Aviation Safety Report

Intelligence, Safety and Risk Analysis Unit

1 July 2015 to 30 June 2016

CIVIL AVIATION AUTHORITY
OF NEW ZEALAND
Te Mana Rererangi Tūmatanui o Aotearoa

Table of Contents

Introduction and Executive Summary

Introduction

This safety report is produced using data from the Civil Aviation Authority Management Information System. It primarily covers the period from 1 July 2015 to 30 June 2016.[1]

Key Indicators

- Key measures of industry activity have increased as follows in the above period.
    - Aircraft on CAA records increased slightly by 1.9%
    - Airline Air transport flights increased by2.6%
    - Adventure Aviation flights including parachute descents increased by 29%
    - Total hours flown increased by 3.6% varying by sector from 42% for Adventure Aviation to 21% **decrease** for Private flying
- The number of organisational certificates currently held has increased by 5.5% to 1023.
- The number of aircraft movements at principal aerodromes has decreased by 0.1% in this period and the trend over three years implies a downward trend in the number of air transport flights from principal aerodromes.
- The number of accidents in the period was 102, up from 101 in the last period, but the trend is downward relative to the average of the preceding three years (104.7 accidents pa 2012 to 2014).
- There were 10 fatalities, 3 less than in the previous 12 months and the fourth lowest in the last ten years. The average of the last four years was 10.25 fatalities pa and the highest in the last ten years was 22 fatalities in 2012
- The accident statistics are now led by private aeroplane, 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 1.8% on the last 12 months while the total flying hours in the same period increased by 3.6%. This is happening in a climate of decreasing aerodrome movements.

J.D. Stanton
Manager Intelligence Safety and Risk Analysis

---

[1] This report uses calendar years. Where quarters are referred to the first quarter is 1 January to 31 March.

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

Executive Summary

Industry status as at 30 June 2016 and trend over the preceding 9 years

This section is organised into three parts

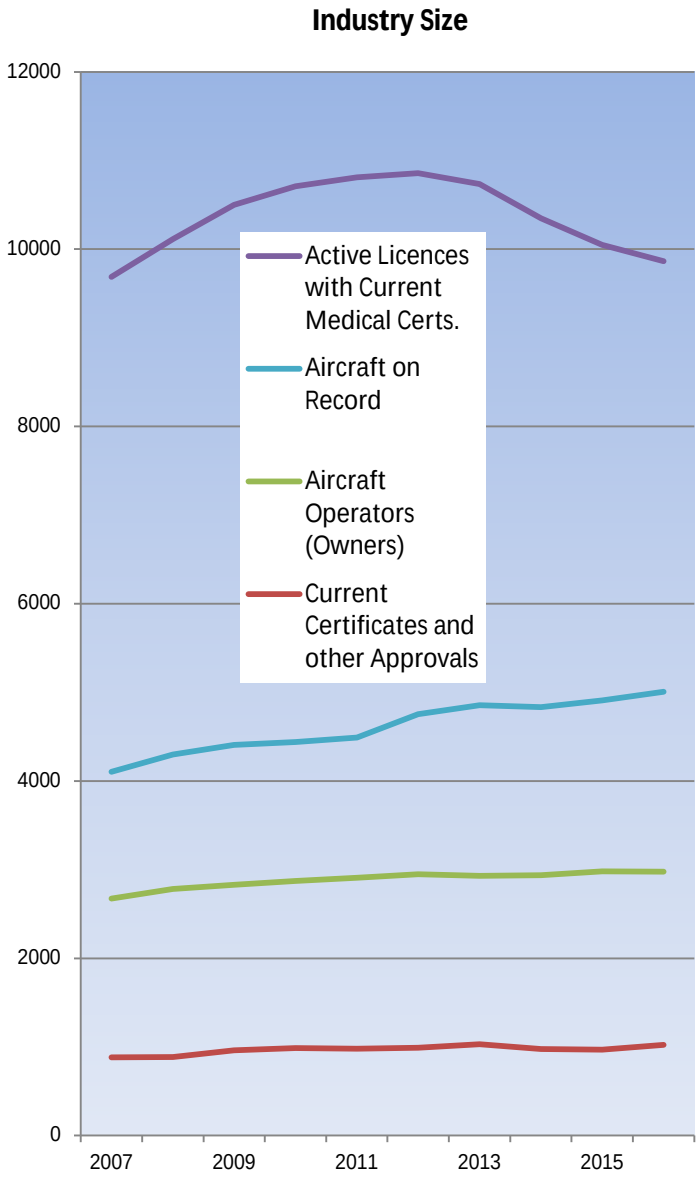
- Industry Size
- Industry Activity
- Safety Outcomes

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

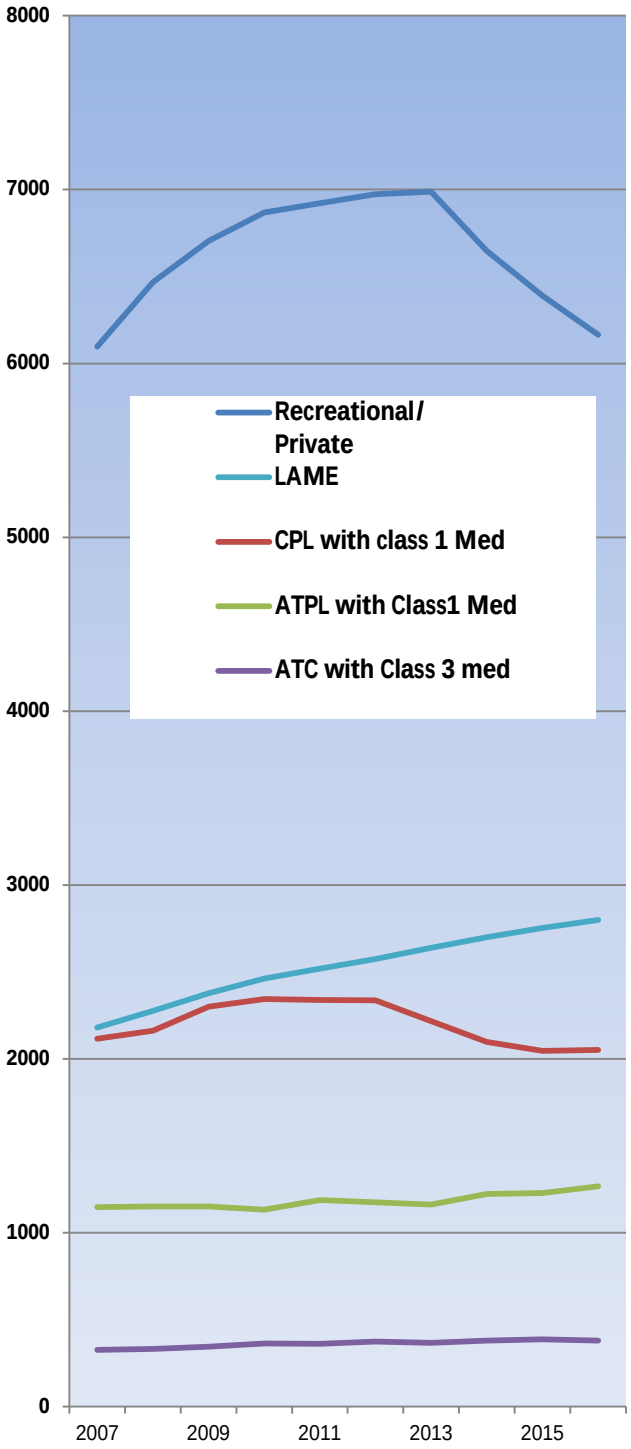
Ten year movements of these measures are summarised in the following graph.



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

The graphs that follow show that the movement in license 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



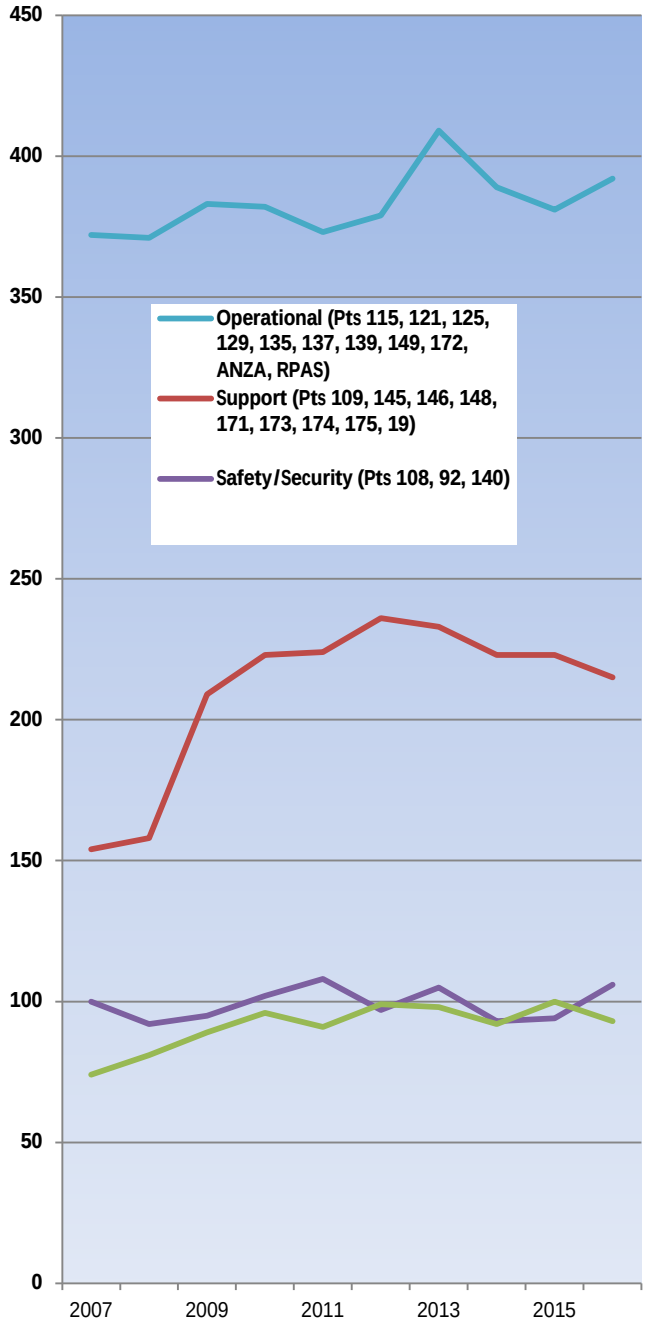
The 'Recreational/Private' group consists of holders of RPL licences who have appropriate current medical certificates plus holders of any pilot licence who have current class 2 medical certificates plus holders of PPL licenses only who hold a current class 1 medical certificate.

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 Recreational/Private and the CPL groups have been slowly declining in numbers over the last 3 years and although Microlight certificates issued by Part 149 organisations are not included it has been suggested that PPL and RPL holders might be choosing to operate in the Microlight sector rather than the fully licensed sector.

For more detail see: Licences

Approvals Held as at 30 June



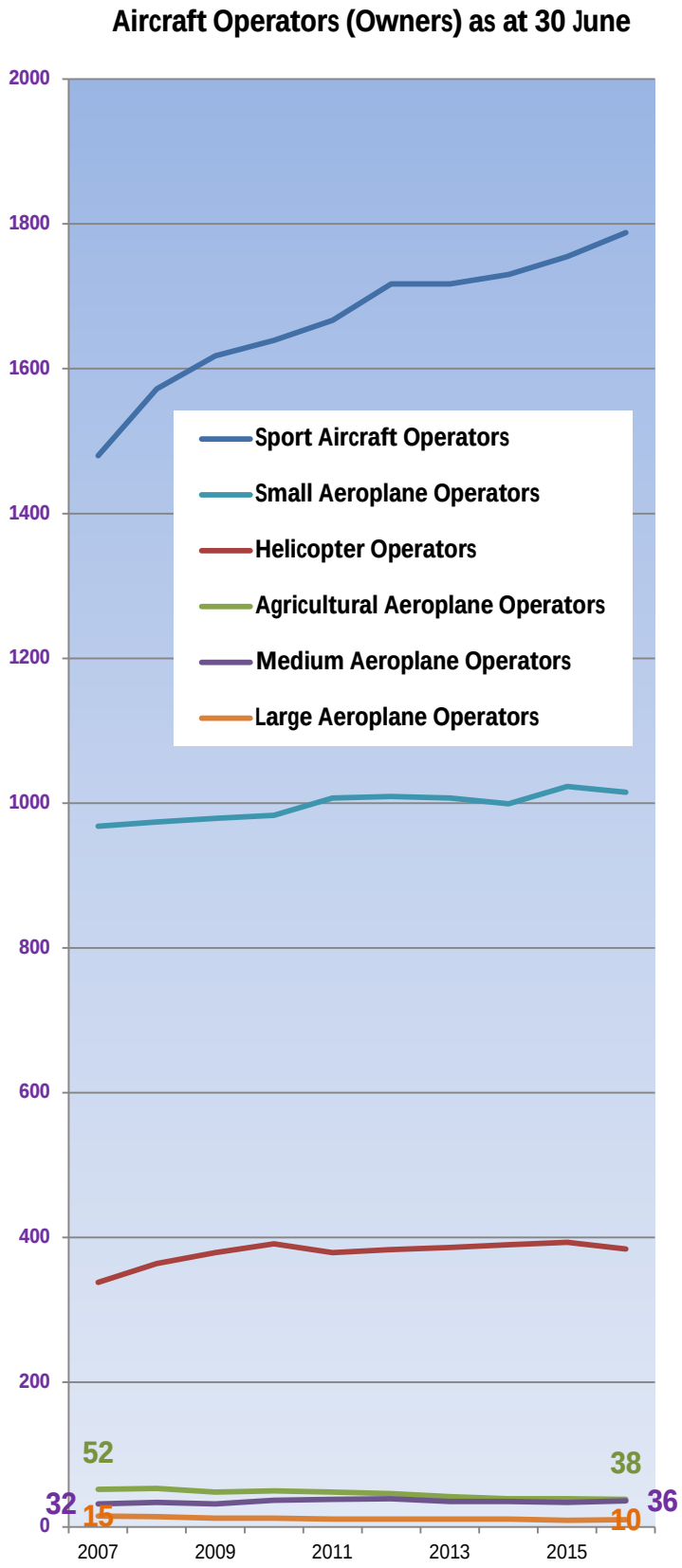
No significant trends are evident.

The number of Part 145 Aircraft Maintenance Organisation approvals peaked 4 years ago at 67 and has since declined to 55. If this is evidence of a continuing trend there might be a case for further assessment.

The number of Part 121 Large Aeroplane Operator approvals has fallen from 11 at the end of June 2007 to 8 at the end of June 2016. This sector is closely monitored.

The numbers of Part 137 Agricultural Aircraft Operator approvals declined from 112 at the end of June 2007 to 99 at the end of June 2014. This decline is not steady and may have begun to reverse. The number was 103 at the end of June 2016. This sector is closely monitored and the decline does not represent any safety concern.

For more detail see: Approvals



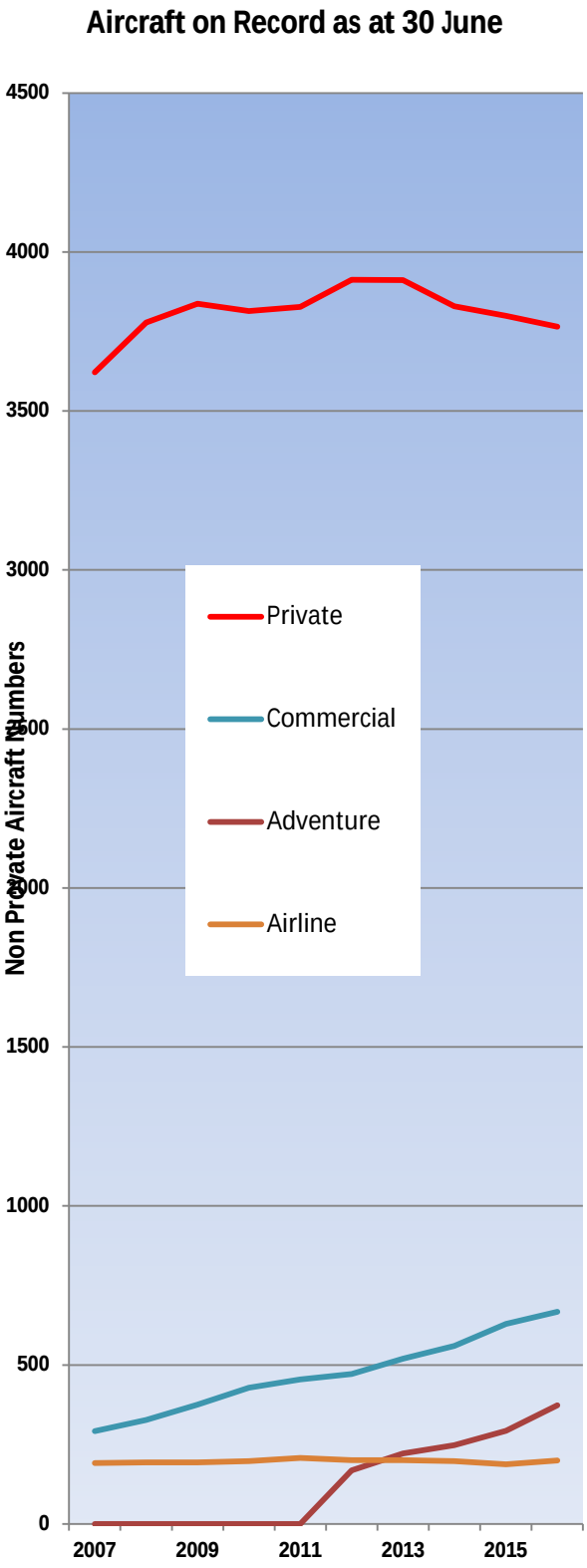
Those operators who operate more than one category of aircraft have been counted in each category. This means that any attempt to total the numbers will lead to more operators than actually exist.

The number of Large Aeroplane operators shows no significant recent trend but has declined by 5 since the 2007 financial year. The number of Agricultural Aeroplane operators peaked at 53 in 2008 declined until 2014 and has remained steady since then.

The number of Medium Aeroplane operators has been between 35 and 37 since 2010.

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 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 230% since June 2007. Both fixed wing and rotary have contributed to this increase but the rotary component is the major factor having gone from 145 at the end of June 2007 to 459 at the end of June 2016, an increase of 317%.

Note from 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

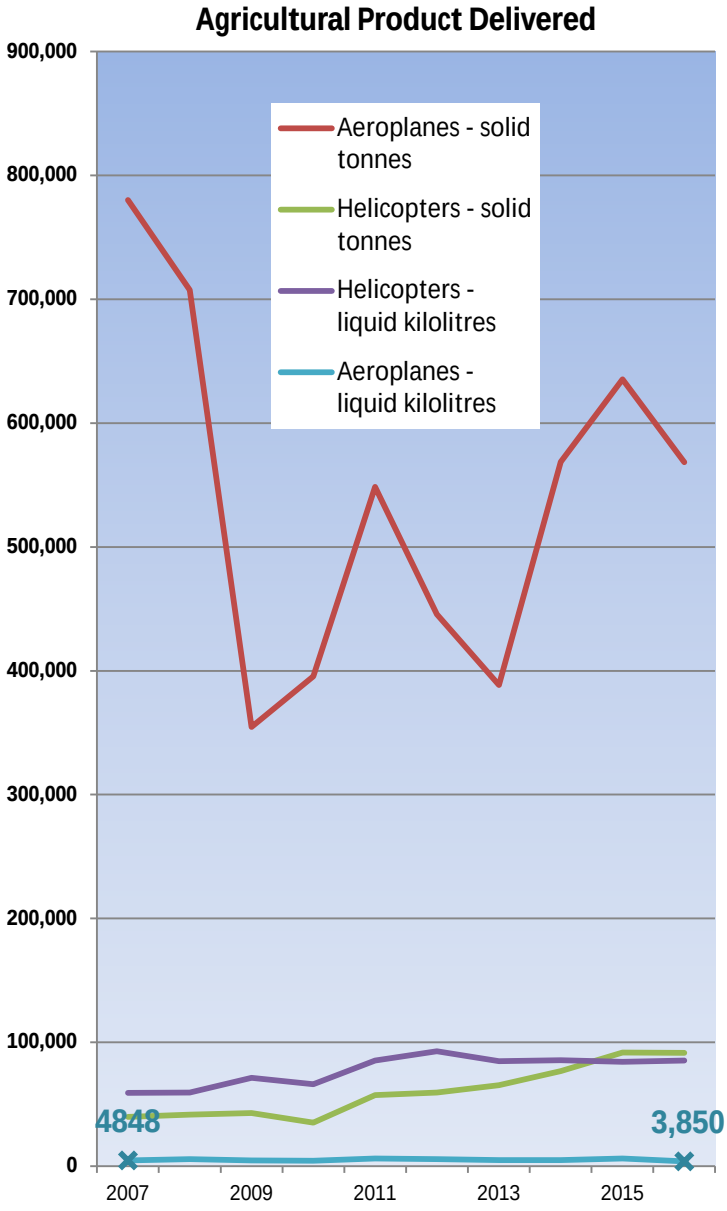
Most activity measures depend on operations statistics returns supplied by operators under the requirements of rule part 12.151 or rule part 19.103 for agricultural aviation statistics.

Compliance with these rules varies widely across the industry and with time. 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. At the time of data extraction 44% of expected returns for the year ended 30 June 2016 had not been received.

The following measures of industry activity are available

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

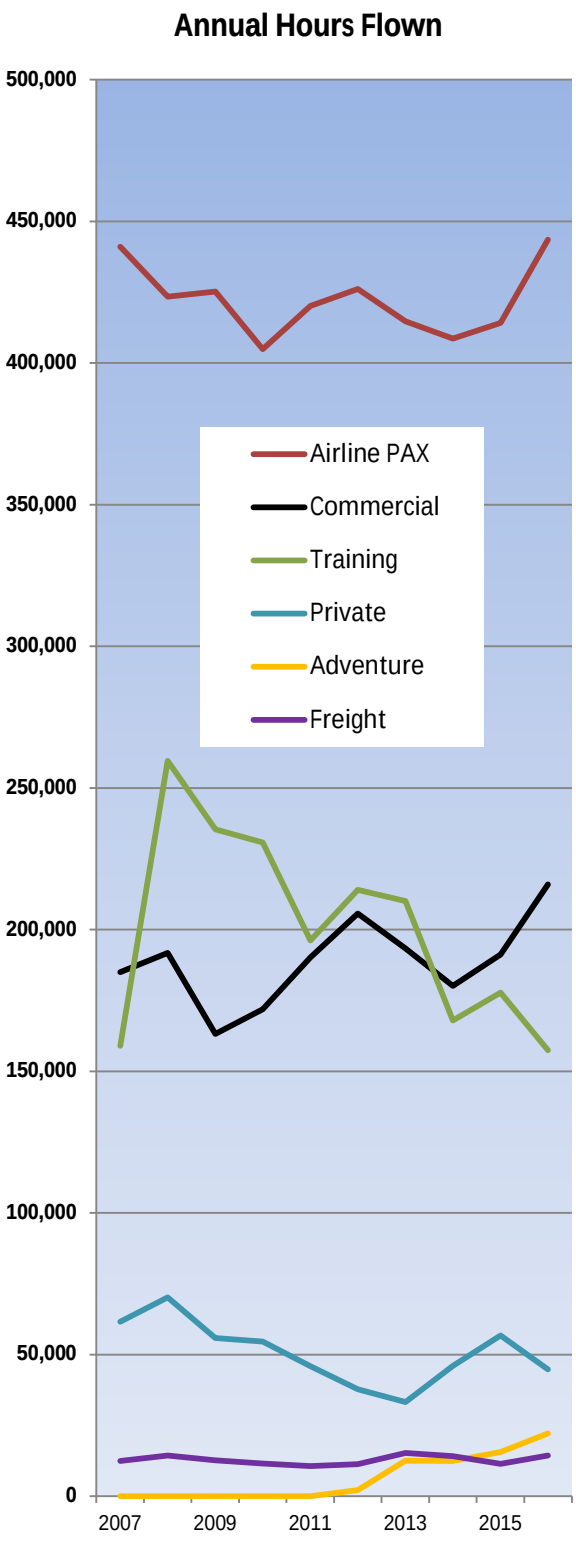
These measures are summarised in the following graphs that relate to years ending 30 June

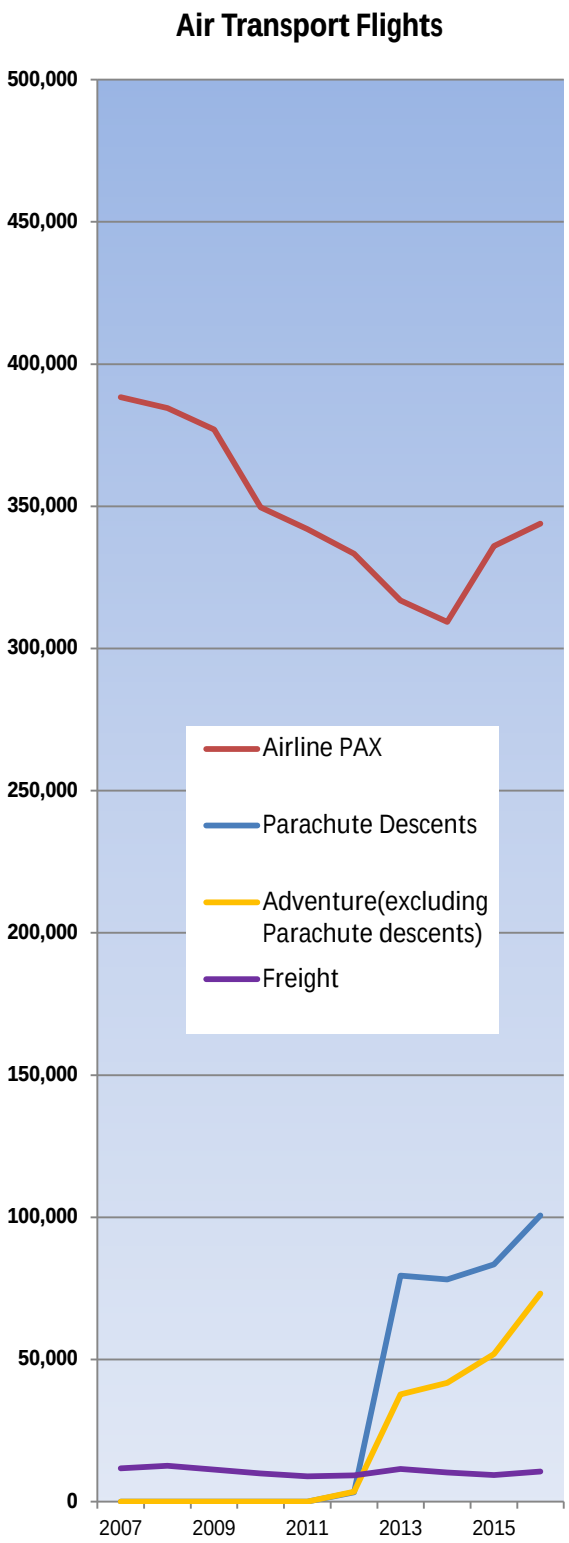


Trends in agricultural product delivery vary by aircraft type.

Liquid quantities applied by helicopter have plateaued from 2010 – 2016, while solid tonnage has increased significantly.

