Report to the Legislature on:

(1) The status of federal regulations relating to unmanned aerial vehicles; and

(2) Whether unmanned aerial vehicles operated by private parties should be registered in Oregon in a manner similar to that required for other aircraft.

Figure 1 Unmanned Aerial System - pilot, communication link and aircraft

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GLOSSARY OF TERMS

Aircraft – A device that is used or intended to be used for flight in the air.[1] The FAA views unmanned aircraft as meeting the definition of aircraft and requires the same process of authorization as for manned aircraft.

Airworthiness Certification - Airworthiness certification is a process that the FAA uses to ensure that an aircraft design complies with the appropriate safety standards in the applicable airworthiness regulations. FAA type design approval indicates the FAA has evaluated the safety of the unmanned aircraft design and all its systems. This is more rigorous than simply making a determination that the UAS is airworthy. Airworthiness standards for existing aircraft are codified in Title 14 of the Code of Federal Regulations, with processes described for FAA type certification in FAA Order 8110.4 and airworthiness certification in FAA Order 8130.2.[2]

Certificate of Authorization (COA) - Authorization issued by the Air Traffic Organization to a public operator for a specific UAS activity. An FAA grant of approval for a specific flight operation. The authorization to operate a UAS in the National Airspace System as a public aircraft outside of Restricted, Warning, or Prohibited areas approved for aviation activities.[3]

Center of Excellence - The FAA announced in August of 2012 they would select an Unmanned Aerial Systems Center of Excellence as directed by Congress in the FAA Modernization and Reform Act (FMRA of 2012.[4] The FAA is authorized to fund and support centers of Excellence under Section 312 of the Federal Aviation Act of 1958 (49 App. U.S.C. 1353). It was later amended as follows;
"*The Administrator may make grants to one or more colleges or universities to establish and operate several regional centers of air transportation excellence, whose locations shall be geographically equitable. Any college or university interested in receiving a grant under this subsection shall submit to the Administrator an application in such form and containing such information as the Administrator may require by regulation.*"[5]
The Center of Excellence will be funded over the next 10 years with a minimum of $500,000 per year.[6] There is at least one Oregon public university (Oregon State University) that has an application in to be the UAS Center of Excellence.

Classes of airspace– Categories of airspace as defined by the FAA. Controlled airspace is a generic term that covers the different classifications of airspace and defined dimensions within which air traffic control (ATC) service is provided in accordance with the airspace classification. Controlled airspace consists of Class A, Class B, Class C, Class D, and Class E.

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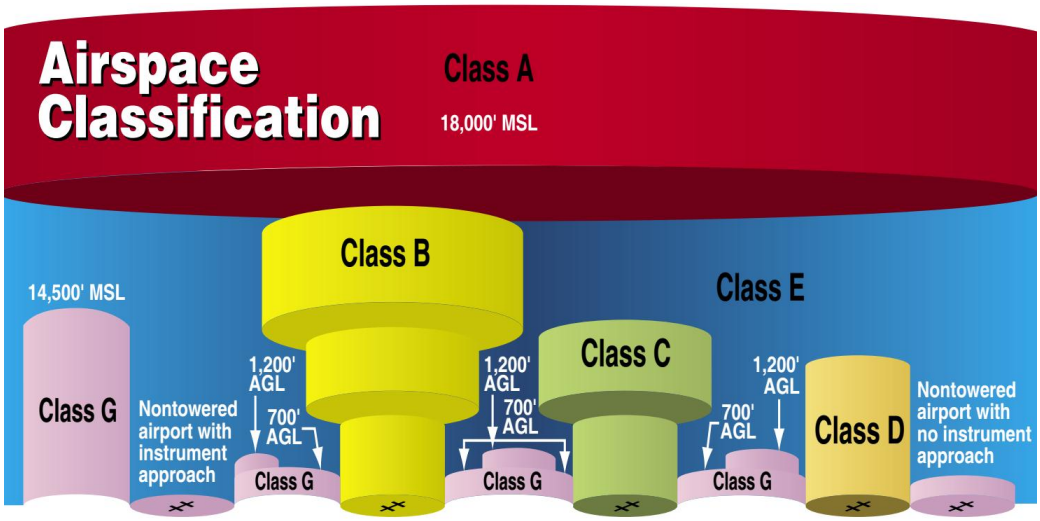
[1] U.S DOT FAA Title 14, Chapter I. Subchapter A Part 1 → §1.1, http://www.ecfr.gov/cgi-bin/text-idx?SID=8fe7b223f5c58736b706ad41f2ea5a3c&node=se14.1.1_11&rgn=div8
[2] Integration of Civil Unmanned Aircraft Systems (UAS) in the National Airspace System (NAS) Roadmap
[3] FAA UAS Roadmap, page 47
[4] http://www.faa.gov/news/updates/?newsId=78725 dated August 12, 2014
[5] Extracted from FAA Website, site updated August 2014 - http://www.faa.gov/about/office_org/headquarters_offices/ang/offices/management/coe/facts/legislation/
[6] Extracted from FAA website press release dated 12 August 2014. WWW.faa.gov/news/updates/?newsid=78725

The chart below shows a visual depiction of classes of airspace and their purposes.[7]



Class A Airspace - Airspace from 18,000 feet Mean Sea Level (MSL) up to and including FL 600 (60,000 ft.) including the airspace overlying the waters within 12 nautical miles of the coast of the 48 contiguous States and Alaska; and designated international airspace beyond 12 nautical miles of the coast of the 48 contiguous States and Alaska within areas of domestic radio navigational signal or ATC radar coverage, and within which domestic procedures are applied.

Class B Airspace - Airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports (Atlanta, Chicago Dallas/Ft Worth) in terms of IFR (Instrument Flight Rules) operations or passenger enplanements. The configuration of each Class B airspace area is individually tailored and consists of a surface area and two or more layers (some Class B airspace areas resemble upside-down wedding cakes), and is designed to contain all published instrument procedures once an aircraft enters the airspace. UAS are not authorized to operate in Class B airspace.

Class C Airspace - Airspace from the surface to 4,000 feet above the airport elevation surrounding those airports that have an operational control tower are serviced by a radar approach control, and that have a certain number of IFR operations or passenger enplanements. Although the configuration of each Class C airspace area is individually tailored, the airspace usually consists of a five nautical mile (NM) radius core surface area that extends from the surface up to 4,000 feet above the airport elevation, and a 10 NM radius shelf area that extends no lower than 1,200 feet up to 4,000 feet above the airport elevation.

Class D Airspace - Airspace from the surface to 2,500 feet above the airport elevation surrounding those airports that have an operational control tower. The configuration of each

[7] http://www.faa.gov/regulations_policies/handbooks_manuals/aviation/pilot_handbook/media/phak%20-%20chapter%2014.pdf

Class D airspace area is individually tailored and when instrument procedures are published, the airspace will normally be designed to contain the procedures.

Class E Airspace – All other airspace. If the airspace is not Class A, Class B, Class C, or Class D, and it is controlled airspace, it is Class E airspace. Class E airspace is generally subclassified for specific purposes including areas around general use airports and transition to and from airport terminal areas, federal airways and offshore controlled airspace.

Class G Airspace – Uncontrolled airspace - That portion of airspace that has not been designated as Class A, Class B, Class C, Class D, or Class E airspace.

Communication Link - The voice or data relay of instructions or information between the UAS pilot and the air traffic controller and other NAS users.[8]

Data Link – A ground-to-air communications system which transmits information via digital coded pulses.[9]

Detect And Avoid (DAA) – Term used instead of Sense and Avoid to describe the collision avoidance description for unmanned aerial systems. It replaces the "See and Avoid" doctrine used by pilots of manned aircraft. [10]

FAA Modernization and Reform Act of 2012 (FMRA) – Congressional Reauthorization of the FAA from 2012.[11] This law includes specific congressional requirements for integrating Unmanned Aerial Systems (including timelines) into the National Airspace System.

First Person View (FPV) - Refers to the operation of a radio controlled (R/C) model aircraft using an onboard camera's cockpit view to orient and control the aircraft.[12]

FPV Aircraft - A remote control (RC) model aircraft equipped with a video transmitter to send real-time video images from an onboard camera to a ground based receiver for display on a pilot's video monitor/goggles. (*FPV model aircraft* types include: Fixed Wing, Rotary Wing, and Multi-Rotor Platforms).[13]

Geo-fencing – The operational concept that restricts an unmanned aircraft from flying outside a specific geographic boundary through software restrictions on altitude or range from a specific point on the ground or from the operator.

Lost Link - Loss of command and control (communication) link between control station and aircraft. There are two types of link: (1) Up link – transmits command instructions to the aircraft and (2) Down link – transmits the status of the aircraft and provides situational

[8] FAA UAS Roadmap, page 47
[9] FAA UAS Roadmap, page 47
[10] UAS Roadmap, http://www.faa.gov/uas/media/uas_roadmap_2013.pdf
[11] FAA Modernization and Reform Act of 2012, 49 USC 40101, Public Law 112-95
[12] Academy for Model Aeronautics website AMA documents #550, Radio Controlled Model Aircraft Operation Utilizing "First Person View" Systems, http://www.modelaircraft.org/files/550.pdf
[13]Academy for Model Aeronautics website AMA documents #550,

awareness to the pilot.[14] Many sophisticated UAS have preprogrammed "lost link" software driven responses that range from holding over existing position until the link can be re-established to flying to a pre-designated geographic location and recovering by landing or other means of recovery.

Manned Aircraft – Aircraft piloted by a human on board[15]

Model Aircraft - An unmanned aircraft that is capable of sustained flight in the atmosphere; flown within visual line-of-sight of the person operating the aircraft and flown for hobby or recreational purposes.[16]

National Airspace System (NAS) - The common network of U.S. airspace; air navigation facilities, equipment and services, airports or landing areas; aeronautical charts, information and services; rules, regulations and procedures, technical information, and manpower and material. Included are system components shared jointly with the military.[17]

Next Generation Air Transportation System (NextGen) - NextGen is a series of inter-linked programs, systems, and policies that implement advanced technologies and capabilities to dramatically change the way the current aviation system is operated. NextGen is satellite-based and relies on a network to share information and digital communications so all users of the system are aware of other users' precise locations.[18]

Pilot in Command (PIC) – Pilot responsible for all aspects of the flight. Must have a second class medical certificate from an FAA authorized doctor. Pilot must be trained and qualified on the specific UA being operated.[19]

Public Aircraft Operations (PAO) - Limited by the statute to certain government operations within U.S. airspace. Although these operations must comply with certain general operating rules (including those applicable to all aircraft in the NAS), other civil certification and safety oversight regulations do not apply. Whether an operation may be considered public is determined on a flight-by-flight basis, under the terms of the statute (49 U.S.C. 40102 and 49 U.S.C. 40125) and depends on FAA Order 7110.65, Air Traffic Control, Pilot/Controller Glossary, Change two. Factors such as aircraft ownership, operator, the purpose of the flight and the persons on board the aircraft.[20]

Any of the following aircraft when not being used for a commercial purpose or to carry an individual other than a crewmember or qualified non-crewmember:

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[14] U.S. DOT FAA section 12 (p), Notice N JO 7210.873 effective July 11, 2014, Unmanned Aircraft Operations in the National Airspace System (NAS) http://www.faa.gov/documentLibrary/media/Notice/N_JO_7210.873_Unmanned_Aircraft_Operations.pdf

[15] FAA UAS Roadmap, page 47 http://www.faa.gov/air_traffic/publications/media/AIM_Basic_4-03-14.pdf

[16] Roadmap page 47

[17] Aeronautical Information Manual, April 2014, http://www.faa.gov/air_traffic/publications/media/AIM_Basic_4-03-14.pdf

[18] U.S. DOT FAA document , Destination 2025, https://www.faa.gov/about/plans_reports/media/Destination2025.pdf

[19] FAA National policy; http://www.faa.gov/documentlibrary/media/notice/n_8900.227.pdf

[20] FAA Order 7110.65, Air Traffic Control, Pilot/Controller Glossary

(1) An aircraft used only for the United States Government; an aircraft owned by the Government and operated by any person for purposes related to crew training, equipment development, or demonstration; an aircraft owned and operated by the government of a State, the District of Columbia, or a territory or possession of the United States or a political subdivision of one of these governments; or an aircraft exclusively leased for at least 90 continuous days by the government of a State, the District of Columbia, or a territory or possession of the United States or a political subdivision of one of these governments.
(i) For the sole purpose of determining public aircraft status, *commercial purposes* means the transportation of persons or property for compensation or hire, but does not include the operation of an aircraft by the armed forces for reimbursement when that reimbursement is required by any Federal statute, regulation, or directive, in effect on November 1, 1999, or by one government on behalf of another government under a cost reimbursement agreement if the government on whose behalf the operation is conducted certifies to the Administrator of the Federal Aviation Administration that the operation is necessary to respond to a significant and imminent threat to life or property (including natural resources) and that no service by a private operator is reasonably available to meet the threat.
(ii) For the sole purpose of determining public aircraft status, *governmental function* means an activity undertaken by a government, such as national defense, intelligence missions, firefighting, search and rescue, law enforcement (including transport of prisoners, detainees, and illegal aliens), aeronautical research, or biological or geological resource management.
(iii) For the sole purpose of determining public aircraft status, *qualified non-crewmember* means an individual, other than a member of the crew, aboard an aircraft operated by the armed forces or an intelligence agency of the United States Government, or whose presence is required to perform, or is associated with the performance of, a governmental function.
(2) An aircraft owned or operated by the armed forces or chartered to provide transportation to the armed forces if—
(i) The aircraft is operated in accordance with title 10 of the United States Code;
(ii) The aircraft is operated in the performance of a governmental function under title 14, 31, 32, or 50 of the United States Code and the aircraft is not used for commercial purposes; or
(iii) The aircraft is chartered to provide transportation to the armed forces and the Secretary of Defense (or the Secretary of the department in which the Coast Guard is operating) designates the operation of the aircraft as being required in the national interest.
(3) An aircraft owned or operated by the National Guard of a State, the District of Columbia, or any territory or possession of the United States, and that meets the criteria of paragraph (2) of this definition, qualifies as a public aircraft only to the extent that it is operated under the direct control of the Department of Defense.[21]

Quadcopter/multicopter – Unmanned aircraft that has four or more rotors and functions as a helicopter.

Radio Technical Commission for Aeronautics (RTCA) –RTCA, Inc. is a private, not-for-profit corporation that develops consensus-based recommendations regarding communications, navigation, surveillance, and air traffic management system issues in partnership with the FAA. RTCA functions as a Federal Advisory Committee. Its

[21] U.S DOT FAA Title 14, Chapter I. Subchapter A Part 1 Paragraph 1.1, http://www.ecfr.gov/cgi-bin/text-idx?SID=e9c81cc6c32d6f09419369e81389169a&node=pt14.1.1&rgn=div5

recommendations are used by the FAA as the basis for policy, program, and regulatory decisions and by the private sector as the basis for development, investment and other business decisions. www.rtca.org.[22] RTCA is directly involved in the rulemaking on UAS.

See and Avoid - When meteorological conditions permit, regardless of type of flight plan or whether or not under control of a radar facility, the pilot is responsible to see and avoid other traffic, terrain, or obstacles. This term is most often used with manned aircraft with a pilot in visual flight conditions.[23]
Sense and Avoid (SAA) – Term used for UAS in the absence of a pilot in the aircraft. It implies an alternative for an alternative method of avoiding other aircraft to prevent collision. In visual flight conditions, sense and avoid can be controlled by the pilot on the ground when within line of sight of the UA. For more sophisticated unmanned aircraft, it will be the technology that senses a potential conflict and causes a UA to maneuver to avoid another aircraft or obstruction when not within sight of the operator. A case in point would be a UA flown in Instrument Meteorological conditions (IMC) or at night. Not used with UAS, preferred term is Detect and Avoid.

Small Unmanned Aerial System (sUAS) – An unmanned aircraft that weighs less than 55 pounds per FAA definition.[24]

Test Range – A defined geographic area where research and development are conducted in accordance with Sections 332 and 334 of the FMRA for Unmanned Aerial Systems. Test ranges are also known as test sites in related documents such as the FAA's Screening Information Request. FMRA required the FAA to establish six test ranges to help integrate UAS into the NAS.[25]

Unmanned Aerial System (UAS) - An unmanned aircraft and its associated elements related to safe operations, which may include control stations (ground, ship, or air-based), control links, support equipment, payloads, flight termination systems, and launch/recovery equipment. Other terms use are drones, unmanned aerial vehicle (UAV), Remotely Piloted Vehicles (RPV), Radio control (R/C) Aircraft.

Unmanned Aircraft (UA) - An aircraft operated without the possibility of direct human intervention from within or on the aircraft.[26]

Traffic Alert and Collision Avoidance System (TCAS) - Collision warning and avoidance system that uses air traffic control radar and aircraft based location and altitude information to provide relative location of aircraft that present imminent collision threat to pilots.
CAS I means a TCAS that utilizes interrogations of, and replies from, airborne radar beacon transponders and provides traffic advisories to the pilot.

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[22] FAA UAS Roadmap
[23] Aeronautical Information Manual, April 2014, http://www.faa.gov/air_traffic/publications/media/AIM_Basic_4-03-14.pdf
[24] FAA UAS Roadmap, page 48
[25] FMRA
[26] U.S. DOT FAA section 12 (p), Notice N JO 7210.873 effective July 11, 2014, Unmanned Aircraft Operations in the National Airspace System (NAS)
http://www.faa.gov/documentLibrary/media/Notice/N_JO_7210.873_Unmanned_Aircraft_Operations.pdf

TCAS II means a TCAS that utilizes interrogations of, and replies from airborne radar beacon transponders and provides traffic advisories and resolution advisories in the vertical plane. *TCAS III* means a TCAS that utilizes interrogation of, and replies from, airborne radar beacon transponders and provides traffic advisories and resolution advisories in the vertical and horizontal planes to the pilot.[27]

Visual Line Of Sight (VLOS*)* - The distance at which the pilot is able to maintain visual contact with the aircraft and determine its orientation without enhancements other than corrective lenses.[28]

[27] U.S DOT FAA Title 14, Chapter I. Subchapter A Part 1 Paragraph 1.1, http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&sid=a3a21673a5020d6763cfb10d068366d8&rgn=div5&view=text&node=14:1.0.1.1.1&idno=14
[28] Academy for Model Aeronautics website AMA documents #550.

ACRONYMS

AC – Advisory Circular

A/C – Aircraft

ACLU – American Civil Liberties Union

ADS-B – Automatic Dependent Surveillance Broadcast

AGL – Above Ground Level

AMA – Academy of Model Aeronautics

ATC – Air Traffic Control

AUVSI – Association of Unmanned Vehicle Systems International

AWOS – Automated Weather Operating System

CFR – Code of Federal Regulation

COA – Certificate of Authorization or Waiver

DAA – Detect and Avoid

DOD – Department of Defense

DOT – Department of Transportation

FAA – Federal Aviation Administration

FMRA – FAA Modernization and Reform Act of 2012

FPV – First Person View

FSS – Flight Service Station

HD – High Definition

IFR – Instrument Flight Rules

IG – Inspector General

LEO – Law Enforcement Operations

MOU – Memorandum of Understanding

MSL – Mean Sea Level

NAS – National Airspace System

NASA – National Aeronautics and Space Administration

NEXTGEN – Next Generation Air Traffic Control System

NIST - National Institute of Standards and Technology

NM – Nautical Mile

NOTAM – Notice to Airmen

NPRM – Notice of Proposed Rulemaking

NTSB – National Transportation and Safety Board

PIC – Pilot in Command

PAO – Public Aircraft Operations

ODOA – Oregon Department of Aviation

OTA – Other Transaction Agreement

RC – Remotely Controlled

RCA – Remotely Controlled Aircraft

RTCA - Radio Technical Commission for Aeronautics

SAA – Sense and Avoid

SAR – Search and Rescue

sUAS – small Unmanned Aerial System

UA - Unmanned Aircraft

UAS – Unmanned Aircraft (or Aerial) System

UAV – Unmanned Aerial Vehicle

U.S.C. – United States Code

U.S. DOT – United States Department of Transportation

TCAS – Traffic Alert and Collision Avoidance System

VFR - Visual Flight Rules

VLOS – visual line of sight

PURPOSE

As required by House Bill 2710 Oregon Laws 2013, the Oregon Department of Aviation respectfully submits a report to the Legislature on the status of Unmanned Aerial Systems (drones) as noted below:

SECTION 18. On or before November 1, 2014, the Oregon Department of Aviation shall report to a joint interim committee of the Legislative Assembly related to the judiciary, or other appropriate interim committees, on:

(1) The status of federal regulations relating to unmanned aerial vehicles; and

(2) Whether unmanned aerial vehicles operated by private parties should be registered in Oregon in a manner similar to that required for other aircraft.

In the 2013 Oregon legislative session, HB 2710 was signed into law to make Oregon one of 24 states with laws on the books with some level of regulation of Unmanned Aerial Systems (UAS). House Bill 2710 was part of a national legislative movement that UAS were beginning to move from the military arena to commercial and recreational markets. In recognition of the potential for misuse, the ACLU was an early sponsor of many statehouse bills to require protection of privacy and ensure that legal due processes were followed. Oregon's Legislature developed one of the most comprehensive UAS laws on privacy and due process/illegal search of any state.

HB 2710 provides protection from violations of privacy and due process and regulates how Oregon law enforcement can use unmanned aircraft. It provides both civil and criminal penalties for violations of the law involving unmanned aerial systems, also known as drones.[29] The statute also protects legal drone operators from interference by making interference such as shooting or firing any projectiles or directing a laser at it a Class C felony as well as subject to civil remedy. The law also protects private landowners from overflight below 400 feet punishable by civil penalty with up to treble damages and attorney fees.[30] The statute includes a state preemption clause directing that the authority to regulate ownership or operation "is vested solely in the Legislative Assembly" and "no local government unless authorized by statute, can regulate drone ownership or operations."[31]

Section Eight of HB 2710 requires the Oregon Department of Aviation to begin registering public drones beginning in January 2016. This report will discuss what constitutes public drones. HB 2710 further requires the Oregon Department of Aviation to recommend to the Legislature whether the state should register unmanned aerial vehicles operated by private

[29] The news media and popular culture have referred to Unmanned Aerial Systems as drones and for practical reasons, the term will be used interchangeably with UAS. The official FAA term is Unmanned Aerial System (UAS) and in some cases Unmanned Aircraft (UA). UAS includes the aircraft, communication system and ground based operator and other equipment used to fly a UA. Unmanned Aircraft is only the aircraft itself.

