



Fact Sheet on Unmanned Aircraft Systems (UAS)

UAVs present a significant safety obstacle to the ag aviation industry. Agricultural aviators treat 71 million acres of cropland, or nearly 20 percent of treated commercial cropland nationwide, every year. They also use their aircraft to control disease-spreading mosquitos, fight fires, and protect the environment from invasive species. Much of this vital work is done just 10 feet off the ground at well over 100 mph, meaning low-flying UAVs are a danger (a 1.5 pound duck can break through an ag aircraft wind shield) and not visible.

Ag Aviation's Use of Aerial Imaging

NAAA members use airborne imaging systems on manned aircraft to collect information and photos to analyze crops. The analysis can then help agronomists and farmers to develop prescription maps to help them irrigate, fertilize, and use crop protection products in a more efficient and environmentally-friendly way.

Satellites and UAVs also share in this imaging work, but UAVs are not widely used for application of crop protection products – that task is likely decades away from coming to fruition in the U.S. While UAV applications are more common in countries like Japan, the average farm size in Japan is about 5 acres¹ compared to 441 acres in the U.S.² UAVs simply cannot carry enough pesticide, fertilizer, or seeds to make them feasible on a large scale on such large farms to make the application quickly, effectively or economically. Moreover, these small UAVs aren't heavy enough to push air and the applied product down into the crop canopy, which ensures pesticides are applied in a targeted fashion directly to and deep into the crop canopy.

Nonetheless, some aerial application businesses are beginning to use UAVs for their aerial imaging capabilities. Moreover, in 2016 NAAA member and aircraft manufacturer Air Tractor bought agricultural drone startup Hanger 78 UAV, which is developing a drone that has strobe lighting and ADS-B Out-like technology to prevent collisions with manned aircraft.

Obstacles to Ag Aviation

The agricultural aviation industry is concerned about UAVs hitting ag aircraft. Bird strikes have shown our industry how dangerous low-flying objects can be, and unmarked towers have taught us that UAV operators will likely be liable in the event of a UAV-manned aircraft accident.

Ag aviators commonly fly between 10 and 500 feet above ground level (AGL) while monitoring many gauges in the cockpit and avoiding trees, telephone poles, power lines, and birds. According to a joint report by the FAA and the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (USDA-APHIS), between 1990 and 2012 over 131,000 wildlife strikes occurred with civil aircraft, 97 percent of which were the result of collisions with birds, with 25 producing fatalities. Accident records maintained by NAAA, as taken from NTSB accident reports, show there were 10 collisions between aircraft, in which at least one of the aircraft was an ag aircraft during the last 10 years (2004-2013).

UAVs are generally similar to birds in size, but a recent FAA study shows they are much more deadly.³ A duck, made of hollow bones, feathers and sinew, weighing less than two pounds can crash through an ag aircraft windshield. A UAV of a similar weight causes far more damage to an aircraft due to dense battery packs, engines and cameras made of metal, glass and plastic.

¹ <http://www.ers.usda.gov/topics/international-markets-trade/countries-regions/japan/basic-information.aspx>

² <http://usda.mannlib.cornell.edu/usda/current/FarmLandIn/FarmLandIn-02-18-2016.pdf>

³ <http://www.assureuas.org/projects/deliverables/sUASAirborneCollisionReport.php>

In addition to avoiding birds and the obstacles mentioned above, ag aviators also have to avoid unmarked towers difficult to see – all while operating a multi-thousand-pound aircraft. From 2007 to 2016 14 pilots were collided with these towers resulting in five fatalities. In 2014, a milestone settlement was reached on a wrongful death action filed by the family of Steve Allen, an agricultural aviator who was tragically killed by an unmarked tower. The settlement awarded \$6.7 million to the aviator’s family, which was to be paid by the tower manufacturer, land owner, farmer, and others for not marking or making known the location of the tower.

There’s good reason to believe a similar outcome would occur if an accident were to occur with a UAV, as UAVs are responsible for giving way to manned aircraft, and as it’s nearly impossible to see a UAV when flying at up to 150 mph.

