Aviation Safety Report

Intelligence, Safety and Risk Analysis Unit

1 January to 31 December 2019

CAA

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 January 2019 to 31 December 2019.[1]

Key Indicators

- Key measures of industry activity have increased as follows in the above period.

    - Aircraft on CAA records increased by 1.9%

    - Airline Air transport flights declined by 3.0%

    - Adventure Aviation flights including parachute descents increased by 5.8%

    - Total hours flown increased by 1% varying by sector from 3.1% for Large Aeroplanes to a 10% **decrease** for Private flying

- The number of organisational certificates currently held has increased by 0.2% to 1062.

- The number of accidents in the period was 105, up from 91 in the last period, but the trend is downward relative to the average of the preceding three years (100 accidents pa 2015 to 2017 – the average for the most recent two years is 98 accidents pa).

- There were 7 fatalities, 7 less than in the previous 12 months and the lowest equal in the last ten years. The average of the last four years was 10.3 fatalities pa and the highest in the last ten years was 21 fatalities in 2012

- The accident statistics are now led by private sport aircraft and sport transport, private aeroplane sectors, and are the principal contributors to the fatalities, and therefore to social cost.

- The recent trend in the airspace incident rate per 100,000 hours flown continues to rise although at a reduced rate. This period the number of reported airspace occurrences (all types) has increased by 2.0% on the last 12 months while the total flying hours in the same period decreased by 21%. This is happening in a climate of slowly increasing aerodrome movements.

J. J. Dewar
Manager Intelligence

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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 31 December 2019 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.

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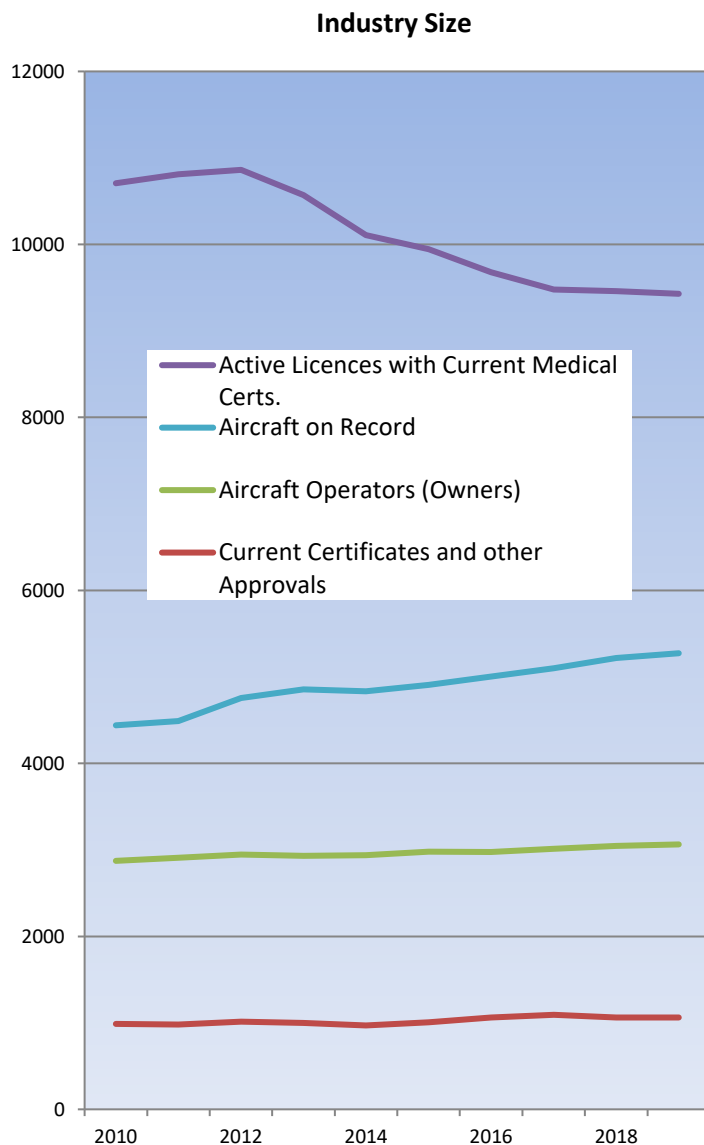
The main points to note are the recent steady decline in the number of licences held and the relatively steady long term increase in the number of aircraft on record.

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

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Licences Held as at 31 December
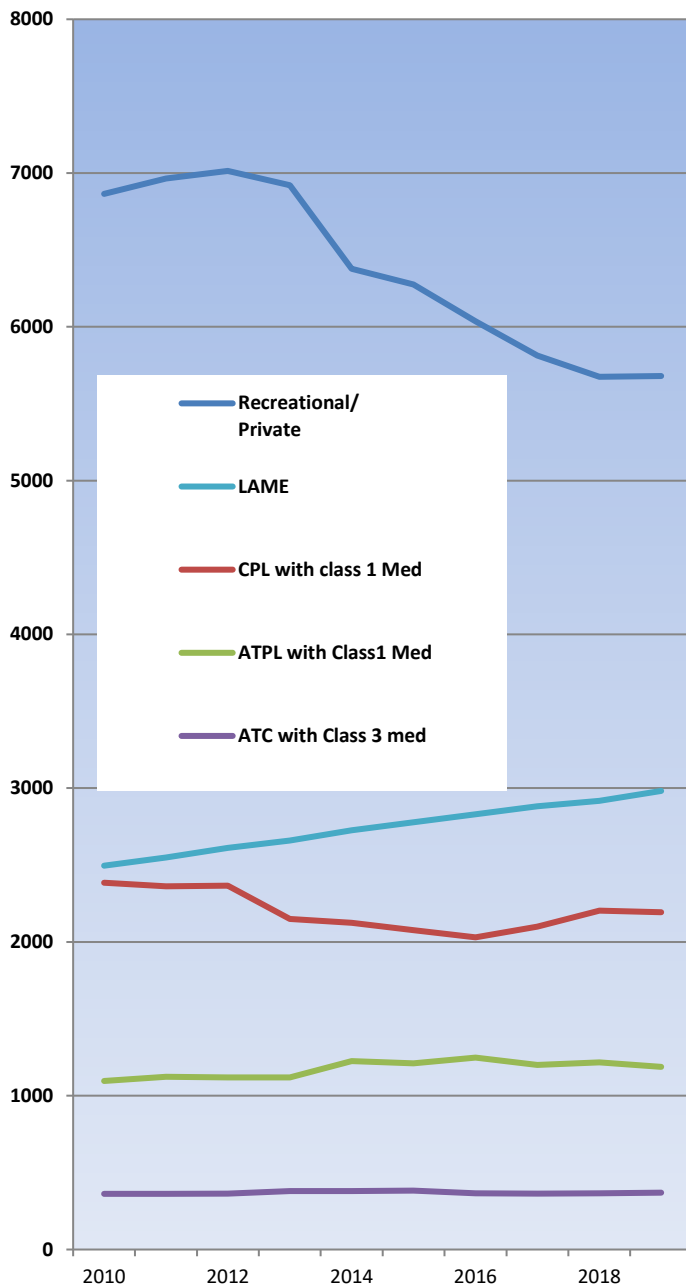
The 'Recreational/Private' group consists of holders of RPL licences who have appropriate current medical certificates plus holders of any pilot licence who have current class 2 medical certificates plus holders of PPL licenses only who hold a current class 1 medical certificate.

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

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

For more detail see: Licences

Approvals Held as at 31 December
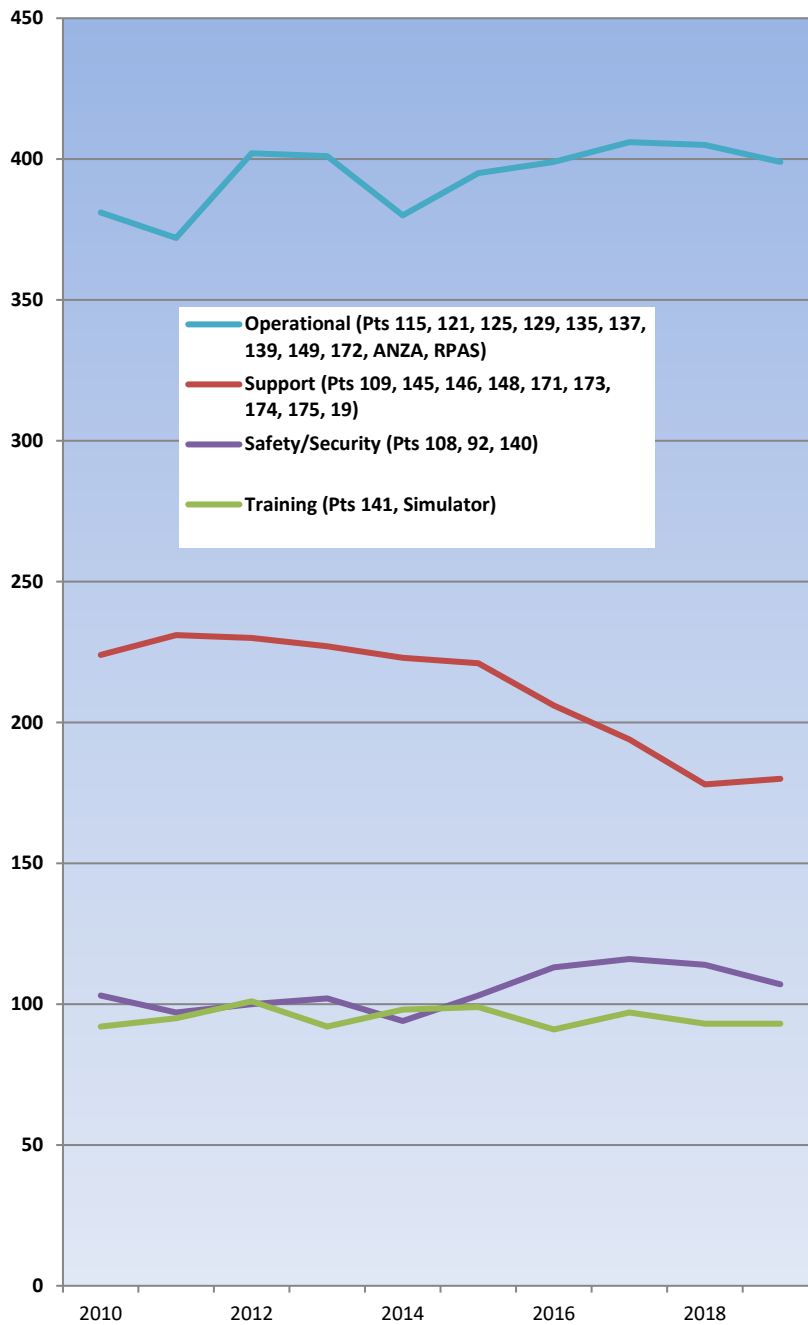
The number of Part 145 Aircraft Maintenance Organisation approvals peaked in 2012 at 67 and has since declined to 52. If this is evidence of a continuing trend there might be a case for further assessment.

The number of Part 121 Large Aeroplane Operator approvals has fallen from 10 at the end of 2010 to 3 at the end of 2019. This sector is closely monitored.

The numbers of Part 137 Agricultural Aircraft Operator approvals declined from 108 at the end of 2010 to 104 at the end of 2019 with a dip of 97 approvals in 2014. This sector is also closely monitored and the decline does not represent any safety concern.

