Unmanned Aircraft Systems in the state of Maryland

A report connected to the Unmanned Aircraft Systems Research, Development, Regulation and Privacy Act of 2015

As required by: Maryland General Assembly CH 164, Acts of 2015

Submitted by:
The Maryland Department of State Police and the Maryland Department of Transportation Maryland Aviation Administration in partnership with the Maryland Coordination and Analysis Center and other state and local agencies

December 2018

Contents

Scope

The Unmanned Aircraft Systems Research, Development, Regulation and Privacy Act of 2015 was enacted by the Maryland General Assembly (CH 164, Acts of 2015) and signed into law by Governor Larry Hogan on 12 May 2015. Section 5 of the Act requires the preparation of a report by the Maryland Department of State Police, the Maryland Department of Transportation Maryland Aviation Administration, local law enforcement officials, and other appropriate local government officials to be submitted on or before 31 December 2018 to the Governor and the General Assembly. The report must include the following:

- Findings from a review of the state of Unmanned Aircraft System (UAS) recreational use including incidents or patterns that interfere with state or local public safety efforts or sensitive areas or facilities; and
- Recommendations regarding changes to State law or local regulatory authority needed to support governance or enforcement efforts related to unmanned aircraft systems.

The Maryland Department of State Police (MDSP) and the Maryland Department of Transportation Maryland Aviation Administration (MDOT MAA), in partnership with the Maryland Coordination and Analysis Center, University of Maryland UAS Test Site, and other local and state agencies gathered, analyzed and presented findings regarding incidents and patterns on small UAS (sUAS) activities in accordance with the guidance in Section 5 of the Act.

Methodology

Incidents involving a sUAS often referred to as drone, or Unmanned Aerial Vehicle (UAV), that were reported to the Maryland Department of State Police (MDSP) in coordination with the Maryland Coordination and Analysis Center (MCAC) were analyzed for trends or patterns.

Incidents not involving law enforcement response are assumed to be following appropriate Federal Aviation Administration (FAA) regulations regarding sUAS use. As such, incidents that rose to the level warranting a police response or a communication to the FAA were analyzed with the presumption that there was a disregard for FAA regulations. Incidents reported included date, time, reporting agency case number and information, reporting officer contact information, complainant information, location classification, description of incident, sUAS operator information (if identified), UAV description (if available) as well as other pertinent incident information. (See Appendix E for incident entry form)

The working group conducted a survey of Law Enforcement, Fire/EMS, and Emergency Management personnel regarding interference by sUAS with first responder activities, and sUAS use by first responders.

The survey of first responders was conducted to collect information on any incident of interference with first responder activities. The survey was later expanded to include non-first responder public entities as well, to identify potential areas of concern including suspicious activity or interfering with other government activities. The survey also requested additional

details on first responder use of sUAS on the presumption that as the use of sUAS in first responder activities increases, the opportunities for interference will also increase. This provided the opportunity to assess how many respondents were using sUAS in their operations and to examine the benefits.

Between 1 March 2018 to 15 June 2018, 96 surveys were completed from unique first responder entities across the state including 54 law enforcement, 21 fire/EMS, 15 emergency services, and six emergency management departments in 22 counties across Maryland and Baltimore City. An additional 31 surveys were completed by other local government agencies. (See Appendices J-L for an example entry form and responses by sector)

A working group of select representatives discussed the current state of sUAS, continuously changing legal landscape and difficulties regulating sUAS, planning, data collection, results, and any other relevant issues.

On 16 August 2016, MDSP sent out a communication to relevant stakeholders to elicit participation in a working group. The first meeting occurred on 19 September 2016. Representatives from the following agencies attended the meeting: MDOT MAA, Charles County Sheriff's Office, Cecil County Sheriff's Office, Mayor's Office of Emergency Management (Baltimore City), City of Annapolis Office of Emergency Management, Frederick Police Department, Governor's Office of Homeland Security, Maryland Emergency Management Agency, Maryland Association of Counties, Maryland Sheriff's Association, Prince George's County Police Department, University of Maryland UAS Test Site, and the Wicomico County Department of Public Works. In 2017, the MCAC joined the working group and in the summer of 2018 began hosting regular in person and online meetings. Representatives from the Maryland Department of Public Safety and Correctional Services, and Baltimore County Police Department have also attended subsequent meetings. The group met 6 times over the course of the study.

Recreational Use of Unmanned Aircraft Systems in the state of Maryland

Fixed wing and rotary wing aircraft of different sizes, weights, and speeds operate across the country, from metropolitan population centers to distant airfields supporting small communities. However, it has been a challenge to integrate sUAS into airspace designed for manned aircraft and rules written from a legacy framework. The United States Congress recognized the importance of sUAS integration into the National Airspace System with the enactment of the FAA Modernization and Reform Act of 2012.[1] Using a solid body of knowledge on aviation principals, airspace management and legal constructs the Congress developed a clear and common understanding of what is required to safely and routinely operate sUAS.

Small UAS are portable, reasonably easy to learn and operate, and are increasingly affordable as more manufacturers enter the market, making the technology attractive to hobbyists, and public and private entities. The FAA predicts that the growth of hobbyist sUAS use will likely double in the next five years.[2]

According to the FAA, as of 12 July 2018, the number of sUAS registrations in the US is 1,150,241. Of those, 20,770 sUAS registrations are in Maryland, ranking the state 17th in the US including DC and Puerto Rico in total sUAS registrations. Additionally, Maryland has 1,660 remote pilots in accordance with Part 107.[3]

Washington, DC Special Flight Rules Area

The National Capital Region is governed by a Special Flight Rules Area (SFRA). The SFRA covers a 30-mile radius around Ronald Reagan Washington National Airport and includes a 15-mile radius inner ring defined as the Flight Restricted Zone (FRZ). Flights in the DC SFRA are more restrictive than in any other part of the country. Flying an UAV within the 15-mile radius inner ring FRZ is prohibited without specific FAA authorization. In Maryland, the FRZ affects Charles, Montgomery, and Prince George's counties. However, flying a sUAS for recreational or non-recreational use between the 15- and 30-mile outer ring SFRA are no different than for other parts of the National Airspace System (NAS) which fall under recreational rules or under FAA Part 107 regulations for commercial operations. FAA Part 107 bounds sUAS operations by the following generalized conditions:

- Aircraft must weigh less than 55 lbs. (including any attachments such as a camera)
- Aircraft must be registered and marked (if it is not operated exclusively under the Special Rule for Model Aircraft, pending NOTAM change)
- Fly below 400 ft.
- Fly within Visual Line of Sight (VLOS) of the operator
- Fly in clear weather conditions
- Never fly near other aircraft

Additional Flight Restricted Areas

Much of Baltimore City is controlled airspace[*] (Class B, D, or lateral E-at-surface airspace) which requires formal waivers to FAA Part 107 regulations for sUAS operations. Additionally, there are often scheduled temporary flight restrictions in place and many of the buildings have heliports that can limit sUAS use within the city.

