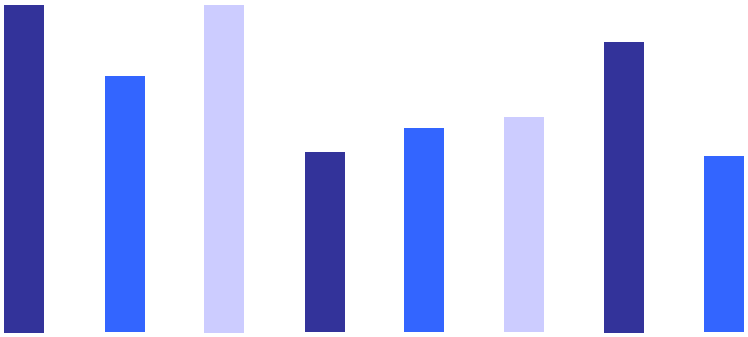
Transportation Safety Board of Canada

Bureau de la sécurité des transports du Canada

Statistical Summary
Aviation Occurrences
2008



Canada

Foreword

This document provides users of Canadian aviation safety data with an annual summary of selected statistics on aviation occurrences.

Users of these statistics are advised that, in a live database, the occurrence data are constantly being updated. Consequently, the statistics can change slightly over time. Further, as many occurrences are not formally investigated, information recorded on some occurrences may not have been verified. Therefore, caution should be used when utilizing these statistics. The 2008 statistics presented here reflect the TSB database updated as of 18 March 2009.

To enhance awareness and increase the safety value of the material presented in the TSB *Statistical Summary, Aviation Occurrences 2008*, readers are encouraged to copy or reprint the data presented, in whole or in part, for further distribution (with acknowledgements of the source).

The TSB is an independent agency operating under its own Act of Parliament. Its sole aim is the advancement of transportation safety.

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AVIATION OCCURRENCES IN 2008

ACCIDENTS

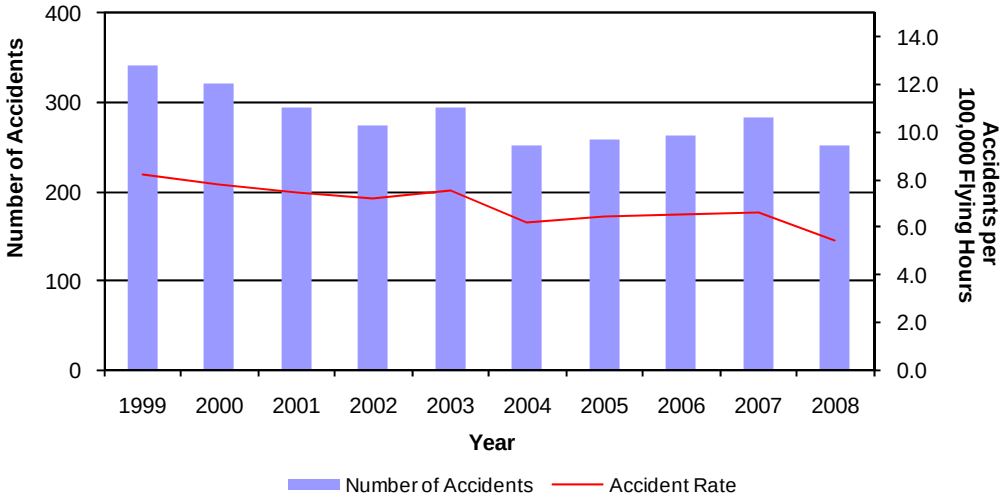
Overview of Accidents and Fatalities (Tables 1, 2, 3 and 8)

In 2008, a total of 295 aviation accidents were reported to the TSB. Of this number, 251 involved Canadian-registered aircraft (excluding ultralights), an 11.6% decrease from 2007 (Figure 1).

Flying activity is comparable to last year and the accident rate has decreased from the 2007 accident rate of 6.6 accidents per 100 000 flying hours to 5.5. Statistical analysis using linear regression indicates a significant downward trend in accident rates ($p < .001$)[1] over the past 10 years.

The 251 accidents involving Canadian-registered aircraft (excluding ultralights) included 200 aeroplanes[2] (67 of which were commercially operated) and 42 helicopters. The remaining 13 were balloons, gliders or gyrocopters.

Figure 1—Accidents and Accident Rates,[3] 1999–2008



Of the 67 commercial aeroplanes (8 airliners, 6 commuter aircraft, 41 air taxi and 12 aerial work) involved in accidents in 2008 (Figure 2), 3 air taxi aircraft were involved in fatal accidents. There were no fatal accidents involving airliners, commuter aircraft or aerial work aircraft.

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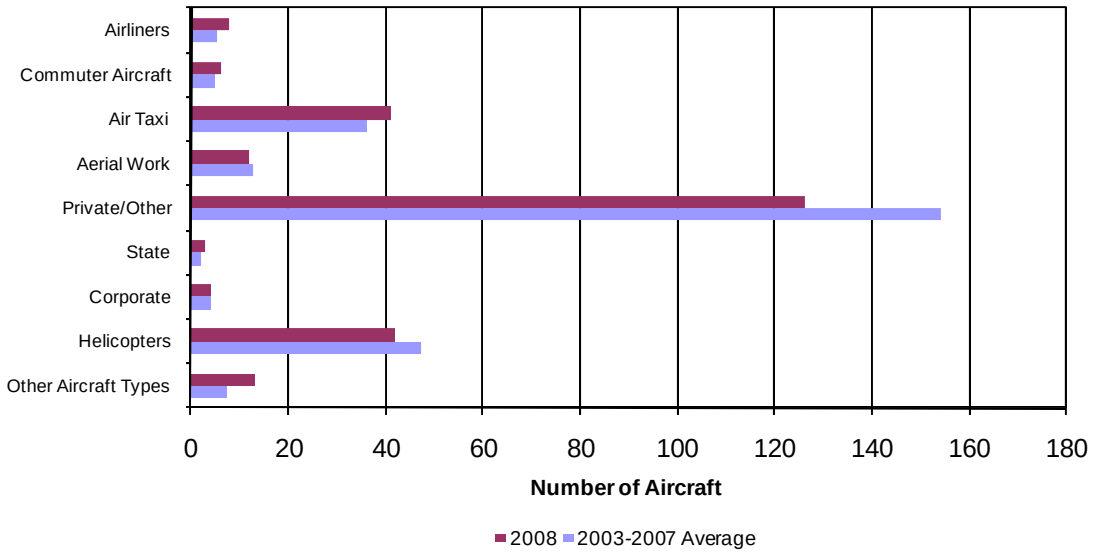
1 It is agreed by convention that, for a result to be considered statistically significant, its probability must be lower than 1 in 20 (that is, $p<.05$).