[30] ORS 646.780 (10 allows for treble damages in civil cases as described in paragraph (1) of the statute: A person, the state or any political subdivision in the state injured in its business or property by a violation of ORS 646.725 (Prohibited acts) or 646.730 (Monopolies prohibited) may sue for the injury and shall recover three times the damages sustained. An action authorized by this paragraph may be brought regardless of whether the plaintiff dealt directly or indirectly with the adverse party. http://www.oregonlaws.org/ors/646.780

[31] 2013 Legislative Session HB 2710

parties. Private party drones can be broken down into two distinct categories. First are recreational users of drones, also known as model aircraft operators. Second are commercial operators, a market which has not opened up yet in federal regulation but is scheduled to be authorized by the FAA by late 2015. In this report, that distinction will be instrumental to the ultimate recommendation on registration of private party drone users as required by section 18 of the statute.

Beyond the three types of UAS (public, commercial, and recreational), the FAA categorizes UAS into two sizes: large (greater than 55 pounds) and small (less than 55 pounds). In the next two years, the FAA will complete rulemaking on small UAS and perhaps change or adjust the categories that constitute small UAS. By contrast, Department of Defense has over eleven categories of UAS.

This paper will address section18 of HB 2710 which calls on Oregon Department of Aviation to report on the status of Federal regulation. The report includes the impact of the most recent actions of Congress, the FAA and industry to address the increasing demand and numbers of UAS in the Oregon. Over the past two years, there have been significant changes in both technology and regulation that will be covered here. There has also been a large increase in the number of recreational UAS sold in retail stores and over the internet. Most significantly, portions of the recreational market have morphed into commercial operations and there is a growing commercial UAS industry base in Oregon that is dependent on the FAA to provide the legal structure for them to operate. Congress mandated integration of UAS into the National Airspace System by 2015 in the 2012 FAA Modernization and Reform Act (FMRA). This report will discuss how that integration is progressing as well as the impact of that regulatory process on the public use, commercial, and recreational UAS industry.

The report will not cover in significant detail the privacy and due process issue. While it is recognized that these are important issues, it is outside the scope of the HB 2710 reporting mandate and outside the expertise for this aviation agency. The Department of Aviation did meet with Oregon American Civil Liberties Union (ACLU) representatives and other civil liberties groups to balance this paper's perspective and ensure their input was considered. This report also shows a graphic representation of the status of the other 49 states (appendix D) and a summary of their legislation as of October 2014.

The report will provide three options with pros and cons for the Legislature to consider for registration of UAS in Oregon. It will also look at the cost of registration for each option. The three options are listed below

1. Register all UAS but postpone registration of private party "drones' pending federal clarification and rule making. Public Use UAS to be registered by January 2016 as required by HB 2710.
2. Register only commercial use UAS and not register the recreational market. Public Use UAS to be registered by January 2016 as required by HB 2710.
3. Register all private party UAS including commercial and recreational use. Public Use UAS to be registered by January 2016 as required by HB 2710.

Finally, the report will make a recommendation on a preferred option to the Legislature.

HISTORICAL PERSPECTIVE

Unmanned Aerial Systems have been used in aviation for a long time. Early unmanned model aircraft were typically amateur recreational operators using relatively low technology radio controlled aircraft in parks and fields for the enjoyment of the operator. One of the earliest true unmanned (non-balloon) aircraft was built in 1848 when inventors in England created an Aerial Steam Carriage with a ten foot wing span that flew short distances.[32] The first modern military application was during World War I when inventors from Sperry Gyroscope Company developed a "flying bomb" intended to be used as an aerial torpedo against German Zeppelins.[33] UAS continued to be developed for military uses, becoming larger and more sophisticated as communication technology and aircraft manufacturing became more developed. UAS were used in World War II and ever since as anti-aircraft target drones.

Today, military drone technology has advanced to the point that UAS can be used to guide many aircraft that previously required a human in the cockpit. They provide less risk of loss of human life and can fly many hours more than is reasonable for a flight crew of human pilots. Modern unmanned aircraft can tolerate extremes of maneuver (G forces) and other phenomena such as radiation, exposure to deadly diseases, and extremes of temperature. Many of the uses previously used only in the military (high definition and zoom cameras, infrared cameras, and other high tech sensors are beginning to have commercial application as well as recreational appeal.

With these capabilities come challenges. The industry has exploded with recreational off the shelf drones available over the internet, in local hobby shops, and even in Oregon major retail chain stores.

Figure 2 Drone fired from Navy Ship

The term drone has been adopted by the media to describe all Unmanned Aerial Systems and more generally picked up by the general public to mean any unmanned aircraft, military or civilian. The traditional meaning of drone is a target unmanned aircraft used by the military for training and moving target shooting proficiency. Drones were launched from ships, towed by manned aircraft, or flown from land based launchers. They were inexpensive and re-flyable once recovered and repaired.

The picture above shows a military drone fired from a U.S. Navy warship to be used as a target by aircraft or shipboard weapon systems.

[32] Extracted from Dragonfly Innovations INC website, http://www.dragonfly.com/news/2009/03/04/a-short-history-of-unmanned-aerial-vehicles-uavs/

[33] Extracted from http://en.wikipedia.org/wiki/History_of_unmanned_aerial_vehicles

Modern military UAS like the General Atomics *Predator* (*see Figure 3)* can loiter for hours, be used as either reconnaissance, electronic listening systems or as airborne weapons. UAS can be as large as a commercial airliner, or as small as a humming bird (figure 4).

Figure 3 Predator Unmanned Aircraft[34]

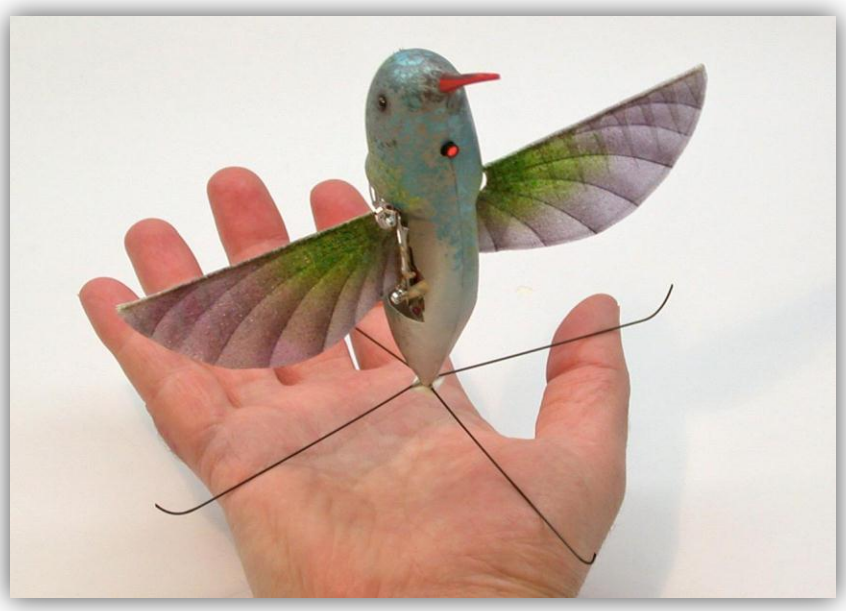

Figure 4 Hummingbird Spy drone

[34] U.S. Air Force photo/Lt Col Leslie Pratt - http://www.af.mil/shared/media/photodb/photos/081131-F

STATUS OF FEDERAL REGULATION

The FAA Modernization and Reform Act (FMRA) of 2012 has far reaching and significant effect on the unmanned aircraft industry as well as both federal and state governments. The provisions of FMRA provide direction for every stakeholder in terms of timelines and progress of Unmanned Aerial Systems (UAS) development. Congress directed the FAA to "*develop a comprehensive plan to safely accelerate the integration of civil unmanned aircraft systems into the national airspace system as soon as practical but not later than September 30, 2015.*"[35] Congress also directed the FAA to a series of actions to expedite the UAS integration process. These actions included directing the FAA to create a comprehensive plan for integration of UAS into the National Airspace System (NAS) and a five year road map to implement the plan. Congress also directed the FAA to create steps to streamline the manner in which public agencies applied for and received Certificates of Authorization (COAs) – permission to fly UA in the NAS or on test ranges) from the FAA and to expedite small UAS operations into the National Airspace System. To date, these congressional tasks have been met late or not at all.

The FAA's primary mission is the safety and efficiency of the National Airspace System. Unmanned Aerial Systems present significant challenges to that imperative. It is important to note that the FAA has developed policy that treats UAS *as aircraft* with the pilot not in the aircraft. Unlike manned aircraft, UAS cannot use the same requirements to see and avoid potential collisions with other aircraft with pilots under the FAA's Visual Flight Rules (VFR – flying by reference to the horizon and other visible cues). For manned aircraft, the accepted VFR practice requires pilots to "see and avoid" other aircraft when visibility allows the pilot to take action to avoid a collision with another aircraft. With the pilot on the ground controlling the unmanned aircraft, the normal cockpit view is not possible. For this reason, the FAA has historically required model unmanned aircraft to be controlled only by line of sight viewing of the unmanned aircraft by the pilot on the ground to minimize the risk of collision with manned aircraft.

Given these challenges to the primary safety mission of the FAA, regulation of this rapidly changing new technology has been slow to develop. The FAA has failed to meet any of the timelines directed by Congress under FMRA. A U.S. Department of Transportation Inspector General (IG) reported out on the FAA's challenges in meeting Congressional timelines under the FMRA. The report states the FAA will not meet the November 2015 deadline to allow UAS to be integrated into the national airspace.[36] The IG was very critical of the progress made to meet the congressional mandate describing the FAA as "*not effectively managing its oversight of UAS operations.*"[37]

The chart on the following pages shows the status of FAA completion of major tasks associated with FMRA as determined by the U.S. Department of Transportation Inspector

[35] FMRA of 2012 section 332 para (3)
[36] U.S. Department of Transportation Office of Inspector General, June 26, 2014, FAA Faces Significant Barriers to Safely Integrate Unmanned Aircraft Systems Into the National Airspace System. Report Number AV-2014-061. http://www.oig.dot.gov/sites/dot/files/FAA%20Oversight%20of%20Unmanned%20Aircraft%20Systems%5E6-26-14_0.pdf
[37] Ibid page 3

General report. It lists the requirements established by Congress and their status as of October 2014. The blocks in green show items that are in the future or are on track. The blocks in yellow indicate congressionally imposed timelines the FAA has met late. Items in red are those that are overdue and FAA has indicated they cannot comply with[38]:

[38]Department of Transportation Inspector General Report; June 26, 2014. FAA FACES SIGNIFICANT BARRIERS TO SAFELY INTEGRATE UNMANNED AIRCRAFT SYSTEMS INTO THE NATIONAL AIRSPACE SYSTEM Federal Aviation Administration Report Number: AV-2014-061

Task	Deadline	Date Achieved	Comments
Requires agreement with public agencies for simplified COA process for public agencies – within 90 days	May 2012	March 2013	FAA completed a streamlined COA process via Memorandum of Understanding (MOU) with Department of Defense (DOD), NASA, and Department of Justice (DOJ) in March 2013. Department of Interior (DOI) in Jan 2014.
Within 90 days, FAA shall enter into agreements with Government Agencies to simplify COA process for operations in the NAS	May 2012	January 2013	Issued as FAA Order N8900.207 (ii) require approval or disapproval within 60 days, allow for an expedited appeal if the application is disapproved; allow a government public safety agency to operate unmanned aircraft weighing 4.4 pounds or less, if operated within the line of sight of the operator less than 400 feet, outside of 5 miles from any airport,
Requires FAA to designate 6 test sites within 6 months	August 2012	December 2013	Terminates 5 years from Feb 2012.
Plan for 24 hour flights in Arctic within 180 days for research and commercial purposes.	August 2012	November 2012	Not fully executed by July 2014.
Report to Congress with 180 days on feasibility of certain UAS operations in NAS prior to completion of Plan and rulemaking	August 2012	November 2013	Report includes which types of unmanned aircraft systems, if any, as a result of their size, weight, speed, operational capability, proximity to airports and populated areas, and operation within visual line of sight do not create a hazard to users of the national airspace system or the public or pose a threat to national security; and (2) whether a certificate of waiver, certificate of authorization, or airworthiness certification under section 44704 of title 49, United States Code, is required for the operation of unmanned aircraft systems identified under paragraph (1).

Within 270 days, FAA shall issue guidance on operation of public UAS	November 2012	January 2013	To expedite issue of COA Collaborative process to incrementally expand into NAS Facilitate public agency use of test ranges. Provide guidance on UAS use by public agencies when operating without COA.
Comprehensive Plan for Integration of UAS into NAS within 270 days. (1)	November 2012	November 2013	Required Implementation by September 2015
Test Sites operational within 18 months of selection ; first one operational by Feb 2013	February 2013	April 2014	AK, OR, HI working on implementation. All have had test flights but continue to work on routine operations
Roadmap for integration of UAS into NAS within 1 year	February 2013	Nov 2013	5 year plan to be updated annually.
Rulemaking within 18 months of comp plan for integration of small UAS into NAS	August 2014	Pending	FAA has publicly said they are unable to meet this deadline. Final Rule within 16 months of NPRM. Domino effect on other UAS integration into NAS
Integrate UAS into NAS as soon as practical but no later than Sep 30, 2015	September 2015	Pending	FAA has already said they cannot meet the deadline.
Rulemaking on integration of all UAS into NAS	December 2015	Pending	FAA and IG report both say FAA will miss deadline
Report to Congress within 90 days from termination of test range program	August 2017	Pending	The report shall include assessment of progress establishing special use airspace to fill needs of DOD.— Develop detection techniques for small UAS; and validate the sense and avoid capability and operation of unmanned aircraft systems
No later than Dec 31, 2015 FAA shall develop and implement cert requirements for Public UAS in the NAS	December 2015	Pending	FAA has taken a go slow approach

The significance of this chart is it shows the FAA missing their deadlines for implementation and has put the UAS industry, privacy advocates, and individual states into a state of uncertainty. Stakeholders cannot plan effectively when the federal rulemaking lags industry and state regulatory function.

FAA Test Sites

Among the tasks Congress gave the FAA was to establish six test sites nationally to provide data to develop certification standards, air traffic requirements, and verify the safety of UAS navigation systems and procedures before integration of UAS into the National Airspace System (NAS). The FAA's selection of the test sites required taking into consideration geographic and climatic diversity, infrastructure, and research needs and consult with the National Aeronautics and Space Administration (NASA) and the Department of Defense (DOD). The selection criteria is not all inclusive and includes the guidelines noted below:

1. Designate airspace for integrated manned and unmanned flight operations.
2. Develop certification standards and air traffic requirements for unmanned flight operations at the test sites. Leverage NASA and DOD to leverage their resources. NASA is working on a UAS plan for airspace for the FAA to implement.
3. Address both civil and public UAS.
4. Make sure the UAS program is coordinated with the FAA's modernization plan called NEXTGEN. (Next Generation Air Transportation System)
5. Verify the Safety of UAS systems and navigation procedures before integration into the NAS. Requires Detect and Avoid technology to be more mature.[39]

Early in the FAA's selection process, Oregon UAS industry stakeholders were interested in submitting an application to be considered to be as one of the six test sites. Oregon is rich in diversity of climate and geography that are ideal for a strong application. However, relative to other states with NASA facilities and military bases, the state was at a disadvantage in developed infrastructure and working relationships with NASA and DOD when it came to establishing its credentials for consideration as a test site. A core group of business development, industry, and academic stakeholders formed a consortium to apply for UAS test site status. With leadership from EDCO (Economic Development for Central Oregon) and Oregon State University, the consortium expanded the Oregon participation to include more statewide involvement covering the entire geography of the state from the coast (Tillamook to Pendleton in the east. Realizing that Oregon alone might not be competitive, the Oregon consortium met with the Alaska UAS team and joined their application for a multistate application package.

The Oregon consortium formed a non-profit Board of Directors whose mission is the development of Unmanned Aircraft Systems industry In Oregon. They named their Organization *SOAR Oregon.*[40] The *SOAR* organization worked directly with the Alaska group to put together a consolidated set of three Oregon ranges in a multiple state application for FAA consideration as one of the six FAA test sites. The two states also added Hawaii as a co-applicant. The combined group is referred to as the *Pan-Pacific Test Ranges*. More recently, Alaska has also partnered with the country of Iceland for test site operations. Iceland does not have the FAA strings attached that hamper test flights in the U.S. based Pan-Pacific ranges.

[39] FMRA of 2012 section 332
[40] http://www.soaroregon.com/

Alaska was always a front runner due to the state's history of UAS operations in the Arctic and direction from Congress in the FMRA under section 332 to "*develop a plan and initiate a process to work with relevant Federal agencies and national and international communities to designate permanent areas in the Arctic where small unmanned aircraft may operate 24 hours per day for research and commercial purposes.*"[41]

By partnering with Alaska, Oregon established its UAS legitimacy with FAA recognition and sanction. Selection as a test site is intended to attract UAS proponents to bring their business into Oregon. It remains to be seen if this will be proven as an effective strategy. The FAA has limited commercial operations in the test ranges and to date, only publicly operated UAS have been approved to operate in them. This limitation may hamper the ability of the ranges to generate revenue since by law, public aircraft operations are not for profit. The six test sites expire five years from the date the FMRA was enacted so there is a time limit to establish their operations.[42] Although, many insiders predict an extension of the time period the ranges will serve as designated FAA test sites. The consensus is also that the FAA will change the regulations that authorize only PAO aircraft on the ranges to allow commercial operations.

The FAA selected the six UAS test sites at the end of December of 2013. Twenty six states submitted applications. Each test site had specific areas of focus that the FAA would like to collect data on as part of integrating UAS into the NAS but the test site focus are not all inclusive. The six test sites selected are as follows:

1. Alaska – Partnered with **Oregon** and Hawaii. Diverse set of ranges over seven different climate zones. Focus is on State monitoring, navigation and safety standards.
2. Nevada – Focus on standards for operators and certification requirements and air traffic procedures. Also focuses on geography and climatic diversity.
3. New York Griffiss International Airport – Focus on Detect and Avoid risk and integration of UAS into the densely populated northeast U.S. airspace.
4. North Dakota Department of Commerce – Focus on airworthiness data and reliability of links between pilots and UAS. Will also focus on human factors. The only test range in the temperate (continental) climate zone.
5. Texas A&M Corpus Christi – Focus on safety systems for UAS, protocols, and procedures for airworthiness testing.
6. Virginia Polytechnic Institute (VPI) – Focus on testing of failure modes and technical risks for UAS. VPI has test sites in both Virginia and New Jersey.[43]

Oregon established three test sites within the state with the potential for additional sites in the future if the requirement for test ranges develops fully. Three test sites are as follows:

1. Tillamook Airport - Has a thriving business contracting with NASA, and other companies to launch balloons and aircraft into the upper atmosphere. Near Space corporation and the airport has infrastructure that is conducive to UAS testing.

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[41] FMRA section 332 (5)(d)(1)
[42] FMRA section
[43] Extracted from FAA website "Fact Sheet-Unmanned Aircraft Systems (UAS)" dated January 6, 2014 http://www.faa.gov/news/fact_sheets/news_story.cfm?newsid=14153

2. Warm Springs - Has a wide variety of geographic diversity and open space.
3. Pendleton Airport - The city has recognized the economic potential and already has a history of military UAS experience. Pendleton has facilities and infrastructure that make it a desirable location for UAS testing.

All three test sites have been granted limited Certificates of Authorization (COA) from the FAA and flown a small number of test flights. Of note, Pendleton had their initial test flight on September 30, 2014. A representative from the Alaska UAS team came to Pendleton to participate and oversee the operation. In the Other Transaction Agreement (OTA) required by the FAA for each of the ranges, Alaska is required to oversee operations for all the ranges, including those in Oregon. The Alaska range sponsors are responsible for the performance and safety of the ranges in all three states of the Pan Pacific Coalition.

Public Use Unmanned Aircraft

FAA authorizes public agencies to operate aircraft according to standard criteria outlined in for traditional governmental functions in 49 U.S.C. 40102 and 49 U.S.C. 40125.[44] The FAA has determined all UAS must meet the same litmus tests to be classified as public (government) aircraft that manned aircraft must meet. Under the U.S. Code, the term "governmental function" means the following:

"An activity undertaken by a government, such as national defense, intelligence missions, firefighting, search and rescue, law enforcement (including transport of prisoners, detainees, and illegal aliens), aeronautical research, or biological or geological resource management."[45]

It can be a blurred line between commercial operations and public aircraft operations. Commercial aircraft can be hired by government agencies or owned/operated by the government agency. Many government agencies hire commercial vendors under contract to the agencies to conduct governmental functions. One example of this is federal and state firefighting. While hired by state or federal government agencies, firefighting operations are generally conducted by commercial companies. For Public Aircraft Operations, the most common litmus test is a requirement for the aircraft to be performing government functions (and not transportation for hire) and operating for 90 days consecutively to be considered a public use aircraft.[46] The definition of Public Use Aircraft in the glossary of terms discusses this distinction between commercial and public aircraft in detail.

The requirement for defining public aircraft is the same for state and local government aircraft. Beyond these basic parameters, the definitional standards for determining whether a UA is a "public aircraft," are quite restrictive. Requirements for public unmanned aircraft are as follows:[47]

- *Determined on a flight by flight basis*

[44] U.S. Code, (49 U.S.C. 40102 and 49 U.S.C. 40125)
[45] U.S. Code, (49 U.S.C. 40102 and 49 U.S.C. 40125)
[46] U.S. Code, (49 U.S.C. 40102 and 49 U.S.C. 40125)
[47] U.S. Code › Title 49 › Subtitle VII › Part A › Subpart i › Chapter 401 › § 40125
49 U.S. CODE § 40125 - *QUALIFICATIONS FOR PUBLIC AIRCRAFT STATUS*.