Additionally, areas of Anne Arundel, Baltimore County, Baltimore City, Charles, Prince George's, and St. Mary's counties have national security sUAS flight restrictions.[4]

Academy of Model Aeronautics Flying Sites

According to the Academy of Model Aeronautics (AMA) website, there are 22 AMA registered flying clubs in Maryland. These AMA chapters generally utilize between 1-4 predesignated flying sites around Maryland. Clubs can differ on types of aircraft flown at each site including electric, fuel/gas, park flyers, and/or radio controlled.[5]

[*] The two categories of airspace are: regulatory and non-regulatory. Within these two categories, there are four types: controlled, uncontrolled, special use, and other airspace. The categories and types of airspace are dictated by the complexity or density of aircraft movements, nature of the operations conducted within the airspace, the level of safety required, and national and public interest. (Source: FAA)

Unauthorized or Unsafe Unmanned Aircraft Systems Use in the state of Maryland

To address the requirements of the Unmanned Aircraft Systems Research, Development, Regulation and Privacy Act of 2015, the MCAC assisted the Maryland Department of State Police and disseminated a bulletin in December 2016 instructing all Maryland law enforcement agencies to report incidents reported to or investigated by any Maryland law enforcement agency involving a drone, unmanned aerial vehicle, or unmanned aircraft system to the MCAC.

To further assess, a survey of law enforcement, fire/EMS, and emergency management personnel was conducted regarding interference by a sUAS with first responder activities and sUAS use by first responders. The survey was later expanded to include non-first responder government entities as well, to identify potential areas of concern including suspicious activity or interfering with other government activities. In all, 129 surveys from unique entities were completed.

Incidents Reported to Law Enforcement

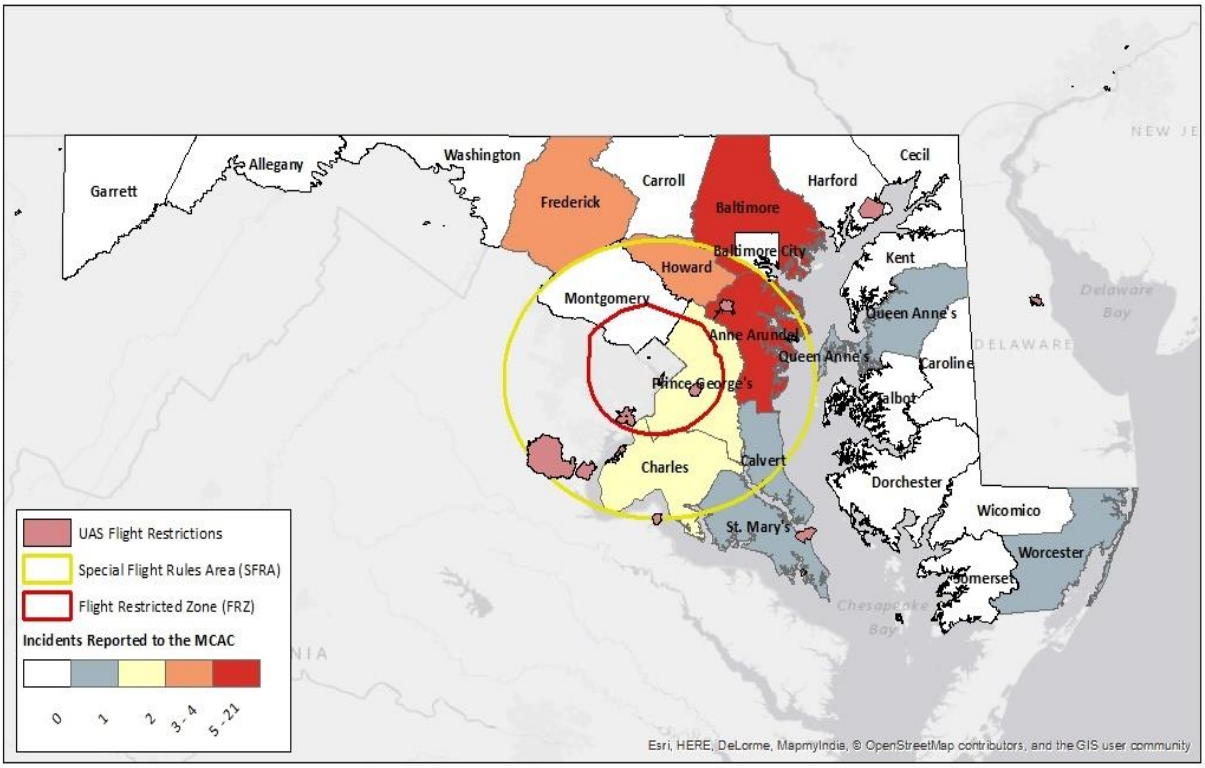
Starting 1 January 2017 to 30 June 2018 any incidents that included one or more of the following criteria were reported to the MCAC:

- The crash or near crash of a drone where there was injury or property damage.
- Use of a drone in the commission of a crime under Maryland law, including violations of protective or peace orders.
- Unsafe use of a drone, including use within protected airspace, too close to an aircraft, airport etc.
- The use of a drone to observe, photograph or interfere with a police, and/or a fire/EMS response.
- Other complaints regarding the use of a drone which were received (even if not formally investigated) by law enforcement. This includes "nuisance reports", "concerned citizen reports" and "good intention reports" and civil complaints, etc.
- Other reports which may be of interest.

