) show the number of non-fatal accidents (blue column) and the number of fatal accidents (orange column). The total number of accidents is the sum of both fatal and non-fatal accidents. Figure 8 shows the number of fatal accidents in all phases of flight.

The NTSB is still investigating these fatal accidents and no probable cause has been issued for any of these accidents. The reports below summarize the three (3) accidents that occurred during this reporting period.

The pilot of a Russia AC-4 was fatally injured and the glider was substantially damaged after impacting terrain after the canopy opened on tow. This fatal accident is still under investigation at the time of this report. *NTSB CEN17LA181.*

The pilot of an ASW 28-18E (ASG 29) motorglider was fatally injured and the motorglider was substantially damaged after it impacted terrain for unknown reasons. The GPS trace shows that the motorglider flew approximately 60 minutes with the engine stowed before the motorglider impacted terrain. There were no witnesses and the NTSB report offers no further details at this time. *NTSB WPR17FA107*

The pilot of a PA-25 Pawnee tow-plane was fatally injured and the tow-plane destroyed after it impacted terrain during an aerotow launch. According to the CFI flying the glider, he was distracted during the initial part of the tow and when he looked back several seconds later he realized that the tow-plane was low and to the right. He released and returned to the airport. However, the tow-plane crashed off the end of the runway. No other information is available at the time this report was written. *NTSB ERA18FA006*

For the five-year period 2013 – 2017, 20 pilots and passengers received fatal injuries while soaring. This equates to a five-year average of 4.0 fatalities per year, a decrease in the number of pilots and passengers lost from the previous 5-year period. The data shows the long term average of 5.5 fatal accidents per year since the SSF began collecting fatal accident data in 1987. While the current 5-year average is down from the initial rate of 7.2

fatal accidents per year recorded in 1991 (1987-1991), the long-term trend is not encouraging. All glider pilots need to evaluate their skills and procedures with an eye toward determining how we can eliminate fatal accidents from our sport.

In 2011 the SSF began taking a closer look at fatal glider/tow-plane accidents. From 2002 – 2017 there were 82 fatal glider/tow-plane accidents in the US involving 93 pilots and passengers and 88 aircraft (mid-air collisions account for the additional aircraft). The NTSB database contains a probable cause (PC) for 75 of these accidents leaving 7 still under investigation.

Figure 8 shows the number of fatal accidents per year and averaged over 2 different time periods. The green bar shows the number of fatal accidents that occurred during that reporting period (Nov 1 – Oct 31). The red bar shows a 5 year moving average and the yellow bar shows the average number of fatal accidents since the SSF began keeping statistics in 1987.

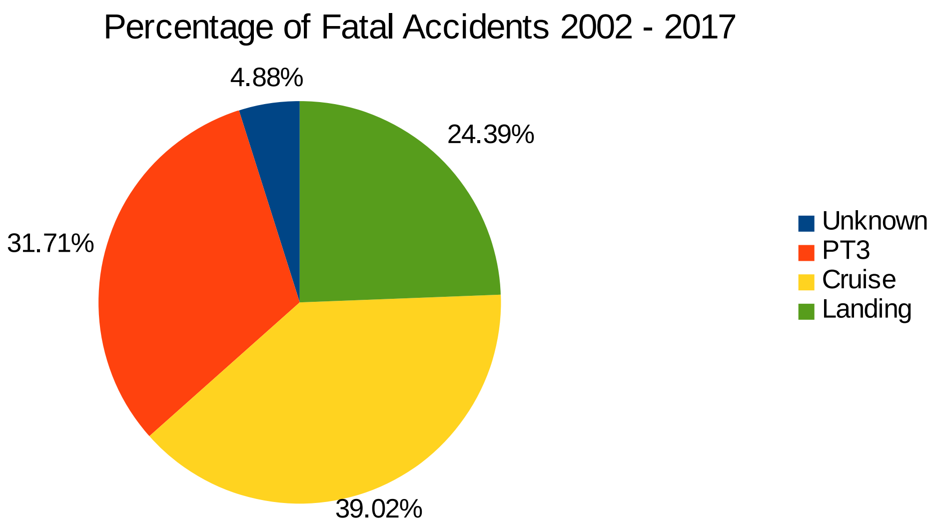

Figure 9: Percentage of Fatal Accidents in various phases of flight

Figure 9 shows the percentage of fatal accidents in the 3 major phases of flight (launch, cruise, and landing) from 2012 thru 2017. It is instructive to compare these percentages to the percentage of accidents as shown in Figure 3. While the majority of accidents occur in the landing phase of flight and the fewest percentage of accidents occur in the cruise phase of flight, fatal accidents show a complete different trend. In this case fatal accidents occur most often in the cruise phase of flight with the fewest number of fatal accidents occurring in the landing phase of flight.

As shown in Figure 10, the NTSB has determined the probable cause of the accident in 75 of the 82 fatal glider/tow-plane accidents that occurred between 2002 and 2017. These causes break down into 9 major areas, with a 10th (no P.C. - Probable Cause) meaning the accident is still under investigation. It is informative to see that the majority of fatal accidents occur after the glider stalled and/or spun. As described later in this report, stall/spin recognition and recovery should be a major flight training activity.

The SSF Trustees will continue to work with the soaring community to find ways to eliminate fatal glider/tow-plane accidents.

