AGRICULTURE SECTOR POISED TO SOAR WITH DRONE INTEGRATION, BUT FEDERAL REGULATION MAY GROUND THE INDUSTRY BEFORE IT CAN TAKE OFF

Comment

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I. KNOW BEFORE YOU FLY: INTRODUCTION TO THE NECESSITY OF DRONES

Imagine you are a farmer in Texas with nearly 30,000 acres of farmland. On a farming operation of that size, you would likely have to hire multiple people just to monitor the crops to effectively manage them. These employees would have to drive the farmland—stopping to evaluate the crops with the naked eye—looking for signs of a number of possible problems, such as water deficiency, weed overgrowth, or disease. If one of the employees discovers a problem in a particular area of the land in cultivation, the foreman must then undertake certain preventive measures to resolve the issue. Often, these measures include hiring a pilot to fly over and spray the fields with different fertilizers, pesticides, and other chemicals to ensure the health of the crops. While the pilot's goal is to only spray the problem areas, effective coverage often results in overspraying and covering more of the area—and using more chemicals—than necessary for effective and efficient application. Furthermore, because the farm hands monitor the crops by driving around and periodically stopping to inspect them, there is a chance they will not spot every problem immediately, resulting in more crops being harmed or lost by the time they do eventually find the problem. All of these factors contribute to inefficiency in production, result in a waste of resources, and can be highly time-intensive.[1] Consequently, the waste created affects the total profitability of the farm, the total yield produced, the products put into commerce, and the ultimate price consumers must pay. If unresolved, these adverse effects could prove extremely troublesome in the international context.[2]

The world's population is increasing at a dramatic rate; it is expected to be more than nine billion by 2050.[3] All of those people will need food, and the vast majority of them will not produce their own—about 70% of the world's population will be in urban areas by 2050.[4] With those statistics, efficient production of a reliable food source will be absolutely necessary to avoid a food shortage. One technological innovation that is available for implementation today that could drastically increase efficiency and mitigate

1. *See* discussion *infra* Part II (discussing ways drones can help combat inefficiency and waste that often occurs on farms and ranches).
2. *See* discussion *infra* Part II.
3. FOOD & AGRIC. ORG., GLOBAL AGRICULTURE TOWARDS 2050 2 (2009), http://www.fao.org/fileadmin/templates/wsfs/docs/Issues_papers/HLEF2050_Global_Agriculture.pdf.
4. *Id.*

waste is the unmanned aircraft system(s) (UAS) or drone. Increasing efficiency will be crucial in Texas, where the average farm size is almost 100 acres larger than the average U.S. farm.[5] In addition to securing a reliable future food source, integration of drones will aid in keeping Texas competitive in a global market for agricultural products.[6]

Only a few years ago, drones were completely banned for all commercial purposes, including agriculture.[7] Recently, however, the Federal Aviation Administration (FAA) has begun to permit commercial operations on a limited basis.[8] While this is a significant step toward drone integration, the FAA has not finalized a set of rules to govern such use.[9] The FAA has, however, proposed a set of rules that would, if finalized, govern how farmers and ranchers use drones in their agricultural operations.[10] This too would be a substantial step toward integration of the technology into the agriculture world, but the seemingly continuous delays in finalization of the rules have served as a hindrance to the potentially substantial benefits that drones offer to agriculture production. Moreover, the proposed operational limitations delineated in the rules—while better than the complete ban—may still be too restrictive and in need of amendment before finalization. Rather than the strict federal rules governing all commercial industries in the U.S., individual states should be allowed to set their own operational limitations as they see fit for their own purposes. Alternatively, the FAA could implement some sort of exemption application procedure by which prospective drone operators could gain exemption from some of the rules that decrease the potential benefit, subject to the FAA's determination that any exemption would pose no additional safety or security risk. Or the FAA could remove intrastate agriculture from the operational regulations altogether and allow those operations to be governed solely by the state in which the farm sits.

Drone technology presents potentially substantial benefits to the agriculture industry—discussed in Part II of this Comment—and consequently, to the economic well-being of those who choose to implement the technology into their ongoing production operations, to Texas, and ultimately to the U.S. Next, Part III provides some information about the FAA's authority to promulgate regulations governing UAS operations, and how the current regulatory landscape has come to be. Then, it analyzes the § 333 exemption process, the FAA's proposed rules, and the possible preemption questions due to Texas's drone legislation. Finally, Part IV discusses potential ways that the FAA could diverge from the proposed rules

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5. *See* U.S. DEP'T OF AGRIC., FARMS AND LAND IN FARMS 9 (2016), http://www.usda.gov//nass/PUBS/TODAYRPT/fnlo0216.pdf.

6. *See* discussion *infra* Part II.

7. *See* discussion *infra* Part III.B.

8. *See* discussion *infra* Part III.B.

9. *See* discussion *infra* Part III.C.

10. *See* discussion *infra* Part III.D.

in its final rulemaking to facilitate the realization of the full potential drones offer to agriculture and all commercial industries. Part IV also calls for a swift rulemaking without further delay, which will encourage innovation and allow producers to begin to reap the benefits of UAS integration on a large scale.

II. THE SKY IS THE LIMIT: POTENTIAL BENEFITS OF DRONE INTEGRATION IN THE AGRICULTURE INDUSTRY

A. Drones Could Lift Agriculture Production to New Heights

The integration of UAS into the agriculture industry holds the potential to positively impact the yields that producers turn out at each harvest in numerous ways.[11] First, the use of drones in precision agriculture would provide immediate benefits to farmers.[12] Monitoring crop health, or scouting, during the growing season is a job traditionally done by the farmers themselves or by hired hands, and requires walking the fields and taking notes based on physically observing the crops.[13] Using drones eliminates the need to hire help for this task and allows for quicker and more cost-effective coverage of more territory.[14] This will be particularly advantageous in Texas, where the average size of farms and ranches is 523 acres,[15] with the largest reaching greater than a half-million acres.[16] Drones also lower the rate of error inherent in the human aspect of traditional scouting.[17] Because drones will provide better, more reliable data almost instantaneously, farmers can use this data to increase their efficiency and crop yields.[18]

One way that drones could increase efficiency is by permitting farmers to detect diseases earlier and see which areas of their fields those diseases are

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11. *See generally* Todd J. Janzen & Thomas P. Redick, *Drone Use in Agriculture at Home and Abroad—U.S. Law Still "Up in the Air,"* 19 ABA AGRIC. MGMT. COMMITTEE NEWSL., no. 1, 2014, at 6 (explaining various uses for drones in agriculture, including examples of how some other countries are already using drones in the agriculture industry).

12. Matthew Grassi, *5 Actual Uses for Drones in Precision Agriculture Today*, DRONELIFE (Dec. 30, 2014), http://dronelife.com/2014/12/30/5-actual-uses-drones-precision-agriculture-today/.

13. *Id.*; *see also What Benefits Can Agricultural Drones Offer Landowners?*, UNITED FARM & RANCH MGMT. (Oct. 29, 2014), http://ufarm.com/benefits-can-agricultural-drones-offer-landowners/ (stating that farmers also use manned aircraft flights or satellites to collect data).

14. *See* Grassi, *supra* note 12; *Economic Impact of Drones in Agriculture*, FARMS.COM (Dec. 3, 2013), http://www.farms.com/news/economic-impact-of-drones-in-ag-in-kansas-70261.aspx.

15. CAROLINE GLEATON & JOHN ROBINSON, FACTS ABOUT TEXAS AND U.S. AGRICULTURE 49 (2013), http://agecoext.tamu.edu/files/2013/08/AgFacts.pdf.

16. Aaron Smith, *This Texas Ranch Can Be Yours for Just $725 Million*, CNNMONEY (May 21, 2015, 11:09 AM), http://money.cnn.com/2015/05/21/real_estate/waggoner-ranch-sale/.

17. *See* Grassi, *supra* note 12.

