Aviation Safety Report

Intelligence, Safety and Risk Analysis Unit

1 July 2016 to 30 June 2017

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

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Introduction and Executive Summary

Introduction

This safety report is produced using data from the Civil Aviation Authority's Aviation Safety Management System. It primarily covers the period from 1 July 2016 to 30 June 2017.[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 by 2.6%
    - 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 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 in recent years and therefore the social cost statistics are the airline helicopter, private sport and private helicopter sectors.
- The recent increase 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.

Operator Risk Scores.

A major change to this edition has been the replacement of the participant Non Compliance Index with a new presentation of operator risk score. The charts on pages 82 onwards attempt to represent the cumulative and individual risk scores within aviation sectors, and how these are changing with time.

J.D. Stanton
Manager Intelligence Safety and Risk Analysis

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[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 2017 and trend over the preceding 9 years

This section is organised into three parts

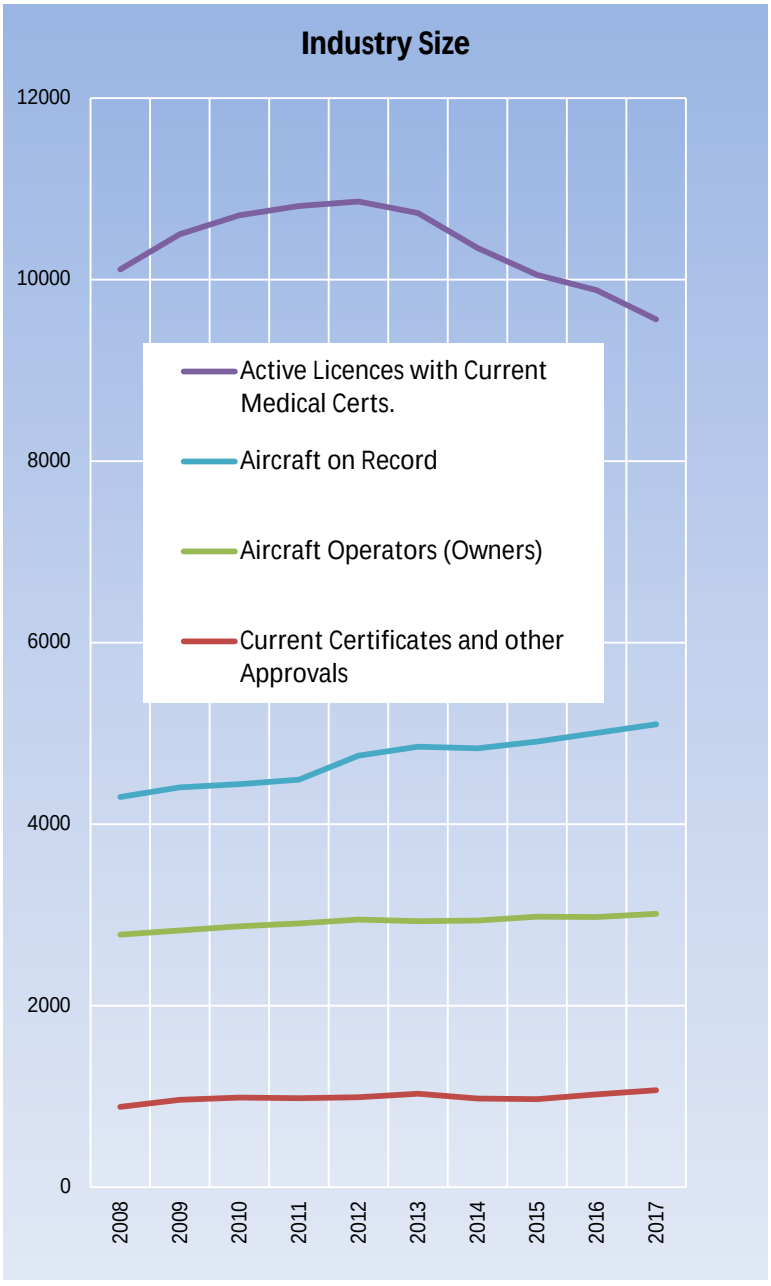
- Industry Size
- Industry Activity
- Safety Outcomes

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

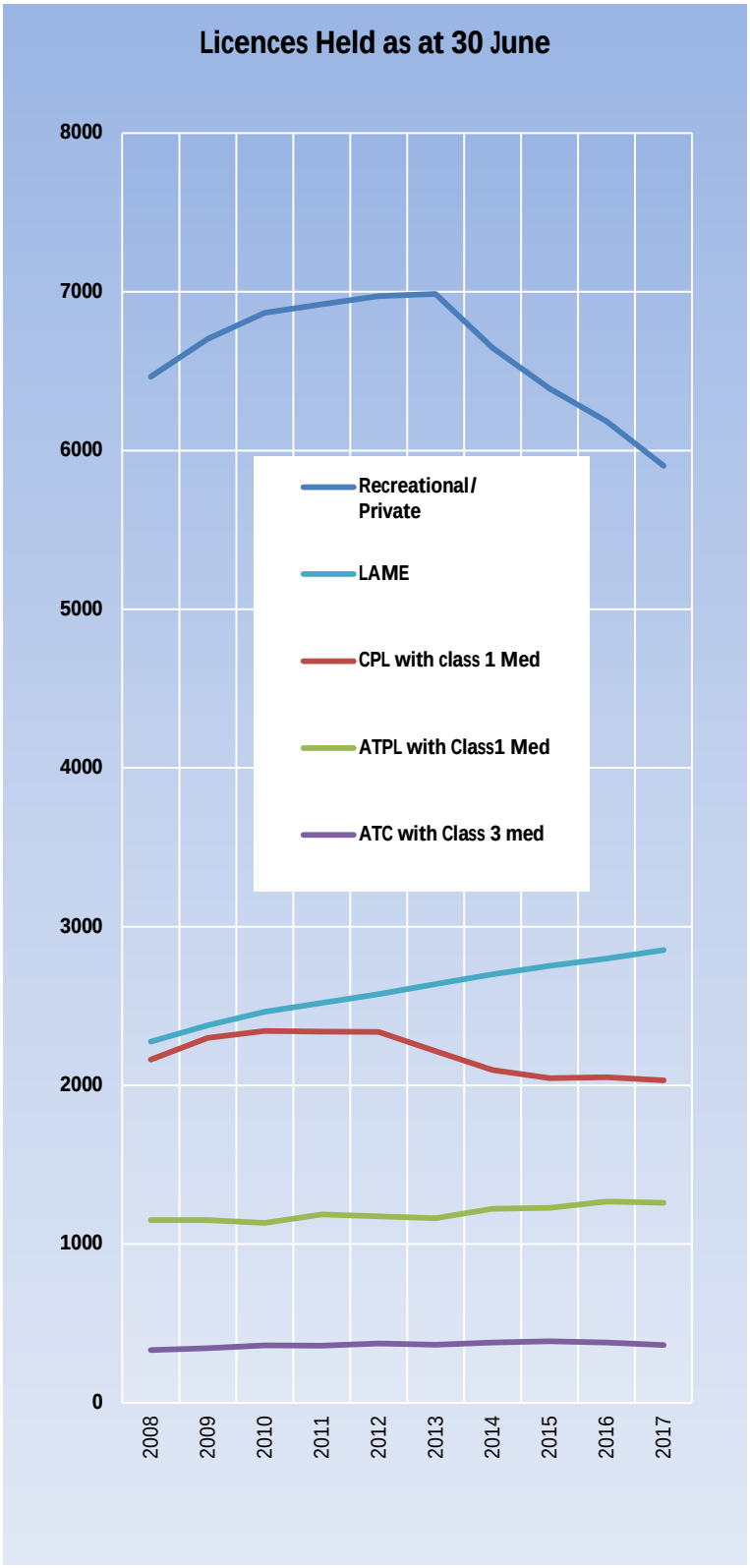
- Number of licenses (with current medical certificates as appropriate) at the year end
- Number of certificates and other operational approvals at the year end
- Number of aircraft operators (owners) at the year end
- Number of aircraft recorded as active at the year end

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 personnel licences held and the relatively steady long term increase in the number of aircraft on record.

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



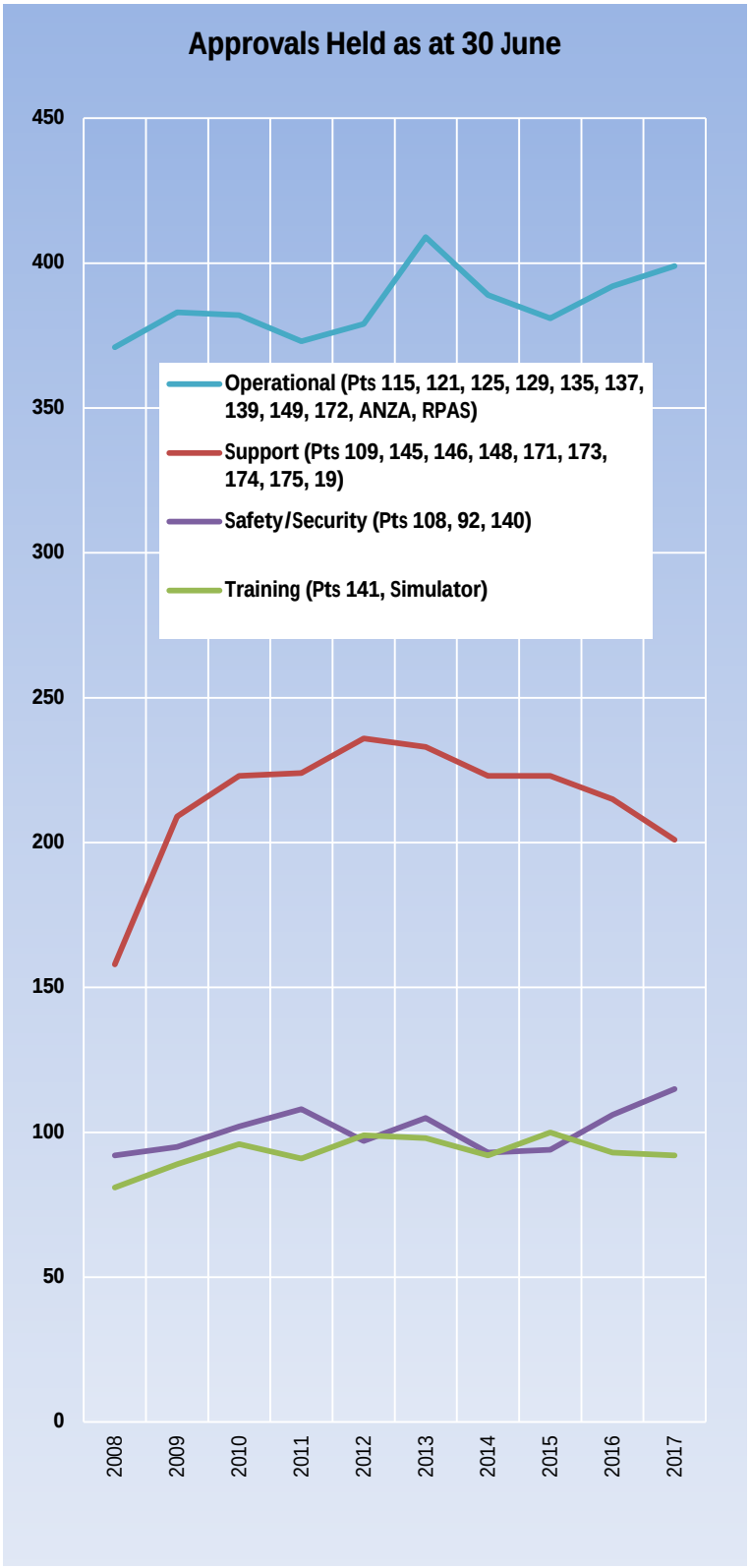
The 'Recreational/Private' group consists of holders of RPL licences who have current medical certification, plus PPL license holders with current medical certificate (class 1&2), and includes higher licence classes holding only class 2 medicals.

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.

Microlight certificates issued by Part 149 organisations are not included in this data.

For more detail see: Licences



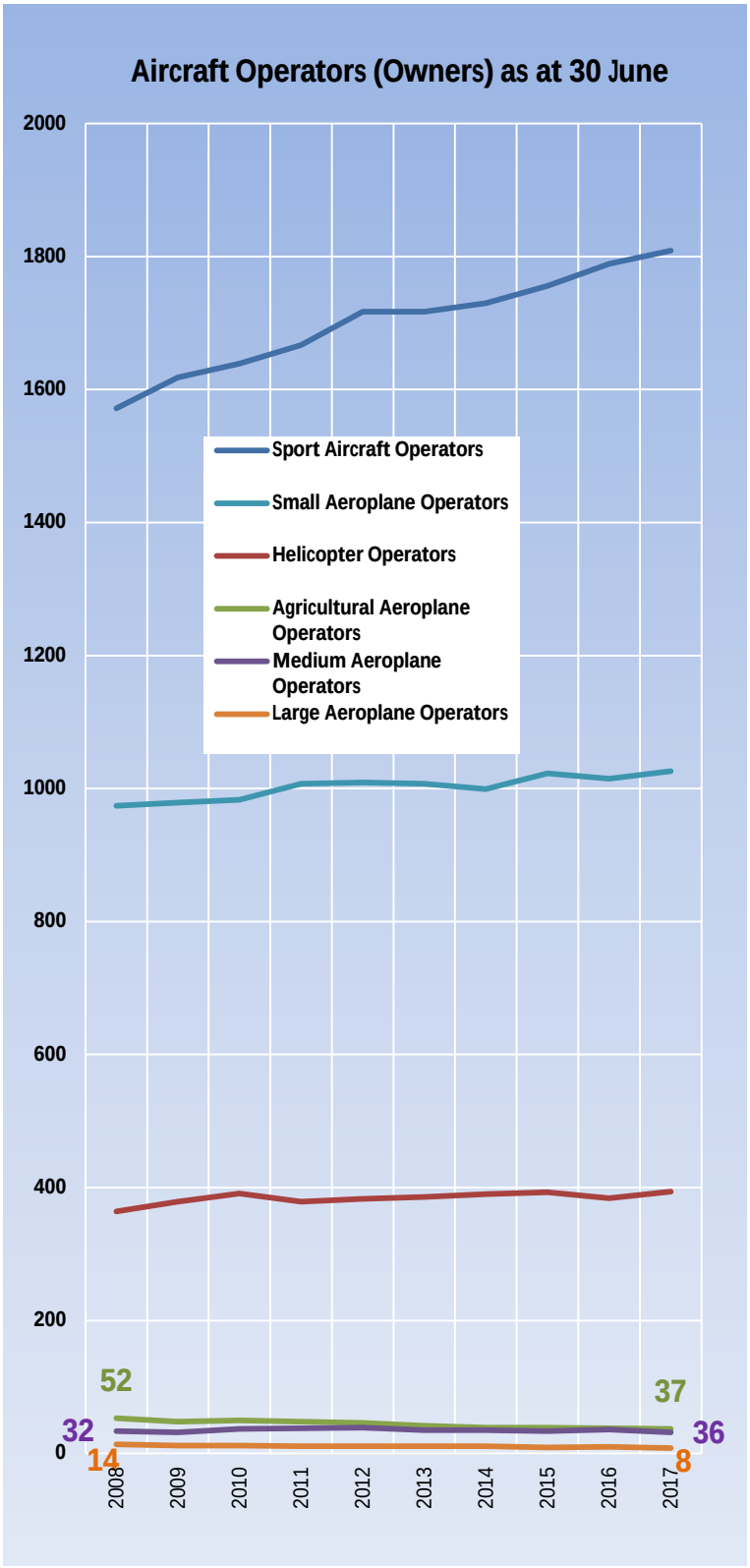
No significant trends are evident.

The number of Part 145 Aircraft Maintenance Organisation approvals peaked 5 years ago at 67 and has since declined to 53. 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 7 at the end of June 2017. This sector is closely monitored.

The numbers of Part 137 Agricultural Aircraft Operator approvals declined from 108 in 2007 to 99 in 2012 but have levelled out since then at just over 100. This sector is also closely monitored and the decline does not represent any safety concern.

For more detail see: Approvals



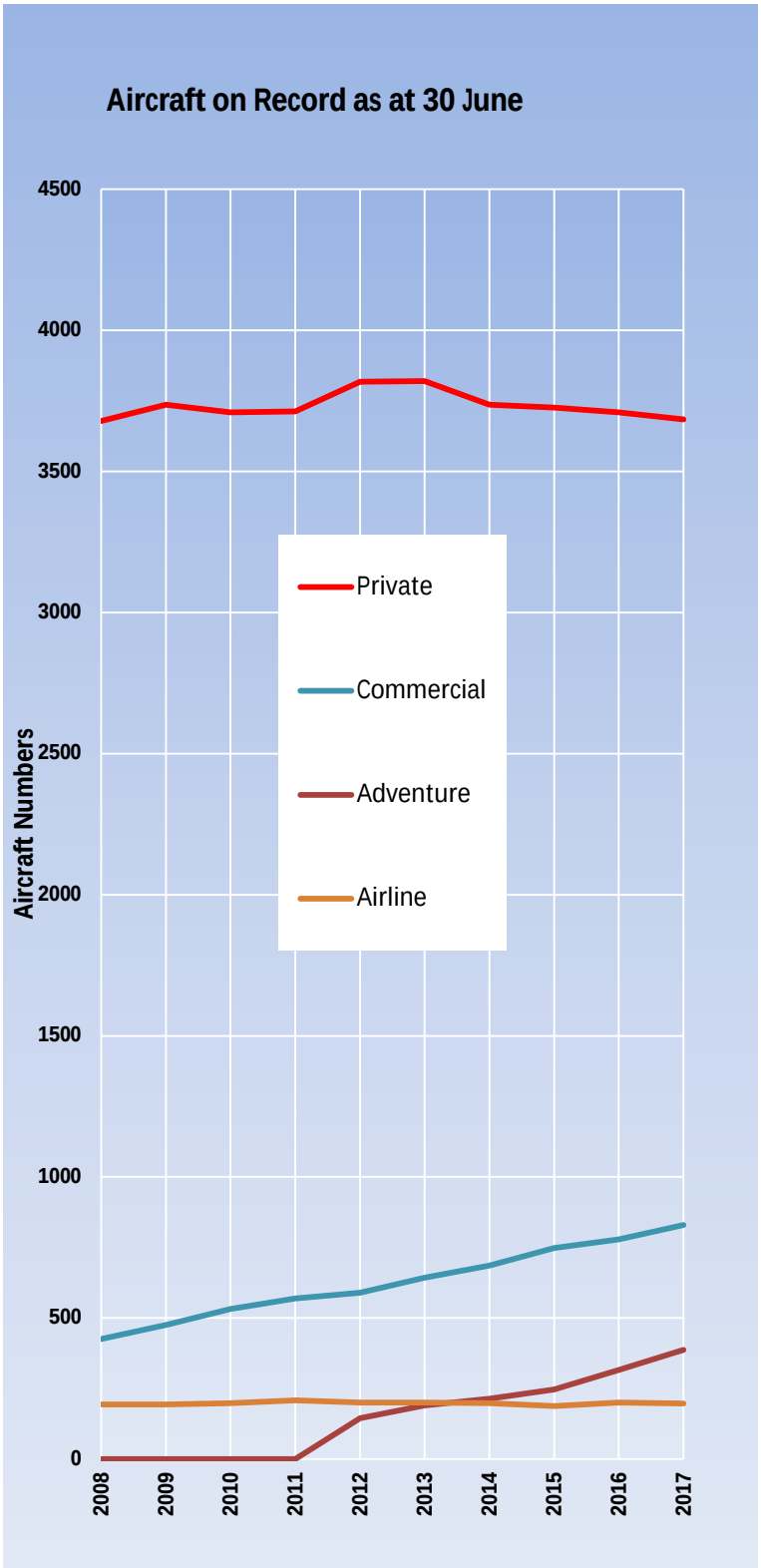
Those operators who operate more than one category of aircraft have been counted in each category. This means that any attempt to total the numbers will lead to more operators than actually exist.

The number of Large Aeroplane operators shows no significant recent trend but has declined by 6 since 2008. 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 32 and 35 since 2013.

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 2013 and have declined since then.

The most notable trend is in the commercial group where the numbers have increased by 115% since June 2007. Both fixed wing and rotary have contributed to this increase but the rotary component is the major factor having gone from 161 at the end of June 2008 to 472 at the end of June 2017, an increase of 193%.

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

For more detail see: Aircraft

Industry Activity

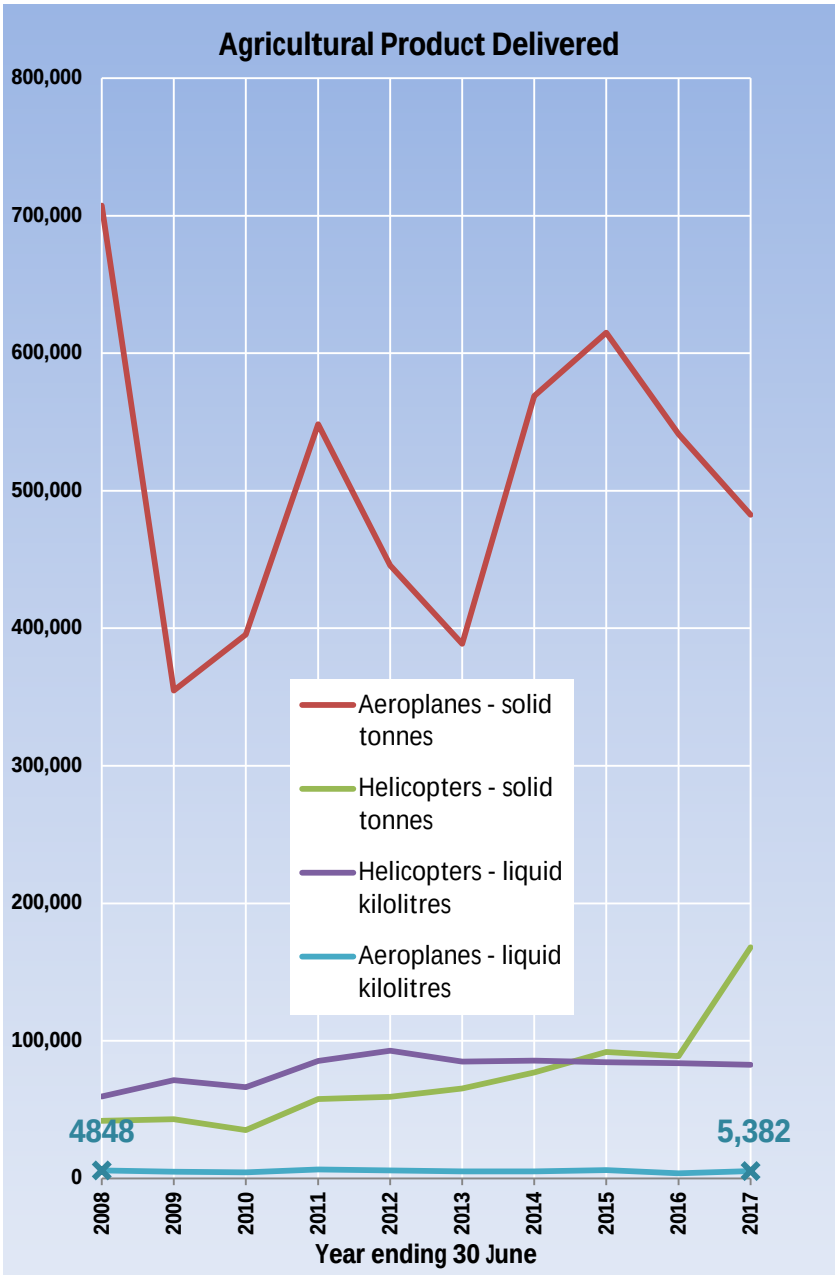
Most activity measures depend on operations statistics returns supplied by operators under the requirements of rule part 12.151 or rule part 19.103 for agricultural aviation statistics.

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 12% of expected agricultural returns and 28% of expected aircraft returns for the year ended 30 June 2017 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

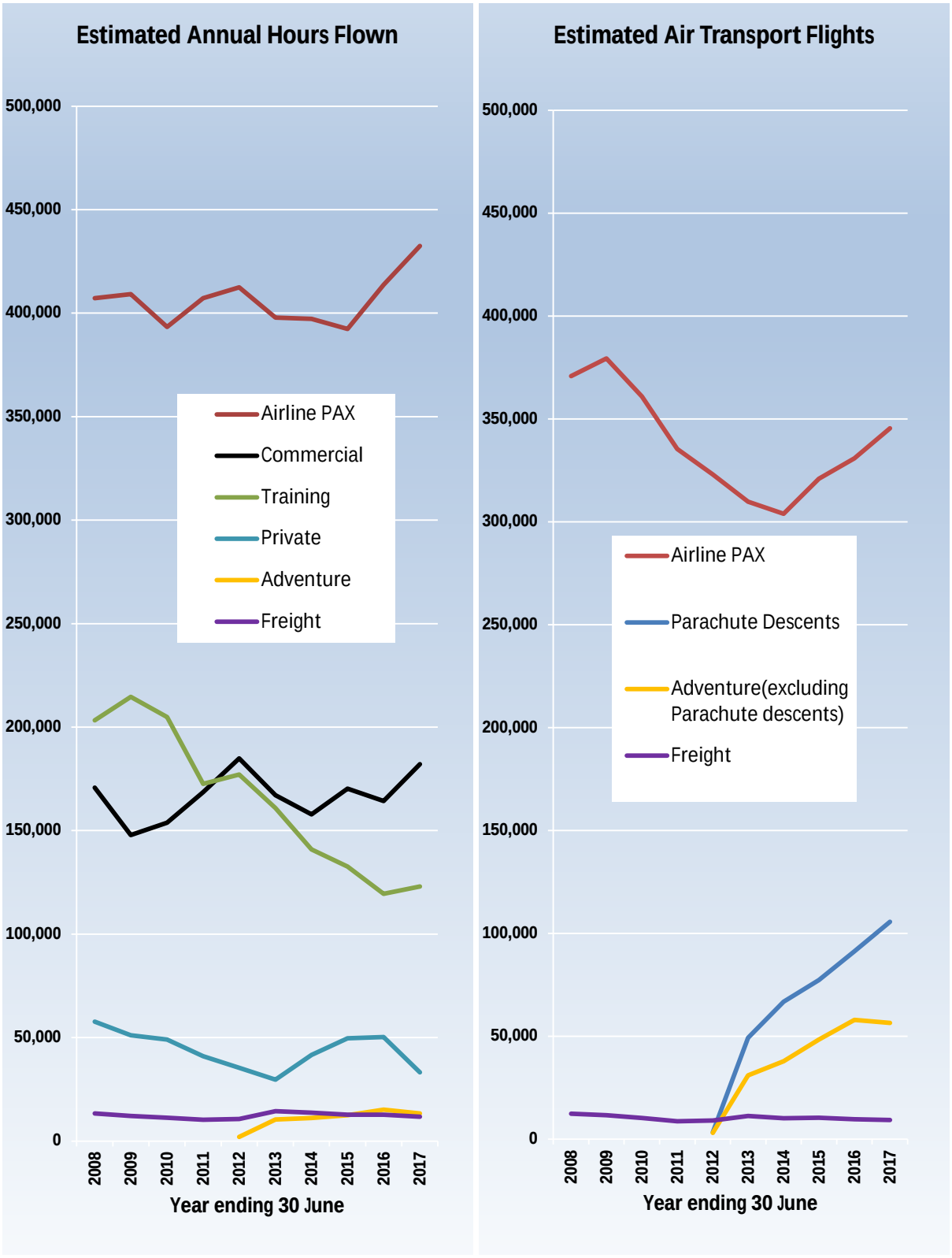
These measures are summarised in the following graphs that relate to years ending 30 June.



Trends in agricultural product delivery vary by aircraft type.

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

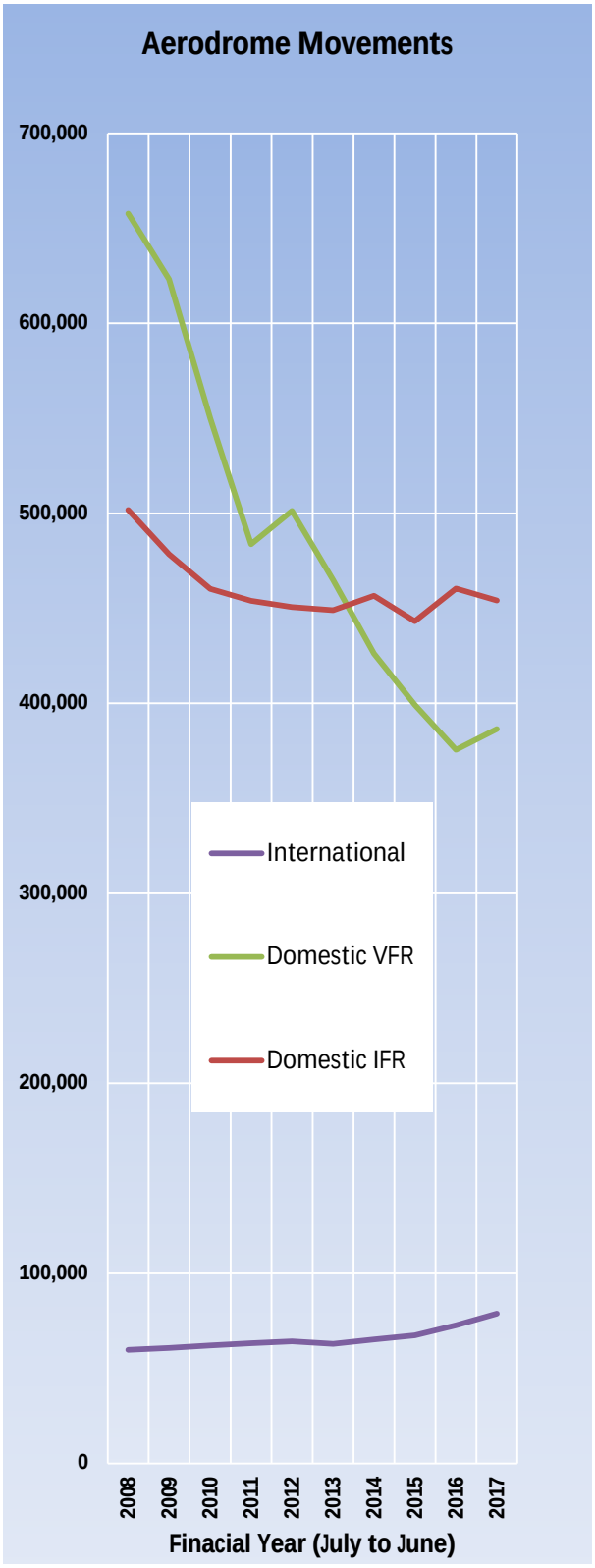
Solid tonnage applied by aeroplane has fluctuated significantly during the last ten years



The data presented here include 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 the more recent return periods.

Adventure aviation activity data was not mandated until the last quarter of 2011.

For more detail follow these links: Hours Flown Flights



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 26,000 over the 10 year period covered by this report and were 20144 during the 2017 financial year.

There has been a steady decline in VFR movements at Airways monitored aerodromes since a peak of 646,695 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

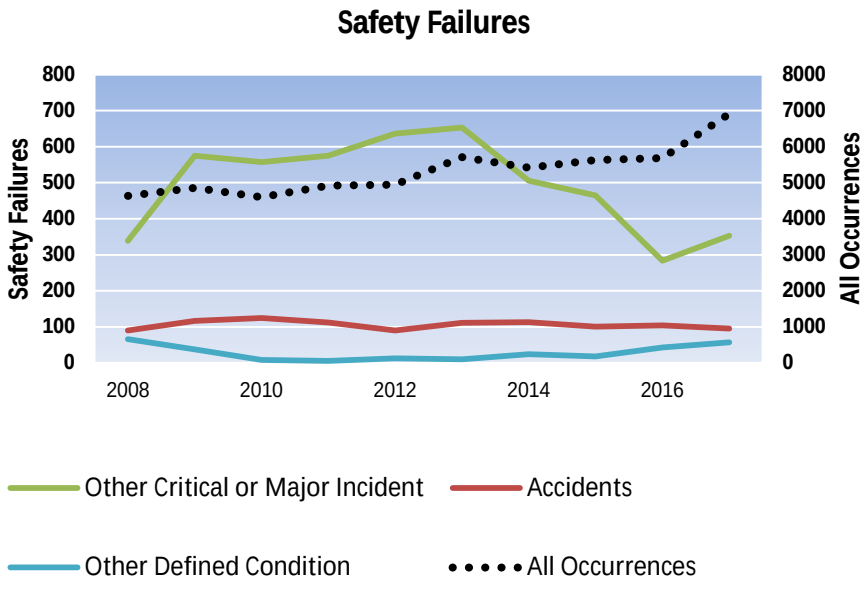
It is not practicable to summarise all of these measures in a concise form so this summary focusses on a concept of Safety Outcomes which classifies all reported occurrences into three groups, Safety Failures, Close Calls and Safety Successes. Aviation-Related Concerns and Risk Assessments are summarised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

The values relate to years ending 30 June

Safety Failures

We have taken a Safety Failure as:

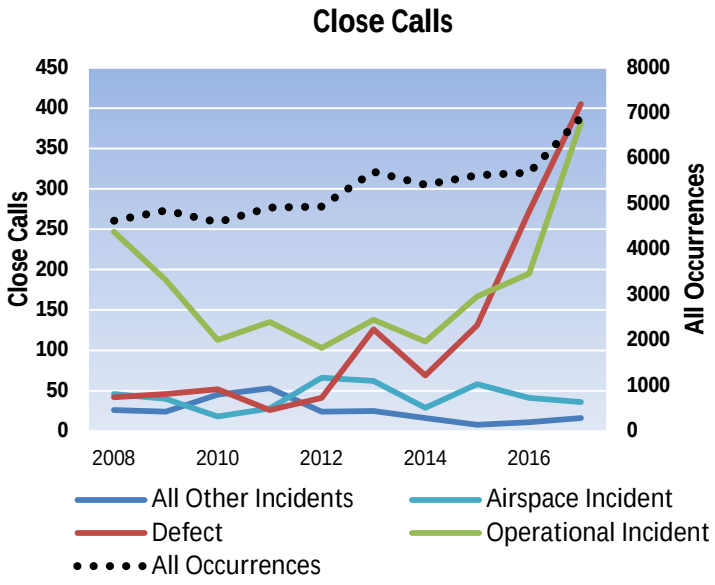
- an accident including hang glider and parachute accidents or
- an incident where the aircraft is written off, destroyed or missing or
- a critical or major incident or
- an incident that has any of 31 selected descriptors (see appendix), most of which relate to collision, serious landing outcomes,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



Whilst the goal for Safety Failures must be continuous reduction, it is difficult to identify a clear trend because of the small population. It is worthy of note that the number of 'Other Critical or Major' incidents declined from the 2013 to 2016 financial years but has increased over the last year. These 'Other' incidents are mostly (86%) made up of Operational Incidents, Airspace Incidents and Defects in decreasing order of frequency.

Close Calls

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

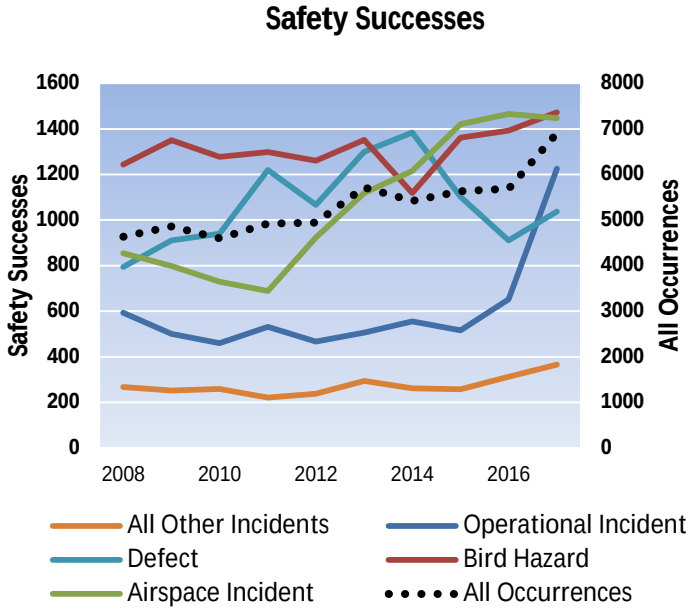


It needs to be noted that the total number of reported defect incidents increased by 96 from 1443 to 1539 during the last year and it is believed that a significant contributing cause is a lowering of the reporting 'threshold' by some operators.

The most obvious trend is the recent increase in the number of defect incidents that are close calls (266 more since 2015). This is accompanied by a decrease in those that are safety failures (124 fewer).

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 by a particular operator, the Routine Audit and Client Risk Assessment processes.

The Client Risk Assessment Process

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

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

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

Activity	Year ending 30 June									
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Part 137 Agricultural Aircraft Operator	26.5	19.0	16.6	16.3	15.5	15.6	14.6	15.1	15.2	14.1
Part 135 Air Operator Helicopters and Small Aeroplanes	22.0	17.4	16.7	15.9	15.8	15.3	13.9	14.5	15.0	13.5
Part 125 Air Operator Medium Aeroplanes	18.3	14.0	15.3	16.1	12.8	14.2	13.8	16.3	14.9	13.1
Part 115 Adventure Aviation Operator Certificate						30.6	13.2	12.2	13.4	13.0
Part 140 Aviation Security Service Organisation	11.0	4.7	5.5	4.5	4.8	5.0	6.1	6.1	8.1	12.8
Part 172 Air Traffic Service Organisation	26.7	7.3	9.7	9.9	22.0	19.1	15.1	12.8	13.2	12.6
Part 129 Foreign Air Transport Operator	12.9	10.6	8.2	8.9	9.6	8.3	6.8	6.4	9.5	11.8
Part 109 Regulated Air Cargo Agent		7.7	13.9	11.2	10.4	11.7	12.7	12.4	11.1	10.6
Part 148 Aircraft Manufacturing Organisation	12.2	11.8	10.4	11.2	10.8	9.4	10.9	11.7	9.6	10.2
Part 149 Aviation Recreation Organisation	3.0	5.1	30.7	8.4	16.2	11.4	14.4	16.2	16.3	9.9
Part 19F Supply Organisation	12.1	12.6	11.1	11.2	10.2	9.1	10.8	10.2	10.3	9.2
Part 146 Aircraft Design Organisation	12.3	9.0	7.6	11.8	10.2	9.4	8.2	8.8	8.3	8.8
Part 145 Maintenance Organisation	12.0	10.7	10.8	10.3	11.1	9.4	9.8	10.3	9.3	8.3
Part 121 Air Operator Large Aeroplanes	11.1	9.5	10.5	10.0	7.8	8.0	8.2	7.6	9.6	8.1
Australia AOC with ANZA Privileges Part 108 Security Programme			5.5	5.9	7.0	6.1	5.6	7.4	8.2	8.1
Part 139 Aerodrome Operator	6.6	5.3	6.3	5.7	5.8	5.9	6.5	7.2	8.6	7.1
Part 108 Security Programme	7.9	7.7	8.3	7.5	7.1	7.0	6.4	6.9	7.6	6.8
Part 92 Dangerous Goods Packaging Approval Holder			2.6	5.6	10.9	5.1	8.4	7.4	12.7	6.7
Part 141 Aviation Training Organisation	15.6	11.8	11.4	9.5	10.7	9.3	8.3	9.3	8.9	6.7
Part 171 Telecom Service Organisation	10.8	6.0	4.9	6.8	17.3	12.7	6.6	5.1	5.0	5.4
Part 174 Meteorological Service Organisation	30.2	7.3	9.6	10.3	15.9	10.7	5.1	5.3	6.1	4.7
Part 173 Instrument Flight Procedure			5.9	8.2	15.4	13.0	11.1	13.5	8.9	4.4
Part 175 Aeronautical Info Service Organisation	34.4	6.2	7.6	12.1	21.2	14.6	11.1	43.3	5.3	3.6

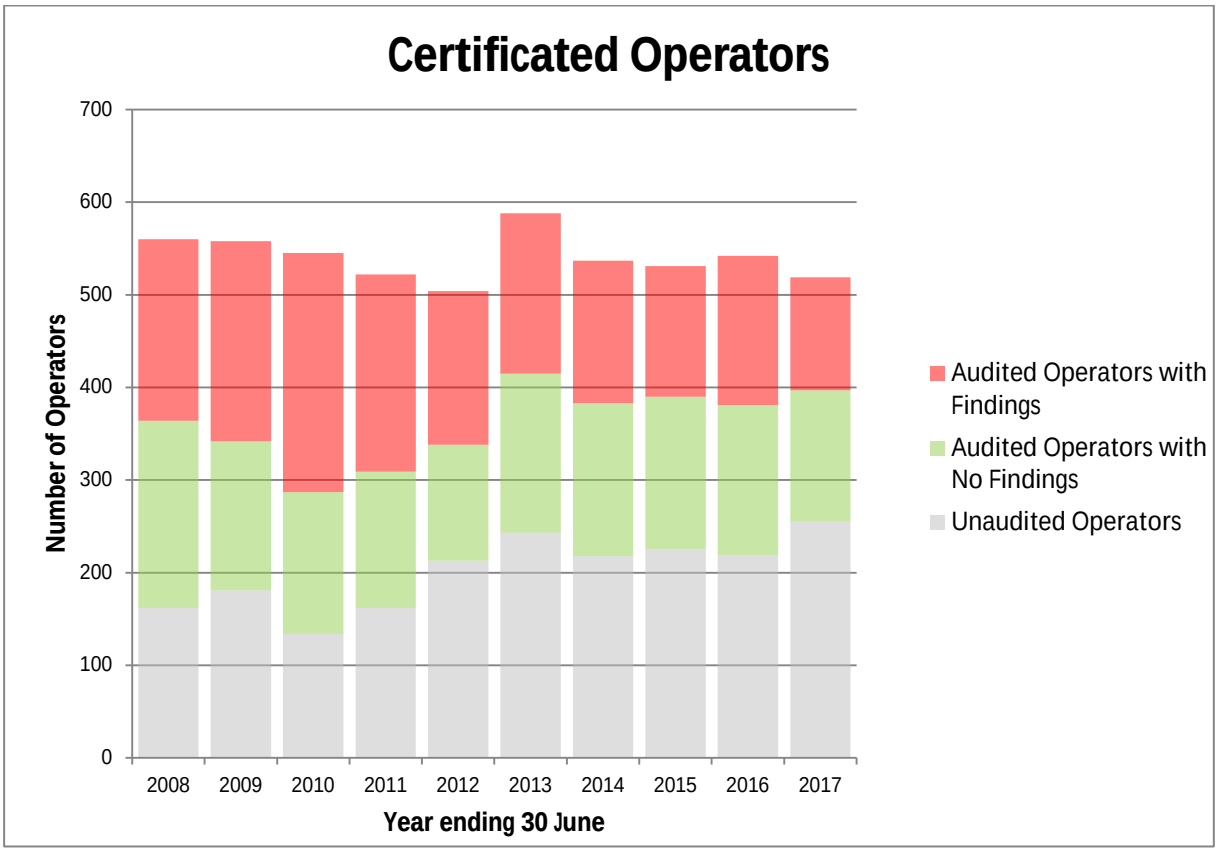
When a client is initially certificated their risk score is automatically high. It gradually declines as the client builds up operational experience. The Part 115 holders illustrate this effect well.