During the reporting period, law enforcement agencies and the FAA reported 54 incidents involving sUAS directly to the MCAC. The incidents types and number of incidents are listed below.

Incident Types

10	Flight of drone too near to persons or property	5	Nuisance to general public
10	Restricted or Prohibited Airspace Violation	4	Flight of drone too near an airport or helipad
8	Spying, Voyeurism, or Unauthorized Photography	2	Flight too close to or causing hazard to an aircraft (inflight or on the ground)
8	Crash of Drone or sUAS	1	Hindering Police, EMS, or Fire Department Operations
5	Drone Sighting (report by citizen with no particular reason for concern)	1	Other



Map Sources: ESRI, FAA, US Census, MCAC

While many of the incidents were not a criminal act or illegal in nature, in the aggregate, the incidents highlight vulnerabilities and obstacles in law enforcement handling of sUAS-related calls for service.

Difficulty identifying the operator

The operator identified by either law enforcement or the complainant in 28% (15) of the incidents reported.

Both recreational and Part 107 sUAS operators must adhere to the VLOS rule, however, when a UAV is hundreds of feet in the air, the operator can still be in compliance, maintaining VLOS, but creating a challenge for law enforcement to ascertain the operator's location. Adding confusion to the situation is if the operator has a Part 107 VLOS waiver (which at the time of this report is very rare); there is no way to indicate so from a distance. LE could potentially be expending resources trying to locate an operator when there was no disregard of any number of Part 107 regulations.

Difficulty providing a UAV description

A description of the UAV containing more than 'Small Consumer Grade (>55lbs & >24)', to include the color, the amount of propellers or any other additional descriptor, was reported in 33% (18) of the incidents. In 22 incidents, there was no description provided.

Small UAS registration numbers or sUAS operator's registration numbers can be affixed by permanent marker, label, or engraving, directly on the sUAS as long as the number remains affixed to the aircraft during routine handling and all operating conditions, and is readily

accessible and legible upon *close* visual inspection. Due to the size of sUAS, it is often impossible to see a registration number. In only 3 incidents was a FAA registration number reported with the description of the sUAS.

Disregard or lack of education on regulations

In several instances of calls for service, subsequent discussion with the operator revealed the operator was not aware of the FAA regulations in place. This continues to be an issue as more manufacturers enter the market, making sUAS more affordable and widely available. Even with the FAA's public roll-out of the sUAS registration program and the free B4UFLY mobile application, consumers may not be aware of, or may disregard, the regulations in place.

⇒ *Disregard Regulations* – There were ten incidents of airspace violations, eight of which occurred in the vicinity of a sensitive federal government facility, a direct violation of National Security UAS flight restrictions.

⇒ *Uneasiness of the General Public* – UAS have long been used in military operations, but with the availability of sUAS on consumer markets, the public can be weary and suspicious when a UAV is spotted. There were several police reports of citizen callers reporting UAV sightings in uncontrolled airspace. In some of these instances, callers mistakenly believed they were victims of harassment, or surveillance. There were three (3) incidents of an operator flying a sUAS over or near a school. In all three incidents they were elementary schools and the callers were concerned about the potential surveillance of minors.

In none of the incidents were there injuries reported, and the only damages to property sustained were to the UAV.

Unmanned Aircraft Systems and Interference with First Responder Operations

There was no identified pattern of interference with first responder operations. However, there is significance in investigating the individual incidents as these may be more likely to occur during similar first responder operations.

Maryland Department of State Police – *"A law enforcement agency helicopter was on the ground waiting for medics to return with a patient. During that time, the pilots observed a UAV approximately 790 feet to the south of the aircraft. The UAV was in the projected departure flightpath of the aircraft. The flight crew requested that the fire department contact the operator and have them land the UAV so the aircraft could transport the patient to the hospital. The fire department contacted the operator and [the operator] landed the aircraft. Due to the operator's actions, patient care was delayed approximately five (5) minutes. After the UAV landed, the aircraft was able to depart the scene."*

***

Prince George's County Fire/EMS Department – *"An identified subject was operating a drone in restricted airspace while law enforcement aircraft was in the area conducting public safety*

operations. The UAV operator directly interfered with fire department and police department personnel during efforts to bring a 5-alarm fire under control. The subject was apprehended and charged with interfering with police and fire response and reckless endangerment"

***

Baltimore City Fire Department *– "While operating on scene of a multi-fatal bus accident, a UAV appeared approximately 50-100 feet above the incident scene as fatalities were lying (uncovered) on the ground. This area was considered to be a crime scene, and was protected by an identified (ground level) exclusion zone. At the time of the occurrence, [Office of the Chief Medical Examiner] was performing identification procedures."*

***

Montgomery County Police Department *– "During a hostage barricade incident, a sUAS was observed overhead of tactical operators. During the time, there was a FAA flight restriction in place over the target residence."*

Unmanned Aircraft Systems and Critical or Sensitive Areas or Facilities

There was no identified pattern of interference with critical or sensitive areas; however, several survey respondents reported instances of unauthorized or unsafe sUAS use during special events including firework events, sporting events, and air shows. Some of the safety concerns stemming from use of sUAS at events such as this and other public events include property damage, and injury.

Suspicious activity indicators and other intrusions such as surveillance, testing or probing of security, and privacy violations are also of concern.

Washington Suburban Sanitary Commission *– "WSSC's Headquarters building was buzzed by an unmanned drone and only observed because it flew/hovered in front of a conference room in which there was a meeting. There is a nearby hobbyist park for use of remote control airplanes and we suspect that the drone came from that location. However, we were not able to confirm."*

Talbot County/Easton Airport *– "UAS have been used by realtors and marketing businesses within the Class D airspace of the airport."*

***

Prince George's County Police Department – (Summarized) Officer responded to an identified chemical business for a report of suspicious activity. Source stated that at a certain date and time two males drove up to the locked gate, exited the vehicle, and flew a drone over top of the property for approximately 30 minutes.

***

Baltimore City Police – (Summarized) Officer responded to an identified energy/natural gas facility for a report of suspicious activity. Source located a drone crashed on the property.