2 As some occurrences involve more than one aircraft, users are cautioned to note differences between the number of occurrences and the number of aircraft involved in occurrences. All tables except Table 1 exclude ultralight aircraft; all tables except Tables 1 and 4 also exclude balloons, gliders and gyrocopters.

3 Canadian-registered aircraft (excluding ultralights).

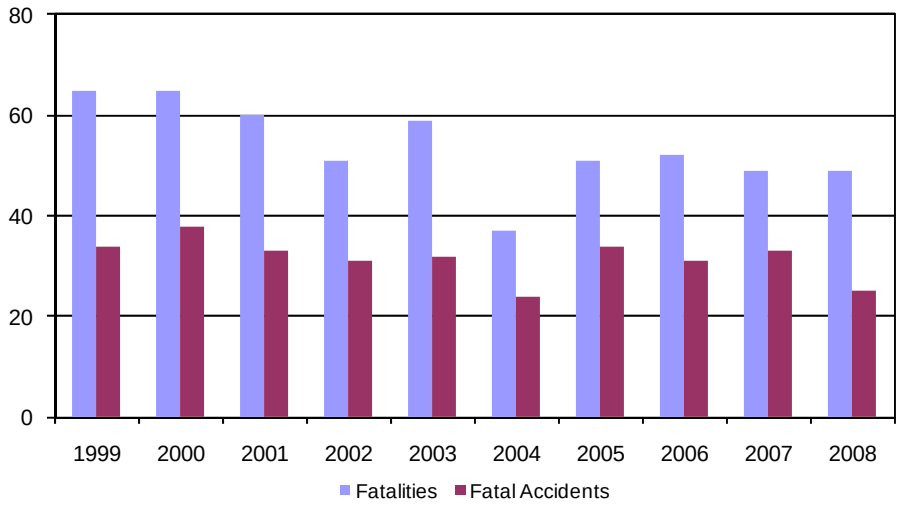
A total of 130 private/corporate/other aeroplanes were involved in accidents, 18% lower than the five-year average of 158. In 2008, 12 such accidents resulted in fatalities, down from 18 in 2007 and less than the five-year average of 16.

Figure 2—Canadian-Registered Aircraft Involved in Accidents by Aircraft Type, 2008



In 2008, Canadian-registered aircraft, excluding ultralights, were involved in 25 fatal accidents (Figure 3), 24% lower than last year's total of 33 and lower than the 2003–2007 average of 31. The number of fatalities (49) was slightly lower than the five-year average (50), and the number of serious injuries (39) also decreased slightly from the five-year average (40). Passenger fatalities accounted for 53% of aircraft fatalities in 2008, and crew member fatalities accounted for 45% (excluding fatalities from ultralight accidents). One ground fatality occurred in 2008.

Figure 3—Fatalities and Fatal Accidents, 1999–2008



Aeroplanes operated by the state (that is, operated by federal or provincial governments) were involved in 3 accidents in 2008, with no fatalities.

In 2008, 42 helicopters were involved in accidents, yielding an 11% decrease from the five-year average of 47. Of the 42 helicopters, 9 were involved in fatal accidents, resulting in 15 fatalities.

Over the past 10 years, the highest proportion of helicopter accidents occurred during air transport operations (33%) and training (13%).

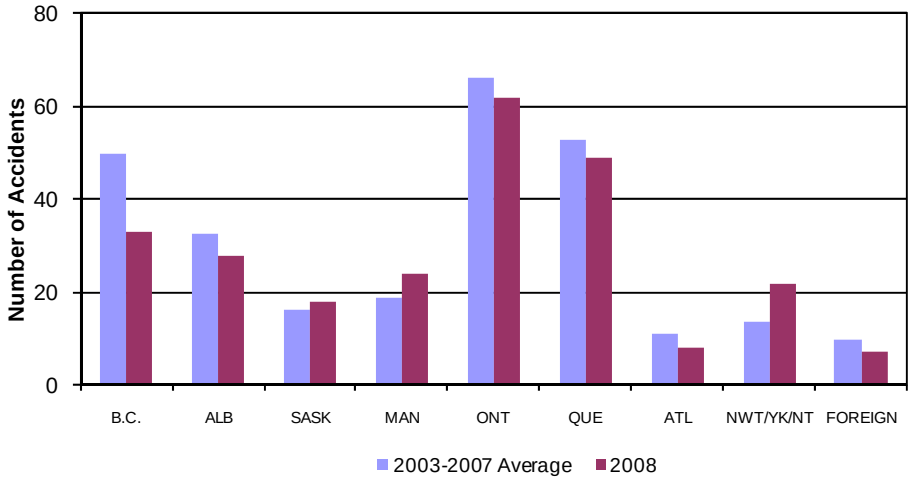
In 2008, 29 ultralight aircraft were involved in accidents in Canada, with 12 accidents resulting in 13 fatalities, which is double the five-year average.

In 2008, 15 accidents involved foreign-registered aircraft in Canada, with no fatalities.

Accidents by Selected Categories

Province (Table 3): In 2008, Ontario accounted for 25% of Canadian-registered aircraft accidents, while Quebec and British Columbia accounted for 20% and 13% respectively. Canadian-registered aircraft accidents were lower than the five-year average in the Atlantic Provinces, Quebec, Ontario, Alberta and British Columbia, and higher than the five-year average in Manitoba, Saskatchewan and in the Northwest Territories, Nunavut and Yukon (Figure 4).

