Review of US Civil Aviation Accidents
Calendar Year 2011

Review of Aircraft Accident Data

NTSB/ARA-14/01
PB2014-101453

National Transportation Safety Board

NTSB/ARA-14/01
PB2014-101453
Notation 8570

Review of US Civil Aviation Accidents

Calendar Year 2011

National Transportation Safety Board

490 L'Enfant Plaza, SW.
Washington, DC 20594

National Transportation Safety Board. 2014. *Review of US Civil Aviation Accidents, Calendar Year 2011*. Annual Review NTSB/ARA-14/01. Washington, DC.

Abstract: The National Transportation Safety Board's (NTSB) *Review of US Civil Aviation Accidents, Calendar Year 2011* covers accidents involving aircraft operated under Title 14 *Code of Federal Regulations* Parts 121 and 135 as well as accidents involving general aviation aircraft operated under Part 91. In total, 1,553 accidents occurred in 2011, involving 1,574 US-registered aircraft. Approximately 18 percent (282) of these accidents were fatal, resulting in 489 fatalities. General aviation accidents accounted for 95 percent of total accidents and 94 percent of fatal accidents in 2011. Data for the years 2002–2010 are also included to provide historical context for the 2011 statistics. The details of the circumstances of the accidents are presented throughout this report. Readers may download a copy of the accident dataset at http://www.ntsb.gov/data/aviation_stats.html.

This report is published before the NTSB issues final probable cause statements for all accidents in 2011. Probable cause data are published periodically and may be queried at http://www.ntsb.gov/aviationquery/index.aspx.

Contents

Figures ..... **iii**
Tables ..... **vi**
Executive Summary **1**
Findings 1
1. Introduction **3**
2. Commercial Air Transport Accidents—Part 121 ..... **5**
Flight Activity 5
Accident Trends 5
2011 In Detail 6
3. Commercial Air Transport Accidents—Part 135 ..... **9**
Scheduled Part 135 Operations 9
Part 135 Air Taxi Operations 11
4. Air Medical Accidents **15**
Flight Activity 15
Accident Trends 15
2011 In Detail 17
5. Air Tour and Sightseeing Accidents **18**
Flight Activity 18
Accident Trends 18
2011 In Detail 20
6. General Aviation Accidents **22**
Personal Flying 23
Instructional Flying 25
Aerial Application 27
Positioning Flights 30
Flight Test 31
References **33**
Appendix A: Accident Terminology **34**
Appendix B: CAST/ICAO Common Taxonomy Team (CICTT) Definitions **35**
Occurrence Categories 35
Phases of Flight 37

Figures

Figure 1. Part 121 Flight Activity Changes Since 2002. 5
Figure 2. Part 121 Accident Rate, 2002–2011. 6
Figure 3. Part 121 Accident Locations (US and Canada), 2011. 7
Figure 4. Part 121 Accident Locations (China and Pacific Ocean), 2011. 7
Figure 5. Defining Event for Part 121 Accidents, 2011. 8
Figure 6. Phase of Flight for Part 121 Accidents, 2011..... 8
Figure 7. Part 135 Accident Locations, 2011. 9
Figure 8. Scheduled Part 135 Flight Activity Changes Since 2002..... 9
Figure 9. Scheduled Part 135 Accidents, 2002–2011. 10
Figure 10. Scheduled Part 135 Accident Rates, 2002–2011... 10
Figure 11. Part 135 Air Taxi Flight Hours, 2002–2011..... 11
Figure 12. Part 135 Air Taxi Accidents (Fixed-Wing), 2002–2011..... 11
Figure 13. Part 135 Air Taxi Accidents (Helicopter), 2002–2011..... 11
Figure 14. Part 135 Air Taxi Accident Rates (Fixed-Wing), 2002–2011..... 12
Figure 15. Part 135 Air Taxi Accident Rates (Helicopter), 2002–2011..... 12
Figure 16. Defining Event for Part 135 Air Taxi Accidents (Fixed-Wing), 2011..... 12
Figure 17. Phase of Flight for Part 135 Air Taxi Accidents (Fixed-Wing), 2011..... 13
Figure 18. Defining Event for Part 135 Air Taxi Accidents (Helicopters), 2011. 13
Figure 19. Phase of Flight for Part 135 Air Taxi Accidents (Helicopters), 2011. 13
Figure 20. Air Medical Flight Hours, 2002–2011. 15
Figure 21. Fixed-Wing Airplanes Involved in Air Medical Accidents, 2002–2011..... 16
Figure 22. Helicopters Involved in Air Medical Accidents, 2002–2011..... 16
Figure 23. Helicopters Involved in Fatal Air Medical Accidents, 2002–2011..... 16
Figure 24. Air Medical Accident Rates, 2002–2011. 17
Figure 25. Sightseeing and Air Tour Flight Hours, 2002–2011. 18
Figure 26. Part 135 Air Tour Accidents, 2002–2011..... 18
Figure 27. Part 135 Air Tour Accident Aircraft, by Aircraft Category, 2002–2011. 19

Figure 28. Part 91 Sightseeing Accidents, 2002–2011. 19
Figure 29. Part 91 Sightseeing Accident Aircraft, by Aircraft Category, 2002–2011. 20
Figure 30. Sightseeing and Air Tour Accident Rates, 2002–2011 20
Figure 31. Defining Event for Part 91 Sightseeing Accidents, 2011 21
Figure 32. Phase of Flight for Part 91 Sightseeing Accidents, 2011 21
Figure 33. General Aviation Flight Hours, 2002–2011. 22
Figure 34. General Aviation Accidents, 2002–2011. 22
Figure 35. General Aviation Accident Rate, 2002–2011. 22
Figure 36. General Aviation Accident Aircraft by State, 2011. ... 23
Figure 37. Personal Flying Hours, 2002–2011. 24
Figure 38. Personal Flying Accidents, 2002–2011. 24
Figure 39. Personal Flying Accident Rate, 2002–2011. 24
Figure 40. Defining Event for Personal Flying Accidents, 2011.. 25
Figure 41. Phase of Flight for Personal Flying Accidents, 2011. . 25
Figure 42. Instructional Flying Hours, 2002–2011. 26
Figure 43. Instructional Flying Accidents, 2002–2011. 26
Figure 44. Instructional Flying Accident Rate, 2002–2011. ... 26
Figure 45. Defining Event for Instructional Flying Accidents, 2011 27
Figure 46. Phase of Flight for Instructional Flying Accidents, 2011 27
Figure 47. Aerial Application Flight Hours, 2002–2011. 28
Figure 48. Aerial Application Accidents (Fixed-Wing Airplanes), 2002–2011. 28
Figure 49. Aerial Application Accidents (Helicopters), 2002–2011 28
Figure 50. Aerial Application Accident Rate (Fixed-Wing Airplanes), 2002–2011. 29
Figure 51. Aerial Application Accident Rate (Helicopters), 2002–2011 29
Figure 52. Defining Event for Aerial Application Accidents, 2011 30
Figure 53. Phase of Flight for Aerial Application Accidents, 2011 30
Figure 54. Positioning Flight Accidents, 2002–2011. 30
Figure 55. Defining Event for Positioning Flight Accidents, 2011 31
Figure 56. Phase of Flight for Positioning Flight Accidents, 2011 31
Figure 57. Flight Test Accidents, 2002–2011. 31

Figure 58. Defining Event for Flight Test Accidents, 2011. .. 32
Figure 59. Phase of Flight for Flight Test Accidents, 2011.... 32

Tables

Table 1. Accident Summary for Major Segments of US Civil Aviation: 2011 1

Table 2. NTSB Classification Scheme for Part 121 Accidents 5

Table 3. Part 121 Accidents by Severity: 2002-2011 5

Table 4. Operational Dichotomies of Part 121 Accidents: 2011 7

Table 5. General Aviation Accident Aircraft by Flight Purpose and Aircraft Category: 2011 23

Executive Summary

From January 1 through December 31, 2011, 1,574 US-registered civil aircraft were involved in 1,553 accidents, of which 282 were fatal accidents resulting in 489 fatalities. Table 1 shows the number of accidents, fatal accidents, and fatalities for each of the major segments of US civil aviation for 2011.

Table 1. Accident Summary for Major Segments of US Civil Aviation, 2011.

Segment	Accidents	Fatal Accidents	Fatalities
Part 121	31	0	0
Part 135[1]	54	16	41
General Aviation[2]	1469	266	448
Total US Civil Aviation[3]	**1553**	**282**	**489**

Findings

Although this report does not produce conclusions or recommendations, the National Transportation Safety Board (NTSB) has developed several findings from the review of these statistical data. The principal findings of this review are as follows:

Part 121 Operations

- Between 2002 and 2011, Part 121 flight hours increased by four percent.
- In 2011, there were 3.2 accidents per million Part 121 departures and 1.7 accidents per million Part 121 flight hours. These accident rates have decreased 17 and 27 percent, respectively, since 2002.
- There were no fatal accidents involving Part 121 operations in 2011.
- The majority of Part 121 accidents in 2011 involved scheduled domestic passenger flights.
- The most prevalent defining event for Part 121 accidents in 2011 was a turbulence encounter, which was experienced by 44 percent of accident aircraft. None of the aircraft involved in these accidents were damaged, but all of these accidents resulted in at least one serious injury.

Part 135 Operations

- Between 2002 and 2011, scheduled Part 135 flight hours increased by 19 percent.
- There were four accidents involving scheduled Part 135 flights in 2011. All four accidents occurred in Alaska and involved fixed-wing airplanes. None of these accidents resulted in fatalities or serious injuries.
- In 2011, there were 35 accidents involving Part 135 air taxi fixed-wing airplanes, which resulted in 20 fatalities. Loss of control-inflight and loss of

[1] These counts include accidents in all facets of 14 CFR Part 135 operations, including air tours and some air medical operations. In Chapter 3 of this report, air medical and air tour operations are not included in aggregate Part 135 accident statistics. Rather, they are outlined separately in Chapters 4 and 5, respectively.

[2] These General Aviation accident counts include all operations not conducted under 14 CFR Part 121, 135, or 129, including sightseeing flights and some air medical operations. In Chapter 6 of this report, air medical operations and sightseeing flights are not included in aggregate General Aviation accident statistics. Rather, they are outlined separately in Chapters 4 and 5, respectively.

[3] The subcategories (Part 121, Part 135, and General Aviation) sum to more than the total of US civil aviation accidents because some accidents involve collisions between aircraft operated under different regulations and are, therefore, counted in more than one category.

control-ground were the most common defining events for these accidents.

- There were seven accidents involving Part 135 air taxi helicopters in 2011, of which two were fatal. All but one of these accidents occurred in Alaska or the Gulf of Mexico.

Air Medical Operations

- Six air medical accidents occurred in 2011, of which two were fatal.
- From 2002 through 2011, 41 percent of air medical accidents involving fixed-wing airplanes and 36 percent of air medical accidents involving helicopters were fatal.

Air Tour and Sightseeing Operations

- Between 2004 and 2010, Part 135 air tour activity increased by 33 percent while Part 91 sightseeing activity decreased by 15 percent.
- Four accidents involving Part 135 air tours occurred in 2011. Two of these accidents were fatal.
- Of the 13 Part 91 sightseeing accidents in 2011, seven involved balloons. Six of the seven balloon accidents occurred during landing.

General Aviation Operations

- General aviation accidents accounted for 95 percent of all accidents, 94 percent of fatal accidents, and 92 percent of all US civil aviation fatalities in 2011.
- Among personal flying accidents in 2011, fatal accidents were most commonly associated with loss of control-inflight, and non-fatal accidents were most commonly associated with loss of control-ground. Landing was the most common phase of flight for all personal flying accidents.
- From 2002 through 2011, nine percent of instructional flying accidents were fatal; this is lower than the corresponding figure for general aviation as a whole, for which 19 percent of accidents during this time period were fatal.
- In 2011, the majority of aerial application accidents occurred during maneuvering flight.
- Non-fatal flight testing accidents in 2011 were most commonly associated with powerplant malfunctions. Fatal flight testing accidents were most commonly associated with loss of control-inflight.

1. Introduction

The NTSB's *Review of US Civil Aviation Accidents, Calendar Year 2011* reviews all civil aviation accidents that occurred between January 1, 2011, and December 31, 2011. This report combines accidents involving air carriers (regulated by Title 14 *Code of Federal Regulations* [CFR] Part 121), commuter and on-demand carriers (regulated by 14 CFR Part 135) and general aviation (regulated by 14 CFR Part 91). This report is published before the adoption of the probable cause for all accidents that were reviewed.[4]

Civil aviation in the United States encompasses a broad variety of aircraft and pilots, flying for many different purposes. These operations can range from light-sport and private flights to commercial air carrier operations. The safety of civil aviation in the United States is regulated by the Federal Aviation Administration (FAA). The FAA distinguishes between commercial and general aviation operations. Commercial operations generally involve carriers that operate aircraft in revenue service, for the purpose of either passenger or cargo transport. These carriers are regulated by Parts 121 and 135.

Most air carriers regulated by Part 121 fly large, transport-category aircraft for the purpose of passenger travel. However, some carriers operating under Part 121 transport cargo only. Both passenger and all-cargo Part 121 carriers normally conduct operations in controlled airspace and at specific, uncontrolled airports that are able to provide certain weather, maintenance, and operational equipment and support.

[4] Probable cause data is published periodically (NTSB 2013a). Additional accident data, including the source data for this report, is available online (NTSB 2013b).

Part 135 applies to commuter and on-demand operations, which may involve takeoffs and landings at airports that do not have the services required by Part 121. Part 135 contains different regulatory requirements than those for Part 121 operators.

Part 121 and Part 135 operations can be further classified into scheduled and non-scheduled services. Scheduled operators offer set departure locations, departure times, and arrival locations in advance of each flight's departure. Non-scheduled operators, or on-demand operators, do not operate from set locations at set times, but instead rely on their customers to determine the departure and arrival locations and times. Examples of non-scheduled operations include some Part 121 cargo operations, Part 135 air taxi operations, and certain emergency medical transport operations.

In contrast, general aviation operations encompass all those not covered by Part 121 or Part 135 (or those covered by Part 129, which applies to foreign carriers operating in US airspace). Whereas Parts 121 and 135 apply to specific types of operations, general aviation encompasses a wide variety of operations, involving an even wider array of aircraft. General aviation includes all non-commercial operations, including flying for pleasure and business, along with very specific commercial operations, such as flight training and banner- or glider-towing. Accidents in each segment of civil aviation will be discussed in subsequent sections of this report.

Some of the statistical summaries in this report use accident categories that were developed by the Commercial Aviation Safety Team (CAST)/International Civil Aviation Organization (ICAO) Common Taxonomy Team (CICTT). CICTT category development focuses on coding aircraft accident

occurrences (CICTT 2013a) and phases of flight (CICTT 2013b) in a standardized and logical manner. In categorizing US civil aviation accidents, the NTSB can use multiple CICTT categories to describe each aircraft involved in an accident. For ease of use, the NTSB identifies one occurrence as the defining event for each accident aircraft. This report categorizes each accident aircraft by its defining event and the phase of flight associated with the defining event. Definitions of each occurrence and phase of flight category can be found in Appendix B.

Activity data collected by the FAA for on-demand Part 135 and general aviation were not available for use in this report (FAA 2013). Consequently, this report does not provide 2011 accident rates for these groups, although counts of accidents by injury type, defining event, and phase of flight are provided. The FAA may release the 2011 activity data at a later date. If available, these data will be incorporated into a future *Review of US Civil Aviation Accidents*.