18. SCOTT KESSELMAN, ASS'N FOR UNMANNED VEHICLE SYS. INT'L, THE FIRST 1,000 COMMERCIAL UAS EXEMPTIONS 5 (2015), https://higherlogicdownload.s3.amazonaws.com/AUVSI/b657da80-1a58-4f8f-9971-7877b707e5c8/UploadedFiles/ZAvlBnqWSeSYXPsnKkoc_Section333Report_online022516.pdf.

affecting.[19] From this, farmers can prevent the spread of disease by treating the affected area more quickly.[20] Additionally, they can then treat only the affected area, rather than the entire field, thereby minimizing the amount of total crops lost and resources required for treatment, such as insecticides, herbicides, and fungicides.[21]

In addition to disease detection and prevention, drones can also detect which areas are nutrient or water deficient, enabling farmers to apply more water or fertilizers in those particular areas, further minimizing loss of crops and resource waste.[22] From the data collected by drones, farmers can assess their past and current production practices and techniques and will be able to justify those that work and discontinue or alter those that prohibit them from realizing their full-yield potential.[23]

In relation to detecting areas that are suffering from disease or malnutrition, utilization of drones may also help producers discover weed-dense areas in their fields.[24] Weeds threaten the productivity of crops because they compete for water and other nutrients that crops need for healthy growth in addition to serving as potential hosts for insects and disease.[25] Weeds also increase the wear-and-tear on farm equipment and simultaneously increase the fuel costs required for that equipment.[26] Farmers are typically unable to realize the severity of their weed problem until harvest.[27] By using the data collected by drones, farmers can create a weed map, identify areas of high-intensity weed growth, and employ treatment measures to eradicate them.[28]

Beyond the data gathering function, drones also provide a viable alternative for applying fertilizers and pesticides.[29] Traditional aerial application, or crop dusting, requires a specialized agricultural aircraft that flies over a field and sprays the fertilizer or pesticide.[30] Aerial application planes require a runway, can be somewhat expensive, and can be dangerous to the pilot and others in the area during the flight.[31] Drones, in comparison,

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19. *Id.*
20. *See id.*
21. *See id.*
22. *See id.*
23. *See id.*
24. *See* Grassi, *supra* note 12.
25. *See* Sharon Bokan, *The Impact of Weeds*, BOULDER COUNTY SMALL ACREAGE MGMT. NEWSL., Spring 2009, at 3, 3, http://www.extension.colostate.edu/boulder/sam/pdf/SAM%20newsletter%20Spring%202009.pdf.
26. *See id.*
27. *See* Grassi, *supra* note 12.
28. *See id.*
29. *Agriculture UAV Crop Duster Sprayers*, HSE, http://www.uavcropdustersprayers.com/ (last visited Apr. 14, 2016).
30. *Id.*
31. *Id.*; *see 10 Things You Didn't Know About Being a Crop Dusting Pilot*, INT'L STUDENT, http://www.internationalstudent.com/study-aviation/crop-dusting-pilot/ (last visited Apr. 14, 2016);

can take off and land vertically.[32] Therefore, their use does not require the farm to have or be near a runway.[33] Drones can fly extremely close to the crops to provide a precise application to only the desired areas, which reduces the amount of total chemicals needed to protect crops.[34] In addition, drones practically eliminate the safety concerns associated with aerial-application planes and significantly reduce the costs of application.[35] For example, crop-dusting companies typically charge $2–$8 an acre, while a company in Maryland boasts that it can do the same job with drones at rates as low as $1 per acre.[36]

By increasing efficiency in production and minimizing waste of resources and loss of crops during the growing season, farmers may provide more accurate yield predictions and produce a greater crop yield at harvest.[37] Consequently, the combination of the benefits provided by drones to the agriculture industry ensures a more reliable food supply for the people of this nation and around the world.[38] As the world's foremost exporter of agricultural products, it is imperative that U.S. producers be permitted to utilize technological innovations as they become available to satisfy the food requirements of Earth's projected 2050 population of nine billion.[39] This concern is pressing in light of the prediction that urban areas will account for 70% of the world's population by the same year, thus making agricultural efficiency crucial for future sustainability.[40]

B. Clear Skies: How Drones Can Improve the Environment

In addition to increasing yields and efficiency in production, drone utilization will allow agricultural producers to mitigate the negative

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Pilots, AUVSI, http://www.auvsi.org/auvsiresources/knowledge/deadliestjobs/pilots (last visited Apr. 14, 2016).

32. *Agriculture UAV Crop Duster Sprayers*, *supra* note 29.

33. *Id.*

34. *See id.*

35. *See Pilots*, *supra* note 31.

36. *Id.* It is important to note that while integration of full-scale UAS presents tremendous potential benefits to agriculture, the data-gathering function of small unmanned aircraft systems (sUAS) operations covers the majority of beneficial uses to agriculture. *See generally* 1 MICHAEL D. SCOTT, SCOTT ON INFORMATION TECHNOLOGY LAW § 1.03[E] (Supp. 2015 & Supp. 2016). Also, because of the technological barriers to full-scale integration, and because the FAA published a Notice of Proposed Rulemaking (NPRM) only for sUAS, the majority of this Comment focuses on sUAS integration. *See* KESSELMAN, *supra* note 18, at 4; *see also infra* Part III.A (discussing the difficulty in distinguishing a model aircraft from an sUAS, for purposes of regulation).

37. KESSELMAN, *supra* note 18.

38. *See* Janzen & Redick, *supra* note 11, at 7.

39. *See* GEORGE S. SERLETIS, U.S. INT'L TRADE COMM'N, U.S. AGRICULTURAL EXPORTS: GLOBAL LEADER DURING 2005–10 WITH CONTINUED RECORD EXPORTS PROJECTED IN 2011 (Apr. 2011), http://www.usitc.gov/publications/332/EBOT_AG_export.pdf; FOOD & AGRIC. ORG., *supra* note 3.

40. FOOD & AGRIC. ORG., *supra* note 3. Urban areas only accounted for 49% of the population in 2009. *Id.*

environmental impacts of their farming practices.[41] Of the lakes and rivers surveyed, the primary source of water quality impacts was agricultural nonpoint source pollution, according to the 2000 National Water Quality Inventory.[42] Agricultural nonpoint source pollution also stood as the second leading source of wetlands impairment and served as a major contributing factor in contaminating estuaries and groundwater.[43] Some of the agricultural activities resulting in nonpoint source pollution include plowing at the wrong time, overplowing, poor irrigation, and imprecise fertilizer and pesticide application practices.[44] Because the data collected from drones will enable farmers to precisely apply fertilizers and pesticides, the amount of potential water contaminants is also reduced.[45] This more precise aerial application also greatly minimizes the potential for chemical drift associated with traditional crop-dusting methods, which can be another source of pollution.[46] Moreover, because drone-collected data enables farmers to see which areas need water at what time, production requires less water, thus causing less erosion and runoff.[47]

C. Growing Money Trees: Substantial Economic Benefits of Drones in Agriculture

All of the benefits drones provide to production and the environment will positively impact the economics of the agriculture industry.[48] Saving money on costs of production while increasing yields could increase the value of the agriculture industry exponentially; thus, presumably lowering the costs of agriculture products to the consumer.[49] Part of these savings will come from reducing the amount of money farmers spend on fertilizers and chemicals needed for production.[50] Farmers will save money by detecting

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41. *Farmers and Ranchers Will Soar with Agricultural Drones*, FARM & RANCH GUIDE (Apr. 28, 2015, 4:45 PM), http://www.farmandranchguide.com/news/crop/farmers-and-ranchers-will-soar-with-agricultural-drones/article_f75aa1ea-edc0-11e4-9e5b-2f201d97d1e1.html.

42. U.S. ENVTL. PROT. AGENCY, NATIONAL WATER QUALITY INVENTORY 12 (2000), https://www.epa.gov/sites/production/files/2015-09/documents/2000_national_water_quality_inventory_report_to_congress.pdf. Nonpoint source pollution comes from diffuse sources, such as land runoff, precipitation, or other like sources, unlike point source pollution, which comes from sources like industrial or sewage treatment plants. *What is Nonpoint Source?*, EPA, https://www.epa.gov/polluted-runoff-nonpoint-source-pollution/what-nonpoint-source (last updated Jan. 5, 2016).

43. U.S. ENVTL. PROT. AGENCY, *supra* note 42, at 30, 45, 52.

44. *Id.* at 49.

45. *See* KESSELMAN, *supra* note 18.

46. *Agriculture UAV Crop Duster Sprayers*, *supra* note 29.

47. *See Farmers and Ranchers Will Soar with Agricultural Drones*, *supra* note 41.

