Part 135 Sector Risk Profile 2015

Prepared for the Civil Aviation Authority
by
Navigatus Consulting

27/11/2015

To the New Zealand aviation community,

The CAA commissioned Navigatus Consulting Limited to conduct an independent risk profile of the Part 135 sector. The Part 135 sector is highly diverse in its operation, operators, and activities. Navigatus were able to engage with a wide range of operators and stakeholders, gather thoughts, suggestions, experiences and information, and combine it all into a profile I believe will be of great use to the sector and the CAA.

Navigatus used a significant amount of information provided by the CAA but did so with complete discretion. They have been careful to ensure that the privacy and confidence of those who were involved has been maintained throughout. I must reiterate again that Navigatus worked independently with the sector and no identifying information will be passed back to the CAA.

The issue of this risk profile is timely, ahead of the implementation of *Rule Part 100: Safety and Compliance Management* and *AC100-1*, the related Advisory Circular. AC100-1 will provide aviation organisations with guidance material to assist in establishing, implementing, and maintaining a Safety Management System (SMS). The sector risk profile will help those operators under Part 135 by providing a set of identified risks that will likely apply to their operation.

This report highlights several areas where increased attention is required. Throughout the report, the CAA has added comments about work already underway and to provide additional perspective. In addition to the analysis undertaken by Navigatus that forms the bulk of the findings, some further analysis was completed internally by the CAA within the framework developed by Navigatus. The page headers indicate where this material is included.

Both the CAA and the sector will benefit as a result of this risk profiling exercise. The CAA will engage with participants to manage identified risks as part of its business as usual. There are opportunities to work with stakeholders in developing sub-sector standards, to work with operators to provide meaningful outcomes from CAA engagement, and to work with the industry to help facilitate user groups.

I commend Navigatus on their thoroughly professional risk profiling of a diverse sector.

Kind regards

Steve Moore

GM General Aviation

Part 135 Sector Risk Profile Project Sponsor

Prepared by Navigatus Consulting Ltd for:

Civil Aviation Authority of New Zealand

Navigatus Consulting Limited

Level 2, 347 Parnell Road

PO Box 137249

Parnell, Auckland 1052

+64 9 377 4132

www.navigatusconsulting.com

Quality Control

Cathy Hua, Consultant: Drafting

Matt Bilderbeck, Analyst: Analysis QA

Celia Cunningham: Report QA

Geraint Bermingham: Project Manager, Review / Sign out.

Revision	Date	Completed / Authorised By	
		Name	Signature
Initial draft for internal review	26 June 15	G. Bermingham	
Draft for client review	31 July 15	G. Bermingham	
Formal QA	2 September 15	C. Cunningham	
Draft final report to Client	4 September 15	G. Bermingham	
Final report	27 November 15	G. Bermingham	

This page is intentionally left blank

Table of Contents

This page is intentionally blank

Glossary

The following terminologies and definitions have been applied within this document.

“Part 135” or “Rule Part 135”:

These names refer to Civil Aviation Rules Part 135: Air Operations – Helicopters and Small Aeroplanes.

Description:

The purpose of Part 135 is to prescribe the operating requirements for air operations, air transport and commercial transport operations, for —

- aeroplanes that have a passenger seating configuration of 9 seats or less, excluding any required crew member seat, or a MCTOW of 5,700 kg or less; or
- helicopters —

carried out by the holder of an Airline or a General Aviation Air Operator Certificate issued under Part 119 of the Rules.

The objective is to standardise the rules for all operators of aircraft in these categories by establishing rules applicable to —

- each person performing an air operation
- each holder of an air operator certificate performing an air operation
- each pilot-in-command performing an air operation
- any additional aircraft equipment, instrument, and certificate requirements and specifications
- aircraft maintenance, preventative maintenance, and modification requirements.

“Part 119” or “Rule Part 119”:

These names refer to Civil Aviation Rules Part 119: Air Operator – Certification

Description:

The purpose of Part 119 is to prescribe the certification requirements for operators to perform Air Operations and the operating requirements for the continuation of this certification. Air Operations include Air Transport Operations (ATO) and Commercial Transport Operations (CTO).

Part 119 introduces two levels of certification —

- Airline air operator certification that permits air operations in all sizes of aircraft
- General aviation air operator certification that permits air operations in helicopters and aeroplane with nine or less passenger seats

Part 119 adopts the standard layout for the rule parts relating to the certification of organisations. The layout prescribes specific requirements for the certification (entry standards), operation (continued operations), and safety audit (surveillance) of operators carrying out air operations.

“Part 121” and “Part 125”:

Refers to the Civil Aviation Rule Part 121 and Part 125, which cover the operation of large and medium aircraft respectively.

“Part 137”:

Refers to the Civil Aviation Rule Part 137, which covers the agricultural aviation sector.

“Part 141”:

Refers to the Civil Aviation Rule Part 141, which covers training organisations.

“Part 135 operators”:

Refers to operators who are authorised to conduct certain activities under Part 135 even though they may not be exercising the privileges afforded under that Part 135 authorisation at this time; and they may be operating under another rule part, or not operating at all. However, for the purposes of this report, all those operators identified as being permitted to operate Part 135 authorised activities as at 10 April 2015, will be referred to as “Part 135 operators”. Operators can hold Part 135 certificates for Rotary and Fixed Wing.

“Pilots”:

Part 135.503 (a) of the Civil Aviation Rule states: A holder of an air operator certificate must ensure that every person assigned as a flight crew member on an air operation conducted under the authority of the certificate—

(1) holds a current pilot licence and rating appropriate to the category of aircraft and to the tasks assigned; and
(2) holds a current class 1 medical certificate appropriate to the task assigned; and
(3) meets all the experience, training, and competency requirements for the task assigned; and
(4) meets all route and aerodrome qualification requirements for the intended operation.

Pilots are required to maintain an accurate and up-to-date logbook containing the full details of all flights they crew. A pilot’s log book must be submitted to the Director when requested. The CAA does not collect and store information that would allow the nature of a pilots employment and activity under operational certificates to be determined. As a result, analysis of pilot data consists of identifying the pool of pilots that might be operating under Part 135. These pools are detailed below.

“Part 135 pilots”:

Unless specified, this term refers to the pool of pilots who have **a)** a Commercial Pilot Licence (Aeroplane or Helicopter), a Senior Commercial Pilot Licence, or an Air Transport Pilot Licence (Helicopter), **b)** a current Class 1 medical certificate, and **c)** classed as active by the CAA. Some pilots may have a CPL for both aeroplane and helicopter. These pilots have not been differentiated and may appear in analysis of both groups.

“Part 121-125 pilots”:

This term refers to those pilots who have **a)** an Air Transport Pilot Licence (Aeroplane), **b)** a current Class 1 medical certificate, and **c)** classed as active by the CAA. As this is the requirements for flying a large or medium aircraft under Part 121 and Part 125 of the aviation rules, it is assumed that these pilots, while likely holding a CPL as well, are probably flying for a Part 121 or Part 125 operator.

“Part 135 aircraft” and “Part 135 fleet”:

“Part 135 aircraft” refers to small fixed wing aircraft and helicopters that meet criteria to allow them to be used for operations under Part 135. Possible Part 135 aircraft were identified by linking aircraft registrations to certified Part 135 operators. However, they may not be being flown operationally and may be private aircraft used for non-hire and reward activities. Also an aircraft may be registered to one operator but flown by another. In addition, operators can have multiple aircraft operating under multiple rule parts; and an operator can also have multiple aircraft and not be operating them at all in a commercial sense. For the purposes of this report, those aircraft identified as likely to be flying under authorised operators will be referred to as “Part 135 aircraft”, and fleet comprised of “Part 135 aircraft” are referred to as “Part 135 fleet”.

“Flying hours”:

Pilots are required to record their flight activities in a log book. This is an accurate way to count flying hours. Where possible in occurrence reporting, the CAA will record the total flying hours and the hours on-type for the pilot involved.

“Flying hours on-type”:

Civil Aviation Rule part 61 states pilots of NZ registered aircraft must hold a current aircraft type rating for that aircraft. This applies to both helicopter and fixed-wing aircraft. Once a pilot is type-rated on an aircraft, any hours accrued flying that type of aircraft are known as hours on-type. Hours on-type, where possible, is recorded in the details of an occurrence.

“Current”:

For operators, “current” refers to an operator whose record held by the CAA is active (not expired). However, being “current” does not indicate whether the operator is, or is not, actively flying and conducting operations.

For pilots, “current” means their class 1 medical certificate is current and there have been no restrictions placed on it. It is likely that if a pilot has a current “active” class 1 medical certificate, they will be flying regularly. Having a class 1 medical certificate does not necessarily mean a pilot is flying for a commercial operation.

For aircraft, “current” means the aircraft record is currently on the CAA register of aircraft. It does not mean that it is actively flying or it is even permitted to fly as it may not have undergone an annual review of airworthiness (ARA).

“Occurrence”, “Incidents”, and “Accidents”:

According to the Civil Aviation Act 1990 and in Civil Aviation Rule Part 12:

- ***Occurrence*** *refers to any accident or incident.*
- ***Accident*** *means an occurrence that is associated with the operation of an aircraft and takes place between the time any person boards the aircraft with the intention of flight and such time as all such persons have disembarked and the engine or any propellers or rotors come to rest, being an occurrence in which —*

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

i. being in the aircraft; or

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

iii. direct exposure to jet blast —

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

2) the aircraft sustains damage or structural failure that —

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

ii. would normally require major repair or replacement of the affected component —

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

3) the aircraft is missing or is completely inaccessible.

· **Incident** means any occurrence, other than an accident, that is associated with the operation of an aircraft and affects, or could affect, the safety of operation.

1 Executive Summary

1.1 Project Recap

Given its role in the public transport and tourism industries, the safety performance of the Part 135 sector is of particular importance. In light of the public exposure, the recreational nature of much of the activity and the potential impact on the reputation of the New Zealand tourism market, the societal impact of a major accident could be severe. Gaining a good understanding of the risk profile of the Part 135 sector is therefore very important.

The Civil Aviation Authority of New Zealand (CAA) takes a risk-based approach to regulating the New Zealand aviation industry with the aim of enhancing safety and reducing the economic and social costs of aviation accidents. In 2015, the CAA commissioned Navigatus Consulting Limited (Navigatus) to conduct a Rule Part 135 sector risk-profiling project to examine the various underlying influences on safety within the sector, so as to assess the risks and to inform targeted and appropriate intervention.

This project was conducted in two phases and employed a mixed approach including quantitative data analysis, an online survey, qualitative interviews and a workshop. Findings and insights obtained at each phase were integrated into a pilot-centred framework that together enables a realistic and insightful evaluation of the sector and its safety performance, as well as a fuller and more rounded risk profile than a traditional approach to risk rating would produce. The project received a high level of industry sector engagement and participation, as well as support and contribution from relevant government agency stakeholders.

1.2 Main Findings

Sector features

The New Zealand Part 135 Sector is diverse, with the aviation operators who together make up what is termed ‘The Part 135 sector’ being varied. Many have relatively little in common across their operations, each having identified a market niche and each operating in differing environments across New Zealand. The fleet size of operators ranges from a single aircraft to fleets of well over 20 aircraft, and with some fleets having purely rotary or fixed wing craft while other fleets may include agricultural, and medium aircraft as well as sport machines. The range of activities is also varied, with some operating purely Part 135 passenger activity, some with repeatable routine operations, some with flexible and changing combinations of passengers, and others also conducting aerial work and agricultural operations.

The age of small aeroplanes and helicopters operated by Part 135 operators ranges from recently manufactured to pre-WWII. The average age of fixed-wing aircraft owned is 35 years, with the majority being over 30 years. The average age of helicopters owned is 23 years, with a third being less than ten years old. The general age of the aircraft within the sector reflects a level of uncertainty and hence investment difficulties many operators face due in part to some features of the markets the sector serves. This is discussed in detail in Section 5.2.

As for the pilots performing under Part 135, insights obtained from the interviews (reflected in the risk profile in Section 3) and survey results (see Addendum for full details) suggest that

there has been an ongoing trend of young fixed-wing pilots using Part 135 to gain hours and experience and as a stepping stone to a career in larger airlines. This continues to result in an outflow of mid-career pilots from Part 135 to Part 121 and Part 125 operators, which in turn has led to an experience gap in the Part 135 sector as described in the risk profile in Section 3.

As to the stakeholders, their involvement with Part 135 operators as described in Section 4 highlights the potential influence of institutional clients. Of note is the Department of Conservation (DOC) who, due to the amount of custom and nature of the services sought, has a marked influence on operators' business decisions and hence, potentially, ability to resource for safety performance. The National Ambulance Sector Office (NASO) and Ambulance New Zealand are also of note, as they have set an effective example of a framework that directly influences sub-sector standards and operations.

Accident data analysis

Due to variability in the reporting of hours by the sector (as explained fully in Section 5.1), accident counts per year rather than accident rates per hour flown, have been used within the analysis to ensure reliability of the results. The relatively stable overall number of operators over the 2006 to 2014 period provides a reasonably robust basis for interpreting the accident and incident performance.

The accident data refers to all those operators who were certificated under Part 135 between 2006 and 2014. There were 184 total accidents reported to the CAA involving these operators. Overall, fatal accidents represented approximately 10 percent of these 184 accidents. During this nine-year period, 170 of these accidents involved Part 135 aircraft. The total annual non-fatal accident count from these 170 accidents ranged from 12 to 25 accidents per year. The fatal accident count also exhibited high variability and it is noted that there were six fatal accidents in 2014, equal to the previous four years combined.

The annual Aircraft Operating Statistics (AOS) submitted by operators showed they conducted a wide range of activities, including for example, agricultural aviation. Of the 170 accidents mentioned above CAA assessed that 45 accidents occurred when conducting typical Part 135 activities, such as passenger transport, some ferry/positioning, search and rescue, and air ambulance.

Among these 45 accidents:

- Six were fatal,
- Thirty two of these 45 accidents occurred on passenger transport activities,
- Nineteen of the 32 accidents on passenger transport activities occurred at remote locations.

Among the afore mentioned 45 accidents, 41 had total pilot hours recorded. A noticeable proportion of these 41 accidents involved pilots with relatively limited experience:

- Forty-four percent involved pilots with less than 2,000 total hours; while
- Twenty four percent involved pilots with less than 1,000 total hours.

It is further noted that, 52 percent of these 41 accidents involved pilots with less than 300 hours on-type.

This result provides evidence to support the risk statement presented in Section 3 that pilot experience is a crucial element of operational safety, and the pilot experience-gap identified during this risk profiling exercise, may represent a key risk factor within the sector's safety performance.

Main risk themes

The interviews, workshop and survey undertaken for this project have led to the identification of a number of key risk themes. These are set out in detail in Section 3.2. In brief the headline risk themes are:

- Training and pilot experience:
  - The normal training pipeline does not in itself prepare pilots for Part 135 operations. Operators must have access to the resources necessary to continue to develop pilots.
  - The needs of the civil airline sector has the effect of drawing most young Part 135 pilots away from the Part 135 sector resulting in an experience gap between the young and older generations of Part 135 pilots.
- Organisational environment and culture:
  - A number of factors are considered to be essential to supporting safety performance, including support to young pilots, development of a Voicing or Just Culture, and ensuring openness within operator organisations.
- Sector safety culture and collaboration:
  - A number of initiatives are seen as being valuable, including support for User Groups and the development of sub-sector operational standards.
- Institutional clients and their role in safety leadership:
  - Some institutional client stakeholders have the opportunity to positively influence sector safety performance through their purchasing policies and behaviours, as well as level of knowledge of those staff who may be passengers from time to time.
- Regulator and its practice:
  - A healthy sector/regulator relationship is considered valuable for safety. The relationship has improved in recent times but remains vulnerable. There may be opportunities for the regulator to support the initiatives of leading operators and cooperatively drive safety initiatives and standards across the sector.

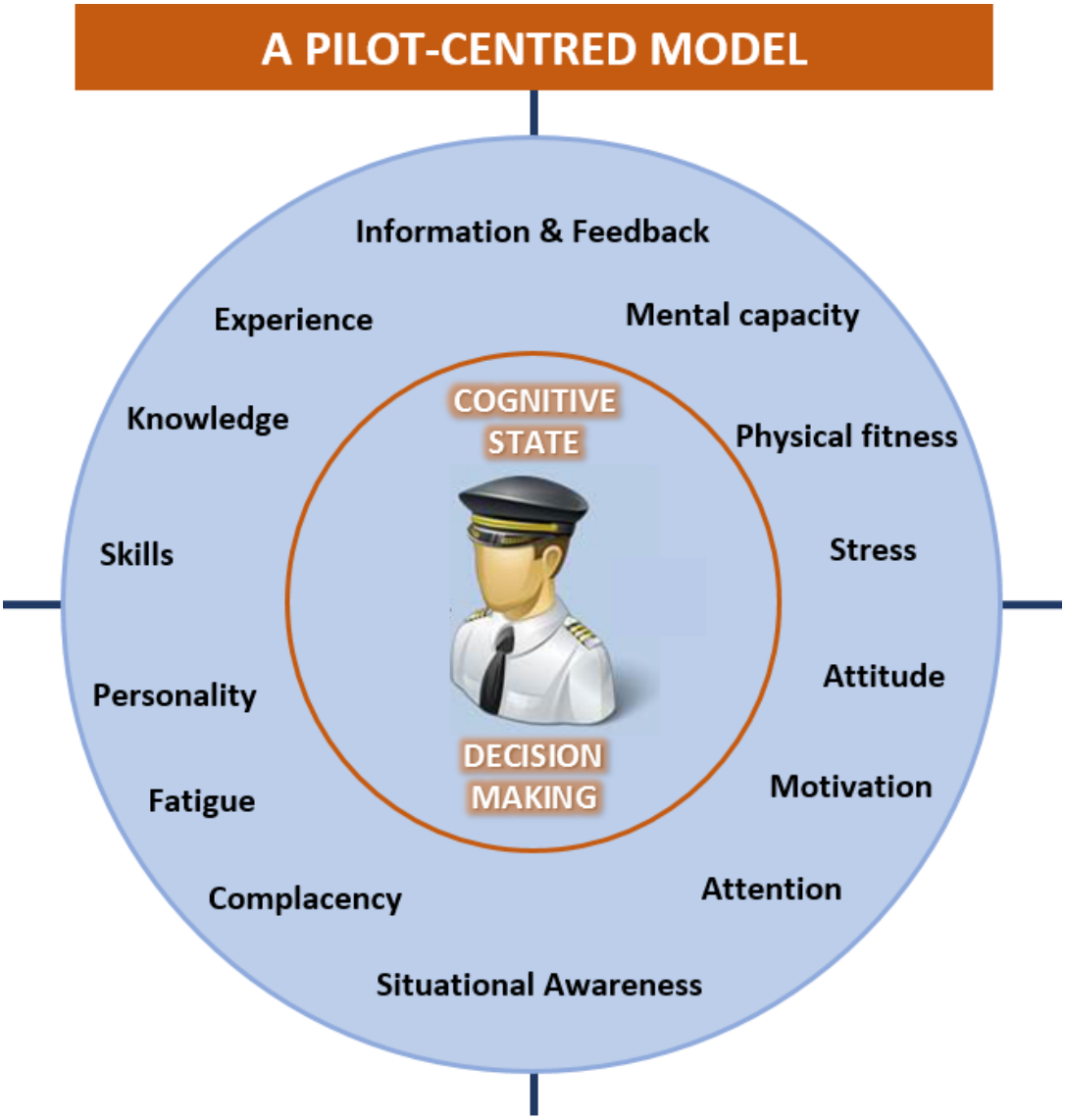
The themes are explained in full in Section 3.2.

1.3 Pilot-centred Model

The risk assessment part of this project has been structured around a 'pilot-centred' model developed specifically for this work.

A pilot-centred model is considered the most appropriate for understanding risk, and the management thereof in the Part 135 environment because of the high probability that operations will be conducted by a single pilot, often operating in uncontrolled environments and/or at unattended aerodromes. Under these circumstances, the pilot is most directly and independently responsible for safety-critical decisions; whereas other factors that could influence the pilot's decision-making capacity or process are considered as risk-shaping/leveraging factors within the pilot-centric model.

A simplified image of the pilot-centred model is shown below, while the full model and rationale are described in Section 2.2.



1.4 Risk Statements

A key output of this risk profiling project has been the development of 'risk statements' that together help to describe the current nature and extent of risks within the Part 135 sector. The statements are set out in full in Section 3.3.

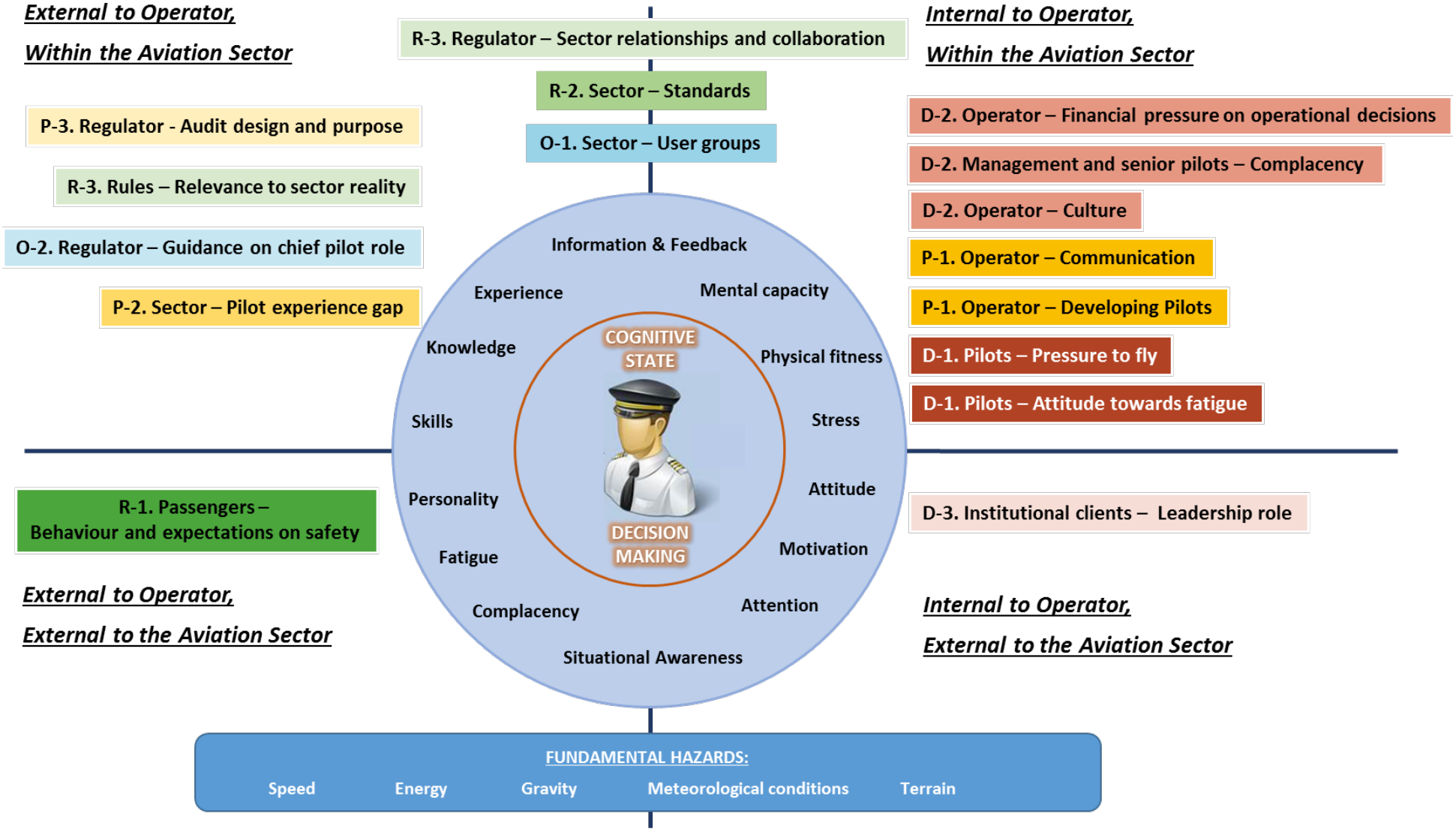
The risk statements have also been classified according to the combination of the immediacy and distance or directness of influence on pilot decision-making. The wide-ranging nature of the Part 135 operational context and the resulting multi-faceted and interrelated nature of the risks are too complex and interwoven to be meaningfully captured by plotting on a more traditionally recognisable risk matrix. Instead, because a key feature of the Part 135 sector is the high probability of single-pilot operations, under which circumstances the pilot is directly and largely independently responsible for safety-critical decisions, a pilot-centred model and matrix have been developed and applied.

The statements and the associated risk classifications are summarised in the immediacy / context matrix and mapped to the pilot-centric model as shown in the model image over.

Note: The matrix ID code and order of the risks in this classification below do NOT relate to a ranking or priority of the risks for mitigation. The priority and resourcing of subsequent initiatives to manage the risks must be guided by many factors and in particular the position of stakeholders within the sector and hence the level and nature of controls available to them.

Immediacy of influence / Context	Operational Context	Operators/ Organisations	External to Operators
Direct	**D-1** · Pilots – Pressure to fly · Pilots – Attitude towards fatigue	**D-2** · Operator – Culture · Management and senior pilots – Complacency · Operator – Financial pressure on operational decisions	**D-3** · Institutional clients – Leadership role
Proximal-indirect	**P-1** · Operators – Communication · Operator – Developing Pilots	**P-2** · Sector – Pilot experience gap	**P-3** · Regulator – Audits
Distal-indirect	**R-1** · Passengers – Behaviour and expectations on safety	**R-2** · Sector – Standards	**R-3** · Regulator – Sector relationships and collaboration · Rules – Relevance to sector reality
Safety Improvement Opportunity		**O-1** Sector – User groups	**O-2** Regulator – Guidance on chief pilot role

SECTOR RISKS VIEWED IN A PILOT-CENTRED MODEL



1.5 Summary

This comprehensive risk profiling exercise has identified a range of important risk themes that are valuable for understanding risk within the Part 135 sector. Further consideration of these themes by the CAA and Part 135 operators, as well as other stakeholders, will enable further controls and initiatives to be developed to positively influence the safety performance of the Part 135 sector. Many of the leading operators across the sector are aware of the importance of a sector-wide view of safety performance and the need to continue to drive up standards. Navigatus believes that these and many other operators within the sector would engage positively with the CAA's efforts to address these issues.