For more detail see: Approvals

Aircraft Operators (Owners) as at 31 December
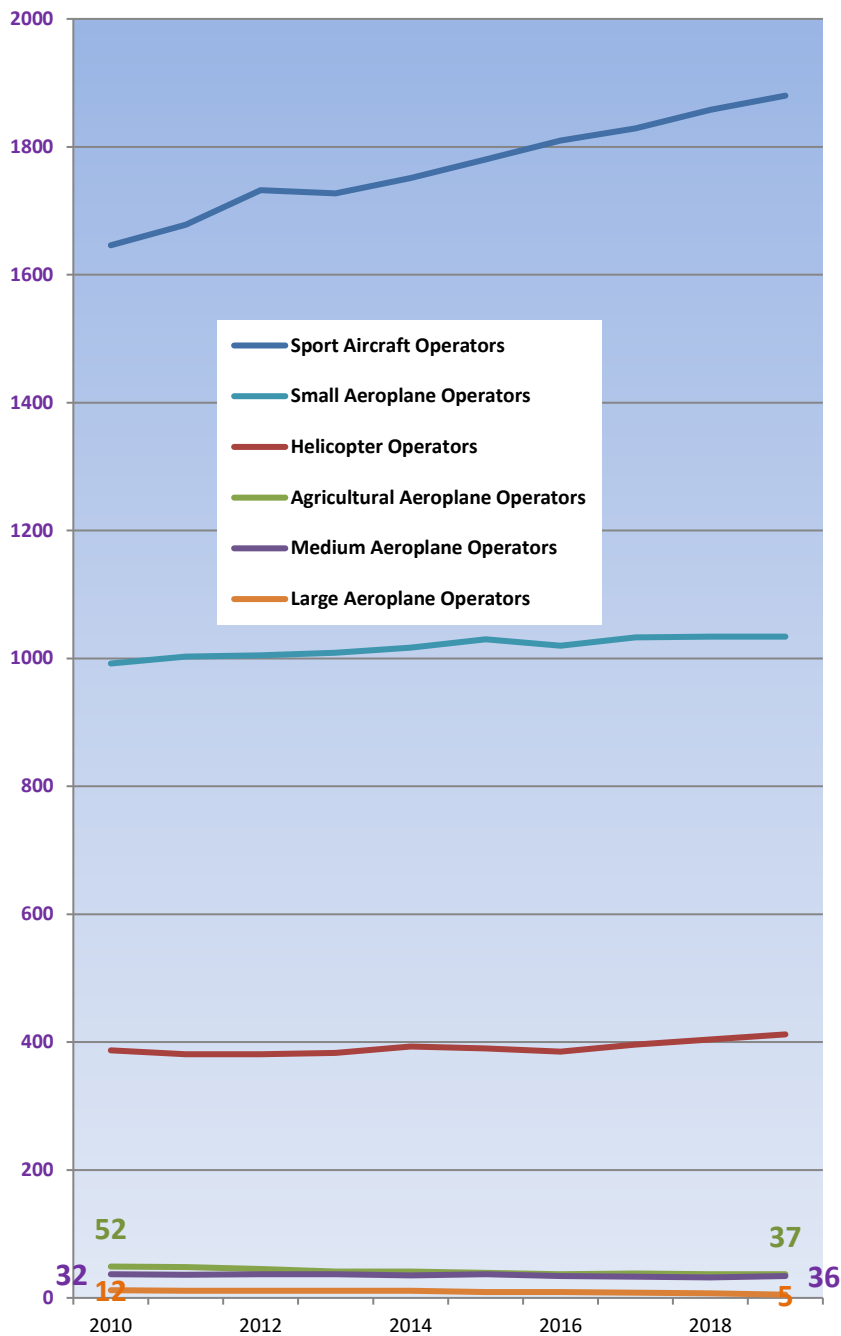
Those operators who operate more than one category of aircraft have been counted in each category. This means that any attempt to total the numbers will lead to more operators than actually exist.

The number of Large Aeroplane operators has declined by 7 since 2010. The number of Agricultural Aeroplane operators declines from 52 in 2010 until 2014 and has remained steady since then.

The number of Medium Aeroplane operators has been between 32 and 37 since 2010.

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

For more detail see: Owners

Aircraft on Record as at 31 December
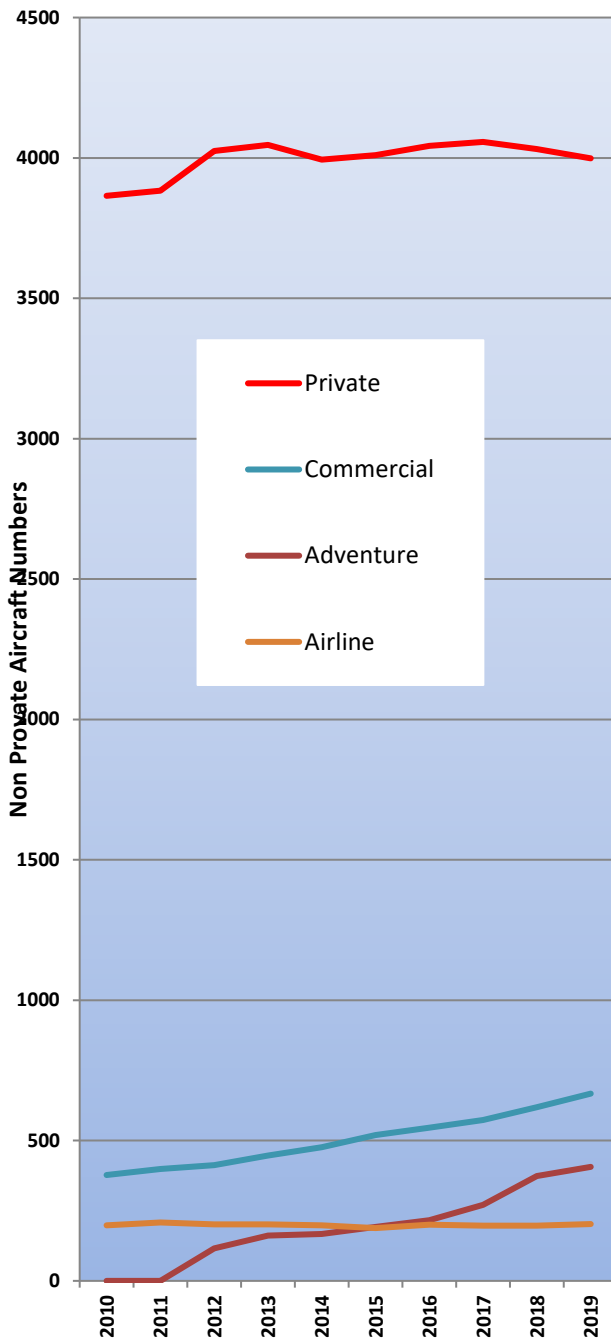
Aircraft have been counted in the Adventure group if there was a current Part 115 approval for the aircraft at the 31 December year end.

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 2017 and have declined since then.

The most notable trend is in the commercial group where the numbers have increased by 79% since December 2010. Both fixed wing and rotary have contributed to this increase but the rotary component is the major factor having gone from 199 at the end of 2010 to 472 at the end of 2019, an increase of 137%.

Note from the previous graph that the number of helicopter operators has risen only slightly, 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.

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 31 December.

Agricultural Product Delivered
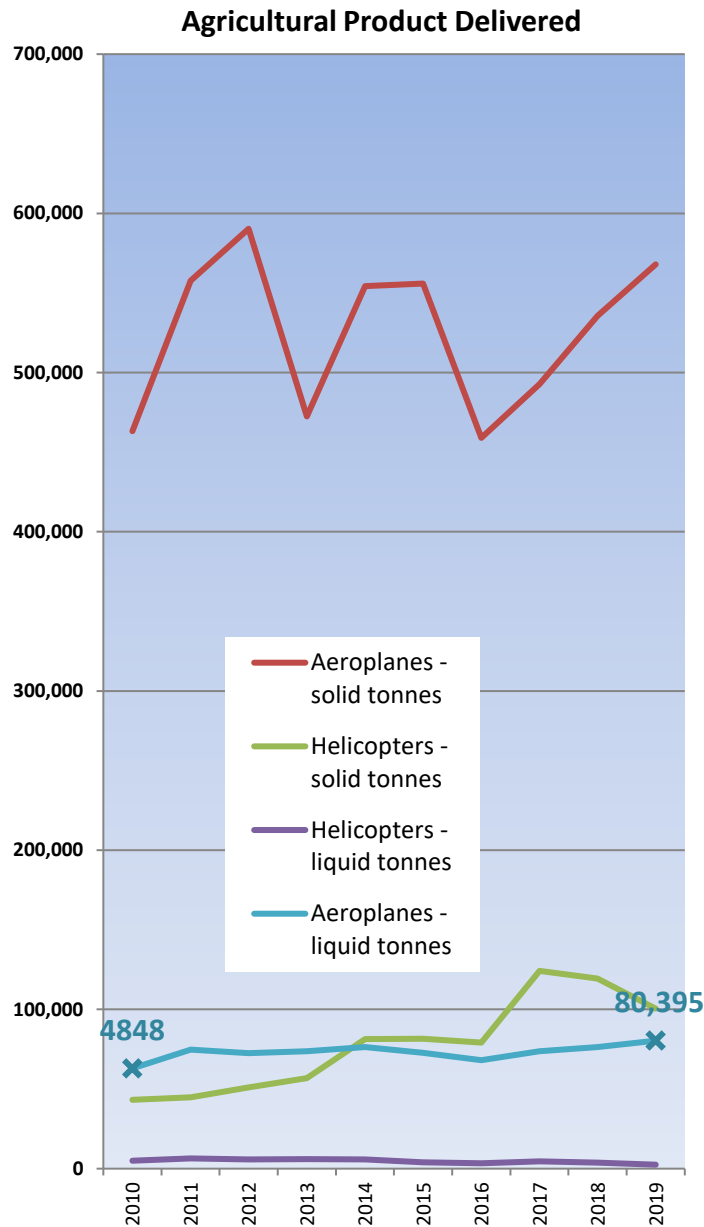
Trends in agricultural product delivery vary by aircraft type.

Liquid quantities applied by helicopter have plateaued from 2010 – 2019, while solid tonnage has increased significantly.

Solid tonnage applied by aeroplane has fluctuated significantly from 2010 – 2019

Annual Hours Flown

Legend:
- Airline/Transport
- Other Commercial
- Private
- Adventure Aviation

Air Transport Flights

Legend:
- Airline/Transport
- Parachute Descents
- Adventure Aviation(excluding Parachute descents)
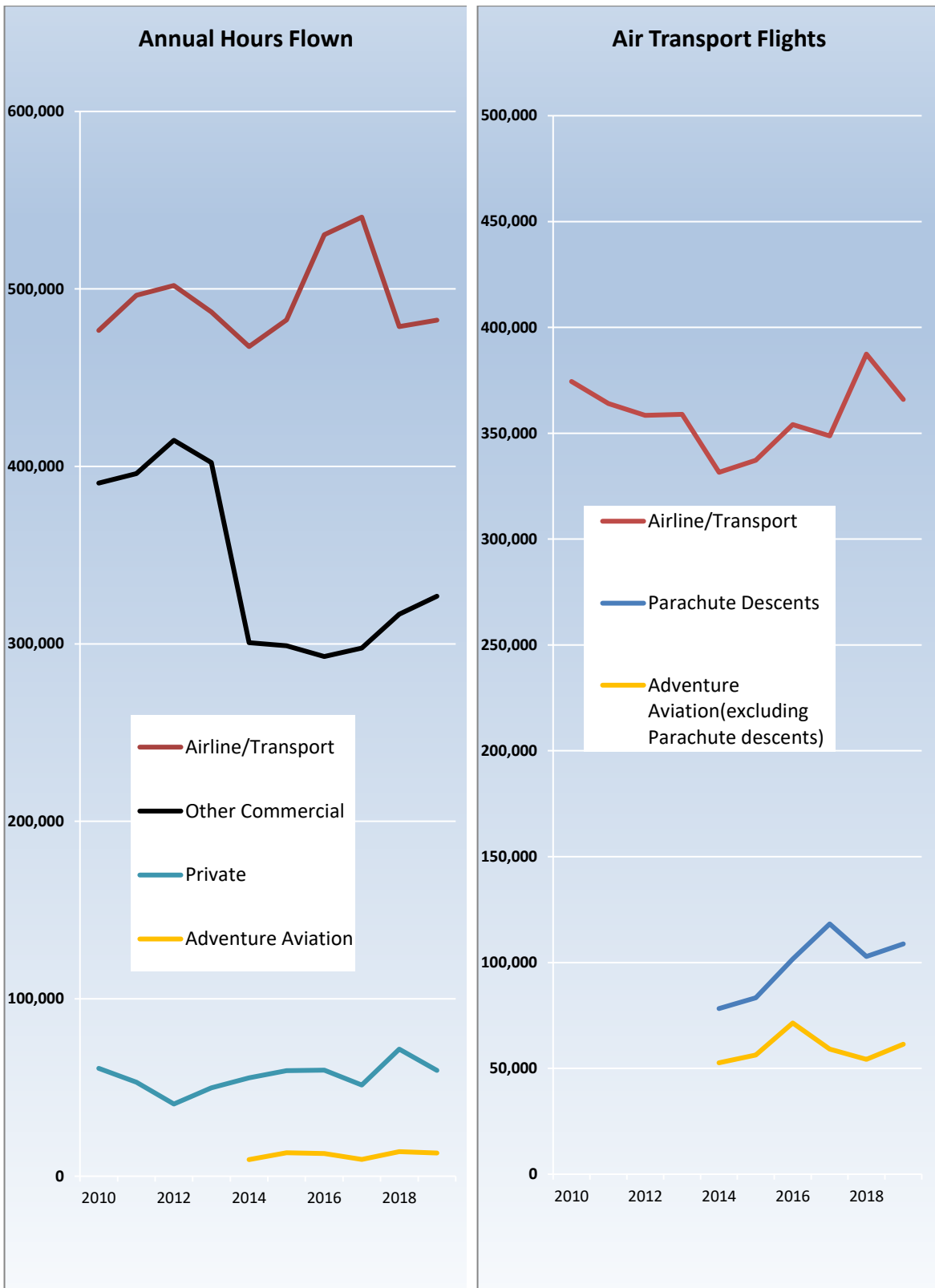
The data presented here includes a 'standard' allowance for those aircraft for which no data had been received at the time of data extraction. This means that more recent data is less reliable than earlier data because there are more missing returns for more recent return periods.

