



SOARING SAFETY FOUNDATION

Nov 1, 2013 – Oct 31, 2014

**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.nts.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 soaring accident information. This data base is then used to develop accident prevention strategies and to continuously improve training methods to reduce the number of soaring accidents.

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

Funding for the SSF is obtained through donations from individuals and organizations interested in the promotion of soaring safety. These funds are then used to develop and promote programs such as soaring safety seminars, flight instructor refresher clinics, 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.

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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

This report covers the FY14 (November 1, 2013 to October 31, 2014) reporting period. A review of the NTSB accident database shows a 16.0% increase in the number of US soaring accidents during this time period compared to the FY13 reporting period. There was no change in the number of fatal accidents in FY14 compared with FY13. In addition, the number of insurance claims rose significantly in FY14. While the long term trend in accidents reported to the NTSB continues to decline, there is general agreement that more steps must be taken to continue reducing the number of accidents and to eliminate all fatal accidents.

For the twelve-month period ending October 31, 2014, twenty-six (26) gliders, and five (5) tow-planes were involved in twenty-nine (29) separate accidents meeting the reporting requirements of NTSB Part 830 of the Code of Federal Regulation. This represents a 16.0% increase in the number of accidents reported during the previous reporting period. The five-year average for the FY10 – FY14 reporting period is 28.6 accidents per year, representing a 1.0% decrease in the average number of accidents from the previous five-year period.

While the average number of accidents per year has shown a steady decline since 1981 (averaging 45.6/year in the 80's, 38.6/year in the 90's, 33.5/year in the 00's, and 28.6/year for the first 5 years of this decade) the number of accidents each year remains too high. In addition, the average number of fatalities has remained nearly constant, at just under 6 per year since the mid 1990's. In the FY14 reporting period three (3) accidents resulted in fatal injuries to three (3) pilots. In addition, nine (9) pilots received serious injuries while twelve (12) pilots and one (1) passenger received minor or no injuries.

A review of the three (3) fatal accidents showed that a commercial pilot was fatally injured during an aborted aerotow launch. The tow-pilot reported the glider separated from the tow-rope about 100ft AGL for unknown reasons and the glider impacted terrain about 350 ft east of the airport. Witnesses reported seeing the glider stall/spin from 50ft AGL while it was attempting to land on Runway 25, the pilot was fatally injured. The pilot was fatally injured after the glider crashed for unknown reasons. All fatal accidents are still under investigation by the NTSB, more details are given in the main report (<http://www.soaringsafety.org/prevention/reports.html>).

Continuing a long historical trend, the largest number of accidents occurred during the landing phase of flight during this reporting period. In FY14 landing accidents represented 76% of all accidents. It should also be noted that thirteen (13) of the twenty-two (22) landing accidents, or 59%, occurred while the pilot was attempting to land at an airport! The remaining nine (9) accidents occurred while the pilot was attempting to land in a field. It should also be noted that two of these off-airport landing accidents involved tow-planes that made forced landings after running out of gas while towing a glider.

Proper training and an operational focus on safe arrivals can go a long way toward addressing the landing accident problem. The SSF continues to promote that pilots and instructors adopt a 'goal oriented approach' to pattern planning and execution. The 'goal' is to arrive at your selected landing spot, so that you can stop at a predetermined point. In this approach, the pilot continuously evaluates the gliders flight path taking into account wind speed/direction, lift/sink, distance remaining to the landing spot, glider performance, and the height above the landing spot.

The key to accomplishing this approach is to recognize that while most pilots have difficulty picking out a specific angle, every pilot is adept at recognizing changes in look-down angles. Responding to even the slightest change, by making small changes in the gliders flight path or sink rate, will help the pilot remain on the intended glide path to the landing spot. This increases the pilot's chances of successfully dealing with unexpected conditions throughout the landing phase of flight.

Six (6) aborted launch accidents, called PT3 (premature termination of the tow) events, accounted for 20.7% of the FY14 accidents. A pilot received minor injuries while attempting to make a no spoiler landing, the pilot had released at 300ft AGL due to the canopy being unlatched and he was unable to manipulate the spoilers and hold the canopy closed at the same time. The remaining accidents are described in the full report. Pilots can, and should, mentally prepare for a failed launch by developing a specific set of action plans to deal with several contingencies. The task is then to execute the proper plan at the proper time. Flight instructors should continue to emphasize launch emergencies during flight reviews, check rides and flight training.

No motorgliders were involved in accidents during the FY14 reporting period.

Flight instructors play an important safety role during everyday glider operations. They need to supervise flying activities and serve as critics to any operation that is potentially unsafe. Their main job is to provide the foundation upon which a strong safety culture can be built. Other pilots and people involved with the ground and flying activities also need to be trained to recognize and properly respond to any safety issues during the daily activity. Everyone, students, pilots, ground operations staff, and instructors, should continuously evaluate both ground and flight operations at US chapters, clubs, commercial operations and at contests. An operations safety culture should train everyone to raise safety issues with fellow pilots, club officers, and instructors. By addressing issues before they become accidents, we can improve soaring safety. Only by the combined efforts of ALL pilots can we reduce the number of accidents.

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SOARING SAFETY FOUNDATION

ANNUAL SAFETY REPORT

FY 2014

This report covers the FY14 (November 1, 2013 to October 31, 2014) reporting period. A review of the NTSB accident database shows a 16.0% increase in the number of US soaring accidents during this time period compared to the FY13 reporting period. There was no change in the number of fatal accidents in FY14 compared with FY13. In addition, the number of insurance claims rose significantly in FY14. While the long term trend in accidents reported to the NTSB continues to decline, there is general agreement that more steps must be taken to continue reducing the number of accidents and to eliminate all fatal accidents.

For many reasons¹, this report represents an incomplete view of the accidents involving US glider pilots. Despite these limitations, this annual report is published to highlight some of the glider 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 ends with a safe arrival at the intended point of landing.

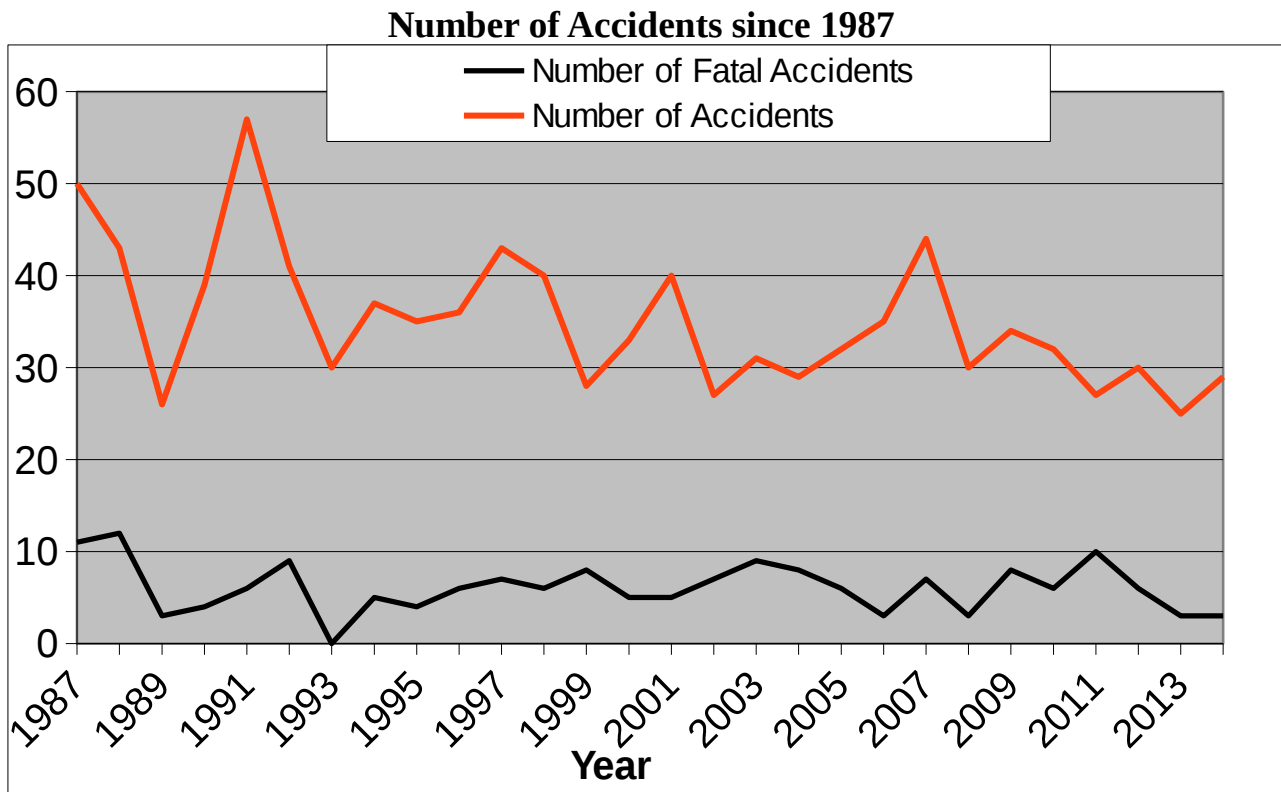


Figure 1 Total number of accidents and fatal accidents on a per year basis.