Activities where this expected trend is not established or has reversed include Part 149, Part 129, Part 172, Part 175 and Part 140

The Routine Audit Process

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

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



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

Industry Size and Activity Data

Registered Aircraft

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

Aircraft Category and Class	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Large Aeroplane	**119**	120	119	128	126	128	127	117	131	135
Medium Aeroplane	**75**	74	79	80	79	79	77	77	75	70
Small Aeroplane	**1480**	1519	1518	1521	1525	1531	1497	1499	1498	1508
Helicopter	**725**	752	767	765	770	787	798	828	825	838
Agricultural Aeroplane	**116**	111	109	110	109	106	102	93	93	91
Sport Aircraft - Aeroplanes	**110**	117	119	124	136	148	159	167	173	174
Sport Aircraft - Amateur Built Aeroplane	**234**	245	251	255	265	273	279	279	290	296
Sport Aircraft - Amateur Built Glider	**4**	4	4	4	4	3	3	3	3	3
Sport Aircraft - Amateur Built Helicopter	**18**	19	21	21	22	23	24	23	24	22
Sport Aircraft - Balloons	**67**	72	69	70	72	70	61	64	60	61
Sport Aircraft - Glider	**317**	303	301	300	296	293	285	283	284	284
Sport Aircraft - Gyroplane	**34**	39	42	40	38	41	49	57	64	72
Sport Aircraft - Hang Glider	**0**	0	0	0	13	13	18	18	20	24
Sport Aircraft - Helicopter	**4**	5	5	5	5	6	4	5	5	5
Sport Aircraft - Jet Pack	**0**	0	0	0	0	0	0	1	3	6
Sport Aircraft - Microlight Class 1	**250**	243	234	231	226	220	214	207	205	207
Sport Aircraft - Microlight Class 2	**698**	735	754	788	812	825	827	860	873	881
Sport Aircraft - Power Glider	**48**	48	48	48	47	46	46	47	51	51
Sport Aircraft - Parachute	**0**	0	0	0	174	195	198	204	240	266
Sport Aircraft - Para Glider	**0**	0	0	0	35	67	67	77	88	104
Total	**4299**	**4406**	**4440**	**4490**	**4754**	**4854**	**4835**	**4909**	**5005**	**5098**

Statistically significant growth areas are:

- gyroplanes – from 38 in 2012 to 72 in 2017
- sport aeroplanes – from 110 in 2008 to 174 in 2017
- Part 115 hang gliders – from 13 in 2012 to 24 in 2017
- Part 115 parachutes – from 174 in 2012 to 266 in 2017
- Part 115 para gliders – from 35 in 2012 to 104 in 2017

Moderate declines are evident for

- class 1 microlights - from 249 in 2007 to 207 in 2017
- agricultural aeroplanes – from 116 in 2008 to 91 in 2017

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

Licences

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

Licences	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Recreational (RPL with Med or any Class2 Med only or any PPL only)	6466	6704	6868	6921	6973	6987	6647	6389	6184	5904
CPL with class 1 Med	2162	2300	2344	2339	2337	2217	2098	2046	2051	2032
ATPL with Class1 Med	1152	1152	1134	1188	1175	1163	1223	1228	1268	1261
ATC with Class 3 Med	332	345	363	361	374	367	381	387	381	364
LAME	2276	2378	2463	2519	2575	2639	2699	2754	2800	2852
Total	12388	12879	13172	13328	13434	13373	13048	12804	12684	12413

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.

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

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

The numbers of 'Recreational' Pilot licence holders have been declining since 2013 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:	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Large Aeroplanes	14	12	12	11	11	11	11	9	10	8
Medium Aeroplanes	34	32	37	38	39	35	35	34	36	32
Agricultural Aeroplanes	53	48	50	48	46	42	39	39	38	37
Helicopters	364	379	391	379	383	386	390	393	384	394
Small Aeroplanes	974	979	983	1007	1009	1007	999	1023	1015	1026
Sport Aircraft	1572	1618	1639	1667	1717	1717	1730	1756	1789	1809

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 42% drop in the number of large aeroplane operators and a 30% drop in the number of agricultural aeroplane operators over the last ten years along with increases of 8%, and 15% in the numbers of helicopter and sport aircraft operators over the same period.

Certificated Operators

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

Approval	Years 20--									
	08	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
Part 109 Regulated Air Cargo Agent	0	55	63	63	63	67	65	65	66	**65**
Part 115 Adventure Aviation Operator	0	0	0	0	20	33	28	28	28	**29**
Part 119 Air Operator	174	182	185	184	181	185	179	172	172	**174**
Part 119 Air Operator - Pacific	3	1	0	0	0	0	0	0	0	**0**
Part 129 Foreign Air Operator	38	40	37	33	28	31	30	28	36	**43**
Part 137 Agricultural Aircraft Operator	108	108	108	104	99	103	99	103	103	**102**
Part 139 Aerodromes	25	26	26	26	26	27	25	27	27	**27**
Part 140 Aviation Security Service	1	1	1	1	1	1	1	1	1	**1**
Part 141 Aviation Training Organisation	48	53	58	54	57	57	53	56	53	**52**
Part 141 Restricted Training Organisation	0	0	0	0	0	0	0	0	0	**0**
Part 145 Aircraft Maintenance Organisation	57	55	55	60	67	66	58	56	55	**53**
Part 146 Aircraft Design Organisation	11	10	13	14	15	14	14	14	12	**12**
Part 148 Aircraft Manufacturing Organisation	22	21	22	21	23	20	20	20	20	**17**
Part 149 Aviation Recreation Organisation	8	9	9	9	9	7	8	8	8	**8**
Part 171 Aeronautical Telecommunication Service Organisation	3	2	2	2	2	2	2	2	2	**2**
Part 172 Air Traffic Service*	1	1	1	1	1	1	1	1	1	**1**
Part 173 Instrument Flight Procedure Service Organisation	0	1	3	3	3	3	4	2	2	**2**
Part 174 Meteorological Service Organisation	2	2	2	2	2	2	2	2	2	**2**
Part 175 Aeronautical Information Service Organisation	2	2	2	1	1	1	1	2	2	**2**
Part 19 Supply Organisation Certificate of Approval	61	61	61	58	60	58	57	60	54	**46**
Part 92 Dangerous Goods Packaging Approval*	40	46	56	65	57	62	52	57	59	**61**
Part 129/108 Security Programme	30	30	26	25	21	23	22	20	28	**37**
Part 119/108 Security Programme	21	18	19	17	18	19	18	16	18	**16**
Part 121 Large Aeroplanes	11	10	10	9	9	9	9	7	8	**6**
Part 125 Medium Aeroplanes	16	15	15	15	15	16	14	13	15	**13**
Part 135 Helicopters and Small Aeroplanes	161	171	174	174	171	173	168	163	162	**166**
Australian AOC Operating with ANZA Privileges	0	2	2	2	1	2	2	2	4	**4**
Synthetic Training Device (Airlines)	6	7	10	10	9	9	11	14	12	**11**
Synthetic Training Device (General Aviation)	27	29	28	27	33	32	28	30	28	**29**
Pilotless Aircraft Authorisation	0	0	0	0	0	7	5	1	0	**0**
Part 102 Unmanned Aircraft Operator Certificate	0	0	0	0	0	0	0	0	45	**89**
Total	**886**	**962**	**988**	**980**	**992**	**1030**	**976**	**970**	**1023**	**1070**

* Note:

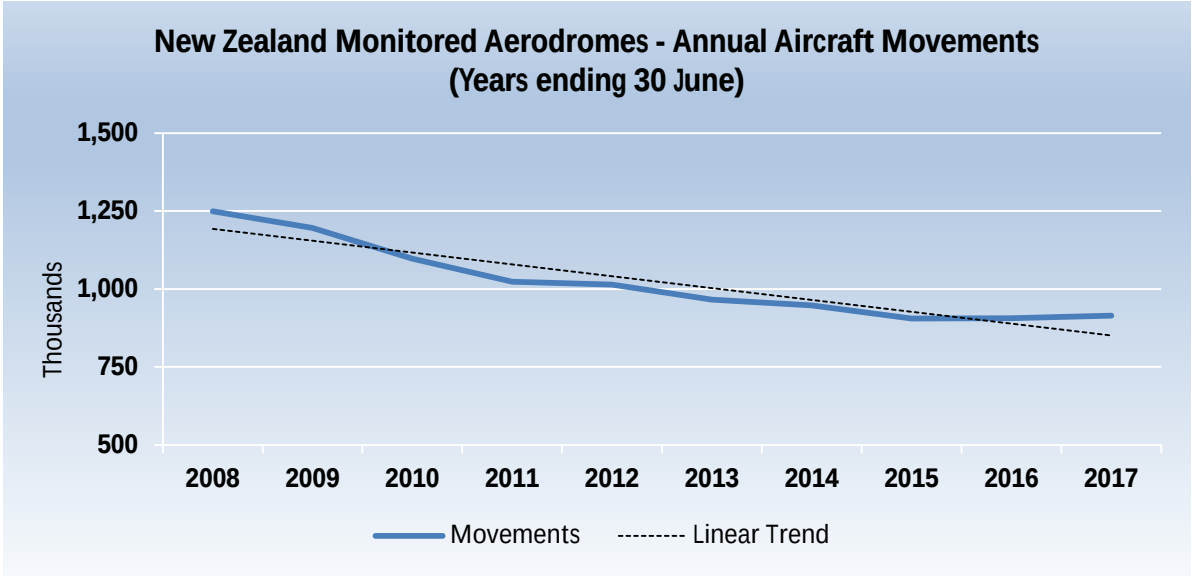
For organisations with Part 92 and for those with Part 172 certificates the figures show the total number of services that are certificated. This does not necessarily equate to the number of organisations that hold the certificate.

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 30 June 2017. 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

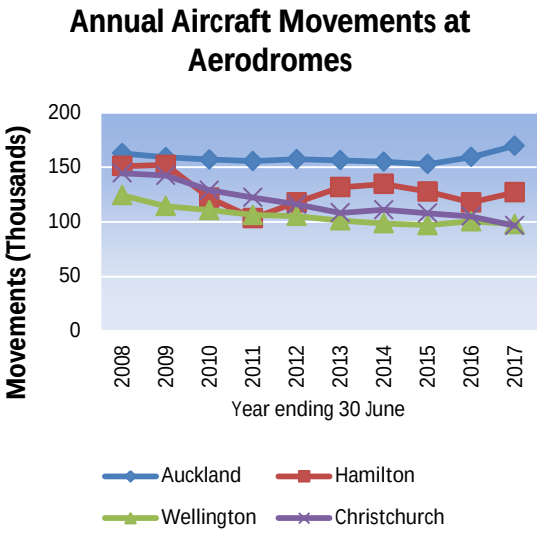
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Auckland	162749	159157	157032	155609	157365	156405	155093	152792	159294	**169701**
Hamilton	151143	152062	122086	103408	117870	131795	134701	127861	117762	**126994**
Wellington	124399	114440	110817	106426	105323	101279	98601	97023	100522	**97972**
Christchurch	144645	142434	128984	122352	116007	108259	111140	107996	105109	**96618**
Tauranga	104984	101664	93360	76784	72158	73193	64903	52590	56145	**61114**
Queenstown	50264	46471	44831	41406	43943	42070	43861	47991	52828	**55262**
Nelson	49381	48653	49813	50610	50295	46531	45139	45283	48065	**47058**
Palmerston North	94396	67646	55504	59476	68073	62881	53753	53534	48030	**44303**
Ohakea	76069	75263	68597	56850	44154	27459	36007	28429	29670	**26690**
Paraparaumu			6305		30151	35639	23959	26055	26805	**24943**
Dunedin	49502	60995	46661	35213	28236	23300	23628	22412	22183	**23092**
Napier	26242	25965	25661	27725	25720	23963	24042	22371	22541	**22177**
Woodbourne	26806	24317	22887	23703	23124	22077	21229	21416	21626	**21206**
Taupo	34102	32024	29370	27224	26558	24146	22976	21476	22393	**20144**
New Plymouth	45731	43775	40578	34590	31687	27797	23402	21011	19340	**19454**
Milford	16933	14185	14426	13094	12931	13918	12836	15356	16847	**19007**
Rotorua	28583	24135	23331	22089	23100	22103	21204	19528	18671	**18973**
Invercargill	24810	25841	26251	29483	31268	25230	21468	17907	16346	**17901**
Gisborne	24157	24083	23279	22295	21563	18054	17149	15728	15989	**15128**
Whenuapai	13915	12918	13642	14981	14107	15145	15909	14711	13239	**11126**

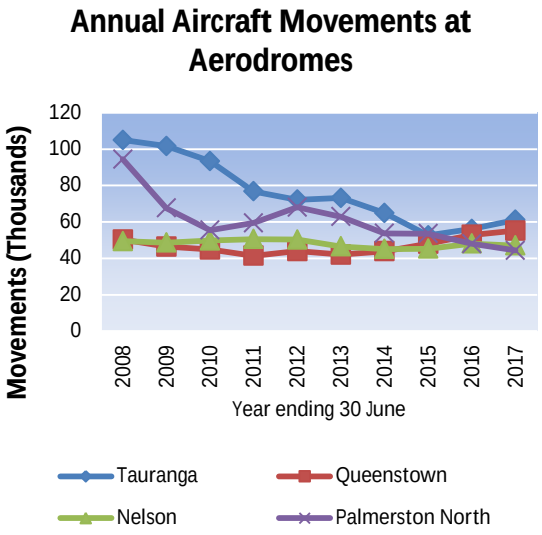
Movements data for individual aerodromes are graphed on the next page.

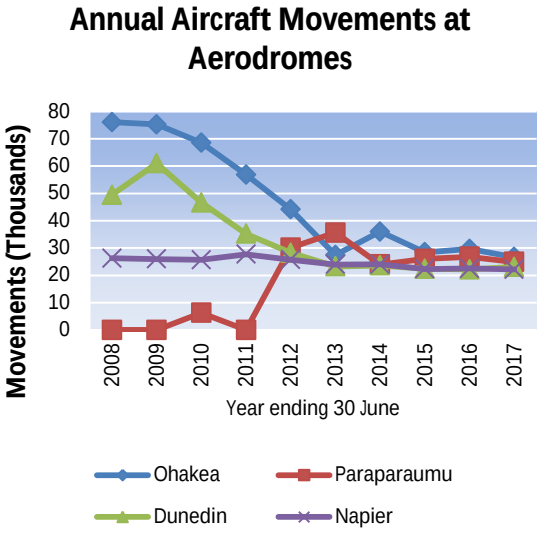
The aerodromes are grouped by the number of movements over the last year covered by this report.

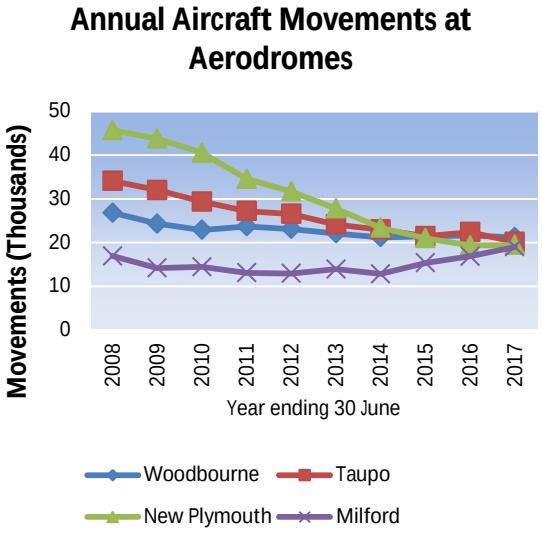
Note that the scales are different for each chart to prevent the smaller aerodromes' graphs from becoming unreadable which would happen if all the charts had the same scales.

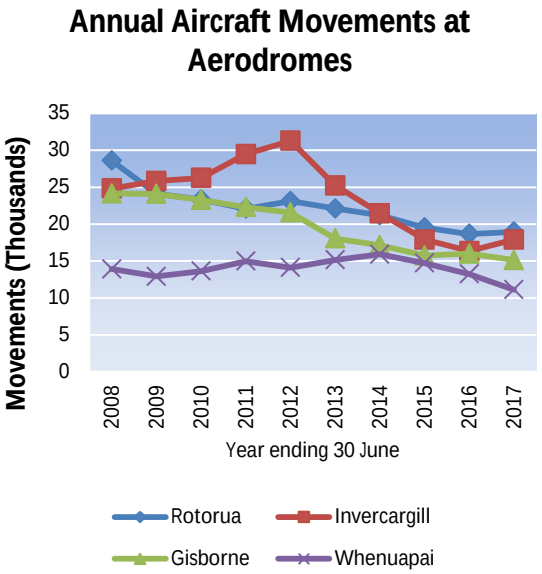
No information is available for Ardmore aerodrome although it is reported in the AIP as NZ's busiest aerodrome. The 2015 update of Part 139 which requires all aerodromes that are published in the AIP to supply movement data should ensure that a more complete picture of aerodrome movements will be available in the future.


Annual Aircraft Movements at Aerodromes
Movements (Thousands)
200
150
100
50
0
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
Year ending 30 June
Auckland
Hamilton
Wellington
Christchurch


Annual Aircraft Movements at Aerodromes
Movements (Thousands)
120
100
80
60
40
20
0
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
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
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
Year ending 30 June
Ohakea
Paraparaumu
Dunedin
Napier

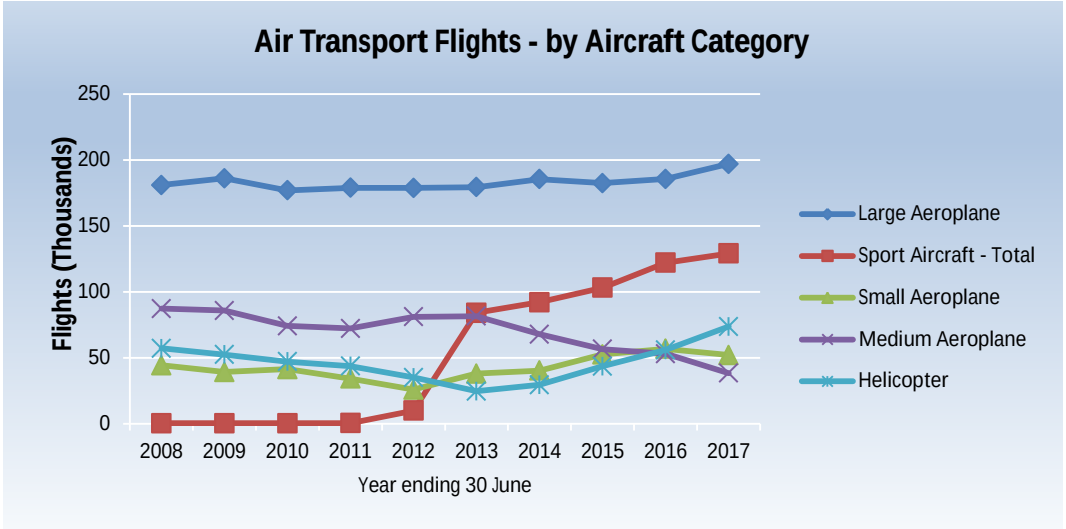

Annual Aircraft Movements at Aerodromes
Movements (Thousands)
50
40
30
20
10
0
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
Year ending 30 June
Woodbourne
Taupo
New Plymouth
Milford


Annual Aircraft Movements at Aerodromes
Movements (Thousands)
35
30
25
20
15
10
5
0
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
Year ending 30 June
Rotorua
Invercargill
Gisborne
Whenuapai

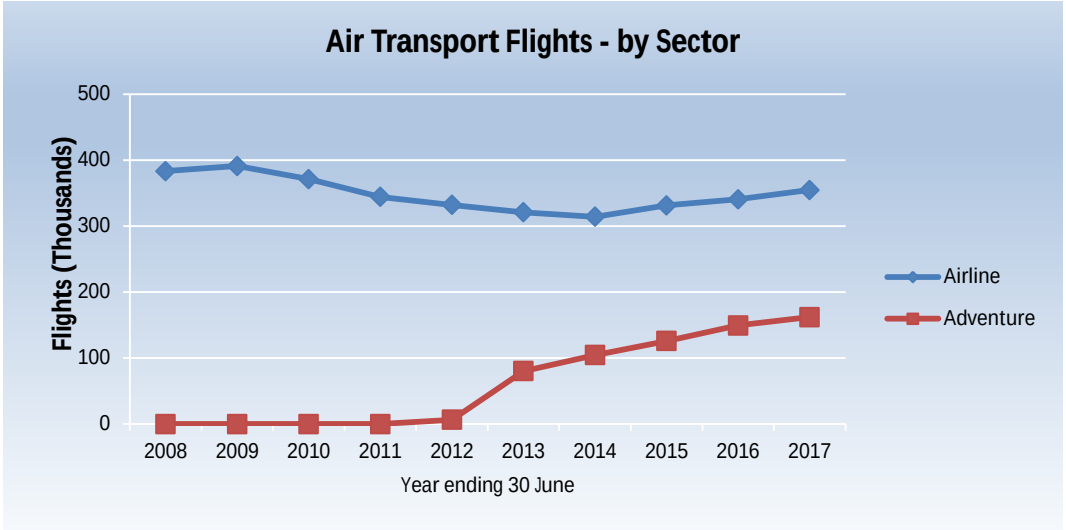
Air Transport Flights

The following graphs show the estimated number of air transport flights for the ten years ending 30 June 2017. 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.

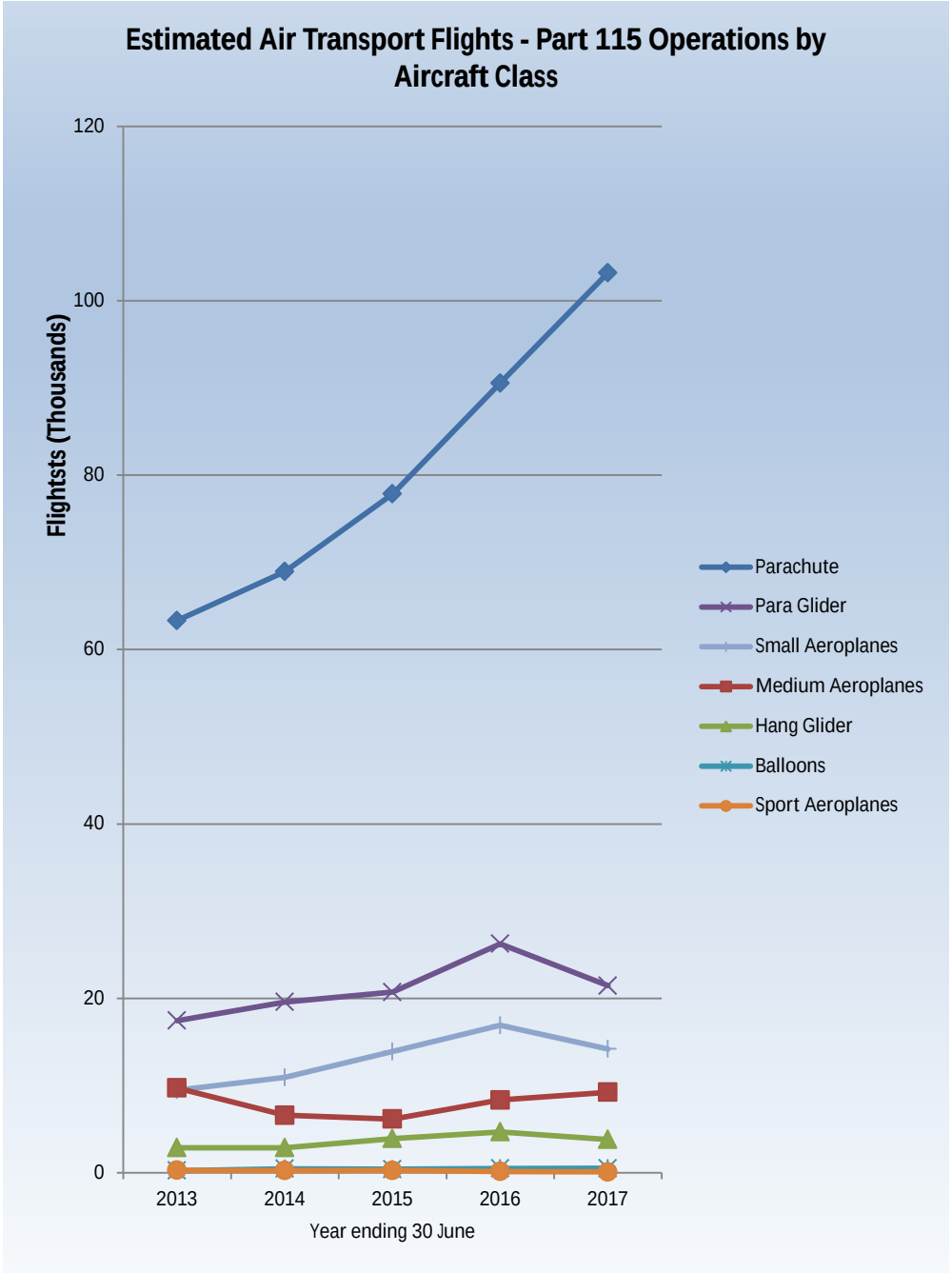


Apart from the emergence of adventure aviation flights the only trend that may be worthy of note is that Helicopter Air Transport Flights have reversed the declining trend that existed since 2009 and now exceed 2008 levels by 29%. This change is believed to relate at least in part to the growth in tourism. The increase in tourism is also likely to be driving the increase in large aeroplane flights.



The Airline flights graph shows an overall decrease of 14% over the ten years, although in the last three years the number of flights has steadily increased. The 14% decrease is significantly less than the 27% decrease in movements at the monitored aerodromes. This disparity probably reflects the number of airline helicopter flights which are not all reflected in the monitored aerodromes data.

It is interesting to note that the recent increase in airline sector flights is appearing in the aerodrome movements data for Auckland and Queenstown. The increase traffic in Queenstown is likely to be also influencing the increased movements recorded for Invercargill, which is a bad weather alternate for Queenstown.



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.

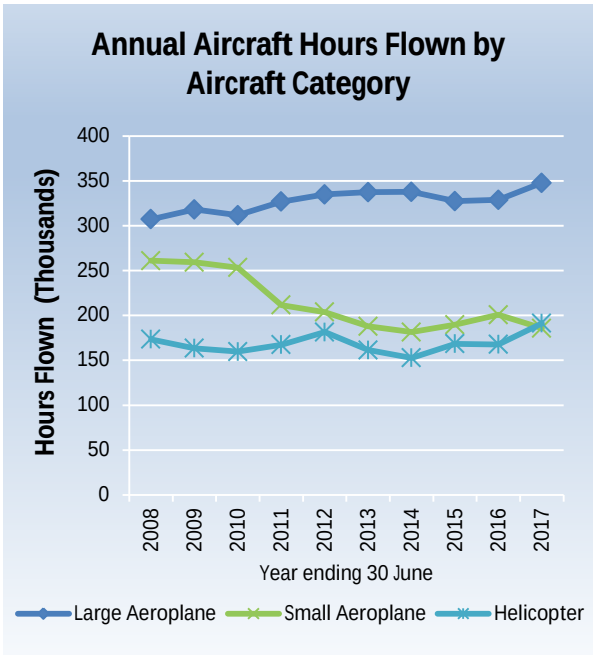
Sport aeroplanes and balloons conduct less than 1000 adventure aviation flights each per year. The reported figures for 2017 (30 June year-end) are 181 and 552 respectively. (The balloon curve is obscured by sport aeroplane curve in the graph above)

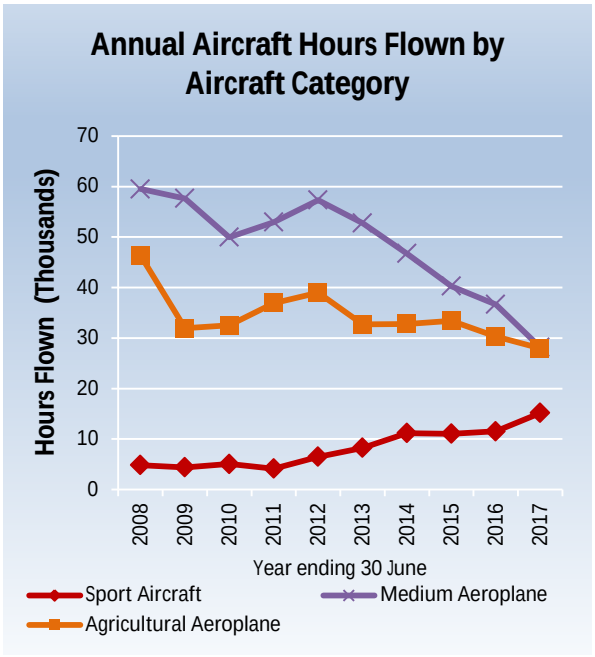
The most obvious trend is the steady growth in the sector particularly in parachute flights.

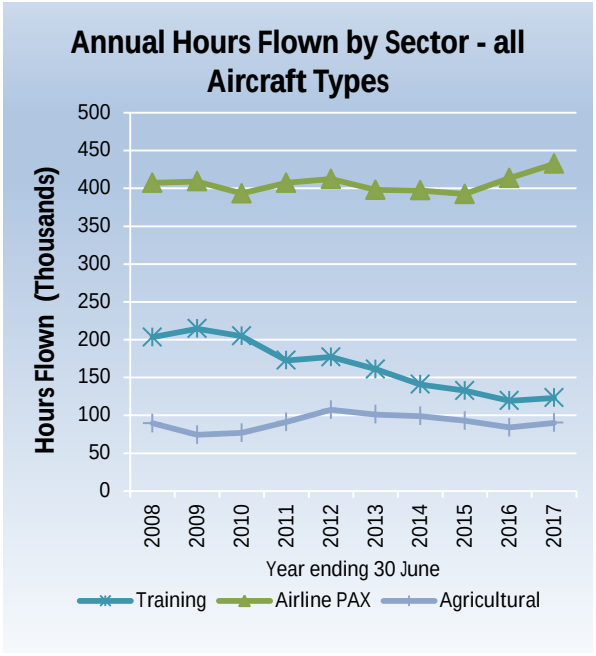
Hours Flown

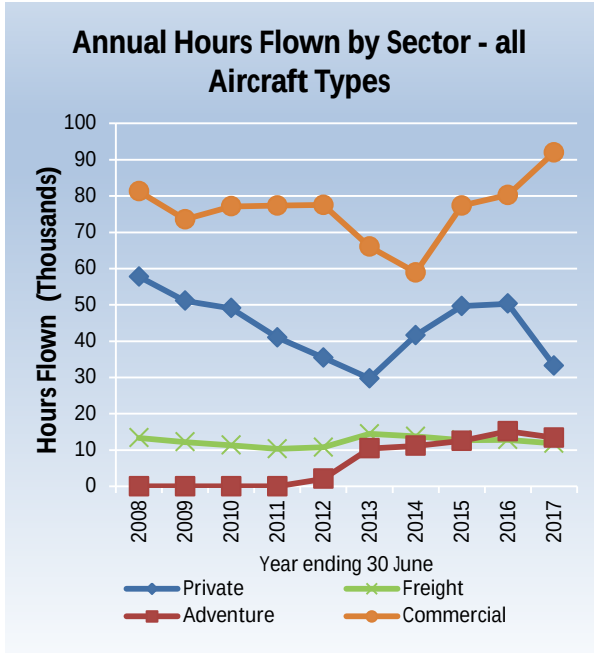
The following graphs show the estimated number of annual hours flown during the ten year period ending 30 June 2017. The estimates are based on the reported hours with an allowance for aircraft for which reports were not received. Recent improvements in the collection procedure for operating statistics data have resulted in improved return rates with a consequent improvement in confidence in the published data.

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









Seat-Hours

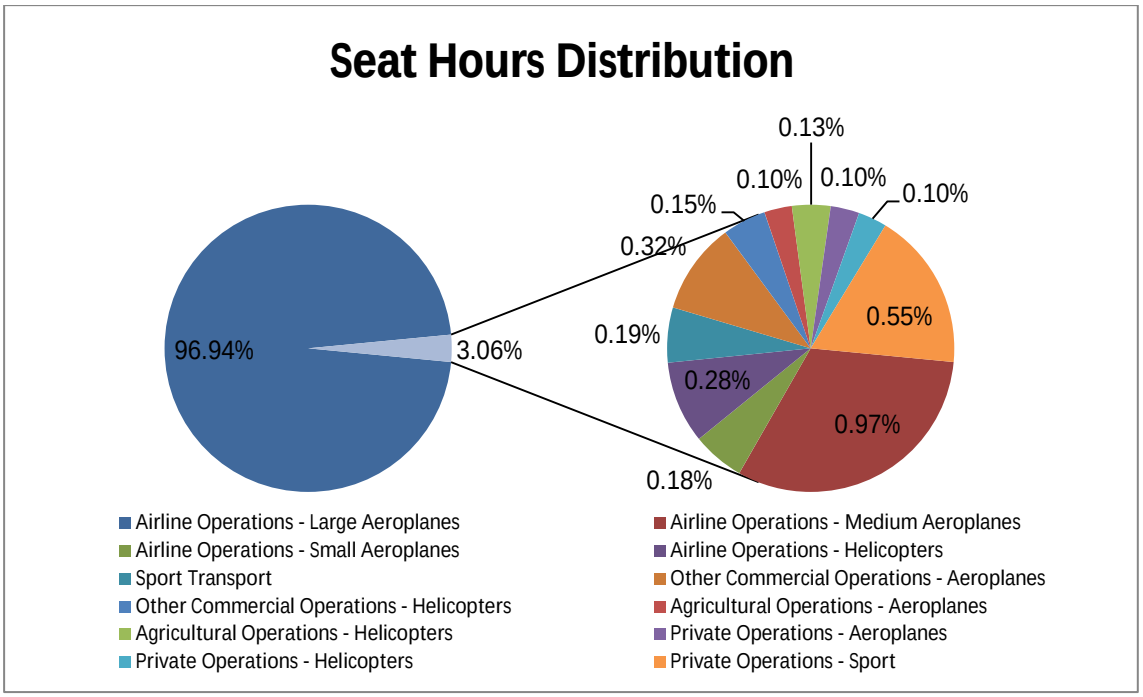
The following table indicates the size of the aviation industry as determined from Aircraft Operating Statistics in the relevant 2010 Safety Target Group categories for years ending 30 June.

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

The values in the table are thousands of seat hours.

Safety Outcome Target Group	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Airline Operations - Large Aeroplanes	44,747	47,028	45,232	47,504	48,779	49,556	49,560	47,948	48,202	**49,270**
Airline Operations - Medium Aeroplanes	786	764	656	696	732	679	581	481	447	**408**
Airline Operations - Small Aeroplanes	116	99	104	110	106	102	73	89	150	**112**
Airline Operations - Helicopters	138	126	112	128	132	123	118	140	167	**167**
Sport Transport	122	122	122	122	57	96	92	94	107	**87**
Other Commercial Operations - Aeroplanes	252	270	279	230	275	294	198	156	145	**133**
Other Commercial Operations - Helicopters	99	97	105	94	95	88	53	74	65	**47**
Agricultural Operations - Aeroplanes	53	35	37	45	51	43	44	47	43	**45**
Agricultural Operations - Helicopters	95	95	97	123	78	94	80	66	60	**61**
Private Operations - Aeroplanes	62	54	55	50	42	39	45	49	53	**52**
Private Operations - Helicopters	58	53	50	39	36	36	45	49	46	**45**
Private Operations - Sport	206	206	206	206	252	267	268	270	276	**295**

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



This chart shows that for the year ending June 2017 approximately 96.9% of seat hours were offered by the Airline Operations – Large Aeroplanes group, approximately 1.0% by the Airline Operations – Medium Aeroplanes group, with the remaining 2.1% of seat hours offered being split between the other safety target groups.

By comparison the 341,000 hours flown by the 135 large aircraft is only approximately 30% more than the 262,000 hours flown by the 1508 small aeroplanes on the register. The difference in passenger exposure is thus largely a function of the seating capacity.

