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Hope For Environmental Drones Is Still Up In The Air

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Unmanned aerial systems, or drones in common parlance, hold obvious utility for environmental applications. The Federal Aviation Administration itself recognizes their utility for "aerial photography, surveying land and crops, communications and broadcast, monitoring forest fires and environmental conditions, and protecting critical infrastructures."[1] Small, maneuverable drones loaded out with Summa canisters have been used for low-altitude air sampling and stack testing. Swap the canister for a lightweight, high-resolution or infrared camera and the same drone can execute a variety of environmentally relevant surveillance measures, such as assessing damage to vegetation from invasive species.

In the basic site investigation context, a drone might provide real-time overhead imagery for the telltale discoloration or stressed vegetation caused by discharges of hazardous substances on large sites. It could sweep difficult-to-access surface areas for cultural resources or other elements for an environmental impact statement prepared pursuant to the National Environmental Policy Act or its state-equivalents, such as the California Environmental Quality Act. Drones offer low-impact and, given the ever-progressing efficacy of modern sensors, more accurate surveillance of wildlife, demanded by the federal Endangered Species Act. Indeed, some military drones have reportedly been repurposed to do just that.

While the UAS is not new, the small, relatively inexpensive, user-friendly ones likely to be helpful in the environmental field are relatively recent innovations. They represent the melding of two strains of aircraft technology: unmanned military aircraft and recreational hobby model aircraft.

Unmanned military aircraft date back to World War I and World War II predominately as aerial targets and crudely guided munitions, but the early postwar years saw drones used in air sampling. In 1946, World War II-era bombers, retrofitted for radio control, took radioactive air samples off Bikini Atoll. The drone's progression from a niche curiosity to a high-capability information collection platform hit its stride with the deployment of the iconic Predator reconnaissance drones in the Balkans during the mid-1990s.

Of more general application to the environmental field than the conventional aircraft-sized, resource-intensive drones, such as the Predator, are their smaller-scale and portable cousins: model aircraft for recreation. Remote-controlled hobby airplanes date to the 1930s, but increasingly have gained popularity over the years, particularly with the development of strong but lightweight materials and advancements in wireless technology. Because of these innovations, the costs have fallen precipitously in the last few years. Today, a recreational, remote-controlled model aircraft can be had for the cost of a

nice dinner. More importantly, stable and programmable drones with sufficient loadbearing capacity to carry equipment, such as cameras or sampling devices, are now readily available, costing about the same as a high-end bicycle.

The FAA tightly regulates any aircraft in the national airspace and defines both expansively. According to the FAA, it is "responsible for the safety of U.S. airspace from the ground up."[2] Under 47 USC §40102 and 14 CFR 1.1, an aircraft is literally any device "invented, used, or designed to navigate, or fly in, the air." FAA regulations require all aircraft to possess a certificate of airworthiness, exhibit identifying registration numbers on the exterior of the aircraft, and carry medical and safety equipment, among other things.[3] The regulations further require that operators of aircraft possess an airman's certification and a medical certificate.[4] As one administrative law judge for the National Transportation Safety Board noted, taken to the extreme, this combination could snare even "paper aircraft, or a toy balsa wood glider," in the FAA's regulatory net.[5]

While the FAA does not require airworthiness certificates for folded paper airplanes or aviation insurance and pilot licensure for the children lofting them, the FAA does take the position that model aircraft are aircraft subject to its regulation. A 1981 FAA circular[6] set out voluntary operating standards for model aircraft without distinction as to whether the model aircraft was for commercial or recreational use. Then, in a 2007 policy statement, the FAA stated that "no person may operate a UAS in the National Airspace System without specific authority[.]" 72 Fed. Reg. 6689. It limited the 1981 standards to "modelers" and excluded "its use by persons or companies for business purposes."

This policy left commercial users of drones in a regulatory quandary. If they were to use drones for commercial purposes, such as for film, television or even wildlife research, they would have to comply with the FAA regulations. For researchers and nonprofit environmental organizations, the cost of complying with the FAA regulations effectively prohibited use of this immensely powerful technology for gathering critical data.

In 2012, Congress enacted the FAA Modernization and Reform Act.[7] The Act likewise required the FAA to exempt out "model aircraft" if "flown strictly for hobby or recreational use," is 55 pounds or less, and is operated in accordance with certain other restrictions.[8] As to commercial uses, the Act requires the FAA to promulgate regulations for the integration of UAS into the national airspace by Sept. 30, 2015. Until such regulations are promulgated, the secretary of transportation is authorized under Section 333 of the Act to exempt out commercial drone operations that "[a]s a result of their size, weight, speed, operational capability, proximity to airports and populated areas, and operation within visual line of sight do not create a hazard to users of the national airspace system or the public or pose a threat to national security."