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

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

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

Changing this culture will require effort from everyone from ground crews to pilots to the organizations management. Flight instructors must be provided with the tools, equipment, and most importantly TIME, needed to properly train pilots to an adequate level of proficiency. The organization must have a written training syllabus (paper or electronic) that all instructors embrace and use. The organization must demonstrate that safety is not something that is just talked about, but really practiced. Flight reviews must not be treated as a burden for the pilot, but as an opportunity for pilots to learn new skills. Spring checkouts should provide more than an opportunity to sit in the cockpit, ground time should be included to review standard operating procedures and emergency procedures.

As the SSF recommended in 2011, take a video camera out to your field and film your operation. Then evaluate that video with an eye toward looking for problems. Pull out a copy of your organizations standard operating procedures and see if your pilots and crews are doing what they said they would do. If not, FIX this problem. Pull your flight instructor training syllabus off the shelf and really look at it. Does it mandate your instructors provide both ground and flight training to students and rated pilots? Does it give them the time and resources they need to do as effective a job on the ground as they do in the air?

Are students and rated pilots recognized when they make good decisions? If you do not have a system in place to recognize and reward pilots for making good decisions, should we be surprised when they don't? One approach would be to award a free tow, or some other tangible benefit, to the individual who makes the biggest contribution to the organizations safety culture each year.

FY14 ACCIDENT SUMMARY

Number of Accidents

For the twelve-month period ending October 31, 2014, twenty-four (24) gliders, and five (5) tow-planes were involved in twenty-nine (29) separate accidents meeting the reporting requirements of NTSB Part 830 of the Code of Federal Regulation. This represents a 16.0% increase in the number of accidents reported during the previous reporting period. The five-year average for the FY10 – FY14 reporting period is 28.6 accidents per year, representing a 1.0% decrease in the average number of accidents from the previous five-year period.

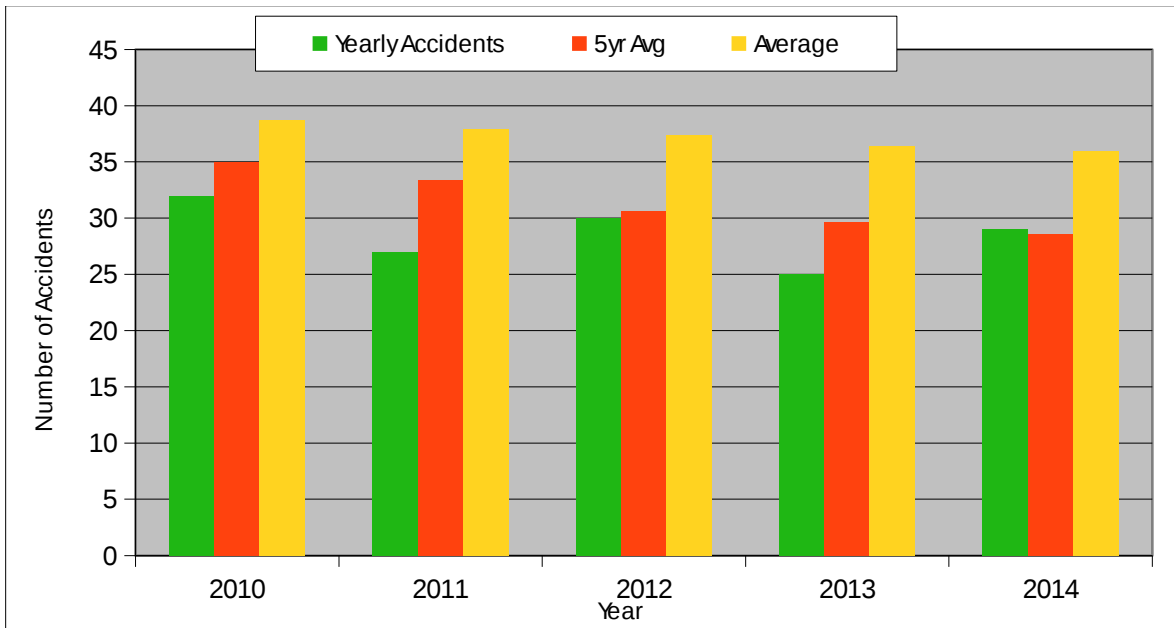


Figure 2 Number of accident, 5 year average 2010 - 2014

While the average number of accidents per year has shown a steady decline since 1981 (averaging 45.6/year in the 80’s, 38.6/year in the 90’s, 33.5/year in the 00’s, and 28.6/year for the first 5 years of this decade) the number of accidents each year remains too high. In addition, the average number of fatalities has remained nearly constant, at just under 6 per year since the mid 1990’s. In the FY14 reporting period three (3) accidents resulted in fatal injuries to three (3) pilots. In addition, nine (9) pilots received serious injuries while thirteen (13) pilots and one (1) passenger received minor or no injuries.

Phase of Flight

The number of accidents that occur during the approach and landing phase of flight again surpass those recorded during any other phase of flight. For the FY14 reporting period, approach and landing accidents were 75.8% of the total number of accidents reported for the year. These accidents are split between pilots landing on an airport (59%) and pilots landing off-airport (41%). Historically landing accidents contribute to the largest number of accidents year in and year out. Takeoff accidents accounted for 20.7% of the number of accidents in this reporting period, meaning that 96.5% of the number of accidents occurred during the takeoff and landing phase of flight. The NTSB report for the remaining fatal accident does not contain any description of the accident so it is currently placed in the unknown accident category.

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

Percentage of Accidents per Category

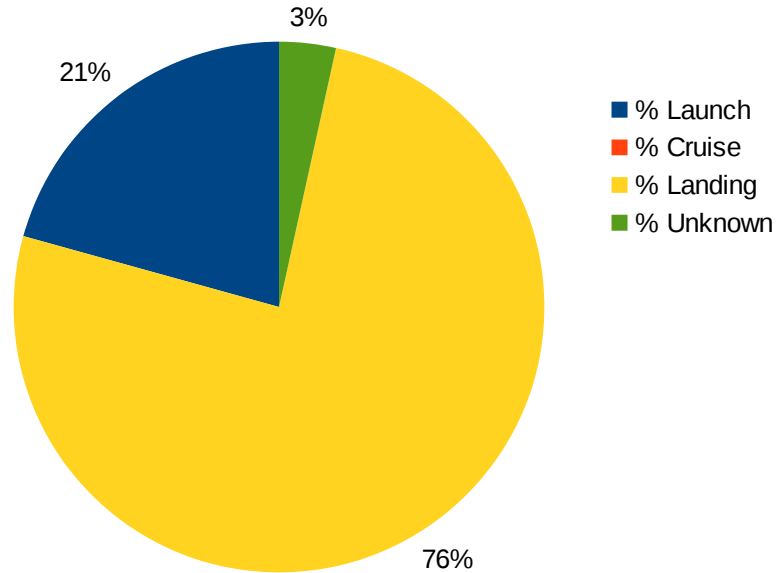


Figure 3 Percentage of Accidents in defined phase of flight

Launch Accidents

Six (6) aborted launch accidents, called PT3 (Premature Termination of The Tow) events, accounted for 20.7% of the FY14 accidents. All 6 accidents involved the glider being aerotowed. Pilots must be mentally prepare for a failed launch by developing a specific set of action plans to deal with several contingencies. The task is then to execute the proper plan at the proper time. Flight instructors should continue to emphasize launch emergencies during flight reviews, club check rides and initial flight training.

