Aviation Safety Report

Intelligence, Safety and Risk Analysis Unit

1 July 2017 to 30 June 2018

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Introduction and Executive Summary

Introduction

This safety report is produced using data from the Civil Aviation Authority's Aviation Safety Management System. It primarily covers the period from 1 July 2017 to 30 June 2018.[1]

Key Indicators

- Key measures of industry activity have increased as follows in the above period.
    - Aircraft on CAA records increased slightly by 2.4%
    - Total hours flown remained at 2017 levels.
- The number of organisational certificates currently held has increased by 0.5% to 1075.
- The number of accidents in the period was 91, down from 97 in the last period, and the trend is downward relative to the average of the preceding three years (106 accidents pa 2014 to 2016).
- There were 9 fatalities, 4 less than in the previous 12 months and the third lowest in the last ten years. The average of the last four years was 11 fatalities pa and the highest in the last ten years was 22 fatalities in 2011
- The accident statistics are now led by, private sport aircraft, and sport transport sectors, but the principal contributors to the fatalities and therefore the social cost statistics are the airline helicopter, private sport and private helicopter sectors.
- The recent surge in the airspace incident rate per 100,000 hours flown continues although at a reduced rate. This period the number of reported airspace occurrences (all types) has increased by 0.3% on the last 12 months while the total flying hours in the same period increased by 0.2%. This is happening in a climate of a slight increase in aerodrome movements.

J.D. Stanton
Manager Intelligence Safety and Risk Analysis

[1] This report uses June years. Where quarters are referred to the first quarter is 1 July to 30 September.

Data in tables may not sum exactly to the total shown due to rounding

Executive Summary

Industry status as at 30 June 2018 and trend over the preceding 9 years

This section is organised into three parts

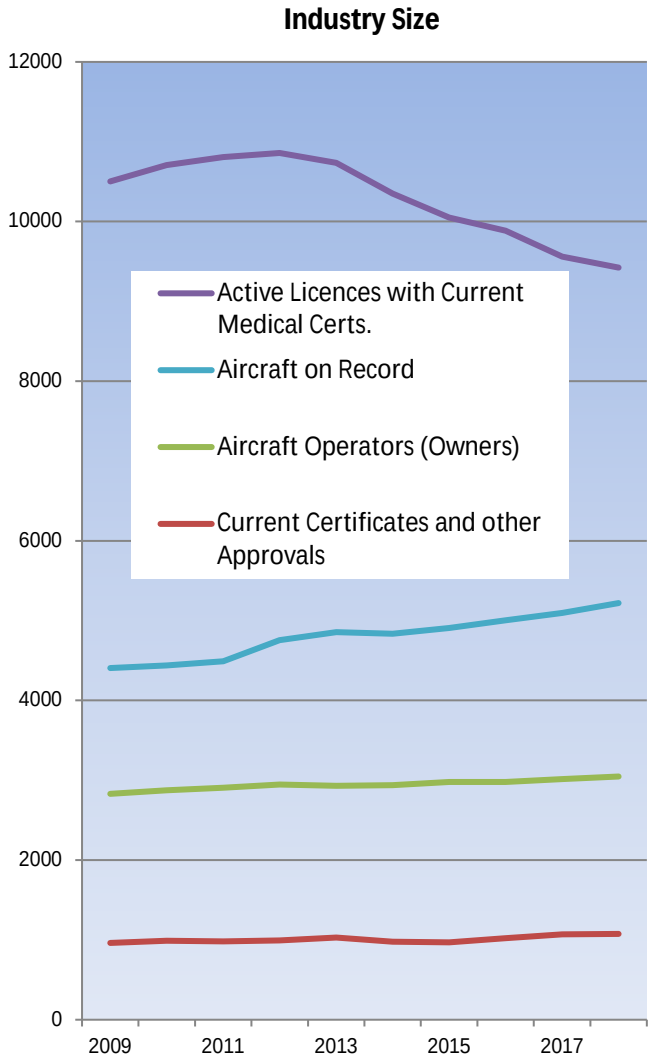
- Industry Size
- Industry Activity
- Safety Outcomes

Industry Size

Several different measures of industry size are available. No single measure is likely to meet the needs of all readers. Available measures are

- Number of licenses (with current medical certificates as appropriate) at the year end
- Number of certificates and other operational approvals at the year end
- Number of aircraft operators (owners) at the year end
- Number of aircraft recorded as active at the year end

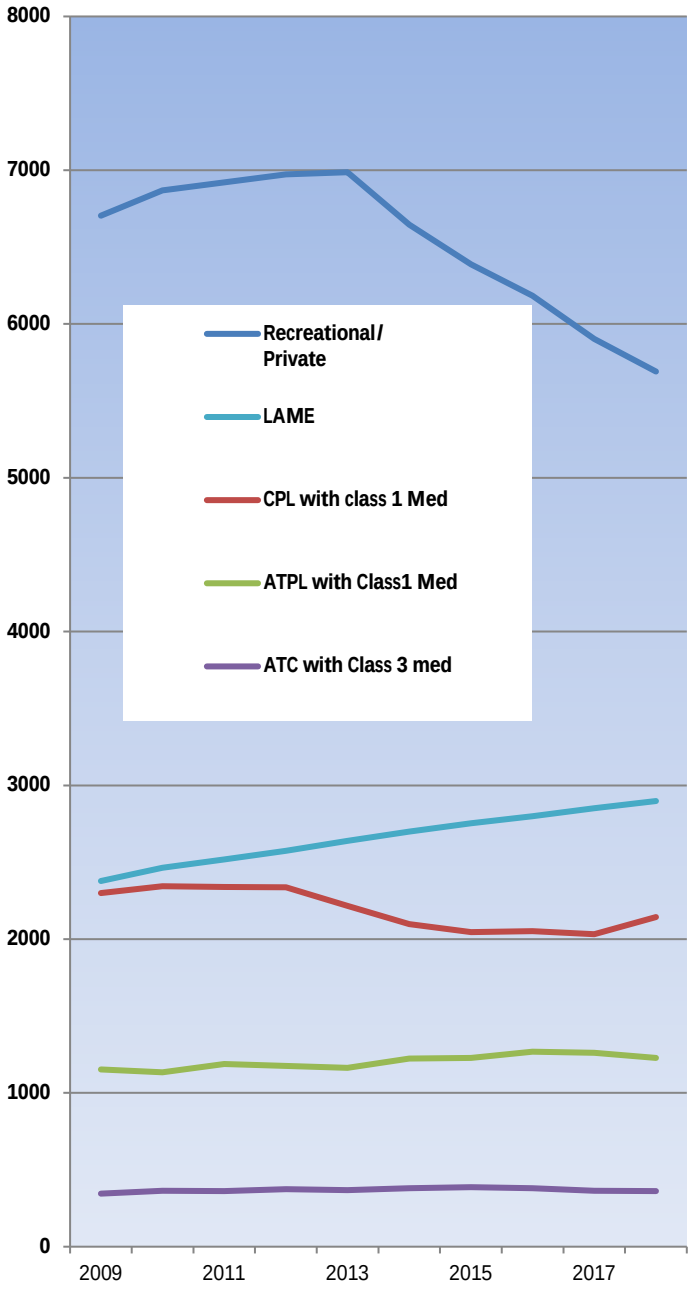
Ten year movements of these measures are summarised in the following graph.



The main points to note are the recent steady decline in the number of licences held and the relatively steady long term increase in the number of aircraft on record.

The graphs that follow show that the movement in licence numbers comes mostly from the recreational and private sector and the increase in aircraft numbers comes mostly from the commercial and adventure sectors.

Licences Held as at 30 June



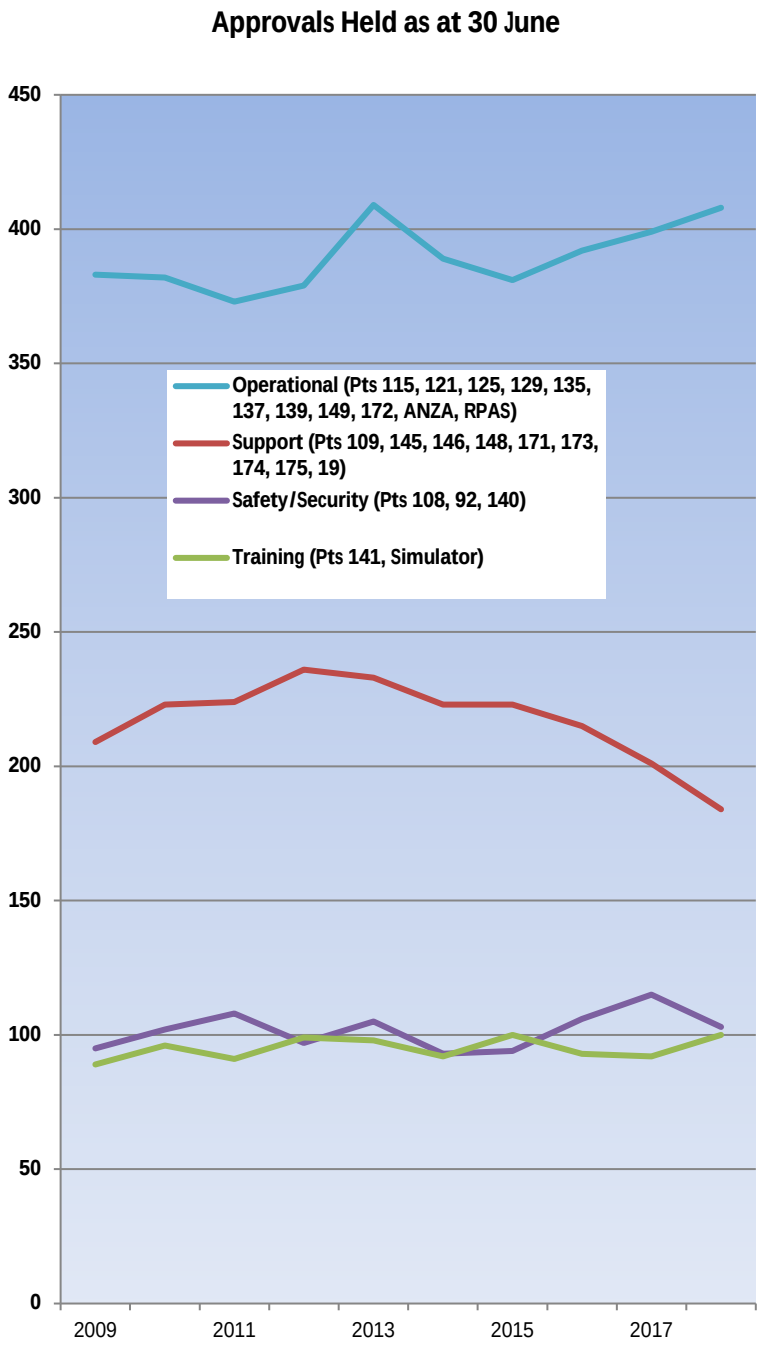
The 'Recreational/Private' group consists of holders of RPL licences who have appropriate current medical certificates plus holders of any pilot licence who have current class 2 medical certificates plus holders of PPL licenses only who hold a current class 1 medical certificate.

There is no medical requirement for holders of LAME licences which are issued on a lifetime basis. The increase in their numbers is simply an indication that more licences are being issued than holders' lifetimes are terminating.

Both the ATPL and the CPL groups have been flat numbers over the last 3 years, with a 5.5% uptick in the last 12 months for CPLs.

The recreational/Private numbers do not include Microlight certificates issued by Part 149 organisations.

For more detail see: Licences



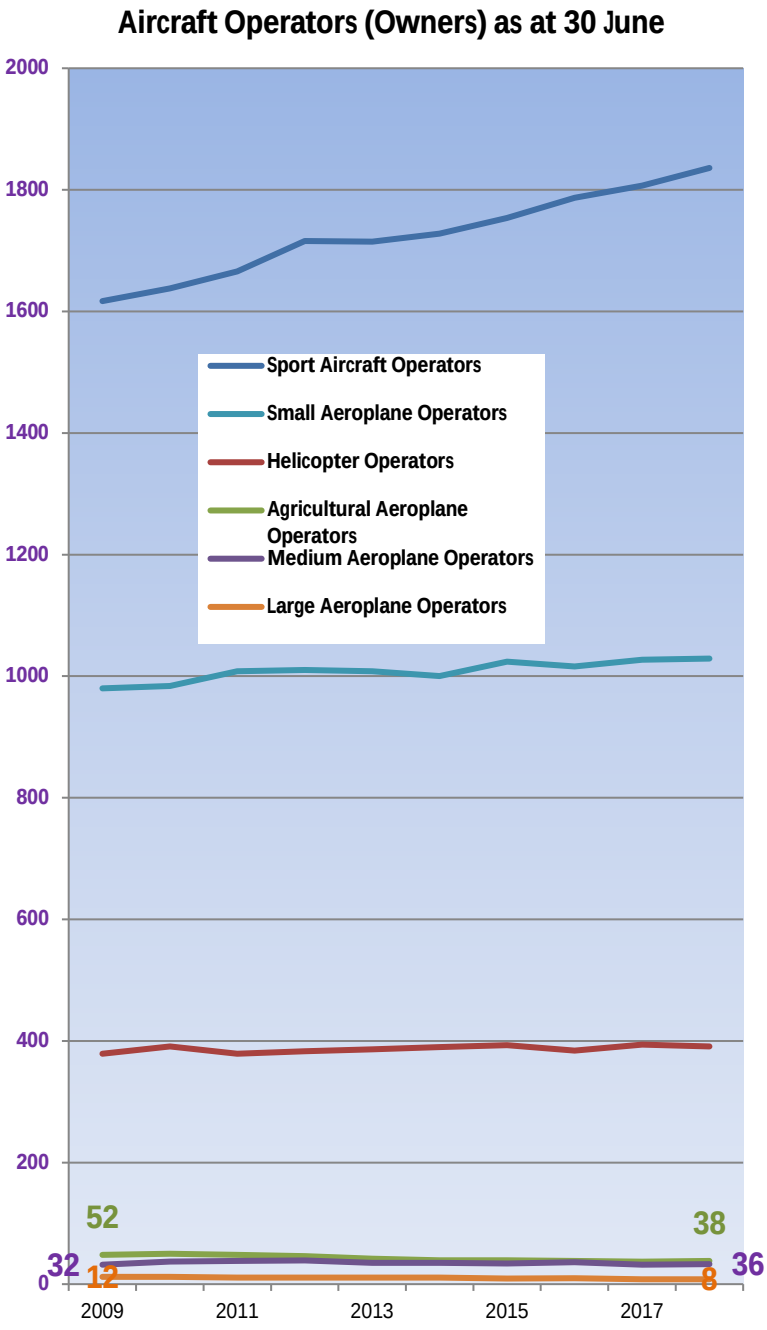
No significant trends are evident.

The number of Part 145 Aircraft Maintenance Organisation approvals peaked 6 years ago at 67 and has since declined to 51.

The number of Part 121 Large Aeroplane Operator approvals has risen from 7 at the end of 2016 to 13 at the end of 2018. This sector is closely monitored.

The numbers of Part 137 Agricultural Aircraft Operator approvals rose from 99 at the end of 2007 to 113 at the end of 2018. This sector is also closely monitored and the decline does not represent any safety concern.

For more detail see: Approvals



Those operators who operate more than one category of aircraft have been counted in each category. This means that totalling the numbers will lead to more operators than actually exist.

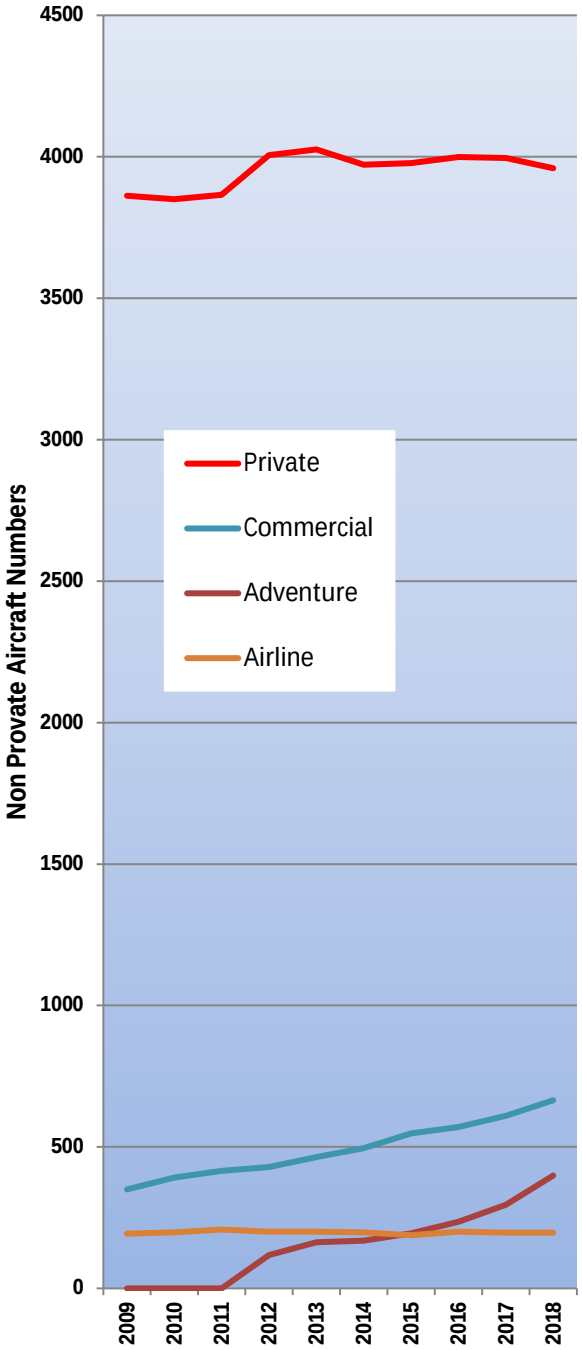
The number of Large Aeroplane operators shows no significant recent trend but has declined by 4 since 2009. The number of Agricultural Aeroplane operators peaked at 50 in 2010 declined until 2017 and has remained steady since then.

The number of Medium Aeroplane operators has been between 38 and 32 since 2011.

All other categories show small increases in the number of operators except for the Sport Aircraft category where there has been significant growth across the whole period covered by this report

For more detail see: Owners

Aircraft on Record as at 30 June



Aircraft have been counted in the Adventure group if there was a current Part 115 approval for the aircraft at the 30 June year end.

Aircraft have been counted in the Private group if they have no Part 119 or Part 115 approval and they are not an agricultural aeroplane. So this includes standard/restricted and special category aircraft (including microlights). The vast majority of aircraft recorded in the CAA database are private and their numbers increased until 2012 and have declined since then.

The most notable trend is in the commercial group where the numbers have increased by 90% since December 2007. Both fixed wing and rotary have contributed to this increase but the rotary component is the major factor having gone from 185 at the end of 2009 to 665 at the middle of 2018, an increase of 259%.

Note from the previous graph that the number of helicopter operators has remained almost constant, suggesting that existing operators are expanding their fleets.

For more detail see: Aircraft

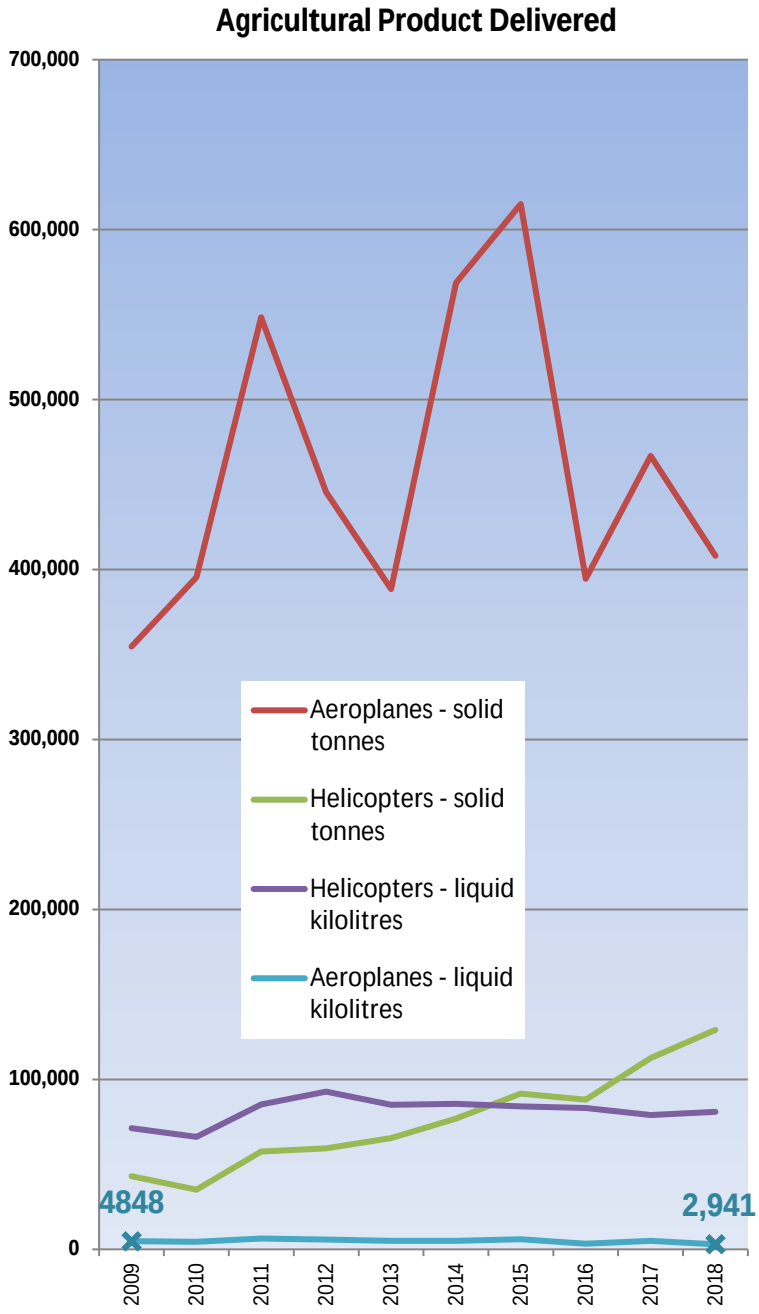
Industry Activity

Most activity measures depend on operations statistics returns supplied by operators under the requirements of rule part 12.151 or rule part 19.103 for agricultural aviation statistics.

Activity estimates are carried out to adjust the industry totals for non-compliant operators. These estimates are calculated by assuming each non-compliant operator carries out the same mix of operations as the average of all compliant operators of the same aircraft category and class for the year and quarter being measured.

- Estimate of Agricultural Product delivered during the year
- Estimate of Hours Flown during the year
- Aerodrome Movements conducted during the year at monitored aerodromes

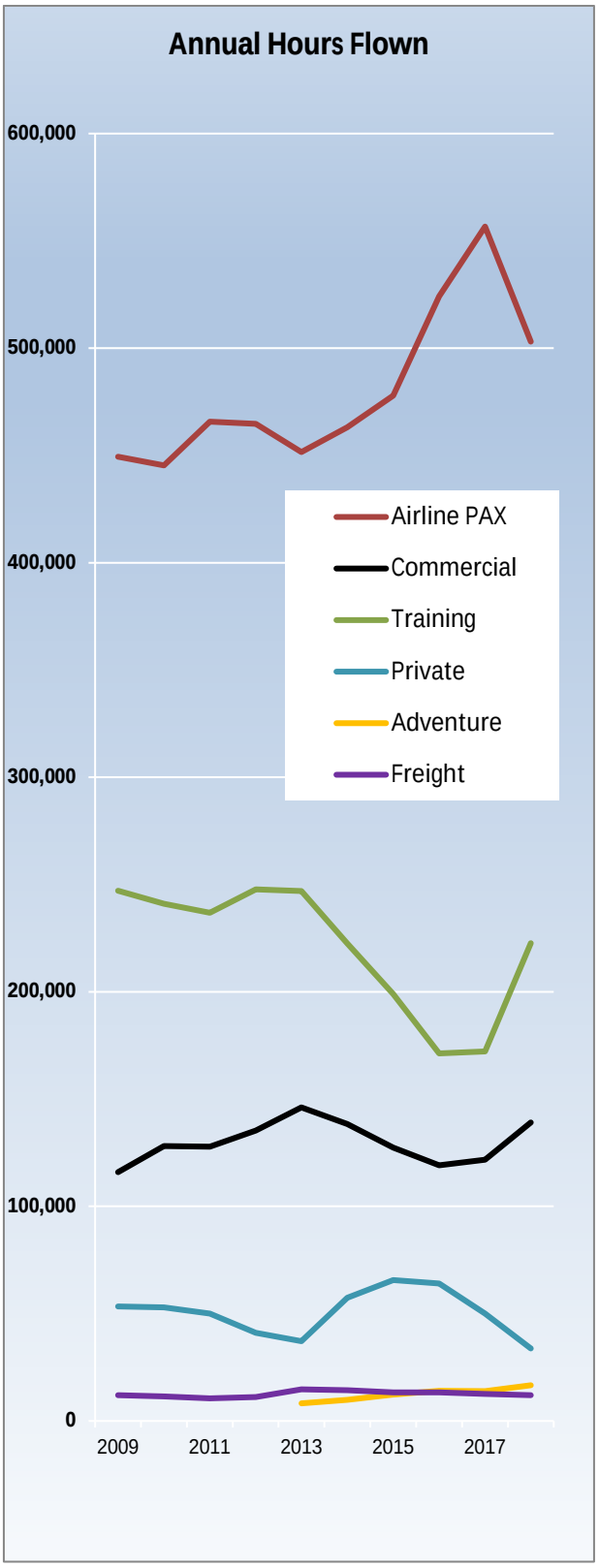
These measures are summarised in the following graphs that relate to years ending 30 June.



Trends in agricultural product delivery vary by aircraft type.

Liquid quantities applied by helicopter have plateaued from 2012 – 2018, while solid tonnage has increased significantly.

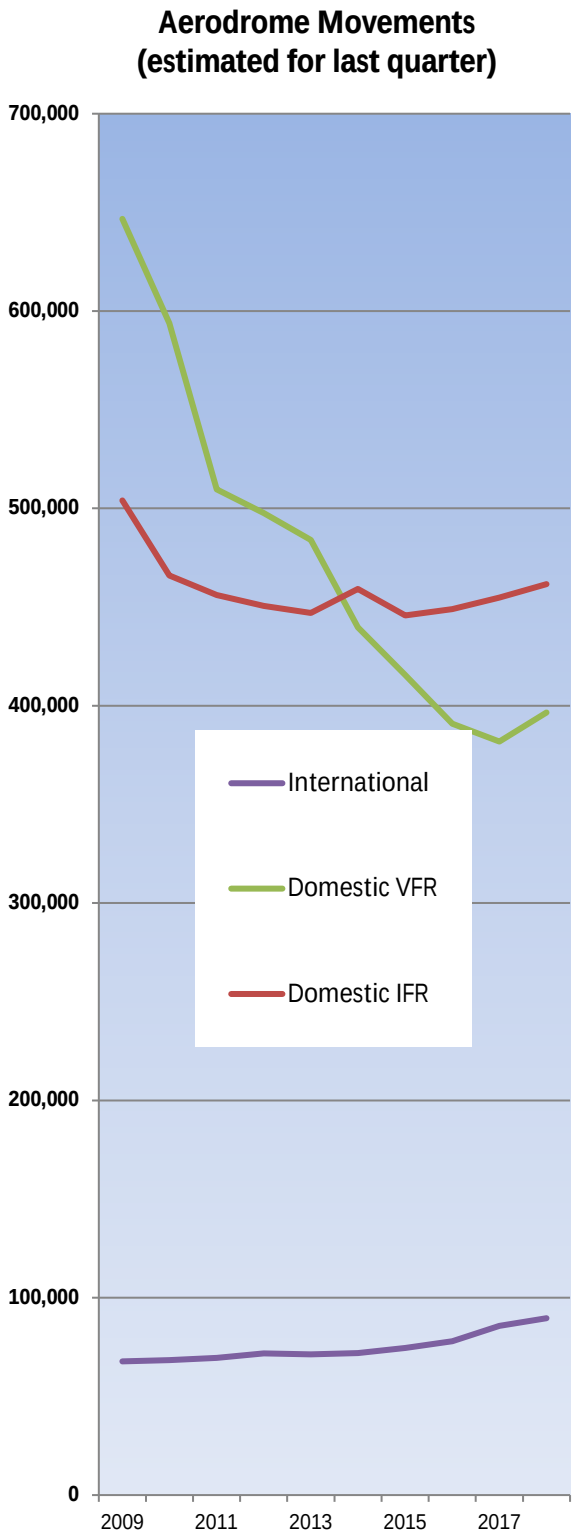
Solid tonnage applied by aeroplane has fluctuated significantly from 2009 – 2018



The data presented here includes a 'standard' allowance for those aircraft for which no data had been received at the time of data extraction. This means that more recent data is less reliable than earlier data because there are more missing returns for more recent return periods.