2 Introduction

2.1 Project Background

Since 2011, indications are that the accident rate in New Zealand Part 135 sector has shown an upward trend, and the underlying causes of this are not immediately apparent. In order to effectively mitigate risks in the civil aviation system and to apply the most appropriate intervention, the CAA commissioned Navigatus to complete a sector risk profile. This includes a sector description to aid understanding of the sector's participants and their involvements, and sector risk statements to identify and evaluate risks that have or may impact sector safety performance.

The focus of the sector risk profile is on the activities of operators carried out under Rule Part 135. However, there is no clear boundary between operators and their activities under Part 135 and many other rule parts. As described fully in Section 4, the operators authorised to perform activities under Part 135 vary considerably in terms of fleet size (from a single aircraft to more than 20 machines), type of aircraft owned (from helicopters and/or small aeroplanes, to agricultural, medium, large aeroplanes and sport aircraft), and also engage in a broad range of activities that fall under Rule Part 121, Part 125, Part 137 and / or Part 141. Therefore, to understand the risk associated with the Part 135 sector, it was considered necessary to examine the overall safety performance of Part 135 related organisations. This meant looking beyond simply those activities and occurrences that occurred while operating under Part 135, but also examining all activities undertaken by an operator. There was also a focus on understanding helicopter and air ambulance operation-related risks.

2.2 Methodologies

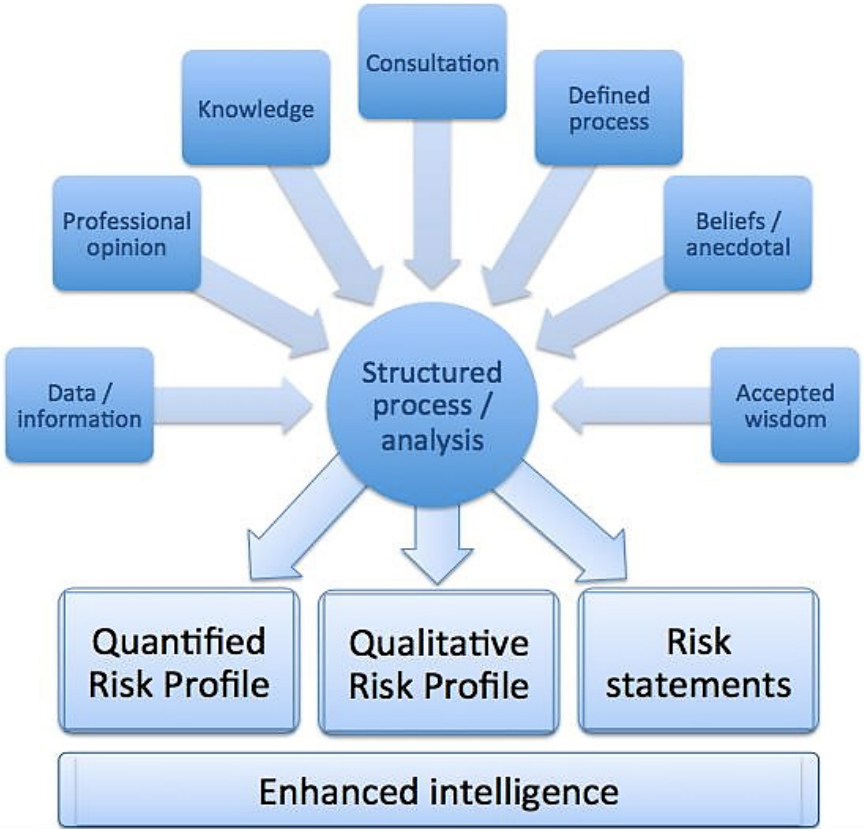
Between March and July 2015, Navigatus conducted a two-stage review of the sector with stakeholder engagement and a combination of research and analysis to form the basis of the findings presented in this report. The process design concept and approaches are summarised below.

Design

To ensure that the process elicited rigorous stakeholder-wide knowledge, and expertise, Navigatus adopted a disciplined evidence-led approach. The process was intended to draw the most value from expert opinion and wisdom, traditional data analysis and a process of new or re-presented information of the actual performance and underlying factors, supported by use of advanced system visualisation tools.

Figure 1 below illustrates the concept behind this process. Essentially the full range of inputs, whether based on data or opinion, are brought together in a structured way to enable both quantitative and qualitative assessment and the development of risk statements, which together create a fuller, rounded and therefore robust risk profile to be prepared.

Figure 1. Process Overview



Besides the process of using data and analysis to inform expert stakeholders as part of a dialogue on risk, a pilot-centred model as shown in Figure 2 was used as a framework to both challenge accepted views and prompt a full breadth of debate. Such a model adopts a systems view [1] by taking into account the immediate and indirect operational context, equipment, rules, culture and norms, human factors, and their interactions to examine how they ultimately influence pilot decision-making and behaviours.

A key underlying philosophy of the work is that with mature processes and technology, there is now no reason that aircraft should not be airworthy. Given that, ultimately, safety is achieved only when pilots consistently and repeatedly make sound pre-flight and in-flight decisions.

[1] E.g., de Waard, D. (Ed.). (2010). *Human factors: A system view of human, technology and organisation.* Maastricht: Shaker Publishing.

Figure 2. A pilot-centred model-based framework

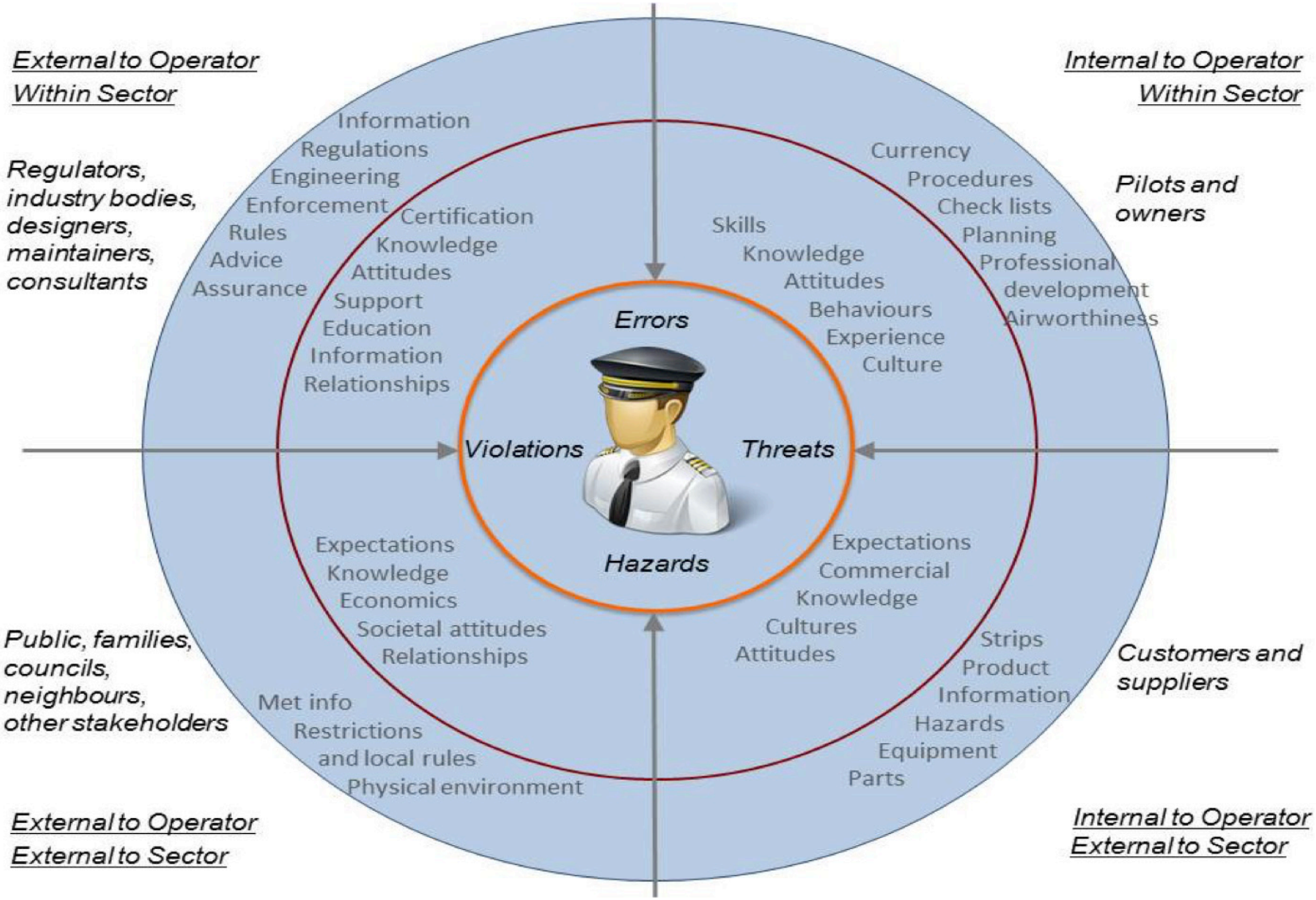
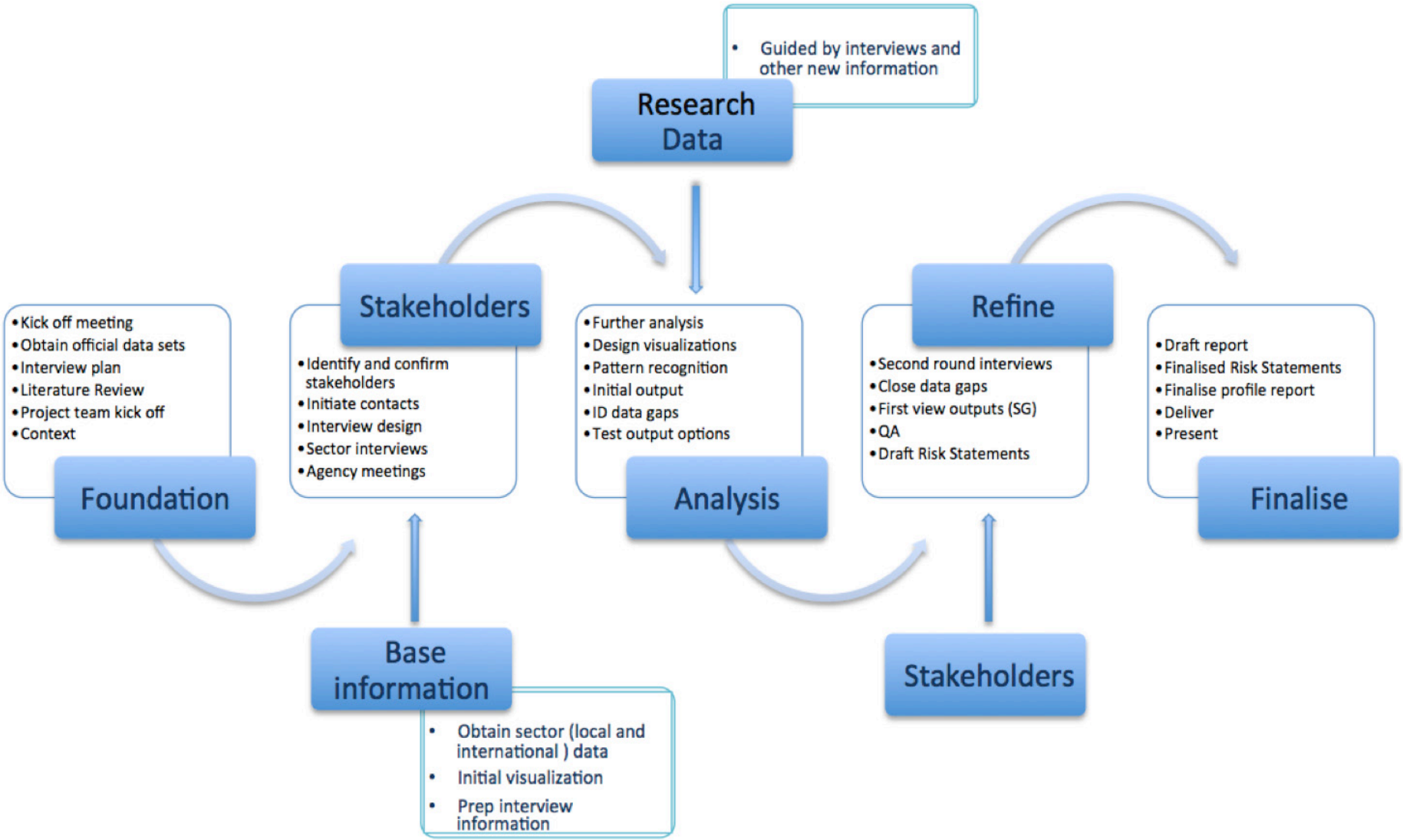


Figure 3. Process Overview



Procedures

Under the process design principles described above, the project procedure involved the steps illustrated in **Error! Reference source not found.**. Overall, the process included the following pproaches:

CAA Data Analysis

The analysis of CAA data provided objective understanding of the Part 135 Sector's operations, status and safety performance.

Data analysis was conducted with CAA-supplied data on operator profiles and registration, aircraft registration, pilot registration, and reported occurrences across various time ranges.

In order to ensure data consistency, all longitudinal analyses involved data between 2006 and 2014 (both years inclusive). Among the datasets, entries were matched with operator identity, occurrence identity, and aircraft identity to form an extended dataset.

Missing data were identified, and the nature of gaps was analysed; cases with random gaps were excluded from the analysis. Variables with apparently non-random patterns to missing data, were further examined. Various trials were undertaken to determine the best approach for ensuring output reliability and validity. Eventually, it was found that data on operator hours could not be used due to the apparently random incompleteness of reporting of this information. As a result of not having a reliable hours based denominator, incident count per year – as opposed to rates per flight hour – have been presented.

The data analysis results on Part 135 sector description and accidents and incidents are given in Appendices I and II (Sections 7 and 8).

Interviews and Workshop

In order to gain a comprehensive understanding of the sector's operation and 'eco-system', and learn the roles, involvement, and insights of different participants and stakeholders, consultation was undertaken with the following Part 135 stakeholders and participants:

Regulator: A facilitated workshop discussion was held with a number of CAA auditors and other CAA staff closely involved in Part 135-related matters.

An interview was conducted with CAA training staff to help understanding of training-related issues raised during the initial interviews with other stakeholders and operators.

Stakeholders: An interview was conducted with each of the government agencies that have involvement with Part 135 operations or operators:

- Ministry of Transport (MOT),
- Department of Conservation (DOC),
- The Tourism Industry Association New Zealand (TIANZ),
- National Ambulance Sector Office (NASO), and
- Ambulance New Zealand.

Operators: An interview was conducted with the management, and in most cases also the Chief Pilots, of five fixed wing and helicopter operators that either self-nominated to provide insights, were identified by industry leaders as experienced, informed and holding a range of views on sector safety and safety management, or were identified by Navigatus for direct engagement. This ensured a broad range of operator types were consulted.

Subsequently, feedback and opinion was also elicited from operators during Aviation NZ's 2015 Aviation Leadership Summit Conference.

Experts: In addition to the workshop and interviews described above, in the first and second round of the process, a number of experienced sector veterans were consulted for opinion and feedback.

The insights obtained from these interviews and the workshop, were used to develop the stakeholder section of the sector description (Section 4.5) and calibrate the pilot-centred model and developing the risk statements (Section 3).

Online Survey

An online survey was conducted to reach further and wider into the sector than the interviews could access and in particular seek the views of both chief and line pilots. This helped develop the understanding of the issues identified via data analysis and the themes coming from the in-depth interviews and workshop. It also allowed consistent evaluation of the "soft factors" such as culture, attitude, and opinions obtained across the sector from pilots and operators.

The survey was run between the 3rd and 22nd of June 2015. An invitation email containing the survey link was sent to the contact email address of 162 current and 22 expired Part 135 operators identified by CAA. These operators were informed of the purpose of the survey, and were invited to share the survey link with their managers, Chief Pilots, and line pilots. Counting only the 162 current operators invited, the survey yielded a response rate of 61.7% with 100 complete responses returned. The respondents were reasonably evenly distributed, with 49 company managers, 32 line pilots, and 19 Chief Pilots returning complete surveys. Overall, there were 30 respondents from fixed-wing-only operators, 31 from helicopter-only operators, and seven from mixed-fleet companies. Among the 51 pilots, 16 were fixed-wing rated, 14 were rotary-rated, and eight had ratings for both fixed-wing and helicopters.

The questionnaire contained three sets of questions: 1) Questions for managers on Part 135 operation and safety-related company practices; 2) Questions for pilots engaged in flight activities, on workload, attitudes, and recall of a recent occurrence along multiple human factor dimensions; 3) For all participants, evaluation and comments regarding sector risk and safety, as well as the effectiveness of the improvement in some safety-related services. To ensure overall response and attention rate, most questions were non-compulsory. Therefore, the total number of responses per each question varies throughout the questionnaire.

Line pilots were directed to pilot-related questions and common questions; managers and Chief Pilots were directed to manager-related questions and common questions, after which the Chief Pilots were also asked if they wished to complete the pilot-related questions.

The survey results were used for calibrating the pilot-centred model, setting the focus for subsequent interviews and discussions, as well as developing the sector risk statements that are presented in Section 3. The survey results are presented in the Addendum to this report (separate document).

3 Sector Risk Profile

3.1 A Pilot-centred Model

Based on the results of data analysis and the insights developed from the interviews, workshops and the survey, and the process overview given in Figure 3, the pilot-centred model displayed on the next page was developed to reflect and help communicate the findings.

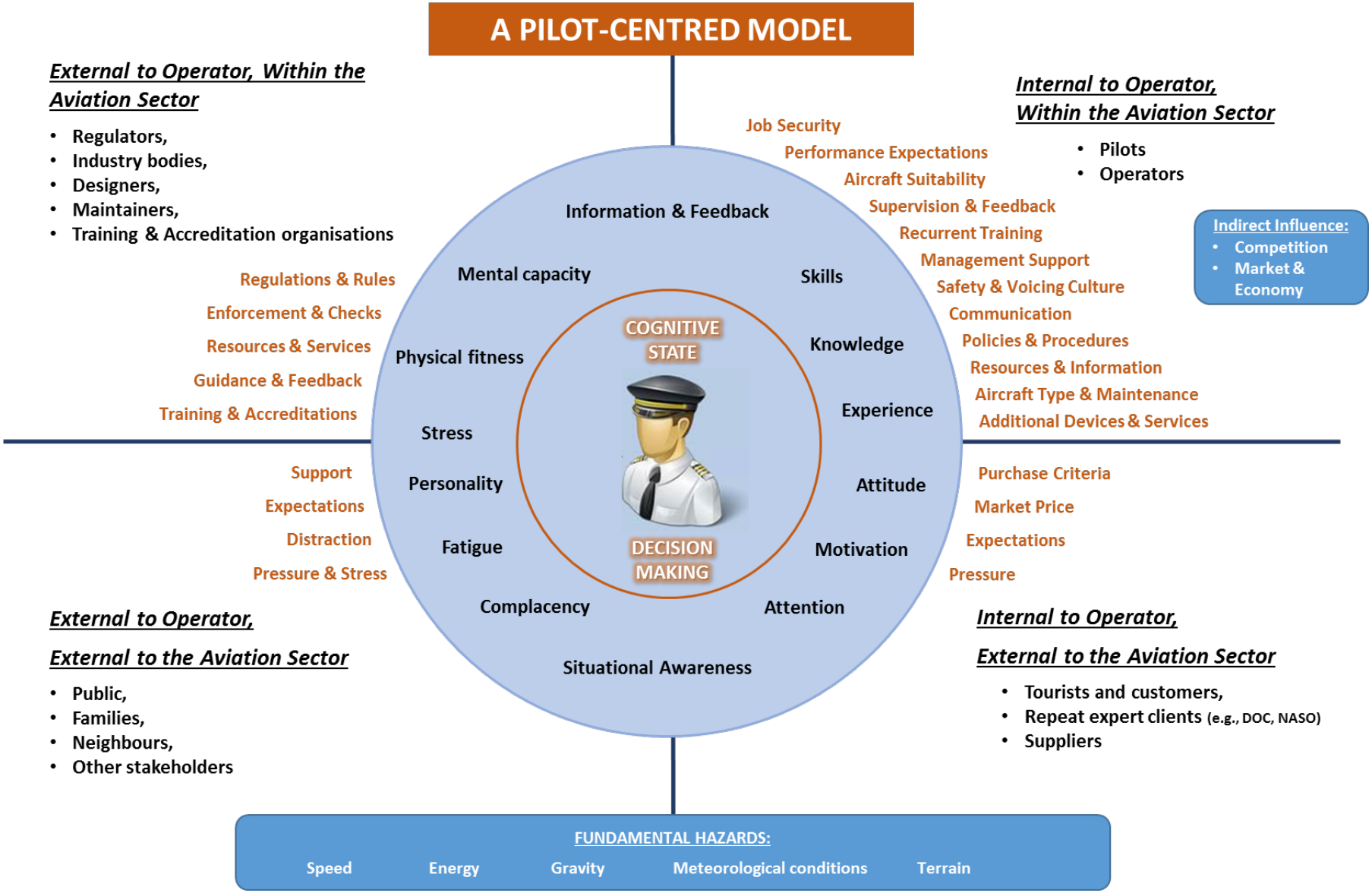
This pilot-centred model portrays the sector operational environment as a system consisting of two interlocking dimensions (internal / external to the sector and internal / external to the operator) across the individual, organisational, sector, industry, and broader society context. Within this construct - one with the pilot as the central element - key factors identified as being essential for ongoing operational safety performance can be derived based on the four dimensional intersects: people (attitude, knowledge, skills, cognitive capacity etc.), hardware (aircraft and devices etc.), software (rules, culture, norms, procedures etc.), and environmental factors (the in-flight environment and the broader societal background). These factors influence operational safety through direct impact and indirect influence on the pilot's cognitive state and decision-making capability.[2]

Among the factors listed in the model, those that were identified as particular sources of risk or those that could influence safety performance were further expanded in the risk themes and statements in the next section.

[2] Hawkins, F. H., & Orlady, H. W. (Ed.). (1993). *Human factors in flight* (2nd ed.). England: Avebury Technical, 1993.

Keightley, A. (2004). *190.216 human factors study guide*. Palmerston North: Massey University, 2004.

Figure 4. The Pilot-Centred model



3.2 Sector Risk Themes

Insights obtained from operators, pilots, and stakeholders suggest that the Part 135 sector is notable for its diversity and practical constraints in terms of operational condition, operator company size, business model, and market. The differences among small and large operators in terms of their resources and operational capacities, as well as operational context, suggests that the "one-size-fits-all" operational safety model may not suit the sector's reality. However, there is an increasing awareness and focus on safety across the sector, as most operators described safety as the foundation and a priority of their business and service.

With such an acknowledgement, a number of themes relating to sector safety were identified. These were:

- Training and pilot experience
  - Experience gap
  - Training
- Organisational environment and culture
  - Young pilots
  - Commercial pressure and competition
  - Voicing / Just Culture
  - Communication
  - Pressure to fly
- Sector safety culture and collaboration
  - Safety culture
  - User groups
  - Sub-sector standards
- Institutional clients and their role in influencing and potentially safety leadership
- Regulator and its practice
  - Regulator-sector relationship
  - Auditing
  - Role of the regulator

Evidence supporting these themes can also be found in the managers and pilots' comments and ratings of key risk and safety factors presented in the survey results in the Addendum. In addition to the extensive dialogue with the sector and stakeholders during the project, the risk theme and statements are supported by the data analysis results 1) on pilot age distribution which provides evidence of the pilot-outflow to a larger airline career discussed below; and 2) on accident counts by pilot hours which demonstrated the importance of pilot experience and supported the potential impact of pilot experience gap.

Training and pilot experience

- **Experience gap:**

There is wide acknowledgement that there is a shortage of experienced pilots, especially in the fixed wing sub-sector. This is to a large extent due to the out-flux of mid-career pilots to larger airlines, as many young fixed-wing pilots tend to treat their Part 135 (and Part 125) time as a

stepping stone to an airline career. Such an out-flux and hence shortage of mid-career pilots results in heightened turnover rate, added training costs for operators, overall lowered level of organisational experience, and a workforce gap formed between new pilots and the highly experienced pilot group. With the helicopter sector, there is a pilot out-flux to higher paying overseas oil/gas/EMS type employment, however this out-flux tends to be less consistent and marked than for fixed-wing pilots.

In addition, this pilot-experience resource-gap also influences the availability of experienced flight instructors. There is no direct indication of how inexperienced flight instructors contribute to in-career safety issues. However, it is a widely recognised concern among the Part 135 operators that this situation leads to quality-constrained teaching as the empirical experience and knowledge that are critical for decision-making, especially in regional operational conditions, is not directly accessible by the trainee. That said, it was suggested that this situation has essentially always been the case, and a solution is difficult to conceive without some form of industry led – and possibly funded - advanced training school initiative (see 'training' below).

- **Training:**

Along with the shortage of experienced pilots, the sector is seeing an increasing number of incoming young pilots. Most operators provide their new pilots with onboarding and operational training, which cover both flying and customer service. However, there is a shared view that young pilots' basic skills gained from certificate training does not fully prepare them for Part 135 operation and New Zealand's challenging regional conditions. On the other hand, there is also a view that given the diversity in Part 135 operation and flight activities, the cost of integrating a large range of customised operational training content would be impractically high and unrealistic. However, operators with similar training needs could in theory organise a joint customised operational training regime.

There was also a view expressed by some operators that the current training programmes would benefit from stricter regulation so as to match training content with sector compliance requirements and development needs. Moreover, some operators consider many of the current training programmes to be oriented towards large airline needs with their stable and structured operational environments and advanced aircraft/cockpit/flight-deck environment - features not evident within, or required by, the Part 135 sector.

Beyond basic certificate training, there is evidence that not all organisations provide recurrent training to pilots due to the perceived high business cost. However, some benchmark operators are shifting focuses from flying skills and instrument knowledge into the human factors involved in the operational context. There were reports that some operators are attempting to shift the focus of recurrent training away from flying and emergency recovery skills, and towards scenario-based decision-making, which integrates basic skills with specific operational conditions and tasks.

CAA Comment 1: The CPL training syllabus provides for a basic level of pilot competency. Air transport operators, including those with Part 135 privileges, must then provide pilots with type training and line training for their specific operation. While CPL training is generic, this operator training will vary according to the aircraft and nature of the operation. Shifting this Part 135 focused training to a CPL syllabus would be difficult given the vast differences in this sector, and would potentially detract from existing programmes aimed at instilling behaviours which will be applicable throughout a pilot's flying career. Nevertheless, the CAA is willing to work with Part 135 operators and flight training providers to identify opportunities regarding training that better meet Part 135 operational requirements.