Total Launch (PT3) Accidents

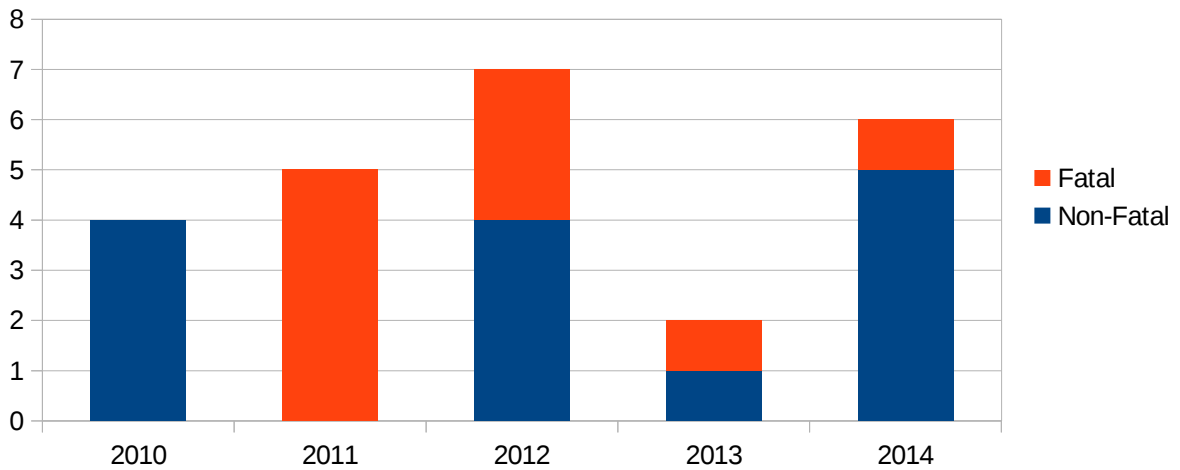


Figure 4: Number of fatal and non-fatal launch accidents

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

The commercial pilot of a SGS 2-33A was seriously injured after the pilot intentionally released about 400 ft AGL while conducting a glider maintenance flight. The tow-pilot observed the glider yawing left and right on tow with the nose pointing up to 45 deg to the side while in a normal tow position. A post flight examination of the glider revealed that the rudder cables had been rigged incorrectly. *NTSB ERA13LA229.*

The fatal launch accident will be discussed later in this report.

As can be seen by the above accident, every pilot should be prepared for a failed launch. This includes making sure the launch area is free of obstructions, the aircraft is properly assembled and rigged, the pilot/passenger is briefed on possible actions, and the pilot is operating within their abilities. It should also be noted that two (2) of the aborted launch accidents occurred after the pilot actuated the tow release in their aircraft. In three (3) of the accidents the tow-pilot pulled the release or the rope broke. In one case it is not reported if the rope broke or the pilot pulled the release. Every glider pilot must have a predetermined plan of action that can be executed immediately if the launch does not go as planned.

The pilot of an ASW-27 was not injured, but the glider was substantially damaged after it ground-looped during the take-off roll. The pilot reported the right wing started to drop and he over corrected with aileron causing the left wing to contact the ground. The glider then spun 180 degrees, breaking the weak link and rolled backwards down the runway. *NTSB WPR14CA213*

The pilot of a Nimbus 3/24.5 glider received minor injuries while the glider was substantially damaged after it impacted terrain during the take-off roll. The pilot reported he was making an unassisted take-off with the wings balanced on wing stands. He further stated that during the initial take-off roll the glider encountered a wind gust that forced the left wing up and the glider climbed about 8 ft AGL. The pilot was unable to return to the proper tow position so he released and the glider made a 30 deg heading change to the right before impacting the ground. *NTSB CEN14CA280*

The pilot of a SGS 1-34 received minor injuries while the glider was substantially damaged when it struck a tree and landed hard following an aborted tow at 300 ft AGL. The pilot reported that the canopy was unlatched so he released and attempted to land back on the runway. He was unable to activate the spoilers and hold the canopy closed so he was high and the right wing struck a tree while maneuvering for a landing. *NTSB WPR14CA350*

The ATP rated pilot of the Pawnee was seriously injured and the tow-plane was destroyed after it impacted terrain during a failed launch. The glider pilot reported slack appeared in the rope as the glider got high and outside as the tow-plane began the turn to cross-wind. The situation got worse as the tow-plane turned again and both pilots releases when the slack was suddenly removed about 200 ft AGL. The tow-pilot was unable to recover the upset, while the SGS 2-33 successfully returned to the airport. *NTSB WPR14LA367*

Neither the Mini-Nimbus glider pilot nor the Pawnee tow-pilot were injured but both aircraft were substantially damaged following a ground collision during an aborted take-off roll. The tow-pilot reported fuel spraying on the windscreen so he aborted the launch and turned right. The glider pilot was unable to avoid the tow-plane when he also turned right after the tow-plane aborted the launch. *NTSB ERA15LA022A and ERA15LA022B*

An analysis of several years worth of PT3 accidents has identified 3 major causal factors. 1) the glider pilot launched with the spoilers open, 2) the glider pilot got out of position, and 3) there was a mechanical problem with the tow-plane. The instructor could begin to evaluate the pilots decision making and flying skills by describing these 3 potential issues and then asking the pilot (student or rated pilot receiving a flight review) to pick one. The pilot should then describe how they would recognize this event, what their response would be, and how they would complete the flight. The instructor should guide this discussion to ensure the pilot recognizes all of the internal and external factors that must be accounted for. The pilot and instructor should then develop an initial plan to safely practice this maneuver. With this initial plan in place, the pilot and instructor must then talk with the tow-pilot to get agreement between all 3 pilots that the plan can be safely executed. The final step is to fly this flight. The instructor can now evaluate the pilots flight skills and his/her decision making skills.

In addition to practicing tow signals with your instructor, the pilot and instructor can simulate numerous situations and talk through the possible solutions without actually making a flight. These simulations can help build up a ‘mental store’ of possible actions, that you can use in the event of a real PT3 event. A quick review of these scenarios just before launch can prime the pilot to react appropriately when the launch isn’t going as expected. Finally, but most importantly, it is critical for pilots to understand that a pilot’s most basic responsibility is control of the aircraft. Regardless of the circumstances, **FLY THE AIRCRAFT!!**

Ground Launch Accidents

There were no ground launch accidents reported during the FY14 reporting period.

Cruise Flight Accidents

There were no cruise flight accidents reported during the FY14 reporting period.

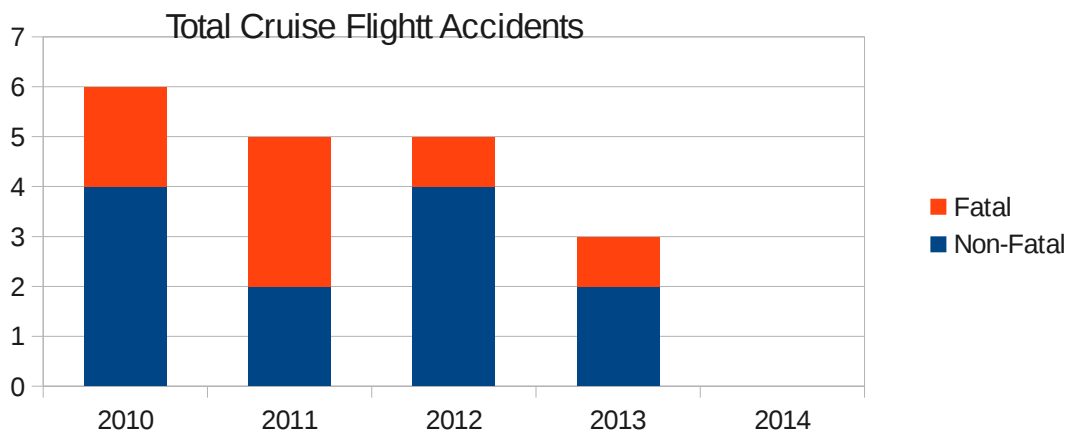


Figure 5: Number of Fatal and non-Fatal Cruise flight Accidents

Landing Accidents

Accidents occurring during the landing phase of flight again accounted for the majority of injuries to pilots and damaged or destroyed gliders. During the FY14 reporting period, gliders hitting objects on final or during the landing roll accounted for the majority of the landing accidents. This was followed by hard landings, long/short landings, and stall/spin accidents. Over half (59%) of the reported landing accidents occurred while the pilot was landing at their home airport.