In 2015, the Colorado Agricultural Aviation Association teamed up with aviation and UAS organizations in the state to conduct a visibility test to determine if pilots can see UAVs mid-flight. The results showed not a single pilot could visually track a six-pound, 28-inch-wide Enduro quadcopter when flying at regular speeds, and only one of six pilots were able to even briefly spot a UAV while flying. Small UAVs are essentially not visible to pilots, a dangerous reality that greatly increases the chance of fatal crashes. The result of this test leads NAAA to believe that UAVs must be marked/lighted and equipped with an ADS-B Out-like system, and/or that UAVs and manned aircraft should not be in close proximity to one another while flying to ensure pilot safety.

UAS Federal Policy Background

The FAA Modernization and Reform Act of 2012 provided the first delineation since a 1981 advisory circular (AC 91-57) on the difference between unmanned aircraft and model aircraft. Section 336 of the Act defines model aircraft as an unmanned aircraft capable of sustained flight, flown within visual line of site of the person operating the aircraft, and flown for hobby or recreational purposes. The section also prohibits the FAA from regulating unmanned aircraft if the aircraft is used for hobby or recreational use (not commercial purposes) that are operated within the guidelines of a community based or national organization; limited to 55 pounds or less; operated in a manner that does not interfere with manned aircraft; and, if within five miles of an airport, the operator notifies the airport operator and the air traffic control tower (if the airport is towered).

The reauthorization also required the FAA to provide for the safe integration of commercial, unmanned aircraft systems into the national airspace system as soon as practicable. In December of 2015, FAA announced it would require all hobbyists and commercial users to register UAVs between 250 grams (about 0.55 pounds) and 55 pounds. Registrants must then label their UAS with a registration number provided by the FAA. After briefly being halted by a judge in 2017 for conflicting with the 2012 FAA Modernization and Reform Act, which prohibited the FAA from regulating model aircraft, the registration system was reinstated through the 2017 National Defense Reauthorization Act. As of January 2018, over 1 million UAVs have been registered with the FAA. This is compared to the 320,000 manned aircraft registered with the agency.

In June of 2016, FAA finalized its small UAS (sUAS) rule which went into effect in August of the same year. The rule applies only to commercial UAS under 55 pounds and allows UAS operators to fly without a Sec. 333 exemption. Instead, sUAS may be operated commercially by someone with a remote pilot airman certificate, which requires having a pilot’s license and completing an online course, or by taking an in-person remote pilot knowledge exam at an FAA approved test center.

In part thanks to NAAA, comments on the notice of the proposed rule, the ceiling for UAS flights was lowered from 500 to 400 feet. Other operational limitations for sUAS include that sUAS operations avoid manned aircraft, be conducted within visual line-of-sight during daylight or civil twilight, sUAS may not operate over any persons not directly participating in the operation, an sUAS may not travel faster than 100 mph, a UAV

must be inspected by the remote pilot prior to flight, and sUAS must give way to all other aircraft. Most of these restrictions can be waived by FAA if an applicant demonstrates that they will not endanger the NAS or persons on the ground. As of January 2018 the FAA was granted 1,448 Part 107 waivers. The most common waiver requests are for night operations, operations over people, and beyond line-of-sight operations.

In July of 2016, President Obama signed into law the FAA Extension, Safety, and Security Act of 2016. This bill took baby steps forward to augment aviation safety by requiring all sUAS manufacturers to make available at the time of purchase a safety statement informing the buyer about laws and regulations applicable to sUAS and recommendations for safe use of the sUAS. It also prevented UAS operators from interfering with a wildfire suppression effort, mandated a UAS traffic management pilot program, and created a UAS crash test program to determine the effect of a UAS accident with a manned aircraft.

NAAA's Actions to Promote Safety

NAAA has worked to educate UAS users and the public about how they can use UAVs safely, especially in agricultural areas.

NAAA has created free fliers to include in the bills ag pilots send to farmer customers to remind them of safe UAV practices. The flier asks farmers to hire certified UAV pilots, only use UAVs with strobe lights and an ADS-B Out-like system, and always give the right-of-way to manned aircraft to help manned aircraft to stay safe, among other suggestions.



UAVS CAN BE HAZARDOUS TO LOW-FLYING PILOTS

Don't Bet the Farm by Putting UAV Operations Above Pilot Safety.

Small UAVs can be virtually invisible—and potentially lethal—to agricultural pilots, emergency medical helicopters, law enforcement and other low-flying aircraft operating in the same airspace. Birds smaller than many UAVs have collided with aircraft, blowing through cockpit windows, disabling engines and killing pilots in the process.

