09/03/15 Task Force Meeting

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Legislative Task Force on Unmanned Aircraft Systems
September 3, 2015 Meeting at 813 Noble Street, Fairbanks
Westmark Hotel Fairbanks

1:00pm - 4:45pm

Task Force Members:

- Representative Shelley Hughes, Co-Chair
- Senator Peter Micciche, Co-Chair
- Ethan Tyler, Commissioner Designee, Department of Commerce, Community Economic Devel.
- Mike O'Hare, Commissioner Designee, Department of Military and Veterans' Affairs
- Lieutenant Steve Adams, Commissioner Designee, Department of Public Safety
- John Binder, Commissioner Designee, Department of Transportation, Public Facilities
- Ro Bailey, University of Alaska Fairbanks
- Steve Strait, Aviation Advisory Board, Governor's Office and DOT/PF
- Steve Colligan, Representative Member for the Academy of Model Aeronautics
- John Parker, Integrated Robotics Imaging Systems
- Steve Wackowski, Tulugaq II
- Bob May, Gallery Lodge, Kasilof

- Ginger Blaisdell, Staff to Rep. Hughes
- Chuck Kopp, Staff to Senator Micciche

Task Force Responsibilities per HCR15 and Review of Resolution

The duties of the task force shall include

1. reviewing regulations and guidance from the Federal Aviation Administration regarding unmanned aircraft systems;
2. providing written recommendations, together with suggested legislation, for a comprehensive state policy for unmanned aircraft that protects privacy and allows the use of unmanned aircraft systems for public and private applications;
3. evaluating complaints and concerns expressed to the task force;
4. identifying potential privacy and public safety concerns associated with unmanned aircraft systems and determining whether legislation is necessary to address them;
5. considering recommendations for public education related to unmanned aircraft systems;
6. studying the Federal Aviation Administration's "Integration of Civil Unmanned Aircraft Systems (UAS) in the National Airspace System Roadmap," issued November 7, 2013 (1st ed. 2013) and its application to the development of unmanned aircraft systems in the state;

7. conducting a public hearing concerning privacy and the capture of data by unmanned aircraft systems at the University of Alaska's test site;
8. further studying the nonpublic use of unmanned aircraft systems to encourage development of the private sector unmanned aircraft system industry; and
9. further studying and making recommendations with respect to ensuring unmanned aircraft users comply with applicable laws.

AGENDA

1:00pm Welcome and Introductions .....Representative Shelley Hughes

- News review and task force updates
- Public Testimony
- Josh Waite – presentation on UAS integration and safety
- UAS and Personal Privacy Guidelines document
- Discussion on final actions of the UASLTF

4:45pm Adjournment - members may join the Interest Group Meeting closing remarks from Marty Rogers followed by no host dinner on the Riverboat Discovery Dinner cruise beginning at 6:30pm

Invitation to attend:

9:30am - Friday, September 4 - Ro Bailey and ACUASI have made arrangements for demonstration flights of UAS downtown Fairbanks at the Fire Training facility for the benefit of the UAS Task Force to see working drones in action. Interest Group Meeting participants are invited to attend.

STATE CAPITOL
P.O. Box 110001
Juneau, AK 99811-0001
907-465-3500
fax: 907-465-3532

550 West Seventh Avenue, Suite 1700
Anchorage, AK 99501
907-269-7450
fax 907-269-7461
www.Gov.Alaska.Gov
Governor@Alaska.Gov

Governor Bill Walker
STATE OF ALASKA

September 3, 2015

Mr. Dave Mathewson
Executive Director
Academy of Model Aeronautics
5161 East Memorial Drive
Muncie, IN 47302

Dear Director Mathewson:

Thank you for leading the Academy of Model Aeronautics (AMA) in their quest to educate recreational aircraft pilots about safety and the responsibilities of flying and fully enjoying model aircraft. With the integration of unmanned aircraft systems (UAS) into the National Air Space, the public's attention on, and awareness of, government, commercial, and hobby pilots has increased dramatically. The AMA's role in educating the public by publishing safety guidelines is critical to keeping both our skies above, and the ground below, free from tragic accidents.

Alaska is known for its vast land mass and few roads. Many of our communities are not on the road system and are only primarily accessible by air. Alaska has the highest number of private pilots per capita (2006). It is estimated that 45 percent of all jobs in Alaska are related to the aviation industry in some way, according to a statement by the former Alaska Lt. Governor. Given these factors, it is quite realistic to assume that UAS will have a significant impact on Alaska, on our lives and our well-being. Generally, Alaskans are very receptive to UAS and are eager to receive the safety, cost savings, and improved data capture benefits of UAS. UAS are used not just for recreational purposes, but also practical public and business purposes such as search and rescue, wildlife counts, infrastructure monitoring, mapping, fire and disaster relief, real estate, surveying, photography and videography, oil and gas exploration and development, and mining.

The Alaska State Legislature established the Unmanned Aircraft Systems Legislative Task Force in 2012 to review existing laws regarding safety and privacy applicable to UAS. The Task Force is made up of 12 members including legislators, State of Alaska department designees, industry and public members, and a representative of the Academy of Model Aeronautics. The Task Force was instrumental in the passage of legislation pertaining to the parameters for law enforcement use of UAS, to provisions for public input, to the authority for training programs at the University of Alaska, and to the duty of the Task Force to report recommendations regarding privacy and other policy related to UAS to the Legislature each year.

I want to thank your organization for its assistance to the Task Force in creating and distributing a safety flyer during the last holiday season as small UAS were flying off the shelves as gift purchases. The Task Force is currently working on privacy guidelines flyer for operators and other interested

Alaskans. Lastly, the Task Force holds quarterly meetings to receive updates on UAS topics, address current issues, consider policy recommendations, and provide regular opportunities for public input.

House Joint Resolution 5, passed by the Alaska State Legislature this year, recognizes the important role of the Academy of Model Aeronautics in educating the public on safety and privacy guidelines. The AMA reaches a broad audience of interested pilots around the world. Alaska is proud to recognize your organization as a leader in model aeronautics and in the promotion of safe operations and privacy rights. While the State's policies regarding use of the Alaska State prevent our inclusion of the State Seal in your "Know Before You Fly" safety publications and your web page relating to the materials, we encourage you to utilize the Alaska Flag or outline of the state to symbolize my administration's support of your work. As Alaska has a great history and appreciation of aviation, it is appropriate that it be the first state to offer such support.

Sincerely,

Bill Walker
Governor

Commissioner XXXXXX XXXXXXXXXX
Department of YYYYYYYYYYYYY
ADDRESS
CITY, Alaska 99ZZZ

June 26, 2015

Dear Commissioner,

The Unmanned Aircraft Systems (UAS) Legislative Task Force has been considering policy the last two years regarding the use of UAS by public entities as well as by commercial users and recreational operators. This rapidly advancing technology is becoming more and more common place as one in every four homes in America now owns a small UAS, and the Federal Aviation Authority is beginning to grant authorizations for commercial users to employ UAS for business purposes. Our goal as a Task Force is to harness this tool for good in Alaska, always keeping safety and the privacy rights of Alaskans as top priorities.

As Co-Chair, I am relaying a request of the Unmanned Aircraft Systems Legislative Task Force, asking that you provide a contact at your department, the name of a point person with whom we can communicate regarding UAS as it relates to your department and state business. At this present time, no one department of the State of Alaska is a central contact for UAS, and until such time that one may be designated in the future, as the Task Force, we want to ensure good communications are occurring. We foresee that the list will be used only for information updates as UAS pertain to government operations or citizen inquiries regarding a specific departments' UAS activity. We also hope that the point of contact at your department would communicate with the Task Force when activities related to UAS occur.

I would like to have a contact for each department compiled into a list by the next Task Force meeting on September 3, 2015. Please forward your contact person's name, email and phone number to Ginger Blaisdell at ginger.blaisdell@akleg.gov by August 24, 2015.

The Task Force would also like you to be aware that we have developed a web site www.alaskadrones.org to help keep the public informed about UAS, particularly in regard to safe operations of small UAS and the privacy rights of Alaskans. We welcome any suggestions to make the website and information user-friendly and easy to understand.

Sincerely,

Representative Shelley Hughes
Co-Chair, UAS Legislative Task Force

State Agency Point of Contact for UAS Information

Office of the Governor
None designated

Department of Administration
Megan Collie, Special Assistant to the Commissioner
Department of Commerce, Community and Economic Development
* (Ethan Tyler)
Department of Corrections
Phil Cole, Special Assistant to the Commissioner
Department of Education and Early Development
Bjorn Wolter,
Department of Environmental Conservation
Alida Bus, Legislative Liaison
Department of Fish and Game
Carol Petraborg, Director of Administrative Services
Department of Health and Social Services
*
Department of Labor and Workforce Development
Anna Latham, Legislative Liaison
Department of Law
Kaci Schroeder, Special Assistant to the Attorney General
Department of Military and Veterans Affairs
Mike O'Hare, Director of Homeland Security and Emergency Management
Department of Natural Resources
*
Department of Public Safety
Lt Steve Adams, Alaska State Troopers
Department of Revenue
*
Department of Transportation and Public Facilities
Rich Sewell, Transportation Planner for Statewide Aviation

Alaska Court System
University of Alaska
* Ro Bailey

Risks of UAS Integration

EXCERPTS FROM NPRM RESPONSE

JOSH WAITE

Aircraft

Current

- Section 333 Exemption
  - Airworthiness requirement is waived
- Amateur
  - Airworthiness is self-determined

Proposed

- Airworthiness inspection / certification not required
- No standard

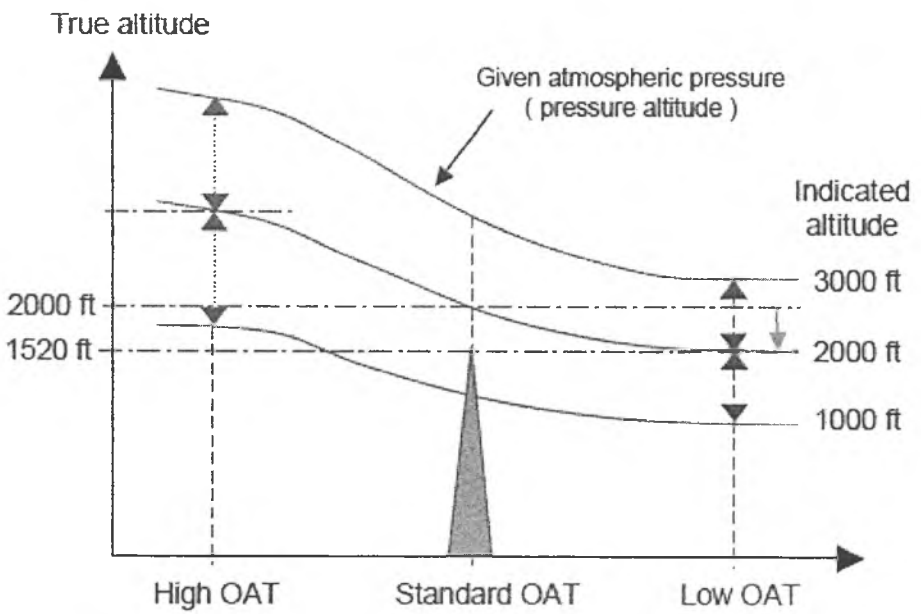
"Standard" Design Concerns

GPS Altimeter

Lack of Certified ADS-B & Transponder

GPS-derived altitude vs Barometric Altitude

- GPS reports true altitude vs barometric
- GPS altitude error ~1.5x the horizontal error



"Standard" Design Concerns

GPS Altimeter

Lack of Certified ADS-B & Transponder

Non-certified Alerting equipment

- ADS-B
- Transponder

FAA cites Size / Weight / Availability

- Multiple versions of <.25 lb ADS-B units
- Including Mode S Transponder / ADS-B out / Integrated GPS
- DoD has issued AIMS Transponder Certification
  - This includes performance / interoperability evaluation and certification of systems and sub-systems at both the end item and integrated platform level.

Risks Without Testing & Certification

Loss of Positive Control (Flyaway)

Single Points of Failure Unidentified

e.g. Electrical System Failures

- Concurrent Loss of Link and Loss of Navigation

Signal Strength, Latency, Direction

Airspace

FAA Proposal would allow commercial UAV use of airspace up to 500' AGL,

Proximity to airports is limited to:

- 5 nautical miles (nm) from an airport having an operational control tower; or
- 3 nm from an airport with a published instrument flight procedure, but not an operational tower; or
- 2 nm from an airport without a published instrument flight procedure or an operational tower; or
- 2 nm from a heliport with a published instrument flight procedure.

Highest Risk Airspace

Near Airports

Low Altitude Traffic

Military Training Routes

Airports

An aircraft on a 3° approach will be at 600' AGL in 2nm. There is no requirement for every approach to be 3°.

Low altitude traffic (14 CFR 91.119)

- "Other than congested areas"
  - 500' AGL limit
- "Sparsely populated areas"
  - 500' from person, vessel, vehicle or structure
  - Agriculture, helicopters, cub pilots

Military Training Routes

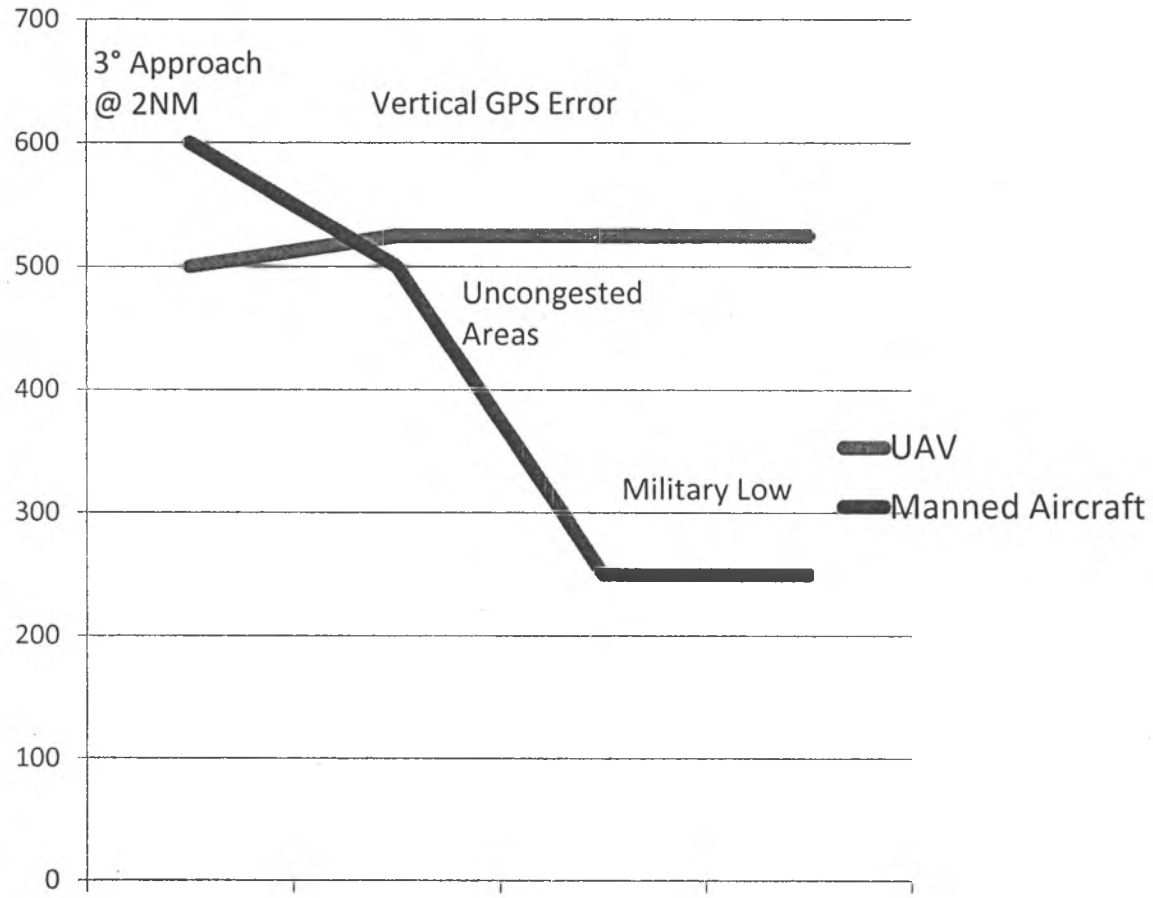
- Military aircraft low-level training (~300' AGL and higher)
- In excess of 250 kts (may be up to 420 kts)

Highest Risk Airspace

Near Airports

Low Altitude Traffic

Military Training Routes



Airman

Lack of Formal Training

Insufficient Testing

No Insurance

Risk Assessment

Training Vs Cost

Formal Training

Knowledge Test

Liability Insurance

Risk Assessment

"Formal training is too great a burden for operators wishing to commercially operate small UAS in the NAS" (from NPRM)

Training requirements for other commercial operations

- commercial drivers
- commercial vessel captains
- commercial pilots

Knowledge Test "would not require any specific form of training or studying in order to pass" (from NPRM)

- What is covered?

Lack of liability Insurance requirement

- No insurance-driven mitigations

Risk Assessment

- Lack of full understanding of the situation

Math $KE = \frac{1}{2} MV^2$

Analysis shows that KE of ~30,000 ft/lb can cause structural damage to large aircraft

KE of a 55lb object moving at 87 kts (100 mph) is 18,386.1 ft/lb

Analysis of aircraft damage and pictures from *Kinetic Energy of Bird Strikes & Damage to Aircraft* by Roger Nicholson, PhD

Bird Strike Requirements

(14 CFR Part 23, 25, 29)

Transport Airplane vs 8lb bird

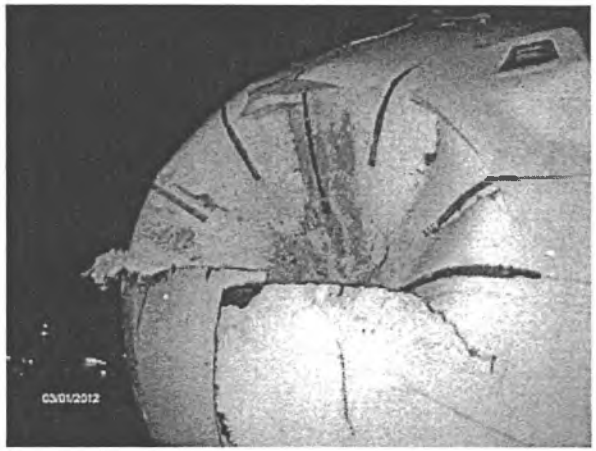
Transport Airplane vs 4lb bird

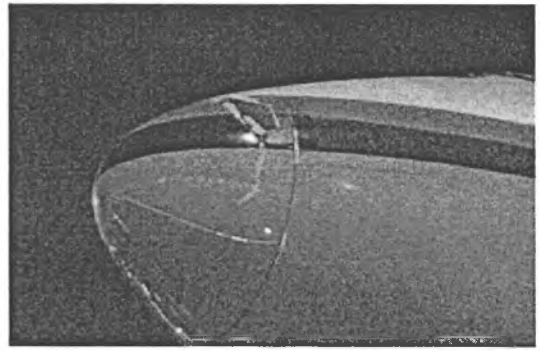
Normal/Utility/Commuter vs 2lb bird

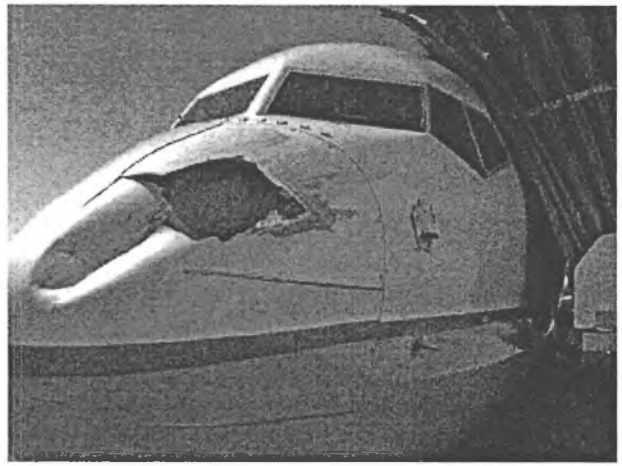
Transport Rotorcraft vs 2.2lb bird

- *Empennage structure* of transport category airplane vs **8 lb bird**
  - *If cruise speed is 400 kts, then* ***KE = 56,666 ft-lb***
- *Structural damage and windshield damage* of transport category airplanes vs **4 lb bird**
  - *If cruise speed is 400 kts, then* ***KE = 28,333 ft-lb***
- *Windshield* of normal, utility, acrobatic and commuter category airplanes vs **2 lb bird** at maximum approach flap speed
  - *If this speed is 180 kts, then* ***KE = 2,869 ft-lb***
- *Structure* of transport category rotorcraft vs **2.2 lb bird**
  - *If using the high Vne of a UH-60 (194 kts), then* ***KE = 3,666***

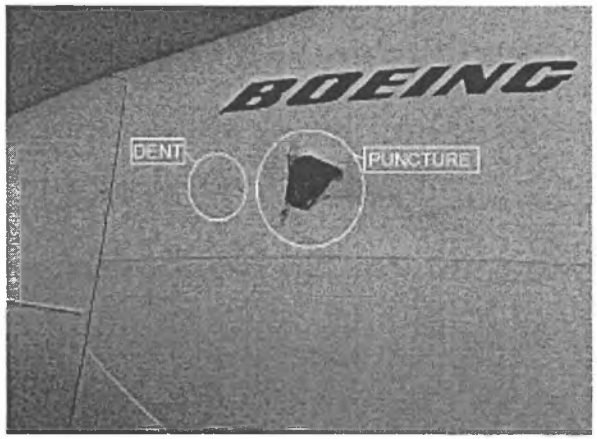
Radome

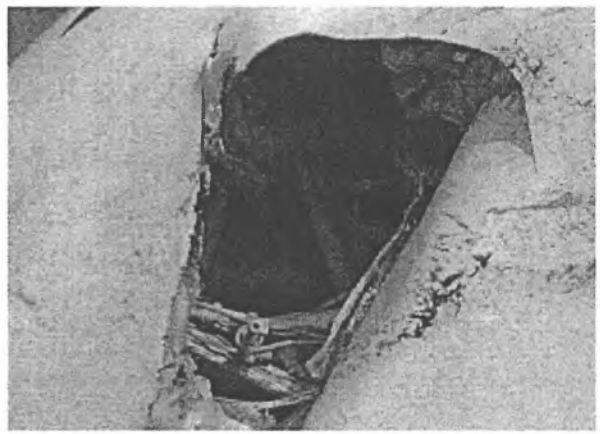




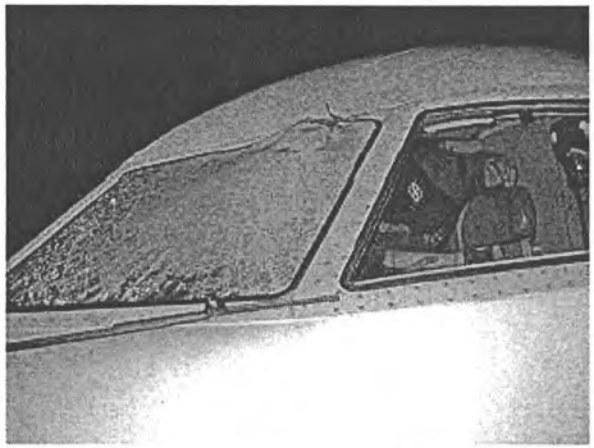


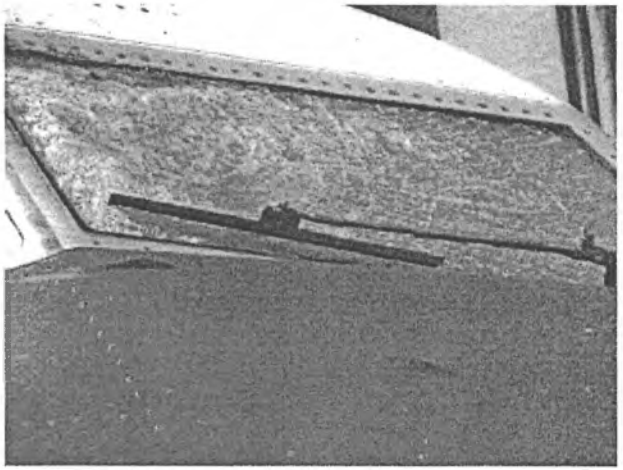
Nose

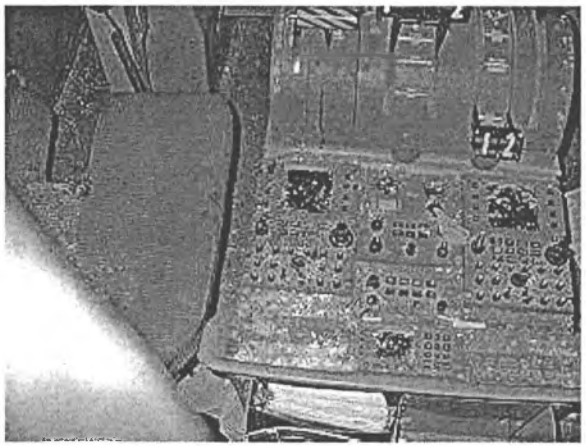


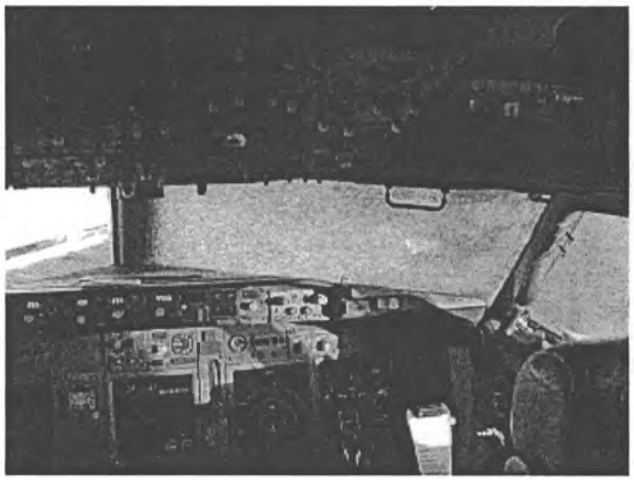


Windshield

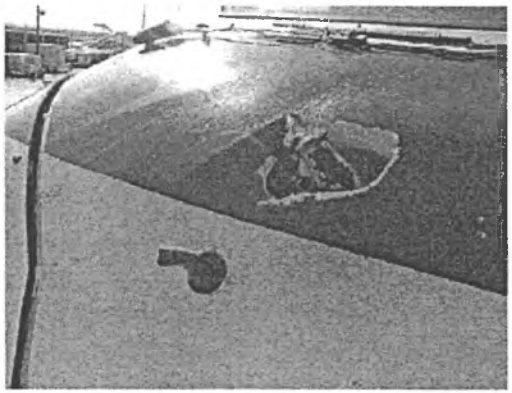


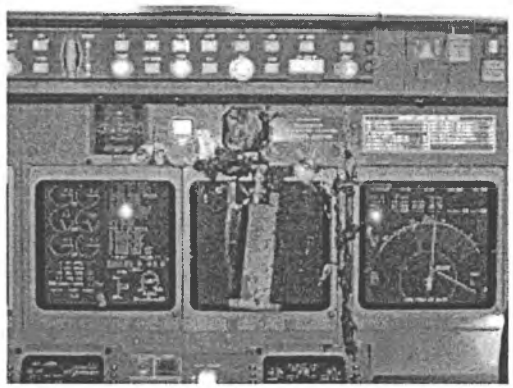




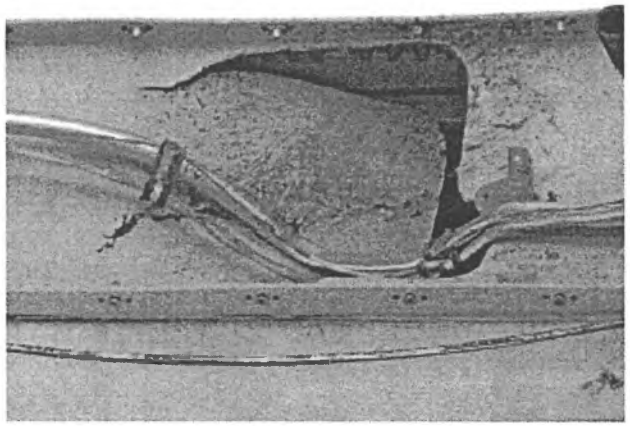


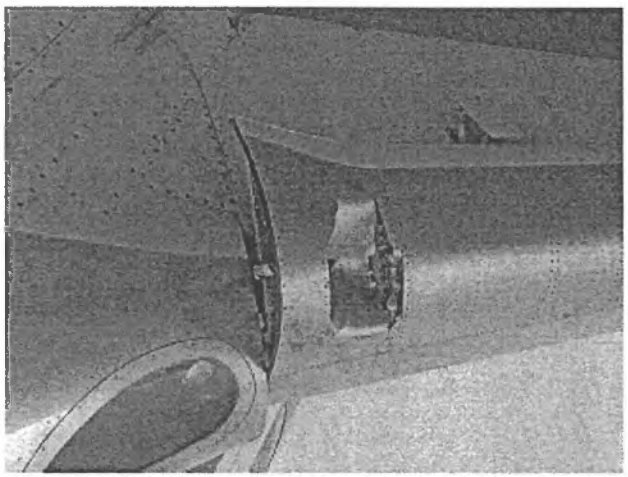
Flight Deck Penetration

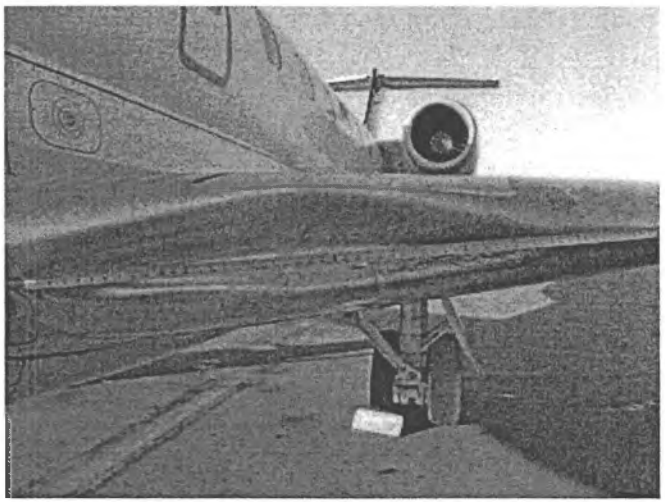




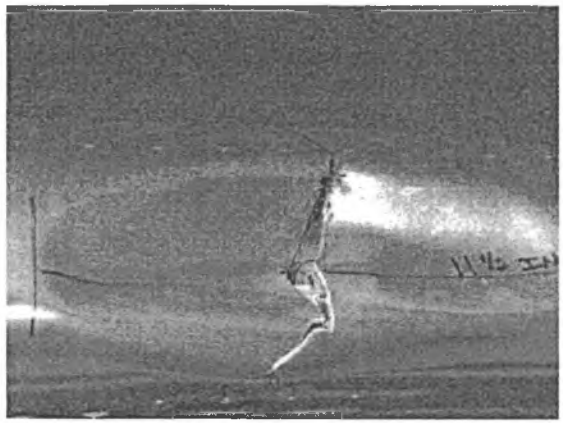
Wing

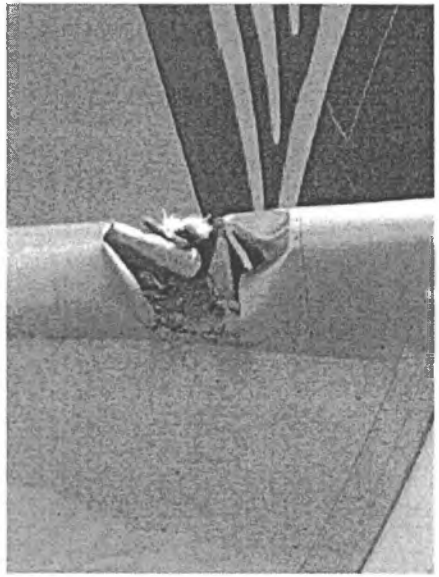




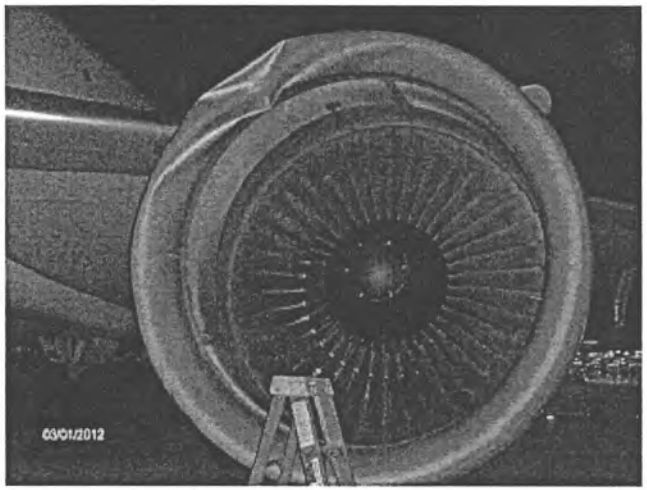


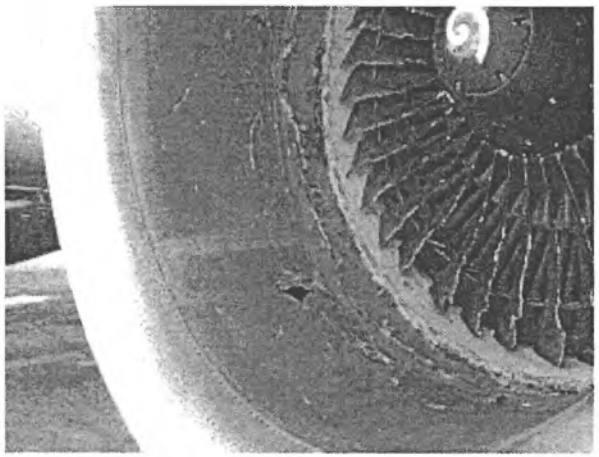
Empennage

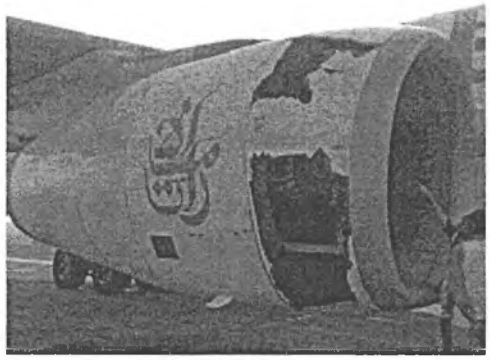




Powerplant







Bird Strike Requirements

(14 CFR Part 23, 25, 29)

