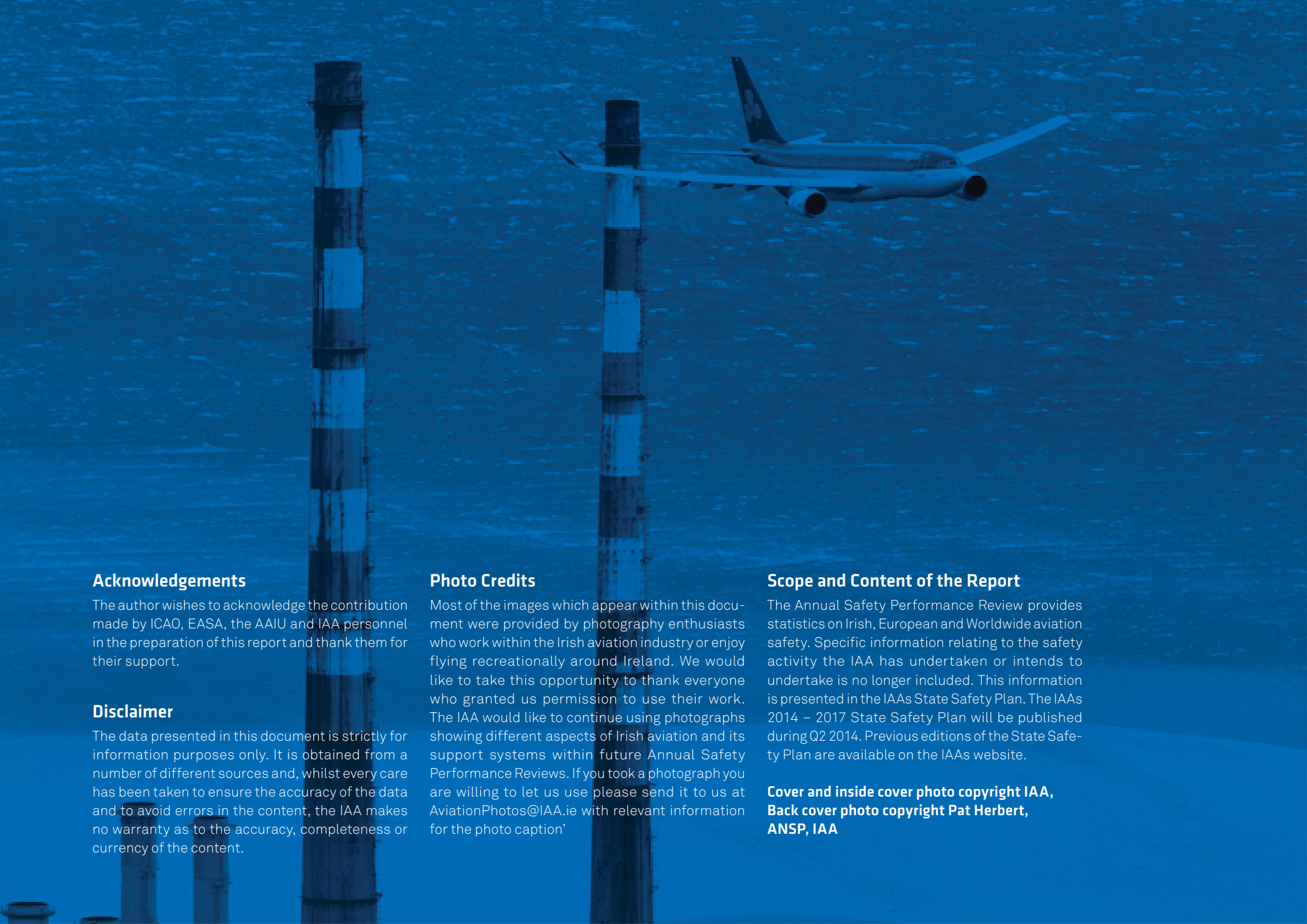
Annual Safety Performance Review of Aviation in Ireland

2013

IAA



Acknowledgements

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Scope and Content of the Report

The Annual Safety Performance Review provides statistics on Irish, European and Worldwide aviation safety. Specific information relating to the safety activity the IAA has undertaken or intends to undertake is no longer included. This information is presented in the IAAs State Safety Plan. The IAAs 2014 – 2017 State Safety Plan will be published during Q2 2014. Previous editions of the State Safety Plan are available on the IAAs website.

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Spectators watch a British Airways Airbus A380 fly over Dublin during FlightFest, the Irish Aviation Gathering

01 Foreword

Kevin Humphreys
Director Safety
Regulation Division

Welcome to the IAAs 2013 Annual Safety Performance Review.

The 1st January 2014 marked the 100th anniversary of the beginnings of commercial aviation and since then air transport has become one of the safest forms of travel. Indeed preliminary figures from EASA show that during 2013 worldwide accidents involving large commercial aeroplanes were at an all-time low and fatalities as a result of aviation accidents were substantially lower than in recent years. On a global basis this makes 2013 the best year in terms of safety performance industries.

Closer to home there were no fatal accidents in 2013 involving Irish registered commercial aircraft, aircraft operated by holders of an Irish Air Operators Certificate (AOC) and aircraft flying within Ireland commercially or recreationally. This is the first time in over six years none of these sectors of the Irish aviation industry have experienced a fatal accident. It is a milestone to be proud of and an achievement I hope we repeat regularly.

There were a small number of non-fatal accidents and serious incidents to commercial aircraft on the Irish register, aircraft engaged in general aviation activity in Ireland and at aerodromes within Ireland during 2013. Statistics and other information on these occurrences are contained within this publication. The IAA will continue to use all available avenues to work with the aviation industry and general aviation to address the safety issues these occurrences have highlighted.

Although preliminary figures show 2013 has been a very safe year for aviation there were still nine fatal commercial air transport accidents around the world. These accidents were responsible for the tragic loss of 173 lives and occurred on every continent except Australia. In July the USA experienced its first fatal accident involving a commercial aircraft since 2009. It occurred when an Asian registered aircraft hit the seawall just short of San Francisco airports runway during the approach. Following Irelands first year without a fatal accident these nine accidents remind us that they can still occur, even in environments which continually strive to improve safety and remain vigilant to potential safety risks.

02 Executive Summary

There were 745 large commercial air transport aircraft on the Irish aircraft register on the 31st December 2013 (this figure includes the Irish lease fleet and the Irish AOC holders). This is a slight increase in the number of aircraft that were on the Irish register on the 31st December 2012. The Irish lease fleet aircraft and aircraft operated by Irish AOC holders were involved in three non-fatal accidents and 18 serious incidents during 2013.

The five largest Irish AOC holders are Aer Arann, Aer Lingus, Air Contractors, CityJet and Ryanair and collectively they conducted 686,399 flights in 2013. This is an increase of over 12,000 flights on 2012 and marks over 12 years of consistent growth for this sector of the Irish aviation industry.

Under S.I. No. 285 of 2007 European Communities (Occurrence Reporting in Civil Aviation) Regulation 2007 the IAA received 5,971 occurrence reports from the five largest Irish AOC holders during 2013, the vast majority of which described incidents where the safety barriers were effective in preventing a situation where an accident may have occurred.

During 2013 Ireland was one of thirteen European Aviation Safety Agency (EASA) Member States that participated in a survey on occurrence reporting rates. Reporting rates for 83 AOC holders, who operate large aircraft, were available. The results of the survey indicate that the reporting culture for Irish AOC holders is mature when compared with our European counterparts.

The Irish AOC holders operating helicopters are Bond Air Services Ireland, CHC (Ireland), Executive Helicopters, Irish Helicopters and Starlite Aviation Ireland and they conducted 9,514 flights in 2013. This is an increase of over 337 flights on 2012. They were not involved in any accidents or serious incidents during 2013. Collectively they submitted 100 occurrence reports during 2013, the vast majority of which described incidents where the safety barriers were effective in preventing a situation where an accident may have occurred.

Flight hours describe the length of time aircraft spent in Irish controlled airspace. It includes en-route (overflight) traffic as well as aircraft that land or depart from an Irish airport. The number of flight hours rose slightly in 2013. The number of arrivals and departures at aerodromes located within Ireland also rose during 2013. There was one accident involving a commercial aircraft at an Irish aerodrome in 2013, it did not result in any fatalities.

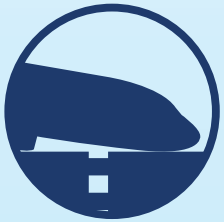
There were non-fatal accidents and one serious incident in 2013 to aircraft used for general aviation in Ireland. These are currently under investigation by the Air Accident Investigation Unit (AAIU) of the Department of Transport, Tourism and Sport and their findings and safety recommendations will be published on completion of their investigation.

During 2013 the three licensed parachuting clubs conducted 15,040 jumps. A total of seven parachutists sustained injuries during the landing phase that required medical attention. None of the injuries sustained were life threatening, they mostly consisted of sprains or broken bones.

Irish Lease Fleet and the Irish AOC Holders

There were 17 accidents between 2010 and 2013, the most common causes of accidents were:

Ground Handling



Abnormal Runway Contact

Ground Collision

MORs and the 5 Main Irish AOC Holders

Between 2011 and 2013 the five largest AOC holders submitted 15,868 MORs to SRD IAA.

The most commonly reported occurrences were:

System Failure or Malfunction

Birdstrike

Cabin Safety Incidents

The most common risk bearing occurrences were:

Human Factors Crew

Airprox or near mid air collision

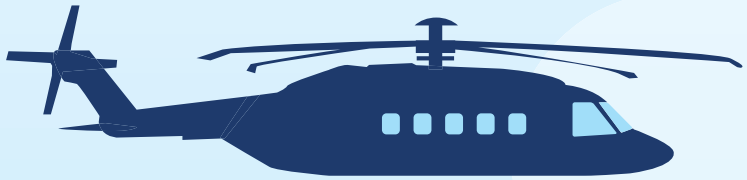
Shining of Lasers at Aircraft

Human Factors Crew

An extensive analysis of all risk bearing human factors occurrences that occurred during 2012 identified the main reasons for the occurrence were poor execution, breach of cockpit procedures, crew/technology interface and a lack of communication between the cockpit crew.

The most common effect of the HF crew occurrence on the flight was a hard landing, the activation of the EGPWS warning system within the cockpit, a go-around or an unstable approach.

Irish Helicopters AOC Holders



Between 2010 and 2013 the helicopters AOC holders were involved in one serious incident and zero accidents.

During 2013 they submitted 100 MOR reports to SRD IAA. The most common occurrences were ‘System failure or malfunction’, of which there were 66, and ‘Engine failure or malfunction’, of which there were 12.

The only risk bearing occurrence during 2013 was HF crew.

Corporate Aviation

Between 2010 and 2013 the corporate AOC holders were involved in one serious incident and zero accidents.

During 2013 they submitted 19 MOR reports to SRD IAA. This is far lower than expected.

11 of the 19 MORs reported involved an ‘Engine failure or malfunction.

Irish Air Navigation Services

Between 2010 and 2013 there were eight serious incidents and four accidents. Tragically one accident resulted in six fatalities. There were eight different reasons for the accidents and serious incidents.

In 2013 IAA SRD received 1,162 MORs describing 58 types of incident. The most regularly reported were:

Shining of lasers at aircraft

Weather related go around

Aircraft technical problem

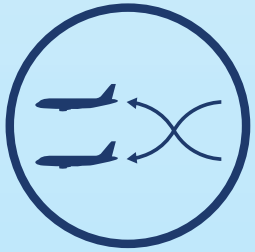
The Key Safety Indicators for air traffic services at Irish Aerodromes

Airspace Infringements

Static: 90 between 2010 and 2013, 24 in 2013

Deviations from ATC Clearance

Increasing: 325 between 2010 and 2013, 90 in 2013

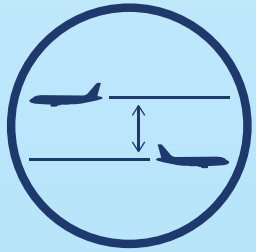


Level Busts

Increasing: 153 between 2010 and 2013, 49 in 2013

Runway Incursions

Decreasing: 126 between 2010 and 2013, 24 in 2013



Separation Minima Infringement

Decreasing: 56 between 2010 and 2013, 16 in 2013

General Aviation between 2010 and 2013

No fatal accidents in 2013! But there were four accidents and one serious incident

Parachute Jumping

28 Injuries

Aeroplanes Over 2,250kg

0 Fatal Accidents
0 Non Fatal Accidents
0 Serious Incidents

Aeroplanes Below 2,250kg

2 Fatal Accidents
16 Non Fatal Accidents
7 Serious Incidents

Helicopters Over 2,250kg

0 Fatal Accidents
0 Non Fatal Accidents
0 Serious Incidents

Helicopters Below 2,250kg

0 Fatal Accidents
3 Non Fatal Accidents
0 Serious Incidents

Microlight

0 Fatal Accidents
10 Non Fatal Accidents
2 Serious Incidents

Sailplanes and Powered Sailplanes

0 Fatal Accidents
3 Non Fatal Accidents
1 Serious Incidents

Gryoplanes

0 Fatal Accidents
0 Non Fatal Accidents
1 Serious Incidents

Balloons

0 Fatal Accidents
0 Non Fatal Accidents
0 Serious Incidents

Paragliders, Powered Paragliders and Powered Parachutes

0 Fatal Accidents
5 Non Fatal Accidents
1 Serious Incidents

This CHC Sikorsky S92 search and rescue helicopter is based at Sligo airport and provides 24 hour search and rescue services over the Atlantic Ocean and the north-west coast of Ireland.

Photo provided by CHC.

03 Irish Commercial Air Transport Aeroplanes and Helicopters

The Irish Aviation Authority (IAA) is a limited liability company wholly owned by the Irish State. The Safety Regulation Division (SRD) of the IAA is responsible for Ireland's regulatory and safety oversight functions within the civil aviation industry. As part of its role as a regulator IAA SRD analyses and monitors the safety of organisations and aircraft under its remit. This section provides information relating to occurrences defined under International Civil Aviation Organization (ICAO) Annex 13 as an accident or serious incident which involved Irish commercial air transport (Irish Air Operators Certificate (AOC) holders and lease fleet aircraft).

Accidents and Serious Incidents

The meaning of an aviation accident and serious incident is defined in ICAO Annex 13, which also contains examples of serious incidents. It states an accident or serious incident can only take place between the time the first person boards the aircraft with the intention of flight and the time all such persons have disembarked.

In brief Annex 13 defines an accident as an occurrence associated with the operation of an aircraft in which a person is fatally or seriously injured as a result of being in the aircraft or in direct contact with any part of the aircraft. Annex 13 also defines an accident as any occurrence where the aircraft sustains damage or structural failure which adversely affects the structural strength, performance or flight characteristics of the aircraft and would normally require major repair or replacement of the affected component. Finally Annex 13 specifies that an accident has occurred if the aircraft is missing or completely inaccessible.

Annex 13 defines a serious incident as an occurrence involving circumstances indicating that an accident nearly occurred. It states the difference between an accident and a serious incident lies only in the result.

Many States have a designated Air Accident Investigation Authority responsible for determining if an accident or a serious incident occurred and investigating it. In 2014 ICAO will issue a new Annex 13 standard making this a requirement. The purpose of such investigations is to identify the reason(s) it took place so that other, similar, occurrences will be prevented. Once the investigation is complete the Investigation Report is published and made publicly available. Within Europe the investigation of such occurrences is governed by European Union (EU) Regulation 996/2010 which incorporates the Standards and Recommended Practices (SARPS) of Annex 13 into EU law.

