

CIVIL AVIATION SAFETY AUTHORITY

Contract CASA 26/16

Australian Aircraft Equipage Study 2026

Report

A national survey of avionics fitment and electronic conspicuity across general aviation, sport aviation and RPAS

PREPARED FOR

Civil Aviation Safety Authority

PREPARED BY

Queensland University of Technology

School of Electrical Engineering and Robotics, Faculty of Engineering

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CASA 26/16

Australian Aircraft Equipage Study 2026

Final Report

Prepared for: Civil Aviation Safety Authority (CASA)

Prepared by: Queensland University of Technology (QUT), Faculty of Engineering

Version 1.0 | July 2026

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1. Executive Summary

A survey was conducted by Queensland University of Technology (QUT) on behalf of the Civil Aviation Safety Authority (CASA) from 28 May 2026 to 25 June 2026, assessing equipage rates for various electronic conspicuity technologies used on aircraft for communication, navigation and surveillance (CNS) across Australian aviation sectors.

The survey targeted VH-registered aircraft as well as sport aviation users such as RAAus registered aircraft, gliders and other experimental aircraft operating in Australia. Focus was primarily on operations under visual flight rules (VFR) with the objective to identify equipage differences (rates, types), equipage changes (since 2021) and equipage uptake drivers within and between the target aviation sectors.

The survey was distributed across 78 organisations and 10 aviation sectors, amplified by six industry groups/bodies, and open to pilots, operators and aircraft owners. 1662 voluntary responses were received and this report covers 3037 unique aircraft. The responses were assessed for representativeness against the known fleet population and used to estimate equipage rates and indicative locations for electronic conspicuity technologies including transponders, ADS-B and Electronic Flight Bag (EFB). Where reliable, results are presented as confidence intervals (consistent with the 2021 study [CASA, Statistical Summary of Aircraft Equipment Survey, Version 1.2 – 07/2021]) to allow trend comparison.

STUDY AT A GLANCE

1662 responses · 3037 unique aircraft · 10 aviation sectors · 78 organisations directly contacted · 6 resharing organisations · survey window 28 May - 25 June 2026

Technology	2021 Survey	2026 Survey
Radio	Within scope of the 2021 survey. 94.6–96.2% VHF radio equipped; only 3.8–5.4% of VFR aircraft had no radio (mostly gliders and paragliders).	Not within scope of the 2026 survey. <i>Not re-surveyed - fitment understood to be near-universal, and the 2021 result indicated little residual value in re-measuring it</i>
Transponder	VFR (general aviation and sport, combined): Mode A/C 39.8–42.8% No transponder 24.7–27.5%	<i>Reported by sector (2021 gave a single combined VFR figure). The clearest change is in transponder type: Mode S is now dominant in GA, where Mode A/C led in 2021.</i> General Aviation Mostly Mode S now, 62.6–67.2%, with a smaller share on Mode A/C (26.3–30.4%) and few unequipped (5.6–8.0%) Sport Mostly unequipped, 69.2–75.9%, with only a small share on Mode S (12.3–17.4%) or Mode A/C (9.6–15.8%) RPAS Most are not fitted with these transponder types, consistent with there being no legislative mandate for transponders in this sector Hot Air Balloon Small sample (n=5); indicative only, 38.5–81.5% Mode A/C
ADS-B Out	General Aviation 35.7–39.7% Sport 10.9–13.8% RPAS No information	General Aviation High, 76.1–84.2% — roughly doubled since 2021, mostly certified Sport Moderate, 34.0–45.6% — roughly tripled since 2021, mostly low-cost/portable RPAS Very low, 7.0–12.2% — no legislative mandate; equipage driven by operational risk Hot Air Balloon Effectively none
ADS-B In	General Aviation 16.0–18.3% Sport 6.6–8.6% RPAS No information	General Aviation 49.7–54.6% — roughly tripled since 2021, mostly certified Sport 36.3–45.5% — significant increase, mostly low-cost/portable RPAS 57.8–64.4% (highest of any sector) — overwhelmingly low-cost, receive-only Hot Air Balloon Effectively none
Low-cost ADS-B	Awareness 67.2–70.8%; Purchase interest 45.5–49.6% of those aware.	Not re-measured directly; reflected in actual uptake: The Australian Government / CASA rebate and lowering hardware costs were the 2 nd and 3 rd most significant reasons influencing respondents' decisions to upgrade equipage behind only a desire for safety improvement. <i>Adoption drivers are detailed in Table 2.</i>
Electronic Flight Bag	<i>Not within scope of the 2021 survey.</i>	Widespread among equipped operators (only ~5% of GA and ~15% of sport report none): General Aviation OzRunways 65.1%, AvPlan 28.2% Sport OzRunways 46.0%, more fragmented (23.8% “Other”, glider-specific apps) <i>Drone-only apps separated out (see §5.4).</i>

Table 1 Summary of Findings

Technology	Operational Drivers and Impact
Recent Equipage	A large share of operators report equipage installed since 2021: 48.5–53.7% of general aviation, 38.4–47.3% of sport and 44.1–50.5% of RPAS, indicating substantial recent investment.
Year of Installation	Among those who equipped since 2021, uptake steady around 20% every year (2022: 19.0%, 2023: 19.9%, 2024: 22.5%, 2025: 21.0%). The 2021–22 (9.2%) step aligns with the introduction of the ADS-B rebate scheme; the part-year 2026 figure (8.3%) is not a decline but incomplete data for a year.
Upgrade Drivers	Safety improvement was the most-cited reason for upgrading (73.3%), followed by the Australian Government / CASA rebate (56.4%); the rebate showing a measurable policy effect on equipage uptake, behind the underlying safety <i>motivation</i> and perceived benefit.
Affordability	Cost featured in the upgrade decision for roughly three-quarters of operators (47.1% a key factor, 29.7% a partial consideration).
Operational Impact of surveillance / EC devices	Across all sectors, most operators reported that surveillance and EC devices would increase their ATC visibility (61.4%), traffic / situational awareness (78.3%) and confidence operating in shared airspace (72.2%). This result spans technologies and is not specific to ADS-B.

Table 2 Operational Drivers and Impact

2. Introduction

A voluntary survey was conducted by Queensland University of Technology (QUT) on behalf of the Civil Aviation Safety Authority (CASA) from 28 May 2026 to 25 June 2026, assessing the equipage rates for various navigation, communication and surveillance technologies on board aircraft operated across Australian aviation sectors. This report uses the results of the survey to estimate the proportion of Australian aircraft fitted with various onboard equipment, and the number of pilots and operators who use it, segmented by aviation sector and geography.

The survey updates the equivalent 2021 study, but its scope has been broadened in several respects. Where the 2021 survey covered crewed aircraft operating under the Visual Flight Rules (VFR), the 2026 survey extends across the general aviation, sport and remotely piloted aircraft (RPAS) sectors. It also introduces new questions not asked in 2021 covering equipage installed since the last study, the reasons behind upgrade decisions, and operators' perceptions of how surveillance and electronic conspicuity devices affect their operations. Radio equipage, reported in 2021, was not within the scope of the 2026 instrument. Radio was not re-surveyed as fitment is understood to be near-universal, and the 2021 result (only 3.8-5.4% of VFR aircraft without radio) indicated little residual value in re-measuring it.

2.1. Purpose

This report is intended to provide CASA with an indication of the equipment on board Australian aircraft operating under the visual flight rules (VFR).

This study updates CASA's national aircraft equipage baseline, measuring current fitment of ADS-B, transponders, navigation equipment and EFBs to inform surveillance policy, airspace management and the ADS-B mandate pathway. It also supports CASA's RPAS and Advanced Air Mobility Strategic Regulatory Roadmap by providing empirical equipage data relevant to shared-airspace integration, BVLOS approvals and surveillance strategy planning.

2.2. Scope

The results of the survey are used to represent equipage rates, expected location-equipage-sector relationships, and uptake motivations across the Australian general aviation, sport and remotely piloted aircraft (RPAS) sectors. All statistics in this report are intended to be used as a statistical representation of these sectors.

The report presents national estimates with confidence intervals and assesses the suitability of the survey dataset against recorded fleet statistics and recorded movements. Within this scope, the report covers three areas:

1. **Equipage counts** the proportion of aircraft fitted with each technology, stratified where the data allows by aircraft type, geography and operating environment and/or airspace class;
2. **Equipage change - comparison with the 2021 survey** indicating changes in uptake since the previous study, where the two surveys measured a comparable population; and
3. **Equipage drivers and motivations** additional 2026 results on why and when operators equipped, not captured in 2021.

3. Data and Methodology

3.1. Data Sources

The survey was administered by QUT using Qualtrics and available via a web interface. A total of **1662** responses constituting 3228 aircraft was obtained, stored locally and processed offline. Of the 3228 aircraft initially captured across all responses, 3037 unique aircraft remained after deduplication and manual cleaning; these form the basis of the aircraft-level analysis in this report.

Questions were designed to balance detail and time commitments of the respondent to minimise survey dropout rate which necessitated manual data pre-processing before analysis to capture additional detail derived mainly from optional text input fields.

For some questions, respondents who were unsure or whose situation did not fit the listed options could select '**Other**' and provide a free-text response. Because these free-text answers do not map directly to a fixed option (category, areas etc.), each one was read individually and, where possible, assigned to the appropriate category, a process referred to as *manual adjustment*. Manual review of the 'Other' responses has been completed for this report, and additional categories (Gyroplane and Paraglider) were added as a result. Any 'Other' responses that could not be confidently assigned to a category are excluded from the relevant analysis (removing 9 of 3228 aircraft) (See section 3.4.3).

After manual data cleaning 1194 of the original 1662 responses were kept for aircraft data analysis with 468 of the responses being unsuitable for aircraft analysis due to the respondent abandoning the survey before completion of critical, required responses or being detected as a duplicate response.

Data Sources - High-level Information:

The survey data constitutes the main information source, with additional aviation datasets used to support the survey and strengthen the analysis (particularly for comparisons and confidence).

The complete set of data sources used in the study includes:

- QUT and CASA, survey results (1662 responses) from 78 organisations across 10 sectors and amplified by 6 resharing organisations (inc. AAAA, RAAA, Swift Avionics/FLARM, AAUS, RFACA).
- The Bureau of Infrastructure, Transport and Regional Economics (BITRE) to estimate the total number of aircraft currently in use by type of aircraft¹. Results from the 2024 data collection were used.
- The CASA aircraft register² to validate aircraft registration codes provided in the survey records. Data from 2026 were used.
- Aireon surveillance data (2024) to compare expected ADS-B equipped VH-registered aircraft (general and sport aviation) from survey results and surveillance data. This data was supported by the Microtronics aircraft database³ for ICAO code to VH registration mapping.
- OzRunways (2024) Electronic Flight Bag (EFB).

¹ BITRE 2026, Australian Aircraft Activity, <https://www.bitre.gov.au/resource/aviation/australian-aircraft-activity-0>

² CASA 2026, *Civil Aircraft Register*, <https://www.casa.gov.au/aircraft/aircraft-registration/data-files-registered-aircraft>

³ Microtronics, <https://github.com/wiedehopf/tar1090-db>

3.2. Statistical Methods

3.2.1 High-Level Summary

A stratified sampling approach was used when examining the survey results. Results were stratified by aircraft category and sectors and subsequently equipage types.

Aircraft categories and sectors were aligned to definitions in the Bureau of Infrastructure and Transport Research Economics (BITRE) Australian Aircraft Activity Statistical Report. Aircraft were split into four (4) groups – **general aviation**; which includes “VH”-registered: light (but not ultralight) fixed-wing aircraft or helicopters but does not include gliders, paragliders or gyroplanes, **sport’s aviation**; which includes sport and recreational aircraft: gliders, hang gliders, paragliders, weight shift microlights and gyrocopters often registered with sports and recreational organisations including many RAAus, and **remotely piloted aircraft systems** (RPAS); which includes aircraft operated with no pilot on board (drones, uncrewed aircraft etc.) and finally **Hot Air Balloons**.

Equipage types were aligned to survey requirements (see Section 2.2) to match common and emerging electronic conspicuity devices used by each sector. Equipage was analysed by transponder (inc. Mode A/C and Mode S split), ADS-B (inc. OUT and IN split) and Electronic Flight Bag (EFB).

3.2.2 Low-Level Summary

Fundamental data cleaning, deduplication and quality assurance were conducted to remove invalid, duplicate and mis-categorised responses. Approximately 20% of responses required some form of manual adjustment such as interpreting free-text and interpreting analysis grouping. Approximately 1% responses were invalid requiring removal from most or all analysis questions.

Statistical methods for **equipage rates (and uptake)** use confidence-interval estimation appropriate to proportion data. For comparability with the 2021 study, where 90% confidence intervals are computed, they are computed using the same statistical method as the 2021 Survey (see Appendix A), with updated (2024) BITRE statistics.

Statistical methods for **geographic correlation of equipage rates** apply statistical weighting to correct for sector and geographic response bias before mapping estimated operating locations and ‘densities’. For extended analysis, surveillance and movement data (for ADS-B OUT and EFB only) is used to provide a finer resolution comparison (spatial and numerically).

Remark 1: Details of the specific formula applied to each analysis is provided in the corresponding section with additional detail provided (where appropriate) in Appendix A.

3.3 Analysis Group Assignment

Analysis Group Assignment is the categorisation of a respondent's answers to survey questions into useful groupings for the purposes of statistical analysis.

For aircraft specific equipage analysis, responses were grouped into four analysis groups:

1. **General Aviation:** VH registered aircraft that are either light (but not ultralight) fixed-wing aircraft or helicopters.
2. **Sports Aviation:** A category aligning with the BITRE definition of sport and recreational aircraft: gliders, hang gliders, paragliders, weight shift microlights and gyrocopters.
3. **Remotely Piloted Aircraft Systems (RPAS) / Drones.**
4. **Balloons** – Hot Air Balloons. Only a small number of responses were received for this category and as such only limited analysis was undertaken where appropriate.

There are several steps required to accurately assign respondent survey answers to analysis groups. These steps improve the quality of the response data, handle free-text input and align the categories with BITRE data for improved calculation of confidence intervals. The following subsections detail removing missing, duplicate, or invalid data, the logic used to assign responses to an analysis group and how manual adjustments were made based on user comments.

3.3.1 Removing Invalid or Missing Data

Removing invalid or missing data refers to detecting response fields that were left empty or are invalid and removing these detected responses from specific statistical analysis that required these fields.

Empty response fields are caused by respondents not answering optional fields or respondents leaving the survey before completing all sections. Each analysis requires one or more fields to have valid responses. If a respondent did not have valid responses for every field required for that specific analysis, the response for that specific analysis was ignored. For example, when analysing ADS-B Out Equipage, for a response to be included the respondent must have entered a valid aircraft count, valid ADS-B equipage and be assignable to an analysis group.

Being assignable to an analysis group is a requirement for many but not all analysis questions. The largest cause of failure to assign to an analysis group is caused by a respondent not answering critical questions typically due to survey abandonment; approximately one in four respondents left the survey before completion of response fields required for accurate analysis group assignment.

The second cause of failure to assign to an analysis group is invalid data and accounted for less than 10 respondents. Reasons for invalid data include but are not limited to:

- Respondent was providing information for aircraft that operate in another country.
- Respondent provided unclear information about their aircraft such as specifying 'Unsure' or not responding to many questions.

3.3.2 Duplicate Responses

Duplicate responses refer to response data that has detected as being provided more than once.

Duplicate detection relies on the aircraft registration field which is an optional question that asked respondents to enter aircraft registration number(s) of aircraft they pilot / manage. Only approximately one in three respondent's valid responses provided information in this field which means there may be some additional duplicate responses that were undetectable.

There are two types of duplication that were handled in different ways including:

1. Same Aircraft, Same Respondent, Multiple Times

Same aircraft, same respondent, multiple times refers to one respondent that completed the survey more than once with the same data.

This duplication is detected when there are multiple responses with almost identical response data. For example, two different people are unlikely to both be the 'Aircraft Owner' of the same registered aircraft and it is more likely the same person responded twice, especially if these 'two people' share identical survey question responses. There were only approximately 20 responses that could confidently be determined as a duplicate response.

For these responses, one of the responses was ignored for all analysis.

2. Same Aircraft, Multiple Respondents

Same aircraft, multiple respondents refer to the scenario that the survey was completed by multiple different people that share the same aircraft (e.g. multiple pilots sharing one aircraft).

Differentiating between same aircraft, multiple respondents and same aircraft, same respondent, multiple times was a manual task that required analysing key fields. Examples of decisions that mark a response as same aircraft, multiple respondents occurred when two or more responses contained the same aircraft registration and one or more of the following:

- One respondent was a Pilot and the other an Aircraft Owner.
- Multiple respondents for the same aircraft registration provided different responses to the same question.
- Some pilots flew and reported many aircraft as a unique set of registration codes that were not present in any other response.

Duplicate responses for the same aircraft with different answers for the same question created the problem of contradictory data. When this occurred, the following procedure for choosing the most probable answer was chosen:

- If one respondent answered 'Unsure' to a question and a second respondent chose a valid answer, the second respondent's answer was chosen.
- If one respondent answered for only one aircraft (e.g. an aircraft owner) and another answered generally for a list of aircraft (e.g. a pilot that flies many aircraft). The more specific response was chosen.
- If detailed comments were left for a specific aircraft, they were useful at deciphering the most accurate answer.
- Finally, if the answer to some questions couldn't be accurately determined a confidence interval was applied to the response (see section 3.4.2).

3.3.3 Invalid Registration Codes

Invalid or unrecognised registration codes refer to respondents who provided VH registrations that did not exist in the CASA VH registration of June 2026.

There were three respondents who provided VH codes that were not present in the CASA VH registration list of June 2026.

- Two of those responses appeared valid as they were in a list of other valid responses. It is possible that these were mistyped or autocorrected. These responses were included in the report.
- One response did not exist in the CASA registration, and the other questions responses were of dubious quality. This response was removed from the report.

3.3.4 Assigning Responses to Analysis Groups

Assigning responses to analysis groups refers to the response fields and methods used to categorise survey responses into analysis groups. This categorisation relies on responses to three specific questions and the following outlines the method of the combining valid responses of these questions into an analysis group categorisation.

The first question used to determine categorisation was: *“What is your Aircraft registration / category?”*. While some categorisation was simple based on solely the response of this question such as **Gliding** -> **Sport Glider** and **RPAS** -> **RPAS**, other responses such as **VH Registered** or **RAAus** are not so clear cut.

For example, it is possible to have gliders that are VH registered and while RAAus registered aircraft are generally sport, from this question alone it is impossible to distinguish between an RAAus Glider and RAAus Ultralight. In these cases, the following question was used: *“What type of aircraft do you predominantly operate?”*. This question narrowed down the category using the following mapping table:

Registration	Aircraft type	Categorisation
VH	Fixed wing	General Aviation
VH	Rotary wing	General Aviation
VH / RAAus	Glider	Sports Aviation: Glider
RAAus	Fixed wing	Sports Aviation: Ultralight
(Any)	Gyroplane	Sports Aviation: Gyroplane
(Any)	Powered parachute	Sports Aviation: Paraglider

Table 3 Analysis Groups Mapping Table 1

In rare cases, a respondent may have put ‘Experimental’ as a response to both the registration category and the aircraft type. In this case, the response from a third question was used: *“Which aviation sectors do you primarily operate in?”*. The following rules were applied:

Field selections	Categorisation
‘Gliding’ selected and ‘Experimental / ultralight’ not selected	Sports Aviation: Glider
‘General Aviation (VH)’ selected; ‘RAAus / recreational’ and ‘Gliding’ not selected	General Aviation
‘RAAus / recreational aviation’ selected; ‘General Aviation (VH)’ and ‘Gliding’ not selected	Sports Aviation: Ultralight

Table 4 Analysis Groups Mapping Table 2

A flow chart of the categorisation logic is found here: [Appendix C: Aircraft Categorisation Flow Diagrams](#).

3.4 Analysis Group Adjustments

3.4.1 Relevant Survey Questions

Analysis group adjustments refer to the manual steps taken to clean original data that could not be automatically assigned to an analysis group.

Data cleaning is required to accurately represent the response data while considering response fields (including free-text fields) that describe aircraft fleet variability. Cleaning requires several steps to accurately categorise a response into a group, due to how questions were asked at various points in the survey and the associated response options providing opportunity for ambiguity, inconsistency or no response. This was intentional, providing a mechanism to check response consistency but requires manual adjustments to improve data quality.

Adjustments include manual changes and updates and consideration/compensation for failed assignment. The following subsections detail such adjustments.

3.4.2 Manual Adjustment

Manual adjustment is the task of reading through the response data csv for responses where failures or uncertainty in automatic parsing occurred and creating new csv data with modifications to remove invalid or uncertain data based on expert knowledge.

These manual adjustments were performed by a senior research engineer and have the possibility to introduce bias into the results. To reduce the impact of bias, error bounds in the aircraft counts were added to responses with ambiguous responses. For example, for an ambiguous response, the manually cleaned data may split a response of 2 aircraft with ambiguous ADS-B equipage type into two responses with a lower bound of 0 aircraft and an upper bound of 2 aircraft with each new response a different possible ADS-B equipage based on the original response.

Using the text comments, manual adjustments also identified an analysis group of aircraft (Balloon) that was not present in the survey questions.

3.4.3 Failed Assignment

Failed assignment refers to responses that could not be assigned an analysis category, despite scrutiny from the manual review.

There were 9 aircraft that failed to be categorised despite manual analysis and were not included in any aircraft analysis. Of these, 5 had little or no data for the later questions of the survey (it is likely the survey respondent left the survey without completion) and the other 4 were experimental aircraft where it could not be determined whether they belonged to the General Aviation category or the Sports category.

3.5 Aircraft Count Uncertainty

Aircraft count uncertainty refers to the uncertainty of aircraft fleet counts in a respondent's survey responses and is one of two contributors to the lower and upper confidence intervals displayed in results.

The following section details how aircraft count uncertainty arises from survey design and analysis grouping, how count uncertainty is used in determining confidence intervals and how this improves robustness of the survey results.

3.5.1 Relevant Survey Questions

The relevant survey questions refer to the questions that govern the uncertainty in aircraft counts.

The following questions were asked of all survey respondents:

1. *"How many aircraft do you own or operate?"*
2. *"For the following sections, if you operate multiple aircraft in different ways, please answer based on how you most commonly operate. Later, you will also have the opportunity to indicate whether other aircraft in your fleet have notably differences."*

In an effort to lower survey abandonment rate by reducing question load, respondents with multiple aircraft in their fleet were asked the following questions instead of repeating sections for each aircraft:

3. *"Could you provide more information about how equipage configuration differs on your other aircraft?"*
4. *"Approximately what proportion of your fleet has the same equipage configuration?"*
 - 0 - 25%
 - 26 - 50%
 - 51 - 75%
 - 76 - 100%
 - Not sure
5. *"Which of the following equipment differences exist within your fleet?"*
6. *"Please describe the main differences in equipage across your aircraft" (Free-text Input)*

High quality responses included detailed information about the differences in equipage across aircraft in their fleet in the free-text fields. Lower quality responses however provided limited information about the differences.

3.5.2 Manual Adjustments (Increase Aircraft Response Accuracy)

Individual responses that indicated more than one aircraft then included the proportion of the fleet with the same equipage were manually reviewed. The review is used to apportion aircraft counts more appropriately to the equipage categories and thus increase aircraft count accuracy.

Given the proportions are limited (list of options inc. 'Not Sure') and that limited information may be provided about differences in the fleet there can be uncertainty in aircraft counts. High-quality responses enable exact counts of aircraft with specific equipage. Lower quality response by contrast introduce ambiguity in exact counts and specific equipage from a respondent; aircraft derived from these responses included a lower, expected and upper confidence interval for aircraft counts of specific equipage.

Example:

Consider a scenario where a respondent:

- Is an aircraft operator with fleet size of 11 gliders.
- Adds information about the glider that gets the most use.
- Reports that this glider has a low-cost portable ADS-B solution.
- Reports that 51 - 75% of aircraft have a similar equipage.
- Does not describe the differences between that glider and the rest of the fleet.

In this case, the confidence intervals for this respondent's gliders with the detailed equipage are set to a lower bound of 5, expected value of 7 and an upper bound of 9.

3.5.3 Aircraft Count Analysis Limits (from data)

Aircraft count analysis limits refer to the lowest possible proportion of 'yes' to 'no' responses (lower), expected proportion of 'yes' to 'no' responses (expected) and highest possible proportion of 'yes' to 'no' responses (upper) given the uncertainty in aircraft count.

The **lower limit** refers to the lowest possible proportion of 'yes' responses for a given category. It is calculated as a proportion of the smallest possible number of 'yes' responses for the category to the largest possible number of other responses given the 'yes' responses.

The **expected** refers to the expected proportion of 'yes' responses for a given category. It is calculated as the proportion of the expected 'yes' responses for the category to the expected aircraft count.

The **upper limit** refers to the largest possible proportion of 'yes' responses for a given category. It is calculated as a proportion of the largest possible number of 'yes' responses for the category to the smallest possible number of other responses given the 'yes' responses.

Example:

Consider the case when analysing ADS-B IN equipage from three respondents:

Respondent	Aircraft Count			ADS-B In Equipped
	Lower Bound (B _L)	Expected (B _E)	Upper Bound (B _U)	
A	1	2	3	Yes
B	4	5	6	No
C	0	1	2	Yes

Table 5 Aircraft Count Analysis Limits Example - A

When calculating the proportion of aircraft with ADS-B IN Equipage, the following bounds would be calculated:

Output Bound	Yes Responses	Total Count
Lower Bound	$\sum^{Yes} B_L$	$\sum^{Yes} B_L + \sum^{No} B_U$
Expected Value	$\sum^{Yes} B_E$	$\sum B_E$
Upper Bound	$\sum^{Yes} B_U$	$\sum^{Yes} B_U + \sum^{No} B_L$

Table 6 Aircraft Count Analysis Limits Example – B

In the above example, this would be:

Proportion of aircraft with ADS-B IN (worked example)			
Output bound	Yes Responses	Total count	Proportion equipped
Lower bound	1	1 + 6 + 0	14.3%
Expected value	3	2 + 5 + 1	37.5%
Upper bound	5	3 + 4 + 2	55.6%

Table 7 Aircraft Count Analysis Limits Example – B

3.5.4 Confidence Interval Analysis

Confidence Intervals (CI) are a combination of uncertainty in aircraft counts and variance estimated based on the proportion of the total number of aircraft survey compared to the total active aircraft count of a given analysis group. The data variance is calculated with respect to known or unknown population sizes (from BITRE data) using well-founded statistics methods (see Appendix A and CASA 2021).