Solid tonnage applied by aeroplanes has fluctuated significantly from 2007 – 2016

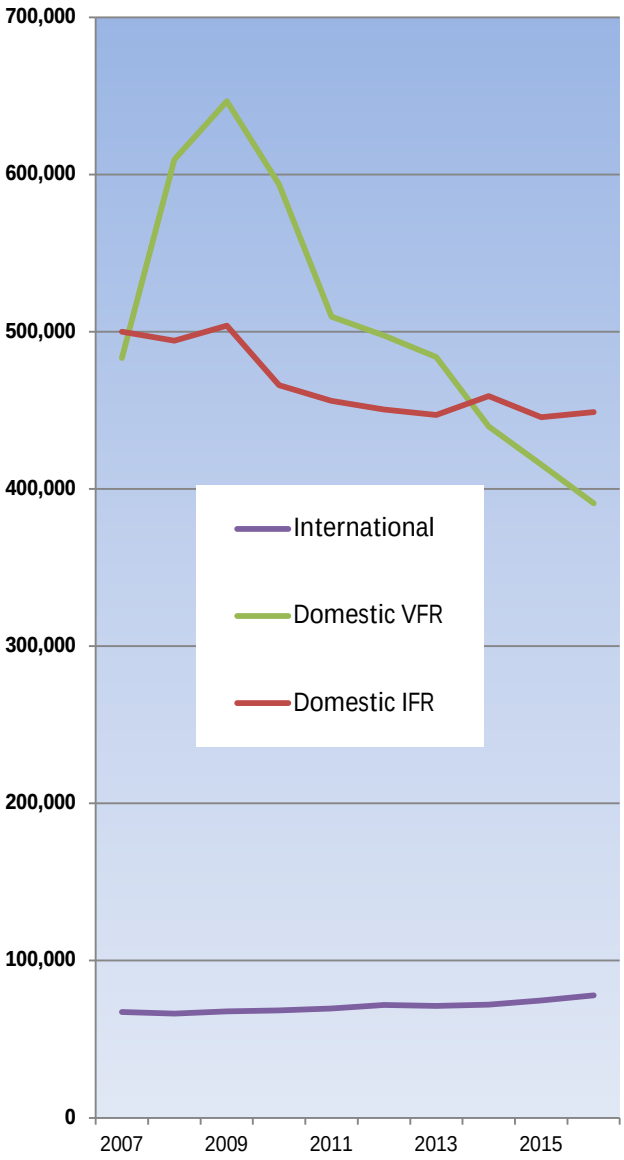




The data presented here includes a 'standard' allowance for those aircraft for which no data had been received at the time of data extraction. This means that more recent data is less reliable than earlier data because there are more missing returns for more recent return periods.

For more detail follow these links: Hours Flown Flights

Aerodrome Movements
(estimated for last quarter)



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 27000 over the 10 year period covered by this report and were 22393 during the 2015 calendar year.

There has been a steady decline in VFR movements at Airways monitored aerodromes since a peak of 646695 in 2008. 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

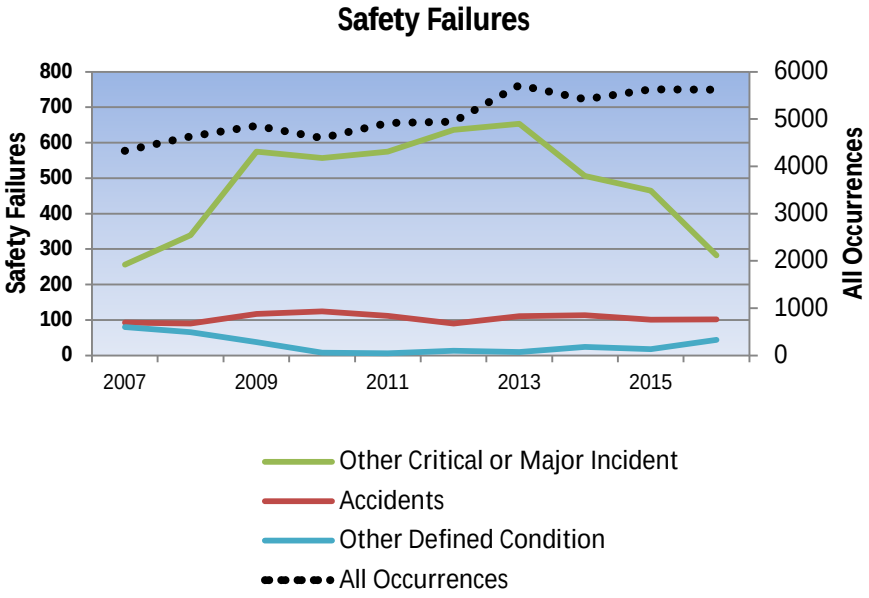
It is not practicable to summarise all of these measures in a concise form so this summary focusses on a concept of Safety Outcomes which classifies all reported occurrences into three groups, Safety Failures, Close Calls and Safety Successes. Aviation-Related Concerns, Risk Assessments and Non-Compliance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

The values relate to years ending 30 June

Safety Failures

We have taken a Safety Failure as:

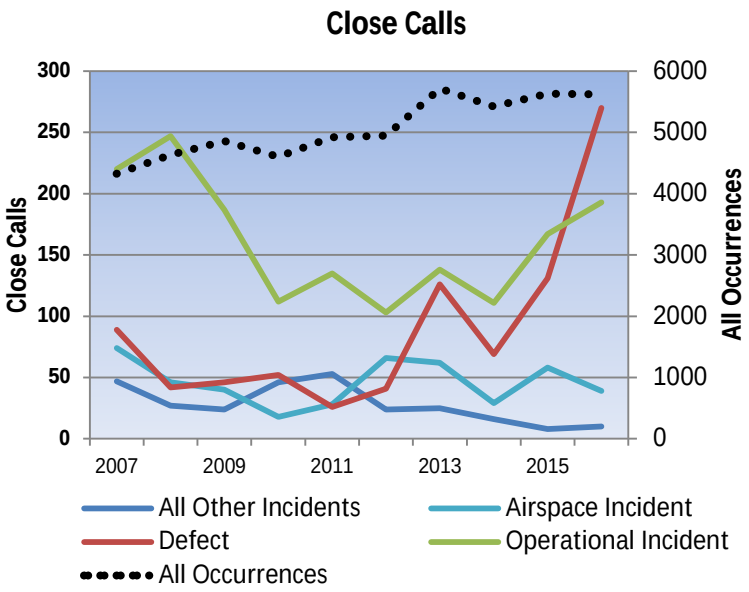
- an accident including hang glider and parachute accidents or
- an incident where the aircraft is written off, destroyed or missing or
- a critical or major incident or
- an incident that has any of 31 selected descriptors (see appendix), most of which relate to collision, serious landing outcomes, 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 (86%) made up of Airspace Incidents, Defects and Operational Incidents in decreasing order of frequency.

Close Calls

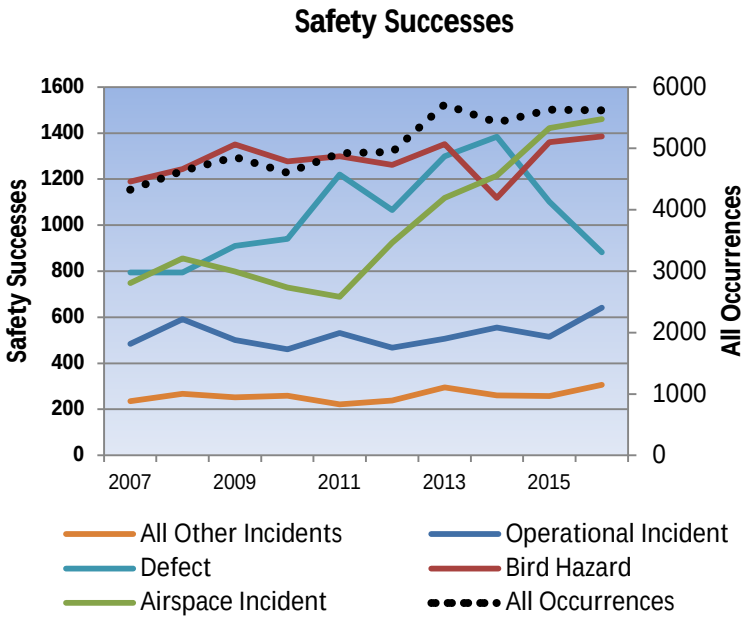
We have defined a Close Call as an incident that is not a safety failure but that has any of 112 selected descriptors (see appendix) that support the assumption that failure would have been the outcome if either the condition had escalated or adequate compensating action had not been taken.



The most obvious trend is the increase in the number of defect incidents are close calls (134). This is accompanied by an almost equal decrease in those that are safety failures (137). The total number of reported defect incidents also decreased by 214 from 1433 to 1219.

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 Client Risk Assessment and Routine Audit 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 have changed over the last 9 years within each certifcate type.

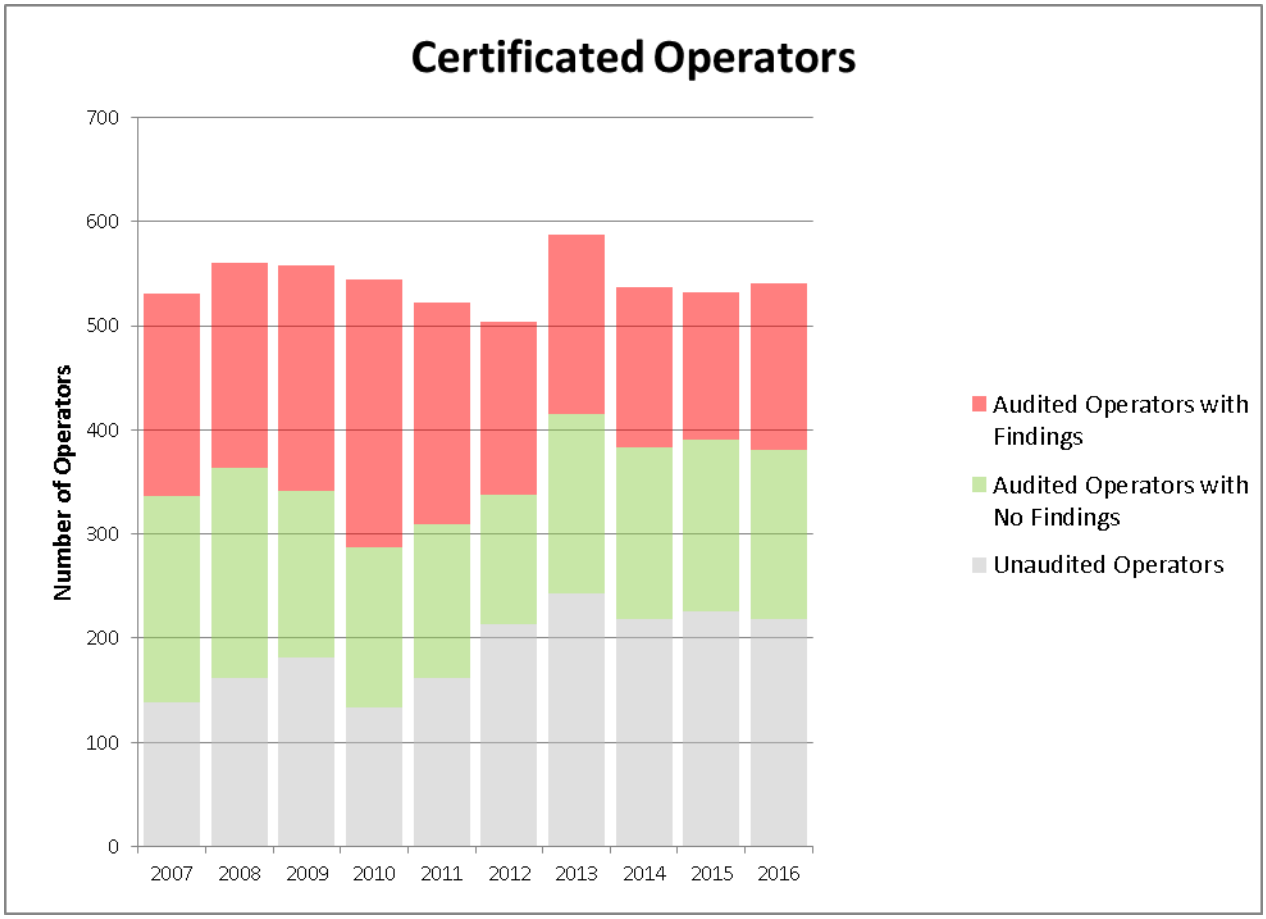
Activity	Year ending 30 June									
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Part 149 Aviation Recreation Organisation	11.8	3.0	5.1	30.7	8.4	16.2	11.4	14.4	16.2	16.3
Part 137 Agricultural Aircraft Operator	33.7	26.5	19.0	16.6	16.3	15.5	15.6	14.6	15.1	15.2
Part 135 Air Operator Helicopters and Small Aeroplanes	28.7	22.0	17.4	16.7	15.9	15.8	15.3	13.9	14.5	15.0
Part 125 Air Operator Medium Aeroplanes	24.3	18.3	14.0	15.3	16.1	12.8	14.2	13.8	16.3	14.9
Part 115 Adventure Aviation Operator Certificate							30.6	13.2	12.2	13.4
Part 172 Air Traffic Service Organisation	29.2	26.7	7.3	9.7	9.9	22.0	19.1	15.1	12.8	13.2
Part 92 Dangerous Goods Packaging Approval Holder	2.6			2.6	5.6	10.9	5.1	8.4	7.4	12.7
Part 109 Regulated Air Cargo Agent			7.7	13.9	11.2	10.4	11.7	12.7	12.4	11.1
Part 19F Supply Organisation	13.8	12.1	12.6	11.1	11.2	10.2	9.1	10.8	10.2	10.3
Part 121 Air Operator Large Aeroplanes	13.8	11.1	9.5	10.5	10.0	7.8	8.0	8.2	7.6	9.6
Part 148 Aircraft Manufacturing Organisation	14.4	12.2	11.8	10.4	11.2	10.8	9.4	10.9	11.7	9.6
Part 129 Foreign Air Transport Operator	9.2	12.9	10.6	8.2	8.9	9.6	8.3	6.8	6.4	9.5
Part 145 Maintenance Organisation	14.8	12.0	10.7	10.8	10.3	11.1	9.4	9.8	10.3	9.3
Part 141 Aviation Training Organisation	15.1	15.6	11.8	11.4	9.5	10.7	9.3	8.3	9.3	8.9
Part 173 Instrument Flight Procedure				5.9	8.2	15.4	13.0	11.1	13.5	8.9
Part 139 Aerodrome Operator	8.5	6.6	5.3	6.3	5.7	5.8	5.9	6.5	7.2	8.6
Part 146 Aircraft Design Organisation	12.2	12.3	9.0	7.6	11.8	10.2	9.4	8.2	8.8	8.3
Australia AOC with ANZA Privileges Part 108 Security Programme				5.5	5.9	7.0	6.1	5.6	7.4	8.2
Part 140 Aviation Security Service Organisation	29.7	11.0	4.7	5.5	4.5	4.8	5.0	6.1	6.1	8.1
Part 108 Security Programme	7.8	7.9	7.7	8.3	7.5	7.1	7.0	6.4	6.9	7.6
Part 174 Meteorological Service Organisation	16.3	30.2	7.3	9.6	10.3	15.9	10.7	5.1	5.3	6.1
Part 175 Aeronautical Info Service Organisation	25.1	34.4	6.2	7.6	12.1	21.2	14.6	11.1	43.3	5.3
Part 171 Telecom Service Organisation	21.9	10.8	6.0	4.9	6.8	17.3	12.7	6.6	5.1	5.0

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 number of findings and their severity divided by the number of hours spent on the inspection are used to generate a Non-Compliance Index.

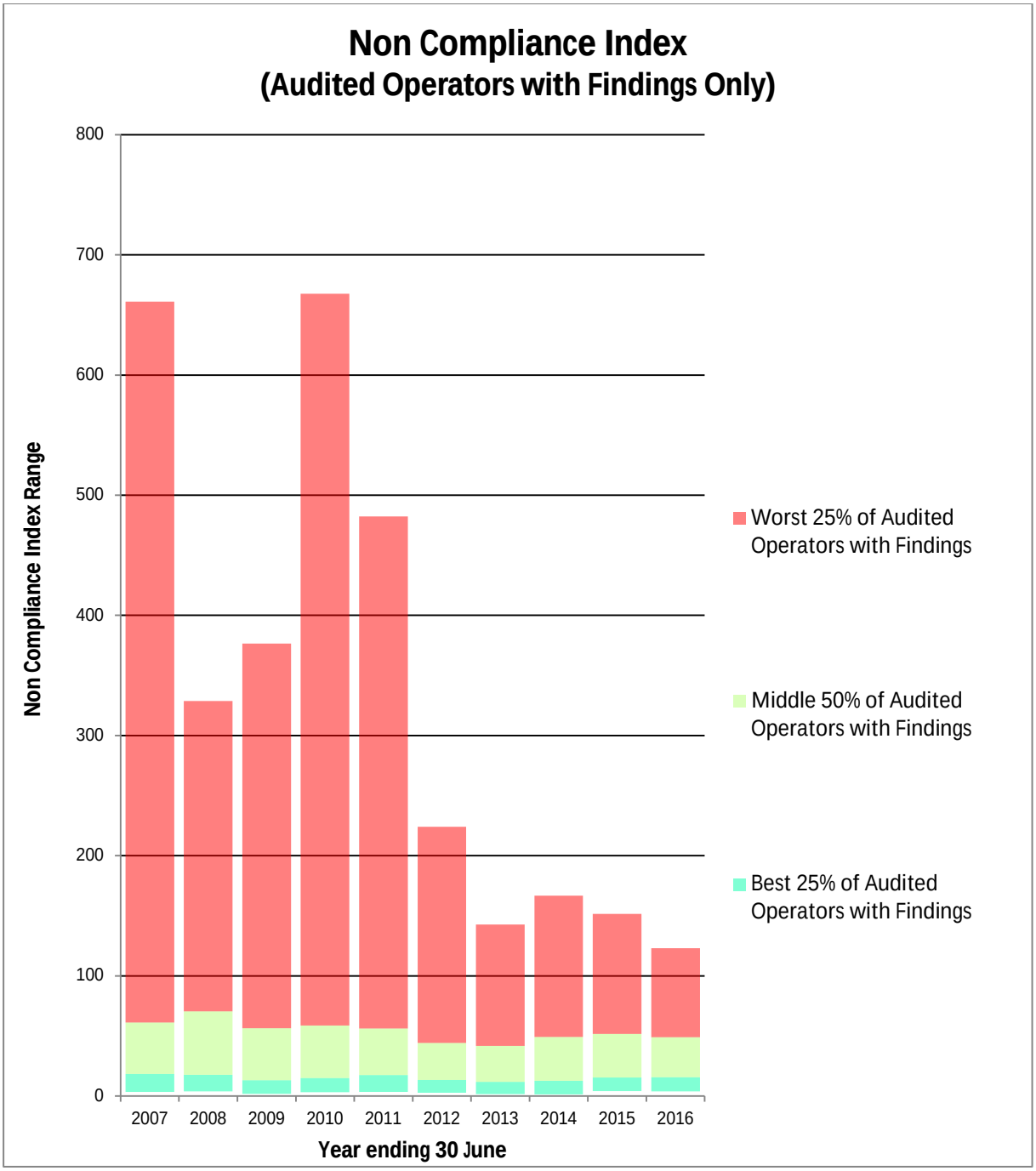
The following chart shows the numbers of certificated operators. They are separated into those that have not been audited, those that have been audited and for whom no non-compliances were discovered and finally those for whom one or more non-compliances were discovered either as a result of an audit, an inspection or an investigation. The chart uses financial 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 in keeping with the previous graph of client risk scores, there is evidence of improvement in both the average client risk score, and a reduction in the number of findings, the improvement in both the indexes suggests operators are better managing their safety risks.

The next chart shows how the non-compliance findings have been distributed across those clients that have been audited over the last 10 years. The chart plots a 'Non-Compliance Index' (NCI) which is a weighted measure of the number of non-compliances discovered divided by the number of hours spent on the audit process. The weighting factors used reflect the relative severity of the non-compliance and are 30 for a critical, 2 for a major and 1 for a minor finding.

To help with interpreting this chart it may be worth noting that to generate an index of 100 an audit lasting 30 hours would need to discover one critical finding or alternatively 10 Major plus 10 Minor findings.



The most noticeable trend is the improvement in the compliance of the worst 25 % (the top quartile) of audited operators. This has come about during a decade of significantly reduced audit activity, and taken with the previous two graphs reflects a continued effort to improve standards in areas of high risk/low compliance.

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	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Large Aeroplane	118	119	120	119	128	126	128	127	117	**131**
Medium Aeroplane	74	75	74	79	80	79	79	77	77	**75**
Small Aeroplane	1448	1480	1519	1518	1521	1525	1531	1497	1499	**1498**
Helicopter	672	725	752	767	765	770	787	798	828	**825**
Agricultural Aeroplane	119	116	111	109	110	109	106	102	93	**93**
Sport Aircraft - Aeroplanes	101	110	117	119	124	136	149	159	168	**175**
Sport Aircraft - Amateur Built Aeroplane	216	237	248	255	259	269	277	283	283	**294**
Sport Aircraft - Amateur Built Glider	3	4	4	4	4	4	3	3	3	**3**
Sport Aircraft - Amateur Built Helicopter	15	18	19	21	21	22	23	24	23	**24**
Sport Aircraft - Balloons	61	67	72	69	70	72	70	61	64	**60**
Sport Aircraft - Glider	312	318	304	302	301	297	294	285	283	**284**
Sport Aircraft - Gyroplane	25	35	40	43	41	39	42	49	57	**64**
Sport Aircraft - Hang Glider	0	0	0	0	0	13	13	18	18	**20**
Sport Aircraft - Helicopter	6	4	5	5	5	5	6	4	5	**5**
Sport Aircraft - Microlight Class 1	247	247	240	230	227	222	216	212	205	**204**
Sport Aircraft - Microlight Class 2	643	696	733	752	786	810	822	825	858	**871**
Sport Aircraft - Power Glider	45	48	48	48	48	47	46	46	47	**51**
Sport Aircraft - Parachute	0	0	0	0	0	174	195	198	204	**240**
Sport Aircraft - Para Glider	0	0	0	0	0	35	67	67	77	**88**
Total	**4105**	**4299**	**4406**	**4440**	**4490**	**4754**	**4854**	**4835**	**4909**	**5005**

Significant growth areas are gyroplanes, sport aeroplanes and class 2 microlights.

Moderate declines are evident in the numbers of class 1 microlights and agricultural aeroplanes.

The totals for sports 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	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Private & Recreational	6097	6466	6704	6868	6921	6973	6987	6647	6389	**6165**
CPL with class 1 Med	2117	2162	2300	2344	2339	2337	2217	2098	2046	**2051**
ATPL with Class1 Med	1147	1152	1152	1134	1188	1175	1163	1223	1228	**1268**
ATC with Class 3 Med	326	332	345	363	361	374	367	381	387	**381**
LAME	2181	2276	2378	2463	2519	2575	2639	2699	2754	**2800**
Total	**11868**	**12388**	**12879**	**13172**	**13328**	**13434**	**13373**	**13048**	**12804**	**12665**

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 valid medical, any aircrew licence with only Class2 Med and 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.

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:	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Large Aeroplane	15	14	12	12	11	11	11	11	9	**10**
Medium Aeroplane	32	34	32	37	38	39	35	35	34	**36**
Agricultural Aeroplane	52	53	48	50	48	46	42	39	39	**38**
Helicopter	338	364	379	391	379	383	386	390	393	**384**
Small Aeroplane	968	974	979	983	1007	1009	1007	999	1023	**1015**
Sport Aircraft	1480	1572	1618	1639	1667	1717	1717	1730	1755	**1788**

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 12%, 14% and 21% in the numbers of medium aeroplane, 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.

	Years 20--									
Approval	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Part 109 Regulated Air Cargo Agent	0	0	55	63	63	63	67	65	65	**66**
Part 115 Adventure Aviation Operator	0	0	0	0	0	20	33	28	28	**28**
Part 119 Air Operator	171	174	182	185	184	181	185	179	172	**172**
Part 119 Air Operator - Pacific	3	3	1	0	0	0	0	0	0	**0**
Part 129 Foreign Air Operator	41	38	40	37	33	28	31	30	28	**36**
Part 137 Agricultural Aircraft Operator	112	108	108	108	104	99	103	99	103	**103**
Part 139 Aerodromes	25	25	26	26	26	26	27	25	27	**27**
Part 140 Aviation Security Service	1	1	1	1	1	1	1	1	1	**1**
Part 141 Aviation Training Organisation	47	48	53	58	54	57	57	53	56	**53**
Part 141 Restricted Training Organisation	0	0	0	0	0	0	0	0	0	**0**
Part 145 Aircraft Maintenance Organisation	52	57	55	55	60	67	66	58	56	**55**
Part 146 Aircraft Design Organisation	12	11	10	13	14	15	14	14	14	**12**
Part 148 Aircraft Manufacturing Organisation	24	22	21	22	21	23	20	20	20	**20**
Part 149 Aviation Recreation Organisation	7	8	9	9	9	9	7	8	8	**8**
Part 171 Aeronautical Telecommunication Service Organisation	3	3	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	0	0	1	3	3	3	3	4	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	2	2	1	1	1	1	2	**2**
Part 19 Supply Organisation Certificate of Approval	59	61	61	61	58	60	58	57	60	**54**
Part 92 Dangerous Goods Packaging Approval	48	40	46	56	65	57	62	52	57	**59**
Part 129/108 Security Programme	33	30	30	26	25	21	23	22	20	**28**
Part 119/108 Security Programme	18	21	18	19	17	18	19	18	16	**18**
Part 121 Large Aeroplanes	11	11	10	10	9	9	9	9	7	**8**
Part 125 Medium Aeroplanes	13	16	15	15	15	15	16	14	13	**15**
Part 135 Helicopters and Small Aeroplanes	159	161	171	174	174	171	173	168	163	**162**
Part 119 Pacific/108 Security Programme	3	3	1	0	0	0	0	0	0	**0**
Pacific - Part 121 Large Aeroplanes	2	3	1	0	0	0	0	0	0	**0**
Pacific - Part 125 Medium Aeroplanes	3	2	1	0	0	0	0	0	0	**0**
Pacific - Part 135 Helicopters and Small Aeroplanes	3	2	1	0	0	0	0	0	0	**0**
Australian AOC Operating with ANZA Privileges	0	0	2	2	2	1	2	2	2	**4**
Synthetic Training Device (Airlines)	5	6	7	10	10	9	9	11	14	**12**
Synthetic Training Device (General Aviation)	22	27	29	28	27	33	32	28	30	**28**
Pilotless Aircraft Authorisation	0	0	0	0	0	0	7	5	1	**0**
Part 102 Unmanned Aircraft Operator Certificate	0	0	0	0	0	0	0	0	0	**45**
Total	882	886	962	988	980	992	1030	976	970	**1023**

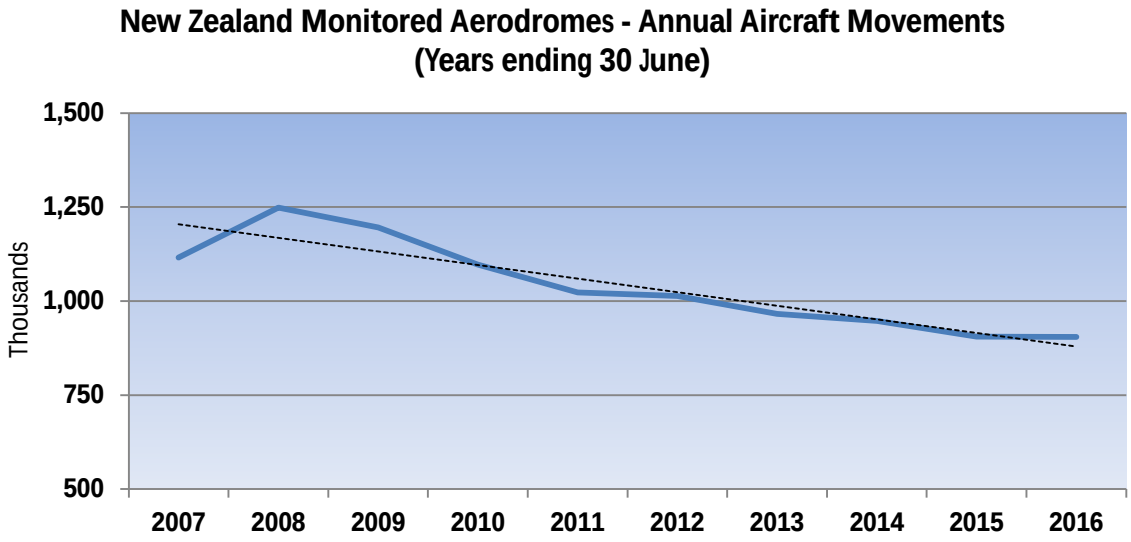
* Note:
For organisations with Part 92 and for those with Part 172 certificates the figures show the total number of services that are certificated. This does not necessarily equate to the number of organisations that hold the certificate.