Within Ireland the Air Accident Investigation Unit (AAIU) is required by legislation to investigate occurrences that happen in Irish airspace, involve an Irish AOC holder or involve an aircraft on the Irish register. If the AAIU is investigating an occurrence, it formally notifies the IAA together with the states of manufacture and the operator through a formal notification document. Foreign Accident Investigation Authorities may investigate occurrences involving an Irish AOC holder or an Irish registered aircraft if they occur outside Ireland or they may delegate the investigation in part or wholly to the AAIU. If a foreign authority investigates an occurrence they similarly notify the AAIU through a formal notification document. The AAIU in turn notifies the IAA and the Operator(s). Thus the AAIU and the IAA are normally aware of the commencement of an investigation in advance of receiving formal notification and will have engaged with the Operator where necessary.

During the investigation it may transpire the occurrence was not as serious as it first appeared and under these circumstances the investigating authority (AAIU or foreign equivalent) may change the classification from an accident to a serious incident or from a serious incident to an incident. Similarly the classification may be revised upwards. Only the authority investigating the occurrence can change the classification.

The AAIU maintain a database of accidents and serious incidents including those that occurred in Ireland, involved Irish AOC holders or involved aircraft on the Irish aircraft register. The summary of accidents and serious incidents provided within this document has been complied using the AAIU's accident and serious incident database.

Irish Air Operators Certificate (AOC) Holders

An AOC grants an Operator permission to fly an aeroplane or a helicopter for commercial purposes. There are currently 14 AOC holders in Ireland and they differ considerably in terms of the size and type of operation. However, regardless of the type of aircraft or operation the AOC covers, and before an AOC is issued, the Operator is required to have personnel, assets and systems in place to ensure the safety of its employees and the general public.

The five largest AOC holders who provide aeroplane transport are Aer Arann, Aer Lingus, Air Contractors, CityJet and Ryanair. Collectively they conducted 686,399 flights in 2013. This is an increase of over 12,000 flights on 2012 and marks over 13 years of consistent growth for this sector of the Irish aviation industry.

The Irish AOC holders who provide helicopter transport are Bond Air Services Ireland, CHC (Ireland), Executive Helicopters, Irish Helicopters and Starlite Aviation Ireland. These Operators are active within Ireland and some also operate abroad. They conduct commercial air transport operations – both onshore and offshore, carry out search and rescue (SAR) operations and aerial work operations to support inspections of facilities / structures, powerlines, gas pipelines etc. Currently training for SAR operations takes place under an AOC and SAR operations are conducted under an aerial works permission. During 2014 legislation will come into effect so that SAR operations will also take place under an AOC.

The other Irish AOC holders are Airlink Airways, WestAir Aviation, Galway Aviation Services and the National Flight Centre. Airlink Airways and WestAir Aviation provide corporate air transport services and are active within Ireland and also operate abroad. Galway Aviation Services and the National Flight Centre operate Britten-Norman Islanders, Beech and Cessna aeroplanes. These aeroplanes are smaller than those operated by the five main AOC holders and are designed to transport a small number of people and cargo.

Norwegian Air International Ltd. began operating under an Irish AOC on the 12th February 2014, consequently they are not included in the 2013 Annual Safety Performance review. The IAA looks forward to including them in the 2014 Annual Safety Performance Review.

Irish Lease Fleet

The Irish Lease Fleet consists of large transport aircraft registered in Ireland and operated by the holder of an AOC issued by another State. The IAA, under Article 83bis of the Convention on International Civil Aviation, (ICAO), delegates safety oversight of the aircraft to the foreign State that issued the AOC. All 83bis agreements are lodged and registered with the ICAO legal bureau in Montreal. During 2013 IAA SRD continued to monitor the Irish Lease Fleet and their Operators.

Irish Commercial Air Transport - Aeroplanes

The Irish commercial transport industry includes two types of commercial organisations; operators who hold an AOC issued by the IAA and organisations with aeroplanes on the Irish register which they lease to an Operator that holds an AOC issued by a foreign state. All the Irish AOC holders operating aeroplanes over 2,250kg have placed their aircraft on the Irish aircraft register.

Number of accidents and serious incidents

Table 1.1 shows the number of aeroplanes on the IAAs aircraft register at the end of each year as well as the number of Annex 13 accidents, fatal accidents and serious incidents to Irish registered aeroplanes over 2,250kg involved in commercial air transport. The tragic accident that occurred at Cork airport during 2011 and sadly resulted in the loss of six lives is not included in Table 1.1 as the Operator did not hold an AOC issued by the IAA and the aeroplane was not on the Irish aircraft register.

Between the Irish lease fleet and the Irish AOC holders there were 745 large commercial aeroplanes on the Irish aircraft register on the 31st December 2013. This is a slight increase in the number of aeroplanes that were on the Irish register on the 31st December 2012.

Over the four years considered none of the aeroplanes in the Irish lease fleet or those operated by an Irish AOC holder have been involved in an accident which resulted in a fatality.

Aeroplanes operated by Irish AOC holders and aircraft in the Irish registered lease fleet have been involved in 17 accidents over the last four years, three of which occurred in 2013. The majority of these involved passengers disembarking the aeroplane or occurred while the aeroplane was on the ground and either taxiing or manoeuvring onto the stand. Accidents that occur under these circumstances can result in injuries to passengers and crew or require significant repairs to the aeroplane.

The Irish registered lease fleet and aeroplanes operated by Irish AOC holders have been involved in 84 serious incidents over the last four years, 18 of which occurred during 2013. This is a reduction on the number reported during 2012.

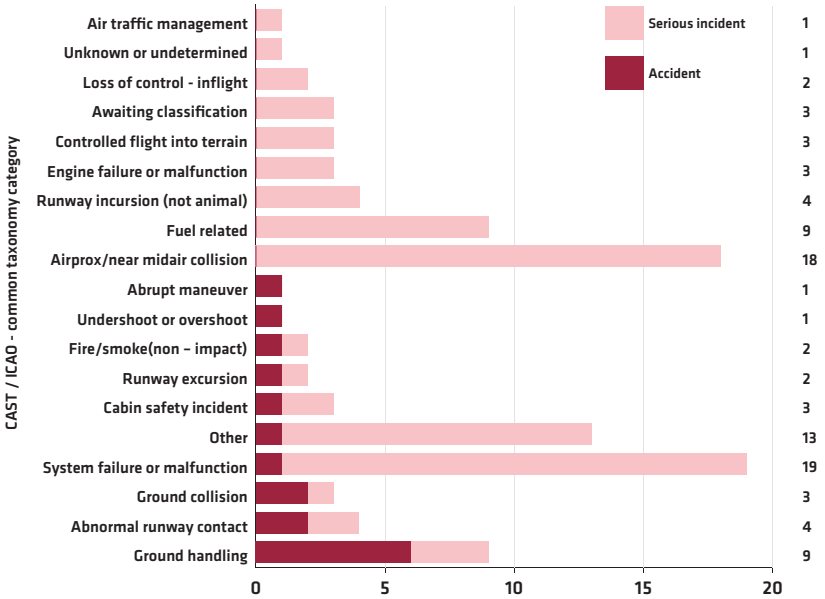
Table 1.1: No. of accidents, fatal accidents and serious incidents involving Irish registered aeroplanes over 2,250kg

Year	Total Registered in Ireland	Accidents			Serious Incidents
		Non-fatal	Fatal	Total	
2010	617	3	0	3	13
2011	670	4	0	4	24
2012	739	7	0	7	29
2013	745	3	0	3	18
Total	**-**	**17**	**0**	**17**	**84**

Categorization of Accidents and Serious Incidents

The AAIU or a foreign Accident Investigation Authority assigns a CAST / ICAO - common taxonomy category to Annex 13 accidents and serious incidents to assist in identifying safety issues. In some cases the categories do not indicate the cause of the event, rather the end result in a chain of events. Figure 1.1 summarises the categories assigned to the 17 accidents and 84 serious incidents that took place between 2010 and 2013.

Figure 1.1: AAIU classification of the Annex 13 occurrences according to type



From Figure 1.1 it is clear the most common causes of accidents were 'Ground handling', 'Abnormal runway contact' and 'Ground collision'.

'Ground handling' was associated with six accidents. It describes a wide variety of occurrences that may take place during or as a result of ground handling operations. Accidents classified as such include collisions that occur while servicing, boarding, loading or manoeuvring the aeroplane or occurrences that cause serious or fatal injuries to people from propeller / fan blade strikes or jet blast.

'Abnormal runway contact' was associated with two accidents. It describes any landing or take-off involving abnormal contact with the runway or landing surface. It is normally the end result in a chain of events, such as an unstabalised approach. Hard, long, fast, off centre and crabbed landings are included in this category as well as nose wheel first touchdowns, tail strikes and wing tip strikes.

There were two 'Ground collision' accidents. This describes a collision while taxiing to or from a runway that is in use. Collisions that occur on the runway are not included in this category. The collision can involve two aeroplanes or involve one aeroplane and a person, animal, ground vehicle, obstacle, building or structure.

The most common causes of serious incidents were 'System failure or malfunction', 'Airprox / near mid-air collision' and 'Other'.

The most common type of serious incident was 'System failure or malfunction'. This describes the failure or malfunction of components on-board the aeroplane that were not associated with the engine. EASA do not release the number of serious incidents however they identified this taxonomy as a factor in 40 accidents between 2003 and 2012, making it the third most frequently assigned taxonomy to accidents.

An 'Airprox or near mid-air collision' occurs when there is a significant loss of separation between two or more airborne aeroplanes. Occurrences of this nature that escalate into an accident are very rare within Europe and Irish AOC holders have never been involved in an accident caused by an Airprox. Commercial aircraft operating within Europe must be fitted with advance warning systems that alert the flight crew when there is a loss of separation between their aircraft.

'Other' describes any occurrence that is not covered under an alternative category.

Irish Commercial Air Transport - Helicopters

Another significant sector of the Irish aviation industry is helicopter Operators who hold an IAA issued AOC. This sector consists of Bond Air Services Ireland, CHC (Ireland), Executive Helicopters, Irish Helicopters and Starlite Aviation Ireland. They conduct commercial air transport operations and aerial work operations. In addition CHC also conduct SAR operations.

Number of accidents and serious incidents

Table 1.2 provides statistics on the five helicopter Operators who hold an AOC issued by the IAA. The IAA also oversees commercial helicopter activity carried out in Irish territory when the Operator holds an AOC issued by a foreign National Authority. Data for these Operators is not included.

Table 1.2: No. of accidents, fatal accidents and serious incidents involving helicopters registered to Irish AOC holders

Year	Total Registered in Ireland	Number of Flights	Accidents			Serious Incidents
			Non-fatal	Fatal	Total	
2010	15	9,820	0	0	0	1
2011	11	10,146	0	0	0	0
2012	11	9,177	0	0	0	0
2013	15	9,514	0	0	0	0
Total	**-**	**-**	**0**	**0**	**0**	**1**

Table 1.2 indicates that on the 31st December 2013 there were a total of 15 helicopters on the Irish aircraft register engaged in commercial air transport or other commercial activity. This is an increase on the number of helicopters on the 31st December 2012.

The number of flights is also provided in the table. A helicopter flight has been defined as a departure and a landing irrespective of where they took place. Hence a helicopter departing an airfield and landing on an off shore oil rig is considered to be one flight and a subsequent flight to another oil rig or the return flight to the airfield is an additional flight. During 2013 these AOC holders conducted over 9,514 flights.

Over the period considered the helicopters operated by the five AOC holders have not been involved in any accidents. During 2010 they were involved in one serious incident. The incident in question was an electrical fire in the cockpit during start-up procedures (prior to take-off) which was caused by a short circuit on one of the electrical connectors on the AC circuit breaker panel. There were no injuries but the helicopter sustained minor damage. It was classified by the AAIU using the CAST / ICAO taxonomy as 'Fire / smoke (non-impact)".

Irish Commercial Air Transport – Corporate Aviation

Another sector of the commercial air transport industry are AOC holders who provide corporate aviation services aimed at the business community. There are currently two Operators who hold an IAA issued AOC to provide this type of service; Airlink Airways and WestAir Aviation. Both Operators have a number of different types of aircraft within their fleet.

Number of accidents and serious incidents

Table 1.3 provides the number of aircraft on the Irish aircraft register engaged in providing corporate aviation services as well as the number of accidents and serious incidents.

Table 1.3: No. of accidents, fatal accidents and serious incidents involving aircraft registered to Irish AOC holders who provide corporate services

Year	Total Registered in Ireland	Accidents			Serious Incidents
		Non-fatal	Fatal	Total	
2010	10	0	0	0	1
2011	9	0	0	0	0
2012	6	0	0	0	0
2013	8	0	0	0	0
Total	**-**	**0**	**0**	**0**	**1**

Table 1.3 indicates on the 31st December 2013 there were a total of eight aircraft on the Irish aircraft register engaged in providing corporate aviation services. This is an increase of two aircraft since the 31st December 2012. Over the period considered the aircraft operated by these AOC holders have not been involved in any accidents.

During 2010 they were involved in one serious incident. The occurrence in question involved the loss of cabin pressure mid-flight. There were no injuries or damage to the aircraft as a result of the occurrence. It was classified by the AAIU using the CAST / ICAO taxonomy as 'System/component failure or mal-function [non-powerplant]'. Components not associated with the aircrafts engine are described as 'non-powerplant'.

Irish Commercial Air Transport – Flying Light Aircraft

The Irish AOC holders who provide helicopter transport are Bond Air Services Ireland, CHC (Ireland), Executive Helicopters, Irish Helicopters and Starlite Aviation Ireland. These Operators are active within Ireland and some also operate abroad. They conduct commercial air transport operations and aerial work operations. In addition CHC also conduct SAR operations.

A Transaero Boeing 767 flies over Dublin during FlightFest, the Irish Aviation Gathering

Brian McCarthys' 'Highly Commended' entry to the IAAs FlightFest Art Competition.

Drawing by Brian McCarthy, 'Category 3' Entrant.

03 Mandatory Occurrence Reporting by Irish AOC Holders

Under S.I. No. 285 of 2007 European Communities (Occurrence Reporting in Civil Aviation) Regulation 2007 'persons involved in Commercial Air Transport must report any occurrence which affects, or is likely to affect, the safety of the aircraft to the relevant oversight authority'. The report submitted is called a Mandatory Occurrence Report (MOR) and Operators submit reports to the IAA via the Safety Occurrence Tracking System (SOTS). The MOR's provide an account of what happened as well as other relevant details such as the weather and phase of flight at the time of the occurrence.

Since January 2011 IAA SRD has received 16,038 MORs from all sectors of the aviation industry, over 94% of which described incidents where the safety barriers were effective and there was no credible scenario in which an accident could occur. This section provides an analysis of the MOR reports submitted by Irish AOC holders according to the following two types of aircraft: aeroplanes and helicopters.

ARMS Methodology

Once an MOR is submitted by an Operator an IAA SRD Inspector uses the Airline Risk Management Solutions (ARMS) methodology to assess the safety risk associated with the incident. The purpose of this is to identify occurrences associated with an elevated safety risk so that the area may be targeted. The ARMS risk matrix assigns a risk score by assessing the effectiveness of the remaining barriers between what transpired and the most credible accident outcome if the incident had escalated. All types of potential outcomes are considered, from those with no potential injury to those onboard and no damage to the aircraft to multiple fatalities and the loss of the aircraft.

The risk matrix assigns 1 of 13 risk scores between 1 and 2,500 to the occurrence. Figure 2.1 demonstrates how a score is assigned. Further information on ARMS can be found on Skybrary at www.skybrary.aero/index.php/ARMS_Methodology_for_Risk_Assessment

A score of between 1 and 10 indicates there was a low safety risk, a score of between 20 and 102 indicates there was an elevated safety risk and a score of 500 or over indicates it was a high risk occurrence.