To calculate confidence intervals limits used in this report, the 90% confidence intervals for expected (nominal), minimum and maximum bounds are used. First, the 90% CI is calculated for the lower bound (see 3.4.3) assuming a Gaussian distribution (See Figure 1). This is repeated for 90% CI of the upper bound. Using these values, the lower 90% CI limit from the lower bound (i.e. B_L) and the upper 90% CI limit from the upper bound (i.e. B_U) are used as the confidence interval as displayed in the results (See Figure 3 and Remark 2).

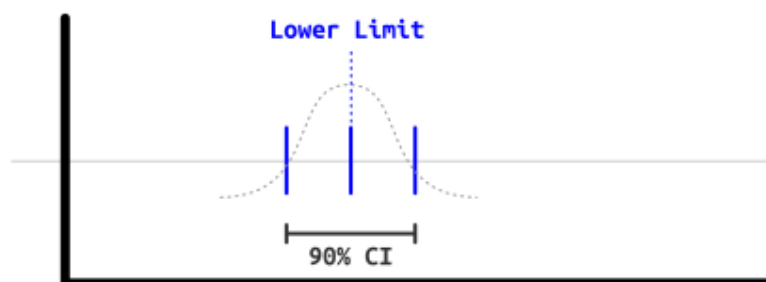


Fig. 1 Visual representation of the 90% confidence interval calculated on the lower limit of the aircraft counts

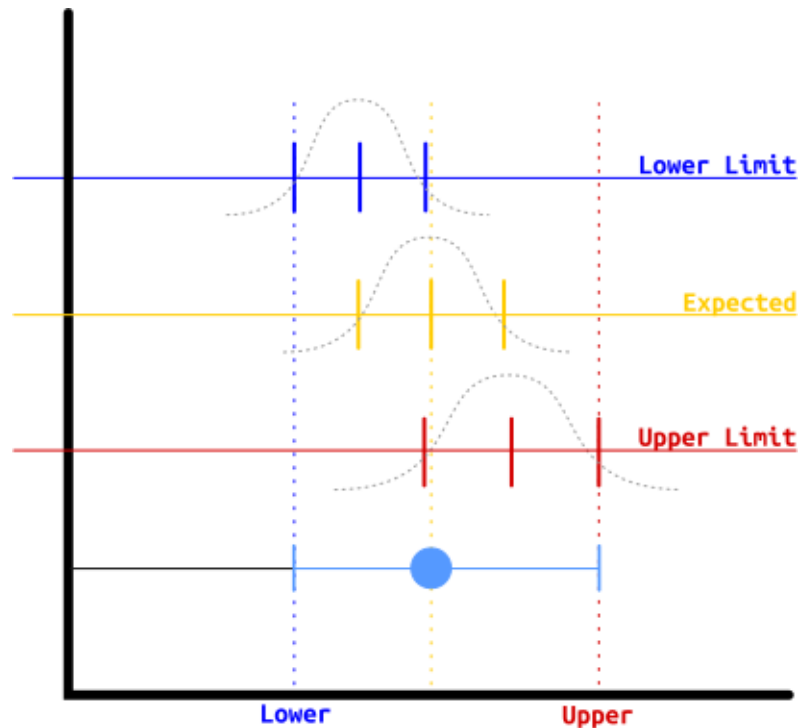


Fig. 2 Visual representation of how the aircraft count uncertainty and survey variance per analysis group is combined.

Remark 2: The confidence intervals calculated here are not true 90% confidence intervals and instead capture at least 90% confidence w.r.t the expected value. Essentially, this confidence interval attempts to model the uncertainty on discrete aircraft counts given survey nuance and response options.

Example:

Bound	Proportion Equipped (From Aircraft Counts)	90% CI Lower	90% CI Upper	Analysis Value
lower	34%	32%	36%	32%
expected	38%	36%	40%	38%
upper	43%	40%	46%	46%

Table 8 Confidence Intervals Calculation example

3.5.5 Confidence Interval Method Impact

An analysis was done to determine the impact of using the method on the size of the confidence intervals in the report.

To determine the impact, the confidence interval used in the report was compared to the just 90% CI from the variance when using only the expected value, using the following formula:

$$\frac{CI_{Report}}{CI_{90\%}} - 1.0$$

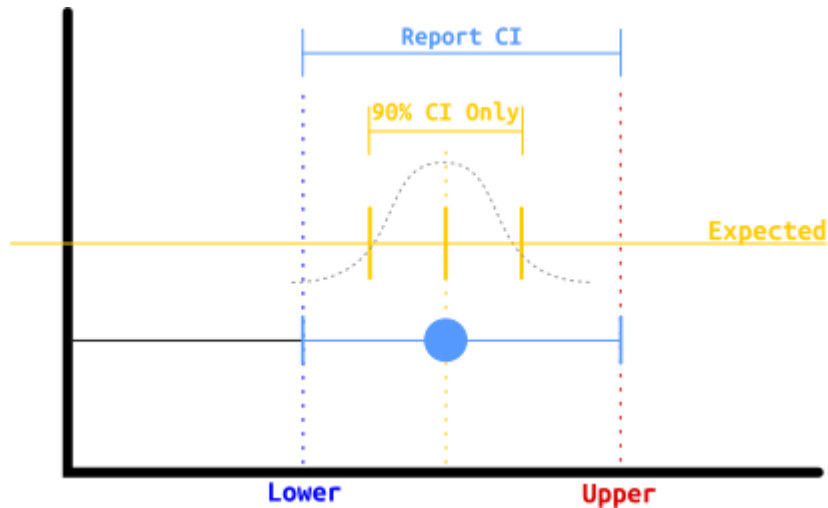


Fig. 3 Comparison of the Report CI against the 90% CI from the variance

The contribution factor values can be interpreted as follows:

- A value of 0.0-0.25 means that uncertainty in aircraft counts has a negligible impact on the confidence intervals.
- A value of 0.25-0.75 means that uncertainty in aircraft counts has a minor impact on the confidence intervals.
- A value between 0.75 - 1.25 means that uncertainty in aircraft counts contributes to a similar degree to the 90% CI from the variance.
- A value between 1.25 - 1.75 means that the uncertainty is highly driven by the uncertainty in aircraft counts.
- A value above 1.75 indicates that the uncertainty in aircraft counts is the majority of uncertainty in the CI.

The following graph shows the contribution factor of the uncertain aircraft counts (all types/categories combined) toward the lower and upper confidence intervals of the results:

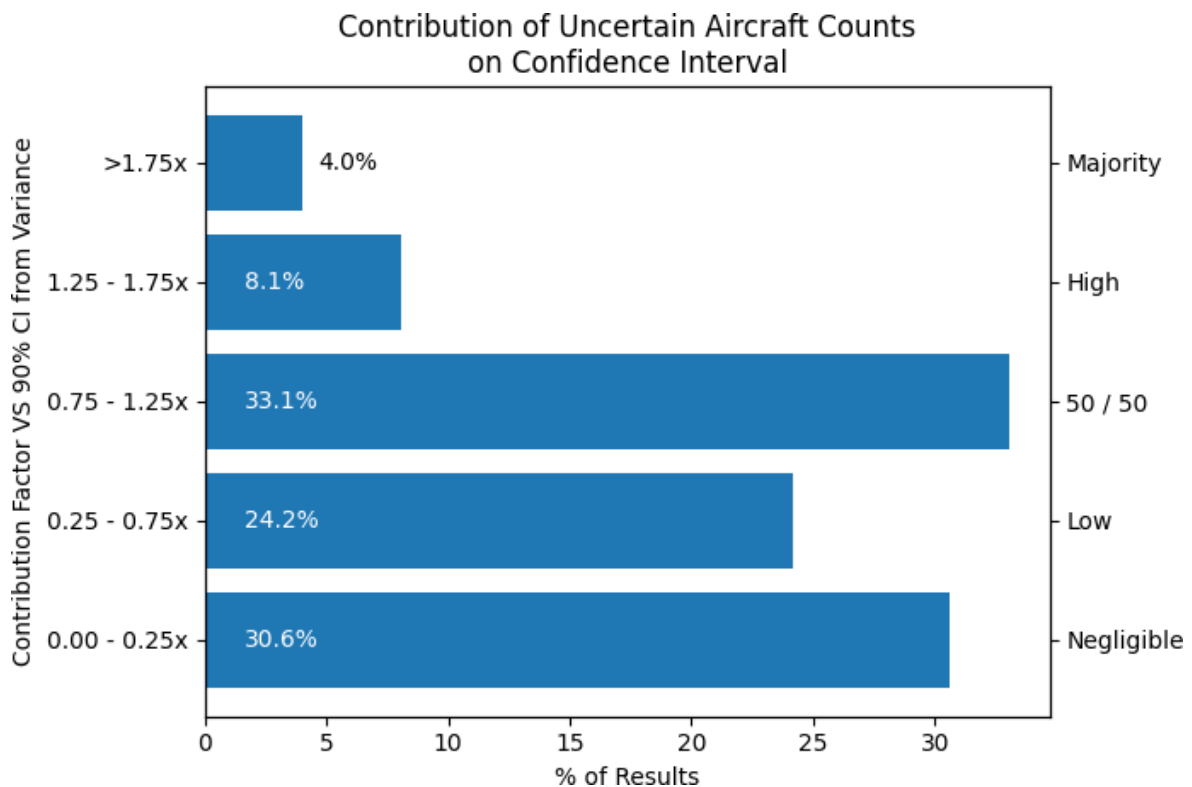


Fig. 4 Contribution of Uncertain Aircraft Counts on CI

Remark 3: This analysis does not consider the Balloon Category as there is no uncertainty about aircraft counts.

This graph shows that for most of the analysis, most of the uncertainty is driven by the 90% CI from the variance. In cases where it isn't, the uncertainty in the aircraft doesn't cause an unreasonably large confidence interval.

While the uncertainty in aircraft counts have limited impact in the confidence intervals of most results, the method improves transparency and robustness for the limitations of the variable quality of the survey data.

3.6. Assumptions

To apply this approach to the collected survey data, the following assumptions were made:

Assumptions	Effect on Summary Statistics
“General aviation” is represented by aircraft on the CASA aircraft register which are not classified as glider, paraglider or other types which are considered under sports aviation by BITRE.	The distinction between a light (General Aviation) and ultralight (Sports Aviation) aircraft is fuzzy (especially with experimental aircraft), introducing the possibility that some responses may have been mis-categorised. This is managed by analysing multiple survey questions to categorise each experimental aircraft and in the rare case an aircraft cannot be categorised, it is excluded from both GA and SPORT categories.
“Sports aviation” is represented by aircraft classed as Glider, Ultralight, RAAus, Paraglider, Experimental aircraft and any other type considered under sports aviation by BITRE.	
Assuming aircraft flown under the VFR combines “general aviation” and “sports aviation” is reasonable for stratification and these groups are mutually exclusive.”	
Assumes sufficient communications and survey exposure was provided to targeted sectors.	A person can only be a participant if they were made aware of the survey before the survey close date. Bias may be introduced by the aviation networks that were reached during survey advertisement and linked re-sharing. This bias was mitigated by monitoring survey responses while the survey was open and targeting outreach to under-represented sectors. However, results may not reflect Australian aviation sectors (as a whole).
Assumes response were random from the targeted sectors	The data quality from an optional survey is driven by a participant's willingness to provide accurate information. The results of this survey might bias towards respondents who are amenable to completing surveys.
Variance is calculated assuming each unique aircraft in responses is a random sample	Some respondents reported information for multiple aircraft. Assuming each aircraft is from a random sample could introduce bias towards respondents with multiple aircraft. As aircraft counts are compared (via usage of confidence intervals) with nationwide movements this impact is minimal/negligible.
Duplicate data have been removed via a manual review process.	Undetected duplicate aircraft information may cause bias in results towards overrepresented aircraft. This bias would be small (few aircraft) and thus minimal impact on CI and VAR.

Assumptions	Effect on Summary Statistics
Movement data obtained from BITRE is assumed to be an accurate nation-wide representation of general aviation and sport aviation traffic.	Variances used to calculate confidence intervals (CI) are themselves calculated using BITRE statistics (movement data). Changes in the active and total movement data obtained from the BITRE statistics could widen or tighten confidence intervals for all categorised analysis. Statistical methods used to compute variances and confidence intervals are well-founded.
Surveillance data obtained from Aireon is assumed to be an accurate (ANSP quality) nation-wide representation of ADS-B OUT equipped traffic.	Aireon provides national satellite ADS-B coverage across Australia. ADS-B coverage is greater than Airservices terrestrial network. Very low powered ADS-B OUT transmitters at low altitudes may not have been detected. This means ADS-B from some low-cost and/or sport aircraft may be missed meaning movements may be underreported not overreported (but inaccurate). ADS-B fitment (location on aircraft) and potentially some low altitude flight near terrain may cause intermittent or incomplete track data. This does not affect results due to surveillance data processing / correction steps.
Categorisation of Aireon data into General Aviation and Sports Aviation matches the categorisation used in this survey	Categories are based on open-source mappings linking identifiers (e.g. ICAO codes) to aircraft type. Types are then used to map to General Aviation and Sports Aviation. Miscategorisation may be present due to no identifier or unknown aircraft type (so an inability to provide a mapping) or erroneous mapping data. This is partially mitigated in the context of the survey by the volume of data (i.e. 1 year, nationwide, under 20,000 AMSL), but flight patterns might show up for some categories where none exist for that category.
Track data obtained from OzRunways is assumed to be an accurate nation wide representation of aircraft movement for EFB equipped traffic	OzRunways data quality is linked to the quality of the navigation systems linked to the OzRunways app. OzRunways data is user uploaded post-flight. Data for users that opt out of the data upload or didn't connect the OzRunways app to the OzRunways servers after flight may be missing meaning movements may be underreported not overreported (but inaccurate).

Table 9 Assumptions applied in the analysis

4. Results Suitability Assessment

The survey dataset is assessed for representativeness of Australian aircraft activity. The assessment helps determine the extent to which the survey data represents national activity, thus bounding how to generalise and use results in the national context.

The following sections include a visual suitability assessment followed by numerical suitability assessment. These assessments use multiple reference data sources for comparison.

4.1. Geographical distribution of flights

The **first check** (activity) is to examine the aircraft operating locations identified in the survey to make sure they consistently represent aircraft flown in Australia. This is done by visualising the aircraft operating locations provided in the survey.

4.1.1 Survey Results

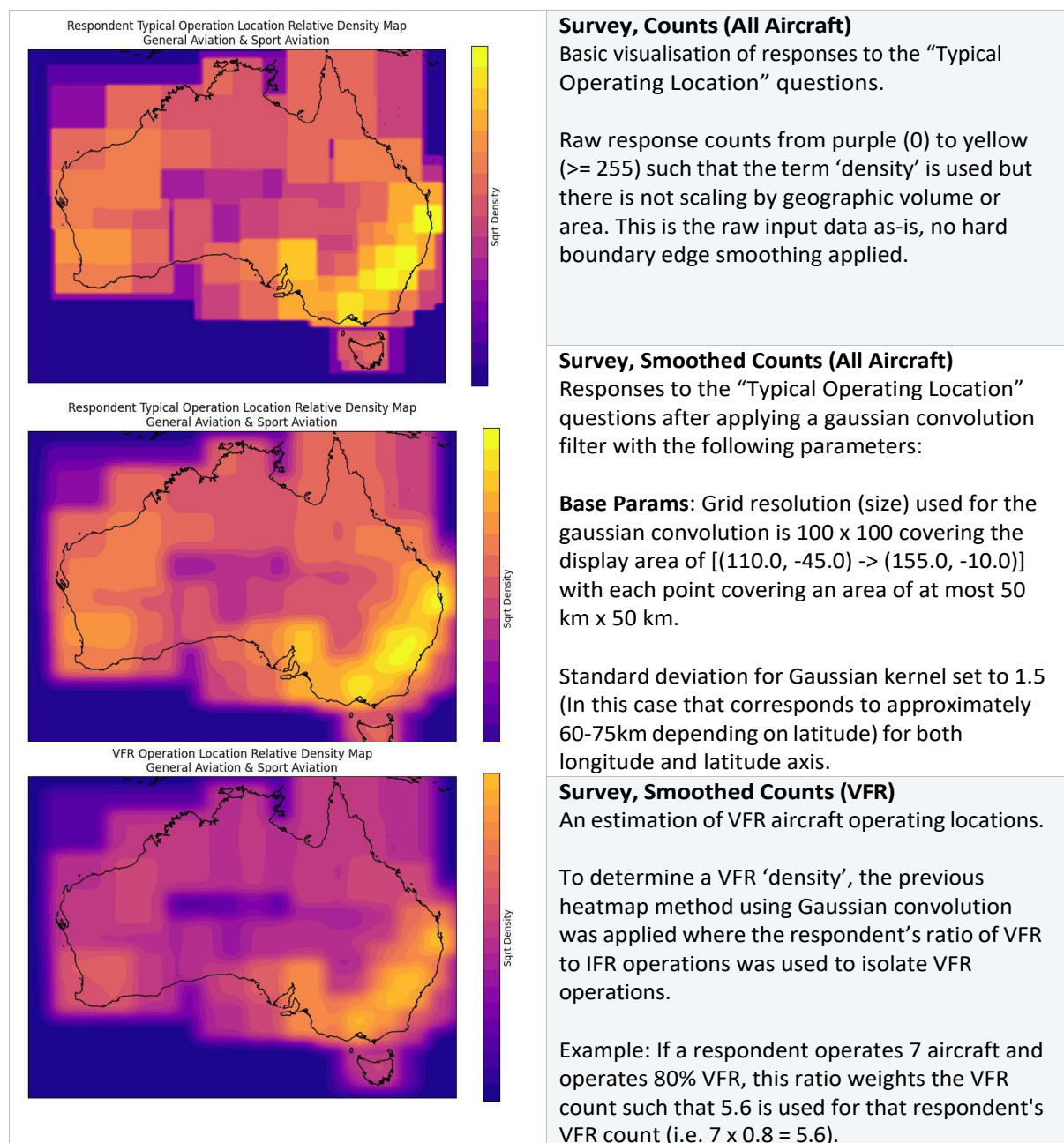


Fig. 5 Aircraft Operating Locations (Geographical) from Survey

Remark 4: *Instead of a linear density display, the sqrt of the values has been used so there is more colour variation in the less dense regions. A log scale was also investigated, but that gave a false visual impression of a higher density in regions with very little data.*

4.1.2 Secondary Data Sources

To gauge how well representative the survey results are of the total VFR aircraft population in Australia, this report compares responses to secondary historical flight path data sources for the year of 2024 from Aireon and OzRunways.

4.1.2.1 Aireon

Self-described as “The pioneer of space-based automatic dependent surveillance-broadcast (ADS-B) data for the aviation industry”, Aireon uses a satellite constellation of ADS-B receivers providing a near 100% coverage of Australia with no temporal gaps. Historical Aireon ADS-B data for the year of 2024 was compared against data from survey respondents in the General Aviation and Sports Aviation analysis groups to gauge areas of over and under-representation in the data.

To assign Aireon ADS-B data to an analysis group for the purpose of comparison with the survey results a process of data mapping was performed. The process first involves mapping the unique aircraft identifier (ICAO code from the ADS-B data) to aircraft parameters such as weight and engine type. Mappings are performed using open-source data bases such as the Microtronics aircraft database (<https://www.mictronics.de/aircraft-database/>) and other QUT built databases. Aircraft parameters such as weight and engine type are used to estimate the category of aircraft (general aviation or sports aviation). While there is always a potential for group misclassification as the line between a general aviation aircraft and a sports aviation ultralight is not always clear from aircraft parameters alone, for the purposes of this analysis (and due large samples size), the impacts of misclassifications are reduced.

4.1.2.2 OzRunways

OzRunways is among the most popular and widely used electronic flight bags in Australia and operates independently to ADS-B equipage. While Aireon historical data can help gauge the suitability of survey responses with ADS-B OUT equipage, there are a significant portion of respondents that don’t have such ADS-B equipage.

To help determine the suitability of their results, OzRunways historical data for the year of 2024 was compared to survey results for respondents who reported using the OzRunways Electronic Flight Bag. Typically operating on a smart phone or tablet, the OzRunways application records GPS position during flights and depending on user configuration uploads flight track data to the OzRunways servers as historic data. Unlike Aireon data, OzRunways doesn’t record information that can be used to accurately classify an aircraft into an analysis group of general aviation or sports aviation due to a lack of verifiable mapping between flights and aircraft make and model. Without a mapping from individual flights to aircraft, this comparison included in this report is based solely on the total flight hours for all aircraft spent for each location.

4.1.3. ADS-B Results

4.1.3.1 Aireon Satellite ADS-B OUT, Unique Aircraft Counts, General Aviation

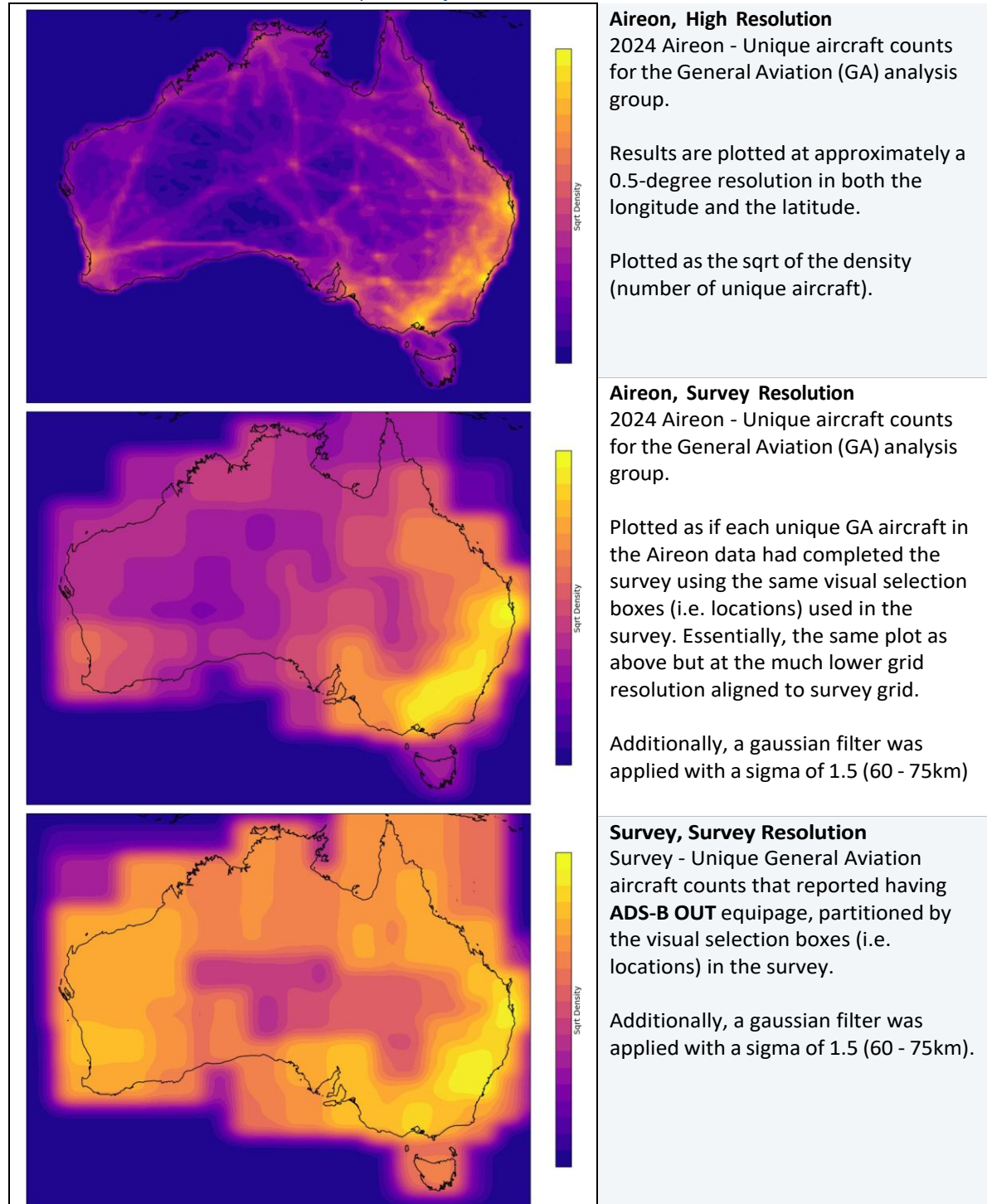


Fig. 6 Aircraft Operating Locations (Geographical): General Aviation, ADS-B OUT Flight Count from Survey and Aireon

Interpretation

These figures help to visually identify regions of overrepresentation and underrepresentation in the survey for GA aircraft with ADS-B OUT noting coarseness of the location selection. The survey:

- overrepresents rural areas especially in the north of Western Australia, the Northern Territory, west Queensland with slight overrepresentation in Tasmania.
- underrepresents the inland corridor between Melbourne and Sydney.

Overall, for this category the survey provides a reasonable representation, albeit on the overrepresentation side if Aireon data is 'trusted'.

