SOARING SAFETY FOUNDATION

Nov 1, 2022 – Oct 31, 2023

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, promote, and conduct 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.

Richard Carlson - Chairman
Burt Compton
Stephen Dee
Thomas Johnson
Ron Ridenour

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, 2023, five (5) gliders and six (6) motor-gliders were involved in eleven (11) separate accidents that met the reporting requirements of NTSB, 49 CFR 830. This represents a 60.7% decrease in the number of accidents reported during the previous twelve (12) month reporting period. The five-year average for the FY19 – FY23 reporting period is 21.2 accidents per year, representing a 14.5% 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, 25.5/year for the 10's, and 21.0/year for 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 six (6) per year since the mid 1990's and is also considered too high. In the FY23 reporting period, one (1) accident resulted in fatal injuries to one (1) pilot. In addition, two (2) pilots received serious injuries while ten (10) pilots and passengers received minor or no injuries in these ten (10) non-fatal accidents.

While the number of accidents reported to the NTSB is easy to track (Figure 1), and that number has been declining for both Gliders and General Aviation as a whole, it is important that this number must be combined with flight hours or launches to determine the accident rate. Several years ago, the SSF Trustees began asking all soaring organizations (clubs, chapters, commercial operators) to submit their flight times/launches in a confidential manner. This is done by mailing postcards to the organizations' representative listed in the SSA's database. For the past six (6) years approximately 30% of the organizations have returned these postcards. In January 2024, another mailing occurred, readers of this report are encouraged ask their organization to respond. Getting better data via soaring organizations confidentially reporting this data will help clarify this situation.

A review of the fatal accident showed that the pilot of an ASH-26E motor-glider in Colorado was fatally injured after it impacted terrain in a 77 degree nose down attitude for unknown reasons. This fatal accident is still under investigation by the NTSB, and the full report is available at (http://www.soaringsafety.org/accidentprev/ssfreports.html).

Unlike previous years, the NTSB aviation accident database is up to date with completed or preliminary descriptions of the eleven (11) accident that occurred during this reporting period.

In FY23 five (5) landing accidents represented 45% of all accidents. Three out of five (60%) of the landing accidents occurred while the pilot was attempting to land at an airport, while the other 2 (40%) occurred while attempting an off-field landings. Details of these accidents are given in the full report.

The SSF trustees were pleased, but surprised, to find no launch accidents (PT3 accidents) in FY23. We have no insights into as to why, but we encourage the community to continue this trend by using checklists and proper pre-launch planning to prepare for an unexpected termination of the tow on every flight. There were four (4) cruise flight accidents in FY23. Two (2) of them involved in-flight vibrations that caused structural damage to the aircraft. Details on these accidents will be given in the full report.

There were six (6) motor-gliders involved in accidents during the FY23 reporting period. See the full report for more details.

While this significant reduction in accidents is good news, the Soaring Safety Foundation encourages each and every individual to be constantly aware of and manage their own personal risk factors as they fly gliders and towplanes. This includes using the IMSAFE checklist and maintaining our flying proficiency not just our flying currency. We highly encourage the use of the FAA WINGS program when complying with the FAR 61.56 Flight Review requirement. We must collectively continue to monitor the safety culture that exists in the club or commercial operation we fly at, remembering that WE are the safety culture. Please adopt the mantra "If you SEE something, SAY something" to your clubs BOD, Safety Officer or Owner. Having a Safety Culture that works means that every individual needs to participate. Let’s strive for fewer accidents and zero fatalities in 2024!

The Soaring Safety Foundation continues to provide tools for your location to enhance safety. We offer an anonymous Site Survey that gives your operation an objective look at how you are doing. We also offer Safety Seminars at your location as a part of our ongoing commitment to safety. Our Flight Instructor Refresher Courses (FIRC) allow ANY certificated Flight Instructor to renew their certificate in a highly interactive in-person format. More information on these and our growing collection of on-line safety and training programs can be found on our website. http://www.soaringsafety.org

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SOARING SAFETY FOUNDATION

ANNUAL SAFETY REPORT

FY 2023

This report covers the FY23 (November 1, 2022 to October 31, 2023) reporting period. A review of the NTSB accident database shows a decrease of 60.7% (11 vs 28) in the number of US soaring accidents during this time period compared to the FY22 reporting period. The number of fatal accidents in FY23 decreased from six (6) to one (1), a 83.3% decrease. In addition to seeing a decrease in the number of accidents reported to the NTSB, 2023 also saw a 34% decrease in the number of insurance claims compared to 2022. The reduced number of accidents, both in-flight and ground, has helped to contain these costs, and little or no increase in premiums is expected in 2023. 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.

Number of Accidents since 1987

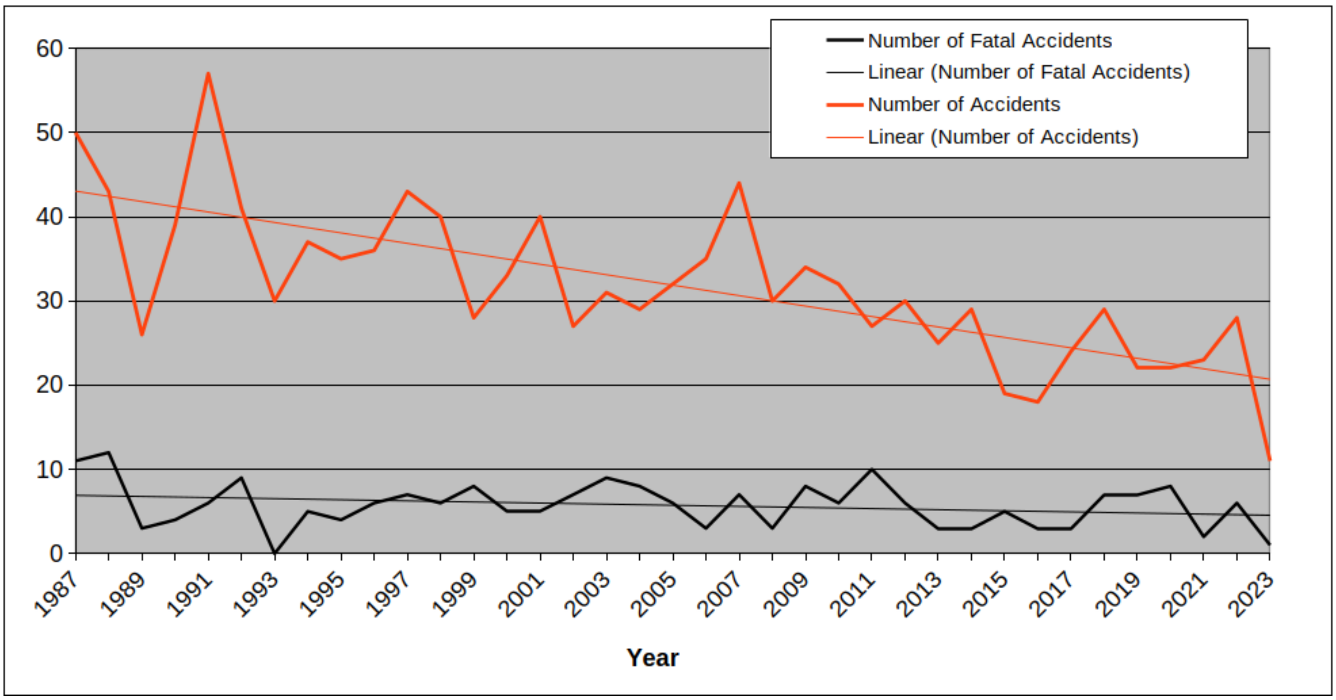

Figure 1 Total number of accidents and fatal accidents on a per year basis.

Figure 1 shows the total number of accidents and the number of fatal accidents from 1987 to the present. The top line is the total 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 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 fatal accidents have remained constant averaging just under 6 fatal accidents each year. See the **Fatal Accidents** section for more details on this topic.

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/towplane 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.

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 has this information (at least they know the number of launches they do). See the **SSF Trustee Action: Glider Flight Data** section for more details. For the past 6 years the SSF mailed postcards and letters to the individual every club, chapter, and commercial operator in the U.S. indicated to the SSA as their point of contact. In each of these years approximately 33% of these clubs, chapters, and commercial operators anonymously responded with this flight time data. In January of 2023 the SSF again sent requests to every club, chapter, and commercial operator in the US. The **SSF Trustee Action: Glider Flight Data** section contains the results from 2017-2022 data. Given the large decrease in the number of accidents in FY23, it is important to understand if there is also a significant decrease in flight operations. The SSF Trustees encourage everyone to contact their club/chapter/commercial operator leadership to verify that they are responding to this important confidential request. SSA clubs and chapters should regularly update with the SSA their soaring site contact information so the SSF can collect more data.

This trend, where the total number of accidents is declining while the number of fatal accidents remain constant does NOT appear in the General Aviation accident numbers. As figures 2 and 3 show, GA percentage of fatal to non-fatal accidents has remained constant at about 20% while Glider fatal to non-fatal percentages have varied from about 10% to almost 40% over the last 18 years.

As shown below, the largest number of accidents continues to occur in the landing phase of flight. However, when looking at the percentage of fatal vs non-fatal accidents in each phase of flight we see that the cruise phase of flight has the worst record. This means that different programs are needed to address the different causes of these accidents. Landing accidents are primarily due to the pilots coming in low and striking an object short of the runway. Fatal accidents are primarily due to pilots accepting a high level of risk while maneuvering close to the terrain. This maneuvering leads to a stall/spin without enough altitude to recover. This issue is discussed in more detail in the **Fatal Accidents** section.

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. The majority of 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

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

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.

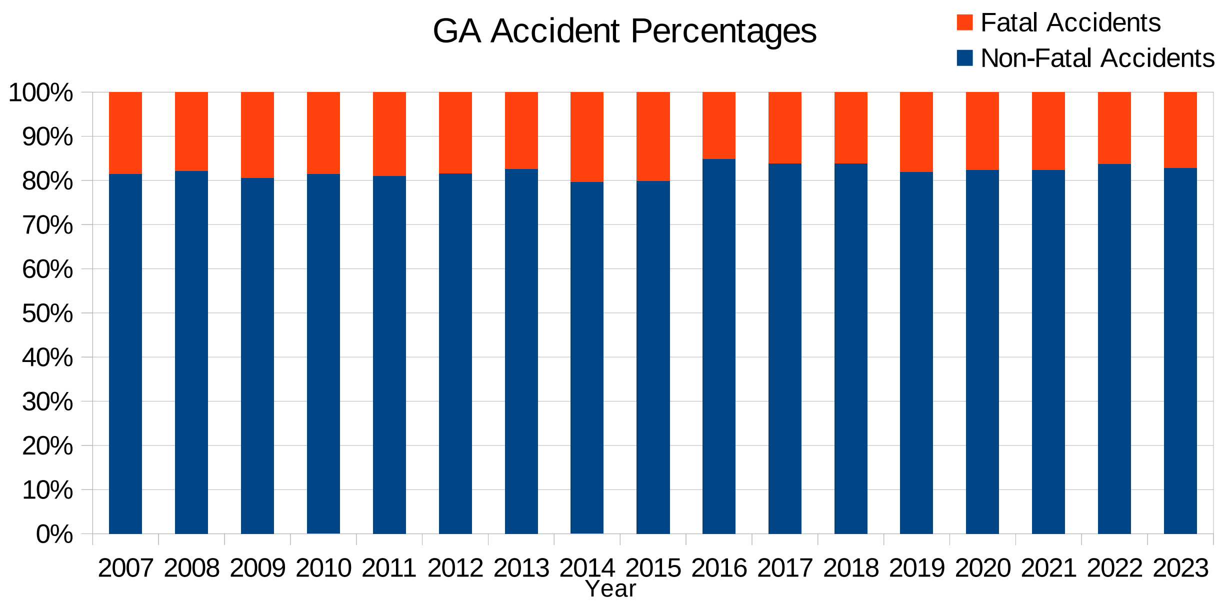

Figure 2: Percentage of fatal to non-fatal accidents in GA

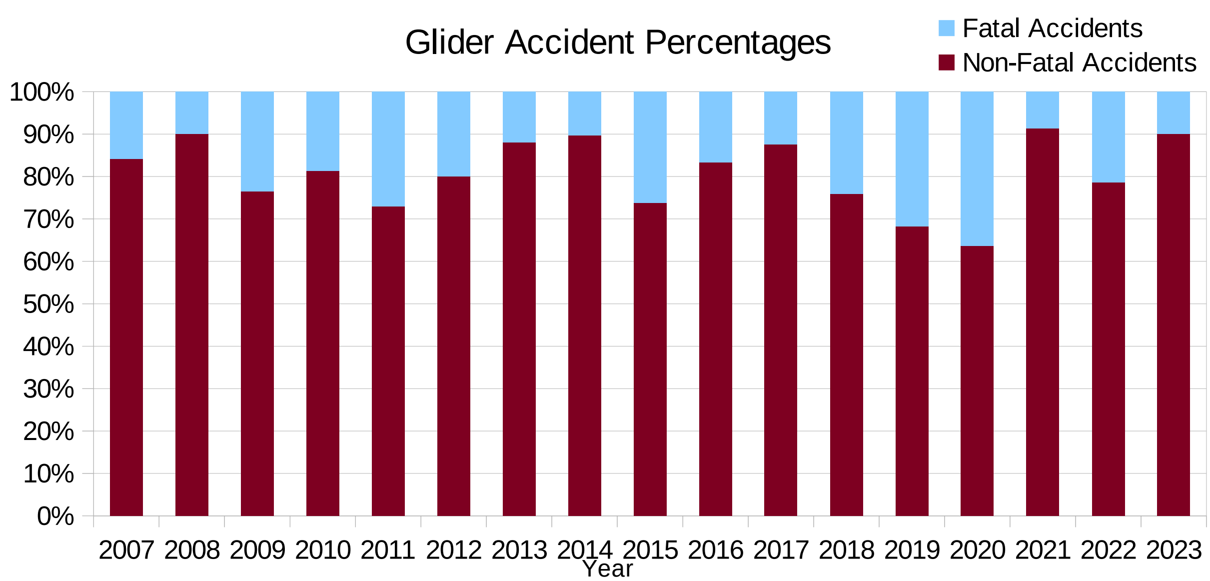

Figure 3: Percentage of fatal to non-fatal accidents in Gliding

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 **SSF Recommendation: Scenario Based Training** section later in this report.