Figure 2.1: The ARMS Risk Matrix quantifies the risk associated with individual occurrences

Question 2			
What was the effectiveness of the remaining barriers between this event and the most credible accident scenario?			
Effective	Limited	Minimal	Not Effective
50	102	502	2500
10	21	101	500
2	4	20	50
1			

Question 1	
If this event had escalated into an accident outcome, what would have been the most credible outcome?	
Catastrophic Accident	Loss of aircraft or multiple fatalities (3 or more)
Major Accident	1 or 2 fatalities, multiple serious injuries, major damage to aircraft
Minor Injuries or Damage	Minor injuries, minor damage to aircraft
No accident outcome	No potential damage or injury could occur

Typical Accident Scenarios
Loss of control, mid air collision, uncontrollable fire on board, explosions, total structural failure of the aircraft, collision with terrain
High speed taxiway collision, major turbulence injuries
Pushback accident, minor weather damage
Any event which could not escalate into an accident, even if it may have operational consequences (e.g. diversion, delay, individual sickness)

Mors and Irish AOC Holders Operating Aeroplanes

The five largest Irish AOC holders operating aeroplanes are Aer Arann, Aer Lingus, Air Contractors, CityJet and Ryanair. Table 2.1 summarises the number of MORs these Operators submitted annually over the past three years, the number of flights flown each year and the annual reporting rate per 1,000 flights.

Table 2.1: Statistics on MORs submitted by the five main Irish AOC holders who operate aeroplanes

Year	2011	2012	2013	Total
No. Reports	4,420	5,477	5,971	15,868
No. Flights (Sectors)	663,375	674,062	686,399	2,023,836
Reporting rate per 1,000 sectors	6.66	8.13	8.70	7.84

Between 2011 and 2013 the main Operators conducted over two million flights and the number of flights they operated annually rose from 663,375 to 686,399. Over the same period they submitted 15,868 MORs; 5,971 of which related to occurrences that took place during 2013. This may seem like a large number however less than 1% of flights were the subject of an MOR and 95% of the MORs described incidents where all the safety barriers were effective and there was no credible scenario in which an accident could occur. The next subsection provides further detail on the safety risk associated with the MORs IAA SRD received.

The reporting rate during 2013 increased for the second consecutive year to 8.70 reports for every 1,000 sectors flown. The increase in the reporting rate should be viewed in a positive light as it indicates a strong reporting culture, one of the main indicators that Irish Operators have a mature Safety Management System (SMS) in place.

During 2013 the IAA volunteered to resurvey the MOR reporting rates of Operators who hold an AOC issued by an EASA Member State (MS). The IAA, with the assistance of Mr. John Franklin, EASA, distributed the survey questionnaire to members of the Network of Analysts (NoA). A total of thirteen EASA MS participated in the survey and consequently reporting rates for 83 AOC holders were available. The results of the survey indicated that, compared to other participating states, Ireland has a strong reporting culture.

Occurrence reporting rates and ARMS score

As previously outlined the risk matrix assigns a score of between 1 and 2,500 to the occurrence. A score of between 1 and 10 indicates there was a low safety risk, a score of between 20 and 102 indicates there was an elevated safety risk and a score of 500 or over indicates it was a high risk occurrence. Table 2.2 summarises the number of MORs received each year according to ARMS score. The percentage of reports assigned to each ARMS score is also provided for convenience. These calculations do not take into account the number of flights conducted and less than 1% of flights were the subject of an MOR.

Over the last three years 95% of MORs the IAA received were assigned an ARMS score of 10 or less. This indicates the MORs described situations where there was no credible accident outcome and all the safety barriers were effective.

Over the same period 5% (742) of occurrences described situations where the ARMS score was between 20 and 102, indicating there was an elevated safety risk. The main Irish AOC holders operated over two million flights during this time and less than 0.04% of these flights were involved in an MOR with an ARMS score of between 20 and 102. There were a total of 21 occasions over the three years where an ARMS score of 500 or over was allocated, indicating there was a high safety risk. Less than 0.001% of the flights the main Irish AOC holders operated were involved in one of these occurrences. When an elevated or high risk occurrence takes place the IAA SRD Inspectors assigned to the Operator work closely with the Operator and will oversee the Operators investigation, the purpose of which is to ensure a similar situation does not arise by taking appropriate steps such as revising safety procedures.

Table 2.2: Statistics on MORs received from the main Irish AOC holders who operate aeroplanes

ARMS Score	2011		2012		2013		ARMS Score Total	
No. Reports	No.	%	No.	%	No.	%	No.	%
ARMS: 1 - 10	4,284	97%	5,212	95%	5,609	94%	15,105	95%
ARMS: 20 - 102	128	3%	255	5%	359	6%	742	5%
ARMS: 500 - 2,500	8	<1%	10	<1%	3	<1%	21	<1%
Annual Total	4,420	100%	5,477	100%	5,971	100%	15,868	100%

Occurrence Types Reported between Jan. 2011 and Dec. 2013

As well as using the ARMS methodology to assess the safety risk associated with the occurrence an IAA SRD Inspector categorises the type of event that took place. Figure 2.2 summarises the classification and ARMS score assigned to the 15,868 MORs submitted between Jan. 2011 and Dec. 2013. During this period the five main AOC holders conducted over two million flights.

From Figure 2.2 it is clear the most common causes of occurrences were 'System Failure or Malfunction', 'Birdstrike' and 'Cabin Safety Incidents'.

The most common type of occurrence reported was 'System Failure or Malfunction', which describes the failure or malfunction of components on-board the aircraft that were not associated with the engine. Approximately 95% of these reports were assigned an ARMS score of 10 or less indicating there was a low safety risk to the aircraft or those aboard.

The second most common type of occurrence was 'Birdstrike'. This category captures the possible or actual collision of an aircraft with one or more birds. Birdstrikes usually occur either on approach to, or takeoff from, an airport and can cause a great deal of damage.

The third most commonly reported type of occurrence was 'Cabin Safety Incidents', which describes miscellaneous occurrences in the passenger cabin. It includes passengers engaging in disruptive or inappropriate behaviour, smoking in the toilets, issues with the interphone or cabin procedures not being adhered to.

Occurrence Types Reported during 2013

During 2013 the five largest Irish AOC holders logged 5,971 MORs through the IAAs SOTS system. Figure 2.3 summarises the classification and ARMS score assigned to these MORs. The order of the classification categories reflects that used in Figure 2.2 to facilitate comparing the graphs.

When MORs for 2011, 2012 and 2013 were grouped the three most commonly reported occurrences were 'System failures or malfunctions', 'Birdstrikes' and 'Cabin safety incidents'. During 2013 the three most commonly reported occurrences were 'System failures or malfunctions', 'Passenger illness or injury' and 'Birdstrikes'.

The most common type of incident reported was 'System failures or malfunctions', which describes the failure or malfunction of components on-board the aircraft that were not associated with the engine. Over 97% of these MORS were assigned an ARMS score of 10 or lower.

The second most commonly reported type of incident was 'Passenger illness or injury'. These occurrences take place in the passenger cabin and involved passenger illness or injury. These types of incidents do not jeopardise the overall safety of the aircraft.

The third most commonly reported occurrence was 'Birdstrike'. This category captures the possible or actual collision of an aircraft with one or more birds.

Figure 2.2: No. of times each occurrence category was assigned during 2011, 2012 and 2013 for the 5 main AOC holders (ARMS score included)(The five main AOC holders conducted over 2 million flights during this period)

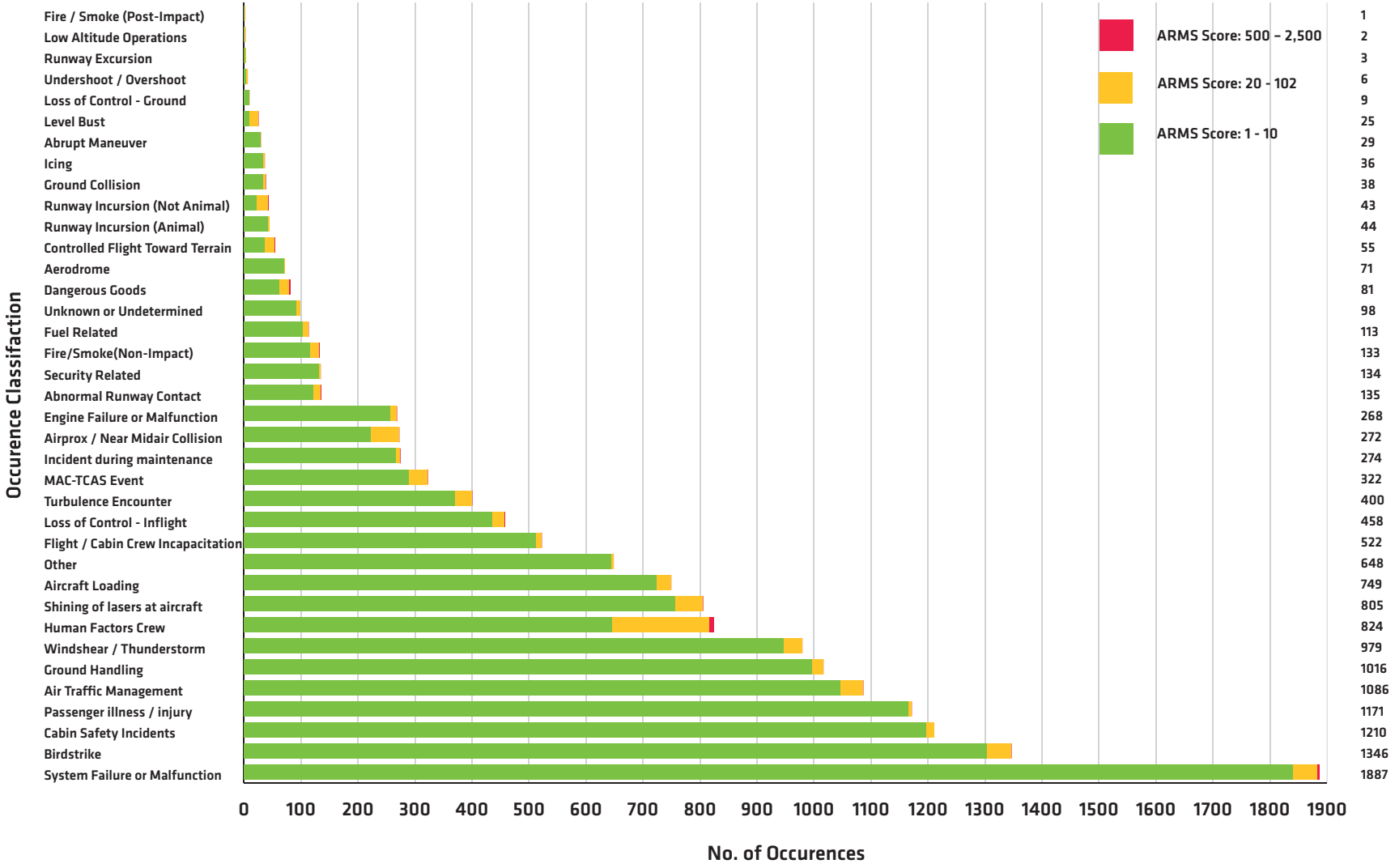
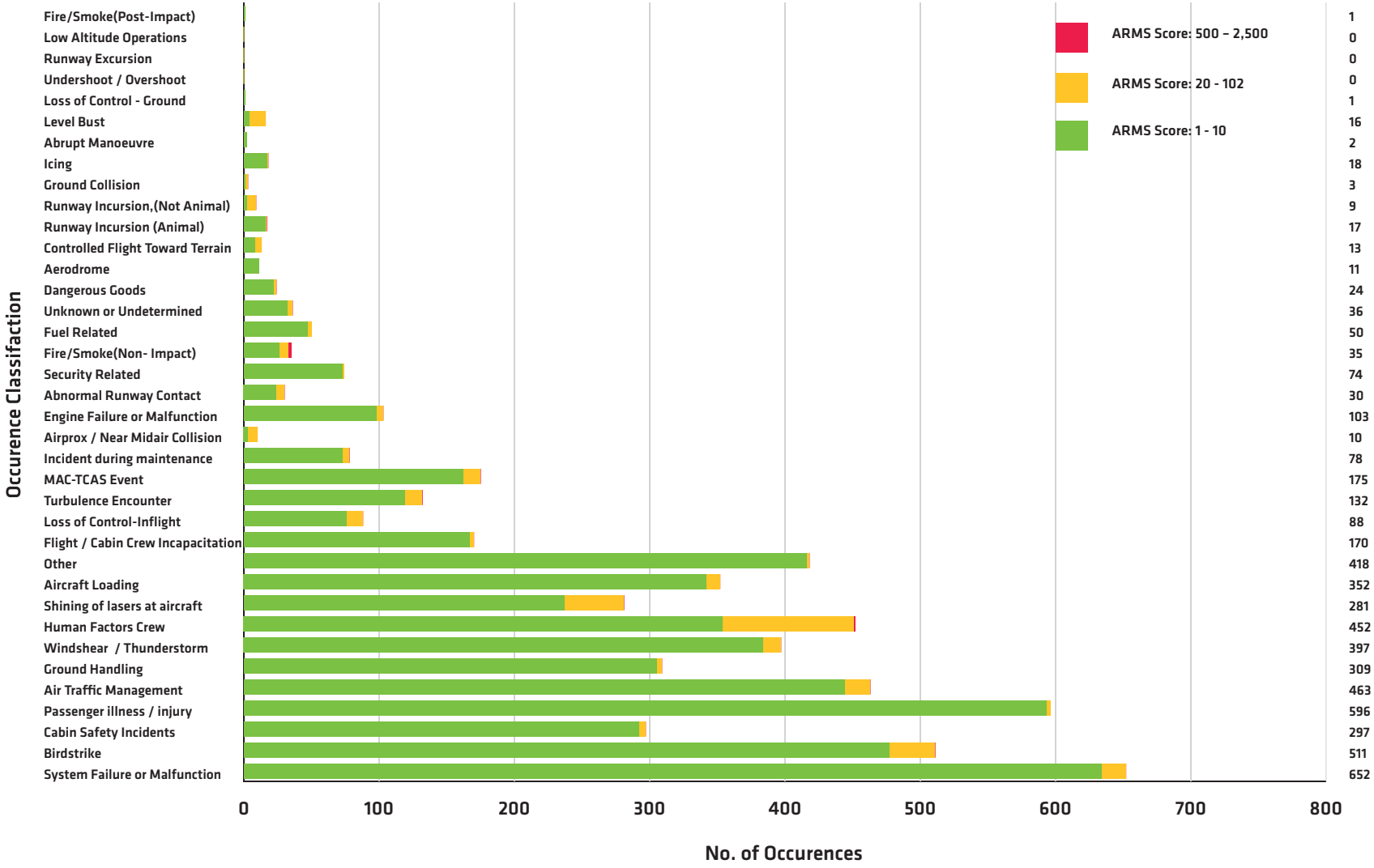


Figure 2.3: No. of times each occurrence category was assigned during 2013 for the 5 main AOC holders (ARMS score included)
(The 5 largest AOC holders conducted 686,399 flights in 2013)



Risk bearing occurrences during 2011, 2012 and 2013

Between Jan. 2011 and Dec. 2013 the five main AOC holders conducted over two million flights and submitted 763 MORs which were assigned an ARMS score of 20 or greater. Figure 2.4 summarises the event classification and ARMS score assigned to these MORs.

From Figure 2.4 it is clear the most common types of risk bearing occurrences were 'Human Factors Crew', 'Airprox or near mid air collision' and 'Shining of lasers at aircraft'.

The most regularly occurring risk bearing occurrence was 'Human Factors Crew'. This category describes occurrences that were initiated through crew error, for example entering information incorrectly into the Flight Management System (FMS) or using an incorrect flap setting during landing or take-off. 'Human Factors Crew' occurrences have been identified as one of the main safety concerns within the EU and further afield. During 2013 the Safety Analysis Group conducted an extensive analysis of all risk bearing human factors occurrences that occurred during 2012 and involved the main Irish AOC holders. The analysis identified the main reasons for the occurrence were poor execution, breach of cockpit procedures, crew / technology interface and a lack of communication between the cockpit crew. Other findings have been fed back to the Irish AOC holders through IAA SRDs Flight Operations Department.