4.1.3.2 Aireon Satellite ADS-B OUT, Flight Hours, General Aviation

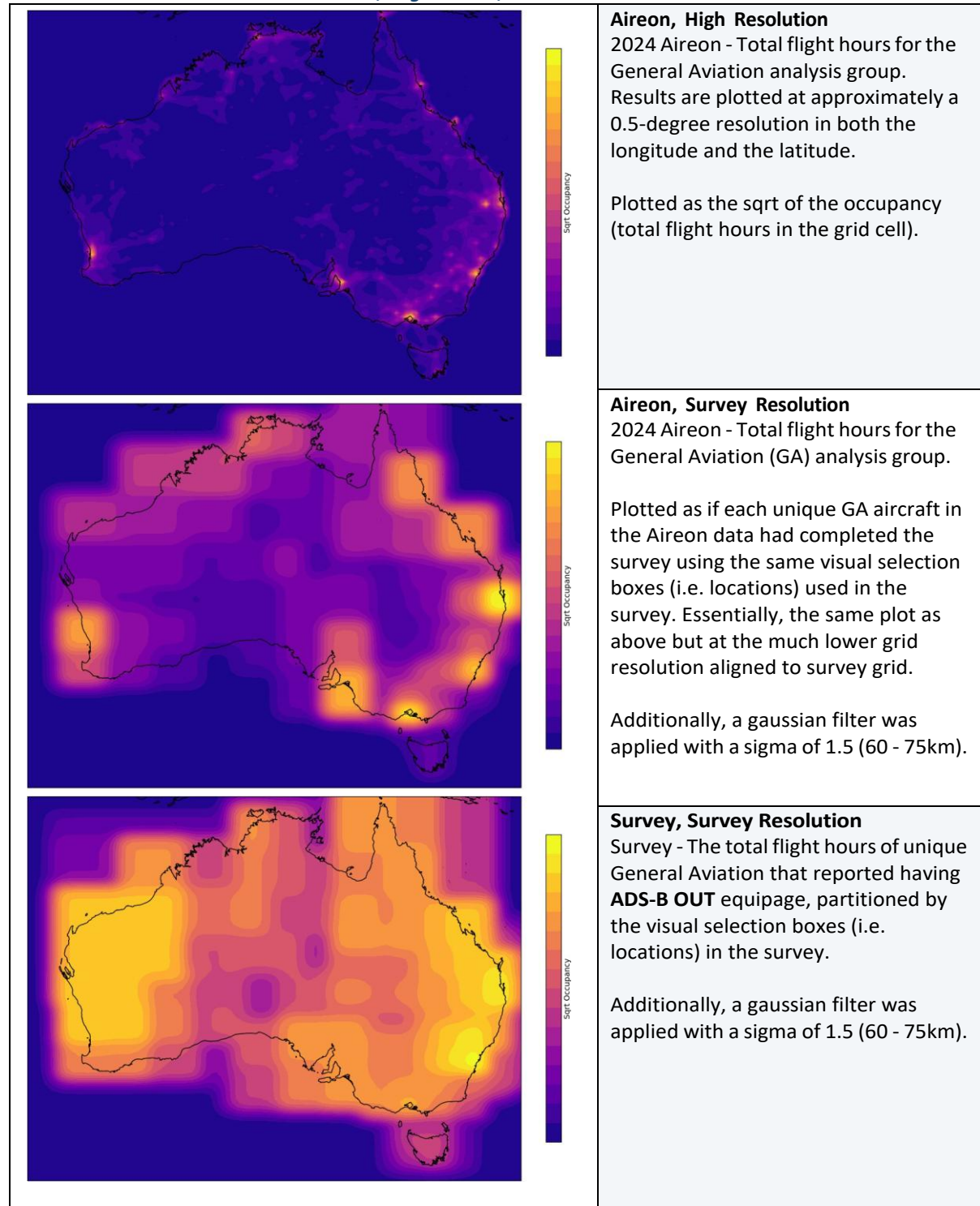


Fig. 7 Aircraft Operating Locations (Geographical): General Aviation, ADS-B OUT Flight Hours from Survey and Aireon

Interpretation

These figures can help to visually identify regions of overrepresentation and underrepresentation in the survey for GA aircraft with ADS-B OUT noting coarseness of the location selection. The survey:

- overrepresents rural areas especially in the north of Western Australia, the Northern Territory, west Queensland with slight overrepresentation in Tasmania.
- underrepresents southern Victoria / Melbourne region.

4.1.3.1 Aireon Satellite ADS-B OUT, Unique Aircraft Counts, Sports Aviation

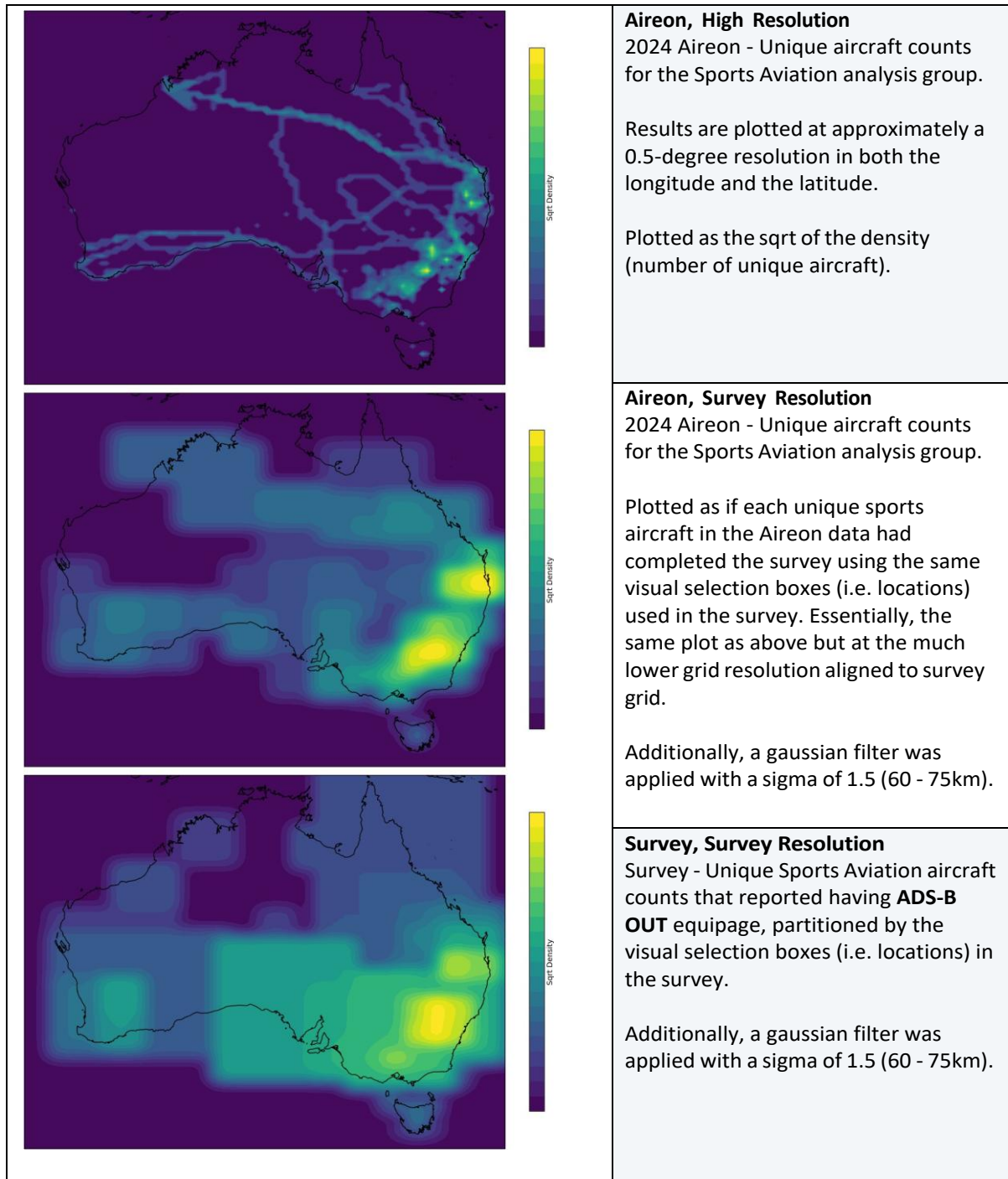


Fig. 8 Aircraft Operating Locations (Geographical): Sport Aircraft, ADS-B OUT Flight Count from Survey and Aireon

Interpretation

These figures can help to visually identify regions of overrepresentation and underrepresentation in the survey for sports aircraft with ADS-B OUT noting coarseness of the location selection.

- Both the survey and the Aireon data show that sports aviation tend to operate in rural areas that are in-land from major population centres (as compared to general aviation); this a good indicator that the survey data provides reasonable location representation.
- The survey appears to overrepresent South Australia and southwestern Western Australia.

Importantly, the process of mapping Aireon aircraft data to a category of sports aviation could introduce misclassifications. The process first involves mapping the unique aircraft identifier (ICAO code) to aircraft parameters such as weight and engine type. These parameters are used to estimate the category of aircraft (general aviation or sports aviation). This potential misclassification is probably best illustrated by the small number of aircraft categorised as sports aircraft that fly cross-country, which is unusual, but not impossible for sports aircraft.

Additionally, it is possible some low-cost low power ADS-B transmitters used by sport aviation may not be picked up by satellites at lower altitude (and potentially pending equipment fitment). This means that the Aireon data may not have captured all sport aircraft using lower cost/uncertified ADS-B OUT.

4.1.3.2 Aireon Satellite ADS-B OUT, Flight Hours, Sports Aviation

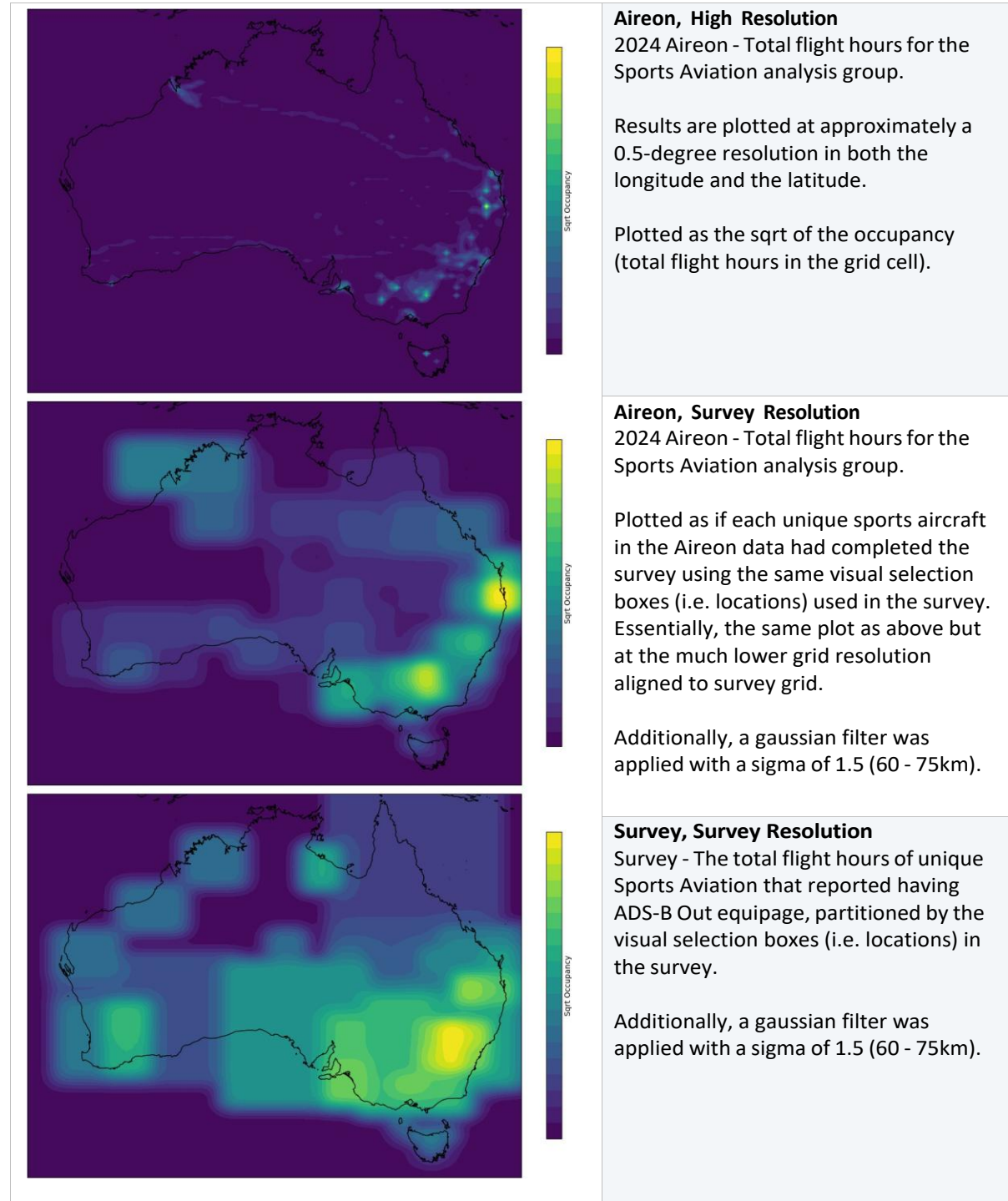


Fig. 9 Aircraft Operating Locations (Geographical): Sport Aircraft, ADS-B OUT Flight Hours from Survey and Aireon

Interpretation

These figures can help to visually identify regions of overrepresentation and underrepresentation in the survey for sports aircraft with ADS-B OUT noting coarseness of the location selection.

- Both the survey and the Aireon data show that sports aviation tend to operate in rural areas that are in-land from major population centres (as compared to general aviation); this a good indicator that the survey data provides good representation for the general structure.
- The survey appears to overrepresent South Australia and the southwestern Western Australia.

- the survey appears to have a higher concentration of sports aviation total flight hours in central New South Wales compared to the Aireon data which has higher total flight hours in Queensland and Victoria.

Note, the Aireon total flight hours data appears more concentrated than the unique aircraft counts of the same analysis group. This indicates that sport aviation aircraft tend to concentrate time spent flying near or within specific locations rather than spreading out evenly over all locations (as expected).

Since the survey doesn't capture how flight hours are distributed over reported flight locations, the figure is constructed by assuming that a respondents flights hours are evenly distributed over each location they reported flying in and as such any concentration effect will not be seen.

4.1.3.3 OzRunways Electronic Flight Bag, Flight Hours, GA + Sport

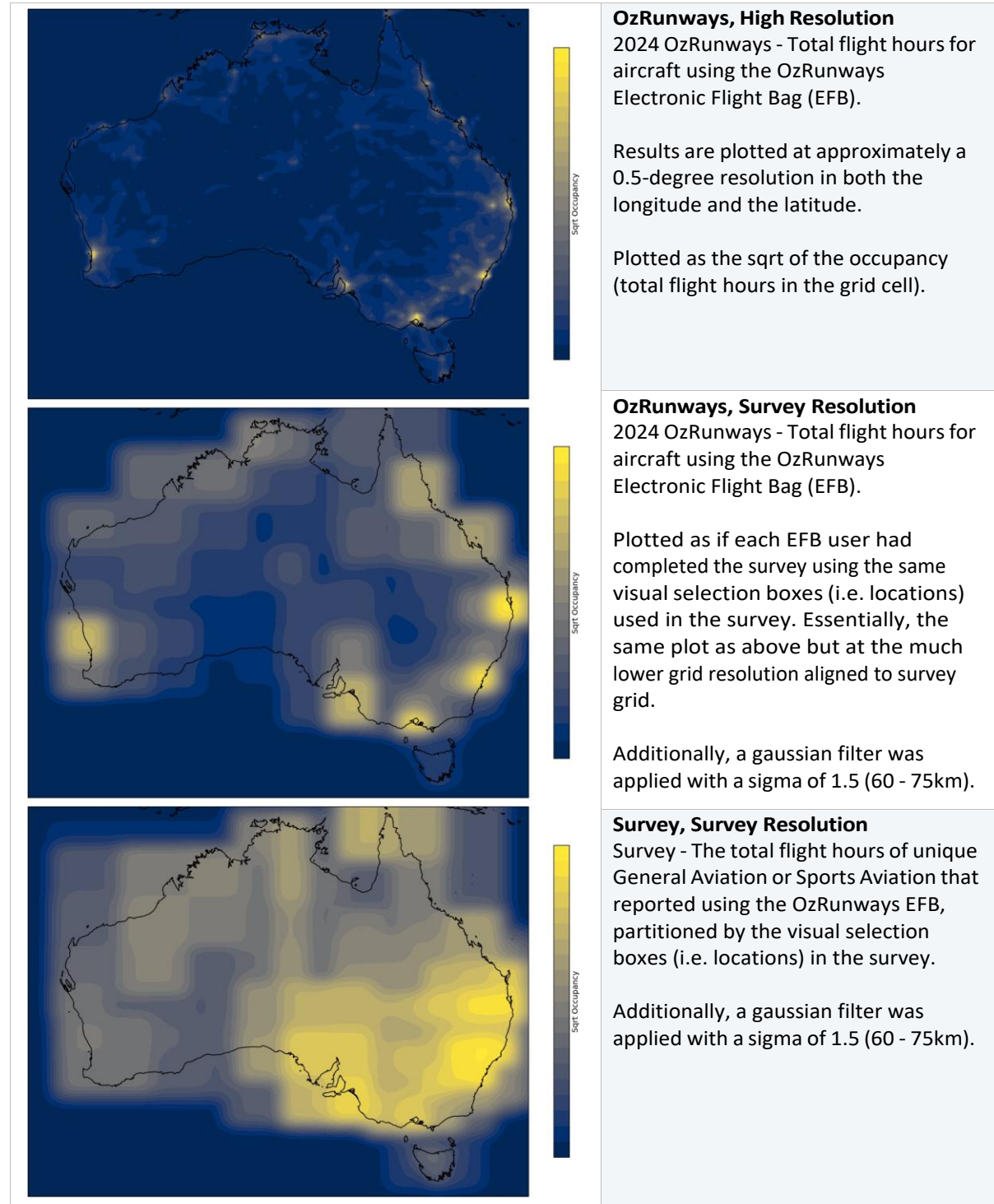


Fig. 10 Aircraft Operating Locations (Geographical): General and Sport Aircraft, EFB Flight Hours from Survey and OzRunways.

Interpretation

These figures can help to visually identify regions of overrepresentation and underrepresentation in the survey for GA + Sports aircraft that report using the OzRunways Electronic Flight Bag (EFB).

- The survey appears to overrepresent rural Australian areas, under-represent the region around Perth in Western Australia and mixed representation in north Queensland coastal regions.
- The hotspots are similar/aligned, with OzRunways resulting in tighter hotspots.

Note, the OzRunways total flight hours data appear more concentrated than the survey data. Like the Aireon analysis of flight hours, since the survey doesn't capture how flight hours are distributed over reported flight locations, the 'Survey, Survey resolution' figure is constructed by assuming that a respondents flights hours are evenly distributed over each location they reported flying.

4.1.3.3 Operating Location Alternate (by Aerodrome)

While most geographic analysis in this survey was conducted using the visual selections associated with regions on a map, a later optional survey question asking respondents to list the codes of the aerodromes they frequently fly from / to can be used to estimate operating regions.

In contrast to the visual selections representing regions, aerodromes offer a point precision location. To convert from individual points to contour heat maps, a kernel density estimate (KDE) was applied over the data to turn the individual aerodrome-aircraft pairs into estimated aircraft operating regions about the aerodromes. This KDE representation assumes that aircraft fly around their operating aerodromes with a gaussian probability density. The KDE is built (for each location) by adding points at the location of each aerodrome equal to the number unique aircraft reported operating at that aerodrome.

The following figures show the estimated operating regions for the analysis groups of General Aviation and Sports Aviation with black dots representing the individual aerodrome positions.

Remark 5: *The predominant geographic analysis in this report (previous maps) use the survey's visual map selections rather than the following Aerodrome KDE geographic maps. The rationale for this decision was based on the following downsides of using aerodrome analysis:*

- *Approximately only 60% of general aviation and sports aviation respondents provided valid operating aerodrome locations which could be used to create these maps.*
- *Respondents that don't operate from aerodromes would be underrepresented (for example, only ~11% of paragliders entered any valid aerodromes).*
- *A point is added for each respondent for each aerodrome code they entered for each aircraft they operate which overrepresents data for respondents who entered more aerodromes codes. Thus, the KDE implementation tends to bias respondents who visit more unique aerodromes rather than metrics such as total flight time in a region.*

Interpretation

Much like the other visual geographic analysis the aerodrome usage shows that sports aviation tend to operate in rural areas that are in-land from major population centres (as compared to general aviation). The general aviation appears to match well with other geographic data, but the sports aviation appears to overrepresent the Perth region and the density in rural NSW / Victoria appears to be skewed a bit towards Victoria. Overall, the data seems representative.

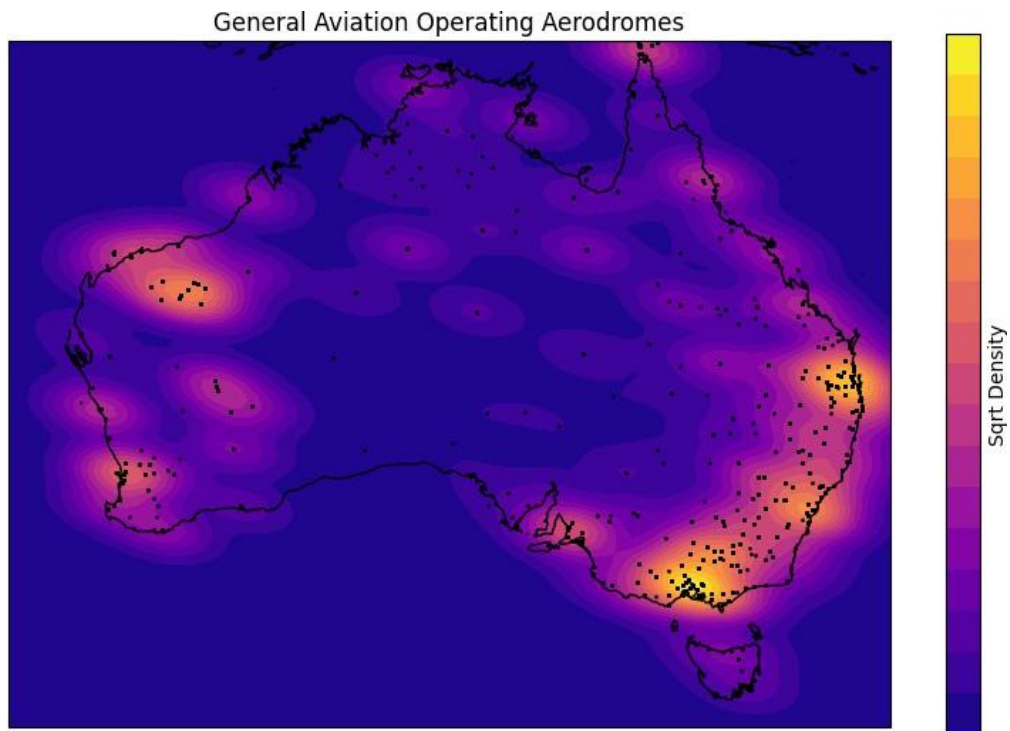


Fig. 11 Estimated operating regions for the analysis group General Aviation assuming aircraft fly around their operating aerodromes with a gaussian probability density, plotted as the sqrt of density.

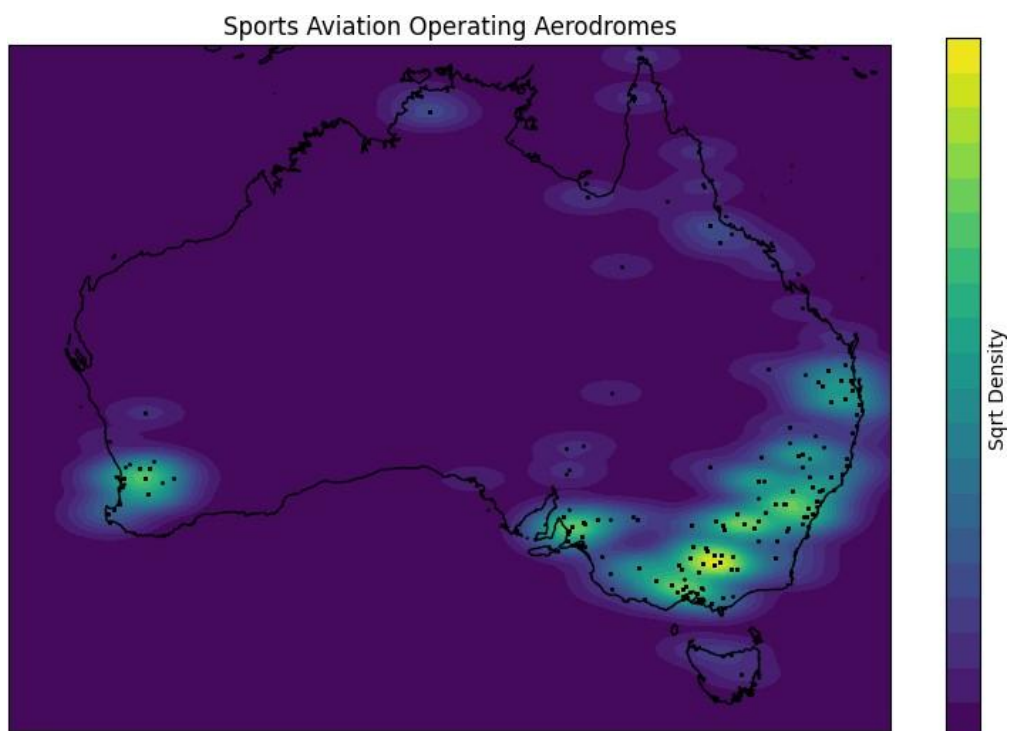


Fig. 12 Estimated operating regions for the analysis group Sports Aviation assuming aircraft fly around their operating aerodromes with a gaussian probability density, plotted as the sqrt of density.

4.1.4 RPAS

Unlike other analysis groups, QUT does not have secondary data source for where RPAS fly to use for comparison and as such, the geographic analysis will be conducted in isolation.

4.1.4.1 RPAS Unique Aircraft Count

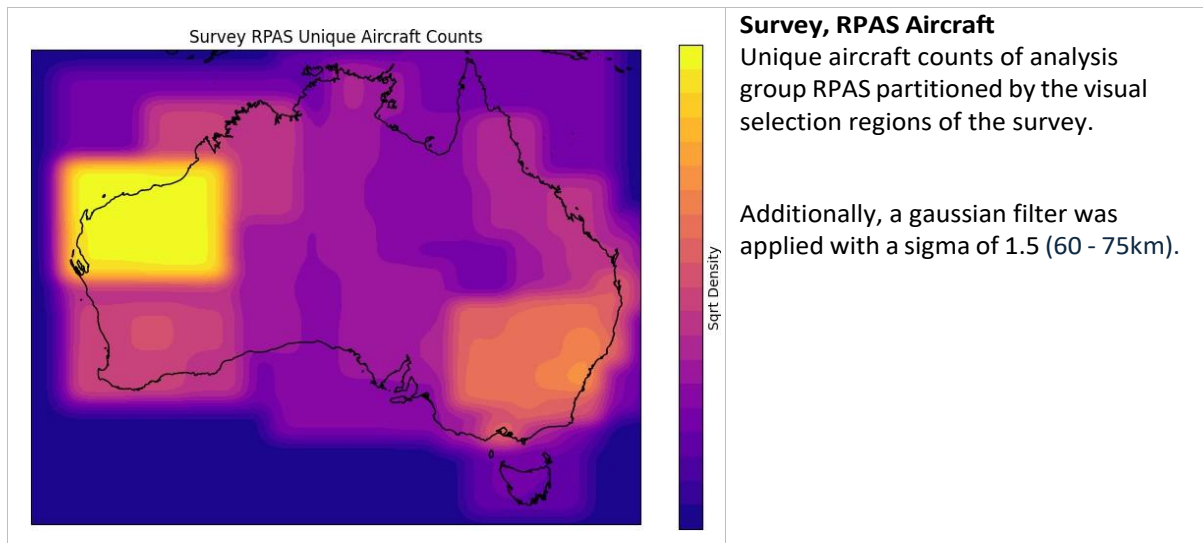


Fig. 13 Aircraft Operating Locations (Geographical): RPAS, Aircraft Count from Survey.

The above figure shows a bright hotspot in the north-west of Western Australia. Unlike the other analysis categories in this survey, RPAS was unique among analysis groups for having single operators with very large fleet sizes. The largest RPAS fleet size of any single operator was 250 unique RPAS aircraft, operating in north-west Western Australia. For this reason, it is worth examining the number of unique respondents instead of number of unique aircraft (see 4.1.4.2 below).