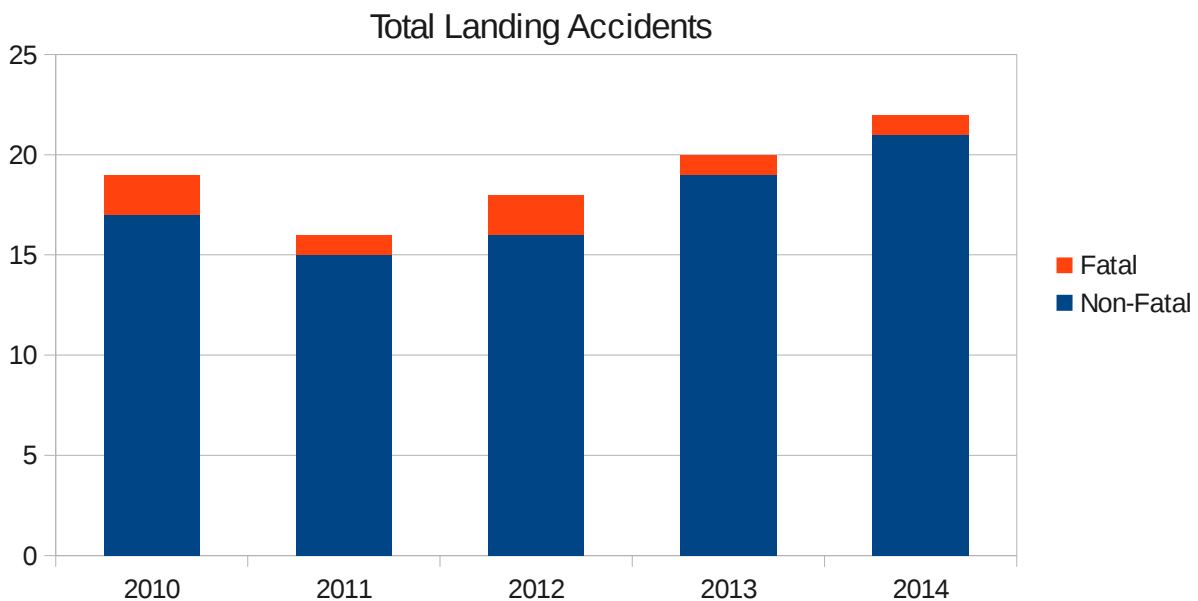


Figure 6: Number of Fatal and non-Fatal Landing Accidents

Figure 5 shows the total number of landing accidents from 2010 – 2014 broken down by fatal and non-fatal accidents. This figure shows that the vast majority of landing accidents do not result in fatal injuries to the pilot. A deeper analysis of the landing accidents in FY14 indicate pilots continue to strike an object during the final approach (6 accidents) or while on the ground roll (6 accidents). See figure 7 for a complete breakdown of landing accident factors.

The private pilot of a Blanik L-33 was seriously injured and the glider was substantially damaged after it impacted terrain after stalling and spinning during the turn from downwind to base. The pilot had reported over the radio that he was returning to the airport and wanted another tow. Witnesses reported the glider entered downwind low and abeam of the approach end of the runway. One witness lost sight of the glider behind trees as it turned base, a 2nd witness reported seeing the glider through the trees in a nose low attitude and reported seeing the wings rotate. *NTSB ERA14LA199*

The commercial pilot of a Pawnee received minor injuries and the tow-plane was substantially damaged after colliding with a fence and terrain during a forced landing. The pilot reported the tow was uneventful and while returning to the airport the engine began running rough and then quit. The pilot determined he did not have enough altitude to make the airport and elected to land in a soccer field. The landing gear struck a fence and the pilot attempted to maneuver below power lines causing the plane to impact a road and drainage ditch. *NTSB CEN14LA261*

The pilot of a PW 5 received minor injuries while the glider was substantially damaged while attempting to land on the home runway. The pilot reported encountering strong lift on downwind so he deployed spoilers and completed a couple of 360 deg turns before initiating a slip to increase the gliders descent rate. As the pilot exited the forward slip and aligned the glider for landing it stalled and landed hard. During the ground roll the right wing struck the ground and the glider ground looped. *NTSB WPR14CA219*

The pilot of a Pegasus received minor injuries while the glider was substantially damaged when it struck two culverts during the landing roll. The pilot reported he was attempting to land on the parallel grass runway, but he inadvertently lined up with a grass field next to the runway. The glider was too low to maneuver when the pilot recognized the error so he continued the landing into the field. *NTSB WPR14CA321*

The pilot and passenger of a K7 were uninjured but the glider was substantially damaged after it struck a fence during an off-airport landing. The pilot reported that after release he noticed that he did not have full elevator control. The pilot and passenger were unable to determine what was obstructing the stick, and the pilot was unable to fly back to the airport resulting in an off-airport landing. A post-flight inspection revealed that the unsecured rear seat cushion had shifted and its metal frame was preventing the stick from reaching its full travel. *NTSB ERA14CA335*

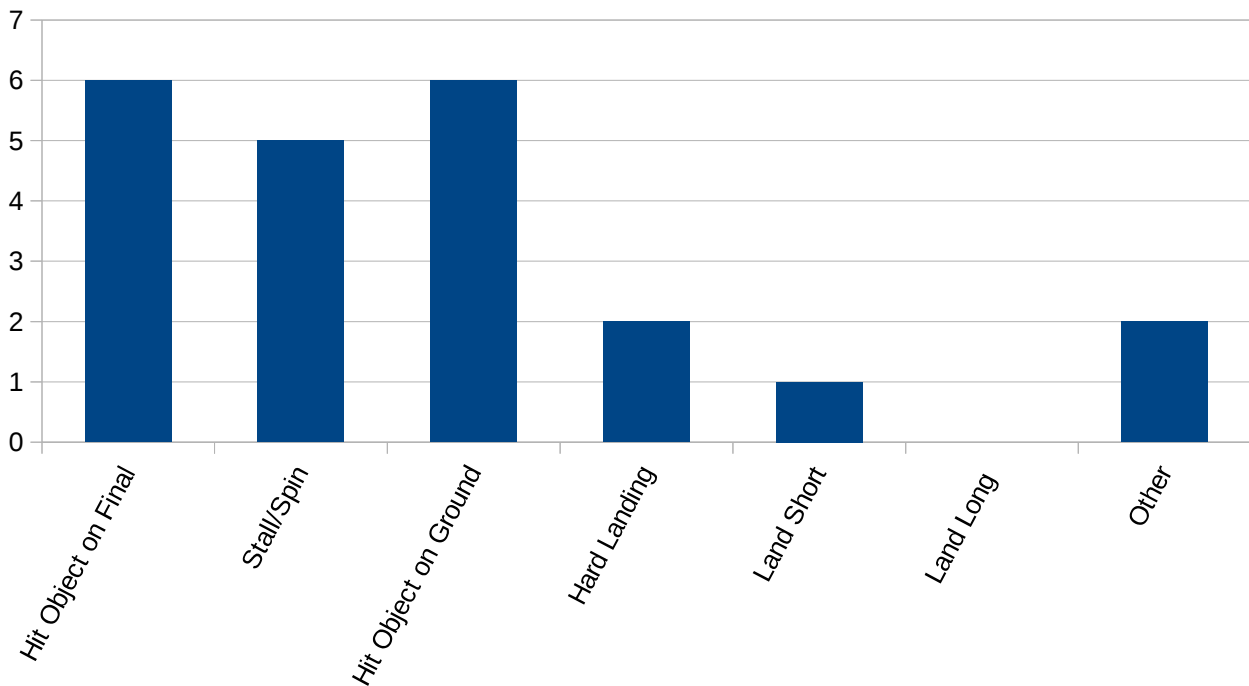


Figure 7: Reported factors in landing accident

Neither the 2 student pilots nor the 2 flight instructors were injured but two Blanik L-23 gliders were substantially damaged after a landing glider collided with a stopped glider that had remained on the runway after it landed. After a day of flying and numerous landings the pilot of the 1st Blanik landed and stopped about 1000 ft from the runway threshold. While waiting for the ground crew to show up and move the glider, the 2nd Blanik landed behind the stopped glider.

