



Transportation
Safety Board
of Canada

Bureau de la sécurité
des transports
du Canada



STATISTICAL SUMMARY AIR OCCURRENCES IN 2017

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Statistical summary: air occurrences in 2017

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Le présent rapport est également disponible en français.

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Statistical Summary

Air Occurrences in 2017

This document is a summary of selected 2017 aviation safety data.

The TSB gathers and uses this data during the course of its investigations to analyse safety deficiencies and identify risks in the Canadian transportation system.

It should be noted that certain characteristics of the data constrain statistical analysis and identification of emerging trends. These include the small totals of accidents and incidents, the large variability in the data from year to year, and changes to regulations and definitions. The reader is cautioned to keep these limitations in mind when viewing this summary to avoid drawing conclusions that cannot be supported by statistical analysis.

The 2017 data were collected according to the reporting requirements described in the TSB Regulations in force during that calendar year.

The statistics presented here reflect the TSB database at 11 February 2018. Since the occurrence data are constantly being updated in the live database, the statistics may change slightly over time.

Also, as many occurrences are not formally investigated, information recorded on some occurrences may not have been verified.

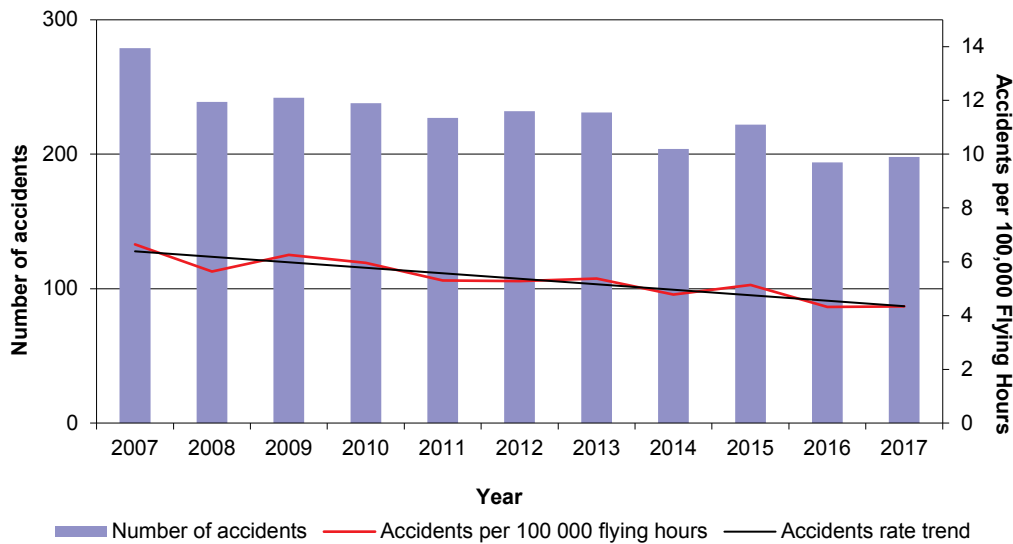
Accidents

Overview of accidents and fatalities

In 2017, a total of 240 aviation accidents were reported to the TSB, up from the previous year's total of 230, but 13% below the average of 276 over the previous 10 years (2007 to 2016). Of the total, 208 involved Canadian-registered aircraft (excluding ultra-lights),¹ a small increase from the previous year's total of 200, but 13% below the average of 238 for the previous 10 years.

The 2017 estimate of flying activity for Canadian-registered aircraft is 4 565 000 hours,² and the corresponding accident rate for Canadian-registered aircraft was 4.3 accidents per 100 000 flying hours, unchanged from 2016. Analysis using linear regression indicates a statistically significant downward trend in accident rates ($p < .0001$)³ over the 11-year period from 2007 to 2017 (Figure 1). Similarly, the 2017 accident rate of 3.2 accidents per 100 000 aircraft movements decreased from the 2016 rate of 3.3 accidents per 100 000 aircraft movements and also indicates a statistically significant downward trend ($p < .01$) over the same 11-year period (data not shown).

Figure 1. Accidents and accident rates, 2007–2017



The 208 accidents involving Canadian-registered aircraft (Figure 2) included 171 accidents involving aeroplanes,⁴ and 27 accidents involving helicopters. The remaining 10 accidents involved 5 gliders, 1

¹ Ultra-light accidents will be presented separately in all subsequent discussions of occurrences involving Canadian-registered aircraft.

² Source: Transport Canada

³ 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, $p < .05$).

⁴ As some occurrences involve more than one aircraft, readers are cautioned to note differences between the number of occurrences and the number of aircraft involved in occurrences. All Tables except Table 1 exclude

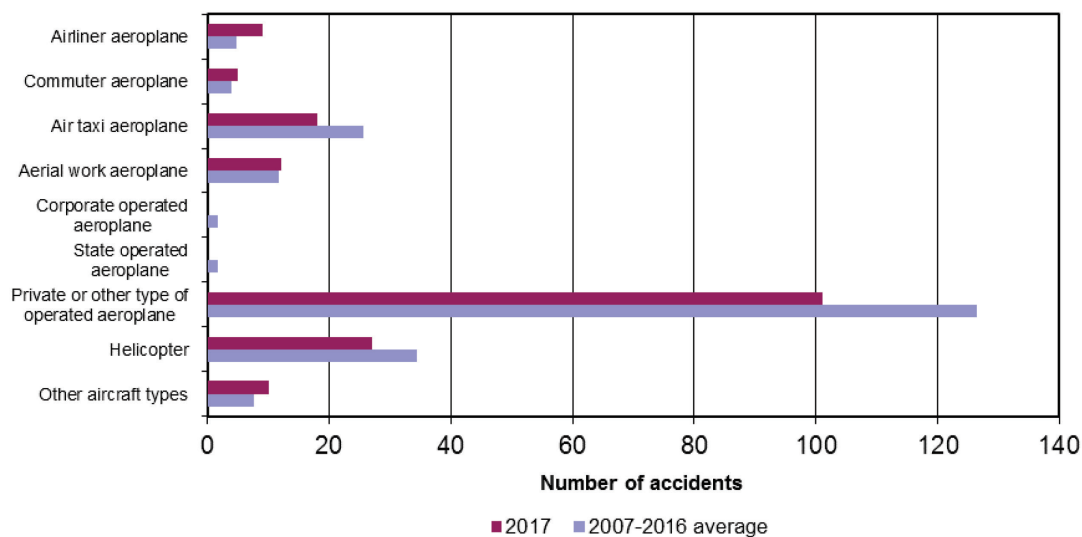
gyroplane, 1 balloon, and 3 unmanned aerial systems (UAS) of which 2 were fixed-wing and 1 was a rotary-wing UAS.

Seventy-five Canadian-registered commercially operated aeroplanes (10 airliners, 5 commuters, 19 air taxis, 13 aerial work, and 28 flight training aircraft) were involved in 71 accidents in 2017, which is an increase from 42 commercial accidents the previous year, and above the previous 10-year average of 67.3. The increase in commercial accidents is reflected in almost every category of operator, but most notably involved 9 airliner accidents (involving 10 aircraft) which is up from 1 commercial airliner accident in 2016, and above the previous 10-year average of 4.9. Two of the 9 airliner accidents that occurred in 2017 were formally investigated by the TSB. Three were low speed ground collisions, 2 involved injuries to cabin crew, 1 involved a lightning strike, and 1 involved damage related to engine failure. A further 27 accidents involved commercially-operated flight-training aircraft (in the category “other commercial type” in Table 2), which is up from 16 accidents in 2016, and above the 10-year average of 19.2 in this category.

Canadian-registered commercially operated aeroplanes were involved in 7 fatal accidents that resulted in a total of 14 fatalities in 2017. One fatal accident involved an airliner, 1 involved air taxi operations, 2 involved aerial work, and 3 involved flight training.

The number of accidents involving Canadian-registered private/other aeroplanes fell to 101 in 2017, 20% lower than the previous 10-year average of 126. In 2017, 10 of these accidents resulted in fatalities, down from 18 in 2016, and below the average of 14 for the previous 10 years.

Figure 2. Accidents involving Canadian-registered aircraft, by operation type, 2017



In 2017, 20 fatal accidents involved Canadian-registered aircraft other than ultra-lights (Figure 3), down somewhat from the 2016 total of 24, and below the average of 27 for the previous 10-year period.

ultra-light aircraft; all tables except Tables 1 and 4 also exclude balloons, gliders, gyrocopters, and UAVs, as does Figure 1.

The number of fatalities in 2017 (31), was lower than the 2016 total of 34, and well below the average of 49 for the previous 10-year period. However, the number of persons with serious injuries was 27, up from 17 in 2016, but still below the average of 34 over the previous 10 years (data not shown).

Figure 3. Fatalities and fatal accidents, 2007–2017



Of the 31 fatalities in 2017, 27 involved crew and 4 involved passengers. One additional fatality involved the pilot of an ultra-light aircraft.

Twenty-seven accidents involving Canadian-registered helicopters were tallied in 2017. This number was slightly lower than the average of 34 such accidents per year over the previous 10-year period. Two of the 27 accidents were fatal, accounting for 5 fatalities. The total number of fatal accidents (2) compares favourably with previous yearly averages of approximately 5, and the previous 10-year average of 11 (data not shown).

In 2017, 25 accidents in Canada involved Canadian-registered ultra-light aircraft. This is up slightly from 22 ultra-light accidents in 2016, and not far from the average of 27 accidents per year over the previous 10 years. One of these accidents was fatal, resulting in a single fatality.

In 2017, 7 accidents involved 8 foreign-registered aircraft in Canada, with no resulting fatalities.

