Australian Government

Australian Transport Safety Bureau

ATSB TRANSPORT SAFETY REPORT
Aviation Research and Analysis Report – AR-2009-016(3)
Final

Aviation Occurrence Statistics 1999 to 2009

Australian Government

Australian Transport Safety Bureau

ATSB TRANSPORT SAFETY REPORT

Aviation Research and Analysis Report
AR-2009-016(3)
Final

Aviation Occurrence Statistics 1999 to 2009

Published by: Australian Transport Safety Bureau
Postal address: PO Box 967. Civic Square ACT 2608
Office location: 62 Northbourne Ave, Canberra City, Australian Capital Territory, 2601
Telephone: 1800 020 616, from overseas +61 2 6257 4150
Accident and incident notification: 1800 011 034 (24 hours)
Facsimile: 02 6247 3117, from overseas +61 2 6247 3117
Email: atsbinfo@atsb.gov.au
Internet: www.atsb.gov.au

ISBN and formal report title: see 'Document retrieval information' on page v

CONTENTS

DOCUMENT RETRIEVAL INFORMATION

Report No.	Publication date	No. of pages	ISBN	ISSN
AR-2010-16(3)	May 2010	79	978-1-74251-058-3	1837-2430

Publication title

Aviation Occurrence Statistics: 1999 to 2009

Prepared By

Australian Transport Safety Bureau
PO Box 967, Civic Square ACT 2608 Australia
http://www.atsb.gov.au

Reference Number

MAY10/ATSB87

Acknowledgements

Activity data (departures and hours flown) was provided by the Bureau of Infrastructure, Transport and Regional Economics.

Abstract

Each year, 'responsible persons', as defined in the Transport Safety Investigation Regulations 2003, Part 2.5, provide the Australian Transport Safety Bureau (ATSB) with reports on aviation accidents and incidents, collectively termed occurrences. These reports are used by the ATSB to assist with the independent investigation of occurrences and for identifying safety trends.

This report provides aviation occurrence data for the period 1 January 1999 to 31 December 2009. The data contained herein is dynamic and subject to change pending the provision of new information to the ATSB. The data will be adjusted biannually to reflect new information received during the reporting period.

For commercial air transport (high capacity regular public transport (RPT), low capacity RPT and charter), although the accident rate had climbed in 2007 and 2008, the number of accidents reduced from 29 (2008) to 11 in 2009. This accident trend was mostly driven by changes in the accident rate for charter operations. Similarly, the number of serious incidents for commercial air transport reduced from 45 (2007 and 2008) to 26 in 2009. There were no fatal air transport accidents in 2009. One significant accident in 2009 involved the tail scrape and runway excursion at takeoff of a foreign-registered Airbus A340-500 in Melbourne on 20 March. Charter has an accident rate that is about five times that of low capacity and high capacity RPT. Most fatal accidents in commercial air transport are in charter operations, and it has a similar rate of fatal accidents to all general aviation.

For general aviation (aerial work, flying training, and private/business and (VH-registered) sport aviation), accidents and serious incidents have remained generally consistent since 2007. In 2009, there were 126 accidents, including 18 fatal accidents, and 95 serious incidents. Compared with flying training, aerial work has an accident rate per million hours that is two times higher, and private/business has an accident rate that is 2.5 times higher. In terms of fatal accidents per million hours, the fatality rate in aerial work is three times higher than flying training, and private/business is at least six times higher.

THE AUSTRALIAN TRANSPORT SAFETY BUREAU

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory agency. The Bureau is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in: independent investigation of transport accidents and other safety occurrences; safety data recording, analysis and research; fostering safety awareness, knowledge and action.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within Commonwealth jurisdiction, as well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to fare-paying passenger operations.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, relevant international agreements.

TERMINOLOGY USED IN THIS REPORT

Occurrence: accident or incident.

Accident: an occurrence involving a aircraft where:
(a) a person dies or suffers serious injury; or
(b) the aircraft is destroyed or seriously damaged; or
(c) any property is destroyed or seriously damaged (TSI Act, 2003).

Incident: an occurrence, other than an accident, associated with the operation of an aircraft which affects or could affect the safety of operation (ICAO Annex 13).

Serious incident: an incident involving circumstances indicating that an accident nearly occurred (ICAO Annex 13).

Serious injury: an injury that requires, or would usually require, admission to hospital within 7 days after the day when the injury is suffered (TSI Regulations, 2003).

ABBREVIATIONS

ATSB	Australian Transport Safety Bureau
BITRE	Bureau of Infrastructure, Transport and Regional Economics
CASA	Civil Aviation Safety Authority
GAAP	General aviation airport procedure aerodromes
IFR	Instrument flight rules
IRM	Immediately reportable matter
MTOW	Maximum take-off weight
NM	Nautical miles
PIC	Pilot in command
RPT	Regular public transport
RRM Routine	reportable matter
SIIMS	Safety Investigation Information Management System
TSI	Transport Safety Investigation Regulations 2003
VFR	Visual flight rules

OPERATION TYPES USED IN THIS REPORT

This report provides data relating to the following operational types:

- **Commercial air transport:** Commercial air transport refers to scheduled and non-scheduled commercial operations used for the purposes of transporting passengers and/or cargo for hire or reward. Specifically, this includes:
  - ***High capacity regular public transport*** (RPT). Regular public transport operations[1] conducted in high capacity aircraft. A high capacity aircraft refers to an aircraft that is certified as having a maximum capacity exceeding 38 seats or a maximum payload exceeding 4,200 kg.
  - ***Low capacity RPT***. Regular public transport operations conducted in aircraft other than high capacity aircraft. That is, aircraft with a maximum capacity of 38 seats or less, or a maximum payload of 4,200 kg or below.
  - ***Charter***. Charter operations involve the carriage of passengers and/or cargo on non-scheduled operations by the aircraft operator, or the operator's employees, in trade or commerce, excluding RPT operations.[2]
- **General aviation:** General aviation is all flying activities outside of scheduled (RPT) and non-scheduled (charter) passenger and freight operations. General aviation in this report does not include Australian non-VH registered aircraft. General aviation does include:
  - ***Aerial work***: including ambulance and emergency medical services, agriculture, mustering, search and rescue, fire control, and survey and photography.
  - ***Flying training***.
  - ***Private, business and sports aviation***. Sports aviation includes gliding, parachute operations, and acrobatics.

[1] RPT operations are conducted in accordance with fixed schedules to and from fixed terminals over specific routes.

[2] In this report, charter operations (for both occurrences and departures/hours flown) mostly refer to charter operations in low capacity aircraft. High capacity charter operations by predominately high capacity RPT-orientated airlines are not routinely differentiated from regular public transport operations in either occurrence reports (to the ATSB) or activity reports (to BITRE).

1 INTRODUCTION

1.1 Background to the report

Each year, the Australian Transport Safety Bureau (ATSB) receives accident and incident notifications from pilots, airline operators, air traffic control, maintenance personnel, and emergency services authorities. The reporting of these aviation accidents and incidents, collectively termed occurrences, assists the ATSB in monitoring safety through its core function of independent investigation and the analysis of data to identify emerging trends.

The types of occurrences that are required to be reported to the ATSB are detailed in the Transport Safety Investigation Regulations 2003. These occurrences are categorised as either immediately reportable matters (IRMs) or routine reportable matters (RRMs) depending on the seriousness of the event and the category of operation. To see the full list of IRMs and RRMs, visit the ATSB's website at www.atsb.gov.au/about_atsb/legislation.aspx.

This publication has been significantly enhanced and expanded compared with previous editions, and will continue to be refined in coming editions. The *Aviation occurrence statistics* report will be updated and published biannually.

1.2 Data sources

1.2.1 Occurrence data

The accident and incident data collected by the ATSB is recorded in the Bureau's aviation safety database, the Safety Investigation Information Management System (SIIMS). The occurrence data provided herein was extracted from the SIIMS database for the period 1 January 1999 to 31 December 2009 for Australian civil registered aircraft operating both within and outside Australian territory[3] and foreign registered aircraft operating within Australian territory only.

1.2.2 Activity data

The Bureau of Infrastructure, Transport and Regional Economics (BITRE) Aviation Statistics section routinely collects activity data for air transport and general aviation operations. This includes hours flown data and departures data collected through:

- The annual *General Aviation Activity Survey*, which is distributed to operators or owners of aircraft listed on the Civil Aviation Safety Authority's civil aircraft register, with the exception of aircraft operated by the major domestic airlines (Qantas – mainline, Virgin Blue, Jetstar and Tiger Airways).
- Monthly performance data provided to the BITRE by airline operators.

[3] Australian territory refers to mainland Australia, and within the Tasmanian and Australian territories 12 nautical mile limit.

The above activity data, available up to and including 2008 was used to calculate accident and fatal accident rates per million departures and per million hours flown.

For more aviation activity statistics, please visit the BITRE website at www.bitre.gov.au.

1.3 Disclaimer

Occurrence data used in this report is provided to the ATSB by responsible persons as defined in the Transport Safety Investigation Regulations 2003 Part 2.5. The ATSB accepts no liability for any loss or damage suffered by any person or corporation resulting from the use of this data.

The data contained in SIIMS is dynamic and subject to change pending the provision of new information to the ATSB.

2 ACTIVITY DATA

The number of aviation occurrences alone does not represent a complete picture of safety within the industry. For meaningful comparisons to be made between different types of aircraft and operations they perform, data is presented as a rate per million hours flown or departures. Activity data used to calculate rates in this report are found in Table 1 and Table 2. These data are rounded to the nearest thousand hours or departures to reflect the magnitude of the accuracy. The Bureau of Infrastructure, Transport and Regional Economics (BITRE) compiles these data from airlines via reports submitted by the airlines, and from other aircraft operators through the *General Aviation Activity Survey*. Activity data for sports aviation are not tabled in this report.

2.1 Departures

Aircraft departures are widely used as a measure of exposure, or the opportunity for an event to occur. This report uses these data as denominator figures for calculating accident and fatal accident rates for all air transport operation types[4] and general aviation. Departures are considered to be a more appropriate exposure measure than hours flown as most accidents occur either during the approach and landing or departure phases of flight. Departures data is not available for individual operation types with general aviation.

It can be seen in Table 1 that general aviation has more than twice the number of aircraft departures in Australia than commercial air transport. However, the number of general aviation departures has decreased by about 460,000 from 1999 to 2008.

Domestic high capacity departures have increased from 1999 to 2008 in a linear fashion by about 189,000 departures from 1999 to 2009. Low capacity aircraft departures have decreased in a linear fashion from about 208,000 departures from 1999 to 2009. Charter departures have remained relatively static with a slight increase since 2003. An increase in foreign registered aircraft departures has been observed over the reporting period.

---

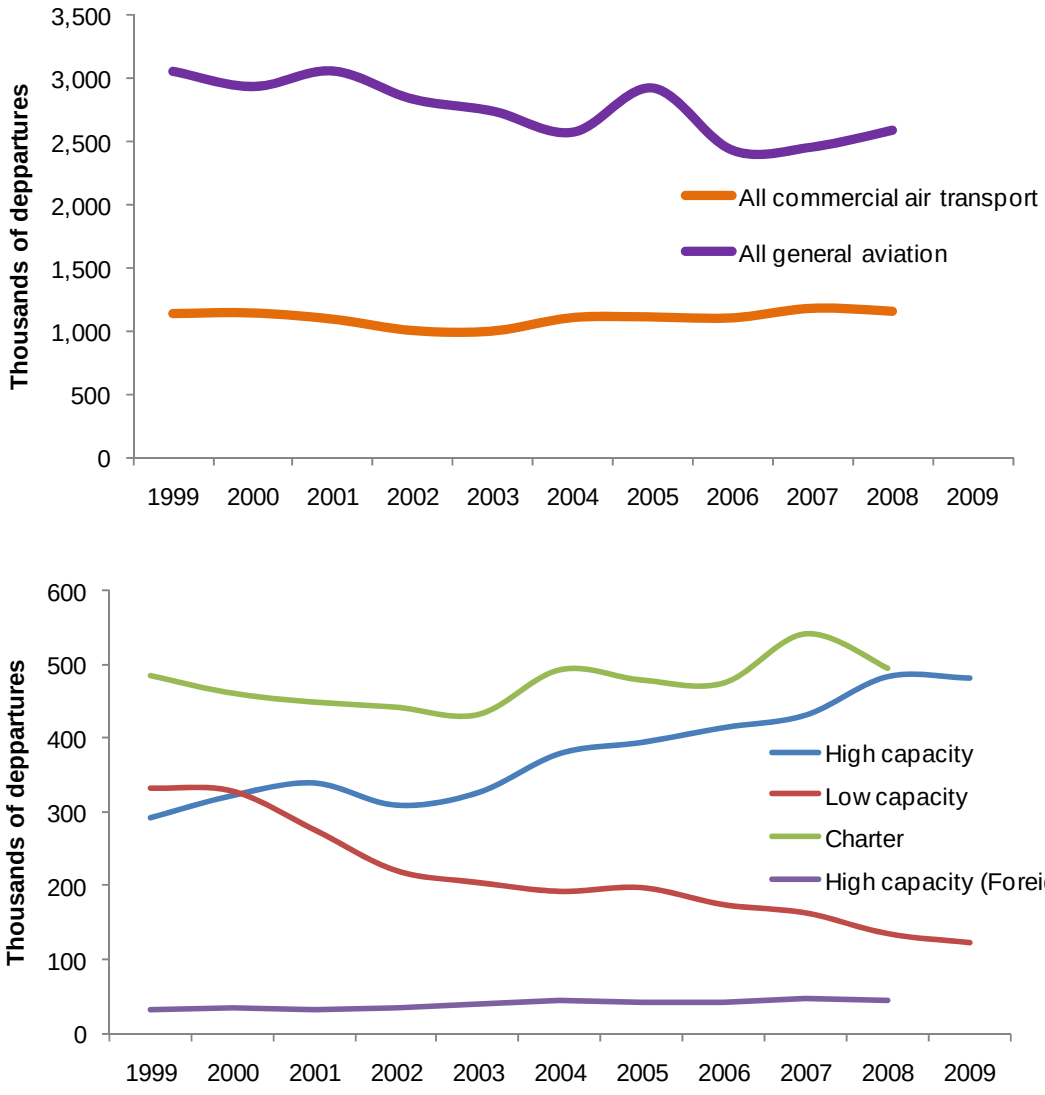
[4] Departures for charter operations are not recorded separately from all departures in the BITRE General Aviation Activity Survey; therefore, data for charter departures is an estimate based on aircraft performing 80 per cent of total flying hours in charter operations. This covers approximately 70 per cent of all general aviation (GA) aircraft performing charter. This report uses 0.9 landings per hour for fixed wing aircraft, and 0.5 landings per hour for rotary wing aircraft; these figures are then aggregated to produce a sum or total.

As high capacity charter aircraft activity is not routinely separated from RPT operations, the real number of charter departures will be slightly different than those reported here. However, it is unlikely to significantly influence rate data.

Table 1: Departures (thousands), 1999 to 2009

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009[5]
All commercial air transport	1,141	1,146	1,097	1,007	1003	1,109	1,114	1,107	1,183	1,159	
High capacity (*VH- registered)*	293	323	340	310	327	380	395	415	432	484	482
Low capacity	331	327	275	220	204	192	197	174	163	135	123
Charter	485	461	449	442	432	493	479	475	542	495	
High capacity (*Foreign)*	32	35	33	35	40	44	43	43	46	45	
All general aviation	3,050	2,931	3,053	2,833	2,740	2,574	2,920	2,434	2,459	2,590	

Figure 1: Departures by operation type, 1999 to 2009



[5] Departures data for 2009 are provisional.

2.2 Hours flown

Hours flown data, available up to the end of 2008, is used to calculate accident and fatal accident rates for different operation types. This data includes hours flown for both domestic/regional and international high capacity RPT operations for Australian airlines only, and general aviation. Note that hours flown by foreign registered aircraft are not known. Hours flown is considered to be a more appropriate measure of exposure than departures for some operation types within general aviation because of the higher risk of an accident outside of the approach/landing and takeoff phases of flight (such as due to low flying requirements).

Table 2 records VH- registered thousand hours flown by operation type, 1999 to 2008.[6] Overall, fewer hours were flown in commercial air transport and general aviation following 2001. Recovery was quicker in the air transport sector than in general aviation. Low capacity air transport hours flown have continued to decrease, while high capacity air transport hours continue to increase. This is, in part, due to a blurring of traditional regional and domestic airline capability, where larger aircraft are being flown into regional airports and mines.

General aviation experienced a U-shaped hours-flown distribution, with a drop of about 200,000 hours when 1999 is compared with 2004. Taking into account some year-to-year variability, flying training and private/business hours flown have decreased over the reporting period. Survey and agricultural flying hours have displayed significant variability, most likely due to the changes in business markets and drought conditions. Other types of aerial work have displayed a relatively stable level trend in hours flown.[7]

Although general aviation hours and landings as a group (Table 2) were greater than in air transport operations (Table 2), the hours and departures in general aviation are diffused across a much larger fleet. In 1999, there was a wider divergence between general aviation and air transport hours flown – the difference being about 340,000 movements per year. Since 2004, the difference has diminished and is currently at a difference of about 100,000 movements per year.

---

[6] Activity figures for charter and aerial work in this edition have been revised from previous editions. Test and ferry hours within general aviation are distributed across other categories of operation based on a weighting of 11 per cent for private/business, 21 per cent for flying training, 31 per cent for agriculture, 26 per cent for aerial work and 11 per cent for charter.