Figure 4—Canadian-Registered Aircraft Involved in Accidents by Province, 2008



Events and Phases (Tables 4 to 7): Accidents are frequently classified according to the first event (or abnormal condition) in the sequence of events that led to the occurrence. This classification serves to demonstrate the nature and distribution of safety-significant events, and how these events shift over time. However, the first event should not be construed to be the cause of the accident.

In 2008, the most common first events in aeroplane accidents were take-off/landing events (17%) and collision with object events (17%). Power loss (16%) and control loss (11%) were the next most common first events. In helicopter accidents, collision with terrain (19%) and control loss (17%) were the most common first events.

The 1999-2008 statistics show that the first event leading to an accident varies substantially according to the flight phase of the aircraft involved. For aeroplanes, accidents during the landing phase account for about 38% of total accidents. The most common first events in such accidents were landing (such as nose over, tire blow-out, etc.) and control loss. Approximately 22% of aeroplane accidents occur during the take-off phase; in these accidents, power loss and control loss were the most common first events. The en-route phase accounted for about 14% of aeroplane accidents, with power loss being the most common first event in that flight phase.

The approach/landing phase accounted for 31% of helicopter accidents, with the most common first events being collision with object and power loss. The en-route phase (18%) had power loss and collision with terrain as the most common first events. The maneuvering phase (15%) had power loss and collision with object as the most common first events. About 14% of helicopter accidents occurred in the take-off phase, with control loss, collision with object, collision with terrain and dynamic rollover being common first events.

Operation Type (Table 8): In 2008, aeroplane accidents occurred mainly on recreational flights (41%), followed by air transport (25%) and training flights (15%). Helicopter accidents occurred mainly on air transport flights (52%) and on recreational flights (21%).

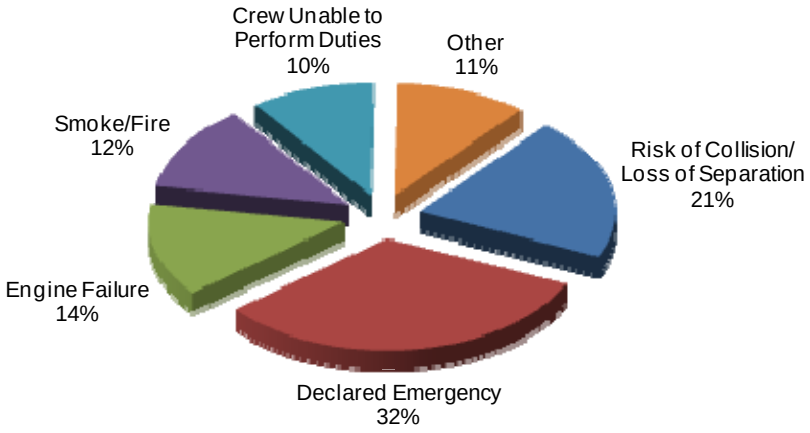
INCIDENTS

Overview of Incidents (Tables 1, 9 and 10)

Pursuant to TSB mandatory incident reporting requirements, 914 incidents were reported in 2008, 725 of which involved Canadian-registered aircraft.

In 2008, the most frequent incident types were declared emergency (32%), risk of collision or loss of separation (21%), and engine failure (14%) (Figure 5).

Figure 5—Reportable Incidents by Type, 2008



Over the past five years, the first event in declared emergency on Canadian-registered aircraft usually involved component failures, the most common of which were landing gear or hydraulic system failures.

The majority of risk of collision/loss of separation incidents involving Canadian-registered aircraft had an air traffic services (ATS)–related event[4] as their first event.

The increase in crew unable to perform duties is very large over the last several years, likely for several reasons, including changes in reporting, and increased activity rates.

4 Refer to Appendix B for the definition of ATS-related event.

APPENDIX A – AVIATION OCCURRENCE TABLES

Table 1

Aviation Occurrences and Casualties
1999–2008

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Canadian-Registered Aircraft[1]										
Accidents	**341**	**320**	**295**	**274**	**295**	**252**	**259**	**262**	**284**	**251**
Aeroplanes Involved[2]	286	258	243	210	242	206	206	208	237	200
Airliners	6	9	5	6	7	3	5	7	5	8
Commuter Aircraft	13	4	8	6	9	1	6	4	4	6
Air Taxi	70	45	37	41	35	43	33	31	39	41
Aerial Work	18	19	18	12	17	8	14	14	11	12
Corporate	6	5	4	2	2	4	6	2	7	4
State	2	1	3	4	3	2	1	4	1	3
Private/Other[3]	171	175	168	139	169	145	141	146	170	126
Helicopters Involved	46	53	46	56	44	41	50	56	46	42
Other Aircraft Involved[4]	15	12	9	10	12	9	8	4	4	13
Hours Flown (thousands)[5]	4046	3982	3885	3713	3790	3961	3979	4059	4266	4432
Accident Rate (per 100 000 hours)[6]	8.2	7.8	7.4	7.2	7.5	6.2	6.4	6.5	6.6	5.5
Fatal Accidents	**34**	**38**	**33**	**31**	**32**	**24**	**34**	**31**	**33**	**25**
Aeroplanes Involved[2]	28	26	25	23	26	18	22	23	25	15
Airliners	1	1	0	0	0	0	0	0	0	0
Commuter Aircraft	2	1	1	0	0	0	1	0	1	0
Air Taxi	5	3	5	5	5	3	6	5	5	3
Aerial Work	1	2	1	1	3	0	2	1	1	0
Corporate	2	0	1	0	0	0	0	0	1	2
State	0	1	0	2	0	0	0	1	0	0
Private/Other[3]	17	18	17	15	18	15	13	16	17	10
Helicopters Involved	4	11	6	6	3	4	10	9	7	9
Other Aircraft Involved[4]	4	1	3	3	4	2	2	0	2	1
Fatalities	**65**	**65**	**60**	**51**	**59**	**37**	**51**	**52**	**49**	**49**
Serious Injuries	**42**	**53**	**37**	**42**	**43**	**27**	**37**	**40**	**55**	**39**
Canadian-Registered Ultralight Aircraft										
Accidents	35	38	35	36	46	36	31	28	30	29
Fatal Accidents	12	5	6	9	7	6	5	1	5	12
Fatalities	19	9	8	12	9	10	6	1	6	13
Serious Injuries	7	10	8	4	14	7	9	12	7	4
Foreign-Registered Aircraft										
Accidents in Canada	21	17	29	13	30	20	18	14	10	15
Fatal Accidents	5	6	8	1	6	3	6	2	0	0
Fatalities	8	16	10	2	8	10	10	2	0	0
Serious Injuries	0	2	5	0	3	2	15	1	2	5
All Aircraft: Reportable Incidents	**699**	**725**	**853**	**865**	**834**	**910**	**822**	**826**	**895**	**914**
Risk of Collision/Loss of Separation	168	161	204	193	154	223	180	171	171	176
Declared Emergency	207	225	255	280	293	278	224	260	302	327
Engine Failure	155	161	175	160	132	143	148	136	137	128
Smoke/Fire	87	84	107	101	103	94	103	107	125	108
Collision	7	8	19	22	16	21	12	21	14	8
Other	75	86	93	109	136	151	155	131	146	167