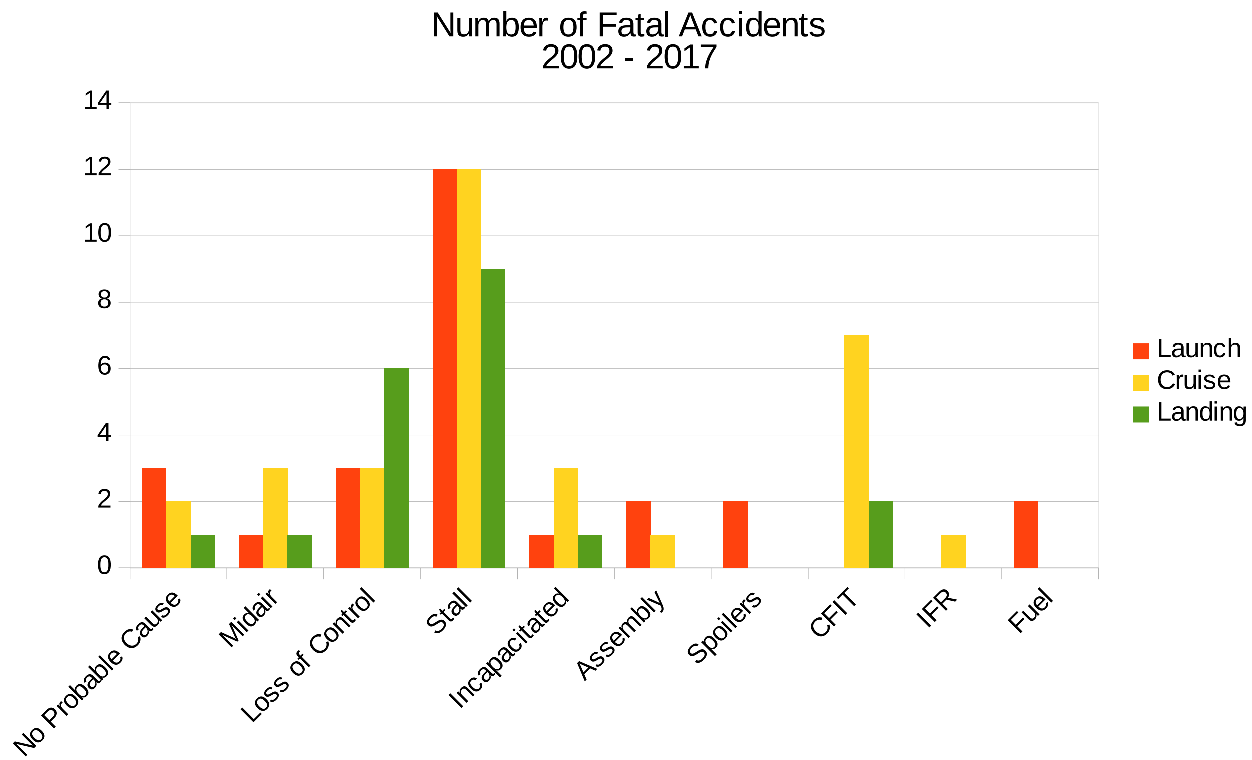

Figure 10: Number of fatal accidents by NSTB defined Probable Cause

Damage to Aircraft

A total of nine (9) gliders, three (3) motorgliders, and two (2) tow-planes received structural or substantial damage during this reporting period. One (1) glider and one (1) tow-plane were destroyed during accidents in the FY17 reporting period.

The large number of damaged gliders has a significant impact on club and commercial operators flight operations. Not only is there the immediate issue of dealing with the injuries resulting from the accident but also the long-term impact cannot be forgotten. Typically the damaged glider will be out of service for several months while it is being repaired. During this time flight operations may be reduced or suspended if this is the operation's only glider. This can place a significant financial strain on the club or commercial operator and makes it harder for members/customers to obtain and maintain both currency and proficiency.

Auxiliary-Powered Sailplanes

Three (3) motorgliders were involved in accidents during this reporting period. Details of those accidents are reported in the appropriate section (launch, cruise, landing or fatal) above.

Accidents Involving Tow-Aircraft

During the FY17 reporting period three (3) accident involving tow-planes occurred. .

Details for this tow-plane accident are described in the Cruise, Landing, and Fatal accident sections of this report.

Accidents by SSA Region

A comparison of the geographic locations of accidents in relation to SSA Regions tends to reflect the geographic distribution of the SSA membership. In general, those regions having the greatest populations of SSA members and soaring activity tend to record the highest numbers of accidents[3].