2. Commercial Air Transport Accidents—Part 121

This section provides a summary of the activity and experiences of air carriers regulated by Part 121. These operators generally fly large, transport-category aircraft carrying passengers, cargo, or both for hire.

Flight Activity

In 2011, 9.6 million flights were conducted under Part 121, carrying 734 million passengers and resulting in 18 million flight hours. Since 2002, yearly passenger enplanements have grown by 19 percent, while flight hours have increased by 4 percent and departures have decreased by 9 percent, as shown in Figure 1.

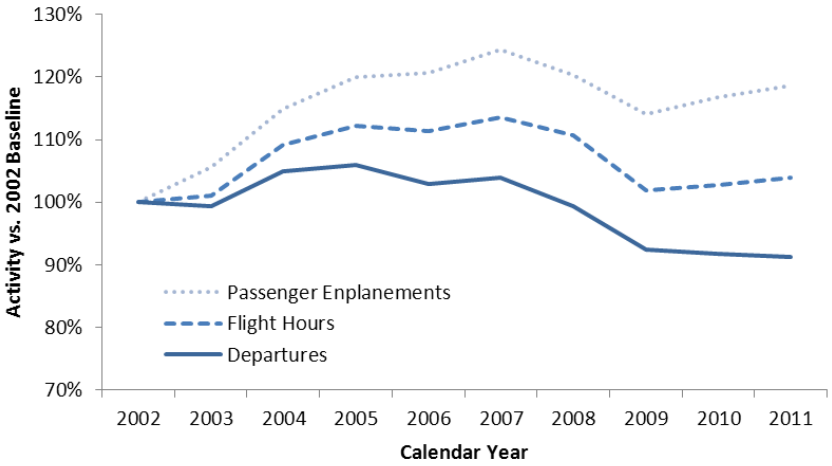

Figure 1. Part 121 Flight Activity Changes Since 2002.

Accident Trends

The NTSB classifies Part 121 accidents according to severity, which is defined by the degree of aircraft damage and the number and seriousness of injuries and fatalities.[5] The four severity levels are described in Table 2.

Table 2. NTSB Classification Scheme for Part 121 Accidents.

Severity	Criteria
Major	The aircraft was destroyed, OR There were multiple fatalities, OR There was one fatality AND substantial damage to the aircraft.
Serious	A single fatality without substantial damage to the aircraft, OR At least one serious injury AND the aircraft was substantially damaged.
Injury	Non-fatal accident with at least one serious injury but no substantial damage to the aircraft.
Damage	No person was killed or seriously injured, but the aircraft was substantially damaged.

As shown in Table 3, for the 10-year time period between 2002 and 2011, approximately half of the Part 121 accidents fell into the damage category. Forty-one percent of the accidents were in the injury category, and the remainder were in the serious or major category. In 2011, no serious or major Part 121 accidents occurred.

Table 3. Part 121 Accidents by Severity, 2002–2011.

Severity	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Major	1	2	4	2	2	0	4	2	1	0
Serious	1	3	0	3	2	2	1	3	0	0
Injury	14	24	15	11	7	14	8	15	14	19
Damage	25	25	11	24	22	12	15	10	14	12

[5] Appendix A provides definitions for the terms *fatality*, *serious injury*, and *substantial damage*.

Although the total number of accidents can show the occurrences during a particular time period, it is important to consider the accident rate in relation to the relative risk of occurrence, such as the ratio of accidents to a suitable measure. These ratios rely on the availability and accuracy of the exposure measures, specifically, hours of service and number of departures for Part 121 operators.

For accident risk associated with takeoff and landing (for example, hard landings and runway excursions), the number of flights or departures is a good measure of exposure to risk. For risk that is associated with time aloft (for example, turbulence encounters), the total flight time can provide a better index of exposure. Both types of rates are presented in the aggregate analysis in this section.

Accident rates for both exposure measures generally decreased from 2002 through 2006, as shown in Figure 2. Although accident rates increased slightly during the latter half of the decade, they have remained below four accidents per million departures and below two accidents per million flight hours since 2006. In 2011, there were 3.2 accidents per million Part 121 departures and 1.7 accidents per million Part 121 flight hours.

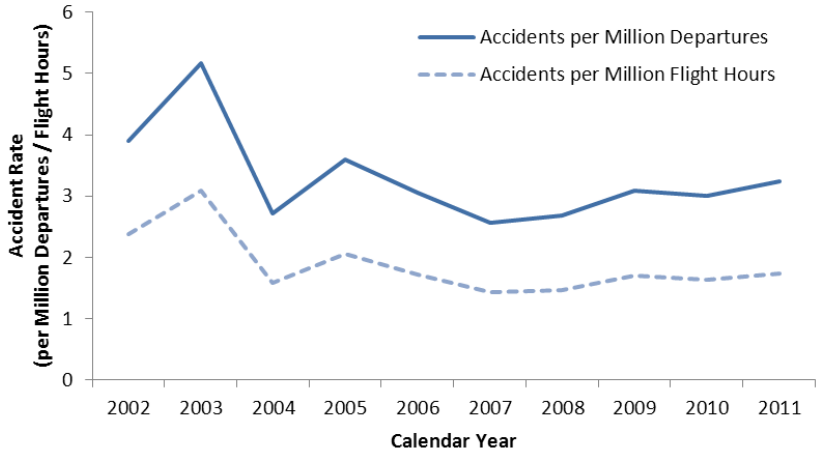

Figure 2. Part 121 Accident Rate, 2002–2011.

2011 In Detail

There were 31 accidents involving 34 Part 121 aircraft in 2011 (two accidents involved on-ground collisions between two aircraft; narrative details are not available for the third multiple-aircraft accident). None of these accidents were fatal. The accidents were distributed across 14 states, Canada, China, and the Pacfiic Ocean, as shown in Figure 3 and Figure 4.

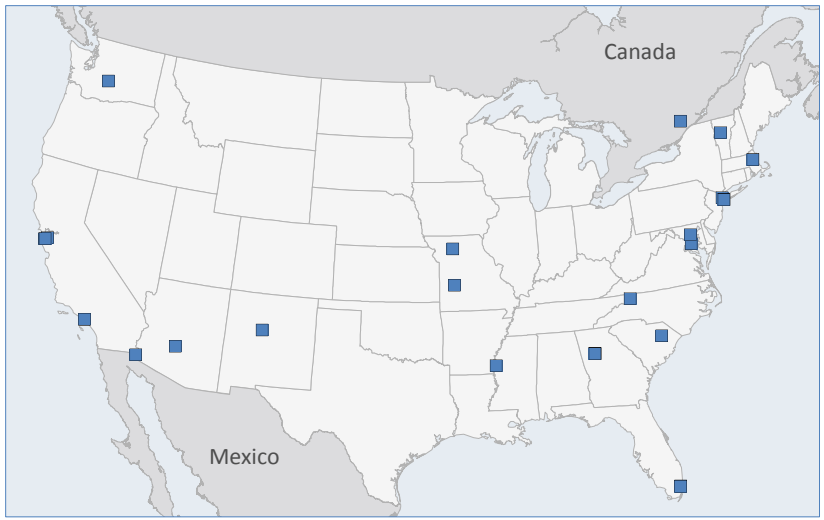

Figure 3. Part 121 Accident Locations (United States and Canada), 2011.

Figure 4. Part 121 Accident Locations (China and Pacific Ocean), 2011.

Table 4 partitions Part 121 accident flights into three operational dichotomies: passenger versus cargo flights, domestic versus international flights, and scheduled versus non-scheduled flights. In 2011, most Part 121 accidents involved aircraft engaged in scheduled, passenger operations. Approximately two-thirds of accident aircraft were conducting domestic flights; one-third were conducting international flights.

Table 4. Operational Dichotomies of Part 121 Accidents, 2011.

Operational Dichotomies	Aircraft Involved In Accidents	Aircraft Involved In Fatal Accidents
Passenger	33	0
Cargo	1	0
Domestic	23	0
International	11	0
Scheduled	31	0
Non-Scheduled	3	0

As shown in Figure 5, the most common defining event for Part 121 accident aircraft in 2011 was a turbulence encounter. Thirteen of the 15 turbulence encounters occurred during the en route phase of flight; the remaining two occurred during approach. None of the aircraft involved in these turbulence encounters sustained any damage. However, all of these accidents resulted in at least one serious injury.

In contrast, the accidents with the next most common defining events—ground collision and ground handling—resulted in only one serious injury among 10 accident aircraft (a foot injury to a ground crewmember caused by an aircraft nosewheel). The other accidents in these categories resulted in

no injuries but caused substantial damage to at least one aircraft.

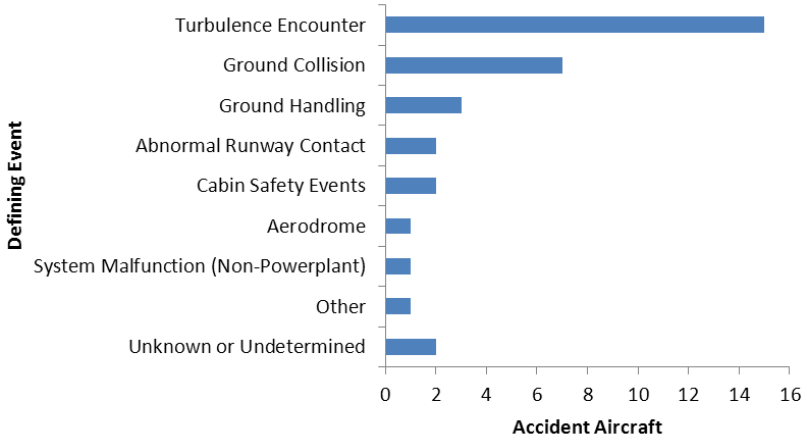

Figure 5. Defining Event for Part 121 Accidents, 2011.

The most common phases of flight for Part 121 accident aircraft in 2011 were en route, taxi, and pushback/towing, as shown in Figure 6. These results are consistent with the most common defining events (turbulence encounter, ground collision, and ground handling).

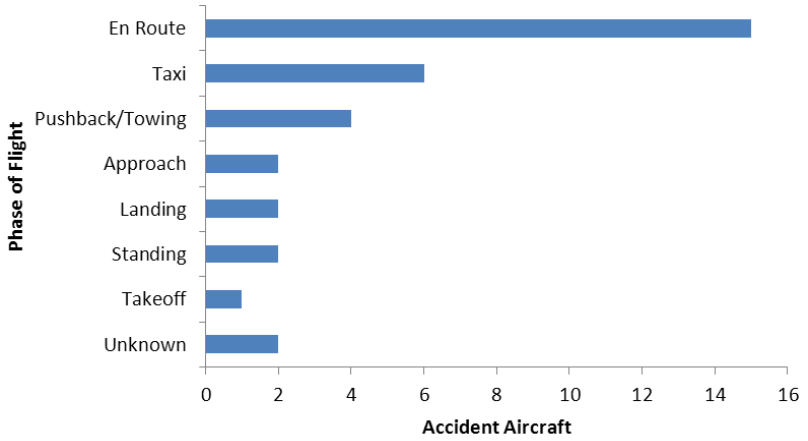

Figure 6. Phase of Flight for Part 121 Accidents, 2011

In 2011, Part 121 accident pilots had an average total flight time of 14,036 hours, with an average of 3,672 hours in the type of accident aircraft. Accident pilots were an average of 52 years old.[6]

[6] The pilot statistics presented in this document only use data from the pilot listed first (normally the captain) in the NTSB accident investigation report. Also, pilot demographics are not available for every accident. For the 34 Part 121 accident aircraft in 2011, flight hour data were available for 22 pilots and age data were available for 24 pilots.

3. Commercial Air Transport Accidents—Part 135

Title 14 CFR Part 135 governs the operation of certain aircraft with fewer than 10 passenger seats operating scheduled commuter services as well as aircraft operating on-demand passenger or cargo services. On-demand passenger services include air taxi, air medical, and air tour operations. However, in this chapter, air medical and air tour operations are not included in aggregate Part 135 accident statistics. Rather, they are outlined separately in Chapters 4 and 5, respectively. Figure 7 shows the locations of accidents involving Part 135 scheduled and air taxi operations in 2011.

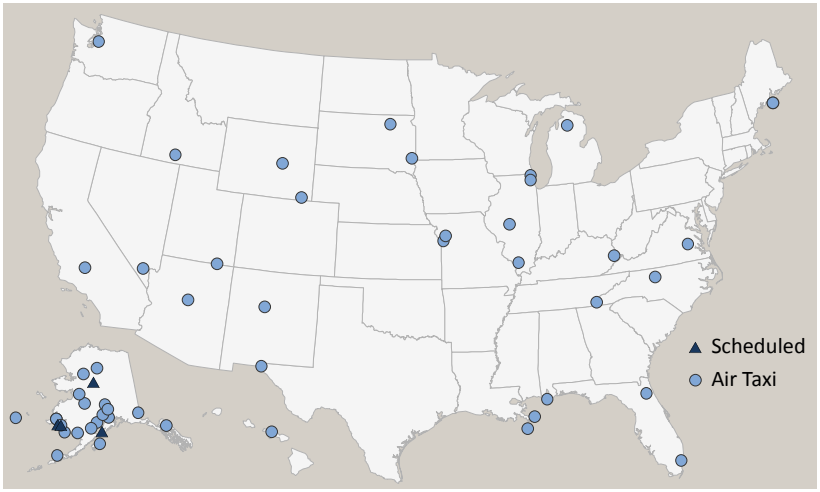

Figure 7. Part 135 Accident Locations, 2011.

Scheduled Part 135 Operations

Flight Activity

In 2011, 608,000 scheduled Part 135 flights were conducted, resulting in 326,000 flight hours. Figure 8 shows that, since 2002, scheduled Part 135 departures have increased by 18 percent and scheduled Part 135 flight hours have increased by 19 percent.

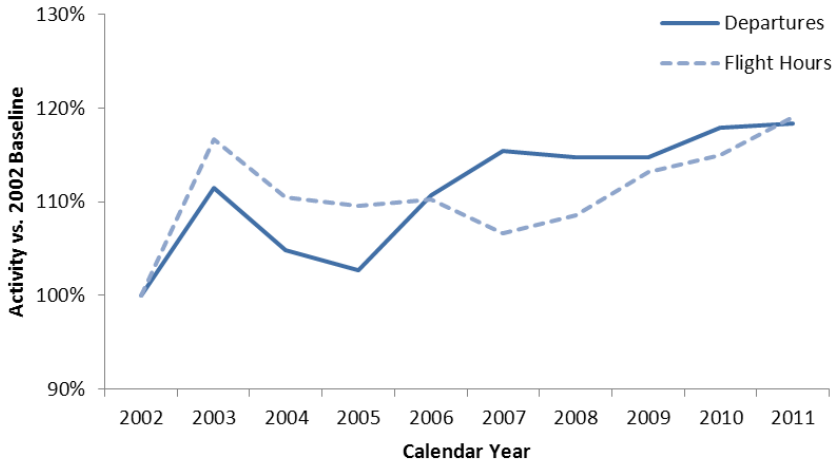

Figure 8. Scheduled Part 135 Flight Activity Changes Since 2002.

Accident Trends

As shown in Figure 9, the number of accidents for scheduled Part 135 flights has remained at or below seven per year since 2002.