The second most common risk bearing occurrence was 'Airprox or near mid air collision'. This occurs when there is a significant loss of separation between two or more aircraft. Occurrences resulting in a mid-air collision are very rare within Europe and Irish AOC holders have never been involved in one that escalated into an accident.

The third most regularly occurring risk bearing occurrence was 'Shining of lasers at aircraft'. These are optical devices that produce a very highly concentrated beam of light in a single colour. The more serious side-effects reported by pilots' include flash blindness, glare and being distracted

2013 risk-bearing occurrences

During 2013 a total of 362 occurrences reported by the five main AOC holders were allocated an ARMS score of 20 or greater. Figure 2.5 summarises the classification and ARMS score allocated to these occurrences. The classification order on the vertical axis reflects that of Figure 2.4 to facilitate an easy comparison between the two graphs.

When MORs received during 2011, 2012 and 2013 was pooled the most commonly reported risk bearing occurrences were 'Human factors crew', 'Airprox / near mid air collision' and 'Shining of laser at aircraft'. The most commonly reported risk bearing occurrences during 2013 were 'Human factors crew', 'Shining of laser at aircraft' and 'Birdstrikes'.

The most regularly occurring risk bearing occurrence during 2013 was 'Human Factors Crew'. As previously stated it describes incidents that were initiated through crew error. During 2013 the Safety Analysis Group conducted an extensive analysis of all risk bearing human factors occurrences involving Irish AOC holders that occurred during 2012. The most common effect of the occurrence on the flight was a hard landing, the activation of the EGPWS warning system within the cockpit, a go-around or an unstable approach. In all cases the flight crew took the appropriate action to prevent the occurrence escalating into an accident. All Irish Operators have integrated Human Factors Principles into their training programmes.

The second most regularly occurring risk bearing occurrence during 2013 was 'Shining of laser at aircraft'. These are optical devices that produce a very highly concentrated beam of light in a single colour.

The third most common type of risk-bearing occurrence reported by Irish AOC holders were 'Birdstrikes'. This category was the third most commonly reported type of incident when all occurrences that took place during 2013 were analysed.

Figure 2.4: No. of times each occurrence category was assigned to risk bearing MORs for the 5 main AOC holders (2011, 2012 & 2013)
(The 5 largest AOC holders conducted over 2 million flights during this period)

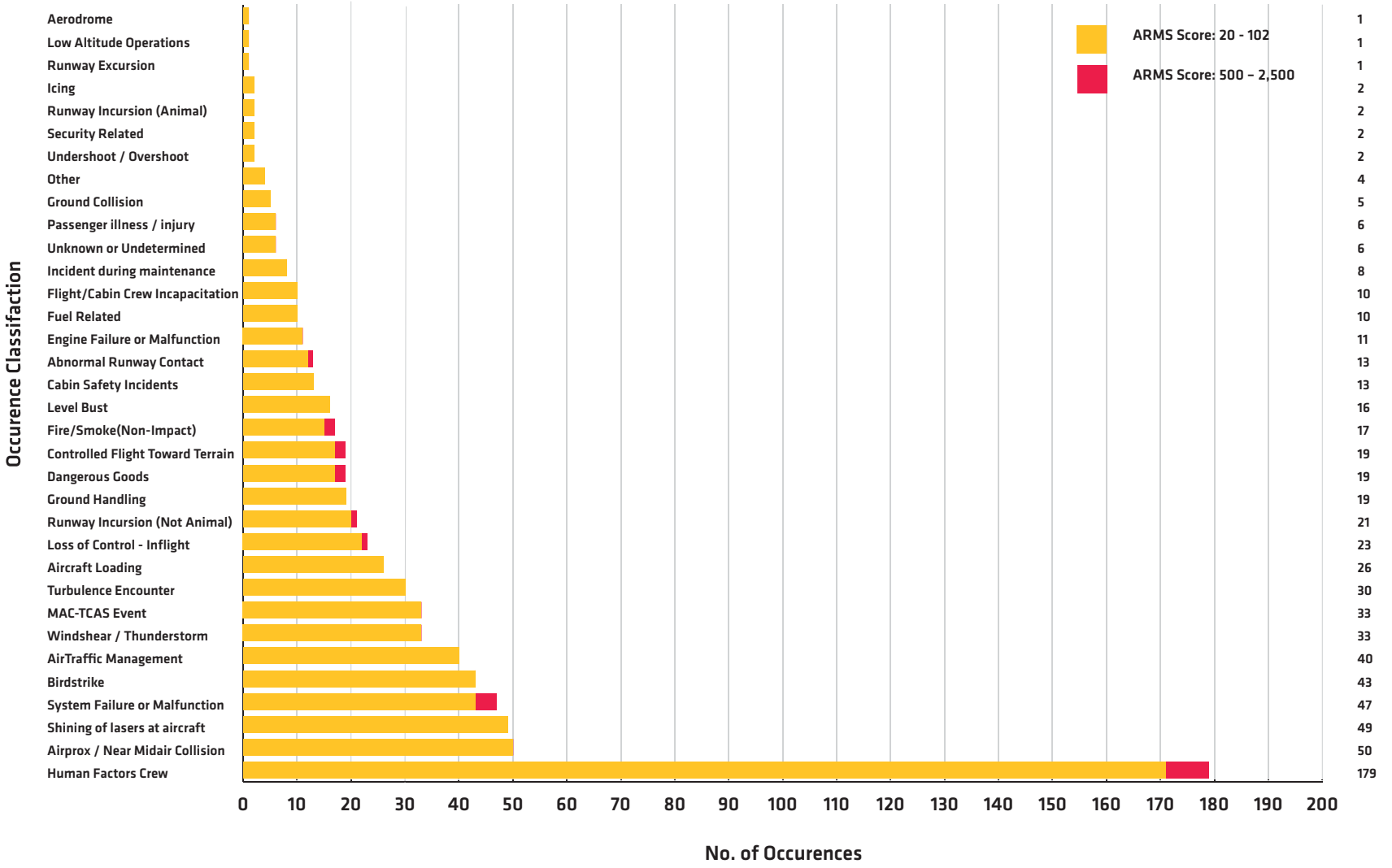
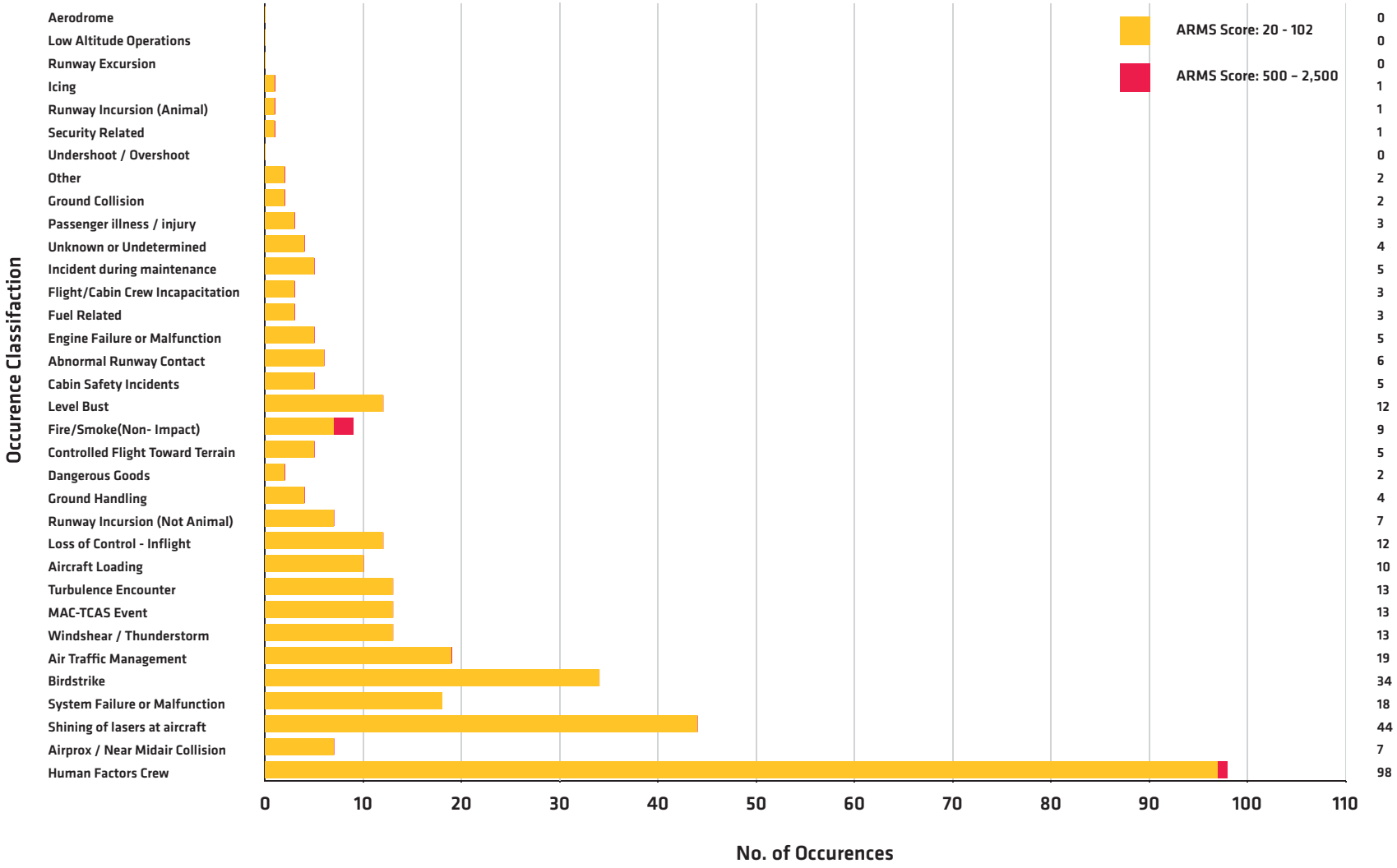


Figure 2.5: Categorisation of risk bearing MORs which occurred during 2013 for the 5 main AOC holders
(The five main AOC holders conducted 686,399 flights during 2013)



MORs and Irish AOC Holders Operating Helicopters

Occurrence reports during 2013

The five Irish AOC holders providing helicopter transport services are Bond Air Services Ireland, CHC (Ireland), Executive Helicopters, Irish Helicopters and Starlite Aviation Ireland. Table 2.3 summarises the number of MORs they submitted and flights they conducted over the last three years as well as the associated reporting rate per 1,000 flights.

Table 2.3: Occurrence reporting rate per 1,000 sectors flown by the main Irish helicopter AOC holders

Year	2011	2012	2013	Total
No. Reports	20	46	100	166
No. Flights (Operations)	10,146	9,177	9,514	28,837
Reporting rate	1.97	5.01	10.51	5.76

Table 2.3 indicates the helicopter AOC holders submitted 166 occurrence reports and conducted 28,837 flights over the three year period considered. The helicopter AOC holders submitted a much smaller number of MORs than aeroplane AOC holders. This reflects the number of helicopter flights is much smaller and the operating environments differ significantly. Over the three year period considered the occurrence reporting rate increased steadily, from 1.97 to 10.51 MORs per 1,000 flights.

Occurrence Types Reported during 2013

When IAA SRD receives an MOR an Inspector classifies the type of occurrence that took place and uses the ARMS methodology to assess the safety risk associated with the occurrence. The purpose of assigning a classification and ARMS score is to identify emerging safety concerns.

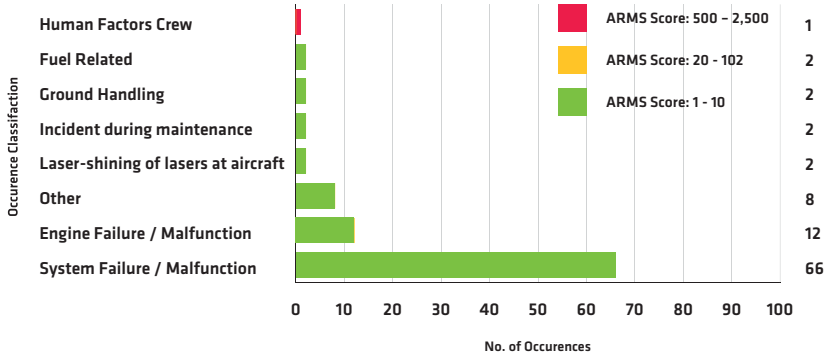
system failure could jeopardise the safety Figure 2.6 summarises the types of occurrences that took place during 2013 and the associated ARMS score.

The most common classification assigned to MORs which took place during 2013 was 'System failure or malfunction', which captures the failure or malfunction of components on-board the helicopter that are not associated with the engine. None of these occurrences received an ARMS score of greater than 10, indicating they were low risk occurrences and there were no circumstances under which the system failure could jeopardise the safety of the aircraft or those on board.

The second most common type of classification was 'Engine failure or malfunction' which described the failure or malfunction of components associated with the engine. Most of the occurrences detailed the illumination of a warning light in the cockpit associated with the operation of the engine. In most cases the warning was spurious and the engine was operating normally.

The third most common classification assigned to the MORs was 'Other'. This classification captures occurrences that do not fit under an alternative category. None of the eight occurrences that were categorised as 'Other' describes situations which posed a safety risk to the helicopter or those on-board.

Figure 2.6: Categorization of MORs which occurred during 2013 for the AOC holders operating helicopters



MORs and Irish AOC Holders Providing Corporate Aviation Services

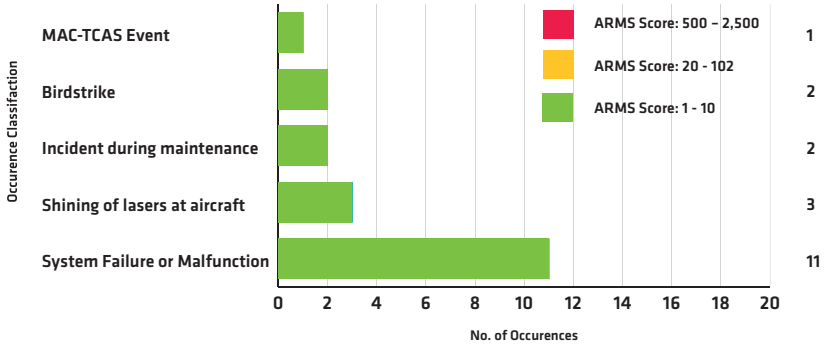
Occurrence reports during 2013

The Irish AOC holders providing corporate transport services are Airlink Airways and WestAir Aviation. During 2013 these AOC holders submitted 19 MORs. The relatively low number of MORs reflects the small number of aircraft operating within this sector of the Irish aviation industry.

Occurrence Types Reported during 2013

Figure 2.7 summarises the types of occurrences that took place during 2013 and the associated ARMS score. From the graph it is clear none of the MORs were assigned an ARMS score of greater than 10.

Figure 2.7: Categorization of MORs which occurred during 2013 for the AOC holders providing corporate services



From Figure 2.7 it is clear the most common occurrences were 'System failure or malfunction', 'Shining of laser at aircraft' and 'Incident during maintenance'.

The most common classification assigned to MORs which took place during 2013 was 'System failure or malfunction', which captures the failure or malfunction of components on-board the aircraft that are not associated with the engine. None of these occurrences received an ARMS score of greater than 10, indicating they were low risk occurrences and there were no circumstances under which the system failure could jeopardise the safety of the helicopter or those on board.

The second most regularly occurring risk bearing occurrence during 2013 was 'Shining of laser at aircraft'. Lasers are optical devices that produce a very highly concentrated beam of light in a single colour.

The third most common classification assigned to the MORs was 'Incident during maintenance'. This classification includes major damage to aircraft, unreported damage and major failures to safety critical systems found during maintenance. It also includes serious occurrences relating to the performance of maintenance, including Human Factors issues.

Donegal airports runway and approach lights.

04 Irish Aerodromes and Air Navigation Services

There are two types of aerodrome in Ireland, those that are licenced for public use and those that are licenced for private use. Aerodromes licensed for private use accept aircraft engaging in aerial work and other aviation activities, such as general aviation flight training, but not aircraft engaged in commercial air transport. Aerodromes licensed for public use accept aircraft engaged in commercial air transport operations as well as aircraft engaging in aerial work and other aviation activities such as general aviation flight training.