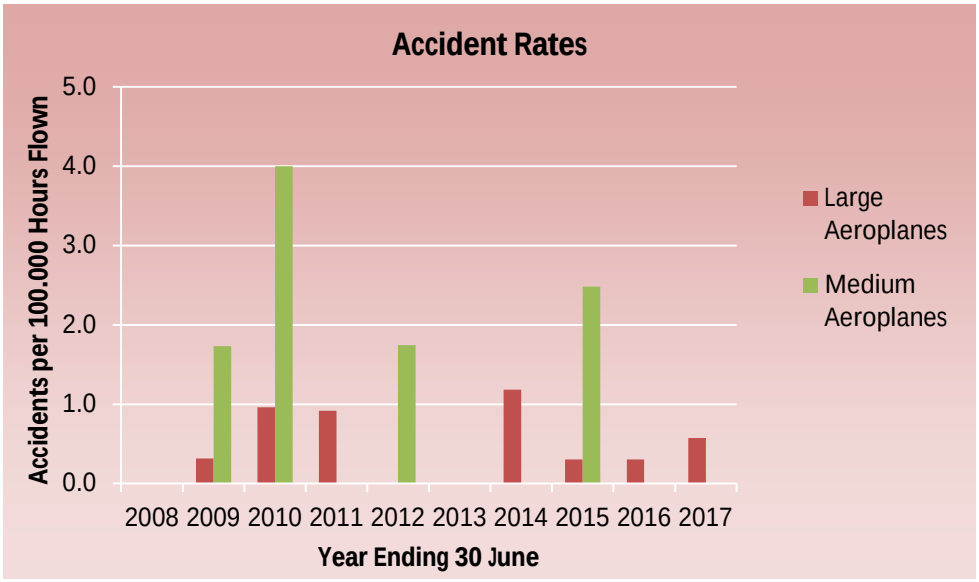
Occurrence Analysis

Aircraft Accidents

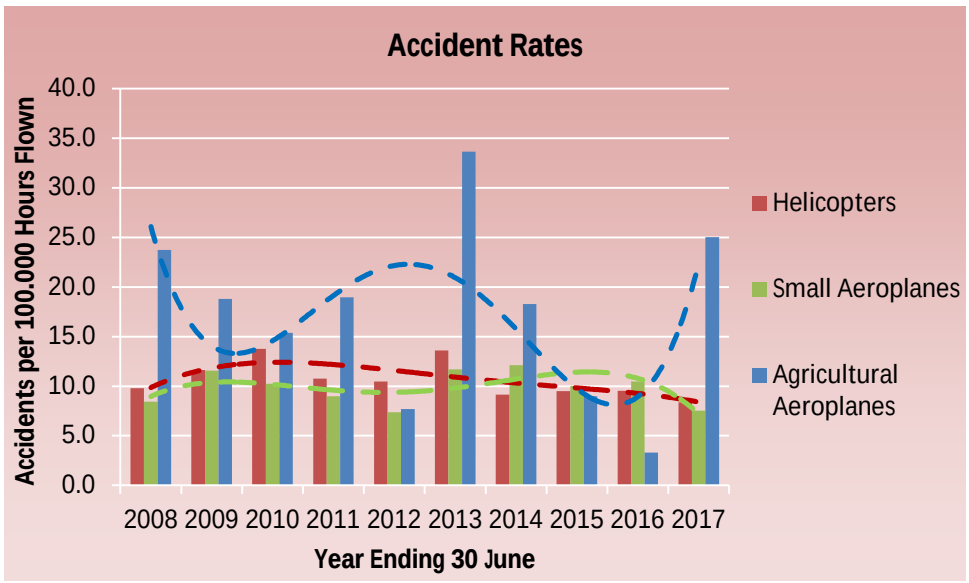
For a full definition of an accident see the appendix. An accident must either involve a serious or fatal injury or result in significant damage to or loss of an aircraft. Sometimes a serious injury can be the result of a seemingly minor event such as a hot drink spill.

The following graphs show the annual aircraft accident rates (accidents per estimated 100,000 hours flown) for the ten financial years up to and including 2017 (excluding the Sport Aircraft statistics category).

Breakdown by Aircraft Category

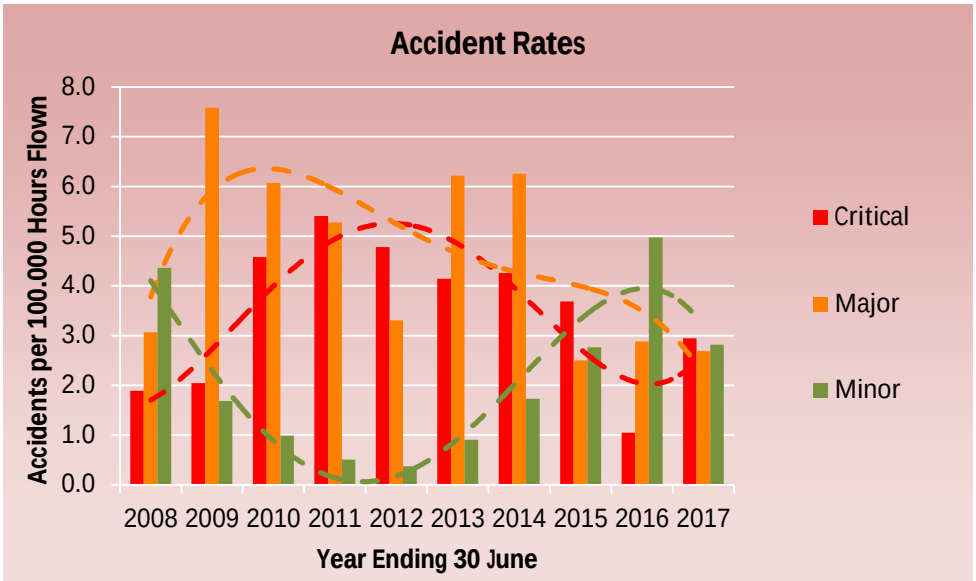


The numbers and rates of accidents in these two aircraft categories are too small for any trend analysis to be useful



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

Breakdown by Severity



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

Yearly Comparisons – counts, not rates

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

The values relate to years ending 30 June

Critical Accidents

Aircraft Type	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Large Aeroplanes	0	0	0	0	0	0	1	0	0	0
Medium Aeroplanes	0	0	1	0	0	0	0	0	0	0
Small Aeroplanes	6	5	8	9	7	7	7	6	0	2
Helicopters	3	5	6	16	14	10	8	14	5	10
Sport Aircraft excluding Hang Gliders and Parachutes	4	5	19	17	17	11	14	7	3	6
Hang Gliders	1	6	5	4	7	8	5	6	5	5
Parachutes	0	0	3	3	4	3	4	4	1	5
Agricultural Aeroplanes	2	2	3	1	1	3	2	1	0	4
Unknown	1	0	0	0	0	1	0	0	0	1
Total	17	23	45	50	50	43	41	38	14	33

Major Accidents

Aircraft Type	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Large Aeroplanes	0	0	0	2	0	0	2	0	1	1
Medium Aeroplanes	0	1	0	0	1	0	0	1	0	0
Small Aeroplanes	5	20	16	10	7	13	11	7	5	3
Helicopters	12	13	16	2	5	12	5	1	6	6
Sport Aircraft excluding Hang Gliders and Parachutes	5	27	15	22	11	15	25	8	10	9
Hang Gliders	2	6	8	4	2	2	4	2	5	5
Parachutes	1	3	2	3	7	4	1	1	4	6
Agricultural Aeroplanes	4	2	2	4	2	8	2	2	0	2
Unknown	0	0	0	2	1	0	2	0	0	0
Total	29	72	59	49	36	54	52	22	31	32

Minor Accidents

Aircraft Type	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Large Aeroplanes	0	1	3	1	0	0	1	1	0	1
Medium Aeroplanes	0	0	1	0	0	0	0	0	0	0
Small Aeroplanes	11	5	2	0	1	2	4	6	16	9
Helicopters	2	1	0	0	0	0	1	1	5	0
Sport Aircraft excluding Hang Gliders and Parachutes	19	4	2	1	1	5	4	13	16	10
Hang Gliders	7	5	12	5	0	3	4	17	18	4
Parachutes	0	3	1	4	1	4	3	3	3	5
Agricultural Aeroplanes	5	2	0	2	0	0	2	0	1	1
Unknown	0	1	0	0	1	0	1	0	0	1
Total	44	22	21	13	4	14	20	41	59	31

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.

Private Operations - Sport

- Matamata: RCCNZ received a beacon alert from aircraft. Fire and ambulance in attendance. 1 fatality. Occurrence Id: 16/5545
- 179 Wright Rd, Balclutha: Fatal Microlight crash on a rural property.2 fatalities. Aircraft destroyed. Occurrence Id: 17/1635
- Pio Pio: Aircraft crash reported to RCC by Fire Service.1 fatalities. Occurrence Id: 17/1785
- Port Hills: During flight, the paraglider hit a barrier and crashed. Aircraft destroyed. Occurrence Id: 17/2035
- Queenstown: Canopy collapsed during aerobatics and pilot failed to pull reserve chute. Paraglider crashed into a building at a primary school, fatally injuring the pilot. Pilot was a staff member of a local paragliding organisation but was on a recreational flight. Occurrence Id: 17/2075
- Welshman's Creek: Fatal Microlight aircraft crash while on cross-country flight.1 fatalities. Occurrence Id: 17/3767

Other Commercial Operations -Helicopters

- Christchurch: Helicopter crashed during a fire fighting exercise.1 fatality. Aircraft destroyed. Occurrence Id: 17/566

Agricultural Operations - Helicopters

- Glenbervie Forest: Helicopter crashed during forest spray operations.2 fatalities. Aircraft destroyed. Occurrence Id: 16/5811

Agricultural Operations - Aeroplanes

- North of Wairoa: Aircraft collided with power lines, crashed and caught fire.2 fatalities. Aircraft destroyed. Occurrence Id: 16/6701

Private Operations - Helicopters

- Larrys Creek: Fatal helicopter accident during venison recovery operation.1 fatality. Aircraft destroyed. Occurrence Id: 17/1543

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 financial years ending with 2017. All aircraft types are included. The table is sorted by the number of accidents in the 2017 financial year.

Safety Outcome Target Group	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Private Operations - Sport	40	47	56	54	39	42	46	45	47	**38**
Sport Transport	0	12	12	11	10	4	8	12	11	**15**
Private Operations - Aeroplanes	4	18	9	5	7	12	11	10	14	**9**
Agricultural Operations - Aeroplanes	11	6	5	6	3	11	6	3	2	**7**
Other Commercial Operations - Helicopters	4	6	3	7	8	4	5	5	4	**5**
Agricultural Operations - Helicopters	4	6	5	3	7	4	3	5	3	**5**
Other Commercial Operations - Sport	0	0	0	0	3	10	11	5	7	**4**
Private Operations - Helicopters	8	3	11	7	2	8	1	4	5	**4**
Other Commercial Operations - Aeroplanes	16	9	12	11	5	7	10	6	6	**3**
Airline Operations - Large Aeroplanes	0	2	3	3	0	0	4	1	1	**2**
Airline Operations - Helicopters	1	4	3	1	2	6	5	2	4	**2**
Airline Operations - Small Aeroplanes	2	3	3	3	1	2	1	2	0	**1**
Other	0	1	1	1	2	1	2	0	0	**1**
Airline Operations - Medium Aeroplanes	0	0	2	0	1	0	0	1	0	**0**
Total	**90**	**117**	**125**	**112**	**90**	**111**	**113**	**101**	**104**	**96**

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 6th as can be seen from the next section.

Annual Social Cost

Social cost is a measure of the impact of fatal, serious and minor injuries and aircraft destroyed. The measure has been developed and maintained by the Ministry of Transport, and is updated annually. The following table displays the social cost expressed in millions of 2016 dollars for each safety target group for the last ten financial years ending with 2017. The table is sorted by the social cost in the 2017 year

Safety Outcome Target Group	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Private Operations - Sport	31.9	13.8	24.5	25.3	30.4	14.9	12.7	6.9	14.4	**34.2**
Agricultural Operations - Helicopter	1.6	1.1	0.0	1.3	5.8	0.0	11.4	6.1	0.5	**11.0**
Agricultural Operations - Aeroplane	7.5	5.1	1.8	0.0	0.0	5.9	1.8	0.8	0.0	**9.3**
Other Commercial Operations - Helicopter	11.9	0.8	0.0	19.4	16.5	0.4	0.9	14.8	0.0	**6.7**
Private Operations - Helicopter	1.0	4.5	1.7	8.4	0.0	5.5	8.7	5.7	5.3	**4.5**
Sport Transport	0.0	23.3	1.9	1.8	47.3	0.7	1.0	2.4	1.0	**4.5**
Airline Operations - Helicopter	0.0	2.5	1.3	0.4	0.4	6.1	9.2	10.0	31.0	**2.4**
Other	0.0	8.3	0.0	0.0	0.0	8.7	0.0	0.0	0.4	**2.3**
Airline Operations - Large Aeroplanes	0.4	0.1	0.0	0.0	0.1	0.1	3.5	0.1	0.1	**1.4**
Other Commercial Operations - Sport	0.0	0.0	0.0	0.0	0.0	5.5	1.0	9.3	0.5	1.4
Private Operations - Aeroplane	0.0	1.5	8.7	0.2	6.7	0.4	4.3	18.3	0.1	**1.1**
Other Commercial Operations - Aeroplane	18.9	0.2	4.7	48.1	0.2	0.2	11.8	0.2	0.0	**0.5**
Airline Operations - Small Aeroplanes	0.0	0.2	0.6	0.0	0.2	0.8	1.0	5.2	0.0	**0.0**
Airline Operations - Medium Aeroplanes	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Total	**73.3**	**61.5**	**45.3**	**104.8**	**107.6**	**49.0**	**67.4**	**80.0**	**53.1**	**79.4**

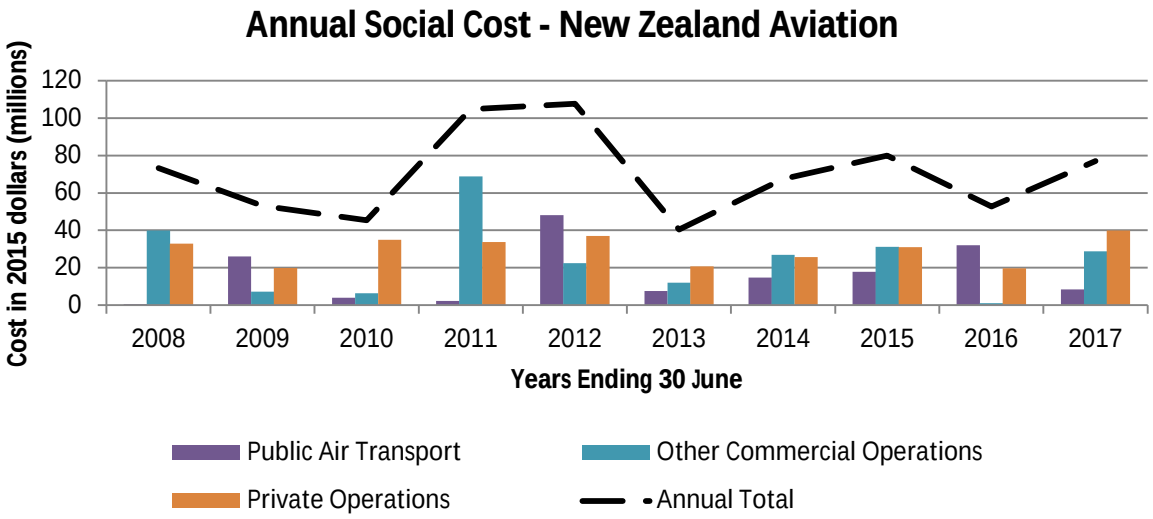
Social Cost Analysis

The extreme value of 107.6 million dollars in the year ending 30 June 2012 is largely a result of a multiple fatality accident in the ballooning sector. The year ending 30 June 2017 incurred a 79.4 million dollar social cost approximately 11% higher than the average of the previous nine years. The biggest contributing sector was the Private sector at 39.9 million dollars.

The biggest contributor to social cost is fatalities and these are essentially rare and relatively random. This means that trends in social cost are not easy to discern and not very meaningful or useful.

The following charts show the annual social cost for each Safety Outcome Target Group for the ten financial years ending with 2017. Note that the Sport groups include hang gliders and parachutes. These charts show the same data as the table above but are intended to give a more visual perspective on the Safety performance of the industry as measured by the Social Cost.

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



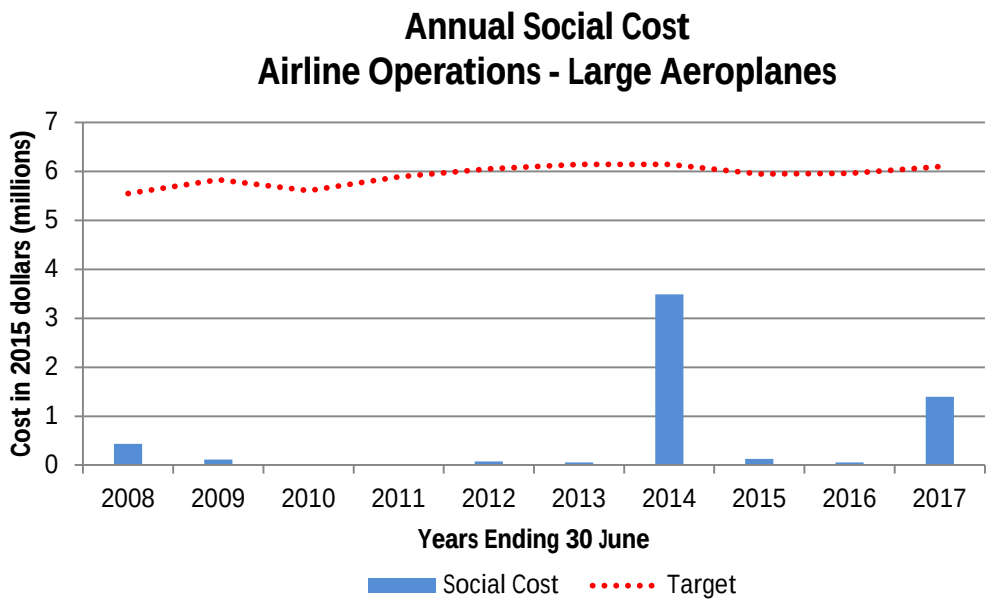
Arising from:

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Fatalities	14	18	8	21	22	8	10	13	10	13
Serious Injuries	10	24	14	22	21	20	31	32	20	36
Minor Injuries	14	25	38	15	15	27	39	49	38	39
Aircraft Unusable	24	17	18	24	16	18	20	28	4	13

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

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

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



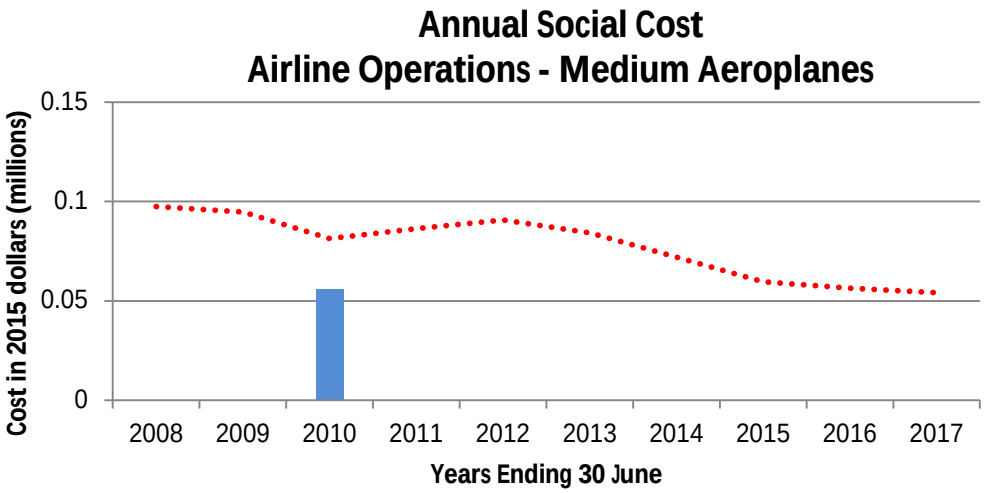
Arising from:

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Fatalities	0	0	0	0	0	0	0	0	0	0
Serious Injuries	1	0	1	0	0	0	3	0	0	3
Minor Injuries	0	7	0	0	4	3	7	7	3	5
Aircraft Unusable	0	0	0	0	0	0	1	0	0	0

The most significant contribution was one aircraft written off in 2014

Two of the eight serious injuries were severe burns resulting from hot liquid spills

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



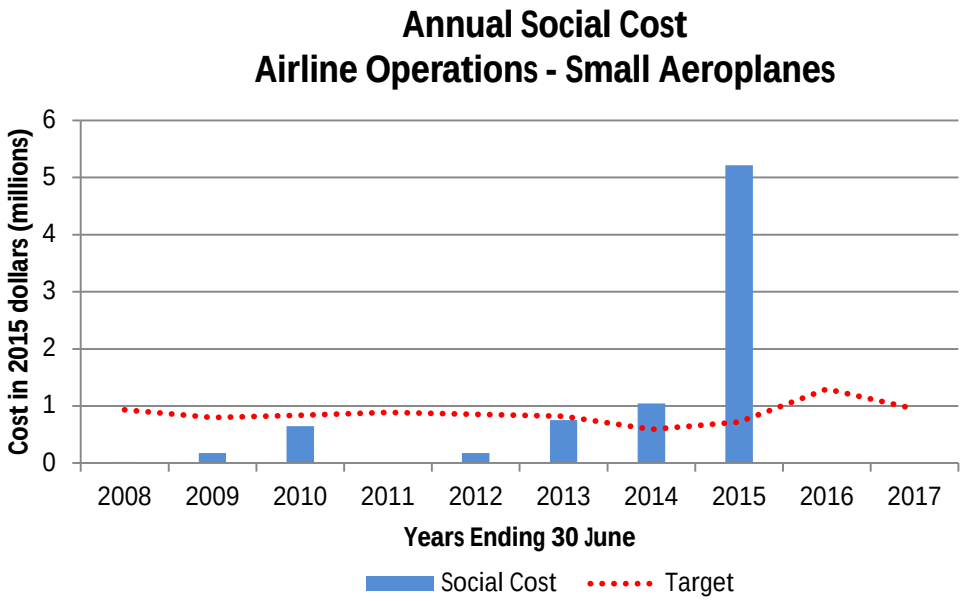
Arising from:

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
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	3	0	0	0	0	0	0	0
Aircraft Unusable	0	0	0	0	0	0	0	0	0	0

The only contribution is three minor injuries in 2010

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

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

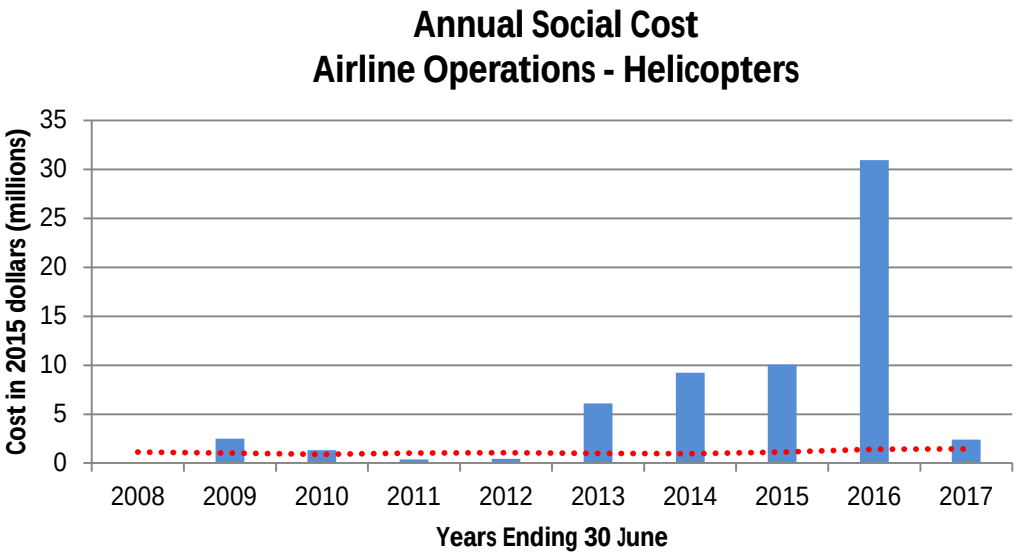


Arising from:

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Fatalities	0	0	0	0	0	0	0	1	0	0
Serious Injuries	0	0	1	0	0	1	2	2	0	0
Minor Injuries	1	0	2	0	0	0	0	0	0	0
Aircraft Unusable	0	1	1	0	1	1	1	1	0	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 5 of which occurred in the last five years.

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



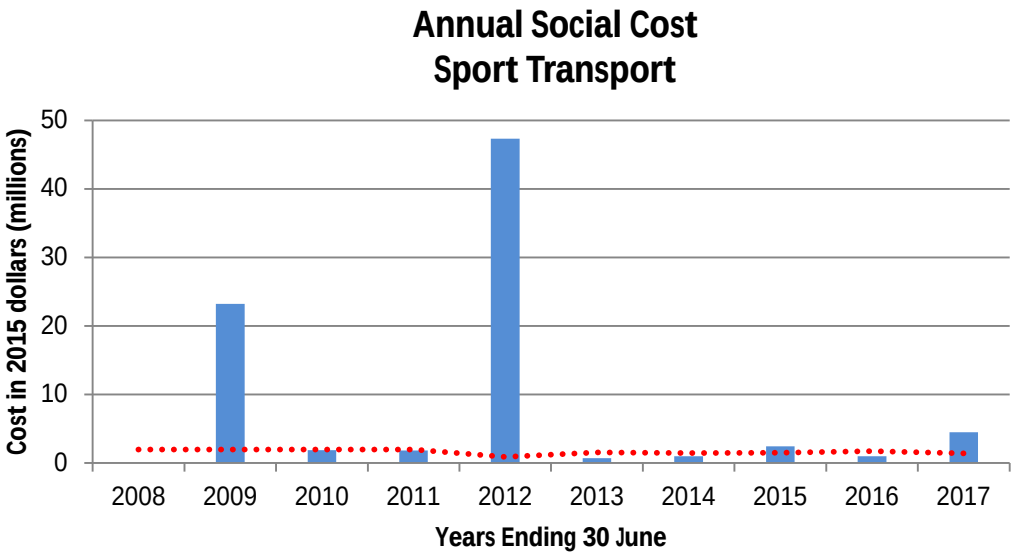
Arising from:

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Fatalities	0	0	0	0	0	1	1	1	7	0
Serious Injuries	0	2	0	0	1	0	1	6	1	1
Minor Injuries	0	2	2	2	0	0	7	2	1	2
Aircraft Unusable	0	2	1	1	0	1	3	2	1	1

This group has generated ten fatalities in the last ten years, all of them in the last five years. This coupled with three aircraft write-offs in 2014 and an increasing number of serious and minor injuries in the recent years means there has been a concern about the safety trend in this group.

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

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.



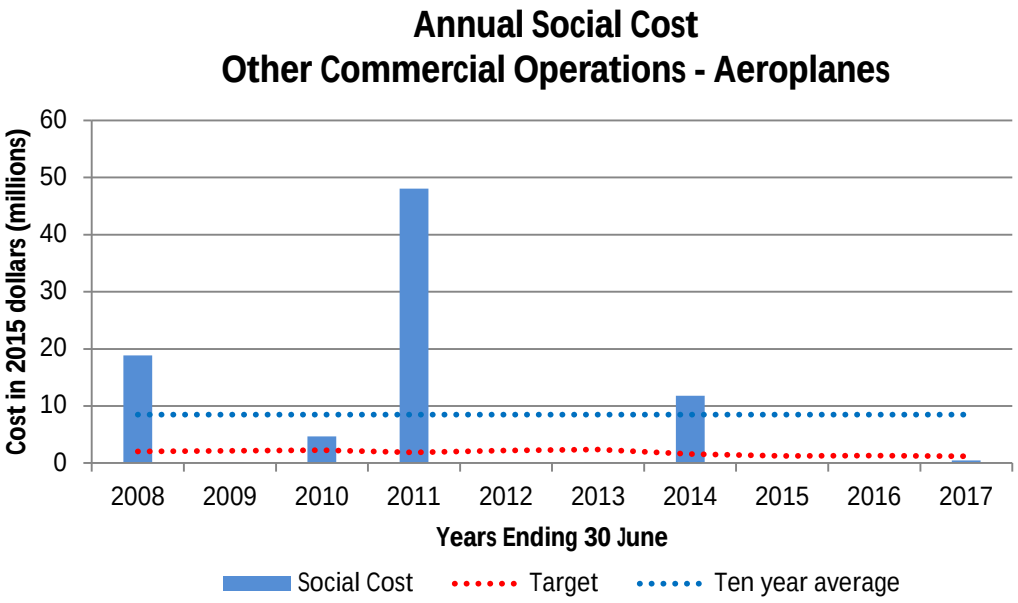
Arising from:

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Fatalities	0	5	0	0	11	0	0	0	0	0
Serious Injuries	0	5	3	5	3	1	3	3	2	10
Minor Injuries	1	4	5	6	4	5	6	9	7	10
Aircraft Unusable	0	3	1	1	1	1	0	1	0	0

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

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

The big increase in serious injuries in the 2017 financial year is of concern.



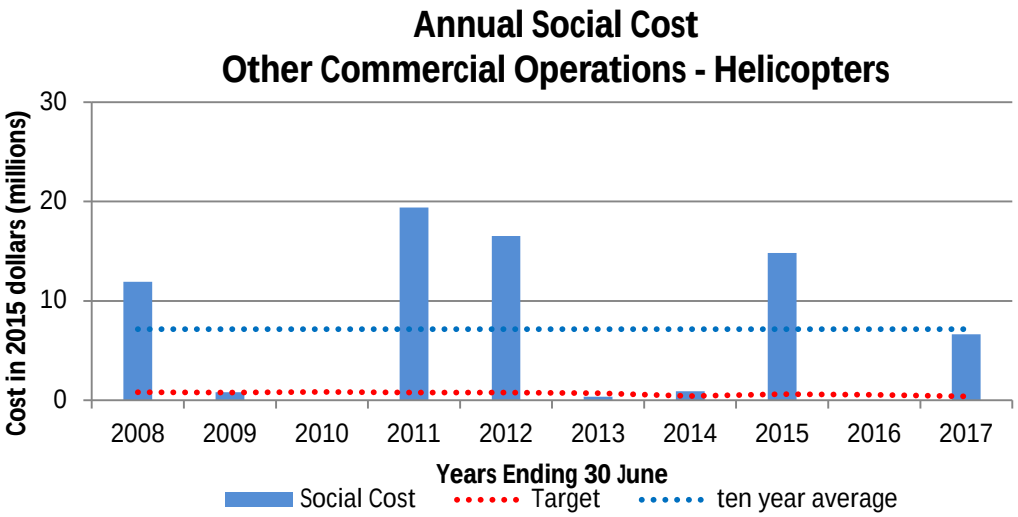
Arising from:

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Fatalities	4	0	1	11	0	0	2	0	0	0
Serious Injuries	3	0	0	2	0	0	6	0	0	1
Minor Injuries	1	1	0	0	0	1	0	0	0	1
Aircraft Unusable	5	1	3	4	1	1	5	1	0	0

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

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

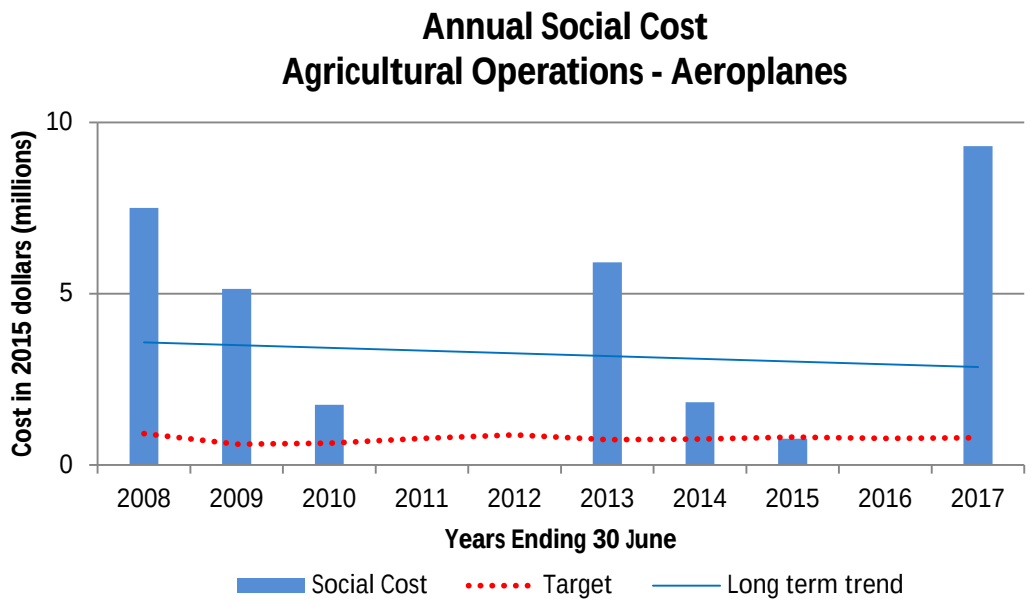
This is not the case in this group.



Arising from:

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Fatalities	2	0	0	4	3	0	1	3	0	1
Serious Injuries	0	1	0	1	1	0	3	0	0	2
Minor Injuries	1	2	0	1	2	2	2	3	1	0
Aircraft Unusable	3	1	0	4	3	1	1	5	0	2

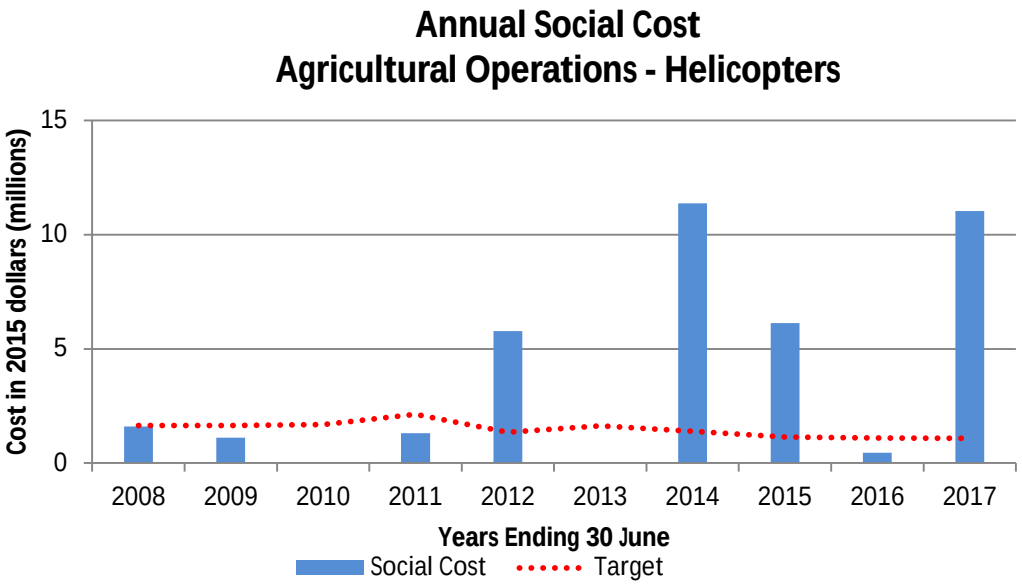
The low level of activity within this sector (0.13% of all the seat-hours in the industry) means that a single event has the ability to cause the social cost to exceed the target in the year the event occurred. While this may not be a problem as long as the target is met on average over an extended period,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



Arising from:

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Fatalities	1	1	0	0	0	1	0	0	0	2
Serious Injuries	1	0	1	0	0	1	2	1	0	0
Minor Injuries	0	0	2	0	0	1	0	1	0	0
Aircraft Unusable	5	1	2	0	0	2	1	1	0	1

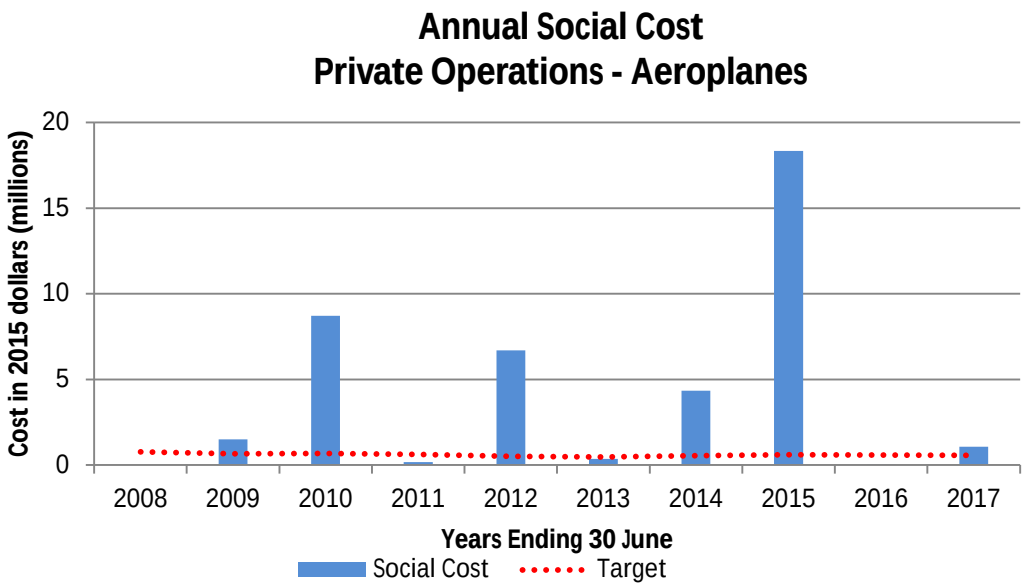
This group's safety performance is closely monitored and following significant safety failures the performance usually improves for a few years before rising again, often with increase in activity as evidenced by tonnage spread (see graph on page 12). The long term linear trend in social cost is slightly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



Arising from:

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Fatalities	0	0	0	0	1	0	1	1	0	2
Serious Injuries	0	1	0	0	0	0	0	0	1	1
Minor Injuries	0	2	0	0	0	0	1	1	1	0
Aircraft Unusable	2	2	0	0	2	0	2	3	0	2

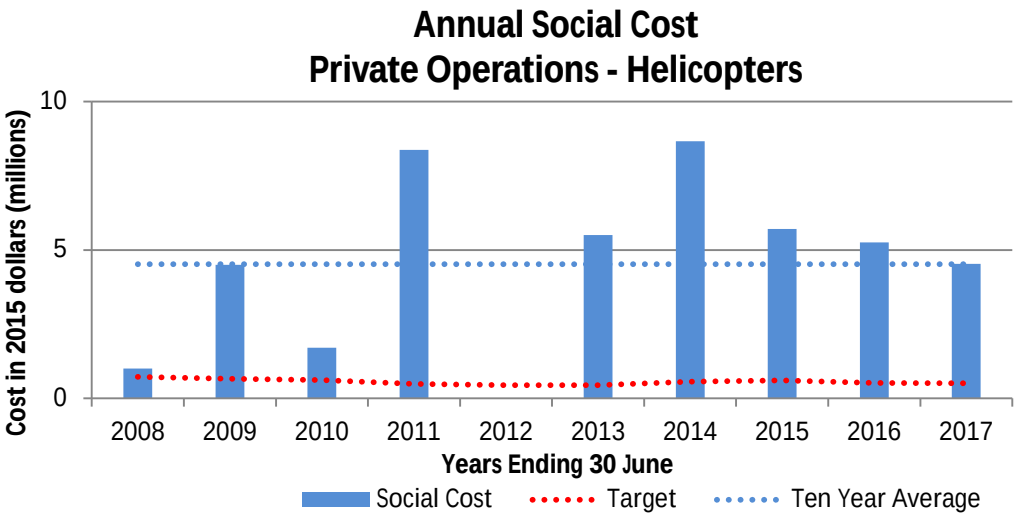
Although the absolute social costs of the safety failures in this group are on a par with those of the agricultural aeroplanes group, it must be remembered that this group operates about twice the number of hours of the aeroplane group, representing a better safety performance per flying hour. Nevertheless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



Arising from:

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Fatalities	0	0	1	0	1	0	1	4	0	0
Serious Injuries	0	3	0	0	5	0	0	2	0	2
Minor Injuries	1	1	1	0	0	1	0	4	3	2
Aircraft Unusable	0	1	2	1	2	2	1	4	0	1

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

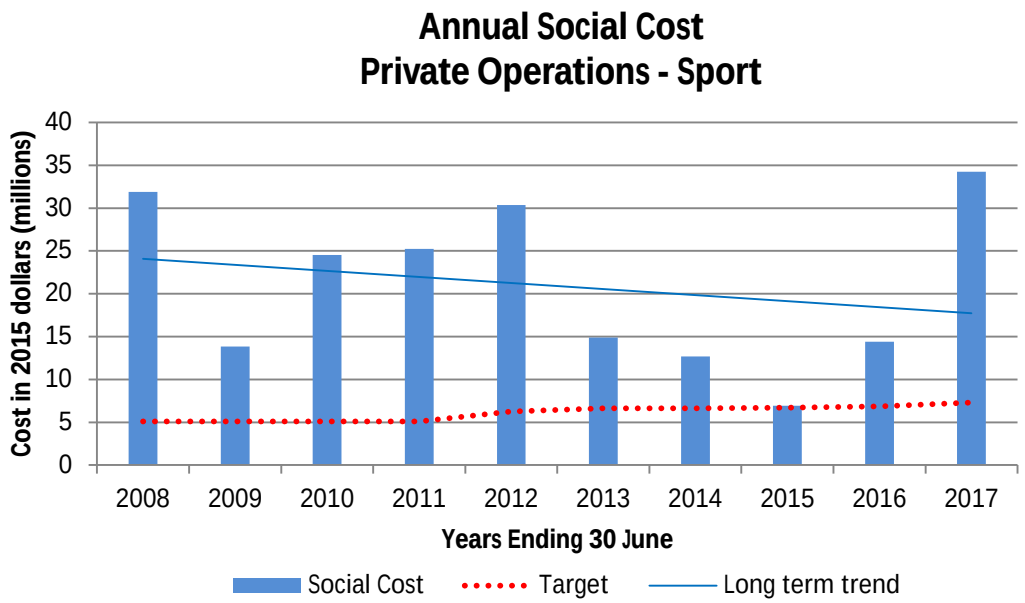


Arising from:

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Fatalities	0	1	0	1	0	1	2	1	1	1
Serious Injuries	0	0	0	3	0	0	0	2	1	0
Minor Injuries	2	0	5	1	0	2	0	1	0	2
Aircraft Unusable	3	1	2	5	0	4	1	2	2	1

Only three of the last ten years have been free of fatalities.