1 Ultralight aircraft excluded

2 As some accidents may involve multiple aircraft, the number of aircraft involved may differ from the total number of accidents.

3 Other: Contains, but is not limited to, organizations that rent aircraft (that is, flying schools, flying clubs, etc.)

4 Includes gliders, balloons and gyrocopters

5 Source: Transport Canada (hours flown are estimated from 2003)

6 Accident rate does not include "Other Aircraft Involved"

Figures are preliminary as of 18 March 2009.

Table 2

Canadian-Registered Aircraft[1] Involved in Accidents, Accident Rates and Fatalities by Operator Type 1999–2008

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Accidents										
Aeroplanes Involved										
Airliners	6	9	5	6	7	3	5	7	5	8
Commuter Aircraft	13	4	8	6	9	1	6	4	4	6
Air Taxi	70	45	37	41	35	43	33	31	39	41
Aerial Work	18	19	18	12	17	8	14	14	11	12
State	2	1	3	4	3	2	1	4	1	3
Private/Other/Corporate[2]	177	180	172	141	171	149	147	148	177	130
Helicopters Involved	46	53	46	56	44	41	50	56	46	42
Total	**332**	**311**	**289**	**266**	**286**	**247**	**256**	**264**	**283**	**242**
Hours Flown (thousands)[3]										
Aeroplanes	3437	3377	3281	3135	3200	3351	3388	3426	3591	3698
Airliners	1247	1198	1168	1124	1148	1244	1334	1387	1469	1530
Commuter Aircraft	344	337	322	311	318	326	335	340	358	379
Air Taxi	825	792	754	683	651	655	633	609	631	652
Aerial Work	197	219	242	262	313	337	360	373	397	399
State	196	220	240	258	307	344	385	401	403	404
Private/Other/Corporate	629	612	555	496	463	445	341	316	332	334
Helicopters	609	604	604	578	590	610	591	633	675	735
Total	**4046**	**3982**	**3885**	**3713**	**3790**	**3961**	**3979**	**4059**	**4266**	**4432**
Accident Rates (per 100 000 hours)										
Aeroplanes										
Airliners	0.5	0.8	0.4	0.5	0.6	0.2	0.4	0.5	0.3	0.5
Commuter Aircraft	3.8	1.2	2.5	1.9	2.8	0.3	1.8	1.2	1.1	1.6
Air Taxi	8.5	5.7	4.9	6.0	5.4	6.6	5.2	5.1	6.2	6.3
Aerial Work	9.1	8.7	7.4	4.6	5.4	2.4	3.9	3.7	2.8	3.0
State	1.0	0.5	1.3	1.6	1.0	0.6	0.3	1.0	0.2	0.7
Private/Other/Corporate	28.1	29.4	31.0	28.4	36.9	33.5	43.1	46.9	53.3	38.9
Helicopters	7.6	8.8	7.6	9.7	7.5	6.7	8.5	8.8	6.8	5.7
Total (all aircraft)	8.2	7.8	7.4	7.2	7.5	6.2	6.4	6.5	6.6	5.5
Fatalities: Crew										
Aeroplanes										
Airliners	2	2	0	0	0	0	0	0	0	0
Commuter Aircraft	2	2	2	0	0	0	2	0	0	0
Air Taxi	6	2	4	1	5	2	6	5	6	3
Aerial Work	1	3	1	1	4	0	2	1	1	0
Corporate	1	0	1	0	0	0	0	0	1	2
State	0	2	0	1	0	0	0	1	0	0
Private/Other	16	20	17	15	15	14	11	16	17	10
Helicopters	5	10	7	6	3	4	8	6	6	7
Total	**33**	**41**	**32**	**24**	**27**	**20**	**29**	**29**	**31**	**22**
Fatalities: Passengers										
Aeroplanes										
Airliners	0	0	0	0	0	0	0	0	0	0
Commuter Aircraft	0	0	0	0	0	0	0	0	1	0
Air Taxi	4	5	8	7	10	14	2	10	2	10
Aerial Work	0	1	1	0	0	0	3	0	0	0
Corporate	4	0	1	0	0	0	0	0	0	5
State	0	0	0	0	0	0	0	0	0	0
Private/Other	14	6	12	16	16	1	7	7	11	3
Helicopters	6	8	2	0	3	0	7	5	1	8
Total	**28**	**20**	**24**	**23**	**29**	**15**	**19**	**22**	**15**	**26**

1 Ultralight aircraft excluded

2 Other: Contains, but is not limited to, organizations that rent aircraft (that is, flying schools, flying clubs, etc.)

3 Source: Transport Canada (hours flown are estimated from 2003)

Figures are preliminary as of 18 March 2009.