4.1.4.2 RPAS Unique Respondent Count

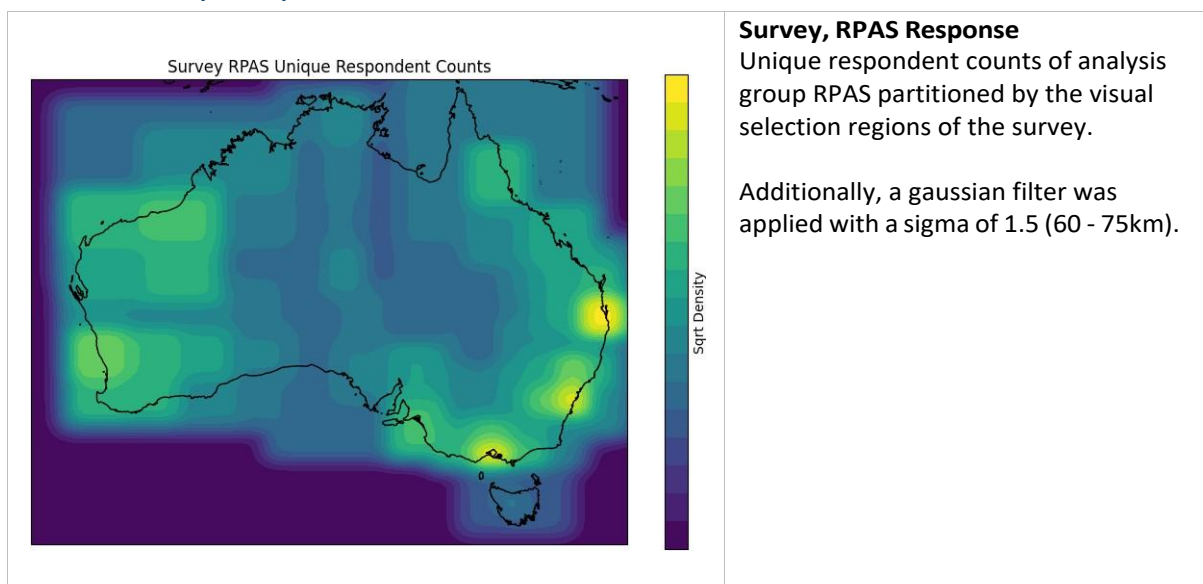


Fig. 14 Aircraft Operating Locations (Geographical): RPAS, Respondent Count from Survey.

The above figure shows that the number of unique respondents for the RPAS analysis group is more evenly distributed throughout Australia (compared to RPAS aircraft in previous figure). Hotspots can be found at population centres and to a lesser extent, the north-west of Western Australia and north Queensland coastal regions.

4.2. Proportion of examined aircraft by type

The **second check** (activity) is to examine the aircraft types identified in the survey to make sure they consistently represent aircraft flown in Australia. This is done by comparing the aircraft types in the survey to those identified by BITRE and Aireon. The results are as follows:

4.2.1 Aircraft Count Estimates

The following tables list the number of survey respondents per analysis group, the lower and upper limits of the number of unique aircraft represented in the survey for each analysis group, the total number of aircraft of that analysis group as reported in the 2024 BITRE statistical report and finally the proportion of surveyed aircraft for that analysis group.

Remark 6: The uncertainty (lower and upper confidence interval) aircraft is result of survey design and the interpretation of results from respondents with larger aircraft fleets. For more information see sections 3.3 Analysis Group Assignment, 3.4 Analysis Group Adjustments, and 3.5 Aircraft Count Uncertainty.

Analysis category	Unique respondents	Unique Aircraft	Total aircraft (BITRE, 2024)		Proportion surveyed
		Lower CI	Upper CI		
General Aviation	570	1,250	1,309	10,487	11.9% – 12.5%
Sport Aviation	381	796	870	8,234	9.7% – 10.6%
RPAS	260	1,105	1,112	N/A	N/A
Balloon	5	16	16	N/A	N/A

Table 10 Proportion of active population surveyed for general aviation, sport and RPAS aircraft types.

BITRE sub-category	Unique respondents	Unique Aircraft	Total aircraft (BITRE, 2024)		Proportion surveyed
		Lower CI	Upper CI		
Ultralight	53	93	102	2,910	3.2% – 3.5%
Glider	296	628	689	1,272	49.4% – 54.2%
Paraglider	36	70	74	3,726	1.9% – 2.0%
Gyroplane	1	5	5	326	1.5%

Table 11 Proportion of active population surveyed for the different types within sports aviation.

Survey response category	Total population estimate source
General Aviation (VH registered light aircraft, heli)	BITRE — General Aviation
Glider	BITRE — Gliders
Ultralight	BITRE — Ultralight
Paraglider	BITRE — Hang Gliders and Paragliders
Gyroplane	BITRE — Gyroplane
RPAS	Infinite population size (conservative)
Balloon	Infinite population size (conservative)

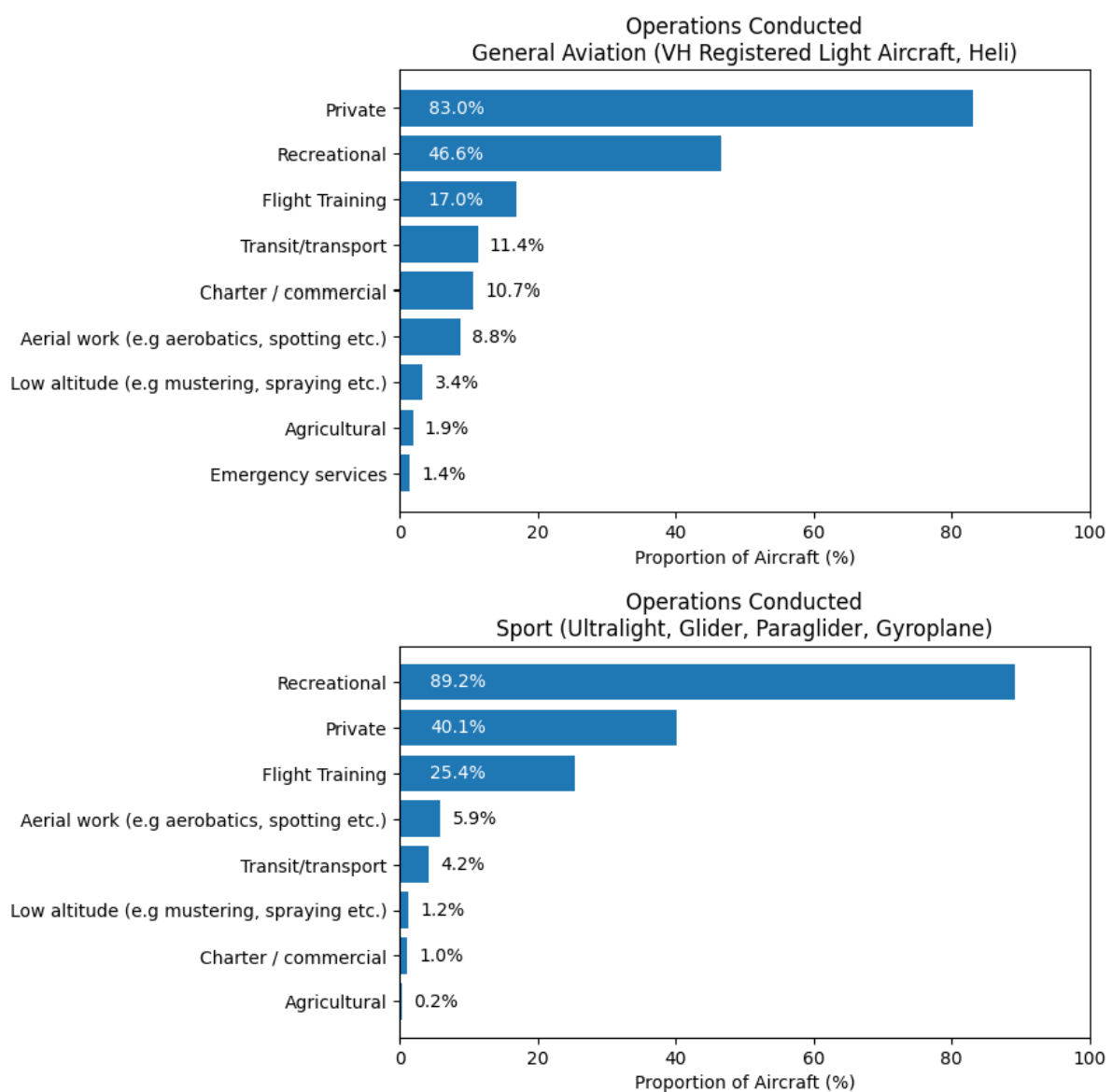
Table 12 Population estimate Source

5. Results

Equipage results are presented by technology (capability). National estimates, confidence intervals, and geographically segmented results are provided where supported by data.

5.1 Operation Types

Operation types were estimated from all valid, categorisable responses (General Aviation, Sport, RPAS, Balloon) that answered the question “What types of operations do you conduct”. This question was a multi-select question allowing respondents to select multiple options meaning the sum of all percentages can exceed 100%. The following graphs show the percentage of respondents with aircraft of a given category with a given the operation type selected, ordered by most common operation type for that category. Operation types with no selections for the entire category were not shown which is why hot air balloon only has two operation types.



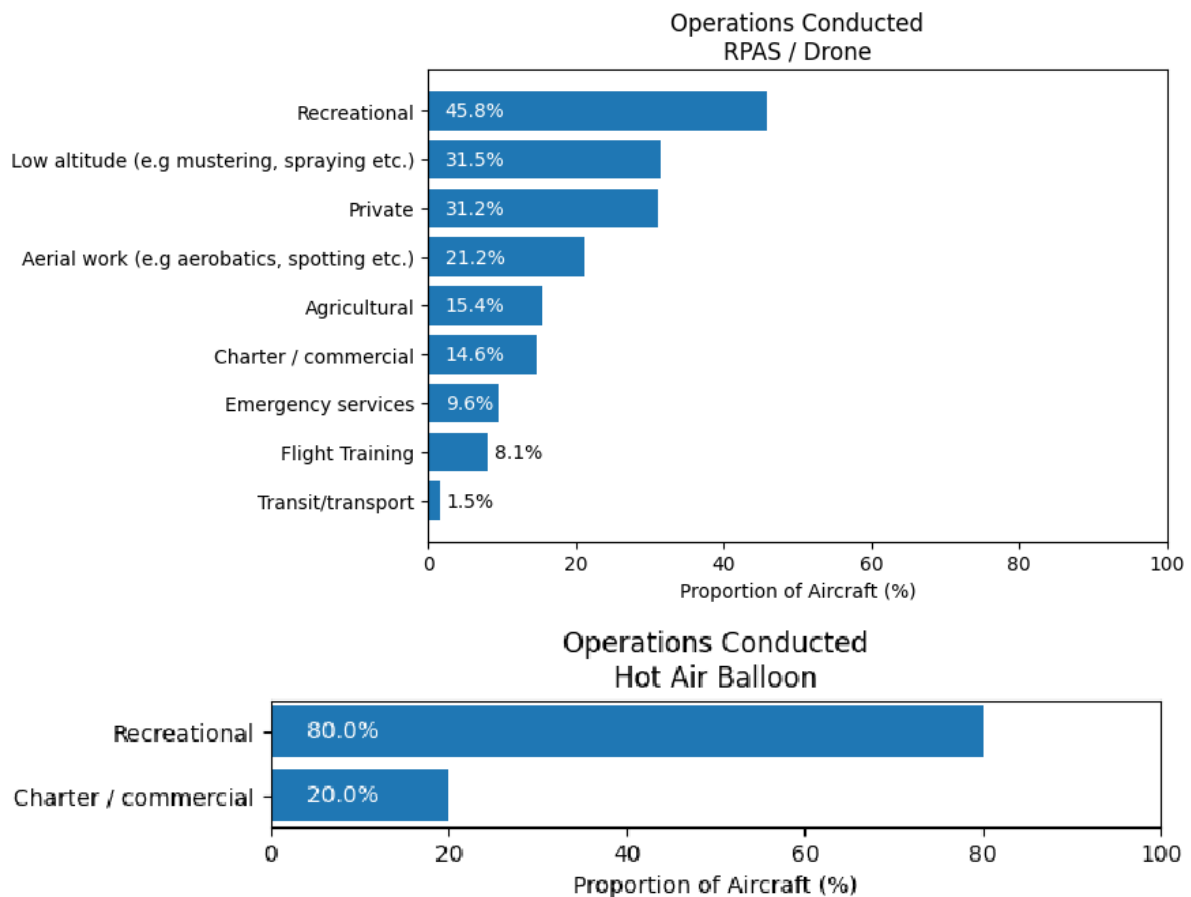


Fig. 15 Operations Conducted by Aircraft Type

5.2 VFR vs IFR Ratio

Time spent flying under visual flight rules (VFR) was estimated from all valid, categorisable responses in General Aviation and Sport that entered a ratio of VFR vs IFR flying. For each sector the proportion of aircraft of the specified type and category multiplied by their reported ratio of VFR vs IFR operations among all aircraft with a valid response in the same category. Results table combined with day flying.

5.3 Day Time Flying

Time spent flying during the day was estimated from all valid, categorisable responses (General Aviation, Sport, RPAS, Balloon) that entered a ratio of day vs night flying. For each sector the proportion of aircraft of the specified type and category multiplied by their reported ratio of day vs night operations among all aircraft with a valid response in the same category.

Proportion of time by operating condition		
Category	% time under VFR	% time flying during the day
General Aviation	72.44%	79.64%
Sport Aviation	92.87%	92.91%
RPAS	Not relevant for this category	84.33%
Balloon	100% (balloons operate under VFR only, by regulation)	100%

Table 13 Proportion of time by operating condition

5.4. Transponder Equipage

Transponder equipage was estimated from all valid, categorisable responses (General Aviation, Sport, RPAS, Balloon) that answered the Transponder question with a definite selection; 'Unsure' responses were excluded. For each sector the proportion is the percentage of equipped aircraft of the specified type and category among all aircraft with a valid response in the same category, with results reported as a confidence interval.

5.4.1 General Aviation (VH Registered Light Aircraft, Heli)

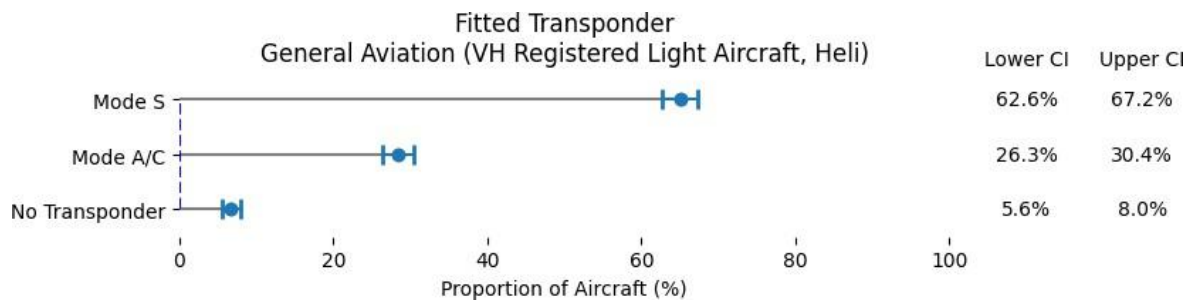


Fig. 16 Transponder Equipage General Aviation

5.4.2 Sport (Ultralight, Glider, Paraglider, Gyroplane)

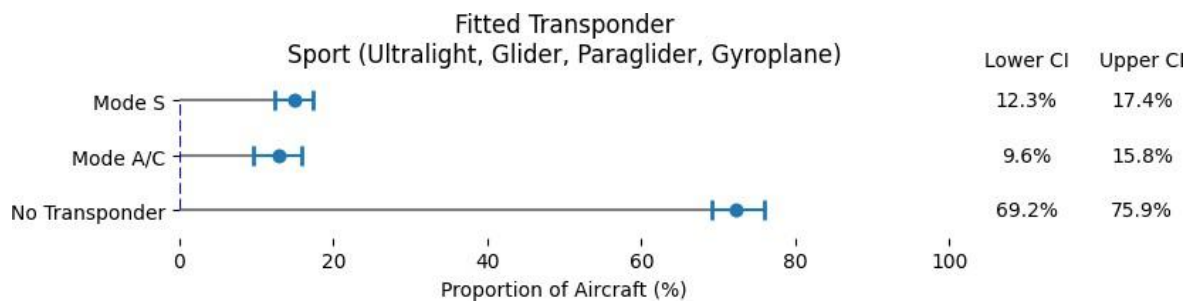


Fig. 17 Transponder Equipage Sport Aviation

5.4.3 Remotely Piloted Aircraft Systems (RPAS)

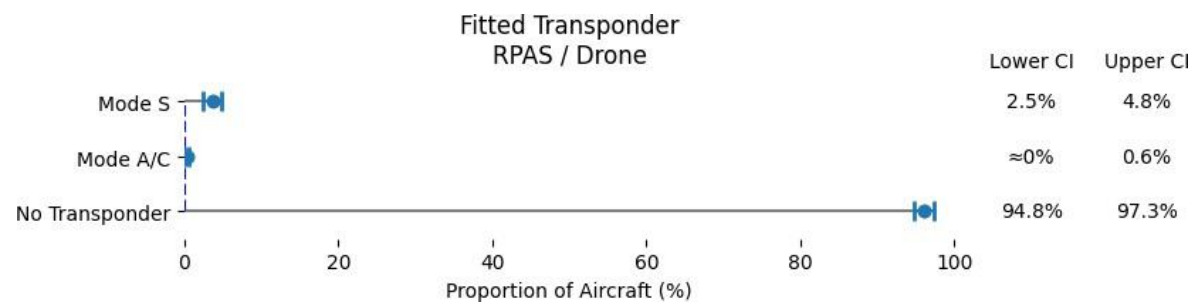


Fig. 18 Transponder Equipage RPAS

Remark 7: Few RPAS report a fitted transponder (94.8-97.3% report none), which aligns with expectations there is currently no legislative requirement for transponder or ADS-B Out equipage on RPAS, and equipage is generally driven by the operational requirements of a given operation, commensurate with its risk. Where RPAS are equipped for ADS-B Out, this is typically delivered by Mode S-capable devices (for example the uAvionix ping200X). The figures in this section are therefore indicative only.

5.4.4 Hot Air Balloon

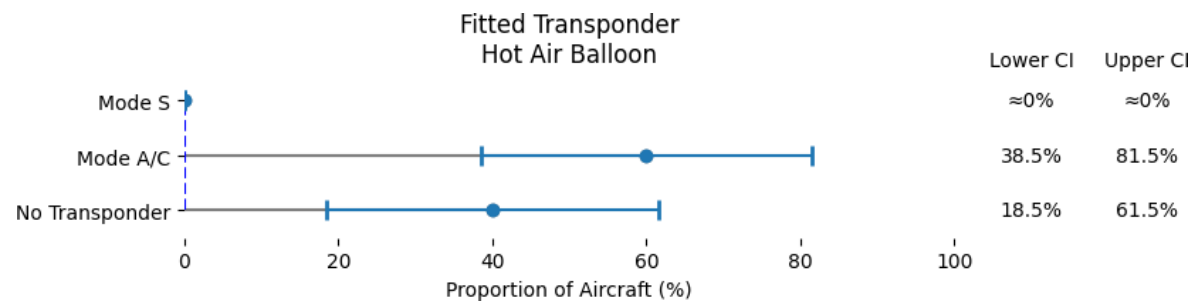


Fig. 19 Transponder Equipage Hot Air Balloon

Remark 8: High error bounds are due to low sample size - only five hot-air-balloon operators completed the survey. The figures are indicative only and should not be read as a reliable sector estimate.

5.4.5 Summary and Results Interpretation

In general aviation, Mode S is now the predominant transponder type (62.6–67.2%), with a minority on Mode A/C (26.3–30.4%), consistent with the shift toward ADS-B-capable equipage. Compared with the 2021 survey, the proportion of general aviation aircraft without a transponder has approximately halved, and Mode S adoption has risen substantially, indicating a clear move toward equipment upgrade in this sector.

In sport aviation, the picture is reversed: most respondents reported no transponder fitted (69.2–75.9%), with only a small proportion on Mode S (12.3–17.4%) or Mode A/C (9.6–15.8%). This proportion is essentially unchanged from 2021 (within the margin of error), indicating little movement in transponder fitment across the sport sector over the period.

RPAS are largely outside the transponder-based surveillance model (94.8–97.3% report no transponder), and hot-air-balloon figures rest on only five respondents.

Transponder findings are therefore best used qualitatively and are superseded by the more reliable ADS-B results in Section 5.5.

Fitted transponder type by sector			
Sector	Mode S	Mode A/C	No transponder
General Aviation	62.6-67.2%	26.3–30.4%	5.6-8.0%
Sport	12.3-17.4%	9.6–15.8%	69.2-75.9%
RPAS	2.5-4.8%	≈0–0.6%	94.8-97.3%
Hot Air Balloon	≈0%	38.5–81.5%	18.5-61.5%

Table 14 Fitted transponder type by sector

Group	No Transponder	Mode A/C	Mode S
Ultralight	11.3% - 16.8%	36.6% - 47.7%	38.8% - 49.2%
Glider	77.7% - 82.4%	7.4% - 10.8%	9.5 - 12.3%
Paraglider	97.3% - 99.6%	0.4% - 2.7%	~0.0%
Gyroplane	Not Enough Data	Not Enough Data	Not Enough Data

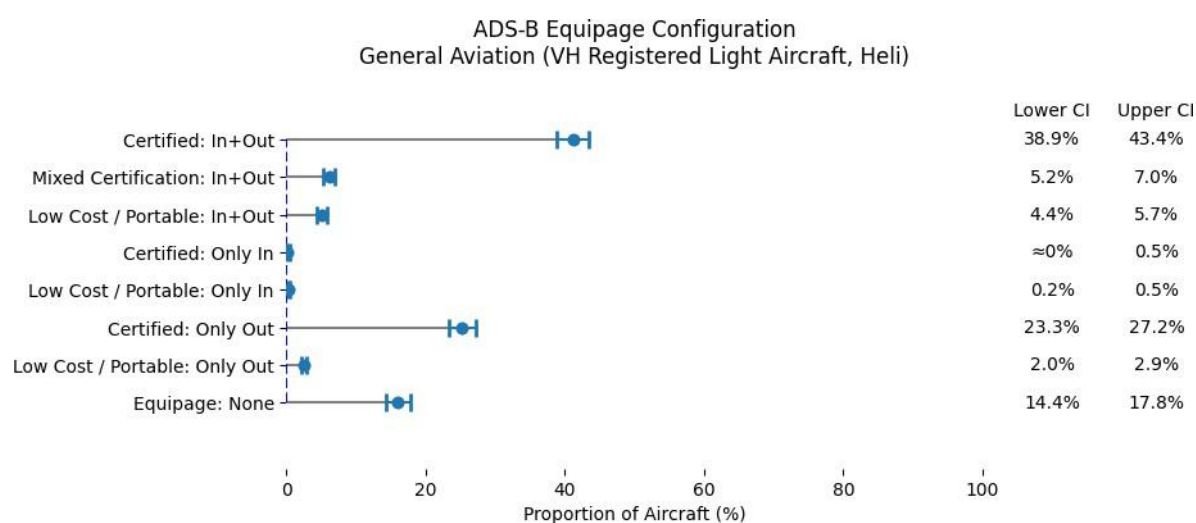
Table 15 Fitted transponder type by within the sport sector

5.5. ADS-B Equipage

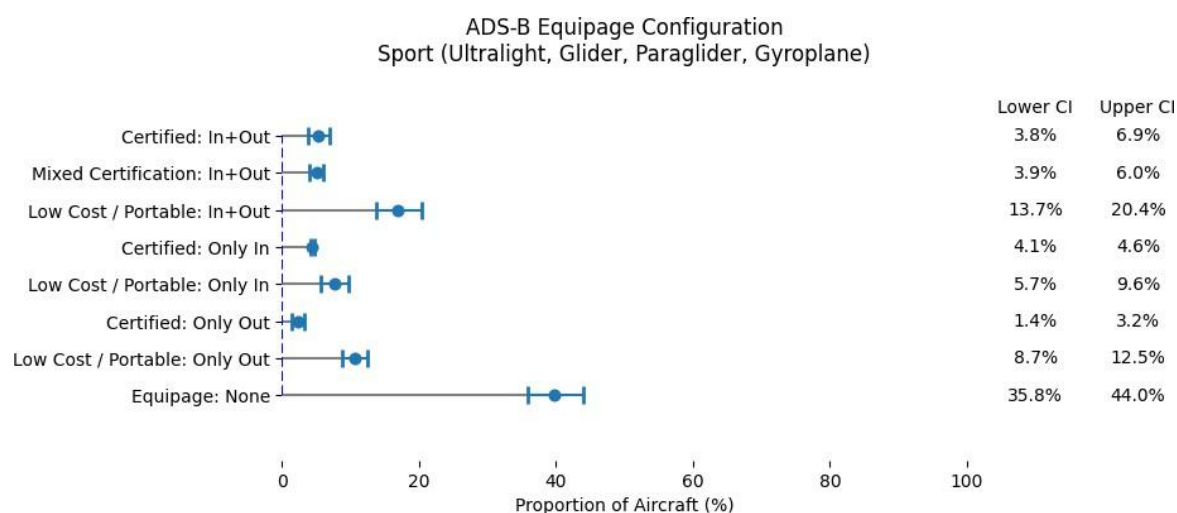
Respondents were asked whether their aircraft is fitted with ADS-B OUT (transmit) and ADS-B IN (receive) capability, and in each case whether the equipment is certified or a low-cost/portable device. Equipage was estimated from all valid, categorisable responses that answered with a definite selection; 'Unsure' responses were excluded. For each sector the proportion equipped is the ratio of equipped aircraft to aircraft with a valid response, reported as a confidence interval. Where the 2021 study measured a comparable population, the change is expressed as an approximate multiplier of the midpoints and is indicative only.