The estimation methods for these metrics are under review and redevelopment

For more detail follow these links: Hours Flown



This data covers only aerodromes that have an Airways presence either as Air Traffic Control or Flight Service. An examination of airlines' published schedules suggests that there are between 10 and 20 thousand scheduled movements at certificated aerodromes that are not included in our data. With the exception of Taupo Airport, there is no long term data available on the numbers of unscheduled movements at certificated aerodromes that have no Airways presence. Taupo aerodrome's annual movements averaged approximately 24000 over the 10 year period covered by this report and were 19688 during the 2018 calendar year.

There has been a steady decline in VFR movements at Airways monitored aerodromes since a peak of 646710 in 2009. This may be a consequence of a move of private flying away from busy commercial airports or may be an indication that private flying is declining in New Zealand generally.

For more detail see: Aerodrome Movements

Safety Outcomes

Safety outcome measures covered in this report include

1. Fatality and serious injury rates
2. Accident rates
3. Airspace, Operational, Aerodrome, Defect, Bird and Security incident rates
4. Social costs
5. Participant Risk-Assessments

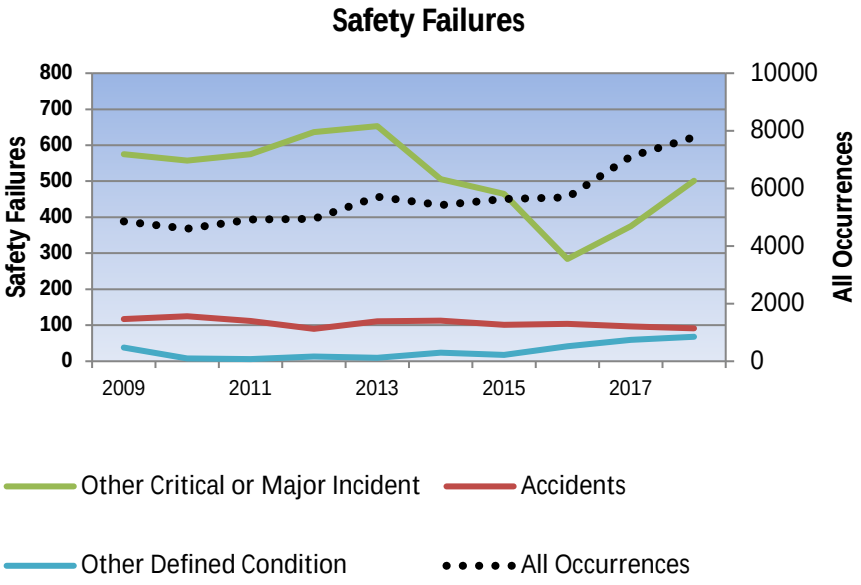
It is not practicable to summarise all of these measures in a concise form so this summary focusses on a concept of Safety Outcomes which classifies all reported occurrences into three groups, Safety Failures, Close Calls and Safety Successes. Aviation-Related Concerns and Risk Assessments are summarised separately.

The values relate to years ending 30 June

Safety Failures

We have taken a Safety Failure as:

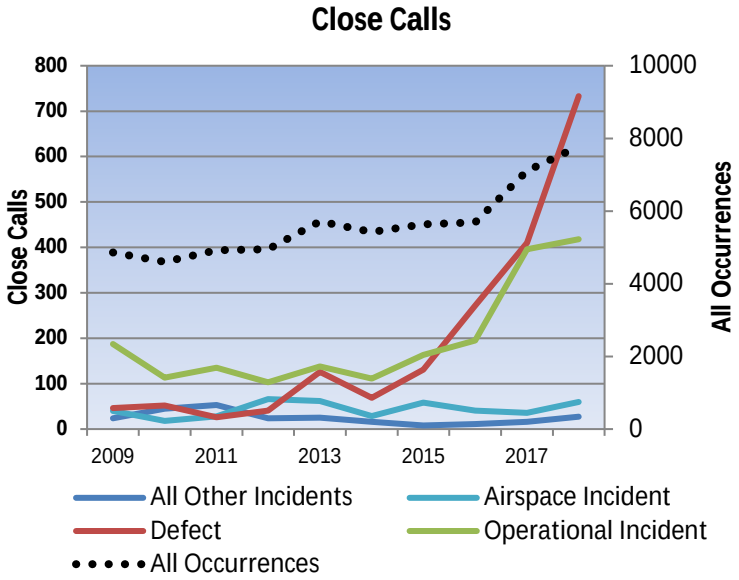
- an accident including hang glider and parachute accidents or
- an incident where the aircraft is written off, destroyed or missing or
- a critical or major incident or
- an incident that has any of 31 selected descriptors (see appendix), most of which relate to collision, serious landing outcomes, serious aircraft technical or operational failures or acts of violence



Whilst the goal for Safety Failures must be continuous reduction, it is difficult to identify a clear trend because of the small population. It is worthy of note that the number of 'Other Critical or Major' incidents does seem to be declining in recent years. These 'Other' incidents are mostly (87%) made up of Operational Incidents, Airspace Incidents and Defects in decreasing order of frequency.

Close Calls

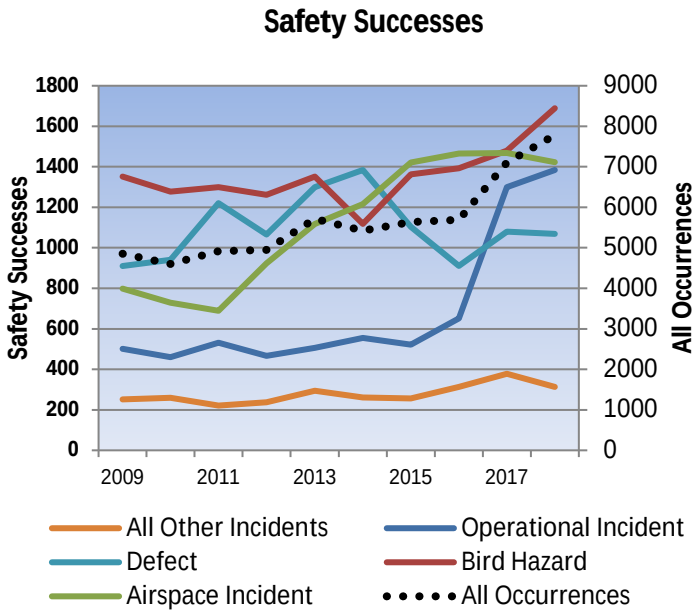
We have defined a Close Call as an incident that is not a safety failure but that has any of 112 selected descriptors (see appendix) that support the assumption that failure would have been the outcome if either the condition had escalated or adequate compensating action had not been taken



The most obvious trend is the recent increase in the number of defect incidents are close calls (733 in 2018).

Safety Successes

We have defined a Safety Success as a reported incident (i.e. something unexpected) that was managed to a safe outcome using normal operational procedures



Precursors to Safety Failure

The CAA operates two processes that generate indicators of possible future safety failure of a particular activity type by a particular operator. They are the Routine Audit and Client Risk Assessment processes.

The Client Risk Assessment Process

This process generates a 'score' representing a weighted assessment of a range of factors all of which have the ability to indicate possible risk to an operation. A new score is generated any time any one of the relevant factors changes or if a manual assessment is initiated.

Client Risk Assessment scores are unique to a particular activity type and are not comparable between one activity and another.

The next table shows how the average of annual Risk Assessments has changed over the last 9 years within each certificate type. A value of 100 would represent the highest risk possible.

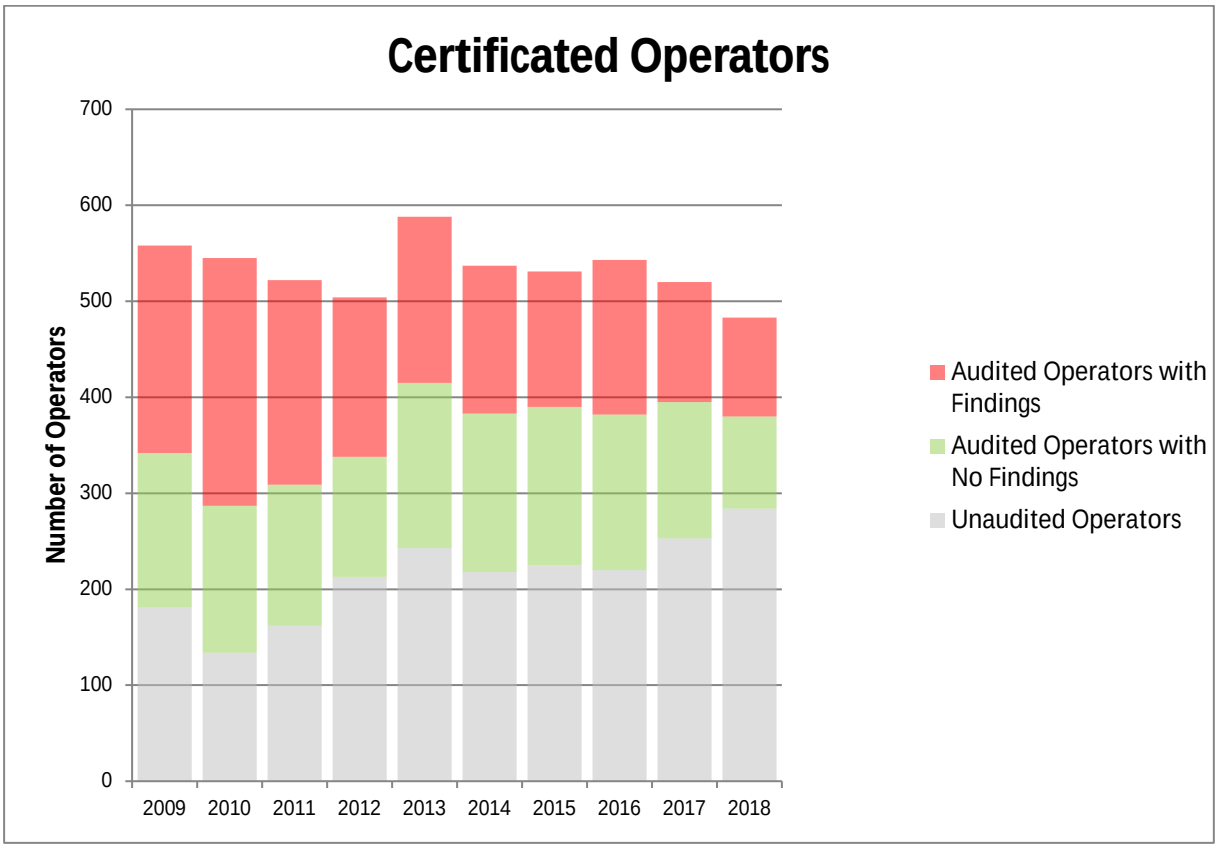
Activity	Year ending 30 June									
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Part 149 Aviation Recreation Organisation	5.1	30.7	8.4	16.2	11.4	14.4	16.2	16.3	9.9	10.1
Part 137 Agricultural Aircraft Operator	19.0	16.6	16.3	15.5	15.6	14.6	15.1	15.2	14.1	14.5
Part 135 Air Operator Helicopters and	17.4	16.7	15.9	15.8	15.3	13.9	14.5	15.0	13.5	14.4
Part 125 Air Operator Medium	14.0	15.3	16.1	12.8	14.2	13.8	16.3	14.9	13.1	13.7
Part 115 Adventure Aviation Operator					30.6	13.2	12.2	13.4	13.0	11.7
Part 172 Air Traffic Service Organisation	7.3	9.7	9.9	22.0	19.1	15.1	12.8	13.2	12.6	16.3
Part 92 Dangerous Goods Packaging		2.6	5.6	10.9	5.1	8.4	7.4	12.7	6.7	7.1
Part 109 Regulated Air Cargo Agent	7.7	13.9	11.2	10.4	11.7	12.7	12.4	11.1	10.6	11.6
Part 19F Supply Organisation	12.6	11.1	11.2	10.2	9.1	10.8	10.2	10.3	9.2	9.2
Part 148 Aircraft Manufacturing Organisation	11.8	10.4	11.2	10.8	9.4	10.9	11.6	9.6	10.2	10.8
Part 121 Air Operator Large Aeroplanes	9.5	10.5	10.0	7.8	8.0	8.2	7.6	9.6	8.1	7.4
Part 129 Foreign Air Transport Operator	10.6	8.2	8.9	9.6	8.3	6.8	6.4	9.5	11.8	8.6
Part 145 Maintenance Organisation	10.7	10.8	10.3	11.1	9.4	9.8	10.3	9.3	8.3	9.3
Part 141 Aviation Training Organisation	11.8	11.4	9.5	10.7	9.3	8.3	9.3	8.9	6.7	8.3
Part 173 Instrument Flight Procedure		5.9	8.2	15.4	13.0	11.1	13.5	8.9	4.4	4.0
Part 139 Aerodrome Operator	5.3	6.3	5.7	5.8	5.9	6.5	7.2	8.6	7.1	7.5
Part 146 Aircraft Design Organisation	9.0	7.6	11.8	10.2	9.4	8.2	8.8	8.3	8.8	8.4
Australia AOC with ANZA Privileges Part		5.5	5.9	7.0	6.1	5.6	7.4	8.2	8.1	7.2
Part 140 Aviation Security Service	4.7	5.5	4.5	4.8	5.0	6.1	6.1	8.1	12.8	11.4
Part 108 Security Programme	7.7	8.3	7.5	7.1	7.0	6.4	6.9	7.6	6.8	6.6
Part 174 Meteorological Service	7.3	9.6	10.3	15.9	10.7	5.1	5.3	6.1	4.7	10.0
Part 175 Aeronautical Info Service	6.2	7.6	12.1	21.2	14.6	11.1	43.3	5.3	3.6	3.3
Part 171 Telecom Service Organisation	6.0	4.9	6.8	17.3	12.7	6.6	5.1	5.0	5.4	17.0

When a client is initially certificated their risk score is automatically high. It gradually declines as the client builds up operational experience. The Part 115 holders illustrate this effect well.

The Routine Audit Process

This process generates findings as a result of inspections of compliance with CAA rules.

The following chart shows the numbers of certificated operators. They are separated into those that have not been audited, those that have been audited and for whom no non-compliances were discovered and finally those for whom one or more non-compliances were discovered either as a result of an audit, an inspection or an investigation. The chart uses calendar years.



It is worth noting that as the CAA moves to risk-based auditing decisions, slightly fewer operators are being audited than in previous years. It is also worth noting that over the last three years only about half of the operators who are audited have generated findings. This is a change from earlier years when for most years significantly more than half of all audited operators generated findings. This is reflected in the table of client risk scores which is to be expected since non-compliance findings are one component of the risk score.

Industry Size and Activity Data

Registered Aircraft

The following table summarises the number of registered aircraft or Part 115 approved aircraft as at 30 June of each year.

Aircraft Category and Class	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Large Aeroplane	120	119	128	126	128	127	117	131	135	130
Medium Aeroplane	74	79	80	79	79	77	77	75	70	76
Small Aeroplane	1520	1519	1522	1526	1532	1498	1500	1499	1509	1519
Helicopter	752	767	765	770	787	798	828	825	838	859
Agricultural Aeroplane	111	109	110	109	106	102	93	93	91	95
Sport Aircraft - Aeroplanes	117	119	124	136	147	158	166	172	173	175
Sport Aircraft - Amateur Built Aeroplane	241	247	251	262	270	275	275	286	291	295
Sport Aircraft - Amateur Built Glider	4	4	4	4	3	3	3	3	3	3
Sport Aircraft - Amateur Built Helicopter	19	21	21	22	23	24	23	24	22	24
Sport Aircraft - Balloons	72	69	70	72	70	61	64	60	61	63
Sport Aircraft - Glider	303	301	300	296	293	284	282	283	283	282
Sport Aircraft - Gyroplane	39	42	40	38	41	49	57	64	72	77
Sport Aircraft - Hang Glider	0	0	0	13	13	18	18	20	24	21
Sport Aircraft - Helicopter	5	5	5	5	6	4	5	5	5	5
Sport Aircraft - Microlight Class 1	244	235	232	227	221	216	209	207	209	210
Sport Aircraft - Microlight Class 2	737	756	790	813	827	830	863	876	885	899
Sport Aircraft - Power Glider	48	48	48	47	46	46	47	51	51	53
Sport Aircraft - Parachute	0	0	0	174	195	198	204	240	266	331
Sport Aircraft - Para Glider	0	0	0	35	67	67	77	88	104	97
Total	4406	4440	4490	4754	4854	4835	4908	5002	5092	5214

Statistically significant growth areas are:

- gyroplanes – from 36 in 2011 to 77 in 2018
- sport aeroplanes – from 117 in 2009 to 175 in 2018
- Part 115 hang gliders – from 13 in 2012 to 21 in 2018
- Part 115 parachutes – from 195 in 2012 to 331 in 2018
- Part 115 para gliders – from 35 in 2012 to 97 in 2018

Moderate declines are evident for

- class 1 microlights - from 244 in 2009 to 210 in 2018
- agricultural aeroplanes – from 111 in 2009 to 95 in 2018

The totals for sport aircraft need to be interpreted with care because the figures before 2011 did not include Hang Gliders, Parachutes or Para Gliders. These aircraft classes have only been recorded since the need to approve them for Part 115 operations arose in late 2011. Even now any private aircraft of these classes do not appear in the CAA records

Licences

The following table summarises the number of airline transport, commercial, private and recreational pilot, air traffic controller, and aircraft maintenance engineer licences on the register as at 30 June of each year.

Licences	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Private & Recreational	6704	6868	6921	6973	6987	6647	6389	6184	5904	**5691**
CPL with class 1 Med	2300	2344	2339	2337	2217	2098	2046	2051	2032	**2143**
ATPL with Class1 Med	1152	1134	1188	1175	1163	1223	1228	1268	1261	**1228**
ATC with Class 3 Med	345	363	361	374	367	381	387	381	364	361
LAME	2378	2463	2519	2575	2639	2699	2754	2800	2852	2898
Total	**12879**	13172	13328	13434	13373	13048	12804	12684	12413	12321

Note — the statistics above for pilot licences count only those with active medical certificates of a class appropriate for the licence type. This means that for CPL and ATPL licences, the number with a class 2 medical only, must only be exercising PPL privileges (or not flying at all). The statistics for ATCL holders count only those with an active class 3 medical certificate.

('Private & Recreational' is the combined total of any PPLs with a valid medical certificate, any aircrew licence with only Class2 medical certificate and any RPLs with current DL9 medical)

These statistics show the number of licences held and the totals therefore overestimate the number of licence holders, as each holder may hold more than one licence.

The numbers of 'Private & Recreational' Pilot licence holders have been declining since 2012 and those of Commercial Pilot licence holders have been declining since 2010 and have increased slightly this year.

Operators (Owners)

The following table summarises the number of registered operators of aircraft on the register as at 30 June of each year.

Operators of:	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Large Aeroplanes	12	12	11	11	11	11	9	10	8	8
Medium Aeroplanes	32	37	38	39	35	35	34	36	32	33
Agricultural Aeroplanes	48	50	48	46	42	39	39	38	37	38
Helicopters	379	391	379	383	386	390	393	384	394	391
Small Aeroplanes	980	984	1008	1010	1008	1000	1024	1016	1027	1029
Sport Aircraft	1617	1638	1666	1716	1715	1728	1754	1787	1807	1836

No attempt has been made to total these figures because many operators own aircraft from multiple categories making totals meaningless.

The most notable trends are a 33% drop in the number of large aeroplane operators and a 27% drop in the number of agricultural aeroplane operators over the last ten years along with increases of 6%, and 15% in the numbers of helicopter and sport aircraft operators over the same period.

Certificated Operators

The following table shows the number of Civil Aviation Rule Part certificate holders as at 30 June of each year.

Approval	Years 20--									
	09	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
Part 109 Regulated Air Cargo Agent	55	63	63	63	67	65	65	66	65	63
Part 115 Adventure Aviation Operator	0	0	0	20	33	28	28	28	29	27
Part 119 Air Operator	182	185	184	181	185	179	172	172	174	175
Part 119 Air Operator - Pacific	1	0	0	0	0	0	0	0	0	0
Part 129 Foreign Air Operator	40	37	33	28	31	30	28	36	43	45
Part 137 Agricultural Aircraft Operator	108	108	104	99	103	99	103	103	102	104
Part 139 Aerodromes	26	26	26	26	27	25	27	27	27	26
Part 140 Aviation Security Service	1	1	1	1	1	1	1	1	1	1
Part 141 Aviation Training Organisation	53	58	54	57	57	53	56	53	52	51
Part 141 Restricted Training Organisation	0	0	0	0	0	0	0	0	0	0
Part 145 Aircraft Maintenance Organisation	55	55	60	67	66	58	56	55	53	51
Part 146 Aircraft Design Organisation	10	13	14	15	14	14	14	12	12	12
Part 148 Aircraft Manufacturing Organisation	21	22	21	23	20	20	20	20	17	14
Part 149 Aviation Recreation Organisation	9	9	9	9	7	8	8	8	8	8
Part 171 Aeronautical Telecommunication Service Organisation	2	2	2	2	2	2	2	2	2	2
Part 172 Air Traffic Service	1	1	1	1	1	1	1	1	1	1
Part 173 Instrument Flight Procedure Service Organisation	1	3	3	3	3	4	2	2	2	2
Part 174 Meteorological Service Organisation	2	2	2	2	2	2	2	2	2	2
Part 175 Aeronautical Information Service Organisation	2	2	1	1	1	1	2	2	2	2
Part 19 Supply Organisation Certificate of Approval	61	61	58	60	58	57	60	54	46	36
Part 92 Dangerous Goods Packaging Approval	46	56	65	57	62	52	57	59	61	55
Part 129/108 Security Programme	30	26	25	21	23	22	20	28	37	41
Part 119/108 Security Programme	18	19	17	18	19	18	16	18	16	6
Part 121 Large Aeroplanes	10	10	9	9	9	9	7	8	6	13
Part 125 Medium Aeroplanes	15	15	15	15	16	14	13	15	13	12
Part 135 Helicopters and Small Aeroplanes	171	174	174	171	173	168	163	162	166	167
Part 119 Pacific/108 Security Programme	1	0	0	0	0	0	0	0	0	0
Pacific - Part 121 Large Aeroplanes	1	0	0	0	0	0	0	0	0	0
Pacific - Part 125 Medium Aeroplanes	1	0	0	0	0	0	0	0	0	0
Pacific - Part 135 Helicopters and Small Aeroplanes	1	0	0	0	0	0	0	0	0	0
Australian AOC Operating with ANZA Privileges	2	2	2	1	2	2	2	4	4	5
Synthetic Training Device (Airlines)	7	10	10	9	9	11	14	12	11	11
Synthetic Training Device (General Aviation)	29	28	27	33	32	28	30	28	29	38
Pilotless Aircraft Authorisation	0	0	0	0	7	5	1	0	0	0
Part 102 Unmanned Aircraft Operator Certificate	0	0	0	0	0	0	0	45	89	105
Total	962	988	980	992	1030	976	970	1023	1070	1075

* Note:

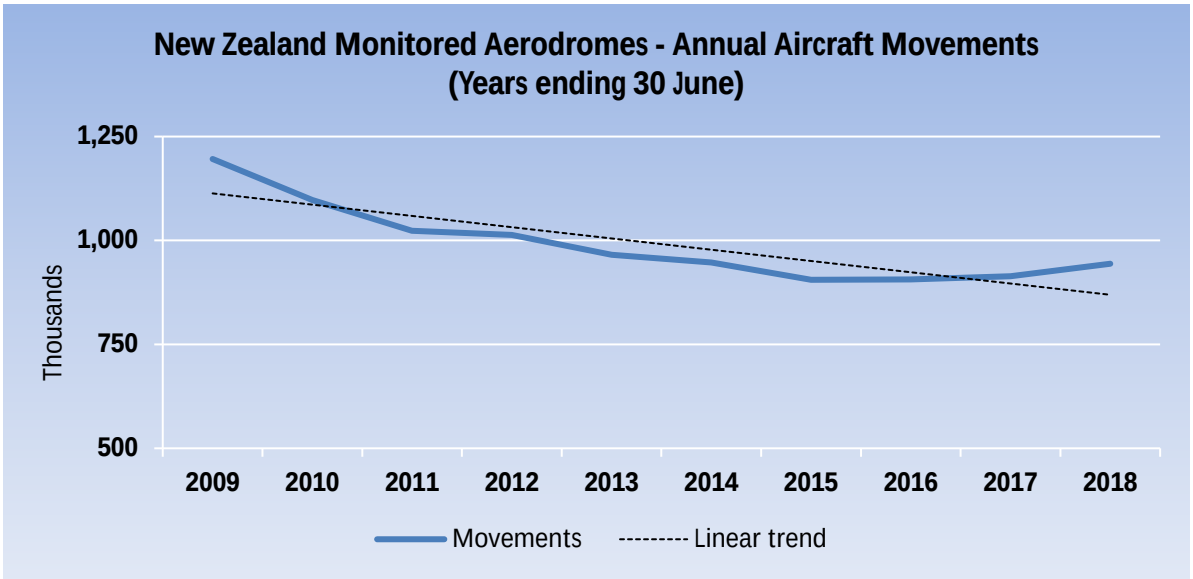
For organisations with Part 92 and for those with Part 172 certificates the figures show the total number of services that are certificated. This does not necessarily equate to the number of organisations that hold the certificate.

Aircraft Movements

Quarterly aircraft movement numbers are supplied to CAA by Airways Corporation for all aerodromes that they service, either by way of a control service or an information service. In addition Taupo airport voluntarily supplies movement information on a regular basis. A movement is defined as a take-off or a landing but touch-and-go operations are not defined. Airways counts each as a single movement, Taupo Airport counts each as two movements. This means that Taupo's values may not be validly compared with other aerodromes' but can of course be used to inform trends over time.

Long-Term Change in Aircraft Movements

The following graph shows the annual number of aircraft movements for the ten-year period ending 30 June 2018. Paraparaumu Airport has been omitted from this long term analysis because the available data is incomplete because there has only been a flight information service available since October 2011.



