Testimony

Of

Dr. Ryan Wallace
Professor of Aeronautical Science
Embry-Riddle Aeronautical University

Before

The United States House of Representatives
Committee on the Judiciary
Subcommittee on Crime and Government Surveillance

# *Unmanned and Unchecked: Confronting the Rising Threat of Malicious Drone Use in America*

Washington, D.C.
September 16, 2025

**INTRODUCTION**

Chairman Biggs, Ranking Member McBath, and other distinguished committee members, thank you for the opportunity to testify on the important issue of protecting our nation from the misuse of unmanned aircraft systems, sometimes referred to as UAS or more colloquially as "drones."

My name is Ryan Wallace, and I currently serve as a professor at Embry-Riddle Aeronautical University. For the past 10 years, my research has focused primarily on UAS safety and security threats through the use of UAS detection equipment, supported by methodologies such as geospatial analysis and data analytics.

The misuse of unmanned aircraft is not fundamentally a technology problem, but rather a *people* problem. What makes this problem particularly challenging is the unique aerial capabilities that UAS provide to operators—capabilities previously limited only to those with the resources and training to operate manned aircraft. The accessibility, affordability, and automation have now placed these capabilities within reach of anyone with a few hundred dollars. This creates a disproportionate, force-multiplier for bad actors. The destructive potential of consumer drones recently came to global attention in Ukraine during the famed Operation "Spider's Web," where small unmanned aircraft were surreptitiously smuggled into Russia to conduct rapid, surprising, accurate, and devastating attacks against strategic military aircraft. These attacks were executed with near impunity, highlighting the critical vulnerability gap posed by UAS threats. The remote nature of such attacks left no one to arrest or hold accountable.

**BACKGROUND**

As of the end of 2024, the Federal Aviation Administration (FAA, 2025b) estimated there were more than 2.8M UAS in the United States, comprised of nearly 1.9M recreational UAS and 966,000 non-recreational UAS. Today, drones outnumber manned aircraft by nearly 13-to-1 (Bureau of Transportation Statistics, 2025). Within five years, the agency estimates the total number of UAS will grow by more than 10% (FAA, 2025b).

Drone users can be broadly categorized into five groups: the *compliant*, the *clueless*, the *careless*, the *criminal*, and finally, those *committed* actors intent on using UAS as a weapon for terrorism or causing public harm. I want to talk briefly about each of these groups and reiterate that it is not the UAS itself that causes harm, but rather the people behind these acts. The UAS is merely a tool—one that can be used for constructive or destructive purposes.

The vast majority of UAS operators fall into the compliant category and do their best to follow the rules. Compliance with UAS is a complex endeavor, as the pace of regulatory change, coupled with multiple layers of UAS rules imposed by federal, state, and local governments, makes complete compliance challenging. This important group, however, include the constituents who make up entrepreneurs using drones to advance American business, local governments leveraging drones to improve policing and public safety, and hobbyists pursuing harmless recreation.

The second group is the *clueless*—UAS operators who are unaware of rules or restrictions. These individuals view UAS as a toy, rather than a regulated aircraft that requires knowledge and compliance with rules designed to protect the safety and security of our skies and those on the ground. While

efforts have been taken over the years to improve outreach and awareness, these efforts are being met with varying degrees of success.

The third group comprises the *careless*—these operators are aware of UAS rules and regulations, yet electively ignore them and fly with impunity, in spite of potential risk or consequence. One measure of clueless and careless activity is UAS sighting reports, which include observations of UAS by aircrew members, air traffic controllers, law enforcement, and members of the public, often in areas where they are not permitted to be, or performing activities deemed by the observer to be unsafe. While this measure is imperfect, as it relies on human perception, it does provide a barometer of the state of potentially unsafe UAS activity within the National Airspace System. As of the second quarter of 2025, the FAA recorded a total of 1,022 sightings—approximately 170 per month—with most of these occurrences generally correlating with population centers (FAA, 2025a; Scallon & Wallace, 2025). Of these events, aircrew reported taking evasive action in approximately 2.8% of cases in 2025. The potential consequences of careless operations erode the safety of our skies. As an example, in January of this year, a Canadair CL-415 collided with a Da-Jiang Innovations (DJI) Mini, a 249g drone, operating at low altitude within a temporary flight restriction zone near the Palisades fire. The drone penetrated the aircraft wing, grounding the critical firefighting asset during the height of the incident. Air operations were briefly suspended, allowing the fire to expand unabated, further enhancing the destruction and risk to response personnel (Wallace, 2025).