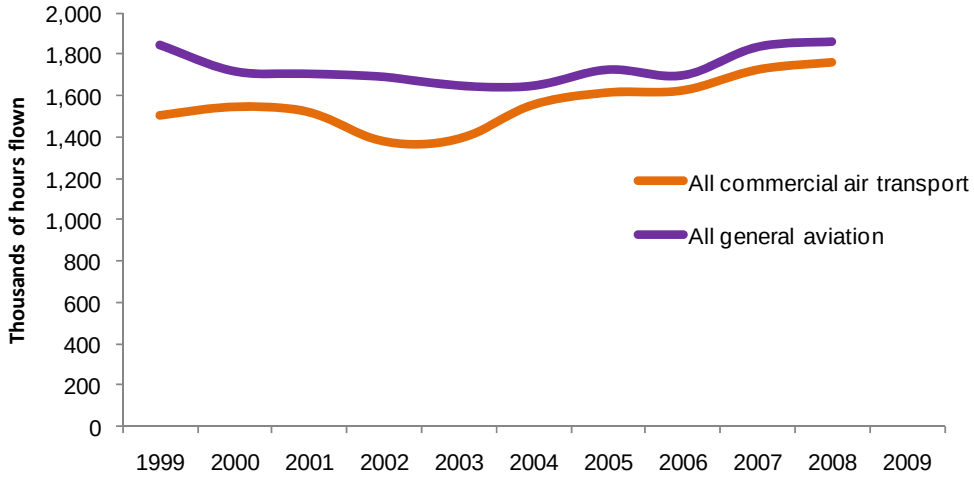
[7] Hours flown by general aviation operation types are not recorded individually for all types of aerial work.

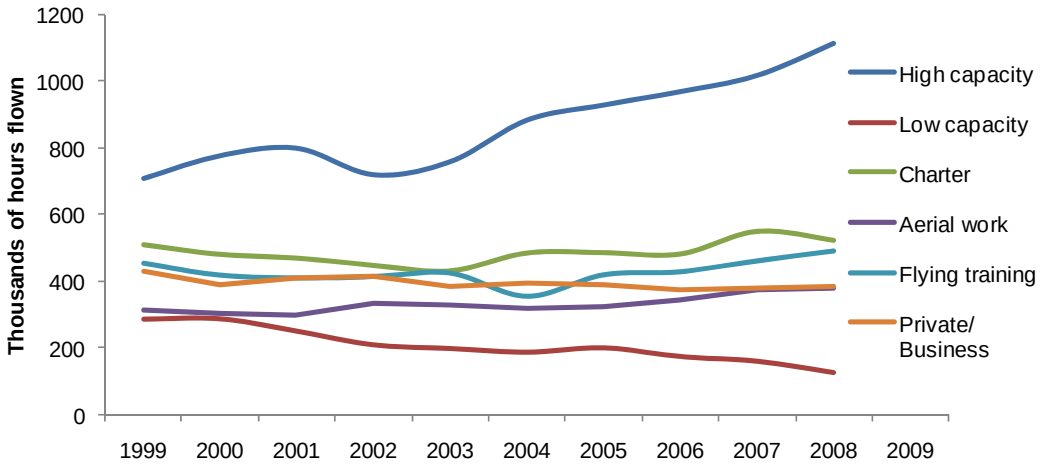
Table 2: Hours flown (thousands), 1999 to 2008

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009[8]
All commercial air transport	1,502	1,543	1,517	1,376	1,388	1,553	1,612	1,622	1,722	1,758	
High capacity	709	777	799	720	759	883	928	968	1,016	1,112	
Low capacity	285	286	249	208	197	186	199	173	159	125	
Charter	508	480	469	448	432	484	485	481	547	521	
All general aviation	1,842	1,715	1,703	1,688	1,646	1,645	1,723	1,695	1,832	1,858	
All Aerial work	314	304	300	333	328	318	325	344	375	379	
Aerial Agriculture	135	124	114	77	76	93	102	68	70	85	
Aerial Mustering	92	97	96	111	100	103	113	102	113	113	
Aerial EMS	57	48	63	67	68	69	69	79	75	82	
Aerial Search & Rescue	7	4	6	5	4	5	7	7	9	9	
Aerial Survey	51	46	46	39	53	34	33	45	54	64	
Flying training	454	419	411	415	425	357	420	429	461	490	
Private/Business	432	388	409	415	385	393	391	374	379	382	

[8] For 2009, comparative hours flown data are not available.

Figure 2: Hours flown by operation type, 1999 to 2008





3 EXPLANATORY NOTES

Occurrence data represent a picture of aviation derived from information available at the time the report was generated. Data in this report are different from previous versions of *Aviation occurrence statistics* and are not directly comparable to those versions. The ATSB has undertaken a quality review of occurrence data, upgrading a number of records to serious incident and accident, and downgrading occurrences not meeting the definitions contained in the *Transport Safety Investigation Act, 2003* and the International Civil Aviation Organisation (ICAO) Annex 13 definitions of serious incident. In addition, this report has expanded the aerial work operation type into sub-categories. For occurrence types (Chapter 7), all occurrence types associated with each occurrence have been reported rather than just the primary occurrence type.

The following section contains a brief explanation of inclusions, exclusions, the structure of the report and other relevant factors to consider when reading this report.

Inclusions

Specifically, occurrence data in Chapters 4 to 7 include:

- the number of aircraft involved in incidents, serious incidents, serious injury accidents, fatal accidents and total accidents;
- the number of serious injuries and fatalities; and
- accident and fatal accident rates per million departures and million hours flown.

Exclusions

- Fatalities do not include those resulting from:
  - parachuting operations where aircraft safety was not a factor
  - suicides
  - criminal acts.

Structure of data in this report

In order to understand the structure of data in this report, a number of procedures are used in each chapter to distinguish occurrences from aircraft and injuries. An occurrence may involve one or more aircraft. The following points are of note:

- Occurrence data in Chapters 4 and 5 are presented based on aircraft involved in occurrences. Occurrences involving more than one aircraft are recorded once for each aircraft involved.
- For fatal accidents involving more than one aircraft, each aircraft is recorded as being involved in a fatal accident within the operation type of the aircraft, even if a fatality only occurred in one aircraft.
- Injuries and fatalities are recorded against only the operation type of the aircraft which the injury or fatality occurred.
- Tables in this report record aircraft where the registration or flight number is known and/or where the operation type can be reasonably ascertained. For example, aircraft operating in G class airspace without a transponder or flight plan can be reasonably

expected to belong to general aviation, even though the operation subtype is not known.

- Where an occurrence has more than one level of injury, the highest injury level is recorded. For example, an accident involving an aircraft with four occupants may have one person with no injury, one person with minor injury, one person with serious injury, and one person with fatal injuries; this aircraft will be recorded as being involved in a fatal accident only.
- Serious injuries may be derived from either fatal accidents or serious injury accidents. Serious injury accidents represent occurrences where serious injury is the highest injury recorded.
- It is important not confuse serious injury and serious incident. A serious incident is an incident where an accident nearly occurred. In contrast, a serious injury involves an occurrence that requires, or would usually require, admission to hospital within 7 days after the day when the injury is suffered.

Further definitions of terminology used in this report can be found in the prefix.

4 OCCURRENCES BY OPERATION TYPE

This chapter provides data on occurrence numbers and rates relating to the following operational types:

- **Commercial air transport:** high capacity regular public transport (RPT), low capacity RPT, and charter (VH-registered and foreign-registered aircraft).
- **General aviation:** aerial work, flying training, private, business and sports aviation (VH-registered and foreign-registered aircraft).

4.1 Commercial air transport

A general increase has been observed in the number of VH- and foreign registered commercial air transport aircraft incidents (Table 3) over the 11 years of observation. This increase may be attributed to the introduction of the Transport Safety Investigation Regulations 2003 (TSI Regulations), which provides a prescriptive list of the types of occurrences that are required to be reported to the ATSB. This increase may also reflect a better reporting culture.

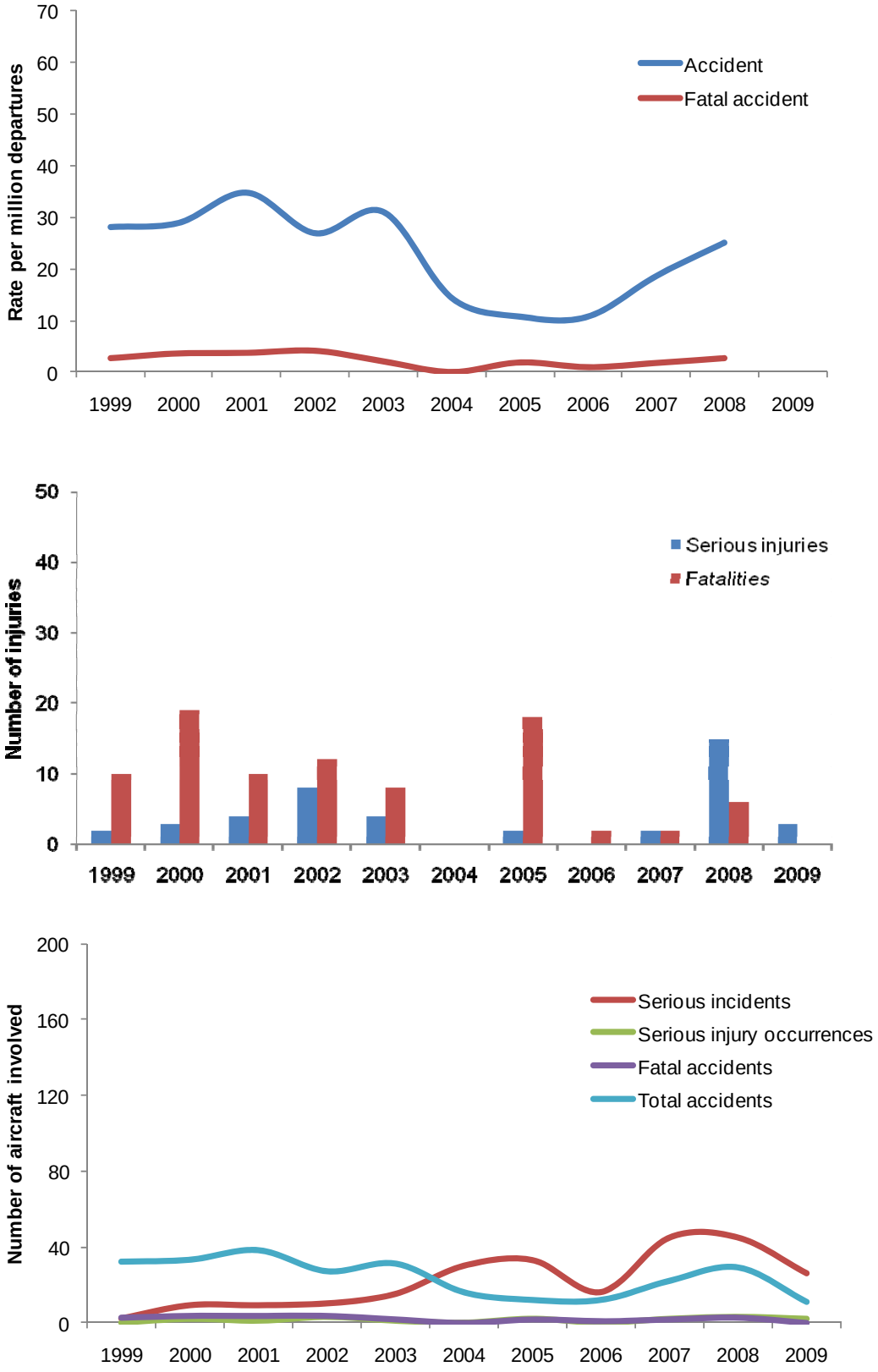
Table 3: Commercial air transport occurrences, 1999 to 2009

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Number of aircraft involved											
Incidents	3,185	3,213	3,142	3,011	2,695	3,464	4,119	3,708	3,915	4,053	3,864
Serious incidents	2	9	9	10	15	30	33	16	45	46	26
Serious injury accidents	0	2	1	3	1	0	2	0	1	3	2
Fatal accidents	3	4	4	4	2	0	2	1	2	3	0
Total accidents	32	33	38	27	31	16	12	12	22	29	11
Number of people involved											
Serious injuries	2	3	4	8	4	0	2	0	1	15	3
Fatalities	10	19	10	12	8	0	18	2	2	6	0
Rate of aircraft involved											
Accidents per million departures	28.0	28.8	34.6	26.8	30.9	14.4	10.8	10.8	18.6	25.0	
Fatal accidents per million departures	2.6	3.5	3.6	4.0	2.0	0.0	1.8	0.9	1.7	2.6	

Most occurrences were incidents - about one per cent of all air transport occurrences were serious incidents or accidents. On average, there were about two fatal accidents every year involving these aircraft, and they belonged mainly to the category of charter operations. About one-in-ten accidents involved a fatality, and there are about three fatal injuries for each accident that involved a fatality. In 2009 there were no fatalities.

The accident rate per million departures showed a U-shape line (Figure 3) from 2003 onwards. Charter aircraft account for the majority of accidents in commercial air transport and have an accident rate about five times higher than for high and low capacity RPT operations. Observation of the number of accidents in 2009, however, shows a steep decline to 11 accidents after the two consecutive years of increasing accidents. The fatal accident rate per million departures showed figures less than, or equal to four fatal accidents per million departures. No clear trend in fatal accident rates per million departures was observed, although some variability is observed between years. The fatal accident rate was at its highest in 2002 and lowest in 2004. An increase in serious incidents was observed from about 2003 onwards. This is when the *Transport Safety Investigation Act 2003* came into force. However, the number of serious incidents dropped from 45 (2007 and 2008) to 26 in 2009. Serious incidents are indicators of events that almost led to accidents. As such, they represent occurrences which could have had more serious consequences. In relation to serious injuries, there were generally less serious injuries than fatalities, although in 2008 and 2009, this trend was reversed.

Figure 3: Commercial air transport occurrences and injuries, 1999 to 2009



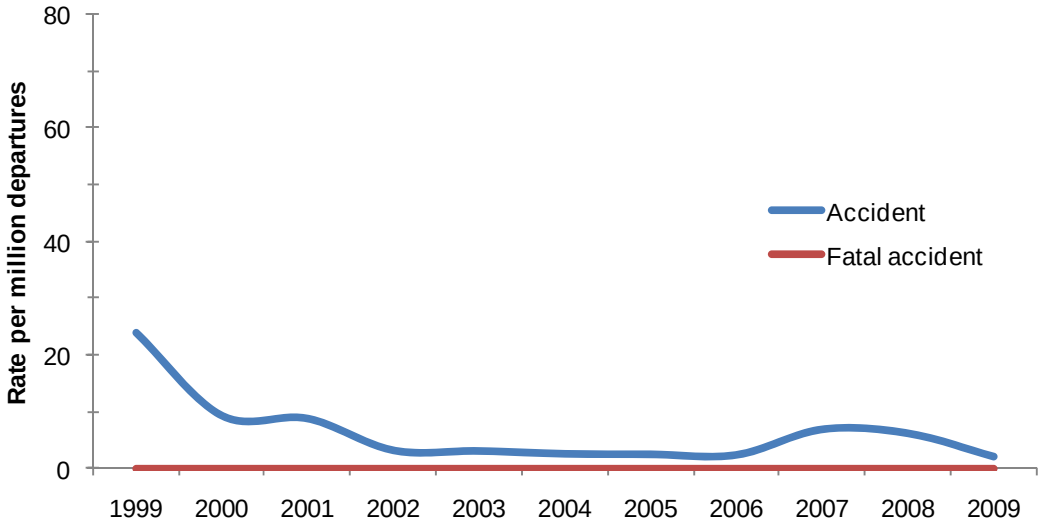
4.1.1 High capacity RPT (VH- registered)

A general increase has been observed in the total number of incidents reported to the ATSB by VH-registered high capacity aircraft (Table 4). This equates roughly to a 40 per cent relative increase in reported incidents when 1999 and 2009 are compared.

No fatalities were recorded among VH- registered high capacity RPT aircraft between 1999 and 2009 and Australia continues to hold an enviable safety record in this area of operation. The number of total accidents has remained low, with about two accidents per year on average. The accident rate per million hours mirrors the accident rate per million departures. The accident rate declined from its highest point (23.9 accidents per million departures) in 1999 to 3.2 per million departures in 2002. It has stayed in the vicinity of 2 to 3 per million departures, apart from a brief rise in 2007 and 2008. A total of 25 aircraft involved in accidents were recorded between 1999 and 2009.

The number of serious incidents increased from 2004 onwards. This, in part, was due to a review of the ATSB's classification of immediately reportable matters (IRMs), which took effect in July 2003. The number of serious incidents declined in 2009.

Figure 4: High capacity (VH- registered) aircraft involved in accidents per million departures, 1999 to 2009



There was one accident in 2009 involving a high capacity RPT aircraft. A member of the ground crew was on top of portable stairs closing a rear Boeing 737 cabin door when another ground crew removed the stairs. The person on top of the stairs initially tried to hang onto the door but fell to the tarmac and sustained serious injuries.

In addition, there were 10 serious incidents in 2009. These involved engine compressor blade damage, a breakdown of separation, an aircraft commencing to land with the landing gear retracted, a separation of the nosewheel from an aircraft, an in-flight windscreen fire, a cabin depressurisation, an in-flight warning (ATSB investigation AO-2009-065), and three occurrences involving crew incapacitation.