Table 3

Accidents Involving Canadian-Registered Aircraft by Province/Territory
1999–2008

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Accidents										
Newfoundland and Labrador	5	14	10	6	9	5	5	3	5	5
Prince Edward Island	0	1	1	0	1	0	1	0	0	0
Nova Scotia	4	9	3	7	1	3	0	0	3	2
New Brunswick	7	5	4	2	1	5	5	2	7	1
Quebec	46	55	48	42	55	44	56	48	61	49
Ontario	106	73	64	74	80	71	57	52	71	62
Manitoba	32	17	28	17	28	12	18	18	17	24
Saskatchewan	22	9	18	18	16	13	13	18	21	18
Alberta	52	39	36	46	34	29	28	41	30	28
British Columbia	40	68	58	41	54	46	59	53	36	33
Nunavut[1]	0	4	2	1	0	2	2	6	4	7
Northwest Territories	14	11	12	4	5	7	5	6	9	8
Yukon	4	6	4	4	4	6	3	4	6	7
Outside Canada	9	9	7	12	7	9	7	11	14	7
Total	**341**	**320**	**295**	**274**	**295**	**252**	**259**	**262**	**284**	**251**
Fatal Accidents										
Newfoundland and Labrador	1	2	1	1	2	1	1	0	1	0
Prince Edward Island	0	0	0	0	0	0	0	0	0	0
Nova Scotia	0	3	0	2	0	1	0	0	0	0
New Brunswick	0	0	0	0	0	0	1	0	0	0
Quebec	5	5	6	6	5	4	9	3	4	4
Ontario	9	4	6	5	11	2	6	4	6	3
Manitoba	4	0	2	1	0	2	2	0	3	1
Saskatchewan	1	2	0	2	1	2	0	3	4	0
Alberta	5	3	2	2	3	2	2	6	3	4
British Columbia	8	10	11	9	8	6	12	9	9	6
Nunavut[1]	0	3	1	0	0	1	0	0	0	0
Northwest Territories	1	1	3	0	0	1	0	1	1	2
Yukon	0	1	0	0	1	0	0	1	1	1
Outside Canada	0	4	1	3	1	2	1	4	1	4
Total	**34**	**38**	**33**	**31**	**32**	**24**	**34**	**31**	**33**	**25**
Fatalities										
Newfoundland and Labrador	1	3	3	2	3	1	2	0	1	0
Prince Edward Island	0	0	0	0	0	0	0	0	0	0
Nova Scotia	0	4	0	2	0	1	0	0	0	0
New Brunswick	0	0	0	0	0	0	1	0	0	0
Quebec	9	8	12	14	9	4	12	6	5	6
Ontario	14	5	8	6	27	14	10	6	7	3
Manitoba	7	0	4	1	0	2	2	0	4	1
Saskatchewan	1	2	0	2	1	2	0	3	5	0
Alberta	8	3	4	3	4	2	4	9	5	8
British Columbia	24	19	17	16	13	6	19	16	15	22
Nunavut[1]	0	5	3	0	0	1	0	0	0	0
Northwest Territories	1	3	8	0	0	2	0	6	3	2
Yukon	0	2	0	0	1	0	0	1	1	1
Outside Canada	0	11	1	5	1	2	1	5	3	7
Total	**65**	**65**	**60**	**51**	**59**	**37**	**51**	**52**	**49**	**50**

1 This territory was created on 01 April 1999.

Figures are preliminary as of 18 March 2009.

Table 4

Canadian-Registered Aircraft Involved in Accidents by First Event and Phase of Flight
1999–2008

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Aeroplanes Involved in Accidents by First Event										
Control Loss	30	41	37	23	27	31	24	21	22	22
Power Loss	41	37	37	28	36	20	32	27	22	32
Collision with Object	36	24	21	16	25	16	19	29	24	34
Collision with Terrain	22	30	17	16	25	18	20	24	27	17
Collision with Moving Aircraft	9	3	3	2	1	3	1	8	5	7
Operations-Related Event	12	5	6	6	5	4	10	5	7	2
Component System Malfunction	18	15	13	14	7	16	11	10	14	13
Landing Gear Collapsed/Retracted	15	8	7	10	9	10	3	3	9	8
Runway Overrun	4	2	1	1	1	2	4	3	1	2
Take-off/Landing Event	53	46	47	45	55	39	34	43	64	33
Wheels-up Landing	9	4	5	9	5	6	5	3	6	5
Component System-Related Event	4	10	9	7	13	3	7	4	11	8
Weather-Related Event	7	15	12	12	9	16	13	5	5	5
Aircraft Damage	1	5	4	3	4	2	4	5	3	4
Other/Unknown	25	13	24	18	20	20	19	18	17	8
Total	**286**	**258**	**243**	**210**	**242**	**206**	**206**	**208**	**237**	**200**
Helicopters Involved in Accidents by First Event										
Control Loss	3	3	5	6	3	3	5	7	5	7
Power Loss	12	9	5	9	11	3	5	10	8	3
Collision with Object	8	14	8	5	3	3	6	11	6	5
Collision with Terrain	6	5	4	9	5	7	9	8	7	8
Collision with Moving Aircraft	0	0	1	0	0	0	0	0	2	0
Operations-Related Event	5	1	2	0	2	6	2	1	2	3
Sling-Related Event	2	2	2	4	2	2	0	4	1	1
Dynamic System Malfunction	0	2	2	2	1	1	0	0	1	0
Dynamic Rollover	0	3	1	3	1	3	4	0	1	3
Autorotative Landing	2	2	3	4	4	0	1	0	0	0
Weather-Related Event	1	3	4	2	1	2	2	3	3	2
Aircraft Damage	3	2	3	1	3	4	5	2	1	1
Other/Unknown	4	7	6	11	8	7	11	10	9	9
Total	**46**	**53**	**46**	**56**	**44**	**41**	**50**	**56**	**46**	**42**
Aeroplanes Involved in Accidents by Phase of Flight										
Standing/Taxiing	17	21	18	22	23	16	19	22	16	13
Take-off	72	59	52	50	47	49	47	44	46	38
En Route	38	39	34	30	40	20	29	35	26	27
Manoeuvring	21	17	15	11	11	8	14	11	12	12
Approach	30	24	36	18	21	23	24	20	21	23
Landing	105	91	87	72	93	83	70	73	109	81
Post-Impact	1	0	0	0	1	1	0	0	0	0
Unknown	2	7	1	7	6	6	3	3	7	6
Total	**286**	**258**	**243**	**210**	**242**	**206**	**206**	**208**	**237**	**200**
Helicopters Involved in Accidents by Phase of Flight										
Standing	4	2	3	2	1	6	5	5	2	3
Take-off	4	9	5	9	5	6	9	10	6	6
En Route	6	8	10	7	6	6	8	12	12	11
Hover/Lift	10	4	5	3	4	4	3	7	3	3
Manoeuvring	8	14	2	9	9	7	4	7	8	3
Approach/Landing	12	13	19	21	18	11	15	13	13	16
Unknown	2	3	2	5	1	1	6	2	2	0
Total	**46**	**53**	**46**	**56**	**44**	**41**	**50**	**56**	**46**	**42**

Figures are preliminary as of 18 March 2009.