Despite using maximum braking, the instructor was unable to stop and the landing Blanik struck the stopped glider. *NTSB ERA14LA341A and ERA14LA341B*

The pilot of an ASW-19 received serious injuries and the glider was substantially damaged after the left wing struck terrain during an off-airport landing. The pilot stated he was on a cross-country flight and while returning to the home field lift decreased. At 800 ft AGL about 10 miles from home the pilot decided to land in a field. While on final to his intended field, the pilot noticed a small hill prior to the field and he turned left to avoid running straight into it. The left wing struck the hill as the pilot attempted to maneuver around it. *NTSB ERA14CA426*

The pilot of the Pawnee was not injured but the tow-plane was substantially damaged after it landed in ocean surf just off shore while returning to the airport. The pilot reported that he estimated there was 45 minutes of fuel on board and he towed a glider up for a flight. After release the engine lost power and quit. The pilot determined he could not make the airport and made an off-airport landing in the ocean surf. A post flight inspection revealed that the undamaged fuel tank was empty. *NTSB WPR14CA389*

The student pilot of a Blanik L-23 was seriously injured and the glider was substantially damaged after impacting trees and terrain about 1 mile north of the airport. The pilot reported being about 1200 ft AGL and preparing to land when she made a right turn for spacing with another landing glider. Witnesses reported that the glider then stalled and entered a right spin. The glider appeared to recover, but then reentered a spin and completed 2 full rotations before disappearing from view. The glider came to rest in a near vertical position in trees. *NTSB ERA14LA391*

The remaining landing accidents include problems associated with striking objects on final or during the landing roll and off-airport landings.

While a detailed look at all landing accidents is beyond the scope of this report, the reader is encouraged to review the NTSB reports for additional details. One point that should be made is that many pilots report encountering 'heavy sink' on short final. There are numerous reasons for this, and one of the most insidious is a condition known as wind gradient. It is well known that wind speeds can, and do, vary with altitude. A wind gradient is a change in wind speed with altitude.

When a gradient, or shear, is encountered the forces acting on the glider change and the glider responds to those changes. One noticeable change is an increase in the gliders sink rate with a reduction in wind speed, resulting in a tendency to land short. This occurs as the glider attempts to maintain its trimmed airspeed or as the pilot pushes forward to maintain the desired airspeed. An analysis shows that a glider approaching at 60 kts will land 53% shorter than expected when landing into a 20 Kt decreasing wind gradient. The exact decrease in glide distance will depend on the gliders initial and final airspeed as it descends through the gradient. The mass of the glider is not a factor (in other words a 1-26 and Nimbus 4 will both fall just as short). All pilots need to be trained to recognize and respond to wind gradient/shear conditions. The SSF's goal orientated approach (see below) can help pilots accomplish this task.

Fatal Accidents

Three (3) glider pilots were involved in three (3) fatal accidents during the FY14 reporting period. This represents no change in the number of accidents (3 vs 3) from previous reporting period. One (1) accident occurred during the launch phase of flight (aerotow), one (1) accident

occurred in the landing phase of flight, no details are provided in the NTSB report to determine the phase of flight for the remaining accident.

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

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

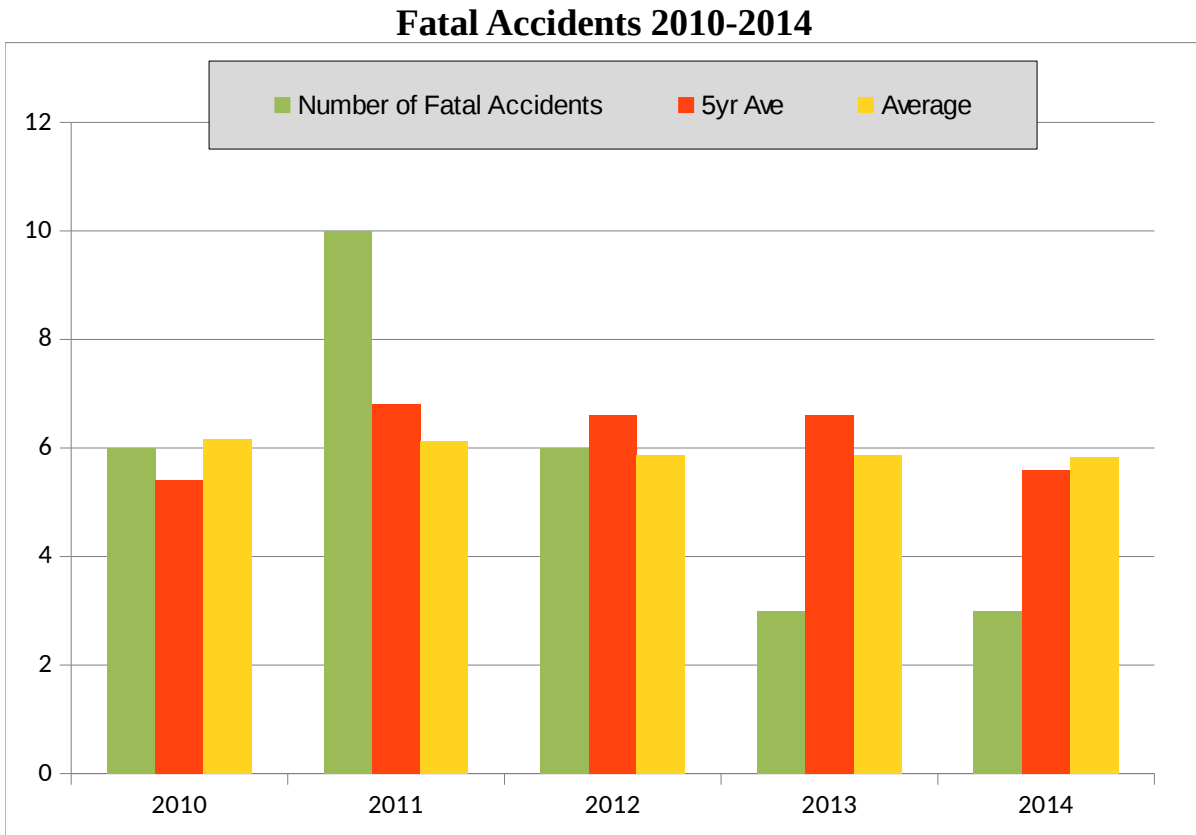


Figure 8: Number of fatal accidents, 5 year average, and average since 1987

The pilot of a Zuni was fatally injured and the glider substantially damaged after it collided with terrain during an aborted aerotow. The tow-pilot reported the take-off was normal and shortly after beginning the climb he realized the glider was no longer on tow. A subsequent review indicated that the glider separated (the NTSB report does not explain why or how the glider released) from the tow-plane about 100 ft AGL. The glider impacted terrain about 350 ft east of the airport. *NTSB WPR14FA181*

The pilot of an ASC Spirt was fatally injured and the glider substantially damaged after it stalled and spun while attempting to land at the home airport. Witnesses reporting hearing the pilot make a radio call indicating that he was landing and they saw the glider circling to land on runway 35. When the glider was 40 – 50 ft AGL the right wing dropped and the glider nosed into the ground short of the runway. *NTSB WPR14LA263*

The pilot of a JS1-C glider was fatally injured and the glider was substantially damaged after it impacted terrain. No other information is available at the time this report was written. *NTSB CEN14LA372*.