Table 4: High capacity RPT (VH- registered), 1999 to 2009

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Number of aircraft involved											
Incidents	1,672	1,711	1,733	1,776	1,478	1,976	2,391	2,184	2,242	2,457	2,404
Serious incidents	1	4	5	6	6	10	12	4	16	20	10
Serious injury accidents	0	1	1	1	1	0	1	0	1	1	1
Fatal accidents	0	0	0	0	0	0	0	0	0	0	0
Total accidents	7	3	3	1	1	1	1	1	3	3	1
Number of people involved											
Serious injuries	0	2	1	1	4	0	1	0	1	12	1
Fatalities	0	0	0	0	0	0	0	0	0	0	0
Rate of aircraft involved											
Accidents per million departures	23.9	9.3	8.8	3.2	3.1	2.6	2.5	2.4	6.9	6.2	2.1
Fatal accidents per million departures	0	0	0	0	0	0	0	0	0	0	0
Accidents per million hrs	9.9	3.9	3.8	1.4	1.3	1.1	1.1	1.0	3.0	2.7	
Fatal accidents per million hrs	0	0	0	0	0	0	0	0	0	0	

The number of serious injuries generally remained small, with the exception of 2003 and 2008, where the following two accidents resulted in four and 12 injuries respectively:

- On 2 July 2003, the Boeing 747-438 aircraft, registered VH-OJU, operating on a scheduled flight from Singapore, arrived at Sydney during the airport's curfew period under a tailwind of around 12 knots. The pilot flying selected auto brake setting three and idle reverse thrust in accordance with the curfew requirement. However, during the landing roll, the reverse thrust was inadvertently de-selected. On arrival at the terminal, the pilot in command (PIC) observed a BRAKE TEMP advisory message and notified the ground engineers. At that point, a fire ignited on a right wing landing gear brake unit. The flight crew were advised and the PIC ordered an evacuation of the aircraft. On receiving the evacuation announcement, the cabin crew commenced the evacuation drill deploying the aircraft's escape slides. As a result of the evacuation, one flight crew member and three passengers were seriously injured (ATSB investigation 200302980).
- On 7 October 2008, an Airbus A330-303 aircraft, registered VH-QPA, departed Singapore on a scheduled passenger transport service to Perth, Australia. While the aircraft was cruising at 37,000 ft, the autopilot disconnected. From about the same time there were various aircraft system failure indications. While the crew was evaluating the situation, the aircraft abruptly pitched nose-down and descended 650 ft during the event. After returning the aircraft to 37,000 ft, the crew commenced actions to deal with multiple failure messages. Shortly after, the aircraft commenced a second uncommanded pitch-down event and descended about 400 ft during this second event. One flight attendant and 11 passengers were seriously injured and many others experienced less serious injuries. Most of the injuries involved passengers who were seated without their seatbelts fastened

or were standing. The investigation is continuing (ATSB investigation AO-2008-070).

In addition to these occurrences several other important serious incidents and accidents have occurred:

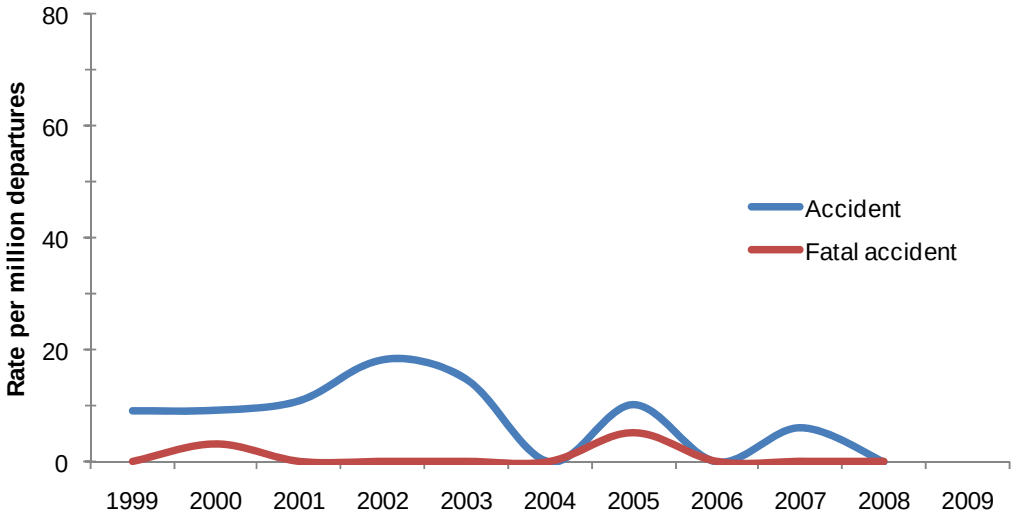
- On 21 July 2007, an Airbus Industrie A320-232 aircraft, registered VH-VQT, was attempting to land at Melbourne airport in fog, but abandoned the landing due to low visibility. During the go-around, the aircraft was not in the correct flight mode, and it did not initially climb as expected by the crew. The aircraft descended to within 38 ft of the ground and this triggered an Enhanced Ground Proximity Warning System alert. A second missed approach was conducted and the aircraft diverted to Avalon, Victoria. The investigation found that the thrust levers were not in the take-off/go-around position during the first missed approach. It also found that the aircraft operator had changed the standard operating procedure for go-around, and this reduced the possibility of the flight crew detecting the incorrect flight mode (AO-2007-044).
- On 7 February 2008, a Boeing 717-200 aircraft, registered VH-NXE, was operating on a scheduled passenger transport service to Darwin, Northern Territory. The pilot conducted a visual approach, and elected to follow the instrument landing system to the runway. The aircraft was above the glideslope for the majority of its approach and shortly before landing, it temporarily exceed the operator's stabilised approach criteria. The aircraft landed heavily on the left main landing gear with a force of 3.6 g, and this led to creasing of the fuselage and damage to airframe longitudinal structural components, landing gear, and tyres. No passengers were injured in this accident (AO-2008-007).
- On 25 July 2008, a Boeing Company 747-438 aircraft, registered VH-OJK, was operating a scheduled passenger service between Hong Kong and Melbourne, Australia, when an oxygen cylinder, installed in the forward cargo hold, discharged its pressurised contents, propelling the cylinder upwards through the cabin floor. This led to an immediate and rapid depressurisation of the cabin. The cylinder struck a door frame, door handle and overhead panelling before falling to the cabin floor and exiting the aircraft through the ruptured fuselage. The aircraft made an emergency landing, and all passengers safely disembarked from the aircraft.

The ATSB investigated two other serious injury accidents involving high capacity RPT aircraft in 2000 and 2005. On 27 October 2000, a Boeing 747-400, registered VH-ANA, encountered what was thought to be clear air turbulence, and two passengers sustained serious injuries (ATSB investigation 200005031). In a second occurrence on 20 August 2005, smoke was detected in the forward cargo hold of an Airbus A330-303, registered VH-QPE, during cruise. It diverted to Kansai, Japan for a precautionary landing and during evacuation, one passenger sustained serious injuries and eight others sustained minor injuries (ATSB investigation 200504074).

4.1.2 Low capacity RPT (VH- registered)

Overall, the number of incidents reported to the ATSB involving low capacity RPT aircraft has shown a relative decrease of about 30 per cent (Table 5). The decline in reported incidents may relate to the decline in low capacity aircraft movements. In low capacity RPT operations, the rate of accidents per million hours and million departures are virtually identical.

Figure 5: Low capacity aircraft (VH- registered) involved in accidents per million departures, 1999 to 2009



The total number of accidents has been relatively small in any given year. There were a total of 20 accidents recorded between 1999 and 2009, with the highest number recorded in 2002. There was one accident in 2009, which was the result of an amphibious aircraft with floats landing on water with the wheels extended and flipping over. In addition, there were four serious incidents in 2009. Two occurrences involved flight control systems, one being a trim system failure and nose pitch up, and the other being a nose pitch down event of unknown origin. The other two serious incidents related to airspace separation and an airprox.[9]

[9] An occurrence in which two or more aircraft come into such close proximity that a threat to the safety of the aircraft exists or may exist, in airspace where the aircraft are not subject to an air traffic separation standard or where separation is a pilot responsibility (Transport Safety Regulations, 2003).

Table 5: Low capacity RPT (VH- registered), 1999 to 2009

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Number of aircraft involved											
Incidents	704	811	750	561	579	636	691	540	605	492	469
Serious incidents	0	3	1	1	6	10	8	5	8	10	4
Serious injury accidents	0	0	0	0	0	0	0	0	0	0	0
Fatal accidents	0	1	0	0	0	0	1	0	0	0	0
Total accidents	3	3	3	4	3	0	2	0	1	0	1
Number of people involved											
Serious injuries	0	0	0	0	0	0	0	0	0	0	0
Fatalities	0	8	0	0	0	0	15	0	0	0	0
Rate of aircraft involved											
Accidents per million departures	9.1	9.2	10.9	18.2	14.7	0.0	10.2	0.0	6.1	0.0	8.1
Fatal accidents per million departures	0.0	3.1	0.0	0.0	0.0	0.0	5.1	0.0	0.0	0.0	0.0
Accidents per million hrs	10.5	10.5	12.0	19.2	15.2	0.0	10.1	0.0	6.3	0.0	
Fatal accidents per million hrs	0.0	3.5	0.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	

There have been two notable fatal accidents, one in 2000 and the other in 2005, resulting in a total of 23 fatalities. These were:

- On the evening of 31 May 2000, a Piper Chieftain, registered VH-MZK, was being operated by Whyalla Airlines as Flight WW904 on a regular public transport service from Adelaide to Whyalla, South Australia. The aircraft reached 6,000 ft and proceeded apparently normally at that altitude on the direct track to Whyalla. Shortly after commencing descent from 6,000 ft, the pilot transmitted a distress call indicating that both engines had failed and that he was going to have to ditch the aircraft. There was no further contact with the aircraft. Early the following morning, a search and rescue operation located two deceased persons and a small amount of wreckage in Spencer Gulf, near the last reported position of the aircraft. The aircraft, together with five deceased occupants, was located several days later on the sea-bed. One passenger remained missing (ATSB investigation 200002157).
- On 7 May 2005, a Fairchild Aircraft Inc. SA227-DC Metro 23 aircraft, registered VH-TFU, with two pilots and 13 passengers, was being operated by Transair on an instrument flight rules regular public transport service from Bamaga to Cairns, with an intermediate stop at Lockhart River, Queensland. On approach to Lockhart River, the aircraft impacted terrain in the Iron Range National Park on the north-western slope of South Pap, a heavily timbered ridge, approximately 11 km north-west of the Lockhart River aerodrome. The aircraft was destroyed and there were no survivors (ATSB investigation 200501977).

4.1.3 Charter (VH- registered)

Between 1999 and 2003, the number of aircraft involved in charter occurrences was stable at about 400 per year, but between 2004 and 2008, a significant rise in reported incidents was observed (Table 6). The year 2009 showed a small reversal of this trend.

Of all air transport operations, charter had the highest total number, and rate of accidents and fatal accidents per million hours and departures. The number of total accidents generally reduced from a maximum of 32 accidents in 2001 to nine in 2005, before climbing again to 2003 levels in 2008. In 2009, the total number of accidents sharply dropped again to eight.

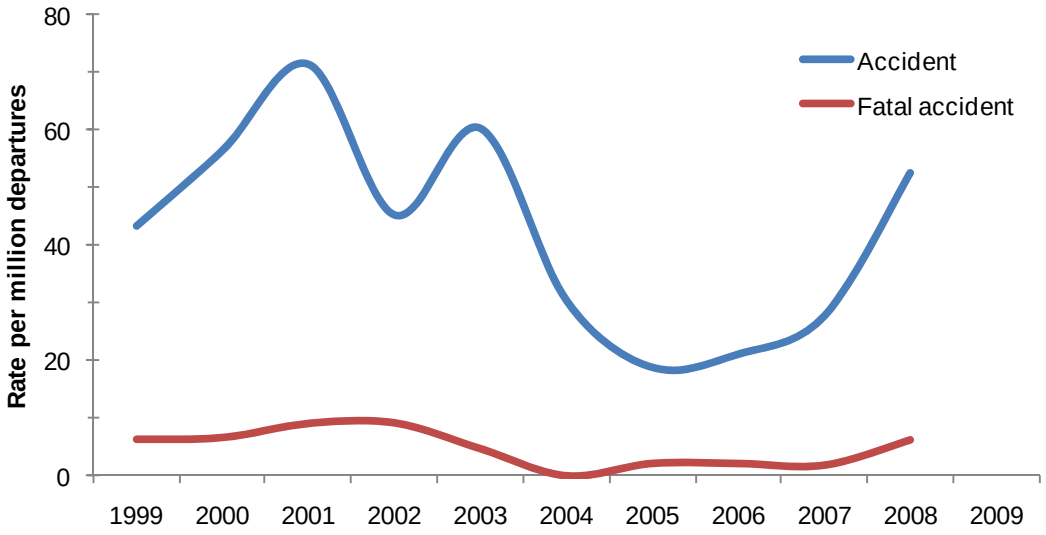
Similarly, the accident rate declined after 2001 until 2005 but, then increased from 2006 to 2008 to close to the 2003 levels. Activity levels are not yet available for charter operations in 2009. The rate of accidents and fatal accidents per million departures and hours is approximately the same.

The number of serious incidents also increased from 2003 onwards, but levelled out in 2006.

Table 6: Charter (VH- registered), 1999 to 2009

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Number of aircraft involved											
Incidents	424	435	357	411	374	445	522	577	689	712	599
Serious incidents	1	0	0	1	3	9	6	6	13	13	11
Serious injury accidents	0	1	0	2	0	0	1	0	0	2	1
Fatal accidents	3	3	4	4	2	0	1	1	2	3	0
Total accidents	21	26	32	20	26	15	9	10	18	26	8
Number of people involved											
Serious injuries	2	1	3	7	0	0	1	0	0	3	2
Fatalities	10	11	10	12	8	0	3	2	2	6	0
Rate of aircraft involved											
Accidents per million departures	43.3	56.4	71.3	45.2	60.2	30.4	18.8	21.1	33.2	52.5	
Fatal accidents per million departures	6.2	6.5	8.9	9.0	4.6	0.0	2.1	2.1	3.7	6.1	
Accidents per million hrs	41.3	54.2	68.2	44.6	60.2	31.0	18.6	20.8	32.9	49.9	
Fatal accidents per million hrs	5.9	6.3	8.5	8.9	4.6	0.0	2.1	2.1	3.7	5.8	

Figure 6: Charter aircraft (VH- registered) involved in accidents per million departures, 1999 to 2009



There were eight accidents in 2009 involving charter aircraft. Four accidents were associated with wheels-up landing – three related to landing gear malfunction and one due to pilot error. There were three engine failure accidents and one aircraft flipped over on the aerodrome apron due to a strong gust of wind.

Both the number and rate of fatal accidents remained relatively low, while the corresponding fatality numbers were more pronounced, particularly at the beginning of the reporting period. Some of the fatal accidents in charter include:

- On 16 January 1999, a Pilatus Britten-Norman BN2 initiated a go-around on final approach because of a vehicle on the airstrip. During the go-around, the left engine lost power and the pilot lost control of the aircraft at low speed. The aircraft crashed and was destroyed. One persons on board sustained fatal injuries (ATSB investigation 199900220).
- On 24 November 1999, the pilot of a Cessna Aircraft Company U206A aircraft reported encountering adverse weather and elected to divert to Burketown, Queensland. A subsequent search found numerous small items from the aircraft floating on the water near Sweers Island, Gulf of Carpentaria. The pilot and five passengers were fatally injured (ATSB investigation 199905562).
- On 4 September 2000, a Beech Super King Air 200 aircraft, registered VH-SKC, departed Perth, Western Australia on a charter flight to Leonora with one pilot and seven passengers on board. Shortly after the aircraft had climbed through its assigned altitude, the pilot's speech became significantly impaired and he appeared unable to respond to air traffic service instructions. Five hours after taking off, the aircraft impacted the ground near Burketown, Queensland, and was destroyed. There were no survivors (ATSB investigation 200003771).
- On 10 April 2001, a Shrike Commander 500S aircraft, registered VH-UJB, departed Cairns on a charter flight. Shortly after takeoff, the pilot requested an amended altitude and indicated that he was able to continue flight with visual reference to the ground or water. Air Traffic Services recorded data indicated that approximately 13 minutes after departure, the aircraft disappeared from radar. A search located the

wreckage on the north-western side of Thornton Peak. The pilot and three passengers were fatally injured (ATSB investigation 200101537).

- On 27 November 2001, a Raytheon Beech C90 King Air aircraft, registered VH-LQH, took off from runway 29 at Toowoomba aerodrome on a charter flight to Goondiwindi, Queensland. On-board were the pilot and three passengers. At about the time the aircraft became airborne, there was a loss of power on the left engine. Control of the aircraft was lost and it struck high-tension power lines before impacting the ground. All four occupants sustained fatal injuries (ATSB investigation 200105618).
- On 5 June 2002, the pilot of a Bell 206 (Jetranger) helicopter was tasked with conducting a survey operation with five persons on board. The Jetranger departed the Doijnji area for local operations and was later reported overdue at a scheduled refuelling. The wreckage of the helicopter was found the following day. Four of the occupants had not survived (ATSB investigation 200202656).
- On 26 September 2002, a Piper PA-32-300 aircraft, registered VH-MAR, departed Hamilton Island, Queensland. Shortly after the aircraft became airborne, the engine was heard 'coughing' and 'misfiring' before 'cutting out' and then 'starting again'. The aircraft was seen to commence a right turn, and the engine was again heard 'spluttering' and 'misfiring'. A number of witnesses reported that, when part way around the turn, the engine again 'cut out', and the aircraft descended and impacted the ground. The six occupants of the aircraft were fatally injured (ATSB investigation 200204328).
- On 14 March 2003, a Cessna 172G aircraft, registered VH-RPI, was undertaking consecutive charter flights to the Trefoil Island Aircraft Landing Area from Smithton, Tasmania. After takeoff, witnesses reported that the aircraft turned to the left on a southerly heading while climbing, followed by a turn to the east. They reported that following the turn to the east, the nose of the aircraft pitch abruptly upward. Following the nose-up pitching, the aircraft rolled abruptly to the left and it lost altitude and fell from line of sight. All four occupants received fatal injuries (ATSB investigation 200300929).
- On 8 November 2003, a Bell helicopter Company 206 (B206), registered VH-FHY, and a Robinson Helicopter Company R44, registered VH-YKL, were travelling in company returning to Kununurra from a fishing charter. Approximately 17 minutes into the journey, the pilot of the B206 received a broadcast from the pilot of the R44 stating that ‘I'm going in hard’. All four occupants of the R44 received fatal injuries (ATSB investigation 200304546).
- On 8 July 2005, a Piper Chieftain Navajo, PA31-350, registered VH-OAO, was approaching Mount Hotham aerodrome, Victoria, in weather conditions below the VFR and IFR minima. The pilot reported to air traffic control that the aircraft was overhead Mount Hotham, and requested a change from VFR to IFR in order to carry out an RNAV (GNSS) approach to Mount Hotham aerodrome. The pilot subsequently collided with terrain about 200 m below a ridge about 5 km south-east of the aerodrome, and all three occupants were fatality injured (ATSB investigation 200503265).