Here's what you can do as a safe and responsible UAV operator:

- Get certified and well-trained in operating a UAV
- Equip UAVs with strobe lights and tracking technology, like an ADS-B Out system
- Follow the law—always give the right-of-way to the manned aircraft
- Coordinate with local aircraft operators about your UAV operations
- Carry sufficient UAV liability insurance

A UAV collision could have far-reaching consequences. An ag pilot's fatal collision with an unmarked meteorological tower resulted in millions of dollars in liability for the farmer, landowner and tower manufacturer. UAV operators could be similarly culpable for a midair collision.

Fly with care. Don't put your livelihood and pilots' lives at risk.



A message brought to you by your local aerial applicator and

Learn more at AgAviation.org/uavsafety | Knowbeforeyoufly.org | Thinkbeforeyoulaunch.com

NAAA is also working with Mississippi State University (MSU), which leads the Alliance for System Safety of UAS through Research Excellence (ASSURE) as the FAA Center of Excellence for UAS. NAAA is working to help its members donate their GPS logs to MSU so MSU can see where ag aviators fly, and use that data to develop regulatory recommendations for and inform FAA.

Finally, NAAA is working with AirMap and NASA on UAS traffic management (UTM) systems to help UAS and manned aircraft avoid one another by filing public flight plans that will allow aviators to see where others plan to fly, and potentially prevent collisions.

NAAA also serves on the FAA's Drone Advisory Committee subcommittee and the White House's Unmanned Aircraft Safety Team. NAAA also served on the FAA's UAS Identification and Tracking aviation rulemaking committee, but was one of several aviation organizations that dissented from the reports final recommendations because it exempted far too many types of UAS and did not recommend a weight threshold for ID and tracking

requirements, specifically that UAVs weighing more than half a pound should be required to be tracked and identified for safety and security purposes..

NAAA's Recommendations to Congress

NAAA can't keep the skies accident-free on its own. NAAA is concerned that the widespread use of UAS without safe integration will result in low-level aviation accidents and potential loss of life to ag pilots, and we're asking Congress to help improve safety in the NAS.

A fundamental safety principle is the ability to see and avoid obstructions and other aircraft in the airspace in which they operate. This principle can only be utilized when other aircraft do their part to avoid collisions by making their whereabouts known. Requiring UAS to be identified and well-marked will considerably decrease the likelihood that a UAS will collide with a manned aircraft.

NAAA believes that the following safety precautions would significantly reduce the likelihood of UAS collisions with manned aircraft, and is advocating these positions to the FAA and Congress:

- Before UAS operate in areas commonly trafficked by manned aircraft, such as above farms, they should be equipped with an ADS-B Out or LATAS (Low Altitude Tracking and Avoidance)-like surveillance technology in which an aircraft determines its position and continually broadcasts it, enabling the UAV to be tracked and land in the event that a manned aircraft is approaching from a potentially unsafe distance.
- UAS should be equipped with visible strobe lights so that they may be observed by manned aircraft.
- UAS pilots should be held to standards similar to manned pilots. This includes a second-class medical certificate to demonstrate physical capability to operate a UAS.
- Like manned aircraft, UAS should be certified as being airworthy by the FAA prior to having permission to fly in the NAS to ensure safety.
- UAS should be painted in readily distinguishable colors, such as aviation orange and white, to increase visibility.
- UAS should be required to land immediately if the observer or operator see a manned aircraft within two miles of the UAS.
- The training and licensing of UAS operators who intend to spray chemicals should be equally as stringent as that for aerial application pilots in terms of obtaining commercial pesticide licenses; ensuring compliance with state regulations, 14 CFR Part 137 regulations, and EPA regulations.
- Commercial UAS operators should be required to carry liability insurance and ensure their UAS is properly maintained.

NAAA represents approximately 1,800 members in 46 states. NAAA member operator/pilots are licensed as commercial applicators that use aircraft to enhance food, fiber and bio-fuel production, protect forestry, and control health-threatening pests. Furthermore, through its affiliation with the National Agricultural Aviation Research & Education Fund (NAAREF), NAAA contributes to research and education programs aimed at enhancing the efficacy and safety of aerial application.

Questions? Contact Andrew D. Moore, NAAA Executive Director (admoore@agaviation.org) or Frank Taylor, Coordinator of Government and Public Relations (ftaylor@agaviation.org).

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