For the five-year period 2010 – 2014, 35 pilots and passengers received fatal injuries while soaring. This equates to a five-year average of 7.0 fatalities per year, a slight decrease in the number of pilots and passengers lost from the previous 5-year period. The data shows for the previous 5-year period (2010-2014) there were an average of 5.6 fatal accidents per year², down slightly from the past 5-year period (2009-2013), and just below the long term average of 5.8 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 soaring accidents. At the 2013 SSA convention the SSF began discussing the results of this analysis. From 2002 – 2014 there were 72 fatal soaring accidents in the US involving 82 pilots and passengers and 78 aircraft (mid-air collisions account for the additional aircraft). The NTSB database contains a probable cause (PC) for 66 of these accidents leaving 6 still under investigation.

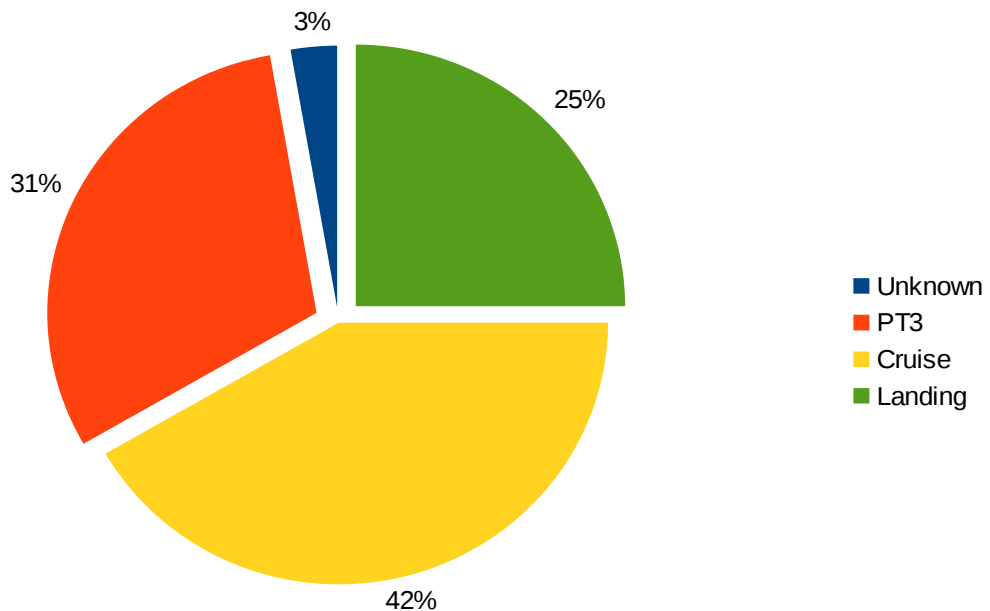


Figure 9: Percentage of Fatal Accidents in various phases of flight

²Note that the difference between the 5-year average number of fatal accidents (6.6) and the 5-year average number of fatalities (8.2) is due to multiple individuals being involved in these accidents.

Figure 8 shows the percentage of fatal accidents in the 3 major phases of flight (launch, cruise, and landing). It is instructive to compare these percentages to the percentage of accidents as shown in Figure 3. While the majority of accidents occur in the landing phase of flight and the fewest percentage of accidents occur in the cruise phase of flight, fatal accidents showed a complete different trend. In this case fatal accidents occur most often in the cruise phase of flight.

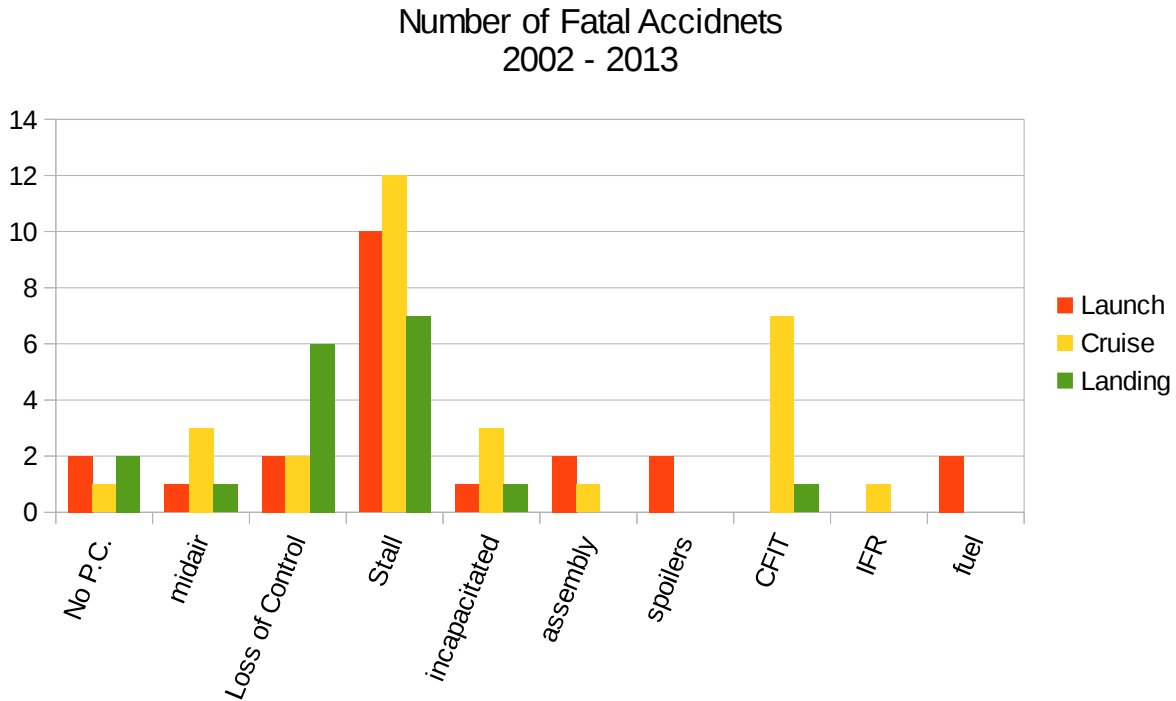


Figure 10: Number of fatal accidents by NSTB defined Probable Cause

As shown in Figure 9, the NTSB has determined the probable cause of the accident in 66 of the 72 accidents. These causes break down into 9 major areas, with a 10th (no P.C. - Probable Cause) meaning the accident is still under investigation. It is informative to see that the majority of fatal accidents occur after the glider stalled and/or spun. As described later in this report, stall/spin recognition and recovery should be a major flight training activity.

The SSF Trustees will continue to work with the soaring community to find ways to eliminate fatal soaring accidents.

Damage to Aircraft

A total of twenty-six (26) gliders and five (5) tow-planes received structural or substantial damage during this reporting period. One (1) tow-plane was destroyed following an in-flight upset due to the glider kiting during the initial portion of the tow.

The large number of damaged gliders has a significant impact on club and commercial operators flight operations. Not only is there the immediate issue of dealing with the injuries resulting from the accident but also the long-term impact cannot be forgotten. Typically the damaged glider will be out of service for several months while it is being repaired. During this time flight operations

may be reduced or suspended if this is the operation’s only glider. This can place a significant financial strain on the club or commercial operator and makes it harder for members/customers to obtain and maintain both currency and proficiency.

Auxiliary-Powered Sailplanes

No motor gliders were involved in accidents during the FY14 reporting period.

Accidents Involving Tow-Aircraft

During the FY14 reporting period five (5) accidents involving a tow-plane occurred resulting in no injuries to a tow-pilot. Two of these accidents were caused by fuel exhaustion resulting in the tow-plane being unable to return to the airport after release.

An ATP rated pilot received minor injuries while the Cessna 305A (Bird-dog) tow-plane was substantially damaged after it flipped over while landing. The pilot reported that during the landing roll the plane came to an abrupt stop and flipped over. A FAA safety inspector noted that the right brake was locked up and the tire would not rotate normally. The brake was disassembled and upon reassembly it worked properly. *NTSB WPR14LA045*

Details for the remaining tow-plane accidents are noted in the PT3 and Landing accident sections of this report.

Accidents by SSA Region

A comparison of the geographic locations of accidents in relation to SSA Regions tends to reflect the geographic distribution of the SSA membership. In general, those regions having the greatest populations of SSA members and soaring activity tend to record the highest numbers of accidents³.