Accidents by selected categories

Operation type (Table 6)

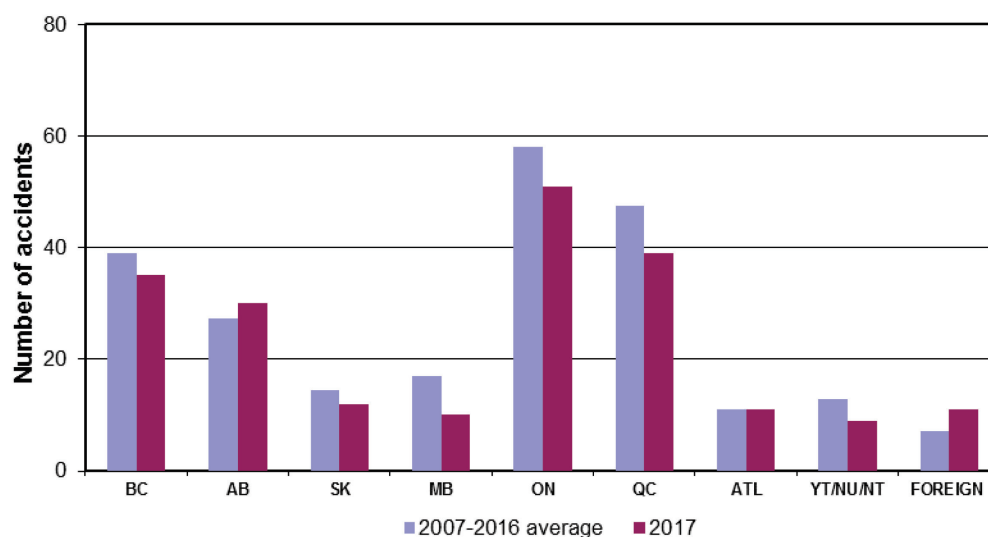
In 2017, there were 171 accidents involving Canadian-registered aeroplanes. These accidents occurred mainly on flights taken for: pleasure or travel (53%), training flights (18%), and commercial air transport (16%). Almost a quarter (22%) of helicopter accidents occurred on training flights. Categories where helicopter accidents have been more common in past years (air transport, and pleasure or travel)

represented fewer accidents in 2017. For instance, there were 3 helicopter accidents in air transport operations in 2017, whereas the previous 10-year average was 13.

Province/Territory (Table 8)

Of the accidents involving Canadian-registered aircraft in 2017, 43% occurred in Ontario or Quebec. This proportion is typical compared to previous years. British Columbia (17%) and Alberta (14%) also accounted for a sizeable share of accidents in 2017. Following the pattern of generally decreasing accident counts, most regions in Canada experienced fewer accidents than the previous 10-year average (Figure 4). Also, the number of accidents outside Canada involving Canadian-registered aircraft was above the previous 10-year average.

Figure 4. Accidents involving Canadian-registered aircraft, by province/territory, 2017



Accident events and phases

Accidents may be analyzed in more detail by examining the nature and distribution of selected events that contributed to an occurrence. Tables 11 through 14 show counts of accidents involving selected event types within each phase of flight.

Although a single accident may involve more than one event within a phase of flight, that accident is only counted once in the phase total. Therefore, the total number of accidents for each event within a phase will not sum to the total number of accidents within a phase. For example, in the "take-off" phase, if an accident involves both "loss of control" and "power loss" events, the accident is counted once in each event category within the phase, but only once in the overall phase total. As well, approximately 38% of aeroplane accidents and 29% of helicopter accidents involve events in more than one phase of flight (not including "post-impact"), so the number of accidents shown in Figure 5 and Figure 6 sum to more than the total number of accidents.

Over the past 11 years (2007–2017), the distribution of aeroplane accident events (Figure 5) shows the greatest numbers of events are associated with landing (56% of aeroplane accidents involve an event in

the landing phase) and take-off (23%) phases of flight, followed by en route (15%) and approach (13%) phases. The greatest numbers of helicopter accident events (Figure 6) were associated with landing (41%), manoeuvring⁵ (24%), en route (22%), takeoff (17%), and approach (12%) phases of flight.

Figure 5. Aeroplane accident events by phase of flight, 2007–2017

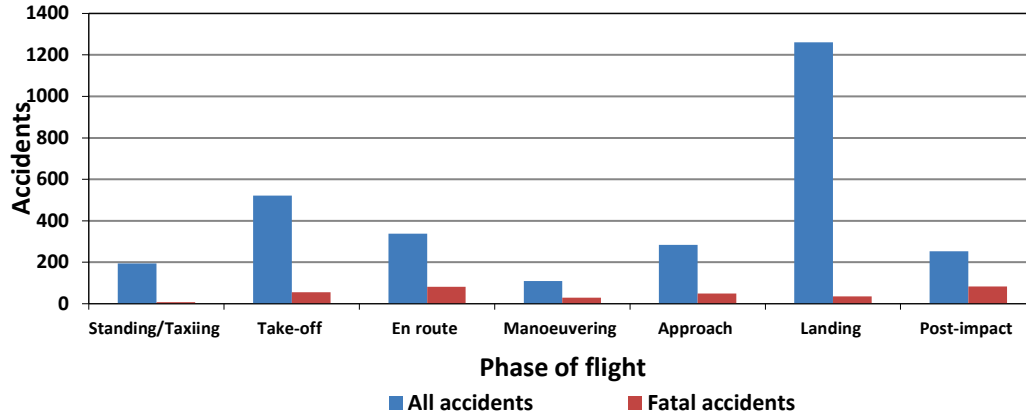
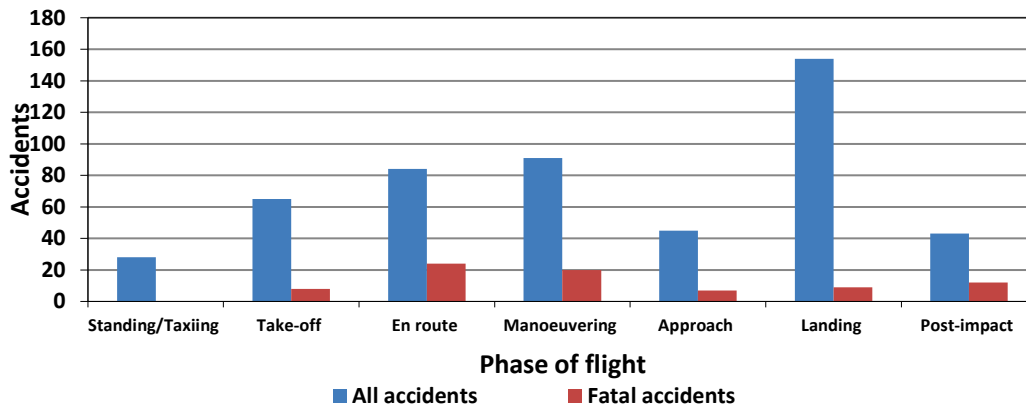


Figure 6. Helicopter accidents by event phase of flight, 2007–2017



From 2007 to 2017 (Table 11), of the 1261 aeroplane accidents with landing phase events, 21% involved collision with object, 21% involved missing or going off the runway, 21% involved landing gear collapse or retraction, and 20% involved a nosedown or overturning event. Of the 522 aeroplane accidents with take-off phase events, 28% involved collision with terrain, 27% involved collision with object, 25% involved loss of control, and 25% involved power loss.

Collision with terrain was the predominant event in fatal aeroplane accidents from 2007 to 2017 (Table 13). Collision with terrain was involved in 60% of the 55 fatal aeroplane accidents with takeoff phase events, 68% of 82 fatal aeroplane accidents with en route phase events, 80% of 30 fatal aeroplane accidents with manoeuvring phase events, 70% of 50 fatal aeroplane accidents with approach phase events, and 54% of 35 fatal aeroplane accidents with landing phase events.

⁵ Manoeuvring (i.e., low altitude/aerobatic flight operations) - does not occur on all flights.

From 2007 to 2017 (Table 12), of the 154 helicopter accidents with landing phase events, 25% involved a collision with object, 20% involved a hard landing, 19% involved collision with terrain, and 18% involved loss of control. Of the 91 helicopter accidents with manoeuvring phase events, 48% involved collision with terrain, 35% involved loss of control, and 25% involved an operations related event.

Collision with terrain was also the predominant event in fatal helicopter accidents from 2007 to 2017 (Table 14). Collision with terrain was involved in 6 of 8 fatal helicopter accidents with takeoff phase events, 17 of 24 fatal helicopter accidents with en route phase events, 13 of 20 fatal helicopter accidents with manoeuvring phase events, 3 of 7 fatal helicopter accidents with approach phase events, and 6 of 9 fatal helicopter accidents with landing phase events.

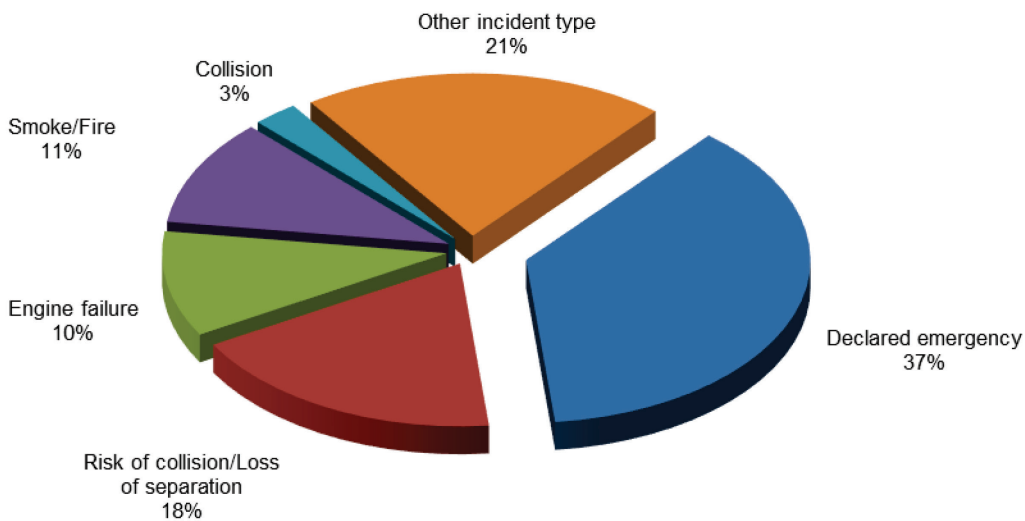
Incidents

Overview of Incidents

Pursuant to TSB mandatory incident reporting requirements, 934 incidents were reported in 2017, with 861 involving Canadian-registered aircraft. This is a 17% increase from the 2016 total of 737, and a 32% increase from the average of 653 for the previous 10 years. However, the apparent increase in incidents is largely explained by two recent changes. First, new regulations became effective 1 July 2014. Under the new reporting requirements, aviation incidents include aircraft having a maximum certificated take-off weight greater than 2250 kg (formerly 5700 kg) and aircraft being operated under an air operator certificate issued under the *Canadian Aviation Regulations (CARs) Part VII*. Second, the TSB has implemented changes to improve data capture for incidents involving Canadian-registered aircraft outside of Canada. This change took effect mid way through 2016. Together these changes substantially increased the number of reportable incidents.