For more detail follow these links: Hours Flown   Flights

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Aerodrome Movements
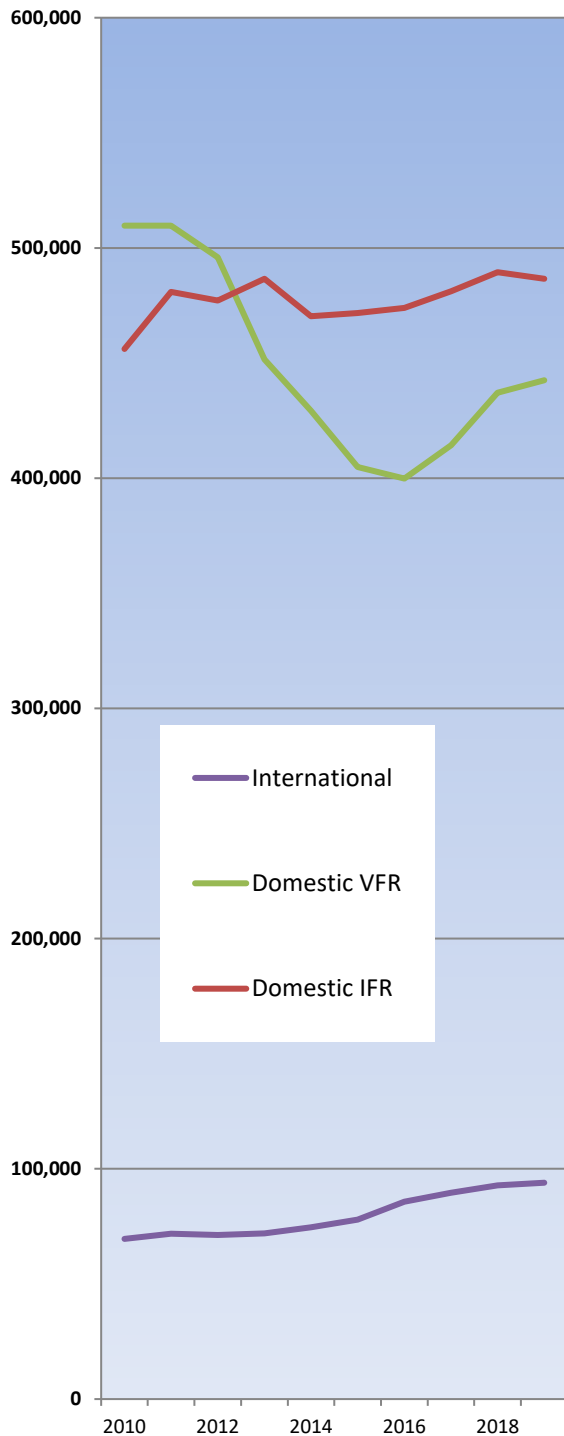
This data covers only aerodromes that have an Airways presence either as Air Traffic Control or Flight Service. An examination of airlines' published schedules suggests that there are between 10 and 20 thousand scheduled movements at certificated aerodromes that are not included in our data. With the 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 23300 over the 10 year period covered by this report and were 21680 during the 2019 calendar year.

There has been a steady decline in VFR movements at Airways monitored aerodromes since a peak of 509654 in 2010. 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 31 December

Safety Failures

We have taken a Safety Failure as:

*   an accident including hang glider and parachute accidents or
*   an incident where the aircraft is written off, destroyed or missing or
*   a critical or major incident or
*   an incident that has any of 31 selected descriptors (see appendix), most of which relate to collision, serious landing outcomes, serious aircraft technical or operational failures or acts of violence
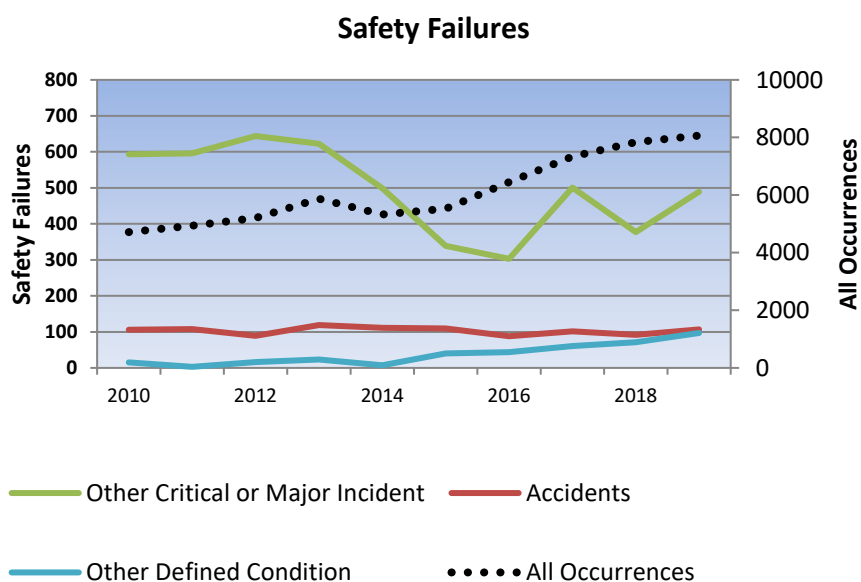
Whilst the goal for Safety Failures must be continuous reduction, it is difficult to identify a clear trend because of the small population. It is worthy of note that the number of 'Other Critical or Major' incidents does seem to be declining in recent years. These 'Other' incidents are mostly (87%) made up of Operational Incidents, Airspace Incidents and Defects in decreasing order of frequency.

Close Calls

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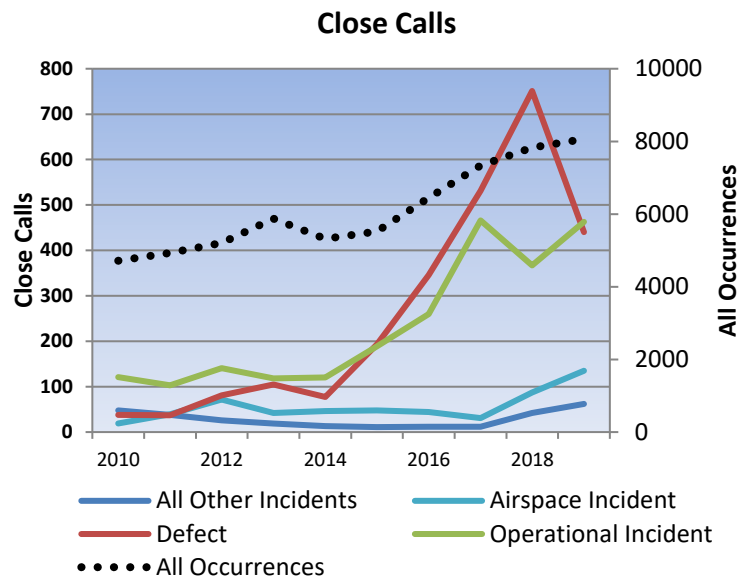
Close Calls

The most obvious trend is the recent spike in the number of defect incidents are close calls (751 in 2018 down to 440 in 2019). This is accompanied by an increase in those that are safety failures (169 up from 126 the previous year). The total number of reported defect incidents also decreased by 390 from 1934 to 1544.

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

Safety Successes
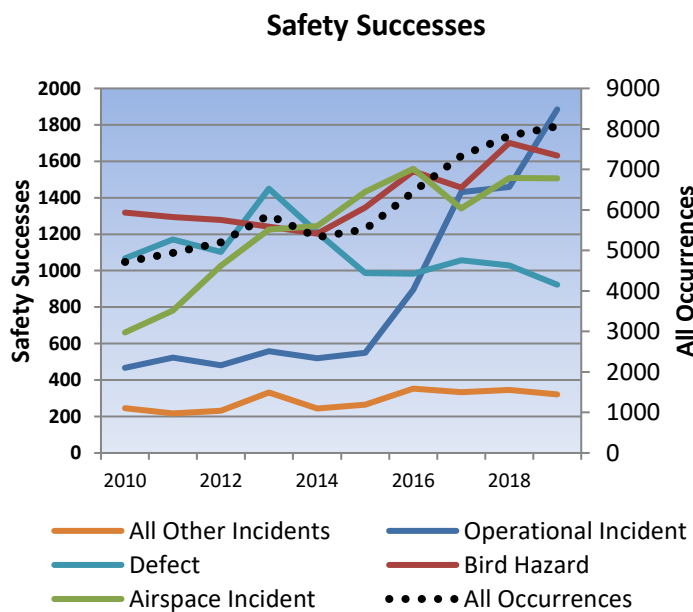
Precursors to Safety Failure

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

The Client Risk Assessment Process

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

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

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

Activity	Year ending 31 December									
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Part 149 Aviation Recreation Organisation	30.7	8.4	16.2	11.4	14.4	16.2	16.3	9.9	10.1	10.0
Part 137 Agricultural Aircraft Operator	16.6	16.3	15.5	15.6	14.6	15.1	15.2	14.1	14.5	15.8
Part 135 Air Operator Helicopters and Small Aeroplanes	16.7	15.9	15.8	15.3	13.9	14.5	15.0	13.5	14.4	15.2
Part 125 Air Operator Medium Aeroplanes	15.3	16.1	12.8	14.2	13.8	16.3	14.9	13.1	13.8	12.4
Part 115 Adventure Aviation Operator Certificate				30.6	13.2	12.2	13.4	13.0	11.7	13.6
Part 172 Air Traffic Service Organisation	9.7	9.9	22.0	19.1	15.1	12.8	13.2	12.6	16.3	16.1
Part 92 Dangerous Goods Packaging Approval Holder	2.6	5.6	10.9	5.1	8.4	7.4	12.7	6.7	7.1	6.0
Part 109 Regulated Air Cargo Agent	13.9	11.2	10.4	11.7	12.7	12.4	11.1	10.6	11.6	12.9
Part 19F Supply Organisation	11.1	11.2	10.2	9.1	10.8	10.2	10.3	9.2	9.2	7.9
Part 148 Aircraft Manufacturing Organisation	10.4	11.2	10.8	9.4	10.9	11.6	9.6	10.2	10.8	10.7
Part 121 Air Operator Large Aeroplanes	10.5	10.0	7.8	8.0	8.2	7.6	9.6	8.1	7.4	9.0
Part 129 Foreign Air Transport Operator	8.2	8.9	9.6	8.3	6.8	6.4	9.5	11.8	8.6	9.4
Part 145 Maintenance Organisation	10.8	10.3	11.1	9.4	9.8	10.3	9.3	8.3	9.3	9.2
Part 141 Aviation Training Organisation	11.4	9.5	10.7	9.3	8.3	9.3	8.9	6.7	8.3	8.7
Part 173 Instrument Flight Procedure	5.9	8.2	15.4	13.0	11.1	13.5	8.9	4.4	4.0	4.5
Part 139 Aerodrome Operator	6.3	5.7	5.8	5.9	6.5	7.2	8.6	7.1	7.5	6.3
Part 146 Aircraft Design Organisation	7.6	11.8	10.2	9.4	8.2	8.8	8.3	8.8	8.4	9.6
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	7.2	6.7
Part 140 Aviation Security Service Organisation	5.5	4.5	4.8	5.0	6.1	6.1	8.1	12.8	11.4	18.9
Part 108 Security Programme	8.3	7.5	7.1	7.0	6.4	6.9	7.6	6.8	6.6	7.3
Part 174 Meteorological Service Organisation	9.6	10.3	15.9	10.7	5.1	5.3	6.1	4.7	10.0	8.8
Part 175 Aeronautical Info Service Organisation	7.6	12.1	21.2	14.6	11.1	43.3	5.3	3.6	3.3	6.0
Part 171 Telecom Service Organisation	4.9	6.8	17.3	12.7	6.6	5.1	5.0	5.4	17.0	7.7