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



Arising from:

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Fatalities	7	2	6	5	6	2	2	0	2	7
Serious Injuries	5	12	8	11	11	14	9	14	13	11
Minor Injuries	6	5	17	5	4	11	12	21	19	6
Aircraft Unusable	6	3	6	7	6	4	3	7	1	3

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

The social cost trend over the 2013 to 2015 period was steady and an improvement over the time before that. Since then though the trend has reversed. The long term trend, although not large is at least downward.

Of note are the significant increases in the numbers of minor injuries in four of the last eight years and serious injuries in four of the last nine years.

Flight Phase

The following table shows the flight phase recorded for accidents for the ten one-year periods ending 30 June 2017. The figures include all aircraft types. The table is ordered by the 2017 values.

Flight Phase	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
LANDING	31	43	49	36	32	45	47	41	46	40
TAKEOFF	20	23	26	24	13	9	21	17	16	15
UNKNOWN	0	1	0	2	2	3	1	5	5	12
CRUISE	13	14	11	12	10	13	14	14	9	10
APPROACH	2	6	6	5	6	6	8	4	3	5
DESCENT	2	4	4	4	2	7	2	4	5	4
CLIMB	5	7	6	11	3	5	7	6	7	2
PARKED	3	5	3	2	4	8	0	0	5	2
TAXIING	5	5	3	5	3	3	4	3	4	2
AGRICULTURAL MANOEUVRES	2	1	5	2	2	3	2	4	0	1
HOVER TAXI	0	0	0	0	0	2	1	0	0	1
CIRCUIT	1	1	0	1	1	0	0	1	0	1
AEROBATICS	0	0	0	0	1	0	1	0	0	1
HOVER	3	2	6	1	5	3	2	2	4	0
Not Recorded	2	5	6	7	6	4	3	0	0	0
HOLDING	1	0	0	0	0	0	0	0	0	0

The most common phase of flight during which accidents occurred in the year ending 30 June 2017 was the Landing phase (42%). This proportion of accidents by flight phase is largely unchanged from previous years and reflects the fact that landing is the highest risk phase of flight.

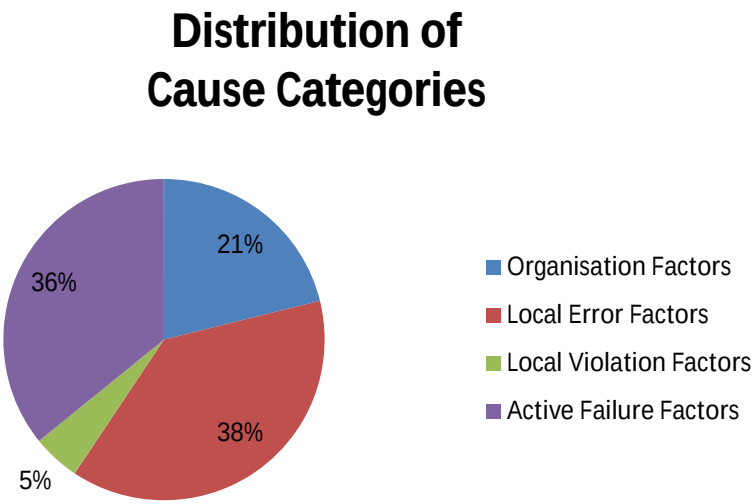
The most common descriptors (at 17%) assigned to Landing Phase accidents during the 2017 financial year were ‘Damage to aircraft’ and ‘Injuries to persons’.

The most common causes (at 8%, 7% and 6% respectively) recorded for Landing phase accidents during the 2017 financial year were ‘Active Failure Factors - POOR PROCEDURE "ACTION"’, ‘Active Failure Factors - PRIMARILY "STRUCTURAL/MECHANICAL"’ and ‘Local Error Factors - RISK MISPERCEPTION’.

Accident Causal Factors

795 causal factors have been assigned to 385 (40%) of the 969 accidents that were reported as occurring during the 2017 financial year.

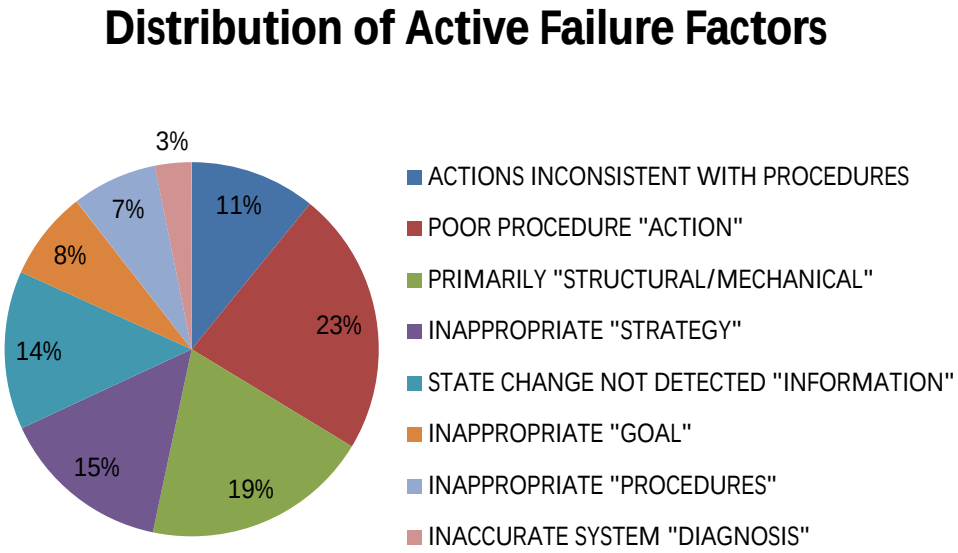
The following chart shows the distribution of cause categories (groupings of causal factors) recorded for those accidents.



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.

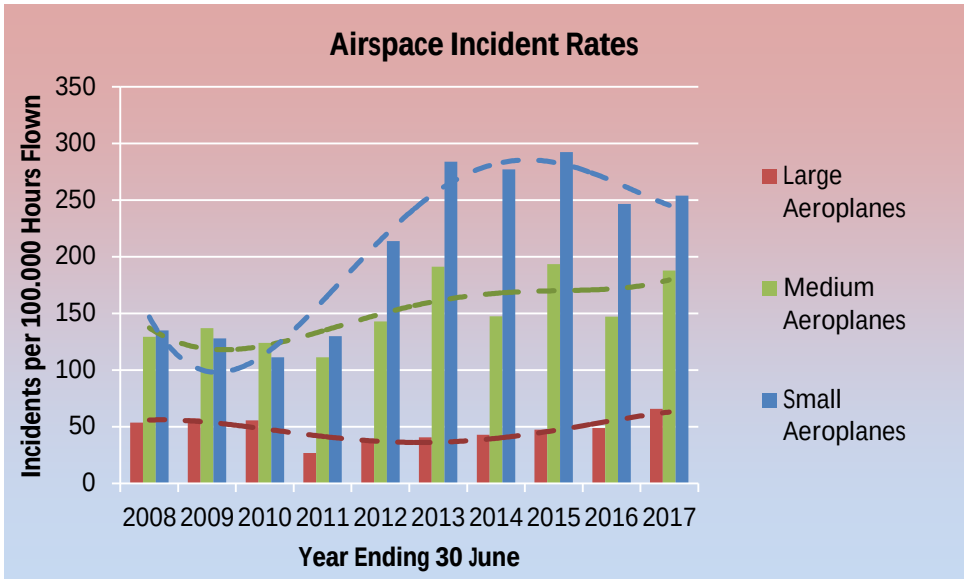
The following chart shows the distribution of Active Failure factors during the same period as above.

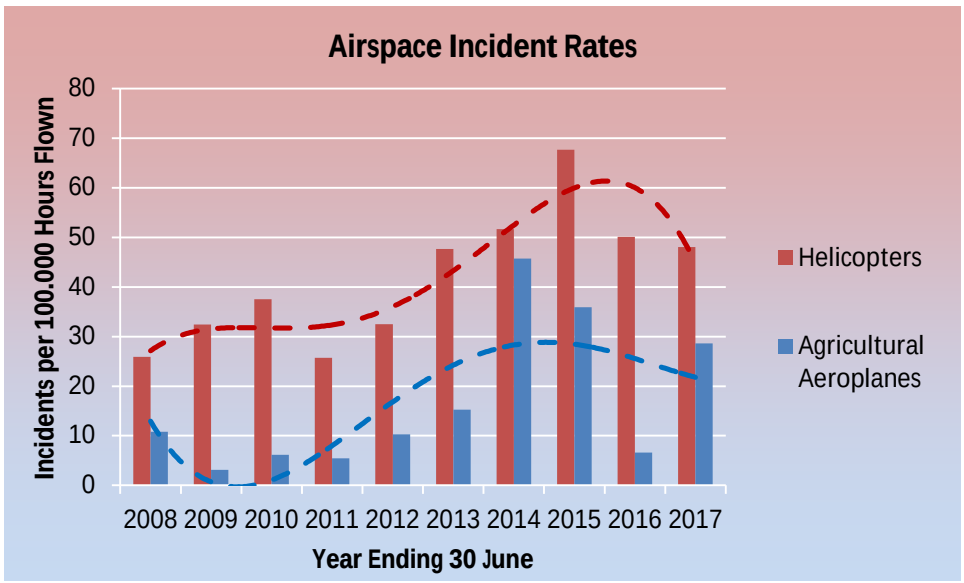


Airspace Incidents

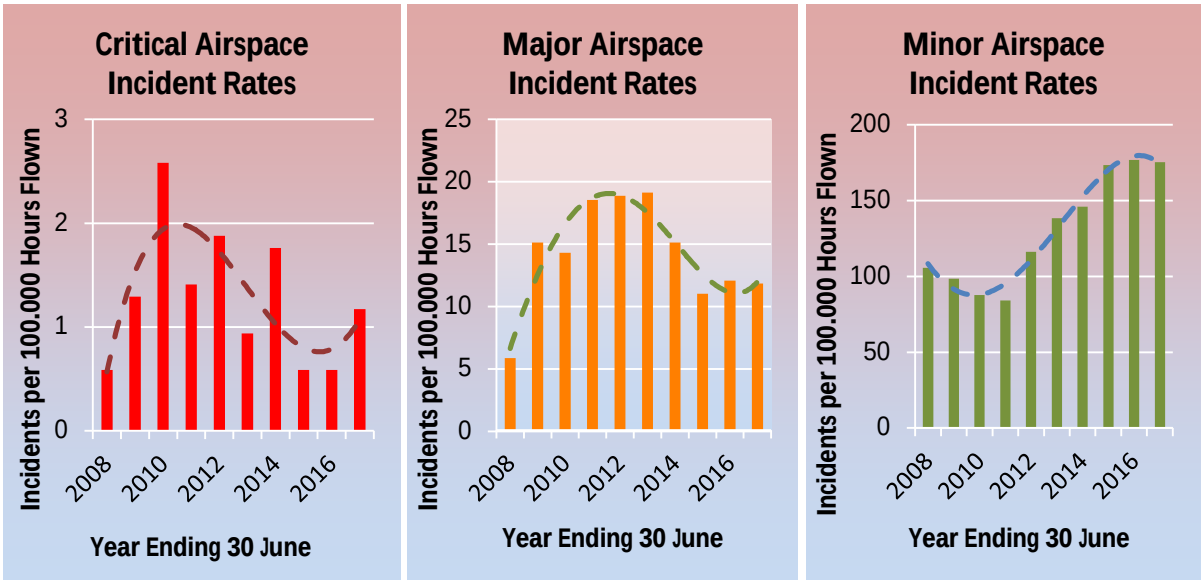
The following graphs show the reported annual airspace incident rates (incidents per 100,000 hours flown) for the ten one-year periods ending 30 June 2017 (excluding the Sport Aircraft category). The graphs do not differentiate between incidents that are pilot or ATS attributable.

Breakdown by Aircraft Category



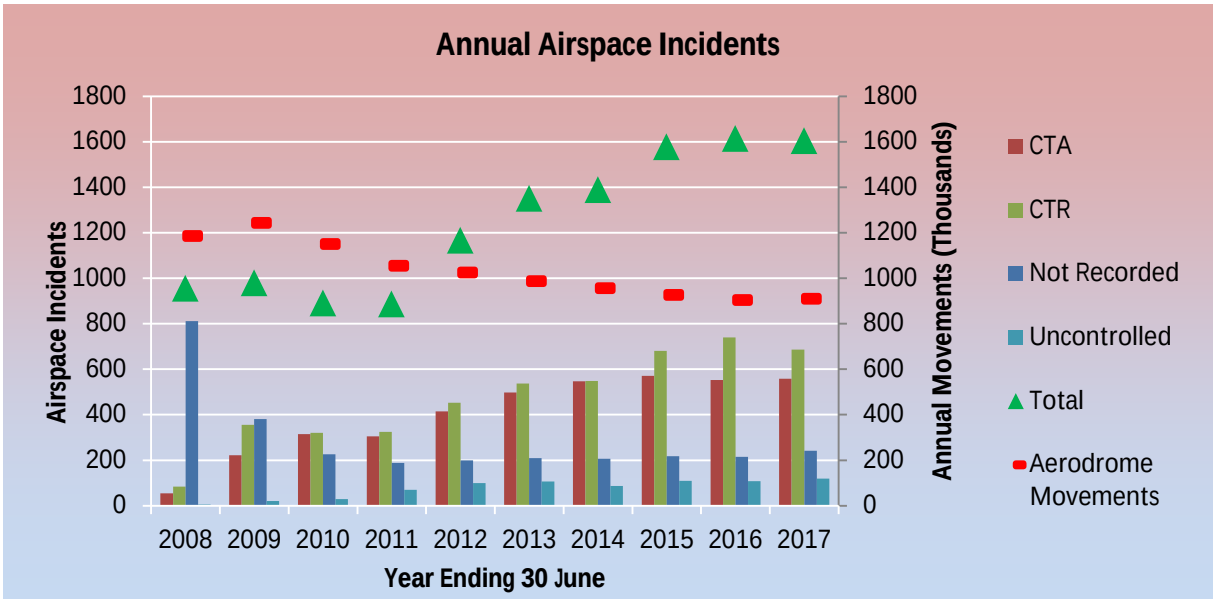


Breakdown by Severity



Breakdown by Airspace Designation

(Counts not Rates)



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

Breakdown of Airspace Incidents in Control Zones by Aerodrome

Aerodrome	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Hamilton	11	55	48	60	119	164	95	163	162	156
Auckland	7	39	37	39	36	50	49	71	96	84
Christchurch	10	42	27	30	36	36	66	71	83	73
Queenstown	0	17	22	27	35	30	35	64	42	60
Wellington	7	47	32	32	46	28	33	27	57	53
Nelson	2	17	27	18	29	20	19	29	34	41
Dunedin	2	3	15	9	20	33	29	42	31	35
Tauranga	3	15	14	26	43	47	73	67	83	34
Palmerston North	13	36	22	23	24	37	47	50	33	27
Woodbourne	7	31	25	14	5	17	17	17	23	22
Napier	7	7	8	5	10	17	16	17	20	21
Rotorua	5	13	13	18	20	7	15	10	22	16
Gisborne	2	2	4	5	1	13	9	9	16	9
Whenuapai	0	5	6	4	7	13	9	12	8	9
Invercargill	0	2	5	3	1	3	5	3	7	9
New Plymouth	2	8	7	6	4	5	11	8	3	8
Ohakea	1	8	7	3	10	11	14	11	14	4

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 1556 of the 1605 reported airspace incidents in the 2017 financial year. This means that most but not quite all airspace incidents are accounted for in the following attributability tables and graphs.

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

Descriptor Categories

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

The following table shows the breakdown into these broad categories.

Descriptor is associated with	Number of times descriptor applied
ATS	291
Pilot	1295
Either	329

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 2017
ATS Clearance/Instruction Deficiency	176
ATS Coordination Deficiency	97
ATS Flight Information Deficiency	18
ATS Flight Planning System Deficiency	5

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

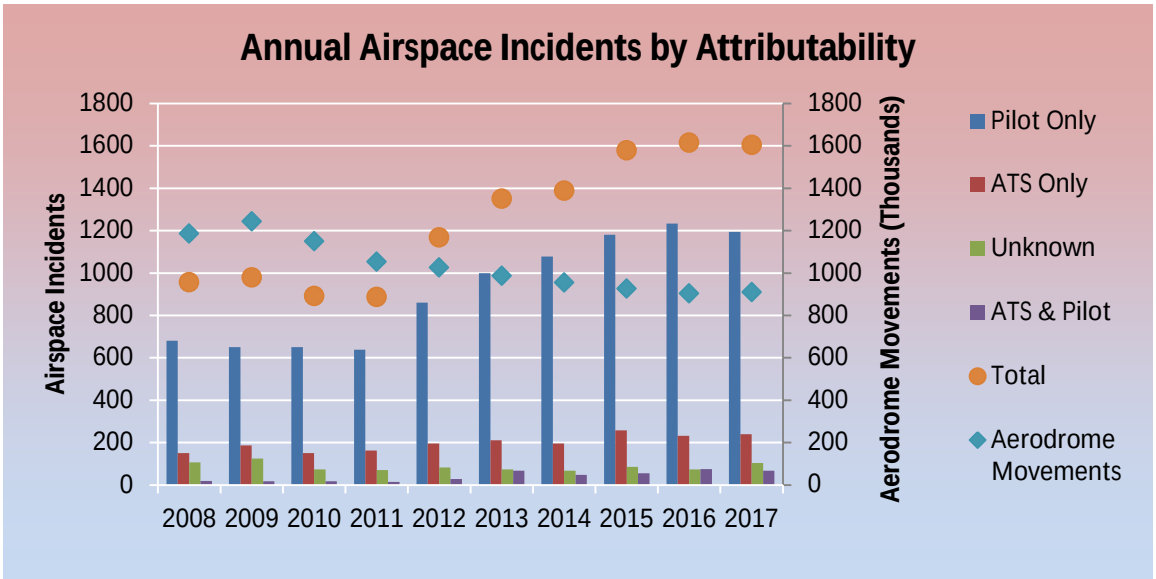
Descriptor	Number assigned in 2017
Breach Of Other Clearance	609
Unauth Airspace Incursion	368
Unauth Altitude Penetration	107
Pilot Position Reporting Deficiency	88
Air Proximity	57
Pilot Flight Planning Deficiency	53
Pilot Readback Deficiency	8
Flight Assist	4
Reduced Navigation Performance	1
Global Positioning System	0
Pilot Breach of Ground Clearance	0

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

Descriptor	Number assigned in 2017
Other	160
Traffic Collision Avoidance System	77
Loss Of Separation	59
Near Collision	18
Short Term Conflict Alert	7
Controller/Pilot Datalink Communications	3
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 2017.



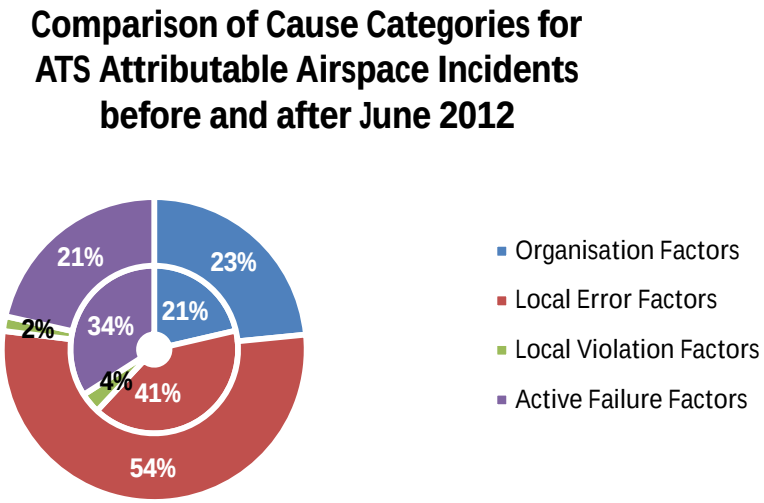
The number of "unknown" attributable airspace incidents reflects difficulties with coding of reports received by the CAA. Note that there is often a time delay between incidents occurring, being investigated and attributability being assigned to either ATS or Pilot.

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 30 June 2012. The inner ring represents the July 2008 to June 2012 period and the outer ring the period from July 2012 to June 2017. 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.



So it seems that coincident with a sharp increase in the rate of airspace incidents there was a corresponding increase in the reporting of local error factors as causes.

Local Error Factors

The top three contributing causes were:

Jul 2006 to Dec 2011		Jan 2012 to Dec 2016	
INADEQUATE CHECKING	54%	INADEQUATE CHECKING	24%
OTHER ERROR ENFORCING CONDITION	11%	OTHER ERROR ENFORCING CONDITION	20%
TASK OVERLOAD	6%	RISK MISPERCEPTION	17%

Active Failure Factors

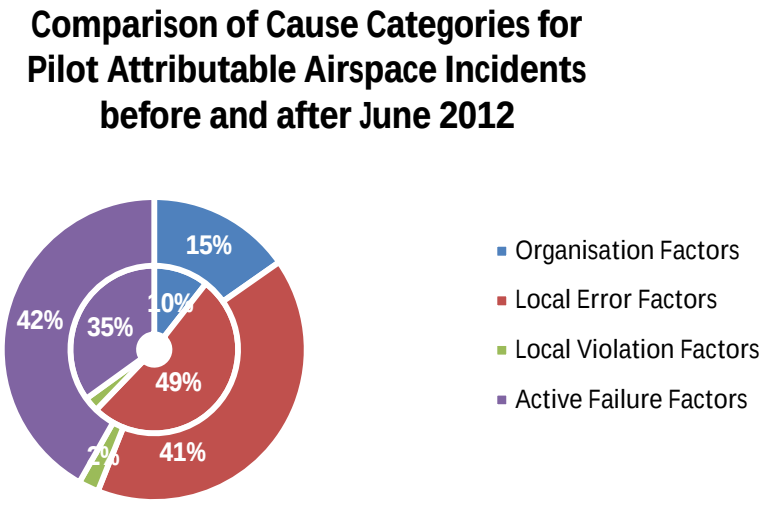
The top three contributing causes were:

Jul 2008 to Jun 2012		Jul 2012 to Jun 2017	
INACCURATE SYSTEM "DIAGNOSIS"	38%	ACTIONS INCONSISTENT WITH PROCEDURES	24%
ACTIONS INCONSISTENT WITH PROCEDURES	22%	INAPPROPRIATE "STRATEGY"	20%
INAPPROPRIATE "STRATEGY"	19%	INACCURATE SYSTEM "DIAGNOSIS"	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 30 June 2012. The inner ring represents the July 2008 to June 2012 period and the outer ring the period from July 2012 to June 2017. 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 10% to 15 % of all causal factors.

The top three causes were:

Jul 2008 to Jun 2012		Jul 2012 to Jun 2017	
INADEQUATE PROCEDURES	23%	INADEQUATE CONTROL AND MONITORING	27%
INADEQUATE COMMUNICATIONS	19%	INADEQUATE TRAINING	20%
INADEQUATE CONTROL AND MONITORING	12%	OTHER ORGANISATION FACTOR	18%

Local Error Factors

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

The top two causes were:

Jul 2008 to Jun 2012		Jul 2012 to Jun 2017	
INADEQUATE CHECKING	28%	INADEQUATE CHECKING	25%
POOR INSTRUCTIONS/PROCEDURES	13%	RISK MISPERCEPTION	13%

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

Significant Incidents

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

Serious Incidents

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

ATS Attributable

- Hamilton: Avoiding action taken by Robin following a C172 as number 2 joining the circuit. ATC had instructed the #1 traffic, a C172 to make a left hand orbit and then later cancelled it. Aircraft, however continued in the orbit, creating the head on conflict with the following traffic. The Robin took avoiding action turning to the right when pilot realised that the C172 was continuing in the orbit. He believes the distance between the 2 aircraft was less than 1 nm, at the same altitude. Occurrence Id: 16/6637

Pilot Attributable

- Paraparaumu: Report of a near collision incident in the PP circuit. A Hughes 300 helicopter was joining from 5nm south, while a Cessna 152 was established in the circuit. Runway, conditions and traffic information passed, the Hughes 300 continued tracking toward right-hand down-wind to runway 16. Both aircraft were passed updated mutual traffic information on one another. Airways ATC replay shows at 0135:40 the aircraft were .029NM (176.2ft) apart, the Hughes 300 was at 900ft and the Cessna 152 was at 1000ft. Occurrence Id: 16/5881

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

Attributability Undetermined

- Motueka: Aircraft joined for runway 02 after mistaking the runway in use to be '02' instead of '20'. Aircraft came into very close proximity with a C172 taking off from runway 20, after a touch go. The incident occurred as the approaching aircraft was passing 100 ft. on final. Aircraft continued with the landing to increase separation with the climbing departing traffic. Occurrence Id: 16/4232

- Waikeria: Helicopter passed within 50m of submitter's helicopter while he was carrying out pre-spray survey at approximately 300 ft. AGL. Intruder then passed over nearby prison farm at low level. Occurrence Id: 16/6872

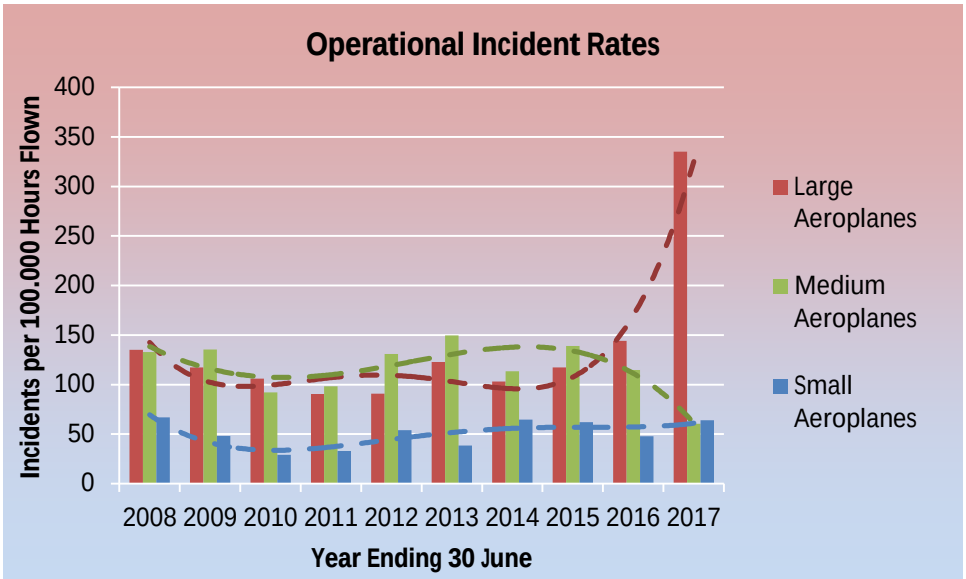
- Near Wanaka: Near collision with glider while operating over the Barrier Ranges. Avoiding action taken by glider and aircraft passed within 10 ft. of each other. Glider registration not provided. Fixed wing pilot advised that no position reports were received from the glider pilot. Occurrence Id: 16/7303

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

Operational (Aircraft) Incidents

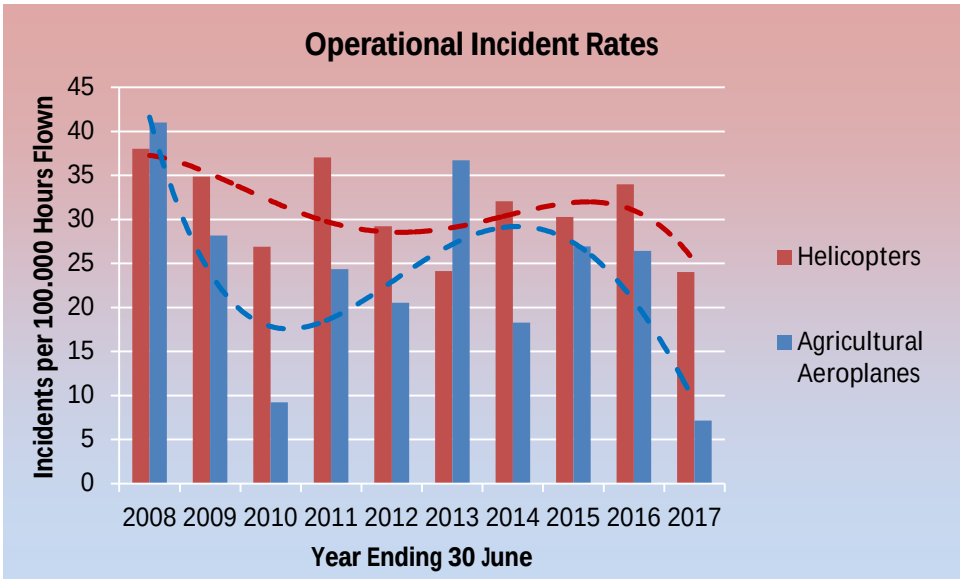
The following graphs show the reported annual operational incident rates (incidents per 100,000 hours flown) for the ten-year period ending 30 June 2017.

Breakdown by Aircraft Category



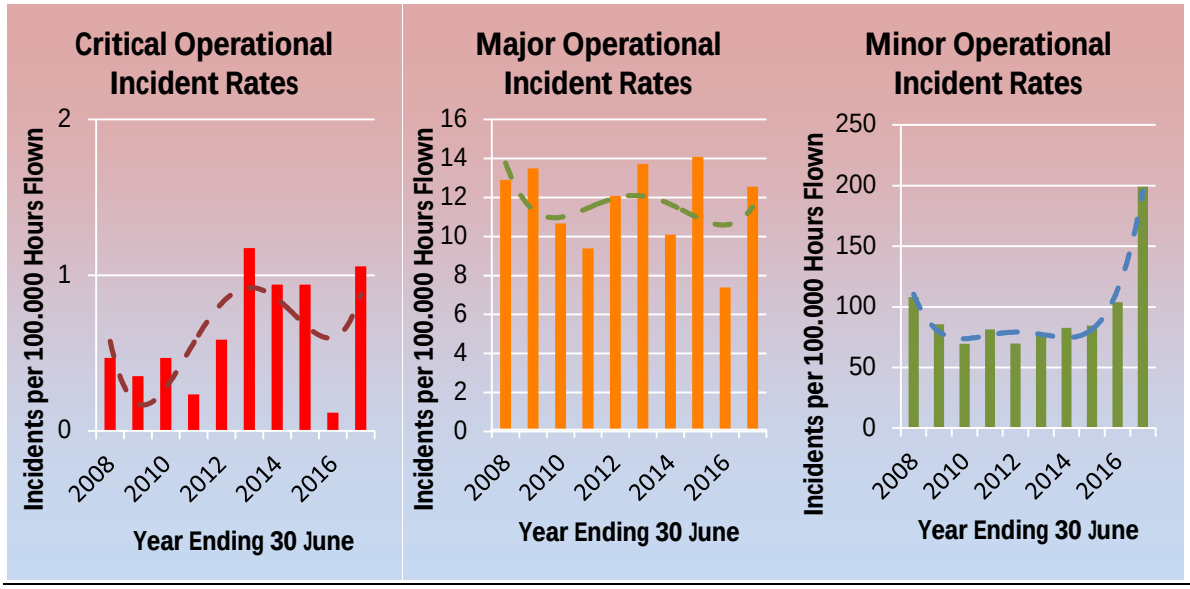
The operational incident rate per 100,000 hours flown for large aeroplanes shows a significant increase in 2017. The CAA has been actively encouraging reporting of occurrences by operators in this sector. Other safety initiatives such as the Sector Risk Profile of this sector may also have contributed to an increase in the number of occurrences reported to the CAA. It is likely there would have been an increase in the rate similar to the increases since 2014.

The decrease in the operational incidents reported to the CAA involving medium aircraft has likely decreased due to fewer flights of medium aircraft in 2016/2017



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 2017. All aircraft types are included. The table is sorted by the number of incidents in the 2017 year.

Safety Outcome Target Group	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Airline Operations - Large Aeroplanes	350	360	333	324	323	457	396	450	547	**1249**
Other	6	7	18	127	53	25	40	55	108	**223**
Sport Transport	7	3	2	5	16	31	46	28	16	**108**
Other Commercial Operations - Aeroplanes	124	94	53	58	78	58	87	93	77	**101**
Private Operations - Sport	25	19	25	18	47	58	68	53	28	**35**
Other Commercial Operations - Helicopters	36	29	18	25	37	17	19	39	52	**28**
Airline Operations - Medium Aeroplanes	79	71	46	43	74	74	57	57	38	**13**
Airline Operations - Small Aeroplanes	31	13	8	11	11	2	9	11	12	**10**
Other Commercial Operations - Sport	0	0	1	0	1	8	5	18	21	**10**
Private Operations - Aeroplanes	16	21	14	10	22	11	24	19	30	**10**
None	315	195	142	107	13	16	14	5	8	**7**
Airline Operations - Helicopters	11	15	10	20	6	11	18	5	2	**6**
Agricultural Operations - Helicopters	14	12	11	11	5	8	9	5	2	**6**
Private Operations - Helicopters	1	2	3	7	7	4	3	2	2	**5**
Agricultural Operations - Aeroplanes	20	8	3	9	9	12	4	9	7	**3**
Total	**1035**	**849**	**687**	**775**	**702**	**792**	**799**	**849**	**950**	**1814**

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

- Enroute Auckland to Nelson: During cruise at FL200, the cabin pressure warning light came on. An emergency descent to 10,000 ft. was accomplished. After take-off, the first officer had inadvertently turned only one bleed on. This was noted while doing the climb checks, but instead of turning the remaining bleed on, pilot turned the other bleed off, hence a slow decompression. Occurrence Id: 16/4229

- Woodbourne: Three EGPWS activations on a visual approach. The aircraft was approximately in its lowest position at 800ft AGL not in compliance with SOPs, as the aircraft was below 1000ft AGL un-configured. Auto pilot was still engaged when first warning was received. After the auto-pilot was disengaged, two more warnings were received. The warnings also received in the cabin. Occurrence Id: 17/725

Serious Operational Incidents

This section describes serious operational incidents reported as occurring during the last year covered by this report. The section is grouped by safety outcome target group. For each incident the location is stated before the description.

Other

- Auckland: Control of the aircraft was lost at the start of the take-off run after the nose wheel locked. The take-off was aborted but the aircraft swerved from one side of the runway to the other. A main wheel came very close to the edge of the runway. One runway edge light was destroyed by the nose wheel. The aircraft was stopped on the runway and was taxied back to the apron for engineers to attend to it. The flight departed later at night. Occurrence Id: 17/302

Sport Transport

- Ashburton: Engine failure after take-off. Aircraft landed in paddock 1nm south east of Ashburton. Occurrence Id: 16/4220

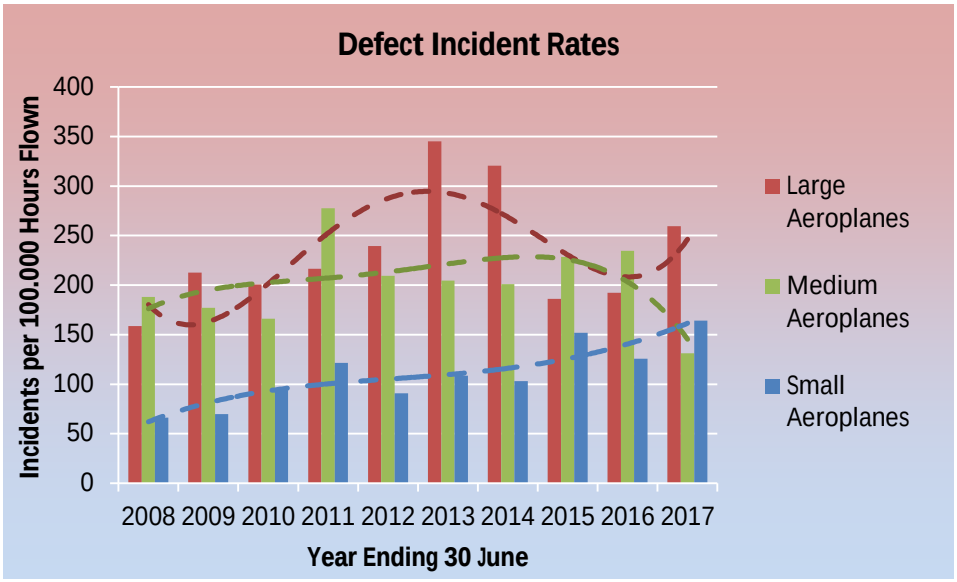
Agricultural Operations - Helicopters

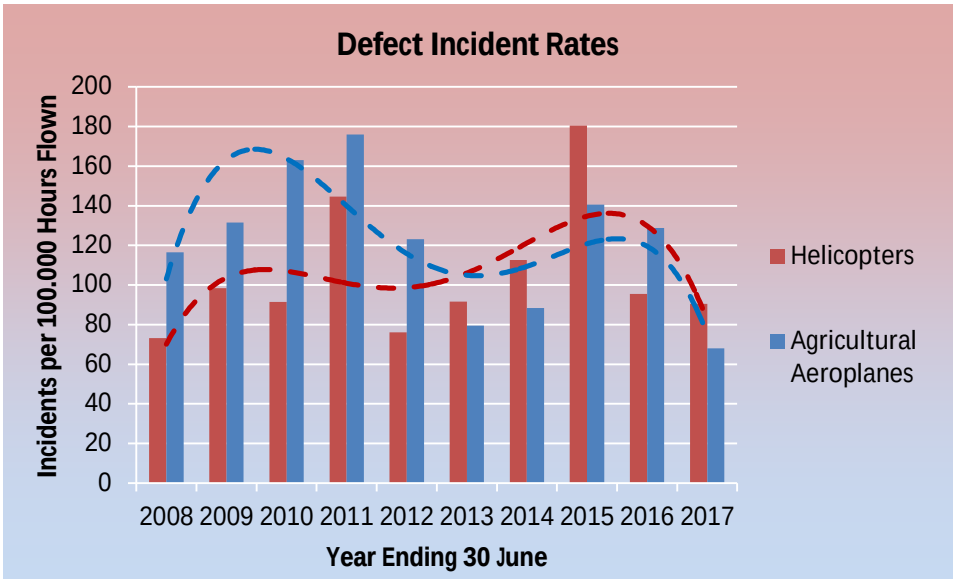
- Haumanga: Helicopter struck a wire immediately after taking off from the load site. The wire had been removed during operations but re-erected by the farmer before final departure without telling the pilot. Occurrence Id: 16/6873

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 2017.

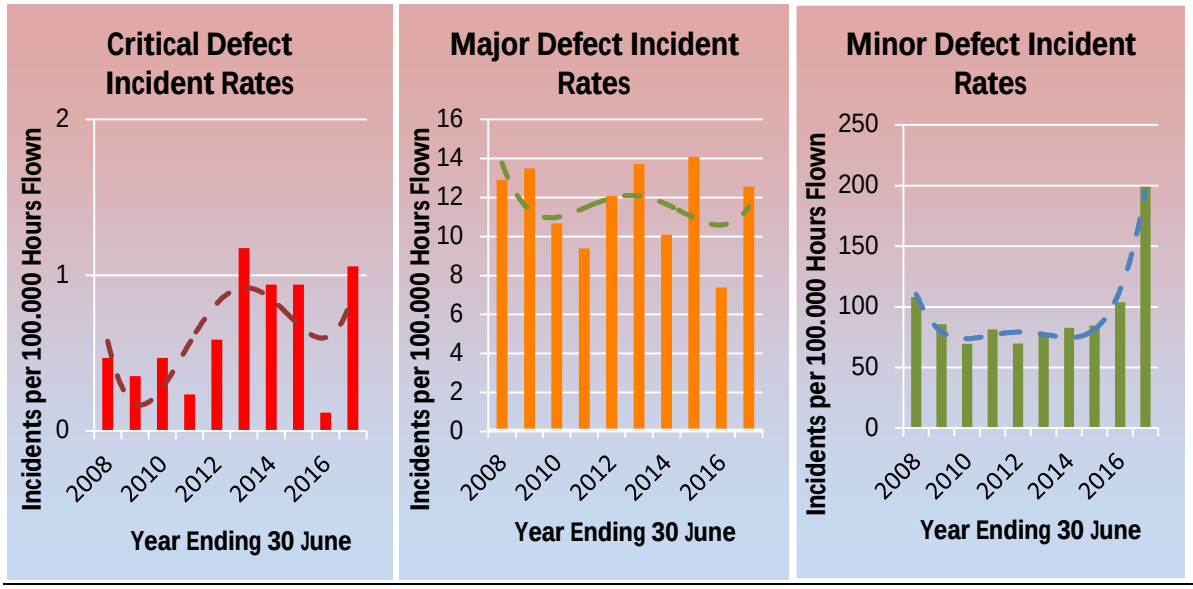
Breakdown by Aircraft Category





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 2017. All aircraft types are included. The table is sorted by the number of incidents in the 2017 year.

