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THE POSSIBILITIES OF DRONE REGULATION

A Case Study of Federal Regulation and Comparative Drone Legislation

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EXECUTIVE SUMMARY

Unmanned Aerial Systems (UAS), or drones, are becoming increasingly prominent in the world. Many people have started using drones recreationally, and there is growing market for drone hobbyists. Businesses have also found creative commercial applications for drones, like using them as a delivery system and for aerial recording. This report summarizes and analyzes the projected economic trends of drone usage, which largely point to significant market growth within the next five years. While the emergence of drones will have many benefits, there are a variety of ways they can be misused. These abuses can span anywhere from authorities or civilians invading the privacy of another person to flying too close to another UAS. This report assesses many of the ways that drones can be used haphazardly or maliciously and considers possible ways to mitigate damage caused by drones. The Federal Aviation Administration (FAA) has created rules and regulations for the commercial use of drones, and several states have adopted their own sets of regulations on drone usage. However, the only legislation to date in New Hampshire on the issue pertains to the use of UAS while hunting. This report explores existing legislation both at the federal and state levels, and the type of approaches New Hampshire could adopt. Overall this report presents different policy options that New Hampshire should consider to prevent drone misuses while simultaneously benefiting from the potential economic and security benefits of increased drone use.

1. INTRODUCTION

As technology becomes better and cheaper, drones will proliferate and become a more significant part of everyday life. It might seem like something out of a science fiction movie to have swarms of drones fly autonomously overhead doing tasks, but the technology currently exists. UAS are no longer solely for military use. They are sold as toys for children, used recreationally to take videos, and able to deliver online orders in minutes. UAS offer new opportunities for commercial, academic, and governmental uses. However, with their new capabilities come risks. What is to prevent someone from using a UAS to harass or spy on someone, weaponizing it to cause terror, or flying it near critical infrastructure? This report highlights policy issues that need to be resolved so that New Hampshire can mitigate the risks to privacy and other civil liberties while maximizing the potential economic benefits of UAS. Additionally, the report analyzes the division of regulation between the FAA and the states which maintains the authority of the federal government.

The proliferation of UAS possess necessitates a preemptive policy that maximizes their societal contribution while protecting certain personal right and state interests. New Hampshire attempted to regulate drones in 2015 with House Bill 602, but it failed to pass. The bill focused on dangers to the privacy of an individual by another or a government

entity.[1] However, the bill does not cover most of the topics concerning UAS, and more issues are likely to emerge as they become more mainstream. UAS are difficult to regulate because they are easy to acquire and are relatively cheap.

This report will start by explaining the federal regulations pertaining to UAS and the FAA's guidance to the states. Then the a number of issues will be explored that New Hampshire may need to consider given the expansion in UAS ownership and the risks it poses. Section four will analyze a case study of a number of gaps in federal regulation and how specific states have responded with their own regulation. Finally, the report will address the current and potential limitations on law enforcement UAS uses and the New Hampshire's two options on its regulation.

2. FEDERAL OVERVIEW

The FAA regulates the National Airspace System (NAS) and is, therefore, is the primary regulatory authority on UAS. Federal laws have built off of each other since 2012, creating the FAA regulations that are in place today. Knowing the extent of these regulations will allow New Hampshire policymakers to better focus its energy on the central regulatory issues not covered by the FAA: privacy protections; law enforcement uses; municipal ordinances; and critical infrastructure.

2.1. Definition

When defining what is colloquially called a "drone," it is important to separately define the aircraft itself and the system used to operate the aircraft. The FAA defines an unmanned aircraft as "an aircraft that is operated without the possibility of direct human intervention from within or on the aircraft."[2] A model aircraft is an unmanned aircraft that is "capable of sustaining flight in the atmosphere: flown within visual line of sight of the person operating the aircraft: and flown for hobby or recreational purposes."[3] A small unmanned aircraft system (UAS) is "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."[4] Despite not explicitly mentioning it in the definition, a model aircraft is still a UAS because it is also an unmanned aircraft.

2.2 FAA Modernization and Reform Act of 2012

The FAA Modernization and Reform Act (FMRA) was the first legislation of its kind to address the regulation of UAS by creating two tracks for civil use. Section 336 (Special Rule for Model Aircraft) applies solely for the use of UAS for hobby or recreation as model

aircraft. Model aircraft must weigh under 55 pounds unless approved by the Academy of Model Aeronautics (AMA), which is the "nationwide community-based organization" that oversees the recreational use of model aircraft.[5] Model aircraft may not fly near other aircraft or emergency response efforts, or outside the visual line of sight. When flying a UAS within five miles of an airport, air traffic control must be notified.[6] The vast majority of recreational UAS are flown under this provision as it is the simplest way to get the authorization to fly.