- *Public aircraft cannot be used for commercial (civil) purposes*
- *Must be contracted to or owned by the Government.*
- *Must have a COA from the FAA*
- *Must operate within visual line of sight of the operator or have a chase plane than can maintain visual line of sight.*

The flow chart at figure (5) shows the basic process for determining whether a federal operation is a "public aircraft." [48]

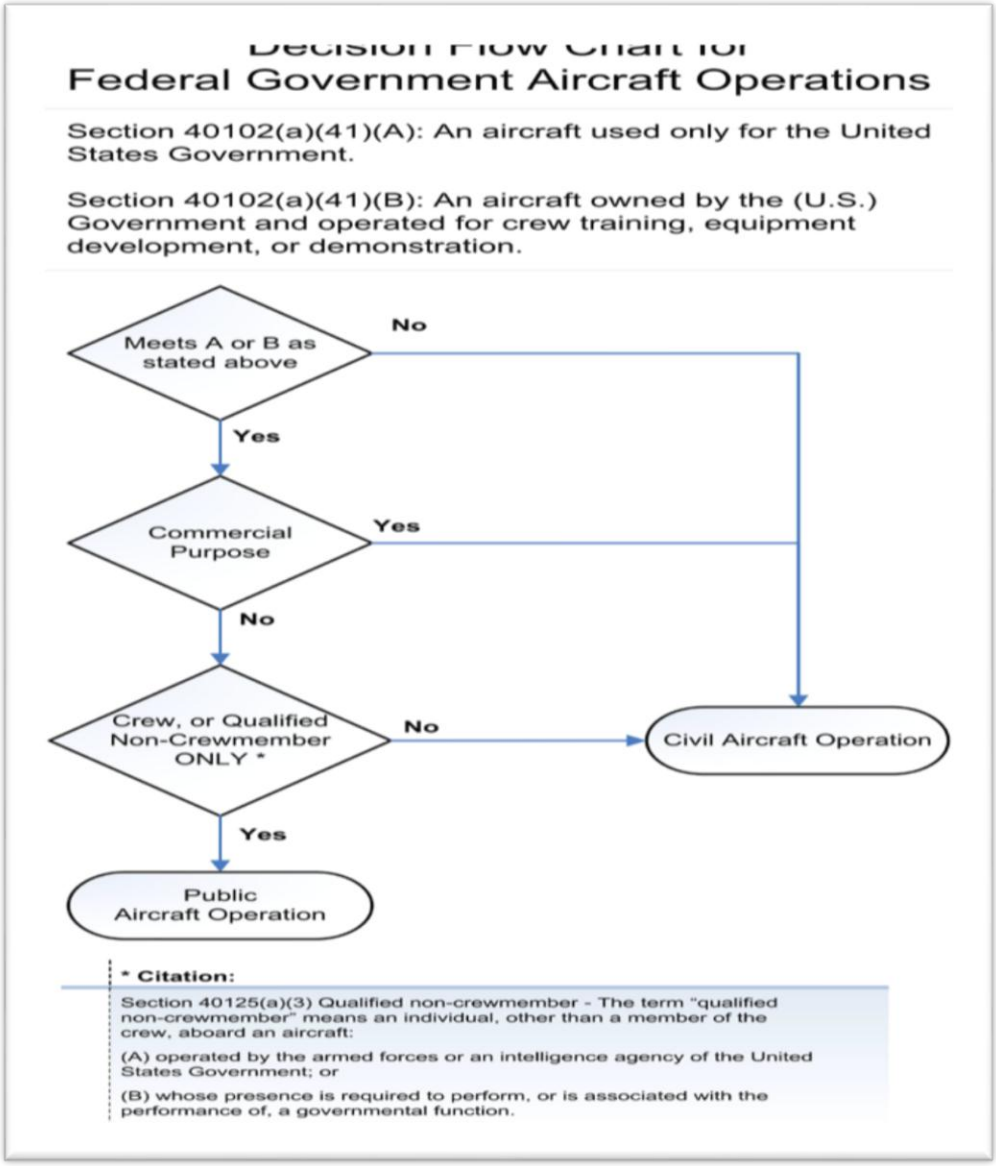

Figure 5 flow chart for determining public aircraft function

[48]Extracted from DOT FAA Advisory Circular 00-1.1A dated 2/12/2014: *Public Aircraft Operations*; http://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_00-1_1A.pdf

Academic institutions have been among the early operators of public UAS. There are a number of prominent universities that have started research programs in UAS design and function. Universities such as Texas A&M Corpus Christi, Virginia Tech, and University of Alaska have leveraged strong programs into selection as FAA test site programs. Oregon State University has also developed research programs in both their Engineering and Agriculture curriculums and is interested in training the next generation of unmanned aircraft technicians and engineers.

A benefit of university research has been the ability to partner with private industry to fund research projects using UAS. However, a recent change in FAA interpretation of academic public use UAS research has hampered their development. FAA attorneys issued a legal opinion that could significantly restrict public aircraft use of UAS for universities and public research. The FAA legal opinion determined that university research bypassed the intent of the public aircraft function because in some cases, it did not use the UAS as the subject of the study but rather as the vehicle for studying other research topics, often with industry funding. An example of this is precision agriculture research of crops using UAS as a tool for agriculture research instead of the UAS or sensors as the subject. The FAA interpreted this type of research as a way around the restrictions imposed on commercial use of UAS even though the purpose was research related. In the FAA legal opinion, the attorneys stated the following:

> *"The public aircraft statute and UAS COAs do not exist to create a loophole of exclusive operation, or allow state universities to become exclusive providers of certain aircraft operations by any entity willing to fund them as 'research.' Consideration of whether a UAS is easier, cheaper, or arguably safer than a larger manned aircraft in a given application does not factor into the analysis of whether the operation constitutes a valid public aircraft operation. Neither utility nor novelty alone create a governmental function to support the operation of a public aircraft."*[49]

This FAA Memorandum continues to tighten down on academic research by restricting UAS research only if the aircraft is the actual subject, not other research unrelated to the sensor or the aircraft itself:

> *"Therefore, a research program to design a UAS to evaluate the capabilities of an unmanned aircraft for soybean field monitoring could be considered aeronautical research, whereas using an off-the-shelf UAS -as opposed to some other available means- to monitor moisture levels in a soybean field as part of an agricultural research project would not qualify as aeronautical research. If a research project does not have at its core the development of the aircraft and aircraft systems and uses, but rather focuses on the thing being observed or monitored using an aircraft, then it is not aeronautical research. Non-aviation*

[49] FAA Memorandum dated 13 June 2014 titled, UAS Operations by Public Universities for Aeronautical Research, https://nppa.org/sites/default/files/Williams-AFS-80%20-%20(2014)%20Legal%20Interpretation%20(01).pdf

research that incidentally uses an aircraft does not qualify as aeronautical research, and would need another governmental function before it would qualify as a public aircraft operation."[50]

This FAA Memorandum caused concern with public universities including those in Oregon. The effect of the legal interpretation was to bring some University research programs to a halt and discourage public/private research capital. It also stifled the very programs which promised to develop the next generation of engineers for UAS development.[51] Within two weeks, the FAA loosened the restrictions stating in an internal memo to the FAA Office in charge of UAS integration (AFS-80):

"we note that whether there is a governmental function that supports a proposed operation is but one of the considerations that goes into determining whether there is a valid public aircraft operation under the terms of the statute."[52]

While FAA direction to universities use of UAS has been inconsistent, other public agency uses have been slow in coming. Other than relatively unregulated recreational drone users, the only UAS operations in the United States continue to be public aircraft operations. Although the FAA has attempted to streamline the process and reduced the approval time for approval of COAs from over 200 days, it still takes over 60 days to receive a COA. This continued delay of public use UAS integration contrasts with the direction of FMRA to streamline and expedite flights into the NAS. In FMRA, Congress gives specific guidance to the FAA on acceleration of approval for public use of UAS in the National Airspace System:[53]

1. *Expedite the issuance of a certificate of authorization process.*

2. *Provide for a collaborative process with public agencies to allow for an incremental expansion of access to the national airspace system as technology matures and the necessary safety analysis and data become available and until standards are completed and technology issues are resolved.*

3. *Facilitate the capability of public agencies to develop and use test ranges, subject to operating restrictions required by the Federal Aviation Administration, to test and operate unmanned aircraft systems.*

4. *Provide guidance on a public entity's responsibility when operating an unmanned aircraft without a civil airworthiness certificate issued by the Administration.*[54]

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[50] FAA Memorandum dated 13 June 2014
[51] http://www.bostonglobe.com/news/nation/2014/08/17/academic-researchers-say-faa-rules-are-forcing-them-ground-their-drones/8iNrbYGo5AGevXl6b3XGiL/story.html
https://www.faa.gov/about/office_org/headquarters_offices/agc/pol_adjudication/agc200/interpretations/data/interps/2014/williams-afs-80%20clarification%20-%20(2014)%20legal%20interp[52] FAA Memorandum July 3, 2014 Clarification of June 13, 2014 Interpretation on Research Using UAS.retation.pdf
[53] FMRA 2012, section 334.
[54] FMRA section 334.

Congress directed the FAA to create a public use UAS policy to be completed by November 2012. The FAA actually published the required policy as a short term notice (N8900.207) but not until January of 2013.[55] The 43 page notice describes the process for obtaining COA authority to fly public agency UA missions, but has done little to date to expedite approvals for public use UAS to be integrated into the National Airspace System.

Examples of Public Use UAS

Technology advances have created the opportunity for substantial benefits to public use of UAS including search and rescue, law enforcement, natural disaster damage assessments, fish and wildlife assessments, and overflights of forest fires at times when manned aircraft are grounded by weather or darkness. There are some pre-planned agreements between FAA and some state and federal agencies. The FAA and the U.S. Department of Interior have a signed Memorandum of Agreement regarding operations of small UAS in class G (uncontrolled) airspace designed to streamline approval time for UAS flights. Using this document for basic agreements on flight profiles is an effective template for other federal and state agencies.

The state of Washington has an emergency agreement with the FAA and INSITU, a Bingen, Washington based company that would allow unmanned aircraft to operate in the Washington in the event of a natural disaster or significant fire event. Their aircraft is equipped with sensors that detect hotspots and can fly with long loiter and real time transmission of data to ground based firefighting teams. Their UAS can fly at night when manned aircraft are grounded. The same type of agreement could be beneficial to Oregon.

There is another interesting example of the beneficial uses of UAS for natural disaster assessments. Although not authorized by the FAA or any public agency, a private citizen overflew the city of Napa, California in the immediate aftermath of the earthquake in August 2014. He took UAS video of the city's damage from the 6.0 earthquake that shows the potential value of UAS images for public agency emergency responders damage assessment. His footage can be found at:

https://www.youtube.com/watch?v=LQhYbfIz0n4[56]

At the current time, the video has over 236,000 views. This drone use is not an authorized use of an unmanned aerial system by FAA regulation.

There are other public interest uses. In Namibia, unmanned aircraft, partly funded by Google, have been used to fly over herds of elephant and other game animals and to alert authorities when poachers are threatening.[57] Similar efforts are underway in other African countries. Another concept under development considers using unmanned aircraft to deliver medicine to critical medical emergency areas unavailable or too dangerous by vehicle or traditional aircraft such as war torn areas or Ebola quarantine regions of affected countries. Emergency managers see them as great tools for search and rescue.

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[55] US Department of Transportation, FAA Notice dated 1/22/13, National Policy, *Unmanned Aircraft Systems Operational Approval.* http://www.faa.gov/documentlibrary/media/notice/n%208900.207.pdf

[56] http://m.youtube.com/watch?v=LQhYbflz0n4

[57] http://www.cnet.com/news/drones-help-prevent-rhino-elephant-poaching

Public use UAS have great promise for a wide variety of applications provided they meet federal and state laws on privacy and due process. They can be less expensive, safer, smaller and less obtrusive than manned aircraft. They are already providing significant benefit internationally but have not yet lived up to their potential in the U.S.

Recreational Use of Unmanned Aerial Systems

Recreational UAS have been flown as model aircraft for much of the twentieth century. In fact, the Academy of Model Aeronautics (AMA), a recreational model aircraft users group, was founded in 1936, pre-dating even the FAA. The AMA is a nationwide community based organization whose purpose is to promote model aircraft use among its members. It reports to have 164,000 members in 2,400 clubs.[58] AMA has been instrumental in developing best practices and responsible use of recreational UAS.

For recreational/model aircraft operators, the FAA has been inconsistent in regulation. The FAA created single page document (Advisory Circular (AC) 97-51) in 1981 for model aircraft operators. It was designed for the remote controlled (RC) aircraft with small engines and limited range appropriate for the technology of the 1980s. The voluntary guidelines from AC 91-57 are listed below:

a. *Select an operating site that is of sufficient distance from populated areas. The selected site should be away from noise sensitive areas such as parks, schools, hospitals, churches, etc.*
b. *Do not operate model aircraft in the presence of spectators until the aircraft is successfully flight tested and proven airworthy.*
c. *Do not fly model aircraft higher than 400 feet above the surface. When flying aircraft within three miles of an airport, notify the airport operator, or when an air traffic facility is located at the airport, notify the control tower, or flight service station.*
d. *Give right of way to, and avoid flying in the proximity of, full-scale aircraft. Use observers to help if possible.*
e. *Do not hesitate to ask for assistance from any airport traffic control or Flight Service Stations (FSS).*[59]

AC 91-57 remained relevant until the recent surge in recreational drone technology and popularity brought more drones into the public airspace. The 30 year old "voluntary" advisory circular was used in a court challenge as FAA attempted to enforce safety standards on modern drones with high definition cameras. The case involved a UAS operator, Raphael Pirker, who flew an unmanned aircraft with a camera through the University of Virginia campus in 2011. Video showed the aircraft flying low over the campus and under pedestrian walkways and the video even shows a man being forced to duck out of the way as the aircraft flies towards him at low level. The FAA fined Pirker $10,000 for "careless and reckless" conduct with an unmanned aircraft.[60] Pirker challenged FAA's determination and fine in an administrative court and the judgment went against the FAA. In *Huerta v Pirker*, (March 6,

[58] Extracted from Academy of Model Aeronautics website 2014, http://www.modelaircraft.org/aboutama/mediaroom.aspx
[59] DOT FAA Advisory Circular 91-57 dated June 9, 1981 Titled; Model Aircraft Operating Standards.
[60] http://www.faa.gov/news/press_releases/news_story.cfm?newsId=15894; *Huerta v Pirker*, Docket CP-217 (March 6, 2014).

2014) a Department of Transportation administrative law judge decided that model aircraft are not aircraft subject to FAA authority at all. The judge reasoned that FAA had failed to engage in any rule making regarding model aircraft and cited AC 91-57 and its 2007 "clarification" (FAA Notice 07-01)[61] noting both were purely voluntary. As such, the judge determined FAA had no law to enforce. The judge explained that these FAA guidance documents were mere "policy" and were not a substitute for enforceable rules following formal rulemaking. He also said the FAA had not clarified their jurisdiction over model aircraft and they did not fit into FAA's definition of aircraft. In a late breaking appeal, (Nov 2014), NTSB overturned the *Pirker* decision and ruled in favor of the FAA reaffirming their jurisdiction over model aircraft, saying they are aircraft by FAA's own definition. The decision supported the FAA's ability to regulate all UAS for issues of safety.

FAA added to the confusion in October, 2014. As a response to the changes in technology FAA revoked AC 97-51 on October 10, 2014[62] and then abruptly reinstated it four days later on October 14, 2014 claiming it was revoked prematurely. FAA explained this reversal, stating that it is out of date and it plans to revoke it permanently in the near future.[63] Until then, AC 91-57 is the foundation and still a relevant historical document regarding flights involving hobby UAS. All current recreational UAS rulemaking still has at its' core, the basics of AC 91-57.

With input from the Recreational UAS community, Congress reiterated essentially the same guidance from AC 91-57 into the FMRA. Section 336 of FMRA (*Special Rule for Model Aircraft*) clarifies the definition of model aircraft as follows:

> *"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."*[64]

Section 336 prevents FAA from regulating "Model Aircraft" so long as:

(1) the aircraft is flown strictly for hobby or recreational use;
(2) the aircraft is operated in accordance with a community- based set of safety guidelines and within the programming of a nationwide community-based organization;
(3) the aircraft is limited to not more than 55 pounds unless otherwise certified through a design, construction, inspection, flight test, and operational safety program administered by a community-based organization;
(4) the aircraft is operated in a manner that does not interfere with and gives way to any manned aircraft; and
(5) when flown within five miles of an airport, the operator of the aircraft provides the airport operator and the airport air traffic control tower (when an air

[61] Fed. Aviation Admin., *Unmanned Aircraft Operations in the National Airspace System*, Notice 07-01, 72 Fed. Reg. 6689 (Feb. 13, 2007) (hereinafter "FAA Notice 07-01").
[62] From Dronelife.com website in October 2014, based on conversation with Jim Williams FAA Executive Manager of UAS Integration Office. http://dronelife.com/2014/10/15/faa-purposefully-trying-confuse-everyone-drone-rules/
[63] http://dronelife.com/2014/10/15/faa-purposefully-trying-confuse-everyone-drone-rules/
[64] FMRA 2012 Section 336

traffic facility is located at the airport) with prior notice of the operation (model aircraft operators flying from a permanent location within 5 miles of an airport should establish a mutually-agreed upon operating procedure with the airport operator and the airport air traffic control tower (when an air traffic facility is located at the airport).[65]

The FMRA language in (2) above; *"community-based safety guidelines within the programming of a nationwide community based organization"* refers to the Academy of Model Aeronautics (AMA) which has developed best practices for model aircraft.

To reinforce and validate their regulatory influence on the recreational users, the FAA issued an interpretation of FMRA Sec 336 clarifying that model (recreational) drones are aircraft and therefore subject to the same federal regulations that apply to manned aircraft in matters of regulation of safety. They also narrowed their interpretation of the definition of "hobby or recreational" use of a drone to exclude any flights that are "incidental" to a person's business and from participation in contests where prizes are awarded. Their clarification also tightened down their visual line of sight doctrine (VLOS) forbidding drone operators from relying on First Person View (FPV) to replace "see and avoid," or for UAS, "detect and avoid."[66] FPV gives the operator the capability to view video or pictures taken from an unmanned aircraft from the same visual perspective as if the operator were in the aircraft. (Note that this technology didn't exist in 1981 when AC 91-57 was developed.) The display can be via a laptop computer or IPAD or 3D view screen that fits over the face as found in many virtual reality games.

The FAA has acted to address the increasing number of UAS operators that have taken their recreational use UAS and begun small commercial operations using high definition cameras for non-recreational uses. The FAA has conducted an outreach and public relations campaign to help educate the recreational and commercial users on the FAA's interpretation and clarification of UAS operations. They issued a *"Busting Myths About the FAA and Unmanned Aircraft"* press release that tried to address what they called "misconceptions and misinformation" about UAS regulations.[67] They produced the following poster on their website that explains the distinction between hobbyist (recreational users) and commercial operators:[68]

Hobby or Recreation	**Not Hobby or Recreation**
Flying a model aircraft at the local model aircraft club.	Receiving money for demonstrating aerobatics with a model aircraft.

[65] FMRA 2012 Section 336
[66] Department Of Transportation Federal Aviation Administration, 14 CFR Part 91 [Docket No. Faa-2014-0396] Interpretation Of The Special Rule For Model Aircraft, http://www.faa.gov/uas/media/model_aircraft_spec_rule.pdf
[67] FAA website press release dated February 2014, http://www.faa.gov/news/updates/?newsId=76240
[68] Department Of Transportation Federal Aviation Administration, 14 CFR Part 91 [Docket No. Faa-2014-0396] Interpretation Of The Special Rule For Model Aircraft, http://www.faa.gov/uas/media/model_aircraft_spec_rule.pdf

Taking photographs with a model aircraft for personal use.	A realtor using a model aircraft to photograph a property that he is trying to sell and using the photos in the property's real estate listing. A person photographing a property or event and selling the photos to someone else.
Using a model aircraft to move a box from point to point without any kind of compensation.	Delivering packages to people for a fee.[6]
Viewing a field to determine whether crops need water when they are grown for personal enjoyment.	Determining whether crops need to be watered that are grown as part of commercial farming operation.

The FAA used the FMRA to provide the justification for the more regulatory approach taken on recreational unmanned aircraft operations. Affected by the *Pirker* decision, the FAA's used the NPRM to strengthen the legal argument that FAA could regulate safety regarding careless and reckless behavior by model aircraft operators.[69]

In addition to the *Pirker v. Huerta* court decision, another setback to the FAA's enforcement efforts occurred in Texas where an organization, *Texas Equusearch*, used drones to fly not-for-profit search and rescue missions for missing persons. *Texas Equusearch* was sent an email by an employee of the FAA directing them to cease and desist search and rescue operations using drones. *Equusearch* sued the FAA and a federal appeals court dismissed the lawsuit on similar grounds to *Pirker*. The court determined the FAA's email was an advisory opinion and not an appealable final order rendering the FAA's cease and desist email legally meaningless. The court ruled that the email "did not give rise to any legal consequence"[70] for *Equusearch*. The non-profit company resumed search and rescue missions and claims credit for over 300 rescues of individuals and recovering the remains of almost 180 people using unmanned aircraft.[71] In an ironic twist, the FAA gave approval to *Texas Equusearch* in September 2014, to search for a missing person via an emergency COA through an intermediary agent, the National Institute of Standards and Technology (NIST) operating from Gathersburg, Maryland.[72] The impact of the *Pirker* reversal on this case remains to be seen.

The recreational UA market is one of the fastest growing areas of the industry. By some estimates, over 10,000 new units are being sold per month in the United States. Recreational use unmanned aircraft kits with High Definition (HD) cameras are available over the internet. In Oregon, anyone can purchase a drone with an HD camera for under $500 at wide variety of retail stores.

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[69] Huerta v. Pirker

[70] Dallas Morning News report dated July 18,2014 http://www.dallasnews.com/news/state/headlines/20140718-texas-search-group-to-resume-using-drones-despite-faa-admonition.ece

[71] Dallas Morning News report dated July 18,2014

[72] Extracted from The Hill website article dated September 11,2014, FAA Allows Drone Use in Missing Person Search http://thehill.com/policy/transportation/217393-faa-allows-police-to-use-drone-in-missing-person-search

Drone popularity does bring with it the potential for misuse including violations of safety around populated areas, airports and aircraft. For example, a conflict took place in Oregon during the height of 2014 fire season when a small recreational unmanned aircraft was reported near the *Two Bulls* fire creating a potential safety hazard. The news report by the Statesman Journal claims that the drones flown over the *Two Bulls* fire and others in Northern California and Washington State almost grounded airborne firefighting.[73]

In Australia, where UAS use is more widely allowed and accepted, a drone crashed into an athlete's head during a triathlon.[74] Fortunately, she was not seriously injured. There have also been several reports by airline pilots that UAS were flown in conflict with their final approaches or takeoffs at busy commercial airports in direct contravention to both FAA and AMA standards. Another incident occurred in Dayton Ohio where a drone interfered with a Helicopter ambulance as it tried to land on a hospital landing pad.[75] The internet is full of amateur camera and video of UAS operators conducting a wide variety of flights from overflight of vineyards, videos of sporting events, to coverage of news and current events.