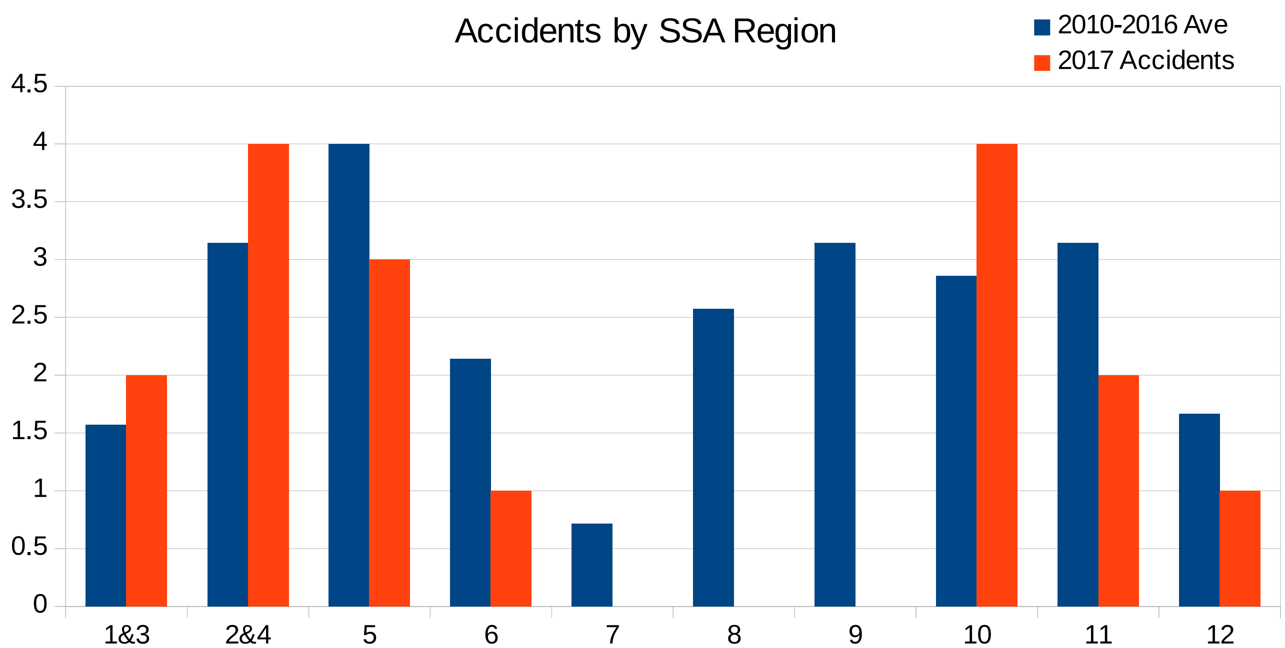

Figure 11: FY17 and average Number of accident per SSA Region

Figure 11 shows the number of accidents in each SSA region along with the average number of accidents in that region during the previous 6 years (FY10-FY16). Figure 12 shows the same information for fatal accidents during the same periods.

As can be seen, accidents occur in all regions. Due to the different geography in the US, it is difficult to compare one region against the other. However, it is possible to see how each region compares to its historical trend. The intent of these graphs is to show how the current reporting period compares to the historical trend for each region.

A strong 'safety culture' is a large part of the solution to reducing the number and severity of glider/tow-plane accidents. Every pilot must continuously evaluate the ground and flight operations with an eye toward preventing incidents from becoming accidents.

The SSF web site now contains an incident reporting form (http://www.soaringsafety.org/incident.html) that individuals can use to anonymously report issues that might impact a pilot's or passenger's safety. The SSF will use this information to aid in identifying accident trends and to formulate procedures to assist pilots and instructors in preventing future accidents.

[3] See Appendix A for more details

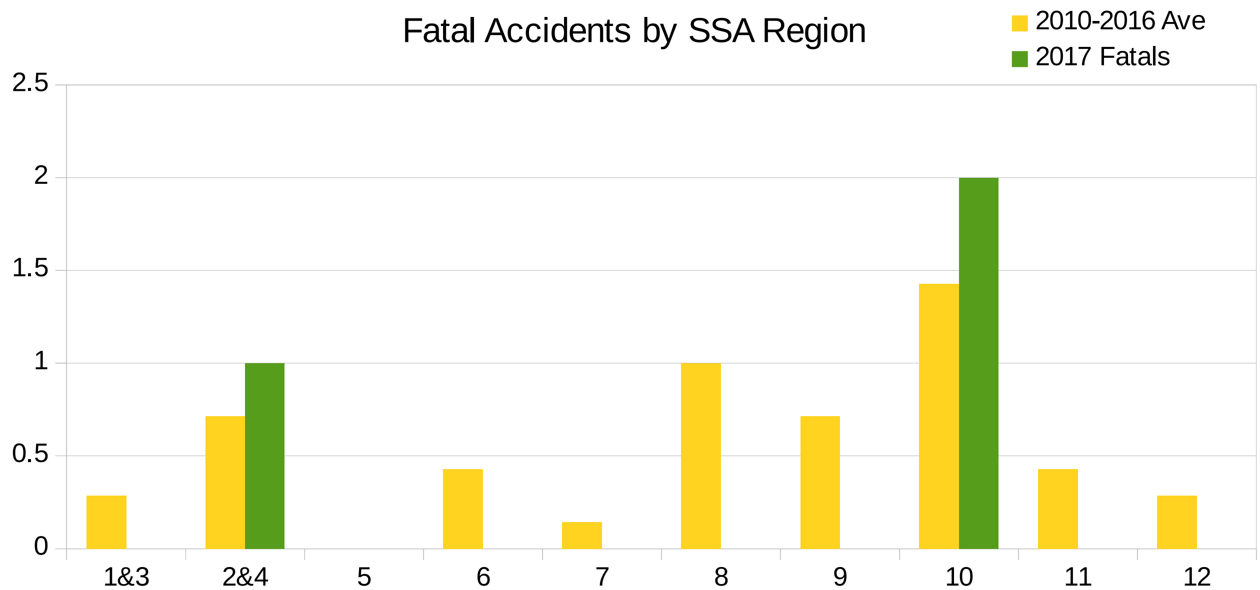

Figure 12: FY17 and Average number of Fatal Accidents per SSA Region

Flight Training and Safety Report

The SSF generates this safety report based on data extracted from the NTSB aviation accident database. We also receive summary and trend information from the SSA's group insurance program. Slow, long term progress continues to be made. While the number of claims is up last year (9% higher over 2016) it is still lower than the number of claims in 2012. However, it is obvious that there are still more things we all need to do.

First and foremost, we all need to accept the fact that the causal factor behind most glider/tow-plane accidents is the Human Error factor. The question then is how can we reduce these errors? Fortunately for us, there is a body of knowledge on this topic that we can tap into. If we accept a new premise and follow a few simple guidelines we can significantly reduce the number of accidents.

According to Sidney Dekker[4] author of “The Field Guide to Understanding Human Error” we all need to accept the, apparently, radical view that simple human error is not the cause of an accident. Rather, the error is a symptom of a deeper problem (education, knowledge, and proficiency). If we accept this view, then we can begin to identify the underlying causes that lead to the accident and fix them.