Organisational environment and culture

It is widely recognised across the aviation sector that organisational culture is critical to the development of pilots' decision-making abilities and an organisation's safety performance.

- **Young pilots:**

Many experienced pilots and managers consider the new generation of pilots to be inherently more professional than was generally the case with previous generations. However, it is also reported that there is a feeling that some young pilots are not sufficiently aware of, or do not communicate effectively about, their limitations. This, in turn, leads to the perceived impression of lacking confidence, or alternatively arrogance and/or complacency and therefore pilots not actively seeking guidance from more experienced peers. However, it became evident from the interviews and survey insights that some young pilots may hesitate to seek help or discuss their limitations from a fear of affecting job security.

- **Commercial pressure and competition:**

Commercial pressure and competition are widely recognised as key factors in sector safety performance. In general, an economic recession would be expected to reduce income whilst compliance and operational costs tend to remain unaffected. This is compounded by regional competition adding further commercial pressure on operators. In most cases, safety has priority in operational decision-making; however, over time, safety could self-evidently be compromised due to financial constraints affecting material investments and the resourcing of safety initiatives.

There are also indications that the recent increase of recurrent and medical check costs has added financial pressure directly on to pilots themselves, which may influence, to some extent, their motivation in accepting jobs and an imperative to fly.

There is also some comment within the sector about operators compromising operational standards in response to competitive pressures that drive down prices and hence margins, but the reduced margins within some operators not being addressed by the regulator. Although no concrete example of such a case was offered in evidence, such views were separately put in various forums suggesting some foundation for these concerns. This could potentially have adverse impacts on some operators' perception of even-handedness and effectiveness of regulatory oversight.

CAA Comment 2: The CAA acknowledges that commercial pressures and competition will remain a consideration for all Part 135 operators. This is mitigated somewhat by the fact that regulatory requirements apply equally to all operators conducting the same type of activity. The CAA's role is to ensure the safety of the public; the CAA does not condone any action by operators which would compromise safety standards, and therefore public safety. The CAA's oversight is risk-based, and so costs associated with surveillance may be higher for those who present a higher risk. In regards to some CAA imposed costs, the CAA has launched a funding review which is shortly to go into consultation. The funding review is designed to ensure a balance between the private/club/public good associated with regulatory safety oversight and apportion cost accordingly.

- **Voicing / Just Culture:**

There is a sector-wide consensus that organisational culture is key to operational safety. An honest, supportive culture that gives everyone the ability and confidence to raise concerns and issues, and openly discuss and learn from operational experience and mistakes, is critically important and helpful for driving safety performance. However, developing and maintaining both a "voicing" and "just culture" takes determination and leadership – both need to be actively nurtured. It is generally the view across leading operators that such cultures are not universally seen across the sector.

Externally, the relationship between the CAA and the sector should ideally also reflect both a voicing and a just culture. This is currently not evident with a reported 'fear' of honest reporting of incidents to the CAA being seen as the norm. The fear being that those reporting will attract compliance scrutiny rather than support to address causal issues.

CAA Comment 3: The CAA intervention policy aims to direct interventions toward risks that affect numerous operators in a sector. Where the risk is seen to exist across the sector, the 'liability' of a single event becomes less important.

The CAA considers open reporting to be the sign of a good safety culture, and this reporting can build confidence with the regulator that the operator is openly addressing issues towards continual improvement. Conversely, an absence of reporting, particularly when issues are uncovered through means other than self-reporting, can erode that confidence. It is also true that unreported hazards or events deprive others from this learning and therefore preventing similar events. The CAA encourages reporting so that safety issues affecting the sector can be identified and addressed.

While the CAA uses occurrences to identify areas of risk and target audits, one of the aims of the funding review is to reduce the direct hourly cost of surveillance. This will allow the CAA to engage more effectively with participants who are operating in areas of high risk.

- **Communication:**

Good communication within and across organisations is also recognised as key to safety. This requires management's support and active understanding of the actual operational environment. However, it was identified that some larger operator organisations have structures and cultures that have the effect of creating cultural and awareness distance between management and operational staff, and, as a result, hinders communication and leads to reduced operational sensitivity. This in turn can be expected to lead to inadvertent operational pressures and circumstances that may compromise safety performance.

- **Pressure to fly:**

According to the survey, during peak season in the past five years, the perceived need to "get the job done" compounded with having no back up pilots sometimes resulted in a small number of pilots working for prolonged hours and sometimes continuing flying despite fatigue. This is a combined result of commercial pressure, organisational culture, and personal attitudes. However, the survey results suggest that in most cases, pilots were not pressured to fly in adverse conditions.

Sector safety culture and collaboration

- **Sector safety culture:**

It is evident that there is a shared view that the Part 135 sector has matured in terms of its emphasis on safety, attitudes and actions towards addressing accidents and incidents, and people's efforts in learning from mistakes and sharing lessons with others. This trend contributes to the improving recognition of the power of a "voicing/ just culture" among operators, and the GA industry's initiatives in organising learning and self-developed SMS and audit programmes. These all indicate an industry in which many of the natural leaders are striving for continuous improvement.

On the other hand, such change brings the higher expectation of a return from safety and performance improvement initiatives, as well as lower tolerance to below-the-bar operation. Thus, there are expectations within the sector that greater recognition of good performance from the regulator needs to be more evident, and of more sector-regulator collaborations in driving the sector safety culture and initiatives.

CAA Comment 4: The CAA encourages the collaboration between the sector and the regulator. This sector risk profile is intended to be a shared resource for the sector and the CAA and is intended to lead to further collaboration.

- **User groups:**

User groups are considered by many in the sector as a valuable means of collaborative issue-identification, problem-solving, and learning and sharing – and so an effective way of driving continuous improvement. Although it is evident that the role of user-groups as a collective voice are not fully utilised, user groups have previously resolved airspace issues and improved consistency and standards of regional practice. However, not all the regions have user groups, and some feel that there is an opportunity for CAA to actively encourage and support the development of the user group model.

- **Sub-sector standards:**

Within the Part 135 sector, the Air Ambulance operation has relatively mature standards and protocols, which defines and helps maintain the standard for training, operation and the purchasing of services. Such sub-sector standards are not found in other types of Part 135 operation. Although this is not directly related to any safety concerns expressed, having a sub-sector standard combined with oversight and sector collaborative safety initiatives (such as user groups) could potentially improve the support and drive performance standards, help avoid non-sustainable competition, and to some extent channel the impact of institutional clients' purchasing criteria and each sub-sector's operational standards.

Institutional clients and their role in safety leadership

It is clear that institutional clients who routinely interact with the Part 135 sector have the potential to have considerable impact on the sector's safety performance. This influence comes through their purchasing criteria, their requirements or otherwise for evidence of safety standards, and their staff's behaviour and requirements at the front line (which may interfere with pilot or operator decisions).

It is reported that some institutional clients either do not recognise the potential impact of their policies or are not reflecting this in their interactions with service providers. Aside from institutional factors, operational safety can be directly influenced by the actions of their staff. There were reports of cases of front-line and real-time requests – for example to carry heavy loads - that put pressure on the pilots to compromise standards. Such behaviour is probably a result of a lack of knowledge of the safety implications of such requests on the part of those staff involved.

Regulator and its practice

- **Regulator-sector relationship**

It is accepted as important to have effective and healthy regulator-sector communication, as well as sector engagement, especially from the benchmark organisations. Lacking such effective regulator-sector relationship and communication can be expected to result in impaired sector buy-in in regulator decision-making and snowballing of some issues.

There were a number of positive comments made on the regulator's recent attempts at improving the relationship. However, this improvement is seen as fragile and so requiring careful nurturing.

There is a perception among some operators that the regulator is not working with the sector leaders and is missing an opportunity to leverage that leadership.

It was also evident that there are perceptions that the regulator has a general lack of understanding in sector operation, as well as a punitive response towards reporting of occurrences and non-compliances. These lead to fear of reporting, missed opportunities for the sector to learn from across the industry, impaired regulator insight of the sector's performance, and an impaired sector-regulator relationship.

CAA Comment 5: The CAA recognises the importance of a strong relationship between the sector and the regulator. Due to the geographically spread out nature of the sector, it may be effective for the CAA to work with leaders who emerge from locally coordinated user groups.

- **Auditing:**

Many operators consider that CAA auditing is overly focused on rule compliance and often neglects operation, safety management, and culture aspects.

Such perceptions mainly derive from the auditing experience of some operators, where auditors (especially those with engineering and ex-military backgrounds and a lack of familiarity with sector operation) have been overly focused on “box-ticking” and fault picking, while not evaluating indicators that the operator believes can reflect the overall operational management and performance. This also leads to the perception of punitive regulator response as described above.

Moreover, it was reported that there are inconsistencies in auditors’ criteria and approaches, which yield different results. Such inconsistency compromises the credibility of auditing results. Thus, the audit does not always seem to deliver valuable feedback to the operators, and is considered paperwork-heavy and omitting factors that are recognised as key to performance and safety.

It was suggested that an audit with a combination of a compliance check and an operation evaluation done by operation-knowledgeable auditors could provide greater value. In addition, the auditors who have seen a large number of operations could be a vehicle for sharing good practices and enhancing performance across the sector.

CAA Comment 6: The CAA accepts that there are opportunities to improve the conduct of surveillance. The CAA has implemented new audit procedures which are risk-based, and focus on operator systems and processes to manage safety. Further work is planned to improve CAA auditor skills in this area, including improving understanding of Safety Management Systems (SMS) and safety culture. This training will take on board the SRP comments of improving consistency and adding value. This Sector Risk Profile work is viewed as a positive and collaborative initiative, and an example of the type of engagement the CAA seeks to have with participants in the conduct of its regulatory activities such as audit.

- **The role of regulator:**

It is identified as important to develop and maintain an effective and healthy regulator-sector relationship, including sector engagement, especially with the benchmark organisations. There is a perception that the regulator has not been working as well as could be with the sector leaders and has been missing an opportunity to leverage that leadership, and that regulator-sector communication could be enhanced. The previously mentioned ‘fear of reporting’ is a particular indication of a less than ideal relationship.

Through the interviews and survey, the operators expressed the following expectations of the regulator to support and collaborate with the sector in improving its safety performance by:

- giving recognition to good safety efforts and performance including explicitly encouraging and supporting operators who voluntarily report incidents and non-compliances;
- providing more guidance, resources, and learning opportunities with easier access (e.g., webinars, online resources) to support GA aviation sector safety initiatives and performance;
- pre-emptively sharing information, best practice, and feedback on sector safety performance and safety initiatives to help the GA aviation sector assess its own performance and develop proactive approaches to risk and safety management;

- providing guidelines and resources to support and nurture personnel fulfilling the Chief Pilot role;
- providing support in developing tools widely needed by the sector (such as in-cockpit recorders), or taking actions to resolve fleet-wide manufacturing and spares issues (such as the recent Robinson R44 fuel valve and rotor blade issues) on behalf of the GA aviation sector.

CAA Comment 7: The role of the CAA is to ensure public safety by ensuring that participants entering the system meet safety criteria and through on-going monitoring to ensure safety standards are maintained. The CAA also has a role to play in promoting safety and providing guidance to participants to assist them in their efforts. This is currently happening through Aviation Safety Advisors, AvKiwi seminars, provision of safety reports, CAA participation at industry seminars and workshop, and initiatives such as this Sector Risk Profile. However, the CAA take on board the industry comments and will explore other ways to share information more effectively. Regarding the comments pertaining to spares and support, the CAA cannot intervene in commercial matters.

3.3 Sector Risk Model, Classification, and Risk Statements

Based on interviews and general consultations supported by survey results, the key factors identified and described in the sector risk themes are presented in the pilot-centred model below, followed by risk classification and risk statements.

The aviation operators that together make up what is termed ‘the Part 135 sector’ are varied and many have relatively little in common across their operations, each having identified a market niche and each operating in differing environments across New Zealand. The fleet size of operators ranges from single aircraft to large fleets of 20 plus aircraft, with some having purely rotary or fixed wing craft while others, a mixed fleet. The range of activities is also varied, with some operating purely Part 135 passenger activity and others undertaking flexible and changing combinations of passenger, other aerial work and agricultural operations.

What is common to the sector is the high probability that operations are undertaken by a single pilot, often operating in uncontrolled environments and/or at unattended aerodromes. Under these circumstances, the pilot is more directly and independently responsible for safety-critical decisions than in the large aircraft airline environment where operations planning, co-pilot and ATC participate in the conduct of flight operations. It is for this reason that a pilot-centred model is considered the most appropriate for understanding risk, and the management thereof in the Part 135 environment. As the final decision-making rests entirely with the pilot, the sector risk classification matrix and risk statements listed below shows the risks as they relate to an individual pilot in charge and the proximity to the in-flight decision-making processes.

It is, however, important to recognise that the risks are often multifaceted and interrelated. Risks and the factors that influence them are complex and so changes in the management of one will influence others. The opportunity to realistically give a risk factor a single risk classification based upon a given likelihood of occurrence and scale of impact tends only to exist in simple contexts or where cause and effect are tightly coupled and linear in nature. However, that is not the case here. Therefore, the typically used 5x5 type risk matrix that displays a ranking of potential consequence and likelihood would be overly simplistic and somewhat meaningless. Instead, a more meaningful model has been developed for this study.

The risk factors are classified according to the combination of two dimensions; immediacy and distance or directness of influence on pilot decision-making:

- **Safety-shaping Contexts:**
  - Operational context – this includes factors that influence the pilot's capacity for operations and decision-making from within the immediate operational context. e.g., pressure to fly, communication, and pilots' skills and experience.
  - Operators/Organisations – this category refers to factors that exist within a particular operator or within the Part 135 sector that could influence the immediate operational context mentioned above. e.g., organisational culture, organisational decisions, sector-wide pilot experience and supply, and the sector's adoption of standards.
  - External to operators – this category includes factors from outside the operator or the Part 135 sector but that influence the organisational and sector safety-shaping context. e.g., Rules, regulator-sector relationship, and institutional clients.

- **Immediacy of influence:**
  - Direct – factors that have direct influence on the specified safety-shaping context.
  - Proximal-indirect – factors that have relatively indirect and often non-immediate influence on the specified safety-shaping context.
  - Distal-indirect – factors that often influence a specified safety-shaping context further removed as an influence than the proximal-indirect factors.
  - Safety improvement opportunity – factors that were not raised as a risk, but are considered as potential leverages that could support improvement in safety performance.

Example 1: In the pilot's immediate operational context, the subject is the pilot's capacity and state of operational decision-making. Pressure on pilots to fly is considered to be a factor that directly influences pilots' decision-making, whereas the effect of communication and pilot development are relatively indirect and non-immediate as they become embedded in the pilot's cognitive model, skills and knowledge that serve as the background of the operation and decision-making. Furthermore, passenger behaviours and expectations on safety are considered distal-indirect as the influence on a pilot's decision-making is channelled via social and media influences and by organisational factors such as customer service requirements and briefing procedures.

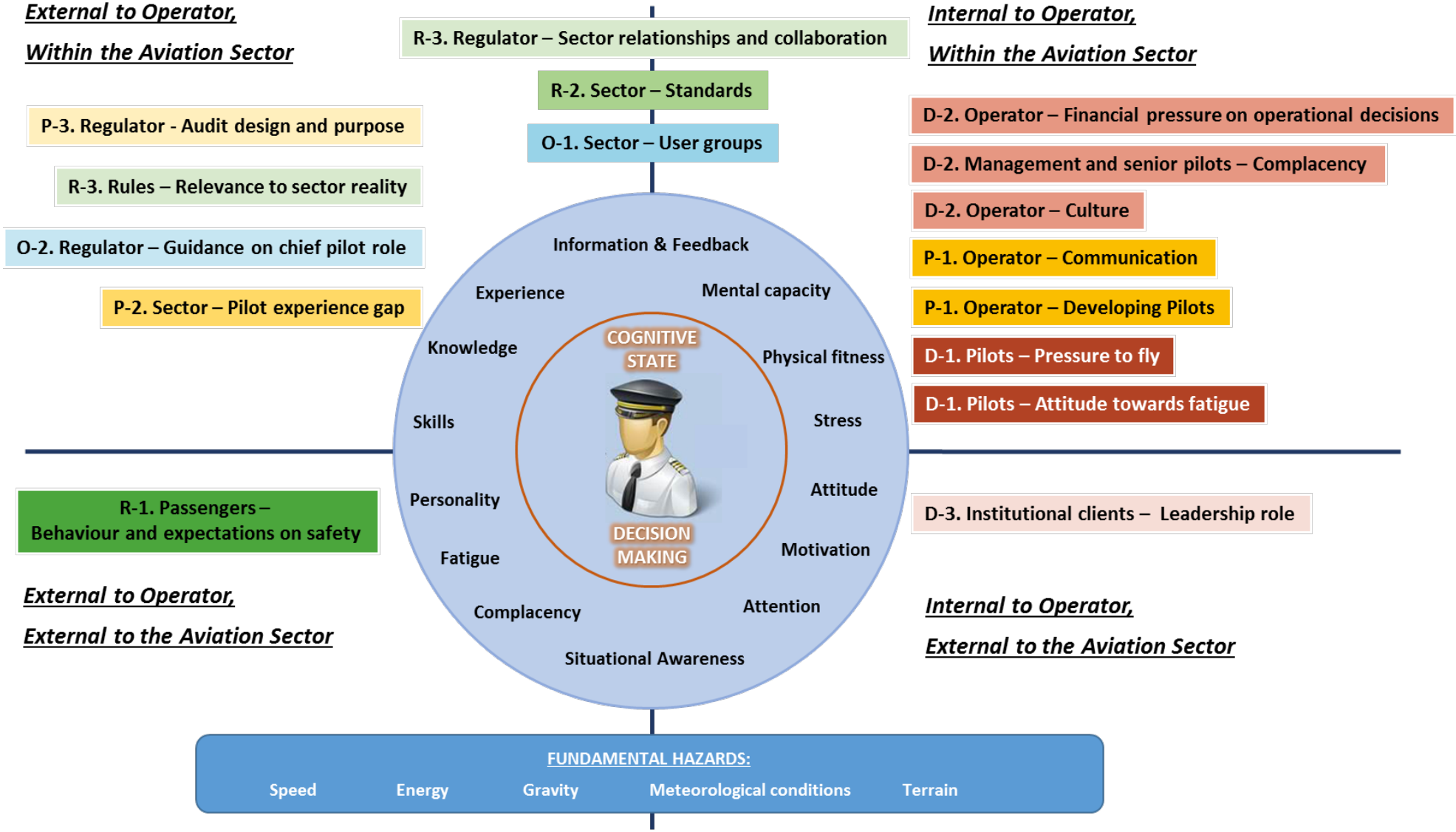
Example 2: For the safety-shaping context external to the operators, the subject is the organisational/sector-level safety context. The influence of institutional clients' purchasing criteria has a direct impact on operators' decision-making and operation (which then indirectly influences the pilot's immediate operational context and decisions). In comparison, the influence of regulator audits is relevant but relatively indirect and non-immediate to the pilot-level context, whereas that of regulator-sector relationship and rules are further removed and indirect to the pilots' safety context with less-targeted relevance.

Notes:

1) *The ID code and order of the risks in the risk classification and risk statements do NOT relate to a ranking or priority of the risks. Instead, mapping of the risks within the matrix reflects the combination of immediacy and direct influence on pilot decision-making. The priority and resourcing of subsequent initiatives to manage the risks must be guided by many factors and in particular the position of stakeholders within the sector and hence the level and nature of controls available to them.*

2) *The classifications reflect each factor's potential impact if not addressed, whereas the current sector reality of each factor is described in the risk statement.*

SECTOR RISKS VIEWED IN A PILOT-CENTRED MODEL



3.4 New Zealand Part 135 Sector Risk Classifications

Risk statements and risk classifications are based on interviews and general consultations supported by survey results.

Immediacy of influence / Context	Operational Context	Operators/ Organisations	External to Operators
Direct	**D-1** · Pilots – Pressure to fly · Pilots – Attitude towards fatigue	**D-2** · Operator – Culture · Management and senior pilots – Complacency · Operator – Financial pressure on operational decisions	**D-3** · Institutional clients – Leadership role
Proximal-indirect	**P-1** · Operators – Communication · Operator – Developing Pilots	**P-2** · Sector – Pilot experience gap	**P-3** · Regulator – Audits
Distal-indirect	**R-1** · Passengers – Behaviour and expectations on safety	**R-2** · Sector – Standards	**R-3** · Regulator – Sector relationships and collaboration · Rules – Relevance to sector reality
Safety Improvement Opportunity		**O-1** Sector – User groups	**O-2** Regulator – Guidance on chief pilot role

Note: The matrix ID code and order of the risks in this classification do NOT relate to a ranking or priority of the risks. Instead, mapping of the risks within the matrix reflects the combination of immediacy and direct influence on pilot decision-making.

3.5 New Zealand Part 135 Sector Risk Statement

Note:

1. ***Risk statements and risk classifications are based on interviews and general consultations supported by survey results.***
2. ***The ID code and order of the risks in the risk statements do NOT relate to a ranking or priority of the risks. Instead, the classifications of the risks reflect the combination of immediacy and direct influence on pilot decision-making.***

ID	Classification	Themes	Summary	Risk Statements	Impacts
D-1	**Direct – Operational context**	Pilots – Pressure to fly	Pressure to fly in challenging conditions or circumstances	Operators are generally conscious of the need to support and nurture young pilots, and ensure that they do not feel pressured to fly in conditions that are not safe. However, such an attitude may not be evident to all operators, especially during peak seasons.	1) Heightened operational safety risk due to fatigue. 2) Heightened operational safety risk due to pilots operating in situations that may exceed their ability to recognise or respond to hazardous conditions. 3) Impaired safety culture in some organisations (not walking the talk).
		Pilots – Attitude towards fatigue	Fatigue tolerance	Some pilots tolerate a mild to medium level of fatigue during peak season due to a perceived obligation (that may be self-imposed) to “get the job done”, or the belief that they can handle it. *It is of note that it is inherently difficult to measure fatigue and detect individual thresholds.*	1) Potential likelihood of impaired decision-making due to fatigue prior to or during flying operations. 2) Negative influence on company safety culture (not walking the talk)

Refer CAA comment 3

ID	Classification	Themes	Summary	Risk Statements	Impacts
D-2	**Direct – Operators/ organisations**	Operator – Culture	*"Voicing / just culture."*	An honest, supportive culture that gives everyone the role and confidence to raise concerns and issues, and openly discuss and learn from operational experience and mistakes is recognised as important and helpful for driving safety performance. However, developing and maintaining both a "voicing" and "just culture" takes determination and leadership. Such cultures are not universally seen across the sector.	1) Under-reporting of incidents and concerns from pilots due to lack of confidence in how reports will be received. 2) Fear of young pilots to raise concerns and ask for support in perceived impact on job security. 3) Operational sensitivity by management undermined due to limited front-line reporting and associated debate. 4) Lost opportunities for continuous improvement and risk identification and mitigation.
		Management and senior pilots – Complacency	Complacency among some management and senior pilots	There is some sense that a few management and senior pilots may exhibit complacency towards changing safety management expectations believing established practice to be adequate.	1) Potential for inadequate flight planning, impaired decision-making. This may lead to inadvertent exposure to operational situations that require emergency recovery or those they are not able to safely respond to. 2) Potential for the sector to be left behind as the expectations of the customers and professional groups continues to evolve. 3) Resulting chance of a major accident, or generally static or degrading safety performance within the sector would be expected to lead to poor public perception and the sector having controls imposed on it as opposed to leading safety developments.
		Operator – Financial pressure on operational decisions	Cost-driven operational decisions	Cost-driven operational decisions may inadvertently impact on safety by constraining investment in safety initiatives and influences on decision-making.	1) Compromised safety-in-practice as the practice approaches or exceeds the limit of operation.

Refer CAA comment 2

ID	Classification	Themes	Summary	Risk Statements	Impacts
D-3	**Direct – External to operators**	Institutional clients – Leadership role	Some institutional clients (e.g., DOC, charter boats) did not lead safety culture through their standards and practice	Some institutional clients' purchase policies and standard requirements do not reflect an emphasis on safety. Moreover, there is unwitting pressure from the front line that may compromise safe operations, e.g., overloading.	1) Perceived unjust and impaired motivation of operators to invest and maintain safe and high-quality operation. 2) Customers are aware of implications of requests and expectations that put pressure on operators in a way that may inadvertently compromise safety. 3) The inadvertent impact of perception of some institutional clients.
P-1	**Proximal-indirect – Operational context**	Operators – Communication	Communication and operational awareness	Management support and understanding of the actual operation, and effective communication across all levels of the organisation are recognised as important for safe operation. However, some large organisations have structures and cultures that distance management from the operational staff, and result in less effective communication and insufficient management focus on operation issues.	1) Deterioration of safety-in-practice as management not aware of operational implications during business decision-making. 2) Reduced operation efficiency and possible under-reporting and snowballing of operational issues.
		Operator – Developing Pilots	Not all operators are providing sufficient resources to support development of pilots	There are challenges for small operators in finding adequate resources to support the development of young or new pilots properly. Larger organisations will tend to be better resourced to support supervision and monitoring for pilots and enable professional growth. However, there must also be a collegiate and sharing environment for this benefit to be realised.	1) Without on-the-job training and supervision, new pilots may not develop the skills and knowledge about local operation conditions necessary to grow and meet the challenges they can be expected to face, as well as company operation procedures and policies. This could lead to higher likelihood of incidents/accidents and can be expected to lead to lower safety performance across the sector, greater pilot stress, and lowered retention rates.

Refer CAA comment 1

ID	Classification	Themes	Summary	Risk Statements	Impacts
P-2	**Proximal indirect – Operators/ organisations**	Sector – Pilot experience gap	High pilot out-flux to airlines in the fixed-wing sub-sector and to overseas oil/gas/EMS jobs for the helicopter sub-sector	There is a sector-wide experience gap between new and very experienced pilots. In the fixed-wing sub-sector, this experience gap is due in large part to the outflow of younger pilots who use early experience in Part 135 as a stepping-stone to employment with an airline. To a lesser extent, in the helicopter sub-sector, there is also an out-flux of pilots to overseas oil/gas/EMS jobs for higher income.	1) A shortage of mid-career pilots to act as instructors and supervisors. 2) Overall lowered level of sector-wide pilot competency in the medium-long run. 3) Operational impact for operators due to the need to use few experienced pilots to provide on-the-job supervision and training with limited resources. 4) Demand on experienced pilots to take on jobs that would otherwise be suitable for mid-level pilots to gain experience. 5) Added pressure on operators with the resulting potential to distract from safety focus and initiatives. 6) Operators needing to manage inexperienced pilots with limited awareness of their limitations.