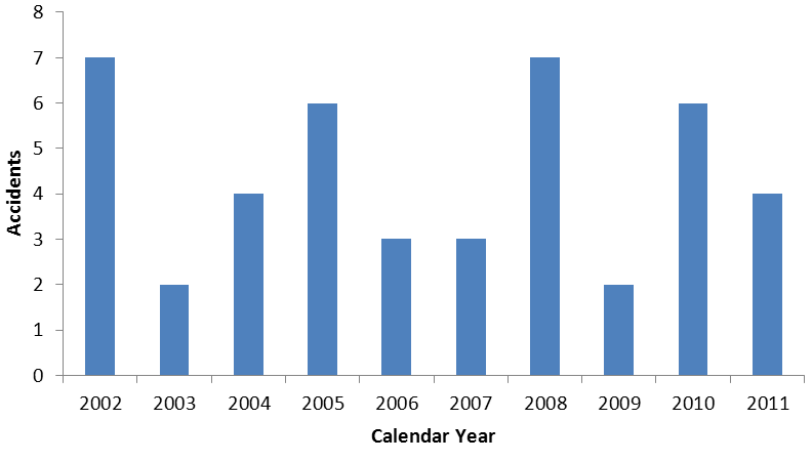

Figure 9. Scheduled Part 135 Accidents, 2002–2011.

Figure 10 shows the accident rates for scheduled Part 135 operations from 2002 through 2011, normalized by the number of flights and flight hours. The large year-to-year variation is due to the low number of accidents among this segment of aviation; small changes in accident counts can thus result in large changes in accident rates.

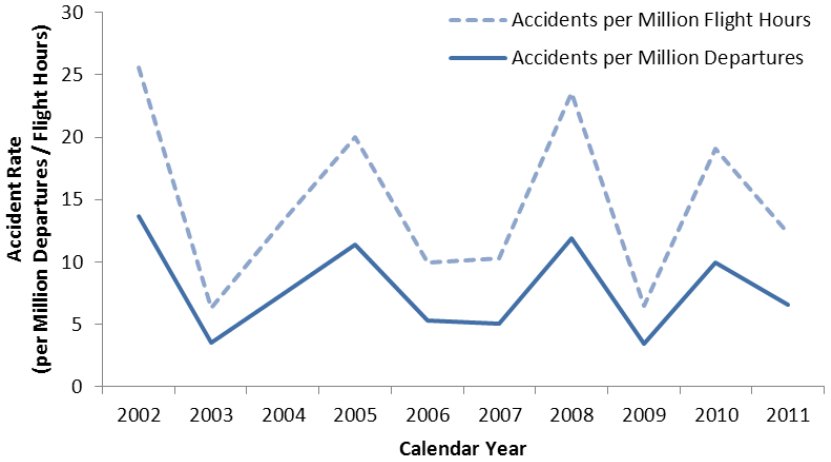

Figure 10. Scheduled Part 135 Accident Rates, 2002–2011.

2011 In Detail

There were four accidents involving scheduled Part 135 flights in 2011. All four accidents occurred in Alaska and involved fixed-wing airplanes. None of these accidents resulted in fatalities to crewmembers or passengers (two resulted in minor injuries), but the aircraft was substantially damaged in each case. Three accidents occurred in daylight and one accident occurred at dusk.

Two of these accidents occurred during the initial climb after takeoff (with a defining event of loss of control-inflight), one occurred during landing (with a defining event of a collision with terrain), and one occurred during taxi (with a defining event of a ground collision).

The pilots involved in these accidents had an average total flight time of 8,305 hours, with an average of 2,003 hours in the type of accident aircraft. Accident pilots were an average of 42 years old.

Part 135 Air Taxi Operations

Flight Activity

Figure 11 shows Part 135 air taxi flight activity for helicopters and fixed-wing airplanes (FAA 2013). Between 2004 and 2010,[7] helicopter flight activity increased by 97 percent while fixed-wing flight activity decreased by 28 percent.

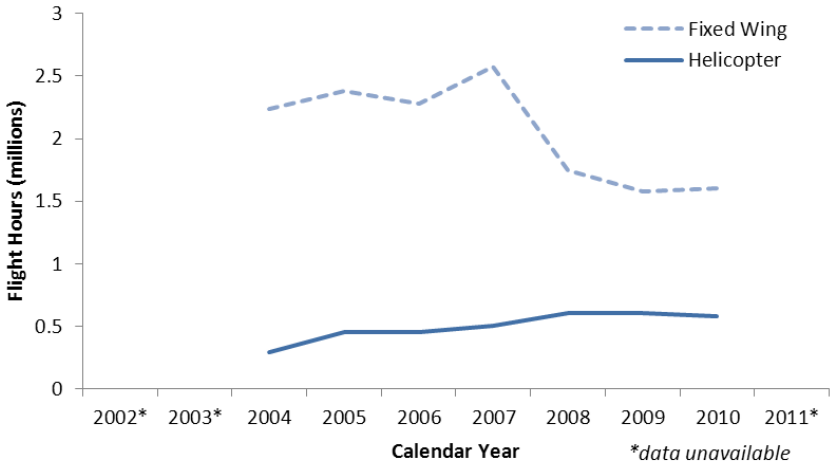

Figure 11. Part 135 Air Taxi Flight Hours, 2002–2011.

Accident Trends

Figure 12 shows the number of fatal and total air taxi accidents involving fixed-wing airplanes from 2002 through 2011; Figure 13 shows the same data for helicopters.

[7] As explained in the Introduction, 2011 activity data for on-demand Part 135 and general aviation are not shown because the 2011 FAA *General Aviation and Part 135 Activity Survey* data were not yet available at the time of this review's publication. In addition, air taxi, air medical, and sightseeing activity data for 2002 and 2003 are not available because the survey did not distinguish between these categories and other Part 135 and general aviation operations prior to 2004.

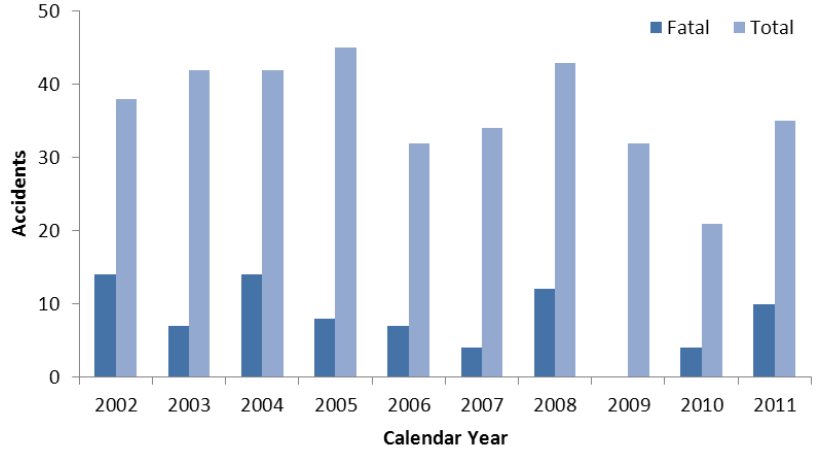

Figure 12. Part 135 Air Taxi Accidents (Fixed-Wing), 2002–2011.

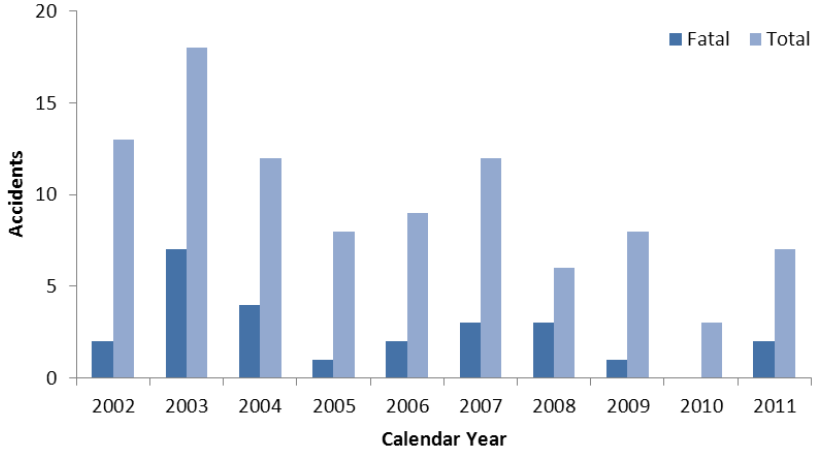

Figure 13. Part 135 Air Taxi Accidents (Helicopter), 2002–2011.

Figure 14 shows the fatal and total rates of air taxi accidents involving fixed-wing airplanes from 2002 through

2011 for which data is available; Figure 15 shows the same data for helicopters.

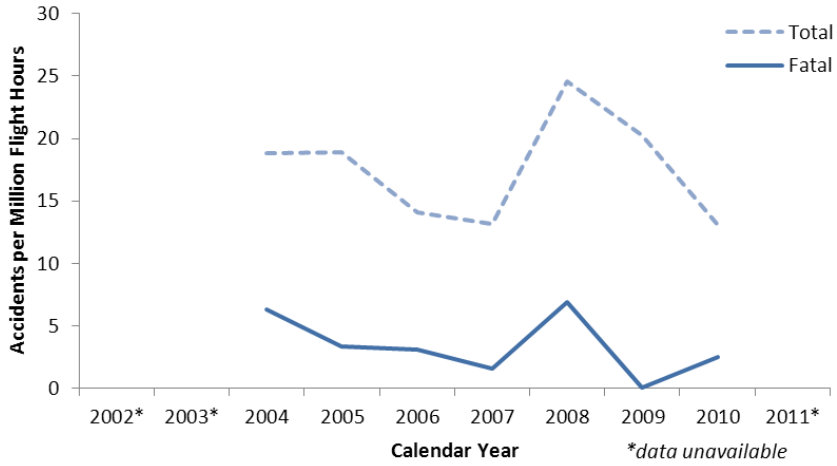

Figure 14. Part 135 Air Taxi Accident Rates (Fixed-Wing), 2002–2011.

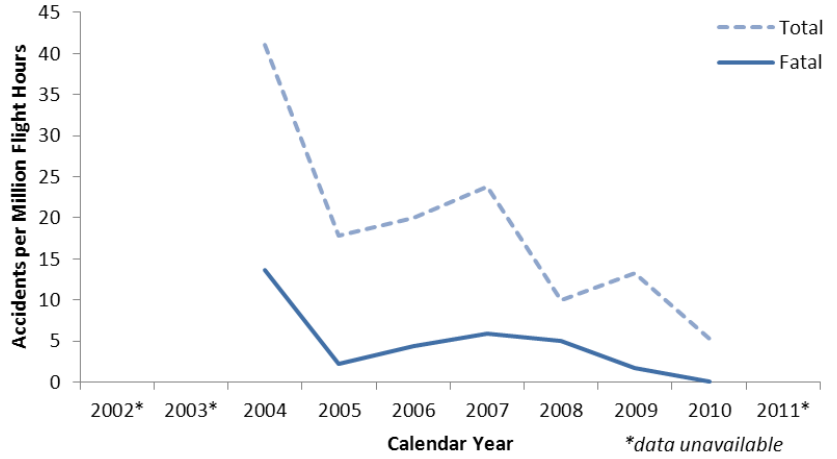

Figure 15. Part 135 Air Taxi Accident Rates (Helicopter), 2002–2011.

2011 In Detail

Thirty-six fixed-wing airplanes conducting Part 135 air taxi operations were involved in 35 accidents in 2011. Of these, 10 accidents resulted in 20 fatalities and an additional three accidents resulted in serious injuries. All 36 accident aircraft sustained substantial damage. Fifteen of the 35 accidents occurred in Alaska.

As shown in Figure 16, the most common defining events for fixed-wing Part 135 air taxi accident aircraft were loss of control-inflight and loss of control-ground. Loss of control-inflight was also the most frequent defining event for fatal accidents.

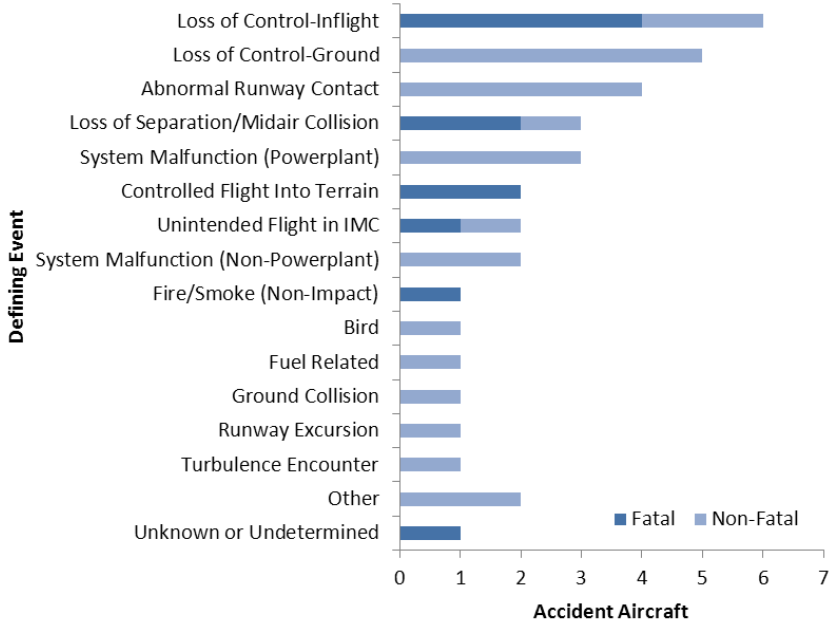

Figure 16. Defining Event for Part 135 Air Taxi Accidents (Fixed-Wing), 2011.

Figure 17 shows the phase of flight for each of the 36 Part 135 air taxi fixed-wing airplanes involved in accidents in 2011. Half of these accidents occurred during the en route or landing phases.

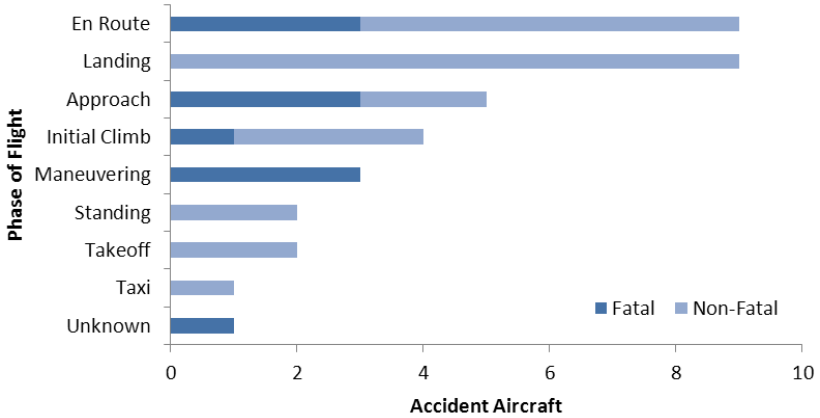

Figure 17. Phase of Flight for Part 135 Air Taxi Accidents (Fixed-Wing), 2011.

Seven helicopters conducting Part 135 air taxi operations were involved in accidents in 2011. Of these, two accidents resulted in four fatalities and one additional accident resulted in serious injuries. One helicopter was destroyed during the accident and the other six sustained substantial damage. Three of the accidents occurred in Alaska, three occurred in the Gulf of Mexico, and the remaining accident occurred in Florida.

Figure 18 shows the defining event for each of the seven Part 135 air taxi helicopters involved in accidents during 2011. The most common defining event, as well as the defining event for both fatal accidents, was controlled flight into terrain.