In December 2023 the SSF was introduced to the concept of Safety-II to expand on the concepts found in the currently implemented Safety-I programs. For more information see the **SSF Trustee Action: Safety-II concept** section later in this report.

FY23 ACCIDENT SUMMARY

Number of Accidents

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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, 25.5/year for the 10's, and 21.0/year for this decade) the number of accidents each year remains too high.

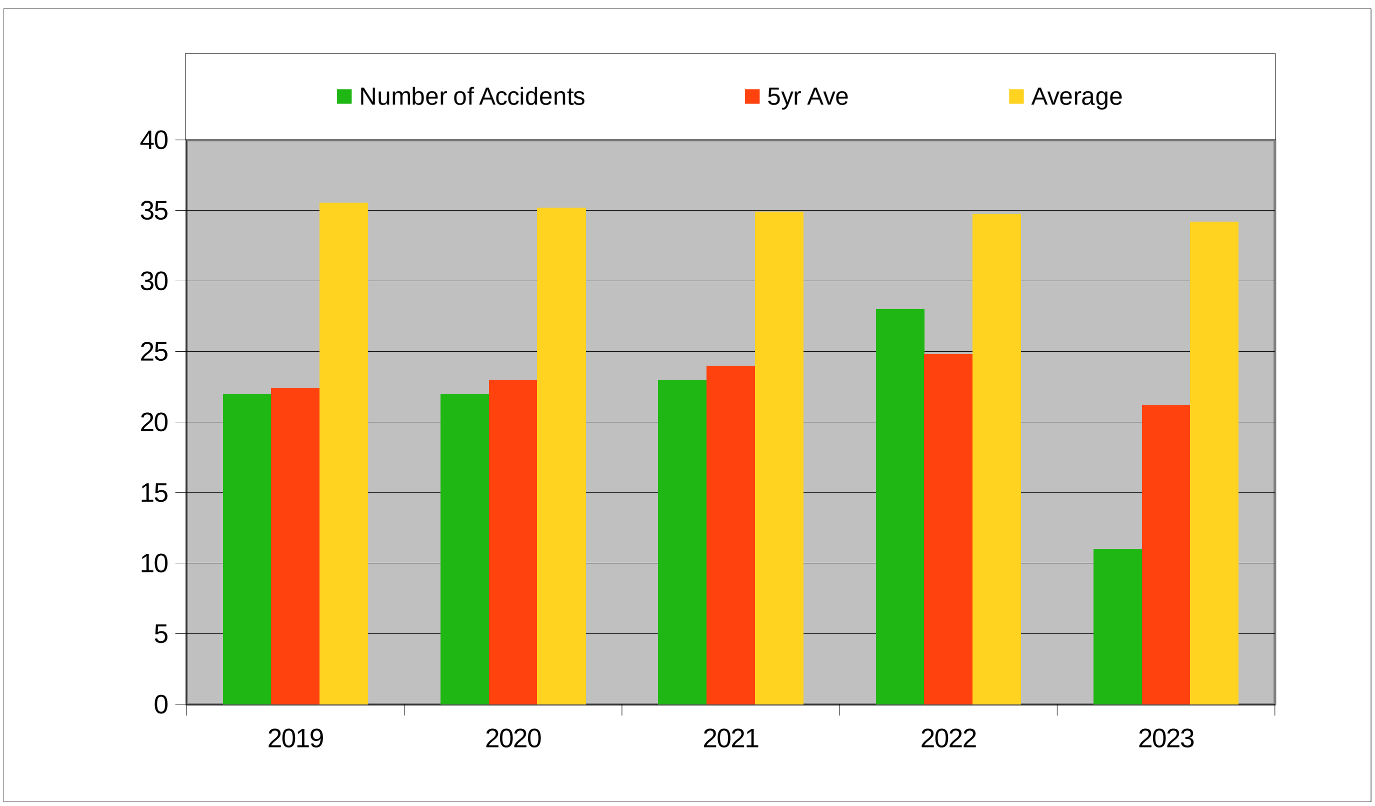

Figure 4 Number of accident, 5 year average FY19 - FY23

In addition, the average number of fatalities has remained nearly constant, at just under six (6) per year since the mid 1990's and is also considered too high. In the FY23 reporting period, one (1) accident resulted in fatal injuries to one (1) pilot. In addition, two (2) pilots received serious injuries while ten (10) pilots and passengers received minor or no injuries in these ten (10) non-fatal accidents.

Figure 4 shows the number of accidents that occurred in each year (green bar), the 5-year moving average that covers the noted year and the 4 previous years (red bar), and the long term average from 1981 to the listed year (yellow bar).

Phase of Flight

The number of accidents that occur during the approach and landing phase of flight again surpasses those recorded during any other phase of flight. For the FY23 reporting period, approach and landing accidents were 45% of the total number of accidents reported for the year[2]. Continuing the historical trend, less than half (40% or 2/5) of the landing accidents occurred when the pilots attempted an off-airport landing while the remaining accidents (60% or 3/5) occurred while landing at an airport. Historically landing accidents contribute to the largest number of accidents year in and year out.

There were NO launch accidents in this reporting period, meaning that 45% of the number of accidents occurred during the takeoff or landing phase of flight. The NTSB data show that remaining 36% of the accidents occurred while the glider was in cruise flight, (9%) in ground operations and (9%) for unknown reasons. These percentages differ from the long-term averages due to the lack of launch accidents in FY23.

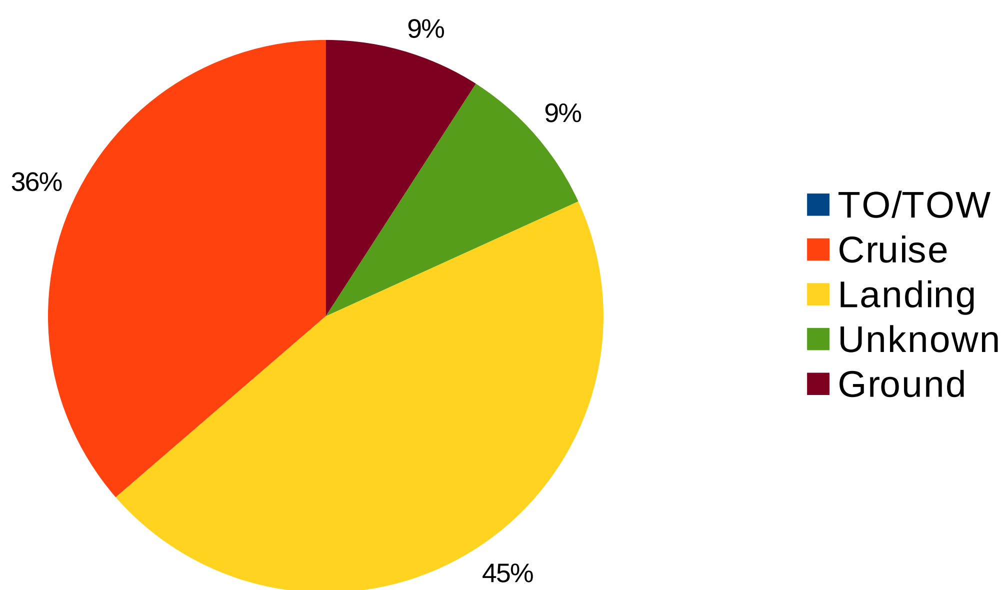

Figure 5: Glider accidents by category in FY23

[2]This is the percentage of the accidents that the NTSB has completed investigating and has released a probably cause.

It should come as no surprise 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 or the use of poor decision-making skills become increasingly difficult. Pilots must become proficient in dealing with launch emergencies. Having a pre-planned set of actions that pilots will execute if the launch starts to go wrong. Pilots must conduct a proper pre-launch written checklist and use a pre-launch briefing to mentally prepare for contingencies.

Take-off scenarios can help students and pilots mentally walk through numerous potential launch failures. 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 towplane pilot fanned the rudder during tow (c*heck your spoilers*)? How would a cross-wind affect the towplane and glider (*weather-vane on the ground, drift downwind in the air*), or what would you do in the self-launching glider whose 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 (*use Condor*)? 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. See the **Launch Accidents** section for more details on how to deal with launch failures.

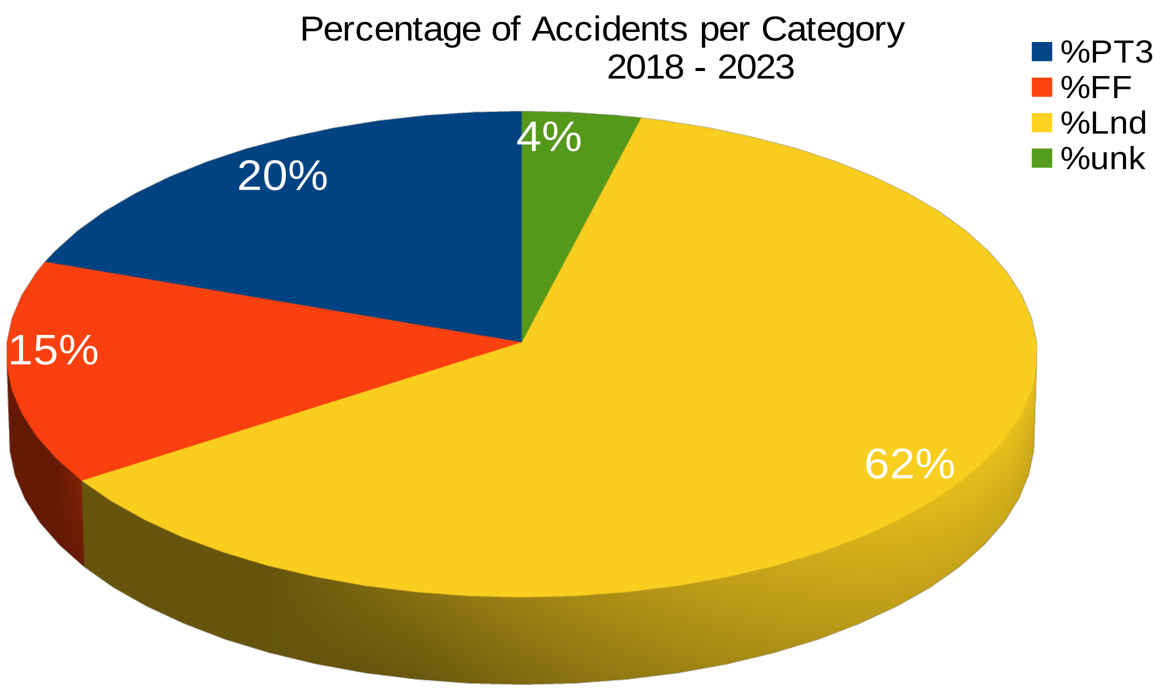

Figure 6: Percentage of FY18 - FY23 Accidents by Phase of Flight

Figure 6 shows the percentage of accidents that occur in the various phases of flight over the past 6 years. TO/Tow accidents are classified as those where a Premature Termination of The Tow (PT3) event occurred ending the tow before the time/altitude the pilot intended when the launch began.

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 as intended, 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 or where no probable cause has been determined.

As shown in figure 6, the largest number of soaring accidents occurs during the landing phase of flight. However, Figure 7 shows an entirely different picture when comparing fatal to non-fatal accidents in each flight category. It may surprise SSA members to learn this analysis shows that a larger percentage of accidents during the cruise phase of flight result in fatal injuries to pilots than during the other categories. Table 1 shows the number of fatal and non-fatal accidents for the fiscal years 2018 – 2023. The suffix notation "-F" (fatal) and "-NF" (nonfatal) is attached to each of the 3 major phases of flight Launch (PT3), Cruise (Free Flight - FF), Landing (Lnd), and Unknown (Unk). Accidents during ground handling are not broken out, but are included in the totals. Table 1 shows the same information as was found graphically in Figures 6 and 7. Note that looking at the percentage of fatal to non-fatal accidents in each category during this period we see 27% of the cruise flight accidents result in fatal injuries to pilots or passengers compared to 21% during the launch phase and just 7% during the landing phase of flight.