48. *See generally* DARRYL JENKINS & BIJAN VASIGH, THE ECONOMIC IMPACT OF UNMANNED AIRCRAFT SYSTEMS INTEGRATION IN THE UNITED STATES (2013), http://robohub.org/_uploads/AUVSI_New_Economic_Report_2013_Full.pdf (reporting the projected economic impact of totally integrating commercial drones in the U.S. and in each state individually).

49. *See* Janzen & Redick, *supra* note 11.

50. *Agriculture UAV Crop Duster Sprayers*, *supra* note 29; *see also 2012 Census Highlights*, USDA, http://www.agcensus.usda.gov/Publications/2012/Online_Resources/Highlights/Farm_Economics/ (last

disease and other problems earlier—before these problems have a chance to spread and affect a greater area—thereby requiring fewer chemical applications for treatment.[51] Moreover, the use of drones allows for more precise application of fertilizers and chemicals, resulting in less chemical waste; therefore, drones reduce the total volume of necessary chemicals during the application process, all of which results in further cost savings to the farmer.[52] The benefits of better data collection, more precise chemical application, and the financial savings on chemicals would result in a reduction of crops lost as well as a cost reduction that would be passed onto consumers.[53]

When farmers integrate drones into their farming practices and techniques, the need for hired help will also fall.[54] Relative to the chemical cost savings from more precise application, the cost of the actual application would also decrease because of the implementation of drone technology.[55] Hiring a drone crop-dusting company that may charge as low as $1.00 per acre presents obvious savings when compared to traditional crop-dusting companies that may charge $2–$8 per acre.[56] Moreover, the average price of a drone is nominal in comparison to the cost of a manned aircraft.[57] Even if a farmer tried to mitigate the costs associated with hiring a crop-dusting service by purchasing and learning how to operate a crop-dusting plane, or simply hiring a pilot to fly it, additional costs would arise.[58] While it is true that integration of agricultural drones will probably cause the loss of some jobs—such as crop-dusting pilots and field workers who scout and monitor crops—the cost and efficiency advantages to farmers are undeniable; drones give these producers a way to fight the increasing cost of production incurred from hired labor.[59]

Although integration of drones into commercial industries will displace necessary jobs today, it will also create new jobs and boost the national economy, especially in the agriculture sector.[60] According to a 2013 projected economic impact report, before the FAA began allowing access to

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modified Nov. 16, 2015) (reporting that fertilizer expenses in production rose 57.6% from 2007–2012 and that chemical expenses rose 63.4% in that same time span).

51. *See* KESSELMAN, *supra* note 18.

52. *See id.*; *Agriculture UAV Crop Duster Sprayers*, *supra* note 29.

53. *See* KESSELMAN, *supra* note 18.

54. *Cf.* Grassi, *supra* note 12 (indicating that drones used for crop monitoring would replace the need for human scouting); *Agriculture UAV Crop Duster Sprayers*, *supra* note 29 (explaining how drones are a viable alternative to hiring manned aircraft for crop dusting).

55. *See* JENKINS & VASIGH, *supra* note 48, at 3.

56. *Pilots*, *supra* note 31.

57. JENKINS & VASIGH, *supra* note 48, at 3; *see also Pilots*, *supra* note 31 (giving an example of one type of crop-dusting plane that costs around $38,000).

58. *Pilots*, *supra* note 31 (stating that the cost of training a pilot may be around $100,000 and that crop-dusting pilots usually earn $60,000–$100,000 a year).

59. *Id.*; Grassi, *supra* note 12; *see 2012 Census Highlights*, *supra* note 50 (showing that expenses on hired labor rose 23.4% from 2007–2012).

60. *See* KESSELMAN, *supra* note 18.

the National Airspace (NAS) on a limited basis, the Association for Unmanned Vehicle Systems International (the Association) projected that in the first ten years, integration will create over 100,000 new jobs and contribute $82 billion in economic impacts to our economy.[61] The same report predicted that agriculture and related industries would make up 80% of the projected impact, some $75.6 billion; that precision agriculture is one of the most promising commercial and civil markets; and that agriculture will by far be the largest market compared to all others.[62] The U.S. Department of Agriculture reported that in 2013, agriculture and related industries contributed $789 billion to the economy, comprising 4.7% of the nation's gross domestic product.[63]

Texas ranks third among states expected to see the most gains from the economic impact of drone integration, behind only California and Washington.[64] Further, some expect Texas to contribute more than $6.5 billion to the predicted $82 billion economic impact within the first ten years.[65] The projections also indicate that integration will create over 8,000 new jobs in Texas.[66] In the 2013 economic impact report, the Association predicted that in the first year of integration, there will be a $166,755,758 total economic impact from agricultural spending in Texas, which will create 1,715 jobs in the state.[67] The direct economic impact of agriculture spending—which is the consequence of "economic activities carried out by a company or organization" in the state's economy, such as employing labor or causing increased purchases of locally produced goods—will generate $84,235,673 of the predicted total economic impact and 883 of the jobs.[68] The remainder of the predicted total economic impact from agriculture spending in Texas will come from indirect and induced impacts.[69]

As farmers compete in a competitive global market, quick integration of drones into the NAS for commercial purposes is crucial to the agriculture industry.[70] Delays in integration in the U.S. inhibit technological and job development and cause a lag in manufacturing and stimulation to the

61. JENKINS & VASIGH, *supra* note 48, at 2.

62. *Id.* at 2, 6, 20; KESSELMAN, *supra* note 18.

63. *Ag and Food Sectors and the Economy*, USDA, http://www.ers.usda.gov/data-products/ag-and-food-statistics-charting-the-essentials/ag-and-food-sectors-and-the-economy.aspx (last updated Feb. 17, 2016).

64. JENKINS & VASIGH, *supra* note 48, at 3 ("[T]he projections contained in this report are based on the current airspace activity and infrastructure in a given state.").

65. *Id.* at 4.

66. *Id.*

67. *Id.* at 13.

68. *Id.* at 10.

69. *See id.* at 10, 15, 16 (defining indirect impacts as "impacts derive[d] from off-site economic activities that are attributable to the business activities of the manufacturers of UAS' presence," or new jobs created for supplying ancillary services for those employed by and customers of the new drone manufacturing facility; and defining induced impacts as "the result of spending of the wages and salaries of the direct and indirect employees . . . throughout the economy").

70. KESSELMAN, *supra* note 18.

economy, which provides an advantage to our global competitors, some of whom have been utilizing drone technology for over two decades.[71] It is also important to note that each year that drones are not integrated into the NAS, the U.S. misses out on a potential $10 billion in projected economic impact.[72]

III. NAVIGATING THE AIRSPACE: ANALYSIS OF WHERE THE FEDERAL REGULATORY FRAMEWORK HAS BEEN AND WHERE IT'S GOING

A. *It's a Bird, It's a Plane, It's a . . . What Is It? Defining Unmanned Aircraft and* Huerta v. Pirker

The FAA maintains jurisdiction over the NAS, which essentially means it has control over who and what may enter the NAS, including unmanned aircraft.[73] Part of the difficulty in determining how to regulate unmanned aircraft flights in the NAS arose from the difficulty in actually defining the term.[74] Distinguishing between model aircraft and small unmanned aircraft systems (sUAS) has proven the most difficult task due to the similarities between the two.[75] The main difference between unmanned aircraft and model aircraft is the purpose for which each is flown.[76] In the FAA Modernization and Reform Act of 2012 (the Act), Congress "defined a model aircraft 'as an unmanned aircraft that is—(1) capable of sustained flight in the atmosphere; (2) flown within visual line of sight of the person operating the aircraft; and (3) flown for hobby or recreational purposes.'"[77] Congress further explained in the Act that an unmanned aircraft is an aircraft capable of operation with no direct human intervention onboard the aircraft.[78] In comparison, the FAA noted that to qualify as a model aircraft, prior to its interpretation of the Act, it required that the aircraft be operated within the visual line of sight solely for recreational purposes, and specifically excluded commercial use by companies or individuals.[79] Prior to the passage of the Act, "the FAA define[d] an unmanned aircraft as 'the flying portion' of [an

71. JENKINS & VASIGH, *supra* note 48, at 5, 9.

72. *Id.* at 2.