Safety Outcome Target Group	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Airline Operations - Large Aeroplanes	423	590	620	700	794	1155	1090	630	656	**931**
Other Commercial Operations - Aeroplanes	94	219	143	185	133	146	154	261	250	**277**
Other Commercial Operations - Helicopters	63	65	46	109	82	57	94	281	152	**141**
Other	8	10	17	35	15	23	48	25	19	**42**
Private Operations - Aeroplanes	31	26	65	33	33	30	35	44	29	**29**
Airline Operations - Small Aeroplanes	49	49	48	80	33	41	26	25	29	**27**
Agricultural Operations - Aeroplanes	51	36	44	65	47	29	29	53	41	**21**
Airline Operations - Medium Aeroplanes	100	74	66	117	111	97	77	70	37	**19**
Airline Operations - Helicopters	28	61	60	78	26	54	27	5	1	**17**
Private Operations - Sport	9	11	30	27	38	19	17	16	21	**15**
Private Operations - Helicopters	3	15	17	26	12	12	26	15	7	**10**
Sport Transport	1	0	1	8	5	11	4	1	0	**9**
Agricultural Operations - Helicopters	6	8	13	29	19	27	25	6	2	**9**
None	129	46	69	24	14	12	10	10	11	**9**
Other Commercial Operations - Sport	0	0	0	0	1	0	3	1	4	**2**
Total	**995**	**1210**	**1239**	**1516**	**1363**	**1713**	**1665**	**1443**	**1259**	**1558**

Significant Incidents

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

Airline Operations - Medium Aeroplanes

- Wellington: While retracting the flaps after take-off the selector was noted to be at 0 but the flaps had failed to retract and remained at 5-10 degrees. An attempt was made to retract the flaps using the standby system. On un-guarding the switches a cracking noise followed by an arcing sound was heard followed by an electrical burning smell. The ENG FIRE annunciator and alarm sounded along with the Fuel Off annunciator and alarm sounding. The aircraft returned to Wellington. Occurrence Id: 16/5153

Other

- Auckland: During initial climb just after take-off an EICAS message OVERHEAT ENG L was received. As the crew actioned the Engine Overheat Checklist an EICAS message FIRE ENG L appeared, the fire warning light and overheat light illuminated and the fire siren sounded. The flight crew executed memory items of the checklist. The fire warning disappeared when the fire extinguishing handle was pulled out therefore the flight crew did not release the fire extinguisher bottle. The crew declared PAN and requested return to land. The crew decided on an overweight landing and finished the overweight landing checklist. Occurrence Id: 16/5962

Serious Incidents

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

ATA Chapters

Defect Incidents reported as occurring during the year ending 30 June 2017 were associated with the following ATA component code chapters.

Large Aeroplanes

The most common chapter was AEROPLANE FLIGHT CONTROL - GENERAL with 185 defects.

The next most common chapter was FLIGHT NAVIGATION SYSTEMS - GENERAL with 92 defects.

Medium Aeroplanes

The most common chapter was LANDING GEAR (LG) - GENERAL with 9 defects.

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

The next most common chapter was ENGINE (TURBINE/TURBOPROP) - GENERAL with 4 defects.

Small Aeroplanes

The most common chapter was LANDING GEAR (LG) - GENERAL with 35 defects.

The next most common chapter was AEROPLANE FLIGHT CONTROL - GENERAL with 20 defects.

Agricultural Aeroplanes

The most common chapter was LANDING GEAR (LG) - GENERAL with 5 defects.

The next most common chapter was AEROPLANE FLIGHT CONTROL - GENERAL with 5 defects.

Helicopters

The most common chapter was POWERPLANT FUEL SYSTEM - GENERAL with 20 defects.

The next most common chapter was MAIN ROTOR - GENERAL with 15 defects.

Sport Aircraft

The most common chapter was LANDING GEAR (LG) - GENERAL with 3 defects.

The next most common chapter was POWERPLANT INSTALLATION - GENERAL with 2 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.

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

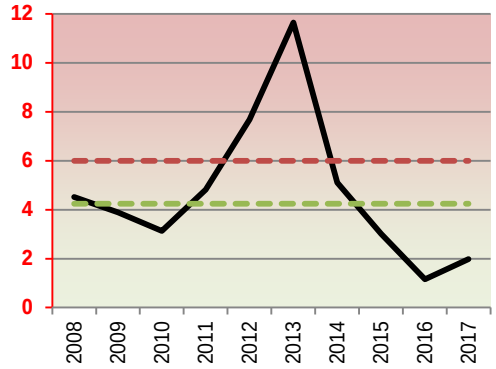
The timing of defect reports is often considerably later than what is mandated by Rule Part 12 and likewise a small number of operators of large and medium aeroplanes are persistently late with their hours and flights data returns. As a result the last two quarters of following defect rate graphs are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

Analysis

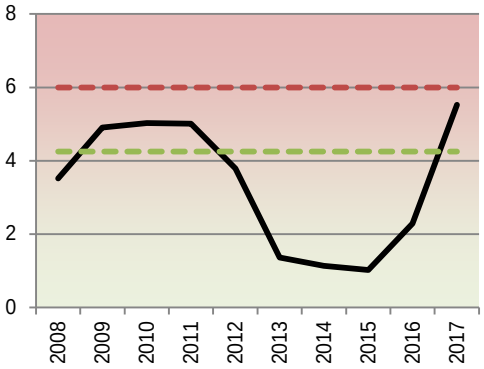
The red line on each graph shows the High defect rate. The green line shows the Alert defect rate. The Manager Airworthiness is notified of all high and alert rates on a quarterly basis.

Large Aeroplanes

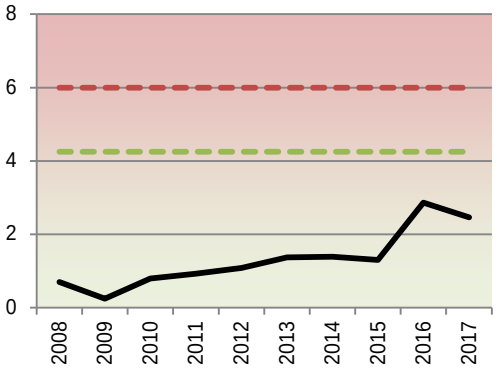
B737-300 Defects per 1000 hours



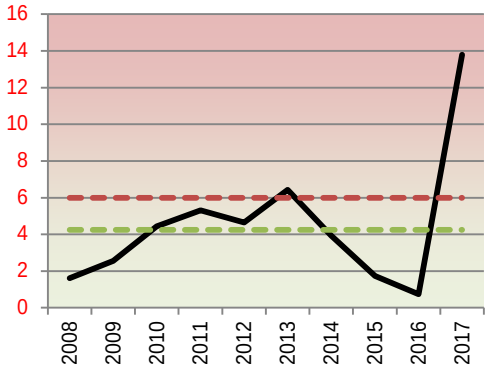
B737-400 Defects per 1000 hours



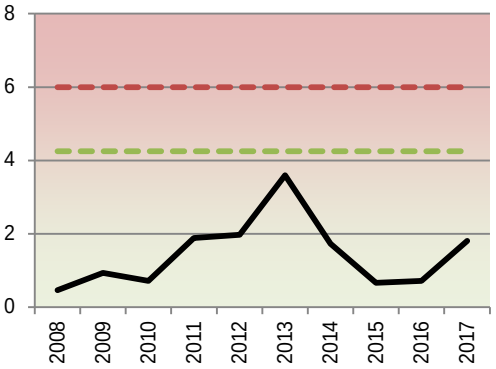
B737-800 Defects per 1000 hours



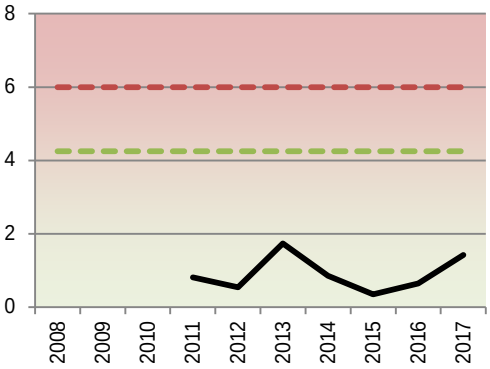
B767-300 Defects per 1000 hours



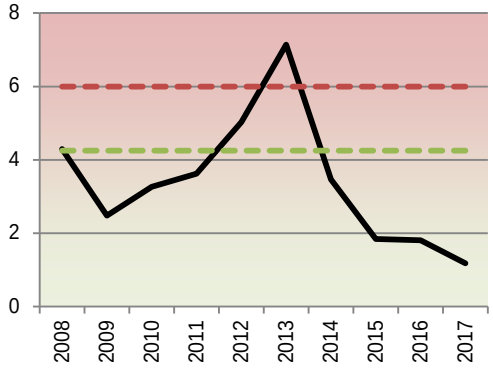
B777-200 Defects per 1000 hours



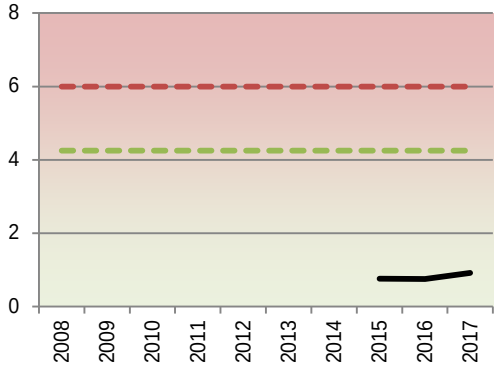
B777-300 Defects per 1000 hours



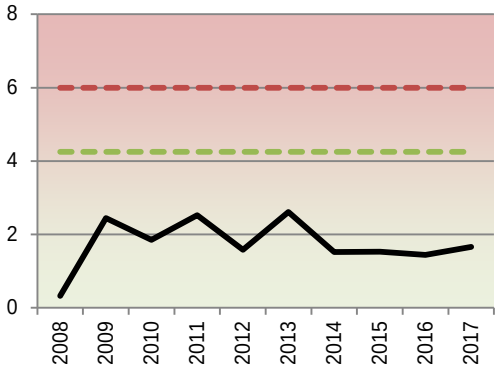
A320 Defects per 1000 hours



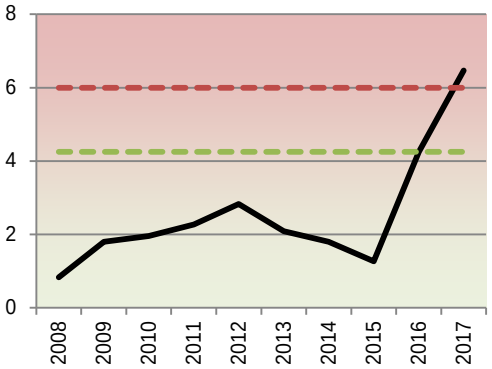
B787-900 Defects per 1000 hours



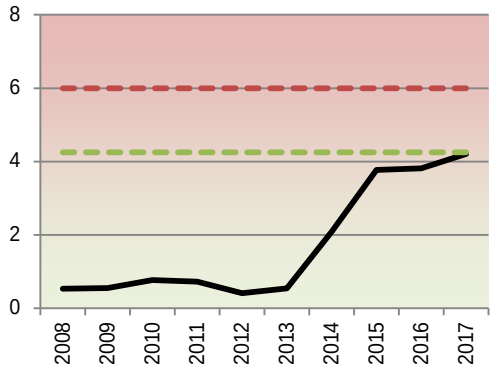
Convair 580 Defects per 1000 hours



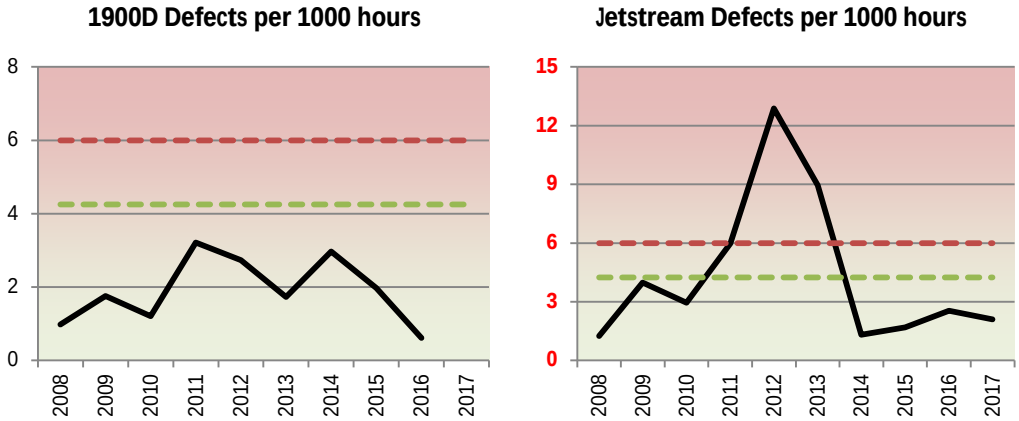
ATR 72 Defects per 1000 hours

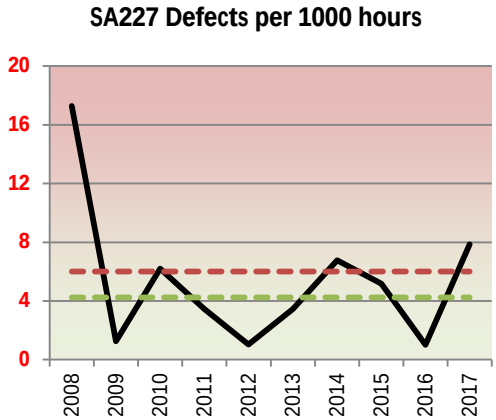


DHC-8 Defects per 1000 hours



Medium Aeroplanes





Bird Incident Rates

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

Annual Strike Rate

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

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

Aerodrome	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Manapouri *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.8	0.0	27.8
Napier	6.9	5.0	12.9	6.9	9.3	11.7	7.1	11.2	16.4	23.4
Woodbourne	4.1	2.9	5.2	4.2	4.3	10.4	4.7	6.5	3.2	8.5
Nelson	1.6	1.8	1.6	2.0	2.2	5.6	2.9	6.2	7.5	8.1
Whenuapai	12.2	7.7	12.5	10.0	14.2	6.6	8.2	8.8	6.8	8.1
New Plymouth	2.6	5.3	4.4	5.8	3.5	6.8	1.7	7.1	7.8	7.7
Dunedin	3.2	3.4	4.3	4.8	5.3	6.0	6.3	5.8	6.3	7.4
Invercargill	8.1	7.4	6.9	5.8	3.8	3.6	6.5	10.1	4.9	6.7
Palmerston North	3.2	5.0	4.3	3.9	2.8	4.8	4.7	3.7	4.0	6.5
Christchurch	3.0	2.5	2.0	3.1	3.6	3.0	3.3	3.4	4.6	5.4
Rotorua	5.2	5.4	6.0	3.6	2.6	6.3	5.2	4.6	4.3	5.3
Westport	19.4	19.4	24.2	4.8	14.5	4.8	9.7	14.5	4.8	4.8
Gisborne	11.2	6.2	3.0	5.8	7.0	7.2	7.0	9.5	7.5	4.6
Tauranga	1.3	2.0	0.9	2.6	1.9	2.2	3.4	2.3	2.5	4.3
Wellington	1.0	1.6	1.6	1.5	2.6	2.8	1.6	3.9	2.3	4.3
Kerikeri	3.8	7.5	8.8	8.8	7.5	13.8	11.3	5.0	2.5	3.8
Whangarei	0.8	3.0	6.8	7.5	6.8	3.8	6.0	1.5	0.8	3.8
Whakatane	5.0	1.7	10.8	5.8	3.3	3.3	6.7	4.2	1.7	2.5
Taupo	1.8	2.5	2.4	5.9	2.3	1.7	1.7	0.5	0.9	2.0
Ohakea	1.7	2.3	2.5	2.5	2.9	1.8	6.1	3.9	7.1	1.9
Auckland	2.9	2.1	3.0	2.4	3.1	3.1	1.7	3.1	2.0	1.8
Hamilton	2.3	2.4	1.9	1.9	1.2	1.1	1.6	1.4	1.3	1.8
Queenstown	3.8	2.4	1.6	1.9	3.6	4.3	2.3	2.9	6.2	1.6
Timaru	5.0	8.8	3.8	10.0	2.5	5.0	2.5	1.3	2.5	0.7
Paraparaumu	0.0	0.0	0.8	0.4	1.6	1.4	0.9	0.9	0.4	0.5
Hokitika	7.2	2.4	2.4	2.4	2.4	0.0	2.4	0.0	0.0	0.1
Chatham Islands	0.0	10.0	0.0	0.0	0.0	0.0	20.0	20.0	0.0	0.0
Wanganui	0.7	1.4	1.4	4.2	2.8	6.9	2.8	3.5	1.4	0.0

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

For most of the certificated aerodromes that do not have a control or information service, the 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 yellow 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 30 June 2017 for individual aerodromes are shown in the following table.

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

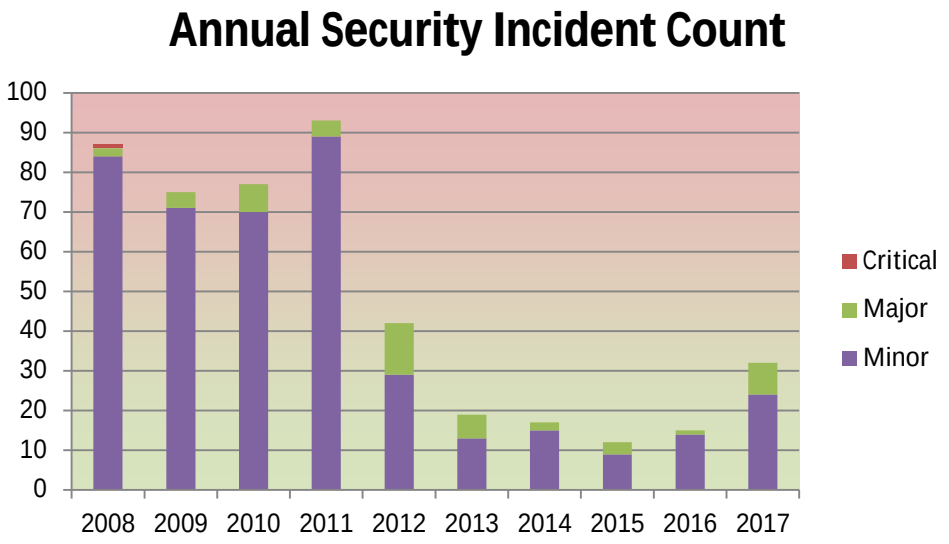
Significant or Serious Incidents

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 2017



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

Breakdown by Nearest Aerodrome

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

Aerodrome	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Auckland	8	20	25	51	13	5	2	3	3	9
Christchurch	2	10	4	15	1	1	1	1	1	4
Wellington	0	6	6	7	10	2	2	2	0	3
Dunedin	0	1	2	0	0	0	0	0	1	2
Queenstown	1	1	3	2	1	0	0	0	2	2
Hamilton	0	2	1	0	3	0	1	0	0	1
Napier	0	0	1	0	0	0	0	0	0	1
Nelson	1	1	2	2	0	1	0	2	4	1
Invercargill	0	1	0	0	0	0	0	0	0	1
Palmerston North	0	0	0	0	0	0	0	0	0	1
Paraparaumu	0	0	2	0	1	0	1	1	0	1
Rotorua	0	2	0	0	0	0	0	0	1	1
Tauranga	2	0	0	0	0	0	0	0	0	1
Woodbourne	0	0	0	1	0	0	0	0	0	1
Gisborne	0	0	2	0	0	3	0	0	0	0
Milford Sound	5	1	0	0	0	0	0	0	0	0
New Plymouth	0	0	0	0	0	0	0	0	0	0
Off Aerodrome	65	26	26	15	11	5	9	3	3	3

Breakdown by Aircraft Category

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

Aircraft Category	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Large Aeroplanes	17	20	10	3	14	6	8	2	7	14
Medium Aeroplanes	3	6	0	2	1	4	0	1	0	0
Small Aeroplanes	0	0	0	0	1	1	0	0	0	0
Helicopters	0	0	0	0	0	0	0	0	0	0
Hang Gliders	0	0	0	0	0	0	0	0	0	0
Parachutes	0	0	0	0	0	0	0	0	0	0
Agricultural Aeroplanes	0	0	0	0	0	0	0	0	0	0
Unknown	67	49	67	88	26	8	9	9	8	18
Total	87	75	77	93	42	19	17	12	15	32

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.

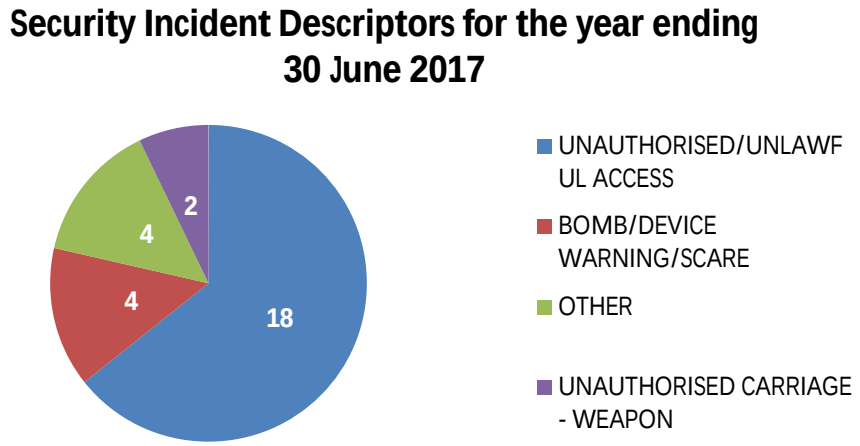
Descriptors and Causal Factors

The most common descriptor recorded for Security Incidents during the year ending 30 June 2017 was 'UNAUTHORISED/UNLAWFUL ACCESS' (18) with 'BOMB/DEVICE WARNING/SCARE' and 'OTHER' being the second most common (4 each)

No causal factors have been recorded for security incidents that occurred during the year ending 30 June 2017.

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 2017.



Aerodrome Incidents

Runway Incursions

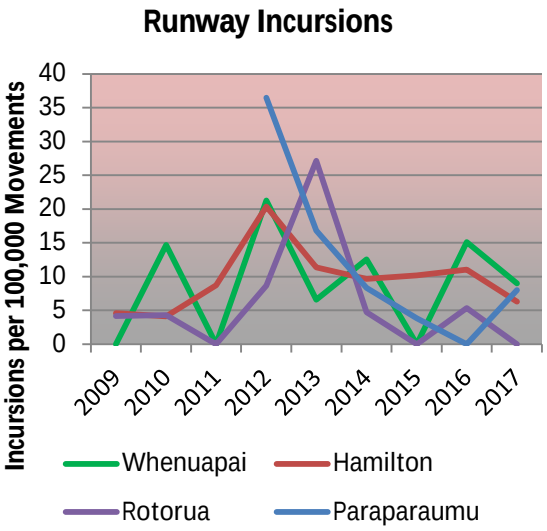
Runway incursion rates are calculated by dividing the total number of reported Aerodrome Incidents that have any of the five runway incursion descriptors by the total number of reported movements for the same aerodrome over the same period. The result is tabulated and graphed as runway incursions per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

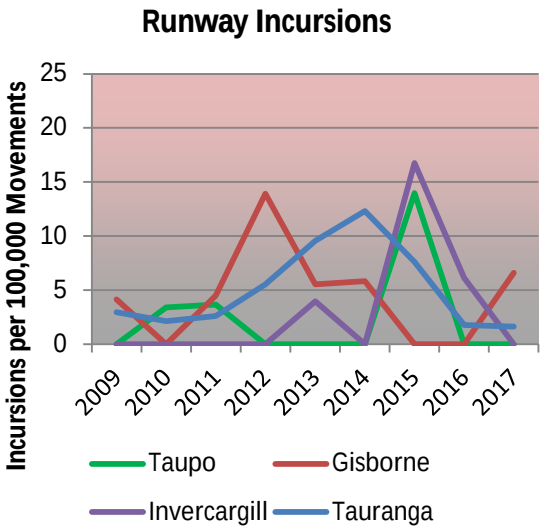
Clearly the number of runway incursions is low with many certificated aerodromes having no such incidents reported at all. With such low numbers caution needs to be exercised in drawing statistical conclusions.

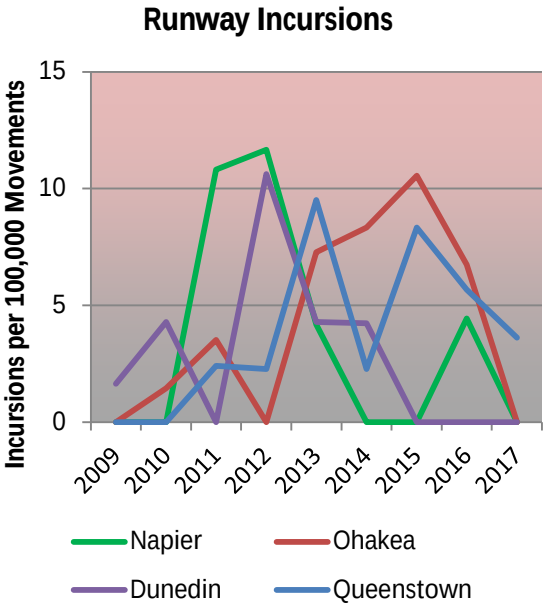
The following table shows annual values of reported runway incursion rates for all certificated aerodromes for which adequate movement data is available. The table is ordered by the maximum rate that has been recorded for any year in the period.

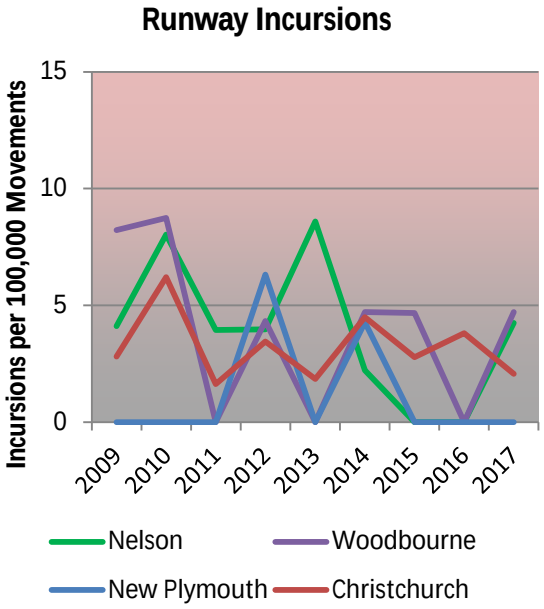
Aerodrome	2009	2010	2011	2012	2013	2014	2015	2016	2017
Whenuapai	0.0	14.7	0.0	21.3	6.6	12.6	0.0	15.1	9.0
Paraparaumu		15.9			16.8	8.3	3.8	0.0	8.0
Gisborne	4.2	0.0	4.5	13.9	5.5	5.8	0.0	0.0	6.6
Hamilton	4.6	4.1	8.7	20.4	11.4	9.7	10.2	11.0	6.3
Woodbourne	8.2	8.7	0.0	4.3	0.0	4.7	4.7	0.0	4.7
Nelson	4.1	8.0	4.0	4.0	8.6	2.2	0.0	0.0	4.3
Queenstown	0.0	0.0	2.4	2.3	9.5	2.3	8.3	5.7	3.6
Auckland	3.8	4.5	1.9	1.9	2.6	4.5	2.6	5.0	3.5
Palmerston North	5.9	1.8	0.0	2.9	1.6	3.7	3.7	2.1	2.3
Christchurch	2.8	6.2	1.6	3.4	1.8	4.5	2.8	3.8	2.1
Tauranga	3.0	2.1	2.6	5.5	9.6	12.3	7.6	1.8	1.6
Wellington	5.2	3.6	0.9	4.7	2.0	4.1	3.1	0.0	1.0
Rotorua	4.1	4.3	0.0	8.7	27.1	4.7	0.0	5.4	0.0
Invercargill	0.0	0.0	0.0	0.0	4.0	0.0	16.8	6.1	0.0
Ohakea	0.0	1.5	3.5	0.0	7.3	8.3	10.6	6.7	0.0
Napier	0.0	0.0	10.8	11.7	4.2	0.0	0.0	4.4	0.0
Dunedin	1.6	4.3	0.0	10.6	4.3	4.2	0.0	0.0	0.0
Taupo	0.0	3.4	3.7	0.0	0.0	0.0	14.0	0.0	0.0
New Plymouth	0.0	0.0	0.0	6.3	0.0	4.3	0.0	0.0	0.0

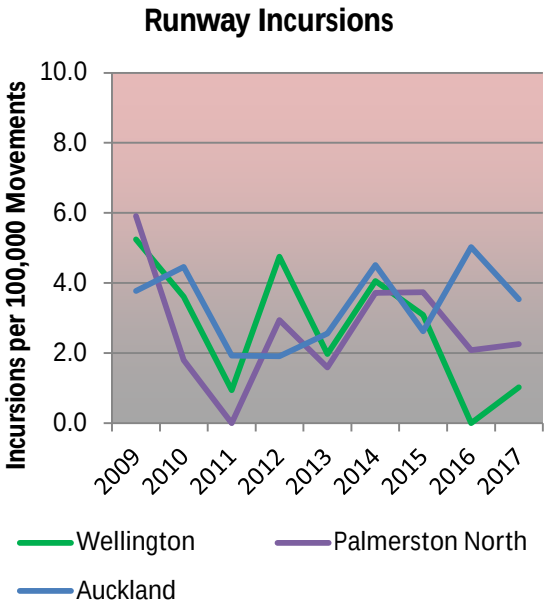
The charts on the next page show the above data in a graphical way. Aerodromes have been grouped in an arbitrary way to keep the number of lines on each chart roughly equal. The grouping is based on the largest value reported over the period covered.


Runway Incursions
Incursions per 100,000 Movements
40
35
30
25
20
15
10
5
0
2009
2010
2011
2012
2013
2014
2015
2016
2017
Whenuapai
Hamilton
Rotorua
Paraparaumu


Runway Incursions
Incursions per 100,000 Movements
25
20
15
10
5
0
2009
2010
2011
2012
2013
2014
2015
2016
2017
Taupo
Gisborne
Invercargill
Tauranga


Runway Incursions
Incursions per 100,000 Movements
15
10
5
0
2009
2010
2011
2012
2013
2014
2015
2016
2017
Napier
Ohakea
Dunedin
Queenstown


Runway Incursions
Incursions per 100,000 Movements
15
10
5
0
2009
2010
2011
2012
2013
2014
2015
2016
2017
Nelson
Woodbourne
New Plymouth
Christchurch


Runway Incursions
Incursions per 100,000 Movements
10.0
8.0
6.0
4.0
2.0
0.0
2009
2010
2011
2012
2013
2014
2015
2016
2017
Wellington
Palmerston North
Auckland

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 incident.

Serious Incidents

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

Airline Operations - Large Aeroplanes

- Wellington: As an ATR taxied to stand 78, the aircraft's wingtip passed over a Dash 8's wind screen. The Dash 8 was parked on stand 79. Words similar to "you're on the wrong lines" were heard on the ground control frequency. Occurrence Id: 17/1293

Other Commercial Operations - Aeroplanes

- Hamilton: A Robin called ready at the run-up area and was instructed to taxi to Holding Point C3, was then cleared to taxi to and hold at holding point E2 cross runway 18R (due to a DV20 on short final for touch and go on Runway 18L). The Robin was then observed to have entered RWY 18L without a clearance, come to a stop at the intersection of taxiway E and RWY 18L. The DV20 was accelerating in the touch and go at this time passing the Robin with a horizontal separation of approximately 20m. Occurrence Id: 17/2681

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-2016	4	20	40	99	101	113	4	0	97	5	0	2	2
Aug-2016	4	14	83	128	208	139	4	2	123	6	0	4	0
Sep-2016	6	24	106	149	88	158	7	2	126	7	0	3	1
Oct-2016	7	18	58	127	128	132	2	0	117	9	1	7	6
Nov-2016	4	22	53	177	139	89	4	1	122	8	1	2	3
Dec-2016	4	16	63	86	54	100	5	2	119	2	4	3	0
Jan-2017	10	17	48	116	111	99	4	3	165	3	4	3	4
Feb-2017	8	18	65	128	59	102	1	0	148	3	1	2	4
Mar-2017	9	26	80	161	197	172	19	2	177	5	0	1	1
Apr-2017	5	19	46	93	148	103	2	2	139	6	1	3	0
May-2017	4	23	148	187	184	161	7	2	234	8	1	2	3
Jun-2017	4	25	185	142	113	177	5	0	174	7	2	2	5

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

Causal Factor Summary

Introduction

The following section presents a summary of occurrence causes recorded during the year ending 31 December 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 June2017 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	ASP	DEF	INC
Active Failure	ACTIONS INCONSISTENT WITH PROCEDURES			1
	INACCURATE SYSTEM "DIAGNOSIS"			1
	PRIMARILY "STRUCTURAL/MECHANICAL"		4	1
	STATE CHANGE NOT DETECTED "INFORMATION"	1		
Organisation	DESIGN DEFICIENCIES	1		
	INADEQUATE COMMUNICATIONS	1		
Local Error	TASK OVERLOAD	1		
Local Violation	HAZARD MISPERCEPTION			1

Medium Aeroplanes

Category	Cause	DEF	INC
Active Failure	ACTIONS INCONSISTENT WITH PROCEDURES		1
	PRIMARILY "STRUCTURAL/MECHANICAL"	1	
Local Error	INADEQUATE CHECKING		1
	RISK MISPERCEPTION		1

Unknown Aircraft Category

Category	Cause	ASP
Active Failure	ACTIONS INCONSISTENT WITH PROCEDURES	3
	STATE CHANGE NOT DETECTED "INFORMATION"	1
Local Error	INADEQUATE CHECKING	1
	POOR SYSTEM FEEDBACK	1
	PSYCHOLOGICAL OTHER	1

Small Aeroplanes

Category	Cause	ACC	ADI	ASP	DEF	INC
Active Failure	ACTIONS INCONSISTENT WITH PROCEDURES		1	4		2
	INACCURATE SYSTEM "DIAGNOSIS"			1		
	INAPPROPRIATE "STRATEGY"	1				
	POOR PROCEDURE "ACTION"	1		1		2
	PRIMARILY "STRUCTURAL/MECHANICAL"				4	
	STATE CHANGE NOT DETECTED "INFORMATION"	1				
Organisation	INADEQUATE CONTROL AND MONITORING	1				
	UNSUITABLE EQUIPMENT					1
Local Error	HOSTILE ENVIRONMENT	1				
	INADEQUATE CHECKING			2		2
	RISK MISPERCEPTION			1		1
	TASK OVERLOAD					1
	TASK UNFAMILIARITY	1				

Other Aeroplanes, Helicopters and Sport Aircraft

Category	Cause	ACC	ARC	ASP	DEF	HGA	INC
Active Failure	ACTIONS INCONSISTENT WITH PROCEDURES	1				1	2
	INAPPROPRIATE "STRATEGY"	1	1				
	POOR PROCEDURE "ACTION"	3		1			
	PRIMARILY "STRUCTURAL/MECHANICAL"	1			7		
	STATE CHANGE NOT DETECTED "INFORMATION"	3		1			1
Organisation	INADEQUATE PROCEDURES	1				1	
	UNSUITABLE EQUIPMENT					1	
Local Error	OTHER ERROR ENFORCING CONDITION						1
	POOR INSTRUCTIONS/PROCEDURES		1				
	RISK MISPERCEPTION	2		1			1
Local Violation	HAZARD MISPERCEPTION		1				
	OTHER VIOLATION ENFORCING CONDITION	2					
	PERCEIVED LICENSE TO BEND RULES		1				

Aircraft Maintenance Operations

The following section summarises causal factors identified from investigation of occurrences that occurred during the year ended 30 June 2017 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	DEF	INC
Active Failure	ACTIONS INCONSISTENT WITH PROCEDURES	1	
	PRIMARILY "STRUCTURAL/MECHANICAL"	4	
	STATE CHANGE NOT DETECTED "INFORMATION"	1	
Organisation	INADEQUATE PROCEDURES	2	
	INADEQUATE SPECIFICATIONS/REQUIREMENTS	1	
	UNSUITABLE MATERIALS		1

Medium Aeroplanes

No causes established

Small Aeroplanes

No causes established

Unknown Aircraft Category

Category	Cause	ARC	DEF
Active Failure	INACCURATE SYSTEM "DIAGNOSIS"		1
Local Error	INADEQUATE CHECKING		1
	POOR INSTRUCTIONS/PROCEDURES	1	

Helicopters, Agricultural Aeroplanes and Sport Aircraft

Category	Cause	ACC	ARC	DEF
Active Failure	ACTIONS INCONSISTENT WITH PROCEDURES			1
	INACCURATE SYSTEM "DIAGNOSIS"			1
	PRIMARILY "STRUCTURAL/MECHANICAL"			1
	STATE CHANGE NOT DETECTED "INFORMATION"			1
Organisation	DESIGN DEFICIENCIES			6
	INADEQUATE CONTROL AND MONITORING	1		
	INADEQUATE DEFENCES			2
Local Error	INADEQUATE CHECKING			1
	POOR INSTRUCTIONS/PROCEDURES	1	1	
	RISK MISPERCEPTION		2	

Air Traffic Services and Personnel

The following tables summarise causal factors identified from investigation of occurrences that occurred during the year ended 30 June 2017 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	NIO
Organisation	INADEQUATE COMMUNICATIONS	1	
	INADEQUATE DEFENCES	2	
	INADEQUATE PLANNING	1	
	INADEQUATE TRAINING	2	
	OTHER ORGANISATION FACTOR	7	2
	POOR COORDINATION	1	
Local Error	OTHER ERROR ENFORCING CONDITION	1	

Air Traffic Service Personnel

Category	Cause	ADI	ASP
Active Failure	POOR PROCEDURE "ACTION"		3
Local Error	FATIGUE - OTHER		1
	INADEQUATE CHECKING	1	5
	INEXPERIENCE (NOT LACK OF TRAINING)		3
	INFORMATION OVERLOAD		1
	OTHER ENVIRONMENTAL FACTOR (EG WEATHER)		2
	OTHER ERROR ENFORCING CONDITION		4
	PHYSIOLOGICAL OTHER		2
	PSYCHOLOGICAL OTHER		4
	RISK MISPERCEPTION		4
	TASK OVERLOAD		3
	TASK UNFAMILIARITY		2
	TIME SHORTAGE	1	1
	DISTURBED SLEEP PATTERNS		1
Local Violation	OTHER VIOLATION ENFORCING CONDITION		1

Client Risk Assessment

Introduction

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

The system measures a series of indicators, rated using a scale of 1 to 5 where 1 is an exemplary rating. It is a qualitative rating and relates solely to an official interaction that a 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.