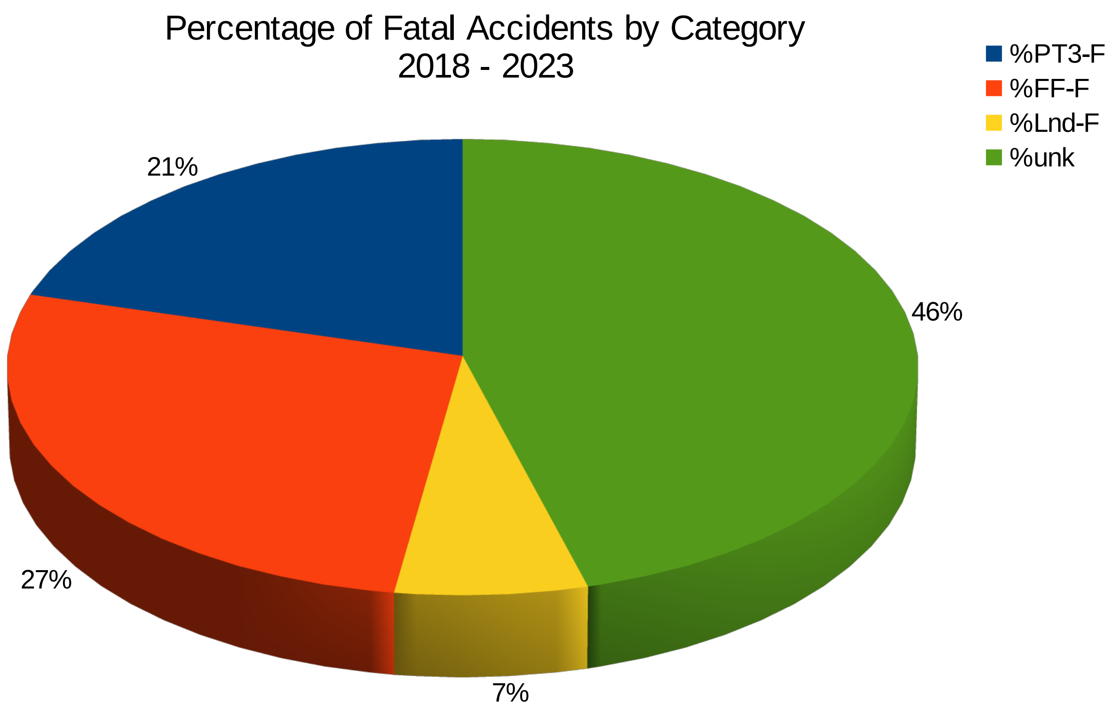

Figure 7: Percentage of Fatal Accidents by Phase of Flight

Pilots need to recognize the risks of low altitude thermalling. Circling at low speeds in turbulent air close to the ground can easily lead to an unintentional stall or spin entry in many gliders. Recovery, even for a proficient pilot can be impossible. Pilots must also learn how to deal with problems and emergencies in the launch and landing phases of flight. The SSF Goal Oriented Approach, described below, provides guidance on how to plan and execute safe landings.

	PT3-NF	PT3-F	FF-NF	FF-F	Lnd-NF	Lnd-F	Unk-NF	Unk-F	Total
2018	3	1	1	4	17	1	0	1	29
2019	2	1	1	2	11	3	0	1	22
2020	3	4	1	3	9	1	1	0	22
2021	4	2	1	0	15	0	0	1	23
2022	4	1	2	0	13	4	0	1	28
2023	0	0	4	0	5	0	0	1	11
Total	16	9	10	9	70	9	1	4	135

Table 1: Number of non-fatal (NF) and fatal (F) accidents from 20178- 2023

Launch Accidents

There were NO launch accidents in the FY23 reporting period. That said, pilots can continue this trend by mentally preparing 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.

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. Over the past few decades accident reports indicate that over 60% of PT3 accidents occur after the pilot intentionally pulled the release. Being prepared can help pilots better deal with these types of unexpected events. Instructors must evaluate and critique the pilot’s decision making skills in addition to the in-flight piloting skills.

Aerotow Launch Accidents

There were no aerotow launch PT3 accidents reported in the FY23 reporting period.

Ground Launch Accidents

There were no ground launch PT3 accidents reported in the FY23 reporting period.

Self-Launch Accidents

There were no self-launch PT3 accidents reported in the FY23 reporting period.

Towplane Accidents

There were no towplane accidents reported in the FY23 reporting period.

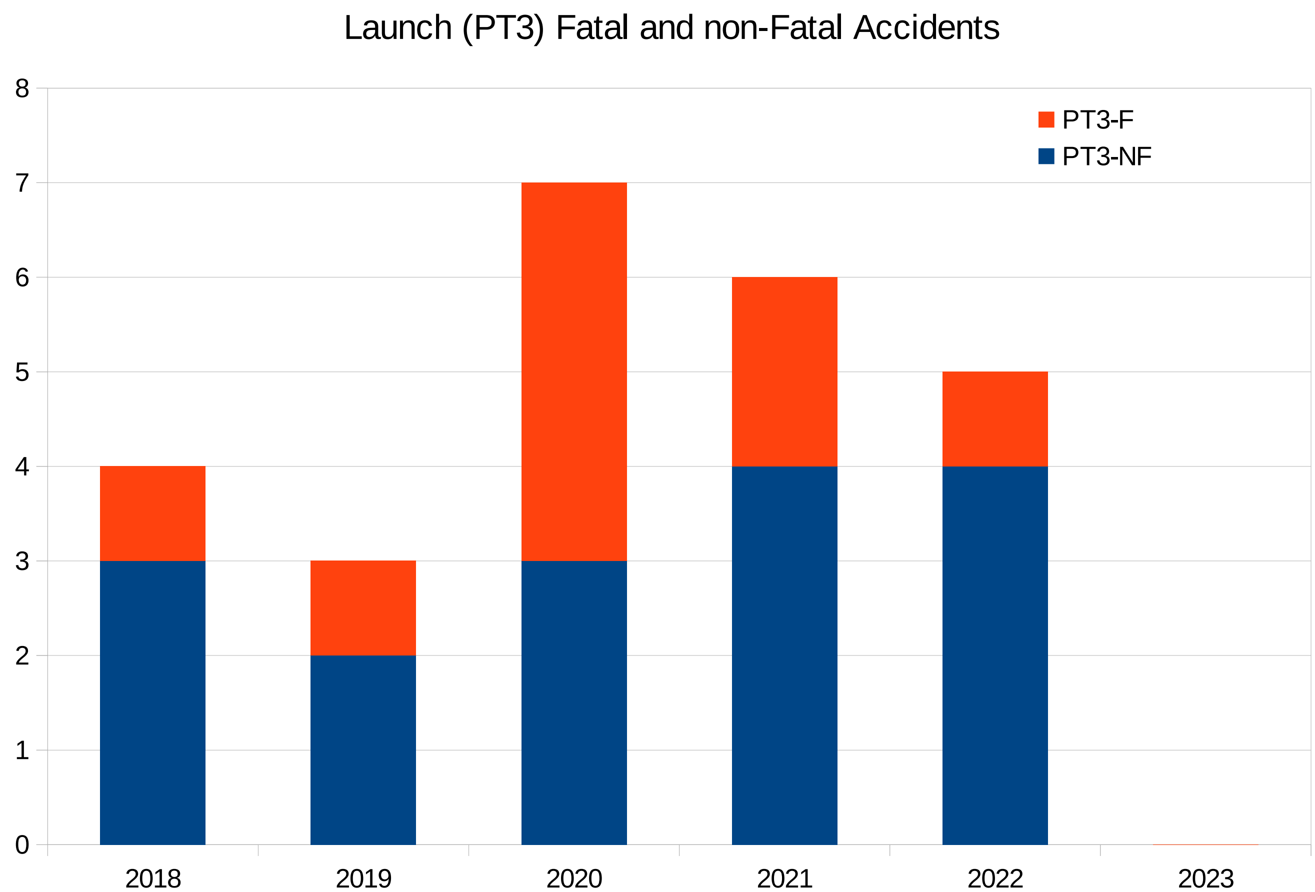

Figure 8: Number of fatal and non-fatal launch accidents

Even though there were no launch failure accidents in FY23, every pilot must 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, a proper written pre-launch checklist has been completed without interruption, 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.

When practicing emergency procedures pilots must consider all factors such as wind, terrain, density altitude, glider and towplane performance. An exact plan of action must include how the towplane will maneuver, stay on the extended runway centerline or drift downwind after clearing obstacles to give the glider pilot a more direct turn into the wind. While altitude is important the lateral position is also important as a low climb rate or terrain features may place the glider in a position where a safe return to the runway is not possible.

It is also essential that the glider has sufficient airspeed to safely maneuver for the intended landing. The pitch attitude of a launching glider (regardless of launch method) is not the pitch attitude that must be achieved once off tow, or when the engine is stopped. The immediate pilot action must be to establish the proper nose low pitch attitude and then wait several seconds to ensure that the proper airspeed has been obtained. Only then can any turn be made. Pilots who impulsively make an immediate turn without ensuring the proper pitch attitude and airspeed are at high risk of a stall/spin accident.

It is also desirable to perform any turns with as much altitude as possible. This may be accomplished by having the towplane drift downwind from the runway centerline or the pilot can make their initial turn away from the extended runway centerline to give the glider turning room so a final turn will allow the glider to roll out on the runway centerline avoiding a final alignment turn much closer to the ground. Finally, the pilot must be prepared to change plans and make a safe off-airport landing if it becomes clear that making the runway is no longer an option.

Once a decision to abort the launch is made and a decision to turn back toward the field is made, the most important task to concentrate on is the **quality** of the turn, pitch attitude and proper coordination. **MAINTAIN THE PROPER PITCH ATTITUDE (AIRSPEED) AND MAKE A COORDINATED 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 the internal and external factors that must be accounted for. The pilot and instructor must next 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 glider pilots flight skills and his/her decision making skills.

All tow operations need to have a Standard Operation Procedure for tow. This SOP should define the normal tow procedures and set the expectations for both the glider and towplane pilots. Any deviation from these SOPs needs to be communicated between both pilots before the launch begins. Abnormal operations like holding the towplane in ground effect before zoom climbing at the end of the runway need to be completely discussed before the launch begins. Failure to do so leaves the glider pilot in a difficult situation not knowing if the towplane is having a performance problem or if both aircraft will clear any obstacles off the end of the runway.

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!!**

Cruise Flight Accidents

There were four (4) non-fatal cruise flight accidents reported during the FY23 reporting period. Figure 9 shows the total number of cruise flight accidents from FY18 to FY23.

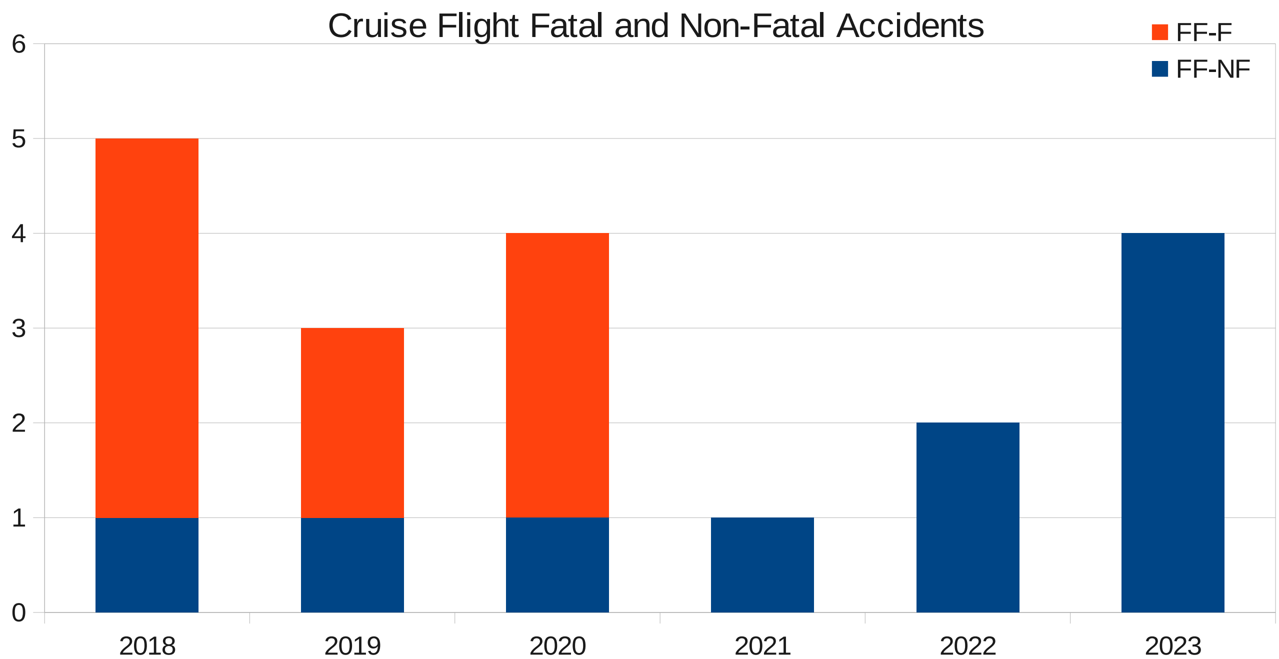

Figure 9: Cruise Flight Fatal and Non-Fatal Accidents

The ATP rated pilot in a PIK 20D received minor injured while the glider was substantially damaged after striking trees in mountainous terrain. The pilot reported that while ridge soaring, he attempted to join birds in a thermal, turning towards the ridge. During this turn the glider drifted downwind and into sinking air resulting a collision with trees while attempting to reenter the thermal. *NTSB ERA23LA115*

The private pilot in an AC-5M was seriously injured while the motor-glider was substantially damaged after the wings came off while in-flight. Witnesses reported that the pilot had recently purchased the glider and this was the first flight following that purchase. The assembly process was observed and documented with photographs and videos before the pilot took an aerotow to 3,200 ft MSL (3,000 ft AGL). The pilot reported extending and retracting the engine when he heard a ‘bang’ and the glider entered a spin. The pilot bailed out before the fuselage impacted the ground with both wings about 200 ft from the main wreckage. Examination of the wreckage showed that the right wing attachment tab was separated from the wing root. *NTSB WPR23LA255*

The pilot in a Silent 2 Electro motor-glider was not injured while the aircraft was substantially damaged after experiencing severe vibrations while in cruise flight. The pilot reported that while in flight about 4,000 ft MSL, the aircraft began to severely vibrate. The pilot reported deploying the spoilers to slow down, and about 60 kts, the vibrations stopped. The pilot then increased speed and the vibrations started again. The pilot then resumed a speed below 60 kts and made a straight in approach and uneventful landing from about 2 miles out. After exiting the aircraft, the pilot noticed cracking of the composite tail boom structure. *NTSB CEN23LA319*

The commercial pilot in a Silent 2 Electro motor-glider was not injured while the aircraft was was substantially damaged after experiencing severe vibrations while in cruise flight. The pilot reported that while in flight at 80 kts and 4,800 ft MSL, the aircraft began to severely vibrate. The pilot reported that after slowing to 60 kts, the vibrations stopped. The pilot then returned to the departure airport and made an uneventful landing. After exiting the aircraft, the pilot noticed cracking of the composite tail boom structure. *NTSB CEN23LA405*

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 FY23 reporting period, gliders hitting objects on final or during the landing roll accounted for the majority of the landing accidents. Continuing a historical trend, over half of the landing accidents (60%) occurred while the pilot was landing at an airport. The remaining 40% (2/5) accidents occurred while the pilot was making an off-airport landing.