4.1.4 Foreign-registered air transport

As with VH- registered aircraft, foreign air transport did not record any fatal accidents, and the total number of accidents was low; however, the accidents involved potentially serious situations including engine failures, maintenance issues, a tail strike, collision on ground, and flap component corrosion. The years 2005 and 2006 saw a jump in reported incidents, but this has subsequently diminished to reporting levels found in 1999 (Table 7).

Table 7: Foreign registered air transport occurrences, 1999 to 2009

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Number of aircraft involved											
Incidents	383	255	298	261	250	389	504	403	366	379	381
Serious incidents	0	2	3	2	0	1	7	1	5	3	1
Serious injury accidents	0	0	0	0	0	0	0	0	0	0	0
Fatal accidents	0	0	0	0	0	0	0	0	0	0	0
Total accidents	1	1	0	2	1	0	0	1	0	0	1
Number of people involved											
Serious injuries	0	0	0	0	0	0	0	0	0	0	0
Fatalities	0	0	0	0	0	0	0	0	0	0	0

There was one accident for foreign-registered high capacity aircraft in 2009. On 20 March 2009, an Airbus A340-500 aircraft, registered A6-ERG, commenced the take-off roll on runway 16 at Melbourne Airport. The aircraft failed to rotate as expected and sustained a tail strike when extra thrust was applied by the captain to get the aircraft airborne. The tail strike damaged the aircraft, airport lighting and the instrument landing systems. The aircraft subsequently returned and landed at Melbourne with no reported injuries. The take-off weight inadvertently used for take-off performance calculations was 100 tonnes below the actual take-off weight of the aircraft. The investigation is continuing (ATSB investigation AO-2009-012). One serious incident was recorded in 2009, associated with a breakdown of separation between a Boeing 737 and an Airbus A330.

Some earlier accidents involving foreign-registered high capacity aircraft include:

- On 18 February 2000, a Lockheed Hercules L382-G, registered ZS-JIY, was on a United Nations charter flight from Dili in Timor-Leste to Darwin. The aircraft had experienced problems the day before the accident, and performed a flypast of the control tower, but ground engineers could not find any fault and it was returned to service. On the day of the accident, the crew received unsafe landing gear warnings, and because of limited fuel reserves elected to conduct a gear-up landing on Runway 29. Although the aircraft sustained substantial fuselage damage, none of the crew or passengers were injured. Subsequent investigations showed that the left rear main landing gear ball screw assembly had failed internally (ATSB investigation 199901111).

- On 1 March 2002, the Boeing 747-436, registered G-BLND, departed from Sydney, NSW on an RPT flight to Bangkok, Thailand. While cruising at FL330 the crew experienced a sudden onset of airframe vibration, followed by alerts relating to the number-3 engine. Following problem solving, the engine was shut down and the aircraft jettisoned fuel, then returned to Sydney and landed using an over water approach. Technical investigation showed that a fan blade on the number-3 engine cracked due to fatigue, originating from a manufacturing bond-line defect. Blade fragments which escaped forward of the engine nacelle damaged the wing, control surfaces, fuselage and the number-4 engine. The engine blade had accrued 9,444 cycles of the 15,000-cycle design life before failing (ATSB investigation 200200646).
- On 8 December 2002, a Boeing 767-219ER aircraft, registered ZK-NBC sustained an uncontained failure of the left engine from a fatigue crack in the first stage high pressure turbine disk. The aircraft returned to Brisbane and landed safely. Parts ejected from the engine damaged wing leading edge flaps, and they could not be used to land the aircraft. The investigation found that the damaged turbine disk had sustained microstructural damage during manufacturing or repair shot peening. The turbine disk had accumulated 42,069 hours and 12,485 cycles. It also found that there were emergency procedure-related misunderstandings between flight crew and cabin crew (ATSB investigation 200205780).
- On 22 August 2003, the Reims F406 aircraft, registered ZK-VAF, was being operated on a passenger charter flight from Darwin to Tindal, NT. At approximately 85 to 90 kts during the take-off roll, the nose landing gear collapsed. The aircraft slid to a stop, the pilot shutdown the engines and all occupants evacuated the aircraft uninjured. The actuator rod-end was noted to have an incorrect locking washer fitted. The incorrect locking washer did not conform to the locking device specified by the nose landing gear actuator manufacturer. Additionally, the nose landing gear actuator microswitch was found to be incorrectly adjusted (ATSB investigation 200303713).
- On 2 February 2006, a United States registered Boeing Company 747-422 (747) aircraft was taxiing for departure at Melbourne Airport, Victoria. At the same time, a Boeing Company 767-338ER (767) aircraft was stationary on taxiway Echo and waiting in line to depart from runway 16. The tail section of the 767 was protruding into taxiway Alpha while it was stationery on taxiway Echo awaiting a clearance to enter the runway. The left wing tip of the 747 collided with the right horizontal stabiliser of the 767 as the 747 crew attempted to manoeuvre behind the 767. The pilot in command of the 747 misjudged the distance between the wingtip of the 747 and the right horizontal stabiliser of the 767, which resulted in the collision (ATSB investigation 200600524).

4.2 General aviation

General aviation is all flying activities outside of scheduled (RPT) and non-scheduled (charter) passenger and freight operations (Table 8). It includes aerial work (ambulance and emergency medical services, agriculture, mustering, search and rescue, fire control, and survey and photography), flying training, and private/business and sports aviation. General aviation in this report does not include Australian non-VH registered aircraft.

Large air transport aircraft (35,000 kg or more) operated by airlines only make up approximately 2.5 per cent of all aircraft on the CASA VH- register. A conservative estimate places at least 90 per cent of the VH- aircraft fleet into general aviation. General aviation airport procedures (GAAP)[10] aerodromes account for the vast majority of aircraft movements across Australia (Table 1). For the size of the general aviation fleet, there are comparatively few occurrence reports sent to the ATSB, using air transport operations as a reference group. This may relate to, but not be limited to such elements as use of safety management systems, reporting culture, and airline system complexity. In addition, the number of prescribed reportable matters detailed in the Transport Safety Regulations, 2003, is smaller for general aviation when compared with air transport.

Table 8: All general aviation (VH- and foreign registered), 1999 to 2009

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Number of aircraft involved											
Incidents	2,262	2,481	2,381	2,653	2,410	2,683	3,072	3,506	3,551	3,552	3,592
Serious incidents	5	2	1	2	45	60	48	64	79	100	95
Serious injury accidents	9	20	16	10	11	14	4	8	7	16	10
Fatal accidents	20	14	18	6	12	12	16	19	16	22	18
Total accidents	155	180	151	130	116	143	118	92	122	128	126
Number of people involved											
Serious injuries	17	35	22	15	19	21	5	13	10	23	13
Fatalities	32	19	31	12	26	24	21	34	26	34	18
Rate of aircraft involved											
Accidents per million departures	50.8	61.4	49.5	45.9	42.3	55.6	40.4	37.8	49.6	49.4	
Fatal accidents per million departures	6.6	4.8	5.9	2.1	4.4	4.7	5.5	7.8	6.5	8.5	
Accidents per million hours	84.1	105.0	88.7	77.0	70.5	86.9	68.5	54.3	66.6	68.9	
Fatal accidents per million hours	10.9	8.2	10.6	3.6	7.3	7.3	9.3	11.2	8.7	11.8	

Of note, for the first time in 11 years, the number of aircraft involved in general aviation accidents, serious incidents and incidents (Table 8) has risen to about the same level as air transport (Table 3). Both general aviation and air transport operations recorded less occurrence reports in 2003, but since that time, both have continued to rise. The amount of flying performed, along with take-off and landing data, may influence these results.

[10] From 3 June 2010, all GAAP aerodromes will change to Class D airspace procedures.

About 23,000 incidents were recorded as involving 'unknown general aviation' aircraft. The ATSB was notified about these occurrences mostly by someone other than the pilot(s), and they were associated with four main occurrences types (listed in order of frequency from highest to lowest):

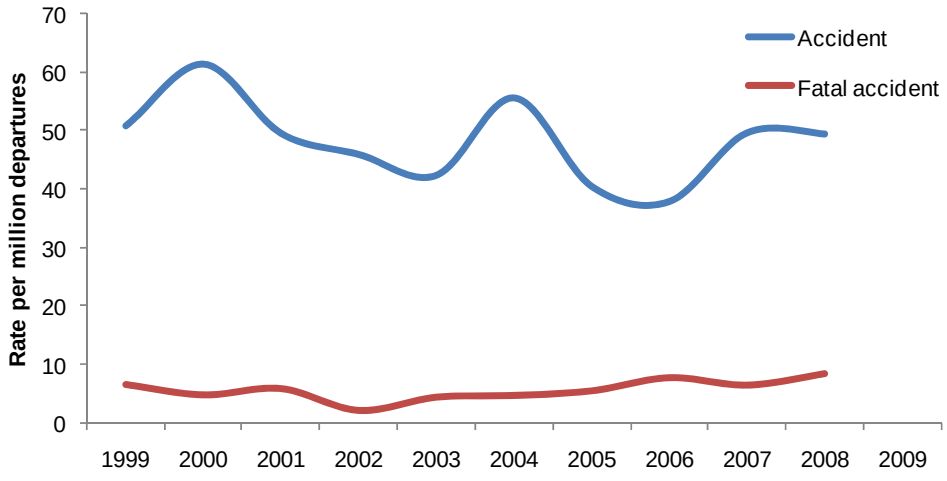
- airspace incursion, aircraft separation, operational non-compliance, and regulations and standard operating procedures
- ground operations
- bird and animal strikes
- significant operational events.

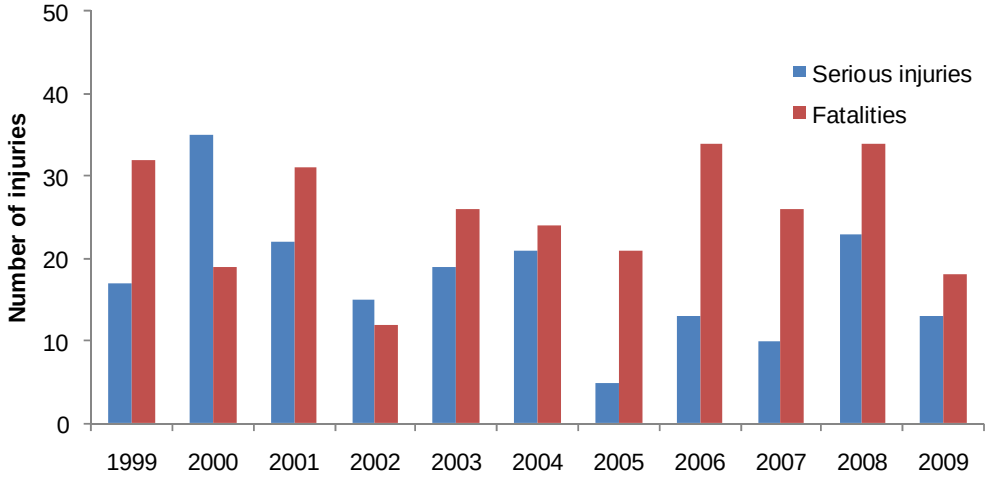
Table 8 shows that there has been a general increase in the number of aircraft involved in incidents, but a decline in total accidents, mainly from 2000 onwards, with a levelling off from 2007 at about 125 accidents a year. On average, for each fatal accident there were about two people who received fatal injuries. This is different from air transport, where fatal accidents are associated with more deaths because of the size of the aircraft. For the 1,461 aircraft involved in accidents in general aviation across 1999-2009, 173 were fatal accidents, with 277 fatal injuries.

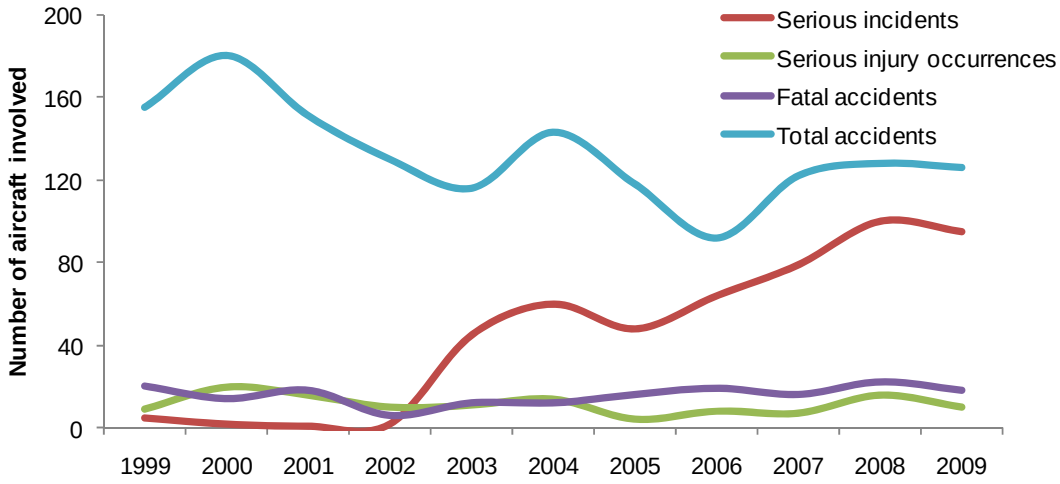
Overall, an increase in serious incidents was evident, with a jump in serious incidents following the introduction of the TSI Regulations in 2003 (Table 8). To some degree, the increasing trend of serious incidents may account for the drop in accidents for the same period.

The general aviation accident rate per million departures is lower than for hours flown. In the most recent year where departures are available (2008), the accident rate (per million departures) was twice as large in general aviation as in commercial air transport, and the fatal accident rate was three-times as large.

Figure 7: General aviation (VH- and foreign registered) rates, injuries and occurrences, 1999 to 2009







Subcategories of general aviation have different accident and fatality rates. When the data is pooled over the report period, certain features emerge. Compared with flying training, aerial work has an accident rate per million hours that is two times higher and private/business has an accident rate that is 2.5 times higher. In terms of fatal accidents per million hours, the fatality rate in aerial work is three times higher than flying training, and private/business is at least six times higher. These rates are explored in the following tables. Note that accident rates are recorded per million hours flown, as departures in each subcategory are not known.

4.2.1 Aerial work

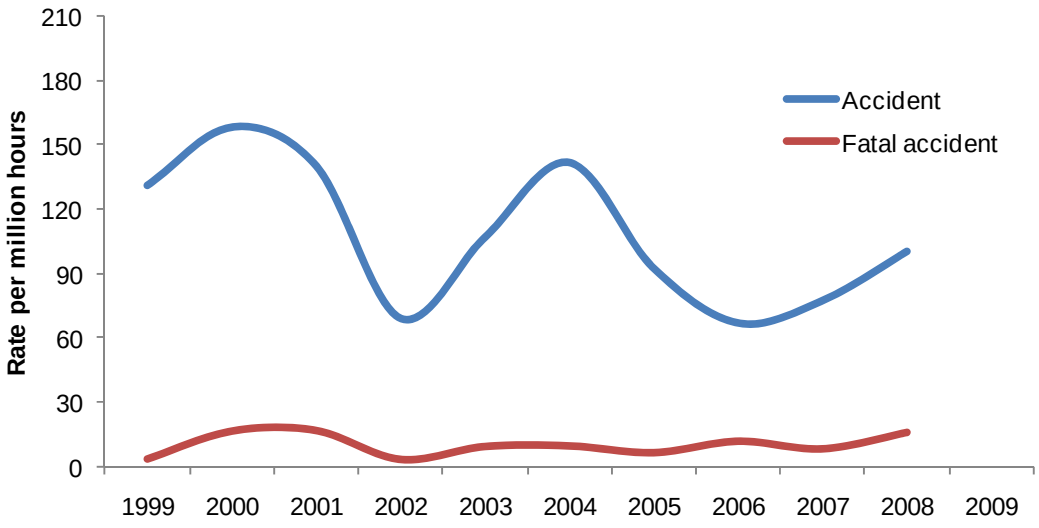
The number of incidents involving VH- registered aircraft conducting aerial work activities, including aerial agriculture, mustering, surveying and photography, emergency services, search and rescue, and fire control, increased from 189 incidents in 1999 to 288 in 2009. This represented about a 50 per cent relative increase over the report period.

Total accident numbers were largely variable, with a minimum of 23 accidents in 2002 and 2006, and a maximum of 48 accidents in 2000. This was also reflected in the total accident rate. The increase in serious incidents reflects the introduction of the TSI Regulations in 2003.