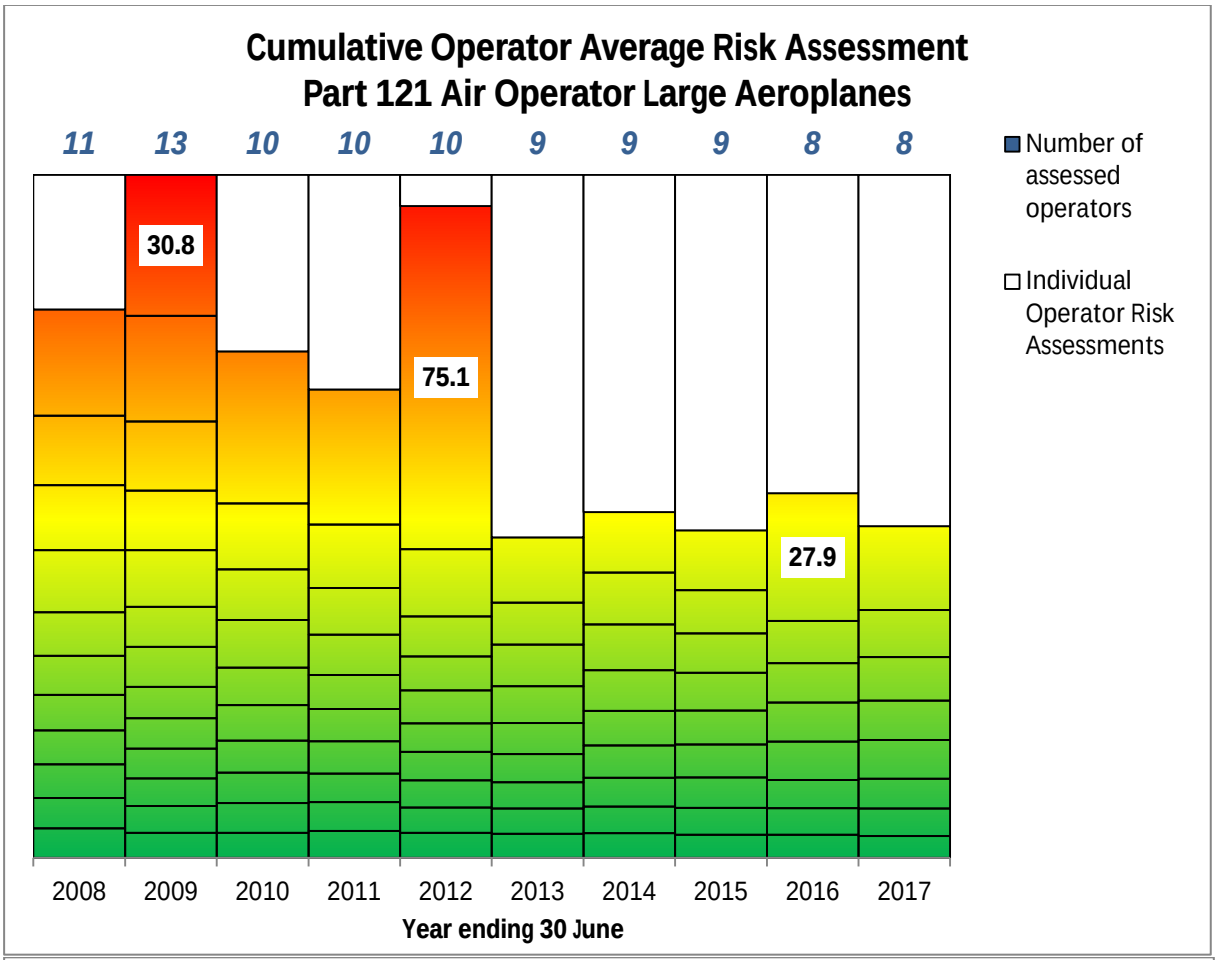
Results are in the form of a percentage of the maximum possible value (if all factors had been rated 5), and thus 100% represents the 'riskiest possible' operator. Clients can have several risk profiles current at one time, one for each activity. Each risk profile is independent of the others, and applies only to the relevant activity, although they may be have common influences, such as aircraft types.

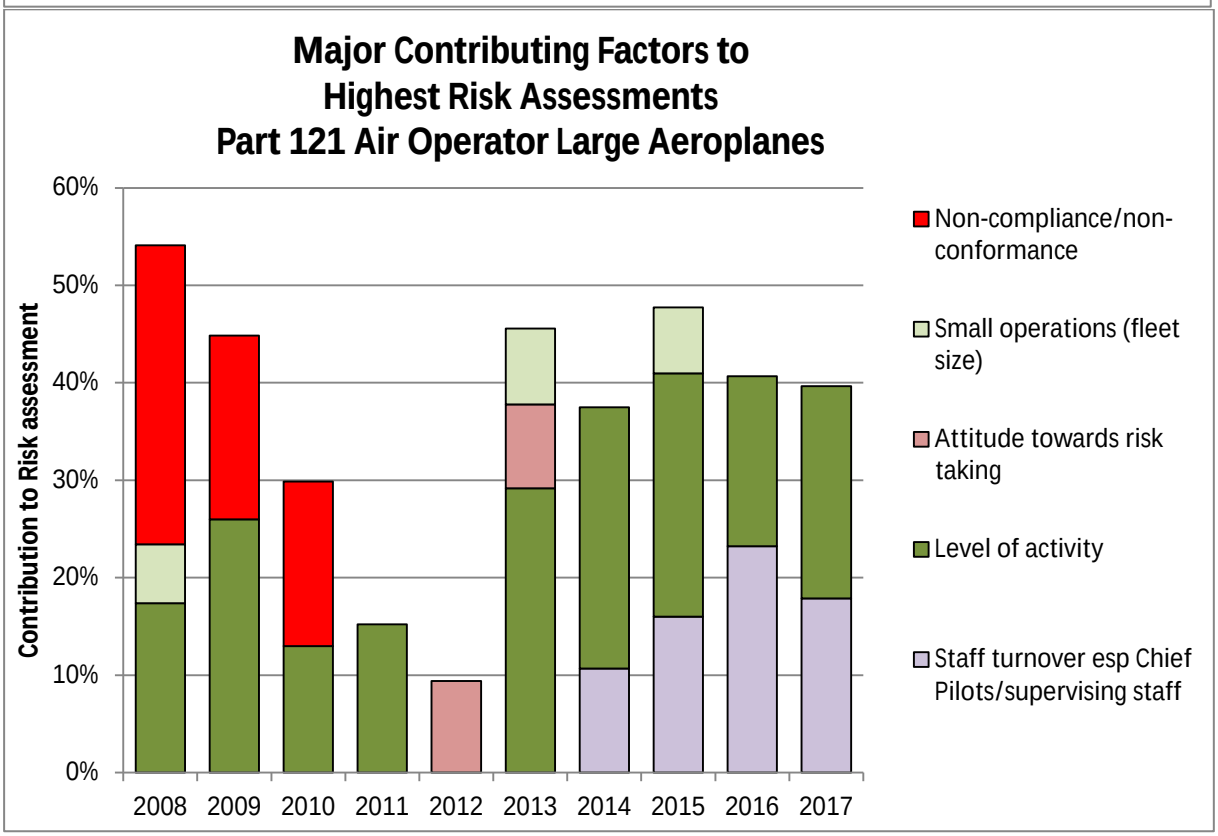
The first chart in each of the following chart pairs depicts the cumulative annual risk assessment for each certificated activity. Each 'cell' represents the annual average risk assessment for one operator with the highest risk operators at the top of the column and the lowest at the bottom. Numbers at the top of each column indicate the total number of operators assessed for the activity in that year. To provide an indication of the scale, the absolute value of the highest risk operator is included as a data label.

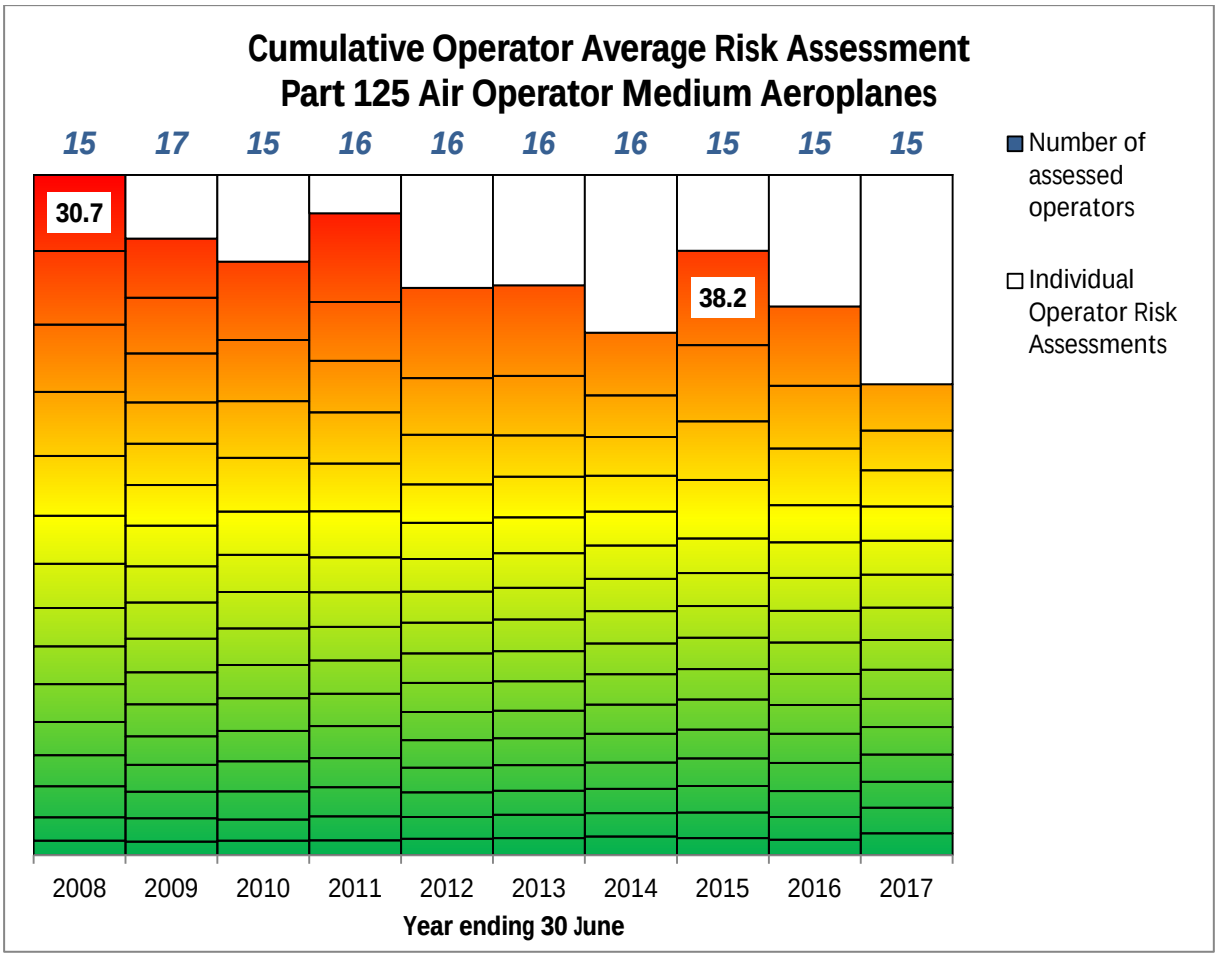
These charts can be used to visualise the overall risk within a particular certificated sector because the height of each 'column' is determined by both the risk assessments and the number of participants. Each yearly column indicates whether risk within the sector is evenly distributed amongst many, or concentrated within a small number of operators. The client risk assessment assigns high risk ratings to new certificate holders, until they accumulate some history, and this is particularly apparent in the chart for Part 129 foreign operators

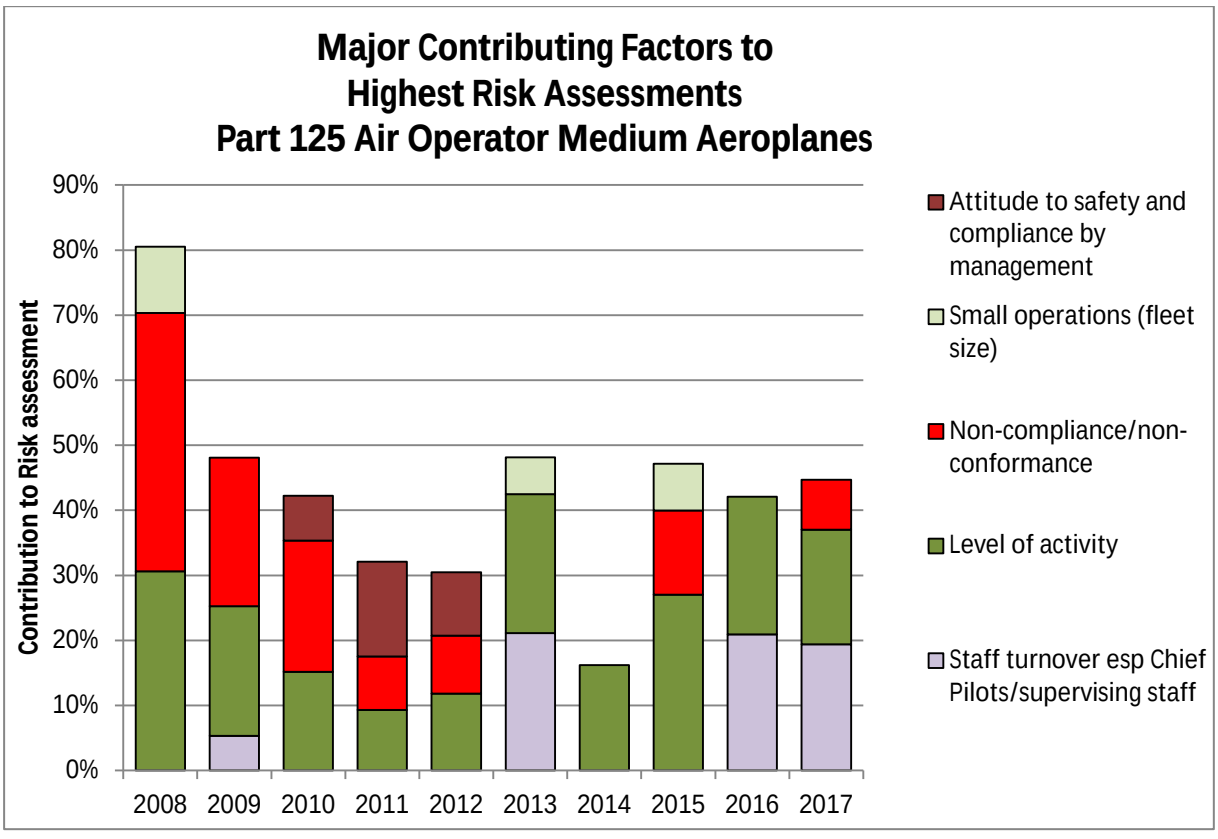
The second chart in each pair shows a more detailed breakdown of the major contributing risk indicators for the worst 10% of the risk assessments in each year. In recent years, turnover of staff has emerged as leading contributor to the highest client risk scores.

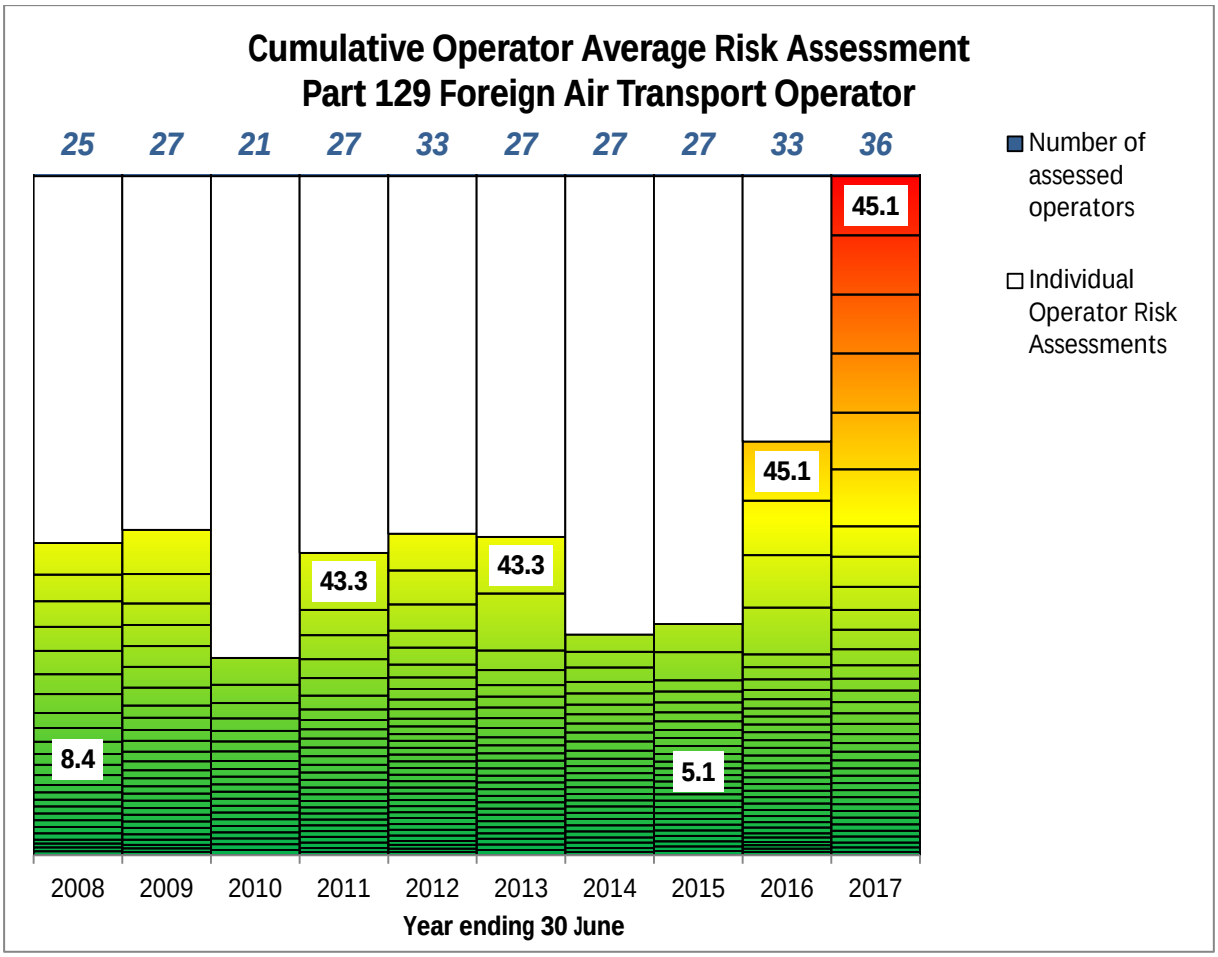
Air Transport Activities

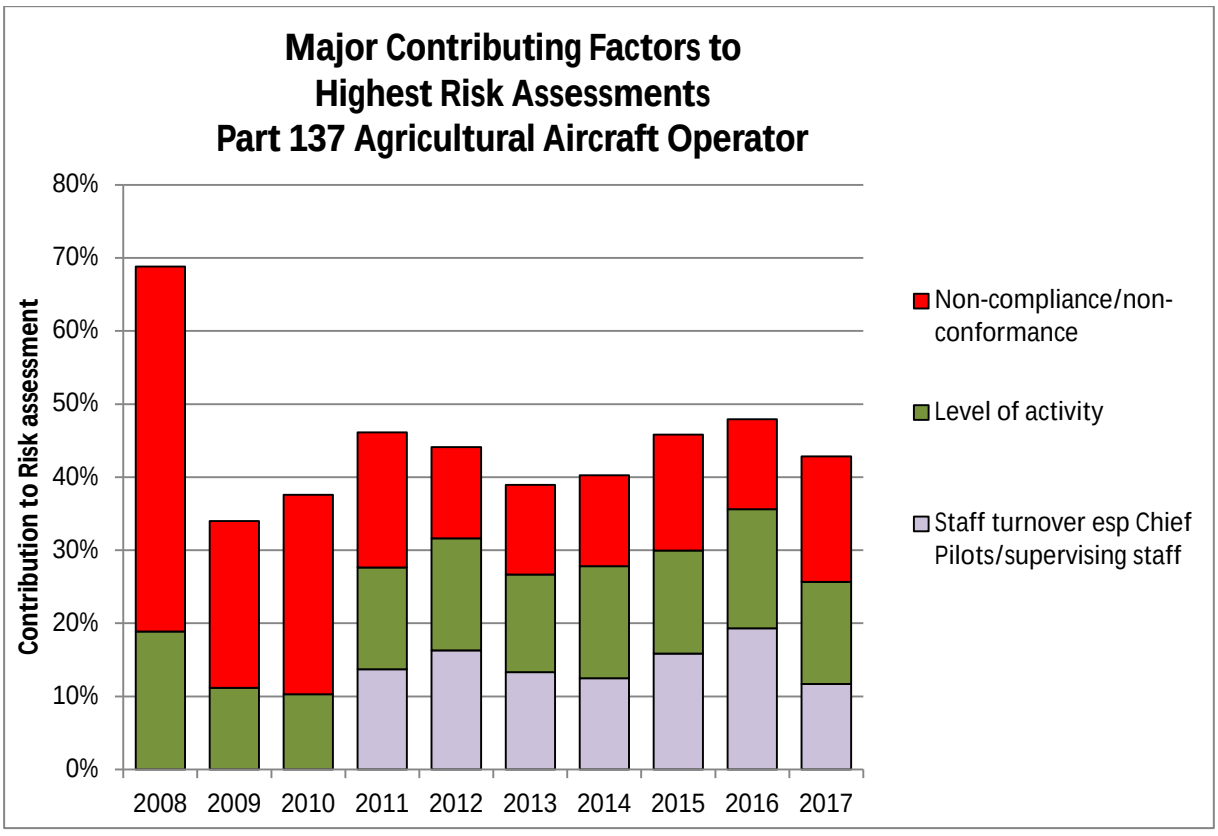


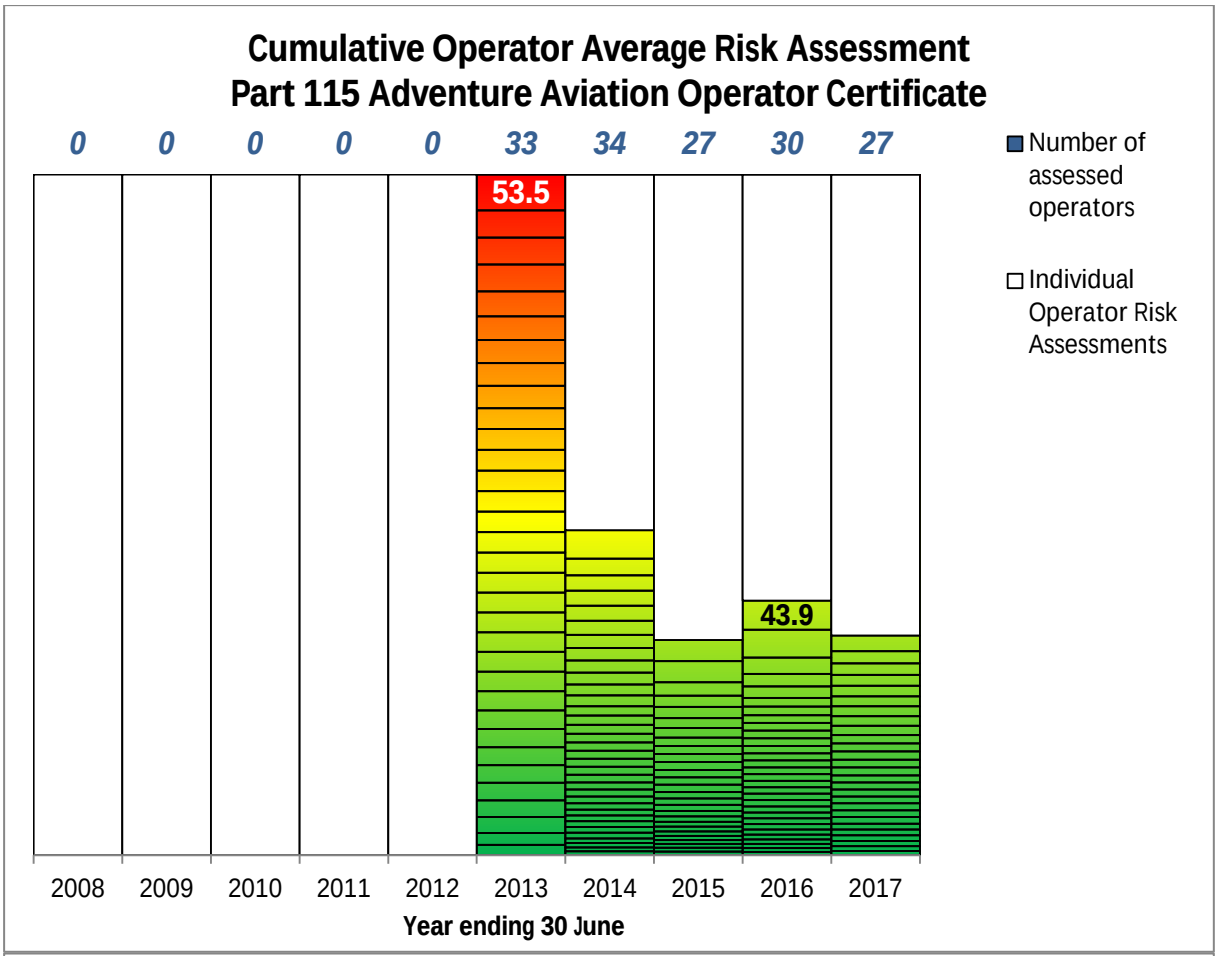


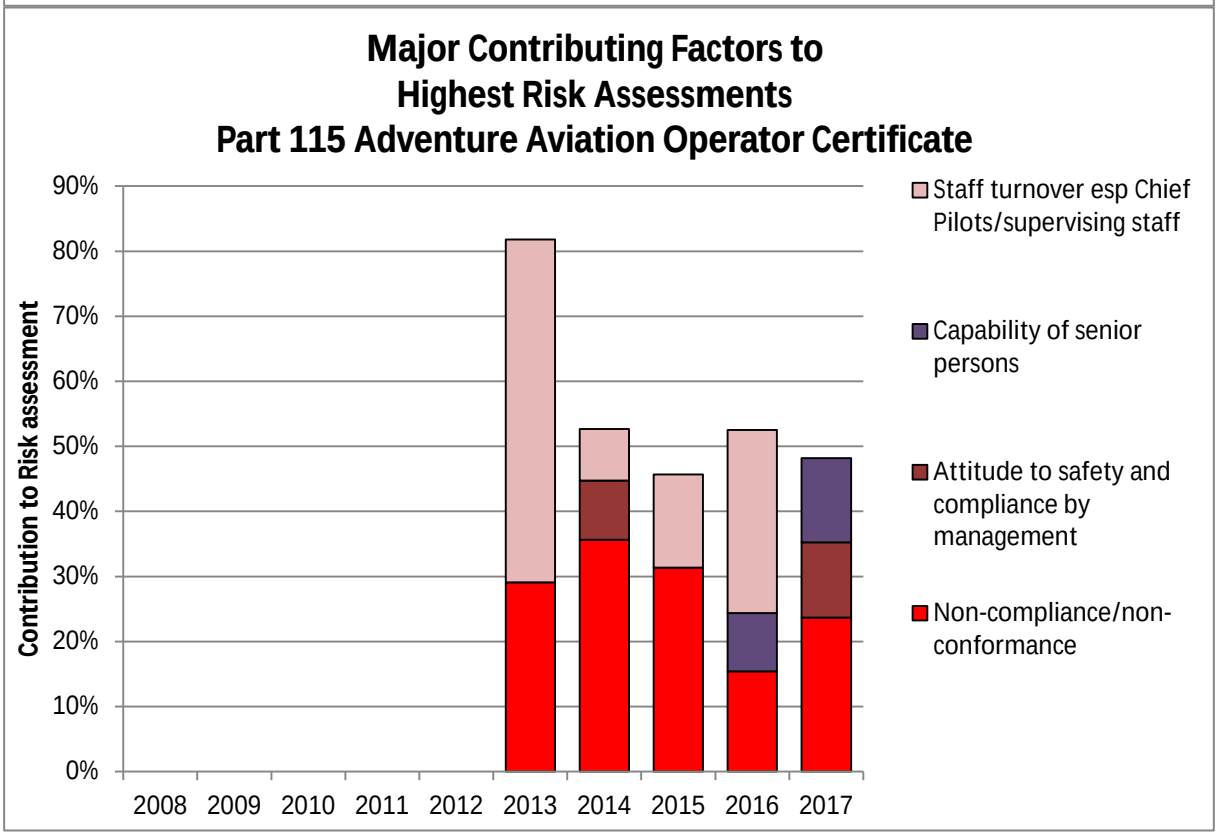




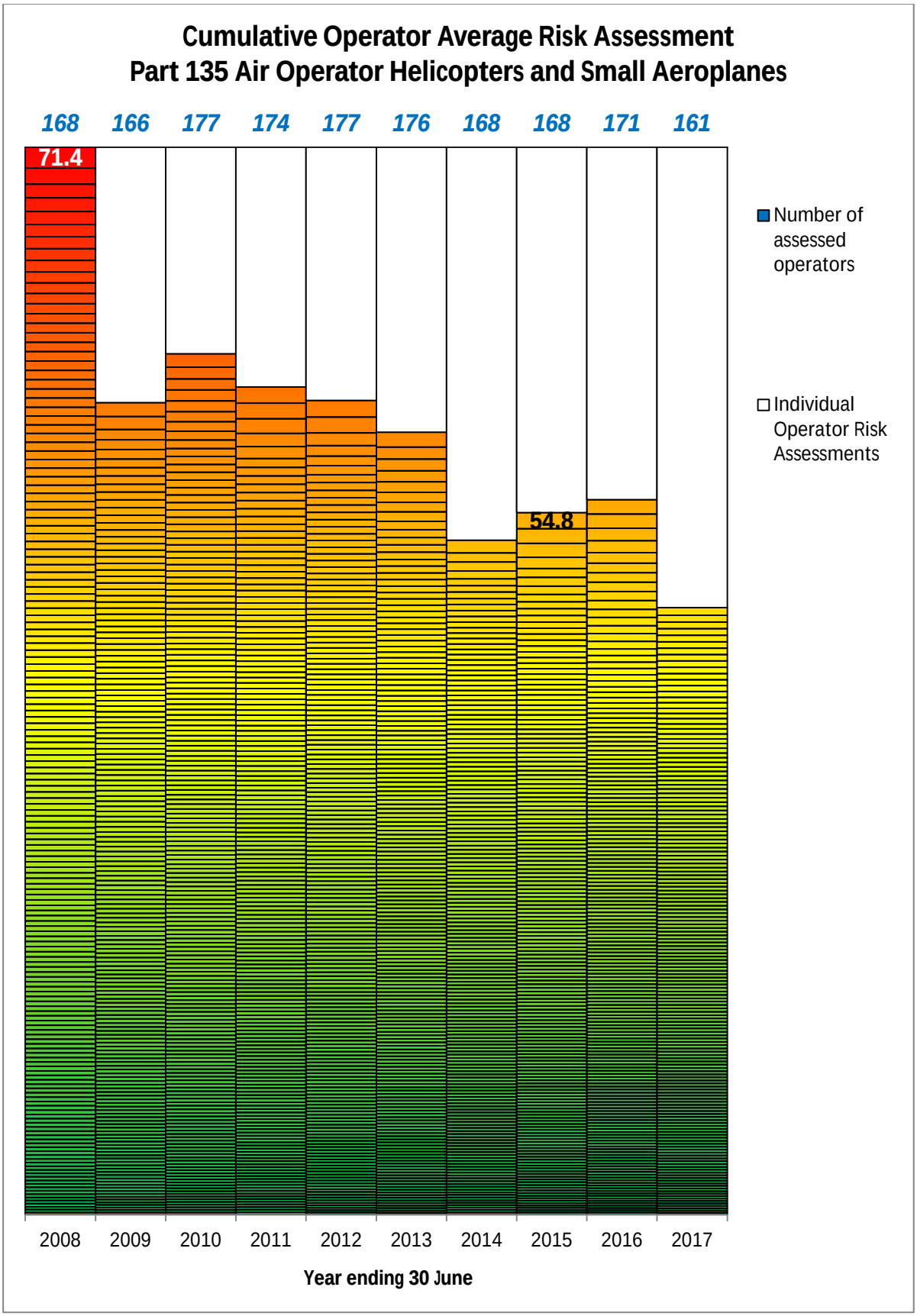

Cumulative Operator Average Risk Assessment
Part 129 Foreign Air Transport Operator
25
27
21
27
33
27
27
27
33
36
45.1
45.1
43.3
43.3
8.4
5.1
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
Year ending 30 June
Number of assessed operators
Individual Operator Risk Assessments

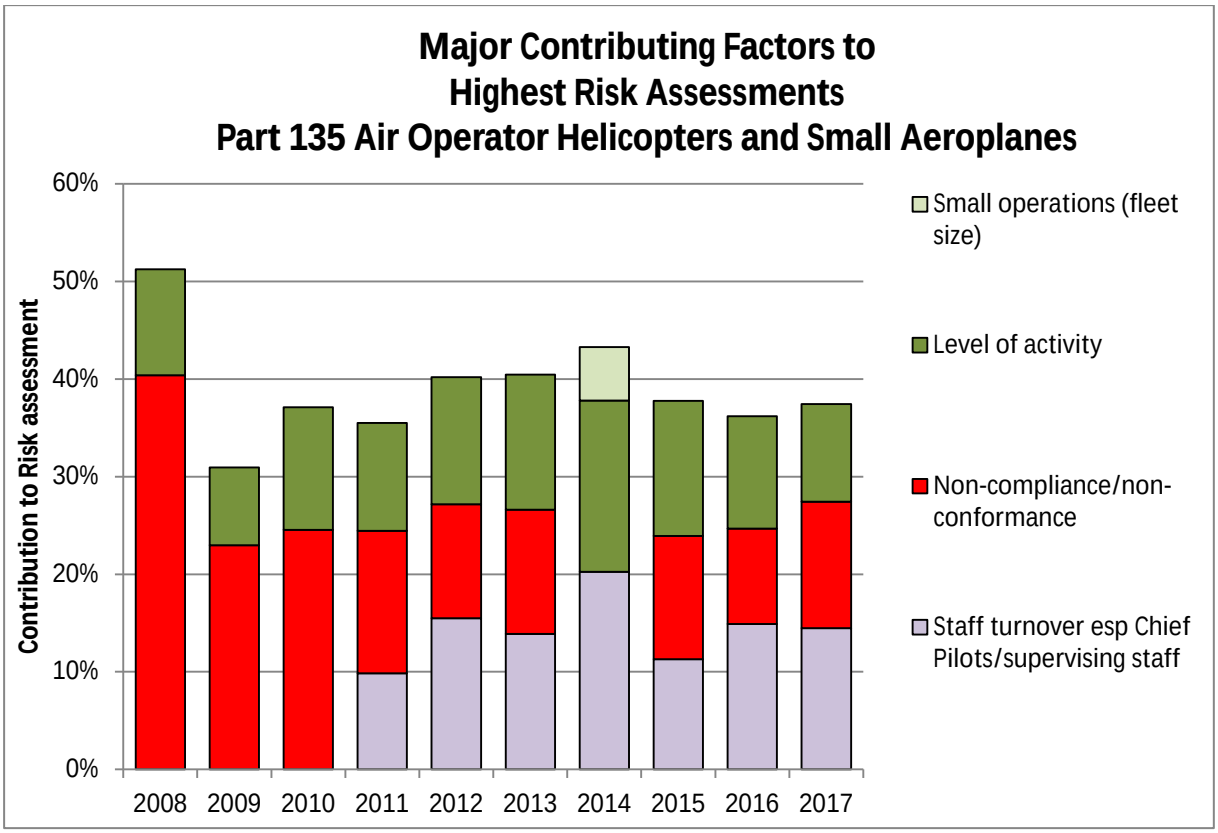

Major Contributing Factors to
Highest Risk Assessments
Part 137 Agricultural Aircraft Operator
Contribution to Risk assessment
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
Non-compliance/non-conformance
Level of activity
Staff turnover esp Chief Pilots/supervising staff