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 takeoff 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 31 December 2015. 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

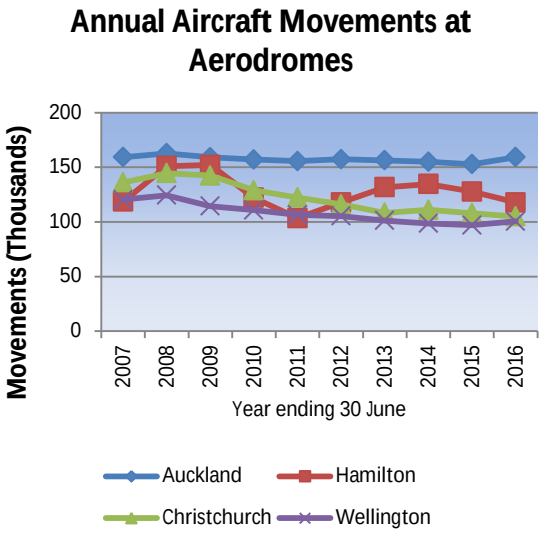
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Auckland	159287	162749	159157	157032	155609	157365	156405	155093	152792	**159294**
Hamilton	118626	151143	152062	122086	103408	117870	131795	134701	127861	**117762**
Christchurch	136151	144645	142434	128984	122352	116007	108259	111140	107996	**105109**
Wellington	120524	124399	114440	110817	106426	105323	101279	98601	97023	**100522**
Tauranga	96011	104984	101664	93360	76784	72158	73193	64903	52590	**56145**
Queenstown	49080	50264	46471	44831	41406	43943	42070	43861	47991	**50463**
Nelson	51960	49381	48653	49813	50610	50295	46531	45139	45283	**48065**
Palmerston North	71875	94396	67646	55504	59476	68073	62881	53753	53534	**48030**
Ohakea	56326	76069	75263	68597	56850	44154	27459	36007	28429	**29670**
Paraparaumu	0	0	0	6305	0	30151	35639	23959	26055	**26805**
Napier	24173	26242	25965	25661	27725	25720	23963	24042	22371	**22541**
Taupo	33372	34102	32024	29370	27224	26558	24146	22976	21476	**22393**
Dunedin	32044	49502	60995	46661	35213	28236	23300	23628	22412	**22183**
Woodbourne	24236	26806	24317	22887	23703	23124	22077	21229	21416	**21626**
New Plymouth	34042	45731	43775	40578	34590	31687	27797	23402	21011	**19340**
Rotorua	24638	28583	24135	23331	22089	23100	22103	21204	19528	**18671**
Milford	17071	16933	14185	14426	13094	12931	13918	12836	15356	**16847**
Invercargill	24127	24810	25841	26251	29483	31268	25230	21468	17907	**16346**
Gisborne	25438	24157	24083	23279	22295	21563	18054	17149	15728	**15989**
Whenuapai	16925	13915	12918	13642	14981	14107	15145	15909	14711	**13239**
Total	1115906	1248811	1196028	1097110	1023318	1013482	965605	947041	905415	**904235**

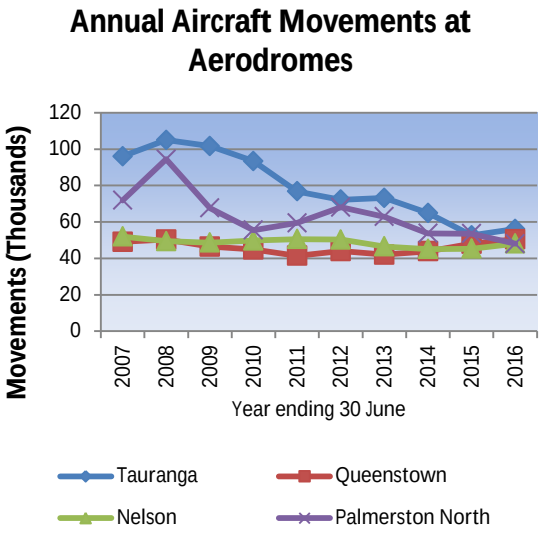
Movements data for individual aerodromes are graphed on the next page.

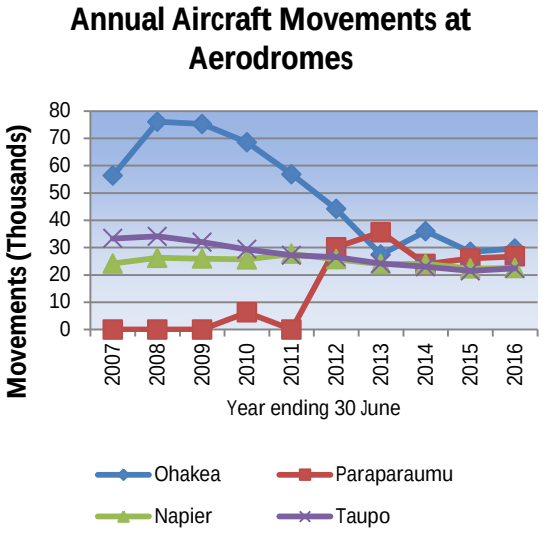
The aerodromes are grouped by the largest number of movements over the last year covered by this report

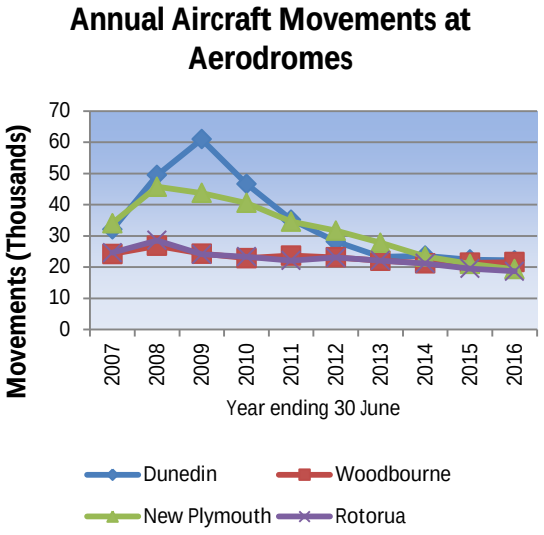
Note that the scales are different for each chart to prevent the smaller aerodromes' graphs from becoming unreadable which would happen if all the charts had the same scales.

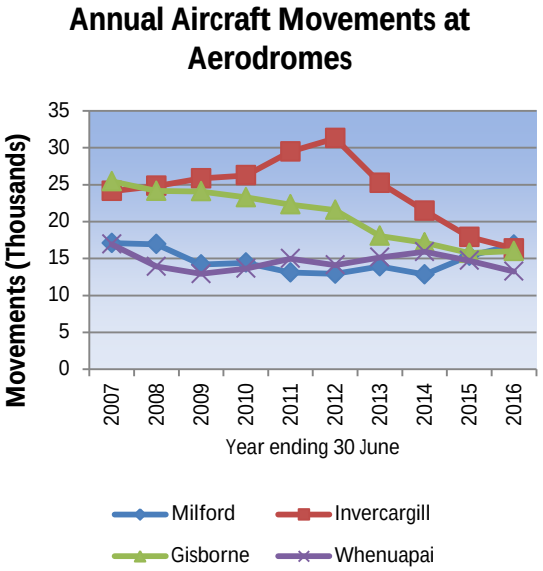
No information is available for Ardmore aerodrome although it is reported in the AIP as NZ's busiest aerodrome. The recent update of Part 139 which requires all aerodromes that are published in the AIP to supply movement data will ensure that a more complete picture of aerodrome movements will be available in the future.


Annual Aircraft Movements at Aerodromes
Movements (Thousands)
200
150
100
50
0
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
Year ending 30 June
Auckland
Hamilton
Christchurch
Wellington


Annual Aircraft Movements at Aerodromes
Movements (Thousands)
120
100
80
60
40
20
0
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
Year ending 30 June
Tauranga
Queenstown
Nelson
Palmerston North


Annual Aircraft Movements at Aerodromes
Movements (Thousands)
80
70
60
50
40
30
20
10
0
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
Year ending 30 June
Ohakea
Paraparaumu
Napier
Taupo

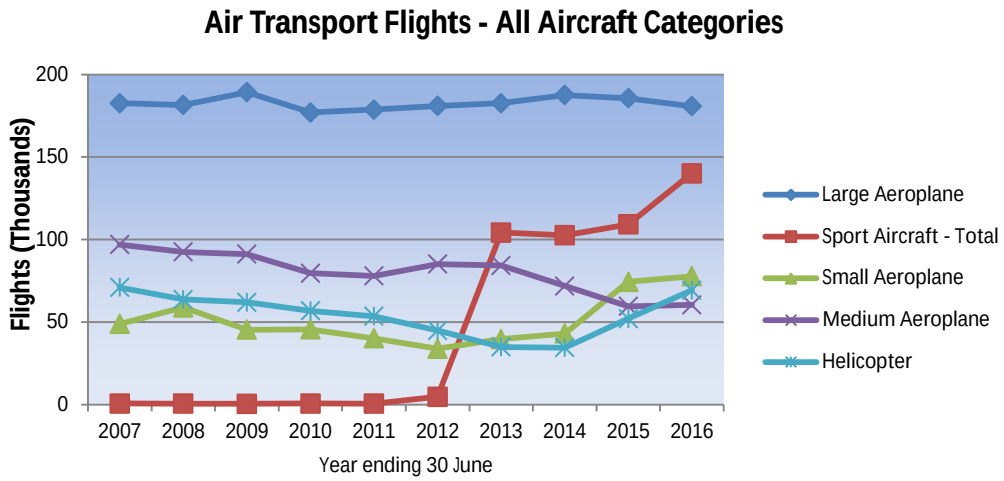

Annual Aircraft Movements at Aerodromes
Movements (Thousands)
70
60
50
40
30
20
10
0
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
Year ending 30 June
Dunedin
Woodbourne
New Plymouth
Rotorua


Annual Aircraft Movements at Aerodromes
Movements (Thousands)
35
30
25
20
15
10
5
0
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
Year ending 30 June
Milford
Invercargill
Gisborne
Whenuapai

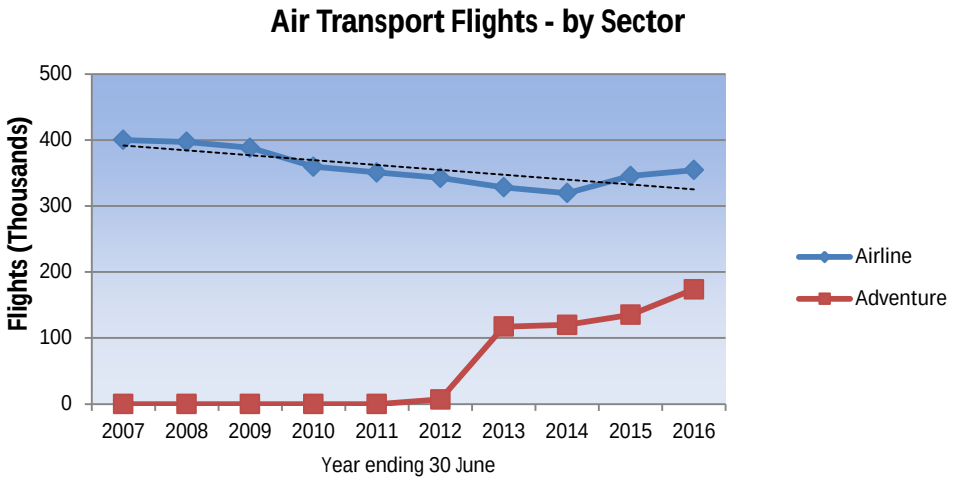
Air Transport Flights

The following graphs show the estimated number of air transport flights for the nine years ending 30 June 2016. The estimates are based on the reported numbers of flights with an allowance for aircraft for which reports were not received.

Note that these graphs exclude foreign registered aircraft that are operated in New Zealand.

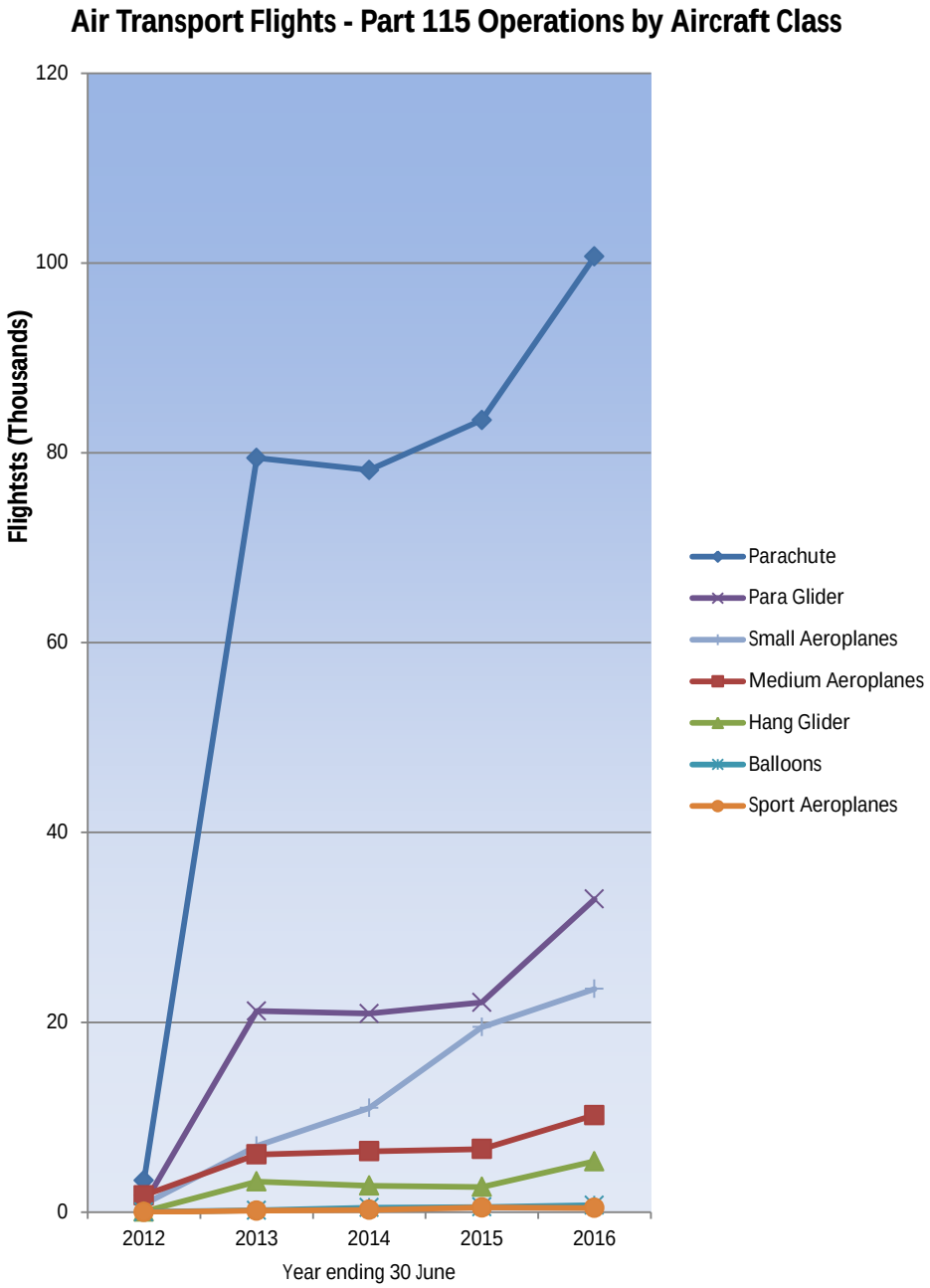


Apart from the expected emergence of adventure aviation flights the only trend that may be worthy of note is that Helicopter Air Transport Flights have reversed the declining trend that has existed since 2006 and are now back to 2007 levels. This change is believed to relate in part to the growth in tourism.



The Airline graph shows a decrease of 11%. This trend is significantly less than the decrease in the aerodrome movements of 19% over the last ten years.

While it is expected that the Part 115 operations will not be reflected in the aerodrome movements data, it is interesting to note that the recent increase in airline sector flights is not seen in the aerodrome data. The increase is clearly seen in the small aeroplane and helicopter groups whose operations are less focussed around the monitored aerodromes than are the airlines operations.



Rule Part 115 didn't come into force until 10 November 2011 so the year ending 30 June 2012 represents a start-up year for most operators. This data therefore should only be seen as representing industry growth from the 2013 year onwards.

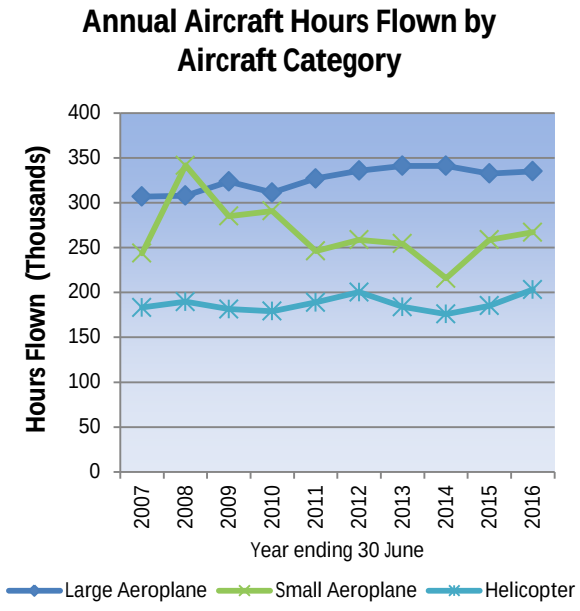
Sport aeroplanes and balloons conduct less than 1000 adventure aviation flights each per year. The reported figures for 2016 (30 June year-end) are 432 and 715 respectively. (The balloon curve is obscured by sport aeroplane curve in the graph above)

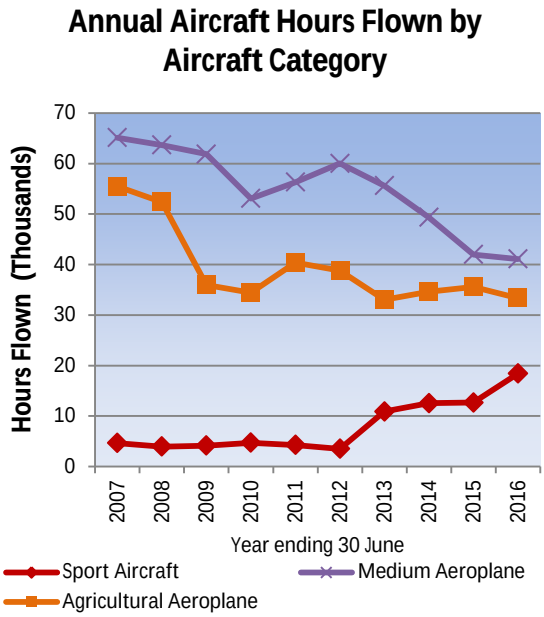
The most obvious trend is the steady growth in the sector particularly in parachute and paraglider flights.

Hours Flown

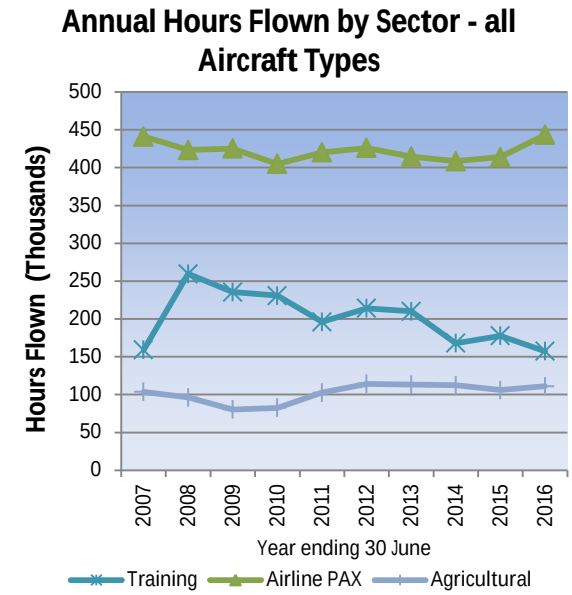
The following graphs show the estimated number of annual hours flown during the nine year period ending 30 June 2016. The estimates are based on the reported hours with an allowance for aircraft for which reports were not received. Recent improvements in the collection procedure for operating statistics data have resulted in improved return rates with a consequent improvement in confidence in the published data.

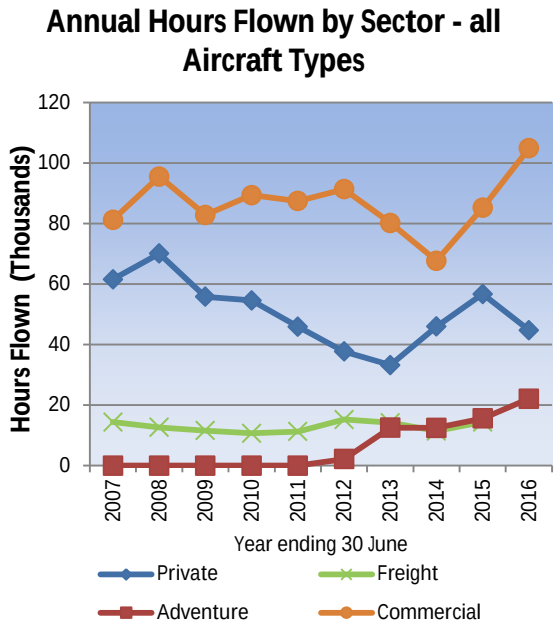
Note that these graphs exclude the aircraft statistics categories Sport Aircraft and Hang Gliders except where the aircraft are approved for use in Part 115 operations. Parachutes and foreign registered aircraft that are operated in New Zealand are also excluded.





Noteworthy is the decline in hours flown by Agricultural Aeroplanes from 57,000 in the year ending June 2008 to 35,000 three years later. This should be read together with the graph of agricultural products on page 12, which declined over the same period by 160,000 tonnes (22%).





Seat-Hours

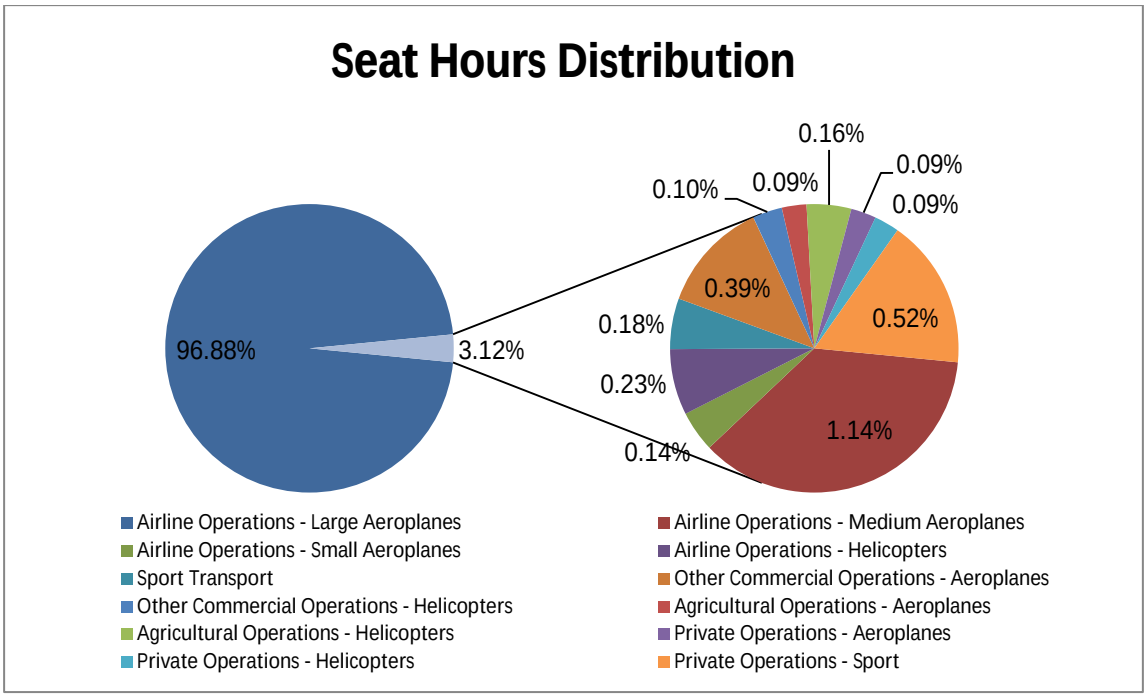
The following table indicates the size of the aviation industry as determined from Aircraft Operating Statistics in the relevant 2010 Safety Target Group categories for years ending 30 June.

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	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Airline Operations - Large Aeroplanes	38,562	44,747	47,028	45,232	47,504	48,779	49,556	49,551	48,323	**48,393**
Airline Operations - Medium Aeroplanes	544	786	764	656	696	732	679	581	486	**542**
Airline Operations - Small Aeroplanes	157	116	99	104	110	106	102	73	96	**135**
Airline Operations - Helicopters	154	138	126	112	128	132	123	118	145	**173**
Sport Transport	80	122	122	122	122	57	96	91	97	**115**
Other Commercial Operations - Aeroplanes	187	252	270	279	230	275	294	199	167	**184**
Other Commercial Operations - Helicopters	74	99	97	105	94	95	88	53	65	**62**
Agricultural Operations - Aeroplanes	59	53	35	37	45	51	43	44	48	**52**
Agricultural Operations - Helicopters	100	95	95	97	123	78	94	80	68	**65**
Private Operations - Aeroplanes	65	62	54	55	50	42	39	45	49	**49**
Private Operations - Helicopters	51	58	53	50	39	36	36	45	49	**43**
Private Operations - Sport	131	206	206	206	206	252	267	268	271	**281**

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 December 2015 approximately 96.9% of seat hours were offered by the Airline Operations – Large Aeroplanes group, approximately 1.1% by the Airline Operations – Medium Aeroplanes group, with the remaining 2.0% of seat hours offered being split between the other safety target groups.

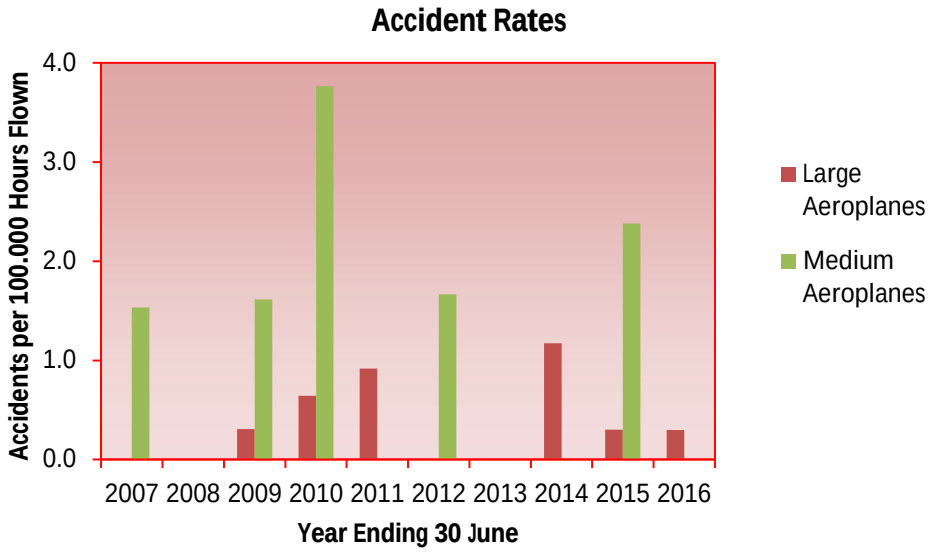
By comparison the 335,000 hours flown by the 131 large aircraft is similar to the 267,000 hours flown by the 1498 small aeroplanes on the register. The difference in passenger exposure is thus largely a function of the seating capacity.