The traditional view of a human error accident is that the pilot having the accident failed in some way. Either this pilot failed to learn a key fact (a mid-air occurred because the pilot failed to clear his turn), or the pilot ignored a rule or regulation (a stall/spin turning to final because the pilot entered the pattern too low or flew to slow). While it might be comforting to accept that this single pilot was at fault, in reality this is not the case.

If a pilot fails to clear his turns, then how many times did he successfully make turns without looking? It could be thousands. Thus the problem is not simply that the pilot failed to clear his turns, the problem is that the flight instructor(s) he trained with failed to emphasize the importance of this task. The operations training syllabus may not have emphasizes this task and instructors may not have been given the post-flight time to evaluate and critique the pilots actions on this critical skill. The flight instructor(s) also failed to catch this sub-par performance during recurrent training (flight review) and fellow pilots failed to critique the pilots performance

[4]Professor of Human Factors and System Safety at Lund University, Sweden and Director of the Lenardo Da Vinci Laboratory for Complexity and Systems Thinking.

of this critical task if/when it was noticed. It is this structural problem with the organizations initial and recurrent training programs that need to be fixed. Thus the solution is to ensure that pilots are taught to clear turns and that their proficiency at this task is verified on a regular basis.

If a pilot continues to fly a 'normal' landing pattern despite being low, how many times has he successfully done this before? Again the problem is that the soaring operations training syllabus did not provide the pilot with the skills needed to recognize both normal and abnormal landing patterns. The syllabus did not allow the instructor the time to practice multiple normal and abnormal approaches to build the pilots proficiency levels up to the point they should be. The operation also failed to notice, and provide the recurrent training necessary to correct this poor performance. The solution is to ensure that the pilot is trained to modifying the pattern as necessary to deal with normal and abnormal situations. This can be easily accomplished through the use of scenario based training (SBT) which allows the instructor to evaluate a pilot’s response to different scenarios as presented.

This new view of human factors errors can help us break through the accident plateau we currently suffer from. However, it will take an effort from each of us to examine our operations current initial and recurrent training program to determine what is broken and how to fix these problems.

SSF Trustee Action: Glider flight Data

As noted earlier in this report, the SSF accident reports have historically reported on the number of accidents that are reported to the National Transportation Safety Board. The SSF Trustees search the NTSB aviation accident database several times a year to collect accident reports and identify accident trends and probable causes. The SSF trustees started capturing NTSB data in 1981 and have continued to do so annually for the past 35 years.

However, while this data can show trends, it does not show the accident rates that are commonly shown in General Aviation publications or Commercial publications. To have statistically meaningful data you need to have both the number of accidents and the number of flights or flight hours. Without that flight/time component you can’t tell if the number is decreasing because pilots are making better decisions or because pilots are flying less.

Getting flight hour data has stymied the SSF since it was formed in 1981. Try as we might, the community has been unable/unwilling to reliably submit flight hours to the SSF. However, getting this data is crucial to understanding if the decline in accident numbers is due to a lower accident rate or just fewer pilots flying fewer hours.

At the 2018 Soaring Convention the SSF Chairman gave a presentation on the U.S. glider accident rate, using several proxies and assumptions. The presentation, available on the http://www.soaringsafety.org/presentations/presssa.html web page, shows how these proxies and assumptions were generated and what they say about accident rates. The absolute number given by these proxies and assumptions is suspect, or flat out wrong, but all of them show the same trend. The Accident Rate for gliders has been declining for the past few years. Here’s a summary of that talk.

OLC Data:
The international On-Line Contest (OLC) web site has downloadable files that can be filtered to show the number of flights and miles flown by U.S. pilots. There is also a file that contains the best flight for each contestant, which includes the task speed and distance for that flight. This allows us to calculate the number of hours the contestant flew. Using that data, and making an assumption that the rest of the flights made by each pilot are 80% shorter, then it is possible to estimate the average number of hours OLC pilots flew per year from 2007 to 2016. Using this number, approximately 30,000 hours/year, as a proxy we see a glider accident rate as shown in figure 13 (accident rate per 100,000 hours vs year).

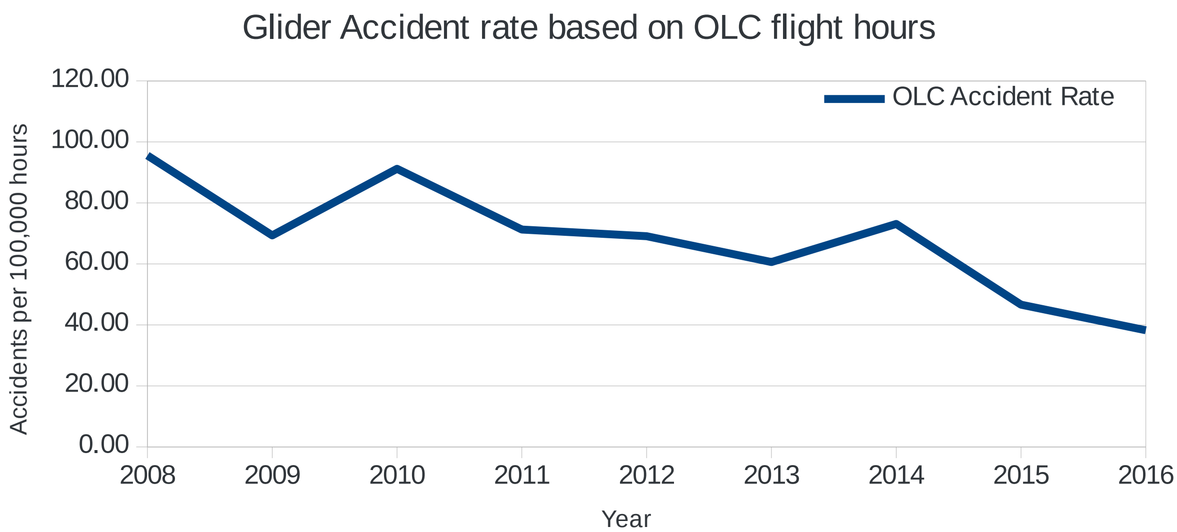

Figure 13: Estimated accident rate using OLC flight hours

FAA Survey Data:
Every year the FAA sends a random subset of glider pilots, clubs, and commercial operators, a post card requesting that they go on-line and fill out a usage survey. This survey data is then placed on the FAA web site and the files can be downloaded for review. Using this data, approximately 90,000 hours/year are flown by U.S. glider pilots. As a 2nd proxy we can again we can plot the glider accident rates for the U.S. glider population. This accident rate is shown in figure 14 (accident rate per 100,000 hours vs year).