Additionally, UAS are legally required also to follow the AMA "community-based safety guidelines.[7] These guidelines include yielding the right of way to human-carrying aircraft, not flying directly over unprotected people, moving vehicles, and occupied structures, maintaining visual contact with the model aircraft, only flying turbine-powered model aircraft, not flying near stadiums, critical infrastructure, large open-air events, or any time or place where model aircraft operations are prohibited. It is prohibited to use imaging technology for aerial surveillance where there is a reasonable expectation of privacy unless permission is granted.

UAS not flown for recreational purposes can apply for Section 333 Exemption.[8] The Secretary of Transportation may decide on a case-by-case basis whether an airworthiness certificate is required for a UAS to operate in the NAS. However, FMRA requires the FAA to publish a final regulation of UAS for civil operation in the NAS to replace Section 333 within 18 months after FMRA is passed. A system is required to be put in place to expedite the authorization of UAS use for non-recreational uses.

Section 332 provides the FAA with authority to establish rules for the registration and licensing of UAS in addition to setting standards for operation and certifications of UAS and ensuring that UAS include a "sense and avoid capability."[9] The act also compels the FAA to publish a five-year roadmap that details the policies being taken to introduce civil UAS into the NAS.[10]

2.3. Registration and Marking Requirements for Small Unmanned Aircraft

The FAA Registration and Marking Requirements for Small Unmanned Aircraft (RMRSUA) established a system requiring all UAS to be registered online. The cost is $5, and it is valid for three years.[11] The registration requires UAS pilots to provide an email address, credit or debit card, physical address, and make and model of the UAS (only for Part 107). The registration was controversial because it required UAS flown as model aircraft under Section 336 to register despite FMRA stating that the FAA "'may not promulgate any rule or regulation regarding a model aircraft" that meets certain criteria. However, the FAA claims that:

> *"While section 336 bars the FAA from promulgating new rules or regulations that apply only to model aircraft, the prohibition against future rulemaking is not a complete bar on rulemaking and does not exempt model aircraft from complying with existing statutory and regulatory requirements."*[12]

2.4. Part 107

The FAA released 14 CFR Part 107 otherwise known as the Small UAS Rule (Part 107) in December of 2015 to replace Section 333 exemptions. Part 107 covers both recreational and commercial use, but because Section 336 is much more convenient, Part 107 is primarily intended for commercial use. It requires that UAS must weigh less than 55 pounds, stay within the line-of-sight of the pilot, not fly over people not involved in the operation and not below or inside a covered structure or vehicle, stay below 400 feet in altitude of the ground, not fly at night, among many others, but many requirements can be waived with FAA approval. Pilots must also pass an FAA-administered test to attain a remote pilot certificate or be under the supervision of someone with the qualification, be vetted by the Transportation Security Administration,[13] and be at least 16 years old.[14] While Section 333 still exists, the FAA has phased it out in favor of Part 107.[15]

2.5. FAA Extension, Safety, and Security Act of 2016

The FAA Extension, Safety, and Security Act (FESSA) extends the authorization of FAA programs through September 2017 and also includes additional regulations on UAS. The Act prohibits UAS from interfering with emergency response activities which includes wildfire suppression, law enforcement, or emergency response. However, this does not apply to public entities using UAS to respond to the issue. The FAA must also establish a process for applicants to petition the FAA to prohibit or restrict the use of UAS near critical infrastructure, oil refineries, chemical facilities, amusement parks, and "other locations that warrant such restrictions."[16] However, the deadline for setting the application process has come and passed with still no procedure in place to petition the FAA.

2.6. Taylor v. Huerta

John Taylor brought forth a case against Michael Huerta (Taylor v. Huerta), the Administrator of the FAA, claiming that the RMRSUA violates the FRMA by regulating the use of model aircraft despite Section 336 stating that the FAA is prohibited from possessing that authority. The United States Court of Appeals for the District of Columbia Circuit ruled in May 2017 that Taylor was right.[17] The ruling voided the requirement to

register a UAS if flying under Section 336, but it still applies to Part 107. However, the National Defense Authorization Act for Fiscal Year 2018 overturned Taylor v. Huerta by reinstating the RMRSUA. UAS under Section 336 are once again required to register with the FAA.

