A11L.UAS.122-A83 Drone Traffic Analysis: 2025 Annual Report

January 15, 2026

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This annual report summarizes project activities conducted during the initial performance period of November 2024 through December 2025, supporting the FAA's mission to maintain the safety of the National Airspace System (NAS) while integrating emerging Unmanned Aircraft System (UAS) operations. The project addresses a critical need for comprehensive, data-driven insight into existing and evolving UAS traffic trends, regulatory compliance, and collision risk. Using an unprecedented combination of detection, registration, survey, surveillance, and navigation datasets, the research builds upon prior ASSURE efforts (Projects A40, A47, A50, and A60) to characterize UAS traffic in several urban environments across the NAS.

Activities focused on analyzing current UAS operations, identifying trends in traffic evolution, and assessing potential risk within the NAS. The project evaluated adherence to Part 107 operational rules and codified attributes of regulatory exceedances. Additionally, forecasting analyses were advanced to project future drone traffic demand and associated safety considerations. Specialized sensors capable of collecting both Remote ID and ADS-B data were deployed in select locations to support aircraft-UAS encounter identification and assessment.

Preliminary findings show that most UAS activity is low-altitude, low-speed, short in duration, and conducted close to the operator, typically in low-density areas and during weekday daylight hours, which generally limits risk. However, the analysis also highlights areas needing continued attention, including data quality challenges, localized variability, operations near heliports, and a significant share of flights above UAS Facility Map grid limits. These results emphasize both the value of Remote ID for risk-informed oversight and the importance of continued data maturation, integration, and longitudinal analysis to support safe and scalable UAS integration. The findings enhance the FAA's ability to evaluate the effectiveness of existing rules, anticipate future challenges, and refine policies that promote NAS safety.</td></tr>
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UNITS OF MEASUREMENT

Measurement	Acronym	Datum	Type
Estimated Decibels relative to 1 milliwatt	dBm	N/A	Signal Strength
Feet	ft	MSL or AGL, as indicated	Vertical distance
Hour(s): Minute(s)	hh:mm	UTM or Local, as indicated	Time
Quarter	Q	Calendar Quarter	Longitudinal time comparison
Meters	m	N/A	Lateral distance or vertical distance (research team will convert)
Meters per Second	m/s	N/A	Speed (research team will convert)
Miles per Hour	mph	N/A	Speed
Nautical Mile	NM	N/A	Distance
Persons per Square Mile	persons / SM^2	N/A	Population Density
Pounds	Lbs	N/A	Weight
Seconds	s	N/A	Duration
Statute Mile	SM	N/A	Lateral distance
Year-Over-Year	YoY/CY	Calendar Year	Longitudinal time comparison

TABLE OF ACRONYMS

Acronym	Meaning
4G	Fourth Generation (Cellular Technology)
A	Airport
AAM	Advanced Air Mobility
AGL	Above Ground Level
ADS-B	Automatic Dependent Surveillance-Broadcast
ASTM	American Society of Testing and Materials
ASSURE	Alliance for System Safety of UAS Through Research Excellence
AUVSI	Association of Uncrewed Vehicle Systems International
B	Billion
BVLOS	Beyond Visual Line of Sight
C	Closed Aerodrome
CFR	Code of Federal Regulations
C-UAS	Counter-Unmanned Aircraft System
DFW	Dallas-Fort Worth International Airport
DJI	Dà-Jiāng Innovations
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FRIA	FAA-Recognized Identification Area
GIS	Geographic Information Systems
H	Heliport
HAE	Height Above Ellipsoid
K	Thousand
LAANC	Low Altitude Authorization and Notification Capability
LTE	Long Term Evolution
M	Million
MSL	Mean Sea Level
NAS	National Airspace System
NDAA	National Defense Authorization Act
RID	Remote Identification
RSSI	Received Signal Strength Indicator
ST	State
sUAS	Small Unmanned Aircraft System
TFR	Temporary Flight Restriction
TRUST	The Recreational UAS Safety Test
UAS	Unmanned Aircraft System
UASFM	Unmanned Aircraft System Facility Map
URSA	Unmanned Robotics Systems Analysis
US / U.S. / USA	United States

Executive Summary

The Federal Aviation Administration's (FAA's) mission is to maintain the safety of the National Airspace System (NAS) while accommodating new types of Unmanned Aircraft System (UAS) operations, and—to that end—it is crucial to assess the effectiveness of existing drone regulations, policies, and applicable executive orders, and forecast future UAS integration needs. Using UAS Remote Identification data in conjunction with supporting datasets such as air traffic data, UAS registrations, airspace metrics, and other geographic information system data, this research will provide data and analysis to support analyzing UAS traffic and traffic collision risks at several aerodrome locations across the NAS.

Key Objectives:

- Gain insight into existing drone traffic operations within the NAS.
- Support accurate drone population and traffic forecasting.
- Evaluate the compliance and effectiveness of current drone regulations in ensuring NAS safety.
- Assess collision risk of current drone operations.

Methodology:

This research team deployed 25 UAS Remote Identification sensors near aerodrome locations throughout the US to capture a sampling of drone traffic within the NAS. Sampling locations were selected based on airport size and extent of flight operations, proximity to advanced aviation (i.e., Advanced Air Mobility) development areas, and other locations exhibiting high UAS traffic or conducting unique UAS operations. The research team incorporated data and analysis into a software platform to evaluate UAS traffic trends, assess risks to air traffic, infrastructure, and people on the ground, and assess impacts on regulations.

Implications:

- **Enhance Operational Safety**: Study findings enable improved operational safety policy development through the understanding of UAS population growth, operational trends, and potential NAS risks.
- **Inform FAA Regulation and Policy**: Results highlight operator behaviors, and the effectiveness of existing UAS regulations in ensuring NAS safety.
- **Support Further UAS Integration**: Study results will advise the agency about the state of the NAS in support of further UAS integration efforts.

Findings:

Overall, the project's initial findings demonstrate that Remote ID data provides a valuable foundation for understanding small UAS operational behavior and its interaction with the NAS, while also highlighting important analytical and technical limitations. The results show that most UAS operations are low-altitude, low-speed, short-duration, and conducted close to the operator, typically in low-density population areas and during weekday daylight hours—conditions that generally limit risk. At the same time, the analysis identifies areas requiring continued attention, including data quality challenges, localized variability, proximity to heliports, and a notable proportion of operations above UAS Facility Map grid limits. Collectively, these conclusions underscore both the promise of Remote ID as a tool for risk-informed oversight and the need for continued data maturation, fusion, and longitudinal analysis to support safe and scalable UAS integration into the NAS.

Planned Activities During Next Performance Period:

For the next deliverable, the research team will focus on expanding data collection and advancing analytical capabilities to support safe UAS integration. Planned activities include the continued deployment of Remote ID sensors at high-priority locations to capture operationally significant UAS activity; implementation of UAS–aircraft encounter modeling through the fusion of Remote ID and Automatic Dependent Surveillance-Broadcast (ADS-B) data; and development of a methodology to assess UAS activity within Temporary Flight Restriction and no-drone zones. In parallel, the team will refine approaches for longitudinal analysis and predictive forecasting by addressing current data limitations and variability. Collectively, these efforts are intended to strengthen the empirical foundation for risk-informed analysis, situational awareness, and future UAS traffic and safety assessments.

1 INTRODUCTION AND BACKGROUND

1.1 Problem

The FAA lacks data related to existing drone traffic, especially at low altitudes. This research will enable the FAA to gain insights into existing drone traffic, help develop forecasts of drone traffic, understand the efficacy of existing drone regulations, and assess the collision risk of existing drone operations. This research is being driven by a need for the FAA to understand current drone traffic, the evolution of drone traffic, drone traffic forecasts, and drone collision risks. Results will facilitate understanding existing drone traffic densities and associated collision risks in the NAS, and provide a feedback mechanism for policy updates. This information will enhance the FAA's ability to create policies that appropriately ensure safety while enabling the drone industry to expand.

1.2 Previous Research

1.2.1 Small UAS Traffic Analysis (ASSURE A50: A11L.UAS.91)

The National Academies of Science (2018) highlighted the evolving need to collect empirical data to advise about the status of the UAS activity within the NAS. Using a series of commercially available technologies, researchers established a network of passive radio-frequency UAS detection sensors at locations around the US to sample UAS activity. This research evaluated six focal areas, including UAS analysis tool development, the current state of UAS within the NAS, small Unmanned Aircraft System (sUAS) regulatory compliance and exceedance rates, near-aerodrome sUAS operations and aircraft encounters, and forecasting industry and operational growth patterns. The research team identified a myriad of operational factors to inform agency policymakers about the state of UAS activity within areas of the NAS, including operational dates/times, speed, altitude, levels of activity, distribution of UAS platforms, origination locations, airspace use, flights near aerodromes and critical infrastructure, Low Altitude Authorization and Notification Capability (LAANC) grid use, areas of elevated aircraft encounter risk, and related findings (Wallace et al., 2022; Wallace et al, 2025). A transition in scope during the project led the research team to adopt new Remote Identification sensor technology, which became a regulatory requirement for most UAS users on September 16, 2022 (Remote Identification of Unmanned Aircraft, 2021).

1.2.2 Evaluation of UAS Integration Safety and Security Technologies in the NAS (ASSURE A60; A11L.UAS.90)

This multi-faceted ASSURE project evaluated safety and security technologies for improving NAS safety and security from authorized and unauthorized drone threats. The project was divided into six phases. The first focused on analyzing technologies, sensors, and systems for detecting UAS, including radar, radio frequency, acoustic, visual systems, and Remote Identification (RID) (McGowan and Noel, 2023b). Phase 2 of the project focused on the safety, efficacy, and reliability of software and hardware platforms supporting safety and security functions (Warr, 2023). The third phase provided recommendations for counter-UAS system certification, permitting, authorization, and deployment. Phase four efforts assessed the potential collateral effects of operating counter-UAS systems within the NAS and airport environments to determine potential interference and impacts (Ball, 2023). The fifth phase of the project analyzed the effectiveness of Counter-UAS (C-UAS) equipment under different operational and environmental conditions as determined by flight testing (McGowan and Noel, 2023a). The project's final phase delivers an ontology analysis from nine different domain areas, including aircraft types, airspace, sensors, UAS vehicles, UAS traffic management, waivers/authorizations/advisories, weather, and related topics (Khan et al., 2022).

1.2.3 sUAS Mid-Air Collision Likelihood (ASSURE A47; A11L.UAS.89)

This research project analyzed the risk of a small UAS midair collision with commercial, business, and general aviation aircraft. Using an encounter model developed by the Massachusetts Institute of Technology

Lincoln Laboratory, the research team calculated the probabilities of a Midair Collision, given a Near Midair Collision. Resulting encounter probabilities were assessed both with and without the benefit of detect and avoid systems. The resultant probabilities were then compared against available aircraft bird strike statistics to provide relevant context (De Abreu et al., 2023).

1.2.4 Integrating Expanded and Non-Segregated UAS Operations in the NAS: Impact on Traffic Trends and Safety (ASSURE A21; A11L.UAS.69)

In this ASSURE research project, investigators collected, cataloged, and analyzed various FAA datasets, including sUAS registration data, remote pilot certificate census, flight waivers, UAS sighting reports, and related operational data. Also, sUAS detection data collected more than 18 months from Dallas-Fort Worth International Airport (DFW) was included. The research team provided estimated forecasts for UAS growth within the NAS and reported various UAS operational metrics collected from the DFW sample site. Sixty-six industry experts were interviewed to identify further current challenges related to sUAS technologies and influencing concepts that could adversely affect UAS integration into the NAS. The project culminated with researchers introducing a statistically supported, risk-based framework for quantitatively evaluating safety risks with recommendations for agency implementation within its Safety Risk Management Program (Smith et al., 2022).

1.3 Project Purpose

This project is informed by and expands upon the work performed in the aforementioned ASSURE research projects. This research will seek to answer the knowledge gaps and questions summarized in the following sections.

1.4 Knowledge Gaps/Research Questions

The research project seeks to answer the following questions:

- What is the closest point of approach distribution curve for drone traffic encountering crewed aircraft?
- What does an analysis of drone traffic indicate about current and future drone safety risks?
- What percentage of drone traffic is following Part 107 rules?
- How many aircraft are flying in No-Drone-Zones, and what are their traffic attributes important for counter-drone efforts?
- What can we learn from current drone traffic?
- How is drone traffic evolving over time?
- What is the drone traffic forecast?

2 DATA COLLECTION AND ANALYSIS METHODOLOGY

This section overviews the data collection approach, analysis methodology, and related processes and procedures for conducting the sUAS traffic analysis research.

2.1 Research Approach

The research team worked with vendors to deploy Remote Identification / Automatic-Dependent Surveillance-Broadcast (ADS-B) detection equipment, at airport locations around the contiguous US to assess the state of sUAS traffic and nearby air traffic. Collected data will be analyzed using a combination of analysis methods developed by the research team and supported by Unmanned Robotics Systems Analysis, Inc.'s (URSA) proprietary Airspace Awareness Platform. The research team will evaluate and interpret the results. Team members will also work with URSA engineering staff to add new analytics capabilities, as required, to answer all posed research questions.

2.2 Instruments and Data Analysis Resources

2.2.1 Remote Identification Technology Overview

Remote Identification is an innovative "digital license plate" for drones, allowing for identification and location-sharing of UAS during flight. This technology broadcasts a signal containing essential information, such as the drone's unique identifier, location, altitude, and the location of its controller (FAA, 2023a). Remote ID data is transmitted via Bluetooth or Wi-Fi signal. Remote ID signal detection is made possible through a specialized phone or tablet application, which can receive and decode the Remote ID signal in real-time. Remote ID is a foundational component for advancing drone integration into the NAS, addressing critical safety, security, and privacy concerns. It ensures that federal authorities and other security or law enforcement agencies can track drones efficiently, especially when they are operated in sensitive or restricted zones. By reinforcing accountability and transparency, Remote ID also opens the door for more complex drone operations, such as flights over populated areas or beyond the operator's visual line of sight, while aiming to preserve public trust in the evolving landscape of drone technology.

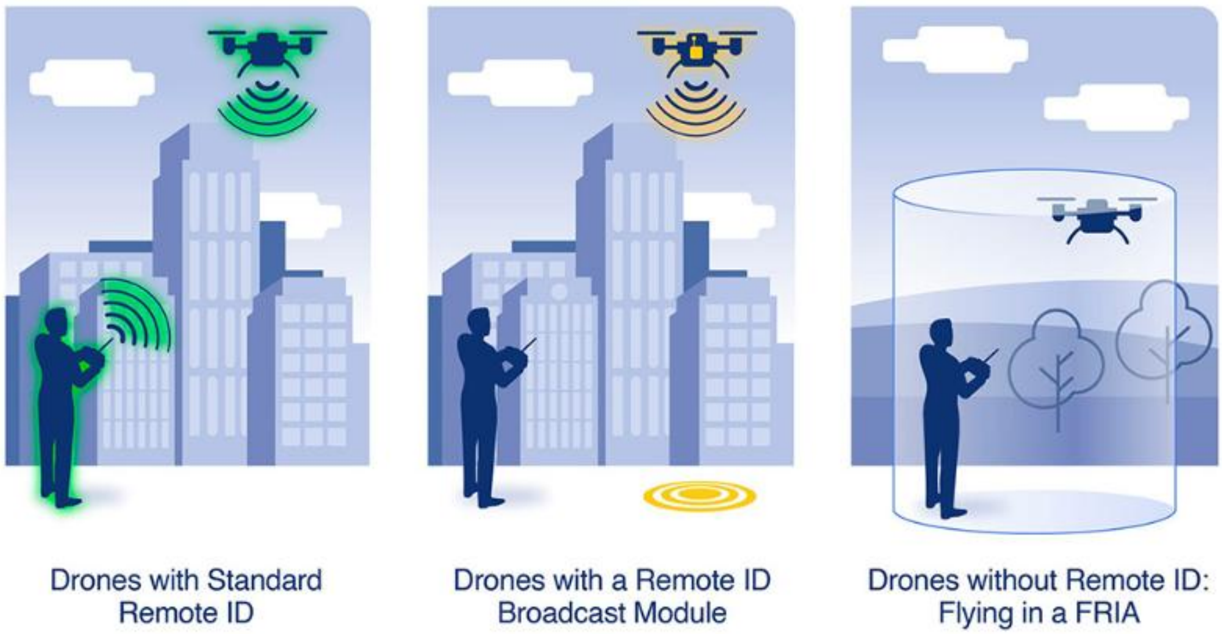
The compliance landscape for drone pilots is codified under Title 14 Code of Federal Regulations (CFR) Part 89, Remote Identification of Unmanned Aircraft (FAA, 2023). Drone operators have several avenues of compliance with Remote ID rules, including: 1) the option to employ Standard Remote ID drones; 2) attach Remote ID broadcast modules to existing drones; or, 3) operate within FAA-Recognized Identification Areas (FRIAs) without Remote ID (FAA, 2023a). These rules apply broadly, encompassing recreational, commercial, and some government-operated drones--all contributing to the diversity of aircraft sharing the skies. The requirement for these "digital license plates" enhances the FAA's ability to integrate drones into the airspace safely and systematically, ensuring all registered drones are identifiable and traceable (FAA, 2020). With certain exemptions for lightweight or research-oriented drones, the mandate for Remote ID maintains a balance between innovation and regulatory compliance.

Originally intended to take effect in September 2023, the implementation date for enforcing Remote ID compliance was delayed until March 2024 to ensure UAS operators could secure Remote ID broadcast modules before enforcement (FAA, 2023b). The FAA is cognizant of the challenges drone pilots may face in meeting Remote ID requirements, such as the availability of broadcast modules and the designation of FRIAs (FAA, 2023b). The FAA's guidelines indicate a willingness to consider these factors before enforcing penalties during the initial rollout phase. The specification for Remote ID is detailed, mandating the broadcasting of identification, location, velocity, and emergency status information in a format that can be received without the need for an internet connection, leveraging widely adopted Wi-Fi or Bluetooth standards for communication. These Remote ID mechanisms aim to detect, identify, track, and manage UAS operating within urban airspace.

2.2.2 Performance Requirements (14 CFR §89)

The FAA defines requirements for Remote Identification under 14 CFR §89, Remote Identification of Unmanned Aircraft (2021). RID requirements apply to most UAS required to be registered under 14 CFR §47 or §48. Remote identification compliance can be achieved in one of three methods: 1) Standard Remote ID; 2) Equipage of a Remote ID Broadcast Module; or 3) Flight restricted to within a designated FRIA (see

Figure 1). *Standard Remote Identification* is integrated within a manufactured UAS. A *Remote ID Broadcast Module* is a retrofit device attached to a UAS that broadcasts identification and location information. The agency designates geographic areas where UAS may be flown without RID-equipped, known as *FAA-Recognized Identification Areas* (FAA, 2024). UAS operators are required to register the serial number of their Remote ID devices with the FAA in accordance with 14 CFR §47.14 or 14 CFR §48.110.



Note: Public Domain Image (FAA, 2023a)

Figure 1. Remote ID Methods of Compliance.

2.2.3 Standards for Remote Identification

In addition to Remote ID regulatory and compliance requirements prescribed by the FAA, the American Society of Testing and Materials (ASTM, 2022) established a recognized standard for Remote Identification under ASTM F3411-22a. This standard establishes performance requirements for Remote Identification of UAS, defines the format and implementation of RID messages, identifies transmission methods, and establishes minimum performance requirements.

This project utilized technology that complies with this established standard.

2.2.4 UAS Remote ID Data Description

This project employed Remote ID sensors capable of detecting and tracking sUAS in real-time. Beginning on September 16, 2023, the FAA requires all UAS operators to register their drones to operate under new Remote ID rules codified in 14 CFR §89 and portions of 14 CFR §107. These sensors provide for continuous, passive monitoring of detailed operations data, including UAS location, altitude, speed, control station location, control station altitude, takeoff location, and other details.

Table 1 overviews Remote Identification data elements collected by one of the vendors participating in this project. The authors note that data for some elements may not be available, or consistently collected due to a variety of factors.

Table 1. Remote ID Data Elements.

• Identification (ID) • Mode • Timestamp • Origin Address • Origin Point Latitude • Origin Point Longitude • Origin Point Heading • Origin Point Speed • Origin Point Altitude Mean Sea Level (MSL) Geodetic • Origin Point Altitude Barometric Meters • Origin Point Altitude Height Above Ellipsoid (HAE) • Operational Status • Point Latitude • Point Longitude • Point Heading • Point Speed • Point Altitude MSL Geodetic • Point Altitude MSL Barometric	• Point Altitude HAE • Remote ID Details Remote ID Compliant • Remote ID Details Takeoff Location Latitude • Remote ID Details Takeoff Location Longitude • Remote ID Details Takeoff Location Heading • Remote ID Details Takeoff Location Speed • Remote ID Details Takeoff Location Altitude MSL Geodetic • Remote ID Details Takeoff Location Altitude MSL Barometric • Remote ID Details Takeoff Location Altitude HAE • Remote ID Radio Bluetooth Received Signal Strength Indicator (RSSI) • Remote ID Radio Wi-Fi RSSI • Remote ID Radio Estimated Receive Interval •

2.3 Data Acquisition

2.3.1 Supporting Vendors

Pierce Aerospace

Pierce Aerospace furnished Remote Identification data for this project (https://www.pierceaerospace.net/). Pierce Aerospace has developed Remote ID solutions since 2017 and is funded by the US Air Force, the State of Indiana, and Techstars. The company provides a myriad of Remote ID solutions, including various commercial and government Remote ID beacon sets, and the company's proprietary Remote ID Receiver. Pierce Aerospace is located in Indianapolis, Indiana.

Pierce Aerospace was tasked with deploying RID sensors to selected, prioritized locations, based on established project objectives. The company constructed, deployed, operated, and maintained all sensor platforms at the various sampling locations. The vendor aided in selection of sensor deployment locations within each sample area to establish the best available RID coverage for the desired target location. The vendor collected data in near-real time via Long Term Evolution (LTE [4G])/ wireless connectivity with the company's data server. Data deliveries were furnished to the data analysis vendor and research team monthly during the collection period.

DroneSpotter

DroneSpotter also furnished Remote Identification data in support of this project. DroneSpotter (https://www.dronespotter.com/) specializes in detecting and analyzing drone Remote ID broadcasts, enabling businesses, governments, and organizations to make informed decisions about airspace safety and utilization. With deployments across more than 10 major US cities, the company actively monitors drones over corporate campuses, airports, and critical infrastructure. DroneSpotter is redefining airspace awareness by bridging the gap between traditional aviation practices and the rapidly growing drone ecosystem. DroneSpotter ensures safety, enhances decision-making, and empowers organizations to navigate an increasingly complex airspace environment by providing innovative and cost-effective solutions.

2.3.2 Data Collection Instrumentation

The following data collection instruments were used during the project:

WR1 Remote ID Sensor

The YR1 Remote ID sensor from Pierce Aerospace represents the next generation of Remote ID sensor technology, providing superior performance signal detection for airspace awareness. The device features high-performance RID detection, flexible mobile or fixed site configurations, software agnostic interface, Flight Portal ID-compatible, and Command and Control/Unmanned Traffic Management integration (Pierce Aerospace, 2024).

DroneSpotter RID Sensor

The DroneSpotter proprietary 2.75 lb RID sensor is IP66-rated [Ingress Protection Rating] for superior performance in adverse environmental conditions. The receiver is configured with an LTE modem to transfer RID detection data to a cloud server via the cellular data network. The device is configured to work with DroneSpotter's Corporate Network via a web application or Application Programming Interface (DroneSpotter, n.d.).

A visual depiction of Remote ID sensors used in this project is presented in Figure 2.

Note: Pierce Aerospace RID Sensor [LEFT]; Dronespotter RID Sensor [RIGHT].

Figure 2. Remote ID Sensors.

2.4 Data Analysis

2.4.1 Supporting Vendors

Unmanned Robotics Systems Analysis (URSA)

URSA (https://ursainc.com/) is an ASSURE Center of Excellence Certified Partner and project sub-awardee. URSA is a leading UAS and C-UAS data analytics company. URSA has supported US Air Force C-UAS integration efforts through Small Business Innovation Research grants, Customs and Border Protection, and the FAA through UAS forensics contracts, and is involved with a C-UAS test and evaluation exercise for the Bureau of Prisons as the system of record for all C-UAS and UAS telemetry data. URSA's platform enables operators, law enforcement, and regulators to investigate UAS behavior and activity by combining various data sources into a single, flexible platform.

Airspace Awareness Platform
URSA's (n.d.) customizable Airspace Awareness platform provides scalable vendor-agnostic data analytics capable of processing multi-source telemetry and Geographical Information Systems (GIS) data. The system operates on an integrated web-based platform supported by the robust Amazon Web Services framework for performing both generalized assessment and detailed case-level data analysis. Leveraging modern data science and artificial intelligence capabilities, the platform provides rapid pattern detection, data visualization, and automated reporting capabilities.

2.5 Additional Datasets

The following additional datasets support project tasks and analysis associated with project objectives (see Table 2). Not all listed tools and resources were used during the initial performance period.

Table 2. Additional Supporting Datasets.