The fourth group comprises *criminal* use of UAS. While entrepreneurs recognize the value and opportunities that unmanned aircraft bring to business, these advantages are not lost on the criminal elements of society, who also seek technological advantage. As UAS are adept at bypassing ground-based physical security measures, public safety personnel are currently struggling to contain two particular criminal applications of UAS—prison incursions and cross-border contraband delivery.

A 2020 report released by the Department of Justice Office of Inspector General (DOJ OIG, 2020), identified UAS as an increasing threat posed to federal correctional institutions, identifying a substantial uptick in drone incidents at the organization's 122 facilities following the implementation of mandatory drone incident reporting requirements in 2018. In subsequent testimony furnished to the Senate Committee on the Judiciary, Christopher Hardee from the Department of Justice Office of Law and Policy and Michael Torphy, Unit Chief of the Federal Bureau of Investigation's Critical Incident Response Group, cited that drone activity has proliferated to more than half of the Bureau of Prisons federal facilities, with incidents climbing to more than 479 in 2024—nearly 20 times the number since the agency started tracking drone incidents in 2018.

In Georgia, a 2024 joint investigation by the state department of corrections and the FBI thwarted what was described as "a sophisticated, multi-state criminal enterprise" which employed drones as a key tool for injecting contraband into correctional facilities (Kemp, 2024). Law enforcement personnel seized more than 87 drones, 22 weapons, 453 cellular phones, and more than 315 pounds of tobacco and narcotics (Kemp, 2024).

Mr. Steven Willoughby from the Department of Homeland Security highlighted the extent of porous UAS activity along the U.S. border. "In the last six months of 2024, over 27,000 drones were detected within 500 meters of the southern border…" (Willoughby, 2025, p. 2). The operational behaviors of these flights suggest a concerted effort to employ tactics designed to evade customs and border protection agents, such as operating during the hours of darkness, flying above 400 feet above ground level (AGL),

making drones difficult to visually detect, and even conducting counter-surveillance flights against Customs and Border Protection (CBP) personnel.

The final group comprises those who are *committed* to using UAS to cause harm. In 2024, reports emerged that Mexican cartels began employing drones to drop explosives, killing several soldiers in Michoacan (Price, 2024). In August 2025, reports emerged suggesting a drone had been used as a part of a coordinated attack by a Colombian narcotics trafficking gang to down a Colombian National Police UH-60 Black Hawk helicopter, killing all 12 aboard (Forero, 2025; Altman & Rogoway, 2025). While details about this latest incident are still scarce, evidence strongly suggests non-state actors are adapting battlefield drone tactics to great effect, with one source reporting cartel members fought in the Ukrainian theater specifically to gain experience in first-person view (FPV) drone warfare tactics (Altman, 2025).

**CURRENT GAPS**

I want to differentiate two foundational functions of addressing unauthorized and malicious UAS activity: 1) detection, tracking, and identification (DTI) enabling early warning, airspace situational awareness and monitoring, and risk-driven response decision-making; and, 2) "counter-UAS" often referred to as *mitigation*, which refers to a system or device used to disable, disrupt, or seize control of a UAS (49 U.S.C. §44801[5]). Effective employment of these functions requires three critical components: 1) an understanding of protection priorities and the threat landscape; 2) collection of valid and reliable data derived from tested and resilient DTI equipment; and, 3) efficient application of Rules of Engagement, procedures, or equipment to respond to or mitigate a potential aerial threat.