5.5.1 ADS-B Equipage:

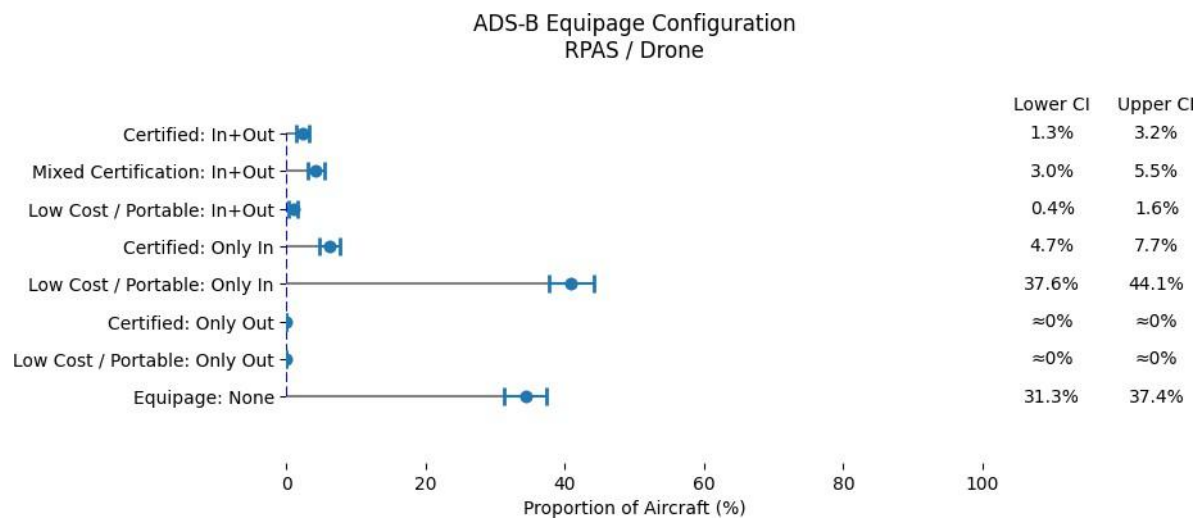
5.5.1.1 General Aviation (VH Registered Light Aircraft, Heli)



5.5.1.2 Sport (Ultralight, Glider, Paraglider, Gyroplane)

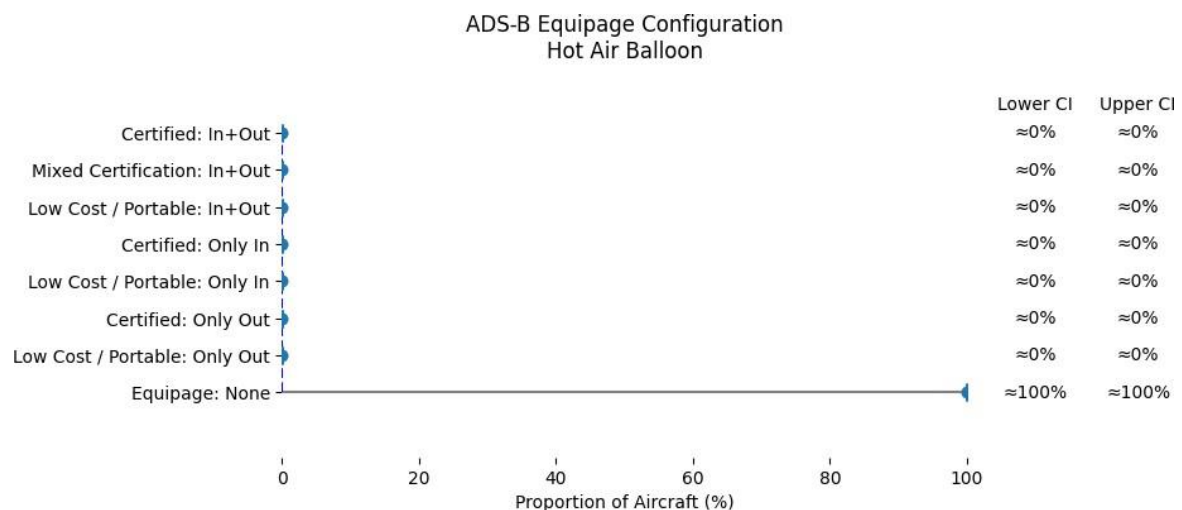


5.5.1.3 Remotely Piloted Aircraft Systems (RPAS)



Remark 9: There is currently no legislative requirement for transponder or ADS-B OUT equipage on RPAS, and equipage is generally driven by the operational requirements of a given operation, commensurate with its risk. Where RPAS are equipped for ADS-B OUT, this is typically delivered by Mode S-capable devices (for example the uAvionix ping200X). The figures in this section are therefore indicative only.

5.5.1.4 Hot Air Balloon



5.5.2 ADS-B OUT Geographic Representation

The following two figures show the estimate of where VFR (General Aviation and Sports Aviation analysis groups) aircraft fly with and without ADS-B OUT equipage.

5.5.2.1 VFR Aircraft with and without ADS-B OUT Equipage Operating Locations

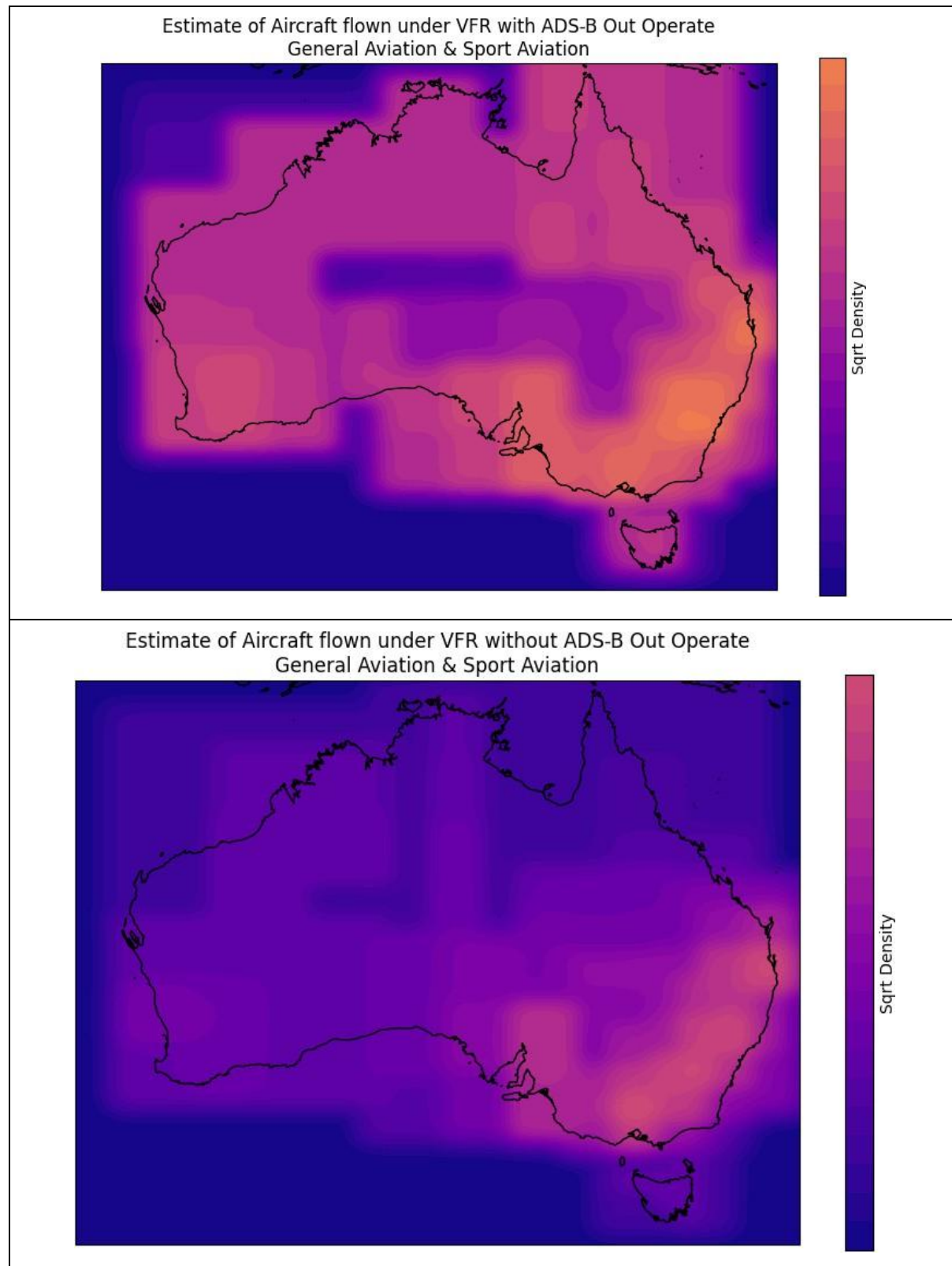


Fig. 21 Estimated operating location and density of VFR aircraft with (top) and without (bottom) ADS-B OUT capability. The square root of the density is used to expose relative difference for visualisation purposes.

5.5.3 Summary and Results Interpretation

ADS-B is now the dominant electronic conspicuity technology in Australian aviation, but the pattern of Out versus IN capability differs sharply by sector. ADS-B IN is more evenly distributed across sectors than ADS-B OUT, and is notably highest in RPAS.

In **general aviation**, ADS-B OUT is the norm: roughly four in five aircraft transmit (78.3–82.0%), the large majority via certified equipment, and equipage has approximately doubled since 2021. IN capability is lower overall (49.7–54.6%) but has roughly tripled since 2021 and is predominantly certified (72.9–77.1% of those with IN) — consistent with IN capability accompanying certified OUT installations.

In **sport aviation**, uptake is moderate for both (OUT 34.0–45.6% IN 36.3–45.5%) but has grown fastest of any sector, roughly tripling for OUT and increasing more than fivefold for IN. In both cases capability is delivered mostly through low-cost or portable devices rather than certified equipment — a direct reflection of the low-cost device market that the 2021 study anticipated.

In **RPAS**, the two capabilities diverge completely: ADS-B OUT is effectively absent (7.8–11.5%), while ADS-B IN is the highest of any sector (57.8–64.4%) and is delivered overwhelmingly through low-cost devices (73.1–80.3%). Given the sector's very low certified-OUT equipage, this is consistent with receive-only conspicuity supporting detect-and-avoid.

The RPAS result should be read in context rather than as a shortfall: there is currently no legislative requirement for ADS-B OUT on RPAS, and equipage in that sector is driven by the operational requirements of a given operation, commensurate with its risk. Where RPAS are equipped for ADS-B OUT, this is typically delivered by Mode S-capable devices (for example the uAvionix ping200X).

Proportion of Aircraft with ADS-B OUT					
Group	Survey (CASA, 2021)	Survey (QUT, 2026)			Change
	All	Certified	Low-Cost	All	
General Aviation	35.7-39.7%	67.9-72.8%	8.2-11.4%	78.3-82.0%	↑ ~2.1x
Sport Aviation	10.8-13.9%	5.2-8.9%	28.8-36.7%	34.0-45.6%	↑ ~3.2x
RPAS	N/A	1.3-3.2%	5.7-9.0%	7.8-11.5%	N/A

Table 16 Proportion of Aircraft with ADS-B OUT

Group	No ADSB OUT	Low Cost / Portable	Certified
Ultralight	43.9%-54.7%	24.8%-36.1%	17.1%-23.8%
Glider	55.3%-61.7%	32.8%-39.0%	4.6%-6.8%
Paraglider	93.5%-97.4%	2.6%-6.5%	~0.0%
Gyroplane	Not Enough Data	Not Enough Data	Not Enough Data

Table 17 ADS-B Out equipage within the sport sector

Proportion of Aircraft with any ADS-B IN			
Group	Survey (CASA, 2021)	Survey (QUT, 2026)	Change
General Aviation	16.0 - 18.3%	49.7-54.6%	↑ 3x
Sport Aviation	6.6 - 8.6%	36.3-45.5%	↑ 5.4x
RPAS	N/A	57.8-64.4%	N/A

Table 18 Proportion of aircraft with ADS-B In capability across aviation sectors

ADS-B IN type (where reported)			
Sector	Certified	Low-cost	Both
General Aviation	72.9–77.1%	18.8–22.7%	3.5–5.1%
Sport Aviation	22.3–30.3%	64.9–73.4%	3.6–5.6%
RPAS	14.6–21.1%	73.1–80.3%	3.5–7.3%

Table 19 Proportion of ADS-B In type (where reported)

Group	No ADS-B IN	Low Cost / Portable	Certified
Ultralight	53.5%-60.0%	26.0%-32.8%	12.4%-14.7%
Glider	55.6%-66.3%	19.1%-29.2%	12.3%-18.0%
Paraglider	75.0%-82.5%	17.5%-25.0%	~0.0%
Gyroplane	Not Enough Data	Not Enough Data	Not Enough Data

Table 20 ADS-B In equipage within the sport sector

MAIN EQUIPAGE FINDING

ADS-B OUT is predominant in general aviation (~80%), moderate in sport aviation (**34.0-45.6%**) and effectively absent in RPAS (<12%). **ADS-B IN** is moderate in general aviation (~52%) and sport (~36–46%), and highest in RPAS (~58–64%). With the exception of RPAS Out, **ADS-B equipage has at least doubled across all sectors since 2021**. Certified equipment dominates in general aviation; low-cost and portable devices dominate in sport and RPAS.

ADS-B In capability is moderate in general aviation (~52%), moderate in sport aviation (~36-46%) and highest in RPAS (~58-64%)*. With the exception of RPAS, ADS-B In equipage appears to have roughly tripled or more in the four years since 2021.

*The RPAS result implies a substantial number of RPAS operators with receive-only capability, since over 88% of RPAS report no ADS-B Out. This is plausible: for RPAS, ADS-B In supports detect-and-avoid without the certification requirements of certified Out, and the type breakdown confirms RPAS In is overwhelmingly low-cost.

5.6. Operating Aerodrome Types

Respondents were asked two separate questions about the aerodromes they typically operate from or to: the airspace type (whether the aerodrome is controlled or uncontrolled), and, separately, the aerodrome's certification status. These are independent characteristics, a non-controlled aerodrome may still be a certified aerodrome and are reported separately below.

5.6.1. Controlled and Uncontrolled

Respondents were asked "What type of aerodromes do you typically operate from or to?" and could select *Controlled aerodromes*, *Uncontrolled aerodromes*, or *Mixed (both controlled and uncontrolled)*. This question concerns the airspace associated with the aerodrome, that is, whether air traffic control services are provided, rather than its physical certification status.

Responses were assigned to the analysis groups General Aviation, Sport Aviation, RPAS and Hot Air Balloon. For each group the proportion is the percentage of respondents selecting each aerodrome type among all respondents in that group who gave a valid response, with results reported as a confidence interval.

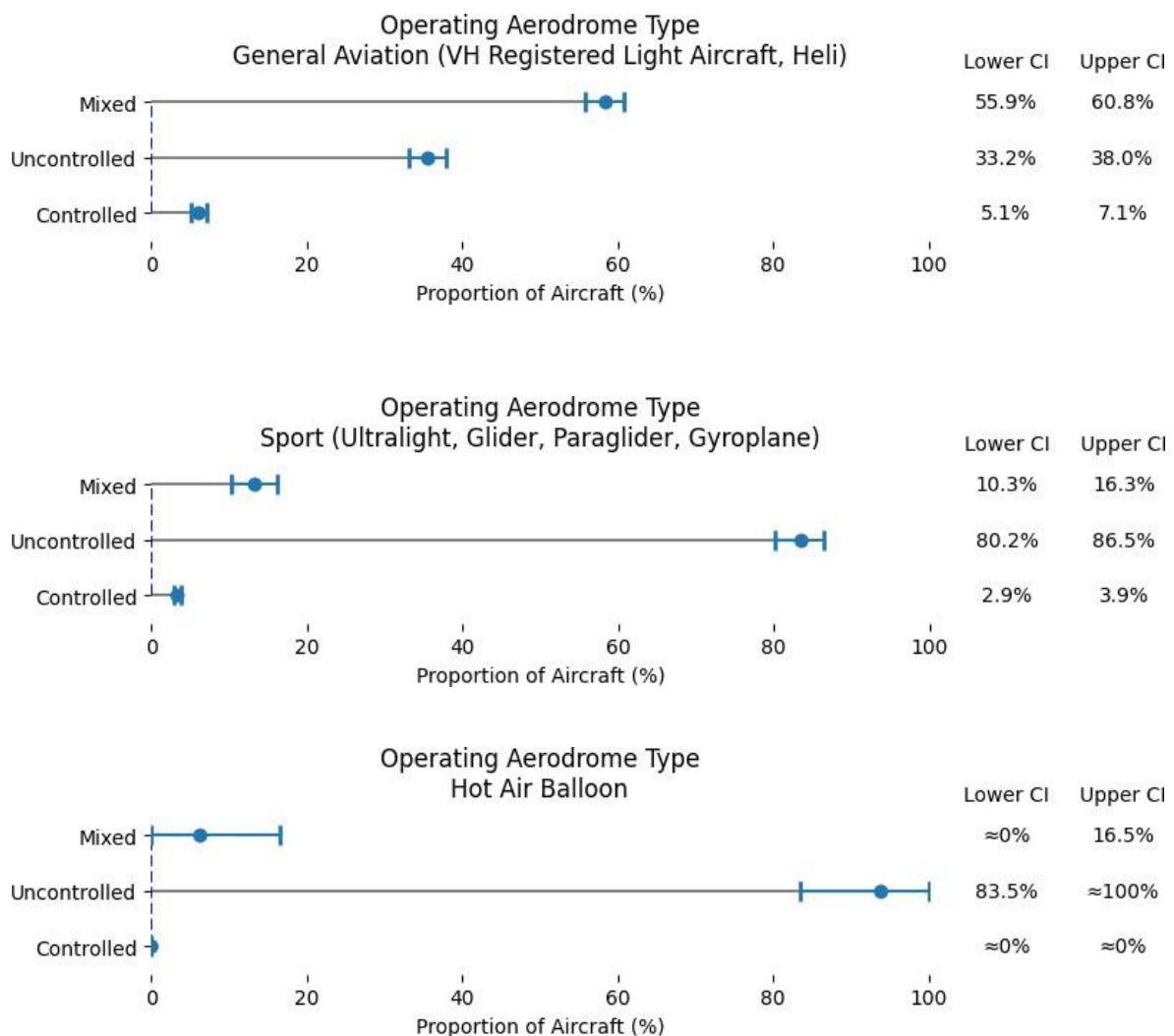


Fig. 22 Operating Aerodrome Type by sector

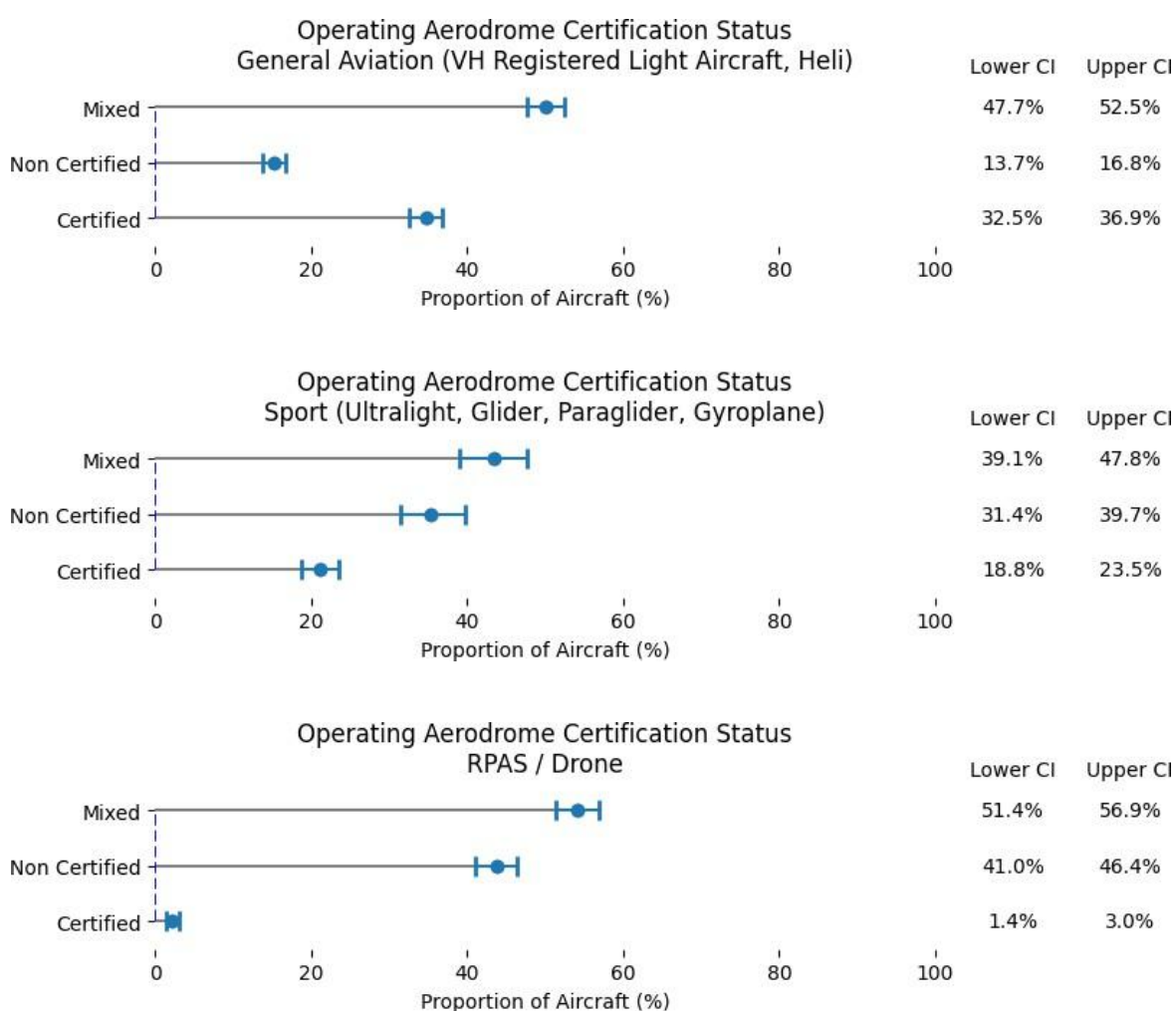
Remark 10: Currently, many RPAS operations typically may not start, end or conduct operations within an aerodrome due to the operational domain/application and relative complexity operating from some aerodromes. This figure is included for completeness so results may reflect aerodrome type usage and/or airspace class.

5.6.2 Certification Level

Respondents were separately asked "What type of aerodrome certification status do you typically operate from?" and could select Certified aerodromes, Non-certified aerodromes (including registered / private / unregulated strips), or Mixed (both certified and non-certified).

Certification status refers to whether the physical aerodrome has been assessed and approved by CASA as a certified aerodrome. It is independent of the controlled/uncontrolled distinction in Section 5.6.1: a non-controlled aerodrome can be a certified aerodrome, so certification does not indicate the presence of air traffic control services.

Responses were assigned to the same analysis groups (General Aviation, Sport Aviation, RPAS and Hot Air Balloon), and the proportion selecting each certification category is reported per group as a confidence interval.



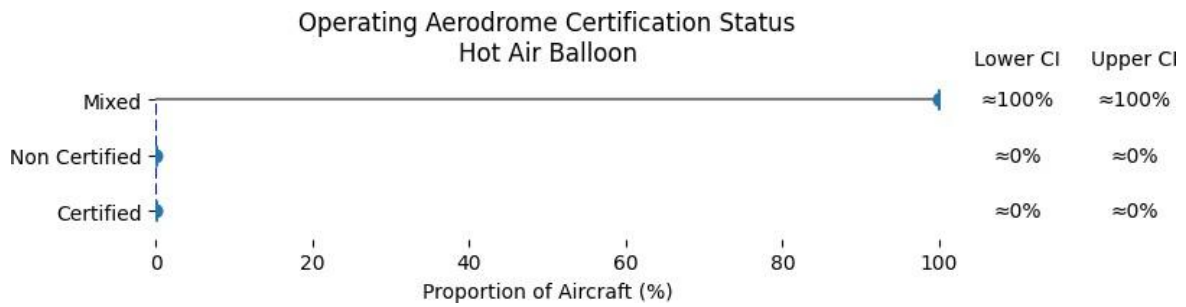


Fig. 23 Operating Aerodrome Certification Status by sector

Remark 11: Currently, many RPAS operations typically may not start, end or conduct operations within an aerodrome due the operational domain/application and relative complexity operating from some aerodromes. This figure is included for completeness so results may reflect aerodrome type usage and/or airspace class.

5.7. Electronic Flight Bag

Respondents were asked which EFB application they use. The question was shown only to respondents who did not answer 'None' to the transponder question. Free-text responses were manually reviewed: drone-only applications (e.g. DJI, DroneDeploy, ArcGIS Flight, Mission Planner) were separated from crewed-aircraft EFBs, and entries not corresponding to a recognised EFB, for example ground-based networks such as OpenSky or Open Glider Network, or service names rather than applications, were classed as "Unknown" and not included.