In some communities, local police have also taken action against perceived illegal operations by recreational users. A September 18, 2014, a report in the *Washington Times* documented a near miss collision with a DJI Phantom and a police helicopter over New York City while the police helicopter was searching for a missing teenage girl. The pilot of the unmanned quadcopter was arrested, arraigned, and released on $1,000 bail pending trial.[76]

DJI Phantom Unmanned Aircraft

Even before the *Pirker* appeal was successful, the FAA continued to pursue high visibility safety incidents. In May 2014, the FAA fined the operator of a DJI Phantom unmanned aircraft (shown at left) $2,200 for flying his aircraft in midtown Manhattan. The fine was assessed because the operator, David Zabidowski, operated it from a motel that was in class B airspace prohibited to unmanned aircraft (see glossary, page four), without an FAA clearance. Per FAA regulation, that airspace is restricted to large airport commercial aircraft. The FAA said in their assessment

[73] USA Today from Statesman Journal dated August 16, 2014, *Drone Flights Pose Threat in Wildfires, officials Say,* http://www.usatoday.com/story/news/nation/2014/08/16/drone-flights-pose-threat-in-wildfires-officials-say/14182029/

[74] Gawker Website dated April 6, 2014; Drone *falls on Athlete's Head During Triathlon.* http://gawker.com/drone-falls-on-athletes-head-during-triathlon-1559420088

[75] News Report, Dayton Ohio Channel 12 dated August 12, 2014, *Drone Delays Medical Helicopter Landing at OH Hospital*, http://www.12newsnow.com/story/26385252/drone-delays-medical-helicopter-landing-at-oh-hospital

[76] http://www.washingtontimes.com/news/2014/sep/18/new-york-police-search-chopper-drone-nearly-crash-/#!

letter, the operation of the aircraft "endangered the safety of the national airspace system."[77] The news report indicated the aircraft fell from the sky "bouncing off buildings" and almost hit a pedestrian below.

On October 10, 2014, the FAA finalized rulemaking on their clarification of UAS operations and published a change to their Compliance and Enforcement Bulletin. Order 2150.3B change six provided enforcement direction to "*all agency personnel who investigate, report, or process enforcement actions involving the operation of UAS in the NAS with guidance to enforce actions on UAS operators that violate the Federal Aviation Regulations or model aircraft operators that endanger the safety of the National Airspace System.*"[78] This change gives the FAA the authority to apply civil penalties to safety violations specifically to recreational UAS operators, as well as any other safety or airspace violations the NAS by commercial UAS operators.

Commercial Operations of UAS

One of the most promising uses of Unmanned Aerial Systems is in the commercial arena. Already, there are major companies looking forward to using UA for commercial operations in ways that would have been science fiction only a few years ago. The technology is growing so fast that companies like Google and Amazon now see usage applications such as long loiter flights of unmanned aircraft for remote or emergency broadcast of internet signals and to deliver packages to customers' doorstep rapidly and efficiently. Major agriculture companies anticipate using drones and highly technical sensors to help monitor crops. The term Precision Agriculture describes the ability to use GPS to navigate UAS to fly over crops using spectrum analysis to determine optimal use of water, pesticides and herbicides with the potential to save millions of dollars in efficiencies attributable to drones.

Many industries see UAS as a cost effective and safe alternative to manned flight for their video, photograph, and inspection needs. According to a report by AUVSI, the Unmanned Aerial Systems industry will be a $13.6 billion business nationally in the next three years, and anticipates providing over $82 billion in economic benefit by 2025. UAS businesses are also forecast to provide over 100,000 new jobs into the economy of in the United States by 2025.[79] Oregon already has a number of prominent UAS businesses and AUVSI forecasts Oregon to employ over 600 people in the state by 2025 with an economic impact of over $60 million dollars.[80] (See figure 5 next page) A report compiled by a local UAS business person shows that there is already a substantial industry representation in Oregon that may make the AUVSI numbers seem low. The list includes over 200 Oregon UAS companies. (See Appendix 3)

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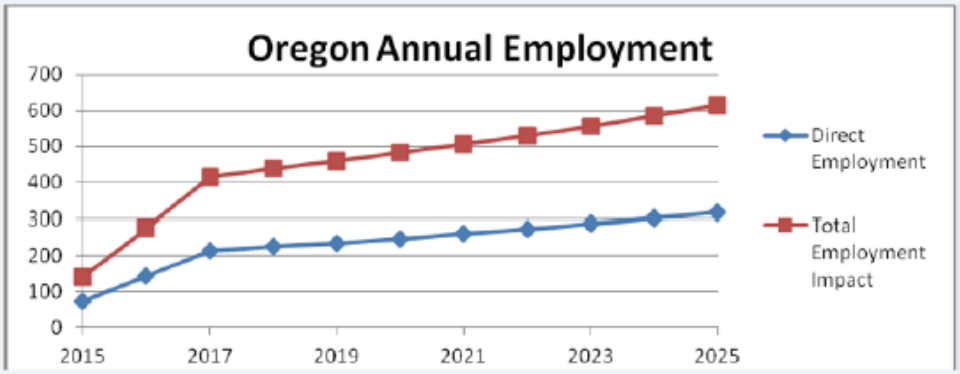
[77] sUAS News article dated May 2, 2014, "FAA seeks $220 fine from DJI Phantom Pilot. http://www.suasnews.com/2014/05/28920/faa-seeks-2200-fine-from-dji-phantom-pilot/

[78] U.S. Department of Transportation FAA National Policy Order 2150.3b with Change 6 dated 10 October 2014, http://www.faa.gov/documentLibrary/media/Order/2150.3B_W-Chg_6.pdf

[79] Association of Unmanned Vehicle Systems International Report dated March 2013; The Economic Impact Of Unmanned Aircraft Systems Integration In The United States; http://higherlogicdownload.s3.amazonaws.com/AUVSI/958c920a-7f9b-4ad2-9807-f9a4e95d1ef1/UploadedImages/New_Economic%20Report%202013%20Full.pdf

[80] Ibid, AUVSI report dated March 2013 state by state page 33, http://higherlogicdownload.s3.amazonaws.com/AUVSI/958c920a-7f9b-4ad2-9807-f9a4e95d1ef1/UploadedImages/New_Economic%20Report%202013%20Full.pdf

Oregon Economic Impact						
Year	Direct Employment	Total Employment Impact	Total Direct Spending ($M)	Total Economic Impact ($M)	Total State Taxes ($K)	Percent Change Over Previous Year
2015	71	139	$7.21	$13.48	$68.59	
2016	143	277	$14.43	$26.96	$137.18	100%
2017	214	416	$21.64	$40.43	$205.77	50%
2018	225	437	$22.72	$42.46	$216.06	5%
2019	236	459	$23.86	$44.58	$226.86	5%
2020	248	481	$25.05	$46.81	$238.20	5%
2021	260	506	$26.30	$49.15	$250.11	5%
2022	273	531	$27.62	$51.61	$262.62	5%
2023	287	557	$29.00	$54.19	$275.75	5%
2024	301	585	$30.45	$56.90	$289.54	5%
2025	316	614	$31.97	$59.74	$304.01	5%



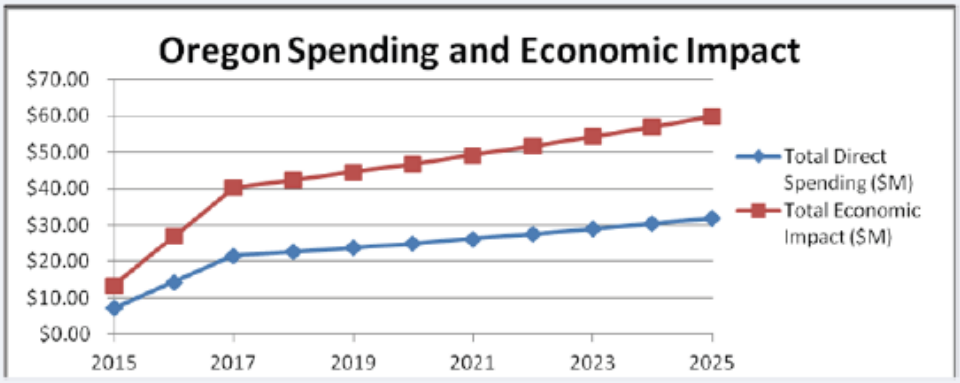


Figure 6 AUVSI estimates of Oregon economic benefit

The U.S. Department of Transportation commissioned the John A. Volpe National Transportation Systems Center to conduct a study in September 2013 that concluded demand for commercial unmanned aircraft will surpass the demand for unmanned aircraft in the military and public domain by 2029. See chart at figure 7.[81]

[81] U.S. Department of Transportation Research and Innovative Technology Administration John A. Volpe National Transportation Systems Center dated September 2013, *Unmanned Aircraft Systems (UAS) Service Demand 2015-2035.*

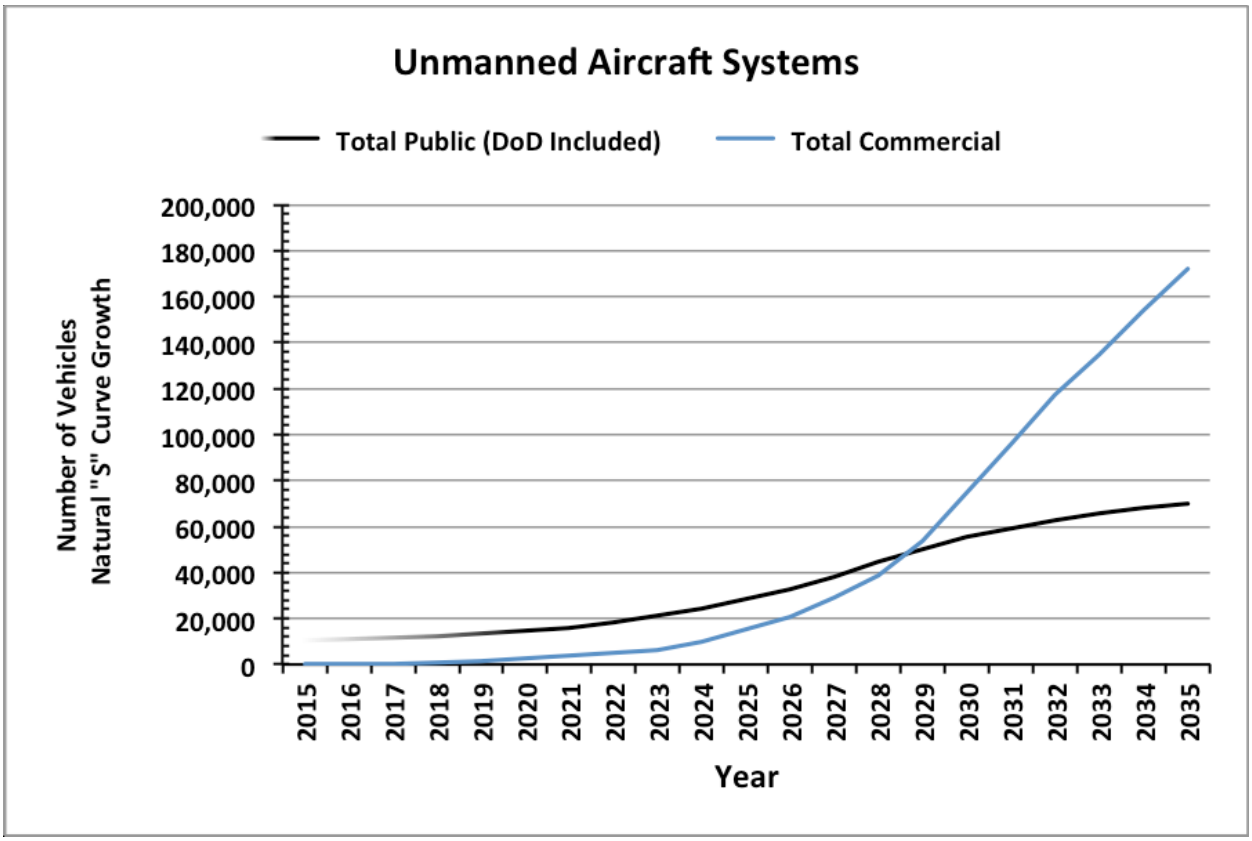


Figure 7 Growth of Unmanned Aerial Systems

This level of economic potential has created a market for entrepreneurs. For the past few years, commercial businesses have engaged in a cottage industry catering to small market uses of unmanned aircraft despite no definitive authority to do so by the FAA. There are many such companies operating throughout the U.S. including Oregon. These businesses are operating without authorization from the FAA. With the exception of isolated flights by energy companies in the Arctic, the FAA has authorized almost no commercial uses of UAS in the National Airspace System to date.

Despite the restrictions on commercial operations, there are many businesses working in good faith with the FAA. Unlike the cottage industry businesses that operate "under the FAA's radar," these legitimate companies have tried to develop economically viable and technically proficient UAS capability ready to be deployed when the FAA does approve commercial flights in the NAS. However, the slow pace of FAA authorization has penalized the very companies most rigidly abiding by FAA restrictions while cottage industry companies continue to fly with little regard for federal regulation.

The movie industry is also interested in this technology and just received permission from the FAA for six industry video companies to get exemptions from FAA regulation on "sterile" (free from other aircraft) sets with a waiver of the FAA requirement to have a certified unmanned aircraft. This is possible through an exception clause in FMRA. The FAA can authorize commercial flights on a case by case "exemption" basis under a special provision of

FMRA. The exceptions are called "333 exceptions" after the section of FMRA that authorizes them:

SEC. 333. SPECIAL RULES FOR CERTAIN UNMANNED AIRCRAFT SYSTEMS.

(a) IN GENERAL.—Notwithstanding any other requirement of this subtitle, and not later than 180 days after the date of enactment of this Act, the Secretary of Transportation shall determine if certain unmanned aircraft systems may operate safely in the national airspace system before completion of the plan and rulemaking required by section 332 of this Act or the guidance required by section 334 of this Act. [82]

As of October 2014, there are 92 "Sec. 333 exemption" requests submitted to the FAA and only seven have been approved. The seven approved Sec. 333 exemptions are for celebrity filmmaking organizations for making movies, televisions shows, and commercials. That number will only grow in view of the exceptions granted to the movie industry and the slow pace of approval for other commercial UAS operations by the FAA. The list of pending Section 333 applications includes additional movie industry companies, Amazon Prime Air, utility companies, BNSF Railway Company, Wilbur-Ellis Company and several news media companies.[83] Sec. 333 exemptions may be issued by FAA based on the agency's determination regarding "*which types of unmanned aircraft systems, if any, as a result of their size, weight, speed, operational capability, proximity to airports and populated areas, and operation within visual line of sight do not create a hazard to users of the national airspace system or the public or pose a threat to national security*."[84]

Congress has directed unmanned aircraft integration as a key FAA priority. Technology is driving more use in the recreational, public use and commercial application of UAS operations. With significant economic opportunity and utilitarian applications growing daily, it will become routine to see the national airspace system with unmanned aircraft performing many of the tasks currently performed by manned flight, including new innovative missions deemed impractical or impossible only a few short years ago.

With over 200 companies in Oregon involved in the commercial UAS industry, there is significant economic opportunity for Oregon. The slow pace of federal regulation hampers their ability to live up to their full potential. Recent conversations with FAA representatives and other key stakeholders indicate FAA intends to put out the sUAS NPRM directed by Congress in FMRA before the end of 2014. However, FAA has said it will take an additional 16 months from publication to promulgate the rule.[85] The net effect is there may be very few commercial UAS approved for operation in the next two years outside of the 333 exception process. The 16 month clock will not even start on small UAS rule to integrate into the NAS until the NPRM is posted.

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[82] FMRA section 333 (a)

[83] A complete list of the part 333 exception requests is listed at: http://www.regulations.gov/#!searchResults;rpp=25;po=0;s=%2522section%252B333%2522%252BFAA;fp=true;ns=true

[84] FMRA of 2012 Section 333

[85] FAA executive response to question posed at Alaska UAS Conference in September 2014.

Concerned by the slow pace of regulation, a consortium of companies including some large well known multinational businesses have hired an international law firm, ***Akin Gump, Strauss, Hauer and Feld LLP,*** to advocate with the FAA and Congress on the NPRMs for integrating UAS into the NAS. Their objective is to influence Congress and FAA to accelerate the commercial UAS industry integration into the NAS. Representatives from the firm attended and presented at a recent UAS conference at the Warm Springs Range in Oregon held October 1-2, 2014. The organization, with its advocates and clients, calls itself the ***Small UAV Coalition,*** and represents such well-known companies as Amazon Prime Air, Google (x) Project Wing, GoPro (small HD cameras) and Parrot (a prominent UAS manufacturer).[86]

Without an acceleration in rulemaking by the FAA or application and acceptance of a FMRA section 333 exception, commercial businesses in Oregon may continue to look for business internationally in order to generate revenue and continue to operate.

[86] Extracted from The Hill website, dated Oct 6, 2014; *Obama's Drone Order Could Come Any Day Now, Lobbyist Says.* http://thehill.com/policy/transportation/219920-obamas-drone-order-could-come-any-day-now-lobbyist-says

PRIVACY, DUE PROCESS/WARRANTLESS SEARCH AND SAFETY

Although out of the purview of the reporting requirements for Oregon Department of Aviation, privacy and due process concerns are a significant issue as 'drones' become more popular and the potential for abuse increases. In recognition of the concerns of privacy and due process advocates and the overlap into airspace considerations regarding altitudes that buffer personal property from intrusion, this section will briefly address the federal and state regulation as they relate to privacy and due process.

There are many issues in developing policy on Unmanned Aerial Systems beyond the scope of this report which are key elements on any policy discussion on Unmanned Aerial Systems. They fall under three basic areas:

1. Privacy Protection
2. Due Process/Warrantless Searches
3. Safety

While recognizing these are important issues in any discussion of UAS operations, the Oregon Department of Aviation insufficiently expert to address the areas of privacy and due process/warrantless searches. The agency does have the capability of addressing the issue of safety. In the areas of privacy and due process, there were numerous conversations with stakeholders and several meetings to discuss the way forward with representatives from UAS civil liberties and law enforcement organizations. Among the outcomes of those meetings, there is a general satisfaction with the direction Oregon has taken in its legislative approach. Stakeholders in the discussion groups were generally in agreement that current legislation adequately addresses regulations protecting privacy and due process/warrantless searches in the state. In a study of all 50 states, Oregon is one of only a few states that has comprehensive state legislation on UAS. It is the only state to address all the issues of privacy, due process, weaponization, preemption, and protection of legal use.[87] Other states address some of the issues but as of November 2014, no other states address all of them. None except Oregon address preemption. It is one of only two states that will require registration of Unmanned Aircraft. North Carolina is the other state and requires "licensing" of UAS.

Alaska joined two other states to prevent using unmanned aircraft to hunt or assist in spotting game animals. Other states have considered and failed to find sufficient votes to pass legislation. Four states passed legislation only to have their governors veto the legislation. The four states include Washington. Idaho passed legislation in April 2013, (SB 1134) that prohibited surveillance of individuals or property without written consent of the individual or property owner.[88]

In Washington State, Governor Jay Inslee vetoed a bill in April of 2014 that had passed both houses of the state Legislature by substantial margins. He cited concerns about privacy

[87] 50 state summary of state legislation spreadsheet.
[88] Extracted from Idaho State Legislature website http://www.legislature.idaho.gov/legislation/2013/S1134.pdf

protection and put a moratorium on state agency use of UAS.[89] Since then, Washington has put a panel together with members of industry and privacy advocates to craft additional legislation. Some of the advisors to the Washington group are members of the Oregon UAS community. They looked at Oregon's 2013-2015 legislation as a resource for their legislative concept.

In California, Governor Jerry Brown also vetoed a UAS bill that limited police use of drones by law enforcement in September 2014. He cited undue restrictions on police.[90]
In the Washington, Alaska, and California cases, states slowed the process of legislation to provide more opportunity to study the issue before creating new legislation.

Privacy Concerns

Privacy is one of the most controversial issues about UAS use and regardless of whether the operator is public, commercial or recreational; it plays to the fears about a new threat from above to a person's right to privacy. Some UAS operators are well meaning recreational users without training on airspace limitations or understanding of privacy concerns by citizens. Their concerns are not without merit since unmanned aircraft with HD cameras have the versatility for unique lawful and unlawful uses. The main issue centers on violations of privacy that are possible using UAS technology from an overhead perspective. It introduces a new paradigm in the bird's eye viewpoint of overhead flight. It is a relatively inexpensive way to overfly private property providing access previously not available to the general public or public agencies. Privacy advocates concerns and desire for reasonable limits on drone use to protect the privacy of Oregon citizens are a valid consideration for all UAS operators.

To illustrate this point, citizens that see drones flying near their homes perceive the worst of intentions. A recent news report from Seattle told of a drone outside the 15th floor window of a woman's apartment. The woman was convinced the drone was spying on her. Investigation later determined it was a commercial use drone operating without sanction from the FAA taking pictures for a commercial real estate company.[91] The drone operator is from a Portland, Oregon based company on a jobsite in Seattle. The perception of abuse of drone technology may be as harmful to legitimate operators as the actual misuse or unlawful behavior.

UAS development can also drive actual criminal behavior. A report from England cited how criminals used a drone with heat seeking capability to target marijuana growers by locating houses with high heat signatures so they could be targeted for robbery.[92]

Competition among business rivals could trigger corporate espionage. Friction between neighbors could increase the nuisance of both noise and overflight concerns. These types of

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[89] Extracted from Seattle Times article date April 4, 2014http://blogs.seattletimes.com/politicsnorthwest/2014/04/04/inslee-vetoes-drone-bill/

[90] Extracted from Los Angeles Times article dated September 28, 2014. http://www.latimes.com/local/political/la-me-ln-governor-vetoes-bill-to-limit-police-use-of-drones-20140928-story.html

[91] Extracted from Seattle Fox 13 News Report dated June 24th, 2014 titled *Seattle drone mystery solved: it wasn't peeping*, http://q13fox.com/2014/06/24/half-dressed-woman-sees-drone-out-window-on-26th-floor/

[92]Halesowen News online report, Thursday 17th April 2014 in News Exclusive By Adam Smith, *Tech-savvy criminals now using heat-seeking drones to target cannabis farms;* http://www.halesowennews.co.uk/news/11155386.Tech_savvy_criminals_now_using_heat_seeking_drones_to_target_cannabis_farms/?ref=mc&ref=mmsp

concerns about drones "spying" on private citizens are factors in state legislatures creating protections for citizens as Oregon did in adopting HB 2710. HB 2710 provides additional protection where overflight of private property, once warned, can be grounds for a civil complaint with up to treble damages. Theoretically, this is a reasonable safeguard for private property owners but the arbitrary 400 ft. altitude may need to be reviewed by policymakers to avoid conflicts with federal airspace regulation.[93] The FAA is expected to develop airspace for commercial UAS operations that will primarily allocate airspace below 500 ft. Above Ground Level (AGL). There may need to be a reasonable compromise on altitude that protects the privacy of Oregon citizens based on the intent of the operator rather than the altitude of the aircraft.