Refer CAA comment 6

ID	Classification	Themes	Summary	Risk Statements	Impacts
P-3	**Proximal indirect – External to operators**	Regulator – Audits	Audit consistency	Different auditors appear to follow inconsistent criteria and to also hold different interpretations of rules.	1) Frustration and inefficiency are undermining regulator/operator relationship. 2) Inconsistent interpretation of a rule could potentially increase risk.
			Focus of audits	CAA auditing is perceived as being overly focused on rule compliance and often neglecting the operation, safety management, and culture aspects. Thus, the audit does not always seem to deliver valuable feedback to the operators, and is considered paperwork-heavy and omitting factors that are recognised as key to performance and safety. It was suggested that an audit with a combination of compliance check and operation evaluation done by operation-knowledgeable auditor-team could provide greater value; also the auditors, who have seen a large number of operations, could be a vehicle for sharing good practices and enhancing performance across the sector.	1) Perceived punitive/ fear-based regulation, which leads to under-reporting, whereas an aviation sector-wide just-culture environment could be fostered. 2) A perception of the regulator's lack of understanding of realities of sector and operations and safe operations. 3) Auditing process becomes a perceived paperwork exercise that misses some important aspects of operation and safety. 4) Missed opportunity to support operator in knowledge and development of safety processes and hence performance.

ID	Classification	Themes	Summary	Risk Statements	Impacts
R-1	**Distal indirect – Operational context**	Passengers – Behaviour and expectations on safety	Occasional cases of poor passenger behaviour	There is some evidence of difficult passengers with poor behaviours. However, in general, tourists today exhibit higher understanding and expectations of safety.	1) Distraction and stress on pilots during flight, which may influence flight safety. 2) Incorrect weight and balance or loading due to passengers not complying with seating or loading instructions. 3) Compromised transport experience for other passengers.
R-2	**Distal indirect – Operators/ organisations**	Sector – Standards	Lack of standards in some sub-sectors	Standards and membership to a certification network (such as that within the air-ambulance sub-sector) are recognised as helpful in defining and maintaining operational standards and safety. However, not all types of operations are supported by agreed standards.	1) Lack of consistent standards, performance criteria and procedures, which leads to uncertainty of operator and pilot preparedness and capability in specialist and potentially challenging operations. *2)* Inconsistent purchasing criteria based on individual customer decisions rather than clearly defined standards and criteria. 3) Purchasing decisions are more likely to be based on cost given absence of performance against defined operational standards.

Refer CAA comment 5

ID	Classification	Themes	Summary	Risk Statements	Impacts
R-3	**Distal indirect – External to operators**	Regulator – Sector relationships and collaboration	Relationship, communication and engagement with the sector	It is identified as important to have effective and healthy regulator-sector communication, as well as sector engagement, especially from the benchmark organisations. There is a perception that the regulator is not working with the sector leaders and missing an opportunity to leverage that leadership. There is a fear among operators of punitive response of the regulator to reports of occurrences and self-reported non-compliances. This is at odds with and undermines the development of a just culture environment.	1) Impaired sector-buy-in in regulator decision. There are positive comments on the regulator's recent attempt at improving the relationship. However, such improvement is fragile and requires careful maintenance. 2) Ineffective communication may lead to snowballing of some issues. 3) Under-reporting of occurrences and non-compliances. 4) The sector is missing the opportunity of learning from across the industry. 5) Impaired knowledge and insight of the regulator into sector performance.
		Rules – Relevance to sector reality	Rules clarity and relevance	There are inconsistent interpretations of some rules, compounded by the limited relevance of some rules to all aircraft types.	1) Confusion and ambiguity in compliance. 2) Perceived limited relevance between regulation and sub-sector reality. Rotary wing craft. 3) Potential for gaps in rules.

Refer CAA comment 7

ID	Classification	Themes	Summary	Risk Statements	Impacts
O-1	**Safety improvement opportunity – Operators/ organisations**	Sector – User groups	Where available, user groups help to set and implement standards.	User groups are recognised within the sector and by some customers as a valuable contributor to safety and continuous improvement. They offer support in collaborative problem solving, resource/information sharing, and issue identification. However, not all regions have user groups, and not all user groups are fully utilised.	1) Benefits of user groups not fully realised for improving regional sector safety. 2) Overall variability of safety performance and standards among regions and operations across the sector. 3) Regional or sector-wide issues are not well resourced and worked on by the sector itself.
O-2	**Safety improvement opportunity – External to Operators**	Regulator – Guidance on chief pilot role	Chief pilot role not defined and regulated	The Chief Pilot role is a critical safety leadership position. Greater guidance and materials to recognise, value, define and support the chief pilot role has the potential to drive safety culture and performance.	1) Ambiguity and inconsistent standards across the sector. 2) Limited recognition of the importance of the role. 3) Unrealised opportunities to support Chief Pilots.

4 Part 135 Stakeholders

The following section provides information on the main stakeholders[3] involved in the New Zealand Part 135 sector:

Regulatory Bodies:

The Ministry of Transport (MOT)

The Minister of Transport (MOT) establishes the aviation rules that the CAA enforces and that all pilots, engineers, aircraft operators, airlines, air traffic controllers, aerodrome operators, and regulated air cargo agents follow with the aim of keeping aviation safe and secure.

The MOT is the government's principal transport adviser. It receives updates from various government departments and informs and advises the Minister of Transport. It has considerable involvement in aviation and airspace changes via the government groups, such as the aviation group and safety group. The MOT takes a more holistic and broader view on the impact of rules than the CAA is required to, by considering the impact on other transportation sectors and on the overall economy and society. When there is an occurrence report, the MOT advises the Minister and the Board members with comment on the accident report in a broader context, and prepares media notes and Q&As for the Minister. The MOT manages the contract with Met Services, and owns the Milford aerodrome that is operated by the local council.

The Civil Aviation Authority of New Zealand (CAA)

The Civil Aviation Authority of New Zealand (CAA) was established in 1992 as a crown entity under the Civil Aviation Act 1990. The CAA is responsible to the Minister of Transport, and governed by the 'Authority', a five-member board appointed by the Minister to represent the public interest in civil aviation.

The CAA checks that rules are being complied with and has the power to take action if they are not. It also monitors the safety and security performance of the aviation industry. The CAA also has an education role, producing safety publications and running safety seminars for the aviation community.

The CAA regulates aviation in New Zealand with the aim of enhancing safety and so reducing the economic and social costs of aviation accidents. New Zealand is a signatory to the Chicago Convention and so the CAA monitors safety performance in line with worldwide practice by recording the number of accidents, and expressing those as a rate of accidents per flying hour. To account for inherent differences, the aviation industry is divided into 13 groups known as safety outcome target groups. Even so, the accidents within a sector have many different causes, which are not always apparent when expressed as an aggregated accident rate.

[3] Source: interviews and each agency's official website.

The CAA consists of two parts: 1) The agency that oversees aviation safety and the rules underpinning it, led by the Director of Civil Aviation; and 2) The Aviation Security Service, known as Avsec, directed by the General Manager of Aviation Security.

Clients:

Tourists [4]

Given the Part 135 sector's engagement in New Zealand's air passenger transport activities, tourists are one of the primary customer groups.

In 2013, the New Zealand tourism industry generated $24 billion (or $66 million per day) total revenue from 2.7 million international visitors and 16.6 million domestic overnight trips. New Zealand has the 5th international ranking as a destination brand. In 2013, the reasons given for New Zealand to be ranked the "Best Country" in the UK Telegraph annual travel award included alpine scenery (No.1) and extreme sports (No.3). Both of these activities involve passenger transport by air.

New Zealand Tourism forecasts for 2015-2021 predict the estimated visitor expenditure numbers will increase by 48.5 percent to $11.1 billion by 2021, while the aim is to grow the international tourism volume by 6% a year and domestic tourism at 4% a year; and achieve a $41 billion total tourism revenue in 2025 through enhanced visitor experience and satisfaction (happier and longer stay with greater spending). This indicates a potential significant increase in demand for Part 135 passenger transport services. In particular, emerging markets such as China and India are expected to become important sources of customers, which may present cross-cultural service challenges to the Part 135 sector.

According to operator interviews, tourists have a general expectation that they will be safe. It is reported that there is very little pressure from tourists to conduct operations that could directly compromise safety. However, general market competition, and the influence of user feedback via social media on tourists' choices (such as Trip Adviser) have become critical factors of concern from a customer service perspective. Conversely, some overseas customers do at times resist instructions given by pilots and so may inadvertently create a potential hazard.

The New Zealand Tourism Industry (TIANZ)

The Tourism Industry Association New Zealand (TIANZ) is the only independent association that represents all sectors of New Zealand's large and diverse tourism industry. It has around 1,500 members making up around 85% of New Zealand's tourism turnover. The TIANZ supports the tourism industry by lobbying local and central government to shape policies and create a tourism-supportive environment, leading development of the industry's Tourism 2025 growth framework which aims to almost double annual tourism revenue to $41 billion by 2025, providing leadership on matters that impact on the competitiveness and success of the tourism industry, and delivering a comprehensive and diverse range of industry events.

---

4 Source: *Tourism 2015: Growing value together*. http://tourism2025.org.nz/assets/Documents/Tourism-2025-Summary.pdf

According to the interview with TIANZ associates, although the TIANZ has no direct interaction with the Part 135 sector, its operation is in close collaboration with the tourist-faced operators and their services. On the other hand, tourism air passenger transport safety and its subsequent global market influence is a priority area for TIANZ. Thus, the TIANZ mission is closely associated and benefits from safety performance of the Part 135 sector.

The Department of Conservation (DOC)

The Department of Conservation (DOC) is both a major institutional client and also grants access concessions to the Part 135 sector.

DOC manages 1/3 of New Zealand's land area (including 1/2 of the South Island) and a public network of 14,000 km of tracks and 976 huts. DOC welcomes over 1.5 million visitors to its 24 visitor centres, and 2.5 million (74%) of New Zealanders aged 18+ access the public conservation estate.

DOC has a strong connection with the Part 135 sector through both its internal tasks that require flying, as well as tourist passenger flights in its area of management for which concession from DOC is required.

According to the interview with DOC, there are now fewer operators who rely mainly on DOC work. The main craft type used in DOC work is rotary. Many DOC staff fly nearly every day, and so undertake annual health and safety training and refreshers for aviation activities.

According to its 2014 Annual Report, among all the incomes DOC collected on behalf of the Crown, over 76% of total revenue were from concessions, leases and licences in 2013 (77%) and 2014 (76.5%). Among all the revenue generated from concessions, leases and licences, aircraft landing makes up 11.2% and 7.5% in 2013 and 2014 respectively, equivalent to 8.6% and 5.8% of the total annual actual revenue.

After the 2013 restructure, DOC now has two main teams: The Conservation Services Team and the Conservation Partnership team. A new regional structure is in place that redefines the current geographical boundaries from eleven Conservancies to six Partnership regions and six new Service regions.

Associations:

The National Ambulance Sector Office (NASO):

The National Ambulance Sector Office (NASO) is a business unit within the Ministry of Health (MoH) that is jointly funded and governed by the Ministry and the Accident Compensation Corporation (ACC). It was first established in September 2008 and was confirmed by the Ministers of Health and ACC in June 2009, with the formal announcement of the New Zealand Ambulance Service Strategy. NASO is a funder and contract manager of fixed wing and 10 helicopter EMS service providers. Most of these helicopter service providers are established as community trusts. NASO also manages reports, certificates, compliance (such as service specifications), and reports of incidences that are relevant to ambulance services. NASO has a significant number of requirements for its providers.

Under NASO, the air ambulance sub-sector's main services include primary retrievals, non-emergency Inter-hospital Transfer (IHT). The local District Health Boards (DHBs) is another

main user of the air ambulance service, with relatively less strict requirements on the aircrew and contract selection than NASO.

NASO requires certificates and eligibility from its contractors. The standards and accreditation system is created and managed by Ambulance NZ, which provides quarterly reports to NASO to provide insights of operation status and occurrences.

According to the interview with the NASO, the need for Air Ambulance service used to be heavily injury-related and had a seasonal pattern, with heavy demand from ski areas in winter and Coromandel area over the summer. However, there is ongoing growth of air ambulance usage for medical events (e.g. heart attack), so the medical work is becoming relatively evenly spread across the year, and also becoming heavily used around South Island as the landscape makes road access relatively slow.

Ambulance New Zealand:

Ambulance NZ is a membership-based organisation for both rotary and fixed wing aircraft operators. It is a standards-setting body for the New Zealand EMS sub-sector. Membership of ANZ is a prerequisite for getting a contract from the National Ambulance Sector Office (NASO).

Ambulance NZ oversees the standards, quality, and qualification regime of the air ambulance system to ensure minimum common standards are met. It solely manages, and jointly own the Air Ambulance / Air Search and Rescue Standard (the AA/ASR Standard) with Aviation New Zealand. The AA/ASR Standard is safety-based (primarily patient safety aspects but also now aviation safety) and, and is adopted by Accident Compensation Corporation (ACC) and the Ministry of Transport (MOT) as a pre-requisite for contracts with NASO. Besides the general Part 135 rules and the Ambulance NZ standards, there are no other specific regulations for air ambulances in New Zealand.

Ambulance NZ solely manages the AA/ASR Standard, monitors and audits its members. It also engages in relevant education in paramedic practice of pilots and crew (winch operators, paramedics and pilots).

Ambulance NZ sets rigorous reporting requirements to its members without duplicating the CAA requirements. Any occurrence will be reported to NASO in addition to CAA.

There are currently about forty dispatch centres around New Zealand, among which there might be limited understandings of the capability of individual machines, equipment, crew, local geography and weather. In order to systematically improve safety, efficiency, and flight tracking of the sub-sector, Ambulance NZ is working with the Auckland Communication Centre for Air Ambulance to establish a national centre for dispatching rotary and other specialist dispatch. Such centralised approach is expected to enhance safety by ensuring only suitable craft are dispatched.

Summary:

Based on information provided in Section 4 the New Zealand government believes that demand for the services offered by Part 135 operators will increase markedly in the coming years, driven mainly by projected tourist numbers. Given the evident attraction of a large-aircraft airline career, obtaining and maintaining the pilot resource to support this demand for Part 135 operations may prove problematic.

5 Sector Feature Highlights

This section provides an overview of the sector features and is based on CAA data and insights from Navigatus' interviews with Part 135 operators and other stakeholders. The collation, modelling, and analysis of the CAA data was developed by Navigatus. However, due to the complexity of the CAA system and hence access to the data, some analysis was completed by the CAA. The page header indicates where within this report, the findings of this auxiliary analysis is presented.

The New Zealand Part 135 Sector is diverse in many ways. Overall, the majority of the operators certified to conduct activities under Part 135 ("Part 135 operators", see the Glossary section for detailed definition) have a single type of aircraft (rotary or fixed-wing) fleet, and there are more rotary-wing operators than fixed-wing operators. Besides small aeroplanes and helicopters, many Part 135 operators also own agricultural, medium, and large aeroplanes as well as sport aircraft. Moreover, the activities they perform often require these operators to also operate under other rule parts, such as Part 137, Part 121, Part 125, and/or Part 141.[5]

Analysis of the pilot groups operating under Part 135, insights obtained from the interviews (reflected in the risk profile in Section 3) and survey results (see Addendum) suggest there has been an ongoing trend of young fixed-wing pilots using Part 135 to earn hours and experience as a stepping stone to a large aircraft airline career. This results in an outflow of mid-career pilots from Part 135 to Part 121 and Part 125 operators, which in turn leads to an experience gap in the Part 135 sector as described in the risk profile in Section 3.

This section provides an overview of the key statistical features of the sector. Additional data is provided in Appendix I.

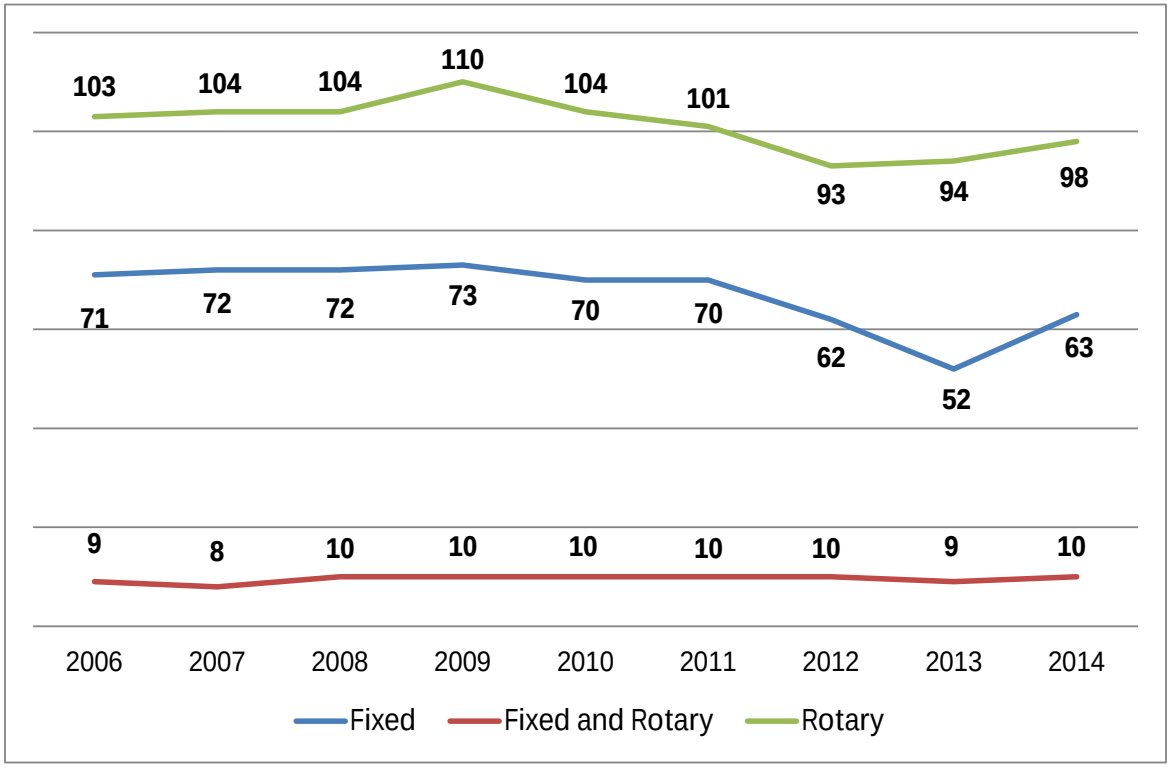
[5] Part 125 and Part 121 covers the operation of Medium and Large Aircraft respectively.
Part 137 covers the Agricultural Aviation sector and this sector has already been profiled.
Part 141 covers Training Organisations and a sector risk profile will also be covered in the future.

5.1 Part 135 Operators

Operators can hold Part 135 certificates for rotary and/or fixed-wing aircraft. From 1 January 2006 to 31 December 2014, there was an average of 178 certified Part 135 operators per year, with an average of 38 percent likely operating with small fixed-wing aircraft only, 57 percent with rotary-wing only, and 5 percent operating a mixed fleet.

Figure 5 shows the number of certified Part 135 operators was reasonably stable over this nine year period, with a slight peak around 2009 (193) and then a decline to a low of 155 around 2013 before a climb to 171 in 2014.

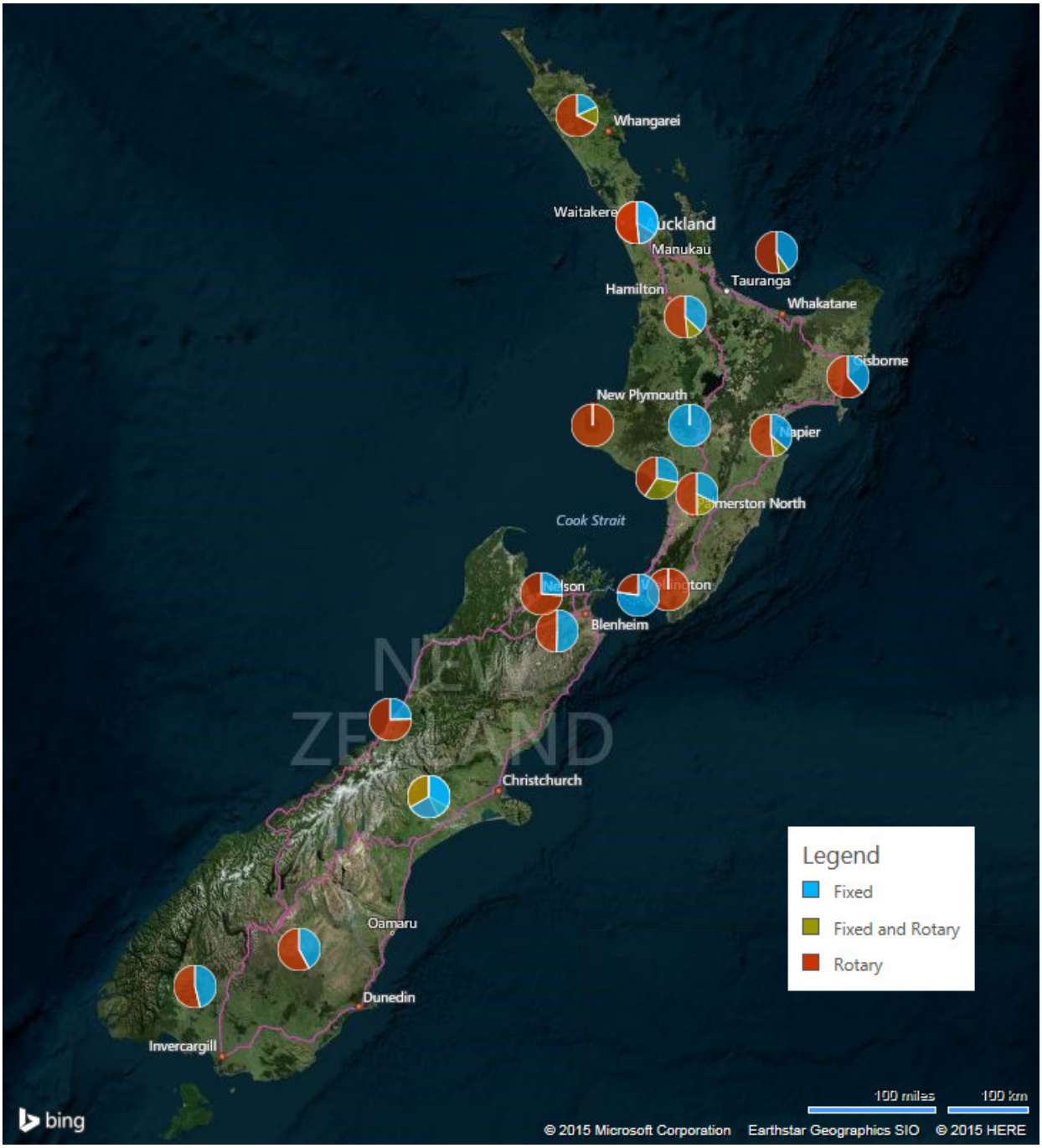
Figure 5: Counts of Part 135 Operators by certificate types held (2006-2014).



In both 2006 and 2014, Otago, Waikato, Southland, Bay of Plenty, Canterbury, Marlborough, and Auckland were the regions where the greatest number of Part 135 operators had their CAA registered address (as held by CAA). Otago has the largest number of Part 135 operators in both fixed wing and rotary categories; followed by Waikato, Canterbury, and Southland.

While it is probable the operator is operating in the location of their registered address, it is possible that this is not the case. This information should only be used an indication of where Part 135 operators are based. Figure 6 shows the general regions of registered addresses of Part 135 operators in 2014.

Figure 6: Distribution of Part 135 operators by company registered location and Part 135 certificate type (2014).

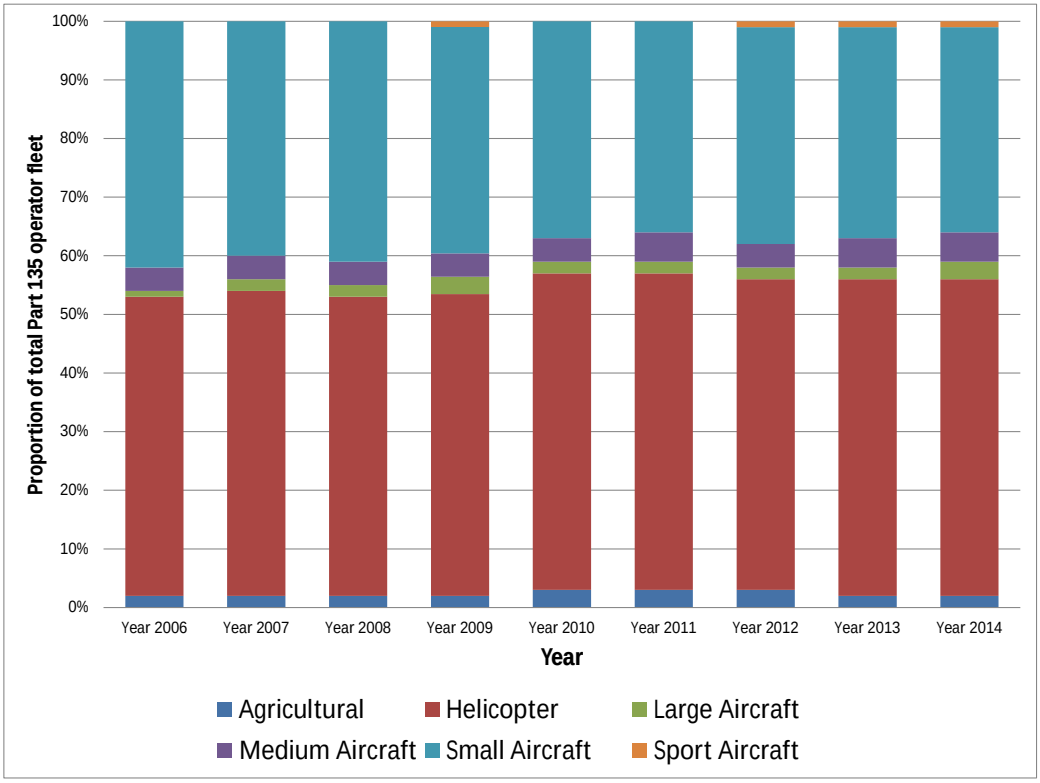


5.2 Part 135 Fleet

The aircraft-fleet profile of Part 135 operators varies in several aspects, including the type of aircraft (rotary or fixed-wing), fleet size, and aircraft age. Figure 7 shows the relative proportion of the fleet by aircraft category per year from 2006 to 2014.