Areas of Consideration in sUAS operations and its impact in Maryland

In addition to the previously outlined data collection techniques, the MCAC disseminated a Request for Information to the seventy-nine Department of Homeland Security recognized fusion centers. The request was for any study or reports on sUAS for intelligence or research purposes. The responses indicated current concerns in the intelligence community included cybersecurity threats, weaponization, counter-intelligence/surveillance of law enforcement, and smuggling.

First Responder and Public Entity Use of sUAS

The policy discourse related to sUAS' integration into public safety operations is technically, legally and politically complex. There is an opportunity to not only expand sUAS capabilities in the public safety arena, but assuage fears when public safety leaders properly construct and execute sUAS policy.

For public entities, including first responder agencies, sUAS provide aerial support to departments and agencies that may or may not have had aerial capability previously. These capabilities can aide in safety, efficiency, and cost for operations such as support in fire operations, support in disaster response, inspections, search and rescue, and traffic crash and crime scene reconstruction amongst others. The enhanced technology, coupled with the ease of use and mobility makes sUAS a potentially valuable component to first responder and other public entity actions, improving both community and officer safety, while decreasing the cost of upgrading operations.

Consumers, without any criminal intent, may not be aware of the current laws and regulations as the regulatory environment is continually evolving and may be confusing to the average off-the-shelf purchaser. It is the FAA that is required to regulate aircraft operations conducted in the National Airspace System, irrespective of whether it is manned or unmanned and at what altitude.[6] However, a provision in Section 336 of the FAA Modernization and Reform Act of 2012 preempts the FAA from regulating most recreational sUAS. [7] This can be confusing to hobbyists and makes it difficult for the FAA to develop new regulatory approaches.

Our working group recognized that the UAS policy landscape is highly fluid at this time. As recently as 26 September 2018, the United States Congress passed additional legislation that addresses drone integration as part of the five-year FAA Reauthorization Act, which the President signed into law. The Act contains more than forty separate provisions regarding UAS, some of which are highlighted below.

- Section 348 requires the FAA to issue safety regulations to authorize commercial delivery of goods using drones (Amazon and other online retailers were strong advocates for this).
- Section 349, concerning recreational or "hobbyist" drones, repeals the previous exemption of "model aircraft" from FAA regulations. Section 349 now requires that recreational drones meet operating requirements and mandates that operators pass FAA-

imposed aeronautical knowledge testing, establishes the qualifications for community-based organizations that may develop safety guidelines (previously, those organizations were not defined), and requires airspace authorization from FAA coextensive with that required of commercial drone operators.

- Section 373 requires the Comptroller General to undertake a study on the regulation of UAS and the appropriate role of local governments.
- Section 351 codifies the U.S. Department of Transportation's UAS Integration Pilot Program, which also endorses the concept of co-regulation between FAA and local governments.
- Section 383 requires FAA to test UAS hazard mitigation systems at public-use airports, which will then become eligible for AIP funding once approved.
- Section 384 makes it a crime to knowingly interfere or disrupt the operation of a manned aircraft with unmanned aircraft or knowingly operate an unmanned aircraft in a runway exclusion zone near an airport.

On 10 September 2018, the National Conference on State Legislatures (NCSL) provided an update on the current UAS state law landscape. The NCSL assesses, "[a]s a result of the increased availability and popularity of UAS with commercial users and the public, state lawmakers have considered many pieces of legislation addressing what has been viewed as both an exciting new technology with great promise, and a technology of which many are wary."[8] In considering this type of legislation, state lawmakers have often run into issues of preemption.[9] If a state or local law directly conflicts with federal laws or regulations, the state or local law is likely to be invalidated. Because the FAA is the designated authority to regulate US airspace, any state or local law that conflicts with FAA regulations or attempts to regulate in an area that is within the purview of the FAA may be preempted. Recognizing that states and localities were increasingly acting on UAS regulation, the FAA now regularly releases fact sheets to provide guidance to state and local governments.

In summary, the UAS industry continues to make advancements and the federal regulatory climate remains fluid. Accordingly, the working group consensus is to allow time for the federal regulatory framework to develop and mature through on-going research and development by Federal, State, and industry stakeholders.

Appendix A: Key Terms

Certificate of Waiver; Certificate of Authorization (COA): The terms "certificate of waiver" and "certificate of authorization" mean a Federal Aviation Administration grant of approval for a specific flight operation.

Drone: An aircraft that is operated without the possibility of direct human intervention from within or on the aircraft.

Flight Restricted Zone (FRZ): The formal definition of the FRZ (as provided in CFR Title 14 - 93.331) can be summarized as the airspace defined by an approximate 15-nautical-mile radius around DCA that extends from the surface to, but not including, 18,000 feet above sea level.

National Airspace System (NAS): The common network of U.S. airspace; air navigation facilities, equipment and services, airports or landing areas; aeronautical charts, information and services; rules, regulations and procedures, technical information, and manpower and material. Included are system components shared jointly with the military.

Small Unmanned Aircraft System (sUAS): a small unmanned aircraft and its associated elements (including communication links and the components that control the small unmanned aircraft) that are required for the safe and efficient operation of the small unmanned aircraft in the national airspace system.

Special Flight Rules Area (SFRA): The area of airspace over the surface of the earth where the ready identification, location, and control of aircraft is required in the interests of national security. Specifically, the DC SFRA is that airspace, from the surface to, but not including, 18,000 feet above sea level, within a 30-mile radius of DCA. The DC SFRA includes the DC FRZ.

Unmanned Aircraft (UA): A device used or intended to be used for flight that has no onboard pilot. This device can be any type of airplane, helicopter, airship, or powered-lift aircraft. Unmanned free balloons, moored balloons, tethered aircraft, gliders, and unmanned rockets are not considered to be a UA.

Unmanned Aircraft Systems (UAS): An unmanned aircraft system is an unmanned aircraft and the equipment necessary for the safe and efficient operation of that aircraft. An unmanned aircraft is a component of a UAS.