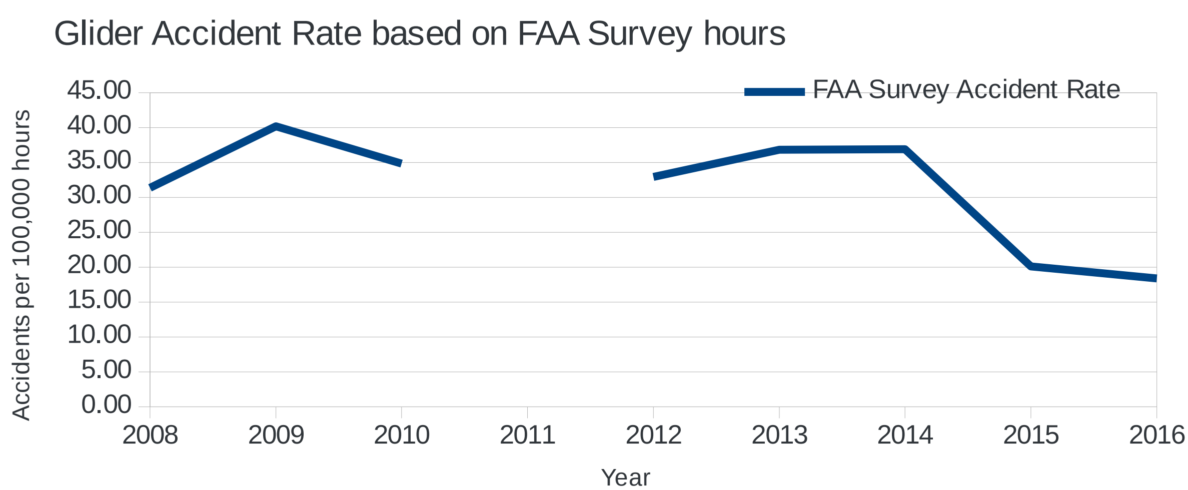

Figure 14: Estimated accident rate based on FAA survey data (2011 data missing)

Finally, the FAA has 2 downloadable databases that can be used as a 3rd proxy. The first database contains the number of gliders registered in the U.S. The second database contains the pilot certificate information for individuals with U.S. pilot certificates. Knowing the number of gliders and the number of glider pilots is a good starting point. What we need are a couple of estimates as to how many hours these gliders and pilots can fly each year.

To find an upper bound I assumed that every glider would fly 8 hours a day for 78 days. That would be every weekend day for 9 months. That number is approximately 2 million hours per year. Clearly nobody believes that we actually fly 2 million hours per year, it is simply meant to be an upper limit that will never be reached.

Next I took the pilot population and assumed that 45% of the licensed glider pilots flew each year. I also assumed that 1% flew 200 hours/year, the majority (22%) flew 3 hours/year, and the reminder flew different numbers of hours between these two extremes. I then estimated the number of student pilots who start training each year and further estimated they flew 39 hours each year (1 hour/week for 9 months). This gave me a total of approximately 410,000 hours of flight time per year. Figure 3 show the glider accident rate (accident rate per 100,000 hours vs year) and compares that to the General Aviation accident rate and to the non-airline Commercial aviation accident rate.

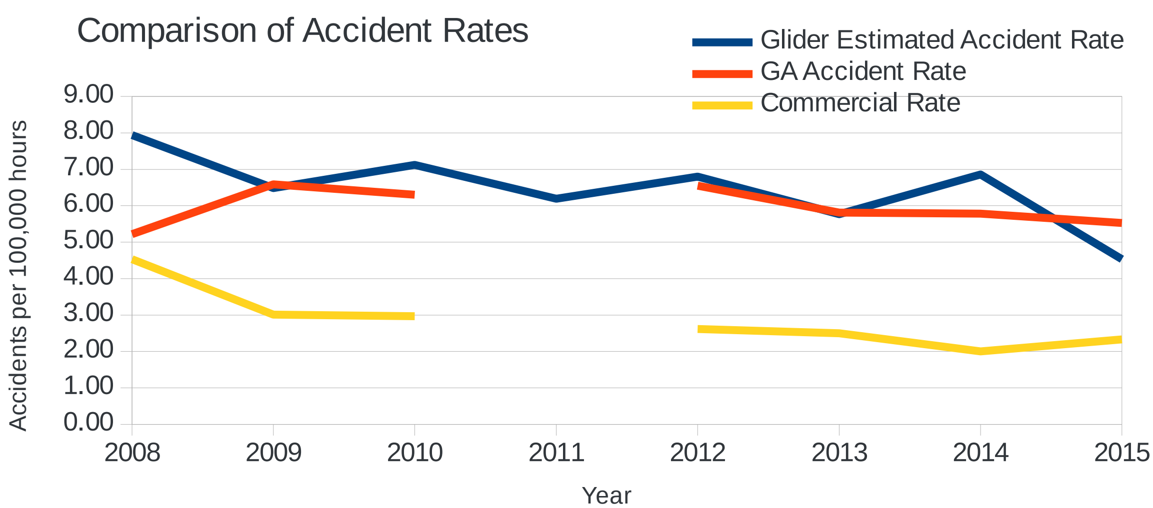

Figure 15: Estimated Glider accident rate compared to GA and non airline commercial rate (2011 data missing)

As can be seen from the above graphs, the number of hours shown in the OLC, FAA Survey, and Pilot estimation varies dramatically. To repeat ourselves, the accident rate/100,000 hours values shown in each of the graphs are suspect or flat out wrong. However, it is noteworthy that each graph shows a decline in the accident rate over the past 10 years. While this is encouraging, we still want to know what the real number is!