2.7. FAA Guidance to the States

Because the proliferation of ownership of UAS over the past few years, the FAA is in a difficult position to enforce federal laws and regulations. However, the FAA states that "State and local [law enforcement officers] are often in the best position to deter, detect, immediately investigate, and, as appropriate, pursue enforcement actions to stop unauthorized UAS operations."[18] The Administration lists some ways that states and municipal officers can assist. These include identifying potential witnesses and conducting initial interviews, identification of the UAS operator, viewing and recording the location of the event, notifying an FAA Regional Operation Center, and securing evidence. The agency states that it relies on a cooperative partnership with local law enforcement to enforce its rules, but warns against conducting any arrests, detentions or non-consensual searches as such actions fall under the legal authority of the FAA since the agency has the sole authority "to regulate the areas of airspace use, management and efficiency, air traffic control, safety, navigational facilities, and aircraft noise at its source."[19] Laws relating to "land use, zoning, privacy, trespassing, and law enforcement operations" do not fall under federal regulation.[20] In these cases, the state and local governments have the prerogative to make and enforce laws covering these issues. New Hampshire's ability to enforce FAA regulations will require resources, guidance, and on-the-ground capabilities which will require assistance from the FAA. Therefore, New Hampshire must make sure that it is well positioned to provide this sort of state-level enforcement in the coming future which will likely require developing a stronger, cooperative relationship with the FAA. This will require However, the FAA warns against municipalities enacting their own ordinances that regulate UAS. A "'patchwork quilt of differing restrictions" would hinder the ability of the FAA to coordinate flight patterns and air traffic flow,[21] as local ordinances could overly complicate airspace for pilots and the FAA.

3. IMPLICATIONS OF UAS PROLIFERATION FOR NEW HAMPSHIRE

With the ever-increasing availability of UAS technology to the public, there is a growing concern that people will use UAS for malicious purposes.[22] It is highly possible that private parties use UAS to spy on or stalk people, invade the privacy of others, or trespass onto private property. There is also a concern for safety, and people are unsure if increased UAS use will result in an increase of UAS-related injuries and incidents. While there are already comprehensive privacy, stalking, and trespassing laws established in New Hampshire,

none of these laws directly addresses the issue of UAS use and as such it is unclear if those laws would apply to a case involving UAS. There are multiple ways that the legislature could address these UAS-related issues by either adding additional provisions to existing laws or passing new laws. The following issues are not an exhaustive list of the issues the civilian use of UAS, but it addresses the main debates in today's discussion on the topic pertaining to issues that concern the legislature of New Hampshire.

3.1. Privacy

People are mainly concerned with UAS being used for spying, stalking, tracking, or any other invasion of privacy. In New Hampshire, it is currently illegal for a person to install or use a device for the purposes of observing, photographing, recording, amplifying, broadcasting, or transmitting images and sounds of the private parts of a person, a person in a private place, or a person outside a private place that is not ordinarily audible, visible, or comprehensible outside such place.[23] Considering that the problematic part of a UAS would be the recording device attached to the UAS, and the not the UAS itself, this law might be broad enough to include UAS abuses within its provisions. However, because the technology is not specifically mentioned here, there is no guarantee that a court would count a UAS abuse under this law.[24] The other extreme is also true in the sense that an innocent case of UAS usage might fall under this category. UAS fly at low altitudes, and as such a person using a UAS to record footage in a residential area might unknowingly capture imagery within private property. Similarly, it might accidentally record footage of a person in a public place in a way that is not ordinarily audible, visible, or comprehensible to an outsider. In these cases, it is possible the person is guilty of a Class A misdemeanor.[25] Unless the legislature sees this as a desirable reality, it might be worthwhile passing legislation that clarifies the bounds of privacy violations committed by UAS. If that is the case, the legislature could then also decide varying degrees of penalties for how much privacy was violated, and if the violation was accidental or not. These same issues and potential solutions apply to New Hampshire stalking laws, as those laws are also broad enough to include UAS violations potentially.

3.2. Trespassing

UAS provide people the ability to go places through a drone and camera that allows unprecedented access to the world around them. While this technology can be used for recreation and remarkable commercial feats, it also can be used maliciously. Flying a UAS over private property or critical infrastructure poses a threat that is difficult to manage. New Hampshire law addresses trespassing, but it needs to be revisited given the new issues faced by the rapid growth of technology.

3.2.1 Private Property

There is a concern that UAS can easily trespass onto the property of other people. While recording within the property of others is illegal, just flying a UAS into private property might not be illegal. Within the current language of trespass laws in New Hampshire, it is illegal for a person to enter and remain in any place in which he is not licensed or privileged to do so.[26] This law seemingly only refers to the physical body of the person accused of trespassing. As such, it is unclear whether if a person navigates his UAS into private property, it is considered trespassing. This might be problematic considering there have already been cases of UAS trespassing into private property.[27] The most famous example is the case in Kentucky where a UAS flew into a backyard of a house where a girl was sunbathing.[28] The father of the girl came out and shot the UAS down with a shotgun and was arrested.[29] While a judge eventually deemed that he was not guilty, it highlights the issue of trespassing laws potentially not being comprehensive enough to include UAS.

The legislature of New Hampshire might find it worthwhile to pass additional legislation that would define a UAS entering private property as trespassing. This way they can prevent the unwanted presence of UAS within private property and decide upon an appropriate penalty. If flying a UAS above private property is considered trespass, then it might then be additionally worthwhile to assess if the airspace a person possesses above his property is high enough to prevent a privacy violation thoroughly. Right now, a person owns at least between 83 to 400 feet above his property, which could be low enough to the ground that a high-quality camera can record relatively easily. While the FAA is the sole entity that can regulate the altitudes at which UAS can fly, the legislature might be able to increase the amount of airspace included in private property to a level that will make it difficult for UAS to record items within private property clearly. However, this might also make it harder for UAS to navigate through residential areas innocently and might inadvertently trespass.