Table 5

Canadian-Registered Aircraft Involved in Accidents
First Event vs. Phase of Flight
1999–2008

	Phase of Flight							
	Standing/ Taxiing	Take-off	En Route	Manoeuvring	Approach	Landing	Other/ Unknown	**Total**
Aeroplanes Involved in Accidents by First Event								
Control Loss	8	94	11	23	15	124	3	**278**
Power Loss	0	102	129	24	54	2	1	**312**
Collision with Object	52	58	20	22	35	54	3	**244**
Collision with Terrain	8	46	42	27	28	44	21	**216**
Collision with Moving Aircraft	21	6	4	7	4	0	0	**42**
Operations-Related Event	5	20	12	3	7	14	1	**62**
Component System Malfunction	9	24	19	4	35	39	1	**131**
Landing Gear Collapsed/Retracted	11	7	0	0	0	64	0	**82**
Runway Overrun	1	2	0	0	0	18	0	**21**
Take-off/Landing Event	4	71	3	2	11	365	3	**459**
Wheels-up Landing	0	0	0	0	0	57	0	**57**
Component System-Related Event	1	21	25	4	8	17	0	**76**
Weather-Related Event	4	27	24	5	23	15	1	**99**
Aircraft Damage	28	4	0	1	0	2	0	**35**
Other/Unknown	35	22	29	10	20	49	17	**182**
Total	**187**	**504**	**318**	**132**	**240**	**864**	**51**	**2296**

	Phase of Flight							
	Standing	Take-off	En Route	Hover/Lift	Manoeuvring	Approach/ Landing	Unknown	**Total**
Helicopters Involved in Accidents by First Event								
Control Loss	5	9	3	2	9	17	2	**47**
Power Loss	0	7	22	8	16	21	1	**75**
Collision with Object	3	9	0	10	13	32	2	**69**
Collision with Terrain	5	9	17	5	11	17	4	**68**
Collision with Moving Aircraft	0	1	1	0	0	1	0	**3**
Operations-Related Event	1	6	2	3	3	7	2	**24**
Sling-Related Event	0	5	1	7	6	1	0	**20**
Dynamic System Malfunction	0	2	3	0	3	1	0	**9**
Dynamic Rollover	1	9	0	0	0	8	1	**19**
Autorotative Landing	0	0	0	0	1	14	1	**16**
Weather-Related Event	1	1	13	2	0	6	0	**23**
Aircraft Damage	7	3	1	4	0	7	3	**25**
Other/Unknown	10	8	23	5	9	19	8	**82**
Total	**33**	**69**	**86**	**46**	**71**	**151**	**24**	**480**

Figures are preliminary as of 18 March 2009.

Table 6

Canadian-Registered Aeroplanes Involved in Accidents
First Event vs. Commercial or Operator Type
1999–2008

	Commercial Type				Operator Type		
	Airliner	Commuter	Air Taxi	Aerial Work	Corporate	State	Private/Other
Aeroplanes Involved in Accidents by First Event							
Control Loss	1	6	36	8	7	0	220
Power Loss	2	0	47	34	6	1	222
Collision with Object	11	12	48	28	7	7	131
Collision with Terrain	3	6	53	16	2	2	134
Collision with Moving Aircraft	6	2	4	3	1	1	25
Operations-Related Event	1	0	12	5	0	0	44
Component System Malfunction	5	10	30	5	1	6	74
Landing Gear Collapsed/Retracted	1	4	16	2	0	1	58
Runway Overrun	1	1	6	0	0	0	13
Take-off/Landing Event	11	8	72	19	9	2	338
Wheels-up Landing	2	1	14	3	2	1	34
Component System-Related Event	3	1	10	4	2	1	55
Weather-Related Event	1	3	27	6	1	0	61
Aircraft Damage	4	4	3	1	1	1	21
Other/Unknown	9	3	37	9	3	1	120
Total	**61**	**61**	**415**	**143**	**42**	**24**	**1550**
Aeroplanes Involved in Fatal Accidents by First Event							
Control Loss	0	1	10	1	2	0	21
Power Loss	0	0	2	1	0	0	19
Collision with Object	0	0	2	2	0	1	9
Collision with Terrain	2	3	20	6	1	2	61
Collision with Moving Aircraft	0	0	0	0	1	1	9
Operations-Related Event	0	0	1	0	0	0	3
Component System Malfunction	0	0	0	0	0	0	2
Landing Gear Collapsed/Retracted	0	0	0	0	0	0	0
Runway Overrun	0	0	0	0	0	0	0
Take-off/Landing Event	0	2	0	1	0	0	2
Wheels-up Landing	0	0	0	0	0	0	0
Component System-Related Event	0	0	0	0	0	0	4
Weather-Related Event	0	0	3	0	1	0	5
Aircraft Damage	0	0	0	0	0	0	0
Other/Unknown	0	0	7	1	1	0	21
Total	**2**	**6**	**45**	**12**	**6**	**4**	**156**

Figures are preliminary as of 18 March 2009.