Dataset	Overview	Source
20-Year Aerospace Forecast	Annual FAA estimation of aeronautical activity trending	FAA
Astronomical Database	Dataset of geographic sunrise, sunset, and civil twilight data	TimeandDate.com
Automatic Dependent Surveillance-Broadcast (ADS-B)	Surveillance/broadcast technology for aircraft position reporting	Dual Deployed with Select RID Sensors
Controlled Airspace Dataset	Geographical depiction of various classes of airspace	FAA
Declaration of Compliance Database	Manufacturer Remote ID Declaration of Compliance data by UAS model	FAA
Digital Obstacle File Database	Detailed listing of known obstacles affecting aviation operations	FAA
Electronic National Airspace System Resource (eNASR)	Aeronautical data, including airports, airways, Air Route Traffic Control Centers, and other related resources	FAA
Geographic Low Altitude Risk Estimation (GLARE) Tool	GIS database for UAS risk assessment and forecasting	FAA
Historical Weather Data	Historical routine aviation weather reporting (METAR) data for selected airport sampling locations derived from Automated Surface Observation Station (ASOS) / Automated Weather Observation Station (AWOS) data	Iowa State MESONET
LAANC Approval Data	Record of LAANC approvals for participating airports in the UAS data exchange network; provides airport LAANC grid(s), approved altitude, approval timeframe, operator information, and operation type (§107 vs. §44809)	FAA
Remote Pilot Certificate Database	Geographic dataset of remote pilot certificate issuance, currency, and expiration	FAA

Temporary Flight Restriction (TFR) Database	Geographic location, effective dates, times, altitudes, and restrictions of various TFRs associated with 14 CFR 99.7 Special Security Instructions	FAA
UAS Facility Map (UASFM) Dataset	UAS Facility Map grid and max altitudes surrounding airports participating in the LAANC program	FAA
UAS Registration Database	Record of UAS model, manufacturer, registration issuance, expiration, RID serial number, and status (i.e., §107 vs. §44809)	FAA

2.6 Remote ID Deployment Plan and Sampling Locations

UAS Remote ID data were planned to be collected from January 2025 to approximately December 2027 from sensors deployed at diverse geographical locations throughout the US. The research team targeted 15 priority locations for sensor deployment and data collection. Sampling locations were selected based on proximity to the following areas of interest: 1) Core-30 Airports; 2) Advanced Air Mobility (AAM) flight testing, operations, and infrastructure development areas; 3) Innovate28 locations; 4) special UAS areas of interest (i.e. UAS delivery, high UAS traffic areas, etc.); and, 5) other or miscellaneous aviation criteria. A summary of proposed sampling locations with the included selection rationale is included in Table 3. Locations denoted with an asterisk (*) were included during the current performance period.

Table 3. Prioritized Sampling Locations.

Location	**Sample (months)**	**IATA Code**	**Selection Rationale**
San Francisco International Airport	36	SFO	Core 30 Airport; AAM testing/operations
John F. Kennedy International Airport	36	JFK	Core 30 Airport; AAM testing/operations
Dallas-Fort Worth International Airport / Dallas Love Field	36	DFW/DAL	Core 30 Airport; UAS package delivery
Houston, TX Area*	36	N/A	Innovate28
Orlando International Airport	36	MCO	Innovate28; Core 30 Airport
Los Angeles International Airport	36	LAX	Core 30 Airport; Innovate28
Blacksburg, VA Area	36	N/A	High drone activity location
Fort Lauderdale-Hollywood International Airport*	36	FLL	Core 30 Airport; AAM testing/operations
Van Nuys Airport	36	VNY	High general aviation population/traffic
Seattle, WA Area*	36	N/A	Populated area with unrestricted UAS activity
John Glenn Columbus International Airport	36	CMH	AAM testing/operations
Salinas Municipal Airport	36	SNS	Charging location for AAM vehicles
Chicago-Midway Airport*	36	MDW	Core 30 Airport
San Diego Airport*	36	SAN	Core 30 Airport
Chicago O'Hare International Airport*	36	ORD	Core 30 Airport

Final selection of sampling locations will be determined based on sensor availability and logistical considerations, including the suitability of each site for sensor deployment, required permissions, and the ability to sustain operations over the sampling period. Additional factors such as project applicability, cost, operational constraints, and other relevant considerations will also inform the final site selection to ensure reliable data collection and alignment with project objectives.

2.7 Assumptions and Limitations

The research team acknowledges that the following assumptions and limitations apply to this project:

- Remote ID detection sensors only provide detection and tracking for sUAS platforms equipped with either an embedded or attached Remote ID beacon that meets specifications of ASTM F3411-22a, Standard Specifications for Remote ID and Tracking (ASTM International, 2022). UAS platforms not equipped with Remote ID or beacons that do not meet the ASTM F3411-22a standard will not be detected.
- Remote ID detection sensors only detect platforms within electronic line of sight. The range of Remote ID detection sensors can be affected by various factors, including sensor elevation, terrain, obstructions, and antenna configuration. While the research team will coordinate the deployment of multiple Remote ID sensors in each sampling location, the team cannot estimate the effective coverage area or detection range. Additionally, signals used by Remote ID beacons, such as Wi-Fi and Bluetooth, are relatively weak and have limited penetration power. Obstacles that interfere with the electronic line of sight between the sUAS and the Remote ID sensor may prevent or limit telemetry collection.
- Platform or model identification relies on accurate sUAS Certificate of Compliance information being submitted to the FAA. This may result in reporting inaccurate model identification information.
- The authors are unable to assess which operational ruleset sUAS operations are being conducted under 14 CFR §107 (Commercial), 49 U.S.C. §44809 (Recreational / Hobbyist), 49 U.S.C. §40102(a)(41) and §40125 (Public Aircraft) or under a certificate of authorization. It is also impossible to determine if an operator under 14 CFR §107 is operating under the authority of a waiver or airspace authorization. While advancements have been made to leverage telemetry analysis and other techniques for indicating operation type, this approach has yet to be validated.
- While the study collected data from multiple sample locations, these areas may not necessarily represent operating areas across the nation. Certain areas may be influenced by lurking variables, which may include seasonality, weather, state operating restrictions, limited access to airspace or flight areas, or other factors beyond the scope of the study. Readers should be cautious before generalizing these localized findings.
- Analysis of aircraft penetration into LAANC grid zones is limited by ADS-B sensor coverage, which may be limited by electronic line of sight, obstructions, or other factors that limit low-altitude coverage. These limitations may result in incomplete capture of ADS-B data, and thus could result in underreporting of actual aircraft conflicts or LAANC grid incursions.
- The initial data cleaning process removed data points in which data was unavailable or clearly invalid. This may result in some valid UAS flight telemetry sets being removed or truncated.

2.8 Data Validation and Cleaning

Data collected from Remote ID sensors are subject to various sources of error, including missing data elements, incomplete records, and inaccurate or incorrect information. These limitations may arise from sensor performance, signal interference, environmental conditions, or other related factors. To address these factors, the research team established a comprehensive approach for validating data completeness and validity.

2.8.1 Data Removal Criteria, Procedures, and Documentation

Suspect or spurious data points were removed from the dataset based on the following procedure:

- Eliminate data duplication from overlapping Remote ID sensors, as appropriate.
- Remove data points with invalid dates/timestamps (such as those that fall outside the established collection period).
- Remove data points with invalid latitude or longitude values (such as data points outside the US).
- Remove data points with null latitude/longitude or Remote ID Serial Number values.
- Remove data points lacking operator location information.
- The research team documented the number of data elements contained in the original data, the number of records removed, and the remaining records retained for analysis.

2.8.2 Data Standardization and Transformation

Following the data cleaning procedure, the remaining dataset was standardized to ensure consistency across all data points. These steps were taken to improve comparability, accuracy, and reliability of subsequent analysis and conclusions. The following data standardization procedure was employed:

- Transformation of altitude data from meters (m) above takeoff location to feet (ft) above takeoff location
- Transformation of speed data from meters per second (m/s) to miles per hour (mph)

2.8.3 Flight Stringing Procedure

One limitation of Remote ID data is that it does not have an inherent architecture designed to distinguish between individual UAS flights. Since the purpose of this project was to assess UAS traffic levels and trends, it was important to create a consistent, systemic approach for distinguishing individual flights. Based on data derived from previous research by Wallace et al. (2022), the research team selected a 20-minute temporal separation interval to segregate between different individual flights. This interval was chosen to avoid duplicate counting of sequential flights conducting a consolidated purpose or "mission." The research asserts that the 20-minute interval provides a reliable flight/sortie activity count, while removing duplicate cycle counting for events like short battery swaps. To effect this counting method, the research team used the following procedure:

- Remote ID detection data was organized into a two-order sort, first by UAS Remote ID serial number, and next by date/time from newest to oldest.
- A tabular calculation was performed to determine if sequential data point Remote IDs were identical, and if the time interval between sequential data points was less than 20 minutes in duration. If either of these conditions failed, the flight count was increased. If Remote ID detection data originated from the same serial number, but sequential data points had less than a 20-minute interruption, all data was considered to be a part of the same flight operation.

2.8.4 Supplemental Data Collection and Fusion

One of the Remote ID vendors did not include manufacturer and model information in their provided dataset. The research team asserts that this data is vital to understanding not only UAS traffic trends but also the nature of potential risk posed by UAS within the National Airspace System. UAS model information provides important context about the size, weight, and general capabilities of UAS platforms operating in the NAS. The research team leveraged a custom-built, Python-based software solution to perform automated UAS Remote ID serial number queries of the FAA's Declaration of Compliance database. The software query tool runs a hidden Chrome browser with an automated data extraction algorithm and can process between 500 and 700 queries per hour. This lookup process yielded individual UAS make (manufacturer) and model information.

3 PRELIMINARY FINDINGS

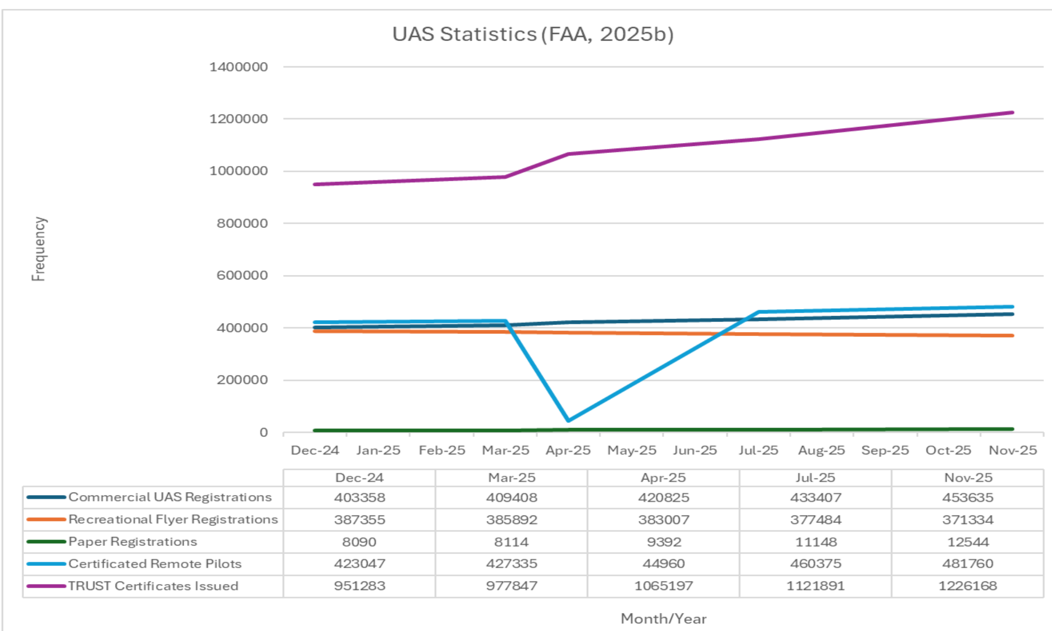
This section provides a breakdown of the preliminary findings to address the following project research questions:

- What can we learn from current drone traffic?
- How is drone traffic evolving over time?
- What is the drone traffic forecast?
- What does an analysis of drone traffic indicate about current and future drone safety risks?
- What percentage of drone traffic is following Part 107 rules?
- What is the closest point of approach distribution curve for drone traffic encountering crewed aircraft?
- How many aircraft are flying in No-Drone-Zones, and what are their traffic attributes important for counter-drone efforts?

3.1 Ancillary Data Sources

3.1.1 UAS Metrics by the Numbers

The FAA (2025b) captures vital UAS statistics and communicates them via their DroneZone public website at routine intervals. As of November 2025, the agency recorded a cumulative 453,635 commercial registered UAS; 371,334 recreational flyer registrations; 12,544 paper UAS registrations (typically for UAS above 55 lbs); 481,760 certificated remote pilots; and 1,226,168 [The] Recreational UAS Safety Test (TRUST) certificates issued (FAA, 2025b). Using the Wayback Machine (2014), an internet archiving tool, the authors captured trending UAS metrics from historical captures of the FAA's (2025b) reported UAS statistics at approximately quarterly intervals extending from December 2024 to November 2025. Results are presented in Figure 3. The authors acknowledge several limitations associated with use of archival data derived from the Wayback machine, which can include: incomplete archiving, inconsistent snapshot intervals, and inability to validate data accuracy or authenticity.



	Dec-24	Mar-25	Apr-25	Jul-25	Nov-25
Commercial UAS Registrations	403358	409408	420825	433407	453635
Recreational Flyer Registrations	387355	385892	383007	377484	371334
Paper Registrations	8090	8114	9392	11148	12544
Certificated Remote Pilots	423047	427335	44960	460375	481760
TRUST Certificates Issued	951283	977847	1065197	1121891	1226168

Figure 3. UAS Statistics.

Based on these metrics, commercial UAS registrations show an annualized growth of nearly 12.5%; recreational flyer registrations show a decline of approximately 4.1%; paper UAS registrations reveal a

55.1% increase; certificated remote pilots grew by 13.9%; and total recreational TRUST certificate issuances increased by 28.9%.

FAA (2024a) remote pilot records obtained from U.S. Civil Airmen Statistics from 2016, when Part 107 remote pilot certification was introduced, to 2024 are shown in Figure 4. The left axis aligns with the bar graph indicating the total number of remote pilots and right axis aligns to the line graph, indicating proportional change in the number of remote pilots from the prior reporting year.

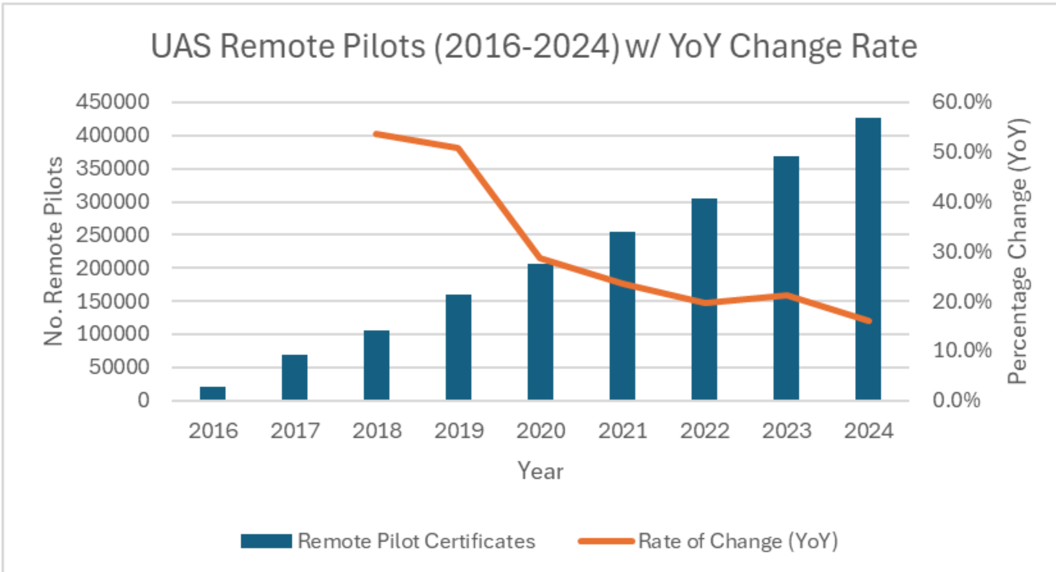


Figure 4. UAS Remote Pilots (2016-2024) with Year-Over-Year Change Rate.

3.1.2 Low Altitude Authorization and Notification Capability (LAANC) Data

Currently, there are few empirical indicators of the extent and trend of UAS traffic on a national scale. One available indicator is the level of use of the FAA's LAANC. LAANC provides drone pilots with access to low-altitude areas of controlled airspace at participating airports (FAA, 2024c). LAANC further enables situational awareness of where UAS operators are able to fly, information on Temporary Flight Restrictions (TFRs) and special use airspace areas, and provides air traffic control notification of planned UAS activity.

3.1.3 LAANC Data Collection and Analysis

The authors received de-identified LAANC authorization data extending from January 1, 2025, to November 30, 2025, which included 688,716 individual authorizations. As of August 2025 the FAA (2025a) reported 1,219 airports actively participated in the LAANC approval system, which included 961 civil airports, 81 military airports, and 13 joint-use facilities. Collected data included 501,582 Part 107 authorization requests (72.8%) and 187,134 Part 44809 requests (27.1%). Monthly activity showed a minimum of 734 active LAANC airports during the sampling period. An overview of system-wide LAANC activity is provided in Figure 5. For the 11-month sample January-November 2025, growth stood at 9.2% over the same period in 2024.

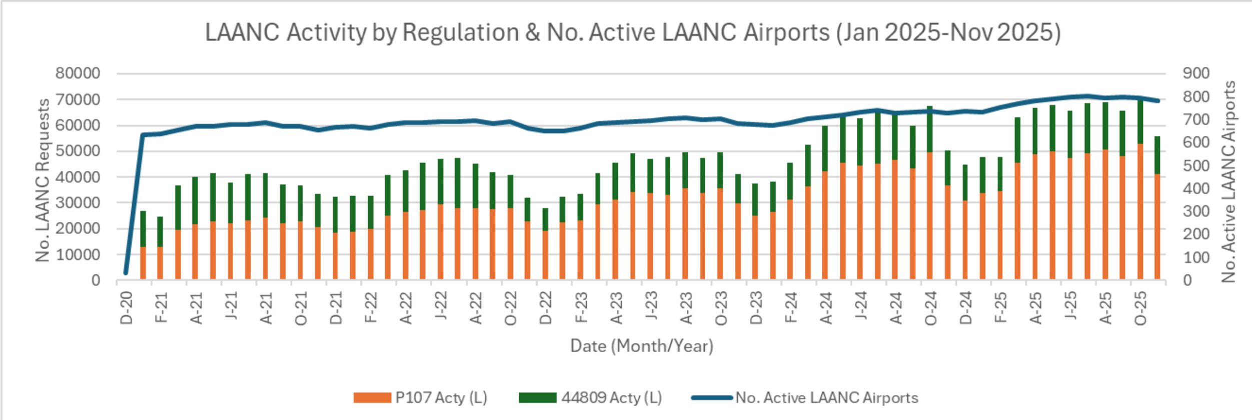


Figure 5. LAANC Activity by Regulation and No. Active LAANC Airports (Jan 2025-Nov 2025).

A detailed summary of LAANC data is provided in Table 4. The table provides a breakdown of LAANC authorization requests by airspace type, regulation, number of UAS Facility Map grids requested, and requested altitude interval. The proportional value in parentheses indicates the proportion of authorizations that received automated approval, with the remainder requiring additional coordination.

Table 4. LAANC Authorizations by Airspace Type, Regulation, and No. Requested Grids.

Airspace / Part	Requests	Grids	50	100	150	200	250	300	350	400
Part 107										
B - Part 107	101501 (14.7%)	475273 (15.1%)	21301 (89.7%)	73881 (92.1%)	32506 (86.8%)	83247 (90.0%)	20974 (80.7%)	50148 (84.8%)	10188 (88.7%)	183028 (96.0%)
C - Part 107	113505 (16.5%)	520712 (16.6%)	22974 (92.2%)	74922 (89.4%)	29778 (82.5%)	127775 (92.9%)	24284 (84.9%)	67510 (92.9%)	8860 (77.9%)	164609 (94.1%)
D - Part 107	249481 (36.2%)	1106748 (35.2%)	48013 (89.7%)	168738 (90.8%)	66358 (84.9%)	253669 (92.5%)	39736 (73.3%)	129058 (93.5%)	18110 (81.6%)	383066 (79.8%)
E - Part 107	37095 (5.4%)	191780 (6.1%)	3921 (66.8%)	55042 (88.9%)	6110 (57.0%)	61623 (85.1%)	4063 (42.0%)	6575 (46.7%)	2281 (68.3%)	52165 (85.7%)
Subtotal 107	501582	2294513	96209	372583	134752	526314	89057	253291	39439	782868
Part 44809										
B - Part 44809	36757 (5.3%)	161788 (5.2%)	13425 (100.0%)	25847 (100.0%)	8764 (100.0%)	27774 (100.0%)	4973 (100.0%)	12618 (100.0%)	4311 (100.0%)	64076 (100.0%)
C - Part 44809	41853 (6.1%)	181762 (5.8%)	9822 (100.0%)	27387 (100.0%)	7969 (100.0%)	44317 (100.0%)	6385 (100.0%)	22479 (100.0%)	3206 (100.0%)	60197 (100.0%)
D - Part 44809	93469 (13.6%)	427057 (13.6%)	29328 (100.0%)	76626 (100.0%)	21818 (100.0%)	92049 (100.0%)	12325 (100.0%)	48818 (100.0%)	8234 (100.0%)	137859 (100.0%)
E - Part 44809	15055 (2.2%)	75336 (2.4%)	1116 (100.0%)	21250 (100.0%)	1040 (100.0%)	25810 (100.0%)	445 (100.0%)	1776 (100.0%)	1188 (100.0%)	22711 (100.0%)
Subtotal 44809	187134	845943	53691	151110	39591	189950	24128	85691	16939	284843
CUMULATIVE	688716	3140456	149900	523693	174343	716264	113185	338982	56378	1067711

Of the 826 airports that saw LAANC activity during the sample period, 33 (4.0%) were in Class B airspace, 114 (13.8%) were in Class C airspace, 451 (54.6%) were in Class D airspace, and 228 (27.6%) were in Class E. Approximately 93.0% of LAANC requests received automated approval with 7.0% requiring further coordination prior to approval.

During the sample period, Part 107 UAS operators requested an average of 4.6 grids per request (Mdn = 3), and Part 44809 operators requested an average of 4.5 grids per request (Mdn = 3). Mean requested altitude was 237 feet Above Ground Level (AGL) for both Part 107 and Part 44809 UAS operators (Mdn = 200). Figure 6 shows a scatterplot of requested grids and accompanying flight altitude. A small number of UAS operators requested a substantial number of UASFM grids, generally at 100-foot altitude intervals, with the maximum number of grids requested under a single request being 274.

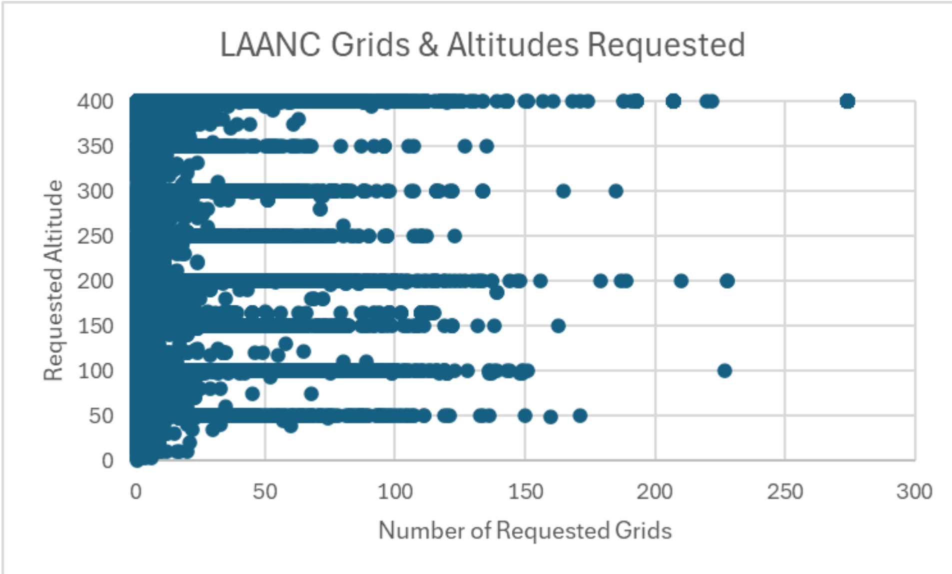


Figure 6. LAANC Grids and Altitudes Requested.

Table 5 provides an overview of individual airport LAANC activity by month, showing the top 25 airports by quantity of LAANC approvals in descending order.

Table 5. Individual Airport LAANC Activity, No. Authorized Requests (2025, Top 25 Airports).