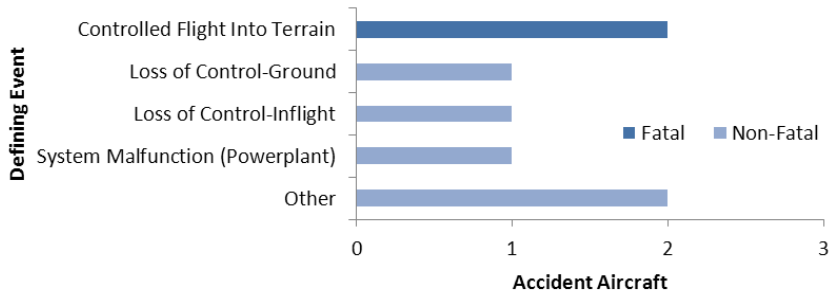

Figure 18. Defining Event for Part 135 Air Taxi Accidents (Helicopters), 2011.

Figure 19 shows the phase of flight for each of the seven Part 135 air taxi helicopters involved in accidents in 2011. The most common accident phase of flight was standing. These three accidents occurred either prior to takeoff or after landing, and the accidents were located on an offshore oil platform, at a remote drilling site, and at a remote mountain site.

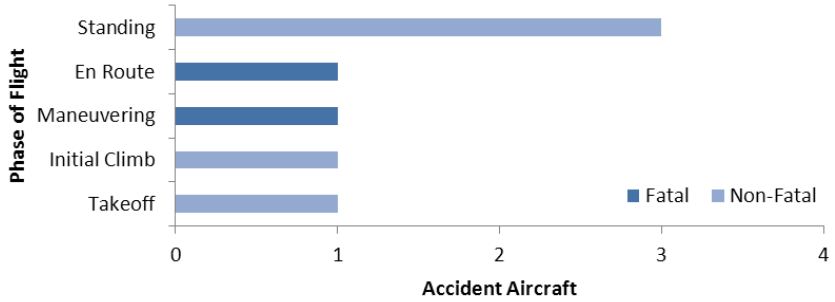

Figure 19. Phase of Flight for Part 135 Air Taxi Accidents (Helicopters), 2011.

In 2011, pilots of Part 135 air taxi fixed-wing accident airplanes had an average total flight time of 10,736 hours, with an average of 2,879 hours in the type of accident aircraft.

These accident pilots were an average of 46 years old. Pilots of Part 135 air taxi accident helicopters had an average total flight time of 7,158 hours, with an average of 1,563 hours in the type of accident aircraft. These accident pilots were also an average of 46 years old.

4. Air Medical Accidents

Air medical operations are conducted under both Part 135 and Part 91, depending on the type of mission being flown.[8] The FAA (1990, 1991) has issued guidance on the operation of air medical services and what operations can be conducted under each part. In addition, some air medical operations, particularly for emergency medical services, are conducted by state or local governments as public aircraft operations.

Air medical operations can be further separated as a function of the type of aircraft that are used. Fixed-wing airplanes are used for inter-facility transportation of patients or organs and use established airport facilities. Emergency medical service operations most often make use of helicopters, and they frequently use helipads and/or unimproved landing sites at accident sites as well as landing facilities at hospitals.

Flight Activity

Figure 20 shows air medical flight hours by year. Part 135 operations comprise the majority of air medical flights.

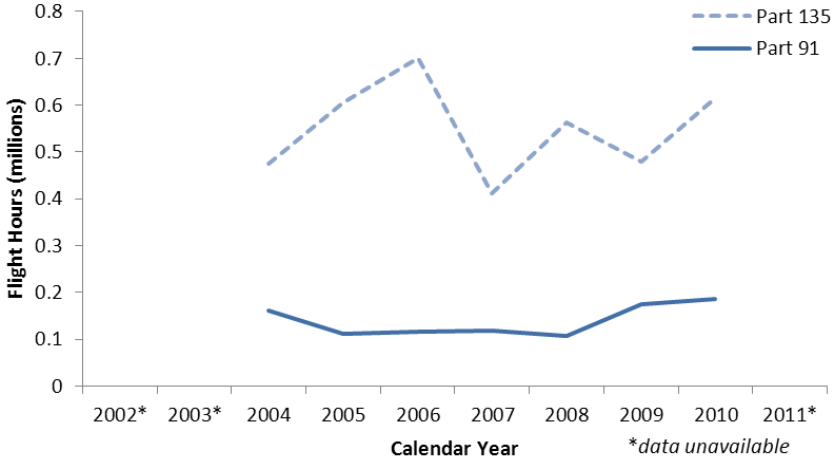

Figure 20. Air Medical Flight Hours, 2002–2011.

Accident Trends

Figure 21 shows the total number of fixed-wing airplanes involved in air medical accidents between 2002 and 2011 operating under Part 91, Part 135, or as public aircraft. During this 10-year period, 12 of the 29 accidents (41 percent) resulted in fatalities.

[8] Missions include inter-facility transport, which would be operated under Part 135, and refueling and repositioning, which would typically be operated under Part 91.

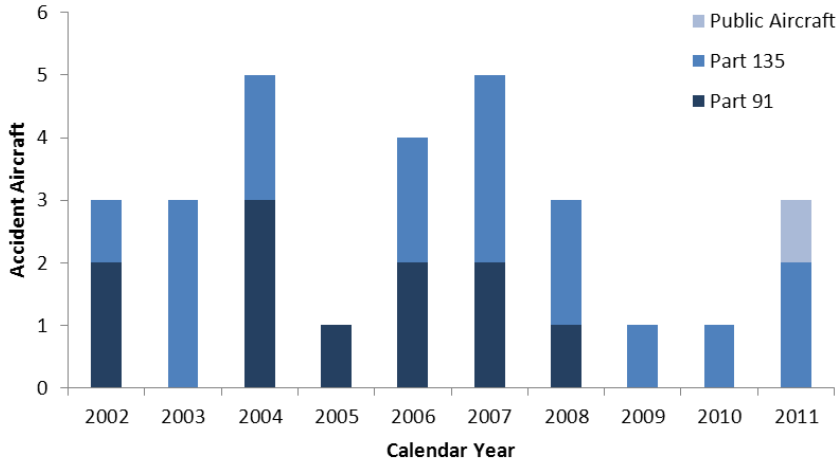

Figure 21. Fixed-Wing Airplanes Involved in Air Medical Accidents, 2002–2011.

Figure 22 shows the total number of helicopters involved in air medical accidents between 2002 and 2011 operating under Part 91 or Part 135 or as public aircraft. Helicopter emergency medical services (HEMS) accounted for about 80 percent of all air medical accidents during the ten-year period. Figure 23 shows the number of HEMS accident aircraft that were involved in fatal accidents from 2002 through 2011. During this time period, 42 of the 118 HEMS accidents (36 percent) were fatal.

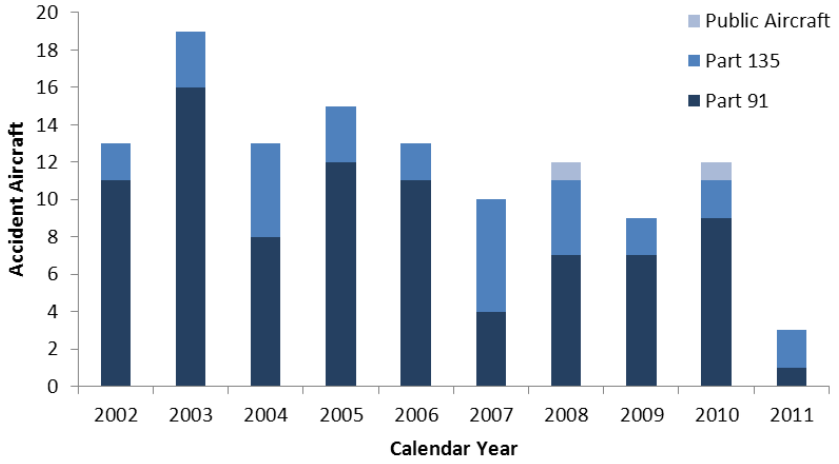

Figure 22. Helicopters Involved in Air Medical Accidents, 2002–2011.

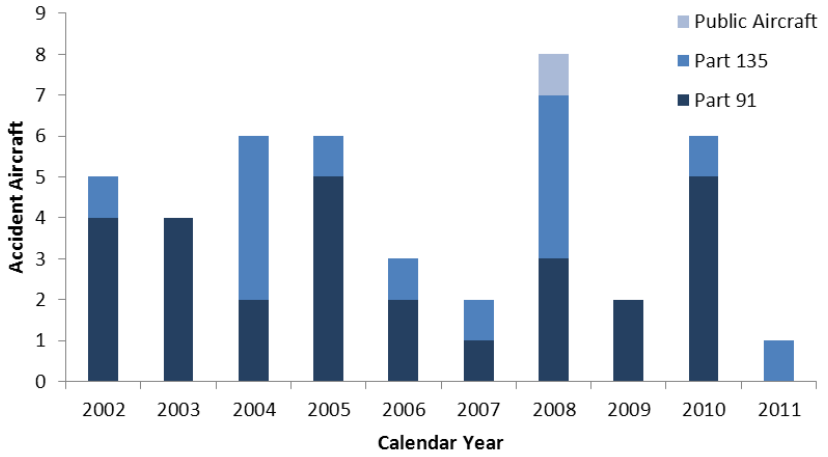

Figure 23. Helicopters Involved in Fatal Air Medical Accidents, 2002–2011.

Figure 24 shows yearly accident rates for Part 91 and Part 135 air medical operations.

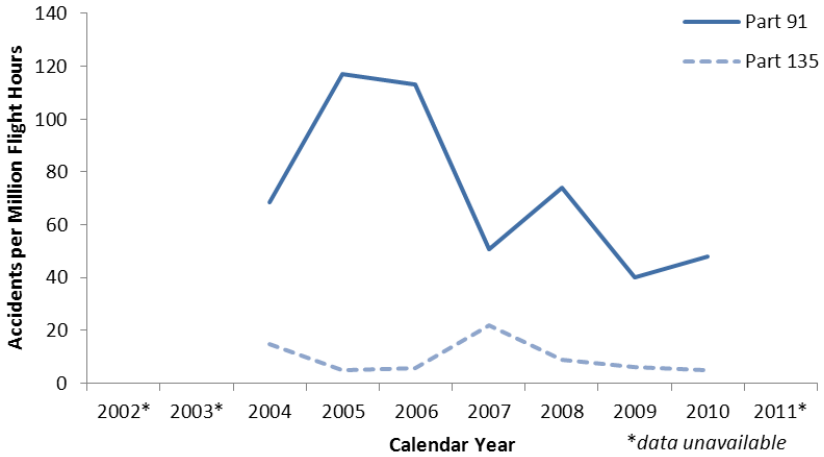

Figure 24. Air Medical Accident Rates, 2002–2011.

2011 In Detail

There were three fixed-wing airplanes involved in air medical accidents in 2011. In the first accident, involving a public aircraft, a stall on approach in icing conditions led to a ground collision, resulting in substantial aircraft damage and minor occupant injuries. In the second accident, involving an airplane operating under Part 135, a cabin door separated from the aircraft in flight, resulting in substantial damage but no injuries. In the third accident, also involving an airplane operating under Part 135, fuel exhaustion led to an off-airport landing that resulted in substantial aircraft damage and three fatalities.

The pilots of these airplanes had an average total flight time of 6,864 hours, with an average of 1,280 hours in the type of accident aircraft. These accident pilots were an average of 55 years old.

There were three helicopters involved in air medical accidents in 2011. In the first accident, involving a helicopter operating under Part 91, abnormal runway contact during a power-off landing resulted in substantial aircraft damage but no injuries. In the second accident, involving a helicopter operating under Part 135, the aircraft sustained substantial damage when it impacted terrain during an autorotation following a loss of power and all four occupants were fatally injured. In the third accident, also involving a helicopter operating under Part 135, a main rotor blade contacted the vertical stabilizer during engine shutdown, resulting in substantial damage but no injuries.

The pilots of these helicopters had an average total flight time of 11,935 hours, with an average of 1,355 hours in the type of accident aircraft. These accident pilots were an average of 53 years old.

5. Air Tour and Sightseeing Accidents

Air tour and sightseeing flights are governed under rules finalized in 2007 in the FAA's rulemaking on National Air Tour Safety Standards (*Federal Register* 2007, 6884). These regulations classify operators into three groups: (1) air carriers or commercial operators with authority to conduct flights under Part 121 or Part 135; (2) Part 91 operators conducting flights that return to the departure airport and remain within 25 miles of the airport; and (3) Part 91 operators conducting flights for certain charitable, nonprofit, or community events.[9,10] The rulemaking also consolidated general air tour and sightseeing safety standards into Part 136, which establishes certain safety and management rules in order to promote a safe and efficient air tour system in the United States. Although the requirements are comprehensive for airplanes and helicopters operating air tours, they do not address gliders or balloons operating under commercial exceptions in Part 91.

Flight Activity

Figure 25 shows air tour and sightseeing flight hours by year. Between 2004 and 2010, Part 135 air tour activity increased by 33 percent while Part 91 sightseeing activity decreased by 15 percent.

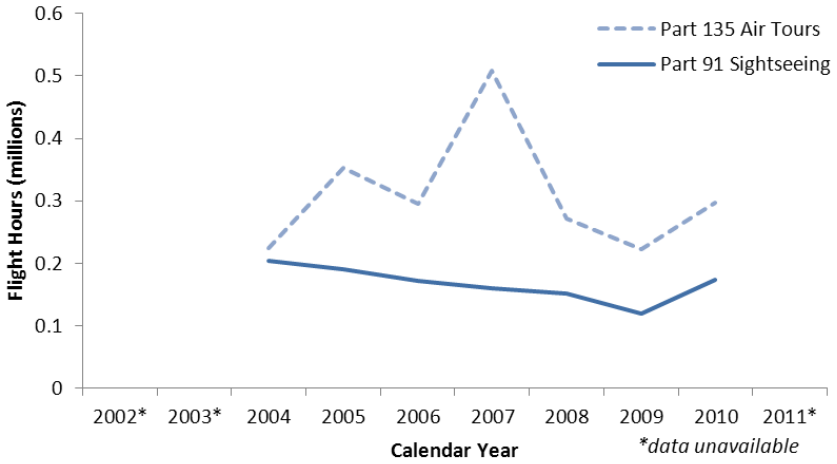

Figure 25. Sightseeing and Air Tour Flight Hours, 2002–2011.

Accident Trends

Figure 26 shows the total and fatal Part 135 air tour accidents from 2002 through 2011. During this 10-year period, 25 percent of accidents resulted in one or more fatalities.

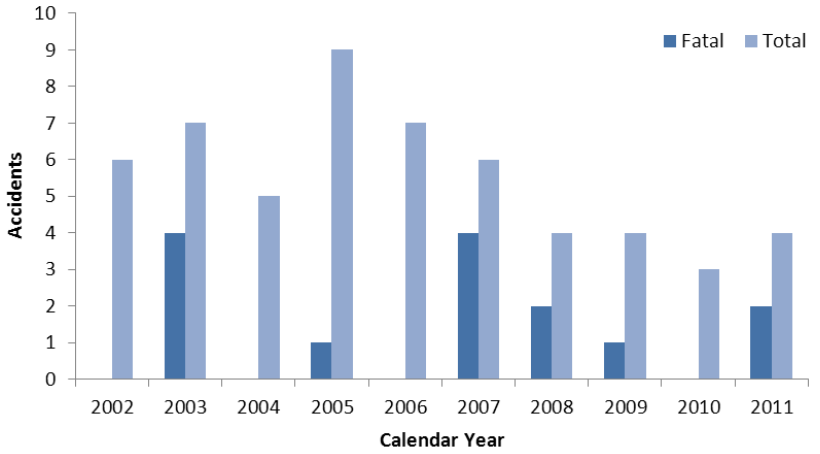

Figure 26. Part 135 Air Tour Accidents, 2002–2011.