Breakdown by Aerodrome

The following table shows the number of aircraft movements reported at the following aerodromes: Auckland, Christchurch, Dunedin, Gisborne, Hamilton, Invercargill, Milford Sound, Napier, Nelson, New Plymouth, Ohakea, Palmerston North, Paraparaumu, Queenstown, Rotorua, Taupo, Tauranga, Wellington, Whenuapai and Woodbourne.

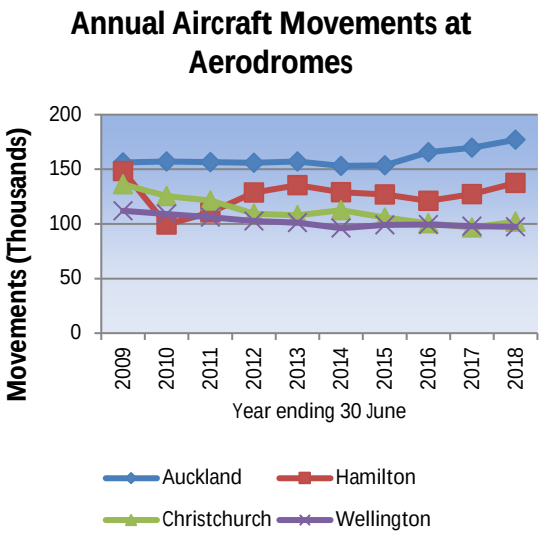
Annual Aircraft Movements at Aerodromes

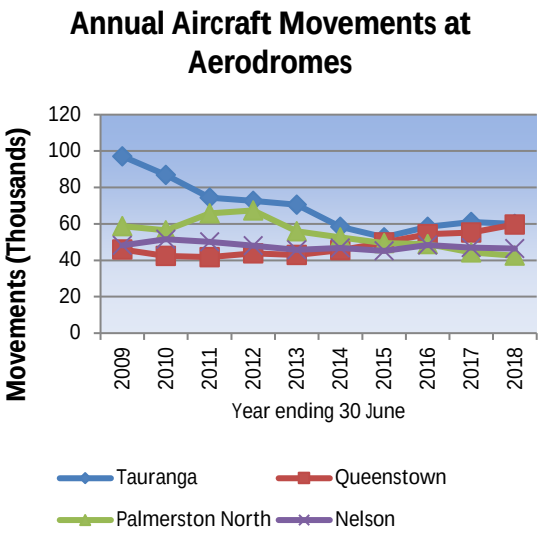
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Auckland	156325	157201	156655	156062	157141	153092	153561	165692	169712	176977
Christchurch	148380	99308	110419	128744	135404	129050	127044	121084	127168	137510
Dunedin	136249	125611	121469	109444	107754	112568	105760	100548	96641	101894
Gisborne	111969	109193	105988	102488	101279	96084	99053	99443	98000	97305
Hamilton	97144	86935	74400	72652	70450	58448	52662	58340	61114	60014
Milford	45966	42347	41769	43776	43012	45620	49794	54347	55262	59715
New Plymouth	58761	56439	65708	67395	55960	52655	49494	48870	44303	42518
Napier	48273	51570	50094	48073	45677	46770	45180	48469	47034	46378
Nelson	6305	0	12832	33702	31241	24279	26115	27274	24993	22922
Invercargill	72997	61896	55726	30959	28807	36512	29632	26264	26691	31924
Ohakea	24114	27172	27332	25242	24386	22728	21268	23090	22177	24388
Palmerston North	53602	44003	29229	25328	22758	22750	23276	21905	23092	26731
Paraparaumu	30680	28774	26376	25536	23814	22642	22009	20792	20144	19688
Queenstown	24058	22829	23660	22689	21826	20451	22374	20372	21206	22246
Rotorua	43518	37097	32791	30773	24910	21831	19678	19684	19454	19587
Taupo	20734	23380	22682	22092	22532	20143	19256	17870	19014	19199
Tauranga	14227	14042	13043	12902	13482	13980	16658	17475	19007	19022
Woodbourne	25805	29279	30840	28491	23058	19960	15910	16939	17890	18046
Wellington	23955	22174	22459	19594	17671	15897	16003	15331	15128	23037
Whenuapai	13220	14347	14675	14915	15419	14946	14392	12188	11126	9495
Total (excluding Paraparaumu)	1149977	1053597	1025315	987155	955340	926127	903004	908703	919012	958908

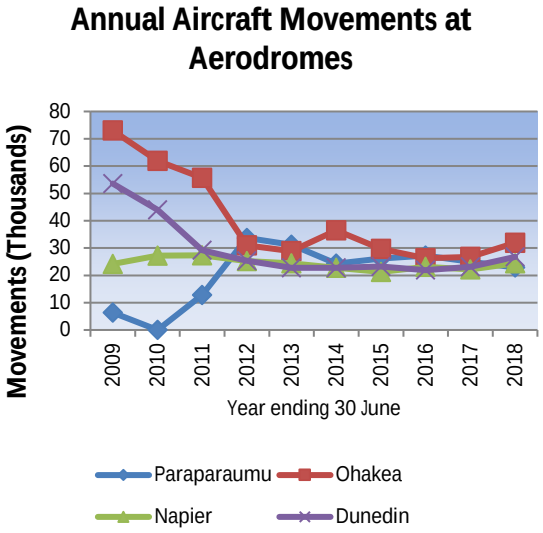
Movements data for individual aerodromes are graphed on the next page.

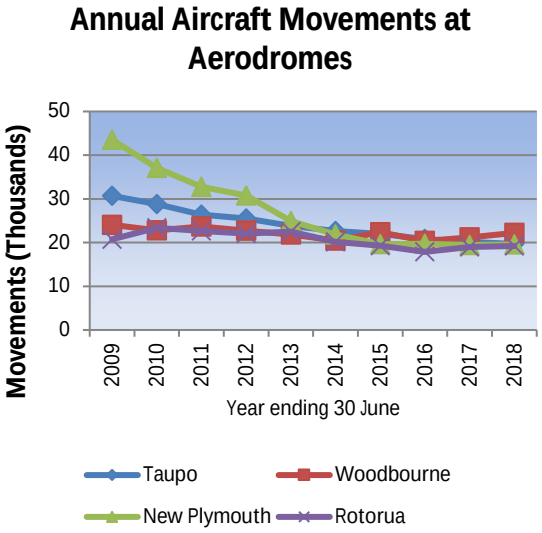
The aerodromes are grouped by the number of movements over the last year covered by this report.

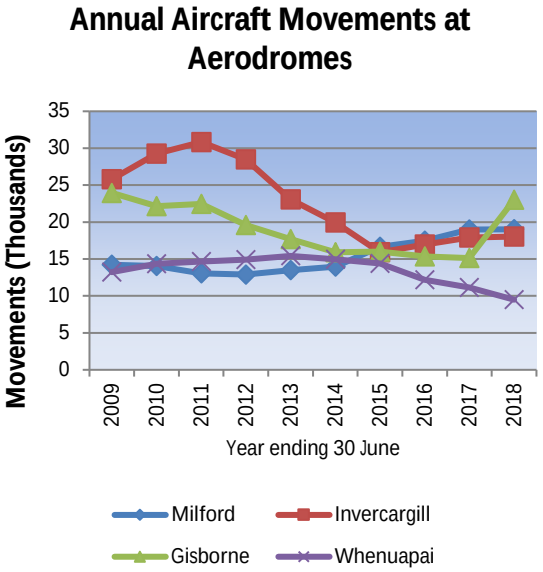
Note that the scales are different for each chart to prevent the smaller aerodromes' graphs from becoming unreadable which would happen if all the charts had the same scales.







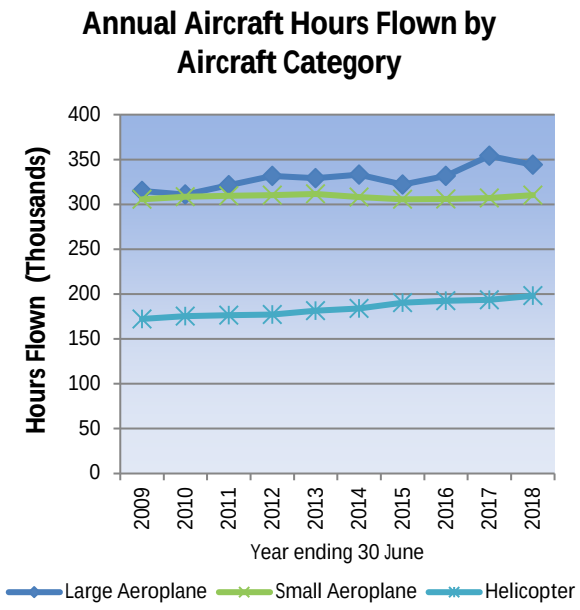


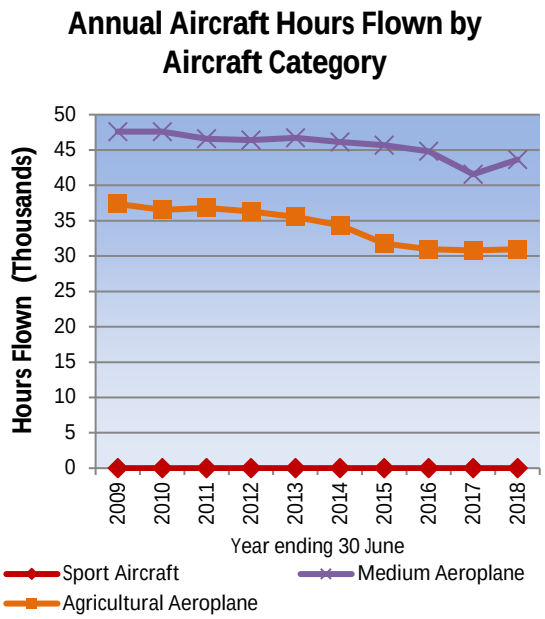


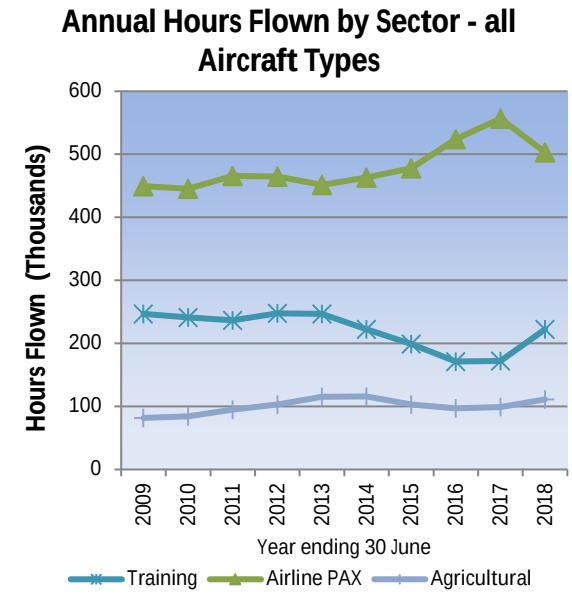
Hours Flown

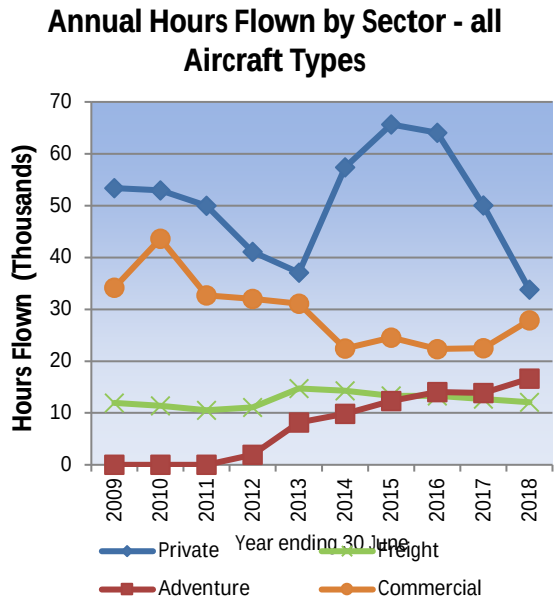
The following graphs show the estimated number of annual hours flown during the ten year period ending 30 June 2018. The estimates are based on the reported hours with an allowance for aircraft for which reports were not received. Recent improvements in the collection procedure for operating statistics data have resulted in improved return rates with a consequent improvement in confidence in the published data.

Note that these graphs exclude the aircraft statistics categories Sport Aircraft and Hang Gliders except where the aircraft are approved for use in Part 115 operations. Foreign registered aircraft that are operated in New Zealand and parachutes are also excluded.









Seat-Hours

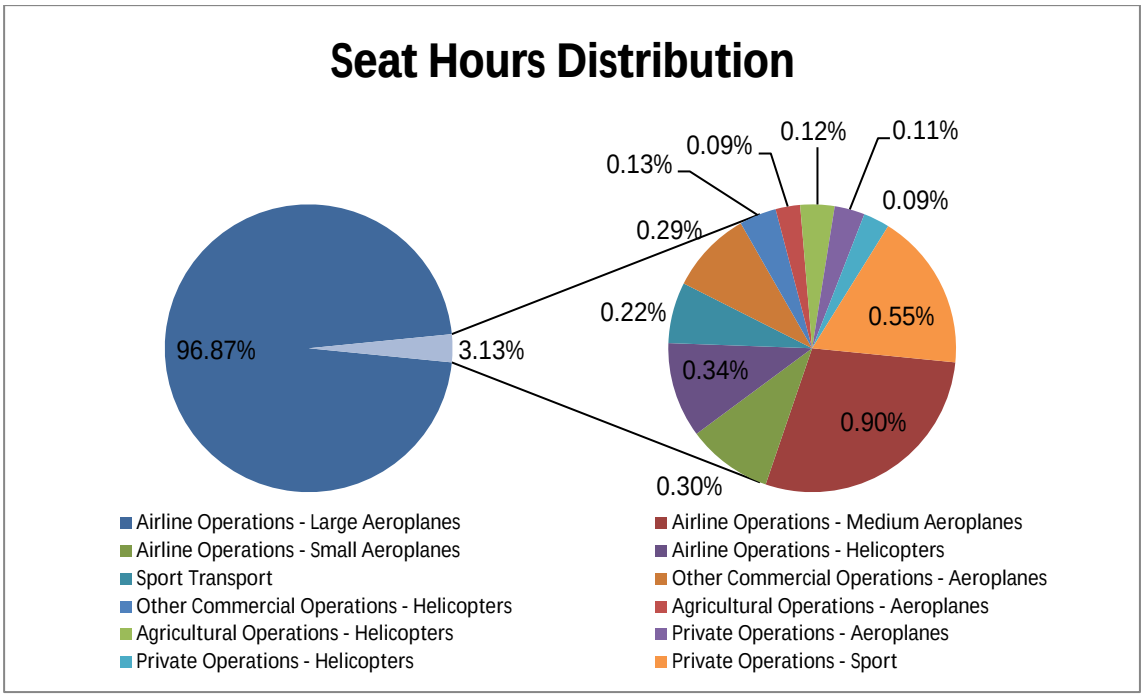
The following table indicates the size of the aviation industry as determined from Aircraft Operating Statistics in the relevant 2010 Safety Target Group categories for years ending 30 June.

A seat-hours measure is used as an indication of person exposure. For each Safety Target Group the total number of hours flown is multiplied by the average number of seats and an appropriate load factor, to give the number of seat hours utilised by the group (person exposure). For Safety Target Groups that are not predominantly passenger carrying a surrogate of 500 kg of aircraft weight is used instead of seats.

The values in the table are thousands of seat hours.

Safety Outcome Target Group	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Airline Operations - Large Aeroplanes	47,028	45,232	47,504	48,779	49,556	49,560	47,948	48,202	51,325	50,640
Airline Operations - Medium Aeroplanes	764	656	696	732	679	581	481	447	347	367
Airline Operations - Small Aeroplanes	99	104	110	106	102	73	89	150	180	167
Airline Operations - Helicopters	126	112	128	132	123	118	140	167	208	174
Sport Transport	122	122	122	57	96	92	94	107	111	92
Other Commercial Operations - Aeroplanes	270	279	230	275	294	198	156	145	161	155
Other Commercial Operations - Helicopters	97	105	94	95	88	53	74	65	50	61
Agricultural Operations - Aeroplanes	35	37	45	51	43	44	47	43	41	41
Agricultural Operations - Helicopters	95	97	123	78	94	80	66	60	69	67
Private Operations - Aeroplanes	54	55	50	42	39	45	49	53	42	53
Private Operations - Helicopters	53	50	39	36	36	45	49	46	36	46
Private Operations - Sport	206	206	206	252	267	268	270	276	287	306

Most sport aircraft do not report hours or seats, so a standard estimate of seat hours offered is used as well as reported data for such aircraft in these groups.



This chart shows that for the year ending June 2018 approximately 96.9% of seat hours were offered by the Airline Operations – Large Aeroplanes group, approximately 0.9% by the Airline Operations – Medium Aeroplanes group, with the remaining 2.2% of seat hours offered being split between the other safety target groups.

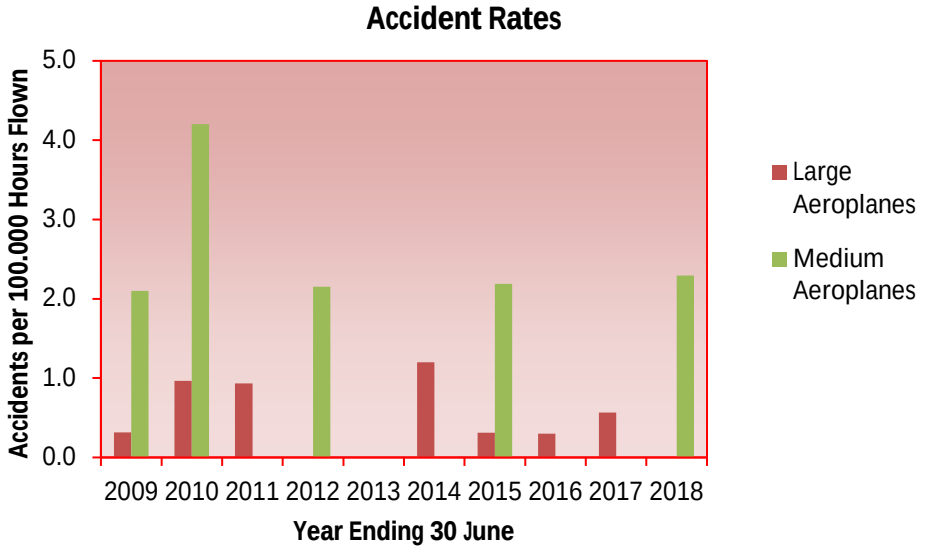
By comparison the 350,000 hours flown by the 136 large aircraft is only approximately 40% more than the 250,000 hours flown by the 1508 small aeroplanes on the register. The difference in passenger exposure is thus largely a function of the seating capacity.

Occurrence Analysis

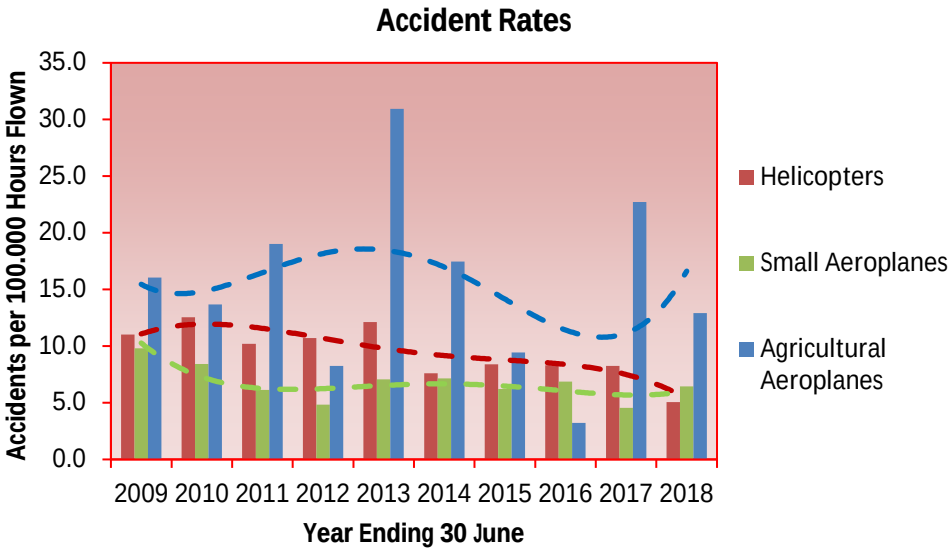
Aircraft Accidents

The following graphs show the annual aircraft accident rates (accidents per estimated 100,000 hours flown) for the ten calendar years up to and including 2018 (excluding the Sport Aircraft statistics category).

Breakdown by Aircraft Category

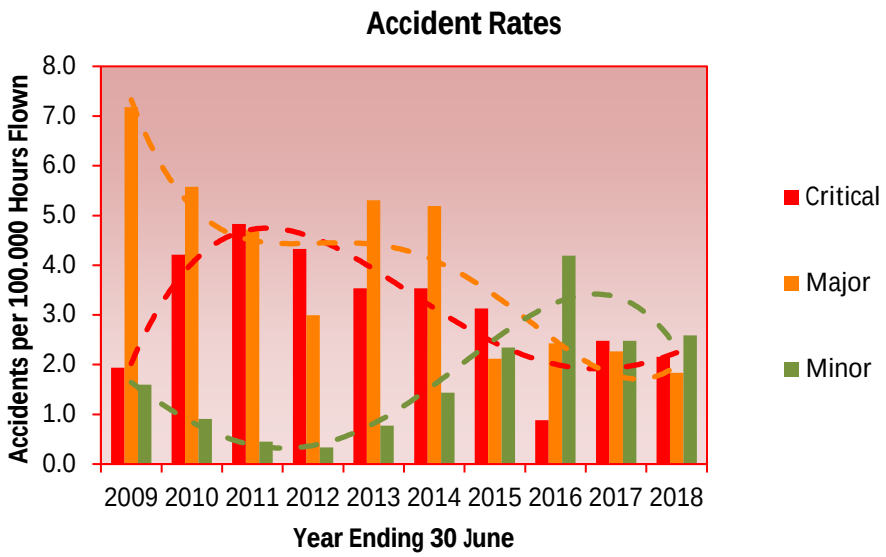


The numbers and rates of accidents in these two aircraft categories are too small for any trend analysis to be useful



Trends are indicated by dashed lines colour coded the same as the corresponding aircraft categories.

Breakdown by Severity



The definitions of Accident and Severity (see Appendix) are such that most accidents fall into the critical or major categories so the recent resurgence in the numbers of minor accidents is noteworthy.

Yearly Comparisons – counts, not rates

The tables below show the numbers of reported accidents broken down by aircraft type and accident severity.

The values relate to years ending 30 June

Critical Accidents

Aircraft Type	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Large Aeroplanes	0	0	0	0	0	1	0	0	0	0
Medium Aeroplanes	0	1	0	0	0	0	0	0	0	0
Small Aeroplanes	5	8	9	7	7	7	6	0	2	4
Helicopters	5	6	16	14	10	8	14	5	10	6
Sport Aircraft excluding Hang Gliders and Parachutes	5	19	17	17	11	14	7	3	6	8
Hang Gliders	6	5	4	7	8	5	6	5	5	10
Parachutes	0	3	3	4	3	4	4	1	5	9
Agricultural Aeroplanes	2	3	1	1	3	2	1	0	4	2
Unknown	0	0	0	0	1	0	0	0	1	0
Total	23	45	50	50	43	41	38	14	33	39

Major Accidents

Aircraft Type	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Large Aeroplanes	0	0	2	0	0	2	0	1	1	0
Medium Aeroplanes	1	0	0	1	0	0	1	0	0	0
Small Aeroplanes	20	16	10	7	13	11	7	5	3	5
Helicopters	13	16	2	5	12	5	1	6	6	3
Sport Aircraft excluding Hang Gliders and Parachutes	27	15	22	11	15	25	8	10	9	7
Hang Gliders	6	8	4	2	2	4	2	5	5	6
Parachutes	3	2	3	7	4	1	1	4	6	1
Agricultural Aeroplanes	2	2	4	2	8	2	2	0	2	1
Unknown	0	0	2	1	0	2	0	0	0	1
Total	72	59	49	36	54	52	22	31	32	24

Minor Accidents

Aircraft Type	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Large Aeroplanes	1	3	1	0	0	1	1	0	1	0
Medium Aeroplanes	0	1	0	0	0	0	0	0	0	1
Small Aeroplanes	5	2	0	1	2	4	6	16	9	11
Helicopters	1	0	0	0	0	1	1	5	0	1
Sport Aircraft excluding Hang Gliders and Parachutes	4	2	1	1	5	4	13	16	10	10
Hang Gliders	5	12	5	0	3	4	17	18	4	2
Parachutes	3	1	4	1	4	3	3	3	5	2
Agricultural Aeroplanes	2	0	2	0	0	2	0	1	1	1
Unknown	1	0	0	1	0	1	0	0	2	0
Total	22	21	13	4	14	20	41	59	32	28

Significant Accidents

This section describes significant accidents reported as occurring during the period covered by this report. The section is grouped by safety outcome target group. Groups with no significant events have been omitted. For each incident the location is stated before the description.

Airline Operations – Small Aeroplanes

- South Hokitika river mouth: During descent into NZHK, the engine lost power due to insufficient fuel in the left-hand fuel tank. The pilot changed to the right-hand fuel tank which contained sufficient fuel however the engine would not restart. The pilot carried out a forced landing onto a nearby beach however during the landing roll out the nose undercarriage leg collapsed due to the soft sand.|~The aircraft landed below the high tide mark and the incoming king tide swamped the aircraft before it could be moved further up the beach. The aircraft has subsequently been written off by the insurers. 0 fatalities. Aircraft destroyed. Occurrence Id: 18/4

Other Commercial Operations -Helicopters

- Ngmatea: Helicopter appeared to suffer a partial power loss. A/c landed heavy and destroyed, multiple injuries 1 fatality. Occurrence Id: 18/4379

Private Operations - Sport

- Kaikohe: Electric motor-glider departed at 15:30 for a local flight. RCCNZ was advised that the glider was overdue at 17:30 local time. Glider wreckage was located at 19:17.1 fatalities. Aircraft destroyed. Occurrence Id: 17/7177

- Omarama: Glider was reported overdue and the wreckage was later found on a steep western facing ridge at approximately 4,000 feet. 1 fatalities. Aircraft destroyed. Occurrence Id: 17/7309

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Safety Target Structure

The 2010 Safety Targets classify all New Zealand aviation under three broad group headings: Public Air Transport, Other Commercial Operations, and Non-commercial Operations. Thirteen further sub-groups enable differentiation between aeroplanes, helicopters, and sport aircraft, and also allow for different weight groups. This section presents the same accidents as the previous section but classified by type of operation (sector) rather than type of aircraft.

Number of Accidents

The following table shows, for each safety target group, the number of accidents each year for the last ten calendar-years ending with 2018. All aircraft types are included.