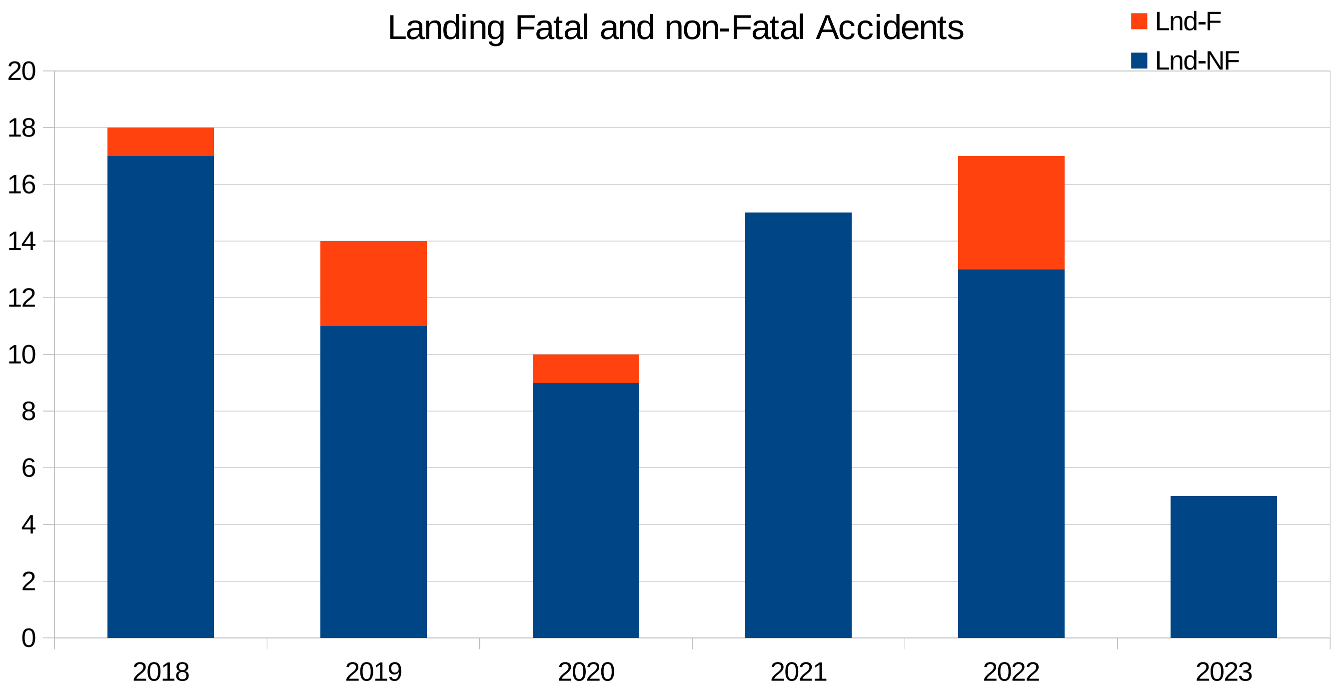

Figure 10: Landing Fatal and Non-Fatal Accidents

Figure 10 shows the total number of landing accidents from FY18 to FY23 broken down by fatal and non-fatal accidents. This figure shows that the majority of landing accidents do not result in fatal injuries to the pilot. A deeper analysis of the landing accidents in FY23 indicate pilots continue to strike objects while on the ground roll (1 accident) or land short (2 accidents). See figure 11 for a complete breakdown of landing accident factors.

During the FY23 reporting period five (5) non-fatal landing accidents met the reporting requirements of NTSB part 830. The NTSB reports indicate that one (1) student pilot, one (1) ATP pilot, and one (1) CFI-G rated pilots were involved in these accidents. The certificate of the other two (2) pilots was not reported.

The ATP rated pilot in a Discus 2B was not injured while the glider was substantially damaged while landing at the home airport. The pilot reported that he was about 5 ft AGL during the landing when the glider ran into a dust devil. The glider struck the ground and bounced back into the air before stalling and hitting the runway hard again. *NTSB WPR23LA182*

The CFI pilot in a Blanik L-23 was seriously injured while the student received minor injuries and the glider was substantially damaged after it impacted terrain during an off-airport landing. The student reported that while on a training flight the CFI assumed control of the glider and attempted to find a thermal to gain altitude. The CFI was unable to climb and prepared to perform an off-airport landing. The student reported they overflew a line of trees and turned to land in a bean field. The glider then impacted terrain damaging both wings and the fuselage. *NTSB CEN23LA254*

The ATP rated pilot in an ASG-26E motor-glider was not injured while the motor-glider was substantially damaged after impacting terrain short of the runway. The pilot reported completing the pre-landing checklist and partially extending the spoilers with the intent to land at an airport. While on base the pilot reported encountering ‘significant sinking air’ so he turned directly towards the runway and closed the spoilers. The pilot attempted to use ‘ground effect’ to reach the end of the runway, but was unable to make it to the runway, impacting terrain and damaging the nose of the motor-glider. *NTSB WPR23LA245*

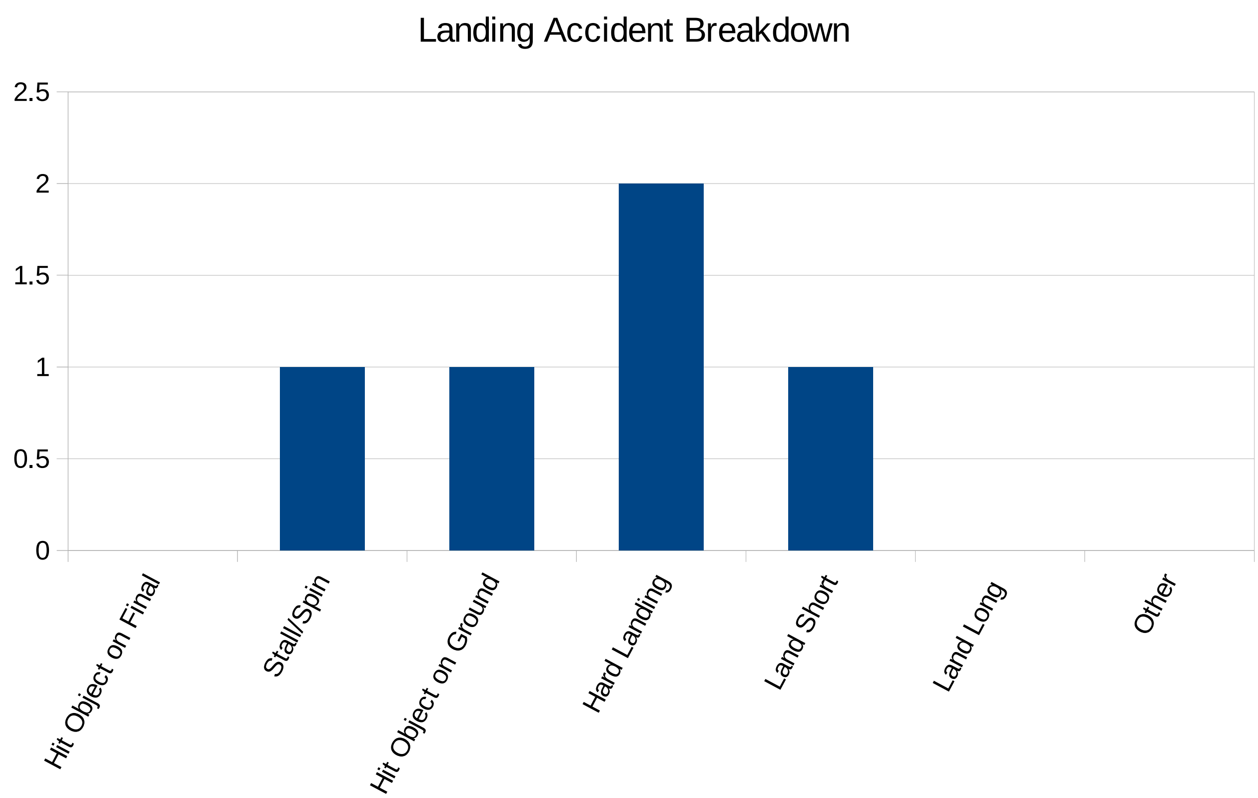

Figure 11: Reported factors in landing accident

The ATP rated pilot in a SGS-233A glider was not injured while the glider was substantially damaged while performing an off-airport landing. The pilot reported he was attempting to land on the runway, but realized that the glider was high and began a forward slip with full dive brakes on base, continuing this on final. About mid-field, the pilot made a left turn to establish a right downwind for an off-airport landing. The right wing and nose impacted terrain during the landing. *NTSB ERA24LA029*

Even pilots on local flights must use good Aeronautical Decision Making/Risk Management (ADM/RM) skills to consider the possibility of an off-airport landing. Picking a field that has sufficient length even when obstacles like trees and power lines exist is a primary task. Being able to judge the landing without reference to the altimeter and without reference to specific objects on the ground (e.g., turn base over the field where Joe's garage used to be) are essential skills all pilots need to develop.

Picking a landing field based on the ease of the retrieve vs the safety of the landing has led to many accidents and incidents. It is always better to land and stop safely and then figure out how to get the glider to the trailer.

Scenario based training techniques can be used to help pilots develop the necessary ADM/RM skills they need. In addition, the SSA ABC/Bronze Badge program can help all pilots develop the piloting skills needed to make off-airport landings. The Bronze Badge program requires the pilot demonstrate some soaring skills (two – 2-hour flights) and the landing skills (spot landings and landings without reference to the Altimeter). Talk to your clubs/schools SSA-Instructor (SSAI) to participate in this program and develop/demonstrate proficiency in your skills.

Remember, that all skills atrophy if not used so practice them on a regular basis. Make every landing a spot landing. Don't allow yourself to simply 'stop somewhere on the airport'. Before launch, or before entering the pattern, pick a specific stopping spot on the runway. Then use the skills you developed during your primary training to land and stop at this spot. Talk to you instructor if you have trouble accomplishing this task and re-develop these skills to proficiency. Remember you demonstrated these tasks to the pilot examiner when you initially earned your pilot certificate.

Another fun way to practice is to hold a spot landing contest. Pick an afternoon when conditions are calm and put an orange highway cone on the runway. Give everyone a pattern tow and have classes for students, private, and commercial pilots. See who can get the closest without overrunning the cone. You may be amazed with the results.

Fatal Accidents

One (1) glider pilot was involved in one (1) fatal accident during the FY23 reporting period. This represents an 83.3% decrease in the number of fatal accidents (1 vs 6) from previous reporting period. This accident occurred for unknown reasons.

The pilot in an ASH-26E motor-glider was fatally injured and the aircraft was substantially damaged after it impacted terrain in a nose down attitude. The GPS trace showed pilot self-launched and climbed to an altitude of 7,800 ft MSL before executing a 180^{O} heading change. The aircraft continued a steady descent and the last IGC record showed the aircraft at 60 kts about 250 ft AGL. The ground scars indicate the motor-glider stalled and impacted terrain about 77^{O} nose down. The spoilers were found in the closed position while the propeller and driveshaft were in the 'halfway in' position with no damage to the propeller blades. *NTSB CEN23FA391*

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 8, 9, and 10 (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 12 shows the number of fatal accidents in all phases of flight. The green bar shows the number of fatal accidents that occurred during that year, the red bar is a moving 5-year average, while the yellow bar is the average starting from 1987 to the year shown in the X-axis.

The NTSB is still investigating some of these fatal accidents and no probable cause has been issued for those still under investigation. Figure 14 shows the breakdown of probable causes for all fatal accidents from FY02 to FY23.