Table 9: Aerial work (VH- registered), 1999 to 2009

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Number of aircraft involved											
Incidents	188	227	192	220	203	202	271	279	254	274	288
Serious incidents	2	2	0	1	15	15	15	9	14	18	16
Serious injury accidents	5	6	3	0	4	6	2	2	2	7	2
Fatal accidents	1	5	5	1	3	3	2	4	3	6	7
Total accidents	41	48	42	23	35	45	30	23	29	38	31
Number of people involved											
Serious injuries	5	9	5	1	9	9	2	2	2	9	4
Fatalities	2	9	9	1	7	4	2	9	3	7	7
Rate of aircraft involved											
Accidents per million hours	130.6	157.9	140.0	69.1	106.7	141.5	92.3	66.9	77.3	100.3	
Fatal accidents per million hours	3.2	16.4	16.7	3.0	9.1	9.4	6.2	11.6	8.0	15.8	

Figure 8: Aircraft involved in aerial work accidents per million hours, 1999 to 2009



These extremes in accident rates may in part reflect the seasonal nature of some aerial work activities and the environmental factors affecting the growing cycles of crops, such as the long periods of drought in Australia. When analysing aerial work occurrence data, it also important to take into consideration that some of these activities operate within the low-level environment, which is inherently more hazardous than higher-altitude flying.

During the reporting period, there were a number of accidents that resulted in multiple fatalities. Some of these included:

- On 26 January 2001, a Cessna 310R aircraft, registered VH-HCP, departed Kiwirrkurra, Western Australia (WA), for Newman. The aircraft was operated by the Air Support Unit (ASU) of the WA Police Service and had been used to transport police officers from Newman to Kiwirrkurra earlier that day. Witnesses at Newman aerodrome heard the engines start to 'cough and splutter'. Soon after, the aircraft

collided with the ground. The four occupants sustained fatal injuries (ATSB investigation 200100348).

- On 11 August 2003, a Cessna 404 Titan aircraft, registered VH-ANV, impacted terrain within the Jandakot aerodrome perimeter shortly after takeoff from runway 24 right during an attempt by the pilot to return for an emergency landing. The aircraft was destroyed by the post-impact fire and one of the five passengers was fatally injured. The pilot and the other four passengers all received serious, life-threatening thermal injuries and one of those passengers died 85 days after the accident (ATSB investigation 200303579).

On 21 February 2006, a Robinson Helicopter Company R44 'Astro' helicopter, registered VH-HBS, was being operated on a series of aerial survey flights approximately 100 km to the north of Mt Isa Airport. The pilot refuelled the helicopter and departed for a survey flight with three passengers on board. When the helicopter did not arrive at a pre-arranged rendezvous point, a search was initiated. Searchers found the burnt wreckage of the helicopter the next day. The four occupants were fatally injured (ATSB investigation 200600979).

Subcategories of aerial work are explored in the following tables.

Agriculture

There were 332 aircraft involved in agricultural occurrences over the reporting period. There were 13 fatalities over the reporting period and 18 serious injuries. The numbers are relatively small, and this introduces significant variability into the accident and fatality rates. The following three accidents illustrate the nature of some of the fatal occurrences:

- On 11 December 2000, a Ayres Thrush S2R-T34, registered VH-PDJ was conducting cotton spraying operations in approaching darkness when it struck a 2.5 m channel embankment and cart wheeled into the crop. There aircraft was destroyed by impact forces and fire and the pilot was fatally injured.
- On 19 July 2004, a Bell 47G-3B-1 helicopter, registered VH-RTK was contracted to perform spraying operations on a property near Wodonga, Victoria. Preparations included an aerial survey, and discussion of known hazards including powerlines. The pilot conducted a low-level return to the replenishment point outside the pre-planned safety transit route, severing a disused powerline about 34 m above the ground. It descended into a wooded area and was destroyed, and the pilot was fatally injured. The helicopter was not, nor could it have been, fitted with a wire-strike protection system.
- On 26 February 2008, two Air Tractor 502 aircraft, registered VH-ATB and VH-CJK, collided in mid-air. VH-ATB took off from an adjacent strip about 3 km from where VH-CJK was performing reciprocal spray runs utilising turn manoeuvres. VH-ATB entered a flight path just south of the field being sprayed by VH-CJK and the aircraft collided. The aircraft came to rest about 300 m apart, with the pilot of VH-CJK being fatally injured and the pilot of VH-ATB being seriously injured.

Table 10: Agricultural occurrences, 1999 to 2009

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Number of aircraft involved											
Incidents	17	24	14	13	11	6	7	2	4	5	6
Serious incidents	0	0	0	0	8	9	9	3	5	7	5
Serious injury accidents	3	1	1	0	1	4	2	1	1	4	0
Fatal accidents	0	3	1	0	0	1	1	1	0	3	3
Total accidents	25	22	17	10	15	22	20	8	10	18	10
Number of people involved											
Serious injuries	3	1	1	0	1	4	2	1	1	4	0
Fatalities	0	3	1	0	0	1	1	1	0	3	3
Rate of aircraft involved											
Accidents per million hours	185.2	177.4	149.1	129.9	197.4	236.6	196.1	117.6	142.9	211.8	
Fatal accidents per million hours	0	24.2	8.8	0.0	0.0	10.8	9.8	14.7	0.0	35.3	

Mustering

As with agricultural work, mustering numbers are small and there was significant variability when year-on-year comparisons were made. Despite this, the total number of accidents appeared to be diminishing over the reporting period. Almost all records sent to the ATSB were accidents, and this suggests that incidents are generally not reported to the ATSB.

- On 28 September 2003, Robinson R22 helicopter, registered VH-UXF, was engaged in aerial mustering operations south of Derby, Western Australia when the clutch drive shaft separated from the main rotor gearbox due to a fatigue crack that initiated from one of the shaft bolt holes. The investigation found that unapproved sealant was used when the shaft was last assembled. Although the pilot and passenger initially survived the crash, they succumbed to their injuries before medical help arrived.
- On 24 July 2007, a Robinson R22 helicopter, registered VH-VHQ, departed from a helipad at Maryfield Station, Northern Territory to recommence cattle mustering activities. During the initial climb, at about the height of surrounding trees, the helicopter was struck by a gust of wind that resulted in a loss of height. During the recovery manoeuvre by the pilot, a person on the ground was struck in the head and fatally injured.

Table 11: Mustering occurrences, 1999 to 2009

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Number of aircraft involved											
Incidents	3	1	3	2	0	0	1	4	1	0	1
Serious incidents	0	0	0	0	0	0	1	1	0	1	0
Serious injury accidents	1	3	2	0	1	1	0	0	1	1	0
Fatal accidents	0	1	1	1	1	0	0	0	1	0	2
Total accidents	7	15	11	6	8	7	5	4	8	3	5
Number of people involved											
Serious injuries	1	5	2	1	1	1	0	0	1	1	0
Fatalities	0	1	1	1	2	0	0	0	1	0	2
Rate of aircraft involved											
Accidents per million hours	76.1	154.6	114.6	54.1	80.0	68.0	44.2	39.2	70.8	26.5	
Fatal accidents per million hours	0.0	10.3	10.4	9.0	10.0	0.0	0.0	0.0	8.8	0.0	

Emergency medical

Emergency medical operations showed an increase in the number of reported incidents over the report period. Of all aerial work categories with comparable rate data, accident rates per million hours for emergency medical operations were the lowest of any category. This is in spite of the difficulty associated with approaching and landing at unusual places. Fatal accident data has episodic or non linear features.

- On 24 July 2000, a Bell Helicopter Co 206L-3, registered VH-FFI, was operating a medical evacuation flight to Rockhampton Hospital with five people on board. Shortly after departure, the pilot became aware that the helicopter's fuel state was insufficient to enable a return direct to Rockhampton, so he decided to divert to Marlborough. Upon arrival, thick fog was present with visibility of about 5 m. The pilot activated the Nightsun searchlight and made two attempts at landing on a sports field using the emergency vehicle external flashing lights as a reference point. After this, the pilot requested that emergency vehicles be repositioned. While manoeuvring in preparation for the revised landing site approach, the helicopter lost power and impacted the ground. The investigation considered the possibility that engine power loss was due to interruption of fuel supply. All five occupants received fatal injuries (ATSB investigation 200003130).
- On 10 December 2001, a Raytheon Beech Super King Air 200C, registered VH-FMN, was being repositioned with a medical crewmember to Mount Gambier to transport a patient to Sydney. On approach to Mount Gambier aerodrome with the pilot activated lighting illuminated, the aircraft impacted the ground 3.1 NM from the runway threshold. The investigation concluded that it was likely the pilot was conducting a straight-in GPS approach, but could not ascertain why the aircraft collided with terrain. The pilot was fatally injured and the crewmember was seriously injured (ATSB investigation 200105769).
- On 17 October 2003, a Bell 407 helicopter, registered VH-HTD, was tasked with retrieving a patient from Hamilton Island, Queensland. It took off from Mackay, but did not arrive at Hamilton Island and the wreckage was found 3.2 NM from Cape Hillsborough, Queensland, in water. The investigation was unable to precisely

determine what caused the accident, but considered it was consistent with spatial disorientation of the pilot (ATSB investigation 200304282).

Table 12: Emergency medical occurrences, 1999 to 2009

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Number of aircraft involved											
Incidents	76	97	92	93	101	98	133	139	132	160	156
Serious incidents	1	1	0	1	2	1	1	0	2	5	3
Serious injury accidents	0	0	0	0	0	0	0	0	0	0	1
Fatal accidents	0	1	1	0	1	0	0	0	0	0	0
Total accidents	0	4	1	1	2	0	0	0	1	0	3
Number of people involved											
Serious injuries	0	0	1	0	0	0	0	0	0	0	2
Fatalities	0	5	1	0	3	0	0	0	0	0	0
Rate of aircraft involved											
Accidents per million hrs	0.0	83.3	15.9	14.9	29.4	0.0	0.0	0.0	13.3	0.0	
Fatal accidents per million hours	0.0	20.8	15.9	0.0	14.7	0.0	0.0	0.0	0.0	0.0	

Search and rescue

There are very few search and rescue related occurrences reported to the ATSB. There has been one accident in the last 11 years, and no fatalities. The following occurrence describes the single accident:

- On 27 April 2001, a VFR equipped Bell 407 helicopter, registered VH-WOQ, was engaged in a search and rescue operation involving occupants of a sinking yacht. The pilot agreed to drop a life raft to the yacht crew, but as the helicopter approached the drop site, it descended and collided with water at a speed of about 50 kts. The investigation found that the conditions above the water surface were conducive to visual illusions. The helicopter was not adequately equipped to perform a night over-water, search and rescue flight. Both the pilot and crewman survived the accident (ATSB investigation 200102083).

Fire control

Fire-bombing operations in Australia have been used since the early 1960s. There are few accidents associated with this type of operation, despite potential hazards associated with reduced visibility and high operating weight. Hours flown data is not available for this type of operation.

- On 16 February 2006, a PZL-Warszawa-Okecie, Dromader M-18A, registered VH-FVF, collided with terrain while performing fire control operations. The aircraft made a left turn at an estimated height of 300 ft and banked left at nearly 90 degrees, consistent with a wing drop. There was insufficient height for the

pilot to attempt recovery action. The investigation team could not conclusively determine what happened to the aircraft, but considered the possibility of an aircraft stall, in association with high operating weights and pilot distraction associated with fire-bombing operations. The pilot had limited experience on the turbine modified aircraft being flown (ATSB investigation 200600851).

Table 13: Fire control occurrences, 1999 to 2009

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Number of aircraft involved											
Incidents	4	8	8	8	4	3	2	11	4	2	8
Serious incidents	0	0	0	0	0	1	2	1	1	1	3
Serious injury accidents	0	0	0	0	1	0	0	0	0	0	1
Fatal accidents	0	0	0	0	0	0	0	1	0	0	1
Total accidents	0	0	2	1	3	1	0	3	1	0	4
Number of people involved											
Serious injuries	0	0	0	0	1	0	0	0	0	0	2
Fatalities	0	0	0	0	0	0	0	1	0	0	1

Survey and photography

Very few survey and photography occurrences are reported to the ATSB. Table 14 shows that the number of incidents has increased from 2003 onwards. There were six fatal accidents, resulting in 12 fatalities. Significant variability seen in accident and fatal accidents rates per million hours, suggests this type of occurrence is episodic or non linear.

- On 2 February 2006, a Bell 206B (III) helicopter, registered VH-MFI, struck powerlines about 37 m above ground level while on a noxious weeds survey near Parkes, New South Wales. The helicopter continued a further 88 m before striking the ground. The pilot and two passengers received fatal injuries (ATSB investigation 200600523).
- On 19 November 2008, a pilot and two linesmen were operating a McDonnell Douglas 369D helicopter, registered VH-PLJ, to test a high-voltage power line between Mannum and Mobilong, South Australia. While manoeuvring to test a conductor joint, the helicopter's main rotors struck a conductor and the helicopter impacted the ground. One linesman was fatally injured and the other sustained minor injuries, while the pilot sustained serious injuries. The investigation is continuing (ATSB investigation AO-2008-078).
- On 15 May 2008, a Cessna, 210L, registered VH-IDM, on a low-level geophysical flight, 83 km north-east of Georgetown, Queensland, lost altitude during a left turn, impacting the ground in a steep left-wing-down attitude, consistent with loss of control. The investigation found that the loss of control was most likely due to pilot loss of consciousness as a result of a heart arrhythmia associated with focal scaring or chronic heart muscle inflammation (ATSB investigation AO-2008-035).

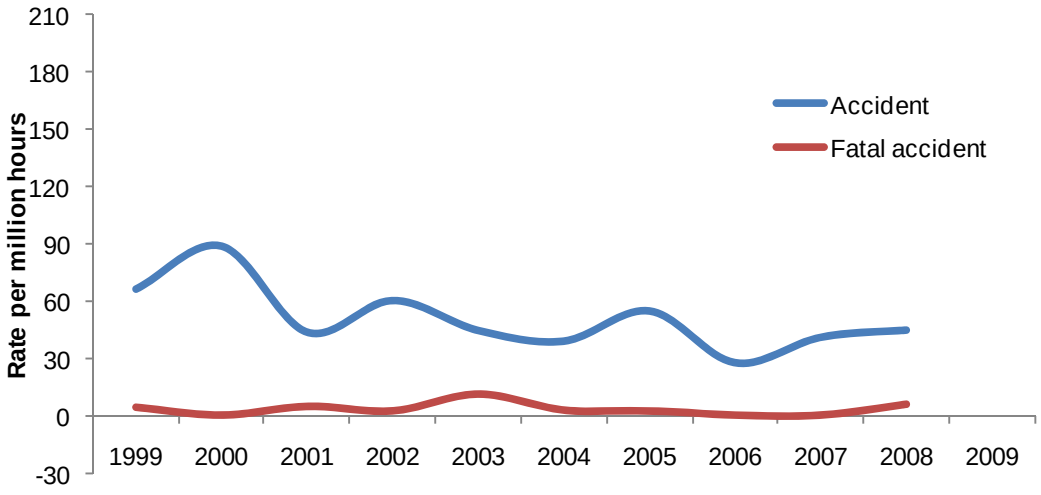
Table 14: VH- registered survey and photography occurrences, 1999 to 2009

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Number of aircraft involved											
Incidents	15	12	7	8	4	8	14	16	18	24	37
Serious incidents	0	0	0	0	0	0	0	1	1	1	2
Serious injury accidents	0	2	0	0	0	0	0	1	0	1	0
Fatal accidents	0	0	0	0	1	0	0	2	1	2	0
Total accidents	1	2	2	0	2	0	0	3	2	7	3
Number of people involved											
Serious injuries	0	3	0	0	4	0	0	1	0	3	0
Fatalities	0	0	0	0	2	0	0	7	1	2	0
Rate of aircraft involved											
Accidents per million hours	19.6	43.5	43.5	0.0	37.7	0.0	0.0	66.7	37.0	109.4	
Fatal accidents per million hours	0.0	0.0	0.0	0.0	18.9	0.0	0.0	44.4	18.5	31.3	

4.2.2 Flying training

During the period 1999 to 2009 there were 3,743 aircraft involved in flying training occurrences. The number of flying training aircraft involved in incidents declined between 1999 and 2002. After this, the numbers gradually increased until 2006, from which point in time they have declined.

Figure 9: Aircraft involved in flying training accidents per million hours, 1999 to 2009



There was a general downward trend in both the number and rate of total accidents. Fatal accidents have remained low, with the exception of 2003, where five fatal accidents were

recorded, resulting in seven fatalities. Some of these flying training fatal accidents include:

- On Monday 29 July 2002, two Cessna Aircraft Company 172R aircraft, registered VH-CNW and VH-EUH, collided while on short final approach to runway 17 left at Moorabbin airport, Victoria. The two aeroplanes were entangled when they impacted the runway. The student pilot and instructor of EUH were able to exit their aircraft before fire engulfed both aeroplanes. The solo pilot of CNW sustained fatal injuries (ATSB investigation 200203449).
- On 20 June 2003, a Robinson Helicopter Company Model R22 helicopter, registered VH-OHA, was being used to conduct flying training in the Bankstown training area, with an experienced flight instructor and student pilot on board. The helicopter was observed and heard flying in a normal manner. Witnesses reported subsequently hearing a number of loud bangs and one witness observed what appeared to be a main rotor blade separating from the helicopter. The helicopter descended to the ground in an inverted attitude and both occupants were fatally injured (ATSB investigation 200302820).
- On 11 November 2003, a qualified pilot, with a flight instructor, was undertaking multi-engine aircraft training in a Piper Aircraft Corp PA-34-200 Seneca aircraft, registered VH-CTT. The aircraft departed Bankstown Airport and turned right to operate in the southern training circuit. They completed three circuits and were on final approach for a fourth touch and go. Witnesses reported that when the aircraft was almost over the threshold, it started to diverge right, while maintaining a low height. They reported that when the aircraft was abeam the mid length of the runway, its nose lifted and the aircraft banked steeply to the right before impacting the ground in a near vertical nose-down attitude. The pilot was fatally injured. The instructor received severe burns and was treated in hospital for three and a half weeks before succumbing to those injuries (ATSB investigation 200304589).
- On 27 January 2004, a TedSmith Aerostar 601 aircraft, registered VH-WRF, departed Coolangatta on a dual training flight in the Byron Bay area, with a flight instructor and a commercial pilot on board. At approximately 1445, the operator advised Australian Search and Rescue that the aircraft had not returned to Coolangatta, and that it was overdue. A small amount of debris from the aircraft was recovered from the surface of the ocean (ATSB occurrence 200400242).
- On 18 December 2008, a Cessna 152 aircraft and a Liberty XL2 aircraft collided in midair over Casula, NSW, in the proximity of the 2RN reporting point, south-west of Bankstown Airport. The Liberty remained flyable and landed at Bankstown approximately 6 minutes later, while the Cessna descended to the ground and was destroyed. Both occupants of the Cessna were fatally injured. The investigation is continuing (ATSB investigation AO-2008-081).