Safety requirements for aerodromes are not based around the type of licence held; instead they are in proportion to the type of aircraft that use it and other considerations (such as whether night or low visibility operations are permitted there). The principal difference between the two types of aerodromes is those with a licence for public use must be available to all aircraft on equal terms and conditions and must be open during promulgated hours, whereas using a private aerodrome is subject to the prior permission of the licensee. There are 28 licenced aerodromes in Ireland, 13 for private use and 15 for public use. This section provides information on the principle aerodromes that were licenced for public use between the 1st January 2010 and 31st December 2013. These were Cork, Donegal, Dublin, Galway, Ireland West, Kerry, Shannon, Sligo and Waterford aerodromes.

Accidents and serious incidents

The Irish AAIU use ICAO Annex 13 to determine if an accident or serious incident has occurred within Ireland. Further information on the definitions of both types of event and the AAIU was provided in the section entitled 'Irish Commercial Air Transport – Aeroplanes and Helicopters'. Table 3.1 summarises the number of accidents and serious incidents involving commercial air transport at the principal aerodromes licenced for public use in Ireland, as well as the number of flight hours and aircraft flights the aerodromes recorded since 2010. Accidents and serious incidents involving commercial aircraft that are on the Irish aircraft register, a foreign aircraft register, held an AOC issued by the IAA or by a foreign Aviation Authority are included in the table. Consequently some of the events included here are also included in the section on Irish Commercial Air Transport. Accidents and serious incidents involving aircraft engaged in general aviation are not included (unless there was a second aircraft, engaged in commercial air transport, involved in the same incident).

Table 3.1: Airport flights and flight hours as well as accidents, fatal accidents and serious incidents to commercial air transport at the main Irish aerodromes licenced for public use

Year	Irish Airport Flights (Arrivals & Departures)	Flight Hours in Irish Airspace	Accidents			Serious Incidents
			Non-Fatal	Fatal	Total	
2010	207,552	220,904	0	0	0	2
2011	207,586	261,671	1	1	2	2
2012	207,192	263,974	1	0	1	2
2013	229,983	267,860	1	0	1	2
Total	**-**	**-**	**3**	**1**	**4**	**8**

Airport flights describe the number of aircraft that land and depart at an aerodrome. Flight hours for every aircraft that enters Irish airspace are calculated from the flight plan as the difference between the aircrafts entry and exit time in the controlled airspace of the flight trajectory. En-route traffic which passes through Irish airspace but does not land (overflight traffic) as well as aircraft that land or depart from an Irish airport (terminal traffic) are included. From the table it is clear that the number of flights and flight hours rose during 2013.

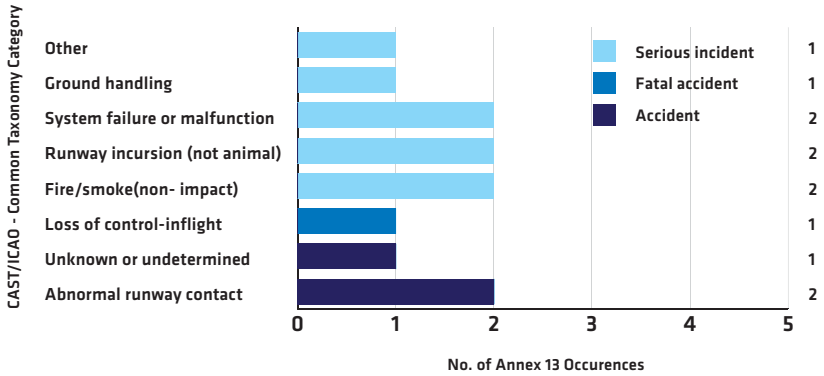
There were four accidents over the four year period considered and tragically one of these resulted in fatalities. The fatal accident, involving a foreign AOC holder, occurred at Cork airport during 2011. There were 12 individuals on board the aircraft and sadly six lives were lost. Of the six people who survived the accident four suffered serious injuries and two suffered minor injuries. It is the first fatal accident involving a commercial aircraft at an Irish aerodrome since 1976. The AAIU have published the findings of their investigation in a formal, final, report that is available on their website (report reference no. 2014-001). Three preliminary reports on the accident are also available (report reference no's 2011-005, 2012-003 and 2013-002).

There were eight serious incidents over the same period, two of which occurred during 2013.

Categorization of accidents and serious incidents

The Irish AAIU assigns one of the CAST / ICAO common taxonomy categories to the accident or serious incident. The purpose of this is to assist in identifying safety issues. In some cases the category describes the end result in a chain of events rather than the cause. Figure 3.1 summarises the categories assigned to the four accidents and eight serious incidents that took place between 2010 and 2013. It is clear from the graph there isn't a single common cause of occurrences classified as an accident or serious incident.

Figure 3.1: CAST / ICAO classification of Annex 13 occurrences which took place at the main Irish aerodromes licenced for public use



The ESARR2 Severity Classification Scheme

Air Traffic Service (ATS) providers are subject to S.I. No. 285 of 2007 and must submit an MOR to IAA SRD if an occurrence which affects, or is likely to affect, the safety of the aircraft takes place. Once an MOR is submitted to IAA SRD an SRD Inspector classifies the type of occurrence and associated safety risk. The purpose of this is to identify safety issues and target occurrences associated with an elevated safety risk for further investigation.

The safety risk associated with the occurrence is assessed in accordance with the ESARR 2 Severity Classification Scheme described in Table 3.2. The IAA adheres to EUROCONTROLs guidance material on how to implement the scheme.

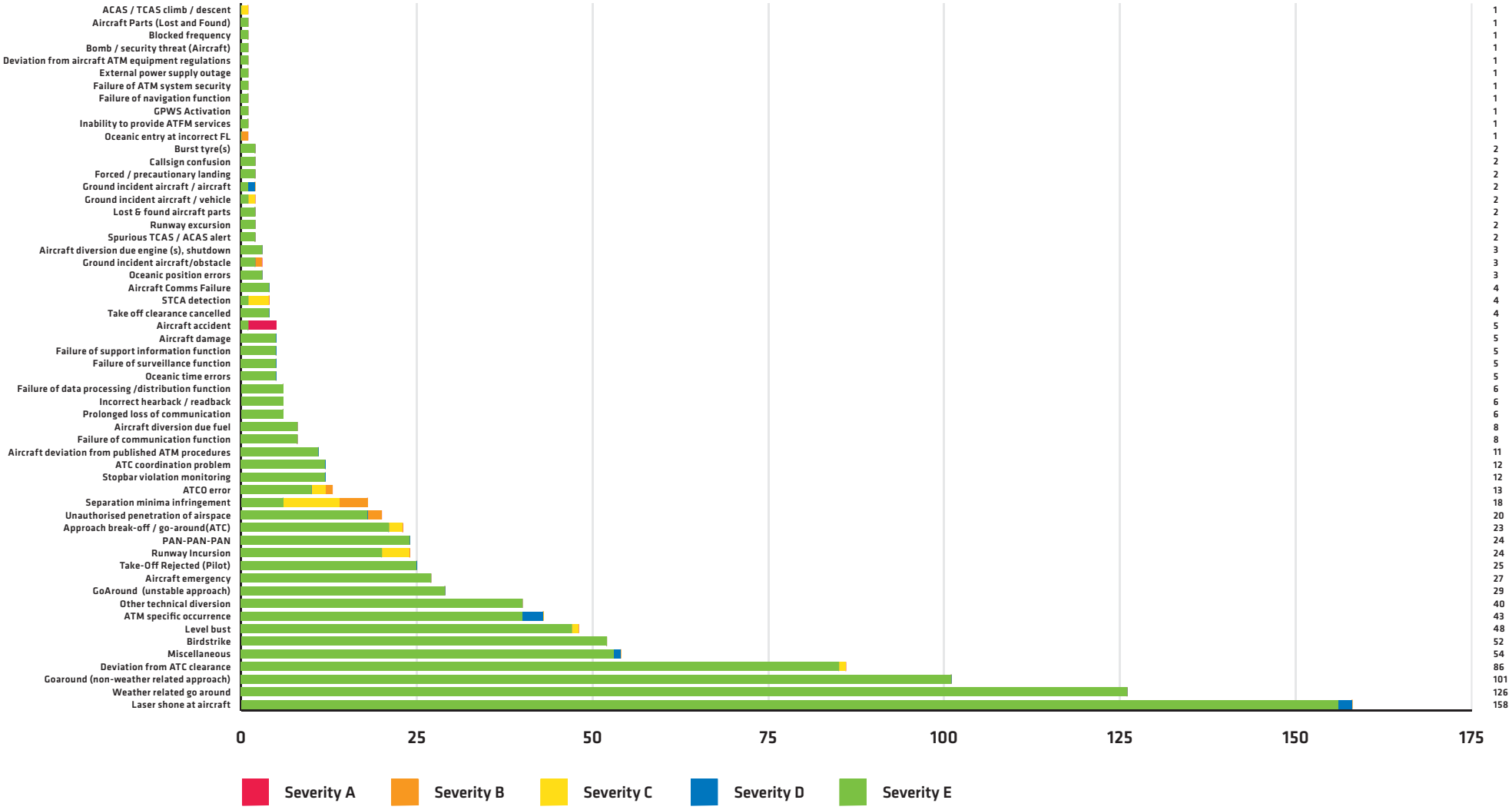
Table 3.2: Summary of ESARR 2 Severity Classification Scheme

Severity Class	Severity A	Severity B	Severity C	Severity D	Severity E
Definition	Serious Incident	Major Incident	Significant Incident	Not Determined	No Safety Effect

Mandatory Occurrence Reporting in Air Traffic Services (ATS)

During 2013 the ATS providers at the principal aerodromes submitted 1,162 MORs to IAA SRD. The topics ATS reported on are diverse and range from aircraft performing go-arounds due to adverse weather or an unstable approach, to aircraft requiring a priority landing due to a sick passenger or technical issues with communication systems / landing aids. Figure 3.2 summarises the occurrence classification and ESARR 2 severity score assigned to the MORs.

Figure 3.2: Occurrence classification of MORs submitted by ATS during 2013 and their associated ESARR2 severity score



The three issues most regularly reported were 'Laser shone at aircraft', 'Weather related go around' and 'Aircraft technical problem'. The most common occurrence submitted by ATS was 'Laser shone at aircraft'. Pilots usually notify ATS of a laser light being aimed skyward or targeting their aircraft. Pilots of both commercial aeroplanes and helicopters have reported being targeted by laser beams. Some of the MORs ATS filed relate to laser attacks on the Garda Air Support Unit. These helicopters are operated by the Irish Air Corps who are outside the IAAs remit, however the MOR's are included in the data as they were notified to the ATS provider.

The second most common occurrence reported by ATS was a 'Weather related go-around'. Many of these reports indicate there was a sudden change in wind velocity that would make continuing the approach unsafe and so a go-around was performed.

The third most common occurrence reported by ATS is 'Aircraft technical problem'. The flight crew notify ATS if they suspect a component onboard the aircraft has failed which may impact the flight plan or otherwise effect ATS.

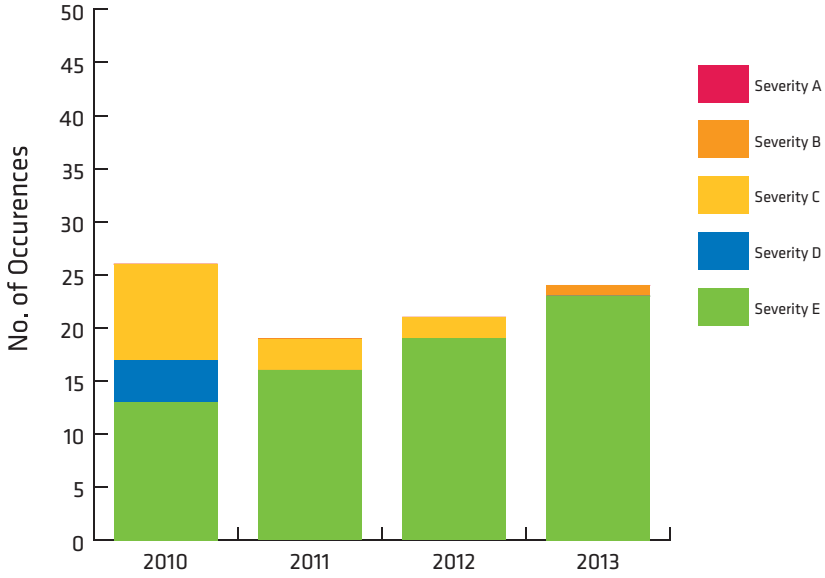
Key Safety Indicators (KSIs)

ICAO defines safety indicators as "the parameters that characterise and / or typify the level of safety of a system". EUROCONTROL has identified the following occurrences as having the potential to cause or contribute to an accident or serious incident within European Airspace; separation minima infringements, level busts, deviation from ATC clearance, runway incursions and airspace infringements. As part of the State Safety Programme (SSP) the IAA has adopted these occurrences as KSIs for air traffic services at Irish Aerodromes. There are a small number of occurrence reports which describe two KSIs, for example a deviation from ATC clearance may lead to a level bust. In these circumstances both classifications were applied to the occurrence and consequently some occurrences are counted twice in the following summaries. The safety risk attached to the KSIs is assessed in accordance with the ESARR 2 Severity Classification Scheme.

Airspace Infringements

An airspace infringement occurs when an aircraft enters airspace without requesting and obtaining clearance from the authority controlling the airspace in advance of doing so. The majority of incidents recorded involve General Aviation (GA) aircraft, reflecting that whereas most GA VFR flights are conducted outside control areas and zones, some infringements into controlled airspace by GA aircraft do occur.

Figure 3.3: No. of airspace infringements between 2010 and 2013



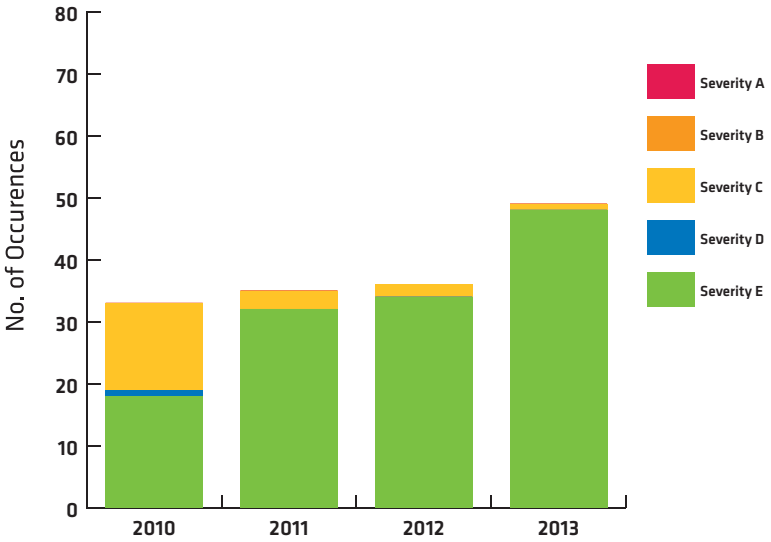
The number of airspace infringements rose slightly over the last three years, however the rise has not been significant. The vast majority of airspace infringements were not associated with a safety risk and were classified as Severity E, the lowest rating on the ESARR 2 Severity Classification Scheme.

The European Commercial Aviation Safety Team (ECAST) has developed the European Action Plan for Airspace Infringement Risk Reduction was developed to reduce their frequency. The plan contained 13 recommendations and proposed actions for regulators, all of which the IAA has implemented.

Level Busts

A level bust can only occur within controlled airspace and is defined as when an aircraft ascends or descends more than 300 feet from an ATS flight clearance. ECAST identified level busts as one of five main risk factors which can lead to a loss of separation event. (The other four principal factors were ineffective air traffic control, airspace infringements, lateral navigation errors and ineffective collision avoidance).