Safety Outcome Target Group	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Airline Operations - Large Aeroplanes	2	3	3	0	0	4	1	1	2	**0**
Airline Operations - Medium Aeroplanes	0	2	0	1	0	0	1	0	0	**0**
Airline Operations - Small Aeroplanes	3	3	3	1	2	1	2	0	1	**2**
Airline Operations - Helicopter	0	0	0	0	0	0	0	0	0	**0**
Sport Transport	12	12	11	10	4	8	12	11	15	**12**
Other Commercial Operations - Aeroplane	0	0	0	0	0	0	0	0	0	**0**
Other Commercial Operations - Helicopter	0	0	0	0	0	0	0	0	0	**0**
Agricultural Operations - Aeroplane	0	0	0	0	0	0	0	0	0	**0**
Agricultural Operations - Helicopter	0	0	0	0	0	0	0	0	0	**0**
Private Operations - Aeroplane	0	0	0	0	0	0	0	0	0	**0**
Private Operations - Helicopter	0	0	0	0	0	0	0	0	0	**0**
Private Operations - Sport	47	56	54	39	42	46	45	47	38	**37**
Other	1	1	1	2	1	2	0	0	2	**1**
None	0	0	0	0	0	0	0	0	0	**0**
Total	**65**	**77**	**72**	**53**	**49**	**61**	**61**	**59**	**58**	**52**

Not all accidents generate equal consequences and the usefulness of the above data for focussing intervention decisions is limited. The 'Sport Transport' group ranks 2nd in this data but when consequential factors like fatalities, serious injuries and aircraft damage are taken into account the ranking changes to 3rd as can be seen from the next section.

Annual Social Cost

Social cost is a measure of the impact of fatal, serious and minor injuries and aircraft destroyed. The measure has been developed and maintained by the Ministry of Transport, and is updated annually. The following table displays the social cost expressed in millions of 2015 dollars for each safety target group for the last ten calendar-years ending with 2017. The table is sorted by the social cost in the 2017 year

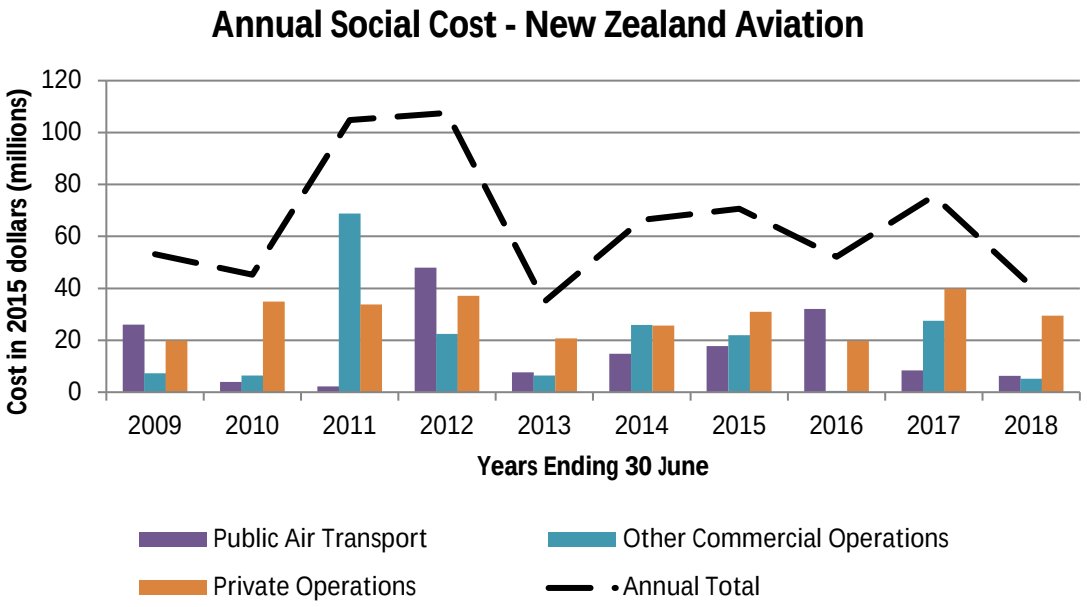
Safety Outcome Target Group	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Private Operations - Aeroplane	1.5	8.7	0.2	6.7	0.4	4.3	18.3	0.1	1.1	**0.0**
Other Commercial Operations - Helicopter	0.8	0.0	19.4	16.5	0.4	0.9	14.8	0.0	6.7	**5.1**
Private Operations - Sport	13.8	24.5	25.3	30.4	14.9	12.7	6.9	14.4	34.2	**29.4**
Airline Operations - Helicopter	2.5	1.3	0.4	0.4	6.1	9.2	10.0	31.0	2.4	**0.0**
Agricultural Operations - Helicopter	1.1	0.0	1.3	5.8	0.0	11.4	6.1	0.5	11.0	**0.0**
Private Operations - Helicopter	4.5	1.7	8.4	0.0	5.5	8.7	5.7	5.3	4.5	**0.0**
Airline Operations - Small Aeroplanes	0.2	0.6	0.0	0.2	0.8	1.0	5.2	0.0	0.0	**0.0**
Sport Transport	23.3	1.9	1.8	47.3	0.7	1.0	2.4	1.0	4.5	**6.1**
Agricultural Operations - Aeroplane	5.1	1.8	0.0	0.0	5.9	1.8	0.8	0.0	9.3	**0.0**
Airline Operations - Large Aeroplanes	0.1	0.0	0.0	0.1	0.1	3.5	0.1	0.1	1.4	**0.2**
Other Commercial Operations - Aeroplane	0.2	4.7	48.1	0.2	0.2	11.8	0.2	0.0	0.5	**0.0**
Airline Operations - Medium Aeroplanes	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Other	8.3	0.0	0.0	0.0	8.7	0.0	0.0	0.4	2.4	**0.0**
Total	**61.5**	**45.3**	**104.8**	**107.6**	**43.5**	**66.4**	**70.7**	**52.6**	**78.0**	**40.9**

Social Cost Analysis

The extreme value of 93.6 million dollars in the year ending 30 June 2012 is largely a result of a multiple fatality accident in the ballooning sector. The year ending 30 December 2018 has incurred a social cost lower than the average of the previous nine years.

The following charts show the annual social cost for each Safety Outcome Target Group for the ten calendar years ending with 2018. Note that the Sport groups include hang gliders and parachutes. These charts show the same data as the table above but are intended to give a more visual perspective on the Safety performance of the industry as measured by the Social Cost.

The first chart shows a breakdown into the three major groups, Public Air Transport (including Adventure Aviation), Other Commercial (including Agricultural) and Private operations.



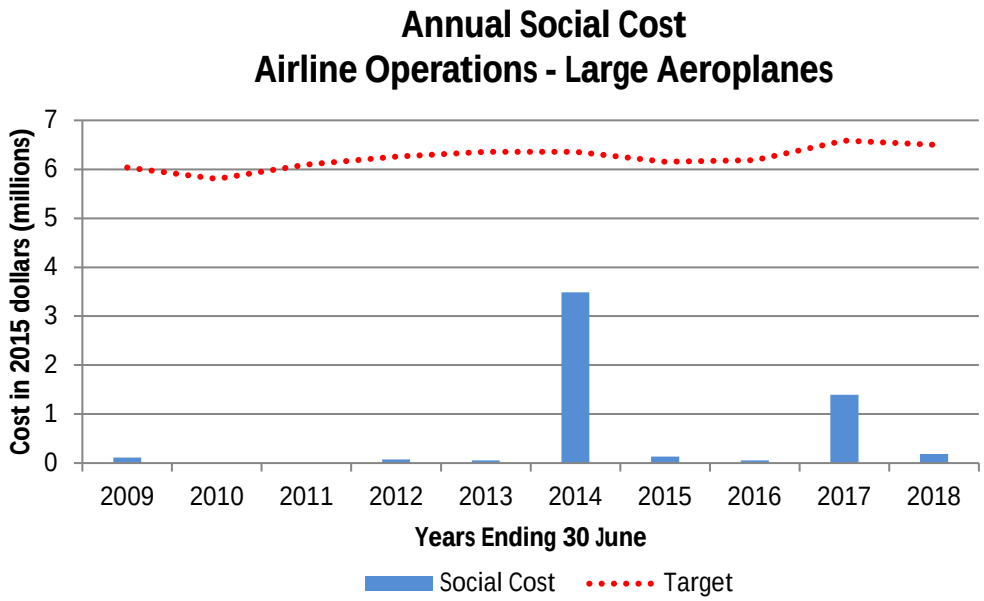
Arising from:

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Fatalities	18	8	21	22	8	10	13	10	13	9
Serious Injuries	24	14	22	22	21	33	34	20	36	18
Minor Injuries	25	38	15	15	27	39	50	38	41	44
Aircraft Unusable	17	18	24	16	18	20	28	5	14	5

The next charts show the breakdowns by individual Safety Outcome Target Group.

Each chart also shows the social cost target for the group. These targets were set in 2005 as a 'social cost dollars per seat-hour flown' value. For the graphs below, these target figures have been scaled by the seat hours estimated to have been flown within the group and adjusted by the general consumer price index for the intervening years.

Each chart is followed by a table showing the numbers of injuries or events that contributed to the social cost.

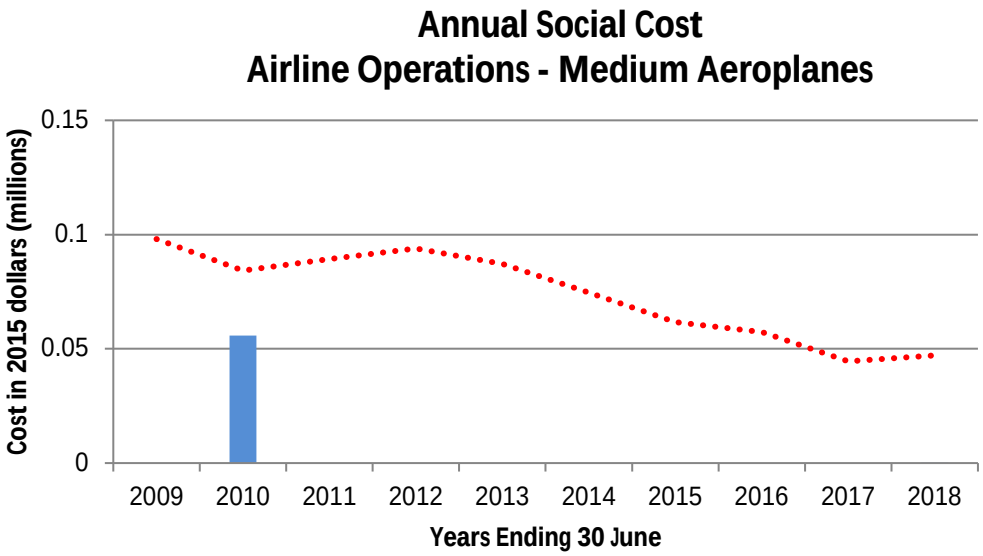


Arising from:

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Fatalities	0	0	0	0	0	0	0	0	0	0
Serious Injuries	0	1	0	0	0	3	0	0	3	0
Minor Injuries	7	0	0	4	3	7	7	3	5	10
Aircraft Unusable	0	0	0	0	0	1	0	0	0	0

The most significant contribution was one aircraft written off in 2014

Because of the number of seats offered within this group the potential exists for a single event to be catastrophic. Accordingly the operators give priority to safety and the CAA maintains relatively tight surveillance. The outcome is a level of safety well within the target level.



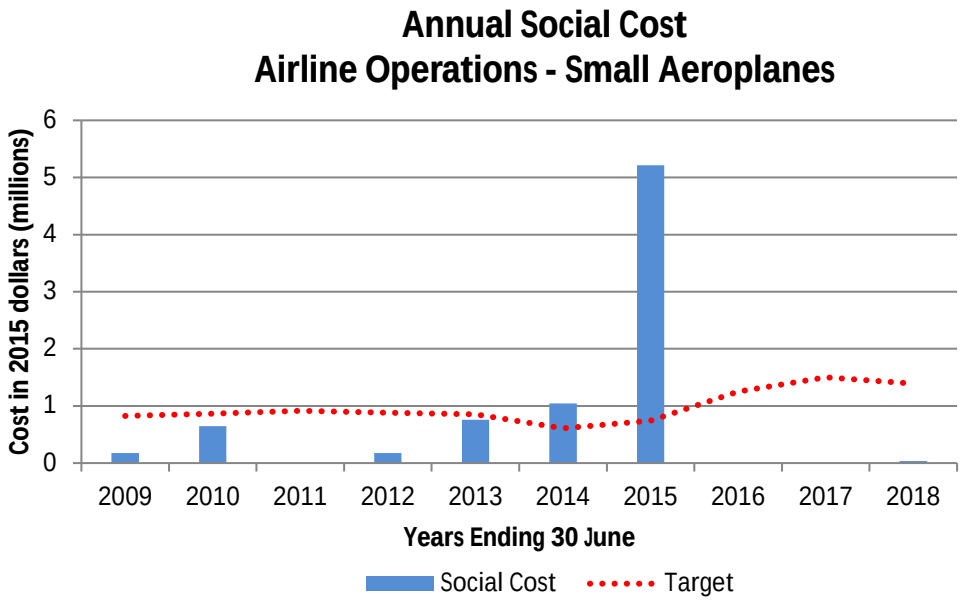
Arising from:

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Fatalities	0	0	0	0	0	0	0	0	0	0
Serious Injuries	0	0	0	0	0	0	0	0	0	0
Minor Injuries	0	3	0	0	0	0	0	0	0	0
Aircraft Unusable	0	0	0	0	0	0	0	0	0	0

The only contribution is three minor injuries in 2010

Because of the number of seats offered within this group the potential exists for an event to be catastrophic. Accordingly the operators give priority to safety and the CAA maintains relatively tight surveillance. The outcome is a level of safety well within the target level.

The much lower level of activity within this sector (1.0% of all the seat-hours in the industry) means that a single event has the ability to cause the social cost to exceed the target in the year the event occurred. This is not seen as a problem as long as the target is met on average over an extended period.

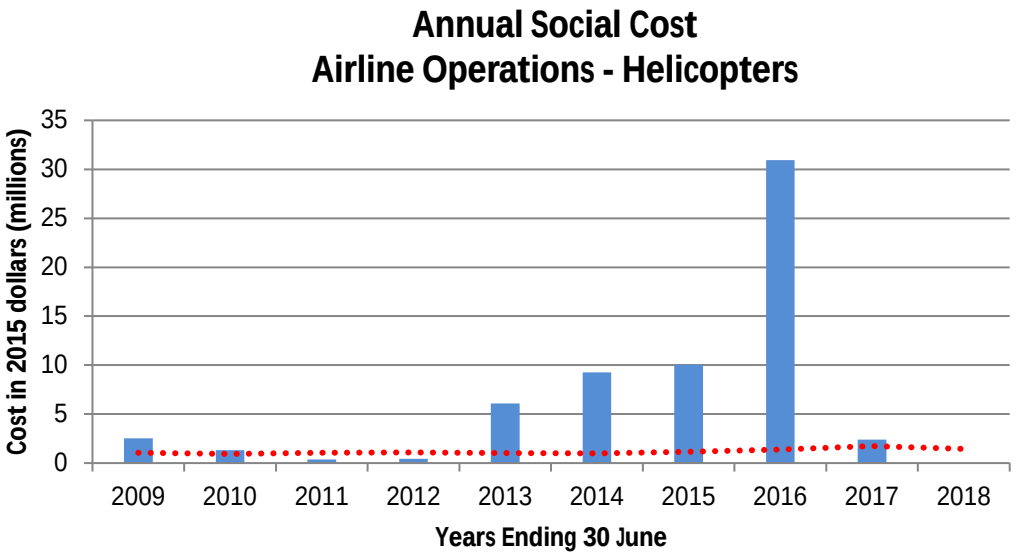


Arising from:

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Fatalities	0	0	0	0	0	0	1	0	0	0
Serious Injuries	0	1	0	0	1	2	2	0	0	0
Minor Injuries	0	2	0	0	0	0	0	0	0	2
Aircraft Unusable	1	1	0	1	1	1	1	0	0	1

One fatal accident in 2014 is the major contributing factor in this group coupled with an average aeroplane write-off rate of 0.6 per year over the last ten years. There have also been 6 serious injuries 5 of which occurred in the last five years.

The safety trend in this group is a concern with this measure having exceeded the target for two of the last five years. This was one of the reasons for commencing the Part 135 sector risk profile, published November 2015.



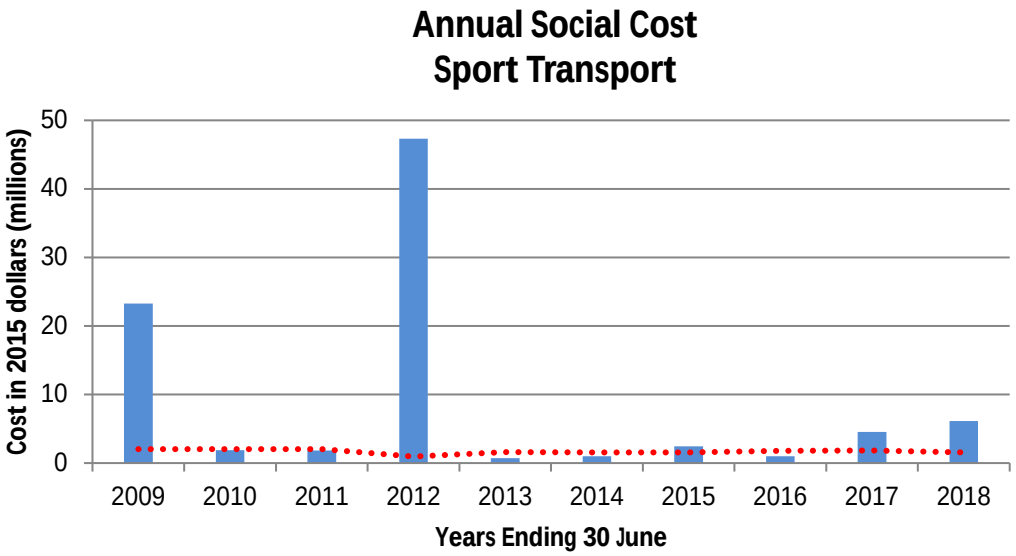
Arising from:

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Fatalities	0	0	0	0	1	1	1	7	0	0
Serious Injuries	2	0	0	1	0	1	6	1	1	0
Minor Injuries	2	2	2	0	0	7	2	1	2	0
Aircraft Unusable	2	1	1	0	1	3	2	1	1	0

This group has generated ten fatalities in the last ten years, all of them in the last four years. This coupled with three aircraft write-offs in 2013 and an increasing number of serious and minor injuries in the recent years means there is concern about the safety trend in this group.

The social cost target has been met or very closely approached in six of the last ten years.

The helicopter sector has been identified as a priority area for the CAA in the 2018/19 strategic safety plan. This sector was also examined by the Part 135 Sector Risk Profile Published November 2015 on the CAA website.

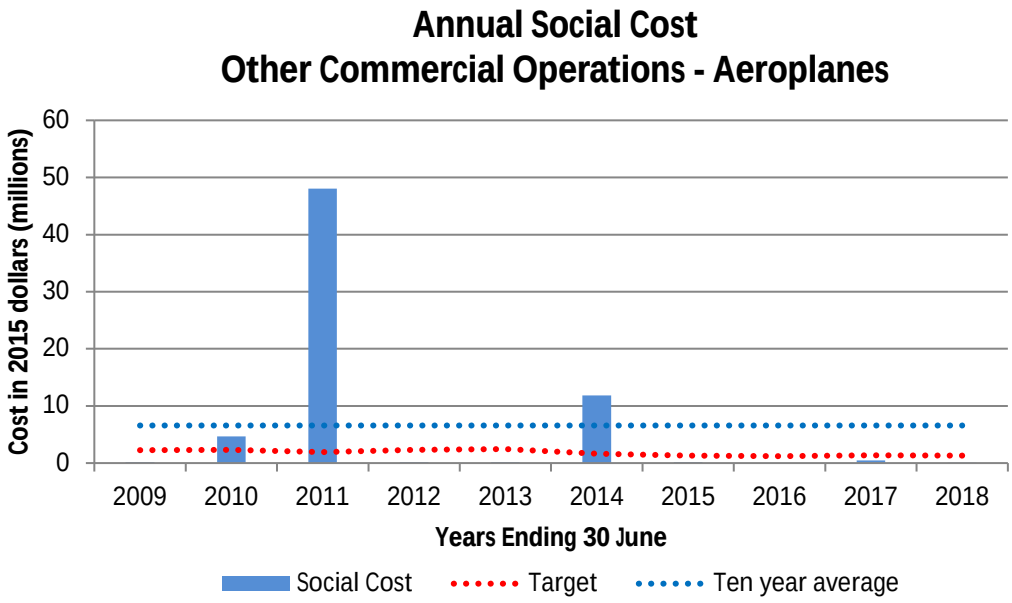


Arising from:

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Fatalities	5	0	0	11	0	0	0	0	0	1
Serious Injuries	5	3	5	4	2	5	5	2	10	5
Minor Injuries	4	5	6	4	5	6	10	7	11	11
Aircraft Unusable	3	1	1	1	1	0	1	0	0	0

Eleven fatalities in 2012 dominate the safety performance of this group. Since November 2011 this group has included the Adventure Aviation (Rule Part 115) operations. The slightly higher social cost target for this operation category reflects the greater degree of risk.

The group has exceeded, met or approached the social cost targets in seven of the last ten years.



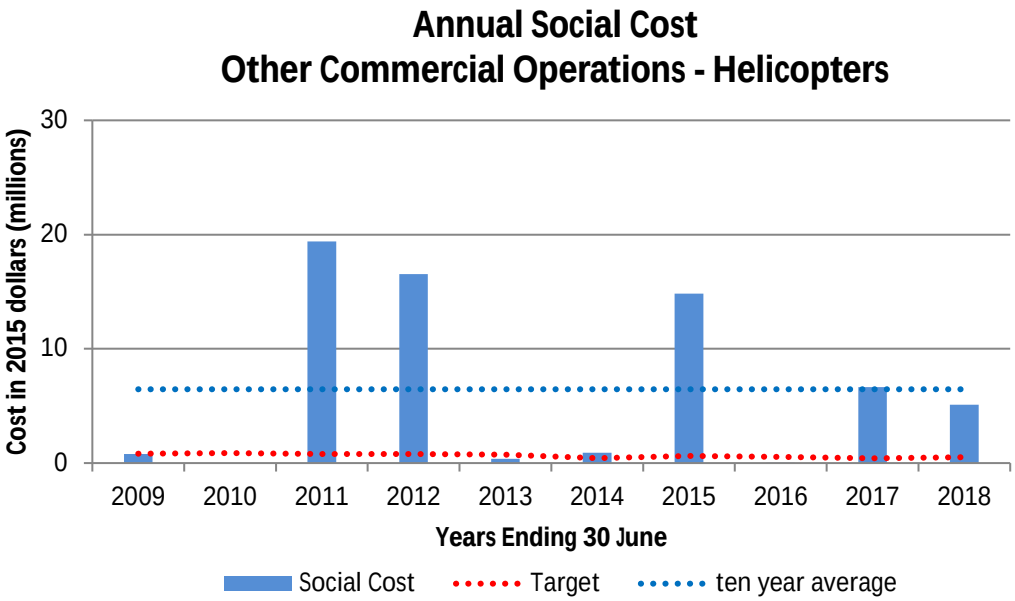
Arising from:

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Fatalities	0	1	11	0	0	2	0	0	0	0
Serious Injuries	0	0	2	0	0	6	0	0	1	0
Minor Injuries	1	0	0	0	1	0	0	0	1	2
Aircraft Unusable	1	3	4	1	1	5	1	0	0	0

The most noteworthy event in this group is an accident in 2010 in which five crew and four passenger fatalities occurred during a parachuting transport flight.

The low level of activity within this sector (0.3% of all the seat-hours in the industry) means that a single event has the ability to cause the social cost to exceed the target in the year the event occurred. This is not seen as a problem as long as the target is met on average over an extended period.

This is not the case in this group.

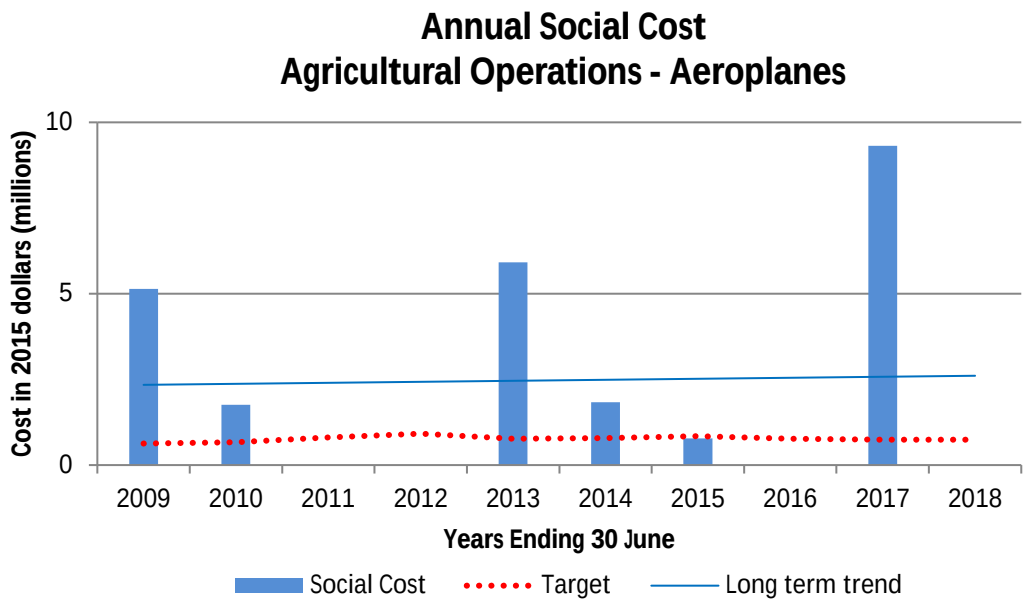


Arising from:

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Fatalities	0	0	4	3	0	1	3	0	1	1
Serious Injuries	1	0	1	1	0	3	0	0	2	2
Minor Injuries	2	0	1	2	2	2	3	1	0	4
Aircraft Unusable	1	0	4	3	1	1	5	0	2	0

This group seems to display an almost cyclic pattern of safety failure. It is possible that economic pressures might influence behaviour but difficult to show any reliable correlation.

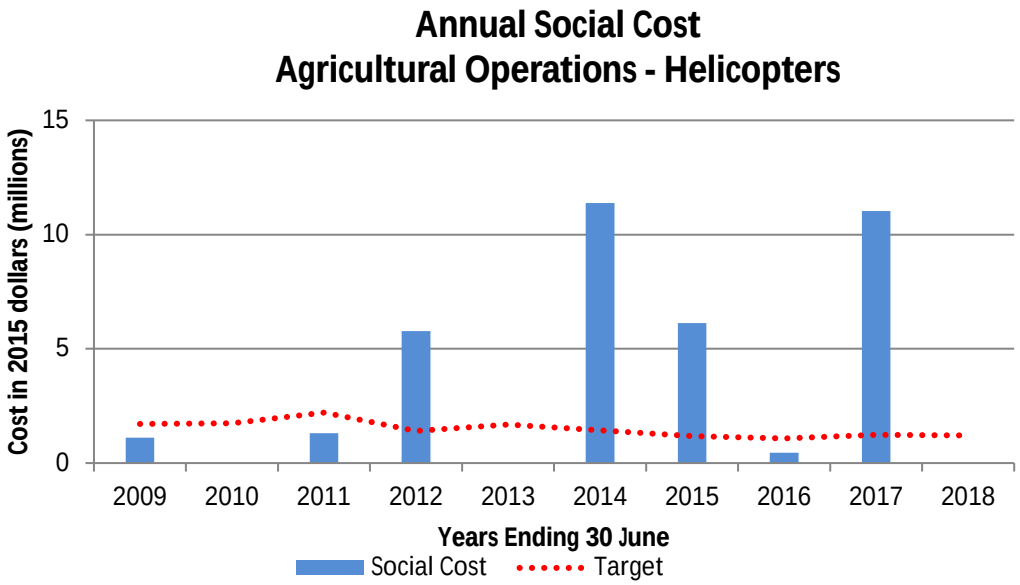
The low level of activity within this sector (0.13% of all the seat-hours in the industry) means that a single event has the ability to cause the social cost to exceed the target in the year the event occurred. While this may not be a problem as long as the target is met on average over an extended period, this is not the case in this group. The ten year average significantly exceeds the target. For this reason commercial helicopter operations are one of the CAAs ongoing focus areas.