To effectively address these challenges, I offer several observations—foremost, that all drone incidents are local incidents first. Often, the first response to these incidents will be sworn officers from one of the nation's 17,541 state and local law enforcement agencies (Gardner & Scott, 2018). Most of these agencies lack formal training for dealing with drone incidents, and even fewer are equipped with tools to support the detection, tracking, and identification of UAS. Currently, no state or local law enforcement agencies are equipped and authorized to forcibly take down a UAS threat without the compliance of the operator, who may be positioned miles away from the aerial vehicle. For DJI-manufactured consumer-grade drones, which continue to see heavy use across the National Airspace System, operating range can be five or more miles. Without Remote ID or UAS detection equipment capable of locating the operator, this prospect can be extremely challenging. While the Preventing Emerging Threats Act enabled UAS mitigation authority under relatively tight controls for both the Department of Homeland Security and the Department of Justice, the threat landscape in recent years has changed. When this authority was initially passed in 2018, the FAA estimated the size of the UAS fleet to include approximately 277,000 non-recreational UAS and 1.25M recreational UAS—approximately half the number of UAS estimated to be in active operation today. Similarly, the demand for counter-UAS protection has also increased. Testimony by Michael Torphy from the FBI underscored resource limitations in providing counter-UAS protection to special events, highlighting that the agency was only able to cover 0.05% of the more than 240,000 special events eligible for counter-UAS protection under §124n (Hardee & Torphy, 2025). Ultimately, the widespread, immediate need for counter-UAS protection and available capacity for that response should be part of the calculus used to determine future authorities.

Training is a vital element in preparing our public safety personnel to respond effectively to drone incidents. Foremost, it is essential to ensure that both UAS detection and mitigation efforts do not

create or exacerbate hazards within the National Airspace System through spectrum interference with navigation or communication infrastructure, create collision hazards, or impede air traffic management functions. Second, training is necessary to educate officers on how to effectively respond, investigate, document, and charge these incidents in a manner that leads to successful prosecutions. Moreover, such training ensures reinforcement of appropriate procedures designed to protect rights to expression, privacy, and other civil liberties.

In addition to preparing and equipping public safety personnel to respond to drone incidents, it is critical to ensure access to a consolidated database of nationwide drone incidents. Two such incidents follow, as examples. In 2025, U.S. Immigration and Customs Enforcement removed Fengyun Shi, a Chinese citizen residing in the U.S. on a student visa, following a conviction for using a small UAS to photograph vessels and shipyard infrastructure at two naval facilities near Norfolk, Virginia (Immigration & Customs Enforcement [ICE], 2025; Pearson, 2024). Shi had traveled to Virginia while on leave from his graduate program in the Midwest U.S. (Pearson, 2024). This comes on the heels of another similar incident in late 2024, where Yinpiao Zhou, a Chinese national, flew a small UAS, at altitudes of more than a mile above ground, over Vandenberg Space Force Base inside restricted airspace during a nighttime active satellite launch operation (Brading, 2025; McEvoy, 2024). An investigation by the Air Force Office of Special Investigations uncovered additional photos of sites in Texas, Arkansas, and China (Brading, 2025). Zhao also posted messages on social media seeking ways to bypass UAS altitude limitations (Brading, 2025). The creation of an incident database is likely to improve the ability to detect suspicious cross-jurisdictional activity involving drones. To further support drone incident tracking and streamline information-sharing between agencies, it is also recommended to implement standardized agency reporting nomenclature.

To further reinforce community resilience for drone incidents, public safety personnel require current information about adversary applications and tactics. Understanding technical details of how UAS are tactically employed for various illicit activities enables law enforcement to better identify potential drone threats, determine likely capabilities (such as payload capacity and speed), better assess overall risk, and evaluate effective mitigation and response options. As evidenced in the conflict in Ukraine, the use and tactics of drones are evolving at a breakneck pace, and these lessons are quickly proliferating closer to our borders. Mexican cartels are leveraging small, cheap commercial-off-the-shelf drones and adapting them for surveillance and precision-bombing using rudimentary improvised explosive devices (Villegas, 2025). Devices seized in two Mexican states show continued progression in drone weaponization, including fragmentation munitions, anti-personnel explosives, and chemical devices (Campbell, 2025). Evidence also suggests cartels are adopting strategies to reduce visibility, electronic signatures, and radar footprint of drones through the use of strategic selection of construction materials, UAS design, and adaptive operational tactics (Researching Ukraine, 2025).