3.2.2 Critical Infrastructure

While the FESSA prohibits flying UAS near sensitive locations and "critical infrastructure," the failure to produce a process of marking these places has pushed the issue towards the states. As previously discussed, some states have passed laws prohibiting UAS from flying in specifically defined areas of critical infrastructure. These laws clearly state what areas are off limits at what distances and distances, and given the FAA's inability to create a list, seem to be a practical solution for the short term. However, when the FAA creates its own process and list for areas of critical

infrastructure, states must recognize its authority as the sole body authorized to regulate aerial flight.

While defining areas of critical infrastructure may be a good first step for temporarily filling in the gap for the FAA, New Hampshire must recognize the issue of actually enforcing these laws. Given the difficulty of recognizing and then neutralizing a UAS threat, many laws today are nearly impossible to enforce until after the fact. While specific punishments may convince law-abiding citizens to stay away, those intent on breaking the law will be difficult to stop. In many cases, irreparable damage might be done before law enforcement can react and the lawbreaker will have achieved his or her goal. Law enforcement could track the UAS if it returns to the person flying it, but that is not guaranteed as information can be transmitted wirelessly. New Hampshire must realize the current limits of its ability to defend against UAS intrusion into critical infrastructure. As with any technology, the means to guard against its abuses usually lag behind its conception. With that being said DJI, the largest drone company for civilian use, has implemented software called "Geo-Fencing" which makes certain locations off-limits to pilots such as prisons, airports, and nuclear power plants.[30] The industry has begun to collaborate with governments, and this form of self-regulation will hopefully catch up to address the issue of unauthorized flights over critical infrastructure.

3.3. Hacking

The last major concern of public UAS use concerning its ability to record information is how secure UAS are from hackers. It happens to be that UAS are relatively easy to be taken over by hackers, and guides have even been published on how to hack a UAS.[31] Besides being a violation of property rights, this might be dangerous as it would allow people to procure recorded information of others that might be private, and people could use the UAS for malicious intent.[32] There are technologies and production methods that would make UAS more resilient to hacking attempts. However, it would be nearly impossible to require all UAS to be produced with that technology.[33] The legislature may, however, limit what civilian UAS are allowed to do depending on how hackable they are.[34] For example, if a UAS is particularly susceptible to hacking, the legislature could limit what type of technology the UAS is equipped with, the amount of information the UAS can collect, how long the UAS can retain that information, and where the UAS is allowed to fly.[35] This would mitigate the dangers associated with UAS vulnerability.[36] These restrictions might not even be necessary and could interfere with the potential beneficial uses of UAS. Even though UAS are easily hackable, it does not mean that many people have the equipment or knowledge base to do so. It might be sufficient to place criminal penalties for interfering with the UAS of others as a form of deterrence.

4. STATE SOLUTIONS TO FILL THE GAPS IN FEDERAL REGULAITONS

As drone ownership continues to grow, many states have adopted regulations addressing the main issues of UAS regulation not covered or not fully elaborated by the FAA. States UAS regulations tend to pertain to privacy, law enforcement use, municipal ordinances, no-fly zones, and protection from liability of first responders. Other issues regarding the regulation of UAS not covered in this section either have not been addressed by the states, or there is no variance on the state policy responses. For example, all states that address the weaponization of UAS have made it illegal and offer no exception for civilians. Additionally, the New Hampshire law on the use of UAS for hunting mirrors similar responses by other states which ban UAS use in most capacities.

State UAS regulation only began in in April 2013 in Virginia. Since then, most states have passed some law regulating UAS. However, it is early in the process to determine what has worked or not since UAS are still proliferating and there is little available data on the topic. What follows below is a collection of the most concerning issues on UAS regulation and the different steps that states have taken to address the issues.

4.1. Trespassing and Surveillance Over Private Property

The proliferation of UAS commonly raises the issue of trespassing and surveillance. The United States Supreme Court has not established an upper height limit to property ownership. However, the FAA considers airspace above 500 feet to be navigable airspace in uncongested areas;[37] the Supreme Court labeled this space a "public highway."[38] In *United States V. Causby* the Court ruled that a plane flying at 83 feet was an invasion of private property.[39] Therefore, the limit must lie somewhere between 83 and 500 feet.

The state of Nevada established a 250-foot ceiling under which a UAS is considered to be trespassing without the approval of the owner of the real estate. However, this height restriction may be waived or further limited under the circumstances that the UAS is in the flight path for an airport, taking off or landing, lawfully operated by a public agency, or under the lawful operation of a business or land surveyor registered in the state and approved by the FAA while not interfering with the use of the real property.[40] This creates an issue because a landowner could claim that he or she owns the airspace above the 250-foot mark, up to 500 feet.