APPROVALS	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	TOTAL
DFW*	1389	1331	1605	1391	1714	1526	1547	1427	1594	1734	1465	16723
BOS*	905	807	1133	1226	1366	1273	1162	1279	1103	1125	967	12346
LAS*	670	693	801	802	748	714	689	740	842	898	701	8298
MIA*	634	719	762	723	664	656	742	701	608	864	776	7849
LGA*	519	489	666	651	837	843	886	805	625	729	498	7548
PHX*	614	674	639	636	646	578	579	535	640	759	694	6994
PHL*	421	508	585	580	668	622	715	671	640	683	488	6581
FLL*	425	548	562	592	673	565	526	555	596	695	636	6373
CLT*	473	491	603	582	601	616	555	591	539	638	519	6208
BWI*	413	376	496	553	537	505	572	566	449	533	539	5539
IAH*	421	337	445	514	567	428	473	450	453	501	428	5017
IAD*	291	302	523	438	517	482	524	575	406	505	445	5008
SNA	443	456	471	528	570	472	390	416	397	464	336	4943
MSP*	248	251	354	493	507	526	549	534	511	527	380	4880
APA	185	173	469	344	365	426	457	519	546	509	348	4341
SMO	373	404	405	339	427	337	373	468	365	387	375	4253
SAN*	341	325	332	377	343	426	466	432	350	420	335	4147
ORD*	268	211	336	384	417	436	380	445	443	396	262	3978
HOU	301	286	371	346	314	298	357	360	328	448	366	3775
IWA	237	285	339	373	396	329	276	307	373	379	369	3663
SJC	307	269	375	305	342	316	317	305	312	306	257	3411
BNA	313	206	297	289	353	394	303	355	306	338	254	3408
BKL	146	190	302	325	373	326	322	330	365	332	282	3293
LGB	328	254	229	337	315	279	300	330	288	289	283	3232
ORL	239	267	340	301	271	241	292	325	248	348	346	3218

Note: *Indicates Core 30 Airport

Similarly, Table 6 provides a census of the number of grid authorizations by individual airports during the sampling period, showing the top 25 airports in descending order.

Table 6. Individual Airport LAANC Activity, No. Authorized Grids (2025, Top 25 Airports).

GRIDS	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	TOTAL
DFW*	6860	6899	7839	7295	9785	8041	8830	9064	14973	8370	7720	95676
GLS	52	70	113	486	8892	8311	8703	7572	8399	8417	8214	59229
BOS*	3616	3342	4633	5598	6204	6141	6013	7114	5018	4559	3648	55886
BWI*	2315	2628	2665	3204	2764	2722	3111	2822	2774	3012	4143	32160
LAS*	3309	2365	2669	2847	2490	2509	3080	2345	3591	3256	2981	31442
PHX*	3516	4000	3344	2576	2700	2132	2433	2402	2492	2947	2836	31378
LGA*	2032	1806	2228	2509	3951	3397	3658	3472	2443	2839	2468	30803
PHL*	1710	2428	2409	2253	2474	2744	3422	2769	2921	3271	2733	29134
FLL*	2205	2460	2357	2537	3302	2605	2303	2252	2268	2897	3433	28619
MIA*	2312	2498	2922	2445	2644	2479	2858	2598	1955	3168	2593	28472
CLT*	2167	2271	2896	2634	2985	2514	2434	2511	2113	2397	2186	27108
MDW*	1177	1347	2300	2293	3274	2503	2585	3620	2767	2278	2556	26700
IAH*	1506	1211	1685	2567	2975	2637	2411	2296	2512	2579	2161	24540
BOI	3006	2054	2746	2753	1644	1656	1793	2103	1900	1744	1744	23143
IAD*	1447	1309	2528	1986	2306	2088	2088	2801	1564	2432	2228	22777
MSP*	1182	1270	1566	2430	2969	2440	2432	2020	2075	2644	1619	22647
APA	688	708	2489	1707	1881	2150	1967	1970	3065	2535	1839	20999
SNA	1970	1673	1849	1995	2350	2119	1574	1491	1525	1645	1328	19519
HOU	1397	2727	2081	1572	1538	1423	1395	1572	1495	2612	1669	19481
ORL	1194	1143	1383	1634	2218	1963	1770	1967	1430	2017	2082	18801
BKL	847	779	1745	2135	2739	2225	1721	1965	1904	1435	1271	18766
DTW*	1681	918	2011	1990	2226	2559	2061	1518	837	1609	830	18240
SYR	836	950	1776	1827	1683	1667	2052	1896	1952	1897	1106	17642
AUS	1439	1233	1768	1596	2168	2442	1777	1243	1320	1639	952	17577
MSN	1252	1277	802	1103	2170	2184	2049	1587	2357	1957	784	17522

Note: *Indicates Core 30 Airport

The authors further analyzed LAANC request start and end times. Figure 7 plots requested start and end times, in UTC time. The largest proportion of start times for Part 107 operators (58.8%) occurred between the hours of 1400Z-1900Z, with end times highest (55.4%) between 1600Z-2100Z. Similarly, Part 44809 operator start times were highest (49.3%) during the period of 1800Z-2300Z, with end times most prominent (53.8%) during the period of 2000Z-0100Z. Peak authorization hours generally corresponded to hours of daylight.

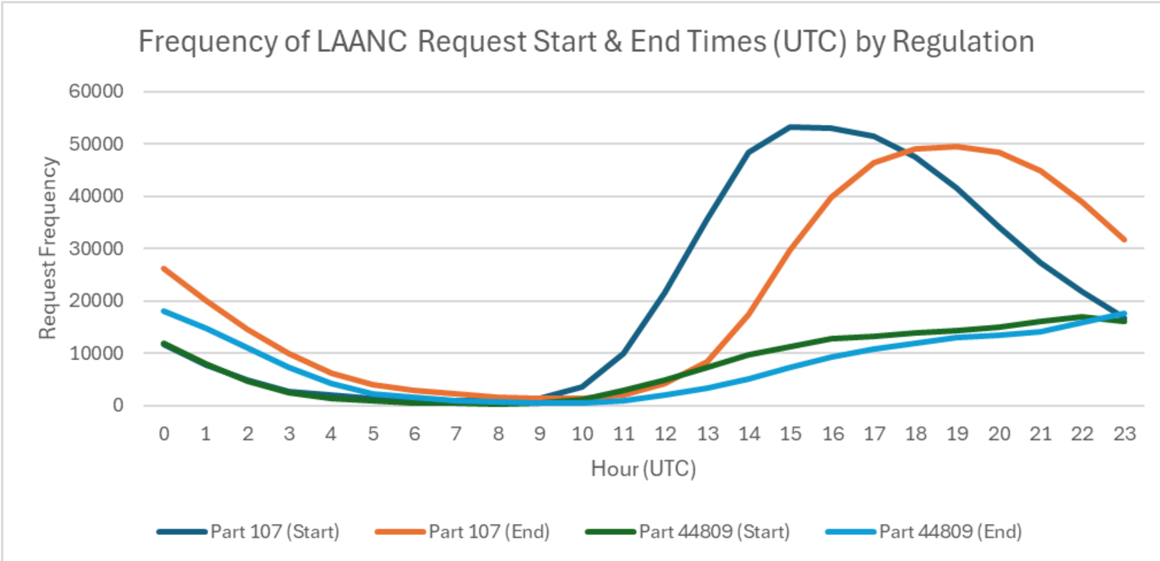


Figure 7. Frequency of LAANC Request Start and End Times (UTC) by Regulation.

The authors further analyzed authorization times to gauge the duration of UAS operations conducted under LAANC. Results are presented in Figure 8. Data shows 74.5% of Part 107 LAANC authorizations requested durations of two hours or less, with an even higher proportion of Part 44809 authorizations (84.9%) requesting authorization durations of two hours or less.

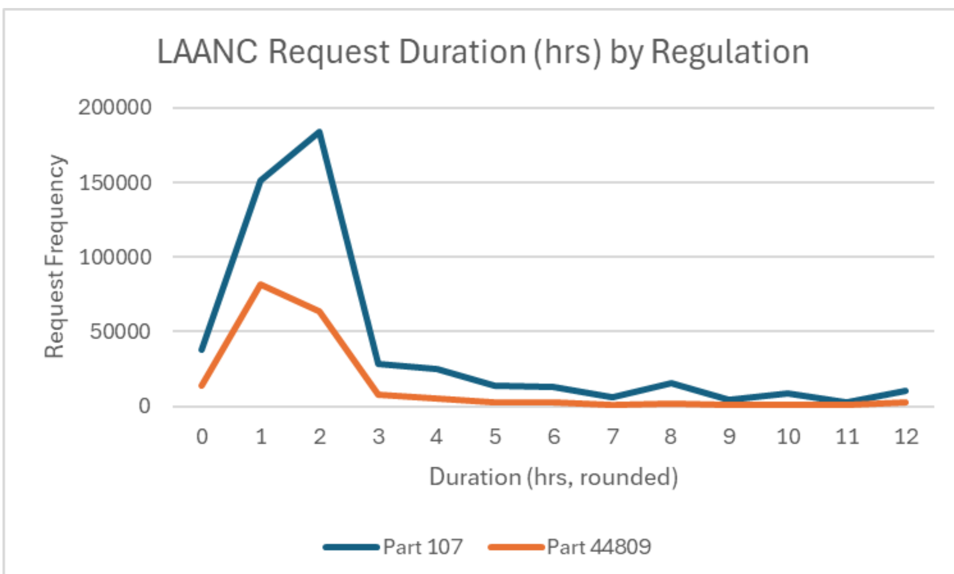


Figure 8. LAANC Request Duration (hrs) by Regulation.

3.1.4 UAS Sighting Reports

UAS sighting reports are collected by the FAA from pilots, citizens, law enforcement, and other stakeholders and codified in quarterly reporting managed by the agency (FAA, 2025c). The authors caution that both the frequency and narrative content of sighting reports should be interpreted with caution, as sighting reports are subject to significant perceptual error. Previous reports by the Academy of Model

Aeronautics, Unmanned Aircraft Safety Team (now Drone Safety Team), noted several inaccuracies and discrepancies in submitted UAS sighting reports. The authors recommend that sighting reports should be interpreted holistically, in context with other data, rather than independently.

During the sampling period, the FAA released three quarters (nine months) of UAS sighting reports, which included 1,557 individual entries. On a year-over-year comparison of the available data, 2025 sightings reports have grown approximately 19.9% over 2024. Historical UAS sighting report data dating back to calendar year 2014, quarter 4—when the FAA first began collecting narrative UAS sightings data—is presented in Figure 9.

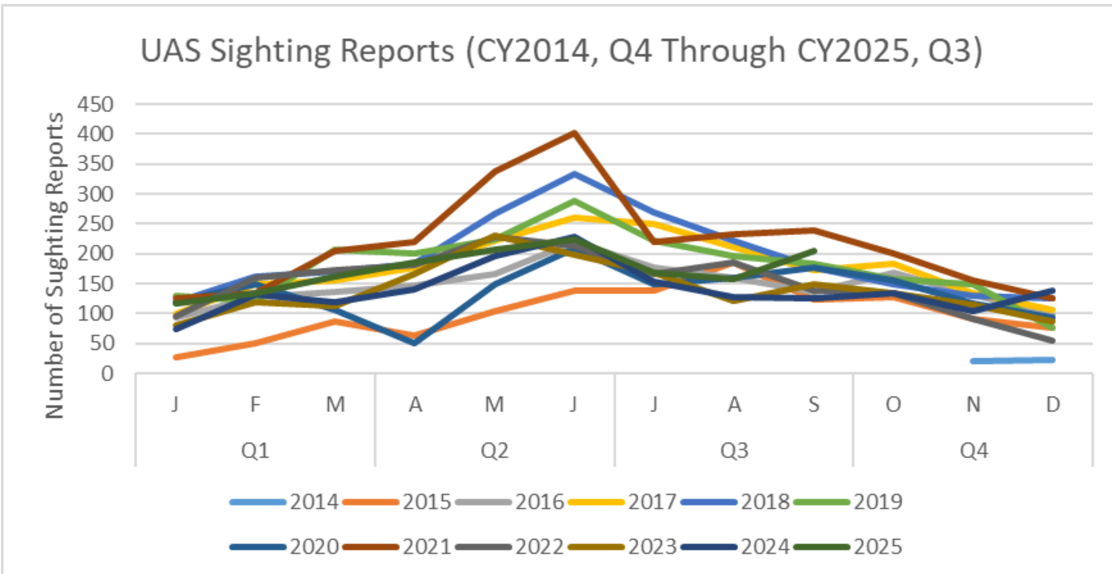


Figure 9. UAS Sighting Reports (CY2014, Q4 Through CY2025, Q3).

A heatmap of 2025 UAS sightings data by state is provided in Figure 10, with detailed year-over-year information furnished in Table 7. States with the highest UAS sighting reports in Q1-Q3 of 2025 include California (183), Florida (172), Illinois (122), Texas (115), New York (94), Georgia (57), and North Carolina (54).

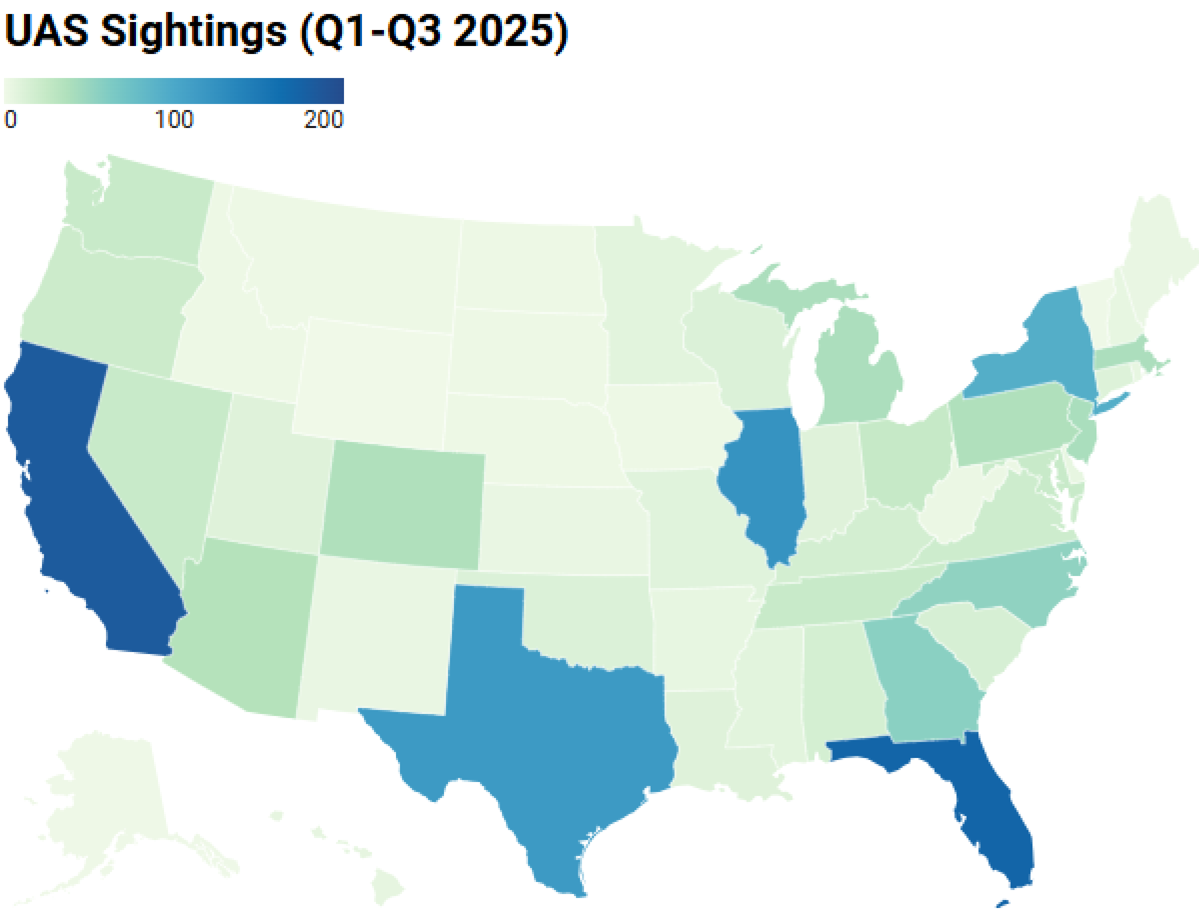


Figure 10. Heatmap of UAS Sightings by State (Q1-Q3, 2025).

Table 7. UAS Sightings Report Data by State (Q1-Q3, 2025).

State	Sightings* (2025)	% (2025)	Prior Year (2024)	% (2024)
Unreported	153	9.9%	28	1.7%
AL	16	1.0%	19	1.1%
AK	1	0.1%	3	0.2%
AZ	34	2.2%	52	3.1%
AR	5	0.3%	5	0.3%
CA	183	11.8%	212	12.7%
CO	37	2.4%	35	2.1%
CT	11	0.7%	13	0.8%
DE	5	0.3%	4	0.2%
DC	24	1.5%	35	2.1%
FL	172	11.1%	199	11.9%
GA	57	3.7%	73	4.4%
HI	6	0.4%	1	0.1%
ID	2	0.1%	3	0.2%
IL	122	7.9%	101	6.1%
IN	10	0.6%	20	1.2%
IA	2	0.1%	7	0.4%
KS	4	0.3%	4	0.2%
KY	17	1.1%	15	0.9%
LA	10	0.6%	5	0.3%
ME	4	0.3%	3	0.2%
MD	23	1.5%	33	2.0%
MA	39	2.5%	39	2.3%
MI	39	2.5%	40	2.4%
MN	8	0.5%	21	1.3%
MS	8	0.5%	12	0.7%
MO	9	0.6%	16	1.0%
MT	2	0.1%	2	0.1%
NE	2	0.1%	3	0.2%
NV	23	1.5%	34	2.0%
NH	5	0.3%	3	0.2%
NJ	40	2.6%	53	3.2%
NM	4	0.3%	4	0.2%
NY	94	6.1%	121	7.3%
NC	54	3.5%	63	3.8%
ND	2	0.1%	1	0.1%
OH	24	1.5%	31	1.9%
OK	12	0.8%	10	0.6%
OR	21	1.4%	15	0.9%
PA	37	2.4%	32	1.9%
PR	2	0.1%	7	0.4%
RI	5	0.3%	6	0.4%
SC	15	1.0%	27	1.6%
SD	2	0.1%	2	0.1%
TN	23	1.5%	34	2.0%
TX	115	7.4%	133	8.0%
UT	10	0.6%	6	0.4%
VT	1	0.1%	0	0.0%
VA	20	1.3%	28	1.7%
WA	23	1.5%	24	1.4%
WV	3	0.2%	7	0.4%
WI	12	0.8%	22	1.3%
WY	0	0.0%	2	0.1%
TOTAL	**1552**		**1668**	

*Indicates sightings data for the full calendar year are not available; data limited to Q1-Q3.

Counties with the highest 2025 UAS sighting metrics are overviewed in Table 8 in descending order. Coloration shows county-level relative changes with green showing reduced sighting levels, yellow indicating sustained sighting levels, and red showing increasing sightings from previous annual metrics. The authors note that final Q4 results for 2025 were unavailable as of the publication of this report.

Table 8. Counties with Highest No. UAS Sightings (Q1-Q3, 2025).

FIPS	STATE	COUNTY	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025*
17031	IL	Cook	0	21	45	51	58	61	48	85	53	46	80	83
Unreported	Blank	Blank	4	62	67	62	38	40	23	24	16	17	20	65
6037	CA	Los Angeles	5	102	149	135	173	104	93	162	112	61	77	57
6073	CA	San Diego	2	49	59	65	60	55	37	55	24	18	22	37
48201	TX	Harris	1	16	40	35	53	57	34	49	63	35	35	37
12011	FL	Broward	2	12	21	36	45	30	20	50	33	42	20	33
4013	AZ	Maricopa	1	31	48	54	64	63	54	97	51	56	41	31
12095	FL	Orange	0	18	28	41	52	41	22	62	52	39	21	26
11001	DC	D.C	1	21	17	38	28	35	27	41	39	25	34	24
32003	NV	Clark	1	7	33	30	42	33	20	42	32	32	33	24
48113	TX	Dallas	0	21	33	36	45	51	52	40	13	14	25	23
6001	CA	Alameda	0	12	13	18	34	17	13	31	12	10	17	22
12086	FL	Miami-Dade	2	21	38	52	57	44	49	65	34	47	41	21
36081	NY	Queens	0	14	21	31	27	24	8	20	27	26	25	21
17043	IL	DuPage	0	4	2	1	6	6	2	14	3	6	10	19
6085	CA	Santa Clara	0	24	23	26	23	22	6	34	18	20	13	15
13121	GA	Fulton	0	15	13	35	35	33	26	28	22	20	15	15
36103	NY	Suffolk	0	15	21	26	20	20	14	25	13	20	15	15
26163	MI	Wayne	0	5	15	11	24	22	13	23	16	10	16	14
37119	NC	Mecklenburg	0	9	22	24	26	19	17	28	16	12	18	14
34003	NJ	Bergen	0	9	7	15	20	6	9	17	12	13	7	13
36061	NY	New York	3	51	50	86	92	56	22	28	29	24	14	13
12099	FL	Palm Beach	2	10	16	18	22	31	15	27	22	24	11	12
12127	FL	Volusia	1	5	14	10	5	4	8	6	9	9	9	12

*Indicates sightings data for the full calendar year are not available; data limited to Q1-Q3.

Historical UAS sighting metrics are provided in Table 9, based on analytics furnished from Scallon and Wallace's (2025) UAS Sightings Report Power BI Tool. These metrics show a general downward trend both in the overall number of UAS sighting reports, as well as the proportion of UAS sightings requiring aircraft pilots to take evasive action for avoidance. The authors note that the number of sightings within 1 mile of an airport remains relatively unchanged. This finding may not necessarily be indicative of problems, as previous sightings report research identified that legal and safe UAS operations were commonly reported. With extensive near-airport operations supported by both the Low Altitude Authorization and Notification Capability, airspace authorizations, and other regulatory approval mediums, more UAS are being operated in the terminal environment. A more granular narrative analysis is necessary to better evaluate potential safety implications. In short, the authors caution that the interpretation of UAS sighting report metrics alone does not paint the full picture of safety implications in the near-airport environment.

Table 9. Historical UAS Sighting Metrics (2014-2025).

Year	No. UAS Sightings	% Requiring Evasive Action	Sightings within 5 mi of an Airport					
			1 mi	2 mi	3 mi	4 mi	5 mi	>5 mi
2025	1552	2.1%	102	117	109	94	112	609
2024	1668	2.7%	102	126	106	95	152	585
2023	1682	1.0%	110	130	116	109	167	538
2022	1820	1.3%	90	95	91	108	111	491
2021	2595	2.4%	91	109	106	109	139	599
2020	1632	5.3%	48	80	73	49	72	313
2019	2152	5.3%	38	71	81	60	93	383
2018	2308	5.7%	22	67	58	62	86	329
2017	2120	5.0%	29	72	57	54	80	300
2016	1760	6.4%	17	59	55	40	57	223
2015	1209	6.0%	8	46	35	36	41	179
2014	43	0.0%	0	1	2	3	2	6
CUMULATIVE	**20.5K**	**3.9%**	**0.7K**	**1.0K**	**0.9K**	**0.8K**	**1.1K**	**4.6K**

Based on the preponderance of the data, the authors believe that recent UAS sightings, in part, are reflective of the substantial growth in the number of UAS platforms being operated within the National Airspace System. The authors estimate that the final number of 2025 sightings will likely be comparable to 2022-2023 values.

3.2 Data Validation and Cleaning

The research team collected Remote Identification data at various locations around the continental US during the period January 1, 2025 – November 30, 2025 (334 days). One vendor contributed more than 7.1M data points, and the second vendor contributed 0.1M data points for a total original dataset of 7,231,522 data points. During the cleaning process, 772,576 (10.7%) data points were removed, based on established validation and data cleaning procedures. Detailed data retention and removal metrics are provided in Table 10.

Table 10. Remote ID Data Retention and Removal Metrics.

	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25	Jul-25	Aug-25	Sep-25	Oct-25	Nov-25
Data points	7747	304282	741699	560866	714577	575096	865966	596857	611406	811889	668561
Removed	24	9347	206504	74101	29963	12564	66931	31502	72501	213470	55669
TOTAL Points	7771	313629	948203	634967	744540	587660	932897	628359	683907	1025359	724230

3.3 RQ1: What can we learn from current drone traffic?

3.3.1 Remote Identification Data Collection Metrics

During the sampling period, the research team detected a cumulative 5,565 unique UAS platforms. These platforms conducted an estimated 19,091 individual flight operations. Detailed metrics are contained in Table 11.

Table 11. Remote ID Platform and Flight Activity Data by Month (2025).

	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25	Jul-25	Aug-25	Sep-25	Oct-25	Nov-25
Platforms	67	318	569	715	798	851	1083	1055	1054	1283	1127
Flights	100	595	1148	1797	1439	1617	2494	2233	2338	2898	2432

Daily flight metrics over the sampling period are provided in Figure 11. The authors note that the generalized increase in the number of flight detections is due, in part, to the deployment of additional Remote ID sensors to the prioritized sampling locations throughout data collection, and the addition of limited temporary event deployment data. Nevertheless, several observations can be made from the data trends. First, there appears to be relatively wide inter-day variability in the number of daily flight operations. Additionally, a disproportionate number of flight operations were observed during selected holidays—most notably during Independence Day (July 4)—the notable spike in the center of the graph. This is reflective of previously reported findings.