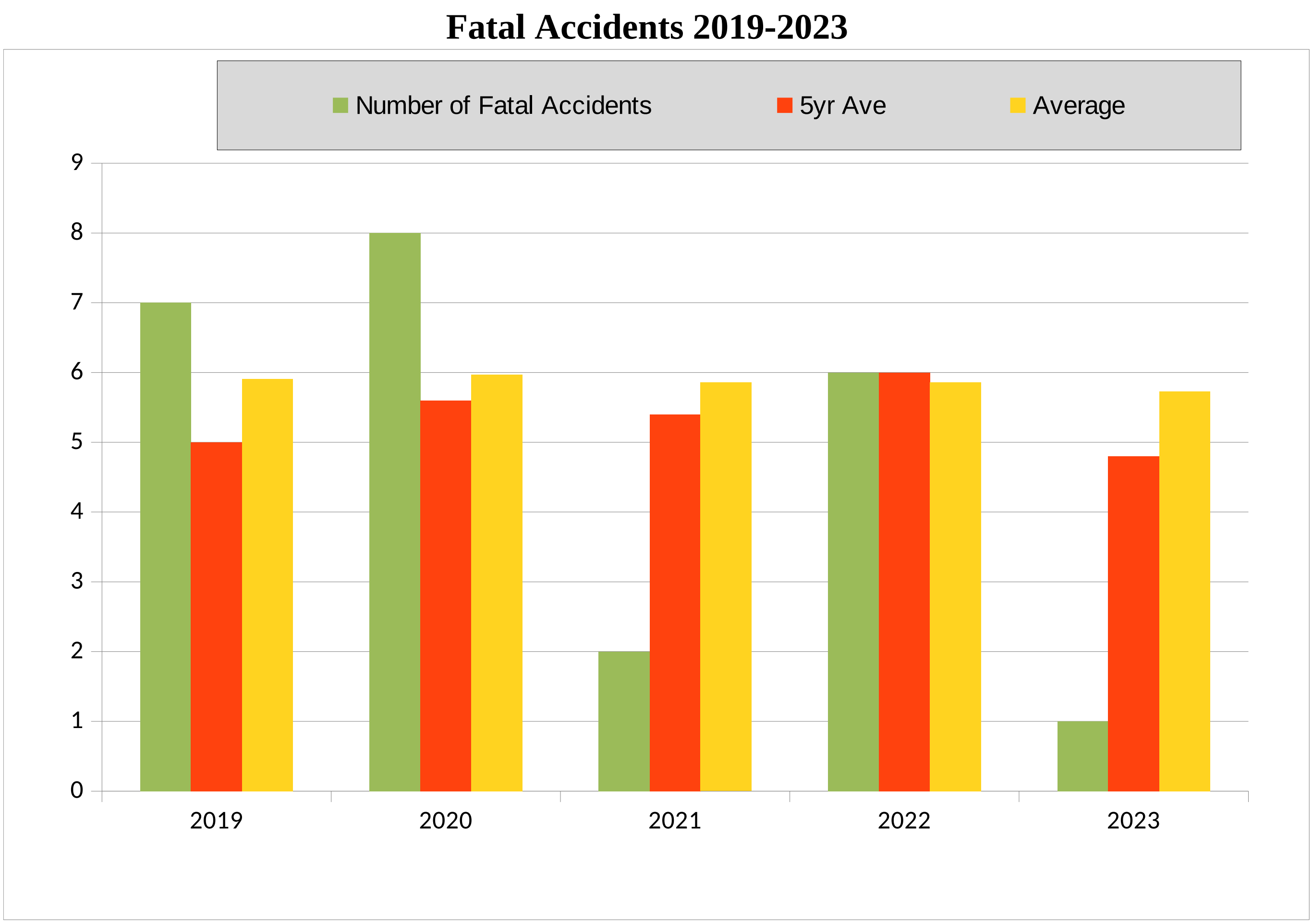

Figure 12: Number of fatal accidents, 5 year average, and average since 1987

For the five-year period 2019 – 2023, twenty-four (24) pilots and two (2) passengers received fatal injuries while soaring. This equates to a five-year average of 5.2 fatalities (4.8 fatal accidents) 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 5.7 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 and tow-plane accidents. From FY02 – FY23 there were 113 fatal glider or tow-plane accidents in the US involving 116 pilots and 14 passengers in 116 aircraft (mid-air collisions account for the additional aircraft). The NTSB database contains a probable cause (PC) for 109 of these accidents leaving 4 still under investigation.

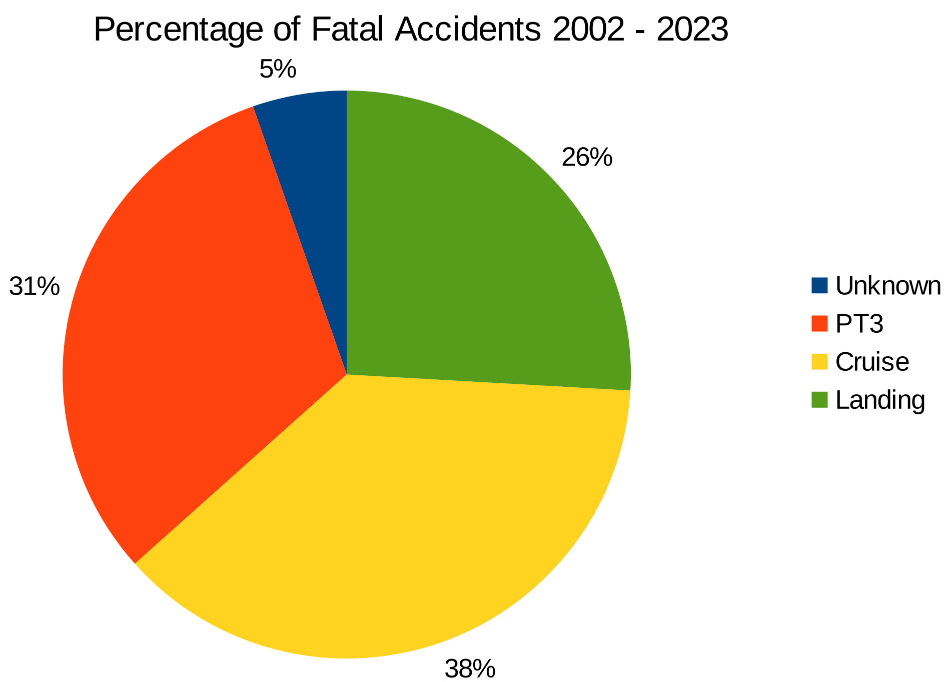

Figure 13: Percentage of Fatal Accidents in various phases of flight

Figure 13 shows the percentage of fatal accidents in the 3 major phases of flight (launch, cruise, and landing) from FY02 thru FY23. It is instructive to compare these percentages to the percentage of accidents as shown in Figure 5. 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 completely different trend. This data shows the highest percentage of fatal accidents occur in the cruise phase of flight with the fewest percentage of fatal accidents occurring in the landing phase of flight.

Figure 14, shows the breakdown of probable causes in 11 major areas, with a 12^{th} (no P.C. - Probable Cause) meaning the accident is still under investigation. It is informative to see the majority of fatal accidents occur after the pilot lost control of the glider and it 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.

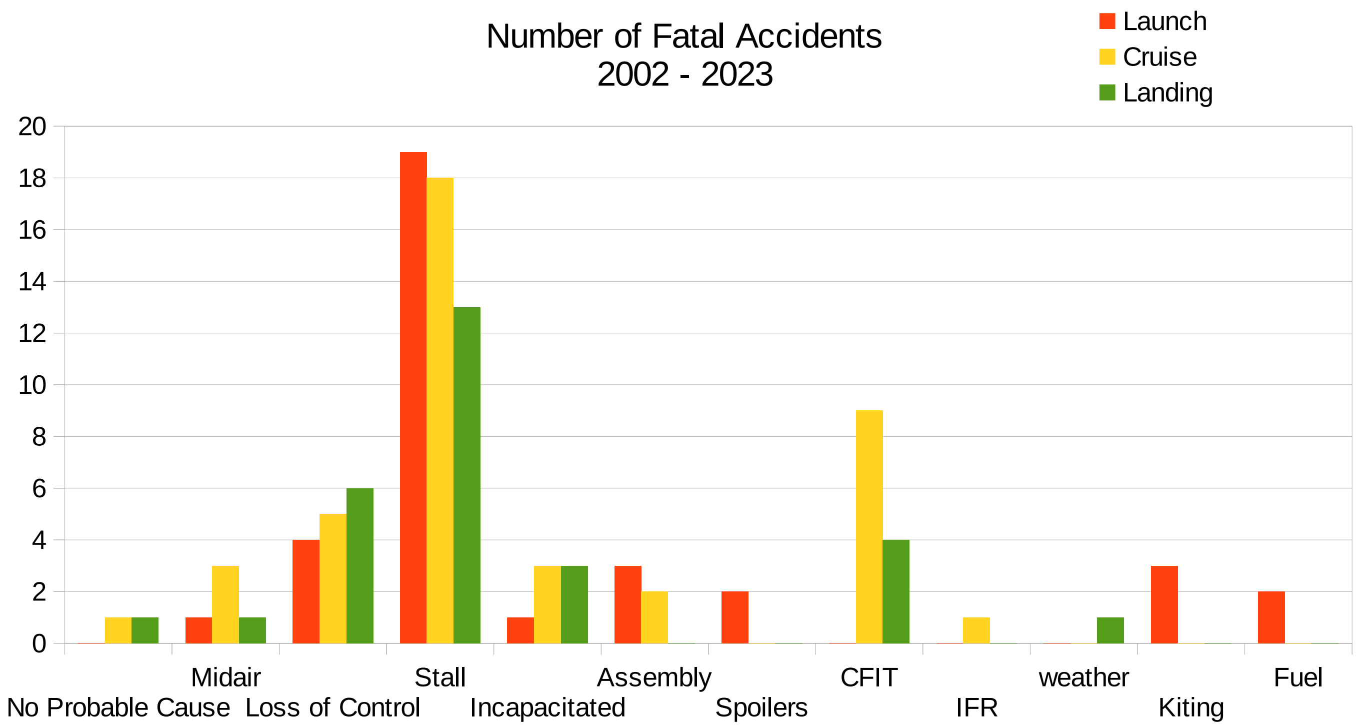

Figure 14: Number of fatal accidents by NSTB defined Probable Cause

Damage to Aircraft

A total of five (5) gliders and six (6) motor-gliders received structural or substantial damage during the FY23 reporting period.

The private pilot and passenger in a Sinus were not injured, but the motor-glider was substantially damaged after an engine fire while on the ground. The pilot stated that the engine quit, and would not restart, while on the runway preparing to depart. The aircraft was pushed off the runway and the engine was allowed to cool. The engine then restarted but quit when engine power was increased to about 4,000 rpm. This happened 2 additional times, after which the pilot noticed thin white smoke coming from the engine compartment. The fire caused substantial damage to the aircraft. *CEN23LA165*

Damaged gliders have 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 or customers to obtain and maintain both currency and proficiency.

Auxiliary-Powered Sailplanes

Six (6) gliders equipped with some kind of internal powerplant (gas or electric) were involved in accidents during this reporting period. In this report a glider that can self-launch, or simply sustain flight after a conventional glider launch has been completed is referred to as a motor-glider. Details of those accidents are reported in the appropriate section (cruise, landing, or damage to aircraft) above. The details of 1 accident can be found in the F**atal Accidents** section.

It should be noted that, while not a factor, in four (4) of these accidents the motor-gliders had self-launched.

Accidents Involving Tow-Aircraft

There were no accidents involving towplanes in the FY23 reporting period.

Accidents with no known cause

There is one (1) fatal accident in FY23 for which no known cause has been found. Details can be found in the **Fatal Accidents** section 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].

Instead of focusing on comparing accidents in one region to others, figure 15 compares the number of accidents in each SSA region with the average number of accidents in that region during the previous 14 years (FY10-FY23). Figure 16 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 across 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 and towplane accidents. Every pilot must continuously evaluate the ground and flight operations with an eye toward preventing incidents from becoming accidents.

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[3] See Appendix A for more details