In 2017, the most frequent incident types (Figure 7) involving all Canadian-registered and foreign-registered aircraft were: Declared emergency (37%), Risk of collision/Loss of separation (18%), and Smoke/Fire (11%).

Figure 7. Reportable incidents by type, 2017



Data tables

Table 1
Reportable aviation occurrences
2007-2017

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Accidents	323	294	297	288	257	291	276	249	251	230	240
Accidents in Canada involving Canadian-registered aircraft	300	274	271	273	240	267	262	238	232	214	222
Accidents outside Canada involving Canadian-registered aircraft	13	7	11	1	7	8	4	4	10	8	11
Accidents in Canada involving foreign-registered aircraft	10	15	15	14	10	17	10	7	9	8	7
Accidents by operator type	323	294	297	288	257	291	276	249	251	230	240
Commercial	128	125	114	109	99	92	84	82	74	63	96
Airliner (705)	4	6	2	6	6	5	7	4	9	1	9
Commuter (704)	4	6	6	7	6	5	3	2	3	3	5
Air taxi (703)	54	64	42	45	37	33	33	34	23	26	28
Aerial work (702)	34	19	21	29	27	26	21	17	18	16	18
Foreign/Other commercial type (a)	33	31	43	22	23	24	20	26	21	18	37
State	2	3	3	5	2	3	6	4	1	0	0
Corporate (b)	6	2	4	2	5	4	4	3	0	0	0
Private/Other operator type (c)	187	165	179	172	152	192	183	161	177	167	145
Accidents by aircraft type	323	294	297	288	257	291	276	249	251	230	240
Airplane	243	208	223	220	201	205	212	176	197	174	178
Helicopter	46	44	33	31	36	41	27	34	33	28	27
Ultralight	30	29	35	30	17	36	23	32	17	22	25
Other aircraft type (d)	5	13	7	7	3	9	15	8	7	6	10
Number of aircraft involved in accidents*	327	300	303	290	261	296	280	253	259	234	247
Airplanes	245	214	228	222	204	209	215	179	202	178	184
Helicopters	47	44	33	31	36	42	27	34	33	28	27
Ultralights	30	29	35	30	17	36	23	32	17	22	25
Other aircraft type (d)	5	13	7	7	4	9	15	8	7	6	11
Fatal accidents by aircraft type	38	38	34	37	35	42	38	14	29	29	21
Airplanes	25	16	21	29	23	25	25	12	20	22	17
Helicopter	6	9	8	3	8	7	6	0	5	2	2
Ultralight	5	12	4	3	3	8	4	2	4	4	1
Other aircraft type (d)	2	1	1	2	1	2	4	0	0	1	1
Fatalities	56	64	71	72	66	63	65	21	47	45	32
Serious injuries	65	51	45	36	49	48	22	36	32	18	33
Accidents in Canada involving foreign-registered aircraft	10	15	15	14	10	17	10	7	9	8	7
Fatal accidents	0	0	2	2	2	1	2	2	3	1	0
Fatalities	0	0	2	2	2	1	2	4	4	7	0
Serious injuries	2	5	3	1	1	4	0	1	0	0	0
Occurrences with a dangerous good release	4	1	3	1	0	1	4	4	6	7	8
Incidents (e)	874	887	790	813	677	636	686	739	789	833	934
Incidents in Canada involving Canadian-registered aircraft	622	650	591	582	521	481	540	596	649	614	676
Incidents outside Canada involving Canadian-registered aircraft	69	78	67	82	55	49	39	58	62	123	185
Incidents in Canada involving foreign-registered aircraft	224	195	155	188	127	129	126	100	106	117	106
Incidents by type (e)	874	887	790	813	677	636	686	739	789	833	934
Risk of collision/Loss of separation	168	172	153	206	120	101	115	94	111	139	171
Declared emergency	298	314	313	310	275	260	291	313	333	311	348
Engine failure	129	120	107	87	95	90	83	104	110	110	98
Smoke/Fire	123	107	97	80	88	71	67	88	87	85	99
Collision	13	8	9	4	7	5	15	16	8	18	24
Other incident type	143	166	111	126	92	109	115	124	140	170	194

Data extracted February 11, 2018

Accidents and reportable incidents are reported in accordance with the TSB's regulations for mandatory reporting of occurrences.

Breakdowns may not add up to totals. For example, in the total "Accidents by aircraft type", when an occurrence involves an airplane and a helicopter, the occurrence is counted in each category, but only once in the total.

* "Number of aircraft involved in accidents" are aircraft counts, all other data are accident counts.

a. Includes foreign commercial operations (part 701), and flight training units (part 406).

b. Beginning in February of 2015, corporate operators are counted as private operators.

c. Includes private operators (part 604), recreational, and foreign private operations.

d. Includes balloons, gyroplanes, gliders, dirigibles, hang gliders, unmanned aerial vehicles (UAV) and similar aircraft types.

e. New TSB regulations came into effect on July 1, 2014. Under new reporting requirements aviation incidents include: a) aircraft having a maximum certificated take-off weight greater than 2 250 kg (formerly 5700 kg); b) aircraft being operated under an air operator certificate issued under CARs Part VII.

Table 2
Occurrences involving Canadian-registered aircraft
2007-2017

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Accidents by aircraft and operator type (a)	284	252	249	244	230	239	243	212	227	200	208
Aeroplane accidents	234	197	210	209	192	191	204	170	190	167	171
Commercial	84	85	88	77	71	62	58	55	51	42	71
Airliner (705)	4	6	2	6	5	5	7	4	9	1	9
Commuter (704)	4	6	5	6	4	5	3	1	3	3	5
Air taxi (703)	40	41	34	29	26	19	19	19	12	16	18
Aerial work (702)	11	12	11	18	14	14	12	8	10	7	12
Other commercial type (b)	25	21	36	18	22	19	17	23	17	16	27
State	1	3	1	3	2	1	2	3	1	0	0
Corporate (c)	4	2	2	2	2	1	3	1	0	0	0
Private/Other operator type (d)	145	107	122	127	118	127	142	112	139	125	101
Helicopter accidents	45	42	32	29	35	41	27	34	32	27	27
Commercial	36	33	22	27	26	28	22	26	23	18	21
State	1	0	0	0	0	2	1	1	0	0	0
Corporate (c)	2	0	1	0	1	1	0	0	0	0	0
Private/Other operator type (d)	6	9	9	2	8	10	4	7	9	9	6
Other aircraft type (e)	5	13	7	6	3	7	13	8	7	6	10
Fatal accidents by aircraft and operator type (a)	33	26	28	32	30	33	32	10	23	24	20
Aeroplane accidents	25	16	20	28	21	25	24	10	18	21	17
Commercial	10	3	6	12	11	6	8	2	6	3	7
Airliner (705)	0	0	0	0	1	0	0	0	0	0	1
Commuter (704)	1	0	0	1	1	1	1	0	0	0	0
Air taxi (703)	5	3	5	7	6	3	5	1	3	1	1
Aerial work (702)	1	0	0	4	2	2	1	1	2	1	2
Other commercial type (b)	3	0	1	0	1	0	1	0	1	1	3
State	0	0	0	0	0	0	0	0	0	0	0
Corporate (c)	1	2	0	0	0	0	1	0	0	0	0
Private/Other operator type (d)	14	11	14	16	10	19	15	8	13	18	10
Helicopter accidents	6	9	7	3	8	7	6	0	5	2	2
Other aircraft type (e)	2	1	1	1	1	1	3	0	0	1	1
Fatalities (a)	50	51	64	66	61	54	59	15	40	34	31
Serious injuries (a)	56	41	34	31	43	38	19	29	29	17	27
Incidents by type (f)	691	728	658	664	576	530	579	654	711	737	861
Risk of collision/Loss of separation	152	149	137	179	106	92	105	84	101	127	158
Declared emergency	186	234	237	238	224	200	231	277	290	263	316
Engines failure	108	98	94	67	87	77	70	94	102	102	88
Smoke/Fire	106	90	84	69	67	59	55	76	79	75	94
Collision	9	7	7	3	7	4	14	15	7	16	23
Other incident type	130	150	99	108	85	98	104	108	132	154	182
Accidents involving ultralight aircraft	30	29	34	30	17	36	23	31	16	22	25
Fatal accidents	5	12	4	3	3	8	4	2	3	4	1
Fatalities	6	13	5	4	3	8	4	2	3	4	1
Serious injuries	7	5	8	4	5	6	3	6	3	1	6

Data extracted February 11, 2018

Accidents and reportable incidents are reported in accordance with the TSB's regulations for mandatory reporting of occurrences.

Breakdowns may not add up to totals. For example, in the total "Number of accidents by aircraft type", when an occurrence involves an airplane and a helicopter, the occurrence is counted in each category, but only once in the total.

a. Accidents involving Canadian-registered aircraft, excluding ultralights.

b. Includes foreign commercial operations (part 701), and flight training units (part 406).

c. Beginning in February of 2015, corporate operators are counted as private operators.

d. Includes private operators (part 604), recreational, and foreign private operations.

e. Includes balloons, gyroplanes, gliders, dirigibles, hang gliders, unmanned aerial vehicles (UAV) and similar aircraft types.

f. New TSB regulations came into effect on July 1, 2014. Under new reporting requirements aviation incidents include: a) aircraft having a maximum certificated take-off weight greater than 2 250 kg (formerly 5700 kg); b) aircraft being operated under an air operator certificate issued under CARS Part VII.