[9] Under a rule known as the "25-statute-mile exception" in 14 CFR 119.1(e)(2), 121.1(d), and 135.1(a)(5), certain sightseeing operators, that would normally have to be certificated under Part 119, may operate flights under Part 91 if the flights originate and terminate at the same airport and do not go outside of a 25-mile radius from the originating airport.

[10] Although the regulations refer to all three groups as "commercial air tour" operators, this report uses "air tour" for Part 135 operations and "sightseeing" for Part 91 operations to be consistent with terminology in the FAA *General Aviation and Part 135 Activity Survey*.

Figure 27 shows the number of Part 135 air tour accidents by aircraft category from 2002 through 2011. During this 10-year period, helicopters accounted for 60 percent of accident aircraft and fixed-wing airplanes accounted for 40 percent.

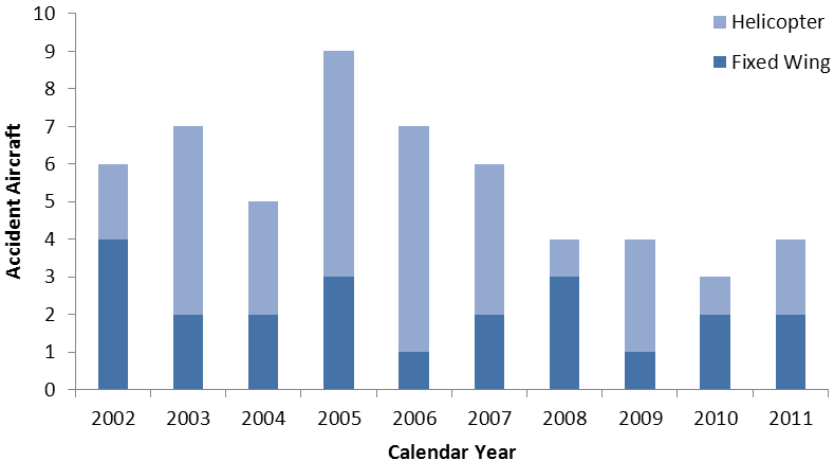

Figure 27. Part 135 Air Tour Accident Aircraft, by Aircraft Category, 2002–2011.

Figure 28 shows the total and fatal Part 91 sightseeing accidents from 2002 through 2011. During this 10-year period, 12 percent of accidents resulted in one or more fatalities.

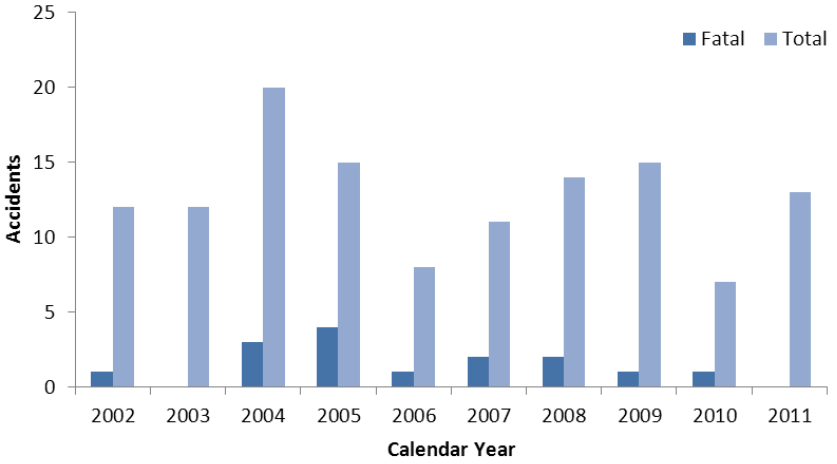

Figure 28. Part 91 Sightseeing Accidents, 2002–2011.

Figure 29 shows the number of Part 91 sightseeing accident aircraft by category from 2002 through 2011. During this 10-year period, balloons accounted for 48 percent of accident aircraft, followed by fixed-wing airplanes (27 percent), helicopters (20 percent), and gliders (4 percent).[11]

[11] Due to rounding, the percentages do not sum to 100.

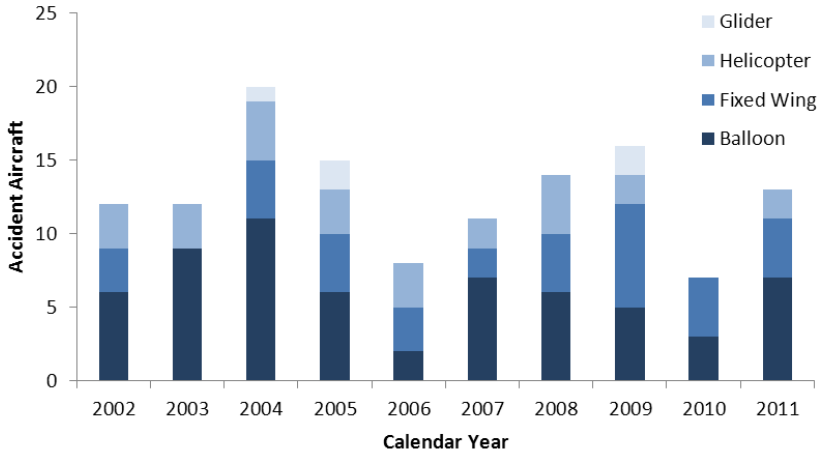

Figure 29. Part 91 Sightseeing Accident Aircraft, by Aircraft Category, 2002–2011.

Figure 30 shows yearly accident rates for Part 91 sightseeing and Part 135 air tour operations. From 2004 through 2010, Part 135 air tours had a lower accident rate than Part 91 sightseeing flights.

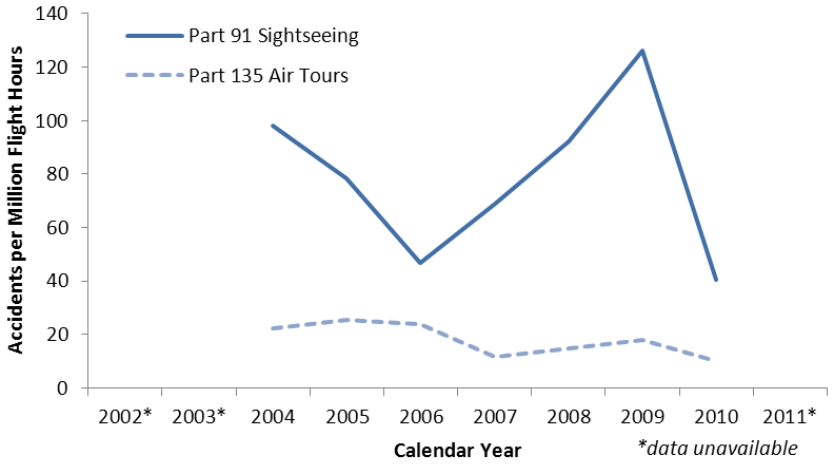

Figure 30. Sightseeing and Air Tour Accident Rates, 2002–2011.

2011 In Detail

There were four accidents involving Part 135 air tours in 2011. Two accidents, both involving helicopters, resulted in a total of 10 fatalities. Three of the accidents occurred in or near mountainous terrain and one occurred on a snow-covered glacier.

The pilots of these aircraft had an average total flight time of 2,955 hours, with an average of 570 hours in the type of accident aircraft. These accident pilots were an average of 40 years old.

There were 13 accidents involving Part 91 sightseeing operations in 2011. None of these accidents were fatal. Seven of the accidents involved balloons.

Figure 31 shows the defining event for each aircraft involved in a Part 91 sightseeing accident in 2011, and Figure 32 shows the phase of flight for each accident aircraft. The

most common defining event for these accidents was abnormal runway contact, and the most common phase of flight was landing.

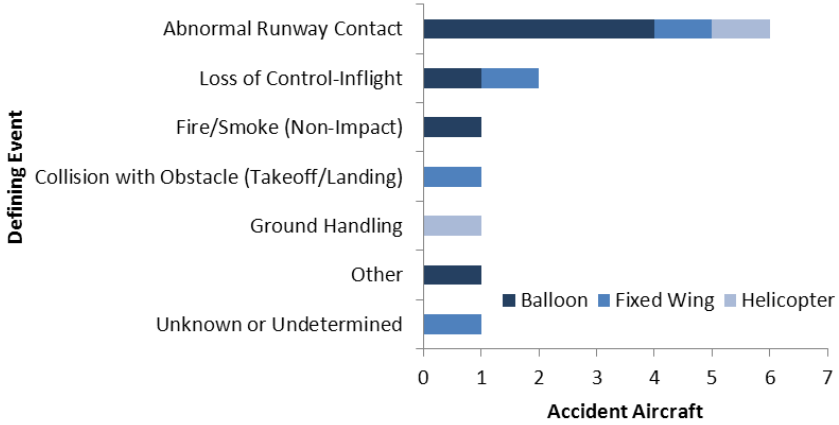

Figure 31. Defining Event for Part 91 Sightseeing Accidents, 2011.

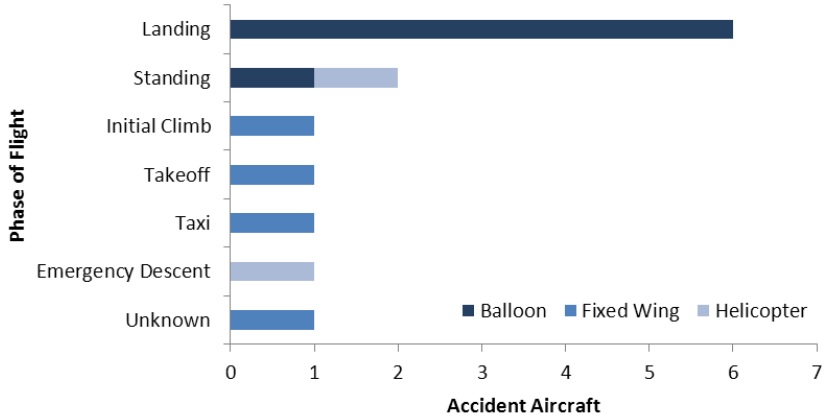

Figure 32. Phase of Flight for Part 91 Sightseeing Accidents, 2011.

The pilots of these aircraft had an average total flight time of 5,161 hours, with an average of 714 hours in the type of accident aircraft. These accident pilots were an average of 52 years old.

6. General Aviation Accidents

General aviation is the umbrella term for any operation that is not governed by Parts 121, 135, or 129. In 2011, general aviation aircraft were involved in 95 percent of all aviation accidents and 94 percent of fatal aviation accidents; accidents involving general aviation aircraft accounted for 92 percent of all US civil aviation fatalities. Figure 33 shows general aviation flight activity by year.[12] Figure 34 shows total and fatal general aviation accidents from 2002 through 2011.

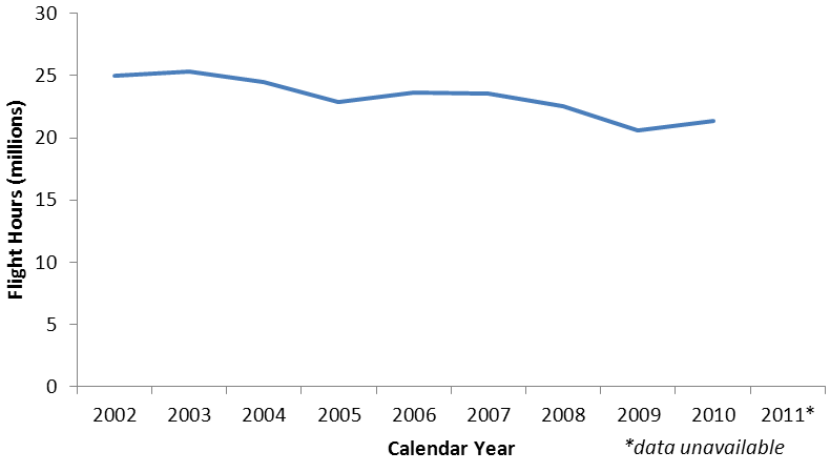

Figure 33. General Aviation Flight Hours, 2002–2011.

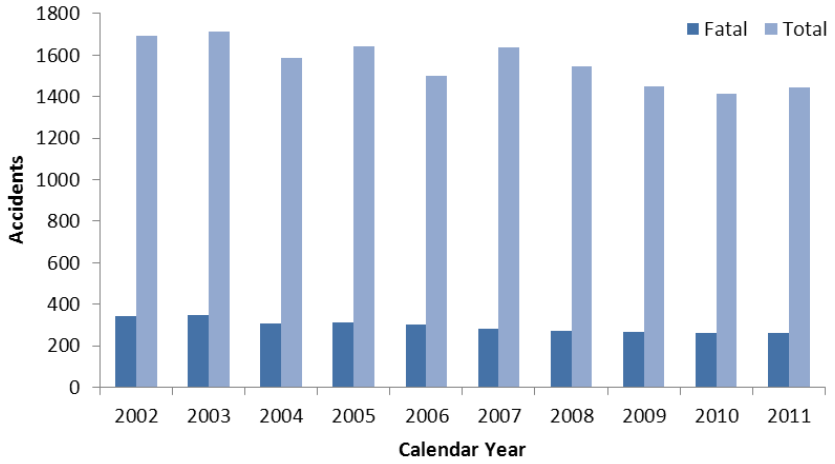

Figure 34. General Aviation Accidents, 2002–2011.

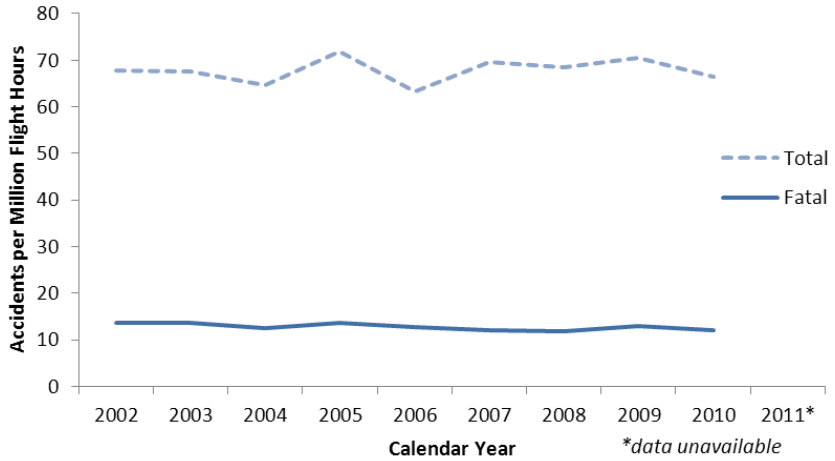

Figure 35. General Aviation Accident Rate, 2002–2011.