73. *See* SCOTT, *supra* note 36, § 1.03[E][2].

74. *See* Benjamin Kapnik, *Unmanned but Accelerating: Navigating the Regulatory and Privacy Challenges of Introducing Unmanned Aircraft into the National Airspace System*, 77 J. AIR L. & COM. 439, 442–44 (2012).

75. *See id.* at 442–43.

76. *See, e.g.*, *id.* at 443 (stating that, under Congress's definition, model aircraft are flown for non-commercial purposes within the operator's line of sight).

77. *Id.* (quoting the FAA Modernization and Reform Act of 2012, Pub. L. No. 112-95, § 336(c), 126 Stat. 11).

78. *Id.* at 444 (quoting FAA Modernization and Reform Act of 2012 § 331).

79. *See* FAA Interpretation of the Special Rule for Model Aircraft, 14 C.F.R. pt. 91 (2014) (explaining that this definition included the guidelines in Advisory Circular 91-57, which prohibit flights over densely populated areas and require devices to be proven airworthy based on flight tests, to stay at or below 400 feet, and to heed the right of way to manned aircraft).

UAS], which is 'flown by a pilot via a ground control system, or autonomously through use of an on-board computer, communication links and any additional equipment that is necessary for the [UAS] to operate safely.'"[80] Moreover, the Academy of Model Aeronautics (the Academy) has its own safety standards for model aircraft operation and pilot conduct.[81] Therefore, the FAA typically permits model aircraft operators to self-regulate.[82] These definitions are important because, depending upon the vehicle's categorization, the aircraft may or may not fall under the gamut of FAA regulation, as illustrated by the controversy in *Huerta v. Pirker*.[83]

The distinction between model aircraft and an sUAS for the purposes of federal regulation was the subject of the dispute in *Huerta v. Pirker*.[84] On June 27, 2013, the Administrator of the FAA issued an order assessing a civil penalty of $10,000 against Raphael Pirker for operating an unmanned aircraft in a careless or reckless manner in violation of 14 C.F.R. § 91.13(a).[85] The assessment, which served as the Administrator's complaint, alleged that Pirker operated an UAS in a dangerous manner around the University of Virginia.[86] The Administrator argued that Pirker operated the aircraft at extremely low altitudes and conducted the flight for compensation without express authorization from the FAA.[87] Pirker appealed the order, arguing that the Federal Aviation Regulations were not applicable because the device he used was a model aircraft, which, according to him, was not subject to the aviation regulations because it did not constitute an "aircraft."[88] In a March 6, 2014 decisional order, the administrative law judge dismissed the Administrator's order, thereby terminating the enforcement proceeding against Pirker.[89]

Agreeing with Pirker, the administrative law judge ruled that Pirker's UAS was not an aircraft under the aviation regulations, and that the device was a model aircraft, so 14 C.F.R. § 91.13(a)—which applies to aircraft and under which the penalty was assessed—did not apply to these circumstances.[90] In explaining his holding, the judge cited material published

80. Kapnik, *supra* note 74, at 444 (quoting *Unmanned Aircraft (UAS)—Questions and Answers*, FAA (Oct. 14, 2011, 11:08 AM), http://www.faa.gov/about/initiatives/uas/uas_faqs/#Qn1).

81. SCOTT, *supra* note 36, § 1.03[E][d].

82. *Id.*

83. *See id.* (explaining that model aircraft operated solely for recreational purposes are typically unregulated by the FAA, provided that they follow the Academy's guidelines; while sUAS, on the other hand, fall within FAA jurisdiction because of the public risk presented when operated outside of Academy airports for commercial purposes); Huerta v. Pirker, N.T.S.B. No. CP-217 (2014), 2014 WL 3388631, http://www.ntsb.gov/legal/alj/Documents/5730.pdf.

84. *See generally* N.T.S.B. No. CP-217; SCOTT, *supra* note 36, § 1.03[E][2][a].

85. N.T.S.B No. CP-217, at 1–2.

86. *Id.* at 2.

87. *Id.*

88. *Id.* at 2–3.

89. *Id.* at 2.

90. *Id.* at 3.

by the FAA stating that model aircraft were a class distinguishable from other aircraft; thus, model aircraft were excluded from the regulatory definition of the term.[91] He reasoned that accepting the argument that Pirker's device was an aircraft for regulatory purposes could give rise to arguments that a paper airplane "operator" is subject to the regulatory provisions applicable to "other aircraft."[92]

The Administrator appealed, arguing that the judge's decision was erroneous and that Pirker's device was in fact an aircraft subject to the aviation regulations applicable to other aircraft.[93] The National Transportation Safety Board (NTSB) found for the Administrator, and held that an UAS is an aircraft subject to the aviation regulations applicable to all aircraft.[94] The NTSB reasoned that the plain language of the definition for aircraft—in both 49 U.S.C. § 40102(a)(6) and 14 C.F.R. § 1.1—clearly and unambiguously shows that any device used for flight constitutes an aircraft, regardless of whether it is manned or unmanned.[95]

This decision removes any question regarding whether the FAA may regulate UAS operations.[96] The NTSB's ruling "makes sense . . . because there's really nowhere that they can draw the line except to give the FAA the broad authority that they've been exercising."[97] Now that there is no question about the extent of the FAA's authority, hopefully, there will be less delay in the FAA's process for promulgating a final set of rules for integrating UAS into the NAS.[98]

B. Regulating UAS and the FAA Modernization and Reform Act of 2012

As shown, the difficulty in defining an unmanned aircraft, as opposed to model aircraft, has made regulating sUAS difficult.[99] Before the Act's passage, the FAA regulated unmanned aircraft pursuant to regulations applicable to manned aircraft.[100] But, because of the obvious differences, UAS typically cannot satisfy many of the manned aircraft regulations—most importantly, the capability to "see and avoid" potential obstructions—so

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91. *Id.*

92. *Id.* at 3–4.

93. *Id.* at 4.

94. *Id.* at 5.

95. *Id.* at 5–6.

96. *See* Juliet Van Wagenen, Pirker v. Huerta *Ruling Clears the Way to UAS Integration*, AVIONICS (Nov. 25, 2014), http://www.aviationtoday.com/av/topstories/Pirker-v-Huerta-Ruling-Clears-the-Way-to-UAS-Integration_83611.html#.VjqM2BCrRPM.

97. *Id.*

98. *See id.*

99. *See generally* N.T.S.B. No. CP-217 (exemplifying difficulty in distinguishing between model aircraft and sUAS, and when the FAA may regulate such aircraft).

100. *See* Kapnik, *supra* note 74, at 444.

operators must obtain a Certificate of Waiver or Authorization (COA) from the FAA as a prerequisite to conducting flights in the NAS.[101]

Before the FAA opened the § 333 exemption application process to individuals and companies, only public entities, such as government entities and universities, could apply for and obtain a COA.[102] To qualify for a COA, the public entity had to carefully follow the FAA's compliance procedures, of which the two main aspects are to have a mission plan and operate "public" aircraft.[103] To satisfy the mission plan requirement, the entity had to show that the plan included an aircraft that was controlled by qualified crew members and a non-commercial flight plan that served a government function.[104] In addition to filing an application with the FAA and detailing the proposed operations and aircraft specifications, the entity was required to contact an Air Traffic Organization, which is typically a local airport.[105] After all this, the FAA would conduct a safety assessment and, if satisfied with the entity's proposed operational plan and technical specifications, the Air Traffic Organization would issue a COA.[106]

In contrast, under the prior regulatory scheme, the FAA required civilians to obtain a Certificate of Airworthiness.[107] This certificate, which the FAA issues to all aircraft in the NAS, ensures that aircraft will not endanger public safety.[108] The FAA only issues these certificates to UAS for purposes of training, research and development, or market surveys.[109]

Due to dissatisfaction with the COA and the Certificate of Airworthiness systems, Congress passed the Act.[110] This forced the Secretary of Transportation to implement multiple policy changes regarding UAS, and mandated a "simpler process" and expedited timeframe "for issuing certificates to 'appropriate government agencies' seeking to operate unmanned aircraft in the NAS."[111] Furthermore, the Act mandated that the FAA come up with a comprehensive plan for safe integration of civil UAS into the NAS and required the FAA to promulgate a set of rules to speed the process of sUAS integration.[112]

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101. *See id.* at 444–45; *It's (a) Grand! FAA Passes 1,000 UAS Section 333 Exemptions*, FED. AVIATION ADMIN., https://www.faa.gov/news/updates/?newsId=83395 (last updated Aug. 4, 2015, 10:57 AM).