Table 3a**Accident rates involving Canadian-registered aircraft (per hours flown, excluding ultralights and other aircraft types)****2007-2017**

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Accidents	279	239	242	238	227	232	231	204	222	194	198
Fatal accidents	31	25	27	31	29	32	30	10	23	23	19
Fatalities	47	50	63	65	59	53	57	15	40	33	30
Hours flown (thousands) (a)	4,198	4,239	3,869	3,992	4,279	4,391	4,295	4,272	4,318	4,492	4,565
Accidents per 100,000 hours	6.6	5.6	6.3	6.0	5.3	5.3	5.4	4.8	5.1	4.3	4.3
Fatal accidents per 100,000 hours	0.7	0.6	0.7	0.8	0.7	0.7	0.7	0.2	0.5	0.5	0.4
Fatalities per 100,000 hours	1.1	1.2	1.6	1.6	1.4	1.2	1.3	0.4	0.9	0.7	0.7

Data extracted February 11, 2018

Accidents are reported in accordance with the TSB's regulations for mandatory reporting of occurrences.

Canadian-registered aircraft, excluding ultralights, balloons, gyroplanes, gliders, dirigibles, hang gliders and similar aircraft types.

a. Source: Transport Canada (2013 to 2017 hours flown are estimated).

Table 3b**Aircraft accident rates in Canada (per movements, excluding ultralights and other aircraft types)****2007-2017**

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Accidents	277	245	246	250	230	238	235	206	220	196	195
Fatal accidents	30	21	28	32	30	31	28	11	21	23	17
Fatalities	44	43	64	66	60	52	52	17	39	37	28
Aircraft movements (thousands) (a)	6,722	6,751	6,443	6,327	6,179	6,157	6,024	6,009	6,015	6,013	6,123
Accidents per 100,000 aircraft movements	4.1	3.6	3.8	4.0	3.7	3.9	3.9	3.4	3.7	3.3	3.2
Fatal accidents per 100,000 aircraft movements	0.4	0.3	0.4	0.5	0.5	0.5	0.5	0.2	0.3	0.4	0.3
Fatalities per 100,000 aircraft movements	0.7	0.6	1.0	1.0	1.0	0.8	0.9	0.3	0.6	0.6	0.5

Data extracted February 11, 2018

Accidents are reported in accordance with the TSB's regulations for mandatory reporting of occurrences.

Excluding ultralights, balloons, gyroplanes, gliders, dirigibles, hang gliders and similar aircraft types.

a. Source: Statistics Canada (2017 movements are estimated).

Table 4
Aircraft accident fatalities
2007-2017

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Fatalities	56	64	71	72	66	63	65	21	47	45	32
Fatalities in Canada involving Canadian-registered aircraft	53	57	67	70	63	61	57	15	39	35	30
Fatalities outside Canada involving Canadian-registered aircraft	3	7	2	0	1	1	6	2	4	3	2
Fatalities in Canada involving foreign-registered aircraft	0	0	2	2	2	1	2	4	4	7	0
Fatalities by operator type	56	64	71	72	66	63	65	21	47	45	32
Commercial	25	25	39	36	40	18	29	4	20	6	14
Airliner (705)	0	0	0	0	12	0	0	0	0	0	1
Commuter (704)	1	0	17	1	2	1	5	0	0	0	0
Air taxi (703)	10	20	18	28	16	12	19	2	12	1	1
Aerial work (702)	9	5	1	7	8	3	4	2	6	2	7
Foreign/Other commercial type (a)	6	0	3	0	2	2	1	0	2	3	5
State	0	0	0	0	0	1	0	0	0	0	0
Corporate (b)	1	7	0	0	2	0	1	0	0	0	0
Private/Other operator type (c)	30	32	32	36	24	44	35	17	29	39	18
Crew fatalities by operator type	37	35	35	40	37	40	44	15	29	25	28
Commercial	17	8	12	17	20	11	21	3	10	3	13
Airliner (705)	0	0	0	0	4	0	0	0	0	0	0
Commuter (704)	0	0	2	1	2	0	2	0	0	0	0
Air taxi (703)	7	6	7	11	7	7	14	1	4	1	1
Aerial work (702)	6	2	1	5	5	2	4	2	4	1	7
Foreign/Other commercial type (a)	5	0	2	0	2	2	1	0	2	1	5
State	0	0	0	0	0	1	0	0	0	0	0
Corporate (b)	1	2	0	0	2	0	1	0	0	0	0
Private/Other operator type (c)	19	25	23	23	15	28	22	12	21	22	15
Passenger fatalities by operator type	19	28	36	31	29	22	20	6	18	20	4
Commercial	8	16	27	18	20	6	8	1	10	3	1
Airliner (705)	0	0	0	0	8	0	0	0	0	0	1
Commuter (704)	1	0	15	0	0	1	3	0	0	0	0
Air taxi (703)	3	14	11	16	9	5	5	1	8	0	0
Aerial work (702)	3	2	0	2	3	0	0	0	2	1	0
Foreign/Other commercial type (a)	1	0	1	0	0	0	0	0	0	2	0
State	0	0	0	0	0	0	0	0	0	0	0
Corporate (b)	0	5	0	0	0	0	0	0	0	0	0
Private/Other operator type (c)	11	7	9	13	9	16	12	5	8	17	3
Ground fatalities	0	1	0	1	0	1	1	0	0	0	0
Fatalities by aircraft type	56	64	71	72	66	63	65	21	47	45	32
Aeroplane	39	34	38	59	46	44	46	19	35	37	25
Helicopter	8	16	27	7	15	9	12	0	8	3	5
Ultralight	6	13	5	4	3	8	4	2	4	4	1
Other aircraft type (d)	3	1	1	2	2	2	7	0	0	1	1

Data extracted February 11, 2018

Accidents are reported in accordance with the TSB's regulations for mandatory reporting of occurrences.

Breakdowns may not add up to totals. For example, in the total "Fatalities by aircraft type", when an occurrence involves an airplane and a helicopter, a fatality is counted in each category, but only once in the total.

a. Includes foreign commercial operations (part 701), and flight training units (part 406).

b. Beginning in February of 2015, corporate operators are counted as private operators.

c. Includes private operators (part 604), recreational, and foreign private operations.

d. Includes balloons, gyroplanes, gliders, dirigibles, hang gliders, unmanned aerial vehicles (UAV) and similar aircraft types.

Table 5
Aircraft accident serious injuries
2007-2017

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Serious injuries	65	50	45	36	49	48	22	36	32	18	33
Serious injuries in Canada involving Canadian-registered aircraft	61	45	41	35	39	39	22	35	28	17	31
Serious injuries outside Canada involving Canadian-registered aircraft	2	0	1	0	9	5	0	0	4	1	2
Serious injuries in Canada involving foreign-registered aircraft	2	5	3	1	1	4	0	1	0	0	0
Serious injuries by operator type	65	50	45	36	49	48	22	36	32	18	33
Commercial	33	25	14	18	31	22	11	10	15	8	12
Airliner (705)	0	1	1	1	10	1	0	0	3	2	8
Commuter (704)	1	2	1	4	7	2	2	0	0	0	0
Air taxi (703)	15	18	6	7	9	15	6	5	8	4	0
Aerial work (702)	14	3	3	5	5	1	3	3	3	2	2
Foreign/Other commercial type (a)	3	1	3	1	0	3	0	2	1	0	2
State	3	0	2	1	0	0	0	0	0	0	0
Corporate (b)	1	0	3	0	0	0	0	0	0	0	0
Private/Other operator type (c)	28	25	26	17	18	26	11	26	17	10	21
Crew serious injuries by operator type	30	25	26	22	18	24	13	23	18	8	22
Commercial	11	12	8	8	6	6	4	5	6	3	7
Airliner (705)	0	0	0	0	0	0	0	0	1	0	3
Commuter (704)	1	0	0	1	0	2	0	0	0	0	0
Air taxi (703)	3	9	2	2	2	1	2	2	2	2	0
Aerial work (702)	6	2	3	4	4	1	2	1	3	1	2
Foreign/Other commercial type (a)	1	1	3	1	0	2	0	2	0	0	2
State	1	0	1	1	0	0	0	0	0	0	0
Corporate (b)	0	0	2	0	0	0	0	0	0	0	0
Private/Other operator type (c)	18	13	15	13	12	18	9	18	12	5	15
Passenger serious injuries by operator type	32	25	19	13	30	23	8	12	14	8	11
Commercial	22	13	6	10	24	15	6	5	9	4	5
Airliner (705)	0	1	1	1	10	0	0	0	2	2	5
Commuter (704)	0	2	1	3	7	0	2	0	0	0	0
Air taxi (703)	12	9	4	5	7	14	4	3	6	2	0
Aerial work (702)	8	1	0	1	0	0	0	2	0	0	0
Foreign/Other commercial type (a)	2	0	0	0	0	1	0	0	1	0	0
State	2	0	1	0	0	0	0	0	0	0	0
Corporate (b)	1	0	1	0	0	0	0	0	0	0	0
Private/Other operator type (c)	7	12	11	3	6	8	2	7	5	4	6
Ground serious injuries	3	0	0	1	1	1	1	1	0	2	0
Serious injuries by aircraft type	65	50	45	36	49	48	22	36	32	18	33
Aeroplane	32	29	24	28	36	31	13	21	24	10	23
Helicopter	13	14	11	3	8	7	6	7	5	6	3
Ultralight	7	5	8	4	5	6	3	7	3	1	6
Other aircraft type (d)	13	2	2	1	0	4	0	1	0	1	1

Data extracted February 11, 2018

Accidents are reported in accordance with the TSB's regulations for mandatory reporting of occurrences.