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

The Routine Audit Process

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

The following chart shows the numbers of certificated operators. They are separated into those that have not been audited, those that have been audited and for whom no non-compliances were discovered and finally those for whom one or more non-compliances were discovered either as a result of an audit, an inspection or an investigation. The chart uses calendar years.
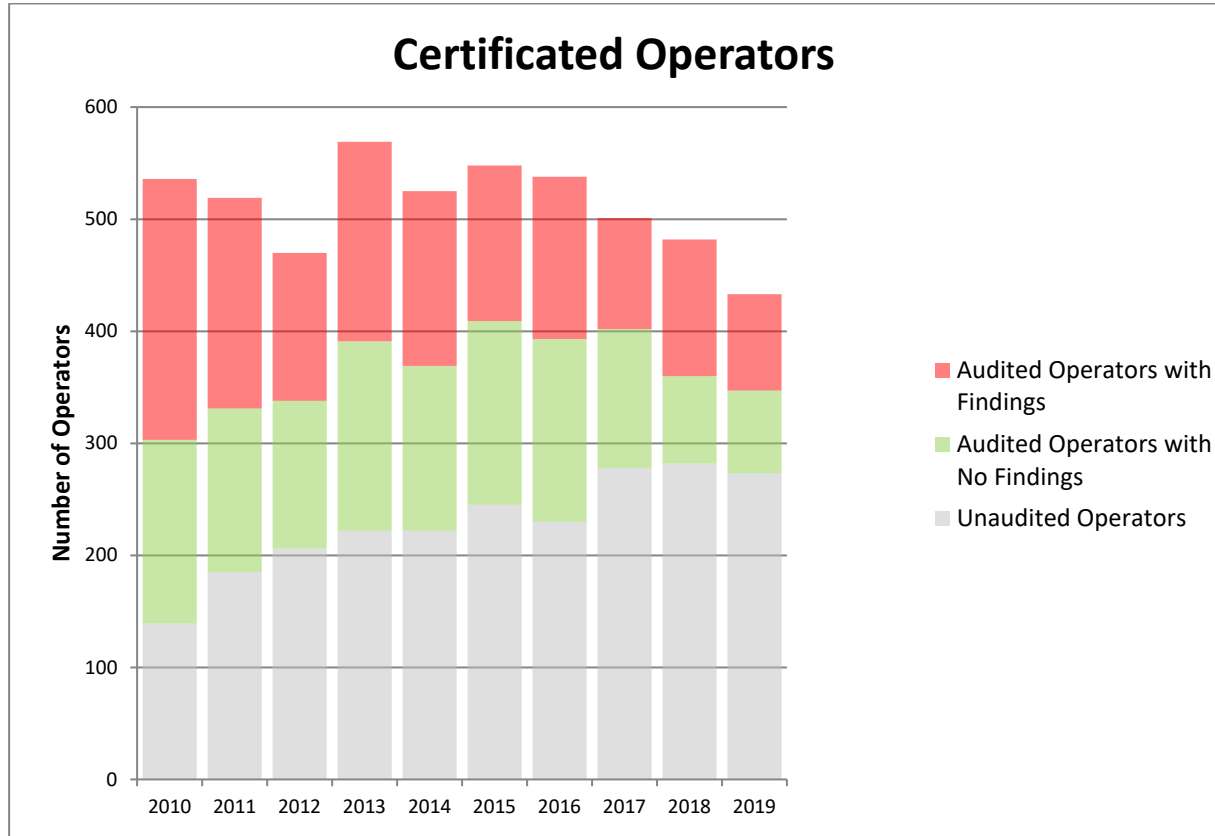
It is worth noting that as the CAA moves to risk-based auditing decisions, slightly fewer operators are being audited than in previous years. It is also worth noting that over the last three years only about half of the operators who are audited have generated findings. This is a change from earlier years when for most years significantly more than half of all audited operators generated findings. This is reflected in the table of client risk scores which is to be expected since non-compliance findings are one component of the risk score.

Industry Size and Activity Data

Registered Aircraft

The following table summarises the number of registered aircraft or Part 115 approved aircraft as at 31 December of each year.

Aircraft Category and Class	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Large Aeroplane	119	127	125	128	128	125	136	134	136	142
Medium Aeroplane	78	78	80	79	78	77	69	74	76	81
Small Aeroplane	1518	1521	1527	1513	1496	1507	1509	1525	1528	1538
Helicopter	761	767	787	795	831	840	845	863	880	889
Agricultural Aeroplane	110	109	107	103	97	93	94	93	95	98
Sport Aircraft - Aeroplanes	117	126	143	150	164	167	174	176	179	181
Sport Aircraft - Amateur Built Aeroplane	243	251	260	265	266	275	282	287	290	303
Sport Aircraft - Amateur Built Glider	4	4	3	3	3	3	3	3	3	3
Sport Aircraft - Amateur Built Helicopter	20	22	23	24	24	24	23	24	24	25
Sport Aircraft - Balloons	69	72	74	61	64	64	61	64	63	59
Sport Aircraft - Glider	299	299	295	292	287	288	286	284	286	292
Sport Aircraft - Gyroplane	42	36	42	46	53	62	70	77	78	77
Sport Aircraft - Hang Glider	0	0	13	17	18	18	23	24	21	19
Sport Aircraft - Helicopter	3	5	6	4	5	5	5	5	5	5
Sport Aircraft - Microlight Class 1	233	226	230	220	217	211	211	213	214	213
Sport Aircraft - Microlight Class 2	778	808	833	833	855	886	897	901	915	932
Sport Aircraft - Power Glider	48	48	46	46	46	49	51	51	52	54
Sport Aircraft - Parachute	0	0	194	188	210	209	256	324	334	342
Sport Aircraft - Para Glider	0	0	61	82	69	89	105	91	101	127
Total	4442	4499	4849	4849	4911	4992	5100	5213	5280	5380

Statistically significant growth areas are:

- gyroplanes – from 42 in 2011 to 77 in 2019
- sport aeroplanes – from 117 in 2007 to 181 in 2019
- Part 115 hang gliders – from 13 in 2012 to 19 in 2019
- Part 115 parachutes – from 194 in 2012 to 342 in 2019
- Part 115 para gliders – from 61 in 2012 to 127 in 2019

Moderate declines are evident for

- class 1 microlights - from 233 in 2010 to 213 in 2019
- agricultural aeroplanes – from 110 in 2010 to 98 in 2019

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 31 December of each year.

Licences	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Recreational (RPL with Med or any Class2 Med only or any PPL only)	6865	6964	7014	6921	6377	6275	6036	5814	5675	5680
CPL with class 1 Med	2385	2362	2366	2150	2125	2076	2030	2100	2203	2193
ATPL with Class1 Med	1096	1124	1119	1120	1226	1210	1248	1201	1217	1187
ATC with Class 3 Med	362	362	363	380	379	383	366	364	365	369
LAME	2496	2549	2611	2660	2726	2779	2830	2882	2918	2982
Total	**13204**	**13361**	**13473**	**13231**	**12833**	**12723**	**12510**	**12361**	**12378**	**12411**

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

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

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

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

Operators (Owners)

The following table summarises the number of registered operators of aircraft on the register as at 31 December of each year.

Operators of:	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Large Aeroplane Operators	12	11	11	11	11	9	9	8	7	5
Medium Aeroplane Operators	37	36	37	37	35	37	34	33	32	34
Agricultural Aeroplane Operators	49	48	45	41	41	39	37	38	37	37
Helicopter Operators	387	381	381	383	393	390	385	396	404	412
Small Aeroplane Operators	992	1003	1005	1009	1017	1030	1020	1033	1034	1034
Sport Aircraft Operators	1646	1678	1732	1727	1751	1780	1810	1829	1858	1880

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 58% drop in the number of large aeroplane operators and a 24% drop in the number of agricultural aeroplane operators over the last ten years along with increases of 6%, and 14% 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 31 December of each year.

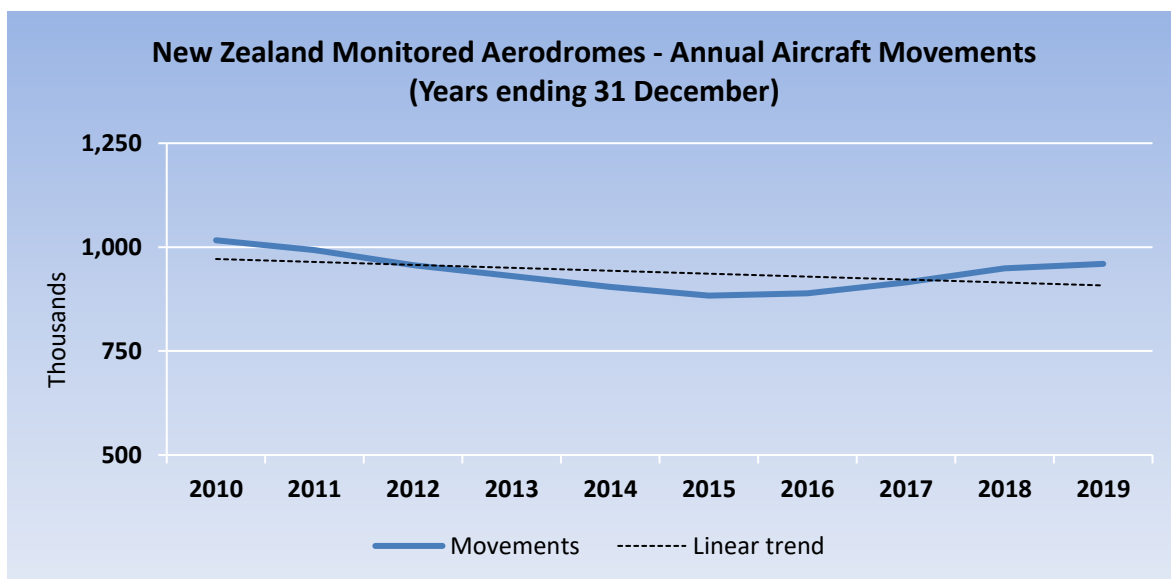| Approval	Years 20--									
	10	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**
Part 109 Regulated Air Cargo Agent	63	63	65	66	65	66	66	64	60	70
Part 115 Adventure Aviation Operator	0	1	33	34	27	30	29	29	27	24
Part 119 Air Operator	187	185	179	178	175	174	175	175	170	162
Part 119 Air Operator - Pacific	0	0	0	0	0	0	0	0	4	0
Part 129 Foreign Air Operator	34	30	32	31	31	33	40	45	49	55
Part 137 Agricultural Aircraft Operator	108	105	104	99	97	104	102	105	106	104
Part 139 Aerodromes	26	26	27	27	27	27	27	26	26	29
Part 140 Aviation Security Service	1	1	1	1	1	1	1	1	1	1
Part 141 Aviation Training Organisation	56	57	59	56	55	55	52	50	48	44
Part 141 Restricted Training Organisation	0	0	0	0	0	0	0	0	0	0
Part 145 Aircraft Maintenance Organisation	60	63	67	63	56	56	54	53	52	52
Part 146 Aircraft Design Organisation	14	14	14	14	14	13	12	12	12	12
Part 148 Aircraft Manufacturing Organisation	22	23	20	20	20	20	16	15	14	13
Part 149 Aviation Recreation Organisation	8	8	7	8	8	8	8	8	8	8
Part 171 Aeronautical Telecommunication Service Organisation	2	2	2	2	2	2	2	2	2	1
Part 172 Air Traffic Service	2	2	2	2	2	3	2	2	1	1
Part 173 Instrument Flight Procedure Service Organisation	3	3	3	3	3	2	2	2	2	2
Part 174 Meteorological Service Organisation	2	2	2	2	2	2	2	2	2	3
Part 175 Aeronautical Information Service Organisation	1	1	1	1	2	2	2	2	2	2
Part 19 Supply Organisation Certificate of Approval	57	60	56	56	59	58	50	42	32	25
Part 92 Dangerous Goods Packaging Approval	57	57	58	59	55	59	62	59	56	49
Part 129/108 Security Programme	26	21	23	23	22	25	33	39	43	46
Part 119/108 Security Programme	19	18	18	19	16	18	17	17	14	11
Part 121 Large Aeroplanes	10	9	9	9	8	8	7	6	5	3
Part 125 Medium Aeroplanes	16	15	15	15	12	15	15	13	11	14
Part 135 Helicopters and Small Aeroplanes	175	175	168	166	165	164	164	167	163	156
Part 119 Pacific/108 Security Programme	0	0	0	0	0	0	0	0	0	0
Pacific - Part 121 Large Aeroplanes	0	0	0	0	0	0	0	0	0	0
Pacific - Part 125 Medium Aeroplanes	0	0	0	0	0	0	0	0	0	0
Pacific - Part 135 Helicopters and Small Aeroplanes	0	0	0	0	0	0	0	0	0	0
Australian AOC Operating with ANZA Privileges	2	1	2	2	1	3	5	5	5	5
Synthetic Training Device (Airlines)	10	9	9	10	13	13	11	11	8	8
Synthetic Training Device (General Aviation)	26	29	33	26	30	31	28	36	37	41
Pilotless Aircraft Authorisation	0	0	3	8	2	0	0	0	0	0
Part 102 Unmanned Aircraft Operator Certificate	0	0	0	0	0	16	76	105	100	121
Total	**987**	**980**	**1012**	**1000**	**970**	**1008**	**1060**	**1093**	**1060**	**1062**

* Note:

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

Aircraft Movements

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

Long-Term Change in Aircraft Movements

The following graph shows the annual number of aircraft movements for the ten-year period ending 31 December 2019. 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.