North Carolina broadens the regulation by removing a ceiling. UAS may not conduct surveillance of "private real property without the consent of the owner, easement holder, or lessee of the property."[41] In this case, there is no defined ceiling which could cause legal issues. If a UAS flies above 500 feet, Section 336 has no flight ceiling and conducts

surveillance; it would be unclear if it is a violation of the state law against UAS surveillance since it would be operating in navigable airspace which is under the sole authority of the FAA. With cameras becoming more and more powerful, the added height might not be much of an obstacle in preventing detailed videos or photographs.

4.2. Law Enforcement Use and Warrants

The use of UAS by state and local emergency services, specifically law enforcement, is a common concern of the public. There is no federal law on surveillance, so states have adopted their own laws on its regulation.[42] Regarding the use of UAS, it has been the pattern that states require law enforcement to obtain a warrant to collect evidence or conduct aerial surveillance. Most of the following states grant exceptions for warrants by law enforcement in cases of exigent circumstances including terrorism, natural disasters, or search and rescue or in cases where written consent is given. Information gathered from unlawful surveillance is also typically not permitted to be used in judicial or administrative cases. However, states do differ on specific exceptions for the need for a warrant in particular cases.

Nevada requires a warrant to specify a period which must be less than ten days but may be renewed. A warrant is not needed if a law enforcement agency has probable cause that a person committed a crime, is committing a crime, or is about to commit a crime and exigent circumstances make it unreasonable to obtain a warrant.[43] In North Carolina, a warrant is not needed if surveillance is conducted in plain sight in a location that an officer is legally allowed to be in or when the general public is invited onto public or private.[44] Vermont prohibits UAS from monitoring citizens from exercising "their constitutional rights of free speech and assembly" without a warrant. In cases of exigent circumstances, law enforcement must obtain a warrant to the use of the UAS within 48 hours of the operation and it the warrant is denied the UAS must stop operating, and the information must be destroyed.[45] Among the few other additional exceptions for a warrant, Utah specifically allows law enforcement to use a UAS "to locate a lost or missing person in an area in which a person has no reasonable expectation of privacy."[46]

North Dakota requires warrants to list the name of the operator, the location in which the UAS will operate, the maximum period the UAS will operate in each flight, whether information will be collected on individuals or groups of individuals, and how the UAS will collect, use, disclose, or destroy the data. Flight information includes the duration, flight path, and mission objectives and a supervising person authorized by a court must verify it before it is stored for five years. Data unrelated to a crime or relevant trial may not be retained for more than ninety days, and anyone accused of a crime may have full access to the information gathered by the UAS.[47] Warrants are not needed for patrolling the

national border within 25 miles to prevent illegal entry of individuals, illegal substance, or contraband.[48]

4.3. Municipal Ordinances

Many states forbid municipalities from passing ordinances on UAS. The exception to this regulation in Connecticut is that "any municipality that is also a water company" may regulate the flight of "private and commercial" UAS only "over such municipality's public water supply."[49] Florida affirms the preeminence of the state on the regulation of UAS, but permits local governments to enforce local ordinances related to "nuisances, voyeurism, harassment, reckless, endangerment, property damage, or other illegal acts arising from the use of unmanned aircraft systems." The writing of this law reinforces the sole authority of the FAA to regulate the national airspace while recognizing the rights of states to enforce their laws on other issues despite the use of a UAS. Georgia allows municipalities to "prohibit the launch or intentional landing" of a UAS from or on public property except for commercial purposes.[50] This regulation may give towns more control over their skies, but it also may run the danger of adding to the "patchwork quilt" of UAS aviation regulation which could complicate unknowing pilots. Without an equivalent of traffic signs on the road, it is more difficult to inform the public of local UAS ordinances in the air.

4.4. Critical Infrastructure

Nevada lists "petroleum refinery, a petroleum or chemical production, transportation, storage or processing facility, a chemical manufacturing facility, a pipeline and any appurtenance thereto, a wastewater treatment facility, a water treatment facility, a mine…, a power generating station, plant or substation and any appurtenances thereto, any transmission line that is owned in whole or in part by an electric utility…, a county, city or town jail or detention facility and any prison, facility or institution under the control of the Department of Corrections" as a critical facility.[51] This list is among one of the most extensive in the country and represents the range of facilities that may be covered by any state regulation. UAS are not allowed to fly a UAS within 500 feet horizontally and 250 feet vertically of a critical facility without the written consent of the owner. North Carolina uses the same distances in its regulation prohibiting UAS from flying near confinement or correctional facilities.[52] As previously noted, the FAA has yet to release the application process to designate a location as critical infrastructure to restrict the access to UAS. The development of a system could possibly eliminate the need for states to legislate the issue of critical infrastructure.