Breakdowns may not add up to totals. For example, in the total "Fatalities by aircraft type", when an occurrence involves an airplane and a helicopter, a fatality is counted in each category, but only once in the total.

a. Includes foreign commercial operations (part 701), and flight training units (part 406).

b. Beginning in February of 2015, corporate operators are counted as private operators.

c. Includes private operators (part 604), recreational, and foreign private operations.

d. Includes balloons, gyroplanes, gliders, dirigibles, hang gliders, unmanned aerial vehicles (UAV) and similar aircraft types.

Table 6
Accidents involving Canadian-registered aeroplanes and helicopters by operation type
2007-2017

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Aeroplane accidents by operation type	234	197	210	209	192	191	204	170	190	167	171
Training	33	30	43	28	28	27	24	27	16	20	31
Pleasure/Travel	118	83	109	108	102	109	127	96	125	111	90
Business	15	7	4	6	7	4	2	9	1	3	1
Forest fire management	0	1	3	2	1	2	3	2	2	1	0
Test/Demonstration/Ferry	8	4	0	6	4	4	4	5	2	2	4
Aerial application	8	9	4	10	4	3	7	4	5	6	6
Inspection	0	1	1	1	0	1	1	0	1	0	1
Air transport	40	46	34	37	35	28	26	22	22	16	27
Air ambulance	2	3	5	2	1	1	0	1	0	3	1
Sightseeing	1	2	2	1	2	6	1	1	1	0	1
Other/Unknown	9	11	8	9	10	8	11	4	16	6	10
Aeroplane fatal accidents by operation type	25	16	20	28	21	25	24	10	18	21	17
Training	3	0	1	1	1	1	2	1	1	1	3
Pleasure/Travel	10	8	13	15	10	16	11	7	12	15	7
Business	1	2	1	1	0	1	1	1	0	1	0
Forest fire management	0	0	0	2	0	0	0	0	1	0	0
Test/Demonstration/Ferry	4	1	0	0	0	1	1	0	0	1	0
Aerial application	1	1	0	0	0	0	1	0	0	2	1
Inspection	0	0	0	0	0	0	0	0	0	0	0
Air transport	4	3	4	7	8	4	5	1	2	1	2
Air ambulance	1	0	1	0	0	0	0	0	0	0	0
Sightseeing	1	0	0	0	1	0	0	0	1	0	0
Other/Unknown	0	1	0	2	1	3	3	0	2	0	4
Helicopter accidents by operation type	45	42	32	29	35	41	27	34	32	27	27
Training	3	6	5	0	2	1	1	2	5	1	6
Pleasure/Travel	4	9	5	2	9	8	2	7	8	9	4
Business	5	0	3	0	0	3	1	0	1	0	0
Forest fire management	0	0	4	1	2	1	3	0	2	0	2
Test/Demonstration/Ferry	3	0	0	1	1	0	1	0	0	0	0
Aerial application	2	1	0	3	1	5	0	1	2	1	3
Inspection	1	0	0	1	2	2	2	3	0	1	0
Air transport	16	22	10	15	13	9	8	18	10	7	3
Air ambulance	0	1	0	0	0	1	2	0	0	0	1
Sightseeing	0	0	1	0	0	1	0	1	0	0	1
Other/Unknown	12	3	4	6	5	10	7	2	4	8	7
Fatal helicopter accidents by operation type	6	9	7	3	8	7	6	0	5	2	2
Training	0	0	1	0	1	1	0	0	0	0	0
Pleasure/Travel	0	3	2	0	2	0	0	0	0	1	0
Business	1	0	0	0	0	1	0	0	1	0	0
Forest fire management	0	0	1	0	1	0	0	0	0	0	0
Test/Demonstration/Ferry	0	0	0	1	1	0	0	0	0	0	0
Aerial application	0	0	0	0	0	0	0	0	1	0	0
Inspection	1	0	0	0	1	0	1	0	0	0	0
Air transport	3	4	3	2	1	1	3	0	3	0	0
Air ambulance	0	0	0	0	0	0	1	0	0	0	0
Sightseeing	0	0	0	0	0	1	0	0	0	0	0
Other/Unknown	2	2	0	0	1	3	1	0	0	1	2

Data extracted February 11, 2018

Accidents are reported in accordance with the TSB's regulations for mandatory reporting of occurrences.

Breakdowns may not add up to totals. For example, in the total "Airplane accidents by operation type", when an occurrence involves a Business and an Inspection airplane, the occurrence is counted in each category, but only once in the total.

Canadian-registered aircraft, excluding ultralights, balloons, gyroplanes, gliders, dirigibles, hang gliders and similar aircraft types.

Table 7
Aircraft accidents by province/territory
2007-2017

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Accidents by province/territory	323	294	297	288	257	291	276	249	251	230	240
Newfoundland and Labrador	6	7	3	3	3	5	3	5	6	5	4
Prince Edward Island	0	0	1	0	0	0	0	0	0	0	2
Nova Scotia	4	6	3	7	5	5	5	3	6	2	3
New Brunswick	8	1	2	5	3	3	2	6	2	5	7
Quebec	72	58	68	65	58	71	66	69	51	34	44
Ontario	81	69	74	71	63	67	72	67	74	50	62
Manitoba	18	27	19	27	17	18	13	12	14	17	10
Saskatchewan	23	19	14	18	18	9	19	12	13	10	13
Alberta	32	33	31	25	22	35	29	33	23	38	35
British Columbia	46	44	39	47	43	54	51	30	42	53	39
Yukon	7	7	4	3	8	8	4	4	6	2	4
Northwest Territories	8	8	6	9	6	5	3	3	2	3	2
Nunavut	5	8	2	7	4	3	4	1	2	3	3
Other air space under Canadian air traffic control	0	0	0	0	0	0	1	0	0	0	1
Outside Canada	13	7	11	1	7	8	4	4	10	8	11
Fatal accidents by province/territory	38	38	34	37	35	42	38	14	29	29	21
Newfoundland and Labrador	1	0	2	1	0	0	0	0	1	0	0
Prince Edward Island	0	0	1	0	0	0	0	0	0	0	0
Nova Scotia	1	0	0	1	1	0	1	1	1	0	0
New Brunswick	0	0	0	2	0	0	0	1	0	1	0
Quebec	6	5	10	10	5	10	5	2	7	7	4
Ontario	6	7	6	9	6	10	9	5	6	5	4
Manitoba	3	1	0	1	1	3	2	0	1	1	3
Saskatchewan	5	0	2	0	3	1	2	1	2	2	2
Alberta	3	8	1	2	4	6	4	1	3	4	3
British Columbia	10	10	8	7	10	9	10	2	4	8	2
Yukon	1	1	1	0	1	1	0	0	0	0	1
Northwest Territories	1	2	1	3	2	0	1	0	0	0	0
Nunavut	0	0	0	1	1	1	0	0	0	0	0
Other air space under Canadian air traffic control	0	0	0	0	0	0	1	0	0	0	0
Outside Canada	1	4	2	0	1	1	3	1	4	1	2
Fatalities by province/territory	56	64	71	72	66	63	65	21	47	45	32
Newfoundland and Labrador	1	0	18	2	0	0	0	0	1	0	0
Prince Edward Island	0	0	1	0	0	0	0	0	0	0	0
Nova Scotia	1	0	0	2	1	0	1	1	1	0	0
New Brunswick	0	0	0	2	0	0	0	2	0	2	0
Quebec	7	7	16	28	9	11	5	2	16	15	6
Ontario	7	8	12	14	9	19	19	8	10	5	9
Manitoba	5	1	0	1	1	4	5	0	1	2	4
Saskatchewan	6	0	4	0	7	5	3	2	3	2	3
Alberta	5	12	1	4	5	6	5	1	4	4	5
British Columbia	17	26	14	15	16	15	17	3	7	12	2
Yukon	1	1	1	0	1	1	0	0	0	0	1
Northwest Territories	3	2	2	3	4	0	1	0	0	0	0
Nunavut	0	0	0	1	12	1	0	0	0	0	0
Other air space under Canadian air traffic control	0	0	0	0	0	0	3	0	0	0	0
Outside Canada	3	7	2	0	1	1	6	2	4	3	2

Data extracted February 11, 2018

Accidents are reported in accordance with the TSB's regulations for mandatory reporting of occurrences.

Table 8
Accidents involving Canadian-registered aircraft by province/territory (excluding ultralights)
2007-2017

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Accidents by province/territory	284	252	249	244	230	239	243	212	227	200	208
Newfoundland and Labrador	5	5	3	3	3	5	3	4	6	4	3
Prince Edward Island	0	0	1	0	0	0	0	0	0	0	1
Nova Scotia	3	2	1	7	3	3	5	2	5	2	2
New Brunswick	7	1	2	4	3	3	2	6	2	5	5
Quebec	61	50	60	52	52	52	57	57	44	28	39
Ontario	71	62	61	55	56	54	59	53	66	43	51
Manitoba	17	24	19	25	16	15	13	11	13	17	10
Saskatchewan	21	18	12	18	17	8	18	10	12	10	12
Alberta	31	28	28	24	18	30	27	31	21	36	30
British Columbia	36	33	44	38	39	46	44	27	39	43	35
Yukon	6	7	2	3	7	7	4	4	6	1	4
Northwest Territories	8	8	5	8	6	5	3	2	2	3	2
Nunavut	5	7	1	6	3	3	3	1	1	2	3
Other air space under Canadian air traffic control	0	0	0	0	0	0	1	0	0	0	0
Outside Canada	13	7	10	1	7	8	4	4	10	6	11
Fatal accidents by province/territory	33	26	28	32	30	33	32	10	23	24	20
Newfoundland and Labrador	1	0	2	1	0	0	0	0	1	0	0
Prince Edward Island	0	0	1	0	0	0	0	0	0	0	0
Nova Scotia	0	0	0	1	0	0	1	0	0	0	0
New Brunswick	0	0	0	2	0	0	0	1	0	1	0
Quebec	4	4	8	9	5	4	3	1	6	5	4
Ontario	6	4	5	8	4	9	6	3	5	3	4
Manitoba	3	1	0	1	1	3	2	0	0	1	3
Saskatchewan	4	0	1	0	3	1	2	1	2	2	2
Alberta	3	4	1	2	3	5	4	1	3	4	3
British Columbia	9	6	8	5	9	8	9	2	2	7	1
Yukon	1	1	0	0	1	1	0	0	0	0	1
Northwest Territories	1	2	1	2	2	0	1	0	0	0	0
Nunavut	0	0	0	1	1	1	0	0	0	0	0
Other air space under Canadian air traffic control	0	0	0	0	0	0	1	0	0	0	0
Outside Canada	1	4	1	0	1	1	3	1	4	1	2
Fatalities by province/territory	50	51	64	66	61	54	59	15	40	34	31
Newfoundland and Labrador	1	0	18	2	0	0	0	0	1	0	0
Prince Edward Island	0	0	1	0	0	0	0	0	0	0	0
Nova Scotia	0	0	0	2	0	0	1	0	0	0	0
New Brunswick	0	0	0	2	0	0	0	2	0	2	0
Quebec	5	6	14	27	9	5	3	1	15	7	6
Ontario	7	4	11	12	7	18	16	4	9	3	9
Manitoba	5	1	0	1	1	4	5	0	0	2	4
Saskatchewan	5	0	2	0	7	5	3	2	3	2	3
Alberta	5	8	1	4	4	5	5	1	4	4	5
British Columbia	15	22	14	13	15	14	16	3	4	11	1
Yukon	1	1	0	0	1	1	0	0	0	0	1
Northwest Territories	3	2	2	2	4	0	1	0	0	0	0
Nunavut	0	0	0	1	12	1	0	0	0	0	0
Other air space under Canadian air traffic control	0	0	0	0	0	0	3	0	0	0	0
Outside Canada	3	7	1	0	1	1	6	2	4	3	2