New Zealand Monitored Aerodromes - Annual Aircraft Movements
(Years ending 31 December)

[Line graph showing annual aircraft movements (in thousands) from 2010 to 2019. The Movements line starts around 1,020 in 2010, declines to about 875 in 2015, then rises to approximately 960 in 2019. A dashed linear trend line runs roughly flat at around 950-970. Y-axis labelled "Thousands" ranging from 500 to 1,250. Legend: Movements (solid line), Linear trend (dashed line).]

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

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Auckland	157201	156655	156062	157141	153092	153561	165692	173204	164147	178029
Hamilton	99308	110419	128744	135404	129050	127044	121161	129058	137794	127309
Christchurch	125611	121469	109444	107754	112568	105760	100557	99293	104809	108804
Wellington	109193	105988	102488	101279	96084	99053	99443	97995	97836	99414
Tauranga	86935	74400	72652	70450	58448	52662	58340	62155	62727	58584
Queenstown	42347	41769	43776	43012	45620	49794	54140	59079	59450	55759
Palmerston North	56439	65708	67395	55960	52655	49494	48870	42819	43920	46221
Nelson	51570	50094	48073	45677	46770	45180	48456	46348	48502	47880
Paraparaumu	0	12832	33702	31241	24279	26115	27274	24052	21692	24652
Ohakea	61896	55726	30959	28807	36512	29632	26265	28796	38250	39514
Napier	27172	27332	25242	24386	22728	21268	23090	23082	24931	23828
Dunedin	44003	29229	25328	22758	22750	23276	21905	24342	29652	34429
Taupo	28774	26376	25536	23814	22642	22009	20792	20808	20516	21680
Woodbourne	22829	23660	22689	21826	20451	22374	20372	22714	21622	21176
New Plymouth	37097	32791	30773	24910	21831	19678	19684	19466	20045	19609
Rotorua	23380	22682	22092	22532	20143	19256	17870	19225	20301	19853
Milford	14042	13043	12902	13482	13980	16658	17475	20204	17872	15582
Invercargill	29279	30840	28491	23058	19960	15910	16938	18002	18989	18870
Gisborne	22174	22459	19594	17671	15897	16003	15331	17372	28267	32841
Whenuapai	14347	14675	14915	15419	14946	14392	12188	10687	9410	10056
New Zealand Monitored Aerodromes -	1053597	1038147	1020857	986581	950406	929119	935843	958701	990732	1004090

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 recent update of Part 139 which requires all aerodromes that are published in the AIP to supply movement data will ensure that a more complete picture of aerodrome movements will be available in the future.

Annual Aircraft Movements at Aerodromes
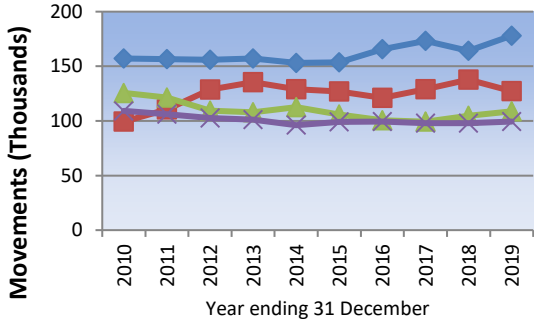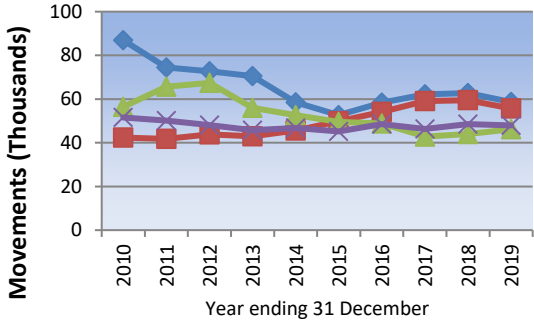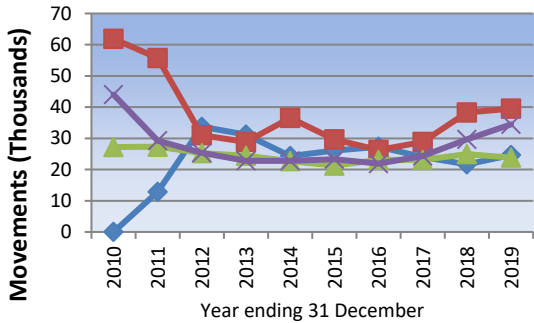
Annual Aircraft Movements at Aerodromes
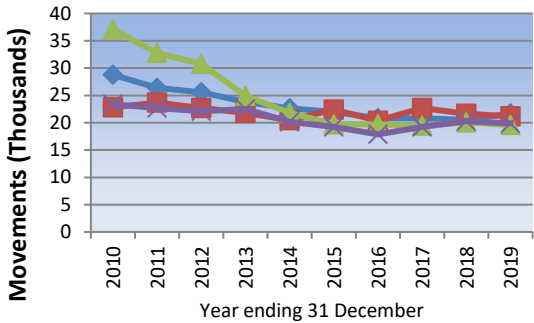
Annual Aircraft Movements at Aerodromes

Annual Aircraft Movements at Aerodromes

Annual Aircraft Movements at Aerodromes
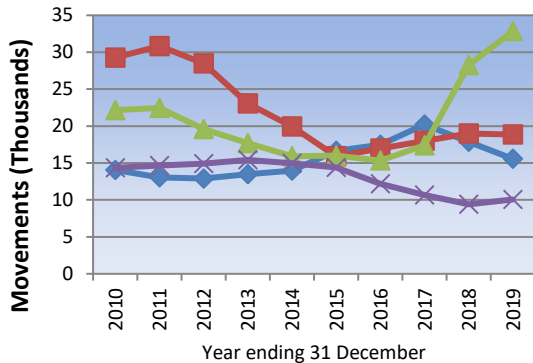
Air Transport Flights

The following graphs show the estimated number of air transport flights for the ten years ending 31 December 2019. 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.

Air Transport Flights - All Aircraft Categories
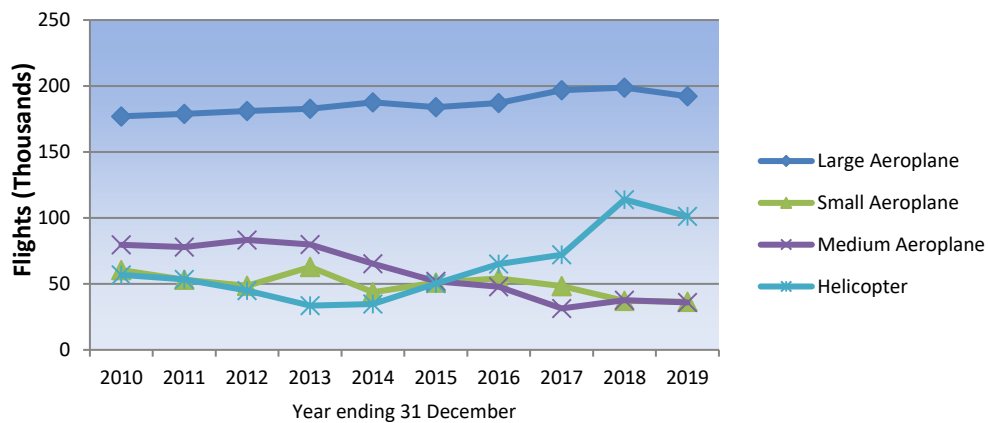

Apart from the expected emergence of adventure aviation flights the only trend that may be worthy of note is that Helicopter Air Transport Flights have reversed the declining trend that existed since 2010 and are now back to 2007 levels. This change is believed to relate in part to the growth in tourism.

Air Transport Flights - by Sector
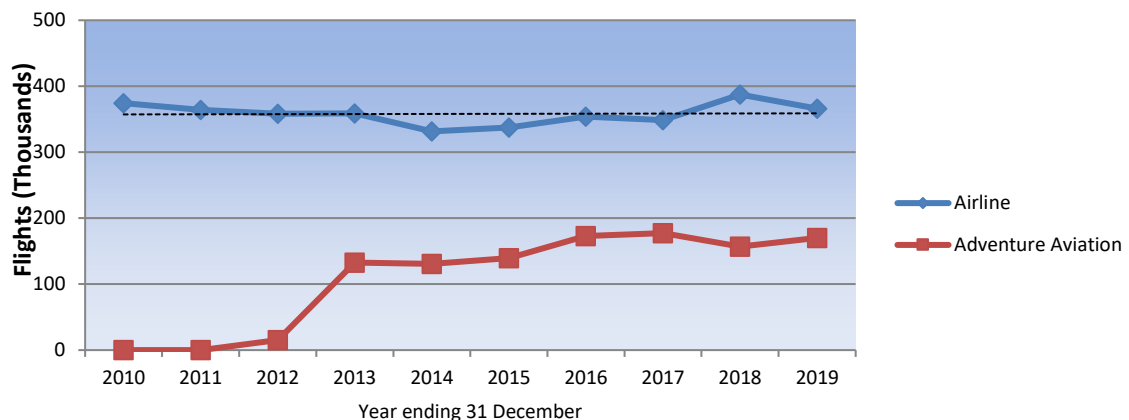
The Airline graph shows a decrease of 14% over the ten years. This trend is significantly less than the decrease in the monitored aerodrome movements of 23% over the same period.

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

Air Transport Flights - Part 115 Operations by Aircraft Class
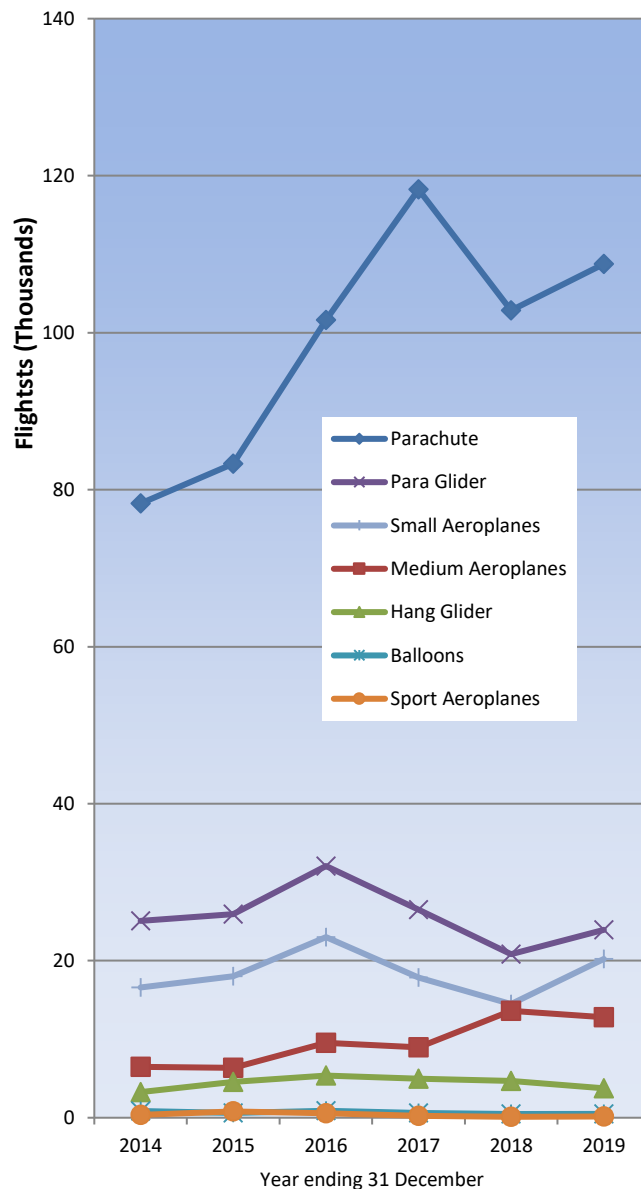
Rule Part 115 didn't come into force until 10 November 2011 so the year ending 31 December 2012 represents a start-up year for most operators. This data therefore should only be seen as representing industry growth from the 2013 year onwards.

Sport aeroplanes and balloons conduct less than 1000 adventure aviation flights each per year. The reported figures for 2019 (31 December year-end) are 159 and 491 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 31 December 2019. 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.