Now it is time for every club, chapter, and commercial operator to step up and help the SSF obtain this missing data. What is the real glider accident rate in the U.S.?   The SSF Board of Trustees has decided to take 2 approaches to get this data.

1) We have asked the soaring contest community to provide us with the number of launches and number of flight hours from each sanctioned glider contest. The contest committee will look for ways to easily extract this information and submit it to the SSF.

2) The SSF will contact every club, chapter, and commercial operator, via email and US postal mail, in the U.S. asking that they annually submit, on a voluntary basis, the following 6 pieces of information:

A) The number of gliders located at your field
B) The number of club/commercial gliders located at your field
C) The number of tow-planes and/or winches at your field

D) The number of launches (broken down by type) you gave
E) The number of club/commercial glider launches you gave
F) The number of hours your club gliders flew

You will notice that we are not asking for the number of hours the privately owned gliders fly. We realize that the club/commercial operator probably doesn't have that information. The SSF will attempt to obtain those hours in other ways.

Getting real data from the SSA membership will go a long way towards giving us realistic accident rates. We can then compare these rates to our European colleagues to see how we fair. We can compare the data to General Aviation and Sport Aviation communities to see if there are common elements that we can all work to solve. Most importantly, we can demonstrate to ourselves and our community that Soaring pilots really are developing the Risk Management (RM) and Aeronautical Decision Making (ADM) skills needed to fly safely while having fun doing so.

So, step up and submit your data. The SSF letter/email will provide details on how to submit your club, chapter, commercial operate data.

SSF Recommendation: Scenario Based Training

From October 2015 to February 2016 the SSF published a series of articles in SOARING dealing with Scenario Based Training (SBT). Reprints of those articles can be found on the SSF's web site at http://www.soaringsafety.org/publications/soaring-articles.html These articles were followed by a special SBT training session during the 2016 Convention in Greenville SC. Copies of the presentation slides can also be found on the SSF's web site at http://www.soaringsafety.org/presentations/presssa.html

As these articles describe, SBT is the training method the airlines and military use to train their pilots, flight crews, and other personnel involved in flight/ground operations. The idea is to provide a realistic situation that either has occurred in the past, or might occur in the future and discuss the potential threats this situation presents to the pilot and/or aircraft. The pilots/instructors then determine potential mitigation strategies that can range from not taking the flight, to deviating to an alternate destination, to ensuring that an emergency plan is developed and practiced in case this situation occurred. The flight instructor should use a guided discussion technique to ask questions that lead the pilot to consider all the factors that must be considered to safely mitigate this situation.

The question you may be asking now is, "How do I create a scenario"? The answer to that is "it's easy". The SSF has created an on-line database http://www.soaringsafety.org/forms/sbt.html with dozens of scenarios that were created for flight instructor training. You can use these as is, or modify them slightly to fit your local situation. Another good method is to look at the NTSB data base, or review the accidents listed in this report. These are real life examples that you can use to talk about how your students and pilots can learn from the mistakes of others. You can look at the SSF's on-line Incident Reporting Database http://www.soaringsafety.org/forms/incident.html to find out what problems and issues other clubs are having.

Finally, as the SSF recommended in 2011, take a video camera out to your field and film your operation. Then evaluate that video with an eye toward looking for problems. You might just capture an incident or issue that would make a great scenario. The point is, scenarios aren't hard to create, they happen all around us. You just need to look for them and you will have plenty of canned versions and plenty more occurring in real life.

In addition to finding issues and problems at your soaring site, the SSF also suggests that you recognize students and rated pilots when they make a good decision. If you do not have a system in place to recognize and reward pilots for making good decisions, should we be surprised when they don't value this skill? One approach would be to award a free tow, or some other tangible benefit, to the individual who makes the biggest contribution to the organizations safety culture each year

SBT is an excellent way to provide the RM/ADM skills CFIs are required to teach. It is well recognized that RM/ADM skills are a learned behavior, just as you need to learn how to keep the yaw string centered, you need to learn how to make good decisions. Also, just as you have to continuously practice keeping the yaw string centered, you need to practice making good decisions. The SSF's role is to provide you, your instructor, and your club's management with the resources and support systems needed to help you obtain and maintain good RM/ADM skills.

A good example of this is the glider assembly process. The process starts with having sufficient knowledge to complete the process successfully, sufficient room, a knowledgeable assistant and no distractions. There are then multiple checks after the assembly process is completed, including a walk-around inspection, positive control checks (PCC), and critical assembly checks (CAC) to ensure that the assembly process was correctly completed. These multiple barriers allow the pilot to catch errors or mistakes.

Imagine that during the assembly process you are installing the horizontal stabilizer and after putting it in place you realize you forgot the assembly tool in the cockpit side pocket. No problem you think, I'll just walk around the wing and get it. While digging in the cockpit a fellow pilot comes up and asks you a question about the day's task. You interrupt your assembly process and begin to answer his question when you notice the weather is changing so you decide to go into the clubhouse and check the radar returns. The check reveals that things will be OK, but the day will be shorter than you expected so you need to hurry if you are to get a short X-C flight in. You go back out and rush though the rest of the prep work before pushing the glider out to the flight line for your launch. Being rushed, the pilot also decides the PCC and CAC checks are not needed, as they have never found anything before and he needs to get going now.