5.7.1 EFB Usage across Sectors

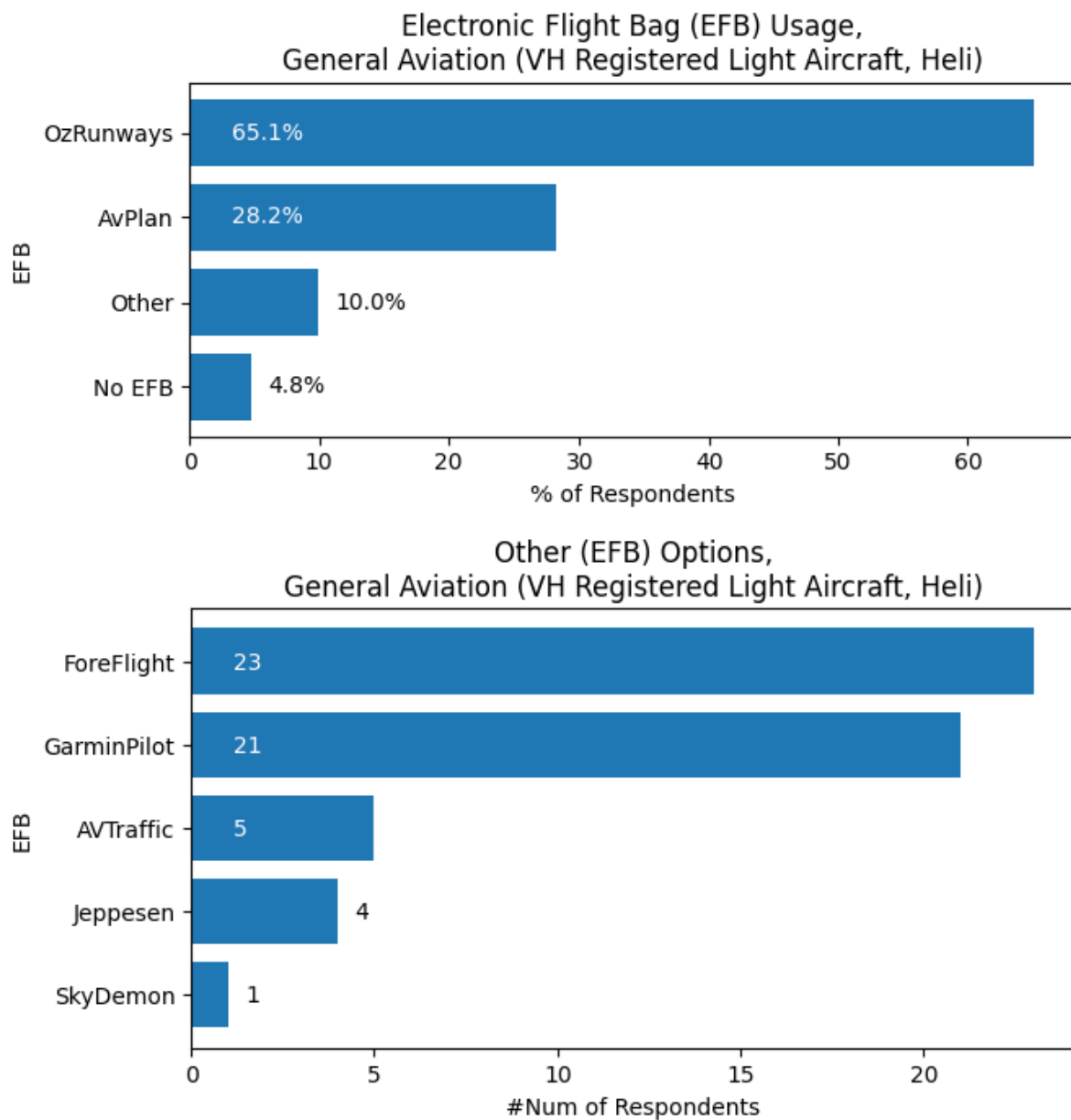
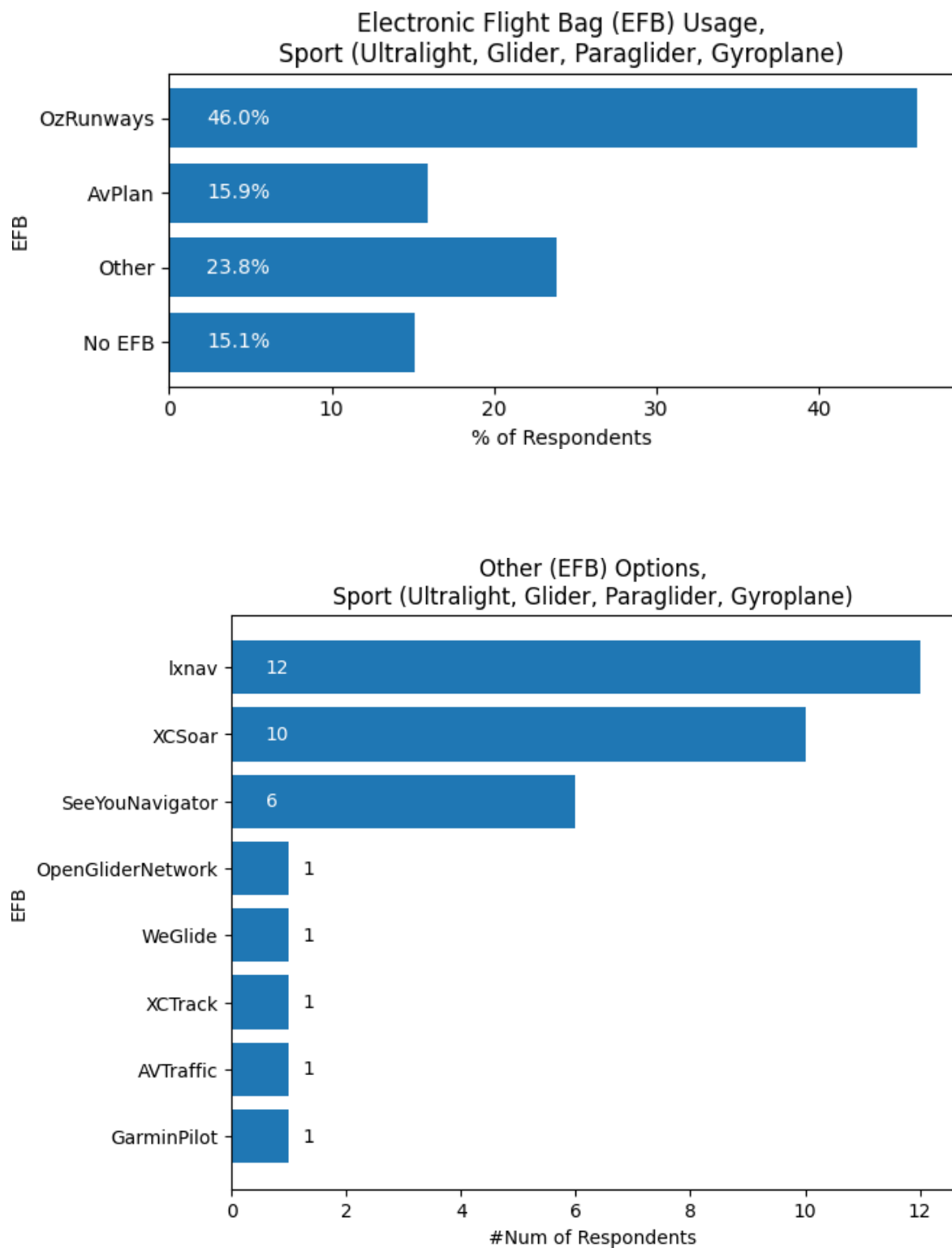


Fig. 24 EFB Usage across General Aviation

*Fig. 25 EFB Usage across Sport Aviation*

5.7.2 Summary and Results Interpretation

Electronic Flight Bag applications are in widespread use across the equipped fleet. In general aviation, OzRunways (65.1%) and AvPlan (28.2%) account for the large majority of use, with only 4.8% reporting no EFB.

Sport aviation is more fragmented: OzRunways leads (46.0%) but a larger share fall into "Other" (23.8%) reflecting the glider-specific applications common in that sector and a higher proportion report no EFB (15.1%).

Within the "Other" category, ForeFlight and GarminPilot are the most common in general aviation.

Proportion of EFB application use by sector		
Application	General Aviation	Sport Aviation
OzRunways	65.1%	46.0%
AvPlan	28.2%	15.9%
Other	10.0%	23.8%
No EFB	4.8%	15.1%
<i>Figures are % of respondents in each sector. Question shown only to respondents who did not select 'None' for transponder fitment, so they describe the equipped subset rather than the whole fleet.</i>		

Table 21 Proportion of EFB application use by sector

MAIN EQUIPAGE FINDING

EFB use is very widespread among equipped operators: only about 5% of general aviation and 15% of sport respondents reported using no EFB. OzRunways is the dominant application in both sectors (65.1% GA, 46.0% sport), with AvPlan the main alternative in general aviation. Drone-only applications were reported separately and are not comparable to crewed-aircraft EFBs.

SURVEY NOTE: Free-text EFB responses were manually reviewed and cleaned. Drone-only applications (e.g. DJI, DroneDeploy, ArcGIS Flight, Mission Planner) were separated from crewed-aircraft EFBs, and responses that did not correspond to a recognised EFB, for example ground-based networks such as OpenSky or Open Glider Network, or entries naming a service rather than an application, were classed as "Unknown".

5.8 Electronic Conspicuity

Respondents were asked whether traffic display or electronic conspicuity capability is available to them, that is, the ability to see other traffic, as distinct from being seen. The question was shown only to respondents who did not answer 'None' to the transponder question, so the figures describe the equipped subset rather than the whole fleet. Capability is reported per sector as a confidence interval, split into panel-integrated displays and portable app/device solutions.

5.8.1 Electronic Conspicuity across sectors

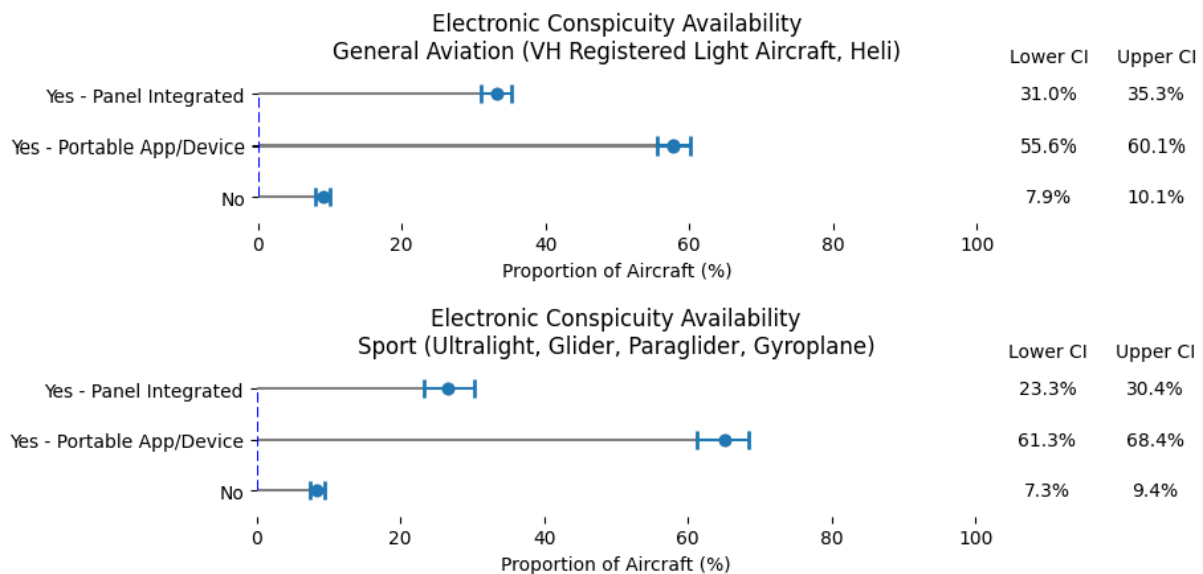


Fig. 26 Electronic Conspicuity across sectors

5.8.2 Summary and Results Interpretation

Among transponder-equipped respondents, roughly nine in ten have electronic conspicuity capability available, with only about 8-10% having none. In both sectors the portable app/device pathway dominates over panel-integrated displays — most pronounced in sport aviation (61.3-68.4% portable vs 23.3-30.4% integrated) but also clear in general aviation. This is consistent with the ADS-B In findings in 5.5 and with the broader pattern of low-cost, portable equipage driving recent conspicuity uptake, especially outside general aviation. As with the EFB question, these figures reflect the equipped subset rather than the whole fleet.

Proportion of EC by sector and type			
Sector	Panel-integrated	Portable app / device	None
General Aviation	31.0-35.3%	55.6-60.1%	7.9-10.1%
Sport	23.3-30.4%	61.3-68.4%	7.3-9.4%

displayed as confidence intervals. Among respondents reporting a fitted transponder.

Table 22 Proportion of EC by sector and type

MAIN EQUIPAGE FINDING

The large majority of equipped operators have some form of traffic display or electronic conspicuity available - around 90% in both general aviation and sport. Capability is delivered predominantly

through portable apps and devices rather than panel-integrated systems, particularly in the sport sector.

5.9 Equipage Uptake (Since 2021)

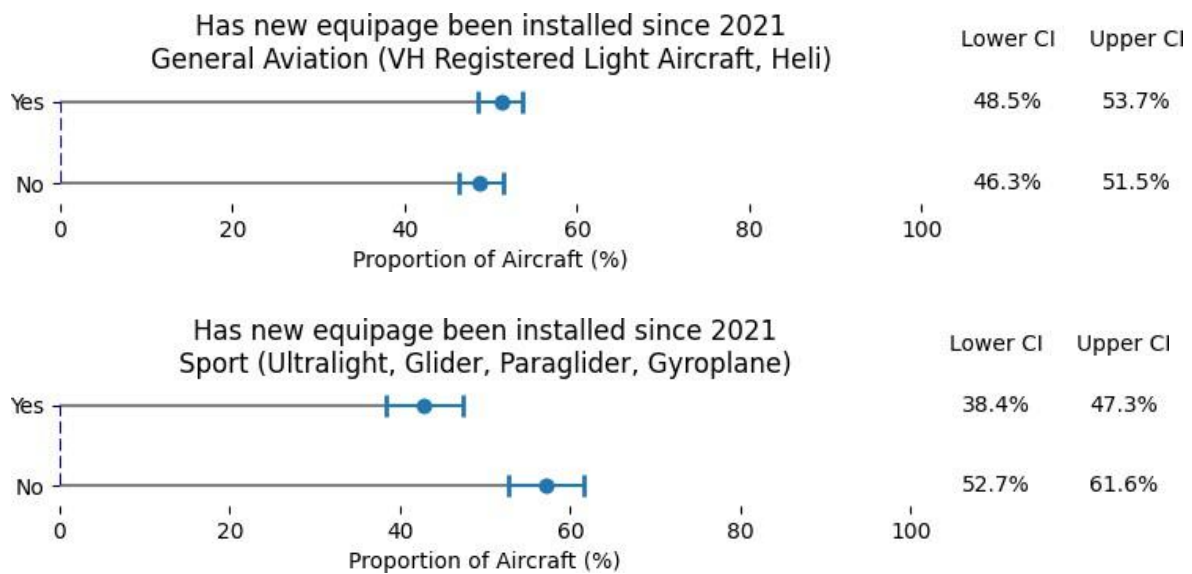
Respondents were asked whether new equipage had been installed on their aircraft since the 2021 study, and if so, in which year and for what reasons. Proportions answering 'Yes' are reported per analysis group as confidence intervals.

These questions were not asked in 2021 and so have no directly comparable baseline. They are included to establish when recent investment occurred and what drove it — providing context for the equipage levels reported in Sections 5.1 to 5.5, and an indication of whether uptake is continuing or has plateaued.

5.9.1 Installed Equipment

Respondents were asked whether any electronic conspicuity equipment had been installed on their aircraft since the 2021 study (Yes / No). Responses were assigned to analysis groups using the method described in Section 3.3, and proportions are reported per group as confidence intervals reflecting both sampling variance and aircraft count uncertainty.

The question captures installation of any electronic conspicuity equipment rather than a specific technology, so results should be read as an indicator of overall recent investment rather than uptake of ADS-B specifically. Where a respondent operated multiple aircraft with differing equipage, the fleet-level adjustments described in Section 3.5.2 were applied.



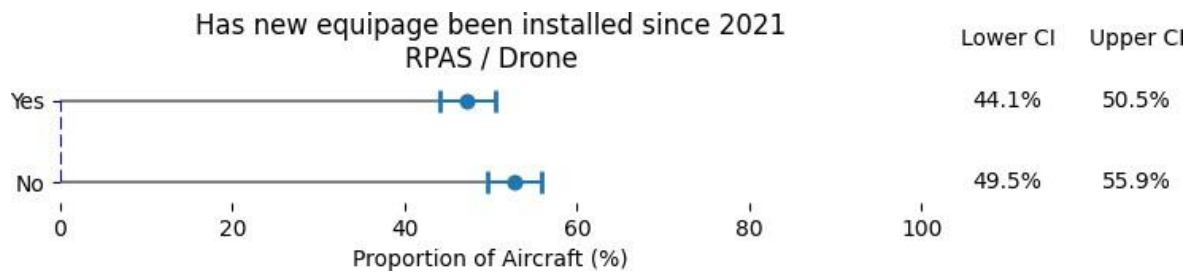


Fig. 27 Equipage installation since 2021 across General Aviation, Sport and RPAS

5.9.2 Installation Year

Among those who installed equipage since 2021, the distribution by year shows a clear upward jump as the rebate was introduced: 2021: 9.2%, 2022: 19%, then remains steady at around 20%, 2023: 19.9%, 2024: 22.5%, 2025: 21.0%, 2026: 8.3%. The 2026 figure is a part-year value (the survey ran in Q2 2026) and should not be read as a decline. Excluding 2021 and 2026, uptake remains steady at around 20% year on year. The step up from 2021 to 2022 aligns with the introduction of the ADS-B rebate scheme (Round 1 in 2022, subsequently extended, with Round 2 from 2024), a defensible, policy-linked explanation for the acceleration.

Remark 12: This result should be interpreted with some caution. Taken together with the ADS-B OUT findings, where over 90% of RPAS report no ADS-B OUT, it implies that the RPAS operators have increased installation of ADS-B IN (receive-only) capability relatively recently. This pattern is plausible for uncrewed operations, where ADS-B IN supports detect-and-avoid without the certification requirements of ADS-B OUT.

Survey Note: The year-of-installation question was shown only to respondents who answered "Yes" to whether new equipage had been installed since 2021, thus percentages sum to 100%.

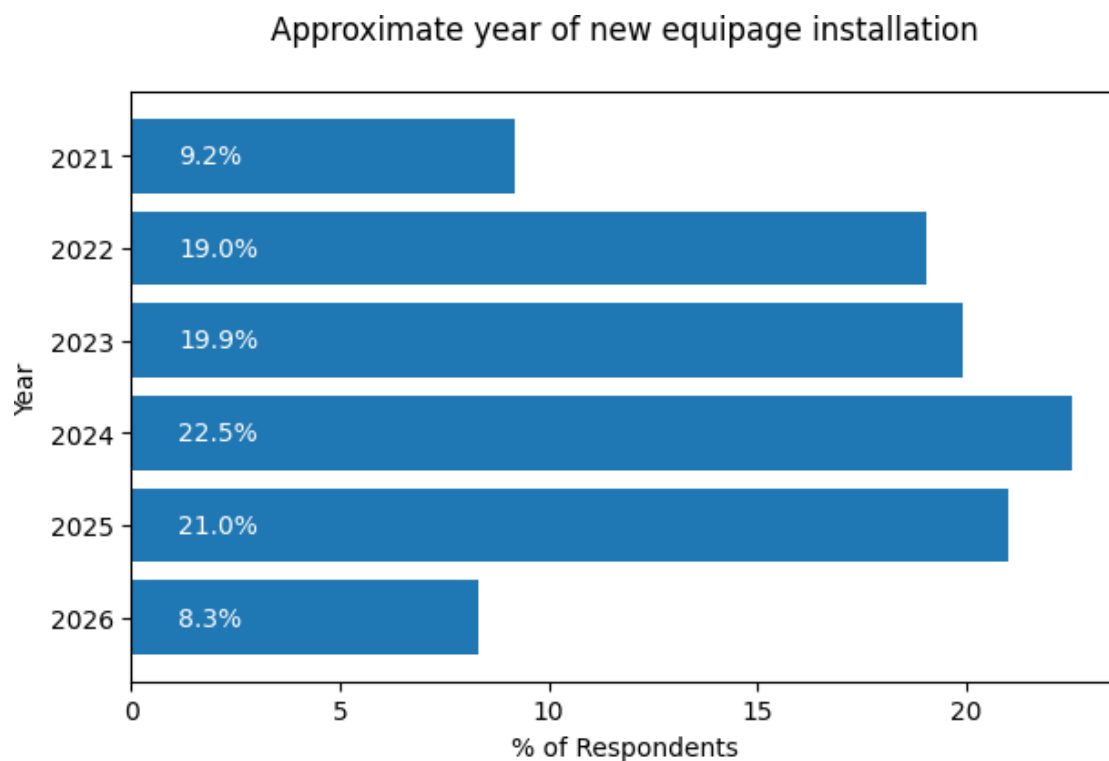


Fig. 28 Approximate year of new equipage installation

Remark 13: The 2026 figure reflects only part of the year (the survey closed in Q2 2026) and should not be read as a decline. Excluding 2026, the data shows a clear year-on-year increase in equipage uptake. The step up from 2021 to 2022 coincides with the introduction of the ADS-B rebate scheme, which has operated since 2022 (Round 1 in 2022, subsequently extended, with Round 2 from 2024).

5.9.3 Installation Drivers

5.9.3.1 Low-cost ADS-B

Affordability was a material factor in upgrade decisions for most respondents: 47.1% said affordability was a key factor, a further 29.7% said it was partly a consideration but not the main factor, and 23.2% said no. Taken together, cost featured in the decision for roughly three-quarters of upgraders, evidence that low-cost device availability and the rebate environment have lowered the barrier to equipage.

Was low-cost ADS-B availability a key driver for your equipment upgrade?

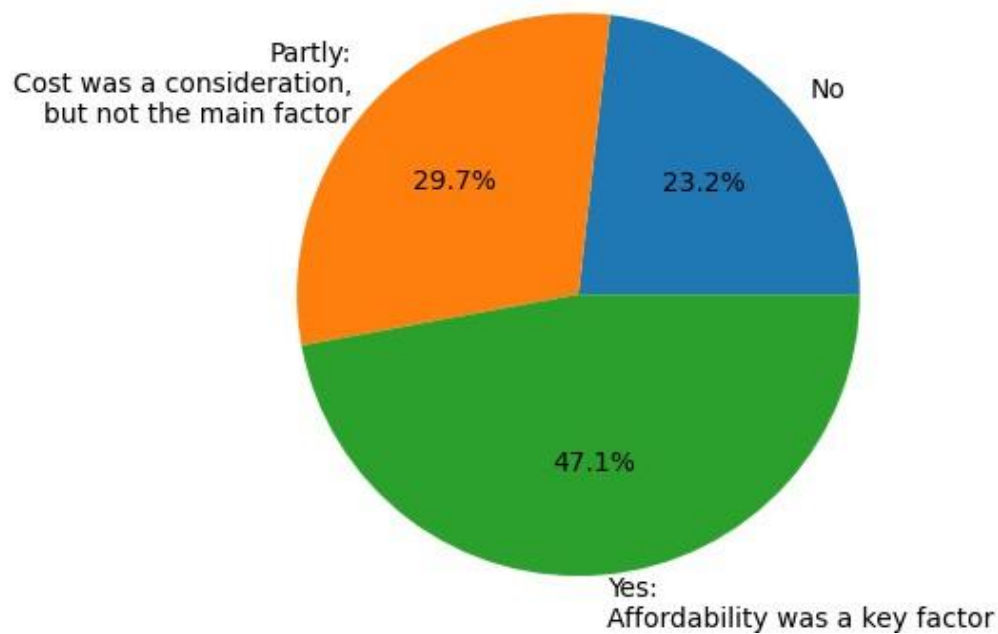


Fig. 29 Low-cost ADS-B device availability a decision factor

5.9.3.2 Other Drivers

Safety improvement was by far the most-cited driver (73.3%), followed by the Australian Government / CASA rebate (56.4%), reinforcing the rebate's visible role in the year-of-installation trend.

Lowering hardware costs (30.8%), airspace-access benefits (25.6%) and regulatory preparedness (21.6%) formed a middle tier, while peer adoption (8.8%), other grant funding (8.9%), organisational mandate (7%) and insurance incentives (5.3%) were minor.

Free-text 'Other' responses added nuance: equipage bundled with a new hardware purchase, enabling third-party tracking (e.g. FlightRadar24 for family and friends), pilot requests, and IFR requirements (an airspace-access benefit).

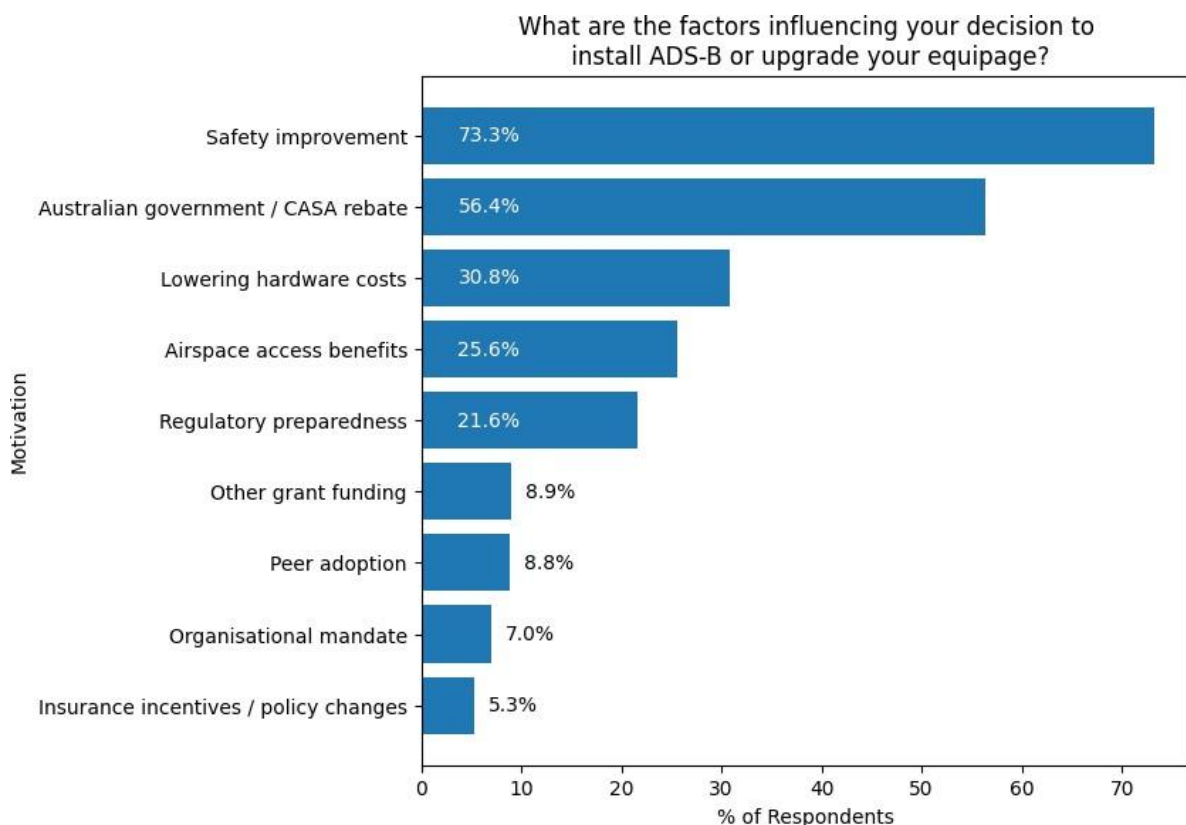


Fig. 30 Factors influencing decision to install ADS-B or upgrade equipment

Remark 14: There was an 'Other' option that allowed participants to add reasons that were not provided, the following are the noteworthy reasons:

- "Comes bundled with new hardware purchase". The user purchased new hardware and bundled with that new hardware was upgraded equipage. In this case it appears the reason for purchasing the new hardware was not driven by a desire to upgrade ADS-B equipage.
- "Allows family and friends to track using tools like FlightRadar24".
- "Pilot requests". It seems this respondent was an operator and their pilots requested the equipage upgrade.
- "Required for IFR". This probably falls under the "Airspace access benefits" category, but indicates the pilot wanted to use their plane for IFR and needed to upgrade to do so.

Survey Note: Upgrade reasons were a multiselect question - participants could select all factors that applied, so percentages sum to more than 100.

5.9.4 Summary and Results Interpretation

Across all three sectors, roughly half of operators report installing electronic conspicuity equipment since the 2021 study, pointing to substantial recent investment. The year-of-installation profile shows a steady year-on-year rise across the complete years with the part-year 2026 figure not to be read as a decline.

The step up from 2021 to 2022 aligns with the introduction of the ADS-B rebate scheme. Operators' stated reasons reinforce this: safety improvement was the most-cited driver, followed by the Australian Government / CASA rebate, and affordability featured in the decision for roughly three-quarters of upgraders. Together this indicates that the combination of low-cost devices and rebate support has materially lowered the barrier to equipage.