Appendix B: Types of Unmanned Aircraft Systems

Type		Pros	Cons
Rotary-Wing	Multi-Rotor	• Accessibility • Ease of use • VTOL and hover flight • Good camera control • Can operate in a confined area	• Short flight times • Small payload capacity
	Single-Rotor	• VTOL and hover flight • Long endurance (with gas power) • Heavier payload capability	• More dangerous • Harder to fly, more training needed • Expensive
Fixed Wing	Fixed-Wing	• Long endurance • Large area coverage • Fast flight speed	• Launch and recovery needs a lot of space • no VTOL/hover • Harder to fly, more training needed • Expensive
	Fixed-Wing Hybrid	• VTOL and long-endurance flight	• Not perfect at either hovering or forward flight • Still in development

Source: https://www.auav.com.au/articles/drone-types/

Appendix C: Relevant Legislation

The FAA retains authority, with few exceptions, for manned and unmanned aircraft regulation including:

- regulation of the navigable airspace;
- operation of aircraft;
- setting aircraft certification standards; and
- pilot certification requirements.

Additionally, the FAA retains the final authority to enforce civil penalties on sUAS operators flying recklessly, unregistered, and/or who interfere with first responder activities. Any state or local efforts at regulating the operation of unmanned aircraft directly are preempted by the FAA's authority over the national airspace system. The FAA has established procedures for two different classes of sUAS operators who fly recreationally. The two discussed in this report are Section 336 of the FAA Modernization and Reform Act of 2012 (recreational use) and 14 CFR Part 107 (commercial use).

To fly under Section 336, the Special Rule for Model Aircraft, Recreational/Hobbyist UAS operators must:

- Fly for hobby or recreation only; no commercial use
- Follow community-based safety guidelines and fly within the programming of a nationwide community-based organization
- Fly within visual line-of-sight
- UAV must be under 55 lbs. unless certified by a community-based organization
- Notify the airport and air traffic control tower prior to flying within 5 miles of an airport
- Never fly near other aircraft
- Never fly near emergency response efforts
- Must be registered as a "modeler" and mark their aircrafts with the owner's registration number. Only the operator is required to be registered (not the UAV), the registration fee costs $5 and is valid for three years.

If the criterion for Section 336 is not met, operators must fly under the FAA's Small UAS rule, 14 CFR Part 107.

- Fly for recreational OR commercial use
- Operator must have a Remote Pilot Certificate from the FAA
- UAV must be under 55 lbs. including payload, at takeoff
- Fly within Visual-Line-of-Sight
- Fly in Class G Airspace
- Fly at or below 400 feet
- Fly during daylight or civil twilight
- Fly at or under 100 mph
- Do not fly in controlled airspace near airports without FAA permission
- Do not fly near other aircraft or over people
- Yield right of way to manned aircraft
- UAV must be registered under "Part 107" and the aircraft must be marked with the registration number. The registration fee costs $5 per UAV and is valid for three years.

Part 107 operators can request to be exempted from the following Part 107 regulations with a waiver:

- Operations from a moving vehicle or aircraft
- Daylight operation
- Visual line of sight aircraft operation
- Visual observer
- Operation of multiple sUAS
- Yielding the right of way
- Operation over people
- Operation in certain airspace
- Operating limitations: ground speed
- Operating limitations: altitude
- Operating limitations: minimum visibility
- Operating limitations: minimum distance from clouds

Public entities are authorized to operate sUAS under a Certificate of Waiver or Authorization (COA). This is granted by the FAA if the sUAS is not deemed to pose a threat to the National Airspace System or national and public security, can be conducted safely, and can be reasonably articulated why it is necessary including fulfilling a public mission.

Appendix D: Maryland Coordination and Analysis Center Bulletin 2016-0481

UNCLASSIFIED // FOR OFFICIAL USE ONLY

Situational Awareness Bulletin

Date: 20 December 2016 *Number: 2016-0481*

(U//FOUO) Reporting Requirements for Unmanned Aircraft Systems Incidents

(U//FOUO) Starting 1 January 2016, in accordance with Maryland Senate Bill 370/Ch. 164(5), (2015), Maryland Law Enforcement agencies will be required to document incidents reported to or investigated by their agency that involve a drone, unmanned aircraft vehicle or system, or similar device, collectively referred to as "drone." To assist law enforcement in coordinating reporting, the Maryland Coordination and Analysis Center (MCAC) is requesting that law enforcement report incidents to the MCAC Watch Section at 1-800-492-8477 or mdwatch@mcac.maryland.gov. The data collected will be presented for use in the design of future Maryland laws related to drone operations.

(U//FOUO) The type of incidents to be reported includes any of the following:

1) The crash or near crash of a drone where there was injury or property damage
2) Use of a drone in the commission of a crime under Maryland Law, including violations of Protective or Peace Orders
3) Unsafe use of a drone, including use within protected airspace, too close to an aircraft or airport, etc.
4) The use of a drone to observe, photograph or interfere with a Police, Fire or EMS response
5) Other complaints regarding the use of a drone, which were received, even if not formally investigated, by Law Enforcement. This includes "nuisance reports," "concerned citizen reports," "good intention reports," etc.
6) Other reports which may be of interest

(U) Maryland SB 370/Ch. 164(5), (2015)
Section 5. *"…That the Department of State Police, the Maryland Aviation Administration, local law enforcement officials, and other appropriate local government officials shall:*

(1) review the state of unmanned aircraft system recreational use in the State in an attempt to document incidents or patterns of the unauthorized or unsafe use of unmanned aircraft systems, including use that interferes with State or local public safety efforts or sensitive areas or facilities; and

(2) on or before December 31, 2018, report to the Governor, and in accordance with § 2-1246 of the State Government Article the General Assembly on their findings and recommendations regarding changes to State law or local regulatory authority needed to support governance or enforcement efforts related to unmanned aircraft systems."

MCAC Feedback Survey

Please take a moment to complete this on-line survey to help evaluate the quality and value of this MCAC product. Your response will help us serve you more effectively in the future. Click ***here*** to access the survey.

Situational Awareness Bulletins are a service of the Maryland Coordination and Analysis Center. The content of this document is FOR OFFICIAL USE ONLY. Any request for disclosure of this document or the information contained herein should be referred to: Maryland Coordination and Analysis Center at 800-492-8477.