102. SCOTT, *supra* note 36, § 1.03[E][3][a].

103. *Id.* Public aircraft are those owned by and operated only for the U.S. Government. *Id.*

104. *Id.*

105. *Id.*

106. *Id.*

107. *Id.*

108. *Id.*

109. *Id.*; Kapnik, *supra* note 74, at 445.

110. Kapnik, *supra* note 74, at 447.

111. *Id.*

112. *Id.* at 447–48.

C. Access Granted: Section 333 and Petitioning for Exemption

Section 333 of the Act requires the Secretary of Transportation to determine if certain types of UAS can operate safely in the NAS before completing a plan for integration or rulemaking, and gives him authority to determine "whether a certificate of waiver, certificate of authorization, or airworthiness certification . . . is required . . . under paragraph (1)."[113] As mentioned above, only public entities were originally permitted to apply for a COA and conduct non-recreational UAS operations.[114] Since passage of the Act, however, the FAA has opened the application process to individuals and commercial entities as well.[115] The FAA began accepting petitions for § 333 exemptions in May 2014, and in the following month, the FAA issued the first Certificate of Waiver for commercial UAS flights over land.[116]

Until the FAA finalizes rules regarding the integration of UAS into the NAS, civil UAS operators must continue to apply for airworthiness certifications or petition for a § 333 exemption.[117] Due to the more restrictive nature of airworthiness certifications, § 333 exemptions are more likely to meet the desires of UAS operators hoping to conduct UAS flights for commercial purposes until the rules are implemented.[118] While § 333 provides some flexibility relative to the airworthiness certification requirements, it does not provide relief from other aviation regulations.[119] Thus, if the Secretary of Transportation determines an UAS does not require an airworthiness certification, satisfaction of certain requirements applicable to other aircraft may not be necessary; however, certain other requirements will be necessary regardless of the Secretary's determination.[120] Because the Secretary determined that to meet the "requirement in Section 333 for operations to not pose a threat to national security," UAS operations "will only be conducted by airmen with valid airmen certificates," those seeking

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113. FAA Modernization and Reform Act of 2012, Pub. L. No. 112-95, § 333(a), (b)(2), 126 Stat. 11. Section 333(b)(1) requires the Secretary to determine—at a minimum—the types of UAS, if any, that do not pose a threat to national security or "create a hazard to users of the [NAS] system or the public," based on the UAS's "size, weight, speed, operational capability, proximity to airports and populated areas, and operation within visual line of sight." *Id.* § 333(b)(1).

114. SCOTT, *supra* note 36, § 1.03[E][3][a].

115. *It's (a) Grand! FAA Passes 1,000 UAS Section 333 Exemptions*, *supra* note 101.

116. SCOTT, *supra* note 36, § 1.03[E][3][e] (stating that an Alaskan company conducting oil pipeline inspections performed the first FAA-sanctioned flights in the U.S.); KESSELMAN, *supra* note 18, at 4.

117. *See* FED. AVIATION ADMIN., PUBLIC GUIDANCE FOR PETITIONS FOR EXEMPTION FILED UNDER SECTION 333 1–2 (2014), http://www.faa.gov/uas/legislative_programs/section_333/how_to_file_a_petition/media/section333_public_guidance.pdf.

118. *See id.*

119. *Id.* Title 49 of the U.S. Code is the public law for transportation, and §§ 40101–50105 deal with aviation programs. 49 U.S.C. §§ 40101–50105 (2012).

120. *E.g.*, FED. AVIATION ADMIN., *supra* note 117, at 4 (explaining how noise certification may not be necessary, conditioned on the Secretary's determination that airworthiness certification is not required; but, the Pilot in Command (PIC) "must possess the appropriate airman certificate" because § 333 "does not provide flexibility for the statutory requirement to hold an airman certificate under § 44711").

an exemption must first obtain this certificate and submit to a security screening by the Transportation Security Administration.[121] Moreover, "[b]ecause Section 333 provides limited relief from certain certifications or authorizations," it is important that potential UAS operators familiarize themselves and comply with the other relevant regulations regarding aircraft operation.[122] Additionally, UAS operations for non-recreational purposes must comply with the regulations in 14 C.F.R., and if operators believe there are regulations they cannot comply with due to the circumstances of their operations, they must petition for exemption from those regulations.[123]

Petitions for § 333 exemptions must meet the requirements laid out in 14 C.F.R. § 11.81 for the FAA to consider them.[124] If this requirement is met, the FAA will then analyze various safety aspects of the petitioner's proposed UAS operation.[125] In making an evaluation of the proposed UAS operation, the FAA will consider safety information regarding the UAS, the Unmanned Aircraft PIC, and the Operation of the Unmanned Aircraft.[126] In addition to getting a § 333 exemption, an UAS operator must also obtain a COA before conducting non-recreational operations.[127] Due to the high demand for § 333 exemptions, the FAA recently streamlined the process and in March 2015, "the agency began issuing 'blanket' Certificates of Waiver or Authorization (COAs) to Section 333 exemption holders."[128] In comparison to previously granted COAs, which allowed flights only in a certain designated block of airspace, these COAs allow "flights anywhere in the country at or below 200 feet except in" certain restricted areas.[129] In April 2015, the FAA began issuing summary grants on a case-by-case basis similar to those already approved, which further expedited the process.[130] To date, the FAA has granted over 1000 exemptions for commercial UAS operations.[131]

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121. *See id.*

122. *See id.*

123. *Id.* at 4–5.

124. *Id.* at 5. This subsection of 14 C.F.R. lists the basic requirements that a petitioner must include in its exemption petition. 14 C.F.R. § 11.81 (2015).

125. FED. AVIATION ADMIN., *supra* note 117, at 5.

126. *Id.* at 5–7. Petitioners should review the information on these pages prior to filing a petition for a § 333 exemption to carefully comply with the FAA's requirements and provide sufficient information to see what other regulations may potentially apply to their specific proposed operations, and how exactly to file the petition with the FAA. *See id.* at 5–8.

127. *Id.* at 5.

128. *It's (a) Grand! FAA Passes 1,000 UAS Section 333 Exemptions*, *supra* note 101.

129. *Id.* UAS operators still may not conduct flights in areas of "restricted airspace, close to airports, and other areas, such as major cities where the FAA prohibits UAS operations." *Id.*

130. *Id.*

131. *Id.*

D. A Small Step Forward: Notice of Proposed Rulemaking for Small Unmanned Aircraft

The Act required the FAA to finalize a set of rules for integration of all UAS into the NAS by September 2015, and final rules for sUAS integration by August 2014.[132] However, apparently due to safety and technological concerns, the FAA missed these deadlines, and it seems that a final set of rules could be as far away as 2017.[133] Although the rules finalization will miss the deadline considerably, the FAA did publish a Notice of Proposed Rulemaking (NPRM) for sUAS in February 2015.[134] Among other things, this set of proposed rules requires the following: (1) operators must limit flight altitude to 500 feet and fly no faster than 100 mph, (2) the sUAS must be less than 55 pounds, (3) operators must stay out of restricted areas and out of airport flight paths, and (4) operations may only be conducted during daylight hours.[135] While these rules serve as a good indicator of what the FAA's final set of rules will look like, until they are finalized, operators must continue to petition for § 333 exemptions, operate under the existing guidelines, and comply with their respective state's drone legislation, if any exists.[136]

E. Friendly Skies: Texas Drone Legislation and Preemption

Although the FAA has yet to finalize a comprehensive set of regulations, many states have proposed and enacted their own drone laws.[137] To date, twenty-six different states, including Texas, have enacted legislation regarding drones and related issues.[138] The drone laws in Texas deal with

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132. KESSELMAN, *supra* note 18, at 3; Bryan Koenig, *FAA Making Progress on Drone Integration, GAO Says*, LAW360 (Aug. 17, 2015, 6:27 PM), http://www.law360.com/articles/691875/faa-making-progress-on-drone-integration-gao-says.