4.5. Emergency Services

While FESSA prohibits UAS from interfering with wildfire suppression, law enforcement, or emergency response by first responders, police, or firefighters, some states have similar legislation prohibiting it. UAS regulation in Utah primarily pertains to wildfires and permits local law enforcement to "neutralize" a UAS flying in the restricted airspace of a wildfire.[53] California goes even further and declares that an emergency responder who damages a UAS interfering with the emergency service is not liable for any damage.[54] This includes Emergency medical services, firefighters, and search and rescue services.

5. CURRENT AND POTENTIAL LIMITATIONS ON LAW ENFORCEMENT USES

Since UAS are able to monitor and record information with relative ease, it is highly likely law enforcement will begin to implement their technology in their methods of collecting data. This raises a plethora of privacy concerns on behalf of the citizens since it is possible that law enforcement could go too far in their use of drones. While there are countless other uses for government UAS other than surveillance, this section will focus on this issue, as it is one of the most common debates related to UAS, to understand the impact of different levels of regulation. This section's analysis can be applied to other government applications of UAS as well. As such, it is necessary to evaluate the different options a legislature can pursue to protect the rights of its citizenry, ranging from passing no legislation at all to heavily restricting the use of drones by law enforcement. Even where no legislation is passed, there are complicated Fourth Amendment issues that can arise through drone use by law enforcement.

5.1. No Legislation or Warrant Requirement with Vague Exceptions

One possible policy option is not to regulate UAS use by law enforcement in searches at all. While potential privacy abuses and Fourth Amendment violations would possibly go unregulated by the state legislature, it would fall to the courts to determine what types of searches would be legal.[55] Although there has yet to be a case dealing with UAS searches, there have been several loosely related cases that could set a precedent for deciding cases involving UAS use by law enforcement. If the legislature of New Hampshire pursues this option, then those cases become significant factors in determining what constitutes lawful use of UAS technology and what constitutes egregious violations of privacy. It is, therefore, necessary to review those cases to understand the outcome of not regulating UAS use in law enforcement efforts through legislation.

The first case worth noting is *Katz v. United States* where law enforcement placed recording devices in a phone booth that Katz used to determine if he was involved in illegal activity.[56] Law enforcement claimed that since the phone booth was public, it was legal for them to place a recording device within it.[57] The Justices determined that the Fourth Amendment protects "people, not places," and because Katz had a reasonable expectation of privacy within the phone booth the Fourth Amendment protections applied to him.[58] This case set forth a test, "first that a person has exhibited an actual, subjective expectation of privacy and, second, that the expectation be one that society is prepared to recognize as 'reasonable.'"[59] Taken by itself, this case indicates that as long as people exhibit some expectation of privacy from UAS monitoring them, and that society sees that that expectation was reasonable, then a UAS search would violate the Fourth Amendment. It is also possible that regulation of civilian UAS use might influence what the standard expectation of privacy is in the state.[60] However, this case alone does not indicate that all UAS uses for searches is unconstitutional or whether there are varying degrees of use that might be permissible.

Two other cases might have a bearing on this issue regarding aerial observation. The first is *California v. Ciraolo* where police flew a plane 1,000 feet over the property of Ciraolo to see if he was growing marijuana in his backyard.[61] While he had fences to protect his property from ground level observers, he had nothing to obscure aerial views of his property.[62] The court determined that since people do not have a reasonable expectation of privacy from observations from aerial vehicles, this qualified as a lawful search under the Fourth Amendment.[63] Similarly, in *Florida v. Riley*, officers flew a helicopter 400 feet above the property of Riley to see if he was growing marijuana in his greenhouse.[64] Once again, Riley did not have anything covering his property from aerial observation, and the court determined that it did not violate his reasonable expectation of privacy.[65] From these two cases, it would appear that flying UAS over a person's property would be permissible as long as the observations are not any more invasive than those made from a plane or helicopter.

There are a few other Fourth Amendment cases related to technology that might also have a bearing on UAS issue. In *United States v. Knotts*, police officers put a radio transmitter in a container of chloroform to see if an employee of a chemical company was stealing chemicals.[66] After tracking the container, they found that employee was indeed stealing chemicals and Knotts asserted that the radio transmitter violated his Fourth Amendment right.[67] It was ultimately determined that because the police were only tracking his public movement that it was not a violation of the Fourth Amendment.[68] From this, it might be conceivable that the court would conclude that a UAS could surveil people moving through public grounds and track them. With facial recognition technology, this is not outside the realms of possibility.