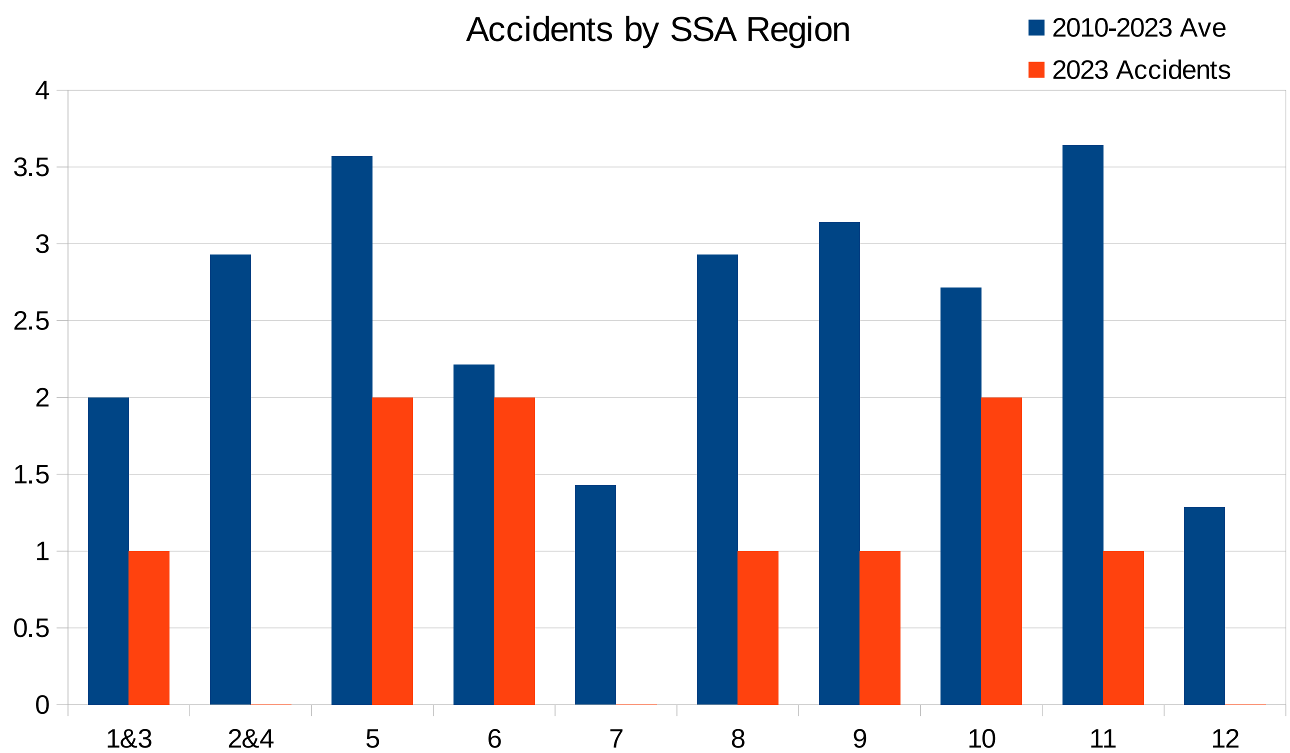

Figure 15: FY23 and average Number of accident per SSA Region

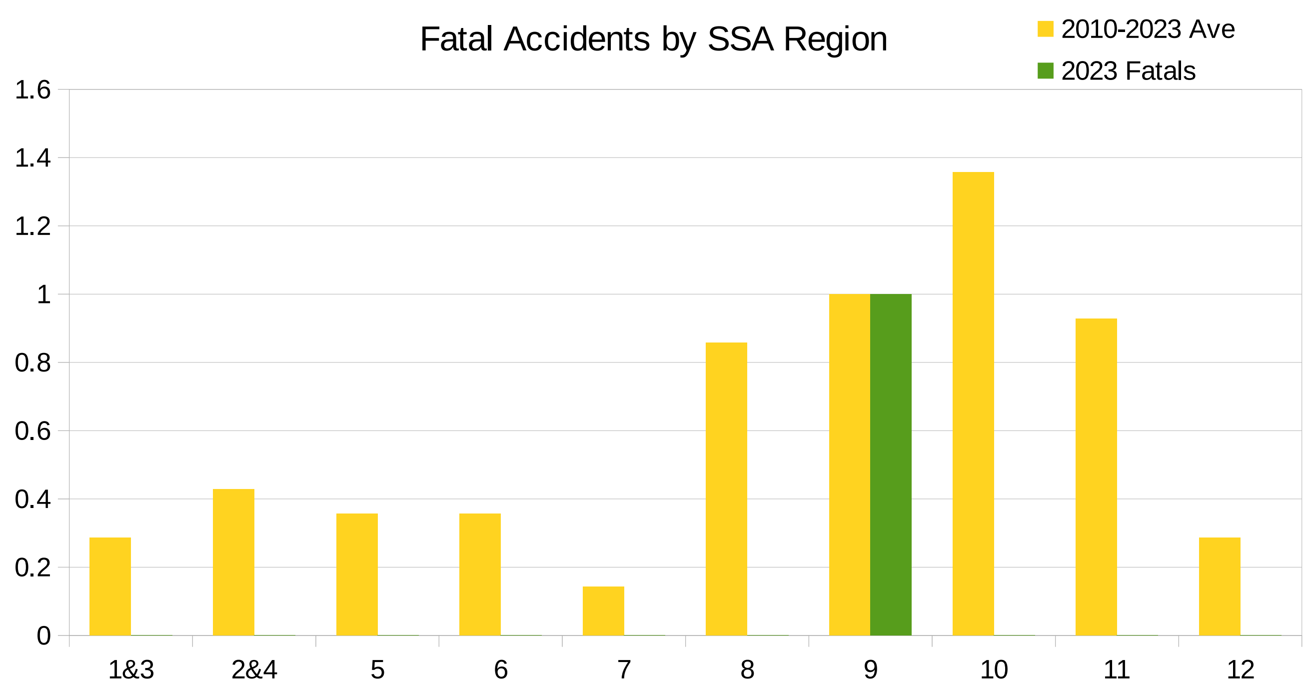

Figure 16: FY23 and Average number of Fatal Accidents per SSA Region

The SSF web site 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 trends and to formulate procedures to assist pilots and instructors in preventing future accidents.

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. The number of claims fell 34% from the previous year, while the claims value fell about 58% as fewer gliders were damaged and fewer pilots or passengers were injured. Obviously, 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 and towplane accidents is the Human Error factor. The question then is what does this mean?

In some cases, it means that the pilot does not have the necessary skills to control the glider within certain parameters. An example would be failure to maintain a constant airspeed when making a steep turn. With instruction and practice the pilot can develop the skills needed to perform this maneuver.

In some cases, it means that the pilot does not have the necessary aeronautical decision making skills (ADM) to recognize the risks that arise from a specific action. An example would be failure to pick and maintain the proper approach speed when landing into a decreasing headwind (e.g., a wind gradient). With instruction and practice the pilot can learn how to make the decision in order to make a safe approach and landing in these conditions.

In some cases, it means that the pilot had the necessary skills and ADM knowledge, but failed to apply good Risk Management (RM) skills to mitigate those risks. An example would be that the pilot attempts to make a low altitude save because a land out and retrieve would mean getting home much later than expected.

In some cases, it means that the pilot has succumbed to a condition known as ‘Normalization of Deviance’. This means that the pilot has successfully gotten away with a risky behavior (e.g., climbing up from 600 ft AGL) so a new tolerance limit is set at a lower level (e.g., going down to 500 ft AGL is now acceptable).

Aviation safety experts consider the cause of an accident to be Human Factors when any or all of these factors are at work. What is important to understand is, that with training and practice we can develop the skills to recognize when we are susceptible to falling into a Human Factors accident chain. Constantly practicing those skills can significantly reduce the accident rates in the U.S. Thus, building and maintaining a safety culture where everyone involved in the organization holds themselves and others to the standards agreed upon by those members is the best safety action you can take.

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.

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

Imagine that a pilot is involved in a near-miss incident due to a failure to see and avoid the other glider. 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, <u>the problem is that the flight instructor(s) he trained with failed to emphasize the importance of this task.</u> The operations training syllabus may not have emphasized this task and instructors may not have been given the post-flight time to evaluate and critique the pilot's 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 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 often has the pilot been put in this situation during training or recurrent training? 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 modify 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 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 both initial and recurrent training program to determine what is broken and how to fix these problems.

SSF Trustee Action: Safety-II concept

In December 2022 the SSF was introduced to the Safety-II concept, which can be viewed as an enhancement to our current Safety-I programs. To understand how Safety-II enhances Safety-I, it is informative to look at how safety programs have developed over the past 70 years.

In the early to mid-1950's, general aviation grew at a tremendous rate, with a commensurate increase in aircraft accidents. This led the FAA to begin writing more rules and regulations to deter pilots from engaging in unsafe activities. We have all heard the line 'that regulation was written in blood'. Meaning that a fatal accident had occurred, the accident review determined the probable cause, and a regulation was written as a deterrent to other pilots performing this action. This response worked well for the next few decades.

However, in the mid to late 1970's, experts notices that the number of accidents were not decreasing as rapidly as before. This led to the focus on Human Factors as a major cause of accidents. The aircraft and engines were not failing as often as before and it was recognized that pilots making mistakes or failing to recognize hazards and risks were major causal factors. This led to the regulatory requirement that pilots be trained in Aeronautical Decision Making. Programs which introduced the 5 Hazardous Thoughts (Anti-Authority, Invulnerability, Invincibility, Macho, and Resignation) and their antidotes and the IMSAFE (Illness, Medication, Stress, Alcohol, Fatigue, and Emotion) checklist are 2 examples of ADM skills pilots can learn. The learning of ADM and Risk Management (RM) skills have made a significant positive impact on reducing aviation accidents.

However, as we enter the 3rd decade of the 21st century we again see a plateauing of aviation accidents. This has lead aviation safety experts to develop additional safety management programs, specifically" one called Safety-II.

As defined in "Safety-I and Safety-II; The Past and Future of Safety Management by Erik Hollnagel[5]" traditional, or Safety-I, programs operate under the definition that 'Safety is the condition where the number of adverse outcomes (accidents/incidents/near misses) is as low as possible'. In contrast, Safety-II is defined as 'The condition where the number of successful outcomes is as high as possible'. Safety-I is our communities' current method where we look for problems, analyze them to identify causal factors, and implement corrective actions (i.e.; new rules, training, re-training, procedures, enforcement, etc.). Moving to a Safety-II program requires a different mindset.

Consider the following scenario and how the Safety-I and Safety-II program responses differ.

Joe is moving his glider up the taxiway using the glider tow-out gear. Sam has his trailer parked in the glider assembly area to the right of the taxiway and is standing next to the cockpit after just completing the post-assembly checklist. As Joe approaches there are several possibilities:

1. Joe drives by knowing that his left wing-tip will clear Sam's tail.
2. Joe stops short and looks over his shoulder and estimates that there is about 6' of clearance between the wingtip and tail before moving forward.
3. Joe stops and calls out to Sam who estimates that there is about 6' of clearance between the wingtip and tail so Joe moves forward.
4. Joe stops and calls out to Sam, who walks around the wing to the tail and confirms that there is 6' of clearance and stays there as Joe slowly moves forward.
5. Joe stops and call out to Harold, who helped Sam assemble his glider, and has him stand by the tail to confirm that there is 6' of clearance before Joe slowly moves forward.

As you can imagine, there are many other options that could have taken place to assist Joe in safely moving his glider past Sam's.

In a Safety-I program, this scenario would not generate a report or comment unless the wing of Joe's glider did strike, or came close to striking the tail of Sam's glider. In that case, the normal investigation would have taken place with one or more of the corrective actions stated above used to prevent further occurrences.

In a Safety-II program, all of the outcomes, especially the positive ones, would be documented and

[5]Erik Hollnagel Professor, PhD. Professor Emeritus Linköping University Sweden,

used to determine how often this situation occurs and how different people respond in a positive way to avoid or prevent the accident or incident. Thus, in a Safety-II program, the pilots and observers recognize the hazard or threat, take positive actions to mitigate the risk, and then documents that positive action. The organization then has a record of these positive actions and can count the number of times pilots thought about safety and actively did something to promote that safety culture.

The SSF trustees and advisors are working with the international gliding community to better understand how Safety-II concepts can be implemented and used by the U.S. Soaring community. Updates will be presented in articles and presentations as that knowledge is gained.

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 'Carol' 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 42 years.

However, while this data can show trends, it does not show the accident rates that are commonly shown in General Aviation or Commercial aviation 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 raw numbers are 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 or 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.

Since that time, the SSF has continued to gather raw accident numbers from the NTSB database and flight hours/launches from both the FAA survey data and data submitted to the SSF via our annual postcard request. A comparison of this data is shown below.

FAA Survey Data:

Every year the FAA sends a random subset of glider owners (pilots, clubs, and commercial operators) a letter or postcard 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. This data shows that U.S. glider pilots have flown an average of 102,412 hours/year between 1999 and 2021. This has ranged from a high of 157,831 hours in 2002 to a low of 50,352 in 2020. This accident rate, based on this FAA data, is shown in figure 17 (accident rate per 100,000 hours/year and launches/year).

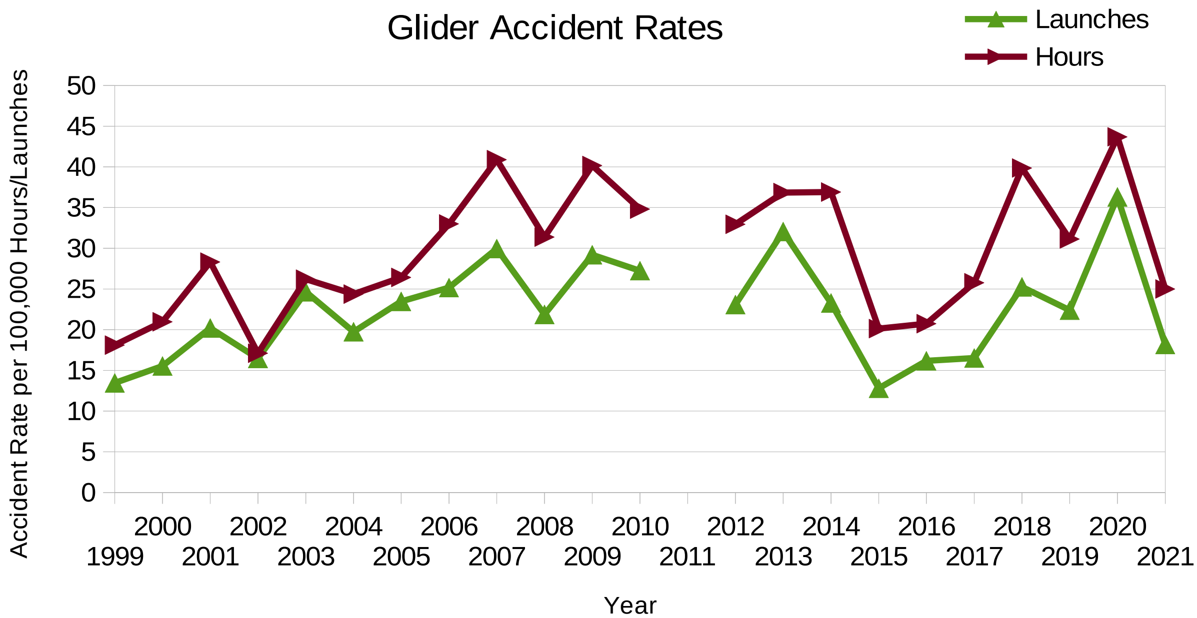

Figure 17: Glider accident rate based on FAA survey data

Figure 18 (below) shows the accident rates (per 100,000 launches and hours) based on the date collected by the SSF. Clubs, chapters, and commercial operators who return their postcards. Comparing figures 17 and 18 helps demonstrate the value of returning your postcard.