Table 15: Flying training, 1999 to 2009

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Number of aircraft involved											
Incidents	385	317	285	281	277	295	365	353	338	248	248
Serious incidents	0	0	0	0	13	10	12	22	18	18	22
Serious injury accidents	1	3	2	1	1	1	0	1	0	0	1
Fatal accidents	2	0	2	1	5	1	1	0	0	3	1
Total accidents	30	37	18	25	19	14	23	12	19	22	21
Number of people involved											
Serious injuries	2	4	2	1	2	2	0	1	0	0	1
Fatalities	2	0	2	1	7	2	1	0	0	4	1
Rate of aircraft involved											
Accidents per million hours	66.1	88.3	43.8	60.2	44.7	39.2	54.8	28.0	41.2	44.9	
Fatal accidents per million hours	4.4	0.0	4.9	2.4	11.8	2.8	2.4	0.0	0.0	6.1	

4.2.3 Private/business and sports aviation

Private/business and sports aviation generally involves aircraft that are operated for pleasure, or to meet a business or professional need. It is difficult from data held by the ATSB to distinguish between business and private operations; therefore, these data are aggregated in this report.

A general decrease in reported private/business and sports aviation incidents was observed between 1999 and 2004, which has subsequently risen at a slow rate, but not returned to levels found in 1999. The number of aircraft involved in serious incidents has risen as a result of the introduction of the TSI Regulations in 2003. Although there is some variability in total accident figures, a general decrease is observed. Fatal accidents show no clear trend and show features of randomness. As hours flown for sports aviation is not comprehensively known, rate data is not available for the combined private/business and sports aviation operation type.

Private/Business

There were 3,480 aircraft involving private/business occurrences over the period 1999 to 2009. A general decline in all reported occurrences was observed between 1999 and 2003, but since that time, reported occurrences have risen, but not returned to pre-1998 levels. Serious incidents have increased since the introduction of the TSI Regulations in 2003. There have been a total of 167 fatalities from 92 aircraft involved in fatal accidents, equating to about two fatalities per fatal accident. Eighty-two serious injuries were recorded over the report period.

Table 16: Private/business and sports aviation occurrences, 1999 to 2009

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Number of aircraft involved											
Incidents	402	326	265	264	222	217	240	288	318	280	286
Serious incidents	3	0	1	1	3	20	13	14	24	17	21
Serious injury accidents	3	11	11	8	6	7	2	5	5	9	6
Fatal accidents	16	8	11	4	4	7	13	15	9	13	8
Total accidents	82	93	91	79	62	83	64	56	66	65	65
Number of people involved											
Serious injuries	10	22	15	12	8	10	3	10	7	14	7
Fatalities	26	9	20	10	12	16	18	25	18	23	8

Private operations recorded the highest accident rate of any Australian aviation operation type at about 160 accidents per million hours. In terms of fatal accidents, there are about 20 fatal accidents per million hours. This is significantly higher than any other operation type.

Some of the private/business accidents resulting in fatalities include:

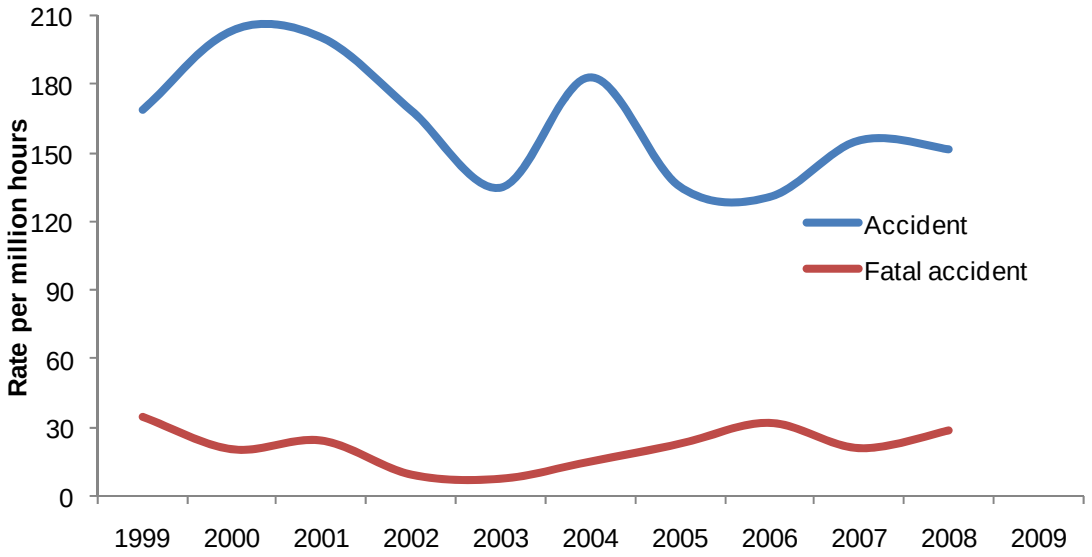
- On 22 June 2003, a Cessna 172M, registered VH-TUR, entered a spin during a right turn after takeoff from runway 35 at Wedderburn aerodrome in New South Wales. It impacted the ground to the north-east of the airfield and the four occupants were fatally injured. The investigation team considered the reduction in climb performance and collision with terrain to be related to an overweight aircraft, with 10 degrees of flaps, which climbed into an increasing and gusting tailwind (ATSB investigation 200302847).
- On 7 February 2004, a Piper PA-28R-200 Arrow, registered VH-TRZ, was conducting a private sightseeing flight over Lake Eildon in Victoria. It struck a high voltage power line about 133 ft above the water level of the lake. This dislodged the left wing of the aircraft, and the aircraft impacted water 165 m beyond the cable. The four aircraft occupants were fatally injured when the aircraft impacted the water. The power line was not fitted with marker devices, and nor was it required to be (ATSB investigation 200400437).
- On 17 November 2007, the owner-pilot of a Cessna Aircraft Company C337G (Skymaster), registered VH-CHU, was conducting a private flight in accordance with the visual flight rules (VFR) from Moorabbin Airport, Victoia to Merimbula, New South Wales. The aircraft did not arrive at Merimbula as expected and on 19 November 2007, aircraft wreckage and three of the deceased occupants were found on a beach between Venus Bay and Cape Liptrap, Victoria. The investigation found that while manoeuvring over water at low level in conditions of reduced visibility, the pilot probably became spatially disorientated and inadvertently descended into the water (ATSB investigation AO-2007-061).
- On 31 October 2006, a Piper PA-31-350 Chieftain, registered VH-ZGZ, was operating on an instrument flight rules (IFR) flight from Emerald to Gladstone, Queensland. The aircraft impacted the ground in a very steep nose-down attitude at high speed. Three people on board the aircraft sustained fatal injuries. The investigation team could not conclusively establish why the aircraft experienced a loss of control, but considered malfunction of the autopilot or flight controls (such

as jammed control), and fuel starvation possible. Adverse weather, pilot incapacitation, and structural failure were considered unlikely factors that might have lead to the loss of control. The pilot's experience on the aircraft was low, and night and instrument flying experience was also low (ATSB investigation AO-2006-001).

Table 17: Private/business occurrences, 1999 to 2009

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Number of aircraft involved											
Incidents	353	270	217	217	178	173	208	274	293	237	258
Serious incidents	3	0	1	1	2	17	12	13	19	14	18
Serious injury accidents	2	7	7	5	2	3	0	4	4	7	3
Fatal accidents	15	8	9	4	3	6	9	12	7	11	5
Total accidents	73	78	81	70	52	72	53	49	58	58	56
Number of people involved											
Serious injuries	8	18	9	8	2	6	1	9	6	12	3
Fatalities	25	9	18	10	11	15	14	21	15	20	5
Rate of aircraft involved											
Accidents per million hours	169.0	201.0	198.0	168.7	135.1	183.2	135.5	131.0	153.0	151.8	
Fatal accidents per million hours	34.7	20.6	22.0	9.6	7.8	15.3	23.0	32.1	18.5	28.8	

Figure 10: Aircraft involved in private/business accidents per million hours, 1999 to 2009



Sports aviation

Sports aviation includes gliding, parachute operations, and aerobatics in VH-registered aircraft. Accident numbers are low and have reduced since 2005. There were three fatal accidents in 2009, one involving a glider, and the other two fatal accidents were in single

engine fixed-wing aircraft. The first of the fixed-wing fatal accidents involved an aircraft that collided with terrain while filming an aerobatic manoeuvre. The second of the fixed-wing fatal accidents involved an aircraft that collided with terrain while practising for an airshow.

Table 18: Sports aviation (VH- registered), 1999 to 2009

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Number of aircraft involved											
Incidents	49	56	48	47	44	44	32	14	25	43	28
Serious incidents	0	0	0	0	1	3	1	1	5	3	3
Serious injury accidents	1	4	4	3	4	4	2	1	1	2	3
Fatal accidents	1	0	2	0	1	1	4	3	2	2	3
Total accidents	9	15	10	9	10	11	11	7	8	7	9
Number of people involved											
Serious injuries	2	4	6	4	6	4	2	1	1	2	4
Fatalities	1	0	2	0	1	1	4	4	3	3	3

4.2.4 Foreign general aviation

There have been a minimal number of accidents involving foreign registered general aviation aircraft, and none in 2009.

- On 27 October 1999, a Cessna P210N, registered N62J, was conducting an IFR flight from Maroochydore, Queensland, to Bankstown, New South Wales. While enroute at flight level (FL) 160, the pilot reported icing and requested and was given three clearances to descend to 10,000 feet. Two minutes later, the pilot reported an engine failure, and then lost generator power. The investigation considered icing and turbulence as factors that most likely led to engine failure. The engine was producing power upon impact with the ground, which suggests that the engine probably returned to normal operation during the descent. It also considered pilot loss of control, or an encounter with severe turbulence as factors that led to the airframe being stressed beyond its design limits and subsequent in-flight breakup. (ATSB investigation 199905037).
- On 24 November 2000, a Vans RV-6A, registered ZK-VBC, was conducting a flight from Townsville to Toowoomba, Queensland when the pilot reported that the propeller blade had failed. A 20 centimetre section of the propeller blade broke off, and from this point on, the investigation team considered it possible that little effective power was delivered from the aircraft's engine. The pilot attempted a landing in a small clearing, but stalled about 50 ft off the ground and the aircraft rolled at a height insufficient for recovery. The propeller blade failed as a result of torsional vibration induced by abnormal combustion pressures (ATSB investigation 200005572).

Table 19: Foreign registered general aviation, 1999 to 2009

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Number of aircraft involved											
Incidents	30	22	18	34	20	12	31	43	47	56	49
Serious incidents	0	0	0	0	0	1	1	0	1	0	0
Serious injury accidents	0	0	0	1	0	0	0	0	0	0	0
Fatal accidents	1	1	0	0	0	1	0	0	0	0	0
Total accidents	2	2	0	3	0	1	0	1	1	1	0
Number of people involved											
Serious injuries	0	0	0	1	0	0	0	0	0	0	0
Fatalities	2	1	0	0	0	2	0	0	0	0	0

5 OCCURRENCES BY AIRCRAFT TYPE

As at 30 June 2009, fixed-wing aircraft (aeroplanes) accounted for 77 per cent of all aircraft on the Civil Aviation Safety Authority's civil aircraft register (VH- register). This was followed by rotary-wing aircraft (helicopters), accounting for 12 per cent.

Rotary-wing aircraft make up about 25 per cent of all accidents (Table 20) and fatal accidents (Table 21) in general aviation for the reporting period, even though in total numbers on the VH- register, they account for 12 per cent of all aircraft. The total number of hours flown by helicopters is about 20 per cent of total hours flown by fixed-wing general aviation aircraft.[11] When single and multi engine hours flown are combined (data not shown) and data between 1999 and 2008 is pooled, the fixed-wing accident rate for general aviation is about six times higher than air transport, while the fixed-wing fatal accident rate in general aviation is about eight times higher than air transport.

Table 20: Number of aircraft involved in accidents, 1999 to 2009

Fixed-wing	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Air transport	30	29	35	25	28	12	12	11	17	23	10
General aviation	122	126	103	100	80	99	78	60	84	84	79
Rotary-wing											
Air transport	2	4	3	2	3	4	0	1	5	6	1
General aviation	26	42	40	21	27	34	31	25	26	35	34

Using the same type of comparison in rotary-wing aircraft, the accident rate is about 3.5 times higher in general aviation than air transport, while the rotary-wing fatal accident rate in general aviation is about two times higher than air transport. Comparing rotary-wing and fixed-wing aircraft, rotary-wing aircraft in air transport have an accident rate that is about two times that of fixed wing. Comparing rotary-wing and fixed-wing aircraft in general aviation, rotary-wing aircraft have an accident rate and fatality rate per million hours that is about 1.4 times higher than fixed wing aircraft. In terms of fatal accidents per million hours flown, rotary-wing air transport has a fatality rate that is about five times higher than fixed-wing air transport aircraft.

Table 21: Number of aircraft involved in fatal accidents, 1999 to 2009

Fixed-wing	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Air transport	2	4	4	3	1	0	2	1	1	2	0
General aviation	14	11	13	5	7	7	10	12	9	18	7
Rotary-wing											
Air transport	1	0	0	1	1	0	0	0	1	1	0
General aviation	5	3	5	1	5	4	3	4	2	2	8

[11] Bureau of Infrastructure, Transport and Regional Economics, 2010, *General Aviation Activity 2008*, and Bureau of Transport and Regional Economics, 2003, *Aviation Statistics GA 2003*.

Table 22: Number of fatalities, 1999 to 2009

Fixed-wing	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Air transport	9	19	10	8	4	0	18	2	1	2	0
General aviation	24	11	25	11	16	17	15	21	18	29	7
Rotary-wing											
Air transport	1	0	0	4	4	0	0	0	1	4	0
General aviation	7	8	6	1	10	6	3	9	2	2	8

Table 22 shows that the total number of fatalities in general aviation is greater than the total number of fatalities in air transport. Year-on-year comparison between fixed-wing air transport aircraft and fixed-wing general aviation aircraft shows that in all years, apart from 2000 and 2005, the majority of fatalities are in general aviation. In 2000 and 2005 two significant low capacity air transport accidents[12] accounted for the difference.

Table 23: Number of aircraft involved in accidents by number of engines, 1999 to 2009

Fixed-wing	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Single-engine	129	125	110	105	84	102	75	58	100	109	84
Multi-engine	28	38	32	28	32	16	17	15	17	14	15
Rotary-wing											
Single-engine	28	45	41	23	30	36	31	26	31	38	33
Multi-engine	0	1	2	0	0	2	0	0	0	3	1

The number of aircraft involved in accidents by number of engines is recorded in Table 23 and the number of aircraft involved in fatal accidents by number of engines is recorded in Table 24. The most striking feature of these tables is that multi-engine aircraft are involved in fewer accidents; this is true for rotary-wing and fixed-wing aircraft, even though more hours per aircraft are flown in multi-engine aircraft. Caution should be used in interpreting accidents by the number of engines. In part this may reflect the type of aircraft operation, rather than a specific engine configuration. No fatal accidents were recorded among operators of multi-engine rotary wing aircraft (Table 24). There are about 1.7 fatalities per single engine rotary wing accident and about 1.5 fatalities per single engine fixed-wing accident (Table 25).

[12] Whyalla Airlines Piper Chieftain, Spencer Gulf, South Australia, 31 May 2000 – 8 fatalities; Transair Metro 23, near Lockhart River, Queensland, 7 May 2005 – 15 fatalities.

Table 24: Number of aircraft involved in fatal accidents by number of engines, 1999 to 2009

Fixed-wing	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Single-engine	16	14	13	15	8	7	9	12	13	18	7
Multi-engine	1	3	5	0	4	4	4	2	3	2	0
Rotary-wing											
Single-engine	6	3	5	2	6	4	3	4	3	3	8
Multi-engine	0	0	0	0	0	0	0	0	0	0	0

Table 25: Number of fatalities by number of engines, 1999 to 2009

Fixed-wing	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Single-engine	32	15	21	26	16	10	11	19	21	26	7
Multi-engine	3	17	15	0	10	11	23	5	7	5	0
Rotary-wing											
Single-engine	8	8	6	5	14	6	3	9	3	6	8
Multi-engine	0	0	0	0	0	0	0	0	0	0	0

6 OCCURRENCES BY STATE/TERRITORY

A transport safety research report released by the ATSB in October 2006[13] highlighted the inherent difficulties associated with assessing aviation safety from a regional perspective or within state boundaries.

While aviation is a regional, national and international activity, the location of an occurrence may not have any bearing on causal factors. This, coupled with the difficulty of obtaining comprehensive activity data for a specific State/Territory, means that the assessment and interpretation of occurrence numbers must be treated cautiously. Consequently, rate data cannot be calculated for the following table.

The number of accidents, fatal accidents and fatalities provided below reflects what happened in a particular State or Territory and not the level of aviation safety.

The data below (Table 27) is based on the number of occurrences and includes occurrences involving Australian VH- and non-VH-registered and foreign registered aircraft, including all aircraft types (fixed-wing, rotary-wing, balloons, gliders and ultralights).