General aviation covers a wide range of operations and aircraft, from powered parachutes and light sport aircraft to turboprops and jets used for a variety of flying. General aviation includes some types of commercial activities. Table 5

[12] This and subsequent figures exclude Part 91 air medical and sightseeing operations, which were previously discussed in Chapters 4 and 5, respectively.

shows the purpose of flight, by aircraft type, for the 1,460 general aviation aircraft involved in accidents in 2011.

Table 5. General Aviation Accident Aircraft by Flight Purpose and Aircraft Category, 2011.

Flight Purpose	Fixed Wing	Helicopter	Glider	Balloon	Other	Unknown	Total
Personal	920	31	21	1	21	2	**996**
Instructional	148	28	4	0	3	0	**183**
Aerial Application	78	21	0	0	0	0	**99**
Positioning	22	7	0	0	0	0	**29**
Flight Test	23	2	0	0	1	0	**26**
Business	23	1	0	0	0	0	**24**
Public Use	8	9	0	0	0	0	**17**
Aerial Observation	7	8	0	0	0	0	**15**
Air Race / Show	12	1	1	0	0	0	**14**
Other Work Use	2	9	1	0	0	0	**12**
Skydiving	10	0	0	0	0	0	**10**
Banner Tow	9	0	0	0	0	0	**9**
Ferry	7	1	0	0	0	0	**8**
Executive / Corporate	4	0	0	0	0	0	**4**
External Load	0	3	0	0	0	0	**3**
Glider Tow	2	0	0	0	0	0	**2**
Air Drop	1	0	0	0	0	0	**1**
Unknown	7	1	0	0	0	0	**8**
Total	**1283**	**122**	**27**	**1**	**25**	**2**	**1460**

The majority of general aviation accidents in 2011 involved personal flying, which accounted for 68 percent of accident aircraft, followed by instructional flying, aerial application, positioning flights, and flight testing. Fixed-wing airplanes accounted for 88 percent of general aviation accident aircraft. Figure 36 shows the number of general aviation accident aircraft by state in 2011.[13]

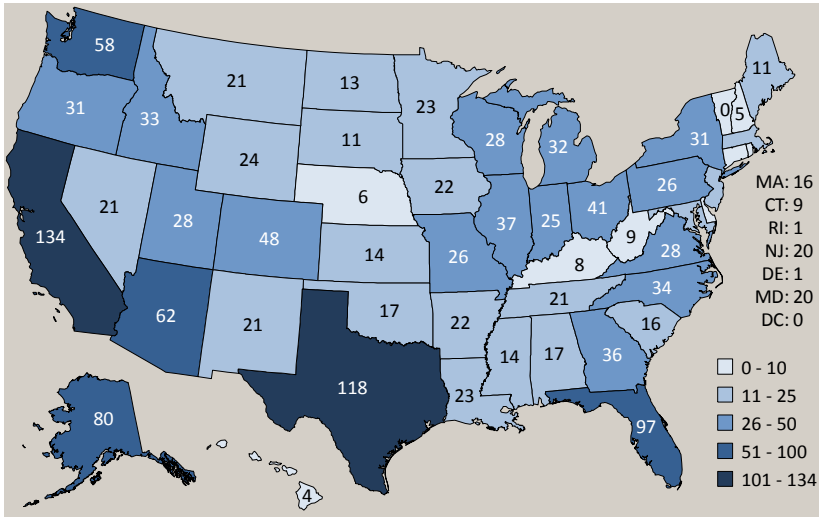

Figure 36. General Aviation Accident Aircraft by State, 2011.

The sections that follow discuss types of general aviation operations that had the highest number of accidents.

Personal Flying

From local flights to maintain pilot currency to longer-distance, cross-country flights, personal flying involves a wide variety of flight activities and aircraft. Figure 37 shows personal flying hours by year. Between 2002 and 2010, personal flying activity decreased by 27 percent, from 11 million to 8 million flight hours per year.

[13] This figure does not include 17 aircraft involved in accidents occurring outside the United States in 2011.

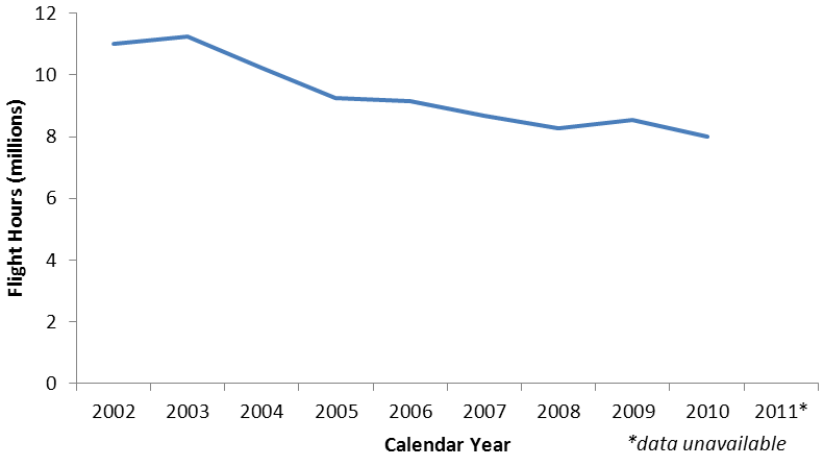

Figure 37. Personal Flying Hours, 2002–2011.

Figure 38 shows the number of total and fatal accidents from 2002 through 2011 that involved personal flying. Over this 10-year period, the number of personal flying accidents ranged from a high of 1,135 in 2003 to a low of 989 in 2011. Twenty-one percent of personal flying accidents during this time period resulted in one or more fatalities.

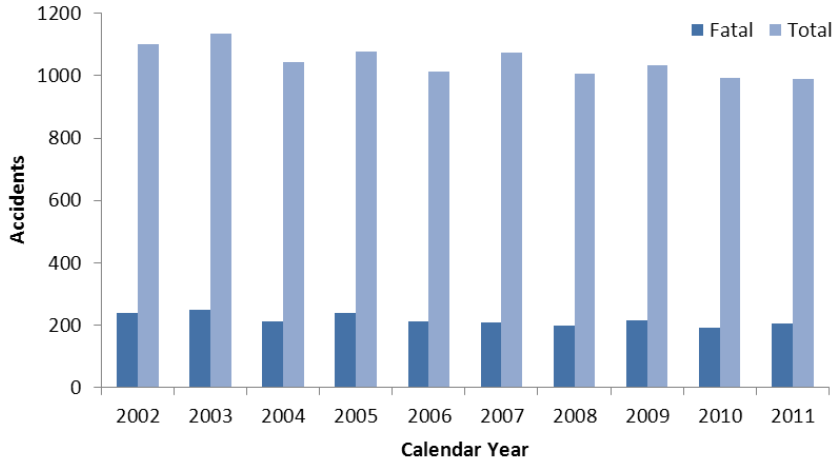

Figure 38. Personal Flying Accidents, 2002–2011.

Figure 39 shows the total and fatal personal flying accident rates by year between 2002 and 2010. During that period, the personal flying total accident rate increased by 24 percent and the fatal accident rate increased by 10 percent.

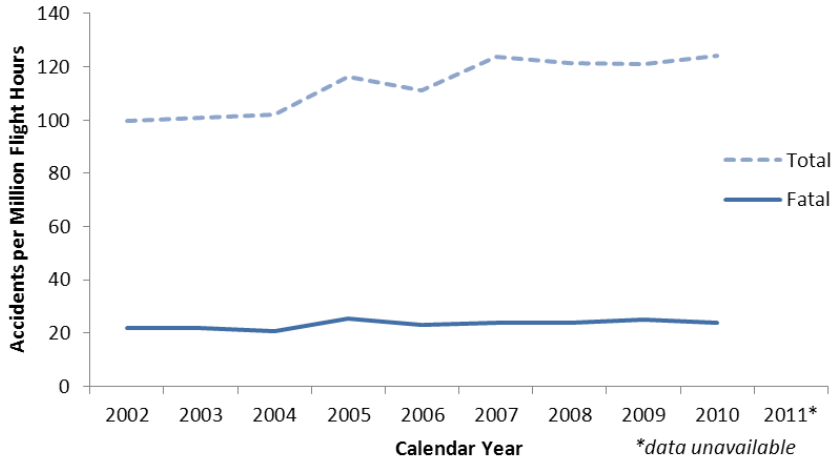

Figure 39. Personal Flying Accident Rate, 2002–2011.

Of the 989 personal flying accidents in 2011, 203 were fatal. Figure 40 shows the defining event for each aircraft involved in a personal flying accident in 2011, and Figure 41 shows the phase of flight for each accident aircraft. Loss of control-inflight, system malfunction (powerplant), loss of control-ground, and abnormal runway contact were the most common defining events; of these, loss of control-inflight had the highest proportion of fatal accidents. In contrast, although landing was the most common phase of flight for personal flying accidents, nearly all of the accidents occurring in this phase were non-fatal.

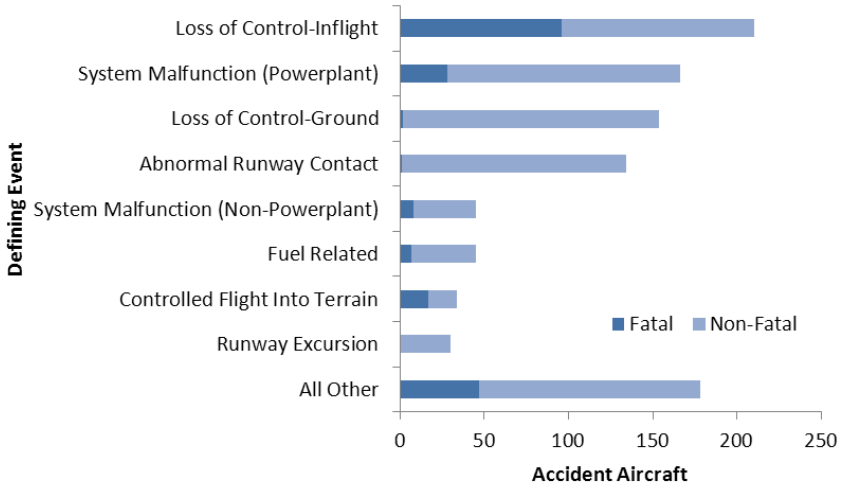

Figure 40. Defining Event for Personal Flying Accidents, 2011.

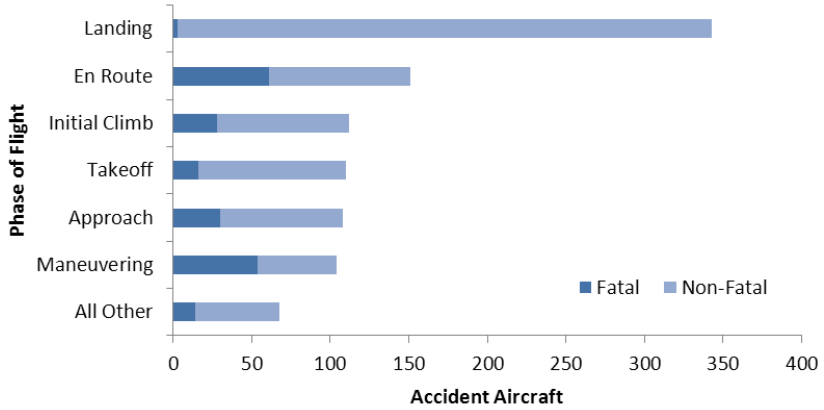

Figure 41. Phase of Flight for Personal Flying Accidents, 2011.

The pilots of these aircraft had an average total flight time of 3,117 hours, with an average of 441 hours in the type of accident aircraft. These accident pilots were an average of 56 years old.

Instructional Flying

Instructional flights include flying while under the supervision of a flight instructor or receiving air carrier training. Figure 42 shows instructional flying hours by year.

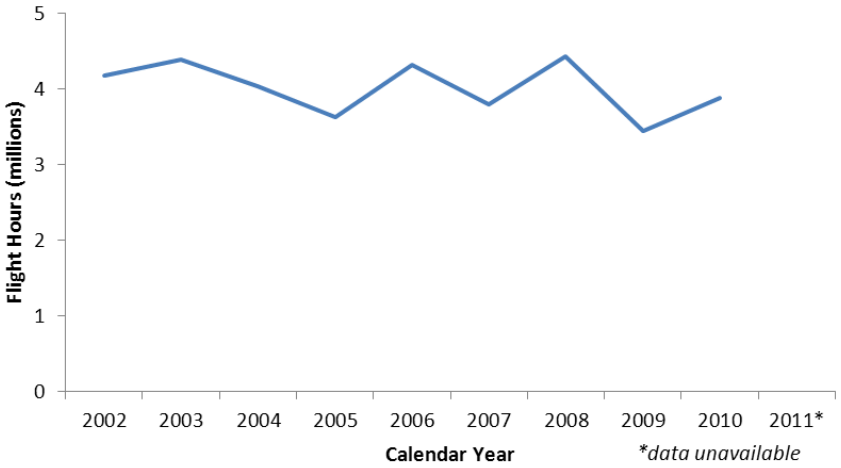

Figure 42. Instructional Flying Hours, 2002–2011.

Figure 43 shows the number of total and fatal accidents from 2002 through 2011 that involved instructional flying. During this 10-year period, 80 percent of accident aircraft were fixed-wing airplanes, 17 percent were helicopters, and the remaining 3 percent were balloons, gliders, and other types of small aircraft. Nine percent of instructional flying accidents resulted in fatalities; this is a lower proportion than general aviation as a whole, for which 19 percent of accidents were fatal during the same period.

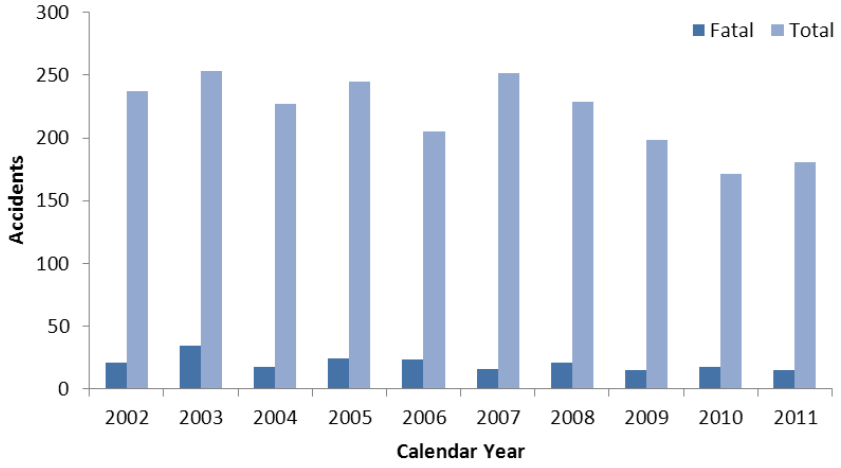

Figure 43. Instructional Flying Accidents, 2002–2011.

Figure 44 shows the total and fatal instructional flying accident rates by year from 2002 through 2010. These rates were lower than the corresponding overall general aviation accident rates.