Transport Airplane vs 8lb bird

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Transport Rotorcraft vs 2.2lb bird

- *Empennage structure* of transport category airplane vs **8 lb bird**
  - *If cruise speed is 400 kts, then* ***KE = 56,666 ft-lb***
  - ***55 lb UAV → 389,578 ft-lb***
- *Structural damage and windshield damage* of transport category airplanes vs **4 lb bird**
  - *If cruise speed is 400 kts, then* ***KE = 28,333 ft-lb***
  - ***55 lb UAV → 389,578 ft-lb***
- *Windshield* of normal, utility, acrobatic and commuter category airplanes vs **2 lb bird** at maximum approach flap speed
  - *If this speed is 180 kts, then* ***KE = 2,869 ft-lb***
  - ***55 lb UAV → 78,889 ft-lb***
- *Structure* of transport category rotorcraft vs **2.2 lb bird**
  - *If using the high Vne of a UH-60 (194 kts), then* ***KE = 3,666***
  - ***55 lb UAV → 91,638 ft-lb***

Bird Strike Requirements

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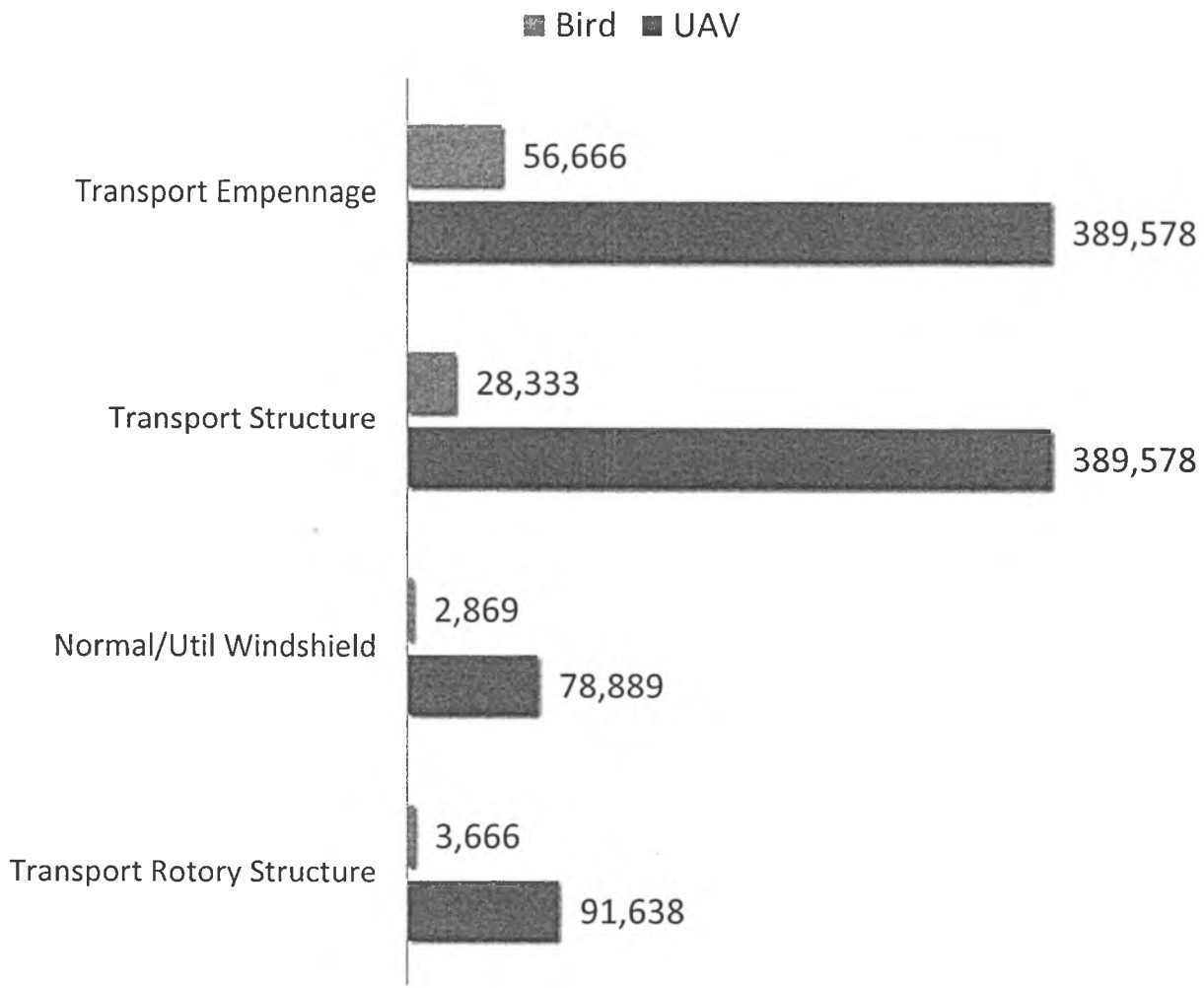
Normal/Utility/Commuter vs 2lb bird

Transport Rotorcraft vs 2.2lb bird



KE Analysis

Assumptions
55 lb UAV at 87 kts
130 kt approach speed of airliner

Same Direction

Crossing

Head-On

MTR

Same Direction

- closure rate of 43 kts – KE of the UAS is **4,502 ft-lb**

Crossing

- Closure Rate of 130 kts – KE is **41,149 ft-lb**

Head-On (Airliner)

- Closure Rate of 217 kts – KE is **114,655 ft-lb**

Head-On (Military Aircraft @ 240 kts)

- Closure Rate of 327 kts – KE is **260,357 ft-lb**

Head-On (Military Aircraft @ 400 kts)

- Closure Rate of 487 kts – KE is **577,473 ft-lb**

KE Analysis

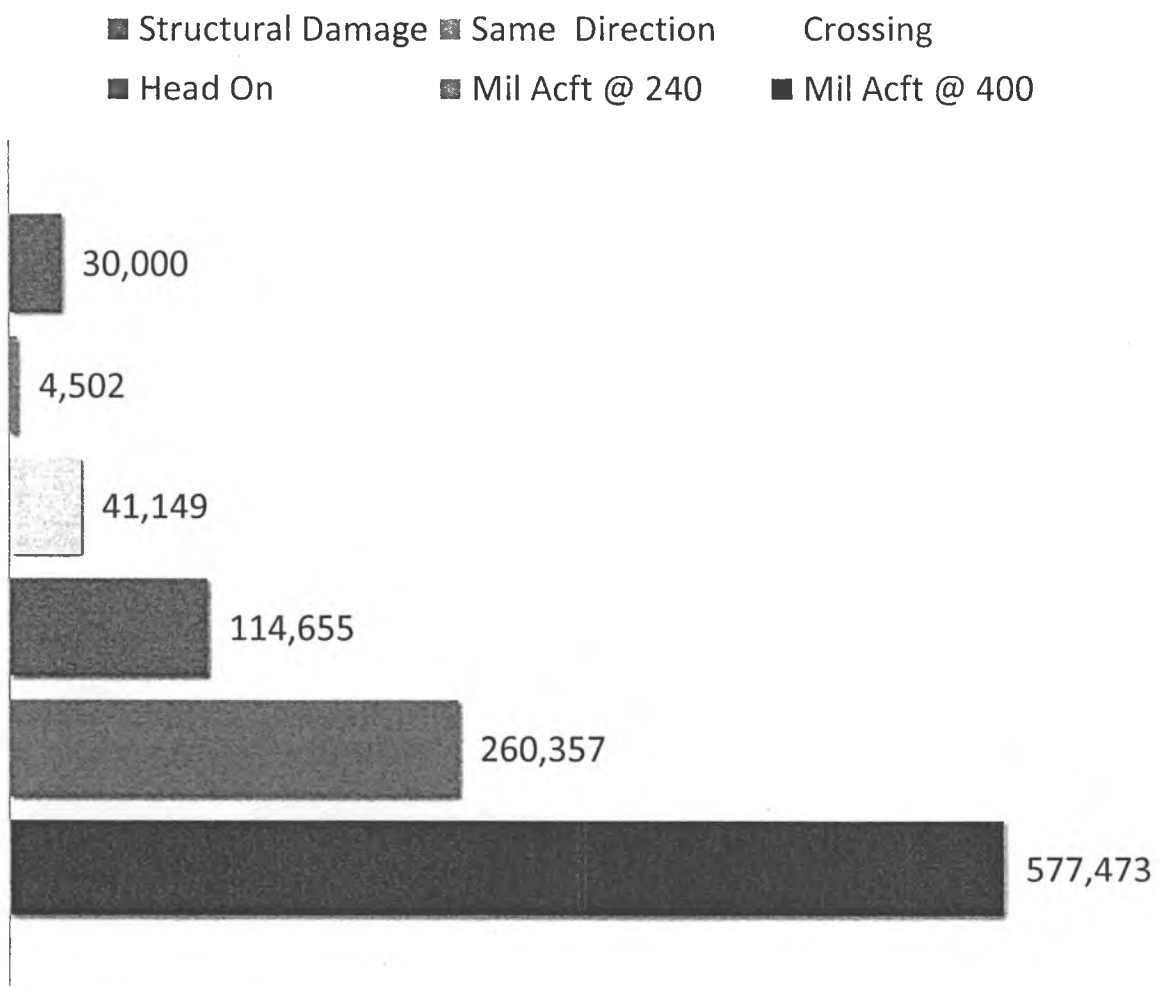
Assumptions
--55 lb UAV at 87 kts
--130 kts approach speed of airliner

Same Direction

Crossing

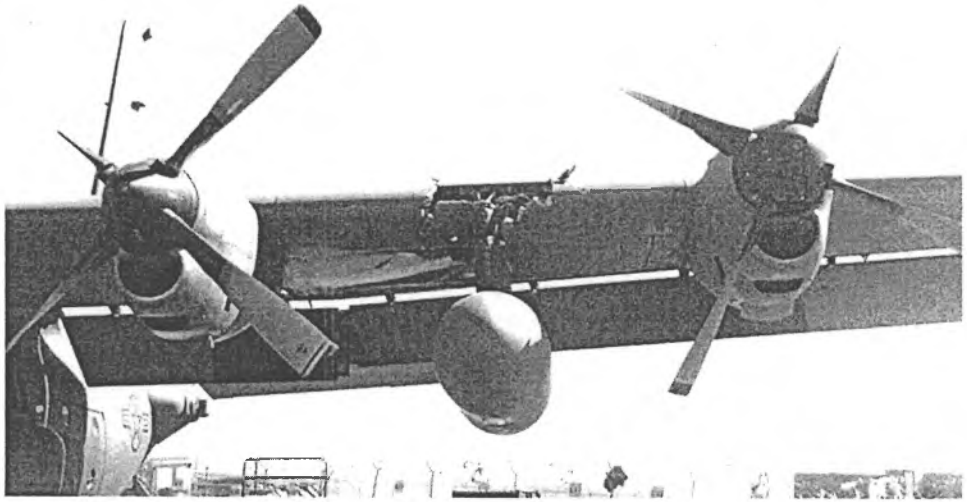
Head-On

MTR



- 375 lb UAV impacted C-130 head on
- Closure rate ~300 kts.
- KE was on the order of 1.5 million ft-lb

- UAV was almost 7 times larger than the small category
- UAV struck the C-130 directly in the wing (through the spar and into the fuel tank)
- C-130 is engineered for ruggedness more than efficiency
- C-130 has a fuel tank designed to limit the possibility of internal fires
- The strike was not directly into an engine or the cockpit



Mitigations

Aircraft

- Airworthiness standards and testing
- Required equipment

Airspace

- 250' AGL max with exceptions for obstacles and obstructions (towers, wind turbines, etc)
- 60 kts limit
- Notification / approval for any higher altitude

Airman

- Training & Certification (pilot license, in-seat training, checkrides)
- Liability insurance

Mitigations

Airworthiness Standards and Testing

- Required Equipment

Lower Altitudes and Airspeeds

- Notification for exceptions

Training and Certification

- Liability Insurance

Questions?

Pan Pacific UAS Test Range Complex
Privacy Policy

Sept 2014

PPUTRC Privacy Policy

1. All operations conducted under the sponsorship of a PPUTRC Test Range will comply with this privacy policy, whether operated by the test range itself or by the client of the test range.
2. PPUTRC will manage a record of each UAS flight, including the time date, and purpose of the flight, and the identity of the authorizing official.
3. PPUTRC will establish an auditable flight record system, including the documentation of a change in a flight time record.
4. PPUTRC will notify the public of UAS operations, either through the establishment of special or restricted use airspace, which should be depicted on FAA navigation charts, or through the issuance of a NOTAM.
5. Images and data collected through UAS flights shall not be considered public records subject to disclosure under applicable public records laws. All images and data collected shall be considered confidential and/or proprietary.

PPUTRC Privacy Policy (cont)

6. PPUTRC shall not provide images and/or data collected through UAS operations to law enforcement agencies unless required by a duly issued subpoena or court order
7. PPUTRC shall separately establish an image and data retention policy.
8. This privacy policy shall be publicly available. The public may comment on this policy at any time by contacting the following:

Geophysical Institute
PO Box 756180
Fairbanks, AK 99775-6180
gido@gi.alaska.edu
907-474-7282

Dave Mathewson, Executive Director
Academy of Model Aeronautics
5161 E Memorial Drive
Muncie, Indiana 47302

September XX, 2015

Dear Director Mathewson,

Thank you for leading the Academy of Model Aeronautics (AMA) in their quest to educate recreational aircraft pilots about safety and the responsibilities of flying and fully enjoying model aircraft. With the integration of unmanned aircraft systems (UAS) into the National Air Space, the public's attention on, and awareness of, government, commercial and hobby pilots has increased dramatically. The AMA's role in educating the public by publishing safety guidelines is critical to keeping both our skies above, and the ground below, free from tragic accidents.

Alaska is known for its vast land mass and few roads. Many of our communities are not on the road system and are only primarily accessible by air. Alaska has the highest number of private pilots per capita (2006). It is estimated that 45% of all jobs in Alaska are related to the airline industry in some way, according to a statement by the former Alaska Lt. Governor. Given these factors, it is quite realistic to assume that UAS will have a significant impact on Alaska, on our lives and our well-being. Generally, Alaskans are very receptive to UAS and are eager to receive the safety, cost savings, and improved data capture benefits of UAS as they are used not just for recreational purposes but also practical public and business purposes such as search and rescue, wildlife counts, infrastructure monitoring, mapping, fire and disaster relief, real estate, surveying, photography and videography, oil, and mining.

The Alaska State Legislature established the Unmanned Aircraft Systems Legislative Task Force in 2012 to review existing laws regarding safety and privacy applicable to UAS. The Task Force is made up of 12 members including legislators, state department designees, industry and public members, and a representative of the Academy of Model Aeronautics. The Task Force was instrumental in the passage of legislation pertaining to the parameters for law enforcement use of UAS, to provisions for public input, to the authority for training programs at the University of Alaska, and to the duty of the Task Force to report recommendations regarding privacy and other policy related to UAS to the legislature each year.

I want to thank your organization for its assistance to the Task Force in creating and distributing a safety flyer during the last holiday season as small UAS were flying off the shelves as gift

purchases. The Task Force is currently working on privacy guidelines flyer for operators and other interested Alaskans. Lastly, the Task Force holds quarterly meetings to receive updates on UAS topics, address current issues, consider policy recommendations, and provide regular opportunities for public input.

House Joint Resolution 5, passed by the Alaska State Legislature this year recognizes the important role of the Academy of Model Aeronautics in educating the public on safety and privacy guidelines. The AMA reaches a broad audience of interested pilots around the world. Alaska is proud to recognize your organization as a leader in model aeronautics and in the promotion of safe operations and privacy rights. While the State's policies regarding use of the Alaska State prevent out inclusion of the state seal in your "Know Before You Fly" safety publications and your web page relating to the materials, we encourage you to utilize the Alaska Flag or outline of the state to symbolize my administrations support of your work. As Alaska has a great history of, and appreciation of aviation, it is appropriate that it be the first state to offer such support.

we hope to

Sincerely,

Bill Walker
Governor

Alaska Drone Ban in Effect Next Week (Aug 31-Sept 2) – FA Airspace Restrictions Due to President's Visit Extend to Recreational Users

Thank you for visiting our website. It is a public education resource provided by Alaska's Unmanned Aircraft Systems Legislative Task For (UASLTF) to raise public awareness of the laws applicable to sUAS.

Shelley A. Hughes Representative Shelley Hughes

December 5, 2014

Alaska's Know-Before-You-Fly Drone Safety Guidelines

FAA allows the operation of model aircraft, also known as small Unmanned Aircraft Systems (sUAS) or drones, f recreational purposes under the Special Rule for Model Aircraft. Recreational UAS must be operated in accordance with community-based safety program and the FAA's guidance in Advisory Circular 91-57.

What is recreational use of a sUAS (Drones)?

Recreational use is the operation of a sUAS for personal interests and enjoyment, and not for compensation or hire. F example, using a sUAS to take photographs for your own personal use would be considered recreational; using the sam device to take photographs or videos for compensation or sale to another individual would be considered commercia You should check with the FAA for further determination as to what constitutes commercial sUAS operation.

SAFETY GUIDELINES FOR RECREATIONAL USERS OF sUAS (DRONES)

- Users should follow community-based safety guidelines, as developed by organizations such as the Academy of Model Aeronautics (AMA)
- Users should fly no higher than 400 feet and remain below surrounding obstacles when possible
- Users must be able to see their sUAS at all times, and use an observer to assist them if needed
- Users should remain well clear and must not interfere with manned aircraft operations, must see and avoid other aircraft and obstacles at all times, must avoid any activity that would cause a manned aircraft pilot to divert from planned operations, and must give way to all other aircraft at all times.
- Users must not intentionally fly over unprotected persons or moving vehicles, and should remain at least 25 feet away from individuals and vulnerable property
- Users must contact the airport or control tower before flying within five miles of an airport
- Users should be aware that in addition to public airports, Alaska has many private airstrips as well as bodies of waters used for take-off and landing by float planes and should not fly a UAS in the vicinity of these locations
- Users should not fly a UAS weighing more than 55 lbs unless it's certified by an aeromodelling community-based organization.

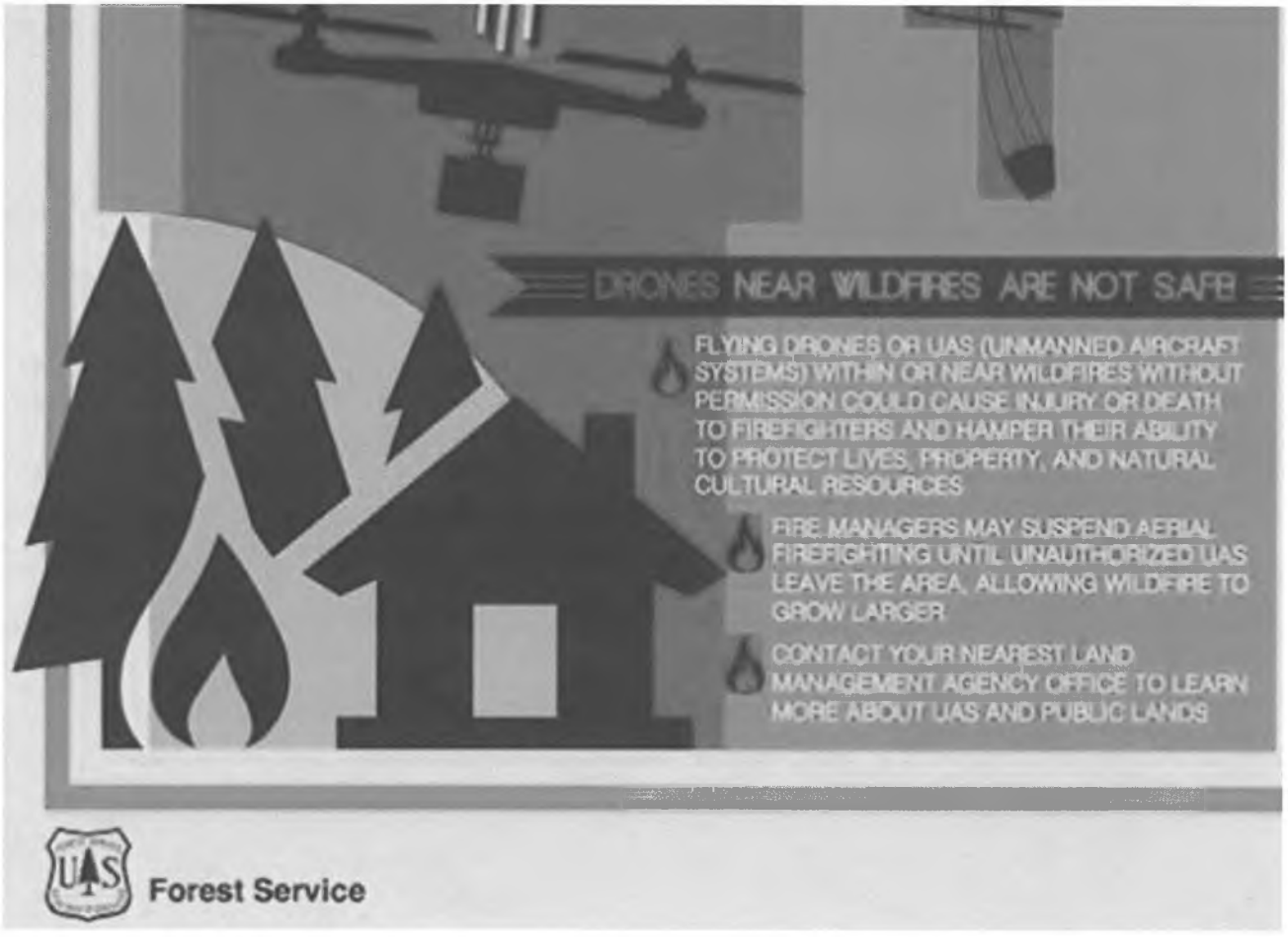
- Users should not fly in adverse weather conditions such as in high winds or reduced visibility
- Users must not fly under the influence of alcohol or drugs
- Users should ensure the operating environment is safe and that the operator is competent and proficient in the operation of the sUAS
- Users should not operate on or fly over private property without first obtaining permission from the property owner and/or tenant
- Users should not fly near or over sensitive infrastructure or property such as power stations, water treatment facilities, correctional facilities, heavily traveled roadways, government facilities, etc.
- Users should not conduct surveillance or photograph persons in areas where there is an expectation of privacy without the individual's permission (See AMA's privacy policy)

Additional safety resources:
AMA National Model Aircraft Safety Code
FAA What Can I Do With My Model Aircraft?

This hand-out is a public education resource provided by Alaska's Unmanned Aircraft Systems Legislative Task Force (UASLTF) to raise awareness by providing a brief summary of the laws applicable to sUAS. For more information, contact 907-376-3725 or Rep.Shelley.Hughes@akleg.gov . The UASLTF would like to thank Academy of Model Aeronautics and the Association of Unmanned Vehicle Systems for their joint campaign to promote safe operations of UAS and for providing the safety guidelines listed above. All sUAS operators are responsible for reviewing and complying with applicable state and federal laws that may apply to flying sUAS. While this hand-out provides a summary of the laws applicable to sUAS, users of sUAS should not rely on this hand-out for a full understanding of applicable laws and are responsible for independently reviewing federal and state law before flying sUAS.

USDA

United States Department of Agriculture



The Unmanned Aircraft Systems Legislative Task Force encourages prospective drone operators to review the following important safety sheet to know where you are authorized to fly, for what purposes, an other safety guidelines. This sheet is also for drone vendors, drone purchasers, drone owners, and others to make available to those wh may or will be flying UAS/drones.

- Alaska "Know Before You Fly" Safety Guidelines.
- FAA "What Can I Do With My Model Aircraft?"
- Local hobby clubs. (slow loading)
- FAA's Model Aircraft Operating Standards Advisory Circular – 91-5

- Academy of Model Aeronautics' (AMA) Privacy Policy and Guideline Conduct Surveillance or Photograph Where There is an Expectatio Privacy.
- Contact the FAA to determine if your operations fall under FAA's recreational or commercial rules.

Representative Shelley Hughes
Co-Chair, Unmanned Aircraft Task Force
Toll Free: 800-565-3743
email: Rep. Shelley Hughes

Session Info:
State Capitol, Room 409
Juneau, AK 99801-1182
Phone: 907-465-3743

Interim Info:
600 E. Railroad Ave.
Wasilla, AK 99654
Phone: 907-376-372

Drone/UAS Operator Safety Guidelines and FAQ's about Privacy

Prepared by the UAS Legislative Task Force
29th Alaska State legislature

Alaskans guard their personal privacy very seriously. How do we define privacy when it comes to Unmanned Aircraft Systems (UAS) commonly known as drones? Because of the rapid development of UAS technology, this question is being contemplated worldwide, and new boundaries must be identified. A threat to safety can be pinpointed more easily because a person can see the aircraft, operator and its effects; on the other hand, a threat to privacy is not so easily pinpointed because it involves thought, sentiment, emotion and perception.

add date / version #

Header on all pages: Alaska's Drone Privacy Guidelines
Incident Reporting: FAA Aviation Safety 907-271-2000 or your local law enforcement

Inside cover page

Unmanned Aircraft Systems Legislative Task Force established by HJR 15, SLA 14

Representative Shelley Hughes, Co-Chair
Senator Peter Micciche, Co-Chair
Ethan Tyler, Commissioner Designee, Department of Commerce, Community Economic Devel.
Mike O'Hare, Commissioner Designee, Department of Military and Veterans' Affairs
Lieutenant Steve Adams, Commissioner Designee, Department of Public Safety
John Binder, Commissioner Designee, Department of Transportation, Public Facilities
Ro Bailey, University of Alaska Fairbanks, ACUASI and PPUTRC
Steve Strait, Aviation Advisory Board
Steve Colligan, Representative Member for the Academy of Model Aeronautics
John Parker, Integrated Robotics Imaging Systems, industry representative
Steve Wackowski, Tulugaq II, industry representative
Bob May, Gallery Lodge, Kasilof, public representative

Many thanks to those who have contributed:

Ginger Blaisdell, Staff to Rep. Hughes
Jay Skaggs, FAA UAS Integration Office, Anchorage, Alaska

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disclaimer . . .

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blue font

1. When does a flying drone breach privacy?

All Alaskans have a reasonable expectation of privacy to live without fear of unwarranted personal invasion. With equal importance, Alaskans enjoy the right to be left alone. The definition for **Reasonable Expectation of Privacy** directly relates to law enforcement requirements to obtain a warrant before actions of search and seizure.

The **United States Constitution Fourth Amendment** forbids the government from performing warrantless and unreasonable searches of any area in which a person maintains a reasonable expectation of privacy.

Alaska's Constitution guarantees Alaskans the right to privacy. Article 1, Section 22 states, "The right of the people to privacy is recognized and shall not be infringed. The legislature shall implement this section." The legislature has a long-standing history of protecting Alaskans' privacy by instituting **statutes** regarding stalking, harassment, indecent viewing, sending explicit images, and misusing confidential information. The UAS Legislative Task Force (UASLTF) continues to review these protections particularly as they relate to unmanned aircraft systems.

The UASLTF has prepared this document to address privacy guidelines with respect to drones and to educate UAS operators and citizens. We will look at privacy as it pertains to the specific act of intrusion into another's privacy, the prevention of intrusion into one's own privacy, and/or the act of exposing elements of one's privacy against an individual's will. This concept is recognized as **"the right to be left alone."**

Private Citizen: Please recognize that individuals experience different levels of sensitivity to interruption to privacy. Was the drone flight intentionally directed at you or just passing through? Do you believe the operator of the drone was flying in an inappropriate way? Be as specific as possible so that you can report the incident to local law enforcement.

Drone Operator: Will you be perceived as intruding on someone's privacy? Would you act in person as you do with your drone? Be courteous and respectful to others.

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FAA and the Role of Law Enforcement

The FAA promotes voluntary compliance by educating individual UAS operators about how they can operate safely under current regulations and laws. The FAA also has a number of enforcement tools available including warning notices, letters of correction, and civil penalties. The FAA may take enforcement action against anyone who conducts an unauthorized UAS operation or operates a UAS in a way that endangers the safety of the national airspace system. This authority is designed to protect users of the airspace as well as people and property on the ground.

However, State and local Law Enforcement Agencies (LEA) are often in the best position to deter, detect, immediately investigate, and, as appropriate, pursue enforcement actions to stop unauthorized UAS operations. Although the FAA retains the responsibility for enforcing FAAs regulations, FAA aviation safety inspectors, who are the agency's principal field elements responsible for following up on these unauthorized and/or unsafe activities, will often be unable to immediately travel to the location of an incident.

While the FAA must exercise caution not to mix criminal law enforcement with the FAA's administrative safety enforcement function, the public interest is best served by coordination and fostering mutual understanding and cooperation between governmental entities with law enforcement responsibilities. Although there are Federal criminal statutes that may be implicated by some UAS operations (see 49 U.S.C. § 44711), most violations of the FAA's regulations may be addressed through administrative enforcement measures. As with any other civil or criminal adjudication, successful enforcement will depend on development of a complete and accurate factual report contemporaneous with the event.

Although certainly not an exhaustive list, law enforcement officials, first responders and others can provide invaluable assistance to the FAA by taking the actions outlined below:

(1) **Witness Identification and Interviews.** Local law enforcement is in the best position to identify potential witnesses and conduct initial interviews, documenting what they observed while the event is still fresh in their minds.