[13] ATSB (2006). *Fatal Aircraft Accidents: Far North Queensland in Context (B2006/0034).* Canberra: Australian Transport Safety Bureau.

Table 26: All aircraft accidents, fatal accidents and fatalities (including non-VH Australian aircraft) by State, 1999 to 2009

State	Category	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
ACT	Total accidents	3	1	2	0	4	0	0	1	0	0	1
	Fatal accidents	1	0	1	0	0	0	0	0	0	0	0
	Fatalities	1	0	4	0	0	0	0	0	0	0	0
NSW	Total accidents	47	58	41	51	45	38	45	30	42	54	47
	Fatal accidents	6	2	3	6	8	5	8	12	7	10	6
	Fatalities	11	2	6	11	15	7	12	16	8	16	6
NT	Total accidents	11	17	18	10	12	11	7	10	14	12	10
	Fatal accidents	1	2	1	2	0	1	1	2	2	3	0
	Fatalities	1	2	1	5	0	1	1	3	4	4	0
Qld	Total accidents	50	63	57	42	37	55	37	27	40	47	45
	Fatal accidents	8	9	10	6	6	8	9	5	6	7	5
	Fatalities	17	21	18	11	13	10	23	14	9	11	5
SA	Total accidents	18	10	15	9	8	11	10	3	10	12	6
	Fatal accidents	3	2	2	0	1	0	1	0	0	1	1
	Fatalities	6	9	2	0	2	0	2	0	0	1	1
Tas.	Total accidents	4	2	4	6	5	5	0	5	5	4	6
	Fatal accidents	0	0	2	0	1	1	0	0	2	0	0
	Fatalities	0	0	2	0	4	1	0	0	2	0	0
Vic.	Total accidents	32	31	24	21	22	26	17	15	28	27	26
	Fatal accidents	4	5	4	5	0	5	4	4	7	3	5
	Fatalities	8	6	5	7	0	13	6	5	12	3	5
WA	Total accidents	26	34	35	25	21	17	17	15	22	32	24
	Fatal accidents	2	4	4	0	4	1	1	1	5	3	5
	Fatalities	2	4	8	0	9	2	1	2	8	8	6
Other[14]	Total accidents	2	5	3	0	0	4	2	1	4	2	2
	Fatal accidents	0	0	1	0	0	0	0	0	0	0	0
	Fatalities	0	0	1	0	0	0	0	0	0	0	0

[14] 'Other' refers to occurrences involving Australian-registered aircraft operating outside mainland Australia, and Tasmanian and Australian territories 12 nautical mile limit.

7 OCCURRENCE TYPES: WHAT HAPPENED

Accidents and incidents are usually the result of a complex set of circumstances, often involving a chain or sequence of events. The challenge is to classify these in a meaningful way, and in doing so, capture its main character to identify what contributed to the occurrence. The aim of this classification method, known as occurrence types, is to ensure consistency in accident and incident classification and allow for useful comparisons to be made.

There are four different occurrence type categories currently used by the ATSB:

- airspace
- aerodrome and airways facility
- mechanical
- operational.

The ATSB is currently reviewing this taxonomy and these data will likely be modified in the next *Aviation Occurrence Statistics* report.

The ATSB records one or more occurrence types for all aircraft involved in accidents, incidents, and serious incidents. Accidents and serious incidents generally have more occurrence types than incidents, as they are more likely to be investigated; there is a greater amount of information to draw upon for analysis and coding. Particular aircraft operations tend to be associated with certain occurrences types. For example, general aviation has many more collisions compared with commercial air transport. As well, general aviation has more airspace-related occurrence types, probably in part, reflecting pilot experience in controlled airspace.

In addition, for occurrences involving multiple aircraft, aircraft with the same operation type are recorded once; aircraft with different operation types are recorded against the corresponding operation type.

Table 27 and Table 29 show that the most frequently reported occurrence type is a significant event. A significant event is often a secondary event such as rejected takeoff, precautionary landing, go-around, or aircraft evacuation. In other words, some other type of event has led to the significant event. This could be related to many different primary events; for example, an engine failure on takeoff may lead to a rejected takeoff, or a runway incursion might lead to a go-around. The relationships between different types of occurrences cannot be detailed in this report, as there are a significant number of occurrence type permutations and combinations.

Occurrence types are not the why of an occurrence per se, but what occurred. There is no description of individual actions, local conditions, risk controls, or organisational influences in these tables. The count of occurrence types does not necessarily reflect their importance, but just how often they are coded. Fuel-related events may be relatively rare, by comparison with aircraft control, but fuel starvation can be very serious, and result in an attempt at an emergency landing, and potential aircraft damage and injury to people on board the aircraft.

Table 27 to Table 30 depict a picture of reported occurrence types which centres on aircraft operations – the critical elements of successful flight – flight planning and communication, ground operations, loading and embarkation, aircraft control on the

ground and in the air, takeoff, flight, landing, unloading, disembarkation, and storage or maintenance of the aircraft.

7.1 Commercial air transport

7.1.1 Accidents and Serious Incidents

Table 27: Air transport Accident and Serious Incidents by Occurrence Type, 1999 to 2009

Occurrence Type	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	*Total*
Aerodrome and airways facility												
Aerodrome related	0	0	0	0	0	0	1	0	0	0	0	*1*
Airspace												
Aircraft separation	0	2	1	4	10	12	11	5	31	12	8	*96*
Operational non-compliance	0	0	1	0	1	1	2	0	5	4	1	*15*
Procedural error	0	1	1	1	0	1	1	0	2	1	0	*8*
Breakdown of co-ordination	0	1	1	0	0	0	0	0	0	0	0	*2*
Airspace incursion	0	0	0	0	0	0	0	1	0	0	0	*1*
Other	0	0	0	0	0	0	0	0	1	0	0	*1*
Mechanical												
Airframe	12	10	7	9	7	7	7	2	9	6	5	*81*
Powerplant / propulsion	3	5	5	6	6	8	6	7	10	14	9	*79*
Systems	6	4	8	3	1	3	6	3	4	6	4	*48*
Operational												
Significant event	18	25	36	24	23	27	28	18	33	61	31	*324*
Aircraft control	5	9	13	6	7	6	4	5	12	8	5	*80*
Collision	8	5	12	5	9	3	5	7	9	12	1	*76*
Ground operations	6	4	1	4	4	3	2	5	4	7	1	*41*
Warning device	0	3	0	4	5	4	2	1	3	9	8	*39*
Fuel related	1	3	3	3	4	5	2	0	4	4	1	*30*
Weather / environment	6	2	2	2	2	4	1	0	6	4	1	*30*
Cabin Safety	0	1	1	2	0	0	3	0	4	1	0	*12*
Regulations and SOPs	1	1	3	2	1	0	1	1	0	0	0	*10*
Communications	0	0	0	1	1	2	0	0	0	5	0	*9*
Bird / animal strike	1	0	4	1	0	0	0	0	2	0	0	*8*
Navigation / flight planning	0	0	0	0	1	0	4	0	2	1	0	*8*
Aircraft loading	0	0	1	1	1	1	0	0	0	0	0	*4*
Miscellaneous	0	0	0	1	0	0	0	2	0	1	0	*4*

7.1.2 Incidents

Table 28: Air transport Incidents by Occurrence Type, 1999 to 2009

Occurrence Type	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	*Total*
Aerodrome and airways facility												
Airways facility	33	46	30	24	26	25	46	16	17	11	9	*283*
Aerodrome related	17	21	22	17	17	21	16	21	20	27	32	*231*
Airspace												
Operational non-compliance	245	274	282	361	381	505	712	596	731	772	702	*5,561*
Aircraft separation	184	174	186	121	148	132	161	183	246	280	205	*2,020*
Breakdown of co-ordination	109	112	122	104	97	158	198	139	175	153	191	*1,558*
Procedural error	82	74	55	54	76	71	106	120	119	123	84	*964*
Information error	61	53	47	32	44	51	101	94	71	49	56	*659*
Airspace incursion	63	67	58	38	38	40	39	30	71	59	41	*544*
Other	27	26	18	16	16	7	15	17	4	7	7	*160*
Mechanical												
Systems	270	306	298	291	207	279	315	320	337	398	328	*3,349*
Powerplant / propulsion	220	233	222	203	152	156	162	154	196	206	209	*2,113*
Airframe	139	148	126	139	118	106	148	127	204	217	204	*1,676*
Operational												
Bird / animal strike	512	595	601	610	641	850	942	884	938	1,043	1,158	*8,774*
Significant event	673	658	715	631	453	509	582	722	819	935	894	*7,591*
Warning device	505	610	585	440	312	443	558	435	365	490	426	*5,169*
Weather / environment	121	94	136	122	101	169	171	171	205	224	175	*1,689*
Ground operations	84	73	74	79	78	86	78	77	90	101	75	*895*
Communications	65	64	40	57	54	99	104	100	85	117	73	*858*
Aircraft loading	62	33	49	33	16	36	41	79	130	109	72	*660*
Cabin Safety	72	48	81	76	29	35	39	42	55	54	39	*570*
Navigation / flight planning	184	43	34	51	21	44	62	38	50	27	15	*569*
Aircraft control	41	29	32	34	22	38	43	56	54	41	31	*421*
Fuel related	24	34	29	39	20	31	23	32	54	52	35	*373*
Miscellaneous	29	21	19	21	12	12	14	8	26	12	2	*176*
Collision	7	18	10	9	17	15	13	19	26	16	16	*166*
Regulations and SOPs	14	8	4	12	3	7	6	10	25	22	5	*116*

7.2 General Aviation

7.2.1 Accidents and serious incidents

Table 29: General Aviation Accident and Serious Incidents by Occurrence Type, 1999 to 2009

Occurrence Type	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	*Total*
Aerodrome and facility related												
Aerodrome related	1	0	0	0	2	0	0	1	0	0	1	*5*
Airspace												
Aircraft separation	0	0	0	0	33	31	21	38	39	66	46	*274*
Operational non-compliance	1	1	1	0	1	4	5	5	4	11	7	*40*
Procedural error	0	0	0	0	0	0	0	2	0	5	1	*8*
Airspace incursion	0	0	0	0	0	0	0	1	1	2	3	*7*
Information error	0	0	0	0	0	0	0	0	0	0	2	*2*
Mechanical												
Powerplant / propulsion	25	33	27	16	16	45	27	33	66	43	52	*383*
Airframe	15	20	11	12	17	9	9	11	8	10	8	*130*
Systems	4	9	3	4	5	5	4	3	5	6	5	*53*
Operational												
Significant event	87	117	91	80	66	102	76	59	98	97	105	*978*
Collision	68	79	82	46	69	78	72	69	95	119	89	*866*
Aircraft control	34	28	32	33	18	26	30	22	29	26	27	*305*
Ground operations	29	18	16	20	18	15	9	9	18	20	22	*194*
Fuel related	12	8	9	4	5	3	7	4	5	8	6	*71*
Weather / environment	7	6	4	3	1	2	2	5	17	6	10	*63*
Bird / animal strike	4	5	5	3	1	3	5	0	2	2	3	*33*
Communications	0	0	0	0	4	6	1	2	0	10	7	*30*
Warning device	2	3	5	4	6	2	1	0	2	2	3	*30*
Regulations and SOPs	5	4	1	0	1	2	6	1	2	3	0	*25*
Cabin Safety	0	2	2	0	4	1	1	2	1	1	0	*14*
Navigation / flight planning	0	1	1	0	1	1	0	2	3	1	1	*11*
Aircraft loading	2	1	1	0	2	0	0	0	1	1	1	*9*
Miscellaneous	2	1	1	0	0	1	3	0	0	1	0	*9*

7.2.2 Incidents

Table 30: General Aviation Incidents by Occurrence Type, 1999 to 2009

Occurrence Type	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	*Total*
Aerodrome and airways facility												
Aerodrome related	5	2	6	6	11	3	8	10	8	5	4	*68*
Airways facility	5	6	10	6	13	2	4	10	0	5	2	*63*
Airspace												
Airspace incursion	802	1,024	899	986	358	45	578	797	1,178	1,133	1,117	*8,917*
Operational non-compliance	221	237	261	319	217	138	285	611	781	1,083	855	*5,008*
Aircraft separation	158	158	197	155	115	124	147	169	263	296	281	*2,063*
Breakdown of co-ordination	33	41	27	46	52	42	41	50	61	55	40	*488*
Other	94	77	35	79	41	6	11	6	1	4	1	*355*
Procedural error	19	19	19	23	19	16	24	39	36	52	33	*299*
Information error	7	12	11	11	15	13	19	17	19	15	19	*158*
Mechanical												
Powerplant / propulsion	180	134	155	148	159	131	141	126	162	167	147	*1,650*
Systems	126	147	119	103	114	199	191	179	162	158	157	*1,655*
Airframe	53	83	77	80	58	76	64	100	118	109	116	*934*
Operational												
Significant event	368	372	375	306	342	332	341	468	452	443	457	*4,256*
Bird / animal strike	87	99	177	209	257	292	383	387	380	362	399	*3,032*
Ground operations	93	87	92	113	120	164	239	223	205	258	410	*2,004*
Communications	79	135	109	89	65	82	73	173	126	208	148	*1,287*
Navigation / flight planning	112	109	92	122	77	75	106	130	111	101	96	*1,131*
Warning device	62	62	74	73	63	76	73	87	74	115	82	*841*
Collision	30	35	37	31	28	25	38	23	39	33	41	*360*
Aircraft control	15	21	27	15	15	18	33	19	41	29	27	*260*
Weather / environment	20	23	17	24	21	16	25	20	34	34	20	*254*
Fuel related	24	38	24	25	26	16	20	13	18	19	13	*236*
Regulations and SOPs	3	5	4	3	3	6	2	4	10	15	5	*60*
Miscellaneous	10	1	3	7	2	2	5	4	10	2	6	*52*
Cabin Safety	3	1	1	6	2	2	5	5	8	2	1	*36*
Aircraft loading	2	2	1	2	0	1	2	2	4	4	1	*21*

8 ATSB INVESTIGATIONS

In the 6 months from 1 July 2009 to 31 December 2009, the Australian Transport Safety Bureau (ATSB) commenced 29 aviation safety occurrence investigations. Two investigations have been discontinued, AO-2009-071 a GPWS warning, and AO-2009-082 a pitch down event. The ATSB assessed that further investigation of these occurrences was unlikely to result in significant safety benefit when compared with other priorities. The following pages provide a brief synopsis of the other 27 investigations.

Collision with terrain

Investigation Number:	AO-2009-032
Investigation Status:	Active
Category:	Accident
Date/time:	2/07/2009 10:15:00 EST
Location:	Gold Coast Aerodrome, QLD
Highest injury:	Fatal
Aircraft details	
Registration:	VH-OML
Manufacturer:	Robinson Helicopter Co.
Model:	R22 BETA
Operation:	Flying Training
Aircraft damage:	Serious

Summary:

While conducting circuits, the helicopter collided with terrain. The solo pilot sustained fatal injuries. The investigation is continuing.

Freight related event

Investigation Number:	AO-2009-034
Investigation Status:	Active
Category:	Incident
Date/time:	5/07/2009 00:01:00 EST
Location:	Sydney Aerodrome, NSW
Highest injury:	Nil
Aircraft details	
Registration:	VH-EBB
Manufacturer:	Airbus Industrie
Model:	A330-202
Operation:	High capacity regular public transport
Aircraft damage:	Nil

Summary:

Unmanifested freight was loaded onto the aircraft without authorisation. The investigation is continuing.

Turbulence event

Investigation Number:	AO-2009-036
Investigation Status:	Active
Category:	Serious Incident
Date/time:	9/07/2009 12:50:00 EST
Location:	Lizard Island (ALA), 180° M 37Km, QLD
Highest injury:	Minor
Aircraft details	
Registration:	VH-TFS
Manufacturer:	Cessna Aircraft Company
Model:	208B
Operation:	Charter
Aircraft damage:	Nil

Summary:

During the cruise at 9,000 ft AMSL, the aircraft encountered severe turbulence. The pilot and two passengers sustained minor injuries. The investigation is continuing.

Smoke event

Investigation Number:	AO-2009-037
Investigation Status:	Active
Category:	Incident
Date/time:	9/07/2009 21:10:00 EST
Location:	Sydney Aerodrome, 050° M 19Km, NSW
Highest injury:	Nil
Aircraft details	
Registration:	VH-OTD
Manufacturer:	Jetstream Aircraft Ltd
Model:	3206
Operation:	Low capacity regular public transport
Aircraft damage:	Nil

Summary:

During the climb, the crew noticed fumes and smoke in the cabin. The aircraft was returned to Sydney. The investigation is continuing.

Abnormal engine indications

Investigation Number:	AO-2009-040
Investigation Status:	Active
Category:	Incident
Date/time:	14/07/2009 09:48:00 CST
Location:	Ayers Rock Aerodrome, NT
Highest injury:	Nil
Aircraft details	
Registration:	VH-NXN
Manufacturer:	The Boeing Company
Model:	717-200
Operation:	High capacity regular public transport
Aircraft damage:	Nil

Summary:

When the crew extended the landing gear, set flap 40 and selected maximum power, the engines did not respond. Speed reduced to below Vmin before the engines spooled up. When speed returned to normal, the crew retarded the throttles and speed again reduced below Vmin before the engines responded to the power selected. The crew landed the aircraft manually. The investigation is continuing.

Air system event

Investigation Number:	AO-2009-044
Investigation Status:	Active
Category:	Serious Incident
Date/time:	16/07/2009 10:30:00 WST
Location:	Perth Aerodrome, 045° M 74Km, WA
Highest injury:	Nil
Aircraft details	
Registration:	VH-TAM
Manufacturer:	Beech Aircraft Corp
Model:	C90
Operation:	Charter
Aircraft damage:	Nil

Summary:

During the climb, the pressurisation system failed and the aircraft climbed to FL210 without the pilot's awareness of the failure. The pilot mistook a GPS distance readout as a groundspeed readout and descended to FL150 due to an apparent strong headwind. At FL150 the pilot became aware of the failure and descended to 10,000 ft. The investigation is continuing.