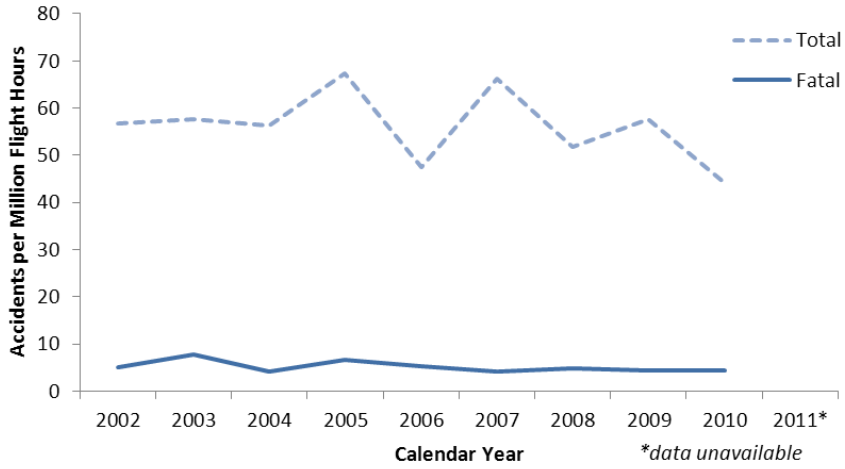

Figure 44. Instructional Flying Accident Rate, 2002–2011.

There were 181 instructional flying accidents in 2011, of which 15 resulted in one or more fatalities. Figure 45 shows the defining event for each aircraft involved in an instructional flying accident in 2011, and Figure 46 shows the phase of flight for each accident aircraft. Abnormal runway contact was the most common defining event, and landing was the most common phase of flight associated with instructional flying accidents.

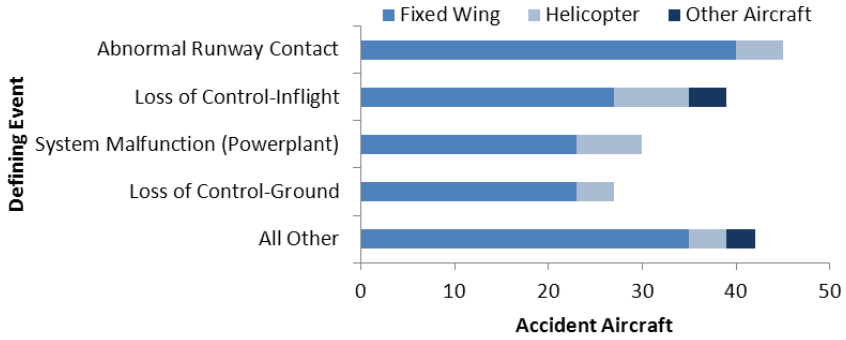

Figure 45. Defining Event for Instructional Flying Accidents, 2011.

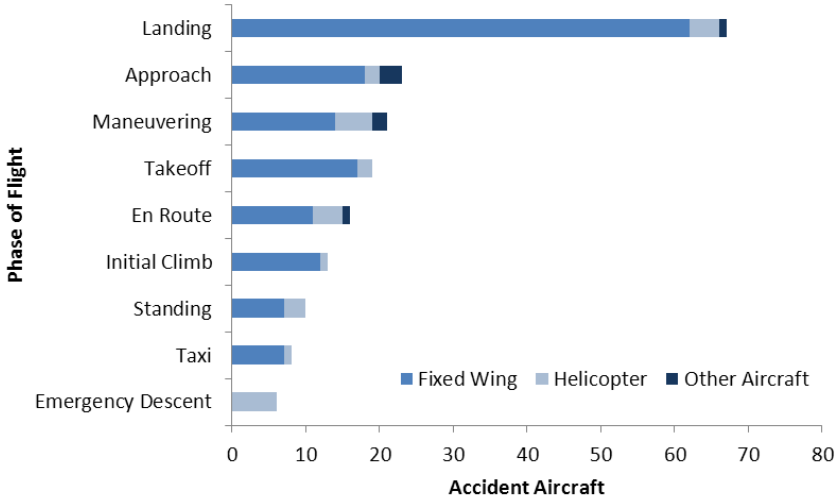

Figure 46. Phase of Flight for Instructional Flying Accidents, 2011.

The pilots of these aircraft had an average total flight time of 3,244 hours, with an average of 393 hours in the type of accident aircraft. These accident pilots were an average of 43 years old.

Aerial Application

Aerial application flights are regulated by 14 CFR Part 137 and involve "the operation of an aircraft for the purpose of (1) dispensing any economic poison, (2) dispensing any other substance intended for plant nourishment, soil treatment, propagation of plant life, or pest control, or (3) engaging in dispensing activities directly affecting agriculture, horticulture, or forest preservation."[14] Both fixed-wing

[14] 14 CFR 137.3 refers to these flights as "agricultural aircraft operations." However, this report uses the term "aerial application" to be consistent with terminology in the FAA *General Aviation and Part 135 Activity Survey*.

airplanes and helicopters are used in aerial application, but most operations are accomplished in fixed-wing airplanes, as shown in Figure 47.

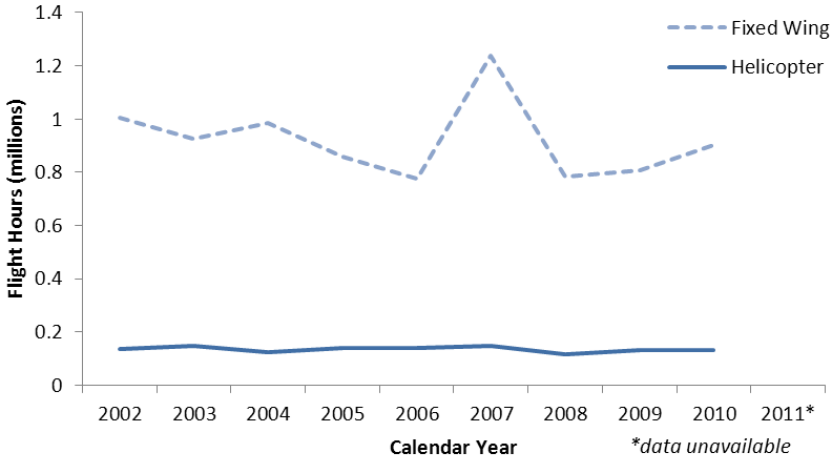

Figure 47. Aerial Application Flight Hours, 2002–2011.

Figure 48 shows the number of total and fatal aerial application accidents from 2002 through 2011 that involved fixed-wing airplanes; Figure 49 shows the same data for helicopters. During this time period, nine percent of all aerial application accidents were fatal.

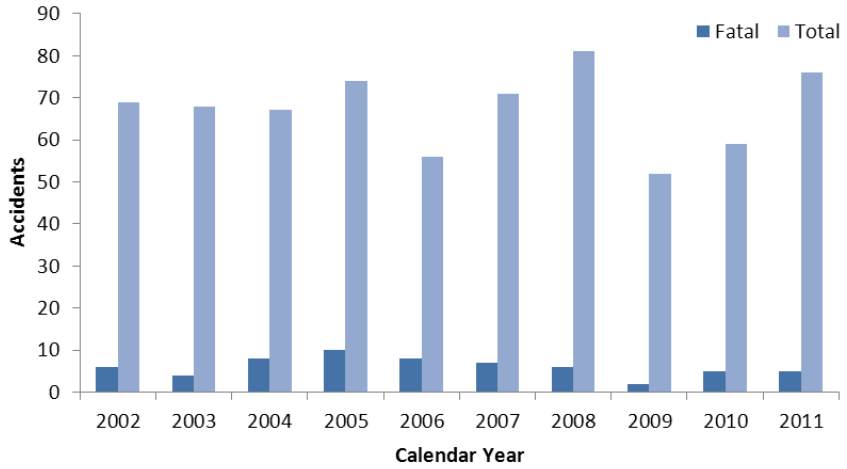

Figure 48. Aerial Application Accidents (Fixed-Wing Airplanes), 2002–2011.

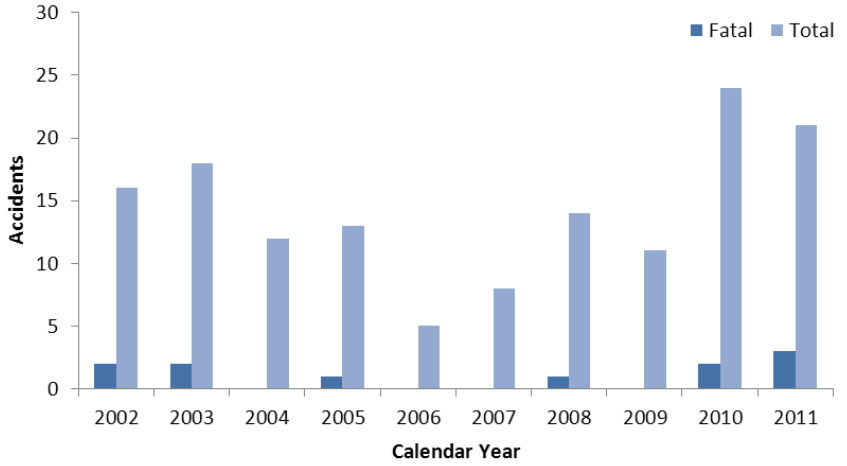

Figure 49. Aerial Application Accidents (Helicopters), 2002–2011.

Figure 50 shows the total and fatal accident rates for fixed-wing airplanes involved in aerial application accidents; Figure 51 shows the same data for helicopters.

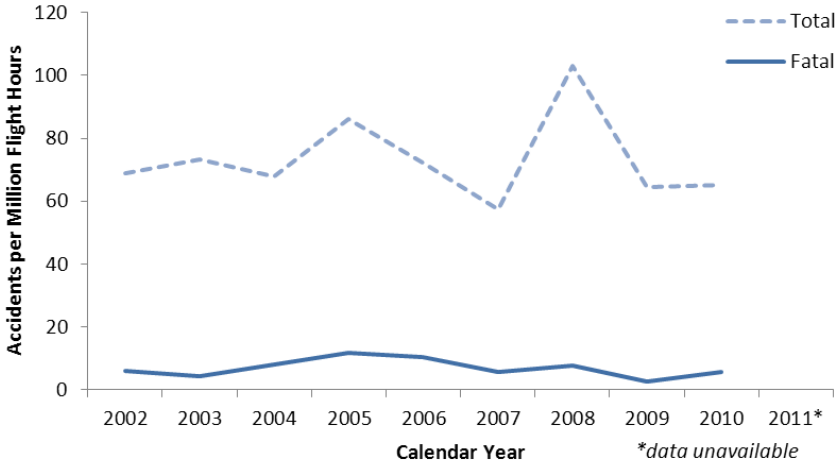

Figure 50. Aerial Application Accident Rate (Fixed-Wing Airplanes), 2002–2011.

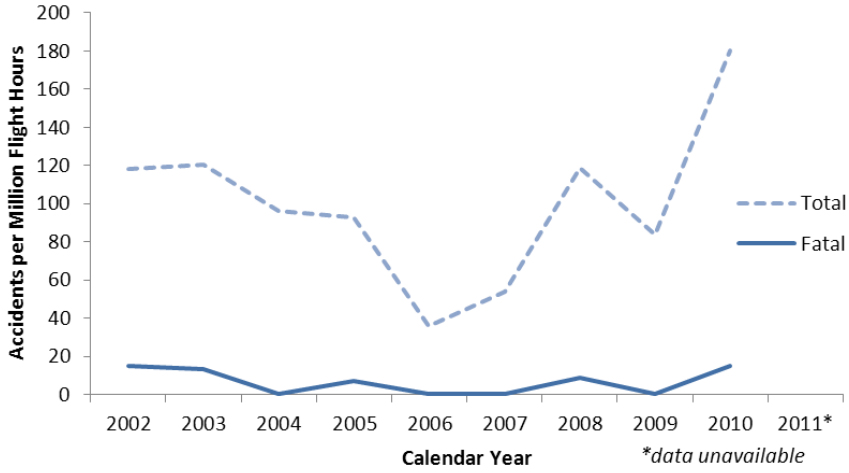

Figure 51. Aerial Application Accident Rate (Helicopters), 2002–2011.

There were 97 aerial application accidents in 2011 (76 involving fixed-wing airplanes and 21 involving helicopters). Figure 52 shows the defining event for each aircraft involved in an aerial application accident in 2011, and Figure 53 shows the phase of flight for each accident aircraft. System malfunction (powerplant) and low altitude operations were the most frequent defining events. Maneuvering was, by far, the most common phase of flight for these accidents.

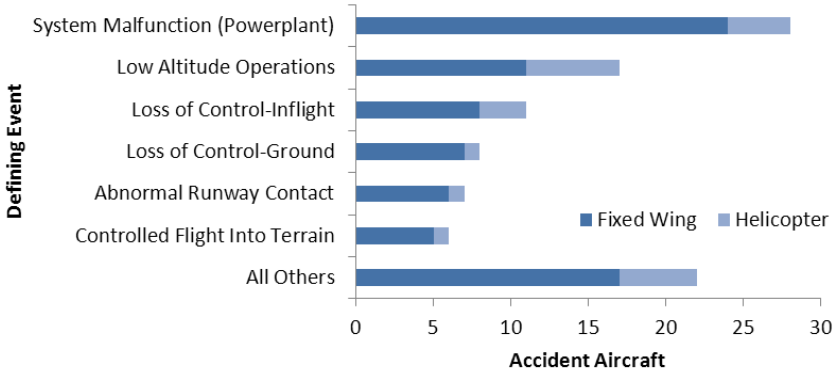

Figure 52. Defining Event for Aerial Application Accidents, 2011.

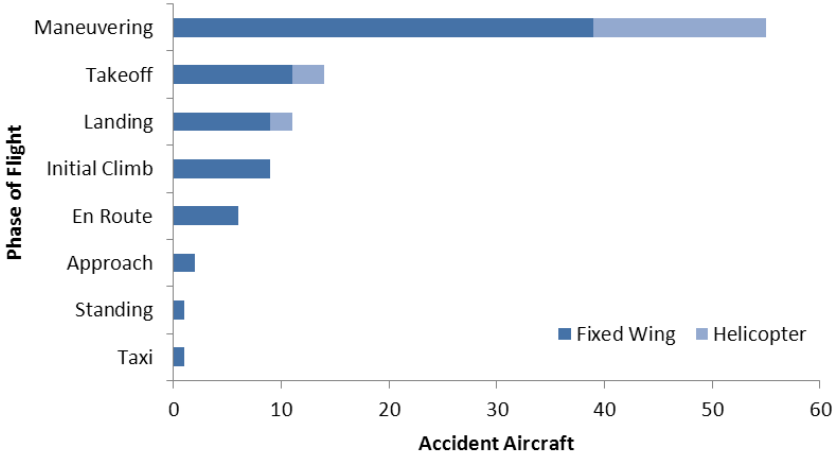

Figure 53. Phase of Flight for Aerial Application Accidents, 2011.

The pilots of these aircraft had an average total flight time of 9,102 hours, with an average of 2,576 hours in the type of accident aircraft. These accident pilots were an average of 48 years old.

Positioning Flights

Positioning flights are non-revenue flights conducted for the primary purpose of moving the aircraft to a maintenance facility or to load passengers or cargo. The FAA does not compile activity data for positioning flights, so accident rates cannot be calculated for this segment of general aviation.

Figure 54 shows the number of total and fatal positioning flight accidents from 2002 through 2011.