In this scenario you can see that the pilot failed to finish the assembly process, and due to the distraction he failed to notice this mistake. We all need to realize that this mistake is not because the pilot was inexperienced, but that distractions caused the pilot to miss an important step and then the changing conditions caused him to ignore the other actions that would have caught this mistake. It should also be noted that the pilot failed to adequately evaluate the potential risks he was facing. In this case the changing conditions and need to rush the launch created increased risks that the pilot needed to manage.

As noted above, pilots need to be trained to recognize and evaluate potential risks. Risk Management (RM) skills are the 1st step in building an effective ADM program. Not performing this RM task can be as deadly as entering a stall/spin at 100 ft AGL. The airlines and military have found that scenario based training, such as the scenario presented above, is an effective RM/ADM training method. Pilots who receive this type of training, and then continue to practice it have fewer accidents that pilots who ignore or avoid this training. Pilots who receive this type of training, and then continue to practice it have fewer accidents that pilots who ignore or avoid this training.

When reading this type of scenario, you should begin by identifying the potential risk factors and then determine how they are changing. You then need to determine what actions you can take to mitigate those risks. Note that eliminating the risks is one strategy, but reducing them to an acceptable level is also a reasonable approach. In the scenario above, the risk mitigation or elimination actions could include, but are not limited to: (1) decide not to fly after all, (2) perform the PCC and CAC checks; (3) have the wing runner ask every pilot if they have completed the PCC/CAC checks, (4) remove the horizontal stabilizer from the tail when you go to get the assembly tool, (5) check with other pilots about the changing weather, (6) change your flight plan to conduct a local flight. The list can go on, and needs to be tailored to the skill and experience level of the pilot.

Also notice that actions 3 and 5 uses good Single Pilot Resource Management (SPRM) skills, where the pilot involves others in helping to evaluate and manage the potential Risks.

Only by improving, and continuously practicing, your RM/ADM skills will the number of accidents in the US soaring community be reduced.

SSF Recommendation: Stall Recognition Proficiency

As aviation accident statistics show, low altitude stall/spin accidents are often fatal. All pilots should evaluate their skill and proficiency in stall/spin recognition. Practice at a safe altitude with a competent instructor and also learn how the glider you fly reacts to stalls while thermaling. Have your instructor create a realistic distraction or do something to create an ‘inadvertent stall’. Pay particular attention to the altitude loss after you recover, now imagine this happening while you are thermaling close to the ground in mountainous terrain. It should be noted that a wind-shear stall is quicker and more violent than the type of stall that can be practiced using the elevator to stall the aircraft.

See a more complete set of recommendations in the SSF 2013 Annual Report.

SSF Goal Orientated Approach

As the FY17 statistics show, the majority of glider/tow-plane accidents continue to occur in the approach and landing phase of flight. For one reason or another, the pilot fails to make it to the landing area. Pilots need to consider multiple factors including: other traffic, wind, lift/sink, location, glider performance, and distance remaining to the landing area in order to safely land a glider. Failure to account for one or more of these factors can leave the pilot unacceptably low or high on the approach with very few corrective options available. The “enter the pattern over the white silo and turn base over the red barn” method is not a good teaching practice and can lead a pilot to making critical errors during the approach. Instructors need to understand the Goal Orientated Approach method and teach this method of approach to a landing to all pilots

See a more complete set of recommendations in the SSF 2013 Annual Report.

Flight Instructor Roles

Flight instructors play an important safety role during every day glider operations. They need to supervise flying activities and serve as critics to any operation that is potentially unsafe. Other pilots and people involved with the flying activity also need to be trained to be alert to any safety issues during the daily activity.

The FAA has mandated that all instructors must include judgment training and RM/ADM in the flight training process. Examiners will check for this training during the practical test. The regulations require that all flight instructors provide some kind of aeronautical judgment training as well as RM/ADM training during pilot training flights (student, private, commercial, and flight instructor). 14 CFR 61.56 flight reviews also offer the flight instructor an opportunity to reach the glider pilot population on a continuing basis. Stressing judgment skills, as well as piloting skills, can help reduce the glider/tow-plane accident rate.

The SSF offers Flight Instructor Refresher Courses throughout the country each year. The SSF Trustees strongly recommend that ALL instructors (experienced and inexperienced alike) avail themselves of these courses to keep updated of the latest safety trends in training including RM/ADM skills and Scenario Based Training skills as well as Stick and Rudder skills. This kind of continuing education course allows for meaningful interaction between fellow CFI’s and will help to keep the training we offer “standardized” throughout the country.

SSA REGIONS

Region 1 Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont.

Region 2 New Jersey, New York (south of 42nd parallel), Pennsylvania (east of 78th meridian).

Region 3 New York (north of 42nd parallel), Pennsylvania (west of 78th meridian).

Region 4 Delaware, District of Columbia, Maryland, Virginia, West Virginia.

Region 5 Alabama, Florida, Georgia, Mississippi, North & South Carolina, Tennessee, Puerto Rico, The Virgin Islands.

Region 6 Indiana, Kentucky, Michigan, Ohio.

Region 7 Illinois, Iowa, Minnesota, Missouri (east of 92nd meridian), North & South Dakota, Wisconsin.

Region 8 Alaska, Idaho, Montana, Oregon, Washington.

Region 9 Arizona, Colorado, New Mexico, Utah, Wyoming.