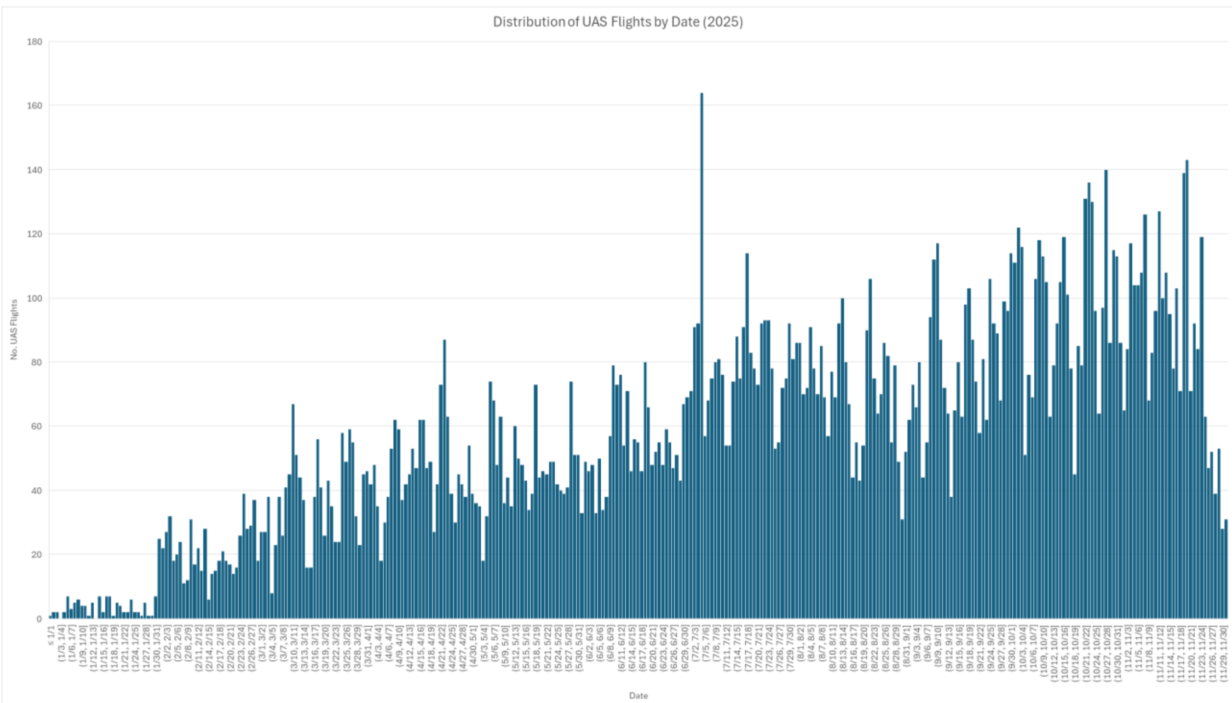


Figure 11. Distribution of UAS Flights by Date (2025).

The research team assessed the number of operations performed on various weekdays (see Figure 12). It is believed that this proportionality *may* provide a clearer indication of the type of operation being performed. The general presumption is that weekday operations would tend to be more indicative of commercial operations, whereas weekend operations would be more reflective of non-commercial/recreational operations. In previous research reporting, daily operations on weekends outnumbered daily operations during most weekdays. During the current sampling, it appears that the trend has shifted, with the preponderance of operations occurring during most weekdays, which suggests commercial/non-recreational operations *may* be overtaking recreational operations. While it is difficult to definitively determine this shift using solely Remote ID data, LAANC authorization data appears to support this assertion, with relatively stable recreational (§44809) activity, and increasing commercial/non-recreational (§107) activity. The authors assert that other metrics, such as LAANC approvals, Part 48 registrations, Part 107 Remote Pilot Certificate issuances, distribution of detected models, and other factors, seem to support this assertion.

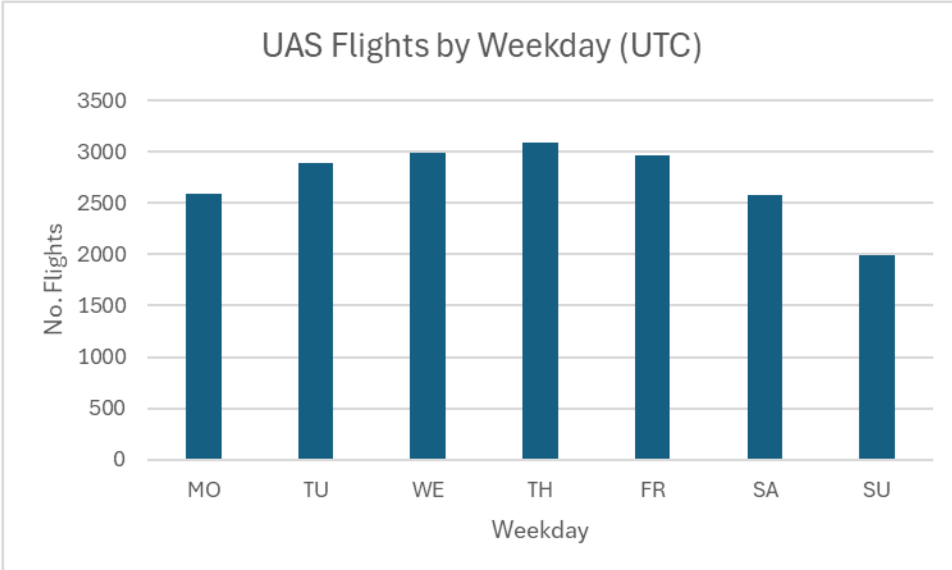


Figure 12. UAS Flights by Weekday.

3.3.2 Flight Locations and Activity Metrics

Since part of the objective of this collection effort was to establish an estimated forecast of UAS traffic, the authors elected to define geographic data capture areas in accordance with the Federal Information Processing System coding system, a US Census Bureau standard for county-level geospatial data. Table 12 overviews the location and number of UAS platforms detected monthly over the course of the sample period. Similarly, Table 13 highlights the location and number of estimated flights conducted each month. The authors note that sensors for various sampling locations were not all deployed at the same time, which may account for differential initial data collection dates. The authors further note that in addition to the primary sampling locations, the Remote Identification Vendors often contributed pro bono data, which explains the addition of short-duration, inconsistent elements of the dataset.

Table 12. UAS Platforms by County.

FIPS	ST	COUNTY	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	SUM
1083	AL	Limestone	0	0	0	0	0	1	0	0	11	20	8	40
1089	AL	Madison	0	1	0	0	4	15	47	45	72	138	109	431
1103	AL	Morgan	0	0	0	0	0	0	0	0	3	4	2	9
4013	AZ	Maricopa	0	0	0	0	0	0	0	0	0	0	25	25
6001	CA	Alameda	0	0	26	45	38	26	33	36	26	35	28	293
6027	CA	Inyo	0	0	0	0	0	0	0	0	0	0	0	0
6029	CA	Kern	0	0	0	0	0	0	0	0	0	0	0	0
6071	CA	San Bernardino	0	0	0	0	1	0	0	0	0	0	0	1
6073	CA	San Diego	63	65	53	52	85	72	42	46	85	82	53	698
6081	CA	San Mateo	0	0	54	77	67	51	66	60	62	61	47	545
6085	CA	Santa Clara	0	0	8	17	15	14	11	17	13	17	17	129
6107	CA	Tulare	0	0	0	0	0	0	0	0	0	0	0	0
10005	DE	Sussex	0	0	0	22	0	0	0	0	0	0	0	22
11001	DC	District of Columbia	0	0	1	0	0	1	3	0	2	0	3	10
12011	FL	Broward	0	0	0	0	0	0	53	56	43	58	49	259
12057	FL	Hillsborough	0	0	0	0	0	0	0	0	0	0	1	1
12095	FL	Orange	0	0	0	0	0	0	0	0	0	0	6	6
12097	FL	Osceola	0	0	0	0	0	0	0	0	0	0	1	1
12105	FL	Polk	0	0	0	4	0	0	0	0	0	0	0	4
17031	IL	Cook	3	6	16	20	28	40	26	33	25	32	25	254
17043	IL	DuPage	0	0	10	13	21	15	15	15	13	13	12	127
18005	IN	Bartholomew	0	2	2	21	16	23	25	30	35	32	26	212
18011	IN	Boone	0	0	0	0	0	0	0	1	0	0	0	1
18015	IN	Carroll	0	0	0	0	0	0	0	0	1	0	0	1
18017	IN	Cass	0	0	3	1	3	5	7	8	6	8	1	42
18021	IN	Clay	0	0	0	0	1	1	1	0	0	0	1	4
18057	IN	Hamilton	0	33	54	64	93	65	120	114	100	103	71	817
18063	IN	Hendricks	0	0	0	0	0	0	0	12	1	1	5	19
18067	IN	Howard	0	2	2	4	3	5	7	7	7	1	1	39
18081	IN	Johnson	0	0	0	0	0	0	0	0	2	0	0	2
18093	IN	Lawrence	0	0	0	0	0	0	0	0	1	0	0	1
18095	IN	Madison	0	0	0	0	0	1	2	0	0	0	0	3
18097	IN	Marion	0	0	45	57	72	91	86	85	62	79	77	654
18103	IN	Miami	0	0	1	6	4	7	6	13	10	5	7	59
18105	IN	Monroe	0	0	0	0	0	0	0	0	0	0	0	0
18129	IN	Posey	0	0	1	0	0	0	0	0	1	0	0	2
18135	IN	Randolph	0	1	4	0	0	0	0	0	0	0	0	5
18145	IN	Shelby	0	0	0	0	0	0	1	0	1	1	3	6
18153	IN	Sullivan	0	0	0	0	2	0	0	0	0	0	0	2
18159	IN	Tipton	0	0	0	0	0	1	5	8	5	5	2	26
18163	IN	Vanderburgh	0	22	32	44	46	47	48	40	46	23	33	381
18167	IN	Vigo	0	5	2	8	21	20	16	0	0	2	23	97
18169	IN	Wabash	0	0	0	0	0	0	0	0	0	0	0	0
18173	IN	Warrick	0	0	1	0	0	2	1	0	1	1	0	6
21093	KY	Hardin	0	0	0	0	0	0	0	0	0	0	0	0
21101	KY	Henderson	0	0	0	1	1	1	1	1	1	1	0	7
21111	KY	Jefferson	0	0	0	0	0	0	1	0	0	0	0	1
22017	LA	Caddo	0	0	0	0	0	0	0	0	0	0	3	3
24047	MD	Worcester	0	0	0	1	0	1	0	2	0	1	1	6
25009	MA	Essex	0	0	0	0	0	0	0	0	0	1	0	1
26161	MI	Washtenaw	0	0	0	0	0	3	0	0	0	0	0	3
31109	NE	Lancaster	0	0	0	0	0	0	0	0	0	21	22	43
33015	NH	Rockingham	0	0	0	0	0	0	0	0	0	1	0	1
34009	NJ	Cape May	0	0	0	30	0	0	0	0	0	0	0	30
34011	NJ	Cumberland	0	0	0	2	0	0	0	0	0	0	0	2
35013	NM	DoÃ±a Ana	0	0	0	0	0	2	0	0	0	0	0	2
37055	NC	Dare	0	0	0	0	0	1	1	0	0	0	0	2
38035	ND	Grand Forks	0	0	0	0	0	0	0	0	0	1	0	1
39005	OH	Ashland	0	0	0	0	0	0	0	0	1	0	2	3
39021	OH	Champaign	0	1	0	0	0	0	0	0	0	1	0	2
39023	OH	Clark	0	28	31	38	36	50	63	58	47	58	36	445
39037	OH	Darke	0	2	4	0	0	0	0	0	0	0	0	6
39047	OH	Fayette	0	0	0	0	0	0	0	0	1	0	0	1
39049	OH	Franklin	0	0	0	0	0	0	1	1	0	0	0	2
39057	OH	Greene	0	9	12	14	11	29	33	30	23	36	20	217
39109	OH	Miami	0	0	0	0	0	0	0	0	0	0	0	0
39125	OH	Paulding	0	0	0	0	0	1	0	0	0	0	0	1
39139	OH	Richland	0	11	41	1	0	0	26	11	67	60	40	257
41025	OR	Harney	0	0	0	0	0	0	0	0	0	0	0	0
41071	OR	Yamhill	0	0	0	0	0	0	0	0	2	0	0	2
42125	PA	Washington	0	0	0	0	0	0	0	0	0	0	1	1
47037	TN	Davidson	0	0	0	0	0	2	0	0	0	0	0	2
47093	TN	Knox	0	0	0	0	0	0	0	0	0	1	0	1
47155	TN	Sevier	0	0	0	0	0	0	0	0	0	3	0	3
48041	TX	Brazos	0	0	0	0	0	0	0	0	0	0	0	0
48141	TX	El Paso	0	0	0	0	0	3	0	0	0	0	0	3
48201	TX	Harris	0	0	0	0	28	43	38	31	16	43	20	219
48465	TX	Val Verde	0	0	2	17	0	0	0	0	0	0	0	19
51001	VA	Accomack	0	1	8	11	12	20	34	18	18	12	17	151
51003	VA	Albemarle	0	0	0	0	0	0	0	0	0	1	0	1
51013	VA	Arlington	0	0	1	1	0	0	0	0	1	3	1	7
51036	VA	Charles City	0	1	2	1	1	3	0	1	1	1	2	13
51041	VA	Chesterfield	0	0	0	0	0	2	0	0	0	0	1	3
51059	VA	Fairfax	0	3	4	8	5	3	4	10	5	6	8	56
51085	VA	Hanover	0	0	1	0	0	0	1	0	0	0	0	2
51087	VA	Henrico	0	2	14	14	12	12	13	14	10	12	10	113
51095	VA	James City	0	0	11	0	0	0	0	0	0	0	0	11
51107	VA	Loudoun	0	14	25	24	29	31	34	30	24	29	19	259
51109	VA	Louisa	0	0	0	0	0	0	0	4	1	3	3	11
51121	VA	Montgomery	0	0	0	0	0	0	0	0	14	32	44	90
51127	VA	New Kent	0	1	1	2	2	5	3	1	0	3	0	18
51137	VA	Orange	0	0	0	0	0	0	1	10	16	12	11	50
51155	VA	Pulaski	0	0	0	0	0	0	0	0	0	0	2	2
51510	VA	Alexandria	0	0	1	0	1	1	2	1	0	6	2	14
51750	VA	Radford	0	0	0	0	0	0	0	0	0	2	0	2
53033	WA	King	0	0	0	0	0	0	9	24	0	0	0	33
55139	WI	Winnebago	0	0	0	0	0	0	2	0	0	0	0	2

Table 13. UAS Flights by County.

FIPS	ST	COUNTY	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	SUM
1083	AL	Limestone	0	0	0	0	0	1	0	0	20	51	28	100
1089	AL	Madison	0	3	0	0	8	37	218	143	186	537	413	1545
1103	AL	Morgan	0	0	0	0	0	0	0	0	3	11	3	17
4013	AZ	Maricopa	0	0	0	0	0	0	0	0	0	0	40	40
6001	CA	Alameda	0	0	38	79	69	47	59	63	48	64	46	513
6027	CA	Inyo	0	0	0	0	0	0	0	0	0	0	0	0
6029	CA	Kern	0	0	0	0	0	0	0	0	0	0	0	0
6071	CA	San Bernardino	0	0	0	0	1	0	0	0	0	0	0	1
6073	CA	San Diego	97	101	87	0	120	116	67	72	169	161	150	1140
6081	CA	San Mateo	0	0	90	151	143	111	141	165	186	163	130	1280
6085	CA	Santa Clara	0	0	23	37	35	26	25	35	41	51	50	323
6107	CA	Tulare	0	0	0	0	0	0	0	0	0	0	0	0
10005	DE	Sussex	0	0	0	47	0	0	0	0	0	0	0	47
11001	DC	District of Columbia	0	0	1	0	0	1	6	0	3	0	19	30
12011	FL	Broward	0	0	0	0	0	0	88	98	70	113	89	458
12057	FL	Hillsborough	0	0	0	0	0	0	0	0	0	0	1	1
12095	FL	Orange	0	0	0	0	0	0	0	0	0	0	8	8
12097	FL	Osceola	0	0	0	0	0	0	0	0	0	0	1	1
12105	FL	Polk	0	0	0	21	0	0	0	0	0	0	0	21
17031	IL	Cook	6	11	35	0	84	70	55	82	65	72	53	533
17043	IL	DuPage	0	0	26	0	66	29	45	30	31	35	24	286
18005	IN	Bartholomew	0	2	4	45	35	58	72	100	83	67	59	525
18011	IN	Boone	0	0	0	0	0	0	0	2	0	0	0	2
18015	IN	Carroll	0	0	0	0	0	0	0	0	3	1	0	4
18017	IN	Cass	0	0	19	5	11	9	11	14	15	22	2	108
18021	IN	Clay	0	0	0	0	2	1	1	0	0	0	4	8
18057	IN	Hamilton	0	84	139	141	189	130	357	363	247	254	141	2045
18063	IN	Hendricks	0	0	0	0	0	0	0	21	2	2	13	38
18067	IN	Howard	0	3	7	8	10	13	13	22	13	2	2	93
18081	IN	Johnson	0	0	0	0	0	0	0	0	2	0	0	2
18093	IN	Lawrence	0	0	0	0	0	0	0	0	1	0	0	1
18095	IN	Madison	0	0	0	0	0	2	3	0	0	0	0	5
18097	IN	Marion	0	0	102	136	133	252	218	193	185	179	118	1516
18103	IN	Miami	0	0	1	15	6	13	73	37	25	8	21	199
18105	IN	Monroe	0	0	0	0	0	0	0	0	0	0	0	0
18129	IN	Posey	0	0	1	0	0	0	0	0	2	0	0	3
18135	IN	Randolph	0	4	8	0	0	0	0	0	0	0	0	12
18145	IN	Shelby	0	0	0	0	0	1	1	0	2	2	5	11
18153	IN	Sullivan	0	0	0	0	4	0	0	0	0	0	0	4
18159	IN	Tipton	0	0	0	0	0	2	10	12	8	12	4	48
18163	IN	Vanderburgh	0	60	128	114	137	172	173	154	174	74	109	1295
18167	IN	Vigo	0	10	4	17	75	53	42	0	0	4	104	309
18169	IN	Wabash	0	0	0	0	0	0	0	0	0	0	0	0
18173	IN	Warrick	0	0	1	0	0	3	4	0	2	1	3	14
21093	KY	Hardin	0	0	0	0	0	0	0	0	0	0	0	0
21101	KY	Henderson	0	0	0	5	2	1	3	1	1	1	0	14
21111	KY	Jefferson	0	0	0	0	0	0	2	0	0	0	0	2
22017	LA	Caddo	0	0	0	0	0	0	0	0	0	0	3	3
24047	MD	Worcester	0	0	0	1	0	2	3	5	1	1	1	14
25009	MA	Essex	0	0	0	0	0	0	0	0	0	2	0	2
26161	MI	Washtenaw	0	0	0	0	0	3	0	0	0	0	0	3
31109	NE	Lancaster	0	0	0	0	0	0	0	0	0	60	46	106
33015	NH	Rockingham	0	0	0	0	0	0	0	0	0	1	0	1
34009	NJ	Cape May	0	0	0	472	0	0	0	0	0	0	0	472
34011	NJ	Cumberland	0	0	0	4	0	0	0	0	0	0	0	4
35013	NM	DoÃ±a Ana	0	0	0	0	0	4	0	0	0	0	0	4
37055	NC	Dare	0	0	0	0	0	2	1	0	0	0	0	3
38035	ND	Grand Forks	0	0	0	0	0	0	0	0	0	1	0	1
39005	OH	Ashland	0	0	0	0	0	0	0	0	2	1	3	6
39021	OH	Champaign	0	1	0	0	0	0	0	0	0	2	0	3
39023	OH	Clark	0	49	79	68	73	118	236	175	131	178	120	1227
39037	OH	Darke	0	4	8	0	0	0	0	0	0	0	0	12
39047	OH	Fayette	0	0	0	0	0	0	0	0	1	0	0	1
39049	OH	Franklin	0	0	0	0	0	0	1	1	0	0	0	2
39057	OH	Greene	0	19	36	28	37	76	79	65	62	85	63	550
39109	OH	Miami	0	0	0	0	0	0	0	0	0	0	0	0
39125	OH	Paulding	0	0	0	0	0	1	0	0	0	0	0	1
39139	OH	Richland	0	27	119	2	0	0	113	27	251	262	146	947
41025	OR	Harney	0	0	0	0	0	0	0	0	0	0	0	0
41071	OR	Yamhill	0	0	0	0	0	0	0	0	5	0	0	5
42125	PA	Washington	0	0	0	0	0	0	0	0	0	0	1	1
47037	TN	Davidson	0	0	0	0	0	2	0	0	0	0	0	2
47093	TN	Knox	0	0	0	0	0	0	0	0	0	2	0	2
47155	TN	Sevier	0	0	0	0	0	0	0	0	0	6	0	6
48041	TX	Brazos	0	0	0	0	0	0	0	0	0	0	1	1
48141	TX	El Paso	0	0	0	0	0	6	0	0	0	0	0	6
48201	TX	Harris	0	0	0	0	46	82	74	60	57	116	49	484
48465	TX	Val Verde	0	0	3	75	0	0	0	0	0	0	0	78
51001	VA	Accomack	0	2	17	26	43	51	96	35	45	25	40	380
51003	VA	Albemarle	0	0	0	0	0	0	0	0	0	2	0	2
51013	VA	Arlington	0	0	1	1	0	0	0	0	1	5	1	9
51036	VA	Charles City	0	1	2	2	1	5	0	1	2	1	3	18
51041	VA	Chesterfield	0	0	0	0	0	3	0	0	0	0	1	4
51059	VA	Fairfax	0	13	24	15	8	10	18	20	10	15	18	151
51085	VA	Hanover	0	0	2	0	0	0	3	0	0	0	0	5
51087	VA	Henrico	0	23	42	47	46	39	47	41	37	38	52	412
51095	VA	James City	0	0	31	0	0	0	0	0	0	0	0	31
51107	VA	Loudoun	0	37	52	54	72	66	108	86	81	89	56	701
51109	VA	Louisa	0	0	0	0	0	0	0	6	1	5	24	36
51121	VA	Montgomery	0	0	0	0	0	0	0	0	26	77	136	239
51127	VA	New Kent	0	2	2	3	5	6	4	2	0	5	0	29
51137	VA	Orange	0	0	0	0	0	0	3	33	41	22	29	128
51155	VA	Pulaski	0	0	0	0	0	0	0	0	0	0	5	5
51510	VA	Alexandria	0	0	2	0	2	2	2	1	0	18	4	31
51750	VA	Radford	0	0	0	0	0	0	0	0	0	4	0	4
53033	WA	King	0	0	0	0	0	0	19	73	0	0	0	92
55139	WI	Winnebago	0	0	0	0	0	0	2	0	0	0	0	2

The authors analyzed Remote ID serial number activity over the sample period. Initial detections of new serial numbers were recorded as *new platforms,* with subsequent detections recorded as *repeat platforms.* The results of the analysis are presented in Table 14. The authors acknowledge that new platform detections are likely to skew higher until a baseline is established; therefore, repeat patterns are more valid towards the end of the sampling period.

Table 14. Repeated Platform Activity.

	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25	Jul-25	Aug-25	Sep-25	Oct-25	Nov-25
New Platform	67	303	462	532	538	531	687	596	574	734	553
Repeat Platform	0	15	107	183	260	320	396	459	480	549	574

3.3.3 Make and Model Information

Using the FAA's (n.d.a) Declaration of Compliance dataset, the authors identified the make and model of each detected UAS platform in use. Distribution of detected UAS manufacturers is presented in Table 15. Use of Dà-Jiāng Innovations (DJI)-manufactured platforms remains dominant, with the company comprising more than 96% of detected platforms. Skydio made up slightly more than 1% of platforms. Remaining manufacturers accounted for less than 2.4% of platforms.

Table 15. Distribution of Detected UAS Manufacturers.

Make	Frequency	Proportion
ACSL	1	0.0%
Aeroo	1	0.0%
Anzu Robotics	11	0.2%
Autel Robotics	6	0.1%
BlueMark	10	0.2%
BRINC	1	0.0%
DJI	4493	96.4%
Dronetag	8	0.2%
EXO	1	0.0%
Fotokite	7	0.2%
Freefly Systems	0	0.0%
Holy Stone	1	0.0%
Inspired Flight	2	0.0%
Lucid Bots	2	0.0%
PARROT	3	0.1%
Pierce Aerospace	4	0.1%
Potensic	1	0.0%
Quantum-Systems	1	0.0%
Ruko	1	0.0%
Skydio	57	1.2%
SPECTA	5	0.1%
Talos Drones	2	0.0%
uAvionix	2	0.0%
Veeniix	0	0.0%
Wing Aviation LLC	33	0.7%
Wingtra	4	0.1%
ZERO ZERO ROBOTICS	5	0.1%

Identifying information for make and model was available for 83.8% (*n*=4,662) of detected platforms. Details are furnished in Figure 13 and Table 16. Figure 14 shows the distribution of the top 22 most commonly detected UAS platforms by weight class, measured in pounds. As identified in previous studies, detected models favored small, less than 0.55 lb platforms, including the Mini 4 Pro (19%), Air 3 (13%), Air 2 S (7%), and Air 3 S (7%). The Mavic 3 Pro, an approximately 2.1 lb platform, continues to show strength, making up about 8% of detected platforms. Larger platforms, such as the Matrice 30T—an 8 lb platform—show marked growth from prior studies, although they still make up only a small proportion of overall platforms. Similarly, the data showed several large, specialized platforms such as the Matrice 400, Agras T50 and T25, and FlyCart 30; however, these platforms only comprised a small proportion of overall detections. The Mavic 3 shows waning usage—approximately half the activity since the previous reporting. More than 93.7% of the top 22 most commonly detected platforms were 3 lbs or less.