Overall, between 2006 and 2014, the Part 135 operators identified by the CAA owned single and twin engine variants of helicopters, small aeroplanes, agricultural, medium aeroplanes, large aeroplanes, and sport aircraft. Some of these operators were authorised to conduct a wide range of activities under different rule parts (such as Part 137 and Part 125) in addition to Part 135.

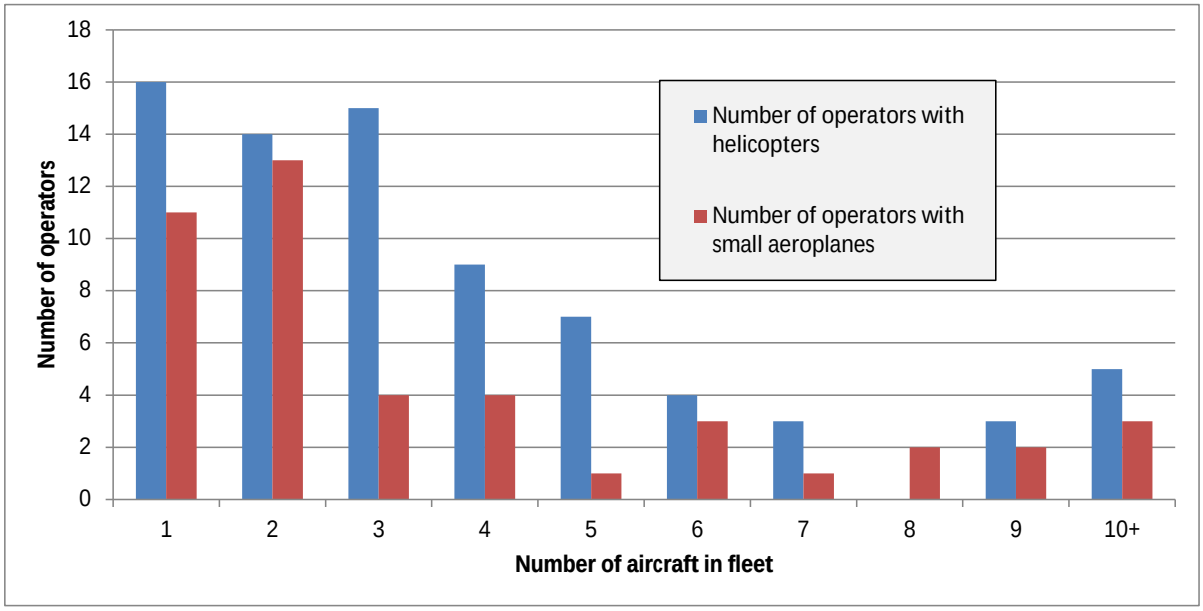
Figure 7: Proportion of total fleet of Part 135 operators by aircraft category (2006-2014)



As of December 2014, among the 130 current Part 135 operators with known fleet size, only six had a mixed fleet with both helicopters and small aeroplanes. The number of aircraft owned ranged from one to 27 (one small aeroplane operator). The fleet size is based on the number of aircraft registered to a known Part 135 operator. It is possible that not all aircraft were in use in 2014.

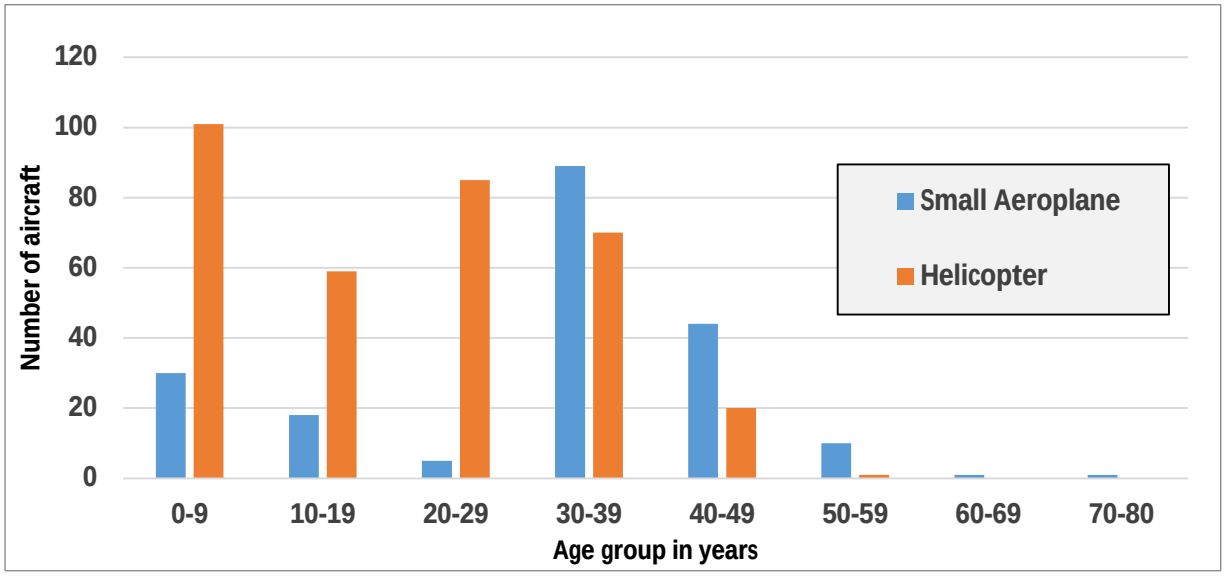
Figure 8 shows the number of Part 135 operators by fleet aircraft category and fleet size in 2014.

Figure 8: Count of Part 135 operators by current single aircraft category fleet size (2014).



For this report, the aircraft age is defined as the number of years from the year of manufacture to 2014. As of December 2014 for Part 135 operators, helicopters tended to be newer with a range from a few months to 52 years, and the majority (73 percent) younger than 30 years. By contrast, the small aeroplanes ranged from new to 80 years old, with the majority (73 percent) aged 30 years and older.

Figure 9: Count of Small Aeroplane and Helicopters Owned by Part 135 Operators by Age (as of 2014)



Aircraft age was not raised as a concern in the survey and interviews. However, insights obtained from operator interviews suggests that there are two main drivers behind a general reluctance to replace aircraft:

1) Lack of business certainty due to perceived uncertainty regarding landing concession criteria and duration, as well as potential changes in the regulations. For example, some operators purchased twin-engine helicopters following a requirement of guaranteed landing in the event of engine failure, but a subsequent application of the rule made the purchase seem less justified.

2) Financial concerns in relation to covering the cost of upgrading. With scenic and tourist aviation activities, the unpredictability of the weather conditions makes it hard to estimate the total number of hours an aircraft will be required to fly in a given period. This leads to the difficulty in evaluating costs against benefits when making investment decisions. Moreover, particularly for smaller operators, large investments such as purchasing new aircraft will mean a tightened financial situation and greater revenue pressure, which may require changes in the business or operation.

On the other hand, there are genuine motivations for operators to upgrade equipment and fleet such as for scenic operations; flying over national parks and high value tourist spots. Some operators have therefore, or are actively investing in noise control and upgrading to a more modern fleet to meet the regional operational requirements and provide an improved customer experience. In the Queenstown-Milford area, a previous wave of upgrading was said to have prompted other operators, who were originally hesitating and waiting, to upgrade. In general, an upgraded fleet is said to bring multiple positive effects, such as enhanced company image and attractiveness to passengers, less maintenance and repair issues, and greater capacity for the company to attract and retain pilots.

5.3 Part 135 Pilots

The pilot information analyses consisted of CAA system generated aggregated tables of pilots by age group, licence type, and status.

5.4 Part 135 Pilots vs. Part 121-125 Pilots

While CAA holds essential information on eligible pilots, pilot employment information for a Part 135 operator is not readily available. The CAA identified **3,222** pilots with active Class 1 Medicals, licensed Airline Transport Pilots Licence – Aeroplane (ATPL(A)) or Airline Transport Pilots Licence – Helicopter (ATPL(H)) or Commercial Pilots Licence (Aeroplane or Helicopter) (CPL(A) or CPL(H)), Senior Commercial Pilots Licence (SCPL) and likely to be actively flying. This pilot group was further divided into two sub groups:

- **"Part 135 Pilots" (N= 2,102)**, or 65 percent, of the total pilots are pilots who have only a CPL(A) or CPL(H) and a Class 1 Medical therefore only eligible to operate under Part 135.
- **"Part 121-125 Pilots" (N= 1,120)**, or 35 percent, of the total pilots have an ATPL(A) and a Class 1 Medical. It is assumed that pilots with an ATPL(A) will likely be flying large or medium aircraft in Part 121 or Part 125 operations. However, it is possible that some ATPL(A) pilots may be flying for Part 135 operations.

Note:

1) It is known that some pilots are licensed, medically certified, and type-rated to fly both fixed wing and rotary aircraft. No distinction has been made in this analysis and it is assumed that most pilots are flying either fixed wing or rotary aircraft.
2) It is likely that some pilots licensed to fly as "Part 121-125 Pilots" may not be flying for an operation with large or medium aircraft. The CAA does not collect information on the employment of pilots unless they are a senior person.
3) The data of those pilots most likely to be actively flying was produced in aggregated form so individual pilot data included age, ethnicity, and experience is not able to be analysed.

Pilots by Aircraft Category

As of August 2015, among the 2,102 Part 135 pilots, 65 percent, or 1366, had a fixed-wing CPL. This was nearly twice as many as the 736 pilots with rotary CPL and ATPL(H) Licences. By comparison, there are 1,120 fixed wing ATPL(A) pilots and 73 rotary wing ATPL(H) pilots.

Table 1. Count and percentage of Part 135 vs. Part 121-125 pilots by aircraft category and licence

Aircraft Category	Part 135 Pilots		Part 121-125 Pilots	
	Count of Pilots (ATPL(H) & CPL(A), CPL(H), SCPL)	Percentage (%)	Count Pilots (ATPL(A))	Percentage (%)
Fixed	1366	65	1120	100
Rotary	736 (73 ATPL(H))	35	0	0
Total	**2102**	**100**	**1120**	**100**

Table 2. Count of Part-135-only vs. Part 121-and/or-125 Pilots by Licence Type and Aircraft Category

Licence Type	Part 135	Part 121-125
ATPL(A) - Airline Transport Pilot Licence (Aeroplane)	0	1120
CPL(A) - Commercial Pilot Licence (Aeroplane)	1364	0
SCPL(A) - Senior Commercial Pilot Licence (Aeroplane)	2	0
ATPL(H) - Airline Transport Pilot Licence (Helicopter)	73	0
CPL(H) - Commercial Pilot Licence (Helicopter)	663	0
TOTAL	**2102**	**1120**

Pilots by Licence Type and Aircraft Category and Age

To achieve an Aeroplane or Helicopter ATPL, Pilots must hold a CPL and have a minimum general flight time experience (Aeroplane – 1500 hours, Helicopter – 1000 hours). The main difference between a CPL and an ATPL is an ATPL allows pilots to act as *pilot-in-command* of an aircraft that is required to be operated with a co-pilot and is engaged on an air transport operation or an operation for hire or reward. In addition, an ATPL requires demonstration of a greater depth of knowledge of aircraft and aviation. It is a requirement to hold an ATPL if a pilot wants to command a medium or large aircraft. As a result it is likely that those pilots who have achieved an ATPL(A) will endeavour to fly for an operator predominantly operating under a Part 121-125. It has been assumed as such for this risk profile, but it is possible that some ATPL(A) pilots are flying for a Part 135 operation.

In comparison, Table 3 shows the ages of the 1,120 Part 121-125 pilots were more evenly distributed:

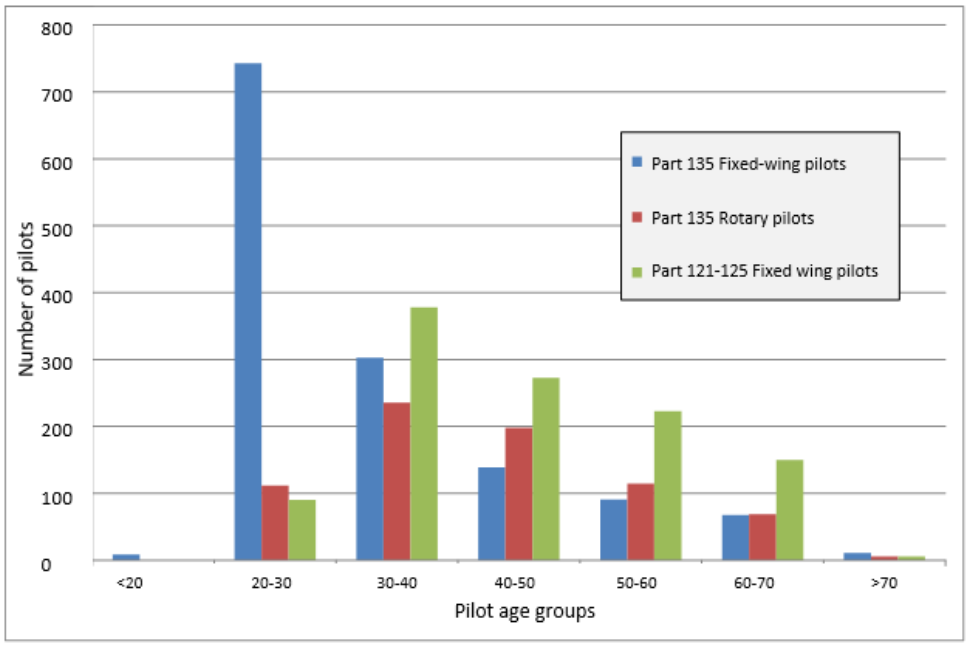
- The majority (58 percent) of the ATPL(A) pilots are aged 30-50 years, with only eight percent aged under 30. This likely reflects the ATPL(A) requirement for the general flight time experience.
- Fifty eight percent of Part 121-125 ATPL(A) pilots are aged over 40.

Table 3. Number of Part 135 vs. Part 121-125 pilots by age group and aircraft category

	Part 135		Part 121-125 Fixed (ATPL(A)	Total
Pilot age groups	**Fixed (CPL(A), SCPL(A))**	**Rotary (CPL(H), ATPL(H))**		
<20	9	0	0	9
20-30	744	112	90	946
30-40	303	236	378	917
40-50	138	198	273	609
50-60	91	115	223	429
60-70	69	69	150	288
>70	12	6	6	24
Total	**1,366**	**736**	**1,120**	**3,222**

Figure 10 shows the significant number of Part 135 fixed wing pilots aged under 30 years, which reflects the high pilot out-flux to airlines in this fixed wing sub-sector as stated in Risk Statement P-2. Navigatus' interviews with Part 135 operators suggest that the relatively low number of young rotary wing pilots seen in the data reflects that these pilots are operating in the oil and gas sector as opposed to a low in-take to the sector.

Figure 10: Count of Part 135 Fixed and Rotary Pilots and ATPL Pilots by Age Group and Aircraft Category



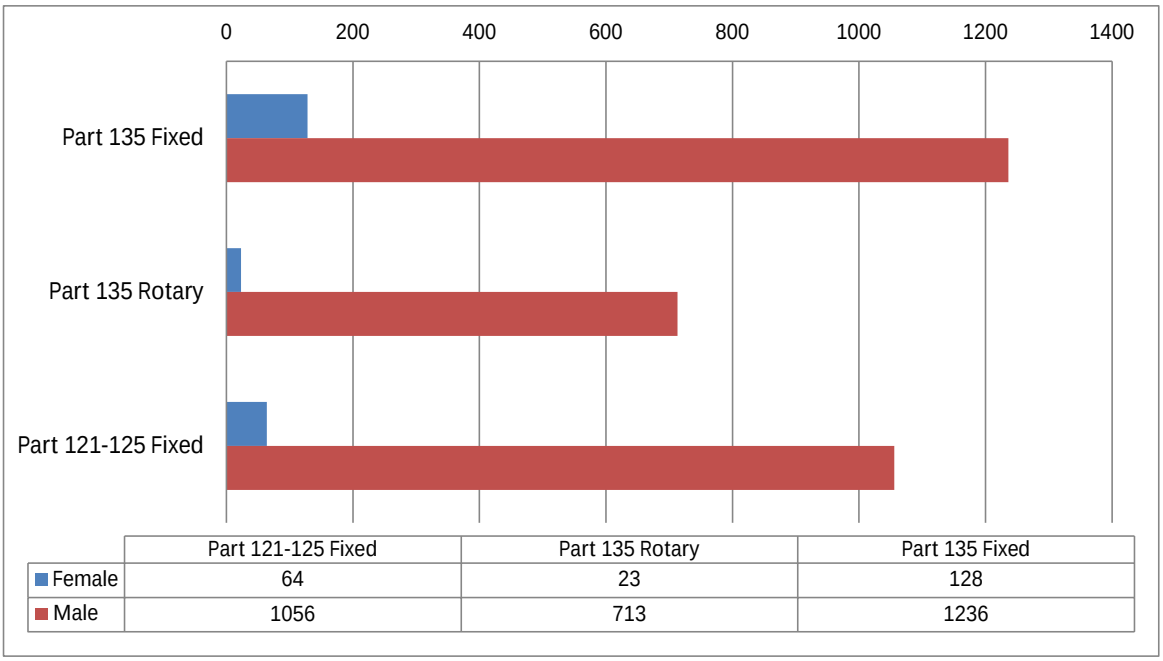
Pilots by Gender and Aircraft Category

As of September 2015, over 93 percent of the pilots in both the Part 135 and Part 121-125 groups were male. The overall female to male ratio within the Part 135 group was 1:13, compared with 1:18 in the Parts 121-125 group.

- Among the 2,102 Part 135 pilots, female pilots make up 9.5 percent of the fixed-wing only group), and 3.1% of the rotary-wing only group.
- The gender distribution among the 1,120 Part 121-125 pilots are predominantly male; only 5.7% of the ATPL fixed-wing pilots are female.

Figure 11 show the number of pilots by gender and aircraft category.

Figure 11. Count of Part-135-only Pilots by gender and aircraft category (N=3220) (as at Aug 2015)



	Part 121-125 Fixed	Part 135 Rotary	Part 135 Fixed
Female	64	23	128
Male	1056	713	1236

5.5 Aircraft Operating Statistics Data Analysis

The CAA collects quarterly Aircraft Operating Statistics (AOS) for all aircraft that perform hire and reward operations. Operators in the NZ civil aviation system are required to report hours, flights, the number of flights with passengers, and the number of flights with cargo. Complete data collection from operators is not always possible for a variety of reasons so often the AOS collections are incomplete. For the purposes of quarterly and annual reporting, the CAA has developed algorithms designed to estimate missing hours.

Navigatus attempted to analyse the information using the AOS data available but due to the variability in routine reporting rates by operators within the sector, the data was not sufficiently complete or robust enough to enable full analysis and interpretation of accident rates. This issue is being addressed in a recent effort by the CAA to contact under-reporting operators, and has led to improvement of reporting rates.

5.6 Accidents

Analysis of aviation accidents can assist regulators and industry to understand risk. The sector that operates under Part 135 is diverse in its personnel, aircraft, and activities. To gain the best understanding it was necessary to distil the accident data down to what was most relevant to the majority of sector operators. While there have been other accidents involving some Part 135 operators, it is likely they were operating under different certificates at the time and these will be dealt with in future sector risk profiles (or, in the case of agricultural aviation accidents, in the Agricultural Aviation Sector Risk Profile (2014)). The following section shows the gradual refining down of the accident analysis based on activity to accidents involving typical Part 135 activities.

5.6.1 All accidents involving helicopters and small aircraft of Part 135 Operators (2006-2014)

There were accidents involving operators certified under Part 135. However, 14 of these accidents did not involve a small aeroplane or helicopter so could have not have occurred during Part 135 operations. Table 4 shows the remaining 170 accidents involving Part 135 operators for all types of activities, 10 percent of which were fatal. The year of 2014 had the highest total fatal accident count (six accidents resulting in seven fatalities). However, most of the accidents may have occurred when operating under a different CAA Rule Part.

Table 4: The number of accidents involving part 135 operators by aircraft type and severity from 2006 to 2014

Aircraft type & severity	Year									
	2006	2007	2008	2009	2010	2011	2012	2013	2014	Totals
Helicopters	**9**	**7**	**18**	**6**	**10**	**17**	**11**	**12**	**12**	**102**
Fatal	1		1			2	1	2	4	**11**
Non-fatal	8	7	17	6	10	15	10	10	8	91
Small Aeroplanes	**5**	**5**	**10**	**10**	**12**	**7**	**3**	**11**	**5**	**68**
Fatal			2	1	1				2	**6**
Non-fatal	5	5	8	9	11	7	3	11	3	62
Totals	**14**	**12**	**28**	**16**	**22**	**24**	**14**	**23**	**17**	**170**

5.6.2 Accidents involving helicopters and small aircraft of Certified Part 135 Operators by nature of flight (2006-2014)

The nature of flight describes the activity or operation that was being conducted by the aircraft at the time of the accident. This is recorded at the time the accident is reported or following an

investigation. Nature of flight categories translate closely to the categories used when operators submit their aircraft operating statistics (see Section 8 for the CAA605B).

There were 170 accidents involving helicopters and small aeroplanes. Eighteen helicopter accidents occurred during 'transport passenger A to A and/or A to B' operations, and 14 accidents involved small aeroplanes during the same operations.

Table 5 shows the wide range of activities being undertaken by Part 135 operators when an accident has occurred. The yellow shading represents typical Part 135 type activities. However, it is possible, in the case of Ferry/positioning nature of flight category, the activity was in relation to another activity type such as agricultural or training. As a result, where it was possible to identify the related nature of flight of activity, these have been separated out.

Table 5: Number of accidents by nature of flight activity involving small aeroplanes and helicopters of Part 135 operators

Activity Type	Helicopters	Small Aeroplanes	Total
Training Dual	9	20	29
Agricultural	27		27
Transport Passenger A to B	13	12	25
Training Solo	3	20	23
Private Other	11	8	19
Other Aerial Work	13	1	14
*Ferry/positioning – Part 135	6	3	9
*Ferry/positioning – Other activities	3	1	4
Transport Passenger A to A	5	2	7
Hunting	4		4
Test	2	1	3
Air Ambulance	2		2
Aerial Application/Dropping	1		1
Flight Test	1		1
Search and Rescue	1		1
Policing	1		1
Total	**102**	**68**	**170**

*Analysis of the information revealed that Ferry/positioning operations were usually related to the final intended activity such as Passenger Transport A to B (Part 135) but also for other activities such as Agricultural operations (non-Part 135). Where it is possible to identify, the ferry/positioning accidents have been separated as per the intended activity.

5.6.3 Accidents involving Part 135 operators (2006-2014)

To better establish the risk around typical Part 135 operations, analysis was conducted on the 45 accidents that were identified as being most representative of Part 135 operations (yellow shaded activities in Table 5).

Analysis of the 45 accidents involving helicopters and small aeroplanes on Part 135 operations reveals that it is the early experience level pilots who are involved in the majority of accidents (orange shading – Table 6 and Table 7).

This finding draws attention to the importance of pilot experience and highlights the need to closely consider risk themes P1 (Developing Pilots) and P2 (Pilot Experience Gap) discussed in Section 3.5. There is an experience gap in the sector. This may be resulting in less

experienced pilots being exposed to aircraft and flight activities for which they are not fully prepared.

In those accidents involving associated activities (those accidents that involved certified Part 135 operator but may have occurred while operating under another CAA rule Part), the less experienced (1-1000 total hours) pilots are over represented (purple shading – Table 6 and Table 7) due to the number of accidents that occur during training activities.

Table 6: Count and percentage of Small Aeroplane and Helicopter Accidents by Pilot Total Hours (2006-2014) by activity

	Total number of accidents			Percentage among total accidents where hours were available		
Total hours groups	**Part 135 activities**	**Associated activities**	**Total**	**Part 135 activities**	**Associated activities**	**Total**
1-1000	10	44	54	24%	51%	43%
1001-2000	8	16	24	20%	19%	19%
2001-3000	10	6	16	24%	7%	13%
3001-4000	5	7	12	12%	8%	9%
4001-5000	1	4	5	2%	5%	4%
5001-6000	2	2	4	5%	2%	3%
6001-7000	0	1	1	0	1%	1%
7001-8000	0	3	3	0	3%	2%
8001-9000	1	0	1	2%	0	1%
9001-10000	1	3	4	2%	3%	3%
10001+	3		3	7%	0	2%
Total accidents where hours were available	41	86	127	100%	100%	100%
Not available	6	32	38			
Grand Total	**45**	**125**	**170**			

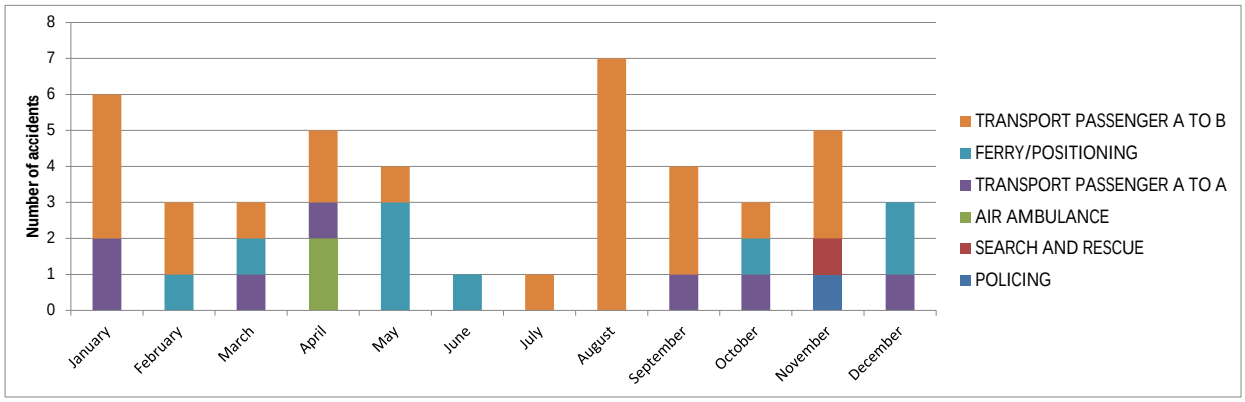
Table 7 shows the percent and count of small aeroplane and helicopter accidents by total pilot hours on-type, where this data was available. Hours on-type data refers to the number of hours the pilot had flown on the specific helicopter or small aeroplane type that was involved in the accident.