133. KESSELMAN, *supra* note 18, at 17; Koenig, *supra* note 132; Stephen Maddox & David Stuckenberg, *Drones in the U.S. National Airspace System: A Safety and Security Assessment*, HARV. L. SCH. NAT'L SECURITY J. (Feb. 24, 2015, 10:53 AM), http://harvardnsj.org/2015/02/drones-in-the-u-s-national-airspace-system-a-safety-and-security-assessment/.

134. *See* Press Release, Fed. Aviation Admin., DOT and FAA Propose New Rules for Small Unmanned Aircraft Systems (Feb. 15, 2015), http://www.faa.gov/news/press_releases/news_story.cfm?newsId=18295.

135. *See* Operation and Certification of Small Unmanned Aircraft Systems, 80 Fed. Reg. 9544, 9546 (proposed Feb. 23, 2015) (to be codified at 14 C.F.R. pt. 107). The proposed rules specify that the aircraft and any payload (additional attachment) on board must be less than fifty-five pounds to be considered a sUAS for purposes of the definition—not merely an empty aircraft weighing less than fifty-five pounds. *Id.* at 9556 .

136. *See* SCOTT, *supra* note 36, § 1.03[E][3][g].

137. *See id.* § 1.03[E][6][c] (indicating that forty-three states proposed drone legislation, of which eleven enacted drone legislation as of 2014).

138. *Current Unmanned Aircraft State Law Landscape*, NAT'L CONF. ST. LEGISLATURES (Apr. 6, 2016), http://www.ncsl.org/research/transportation/current-unmanned-aircraft-state-law-landscape.aspx. Six states have adopted drone-related resolutions. *Id.* Drone-related legislation became effective in Texas

protection of privacy and define certain circumstances in which the operation of a drone may be illegal.[139] The laws also outline the potential penalties for certain drone-related offenses.[140] The Texas laws do not, however, address the majority of the issues included in the FAA's proposed rules—such as the operational limitations of conducting drone flights and the certification, licensing, and registration requirements—presumably because the FAA's final rules will preempt the field.[141]

Field preemption occurs when Congress decides to eliminate the opportunity for states to regulate in a given area of law or on a specific issue.[142] Congress may expressly state its decision to preempt a field, or preemption may be inferred by a regulatory scheme so comprehensive that no room remains for supplementary state regulation.[143] Moreover, when state regulation conflicts with its federal counterpart, it is almost axiomatic as a principle of federalism that the federal regulation precludes the state regulation's enforcement.[144] Thus, because there is little, if any, overlap—with seemingly no conflict—between the drone laws in Texas and those proposed by the FAA, field preemption is likely not an issue with the current drone legislation in Texas.[145] Further, the fact that the Texas drone laws relate to the state's police powers—such as protection of privacy and drone operations for law enforcement purposes—should resolve any remaining concern that the FAA's final rules could preempt those already enacted by the state.[146] Because the projected uses of drones vary greatly from state to state, it seems probable that while some of the proposed rules may not greatly

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on September 1, 2013, to which legislators have since made some amendments that are now in effect. *See* TEX. GOV'T CODE ANN. §§ 423.001–.008 (West 2012 & Supp. 2015).

139. *See, e.g.*, GOV'T § 423.003(a) (explaining that drones may not be used to capture images of private property or of an individual with intent to conduct surveillance).

140. *See, e.g.*, *id.* § 423.003(c) (outlining relevant defenses to prosecution for using drones with intent to conduct surveillance of individuals or private property, which is a Class C misdemeanor).

141. *Compare id.* §§ 423.001–.008 (defining the legality of ancillary drone-related issues, such as protection of privacy and illegal operation of drones over critical infrastructure facilities), *with* Operation and Certification of Small Unmanned Aircraft Systems, 80 Fed. Reg. 9544, 9557–77 (proposed Feb. 23, 2015) (to be codified at 14 C.F.R. pt. 107) (explaining the entirety of the proposed rules and the reasoning behind each, all of which concern the rules for operation, operator certification, and device registration and marking). When Congress occupies an entire field, the ability for states to regulate in that area, even if complimentary or parallel to federal regulation, is impermissible. Arizona v. United States, 132 S. Ct. 2492, 2502 (2012).

142. *Arizona*, 132 S. Ct. at 2502.

143. *Id.*

144. *Id.* This includes instances in which compliance with a state regulation makes it physically impossible to, or serves as an obstacle to, comply with the federal regulation. *Id.* at 2501.

145. *Compare* GOV'T §§ 423.001–.008 (defining certain permissible and impermissible uses of drones for both Texas citizens and law enforcement), *with* Operation and Certification of Small Unmanned Aircraft Systems, 80 Fed. Reg. at 9557–77 (outlining the operational limitations and the certification, registration, and marking requirements).

146. *See* OFFICE OF THE CHIEF COUNSEL, FED. AVIATION ADMIN, STATE AND LOCAL REGULATION OF UNMANNED AIRCRAFT SYSTEMS (UAS) FACT SHEET 3 (Dec. 17, 2015) [hereinafter FAA FACT SHEET], http://www.faa.gov/uas/regulations_policies/media/UAS_Fact_Sheet_Final.pdf.

impede the purposes of commercial drone operators in one state, the same rules could drastically limit the potential effectiveness of operators in another state.[147]

IV. Experiencing Some Turbulence: The FAA Needs to Amend Its Proposal and Stop Delaying Rule Finalization

A. More State Power over Operational Limitations

Although a common national flag unites all states, no two states are exactly the same. Each state differs vastly in terms of landmass, population, and population density.[148] Moreover, each state relies on other states for certain resources that it may not be capable of producing itself, and each state provides different amounts and types of goods and services and contributes to the national gross domestic product in unique ways.[149] While maintaining the already high level of safety is the main purpose of a federal regulatory framework regarding UAS integration, due to the expansive differences between the states and the way that each may utilize the technology, state legislatures should have more power over the limitations of commercial UAS operations to better address these differences unique to their respective states.[150]

1. Freedom to Fly: State Control Based on Federal Guidelines

Rather than a rigid set of federally imposed operational limitations, the FAA could instead publish a set of guidelines regarding operational limitations. This would allow states to enact legislation that better addresses their unique concerns, the different ways that drone technology could be utilized by the primary industries of the state to supplement their own economy, and the consequential effect it could have on the national

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147. KESSELMAN, *supra* note 18, at 14.

148. *Compare TEXAS – 2010 Census Results*, U.S. CENSUS BUREAU, http://www2.census.gov/geo/pdfs/maps-data/maps/2010pop/tx_totalpop_2010map.pdf (last visited Apr. 14, 2016) (reporting a population of over 25 million in 2010), *with WYOMING – 2010 Census Results*, U.S. CENSUS BUREAU, http://www2.census.gov/geo/pdfs/maps-data/maps/2010pop/wy_totalpop_2010map.pdf (last visited Apr. 10, 2016) (showing that Wyoming's population was just over 560,000 in 2010).

149. *See, e.g.*, *Farm Income and Wealth Statistics*, USDA, http://www.ers.usda.gov/data-products/farm-income-and-wealth-statistics/farm-finance-indicators-state-ranking.aspx#P3467715e7e6c4603a684d8dbea23d744_2_186iT0R0x14 (last updated Feb. 9, 2016) (indicating that the farming sector in Texas added a gross value of over $11.6 billion in 2014, while the farming sector in Rhode Island added a gross value of less than $52 million in the same year).