Alternatively, the case *United States v. Jones* established that placing a GPS in a person's car to track their movements violates the Fourth Amendment, even if it only tracks a person along a public road.[69] In that case, the court decided that placing a GPS in the car of a person constitutes trespassing into property where there is a reasonable expectation of privacy. In the concurring opinions of this case, Justice Alito determined that prolonged surveillance of an individual, even in public spaces, also constitutes a search under the Fourth Amendment. This opinion resulted from the Justices' belief that conglomerated documented knowledge of where an individual frequents (e.g., a gym, bar, school) reveals information that is not easily recognizable.[70] As such, an individual most likely has a reasonable expectation of privacy for that information. If UAS were used for prolonged surveillance, the court might similarly rule that if the UAS tracked someone for too long, it might constitute a search under the Fourth Amendment and require a warrant.[71]

Another relevant case is *Kyllo v. United States*, where officers used a thermal-imaging device to determine if Kyllo was growing marijuana in his house.[72] The court ruled that use of such technology constituted a search under the Fourth Amendment.[73] The primary reason for this decision is that thermal-imaging devices are not readily available for public use. As a result, it was used to reveal information not available to the public.[74] This ruling could be applied to UAS use, specifically in cases where the UAS technology used is more advanced than what is currently on the public market, or if it is used to see other private information.[75] In the future, UAS could have higher powered cameras, thermal-imaging devices, extended battery power to stay aloft longer, or be smaller than average UAS to be stealthier. At the same time, this ruling could become less relevant as UAS technology progresses and becomes more widely available to the public.

There are those who claim that the courts are more likely to handle the evolving issue of UAS and privacy than the legislature.[76] The argument is that the courts are more suitable for handling rapidly evolving technology and that most of the successful protections of privacy have originated from the courts. According to this argument, any legislature on the matter would ultimately be insufficient and too reactionary to handle the problem sufficiently. [77] As such, leaving the responsibility to the courts might yield better protections from UAS-related violations.[78] If the courts determined these decisions without state legislation guiding them, there are many articles in academic journals to assist the courts in ruling situations constitute a Fourth Amendment search. Some have suggested that courts use the reasonable expectation of privacy test to expand the subjective expectation of privacy requirement.[79] Another article establishes three questions in which the courts should consider when making their decision, those being: what type of technology the UAS employs in the search, what the extent of the surveillance is by the UAS, and the magnitude of the privacy intrusion.[80] Some of these articles also recommend

using the mosaic theory in the decision-making process.[81] The Mosaic theory is the idea that when the court is assessing multiple aspects of a case, although individual aspects do not constitute a violation of the Fourth Amendment, the aggregate of the cases might.[82] In determining UAS cases, this becomes especially relevant, as individual aspects of UAS usage might not make up a search, but taken together it might.[83]

It is also possible to introduce state legislation that allows the court sufficient room to make its own decisions. Some states have passed laws requiring law enforcement to get a warrant before using UAS, unless the search is "in accordance with judicially recognized exceptions to the warrant requirement."[84] This essentially means that in any situation where the courts would have already ruled that a warrant not be required, law enforcement would be exempt from attaining a warrant.[85] For example, if courts rule that law enforcement can fly UAS over a person's property without a warrant, then that would count as a reasonable exception to the law.

There are also scholars who argue that leaving most of the regulatory decisions to the courts is a bad idea. They argue that while the courts might be able to react more quickly, the rulings would be inconsistent and differ from district to district.[86] Scholarly articles recommending how to decide cases often greatly differ on strategies and different judges may use these various approaches on the issue.[87] As time goes on and more UAS cases are decided, it is likely that there will be conflicting rulings.

There are also specific arguments against the use of the Mosaic theory. First, there is no definitive test to determine at which point a series of individual actions become a search.[88] For example, if a UAS is used for surveillance or tracking purposes, the court would have to decide how long the UAS would have to be in use before it violated the Fourth Amendment. There is no clear and predictable way for courts to come to a conclusion. The next problem is that there is no process for courts to compare different types of government UAS activity.[89] Since UAS can be used in various ways and be of varying quality, the courts would have to take those aspects into account each time, and ultimately determine which types of searches and UAS are invasive enough to constitute a search and which ones are not. As such it is not clear how the courts would rule on each of the unique factors present in every case. The next issue is that because there is no explicit procedure for courts to rule, there might be conflicting rulings between and within jurisdictions.[90] This issue is also a product of there being other recommended ways to assess a case outside of the Mosaic theory.

There is also criticism regarding passing legislation that mandates a warrant that also allows unwarranted searches that are "in accordance with judicially recognized exceptions to the warrant requirement."[91] One specific scholar argues that a law like this adds

essentially no further regulation other than what is already in place.[92] At its core, it establishes a status quo that requires and encourages a warrant to be sought in all cases where it is uncertain if there is a judicially recognized exception. However, if the courts rule on UAS laws in a way that is consistent with the ruling in *Florida v. Riley* and *California v. Ciraolo*, then UAS flyovers might not be considered a search under the Fourth Amendment and as such would not require a warrant.[93] At the same time it is not clear whether the courts would rule the same way, and as such law enforcement might engage in unlawful warrantless searches in situations that they thought were lawful.