Arising from:

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Fatalities	1	0	0	0	1	0	0	0	2	0
Serious Injuries	0	1	0	0	1	2	1	0	0	0
Minor Injuries	0	2	0	0	1	0	1	0	0	0
Aircraft Unusable	1	2	0	0	2	1	1	0	1	0

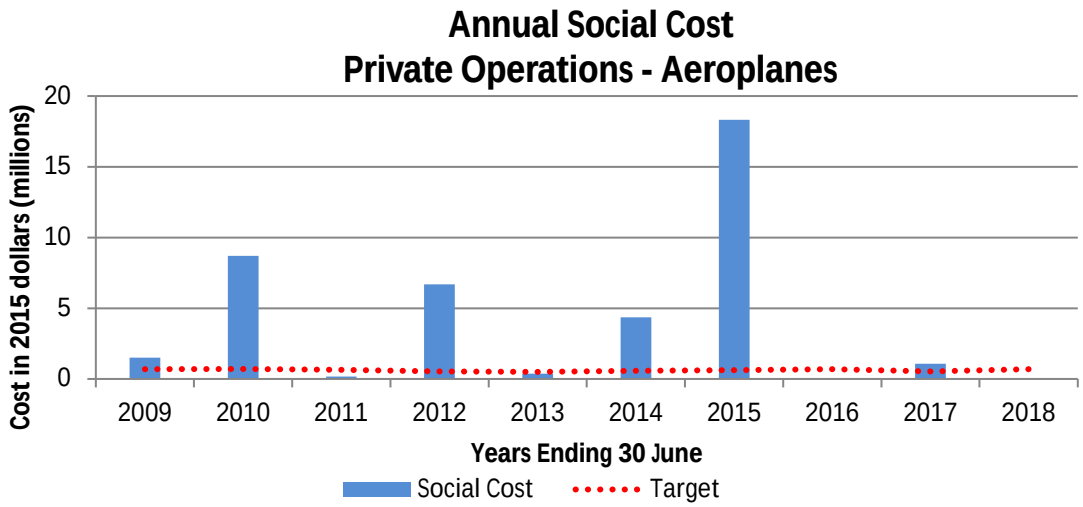
This group's safety performance is closely monitored and following significant safety failures the performance usually improves for a few years before rising again, often with increase in activity as evidenced by tonnage spread (see graph on page 12). The long term linear trend in social cost that was downward in the previous report has become almost flat with the average well above the target level.



Arising from:

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Fatalities	0	0	0	1	0	1	1	0	2	0
Serious Injuries	1	0	0	0	0	0	0	1	1	0
Minor Injuries	2	0	0	0	0	1	1	1	0	0
Aircraft Unusable	2	0	0	2	0	2	3	0	2	0

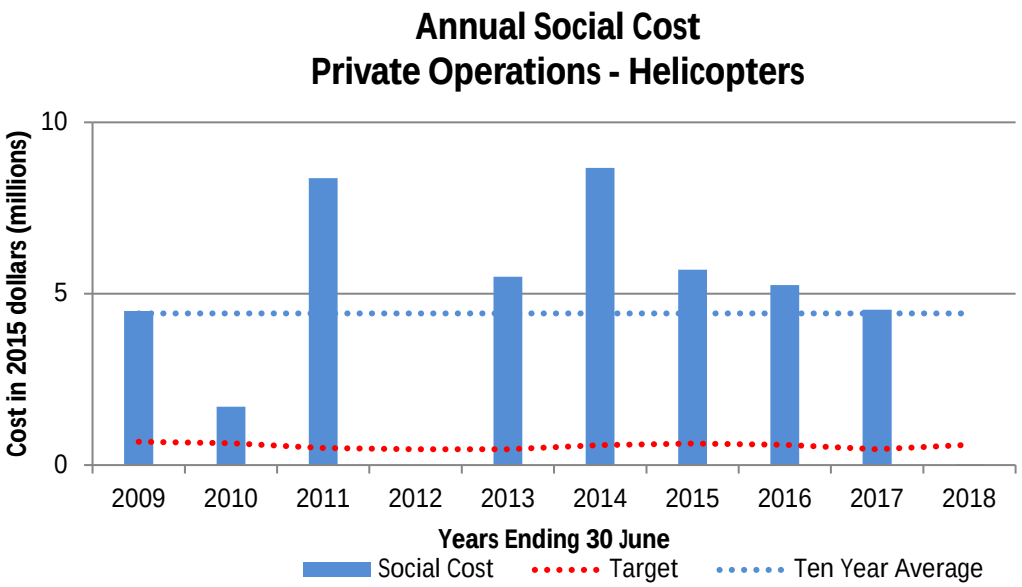
Although the absolute social costs of the safety failures in this group are on a par with those of the agricultural aeroplanes group, it must be remembered that this group operates about twice the number of hours of the aeroplane group, representing a better safety performance per flying hour. Nevertheless social cost levels in four of the last five years are a cause of concern. Significant longer term interventions are in place with the support of the industry, including distributing accident and incident information and a campaign to raise awareness about wires trike risks.



Arising from:

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Fatalities	0	1	0	1	0	1	4	0	0	0
Serious Injuries	3	0	0	5	0	0	2	0	2	0
Minor Injuries	1	1	0	0	1	0	4	3	2	2
Aircraft Unusable	1	2	1	2	2	1	4	0	1	1

Until 2014 there was some optimism that the safety performance in this group was improving but the 2014 and 2015 results are trending the wrong way. The social cost target has been met or bettered on only three of the last ten years.

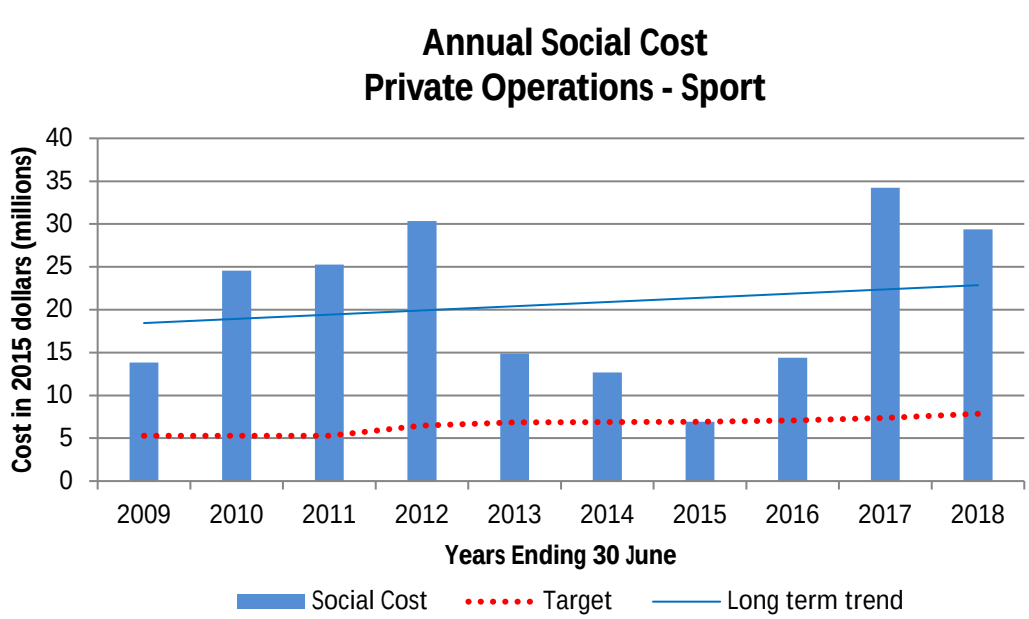


Arising from:

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Fatalities	1	0	1	0	1	2	1	1	1	0
Serious Injuries	0	0	3	0	0	0	2	1	0	0
Minor Injuries	0	5	1	0	2	0	1	0	2	1
Aircraft Unusable	1	2	5	0	4	1	2	2	1	0

The last three years are trending the wrong way.

This is a small group and the social costs can be expected to vary considerably from year to year. Even so the long term average is well above target.



Arising from:

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Fatalities	2	6	5	6	2	2	0	2	7	6
Serious Injuries	12	8	11	11	14	9	14	13	11	10
Minor Injuries	5	17	5	4	11	12	21	19	6	10
Aircraft Unusable	3	6	7	6	4	3	7	2	4	3

This group clearly stands out as the major contributor to the social cost in the private operations sector. The group includes the microlight, amateur-built, parachute and paraglider aircraft types and accordingly represents a large number of aircraft.

The social cost trend over the last three years has been steady and is an improvement over the time before that. The long term trend is increasing.

Of note are the significant increases in the numbers of minor injuries in four of the last seven years and serious injuries over the last six years.

Flight Phase

The following table shows the flight phase recorded for accidents for the ten one-year periods ending 30 June. The figures include all aircraft types. The table is ordered by the 2018 values.

Flight Phase	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
LANDING	43	49	36	32	45	47	41	46	40	40
TAKEOFF	23	26	24	13	9	21	17	16	16	10
CRUISE	14	11	12	10	13	14	14	10	11	9
UNKNOWN	1	0	2	2	3	1	5	4	11	10
APPROACH	6	6	5	6	6	8	4	3	5	3
CLIMB	7	6	11	3	5	7	6	7	2	5
PARKED	5	3	2	4	8	0	0	5	2	0
DESCENT	4	4	4	2	7	2	4	5	4	5
HOVER	2	6	1	5	3	2	2	4	0	2
AGRICULTURAL MANOEUVRES	1	5	2	2	3	2	4	0	1	2
TAXIING	5	3	5	3	3	4	3	4	2	2
HOVER TAXI	0	0	0	0	2	1	0	0	1	0
CIRCUIT	1	0	1	1	0	0	1	0	1	1
Not Recorded	5	6	7	6	4	3	0	0	0	2
HOLDING	0	0	0	0	0	0	0	0	0	0
AEROBATICS	0	0	0	1	0	1	0	0	1	0

The most common phase of flight during which accidents occurred in the year ending 30 June 2018 was the Landing phase (44%). This proportion of accidents by flight phase is largely unchanged from previous years and reflects the fact that landing is the highest risk phase of flight.

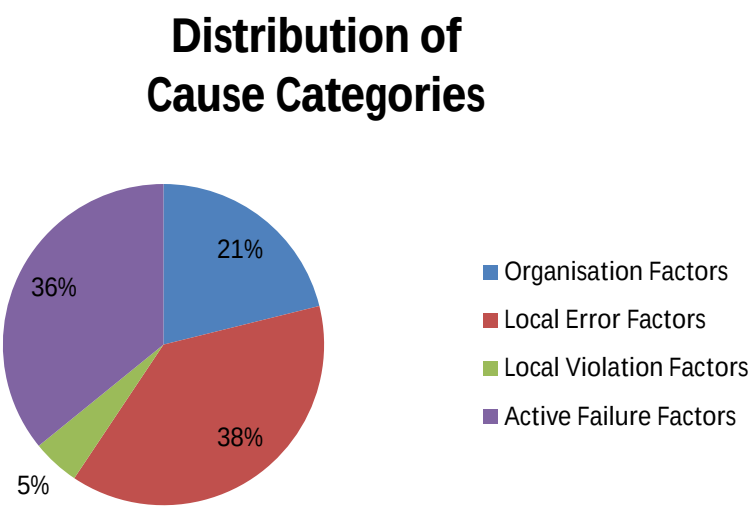
The most common descriptor assigned to Landing Phase accidents during the 2018 year was ‘Damage to aircraft’ at 12%.

The most common causes (at 8%, 7% and 6% respectively) recorded for Landing phase accidents during the year ending 30 June 2018 were ‘Active Failure Factors - POOR PROCEDURE "ACTION",’ Active Failure Factors - PRIMARILY "STRUCTURAL/MECHANICAL", “Local Error Factors - RISK MISPERCEPTION”.

Accident Causal Factors

795 causal factors have been assigned to 373 (40%) of the 944 accidents that were reported as occurring during the ten years ending 30 June 2018.

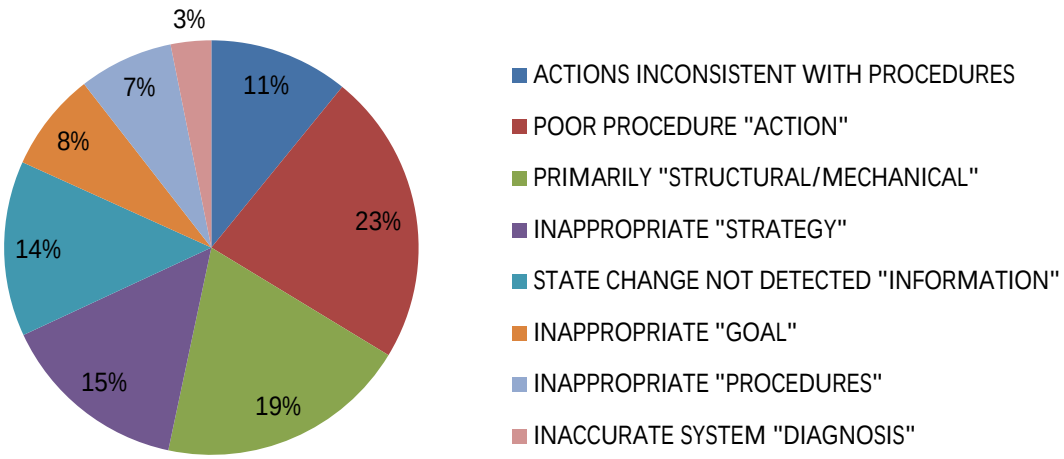
The following chart shows the distribution of cause categories (groupings of causal factors) recorded for those accidents.



Active Failure Factors

The Active Failure cause category has been further analysed on the grounds that whatever precursor latent failures may exist and be discovered during a subsequent investigation, at least one 'Unsafe Act' (e.g. Omitted checklist item, Exceeded ability etc.) must occur for an accident to result. These unsafe acts are collectively grouped as Active Failure Factors.

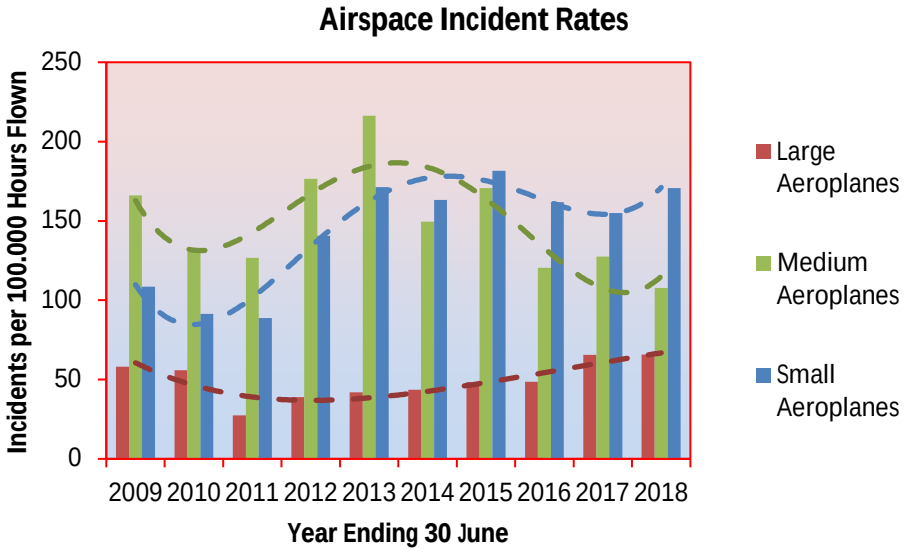
The following chart shows the distribution of Active Failure factors during the same period as above.

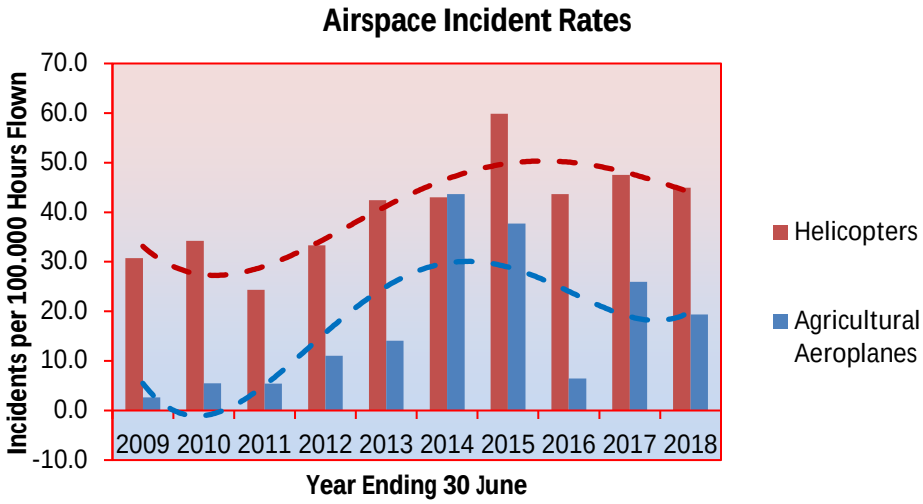


Airspace Incidents

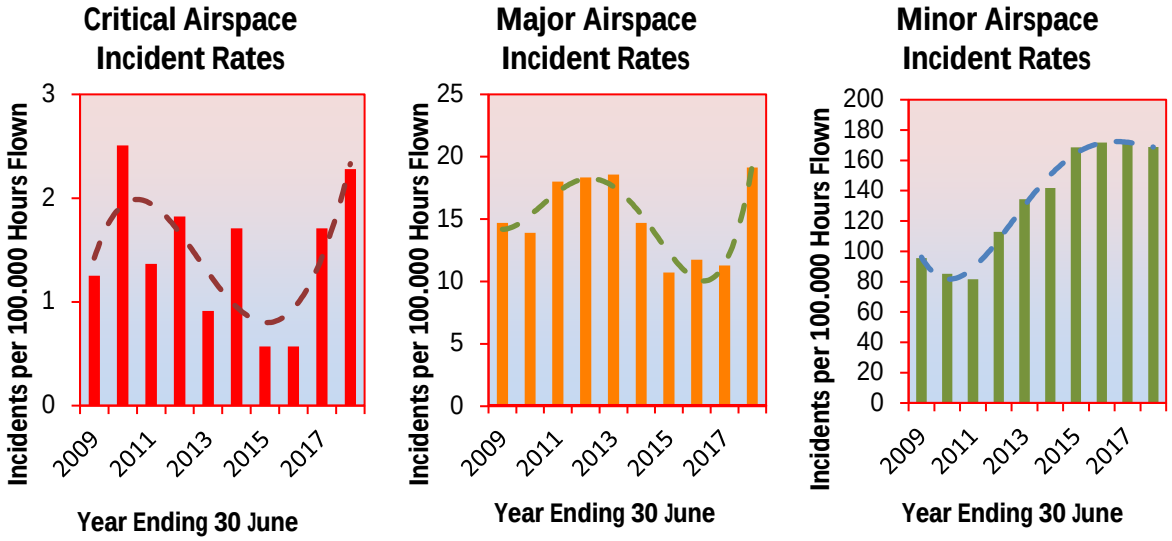
The following graphs show the reported annual airspace incident rates (incidents per 100,000 hours flown) for the ten one-year periods ending 30 June 2018 (excluding the Sport Aircraft category). The graphs do not differentiate between incidents that are pilot or ATS attributable.

Breakdown by Aircraft Category



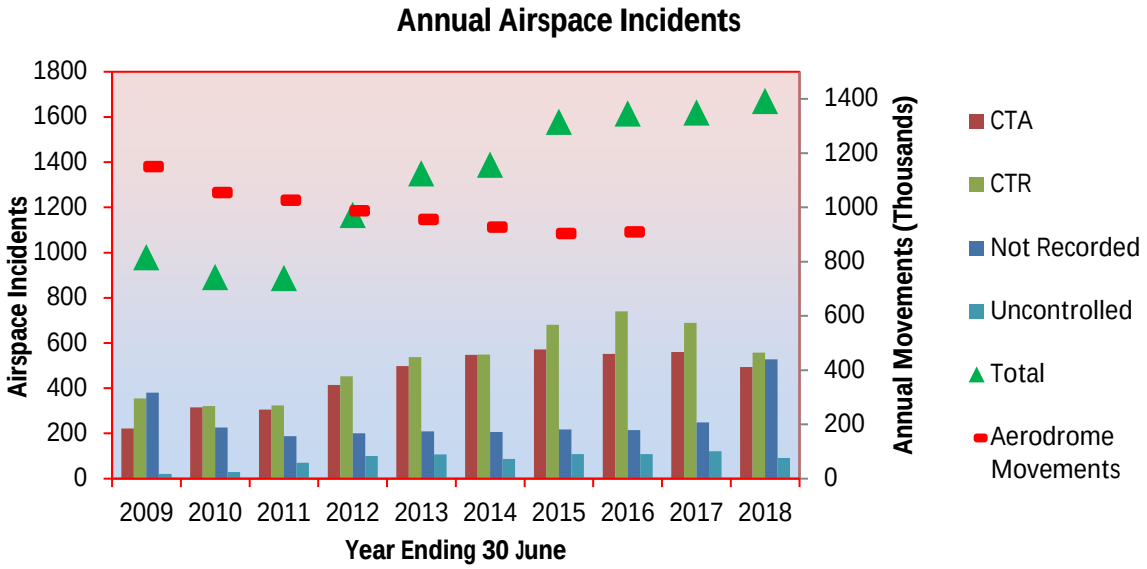


Breakdown by Severity



Breakdown by Airspace Designation

(Counts not Rates)



After June 2011 a sudden onset of a steady increase in the total numbers of reported airspace incidents is evident. This was in an environment of a steady but slower decrease in the reported number of aerodrome movements. No single underlying cause for this increase has been identified, although Airways Corporation began several safety enhancement training initiatives around this time.

Breakdown of Airspace Incidents in Control Zones by Aerodrome

Aerodrome	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Hamilton	55	48	60	119	164	95	163	162	157	95
Auckland	39	37	39	36	50	49	71	96	84	56
Christchurch	42	27	30	36	36	66	71	83	73	76
Tauranga	15	14	26	43	47	73	67	83	35	28
Wellington	47	32	32	46	28	33	27	57	53	27
Queenstown	17	22	27	35	30	35	64	42	60	60
Nelson	17	27	18	29	20	19	29	34	41	28
Palmerston North	36	22	23	24	37	47	50	33	27	49
Dunedin	3	15	9	20	33	29	42	31	35	31
Rotorua	13	13	18	20	7	15	10	22	16	16
Woodbourne	31	25	14	5	17	17	17	23	22	13
Napier	7	8	5	10	17	16	17	20	21	14
Gisborne	2	4	5	1	13	9	9	16	9	15
Ohakea	8	7	3	10	11	14	11	14	4	5
Whenuapai	5	6	4	7	13	9	12	8	10	4
Invercargill	2	5	3	1	3	5	3	7	9	7
New Plymouth	8	7	6	4	5	11	8	3	8	13

Airspace Incident Attributability

Introduction

Airspace incidents are categorised as

- ATS or
- Pilot or
- ATS and pilot attributable.

The categorisation is based on the result of an investigation if available otherwise it is based on the descriptor assignment.

For the purposes of this analysis airspace incidents have been divided into those that have been identified to have an ATS-attributable element and those that have a pilot-attributable element. Accordingly there is some overlap in the number of occurrences reported where both ATS and pilot elements are involved.

Note: ATS-attributable airspace occurrences include those that are attributable to both New Zealand and external ATS organisations. External ATS organisations are included where information coordination problems have arisen or where a New Zealand registered aircraft has reported a conflict in non-NZ airspace.

Descriptors

Airspace occurrence descriptors have been established for 1588 of the 1665 reported airspace incidents in the year ending 30 June 2018. This means that most but not quite all airspace incidents are accounted for in the following attributability tables and graphs.

Note: each airspace incident may have more than one airspace incident descriptor.

Descriptor Categories

Airspace incident descriptors can be broadly grouped into those that are solely associated with Air Traffic Service provision, those that are associated with Pilot activity and those that may be associated with either.

The following table shows the breakdown into these broad categories.

Descriptor is associated with	Number of times descriptor applied
ATS	278
Pilot	1380
Either	323

The following table shows the assignment of airspace occurrence descriptors that are associated with airspace incidents that have an ATS-attributable component.

Descriptor	Number assigned in 2018
ATS Clearance/Instruction Deficiency	162
ATS Coordination Deficiency	103
ATS Flight Information Deficiency	13
ATS Flight Planning System Deficiency	6

The following table shows the assignment of airspace occurrence descriptors that are associated with airspace incidents that have a pilot-attributable component.

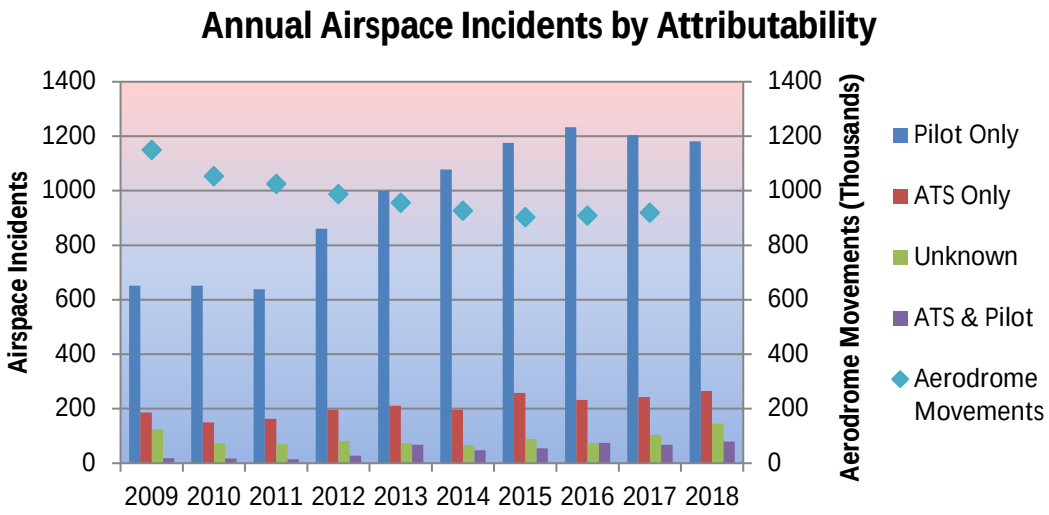
Descriptor	Number assigned in 2018
Air Proximity	49
Breach Of Other Clearance	625
Flight Assist	2
Global Positioning Syatem	0
Pilot Breach of Ground Clearance	0
Pilot Flight Planning Deficiency	49
Pilot Position Reporting Deficiency	110
Pilot Readback Deficiency	5
Reduced Navigation Performance	1
Unauth Airspace Incursion	394
Unauth Altitude Penetration	145

The following table shows the assignment of airspace occurrence descriptors that could be associated with any airspace incident.