Table 7: Count and percentage of Small Aeroplane and Helicopter Accidents by Pilot Hours on-type (2006-2014) by activity

	Total number of accidents			Percentage among total accidents where hours were available		
Hours on-type groups	**Part 135 activities**	**Associated activities**	**Total**	**Part 135 activities**	**Associated activities**	**Total**
1-100	8	34	42	21%	37%	32%
101-200	7	16	23	18%	17%	17%
201-300	5	5	10	13%	5%	8%
301-400	2	2	4	5%	2%	3%
401-500	5	9	14	13%	10%	11%
501+	12	27	39	31%	29%	30%
Total accidents where hours were available	39	93	132	100%	100%	100%
Not available	6	32	38			
Grand Total	**45**	**125**	**170**			

Figure 12 shows the number of accidents involving Part 135 operators on Part 135 activities by month. It is evident there are peaks in January, April, August, and November. In addition, July through November were months with higher number of accidents while conducting transport passenger A to B activities from 2006-2014. However, a seasonal or monthly link to accident risk is unclear as, the sample size is limited (45) and concerns about flight safety related to a particular time of year were not raised by operators during interviews.

Figure 12: The number of accidents by month and flight activity involving Part 135 operators on Part 135 activities (2006-2014)



5.6.4 Accidents while on Passenger Transport A to B AND A to A operations

Passenger transport is a key area of Part 135 operations. As shown in Table 5, of the 45 accidents involving typical Part 135 operations, most accidents occurred while operators were conducting Passenger Transport (A to A and A to B) operations (32 of 45 Part 135 accidents).

Further analysis of those 32 accidents revealed that:

- Twenty-five accidents (78 percent) occurred while on A to B operations and seven on A to A operations;
- Twenty-two accidents (69 percent) occurred during the take-off (N=5) or landing (N=17) phase of flight;
- Eighteen accidents (56 percent) involved helicopters, 14 (44 percent) involved small aeroplanes.

In terms of the location of these 32 accidents:

- Nineteen accidents (59 percent) occurred at a remote location, (As can be expected, helicopters formed the majority of these: 74 percent);
- Twelve accidents (38 percent) occurred at or near an aircraft base, among which 9 (75 percent of these 12 accidents) involved small aeroplanes.

Where total pilot hours and hours on-type data was available (30 of 32 accidents):

- Twenty-three accidents (74 percent) involved pilots with less than 3000 total flying hours;
- Sixteen accidents (53 percent) involved pilots with less than 300 hours on-type.

5.7 Accident Data Analysis Summary (2006-2014)

During the nine-year period between 2006 and 2014, there were 184 total accidents involving operators certified under Part 135. However, 14 accidents did not occur in a small aeroplane or helicopter so are not counted under Part 135, and therefore, there were 170 accidents involving helicopters and small aeroplanes and Part 135 operators from 2006 to 2014.

This sector risk profile has focussed on 45 of those 170 accidents that involved typical Part 135 activities including transport passenger A to A and A to B, ferry/positioning (not agricultural or training related), search and rescue, and air ambulance. There was additional focus on the passenger transport activities of these 45 accidents and the 32 accidents to involve passenger transport specifically. The information explored in this section is presented here:

- Passenger transport is a key area of Part 135 operations. As shown in Table 5, of the 45 accidents involving typical Part 135 operations, most accidents occurred while operators were conducting Passenger Transport (A to A and A to B) operations (32 of 45 Part 135 accidents).

  Further analysis of those 32 accidents revealed that:

  - Twenty-five accidents (78 percent) occurred while on A to B operations and seven on A to A operations;
  - Twenty-two accidents (69 percent) occurred during the take-off (N=5) or landing (N=17) phase of flight;
  - Eighteen accidents (56 percent) involved helicopters, 14 (44 percent) involved small aeroplanes.

- In terms of the location of these 32 accidents:

  - Nineteen accidents (59 percent) occurred at a remote location, (As can be expected, helicopters formed the majority of these: 74 percent);
  - Twelve accidents (38 percent) occurred at or near an aircraft base, among which 9 (75 percent of these 12 accidents) involved small aeroplanes.

- Where total pilot hours and hours on-type data was available (30 of 32 accidents):

  - Twenty-three accidents (74 percent) involved pilots with less than 3000 total flying hours;
  - Sixteen accidents (53 percent) involved pilots with less than 300 hours on-type.

- The months of January, April, August, and November recorded the highest number of accidents. However, a monthly or seasonal risk theme was not raised in discussions with stakeholders. This together with the small sample size means that, a direct link between monthly or seasonal operations and apparently increased accident risk cannot necessarily be inferred.

These results provide further evidence to support the risk statement presented in Section 3 that pilot experience is crucial for operation safety, and the current pilot experience-gap represents a risk to the sector's safety performance.

6 Summary

The New Zealand Rule Part 135 sector is an important contributor to the nation's passenger transport and tourism industries, and will become more so given the growth of global high-value tourists in the foreseeable future. The Part 135 sector's safety performance thus bears considerable social and economic importance for New Zealand, and the nation's global reputation as a tourism destination.

The CAA initiated this risk profiling study to help better understand the Part 135 sector and its risk profile as part of future efforts at influencing and supporting the sector with the aim of continuously improving the safety performance. The sector and its stakeholders' active involvement and significant input during the project is evidence of a supportive attitude and an emphasis on safety among its operators and pilots; and suggests that improving operation safety is increasingly seen as a shared goal among the regulator, the sector, and associated stakeholders.

This comprehensive risk profiling exercise has identified a range of important factors that influence sector safety performance, or where there are indications that the performance is not improving and may be deteriorating. Knowledge of these factors can be used to focus efforts to address the safety performance of the Part 135 sector. Many of the leading operators across the sector are aware of the need to drive safety performance and would engage positively with the CAA's efforts to address these issues.

The diversity of Part 135 operators in terms of location, niche market, fleet size, scope of operation, and service activities indicates that a "one size fits all' approach to regulatory oversight and intervention almost certainly would not work. Instead, an acknowledgement of such diversity, and the fact that ultimately, delivering safe operations lies in the pilots' hands, who in this sector almost always operate on a single-pilot basis and in uncontrolled environments and often to unattended aerodromes. For these reasons, the risk profile in this study was developed on a pilot-centred framework. This model allowed for the operational diversity by factorising organisational, regulatory, and social context in terms of their influence on the pilot and their decision making capacity and cognitive state. Based on this framework, analysis of CAA data, online survey, operator workshops, and stakeholder interviews, a series of risk statements were developed and used to describe the sector's risk profile.

Based on the past nine years of data, the CAA occurrence records suggest that the sector has seen a rising trend of overall accident numbers, with fatal accidents occurring nearly every year with a notable number in 2014.

The most prominent risk-leveraging factors identified based on interviews and surveys, and evident by data analysis results and framed within a pilot-centred model are found to be:

- Directly relevant to the cockpit and in-flight context and the decisions made, are the pilots' experience and attitude, the company culture and communication, the management's focus on supporting pilots and development of the right attitude.
- Surrounding these core factors is the sector context, where there has been improvement in the awareness of safety and sharing of safety practices. However, a sector-wide pilot experience-gap due to pilot outflow to larger airlines, and the variation of sub-sector standard and individuals' interpretation of the rules are important factors.

The long term influence of some key clients' on the ability to plan and resource for safety is also identified as an important factor.

- At the industry and sector level, there is a wide perception that the regulator-sector relationship has been improving, and that mutual trust, close collaboration, and more frequent communication between the two is crucial. The sector expects the regulator to provide guidance for understanding rules, address fleet-wide and sector-wide issues, and to resource support for the sector's continuous learning and development. The regulator auditing process is perceived as of inconsistent quality, and it is felt that improvements in certain aspects could promote sector engagement and compliance.

CAA comment 8: The CAA provides substantial guidance on rules through its website, in Vector magazine, and through its safety promotion team. For further information, visit CAA.govt.nz/Safety-info/.

The analysis of accident data involving Part 135 operators provides evidence to support some of the themes identified by the stakeholder interviews. In particular, the analysis exposed the critical role of overall and on-type pilot experience as a factor in accidents.

The Addendum of this report (presented as a separate document) provides detailed insights into operator-manager and pilot views as well as suggestions on how pilots, operators, regulators, and key stakeholders can contribute to the sector's safety performance.

Furthermore, collaboration among companies and individuals within the sector is recognised as important and helpful in improving sector standards and safety performance. User groups, collaborated resourcing for part-specific operational pilot training, sub-sector operational standards, and experience sharing among operators and pilots have been suggested as potentially helpful approaches.

Overall, in the multi-facetted environment of pilots, operators, regulator, and stakeholders, as well as the regulatory model and societal forces; risk factors are intertwined and multi-faceted. Broader-level and complex factors such as culture influence both directly and indirectly on a pilots' performance. Therefore, when applying the findings and in decision making on risk mitigation efforts, a holistic view should be adopted. This view should be informed by the risk themes identified, the risk statements and the risk matrix developed and presented in this report.

CAA Comment 9: The CAA acknowledges the diverse nature of the Part 135 sector. SMS booklet 3: Implementing safety management systems - Guidelines for small aviation organisations states "There is no one-size-fits-all SMS. You can make your systems, processes and activities as small or large as required, as long as they meet SMS objectives."

Appendix I – Part 135 Sector Features

7 Part 135 Sector Features

7.1 Source of Data

The following Part 135 sector description is based on CAA data on operator registration, aeroplane registration, and pilot registration. It includes information on operators, fleet, and primary stakeholders.

7.2 Definitions

Please refer to the Glossary section at the beginning of this report for definitions of terminologies, such as “Part 135”, “Part 135 operators”, “Part 135 aircraft”, and “Part 135 fleet”.

7.3 Part 135 Operators

Operator by profile

The purpose of Part 135 is to prescribe the operating requirements for air operations, air transport and commercial transport operations, for aeroplanes that have a passenger seating configuration of nine seats or less, excluding any required crew member seat, or a MCTOW of 5,700 kg or less, and for helicopter operations carried out by the holder of an Airline or a General Aviation Air Operator Certificate issued under Part 119 of the Rules.

Between 2006 and 2014 (both years inclusive), there was an average of 178 operators certified under Part 135, with 38 percent (an average of 67) certified to operate small fixed-wing aircraft only, 57 percent (an average of 101) certified to operate rotary only, and five percent (an average of 10) certified to operate a mixed fleet of fixed-wing and rotary aircraft.

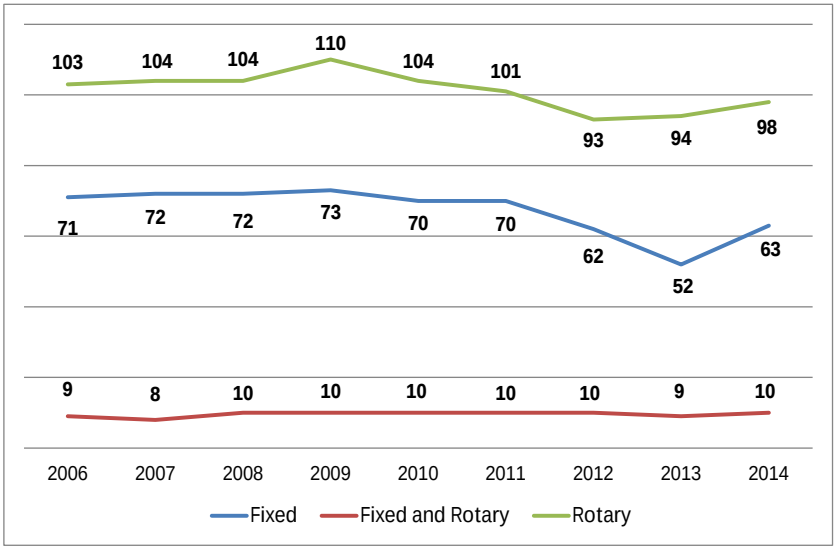
Within this period, the number of certified Part 135 operators peaked around 2009 and then declined to the lowest around 2013, and then showed a rebound in 2014. Table 8 and Figure 13 shows the number of operators by fleet type (rotary, fixed wing, mixed).

It should be noted that it is possible a Part 135 certified operator may not be conducting any operations under Part 135.

Table 8. Counts of Part 135 Operators by Profile (2006-2014)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	Average	%
Fixed Wing	71	72	72	73	70	70	62	52	63	67	38%
Rotary	103	104	104	110	104	101	93	94	98	101	57%
Mixed Fleet	9	8	10	10	10	10	10	9	10	10	5%
Total	**183**	**184**	**186**	**193**	**184**	**181**	**165**	**155**	**171**	**178**	

Figure 13. Counts of Part 135 Operators by fleet type (2006-2014)



Operation Activities

CAA 605B – Aircraft Operations Statistics – Aeroplanes, Helicopters and Balloons (Enclosure I), provides a list of official classifications and explanations of aircraft operation activities. Rule Part 135 was designed to cover the operators engaged in Passenger Air Transport, primarily Transport Passenger A to A and A to B and Helicopter activities. In general, most fixed wing operators will be conducting primarily passenger transport, while Helicopters operations are much more diverse. Operators have submitted aircraft operating statistics covering a wide range of activities.

The activities listed include but are not limited to the following:

Traditional Part 135 activities:	Other activities usually under other certificates:
u Transport passenger A to B, u Transport passenger A to A, u Advertising u Air ambulance, u Search and rescue, u Policing, u Freight, u Ferry/positioning, u Survey/inspection, u Commercial photography, u Business and executive flights,	u Training solo and dual u Aerobatics, u Hunting, u Parachuting, u Aerial application/dropping, u Construction, u Surveillance, u Towing, u Experimentation, u Agricultural, u Demo (including air show), u Military, u Mustering, u Test, flight test, u Ferry/positioning, u And other unspecified aerial work.

There is an element of uncertainty about the specific activities, ferry/positioning has been placed in both columns. The table above has been used as the basis for the accident analysis.

7.4 Part 135 Fleet

Part 135 fleet by category

Between 2006 and 2014 (both years inclusive), Part 135 operators owned an average of 821 aircraft, of which 53% (an average of 436) were helicopters, 38% (an average of 315) were fixed-wing small aeroplanes, and 4% (an average of 37) were medium aeroplanes. In addition, 2% of these 821 aircraft owned by these operators also included agricultural and large aeroplanes (16 and 14 on average), and 1% (an average of 4) were sport aircraft.

(Note: The following breakdowns (Table 9 and Figure 14) show a slightly different overall number of aircraft due to missing data on various factors such as manufacture date and engine type.)

Table 9. Counts of Aircraft Owned by Part 135 Operators (2006-2014).

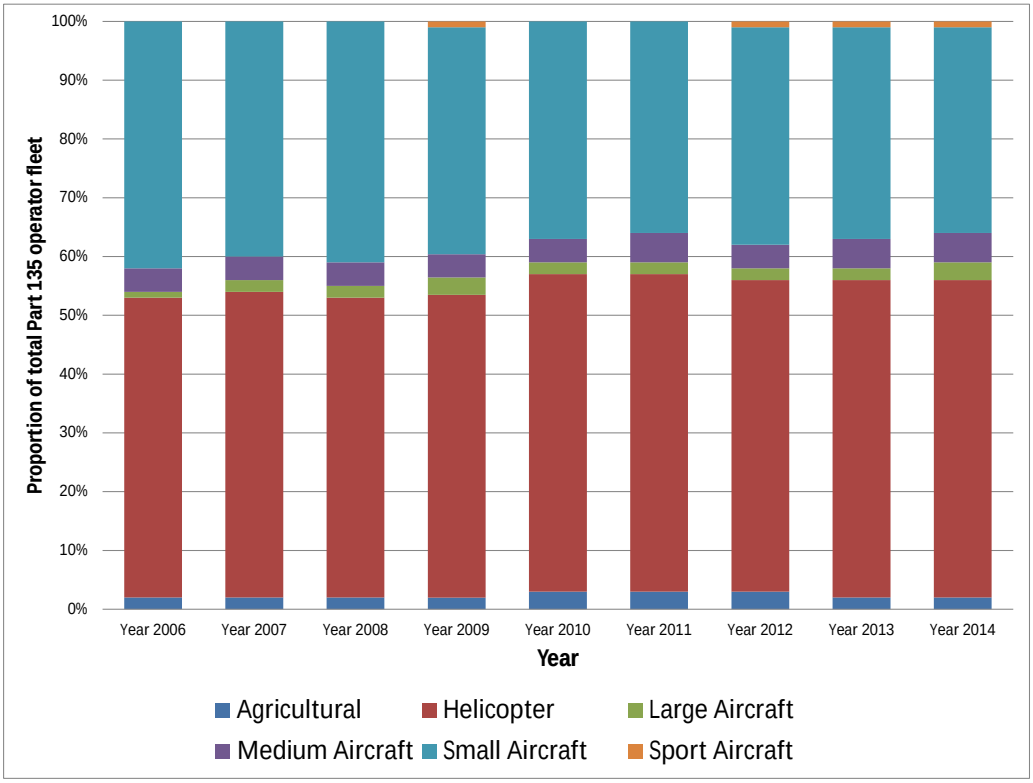
	2006	2007	2008	2009	2010	2011	2012	2013	2014	Average	%
Small Aeroplanes	354	336	349	363	318	309	296	250	262	315	38%
Helicopters	431	437	445	471	462	468	421	382	404	436	53%
Agricultural Aeroplanes*	15	16	15	13	15	18	17	17	14	16	2%
Large Aeroplanes**	9	12	12	19	12	14	16	13	15	14	2%
Medium Aeroplanes***	35	36	37	39	34	40	36	33	41	37	4%
Sport Aircraft	2	3	3	4	3	3	8	6	6	4	1%
Total	**846**	**840**	**861**	**909**	**844**	**852**	**794**	**701**	**742**	**821**	**1**

* Agricultural Aeroplanes are used almost exclusively for agricultural operations, usually by an organisation that is also certified under part 137. While an Ag aircraft might be owned and/or operated by an operator certified to operate under Part 135, it is almost certainly not used for air transport or other commercial transport activities under Part 135.

** Large aircraft can only be operated by operators certified under Part 121.

*** Medium aircraft can only be operated by operators certified under Part 125.

Figure 14. Counts of Aeroplanes Owned by Part 135 Operators (2006-2014)



Part 135 fleet by aircraft age

As of December 2014, there was a total of 584 aircraft with known manufacture dates owned by Part 135 operators. Among these aircraft, there were 336 helicopters, 198 small aeroplanes, 33 medium aeroplanes, 14 large aeroplanes, 14 agricultural aeroplanes, and three sport aircraft. Figure 15, Figure 16, and Table 10 show the age distribution of these aircraft. However the focus of this sub-section will be on small aeroplanes and helicopters.

Table 10: Count of Current Aircraft Owned by Part 135 Operators by Age (as of 2014)

	Part 135 aircraft					Aircraft likely used in associated operations					
Aircraft Age (years)	Small Aeroplane	Helicopter	Total Part 135	Percentage of total Part 135 aircraft		Agricultural Aeroplane	Large Aeroplane	Medium Aeroplane	Sport Aircraft	Total other aircraft	% of total fleet
0-9	30	101	131	25%		0	2	3	3	8	13%
10-19	18	59	77	14%		9	0	8	0	17	27%
20-29	5	85	90	17%		1	9	13	0	23	36%
30-39	89	70	159	30%		3	1	8	0	12	19%
40-49	44	20	64	12%		1	0	0	0	1	2%
50-59	10	1	11	2%		0	1	0	0	1	2%
60-69	1	0	1	0%		0	0	1	0	1	2%
70-80	1	0	1	0%		0	1	0	0	1	2%
Total	**198**	**336**	**534**	**100**		**14**	**14**	**33**	**3**	**64**	**100**

Aircraft age in this report is defined as years between the manufacture date and December 2014. The age of the 198 small aeroplanes owned by Part 135 operators ranged from one to 80 years old, with an average age of 34.8 years. The majority (73.2%) of these small aeroplanes were 30 years and older, with 67.2 percent concentrated between 30-49 years.

The 336 helicopters owned by Part 135 operators ranged in age from less than a year to 52 years old, with an average age of 23.3 years. Over half (52.4%) were 20 years and older, but the majority (72.9%) of these helicopters were below 30 years, with 30.1 percent nine years and below. In addition, 20.8% were between 30-39 years of age, with only 6.3 percent being 40 years and above.

Figure 15. Count of Current Small Aeroplanes and Helicopters Owned by Part 135 Operators by Age (as of 2014)

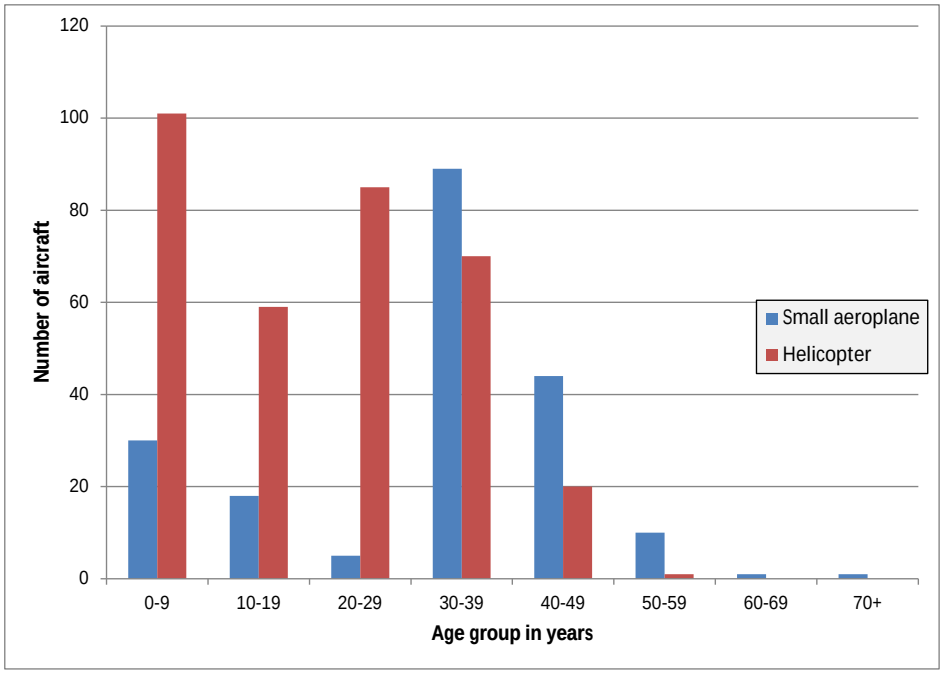
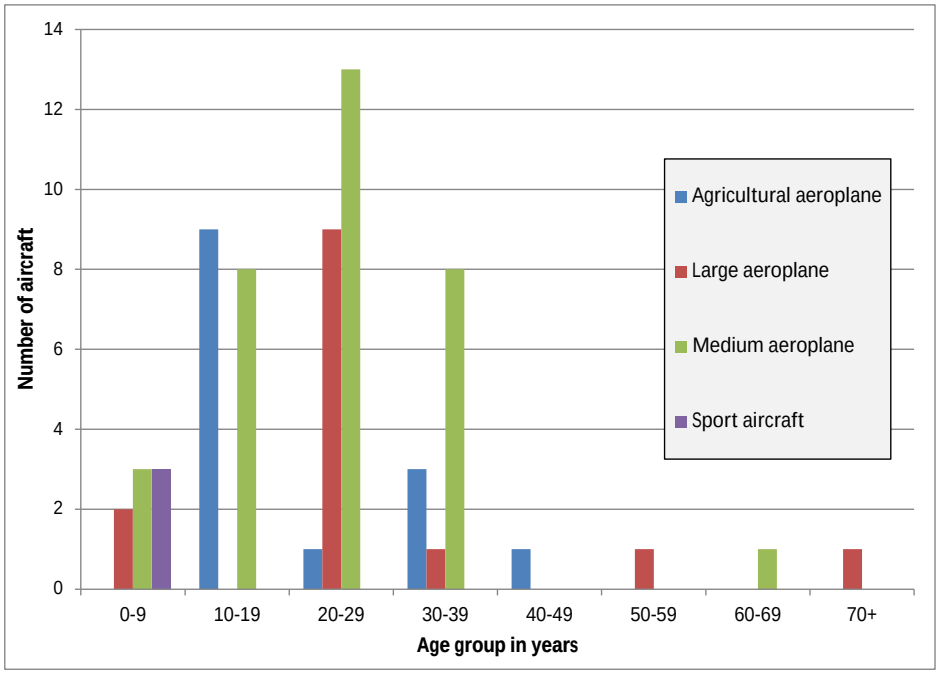


Figure 16. Count of Current Agricultural, Large, Medium Aeroplanes and Sport Aircraft Owned by Part 135 Operators by Age (as of 2014)



Part 135 fleet by number of engines and a/c type

As of December 2014, there was a total of 534 aircraft with a known number of engines owned by Part 135 operators. Among these aircraft, there were 300 single-engine and 36 twin-engine helicopters, compared with 154 single-engine and 42 twin-engine small aeroplanes. See Table 11 and Figure 17. The types of engine are set out in Table 12 and Figure 18.