At the federal level, the FAA issued a privacy policy statement in September of 2013 after an extensive public comment period. In its policy statement, the FAA stated it "should focus on its safety mission; it should not engage in regulating privacy."[94] The FAA did direct that the six test sites selected by the FAA, develop their own privacy policy to include the following:

- Test site operators must maintain a record of all UAS operations in the test sites.
- Test site operators must require every UAS operator in the test site to have a written plan for the operator's use and retention of data collected by the UAS.
- Test site operators must conduct an annual review of test site operations to verify compliance with stated privacy and practices and share those outcomes annually in a public forum with an opportunity for public feedback.[95]

Privacy will continue to be a factor for citizens. UAS businesses and model aircraft users should continue to give it due regard in their operations.

Due Process/Warrantless Searches Concerns

Protecting civil rights and Fourth Amendment protections against unreasonable search are relevant to the discussion about UAS operations. Citizens and civil liberty organizations such as the American Civil Liberties Union (ACLU) are concerned that law enforcement and other regulatory government agencies will use UAS to collect data without adequate due process. UAS provide an overhead perspective that is new and not as readily visible as manned aircraft flights that might be used to collect the same information. The ease of collecting such data and fears of misuse by law enforcement have resonated with civil libertarians.

During most of the stakeholder meetings attended by the author of this report, law enforcement, ACLU and the Criminal Defense Lawyers Association were represented. The Association of Chiefs of Police represented the law enforcement community. Becky Straus from Oregon's ACLU chapter participated as well.

For consideration by the Legislature, the chart at Appendix D shows the status of 50 state legislative actions as a measure of comparison relative to Oregon's statute. For example,

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[93] The 400 foot restriction may also run afoul of United States Constitution First Amendment and related Oregon constitutional provisions protecting news gathering. This issue is well beyond the scope of this paper.
[94] FAA privacy policy, dated http://www.faa.gov/uas/media/UAS_privacy_requirements.pdf
[95] FAA privacy policy page 4 http://www.faa.gov/uas/media/UAS_privacy_requirements.pdf

Alaska is considered one of the most developed states regarding regulation of Unmanned Aerial Systems. Their standing Legislative Task Force report on UAS concluded that existing legislation did not justify additional laws on the books to regulate UAS use regarding privacy and due process/warrantless search issues.[96]

The Oregon Department of Aviation has received inquiries from law enforcement agencies and other interested parties requesting information on how to respond to complaints by persons within their jurisdictions on the status of federal regulation of drones and what enforcement options are available to them in Oregon. One recommendation would be to convene an working group of law enforcement officials to develop a Frequently Asked Questions (FAQ) website with current law explanations and guidelines on law enforcement at all levels of government within the state on handling of UAS misuse, nuisance, privacy violations, and due process. This agency would be willing to help facilitate such a working group and offer assistance on airspace and safety issues.

There are also concerns by civil liberty groups in Oregon about UAS operations by state agencies. ACLU representatives are concerned about state agencies that capture imagery. Should state agencies be able to share the information they gather with other entities.

Another caution brought up by the ACLU is to ensure that any laws that regulate private operators of UAS consider the press will ultimately be operating drones. Any restrictions of operations of UAS should take care not to infringe the constitutional rights of the press including photographers.

Safety

One of the most pressing concerns among the aviation (pilots and airport managers) community in Oregon is safety of manned aircraft in encounters with Unmanned Aerial Systems**.** The Oregon Pilots Association's over 2000 members has been keenly interested in the integration of manned and unmanned aircraft. Among their concerns are intrusion into airspace used by manned aircraft and the potential for mid-air collision. The FAA has historically made 1,000 feet the minimum transit altitude for fixed wing aircraft over congested areas and 500 feet over sparsely populated areas with exceptions where mission dictates or on transition to or from landing or takeoff. For helicopters, there is no minimum altitude except to operate without hazard to persons or property and comply with any routes or altitudes designated by FAA for helicopters.[97] Because UAS can be so small and maneuverable, recreational UAS are harder to see and avoid. Pilots understand this is an up and coming industry but want to see an effective way to prevent UAS from using airspace they have always used, and more importantly, that collision with unmanned aircraft could cause injury or damage to their aircraft or a fatal crash. Historically, altitude separation has been one of the primary methods of keeping aircraft safely away from colliding with another aircraft.

[96] Alaska Legislative Task Force Report.
[97] Title 14, CFR Section 91.119, Minimum Safe Altitudes

The FAAs' guidance for model aircraft from 1981 in AC 91-57 and confirmed in subsequent policy guidance in 2007[98] and in the special rules for model aircraft published in 2014[99] says no model unmanned aircraft should flown in a careless or reckless manner.[100]

The AC also directs no model aircraft should fly above 400 ft. AGL and must stay within line of sight of the operator/pilot. It further says to stay clear of crowds and alert the airport operator when within five miles of an airport. In Oregon, HB 2710 places airspace restriction over private property that requires no flights below 400 feet without authorization of the property owner. This is in direct conflict with federal guidelines for model aircraft and extends to any commercial aircraft as well. The no higher than 400 ft. AGL restriction for UAS in federal regulation is thought to be based on "navigable airspace," a concept that never considered the developments of modern unmanned aircraft as they evolved through 2014. Today, because of size and maneuverability, even the most inexpensive UAS can fly in their own "airspace" with High Definition and "GoPro" cameras. They are capable of operating within and well below most manned flight "navigable airspace." Inevitably, there will be conflicts. One solution will be development of reliable "sense and avoid" capability to mitigate possible conflicts between manned and unmanned flights. Until that capability is readily available, airspace segregation is the FAA's preferred method of collision avoidance.

Because of recreational and commercial UAS ability to fly in airspace below most manned aircraft, they have the potential to be more visible and noticeable to private property owners and other citizens on the ground. While private property owners have a reasonable expectation of privacy and freedom from nuisance over their property, the 400 ft. restriction may directly conflict with existing FAA regulations. The state may not be able to legislate airspace without running into federal preemption issues as detailed in 49 U.S. Code 40103(a) (1):

> ***Sovereignty and use of airspace***
> *(a) SOVEREIGNTY AND PUBLIC RIGHT OF TRANSIT.—(1) The United States Government has exclusive sovereignty of airspace of the United States.*[101]

Pilots are legitimately concerned about UAS and manned aircraft collisions. There have been numerous reports by airline pilots of unmanned aircraft flying too close to their aircraft while departing or arriving at airports. A CNN report described a U.S. Airways flight in March 2014 where a pilot of a CRJ-200 with 50 passenger seating capacity approaching Tallahassee, Florida reported he thought he had hit an unmanned aircraft.[102] A *Washington Post* article reports over 15 cases over the past two years including incidents in Los Angeles and New York City.[103]

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[98] FAA Notice 07-01.
[99] Special rule for model aircraft 2014
[100] Fed. Aviation Admin., *Unmanned Aircraft Operations in the National Airspace System*, Notice 07-01, 72 Fed. Reg. 6689 (Feb. 13, 2007)
[101] 49 U.S.C 40103(a)(1): http://www.gpo.gov/fdsys/pkg/USCODE-2011-title49/pdf/USCODE-2011-title49-subtitleVII-partA-subparti-chap401-sec40103.pdf
[102] Extracted from CNN article dated May 11, 2014 titled "FAA Official: drone, jetliner nearly collided over Flirodayhttp://www.cnn.com/2014/05/09/travel/unmanned-drone-danger/index.html
[103]Extracted from Washington Post Article dated June 23, 2014 titled "*Close Encounters on Rise as Small Drones Gain in Popularity*" http://www.washingtonpost.com/sf/investigative/2014/06/23/close-encounters-with-small-drones-on-rise/

One of the FAA's biggest challenges is the safe integration of a wide variety of unmanned aircraft into airspace already well organized for different categories of manned aircraft. The key technology, detect and avoid, for UAS is still not widely available enough for safe collision avoidance. The technical capability that connects the radar image the location of conflicting aircraft and the ability to automatically avoid a collision is still in the works and being tested in 2014. Until the technology matures, an adequate "detect and avoid" system represents one of the major reasons the FAA is reluctant to allow UAS into the NAS.

The FAA is coordinating with National Aeronautics and Space Administration (NASA) to develop an air traffic system for unmanned aircraft. The project is to develop a "highway in the sky" for unmanned aircraft. Called the Unmanned Aerial Vehicle Traffic Management System (UTM) [104] the project will incorporate geo-fencing[105] and new technology being developed by the FAA as part of their NEXTGEN (Next Generation) modernization of the air traffic control system in the National Airspace System. It will include "detect and avoid" technology using ADS-B (automatic Dependent surveillance Broadcast). [106] ADS-B is part of the FAA's NEXTGEN for safe navigation, efficiency and air traffic management.[107] It uses position data giving relative location from an aircraft (manned or unmanned) based on Air Traffic Control radar and other air traffic monitoring systems. By knowing the relative location of conflicting air traffic from an unmanned aircraft, the operator will be able to manually or autonomously "detect and avoid" the manned air traffic making both safer from the threat of mid-air collision. Until "detect and avoid" technology is more mature, avoidance of collision between UAS and manned aircraft still depends heavily on separation of aircraft in navigable airspace.

NASA's work with the FAA to develop airspace for UAS will almost certainly involve providing airspace for small UAS less than 500 ft. AGL and will probably designate flight allowable and safe routes. The word probably is used because there is no definitive word from NASA or the FAA on what that airspace will look like. It is only appropriate to advise Oregon policymakers of the potential for conflict.

FAA licensed pilots must pass written, oral, and flight exams in order to be licensed to fly in the NAS. The knowledge base includes learning about the classes of airspace, instrument and visual flight rules and how to read and interpret Notices to Airmen (NOTAMS) that warn pilots about hazardous conditions at airports, locations of airspace closed to flight, locations of military operations and other issues of importance. The FAA requires public use and commercial Unmanned Aircraft operators to be licensed pilots but does not require recreational operators to be pilots nor is there any requirement for a recreational user to be a licensed pilot. There is a potential education gap that AMA works to bridge but purchase of a drone at a local hobby or other retail store does not require any training or education on how

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[104] http://dronelife.com/2014/07/11/nasa-building-highway-sky/; How NASA is Building a Highway in the Sky. July 11, 2014.

[105] Geo-fencing is a concept that restricts an unmanned aircraft from flying outside a specific geographic boundary through software restrictions on altitude or range from a specific point on the ground or from the operator.

[106] http://www.aeronautics.nasa.gov/isrp/uas/index.htm. Other sensor technologies may also be employed such as miniaturized TCAS. It is too early to predict the spectrum of technology utilized in the UAV Air Traffic Management System.

[107] http://www.faa.gov/nextgen/

to avoid dangerous behavior. This somewhat justifies the FAA's reluctance and delay in allowing commercial unmanned aircraft to fly freely in U.S. airspace.

The FAA has mitigated this by requiring all UAS operators to maintain line of sight with their aircraft and to "detect and avoid" collision. Promising technology changes such as more automated "detect and avoid" capabilities that electronically detect a potential conflicting aircraft and then take evasive action to avoid a collision are still in development. The "sense" portion of this technology is part of the FAA's NEXTGEN initiative is already being implemented in many states and has been embraced by the airlines. It is the avoid part that is tougher to develop. NEXTGEN has been less affordable and less well received by the general aviation community.

There are companies in Oregon that are working on miniaturizing aircraft transponders to fit smaller, lighter unmanned aircraft. Once the miniaturized transponders are integrated with ADS-B, automatic "detect and avoid" may substantially reduce risk of collision.

In a recent roundtable seminar at a conference in Warm Springs, pilots and unmanned aircraft community members engaged in discussion about how best to work together on communication and reducing the potential for collision. Both general aviation pilots and UAS community members agreed to work together on a strategy to help smooth the transition for both. The general consensus suggested work on the following topics:

- Methods of communication to pilots on location and time of UAS operations. Both parties generally agreed that traditional Notice to Airmen (NOTAMS) may not be the best solution.
- More specific and directed communication such as AWOS (Automated Weather Operating System) broadcasts at the ranges or where COAs are active would alert pilots to unmanned aircraft activity. Another suggestion is to have active websites for the ranges that carry operating hours and geographic and altitude locations.
- Development of detect and avoid and geo-fencing technology. Depends on FAA and industry to develop further. This is a valuable tool in any integration of manned and unmanned aircraft.
- Address concerns by pilots that they might lose access to airspace traditionally available to manned aircraft.
- Safety of flight around airports that have UAS and how they will be separated.

There are three promising areas that can help effectively integrate unmanned and manned aircraft in the national airspace system. First, education of the recreational users on airspace and responsible unmanned aircraft operations. Second, technology improvements such as "detect and avoid" as a practical capability; integration of ADS-B, potentially TCAS and autopilot functionality to prevent mid-air collisions. Last, FAA and NASA coordination on airspace for unmanned aircraft similar to the airspace separation that keeps other manned aircraft flying safely.

The integration of manned and unmanned aircraft is inevitable. Congress has directed it as a key action for the FAA. Technology is driving more use in the recreational, public use and commercial application of UAS operations. With significant economic opportunity and

utilitarian applications growing daily, it will become routine to see the national airspace system with unmanned aircraft performing many of the tasks currently done by manned flight and many new innovative missions deemed impractical or impossible only a few short years ago.

SHOULD DRONES OPERATED BY PRIVATE PARTIES BE REGISTERED IN OREGON IN A MANNER SIMILAR TO THAT REQUIRED FOR OTHER AIRCRAFT?

House Bill 2710 directs the Oregon Department of Aviation (ODOA) to register public use Unmanned Aerial Systems beginning in January 2016. It also asks ODOA to recommend whether the department should register private party drones similar to that required for other aircraft. As this document looks into the answer, it is appropriate to the discussion to know how ODOA currently registers manned aircraft based in Oregon in accordance with ORS 837.015 and 837.040:

> ***837.015 Registration of aircraft.*** *Unless exempted by ORS 837.005*[108]*, no person shall fail to register any aircraft when required by ORS 837.040 to 837.070.*
>
> ***837.040 Persons required to register aircraft; application; timing; late fees; rules.***
> *(1) Except as provided in subsection (2) of this section, the following are required to register civil aircraft with the Oregon Department of Aviation:*
> *(a) The owner of a civil aircraft that is capable of flight and that is based in this state.*
> *(b) The owner of a civil aircraft that is used for commercial operations in this state.*
> *(2) An owner need not register a civil aircraft that is:*
> *(a) Exempted by the provisions of ORS 837.005; or*
> *(b) Subject to assessment and taxation under ORS 308.558.*
> *(3) An owner who is otherwise required to comply with subsection (1) of this section is not exempt from compliance because the aircraft has an appropriate, effective permit or license issued by the United States.*
> *(4) An owner applying for registration of an aircraft under this section shall file an application form supplied by the department. The State Aviation Board may adopt rules specifying the information that may be required on the application form.*
> *(5)(a) The owner of a civil aircraft that is based in Oregon shall register the aircraft within 60 days of the date the aircraft becomes subject to registration. The owner of a civil aircraft that is not based in Oregon but that is used in Oregon for commercial operations shall register the aircraft prior to the first time the aircraft is used in Oregon for commercial operations.*
> *(b) The department may impose a late fee on a person who fails to register an aircraft within the time required by this subsection. The board may determine by rule the amount of late fees that may be imposed under this paragraph. The board may adopt a graduated schedule of late fees, but the maximum amount of a late fee may not be more than the amount of the registration fee.*

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[108] 837.005 Exemptions of certain aircraft from requirements of registration; rules. ORS 837.015 and 837.040 to 837.070 do not apply to:
(1) Aircraft owned by any person, firm or corporation and certificated by the appropriate federal agency for domestic or foreign scheduled air commerce;
(2) Military aircraft of the United States of America;
(3) Aircraft licensed by a foreign country with which the United States has reciprocal relations exempting aircraft registered by the United States, or any political subdivision thereof, from registration within such foreign country; or
(4) Classes of aircraft designated as exempt by rules adopted by the State Aviation Board. [Formerly 493.010; 2005 c.22 §520; 2005 c.75 §1

(6) An application for registration must be accompanied by the registration fee specified in ORS 837.045 and, if a late fee is imposed under subsection (5) of this section, by the late fee.
(7) Registration under this section is not complete until the owner receives a notice of registration from the department.[109]

The Oregon Department of Aviation rules regarding exemption from registration allow a permanent exemption for Civil Air Patrol Aircraft:

Oregon Administrative Rule 738-080-0020 - Exemption from Aircraft Registration Fee
All Civil Air Patrol aircraft controlled by the Oregon Wing, and used primarily for search and rescue training exercises or missions, shall be registered in accordance with applicable state statutes with the exception that the annual registration fee will not be required.[110]

The Agency also has a temporary exemption for aircraft that are "*not physically capable of operation or flight.*"[111]

Oregon has never regulated or registered (unmanned) model aircraft based on the FAA's guidance that model aircraft flying was not an aeronautical activity.[112] Non-aeronautical designation means they are not authorized to be operated at airports. Another reason Model aircraft were never registered is their operators were historically a small percentage of the population and seldom conflicted with manned aircraft. As required by executive and legislative branches, the Oregon Department of Aviation will work to blend the UAS into the existing aircraft registration system. The current database of registered aircraft has over 4,000 aircraft of different categories. Adding categories for UAS will require changes in aircraft type and size to the existing database.

One of the primary reasons to register UAS in the state is to identify individual aircraft and their operators for accountability purposes. To protect the privacy of citizens on the ground and for general law enforcement concerning illicit use of drone technology, law enforcement and government must be able to identify the aircraft, and associate it with an operator. The FAA intends to require N numbers for all unmanned aircraft except for recreational use drones. Assignment of N numbers is how the FAA identifies manned aircraft. For manned aircraft registration in Oregon, the FAA's N numbers are used as well. If Oregon chooses to register commercial unmanned aircraft, N numbers will make identification for law enforcement and for violations of safety or privacy easier to manage.

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[109] ORS 837.040, http://www.oregon.gov/aviation/Pages/laws.aspx
[110] Oregon Administrative Rule; 738-080-0030 http://www.oregon.gov/aviation/Pages/laws.aspx
[111] Oregon Administrative Rule; 738-080-0030, Temporary exemption from Registration. http://www.oregon.gov/aviation/Pages/laws.aspx
[112] FAA Advisory Circular 150/5190-7 "Minimum Standards for Commercial Aeronautical Activities", August 28, 2006: "Activities, such as model aircraft and model rocket operations, are not aeronautical activities." Similarly worded is FAA AC 150/5190-6.

The distinction in the treatment of recreational and commercial UAS at the federal level may affect how Oregon registers UAS in the state. Just as Congress ruled the FAA cannot impose new regulation on recreational users in section 334 of FMRA,[113] Oregon's HB 2710 made a similar assertion in section one:

> (1) drone means an unmanned flying machine. drone does not include a model aircraft as defined in section 336 of the FAA Modernization and Reform Act of 2012 (P.L. 112-95)as in effect on the effective date of this 2013 Act.[114]

Private party drones, described in HB 2710, encompass both commercial and recreational unmanned aircraft. There is an important distinction between the two. Commercial use is anything that involves business or non-recreational flights. With the exception of FMRA 333 exceptions, there has been almost no authorization of commercial use UAS in the U.S. by the FAA. Recreational drones are purely used for the uncompensated enjoyment of the operator. The next sections will discuss the commercial and recreation UAS registration issues.

Commercial UAS

FAA requirements will regulate commercial use UAS strictly, requiring COAs, certified aircraft, qualified and certified pilots among other things. It will also require safeguards against lost link,[115] security of the communication infrastructure and a safety plan. Currently and for the foreseeable future, the FAA requires line of sight operations with the operator for all flights whether they are public, commercial or recreational. In the future, the FAA will require more mature technology with reliable "detect and avoid" capability for any flights beyond line of sight.

The commercial industry, even in its nascent stages, is already working with insurance providers. There a number of prominent national and international insurance providers already prepared to insure unmanned aircraft businesses here in Oregon. Insurance interest in reducing risk and developing guidelines and best practices for safe operations will most certainly drive the commercial UAS industry and be instrumental in development of standards of safety and risk mitigation.

Recreational UAS

Congress directed the FAA to work with "community based organizations"[116] to develop best practices and standards for responsible recreational users of noncommercial UAS. The AMA has a national membership composed of recreational UAS users generally understood to be

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[113]FMRA SEC. 336. SPECIAL RULE FOR MODEL AIRCRAFT.
(a) IN GENERAL.—Notwithstanding any other provision of law relating to the incorporation of unmanned aircraft systems into Federal Aviation Administration plans and policies, including this subtitle, the Administrator of the Federal Aviation Administration may not promulgate any rule or regulation regarding a model aircraft, or an aircraft being developed as a model aircraft,

[114]HB 2710 Section One.

[115] Lost link is the loss of the electronic signal between the aircraft and the operator/pilot on the ground. Most sophisticated UAS will have an autonomous response that flies the aircraft to a specific point for recovery or establish an orbit over a specific safe landmark until the link is reestablished or it runs out of fuel or battery life and recovers over the safe landmark.

[116] Section 336 (3) of the FMRA, (3) "the aircraft is limited to not more than 55 pounds
unless otherwise certified through a design, construction, inspection, flight test, and operational safety program administered by a community-based organization;"

the intended "community based organization" although it is possible that there could be others. Despite AMA's considerable influence, best practices and insurance requirements, it is easy to purchase recreational drones with high definition (HD) cameras from hobby stores, internet sources, personal cellular service providers and even grocery stores outside their sphere of influence. Many buyers of readily available UAS are not aware of AMA's role or benefits of joining the organization.

It is estimated that 10,000 model Unmanned Aerial System kits ready to fly right out of the box are shipped nationwide to amateur model unmanned aircraft aficionados monthly. This increases the potential for mistaken use or misuse by UAS operators. Court decisions by NTSB reinforced FAA's enforcement authority with the recreational UAS and may effectively check some unsafe activities by irresponsible users.