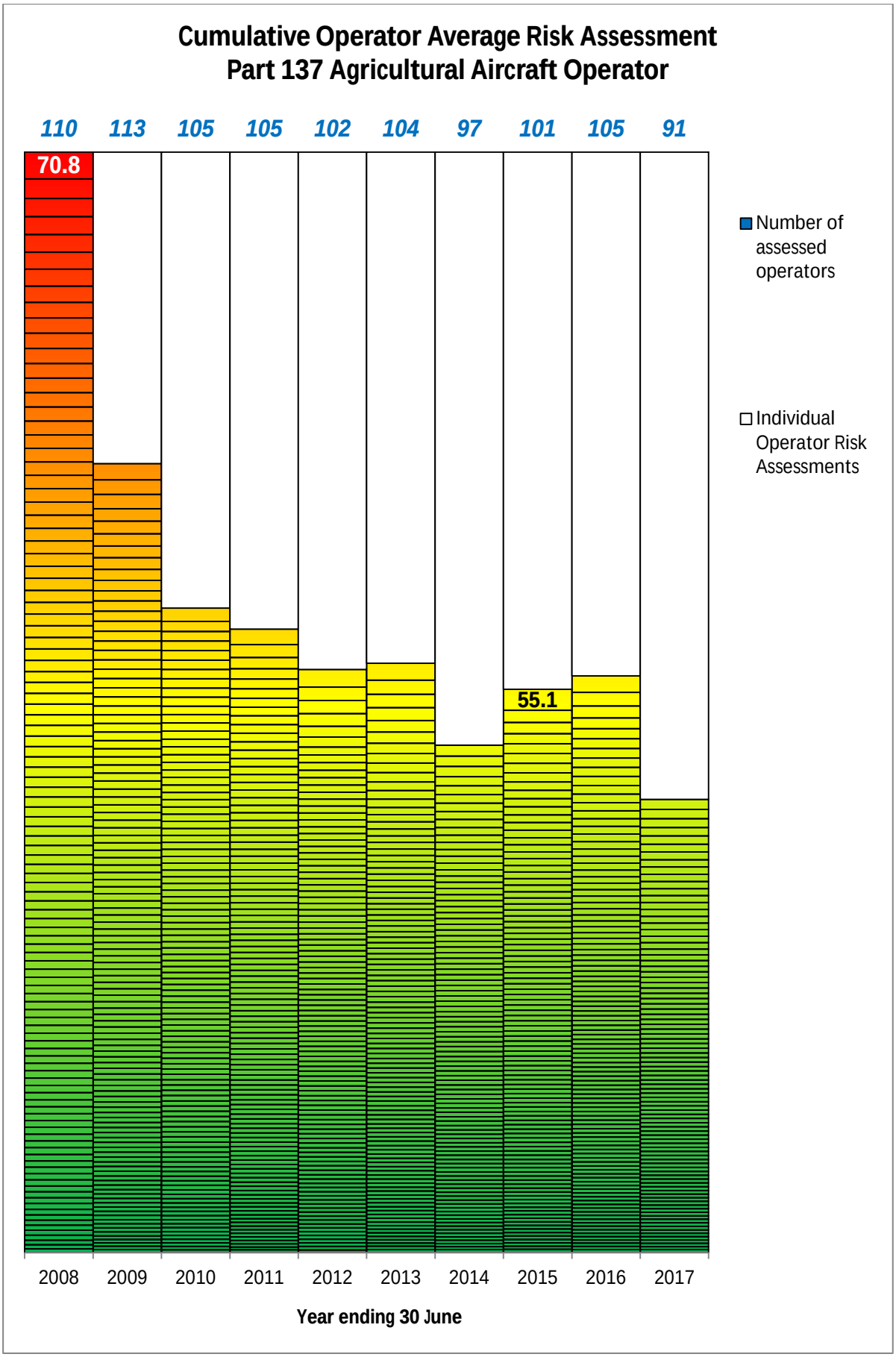


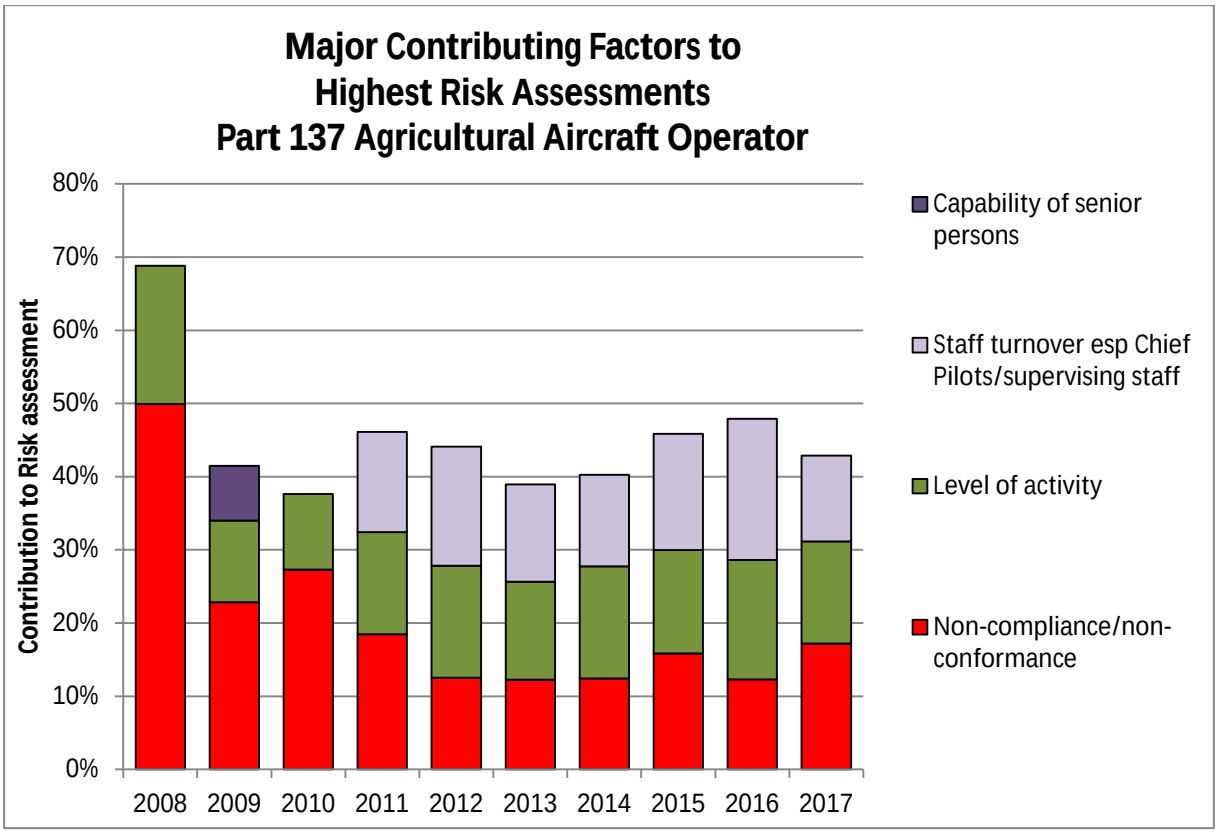


Commercial Activities

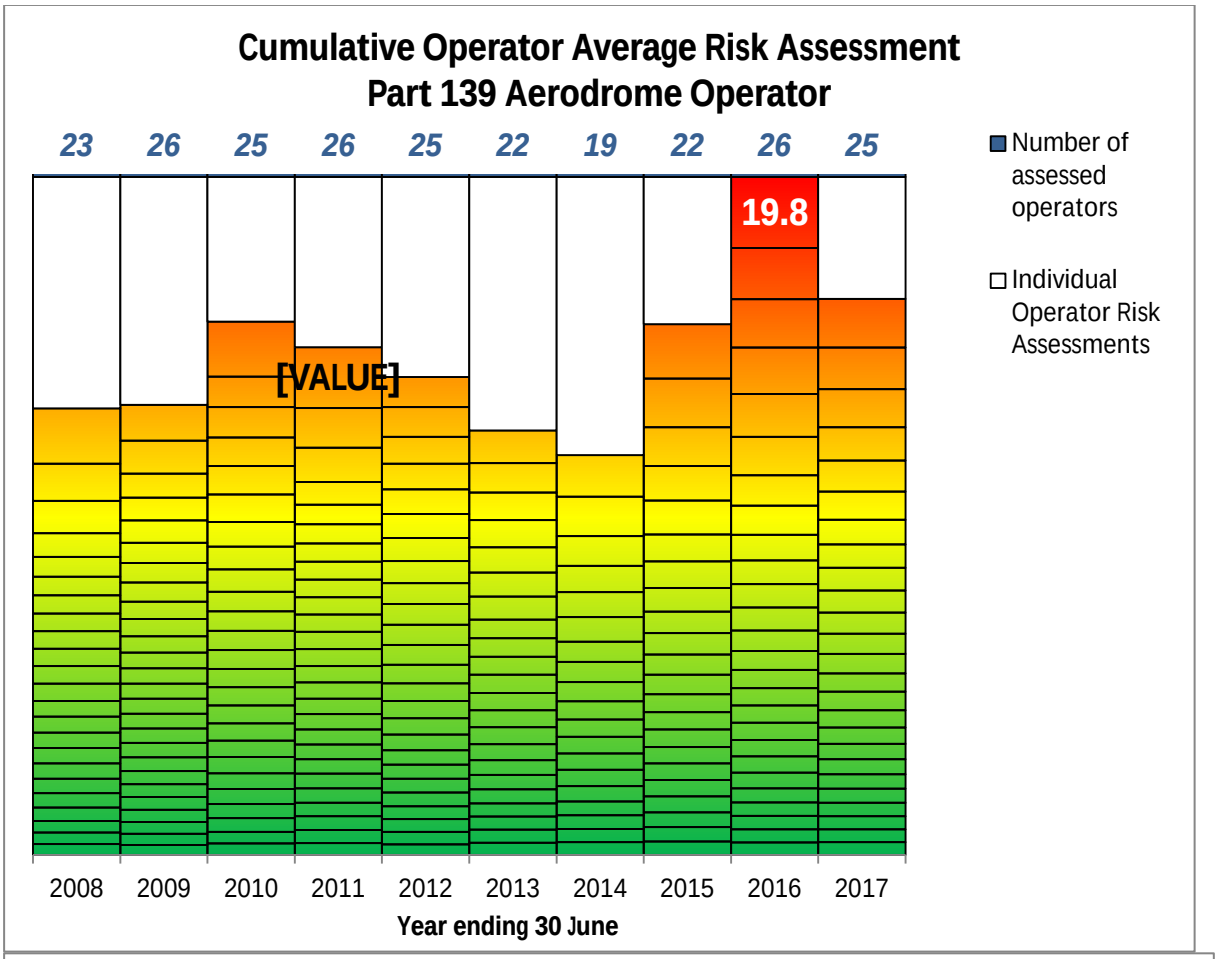


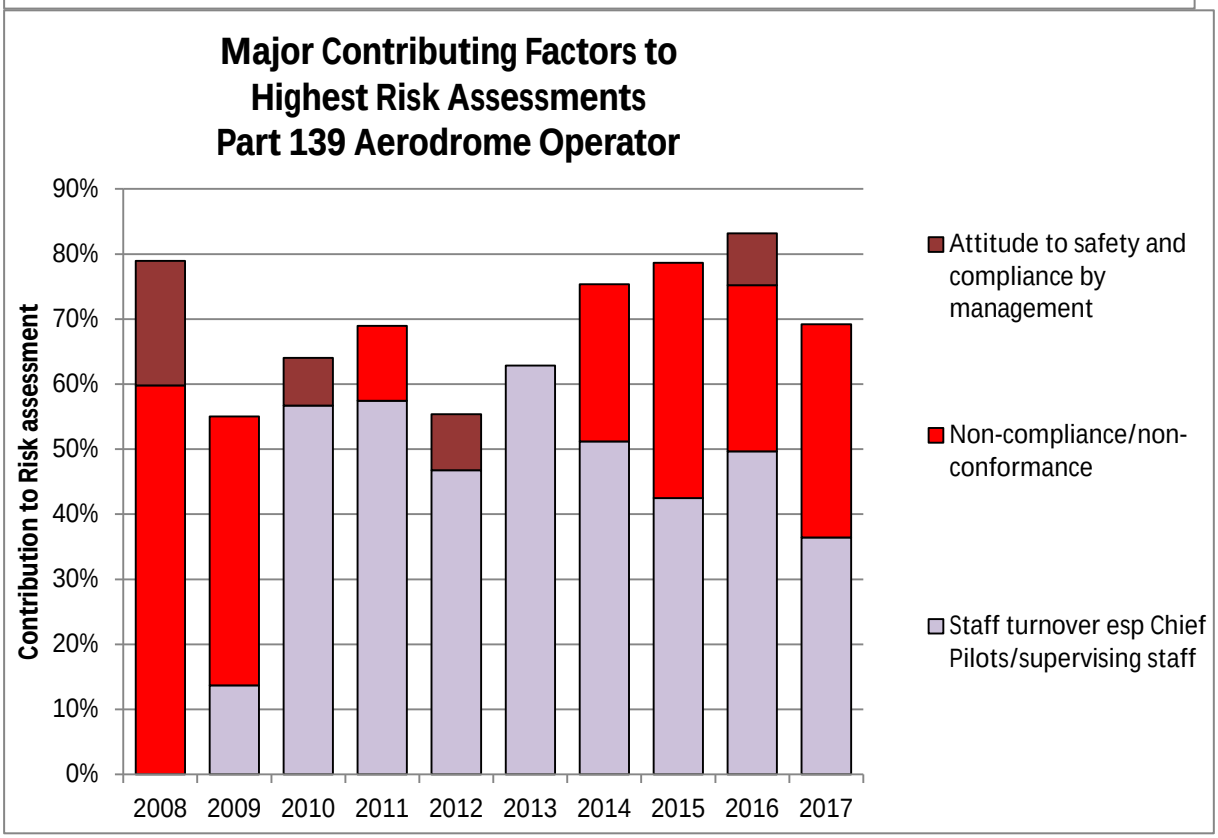


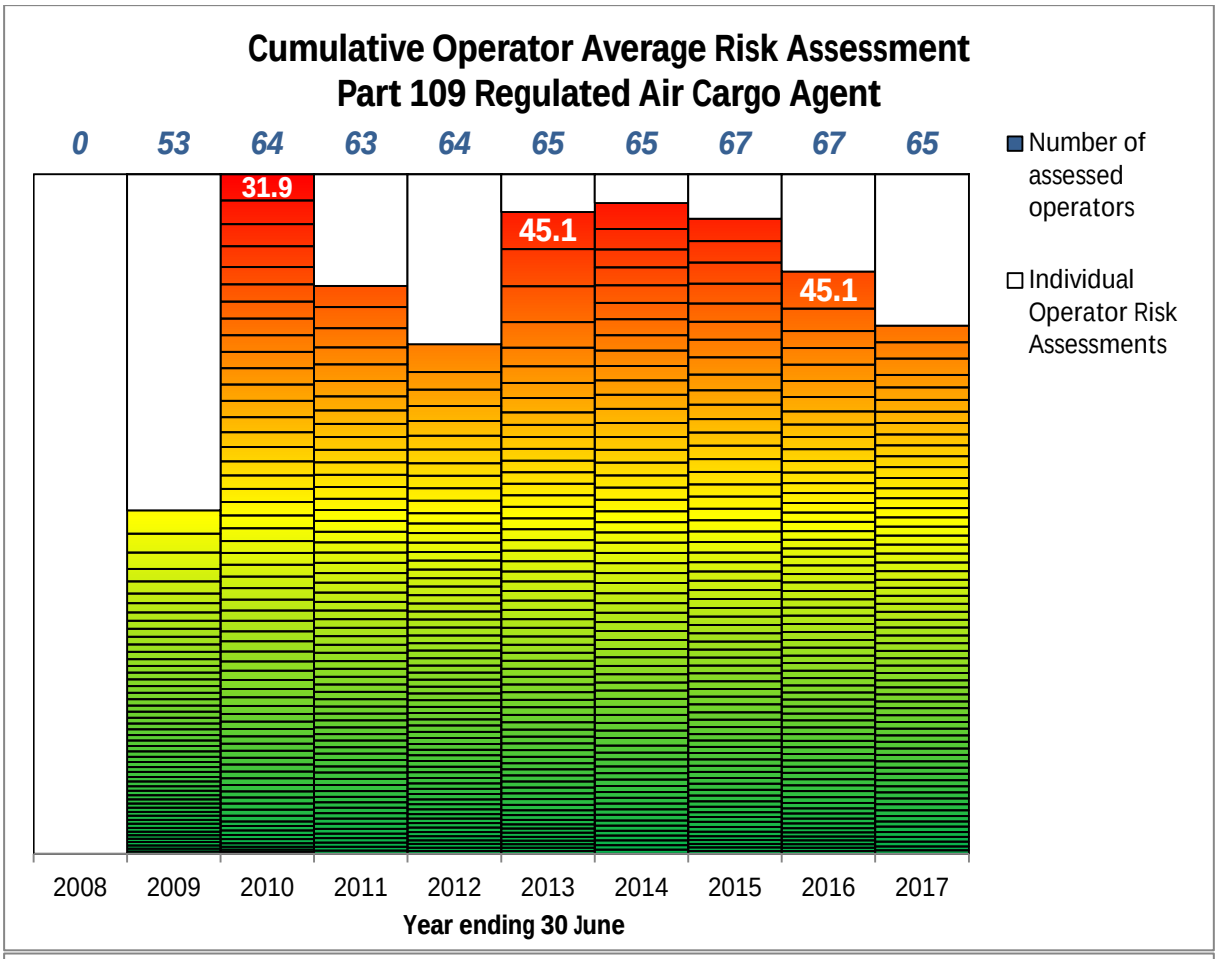

Cumulative Operator Average Risk Assessment
Part 137 Agricultural Aircraft Operator
110
113
105
105
102
104
97
101
105
91
70.8
55.1
Number of assessed operators
Individual Operator Risk Assessments
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
Year ending 30 June

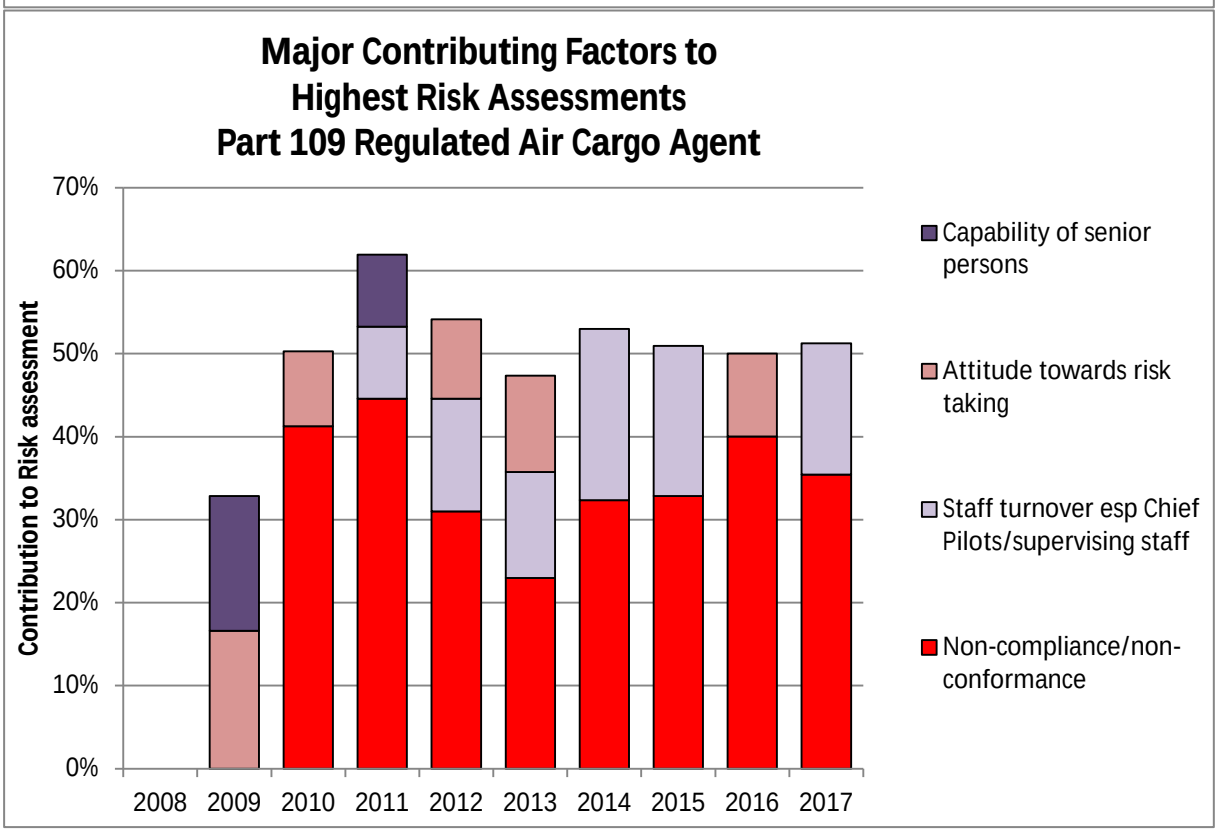


Other Operational Activities

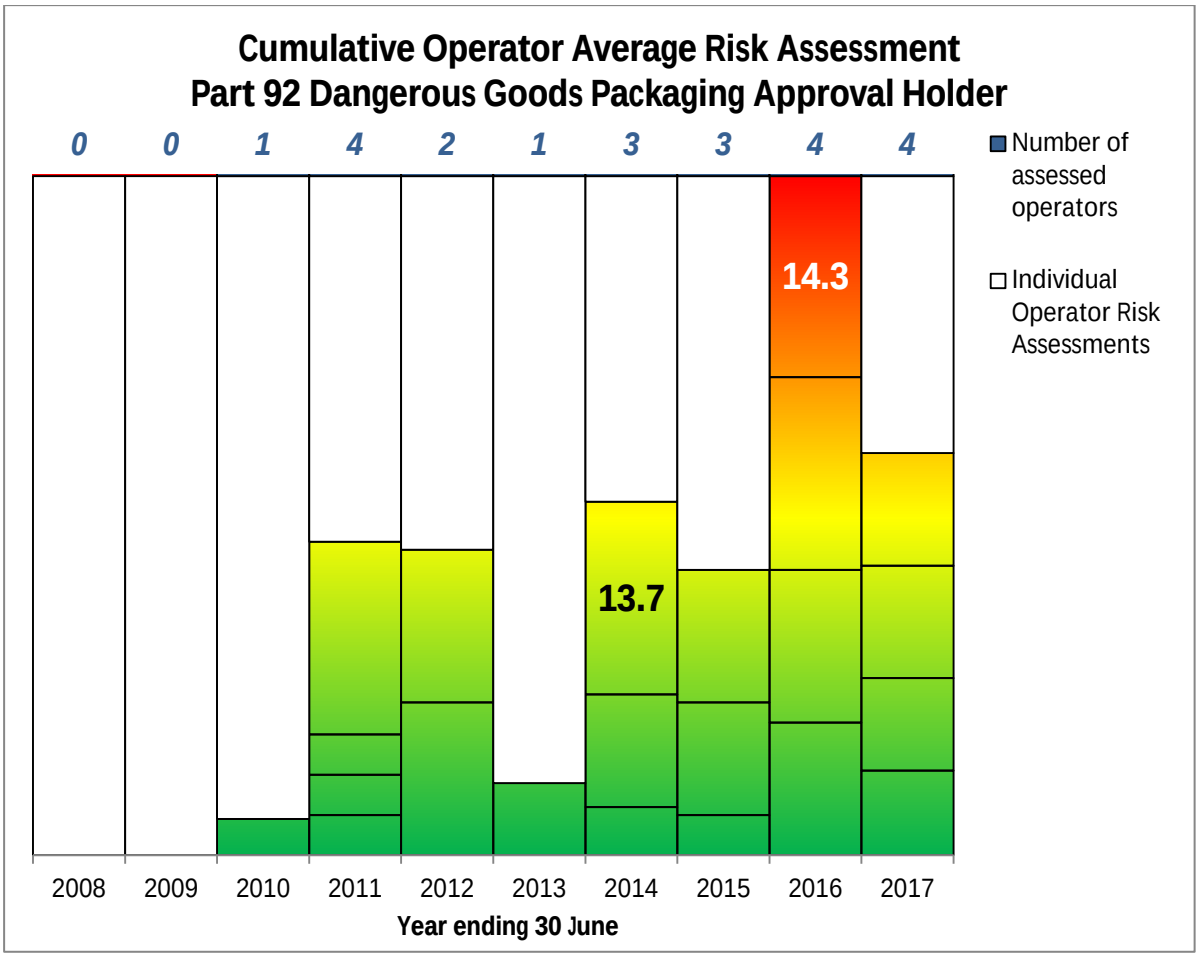








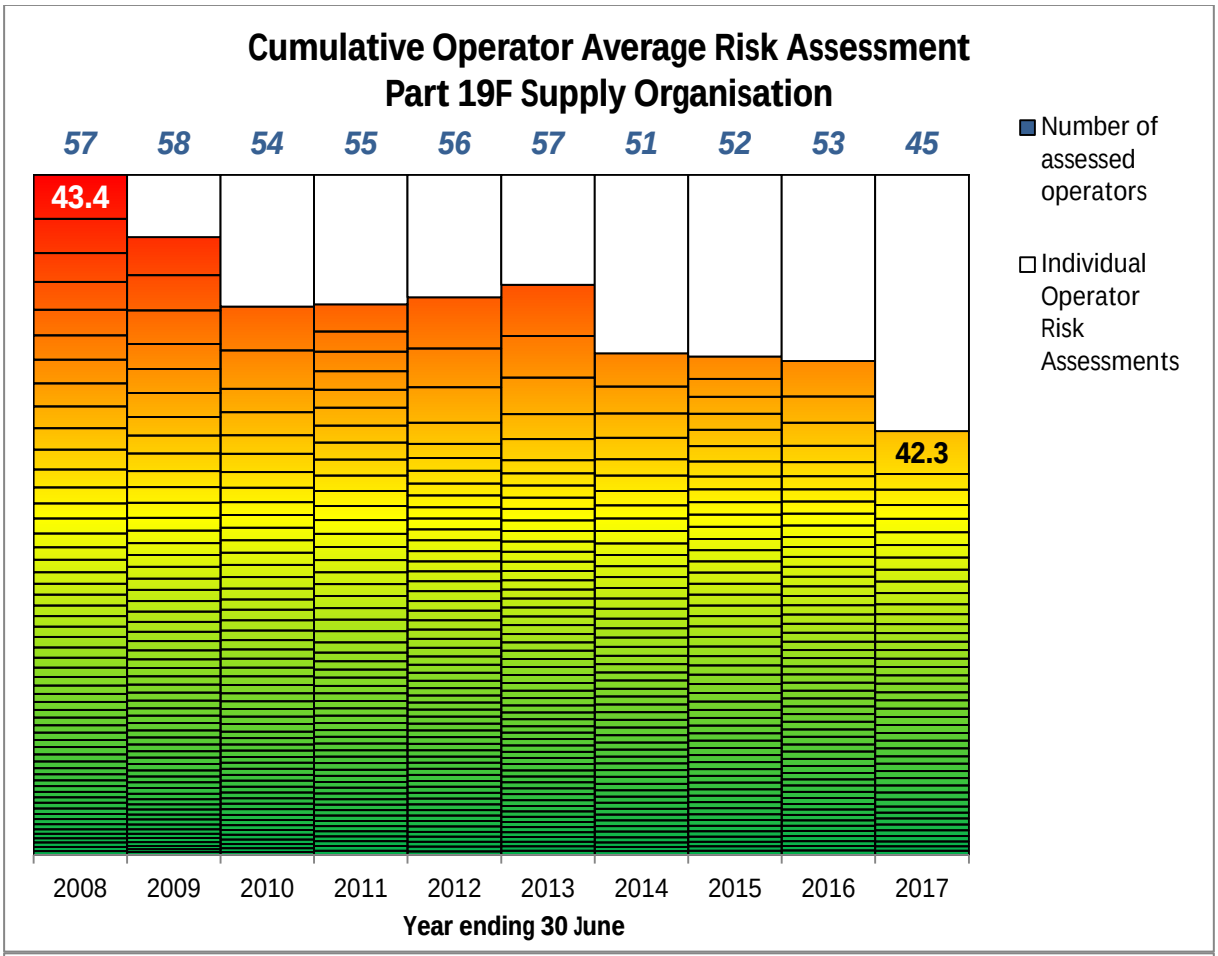
The top contributing indicator to the highest 10% of risk assessments has been 'Non-compliance/non-conformance' for every one of the eight years that this activity has been assessed.

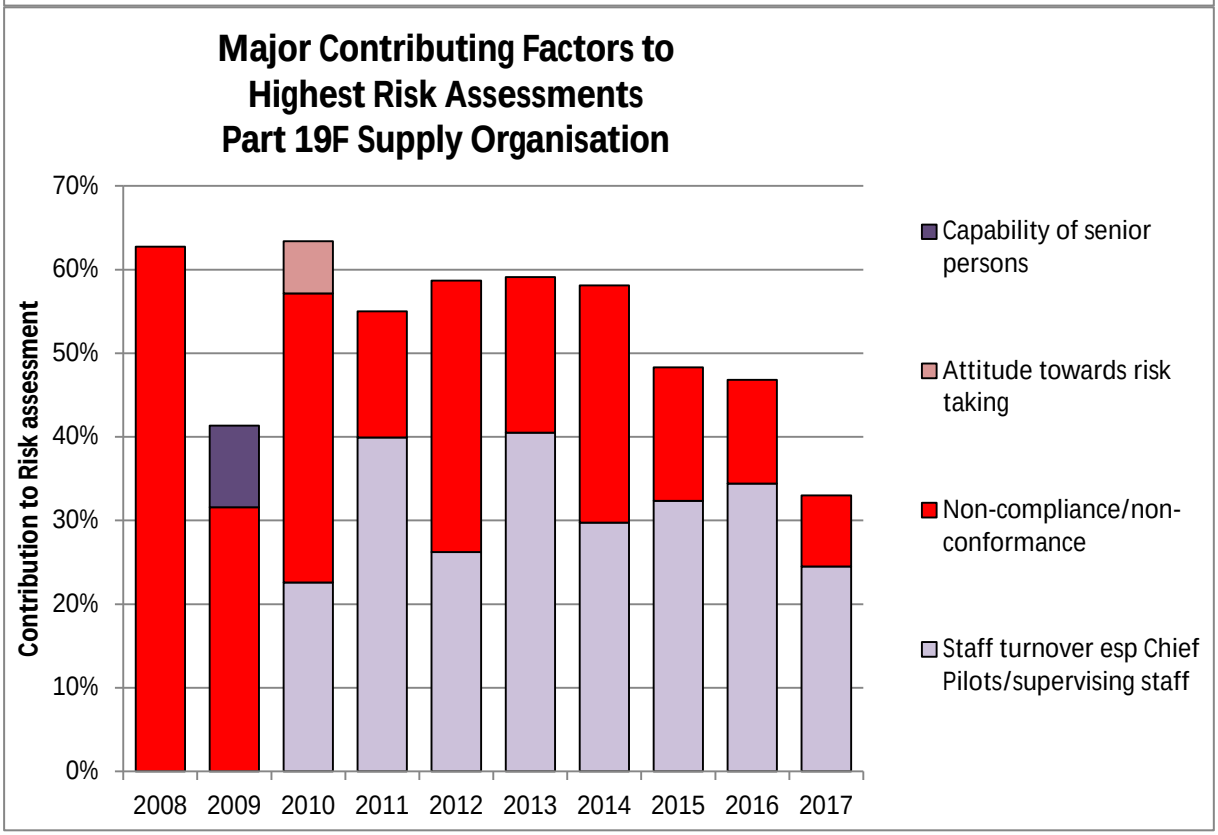


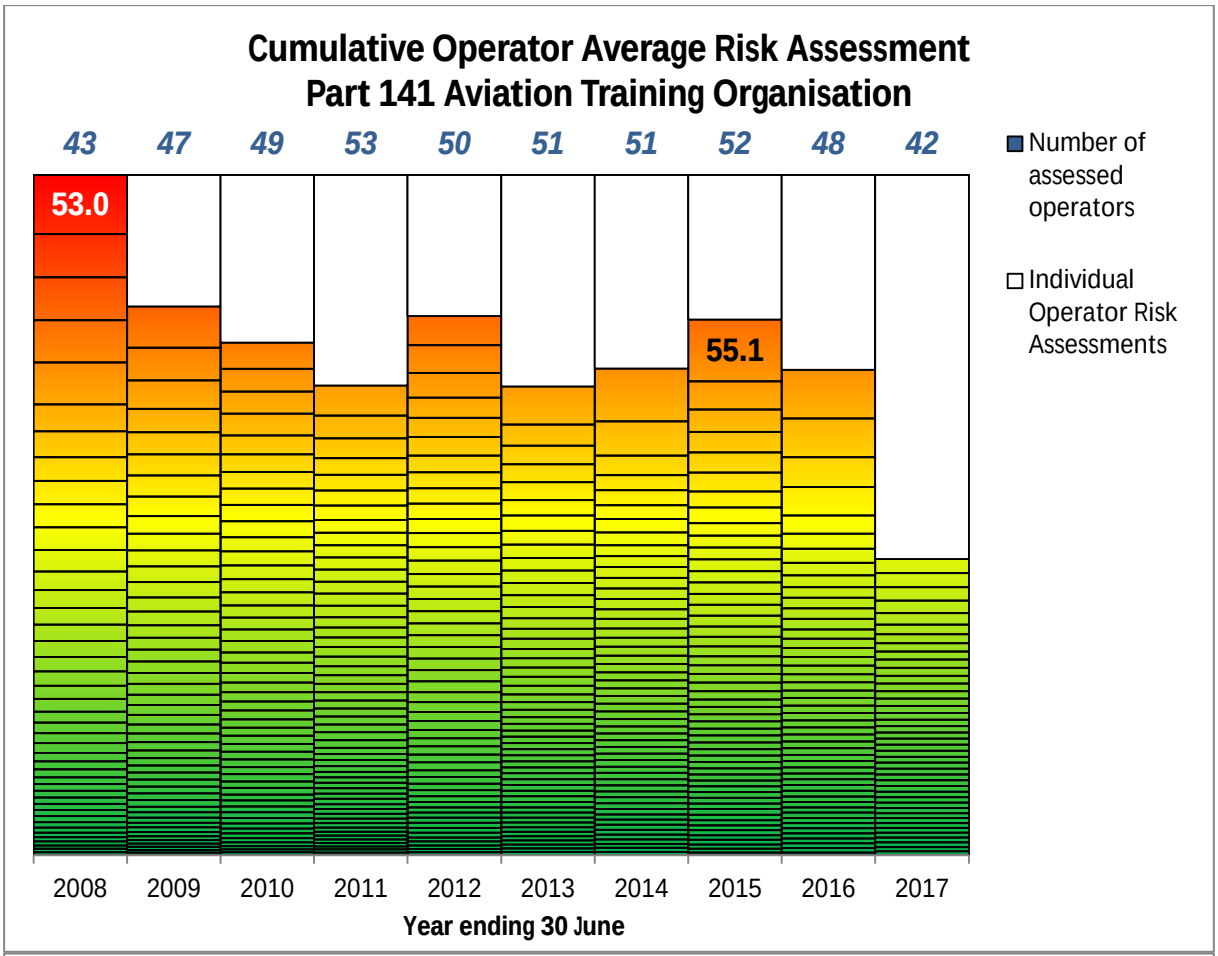
With only four risk-assessed operators the statistical significance of this result is limited.

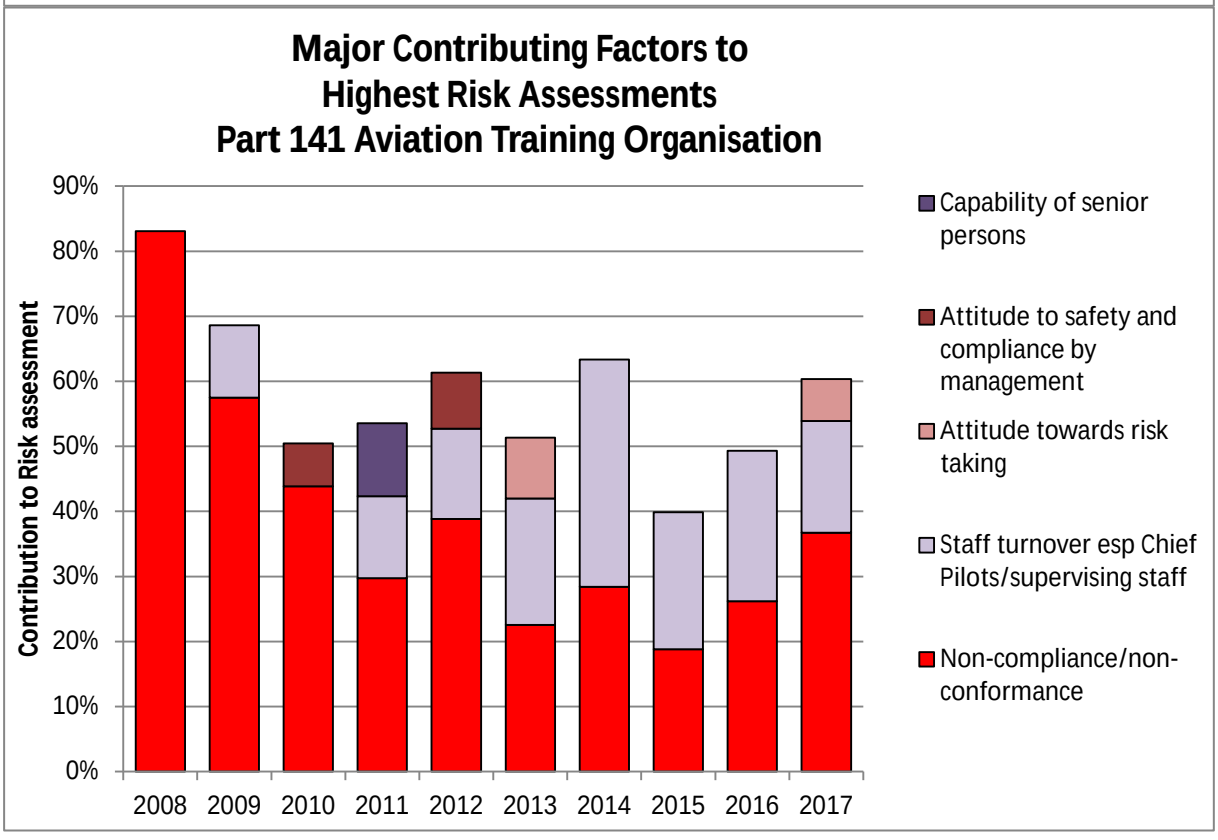
The predominant factor contributing to the financial year 2017 risk assessments in this group was ‘Non-compliance/non-conformance’ contributing 26% of the total