Data extracted February 11, 2018

Accidents are reported in accordance with the TSB's regulations for mandatory reporting of occurrences.

Table 9
Reportable aircraft incidents
2007-2017

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Incidents by type	874	887	790	813	677	636	686	739	789	833	934
Risk of collision/Loss of separation	168	172	153	206	120	101	115	94	111	139	171
Declared emergency	298	314	313	310	275	260	291	313	333	311	348
Engine failure	129	120	107	87	95	90	83	104	110	110	98
Smoke/Fire	123	107	97	80	88	71	67	88	87	85	99
Collision	13	8	9	4	7	5	15	16	8	18	24
Control difficulties	41	39	24	32	31	33	25	40	29	35	33
Crew unable to perform duties	65	78	59	50	26	40	58	36	46	66	78
Dangerous goods-related	3	1	3	1	0	1	3	4	0	2	0
Depressurization	13	17	6	11	16	15	14	12	16	14	20
Fuel shortage	8	7	4	9	6	7	2	6	17	15	17
Failure to remain in landing area	9	18	9	13	11	10	9	20	17	19	22
Incorrect fuel	0	1	0	0	0	0	0	0	0	1	3
Shmg load released	3	5	3	9	1	1	4	5	14	15	20
Transmission or gearbox failure	1	0	3	1	1	2	0	1	1	3	1
Incidents by operator type	874	887	790	813	677	636	686	739	789	833	934
Commercial	823	858	754	780	640	601	653	697	741	785	883
Airliner (705)	563	590	499	519	448	409	450	428	437	490	610
Commuter (704)	75	94	88	86	75	78	90	105	82	77	72
Air taxi (703)	26	36	43	29	29	26	35	81	119	106	103
Aerial work (702)	20	24	32	28	15	11	12	34	48	43	54
Foreign/Other commercial type (a)	200	186	146	181	114	113	113	85	83	111	91
State	28	16	22	23	13	20	20	13	15	8	15
Corporate (b)	43	21	26	18	22	20	20	18	4	0	0
Private/Other operator type (c)	20	28	21	22	25	19	15	31	62	64	69
Incidents by aircraft type	874	887	790	813	677	636	686	739	789	833	934
Asroplane	854	870	772	788	659	624	670	713	749	795	888
Helicopter	22	19	21	32	20	17	20	30	47	38	51
Ultralight/Other aircraft type (d)	0	0	1	2	0	0	0	3	8	7	4
Number of aircraft involved in incidents (e)	1031	1052	916	976	780	733	797	828	887	957	1058
Asroplane	1009	1033	893	942	760	716	777	795	832	912	1002
Helicopters	22	19	22	32	20	17	20	30	47	38	52
Ultralight/Other aircraft type (d)	0	0	1	2	0	0	0	3	8	7	4
Incidents by province/territory	874	887	790	813	677	636	686	739	789	833	934
Newfoundland and Labrador	19	21	16	30	14	17	29	22	30	31	27
Prince Edward Island	1	2	2	0	1	0	2	0	1	4	1
Nova Scotia	26	20	18	25	19	17	11	22	19	17	22
New Brunswick	17	12	5	10	7	7	7	8	9	9	4
Quebec	127	127	97	108	126	107	122	89	116	109	138
Ontario	263	273	195	176	178	155	166	157	152	166	228
Manitoba	52	59	46	51	31	31	31	51	54	47	49
Saskatchewan	19	28	18	19	11	18	27	32	21	25	19
Alberta	80	89	106	84	82	81	103	98	117	110	107
British Columbia	133	120	162	156	76	101	99	132	154	137	101
Yukon	4	4	6	4	3	4	5	6	6	5	5
Northwest Territories	27	27	14	21	30	17	16	25	17	9	20
Nunavut	14	17	8	21	19	19	10	20	15	15	15
Other air space under Canadian air traffic control	23	10	30	26	25	13	19	19	16	26	13
Outside Canada	69	78	67	82	55	49	39	58	62	123	185

Data extracted February 11, 2018

Reportable incidents are reported in accordance with the TSB's regulations for mandatory reporting of occurrences.

New TSB regulations came into effect on July 1, 2014. Under new reporting requirements aviation incidents include: a) aircraft having a maximum certificated take-off weight greater than 2 250 kg (formerly 5700 kg); b) aircraft being operated under an air operator certificate issued under CARS Part VII.

Breakdowns may not add up to totals. For example, in the total "Incidents by aircraft type", when an occurrence involves an airplane and a helicopter, the occurrence is counted in each category, but only once in the total.

a. Includes foreign commercial operations (part 701), and flight training units (part 406).

b. Beginning in February of 2015, corporate operators are counted as private operators.

c. Includes private operators (part 604), recreational, and foreign private operations.

d. Includes balloons, gyroplanes, gliders, dirigibles, hang gliders, unmanned aerial vehicles (UAV) and similar aircraft types.

e. "Number of aircraft involved in incidents" are aircraft counts, all other data are incident counts.

Table 10
Reportable incidents involving Canadian-registered aircraft
2007-2017

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Incidents by type	691	728	658	664	576	530	579	654	711	737	861
Risk of collision/Loss of separation	152	149	137	179	106	92	105	84	101	127	158
Declared emergency	186	234	237	238	224	200	231	277	290	263	316
Engine failure	108	98	94	67	87	77	70	94	102	102	88
Smoke/Fire	106	90	84	69	67	59	55	76	79	75	94
Collision	9	7	7	3	7	4	14	15	7	16	23
Control difficulties	38	32	18	24	27	31	22	36	28	30	32
Crew unable to perform duties	63	76	57	49	26	38	56	35	44	65	74
Dangerous goods-related	3	1	3	1	0	1	3	3	0	2	0
Depressurization	11	15	3	10	15	13	10	10	14	13	18
Fuel shortage	4	4	4	6	5	4	2	3	15	11	16
Failure to remain in landing area	7	16	8	8	10	9	7	17	17	14	18
Incorrect fuel	0	1	0	0	0	0	0	0	0	1	3
Slung load released	3	5	3	9	1	1	4	4	13	15	20
Transmission or gearbox failure	1	0	3	1	1	1	0	0	1	3	1
Incidents by operator type	691	728	658	664	576	530	579	654	711	737	861
Commercial	660	704	630	640	550	504	552	622	674	705	820
Airliner (705)	563	585	495	518	445	409	449	426	436	489	609
Commuter (704)	75	94	88	86	75	78	90	105	82	77	72
Air taxi (703)	26	36	43	29	29	25	35	81	119	106	103
Aerial work (702)	17	24	31	28	15	11	12	31	47	43	54
Other commercial type (a)	40	37	27	41	27	17	13	15	18	32	29
State	27	15	19	19	13	17	19	11	15	6	13
Corporate (b)	23	17	18	15	13	15	15	11	2	0	0
Private/Other operator type (c)	18	26	20	19	21	16	14	27	52	49	58
Incidents by aircraft type	691	728	658	664	576	530	579	654	711	737	861
Aeroplane	673	711	640	641	558	519	563	631	672	699	815
Helicopter	20	19	21	31	20	16	20	27	46	38	51
Ultralight/Other aircraft type (d)	0	0	1	1	0	0	0	3	8	6	4
Number of aircraft involved in incidents (e)	833	873	774	810	670	619	681	730	800	843	976
Aeroplanes	813	854	751	778	650	603	661	700	746	799	920
Helicopters	20	19	22	31	20	16	20	27	46	38	52
Ultralight/Other aircraft type (d)	0	0	1	1	0	0	0	3	8	6	4
Incidents by province/territory	691	728	658	664	576	530	579	654	711	737	861
Newfoundland and Labrador	10	13	7	13	10	10	17	13	20	22	22
Prince Edward Island	0	1	1	0	0	0	1	0	1	4	1
Nova Scotia	17	12	13	19	14	9	9	19	17	12	17
New Brunswick	12	7	3	8	5	7	4	6	9	9	3
Quebec	90	96	77	89	104	84	96	81	103	99	126
Ontario	201	221	168	141	149	127	142	139	141	148	200
Manitoba	43	49	40	45	30	30	27	45	51	44	47
Saskatchewan	16	26	16	15	11	14	26	27	19	25	18
Alberta	68	76	92	74	76	75	93	93	110	103	102
British Columbia	120	103	141	134	68	87	93	125	137	118	100
Yukon	4	2	6	3	3	3	3	5	6	5	3
Northwest Territories	27	27	14	19	30	17	16	25	17	8	20
Nunavut	9	14	7	17	16	15	10	16	14	15	14
Other air space under Canadian air traffic control	5	3	6	5	5	3	3	2	4	2	3
Outside Canada	69	78	67	82	55	49	39	58	62	123	185

Data extracted February 11, 2018

Reportable incidents are reported in accordance with the TSB's regulations for mandatory reporting of occurrences.