(2) **Identification of Operators.** Law enforcement is in the best position to contact the suspected operators of the aircraft, and any participants or support personnel accompanying the operators. Our challenges in locating violators are marked in that very few of these systems are registered in any federal database and rarely will they have identifiable markings such as used for conventional manned aircraft.

(3) **Viewing and Recording the Location of the Event.** Pictures taken in close proximity to the event are often helpful in describing light and weather conditions, any damage or injuries, and the number and density of people on the surface, particularly at public events or in densely populated areas. During any witness interviews, use of fixed landmarks that may be depicted on maps, diagrams or photographs immeasurably help in fixing the position of the aircraft, and such landmarks also should be used as a way to describe lateral distances and altitude above the ground, structures or people.

(4) **Identifying Sensitive Locations, Events, or Activities.** The FAA maintains a variety of security-driven airspace restrictions around the country to help protect sensitive locations, events, and activities through Temporary Flight Restrictions (TFR), Prohibited Areas, and other mechanisms such as the Washington, DC Flight Restricted Zone (DC FRZ). UAS operations, including Model Aircraft flights, are generally prohibited within these defined volumes of airspace.

(5) **Notification.** Immediate notification of an incident, accident or other suspected violation to one of the FAA Regional Operation Centers (ROC) located around the country is valuable to the timely initiation of the FAA's investigation.

(6) **Evidence Collection.** Identifying and preserving any public or private security systems that may provide photographic or other visual evidence of UAS operations, including video or still picture security systems can provide essential evidence to the FAA.

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~~2.~~ My neighbor is sunbathing on her deck and my son is flying his drone...

Although the FAA governs the airspace from the ground up, help your son understand courteous flying so he doesn't disturb the neighbors or fly somewhere he shouldn't. He should never hover over your neighbor's yard.

Know Before You Fly provides recreational flying rules for hobby pilots: www.alaskadrones.org.

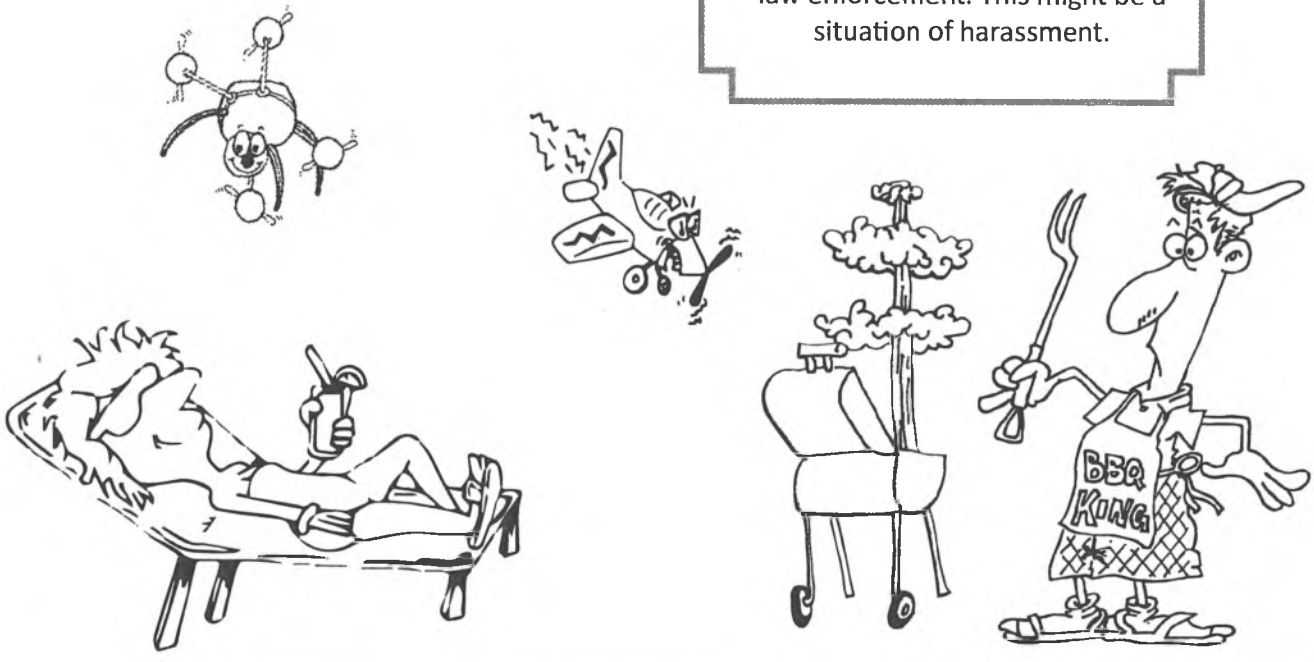
Private Citizen: The FAA governs the airspace from the ground up regardless of whether the property owner is private, public, corporate, or government. While we enjoy the sense of privacy on our property, we may not control what occurs above our heads.

Drone Operator: Fly with respect. Don't fly your drone where people typically expect privacy. Don't use your drone to harass people. In public areas, don't invade people's personal space and their solitude.

EXAMPLE

Someone is flying their drone and interrupting my relaxing evening barbequing in my backyard. They won't stop even when I "shoo" it away...

Try to identify where the drone operator is located. Provide as much information as possible to local law enforcement. This might be a situation of harassment.



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December 5, 2014

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What is recreational use of a sUAS (Drones)?

Recreational use is the operation of a sUAS for personal interests and enjoyment, and not for compensation or hire. For example, using a sUAS to take photographs for your own personal use would be considered recreational; using the same device to take photographs or videos for compensation or sale to another individual would be considered commercial. You should check with the FAA for further determination as to what constitutes commercial sUAS operation.

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- Users should be aware that in addition to public airports, Alaska has many private airstrips as well as bodies of waters used for take-off and landing by float planes and should not fly a UAS in the vicinity of these locations
- Users should not fly a UAS weighing more than 55 lbs unless it's certified by an aeromodelling community-based organization.
- Users should not fly in adverse weather conditions such as in high winds or reduced visibility
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- Users should ensure the operating environment is safe and that the operator is competent and proficient in the operation of the sUAS
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- Users should not fly near or over sensitive infrastructure or property such as power stations, water treatment facilities, correctional facilities, heavily traveled roadways, government facilities, etc.
- Users should not conduct surveillance or photograph persons in areas where there is an expectation of privacy without the individual's permission (See AMA's privacy policy)

Additional safety resources:

AMA National Model Aircraft Safety Code FAA What Can I Do With My Model Aircraft?

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left side

3. Can I shoot it down if it's flying over my house?

Remember that drone is someone else's personal property. It's best to know:

- "Why is a drone flying over your property?"
- "Is it violating the law?"
- "Who and where is the drone operator?"

If you shoot it down or damage it, you may be liable for:

- Destruction of property
- Discharging a weapon in a restricted area
- If you think a drone operator is in violation of the law, immediately contact your local law enforcement agency, and provide as much detail as you can about the encounter.

Private Citizen: The value associated with a recreational drone could be $25 to much more than $1,000. The FAA is rapidly authorizing commercial use, so that a small drone could be carrying specialized equipment and cost more than $100,000. Both the hobby drone and the commercial drone may look very similar as you view it from the ground.

Drone Operator: Before you fly over private property, consider the impact of your flight on someone's privacy. Obtain the owner's permission if you plan to hover and take photos or video. If you do not have permission, data you capture should not exceed what a smart phone could capture from a public viewpoint or area nearby. Avoid flying over populated areas.

"Looks like a moving target to me!"

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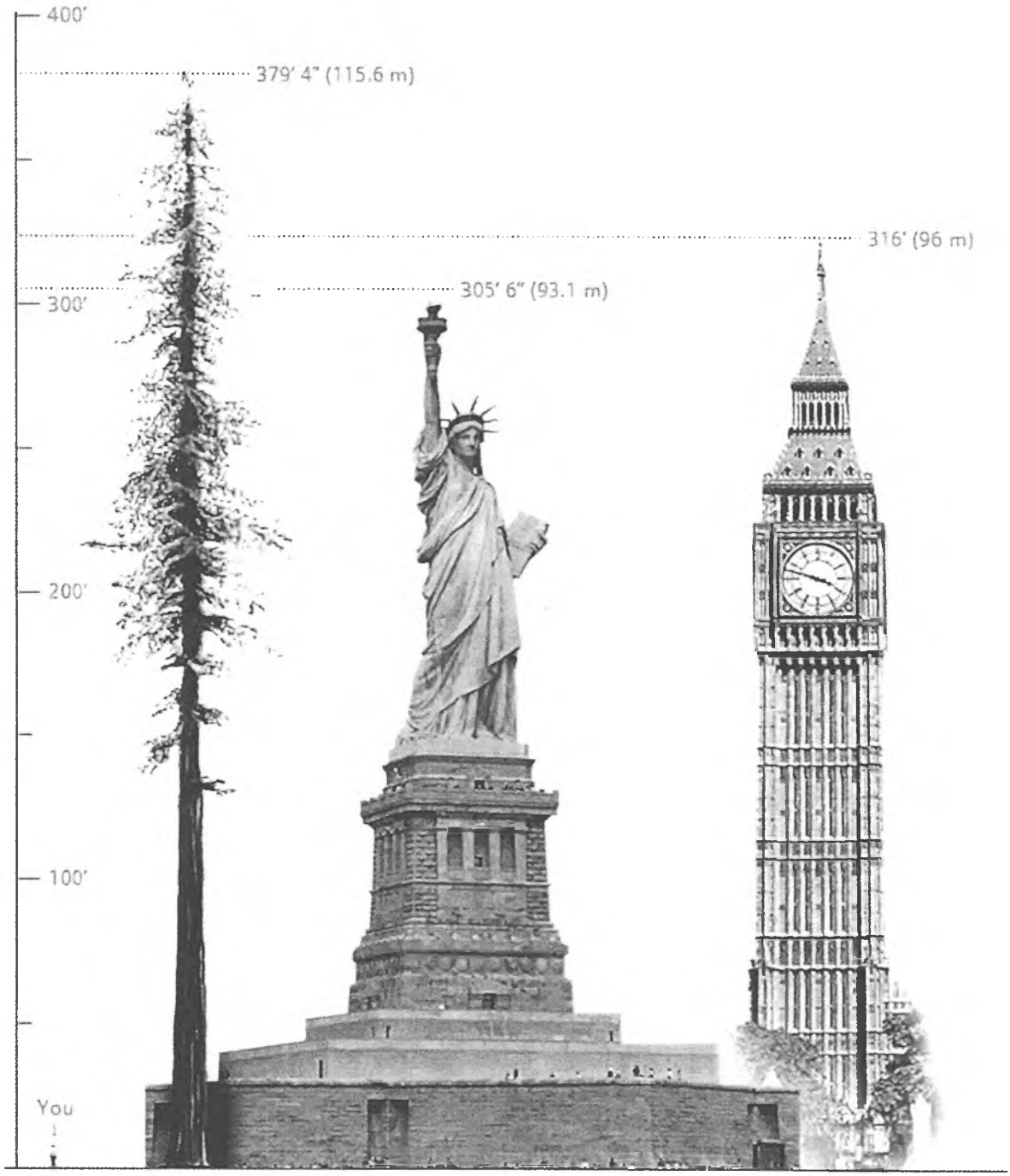
How high is 400 feet?



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4. What if a drone is photographing through my window or hovering around my house?

If you feel threatened or concerned, contact local law enforcement. Alaska has laws that address stalking and "peeping Tom" activities.

Private Citizen: A camera mounted on a drone may be treated in the same way as another camera. If an individual is flying a drone in such a way that you feel violated, local law enforcement should be contacted.

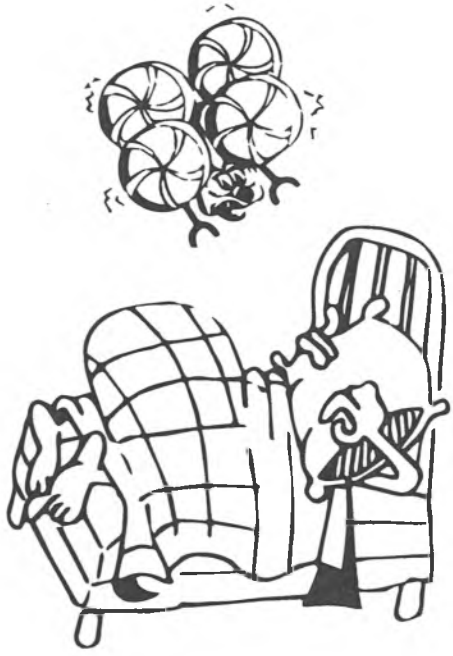
Drone Operator: Enjoy your drone with your family and friends who welcome its presence. When you don't have permission, don't hover and capture images that you couldn't capture on your smart phone while walking down the street, or from a nearby building, or from a manned aircraft overhead.

Welcomed Drone

The family drone hovering and taking a portrait when grandma came to visit.

Unwelcomed Drone

You weren't dreaming and the buzzing sound was not your alarm clock. The drone was spying through the bedroom window. Who knows where the pilot is and how those pictures might be used?



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5. The neighbor is chasing my dog with his drone!

Although the pet's owner may have introduced the dog to a flying toy, the noise and unfamiliarity of the neighbor's drone buzzing around could frighten Fido and could be considered harassment. If the dog swats the drone out of the sky and chews it up, would it be considered damaging another's personal property or self defense by the dog? Who is harrassing who? Did it occur on the dog owner's property or in a public place? There are many factors to consider.

Private Citizen: Know and follow your local animal control laws. If you're in a public area such as a local park, keep your pet away from people flying model aircraft and drones.

Drone Operator: Harassing an animal may come with criminal penalties. Be smart and protect your expensive piece of technology from animals that might view your drone as a threat and attack it.

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6. What can I do if the drone's "buzzing" is annoying me?

A drone typically makes less noise than a standard lawn mower, so fortunately you probably won't find the noise overbearing. But if the noise is annoying, likely the drone is too "near ears" and should be redirected away from people. If the drone is flown during locally recognized waking hours, a drone is probably not in violation of a noise ordinance. Because drones are relatively quiet, any noise you hear might instead be an alert to the bystander that the drone operator is flying too close to people and should be reported to the FAA for unsafe operations. This might be a situation of harassment.

Private Citizen: Many annoying noises are allowable in both public and private areas. The decibel limit separating acceptable noise level is generally compared to the noise of a standard lawn mower or small engine.

Drone Operator: The drone's "buzzing" may not be the only problem. The proximity of the aircraft to another person and the length of time in that proximity may be the real issue. Be courteous to others, don't hover your UAS "near ears," and stay away unless invited.

replace picture with mean drone bothering sunbathing man

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do we want to add: ?

UAS are aircraft - please know the rules

cannot use to assist in hunting (regs)
" " " fishing (regs)

when in doubt check NOTAMS
or call your local airport

left side

I understand why it's not safe to fly a drone near heavy traffic but what about privacy?

A drone flying near traffic could distract drivers and create unsafe driving conditions including accidents. Drivers should keep their eyes on the road, and drone operators should keep their UAS away from traffic.

Private Citizen: Not only are drones dangerous over busy traffic but most drivers don't want to be GPS tracked and photographed. If you see one, keep your eyes on the road. Pull over to report it to local law enforcement if you think it's creating unsafe conditions or collecting data inappropriately.

Drone Operator: Flying over roads can cause distraction and potential automobile accidents on a road system. Don't fly your drone near high traffic roadways.

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safety

happy drone

track meet image

left side

8. What safety and privacy concerns can there be when you're in a crowd?

Sometimes photographing a crowd could result in the capture of inadvertent images. If the drone image shows Captain Blowhole with a catch beyond his limit, that image could be provided to the authorities for legal review.

Private Citizen: Typically, if you're in a crowd, privacy is limited. Although the safety concerns are paramount when a drone is flying above a crowd, the photography could identify something that a citizen would not want shared, such as your secret fishing hole.

Drone Operator: Never fly above a crowd; even a happy drone can create quite a stir. As a drone operator, you know how easy the slightest wind change can cause your aircraft to change direction quickly or drop out of the sky. Although most recreational drones are very light weight, spinning propellers can cause injury.

Safety

If the drone were to fall out of the sky it could injure a bystander. The drone could also compromise the safety of the crowd by interfering with the activity or distracting people, thus rendering them unaware of happenings nearby.

Privacy

During fishing season, this drone inadvertently photographed Clyde's map to Grandpa's secret fishing hole. Because the map was visible in a public area, the photo of the map might be shared with others. Clyde's secret fishing hole is no longer secret.

DISCLAIMER: The purpose of this publication, "Drone/UAS Operator Guidelines FAQs about Privacy" is to provide informational aid and overview of certain federal and state laws that may apply to drone/UAS operation. This publication is not intended to provide legal advice or a comprehensive review of all federal and state laws relating to drone/UAS operation. Laws will almost certainly change, particularly in the rapidly developing areas of the law at the federal and state level regarding drone/UAS operation. Before a person operates a drone/UAS, or pursues a legal claim related to drone/UAS operation, it is the sole responsibility of that person to review applicable laws, and seek legal advice if necessary, regarding the person's rights and liabilities. The publishers of this publication disclaim all liability and are not responsible for damages related to the contents of this publication.

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How will the photos/video be stored or used?

Inappropriate use of images or data captured by technological devices concern Alaskans. If you believe someone has obtained images or data illegally or plans to use them illegally, contact local law enforcement. Be able to answer the following questions: Is the drone operator using the images for inappropriate purposes? Are images being posted in an inappropriate way? Are the images being used for personal gain? Was personal identification stolen?

Private Citizen: Many recreational drone operators have posted video and pictures on social media sites. Enjoy this new interesting form of photography. If you come across footage that you believe may be a violation of privacy, contact local law enforcement.

Drone Operator: If you are photographing something with your drone in a place where you would not be welcomed if you were taking pictures in person, you shouldn't be there. Make sure you don't save or post footage that breaches someone's privacy. If you don't want someone else posting similar footage of you or your property, destroy the footage. Don't post it.

EXAMPLE

A drone is used to record your PIN over your shoulder while you are at the ATM.

A drone records images through your office window of a newly signed contract.

A drone peers through the window while your child is napping.

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left side

10. What happens if a drone captures inadvertent images?

Private Citizen: What happens if a drone captures inadvertent images and those images are posted on social media or reveal something questionable? Photographing in a public area could result in capturing an image that may not have been planned. The image could be of a person not wanting to be photographed but may not be a breach of privacy since it occurred in a public place.

Drone Operator: Be aware of and be sensitive to what you are photographing. Are you capturing proprietary information? If you capture an image of someone appearing to break the law, you may want to surrender images to local authorities. Some people may not want to be photographed and their expectation of privacy could result in an angry situation. Again, if you are photographing something with your drone, in a place where you would not be welcomed if you were taking pictures in person, redirect your drone elsewhere.

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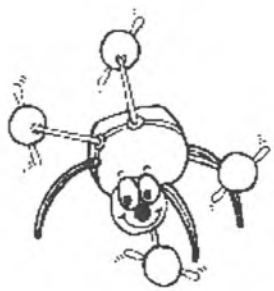
Not about privacy, but another common question...

~~11.~~ Can I use a drone for my business?

Today, the FAA prohibits commercial use of unmanned aircraft systems unless the business has been granted a waiver to use the aircraft for specific purposes in the business. Businesses are beginning to receive authorization to use Unmanned Aircraft Systems for commercial use. Thus far, the most common authorizations have been awarded for specific movie production and specific agriculture tasks.

Aircraft continue to advance technologically and many people are waiting for the opportunity to use drones as part of business.

You must obtain authorization from the FAA if you want to use your drone for commercial purposes. The time will come when safety concerns have been well vetted and business use will become commonplace, but at this time, any commercial use of your drone must be authorized by the FAA at the Aviation Safety Hotline 866-835-5322 option 4 for unmanned aircraft reporting and information or online at FAA.gov/contact/safety.



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Thank you for reviewing these guidelines!

Know your rights and your responsibilities.

Now go enjoy life in a world where UAS technology is changing daily and where the UASLTF continues to look out for you!

Please visit the following web sites for additional information regarding flying your drone:

Federal Aviation Administration, unmanned aircraft section www.faa/gov/uas
Academy of Model Aeronautics, www.modelaircraft.org
Alaska State Legislature, www.alaskadrones.org
University of Alaska Fairbanks, www.acuasi.alaska.edu
FAA UAS Test Range, www.acuasi.alaska.edu/pputrc

To report suspicious behavior of a drone and its operator, please contact your local law enforcement authority.

Alaska Statutes that could be applied to inappropriate drone use:

AS 11.16.120(a)(6)
AS 11.41.270 Stalking, nonconsensual conduct prohibits monitoring by technical means
AS 11.61.120(a)(6) Harassment, publishing or distributing certain images
AS 11.61.123 indecent viewing or photography
~~AS 11.16.120(a)(6)~~
AS 45 Personal Information Protection Act
AS 11.61.116 Sending an explicit image of a minor
~~AS 11.61.120(a)(6) Harassment: publishing or distributing certain images~~
~~AS 11.61.123 Indecent viewing or photography~~
AS 11.76.113 and AS 11.76.115 Misconduct involving confidential information in the first and second degree

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for more information and hyperlinks to web sites go to:

www.alaskadrones.org

footer

name	affiliation	would you like to testify
Ron Tremain	INSITU SCANEAGLE	Y (N)
Ken Kokjer	Self	?
Rachel Thomas	Self	No
Terry Hinman	self	?
Rich Sewell	DOT&PF/statewide Aviation	No.
ERIC FOLKESTAD	CASCADE AUVSI	YES
Jeremy Worrall	DOT&PF	NO
Jay Skaggs	FAA	NO
John Nevadomsky	UAF	No
BILL TART	ASRC	?
TED RALSTON	U HAWAII/NDPTC	YES
ROBERT HESS	LOCKHEED MARTIN	No.
Dorothy Hagen/My	Self	No
Rebecca Hatfield	self	No.

EventDATETIME	LocationCITY	LocationSTATE	EventREPORTNARRATIVE	Item Type	Path
11/13/2014 15:34	Viginia Key	Florida	PRELIM INFO FROM FAA OPS: VIRGINIA KEY, FL/UAS INCIDENT/1534E/MIA TRACON RECEIVED REPORT FROM AMERICAN 397, B737, SJU-MIA, OBSERVED A CYLINDRICAL RED AND SILVER UAS HEADING EASTBOUND AT 8,000 FEET 6 W VIRGINIA KEY, FL. MIAMI DADE PD NOTIFIED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
11/13/2014 16:44	Las Vegas	Nevada	PRELIM INFO FROM FAA OPS: LAS VEGAS, NV/UAS INCIDENT/1644P/LAS VEGAS ATCT ADVISED MERCY AIR 21, HELICOPTER, 3 NW LAS AT 2,800 FEET W BOUND, REPORTED A UAS OFF THE RIGHT SIDE OF THE AIRCRAFT HEADING N BOUND. NO CONFLICTS REPORTED. LAS VEGAS METRO PD NOTIFIED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
11/14/2014 13:55	Los Angeles	California	PRELIM INFO FROM FAA OPS: LAX/UAS INCIDENT/1355P/SCT RECEIVED REPORT FROM CANADA REGISTERED ROUGE 1874, A319, CYYC-LAX, OBSERVED A PURPLE UAS AT 2,600 FEET 6 E LAX. LEOS NOTIFIED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
11/14/2014 16:09	Norfolk	Virginia	PRELIM INFO FROM FAA OPS: ORF/UAS INCIDENT/1609E/ORF ATCT ADVISED PA32, AT 3,000 FEET REPORTED A UAS OFF RIGHT SIDE OF ACFT AT 2,100 FEET FLYING AT 85 KNOTS 20 S ORF. UAS HAD A TRANSPONDER AND SQUAWKING. TARGET WILL BE TRACKED ATC.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
11/14/2014 18:58	Scottsdale	Arizona	PRELIM INFO FROM FAA OPS: SCOTTSDALE, AZ/UAS INCIDENT/1858P/PHOENIX TRACON ADVISED THAT A CITIZEN REPORTED A UAS WITH MULTIPLE LIGHTS WAS FLYING ABOUT 100 FEET ABOVE HIS HOME , SCOTTSDALE. PHOENIX PD NOTIFIED .	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
11/15/2014 14:30	Tuscaloosa	Alabama	PRELIM INFO FROM FAA OPS: TUSCALOOSA, AL/UAS INCIDENT/11-15 1430C/LEO'S REPORTED UAS OPERATION IN TFR OUTSIDE UNIVERSITY OF ALABAMA FOOTBALL STADIUM PRIOR TO GAME. DURING ATTEMPTED LANDING UAS STRUCK BYSTANDER IN MIDSECTION. LEO'S RESPONDED. FSDO INVESTIGATING INCIDENT. NO REPORTED INJURY TO INDIVIDUAL STRUCK BY UAS.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
11/15/2014 19:10	Fort Lauderdale	Florida	PRELIM INFO FROM FAA OPS: FORT LAUDERDALE, FL/UAS INCIDENT/1910E/FLL ATCT ADVISED ROBINSON R44 REPORTED A UAS WITH A SINGLE RED LIGHT FLYING AT 700 FEET 5 W FLL. BROWARD SHERIFF NOTIFIED	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
11/18/2014 17:10	New York	New York	PRELIM INFO FROM FAA OPS: NEW YORK, NY/UAS INCIDENT/1710E/JETBLUE CORPORATION REPORTED JETBLUE 1572, A319, SAW POSSIBLE UAS FLY UNDER NOSE OF ACFT WHILE INBOUND TO LA GUARDIA ARPT BETWEEN 1,500 AND 2,000 FEET ON 11-18 AT 1639E.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
11/19/2014 13:57	New York	New York	PRELIM INFO FROM FAA OPS: NEW YORK, NY/UAS INCIDENT/1357E/JFK ATCT ADVISED JETBLUE 842, A320, SAVANNAH, GA - JFK, ON 2 MILE FINAL FOR RUNWAY 31R OBSERVED A UAS OPERATING AT 300-400 FEET. NASSAU COUNTY PD AND NYPD AVIATION UNIT NOTIFIED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
11/19/2014 16:17	Boston	Massachusetts	PRELIM INFO FROM FAA OPS: BOSTON, MA/UAS INCIDENT/1617E/BOSTON ATCT ADVISED LOCAL VFR HELICOPTER SPOTTED A LARGE UAS ORBITING AT 400 FEET IN CLASS B AIRSPACE 5 SW BOSTON LOGAN INTERNATIONAL ARPT. MASSACHUSETTS STATE POLICE NOTIFIED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
11/20/2014 14:50	New York	New York	PRELIM INFO FROM FAA OPS: NEW YORK, NY/UAS INCIDENT/1450E/LGA REPORTED SIKORSKY S76B OBSERVED 2 UAS OPERATING AT 500 FEET 4 W LGA, VCNTY EAST RIVER 59TH STREET BRIDGE.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
11/21/2014 13:03	Fort Rucker	Alabama	PRELIM INFO FROM FAA OPS: FORT RUCKER, AL/UAS INCIDENT/1303C/TEXAN 2, T6, REPORTED NMAC WITH UAS, 4 S CAIRNS AAF AIRPORT, AT 2,000 FEET. UAS WAS 6-10 FEET IN LENGTH. LEOS NOTIFIED (MILITARY PD).	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
11/21/2014 16:57	Macon	Georgia	PRELIM INFO FROM FAA OPS: MACON, GA/UAS INCIDENT/1657E/MACON ATCT ADVISED THAT HAWKER BEECHCRAFT BE35 PASSED A UAS ON HIS LEFT SIDE WHILE SOUTHBOUND AT 2,500 FEET JUST NORTH OF THE MEDICAL CENTER OF CENTRAL GEORGIA. UAS DESCRIBED AS LIGHTED BLACK AND RED IN COLOR AND ABOUT 14 INCHES IN DIAMETER. UNKN IF LEOS NOTIFIED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
11/24/2014 14:50	Beaumont	Texas	PRELIM INFO FROM FAA OPS: BEAUMONT, TX/UAS INCIDENT/1450C/HOUSTON ARTCC ADVISED THUNDER WINGS AVIATION 303, CESSNA C501, 50 N BPT AT FL200 REPORTED A UAS 2 FEET IN DIAMETER APPROXIMATELY 1,000 FEET BELOW. NO CONFLICTS REPORTED. LEOS NOTIFIED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database

11/28/2014 11:25 Santa Ana	California	PRELIM INFO FROM FAA OPS: JOHN WAYNE ARPT, SANTA ANA, CA/UAS INCIDENT/1125P/SOUTHERN CALIFORNIA TRACON ADVISED PIPER PA28 REPORTED A UAS HOVERING BETWEEN 2,000 - 3,000 FEET 4 MILES SOUTH OF JOHN WAYNE ARPT. NO DESCRIPTION OF THE UAS WAS GIVEN OR EVASIVE ACTIONS TAKEN. ORANGE COUNTY PD NOTIFIED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
11/28/2014 11:50 West Palm Beach	Florida	PRELIM INFO FROM FAA OPS: WEST PALM BEACH, FL/UAS INCIDENT/1150E/WEST PALM BEACH ATCT REPORTED SEVERAL ACFT : NORTH AMERICAN NAVI; DASSAULT F2TH; AND NETJETS 955, CESSNA C750, ALL WESTBOUND ON 1 MILE FINAL FOR RUNWAY 28R REPORTED A UAS OVER THE BEACH DESCRIBED AS A "GO PRO" AT 700 TO 800 FEET. NO EVASIVE ACTIONS TAKEN. PALM BEACH COUNTY SHERIFF NOTIFIED , POLICE HELICOPTER EAGLE 1 SEARCHING THE AREA.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
11/28/2014 15:35 Beverly	Massachusetts	PRELIM INFO FROM FAA OPS: BEVERLY MUNI ARPT, MA/UAS INCIDENT/1535E/BOSTON TRACON ADVISED CESSNA C175 REPORTED A BLACK UAS WITH A SINGLE RED LIGHT, BETWEEN 3 - 10 FEET WIDE IN THE VCNTY OF BEVERLY MUNI ARPT AT 8,500 FEET. NO EVASIVE ACTIONS TAKEN OR NO LEO NOTIFIED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
11/29/2014 11:28 Houston	Texas	PRELIM INFO FROM FAA OPS: HOUSTON INT'L, TX/UAS INCIDENT/1128C/HOUSTON TRACON ADVISED EXPRESSJET 4277, E145, REPORTED A UAS HAD PASSED OFF OF HIS LEFT SIDE AT 2,500 FEET 14 MILES SE HOUSTON INT'L ARPT. NO EVASIVE ACTION TAKEN. NO DESCRIPTION GIVEN. LOCAL FBI NOTIFIED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
11/29/2014 15:22 Washington	District of Columbia	PRELIM INFO FROM FAA OPS: WASHINGTON, DC/UAS INCIDENT/1500E/POTOMAC TRACON ADVISED PIPER PA31 REPORTED A UAS AT 9,000 FEET 50 MILES SOUTH OF DCA ARPT. NO DESCRIPTION WAS GIVEN. NO LEO NOTIFIED. FOLLOW-UP INFO FROM FAA OPS: WASHINGTON, DC/UAS INCIDENT/1522E/POTOMAC TRACON REPORTED THE UAS WAS DESCRIBED AS SILVER AND BLACK, 3 FEET LONG WITH THINGS STICKING OUT OF IT. NO DIRECTION OF TRAVEL WAS GIVEN. FAA NOTIFIED ESSEX COUNTY SHERIFF.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
11/29/2014 16:14 Daytona Beach	Florida	PRELIM INFO FROM FAA OPS: DAYTONA BEACH, FL/UAS INCIDENT/1614E/DAYTONA BEACH TRACON ADVISED CESSNA C172 REPORTED A UAS BLUE IN COLOR HEADING NORTHEAST BOUND AT 4,500 FEET 10 MILES EAST OF DAYTONA BEACH. NO EVASIVE ACTION TAKEN. VOLUSIA COUNTY SHERIFF NOTIFIED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
11/30/2014 17:20 Andrews AFB	Maryland	PRELIM INFO FROM FAA OPS: ANDREWS AFB, MD/UAS INCIDENT/1720E/ANDREWS ATCT ADVISED THAT AN UNIDENTIFED GULFSTREAM REPORTED A UAS ON A 3 MILES FINAL TO RUNWAY 19R. UAS WAS DESCRIBED AS A LARGE VULTURE. PRINCE GEORGES COUNTY PD NOTIFIED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
12/4/2014 10:57 Los Angeles	California	PRELIM INFO FROM FAA OPS: LOS ANGELES, CA/UAS INCIDENT/1057P/LAX ATCT ADVISED MESA 5400, CRJ9, REPORTED A UAS AT 2,600 FEET WHILE ON A 12 MILE FINAL FOR RUNWAY 24R. UAS WAS WHITE, 1 FOOT BY 1 FOOT AND CAME WITHIN 500 FEET OF THE ACFT. NO EVASIVE ACTION REPORTED. LAPD AVIATION UNIT NOTIFIED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
12/5/2014 13:14 Herndon	Virginia	PRELIM INFO FROM FAA OPS: HERNDON, VA/UAS INCIDENT/0930E/FAA NCRCC RECEIVED TELEPHONE CALL AND EMAIL FROM FAIRFAX COUNTY POLICE HELICOPTER DIVISION REGARDING ONGOING DRONE ACTIVITY. THE UAS DESCRIPTION WAS RED AND GREEN LIGHTS PROTRUDING FROM IT. THIS INCIDENT HAPPENED ON 5TH OF DECEMBER AT 2200E.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
12/7/2014 16:35 Miami	Florida	PRELIM INFO FROM FAA OPS: MIAMI, FL/UAS INCIDENT/1635E/MIAMI APCH ADVISED SKY10, HELICOPTER, AND METRO POLICE 6, HELICOPTER, REPORTED UAS AT 150 FEET, 3 E MIA ON THE RUNWAY 26R FINAL. UAS DESCRIBED AS HELO TYPE WITH 4 PROPELLERS. NO CONFLICTS REPORTED. METRO PD AVIATION UNIT NOTIFIED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
12/8/2014 8:25 Los Angeles	California	PRELIM INFO FROM FAA OPS: LAX/UAS INCIDENT/12-8 0825P/COMPASS 6423, E170, SFO-LAX, POSSIBLE DRONE SIGHTING RUNWAY 25L FINAL APPROACH 1 EAST LAX AT 400 FEET. UAS WAS ROUND/CYLINDRICAL MOVING RIGHT TO LEFT AWAY FROM THE RUNWAY. SUNLIGHT APPEARED TO REFLECT OFF OBJECT. NO CONFLICTS OR EVASIVE ACTION REPORTED. LEO NOT NOTIFIED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database