Occurrence Analysis

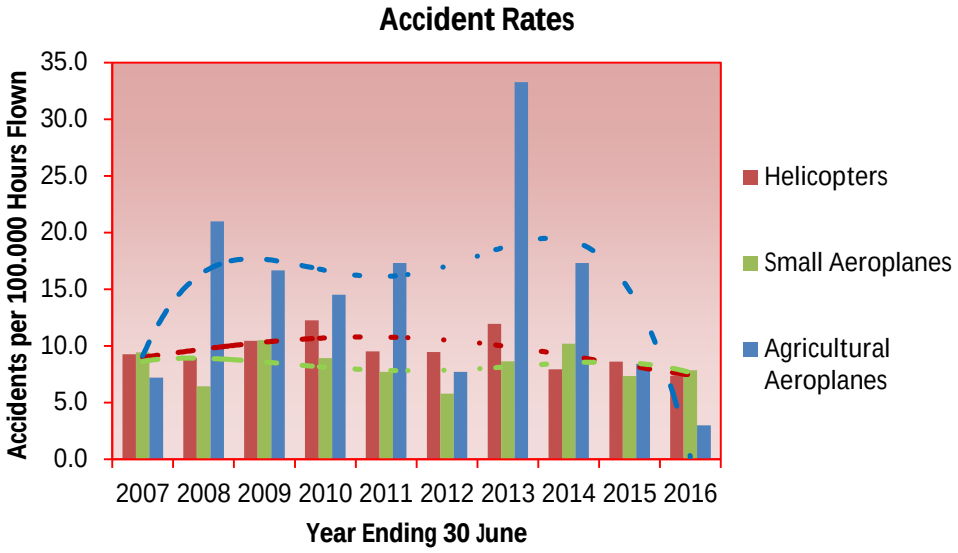
Aircraft Accidents

The following graphs show the annual aircraft accident rates (accidents per estimated 100,000 hours flown) for the nine-year period ending 30 June 2016 (excluding the Sport Aircraft statistics category).

Breakdown by Aircraft Category

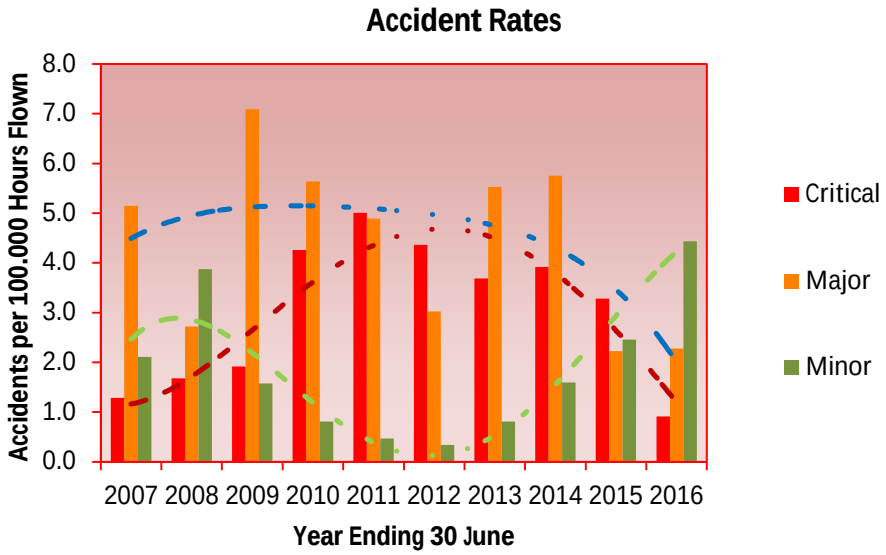


The numbers and rates of accidents in these two aircraft categories are too small for any trend analysis to be useful



Trends are indicated by dashed lines colour coded the same as the corresponding aircraft categories. Note the cyclic nature of the trend line for the accident rate for Agricultural Aeroplanes.

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	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Large Aeroplanes	0	0	0	0	0	0	0	1	0	0
Medium Aeroplanes	1	0	0	1	0	0	0	0	0	0
Small Aeroplanes	2	6	5	8	9	7	7	7	6	0
Helicopters	6	3	5	6	16	14	10	8	14	5
Sport Aircraft excluding Hang Gliders and Parachutes	1	4	5	19	17	17	11	14	7	3
Hang Gliders	3	1	6	5	4	7	8	5	6	5
Parachutes	2	0	0	3	3	4	3	4	4	1
Agricultural Aeroplanes	0	2	2	3	1	1	3	2	1	0
Unknown	1	1	0	0	0	0	1	0	0	0
Total	16	17	23	45	50	50	43	41	38	14

Major Accidents

Aircraft Type	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Large Aeroplanes	0	0	0	0	2	0	0	2	0	1
Medium Aeroplanes	0	0	1	0	0	1	0	0	1	0
Small Aeroplanes	18	5	20	16	10	7	13	11	7	4
Helicopters	9	12	13	16	2	5	12	5	1	5
Sport Aircraft excluding Hang Gliders and Parachutes	12	5	27	15	22	11	15	25	8	10
Hang Gliders	6	2	6	8	4	2	2	4	2	5
Parachutes	2	1	3	2	3	7	4	1	1	4
Agricultural Aeroplanes	4	4	2	2	4	2	8	2	2	0
Unknown	1	0	0	0	2	1	0	2	0	0
Total	52	29	72	59	49	36	54	52	22	29

Minor Accidents

Aircraft Type	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Large Aeroplanes	0	0	1	2	1	0	0	1	1	0
Medium Aeroplanes	0	0	0	1	0	0	0	0	0	0
Small Aeroplanes	3	11	5	2	0	1	2	4	6	17
Helicopters	2	2	1	0	0	0	0	1	1	4
Sport Aircraft excluding Hang Gliders and Parachutes	13	19	4	2	1	1	5	4	13	16
Hang Gliders	4	7	5	12	5	0	3	3	17	17
Parachutes	3	0	3	1	4	1	4	3	3	3
Agricultural Aeroplanes	0	5	2	0	2	0	0	2	0	1
Unknown	0	0	1	0	0	1	0	1	0	0
Total	25	44	22	20	13	4	14	19	41	58

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 - Helicopter

- Fox Glacier: Fatal helicopter accident on Chancellor Shelf, Fox Glacier.
  7 fatalities. Aircraft destroyed. Occurrence Id: 15/5476

Private Operations - Helicopter

- Near Lindis Pass: Helicopter crashed near Lindis Pass. Cause of accident not yet known.
  1 fatality. Aircraft destroyed. Occurrence Id: 16/1973

Private Operations - Sport

- Twizel: The glider became overdue while on a cross country flight from Omarama. The wreckage was found the following day below a ridge line in the Ben Ohau Ranges. The pilot, who did not survive the accident, was found approximately 250 metres further down the terrain below the glider.
  1 fatality. Aircraft destroyed. Occurrence Id: 16/437

- Tauranga: Solo pilot on his first flight on type, came in to land too high. The pilot tried to conduct a low level turn at the end of the runway and spun in from approximately 20 metres.
  1 fatality. Occurrence Id: 16/1970

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 one-year periods ending 30 June 2016. All aircraft types are included. The table is sorted by the number of accidents in the year ending June 2016.

Safety Outcome Target Group	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Private Operations - Sport	40	40	47	56	54	42	52	57	50	**53**
Private Operations - Aeroplane	10	4	18	9	5	7	12	11	10	**13**
Sport Transport	9	0	12	12	11	10	4	7	12	**11**
Other Commercial Operations - Aeroplane	11	16	9	12	11	5	7	10	6	**7**
Private Operations - Helicopter	6	8	3	11	7	2	8	1	4	**5**
Other Commercial Operations - Helicopter	7	4	6	3	7	8	4	5	5	**3**
Agricultural Operations - Helicopter	4	4	6	5	3	7	4	3	5	**3**
Airline Operations - Helicopter	0	1	4	3	1	2	6	5	2	**3**
Agricultural Operations - Aeroplane	4	11	6	5	6	3	11	6	3	**2**
Airline Operations - Large Aeroplanes	0	0	2	2	3	0	0	4	1	**1**
Airline Operations - Small Aeroplanes	1	2	3	3	3	1	2	1	2	**0**
Airline Operations - Medium Aeroplanes	1	0	0	2	0	1	0	0	1	**0**
Other	0	0	1	1	1	2	1	2	0	**0**
None	0	0	0	0	0	0	0	0	0	**0**
Total	**93**	**90**	**117**	**124**	**112**	**90**	**111**	**112**	**101**	**101**

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 7th as can be seen from the next section.

Annual Social Cost

Social cost is a measure of the cost 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 2014 dollars for each safety target group for the last ten one-year periods ending 30 June 2016. The table is sorted by the social cost in the year ending June 2016.

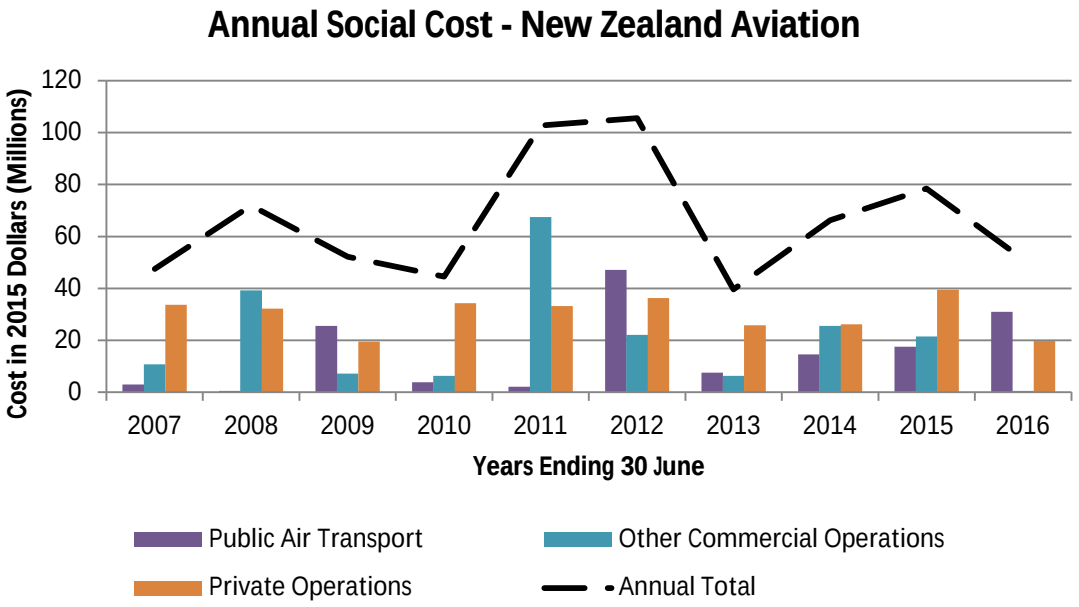
Safety Outcome Target Group	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Airline Operations - Helicopter	0.0	0.0	2.5	1.3	0.4	0.4	6.0	9.1	9.9	**29.9**
Private Operations - Sport	24.2	31.2	13.6	24.0	24.7	29.8	20.0	13.4	15.9	**14.6**
Private Operations - Helicopter	0.8	1.0	4.4	1.7	8.3	0.0	5.4	8.5	5.6	**5.2**
Sport Transport	3.0	0.0	22.8	1.9	1.8	46.4	0.7	1.0	2.4	**1.0**
Agricultural Operations - Helicopter	4.4	1.6	1.1	0.0	1.3	5.7	0.0	11.2	6.0	**0.4**
Other	0.0	0.0	8.2	0.0	0.0	0.0	8.5	0.0	0.0	**0.4**
Private Operations - Aeroplane	8.7	0.0	1.5	8.5	0.2	6.6	0.4	4.3	18.0	**0.1**
Other Commercial Operations - Helicopter	6.0	11.7	0.8	0.0	19.0	16.3	0.4	0.9	14.6	**0.0**
Airline Operations - Small Aeroplanes	0.0	0.0	0.2	0.6	0.0	0.2	0.7	1.0	5.1	**0.0**
Agricultural Operations - Aeroplane	0.3	7.4	5.1	1.7	0.0	0.0	5.8	1.8	0.7	**0.0**
Other Commercial Operations - Aeroplane	0.0	18.5	0.2	4.6	47.1	0.2	0.2	11.6	0.2	**0.0**
Airline Operations - Large Aeroplanes	0.0	0.4	0.1	0.0	0.0	0.1	0.1	3.4	0.1	**0.0**
Airline Operations - Medium Aeroplanes	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	**0.0**
Total	**47.4**	**72.0**	**60.3**	**44.5**	**102.8**	**105.5**	**48.1**	**66.2**	**78.5**	**51.6**

Social Cost Analysis

The extreme value of 105.5 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 June 2016 has incurred a social cost lower than the average of the previous nine years. The biggest contributing sector was the 'Airline Operations - Helicopter' . It was more than twice as high as the next highest which was the 'Private Sport' sector.

The following charts show the annual social cost for each Safety Outcome Target Group for the ten year period ending 30 June 2016. 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 and Private operations.



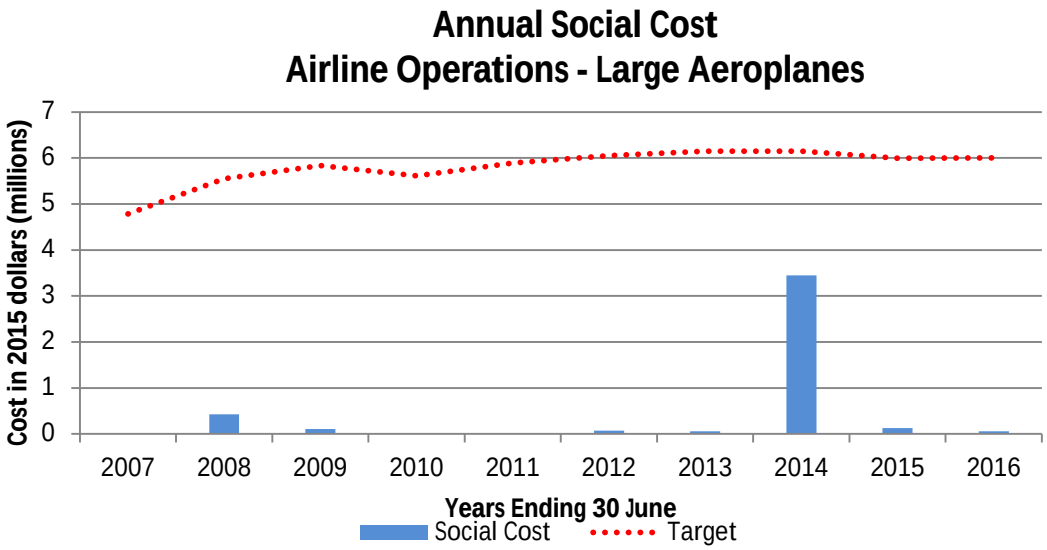
Arising from:

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Fatalities	8	14	18	8	21	22	8	10	13	**10**
Serious Injuries	16	10	24	13	22	21	20	31	32	**19**
Minor Injuries	22	13	23	38	15	15	27	39	47	**35**
Aircraft Unusable	16	24	17	18	24	16	18	20	28	**4**

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.

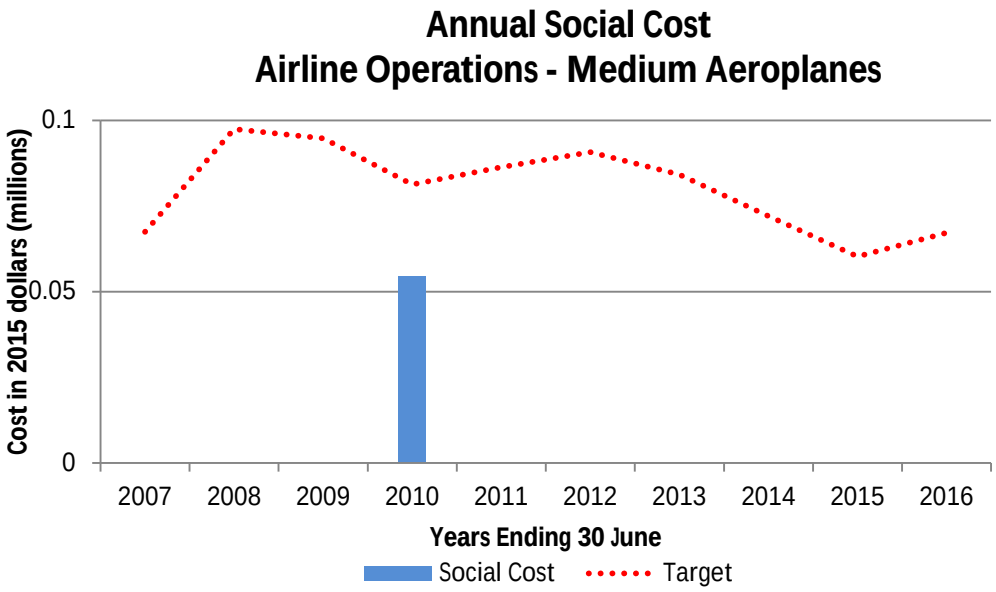
Each chart is followed by a table showing the numbers of injuries or events that contributed to the social cost.



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Fatalities	0	0	0	0	0	0	0	0	0	**0**
Serious Injuries	0	1	0	0	0	0	0	3	0	**0**
Minor Injuries	1	0	6	0	0	4	3	7	6	**1**
Aircraft Unusable	0	0	0	0	0	0	0	1	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 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.

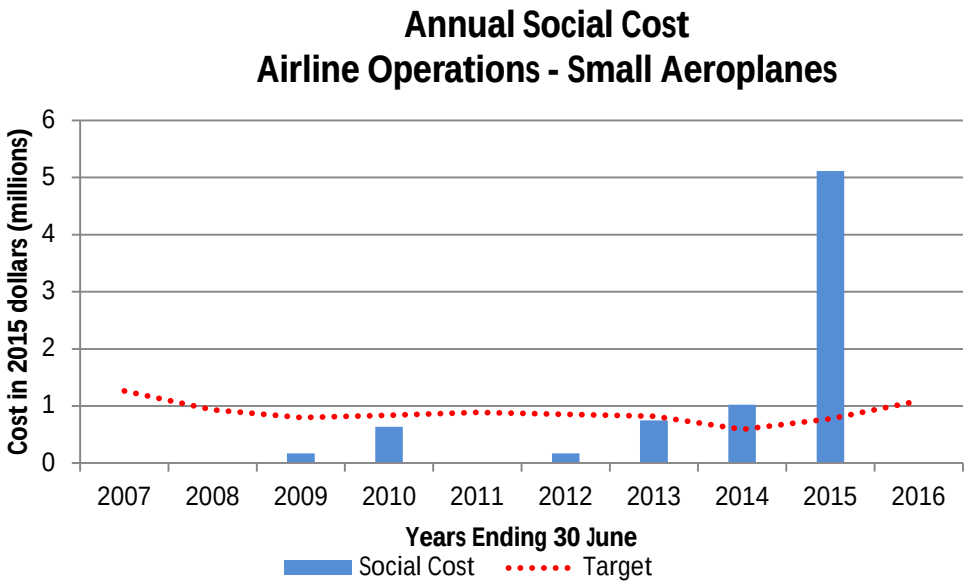


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Fatalities	0	0	0	0	0	0	0	0	0	**0**
Serious Injuries	0	0	0	0	0	0	0	0	0	**0**
Minor Injuries	0	0	0	3	0	0	0	0	0	**0**
Aircraft Unusable	0	0	0	0	0	0	0	0	0	**0**

The most significant contributions are 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 (1.3% 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.

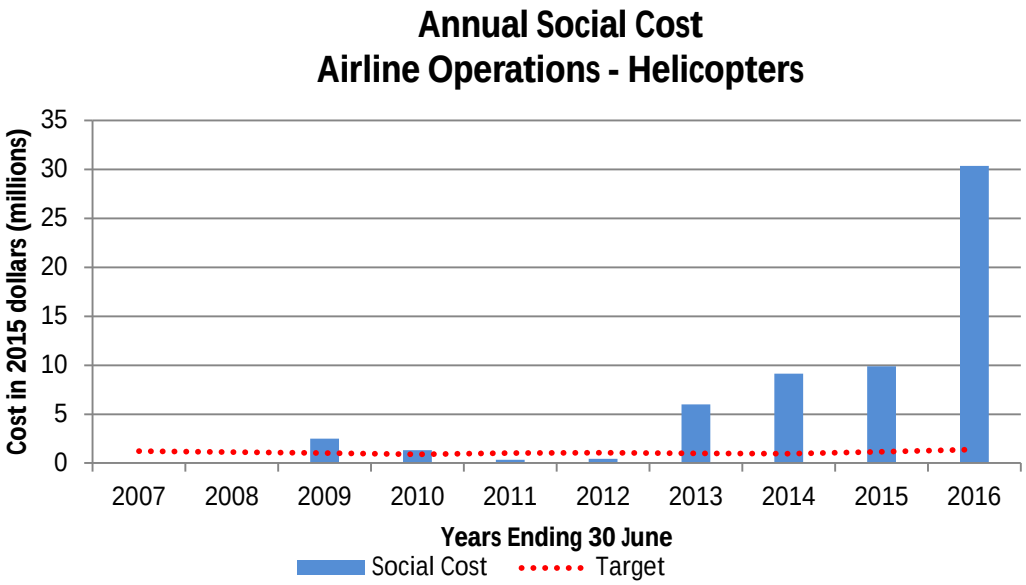


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Fatalities	0	0	0	0	0	0	0	0	1	**0**
Serious Injuries	0	0	0	1	0	0	1	2	2	**0**
Minor Injuries	0	1	0	2	0	0	0	0	0	**0**
Aircraft Unusable	0	0	1	1	0	1	1	1	1	**0**

One fatal accident in 2015 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 4 of which occurred in the last three years.

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

Also social cost is increasing despite activity levels slowly declining within this group.

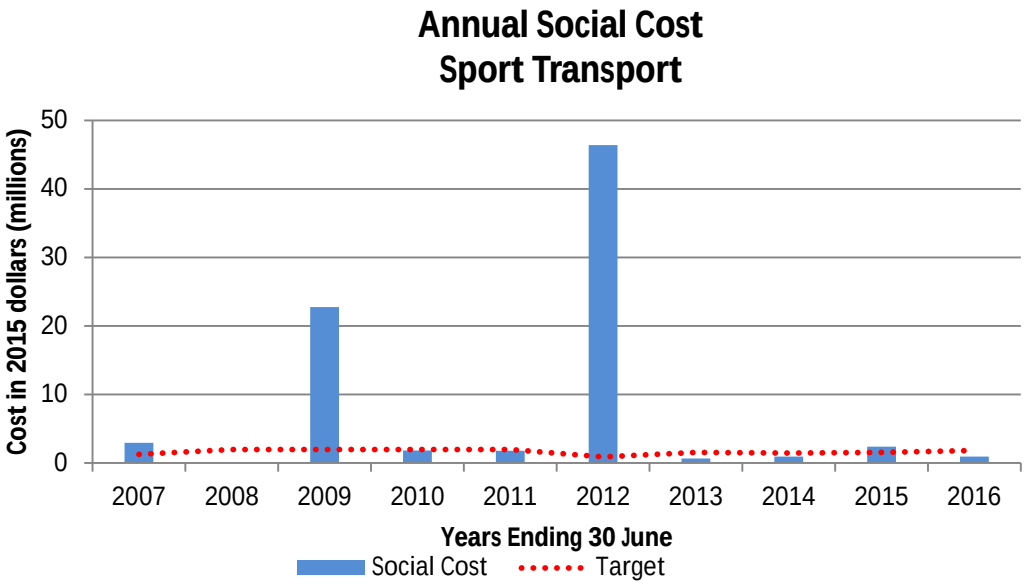


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Fatalities	0	0	0	0	0	0	1	1	1	**7**
Serious Injuries	0	0	2	0	0	1	0	1	6	**0**
Minor Injuries	0	0	2	2	2	0	0	7	2	**1**
Aircraft Unusable	0	0	2	1	1	0	1	3	2	**1**

This group has now generated ten fatalities in the last ten years, all of them in the last four years. This coupled with three aircraft write-offs in the 2014 year 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 in four of the last ten years but the last time was in the year ending June 2012

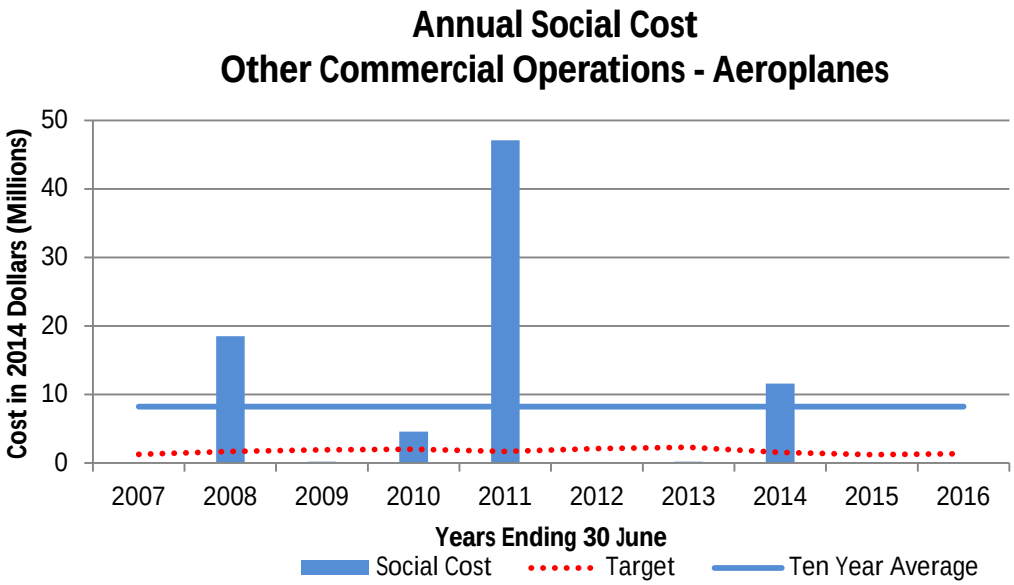
The helicopter sector has been identified as a priority area for the CAA in the 2016/17 strategic safety plan. This sector was also examined by the Part 135 Sector Risk Profile Published November 2015 on the CAA website.



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Fatalities	0	0	5	0	0	11	0	0	0	**0**
Serious Injuries	7	0	5	3	5	3	1	2	3	**2**
Minor Injuries	0	1	4	5	6	4	5	6	9	**7**
Aircraft Unusable	0	0	3	1	1	1	1	0	1	**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 six of the last ten years.

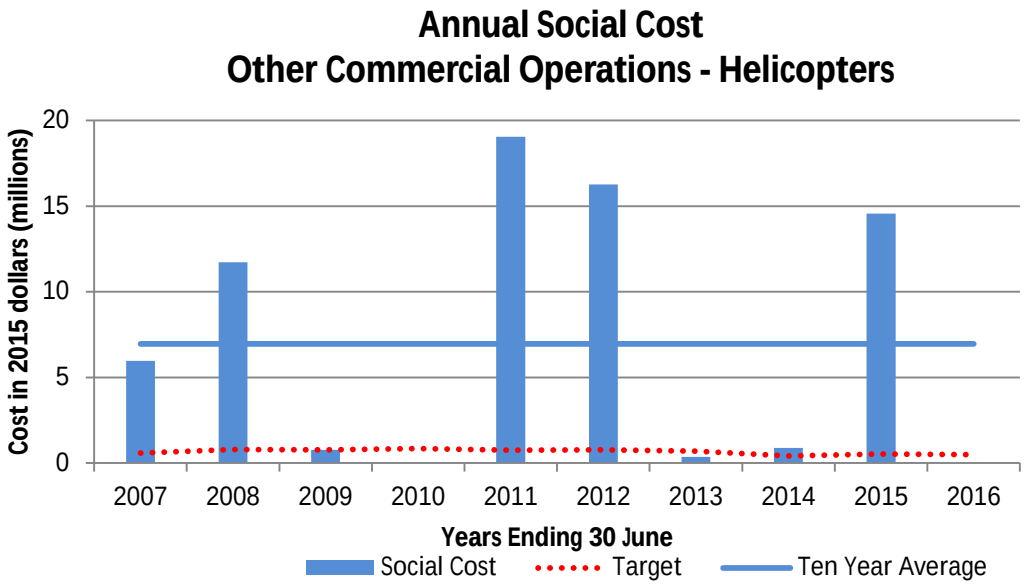


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Fatalities	0	4	0	1	11	0	0	2	0	0
Serious Injuries	0	3	0	0	2	0	0	6	0	0
Minor Injuries	2	1	1	0	0	0	1	0	0	0
Aircraft Unusable	0	5	1	3	4	1	1	5	1	0

The most noteworthy event in this group is an accident in the year ending 30 June 2011 in which five crew and four passenger fatalities occurred during a parachuting transport flight.