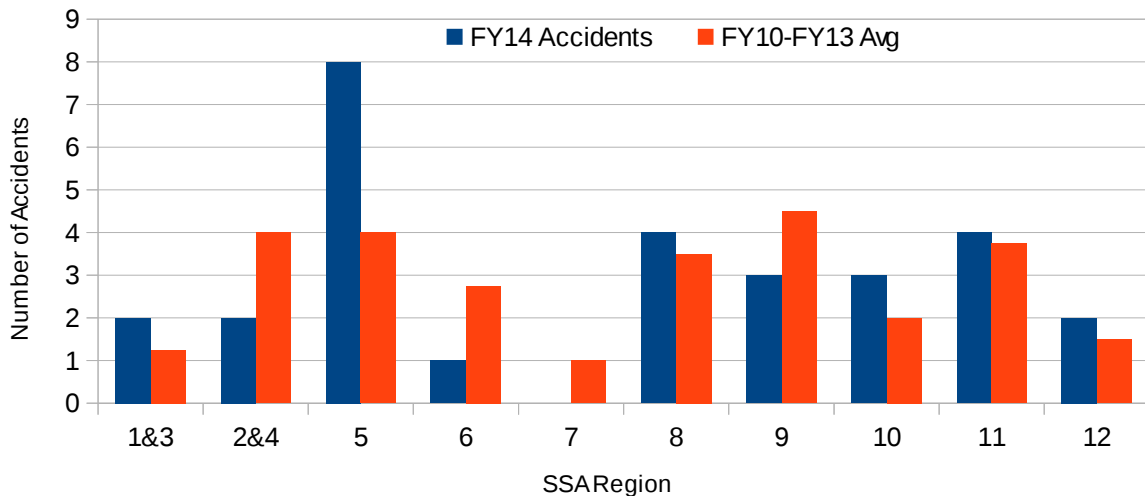


Figure 11: FY14 and average Number of accident per SSA Region

Figure 11 shows the number of accidents in each SSA region along with the average number of accidents in that region during the previous 4 years (FY10-FY13). Figure 12 shows the same information for fatal accidents during the same periods.

³ See Appendix A for more details

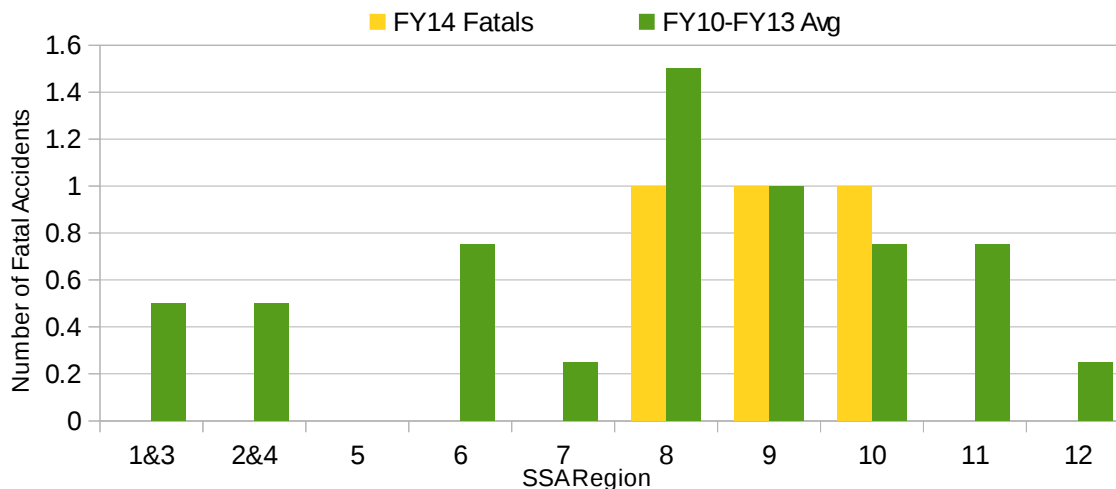


Figure 12: FY14 and Average number of Fatal Accidents per SSA Region

A strong ‘safety culture’ is a large part of the solution to reducing the number and severity of glider accidents. Every pilot must continuously evaluate the ground and flight operations with an eye toward preventing incidents from becoming accidents. The SSF web site now contains an incident reporting form <http://www.soaringsafety.org/incident.html> that individuals can use to anonymously report issues that might impact a pilot’s or passenger’s safety. The SSF will use this information to aid in identifying accident trends and to formulate procedures to assist pilots and instructors in preventing future accidents.

Flight Training and Safety Report

The SSF generates this safety report based on data present in the NTSB aviation accident database. We also receive summary and trend information from the SSA's group insurance program. While long term progress continues to be made, insurance claims were back up in 2014 reversing a 2-year trend of declining claims. 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 soaring accidents is a Human Factor error. The question then is how can we reduce these errors? Fortunately for us, there is a body of knowledge on this topic that we can tap into. If we accept a new premise and follow a few simple guidelines we can significantly reduce the number of accidents.

According to Sidney Dekker⁴ 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.

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

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

If a pilot fails to clear his turns, then how many times did he successfully make turns without looking? It could be thousands. Thus the problem is not simply that the pilot failed to clear his turns, the problem is that the soaring operation he trained in failed to emphasize the importance of this task. The operations training syllabus did not emphasize this task and instructors may not have been given the post-flight time to evaluate and critique the pilots actions on this critical skill. The soaring operations 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 many times has he successfully done this before? Again the problem is that the soaring operations training syllabus did not provide the pilot with the skills needed to recognize both normal and abnormal landing patterns. The syllabus did not allow the instructor the time to practice multiple normal and abnormal approaches to build the pilots proficiency levels up to the point they should be. The operation also failed to notice, and provide the recurrent training necessary to correct this poor performance. The solution is to ensure that the pilot is trained to modifying the pattern as necessary to deal with normal and abnormal situations.

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

SSF Recommendation: Risk Management Training

As noted above, pilot decision-making skills are an important factor in reducing the number of accidents in the US, and throughout the global soaring community. A review of the relevant sections of Part 61 will show that each pilot must receive Aeronautical Decision Making (ADM) training in preparation for a pilot license. Pilots who received their training prior to 1978 may not have received this type of training, as it was not mandated by the FARs. Unfortunately even now most pilots do not receive adequate training in this task which leads to a lack of skill and some pilots have never been exposed to this training. It also appears that most pilots fail to evaluate this skill during a Flight Review, instead focusing on the mechanical skills needed to manipulate the gliders flight controls. The SSF recommends that pilots and flight instructors place a greater focus on these ADM skills.

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

For the past few decades the airlines and military have recognized this fundamental concept, that the key to reducing accidents is better ADM training. They also recognize that pilots must deeply integrate this ADM training into their daily operations and practice it in the cockpit. It is not sufficient to do some classroom exercises and then forget about it once you get into the cockpit. All pilots need to take this same approach to heart if we want to lower the number of accidents.

Risk Management is now recognized as one of the basic ADM skills that a pilot needs to learn and practice before, during, and after every flight. This is another major issue that the airlines and military learned over the past few decades. That is, pilots make mistakes and often fail to evaluate Risks properly. In the 1950's a large increase in the pilot population resulted in a large increase in the number of accidents. The response was to perform an in-depth analysis of a series of accidents to find a common cause. Then a rule was developed to prevent pilots from making the same mistakes, with the result – a lower accident rate. As an example, pilots use pre-launch checklists to ensure that the aircraft is properly configured before beginning the take-off roll.

While this concept worked for a while, in the early 1980's it had become apparent that the aviation accident rate had reached a plateau and further rules were not reducing the accident rate. Studies by several institutions discovered that trying to prevent pilots from making mistakes was not effective. We make errors for a wide variety of reasons. This led to the realization that even if we can't eliminate mistakes, we can develop mechanisms to improve the chances of us detecting when we have made one. This is known as the Swiss Cheese model of ADM.

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

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

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

As noted above, pilots need to be trained to recognize and evaluate potential risks. Risk Management (RM) skills are the 1st step in building an effective ADM program. Not performing this RM task can be as deadly as entering a stall/spin at 100 ft AGL. The airlines and military

have found that scenario based training, such as the scenario presented above, is an effective RM/ADM training method. Pilots who receive this type of training, and then continue to practice it have fewer accidents than pilots who ignore or avoid this training.