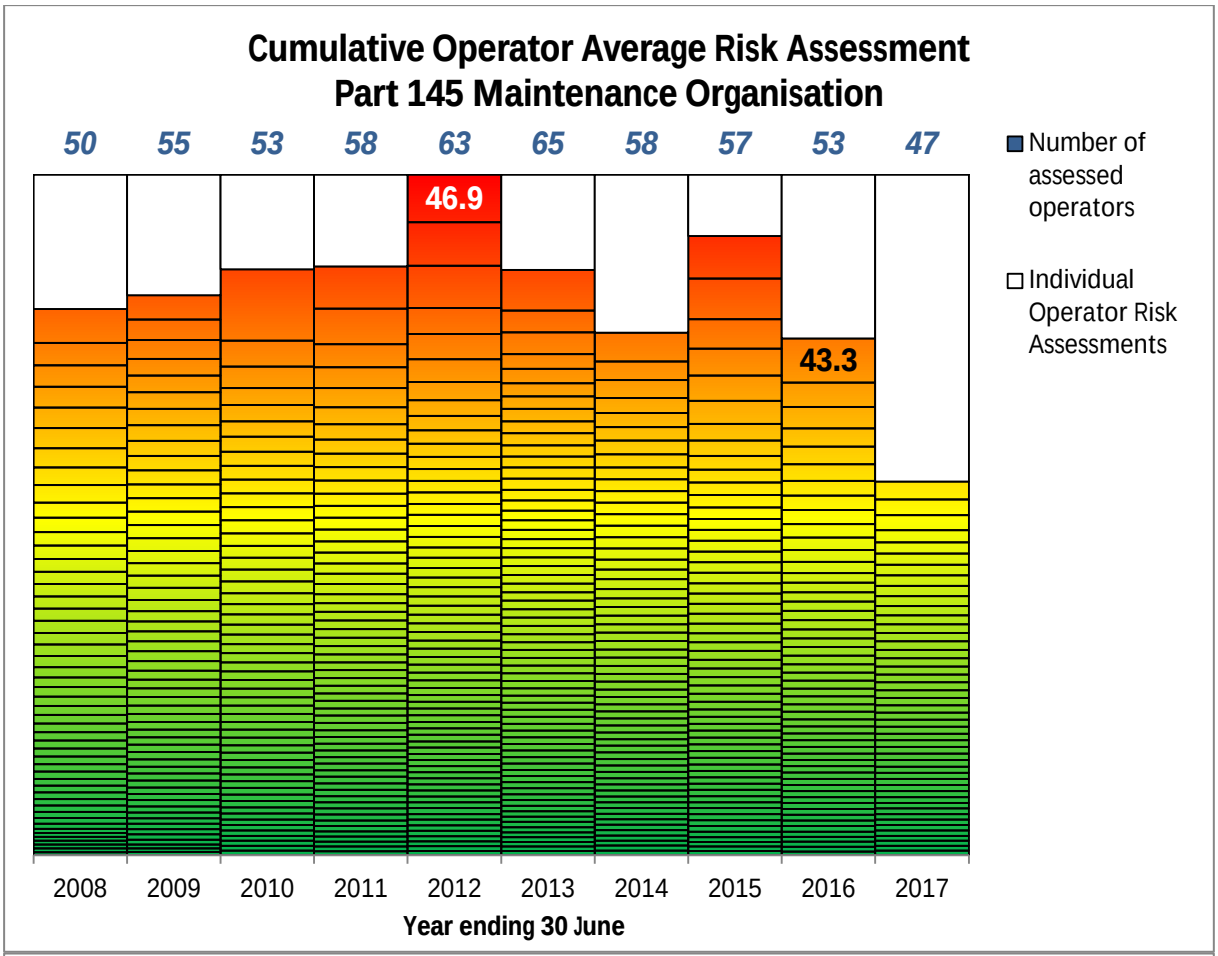
Support Activities

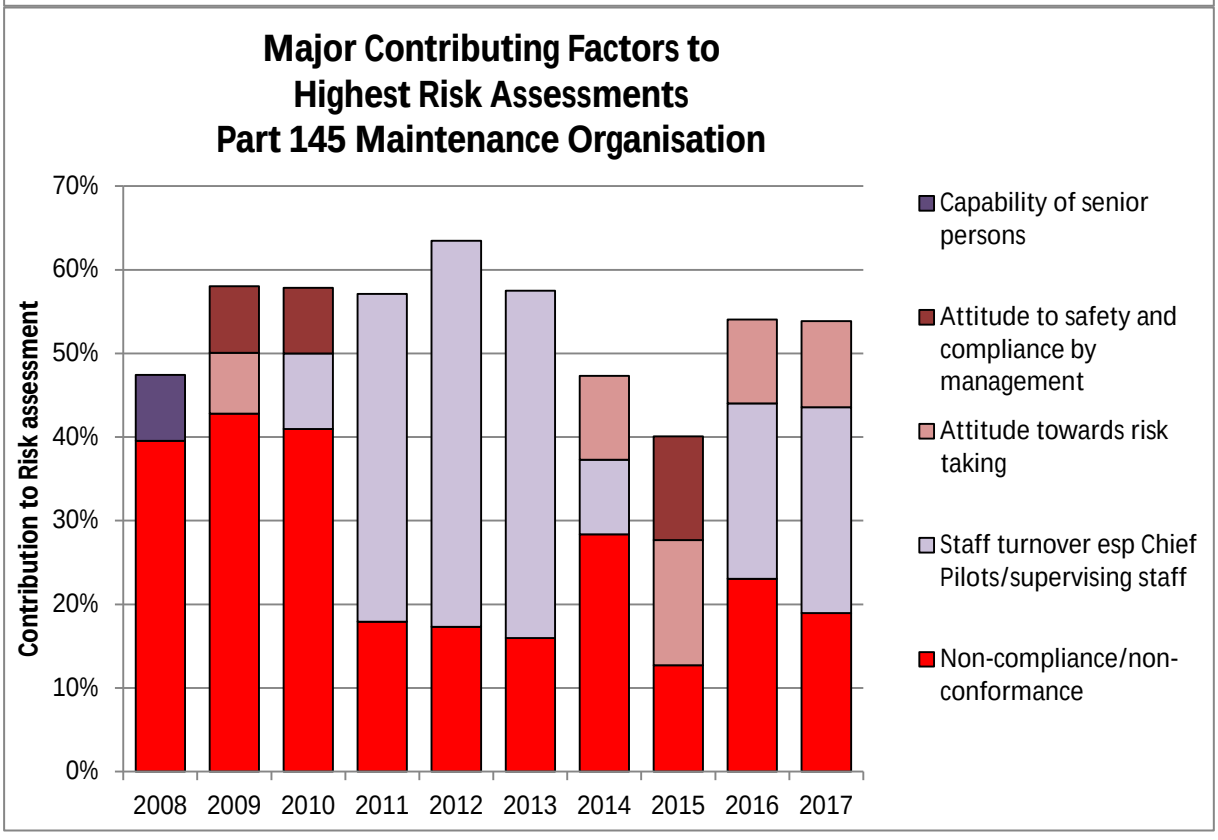


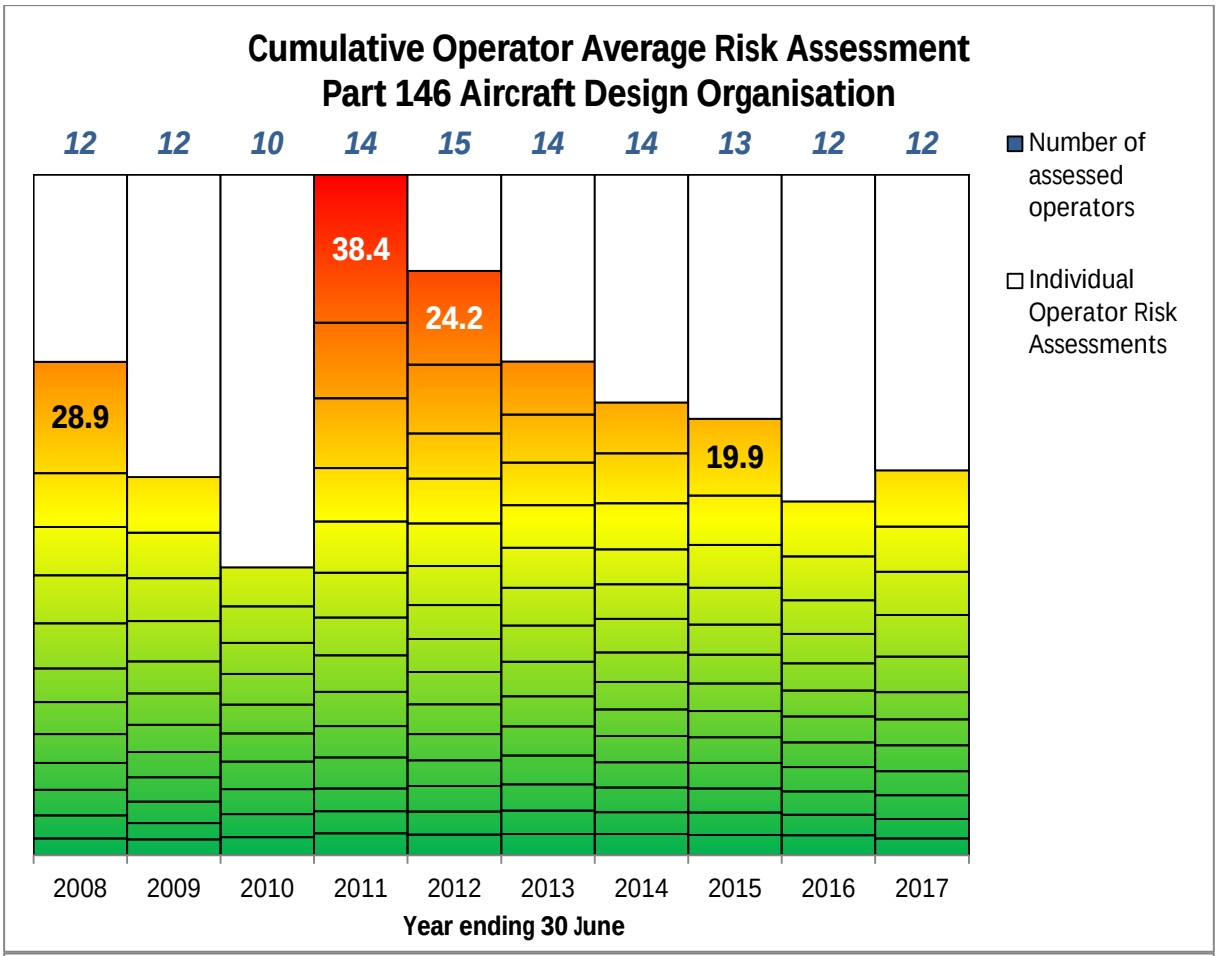


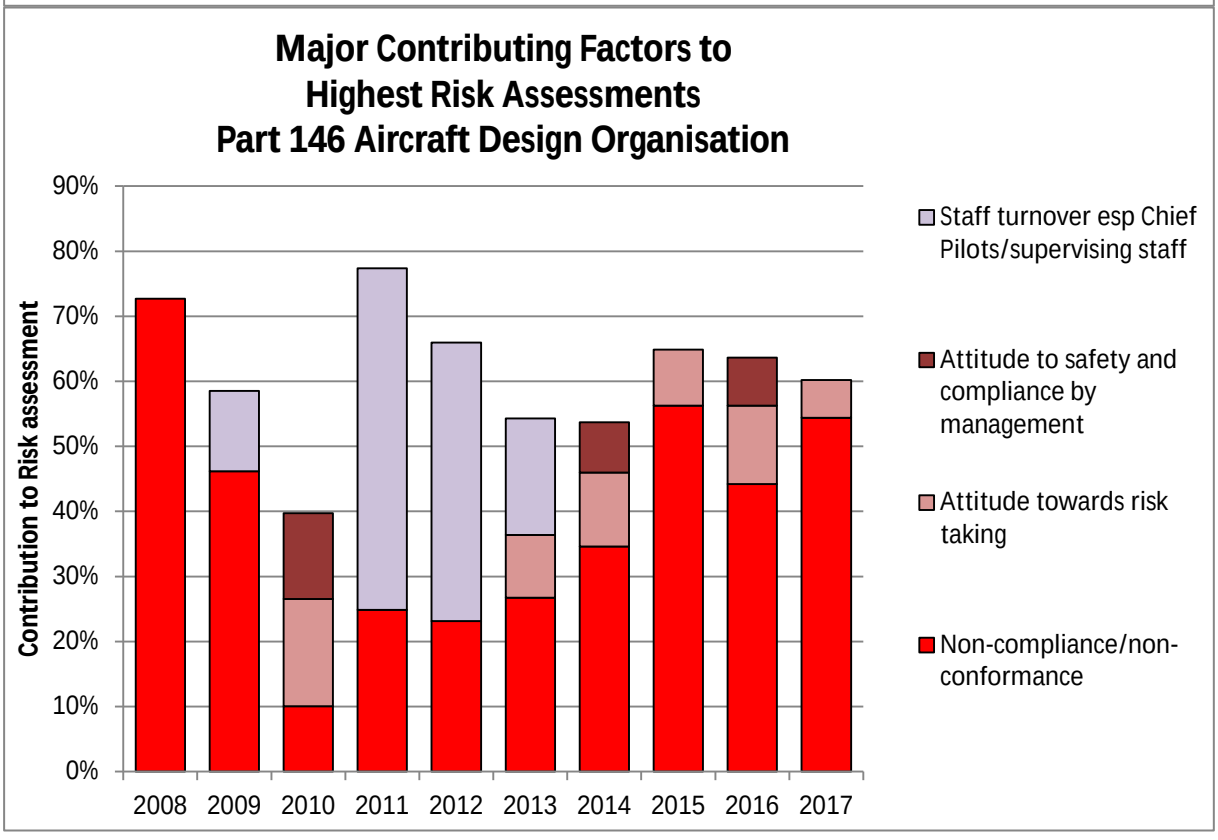

Cumulative Operator Average Risk Assessment
Part 141 Aviation Training Organisation
43
47
49
53
50
51
51
52
48
42
53.0
55.1
Number of assessed operators
Individual Operator Risk Assessments
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
Year ending 30 June

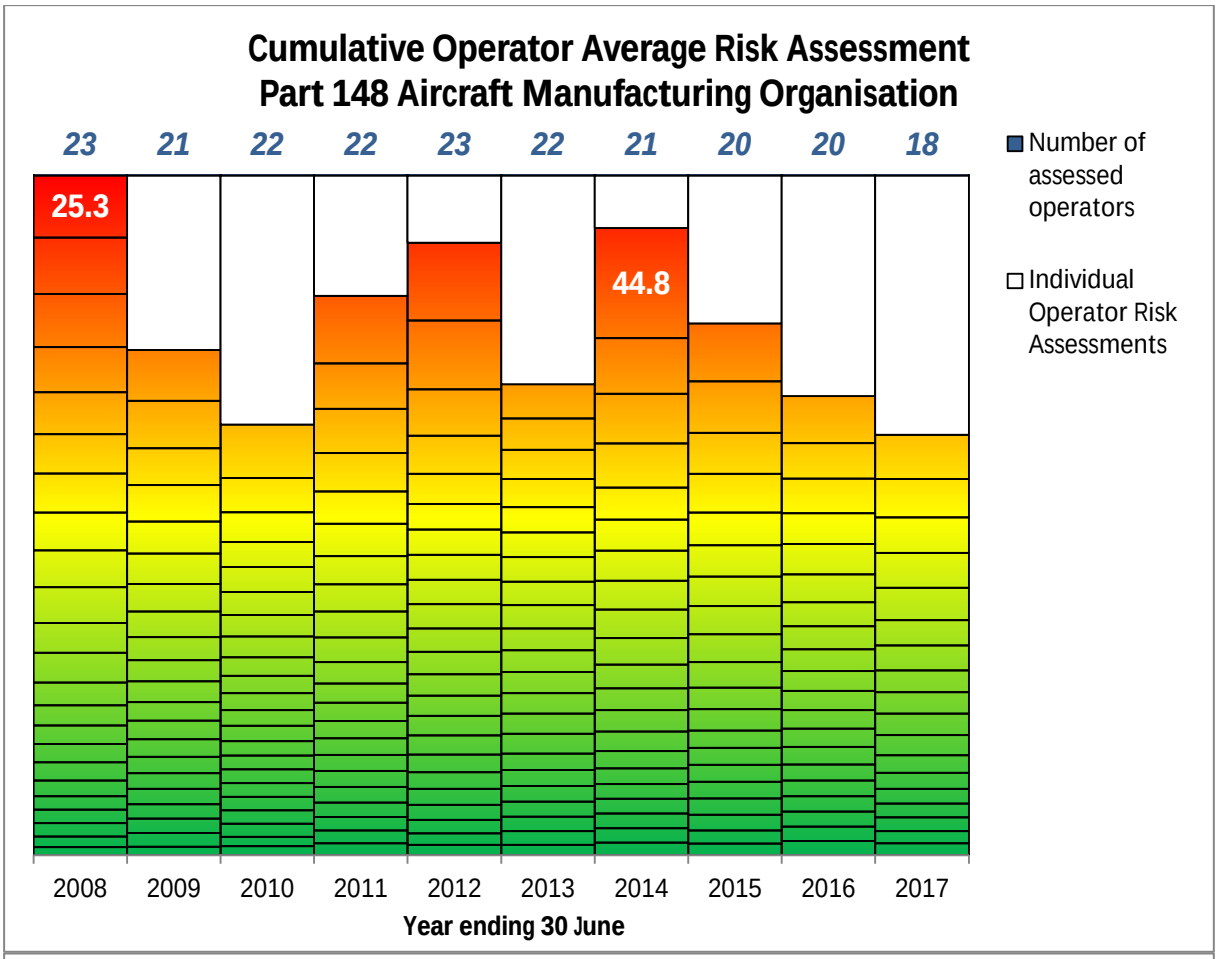

Major Contributing Factors to
Highest Risk Assessments
Part 141 Aviation Training Organisation
Contribution to Risk assessment
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
Capability of senior persons
Attitude to safety and compliance by management
Attitude towards risk taking
Staff turnover esp Chief Pilots/supervising staff
Non-compliance/non-conformance

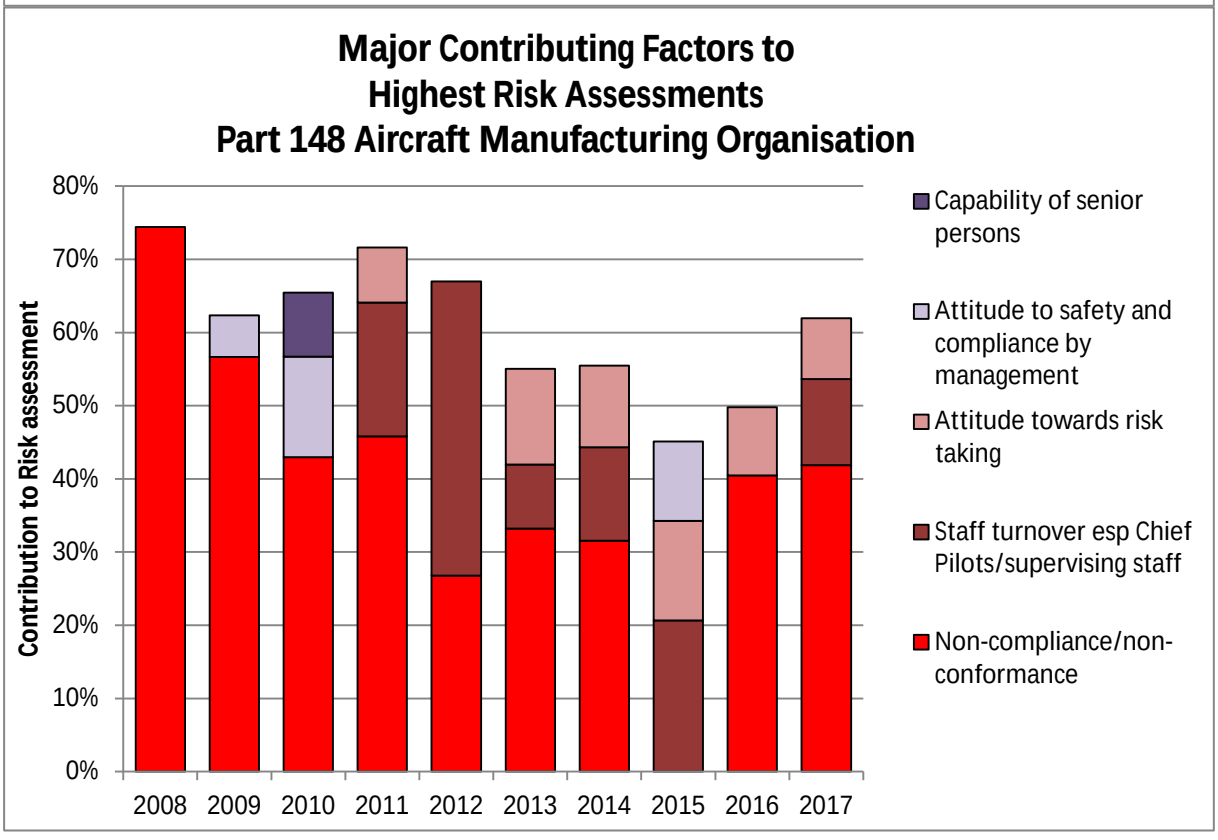




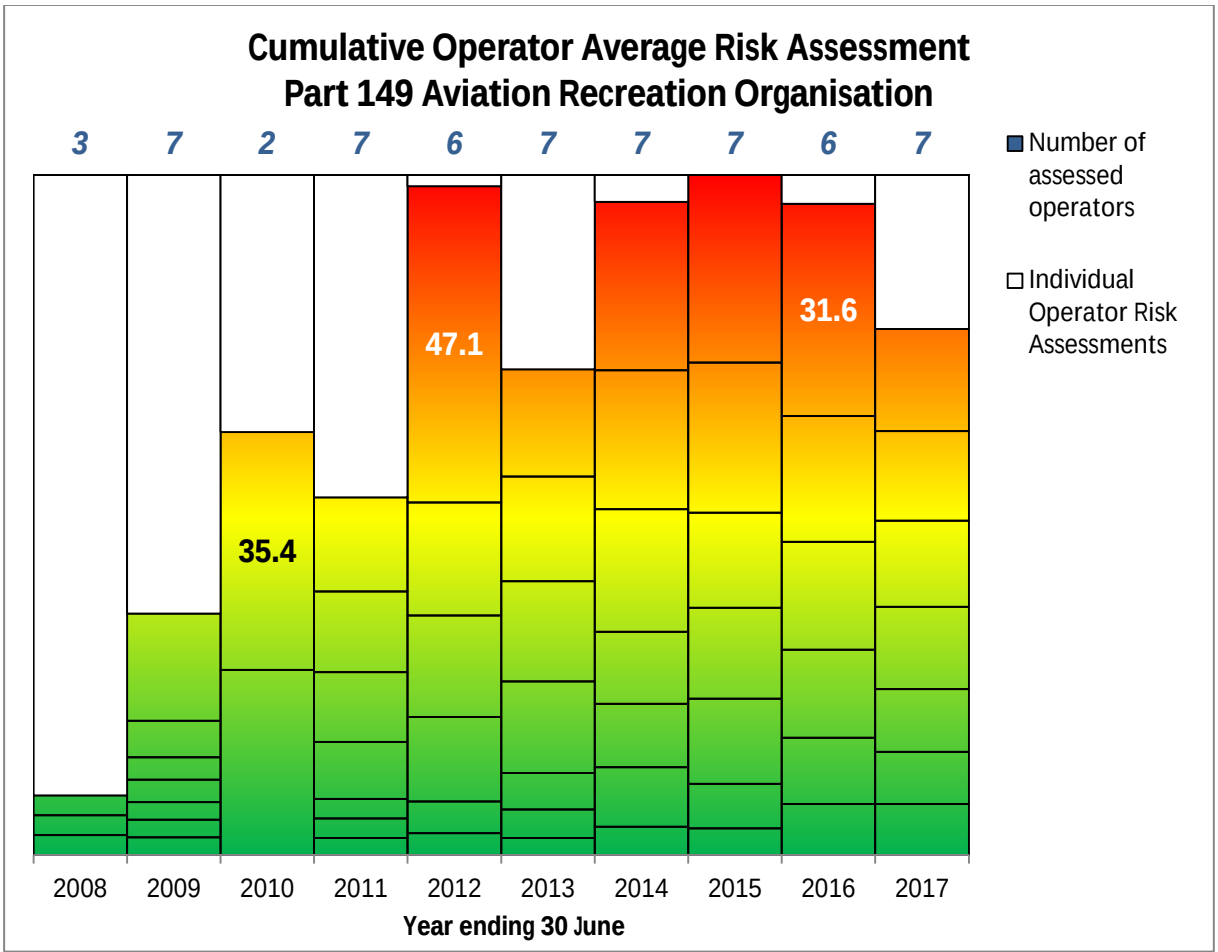

Cumulative Operator Average Risk Assessment
Part 146 Aircraft Design Organisation
12 12 10 14 15 14 14 13 12 12
38.4
24.2
28.9
19.9
Number of assessed operators
Individual Operator Risk Assessments
2008 2009 2010 2011 2012 2013 2014 2015 2016 2017
Year ending 30 June

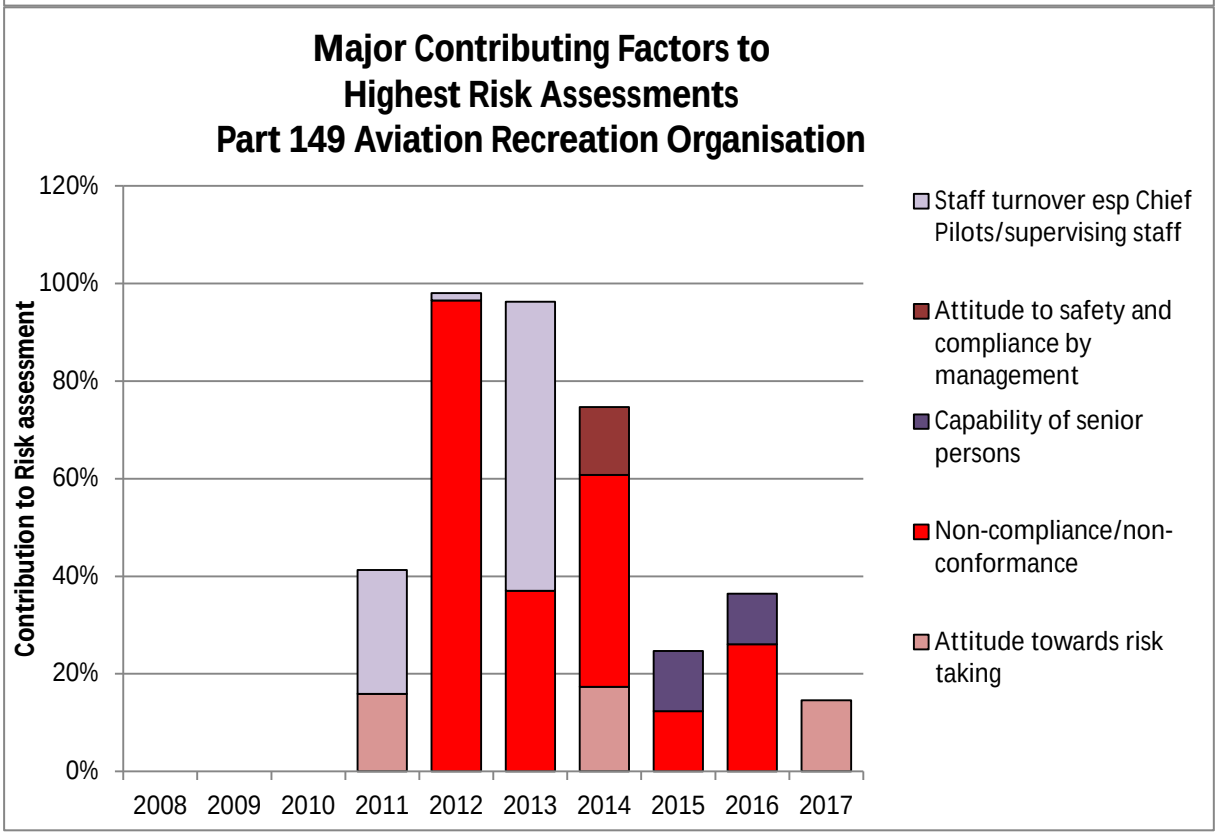

Major Contributing Factors to
Highest Risk Assessments
Part 146 Aircraft Design Organisation
Contribution to Risk assessment
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008 2009 2010 2011 2012 2013 2014 2015 2016 2017
Staff turnover esp Chief Pilots/supervising staff
Attitude to safety and compliance by management
Attitude towards risk taking
Non-compliance/non-conformance





Recreational Activities





Summary of Responses to Reviewed TAIC Reports

Occurrence Number 11/1861 (TAIC 11-003)

The helicopter went missing while conducting a dual training flight from West Coast to Wanaka. The wreckage was found crashed in a riverbed the next morning. The wreckage trail was consistent with the tail rotor and another section of the tail boom having been severed by successive strikes of the main rotor blades. The damage observed in components making up the main rotor blade assembly revealed that the main rotor blades had flapped to extreme up and down angles against the physical stops. The investigation identified that the helicopter had been operating in a high-risk situation at the time due to a combination of factors: at an altitude of 5500 feet, close to its maximum permissible weight and entering an area of moderate to extreme turbulence. The Commission determined that the in-flight break-up was caused by the main rotor blades deviating from their normal operating plane of rotation and striking the tail boom, causing a separation of the tail rotor assembly. This was likely to have been caused by one or a combination of the following conditions: severe or extreme turbulence buffeting the helicopter; the main rotor speed being allowed to drop below its lower limit; and the pilots possibly making large and abrupt movements of the controls.

Recommendation 003/14

That the Director of Civil Aviation conduct a review of Robinson safety awareness training in New Zealand and facilitate development and adoption of best practice across the sector including a level of consistency in the way instructors deliver the safety awareness training.

Response

Work is not yet complete on CAA's response to this recommendation.

Occurrence Number 11/4875 (TAIC 11-007)

Aircraft continued descent below DA in IMC without conducting a missed approach. The standard call of "minimums" from the aircraft and the first officer had been made at 323ft QNH, with no response from the captain. Visual conditions were reached 130ft below DA (at 200ft QNH), and a landing conducted.

Recommendation 015/14

The Commission recommends that the Director of Civil Aviation:

Note that the pilot check process can interfere with safe flight operations if not properly managed, and raise this potential safety issue with industry in the most appropriate manner. (015/14)

Response

After discussion with industry it was determined that the current SOP for the role and required actions by a check captain are adequate and there should be no changes to what is required for pre-flight briefings or the check captain's actions during a check flight. The required CAA action has been closed.

Occurrence Number 13/1156 (TAIC AO-2013-00)

On 9 March 2013 a Robinson Helicopter Company (Robinson) R66 helicopter crashed in the North Island's Kaweka Range after experiencing an occurrence known as a 'mast bump'. A main rotor blade then struck the fuselage, causing the helicopter to break up in flight. The pilot, who was the only person on board, was killed. The weather was suitable for the flight, which was conducted under visual flight rules in uncontrolled airspace. However, the wind strength had increased during the day, leading to patches of moderate turbulence in the mountainous terrain. It was very likely that turbulence was a factor in the accident. The helicopter's light gross weight and relatively high speed at the time would have exacerbated the effects of any turbulence. TAIC found that this accident, when considered alongside four other R66 accidents that have occurred globally in the five years since the helicopter type was introduced into service in 2010, suggested that the R66 was as vulnerable as the smaller Robinson R22 and R44 types to a catastrophic mast bump under certain conditions.

Recommendation 002/16

The Commission recommended the Director include the knowledge and training requirements of Special Federal Aviation Regulation No 73, or an equivalent requirement as a prerequisite for the issue of a Robinson R66 type rating

Response

On the basis that the FAA have twice rejected the inclusion of the Robinson R66 model in SFAR 73, the Director will not implement the recommendation, but will continue to monitor advice from Robinson and the FAA with respect to the operation of R66 helicopters.

Occurrence Number 13/2447 (TAIC 2013-006)

Aircraft taxied via taxiway A1 and lined-up on the northern edge lights of runway 23L. The takeoff roll was commenced with the aircraft striking 7 edge lights before turning towards the centreline and continuing the takeoff. Two tyres were damaged, but the aircraft landed safely in Sydney. The incident became apparent when broken runway lights were discovered during an inspection approximately two hours later.

Recommendation 017/15

On 1 February 2016 the Commission recommended that the Director of Civil Aviation review the use of 'should' in advisory circulars so that any ambiguity regarding compliance requirements is removed

Response

In our letter of, 29 November 2015, we advised that Advisory Circulars contain information pertaining to an acceptable means of compliance. The key point we sought to make is that an Advisory Circular does not describe the only means of compliance with the requirements of a Rule (although there are some exceptions, such as particular performance standards for specified equipment)

While the Director appreciates the point the Commission is making in its recommendation - that is avoid un-intentional ambiguity - it is not appropriate for him to accept the recommendation as worded. Advisory Circulars have a specific role within the civil aviation system. The Director wishes to maintain the flexibility that Advisory Circulars currently provide (in particular with respect to Rules that are more performance based as opposed to those that are prescriptive in their design). That said, the Director does accept the point that care should be taken to ensure that Advisory Circulars are clearly worded, and do not create confusion.

Recommendation 020/15

On 25 February 2016 the Commission recommended that the Director of Civil Aviation, in conjunction with the chief executive of Airways, check that aerodrome runway lighting systems at all certificated aerodromes comply with Part 139.

Response

The recommendation to check aerodrome lighting systems at certified aerodromes for compliance against Rule Part 139 will be implemented. However, the audit schedule to satisfy the work specified in the recommendation will take some time. Therefore an implementation date cannot be provided at this stage.

Occurrence Number 13/833 (TAIC ?)

Engine failure experienced at 300ft during a 6 minute 'city flight' after pilot smelt fuel. The helicopter auto rotated to a successful forced landing into Lake Rotorua and landed in 2 ft. of water, 200 ft. from shoreline. The Transport Accident Investigation Commission (Commission) determined that the most likely cause of the engine power loss was a malfunctioning of the engine's right magneto. The malfunction was caused by engine oil that had accumulated in the magneto because an oil slinger had been omitted during a maintenance procedure.

Recommendation 025/14

On 10 December 2014 the Commission recommended to the Director of Civil Aviation that he promote the use of quick-donning life jackets for all occupants of single-engine aircraft flying over water.

Response

The CAA advises there is specific reference to quick donning life jackets and their use in Vector publication, September/October 2003. The particular article is titled "The most useless things-keep emergency equipment accessible." To satisfy the intent of the recommendation, the Director is prepared to refresh the article along with the referenced Commission's accident inquiry number in a future Vector publication. An implementation date cannot be provided at this time.

Occurrence Number 14/1916 (TAIC ?)

Helicopter had both engines shut down during an ambulance flight. Aircraft made an emergency landing on a paddock. Pilot had forgotten to put transfer pumps on.

Recommendation 006/16

That the Director review all modifications to the cockpit lighting on BK117 helicopters for night vision use, to ensure that they do not unduly increase the risk of a similar incident occurring. If they do introduce an unacceptable risk, changes to the installation, such as a low fuel level aural warning light, should be required

Response

The weight of evidence indicated mismanagement of the engine start process by the pilot. Since then pre start checklists are required to be present in the cockpit and used. The CAA considered that a safety case would need to be submitted for the requirement of additional defences, and that has not been forthcoming. The recommendation was rejected on that basis.

Occurrence Number 14/3583 (TAIC 14-004)

Aircraft crashed while enroute. The aircraft was on a sightseeing trip visiting various Lord of the Rings film locations. The aircraft landed at Omarama for lunch and a comfort stop. The aircraft then departed heading for the next landing on the Bonspiel Station airstrip near the Poolburn Reservoir. At Omarama the pilot contacted the office and updated his ETA and SARTIME. The Rescue Coordination centre (RCC) received an ELT beacon signal from the aircraft at 1559 hours.

RCC contacted the aircraft operator and spoke with the flight follower and the CEO. The SPOT tracker indicated the aircraft was stationary in a gully near the Poolburn Airstrip. Contact with the pilot and passengers via their cell phones were unsuccessful.

The Chief Pilot confirmed the GPS coordinates of the aircraft from SPOT tracker and passed the information to RCC. The RCC then dispatched the Otago Rescue Helicopter at 1515 hours to search for the aircraft.

On locating the aircraft, it was confirmed that the pilot was deceased and the two passengers were seriously injured.

The accident is subject to a Transport Accident Investigation Commission investigation and report No. 14-004

Recommendation 019/16

On 24 August 2016 the Commission recommended that the Director of Civil Aviation provide a clear statement to relevant sectors of the aviation industry on whether stock clearing is a permitted activity. If the Director decides it is a permitted activity under a particular Civil Aviation Rule part, he should provide clear guidance on the conduct of the activity.

Response

There is no CAA rule provision for stock clearing; therefore, the Director cannot provide clear guidance on the conduct of the activity in the context of existing CA Rules.

However - It recognised that an operation to a remote airstrip presents a risk to air transport in that the landing area may have visible hazards, including the presence of stock, which could affect the safety of a landing. Whilst there are no existing provisions in the rules to descend below 500 feet (aside for take-off/landing or a baulked landing/discontinued approach), the Director will agree to

pursue a means to enable air transport operators to overfly a remote airstrip below 500 feet for the purposes of ensuring the landing area is visibly free from hazards.

The CAA remains focused on safety management based on risk mitigation. The CAA believes the alternative safety action will address the safety issue raised by the Commission and we will advise when the work has been completed.

Occurrence Number 14/4683 (TAIC AO-2014-00)

The R44 helicopter was reported missing on a flight from Karamea to Nelson. It was believed to be lost somewhere to the West of Takaka in the Kahurangi National Park. The helicopter was found 3 days later with pilot deceased. Evidently it had suffered an in-flight break up.

Recommendation 008/17

Recommended to the Director of Civil Aviation that until such time as recommendation 007/17 is actioned by the FAA, he extend the limitations and requirements of FAA AD 95-26-04 to R44 and R66 helicopters in New Zealand, and to all pilots of Robinson helicopters in New Zealand regardless of their experience. (008/17)

Response

The Director will consider whether the action sought by the Commission meets the legislative threshold that must be satisfied for the issue of an Airworthiness Directive. In doing this he will take into consideration the fact there have been no 'mast bump' accidents in NZ during the past two years. In addition, at the time of providing this response, the CAA has a team in the US working with the FAA Rotorcraft Directorate and the Robinson Helicopter Company on possible amendments to the Limitations sections of the Pilot Operating Handbooks of the Robinson series aircraft and improvements to safety awareness training. It may be that this work will provide an outcome that will meet the intent of the Commission's recommendation.

Occurrence Number 15/631 (TAIC AO-2015-02)

The helicopter was on a dual training flight. After being reported overdue, the wreckage of the helicopter was located in the Lochy River basin with both occupants deceased. From inspection of the scene and surrounding area, it was clear that the aircraft had suffered a catastrophic event at some height above the terrain. The main parts of the aircraft, barring light weight fragments/components i.e. plexi-glass, were found in an area of approximately 100 square metres.

Recommendation 015/16

On 27 July 2016 the Commission gave notice to the Director of Civil Aviation that a recommendation has been made to the Secretary for Transport that he promote, through the appropriate ICAO forum, the need for cockpit video recorders and/or other forms of data capture in the cockpits of certain classes of helicopter to address this safety issue.

Response

The Director is prepared to accept the recommendation but with a caveat that reflects the Secretary's response, i.e. that the Director of Civil Aviation conduct a safety and cost benefit exercise of installing flight data and/or cockpit video in certain classes of helicopters.

In that regard the Director will initiate an issue assessment paper on recording devices for certain classes of helicopters. Given the timeframe of such a study is likely to be lengthy; the Director cannot provide a completion date at this stage.

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

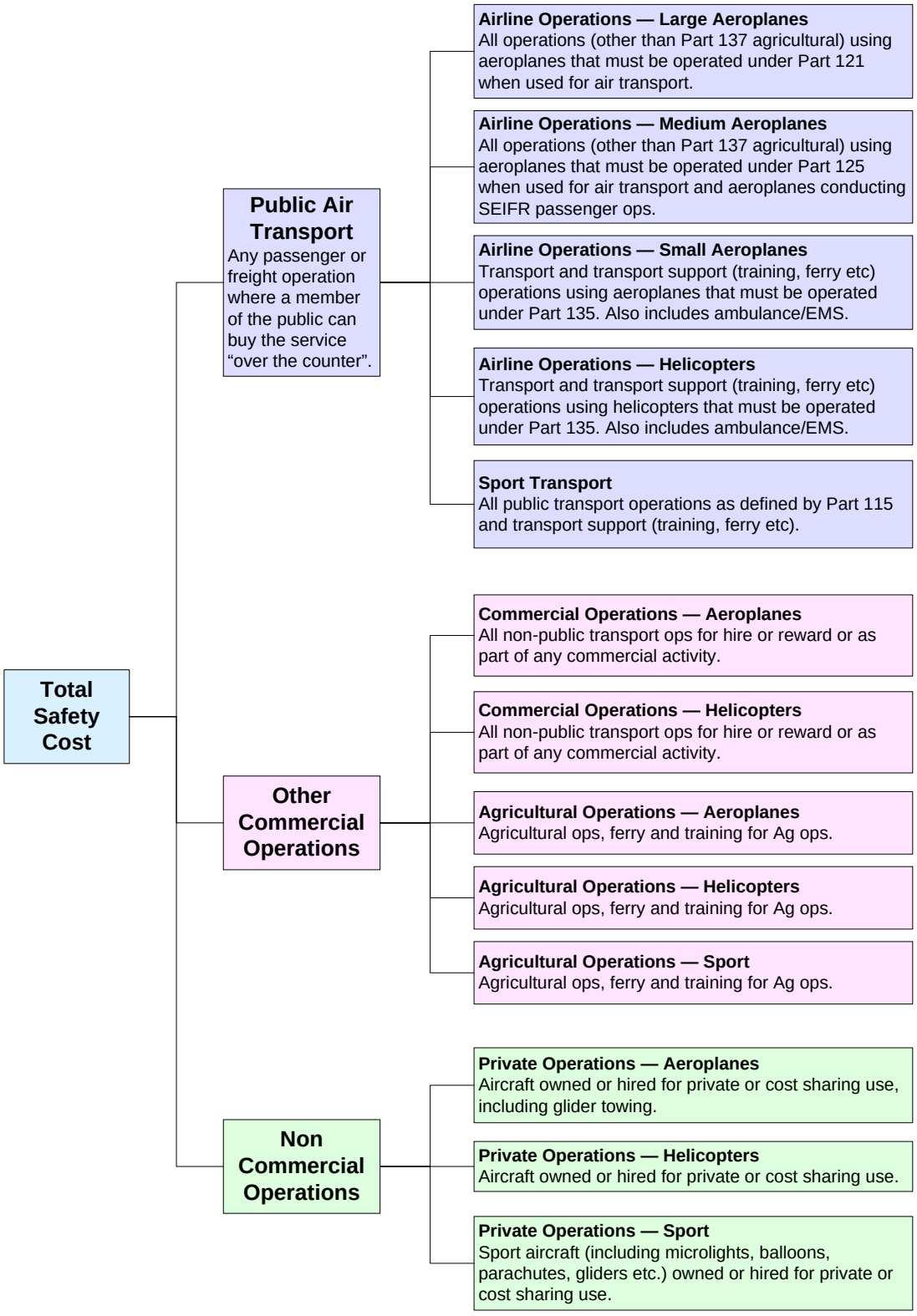
(6) involves verified exposure to infectious substances or injurious radiation.

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
Main Rotor Drive 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

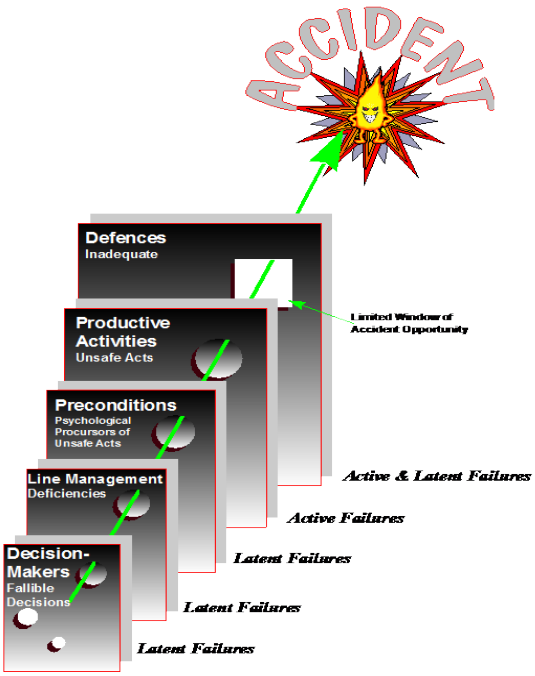


Diagram 1 shows the layers of defences that have been created within the aviation system to prevent accidents and incidents happening. It also shows how these defences have holes in them. When these holes line up there is a window of opportunity for an accident or incident. All that is needed to complete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

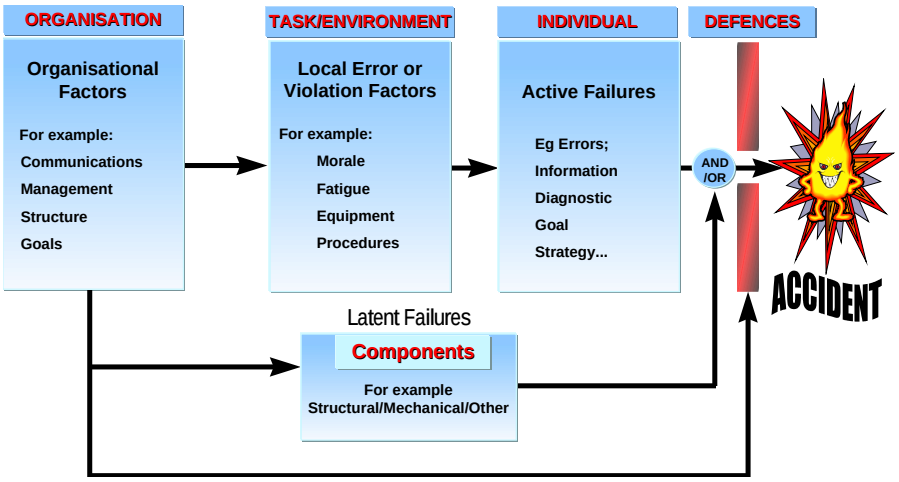


Diagram 2 shows how the latent failures are grouped into 3 areas:

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.