UNCLASSIFIED // FOR OFFICIAL USE ONLY

Appendix E: Drone Related Incident Data Collection Form

Drone Related Incident Data Collection

This form is for the collection of data related to incidents reported to or investigated by any Maryland Law Enforcement agency involving a drone, unmanned aerial vehicle or system, or similar device, collectively referred to as "Drone" within this form. The data collected by this form will be presented for use in the design of future Maryland laws related to drone operations.

Incidents that should be entered include any of the following reported to MD Law Enforcement:
1) The crash or near crash of a drone where there was injury or property damage
2) Use of a drone in the commission of a crime under Maryland Law, including violations of Protective or Peace orders
3) Unsafe use of a drone, including use within protected airspace, too close to an aircraft, airport etc
4) The use of a drone to observe, photograph or interfere with a Police, Fire or EMS response
5) Other complaints regarding the use of a drone which were received (even if not formally investigated) by Law Enforcement. This includes "nuisance reports", "concerned citizen reports" and "good intention reports" and civil complaints, etc...
6) Other reports which may be of interest

Email address Date of Incident Time
Reporting Agency Case #
Reporting Officer
Complainant Name(s)
Location of Incident
Nearest Placename or City Lat/Log (DD MM.SS)
Original Complainant Type
Classification of Incident or Complaint
Level of Investigation
Results of the complaint, report or investigation

Type of Drone Drone Make and Model
Drone Operator Previous incidents with this operator
Drone Registration Serial Number Drone or drone parts seized ☐
Injuries [No injuries] Property Damage (other than the drone) ☐
Were any injuries or property an intentional act?
Was a report made to the FAA* [No] Category of Drone Operation*
Was Airport notification completed by the drone operator***

*A report is required for certain incidents involving the crash of the drone where there is property damage or personal injury. See https://www.faa.gov/uas/report_accident/

**This question asks for what rule set the drone is being operated under. Refer to the part 107 requirements at https://www.faa.gov/uas/media/Part_107_Summary.pdf for further information.

***For operation within 5 miles of an airport see:
https://www.aopa.org/go-fly/aircraft-and-ownership/drones/best-practices-for-flying-your-drone-near-an-airport

COMPLETE THIS SECTION ONLY IF A CRIME HAS OCCURRED UNDER MARYLAND LAW

Where any charges issued against any suspect(s)? ☐
Are additional FAA charges issued or expected?
What charges were issued

Were any arrests made (related to the use of the drone)? ☐
Suspect(s)
Name

COMPLETE THIS SECTION ONLY IF THE INCIDENT INVOLVED AN AIRCRAFT

Type of aircraft operation
Phase of flight
Aircraft Type (Make/Model)
Did a collision with the drone occur ☐ Was evasive maneuvering required ☐
Range of drone at first sight Closest Approach of Drone
Drone altitude
Drone anti-collision devices in use ☐ None ☐ Unknown ☐ Strobes ☐ Red/Green Lights ☐ White lights ☐ Transponder
If the complainant is a pilot, what is their highest rating
Cloud Cover Ceiling Visibility

Brief Description of the incident:

Use additional sheets if necessary

Appendix F: Incident Reports by County

County	Count
Anne Arundel	17
Baltimore County	21
Calvert	1
Charles	2
Frederick	3
Howard	4
Prince George's	2
Queen Anne's	1
St. Mary's	1
Worcester	2

Appendix G: Incident Reports by Original Complainant Type

Original Complainant Type	Count
Anonymous	1
General Public	25
Government Official	3
Law Enforcement Officer	19
Other Public Safety Official	1
Pilot	4
Private Sector	1

Appendix H: Incident Reports by Results of the Complaint, Report, or Investigation

Results	Count
A crime has occurred under MD law	1
Investigation is on-going	5
No Crime (Civil Matter)	1
Other	14
Report Only (No Crime or Civil Matter)	30
Unknown	3

Appendix I: Maryland Coordination and Analysis Center Fusion Center Request for Information Bulletin 2017-0413

UNCLASSIFIED//FOR OFFICIAL USE ONLY

(U) Request For Information: Seeking Information from States and Fusion Centers on Unmanned Aircraft Systems Reports or Studies

Date: 17 November 2017 *RFI #: 2017-0413*

(U//FOUO) Background: Pursuant to the requirements of Maryland Senate Bill 370 Section 5 of the Unmanned Aircraft Systems Research, Development, Regulation, and Privacy Act of 2015, the Maryland Coordination and Analysis Center (MCAC) is assisting in the review of incidents involving Unmanned Aircraft Systems (UAS) in Maryland. The review will be used to create a feasibility study on unauthorized or unsafe use of UAS including activity that interferes with state or local public safety efforts or activity around sensitive areas or facilities.

(U//FOUO) MCAC is requesting information from any other fusion center or state that has conducted a study regarding UAS or has produced a report for intelligence purposes or research purposes.

Questions and responses can be sent to mdwatch@mcac.maryland.gov and direct the response to the Critical Infrastructure lead Intelligence Analyst.

Request for Information are a service of the Maryland Coordination and Analysis Center. The content of this document is FOR OFFICIAL USE ONLY. Any request for disclosure of this document or the information contained herein should be referred to: Maryland Coordination and Analysis Center at 800-492-8477.

UNCLASSIFIED//FOR OFFICIAL USE ONLY

Appendix J: Maryland Emergency Services Survey

Note: This is a representation of the online survey.

Maryland Emergency Services Sector UAS Use Survey

The purpose of this survey is to assess current or planned UAS use by Law Enforcement, Fire/EMS and Emergency Management in the state of Maryland.

Background: Pursuant to the requirements of Section 5 of the Unmanned Aircraft Systems Research, Development, Regulation, and Privacy Act of 2015, the Maryland Coordination and Analysis Center (MCAC) is assisting in the review of use of Unmanned Aircraft Systems (UAS) in Maryland in an effort to document incidents or patterns of the unauthorized or unsafe use of UAS, including use that interferes with the State or local public safety efforts or sensitive areas or facilities. Upon completion of the review, a report will be created of the findings. The report will also provide recommendations regarding changes to State law or local regulatory authority needed to support governance or enforcement efforts related to UAS.