The low level of activity within this sector (0.4% 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.

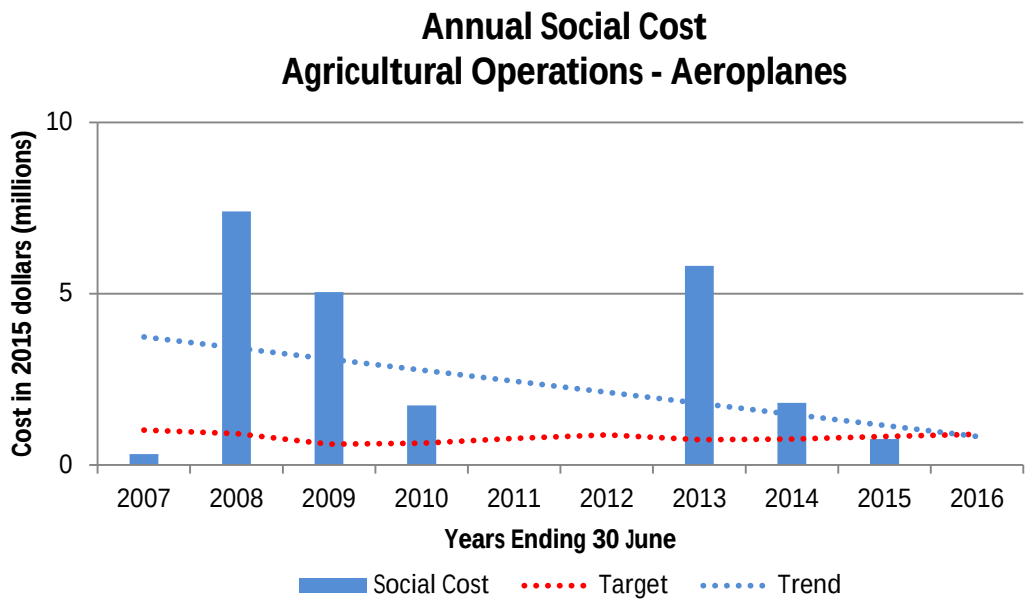
This is not the case in this group.



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Fatalities	0	2	0	0	4	3	0	1	3	**0**
Serious Injuries	1	0	1	0	1	1	0	3	0	**0**
Minor Injuries	5	1	2	0	1	2	2	2	3	**1**
Aircraft Unusable	4	3	1	0	4	3	1	1	5	**0**

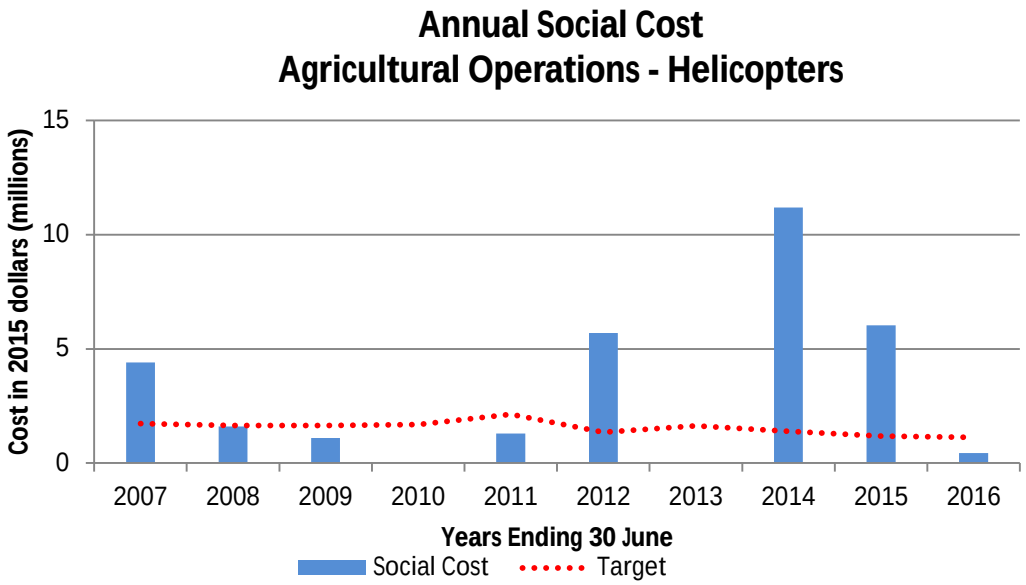
This group seems to display an almost cyclic pattern of safety failure. It is possible that economic pressures might influence behaviour but difficult to show any reliable correlation.

The low level of activity within this sector (0.1% 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.



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Fatalities	0	1	1	0	0	0	1	0	0	**0**
Serious Injuries	0	1	0	1	0	0	1	2	1	**0**
Minor Injuries	0	0	0	2	0	0	1	0	0	**0**
Aircraft Unusable	1	5	1	2	0	0	2	1	1	**0**

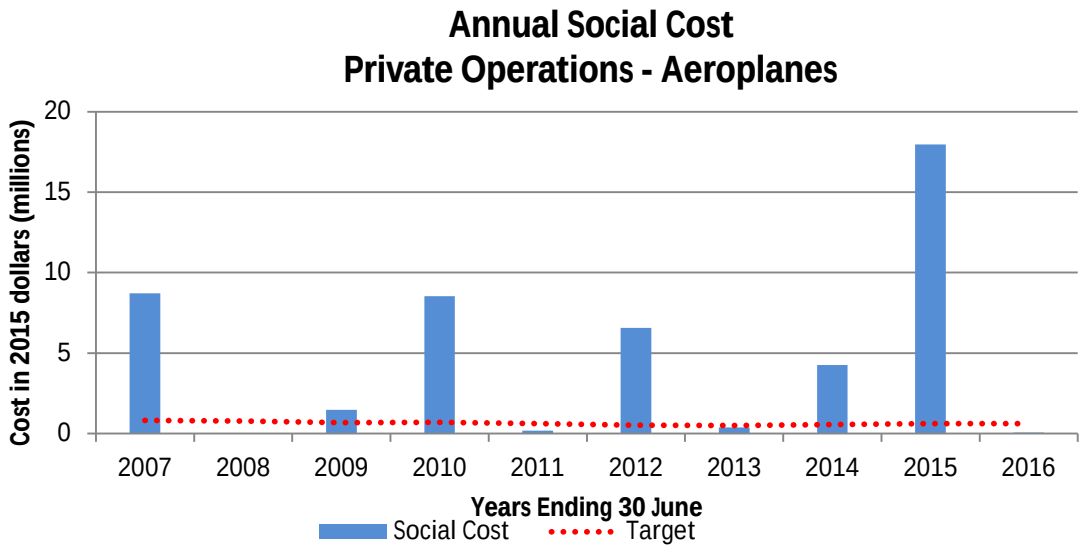
This group's safety performance is closely monitored and following significant safety failures the performance usually improves for a few years before rising again, often with increase in activity (evidenced by tonnage spread, see graph) on page 12, however the long term trend in social cost is downward.



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Fatalities	1	0	0	0	0	1	0	1	1	**0**
Serious Injuries	0	0	1	0	0	0	0	0	0	**1**
Minor Injuries	0	0	2	0	0	0	0	1	1	**1**
Aircraft Unusable	1	2	2	0	0	2	0	2	3	**0**

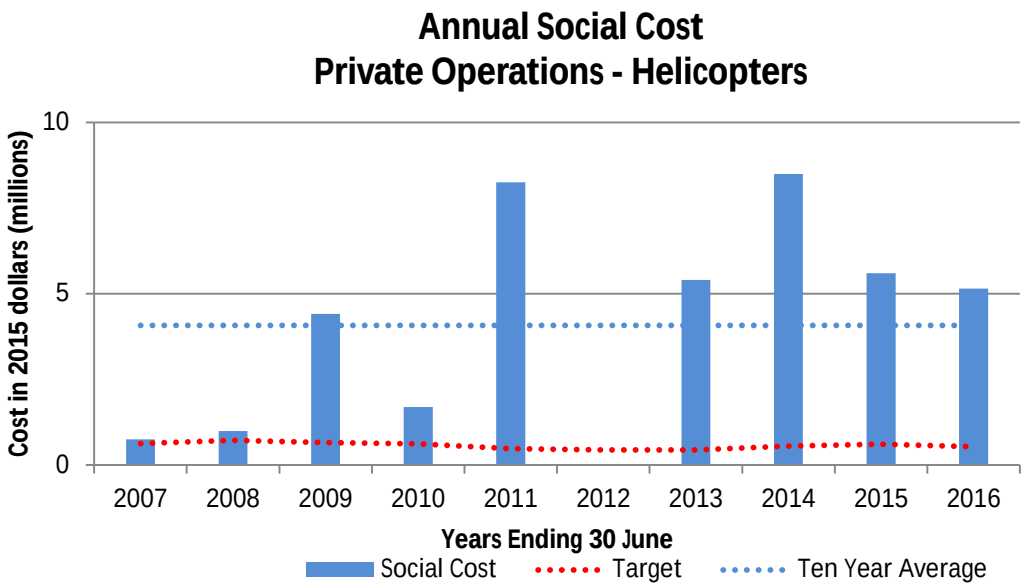
Although the absolute social costs of the safety failures in this group are on a par with those of the agricultural aeroplanes group, it must be remembered that this group operates about twice the number of hours of the aeroplane group, representing a better safety performance per flying hour. Nevertheless social cost levels in two of the last four 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 wirestrike risks.

.



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Fatalities	2	0	0	1	0	1	0	1	4	**0**
Serious Injuries	0	0	3	0	0	5	0	0	2	**0**
Minor Injuries	1	1	1	1	0	0	1	0	4	**3**
Aircraft Unusable	3	0	1	2	1	2	2	1	4	**0**

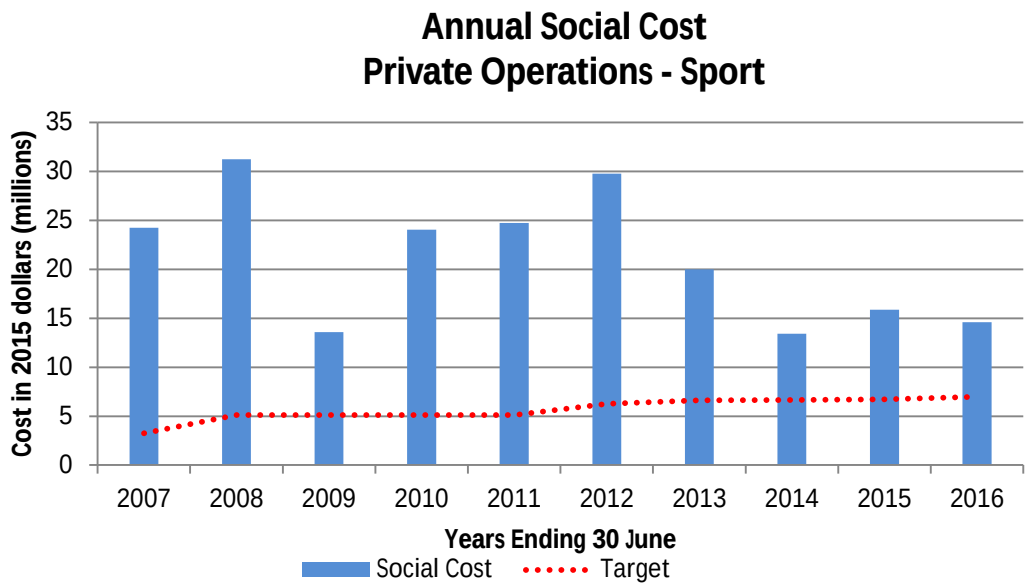
Until 2014 there was some optimism that the safety performance in this group was improving but the 2014 and 2015 results are trending the wrong way. The social cost target has been met or bettered on only four of the last ten years.



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Fatalities	0	0	1	0	1	0	1	2	1	**1**
Serious Injuries	0	0	0	0	3	0	0	0	2	**1**
Minor Injuries	6	2	0	5	1	0	2	0	1	**0**
Aircraft Unusable	2	3	1	2	5	0	4	1	2	**2**

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.



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Fatalities	5	7	2	6	5	6	3	2	2	**2**
Serious Injuries	8	5	12	8	11	11	17	11	16	**14**
Minor Injuries	7	6	5	17	5	4	12	15	21	**21**
Aircraft Unusable	5	6	3	6	7	6	4	4	8	**1**

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.

Of note are the significant increases in the numbers of minor injuries over the last three 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 2016. The figures include all aircraft types. The table is ordered by the 2016 values.

Flight Phase	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
LANDING	41	31	43	49	36	32	45	47	41	**46**
TAKEOFF	9	20	22	26	24	13	9	20	17	**15**
CRUISE	21	13	14	11	12	10	13	14	14	**9**
CLIMB	6	5	7	5	11	3	5	7	6	**7**
UNKNOWN	0	0	1	0	2	2	3	1	5	**5**
DESCENT	2	2	4	4	4	2	7	2	4	**5**
TAXIING	1	5	5	3	5	3	3	4	3	**4**
HOVER	1	3	2	6	1	5	3	2	2	**4**
APPROACH	1	2	6	6	5	6	6	8	4	**3**
PARKED	2	3	5	3	2	4	8	0	0	**3**
AGRICULTURAL MANOEUVRES	1	2	2	5	2	2	3	2	4	**0**
CIRCUIT	1	1	1	0	1	1	0	0	1	**0**
Not Recorded	6	2	5	6	7	6	4	3	0	**0**
HOLDING	0	1	0	0	0	0	0	0	0	**0**
HOVER TAXI	1	0	0	0	0	0	2	1	0	**0**
AEROBATICS	0	0	0	0	0	1	0	1	0	**0**

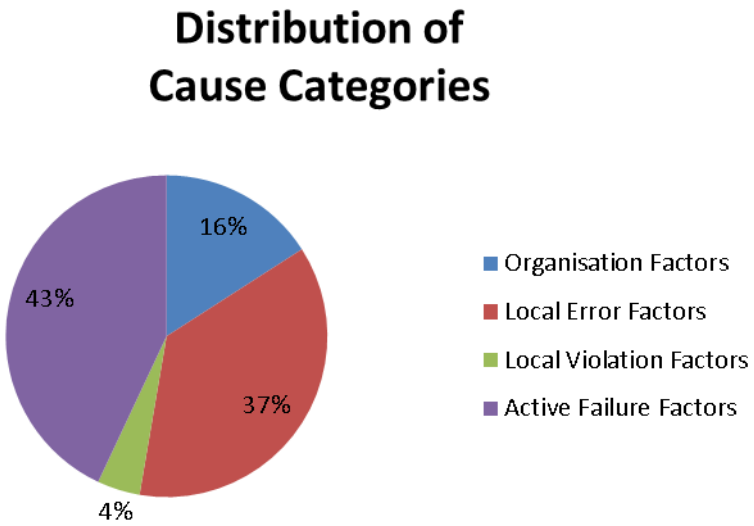
The most common phase of flight during which accidents occurred in the year ending 30 June 2016 was the Landing phase (46%). This proportion of accident by flight phase is largely unchanged from previous years and reflects the fact that landing is the highest risk phase of flight.

The most common causes (at 38%) recorded for Landing phase accidents during the year ending 30 June 2016 were ‘Active Failure Factors - ACTIONS INCONSISTENT WITH PROCEDURES’ and ‘Active Failure Factors - POOR PROCEDURE "ACTION"’.

Accident Causal Factors

465 causal factors have been assigned to 385 (40%) of the 958 accidents that were reported as occurring during the ten years ending 30 June 2016.

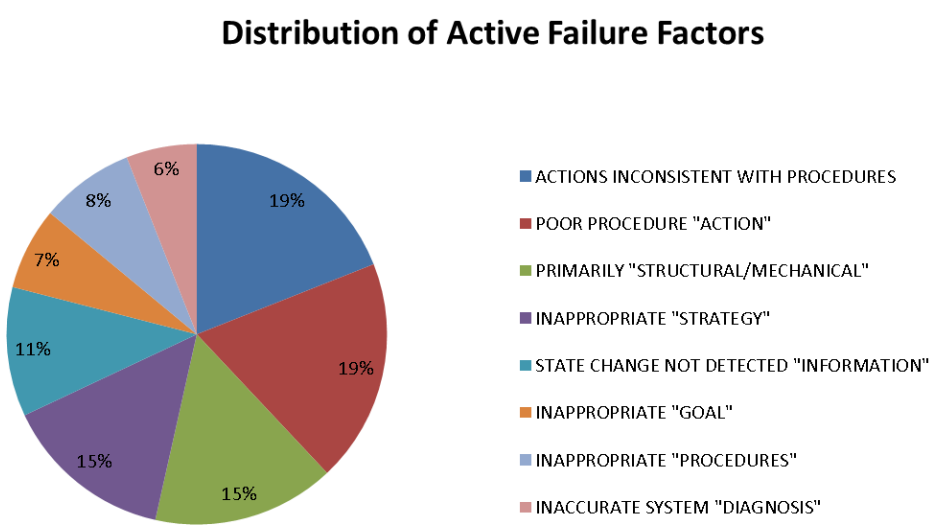
The following chart shows the distribution of cause categories (groupings of causal factors) recorded for those accidents.



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.

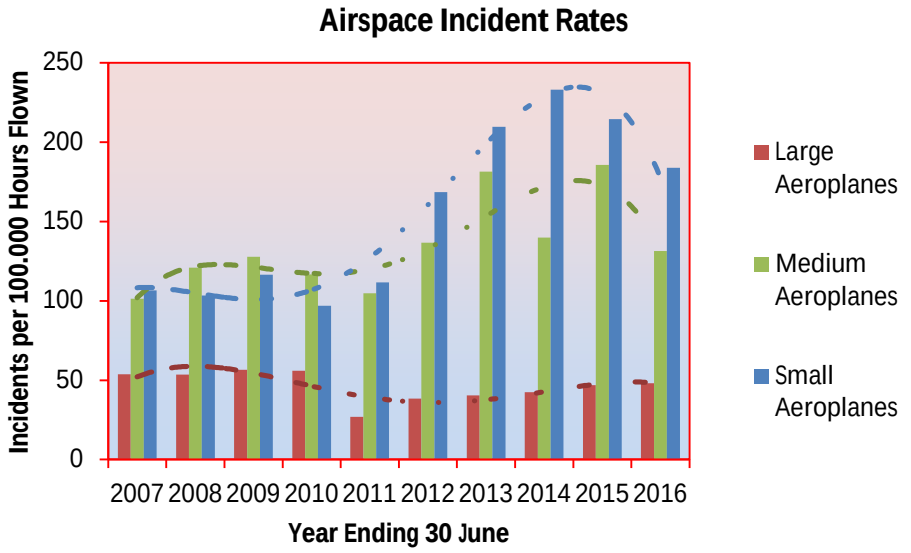
The following chart shows the distribution of Active Failure factors during the same period as above.

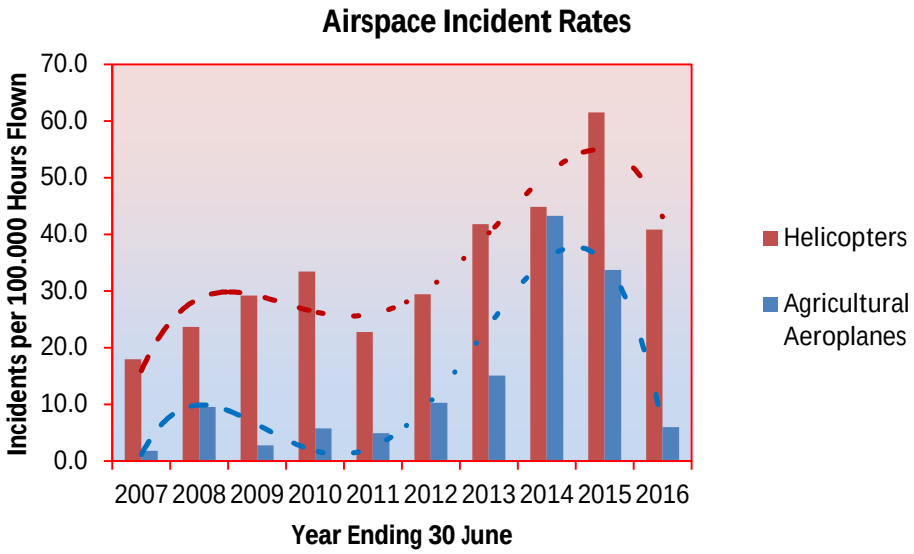


Airspace Incidents

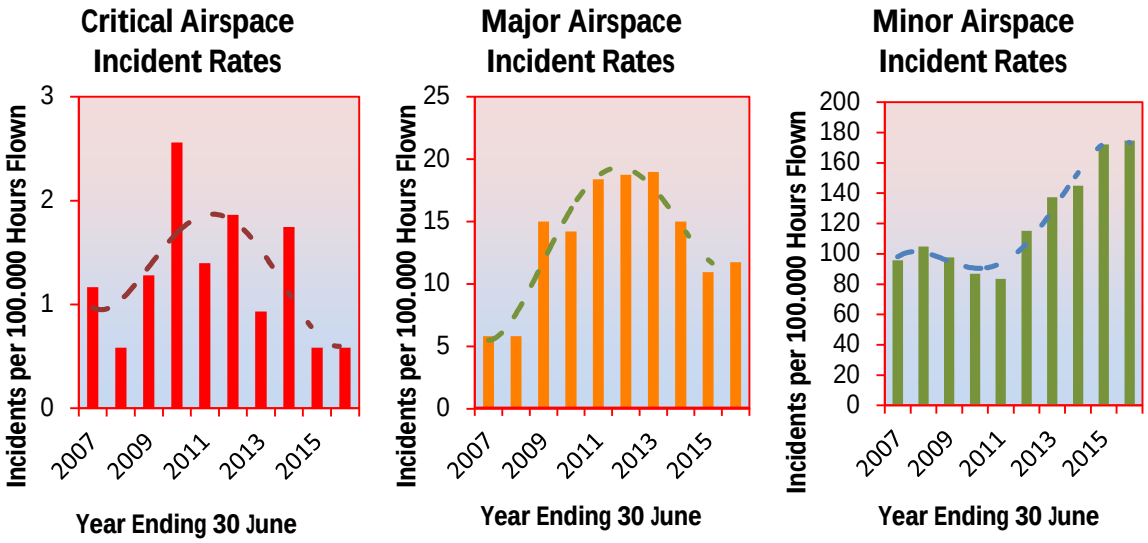
The following graphs show the reported annual airspace incident rates (incidents per 100,000 hours flown) for the ten one-year periods ending 30 June 2016 (excluding the Sport Aircraft category). The graphs do not differentiate between incidents that are pilot or ATS attributable.

Breakdown by Aircraft Category



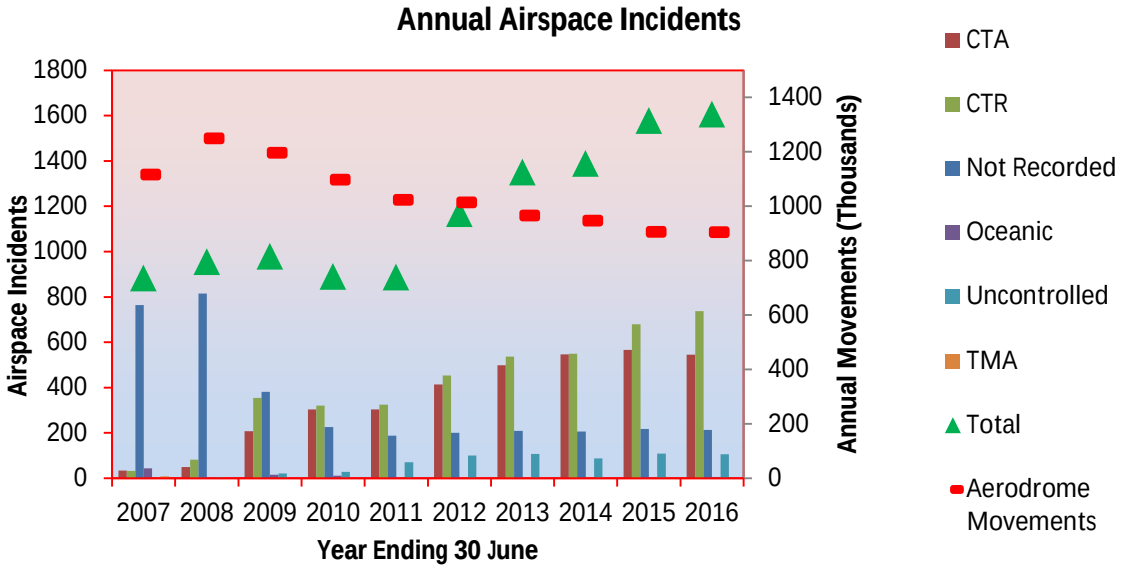


Breakdown by Severity



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 can be identified, although Airways Corporation began several safety enhancement training initiatives around this time.

Breakdown of Airspace Incidents in Control Zones by Aerodrome

Aerodrome	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Hamilton	5	11	55	48	60	118	162	94	163	**161**
Auckland	8	7	39	37	39	36	50	49	70	**95**
Christchurch	3	10	42	27	30	36	36	66	71	**83**
Tauranga	2	3	15	14	26	43	47	73	67	**81**
Wellington	3	7	47	32	32	46	28	33	27	**56**
Queenstown	0	0	17	22	27	35	30	35	64	**42**
Nelson	0	2	17	27	18	29	20	19	29	**34**
Palmerston North	1	11	35	22	24	24	37	47	51	**32**
Dunedin	1	2	3	15	9	20	33	29	42	**31**
Rotorua	1	5	13	13	18	20	7	15	10	**22**
Woodbourne	3	7	31	25	14	5	17	17	17	**23**
Napier	2	7	7	8	5	10	17	12	16	**19**
Gisborne	1	2	2	4	5	1	13	9	9	**16**
Ohakea	0	1	8	7	3	10	11	14	11	**14**
Whenuapai	0	0	5	6	4	7	13	9	12	**8**
Invercargill	0	0	2	5	3	1	3	5	3	**7**
New Plymouth	0	2	8	7	6	4	5	11	8	**3**

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 1495 of the 1600 reported airspace incidents in the year ending 30 June 2016. 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 breakdown into these broad categories is shown in this table.

Descriptor is associated with	Number of times descriptor applied
ATS	267
Pilot	1312
Either	235

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 2016
ATS Clearance/Instruction Deficiency	130
ATS Coordination Deficiency	119
ATS Flight Information Deficiency	12
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.