Descriptor	Number assigned in 2018
Controller/Pilot Datalink Communications	2
Loss Of Separation	55
Near Collision	10
Other	161
Reduced Vertical Separation Minima	0
Short Term Conflict Alert	7
Traffic Collision Avoidance System	82

Trend

The following graph shows the annual numbers of airspace incident reports and their attributability for the ten year period ending 30 June 2018.



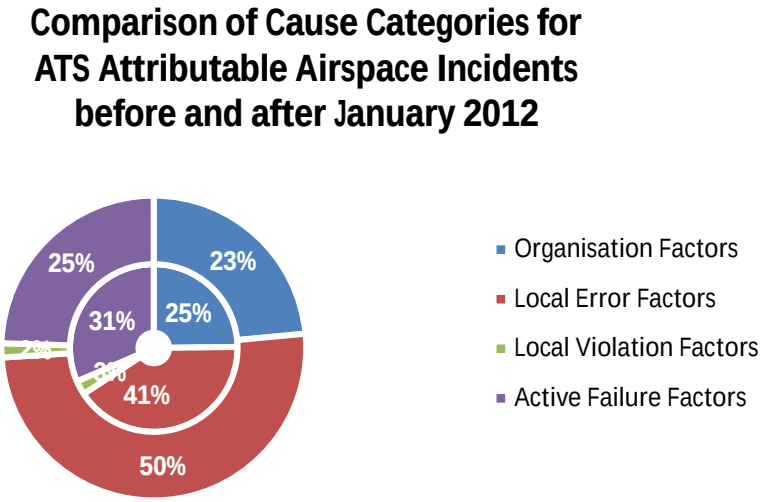
The number of "unknown" attributable airspace incidents reflects difficulties with coding of reports received by the CAA. Note that there is often a time delay between incidents occurring, being investigated, and attributability being assigned to either ATS or Pilot.

The ratio of Pilot Attributable to ATS Attributable incidents was relatively stable until the 2011 year that saw the total numbers begin a sharp upward trend. The data suggest that pilot attributable incidents are a disproportionate component of this trend.

ATS Attributable ASP Incidents

Causal Categories

The following chart shows the distribution of cause categories (groupings of causal factors) recorded for ATS-attributable airspace incidents that occurred before and after 1 January 2012. The inner ring represents the January 2007 to December 2011 period and the outer ring the period from January 2012 to December 2016. This date boundary has been chosen as it aligns approximately with the beginning of the observed sharp ongoing increase in the overall airspace incident rate.



Local Error Factors

The increase in local error factors from 41% to 50 % while perhaps not major is the result of a major shift in causes after January 2012.

The top three causes were:

Jul 2006 to Dec 2011		Jan 2012 to Jun 2018	
INADEQUATE CHECKING	57%	INADEQUATE CHECKING	26%
TASK OVERLOAD	10%	OTHER ERROR ENFORCING CONDITION	21%
OTHER ERROR ENFORCING CONDITION	8%	RISK MISPERCEPTION	16%

Active Failure Factors

The top three contributing causes were:

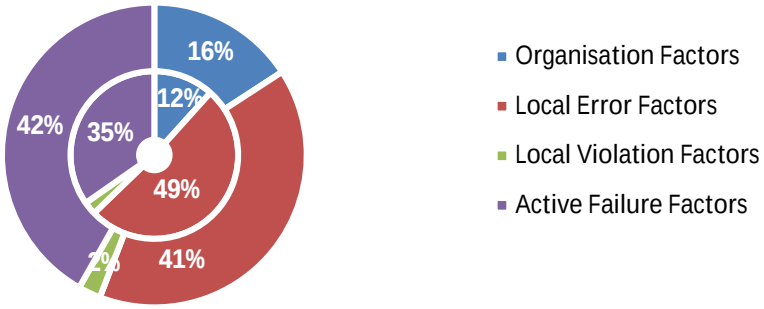
Jan 2007 to Dec 2011		Jan 2012 to Jun 2018	
INACCURATE SYSTEM "DIAGNOSIS"	31%	ACTIONS INCONSISTENT WITH PROCEDURES	27%
ACTIONS INCONSISTENT WITH PROCEDURES	19%	INACCURATE SYSTEM "DIAGNOSIS"	20%
INAPPROPRIATE "STRATEGY"	11%	INAPPROPRIATE "STRATEGY"	18%

Pilot Attributable ASP Incidents

Causal Categories

The following chart shows the distribution of cause categories (groupings of causal factors) recorded for Pilot-attributable airspace incidents that occurred before and after 1 January 2012. The inner ring represents the January 2007 to December 2011 period and the outer ring the period from January 2012 to December 2016. This date boundary has been chosen as it aligns approximately with the beginning of the observed sharp ongoing increase in the overall airspace incident rate.

Comparison of Cause Categories for Pilot Attributable Airspace Incidents before and after January 2012



Organisation Factors

Organisation factors increased from 12% to 16 % of all causal factors.

The top four causes were:

Jan 2007 to Dec 2011		Jan 2012 to Dec 2016	
INADEQUATE PROCEDURES	16%	INADEQUATE CONTROL AND MONITORING	29%
INADEQUATE COMMUNICATIONS	14%	INADEQUATE TRAINING	19%
INADEQUATE SPECIFICATIONS/REQUIREMENTS	14%	OTHER ORGANISATION FACTOR	15%
INADEQUATE CONTROL AND MONITORING	14%	INADEQUATE PROCEDURES	6%

Local Error Factors

A reduction in the incidence of local error factors offset the increase in organisation factors.

The top three causes were:

Jan 2007 to Dec 2011		Jan 2012 to Dec 2016	
INADEQUATE CHECKING	26%	INADEQUATE CHECKING	25%
POOR INSTRUCTIONS/PROCEDURES	12%	RISK MISPERCEPTION	11%
TASK UNFAMILIARITY	7%	OTHER ERROR ENFORCING CONDITION	10%

In early 2011 a system of follow-up letters was introduced by CAA for operators of aircraft who didn't report Airspace incidents that were reported by the ATS provider. Since the introduction of this system there has been a noticeable increase in the number of Airspace Incidents that are reported by both parties.

Significant Incidents

None of the airspace incidents reported as occurring during the last year covered by this report was classified as significant

Serious Incidents

This section describes serious airspace incidents reported as occurring during the last year covered by this report. The section is grouped by attributability. For each incident the location is stated before the description.

Pilot Attributable

- Franz Josef Helipads: Avoiding action required to avoid collision due second helicopter lifting without doing a clearing turn to all other pads behind. Occurrence Id: 17/1085.

- Cascade Valley: H500 was tracking up the right hand side of the Cascade at 1800ft making regular radio calls on 119.10 to look up and find a dark blue small cub type plane directly ahead estimated 70m away, helicopter turned right immediately to avoid. Unable to establish radio contact with the aircraft. Update 27/3/17: Rans S-7 Pilot located, he admitted to being on the wrong frequency 119.20 instead of 119.10 and that he wasn't following the normal right hand rule while flying in the valleys. Occurrence Id: 17/1510.

- Kerikeri: Glider was operating in the MBZ, with no transponder and not making any radio calls causing a near collision with a Q300 on approach. The Q300 crew advised that the aircraft came to within 200 ft. of each other and within a wing span. Occurrence Id: 17/1961

- Whanganui: Avoiding action required against a C150 when both aircraft joining. Approximate distance between aircraft was 60 metres and same level. Occurrence Id: 17/5064

- Matamata: Aircraft turned base in front of a Katana which was ahead in the circuit. The Katana crew took avoiding action by turning left and away from the C172. Distance between the aircraft estimated to be approximately 1.5 wing spans. Occurrence Id: 17/7514

Attributability Undetermined

- Wanaka: Student on solo took off on 29 when circuit was operating for 11. Heli on approach had to take avoiding action as a/c drifted off centerline after liftoff. Radio calls had been made when 2 a/c seen backtracking for takeoff on 29, but didn't change runway. Occurrence Id: 17/4016

- Kaikoura Sth: Avoiding action required to miss sluicing bucket from helicopter in front that had come into circuit out of sequence. Occurrence Id: 17/5130

- Auckland City: Cessna approached at the same level from 3 o'clock and passed in-front within 200 m., took avoiding action - limited by the banner towing. No radio calls heard and banner aircraft had been making regular position reports. The other aircraft did not appear to have the banner aircraft in sight and made a descending turn over Eden Park before turning back the Harbour Bridge. No subsequent calls were heard. Occurrence Id: 17/5395

- Auckland: Pilot reported near miss with drone approximately 50-100ft as aircraft climbed through 1900 feet on departure.. Occurrence Id: 17/5325

- Awatere Station: Aircraft flew directly across course approximately 100m ahead. Unable to contact by radio. Approximately 5 minutes earlier another operator had been heard on 119.1 trying to make contact with the same aircraft. Occurrence Id: 17/5626

- Te Rapa: TCAS target 100 ft lower while in cruise. Aural warning, and observed other aircraft climbing straight in front. Made evasive turn and descended beneath them. Had made radio calls lifting off and climbing, but heard nothing from other aircraft before evading. Occurrence Id: 17/5808

- Huka Falls: Helicopter pilot reported a drone approx 1m from rotor tip during approach to landing pad. Took evasive action. Police informed but operator could not be located. Occurrence Id: 17/6386

- Maihiihi: While climbing out from the loading site during agricultural operations, a fixed wing aircraft flew in front of the helicopter at approximately 20-30 metres, from right to left. The aircraft was flying at approximately 100 ft. Occurrence Id: 17/6722

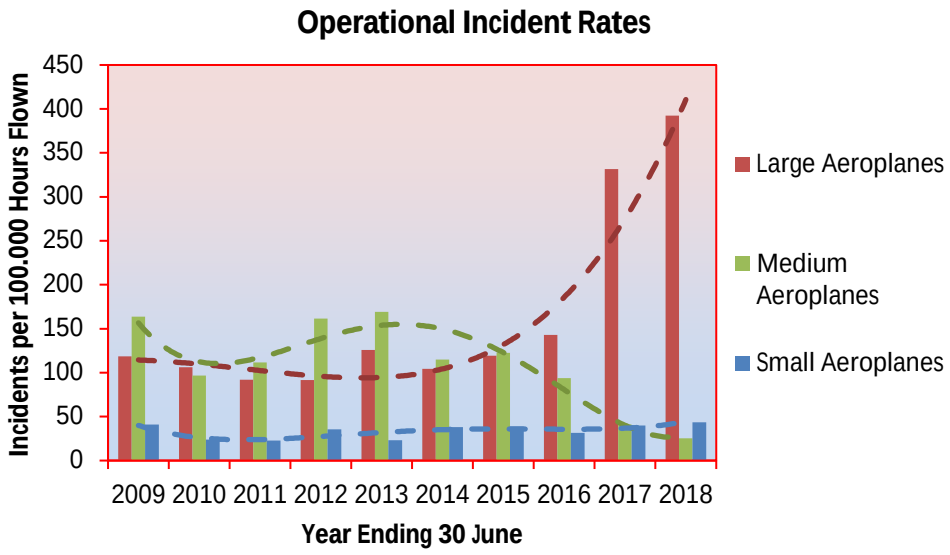
- Hawea Flat, Wanaka: Near collision with ag a/c - estimated 30m horizontal and slightly above. Spotted by student who abruptly lowered collective as avoiding action. Occurrence Id: 17/7987

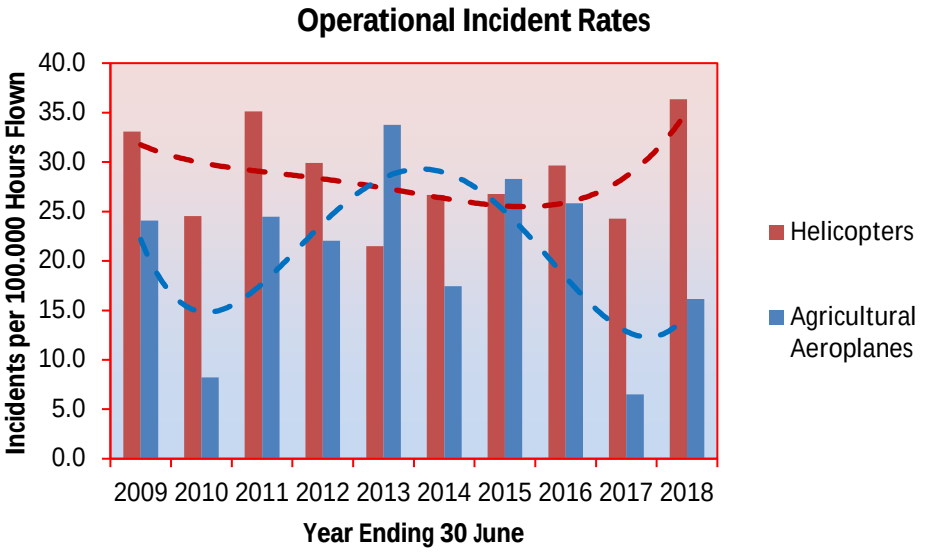
- Queenstown : Drone observed to pass approx 200 ft. below the aircraft as aircraft was conducting the RNAV (RNP) Y 23 approach at Queenstown. Occurrence Id: 17/8163

Operational (Aircraft) Incidents

The following graphs show the reported annual operational incident rates (incidents per 100,000 hours flown) for the ten-year period ending 30 June 2018.

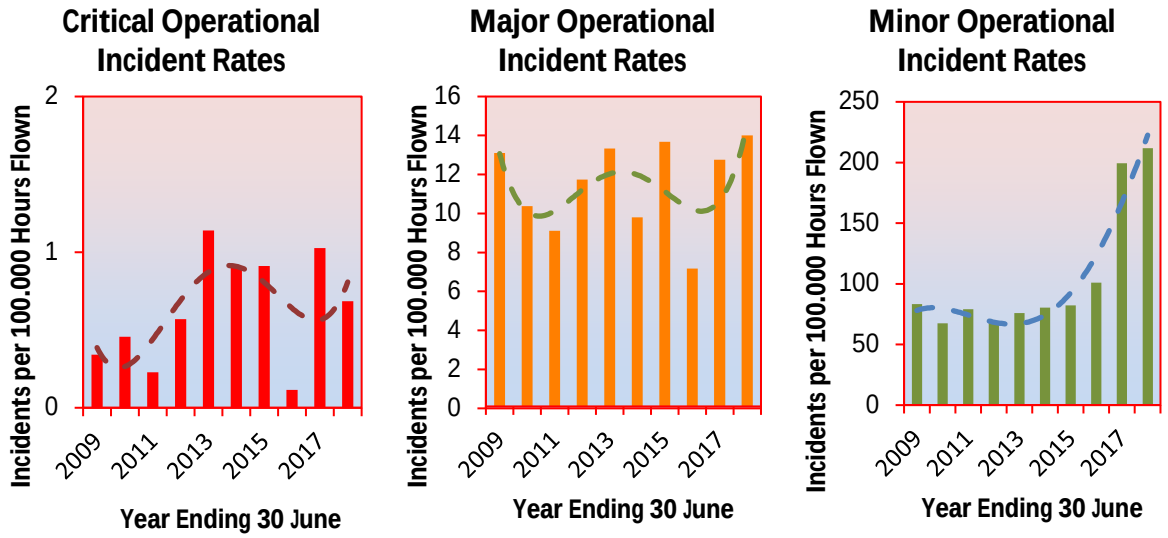
Breakdown by Aircraft Category





Breakdown by Severity

These charts cover all operational incidents regardless of the category of the aircraft involved. The previous section omitted incidents where the aircraft were sport aircraft or the category was not recorded.



Number of Incidents

The following table shows, for each safety target group, the number of operational incidents each year for the last ten one-year periods ending 30 June 2018. All aircraft types are included. The table is sorted by the number of incidents in the year ending June 2018.

Safety Outcome Target Group	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Airline Operations - Large Aeroplanes	424	291	309	363	359	454	381	497	817	**1464**
Airline Operations - Medium Aeroplanes	81	47	50	46	82	83	51	46	18	**12**
Airline Operations - Small Aeroplanes	29	8	10	12	4	7	7	14	11	**19**
Airline Operations - Helicopters	19	12	14	16	7	13	12	4	2	**13**
Sport Transport	4	5	3	8	21	46	34	21	46	**130**
Other Commercial Operations - Aeroplanes	144	64	57	57	80	75	73	97	87	**94**
Other Commercial Operations - Helicopters	39	24	27	26	29	20	20	45	45	**27**
Other Commercial Operations - Sport	0	0	1	0	1	12	7	23	19	**0**
Agricultural Operations - Aeroplanes	21	3	5	11	9	11	8	7	2	**7**
Agricultural Operations - Helicopters	12	10	13	6	7	9	8	0	6	**15**
Private Operations - Aeroplanes	12	23	9	19	18	15	19	27	20	**12**
Private Operations - Helicopters	2	2	3	7	9	2	3	0	3	**6**
Private Operations - Sport	22	31	19	19	72	49	62	41	33	**32**
Other	8	11	45	113	47	25	48	73	169	**228**
None	233	172	143	36	14	9	12	6	9	**12**
Total	**1050**	**703**	**708**	**739**	**759**	**830**	**745**	**901**	**1287**	**2071**

Significant Operational Incidents

This section describes significant operational incidents reported as occurring during the last year covered by this report. The section is grouped by safety outcome target group. Groups with no significant events have been omitted. For each incident the location is stated before the description.

Airline Operations - Large Aeroplanes

- Dunedin : Stick shaker activation during approach in turbulent conditions. Night landing, icing conditions. 2000ft wind 230/50kt. Glide slope not captured, rate of descent reduced to zero followed by turbulence and large airspeed fluctuations, stick shaker activation with AP disconnect and subsequent stick pusher and stick shaker activation. Occurrence Id: 17/3689

Private Operations - Sport

- Te Horo Beach: Engine was running rough and aircraft was unable to maintain altitude. Forced landing made on a field near Te Horo beach Occurrence Id: 17/6441

Airline Operations – Helicopters

- Mt Cook Glacier: While attempting to land on glacier the toe of the left hand skid contacted ice hidden beneath the snow while the aircraft was moving forward at low speed. Landing attempt aborted. After landing back at base it was noted skid portion forward of the crosstube was bent. Occurrence Id: 17/4600

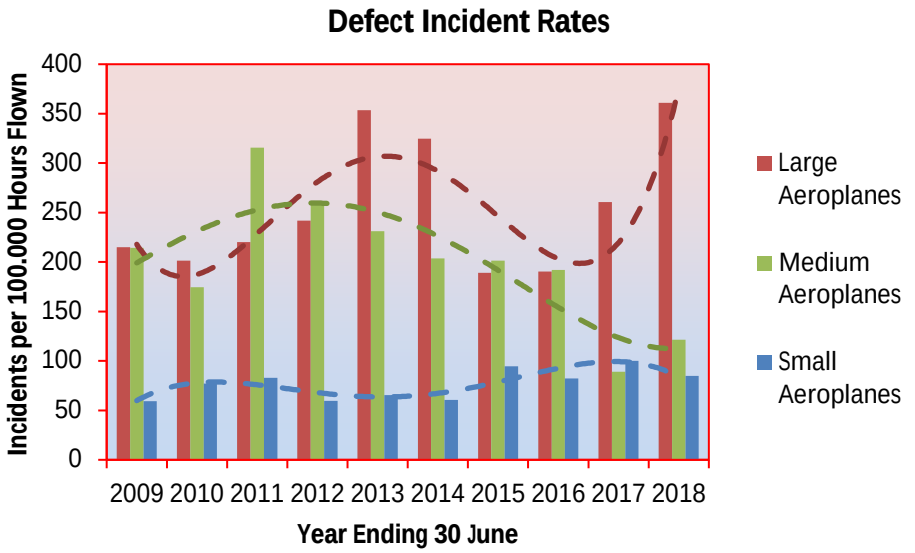
Other

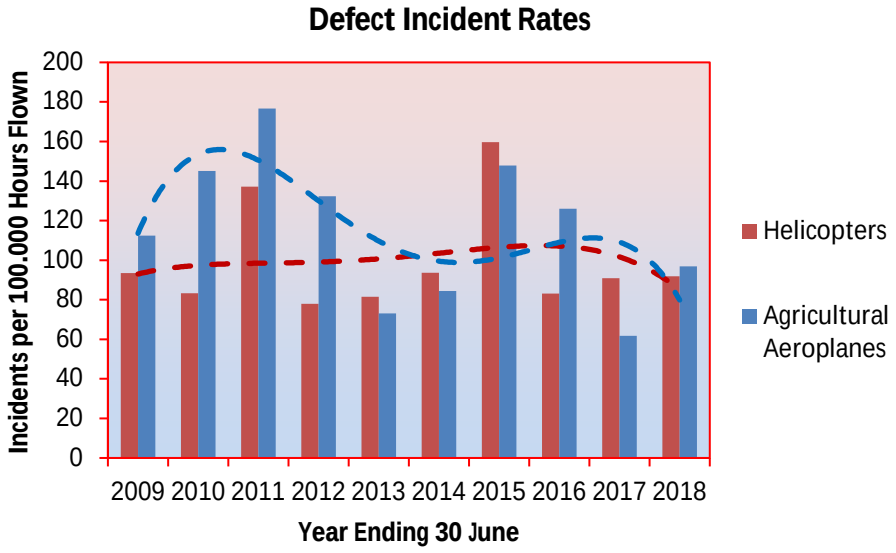
- Auckland: Aircraft lost control at start of the takeoff run after nose wheel locked. Takeoff was aborted but aircraft swerved from one side of the runway to the other. Main wheel came very close to the edge of the runway. One runway edge light was destroyed by the nose wheel. Aircraft stopped on the runway managed to taxi back to the apron for engineers to attend to it. Flight departed later at night. Occurrence Id: 17/302

Defect Incidents

The following graphs show the aircraft defect incident reporting rates (incidents reported per 100,000 hours flown) for the ten-year period ending 30 June 2018.

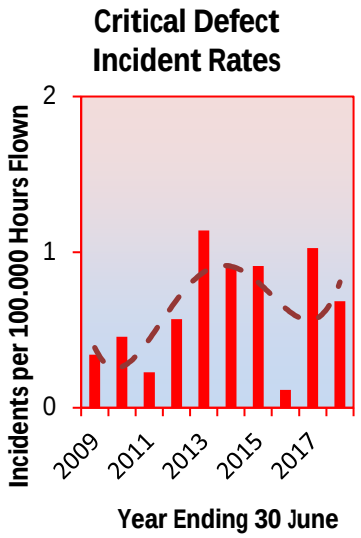
Breakdown by Aircraft Category

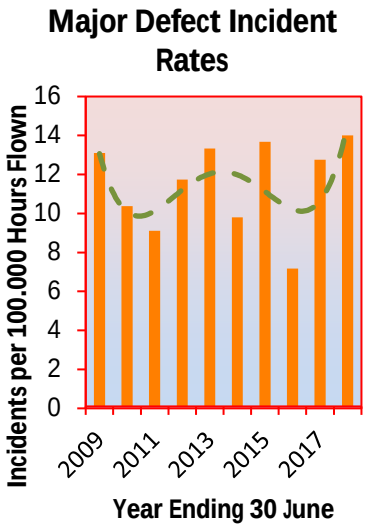


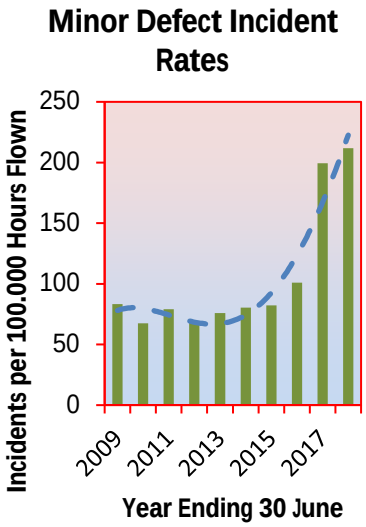


Breakdown by Severity

These charts cover all operational incidents regardless of the category of the aircraft involved. The previous section omitted incidents where the aircraft were sport aircraft or the category was not recorded.







Number of Incidents

The following table shows, for each safety target group, the number of defect incidents each year for the last ten one-year periods ending 30 June 2018. All aircraft types are included. The table is sorted by the number of incidents in the year ending June 2018.

Safety Outcome Target Group	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Airline Operations - Large Aeroplanes	360	333	323	323	457	396	450	547	1256	**1473**
Airline Operations - Medium Aeroplanes	71	46	43	74	74	57	57	38	13	**19**
Airline Operations - Small Aeroplanes	13	8	11	11	2	9	11	12	11	**22**
Airline Operations - Helicopters	15	10	20	6	11	18	5	2	6	**11**
Sport Transport	3	2	5	16	32	46	29	16	108	**136**
Other Commercial Operations - Aeroplanes	94	53	59	78	58	87	93	77	102	**81**
Other Commercial Operations - Helicopters	29	18	25	37	17	19	39	52	28	**43**
Other Commercial Operations - Sport	0	1	0	1	7	5	18	21	10	**0**
Agricultural Operations - Aeroplanes	8	3	9	9	12	4	9	7	3	**4**
Agricultural Operations - Helicopters	12	11	11	5	8	9	5	2	7	**15**
Private Operations - Aeroplanes	21	14	10	22	11	24	19	30	10	**15**
Private Operations - Helicopters	2	3	7	7	4	3	2	2	5	**2**
Private Operations - Sport	19	25	18	47	58	68	53	28	36	**16**
Other	7	18	127	53	25	40	55	108	268	**93**
None	195	142	107	13	16	14	5	8	8	**29**
Total	**849**	**687**	**775**	**702**	**792**	**799**	**850**	**950**	**1871**	**1959**

Significant Incidents

This section describes significant defect incidents reported as occurring during the last year covered by this report. The section is grouped by safety outcome target group. Groups with no significant events have been omitted. For each incident the location is stated before the description.

Airline Operations - Large Aeroplanes

- Auckland: During climb, crew had to shut one of the engines down due to high vibration and EGT. Aircraft made a turn-back to Auckland, dumped fuel and flapless landing conducted. Visual inspection after landing determined uncontained engine failure with associated damage to pylon and horizontal stabilizer. Occurrence Id: 17/7632

Serious Incidents

None of the defect incidents reported as occurring during the last year covered by this report was classified as serious

ATA Chapters

Defect Incidents reported as occurring during the year ending 30 June 2016 were associated with the following ATA component code chapters.

Large Aeroplanes

The most common chapter was AEROPLANE FLIGHT CONTROL - GENERAL with 174 defects.

The next most common chapter was AEROPLANE FLIGHT CONTROL - GENERAL with 131 defects.

Medium Aeroplanes

The most common chapter was LANDING GEAR (LG) - GENERAL with 13 defects.

The next most common chapters were AEROPLANE FLIGHT CONTROL - GENERAL and FLIGHT NAVIGATION SYSTEMS with 4 defects each.

Small Aeroplanes

The most common chapter was LANDING GEAR (LG) - GENERAL with 40 defects.

The next most common chapter was AEROPLANE FLIGHT CONTROL - GENERAL with 30 defects.

Agricultural Aeroplanes

The most common chapters were LANDING GEAR (LG) - GENERAL with 4 defects

The next most common were AEROPLANE FLIGHT CONTROL - GENERAL and FUSELAGE – GENERAL with 3 defects each.

Helicopters

The most common chapter was MAIN ROTOR DRIVE - GENERAL with 14 defects.

The next most common chapter were MAIN ROTOR – GENERAL; ENGINE (TURBINE/TURBOPROP) – GENERAL and MAIN ROTOR – GENERAL with 13 defects each.

Sport Aircraft

The most common chapter was LANDING GEAR (LG) - GENERAL with 4 defects.

The next most common chapter were PROPELLER – GENERAL and FUEL SYSTEM - GENERAL with 3 defects each.