One of the challenges with not requiring registration at either the state or national level is recreational flyers are currently the least regulated and least knowledgeable about aviation and airspace flyers of UAS. Recreational flyers of UA may be unfamiliar with airspace constraints and more likely to fly their aircraft in ways that put citizens on the ground and in other aircraft in a hazardous situation. The popularity of the kits available in local retail stores and over the internet at inexpensive prices make it increasingly possible that the recreational UA operator demographic may need regulatory constraints. An analogy is that UA may be "driven" without the "driver" having any experience or passing any test. While small toy UAS are not particularly dangerous, many of the "off the shelf" models have sharp, fast turning "blades" that can be dangerous if people and property are not kept a healthy distance from the rotor blades. An unmanned helicopter operator was killed in Brooklyn, New York in September 2013 when the helicopter he was operating flew into him and the rotor blades hit him in the head.[117]

The FAA does not currently intend to require N-numbers for recreational or model unmanned aircraft. It is not improbable that FAA will decide that in order to exercise its enforcement authority, registration is necessary. For Oregon, not having N-numbers assigned complicates any requirement to register recreational UAS. Registration will require a unique system of identification visible on the aircraft or in the possession of the operator. While this may seem an inconvenience to the average law abiding operator, it would be instrumental to identification and accountability of irresponsible recreational UAS operators. In the future, technology may provide a Radio Frequency (RF) identification tag similar to an Internet Protocol (IP) address for UAS identification. Although there are companies working on that type of technology, it has not matured to the point of implementation today. Identification of irresponsible or unlawful users in the near future will be by aggrieved citizen visual or photo identification and/or law enforcement investigation.

The wide availability of recreational UAS in hobby and retail stores as well as over the internet makes registration more challenging without widely supported enforcement by local

[117] New York Times dated September 5th, 2013, *Remote Controlled Model Helicopter Fatally Strikes Its Operator*, http://www.nytimes.com/2013/09/06/nyregion/remote-controlled-copter-fatally-strikes-pilot-at-park.html?

communities. Tracking down unwilling registrants will take significant education and outreach as well statutory enforcement.

Status of State Legislation on Unmanned Aerial Systems.

The table at Appendix D page shows a state by state list of legislation compiled from the National Conference of State Legislatures[118]and from the ACLU website page titled "Status of 2014 Domestic Drone Legislation in the states."[119] A website titled "Drone-Laws" that has an interactive website map for state by state legislation was also used.[120] Of note, there are 19 states that have passed some legislation on use of Unmanned Aerial Systems.

The state of Alaska is also at the forefront of UAS operations and has been one of the earliest users of UAS technology. Alaska has been one of the pioneers in working with the FAA on unmanned flight for scientific research on polar ice and arctic wildlife research. They were the first state to be granted a COA for commercial use. The FAA approved Alaska's request for commercial use by the oil and gas industry. The Alaska Legislature passed a bill into law that protects privacy and regulates law enforcement's ability to use drones for collecting evidence.[121] Alaska's legislative task force produced a comprehensive report on UAS issues in Alaska. The report covers all aspects of UAS in the state including safety, privacy, due process and insurance. It also continues to meet regularly in public meetings to stay current and fine tune their policies and determine requirement for changes in statute.[122]

Key observations of state UAS laws:

- Most states that have any regulation focus on privacy and due process/warrantless searches and provide penalties for UAS used for violations of either.
- North Carolina is the only state besides Oregon that requires "license" (registration) by the state for UAS.
- Only Alaska requires a training program for UAS operators.
- Several states including Washington, New Jersey, California and Maine passed bills through their state legislatures and were subsequently vetoed by their respective governors.
- Three states, including Oregon, Wisconsin and North Carolina prohibit weaponization of UAS.
- None of the states make a distinction between commercial, recreational and public use UAS. Only Oregon requires registration of Public use UAS.
- Three states; Illinois, Alabama and Tennessee prohibit harassment of hunters and/or fishermen by UAS.
- Two states; North Carolina and Alaska, prevent using UAS for aiding hunting.

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[118] National Conference of State Legislatures website dated 9/16/2014, http://www.ncsl.org/research/civil-and-criminal-justice/2014-state-unmanned-aircraft-systems-uas-legislation.aspx

[119] American Civil Liberties Union website dated 6/30/2014. https://www.aclu.org/blog/technology-and-liberty/status-2014-domestic-drone-legislation-states

[120] Drone-Laws website dated June 2013, http://www.drone-laws.com/

[121] Extracted from Alaska Commons News service July 8, 2014http://www.alaskacommons.com/2014/07/08/drones-are-coming-task-force-report/

[122] Alaska Legislative Task Force Report on Unmanned Aircraft Systems dated June 30, 2014. http://www.housemajority.org/wp-content/uploads/2014/07/Unmanned_Aircraft_Systems_Legislative_Task_Force_Final_Report.pdf

- Virginia passed a moratorium on all public agency use of UAS in 2013.
- Oregon is the only state that has a state preemption law to prohibit legislation below the state level of government.
- Two states; Alaska and Ohio passed legislation to require legislative task force or Committees on UAS.

What held states back in the past two years? Any laws created could be rendered obsolete depending on FAA's direction on both rule making and enforcement. Any state legislation passed now could be preempted as the FAA and technology create new changes in the UAS market. There is an economic component as well. The Northwest Chapter of AUVSI has done extensive study of the commercial UAS industry in Oregon. The organization has identified over 200 UAS based businesses in Oregon.[123] These companies include manufacturers, sensor and software developers as well as companies that offer to facilitate operations and coordination with the FAA and regulators. There are several with mature operations that are based in Oregon but either do business in military related environments or operate in other countries with less stringent federal regulations. Alaska's test site operators, despite having a more active relationship with the FAA and COAs in the Arctic, have worked with the country of Iceland to offer UAS operations there until U.S. federal regulations become easier to navigate.

[123] Compiled by AUVSI. List is sorted by company name and address. List is at appendix d

Options and Recommendations For Registration of Private Party UAS

One of the essential parts of this report is to recommend to the Legislature whether Oregon should register private use drones. For registration, ODOA looked at three options to recommend to executive and legislative branch policymakers to include:

1. Option One: Registration of all private use drones but postpone until federal law and litigation shake out for another year. This option gives the state the flexibility to delay registration until federal regulation, technology and industry trends the opportunity to develop Accountability for safety, privacy, due process and nuisance are adequately addressed by existing laws including HB 2710. Here are some pros and cons on the

PROS	CONS
Allows additional time for federal regulation to form the foundation for state legislation.	Pace of federal regulation is too slow. Creates a vacuum of law in Oregon.
No additional statutes, rules or administrative requirements or regulations.	State and local law enforcement agencies don't have ability to identify unmanned aircraft or operators.
No additional FTE for registering UAS. Cost savings	No additional FTE for registering UAS. Insufficient manpower available for education outreach, enforcement and registration.
Cost of administration of registration of UAS is lower for public unmanned aircraft per HB 2710.	No additional revenue to share cost of registering public use unmanned aircraft.
Gives industry and technology opportunity to develop in Oregon in a competitive market among states.	Industry becomes accustomed to lack of registration and resists state registration as backlash.

2. Option Two: Register only commercial UAS. This option captures the most responsible operators constrained by federal law and insurance coverage requirements. Will provide the state of Oregon with realistic numbers of commercial UA operating in Oregon. FAA intends to assign registration numbers (N-numbers) to all commercial UAS. A recommended registration approach could be to register UAS using N-Numbers and FAA classification of UAS by size. (Currently large UAS are greater than 55 pounds. Small UAS are less than 55 pounds. This approach could assess a surcharge on large UAS to capture the greater complexity and hazard of larger aircraft threat to manned aircraft or persons on the ground.

PROS	CONS
Creates system that is easiest to track registration for the state	Creates administrative costs of administration.
Provides optimal revenue stream for state of Oregon to offset cost of administration	Potential for resistance from commercial UAS companies.

Provides the state the best reportable database for numbers of commercial UAS operating in the state.	Requires sustained communication and education of commercial users.

3. Option Three: Register both Commercial and Recreational UAS. This could be done by assigning a serial number for recreational and N-Numbers for commercial UAS using FAA assigned N-numbers. This approach would require making it a statutory requirement to register using the AMA and AUVSI to help educate the model aircraft and Commercial users. Commercial operators will be regulated by both FAA and additionally required to meet specific safety standards by the insurance industry. Already there are significant insurance providers willing to cover existing commercial UAS companies. They will be more likely to operate responsibly in order to keep their commercial insurance and FAA license. Identification of unmanned aircraft could provide a level of accountability similar to the way a license plate on an automobile provides identification and accountability for driver identification.

PROS	CONS
Simplest option to ensure registration of both recreational and commercial users,	Difficult to track recreational (model) unmanned aircraft purchased from wide variety of sources including internet.
Generates sufficient revenue to pay for accountability via registration program	Creates additional administrative and financial requirements on state agency and on owner/operators
May provide sufficient revenue to provide assistance to UAS ranges and assist with infrastructure.	Could cause backlash against registration by certain classes of UAS operators.
Protects legitimate users of unmanned aircraft from misidentification with irresponsible or unlawful UAS operators Registration provides easy identification of unsafe operators and violations of privacy.	Requires close coordination with Law enforcement agencies to enforce registration regulation.
Registration of UAS could provide accountability in the eyes of the citizens of Oregon	Creates expectation that registration combined with enhanced regulation will solve all UAS problems.

Administration of Registration

This section will look at the administrative costs of registering unmanned aircraft. The costs cover the labor, information technology and training/outreach education costs.

At the high end of labor costs, it could take as many as two additional FTE. Each FTE will collect registration fees which will be used to spread administrative cost throughout the unmanned aircraft to be registered including FTE cost. The cost below is for an Office

Specialist 2 mid-range pay scale and includes pay and all benefits. One FTE = $122,000 in pay and benefits.[124] $244,000 if two FTE are needed.

Besides FTE, administrative costs for registering UAS in Oregon depends on numbers of UAS registered in various categories. Initially, education outreach, law enforcement training, and program setup will require additional work product and create both a temporary and permanent requirement for FTE, education outreach and information database purchase. Recent estimates of aircraft registration IT program costs range from $20,000 to $60,000. At the low end of $20,000, the existing aircraft registration database would be modified to include several classes of UAS. The economic benefit is IT development costs can be cost-shared with a manned aircraft database.

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The methodology for registering commercial use could be same as the methodology for registering manned aircraft, use of FAA assigned N-numbers. ODA has a database for manned aircraft that could be adjusted for both large and small commercial use Unmanned Systems with a fee structure designed to sustain the registration program.

To be successful in rolling out registration for private operators, the agency will conduct outreach with UAS operators and law enforcement agencies to educate them on registration requirements. The Oregon Department of Aviation estimates over a 6 month roll out timeframe, it will take one FTE an estimated 960 hours to educate and train state and local law enforcement agencies on the law and registration requirements. As demand for registration increases based on increasing numbers of registrations, FTE, and training costs are planned to be covered by registration fees.

Below are estimated numbers of registrations of categories for public use, commercial and recreational UAS. The table includes higher complexity large UAS which are defined by the FAA as large UAS. Large UAS are those that are greater than 55 pounds. The tables cover a progressive development of UAS registrations beginning with low levels of registrations as the program begins and subsequent tables assume increased registrations as time goes on.

Registration of all UAS including recreational, publicly owned/operated and commercial UAS

Estimates using low number of registrations generates less revenue and could be accomplished with ½ FTE initially for program administration. This might be accomplished with a temporary employee. Registration of recreational drone owners will be a novel concept. The Oregon Department of Aviation may encounter both UAS operators who are unaware of the requirement to register and those who resist registration of their unmanned aircraft. To offset the challenge of registering recreational UAS users, this proposal recommends a low cost of registration. $15 is a fee low enough to encourage voluntary or mandatory registration without significant hardship and still helps offset the cost of a registration program.

Informal polling members of the commercial UAS industry determined that there is little objection to a fee as high as $200 for registration costs. While the agency will hold public

[124] From actual data for OS2 FTE in Oregon Department of Aviation.

hearings and take public input, the Department recommends $200 per aircraft for both public use and commercial UAS to offset the cost of registration. The$200 amount is a reasonable fee for commercial and public use registration and recognizes that the blurring of the line between commercial and public use UAS that might occur to comply with FAA regulations. Making them both the same cost makes it irrelevant to administratively determine the difference between public and commercial. It also removes any administrative issues about length of time operated as a PAO as a litmus test of public vs commercial aircraft.[125] The fee is low enough for most small businesses and public agencies to afford without significant impact and still covers the cost of administration of the program as it grows. The additional cost of heavy UAS covers high end more sophisticated UAS equipment and sensors.

Type UAS	registration cost	number	revenue estimates	
Recreational	$15	500	$	7,500
Public Use	$200	12	$	2,400
Commercial	$200	200	$	40,000
Heavy >55 lbs.	$300	50	$	15,000
Total revenue			$	64,900

Moderate number of registration estimate generates sufficient revenue to provide one FTE for program administration and some IT costs.

Type UA	registration cost	number	revenue estimates	
Recreational	15	1000	$	15,000
Public Use	200	25	$	5,000
Commercial	200	500	$	100,000
Heavy >50 lbs.	300	100	$	30,000
Total revenue			$	150,000

Higher number of registration estimate generates sufficient revenue to provide two FTE and software update for program administration plus all IT costs and education and law enforcement education and outreach program. This will cover the growth of the UAS industry in the state.

Type UAS	registration cost	number	revenue estimates	
Recreational	15	2000	$	30,000
Public Use	200	50	$	10,000
Commercial	200	1000	$	200,000

[125] 49 U.S.C. § 40102(a)(41) (D) *Public Aircraft Operations*. An aircraft exclusively leased for at least 90 days continuous days by the government of a state, the District of Columbia, or a territory or possession of the United States or a political subdivision (as determined by the Attorney General of the State) of one of these governments.

Heavy >55 lbs.	300	150	$	45,000
Total revenue			$	285,000

Registration of publicly owned/operated and commercial use UAS. (Excludes recreational operators of UAS.)

If only Commercial and Public use unmanned aircraft were required to register, revenue estimated numbers would be affected as the charts below show:

Estimates using low number of registrations generates less revenue and could enable ½ FTE. For program administration.

Type UAS	registration cost	number	revenue estimates	
Public Use	$200	12	$	2,400
Commercial	$200	200	$	40,000
Heavy >55 lbs.	$300	50	$	15,000
Total revenue			$	57,400

Moderate number of registration estimate generates sufficient revenue to provide one FTE for program administration. Some costs for IT infrastructure

Type UAS	registration cost	number	revenue estimates	
Public Use	200	25	$	5,000
Commercial	200	500	$	100,000
Heavy >55 lbs.	300	100	$	30,000
Total revenue			$	135,000

Higher number of registration estimate generates sufficient revenue to provide 1-2 FTE and software update for program administration. Enables IT infrastructure and some education outreach and law enforcement training.

Type UA	registration cost	number	revenue estimates	
Public Use	200	50	$	10,000
Commercial	200	1000	$	200,000
Heavy >55 lbs.	300	150	$	45,000
Total revenue			$	255,000

Technology advances may provide a more efficient methodology such as a unique wireless tag associated with each recreational unmanned aerial System, similar to an IP address found on every personal computer device sold.

Final Recommendation on Unmanned Aerial Vehicles Operated by Private Parties

The Oregon Department of Aviation recommends that the first option to delay registration for private use UAS be given first consideration. This recommendation is made for a number of reasons as noted below:

- By delaying state registration on commercial and recreational UAS, it will provide the FAA the time to fully articulate the federal policy on registration of private use UAS.

- There are currently very few federally authorized commercial UAS. Delay will enable the commercial market to develop competitively and legally in response to federal regulation.

- Given the delay by FAA in creating rules and regulations, there is little likelihood of commercial operations being available to businesses except by FAA's 333 exemption process. The FAA has not submitted their sUAS NPRM although it is supposed to be posted to the Federal Register by November 2014. The FAA will not develop final regulation of sUAS until at least 16 months after the NPRM is posted for comment in the Federal Register. Registration and revenue estimates are not estimated to meet collection requirements to justify FTE.

- Delay provides an opportunity to assess the recreational user market, evaluate the effect of current law and number of operators, then determine if registration and additional regulation of the model aircraft users is justified/needed.

- North Carolina is the only other state to require UAS registration. Until the market is more established in other states, assessing fees for commercial use unmanned aircraft could factor into a company's business decision on which state to locate.

- The line between commercial and public use will be blurred by public agencies contracting with commercial operators. Delay will demonstrate whether public and commercial use UAS will be clearly identified.

- Public use operators will be determined in the same manner as manned aircraft. They will be required to be in compliance with Federal regulation under 49 U.S. Code 40125126 on the requirements for public use vs commercial unmanned aircraft. Publicly owned UAS are currently required to register by January 2016. This market appears to be fairly small and due to tight regulation by the FAA through the COA process, will remain so. The FAA has narrowly interpreted the "public purposes" that can justify public COAs making public agency COAs a relatively small category.

[126] 49 U.S. Code 40125, http://uscode.house.gov/view.xhtml?req=granuleid:USC-prelim-title49-section40125&num=0&edition=prelim

FAA is taking a go-slow approach to public use despite direction from Congress to accelerate operations for publicly owned UAS. It is feasible for ODOA to register these small numbers of publicly owned UAS within existing resources.

There will be a requirement for ODOA to identify funding for IT modifications to include categories of UAS (large/greater than 55 lbs. or small/less than 55 pounds). Estimated cost are not more than $40,000.

Additional Recommendation

Although this recommendation is not required by HB 2710, The Oregon Department of Aviation also recommends the establishment of a working group or task force to track federal law, provide input for future legislative action, and track industry developments. This working group could be patterned after the Alaska Legislative task force or be implemented on a more informal basis with stakeholders from law enforcement, civil liberties groups, commercial users, public agency users, recreational stakeholders as well as state and local government representatives.

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APPENDICES

APPENDIX A – HOUSE BILL 2710

77th OREGON LEGISLATIVE ASSEMBLY--2013 Regular Session

Enrolled

House Bill 2710

Sponsored by Representative HUFFMAN; Representative WHISNANT, Senator SHIELDS

CHAPTER .....

AN ACT

Relating to drones; and declaring an emergency.
Be It Enacted by the People of the State of Oregon:

DEFINITIONS

SECTION 1. As used in sections 1 to 17 of this 2013 Act:

(1) drone means an unmanned flying machine. drone does not include a model aircraft as defined in section 336 of the FAA Modernization and Reform Act of 2012 (P.L. 112-95) as in effect on the effective date of this 2013 Act.

(2) "Law enforcement agency" means an agency that employs police officers, as defined in ORS 133.525, or that prosecutes offenses.

(3) "Public body" has the meaning given that term in ORS 174.109.

(4) "Warrant" means a warrant issued under ORS 133.525 to 133.703.

USE OF drones BY LAW ENFORCEMENT AGENCIES

SECTION 2. (1) Except as otherwise provided in sections 2 to 7 of this 2013 Act, a law enforcement agency may not operate a drone, acquire information through the operation of a drone or disclose information acquired through the operation of a drone.

(2) Any image or other information that is acquired through the use of a drone by a law enforcement agency in violation of sections 2 to 7 of this 2013 Act, and any evidence derived from that image or information:

(a) Is not admissible in, and may not be disclosed in, a judicial proceeding, administrative proceeding, arbitration proceeding or other adjudicatory proceeding; and

(b) May not be used to establish reasonable suspicion or probable cause to believe that an offense has been committed.

SECTION 3. (1) A law enforcement agency may operate a drone, acquire information through the operation of a drone, or disclose information acquired through the operation of a drone, if:

(a) A warrant is issued authorizing use of a drone; or

(b) The law enforcement agency has probable cause to believe that a person has committed a crime, is committing a crime or is about to commit a crime, and exigent circumstances exist that make it unreasonable for the law enforcement agency to obtain a warrant authorizing use of a drone.

(2) A warrant authorizing the use of a drone must specify the period for which operation of the drone is authorized. In no event may a warrant provide for the operation of a drone for a period of more than 30 days. Upon motion and good cause shown, a court may renew a warrant after the expiration of the 30-day period.

SECTION 4. A law enforcement agency may operate a drone for the purpose of acquiring information about an individual, or about the individual's property, if the individual has given written consent to the use of a drone for those purposes.

SECTION 5. (1) A law enforcement agency may operate a drone, acquire information through the operation of a drone, or disclose information acquired through the operation of a drone, for the purpose of search and rescue activities, as defined in ORS 404.200.

(2) A law enforcement agency may operate a drone, acquire information through the operation of a drone, or disclose information acquired through the operation of a drone, for the purpose of assisting an individual in an emergency if:

(a) The law enforcement agency reasonably believes that there is an imminent threat to the life or safety of the individual, and documents the factual basis for that belief; and

(b) Not more than 48 hours after the emergency operation begins, an official of the law enforcement agency files a sworn statement with the circuit court that describes the nature of the emergency and the need for use of a drone.

(3) A law enforcement agency may operate a drone, acquire information through the operation of a drone, or disclose information acquired through the operation of a drone, during a state of emergency that is declared by the Governor under ORS chapter 401 if:

(a) The drone is used only for the purposes of preserving public safety, protecting property or conducting surveillance for the assessment and evaluation of environmental or weather related damage, erosion or contamination; and

(b) The drone is operated only in the geographical area specified in a proclamation pursuant to ORS 401.165 (5).

SECTION 6. (1) A law enforcement agency may operate a drone, acquire information through the operation of a drone, or disclose information acquired through the operation of a drone, for the purpose of reconstruction of a specific crime scene, or similar physical assessment, related to a specific criminal investigation.

(2) The period that a law enforcement agency may operate a drone under this section may not exceed five days for the purpose of reconstruction of a specific crime scene, or similar physical assessment, related to a specific criminal investigation.

SECTION 7. (1) A law enforcement agency may operate a drone for the purpose of training in:

(a) The use of drones; and

(b) The acquisition of information through the operation of a drone.

(2) Any image or other information that is acquired through the use of a drone by a law enforcement agency under this section, and any evidence derived from that image or information:

(a) Is not admissible in, and may not be disclosed in, a judicial proceeding, administrative proceeding, arbitration proceeding or other adjudicatory proceeding; and

(b) May not be used to establish reasonable suspicion or probable cause to believe that an offense has been committed.

REGISTRATION OF drones USED BY PUBLIC BODIES

SECTION 8. (1) A public body may not operate a drone in the airspace over this state without registering the drone with the Oregon Department of Aviation.

(2) The Oregon Department of Aviation may impose a civil penalty of up to $10,000 against a public body that violates subsection (1) of this section.

(3) Evidence obtained by a public body through the use of a drone in violation of subsection (1) of this section is not admissible in any judicial or administrative proceeding and may not be used to establish reasonable suspicion or probable cause to believe that an offense has been committed.