Table 11. Count of Current Small Aeroplanes and Helicopters Owned by Part 135 Operator Number of Engines (2014)

Engine configuration	Helicopters	Small Aeroplanes	Total
Single-Engine	300	154	454
Double-Engine	36	42	78
Triple-Engine	0	2	2
Total	**336**	**198**	**534**

Figure 17. Count of Current Small Aeroplanes and Helicopters registered under Part 135 operators by aircraft type and number of engines (2014)

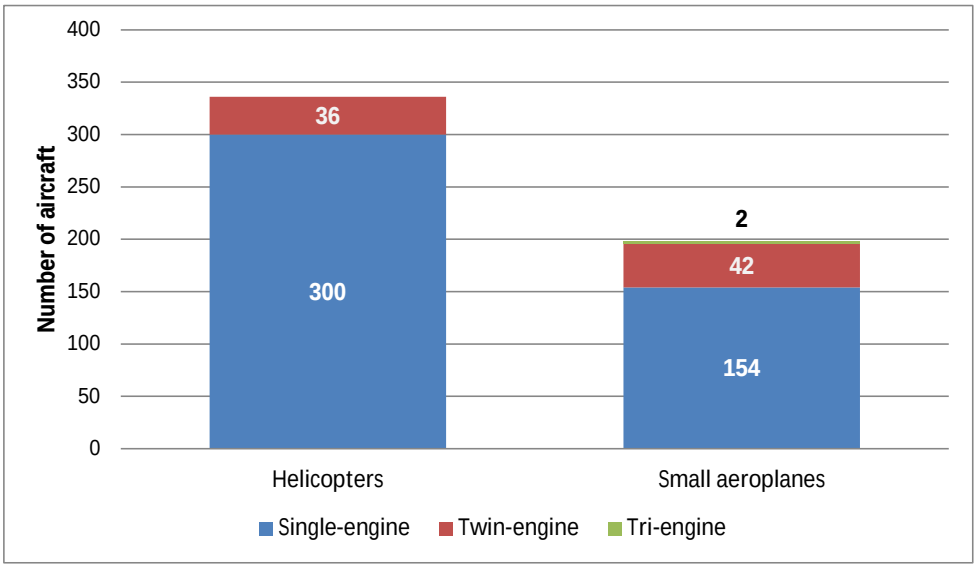
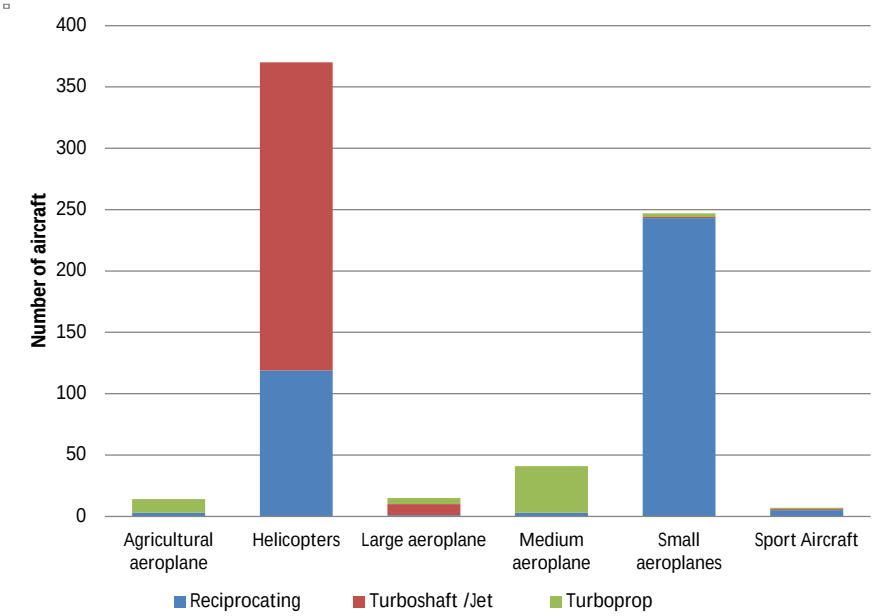


Table 12 shows the count of engine types for small aeroplanes and helicopters registered to Part 135 operators.

Table 12. Count of current small aeroplanes and helicopters owned by engine type (2014)

Engine type	Helicopters	Small Aeroplanes	Total
Reciprocating (RE)	119	243	362
Turboshaft /Jet (T)	251	1	252
Turboprop (TP)	0	3	3
Total	**370**	**247**	**617**

Figure 18. Count of aircraft registered under Part 135 operators by aircraft type and engine type (2014)



Part 135 owner-fleet by size

As of December 2014, among the 130 current Part 135 operators with a known fleet size, six had mixed fleet with both helicopters and small aeroplanes. Across the 130 Part 135 operators, the number of aircraft owned ranged from one (21.1% of operators for helicopters, and 25% of operators for small aeroplanes) to 27 (2.3% of operators for small aeroplanes).

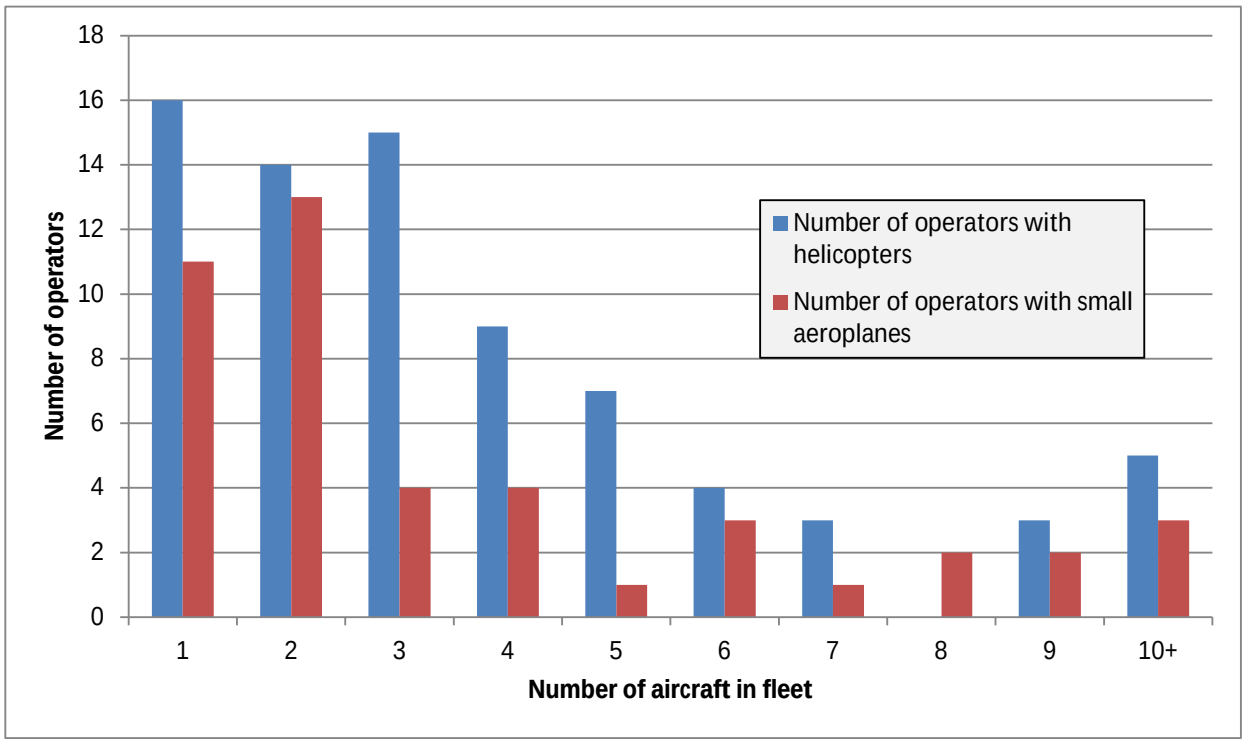
Table 13 and Figure 19 show the number of aircraft owned by operators. Among the 76 helicopter operators, 71% owned four aircraft and below, 39.5% have no more than two helicopters, and 21.1% were single-craft operators. At the higher end, 9.1% owned 8 to 12 helicopters, and the largest rotary fleet belonged to one operator with 19 helicopters.

In terms of the 44 small aeroplane operators, fleet size was more concentrated at the lower end, with 72.7% having no more than four aeroplanes, 54.5% having two aeroplanes and fewer, and 25% being single-aircraft operators. At the higher end, 11.3% had 8 to 12 aeroplanes, there were two operators with 16 and one with 27 small aeroplanes each.

Table 13. Count of current Part 135 operator by fleet size (2014)

Number of aircraft owned	Count of operators per number of aircraft owned			
	Operators with helicopters	Percentage (%)	Operators with small aeroplanes	Percentage (%)
1	16	21.1	11	25.0
2	14	18.4	13	29.5
3	15	19.7	4	9.1
4	9	11.8	4	9.1
5	7	9.2	1	2.3
6	4	5.3	3	6.8
7	3	3.9	1	2.3
8	0	0.0	2	4.5
9	3	3.9	2	4.5
10+	5	6.5	3	6.9
Total	**76**	**100%**	**44**	**100%**

Figure 19. Count of current Part 135 operator by fleet size (2014)



This page is intentionally left blank

Appendix II – Part 135 Accidents and Incidents (2006-2014)

8 Part 135 accidents and incidents (2006-2014)

8.1 Source of Data

Annual Aircraft Operating Statistics (AOS) are determined using a combination of data submitted by operators and an estimation based on the data submitted and previous years data. While the accuracy of the estimation would benefit greatly by increased operator submission of data, at a macro level, the CAA considers the estimation process is robust. For the purposes of this risk profile, the AOS for the sector were examined closely. However, due to the inconsistency and evidence of significant gaps in the hours reported to the CAA, it was concluded that per hour rates would not be appropriate for this analysis. Any incident rate calculated based on the reported hours flown would not be considered accurate or representative. The use of such rates would therefore undermine the reliability and validity of the result. Therefore, this review employs calculations based on incident and accident counts to ensure result reliability.

The following occurrence (accident and incident) information is based on CAA data on all occurrences involving part 135 operators between 2006 and 2014 (both years inclusive).

8.2 Definition

Please refer to the Glossary section at the beginning of this report for definitions of terminologies, such as “Occurrence”, “Accident”, “Incident”, “Part 135”, “Part 135 operators”, “Part 135 aircraft”, and “Part 135 fleet”. It is important to understand that the occurrences refer to all occurrences *involving* part 135 operators. This means that they could have simply reported the occurrence to the CAA or, in the case of an airspace incident, be reporting on the actions of another aircraft involved. The occurrences should not be viewed as a measure of occurrence rate, rather as a count of the involvement of Part 135 operators in aviation occurrences. Occurrences can be reported by Air Traffic Control services, aviators, and any member of the public.

8.3 Part 135 occurrence overview

During 2006 through 2014,there were a total of 8,883 occurrences reported to the CAA that involved operators with a Part 135 certificate; from all types of flight activities (not just while engaged in Part 135 activities). Below is a brief overview of these occurrences:

- In general, there were 3,218 occurrences involving small aeroplane (68 accidents, 1,184 airspace incidents, 344 unspecified incidents, 128 aerodrome incidents, 911 defects, and 364 bird-related occurrences), compared with 3,653 helicopter occurrences (102 accidents, 383 airspace incidents, 401 unspecified incidents, 13 aerodrome incidents, 1233 defects, and 34 bird-related occurrences).

8.4 Part 135 accident overview

The accidents that involved Part 135 operators during the nine-year period involved pilots with a mixed level of experience, and a variety of activities. Fourteen of the 184 total accidents involving operators certified under Part 135 did not involve helicopters or small aeroplanes. Of the remaining 170 total accidents involving helicopters and small aeroplanes from 2006 to 2014:

- Fatal accidents involving Part 135 small aircraft and helicopters have occurred during each year from 2008, with the year 2014 seeing more fatal accidents (6) than the previous three years combined (5). Irrespective of actual sector operating hours, this difference indicates deterioration in the sector operator's safety performance.
- Fifty-five percent involved pilots with 3,000 or less total hours (93 out of 170), and 32 percent (54 out of 170) involved pilots with 1000 or less total flying hours;
- Sixty percent (102 of 170) involved helicopters of which 17 percent (17 of 102) involved pilots with 1000 or less total flying hours;
- Forty percent (68 of a 170 involved small aeroplanes of which 54 percent (37 of 68) involved pilots with 1000 or less total flying hours;

Accidents involving Part 135 operators by aircraft category (2006-2014)

Among the 184 accidents involving Part 135 operators, the majority (170) involved helicopters and small aeroplanes as expected. For both small aeroplanes and helicopters, total accident counts increased noticeably from 2007 to 2008, then have fluctuated between 15 and 25 total accidents per year to 2014.

Table 14. Count of All Accidents by Part 135 Operators by Aircraft Category (2006-2014)

Aircraft Category	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Small Aeroplane	5	5	10	10	12	7	3	11	5	68
Helicopter	9	7	18	6	10	17	11	12	12	102
Agricultural Aeroplane	0	0	3	0	0	1	1	0	0	5
Large Aeroplane	0	0	0	0	0	0	0	0	1	1
Medium Aeroplane	1	0	1	1	0	0	0	0	0	3
Sport Aircraft	1	0	0	0	1	0	0	2	1	5
Total	**16**	**12**	**32**	**17**	**23**	**25**	**15**	**25**	**19**	**184**

Figure 20: Count of All Accidents by Part 135 Operators by Aircraft Category (2006-2014)

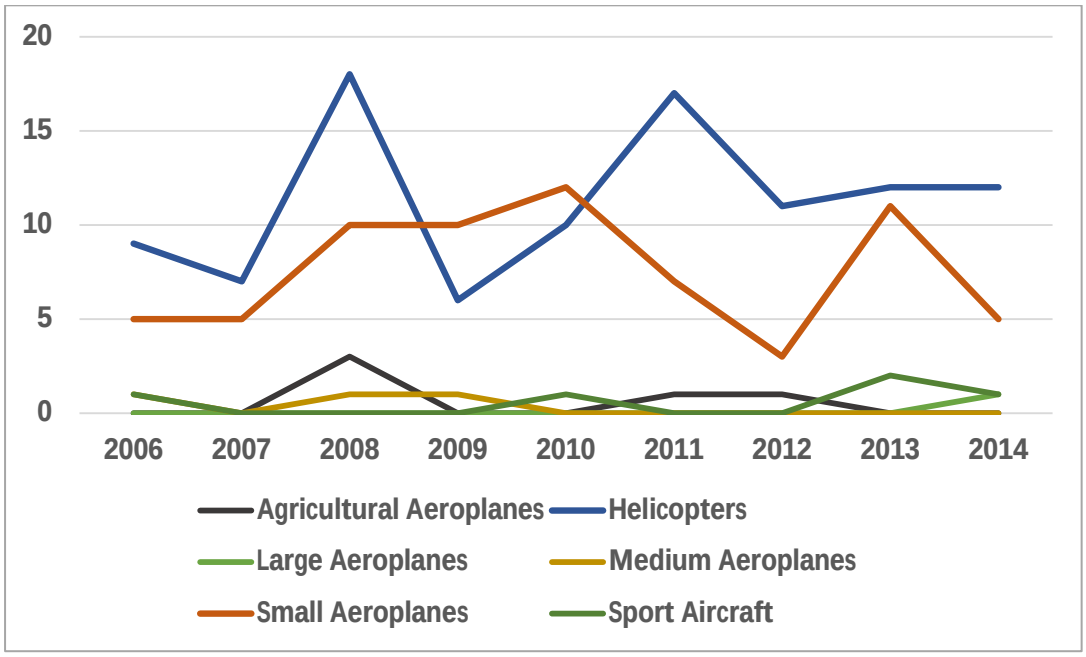
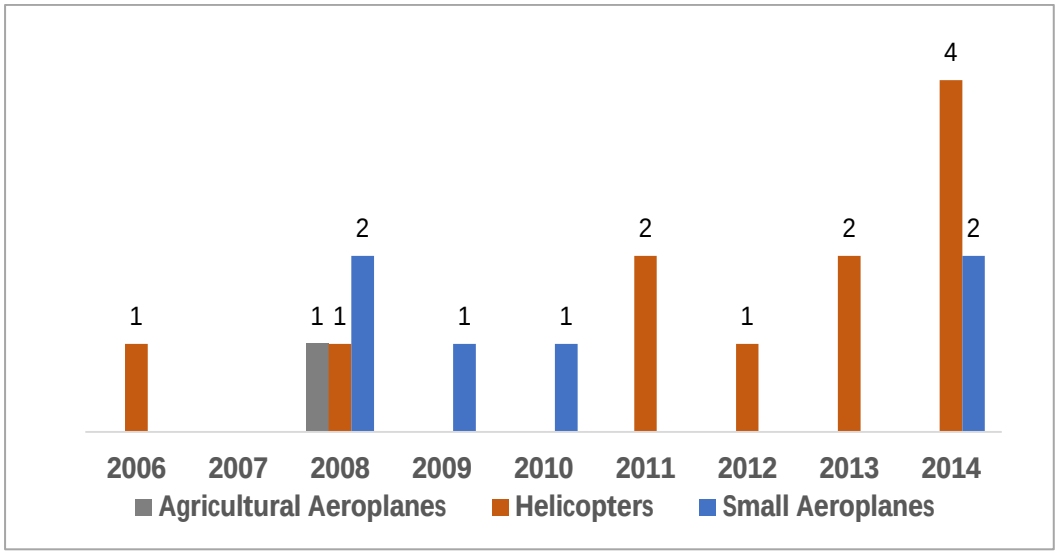


Table 15 and Figure 21 show the 18 fatal accidents involving Part 135 operators between 2006 and 2014 (both years inclusive). There were 11 accidents involving helicopters, six accidents involving small aeroplanes, and one accident involving an agricultural aeroplane. However, of the 18 fatal accidents in nine years, six (five helicopter, one small aeroplane) occurred during Part 135 operations (ferry/positioning (3), transport passenger A to B (2), and search and rescue (1).

Table 15. Count of Fatal Accidents by Part 135 Operators by Aircraft Category (2006-2014)

Aircraft Category	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Agricultural Aeroplane	0	0	1	0	0	0	0	0	0	1
Helicopters	1	0	1	0	0	2	1	2	4	11
Small Aeroplane	0	0	2	1	1	0	0	0	2	6
Total	**1**	**0**	**4**	**1**	**1**	**2**	**1**	**2**	**6**	**18**

Figure 21. Count of all fatal accidents by Part 135 operators by aircraft category (2006-2014)



Small aeroplane and helicopter accidents by nature of flight – All accidents

There is a total of 170 accidents involving Part 135 operators between 2006 and 2014 with small aeroplanes and helicopters.

As shown in Table 16, these 170 accidents involved 102 helicopter and 68 small aeroplane events. Within these 170 accidents, 45 involved typical Part 135 activities, namely: transport passenger A to B, transport passenger A to A, search and rescue, air ambulance, policing, and ferry/positioning.

The largest number of Part 135 helicopter accidents occurred during transport passenger A to B, similar to the largest groups of Part 135 accidents for small aeroplane. There were a total of 25 accidents from transport passenger A to B and seven from transport passenger A to A.

Table 16. Small Aeroplane and Helicopter Accidents – Count of All Accidents by Nature of Flight per Aircraft Category (2006-2014)

Activity type	Helicopters	Small Aeroplanes	Total
Total - Part 135	**28**	**17**	**45**
Transport Passenger A to B	13	12	25
Ferry/positioning	6	3	9
Transport Passenger A to A	5	2	7
Air Ambulance	2		2
Search And Rescue	1		1
Policing	1		1
Total - Other	**74**	**51**	**125**
Training Dual	9	20	29
Agricultural	27		27
Training Solo	3	20	23
Private Other	11	8	19
Other Aerial Work	13	1	14
Ferry/positioning	3	1	4
Hunting	4		4
Test	2	1	3
Aerial Application/dropping	1		1
Flight Test	1		1
Total	**102**	**68**	**170**

Table 17. Small Aeroplane and Helicopter Accidents – Count of All Accidents by Nature of Flight by Year (2006-2014)

Activity type	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Total - Part 135	**3**	**2**	**6**	**6**	**4**	**6**	**3**	**8**	**7**	**45**
Transport Passenger A to B		1	6	4	2	3	3	2	4	25
Ferry/positioning	1				1	1		5	1	9
Transport Passenger A to A	1	1		2	1	1			1	7
Air Ambulance								1	1	2
Search And Rescue						1				1
Policing	1									1
Total - Other	**11**	**10**	**22**	**10**	**18**	**18**	**11**	**15**	**10**	**125**
Training Dual	2	2	3	3	5	3	1	5	5	29
Agricultural	2	2	7		3	2	6	2	3	27
Training Solo	1	2	6	3	3	3	2	2	1	23
Private Other	2	1	3	2	3	3	1	4		19
Other Aerial Work	3	2	1	1	3	2		2		14
Ferry/positioning	1		1			2				4
Hunting				1		1	1		1	4
Test					1	2				3
Aerial Application/dropping		1								1
Flight Test			1							1
Grand Total	**14**	**12**	**28**	**16**	**22**	**24**	**14**	**23**	**17**	**170**

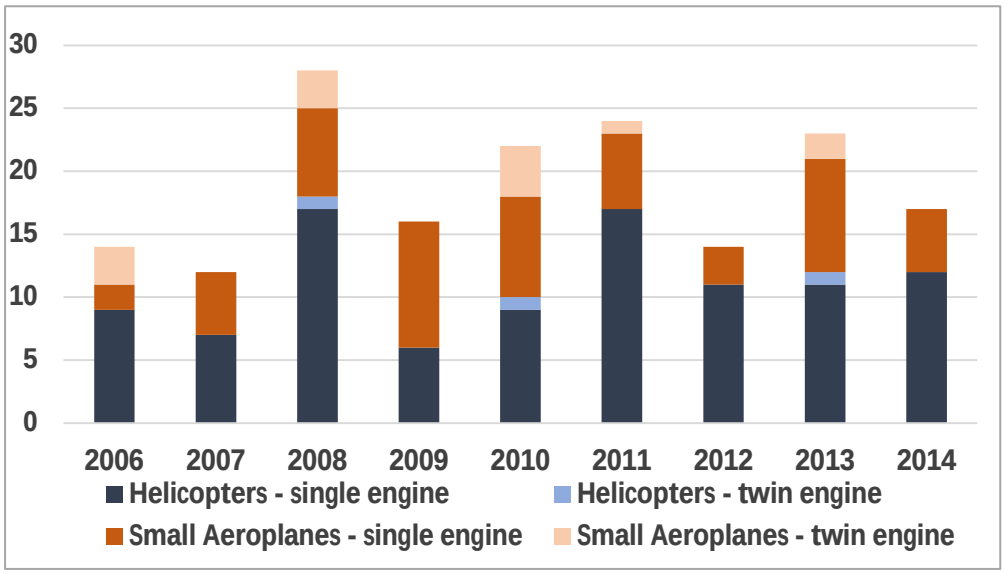
Small aeroplane and helicopter accidents by number of engines

Between 2006 and 2014 (both years inclusive), the majority of accidents by Part 135 certified operators involved single-engine helicopters (a total of 99 accidents out of 170) and single-engine small aeroplanes (a total of 55 accidents out of 170).

Table 18. Small Aeroplane and Helicopter Accidents – Count of All Accidents by number of engines (2006-2014)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Helicopters - single engine	9	7	17	6	9	17	11	11	12	99
Helicopters - twin engine	0	0	1	0	1	0	0	1	0	3
Small Aeroplanes - single engine	2	5	7	10	8	6	3	9	5	55
Small Aeroplanes - twin engine	3	**0**	3	0	4	1	**0**	2	**0**	13
Total	**14**	**12**	**28**	**16**	**22**	**24**	**14**	**23**	**17**	**170**

Figure 22: Small Aeroplane and Helicopter Accidents – Count of All Accidents by number of engines (2006-2014)



Small aeroplane and helicopter accidents by pilot hours

Table 19 and Table 20 show the count and percentage of all small aeroplane and helicopter accidents involving part 135 and associated operations by pilot total hours and pilot hours on-type.

Table 19. Count and percentage of Small Aeroplane and Helicopter Accidents by Pilot Total Hours (2006-2014) by activity.

Total hours groups	Total number of accidents			Percentage		
	Part 135 activities	Associated activities	Total	Part 135 activities	Associated activities	Total
1-1000	10	44	54	24%	51%	43%
1001-2000	8	16	24	20%	19%	19%
2001-3000	10	6	16	24%	7%	13%
3001-4000	5	7	12	12%	8%	9%
4001-5000	1	4	5	2%	5%	4%
5001-6000	2	2	4	5%	2%	3%
6001-7000	0	1	1	0	1%	1%
7001-8000	0	3	3	0	3%	2%
8001-9000	1	0	1	2%	0	1%
9001-10000	1	3	4	2%	3%	3%
10001+	3		3	7%	0	2%
Total accidents where hours available	41	86	127	100%	100%	100%
Not available	6	32	38			
Grand Total	**45**	**125**	**170**			

Table 20. Count and percentage of Small Aeroplane and Helicopter Accidents by Pilot Hours On-Type (2006-2014) by activity.

Hours on-type groups	Total number of accidents			Percentage		
	Part 135 activities	Associated activities	Total	Part 135 activities	Associated activities	Total
1-100	8	34	42	21%	37%	32%
101-200	7	16	23	18%	17%	17%
201-300	5	5	10	13%	5%	8%
301-400	2	2	4	5%	2%	3%
401-500	5	9	14	13%	10%	11%
501+	12	27	39	31%	29%	30%
Total accidents where hours available	39	93	132	100%	100%	100%
Not available	6	32	38			
Grand Total	**45**	**125**	**170**			

Small aeroplane and helicopter accidents by region

Between 2006 and 2014 (both years inclusive), at 10 events West Coast and Queenstown have the largest accumulated number of helicopter accidents, followed by Canterbury (8), and Auckland (7) and Northland (7). For small aeroplanes, Manawatu-Wanganui and Canterbury have the largest accident number at nine each, followed by Queenstown-lakes, Taranaki, Hawke's Bay, and Auckland (5). Altogether, Canterbury with 17 and Queenstown-lakes with 15 are the regions with the highest total accident counts.

Small aeroplane and helicopter accidents by phase of flight

Table 21 shows from 2006 to 2014, the largest group of accidents occurred during landing (23 helicopters and 34 fixed-wing accidents), followed by cruising (20 helicopters and 7 fixed-wing accidents) and take-off (8 helicopters and 7 fixed-wing accidents). There were two groups of helicopter-only accidents: 1) There were 10 accidents involving helicopters engaging in agricultural manoeuvres; and 2) there were 11 accidents that occurred when helicopters were parked with the engine running, and in 7 cases the helicopters were left unattended.