Figure 3.4: No. of level busts between 2010 and 2013

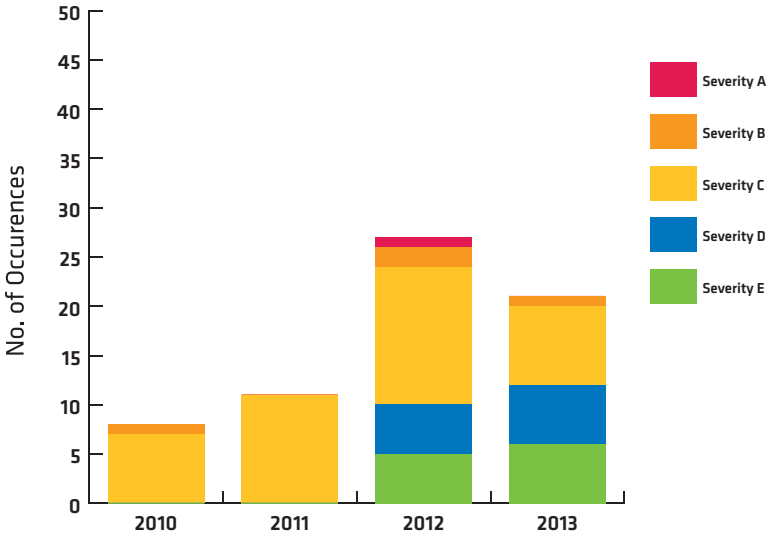


The number of level busts remained steady during 2010, 2011 and 2012. There was an increase in the number reported during 2013, however the majority were of Severity E, indicating there was no safety effect.

Separation Minima Infringements

Separation describes the concept of keeping two or more airborne aircraft a minimum distance apart on both the horizontal and vertical planes to reduce the risk of the aircraft colliding and prevent occurrences due to wake turbulence. Minimum separation distances are specified by regulatory authorities and are based on ICAO standards. A separation minima infringement occurs when these minimum distances are breached on the horizontal plane, the vertical plane, or both planes while the aircraft are airborne.

Figure 3.5: No. of separation minima infringements between 2010 and 2013

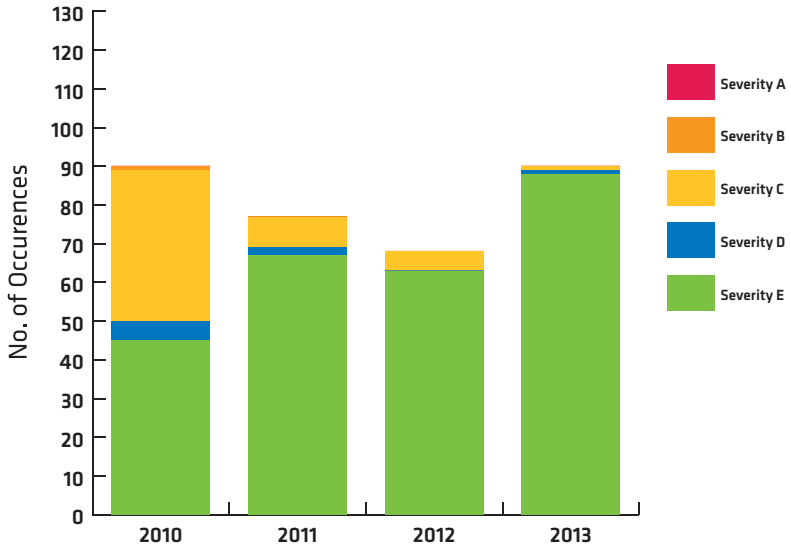


There was a rise in separation minima infringements during 2012. These occurrences mainly took place on the final approach and departure phases at Dublin Airport where the required spacing between aircraft was marginally reduced due to speed differentials between aircraft. This was successfully addressed through a targeted programme which concentrated on the application of accurate speed control to maintain spacing. As a result the number of separation minima infringements fell during 2013.

Deviation from ATC clearance

Deviations from ATC clearance occur when a pilot does not follow the instructions issued by ATC while the aircraft is on the ground or airborne and as a result the aircraft deviates from its' assigned path. Factors known to contribute to a deviation from ATC clearance include ATC issuing several instructions in one transmission or issuing conditional clearances.

Figure 3.6: No. of deviations from ATC clearance between 2010 and 2013

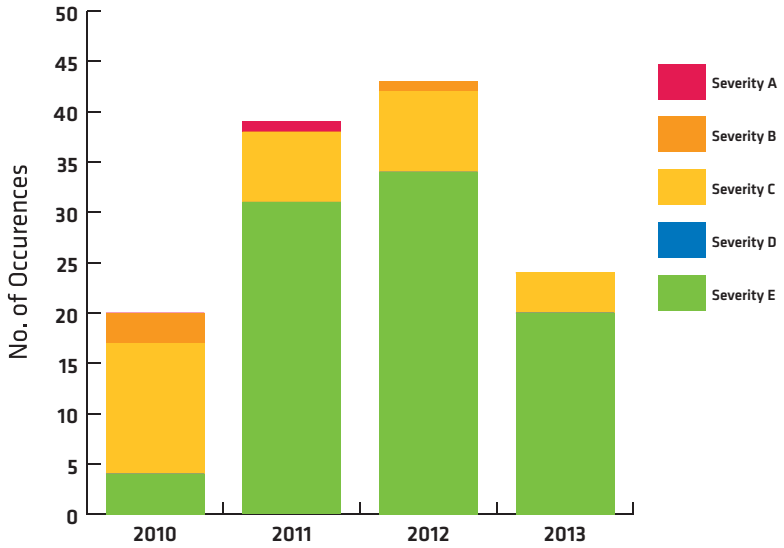


Deviations from ATC clearance are the most commonly reported KSI every year, this is because they may contribute to many other types of occurrences, such as level busts or runway incursions. The number of deviations from ATC clearance increased slightly during 2013, however the majority of these occurrences had no safety effect.

Runway Incursions

Runway incursions are recognised as a key risk in aviation safety due to the number which occur worldwide and their potential consequences. ICAO defines a runway incursion as any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and take-off of aircraft. The IAA uses this definition to identify runway incursions that occur at Irelands aerodromes. Figure 3.7 shows the number of runway incursions at Irish aerodromes since 2010.

Figure 3.7: Number of runway incursions between 2010 and 2013



From Figure 3.7 it is clear the number of runway incursions increased substantially during 2011. This coincided with the introduction of new technology to the Dublin Control Tower. The technology, known as RIMCAS, increased the protection around the runways at Dublin airport by alerting ATC to incursions at an earlier stage then was previously possible through an automatic alarm which sounds within the Control Tower if a red stopbar is crossed. Their introduction has reduced the safety risk associated with individual incursions; this is evident from the fall in the number of incursions classified as being of Severity A, B and C during 2011. However in introducing the new technology a new

type of runway incursion was also introduced, as a result of which the overall number of incursions temporally increased. The new type of incursion occurs when an aircraft, vehicle or person is cleared to enter the runway and does so, as instructed and intended, but before the red stop bar has been extinguished. These incursions are associated with a low safety risk, usually Severity E. Further analysis (not presented here) indicates the technology took until the end of Q2 2012 to be completely bedded in and the number of incursions in 2013 is similar to the number seen in 2010, however the associated safety risk is lower. As part of the State Safety Plan the IAA committed to completing the implementation of all the actions within the 2011 edition of the European Action Plan for the Prevention of Runway Incursions (EAPPRI) addressed to regulatory authorities before 2015.

View of Taxiway Bravo and DVOR (Doppler VHF Omnidirectional range) equipment at Weston airport

Balloon launch at the 2013 Irish Balloon Championships
in Drumshanbo, Co. Leitrim.

06 General Aviation and Aerial Work

The IAA considers General Aviation (GA) to be all civil aviation other than commercial air transport or aerial work. This is a change from the definition used in the 2012 Annual Safety Review, which included SAR operations in the definition of GA activity. Aerial work is defined as when the aircraft is used for specialised services such as agriculture, construction, photography, surveying, observation, patrol or aerial advertisement. This section discusses accidents and serious incidents involving aircraft engaged in GA and Aerial Work according to aircraft type. In another change from previous years the IAAs aircraft register has been used to determine aircraft type, as a result of which there are differences to the statistics provided in the 2012 Annual Safety Review.

General Aviation – Aeroplanes

This section provides fatal accident, non-fatal accident and serious incident statistics involving fixed-wing aeroplanes. The EASA Annual Safety Review provides these statistics according to whether the aeroplanes maximum take-off mass (MTOM) was above or below 2,250kg. For consistency the statistics presented in Table 4.1 are broken down according to the same MTOM categories. The number of Irish registered aeroplanes in each category is also provided.

Table 4.1: Total no. of accidents, fatal accidents and serious incidents involving GA aeroplanes

Year	Irish Airport Flights (Arrivals & Departures)	Accidents			Serious Incidents
		Non-fatal	Fatal	Total	
Aeroplanes over 2,250kg					
2010	30	0	0	0	0
2011	23	0	0	0	0
2012	11	0	0	0	0
2013	11	0	0	0	0
Total	-	**0**	**0**	**0**	**0**
Aeroplanes below 2,250kg					
2010	298	6	1	7	2
2011	259	5	0	5	3
2012	216	2	1	3	1
2013	214	3	0	3	1
Total	-	**16**	**2**	**18**	**7**

Aeroplanes over 2,250kg

There are currently 11 aeroplanes with an MTOM greater than 2,250kg on the Irish aircraft register that are used in general aviation or for aerial work. This is a large drop since 2010, when there were 30.

There were no fatal accidents or serious incidents involving this aircraft type over the last four years. The 2012 Annual Safety Review reported there was a serious incident during 2011. During the subsequent investigation the occurrence was reclassified as a serious incident involving commercial aviation and consequently it is no longer included in Table 4.1. The 2012 Annual Safety Review also reported there was a non-fatal accident during 2012, as the accident was the result of the parachute incorrectly deploying during a parachute jump it has been included in the subsection on parachuting injuries.

Aeroplanes below 2,250kg

The number of aeroplanes registered in Ireland with an MTOM below 2,250kg has fallen steadily from 298 in 2010 to 214 in 2013. This is a substantial drop.

Over the last four years a total of 18 accidents have occurred, three of which took place in 2013. Of the 18 accidents two tragically resulted in fatalities. These accidents occurred during 2010 and 2012.

During the same period seven serious incidents occurred, one of which took place in 2013. There has been a decline in the number of accidents over the last four years, however this may reflect the fall in the number of light aeroplanes flying in Ireland. The IAA will continue to work with the GA community, through the General Aviation Safety Council (GASCI) and other avenues, to address safety issues.

General Aviation – Helicopters

The EASA Annual Safety Review defines large helicopters as those with an MTOM of greater than 2,250kg and small helicopters as those with an MTOM less than 2,250kg. For consistency this safety review uses the same definition. Table 4.2 summarises the safety statistics according to these MTOM categories. The number of registered helicopters in each category is also provided.

Table 4.2: Total no. of accidents, fatal accidents and serious incidents involving GA helicopters

Year	Total registered in Ireland	Accidents			Serious Incidents
		Non-fatal	Fatal	Total	
Helicopters over 2,250kg					
2010	25	0	0	0	0
2011	17	0	0	0	0
2012	15	0	0	0	0
2013	20	0	0	0	0
Total	-	**0**	**0**	**0**	**0**
Helicopters below 2,250kg					
2010	69	2	0	2	0
2011	44	1	0	1	0
2012	32	0	0	0	0
2013	28	0	0	0	0
Total	-	**3**	**0**	**3**	**0**

Helicopters over 2,250kg

There are currently 20 helicopters on the Irish aircraft register within this mass category. There were no accidents or serious incidents involving large helicopters over the period considered. The IAAs 2012 Annual Safety Review reported there was one serious incident in 2010, on receiving more information the AAIU changed the classification of this occurrence.

Helicopters below 2,250kg

Similar to other types of aircraft used for general aviation and aerial work the number of light helicopters on the Irish register has fallen steadily in recent years. In December 2010 there were 69 aircraft on the Irish register and in December 2013 there were 28, a drop of almost 60% over a four year period.

There were two accidents in 2010 and one during 2011 involving light helicopters in Ireland, none of which resulted in a fatality. There have been no serious incidents over the period considered. The IAA welcomes this and hopes it will remain the case, however we are aware the statistics may reflect the reduction in helicopter numbers rather than an improvement in safety and we will continue to identify and address emerging safety concerns in conjunction with the GA community.

In their 2012 Annual Safety Review EASA observed 6% of fatal accidents involved a light helicopter and there has been a decline in the number of fatal accidents involving light helicopters in recent years.

General Aviation – Microlights

There are many types of microlight aircraft. Those on the Irish aircraft register are aircraft with an MTOM of less than 450kg for a two-seater land plane/helicopter or an MTOM of less than 472.5kg for a two-seater land plane equipped with an airframe mounted total recovery parachute system. During 2012 new regulations were introduced under which microlights that are resident in Ireland for longer than 28 days must be placed on the Irish aircraft register or obtain special permission from the IAA.

Table 4.3: Total no. of accidents, fatal accidents and serious incidents involving microlights

Year	Total registered in Ireland	Accidents			Serious Incidents
		Non-fatal	Fatal	Total	
2010	151	1	0	1	1
2011	147	4	0	4	1
2012	133	4	0	4	0
2013	135	1	0	1	0
Total	**-**	**10**	**0**	**10**	**2**

The number of microlights on the Irish aircraft register has remained fairly steady since January 2010. In December 2013 there were a total of 135 microlights on the Irish register, 71 of which held a valid Flight Permit. The other 64 aircraft do not have permission to be flown.

There have been two serious incidents in Ireland involving microlights since 2010, one of which involved a microlight on a foreign register. Over the same period there have been 10 non-fatal accidents involving microlights, four of which were registered abroad. There were no fatal accidents since at least 2006. In their 2012 Annual Safety Review EASA reported that microlighting accidents accounted for 27% of all fatal accidents involving light aircraft.

General Aviation - Other Types of Aircraft

Table 4.4 summarizes the number of non-fatal accidents, fatal accidents and serious incidents involving sailplanes, powered sailplanes, gyroplanes, balloons, paragliders, powered paragliders and powered parachutes.

Table 4.4: Total no. of accidents, fatal accidents and serious incidents involving sailplanes, powered sailplanes, gyroplanes, balloons, paragliders, powered paragliders and powered parachutes

Year	Total registered in Ireland	Accidents			Serious Incidents
		Non-fatal	Fatal	Total	
Sailplanes and Powered Sailplanes					
2010	27	3	0	3	0
2011	27	0	0	0	0
2012	27	0	0	0	1
2013	26	0	0	0	0
Total	**-**	**3**	**0**	**3**	**1**
Gyrocopter					
2010	12	0	0	0	0
2011	12	0	0	0	0
2012	13	0	0	0	1
2013	15	0	0	0	0
Total	-	0	0	0	1
Balloons					
2010	10	0	0	0	0
2011	10	0	0	0	0
2012	10	0	0	0	0
2013	10	0	0	0	0
Total	-	0	0	0	0
Paraglider, Powered Paraglider and Powered Parachutes					
2010	-	1	0	1	0
2011	-	1	0	1	0
2012	-	3	0	3	1
2013	-	0	0	0	0
Total	**-**	**5**	**0**	**5**	**1**

Sailplanes and Powered Sailplanes

A sailplane is a type of glider aircraft with rigid wings and an undercarriage. Powered sailplanes have motors and engines that can be used for take-off or to allow the pilot to fly for an extended period. Some gliders may be launched by a tug aircraft. All sailplanes with a maximum empty mass of more than 80kg when a single-seater or 100kg when a two-seater, including those which are foot launched, are subject to the requirements of EASA European Regulations. There have been three accidents over the four year period considered, all of which occurred in 2010, none of which resulted in fatalities. There was also a serious incident during 2010.