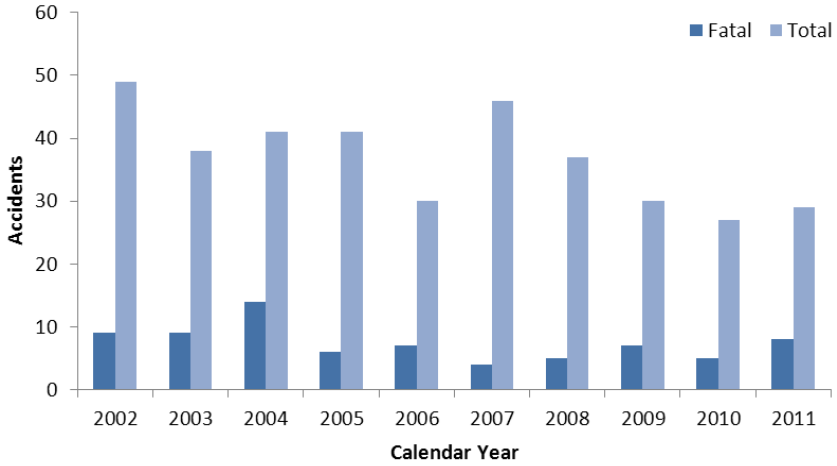

Figure 54. Positioning Flight Accidents, 2002–2011.

In 2011, there were 29 accidents involving the positioning of general aviation aircraft, of which 8 were fatal. Figure 55 shows the defining event for each of these accident aircraft. The most frequent defining events were loss of control-inflight, system malfunction (powerplant), and abnormal runway contact.

Figure 56 shows the phase of flight associated with each accident aircraft. All fatal positioning flight accidents

were associated with the en route, maneuvering, or approach phases of flight.

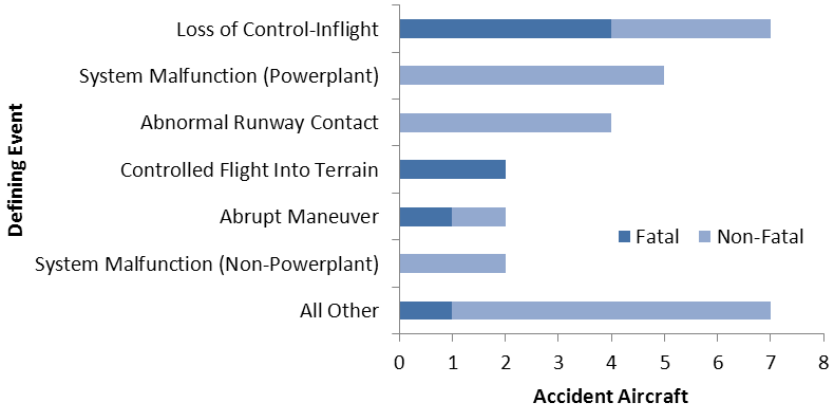

Figure 55. Defining Event for Positioning Flight Accidents, 2011.

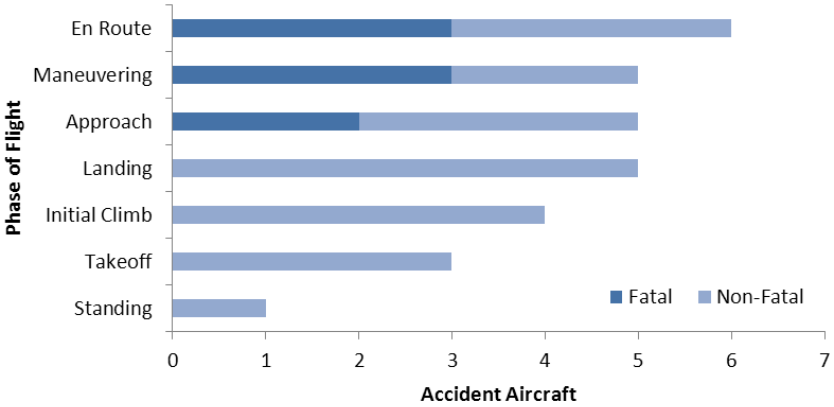

Figure 56. Phase of Flight for Positioning Flight Accidents, 2011.

The pilots of these aircraft had an average total flight time of 5,681 hours, with an average of 657 hours in the type of accident aircraft. These accident pilots were an average of 44 years old.

Flight Test

Flight testing includes investigation of the flight characteristics of an aircraft or aircraft component, or evaluating an applicant for a pilot certificate or rating. The FAA does not compile activity data for flight testing, so accident rates cannot be calculated for this segment of general aviation.

Figure 57 shows the number of total and fatal flight test accidents from 2002 through 2011.

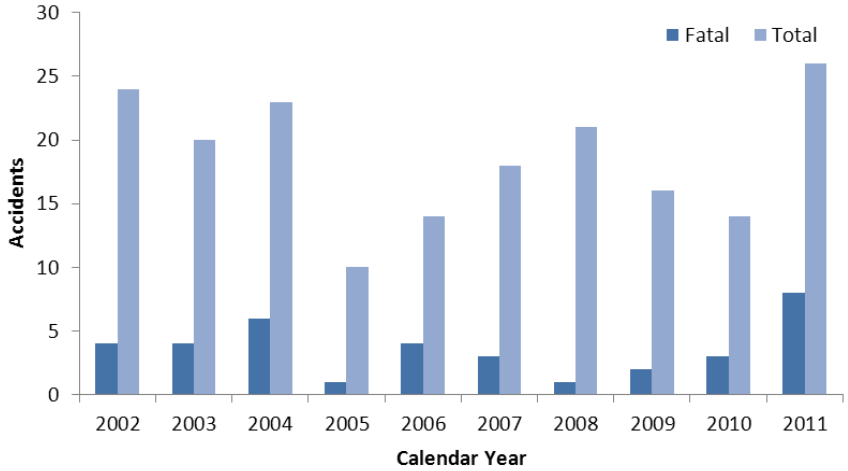

Figure 57. Flight Test Accidents, 2002–2011.

In 2011, there were 26 accidents involving flight testing, of which 8 were fatal. Figure 58 shows the defining event for each of these accident aircraft. System malfunction (powerplant) and loss of control-inflight were, by far, the most frequent defining events for flight test accidents. Loss of

control-inflight was also the defining event for all of the fatal flight test accidents occurring in 2011.

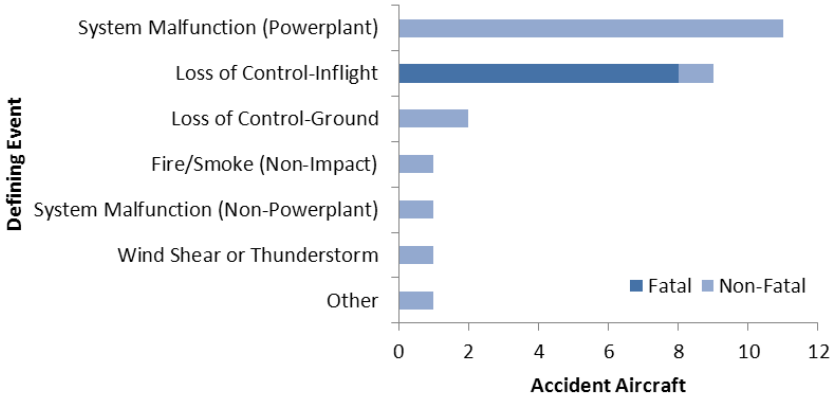

Figure 58. Defining Event for Flight Test Accidents, 2011.

Figure 59 shows the phase of flight for each accident aircraft. The initial climb phase of flight was the most frequent among flight test accidents in 2011.

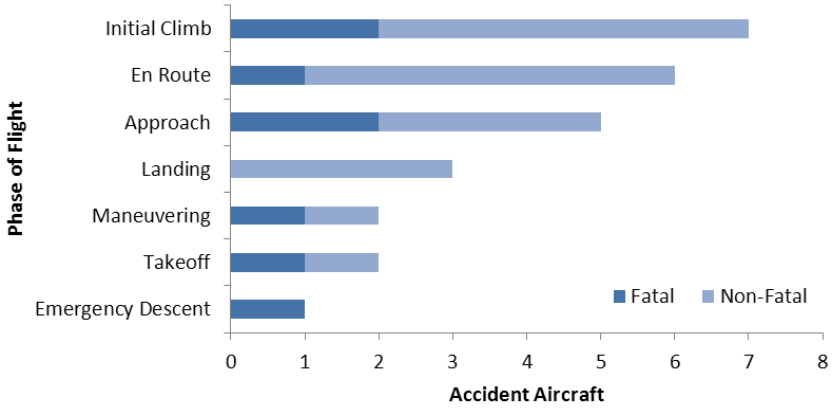

Figure 59. Phase of Flight for Flight Test Accidents, 2011.

The pilots of these aircraft had an average total flight time of 5,992 hours, with an average of 430 hours in the type of accident aircraft. These accident pilots were an average of 57 years old.

References

CICTT (Commercial Aviation Safety Team/International Civil Aviation Organization Common Taxonomy Team). 2013a. *Aviation Occurrence Categories: Definitions and Usage Notes*. v4.5 (July). http://www.intlaviationstandards.org/Documents/OccurrenceCategoryDefinitions.pdf

———. 2013b. *Phase of Flight: Definitions and Usage Notes*. v1.3 (April). http://www.intlaviationstandards.org/Documents/PhaseofFlightDefinitions.pdf

FAA (US Department of Transportation, Federal Aviation Administration). 1990. "Emergency Medical Services/Airplane." Advisory Circular 135-15.

———. 1991. "Emergency Medical Services/Helicopter." Advisory Circular 135-14a.

———. 2013. "General Aviation and Part 135 Activity Surveys." http://www.faa.gov/data_research/aviation_data_statistics/general_aviation/

Federal Register. 2007. Vol. 72, no. 29 (February 13).

NTSB (National Transportation Safety Board). 2013a. "Accident Database & Synopses." http://www.ntsb.gov/aviationquery/

———. 2013b. "Review of Accident Data." http://www.ntsb.gov/data/aviation_stats.html

Appendix A: Accident Terminology

The following NTSB terminology is defined by 49 CFR 830.2.

Term	Definition
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 which 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 a 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.
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."

Appendix B: CAST/ICAO Common Taxonomy Team (CICTT) Definitions

Some occurrence category and phase of flight titles have been truncated from their published names (CICTT 2013a, 2013b) to improve the display of figures.

Occurrence Categories

Title	Description
Aerodrome	Occurrences involving Aerodrome design, service, or functionality issues.
Abrupt Maneuver	The intentional abrupt maneuvering of the aircraft by the flight crew.
Abnormal Runway Contact	Any landing or takeoff involving abnormal runway or landing surface contact.
ATM/CNS	Occurrences involving Air Traffic Management (ATM) or Communication, Navigation, Surveillance (CNS) service issues.
Bird	Occurrences involving collisions/near collisions with bird(s).
Cabin Safety Events	Miscellaneous occurrences in the passenger cabin of transport category aircraft.
Controlled Flight Into or Toward Terrain	In-flight collision or near collision with terrain, water, or obstacle without indication of loss of control.
Collision with Obstacle(s) during Takeoff and Landing	Collision with obstacle(s) during takeoff or landing while airborne.
Evacuation	Occurrence in which either, (a) a person(s) was/were injured during an evacuation, (b) an unnecessary evacuation was performed, (c) evacuation equipment failed to perform as required, or (d) the evacuation contributed to the severity of the occurrence.
External Load Related Occurrences	Occurrences during or as a result of external load or external cargo operations.
Fire/Smoke (Non-Impact)	Fire or smoke in or on the aircraft, in flight, or on the ground, which is not the result of impact.
Fire/Smoke (Post-Impact)	Fire/Smoke resulting from impact.
Fuel Related	One or more powerplants experienced reduced or no power output due to fuel exhaustion, fuel starvation/mismanagement, fuel contamination/wrong fuel, or carburetor and/or induction icing.
Ground Collision	Collision while taxiing to or from a runway in use.
Glider Towing Related Events	Premature release, inadvertent release or non-release during towing, entangling with towing, cable, loss of control, or impact into

	towing aircraft/winch.
Icing	Accumulation of snow, ice, freezing rain, or frost on aircraft surfaces that adversely affects aircraft control or performance.
Low Altitude Operations	Collision or near collision with obstacles/objects/terrain while intentionally operating near the surface (excludes takeoff or landing phases).
Loss of Control-Ground	Loss of aircraft control while the aircraft is on the ground.
Loss of Control-Inflight	Loss of aircraft control while, or deviation from intended flight path, in flight. Loss of control inflight is an extreme manifestation of a deviation from intended flightpath. The phrase "loss of control" may cover only some of the cases during which an unintended deviation occurred.
Loss of Lifting Conditions	Landing en route due to loss of lifting conditions.
Airprox/TCAS Alert/Loss of Separation/Near Midair Collisions/Midair Collisions	Air proximity issues, Traffic Collision Avoidance System (TCAS)/Airborne Collision Avoidance System (ACAS) alerts, loss of separation as well as near collisions or collisions between aircraft in flight.
Other	Any occurrence not covered under another category.
Ground Handling	Occurrences during (or as a result of) ground handling operations.
Runway Excursion	A veer off or overrun off the runway surface.
Runway Incursion	Any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and takeoff of aircraft.
System/Component Failure or Malfunction (Non-Powerplant)	Failure or malfunction of an aircraft system or component other than the powerplant.
System/Component Failure or Malfunction (Powerplant)	Failure or malfunction of an aircraft system or component related to the powerplant.
Security Related	Criminal/Security acts which result in accidents or incidents (per Annex 13 to the Convention on International Civil Aviation).
Turbulence Encounter	In-flight turbulence encounter.
Unintended Flight in IMC	Unintended flight in Instrument Meteorological Conditions (IMC).
Unknown or Undetermined	Insufficient information exists to categorize the occurrence.

Undershoot/Overshoot	A touchdown off the runway/helipad/helideck surface.
Wildlife	Collision with, risk of collision, or evasive action taken by an aircraft to avoid wildlife on the movement area of an aerodrome or on a helipad/helideck in use.
Wind Shear or Thunderstorm	Flight into wind shear or thunderstorm.

Phases of Flight

Title	Description
Approach	Instrument Flight Rules (IFR): From the Initial Approach Fix (IAF) to the beginning of the landing flare. Visual Flight Rules (VFR): From the point of VFR pattern entry, or 1,000 feet above the runway elevation, to the beginning of the landing flare.
Emergency Descent	A controlled descent during any airborne phase in response to a perceived emergency situation.
En Route	Instrument Flight Rules (IFR): From completion of Initial Climb through cruise altitude and completion of controlled descent to the Initial Approach Fix (IAF). Visual Flight Rules (VFR): From completion of Initial Climb through cruise and controlled descent to the VFR pattern altitude or 1,000 feet above runway elevation, whichever comes first.
Initial Climb	From the end of the Takeoff subphase to the first prescribed power reduction, or until reaching 1,000 feet above runway elevation or the VFR pattern, whichever comes first.
Landing	From the beginning of the landing flare until aircraft exits the landing runway, comes to a stop on the runway, or when power is applied for takeoff in the case of a touch-and-go landing.
Maneuvering	Low altitude/aerobatic flight operations.
Pushback/Towing	Aircraft is moving in the gate, ramp, or parking area, assisted by a tow vehicle (tug).
Post-Impact	Any of that portion of the flight which occurs after impact with a person, object, obstacle, or terrain.
Standing	Prior to pushback or taxi, or after arrival, at the gate, ramp, or parking area, while the aircraft is stationary.
Takeoff	From the application of takeoff power, through rotation and to an altitude of 35 feet above runway elevation.
Taxi	The aircraft is moving on the aerodrome surface under its own power prior to takeoff or after landing.
Uncontrolled Descent	A descent during any airborne phase in which the aircraft does not sustain controlled flight.
Unknown	Phase of flight is not discernible from the information available.