Table 21. Count of Small Aeroplane and Helicopter Accidents by phase of flight (2006-2014)

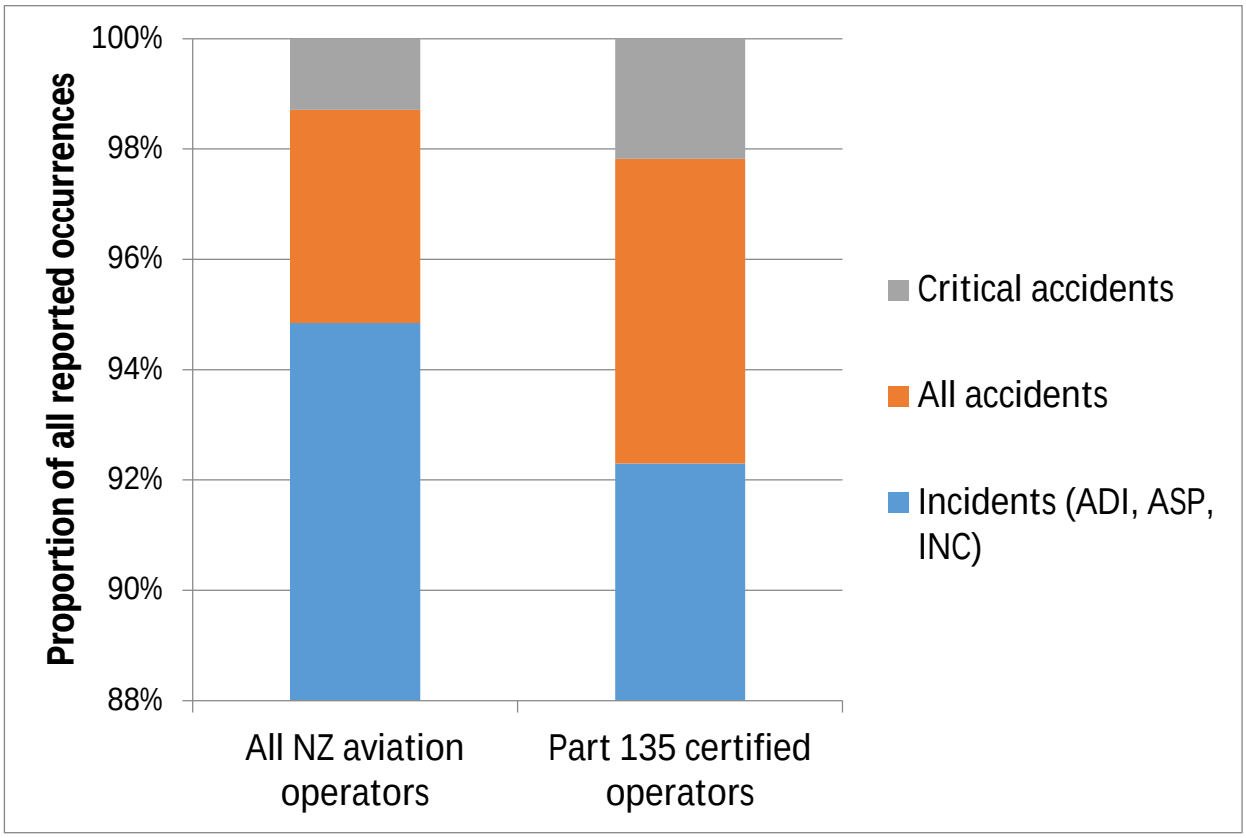
Phase of Flight	Helicopters	Small Aeroplanes	Total
Landing	23	34	57
Cruise	21	8	29
Takeoff	8	7	15
Parked	11	0	11
Agricultural manoeuvres	10	0	10
Climb	6	3	9
Hover	9	0	9
Taxiing	0	8	8
Approach	3	4	7
Unknown	4	2	6
Hover taxi	3	0	3
Circuit	1	2	3
Descent	3	0	3
Total	**102**	**68**	**170**

8.5 Part 135 Incident Counts

All incidents reported by Part 135 operators (2006-2014)

Between 2006 and 2014 (both years inclusive), there were a total of 2,841 incidents (including aerodrome, airspace, and unspecified incidents) reported by Part 135 operators 1656 involved small aeroplanes and 797 helicopters. Among all the incidents, there were 1,747 airspace incidents (ASP), 926 aircraft incidents (INC), and 168 aerodrome incidents (ADI). Figure 23 shows that accidents and critical accidents of Part 135 operators make up a greater proportion of the all those ADI, ASP, and INC occurrences reported to the CAA, than the overall proportion for all operators in the NZ aviation environment.

Figure 23: The proportion of accidents and critical accidents of ADI, ASP, and INC occurrences (2006 to 2014).



8.6 Accident occurrences

There were 184 accidents involving Part 135 operators. Of those, 170 involved small aeroplanes and helicopters, the remainder involving other aircraft types operated by the Part 135 operators, likely under other certificates. The following section identifies those accidents and explores further into the fatal accidents.

Table 22 shows the number of occurrences involving operators with Part 135 small aeroplanes and helicopters, and also where those operators may also be operating aircraft outside of the Part 135 operations.

Table 22. Count of All Occurrences Types per Aircraft Owned by Part 135 Operators (2006-2014)

	Part 135		Associated operations					
Occurrence Type	**Small Aeroplane**	**Helicopter**	**Medium Aeroplane**	**Large Aeroplane**	**Agricultural Aeroplane**	**Sport Aircraft**	**Unspecified Aircraft Type**	**Total**
Accident	68	102	3	1	5	5	0	184
Airspace Incident	1184	383	136	19	3	22	131	1878
Aircraft Incident	344	401	88	70	17	6	23	949
Aerodrome Incident	128	13	17	3	5	2	9	177
Defect occurrence	911	1233	351	415	120	31	33	3094
Aviation Related Concern	167	1469	59	8	13	4	245	1965
Bird strike occurrence	364	34	82	27	11	2	14	534
Navigational Installation Occurrence	3	1	1	2	0	0	5	12
Dangerous Goods	1	1	2	3	0	0	0	7
Promulgated Information Occurrence	0	0	1	0	0	0	0	1
Total	**3218**	**3653**	**747**	**549**	**175**	**72**	**469**	**8801**

Table 23 shows the flight activity for helicopters when an accident occurred. Table 23 and Table 24 show most fatal accidents for both helicopters and small aeroplanes occurred during Part 135 type activities.

Table 23. Count of All accidents involving Helicopters by flight activity (2006-2014)

	Helicopters	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Part 135	**Fatal**										
	TRANSPORT PASSENGER A TO B									1	1
	SEARCH AND RESCUE						1				1
	FERRY/POSITIONING								2	1	3
Other	TRAINING DUAL						1				1
	FLIGHT TEST			1							1
	AGRICULTURAL							1		2	3
	PRIVATE OTHER	1									1
Total helicopter fatal accidents		1		1			2	1	2	4	11
Part 135	**Non-fatal**										
	TRANSPORT PASSENGER A TO B			3	2		1	3	1	2	12
	TRANSPORT PASSENGER A TO A	1			1	1	1			1	5
	AIR AMBULANCE								1	1	2
	POLICING	1									1
	FERRY/POSITIONING – PART 135						1		2		3
Other	FERRY/POSITIONING – OTHER			1							1
	TRAINING DUAL		1	1	1	1	1	1	1	1	8
	TRAINING SOLO			2						1	3
	TEST					1	1				2
	AERIAL APPLICATION/DROPPING		1								1
	OTHER AERIAL WORK	3	2		1	3	2		2		13
	HUNTING				1		1	1		1	4
	AGRICULTURAL	2	2	7		3	2	5	2	1	24
	PRIVATE OTHER	1	1	3		1	3		1		10
Total helicopter non-fatal accidents		8	7	17	6	10	15	10	10	8	91
Total helicopter accidents		**9**	**7**	**18**	**6**	**10**	**17**	**11**	**12**	**12**	**102**

Table 24 shows the flight activity for small aeroplanes when an accident occurred. Most fatal and non-fatal accidents occurred during Part 135 type activities.

Table 24. Count of All accidents involving small aeroplane by flight activity (2006-2014)

	Small Aeroplanes	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Part 135	**Fatal**										
	TRANSPORT PASSENGER A TO B									1	1
Other	TRAINING DUAL					1					
	TRAINING SOLO			1	1						
	OTHER AERIAL WORK			1							1
Total small aeroplane fatal accidents		0	0	2	1	1	0	0	0	2	6
Part 135	**Non-fatal**										
	TRANSPORT PASSENGER A TO B		1	3	2	2	2		1		11
	TRANSPORT PASSENGER A TO A		1		1						2
	FERRY/POSITIONING – PART 135	1				1			1		3
Other	FERRY/POSITIONING – OTHER	1									1
	TRAINING DUAL	2	1	2	2	3	1		4	3	18
	TRAINING SOLO	1	2	3	2	3	3	2	2		18
	TEST						1				1
	PRIVATE OTHER				2	2		1	3		8
Total small aeroplane non-fatal accidents		5	5	8	9	11	7	3	11	3	62
Total small aeroplane accidents		**5**	**5**	**10**	**10**	**12**	**7**	**3**	**11**	**5**	**68**

8.7 Accidents involving Part 135 operations.

All Fatal accidents involving helicopters and small aeroplanes of Part 135 operators (2006-2014)

Between 2006 and 2014 (both years inclusive), there were 170 accidents involving Part 135 operators in helicopters and small aeroplanes under all types of activities. Among these accidents, 45 involved typical Part 135 operations of which five were fatal. Table 25 shows the number and activity of accidents by aircraft type and Table 26 presents basic details of the 45 accidents.

Table 25: Number of accidents involving helicopters and small aeroplanes on Part 135 activities from 2006-2014.

Activity	Helicopters	Small Aeroplanes	Total
Transport Passenger A to B	13	12	25
Ferry/Positioning	6	3	9
Transport Passenger A to A	5	2	7
Air Ambulance	2		2
Search and Rescue	1		1
Policing	1		1
Total	**28**	**17**	**45**

Table 26: Accident details involving Part 135 operators, helicopters and small aeroplanes 2006-2014 on Passenger Transport Activities.

Occ. No.	NOF	Year	Month	Description	Fatal /Non Fatal	Aircraft type	Location
06/4608	TRANSPORT PASSENGER A TO A	2006	December	Whilst engaged in air transport operations aircraft moved sideways during lift off and impacted with the side of the Mount Ruapehu Crater Rim. The aircraft was destroyed during the subsequent roll-over.	Non-fatal	Helicopters	Mount Ruapehu
06/4143	POLICING	2006	November	The helicopter was flying north to the Punakaiki Rocks area when it had a wire strike. It landed on the beach and all four occupants vacated the machine. The pilot was slightly injured by Perspex windscreen debris.	Non-fatal	Helicopters	Punakaiki (north)
06/4799	FERRY /POSITIONING	2006	December	It was reported that an aircraft incurred a double engine failure shortly after departing from TG. A forced landing was made in an estuary at Te Puna.	Non-fatal	Small Aeroplanes	Tauranga
07/4172	TRANSPORT PASSENGER A TO B	2007	November	Airways reported aircraft ended up inverted on RWY34 after having 'line up' instructions.	Non-fatal	Small Aeroplanes	Wellington Ad
07/1118	TRANSPORT PASSENGER A TO A	2007	April	After a normal approach the initial landing roll seemed normal, the pilot retracted the manual flap then applied brakes to no effect. So the	Non-fatal	Small Aeroplanes	Elfin Bay

				pilot carried out a ground-loop. The aircraft skidded through the fence on to the left side of the strip breaking its nose-gear and damaging some other parts before stopping.			
08/3331	TRANSPORT PASSENGER A TO B	2008	August	The helicopter was about to land at a hut to drop the passengers when it encountered a slight tail wind that resulted in the helicopter spinning around and settling into some trees before dropping to the ground.	Non-fatal	Helicopters	Paringa
08/3218	TRANSPORT PASSENGER A TO B	2008	August	Pilot encountered flat light conditions whilst positioning for an recce of a landing site. During deceleration a rate of descent developed that could not be countered before the aircraft struck the ground. Right drift at touchdown and the right hand skid catching a hidden fence wire caused dynamic rollover onto its right-hand side.	Non-fatal	Helicopters	Leaning Rock
08/1971	TRANSPORT PASSENGER A TO B	2008	May	A helicopter landed in a remote area to drop off passengers and was struck by a campervan as it drove through the area. The helicopter suffered substantial damage.	Non-fatal	Helicopters	Kokatahi
08/553	TRANSPORT PASSENGER A TO B	2008	February	The aircraft landed on the grass runway with the main landing gear in the up position. No injuries to POB but the aircraft sustained substantial damage.	Non-fatal	Small Aeroplanes	Hawera
08/3785	TRANSPORT PASSENGER A TO B	2008	September	During the cruise the pilot heard a clunk and felt a shake through the aircraft, the gear up light also went out at the same time. This resulted in missed approach, diversion and eventual gear-up landing.	Non-fatal	Small Aeroplanes	Palmerston North
08/3607	TRANSPORT PASSENGER A TO B	2008	August	During the climb phase of the AT flight a significant power loss occurred. The pilot elected to declare an emergency and carried out a forced landing on a farm paddock. There were no injuries amongst the seven persons on board. The aircraft suffered minor damage.	Non-fatal	Small Aeroplanes	Guthrie, BoP
09/897	TRANSPORT PASSENGER A TO B	2009	March	Helicopter made a heavy landing in Northern Laos. More details to follow.	Non-fatal	Helicopters	Laos

09/3722	TRANSPORT PASSENGER A TO B	2009	September	The helicopter encountered a tailwind as it was descending and about to land. The caused a rapid sink the pilot could not counter and helicopter blades stalled about 6-10' above the ground short of the intended landing area. As a result the main rotor blades were damaged when they contacted some branches.	Non-fatal	Helicopters	Te Aroha
09/3721	TRANSPORT PASSENGER A TO A	2009	September	The helicopter suffered a compressor stall as it was about to land so the pilot turned towards lower ground to fly away but one skid dug into the snow and the helicopter rolled over.	Non-fatal	Helicopters	Fox Glacier
09/3719	TRANSPORT PASSENGER A TO B	2009	September	After take-off, the aircraft failed to climb and crashed into a swampy area approximately 0.5 nm just off to the left of the centreline of RWY 28 at Claris aerodrome. Contributing factors were probable unexpected wind shear/tailwind shortly after take-off, early flap retraction, and the pilot turning the aircraft away from obstacles which would have further increased the effects of the tailwind component.	Non-fatal	Small Aeroplanes	Great Barrier
09/2823	TRANSPORT PASSENGER A TO B	2009	July	Aircraft hit frozen snow and water on landing roll and tipped upside down. Aircraft suffered substantial damage.	Non-fatal	Small Aeroplanes	Mt Aspiring National
09/1077	TRANSPORT PASSENGER A TO A	2009	March	Aircraft had an engine failure after takeoff and landed heavily damaging left float. Selection of an empty fuel tank caused the engine to fail. Hard landing resulted in the struts attaching the floats to the aircraft to collapse.	Non-fatal	Small Aeroplanes	Lake Rotorua
10/68	TRANSPORT PASSENGER A TO A	2010	January	The helicopter was on approach to a snow field behind two other helicopters. The pilot had moved left to maintain separation but collided with an unseen snow bank. The helicopter slid to a stop but remained upright. It suffered a bent skid, broken 'chin' window and later it found to have a creased tail boom.	Non-fatal	Helicopters	Geike Snowfields
10/222	TRANSPORT PASSENGER A TO B	2010	January	Landing over run at Motiti Island	Non-fatal	Small Aeroplanes	Motiti Island

10/4641	TRANSPORT PASSENGER A TO B	2010	November	Aircraft encountered severe, unexpected wind shear which resulted in heavy landing. On checking the aircraft after landing, pilot did not notice any obvious signs of damage. Aircraft flew back to Invercargill and after landing, the Maintenance controller was advised.	Non-fatal	Small Aeroplanes	Stewart Island
10/1920	FERRY /POSITIONING	2010	May	The pilot forgot to lower the landing gear, and with the conditions warranting no flap and power on until landing the gear warning horn did not activate.	Non-fatal	Small Aeroplanes	Ardmore
11/1699	TRANSPORT PASSENGER A TO B	2011	April	Helicopter encountered tailwind on approach resulting in it sinking and rolling over.	Non-fatal	Helicopters	Big South Cape
11/4858	TRANSPORT PASSENGER A TO A	2011	October	A passenger disembarked the helicopter prior to landing - approximately 2.5 metres above the ground and suffered serious injuries.	Non-fatal	Helicopters	Urenui
11/5349	SEARCH AND RESCUE	2011	November	During an aerial fire-fighting operation, the Pilot received that there were members of the public going into the sea to escape the fire and they required urgent evacuation. During the rescue attempt communication was lost with the helicopter. The last known location of the helicopter was identified as over the sea.	Fatal	Helicopters	Karikari Peninsula
11/830	FERRY /POSITIONING	2011	February	The pilot was carrying out a precautionary landing due to fluctuating engine oil pressure. During the landing process, a total engine failure occurred which resulted in a heavy landing and roll over. The pilot who was not using his shoulder restraints or wearing a helmet received serious facial injuries.	Non-fatal	Helicopters	Hokio Beach
11/254	TRANSPORT PASSENGER A TO B	2011	January	Aircraft lost power shortly after takeoff. A landing was made in a paddock beyond the threshold, with the aircraft's left wing and undercarriage sustaining damage.	Non-fatal	Small Aeroplanes	Takaka
11/3510	TRANSPORT PASSENGER A TO B	2011	August	The aircraft was unable to out-climb the rising terrain on departure from Doughboy Bay beach. A steep, slow, low level turn was commenced back to wings level, narrowly missing a standing rock pillar, and	Non-fatal	Small Aeroplanes	Doughboy Bay

				the aircraft flew into the water under full power.			
12/1785	TRANSPORT PASSENGER A TO B	2012	April	During takeoff, helicopter gained altitude slowly. At approximately 30ft agl., a sudden sink was felt by the pilot. The helicopter continued to sink and hit the ground hard.	Non-fatal	Helicopters	Whirinaki Park
12/5015	TRANSPORT PASSENGER A TO B	2012	November	Helicopter suffered a dynamic rollover while landing at Pioneer Hutt. The four climbers and pilot on board were not injured, and were able to walk approximately 500m to Pioneer Hutt.	Non-fatal	Helicopters	Pioneer Hutt
12/3419	TRANSPORT PASSENGER A TO B	2012	August	The pilot had vacated the idling helicopter, and had spent 5 minutes unloading and setting up the pick-up point. The rotor blades were seen to begin oscillating, striking the tail boom and the ground beside the helicopter.	Non-fatal	Helicopters	Minaret Peak
13/5345	TRANSPORT PASSENGER A TO B	2013	October	Helicopter made two attempts to land on a snow field, striking the main rotor of a previously landed helicopter while conducting a go-around following the second attempt. The tail rotor of the airborne helicopter separated from the aircraft, with the helicopter rotating up to 8 times before striking the ground and rolling over approximately 30 metres away.	Non-fatal	Helicopters	Tyndall Glacier
13/6300	FERRY /POSITIONING	2013	December	Helicopter reported at Greenstone Valley tracking to Dumpling Hut to uplift one person, but did not arrive. A company helicopter found the wreckage east of Lake Ross. The wreckage field was described as compact, 10-15 metres across.	Fatal	Helicopters	Lake Ross
13/2821	FERRY /POSITIONING	2013	June	Approximately 3-4 minutes into a ferry flight the engine RPM started to slowly decay, followed by a sudden drop. A 180 degree autorotation was conducted towards a road. Rotor RPM had decayed significantly, resulting in a heavy landing.	Non-fatal	Helicopters	Nelson
13/2662	FERRY /POSITIONING	2013	May	Helicopter's engine stopped suddenly as a turn was being made into wind for landing. An autorotation was conducted with a run-on	Non-fatal	Helicopters	Eglington Valley

				landing. The helicopter had almost come to a stop when the front of a skid caught under the grass, causing the helicopter to tip forward, with the rotor blades cutting the tail boom off.			
13/1156	FERRY /POSITIONING	2013	March	Helicopter was reported missing by the operator when contact was lost on Spidertracks. Wreckage was found in steep bush covered terrain with the pilot deceased near the wreckage.	Fatal	Helicopters	Turangi
13/1635	AIR AMBULANCE	2013	April	During start up, the main rotor blade struck the vertical fin. The engine was shutdown, with a blade striking the tail boom as the main rotor came to a stop. Wind velocity from the Wellington ATIS indicated 23kts gusting 40kts.	Non-fatal	Helicopters	Wellington
13/293	TRANSPORT PASSENGER A TO B	2013	January	Aircraft encountered wind shear on short final at 70kts. The pilot reported that airspeed reduced rapidly and significantly, causing a heavy landing. Damaged was caused to both landing gear oleos and one brake unit, with rippling found on the upper and lower skin of each wing.	Non-fatal	Small Aeroplanes	Okiwi Station
13/2635	FERRY /POSITIONING	2013	May	Aircraft's engine stopped suddenly ten minutes into a twelve minute flight. The only suitable paddock was reached by conducting a 200 degree turn, with the aircraft touching down near the beginning of the paddock. However approximately 50m into the landing roll the left main gear collapsed, with the aircraft coming to a rest on the cargo pod.	Non-fatal	Small Aeroplanes	Takaka
14/769	TRANSPORT PASSENGER A TO B	2014	February	Climbing through 5000ft the pilot heard an unusual sound followed by a loud bang. An auto rotation onto a river valley floor was conducted, with the tail boom cut off by the main rotor on landing. Initial inspection shows a likely gearbox failure.	Non-fatal	Helicopters	Moonlight Creek
14/3826	TRANSPORT PASSENGER A TO B	2014	August	Helicopter crashed on mountainside.	Fatal	Helicopters	Triple Peak
14/280	TRANSPORT PASSENGER A TO B	2014	January	After landing, a bag was sucked out of a utility vehicle deck into the main rotor blade, the main rotor then severed the tail boom and damaged the fuselage. The	Non-fatal	Helicopters	South of Queenstown

				engine was stopped via the main fuel shut-off, with the helicopter remaining on its skids.			
14/52	TRANSPORT PASSENGER A TO A	2014	January	While landing on the Richardson Glacier the helicopter drifted sideways, causing a dynamic rollover. The pilot and four passengers were uninjured, walking to another helicopter which transported them off the glacier.	Non-fatal	Helicopters	Richardson Glacier
14/4683	FERRY /POSITIONING	2014	October	Helicopter missing on a flight from Karamea to Nelson. Believed to be west of Takaka in the Kahurangi National Park. Helicopter was found 3 days later with pilot deceased.	Fatal	Helicopters	West of Takaka
14/1695	AIR AMBULANCE	2014	April	On final approach, noise was heard by pilot and helicopter started rotating uncontrollably. Tail rotor struck a Redwood tree. A hard landing resulted, near the helipad.	Non-fatal	Helicopters	Taupo
14/3583	TRANSPORT PASSENGER A TO B	2014	August	Aircraft crashed while Enroute. TAIC currently investigating.	Fatal	Small Aeroplanes	Alexandra

Enclosure I – Aircraft Operation Activities (CAA605B)

9 Aircraft Operation Activities (CAA605B)

The following form and notes were extracted from *CAA 605B – Aircraft Operations Statistics – Aeroplanes, Helicopters and Balloons*, which provides official list and explanations of main classifications of aircraft operation activities.

Aircraft Operations Statistics Fill in only **White** areas				Use this form for all aircraft **except** those that must be operated under Part 121 or Part 125 when used for Air Transport and aeroplanes conducting SEIFR operations. Use form CAA605a for these aircraft							
Operator Name								**Client Number**			
Reporting Period	**Year**		**Quarter**	**Jan-mar**		**Apr-Jun**		**Jul-Sep**		**Oct-Dec**	
CAA aircraft identification mark. (For registered aircraft, the 'ZK' suffix; For parachutes and hang gliders, the assigned numeric/numeric/alpha code)				ZK		ZK		ZK-			
				Hours flown	**No. Of flights**	**Hours flown**	**No. Of flights**	**Hours flown**	**No. Of flights**		
Air Transport – Carriage of passengers or goods by air for hire or reward and associated support operations	**International**		**Passenger**								
			Freight only								
	Scheduled Domestic		**Passenger A to B**								
			Passenger A to A								
			Freight only								
	Unscheduled Domestic		**Passenger A to B**								
			Passenger A to A								
			Freight only								
	Part 115 Operations		**Aircraft Hours/Flights**								
			Parachute Descents								
	Other		**Commercial (Remote)**								
			Other revenue								
	Support		**Testing/ferrying**								
			Training/Instruction Dual								
			Training/Instruction Solo								
Other hire or reward and associated support operations			**Commercial Transport (no passengers)**								
			Other Revenue								
			Business/Executive								
			Testing/Ferrying								
	Training/ Instruction		**Dual**								
			Solo								
	Agricultural		**Productive/Reconnaissance**								
			Testing/Ferrying								
			Training/Instruction Dual								
			Training/Instruction Solo								
Not for hire or reward			**General**								
			Testing/Ferrying								
			Unsupervised practice for licence or rating								
			Totals								

Notes

CARRIAGE OF PASSENGERS OR GOODS BY AIR FOR HIRE OR REWARD AND ASSOCIATED SUPPORT OPERATIONS

Passenger or freight operations where members of the public can buy the service "over the counter", plus the support flying such as training, testing, and ferrying associated with these operations.

Air Transport	Air transport operations as defined by Rule Part 1 of the Civil Aviation Rules. Within this classification A to A means flights where the aircraft takes off and lands at the same aerodrome without intermediate stops. A to B means all other passenger transport operations.
Other -Commercial Transport	An operation for the carriage of passengers or goods by air for hire or reward where the passengers or goods are carried to or from a remote aerodrome.
Other -Other Revenue	Includes air ambulance, etc.
Part 115 Operations	All operations that may only be carried out by a Part 115 certificated organisation, where carried out by a registered aircraft or a non-registered aircraft that is authorised on the operator's Operations Specification. Includes hang gliding, parachute jumping etc.

OTHER HIRE OR REWARD AND ASSOCIATED SUPPORT OPERATIONS

Operations for hire or reward that are not covered above including commercial training operations, plus the support flying such as training, testing, and ferrying associated with these operations.

Commercial Transport	An operation for the carriage of passengers or goods by air for hire or reward where each passenger is performing, or undergoing training to perform, a task or duty on the operation.
Other Revenue	Includes power line inspection, fire starting and fighting, search and rescue, advertising, helicopter external load operations, glider towing etc.
Agricultural	Operations in which the aircraft is used to provide a work service by an agricultural operator to those persons engaged in agriculture or farming. Includes the following: topdressing, seed sowing, dusting, spraying, dropping of poison baits, supply dropping on farms and forests, farm and forest inspection, stock feeding and stock location, inspection and mustering.

NOT FOR HIRE OR REWARD OPERATIONS

Operations that have no hire or reward component.

General	Aircraft operations that have no hire or reward component such as cost sharing/private, glider towing, and aircraft hired for private or cost sharing use.
Training/Instruction - Solo (unsupervised)	Solo (authorised but unsupervised) practice for the issue of a licence or rating, biennial flight reviews or competency checks.
ALL CATEGORIES	
Testing/Ferrying	Flying for the purpose of testing or checking an aircraft or its equipment on purchase, after modification, repair, maintenance, etc. Delivery or positioning of an aircraft both before and after hire, contract, maintenance, etc.
Training/Instruction (excluding Not for hire or reward operations)	Includes all dual instruction and solo (supervised) practice for the issue of a licence or rating, biennial flight reviews or competency checks.

This page is intentionally left blank