Gyroplane

A gyroplane is a type of rotorcraft which uses an unpowered rotor in autorotation to develop lift, and an engine-powered propeller, similar to that of a fixed-wing aircraft, to provide thrust. Single and two-seater gyroplanes with a maximum take-off mass not exceeding 560kg are regulated by national legislation. Larger gyroplanes are regulated by EASA. There was one serious incident involving a gyroplane during 2012. In their 2012 Annual Safety Review EASA reported there were a total of 19 accidents, four of which resulted in fatalities in 2012.

Balloon aircraft

A hot air balloon consists of an envelope, which is capable of containing heated air, suspended above a gondola or wicker basket, which carries passengers and a source of heat such as an open flame. The heated air inside the envelope makes it buoyant and allows the aircraft to become airborne. There were no reports of any accidents involving balloons between 2010 and 2012 in Ireland. EASA reported a total of 12 accidents, one of which resulted in three fatalities, in 2012.

Paraglider, Powered Paraglider and Powered Parachutes

A paraglider is wide canopy resembling a parachute that is attached to a person's body by a harness in order to allow them to glide through the air after jumping from or being hauled to a height. Powered paragliding, also known as paramotoring, is a form of ultralight aviation where the pilot wears a motor on his back which provides enough thrust to take off using an adapted paraglider wing. Powered parachuting utilises a self-powered flying parachute equipped with a motor and wheels. There was one serious incident and five accidents involving paragliders, powered paragliders and powered parachutes between 2010 and 2012 in Ireland. None of the accidents resulted in fatalities.

General Aviation – Parachute Jumps

Parachuting consists of passengers exiting an airborne aircraft and returning to Earth with the aid of gravity. The rate of descent is slowed during the last part of the jump using a parachute or other means (such as a wing suit) and parachute jumps must be conducted within a designated parachute dropping center, to help ensure the safety of parachutists and other aircraft. Permission to operate a dropping center is obtained from the IAA.

Table 4.5 summarizes the number of parachute jumps the licensed clubs have carried out and the number of injuries sustained which required medical attention. The table includes occurrences where the injuries were minor and consequently were not classified by the AAIU as an Annex 13 accident or serious incident. During one tandem jump both the tandem master and passenger received medical attention; these injuries are counted separately within Table 4.5.

Table 4.5: Total no. of parachute jumps and injuries

Year	No. Jumps	No. Injuries	Rates per 1,000 jumps
2010	15,011	5	0.33
2011	13,595	6	0.44
2012	18,214	10	0.55
2013	15,040	7	0.47
Total	**61,860**	**28**	**0.45**

Over the four years considered a total of 61,860 jumps took place. Over the same period 28 parachutists were injured. This corresponds to 0.45 injuries per 1,000 jumps. Most of the injuries sustained consisted of sprained or broken ankles.

The General Aviation Safety Council of Ireland (GASCI)

The General Aviation Safety Council of Ireland is a volunteer body made up of representatives from General Aviation in Ireland set up in 2012. GASCI meets on a regular basis with the aim to promote General Aviation Safety in Ireland. A large part of the GASCI function is to promote safety awareness among all those involved in the Irish GA community.

This is accomplished by:

- Organising GA Safety Seminars
- Developing printed material, such as Safety Leaflets, posters etc and distributing these to GASCI organisation members and flying clubs
- Providing safety information on GASCI website http://gasci.weebly.com/ as well as on the GASCI Facebook page https://www.facebook.com/gasci.ireland

GASCI identifies safety issues from all available sources of information. For General Aviation much of the available information unfortunately derives from Accident Investigation reports. GASCI would like to encourage anyone involved in General Aviation to report safety related occurrences that they experience, especially if the sharing of this information might provide a valuable lesson to others who might find themselves in similar circumstances and not be so fortunate to as to avoid a serious incident or accident. Such reports can be made voluntarily to the Irish Aviation Authority (see https://www.iaa.ie/voluntary-safety-reporting) with the assurance that the confidentiality of the report is guaranteed by law. A less formal mechanism for information sharing is available on the GASCI website http://gasci.weebly.com/report-an-incident-contact-us.html.

The current membership of GASCI includes

- National Microlight Association of Ireland
- Irish Paramotor Association
- The Irish Gliding and Soaring Association
- Irish Aviation Authority
- Aircraft Owners and Pilots Association Ireland
- Air Accident Investigation Unit
- Irish Sport Rotorcraft Club
- Model Aeronautics Council of Ireland
- Irish Hang Gliding and Paragliding Association
- Irish Ballooning Association
- The Parachute Association of Ireland Ltd
- Irish Light Aviation Society

GASCI held four Council Meetings in 2013 and works to a specific plan of action which is regularly updated. The GASCI accomplishments in 2013 include:

- Development of GASCI Safety Leaflet on Strip Flying (being adopted by EGAST)
- Organising two Safety Evenings both of which were well attended
  1. Feb 2013 – Introduced GASCI and invited safety presentations from UK equivalent body GASCo.
  2. Sep 2013 – Issues discussed included, forced landings, strip flying, decision making
  3. GASCI safety presentations given to 3 x flying clubs and GA gatherings in 2012
- Review, endorsement and distribution of six Safety Leaflets provided by the European General Aviation Safety Team (EGAST)
- Work on Safety Recommendations issued by the Air Accident Investigation Unit of Ireland
  1. Two Safety Recommendations Closed
  2. Two Safety Recommendations are a work in progress.

Upcoming GASCI events planned for early 2014 include:

- Safety Evenings (with UK GASCo) on 10th and 11th April 2014 (See GASCI website for details)
- Safety Leaflet on dangers of Loss of Control following Engine Failure Close to Ground

Voluntary Reporting

Voluntary Reporting involves the collection of any safety data on actual or potential safety deficiencies that may not be captured by the mandatory reporting requirements. The reports may relate to a specific event during a flight or can relate to a safety hazard or concerns encountered by aviation professionals or the general public.

The IAA has implemented the Voluntary Reporting System using the IAA website on *http://www.iaa.ie/voluntary-safety-reporting* which contains all the information required to submit a report. Confidentiality of the data is assured. Three separate templates for submitting voluntary reports are provided:

General Public: This template is best suited for use by a member of the general public who wishes to report a safety event experienced on a commercial airline (Irish and from any other country) or on a business jet.

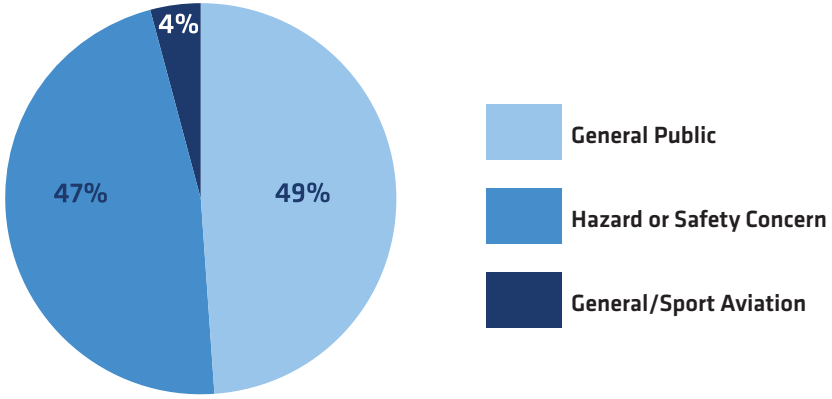
General / Sport Aviation: This template is best suited for use by a private pilot or a passenger of a private aircraft who wishes to report a safety event experienced while flying.

Hazard or Safety Concern: This template is best suited for reporting a hazard or safety concern that is not directly linked to a specific event. This may be used by any person, either in commercial or non-commercial aviation.

The IAA reviews all voluntary reports to identify any safety hazards or concerns that may be emerging or were previously unidentified. All reports received are investigated fully in conjunction with the operator or persons involved, and any necessary actions to avoid future occurrences of the incident are taken.

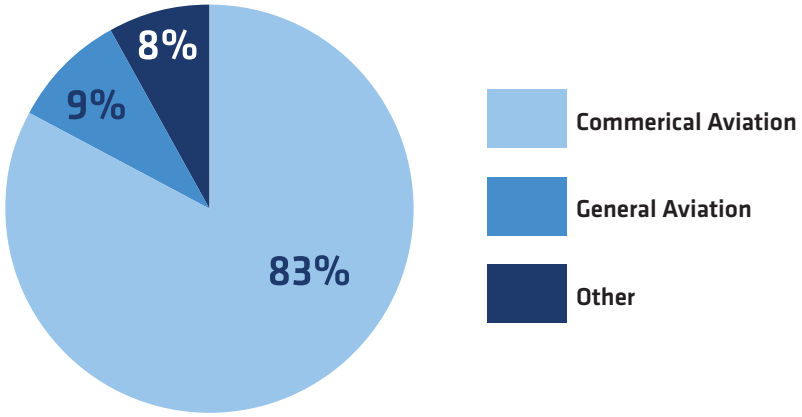
The IAA appreciates the efforts of those reporters who voluntarily submit reports that may help improve aviation safety and is especially thankful to those reporters who have kindly provided their permission for IAA to contact them. Reporters should not however be alarmed if the IAA does not contact them. Reasons why the IAA may not contact a reporter include; the report provided is comprehensive, the report concerns an issue which is already well known to IAA, IAA has received multiple reports of the same occurrence.

By the end of 2013 a total of 131 voluntary reports have been received since the system has been made available in mid- 2011. A breakdown of the templates used shows that the majority of the reports are received using the templates for General Public and Hazard or Safety Concern with very few reports using the General/Sports Aviation templates.



A detailed analysis of the subject matter of the reports is shown in the graph below. It is disappointing that only 9% of the reports concern General/Sports Aviation (GA), however this is 3% more than at the end of 2012, so 2013 has shown a small but welcome increase in the level of reporting from that sector. One of the prime aims of the voluntary reporting system is to allow individuals involved in this area to report safety information in order to share the lessons learned with fellow enthusiasts and to help prevent accidents. The IAA, in conjunction with the General Aviation Safety Council of Ireland, will continue to promote the voluntary reporting in this area.

The vast majority of the reports (83%) relate to passenger experience on Commercial Flights including cabin related issues and passenger perceptions of hazardous aircraft operations (heavy landings, proximate traffic etc). 8% of the reports concern “other” issues and typically concern maintenance or aerial work related reports.



‘Lilie Lennons’ entry into the IAAs FlightFestArt Competition.

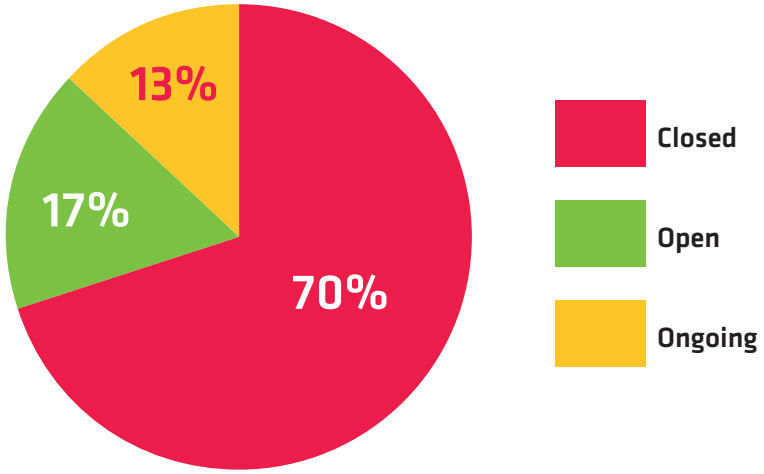
Drawing by Lilie Lennon,
Category A Entrant’

Dublin Airport Fire Service engaged in one of their regular training exercises on their training rig

07 Ireland's State Safety Plan

The safety performance analysis that underpins the Annual Safety Performance Review also helps inform the actions included in the State Safety Plan for Ireland. The State Safety Plan identifies issues and actions at the state level that will help to mitigate against the risks to aviation safety. This annual safety performance review (in common with previous annual reviews) provides details of accidents, serious incidents and occurrences affecting all sectors of the civil aviation system in Ireland. Safety events are categorised using CAST/ICAO taxonomy and mandatory occurrence reports are classified using ARMS event risk classification and this categorization and classification of events helps in the targeting of mitigating actions against higher risk occurrences. The analysis of this data in Ireland, coupled with the similar analysis at EU level (via EASA) and world level (via ICAO) provides the basis for the actions included in the State Safety Plan for Ireland.

The State Safety Plan issues are grouped under three separate headings – systemic (SYS), commercial air transport (CAT) and general aviation (GA). The current published plan is the State Safety Plan 2013-2016 and the plan is updated annually in line with the latest safety analyses.



A detailed account of the progress of each of the safety initiatives identified in the State Safety Plan will be provided in the Plan itself as part of the annual update. The following graph provides an overview of the current status of the actions promulgated in the State Safety Plans published to date.

A copy of the Irelands State Safety Plan may be found on www.iaa.ie.

The IAA monitors the reporting trends for certain higher risk safety performance indicators as identified in both the European Aviation Safety Plan and the State Safety Plan for Ireland. These safety performance indicators are:

- CFIT – Controlled Flight Into Terrain
- LOC-I – Loss of Control - Inflight
- MAC – Mid Air Collision
- Ground Operations - Events occurring at the ramp (including ground collision, ground damage, loading errors etc)
- RI – Runway Incursions (ie by aircraft, vehicle or animal)
- RE – Runway Excursion

The following figures show the reporting trends for each of these indicators as reported to the IAA from all sources under the Mandatory Occurrence Reporting system over the past three years and also the classification of these events in accordance with the ARMS event risk classification scheme. These trends are based on the assessment of the initial reports only and do not consider the effect of the follow-up investigations with the operators involved which could lead to re-categorisation or re-classification of occurrences in a small number of cases.