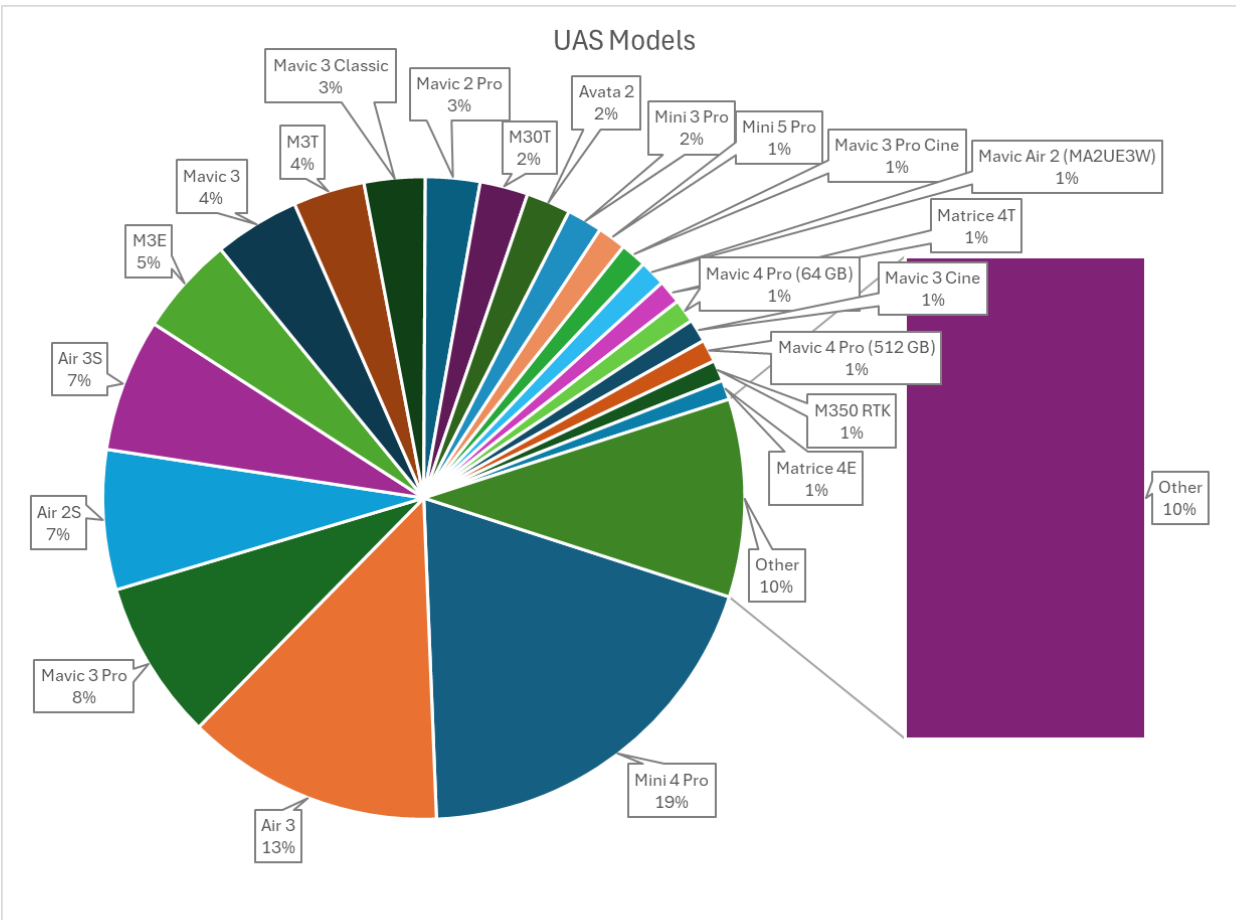
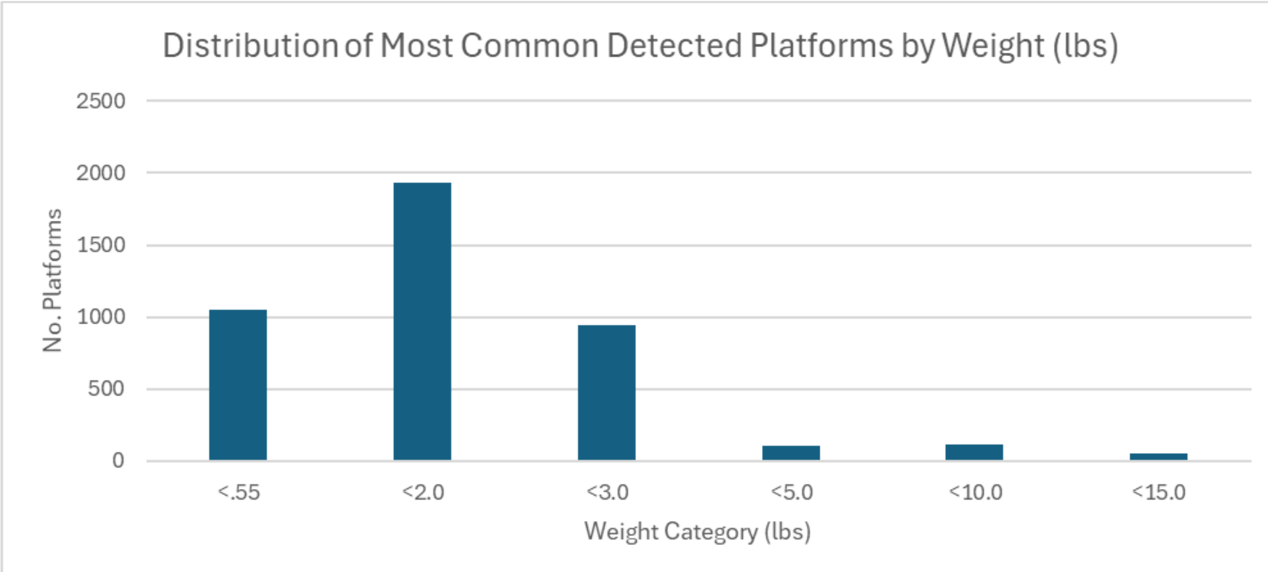


Figure 13. UAS Models.

Table 16. Distribution of Detected UAS Models.

Model	Frequency	Proportion
2 SDRC2V1	4	0.1%
2+ SDR35V1	9	0.2%
Aeroo Pro	1	0.0%
Agras T10	2	0.0%
Agras T20P	18	0.4%
Agras T50 & T25	11	0.2%
AIR	5	0.1%
Air 2S	328	7.0%
Air 3	606	13.0%
Air 3S	312	6.7%
ANAFI Ai	1	0.0%
ANAFI USA	2	0.0%
Astro	0	0.0%
ATOM 2	1	0.0%
AVATA	20	0.4%
Avata 2	104	2.2%
B1	4	0.1%
Beacon	2	0.0%
Blackhawk 3 PRO	1	0.0%
BS	4	0.1%
db120	8	0.2%
db121	1	0.0%
db121pcb	1	0.0%
DRI	1	0.0%
EVO II	2	0.0%
EVO II V3	3	0.1%
EVO Nano	1	0.0%
FlyCart 30	1	0.0%
FPV	37	0.8%
HSRID01	1	0.0%
Hummingbird	29	0.6%
Hummingbird v2	4	0.1%
IF1200A	2	0.0%
Inspire 3	10	0.2%
M300 RTK	38	0.8%
M30T	113	2.4%
M30T Dock version	3	0.1%
M350 RTK	49	1.1%
M3E	232	5.0%
M3M	24	0.5%
M3T	168	3.6%
M3TD	4	0.1%
Matrice 400	2	0.0%
Matrice 4E	46	1.0%
Matrice 4T	56	1.2%
Matrice 4TD	4	0.1%
Mavic 2 Enterprise Advanced	17	0.4%
Mavic 2 Pro	128	2.7%
Mavic 2 Zoom	35	0.8%
Mavic 3	201	4.3%
Mavic 3 Cine	54	1.2%
Mavic 3 Classic	143	3.1%
Mavic 3 Pro	374	8.0%
Mavic 3 Pro Cine	61	1.3%
Mavic 4 Pro (512 GB)	53	1.1%
Mavic 4 Pro (64 GB)	55	1.2%
Mavic Air 2 (MA2UE1N)	3	0.1%
Mavic Air 2 (MA2UE3W)	61	1.3%
Mini	1	0.0%
Mini 3	35	0.8%
Mini 3 Pro	83	1.8%
Mini 4 Pro	904	19.4%
Mini 5 Pro	67	1.4%
Phantom 4 Pro V2.0	19	0.4%
Phantom 4 RTK	12	0.3%
pingRID	2	0.0%
R111	1	0.0%
Raptor	8	0.2%
Raptor T	3	0.1%
RESPONDER	1	0.0%
Sherpa	2	0.0%
Sigma	7	0.2%
SOTEN	1	0.0%
Talos T60x	2	0.0%
Trinity R14	1	0.0%
V113	0	0.0%
WingtraOne Gen II	3	0.1%
WingtraRAY	1	0.0%
X10E SR47P	42	0.9%
X2E SDR21V2	2	0.0%
ZZ-H-1-003	3	0.1%
ZZ-H-1-004	2	0.0%



Note: n = 4,198; includes top 90% of detected platforms (all platforms listed in Figure 13, except the "Other" category).

Figure 14. Distribution of Most Commonly Detected Platforms by Weight (lbs).

Monthly platform use by make was dominated almost exclusively by DJI platforms, as seen in Figure 15.

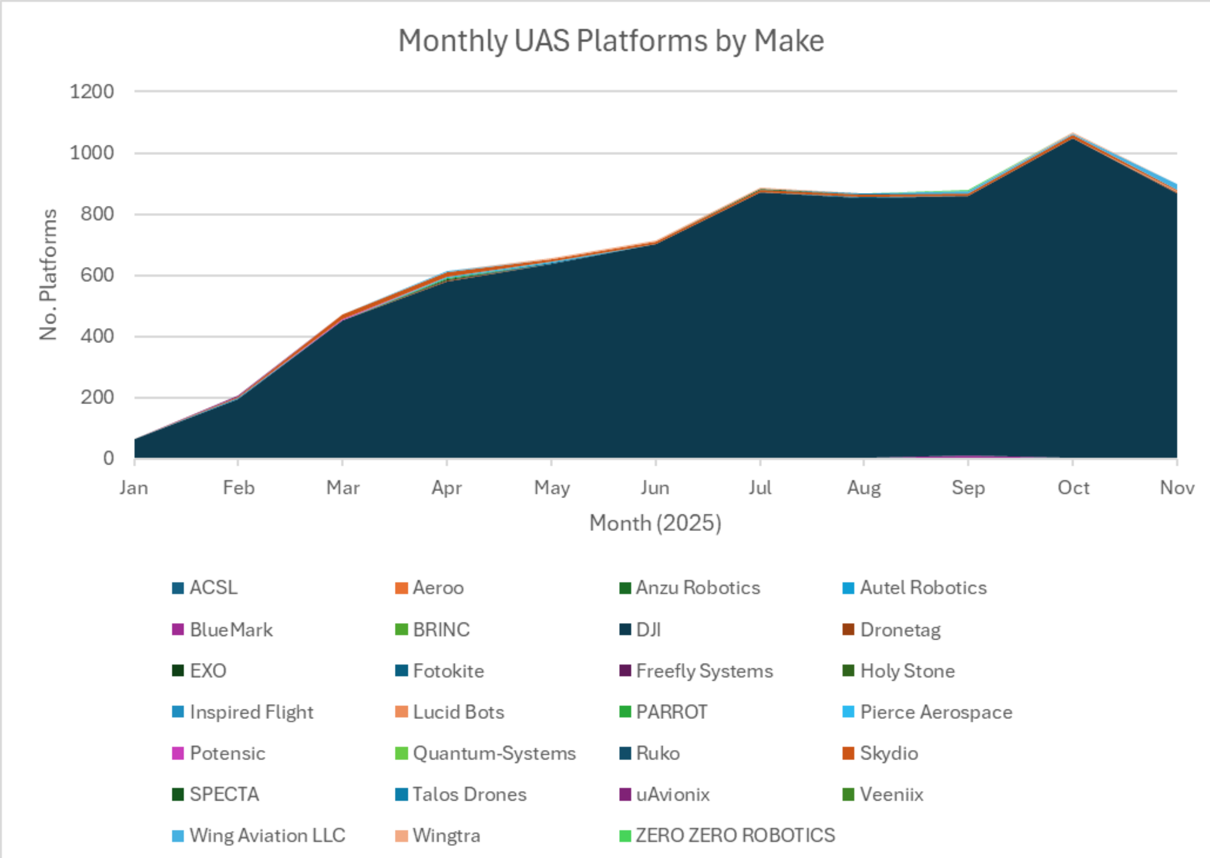


Figure 15. Monthly UAS Platforms by Make.

The proportional distribution of monthly platform detections remained relatively stable throughout the sampling period (see Figure 16). A small number of new platforms showed initial growth in monthly detections, including larger utility platforms like the Matrice 4E, Matrice 4T, and Matrice 4 TD. The Mini 5 Pro is also starting to show strong initial growth in the first several months following its release.

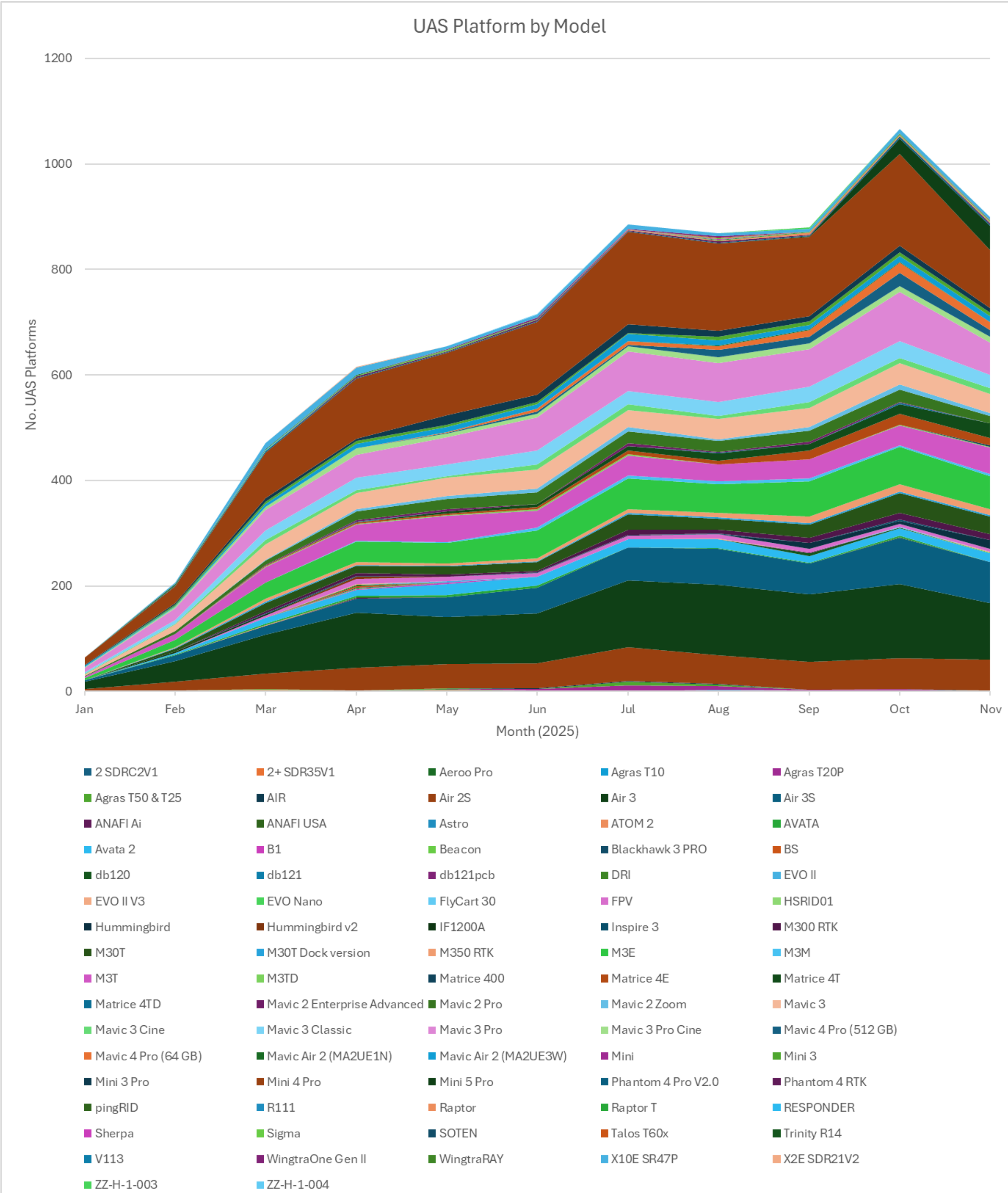


Figure 16. Monthly UAS Platforms by Model.

An evaluation of monthly flight activity by manufacturer revealed similar results to platform detections, with one notable exception. A sizable number of flights (n=378) were carried out in the April timeframe using Autel Robotics platforms (see Figure 17). As this activity was only noted during a single month during the sampling period, the research team assesses it to represent a specialized activity in support of a particular mission set, and is not likely representative of overall, normal operations.

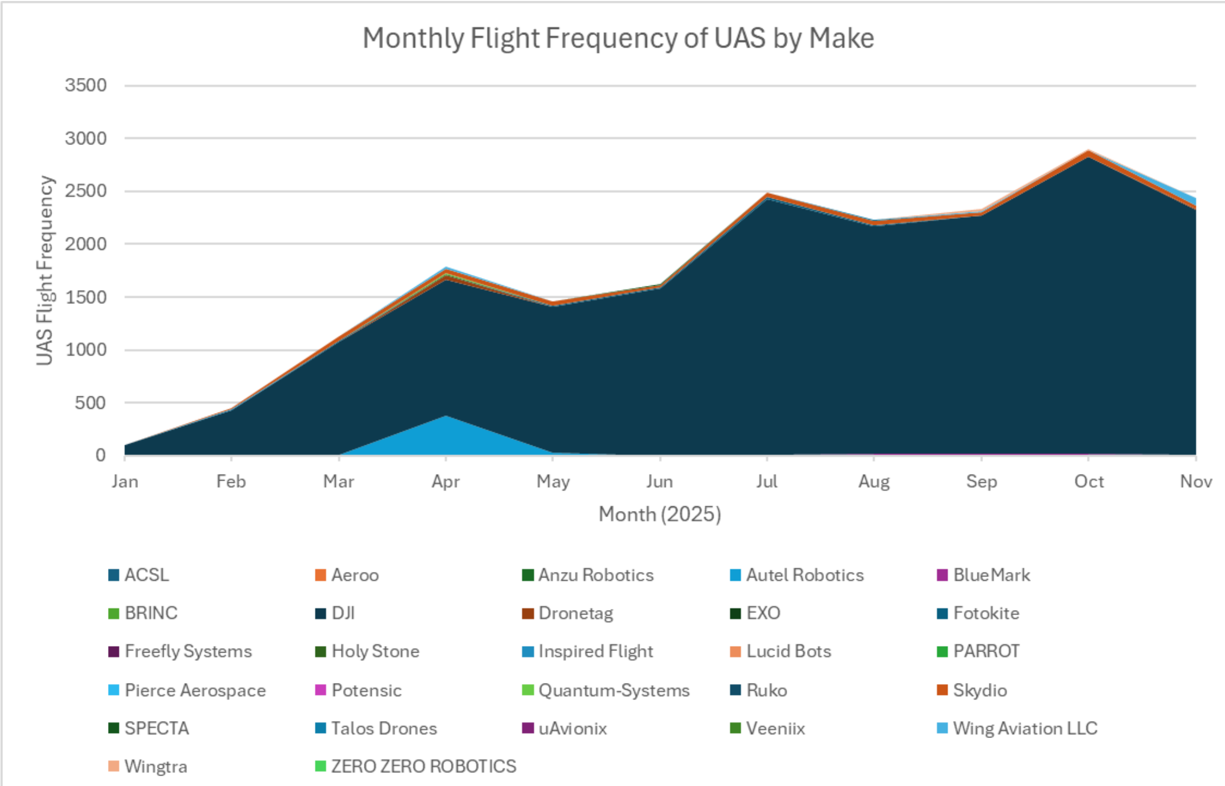


Figure 17. Monthly Flight Frequency of UAS by Make.

A monthly analysis of flights by model revealed elevated levels of activity for the Autel EVO Nano in the April timeframe, as previously described (see Figure 18). Sizable activity growth was also noted for the M350-RTK from July to November, suggesting specialized surveying operations. A small level of Agras activity was noted in August. The authors are interested in further analyzing this activity to better understand the specific purpose of its use, the particular crops supported, and how it aligns with the growing season. The remainder of the monthly flight activity distribution remained largely stable.

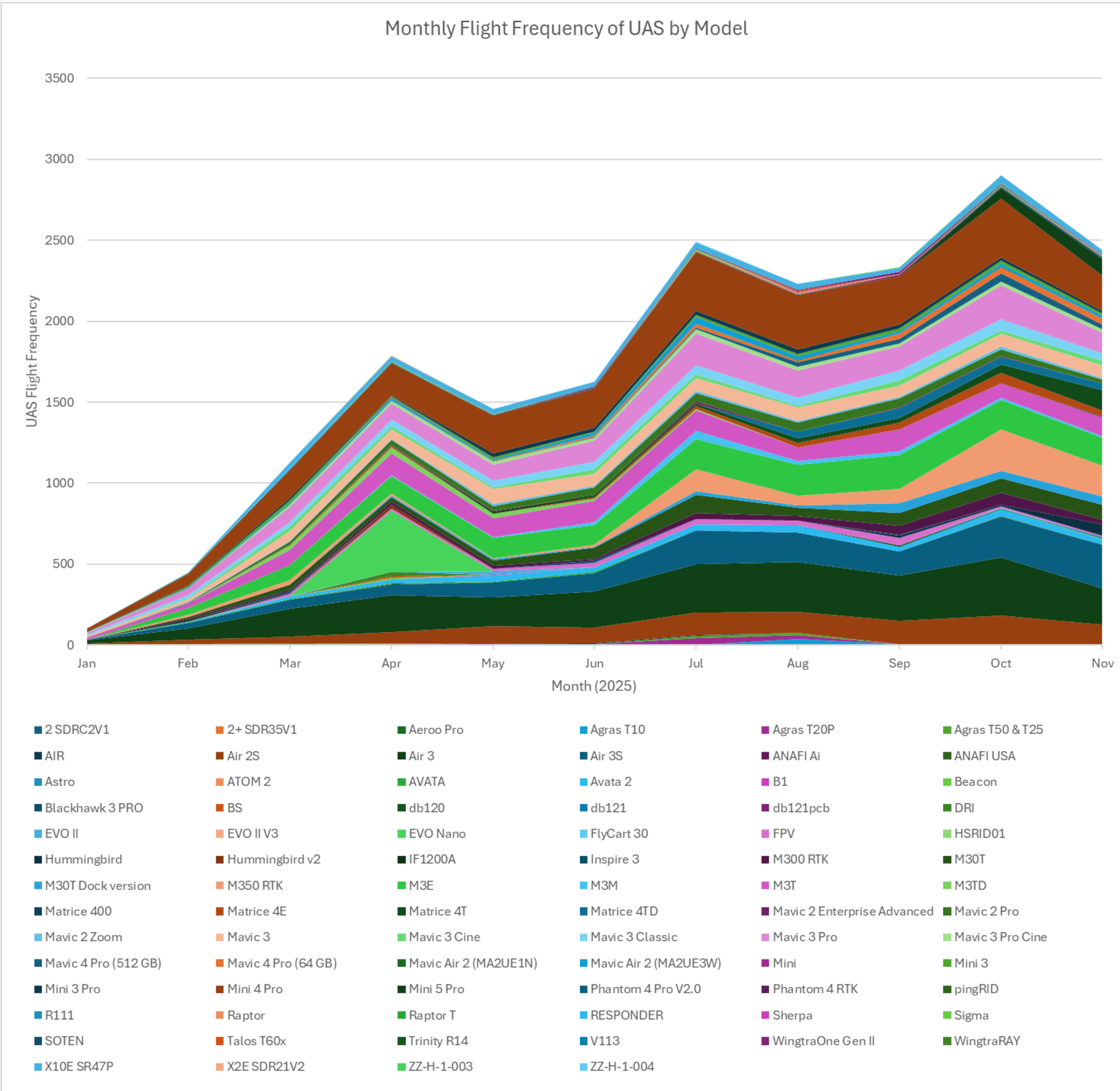


Figure 18. Monthly Flight Frequency of UAS by Model.