150. *See* Edd Gent, *The Future of Drones: Uncertain, Promising and Pretty Awesome*, LIVESCIENCE (Nov. 5, 2015, 9:55 AM), http://www.livescience.com/52701-future-of-drones-uncertain-but-promising.html (quoting an FAA spokesperson on its primary goal in integration). *See generally* KESSELMAN, *supra* note 18 (listing different uses of commercial UAS for exemptions already granted in several different states).

economy.[151] For example, the beyond-line-of-sight limitation could inhibit achievement of the full-potential positive impact of UAS operations in agriculture.[152] In rural areas that pose no significant additional risk, beyond-line-of-sight operations could be instrumental in improving current agricultural operations, especially in Texas, where the average size of farms and ranches is greater than 500 acres.[153] Because these types of operations in rural areas pose little to no additional threat to the NAS, there is little need to unequivocally prohibit them nationwide.[154] Conversely, conducting beyond-line-of-sight operations, as well as nighttime operations, could allow the agriculture industry to move further toward attaining the benefits offered by UAS.[155] Admittedly, further technological development and research may be necessary for the safe implementation of such operations, but a final rule prohibiting it now could prove difficult and time consuming to amend in the future, as evidenced by the amount of time it has taken for the FAA to get to its current state regarding drone regulation.[156]

2. Up, Up, & Away with the Operational Limitations for the Agriculture Industry

Because the FAA's primary purpose in providing a comprehensive regulatory framework is to ensure the safety of the NAS and people on the ground, it is unlikely to grant total authority over the operational limitations to the states.[157] Thus, as an alternative to publishing guidelines regarding operational limitations of all commercial operations and waiting for states to enact their own regulations of the same, the FAA could instead exempt wholly intrastate agriculture operations from the restrictive limitations. Each state could then implement its own operational limitations for agricultural-UAS operations. To ensure states actually impose sufficient limitations, the FAA could require states to submit their proposed regulations and obtain FAA approval before they become effective. FAA oversight and approval would also certify that no state enacts legislation with discriminatory purposes, thereby avoiding any Dormant Commerce Clause challenges.[158] Moreover, if a state did not enact regulations governing

151. *See supra* Part II.

152. *See* KESSELMAN, *supra* note 18, at 13.

153. *See id.* at 17; Smith, *supra* note 16.

154. *See* KESSELMAN, *supra* note 18, at 2–3.

155. *See id.* at 6.

156. *See id.* at 2; Koenig, *supra* note 132.

157. *See* FAA FACT SHEET, *supra* note 146, at 1.

158. See Donald H. Regan, *The Supreme Court and State Protectionism: Making Sense of the Dormant Commerce Clause*, 84 MICH. L. REV. 1091, 1092 (1986) (explaining that "preventing states from engaging in purposeful economic protectionism" is the Supreme Court's central concern when assessing Dormant Commerce Clause challenges). A further protection against potential Dormant Commerce Clause challenges is that state-imposed drone regulations would not inhibit the free flow of agricultural products in interstate commerce. *See id.* at 1175.

operational limitations for agriculture within an FAA-specified time period, the final regulations applicable to all other commercial operations would then become applicable to the state's agriculture operations by default. Such a system would provide states a limited degree of latitude to deviate from the federal regulations—and implement regulations more fitting for agriculture within the state—or take no action and adopt the FAA's operational limitations for all commercial purposes in the state, including agriculture.[159]

A system of this kind would not compromise safety of the airspace because there is a much lower risk of crashes with other aircraft or buildings in rural areas, and the risk of people on the ground not knowing about an ongoing UAS operation and being harmed is almost eliminated on a farm or ranch, as compared to a bustling urban area.[160] Also, because the FAA would have final approval authority, it could veto any proposed regulations that it determines would present too great of a public safety risk. Finally, the FAA could, and should, subject any farms or ranches whose boundaries extend over state lines to follow the limitations applicable to all other commercial operations without exception. Allowing states to create their own operational limitations for agriculture only, subject to FAA approval, for farms and ranches contained entirely within the state should substantially mitigate the risks and the FAA's concerns with allowing states to impose their own UAS regulations.[161]

3. *Flying Around the Rules: Exemption from Operational Limitations*

Although giving states power to enact legislation concerning drone operations would be beneficial, the FAA still has ultimate jurisdiction of the NAS.[162] Therefore, if the FAA does finalize rules that include operational limitations, as it almost certainly will, the Legislature should enact a system to allow exemptions from some of the limitations for certain operations.[163] Similar to the § 333 exemption process, this type of system could allow operators to apply for an exemption from the beyond-line-of-sight or nighttime limitations, for example, and submit data and information about their ongoing operations and plans for any exemption. The FAA could

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159. *See generally* KESSELMAN, *supra* note 18. For example, Texas may decide beyond-line-of-sight operations are necessary because the average farm size is almost 100 acres larger than the U.S. average. GLEATON & ROBINSON, *supra* note 15; *What is the Average Size of an American Farm?*, U.S. FARMERS & RANCHERS ALLIANCE, http://www.fooddialogues.com/foodsource/farm-size-and-ownership/what-is-the-average-size-of-an-american-farm (last visited Apr. 15, 2016). On the other hand, because the average Rhode Island farm is less than 60 acres, it may decide beyond-line-of-sight operations are not necessary and choose to adopt the FAA's operational limitations as enacted. U.S. DEP'T OF AGRIC., *supra* note 5.

160. *See* KESSELMAN, *supra* note 18, at 6.

161. *See* FAA FACT SHEET, *supra* note 146, at 2 (explaining the FAA's concerns regarding safety of the airspace if it allowed states and municipalities to enact their own UAS regulations).

162. *See* SCOTT, *supra* note 36, § 1.03[E][3][g].

163. *See id.* § 1.03[E][3].

review these applications and determine whether or not granting the applications would pose any additional risks to the NAS. Such a process would benefit all parties involved, and because the FAA would review the application and determine its appropriateness prior to granting, virtually no threat would exist in the airspace by approval of these exemptions. If the FAA does not grant states some authority to put forth any of their own regulations or implement some sort of operational-limitation exemption process, the final set of rules will prohibit the agriculture industry from gaining the full benefits offered by drone technology.[164]

B. Final Rules Should Focus on Operator Certification and Registration Requirements

Congress charged the Secretary of Transportation with determining which types of UAS posed no threat to the public, national security, or the airspace, if any, and coming up with requirements for safe integration of UAS into the NAS.[165] Although the proposed rules would certainly provide for safe UAS integration across the nation, they are too restrictive and focus too much on the operational limitations that state legislatures could more effectively address.[166] Rather than a comprehensive set of onerous operational regulations, the final set of rules should center on operator qualification, registration requirements, and the actual UAS itself.

1. Flight Lessons: Operator Certification

One of the safety concerns associated with integrating UAS into the NAS is that operators with little to no knowledge in NAS navigation could conduct flights, thus endangering the airspace and people on the ground.[167] The FAA sought to address this concern in a portion of its sUAS NPRM.[168] Specifically, the proposed rules would require operators to obtain an unmanned aircraft operator certificate.[169] As a prerequisite to receiving this certificate, operators must pass an initial aeronautical knowledge test.[170]

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164. *See* KESSELMAN, *supra* note 18.

165. FAA Modernization and Reform Act of 2012, Pub. L. No. 112-95, § 333(b)(1), (c), 126 Stat. 11.

166. *See, e.g.*, KESSELMAN, *supra* note 18, at 14 (suggesting that newsgathering operations need access to airspace over congested areas to be effective, while that same restriction is probably not a problem for precision agriculture operations on large tracts of land).

167. *Id.* at 15.

168. Operation and Certification of Small Unmanned Aircraft Systems, 80 Fed. Reg. 9544, 9544 (proposed Feb. 23, 2015) (to be codified at 14 C.F.R. pt. 107).

169. *Id.* at 9546. The proposed rules would require operators to get this certificate with a sUAS rating. *Id.* Issuance of this certificate requires that operators be at least seventeen years old and be proficient in the English language, among other things. *Id.* at 9567–68.

170. *Id.* at 9568–69. Areas tested by the initial aeronautical knowledge test include: (1) regulations applicable to sUAS operations; (2) the ability to determine airspace classifications and requirements for operating in that airspace; (3) understanding of different flight restrictions that affect sUAS operations;

Additionally, the proposed rules would require the operator to pass the recurrent aeronautical knowledge test every two years thereafter.[171] Although the initial and recurrent tests do not require operators to demonstrate flight proficiency or aeronautical experience, the areas tested for demonstration of aeronautical knowledge are designed to ensure that only those with adequate knowledge may conduct commercial UAS operations.[172] These tests—designed by the FAA to ensure the safety of the NAS and to certify only qualified individuals—as well as the federal registration requirements, should be the focus of the FAA's final rules.