12/11/2014 12:55	New Orleans	Louisiana	PRELIM INFO FROM FAA OPS: NEW ORLEANS, LA/UAS INCIDENT/1255C/CHAUTAUQUA 6172, E145, NEW ORLEANS - MEMPHIS, REPORTED A LARGE WHITE SINGLE PROP UAS 100 YARDS AWAY WHILE WESTBOUND ON FINAL APPROACH FOR RUNWAY 1 AT 900 FEET. NO EVASIVE ACTION REQUIRED. ST. CHARLES SHERIFF DEPT. NOTIFIED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
12/12/2014 12:31	Jacksonville	Florida	PRELIM INFO FROM FAA OPS: JACKSONVILLE, FL/UAS INCIDENT/1231E/MILITARY VVAJ700, H60, REPORTED AN UNKN UAS AT 1,000 FEET 4.2 W OF JACKSONVILLE NAS. NO EVASIVE ACTION TAKEN. NO LAW ENFORCEMENT NOTIFIED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
12/14/2014 12:50	Tamiami	Florida	PRELIM INFO FROM FAA OPS: TAMIAMI, FL/UAS/1250E PIPER P28A REPORTED A MODEL AIRPLANE FLYING OFF HIS RIGHT WING AT 1,200 FEET VCNTY TAMIAMI. CZECH PIPER SPORT, ALSO REPORTED SEEING THE MODEL ACFT.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
12/14/2014 13:12	Carlsbad	California	PRELIM INFO FROM FAA OPS: CARLSBAD, CA/UAS INCIDENT/1312P/CRQ ATCT ADVISED AN OFF DUTY PILOT REPORTED 3 REMOTE CONTROL HELICOPTERS OPERATING 1.5 E CRQ, ALTITUDE UNKN. CARLSBAD PD NOTIFIED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
12/14/2014 20:15	Miami	Florida	PRELIM INFO FROM FAA OPS: MIAMI, FL/UAS INCIDENT/2015E/LIFE FLIGHT HELICOPTER, REPORTED SEEING A UAS AT OR ABOUT 150 FEET EQUIPPED WITH NAV LIGHTS 5 S MIA. MIAMI DADE POLICE AVIATION UNIT WAS NOTIFIED. FOLLOW UP INFO FROM FAA OPS: MIAMI, FL/UAS INCIDENT/2048E/ZMA REPORTS MIAMI DADE POLICE FOUND OPERATOR FLYING UAS 5 S MIA AND ADVISED NOT TO FLY .	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
12/16/2014 15:04	Kansas City	Missouri	PRELIM INFO FROM FAA OPS: MKC/UAS INCIDENT/12-14 1504C-DELAYED REPORT/KANSAS CITY ARTCC ADVISED THAT AN OFF DUTY PILOT REPORTED A QUAD COPTER OVER THE SOUTH END OF THE BROADWAY BRIDGE HOVERING 50 FEET ABOVE THE TOP OF THE BRIDGE. UNKN IF LEO NOTIFIED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
12/16/2014 15:59	Van Nuys	California	PRELIM INFO FROM FAA OPS: VAN NUYS, CA/UAS INCIDENT/1559P/VAN NUYS ATCT ADVISED ROBINSON R66 REPORTED SMALL UAS OVER THE NW CORNER OF THE PARKING RAMP AT 100 FEET. NO CONFLICTS REPORTED BUT ADVISED IT WAS A HAZARD. LEO'S NOT NOTIFIED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
12/19/2014 11:08	Savannah	Georgia	PRELIM INFO FROM FAA OPS: SAVANNAH, GA/UAS INCIDENT/12-19 1108E CIRRUS SR22 REPORTED UAS OPERATING 1 TO 2 MILES OFF RIGHT WING AT 6,000 FEET 9 NNE SAVANNAH. DIRECTION OF MOVEMENT UNKNOWN. UAS APPEARED ROUND BODIED AND APPROXIMATELY 15 FEET ACROSS. NO EVASIVE ACTION TAKEN. LEO NOTIFICATION UNKNOWN.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
12/20/2014 14:00	Los Angeles	California	PRELIM INFO FROM FAA OPS: LAX/UAS INCIDENT/1400P/SCT ADVISED CANADAIR CL60 AT 5,000 FEET REPORTED A UAS AT SAME ALTITUDE 15 E LAX. LA CO SHERIFF NOTIFIED. NO EVASIVE ACTION TAKEN.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
12/22/2014 22:31	West Palm Beach	Florida	PRELIM INFO FROM FAA OPS: WEST PALM BEACH, FL/UAS INCIDENT/2231E/WEST PALM BEACH APPROACH ADVISED THAT WEST PALM BEACH ARPT OPS CALLER REPORTED A UAS (ALTITUDE AND DIRECTION OF FLIGHT NOT REPORTED) ORBITING AROUND THE APPROACH FOR RUNWAY 10L 6 W WEST PALM BEACH ARPT. PALM BEACH SHERIFF AIR AND GROUND UNITS SEARCHING AREA FOR UAS AND OPERATOR.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
12/24/2014 9:16	Honolulu	Hawaii	PRELIM INFO FROM FAA OPS: HONOLULU, HI/UAS INCIDENT/0916L/2 TOUR HELICOPTERS WEST OF DIAMOND HEAD CRATER, REPORTED A UAS OPERATING AT 200 FEET VCNTY BEACH FRONT PARK. USSS AND LOCAL PD NOTIFIED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
12/25/2014 15:01	Wichita	Kansas	PRELIM INFO FROM FAA OPS: WICHITA, KS/UAS INCIDENT/1501C CESSNA C172 REPORTED A RED AND WHITE UAS 2 FEET IN DIAMETER AT 6,000 FEET 4 SE WICHITA. PILOT STATED THAT UAS ALMOST HIT ACFT. LEO NOTIFICATION UNKNOWN.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
12/27/2014 10:02	Princeton	New Jersey	PRELIM INFO FROM FAA OPS: PRINCETON/ROCKY HILL, NJ/UAS INCIDENT/0945E/NEW YORK TRACON ADVISED CESSNA C172 REPORTED A UAS OVER PRINCETON ARPT (39N) AT 3,500 FEET. NO CONFLICTS REPORTED. NJ STATE PD NOTIFIED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
12/27/2014 14:20	Salem	New Jersey	PRELIM INFO FROM FAA OPS: SALEM, NJ/UAS INCIDENT/1420E/HOPE CREEK NUCLEAR PLANT PERSONNEL REPORTED A UAS TRANSITIONING THE COASTLINE ADJACENT TO THE PLANT FROM SOUTH TO NORTH, NO ADDITIONAL INFO PROVIDED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database

12/28/2014 15:02	San Carlos	California	PRELIM INFO FROM FAA OPS: SAN CARLOS, CA/UAS INCIDENT/1502P/SAN CARLOS ATCT ADVISED CESSNA C172 REPORTED A WHITE UAS, SMALL IN SIZE, AT 1,500 FEET 4 S SAN CARLOS. NO CONFLICTS REPORTED. PRELIM INFO FROM FAA OPS: SAN CARLOS, CA/UAS INCIDENT/1512P/SAN CARLOS ATCT ADVISED SAN CARLOS FLIGHT CENTER 44, ROBINSON R44, WHILE ON 3 MILE FINAL RUNWAY 30, REPORTED A WHITE UAS, SMALL IN SIZE, WITH 4 PROPELLERS AT 1,500 FEET 4 SW SAN CARLOS. NO CONFLICTS REPORTED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
12/28/2014 16:25	Ft Lauderdale	Florida	PRELIM INFO FROM FAA OPS: FT LAUDERDALE, FL/UAS INCIDENT/1625E/MIAMI APCH ADVISED US AIRWAYS 1760, A320, AFTER LANDING REPORTED A WHITE UAS AT 3,400 FEET 7 NW FLL. NO CONFLICTS REPORTED. LEO'S NOTIFIED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
12/29/2014 9:35	Boston	Massachusetts	PRELIM INFO FROM FAA OPS: BOSTON, MA/UAS INCIDENT/0935E/BOSTON ATCT REPORTED JAZZ 7678, CRJ2, MONTREAL, CANADA - BOSTON, SEEING A SMALL DARK UAS WHILE ON .25 FINAL TO RUNWAY 33L JUST BELOW HIM MOVING LEFT TO RIGHT AT UNKN ALTITUDE. FBI NOTIFIED AND RESPONDING TO ATCT.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
12/29/2014 11:30	Redding	California	PRELIM INFO FROM FAA OPS: REDDING, CA/UAS INCIDENT/1130P/READING ATCT REPORTED THAT CESSNA C172 REPORTED A SMALL UAS DESCRIBED AS AN RC TYPE, 500 FEET BELOW ACFT ALTITUDE. NO EVASIVE ACTION REQUIRED. TOWER OBSERVED THE UAS FOR ABOUT 10 MINS WHILE IN THE PATTERN. LOCAL LEOS NOTIFIED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
1/1/2015 0:03	Nashville	Tennessee	PRELIM INFO FROM FAA OPS: NASHVILLE, TN/UAS INCIDENT/0003C/NASHVILLE ATCT REPORTED SKYY5, NEWS HELICOPTER, AT 1,500 FEET OVER DOWNTOWN NASHVILLE SPOTTED A UAS FLYING AT APPROXIMATELY 300 FEET EAST TO WEST OVER CITY. NASHVILLE METRO POLICE NOTIFIED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
1/1/2015 0:50	Arlignton	Washington	PRELIM INFO FROM FAA OPS: ARLINGTON,WA/UAS INCIDENT/0050P MO20 REPORTED A POSSIBLE UAS FLYING OVER THE APPROACH END OF RUNWAY 34 AT ARLINGTON. LEO NOT NOTIFIED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
1/3/2015 15:14	Long Beach	California	PRELIM INFO FROM FAA OPS: LONG BEACH, CA/UAS INCIDENT/1541P/SOUTHERN CALIFORNIA TRACON ADVISED MOONEY M20P REPORTED A 2-3 FEET LONG UAS APPROX 200 FEET LATERAL AT 10,500 FEET VCNTY LGB. NO CONFLICTS REPORTED. LONG BEACH PD NOTIFIED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
1/6/2015 13:37	Melbourne	Florida	PRELIM INFO FROM FAA OPS: MELBOURNE, FL/UAS INCIDENT/1337E/MIA ARTCC ADVISED CIRRUS SR22, SAVANNAH ,GA - PALM BEACH, FL, REPORTED A UAS APPROX 100 FEET OFF THEIR WING AT 12,000 FEET 15 N MELBOURNE, FL. NO CONFLICTS REPORTED. NO LEO NOTIFIED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
1/7/2015 13:30	Ormond Beach	Florida	PRELIM INFO FROM FAA OPS: ORMOND BEACH, FL/UAS INCIDENT/1330E/OMN AIRPORT MANAGEMENT REPORTED RECEIVING A CALL STATING THAT A UAS WAS FLYING ABOVE 400 FEET 2 SW OMN. DAYTONA BEACH TRACON NOTIFIED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
1/11/2015 21:24	Orlando	Florida	PRELIM INFO FROM FAA OPS: ORLANDO, FL/UAS INCIDENT/2124E/MCO ATCT REPORTED CHASE 3 (P3), BELL OH58, INTERCEPTED A PHANTOM II PLUS, QUADCOPTER, WHITE WITH RED STRIPES, 2.5 N OF MCO ON FINAL AT 288 FEET, CLOSEST PROXIMITY TO CHASE 3 WAS 300 FEET. LEOS DIRECTED THE OPERATOR TO LAND THE QUADCOPTER AT THE INTERSECTION OF PERSHING AVE AND SEMORAN BLVD. LEOS INTERVIEWING UAS OPERATOR. ORANGE COUNTY SHERIFF DEPT. NO IMPACT TO AIRPORT OPERATIONS.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
1/13/2015 15:15	Newark	New Jersey	PRELIM INFO FROM FAA OPS: NEWARK, NJ/UAS INCIDENT/1515E/NEW YORK TRACON REPORTED THAT COMMUTAIR 4821, DE HAVILLAND DH8B, BWI - EWR, OBSERVED A RED AND BLACK UAS AT 3,300 FEET APPROX. 18 SW EWR. UAS TRAVELING IN OPPOSITE DIRECTION. SIZE NOT INDICATED. NJ STATE PD NOTIFIED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
1/16/2015 10:08	Burbank	California	PRELIM INFO FROM FAA OPS: BURBANK, CA/UAS/1008P/BURBANK ATCT ADVISED AN UNIDENTIFIED SKY WEST ACFT REPORTED A UAS OFF THE DEPARTURE END OF RUNWAY 15, 2-3 FEET IN DIAMETER, AT 50 FEET IN ALTITUDE .25 S BURBANK ARPT. BURBANK PD NOTIFIED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database

1/16/2015 15:25 Tulsa	Oklahoma	PRELIM INFO FROM FAA OPS: TULSA, OK/UAS INCIDENTS/1525C/TUL ATCT ADVISED HAWKER BEECHCRAFT BE36 REPORTED A 3 FEET BY 3 FEET BLACK UAS PASSED ABOUT .25 MILE OFF ACFT LEFT 12 NE TUL.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
1/16/2015 16:06 Ormond Beach	Florida	PRELIM INFO FROM FAA OPS: ORMOND BEACH, FL/UAS INCIDENT/1606E/DAB ATCT ADVISED A RESIDENT (OFF DUTY LEO) REPORTED HIS NEIGHBOR WAS FLYING A UAS AT UNKN ALTITUDE JUST WEST ORMOND BEACH ARPT. VOLUSIA CO SHERIFF RESPONDED AND INFORMED UAS OPERATOR TO CEASE AND DESIST.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
1/22/2015 0:13 Roanoke	Virginia	PRELIM INFO FROM FAA OPS: ROANOKE, VA/UAS INCIDENT/1213E/ROA TRACON ADVISED USAIR EXPRESS 4808, DE HAVILLAND DH8B, REPORTED A FAST MOVING UAS RESEMBLING AN AIRPLANE PASSING 1,000-1,500 FEET BELOW 17 S ROA.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
1/23/2015 12:38 Ormond Beach	Florida	PRELIM INFO FROM FAA OPS: ORMOND BEACH, FL/UAS INCIDENT/1238E/DAYTONA APRCH ADVISED CESSNA C172 AT 1,000 FEET ON RIGHT DOWNWIND RUNWAY 17 REPORTED UAS AT 200 FEET ABOVE HEADING S BOUND. NO CONFLICTS REPORTED. VOLUSIA COUNTY PD. MOR Alert for DAB Number: DAB-M-2015/01/23-0002 Type: Public inquiry or concern (including all pilot reported NMACs) Date/Time: Jan 23, 2015 - 1809Z A/C: C172 Summary: OMN TOWER REPORTED GA ACFT SIGHTED A UAV 200' ABOVE THE AIRCRAFT WHICH WAS AT 1000' IN OMN'S PATTERN.THE UAV WAS ON THE RIGHT DOWNWIND LEG OF RY17 AT OMN.DEN AND ROC NOTIFIED. VOULISA COUNTY SHERIFF'S OFFICE NOTIFIED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database
1/23/2015 18:30 Minneapolis	Minnesota	PRELIM INFO FROM FAA OPS: MINNEAPOLIS, MN/UAS INCIDENT/1830C/FCM ATCT ADVISED LEO REPORTED UAS OPERATING 1.5 N FCM. NO IMPACT TO OPS. UAS NOT OBSERVED FROM TOWER OR ON RADAR. EDEN PRAIRIE PD INVESTIGATING. MOR Alert for FCM Number: FCM-M-2015/01/23-0002 Type: Public inquiry or concern (including all pilot reported NMACs) Date/Time: Jan 23, 2015 - 0018Z A/C: Summary: EPPD NOTIFIED ATC OF A DRONE FLYING APPROX. 1.5 MILES NORTH OF FIELD WITH GREEN AND WHITE LIGHTS. I DID NOT SEE ANYTHING ON RADAR OR OUT THE WINDOWS. EPPD CALLED FCMT ON THE TOWER DISPATCH RADIO ADVISING THAT THEY NOW KNOW WHERE IT LANDED. DEN NOTIFIED AND ADVISED TO SEND AN OFFICER TO SPEAK WITH THE "PILOT" OF THE DRONE. NO TRAFFIC WAS AFFECTED.	Item	FocusAreas/AFS/AFS-80/Lists/UAS_Reports_Database

Legislative Task Force on Unmanned Aircraft Systems
September 3, 2015 Meeting at 813 Noble Street, Fairbanks
Westmark Hotel Fairbanks

1:00pm - 4:45pm

President Obama

Task Force Members:

- Representative Shelley Hughes, Co-Chair
- Senator Peter Micciche, Co-Chair
- Ethan Tyler, Commissioner Designee, Department of Commerce, Community Economic Devel.
- Mike O'Hare, Commissioner Designee, Department of Military and Veterans' Affairs
- Lieutenant Steve Adams, Commissioner Designee, Department of Public Safety
- John Binder, Commissioner Designee, Department of Transportation, Public Facilities
- Ro Bailey, University of Alaska Fairbanks
- Steve Strait, Aviation Advisory Board, Governor's Office and DOT/PF
- Steve Colligan, Representative Member for the Academy of Model Aeronautics
- John Parker, Integrated Robotics Imaging Systems
- Steve Wackowski, Tulugaq II
- Bob May, Gallery Lodge, Kasilof

- Ginger Blaisdell, Staff to Rep. Hughes
- Chuck Kopp, Staff to Senator Micciche

Guest Attendee(s):

Agency COA group questions
RO - future privacy
Air Fire season
△ Chief of Police meeting Oct
· letter from Gov to AMA
△ Agency contact list POC

Privacy doc incorporate safety guideline animated
John Binder - DOT ~~safe~~ airport brief.

3-3:30 break

AGENDA

1:00pm Welcome and Introductions .....Representative Shelley Hughes

- News review and task force updates

NEW legislation –
- ongoing committee or board/task force
- creating rules for air space on private property
- safety guidelines in statute
- certification requirement for hobbyists

Task Force Responsibilities per HCR15 and Review of Resolution

The duties of the task force shall include

1. reviewing regulations and guidance from the Federal Aviation Administration regarding unmanned aircraft systems;
2. providing written recommendations, together with suggested legislation, for a comprehensive state policy for unmanned aircraft that protects privacy and allows the use of unmanned aircraft systems for public and private applications;
3. evaluating complaints and concerns expressed to the task force;
4. identifying potential privacy and public safety concerns associated with unmanned aircraft systems and determining whether legislation is necessary to address them;
5. considering recommendations for public education related to unmanned aircraft systems;
6. studying the Federal Aviation Administration's "Integration of Civil Unmanned Aircraft Systems (UAS) in the National Airspace System Roadmap," issued November 7, 2013 (1st ed. 2013) and its application to the development of unmanned aircraft systems in the state;
7. conducting a public hearing concerning privacy and the capture of data by unmanned aircraft systems at the University of Alaska's test site;
8. further studying the nonpublic use of unmanned aircraft systems to encourage development of the private sector unmanned aircraft system industry; and
9. further studying and making recommendations with respect to ensuring unmanned aircraft users comply with applicable laws.

AGENDA

- Public Testimony
- Josh Waite – presentation on UAS integration and safety
- UAS and Personal Privacy Guidelines document
- Discussion on final actions of the UASLTF

4:45pm Adjournment - members may join the Interest Group Meeting closing remarks from Marty Rogers followed by no host dinner on the Riverboat Discovery Dinner cruise beginning at 6:30pm

Invitation to attend:

9:30am - Friday, September 4 - Ro Bailey and ACUASI have made arrangements for demonstration flights of UAS downtown Fairbanks at the Fire Training facility for the benefit of the UAS Task Force to see working drones in action. Interest Group Meeting participants are invited to attend.

Rep. Shelley Hughes

From: Rep. Shelley Hughes
Sent: Wednesday, September 02, 2015 4:06 PM
To: 'lhschus+unmannedaircraft@akleg.gov'
Subject: Alaska UAS Legislative Task Force
Attachments: J Waite Risks of UAS Integration-final.pptx; PPUTRC Privacy Policy charts.pptx; UAS Operator Guidelines Draft 3.pdf; UAS TF 08-03-15 AGENDA.pdf

You are receiving this email because you have identified that you are interested in unmanned aircraft systems in Alaska. Please reply with "remove" if you do not want to receive any further email from the Legislative Task Force.

Meeting: Thursday, September 3, 2015
Time: 1:00pm Alaska time
Attachments:
Josh Waite presentation "Risk of UAS Integration"
UAS Operator Guidelines on Privacy – DRAFT

You may tune in by logging in to www.akl.tv and listen to the live stream.
Call—in participation can be arranged by email reply and a toll free number will be provided.

Thank you for your interest in Alaska and unmanned aircraft systems,
Representative Shelley Hughes
Representing District 11 ~ Greater Palmer
907-376-3725

agenda task force members
citizen fear or paranoia
Privacy document
- We are not afraid of commercial / govt pilots, its the hobbyists and those who don't know or intentionally don't follow the rules.
- can't legislate sensitivity of privacy but we need to teach, etiquette know your audience general

start of public testimony

Ginger Blaisdell

From: Ginger Blaisdell
Sent: Friday, August 21, 2015 11:27 AM
To: Ana Enge - DOT committee contact; Bob May (bob@gallerylodge.com); Chuck Kopp; Com Folger; Ethan Tyler; Ginger Blaisdell; John Binder - Dep Com DOT; John Parker; Lt. Steve Adams; Micaela Fowler; Mike Lesmann; Mike O'Hare; Rep. Shelley Hughes; Ro Bailey; Sen. Peter Micciche; Steve Colligan - Model Aeronautics; Steve Strait (steve@straitmedia.us); Steve Wackowski
Subject: tentative agenda for September 3 Fairbanks

Most of you have already signed up for the Interest Group Meeting hosted by the UAF/ACUASI and will be in Fairbanks from Aug 31 – Sep 3.
If you are only attending the UAS task force meetings in the afternoon of September 3rd, there is no need to sign up for the conference.

If you are not able to attend the task force meeting or would like to call in, please let Ginger know.

Here is what we have tentatively planned:

Wednesday, September 2 is an open evening for Interest Group participants.

- I am happy to make dinner reservations at LaVelle's for 6:30pm and just need a head count (we'll probably have a few more from the conference join our reservation)

Thursday, September 3

- 12:30 – 1:00pm Rep Hughes and Sen Micciche will provide an update on the activities of the UAS Task Force and invite attendees to attend (all or part) of the Task Force meeting beginning at 1:00pm – We are intending to have the privacy document available for all attendees at this time

- 1:00pm TENTATIVE agenda
  News review and task force updates
  Public Testimony
  Josh Waite – presentation on UAS integration and safety
  UAS and Personal Privacy Guidelines document

4:45pm we will adjourn so that members may join the Interest Group Meeting closing remarks from Marty Rogers followed by no host dinner on the Riverboat Discovery Dinner cruise beginning at 6:30pm

Friday, September 4

- 9:30am Ro Bailey and ACUASI have made arrangements for demonstration flights of UAS downtown Fairbanks at the Fire Training facility for the benefit of the UAS Task Force to see working drones in action. Ro may invite commercial UAS operators to participate in the demonstration. We will need to coordinate transportation across town for the demonstration event – if you are planning to attend, do you have the ability to help transport?

I hope this provides you with a bit more detail as you make plans to attend.
Ginger
Cell 321-4197

Chief of Staff

Office of Representative Shelley Hughes
Serving Greater Palmer
Capital Building Room 13
Juneau, Alaska 99801

907-465-5265
1-800-565-3743

If you would like to subscribe to Representative Hughes' newsletter, please click http://www.housemajority.org/members/hughes/.

REPRESENTATIVE
SHELLEY HUGHES

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Trade and Tourism Committee
Chairman
Energy Committee
State Affairs Committee
Military & Veterans' Affairs Committee
University Finance Subcommittee
Fish & Game Finance Subcommittee

ALASKA STATE LEGISLATURE

Session:
State Capitol, Room 409
Juneau, Alaska 99801-1182

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Wasilla, AK 99654
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Toll Free 1-800-565-3743

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HOUSE OF REPRESENTATIVES

District 11 - Greater Palmer

To: Unmanned Aircraft Systems Legislative Task Force

From: Representative Shelley Hughes, Co-Chair

Shelley Hughes

Date: August 21, 2015

Re: Committee Schedule for September 3, 2015

The Unmanned Aircraft Systems Legislative Task Force will meet at the Westmark Fairbanks Hotel, 813 Noble St, Fairbanks, room number to be posted at hotel.

Thursday, September 3, 2015

* 1:00pm – 4:45pm
News review and task force updates
Public Testimony
Josh Waite – presentation on US integration safety
UAS and Personal Privacy Guidelines

* This meeting will be teleconferenced for anyone to call in to listen or provide public testimony. Legislative Information Office services are not available at this conference site. AKLEG.tv is not available at this conference site.

Ginger Blaisdell

From: Ginger Blaisdell
Sent: Monday, August 10, 2015 4:29 PM
To: Rep. Shelley Hughes
Subject: DRAFT agenda UAS LTF

Categories: Drone

I'm waiting to hear back from RO on the demonstration for Friday and about housing/hotel options

1:00pm - 1:15pm Welcome and updates

- June 19 minutes
- List of department contacts for UAS
- Notes from department COA group
- National news update (very brief since most will be updated during conference)

1:15pm - 2:30pm Review privacy document
Finalize the document to put up on www.alaskadrones.org
Is the group comfortable with the "good citizen" management of privacy or should there be a bill drafted to regulate when a breach of privacy may occur?

- particularly, prohibiting a UAS from hovering over individuals or above their personal property without consent
- public places are just that - so citizenship should govern

2:30pm - 3:00pm Report from department COA group
Ro Bailey can talk about the law enforcement COA currently under development for law enforcement entities statewide
Strategy for the other departments to complete the COA application - if that's the appropriate next step

3:00pm - 4:30pm public testimony

4:30pm discussion and next meeting planning
discussion regarding any public testimony heard
should there be any legislation drafted
next meeting
final product since task force ends on June 30, 2016

5:00pm adjournment

6:30pm dinner at Lavelles Bistro (still waiting confirmation)

A good location for your dinner would be Lavelle's downtown. They have excellent food: http://www.lavellesbistro.com/. They are located at 575 First Avenue, Fairbanks, AK. The conference is at the Westmark on 10th.

To book the dinner reservation, their contact information is: (907) 450-0555. You can leave a message during the day or try them beginning at 4:30 p.m.

Friday **TENTATIVE**

UAS demonstrations beginning 9:00am in downtown location - Ro Bailey

Afternoon tour at Poker Flats (Ro said there wasn't a whole lot to see there...)

- the test site office(s) is unmarked - it's just offices because the flights occur in a variety of locations around the state
- we could look at the rocket launch facility (30 minutes) but it's not part of the ACUASI / test site

ALASKA UAS
INTEREST GROUP

2015 Annual Meeting – Workshop Agenda

Arctic Theme – Tuesday, September 1

With the U.S. assuming chairmanship of the Arctic Council from April 2015 to April 2017, an Arctic theme is featured the first day with presentations by Alaska corporations on commercialization of the industry and by the university on recent unmanned aircraft missions such as oil spill research, and sea ice, sea grass, and otter surveys. Likewise, several of the university's global partners will be speaking on this day as well.

08:30 – 09:00	**Welcome and Introduction – Overview of UAS Program: Past, Present, and Future** Pat Gamble, former President, University of Alaska Jim Johnsen, President, University of Alaska Dr. Bob McCoy, Director, Geophysical Institute, University of Alaska Fairbanks (UAF) Marty Rogers, Director, Alaska Center for UAS Integration (ACUASI)
09:00 – 09:15	**Keynote Speaker** Senator Pete Kelly, Co-Chair Senate Finance, Alaska State Legislature
09:15 – 09:45	**Arctic Slope Regional Corporation (ASRC) - Federal** Bill "Sweet" Tart, Senior Director, Unmanned Systems and Robotics Kevin "Stenny" Stenstrom, Senior Director, Business Development ASRC Federal ○ *One Alaskan Native Corporation's perspective on the UAS industry*
9:45 – 10:30	**Pogo Mine** David Larimer, Chief Geologist, Sumitomo Metal Mining Pogo LLC ○ *Unmanned Reconnaissance Systems in Underground Mine Rescue Actions* Dr. Mike Hatfield, Assistant Professor, University of Alaska Fairbanks ○ *Unmanned Vehicles for Mine Safety Rescue & Training*
10:30 – 11:00	**Morning Networking Break**
11:00 – 11:45	**University of Alaska Fairbanks and Alaska Center for UAS Integration** Jessica Garron, Senior Science Consultant at Alaska Satellite Facility, UAF Matt Westhoff, UAS Pilot, ACUASI ○ *Aerial Operations for Arctic Oil Spill Response*
11:45 – 12:15	**University of Alaska Fairbanks and Alaska Center for UAS Integration** Dyre "Oliver" Dammann, graduate student in geophysics, University of Alaska Fairbanks Eyal Saiet, Remote Sensing Specialist, ACUASI ○ *Sea Ice Survey Using Unmanned Aircraft Near Barrow, Alaska*
11:45 – 13:15	**Working Lunch** - Enjoy the buffet lunch while the meeting continues

12:15 - 12:45	**Bureau of Ocean Energy Management and Alaska Center for UAS Integration** Rick Raymond, Wildlife Biologist, BOEM Sam Vanderwaal, Systems Integration & Engineering, ACUASI ○ *Testing the use of Unmanned Aircraft Systems for Intertidal Surveys - proof of concept*
12:45 – 13:15	**U.S. Geological Survey, Alaska Science Center** Dr. Brian Battaile, Research Wildlife Biologist ○ *Testing the use of Unmanned Aircraft Systems for Walrus Surveys - proof of concept*
12:45 – 14:00	**National Oceanic Atmospheric Administration (NOAA)** John "JC" Coffey, Director, Unmanned Systems, Cherokee Nation Technologies, NOAA UAS Program Office ○ *NOAA Atmospheric, Marine and Arctic Monitoring Using UASs (including Rapid Response)*
14:00 – 14:30	**URS/AECOM Australia** Dr. Catherine Ball, Regional Unmanned Aerial Systems Lead ○ *World first UAS based environmental and engineering surveys* ○ *The antipodean appetite for UAS* ○ *The good, the bad, and the not so ugly*
14:30 – 15:00	**Afternoon Networking Break**
15:00 – 15:45	**National Oceanic Atmospheric Administration (NOAA)/National Marine Fisheries Sciences (NMFS)** Dr. Robyn Angliss, Deputy Director, NOAA/NMFS ○ *Comparing Manned and Unmanned Aircraft System Surveys for Cetacean Monitoring in the Arctic*
15:45 – 16:30	**Transport Canada & National Research Council Canada** Fernando Mojica, Project Director UAS, Transport Canada / Aircraft Services Directorate (AAF) Paul Truant, Project Manager, UAS Project, Transport Canada Iraj Mantegh, Program Leader, Civil Unmanned Aerial Systems, NRC Canada-Aerospace ○ *Unmanned Aerial Systems in Canada - Transport Canada, National Research Council Canada, and Canadian Coast Guard are Exploring Exciting New Opportunities for the Use of UAS for Civilian Government Applications*
16:30 – 17:00	**University of Hawaii** Ted Ralston, Consultant (Retired aerospace executive) Dilmurat Azimov, PhD, Assistant Professor of Mechanical Engineering ○ *Integrated Sensor Fusion, Targeting, Guidance and Control Framework and Algorithms for Autonomous Unmanned Aerial Systems*
17:00 – 17:05	**Meeting Conclusion and Announcements** Marty Rogers, Director, ACUASI
18:30 – 21:30	**Networking Reception at Fountainhead Antique Auto Museum** 212 Wedgewood Drive, Fairbanks, Alaska 99701. Phone: 907-450-2100 Business networking at its best. Enjoy an evening surrounded by a collection of over 80 vehicles, including horseless carriages, steamers, electric cars, speedsters, cyclecars, midget racers and 30s classics. Featuring rarities such as an 1898 Hay Motor Vehicle, 1906 Compound, 1920 Argonne and 1921 Heine-Velox Victoria.