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

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

The SSF has begun to build a scenario library, both text based and video clips, to help pilots and instructors provide better RM/ADM instruction and training. Visit the SSF web site and navigate through the On-Line Learning tab to the RM/ADM Resources page or follow this link <http://www.soaringsafety.org/school/adm.html> directly to the page.

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

SSF Recommendation: Combating Organizational Complacency

As noted earlier in this report, in 2014, 2 tow-planes crashed after they ran out of gas while conducting towing operations. While it might be comforting to place the blame solely on the tow-pilot, this is not in line with the concepts of good ADM/SPRM (Single Pilot Resource Management). In an SPRM based operation, the tow-pilot uses ALL Available Resources, ground operations personnel, glider pilots, wing runners, etc to help him/her maintain a positive level of safety. After a long day in the tow-plane it can be easy to forget how many tows the pilot has conducted. A ground operations person can also keep track of these flights and can remind the tow-pilot when it's time to refuel.

Another factor in improving the organization's safety culture is to keep a record of how much fuel a normal tow takes. Does this vary from tow-pilot to tow-pilot? Does one of your tow-planes burn more fuel than the other? If the normal towing operation uses 2K ft tows, how do you account for those occasional 3K tows? What happens when you take a long tow to get into wave? If the tow-pilot is used to making normal tows and a longer or higher than normal tow occurs, he/she can become complacent and this can lead to a fuel starvation accident. Using SPRM techniques can help the tow-pilot manage this risk.

Fuel starvation accidents aren't the only example in 2014 of organizational complacency. The accident involving 2 CAP Blanik L-23 gliders may highlight another. In the accident report the CFI's noted that it was common practice for the 2nd glider to land on the runway while the 1st glider was still on the runway center-line. While it may be true that a change in wind conditions (a slight tailwind was reported to exist on the accident flight) that is not the only cause of this accident. The organization accepted the risk of having 2 gliders occupy the same runway as a normal course of events, not as an exceptional or unusual event.

Thus, it appears that the pilots of the glider made no attempt to quickly move the glider off of the active runway. It also appears that the ground crew did not make it a priority to quickly move the glider once it had come to a complete stop. In an SPRM based operation, the ground operations group would have consulted with the pilots to determine how to quickly, efficiently, and safely move a stopped glider off of the active runway. The ground crew would have questioned the CFI's to ask what risks they were accepting and what mitigation strategies they should be using to reduce the risk.

It is also important that we recognize the negative training the students are receiving. While flight training manuals say never allow multiple aircraft occupy the same runway at the same time, the students in this case are learning glider pilots easily accept this risk. The organization, and its normal operational practices, are setting these students up to fail if/when they move to another soaring site.

While it may be necessary for multiple gliders to land on the same runway in a short period of time, it should not be seen as a standard operating procedure. Accepting high risk activities as normal operational procedures is one example of organizational complacency. Pilots can, and must, use SPRM techniques to prevent organizational complacency from creating high risk situations. The organizations management also needs to continuously evaluate how the operation is dealing with potential risks. This means that the organizations management solicits input from the members and makes the appropriate changes when issues are raised.

Both organizational and personnel complacency leads to accidents. Learning and using ADM/SPRM skills can help reduce accidents and incidents.

SSF Recommendation: Stall Recognition Proficiency

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

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

SSF Goal Orientated Approach

As the FY14 statistics show, the majority of soaring 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.

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

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 in the flight training process. Examiners will check for this training during the flight test. The FARs require that all flight instructors provide some kind of aeronautical judgment training during pilot training flights (student, private, commercial, and flight instructor). FAR 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 accident rate.

SSA REGIONS

- Region 1 Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont.
- Region 2 New Jersey, New York (south of 42nd parallel), Pennsylvania (east of 78th meridian).
- Region 3 New York (north of 42nd parallel), Pennsylvania (west of 78th meridian).
- Region 4 Delaware, District of Columbia, Maryland, Virginia, West Virginia.
- Region 5 Alabama, Florida, Georgia, Mississippi, North & South Carolina, Tennessee, Puerto Rico, The Virgin Islands.
- Region 6 Indiana, Kentucky, Michigan, Ohio.
- Region 7 Illinois, Iowa, Minnesota, Missouri (east of 92nd meridian), North & South Dakota, Wisconsin.
- Region 8 Alaska, Idaho, Montana, Oregon, Washington.
- Region 9 Arizona, Colorado, New Mexico, Utah, Wyoming.
- Region 10 Arkansas, Kansas, Louisiana, Missouri (west of 92nd meridian), Nebraska Oklahoma, Texas.
- Region 11 California (north of 36th parallel), Guam, Hawaii, Nevada.
- Region 12 California (south of 36th parallel).

APPENDIX A

Request for Club, Chapter, and Commercial Operator information

The Soaring Safety Foundation is tasked with evaluating US soaring accidents and developing plans that can help reduce these accidents. Since 1981 the SSF has developed and implemented numerous programs and ideas. While the accident rates are trending in the right direction, one serious question remains. How can the SSF generate meaningful accident statistics which can then be used to devise appropriate response plans?

The difficulty is that the SSF can easily obtain the raw number of accidents (the accident rate), but it has few, if any, means to turn these raw numbers into meaningful statistics. Most aviation accident statistics are reported as a fraction or percentage of accidents per flights or accidents per flight hours. To obtain these statistics the SSF needs to know the number of flights or the number of flight hours. Historically, these flight numbers/hours have not been made available to the SSF.

Other general aviation groups calculate their flight numbers/hours by noting the gallons of aviation gas sold throughout the US. Statistical analysis methods can be used to determine the average fuel burn rate for the fleet of general aviation airplanes. Thus, these aviation groups can compute meaningful accidents statistics. Since gliders use little or no fuel, we do not have an easy way to generate the flight number/hours valued needed to create meaningful statistics.

The SSF needs the support of a majority of the clubs, chapters, and commercial operators in the US to help correct this problem. Only by voluntarily submitting this information can the SSF really achieve its goal of reducing accidents. Once the SSF trustees have these number we can combine them with the raw NTSB accident numbers to generate meaningful statistics.

What can your club, chapter, or commercial operator do? At a minimum use the pilot/club flight time form on the SSF web site <http://www.soaringsafety.org/forms/pilot-times.html> annually to report the number of launches and the total flight time that your club ships performed. If you also launch private gliders, then determine their total flight time as well. This information should easily come from your club records, and these two numbers would greatly help the SSF and they will be considered strictly confidential unless otherwise specified.

Do you want to do more? Then send us as much additional detail as you feel comfortable doing. One option would be to extract your club records into an Excel spread sheet and email the file to the SSF. The more details we have, the more analysis we can perform.

One word of caution, in order for these numbers to be statistically valid, we must get details from a majority of the clubs, chapters, and commercial operators. If not, then the number will be skewed and could reflect specific operator issues instead of national trends. Thus, the SSF needs the support from a large portion of the soaring community.

Email your report to any SSF trustee. Rich Carlson <[rcarlson501 at comcast.net](mailto:rcarlson501@comcast.net)>, Burt Compton <[burtcompton at aol.com](mailto:burtcompton@aol.com)>, Stephen Dee <[goflysteve at gmail.com](mailto:goflysteve@gmail.com)> Ron Ridenour <[ronsnimbus3 at aol.com](mailto:ronsnimbus3@aol.com)>, Tom Johnson <[tjj757 at cox.net](mailto:tjj757@cox.net)>, or the generic SSF Webmaster <webmaster@soaringsafety.org>.

APPENDIX B

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 accidents meeting the NTSB reporting criteria are investigated by representatives of the FAA.

All aircraft accidents involving injury to passengers or crewmembers 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 \square 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 C

Phase of Operation

Ground Movement - Repositioning of the glider while on the ground. To meet the definition of an accident, occupants must be onboard 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 aero-tow, ground launch, and self-launch, and is concluded at the point the glider reaches the VFR traffic pattern altitude. For ground launch operations, the takeoff phase continues until release of the towline.

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

In-flight - Begins at the point of release of the towline for all launch types 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 D

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 repositioned 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, aero-tow, 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 overstress 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.