MAIN EQUIPAGE FINDING

A large share of the fleet reports equipage installed since the last study (2021), indicating meaningful recent investment across the past four to five years: 48.5-53.7% of general aviation, 38.4-47.3% of sport and 44.1-50.5% of RPAS.

Equipage Installation Uptake (Since 2021)		
Group	Yes	No
General Aviation	48.5–53.7%	46.3–51.5%
Sport Aviation	38.4–47.3%	52.7–61.6%
RPAS	44.1–50.5%	49.5–55.9%

Table 23 Equipage Installation Uptake (Since 2021)

Year of installation (of equipage installed since 2021)	
Year	Share of installations
2021	9.2%
2022	19.0%
2023	19.9%
2024	22.5%
2025	21.0%
2026 (part-year)	8.3%

Table 24 Year of Installation (of equipage installed since 2021)

Equipage Upgrade Drivers	
Driver	Share citing
Safety improvement	73.3%
Australian Government / CASA rebate	56.4%
Lowering hardware costs	30.8%
Airspace-access benefits	25.6%
Regulatory preparedness	21.6%
Other grant funding	8.9%
Peer adoption	8.8%
Organisational mandate	7.0%
Insurance incentives	5.3%

Table 25 Equipage Upgrade Drivers

Affordability / low-cost ADS-B in the upgrade decision	
Response	Share
Yes — a key factor	47.1%
Partly a consideration	29.7%

Table 26 Affordability / low-cost ADS-B in upgrade decision

5.10 Operational Impact of Surveillance and EC Devices

5.10.1 Impact of surveillance and EC devices on airspace

Respondents were asked whether they conduct VFR or other operations in airspace where ADS-B is not mandated, and what proportion of their flying time is spent under visual flight rules. Responses establish the share of activity occurring outside mandated-surveillance airspace, which provides the context for the perceived-impact results in Section 5.10.2.

Proportions are reported per analysis group. Time-based responses were captured as respondent estimates rather than measured flight data, and should be read as indicative of typical operating patterns rather than precise activity fractions.

5.10.2 Impact of surveillance and EC devices on operations

Respondents were asked whether they conduct VFR or other operations where ADS-B is not mandated. Those answering "Frequently", "Occasionally" or "Rarely" were then asked what impact they believe surveillance and EC devices have on their operations, rating ATC visibility, traffic awareness and shared-airspace confidence as Reduced, No impact or Increased.

Results are self-reported perceptions rather than measured operational outcomes. The rating options were deliberately coarse (three levels) to keep the question accessible to respondents across all sectors; this limits granularity but improves response consistency. Proportions below are across all responding sectors and span multiple technologies — they are not specific to ADS-B.

Category	Reduced	No impact	Increased
ATC visibility	3.3%	35.3%	61.4%
Traffic / situational awareness	3.4%	18.4%	78.3%
Shared-airspace confidence	4.8%	23%	72.2%

Table 27 Perceived impact of surveillance and EC devices on operations

Free-text 'Other' responses raised additional perceived effects, including increased visibility to non-ATC parties (third-party and ground-based tracking, visibility of gliders to GA), benefits for flight following, search and rescue, and forward planning, alongside a smaller number noting reduced workload or concerns such as traffic congestion and regulatory overstep.

5.10.3 Other: Free-text responses

Respondents who selected "Other" were invited to describe additional perceived effects of surveillance and electronic conspicuity (EC) devices on their operations. While free-text responses are not quantified, several consistent themes emerged that extend the rated categories above.

The most common theme was **increased visibility to parties beyond Air Traffic Control**. Respondents valued being seen not only by ATIS but by other operators, ground-based observers and third-party tracking services for example noting that a SkyEcho unit increases visibility to nearby traffic and allows monitoring from the ground, that EC "makes gliding visible to GA", and that family members can follow flights via services such as FlightRadar24. Related benefits cited included flight following, search and rescue, internet-based monitoring, and the combined use of FLARM with radio and NOTAMs. A smaller number raised **broadener operational benefits**, including improved forward planning for delays or potential conflicts on approach, reduced workload, and gains in fuel and operational efficiency.

A second theme concerned **situational awareness and safety more broadly**. A number of respondents described EC devices as improving general situational awareness or safety rather than traffic awareness specifically, a distinction that motivates renaming this category in the analysis (see note below). Two comments captured the safety case directly: one respondent reported that ADS-B Out/In had "quite literally saved me from traffic conflicts" with pilots lacking radio skills or situational awareness, and another noted that operating in an area with high-speed business-jet and turboprop traffic made it valuable to appear on those aircraft's TCAS. A minority of comments were more cautious or critical,

including concern that approaching, but not reaching, universal equipage risks attention drifting from the remaining unequipped aircraft, observations of potential congestion or confusion in traffic displays, a view that equipage represents regulatory overstep, and one respondent indicating they now fly less often. Terrain awareness was also mentioned as a benefit.

5.10.4 Summary and Results Interpretation

Across all sectors, most operators reported that surveillance and EC devices increased their ATC visibility, traffic and situational awareness, and confidence operating in shared airspace. Only a small minority reported any reduction. This result spans technologies and is not specific to ADS-B.

6. Summary

The 2026 survey provides an updated national picture of aircraft equipage across the general aviation, sport and RPAS sectors. Survey results are reported with confidence intervals reflecting the precision available in each analysis. The suitability assessment in Section 4 compares the survey dataset against recorded fleet statistics and recorded movements and shows reasonable representation despite a few areas of over- and under-representation.

ADS-B is now the dominant surveillance technology in general aviation: around 4 in 5 GA aircraft transmit ADS-B Out, the majority via certified equipment. Uptake is thinner in the sport sector, and where it occurs it leans toward low-cost or portable units rather than certified equipage. ADS-B Out is effectively absent in RPAS, where over 88% report none. ADS-B In capability is more evenly distributed and is highest in the RPAS sector; this is consistent with receive-only conspicuity supporting detect-and-avoid, and the type breakdown confirms RPAS In is overwhelmingly low-cost.

The data points to substantial recent investment. A large share of operators report equipage installed since 2021, and the year-of-installation profile shows steady year-on-year upgrades across the complete years (the part-year 2026 figure aside). The step up from 2021 to 2022 aligns with the introduction of the ADS-B rebate scheme, and the rebate is directly visible in operators' own accounts: behind safety improvement, the Australian Government / CASA rebate was the second most-cited reason for upgrading. Affordability featured in the upgrade decision for roughly three-quarters of operators, indicating that the combination of low-cost devices and rebate support has materially lowered the barrier to equipage.

Beyond raw fitment, operators view surveillance and electronic conspicuity devices positively: most reported that these devices increased their ATC visibility, traffic and situational awareness, and confidence operating in shared airspace, with free-text responses reinforcing the value of being seen by other operators and ground-based services as well as by ATC.

Radio equipage was outside the scope of the 2026 instrument and is not reported, as fitment is understood to be near-universal.

Transponders show less change than ADS-B adoption, though newer technologies are becoming increasingly prominent. The proportion of general aviation aircraft without a transponder has approximately halved, while Mode S adoption has risen substantially — a clear trend toward equipment modernisation in this sector. Sports aviation, by contrast, has seen little movement in transponder fitment over the same period, remaining essentially unchanged from 2021. Few RPAS report a fitted transponder, consistent with there being no current legislative requirement for transponder or ADS-B Out equipage on RPAS; in that sector equipage is generally driven by the operational requirements of a given operation, commensurate with its risk.

Taken together, the 2026 study confirms that ADS-B has become the backbone of conspicuity in Australian general aviation, supported by a growing low-cost device market and a rebate scheme with a measurable effect on uptake. The sport and RPAS sectors have recorded meaningful growth in equipage, but their fitment remains comparatively low relative to general aviation. The study provides an updated, sector-segmented evidence base to inform surveillance policy, airspace management, the ongoing ADS-B mandate pathway, and the integration of uncrewed operations into shared airspace.

Appendix A — Technical Details

A.1 Confidence Intervals

A stratified sampling approach was used when examining the survey results. Results were stratified by the type of registration and where appropriate the location aircraft are flown. The proportion of aircraft with various types of equipment is estimated as:

$$\hat{p} = \frac{y}{n}$$

Where:

$\hat{p}$ = estimated proportion of equipped aircraft

y = "Yes" responses in the survey

n = total number of valid responses

To accurately represent the number of equipped aircraft in each case, a 90% confidence interval was used. For each type of aircraft, the variance in the response is estimated as the proportion of the total number of aircraft surveyed multiplied by the proportion of the type of aircraft with all active aircraft and the variance of the survey results.

Mathematically this is expressed as:

$$V(\hat{p}_h) = \left(1 - \frac{n_h}{N_h}\right) \left(\frac{N_h}{N}\right)^2 \left(\frac{\hat{p}_h(1 - \hat{p}_h)}{n_h - 1}\right)$$

Where:

$V(\hat{p}_h)$ = Estimated variance for the h^{th} proportion

$\hat{p}$ = Estimate of proportion of "Yes" responses

n_h = Number of survey responses for the h^{th} type of aircraft

N_h = Total number of active h^{th} type of aircraft

N = Total number of active GA or Sports aircraft

This allows the total variance between groups to be measured as:

$$V(\hat{p}) = \sum V(\hat{p}_h)$$

In some cases, it's not possible to use this approach, particularly when analysing RPAS data neither the number of active nor the total population is known. In these cases, variance is calculated using an infinite population and not a stratified approach:

$$V(\hat{p}) = \frac{\hat{p}(1 - \hat{p})}{n - 1}$$

There are other cases where stratification is not appropriate, but the total population is known. In these cases, variances are calculated by treating the results as a simple random survey. Mathematically, this is expressed as:

$$\widehat{V(p)} = \left(1 - \frac{n}{N}\right) \left(\frac{\hat{p}(1 - \hat{p})}{n - 1}\right)$$

[Reference Note: See reference CI methodology (CASA 2021 Appendix and Luxhoj & Coit 2006; Bai & Lam 2023; IDEA Protocol).]

Appendix B — Survey Data Statistical Summary

The tables in this section provide the statistical results for all items presented above that were broken down by analysis group. This information should be sufficient to reproduce most of the plots in the report (any figures containing a map cannot be reproduced by this data).

Glossary of Terms

Term	Definition
Option	Survey Response Option.
YL	Number of ‘Yes’ responses corresponding to the lower bound given aircraft count uncertainty (See section 3.5).
YE	Number of ‘Yes’ responses corresponding to the expected aircraft count (See section 3.5).
YU	Number of ‘Yes’ responses corresponding to the upper bound given aircraft count uncertainty (See section 3.5).
TL	Total number of responses corresponding to the lower bound given aircraft count uncertainty (See section 3.5).
TE	Total number of responses corresponding to the expected aircraft count (See section 3.5).
TU	Total number of responses corresponding to the upper bound given aircraft count uncertainty (See section 3.5).
Nh	Active Aircraft Population size of the given category according to BITRE 2024. (See section Appendix A).
N	Total Aircraft Population size of the given category according to BITRE 2024. (See section Appendix A).
SDL	The standard deviation calculated using TL.
SDU	The standard deviation calculated using TU.
CIL	The lower confidence interval as seen on figures in the report.
CIU	The upper confidence interval as seen on figures in the report.

Transponder Usage

Survey Question: “What transponder do you have fitted to your aircraft?”

General Aviation

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No Transponder	73	77	84	1177	1157	1147	10487	18721	3.712 e-03	4.068 e-03	5.6%	8.0%
Mode A/C	322	328	336	1174	1157	1150	10487	18721	6.877 e-03	7.091 e-03	26.3%	30.4%
Mode S	741	752	768	1161	1157	1163	10487	18721	7.453 e-03	7.338 e-03	62.6%	67.2%

Sports Aviation

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No Transponder	495	511	535	705	707	715	8234	18721	6.145 e-03	6.523 e-03	69.2%	75.9%
Mode A/C	80	91	100	725	707	695	8234	18721	8.436 e-03	8.397 e-03	9.6%	15.8%
Mode S	100	105	110	735	707	685	8234	18721	7.757 e-03	8.074 e-03	12.3%	17.4%

Sports Aviation (Glider)

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No Transponder	418	433	456	537	542	554	1272	18721	9.265 e-04	8.283 e-04	77.7%	82.4%
Mode A/C	43	50	56	562	542	529	1272	18721	5.697 e-04	6.953 e-04	7.6%	10.7%
Mode S	55	59	63	567	542	524	1272	18721	6.293 e-04	7.410 e-04	9.6%	12.1%

Sports Aviation (Ultralight)

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No Transponder	13	13	13	98	94	89	2910	18721	5.263 e-03	5.762 e-03	12.4%	15.6%
Mode A/C	36	40	43	91	94	96	2910	18721	7.886 e-03	7.799 e-03	38.3%	46.1%
Mode S	40	41	42	96	94	91	2910	18721	7.732 e-03	8.039 e-03	40.4%	47.5%

Sports Aviation (Paraglider)

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No Transponder	64	65	66	65	66	67	3726	18721	3.035 e-03	2.944 e-03	98.0%	99.0%
Mode A/C	1	1	1	67	66	65	3726	18721	2.944 e-03	3.035 e-03	1.0%	2.0%
Mode S	0	0	0	67	66	65	3726	18721	≈0	≈0	0.0%	0.0%

Sports Aviation (Gyroplane)

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No Transponder	0	0	0	5	5	5	326	18721	≈0	≈0	0.0%	0.0%
Mode A/C	0	0	0	5	5	5	326	18721	≈0	≈0	0.0%	0.0%
Mode S	5	5	5	5	5	5	326	18721	≈0	≈0	100.0%	100.0%

RPAS

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No Transponder	658	661	663	685	688	690	N/A	N/A	7.440 e-03	7.387 e-03	94.8%	97.3%
Mode A/C	2	2	2	690	688	685	N/A	N/A	2.048 e-03	2.063 e-03	0.0%	0.6%
Mode S	25	25	25	690	688	685	N/A	N/A	7.119 e-03	7.170 e-03	2.5%	4.8%

Balloon

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No Transponder	6	6	6	15	15	15	N/A	N/A	1.309 e-01	1.309 e-01	18.5%	61.5%
Mode A/C	9	9	9	15	15	15	N/A	N/A	1.309 e-01	1.309 e-01	38.5%	81.5%
Mode S	0	0	0	15	15	15	N/A	N/A	≈0	≈0	0.0%	0.0%

ADS-B Out Equipage

Survey Question: “Is ADS-B OUT capability fitted?”

General Aviation

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No	223	228.5	237	1173	1154	1145	10487	18721	6.051 e-03	6.333 e-03	18.0%	21.7%
Yes - low-cost / portable	105	111.5	122	1170	1154	1148	10487	18721	4.414 e-03	4.810 e-03	8.2%	11.4%
Yes - certified	803	814	828	1162	1154	1156	10487	18721	7.163 e-03	7.009 e-03	67.9%	72.8%

Sports Aviation

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No	424	430	439	734	713	699	8234	18721	9.399 e-03	9.597 e-03	56.2%	64.4%
Yes - low-cost / portable	214	233	256	707	713	726	8234	18721	8.881 e-03	9.040 e-03	28.8%	36.7%
Yes - certified	46	50	54	741	713	692	8234	18721	6.150 e-03	6.708 e-03	5.2%	8.9%

Sports Aviation (Glide r)

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No	316	321	329	567	548	537	1272	18721	1.016 e-03	1.087 e-03	55.6%	61.4%
Yes - low-cost / portable	181	196	216	545	548	559	1272	18721	1.037 e-03	1.049 e-03	33.0%	38.8%
Yes - certified	27	31	35	572	548	532	1272	18721	4.473 e-04	5.575 e-04	4.6%	6.7%

Sports Aviation (Ultralight)

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No	45	46	47	96	94	91	2910	18721	7.826 e-03	8.059 e-03	45.6%	53.0%
Yes - low-cost / portable	25	29	32	91	94	96	2910	18721	7.199 e-03	7.393 e-03	26.3%	34.5%
Yes - certified	19	19	19	98	94	89	2910	18721	6.133 e-03	6.685 e-03	18.4%	22.4%

Sports Aviation (Paraglider)

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No	63	63	63	66	66	66	3726	18721	5.096 e-03	5.096 e-03	94.6%	96.3%
Yes - low-cost / portable	3	3	3	66	66	66	3726	18721	5.096 e-03	5.096 e-03	3.7%	5.4%
Yes - certified	0	0	0	66	66	66	3726	18721	≈0	≈0	0.0%	0.0%

Sports Aviation (Gyroplane)

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No	0	0	0	5	5	5	326	18721	≈0	≈0	0.0%	0.0%
Yes - low-cost / portable	5	5	5	5	5	5	326	18721	≈0	≈0	100.0%	100.0%
Yes - certified	0	0	0	5	5	5	326	18721	≈0	≈0	0.0%	0.0%

RPAS

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No	633	636	638	701	704	706	N/A	N/A	1.119 e-02	1.111 e-02	88.5%	92.2%
Yes - low-cost / portable	52	52	52	706	704	701	N/A	N/A	9.838 e-03	9.905 e-03	5.7%	9.0%
Yes - certified	16	16	16	706	704	701	N/A	N/A	5.605 e-03	5.645 e-03	1.3%	3.2%

Balloon

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No	15	15	15	15	15	15	N/A	N/A	≈0	≈0	100.0%	100.0%
Yes - low-cost / portable	0	0	0	15	15	15	N/A	N/A	≈0	≈0	0.0%	0.0%
Yes - certified	0	0	0	15	15	15	N/A	N/A	≈0	≈0	0.0%	0.0%

ADS-B In Capability

Survey Question: “Is ADS-B IN capability available?”

General Aviation

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No	531	544	563	1137	1138	1148	10487	18721	7.830 e-03	7.803 e-03	45.4%	50.3%
Yes	585	594	606	1148	1138	1137	10487	18721	7.803 e-03	7.830 e-03	49.7%	54.6%

Sports Aviation

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No	380	390	401	671	658	651	8234	18721	1.275 e-02	1.267 e-02	54.5%	63.7%
Yes	250	268	291	651	658	671	8234	18721	1.267 e-02	1.275 e-02	36.3%	45.5%

Sports Aviation (Glider)

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No	273	281	290	506	493	487	1272	18721	1.169 e-03	1.188 e-03	53.8%	59.7%
Yes	197	212	233	487	493	506	1272	18721	1.188 e-03	1.169 e-03	40.3%	46.2%

Sports Aviation (Ultralight)

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No	55	57	59	94	94	93	2910	18721	7.812 e-03	7.679 e-03	57.2%	64.7%
Yes	34	37	39	93	94	94	2910	18721	7.679 e-03	7.812 e-03	35.3%	42.8%

Sports Aviation (Paraglider)

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No	52	52	52	66	66	66	3726	18721	1.000 e-02	1.000 e-02	77.1%	80.4%
Yes	14	14	14	66	66	66	3726	18721	1.000 e-02	1.000 e-02	19.6%	22.9%

Sports Aviation (Gyroplane)

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No	0	0	0	5	5	5	326	18721	≈0	≈0	0.0%	0.0%
Yes	5	5	5	5	5	5	326	18721	≈0	≈0	100.0%	100.0%

RPAS

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No	253	255	256	654	655	655	N/A	N/A	1.906 e-02	1.908 e-02	35.6%	42.2%
Yes	399	400	401	655	655	654	N/A	N/A	1.908 e-02	1.906 e-02	57.8%	64.4%

Balloon

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No	15	15	15	15	15	15	N/A	N/A	≈0	≈0	100.0%	100.0%
Yes	0	0	0	15	15	15	N/A	N/A	≈0	≈0	0.0%	0.0%

ADS-B In Type

Survey Question: “What type of ADS-B IN solution is used?”

Note: the following analysis only pertains to respondents who answered ‘yes’ to having any ADS-B In Capability. As such the balloon analysis is not present as no balloons from this survey reported having ADS-B in capability.

General Aviation

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
Both	25	25	25	593	583	575	10487	18721	4.494e-03	4.636e-03	3.5%	5.1%
Certified	430	437	446	577	583	591	10487	18721	9.886e-03	9.640e-03	72.9%	77.1%
Low Cost	120	121	122	591	583	577	10487	18721	9.012e-03	9.265e-03	18.8%	22.7%

Sports Aviation

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
Both	12	12	12	282	263	247	8234	18721	4.058e-03	4.663e-03	3.6%	5.6%
Certified	68	69	70	280	263	249	8234	18721	1.194e-02	1.323e-02	22.3%	30.3%
Low Cost	167	182	200	249	263	280	8234	18721	1.341e-02	1.216e-02	64.9%	73.4%

Sports Aviation (Glider)

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
Both	11	11	11	224	207	194	1272	18721	8.924e-04	1.041e-03	4.8%	5.8%
Certified	55	56	57	222	207	196	1272	18721	1.793e-03	2.032e-03	24.5%	29.4%
Low Cost	128	140	156	196	207	222	1272	18721	2.130e-03	1.898e-03	65.0%	70.6%

Sports Aviation (Ultralight)

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
Both	1	1	1	39	37	34	2910	18721	3.959e-03	4.545e-03	1.9%	3.7%
Certified	13	13	13	39	37	34	2910	18721	1.181e-02	1.307e-02	31.4%	40.4%
Low Cost	20	23	25	34	37	39	2910	18721	1.324e-02	1.201e-02	56.6%	66.1%

Sports Aviation (Paraglider)

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
Both	0	0	0	14	14	14	3726	18721	≈0	≈0	0.0%	0.0%
Certified	0	0	0	14	14	14	3726	18721	≈0	≈0	0.0%	0.0%
Low Cost	14	14	14	14	14	14	3726	18721	≈0	≈0	100.0%	100.0%

Sports Aviation (Gyrop lane)

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
Both	0	0	0	5	5	5	326	18721	≈0	≈0	0.0%	0.0%
Certified	0	0	0	5	5	5	326	18721	≈0	≈0	0.0%	0.0%
Low Cost	5	5	5	5	5	5	326	18721	≈0	≈0	100.0%	100.0%

RPAS

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
Both	21	21	21	388	387	386	N/A	N/A	1.150e-02	1.156e-02	3.5%	7.3%
Certified	69	69	69	388	387	386	N/A	N/A	1.944e-02	1.953e-02	14.6%	21.1%
Low Cost	296	297	298	386	387	388	N/A	N/A	2.155e-02	2.146e-02	73.1%	80.3%

Balloon

Not Applicable, no respondents had ADS-B In capability.

Aerodrome Type

Survey Question: “What type of Aerodromes do you typically operate from or to?”

General Aviation

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
Controlled	72	76	80	1267	1240	1224	10487	18721	3.418 e-03	3.721 e-03	5.1%	7.1%
Uncontrolled	426	440	460	1241	1240	1250	10487	18721	7.092 e-03	7.174 e-03	33.2%	38.0%
Mixed	718	724	735	1258	1240	1233	10487	18721	7.336 e-03	7.356 e-03	55.9%	60.8%

Sports Aviation

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
Controlled	27	27	27	841	801	767	8234	18721	2.134 e-03	2.346 e-03	2.9%	3.9%
Uncontrolled	640	668	702	779	801	829	8234	18721	1.164 e-02	1.096 e-02	80.2%	86.5%
Mixed	100	106	112	829	801	779	8234	18721	1.084 e-02	1.155 e-02	10.3%	16.3%

Sports Aviation (Glider)

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
Controlled	25	25	25	673	639	612	1272	18721	3.402 e-04	3.919 e-04	3.7%	4.1%
Uncontrolled	518	541	571	620	639	665	1272	18721	7.249 e-04	6.346 e-04	83.4%	86.0%
Mixed	69	73	77	665	639	620	1272	18721	5.555 e-04	6.448 e-04	10.3%	12.5%

Sports Aviation (Ultralight)

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
Controlled	2	2	2	102	98	93	2910	18721	2.107 e-03	2.313 e-03	1.6%	2.5%
Uncontrolled	68	71	73	97	98	98	2910	18721	7.141 e-03	6.763 e-03	68.9%	75.6%
Mixed	23	25	27	98	98	97	2910	18721	6.575 e-03	6.991 e-03	22.4%	29.0%

Sports Aviation (Paraglider)

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
Controlled	0	0	0	61	59	57	3726	18721	≈0	≈0	0.0%	0.0%
Uncontrolled	49	51	53	57	59	61	3726	18721	9.167 e-03	8.602 e-03	84.5%	88.3%
Mixed	8	8	8	61	59	57	3726	18721	8.602 e-03	9.167 e-03	11.7%	15.5%

Sports Aviation (Gyroplane)

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
Controlled	0	0	0	5	5	5	326	18721	≈0	≈0	0.0%	0.0%
Uncontrolled	5	5	5	5	5	5	326	18721	≈0	≈0	100.0%	100.0%
Mixed	0	0	0	5	5	5	326	18721	≈0	≈0	0.0%	0.0%

RPAS

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
Controlled	12	12	12	936	936	935	N/A	N/A	3.679 e-03	3.683 e-03	0.7%	1.9%
Uncontrolled	710	711	711	935	936	936	N/A	N/A	1.399 e-02	1.397 e-02	73.6%	78.3%
Mixed	213	213	213	936	936	935	N/A	N/A	1.371 e-02	1.372 e-02	20.5%	25.0%

Balloon

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
Controlled	0	0	0	16	16	16	N/A	N/A	≈0	≈0	0.0%	0.0%
Uncontrolled	15	15	15	16	16	16	N/A	N/A	6.250 e-02	6.250 e-02	83.5%	100.0%
Mixed	1	1	1	16	16	16	N/A	N/A	6.250 e-02	6.250 e-02	0.0%	16.5%

Aerodrome Certification Status

Survey Question: “What type of aerodrome certification status do you typically operate from?”