Technical Theme – Wednesday, September 2

Technical presentations on emerging technologies will be provided by the military, government, industry, and private participants on a wide variety of unmanned systems on topics including UAS traffic management (UTM), environmental science, emergency response in firefighting, precision integrated programs, and image processing from UAS sensor data.

08:30 – 08:45	**Fort Wainwright, U.S. Army Garrison and U.S. Army Alaska** **COL Sean Williams, Garrison Commander** ○ *Arctic Security and Gray Eagles in Alaska*
08:45 – 09:15	**Keynote Speaker** Senator John Coghill, Majority Leader, Alaska State Legislature
09:15 – 10:00	**Lockheed Martin** Mike Glasgow, Lockheed Martin Fellow, Chief Architect for Aviation Services ○ *UAS Traffic Management (UTM): Enabling UAS Operations*
10:00 – 10:30	**Morning Networking Break**
10:30 - 11:30	**Northrop Grumman Aerospace Systems** Bill Walker, Business Development, HALE Unmanned Systems ○ *Global Hawk in Environmental Science*
11:30 – 12:00	**Bureau of Ocean Energy Management (BOEM)** Rick Raymond, Wildlife Biologist ○ *BOEM Alaska Environmental Studies Program*
11:45 – 13:15	**Working Lunch** - Enjoy the buffet lunch while the meeting continues
12:00 - 13:00	**Airware** Mark Davis, Vice President of Sales ○ *Putting Drones to Work: Meeting the Needs of Enterprises*
13:00 – 14:00	**Aerobat Aviation, Inc.** Travis Shannon, Chairman & CEO ○ *Emergency Response to Wildfires with UAS (data capture in Montana, August 2015)*
14:00 – 15:00	**PEDMAS Technologies & Innovations** John Shepley, Chief Technology Officer ○ *Improving Environmental Situational Awareness for UAV Operations*
15:00 – 15:30	**Afternoon Networking Break**
15:30 – 16:15	**Precision Aviation** Matt Parker, UAS Operations Director ○ *Diversified Operations - An Operator's Perspective*
16:15 – 16:45	**Brainlike – Smart Sensing Solutions** Dr. Robert "Bob" Jannarone, CEO, Brainlike ○ *Image Processing from UAS Sensor Data: Wildlife Survey Prospects*
16:45 – 17:00	**Meeting Conclusion and Announcements** Marty Rogers, Director, ACUASI

Policy Theme – Thursday, September 3

With the dynamic changes over the past year, lead representatives from the Federal Aviation Administration (FAA), the UAS Center of Excellence for Unmanned Aircraft Systems, the FAA's six unmanned aircraft test sites, and others will describe how the unmanned aircraft industry is being shaped. In the afternoon, technical presentations will be provided on miniature surveillance avionics, oil spill response, meeting the needs of enterprises, improving environmental situational awareness, applying complexity leadership theory to drone airspace integration, and developing payloads for climate research in Alaska. At 1:00 p.m., Alaska's Unmanned Aircraft Systems Legislative Task Force will convene a meeting adjacent to the conference that will be open to the public.

08:30 – 08:40 **University of Alaska Fairbanks**
Dr. Bob McCoy, Director, Geophysical Institute
- *Opening and Introductions*

08:40 – 09:00 **Keynote Speaker**
Representative Steve Thompson, Co-Chair House Finance, Alaska State Legislature

09:00 – 09:30 **Federal Aviation Administration (FAA)**
Unmanned Aircraft Systems (UAS) Integration Office, Washington, DC
Bill Crozier, Assistant Manager for Flight Standards
- *Major Strides Forward for Research and Commercialization in 2015*

09:30 – 10:00 **FAA's Center of Excellence on UAS**
Marty Rogers, Vice Director of ASSURE (FAA COE)
- *Universities and Corporations Collaborating for Success for Integration of UAS into the National Airspace System (NAS)*

10:00 – 10:30 **Morning Networking Break**

10:30 - 11:30 **FAA's Six Test Sites to Integrate UAS into the NAS – Technical Panel**
Elizabeth Soltys, Engineer and Manager Unmanned Aircraft Systems Test Sites
- *Discussion of achievements and pathway forward*

11:30 – 12:30 **Federal Aviation Administration**
JoAnn Ford, Manager, FAA Navigation Services Systems Engineer
- *Comparing GPS to WAAS tools that are coming from the NextGen upgrades to the overall NAS systems*

11:45 – 13:15 **Working Lunch** - Enjoy the buffet lunch while the meeting continues

12:30 - 13:00 **Alaska State Legislature**
Unmanned Aircraft Systems Legislative Task Force
Senator Peter Micciche, Co-Chair
Representative Shelley Hughes, Co-Chair,
- *Update on task force efforts from 2014 to 2015*

13:00 – 17:00 **Unmanned Aircraft Systems Legislative Task Force Meeting**
(Adjacent to main conference room directly following the lunch hour)

13:00 – 13:30 **Sagetech Corporation**
Jim Davis, Engineering Director
- *Miniature Surveillance Avionics for sUAS*

13:30 – 14:30 **Trumbull Unmanned**
Dyan Gibbens, Founder & CEO
- *UAVs for Oil Spill Response & Flying Indoors*

14:30 – 15:00 **State of Alaska Department of Transportation**
Jeff Roach, Northern Region Planning Manager, Aviation and Highways
- *UAS from an Airport Perspective*

15:00 – 15:30 **Afternoon Networking Break**

15:30 – 16:15 **University of Alaska Fairbanks, International Arctic Research Center**
Dr. Jessica Cherry
- *Developing payloads for climate research in Alaska*

16:15 – 16:45 **Department of the Interior (DOI)**
Harry Kieling, Alaska Regional Director, Office of Aviation Services (OAS)
- *The Evolution of the Unmanned Aircraft Industry: Then and Now*

16:45 – 17:00 **Meeting Conclusion and Announcements**
Marty Rogers, Director, ACUASI

18:30 – 21:30 **Alaska Riverboat Discovery – Dinner Cruise**
975 Discovery Drive, Fairbanks, Alaska 99709
(907) 479-6673

Enjoy a relaxing dinner cruising into the heart of Alaska introducing you to the culture and way of life in the "Last Frontier". The narration covers the gambit of anthropology, culture, geology, glaciology, history, with even a little hydrology and engineering thrown in for good measure!

Josh Waite
presenter

These responses are based on several years of experience flying in military airspace integrated with UAS and current participation in the UAS industry. I am a military pilot with roughly 2,000 flight hours in Iraq and Afghanistan. And I currently participate in management of an FAA-designated UAS Test Site. 9-3-2015

Effect on Safety of Air Traffic.

1. The proposed rule suggest 500 feet AGL as the limit for small UAS operations. There are two concerns with this altitude: first, the variance in barometric altimeter readings (of manned aircraft) and GPS derived altimeter readings (on most UAS), and second, the lack of sufficient buffer with potential manned aircraft operations.

The difference in altimeter readings is the result of two issues. GPS reception issues reduce the accuracy significantly, and the product is a true altitude, as opposed to the rough relative altitude of a barometric altimeter. I have personally witnessed a UAS reporting that it was below me, but was actually above – a difference of greater than 500 feet from what was reported.

Add to this uncertainty of position the fact that most of the U.S. is "uncongested" area. Therefore, manned flight over most of the National Airspace (NAS) is limited to 500 feet AGL by 14 CFR 91.119. Or, in the case of sparsely populated areas, 500 feet from the nearest person, vessel, vehicle or structure. Meaning that most of the NAS has a buffer of zero on paper, and the altimeter discrepancies have made the situation worse.

In addition, there are many Military Training Routes throughout the NAS. In most cases, this involves fast flight at low altitudes (300 feet AGL in many cases). A UAS operation in one of these areas could encounter a C-130 at 180 to 250 kts, or a much faster aircraft.

I propose a maximum altitude of 250 feet AGL, with exception for towers and other infrastructure of 50 feet above the height of the structure, in a 100 foot radius.

2. The proposed rule suggests a maximum airspeed of 100 mph (87 kts) for small UAS. The kinetic energy (KE) of a 55lb object moving at 100 mph is 18,386.1 ft/lb. KE of ~20,000 ft/lb can cause structural damage to large aircraft. This assumes the large aircraft is standing still. As a UAS strike from the rear of an aircraft is unlikely, we shall discuss only front aspect collisions. In this case, the best scenario of a UAS strike is where the UAS is crossing the path of the aircraft. KE is dependent on the velocity (V) of the aircraft then, and we will use 130 kts as approach speed. And $KE = 1/2MV^2$, so the kinetic energy of the UAS is $\frac{1}{2}*(55lbs)*(130kts)^2 = 41,149$ ft/lb. That's twice the expectation of structural damage.

14 CFR requires certain structural limits in case of bird strikes:

a. 14 CFR Part 25-631: Transport category airplanes must be capable of continued safe flight and a subsequent normal landing after the *empennage structure* has been impacted by an 8 lb bird at cruise speed at mean sea level.
b. 14 CFR Part 23.775: Normal, utility, acrobatic and commuter category airplanes are required to have limited *windshield* integrity to withstand a 2 lb bird impact at maximum approach flap speed and at least one pane with sufficient forward vision remaining to allow continued safe flight.

c. 14 CFR Part 29-631: Transport category rotorcraft are required to have a *structure* which will ensure that continued safe flight and landing is possible after impact with a bird of up to 1 kg (at the lesser of Vne and Vh at 8000 feet above mean sea level.
d. 14 CFR Part 25.571: Transport category airplanes must be capable of successfully completing a flight during which likely *structural damage* occurs as a result of impact with a 4 lb bird with a relative velocity of Vc at sea level or 0.85Vc at 8,000 feet, whichever is more critical.

Today's aircraft are built to withstand 2, 4, and 8 lb birds. Not 55 lb pieces of machinery that shatter rather than squish on impact.

Now, consider again the C-130 at 250 kts or the B-1 at 400 kts and 300 feet AGL.

I propose reducing the altitude limit to 250 feet AGL, and the airspeed limit to 50 mph (44 kts).

Please refer to Attachment 1 *Kinetic Energy of Bird Strikes & Damage to Aircraft* by Roger Nicholson, PhD and Attachment 2 *Bird Strike Airworthiness Standards*

3. The Proposed rule makes no mention of visibility-increasing measures.

I propose the requirement for a high-visibility paint scheme, such as asymmetrical international orange.

4. The proposed rule states that "pilots must have an ATC clearance to enter certain controlled airspace. In other words, the FAA requires ATC to have knowledge of aviation operations in the airspace due to the greater amount of activity in that area compared to uncontrolled airspace." However, no mention is given to proximity to uncontrolled airports. The lack of ATC facilities can make UAS operations in these areas even less safe.

I propose that small UAS operations are not permitted within 10 miles of any airport without an active NOTAM and continuing radio communication with the controlling ATC or with CTAF.

5. The proposal indicates that the only requirement for accident / incident notification is a report due within 10 days of the occurrence. While the referred 49 CFR 830.15(a) does provide for a 10-day timeframe to submit a report, 49 CFR 830.5 requires immediate notification.

I propose correcting the rule to be in accordance with 49 CFR 830.5.

Airworthiness

1. The Proposed rule eliminates the requirement for Airworthiness Certification, yet also identifies that the model aircraft standards of testing are higher and are operations are limited to 400 feet AGL (AC 91-57).

While the proposal has identified the shortcomings of applying the current manned aircraft processes to UAS, I do not believe deleting all the requirements is a viable option. A standard airworthiness certificate may be more than necessary for a small UAS, an experimental – type certificate would be more acceptable. It would ensure an airworthiness review and reduce the excessive burden on manufacturers. The FAA has only just begun the Designated Airworthiness Representative (DAR)

process with UAS. This should be more widely addressed and expanded to include Designated Engineering Representatives (DERs) as well. And as the experimental process has its limitations, I propose that experimental certification is a path to a UAS type certificate covered in a separate Part of 14 CFR to address UAS.

2. The proposal uses the comparison of potential damage from a 55lb UAS and a 6600lb manned aircraft, asserting that the UAS is safer. Given the fact that the 6600lb aircraft has been through rigorous analytical, bench and flight testing, over a period of 3-5 years, I would take exception with that assertion. "Mean Time Between Failures" are known quantities and inspections are directed. The larger, manned aircraft is proven, whereas the untested small UAS is not. Please view the many "drone crash videos" online right now, some of these are operator error, and some are system failure.

3. The proposal identifies Loss of Positive Control as one of the greatest risks, and that confining airspace to that within line-of-sight as the mitigating treatment for that risk. There is no discussion of Loss of Link and Loss of GPS occurring at the same time. The occurrence of these two failures at the same time cannot be excluded due to the fact that no testing and certification is required. There are a number of electrical issues that can easily render both receivers inoperable.

I assert that a confined area, alone, does not satisfactorily reduce risk of Loss of Positive Control and propose that flight testing is required, and that DAR / DERs are utilized for that task. I propose that requirements for Flight Termination Systems or Procedures are utilized as treatments for risk mitigation by Designees in evaluating new systems.

4. The proposal states that transponders and Traffic Collision Avoidance Systems are helpful in reducing mid-air collisions, but they are too large and heavy to be used in small UAS. With regard to transponders, this is an inaccurate statement. There are transponder / ADS-B units today that are designed for small UAS and weigh 100 grams. And regarding TCAS, the statement is disingenuous, as FAA Order 8900.1, Volume 16, *Unmanned Aircraft Systems* states that TCAS cannot be used as a method for see and avoid, and the FAA has issued COAs which prohibit the use of TCAS by UAS.

Both of these traffic sensing systems would be very useful in avoiding potential conflicts, and there use should not be discounted. I propose that ADS-B, at a minimum, is required for all operations above 100 feet AGL.

5. The proposed method of determining function and operability is for the operator to ensure the UAS is safe for flight. But there is no definition of "safe for flight." It implies that operators will instinctively know what is meant by "safe for flight," even without specific training or guidance. Also, discussions were made regarding potential annual inspection requirements, without addition to the proposed rule.

While many operators will exercise "common sense," not all will have the required level of understanding, and the FAA historically does not rely on this approach. . I propose a requirement for training in small UAS operations and maintenance prior to certification, and a requirement for annual inspections for the UAS.

Airman Certification

The proposal suggests that formal training is too great a burden for operators wishing to commercially operate small UAS in the NAS, though the requirements for operating any other vehicle for commercial purposes are much greater – commercial drivers, commercial vessel captains, and commercial pilots. It appears the position held by the FAA throughout this proposal is focused on the "burden" at the expense of safe operation.

1. The proposal suggests small UAS have operators (as opposed to pilots) in order to avoid pilot training requirements. While this shift may reduce the time and dollar burden on the operator, it comes at the cost of air sense. As the proposal states that the rule "would not require any specific form of training or studying in order to pass a knowledge test", there is no consideration to the airman's understanding of air traffic and procedures, nor soft skills such as decision making, situational awareness, checklist procedures, human factors, risk assessment and risk management. Yet the proposal requires the airman to assess risks without specific training or procedures.

I propose that a Commercial Pilots License for UAS be required for all commercial operations of a UAS, where half of the 250 hour requirement to be accomplished in a manned aircraft and the remaining 125 hours with a UAS (less expensive than the standard commercial rating). Recommend this license would have a "UAS-only" limitation for commercial operations.

2. The proposal states that there is no need for PIC designation. Most UAS have the ability to be operated in either autonomous or manual (remote control) mode. This allows for the possibility that separate operators are at each set of controls. If there is such a possibility, then an "in-charge" must be designated or this situation must be excluded by rule. However, excluding such an operation greatly reduces the ability to train a new UAS operator. I submit that a PIC must be designated for each flight as the responsible individual.

3. The FAA proposes not to provide an operator with the emergency powers available to the PIC under § 91.3(b). A designated PIC without training in the applicable regulations and operations is a liability. This is yet another reason to require training of airmen.

4. The proposal states the intent to exempt military and former military pilots based on experience from the full, initial small UAS operator test. At another point in the proposal, the same verbiage is used for allowing current or former military operators of unmanned aircraft to take a more limited test. Given the delineation the FAA has made in this proposal between pilots and operators, is the intent to exempt both?

Military experience in UAS is in *military* airspace, almost exclusively. The burden to the operator in taking the longer initial course is near zero, and not worth the short cut. As a military pilot, I propose that no one – military pilot or UAS operator – is exempt from the longer test.

5. The proposal aims to allow operators to self-certify, at the time of their airman application and attest that they do not have a medical condition that could interfere with the safe operation of a small UAS. Further, it would prohibit a person from acting as an operator or visual observer if he or she knows or has reason to know of any physical or mental condition that would interfere with the safe operation of a

small UAS. The verbiage used is based on Sport Pilot requirements, but will be applied to commercial operations.

While there are opinions as to what such conditions might be, there is no clear listing of such. I propose a list of limiting conditions is specified within the rule. For such a list, I suggest:

- angina
- coronary heart disease that is symptomatic or clinically significant
- psychosis
- bipolar disorder
- personality disorder that is severe enough to have repeatedly manifested itself by overt acts
- substance abuse or dependence (drugs or alcohol)
- epilepsy
- disturbances of consciousness without satisfactory explanation of cause
- transient loss of control of nervous system function without satisfactory explanation of cause.

6. While this proposed rule limits small UAS operation to visual line-of-sight, it does not require vision to be corrected to 20/20.

I propose that vision is required to be corrected to 20/20 to operate a UAS.

7. The proposed rule requires an applicant to be 17 years of age, and cites regulation allowing glider and balloon pilots at 16 years. However, commercial glider and balloon pilots must be 18 years old.

I propose that the minimum age for commercial operations keep in line with all other types of flight operation – 18 years of age.

Line of Sight and VO

1. The proposed rule requires that any Visual Observer maintain visual contact with the small unmanned aircraft and the surrounding airspace and communicate to the operator the flight status of the small UAS and any hazards which may enter the area of operation so that the operator can take appropriate action. While the VO is performing a key pilot-function they would not be required to have training of any kind. Further, accurate estimation of relative motion from a third position is very difficult, and mistakes can make a bad situation worse.

I propose that VOs are required to be trained on the applicable sections of part 91, as is the current standard of governmental entities operating UAS, and also in visual observation techniques.

2. The FAA acknowledges in this proposal that visual observation "is a concentration-intensive activity," but does not address time limits for such an operation. A long period without rest in this type of activity will result in loss of concentration and may result in loss of visual contact or loss of situational awareness. Either of these situations would pose a safety risk.

I propose a maximum duration of operation as a VO to be 45 minutes followed by a break of at least 15 minutes.

Micro UAS

1. The FAA has proposed the Micro UAS class with even less restriction. While this class is smaller, it is still the same size (4.4 lbs) as the birds considered for structural engineering, and at a 100 mph limit, will still carry a significant amount of energy. Even with the proposed frangible materials, parts such as propellers, moving at high speeds can injure people.

The allowance of these UAS to fly over any person, including those not involved, is unsafe and negligent. Training and certification should be defined and required.I propose the following changes to limits in accordance with discussions above:

- Maximum altitude – 250 feet AGL, except 50 feet above a structure within a 100 foot radius of that structure
- Operator ground and flight training, written and practical test required
- Visual Observer training required
- Distance from people and structure would be the same as small UAS – operations not allowed over any person not involved in the operations (unless under a covered structure)

Insurance

This proposal does not define requirements for liability insurance. (while also allowing flight in congested areas over persons and structures). Liability insurance is required of aircraft operators in every other category of flight, in private operations and commercial. Given the risks and early technology stated of the UAS industry, liability insurance should be a requirement.

I propose the same insurance minimums currently required for private and commercial manned flight operations.

N-number

The current and proposed requirements for UAS registration include obtaining an N-number. First, the number of available N-numbers is finite and will struggle to keep up with the volume of UAS entering the market. Second, there is currently no differentiation between manned aircraft and UAS in the assigned N-number. Third, the process for obtaining a registration is antiquated and cumbersome – carbon-copy and regular mail.

I propose a new numbering system for UAS, utilizing "NU" for UAS, similar to the older method of "NX" for experimental. I also propose a web-based system for obtaining a registration, which would greatly expedite the process.

Enforcement

With no need for operations based at an airfield, no requirement for flight plan or NOTAM filing, and the small footprint of a UAS operation, how will the FAA know where to go for compliance inspections?

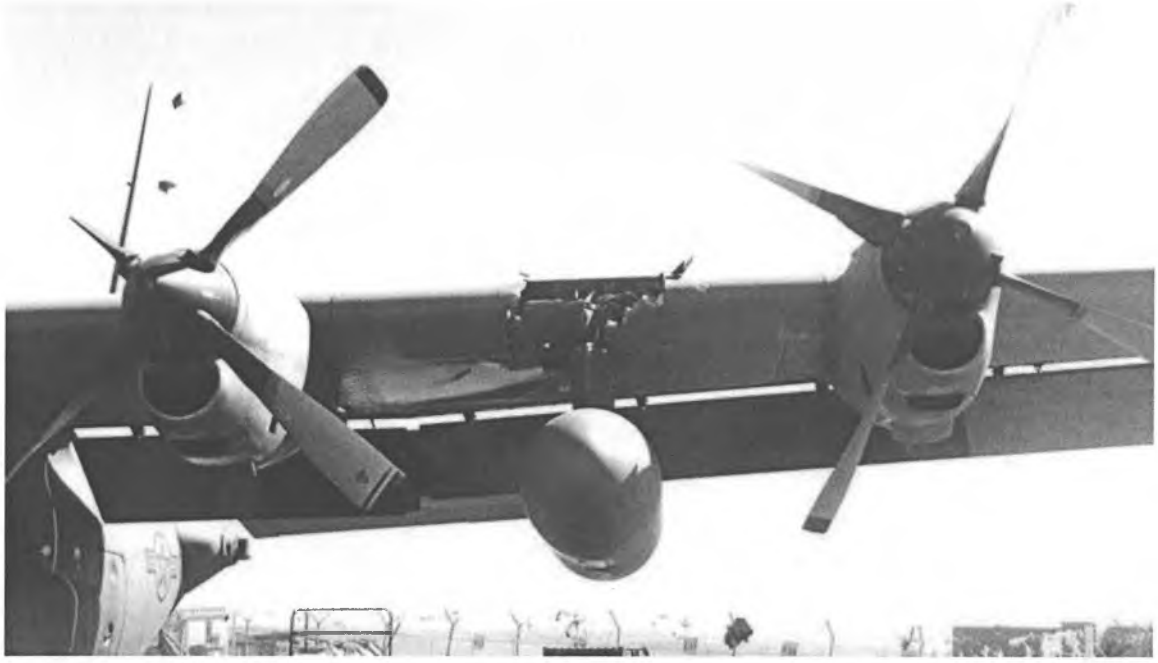
Further, what is at stake for a commercial UAS operation? A near-zero burden reduces the cost for the operator, but in doing so also reduces the incentive to operate in compliance with regulations. Cost of doing business is the incentive keeping most businesses in compliance with regulation, as loss of the ability to operate comes with a significant potential loss in capital. While commercial UAS operations will inherently be cheaper than manned flight, it should not be at the expense of safety with little to no proposed training requirements, no airworthiness inspection / certification, no insurance, and minimal regulation.

Trusting airspace limitations as the only mitigating factor is extremely risky. How are these airspace parameters of operation enforced? When a near-miss incident is reported, who do authorities go to for answers?

I propose mandatory flight plan filing for UAS operations to ensure oversight is possible, and mandatory NOTAM filing for UAS operations within 10 miles of an airfield, and other high-traffic areas.

General Thoughts

1. The proposed rule considers injury and damage to ground-based persons and property, but little for air traffic. As a military aviator with roughly 2,000 flight hours in the combat airspace shared with UAS, I have had several near-misses with unmanned aircraft. Additionally, friends of mine endured a mid-air collision between the C-130 they were flying and a 375 lb UAS. Luckily, they were on 5-mile final to the airport as the impact caused great damage and the aircraft could have become uncontrollable if not for the proximity to landing and quick corrective actions of the crew. Photos of the damage are available online, but a full report of the incident and damage sustained by this ~130,000 lb aircraft can be obtained from the USAF.



If we compare the structural damage to a combat aircraft weighing ~130,000 lbs by a 375 lb UAS to the potential damage to a 1,300 lb general aviation aircraft by a 37.5 lb UAS, the kinetic energy of the impact would be an order of magnitude greater. Without the proper regulations, training, certification and compliance in place, it's not a matter of if, it's a matter of when.

2. The FAA proposal currently rests on "limiting airspace" as a single treatment to mitigate all risks and does not thoroughly consider the potential for uncertified / untested aircraft to exceed those airspace boundaries (due to fault or failure). I understand that there is political pressure to integrate UAS into the national airspace system, but it should not be at the risk of life, limb or property. There have been a significant amount of near-miss incidents between UAS and manned aircraft in the last few years. The 26 Nov 2014 FAA report on near collisions indicated 25 incidents from 1 June 2014 until the report in which a UAS was within 10 seconds (or a few feet) of impacting a manned aircraft.

A few of my personal experiences, with experienced UAS operators in military airspace are described below:

- While flying in the traffic pattern at 1000' AGL in a small aircraft, a 375 lb UAV was launched below me without authorization. I had to maneuver to avoid the UAS and it passed within 500' vertical and less than 1/4 mile lateral. The aircraft I was flying was not equipped with TCAS, and I had to rely on the ATC Tower controllers' direction for initial avoidance maneuvering.
- Flying a medium sized aircraft on 3 mile ILS final, in marginal weather, a 40 lb UAS flew in opposite direction *just* off of centerline. I had to maneuver to avoid the UAS and it passed within 100' vertical and less than 1/2 mile lateral. The UAS was intermittently showing on TCAS, with significant gaps in display.
- In a medium sized aircraft, established at FL220, I was instructed by ATC to descend for a large UAS with lost link. Once I was established at FL210 (within 5 miles of the UAS and opposite

direction) the UAS Lost Link Flightplan commanded it to descend. I had to maneuver to avoid conflict and passed within 500' vertical and 1 mile lateral. This UAS did display on TCAS.

- In a medium sized aircraft, established at FL 200 at night, a large UAS passed less than 500 feet directly beneath me. It was not squawking and passed between my aircraft and another established at FL210. The operator was not talking to anyone on the radio. The UAS was visually acquired.
- In clear conditions, I had visually contacted a UAS above my aircraft, when the UAS showed up on my TCAS display as a traffic alert, it was reporting below my aircraft by ~200 feet. The differences in settings and use of GPS derived altimeter likely contributed to the situation.

Some of these issues were based on communications, some on GPS altimeters, o thers on procedures and understanding of airspace. The thought of UAS flight operations with extremely limited understanding of the operation, air traffic, limited training, no investment, and nothing at stake SCARES ME and should scare every pilot with skin in the game.

As a manned aviator and experienced member of the UAS industry, I am very concerned about current political and industry pressure outweighing safety concerns and risk mitigation.

4. The UAS Test Site program was initiated to assist in UAS integration; providing data and feedback to the FAA. However, due to the lack of funding, limited support, and process management gaps, very few resources have been directly and solely assigned to this program. This has resulted in little progress and the Test Sites continue to wrestle with the FAA to accomplish congressional goals. I recommend prioritization, simplification and wide research scope be established at the Test Sites if we are to expect successful data/results to come from this initiative and assist the FAA in the safe integration of UAS into the NAS.

5. On a final note, a 60 day proposal response window is a very short time period to provide meaningful, constructive responses. The potential impacts of this proposal are vast and daunting. I propose the window is reopened for another 30 days to allow for further collaboration in responses and suggested fixes. This is a matter that could have significant adverse safety impacts.

Joshua Waite

Operations Manager

Peak 3 Technical Services, Inc.