Part 1: Contact Information

Name _____ Agency _____

Email _____ Phone Number _____ Preferred Method of Communication ☐ Phone ☐ Email

If you are not the POC for UAS in your agency please provide the contact information for the POC here:

Name _____ Email _____ Phone _____

Part 2: UAS Usage

1. Does your agency/organization use UAS for operations? ☐ Yes ☐ No
   If 'No', please skip to question 4.
2. Do you operate the UAS under a Certificate of Authorization (COA) or under 14 CFR Part 107 rules? ☐ COA ☐ 14 CFR Part 107
3. What is the mission profile of your UAS program?
   ☐ Aerial Photography ☐ Incident Command and Control
   ☐ Tactical Support ☐ SAR
   ☐ Other (Please Describe): _____
   Continue to Part 3: UAS Interference.
4. If you answered No in question 1, does your agency/organization have plans to use UAS for operations?
   ☐ Yes, we have plans to use UAS for operations
   ☐ We are currently researching the possibility of using UAS for operations.
   ☐ No
   If 'No', please skip to Part 3: UAS Interference.
5. Do you plan on operating the UAS under a Certificate of Authorization (COA) or under 14 CFR Part 107 rules? ☐ COA ☐ 14 CFR Part 107
6. What will be the mission profile of your UAS program?
   ☐ Aerial Photography ☐ Incident Command and Control
   ☐ Tactical Support ☐ SAR
   ☐ Other (Please describe): _____

Part 3: UAS Interference

7. Has a UAS ever interfered with your agency/organization's operations? ☐ Yes ☐ No

If 'Yes', please describe the incident: _____

End of Survey

Thank you for your assistance.

Page 1 of 1

Appendix K: Maryland Local Government Survey

Note: This is a representation of the online survey.

Maryland Local Government UAS Use Survey

The purpose of this survey is to document incidents or patterns of unauthorized or unsafe use of unmanned aircraft systems in addition to collect recommendations on changes to current state law or local regulatory authority needed to support governance or enforcement efforts related to UAS.

The Maryland Coordination and Analysis Center asks for your assistance in documenting incidents or patterns of the unauthorized or unsafe use of unmanned aircraft systems, also known as "drones."

Background: The Unmanned Aircraft Systems Research, Development, Regulation, and Privacy Act of 2015, requires the Department of State Police, the Maryland Aviation Administration, local law enforcement officials, and other appropriate local government officials to report to the General Assembly and Governor:

- The state of unmanned aircraft system recreational use, and
- Recommendations regarding changes to State law or local regulatory authority needed to support governance or enforcement efforts related to unmanned aircraft systems.

For reference, you can find the full text of the law here:
http://mgaleg.maryland.gov/2015RS/chapters_noln/Ch_164_sb0370E.pdf

With growing use of unmanned aircraft systems by hobbyists, and also in various government applications, the MCAC appreciates your assistance in sharing any issues that your Department has encountered with residents using UAS, and any uses of UAS for your operations.

If you have any questions about this survey, or if you are interested in contributing to the State and local workgroup developing this report, please feel to contact:
Jessica Curtis, Maryland Coordination and Analysis Center (MCAC) at jessica.curtis@mcac.maryland.gov or
Robin Clark Eilenberg, Maryland Association of Counties (MACo) at REilenberg@mdcounties.org

Thank you for your assistance.

Part 1: Contact Information

Agency/Depart.		Name		
Email		Phone Number		Preferred Method of Communication ☐ Phone ☐ Email

Part 2: Unmanned Aircraft Systems Interference

As part of the requirements of SB 370, a review of the state of unmanned aircraft system recreational use must be completed. This is done in an attempt to document incidents or patterns of the unauthorized or unsafe use of unmanned aircraft systems, including use that interferes with State or local public safety efforts or sensitive areas or facilities.

The questions in this section are to assess whether you or your agency have observed a UAS interfere with your agencies operations or observed a UAS around a critical facility or sensitive area that interfered with operations or aroused suspicion.

1. Have you observed any unmanned aircraft systems flying in such a way that they interfered with your agency's operations? ☐ Yes ☐ No

2. Have you observed any unmanned aircraft systems flying over a critical facility or sensitive area associated with your department or agency or another government agency or department that interfered with operations or seemed suspicious? ☐ Yes ☐ No

If you answered 'Yes' to either question, please describe the incident:

Page 1 of 2

Appendix K: Maryland Local Government Survey (Con't)

Part 3: Current or Planned Agency/Department Unmanned Aircraft System Usage

The responses to this section will be used in compiling recommendations regarding changes to state law or local regulatory authority needed to support governance or enforcement efforts related to unmanned aircraft systems.

1. Does your agency/department use UAS for operations? ☐ Yes ☐ No
   If 'Yes', please skip to Question 3

2. If you answered No in question 1, does your company have plans to use UAS for operations?
   ☐ Yes, we have plans to use UAS for operations
   ☐ We are currently researching the possibility of using UAS for operations.
   ☐ No
   If 'No', please skip to Part 4. Continue to Question 5 for other answers.

3. Do you operate the UAS under a Certificate of Authorization (COA) or under 14 CFR Part 107 rules? (or both) ☐ 14 CFR Part 107 ☐ COA
   Please proceed to Part 4

4. What is the mission profile of your UAS program?

5. Do you plan on operating the UAS under a Certificate of Authorization (COA) or under 14 CFR Part 107 rules? (or both) ☐ 14 CFR Part 107 ☐ COA

6. What would be the mission profile of your UAS program?

Part 4: Recommendations

Are there any other comments relating to potential UAS laws or regulation in the State of Maryland that you would like to add?

End of Survey

Thank you for your assistance.