General Aviation

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
Certified	423	431	440	1258	1240	1233	10487	18721	7.002 e-03	7.182 e-03	32.5%	36.9%
Non Certified	184	188	195	1264	1240	1227	10487	18721	5.213 e-03	5.496 e-03	13.7%	16.8%
Mixed	609	621	640	1244	1240	1247	10487	18721	7.457 e-03	7.445 e-03	47.7%	52.5%

Sports Aviation

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
Certified	164	169	173	828	797	772	8234	18721	6.061 e-03	6.581 e-03	18.8%	23.5%
Non Certified	271	282	298	810	797	790	8234	18721	1.225 e-02	1.192 e-02	31.4%	39.7%
Mixed	328	346	366	799	797	801	8234	18721	1.207 e-02	1.255 e-02	39.1%	47.8%

Sports Aviation (Glider)

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
Certified	150	155	159	660	635	617	1272	18721	7.694 e-04	8.592 e-04	22.6%	25.9%
Non Certified	198	206	219	648	635	629	1272	18721	8.618 e-04	9.183 e-04	30.4%	35.0%
Mixed	260	274	291	638	635	639	1272	18721	9.339 e-04	9.450 e-04	40.6%	45.7%

Sports Aviation (Ultralight)

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
Certified	13	13	13	102	98	93	2910	18721	5.067 e-03	5.529 e-03	11.9%	14.9%
Non Certified	21	23	25	98	98	97	2910	18721	6.366 e-03	6.822 e-03	20.4%	26.9%
Mixed	59	62	64	97	98	98	2910	18721	7.614 e-03	7.385 e-03	59.6%	66.5%

Sports Aviation (Paraglider)

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
Certified	1	1	1	61	59	57	3726	18721	3.236 e-03	3.465 e-03	1.1%	2.3%
Non Certified	47	48	49	59	59	59	3726	18721	1.044 e-02	9.727 e-03	77.9%	84.7%
Mixed	9	10	11	59	59	59	3726	18721	9.322 e-03	1.010 e-02	13.7%	20.3%

Sports Aviation (Gyroplane)

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
Certified	0	0	0	5	5	5	326	18721	≈0	≈0	0.0%	0.0%
Non Certified	5	5	5	5	5	5	326	18721	≈0	≈0	100.0%	100.0%
Mixed	0	0	0	5	5	5	326	18721	≈0	≈0	0.0%	0.0%

RPAS

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
Certified	20	20	20	917	917	916	N/A	N/A	4.826 e-03	4.831 e-03	1.4%	3.0%
Non Certified	400	401	401	916	917	917	N/A	N/A	1.640 e-02	1.639 e-02	41.0%	46.4%
Mixed	496	496	496	917	917	916	N/A	N/A	1.647 e-02	1.647 e-02	51.4%	56.9%

Balloon

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
Certified	0	0	0	16	16	16	N/A	N/A	≈0	≈0	0.0%	0.0%
Non Certified	0	0	0	16	16	16	N/A	N/A	≈0	≈0	0.0%	0.0%
Mixed	16	16	16	16	16	16	N/A	N/A	≈0	≈0	100.0%	100.0%

New Equipage Installed Since 2021

Survey Question: “Has new equipage been installed in your aircraft since 2021?”

General Aviation

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No	503	516	538	1056	1060	1073	10487	18721	8.168e-03	8.105e-03	46.3%	51.5%
Yes	535	544	553	1073	1060	1056	10487	18721	8.105e-03	8.168e-03	48.5%	53.7%

Sports Aviation

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No	378	391	405	691	683	679	8234	18721	1.224e-02	1.182e-02	52.7%	61.6%
Yes	274	292	313	679	683	691	8234	18721	1.182e-02	1.224e-02	38.4%	47.3%

Sports Aviation (Glider)

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No	265	274	285	531	521	516	1272	18721	1.126e-03	1.148e-03	49.7%	55.4%
Yes	231	247	266	516	521	531	1272	18721	1.148e-03	1.126e-03	44.6%	50.3%

Sports Aviation (Ultralight)

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No	59	62	64	89	90	90	2910	18721	7.712e-03	7.352e-03	65.0%	72.3%
Yes	26	28	30	90	90	89	2910	18721	7.352e-03	7.712e-03	27.7%	35.0%

Sports Aviation (Paraglider)

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No	54	55	56	66	67	68	3726	18721	9.437e-03	9.184e-03	80.3%	83.9%
Yes	12	12	12	68	67	66	3726	18721	9.184e-03	9.437e-03	16.1%	19.7%

Sports Aviation (Gyroplane)

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No	0	0	0	5	5	5	326	18721	≈0	≈0	0.0%	0.0%
Yes	5	5	5	5	5	5	326	18721	≈0	≈0	100.0%	100.0%

RPAS

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No	393	395	396	748	749	749	N/A	N/A	1.827e-02	1.825e-02	49.5%	55.9%
Yes	353	354	355	749	749	748	N/A	N/A	1.825e-02	1.827e-02	44.1%	50.5%

Balloon

Not Applicable, no hot air balloons in this survey reported upgrading equipment since 2021.

Electronic Conspicuity Availability

Survey Question: “Is traffic display or electronic conspicuity capability available?”

Note: This question was only available if the respondent did not select ‘None’ to the question “What transponder do you have fitted to your aircraft?”. This is why there are so few responses for paraglider and why RPAS and balloon analysis was excluded as almost all responses do not have a transponder.

General Aviation

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No	99	101	103	1143	1121	1106	10487	18721	4.401 e-03	4.632 e-03	7.9%	10.1%
Yes - Portable App/Device	638	648	664	1121	1121	1128	10487	18721	7.833 e-03	7.757 e-03	55.6%	60.1%
Yes - Panel Integrated	365	372	380	1132	1121	1117	10487	18721	7.353 e-03	7.509 e-03	31.0%	35.3%

Sports Aviation

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No	19	19	19	237	229	218	8234	18721	4.157 e-03	4.461 e-03	7.3%	9.4%
Yes - Portable App/Device	144	149	151	230	229	225	8234	18721	8.037 e-03	7.689 e-03	61.3%	68.4%
Yes - Panel Integrated	55	61	67	225	229	230	8234	18721	6.853 e-03	7.422 e-03	23.3%	30.4%

Sports Aviation (Glider)

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No	15	15	15	151	145	137	1272	18721	1.558 e-03	1.718 e-03	9.7%	11.2%
Yes - Portable App/Device	78	82	84	145	145	143	1272	18721	2.657 e-03	2.645 e-03	53.4%	59.2%
Yes - Panel Integrated	44	48	52	143	145	145	1272	18721	2.479 e-03	2.556 e-03	30.4%	36.3%

Sports Aviation (Ultralight)

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No	4	4	4	78	76	73	2910	18721	3.855 e-03	4.116 e-03	4.5%	6.2%
Yes - Portable App/Device	58	59	59	77	76	74	2910	18721	7.585 e-03	7.220 e-03	74.1%	80.9%
Yes - Panel Integrated	11	13	15	74	76	77	2910	18721	6.389 e-03	6.968 e-03	13.8%	20.6%

Sports Aviation (Paraglider)

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No	0	0	0	3	3	3	3726	18721	≈0	≈0	0.0%	0.0%
Yes - Portable App/Device	3	3	3	3	3	3	3726	18721	≈0	≈0	100.0%	100.0%
Yes - Panel Integrated	0	0	0	3	3	3	3726	18721	≈0	≈0	0.0%	0.0%

Sports Aviation (Gyrop lane)

Option	YL	YE	YU	TL	TE	TU	Nh	N	SDL	SDU	CIL	CIU
No	0	0	0	5	5	5	326	18721	≈0	≈0	0.0%	0.0%
Yes - Portable App/Device	5	5	5	5	5	5	326	18721	≈0	≈0	100.0%	100.0%
Yes - Panel Integrated	0	0	0	5	5	5	326	18721	≈0	≈0	0.0%	0.0%

RPAS

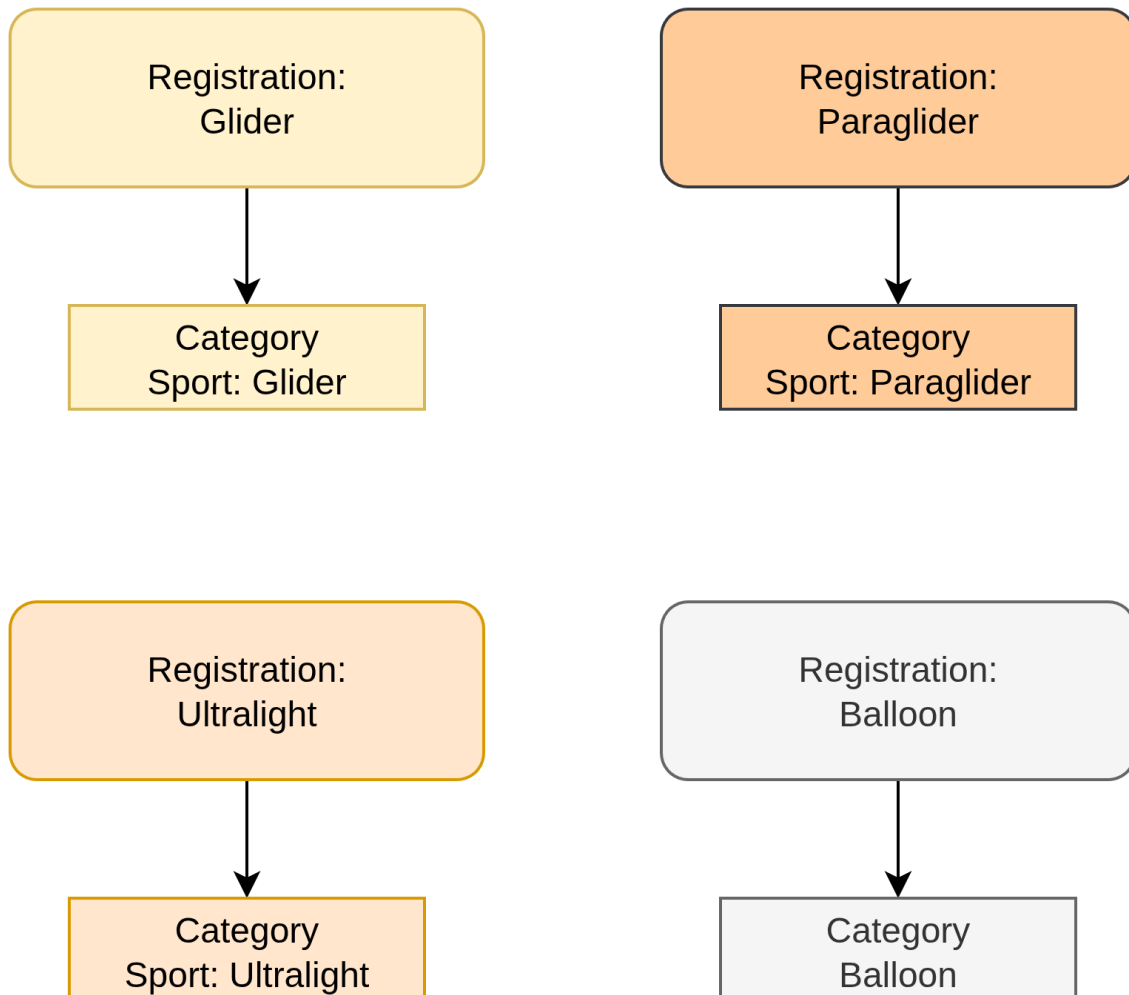
Not Applicable

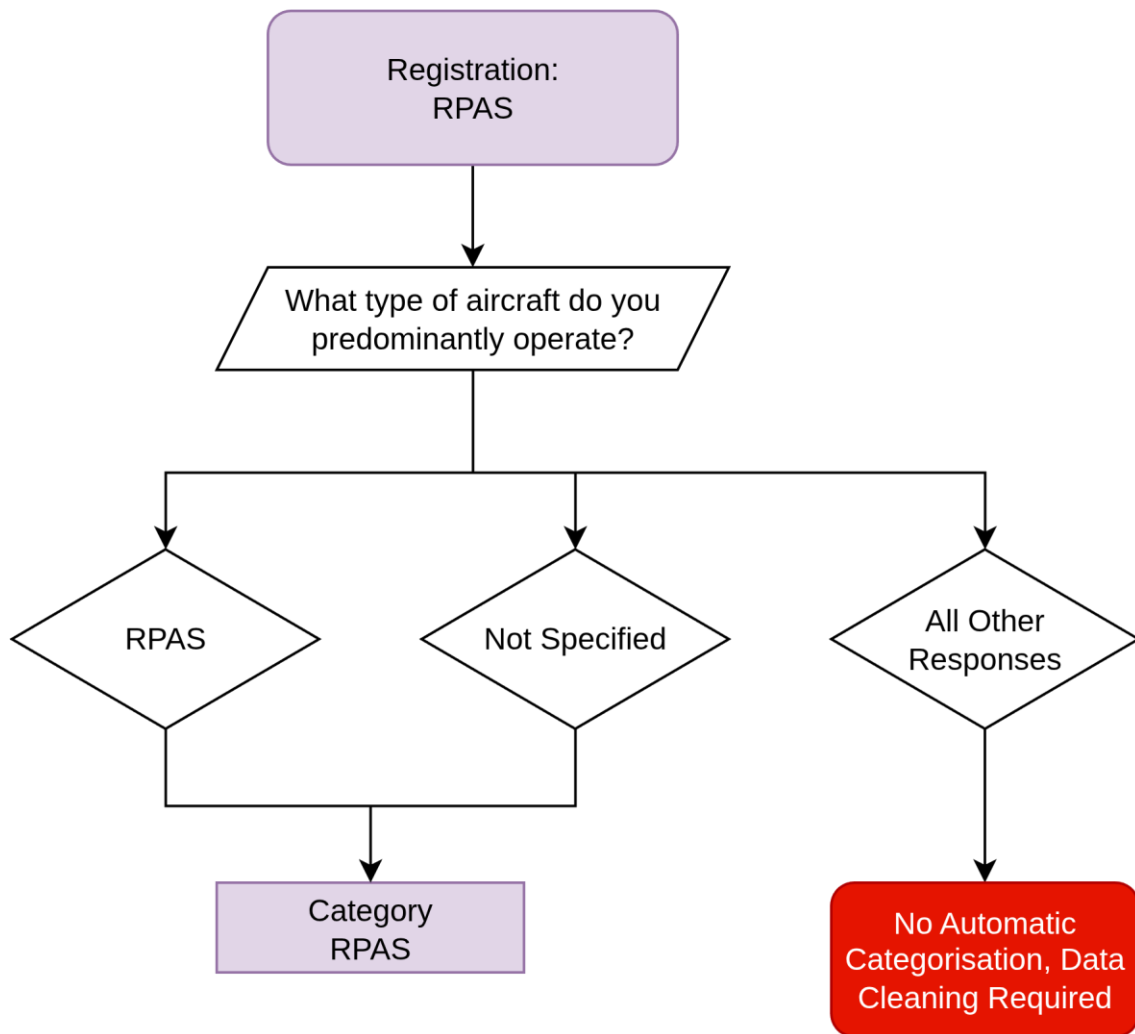
Balloon

Not Applicable

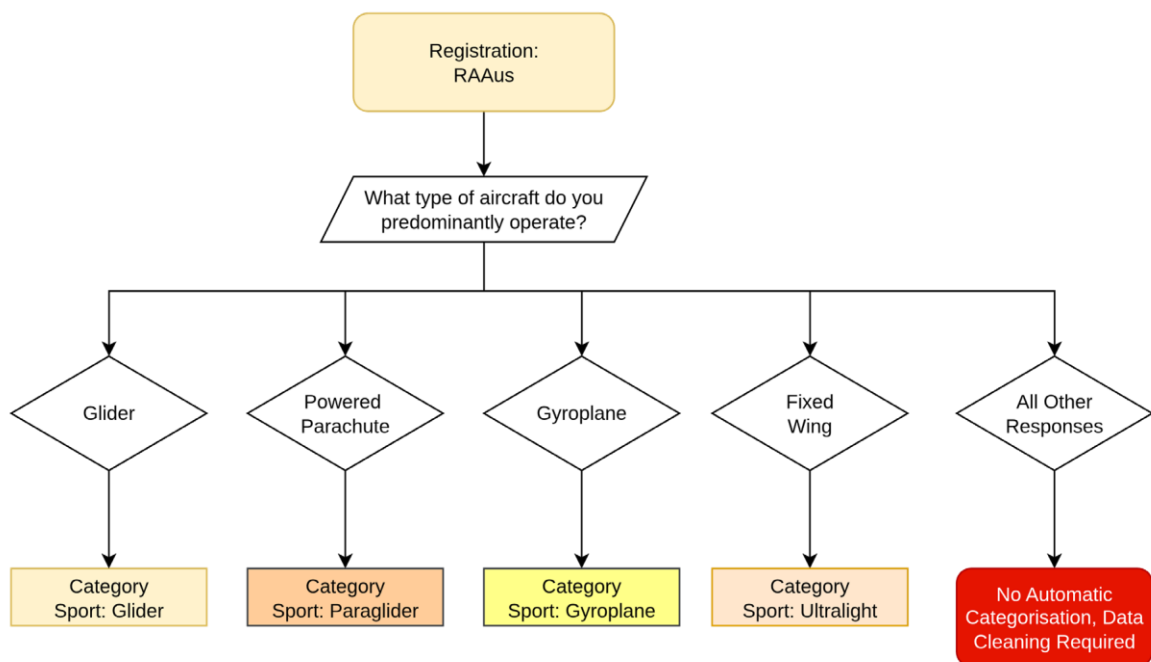
Appendix C — Aircraft Categorisation Flow Diagrams

Simple Categorisations

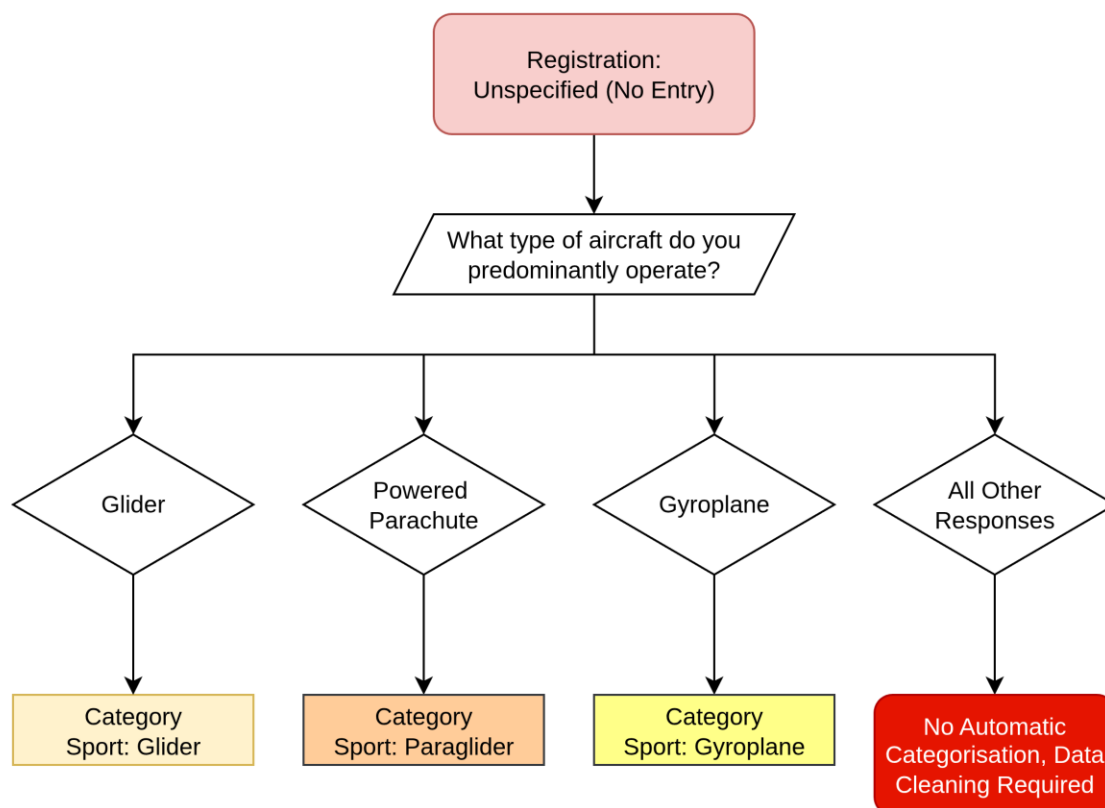


RPAS

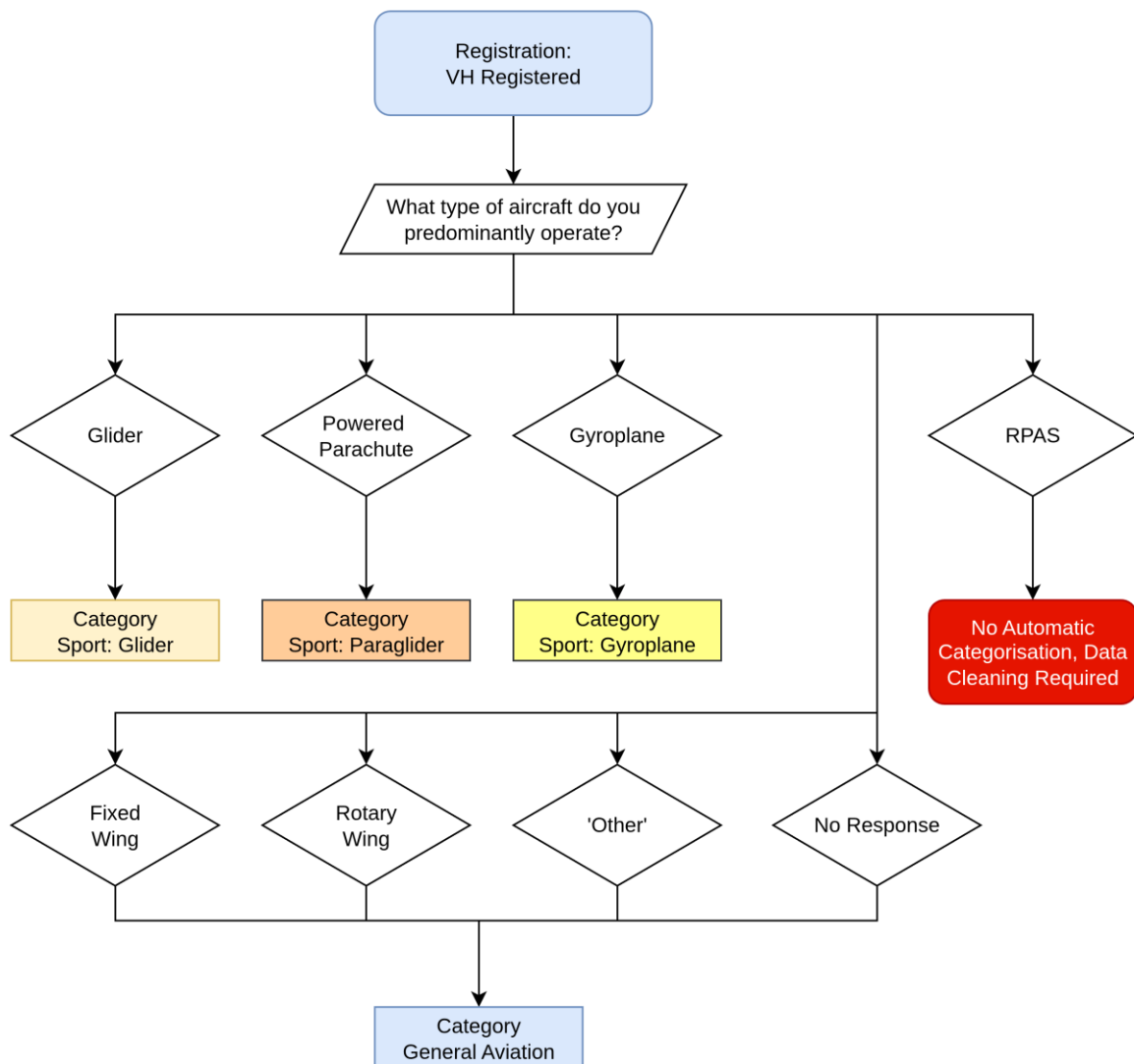
RAAus



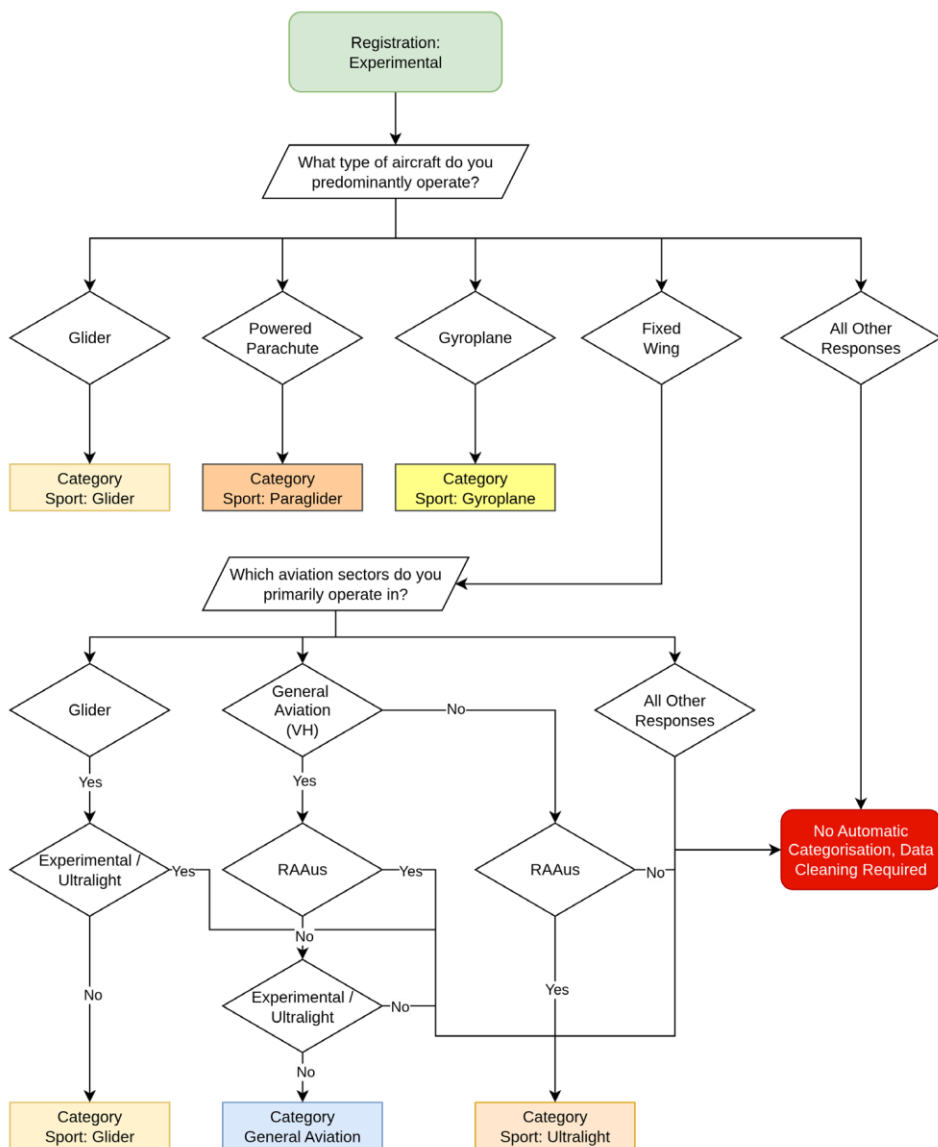
Unspecified Registration



VH Registered



Experimental



Attachment A — Survey Results

[Full survey results dataset (anonymised), provided as the accompanying data package per Milestone 5.]

Prepared by

Professor Aaron McFadyen — Principal Investigator

Peter Smith — Senior Research Engineer

Sabrina Ravail — Engagement & Management Officer