2. *Keeping Track of the Flock: Federal Registration*

The federal registration system is a further provision for maintaining the safety of the NAS.[173] All aircraft, both manned and unmanned, must be registered before operation.[174] After potential sUAS operators register their aircraft, the FAA can then contact those operators to educate them about the safety requirements for operation.[175] Consequently, the information provided by the FAA after registration will notify them about the necessity of obtaining a certificate with an sUAS rating prior to conducting any commercial sUAS operations.[176] Moreover, compliance with the registration requirements provides law enforcement and the FAA with the ability to identify the sUAS and its operator upon occurrence of any sort of accident involving the

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(4) understanding of how to clear an obstacle while flying and the types of maneuvers that can pose a collision hazard with ground structures; (5) effects of weather on a sUAS and how to react to different types of weather, as well as different official sources of weather information; (6) determining impacts on performance based on calculation of variables such as weight, balance, and available power; (7) response to the occurrence of emergency situations during a flight; (8) aeronautical decision-making and anticipation of manned-aircraft pilots' reaction to presence of a sUAS, as well as that ability to function in a team; (9) airport operations, radio communication procedures, and standard terminology; and (10) the effects of drugs and alcohol on one's ability to safely conduct a sUAS operation. *Id.* at 9569.

171. *Id.* at 9570. The recurrent test would evaluate operators' knowledge of sUAS regulations, including those potentially enacted since the time of the last or initial test; knowledge of different classifications of airspace and the different requirements for operating, obstacle clearance, and flight restrictions; knowledge of the most recently developed or developing weather and airport operation services; and knowledge of aeronautical decision-making, crew resource management, and emergency procedures. *Id.*

172. *Id.* at 9570–71. In the proposed rules, the FAA determined that demonstration of flight proficiency and aeronautical experience, which are both tested on the pilot certification exam, should not be required areas of examination on the test for a certificate for an unmanned aircraft operator for various reasons related to the differences between manned and unmanned aircraft operations. *See id.*

173. Registration and Marking Requirements for Small Unmanned Aircraft, 80 Fed. Reg. 78594, 78594 (Dec. 16, 2015) (to be codified at 14 C.F.R. pt. 48) (interim rule).

174. *Id.*

175. *Id.* at 78595.

176. *Id.* As previously mentioned, obtaining and maintaining this certificate requires passing an initial aeronautical knowledge test and passing recurrent tests every two years thereafter, which the FAA designed to maintain the safety of the NAS by ensuring that only those with adequate knowledge conduct operations. Operation and Certification of Small Unmanned Aircraft Systems, 80 Fed. Reg. at 9568–70.

sUAS.[177] Although any accident is obviously undesirable, registration will foster a sense of accountability among all operators and hopefully mitigate the risk of any accidents.[178] The accountability engendered by registration, as well as the opportunity it provides the FAA to engage and educate operators on safety requirements, are safeguards that should substantially reduce concerns that sUAS operators are conducting commercial operations without adequate knowledge and are endangering the safety of the NAS.[179] The safeguards provided by federal registration and operator certification requirements combined with state-imposed operational limitations and requirements would adequately serve to maintain the safety of the NAS.

C. Opportunity Flying by While Agriculture Industry Waits on the Runway: A Call for Swift Rulemaking

Most importantly, the agriculture industry, like all industries set to benefit from drone integration, needs a final set of rules for integration as quickly as possible. Although significant strides have been made toward that end, the continued delays put the U.S. further and further behind other countries that currently enjoy the benefits that UAS technology offers to agriculture.[180] As previously mentioned, the U.S. misses out on a potential $10 billion impact every year that drones are not integrated.[181] Moreover, further regulatory delays discourage technological innovation.[182] Uncertainty about the future regulatory framework leaves companies in the technology and drone industries with little incentive to continue to develop and create new technology due to the fear that they could be wasting money and resources on different types of drones and associated technologies that future regulation might prohibit.[183] More certainty concerning the future of the regulatory framework would incentivize commercial entities to continue development, which could in turn lead to the resolution of many of the technological and safety concerns the operational limitations in the FAA's proposed rules seek to address.[184]

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177. Registration and Marking Requirements for Small Unmanned Aircraft, 80 Fed. Reg. at 78596–97, 78603.

178. *Id.* at 78594. The ability of law enforcement and the FAA to quickly identify and locate operators with registered aircraft in the event of an accident, and hold them accountable if not federally certified to conduct commercial sUAS operations, or for not following operational limitations—whether they are state or federal limitations—should deter all other operators from noncompliance and mitigate the associated risks. *Id.* at 78596–97.

179. *Id.* at 78595.

180. *See* FOOD & AGRIC. ORG., *supra* note 3; *see also supra* Part II (explaining potential benefits that integration could have on the agriculture industry).

181. JENKINS & VASIGH, *supra* note 48, at 2.

182. KESSELMAN, *supra* note 18, at 6.

183. *Id.*

184. *See id.* For example, the FAA determined technology was not developed enough to permit beyond-line-of-sight operations, which consequently may discourage companies from further attempts at

V. CONCLUSION

Drone technology will be invaluable to agriculture once the FAA finally permits its use on a large scale. The data drones can collect could drastically increase efficiency and production yields of farms and ranches that choose to utilize the technology.[185] In turn, the improved efficiency and information gathered by drones will enable producers to minimize unnecessary waste and its harmful impact on the environment.[186] Furthermore, greater efficiency, increased production, and mitigated waste will be extremely beneficial from an economic standpoint. All of these factors will benefit the producers who employ the technology, the ultimate consumers, the state, the nation, and the world.

Despite these benefits, there must admittedly be some oversight to ensure safe integration and operation. To that end, Congress mandated the Secretary of Transportation and the FAA to create regulations for safe and efficient integration.[187] While the FAA maintains ultimate jurisdiction over the NAS, determining what should be regulated and how to regulate it has proven somewhat difficult for the FAA.

While the issue of what the FAA can regulate has been resolved, it still has not finalized a set of rules for integration and operation, as directed by Congress through the Act.[188] But, pursuant to § 333 of the Act, the FAA currently issues exemptions to some hopeful operators, which permit them to conduct operations for commercial purposes, including agriculture.[189] Until the FAA imposes a final set of regulations, those seeking to implement drone technology into their current agriculture practices must obtain a § 333 exemption.[190] The FAA did, however, publish proposed rules, which, if finalized, will govern drone integration and operations.[191] Though merely proposals, the NPRM does provide a good indication of the rules the FAA will likely include in the finalized version, and their restrictive nature.

While unbridled freedom for operators to conduct flights would surely be detrimental to the safety of the NAS, stifling operational limitations could prevent the agriculture industry from gaining all of the advantages drones offer. Instead of comprehensive federal regulations to govern operations for every industry in every state, the FAA could publish guidelines and allow states to enact their own operational limitations for commercial drone flights.

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developing the technology necessary for such operations. Operation and Certification of Small Unmanned Aircraft Systems, 80 Fed. Reg. 9544, 9549, 9564 (proposed Feb. 23, 2015) (to be codified at 14 C.F.R. pt. 107); *see* KESSELMAN, *supra* note 18, at 14.

185. *See* discussion *supra* Part II.A.
186. *See* discussion *supra* Part II.B.
187. *See* discussion *supra* Part III.B.
188. *See* discussion *supra* Part III.A–B.
189. *See* discussion *supra* Part III.C.
190. *See* discussion *supra* Part III.C.
191. *See* discussion *supra* Part III.D.

While many states would probably welcome the idea of complete regulatory freedom for operations, the FAA is unlikely to grant states such broad authority. Instead, the FAA could remove intrastate agriculture from commercial industries subject to the federal operational limitations. This would allow state legislatures to better address the unique characteristics of their agriculture industry. Moreover, required FAA approval of any such legislation would ensure its adequacy and NAS safety; and, if states choose not to create operational limitations, they would adopt those promulgated by the FAA by default. If the FAA does impose federal operational limitations, it should at least implement a process by which operators can apply for exemption from one or more of the regulations that would overburden the purposes of their operations. Furthermore, the federal registration and operator certification requirements, combined with some form of state control over operational limitations, would likely suffice to ensure safe integration and future operations.

Finally, whatever the FAA's decision regarding the level of state control over operational limitations, the drone and agriculture industries need a final set of regulations without further delay. Each year that passes without integration, Texas and the U.S. miss out on substantial economic opportunity. More delays in the future will put us even further behind our global competitors than the delays up to this point have done. Finally, continued delay in a final rulemaking will discourage innovation necessary for technological development, domestic economic stability, and securing a reliable future food source worldwide.