Table 7

Canadian-Registered Aeroplanes Involved in Accidents
First Event vs. Pilot Licence Type
1999–2008

	Pilot Licence Type[1]				
	Student	Private	Commercial	Air Transport	**Total**
Aeroplanes Involved in Accidents by First Event					
Control Loss	8	18	19	11	**56**
Power Loss	3	20	18	9	**50**
Collision with Object	3	12	23	5	**43**
Collision with Terrain	1	20	33	17	**71**
Collision with Moving Aircraft	0	7	7	2	**16**
Operations-Related Event	3	5	4	0	**12**
Component System Malfunction	1	4	3	8	**16**
Landing Gear Collapsed/Retracted	0	4	1	3	**8**
Runway Overrun	0	2	2	3	**7**
Take-off/Landing Event	4	16	15	13	**48**
Wheels-up Landing	0	1	1	1	**3**
Component System-Related Event	0	3	4	2	**9**
Weather-Related Event	0	7	8	5	**20**
Aircraft Damage	1	2	2	1	**6**
Other/Unknown	2	16	14	9	**41**
Total	**26**	**137**	**154**	**89**	**406**

1 Accident pilots for whom the licence type is unknown, and pilots with other licence types are excluded.

Figures are preliminary as of 18 March 2009.

Table 8

Canadian-Registered Aircraft Involved in Accidents by Operation Type
1999–2008

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Aeroplanes Involved in Accidents										
Training	43	45	46	20	34	25	16	34	33	30
Pleasure/Travel	130	116	108	102	122	118	116	96	120	82
Business	10	9	10	6	8	5	6	8	15	7
Test/Demonstration/Ferry	9	5	7	7	5	7	5	6	8	4
Aerial Application	9	12	13	6	13	3	6	8	8	9
Fire Fighting/Fire Management	2	3	2	2	2	3	2	5	0	1
Survey/Inspection	2	0	2	5	2	1	7	3	2	2
Air Ambulance	3	0	3	2	1	2	1	3	2	3
Air Transport	67	53	43	49	42	37	36	38	41	50
Sightseeing	0	5	1	1	4	0	2	3	1	1
Other/Unknown	11	10	8	10	9	5	9	4	7	11
Total	**286**	**258**	**243**	**210**	**242**	**206**	**206**	**208**	**237**	**200**
Aeroplanes Involved in Fatal Accidents										
Training	2	2	2	1	3	4	0	4	3	0
Pleasure/Travel	14	12	10	11	15	10	12	11	10	6
Business	3	3	4	0	0	0	0	1	1	2
Test/Demonstration/Ferry	1	1	2	3	0	0	1	1	4	1
Aerial Application	1	2	0	0	1	0	0	0	1	1
Fire Fighting/Fire Management	0	0	1	0	1	0	0	0	0	0
Survey/Inspection	1	0	0	2	0	0	2	1	0	1
Air Ambulance	0	0	1	0	0	0	0	0	1	0
Air Transport	5	4	4	5	4	3	7	5	4	3
Sightseeing	0	1	0	1	0	0	0	0	1	0
Other/Unknown	1	1	1	0	2	1	0	0	0	1
Total	**28**	**26**	**25**	**23**	**26**	**18**	**22**	**23**	**25**	**15**
Helicopters Involved in Accidents										
Training	6	11	11	9	6	4	3	2	3	6
Pleasure/Travel	0	3	4	2	1	5	11	4	4	9
Business	1	1	4	6	1	0	1	0	4	0
Test/Demonstration/Ferry	3	4	1	5	0	2	0	2	3	0
Aerial Application	1	2	1	1	2	1	2	0	2	1
Fire Fighting/Fire Management	7	2	2	6	6	4	1	3	0	0
Survey/Inspection	4	4	0	3	8	2	1	1	2	1
Air Ambulance	0	0	1	0	0	0	1	0	0	1
Air Transport	10	11	12	14	11	16	19	29	16	22
Sightseeing	1	0	0	0	0	0	0	0	0	0
Other/Unknown	13	15	10	10	9	7	11	15	12	2
Total	**46**	**53**	**46**	**56**	**44**	**41**	**50**	**56**	**46**	**42**
Helicopters Involved in Fatal Accidents										
Training	0	2	1	0	0	0	0	0	0	0
Pleasure/Travel	0	1	2	0	0	1	5	0	0	3
Business	0	0	0	1	0	0	1	0	1	0
Test/Demonstration/Ferry	0	1	1	2	0	0	0	1	0	0
Aerial Application	0	0	0	0	0	0	0	0	0	0
Fire Fighting/Fire Management	0	0	0	0	1	0	0	2	0	0
Survey/Inspection	0	1	0	0	1	1	0	0	1	1
Air Ambulance	0	0	0	0	0	0	0	0	0	0
Air Transport	1	1	1	0	0	2	3	2	3	4
Sightseeing	1	0	0	0	0	0	0	0	0	0
Other/Unknown	2	5	1	3	1	0	1	4	2	1
Total	**4**	**11**	**6**	**6**	**3**	**4**	**10**	**9**	**7**	**9**

Figures are preliminary as of 18 March 2009.

Table 9

Reportable Incidents Involving Canadian-Registered Aircraft by Incident Type
1999–2008

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Incidents										
Risk of Collision/Loss of Separation	142	130	170	169	123	182	150	150	152	149
Declared Emergency	173	174	208	231	229	204	152	184	186	235
Engine Failure	121	129	157	134	104	118	116	106	108	98
Smoke/Fire	71	71	92	83	82	81	85	86	106	90
Collision	7	8	17	19	16	21	8	18	9	6
Control Difficulties	18	25	28	28	41	41	41	31	38	32
Crew Unable to Perform Duties	17	15	13	37	48	51	67	56	63	74
Dangerous Goods-Related	3	2	6	0	2	0	1	2	3	1
Depressurization	6	4	15	18	17	7	12	9	11	15
Fuel Shortage	7	1	2	1	6	10	5	6	4	4
Failure to Remain in Landing Area	10	13	4	6	3	10	10	6	7	15
Incorrect Fuel	0	0	0	1	0	2	1	1	0	1
Slung Load Released	5	6	8	3	4	5	1	3	3	5
Transmission or Gearbox Failure	3	2	2	2	1	2	1	0	1	0
Total[1]	**583**	**580**	**722**	**732**	**676**	**734**	**650**	**658**	**691**	**725**

1 Incidents involving Canadian-registered aircraft only; Table 1 includes those involving foreign aircraft

Figures are preliminary as of 18 March 2009.