(4) The Oregon Department of Aviation shall establish a registry of drones operated by public bodies and may charge a fee sufficient to reimburse the department for the maintenance of the registry.

(5) The Oregon Department of Aviation shall require the following information for registration of a drone:

(a) The name of the public body that owns or operates the drone.

(b) The name and contact information of the individuals who operate the drone.

(c) Identifying information for the drone as required by the department by rule.

(6) A public body that registers one or more drones under this section shall provide an annual report to the Oregon Department of Aviation that summarizes:

(a) The frequency of use of the drones by the public body during the preceding calendar year; and

(b) The purposes for which the drones have been used by the public body during the preceding calendar year.

(7) The State Aviation Board may adopt all rules necessary for the registration of drones in Oregon that are consistent with federal laws and regulations.

SECTION 9. (1) Except as provided in subsection (2) of this section, section 8 of this 2013 Act becomes operative January 2, 2016.

(2) The Oregon Department of Aviation and the State Aviation Board may take any action before January 2, 2016, including the adoption of rules that is necessary to allow implementation of section 8 of this 2013 Act on January 2, 2016.

PROHIBITION ON USE OF WEAPONIZED drones BY PUBLIC BODIES

SECTION 10. A public body may not operate a drone that is capable of firing a bullet or other projectile, directing a laser or otherwise being used as a weapon.

USE OF INFORMATION ACQUIRED BY PUBLIC BODY drones

SECTION 11. Any image or other information that is acquired by a public body through the use of a drone that has not been approved by the Federal Aviation Administration, and any evidence derived from that image or information:

(1) Is not admissible in, and may not be disclosed in, a judicial proceeding, administrative proceeding, arbitration proceeding or other adjudicatory proceeding; and

(2) May not be used to establish reasonable suspicion or probable cause to believe that an offense has been committed.

SECTION 12. Section 11 of this 2013 Act is repealed January 2, 2016.

CRIMES INVOLVING drones

SECTION 13. (1) A person commits a Class A felony if the person possesses or controls a drone and intentionally causes, or attempts to cause, the drone to:

(a) Fire a bullet or other projectile at an aircraft while the aircraft is in the air;

(b) Direct a laser at an aircraft while the aircraft is in the air; or

(c) Crash into an aircraft while the aircraft is in the air.

(2) A person who intentionally interferes with, or gains unauthorized control over, a drone licensed by the Federal Aviation Administration, or operated by the Armed Forces of

the United States as defined in ORS 351.642, an agency of the United States or a federal, state or local law enforcement agency, commits a Class C felony.

CIVIL REMEDIES

SECTION 14. In addition to any other remedies allowed by law, a person who intentionally interferes with, or gains unauthorized control over, a drone licensed by the Federal Aviation Administration, or operated by the Armed Forces of the United States as defined in ORS 351.642, an agency of the United States or a federal, state or local law enforcement agency, is liable to the owner of the drone in an amount of not less than $5,000. The court shall award reasonable attorney fees to a prevailing plaintiff in an action under this section.

SECTION 15. (1) Except as provided in subsection (2) of this section, a person who owns or lawfully occupies real property in this state may bring an action against any person or public body that operates a drone that is flown at a height of less than 400 feet over the property if:

(a) The operator of the drone has flown the drone over the property at a height of less than 400 feet on at least one previous occasion; and

(b) The person notified the owner or operator of the drone that the person did not want the drone flown over the property at a height of less than 400 feet.

(2) A person may not bring an action under this section if:

(a) The drone is lawfully in the flight path for landing at an airport, airfield or runway; and

(b) The drone is in the process of taking off or landing.

(3) A prevailing plaintiff may recover treble damages for any injury to the person or the property by reason of a trespass by a drone as described in this section, and may be awarded injunctive relief in the action.

(4) A prevailing plaintiff may recover attorney fees under ORS 20.080 if the amount pleaded in an action under this section is $10,000 or less.

(5) The Attorney General, on behalf of the State of Oregon, may bring an action or claim for relief alleging nuisance or trespass arising from the operation of a drone in the airspace over this state. A court shall award reasonable attorney fees to the Attorney General if the Attorney General prevails in an action under this section.

APPLICABILITY TO ARMED FORCES

SECTION 16. Sections 1 to 17 of this 2013 Act do not apply to the Armed Forces of the United States as defined in ORS 351.642.

PREEMPTION OF LOCAL LAWS REGULATING drones

SECTION 17. Except as expressly authorized by state statute, the authority to regulate the ownership or operation of drones is vested solely in the Legislative Assembly. Except as expressly authorized by state statute, a local government, as defined ORS 174.116, may not enact an ordinance or resolution that regulates the ownership or operation of drones or otherwise engage in the regulation of the ownership or operation of drones.

REPORT TO LEGISLATURE

SECTION 18. On or before November 1, 2014, the Oregon Department of Aviation shall report to a joint interim committee of the Legislative Assembly related to the judiciary, or other appropriate interim committees, on:

(1) The status of federal regulations relating to unmanned aerial vehicles; and

(2) Whether unmanned aerial vehicles operated by private parties should be registered in Oregon in a manner similar to that required for other aircraft.

CAPTIONS

SECTION 19. The unit captions used in this 2013 Act are provided only for the convenience of the reader and do not become part of the statutory law of this state or express any legislative intent in the enactment of this 2013 Act.

EMERGENCY CLAUSE

SECTION 20. This 2013 Act being necessary for the immediate preservation of the public peace, health and safety, an emergency is declared to exist, and this 2013 Act takes effect on its passage.

Passed by House April 15, 2013

Repassed by House June 26, 2013

.....
Ramona J. Line, Chief Clerk of House

.....
Tina Kotek, Speaker of House

Passed by Senate June 10, 2013

Repassed by Senate June 27, 2013

.....
Peter Courtney, President of Senate

Received by Governor:

.....M.,....., 2013

Approved:

.....M.,....., 2013

.....
John Kitzhaber, Governor

Filed in Office of Secretary of State:

.....M.,....., 2013

.....
Kate Brown, Secretary of State

APPENDIX B – FAA Modernization and Reform Act of 2012 Subtitle B UAS

Subtitle B of the Federal Aviation Administration 2012 Modernization and Reform Act
Subtitle B—Unmanned Aircraft Systems

SEC. 331. DEFINITIONS.

In this subtitle, the following definitions apply:

(1) ARCTIC.—The term "Arctic" means the United States zone of the Chukchi Sea, Beaufort Sea, and Bering Sea north of the Aleutian chain.

(2) CERTIFICATE OF WAIVER; CERTIFICATE OF AUTHORIZATION.—The terms "certificate of waiver" and "certificate of authorization" mean a Federal Aviation Administration grant of approval for a specific flight operation.

(3) PERMANENT AREAS.—The term "permanent areas" means areas on land or water that provide for launch, recovery, and operation of small unmanned aircraft.

(4) PUBLIC UNMANNED AIRCRAFT SYSTEM.—The term "public unmanned aircraft system" means an unmanned aircraft system that meets the qualifications and conditions required for operation of a public aircraft (as defined in section 40102 of title 49, United States Code).

(5) SENSE AND AVOID CAPABILITY.—The term "sense and avoid capability" means the capability of an unmanned aircraft to remain a safe distance from and to avoid collisions with other airborne aircraft.

(6) SMALL UNMANNED AIRCRAFT.—The term "small unmanned aircraft" means an unmanned aircraft weighing less than 55 pounds.

(7) TEST RANGE.—The term "test range" means a defined geographic area where research and development are conducted.

(8) UNMANNED AIRCRAFT.—The term "unmanned aircraft" means an aircraft that is operated without the possibility of direct human intervention from within or on the aircraft.

(9) UNMANNED AIRCRAFT SYSTEM.—The term "unmanned aircraft system" means an unmanned aircraft and associated elements (including communication links and the components that control the unmanned aircraft) that are required for the pilot in command to operate safely and efficiently in the national airspace system.

SEC. 332. INTEGRATION OF CIVIL UNMANNED AIRCRAFT SYSTEMS INTO NATIONAL AIRSPACE SYSTEM.

(a) REQUIRED PLANNING FOR INTEGRATION.—

(1) COMPREHENSIVE PLAN.—Not later than 270 days after the date of enactment of this Act, the Secretary of Transportation, in consultation with representatives of the aviation industry, Federal agencies that employ unmanned aircraft systems technology in the national airspace system, and the unmanned aircraft systems industry, shall develop a comprehensive plan to safely accelerate the integration of civil unmanned aircraft systems into the national airspace system.

(2) CONTENTS OF PLAN.—The plan required under paragraph (1) shall contain, at a minimum, recommendations or projections on—

(A) the rulemaking to be conducted under subsection (b), with specific recommendations on how the rulemaking will—

(i) define the acceptable standards for operation and certification of civil unmanned aircraft systems;

(ii) ensure that any civil unmanned aircraft system includes a sense and avoid capability; and

(iii) establish standards and requirements for the operator and pilot of a civil unmanned aircraft system, including standards and requirements for registration and licensing;

(B) the best methods to enhance the technologies and subsystems necessary to achieve the safe and routine operation of civil unmanned aircraft systems in the national airspace system;

(C) a phased-in approach to the integration of civil unmanned aircraft systems into the national airspace system;

(D) a timeline for the phased-in approach described under subparagraph (C);

(E) creation of a safe

(F) airspace designation for cooperative manned and unmanned flight operations in the national airspace system;

(G) establishment of a process to develop certification, flight standards, and air traffic requirements for civil unmanned aircraft systems at test ranges where such systems are subject to testing;

(H) the best methods to ensure the safe operation of civil unmanned aircraft systems and public unmanned aircraft systems simultaneously in the national airspace system; and

(I) incorporation of the plan into the annual NextGen Implementation Plan document (or any successor document) of the Federal Aviation Administration.

(3) DEADLINE.—The plan required under paragraph (1) shall provide for the safe integration of civil unmanned aircraft systems into the national airspace system as soon as practicable, but not later than September 30, 2015.

(4) REPORT TO CONGRESS.—Not later than 1 year after the date of enactment of this Act, the Secretary shall submit to Congress a copy of the plan required under paragraph (1).

(5) ROADMAP.—Not later than 1 year after the date of enactment of this Act, the Secretary shall approve and make available in print and on the Administration's Internet Web site a 5-year roadmap for the introduction of civil unmanned aircraft systems into the national airspace system, as coordinated by the Unmanned Aircraft Program Office of the Administration. The Secretary shall update the roadmap annually.

(b) RULEMAKING.—Not later than 18 months after the date on which the plan required under subsection (a)(1) is submitted to Congress under subsection (a)(4), the Secretary shall publish in the Federal Register—

(1) a final rule on small unmanned aircraft systems that will allow for civil operation of such systems in the national airspace system, to the extent the systems do not meet the requirements for expedited operational authorization under section 333 of this Act;

(2) a notice of proposed rulemaking to implement the recommendations of the plan required under subsection (a)(1), with the final rule to be published not later than 16 months after the date of publication of the notice; and

(3) an update to the Administration's most recent policy statement on unmanned aircraft systems, contained in Docket No. FAA–2006–25714.

(c) PILOT PROJECTS.—

(1) ESTABLISHMENT.—Not later than 180 days after the date of enactment of this Act, the Administrator shall establish a program to integrate unmanned aircraft systems into the national airspace system at 6 test ranges. The program shall terminate 5 years after the date of enactment of this Act.

(2) PROGRAM REQUIREMENTS.—In establishing the program under paragraph (1), the Administrator shall—

(A) safely designate airspace for integrated manned and unmanned flight operations in the national airspace system;

(B) develop certification standards and air traffic requirements for unmanned flight operations at test ranges;

(C) coordinate with and leverage the resources of the National Aeronautics and Space Administration and the Department of Defense;

(D) address both civil and public unmanned aircraft systems;

(E) ensure that the program is coordinated with the Next Generation Air Transportation System; and

(F) provide for verification of the safety of unmanned aircraft systems and related navigation procedures before integration into the national airspace system.

(3) TEST RANGE LOCATIONS.—In determining the location of the 6 test ranges of the program under paragraph (1), the Administrator shall—

(A) take into consideration geographic and climatic diversity;

(B) take into consideration the location of ground infrastructure and research needs; and

(C) consult with the National Aeronautics and Space Administration and the Department of Defense.

(4) TEST RANGE OPERATION.—A project at a test range shall be operational not later than 180 days after the date on which the project is established.

(5) REPORT TO CONGRESS.—

(A) IN GENERAL.—Not later than 90 days after the date of the termination of the program under paragraph (1), the Administrator shall submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Transportation and Infrastructure and the Committee on Science, Space, and Technology of the House of Representatives a report setting forth the Administrator's findings and conclusions concerning the projects.

(B) ADDITIONAL CONTENTS.—The report under subparagraph (A) shall include a description and assessment of the progress being made in establishing special use airspace to fill the immediate need of the Department of Defense—

(i) to develop detection techniques for small unmanned aircraft systems; and

(ii) to validate the sense and avoid capability and operation of unmanned aircraft systems.

(d) EXPANDING USE OF UNMANNED AIRCRAFT SYSTEMS IN ARCTIC.—

(1) IN GENERAL.—Not later than 180 days after the date of enactment of this Act, the Secretary shall develop a plan and initiate a process to work with relevant

Federal agencies and national and international communities to designate permanent areas in the Arctic where small unmanned aircraft may operate 24 hours per day for research and commercial purposes. The plan for operations in these permanent areas shall include the development of processes to facilitate the safe operation of unmanned aircraft beyond line of sight. Such areas shall enable over-water flights from the surface to at least 2,000 feet in altitude, with ingress and egress routes from selected coastal launch sites.

(2) AGREEMENTS.—To implement the plan under paragraph (1), the Secretary may enter into an agreement with relevant national and international communities.

(3) AIRCRAFT APPROVAL.—Not later than 1 year after the entry into force of an agreement necessary to effectuate the purposes of this subsection, the Secretary shall work with relevant national and international communities to establish and implement a process, or may apply an applicable process already established, for approving the use of unmanned aircraft in the designated permanent areas in the Arctic without regard to whether an unmanned aircraft is used as a public aircraft, a civil aircraft, or a model aircraft.

SEC. 333. SPECIAL RULES FOR CERTAIN UNMANNED AIRCRAFT SYSTEMS.

(a) IN GENERAL.—Notwithstanding any other requirement of this subtitle, and not later than 180 days after the date of enactment of this Act, the Secretary of Transportation shall determine if certain unmanned aircraft systems may operate safely in the national airspace system before completion of the plan and rulemaking required by section 332 of this Act or the guidance required by section 334 of this Act.

(b) ASSESSMENT OF UNMANNED AIRCRAFT SYSTEMS.—In making the determination under subsection (a), the Secretary shall determine, at a minimum—

(1) which types of unmanned aircraft systems, if any, as a result of their size, weight, speed, operational capability, proximity to airports and populated areas, and operation within visual line of sight do not create a hazard to users of the national airspace system or the public or pose a threat to national security; and

(2) whether a certificate of waiver, certificate of authorization, or airworthiness certification under section 44704 of title 49, United States Code, is required for the operation of unmanned aircraft systems identified under paragraph (1).

(c) REQUIREMENTS FOR SAFE OPERATION.—If the Secretary determines under this section that certain unmanned aircraft systems may operate safely in the national airspace system, the Secretary shall establish requirements for the safe operation of such aircraft systems in the national airspace system.

SEC. 334. PUBLIC UNMANNED AIRCRAFT SYSTEMS.

(a) GUIDANCE.—Not later than 270 days after the date of enactment of this Act, the Secretary of Transportation shall issue guidance regarding the operation of public unmanned aircraft systems to—

(1) expedite the issuance of a certificate of authorization process;

(2) provide for a collaborative process with public agencies to allow for an incremental expansion of access to the national airspace system as technology matures and the necessary safety analysis and data become available, and until standards are completed and technology issues are resolved;

(3) facilitate the capability of public agencies to develop and use test ranges, subject to operating restrictions required by the Federal Aviation Administration, to test and operate unmanned aircraft systems; and

(4) provide guidance on a public entity's responsibility when operating an unmanned aircraft without a civil airworthiness certificate issued by the Administration.

(b) STANDARDS FOR OPERATION AND CERTIFICATION.—Not later than December 31, 2015, the Administrator shall develop and implement operational and certification requirements for the operation of public unmanned aircraft systems in the national airspace system.

(c) AGREEMENTS WITH GOVERNMENT AGENCIES.—

(1) IN GENERAL.—Not later than 90 days after the date of enactment of this Act, the Secretary shall enter into agreements with appropriate government agencies to simplify the process for issuing certificates of waiver or authorization with respect to applications seeking authorization to operate public unmanned aircraft systems in the national airspace system.

(2) CONTENTS.—The agreements shall—

(A) with respect to an application described in paragraph (1)—

(i) provide for an expedited review of the application;

(ii) require a decision by the Administrator on approval or disapproval within 60 business days of the date of submission of the application; and

(iii) allow for an expedited appeal if the application is disapproved;

(B) allow for a one-time approval of similar operations carried out during a fixed period of time; and

(C) allow a government public safety agency to operate unmanned aircraft weighing 4.4 pounds or less, if operated—

(i) within the line of sight of the operator;

(ii) less than 400 feet above the ground;

(iii) during daylight conditions;

(iv) within Class G airspace; and

(v) outside of 5 statute miles from any airport, heliport, seaplane base, spaceport, or other location with aviation activities.

SEC. 335. SAFETY STUDIES.

The Administrator of the Federal Aviation Administration shall carry out all safety studies necessary to support the integration of unmanned aircraft systems into the national airspace system.

SEC. 336. SPECIAL RULE FOR MODEL AIRCRAFT.

(a) IN GENERAL.—Notwithstanding any other provision of law relating to the incorporation of unmanned aircraft systems into Federal Aviation Administration plans and policies, including this subtitle, the Administrator of the Federal Aviation Administration may not promulgate any rule or regulation regarding a model aircraft, or an aircraft being developed as a model aircraft, if—

(1) the aircraft is flown strictly for hobby or recreational use;

(2) the aircraft is operated in accordance with a community-based set of safety guidelines and within the programming of a nationwide community-based organization;

(3) the aircraft is limited to not more than 55 pounds unless otherwise certified through a design, construction, inspection, flight test, and operational safety program administered by a community-based organization;

(4) the aircraft is operated in a manner that does not interfere with and gives way to any manned aircraft; and

(5) when flown within 5 miles of an airport, the operator of the aircraft provides the airport operator and the airport air traffic control tower (when an air traffic facility is located at the airport) with prior notice of the operation (model aircraft operators flying from a permanent location within 5 miles of an airport should establish a mutually-agreed upon operating procedure with the airport operator and the airport air traffic control tower (when an air traffic facility is located at the airport)).

(b) STATUTORY CONSTRUCTION.—Nothing in this section shall be construed to limit the authority of the Administrator to pursue enforcement action against persons operating model aircraft who endanger the safety of the national airspace system.

(c) MODEL AIRCRAFT DEFINED.—In this section, the term "model aircraft" means 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.

APPENDIX C - Organizations and Businesses Working With UAS In Oregon

Company	Street address line 1 - Work	City - Work	State	Zip Code
Garmin International, Inc.	1785 Lehigh Way SE	Albany	OR	
Selmet, Inc.	33992 Seven Mile Ln Se	Albany	OR	97322-7240
keyosk.com	22330 Sw Murphy Ln	Aloha	OR	97007
Brammo, Inc.	550 Clover Ln	Ashland	OR	97520-3709
TaylorMade Solutions	49612 Hwy 101 Ste 57	Bandon	OR	97411
Pitch Control Systems LLC	13455 SW Far Vista	Beaverton	OR	97005
Planar	1195 NW Compton Dr	Beaverton	OR	97006
Technical Marketing, Inc.	10700 Sw Beaverton Hillsdale Hwy Ste 535	Beaverton	OR	97005-4772
Tektronix Component Solutions	2905 Sw Hocken Ave	Beaverton	OR	97005-2411
Vanguard EMS	9825 SW Sunshine Ct	Beaverton	OR	97005-4190
Axiom Electronics, LLC.	19545 NW Von Neumann Drive	Beaverton	OR	97006-6939
David H.Sutherland & CO., Inc.	David H. Sutherland & Co., Inc.	Beaverton	OR	
LEMO USA, Inc.	8210 SW Nimbus Avenue	Beaverton	OR	97008
PFC Flexible Circuits	8285 Sw Nimbus Ave Ste 114	Beaverton	OR	97008-6465
Tecolote	2080 SW 187th Ave	Beaverton	OR	
Element 1 Corporation	62971 Plateau Drive, Suite 300	Bend	OR	97701
Advanced Machining Services	20690 Carmen Loop Ste 100	Bend	OR	97702-8408
Aerodynamics, Inc.	21057 Arid Ave.	Bend	OR	
Cv International	20680 Carmen Loop Ste 101	Bend	OR	97702-8410
Dent Instruments	925 SW Emkay Drive	Bend	OR	97702
Epic Aircraft	22590 Nelson Road	Bend	OR	97701
Focus Investment Bankers	60550 Tekampe Road	Bend	OR	97702
Hatch Product Development	20817 Se Desert Woods Dr	Bend	OR	97702-2835
Kawak Aviation Technologies	20690 Carmen Loop Ste 102	Bend	OR	97702-8408
Leading Edge Aviation, Inc.	Bend Municipal Airport (S07), 63342 Powell Butte H	Bend	OR	
Nonsequitur Technologies	900 SE Wilson Avenue, Suite A	Bend	OR	97702
Nosler Inc.	PO Box 671	Bend	OR	97709
Ocean Equipment	20655 Carmen Loop	Bend	OR	97702
Oregon Business Development Dept	650 Sw Columbia St Ste 7100	Bend	OR	97702-4010
Richard Losch, Inc.	340 SW Columbia St.	Bend	OR	97702
TechSoft 3D	1567 SW Chandler, Suite 100	Bend	OR	97702
Windward Performance LLC	63006 Unit A Powell Butte Hwy	Bend	OR	97701
ATI Electrical Distributors	615 Glenwood Drive, Unit B - Suite 11	Bend	OR	
Bend Research, Inc.	64550 Research Rd.	Bend	OR	97701
Bryson Communications	2841 NW Polarstar Ave.,	Bend	OR	97701
Central Oregon Community College	Grandview Hall 2600 NW College Way	Bend	OR	97701-5933
CLS Fabrication	20522 Builders Street	Bend	OR	97701
Commercial Powder Coating, Inc.	20554 Builders Street	Bend	OR	97701