There are no “magic bullet” technological solutions to either UAS detection, tracking, ID, or mitigation. Each type of technology has inherent capabilities and limitations. Acquisition of these technologies requires strategically balancing detection effectiveness, accuracy, coverage, ID capabilities, and the ability to locate the operator, all while considering cost. If mitigation systems are also used, careful attention must be given to ensuring adherence to established mitigation legal authorities. The potential for adverse collateral effects should also be considered, which may include spectrum disruption, falling debris, or downrange impacts.

Finally, I would like to highlight the vital importance of continued research and development in this space. Research consortiums like the Alliance for System Safety of UAS through Research Excellence

(ASSURE) and its accompanying training arm, ASSUREd Safe, are qualified, equipped, and ready to address the evolving challenges affecting National Airspace System safety and security, thereby enabling continued progression toward the full integration of advanced aviation technologies.

Thank you for the opportunity to testify before you today.

**Acknowledgements**

Preparation of this testimony was supported by a number of individuals who provided expertise, analysis, policy recommendations, and related assistance. Acknowledgement does not necessarily imply endorsement of the provided testimony.

Mr. Charles Werner, DRONERESPONDERS
Mr. Mike Monnik, DroneSec
Dr. Jon Loffi, Oklahoma State University
Dr. Anthony Galante, Embry-Riddle Aeronautical University
Prof. Tim Ehrenkaufer, Embry-Riddle Aeronautical University
Mr. Matt Smith, Embry-Riddle Aeronautical University

Ms. Sang-A Lee, Ph.D. Student & Graduate Research Assistant, Embry-Riddle Aeronautical University
Mr. Chris Sidor, Graduate Student, Embry-Riddle Aeronautical University
Ms. Claire Lebakken, Graduate Student, Embry-Riddle Aeronautical University
Ms. Amy Martin, Undergraduate Student, Embry-Riddle Aeronautical University
Mr. Tyler Johnson, Undergraduate Student, Embry-Riddle Aeronautical University

References


Altman, H. (2025). Cartel Members Fought in Ukraine to Learn FPV Drone Skills: Report. *TWZ.* https://www.twz.com/news-features/cartel-members-fought-in-ukraine-to-learn-fpv-drone-skills-report

Altman, H. & Rogoway, T. (2025). Columbian Black Hawn Downed by Drone is a Glimpse of What's to Come (Updated). *TWZ.* https://www.twz.com/air/colombian-black-hawk-downed-by-drone-is-a-glimpse-of-whats-to-come

Brading, T. (2025). Chinese National Sentenced Following Drone Flight During Restricted Launch. *Air Force Office of Special Investigations.* https://www.osi.af.mil/News/Article-Display/Article/4174084/chinese-national-sentenced-following-drone-flight-during-restricted-launch/

Bureau of Transportation Statistics. (2025). Number of U.S. Aircraft, Vehicles, Vessels, and Other Conveyances. *Author.* https://www.bts.gov/content/number-us-aircraft-vehicles-vessels-and-other-conveyances

Campbell, S. (2025). Are We Training for the Right War? *The Zero Lux.* https://www.thezerolux.com/are-we-training-for-the-right-war/

Collett-White, M., Dutta, P.K., & Zafra, M. (2025). How Ukraine Pulled Off an Audacious Attack Deep inside Russia. *Reuters.* https://www.reuters.com/graphics/UKRAINE-CRISIS/DRONES-RUSSIA/mypmjzayyvr/