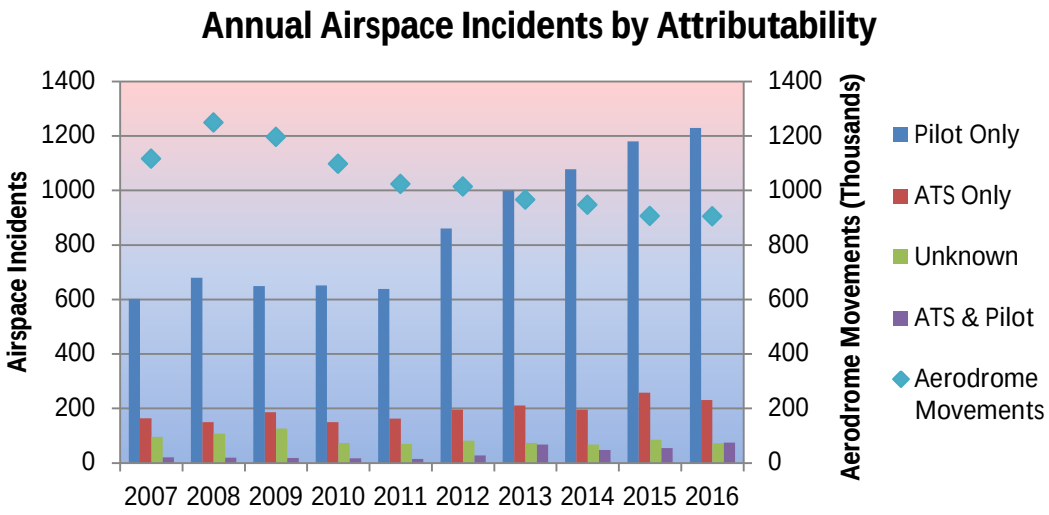
Descriptor	Number assigned in 2016
Breach Of Other Clearance	571
Unauth Airspace Incursion	392
Unauth Altitude Penetration	151
Pilot Position Reporting Deficiency	101
Air Proximity	63
Pilot Flight Planning Deficiency	31
Pilot Readback Deficiency	2
Flight Assist	1

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

Descriptor	Number assigned in 2016
Other	130
Traffic Collision Avoidance System	55
Loss Of Separation	36
Near Collision	8
Short Term Conflict Alert	6
Controller/Pilot Datalink Communications	0
Reduced Vertical Separation Minima	0

Trend

The following graph shows the annual numbers of airspace incident reports and their attributability for the ten year period ending 30 June 2016.



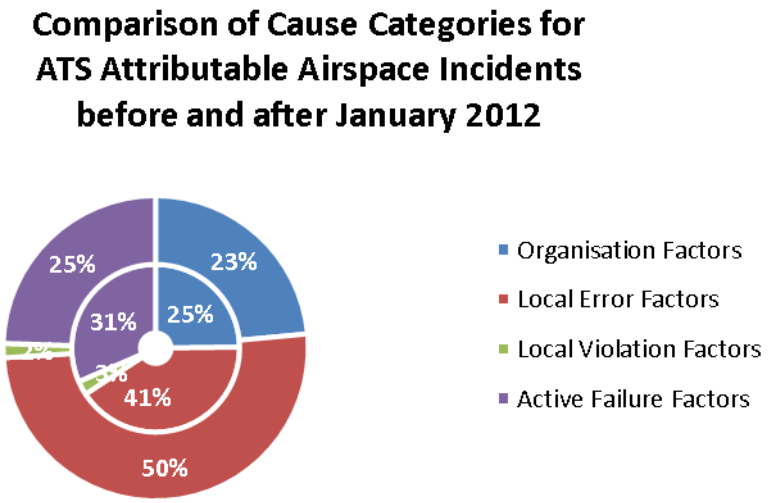
The number of "unknown" attributable airspace incidents reflects difficulties with coding of reports received by the CAA. Note that there is often a time delay between incidents occurring, being investigated, and attributability being assigned to either ATS or Pilot.

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 July 2006 to December 2011 period and the outer ring the period from January 2012 to June 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 2016	
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

A decrease in active failure factors offset most of the shift in local error factors.

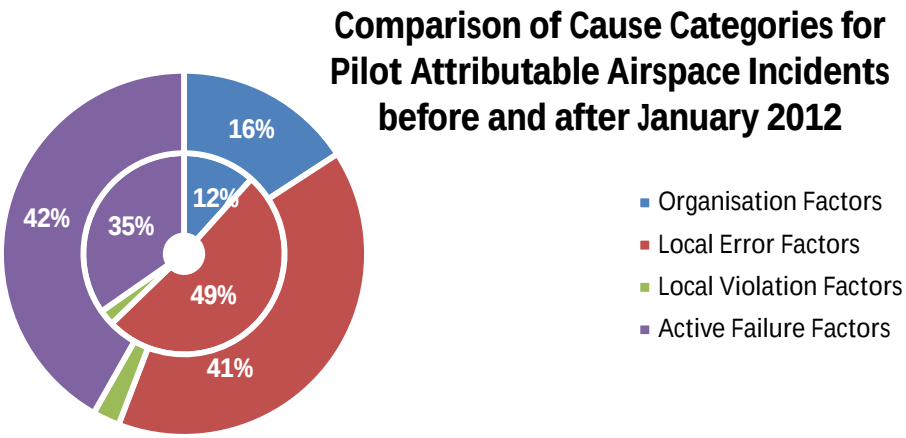
The top three contributing causes were:

Jul 2006 to Dec 2011		Jan 2012 to Jun 2016	
ACTIONS INCONSISTENT WITH PROCEDURES	19%	ACTIONS INCONSISTENT WITH PROCEDURES	27%
INACCURATE SYSTEM "DIAGNOSIS"	31%	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 July 2006 to December 2011 period and the outer ring the period from January 2012 to June 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.



Organisation Factors

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

The top three causes were:

Jul 2006 to Dec 2011		Jan 2012 to Jun 2016	
INADEQUATE PROCEDURES	16%	INADEQUATE CONTROL AND MONITORING	29%
INADEQUATE COMMUNICATIONS	14%	INADEQUATE TRAINING	19%
INADEQUATE SPECIFICATIONS/REQUIREMENTS	14%	OTHER ORGANISATION FACTOR	15%

Local Error Factors

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

The top three causes were:

Jul 2006 to Dec 2011		Jan 2012 to Jun 2016	
Jan 2006 to Dec 2011		Jan 2012 to Dec 2015	
INADEQUATE CHECKING	26%	INADEQUATE CHECKING	25%
POOR INSTRUCTIONS/PROCEDURES	12%	POOR INSTRUCTIONS/PROCEDURES	4%
TASK UNFAMILIARITY	7%	TASK UNFAMILIARITY	7%

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

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

Pilot Attributable

- Timaru: A departing AT504 made radio call taxiing to runway 29, then another call rolling on runway 29. Crossing the 02/20 intersection at 300ft noted a Beechcraft on final for rwy20, no on final radio call heard from the Beechcraft.
  Occurrence ID: 15/4661

Serious Incidents

ATS Attributable

- Hamilton: Aircraft converged on final as one was circling off the instrument approach and another was on a 2 nm. final. The aircraft came to within 0.2 nm. of each other, at the same level. Instructions were issued by ATC for aircraft to take avoiding action. Occurrence ID: 15/5919

Pilot Attributable

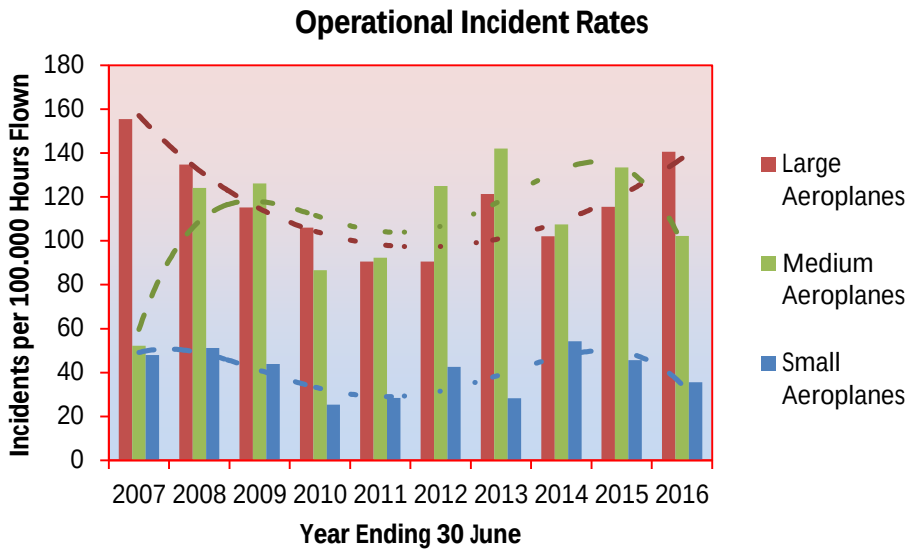
- Ohakea: Object, suspected to be an RPAS (similar to a Parrot Quadcopter) was operated in close proximity to B200 as it was on the approach to Ohakea at 1200 ft. The RPAS was estimated to have been within 20 ft. laterally and 300 ft. vertically of the B200. Aircraft has descended from 1500 ft. to 1200 ft. AMSL.
  Occurrence ID: 15/4904

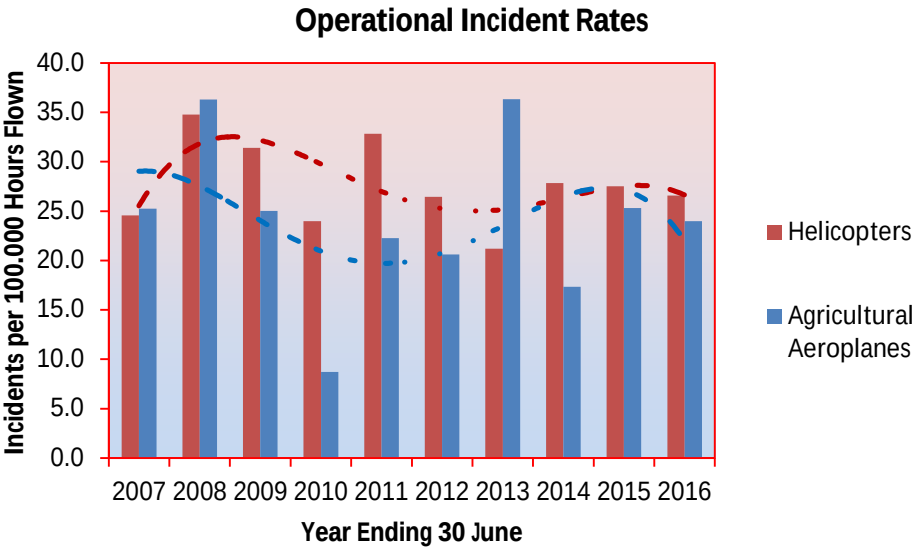
- Cambridge: Student (C172) received a TA "TRAFFIC 0 MILES SAME ALTITUDE". Student was initially confused but started looking for the traffic. Approximately 5-10 seconds later, FU24 passed approximately within 8-12 metres of the C172, being flown by the student on a first solo cross country flight. ATC passed traffic information as FU24 was 1 nm ahead the C172 at the same level (both aircraft were entering controlled airspace). Occurrence Id: 16/1394

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 2016.

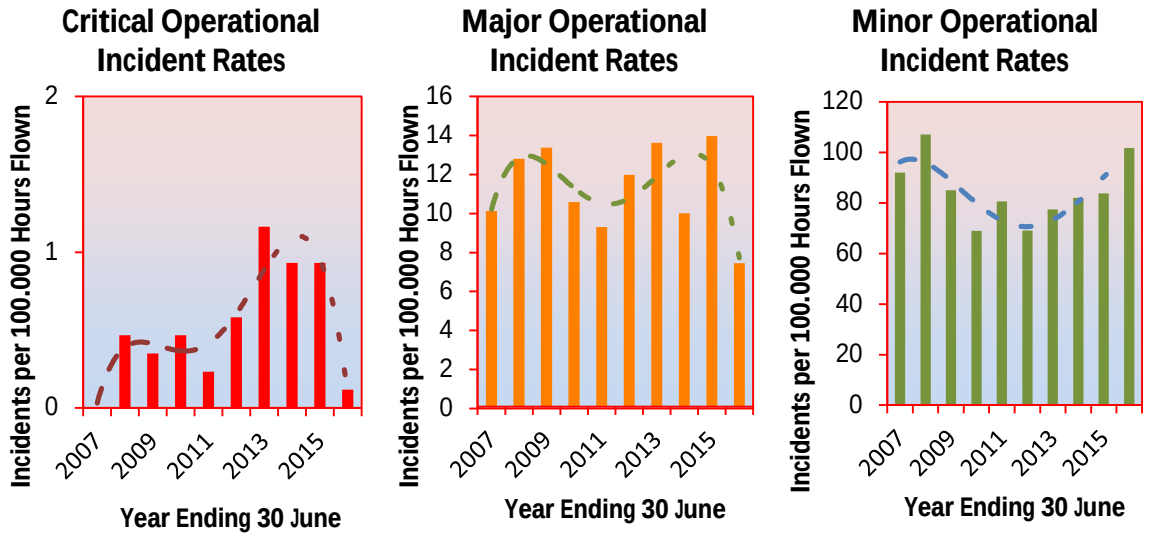
Breakdown by Aircraft Category





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 2016. All aircraft types are included. The table is sorted by the number of incidents in the year ending June 2016.

Safety Outcome Target Group	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Airline Operations - Large Aeroplanes	360	347	360	332	324	323	457	396	450	**544**
Other	6	6	7	18	127	53	25	40	55	**99**
Other Commercial Operations - Aeroplane	59	124	94	53	58	78	58	87	93	**75**
Other Commercial Operations - Helicopter	27	36	29	18	25	37	17	19	39	**47**
Airline Operations - Medium Aeroplanes	31	79	71	46	43	74	74	57	57	**38**
Private Operations - Aeroplane	41	16	21	14	10	22	11	24	19	**30**
Private Operations - Sport	17	25	19	25	18	47	58	68	52	**27**
Other Commercial Operations - Sport	0	0	0	1	0	1	4	5	18	**16**
Sport Transport	2	7	3	2	5	16	31	46	28	**14**
Airline Operations - Small Aeroplanes	11	31	13	8	11	11	2	9	11	**12**
None	298	317	195	143	107	13	15	14	5	**10**
Agricultural Operations - Aeroplane	14	20	8	3	9	9	12	4	9	**7**
Airline Operations - Helicopter	0	11	15	10	20	6	11	18	5	**2**
Agricultural Operations - Helicopter	7	14	12	11	11	5	8	9	5	**2**
Private Operations - Helicopter	5	1	2	3	7	7	4	3	2	**2**
Total	**878**	**1034**	**849**	**687**	**775**	**702**	**787**	**799**	**848**	**925**

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

- Auckland: Go-around from short final due to the landing gear not being selected down by flight crew. Descending through 500ft received a Master Warning illumination with LDG GEAR NOT DOWN red cap.
  Occurrence Id: 16/1623

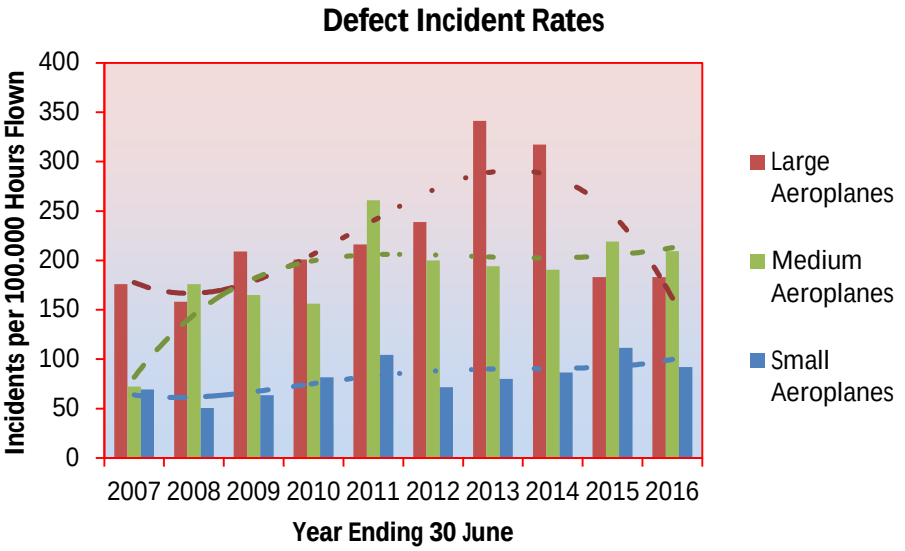
Serious Operational Incidents

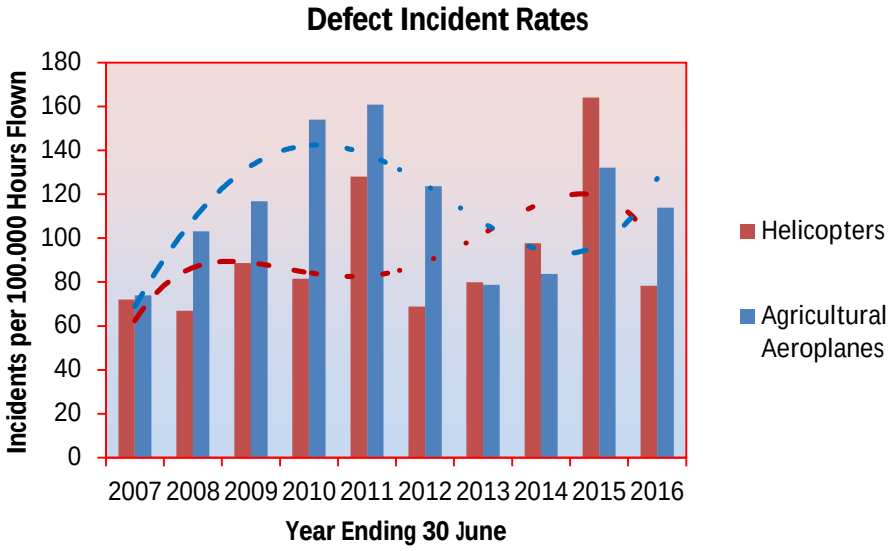
None of the Operational Incidents reported as occurring between 1 July 2015 and 30 June 2016 met the criteria defining a Serious Incident

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 2016.

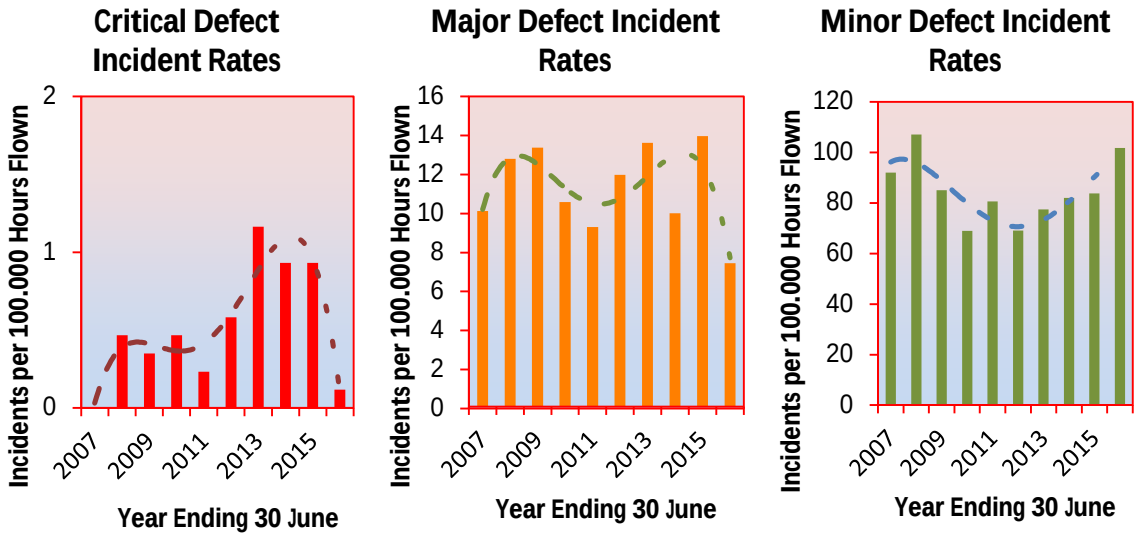
Breakdown by Aircraft Category





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 2016. All aircraft types are included. The table is sorted by the number of incidents in the year ending June 2016.

Safety Outcome Target Group	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Airline Operations - Large Aeroplanes	464	423	590	620	700	794	1155	1090	630	**635**
Other Commercial Operations - Aeroplane	104	94	219	143	185	133	146	154	261	**244**
Other Commercial Operations - Helicopter	66	63	65	46	109	82	55	94	281	**151**
Agricultural Operations - Aeroplane	43	51	36	44	65	47	29	29	53	**40**
Airline Operations - Medium Aeroplanes	50	100	74	66	117	111	97	77	70	**36**
Airline Operations - Small Aeroplanes	45	49	49	48	80	33	41	26	25	**28**
Private Operations - Aeroplane	35	31	26	65	33	33	30	35	44	**28**
Private Operations - Sport	9	9	11	30	27	38	19	17	16	**20**
Other	15	8	10	17	35	15	23	48	25	**18**
None	119	129	46	69	24	14	12	10	9	**9**
Other Commercial Operations - Sport	0	0	0	0	0	1	0	3	1	**4**
Private Operations - Helicopter	8	3	15	17	26	12	12	17	6	**4**
Agricultural Operations - Helicopter	9	6	8	13	29	19	27	25	6	**2**
Airline Operations - Helicopter	20	28	61	60	78	26	54	27	5	**1**
Sport Transport	0	1	0	1	8	5	11	4	1	**0**
Total	**987**	**995**	**1210**	**1239**	**1516**	**1363**	**1711**	**1656**	**1433**	**1220**

Significant Incidents

None of the defects reported as occurring during the period covered by this report met the requirements to be classed as Significant.

Serious Incidents

None of the defects reported as occurring during the period covered by this report met the requirements to be classed 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 213 defects.

The next most common chapter was AUXILIARY POWER - GENERAL with 28 defects.

Medium Aeroplanes

The most common chapter was LANDING GEAR (LG) - GENERAL with 18 defects.

The next most common chapters were AEROPLANE FLIGHT CONTROL - GENERAL and FLIGHT NAVIGATION SYSTEMS - GENERAL with 8 defects each.

Small Aeroplanes

The most common chapter was POWERPLANT FUEL SYSTEM - GENERAL with 46 defects.

The next most common chapter was LANDING GEAR (LG) - GENERAL with 32 defects.

Agricultural Aeroplanes

The most common chapter was LANDING GEAR (LG) - GENERAL with 10 defects.

The next most common chapter was POWERPLANT FUEL SYSTEM - GENERAL with 6 defects.

Helicopters

The most common chapter was POWERPLANT FUEL SYSTEM - GENERAL with 81 defects.

The next most common chapter was MAIN ROTOR - GENERAL with 16 defects.

Sport Aircraft

The most common chapter was COMMUNICATION SYSTEMS - GENERAL with 6 defects.

The next most common chapter was POWERPLANT FUEL SYSTEM - GENERAL with 4 defects.

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, excluding B747-200 aircraft since that type was removed from service during the quarter 1 July to 30 September 1999.

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

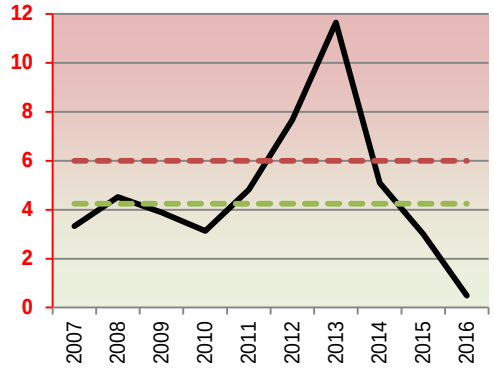
The timing of defect reports is often considerably later than what is mandated by Rule Part 12 and likewise a small number of operators of large and medium aeroplanes are persistently late with their hours and flights data returns. As a result the last two quarters of following defect rate graphs are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

Analysis

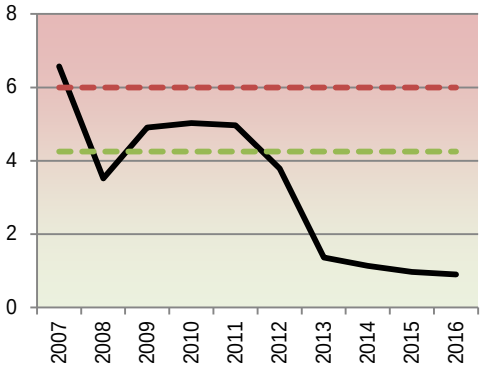
The red line on each graph shows the High defect rate. The green line shows the Alert defect rate. The Manager Airline Maintenance is notified of all high and alert rates on a quarterly basis.