New TSB regulations came into effect on July 1, 2014. Under new reporting requirements aviation incidents include: a) aircraft having a maximum certificated take-off weight greater than 2 250 kg (formerly 5700 kg); b) aircraft being operated under an air operator certificate issued under CARS Part VII.

Breakdowns may not add up to totals. For example, in the total "Incidents by aircraft type", when an occurrence involves an airplane and a helicopter, the occurrence is counted in each category, but only once in the total.

a. Includes foreign commercial operations (part 701), and flight training units (part 406).

b. Beginning in February of 2015, corporate operators are counted as private operators.

c. Includes private operators (part 604), recreational, and foreign private operations.

d. Includes balloons, gyroplanes, gliders, dirigibles, hang gliders, unmanned aerial vehicles (UAV) and similar aircraft types.

e. "Number of aircraft involved in incidents" are aircraft counts, all other data are incident counts.

Table 11
Number of accidents involving aeroplanes by phase of flight and selected event category
2007-2017

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total
Standing/Taxiing	16	13	20	17	18	17	23	16	19	16	20	195
Collision with object	6	6	9	6	6	7	8	6	3	5	9	71
Collision with moving aircraft	2	4	3	1	1	2	1	3	5	4	3	29
Nosedown/Overtumed	0	1	1	4	3	3	5	1	3	2	2	25
Landing gear collapsed/retracted	1	0	4	2	3	0	2	1	2	1	3	19
Loss of control	1	0	1	3	0	3	4	1	0	0	0	13
Other events	10	6	9	8	9	9	11	9	12	13	14	110
Take-off	51	40	49	54	41	54	40	48	53	47	45	522
Collision with terrain	10	9	14	15	11	21	11	10	18	13	15	147
Loss of control	12	7	15	15	12	17	7	18	9	11	7	130
Collision with object	17	14	16	13	9	17	8	11	18	12	8	143
Take-off/Landing event	16	5	13	13	13	19	9	11	11	14	15	139
Power loss	14	14	12	14	11	6	13	16	12	10	10	132
Other events	37	30	34	35	28	33	26	34	50	30	36	373
En route	29	34	41	32	31	31	34	23	29	19	35	338
Power loss	11	18	26	13	14	15	15	14	8	12	15	161
Precautionary/Forced landing/Ditching	6	14	10	11	13	9	8	7	5	4	5	92
Collision with terrain	6	5	9	8	8	8	10	5	4	5	5	73
Component/System related	5	3	4	4	1	2	3	2	3	0	3	30
Other events	18	14	20	20	18	15	18	14	26	8	25	196
Manoeuvring	12	12	3	11	12	10	12	4	11	12	11	110
Collision with terrain	8	3	2	5	6	7	7	1	7	5	7	58
Loss of control	5	3	1	3	1	4	1	1	2	3	4	28
Collision with object	2	4	0	7	1	1	2	1	2	3	1	24
Power loss	0	4	1	1	3	1	0	0	1	2	1	14
Other events	4	6	1	3	9	2	5	3	4	6	2	45
Approach	28	29	31	29	23	21	32	28	25	18	20	284
Collision with terrain	5	8	12	11	7	6	6	7	10	5	6	83
Power loss	7	8	7	7	2	0	11	6	2	3	6	59
Collision with object	9	8	3	6	8	1	7	9	7	6	7	71
Component/System related	6	5	9	2	5	3	3	4	2	0	1	40
Precautionary/Forced landing/Ditching	1	5	4	5	2	2	7	7	1	1	4	39
Loss of control	3	5	3	6	3	4	5	1	4	1	0	35
Other events	14	7	14	10	8	14	10	9	18	12	12	128
Landing	149	114	121	112	113	111	116	99	118	113	95	1261
Missed or went off runway	26	17	24	24	27	26	28	14	30	30	21	267
Collision with object	32	21	23	25	28	26	18	20	29	24	23	269
Landing gear collapsed/retracted	30	28	18	26	24	22	25	17	27	27	23	267
Nosedown/Overtumed	27	27	21	18	17	20	20	17	27	33	29	256
Loss of control	25	16	23	20	17	27	19	22	2	3	6	180
Hard landing	35	16	19	23	22	20	13	14	10	17	19	208
Collision with terrain	21	19	16	18	16	18	12	21	20	12	7	180
Wheels-up landing	11	8	12	7	3	7	10	7	10	9	4	88
Precautionary/Forced landing/Ditching	6	5	11	5	3	9	11	5	12	18	18	103
Other events	54	38	39	47	49	42	45	28	77	77	50	546
Post-impact	13	13	13	20	11	18	13	17	37	57	41	253
Fire/Explosion/Fumes	8	9	8	15	6	7	7	6	13	9	5	93
Other events	6	5	6	5	5	11	6	13	24	49	37	167

Data extracted February 11, 2018

Accidents are reported in accordance with the TSB's regulations for mandatory reporting of occurrences.

Breakdowns do not add up to totals. For example, in the "Take-off" phase, if an occurrence involves both "Control loss" and "Power loss" events, the occurrence is counted in each event category, but only once in the phase total.

Table 12
Number of accidents involving helicopters by phase of flight and selected event category
2007-2017

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total
Standing/Taxing	4	3	3	0	6	4	1	4	2	0	1	28
Collision with terrain	1	0	1	0	2	1	0	0	1	0	0	6
Loss of control	1	1	0	0	2	0	0	2	1	0	0	7
Collision with object	3	1	0	0	0	0	0	2	1	0	1	8
Other events	2	2	3	0	5	4	1	4	0	0	0	21
Take-off	7	7	4	2	7	7	7	9	4	6	5	65
Loss of control	4	4	1	1	4	2	0	5	1	4	4	30
Collision with terrain	2	3	2	2	3	1	2	1	2	1	1	20
Collision with object	1	0	1	1	0	4	2	2	1	0	1	13
Power loss	0	1	1	0	2	0	1	1	0	1	0	7
Other events	2	4	1	1	1	2	2	4	1	3	2	23
En route	12	11	11	7	10	9	5	7	4	5	3	84
Collision with terrain	6	6	3	3	3	3	1	3	1	1	1	31
Power loss	4	4	5	3	2	3	1	1	1	3	0	27
Precautionary/Forced landing/Ditching	3	0	1	1	0	1	1	0	1	0	0	8
Component/System related	0	3	1	0	2	0	1	0	1	0	0	8
Other events	5	10	5	4	7	6	4	5	3	4	3	56
Manoeuvring	13	9	7	6	10	11	8	4	8	8	7	91
Collision with terrain	5	4	3	3	6	5	5	2	3	5	3	44
Loss of control	7	2	3	2	2	3	2	2	2	3	4	32
Collision with object	1	2	1	2	3	3	2	1	1	3	2	21
Operations related event	4	1	2	1	2	2	1	0	2	5	3	23
Power loss	2	2	2	1	0	2	1	0	2	1	1	14
Other events	7	5	5	1	3	6	2	2	5	5	5	46
Approach	4	3	5	4	6	7	3	3	3	5	2	45
Collision with terrain	1	2	3	4	1	1	0	0	0	1	0	13
Power loss	1	0	1	0	0	2	0	1	1	3	0	9
Loss of control	0	0	0	1	1	1	0	1	1	2	1	8
Collision with object	0	0	1	0	2	0	0	1	0	1	1	6
Other events	2	2	3	3	3	5	3	2	2	4	1	30
Landing	16	17	15	15	7	13	12	12	18	16	13	154
Hard landing	5	6	2	4	4	4	1	3	1	0	1	31
Collision with terrain	1	5	5	4	2	4	0	3	6	0	0	30
Loss of control	2	6	2	1	1	1	2	4	6	2	1	28
Collision with object	4	3	5	5	2	2	5	5	1	4	3	39
Other events	9	4	9	7	2	4	9	5	10	4	5	68
Post-impact	4	3	4	4	4	2	3	2	5	11	1	43
Fire/Explosion/Fumes	3	2	3	1	2	1	2	0	1	0	0	15
Other events	1	1	1	3	2	1	1	2	4	11	1	28

Data extracted February 11, 2018

Accidents are reported in accordance with the TSB's regulations for mandatory reporting of occurrences.

Breakdowns do not add up to totals. For example, in the "Take-off" phase, if an occurrence involves both "Control loss" and "Power loss" events, the occurrence is counted in each event category, but only once in the phase total.