Region 10 Arkansas, Kansas, Louisiana, Missouri (west of 92nd meridian), Nebraska Oklahoma, Texas.

Region 11 California (north of 36th parallel), Guam, Hawaii, Nevada.

Region 12 California (south of 36th parallel).

APPENDIX A

NTSB Part 830

The responsibility for investigation of aircraft accidents in the United States was mandated by Congress to the National Transportation Safety Board (NTSB) through The Department of Transportation Act of 1966. This act tasked the NTSB with determining the probable cause of all civil aviation accidents in the United States.

From 1991 - 94, the general aviation community alone accounted for approximately 1,800 aircraft accidents per year. Due to this high level of investigative workload and limited available resources, the NTSB often delegates to the Federal Aviation Administration (FAA) the authority to investigate accidents involving aircraft weighing less than 12,500 pounds maximum certified gross weight. Consequently, many glider/tow-plane accidents meeting the NTSB reporting criteria are investigated by representatives of the FAA.

All aircraft accidents involving injury to passengers or crew-members or substantial damage to the aircraft must be reported to the NTSB.

The terms used in this report to define injury to occupants and damage to aircraft are included in NTSB Part 830 of the Code of Federal Regulations.

Definitions

Aircraft - a device that is used or intended to be used for flight in the air.

Operator - Any person who causes or authorizes the operation of an aircraft.

Aircraft Accident - An occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight and all such persons have disembarked, and in which any person suffers death or serious injury, or, in which the aircraft receives substantial damage.

Fatal Injury - Any injury that results in death within 30 days of the accident.

Serious Injury - Any injury which:

1) Requires hospitalization for more than 48 hours, commencing within 7 days from the date the injury was received;
2) Results in the fracture of any bone except simple fractures of fingers, toes, or nose;
3) Causes severe hemorrhages, nerve, muscle, or tendon damage;
4) Involves any internal organ; or
5) Involves second- or third-degree burns, or any burns affecting more than 5 percent of the body surface.

Minor Injury - Injury not meeting the definition of fatal or serious injury.

Substantial Damage - Damage or failure which adversely affects the structural strength, performance, or Flight characteristics of the aircraft, and which would normally require major repair or replacement of the affected component. Engine failure or damage limited to an engine if only one engine fails or is damaged, bent fairings or cowling, dented skin, small punctured holes in the skin or fabric, ground damage to rotor or propeller blades, and damage to landing gear, wheels, tires, flaps, engine accessories, brakes, or wingtips are not considered substantial damage for the purpose of this part.

Destroyed - Damage to an aircraft which makes it impractical to repair and return it to an airworthy condition. This definition includes those aircraft which could have been repaired, but were not repaired for economic reasons.

Minor Damage - Damage to an aircraft that does not meet the definition of Substantial or Destroyed.

APPENDIX B

Phase of Operation

Ground Movement - Re-positioning of the glider while on the ground. To meet the definition of an accident, occupants must be on-board the glider and movement must be conducted immediately preceding or subsequent to a flight operation that demonstrates the intention of flight. This includes taxi operations of auxiliary-powered sailplanes.

Takeoff - Begins at initiation of the launch operation, including aerotow, ground launch, and self-launch, and is concluded at the point the glider reaches the VFR traffic pattern altitude. For ground launch operations, the takeoff phase continues until release of the towline.

Assisted Climb - Begins at the conclusion of the takeoff phase or point at which an auxiliary powered sailplane or a sailplane using an aero-tow launch climbs above traffic pattern altitude. This phase of operation is not included in ground launch operations.

In-flight - Begins at the point of release of the towline for aerotow and ground launches or the pilot shuts down the engine when self launching and concludes at the point of entry into the traffic pattern or landing approach pattern for an off-airport landing.

Approach/Landing - Begins at the point of entry into the traffic or landing approach pattern and concludes as the glider is brought to a stop at the completion of the ground roll.

APPENDIX C

Accident Category Definitions

Hit Obstruction - Accident occurring during a ground or flight phase as a result of the glider colliding with a fixed object. This classification does not include bird strikes or ground / in-flight collisions with other aircraft.

Ground Collision - Collision of two or more aircraft while being re-positioned or taxied while on the ground.

Loss of Directional Control - Accident which occurs as a result of a loss of directional control of the glider during takeoff or landing operations while the glider is on the ground.

Premature Termination of the Tow (PT3) - Any event, pilot, mechanical, or otherwise induced, which results in a premature termination of the launch process. This classification includes ground, aerotow, and self-launch.

Mechanical - An event that involves a failure of any mechanical component of the glider. This classification includes accidents that result from faulty maintenance or a failure to properly install or inspect primary flight controls. In-flight structural failures caused by fatigue of structural components or pilot induced over-stress of the airframe are included in this classification category.

Loss of Aircraft Control - An accident which occurs as a result of the loss of control of the glider for any reason during takeoff, assisted climb, in-flight, or approach / landing. This classification includes failure to maintain proper tow position during assisted climb.

Mid-air Collision - A collision of two or more aircraft which occurs during the takeoff, assisted climb, in-flight, or approach / landing phase of flight. This classification includes collisions involving gliders and other categories of aircraft (airplane, rotorcraft, etc.).

Land Short - Any accident which occurs as a result of the glider being landed short of the physical boundaries of the intended runway or landing area. This classification includes off airport landing operations.

Land Long - Any accident which occurs as a result of the glider being landed beyond the physical boundaries of the intended runway or landing area. This classification includes off airport landing operations.

Stall / Spin - Any accident which results from the inadvertent stall and/or spin of the glider during takeoff, assisted climb, in-flight, or approach / landing phases of flight.

Hard Landing - Any accident caused by a hard landing during the approach / landing phase of flight.

Other – Any accident caused by factors not defined within the previous categories.