Large Aeroplanes

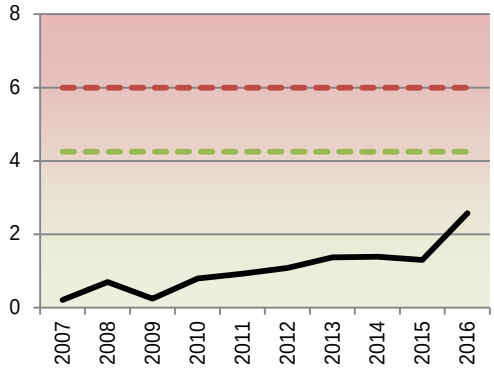
B737-300 Defects per 1000 hours



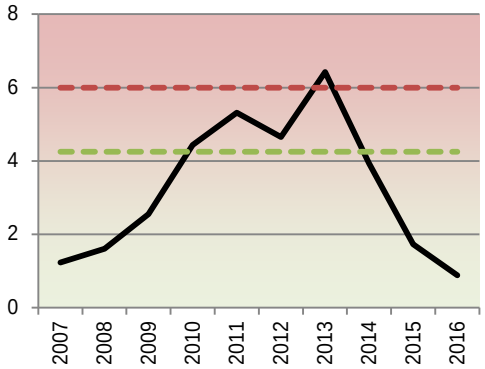
B737-400 Defects per 1000 hours



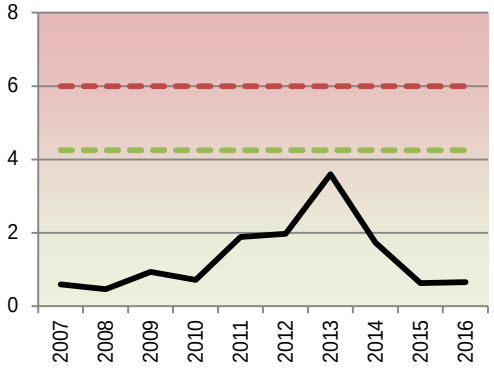
B737-800 Defects per 1000 hours



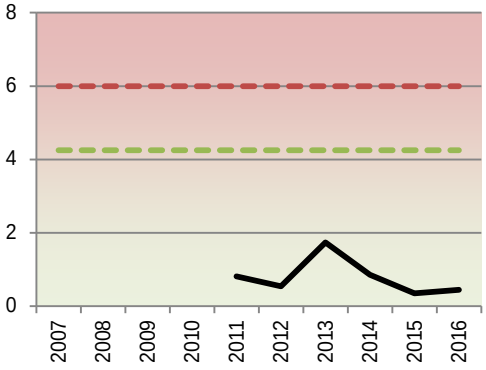
B767-300 Defects per 1000 hours



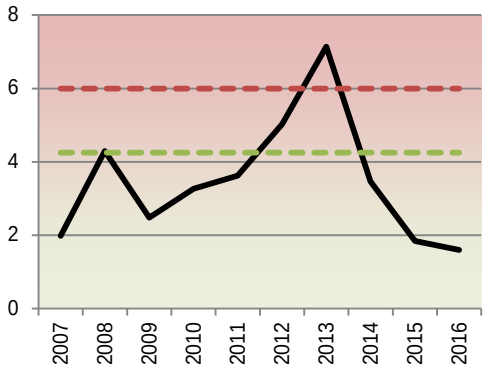
B777-200 Defects per 1000 hours



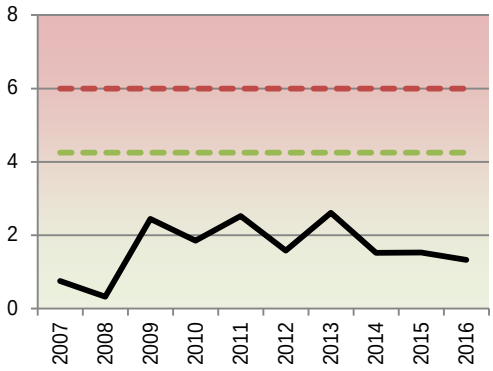
B777-300 Defects per 1000 hours



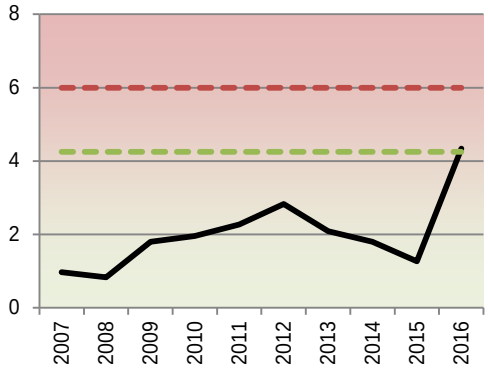
A320 Defects per 1000 hours



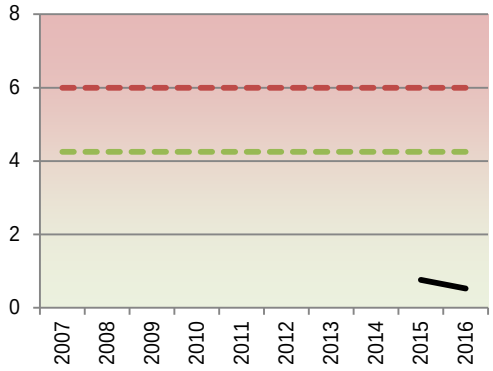
Convair 580 Defects per 1000 hours



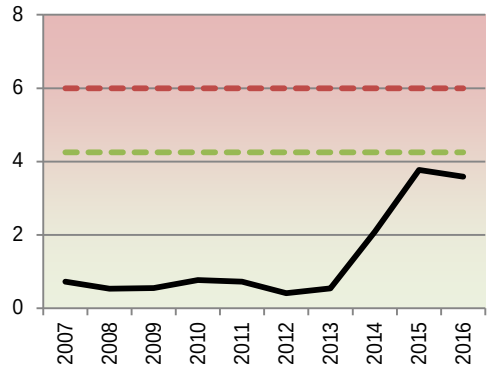
ATR 72 Defects per 1000 hours



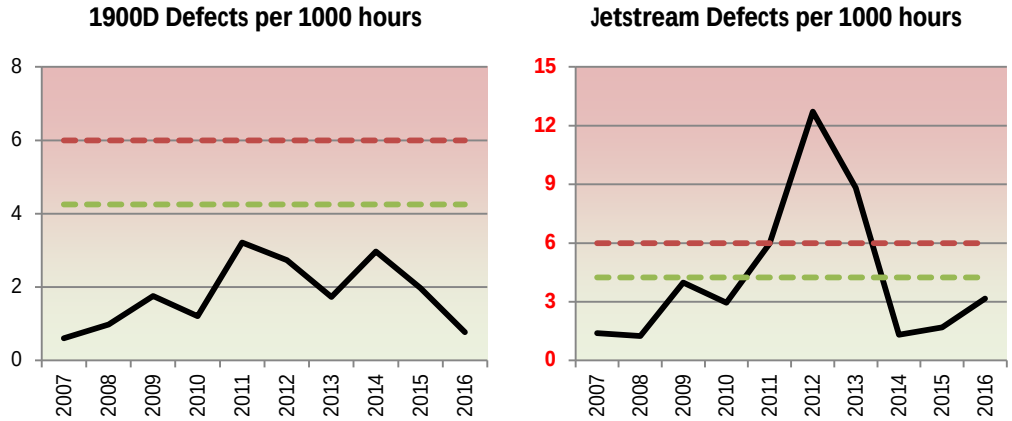
B787-900 Defects per 1000 hours

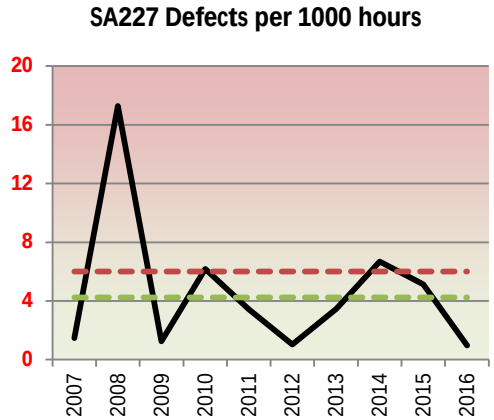


DHC-8 Defects per 1000 hours



Medium Aeroplanes





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 by 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	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Napier	4.6	6.1	4.6	12.1	6.1	7.8	7.9	6.2	8.5	**12.4**
New Plymouth	4.1	1.7	4.1	3.7	4.3	2.5	5.0	1.3	5.7	**6.7**
Nelson	2.1	1.0	1.0	1.0	2.0	2.0	4.7	2.4	4.6	**6.2**
Dunedin	2.8	2.6	2.6	3.6	3.4	3.5	5.6	4.7	3.6	**5.4**
Ohakea	2.0	1.6	1.9	2.0	2.1	2.0	1.8	4.7	3.5	**5.1**
Gisborne	7.1	8.3	5.0	1.7	5.4	6.0	5.5	5.8	7.6	**5.0**
Westport	24.2	19.4	9.7	19.4	4.8	4.8	0.0	4.8	9.7	**4.8**
Whenuapai	7.7	10.8	7.7	11.0	8.0	13.5	4.6	6.9	4.8	**4.5**
Rotorua	5.7	3.1	5.0	5.6	2.7	2.2	4.1	3.3	4.1	**4.3**
Queenstown	2.4	2.8	1.5	1.1	1.2	3.0	2.9	1.4	2.3	**3.2**
Invercargill	5.4	5.6	5.4	5.3	3.4	3.2	2.0	3.7	8.4	**3.1**
Christchurch	2.3	2.3	2.1	1.6	2.0	3.0	2.2	2.0	2.5	**2.9**
Kerikeri	1.3	2.5	7.5	5.0	6.3	3.8	8.8	10.0	5.0	**2.5**
Palmerston North	3.2	2.5	3.4	3.6	2.2	2.5	3.3	3.9	3.5	**2.3**
Wellington	1.2	1.0	1.3	1.6	1.3	1.8	2.1	1.0	3.4	**1.9**
Woodbourne	5.4	2.6	2.5	4.4	2.5	3.9	9.1	2.8	6.5	**1.8**
Whakatane	3.3	2.5	1.7	8.3	4.2	2.5	1.7	5.0	5.0	**1.7**
Tauranga	1.7	0.7	1.5	0.5	2.2	1.8	1.2	2.6	2.1	**1.6**
Auckland	2.0	1.8	1.8	2.5	2.1	2.4	2.7	1.3	2.8	**1.5**
Timaru	5.0	1.3	6.3	2.5	6.3	1.3	1.3	3.8	1.3	**1.3**
Hamilton	2.5	1.6	1.4	1.7	1.3	0.8	1.1	1.4	1.3	**1.0**
Taupo	0.9	0.9	1.9	1.4	4.4	1.5	0.8	1.3	0.5	**0.9**
Whangarei	6.0	0.8	2.3	4.5	5.3	4.5	2.3	4.5	1.5	**0.8**
Wanganui	2.1	0.7	1.4	1.4	3.5	2.1	5.6	2.8	3.5	**0.7**
Paraparaumu	0.4	0.0	0.0	1.2	0.4	1.3	1.7	0.8	1.2	**0.4**
Chatham Islands	0.0	0.0	10.0	0.0	0.0	0.0	0.0	10.0	20.0	**0.0**
Hokitika	4.8	7.2	0.0	2.4	2.4	2.4	0.0	0.0	0.0	**0.0**
Manapouri	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.8	**0.0**

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, Westport and Chatham Islands. 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 movements 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 salmon 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 December 2015 for individual aerodromes are shown in the following table.

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

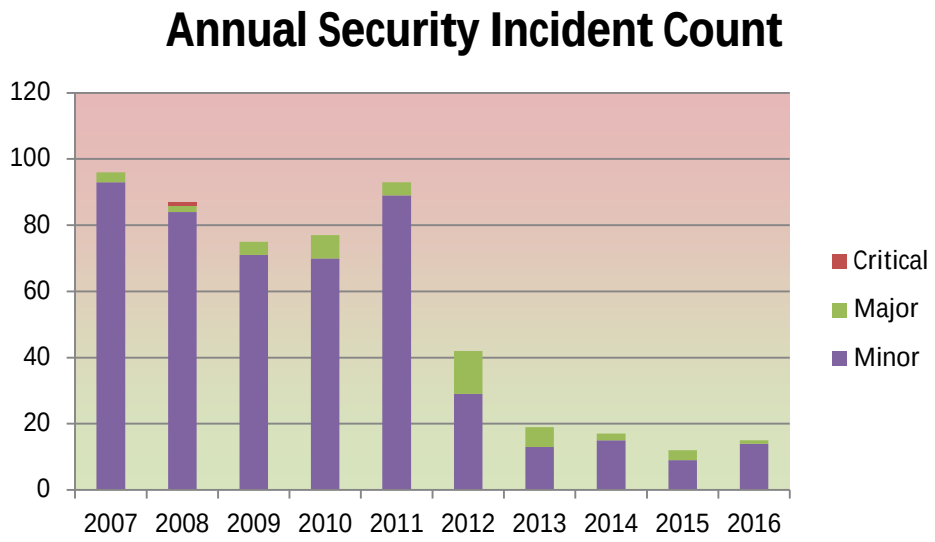
Significant or Serious Incidents

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 2016



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	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Auckland	19	8	20	25	51	13	5	2	3	**3**
Christchurch	11	2	10	4	15	1	1	1	1	**1**
Dunedin	2	0	1	2	0	0	0	0	0	**1**
Gisborne	2	0	0	2	0	0	3	0	0	**0**
Hamilton	0	0	2	1	0	3	0	1	0	**0**
Milford Sound	2	5	1	0	0	0	0	0	0	**0**
New Plymouth	0	0	0	0	0	0	0	0	0	**0**
Napier	1	0	0	1	0	0	0	0	0	**0**
Nelson	1	1	1	2	2	0	1	0	2	**4**
Invercargill	1	0	1	0	0	0	0	0	0	**0**
Palmerston North	1	0	0	0	0	0	0	0	0	**0**
Paraparaumu	0	0	0	2	0	1	0	1	1	**0**
Queenstown	0	1	1	3	2	1	0	0	0	**2**
Rotorua	3	0	2	0	0	0	0	0	0	**1**
Tauranga	2	2	0	0	0	0	0	0	0	**0**
Woodbourne	2	0	0	0	1	0	0	0	0	**0**
Wellington	9	0	6	6	7	10	2	2	2	**0**

Breakdown by Aircraft Category

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

Aircraft Category	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Large Aeroplanes	30	17	20	10	3	14	6	8	2	**7**
Medium Aeroplanes	1	3	6	0	2	1	4	0	1	**0**
Small Aeroplanes	0	0	0	0	0	1	1	0	0	**0**
Helicopters	0	0	0	0	0	0	0	0	0	**0**
Agricultural Aeroplanes	0	0	0	0	0	0	0	0	0	**0**
Unknown	0	0	0	0	0	0	0	0	0	**0**
Total	**31**	**20**	**26**	**10**	**5**	**16**	**11**	**8**	**3**	**7**

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.

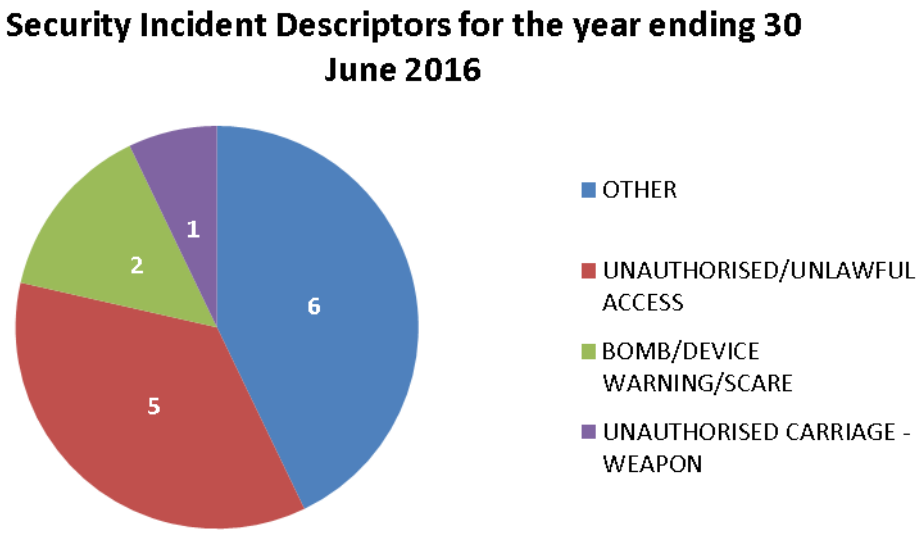
Descriptors and Causal Factors

The most common descriptor (6) recorded for Security Incidents during the year ending 30 June 2016 was 'OTHER' with 'UNAUTHORISED/UNLAWFUL ACCESS' 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

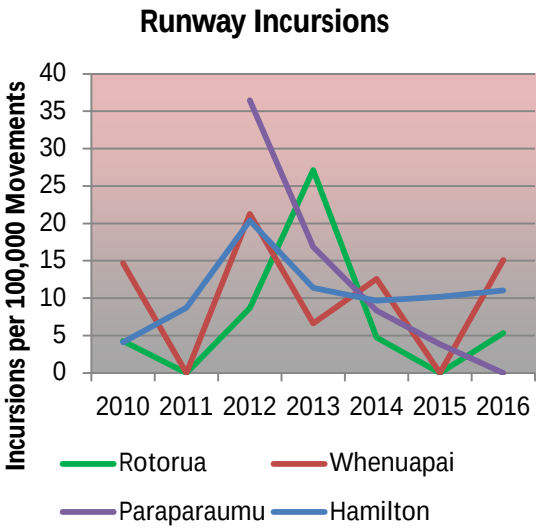
Runway incursion rates are calculated by dividing the total number of reported Aerodrome Incidents that have any of the five runway incursion descriptors by the total number of reported movements for the same aerodrome over the same period. The result is tabulated and graphed as runway incursions per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

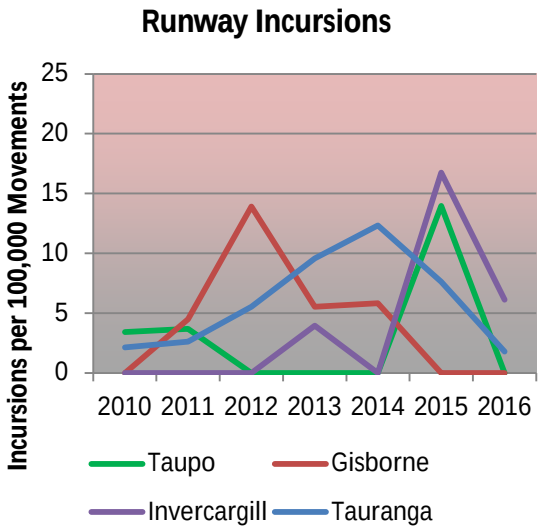
Clearly the number of runway incursions is low with many certificated aerodromes having no such incidents reported at all. With such low numbers caution needs to be exercised in drawing statistical conclusions.

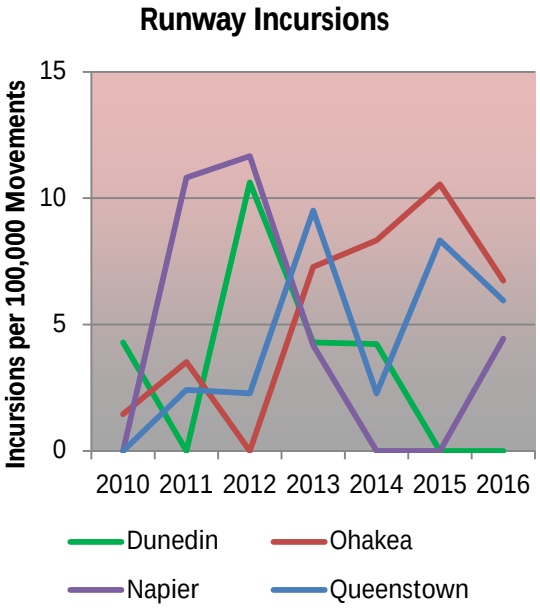
The following table shows annual values of reported runway incursion rates for all certificated aerodromes for which adequate movement data is available. The table is ordered by the maximum rate that has been recorded for any year in the ten year period.

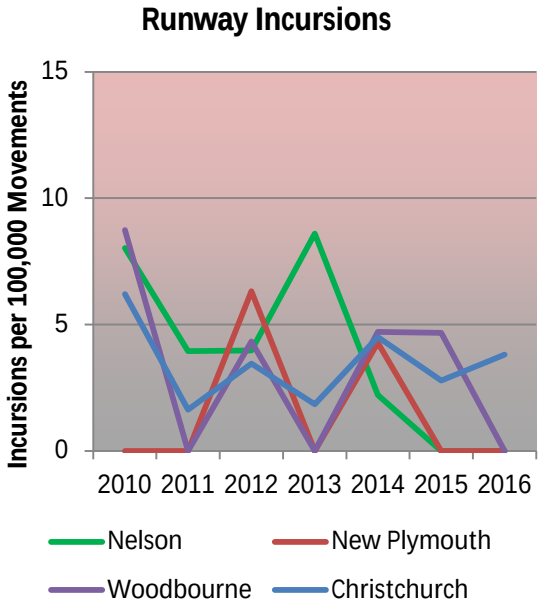
Aerodrome	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Paraparaumu				15.9		36.5	16.8	8.3	3.8	**0.0**
Rotorua	0.0	0.0	4.1	4.3	0.0	8.7	27.1	4.7	0.0	**5.4**
Gisborne	0.0	0.0	4.2	0.0	4.5	13.9	5.5	5.8	0.0	**0.0**
Whenuapai	0.0	0.0	0.0	14.7	0.0	21.3	6.6	12.6	0.0	**15.1**
Hamilton	0.0	0.0	4.6	4.1	8.7	20.4	11.4	9.7	10.2	**11.0**
Invercargill	0.0	0.0	0.0	0.0	0.0	0.0	4.0	0.0	16.8	**6.1**
Ohakea	0.0	1.3	0.0	1.5	3.5	0.0	7.3	8.3	10.6	**6.7**
Woodbourne	0.0	0.0	8.2	8.7	0.0	4.3	0.0	4.7	4.7	**0.0**
Napier	0.0	0.0	0.0	0.0	10.8	11.7	4.2	0.0	0.0	**4.4**
Dunedin	0.0	0.0	1.6	4.3	0.0	10.6	4.3	4.2	0.0	**0.0**
Tauranga	0.0	0.0	3.0	2.1	2.6	5.5	9.6	12.3	7.6	**1.8**
Taupo	0.0	0.0	0.0	3.4	3.7	0.0	0.0	0.0	14.0	**0.0**
Queenstown	0.0	0.0	0.0	0.0	2.4	2.3	9.5	2.3	8.3	**5.9**
Wellington	0.0	1.6	5.2	3.6	0.9	4.7	2.0	4.1	3.1	**0.0**
Palmerston North	0.0	0.0	5.9	1.8	0.0	2.9	1.6	3.7	3.7	**2.1**
Nelson	0.0	0.0	4.1	8.0	4.0	4.0	8.6	2.2	0.0	**0.0**
Auckland	0.6	0.6	3.8	4.5	1.9	1.9	2.6	4.5	2.6	**5.0**
Christchurch	0.0	0.0	2.8	6.2	1.6	3.4	1.8	4.5	2.8	**3.8**
New Plymouth	0.0	0.0	0.0	0.0	0.0	6.3	0.0	4.3	0.0	**0.0**

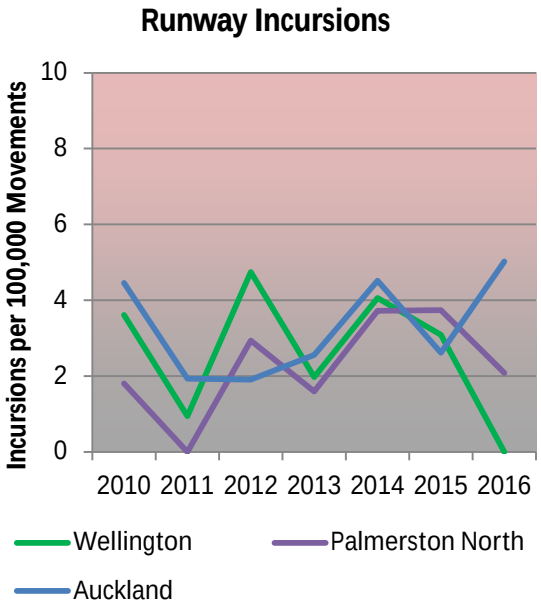
The charts on the next page show the above data in a graphical way. Aerodromes have been grouped in an arbitrary way to keep the number of lines on each chart roughly equal. The grouping is based on the largest value reported over the period covered.











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-2015	6	10	65	137	104	95	2	2	69	8	0	2	0
Aug-2015	6	15	39	115	119	115	3	0	87	3	0	2	2
Sep-2015	3	12	50	109	75	102	2	3	70	6	4	1	2
Oct-2015	4	22	69	103	109	81	9	3	155	5	4	2	0
Nov-2015	6	21	40	142	47	93	5	2	64	6	0	2	0
Dec-2015	6	20	39	119	111	84	2	3	83	5	1	1	2
Jan-2016	11	10	58	134	86	125	5	4	83	3	3	2	1
Feb-2016	4	21	94	184	74	88	2	6	44	3	1	4	1
Mar-2016	7	20	95	162	167	101	6	4	92	3	2	1	4
Apr-2016	3	10	68	118	113	89	6	0	60	1	0	2	1
May-2016	5	25	90	154	171	169	4	1	137	1	0	8	0
Jun-2016	4	22	58	130	189	88	7	0	97	0	0	5	2

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

Causal Factor Summary

Introduction

The following section presents a summary of occurrence causes recorded during the year ending 30 June 2016 as determined by safety investigations.

The causal factor summary is grouped into three parts, each dealing with a unique sector of the aviation industry:

- Aircraft Flight Operations (Aircraft Operator Organisations and Flight Crew);
- Aircraft Maintenance Operations (Aircraft Maintenance/Design Organisations and Maintenance Engineers);
- Air Traffic Services and Personnel (Air Traffic Service Organisations and Air Traffic Service personnel).

The first two sections are further sub-grouped by Aircraft Category, namely:

- Large Aeroplanes;
- Medium Aeroplanes;
- Other Aeroplanes, Helicopters and Sport; and
- "Unknown".

A discussion of the Reason Model – Latent Failure Model used by the CAA for causal factor identification is provided in the appendix.

The following abbreviations apply:

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

Aircraft Flight Operations

The following section summarises causal factors identified from investigation of occurrences that occurred during the year ended 30 June 2016 and which have been attributed to aircraft flight operations (the aircraft operator, organisation or flight crew). The number of times particular causal factors have been identified is reported by occurrence type.

Large Aeroplanes

Category	Cause	ADI	ASP	DEF	INC
Active Failure	ACTIONS INCONSISTENT WITH PROCEDURES		1		4
	INACCURATE SYSTEM "DIAGNOSIS"				1
	PRIMARILY "STRUCTURAL/MECHANICAL"	2		6	
	STATE CHANGE NOT DETECTED "INFORMATION"				1
Organisation	INADEQUATE COMMUNICATIONS		1		
	INADEQUATE CONTROL AND MONITORING			1	
	INADEQUATE PROCEDURES			1	1
	INADEQUATE TRAINING			1	1
	OTHER ORGANISATION FACTOR	1			
	UNSUITABLE EQUIPMENT				1
Local Error	FATIGUE - OTHER				1
	POOR SYSTEM FEEDBACK				1

Medium Aeroplanes

Category	Cause	ASP	DEF	INC
Active Failure	ACTIONS INCONSISTENT WITH PROCEDURES			1
	PRIMARILY "STRUCTURAL/MECHANICAL"		2	
Organisation	INADEQUATE DEFENCES			1
Local Error	INADEQUATE CHECKING	1		1

Small Aeroplanes

Category	Cause	ACC	ASP	DEF	INC
Active Failure	ACTIONS INCONSISTENT WITH PROCEDURES		4		
	INAPPROPRIATE "PROCEDURES"	1	2		1
	INAPPROPRIATE "STRATEGY"		1		2
	POOR PROCEDURE "ACTION"	2	3		
	PRIMARILY "STRUCTURAL/MECHANICAL"			4	2
	STATE CHANGE NOT DETECTED "INFORMATION"		1		2
Organisation	INADEQUATE CONTROL AND MONITORING		1		
	POOR DECISIONS		1		
Local Error	INADEQUATE CHECKING				1
	INEXPERIENCE (NOT LACK OF TRAINING)	1			
	OTHER ENVIRONMENTAL FACTOR (EG WEATHER)				1
	OTHER ERROR ENFORCING CONDITION		1		
	PHYSIOLOGICAL OTHER		1		
	TASK OVERLOAD		1		
	TASK UNFAMILIARITY				1
Local Violation	OTHER VIOLATION ENFORCING CONDITION	1			

Unknown Aircraft Category

Category	Cause	ARC	ASP	DEF	DGD	INC
Active Failure	ACTIONS INCONSISTENT WITH PROCEDURES		1			1
	INACCURATE SYSTEM "DIAGNOSIS"		2			
	INAPPROPRIATE "STRATEGY"				1	
	PRIMARILY "STRUCTURAL/MECHANICAL"			3		
Organisation	OTHER ORGANISATION FACTOR					2
Local Error	LACK OF KNOWLEDGE	1	1			
	OTHER ERROR ENFORCING CONDITION		1			
	POOR SIGNAL:NOISE					1
	POOR SYSTEM FEEDBACK		1			
	TASK UNFAMILIARITY		1			
Local Violation	OTHER VIOLATION ENFORCING CONDITION					1

Other Aeroplanes, Helicopters and Sport Aircraft

Category	Cause	ACC	ASP	DEF	HGA	INC
Active Failure	INAPPROPRIATE "GOAL"		1			
	INAPPROPRIATE "PROCEDURES"		1			
	INAPPROPRIATE "STRATEGY"		1			
	POOR PROCEDURE "ACTION"	2			1	1
	PRIMARILY "STRUCTURAL/MECHANICAL"	3		2		
Organisation	INAPPROPRIATE GOALS OR POLICIES	1				
Local Error	INADEQUATE CHECKING	1				
	POOR INSTRUCTIONS/PROCEDURES				1	
	RISK MISPERCEPTION					1
Local Violation	HAZARD MISPERCEPTION	1				

Aircraft Maintenance Operations

The following section summarises causal factors identified from investigation of occurrences that occurred during the year ended 30 June 2016 and have been attributed to aircraft maintenance operations (the aircraft operator, aircraft maintenance organisation or maintenance engineer). The number of times particular causal factors have been identified is reported by occurrence type.

Large Aeroplanes

Category	Cause	ADI	DEF	INC
Active Failure	ACTIONS INCONSISTENT WITH PROCEDURES	1		1
	POOR PROCEDURE "ACTION"			1
	PRIMARILY "STRUCTURAL/MECHANICAL"		1	
Organisation	DESIGN DEFICIENCIES		1	
Local Error	INADEQUATE CHECKING	1		1

Medium Aeroplanes

No causes established

Small Aeroplanes

Category	Cause	DEF	INC
Active Failure	PRIMARILY "STRUCTURAL/MECHANICAL"	2	
Organisation	DESIGN DEFICIENCIES	1	
	INADEQUATE CONTROL AND MONITORING		1

Unknown Aircraft Category

No instances

Helicopters, Agricultural Aeroplanes and Sport Aircraft

Category	Cause	DEF
Active Failure	PRIMARILY "STRUCTURAL/MECHANICAL"	2
Organisation	INADEQUATE SPECIFICATIONS/REQUIREMENTS	1

Air Traffic Services and Personnel

The following tables summarise causal factors identified from investigation of occurrences that occurred during the year ended 30 June 2016 and which have been attributed to air traffic services or personnel. The number of times particular causal factors have been identified is reported by occurrence type.