Defect Incident Rates

Summary of Defect Rate Standard

Three levels have been defined for categorising quarterly defect rates. The current levels are:

Normal – less than 4.25 defect incidents per 1,000 hours flown.

Alert – between 4.25 and 6 defect incidents per 1,000 hours flown.

High – above 6 defect incidents per 1,000 hours flown.

The current levels were set in July 2002. They are based on data from the three years to 30 June 2002.

CAA Actions

The following table shows how the current values of defect rates will be used to determine CAA action.

Defect Rate	CAA Action
Normal	Monitor
Alert	Notify appropriate General Manager
High	Notify appropriate General Manager

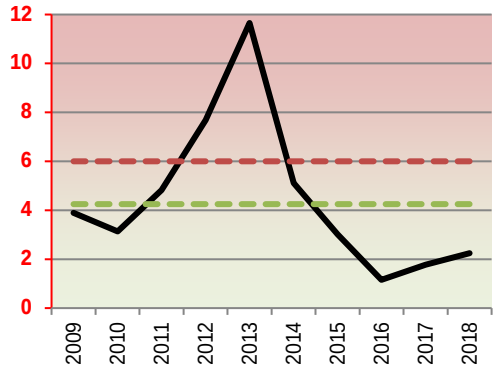
The timing of defect reports is often considerably later than what is mandated by Rule Part 12 and likewise a small number of operators of large and medium aeroplanes are persistently late with their hours and flights data returns. As a result the last two quarters of following defect rate graphs are based on forecasts of hours flown and must be interpreted with caution.

Analysis

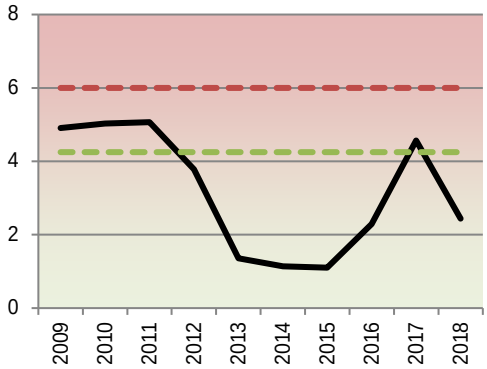
The red line on each graph shows the High defect rate. The green line shows the Alert defect rate. The Manager Airline Maintenance is notified of all high and alert rates on a quarterly basis.

Large Aeroplanes

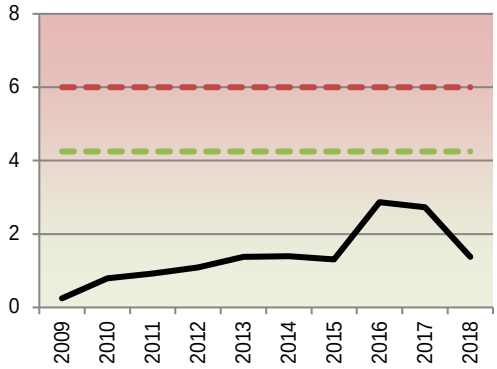
B737-300 Defects per 1000 hours



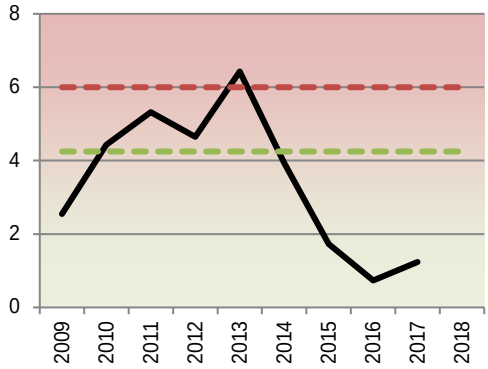
B737-400 Defects per 1000 hours



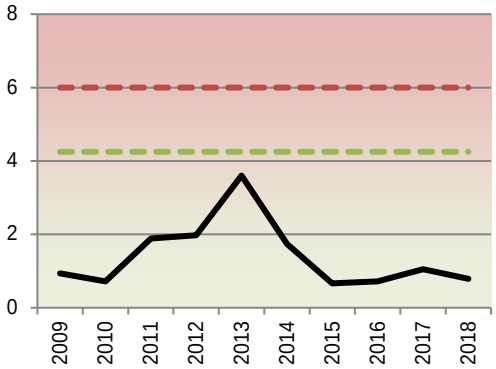
B737-800 Defects per 1000 hours



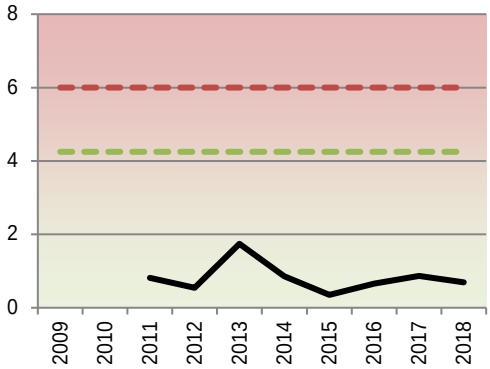
B767-300 Defects per 1000 hours



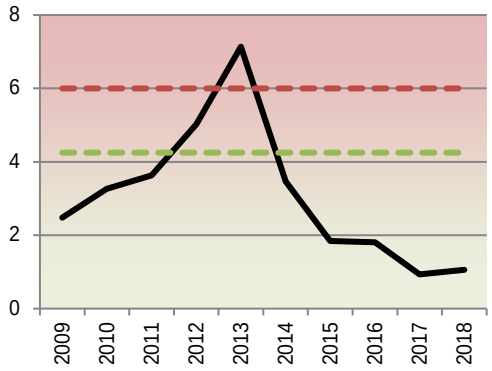
B777-200 Defects per 1000 hours



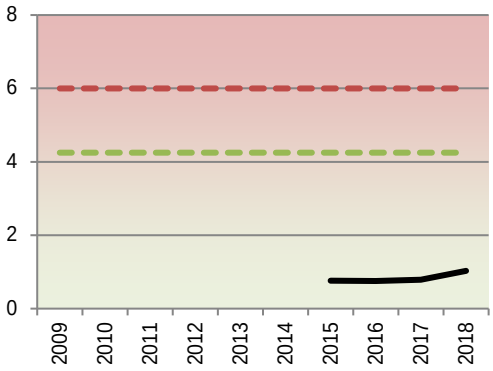
B777-300 Defects per 1000 hours



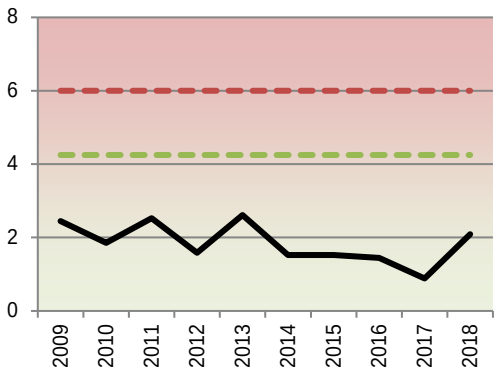
A320 Defects per 1000 hours



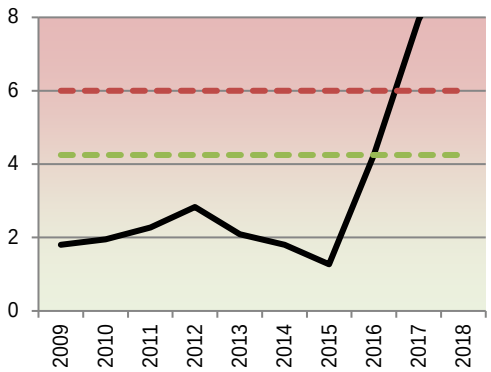
B787-900 Defects per 1000 hours



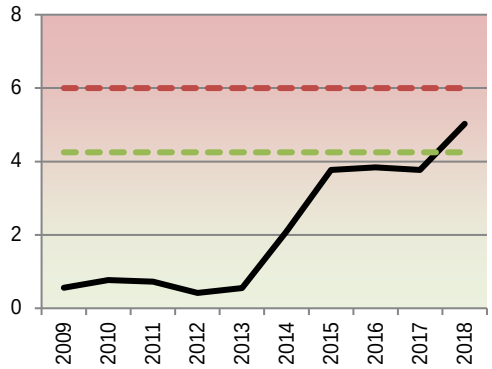
Convair 580 Defects per 1000 hours



ATR 72 Defects per 1000 hours

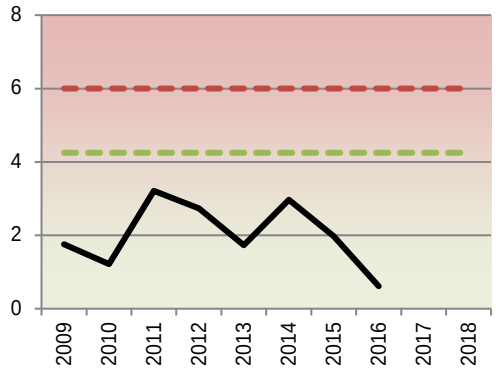


DHC-8 Defects per 1000 hours

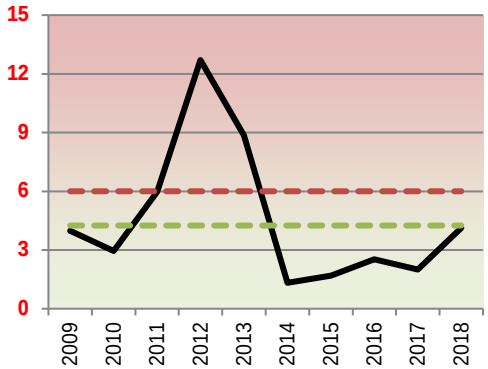


Medium Aeroplanes

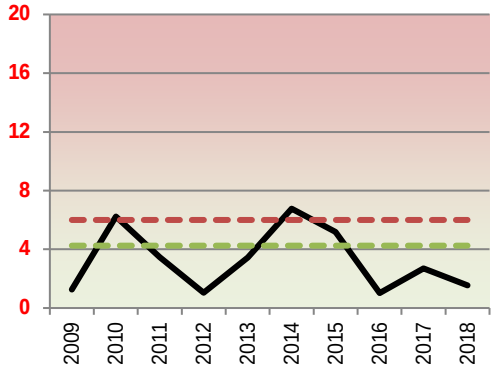
1900D Defects per 1000 hours



Jetstream Defects per 1000 hours



SA227 Defects per 1000 hours



Bird Incident Rates

Bird occurrence reporting rates are measured quarterly by aerodrome. This is achieved by querying the database for the number of bird hazard incidents reported at aerodromes during each quarter. The results of this query are then divided by the aircraft movements at each aerodrome and multiplied by 10,000 to give incidents per 10,000 aircraft movements. Aircraft movements at aerodromes are obtained from the ACNZ, and, where available, from individual airport companies.

Annual Strike Rate

Incidents are categorised as strikes or near-strikes depending on whether or not actual contact occurred between the aircraft and one or more birds.

The following table shows the annual **on-airport strike** rates for identified aerodromes for each year ending 30 June.

Aerodrome	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Rotorua	4.4	6.3	6.4	3.1	3.2	7.5	6.0	5.2	5.0	8.3
Gisborne	10.7	5.8	4.1	5.8	7.1	6.8	12.0	5.6	7.8	10.9
Whenuapai	12.1	10.6	13.2	10.9	12.7	5.2	12.0	6.9	9.0	10.3
Hamilton	3.1	1.6	2.7	1.4	1.5	1.3	1.1	1.5	1.9	2.0
Invercargill	10.7	5.8	7.2	6.8	2.5	2.6	12.5	6.3	8.3	3.9
Ohakea	3.0	1.5	2.7	3.1	2.6	3.8	5.8	3.4	8.4	2.4
Woodbourne	3.1	3.3	6.1	4.6	5.3	8.7	5.9	6.7	3.4	7.9
Napier	6.8	7.9	11.0	9.1	9.1	9.4	10.6	13.6	20.8	22.1
Dunedin	3.1	4.5	4.1	6.5	5.1	6.2	4.8	7.7	10.0	5.3
Tauranga	2.1	1.0	2.0	1.3	2.5	3.0	2.7	2.5	4.1	3.4
Taupo	2.0	2.6	3.1	4.5	2.7	1.3	0.9	1.4	1.0	1.9
Queenstown	2.2	2.4	1.4	2.4	5.7	2.8	3.1	1.8	6.3	2.4
Wellington	1.9	1.4	1.8	2.3	3.4	3.1	3.6	4.4	3.6	5.7
Palmerston North	3.0	6.0	4.3	2.1	4.3	5.7	3.8	5.9	5.9	5.4
Nelson	2.1	1.7	2.7	2.6	3.1	4.2	4.5	6.2	9.9	6.0
Auckland	3.0	2.6	3.2	3.4	2.5	3.8	2.4	3.7	2.8	2.3
Christchurch	3.2	2.4	3.0	3.3	3.9	3.4	3.3	5.2	5.5	6.9
New Plymouth	3.5	4.8	5.7	3.7	4.2	6.4	4.6	8.1	7.6	6.7
Paraparaumu	-	7.9	-	0.0	2.1	2.6	1.6	1.9	0.7	1.2

* For some of the smaller aerodromes that have limited numbers of movements a single birdstrike incident can translate into an apparently serious strike rate. Examples of this can be seen in some of the rates for Manapouri. The CAA understands the “statistical tyranny of small numbers” and does not over react to such outcomes.

For most of the certificated aerodromes that do not have a control or information service, the movement data currently available to the CAA is limited. In these cases an estimate of the movements has been used to calculate the above rates. These estimated rate values are indicated by the use of a cream background

Analysis

Each aerodrome is assigned a risk category based on the most recent 12 month average bird strike rate per 10,000 aircraft movements. These categories are:

Low where the rate is less than 5 strikes per 10,000 movements
Medium where the rate is not less than 5 strikes per 10,000 movements but less than 10 strikes per 10,000 movements
High where the rate is not less than 10 strikes per 10,000 movements.

Each aerodrome is also assigned a trend category based on a straight line approximation to the 3 year history of bird strike rates. These categories are:

Trending down where the 3 year decrease exceeds 20% of the average
Constant where the 3 year change is between + and – 20% of the average
Trending up where the 3 year increase exceeds 20% of the average

The CAA then determines what if any actions are required based on the combination of the above categories

Details as at 31 March 2017 for individual aerodromes are shown in the following table.

Aerodrome	Incident Rate	Trend
Auckland	Low	Constant
Chatham Islands	Low	Downward
Christchurch	Low	Upward
Dunedin	Low	Constant
Gisborne	Low	Downward
Hamilton	Low	Constant
Hokitika	Low	Downward
Invercargill	Low	Downward
Kerikeri	Low	Downward
Manapouri	High	Upward
Napier	High	Upward
Nelson	Low	Upward
New Plymouth	Low	Upward
Ohakea	Low	Constant
Palmerston North	Low	Downward
Paraparaumu	Low	Constant
Queenstown	Low	Upward
Rotorua	Low	Downward
Taupo	Low	Constant
Tauranga	Low	Constant
Timaru	Low	Downward
Wanganui	Low	Downward
Wellington	Low	Downward
Westport	Low	Downward
Whakatane	Low	Downward
Whangarei	Low	Downward
Whenuapai	Low	Downward
Woodbourne	Low	Downward
Overall	Low	Constant

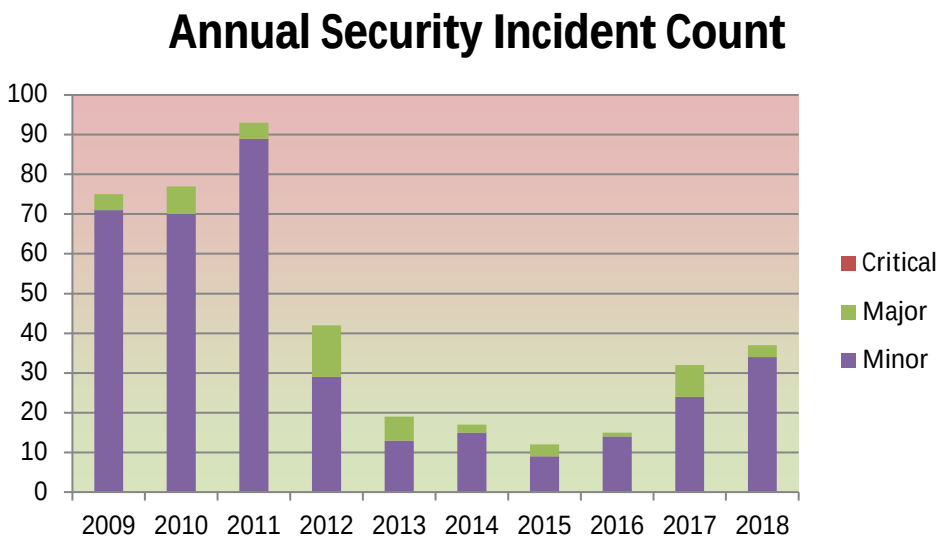
Significant or Serious Incidents

No bird hazard incidents reported as occurring since the end of the period covered by the previous report met the criteria that define either a significant or a serious incident.

Security Incidents

A security incident is defined as an incident that involves unlawful interference

The following chart shows the annual numbers of reported security incidents over the ten year period ending 30 June 2018



The large drop in the number of recorded security incidents is at least partly due to a correction in the way we interpret the definition of a security incident. No attempt has been made at this time to re-assess historic data.

Breakdown by Nearest Aerodrome

The following table shows a breakdown by location (nearest staffed aerodrome) of the above security incidents

Aerodrome	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Auckland	8	30	42	28	6	3	3	2	8	8
Christchurch	6	7	9	9	0	2	0	2	3	1
Dunedin	0	1	2	0	0	0	0	1	0	2
Gisborne	0	2	0	0	0	3	0	0	0	0
Hamilton	0	2	1	3	0	1	0	0	0	1
Milford Sound	1	0	0	0	0	0	0	0	0	0
New Plymouth	0	0	0	0	0	0	0	0	0	0
Napier	0	0	1	0	0	0	0	0	0	1
Nelson	0	1	2	2	0	1	2	1	4	1
Invercargill	1	0	0	0	0	0	0	0	1	0
Palmerston North	0	0	0	0	0	0	0	0	1	0
Paraparaumu	0	2	0	1	0	1	1	0	0	1
Queenstown	0	3	3	1	0	0	0	2	1	1
Rotorua	2	0	0	0	0	0	0	1	0	3
Tauranga	0	0	0	0	0	0	0	0	0	2
Woodbourne	0	0	1	0	0	0	0	0	1	0
Wellington	3	8	8	4	7	3	1	1	0	12
Off Aerodrome	47	9	34	12	5	5	8	1	4	7

Breakdown by Aircraft Category

The following table shows a breakdown by Aircraft Statistics Category of the above security incidents.

Aircraft Category	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Large Aeroplanes	20	11	8	10	8	9	3	3	13	11
Medium Aeroplanes	7	1	2	0	4	1	0	1	0	0
Small Aeroplanes	0	0	0	0	1	1	0	0	0	0
Helicopters	0	0	0	0	0	0	0	0	0	0
Sport Aircraft excluding Hang Gliders and Parachutes	0	0	0	0	0	0	0	0	0	0
Hang Gliders	0	0	0	0	0	0	0	0	0	0
Parachutes	0	0	0	0	0	0	0	0	0	0

Significant or Serious Incidents

No security incidents reported as occurring since the end of the period covered by the previous report met the criteria that define a significant or a serious incident.

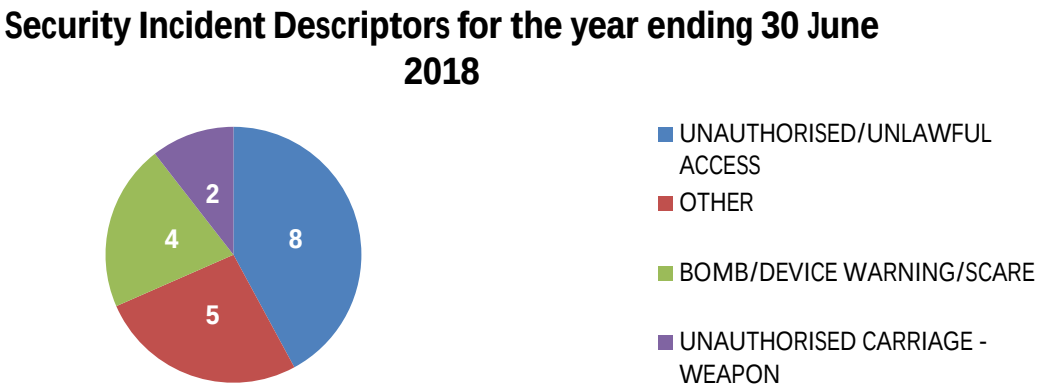
Descriptors and Causal Factors

The most common descriptor (6) recorded for Security Incidents during the year ending 31 December 2016 was 'UNAUTHORISED/UNLAWFUL ACCESS' (8) with 'OTHER' being the second most common (5)

No causal factors have been recorded for security incidents that occurred during the year ending 31 December 2015.

Descriptors

The following chart shows the numbers of each of the occurrence descriptors that have been recorded for security incidents reported as occurring during the year ending 30 June 2016.



Aerodrome Incidents

Runway Incursions

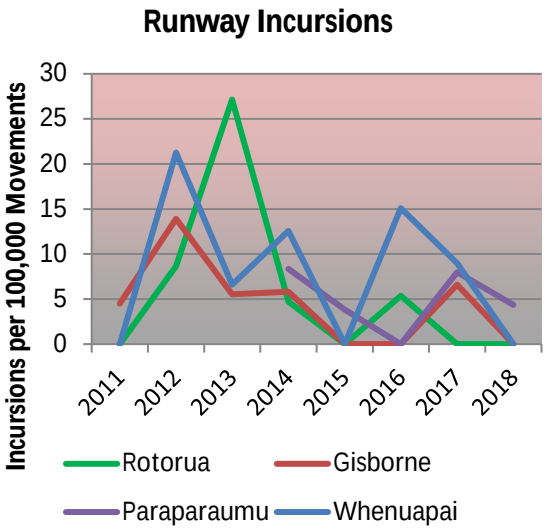
Runway incursion rates are calculated by dividing the total number of reported Aerodrome Incidents that have any of the five runway incursion descriptors by the total number of reported movements for the same aerodrome over the same period. The result is tabulated and graphed as runway incursions per 100,000 movements.

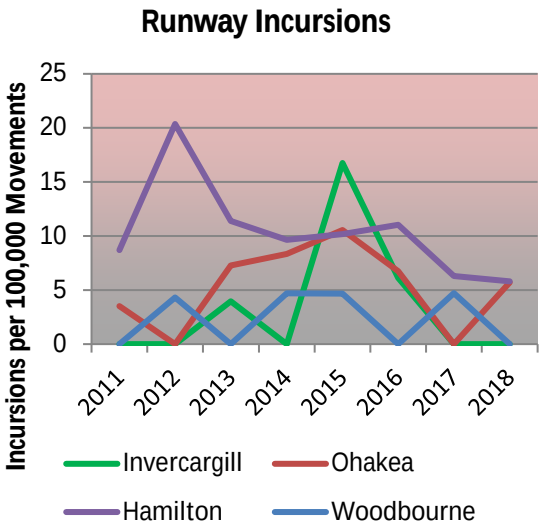
Clearly the number of runway incursions is low with many certificated aerodromes having no such incidents reported at all. With such low numbers caution needs to be exercised in drawing statistical conclusions.

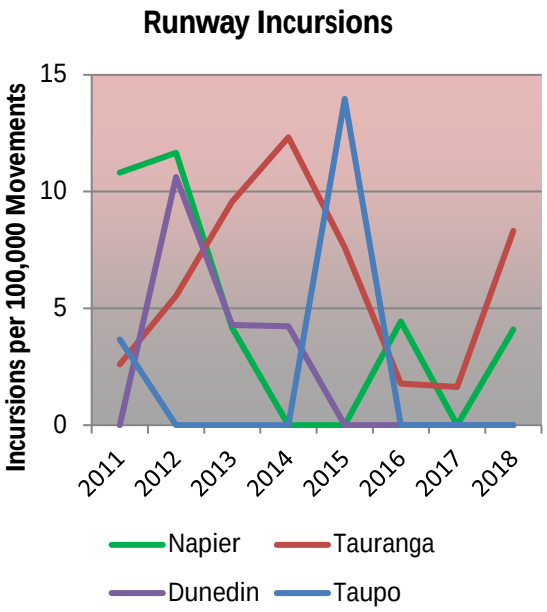
The following table shows annual values of reported runway incursion rates for all certificated aerodromes for which adequate movement data is available. The table is ordered by the maximum rate that has been recorded for any year in the period.

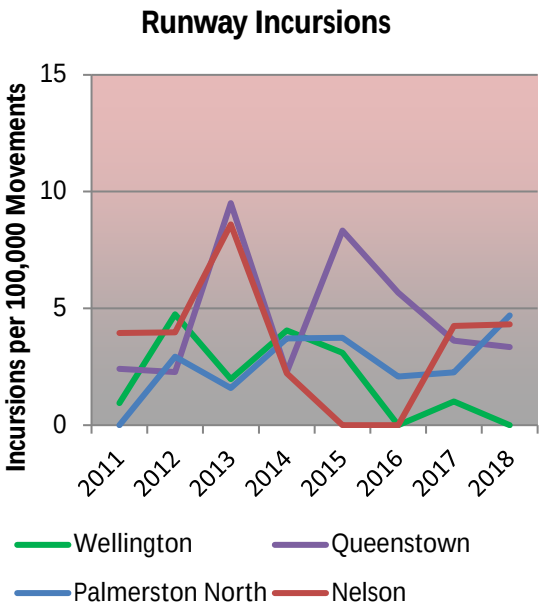
Aerodrome	2010	2011	2012	2013	2014	2015	2016	2017
Paraparaumu				19.2	4.1	0.0	7.3	4.2
Rotorua	4.3	0.0	13.6	22.2	5.0	0.0	5.6	0.0
Gisborne	0.0	4.5	20.4	0.0	6.3	0.0	0.0	5.8
Whenuapai	13.9	6.8	20.1	6.5	6.7	6.9	8.2	9.4
Hamilton	9.1	15.4	16.3	7.4	8.5	12.6	7.4	9.3
Invercargill	0.0	0.0	3.5	0.0	15.0	6.3	0.0	0.0
Ohakea	1.6	3.6	3.2	13.9	5.5	3.4	7.6	0.0
Woodbourne	0.0	0.0	4.4	4.6	0.0	4.5	4.9	0.0
Napier	7.4	11.0	4.0	4.1	0.0	0.0	4.3	0.0
Dunedin	4.5	10.3	0.0	8.8	0.0	0.0	0.0	0.0
Tauranga	2.3	2.7	9.6	9.9	8.6	7.6	1.7	6.4
Taupo	0.0	3.8	0.0	0.0	8.8	4.5	0.0	0.0
Queenstown	0.0	2.4	6.9	4.6	8.8	4.0	7.4	3.4
Wellington	0.9	2.8	2.0	3.0	5.2	1.0	0.0	1.0
Palmerston North	1.8	0.0	3.0	3.6	5.7	2.0	2.0	4.7
Nelson	5.8	4.0	6.2	6.6	2.1	0.0	0.0	6.5
Auckland	3.8	3.2	0.6	5.7	2.6	1.3	4.2	4.0
Christchurch	5.6	1.6	2.7	4.6	0.9	5.7	2.0	3.0
New Plymouth	0.0	3.0	3.2	0.0	4.6	0.0	0.0	0.0

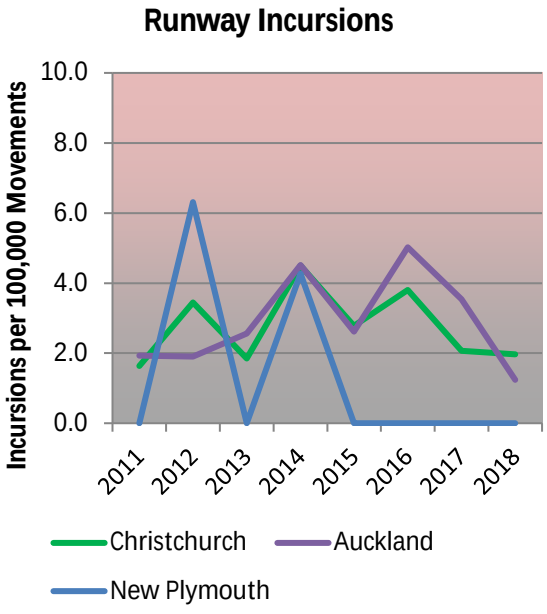
The charts on the next page show the above data in a graphical way. Aerodromes have been grouped in an arbitrary way to keep the number of lines on each chart roughly equal. The grouping is based on the largest value reported over the period covered.