Annual Aircraft Hours Flown by Aircraft Category
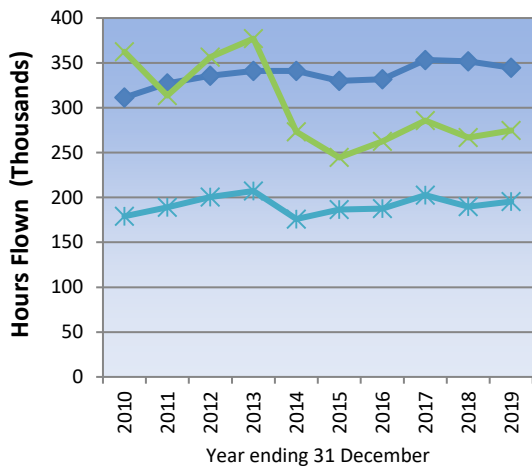
Large Aeroplane — Small Aeroplane — Helicopter

Annual Aircraft Hours Flown by Aircraft Category
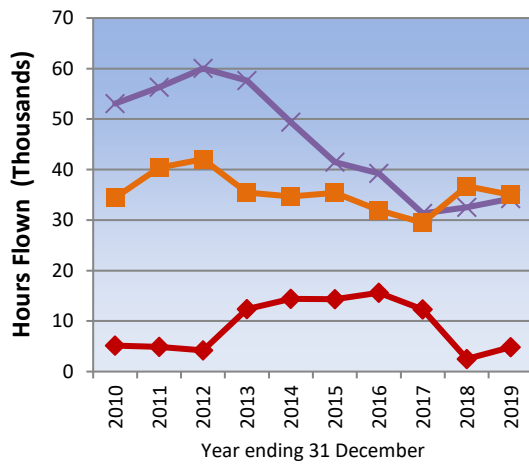
Sport Aircraft — Medium Aeroplane
Agricultural Aeroplane

Annual Hours Flown by Sector - all Aircraft Types
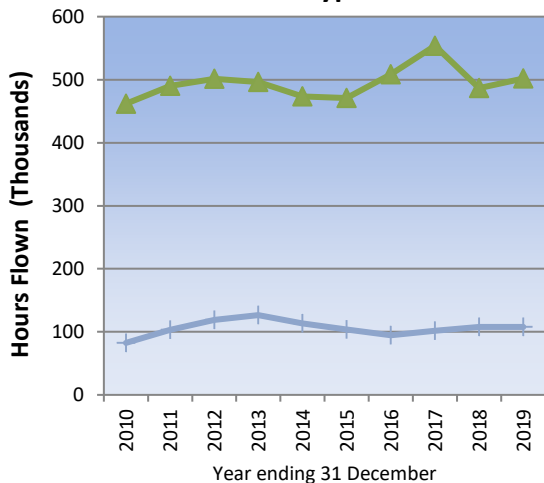
Airline/Transport — Agricultural

Annual Hours Flown by Sector - all Aircraft Types
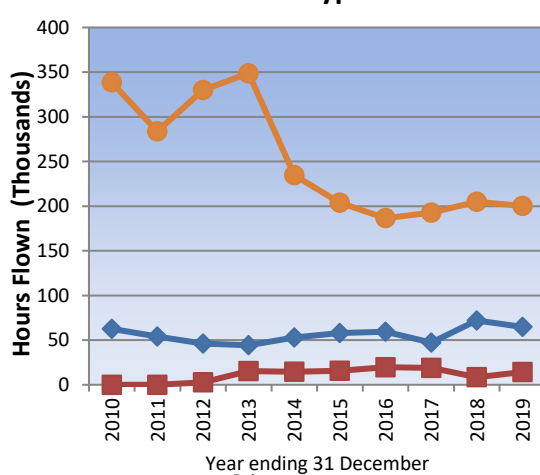
Private
Adventure Aviation
Other Commercial

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 subgroups 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 years ending in December 2019.

Safety Outcome Target Group	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Airline Operations - Large Aeroplanes	2	1	0	2	3	0	2	1	0	**2**
Airline Operations - Medium Aeroplanes	1	1	0	0	0	1	0	0	0	**0**
Airline Operations - Small Aeroplanes	2	3	0	3	1	1	1	1	1	**3**
Airline Operations - Helicopters	1	2	3	6	4	4	2	2	1	**3**
Sport Transport	10	11	8	4	12	13	12	14	12	**20**
Other Commercial Operations - Aeroplanes	14	8	3	9	8	8	4	4	6	**9**
Other Commercial Operations - Helicopters	6	10	3	5	5	5	3	5	4	**5**
Agricultural Operations - Aeroplanes	4	6	8	9	3	2	5	6	3	**3**
Agricultural Operations - Helicopters	3	5	7	4	2	5	3	3	4	**3**
Private Operations - Aeroplanes	4	7	7	15	8	14	11	9	17	**8**
Private Operations - Helicopters	9	6	2	6	3	4	4	4	4	**3**
Private Operations - Sport	50	46	40	43	53	45	38	44	36	**42**
Other	0	2	1	2	1	0	0	3	0	**2**
None	0	0	0	0	0	0	0	0	0	**0**
Total	**106**	**108**	**82**	**108**	**103**	**102**	**85**	**96**	**88**	**103**

Flight Phase

The following table shows the flight phase recorded for accidents for the ten one-year periods ending 31 December 2019. The figures include all aircraft types.

Flight Phase	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
LANDING	43	37	35	48	42	48	44	40	39	44
TAKEOFF	19	20	11	17	20	16	12	17	14	12
CRUISE	5	14	7	16	13	14	8	11	13	7
UNKNOWN	2	1	2	2	5	3	5	14	5	3
APPROACH	3	8	5	5	9	3	6	2	4	5
CLIMB	8	8	2	6	8	7	3	3	5	5
PARKED	4	2	5	5	0	3	3	1	0	3
DESCENT	6	0	6	4	3	6	2	5	3	7
HOVER	4	4	2	5	1	3	2	0	2	1
AGRICULTURAL MANOEUVRES	3	1	5	2	2	2	1	1	2	4
TAXIING	3	5	3	3	4	5	1	3	1	6
HOVER TAXI	0	0	1	2	0	0	1	0	0	1
CIRCUIT	1	1	0	0	1	0	0	2	0	1
Not Recorded	5	7	4	4	2	0	0	2	2	5
HOLDING	0	0	0	0	0	0	0	0	0	0
AEROBATICS	0	0	1	0	1	0	0	1	0	0

The most common phase of flight during which accidents occurred in the year ending 31 September 2019 remains the landing phase (40%). This proportion of accidents by flight phase is largely unchanged from previous years and reflects the fact that landing is generally the highest risk phase of flight.

Number of Fatalities

The following table shows, for each safety target group, the number of fatalities each year for the last ten years ending in December 2019

Safety Outcome Target Group	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Agricultural Operations - Aeroplanes	0	0	1	0	0	0	2	0	0	0
Agricultural Operations - Helicopters	0	0	1	1	1	0	2	0	0	0
Airline Operations - Helicopters	0	0	0	2	1	7	0	0	3	0
Airline Operations - Small Aeroplanes	0	0	0	0	1	0	0	0	0	0
Other	0	0	0	2	0	0	0	0	0	0
Other Commercial Operations - Aeroplanes	11	0	0	0	2	0	0	0	0	3
Other Commercial Operations - Sport	0	0	1	0	0	2	0	0	1	2
Other Commercial Operations - Helicopters	2	5	0	0	2	2	0	1	1	0
Private Operations - Aeroplanes	1	1	0	0	1	4	0	0	0	0
Private Operations - Helicopters	0	1	1	0	2	1	1	1	1	0
Private Operations - Sport	1	4	6	2	2		3	10	7	2
Sport Transport	0	0	11	0	0	0	0	0	1	0
Total	**15**	**11**	**21**	**7**	**12**	**16**	**8**	**12**	**14**	**7**

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 31 December 2019 (excluding the Sport Aircraft category). The graphs do not differentiate between incidents that are pilot or ATS attributable.

<u>Breakdown by Aircraft Category</u>

Airspace Incident Rates

Airspace Incident Rates

Breakdown by Severity

Critical Airspace Incident Rates

Incidents per 100.000 Hours Flown

Year Ending 31 December

Major Airspace Incident Rates

Incidents per 100.000 Hours Flown

Year Ending 31 December

Minor Airspace Incident Rates

Incidents per 100.000 Hours Flown

Year Ending 31 December
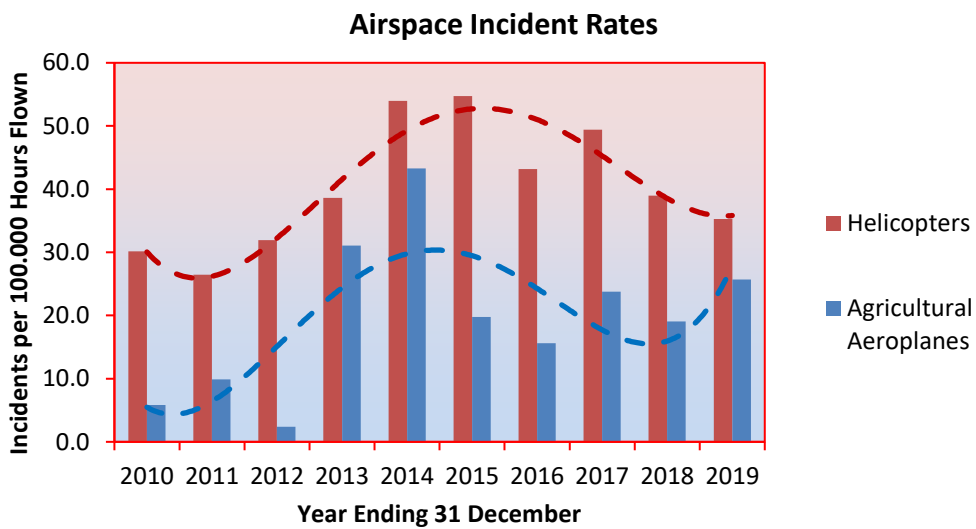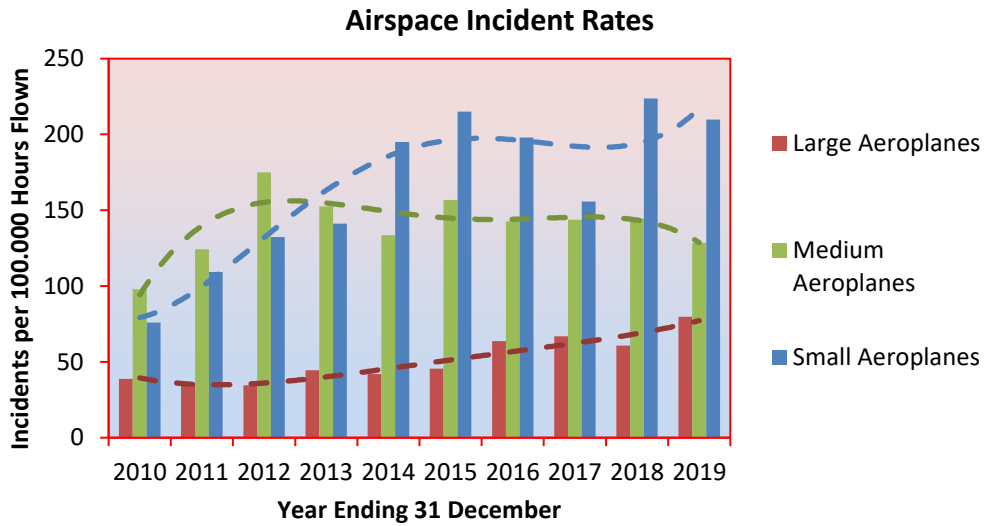
Breakdown by Airspace Designation

(Counts not Rates)

Annual Airspace Incidents

Airspace Incidents

Annual Movements (Thousands)

Year Ending 31 December

- CTA
- CTR
- Not Recorded
- Uncontrolled
- Total
- Aerodrome Movements
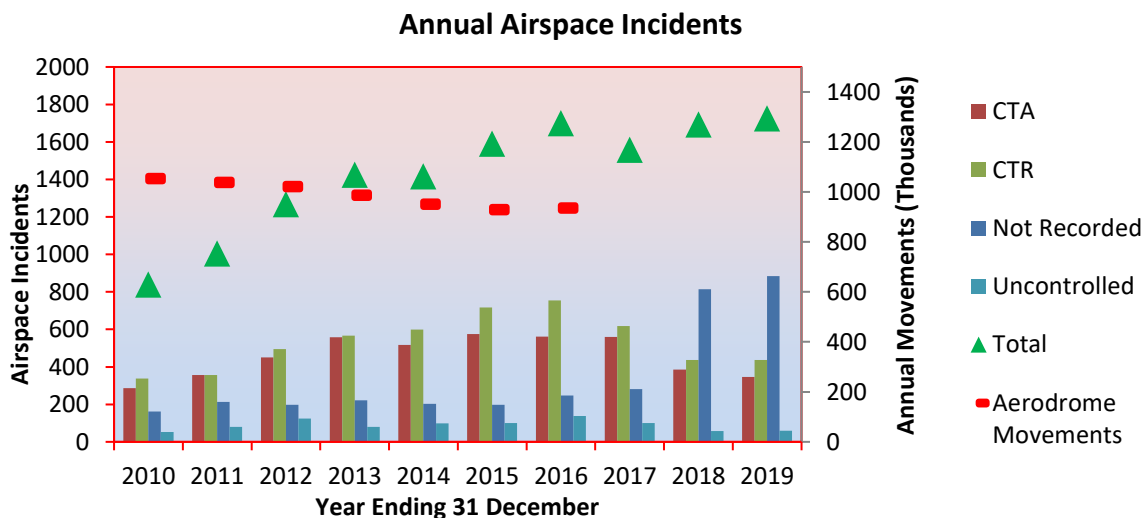
After June 2011 a sudden onset of a steady increase in the total numbers of reported airspace incidents is evident. This was in an environment of a steady but slower decrease in the reported number of aerodrome movements. No single underlying cause for this increase has bene identified, although Airways Corporation began several safety enhancement training initiatives around this time.