Not pursuing state legislation or pursuing state legislation with vague warrant exceptions leaves most of the regulatory power to the courts. The courts have many cases that can be used as precedent in determining these cases, and some argue that they are better equipped to deal with the influx of law enforcement use of UAS. There are those, however, that argue the opposite and suggest that the state legislative remedy is the only adequate way to prepare for the inevitable increase of UAS use in the future.

5.2. Warrant with Exceptions and Varying Limitations

The next possible policy option is requiring law enforcement to attain a warrant before using a UAS. This would provide a base level of protection from potential violations of privacy exhibited by law enforcement UAS use. Besides placing a general requirement that law enforcement seeks out a warrant, the state legislature could also pass a series of exceptions. The number of exceptions passed can vary based on how much UAS use the state deems appropriate and in what situations the state determines that there is little chance for privacy violations. Even within lawful unwarranted uses, the state can place further limitations on UAS use as added protection and assurance that law enforcement does not violate the Fourth Amendment. Alternatively, the state can pass little to no exceptions if it feels that prolific UAS use is dangerous to the general safety of the public and to the level of privacy they expect. At the same time, the presence of a warrant requirement might restrict UAS use in cases where the UAS could be extremely beneficial and operate in a non-invasive manner.[94]

Many states have already passed laws requiring law enforcement to attain a warrant before using UAS with varying amounts of exceptions.[95] These exceptions include: a serious risk of terrorist activity, a reasonable belief that UAS use could prevent imminent harm or prevent a criminal from escaping, a controlled substance investigation, emergency or disaster response, a search for a missing person, traffic-related instances, crime scene documentation, or when there is permission granted by the person the officers are searching.[96] The state legislature can determine which of these they deem a reasonable warrantless use of UAS and pass any number of these regulations. UAS use in these

contexts might be beneficial as they have capabilities unavailable through the typical means of accomplishing them today.[97]

There are some cases that UAS use might be non-invasive and extremely helpful to security that might require a warrant and lack an exception.[98] An example case would be using a UAS to surveil a large public event, such as a city marathon, to help prevent acts of violence.[99] This specific use would most likely not fall under any of the common exceptions and would likely require officers to go through the process of attaining a warrant, which that itself might fail. The state legislature may decide that it would rather not add this case to a list of exceptions in fear of it being used to surveil specific individuals for reasons unrelated to the run or in fear of any other abuse, add this to the list of exceptions or add this to the list of exceptions with varying limitations. This last option would include the state legislature allowing the use of a UAS in such a case but within given parameters. For example, the UAS could only be used during the time of the race, and all information gathered during that time could only be retained for a 24-hour period.[100] Furthermore, any use of a UAS for this purpose would require the user to document the use and report it to the state government by the end of the year. This would allow the UAS to be used for general surveillance, but also protect civilians from potential privacy violations. Restrictions such as these can also be applied to any of the common exceptions listed previously.

If the state truly fears that law enforcement would use UAS to invade the privacy of citizens and violate the Fourth Amendment, the legislature could pass a moratorium until UAS technology is understood better, or a permanent ban on using UAS in general circumstances.[101] Several states have already passed moratoriums in the past and have only allowed their use in emergency circumstances or with a warrant.[102] The obvious benefit of this policy is that there is little to no possibility of law enforcement abusing UAS technology. The obvious downside to this is that law enforcement cannot take advantage of UAS technology even in cases where it is non-invasive and can help substantially.

There is enough flexibility in regulating UAS laws that the state legislature can decide just how much it trusts UAS in law enforcement control. Requiring a warrant creates a baseline expectation that searches need to have a purpose and cannot be done without limitation, and the various exceptions allow a state to decide in which situations law enforcement can be trusted using a UAS without a warrant. The additional benefit to having state legislation is that it can decide on monetary penalties for any individual or group that violates any of the state laws, further encouraging law enforcement to act legally and allowing a wronged citizen an avenue to receive compensation.

6. CONCLUSION

The issue of balancing the need to adopt new technology and protecting infringements on freedom is not new. The rapid growth of UAS ownership in the United States has increased the need to clarify the laws surrounding its use. While the regulation of UAS mostly falls in the hands of the FAA, the state of New Hampshire has an important role to play in clarifying the applicability of certain state laws to UAS and cooperating with the FAA. While there has been a past attempt to set UAS regulation in New Hampshire, it has been ignored since its failure to pass. As trends show that UAS use in the United States will continue to rise and companies will begin to increase their application of the technology further, it is imperative that New Hampshire has a policy before UAS become more mainstream. Other states have shown possible models for regulation, but ultimately New Hampshire must decide the type and degree of regulation to impose on government and civilian use of UAS so that the citizens of the state can benefit from the burgeoning economic and security benefits of UAS while remaining confident that their existing civil liberties remain intact.

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