For the past 6 years the SSF has been asking clubs, chapters, and commercial glider operators to complete an anonymous and confidential usage survey. In late January or early February, the SSF requests a list of mailing addresses from the SSA office in Hobbs, for all soaring organizations and mails them a letter and postcard seeking that organizations flight information. So far approximately 30% of those organizations respond by returning the postcard to us. 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 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

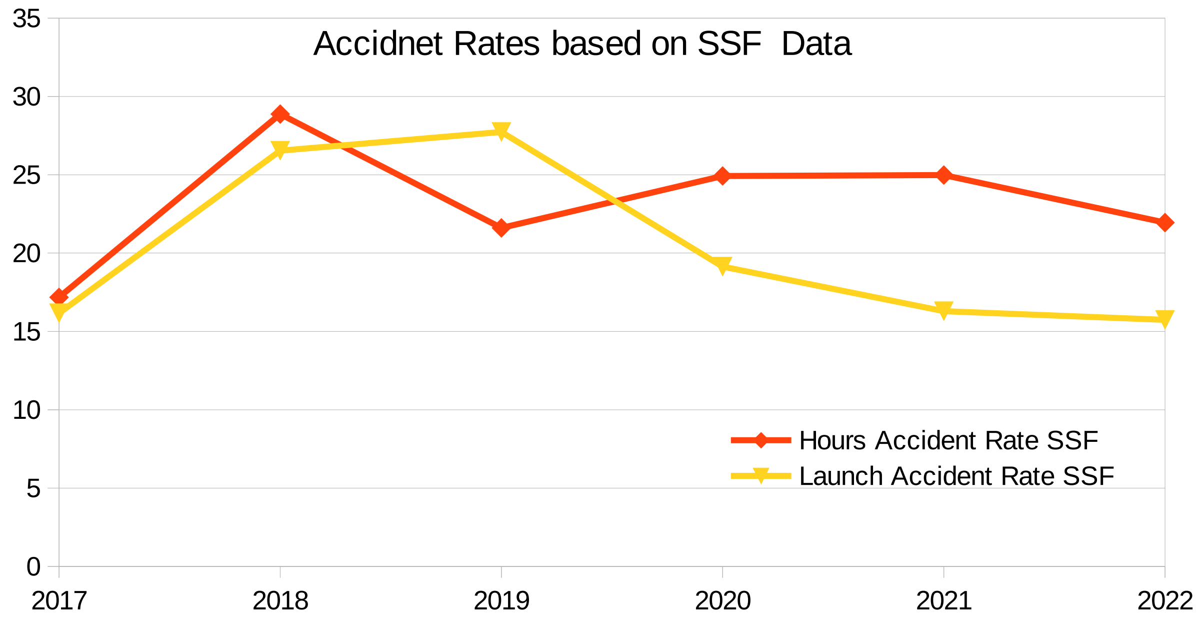

Figure 18: Accident rates (per 100,000 hours or flights) using SSF Club/Commercial provided Data

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

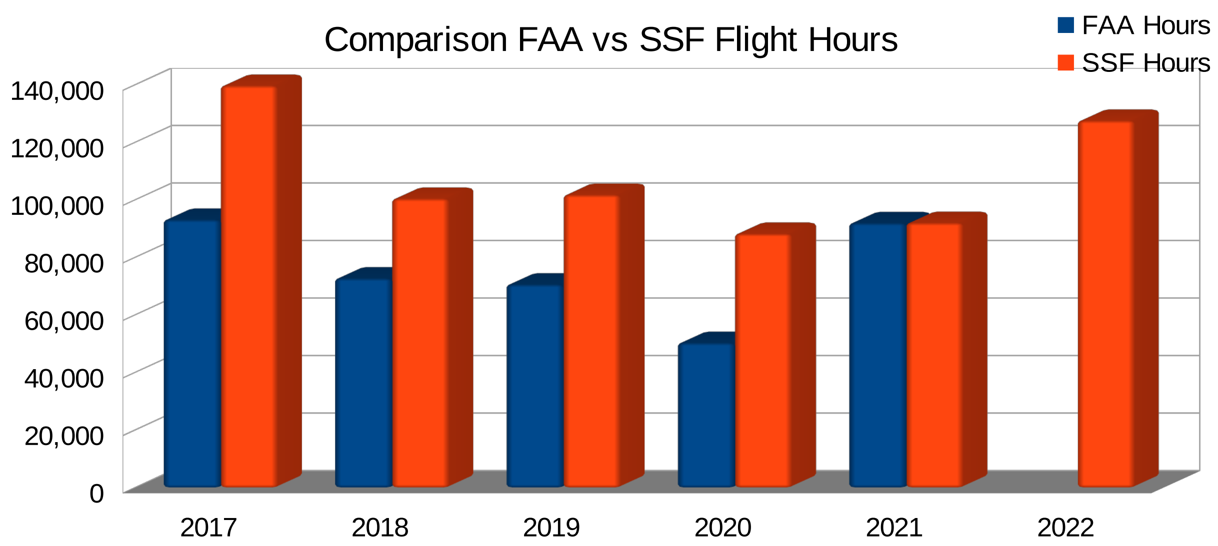

Figure 19: Comparison of flight hours between FAA survey data and SSF postcard request data

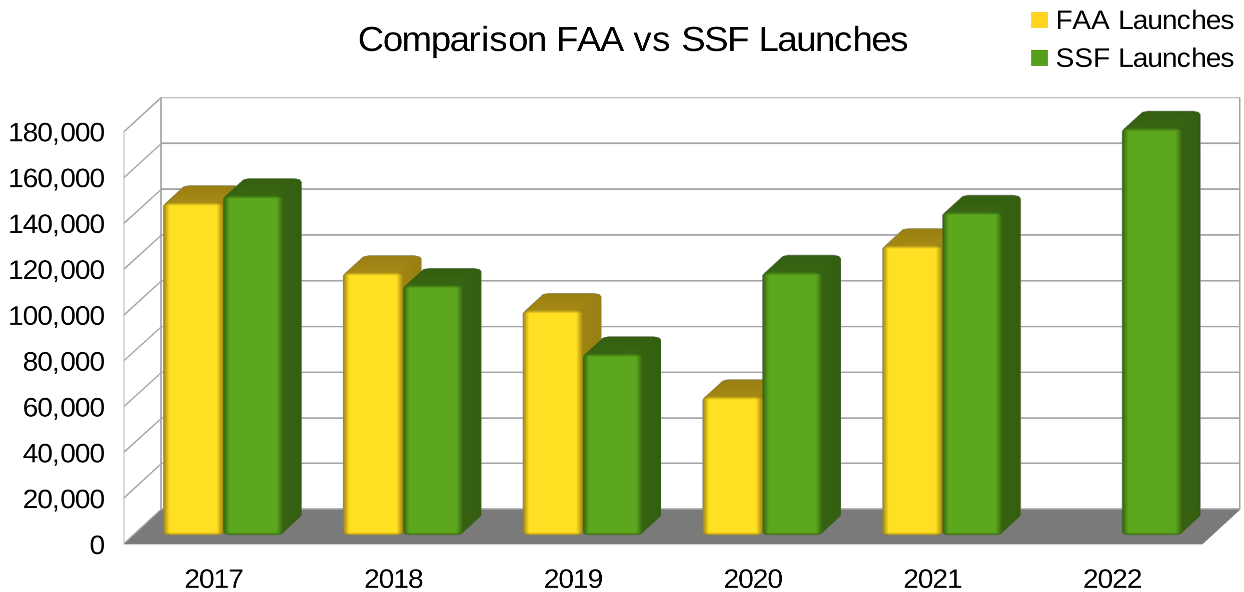

Figure 20: Comparison of launches between FAA survey data and SSF postcard request

Figure 19 compares the flight hours and Figure 20 compares the number of launches between the data extracted from the FAA Survey data and that obtained from clubs, chapters, and commercial operators responding to the SSF's annual postcard request. Up until 2020, the number of launches reported by these member organizations had been tracking closely with the numbers found in the FAA survey. Since we expect that these organizations do not have good numbers on private glider flight times, the SSF calculates private hours by taking the average length of a club flight and estimating that a private flight is 4 times longer. In 2020 the SSF switched from this method to a flat 3 hours per launch. This matches the long-term average in SSA sanctioned contests. Given that about 30% of the member organizations respond, the total number of hours and flights is calculated by multiplying the sum total of the reported hours and flights by 3.

The accident rates data shown in figure 21 illustrate how the rates calculated using the FAA's survey data or the SSF's postcard date can dramatically diverge. As seen in figures 19 and 20, the FAA survey data shows a significant decline in operations that is not shown in the SSF annual postcard data. This should give everyone pause! Only by getting better data, meaning more clubs, chapters, and commercial operators reporting data in an anonymous and confidential manner can that happen.

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 fare. 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.

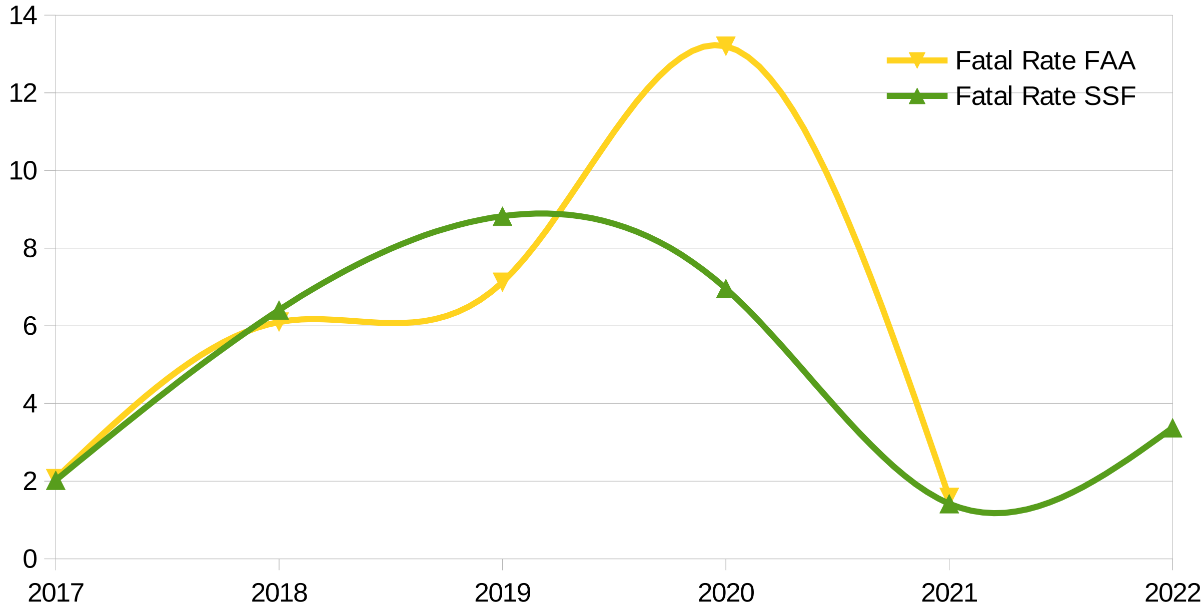

Figure 21: Comparison of fatal accident rates using FAA vs SSF flight time date (fatal accidents/100,000 hours)

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 Trustee Action: Planning for practice PT3 events

Over the past 7 years a total of twenty-nine (29) accidents occurred during an aborted launch. Ten (10) pilots have been fatally injured during these aborted launch accidents. A review of these non-fatal accidents shows that three (3) were practice events with an instructor onboard, one (1) was a Loss of Control inflight, three (3) were distractions during the take-off/tow, seven (7) Loss of control during the initial portion of the take-off roll, and five (5) were other factors. The fatal accident breakdown is 4 Loss of Control inflight, three (3) distractions in the glider causing it to kite killing the tow pilot, and four (4) loss of control during the initial portion of the take-off roll.

For decades the soaring community has operated under the assumption that the glider can safely return to the runway following a rope break after the glider reaches 200 ft AGL. However, as these accidents show, that is not always the case. Pilots must give more thought to what could go wrong and be prepared to abort the launch before losing control of the glider.

It should also be clear that the Glider Practical Test Standard (PTS) **DOES NOT** specifically require the applicant to perform a 200 ft AGL rope break! A rope break, intentional or unintentional at this altitude must be considered an EMERGENCY and handled as such. The PTS Area of Operation IV: Launches and Landings, Task G: Abnormal Occurrences is the task where the examiner must test the applicants knowledge and skills on PT3 events. A good examiner will ensure that this Abnormal Occurrence must not turn into an Emergency!

It is Area of Operation X: Emergency Operations where the applicant's knowledge of EMERGENCY procedures is evaluated. The specific tasks are (A) Simulated Off-Airport Landing and (B) Emergency Equipment and Survival Gear. Both of these tasks are evaluated in the oral portion of the practical test, not during the flight portion. Flight instructors should practice the Abnormal Occurrence of a (b) towline break at an altitude and position where the outcome of the maneuver is not in doubt.

In a real emergency the glider pilot may have few options. In a practice event, there must be no doubt about the outcome of the training event. Yet we see at least 3 accidents where the instructor intentionally released at a low altitude and did not make it back to a safe landing. In at least 3 other cases the glider pilot lost sight of the towplane and released before losing control and crashing.

Every launch must begin with a pre-launch briefing about how the pilot will handle an intentional or unintentional launch abort. This does not mean just reaching a minimum altitude, but planning from the start of the ground roll to arriving at the intended release altitude.

The glider pilot must evaluate the runway condition, density altitude, wind speed and direction, towplane performance, and glider condition. Is there a strong headwind meaning a shorter take-off roll and good climb? Will the glider weather-vane or drift downwind with today's crosswind and will this change as the glider gains airspeed? Where on the runway do you expect the glider to leave the ground, what about the towplane? When will you pull the release and abort the take-off while there is still room left on the runway to stop?

What kind of off-field landing areas are there at your field if the launch fails below your return altitude? Are you mentally prepared to land in those fields? When is it safe to turn around and land back on the runway?

One of the hazardous thoughts is Impulsivity, the need to do something immediately. The antidote is to 'think first before acting'. This is where all that pre-launch planning comes in. Recalling where you are in this evolving plan that changes as the tow progresses and executing the proper response takes time. Give yourself that time!

The only immediate action you need to take is to pitch the glider to a flight attitude that will keep it flying. On tow, the glider's pitch attitude is nose high and once the rope is gone, the glider will begin to slow down. Establishing the appropriate nose low pitch attitude is essential for a safe outcome. Next think about where you are in your plan and execute that next step.

If you are practicing this event with your instructor during your pre-solo flights, during a Flight Review or spring checkout, or with an examiner on a flight test then a return to the airport is expected. Remember, that in order to safely accomplish this you may need more than 200 ft AGL depending on the glider's position in relation to the runway. You, or your instructor, need to consider where the glider is in relation to the runway in addition to the altitude.

It is also important to remember that we want a stable approach on this return, so get any turning done as high as possible. Too many gliders are damaged, and pilots injured while attempting to turn close to the ground. This means you need to have a basic understanding of aerodynamics. What is the turn radius of the glider when it is traveling at 60 kts? How much time will it take to complete the turn at a 45º angle of bank?

Did you have your towplane drift downwind to give you the turning room making it easier to get back? If not, then you will need to do this yourself. Turn the glider to head downwind on a 45º track away from the runway centerline. After 5-6 seconds begin a 45º angle of bank turn into the wind. You will be 50-60 ft lower and almost aligned with the centerline when you complete this turn. You can now make a stabilized approach and landing with a minimal amount of maneuvering. Try this using Condor or some other flight simulator if you have doubts.

Common errors are:

1. immediately (impulsively) entering a steep turn without setting the pitch attitude.
2. immediately (impulsively) turning while on the extended runway centerline causing a low altitude turn reversal.
3. Just considering the gliders height and ignoring the lateral position.
4. Focusing on finding the runway instead of keeping the turn coordinated.
5. Not establishing a stabilized approach once the turn has been completed.