Attachment 1 – *Kinetic Energy of Bird Strikes & Damage to Aircraft* by Roger Nicholson PhD

Attachment 2 – *Bird Strike Airworthiness Standards*

Kinetic Energy of Bird Strikes & Damage to Aircraft

A Visual Analytics Approach using
Bird Species & Kinetic Energy in a Flight Envelope of Strikes
(US FAA National Wildlife Strike Database)

Roger Nicholson PhD
Associate Technical Fellow
Boeing Commercial Airplanes
Roger.Nicholson@Boeing.com
Bird Strike Committee USA Conference & Annual Meeting
August 13-16, Memphis, Tennessee

Outline

- Bird Strike Regulations
- Kinetic Energy
- Flight Envelope: Altitude vs. Speed
- Bird species, size and weight, 0-4lb, 4-8lb, 8-12lb, 12-30lb
- Fatal accidents, hull losses, and significant strikes
- Airplane component damage

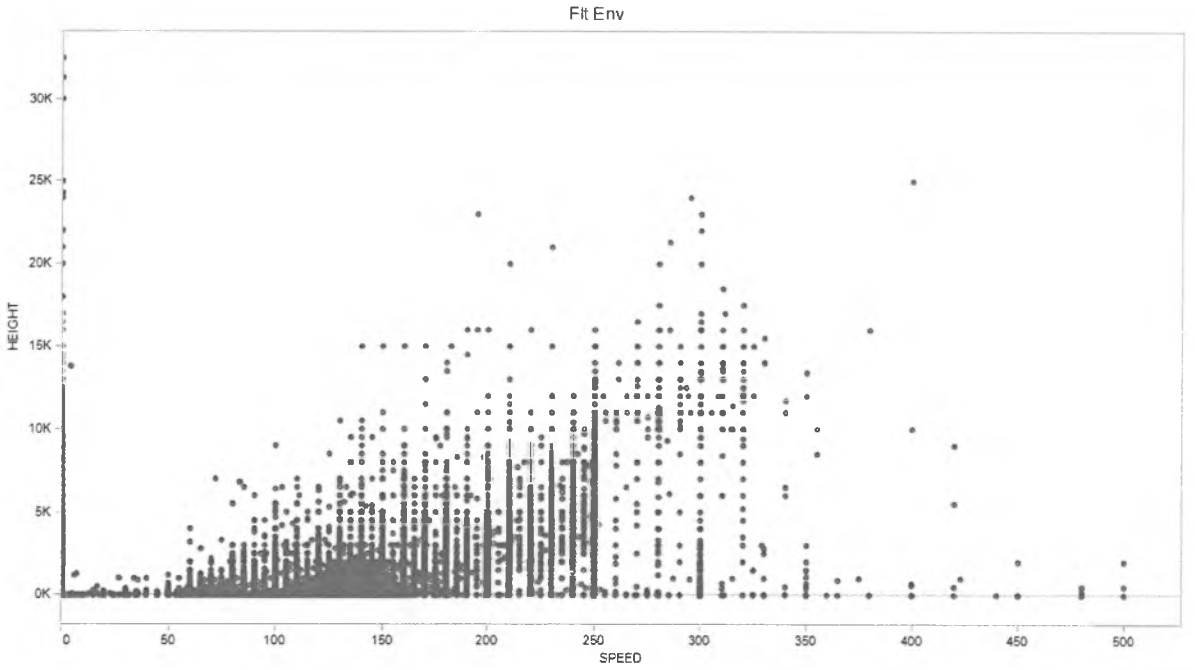
Federal Aviation Requirements (FARs) for Bird Strike, 14 CFR 25

- 25.571 (general structure): 4-lb bird at Vc, airplane cruise speed, 0.85 Vc at 8,000ft
- 25.631 (empennage): 8-lb bird at airplane cruise speed Vc
- Requirements for physical separation of airspeed sensors
- Power plant requirements, Part 33

Kinetic Energy, KE=1/2mV^2

- m, bird mass, obtained from SPECIES table, used average of mean mass of female and mean mass of male, pounds or kilograms
- V, true air speed, knots , derived from pressure altitude and calibrated airspeed, converted to feet/sec or metre/sec
- KE in units of ft-lb, or kilojoule
- Structural damage when KE => 20,000 ft-lb
- Canada goose (9.2-lb), At 250kt, 10,000ft altitude, KE ~ 33,900 ft-lb

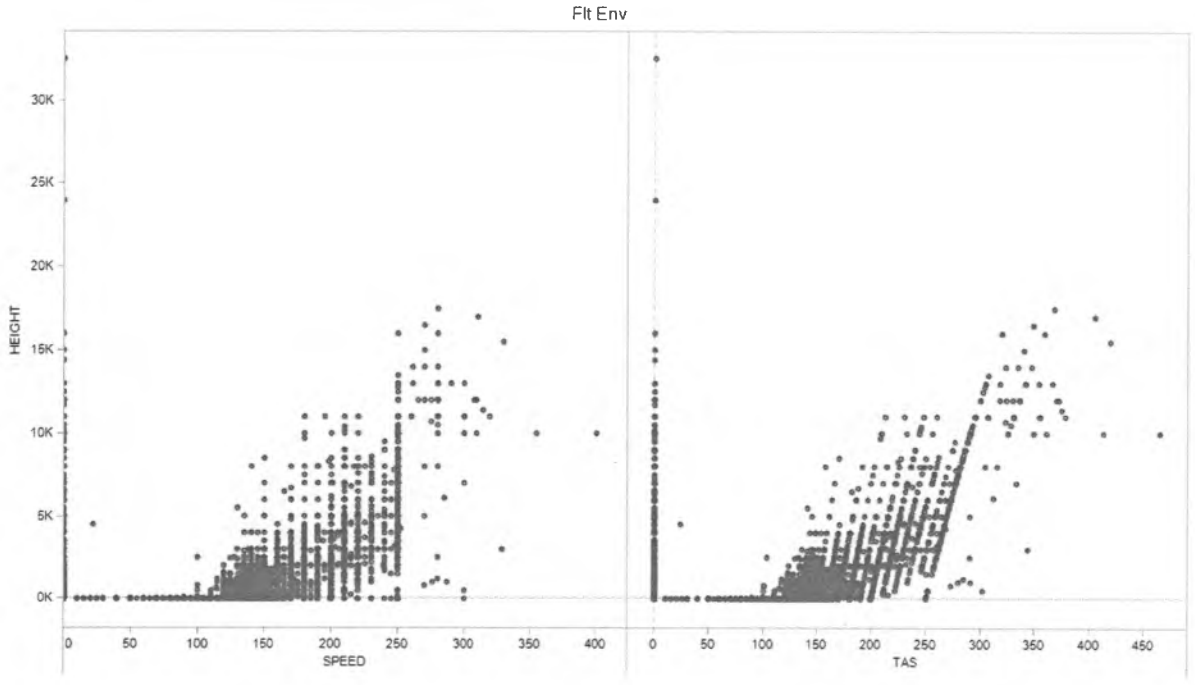
Flight Envelope: NWSDB fields of HEIGHT (above ground level, AGL, ft) & SPEED (indicated air speed, IAS, kt)



Flight Envelope:

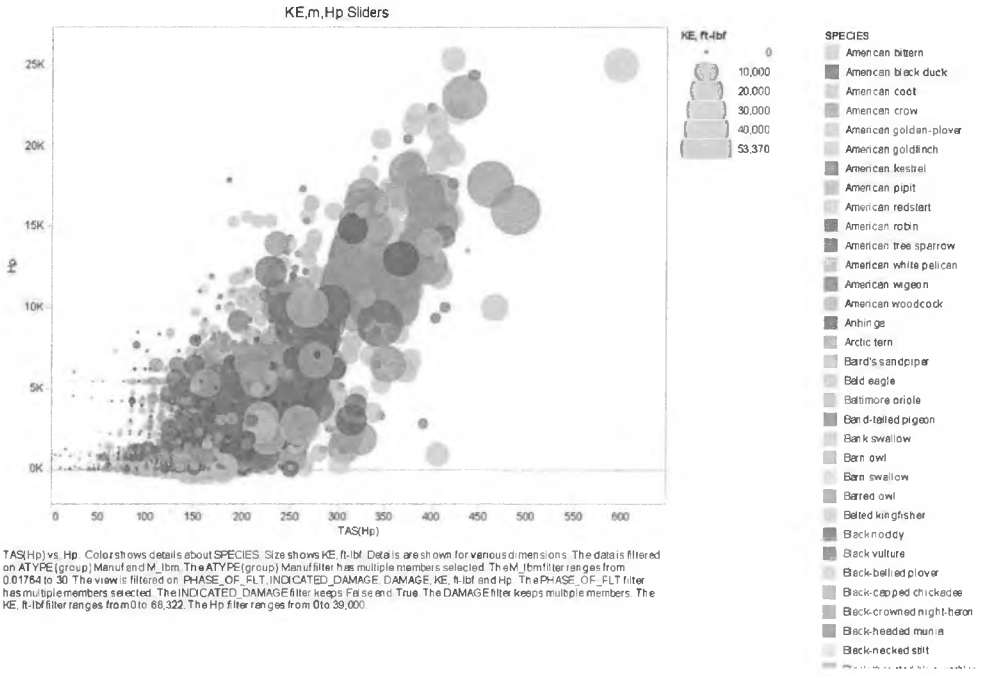
Hp (Pressure altitude) = Height (AGL) + Field Elevation

TAS (True air speed) ~ IAS + (0.02 x IAS x Altitude in 1000ft)



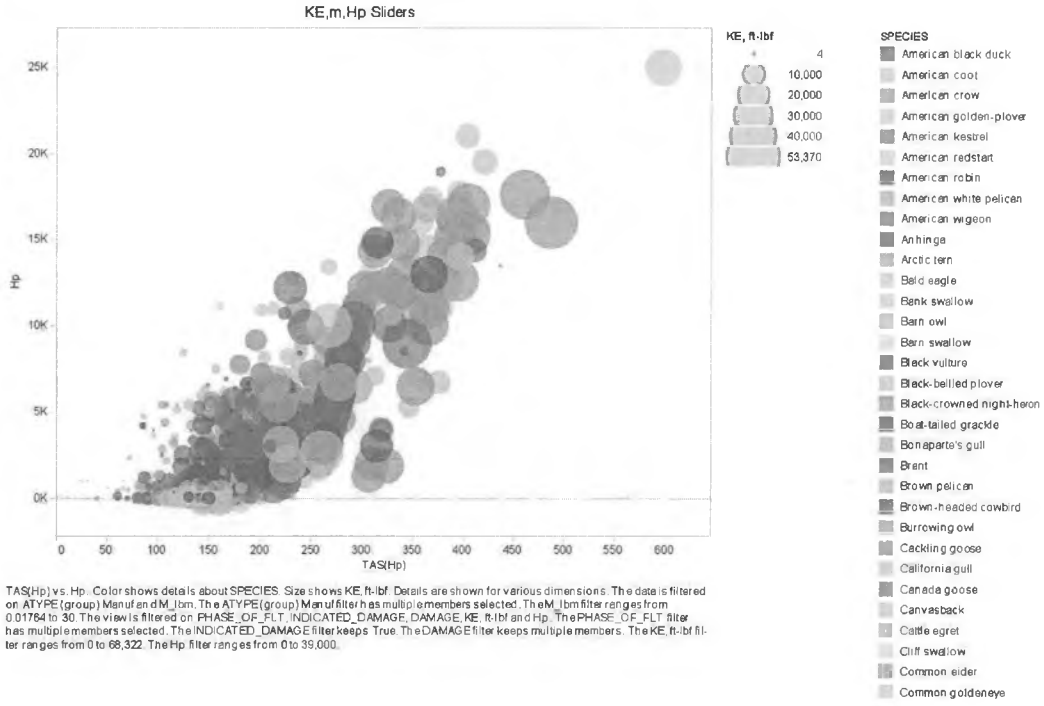
Flight Envelope: Part 121 Strikes

Color: species->mass; Size: kinetic energy



TAS(Hp) vs. Hp. Color shows details about SPECIES. Size shows KE, ft-lbf. Details are shown for various dimensions. The data is filtered on ATYPE (group) Manuf and M_lbm. The ATYPE (group) Manuf filter has multiple members selected. The M_lbm filter ranges from 0.01764 to 30. The view is filtered on PHASE_OF_FLT, INDICATED_DAMAGE, DAMAGE, KE, ft-lbf and Hp. The PHASE_OF_FLT filter has multiple members selected. The INDICATED_DAMAGE filter keeps False and True. The DAMAGE filter keeps multiple members. The KE, ft-lbf filter ranges from 0 to 68,322. The Hp filter ranges from 0 to 39,000.

Part 121 Strikes with Damage



TAS(Hp) vs. Hp. Color shows details about SPECIES. Size shows KE, ft-lbf. Details are shown for various dimensions. The data is filtered on ATYPE (group) Manuf and M_lbm. The ATYPE (group) Manuf filter has multiple members selected. The M_lbm filter ranges from 0.01764 to 30. The view is filtered on PHASE_OF_FLT, INDICATED_DAMAGE, DAMAGE, KE, ft-lbf and Hp. The PHASE_OF_FLT filter has multiple members selected. The INDICATED_DAMAGE filter keeps True. The DAMAGE filter keeps multiple members. The KE, ft-lbf filter ranges from 0 to 68,322. The Hp filter ranges from 0 to 39,000.

Small Birds, 0-2 lb

Cattle egret, 0.82#

Rock pigeon, 0.81#

Laughing gull, 0.72#

Mourning dove, 0.27#

Killdeer, 0.22#

European starling, 0.19#

House sparrow, 0.062#

Small-Medium Birds, 2-4 lb

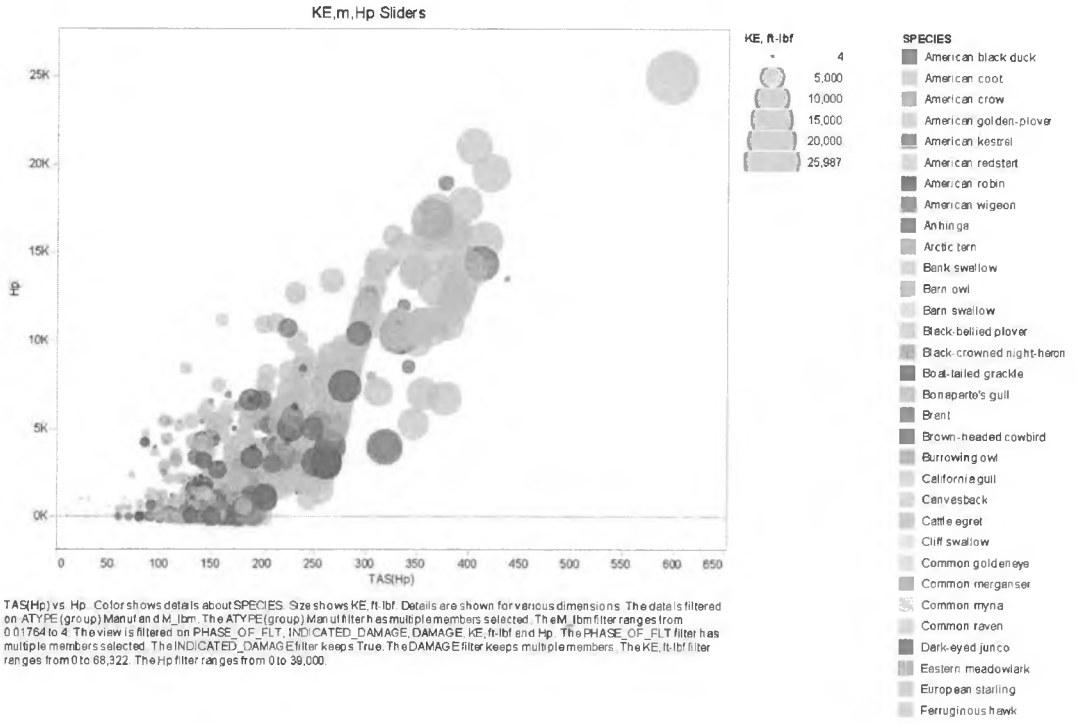
Osprey, 3.5#

Mallard, 2.8#

Red-tailed hawk, 2.7#

Herring gull, 2.5#

Part 121 Strikes with Damage 0-4lb



TAS(Hp) vs. Hp. Color shows details about SPECIES. Size shows KE, ft-lbf. Details are shown for various dimensions. The data is filtered on ATYPE (group) Manuf and M_lbm. The ATYPE (group) Manuf filter has multiple members selected. The M_lbm filter ranges from 0.01764 to 4. The view is filtered on PHASE_OF_FLT, INDICATED_DAMAGE, DAMAGE, KE, ft-lbf and Hp. The PHASE_OF_FLT filter has multiple members selected. The INDICATED_DAMAGE filter keeps True. The DAMAGE filter keeps multiple members. The KE, ft-lbf filter ranges from 0 to 68,322. The Hp filter ranges from 0 to 39,000.

Medium-Large Birds, 4-8 lb

White stork, 7.9#

Greater white-fronted goose, 6.6#

Snow goose, 6.0#

Great blue heron, 5.5#

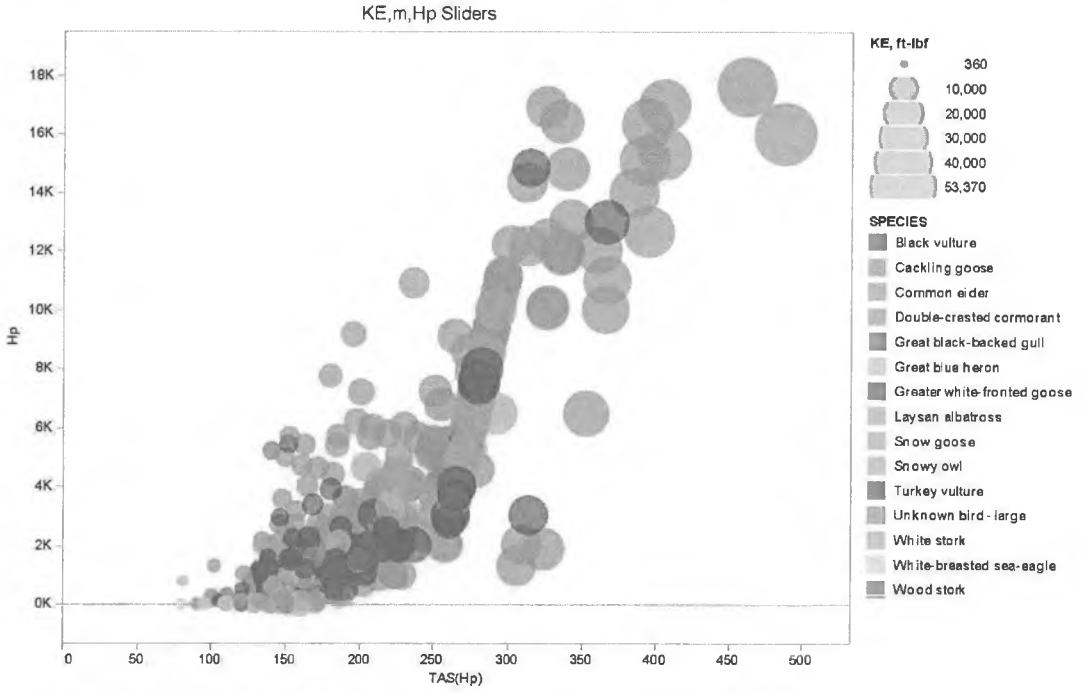
Snowy owl, 5.0#

Black vulture, 4.8#

Turkey vulture, 4.4#

Glaucous gull, 4.1#

Part 121 Strikes with Damage 4-8lb



TAS(Hp) vs. Hp. Color shows details about SPECIES. Size shows KE. ft-lbf. Details are shown for various dimensions. The data is filtered

Large Birds, 8-12 lb

Common loon, 12.0#

Bald eagle, 11.8#

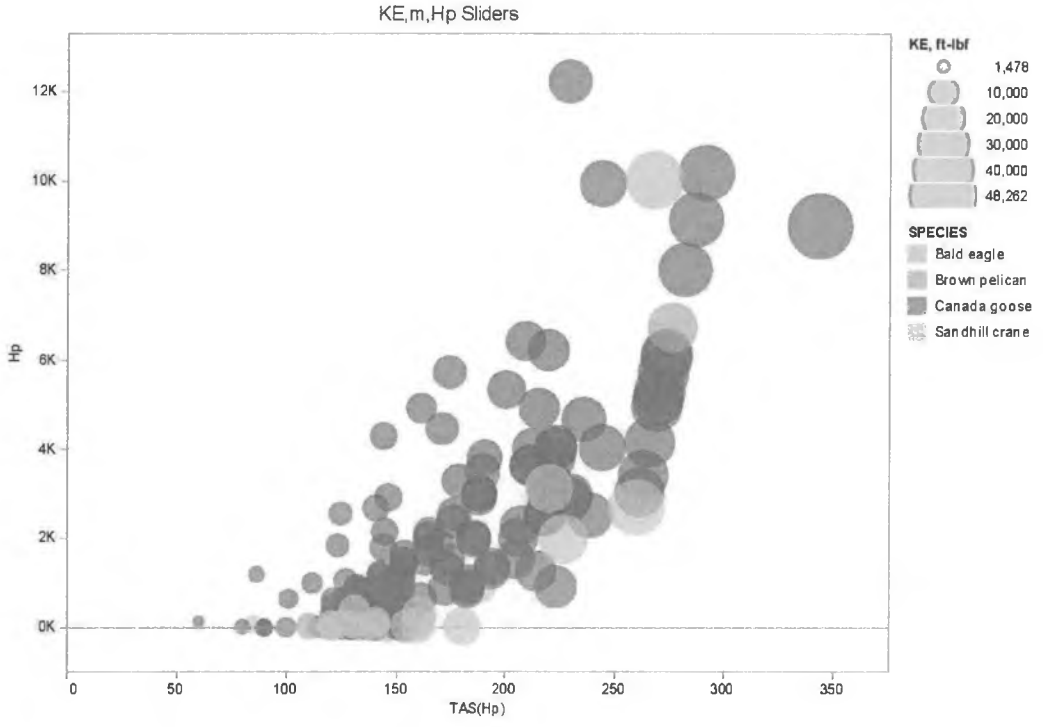
Sandhill crane, 10.6#

Golden eagle, 10.2#

Canada goose, 9.2#

Brown pelican, 8.2#

Part 121 Strikes with Damage 8-12lb



Massive Birds, 12-30 lb

Trumpeter Swan, 26.2#

Mute Swan, 26.0#

Wild Turkey, 17.2#

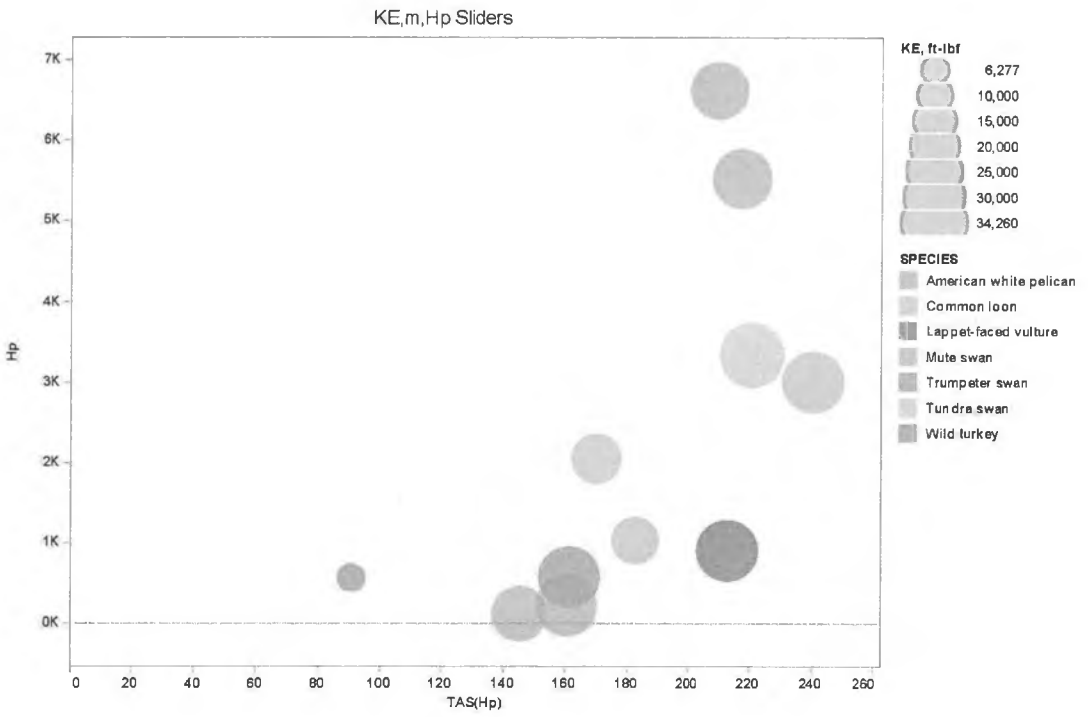
Tundra Swan, 15.9#

Lappet-faced vulture 15.4#

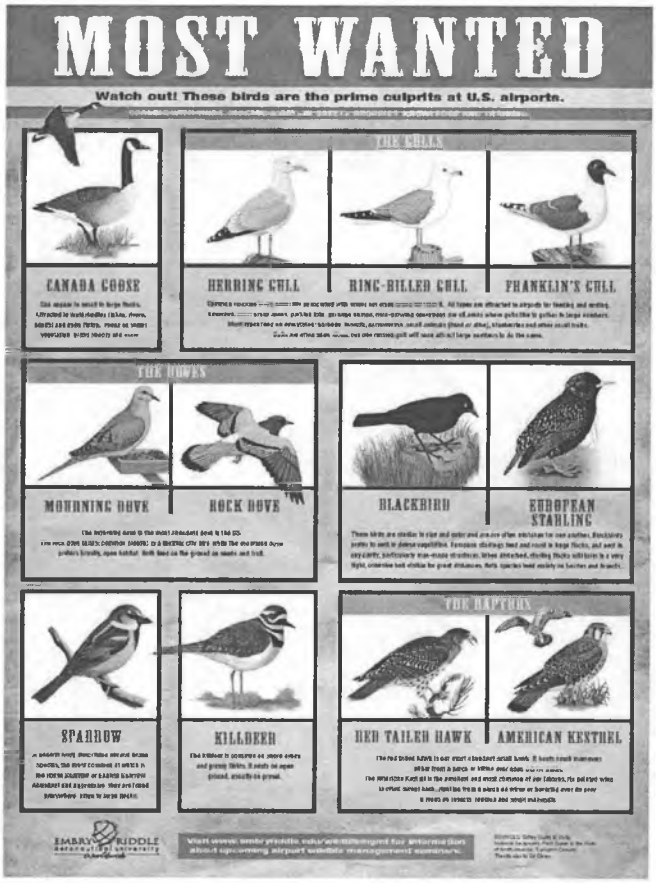
American white pelican, 14.0#

Whooping crane, 12.9#

Part 121 Strikes with Damage 12-30lb



MOST WANTED: Bird Species of Concern, US Airports



Selected Fatal Accidents

Ethiopian Airlines flight 604, 737-200 ET-AJA, 9/15/88, Baha Dar airport, Speckled pigeons, dual engine thrust loss after takeoff, 35 fatalities

September 15, 1988: The remains of a Boeing 737 that collided with a flock of speckled pigeons during take-off at Bhardar, Ethiopia. Out of 105 passengers and crew members, 35 people were killed, 21 were badly wounded and the rest were injured.

USAF AWACS E-3B, Yukla 27, 77-0354, 9/22/95, Elmendorf AFB, Alaska, Canada geese, left engines dual thrust loss after takeoff, 24 fatalities

Other Fatal Accidents

Belgian Air Force C130H, 7/15/1996, Eindhoven, starlings, missed approach, multiple engine thrust loss, 34 fatalities

United Air Lines flight 297, Vickers Viscount 745D, N7430, 11/23/1962, Ellicott City, Maryland, Mute (whistling) swans, cruise, left horizontal tail failure, 17 fatalities

Eastern Air Lines flight 375, Lockheed L-188A Electra N5533, Boston, 10/4/1960, starlings, multiple engine thrust loss on takeoff, 62 fatalities

Selected Hull Loss Accidents

KLM flight 1673, 737-400 PH-BTC, 11/28/2004, Eurasian buzzard, Amsterdam Schipol, nose gear steering failure, runway excursion on landing at Barcelona

Ryanair flight 4102 ,737-800 EI-DYG, 11/10/2008, Rome Ciampino, European starlings, missed approach, multiple engine thrust loss, hard landing

Kalitta Air flight 207, 747-200F N704CK, 5/25/2008, Eurasian kestrel, Brussels, engine ingestion RTO after V1, runway overrun

Overseas National Airways flight 032, DC-10-30 N1032F, JFK NY, 11/12/1975, gulls, RTO, overrun

Other Hull Loss Accidents

US Airways flight 1549, A320 N106US, 15 January 2009, Hudson River, Canada geese, dual engine thrust loss

NATO AWACS E-3A, 14 July 1996, LX-N90457, c/n 22852, ex-79-0457, gulls, Preveza AFB, Aktion, Greece, runway overrun

Selected Birdstrike Events

(21 transport category accidents last 20 years)

USAF B1-B
Colorado
Catastrophic loss of control (LOC),
Multi-hydraulic failure in wing root,
3 fatalities, 3 ejections,
9/1987, pelican

USAF E-3B AWACS,
707, Elmendorf AFB Alaska
Two engines failed, LOC,
24 fatalities
9/22/95, Canada geese

KLM 737-400,
Amsterdam - Barcelona,
Broke worn NGS cable,
Runway excursion,
Economic hull loss,
No fatalities
11/28/04, buzzard

US Airways, 2,750ft
A320, Hudson River,
Dual engine thrust loss,
Ditched Hudson River,
Hull Loss,
No Fatalities
1/15/09, Canada geese

Ethiopian Airlines
737-200, Ethiopia
Dual Engine Thrust loss,
off airport landing,
35 fatalities
9/15/88, Speckled pigeon

American Airlines 12,000ft
767-300, Paris, France,
Multiple strikes, flight deck penetration,
Substantial damage,
No fatalities
4/2/01, Canvasback ducks

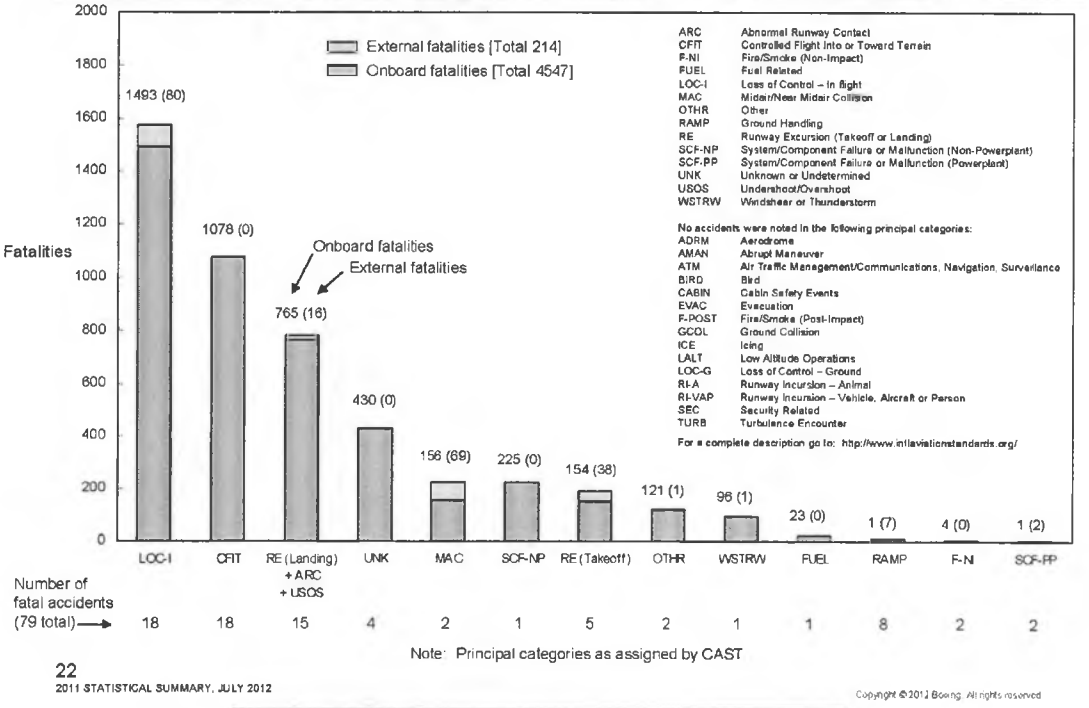
Ryan Air, 120ft
737-800, Rome, Italy,
Dual engine thrust loss,
Hard landing,
Economic hull loss,
No fatalities
11/10/08, Eur. starlings

▽ Multi-Engine
▼ Penetration
▽ Single Bird

No bird strike fatal accidents for transport category in last 20 years

Fatalities by CAST/ICAO Common Taxonomy Team (CICTT) Aviation Occurrence Categories

Fatal Accidents – Worldwide Commercial Jet Fleet – 2002 Through 2011



Note: Principal categories as assigned by CAST

22
2011 STATISTICAL SUMMARY, JULY 2012

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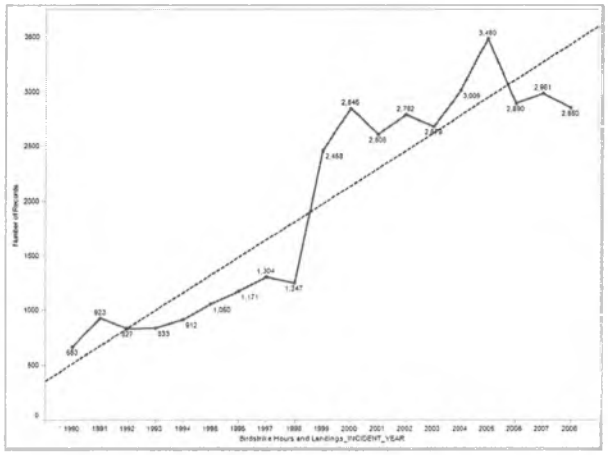
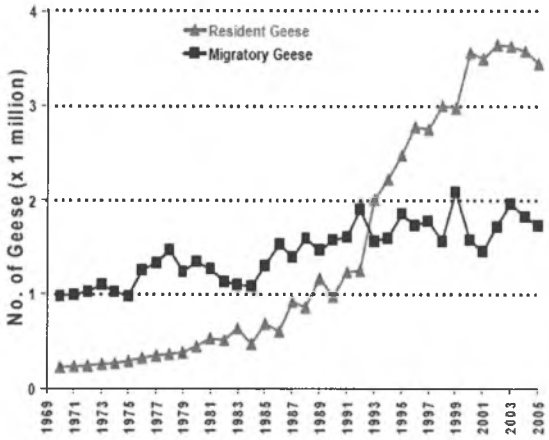
LOC, CFIT & RE have high fatality risk

The Bird Strike Hazard is Increasing



Strikes per year



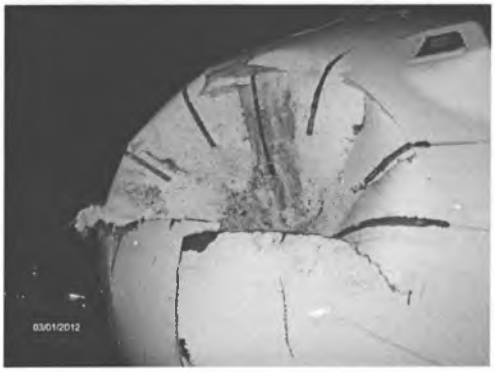
Increasing bird populations

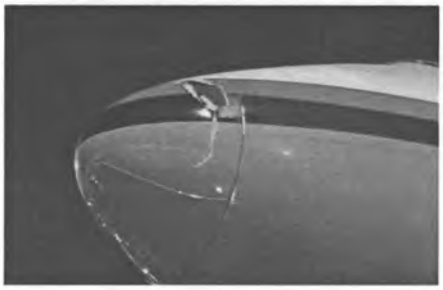
Wildlife strikes to civil aircraft in the United States, 1990–2009. U.S. Department of Transportation, Federal Aviation Administration, Serial Report No. 16 DOT/FAA/AS/00-6(AAS-310). Washington, DC, USA. 81 pages.