The FAA has been accepting and increasingly granting exemption petitions under Section 333. Most of the exemptions granted require the UAS to: (1) be under 55 lbs., (2) not exceed 50 knots ground speed, (3) fly below 400 feet, and most significantly (4) be flown by a licensed pilot. Beyond those, the operator must apply for a Certificate of Waiver for Authorization, which generally informs the "FAA Air Traffic Control facilities … of proposed UAS operations, and provides the FAA the ability to consider airspace issues unique to UAS operations."[9] The licensed pilot requirement is above that required for hobby or recreational drones and may create an impediment to casual drone use for collecting environmental data. However, the license required is the ubiquitous private pilot license, not the more demanding commercial license pilot ordinarily required to operate an aircraft for compensation. Consequently, it is possible that the employee or member rosters of environmental consultants and even fair-sized interest groups serendipitously already include individuals with private pilot licenses. Nevertheless, this

requirement still poses a significant barrier to the use of drones for most educational and nonprofit organizations or small businesses in the environmental arena.

The FAA proposed the Small UAS Rule, Part 107 in the Federal Register on Feb. 23, 2015. Not surprisingly, the proposed rule largely mirrors current waiver criteria. It would relax the pilot requirements through an "unmanned aircraft operator" certificate but still requires associated vetting, testing and inspections of the UAS. The altitude ceiling is slightly more generous than the waivers, rising from 400 to 500 feet. However, the most significant limitation — the visual line-of-sight requirement — remains.[10]

The effect of this line-of-sight limitation on the environmental application of drones is largely a function of terrain. It might matter little for an aerial photographic survey of a limited and relatively flat and open area, free of dense vegetation. On the other hand, it could be fatal for a study of invasive vegetation on a large, wooded and hilly property where maintaining line of sight would be impracticable.

This and other limitations are certain to be significant points of contention in the notice and comment period, which extends to April 24, 2015. Delivery drones, which could allow rapid home delivery of purchased goods from distribution hubs, are proving a particularly promising technology with powerhouses such as Amazon.com Inc. making continuous advancement. Absent some other exception, the line-of-sight requirement presents a potentially insurmountable impediment to the home delivery drone. It is thus likely to receive extensive attention during the notice and comment period, and probably a legal challenge if it survives.

In the meantime, regulatory options for drone use to gather environmental data remain limited. Reliance on a hobby/recreational exception is not advisable: The FAA has been averse to that tack since 2007 and has levied substantial fines on unapproved commercial drone operations, albeit only on allegations of reckless operations. Currently, the only viable option for drone use is through an aircraft and use-specific exemption under Section 333 of the Act.

Such exemptions were quite rare up until about a year ago, but the pace of exemption issuance has increased to a point of practicality for many organizations in the environmental sector. Now, 53 applications have been approved for about 45 different companies and approximately 600 applications are currently pending. An FAA policy issued on March 24, 2015, allows companies granted Section 333 exemption to operate any qualifying drone in any unrestricted airspace at or below 200 feet. Line-of-sight requirements still apply, but applicants need not submit a new application for each drone or geographic area of operation.

Drone technology promises immense utility for a range of environmental applications that can assist in greater protection of our environment and natural resources. Until a workable alternative to the line-of-sight requirement can be found, however, the employment of drones for the collection of environmental data will continue to fly in a challenging regulatory terrain.

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[1] U.S. Department of Transportation, Federal Aviation Administration, Integration of Civil Unmanned Aircraft Systems (UAS) in the National Airspace System (NAS) Roadmap, at 4 (November 2013).

[2] "Busting Myths about the FAA and Unmanned Aircraft" available at http://www.faa.gov/news/updates/?newsId=76240 [last visited March 27, 2015]

[3] See 14 CFR Parts 23-43 (Airworthiness), Part 45 (Identification and Registration Marking), and Part 91 (General Operating and Flight Rules).

[4] See 14 CFR Part 61.

[5] See Decisional Order at 3, FAA v. Raphael Pirker, Docket No. CP-217 (National Transportation Safety Board Office of Administrative Law Judges, March 6, 2014).

[6] See Advisory Circular 91-57.

[7] Public Law 112-95.

[8] Public Law 112-95, Sec 336.

[9] See Petitioning for Exemption under Section 333, available at http://ipv6.faa.gov/uas/legislative_programs/section_333/how_to_file_a_petition/ [last visited March 27, 2015].

[10] The Act provides for "the development of processes to facilitate the safe operation of unmanned aircraft [for both research and commercial purposes] beyond line of sight" only in the Arctic. Section 332(d)(1).