Breakdown of Airspace Incidents in Control Zones by Aerodrome

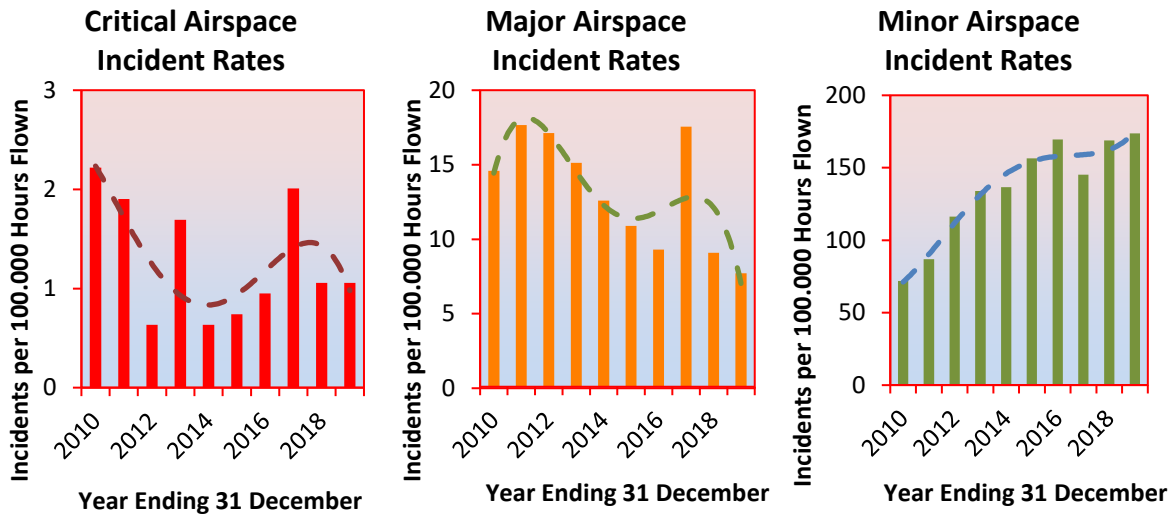| Aerodrome	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Hamilton	59	54	172	136	125	168	182	105	75	103
Auckland	41	38	39	59	45	73	106	78	40	30
Christchurch	36	33	32	52	53	92	72	92	44	51
Tauranga	15	38	46	57	66	86	54	34	28	39
Wellington	29	37	34	38	29	42	58	39	19	35
Queenstown	23	39	24	34	57	47	46	63	43	23
Nelson	23	28	19	17	26	35	40	28	28	22
Palmerston North	22	20	29	37	61	36	37	37	27	25
Dunedin	20	8	26	31	39	32	40	29	28	28
Rotorua	15	17	14	14	10	14	22	16	20	6
Woodbourne	16	12	10	15	19	24	17	22	6	9
Napier	8	6	13	17	18	17	17	23	12	20
Gisborne	3	5	5	13	10	13	13	6	19	15
Ohakea	5	7	8	14	15	11	7	5	5	4
Whenuapai	3	7	8	12	10	9	8	9	4	0
Invercargill	6	3	2	3	4	5	10	5	8	6
New Plymouth	10	3	3	13	4	8	2	16	6	3

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 31 December 2019.

Breakdown by Aircraft Category

Operational Incident Rates

Operational Incident Rates

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.

Critical Operational Incident Rates — Incidents per 100,000 Hours Flown — Year Ending 31 December

Major Operational Incident Rates — Incidents per 100,000 Hours Flown — Year Ending 31 December

Minor Operational Incident Rates — Incidents per 100,000 Hours Flown — Year Ending 31 December

Number of Incidents
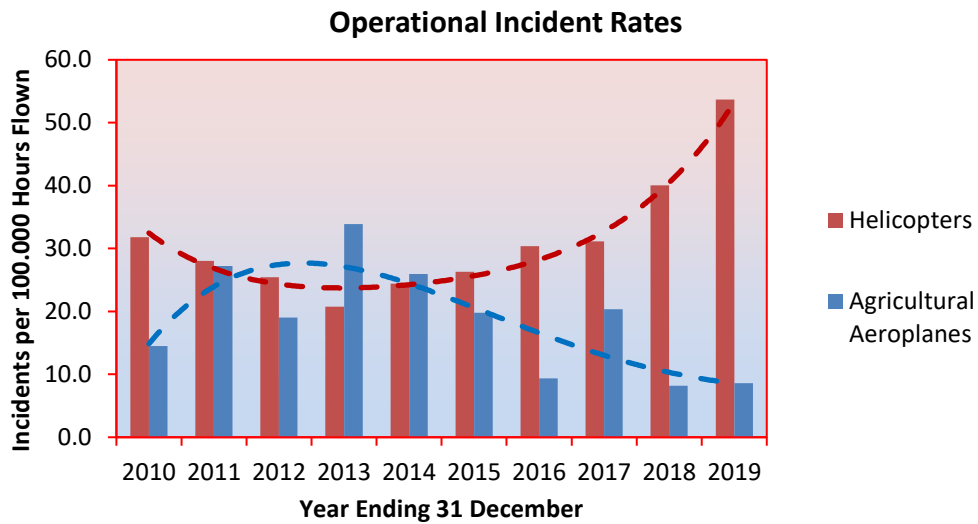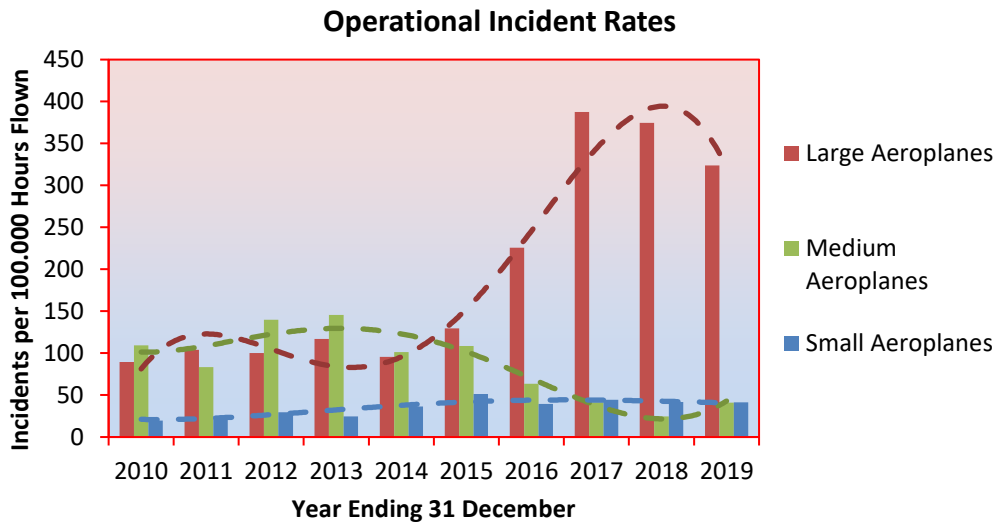
The following table shows, for each safety target group, the number of operational incidents each year for the last ten one-year periods ending 31 December 2016. All aircraft types are included. The table is sorted by the number of incidents in the year ending December 2016.

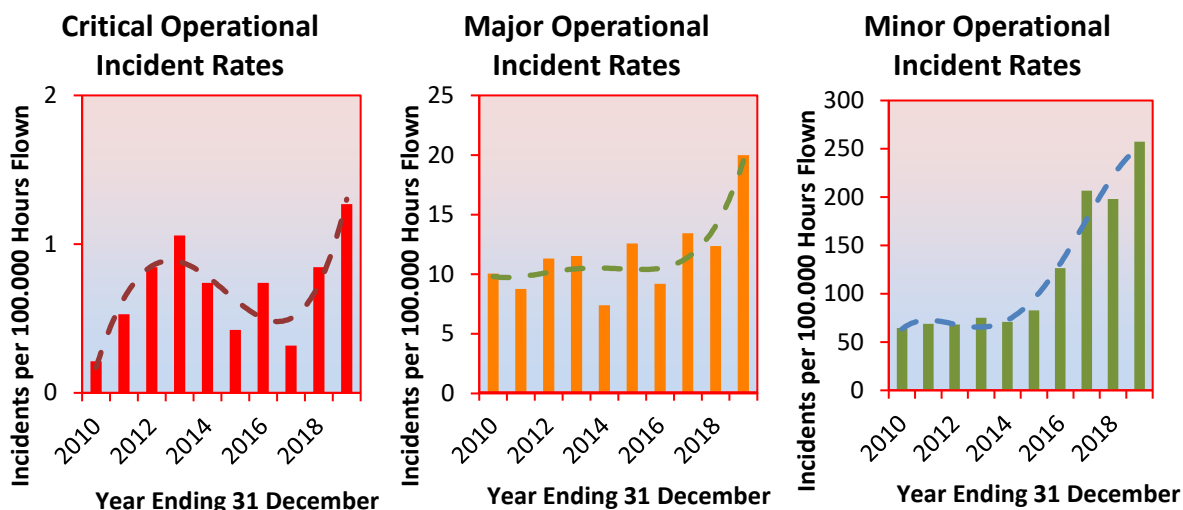| Safety Outcome Target Group	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Airline Operations - Large Aeroplanes	308	363	359	454	381	497	817	1464	1462	**1297**
Other	50	46	82	83	51	46	18	12	24	**20**
Other Commercial Operations - Aeroplanes	10	12	4	7	7	14	11	19	19	**14**
Other Commercial Operations - Helicopters	14	16	7	13	12	4	2	13	5	**16**
Sport Transport	3	8	21	46	35	26	49	141	141	**135**
Private Operations - Sport	58	57	80	75	73	97	87	94	69	**97**
Private Operations - Aeroplanes	27	26	29	20	20	45	46	28	61	**74**
Other Commercial Operations - Sport	1	0	1	12	7	23	19	0	1	**3**
Airline Operations - Medium Aeroplanes	5	11	9	11	8	7	2	7	2	**2**
Airline Operations - Small Aeroplanes	13	6	7	9	8	0	6	15	11	**22**
None	9	19	18	15	19	27	20	12	16	**13**
Agricultural Operations - Helicopters	3	7	9	2	3	0	3	6	0	**0**
Private Operations - Helicopters	19	19	72	49	62	41	33	31	11	**9**
Agricultural Operations - Aeroplanes	45	113	47	25	48	73	169	228	46	**31**
Airline Operations - Helicopters	143	36	14	9	12	6	9	12	104	**902**
Total	**708**	**739**	**759**	**830**	**746**	**906**	**1291**	**2082**	**1972**	**2635**

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 31 December 2019.