What are some strategies to handle the increasing threat?

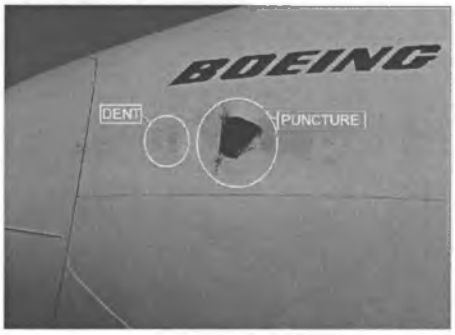
Airplane Component Damage

Radome Strikes



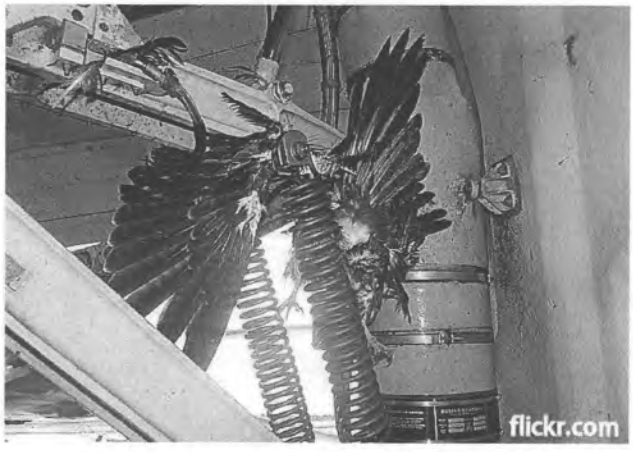


Nose Strikes



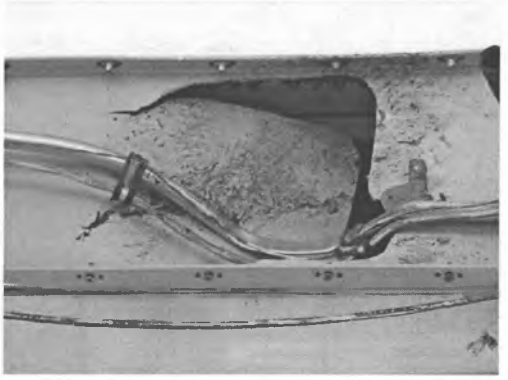
Windshield Strikes

Landing Gear & LG System Strikes

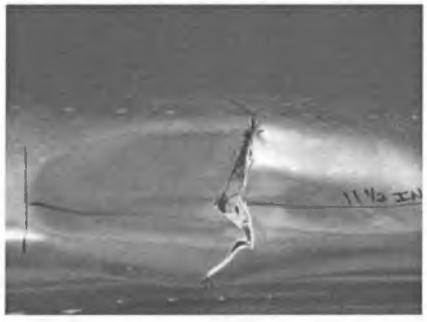


Flight Deck Penetrations

Wing Strikes



Empennage Strikes
Horizontal Tail, Vertical Stabilizer



Powerplant Strikes

Other Strikes to Airplane Systems

- Angle of attack AOA, used for stall warning
- Total Air Temperature TAT probes, used for thrust setting
- Pitot probes, used for airspeed measurement
- Antenna: glideslope and localizer for runway guidance in instrument meteorological conditions
- WXR, weather radar and windshear
- Shock: Flightdeck overhead panel, A320 engine shutdown; electrical panel, Horizon Airlines DHC-8 Medford Oregon, electrical circuit breakers popped, multiple systems lost

Airplane System Strikes: Sensors
AOA, TAT, Pitot, WXR, ILS

Flight Crew Response to Bird Strike

Boeing *AERO* Magazine 2011 Qtr 3
Strategies for Prevention of Bird-Strike Events

http://www.boeing.com/commercial/aeromagazine/articles/2011_q3/4/

The suggested strategies are based on visual analytic methods

Visual Analytics & Bird Strike

- Visual Analytics has greatly improved Boeing's understanding of the aviation wildlife hazard
- Multiple live sessions conducted with design engineers, working with online data (132,000 records), and examining strikes to radome, windshield, tail, landing gear, sensors, engines
- Promoting use of VA tools to wildlife community via US Bird Strike Committee, improve reporting, species identification, enhancement of annual wildlife strike report
- Practical wildlife hazard information for pilots

Visual Analytics Tool Applications for FOD & Bird Strike Prevention

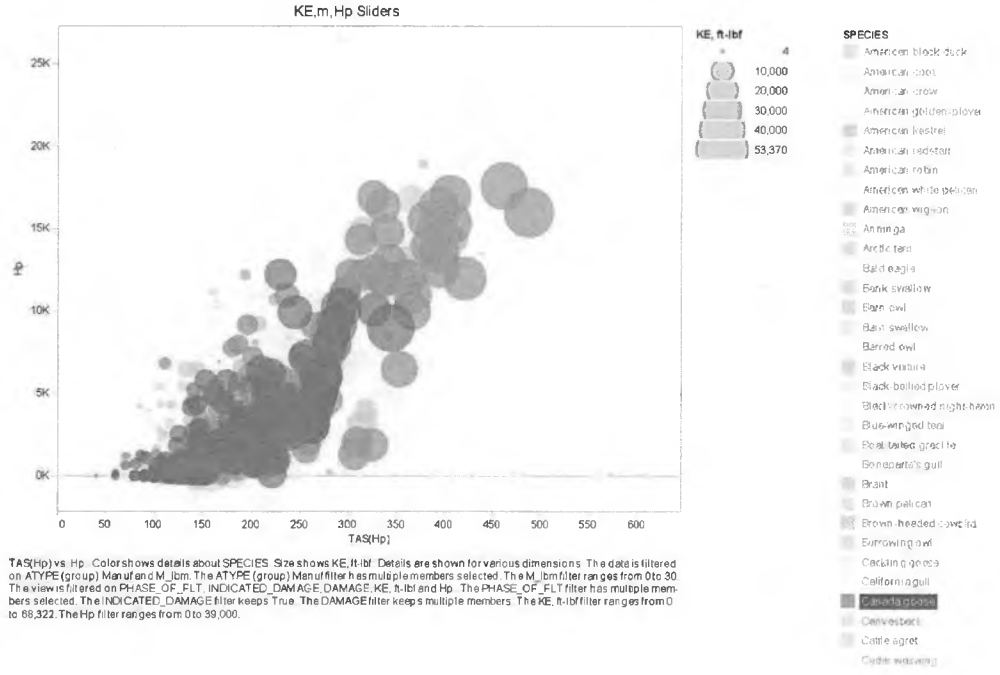
- Wildlife Strike Report Data Analysis
- Wildlife Surveys
- Vegetation Surveys
- Land Use Surveys
- FOD Report Data Analysis
- FOD Mapping

Visual Analytic tools facilitate analysis of multiple & massive sources of data

Aviation Wildlife Hazard Issues

- Voluntary Reporting of Wildlife Strikes in US
- Species Identification, particularly “Unknown Bird Large”
- Safety Requirements and Certification Requirements, Windshields, Nose Structure, Landing Gear, Tail, Lights, Sensors, Engines
- Multiple strikes, multiple engines struck

Species Identification
Canada Goose & “Unknown Bird Large”



TAS(Hp) vs. Hp. Color shows details about SPECIES. Size shows KE, ft-lbf. Details are shown for various dimensions. The data is filtered on ATYPE (group) Manuf and M_lbm. The ATYPE (group) Manuf filter has multiple members selected. The M_lbm filter ranges from 0 to 30. The view is filtered on PHASE_OF_FLT, INDICATED_DAMAGE, DAMAGE, KE, ft-lbf and Hp. The PHASE_OF_FLT filter has multiple members selected. The INDICATED_DAMAGE filter keeps True. The DAMAGE filter keeps multiple members. The KE, ft-lbf filter ranges from 0 to 68,322. The Hp filter ranges from 0 to 39,000.

Visual Analytics for Aviation Safety

- Improving aviation safety data quality: engine & airframe inconsistencies, operational data (speed, altitude & flight phase); accuracy checking of Boeing Statistical Summary of Jet Transport Accidents http://www.boeing.com/news/techissues/pdf/statsum.pdf
- Rejected takeoffs
- Unreliable airspeed
- Loss of control in flight
- Air Traffic Management applications

Visual Analytics (VA) at Boeing

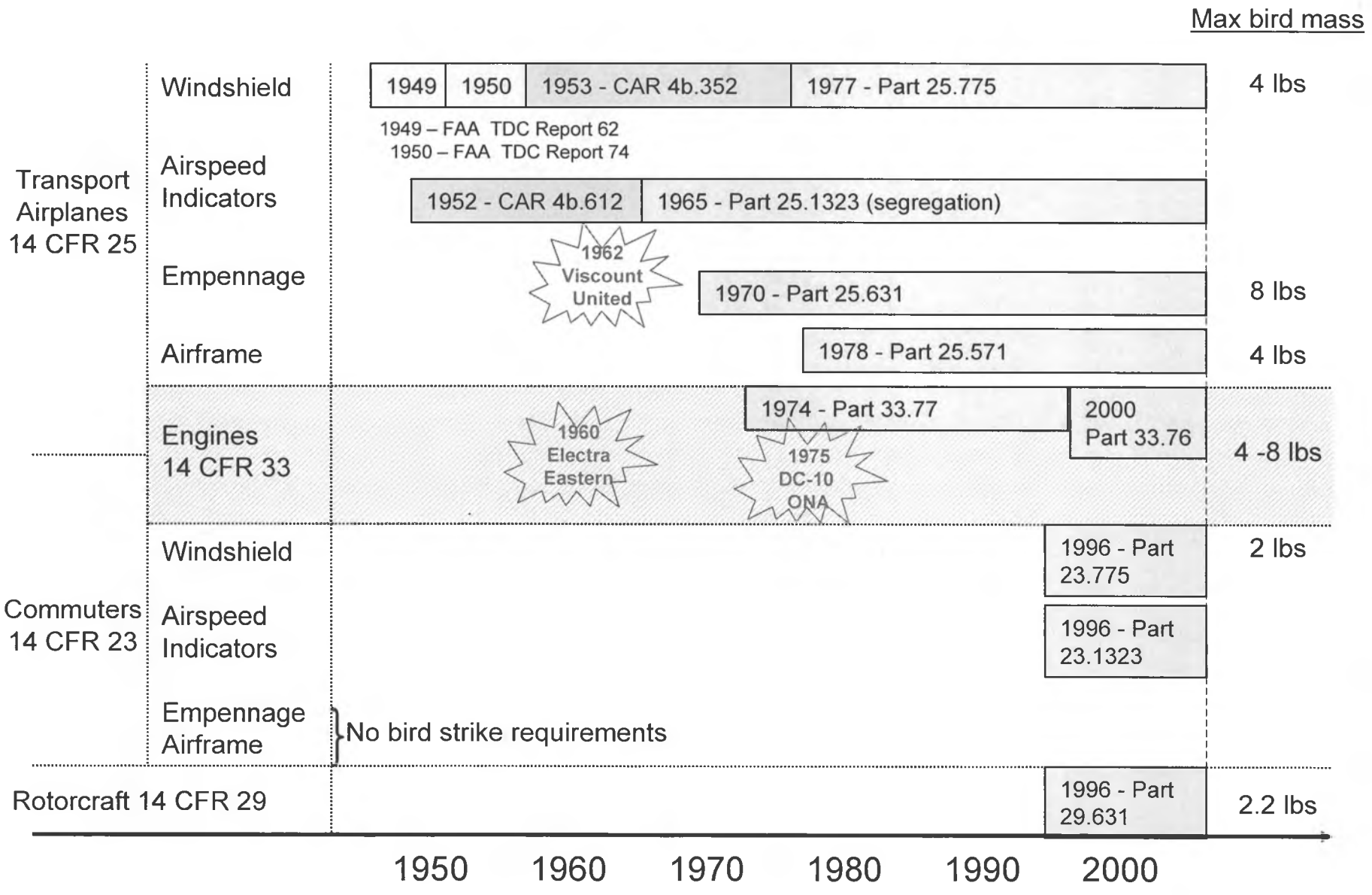
- Boeing Intern Andrew Wade (Simon Fraser University Vancouver Canada) demonstrated power of Visual Analytics for aviation safety at Boeing
- Visual Analytics is an important path forward with massive datasets of digital aviation
- Entry into service of the 787 Dreamliner is being closely monitored with VA applications

Thank You
Any Questions?

WANTED:
Wildlife position

Roger.Nicholson@Boeing.com

Bird Strike Airworthiness Standards



Ginger Blaisdell

From: AUVSI Communications <info@auvsi.org>
Sent: Tuesday, August 25, 2015 3:21 PM
To: Ginger Blaisdell
Subject: AUVSI challenges California UAS bill; Global Hawk starts storm duty

Forward to a Friend

Connect with Us:

Advocacy News

California Assembly passes SB 142, could stymie UAS industry

Brian Wynne (8/25/2015)

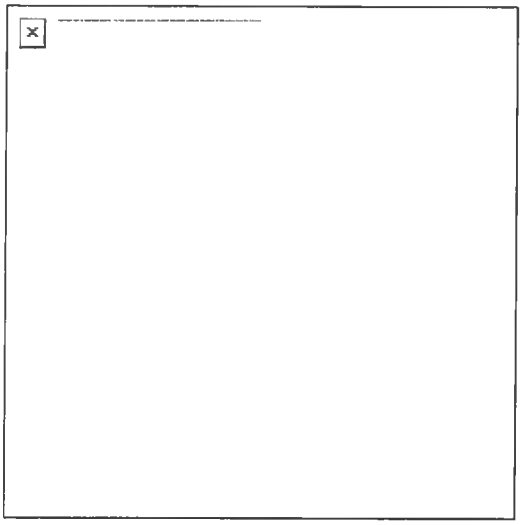
Brian Wynne, president & CEO of AUVSI, today released the following statement on the passage of SB 142 in the California Assembly. The legislation would restrict UAS from flying below 350 feet over private property.

"AUVSI is deeply disappointed with the passage of SB 142 in the California Assembly. While the industry supports the safe, non-intrusive use of UAS technology, SB 142 creates inconsistencies with federal law that has the potential to further confuse UAS users and stifle economic growth in California. The Supreme Court has ruled that property rights do not extend infinitely into the sky. Only the FAA can regulate airspace; states and municipalities can't."

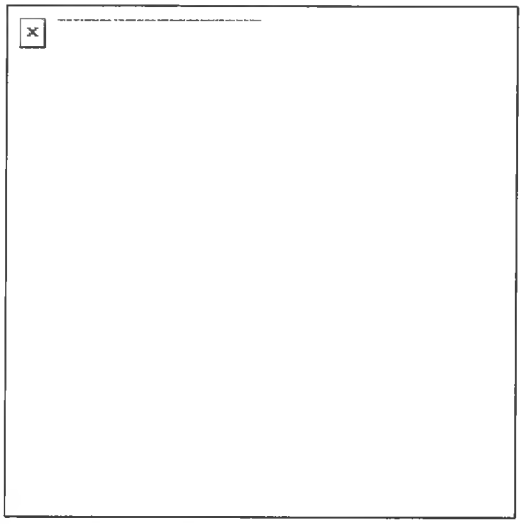
If passed, SB 142 has the potential to limit the societal and economic benefits of UAS technology in the state. From filmmaking to real estate, California industries are already successfully using UAS technology

through more than 100 commercial exemptions granted by the FAA, more than any other state. Once the U.S. airspace is fully opened to UAS, California stands to gain more than 18,100 jobs and more than $14 billion in economic impact within a decade.

Earlier this week, AUVSI President and CEO Brian Wynne penned an op-ed in the Sacramento Bee urging the California Legislature to reject SB 142. We urge you to contact your elected representatives in the California State Assembly and Senate and ask them to oppose SB 142 and allow the FAA — the appropriate authority to regulate airspace — to finalize its rules that govern UAS technology.

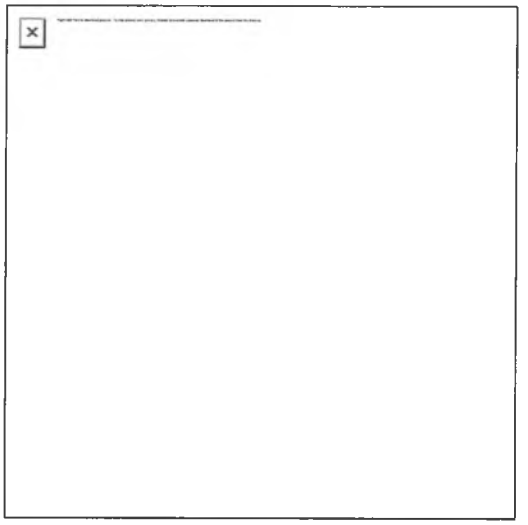


Last chance to join AUVSI on Capitol Hill
AUVIS Advocacy (8/25/15)



Today is the last day to sign up for AUVSI's Hill Day, where AUVSI members have the chance to educate lawmakers about robotics and unmanned systems technologies.

Sign up now!



Industry News

Global Hawk arrives at Wallops for SHOUT duty
AUVSI (8/24/2015)

One of NASA's Global Hawk unmanned aircraft has arrived at Wallops Island, Virginia, where it will begin a new mission to improve hurricane forecasts.

Navy orders $4 Million worth of iRobot FirstLooks
AUVSI (8/20/2015)

AMENDED IN ASSEMBLY JUNE 30, 2015

AMENDED IN ASSEMBLY JUNE 3, 2015

AMENDED IN SENATE APRIL 14, 2015

SENATE BILL No. 142

Introduced by Senator Jackson
(Principal coauthor: Assembly Member Calderon)

January 26, 2015

An act to add Section 1708.83 to the Civil Code, *and to amend Section 21012 of the Public Utilities Code,* relating to civil law.

LEGISLATIVE COUNSEL'S DIGEST

SB 142, as amended, Jackson. Civil law: unmanned aerial vehicles.

Existing federal law, the FAA Modernization and Reform Act of 2012, provides for the integration of civil unmanned aircraft systems, commonly known as drones, into the national airspace system by September 30, 2015. Existing federal law requires the Administrator of the Federal Aviation Administration to develop and implement operational and certification requirements for the operation of public unmanned aircraft systems in the national airspace system by December 31, 2015.

~~Existing law imposes liability for physical invasion of privacy, if a person knowingly enters onto the land of another without permission or otherwise commits a trespass in order to capture any image or recording of the plaintiff engaging in a private activity and the invasion is offensive to a reasonable person.~~

~~This bill would define knowing entry upon the land of another also to include operation of an unmanned aerial vehicle below the navigable airspace overlaying the real property or operation of an unmanned aerial~~

~~vehicle less than 350 feet above ground level within the airspace overlaying the real property, without the consent of the landowner or without legal authority.~~

Existing law deems the detriment caused by wrongful occupation of real property to be the value of the use of the property for the time of the wrongful occupation, the reasonable cost of repair or restoration of the property, and the costs of recovering the possession.

This bill would extend liability for wrongful occupation of real property and damages to a person who operates an unmanned ~~aerial vehicle below the navigable airspace overlaying the real property or operation of an unmanned aerial vehicle~~ *aircraft or unmanned aircraft system, as defined,* less than 350 feet above ground level within the airspace overlaying the real property, without the ~~consent of the landowner~~ *express permission of the person or entity with the legal authority to grant access* or without legal authority.

Vote: majority. Appropriation: no. Fiscal committee: no. State-mandated local program: no.

The people of the State of California do enact as follows:

SECTION 1. Section 1708.83 is added to the Civil Code, to read:

~~1708.83. (a) A person knowingly enters onto the land of another person pursuant to subdivision (a) of Section 1708.8 if, without the consent of the landowner or without legal authority, he or she does either of the following:~~

~~(1) Operates an unmanned aerial vehicle below the navigable airspace, as defined in paragraph (32) of subsection (a) of Section 40102 of Title 49 of the United States Code, overlaying the real property.~~

~~(2) Operates an unmanned aerial vehicle less than 350 feet above ground level within the airspace overlaying the real property.~~

~~(b) A person wrongfully occupies real property and is liable for damages pursuant to Section 3334 if, without the consent of the landowner or without legal authority, he or she does either of the following:~~

~~(1) Operates an unmanned aerial vehicle below the navigable airspace, as defined in paragraph (32) of subsection (a) of Section 40102 of Title 49 of the United States Code, overlaying the real property.~~

~~(2) Operates an unmanned aerial vehicle less than 350 feet above ground level within the airspace overlaying the real property.~~

1708.83. (a) A person wrongfully occupies real property and is liable for damages pursuant to Section 3334 if, without express permission of the person or entity with the legal authority to grant access or without legal authority, he or she operates an unmanned aircraft or unmanned aircraft system less than 350 feet above ground level within the airspace overlaying the real property.

(b) For purposes of this section:

(1) "Unmanned aircraft" means an aircraft that is operated without the possibility of direct human intervention from within or on the aircraft.

(2) "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.

~~(3)~~

(c) This section shall not be construed to impair or limit any otherwise lawful activities of law enforcement personnel or employees of governmental agencies or other public or private entities that may have the right to enter land by operating an ~~unmanned aerial vehicle~~ *unmanned aircraft or unmanned aircraft system* within the airspace overlaying the real property of another, including the right to use private lands acquired pursuant to subdivision (d) of Section 1009.

(d) Nothing in this section is intended to limit the rights and defenses available at common law under a claim of liability for wrongful occupation of real property.

SEC. 2. Section 21012 of the Public Utilities Code is amended to read:

21012. "Aircraft" means any manned contrivance used or designed for navigation of, or flight in, the air requiring certification and registration as prescribed by federal statute or regulation. Notwithstanding the foregoing provisions of this section, manned lighter-than-air balloons and ultralight vehicles as defined in the regulations of the Federal Aviation Administration (14 C.F.R. Part 103), whether or not certificated by the Federal Aviation Administration, shall not be considered to be aircraft for purposes of this part. *"Aircraft" shall not include an unmanned*

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

O

SOAPBOX AUGUST 23, 2015

Don't prematurely limit the potential of aerial drones

HIGHLIGHTS

Legislature considering bill, but it should let FAA set nationwide rules

Drone companies could expand dramatically and create jobs in California

Film industry and real estate agents already capitalizing on technology

BY BRIAN WYNNE
Special to The Bee

From Silicon Valley to Hollywood, unmanned aircraft are transforming how California industries operate and are creating several new ones as well.

But as more and more businesses receive waivers from the Federal Aviation Administration to fly drones commercially, legislators are considering Senate Bill 142, which would restrict drones from flying below 350 feet over private property.

While the industry supports the safe, nonintrusive use of drone technology, passage of SB 142 would create inconsistencies with federal law. The Supreme Court ruled that property rights do not extend infinitely into the sky. In other words, only the FAA can regulate airspace; states and municipalities can't.

Legislation like SB 142 isn't unique to California. Many states have been considering proposals that would prematurely and unnecessarily limit the tremendous societal and economic benefits that drone technology will bring. But until the FAA finalizes its long awaited rules on small unmanned aircraft systems, there is much uncertainty about where operators should and shouldn't fly and for what purpose. For the safety of our skies, we need Washington to make finalizing these rules a top priority.

There is strong evidence that a burgeoning market is waiting to be unleashed once regulations are established. Since the FAA announced in May 2014 that it would grant exemptions for certain low-risk commercial drones, more than 1,100 businesses, including dozens in California, have received permission.

The Association for Unmanned Vehicle Systems International recently examined the first 500 approved petitions and found that California led the way with 70. Unmanned aircraft are being used in many of the state's top industries, including film and television, real estate and agriculture.

For example, Carlsbad-based Aerial Mob was one of the first to receive a commercial exemption from the FAA. An innovator in cinematography and technology, Aerial Mob is also considered a pioneer in safety standards. The company performed the first ever FAA-approved film production project with a major studio on the set of the CBS show "The Mentalist." The company has since filmed Super Bowl promos for NBC, a promo for a new show on Amazon Prime and even helped Apple film a commercial.

Drones are also very popular in California's resurgent real estate industry. Real estate agents see an opportunity to capture unique aerial perspectives for their listings. The FAA has issued 15 exemptions to real estate companies in the state and more than 200 nationwide, according to the National Association of Realtors.

The large number of commercial exemptions granted in California shows that its commercial drone market is waiting to be unleashed. However, the current system of case-by-case approvals isn't a long-term solution. Once the FAA finalizes its rules, any drone operator who follows the rules can fly, opening the door to even more commercial use in California.

A study by our association estimated that in the first decade following drone integration into the national airspace system, California's economy would gain more than 18,100 jobs and more than $14 billion in economic impact. Under the right regulatory environment, there's no question these numbers could go even higher.

Drone technology is developing rapidly and the next innovative use may be just around the corner. To continue reaping the economic benefits, we need to do all we can to support the growth and development of this industry rather than restrict it. Otherwise, California risks losing its innovation edge, plus billions of dollars of economic impact.

Brian Wynne is president and CEO of the Association for Unmanned Vehicle Systems International.

reprints

MORE SOAPBOX

COMMENTS

Sign In Using The Social Network of Your Choice to Comment

To learn more about comments, please see the Comments FAQ.

GAO Reviews FAA Progress on UAS Integration

Federal aviation regulators by September expect to develop a foundation for a detailed plan to integrate drones into U.S. airspace, and then enact it in December, congressional investigators said in a new report.

The Government Accountability Office publicly released a report on Aug. 17 that reviewed the Federal Aviation Administration's progress on drone - or unmanned aerial system, or UAS - integration.

Additionally, the report covered drone challenges as well as the agency's case-by-case approval of drone operations, use of six designated sites to conduct tests, and drone regulations in other countries.

According to the report, which was actually published a month before, FAA is working with the MITRE Corp. to develop a foundation for the implementation plan that would contain several hundred activities to complete the integration process, which is needed as the government and commercial sectors are increasingly using unmanned aircraft for various purposes.

The GAO noted in a footnote that the implementation plan, however, is not expected to be made public.

A federal law enacted in 2012 required that the FAA integrate drones into the national airspace by Sept. 30, 2015, but the regulatory process in drafting and reviewing the rules has been slow.

In the meantime, the FAA issued proposed rules in February for the operations of small drones weighing less than 55 pounds and received more then 4,500 comments in late April. A final rule may not be developed until 2016 or 2017, the GAO report said, reiterating what has been previously reported.

Regarding the six test sites, which were established in 2014 to conduct research and development on drone operations and safety that the FAA reviews, more than 195 test flights have taken place as of March. The report also listed the challenges that these sites faced and their future use.

The report also compared proposed U.S. regulations to those in other countries such as Australia, Canada, France and the United Kingdom, which all have similar, but well-established rules for commercial operations.

"While the United States has not finalized UAS regulations, the provisions of FAA's proposed rules are similar to those in the countries GAO examined," the report said." However, FAA may not issue a final rule for UASs until late 2016 or early 2017, and rules in some of these countries continue to evolve."

All countries face similar challenges, too. For example, the report listed technology concerns regarding detection and avoidance of other aircrafts, lack of standards for command and control systems and the lack of a dedicated and secure spectrum.

In comments about the report, the Transportation Department said GAO addressed many of the challenges, but it did not discuss environmental concerns. The watchdog agency said that it was outside the scope of this report.

The department said that FAA is conducting research to understand the environmental impacts of drone integration, the role of such unmanned vehicles in complying with federal law and the how noise standards apply to them.

Source: FierceGovernmentIT

g+1

United States Government Accountability Office

Report to Congressional Committees

July 2015

UNMANNED AERIAL SYSTEMS

FAA Continues Progress toward Integration into the National Airspace

GAO-15-610

July 2015

UNMANNED AERIAL SYSTEMS

FAA Continues Progress toward Integration into the National Airspace

GAO Highlights

Highlights of GAO-15-610, a report to congressional committees

Why GAO Did This Study

UASs are aircraft that do not carry a pilot aboard, but instead operate on pre-programmed routes or are manually controlled by following commands from pilot-operated ground control stations. Unauthorized UAS operations have, in some instances, compromised safety. The FAA Modernization and Reform Act of 2012 directed FAA to take actions to safely integrate UASs into the national airspace. In response, FAA developed a phased approach to facilitate integration and established test sites among other things.

GAO was asked to review FAA's progress in integrating UASs. This report addresses (1) the status of FAA's progress toward safe integration of UASs into the national airspace, (2) research and development support from FAA's test sites and other resources, and (3) how other countries have progressed toward UAS integration into their airspace for commercial purposes. GAO reviewed and analyzed FAA's integration-planning documents; interviewed officials from FAA and UAS industry stakeholders; and met with the civil aviation authorities from Australia, Canada, France, and the United Kingdom. These countries were selected based on several factors including whether they have regulatory requirements for commercial UASs, operations beyond the view of the pilot, and whether non-military UAS are allowed to operate in the airspace. In comments on this report, the Department of Transportation noted that GAO did not address environmental considerations of UAS integration; such considerations were outside the scope of this report.

View GAO-15-610. For more information, contact Gerald Dillingham at (202) 512-2834 or dillinghamg@gao.gov.

What GAO Found

The Federal Aviation Administration (FAA) has progressed toward its goal of seamlessly integrating unmanned aerial system (UAS) flights into the national airspace. FAA has issued its *UAS Comprehensive Plan* and *UAS Integration Roadmap*, which provide broad plans for integration. However, according to FAA, it is working with MITRE to develop a foundation for an implementation plan; FAA then expects to enact a plan by December 2015. While FAA still approves all UAS operations on a case-by-case basis, in recent years it has increased approvals for UAS operations. Specifically, the total number of approvals for UAS operations has increased each year since 2010, and over the past year has included approvals for commercial UAS operations for the first time. In addition, FAA has issued a Notice of Proposed Rulemaking that proposes regulations for small UASs (less than 55 pounds).

The FAA's six designated test sites have become operational but have had to address various challenges during the process. The designated test sites became operational in 2014, and as of March 2015, over 195 test flights had taken place. These flights provide operations and safety data to FAA in support of UAS integration. In addition, FAA has provided all test sites with a Certificate of Waiver or Authorization allowing small UAS operations below 200 feet anywhere in the United States. However, during the first year of operations, the test sites faced some challenges. Specifically, the test sites sought additional guidance regarding the type of research they should conduct. According to FAA, it cannot direct the test sites, which receive no federal funding, to conduct specific research. However, FAA did provide a list of potential research areas to the test sites to provide some guidance on areas for research. FAA has conducted other UAS research through agreements with MITRE and some universities, and in May 2015 named the location of the UAS Center of Excellence—a partnership among academia, industry, and government conducting additional UAS research. Unlike FAA's agreements with the test sites, many of these arrangements have language specifically addressing the sharing of research and data.