Air Traffic Service Providers

Category	Cause	ASP
Organisation	OTHER ORGANISATION FACTOR	2
Local Error	INTERPRETATION DIFFICULTIES	1

Air Traffic Service Personnel

Category	Cause	ADI	ASP
Active Failure	INAPPROPRIATE "PROCEDURES"		1
	INAPPROPRIATE "STRATEGY"		2
	POOR PROCEDURE "ACTION"		1
Local Error	DESIGNER USER MISMATCH		2
	INADEQUATE CHECKING	1	
	OTHER ERROR ENFORCING CONDITION		1
	PHYSIOLOGICAL OTHER		1
	PSYCHOLOGICAL OTHER		1
	RISK MISPERCEPTION		4

Client Risk Assessment

Introduction

The CAA's client risk assessment system came into operation in February 2007.

The system measures a series of factors, rated using a scale of 1 to 5 where 1 is an exemplary rating. It is a qualitative rating and relates solely to the interaction the CAA staff member is having with the client at that time, or to changes in the organisation recorded in the CAA database.

Risk profiles can be generated at any time, including at the end of every audit.

The combined ratings form a risk assessment used to help decide the depth and frequency of inspection and monitoring for each client.

Results are in the form of a percentage of the maximum possible score (if all factors had been rated 5). Clients can have several risk profiles current at one time, one for each activity. Each risk profile is independent of the others, and applies only to the relevant activity.

Scores are divided into bands of low, moderate, high and very high. Until April 2016 these bands were defined as:

Low: <=16%
Moderate: 16-26%
High: 26-36%
Very High: >36%

From April 2016 the definitions changed and the bands now correspond exactly to the quartiles of the current risk scores for the corresponding activity. The quartile boundaries are recalculated on the first day of each month and apply for the whole of the month.

The following charts show the annual average risk score (the white line) for each activity against a background indicating the quartile boundaries and the maximum and minimum scores over the same year. Half the risk assessments carried out each year generate scores that lie between the red and green bands. The charts also show the median score as a dotted line.

Yearly Trends of Risk Scores

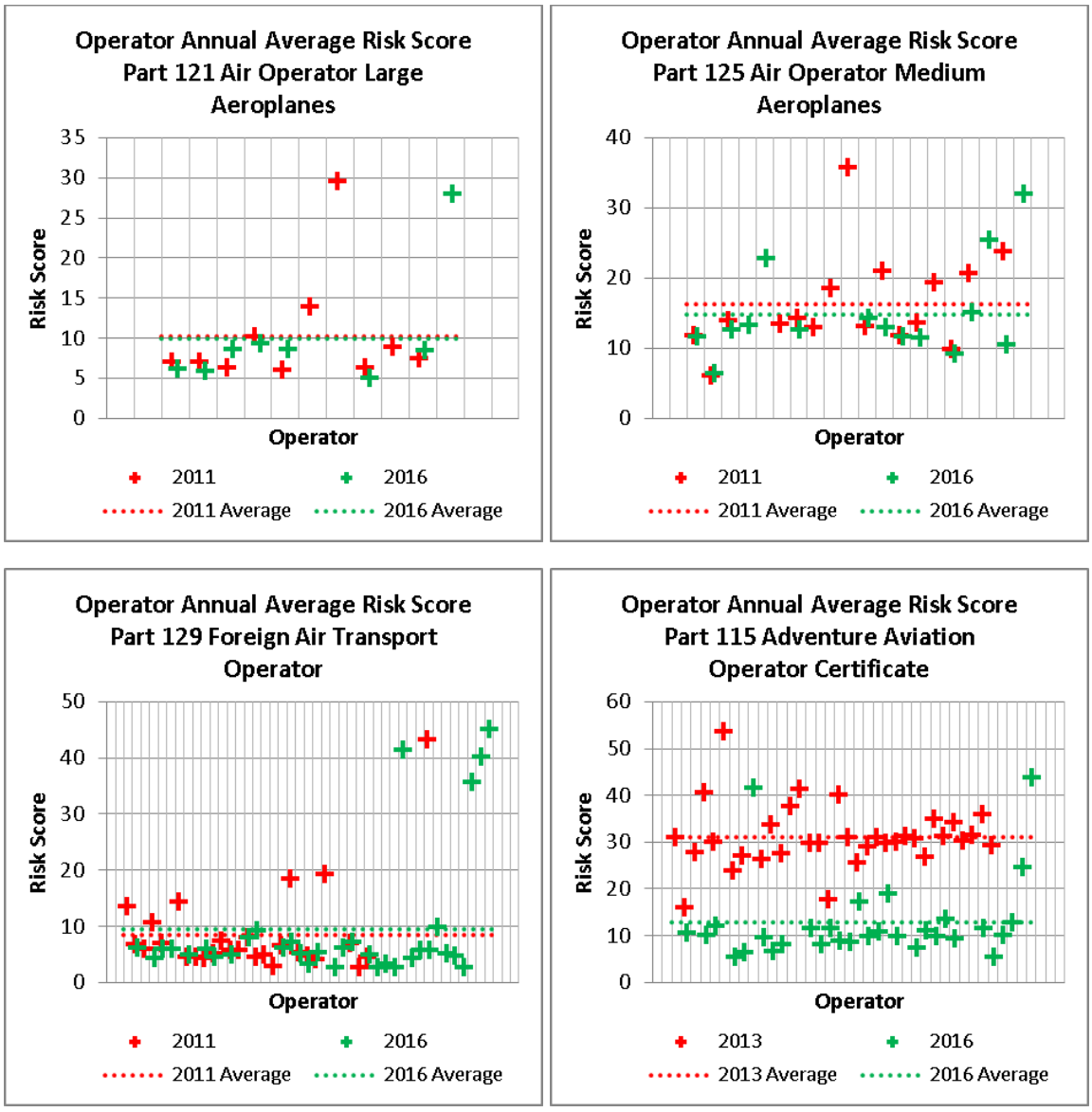
The charts that follow show the average annual risk score for each operator that received at least one risk assessment during the year. To keep the complexity to a manageable level scores are only presented for the two years 2011 and 2016 by default. If data is not available for 2011 a later year has been chosen. Each chart also displays the average score for the whole community of operators involved in that particular activity.

The overwhelming feature of almost all activities is the large majority of operators that achieve risk scores well below the average for the group. This means that there is usually a small number of higher risk operators that the CAA can focus attention on.

Although not universally the case most operators can be seen to achieve improved (i.e. lowered) scores in the later year.

The 'rising score trend' on the right hand side of the charts is probably a result of the order in which individual operators are distributed across the chart. Some of the factors that elevate the risk score are connected to the 'newness' of an operator and when a new operator is certificated they get added to the list at the right hand side of the chart.

Air Transport Activities

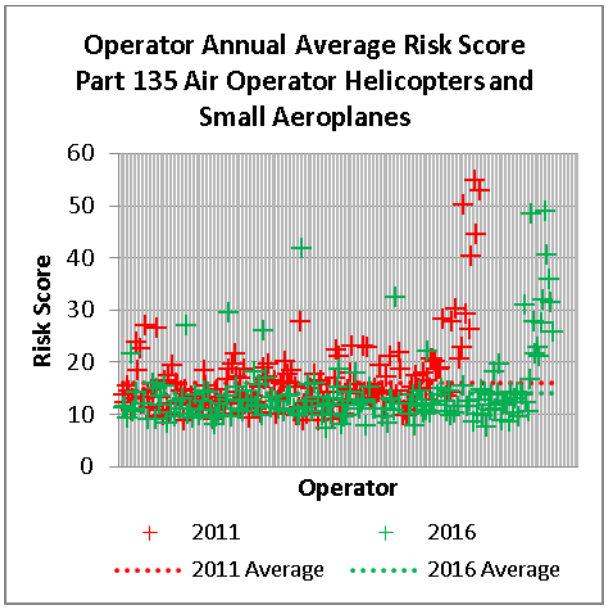


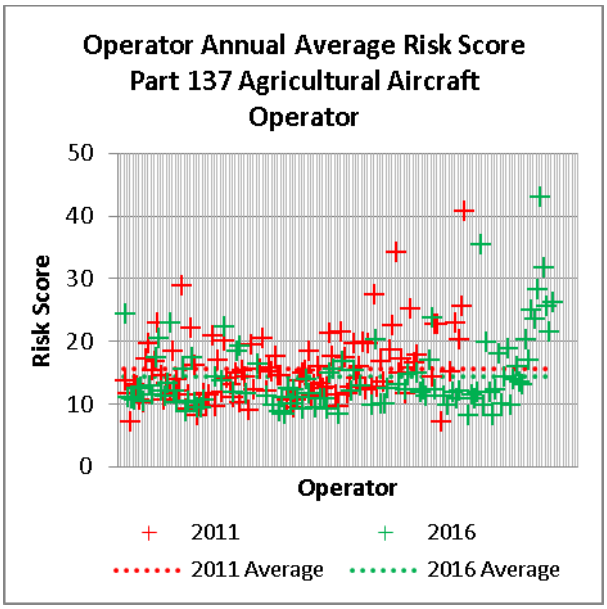
The airline activity groups (Parts 121, 125 and 129) have shown little movement in the group average risk levels between 2011 and 2016.

Although it is not evident from these charts, the high 2016 scores that stand out are almost all due to 'newness' factors and are generally showing improvement.

Part 115 operations have only been included in the risk assessment system since mid-2012 and the trend is towards better (lower) risk scores as would be expected. The few assessments that are well above average are used to influence decisions about which operators to audit and how frequently to do so.

Commercial Activities

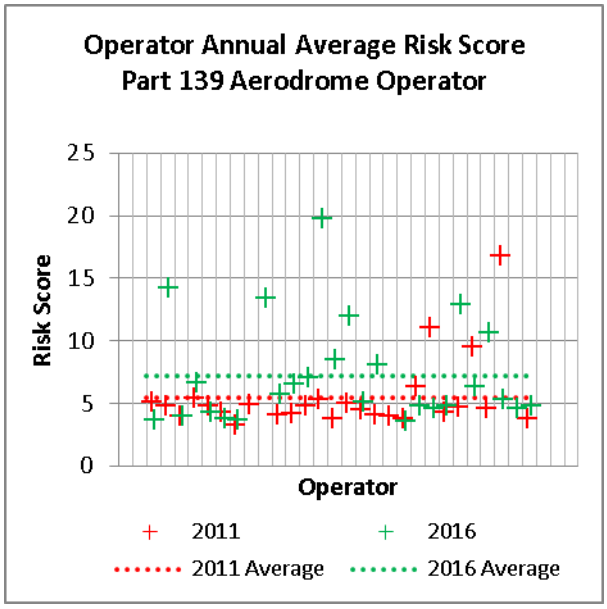




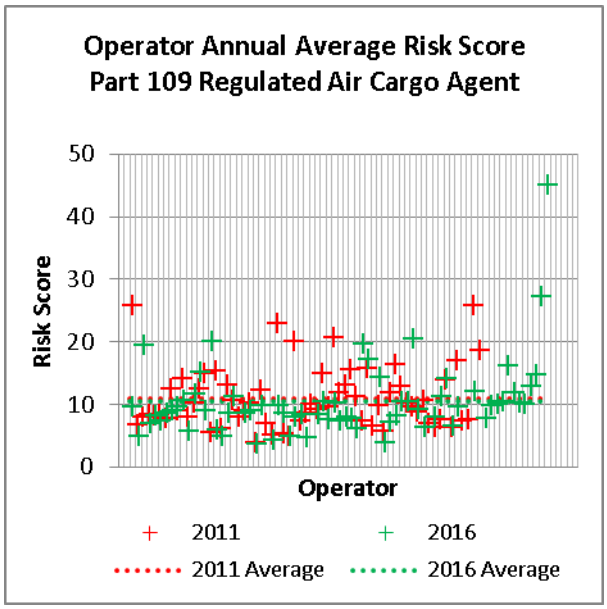
Except for three operators in the Part 135 group and five in the Part 137 group, all the risk scores that were higher in 2016 than in 2011 were due to 'newness' factors. In most cases there is evidence of an improving trend.

It is also worth noting that the group average assessments changed hardly at all between 2011 and 2016.

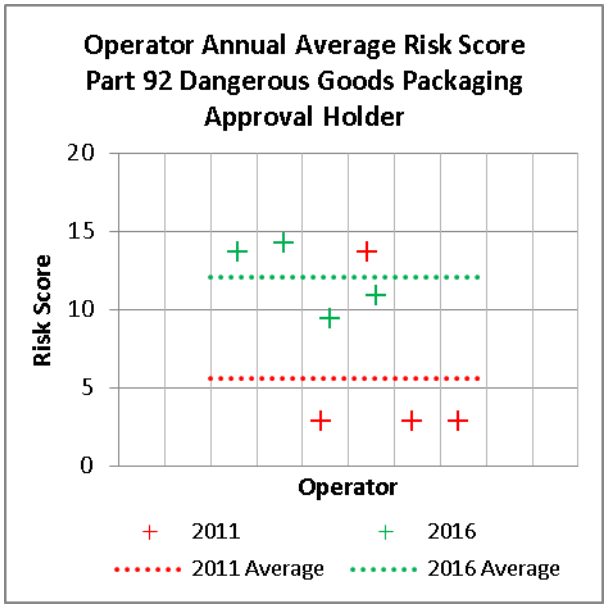
Other Operational Activities



In 2011 there were only 3 operators with risk assessment scores significantly above the average for the year, a feature proportionally common to most activity groups. In 2016 however this number has grown to 6 and along with a significant increase in the overall average risk score may indicate a need for further investigation.

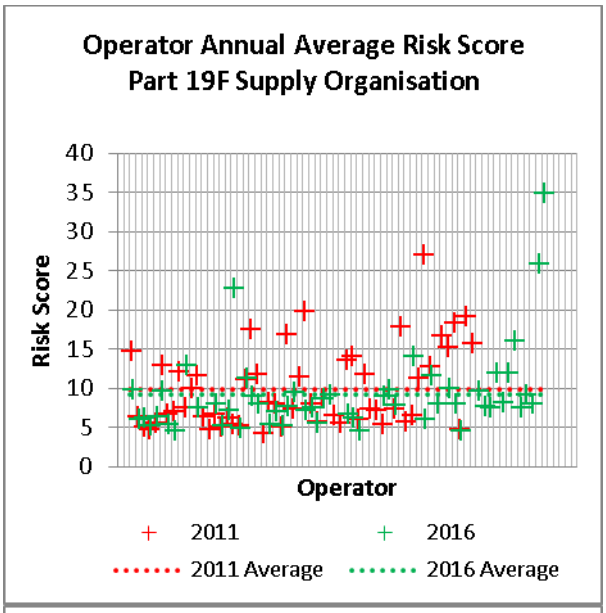


Four operators of the 55 who had current risk assessments in both 2011 and 2016 generated significantly higher risk scores in 2016 than in 2011. None was associated with newness factors and one is trending towards lower risk scores.

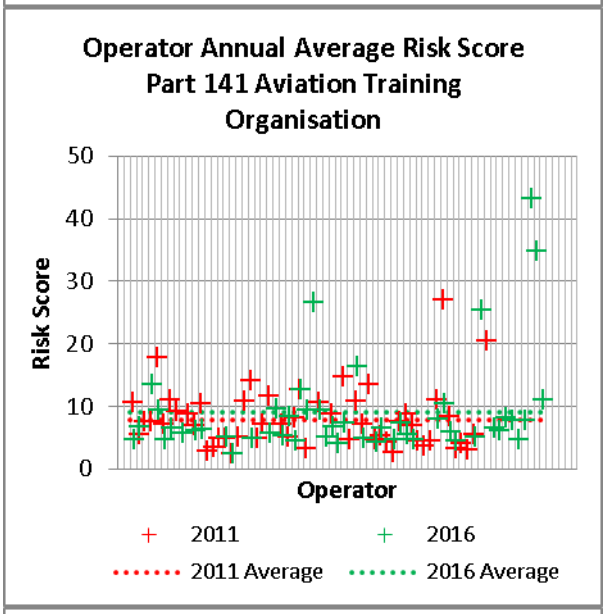


With only four risk assessed operators the statistical significance of this result is limited but the increase in the group average between 2011 and 2016 may indicate a need for further investigation

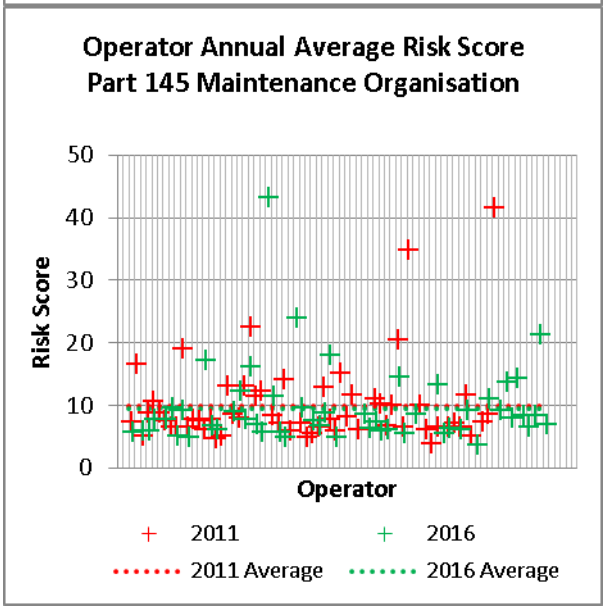
Support Activities



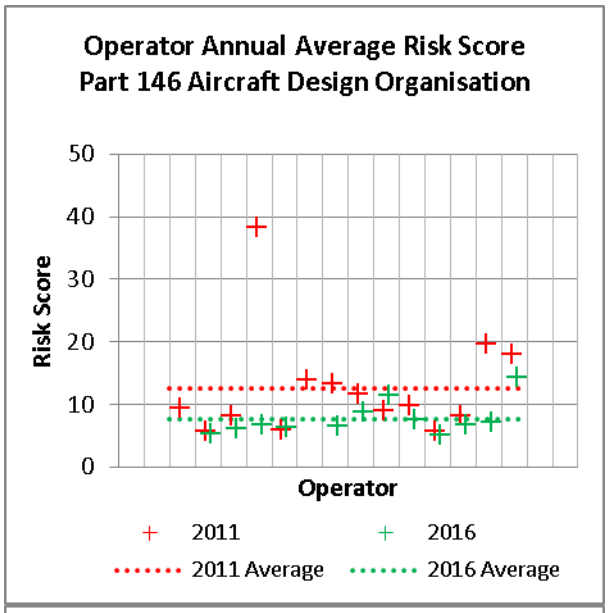
This group is unremarkable except for the one operator whose risk assessment in 2016 was much higher than in 2013. As yet there has been no re-assessment of the factors that generated this high score.



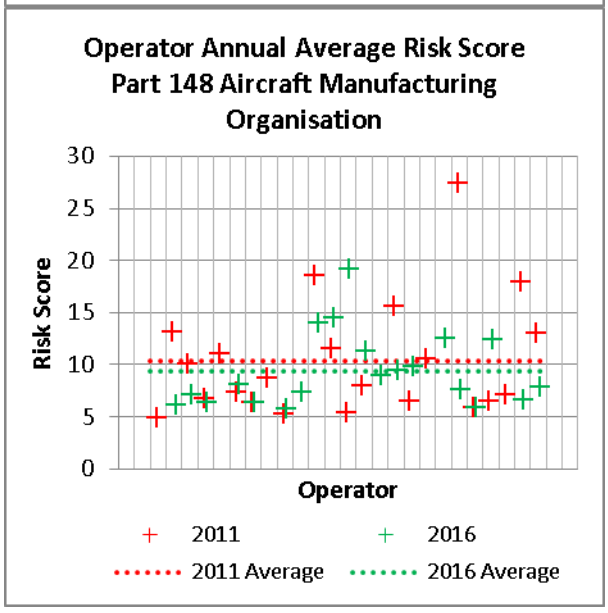
Three operators of the 35 who were risk assessed in both 2011 and 2016 generated significantly higher risk scores in 2016 than in 2011. One was associated with newness factors and two are trending towards lower risk scores.



Of the three operators that scored significantly higher in 2016 than in 2011 none scored high due to newness factors, one is trending towards lower risk scores one is not and the third hasn't been assessed since 2014. (the risk score at any point in time remains valid until a reassessment takes place)

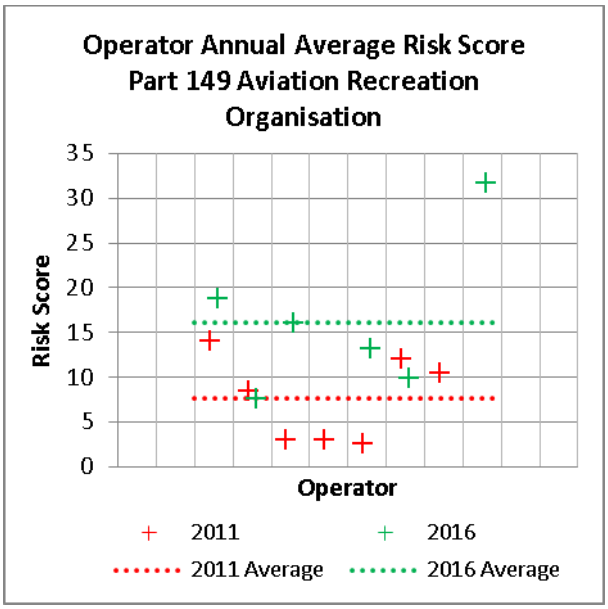


Good



Two operators of the 17 who had current risk assessments in both 2011 and 2016 generated significantly higher risk scores in 2016 than in 2011. None was associated with newness factors.

Recreational Activities



A statistically small group but only one operator showing a small improvement, one showing no significant change and three showing significantly increased risk scores.

.

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

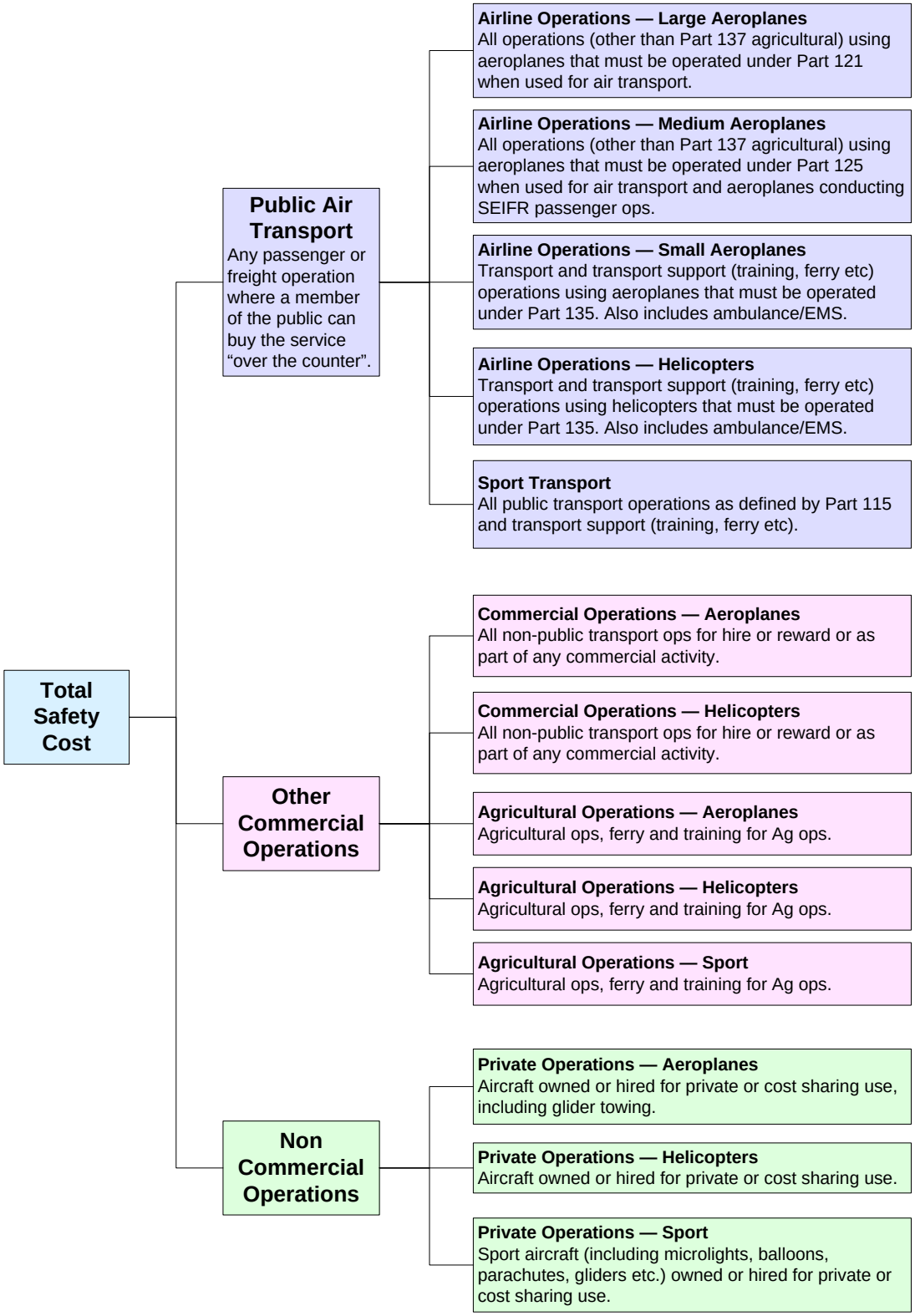
(6) involves verified exposure to infectious substances or injurious radiation.

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

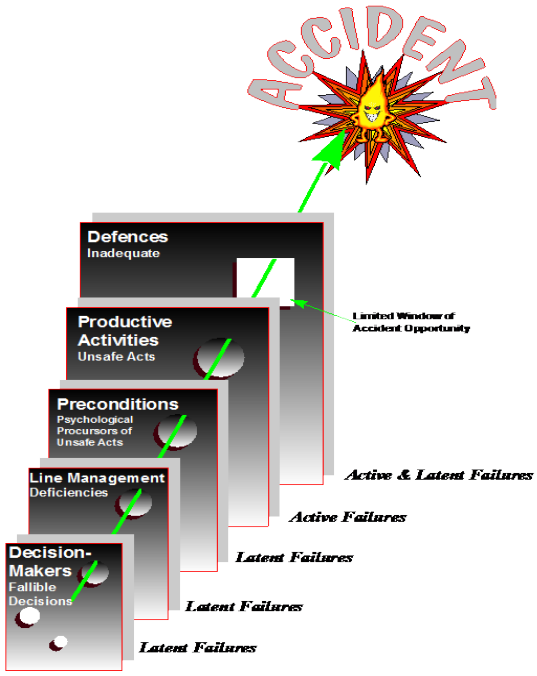


Diagram 1 shows the layers of defences that have been created within the aviation system to prevent accidents and incidents happening. It also shows how these defences have holes in them. When these holes line up there is a window of opportunity for an accident or incident. All that is needed to complete 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

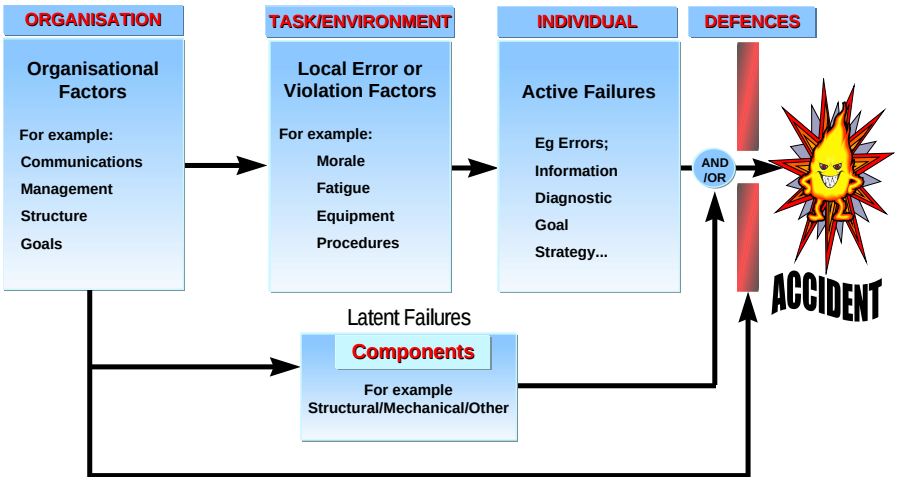


Diagram 2 shows how the latent failures are grouped into 3 areas:

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.