Breakdown by Aircraft Category

Defect Incident Rates

Defect Incident Rates

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.
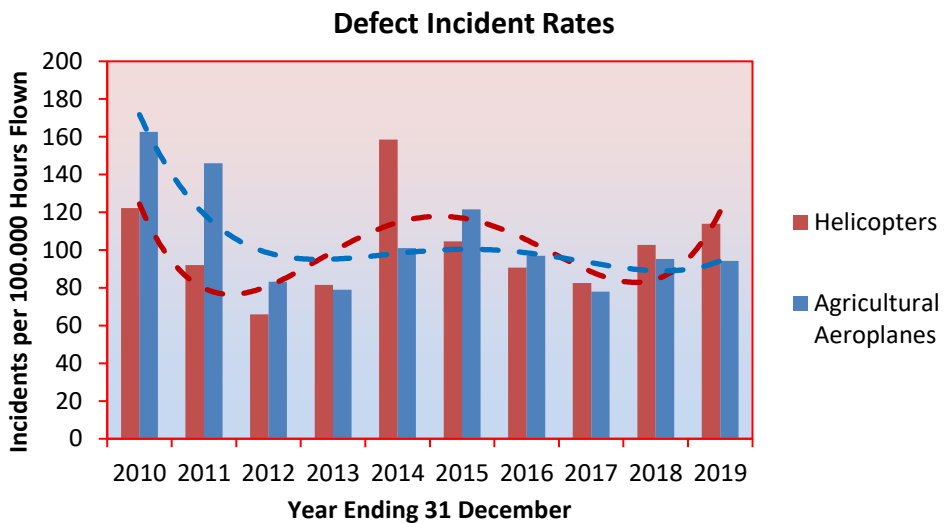
Critical Defect Incident Rates

Major Defect Incident Rates
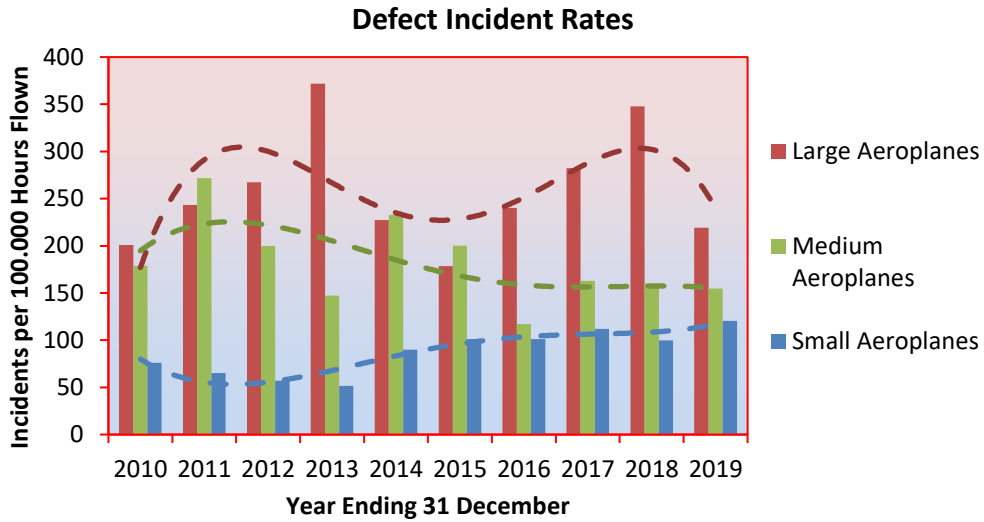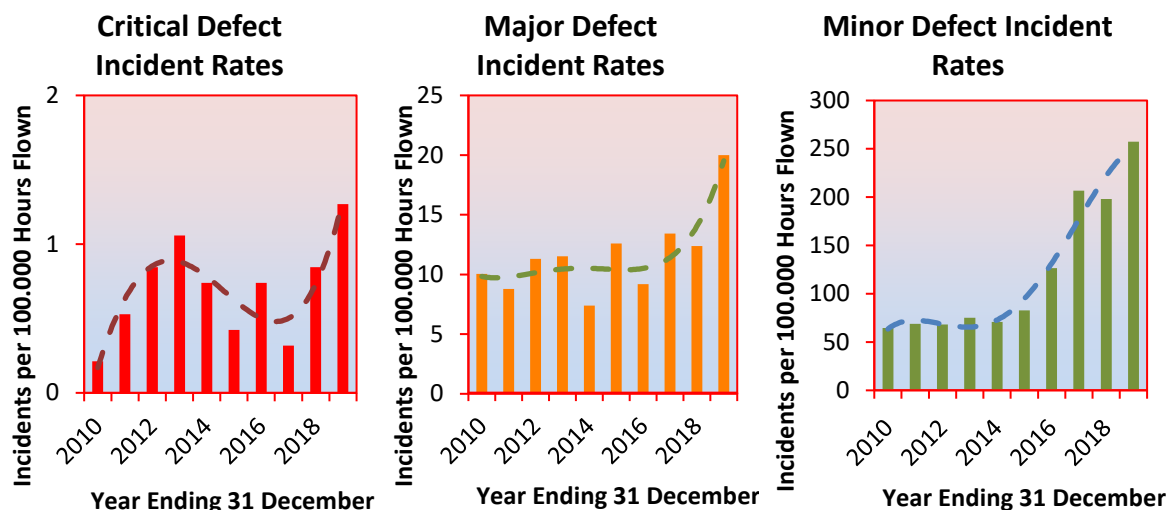
Minor Defect Incident Rates

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

Safety Outcome Target Group	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Airline Operations - Large Aeroplanes	619	790	896	1264	789	616	815	1041	1276	**799**
Other Commercial Operations - Aeroplanes	67	138	111	79	83	53	17	22	29	**21**
Other Commercial Operations -Helicopters	71	52	45	29	24	27	24	34	44	**37**
Other	84	40	36	51	11	1	7	18	6	**11**
Agricultural Operations - Aeroplanes	6	6	7	6	4	1	1	13	7	**8**
Private Operations - Aeroplanes	179	151	141	148	221	232	252	294	187	**304**
Airline Operations - Small Aeroplanes	78	94	69	70	233	186	154	126	167	**188**
Private Operations - Sport	0	0	1	3	0	4	2	3	2	**2**
Airline Operations - Medium Aeroplanes	56	56	37	28	40	46	33	27	43	**36**
Private Operations - Helicopters	27	23	18	32	15	0	4	20	20	**24**
Airline Operations - Helicopters	67	25	29	33	44	31	30	30	41	**38**
None	30	16	10	18	20	13	8	6	5	**6**
Agricultural Operations - Helicopters	32	29	29	21	13	20	20	20	21	**21**
Other Commercial Operations - Sport	33	16	19	47	37	11	37	39	25	**20**
Sport Transport	30	15	14	8	14	9	9	11	28	**29**
Total	1379	1451	1462	1837	1548	1250	1413	1704	1901	1544

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
Jan-2019	10	24	112	163	77	168	5	4	170	8	1	2	0
Feb-2019	7	12	148	155	160	144	7	3	142	5	3	0	1
Mar-2019	8	26	149	148	117	150	17	4	403	3	4	3	3
Apr-2019	5	10	99	139	118	104	5	0	215	8	1	1	1
May-2019	7	23	106	165	196	148	5	0	196	9	3	2	2
Jun-2019	6	16	122	124	190	128	6	0	152	4	1	1	4
Jul-2019	5	15	112	145	93	116	5	7	187	5	0	0	9
Aug-2019	2	19	71	135	58	126	1	0	138	7	1	1	1
Sep-2019	5	6	102	128	166	109	8	0	225	11	0	2	12
Oct-2019	2	16	119	139	87	126	1	1	310	6	1	1	14
Nov-2019	2	13	99	167	142	111	3	1	285	3	0	1	3
Dec-2019	9	13	83	128	246	119	4	1	232	6	1	3	7

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

Total Safety Cost

Public Air Transport
Any passenger or freight operation where a member of the public can buy the service "over the counter".

Airline Operations — Large Aeroplanes
All operations (other than Part 137 agricultural) using aeroplanes that must be operated under Part 121 when used for air transport.

Airline Operations — Medium Aeroplanes
All operations (other than Part 137 agricultural) using aeroplanes that must be operated under Part 125 when used for air transport and aeroplanes conducting SEIFR passenger ops.

Airline Operations — Small Aeroplanes
Transport and transport support (training, ferry etc) operations using aeroplanes that must be operated under Part 135. Also includes ambulance/EMS.

Airline Operations — Helicopters
Transport and transport support (training, ferry etc) operations using helicopters that must be operated under Part 135. Also includes ambulance/EMS.

Sport Transport
All public transport operations as defined by Part 115 and transport support (training, ferry etc).

Other Commercial Operations

Commercial Operations — Aeroplanes
All non-public transport ops for hire or reward or as part of any commercial activity.

Commercial Operations — Helicopters
All non-public transport ops for hire or reward or as part of any commercial activity.

Agricultural Operations — Aeroplanes
Agricultural ops, ferry and training for Ag ops.

Agricultural Operations — Helicopters
Agricultural ops, ferry and training for Ag ops.

Agricultural Operations — Sport
Agricultural ops, ferry and training for Ag ops.

Non Commercial Operations

Private Operations — Aeroplanes
Aircraft owned or hired for private or cost sharing use, including glider towing.

Private Operations — Helicopters
Aircraft owned or hired for private or cost sharing use.

Private Operations — Sport
Sport aircraft (including microlights, balloons, parachutes, gliders etc.) owned or hired for private or cost sharing use.

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

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

Brake

De-icing

Doors/panels

Electrical

Flight Controls

Fuel

Gear

Hydraulic

Instruments

Navigation System

Pneumatic

Pressurisation

Tyre/wheel

Main Rotor

Tail Rotor

Main Rotor Transmissions/gearbox

Maint Rotor Tail Shaft

Tail Rotor Drive Shaft

Struck By Propellor / Rotor / Jet Blast

Sinking Through Surface

Struck By Object

Struck By Stairs / Equipment

GEAR COLLAPSED/RETRACTED

Main Gear

Nose Gear

Complete Gear

Other Gear

LOSS OF CONTROL

Directional Control

Mush/stall

Spin

Spiral

Pitch Control (porpoise)

Other

LOSS OF CONTROL (HELICOPTER)

Dynamic Roll-over (heli)

Inadequate Rotor Rpm (heli)

Settling With Power (heli)

Uncontrolled Rotation (heli)

Other

Fuel Starvation

Mechanical/engine Failure

Non Mechanical Engine Failure

Simulated Engine Failure

Transmission Failure

Driveshaft Failure

Unspecified

Fire

Fumes/smoke

Other

EVACUATION

Insecure Barrier

Scraped Wingtip/cowling/float

Tail Scrape/overrotation

Groundloop/swerve

Hard Landing

Wheels Down Landing On Water

Intentional Wheels-up Landing

Intent Unknown Wheels-up Landing

MISSING AIRCRAFT

Fire/smoke/fumes

Gpws

FAILURE OF EMERGENCY EQUIP/PROCS

EMERGENCY DECLARATION

Incorrect Quantities Loaded

Airspace Incident

NEAR COLLISION

AIR PROXIMITY

Near Miss

Runway Incursion Category A

Runway Incursion Category B

SPILLAGE/LEAKAGE

FUMES/GAS/SMOKE

SABOTAGE

HIJACK/UNLAWFUL SEIZURE

BOMB/DEVICE WARNING/SCARE

Endangering transport

UNLAWFUL INTERFERENCE

Theft

Reason Model – Latent Failure Model

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

The following two diagrams are designed to show the basic principles of the latent failure model:
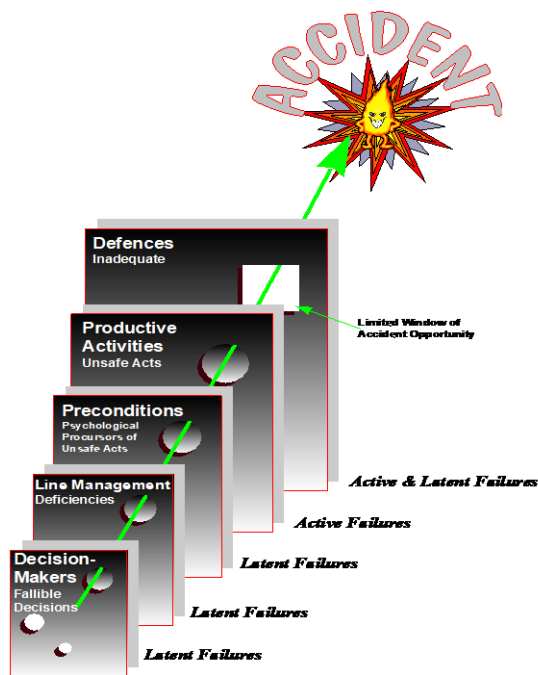
Diagram 1

Diagram 1 shows the layers of defences that have been created within the aviation system to prevent accidents and incidents happening. It also shows how these defences have holes in them. When these holes line up there is a window of opportunity for an accident or incident. All that is needed to complete the breach in the defence is an active failure at the operational level. When this happens an accident occurs. When the defences in the system work properly and are only partially breached the end result may be an incident. Incidents are free lessons that should be investigated to show where the holes (latent failures) in the system are. Holes in the system are there all the time and a good pro-active audit program should also help in detecting them.
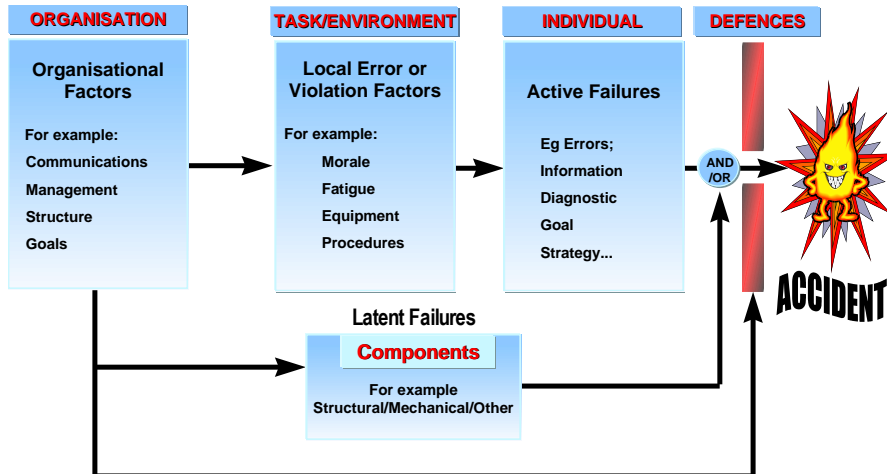
Diagram 2

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

1. The active failures.

2. Task/environment or local factors.

3. Organisational factors.

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