While a proficient pilot can successfully complete a practice rope break from 200 ft AGL, assuming that the lateral position is also correct, pushing this limit has significant hazards. Choosing a higher altitude to give you more time to think and execute your emergency plan makes sense. A training task must never be more hazardous than a real event.

Finally, consider using simulators to practice these events at lower altitudes than can safely be done in the real glider. Train to react with straight ahead and off-field landings to demonstrate that not every event results in a return to the runway. Accident reports show that pilots are spring loaded to return, even when the glider does not have the height or position to safely do so.

The list below briefly describes these ten (10) fatal and fourteen (14) of the non-fatal launch failure accidents.

2017 – AC4, canopy opened during initial tow, PIO with runway impact caused towrope to break and glider crashed, coming to a rest 800 ft after 1st impact.

2017 – PA25, Kiting up on tow by glider pilot, Tow Pilot killed

2018 – SZD 48 Jantar, glider pilot released about 400 ft AGL, trace showed glider climbed 85 ft as airspeed decreased 20 kts, tow pilot reported seeing the glider spinning, it struck the ground in this condition.

2019 – Phoebus, Auto tow launch, slack developed when the glider overran the towline, it then pitched up reaching between 100 and 150 ft AGL before stalling, rolling left and impacting terrain.

2020 – Cessna 305, 2 fatalities Two pilot checkout, following a hard landing the aircraft took off again, yawed to the right and crashed off the right side of the runway.

2020 – Std Cirrus, Glider was out of position so the glider pilot released and tuned right to head back to land on the runway. The glider stalled and spun impacting terrain.

2020 – 8GCBS Scout, Tow pilot killed after glider kited up.

2020 – AC-5M, witness reports state that the pilot self-launched, entered a steep climb before stalling and spinning ending in an impact with terrain.

2021 – 1-35, witnesses reported the glider pilot released about 170 ft AGL in a right bank. GPS data indicates the glider was in a 23 deg right bank and pitched up 20 deg when the pilot released, Witnesses reported seeing the glider begin to recover from the spin before impacting terrain.

2022 – ASW-19B, tow pilot reported the glider pilot released about 250 ft AGL following several PIO events. The glider then entered a steep left turn before impacting terrain in a left wing and nose low attitude. Examination of the wreckage showed that the elevator control pushrod was not connected to the elevator.

Non-Fatal

2017 – G102, Glider pilot reported hearing increased wind noise and assumed that the canopy was not locked. While attempting to close and lock the canopy the glider pilot lost sight of the towplane and released about 150 ft AGL. He then entered a right turn and attempted to land off-field. However the spoilers were open and the glider struck a tree before impacting terrain.

2017 – Lak-12; Glider pilot reported being distracted just after liftoff and the glider kited to about 100 ft AGL. The tow hook back-released and the towplane pilot also released the rope. The glider pilot then entered a 45 deg left turn to head back to the runway, the left wing struck the terrain after completing 150 deg heading change.

2017 – Lak-17, Glider pilot reported that the tow hook on the towplane opened while around 150 ft AGL. He released and attempted to land straight ahead, but did not have enough room before encountering a line of trees. He pulled up and flew over the trees before entering a right turn and impacting terrain.

2018 – Callair A-9, Glider kited up during slack line recovery at 300 ft AGL Glider pilot released, towplane crashed.

2018 – PA25, glider kited at 25-30 ft AGL, glider pilot released and landed straight ahead, towplane departed runway.

2018 – 2-33, CFI reported the towplane lifted off later than usual on the short, upslope turf runway. He was not certain that the glider would clear the 62ft tall trees 1300 ft beyond the departure end of the runway. The CFI released and turned right to avoid the trees and attempted an off-airport landing. The left wing struck trees after 130 – 150 deg heading change.

2019 – SZD 56-2, the glider pilot reported that the glider weather-vaned off the hard surface runway and into soft dirt about 200 ft after the tow began. He stated that this caused the towplane to accelerate more slowly than usual. The glider reached a height of 10-15 ft before settling down with the right wing overflying sagebrush. The wing struck this sagebrush causing the glider to impact terrain.

2020 – L-23, glider stalled and impacted terrain while CFI was demonstrating a PT3 event to the student. Intentionally released about 300 ft AGL and entered a right 270 with the intention of making a left 90 to line up with the runway. The glider impacted terrain after completing the right turn as it flew into a headwind.

2020 – L13 MG, pilot attempted to take off with the spoilers open

2020 – PIK-20/2-33, The PIK drifted downwind and struck 2-33 that was still parked on the side of the runway where it had just landed.

2021 – IS-28B2, During a winch tow launch the weak link broke when the glider was about 800 ft AGL, The CFI maneuvered the glider for landing but stalled while turning final.

2021 – ASW-27-18, Pilot reported left wing touched tall grass just off the side of the runway during the takeoff roll, causing a ground loop.

2021 – 2-33, left wing struck tree after the glider released at 200 ft AGL to practice a PT3 event. The tow pilot had moved further to the right than expected before the pilot released. Pilot reported making the "200 ft" call at which point the instructor pulled the release and the pilot immediately entered a 45 deg left turn to head back to the runway.

2022 – 2-33, Instructor and student practicing a PT3 event, released at 350 AGL, completed two 360 degree turns before lining up right of the runway centerline with a left crosswind. The instructor then entered a forward slip to lose altitude while attempting to also move left to the runway centerline. The right wing struck a tree on the side of the runway before landing.

SSF Trustee Action: Anatomy of a Kiting Accident

In August 2011 an ATP rated towplane pilot was fatally injured when the glider it was towing kited soon after takeoff. The glider released around 300 ft AGL, while the towplane stalled and crashed off the end of the runway. In October 2017 another ATP rated towplane pilot was fatally injured when the glider it was towing kited after the flight instructor became distracted in the cockpit shortly after takeoff. The glider returned safely to the airport while the towplane crashed. In March 2020 it happened again. An experienced towplane pilot was fatally injured when the glider kited shortly after takeoff. This occurred even through the towplane pilot successfully released the glider, the tow pilot was unable to recover before impacting the terrain. The glider pilot reported being distracted during that portion of the tow.

We all understand that getting out of position during an aerotow places the towplane pilot is a potentially deadly position. Studies done by the British showed that a towplane pilot would have difficulty recovering from a kiting glider below 1500 ft AGL. That is almost the typical release altitude for most of us.

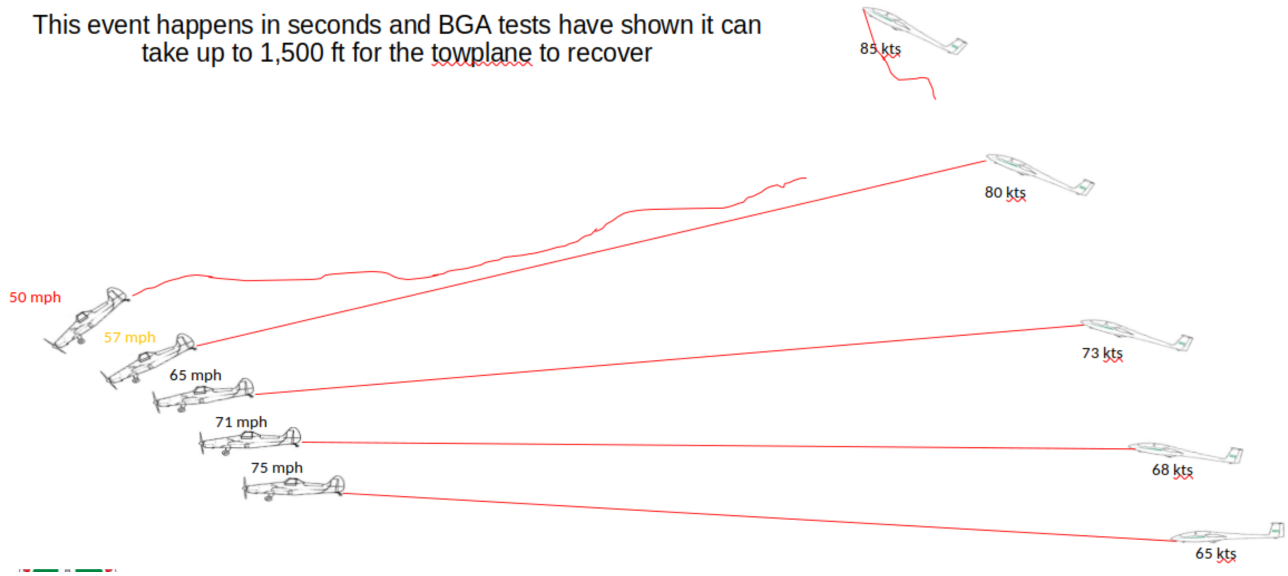

Figure 22: Glider Kiting on Tow

In a kiting incident the glider is not simple gaining altitude extremely rapidly, it is creating a large amount of drag that is impacting the towplane. As we tend to see that as the glider climbs, the towplane pilot adds increasing amounts of up elevator in an attempt to maintain the towplane's pitch attitude. As shown in Figure 22, what we fail to see is that as the glider climbs the energy it is gaining is coming directly from the towplane.

Thus, when the glider disconnects, either by the rope breaking or one or both of the pilots activating their release, the towplane is at an extremely low airspeed, possibly below stall speed, with the flight controls configured to pitch the towplane's nose up. The towplane may also have pitched nose down due to a combination of the glider pulling up on the tail and the stall caused by the low airspeed. The tow pilot is now faced with the situation where there is not enough altitude to regain flying speed that no amount of piloting skill can overcome.

The only solution to this accident scenario is for the glider pilot to remain focused on a single task. Stay behind the towplane and ignore any distractions that may occur. Failure to do so has deadly consequences.

What can cause these distractions? Reports from these accidents and from incidents show that a wide variety of distractions can occur. Canopies opening in flight seem to be a leading cause in many fatal and non-fatal launch accidents. Adjusting the radio, altimeter, flight computer, or camera have all been reported as distractions. Even closing the vent window can cause a distraction. In one case the student pilot looking for traffic was enough of a distraction to make the flight instructor take over the flight controls.

Dealing with these distractions starts with a good written preflight checklist that configures the instrument, flight controls, and other items like vent windows in their proper position prior to beginning the launch. This is followed by the sterile cockpit concept used by airlines and the military. In a sterile cockpit only essential safety conversations are allowed during critical phases of flight when close to the ground. Using this concept helps glider pilots focus on the task at hand, following the towplane and reducing distractions caused by focusing attention inside the cockpit.

SSF Recommendation: Proactive Safety Programs

The traditional method for creating safety programs is to have the club or commercial operator designate someone to lead a safety committee. This committee investigates reported incidents or accidents and draws conclusions about why the event occurred. Once a probable cause has been established, the team recommends a set of steps or actions that the organization can take to prevent this type of event from occurring in the future. This type of reactive safety program has been used for decades and it has been successful in reducing the number of accidents throughout the world.

However as Human Factors errors have become the leading cause of accidents, this reactive approach is having less and less effect. This has led to the creation of proactive safety programs. In a proactive safety program all pilots, from student to flight instructor, actively look for situations or conditions that could potentially led to an incident or accident.

Consider the following example: the club recently refurbished their SGS 2-33 and replaced the fixed tailwheel with a new swivel tailwheel. Knowing that the glider will be parked alongside other gliders near the flight line between fights it is recognized that due to also having wingtip wheels, it may easily rotate in windy conditions, potentially striking a person or other glider. To prevent this from happening, the parking procedures are modified to include chocking the tailwheel to reduce the potential for this to occur and paying more attention to how the glider is parked when not in use. This demonstrates that the club thought about the potential for an incident and planned ahead to reduce the impact of this new threat.

In 2009 Tony Kern authored the book "Blue Threat – Why to Err is Inhuman"[6] which provides the reader with a guide to help themselves understand how they can develop the skills needed to detect and prevent Human Factor errors. Accepting the idea that humans will always make errors implies that there is nothing individuals can do prevent them. As shown in the example above, this is not true. We can examine our environment and personal behaviors to detect where we are likely to make mistakes. We can then modify the environment or change our behavior to reduce the likelihood of this mistake occurring.

The SSF recommends that all clubs and commercial operators implement a proactive safety program. Have all pilots search for and document potential threats or issues that could lead to incidents or accidents. A key element of this program is to document things in writing, electronic or on paper, relying on passing information verbally will lead to incomplete or compartmentalized information silos. The SSF Incident Reporting Database https://www.soaringsafety.org/forms/incident.html is one venue for recording this information.

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

[6]Dr. Tony Kern USAF (ret) served as the Chair of the Air Force Human Factors steering group and was a B-1B command Pilot and Flight examiner.

slides can also be found on the SSF's web site at
http://www.soaringsafety.org/presentations/presssa.html

See a more complete set of recommendations in the SSF 2022 Annual Report.
https://www.soaringsafety.org/accidentprev/SSF_2022_annual_report.pdf

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 thermalling. 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 thermalling 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.
https://www.soaringsafety.org/accidentprev/SSF_2013_annual_report.pdf

SSF Goal Orientated Approach

As the FY17 statistics show, the majority of glider/towplane 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.
https://www.soaringsafety.org/accidentprev/SSF_2013_annual_report.pdf

Flight Instructor Roles

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. 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 Aeronautical Decision Making and Risk Management (ADM/RM) 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 ADM/RM 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/towplane 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 ADM/RM 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 1-3 Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont New York (north of 42nd parallel), Pennsylvania (west of 78th meridian).

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Region 2-4 New Jersey, New York (south of 42nd parallel), Pennsylvania (east of 78^{th} meridian) 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.

Cruise - Begins at the point where the pilot releases and ends when the pilot enters the landing pattern. Cruise flight includes straight glides, heading changes, thermalling turns, and climbing in ridge, wave, or thermals.

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.