3.3.4 *Altitude Utilization*

The research team conducted an analysis of the instantaneous altitude utilization of detected flights to better understand altitude utilization and possible risk exposure to traditional aviation operations. Results are presented in Figure 19. Based on more than 6.3M datapoints, the research team determined that 92.4% of UAS operations were conducted below 400 ft AGL. Approximately 2.4% of flight operations were carried out between 400 and 500 feet AGL; 4.1% of UAS flight operations were conducted between 500-1,000 feet AGL; and 1.2% of flight operations were flown between 1,000-2,000 feet AGL. No UAS operations were detected above 2,000 feet AGL. The authors were unable to compare detected altitudes relative to issued waivers or airspace authorizations.

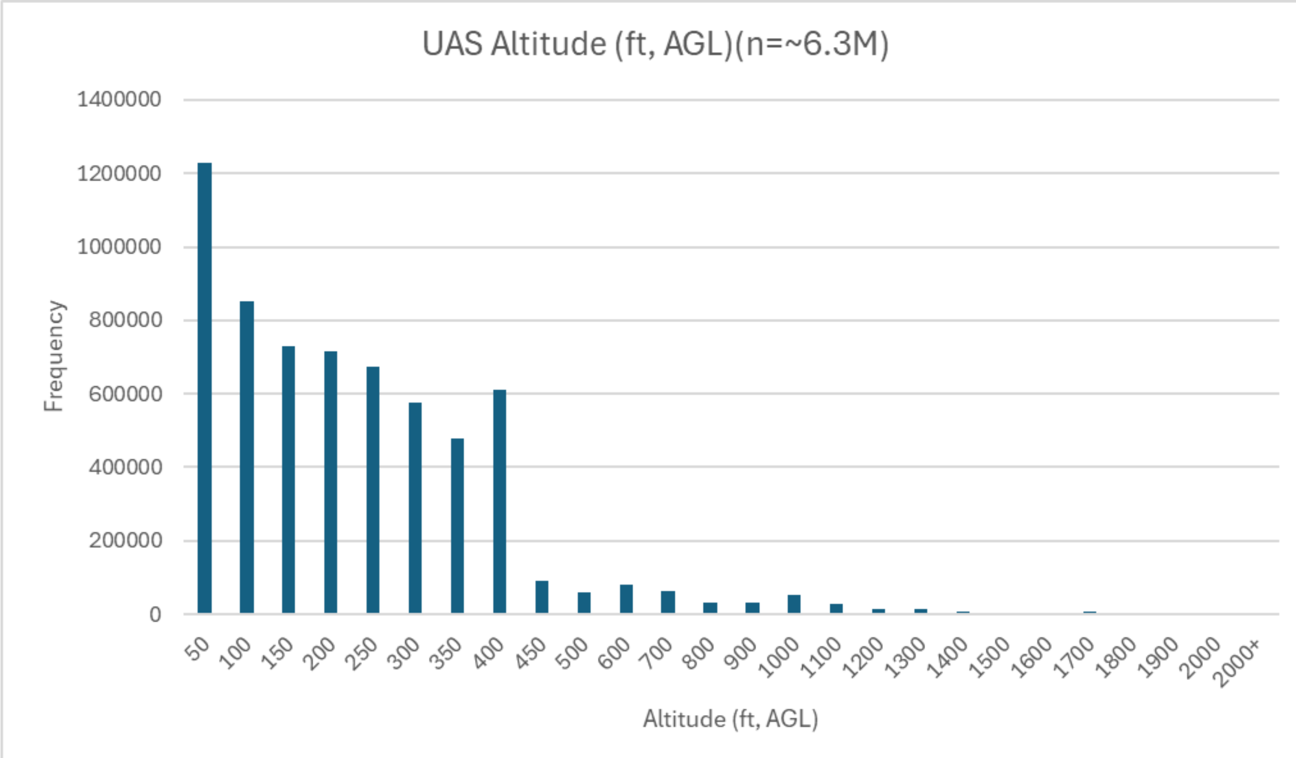


Figure 19. UAS Altitude (ft, AGL).

3.3.5 Flight Speed

Similar to the analysis of altitude utilization, the authors assessed instantaneous UAS speed distributions, based on a sample of more than 6.3M data points. Findings are presented in Figure 20. The analysis revealed that nearly half (49.3%) the telemetry of UAS flights were static. At least 26.9% of the dataset showed UAS operations at relatively slow speeds between 1 and 15 miles per hour. Approximately 16.1% of the data showed operational speeds between 16 and 30 mph. Only 7.8% of UAS flights were conducted at speeds above 30 mph, with only 0.1% flown at high speeds exceeding 50 mph.

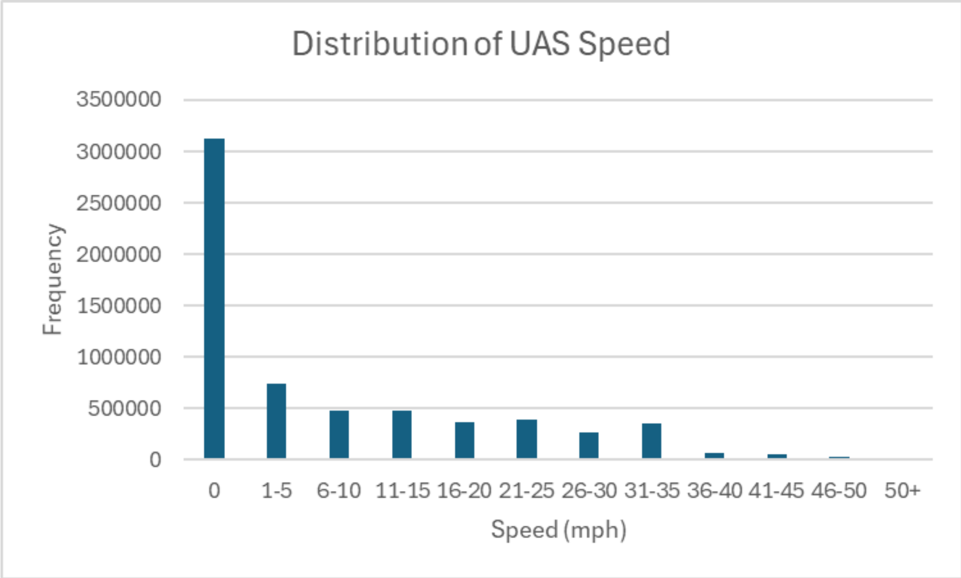


Figure 20. Distribution of Speed (mph).

3.3.6 Flight Duration

The research team analyzed a sample of nearly 7,000 flights to evaluate the distribution of flight durations of UAS activities. Results are presented in Figure 21. Nearly 63.6% of flights lasted less than 1 hour. Just over 18.1% of flight operations lasted more than 1 but less than 2 hours in duration. About 8% of operations lasted more than 2 but less than 3 hours in duration. Only 10.4% of flight operations exceeded 3 hours in duration. None of the operations in the sample exceeded 6 hours in duration. The authors acknowledge that this finding is directly affected by how the authors defined, delineated, and tabulated singular flight operations.

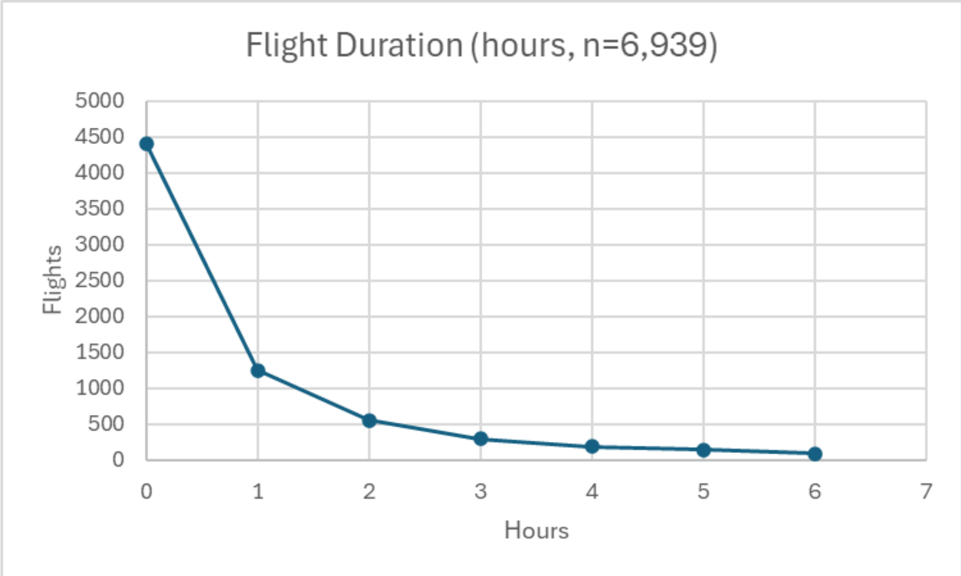


Figure 21. Flight Duration (hours).

3.3.7 Operator Distance from Aerial Vehicle

The authors analyzed instantaneous operator distances from the aerial vehicle throughout the course of each flight operation, with results presented in Figure 22. Nearly 58.2% of collected telemetry data indicated operator flight distances of less than 0.1 NM. At least 17.4% of flight data showed flight distances of more than 0.1 but less than 0.2 NM. Overall, more than 92.6% of flight operations occurred at distances of less than half a nautical mile.

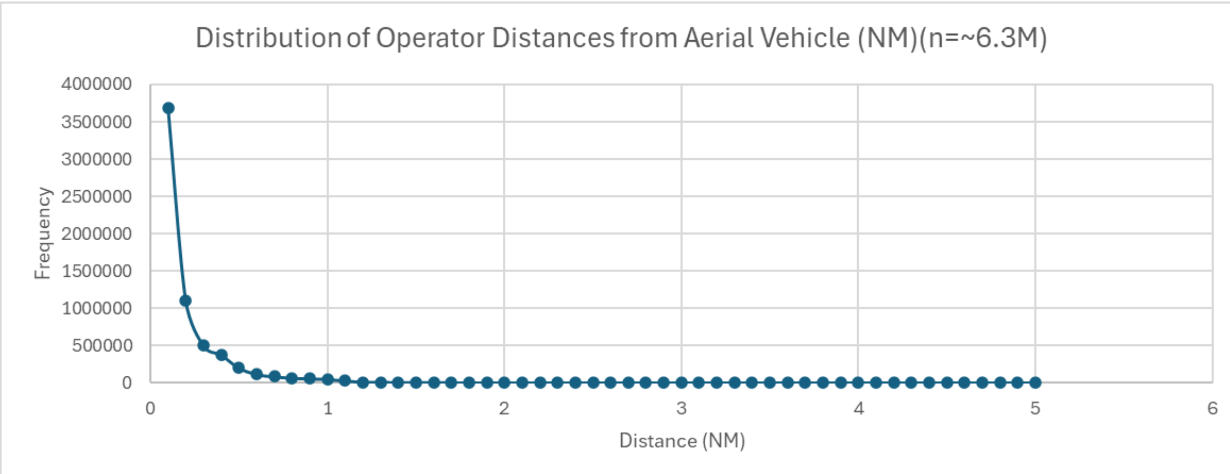


Figure 22. Distribution of Operator Distances from Aerial Vehicle (NM).

The authors further analyzed the relationship between lateral flight distance from the operator and flight altitude. Results are presented in Figure 23 and Table 17. Findings revealed 56.7% of all telemetry data was within 0.1 NM distance at altitudes less than 400 feet AGL. A further 15.9% of telemetry data was collected at distances between 0.1 and 0.2 NM at altitudes up to 400 feet AGL. Yet another 19.3% of the data was contained at distances from 0.2 to 2.0 NM at altitudes up to 400 feet AGL. Less than 6.5% of the data represented flights above 400 feet AGL, but less than 1,000 feet AGL. Only 1.2% of the dataset was conducted at altitudes above 1,000 feet AGL, with the majority of telemetry occurring within 2.0 NM of the operator.

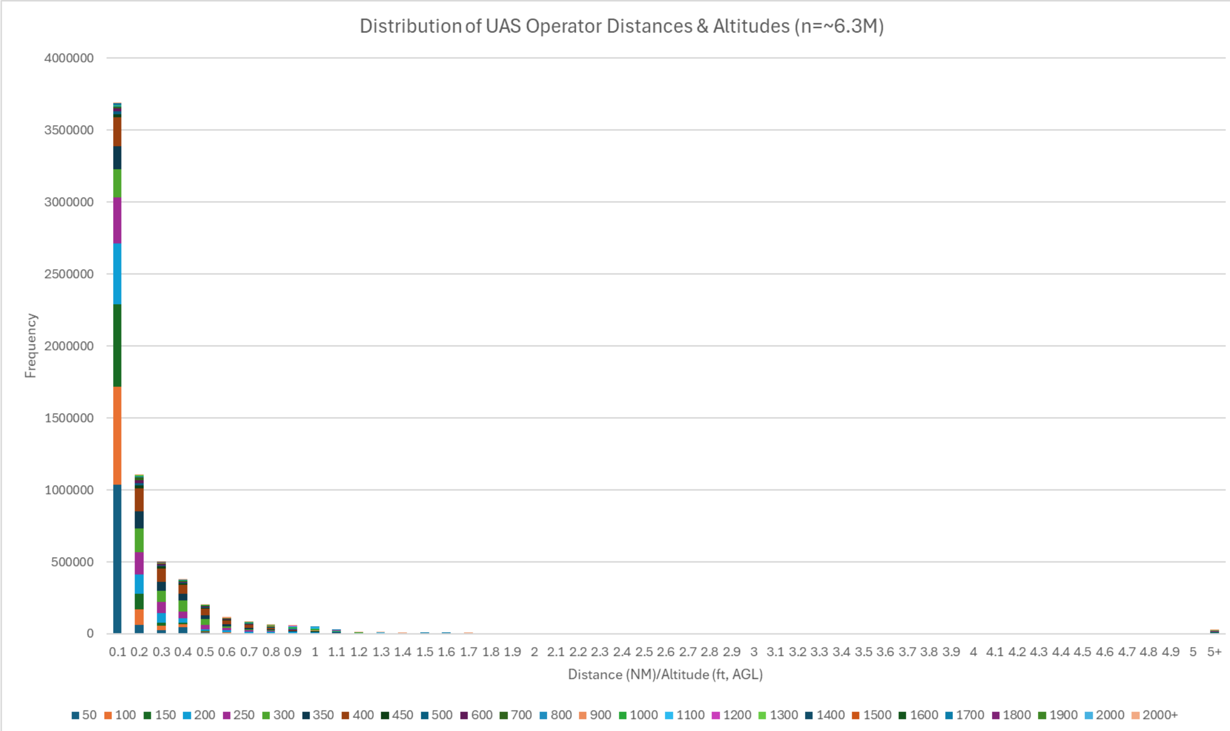


Figure 23. Distribution of UAS Operator Distances and Altitudes.

Table 17. Proportion of Lateral and Vertical Flight Distances.

	50	100	150	200	250	300	350	400	450	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2000+
0.1	16.4%	10.7%	9.0%	6.7%	5.1%	3.1%	2.5%	3.2%	0.4%	0.3%	0.3%	0.2%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
0.2	1.0%	1.7%	1.7%	2.1%	2.5%	2.6%	1.9%	2.5%	0.3%	0.3%	0.3%	0.4%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
0.3	0.4%	0.4%	0.4%	1.0%	1.3%	1.2%	1.0%	1.4%	0.3%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
0.4	0.8%	0.3%	0.2%	0.4%	0.8%	1.2%	0.7%	1.0%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
0.5	0.1%	0.1%	0.1%	0.2%	0.5%	0.6%	0.4%	0.7%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
0.6	0.1%	0.1%	0.0%	0.2%	0.2%	0.2%	0.3%	0.4%	0.1%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
0.7	0.1%	0.0%	0.0%	0.1%	0.1%	0.1%	0.2%	0.3%	0.0%	0.0%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
0.8	0.1%	0.0%	0.0%	0.2%	0.1%	0.1%	0.1%	0.2%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
0.9	0.1%	0.0%	0.0%	0.1%	0.0%	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1.1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1.2	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1.3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1.4	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1.5	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1.6	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1.7	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1.8	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1.9	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

3.3.8 Platform Flight Ratio, Flight Intervals, and Time Variability

The authors evaluated the monthly average number of flights conducted per platform to aid in forecasting estimates. Results are presented in Figure 24. Flight frequency varied between a low of 1.56 flights/platform to a high of 2.81 flights/platform. The relatively low sample size collected in January leads the research team to discount the reliability of the lower extent of the metric. Although the authors anticipated a seasonal effect with increased per-platform operations ratios in the summer months, that condition was not observed in the data. Based on the collected data, the authors estimate a mean, weighted flight ratio of 2.14 (*Mdn* = 2.11, *SD* = .28) flights/platform monthly. In future reports, the authors plan to assess flight ratio by other contributing factors, such as seasonality, platform/model type, location, and other potential influencers.

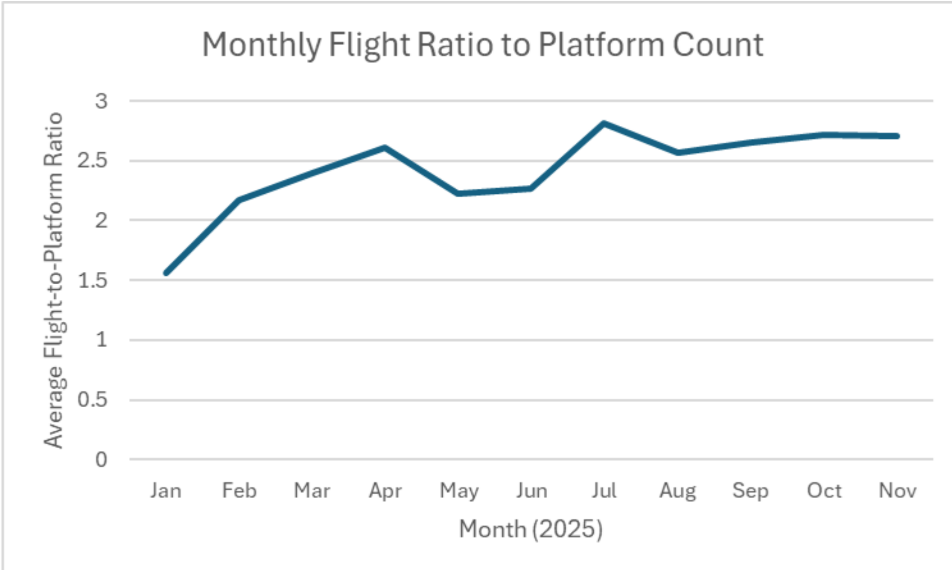


Figure 24. Monthly Flight to Platform Ratio.

To better understand recurrent flight patterns, the research team evaluated flight interval patterns for Remote ID serial numbers that conducted more than one flight. This analysis included two components: 1) a date interval calculation, and 2) a start time differential. The objective of this analysis was to identify possible predictable flight recurrence intervals and determine the consistency of flight timings of multiple flights by the same serial number. Results of the date interval distribution are presented in Figure 25. Findings of the start time differential are presented in Figure 26.

The date interval sample included 13,540 flights. At least 6,003 flights (44.3%) had a subsequent flight interval of less than 24 hours. More than 7.2% of flights had a subsequent flight within one day. More than 26.8% of flights had a subsequent flight between 1 and 7 days. Approximately 28.9% of flights had a subsequent flight interval exceeding 7 days.

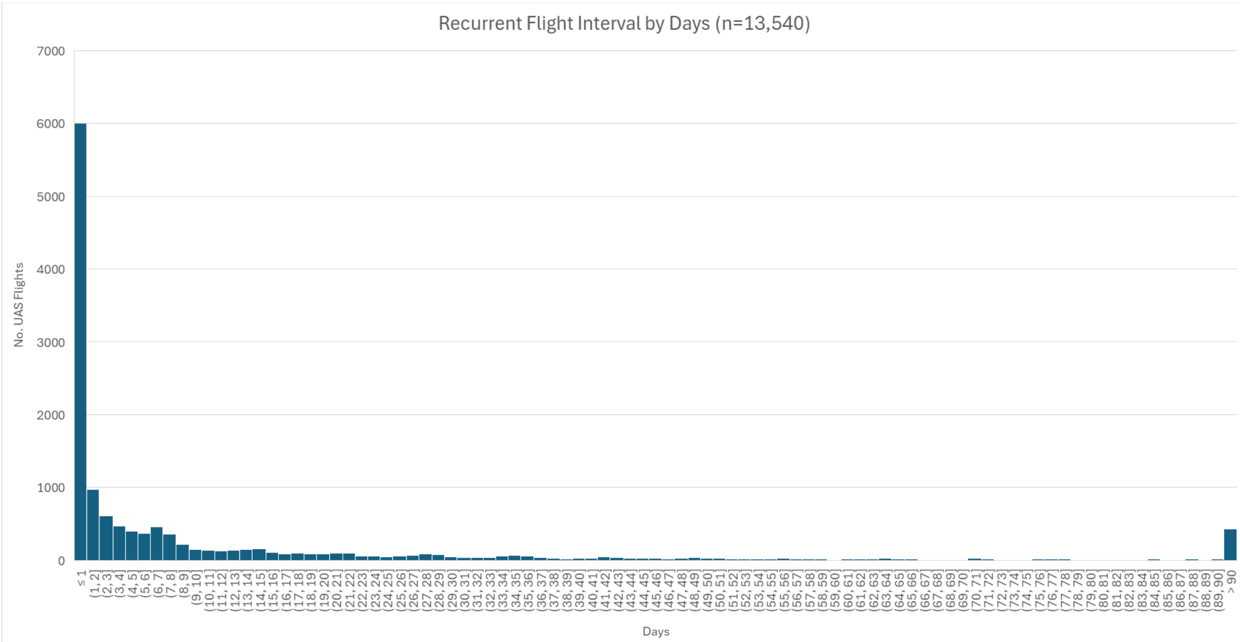


Figure 25. Recurrent Flight Interval by Days.

The timing interval used the same sample as the date interval. Nearly 30.6% of subsequent flights started within one hour of the initial flight time; 21.4% within 2 hours; 12.3% within 3 hours; and 9.5% within 4 hours. Only 26.1% of subsequent flights started more than 4 hours before or after the initial flight time.

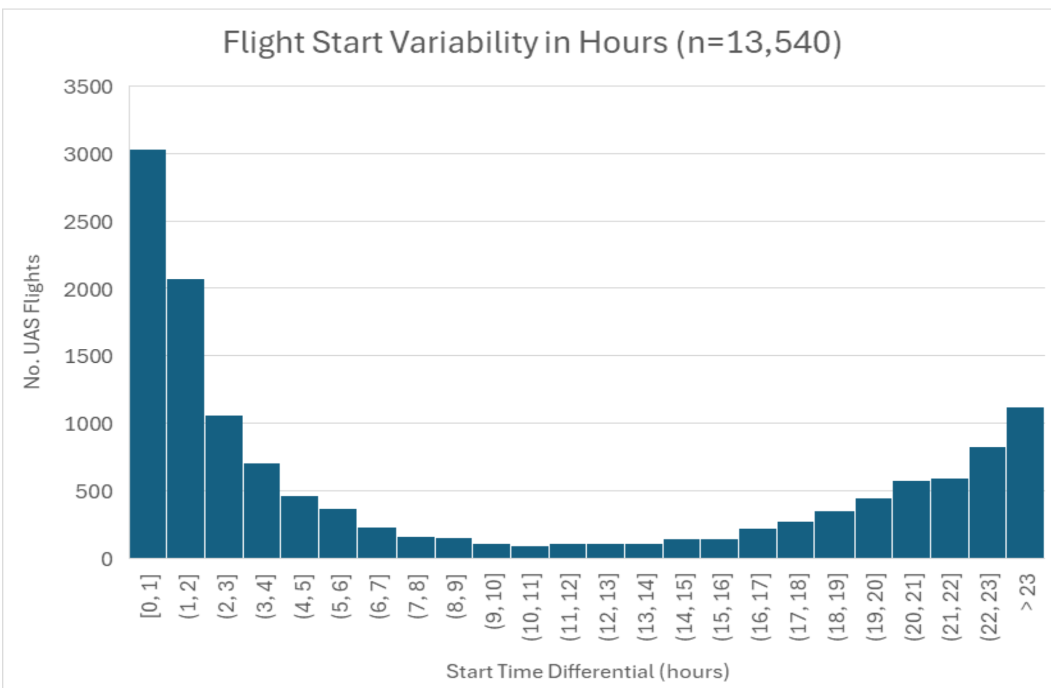


Figure 26. Flight Start Variability in Hours.

3.4 How is drone traffic evolving over time?

The authors assessed both quantitative and qualitative factors to develop projections of UAS traffic.

3.4.1 Datasets

Quantitative sources included empirical sources of data, such as databases, fleet census, certificate issuances, and related datasets.

- UAS Sighting Reports
- Commercial (Part 107) UAS Registrations
- Recreational (Part 44809) UAS Registrations
- Certificated Remote Pilots
- Low Altitude Authorization and Notification Capability Authorizations

The authors further considered the use of collected Remote Identification data as a data source for forecasting; however, this was discounted due to the following factors:

- Limited longitudinal data to discern valid trending
- Inconsistent data collection length for several sampling locations
- Considerable, unexplained data variability; strong data skew in some sample areas
- Potential for unmeasured seasonality effects

Succinctly—at this point—the research team asserts that Remote Identification data collected for this project is in an immature state to be used for reliable, inferential forecasting. The authors believe that with further data collection over the next reporting year, coupled with the ability to perform longitudinal trend comparisons and anticipated data variability stabilization, this dataset could be used to inform future forecasting efforts. The authors caveat that while existing Remote ID data may not be appropriate for population-level representation and inference purposes, it may be appropriate for examining local- or regional-level projection.