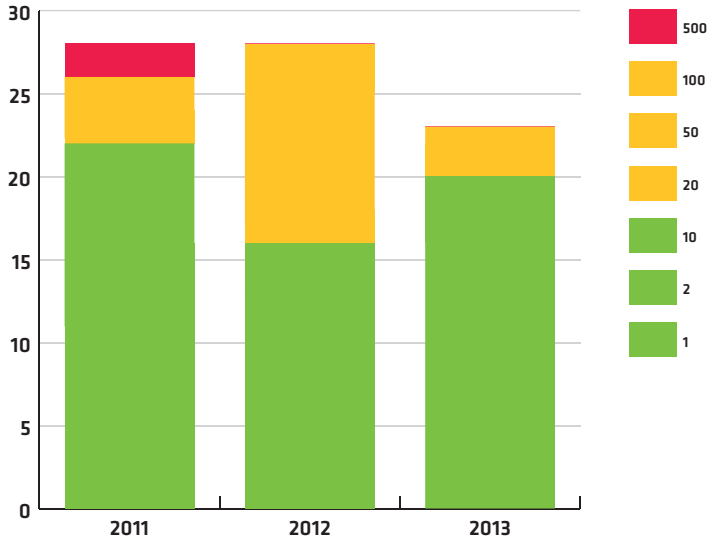


Figure 7.1 Summary of CFIT MOR occurrences

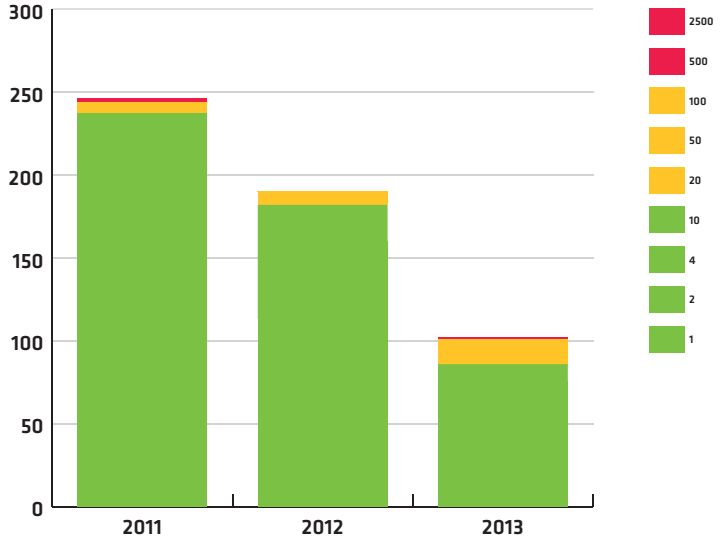


Figure 7.2 Summary o fLOC-I MOR occurrences

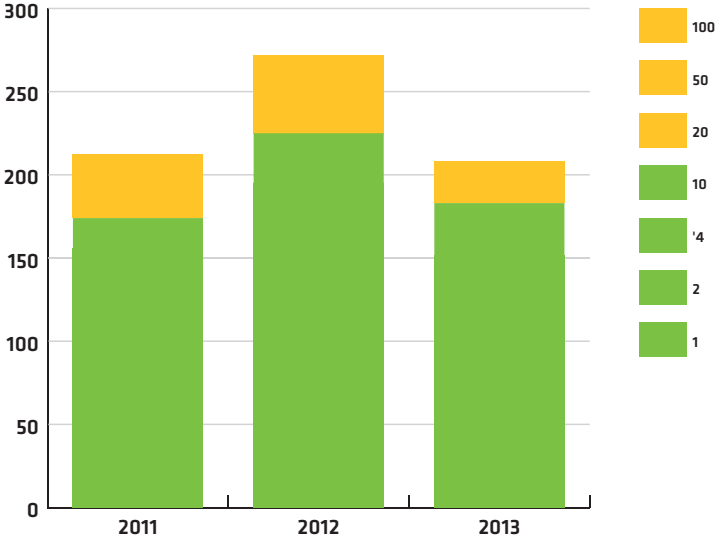


Figure 7.3 Summary of MAC MOR occurrences

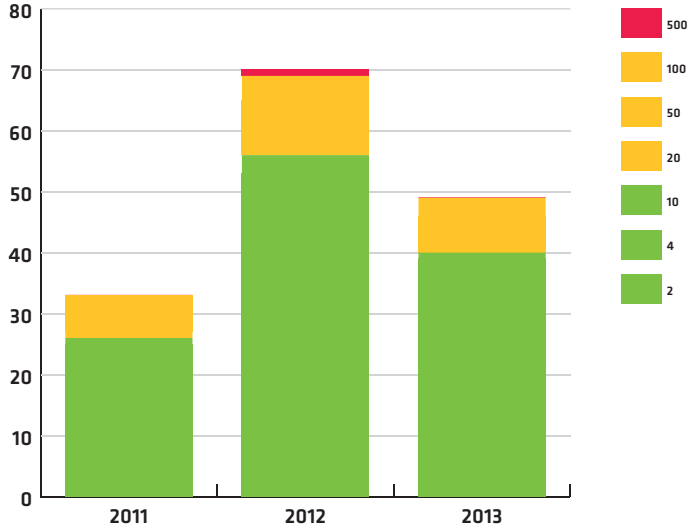


Figure 7.4 Summary of RI MOR occurrences

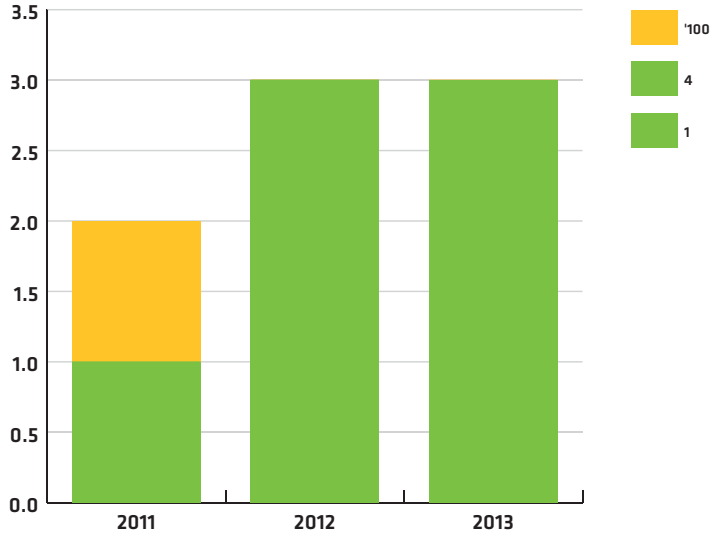


Figure 7.5 Summary of RE MOR occurrences

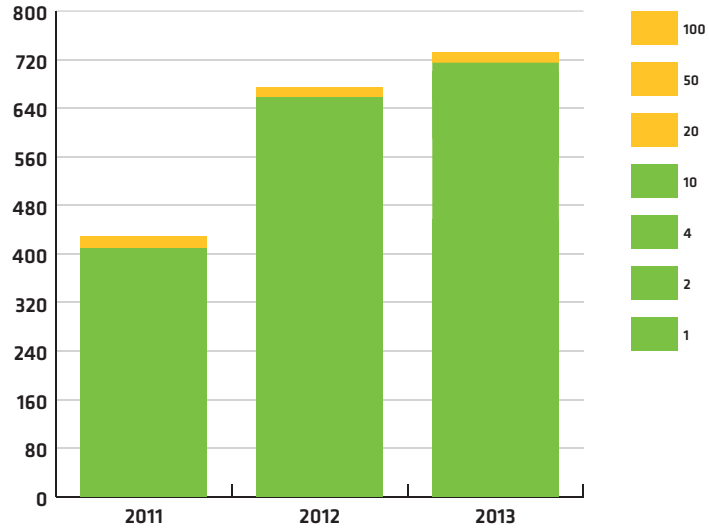
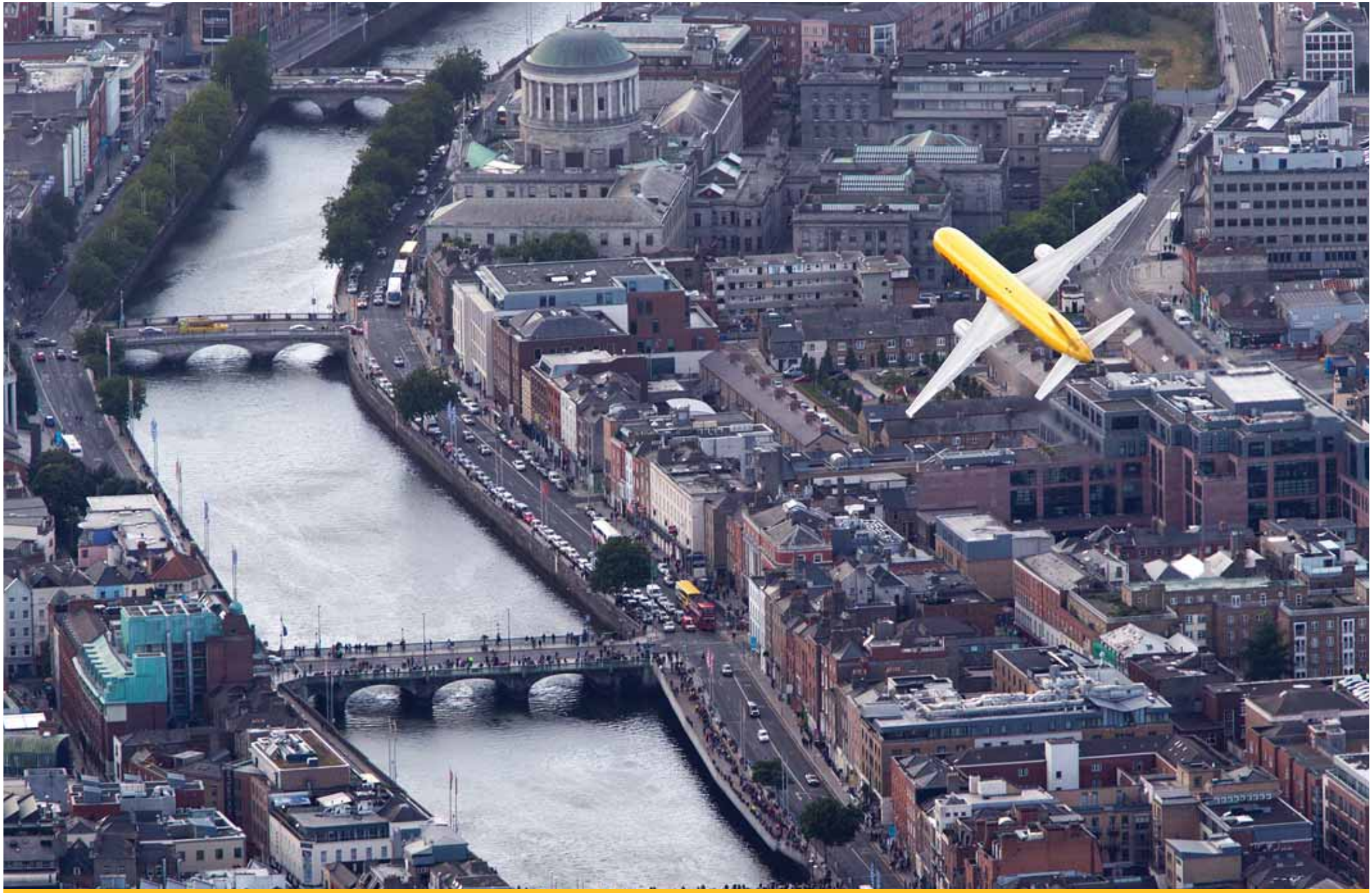


Figure 7.5 Summary of Ground Operations MOR occurrences

The rate of Ground Operations related occurrences (Fig 5) has shown an upward trend, however, the vast majority of these occurrences were classified as lower risk. The increased level of safety oversight in this area in 2013 may also have contributed towards an increased level of reporting of ground operations related occurrences. The level of RE occurrences (Fig 6) reported under the MOR scheme in Ireland is quite low. As there is currently no mandatory reporting requirement for General Aviation, RE occurrences by private aircraft at private airfields are not included in this data.



A DHL Boeing 757 flies over Dublin during FlightFest, the Irish Aviation Gathering.

08 Europe and Worldwide Safety Performance

European Safety Performance

EASA is an EU agency. It is tasked with keeping the air transport industry within Europe safe and sustainable. The EASA MS are the EU Member States as well as Iceland, Norway and Switzerland.

On the 8th January 2014 EASA released a press statement confirming there were no fatal accidents involving large commercial air transport aeroplanes in EASA MS in 2013. In the same year, airline operators in EASA MS performed approximately six million commercial air transport flights and carried over 800 million passengers.

EASA provides an overview of safety within the European aviation industry through its Annual Safety Review, which is published annually during Quarter 3 on EASAs website. Past editions of this document are also available to download from their website.

Network of Analysts (NoA)

The NoA brings together the safety analysis departments of the National Authorities with European bodies such as EASA, Eurocontrol and the EC, to use the information in the European Central Repository (ECR) to support safety planning activity. The NoA also uses this data in conjunction with a range of other sources to identify the safety risks which in turn informs the European Aviation Safety Plan (EASP). The NoA also provides a mechanism for the EASA MS to work together to improve the quality of data in the ECR.

Global Safety Performance

ICAO is a specialised agency within the United Nations (UN) that was created in 1944 to promote the safe and orderly development of international civil air transport. It sets the global standards and regulations for aviation safety, security, efficiency and environmental protection. It also serves as the primary forum for cooperation in all fields of civil aviation among its 191 Member States.

On the 17th January 2014 ICAO released a press statement confirming 2013 was the safest year ever recorded in terms of fatalities for scheduled international air transport operations. Although the number of fatal accidents involving scheduled commercial operations remained steady at nine during 2013, fatalities fell from 372 in 2012 to 173 in 2013. Also of note was that, of the nine fatal accidents worldwide, seven occurred during the approach or go-around phases of flight. The fatal accidents occurred in Africa (one accident), Asia/Pacific (one fatal accident), Europe (two fatal accidents) and the Americas (five fatal accidents).

Further safety information is available in ICAOs 2013 Safety Report, which presents a summary of air transport safety performance between the 1st January 2006 and the 1st January 2013. The full report may be accessed on the ICAO website at this location: www.icao.int. This section provides a brief summary of the global accident figures according to year and UN region.

Accidents and Fatalities Between 2006 and 2012

The air transport industry carried approximately 2.9 billion passengers in 2012. Table 7.1 summarised the number of accidents and fatalities on scheduled commercial flights according to year.

Year	2006	2007	2008	2009	2010	2011	2012
Accidents	112	122	138	113	121	126	99
Fatalities	806	645	524	670	707	414	372

The number of accidents in 2012 decreased by 21% and the global accident rate involving scheduled commercial operations fell to 3.2 accidents per million departures. Compared to 2011, the number of fatalities decreased by 10% making 2012 the safest year since 2004 with regard to fatalities.

ICAO conducted an analysis of accidents that took place during 2012. Three of their notable observations are:

- The percentage of runway safety-related accidents reduced significantly. In 2012 it represented 43% of all accidents, accounted for 11% of all fatal accidents and 1% of all related fatalities. This is a major decrease from the baseline period (2006 to 2011);
- The loss of control in-flight occurrence category represented 1% of all accidents. This category is of significant concern as it accounts for 11% of all fatal accidents and 8% of all fatalities;
- Accidents relating to controlled flight into terrain accounted for 3% of all accidents but represented 22% of all fatal accidents and 37% of fatalities (a major increase from the baseline).

Accidents and Fatal Accidents According to UN Region During 2012

Accident data involving scheduled commercial air transport according to UN region is provided in Table 7.2. The State in which the accident took place determines the allocated region (rather than the State where the aircraft was registered or the State that issued the Operators AOC.

UN Region	Accidents	Accident Rate	Fatal Accidents	Fatalities	% Accidents	% Fatal Accidents	% Fatalities
Africa	5	4.8	2	167	5%	22%	45%
Asia	23	2.7	3	161	23%	33%	43%
Europe	30	4.2	3	42	30%	33%	11%
Latin America & Caribbean	12	3.8	1	2	12%	12%	1%
Northern America	29	2.8	0	0	30%	0%	0%
Oceania	0	0.0	0	0	0%	0%	0%
World (Total)	**99**	**3.2**	**9**	**372**	**-**	**-**	**-**

Jointly Europe and Northern America accounted for 60% of all accidents reported but only 11% of the fatalities. Conversely 28% of all accidents were allocated to either Africa or Asia, but these accidents accounted for 88% of fatalities.

09 Glossary of Terms

A

AAIU	Air Accident Investigation Unit
ANSD	Air Navigation Services Department
AOC	Air Operators Certificate
ARMS	Aviation Risk Management Solutions
ATC	Air Traffic Control
ATS	Air Traffic Service

C

CAST	Commercial Aviation Safety Team
CFIT	Controlled Flight Into Terrain

E

EASA	European Aviation Safety Agency
EASA	MS EASA Member States (28 EU Member States plus Iceland, Liechtenstein, Norway and Switzerland)
EASP	European Aviation Safety Plan
EC	European Commission
ECR	European Central Repository
EGAST	European General Aviation Safety Team
ERC	Event Risk Classification
EU	European Union

G

GA	General Aviation
GASCI	General Aviation Safety Council

I

IAA	Irish Aviation Authority
ICAO	International Civil Aviation Organisation

K

KSI	Key Safety Indicators

L

LOC-I	Loss of control in flight

M

MAC	Mid air collision
MOR	Mandatory Occurrence Report
MTOM	Maximum Take-Off Mass

N

NoA	Network of Analysts

S

SAR	Search and rescue
SMS	Safety Management system
SOTS	Safety Occurrence Tracking System
SRD	Safety Regulation Division

U

UN	United Nations

An Air Contractors ATR 42 flies over Dublin during FlightFest, the Irish Aviation Gathering.

Irish Aviation Authority

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