Table 13
Number of fatal accidents involving aeroplanes by phase of flight and selected event category
2007-2017

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total
Standing/Taxiing	1	0	0	0	1	1	1	0	1	2	1	8
Collision with object	0	0	0	0	0	0	0	0	0	0	0	0
Collision with moving aircraft	0	0	0	0	0	0	0	0	0	0	0	0
Nosedown/Overturned	0	0	0	0	0	0	0	0	0	0	0	0
Landing gear collapsed/retracted	0	0	0	0	0	0	0	0	0	0	0	0
Loss of control	0	0	0	0	0	0	0	0	0	0	0	0
Other events	1	0	0	0	1	1	1	0	1	2	1	8
Take-off	6	1	6	6	4	6	4	2	9	5	6	55
Collision with terrain	3	1	6	2	1	4	3	0	4	4	5	33
Loss of control	4	0	3	1	2	2	2	1	4	4	2	25
Collision with object	2	0	1	0	1	2	0	0	1	0	1	8
Take-off/Landing event	1	0	0	0	1	1	1	1	0	0	0	5
Power loss	1	0	0	3	1	0	0	1	1	1	0	8
Other events	4	1	2	3	4	3	2	0	7	1	5	32
En route	12	7	7	9	9	9	9	3	7	5	5	82
Power loss	3	1	1	0	2	1	0	0	0	2	0	10
Precautionary/Forced landing/Ditching	1	1	0	0	1	0	0	0	0	1	0	4
Collision with terrain	6	5	4	8	5	7	7	3	4	4	3	56
Component/System related	0	0	0	1	0	0	0	0	1	0	0	2
Other events	8	3	4	4	4	3	5	1	6	2	4	44
Manoeuvring	4	3	0	2	1	3	3	2	4	4	4	30
Collision with terrain	3	2	0	1	1	3	2	1	4	3	4	24
Loss of control	3	2	0	1	0	2	0	1	0	1	1	11
Collision with object	0	0	0	2	0	0	0	0	1	1	1	5
Power loss	0	0	0	0	0	0	0	0	0	0	0	0
Other events	1	0	0	1	1	0	1	1	0	1	1	7
Approach	4	0	6	10	6	5	5	1	5	5	3	50
Collision with terrain	2	0	6	6	4	3	5	0	3	4	2	35
Power loss	0	0	1	1	1	0	1	0	0	0	0	4
Collision with object	1	0	0	2	2	0	0	0	1	1	1	8
Component/System related	0	0	0	0	0	0	0	0	0	0	0	0
Precautionary/Forced landing/Ditching	0	0	0	2	1	0	0	0	0	0	0	3
Loss of control	1	0	2	5	0	1	2	0	0	1	0	12
Other events	2	0	3	4	1	4	1	1	2	2	1	21
Landing	3	2	3	3	5	3	3	4	4	5	0	35
Missed or went off runway	1	1	0	0	0	0	0	1	0	1	0	4
Collision with object	1	1	1	0	1	0	0	0	1	1	0	6
Landing gear collapsed/retracted	0	0	0	0	0	0	0	0	0	0	0	0
Nosedown/Overturned	1	0	0	1	1	1	2	1	0	0	0	7
Loss of control	0	1	0	1	0	0	1	0	0	0	0	3
Hard landing	1	0	0	0	0	1	0	0	0	0	0	2
Collision with terrain	1	1	0	2	2	3	2	2	2	4	0	19
Wheels-up landing	0	0	0	0	0	0	0	0	0	0	0	0
Precautionary/Forced landing/Ditching	0	0	1	0	0	0	1	0	1	0	0	3
Other events	2	0	2	1	1	2	0	2	1	3	0	14
Post-impact	8	6	8	13	6	7	8	4	10	9	5	84
Fire/Explosion/Fumes	7	6	6	12	4	6	7	3	10	7	4	72
Other events	2	1	3	1	2	1	1	2	0	2	1	16

Data extracted February 11, 2018

Accidents are reported in accordance with the TSB's regulations for mandatory reporting of occurrences.

Breakdowns do not add up to totals. For example, in the "Take-off" phase, if an occurrence involves both "Control loss" and "Power loss" events, the occurrence is counted in each event category, but only once in the phase total.

Table 14

Number of fatal accidents involving helicopters by phase of flight and selected event category

2007-2017

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total
Standing/Taxing	0	0	0	0	0	0	0	0	0	0	0	0
Collision with terrain	0	0	0	0	0	0	0	0	0	0	0	0
Loss of control	0	0	0	0	0	0	0	0	0	0	0	0
Collision with object	0	0	0	0	0	0	0	0	0	0	0	0
Other events	0	0	0	0	0	0	0	0	0	0	0	0
Take-off	1	2	0	0	2	0	2	0	1	0	0	8
Loss of control	0	0	0	0	0	0	0	0	0	0	0	0
Collision with terrain	1	2	0	0	1	0	1	0	1	0	0	6
Collision with object	0	0	0	0	0	0	1	0	1	0	0	2
Power loss	0	0	0	0	1	0	0	0	0	0	0	1
Other events	0	1	0	0	0	0	0	0	0	0	0	1
En route	4	2	4	3	2	3	2	0	2	1	1	24
Collision with terrain	4	1	2	3	2	2	1	0	1	1	0	17
Power loss	0	0	1	0	0	0	0	0	0	0	0	1
Precautionary/Forced landing/Ditching	0	0	1	0	0	0	0	0	0	0	0	1
Component/System related	0	1	1	0	0	0	0	0	0	0	0	2
Other events	1	2	1	2	1	2	2	0	1	1	1	14
Manoeuvring	1	4	3	0	4	3	2	0	1	1	1	20
Collision with terrain	0	3	2	0	3	1	2	0	1	0	1	13
Loss of control	1	1	2	0	0	1	1	0	0	0	0	7
Collision with object	1	0	0	0	1	0	0	0	0	1	0	3
Operations related event	0	0	1	0	0	2	0	0	0	0	1	4
Power loss	0	1	1	0	0	1	0	0	1	0	0	4
Other events	0	3	2	0	2	2	0	0	0	1	1	11
Approach	1	2	2	0	1	1	0	0	0	0	0	7
Collision with terrain	0	1	2	0	0	0	0	0	0	0	0	3
Power loss	0	0	0	0	0	0	0	0	0	0	0	0
Loss of control	0	0	0	0	1	1	0	0	0	0	0	2
Collision with object	0	0	1	0	0	0	0	0	0	0	0	1
Other events	1	2	0	0	0	1	0	0	0	0	0	4
Landing	0	1	2	0	1	2	0	0	2	0	1	9
Hard landing	0	1	1	0	0	0	0	0	0	0	0	2
Collision with terrain	0	0	2	0	1	2	0	0	1	0	0	6
Loss of control	0	0	0	0	0	0	0	0	1	0	0	1
Collision with object	0	0	1	1	0	0	0	0	0	1	0	3
Other events	0	1	1	0	0	0	0	0	0	0	0	2
Post-impact	1	2	4	0	1	1	2	0	1	0	0	12
Fire/Explosion/Fumes	1	2	3	0	1	1	1	0	1	0	0	10
Other events	0	0	1	0	0	0	1	0	0	0	0	2

Data extracted February 11, 2018

Accidents are reported in accordance with the TSB's regulations for mandatory reporting of occurrences.

Breakdowns do not add up to totals. For example, in the "Take-off" phase, if an occurrence involves both "Control loss" and "Power loss" events, the occurrence is counted in each event category, but only once in the phase total.

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 TSB regulations.

Aviation occurrence

- Any accident or incident associated with the operation of an aircraft, and
- Any situation or condition that the Board has reasonable grounds to believe could, if left unattended, induce an accident or incident described below.

Reportable aviation accident

An accident resulting directly from the operation of an aircraft where:

- a person is killed or sustains a serious injury as a result of:
 - being on board the aircraft,
 - coming into contact with any part of the aircraft, including parts that have become detached from the aircraft, or
 - being directly exposed to jet blast, rotor down wash or propeller wash,
- the aircraft sustains structural failure or damage that adversely affects the aircraft's structural strength, performance or flight characteristics and would normally require major repair or replacement of any affected component, except for
 - engine failure or damage, when the damage is limited to the engine, its cowlings or accessories, or
 - damage limited to propellers, wing tips, antennae, tires, brakes, fairings or small dents or puncture holes in the aircraft's skin, or
- the aircraft is missing or inaccessible.

Reportable aviation incident

An incident involving an aircraft having a maximum certificated take-off weight (MCTOW) greater than 2 250 kg, or of an aircraft being operated under an air operator certificate issued under Part VII of the Canadian Aviation Regulations, where:

- an engine fails or is shut down as a precautionary measure,
- a power train transmission gearbox malfunction occurs,
- smoke is detected or a fire occurs on board,
- 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,
- 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,
- a crew member whose duties are directly related to the safe operation of the aircraft is unable to perform their duties as a result of a physical incapacitation which poses a threat to the safety of persons, property or the environment,

- depressurization of the aircraft occurs that requires an emergency descent,
- a fuel shortage occurs that requires a diversion or requires approach and landing priority at the destination of the aircraft,
- the aircraft is refuelled with the incorrect type of fuel or contaminated fuel,
- a collision, a risk of collision or a loss of separation occurs,
- a crew member declares an emergency or indicates an emergency that requires priority handling by air traffic services or the standing by of emergency response services,
- a slung load is released unintentionally or as a precautionary or emergency measure from the aircraft, or
- any dangerous goods are released in or from the aircraft.

Collision

Collision means an impact, other than an impact associated with normal operating circumstances, between aircraft or between an aircraft and another object or terrain.

Risk of collision

Risk of collision means a situation in which an aircraft comes so close to being involved in a collision that a threat to the safety of any person, property or the environment exists.

Loss of separation

Loss of separation means a situation in which the distance separating two aircraft is less than the minimum established in the *Canadian Domestic Air Traffic Control Separation Standards*, published by the Department of Transport, as amended from time to time.

Serious injury

- a fracture of any bone, except simple fractures of fingers, toes or the nose,
- lacerations that cause severe hemorrhage or nerve, muscle or tendon damage,
- an injury to an internal organ,
- second or third degree burns, or any burns affecting more than 5% of the body surface,
- a verified exposure to infectious substances or injurious radiation, or
- an injury that is likely to require hospitalization.

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.

Operation

Operation means the activities for which an aircraft is used from the time any person boards the aircraft with the intention of flight until they disembark.

Operator

Operator has the same meaning as in subsection 101.01(1) of the *Canadian Aviation Regulations*.

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 8 618 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 multi-engined aircraft that has a MCTOW of 8 618 kg (19 000 pounds) or less and a seating configuration, excluding pilot seats, of 10 to 19, inclusive;
- 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:

- the carriage on board of persons other than flight crew members,
- the carriage of helicopter external loads,
- the towing of objects, or
- 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 single engined aircraft;
- a multi engined aircraft, other than a turbo jet powered aeroplane, that has a MCTOW of 8 618 kg (19 000 pounds) or less and a seating configuration, excluding pilot seats, of nine or less; or
- any aircraft that is authorized by the Minister of Transport to be operated under Part VII, Subpart 3, Division 1 of the 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.