Qualitative factors included (but were not limited to):

- Projected FAA rulemaking
- Applicable legislation
- Geopolitical factors
- Public and industry sentiment
- Available industry economic forecasts

3.4.2 Qualitative Data Analysis and Discussion

The UAS industry has been subject to a number of destabilizing factors in 2025 that are likely to impact the scale of the active UAS fleet, as well as the extent of routine UAS operations.

3.4.2.1 Foreign-Manufactured UAS Added to FCC Covered List

The 2025 National Defense Authorization Act (NDAA) mandated a national security audit of DJI and Autel drones. The legislation did not include a directive assigning the task to a security agency and further established a date-triggered ban in the event a security assessment was not performed (Kesteloo, 2025; Rupprecht, 2025). The combination of these factors essentially assured triggering the ban provision. On December 22, 2025 in accordance with the 2025 NDAA and in alignment with the *Restoring American Airspace Sovereignty* and *Unleashing American Drone Dominance* Presidential Executive Orders, The Federal Communications Commission (FCC) assessed that "UAS critical component parts that are produced in foreign countries pose 'unacceptable risks to the national security of the United States and to the safety of U.S. persons'" (FCC, 2025, p. 1; Executive Order No. 14305, 2025; Executive Order No. 14307, 2025). This determination resulted in foreign-manufactured UAS and designated components being added to the FCC's Covered List, thereby restricting FCC equipment authorization, effectively banning such equipment from the US marketplace (FCC, 2025). While this regulatory action does not affect the possession and use of previously acquired UAS, it creates significant barriers to ensuring continued operation by suspending the ability to secure replacement components. While the legislation originally targeted the security risk posed by DJI and Autel platforms, the FCC's implementation extends to *all foreign-manufactured UAS.* The authors assess that this action **will generate a significant uptick in short-term drone domestic purchases—particularly for non-recreational operators—as these entities attempt to secure available US inventory**. Subsequently, the authors **anticipate an unprecedented downturn in purchases over the next 90-180 days while the industry works out new supply chains and approved manufacturers amp up production**.

The authors further note that these issues could impact the safe integration of UAS into the NAS. Operators may continue flying foreign-manufactured UAS without the ability to replace mission- or safety-critical components. In addition, limited parts support from foreign manufacturers may accelerate the deprecation of these platforms.

3.4.2.2 Release of Notice of Proposed Rulemaking for Routine UAS BVLOS Operations

On June 6, 2025, the White House issued an executive order designed to enhance domestic infrastructure and innovation in the UAS and AAM fields, dubbed *Restoring American Airspace Sovereignty* (Executive Order No. 14305, 2025). Among other provisions, the order directs the Secretary of Transportation to establish a policy for evaluating requirements for routine Beyond Visual Line Of Sight (BVLOS) UAS operations and publish a final rule within 240 days (February 6, 2026)(Executive Order No. 14305, 2025). On August 7, 2025, the FAA released a notice of proposed rulemaking action, *Normalizing Unmanned Aircraft Systems Beyond Visual Line of Sight Operations* (2025), proposing a regulatory framework for addressing the provisions of the executive order. The authors believe final approval of BVLOS rulemaking will markedly increase UAS operations activity within the National Airspace System. While it is difficult to quantify the extent of demand for BVLOS operations, the authors highlight findings from the 2025 FAA Office of Inspector General report, which cites agency approved waivers increased from 1,229 in 2020 to 26,870 in 2023. The Association for Unmanned Vehicle Systems International (AUVSI), a UAS industry advocacy organization, echoed these findings, indicating an 88% annualized growth in BVLOS waivers (AUVSI, 2025). The authors assess significant non-recreational demand for BVLOS operations authority. This **will likely have a moderate-to-large growth impact for prosumer, professional, and industrial-grade UAS platforms**.

3.4.2.3 Department of Defense UAS Acquisition Initiatives

Additional efforts by the Department of Defense to enhance small UAS capabilities for military use are also anticipated to increase UAS operations within the NAS. On July 10, 2025, the Secretary of Defense released a policy memo expected to increase the extent of military investment in the small UAS market (Lopez, 2025). This follows additional policy released in the NDAA designed to streamline the overall military acquisition process through enhanced focus on commercially available technology and contract sourcing (Barbee-Garrett et al. 2025). While this segment may not directly affect the size and operations of the civil UAS fleet, there is a strong tendency that American drone manufacturers will seek alternative civilian markets for developed products, such as law enforcement. The authors **anticipate these factors may slightly increase non-recreational fleet size and operations in the short-term, and likely have a small-to-moderate impact on fleet growth in the long term**.

3.4.2.4 Industry Economic Forecasts

The authors also attempted to reference available industry economic forecasts to further supplement available data; however, most datasets either required a subscription or came at a high cost. According to UHY (2025), the US UAS industry is estimated to increase from \$12B to \$14B in 2026 (~16.7%). Other reports provided generalized summaries that indicated 2026 annualized growth in the 10%-20% range.

Without access to the complete context, however, these reports provide little value other than relativistic reasonability comparison. The authors further note that these reports were published prior to the FCC's Foreign-Manufactured UAS restrictions, and do not take into account these extenuating factors.

3.4.3 Drone Forecast

The projected drone forecast is contained in Table 18. The authors assess that the addition of foreign-manufactured UAS to the FCC's Covered List is likely to have a profoundly chilling effect on UAS fleet growth in 2026, leading the authors to largely discount 2025 growth data in their forecasting prediction. Effects are unlikely to be seen in registration and operations data for up to 3-6 months, until the domestic UAS inventory is exhausted. The authors expect an artificial spike in initial UAS registrations extending through at least the first calendar quarter without an accompanying increase in overall UAS operations. Operational impacts are likely to lag between 6 and 12 months behind as UAS operators fly out the current fleet into deprecation.

Table 18. Drone Forecast.

Indicator	End 2024	End 2025	Change
Part 107			
Commercial UAS Registrations	403358	453635	12.5%
Certificated Remote Pilots	423047	481760	13.9%
LAANC 107	33716	40959	21.5%
Quantitative Estimate Part 107			+15.9%
Qualitative Factor Adjustment Part 107			-12.5%
Best Estimate Part 107			+3.4%
Part 44809			
Recreational Registrations	387355	371334	-4.1%
TRUST Certificates Issued**	410495	274885	-33.0%
LAANC 44809	13904	15001	7.9%
Quantitative Estimate Part 44809		(-3.0%) to +2.0%	
Qualitative Factor Adjustment Part 44809			-5.0%
Best Estimate Part 44809		(-8.0%) to (-3.0%)	
*Limited to Q1-Q3			
**Adjusted values to estiamte annual rather than total issuances			

3.5 What percentage of drone traffic is following Part 107 (or comparable 49 USC 44809) rules?

The research team analyzed the findings of the following reported metrics to estimate current compliance. Non-compliance conditions follow each analysis factor:

- Altitude Utilization [14 CFR §107.51b; 49 USC §44809(a)(6)]: altitudes above 400 feet (AGL)
  - Rationale: Specified regulatory limitation
  - Limitations: unable to determine the status of waivers/authorizations that may permit legal exceedances of altitude limitations
- Flight Speed [14 CFR §107.51(a)]: speeds above 100 mph
  - Rationale: Specified regulatory limitation
  - Limitations: General study limitations
- Operator Distance [14 CFR §107.31]: distances greater than 1 NM
  - Rationale: The FAA does not define visual line of sight requirements; however, studies suggest that the ability to adhere to provisions specified in 14 CFR §107.31(a)(1-4)

indicates significant human limitations at longer distances (Crognale, 2009; Dolgov, 2016; Vance et al., 2017).
    - Limitations: Methodology does not account for UAS footprint/size; inconsistent reporting of UAS specifications and variability of UAS used make individual UAS analysis impractical for this study.
- UAS Offset Distances from Aerodromes [14 CFR §107.43; 49 USC §44809(a)(5)]: distances less than 0.2 NM
    - Rationale: Regulatory requirements to avoid interference with airport or aerodrome operations and traffic patterns; does not interfere and gives way to manned aircraft.
    - Limitations: Runway end offset distance is an imperfect measure for safety; however, it is generally accepted that the most critical safety areas at an airport include those involved with the takeoff and landing of aircraft. These areas generally include runways or other designated takeoff/landing zones.
- UAS Facility Map Altitude Utilization [14 CFR §107.41; 49 USC §44809(a)(5)]: Exceedances of UAS Facility Map Grid Altitude Limits, Excluding 0-ft Grids
    - Rationale: Generally, UAS are restricted to operating in Class G airspace, unless authorized by the administrator with an airspace authorization or other authority to exceed these limitations. Based on the current study, 93% of LAANC authorizations were "auto-approved," indicating the majority of requests adhere to specified UAS Facility Map grid altitude limits without the need for additional coordination approval.
    - Limitations: For this preliminary analysis, it was not possible to correlate detected UAS activity to LAANC approvals.

This analysis yielded the following findings (see Table 19):

Table 19. UAS Operator Compliance Assessment.

Factor	**Compliance Assessment**
Altitude	92.4% below 400 feet AGL
Flight Speed	>99.99% below 100 mph
Operator Distance	98.4% less than 1.0 NM
UAS Offset Distances from Aerodromes	94.9% further than 0.2 NM from Runway End or Landing Zone
UAS Facility Map Altitude Utilization	69.2% below UAS Facility Map Altitude Limits

The authors highlight that established metrics do not perfectly correspond to regulatory requirements; however, they determine that they provide a reasonable gauge of compliance based on available data. The authors assess that overall operator regulatory compliance **likely exceeds 90.0%.**

3.6 What does an analysis of drone traffic indicate about current and future drone safety risks?

3.6.1 Ground Risk: LandScan Metrics

The authors evaluated the distribution of UAS telemetry locations relative to Oak Ridge National Laboratory's (2025) LandScan metrics. LandScan data was available for approximately 6.1M of the total 6.3M sampled datapoints (approximately 94.5% of the available dataset). Most data points that did not have available LandScan data were collected over water or oceanic areas. The distribution of sampled LandScan values is presented in Figure 27. The authors leveraged available 2021 LandScan USA (Daytime) metrics, which establish a population density value for an area of 3 arc-seconds, an area of approximately 90m x 90m (8,100m^2). LandScan values can be approximately converted to persons per square mile by applying a 320 unit multiplier.

The majority of telemetry (45.4%) was in areas assessed to have a LandScan value of zero (0). Approximately 8.5% of the UAS telemetry had a LandScan value of between 1-2 persons (~320-640 persons/SM^2). About 14.3% of the telemetry was in areas with a LandScan value of 3-10 persons (~960-3,200 persons/SM^2). LandScan categories of 11-25 (~3,520-8,000 persons/SM^2) and 26-50 (~8,320-16,000 persons/SM^2) each represented less than 10% of the dataset. LandScan categories of 51-100 (~16,320-32,000 persons/SM^2) and 101-250 (~32,320-80,000 persons/SM^2) each represented less than 5% of the dataset. Approximately 8.5% of the dataset comprised the highest population density category, which included areas with LandScan values of 251-30,000 (>80,320 persons/SM^2).

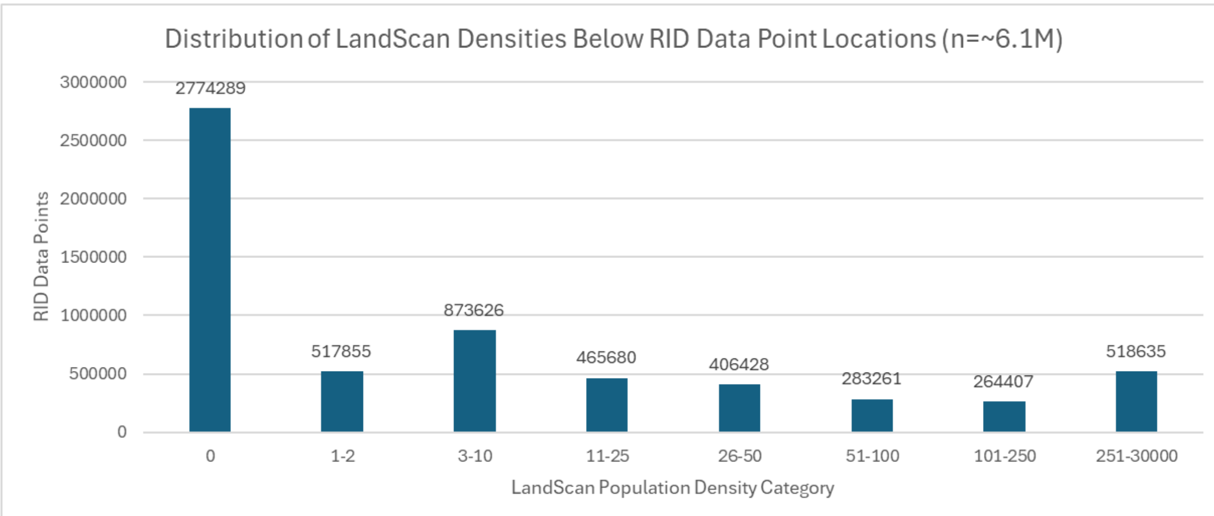


Figure 27. Distribution of LandScan Densities Below RID Data Point Locations.

3.6.2 *Air Risk: UAS Offset Distances from Aerodromes*

The authors analyzed 6,344,280 UAS telemetry datapoints to determine distances to the nearest aerodrome runway end or landing area, based on the FAA's Runway End Database (Department of Transportation, 2025). The analysis included 237 separate aerodromes, including 104 Airports (A), 133 Heliports (H), and 1 Closed facility (C) (see Table 20). The analysis assessed 364 separate runways or landing areas. The dataset did not include any other aerodrome types, such as Seaplane bases (S), Glider ports (G), Ultralight fields (U), or Balloon ports (B), as none were determined to be in proximity to sampled UAS activity.

Table 20. Aerodromes Included in UAS Offset Distance Assessment.

Airport ID	Type	Airport ID	Type	Airport ID	Type	Airport ID	Type	Airport ID	Type	Airport ID	Type	Airport ID	Type
01IN	H	3EV	A	72VA	H	BAK	A	HWD	A	MIV	A	WAL	A
05MA	H	3FD5	H	74II	H	BCB	A	I22	A	MMV	A	WWD	A
07I	C	3FK	A	74VA	H	BFI	A	I54	A	NC88	H	XA67	H
09W	H	3G4	A	75OH	A	BNO	A	I72	A	NH57	H	XMR	A
0AZ0	H	3M5	A	77FA	H	CA47	H	I76	A	NID	A	Y47	A
0AZ6	H	3VG6	H	77FD	H	CL05	H	I80	A	NUQ	A		
0CA1	H	41OI	H	77LA	H	CL16	H	I91	A	NZY	A		
0I2	A	43VA	H	77MD	H	CL64	H	IAD	A	O26	A		
0IL1	H	47NE	H	7IL4	H	CL76	H	IAH	A	OA35	H		
0OH5	A	47TN	H	7IL6	H	CL86	H	II56	H	OH14	H		
0TN4	H	48TE	A	7OH7	A	CL97	H	II88	H	OH81	H		
12G	A	4AL8	A	7VA2	H	CLL	A	IL69	H	OI61	H		
14LL	H	4OH0	H	7VA4	H	DCA	A	IL77	H	OKK	A		
15CA	H	4TS0	H	81II	H	DCU	A	IN01	A	OMH	A		
16IN	H	4TS6	H	84OH	H	DE22	H	IN06	H	ORD	A		
1AL1	H	50OH	A	88IN	A	DE25	A	IN3	U	ORL	A		
1II6	H	54FL	H	8A4	H	DFI	A	IN51	A	OSH	A		
1KY1	H	54IN	H	8I3	A	DNA	A	IN52	H	PAO	A		
1KY2	H	57IN	H	8II8	H	DRT	A	IN73	H	PHX	A		
1WA7	H	5AL9	H	8TE6	H	DT1	H	IN77	H	PSK	A		
1XA9	H	5I2	A	8WA3	H	EVV	A	IN89	H	RIC	A		
20CN	H	5I4	A	91I	H	EYE	A	IN95	H	RNT	A		
20E	H	5I6	A	96OH	H	FD01	H	IN96	H	SAN	A		
21TA	H	5IN1	H	98VA	H	FD36	H	IND	A	SBY	A		
22D	A	5OH1	H	99VA	H	FFA	A	IS09	H	SEA	A		
22FL	H	5OH2	H	9AL9	H	FFO	A	IWH	A	SGH	A		
23IN	H	5VA4	A	9II4	A	FL05	H	JPN	H	SIV	A		
26KY	H	60II	H	9MI0	H	FL46	H	JY32	H	SJC	A		
27II	H	60IN	H	9VA2	H	FLL	A	L71	A	SQL	A		
27IN	H	64WA	H	9WA0	H	GDK	A	L72	A	TN33	H		
2CA0	H	67AZ	H	AL04	A	GFK	A	LAL	A	TX33	H		
2IN7	H	68FA	H	AL36	H	GGP	A	LDR	H	TZR	A		
2R2	A	68VA	H	AL72	H	GKT	A	LNK	A	UMP	A		
2TN6	H	69OH	H	APV	A	GUS	A	LS07	H	UYF	A		
2XA3	H	6FD8	H	AZ24	H	GVE	A	MCO	A	VA86	H		
32AL	H	6I4	A	AZ33	H	HBE	A	MDQ	A	VES	A		
33TX	H	6IS5	H	AZ41	H	HSV	A	MDW	A	VG08	H		
34VA	H	6VG4	H	AZ48	H	HUA	A	MFD	A	W96	A		
36TE	H	71IL	H	AZ99	H	HUF	A	MFV	A	WA53	H		

The authors next analyzed UAS operation proximity to aerodromes. Approximately 70.0% of data points were closest to an airport-type aerodrome; whereas, 30.0% of data points were closest to a heliport facility. Results are presented in Figure 28 and Figure 29 by aerodrome type and distance. The largest proportion of all aerodrome operations occurred at 0.5 NM from the runway ends or landing zones. Generally, UAS operations tended to operate slightly closer to heliports than airport aerodromes. Both aerodrome types had a bimodal distribution, with airports at 0.5 NM and 2.5 NM, and heliports at 0.4 NM and 1.4 NM. The authors emphasize that RID sensor deployment was generally selected based on proximity to major aerodromes.

This finding is reflective of prior studies. The research team believes that operations tend to be closer to heliports than airports because heliports exhibit a number of characteristics that make them more difficult to identify. First, heliports are generally not included on aeronautical charts or electronic reference resources commonly used by remote pilots. In some cases, heliports are plotted on VFR terminal charts, however, this dataset is very limited. Currently, heliports are not included in the FAA's ArcGIS UAS Data System (FAA, n.d.-b), which displays numerous geospatial factors ranging from airspace, airports, recreational flyer areas, and other data. While the capability exists for FAA ArcGIS users to manually add heliports as a layer, the authors assert that this methodology is generally impractical for UAS operator flight planning.

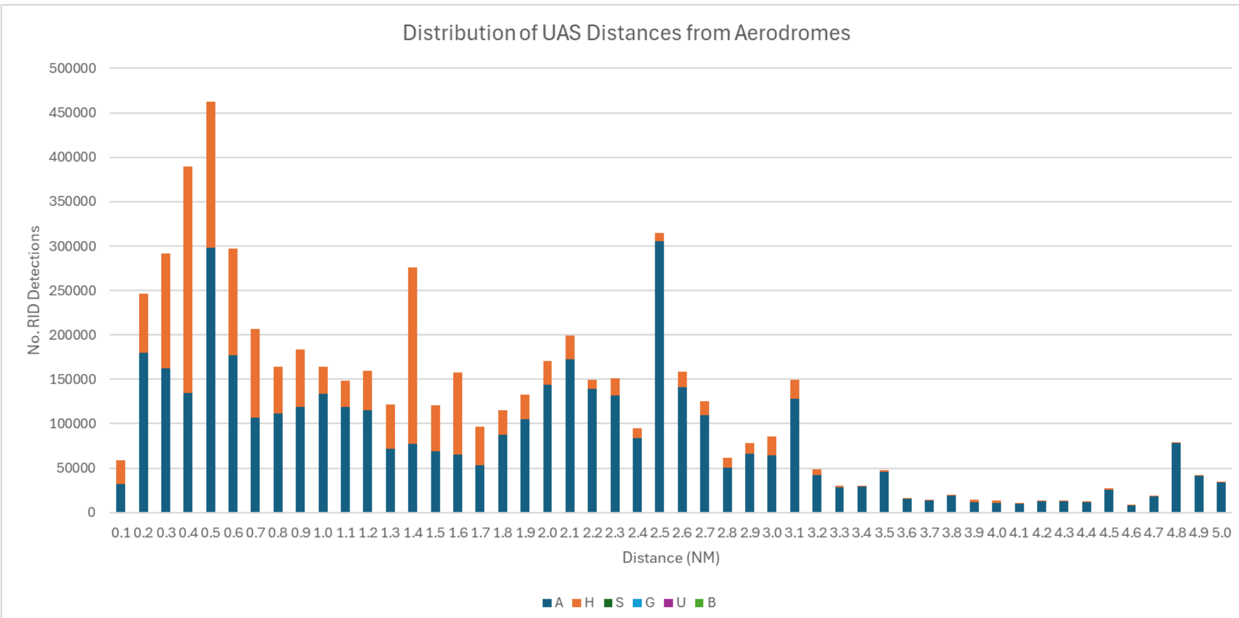


Figure 28. Distribution of UAS Distances from Aerodromes.

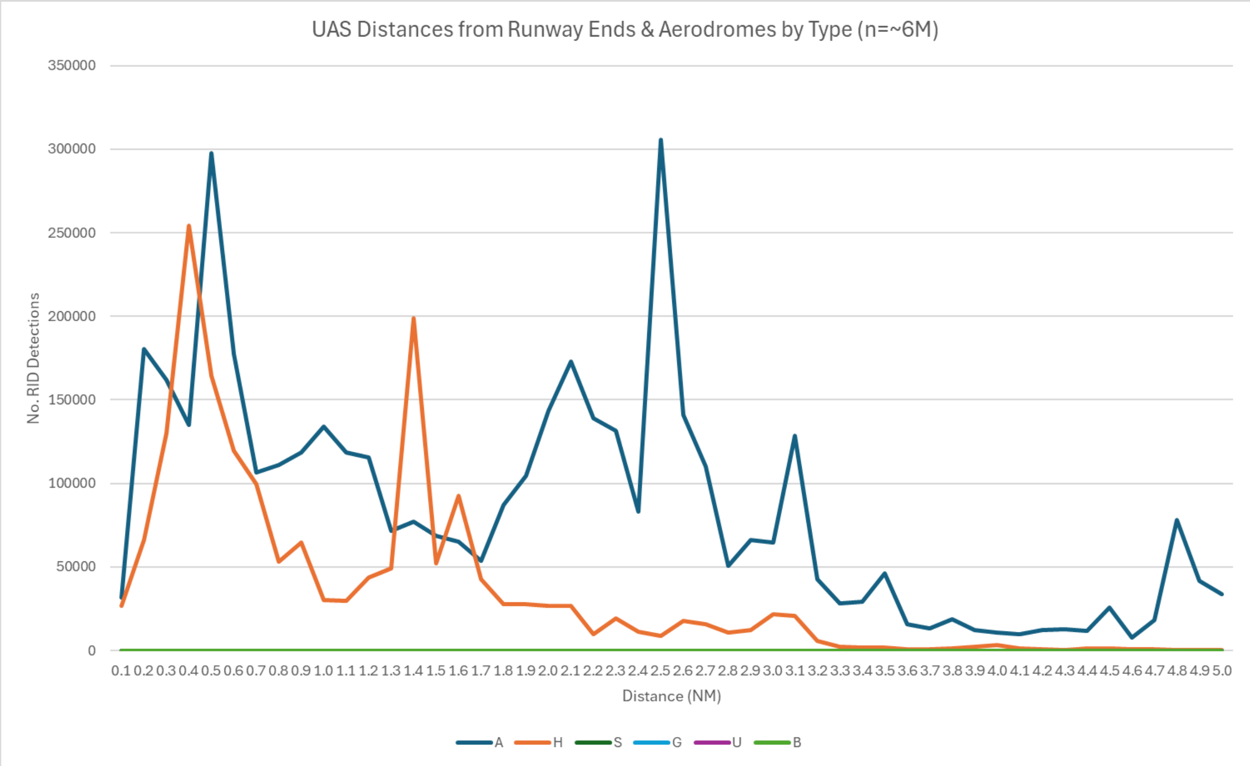


Figure 29. UAS Distances from Runway Ends and Aerodromes by Type.