Department of Justice, Office of the Inspector General. (2020). Audit of the Department of Justice's Efforts to Protect Federal Bureau of Prison Facilities Against Threats Posed by Unmanned Aircraft Systems (Report #20-104). *Author.* https://oig.justice.gov/sites/default/files/reports/20-104.pdf

Federal Aviation Administration. (2025a). Drone Sightings Near Airports. *Author.* https://www.faa.gov/uas/resources/public_records/uas_sightings_report

Federal Aviation Administration. (2025b). Compendium to FAA Aerospace Forecast FY 2025-2045: Emerging Aviation Entrants Unmanned Aircraft Systems and Advanced Air Mobility. *Author.* https://www.faa.gov/data_research/aviation/aerospace_forecasts/2025-uas-and-aam-full-document.pdf

Forero, J. (2025). Police Helicopter Downed by Drone in Columbia, Killing 12. *The Wall Street Journal.* https://www.wsj.com/world/americas/police-helicopter-downed-by-drone-in-colombia-killing-12-48117a0d?reflink=desktopwebshare_permalink

Gardner, A. & Scott, K. (2018). Census of State and Local Law Enforcement Agencies. *Bureau of Justice Statistics.* https://bjs.ojp.gov/library/publications/census-state-and-local-law-enforcement-agencies-2018-statistical-tables

Hardee, C. & Torphy, M. (2025). *Securing the Skies: Law Enforcement Drones and Public Safety*. Committee on the Judiciary of the U.S. Senate. https://www.judiciary.senate.gov/imo/media/doc/94f53245-d172-92ba-152b-06bc9ee00a50/2025-07-22%20-%20Testimony%20-%20Torphy%20&%20Hardee1.pdf

Immigration & Customs Enforcement. (2025). ICE Removes Chinese National Convicted of photographing Military Installations. *Author.* https://www.ice.gov/news/releases/ice-removes-chinese-national-convicted-photographing-military-installations

Kemp, B.P. (2024) Gov. Kemp: Georgia Department of Corrections Investigation Exposes Multi-State Criminal Enterprise [Press Release]. *Author.* https://gov.georgia.gov/press-releases/2024-03-28/gov-kemp-georgia-department-corrections-investigation-exposes-multi-state

McEvoy, C. (2024). Northern California Man Arrested for Allegedly Flying Drone Over and Photographing Vandenberg Space Force Base. *United states Attorney's Office.* https://www.justice.gov/usao-cdca/pr/brentwood-man-arrested-allegedly-flying-drone-over-and-photographing-vandenberg-space

Pearson, J. (2024). The Unusual Espionage Act Case Against a Drone Photographer. *Wired.* https://www.wired.com/story/fengyun-shi-espionage-act-drone-photography/

Price, S. (2024). Drug Cartels Using Bomb-Dropping Drones have Killed Mexican Army Soldiers: Report. *Foxnews.* https://www.foxnews.com/world/drug-cartels-using-bomb-dropping-drones-killed-mexican-army-soldiers-report

Researching Ukraine. (2025). Lessons from the war in Ukraine—Coming to a Drug Cartel Near You. *Author.* https://researchingukraine.substack.com/p/lessons-from-the-war-in-ukraine-coming

Scallon, N., & Wallace, R. (2025). UAS Sightings Report Power BI Tool. https://commons.erau.edu/db-aeronautical-science/6

Villegas, P. (2025). With Drones and I.E.D.s, Mexico's Cartels Adopt Arms of Modern War. *New York Times.* https://www.nytimes.com/2025/09/01/world/americas/mexico-cartel-weapons.html

Wallace, R.J. (2025). Why the Super Scooper Wildfire Aircraft Drone Collision Should be a Wakeup Call to the Drone Industry. *Drone Life.* https://dronelife.com/2025/02/11/drone-incidents-involving-aircraft-should-be-industry-wakeup-call/

Willoughby, S. (2025). Securing the Skies: Law Enforcement, Drones, and Public Safety [Testimony before the Committee on the Judiciary, U.S. Senate]. https://www.judiciary.senate.gov/committee-activity/hearings/securing-the-skies-law-enforcement-drones-and-public-safety