Significant or Serious Incidents

No Aerodrome Incidents reported as occurring since the end of the period covered by the previous report met the criteria that define a significant or a serious incident.

Occurrences — General

The following table shows the number of occurrences (excluding Non-Reportable Occurrences) that were registered on the CAA database during each of the 12 months of the reporting period.

Month	ACC	ADI	ARC	ASP	BRD	DEF	DGD	HGA	INC	NIO	PAA	PIO	SEC
Jul-2017	3	17	69	111	91	189	3	1	233	8	0	1	5
Aug-2017	2	14	103	119	171	157	7	1	231	4	1	2	3
Sep-2017	3	25	85	133	112	153	7	1	223	5	0	3	2
Oct-2017	5	16	96	140	80	113	2	2	123	2	2	2	8
Nov-2017	11	18	108	145	137	155	6	2	137	6	1	2	2
Dec-2017	2	10	74	111	91	132	3	2	114	2	1	6	3
Jan-2018	10	18	76	144	47	143	0	1	152	11	3	2	6
Feb-2018	7	8	33	114	0	108	4	2	100	3	0	1	3
Mar-2018	5	8	85	146	331	142	4	3	133	1	1	2	0
Apr-2018	5	27	195	191	306	292	6	1	275	14	2	6	3
May-2018	4	31	261	212	190	233	6	1	280	5	2	4	3
Jun-2018	5	22	89	130	149	190	3	1	113	4	0	2	0

ACC Accident
ADI Aerodrome Incident
ARC Aviation Related Concern
ASP Airspace Incident
BRD Bird Incident
CSI Cargo Security Incident
DEF Defect Incident
DGD Dangerous Goods Incident
HGA Hang Glider Accident
INC Aircraft (Operational) Incident
NIO Facility Malfunction Incident
PAA Parachute Accident
PIO Promulgated Information Incident
SEC Security Incident

Appendix — Definitions

General

Accident [ACC] — means an occurrence that is associated with the operation of an aircraft and takes place between the time any person boards the aircraft with the intention of flight and such time as all such persons have disembarked and the engine or any propellers or rotors come to rest, being an occurrence in which–

(1) a person is fatally or seriously injured as a result of–

(i) being in the aircraft; or

(ii) direct contact with any part of the aircraft, including any part that has become detached from the aircraft; or

(iii) direct exposure to jet blast–

except when the injuries are self-inflicted or inflicted by other persons, or when the injuries are to stowaways hiding outside the areas normally available to passengers and crew; or

(2) the aircraft sustains damage or structural failure that–

(i) adversely affects the structural strength, performance or flight characteristics of the aircraft; and

(ii) would normally require major repair or replacement of the affected component–

except engine failure or damage that is limited to the engine, its cowlings, or accessories, or damage limited to propellers, wing tips, antennas, tyres, brakes, fairings, small dents, or puncture holes in the aircraft skin; or

(3) the aircraft is missing or is completely inaccessible.

Aerodrome incident [ADI] — means an incident involving an aircraft operation and–

(1) an obstruction either on the aerodrome operational area or protruding into the aerodrome obstacle limitation surfaces; or

(2) a defective visual aid; or

(3) a defective surface of a manoeuvring area; or

(4) any other defective aerodrome facility.

Aircraft incident [INC] — means any incident, not otherwise classified, associated with the operation of an aircraft.

Airspace incident [ASP] — means an incident involving deviation from, or shortcomings of, the procedures or rules for–

(1) avoiding a collision between aircraft; or

(2) avoiding a collision between aircraft and other obstacles when an aircraft is being provided with an Air Traffic Service.

Bird incident [BRD] — means an incident where–

(1) there is a collision between an aircraft and one or more birds; or

(2) when one or more birds pass sufficiently close to an aircraft in flight to cause alarm to the pilot.

Cargo security incident [CSI] — means an incident involving cargo or mail that is carried, or has been accepted by a regulated air cargo agent or an air operator for carriage, by air on an aircraft conducting an international regular air transport operation passenger service, and–

(1) there is evidence of tampering or suspected tampering with the cargo or mail which could be an act or an attempted act of unlawful interference; or

(2) a weapon, explosive, or other dangerous device, article or substance, that may be used to commit an act of unlawful interference is detected in the cargo or mail.

Dangerous goods incident [DGD] — means an incident associated with and related to the carriage of dangerous goods by air after acceptance by the operator, that–

(1) results in injury to a person, property damage, fire, breakage, spillage, leakage of fluid or radiation, or other evidence that the integrity of the packaging has not been maintained; or

(2) involves dangerous goods incorrectly declared, packaged, labelled, marked, or documented.

Defect incident [DEF] — means an incident that involves failure or malfunction of an aircraft or aircraft component, whether found in flight or on the ground.

Facility malfunction incident [NIO] — means an incident that involves an aeronautical facility.

Fatal Injury — means any injury which results in death within 30 days of the accident.

Incident — means any occurrence, other than an accident, that is associated with the operation of an aircraft and affects or could affect the safety of operation. Note: Incident has many sub-categories.

Occurrence — means an accident or incident.

Promulgated information incident [PIO] — means an incident that involves significantly incorrect, inadequate, or misleading information or aeronautical data promulgated in an aeronautical information publication, map, chart, or otherwise provided for the operation of an aircraft.

Security incident [SEC] — means an incident that involves unlawful interference.

Serious Injury — means any injury that is sustained by a person in an accident and that–

(1) requires hospitalisation for more than 48 hours, commencing within 7 days from the date the injury was received; or

(2) results in a fracture of any bone, except simple fractures of fingers, toes, or nose; or

(3) involves lacerations which cause severe haemorrhage, nerve, muscle, or tendon damage; or

(4) involves injury to an internal organ; or

(5) involves second or third degree burns, or any burns affecting more than 5% of the body surface; or

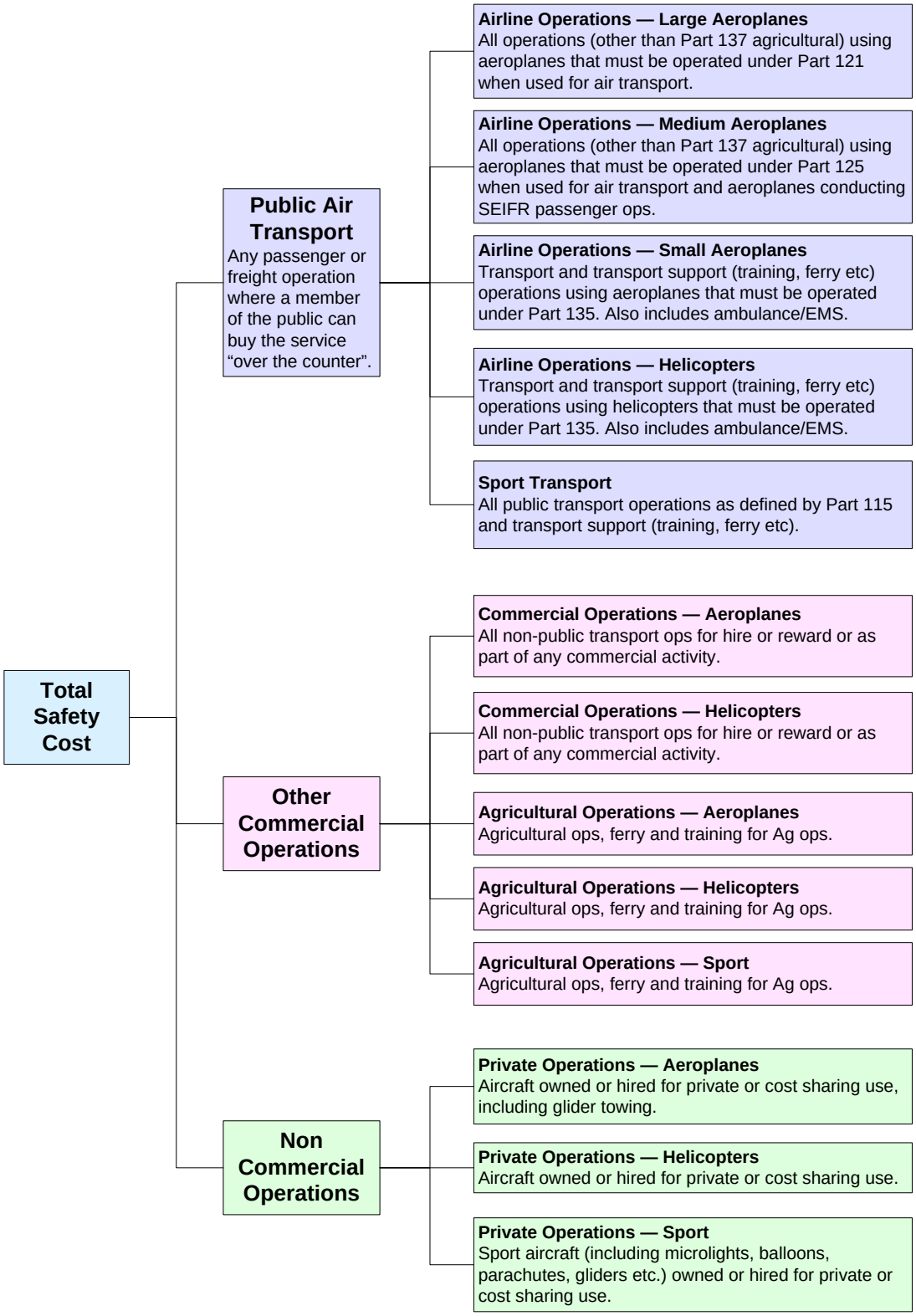
(6) involves verified exposure to infectious substances or injurious radiation.

Severity

The following definitions apply to the severity accorded to occurrences and to findings as the result of investigation of occurrences.

Severity Factor		Definition
CR	Critical	An occurrence or deficiency that caused, or on its own had the potential to cause, loss of life or limb;
MA	Major	An occurrence or deficiency involving a major system that caused, or had the potential to cause, significant problems to the function or effectiveness of that system;
MI	Minor	An isolated occurrence or deficiency not indicative of a significant system problem.

Safety Target Groups



Target group name	General description	Includes	Excludes
Airline Operation - Large Aeroplanes	All operations using large passenger and freight aeroplanes that are operated under part 121	Ferry, test, training, passenger and freight, domestic and international, Part 91 operations, and commercial operations other than Part 137 agricultural operations. Includes all aeroplanes that have a passenger seating configuration of 30 seats or more, or a payload capacity of more than 3410kg.	Part 137 agricultural operations
Airline Operation - Medium aeroplanes	All operations using medium passenger and freight aeroplanes that are operated under part 125.	Ferry, test, training, passenger and freight, domestic and international, Part 91 operations, and commercial operations other than Part 137 agricultural operations. Aeroplanes that have a seating configuration of 10 to 30 seats, excluding any required crew member seats, or a payload capacity of 3410 kg or less and a MCTOW of greater than 5700 kg, and any aeroplanes conducting SEIFR passenger operations.	Part 137 agricultural operations
Airline Operation - Small aeroplanes	All operations by 119 certificate holders using other aeroplanes.	Ferry, test, passenger and freight, domestic and international, training in support of Part 135 operations, Ambulance/EMS	Part 137 agricultural operations, Part 91 operations, and commercial operations. SEIFR under Part 125
Airline Operation - Helicopters	All operations by 119 certificate holders using helicopters	Ferry, test, passenger and freight, domestic and international, training in support of Part 135 operations, Ambulance/EMS	Part 137 agricultural operations, Part 91 operations, and commercial operations. SEIFR under Part 125

Target group name	General description	Includes	Excludes
Commercial Operations - Aeroplane	Other commercial operations Aeroplane (all non-public transport ops for hire or reward or as part of any commercial activity)	Positioning, ferrying flights, training (dual and solo), "Commercial non-certified", Business and Executive	Public transport ops, Agricultural ops & training for Agricultural ops, non-commercial ops
Commercial Operations - Helicopter	Other commercial operations Helicopter (all non-public transport ops for hire or reward or as part of any commercial activity)	Positioning, ferrying flights, training (dual and solo), "Commercial non-certified", Business and Executive	Agricultural ops & training for Agricultural ops, public transport, non-commercial ops.
Agricultural Operations - Aeroplane	Agricultural operations using aeroplanes	Agricultural ops, ferry & training for Ag ops.	Everything else.
Agricultural Operations - Helicopters	Agricultural operations using helicopters	Agricultural ops, ferry & training for Ag ops.	Everything else
Agricultural Operations - Sport Aircraft	Agricultural operations using sport aircraft	Agricultural ops, ferry & training for Ag ops.	Everything else
Private Aeroplane	Private operations in aeroplanes	Cost sharing, aircraft hired from schools and clubs for private or cost sharing use, glider towing	Airline, commercial, agricultural operations, sport aircraft, balloons, training (dual and solo)
Private Helicopter	Private operations in helicopters	Cost sharing, aircraft hired from schools and clubs for private or cost sharing use	Airline, commercial, agricultural operations, sport aircraft, balloons, training, ferry/positioning flights by commercial operators

Target group name	General description	Includes	Excludes
Sport Transport	All public transport ops by sport aircraft	Ferry, test, passenger and freight, domestic and international, training for such ops. And balloons	Agricultural operations.
Sport Private	Private operations using sport aircraft	Cost sharing, aircraft hired from schools and clubs for private or cost sharing use, training, gliders, power gliders, hang gliders, parachutes and all forms of inflatable wing, balloons	Airline, commercial, agricultural operations, and training for these activities

Aircraft Categories

Aircraft Statistics Category	Definition	**Aircraft Class**
Large Aeroplanes	Aeroplanes that must be operated under Part 121 when used for air transport	Aeroplane
Medium Aeroplanes	Aeroplanes that must be operated under Part 125 when used for air transport, except for those required to operate under Part 125 solely due to operating SEIFR	Aeroplane
Small Aeroplanes	Other Aeroplanes with Standard Category Certificates of Airworthiness	Aeroplane
Agricultural Aeroplanes	Aeroplanes with Restricted Category Certificates of Airworthiness limited to agricultural operations	Aeroplane
Helicopters	Helicopters with Standard or Restricted Category Certificates of Airworthiness	Helicopter
Sport Aircraft	All aircraft not included in the groups above	Aeroplane, Amateur Built Aeroplane, Amateur Built Glider, Amateur Built Helicopter, Balloon, Glider, Gyroplane, Helicopter, Microlight Class 1, Microlight Class 2, Power Glider

Significant Events

The following text is taken from the procedure SI - 0.0 Occurrence Management, 0.08 - Occurrence completion:

To facilitate in deciding whether or not your investigation file should be "tagged" as a "Significant Event" here are some occurrences that substantially meet the criteria.

- Occurrences that are investigated by TAIC unless it is known that the TAIC are using the event for their own training purposes and would not otherwise be investigating.
- Critical air transport occurrences resulting in Near Collision (provided one of the aircraft involved is airborne, nearly airborne, or has just landed). In cases where an aircraft is landing or taking off the event would not be significant unless the aircraft's speed was in excess of 10 kts.
- Critical air transport occurrences resulting in Loss of Control
- Critical air transport occurrences where a Distress or Urgency call was (or should have been) made
- Air transport occurrences where the last in a series of "redundant" systems failed in flight or during take off or landing
- SEIFR air transport occurrences involving loss of engine power to the extent that an unscheduled landing is required
- Fatal accidents
- Occurrences that are relevant to a current (group) of safety concerns. For example in 1999/2000 aircraft electrical wiring was a significant international concern therefore occurrences in the New Zealand fleet of electrical wiring problems may warrant them being tagged as significant.
- Occurrences that are relevant to the current CAA (Business) Safety Plan. For the 1999/2000-year collision with terrain, obstacles, and water; controlled flight into terrain and loss of control in flight were relevant for aircraft with a MCTOW of 5,670 kg and above.
- Engine failure in 2-plus engined air transport aircraft at critical phases of flight or failures of a nature that may have a fleet impact or significantly affect safe operations or are subject to media scrutiny.
- Significant structural or engine failure of a private GA aircraft/helicopter that may have implications for the fleet type, particularly where that type is used for air transport operations.

Serious Events

The following text is taken from the procedure SI - 2.0 Safety Investigation - Appendices, 2.02 Appendix B - Aviation Occurrence Notification Checklist:

"Serious incident" means an incident involving circumstances indicating that an accident nearly occurred. The difference between an accident and serious incident lies only in the result (ICAO Annex 13 definition). The serious incidents listed below are extracted from ICAO Annex 13 attachment D. The list is not exhaustive and only serves as guidance to the definition of serious incident.

(a) Near collisions requiring an avoidance manoeuvre to avoid a collision or an unsafe situation or when an avoidance action would have been appropriate.

(b) Controlled flight into terrain only marginally avoided.

(c) Aborted take-off on a closed or engaged runway.

(d) Take-off from a closed or engaged runway with marginal separation from obstacle(s).

(e) Landings or attempted landings on a closed or engaged runway.

(f) Gross failures to achieve predicated performance during take-off or initial climb.

(g) Fires and smoke in the passenger compartment, in cargo compartments or engine fires, even though such fires were extinguished by the use of extinguishing agents.

(h) Events requiring the emergency use of oxygen by the flight crew.

(i) Aircraft structural failures or engine disintegration's not classified as an accident.

(j) Multiple malfunctions of one or more aircraft systems seriously affecting the operation of the aircraft.

(k) Flight crew incapacitation in flight.

(l) Fuel quantity requiring the declaration of an emergency by the pilot.

(m) Take-off or landing incidents. Incidents such as undershooting, overrunning or running off the side of runways.

(n) System failures, weather phenomena, operations outside the approved flight envelope or other occurrences, which could have caused difficulties controlling the aircraft.

(o) Failures of more than one system in a redundancy system mandatory for flight guidance and navigation.

Safety Failure

We have taken a Safety Failure as:

- an accident including hang glider and parachute or
- an incident where the aircraft is written off, destroyed or missing or
- a critical or major incident or
- an incident that has any of the following 31 selected descriptors, most of which relate to collision, serious landing outcomes, serious aircraft technical or operational failures or acts of violence

INJURIES TO PERSONS
FUEL/FLUIDS OCCURRENCE
LANDING OVERRUN
RUNWAY EXCURSION
General Breakup/disintegration
COLLISION/STRIKE OBJECT
Collision Level Terrain/water
Collision Hill/mountain
COLLISION WITH AIRCRAFT ON GROUND
DAMAGE TO AIRCRAFT
ENGINE POWER LOSS
Uncontained Failure
Engine Tearaway
PROPELLOR FAILURE
Propellor Separation
Propellor Runaway
FIRE/EXPLOSION/FUMES
Explosion
Struck By Propellor/rotor/jet Blast
TAKE-OFF OR LANDING
Landing Beside Runway
Undershoot
Overrun
Unintentional Wheels Up Landing
Nose Down/overturned
Critically Low Or Exhausted
Contaminated
Incorrect Type
ACT OF VIOLENCE
Aircraft excursion
Collision

Close Call

We have defined a Close Call as an incident that is not a safety failure but that has any of the following 112 selected descriptors that support the assumption that failure would have been the outcome if either the condition had escalated or adequate compensating action had not been taken.

ENGINE(S) SHUTDOWN
SIGNIFICANT LOSS OF
CONTROL/PERFORMANCE
AVOIDING ACTION
OVERWEIGHT LANDING
ABNORMAL LANDING
AIRFRAME FAILURE
Initial Failure Of Control Surface
Initial Failure Of Fuselage
Initial Failure Of Empennage
Initial Failure Of Wing
Initial Failure - Other
Aircraft Standing
Aerodrome Structure
Animal (not Bird)
Bird
Chimney/mast/pole
Ditch
Embankment
Fence/fence Post
Person
Building
Approach Lights
Taxiway/runway Lights
Tree
Vehicle
Wire/cable/powerline
Other
NEAR COLLISION /STRIKE OBJECT
NEAR COLLISION AIRCRAFT ON GROUND
NEAR COLLISION TERRAIN
Both Moving On Ground

COMPONENT/SYSTEM MALFUNCTION
Avionics
Brake
De-icing
Doors/panels
Electrical
Flight Controls
Fuel
Gear
Hydraulic
Instruments
Navigation System
Pneumatic
Pressurisation
Tyre/wheel
Main Rotor
Tail Rotor
Main Rotor Transmissions/gearbox
Maint Rotor Tail Shaft
Tail Rotor Drive Shaft
Struck By Propellor / Rotor / Jet Blast
Sinking Through Surface
Struck By Object
Struck By Stairs / Equipment
GEAR COLLAPSED/RETRACTED
Main Gear
Nose Gear
Complete Gear
Other Gear
LOSS OF CONTROL
Directional Control
Mush/stall
Spin
Spiral
Pitch Control (porpoise)
Other
LOSS OF CONTROL (HELICOPTER)
Dynamic Roll-over (heli)
Inadequate Rotor Rpm (heli)
Settling With Power (heli)
Uncontrolled Rotation (heli)
Other
Fuel Starvation
Mechanical/engine Failure
Non Mechanical Engine Failure
Simulated Engine Failure
Transmission Failure
Driveshaft Failure
Unspecified
Fire
Fumes/smoke
Other
EVACUATION
Insecure Barrier
Scraped Wingtip/cowling/float
Tail Scrape/overrotation
Groundloop/swerve
Hard Landing
Wheels Down Landing On Water
Intentional Wheels-up Landing
Intent Unknown Wheels-up Landing
MISSING AIRCRAFT
Fire/smoke/fumes
Gpws
FAILURE OF EMERGENCY EQUIP/PROCS
EMERGENCY DECLARATION
Incorrect Quantities Loaded
Airspace Incident
NEAR COLLISION
AIR PROXIMITY
Near Miss
Runway Incursion Category A
Runway Incursion Category B
SPILLAGE/LEAKAGE
FUMES/GAS/SMOKE
SABOTAGE
HIJACK/UNLAWFUL SEIZURE
BOMB/DEVICE WARNING/SCARE
Endangering transport
UNLAWFUL INTERFERENCE
Theft

Reason Model – Latent Failure Model

CAA identification of occurrence causal factors is based on the Reason Model (latent failure model). Occurrence investigations attempt to assign attributable cause by identifying the generic type of organisation or person involved and the contributing active failures, local factors, and/or organisation factors. The analysis contained in the Causal Factor Analysis section of this report summarises the results from investigation by reporting the different types of causal factors identified versus occurrence type. It should be noted that occurrence types (e.g. Accident, Defect etc.) are not mutually exclusive (e.g. an accident and a defect may be associated) and hence any causal factor recorded during the investigation will be recorded for all associated occurrence types.

The following two diagrams are designed to show the basic principles of the latent failure model:

Diagram 1

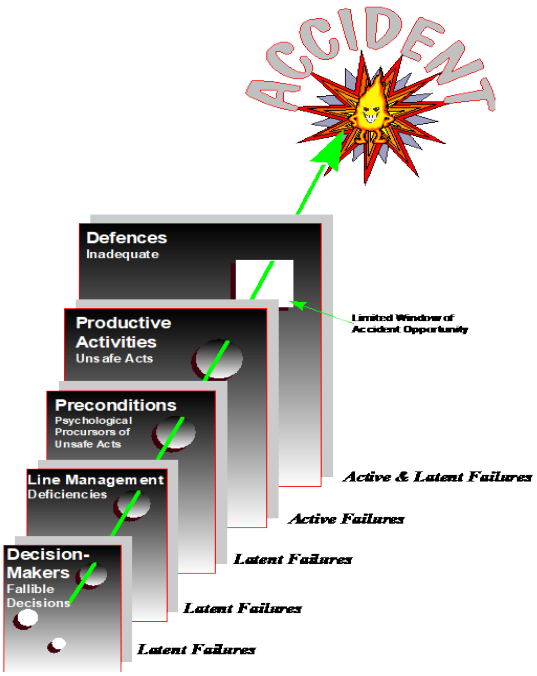


Diagram 1 shows the layers of defences that have been created within the aviation system to prevent accidents and incidents happening. It also shows how these defences have holes in them. When these holes line up there is a window of opportunity for an accident or incident. All that is needed to complete the breach in the defence is an active failure at the operational level. When this happens an accident occurs. When the defences in the system work properly and are only partially breached the end result may be an incident. Incidents are free lessons that should be investigated to show where the holes (latent failures) in the system are. Holes in the system are there all the time and a good pro-active audit program should also help in detecting them.

Diagram 2

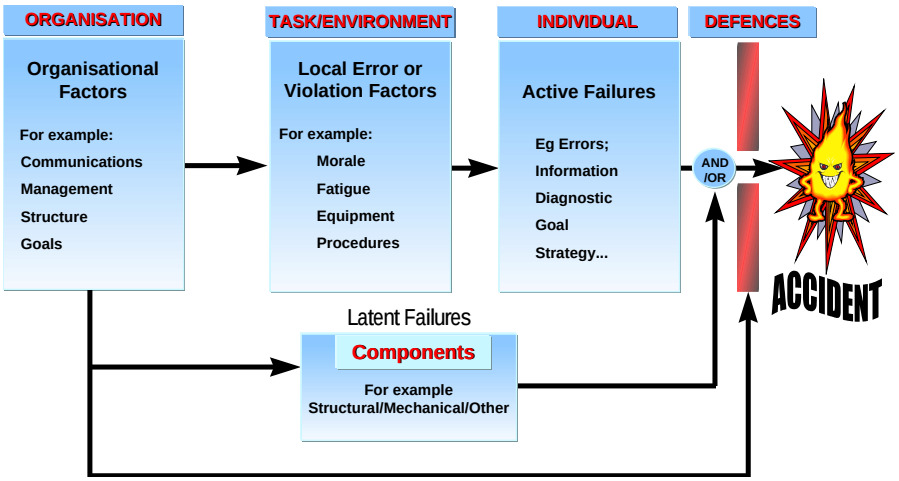


Diagram 2 shows how the latent failures are grouped into 3 areas:

1. The active failures.
2. Task/environment or local factors.
3. Organisational factors.

In basic terms the latent failure model states that an accident is predicated by deficiencies in the management and physical systems responsible for and supporting the particular operation. Management system deficiencies in the responsible organisation(s) can lead to error or violation inducing conditions in the local working environment. The existence of these conditions increases the likelihood of actual errors or violations by personnel which can place an over-reliance on, or expose deficiencies in, final defences.