3.6.3 Air Risk: UAS Operations in UAS Facility Map Areas in Controlled Airspace

The authors analyzed detected UAS telemetry to assess altitude compliance with LAANC. The authors evaluated 6,344,280 data points to determine their location and altitude relative to the UAS Facility Map altitude limits. The assessment determined that 3,863,527 (60.9%) datapoints were operated outside of UAS Facility Maps, with 2,480,753 (39.1%) operated inside UAS Facility Map areas. Results are presented in Figure 30. Detected UAS operations were carried out predominantly in 0-ft Grids (39.3%), 200-ft Grids (19.3%), 400-ft Grids (18.3%), and 300-ft Grids (13.1%). Only small quantities of operations took place in other grid areas. A large proportion of UAS operations were conducted above UAS Facility Map grid limits (58.0%); whereas, about 42.0% were flown below UAS Facility Map grid limits. When removing 0-ft Grids from the calculation, flights below limits comprised 69.2% of the dataset, whereas flights above limits accounted for 30.8%. The authors acknowledge that due to Remote ID limitations, data may be skewed based on sensor placement.

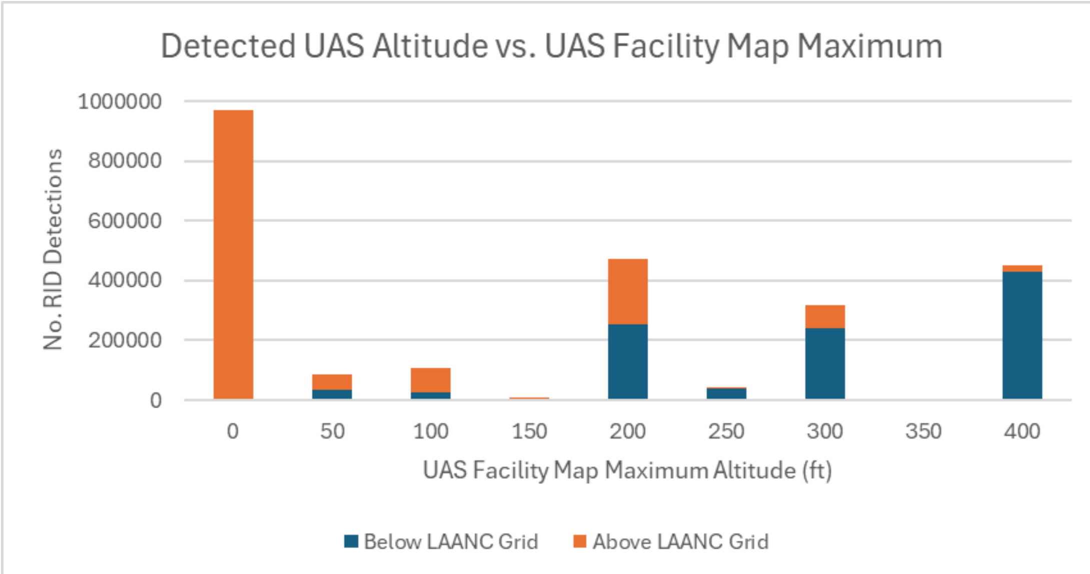


Figure 30. Detected UAS Altitude vs. UAS Facility Map Maximum.

3.7 How many aircraft are flying in No-Drone-Zones, and what are their traffic attributes important for counter-drone efforts?

The authors are still in the process of determining the best approach for implementing data collection and analysis methods for this project task. A method for accessing historical geospatial information and TFR data is required to complete this task. The research team will discuss these challenges at a subsequent Technical Interchange Meetings.

3.8 What is the closest point of approach distribution curve for drone traffic encountering crewed aircraft?

The research needed to answer this question is still ongoing and the team is still developing the methodology needed to provide informative results. The National Institute for Aviation Research at Wichita State University is leading this research task. The authors intend to fuse UAS telemetry data from collected Remote Identification information and aircraft telemetry data collected from ADS-B. Starting in September 2025, approximately a dozen sensors from one of the project vendors were equipped and configured to collect both Remote ID and ADS-B data in support of this tasking.

The authors are refining a methodology to clean, filter, and analyze UAS and aircraft trajectories to determine the extent and potential severity of UAS-aircraft encounters at selected sample locations within the National Airspace System. The research team is currently evaluating approaches to managing the complications of storing and analyzing the extensive data collected from both datasets. A preliminary analysis approach is overviewed in Figure 31.

The authors propose analyzing the dataset in spatial and temporal blocks to flag potential near encounters. The primary purpose of the initial analysis is to filter the dataset to include only segments likely to contain encounters, thereby reducing the complexity and resource requirements for subsequent analysis. High-fidelity analysis will be performed on flagged data to confirm and codify the development and evolution of encounters. The research team will evaluate encounters across a range of horizontal and vertical offsets and generate a distribution curve showing the number of encounters detected in the dataset based on the selected separation criteria.

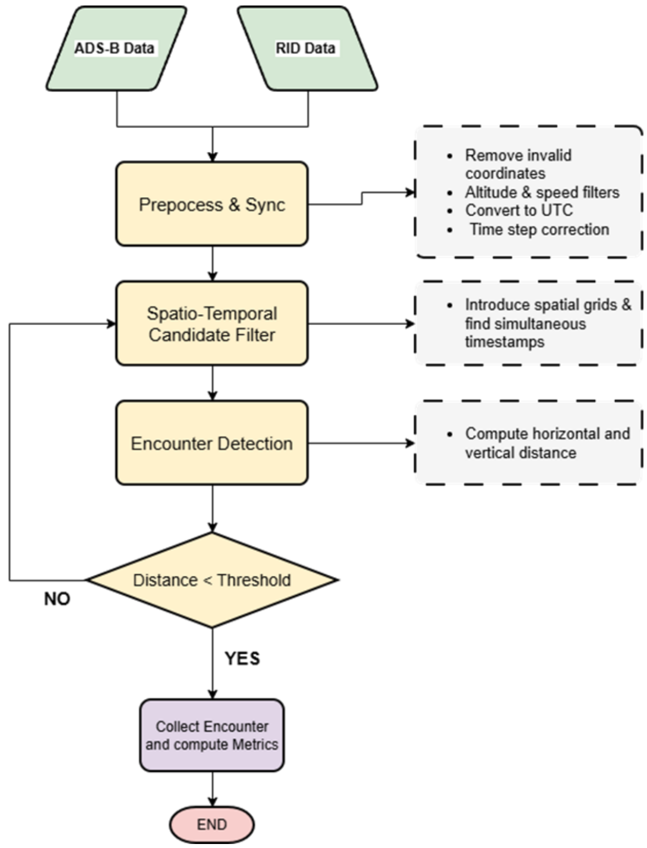


Figure 31. Closest Point of Approach Analysis Methodology.

The authors completed an analysis of an initial data sample comprising approximately 365 UAS flights derived from Remote ID collected in August 2025. The research team initially split the dataset into individual trajectories, each varying in length from 30 to 120 seconds. During initial testing, the authors established analysis criteria to flag possible encounters based on the following metrics:

- Trajectories within 1.5 NM
- Minimum separation check: 6,000 ft (horizontal) and 1000 ft (vertical) separation
- Minimum temporal overlap: 15 seconds
- Timestamp variability tolerance: 5 sec

Figure 32 shows a sample encounter pair identified from the dataset using the established analysis methodology.

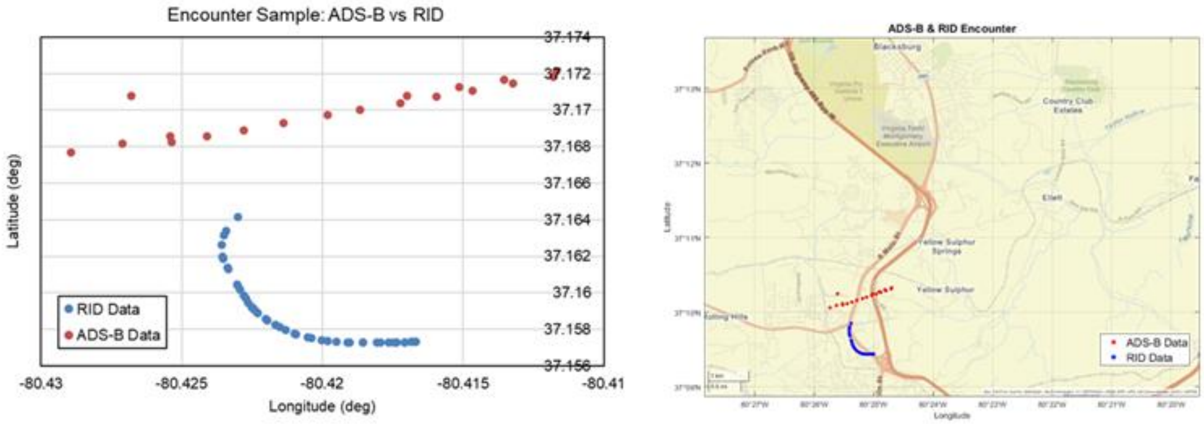


Figure 32. Sample Encounter Pair from Closest Point of Approach Preliminary Analysis.

The research team will continue to develop and refine procedures for analyzing data associated with this task over the course of the next performance year.

3.9 Ancillary Findings

3.9.1 Detection Effectiveness of Remote ID Using Received Signal Strength Indicator (RSSI)

The research team assessed RSSI, which was available in the dataset provided by one vendor. RSSI provides a measure of the strength of a received signal, which includes noise and interference. Reported values can provide one objective measure of the signal quality used for Remote ID detection. The authors caveat that several factors can adversely affect RSSI, such as signal noise, interference, multipathing, antenna types and orientation, and other factors.

The authors analyzed 4,477,514 data points, which contained RSSI information. An initial analysis was performed to determine the distribution of overall RSSI values, based on established limits for signal quality measured in estimated decibels relative to one milliwatt (dBm). The authors used the following threshold limits for categorical signal quality: Excellent (> -50 dBm); Good (-51 dBm to -60 dBm); Moderate (-51 dBm to -70 dBm); Weak (-71 dBm to -80 dBm); Poor (-81 dBm to -90 dBm); and Unusable (< -91 dBm). Results are presented in Figure 33. Only a small percentage of data points fell into the Excellent (1.3%) or Good (12.7%) categories. The preponderance of the dataset was determined to be in the Moderate (21.0%), Weak (44.1%), or Poor (20.8%) categories. Less than 0.1% of the data was assessed to be in the Unusable category; however, the authors acknowledge that the analysis methodology only assesses received signals. This approach fails to account for false-negative conditions in which a UAS was present, but not detected by the sensor. The current methodology did not account for the Remote ID signal type (WiFi or Bluetooth). Generally, Bluetooth transmitters use a much lower transmit power than WiFi. The authors note that increased transmit power does not necessarily imply that WiFi will have a longer range, as range is affected by a multitude of factors.

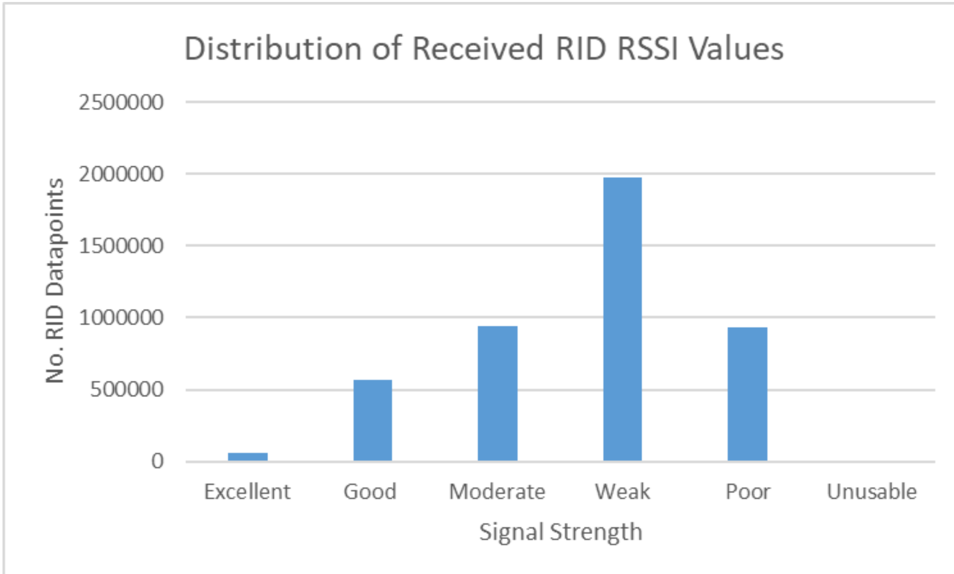


Figure 33. Distribution of Received RID RSSI Values.

The authors further analyzed the dataset to determine RSSI reception values at varied ranges from the receiver. Results are presented in Figure 34. Generally, the proportion of signals classified as Excellent degrades considerably outside of 0.75 NM. Signals classified as Weak were limited outside of 5.5 NM.

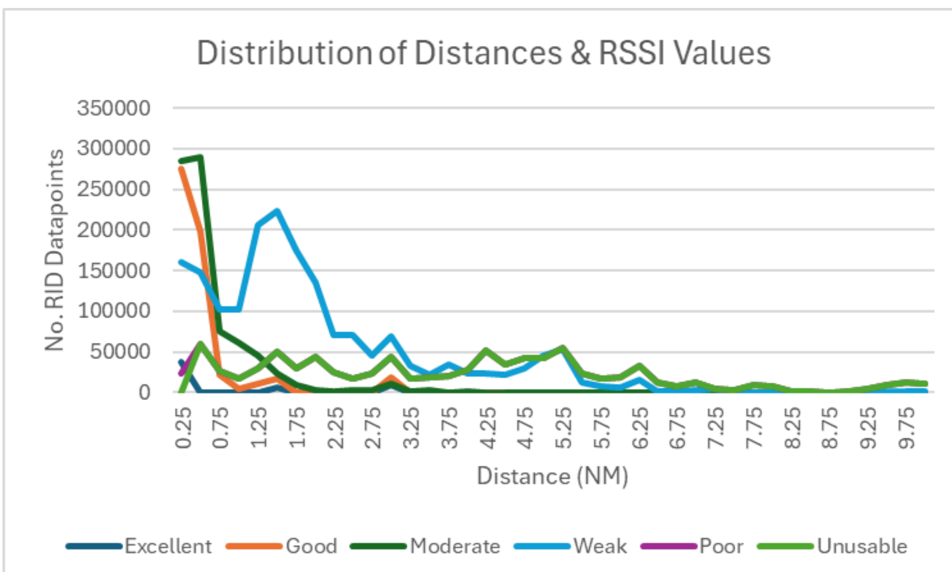


Figure 34. Distribution of Distances and RSSI Values.

The authors note that this analysis did not take into account urbanization, which would likely have a higher potential for signal interference. The authors also did not account for antenna placement or height, which would potentially improve signal reception by reducing the potential for multipathing. These factors could be analyzed in future reports, if deemed valuable by project stakeholders.

4 CONCLUSIONS

The findings derived from the analysis of Remote ID data establish a robust empirical basis for characterizing small UAS operational behavior and its interaction with the NAS. By systematically identifying and quantifying UAS activity patterns, this work enables more informed forecasting of future UAS activity, improves operational awareness, and supports risk-informed safety evaluations. The results demonstrate how Remote ID data can be used to identify potential hazards, assess risk exposure and conflict potential with crewed aircraft, and support proactive mitigation strategies. As UAS activity continues to scale, the effective use of Remote ID–based insights will be increasingly important for guiding policy development, improving airspace oversight, and maintaining the safety and efficiency of the NAS.

The following elements summarize the key technical conclusions identified within the project's initial reporting period:

Remote ID Data Informative, but Presents Analysis Challenges. Remote ID data analysis presents several challenges. The data typically requires extensive cleaning due to missing data, inconsistent formatting, and low transmission quality. The design of Remote ID data also lacks clear flight differentiators, as there are no clear indicators to segment flight start and end times, making it difficult to separate the data into discrete flight operations. Remote ID data on its own provides valuable, but limited operational information without data fusion with other contextual elements, such as airspace authorizations, weather data, geospatial locations, population information, and other markers. Each of these elements requires significant effort to fuse, analyze, and extract meaningful information.

Low Remote ID Signal Strength Limits Consistent and Reliable Tracking. Remote ID's use of shared spectrum in the Industrial, Scientific, and Medical Wi-Fi and Bluetooth frequencies demonstrates significant susceptibility to electromagnetic interference, particularly in signal-rich, urban environments. These challenges are further exacerbated by generally weak signal strength and reception limitations, resulting in a relatively limited effective range. Offsetting these limitations requires greater signal coverage through the deployment of additional sensors, which can be resource-intensive.

Sampled UAS Operations Exhibited Wide, Localized Variability. Monthly sampled UAS operations data exhibited wide variability in fleet population and operations counts. The authors do not currently have an adequate explanation for this variability. It is possible that there are seasonality effects or localized factors at play influencing the dataset. Further longitudinal analysis will be required to establish a better understanding of these variability patterns.

Majority of Operations Occurred During Weekdays, During Daylight Hours. Observed UAS activity was primarily concentrated during weekdays, during daylight hours. The prevalence of daylight UAS operations is consistent with findings from previous studies. Unlike prior studies, which suggested a preponderance of operations occurred on weekends, the current study shows an evolving trend favoring weekday activity. The authors believe this finding reflects operational patterns typically associated with elevated levels of non-recreational/commercial activity. This finding is supported by UAS Operator Survey results, which indicate the preponderance of non-recreational operations occur on weekdays rather than weekends (FAA, 2024b).

Flight Durations Continue to Be Short. Analysis of Remote ID-derived flight start and end times shows most UAS flights are short in duration, with most lasting less than an hour. The authors did note that operational flight times showed a general increase relative to previous studies, which could indicate a shift towards additional nonrecreational activity. This data was reasonably consistent with LAANC authorization data.

DJI Continues to Dominate Fleet Composition. DJI-manufactured platforms dominated the dataset, representing more than 96.4% of all platforms. The authors anticipated that geopolitical factors would dampen DJI's operational prevalence, but that was not reflected in the data. Comparatively, the previous ASSURE A50 study (Wallace et al., 2025) identified that DJI comprises more than 86.3% of platforms. The authors anticipate a strong shift in this trend during the next reporting period, due in large part to the FCC's addition of foreign UAS manufacturers to the Covered List, thereby restricting future foreign UAS imports.

Majority of UAS are Lightweight. The majority of the most commonly detected UAS platforms weighed less than three pounds. This observation aligns with findings from previous studies that concluded most UAS in operation were relatively small in size and lightweight.

Most UAS Operations Conducted at Altitudes Less than 400 Feet AGL. Analysis of operational altitude data indicates that most UAS activity (92.4%) occurred below 400 feet AGL, a key regulatory limit articulated in both 14 CFR §107 and 49 USC §44809. In contrast, only 5.3% of UAS operations occurred above 500 feet AGL—a base altitude where routine manned aircraft operations take place. While additional effort can be made to ensure UAS operator altitude compliance and ensure positive separation between aircraft and UAS, this finding shows that high altitude UAS operations that would elevate potential collision risk are a relatively rare occurrence.

Most UAS Flights Conducted at Relatively Slow Speeds. Analysis of speed data shows that nearly half (49.3%) the telemetry of UAS flights were static, while an additional 26.9% were conducted at relatively slow speeds below 15 mph, indicating most flights involve hovering or slow, controlled movement. In contrast, only 7.8% of UAS operations occurred at speeds exceeding 30 mph, and a negligible 0.1% were flown above 50 mph. This finding reinforces that the vast majority of flight operations are occurring at either low or stationary speeds. While slower speeds limit kinetic damage potential from a collision, it also makes UAS much more difficult to see, as peripheral movement is a key visual indicator for spotting potential UAS collision risks.

Majority of UAS Flights Remain in Proximity to Operator. Analysis of operator separation distances indicates that UAS flights are predominantly conducted very close to the remote pilot. Nearly 58.2% of collected telemetry data show operator flight distances of less than 0.1 NM, with an additional 17.4% occurring between 0.1 and less than 0.2 NM. Overall, more than 92.6% of UAS operations took place within 0.5 NM of the operator, demonstrating that the vast majority of flights likely remain well within the short-range, visual line-of-sight of operators.

Operational Usage Relatively Consistent. Evaluation of monthly flight activity by platform serial number indicates relatively consistent operational usage throughout the year. Overall, the data support a mean, weighted average of approximately 2.14 flights per platform per month, suggesting stable and predictable UAS operational flight behavior over time.

Most Operators Have Consistent Flight Start Times. Analysis of flight start times by serial number shows that UAS operations are temporally clustered around the initial flight activity time. Nearly 30.6% of subsequent flights began within one hour of the initial flight, with 21.4% within two hours, 12.3% within three hours, and 9.5% within four hours. In contrast, only 26.1% of subsequent flights occurred more than four hours before or after the initial flight, indicating that most UAS operations take place within a relatively narrow time window. This finding suggests that initial flight time may be predictive of future flight timing.

Most UAS Operations Over Low-Density Population Areas. Analysis of UAS telemetry against LandScan population metrics shows that ground risk to people is generally low. Nearly 45.4% of operations occurred in areas with zero population density, and most remaining flights were in low-density environments, with less than 10% in moderate-density areas. Flights in higher-density regions were uncommon, with only about 8.5% of operations occurring in the highest population category, indicating that most UAS activity takes place where potential ground risk is limited.

Some UAS Operations Uncomfortably Close To Heliports. Analysis of UAS activity in the vicinity of aerodromes reveals that a portion of operations occur at relatively close distances. Although most datapoints (70%) were nearest to airports, nearly one-third (30%) were closest to heliport facilities, and UAS flights were typically conducted at shorter distances from heliports than from airports. This trend aligns with previous research and may be driven by the fact that heliports are often not included on standard aeronautical charts and commonly used UAS planning tools, increasing the likelihood of unintentional operations in close proximity to heliport facilities.

Significant UAS Operations Above UAS Facility Map Grid Limits. Analysis of detected UAS Remote ID telemetry relative to UAS Facility Maps shows that 39.1% of operations occurred within mapped areas, while 60.9% took place outside UAS Facility Map coverage. Overall, 58.0% of UAS operations were conducted above the applicable UAS Facility Map grid altitude limits, compared to 42.0% below. When 0-ft grids are excluded, compliance improves substantially, with 69.2% of flights operating below grid limits and 30.8% above. The authors were unable to determine the airspace authorization status of detected activity.

Summarily, this analysis reveals that small UAS operations are largely characterized by low-altitude, low-speed, short-range, and localized activity, with limited but important areas of interaction with crewed aviation and ground populations. While most operations occur in environments that present relatively low risk, the findings also identify specific conditions—such as proximity to aerodromes, operations near heliports, and flights above UAS Facility Map grid limits—that warrant continued attention. Collectively, these results demonstrate the value of Remote ID data as a scalable tool for understanding UAS behavior, supporting risk-based oversight, and informing future operational, technical, and regulatory decisions for safe integration into the NAS.

5 PLANNED ACTIVITIES DURING NEXT PERFORMANCE PERIOD

The research team intends to perform the following activities during the next performance period to advance the goals of the project:

Continue Deployment of Remote ID Sensors to Designated High-Priority Locations. Deployment of Remote DI sensors will continue into the next performance period with data collection extending to approximately 15-18 locations, based on operational relevance and insight, based on the following priority factors: 1) Core-30 airports; 2) Advanced Air Mobility testing and operational environments; 3) Innovate28 sites; and, 4) special UAS focus areas such as delivery operations and regions with elevated UAS traffic, as well as other aviation-specific considerations. This targeted deployment strategy is intended to capture diverse and operationally significant UAS activity, supporting ongoing safety analysis and integration efforts in accordance with the approved project Research Task Plan.

Implement UAS-Aircraft Encounter Modeling. During the next performance period, the authors plan to implement and mature UAS–aircraft encounter modeling using fused Remote ID and ADS-B telemetry data. The effort will focus on refining data cleaning and filtering methods, managing large datasets, and applying a tiered analysis approach that first screens trajectories in spatial and temporal blocks to identify likely encounters. Flagged events will then undergo higher-fidelity analysis to confirm and characterize encounter geometry, separation, and evolution. This work will establish a scalable framework for systematically identifying and assessing UAS–aircraft encounters within the NAS.

Develop Temporary Flight Restriction Impact Analysis Methodology. During the next performance period, the authors intend to develop a TFR impact analysis methodology to assess UAS activity within designated no-drone zones and characterize associated traffic attributes relevant to counter-UAS efforts, as articulated in the Research Task Plan. This work will focus on defining data collection and analysis approaches capable of identifying UAS operations occurring within or near TFR boundaries, including the integration of historical geospatial and TFR data. The authors are currently evaluating options for accessing and managing these data sources and will refine the proposed methodology through coordination and discussion at a forthcoming technical meeting.

Refine Methods for Leveraging Remote ID Data for Longitudinal Analysis and Predictive Forecasting. During the next performance period, the authors intend to refine methods for leveraging Remote ID data to support longitudinal analysis and predictive forecasting. The authors will also work to integrate additional data sources in support of forecasting, such as the LAANC activity data and results of the annual UAS Operator Survey. Efforts will focus on addressing current limitations, including limited historical depth for trend identification, inconsistent data-collection durations across sampling locations, unexplained variability and skew within portions of the dataset, and the potential influence of unmeasured seasonal effects. While the authors conclude that the Remote ID dataset is currently too immature to support reliable population-level forecasting, continued data collection over the next reporting year is expected to enable longitudinal comparisons and greater data stability. As these refinements mature, the authors anticipate the data may become suitable, providing a foundation for future predictive analyses.

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