Airframe event

Investigation Number:	AO-2009-047
Investigation Status:	Active
Category:	Serious Incident
Date/time:	25/07/2009 08:26:00 EST
Location:	Melbourne Aerodrome, VIC
Highest injury:	Nil
Aircraft details	
Registration:	VH-VBA
Manufacturer:	The Boeing Company
Model:	737-7Q8
Operation:	High capacity regular public transport
Aircraft damage:	Minor

Summary:

The nosewheel axle failed leading to separation of the right nosewheel from the aircraft. The investigation is continuing.

Operational event

Investigation Number:	AO-2009-049
Investigation Status:	Active
Category:	Serious Incident
Date/time:	5/08/2009 10:40:00 EST
Location:	near Canberra Aerodrome, ACT
Highest injury:	Nil

Aircraft details

Registration:	VH-VND
Manufacturer:	Airbus Industrie
Model:	A320-232
Operation:	High capacity regular public transport
Aircraft damage:	Nil

Summary:

During the cruise, the crew received multiple warnings and diverted to Canberra. The investigation is continuing.

Collision with terrain

Investigation Number:	AO-2009-051
Investigation Status:	Active
Category:	Accident
Date/time:	17/08/2009 17:30:00 EST
Location:	near Malboona (ALA), QLD
Highest injury:	Fatal

Aircraft details

Registration:	VH-KVT
Manufacturer:	Cessna Aircraft Company
Model:	U206G
Operation:	Private
Aircraft damage:	Serious

Summary:

At about 1730 Eastern Standard Time on 17 August 2009, a Cessna Company U206G aircraft, registered VH-KVT, was being operated on a local flight on a property 81 km north-east of Winton, Qld. The pilot was the only person on board. Following a steep dive, the aircraft collided with flat, open terrain in a steep nose-low attitude, resulting in serious damage. The pilot received fatal injuries. The investigation is continuing.

Powerplant / propulsion event

Investigation Number:	AO-2009-053
Investigation Status:	Active
Category:	Serious Incident
Date/time:	20/08/2009 11:37:00 EST
Location:	Launceston Aerodrome, TAS
Highest injury:	Nil
Aircraft details	
Registration:	VH-VOC
Manufacturer:	The Boeing Company
Model:	737-8BK
Operation:	High capacity regular public transport
Aircraft damage:	Unknown

Summary:

During the initial climb, the left engine experienced a compressor stall and the engine surged. The aircraft returned to Launceston. The investigation is continuing.

Airprox

Investigation Number:	AO-2009-054
Investigation Status:	Active
Category:	Serious Incident
Date/time:	25/08/2009 17:09:00 EST
Location:	Bankstown Aerodrome, NSW
Highest injury:	Nil
Aircraft details 1	
Registration:	VH-FKU
Manufacturer:	Piper Aircraft Corp
Model:	PA-28-161
Operation:	General Aviation-Unknown
Aircraft damage:	Nil
Aircraft details 2	
Registration:	VH-HJH
Manufacturer:	Piper Aircraft Corp
Model:	PA-31-350
Operation:	Charter
Aircraft damage:	Nil

Summary:

The Piper PA-28 was reported to have come into close proximity to the Piper PA-31 in the circuit area. The investigation is continuing.

Crew incapacitation

Investigation Number:	AO-2009-055
Investigation Status:	Active
Category:	Serious Incident
Date/time:	31/08/2009 13:56:00 EST
Location:	near Bindook (NDB/VOR), NSW
Highest injury:	Nil
Aircraft details	
Registration:	VH-LAB
Manufacturer:	Beech Aircraft Corp
Model:	B200T
Operation:	Other Aerial Work
Aircraft damage:	Nil

Summary:

ATC were informed by the non-flying crewmember that the pilot was incapacitated for a short time. The pilot recovered in time to land the aircraft. The investigation is continuing.

Breakdown of separation

Investigation Number:	AO-2009-056
Investigation Status:	Active
Category:	Incident
Date/time:	3/09/2009 19:00:00 EST
Location:	MAXEM (IFR), VIC
Highest injury:	Nil
Aircraft details 1	
Registration:	VH-VXU
Manufacturer:	The Boeing Company
Model:	737-838
Operation:	High capacity regular public transport
Aircraft damage:	Nil
Aircraft details 2	
Registration:	A6-EMT
Manufacturer:	The Boeing Company
Model:	777-31H
Operation:	High capacity regular public transport
Aircraft damage:	Nil

Summary:

There was an infringement in separation standards between the Boeing 737 and the Boeing 777. The investigation in continuing.

Ground handling event

Investigation Number:	AO-2009-059
Investigation Status:	Active
Category:	Incident
Date/time:	20/09/2009 16:30:00 WST
Zone	WST
Location:	Perth Aerodrome, WA
Highest injury:	Nil

Aircraft details 1

Registration:	VH-TJW
Manufacturer:	The Boeing Company
Model:	737-4L7
Operation:	High capacity regular public transport
Aircraft damage:	Nil

Aircraft details 2

Registration:	VH-NXO
Manufacturer:	The Boeing Company
Model:	717-200
Operation:	High capacity regular public transport
Aircraft damage:	Nil

Summary:

It was reported that during the turn after pushback, the wing of the Boeing 717 came close to a stationary Boeing 737 which had already been pushed back from the adjacent bay. The investigation is continuing.

Collision with terrain

Investigation Number:	AO-2009-060
Investigation Status:	Active
Category:	Accident
Date/time:	3/10/2009 13:00:00 WST
Location:	5 km north-east of Wickepin, WA
Highest injury:	Fatal
Aircraft details	
Registration:	VH-ODP
Manufacturer:	Air Tractor Inc
Model:	AT-502
Operation:	Aerial Work
Aircraft damage:	Serious

Summary:

At about 1130 Western Standard Time on 3 October 2009, the pilot of an Air Tractor Inc. AT-502 aircraft, registered VH-ODP, took off from a paddock on a property about 5 km north-east of Wickepin, WA to conduct agricultural spraying operations. A short time later, the owner of the property discovered the wreckage of the aircraft, which had impacted the ground in an inverted attitude, fatally injuring the pilot. There were no witnesses to the accident. The investigation is continuing.

Abnormal engine indications

Investigation Number:	AO-2009-061
Investigation Status:	Active
Category:	Serious Incident
Date/time:	4/10/2009 12:57:00 ESuT
Location:	Wagga Wagga Aerodrome, NSW
Highest injury:	Nil
Aircraft details	
Registration:	VH-SBA
Manufacturer:	S.A.A.B. Aircraft Co
Model:	340B
Operation:	Low capacity regular public transport
Aircraft damage:	Nil

Summary:

During the initial climb, the crew noticed an increase in the inter-turbine temperature. The crew conducted the non-normal checklist and shut down the left engine. The aircraft returned to Wagga Wagga. The investigation is continuing.

Airframe event

Investigation Number:	AO-2009-062
Investigation Status:	Active
Category:	Incident
Date/time:	20/10/2009 00:08:41 ESuT
Location:	Melbourne Aerodrome, VIC
Highest injury:	Nil
Aircraft details	
Registration:	VH-VUI
Manufacturer:	The Boeing Company
Model:	737-8FE
Operation:	High capacity regular public transport
Aircraft damage:	Minor

Summary:

The crew reported that after landing, the aircraft was difficult to taxi requiring more power and steering input than usual. Engineering inspection of the right main landing gear revealed that the inner wheel hub and bearing mount of number four wheel had separated from the wheel assembly. The investigation is continuing.

Total power loss

Investigation Number:	AO-2009-063
Investigation Status:	Active
Category:	Incident
Date/time:	19/10/2009 09:30:00 UTC
Location:	near Christmas Island Aerodrome
Highest injury:	Nil
Aircraft details	
Registration:	VH-NJT
Manufacturer:	British Aerospace Plc
Model:	AVRO 146-RJ70
Operation:	High capacity regular public transport
Aircraft damage:	Unknown

Summary:

As the aircraft climbed through 5,000 ft at 250 kts, the crew heard a bang, the aircraft yawed and number two engine EGT climbed rapidly. The crew shut number two engine down and returned the aircraft to Christmas Island. The investigation is continuing.

Incorrect aircraft configuration

Investigation Number:	AO-2009-066
Category:	Serious Incident
Date/time:	26/10/2009 07:35:00 ESuT
Location:	Sydney Aerodrome, NSW
Highest injury:	Nil
Investigation Status:	Active
Aircraft details	
Registration:	VH-OGP
Manufacturer:	The Boeing Company
Model:	767-338
Operation:	High capacity regular public transport
Aircraft damage:	Nil

Summary:

Passing 700 ft on approach into Sydney, the crew commenced a missed approach due to the aircraft being incorrectly configured for landing. During the commencement of the missed approach the 'Too low gear' GPWS warning activated. The investigation is continuing.

Avionics system event

Investigation Number:	AO-2009-065
Category:	Serious Incident
Date/time:	28/10/2009 15:37:00 UTC
Zone	UTC
Location:	Guam international Airport, S M 1145Km
Highest injury:	Nil
Investigation Status:	Active
Aircraft details	
Registration:	VH-EBA
Manufacturer:	Airbus Industrie
Model:	A330-202
Operation:	High capacity regular public transport
Aircraft damage:	Nil

Summary:

During the cruise, the crew received a series of ECAM messages and the autopilot disconnected. The messages included a NAV ADR DISAGREE message and a message indicating that the flight control computers had switched from normal control law to alternate law. The investigation is continuing.

Operational event

Investigation Number:	AO-2009-068
Investigation Status:	Active
Category:	Accident
Date/time:	9/11/2009 15:50:00 EST
Location:	Horn Island Aerodrome, W M 139Km, QLD
Highest injury:	Serious

Aircraft details

Registration:	VH-EMZ
Manufacturer:	Bell Helicopter Co
Model:	412
Operation:	Other Aerial Work
Aircraft damage:	Serious

Summary:

During winching operations, it was reported that the winch cable snapped and two crew members fell approximately 16 metres onto the deck of the ship. Both crew members were seriously injured. The investigation is continuing.

Abnormal engine indications

Investigation Number:	AO-2009-069
Investigation Status:	Active
Category:	Incident
Date/time:	10/11/2009 19:30:00 EST
Location:	Gold Coast Aerodrome, 255° M 70Km, QLD
Highest injury:	Nil

Aircraft details

Registration:	VH-TJY
Manufacturer:	The Boeing Company
Model:	737-476
Operation:	High capacity regular public transport
Aircraft damage:	Minor

Summary:

During the climb, the crew received abnormal engine indications on the right engine. The aircraft returned to Brisbane. The investigation is continuing.

E/GPWS warning

Investigation Number:	AO-2009-071
Investigation Status:	Active
Category:	Incident
Date/time:	9/11/2009 01:00:00 CST
Location:	Darwin Aerodrome, NT
Highest injury:	Nil

Aircraft details

Registration:	VH-VON
Manufacturer:	The Boeing Company
Model:	737-8FE
Operation:	Air Transport High Capacity
Aircraft damage:	Nil

Summary:

During final approach to runway 29, the aircraft encountered severe overshoot windshear and the crew conducted a missed approach. During the second approach to runway 29, the aircraft encountered a 16 kt tailwind and the crew elected to conduct the runway 11 VOR approach. During this approach, the crew received a GPWS flap alert and a GPWS terrain alert. Flight data recording information revealed that the flap blow back feature was activated at the pre-determined speed, but did not return to the original flap setting as designed, when the speed reduced. The crew manually reset the landing flap lever to reset the system. The flaps then returned to the correct landing flap setting. The investigation is continuing.

Collision with terrain

Investigation Number:	AO-2009-070
Investigation Status:	Active
Category:	Accident
Date/time:	17/11/2009 08:00:00 WST
Location:	Kojonup (ALA), 147° T 21Km (Crossburn Farm Strip), WA
Highest injury:	Fatal
Aircraft details	
Registration:	VH-ZRR
Manufacturer:	Cessna Aircraft Company
Model:	A188B
Operation:	Other Aerial Work
Aircraft damage:	Serious

Summary:

At about 0800 Western Standard Time on 17 November 2009, the pilot of a Cessna Aircraft Company A188B Agwagon was fatally injured when his aircraft impacted terrain while conducting spraying operations near Kojonup, WA. The aircraft was destroyed. The investigation is continuing.

Ditching

Investigation Number:	AO-2009-072
Investigation Status:	Active
Category:	Accident
Date/time:	18/11/2009 10:26:00 UTC
Location:	3 NM SW Norfolk Island Aerodrome, External Territory
Highest injury:	Minor
Aircraft details	
Registration:	VH-NGA
Manufacturer:	Israel Aircraft Industries Ltd
Model:	1124A
Operation:	Other Aerial Work
Aircraft damage:	Serious

Summary:

On 18 November 2009, an Israel Aircraft Industries Westwind 1124A aircraft, registered VH-NGA, ditched in the ocean 3 NM (6 km) to the west of Norfolk Island. The six occupants evacuated the sinking aircraft and were later recovered by a rescue vessel from Norfolk Island. The flight crew had been unable to conduct a landing at Norfolk Island Airport because they could not see the runway after conducting four instrument approaches. The crew then elected to ditch before the aircraft's fuel supply was exhausted. Following the event, the aircraft operator initiated a program of checking and revalidation for the company's commercial Westwind pilots. The investigation is continuing.

Unsecured door

Investigation Number:	AO-2009-073
Investigation Status:	Active
Category:	Serious Incident
Date/time:	1/12/2009 07:30:00 EST
Zone	EST
Location:	Maroochydore/Sunshine Coast Aerodrome, NW M 28Km, QLD
Highest injury:	Nil
Aircraft details	
Registration:	VH-PIH
Manufacturer:	Aerospatiale Industries
Model:	AS.350D
Operation:	Other Aerial Work
Aircraft damage:	Minor

Summary:

At approximately 0730 EST on 1 December 2009 (2130 UTC, 30 November 2009), the pilot of a Eurocopter AS350D 'Squirrel' helicopter, registered VH-PIH, was conducting fire-fighting activities near Maryborough, Qld. While in cruise at around 110 knots, and at an altitude of approximately 1,000 ft above ground, the pilot reported hearing two brief 'thuds' and subsequently noticed that the door insecure annunciator light had illuminated. Electing to land the helicopter for an inspection, it was found that the forward left side cargo door had been lost from the airframe, with evidence that it had subsequently travelled through the plane of the main rotor and impacted two main rotor blades. An engineering assessment determined that the blade damage was outside of prescribed serviceability limits, and the helicopter was later moved by road to a maintenance facility for repair.

On 3 December 2009, the Australian Transport Safety Bureau (ATSB) initiated a level-4 safety investigation into the circumstances surrounding this serious incident. Remnants of the liberated door assembly have been recovered and are the subject of technical examination by the ATSB, together with the door hinges and retaining hardware. The investigation is continuing.

Collision with terrain

Investigation Number:	AO-2009-077
Investigation Status:	Active
Category:	Accident
Date/time:	9/12/2009 11:25:00 ESuT
Location:	Dorrigo (VFR), 148° M 3Km, NSW
Highest injury:	Fatal
Aircraft details	
Registration:	VH-MJO
Manufacturer:	Bell Helicopter Co
Model:	206L-1
Operation:	Other Aerial Work
Aircraft damage:	Serious

Summary:

On 9 December 2009, the pilot of a Bell Helicopter Co. 206L-1 Longranger, registered VH-MJO, was conducting a visual flight rules (VFR) flight at Dorrigo NSW, with one passenger on board. Shortly after takeoff, he encountered reduced visibility conditions due to low cloud. Subsequently, all visual reference with the horizon and the ground was lost. The pilot attempted to conduct a landing but the helicopter impacted the ground with a significant vertical force. As a result, the pilot was seriously injured and the passenger was fatally injured. The helicopter was seriously damaged. The investigation is continuing.

Flight control system event

Investigation Number:	AO-2009-082
Investigation Status:	Active
Category:	Serious Incident
Date/time:	24/12/2009 10:30:00 ESuT
Location:	abeam Casino (ALA), NSW
Highest injury:	Nil
Aircraft details	
Registration:	VH-UZP
Manufacturer:	Fairchild Industries Inc
Model:	SA227-AC
Operation:	Air Transport Low Capacity
Aircraft damage:	Nil

Summary:

During the cruise the aircraft commenced an uncommanded pitch down by about 15 degrees. The pilot disconnected the autopilot and reported some difficulties controlling elevator movement. During descent into Brisbane the pilot also reported vibrations through the airframe. The pilot was able to continue the approach and landed at Brisbane. The investigation is continuing.

Collision with terrain

Investigation Number:	AO-2009-081
Investigation Status:	Active
Category:	Accident
Date/time:	23/12/2009 18:50:00 ESuT
Location:	Canowindra (ALA), 310° T 18Km (Nangar National Park), NSW
Highest injury:	Nil
Aircraft details	
Registration:	VH-UHD
Manufacturer:	Garlick Helicopters Inc
Model:	TH-1F
Operation:	Other Aerial Work
Aircraft damage:	Serious

Summary:

The ATSB was notified of an accident to a Garlick Helicopter TH-1F on 23 December 2009 at Nangar National park NSW. The helicopter impacted the ground while conducting aerial fire fighting operations and appears to have sustained a loss of tail rotor pitch control. The investigation is examining the maintenance history of the aircraft, conducting technical examination of recovered components, interviewing witnesses and liaising with the manufacturer. The investigation is continuing.

Aviation Occurrence Statistics
1999 to 2009