Table 10

Canadian-Registered Aircraft Involved in Reportable Incidents
Selected Incident Types vs. First Event
2004–2008

Incident Type	First Event	
Risk of Collision/ Loss of Separation	Air Proximity	396
	ATS-Related Event	714
1278 Aircraft Involved	Altitude-Related Event	33
	Runway Incursion	53
	Other	82
Declared Emergency	Landing Gear Failure	202
961 Aircraft Involved	Hydraulic Failure	120
	Electrical Failure	35
	Other Component Failure	396
	Other	208
Engine Failure	Power Loss – First Engine	259
546 Aircraft Involved	Component Failure	244
	Other	43
Smoke/Fire	Fire/Explosion	328
448 Aircraft Involved	Component Failure	109
	Other	11
Control Difficulties	Component Failure	76
185 Aircraft Involved	Weather-Related Event	51
	Other	58

Figures are preliminary as of 18 March 2009.

APPENDIX B – DEFINITIONS

The following definitions apply to aviation occurrences that are required to be reported pursuant to the *Canadian Transportation Accident Investigation and Safety Board Act* and the associated regulations.

Aviation Occurrence

a) Any accident or incident associated with the operation of an aircraft; and
b) Any situation or condition that the Board has reasonable grounds to believe could, if left unattended, induce an accident or incident described in a) above.

Reportable Aviation Accident

An accident resulting directly from the operation of an aircraft where

a) a person sustains a serious injury or is killed as a result of
   i) being on board the aircraft;
   ii) coming into contact with any part of the aircraft or its contents; or
   iii) being directly exposed to the jet blast or rotor downwash of the aircraft;
b) the aircraft sustains damage that adversely affects the structural strength, performance or flight characteristics of the aircraft and that requires major repair or replacement of any affected component part; or
c) the aircraft is missing or inaccessible.

Reportable Aviation Incident

An incident resulting directly from the operation of an aeroplane having a maximum certificated take-off weight (MCTOW) greater than 5700 kg, or from the operation of a rotorcraft having a MCTOW greater than 2250 kg, where

a) an engine fails or is shut down as a precautionary measure;
b) a transmission gearbox malfunction occurs;
c) smoke or fire occurs;
d) difficulties in controlling the aircraft are encountered owing to any aircraft system malfunction, weather phenomena, wake turbulence, uncontrolled vibrations or operations outside the flight envelope;
e) the aircraft fails to remain within the intended landing or take-off area, lands with all or part of the landing gear retracted, or drags a wing tip, an engine pod, or any other part of the aircraft;
f) any crew member whose duties are directly related to the safe operation of the aircraft is unable to perform the crew member's duties as a result of physical incapacitation that poses a threat to the safety of any person, property, or the environment;
g) depressurization occurs that necessitates an emergency descent;
h) a fuel shortage occurs that necessitates a diversion or requires approach and landing priority at the destination of the aircraft;

i) the aircraft is refuelled with the incorrect type of fuel or contaminated fuel;
j) a collision, risk of collision, or loss of separation occurs;
k) a crew member declares an emergency or indicates any degree of emergency that requires priority handling by an air traffic control unit or the standing by of emergency response services;
l) a slung load is released unintentionally or as a precautionary or emergency measure from the aircraft; or
m) any dangerous goods are released in or from the aircraft.

Serious Injury

An injury that is sustained by a person in an accident and that

a) requires hospitalization for more than 48 hours, commencing within seven days of the date the injury was received; or
b) results in a fracture of any bone (except simple fractures of fingers, toes or nose); or
c) involves lacerations that cause severe haemorrhage or nerve, muscle or tendon damage; or
d) involves injury to any internal organ; or
e) involves second- or third-degree burns, or any burns affecting more than 5% of the body surface; or
f) involves verified exposure to infectious substances or injurious radiation.

ATS-Related Event

Any event related to the provision of air traffic control services including, but not limited to, failure or inability to provide service, emergency handling, or loss of in-flight separation.

Air Proximity Event

A situation in which, in the opinion of a pilot or air traffic services personnel, the distance between aircraft as well as their positions and speed have been such that the safety of the aircraft involved may have been compromised.

Commercial Operators

Commercial operators include carriers that offer a "for-hire" service to transport people or goods, or to undertake specific tasks such as aerial photography, flight training, or crop spraying.

Airliner

An aeroplane used by a Canadian air operator in an air transport service or in aerial work involving sightseeing operations, that has a MCTOW of more than 8618 kg (19 000 pounds) or for which a Canadian type certificate has been issued authorizing the transport of 20 or more passengers.

Commuter Aircraft

An aeroplane used by a Canadian air operator, in an air transport service or in aerial work involving sightseeing operations, in which the aircraft is:

a) a multi-engined aircraft that has a MCTOW of 8618 kg (19 000 pounds) or less and a seating configuration, excluding pilot seats, of 10 to 19 inclusive;
b) a turbo-jet-powered aeroplane that has a maximum zero fuel weight of 22 680 kg (50 000 pounds) or less and for which a Canadian type certificate has been issued authorizing the transport of not more than 19 passengers.

Aerial Work Aircraft

A commercially operated aeroplane or helicopter used in aerial work involving:

a) the carriage on board of persons other than flight crew members;
b) the carriage of helicopter external loads;
c) the towing of objects; or
d) the dispersal of products.

Air Taxi Aircraft

A commercially operated aircraft used in an air transport service or in aerial work involving sightseeing operations, in which the aircraft is:

a) a single-engined aircraft;
b) a multi-engined aircraft, other than a turbo-jet-powered aeroplane, that has a MCTOW of 8618 kg (19 000 pounds) or less and a seating configuration, excluding pilot seats, of nine or less; or
c) any aircraft that is authorized by the Minister of Transport to be operated under Part VII, Subpart 3, Division 1 of the *Canadian Aviation Regulations* (CARs).

State Operators

State operators include the federal and provincial governments.

Corporate Operators

Corporate operators include companies flying for business reasons.

Private Operators

Private operators include individuals flying for pleasure. Included are flights on which it is not possible to transport people or cargo on a "for-hire" basis.