Company	Street address line 1 - Work	City - Work	State	Zip Code
Cutting Edge Design	45 SE Bridgeford Blvd,, Suite A	Bend	OR	97702
Economic Development for Central Oregon	109 NW Greenwood Suite 102	Bend	OR	97701
Electrifying Times	63600 Deschutes Market Rd	Bend	OR	97701-8164
Electronics International, Inc.	63296 Powell Butte Hwy.	Bend	OR	97701
Etrix	20756 High Desert Ct.	Bend	OR	97701
Griffin Interiors	63002 Powell Butte Hwy, Suite B	Bend	OR	97701
ISCO Industrial Service	63055 Corporate Place, Unit 2	Bend	OR	97701
Jetta Tool and Fab	20756 High Desert Ct., Unit 1	Bend	OR	97701
MacSema, Inc.	62971 Plateau Dr, Suite 400	Bend	OR	97701
Max Manufacturing	20651 High Desert Lan	Bend	OR	97701
n-Link Corporation	550 Nw Franklin Ave	Bend	OR	97701-2892
OnTo Technology	63221 Service Road STE F	Bend	OR	97701
Outback Manufacturing, Inc.	63076 Crusher Ave	Bend	OR	97701-1583
Powers of Automation	61533 American Loop No. 1	Bend	OR	
RnD Consulting	2908 Ne Baroness Pl	Bend	OR	97701-6378
Sistech	63056 Lower Meadow Drive	Bend	OR	97701
Snowline Manufacturing	63360 Powell Butte Highway	Bend	OR	97701
Tensility	20802 Sockeye Pl Ste 130	Bend	OR	97701-6842
Aristos Aviation Services	24025 Skywagon Dr.	Bend	OR	97701
High Desert Machining	25417 Cultus Ln.	Bend	OR	97701
Carrillo Underwater Systems	PO Box 6217	Brookings	OR	97415
Aerial Technology International	9053 Se Jannsen Rd	Clackamas	OR	97015-9629
Oregon Iron Works, Inc.	9700 Se Lawnfield Rd	Clackamas	OR	97015-7636
Talent Scout Associates	PO BOX 355	Colton	OR	97017-0355
Sanda Communications, Inc.	2397 Nw Kings Blvd	Corvallis	OR	97330-3986
VDOS, LLC.	230 Sw 6Th St	Corvallis	OR	97333-4617
Oregon State University	1148 Kelley Engineering	Corvallis	OR	97331-8600
Trimble	345 SW Avery	Corvallis,	OR	97339
HDR Engineering, Inc	1285 SE Miller Avenue	Dallas	OR	97338
Aptus Business Group, LLC	29092 SE Crest Dr Suite 200	Eagle Creek	OR	97022
Northwest Technologies, Inc.	1150 Nw Park Ave PO BOX 1304	Estacada	OR	97023-7736
Inside GNSS	1574 Coburg Road No. 233	Eugene	OR	97401-4802
ONAMI Inc.	4555 Pearl St.	Eugene	OR	97405
VersaLogic Corporation	4211 W 11Th Ave	Eugene	OR	97402-5435
Western Shelter	PO BOX 2729	Eugene	OR	97402-0275
Sadler Aircraft Corp	561 Rhododendron Dr	Florence	OR	97439-9317
BBoS Robotics	PO Box 61	Gaston	OR	97119
ECS Case	3560 Rogue River Hwy	Grants Pass	OR	97527-4640
Integral Marketing	3560 Rogue River Hwy	Grants Pass	OR	97527-4640
Logos Technologies, Inc.	4233 S.E. 182nd Ave #109	Gresham	OR	97030
Ducommun LaBarge	1315 Se Roberts Dr	Gresham	OR	97080-7847

Company	Street address line 1 - Work	City - Work	State	Zip Code
Technologies, Inc.				
GDP LLC	10180 SE Vradenburg Road	Happy Valley	OR	
Far West Micro, Inc.	2920 Se Brookwood Ave Ste H	Hillsboro	OR	97123-8553
Intel Americas, Inc.	5200 Ne Elam Young Pkwy	Hillsboro	OR	97124-6463
Raptor Aerosports	7000 SW BORWICK RD	Hillsboro	OR	97123
Solid Concepts	3320 Se Spring Dr	Hillsboro	OR	97123-7455
Washington County Sheriff's Office	215 Sw Adams Ave Ms 32	Hillsboro	OR	97123-3874
Craters & Freighters	5849 NW Cornelius Rd	Hillsboro	OR	97124
Micron Laser Technology	22750 NW Wagon Way	Hillsboro	OR	97124
nLIGHT Photonics Corporation	20795 Nw Cornell Rd	Hillsboro	OR	97124-8001
Ornelas Enterprises, Inc.	7395 Nw Evergreen Pkwy Ste 159 Ste. 159	Hillsboro	OR	97124-5932
picoJet	2130 NE Griffin Oaks St Ste 200	Hillsboro	OR	97124
Quality Production, Ltd.	21420 Nw Nicholas Ct Ste G	Hillsboro	OR	97124-6633
Radisys	5445 Ne Dawson Creek Dr	Hillsboro	OR	97124-5797
Airborne Innovations LLC.	2170 Eugene Street	Hood River	OR	97031
ArgenTech Solutions, Inc.	1688 Orchard Rd	Hood River	OR	97031-9693
Autonomous unmanned vehicle research	1525 Lincoln St.	Hood River	OR	97031
Bech Marine LLC	4103 Cloudview Ct	Hood River	OR	97031
Cloud Cap Technology	PO BOX 1500	Hood River	OR	97031-0500
Decavo	489 N 8th St, Suite 104	Hood River	OR	97031-3104
Goodrich ISR Systems	2621 Wasco St	Hood River	OR	97031-1096
HoodTech Vision	3100 Cascade Ave	Hood River	OR	97031-9780
Insitu, Inc.	3466 Avalon Dr.	Hood River	OR	97031
MaxCarver	1225 Wasco Ave Ste C	Hood River	OR	97031
NAVAIR	1304 Cascade Ave	Hood River	OR	97031-1251
Prigel Machine & Fabrication	3895 Heron Dr	Hood River	OR	97031-8487
RDE UAV	1528 Cascade Ave	Hood River	OR	97031-3107
Real Carbon, Inc.	707 Portway Ave Unit 104	Hood River	OR	97031-1218
Sagetech Corporation	1280 Alameda Rd	Hood River	OR	97031-8707
SightLine Applications	1004 Eugene St	Hood River	OR	97031-1416
Summit Projects	101 1/2 Oak Street	Hood River	OR	97031
TQ Automation	4701 Portland Dr	Hood River	OR	97031-9645
UTC Aerospace Systems	PO BOX 1500	Hood River	OR	97031-0500
Viking Aerospace	PO BOX 459	Independence	OR	97351-0459
Specialized Air Services, Inc.	501 Juanita Dr.	Jacksonville	OR	97530
General Dynamics Armament and Technical Products	7891 St Charles St Ne	Keizer	OR	97303-2486
Integrated Surveillance and Defense	7 Nansen Summit	Lake Oswego	OR	97035
Particle Storm	4091 Jefferson Pkwy	Lake Oswego	OR	97035-1478
Rockwell Collins, Inc.	363 6th St	Lake Oswego	OR	97034

Company	Street address line 1 - Work	City - Work	State	Zip Code
Timbercon	17387 63Rd Ave	Lake Oswego	OR	97035-5205
SA Photonics	130-A Knowles Dr	Los Gatos	OR	95032-1832
Butler Aircraft	2322 NW Airport Way	Madras	OR	97741
McMinnville Economic Development Partnership	417 NW Adams St	McMinnville	OR	97128
Northwest Rapid Manufacturing	2711 Ne Bunn Rd	McMinnville	OR	97128-8218
Northwest UAV Propulsion Systems	11160 Sw Durham Ln	McMinnville	OR	97128-8608
Army National Guard	6404 SE Alder Place	Milwaukie	OR	97222
Pacific Scientific OECO	4607 Se International Way	Milwaukie	OR	97222-4619
Cooper Hollow	13455 Mccaleb Rd	Monmouth	OR	97361-9000
Precision Aviation	17770 NE Aviation Way	Newberg	OR	97132-6899
Valley Machine	30780 Nw Highland Ct	North Plains	OR	97133-8146
Clackamas Comm College	19600 Molalla Ave	Oregon City	OR	97045
Aplus Mobile, Inc.	19093 Beavercreek Rd PMB 256 PMB 256	Oregon City	OR	97045-9539
City of Pendleton	500 SW Dorion Ave/P.O. Box 411	Pendleton	OR	97801
PCC Structurals	4600 S.E. Harney Drive	Portland	OR	97206-0898
Precision Castparts	4600 Se Harney Dr	Portland	OR	97206-0825
Saber Tanker Aerial Group	2407 S.E. 70th	Portland	OR	97206
VT Miltope	2775 NE Wiberg Ln.	Portland	OR	97213-1252
Cascade Engineering Technologies, Inc.	14707 Se River Rd	Portland	OR	97267-2601
Adrenaline-Products, LLC	6555 SE 34th Ave	Portland	OR	97202
Aerotek Aviation	4439 SE Johnson Creek Blvd	Portland	OR	97222
Measured Marketing Solutions	1932 SW Abercrombie Pl	Portland	OR	97225-4502
Meggitt Equipment Group	4607 Se International Way	Portland	OR	97222
Hydra-Power Systems, Inc.	5445 NE 122nd Ave	Portland	OR	97230
P & R Technologies	7412 SW Beaverton Hillsdale Hwy., Suite 205	Portland	OR	97225
Vectorply Corporation	7040 SW Raleighwood Ln	Portland	OR	97225-1929
Ball Janik, LLP.	101 SW Main St Suite 1100	Portland	OR	97204-3219
Business Oregon	121 SW Salmon St Suite 205	Portland	OR	97204-2907
Galois, Inc.	421 SW 6Th Ave Suite 300 Suite 300	Portland	OR	97204-1622
HoneyComb Corporation	2828 SW Corbett Ave Ste 143	Portland	OR	97201-4811
Pacific Crest Securities	111 SW 5Th Ave FL 42 42nd Floor	Portland	OR	97204-3646
Pacific Northwest Defense Coalition	2828 SW Corbett Ave	Portland	OR	97201-4827
Rising Tide Innovations	2865 NW Thurman St	Portland	OR	97210-2206
APEX Drive Laboratories, Inc.	1640 Northwest Irving St	Portland	OR	87209
TVT Die Casting	7330 SW Landmark Lane	Portland	OR	97224
VT Group	7236 SW Durham Road	Portland	OR	97224
Altman Browning and Company	1724 NE Glisan St	Portland	OR	97232
PSI Solutions	107 SE Washington Street	Portland	OR	97214

Company	Street address line 1 - Work	City - Work	State	Zip Code
MetaVR, Inc.	12840 SW Ascension Dr.	Portland	OR	97223-5688
Peak 3, Inc.	15341 SW Wintergreen St	Portland	OR	97223-0615
dronamatic	404 NW Sundown Way	Portland	OR	97229
Embry-Riddle Aeronautical University	2250 NW Kearney St Unit 415	Portland	OR	97210-3072
Aeronautical Management, Inc.	17786 NW Elk Crest Ct	Portland	OR	97229-7303
Ater Wynne, LLP.	1331 NW Lovejoy St Suite 900	Portland	OR	97209-3280
6dms, Inc.	2531 NW 30Th Ave	Portland	OR	97210-2015
iMove	1732 NW Quimby St. Suite 200	Portland	OR	97209-2567
Johnson-Laird Inc.	850 NW Summit Ave	Portland	OR	97210-2816
Pacific International Maritime Medical, Inc.	PO BOX 10006	Portland	OR	97296
Triggerfinger Software	19841 NW Rock Creek Dr.	Portland	OR	97229-2871
Urban Robotics, Inc.	STE 200	Portland	OR	
Applied CAx	6700 N New York Ave Ste 231	Portland	OR	97203-2836
CFA Mills, Inc.	PO BOX 17305	Portland	OR	97217-0305
Ground to Orbit Design	1826 NE Liberty Street	Portland	OR	97211
Park Electrochemical Corp	3129 N Willamette Blvd Apt 207	Portland	OR	97217-4082
RTI- Rising Tide Innovations	1042 NE Mariners Loop	Portland	OR	97211-1575
Sherpa Design, Inc.	6700 N New York Ave Ste 231	Portland	OR	97203-2836
Simplex Manufacturing	13340 Ne Whitaker Way	Portland	OR	97230-1125
Portland State University	Intelligent Robotics Laboratory	Portland	OR	97201
Composite Creations	2734 NW High Desert Drive	Prineville	OR	97754
Fabtech	1440 SW Tom McCall Road	Prineville	OR	97754
Ochoco Manufacturing	2668 NE Third Street	Prineville	OR	97754
Ryco Manufacturing Inc.	2959 High Desert Drive	Prineville	OR	97754
Aero Tec Laboratories, Inc.	1550 NE Kingwood Ave	Redmond	OR	97756-1787
Central Composites	4628 SW 21st St.	Redmond	OR	97756
Central Oregon Precision	220 SW Reindeer Ave., Redmond, OR 97756	Redmond	OR	97756
CIES	221 SE Timber Ave.	Redmond	OR	97756
Composite Approach	217 SW Pumice Ave Suite P	Redmond	OR	97756-8677
CR Fabrication	1789 Veterans Way	Redmond	OR	
Fibercraft	2244 SE Airport Way Suite 104	Redmond	OR	
Flight Line Air Conditioning, Inc.	1842 SE 1st, Unit B	Redmond	OR	97756
Jodeco	217 SW Pumice Ave. Suite G	Redmond	OR	
Lancair International	250 SE Timber Avenue	Redmond	OR	97756
LMH Industries	2095 SW Badger	Redmond	OR	
Mountain High Oxygen Systems	2244 SE Airport Way	Redmond	OR	97756
Newhouse Manufacturing Co.	1048 N. Sixth St. Redmond OR 97756	Redmond	OR	
PCC-Schlosser	345 NE Hemlock	Redmond	OR	97756
RDD Enterprises, LLC.	2244 Se Airport Way Ste 130	Redmond	OR	97756-7537
Bruce Tharpe Engineering	8622 E Evans Creek Road	Rogue River	OR	97537

Company	Street address line 1 - Work	City - Work	State	Zip Code
Invictus Technical Solutions, LLC.	2131 NW Aviation Dr. Suite 1	Roseburg	OR	97470-6521
Pilot	1885 Michigan City Ln NW	Salem	OR	97304-9557
Pacific EMS, LLC.	1715 25Th St SE	Salem	OR	97302-1104
Oregon Aero, Inc.	34020 Skyway Drive	Scappoose	OR	97056
Pinnacle	52286 Miller Rd	Scappoose	OR	
Western Shelter Systems	830 Wilson St.	Eugene	OR	97402
Allied Systems Company	2300 Oregon Street	Sherwood	OR	97140-9799
Treske Precision Machine	14140 SW Galbreath Dr	Sherwood	OR	97140-9163
Environmental Controls	16718 SW Travis Ct	Sherwood	OR	97140
City of Sisters, Oregon	PO BOX 1781	Sisters	OR	97759-1781
ENERGYneering Solutions, Inc.	15820 Barclay Drive	Sisters	OR	
Kruger Optical	251 Barclay Dr.	Sisters	OR	97759
MicroRidge Systems, Inc.	PO Box 3249	Sun River	OR	97707
Engineered Products	7000 SW Sandburg st	Tigard	OR	97221
George Fox University	9430 SW McDonald St	Tigard	OR	97224-5934
Halco Inc.	7140 SW Fir Loop #140	Tigard	OR	97223
Product Reasearch Org	12766 SW Bugle Ct	Tigard	OR	97224
5 Level Solutions, Inc.	9750 SW Serena Way	Tigard	OR	97224-4567
Oracle	11113 SW 113Th Ter	Tigard	OR	97223-4264
Plastic Metals Technologies, Inc.	7051 SW Sandburg Rd Ste 400	Tigard	OR	97223-8057
Roswell Flight Test Crew	7130 SW Ventura Dr.	Tigard	OR	97223-1137
Near Space Corporation	PO Box 909	Tillamook	OR	97141-9641
Stilwell Baker, Inc.	18735 SW Boones Ferry Rd	Tualatin	OR	97062-8487
Sunset Manufacturing Co. Inc.	19355 Southwest Teton Avenue	Tualatin	OR	97062
VersaLogic Corporation	12100 SW Tualatin Rd	Tualatin	OR	97062-7341
Warm Springs Composites	P.O. Box 906	Warm Springs	OR	97761
Warm Springs Geo Visions	4202 Holliday	Warm Springs	OR	97760
Warm Springs GeoVisions	PO BOX 1186	Warm Springs	OR	97761-1186
Daitron Inc.	27750 SW 95Th Ave	Wilsonville	OR	97070-8252
FLIR Systems, Inc.	27700 SW Parkway Ave	Wilsonville	OR	97070-8238
Machine Sciences Corporation	PO Box 969	Wilsonville	OR	97070
Mentor Graphics Corporation	8005 SW Boeckman Rd D3218	Wilsonville	OR	97070-9733
Theia Technologies	29765 SW Town Center Loop W	Wilsonville	OR	97070
Zelpro Solutions	PO Box 452	Wilsonville	OR	97070

APPENDIX D - Status of 50 State Legislation of UAS

State	Passed Legislation	Protects Privacy	Emergency Response	Covers Due Process	Aviation Safety	Registers UAS	Comments
North Carolina	yes, SB 744	Prohibits any entity from conducting UAS surveillance or taking photo without permission. Creates civil cause of action for privacy violation.	OK for UAS to counter acts of terrorism, oversee public gatherings	Prohibits any entity from conducting UAS surveillance or taking photo without permission. Creates civil cause of action for privacy violation.	Requires State Division of Aviation to create UAS knowledge and skills test for state agencies. prohibits weaponized UAS	Creates offense of operating without a UAS license issued by the state.	prohibits interference with UAS, unlawful fishing or hunting, unlawful distribution of images created by UAS,
Illinois	yes, SB 2937	prohibits harassment of hunters with UAS	loosens regulations of LEO during disaster or emergency	includes how law enforcement can use third party UAS data			
Alabama	yes, SB 240	Prohibits harassment of hunters					
Montana	yes, SB 196			Requires search warrant or judicially recognized exceptions unless on public land or international border.			
Wisconsin	yes, SB 196	misdemeanor for person who uses drone in place where there is reasonable expectation of privacy		Requires Warrant for use of UAS	Prohibits weaponized drone as a felony		
Tennessee	yes, SB 1777	Class C misdemeanor to track video surveillance of person hunting and fishing without	allows UAS if required to counter terrorists				Identifies 18 lawful uses of UAS under FAA regulations.

State	Passed Legislation	Protects Privacy	Emergency Response	Covers Due Process	Aviation Safety	Registers UAS	Comments
		consent, prohibits surveillance or photography of individual or possess images					
Utah	yes, SB 167			Requires warrant for UAS data, establishes standards for third party UAS data turned over to policy, Requires LEO to keep data and submit annual report to Dept. of Public Safety			Law notes it is not intended to "prohibit or impede the public and private research, development or manufacture of UAVs."
Idaho	yes, SB 1134	no photography without consent with civil penalty of $1,000		no surveillance without warrant or reasonable suspicion of criminal conduct. No surveillance of farm, diary, ranch or other Ag industry/ excludes LEO engaged in Marijuana eradication.			
Iowa	yes, HF 2289			Illegal to enforce traffic laws with UAS. Requires warrant or other lawful means by LEO			Requires Dept. of Public Safety to develop guidelines for use of UAS

State	Passed Legislation	Protects Privacy	Emergency Response	Covers Due Process	Aviation Safety	Registers UAS	Comments
Texas	yes, HB 912	list of covered illegal activities to take images without authorization, imposes civil penalties of up to $5,000	allows use to assess disaster or emergency, scenes of hazmat spills	long list of covered activities with UAS including search, investigation of crime scenes, auto accidents, SAR, fire suppression			Requires LEO to do biennial written report to legislature and governor on UAS usage and costs
Ohio	yes, HB 292						HB 292 Creates Aerospace and Technology Committee for R&D UAS technology
Oregon	yes, HB 2710	Civil penalty for flight below 400 ft. AGL over private property		requires warrant and destruction of images collected without consent	Prohibits weaponization of UAS	requires registration of public use UAS	prohibits use of laser to target or interference with lawful use of UAS. Has State level preemption clause.
Alaska	yes, HB 255, HR 15			Covers procedures and standards for LEO. Requires training and certification of operators	University of Alaska Training program for operators		HR 15 Authorizes Legislative UAS task force
Virginia	yes, HB 2012						Placed moratorium on all UAS exception for SAR and amber alert
Florida	yes, HB 119			Freedom from unwanted surveillance act; restricts law enforcement without warrant			

State	Passed Legislation	Protects Privacy	Emergency Response	Covers Due Process	Aviation Safety	Registers UAS	Comments
Louisiana	yes, HB 1029			Creates crime of unlawful use of a UAS for UAS to conduct surveillance without owner's permission	also creates crime of unlawful aiming of laser at an aircraft		$500 fine and 6 months imprisonment/ second offense $1,000
Indiana	yes, HB 1009	creates law of "unlawful photography and surveillance on private property as class A misdemeanor		Creates warrant requirements for police use and geo-location tracking			
Washington DC.	Permanent NOTAM prohibiting overflight						
Connecticut	none proposed						
Delaware	none proposed						
Kentucky	none passed						
Arizona	none passed						
Wisconsin	none passed						
Arkansas	none passed						
Colorado	none passed						Parks and Wildlife prohibited use of UAS for assisting hunting
Georgia	none passed						
Hawaii	none passed						State legislature approved $100k for UAS research and training
Maryland	none passed						
Massachusetts	none passed						
Michigan	none passed						
Minnesota	none passed						
Missouri	none passed						
Nebraska	none passed						
Nevada	none passed						Legislature appropriated $4 million of

State	Passed Legislation	Protects Privacy	Emergency Response	Covers Due Process	Aviation Safety	Registers UAS	Comments
							FAA selected UAS test sites.
New Hampshire	none passed						
New Mexico	none passed						
New York	none passed						
North Dakota	none passed						Similar to Nevada, the Legislature appropriated $4 million for FAA selected UAS test sites
Oklahoma	none passed						
Pennsylvania	none passed						
Rhode Island	none passed						
South Carolina	none passed						
Vermont	none passed						
West Virginia	none passed						
Wyoming	none passed						
Kansas	none passed						
Washington	no, GOV vetoed HB 1771						
New jersey	no, GOV pocket vetoed						
Maine	no, bill passed both chambers, vetoed by Governor						
California	no, Bill 1327 vetoed by governor						

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