Page 2 of 2

Appendix L: Type of Respondents Survey Results (Aggregated)

Allegany	**6**
Emergency Services	1
Fire/EMS	3
Law Enforcement	1
Law Enforcement - University	1
Anne Arundel	**5**
Emergency Management	1
Fire/EMS	2
Law Enforcement	1
Fire/EMS - Airport	1
Baltimore County	**10**
Emergency Management	1
Fire/EMS	2
Health	1
IT	1
Law Enforcement	1
Library	1
Parks/Rec	1
Public Works	1
Law Enforcement - University	1
Baltimore City	**3**
Emergency Management	1
Fire/EMS	1
Law Enforcement - University	1
Caroline	**5**
Emergency Services	1
Law Enforcement	3
Planning	1
Carroll	**5**
Fire/EMS	1
Law Enforcement	4
Cecil	**5**
Emergency Services	1
Law Enforcement	3
Legal	1
Charles	**2**
Emergency Services	1
IT	1
Dorchester	**1**

Emergency Services	1
Frederick	**4**
Fire/EMS	1
Law Enforcement	3
Garrett	**4**
Detention	1
Emergency Services	1
Health	1
Law Enforcement	1
Harford	**4**
Emergency Services	1
Law Enforcement	3
Howard	**4**
Detention	1
Fire/EMS	2
Law Enforcement	1
Kent	**3**
Emergency Services	1
Law Enforcement	1
Administrative	1
Montgomery	**8**
DOT	1
Fire/EMS	1
General	1
Health	1
Law Enforcement	3
Administrative	1
Prince George's	**12**
DOE	1
Emergency Management	1
Fire/EMS	1
Law Enforcement	5
Legal	1
Law Enforcement - University	2
Law Enforcement - Water Treatment	1
Queen Anne's	**5**
Emergency Services	1
IT	2
TV	1
Administrative	1
Region	**3**
Emergency Management	1

Health	1
Law Enforcement	1
Somerset	**6**
Emergency Services	1
Law Enforcement	2
Public Works	1
Law Enforcement - University	1
Administrative	1
St. Mary's	**2**
Law Enforcement	1
Local Gov't	1
State	**6**
Emergency Management	1
Fire/EMS	1
Law Enforcement	4
Talbot	**4**
Local Gov't	2
Planning	1
Law Enforcement - University	1
Washington	**4**
Emergency Services	1
Law Enforcement	1
Local Gov't	1
Administrative	1
Wicomico	**11**
Emergency Services	1
Fire/EMS	4
Law Enforcement	5
Public Works	1
Worcester	**7**
Emergency Services	3
Fire/EMS	1
Law Enforcement	2
Planning	1

Appendix M: Survey Results of Unsafe/Unauthorized sUAS Use (Aggregated)

While operating on scene of a multi-fatal bus accident, a UAV appeared approximately 50-100 feet above the incident scene as fatalities were lying (uncovered) on the ground. This area was considered to be a crime scene, and was protected by an identified (ground level) exclusion zone. At the time of the occurrence, OCME was performing identification procedures. (2). While operating during a 4th of July fireworks detail in the Inner Harbor, (2) UAV's operated at low altitudes over BCFD boats performing security sweeps of adjacent public areas. BPD Foxtrot was also operating in the immediate area and it is unknown if the UAV's had direct effects on same. *(Baltimore City Fire Department)*

Interfered with special event (Fourth of July Fireworks) *(Berlin Police Department)*

During a hostage barricade incident, a sUAS was observed overhead of tactical operators. During the time, there was a FAA flight restriction in place over the target residence. *(Montgomery County Police Department)*

We own and operate the Montgomery County Airpark in Gaithersburg. There have been reports from concerned neighbors regarding people's use of UAS and their concerns with it interfering with aircraft over their homes. *(Montgomery County Revenue Authority)*

On the scene of a large fire, a UAS was in the vicinity of the building while a PG Police Helicopter was providing support to the incident. The operator in this incident was located and charged. Another recent incident included a UAS being operated by the media on a crime scene. There have been a few incidents of UASs being operated in close proximity to FedEx Field during events. In all cases operators were hobbyists that claimed to be unaware of any flight restrictions. *(Prince George's County Fire/EMS)*

Usually during our yearly Air Show in June, we have unauthorized UAS roaming around the show center and the entering back bay to catch some footage of the show. *(Ocean City Emergency Services)*

A few years back there was an UAS flying over/around the hospital grounds. Not sure if the operator was located. *(Springfield Hospital Center Police)*

UAS have been used by realtors and marketing businesses within the Class D airspace of the airport. *(Talbot County/Easton Airport)*

Game day activities during Maryland football games. *(University of Maryland Police Department)*

WSSC's Headquarters building was buzzed by an unmanned drone and only observed because it flew/hovered in front of a conference room in which there was a meeting. There is a nearby hobbyist park for use of remote control airplanes and we suspect that the drone came from that location. However, we were not able to confirm. *(WSSC/Police & Homeland Security)*

Endnotes

[1] Federal Aviation Administration Modernization and Reform Act of 2012; 112th Congress (2011-2012); https://www.congress.gov/bill/112th-congress/house-bill/658/text

[2] Report; Federal Aviation Administration; *FAA Aerospace Forecast Fiscal Years 2018-2038, TC18-0004*; March 2018; https://www.faa.gov/data_research/aviation/aerospace_forecasts/media/FY2018-38_FAA_Aerospace_Forecast.pdf; accessed 17 August 2018; This annual report is the industry-wide standard of measurement of US aviation-related activities.

[3] Federal Aviation Administration; EC; 12 July 2018; Source is a Special Agency in the FAA Law Enforcement Assistance Program

[4] Website; Federal Aviation Administration; https://uas-faa.opendata.arcgis.com/; Accessed 30 September 2018

[5] Website; Academy of Model Aeronautics; https://www.modelaircraft.org/; Accessed on 15 August 2018;

[6] Report; Federal Aviation Administration*; Law Enforcement Guidance for Suspected Unauthorized UAS Operations*; Version 5-Issued 8/14/2018; https://www.faa.gov/uas/resources/law_enforcement/media/FAA_UAS-PO_LEA_Guidance.pdf; Document authored by the FAA to provide legal framework that's serves as the basis for FAA legal action against UAS operators and to provide guidance for LEAs to deter, detect, and investigation unauthorized and/or unsafe UAS operations.

[7] Federal Aviation Administration Modernization and Reform Act of 2012; 112th Congress (2011-2012); https://www.congress.gov/bill/112th-congress/house-bill/658/text

[8] Website; National Conference of State Legislatures; http://www.ncsl.org/research/transportation/taking-off-state-unmanned-aircraft-systems-policies.aspx; Accessed 29 October 2018

[9] Website; National Conference of State Legislatures; http://www.ncsl.org/research/transportation/current-unmanned-aircraft-state-law-landscape.aspx; Accessed 29 October 2018