Around the world, countries have been allowing UAS operations in their airspace for purposes such as agricultural applications and aerial surveying. Unlike in the United States, countries GAO examined—Australia, Canada, France, and the United Kingdom—have well-established UAS regulations. Also, Canada and France currently allow more commercial operations than the United States. While the United States has not finalized UAS regulations, the provisions of FAA's proposed rules are similar to those in the countries GAO examined. However, FAA may not issue a final rule for UASs until late 2016 or early 2017, and rules in some of these countries continue to evolve. Meanwhile, unlike under FAA's proposed rule, Canada has created exemptions for commercial use of small UASs in two categories that allow operations without a government-issued certification, and France and Australia are approving limited beyond line-of-sight operations. Similar to the United States, other countries are facing technology shortfalls, such as the ability to detect and avoid other aircraft and obstacles, as well as unresolved issues involving limited spectrum that limit the progress toward full integration of UASs into the airspace in these countries.

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Abbreviations

ASTM International	formerly known as the American Society for Testing and Materials
COA	Certificates of Waiver or Authorization
DHS	Department of Homeland Security
DOD	Department of Defense
DOT	Department of Transportation
EASA	European Aviation Safety Agency
EUROCAE	European Organization for Civil Aviation Equipment
Experimental Certificate	Special Airworthiness Certificates in the Experimental Category
FAA	Federal Aviation Administration
ICAO	International Civil Aviation Organization
MITRE	MITRE Corporation
MOA	memorandum of agreement
MOU	memorandum of understanding
NASA	National Aeronautics and Space Administration
NPRM	Notice of Proposed Rule Making
RTCA	formerly the Radio Technical Commission for Aeronautics (now RTCA)
the 2012 Act	FAA Modernization and Reform Act of 2012
UAS	unmanned aerial systems or unmanned aircraft systems

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GAO U.S. GOVERNMENT ACCOUNTABILITY OFFICE
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July 16, 2015

Congressional Committees

Since the early 1990s, unmanned aerial systems (UAS) have operated on a limited basis in the national airspace system, primarily supporting public uses, such as military and border-security operations.[1] The list of potential uses is now rapidly expanding to include a broad range of UAS operations, including assisting in search and rescue operations, inspecting pipelines, photographing real estate, surveying land and crops, disaster assistance, gathering news, and filming movies. According to a 2013 report by a UAS industry group, the economic benefit of fully integrating UASs into the national airspace system will total more than $13.6 billion in the first 3 years of integration and grow to more than $82.1 billion from 2015 through 2025.

The Federal Aviation Administration's (FAA) goal is to seamlessly integrate all UAS operations into the national airspace. While FAA is developing regulations to allow routine UAS commercial operations, it currently only allows them in the national airspace after a case-by-case safety review and approval. At the same time, the safety of the national airspace is threatened on a nearly daily basis by UASs' operating without approval. For example, one UAS nearly collided with a New York Police Department helicopter over New York City, another came dangerously close to a US Airways regional jet over the Florida panhandle, and numerous UASs have been spotted flying over professional and college football stadiums full of people. The FAA has stated the number of reported incidents has increased recently, with 97 incidents reported from February through March 2015, compared to just 3 incidents reported

[1]See GAO, *Unmanned Aerial Systems: Department of Homeland Security's Review of U.S. Customs and Border Protection's Use and Compliance with Privacy and Civil Liberty Laws and Standards*, GAO-14-849R (Washington, DC: Sept. 30, 2014). UAS aircrafts do not carry a pilot onboard, but instead operate by following commands from pilot-operated ground control stations or pre-programmed routes. UASs are also referred to as "unmanned aerial vehicles," "unmanned aircraft systems," "remotely piloted aircraft," "unmanned aircraft," or "drones." The term "unmanned aerial system" is used to recognize that UASs include not only the airframe and its power source, such as a battery or combustible engine, but also associated elements such as a ground control station and communications links.

during the same period in 2014. FAA believes the increase is due to more awareness about UASs and the need to report incidents, but the extent these factors contribute to the increase is not clear.

As UAS operations in the national airspace continue to increase, members of Congress have raised questions about the safe and efficient integration of UASs into the national airspace system and asked us to examine the progress of UAS integration. This report examines (1) the status of FAA's progress toward safe integration of UASs into the national airspace, (2) research and development support from FAA's test sites and other resources, and (3) how other countries have progressed toward UAS integration into their airspace for commercial purposes.

To address all the objectives, we reviewed FAA reports and prior GAO work[2] related to integrating UASs in the national airspace system, reviewing such work as FAA's framework for UAS integration and our prior work on UAS research and development, efforts by FAA to accommodate ongoing research and commercial UAS use, and UASs' technology challenges.[3] We also reviewed provisions of the FAA Modernization and Reform Act of 2012[4] (the 2012 Act), and the Notice of Proposed Rulemaking for small UAS operations.[5] To determine FAA's progress toward safe integration of UASs into the national airspace, we reviewed and analyzed documents provided by various stakeholders and conducted semi-structured interviews with these stakeholders, including government—FAA, Department of Defense (DOD), National Aeronautics and Space Administration (NASA), and the Department of Homeland Security—academics researching UAS technology, industry trade associations, and others from the UAS industry including a manufacturer and a commercial operator. We selected the private-sector stakeholders,

[2]GAO, *Unmanned Aircraft Systems: Continued Coordination, Operational Data, and Performance Standards Needed to Guide Research and Development*, GAO-13-346T (Washington, DC: Feb. 15, 2013); *Unmanned Aircraft Systems: Measuring Progress and Addressing Potential Privacy Concerns Would Facilitate Integration into the National Airspace System*, GAO-12-981 (Washington, DC: Sept. 14, 2012); and *FAA Reauthorization Act: Progress and Challenges Implementing Various Provisions of the 2012 Act*, GAO-14-285T (Washington, DC: Feb. 5, 2014).

[3]We did not review the environmental challenges of UAS integration.

[4]Pub. L. No. 112-95, 126 Stat. 11.

[5]80 Fed. Reg. 9544 (Feb. 23, 2015).

such as RTCA and ASTM International, based on their involvement within UAS standards groups.[6] To identify research and development support from FAA's test sites and other resources, we reviewed and analyzed documents provided by officials at each of FAA's six test sites and conducted semi-structured interviews with officials from each of the six, including the applications submitted by the selected test sites and quarterly reports provided to FAA. We also interviewed FAA officials managing the test site program and those managing other research and development efforts related to UASs. To identify how other countries have progressed toward UAS integration into their airspace for commercial purposes, we obtained the UAS regulations of authorities in France, the United Kingdom, Australia, and Canada and interviewed the civil aviation authorities in them. We selected these countries based on several factors including whether they have regulatory requirements for commercial UASs, operations beyond the view of the pilot, and whether the country allows non-military UAS to operate in the airspace. We also reviewed key documents and interviewed international aviation entities including the International Civil Aviation Organization (ICAO).[7] More details on our scope and methodology can be found in appendix I.

We conducted this performance audit from January 2014 to July 2015 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

UASs can be categorized by both size and mission, as shown in figure 1.

- For the purposes of this report, in terms of size, we use the broad categories of "small" and "large" UASs. Small UASs typically weigh less than 55 pounds and can be used for a variety of commercial purposes including photography and package delivery. According to

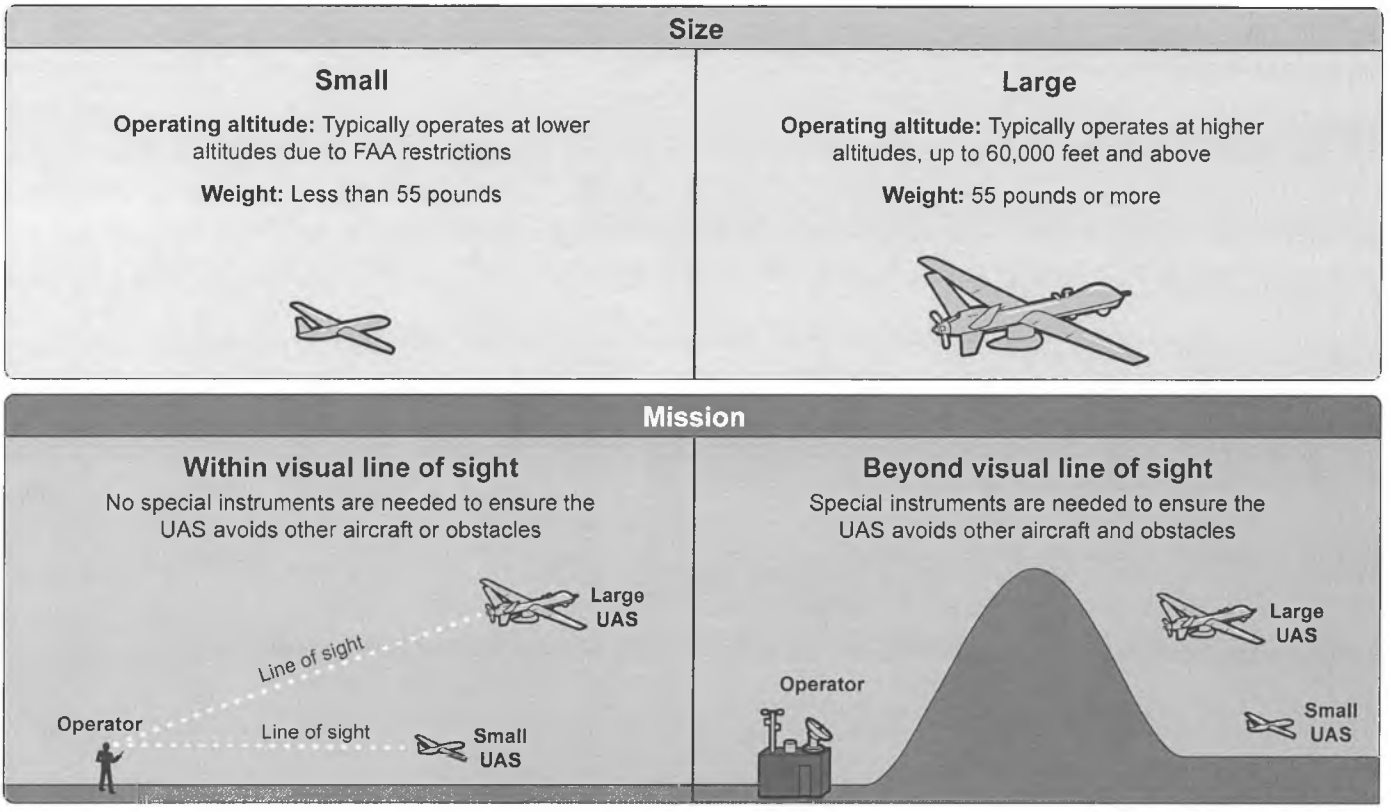
[6]RTCA was formerly known as the Radio Technical Commission for Aeronautics. ASTM International was formerly known as the American Society for Testing and Materials.

[7]ICAO is the international body that, among other things, promulgates international standards and recommended practices in an effort to harmonize global aviation standards.

an industry association, small UASs are expected to comprise the majority of UASs that will operate in the national airspace system. Large UASs, depending on their size and purpose, generally fly at higher altitudes and are used for the purposes of surveillance, data gathering, and communications relay.

- UAS operations are also categorized by how they are being used—their mission—within line of sight of the operator or beyond the line of sight of the operator. For UAS operations within the operator's line of sight—for example a real estate agent taking photographs of a house—the operator relies only on their vision to avoid colliding with other objects. On the other hand, UAS operations occurring beyond the line of sight of the operator—for example conducting rail or pipeline inspections—requires that FAA segregate the airspace or that the UAS needs instruments to sense other aircraft and obstacles and avoid those obstacles, as well as, other technologies that will keep the aircraft safely operating during its mission.

Figure 1: Unmanned Aerial Systems (UAS) Size and Mission Categories



Source: GAO. | GAO-15-610

The FAA plays two major roles in integrating UASs into the national airspace—a regulator and a service provider. As the regulator, the FAA seeks to ensure the safety of persons and property in the air and on the ground in part by requiring that UAS operators and manufactures follow specific operation and manufacturing standards. As the service provider, the FAA is responsible for providing safe and efficient air-traffic control services in the national airspace system and the other portions of global airspace. In addition to FAA, many federal and private sector entities have roles in the effort to integrate UAS into the national airspace system. See table 1 for UAS stakeholders and their responsibilities.

Table 1: Unmanned Aerial Systems (UAS) Stakeholders and Their Responsibilities

Agency	Responsibility
Federal Aviation Administration (FAA)	FAA's UAS Integration Office is responsible for ensuring that Unmanned Aerial Systems (UAS) operate safely in the national airspace system and for providing safe and efficient air traffic control.
Department of Defense (DOD)	DOD provides FAA with UAS operational and safety data, as well as research and development support.
National Aeronautics and Space Administration (NASA)	NASA provides research and development and testing on UAS integration efforts.
Department of Homeland Security (DHS)	DHS's Customs and Border Protection has provided flight demonstrations to FAA's Next Generation Air Transportation System (NextGen) Office.
UAS Executive Committee[a]	The UAS Executive Committee is composed of senior executives from federal agencies including FAA, DOD, NASA, and DHS and is responsible for identifying solutions to the range of technical, procedural, and policy concerns arising from UAS integration.
UAS Aviation Rulemaking Committee	The UAS Aviation Rulemaking Committee was chartered in 2011 to provide a mechanism for industry and academic stakeholders as well as other federal, state, and local government entities to provide recommendations and standards to FAA on issues related to UAS integration.[b]
RTCA Special Committee 228	RTCA is a private, not-for-profit organization consisting of industry experts. Special Committee 228 is responsible for developing standards for UASs to avoid objects and other aircraft, and supporting the radio controls of a UAS.
ASTM International Committee F38[c]	ASTM International Committee F38 is a committee consisting of industry experts that are responsible for developing standards and consensus based recommendations for small UAS integration into the national airspace system and worldwide.

Source: GAO. | GAO-15-610

[a]The UAS Executive Committee was formed as a result of the National Defense Authorization Act for Fiscal Year 2010 (Pub. L. No. 111-84, 123 Stat. 2190 (2009)). Section 935 of the 2010 National Defense Authorization Act states that "The Secretary of Defense and the Secretary of Transportation shall, after consultation with the Secretary of Homeland Security, jointly develop a plan for providing expanded access to the national airspace system for unmanned aircraft systems of the Department of Defense" and requires the Executive Committee members to provide Congress with, among other things, a communications plan, specific milestones for expanded access to the national airspace system, and a report on their efforts.

[b]FAA extended the Aviation Rulemaking Committee's charter through June 17, 2016, requesting the Committee continue to provide information, advice, and recommendations to the FAA for UAS integration.

[c]ASTM International, formerly known as the American Society for Testing and Materials, works to deliver the test methods, specifications, guides, and practices that support industries and governments worldwide.

FAA also partners with a range of industry, federal research entities, universities, and international organizations for research and development on UAS issues.

- Federally Funded Research and Development Centers[8] and Cooperative Research and Development Agreements typically require an agency, organization, or company to perform specific research and provide FAA with data in exchange for funding. FAA uses these types of agreements to support research and development in critical technologies needed for UAS integration including "detect and avoid" and "command and control" as well as for the dedicated radio-frequency spectrum and "human factors."[9]

- Some other partnerships use Other Transaction Agreements to establish the research and development relationship.[10] However, these take many forms and are subject to requirements that may differ from the federal laws and regulations that apply to contracts, grants, or cooperative agreements, and therefore might not include a requirement to share research results with FAA.

Currently, most UAS operations must remain within visual line of sight of the UAS operator. FAA's long-term goal is to pursue research and development that will advance technology in these critical areas, such as detect and avoid, and supporting beyond-visual-line-of-sight operations. These types of operations, according to an industry group, have the most potential for commercial purposes.

In response to the 2012 Act, FAA has been planning for UAS integration into the national airspace and has been taking steps toward increasing

[8]FAA's Federally Funded Research and Development Centers are located at MITRE, MIT's Lincoln Laboratory, and the Air Force Research Laboratory.

[9]"Detect and avoid" is needed to provide UAS with the capability to operate near other aircrafts and objects, yet avoid collisions. "Command and control" addressed the ability to maintain the integrity of radio signals to ensure that the UAS operates as expected and as intended. Dedicated radio-frequency spectrum is important because spectrum is a key security and safety vulnerability and because intentional or unintentional interruption of radio transmissions can sever the UAS's only means of control. The study of the "human factors" affecting UAS operators is important because the separation of pilot and aircraft 1) removes sensory cues needed for flight control, and 2) creates difficulties in scanning the visual environment surrounding the unmanned aircraft.

[10]Other Transaction Agreements are administrative vehicles used by a federal agency. Other Transaction Agreements generally enable the federal government and others entering into these agreements to freely negotiate provisions that are mutually agreeable. FAA's Other Transaction Agreement authority, at 49 U.S.C. § 106(l)(6) provides, in part, that the Administrator may enter into other transactions with any federal agency, among others, on such terms and conditions as the Administrator may consider appropriate.

UAS operations.[11] The 2012 Act outlined 17 date specific requirements and set deadlines for FAA to achieve safe UAS integration by September 2015. These requirements included developing two planning documents - UAS Comprehensive Plan and the UAS Roadmap. FAA has completed these two requirements in addition to naming six test sites where research and development will occur.[12] However, we found in December 2014 that several other requirements, some key ones, including the publication of a final rule on small UAS operations, had not been completed (see app. II).[13]

As part of its role in supporting UAS integration, FAA authorizes all UAS operations (access to the airspace as well as the aircraft itself) in the national airspace system—military; public (academic institutions and, federal, state, and local governments including law enforcement organizations); and civil (non-government including commercial).[14] Depending on the type of user, public or civil, the process for accessing the airspace may be different (see table 2).

Table 2: Federal Aviation Administration (FAA) Approvals Required for Unmanned Aerial Systems to Access the National Airspace

Type of operations	Airspace approval	Equipment approval
Public (academic institutions and federal, state, and local governments including law enforcement organizations)	Public Certificates of Waiver or Authorization (COA)	Public COA
Civil (non-government, including commercial)	Civil COA	Section 333 exemption, Special Airworthiness Certificates in the Experimental Category

Source: GAO presentation of FAA information | GAO-15-610

[11]Pub. L. No. 112-95, §§ 331 – 335, 126 Stat. 11.

[12]The test sites are located at the University of Alaska (includes test ranges in Hawaii, Oregon, and Iceland); State of Nevada; New York's Griffiss International Airport (includes test range locations in Massachusetts); North Dakota Department of Commerce; Texas A&M University–Corpus Christi; and Virginia Polytechnic Institute and State University (Virginia Tech) (includes test ranges in Maryland, partnered with the University of Maryland, and New Jersey, partnered with Rutgers University).

[13]GAO, *Unmanned Aerial Systems: Efforts Made toward Integration into the National Airspace Continue, but Many Actions Still Required,* GAO-15-254T (Washington, DC: Dec. 10, 2014).

[14]The integration or use of military aircraft was outside the scope of this review.

Currently, since a final rulemaking is not yet completed, FAA only approves UASs access to the national airspace on a case-by-case basis. FAA provides this approval through three different means:

- Public or Civil Certificates of Waiver or Authorization (COA): A COA is an authorization, generally for up to 2 years, issued by the FAA to an operator for a specific UAS activity. Public entities, including FAA-designated test sites (described in more detail later), and civil entities may apply for a COA to obtain authorized access to the airspace. FAA has a goal to review and approve all COAs within 60 days of being received.

- Section 333 exemptions: Since September 2014, commercial entities have applied to FAA for exemptions under section 333 of the 2012 Act, Special Rules for Certain Unmanned Aircraft Systems. This exemption requires the Secretary of Transportation to determine if certain UASs may operate safely in the national airspace system prior to the completion of UAS rulemakings.

- Special Airworthiness Certificates in the Experimental Category and the Restricted Category (Experimental Certificate): Civil entities, including commercial interests, may apply for experimental certificates, which may be used for research and development, commercial operations, training, or demonstrations by manufacturers.

While FAA has proceeded in planning for integration, foreign countries are also experiencing an increase in UAS use and planning for integration, and some have begun to allow commercial entities to fly UASs under limited circumstances. Some countries have already established regulations for flying UASs or formal processes for exemptions, while others have taken steps to completely ban all UAS operations. While some countries have worked independently to integrate UAS operations, some international groups, such as the ICAO, are working to harmonize UAS regulations and standards across borders.

FAA Has Made Progress in the First Phase of UAS Integration

Developing Planning Documents

FAA has taken a number of steps to move toward further safe integration of UAS in the national airspace in response to key requirements of the 2012 Act. FAA has developed the following planning documents:

- In November 2013, FAA issued the *UAS Comprehensive Plan*[15] identifying six high-level strategic goals for integrating UAS into the national airspace, including routine public operation and routine civil operations.[16] The *Comprehensive Plan* provides a phased-in approach for achieving these goals, which will initially focus on public UAS operations, but ultimately will provide a framework for civil UAS operations. According to the plan, each partner agency will work to achieve these national goals and may develop agency-specific plans that are aligned to the national goals and objectives. The DOD's *Unmanned Systems Integrated Roadmap* and FAA's *UAS Integration Roadmap*, described below, are examples of such plans.[17]

- In November 2013, FAA also issued the *UAS Integration Roadmap*, which identified a broad three phase approach to UAS integration—accommodation, integration, and evolution—with associated priorities for each phase.[18] These priorities provide insight into FAA's near-, mid-, and far-term goals for UAS integration, as shown in figure 2. FAA intends to use this approach to facilitate further incremental steps toward its goal of seamlessly integrating UAS flight into the national airspace. Under this approach, FAA's initial focus during the accommodation phase will be on safely allowing for the expanded operation of UASs by selectively accommodating some use and demonstrating progress by increasing operations throughout the phase. In the integration phase, FAA plans to develop new operational rules, standards, and guidance, shifting its emphasis

[15]Joint Planning and Development Office, *Unmanned Aircraft Systems (UAS) Comprehensive Plan: A Report on the Nation's UAS Path Forward* (Washington, D.C.: Sept., 2013).

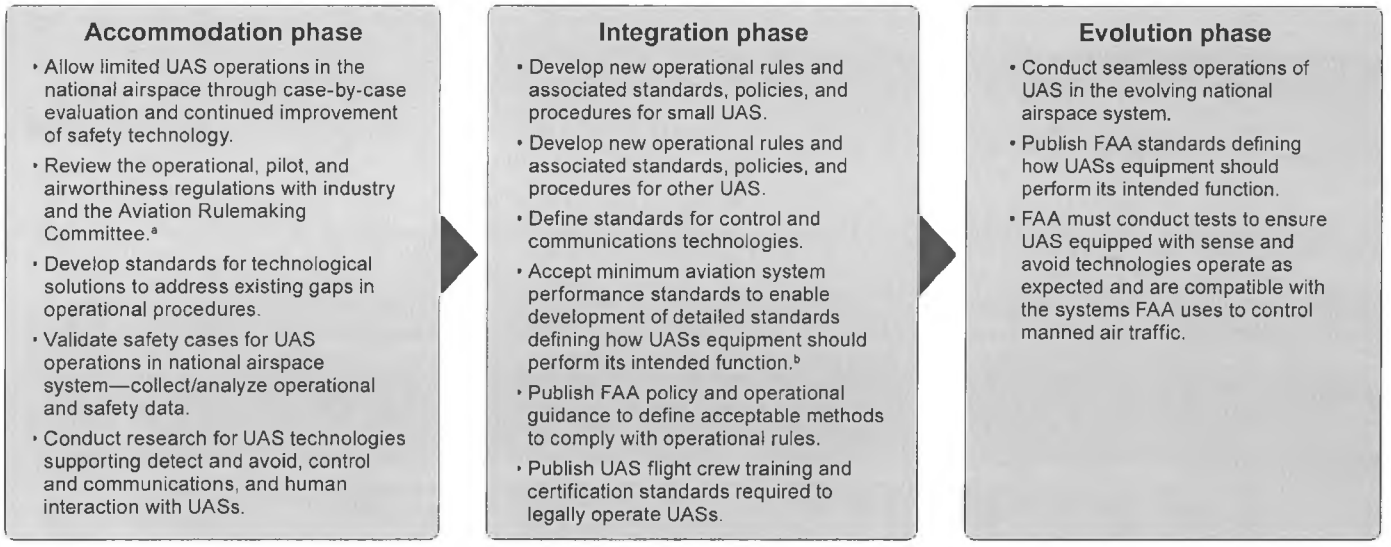
[16]The six goals address small UAS (under 55 pounds) operating within visual line-of-sight, larger UASs and operations beyond visual line-of-sight, planning and managing growing automation capabilities through research, and the opportunity for the U.S. to remain world leaders in UAS technology.

[17]DOD, *Unmanned Systems Integrated Roadmap FY2013-2038* (Washington, D.C.: 2013).

[18]FAA, *Integration of Civil Unmanned Aircraft Systems (UAS) in the National Airspace System (NAS) Roadmap: First Edition—2013* (Washington, D.C.: Nov. 2013).

toward moving beyond case-by-case approval for UAS use, once technology can support safe operations. Finally, in the evolution phase, FAA plans to focus on revising its regulations, policy, and standards based on the changing needs of the airspace. This phased approach has been supported by stakeholders across both academia and industry. The 2012 Act requires the Roadmap to be updated annually, but as of May 2015 FAA has only issued one version of the Roadmap. FAA intends to update the *Roadmap* by September 2015 and send it to the Office of Management and Budget for additional review before it is publicly released.

Figure 2: Priorities for Federal Aviation Administration's (FAA) Three Phases of Unmanned Aircraft Systems (UAS) Integration as Described in the *UAS Integration Roadmap*



Source: Federal Aviation Administration (FAA) UAS Roadmap. | GAO-15-610

[a]FAA's aviation policies and regulations focus on overall safety being addressed through three primary areas: equipment (airworthiness), personnel (pilot), and operations. Each of these areas has standards and minimum levels of safety that must be met independent of each other. Since these policies and regulations were not designed with UAS in mind, they must be reviewed and revised to safely accommodate UAS in the national airspace.

[b]Minimum aviation-system performance standards specify characteristics that are useful to designers, installers, manufacturers, service providers, and users of systems intended for operational use within a defined airspace.

While these planning documents provide a broad framework for integration, FAA is still in process of developing an implementation plan for integrating UASs. FAA's Comprehensive Plan and Roadmap provide broad plans for integration, but are not detailed implementation plans that predict with any certainty when full integration will occur and what

resources will be needed. The Department of Transportation's Inspector General issued a report in June 2014 that recommended FAA develop an implementation plan.[19]

Two reports—one from the UAS Aviation Rulemaking Committee and a second internal FAA report—have discussed the importance of an implementation plan and information to include as part of such a plan. The UAS Aviation Rulemaking Committee has emphasized that FAA needs an implementation plan that would identify the means, necessary resources, and schedule to safely and expeditiously integrate civil UAS into the national airspace. The proposed implementation plan contains several hundred tasks and other activities needed to complete the UAS integration process, including:

- identifying gaps in current UAS technologies, regulations, standards, policies, or procedures;
- developing new technologies, regulations, standards, policies, and procedures that would support safe UAS operations; and
- identifying necessary activities to advance routine UAS operations in the national airspace, including the development of guidance materials, training, and procedures for certification of aircraft.

An internal FAA report from August 2014 prepared by MITRE Corporation (MITRE) was intended to assist FAA's development of the key components of an implementation plan.[20] This report suggested that among other actions FAA's implementation plan should:

- identify the tasks necessary, responsibilities, resources, and expected time frames for incremental expansion of UAS operations;
- clarify the priorities for aligning internal resources in support of near-term and long-term integration efforts and provide consistent

[19]Department of Transportation Office of Inspector General, *FAA Faces Significant Barriers to Safely Integrate Unmanned Aircraft Systems into the National Airspace System*, Report Number AV-2014-061 (Washington, D.C.: June 2014).

[20]Deborah Kirkman, *Inputs and Recommendations for the Federal Aviation Administration UAS Integration Strategy: 2014–2019*, MITRE Corporation (August: 2014).

communication with external stakeholders on the expected progress, cost, and extent of UAS integration during these time periods;

- align resources supporting UAS integration including allocation of FAA personnel and funds used for contracts and to acquire systems and services in support of integration; and
- establish the operational, performance, and safety data needed and also the associated infrastructure for collecting, storing, disseminating, and analyzing data, actions that could be a component of an implementation plan.

According to FAA, it continues to work with MITRE developing the foundation for a detailed implementation plan. FAA expects MITRE to complete this by September 2015 and FAA to enact the plan by December 2015.[21] According to FAA, the agency used the Aviation Rulemaking Committee's report when writing the *Roadmap* and is applying the report prepared by MITRE to help develop the detailed implementation plan.

Issuing a Final Rule for Small UAS Operations

In February 2015, FAA made progress toward the 2012 Act's requirement to issue a final rule for the operations of small UASs—those weighing less than 55 pounds—by issuing a Notice of Proposed Rulemaking (NPRM) that could, once finalized, allow greater access to the national airspace.[22] To mitigate risk, the proposed rule would limit small UASs to daylight-only operations, confined areas of operation, and visual-line-of-sight operations. This proposed rule also addressed other issues pertinent to UAS operations including aircraft registration, operations in the national airspace, and operator certification. See table 3 for a summary of the rule's major provisions. FAA's release of this proposed rule for small UAS operations started the process of addressing remaining requirements of the 2012 Act.

[21]FAA told us they do intend to publicly issue the implementation plan.

[22]80 Fed. Reg. 9544 (Feb. 23, 2015).

Table 3: Selected Provisions of Proposed Rule for Small Unmanned Aircraft Systems (UAS) Operations, by Major Category

Category	Summary of proposed requirements
Operational limitations	• Must weigh less than 55 lbs. (25 kg). • Must operate within visual line of sight only. • May not operate above any persons not directly involved in the operation. • Must only operate during the day, no nighttime operations. • Maximum airspeed of 100 mph. • Maximum altitude of 500 feet above ground level. • Must not operate carelessly or recklessly. • Establishment of a micro-UAS category (4.4 lbs. or less). • Must yield right-of-way to other aircraft, manned or unmanned.
Operator certification and responsibilities	• Must pass a knowledge test initially and every 24 months. • Must be vetted by the Transportation Security Administration. • Must obtain an unmanned-aircraft operator's certificate with a small UAS rating.
Aircraft requirements	• Federal Aviation Administration (FAA) airworthiness certification not required, but operator must inspect the UAS to ensure that it is in a condition for safe operation. • Aircraft markings required; if aircraft is too small to display markings in standard size, then the aircraft simply needs to display markings in the largest practicable manner.
Model aircraft	• Would not apply to model aircraft that satisfy all of the criteria specified in section 336 of Public Law 112-95. • Would incorporate a 2012 Act provision that preserves the FAA's enforcement authority to pursue enforcement against model aircraft operators who endanger the safety of the national airspace system.

Source: Notice of Proposed Rulemaking for small UAS. | GAO-15-610

FAA's proposed rule also sought comments on a potential micro-UAS classification (4.4 pounds or less) that would apply to very small UAS being used for authorized purposes. This classification would be based on the UAS Aviation Rulemaking Committee's recommendations, as well as approaches adopted in other countries, that a separate set of regulations for micro-UASs be created. FAA is considering provisions for micro-UASs classification such as limiting operation airspeed to 30 knots, limiting flight to within visual line of sight, and having aircraft made out of materials that break on impact.

The proposed rule would not apply to model aircraft—unmanned aircraft that are flown for hobby or recreational purposes, capable of sustained flight in the atmosphere, and flown within visual line of site of the person

who is operating the aircraft—as specified in the 2012 Act.[23] Whether or not a UAS is considered a model aircraft or a small UAS depends upon its operation. For example, if the operator is flying an unmanned aircraft for recreational purposes the unmanned aircraft is considered a model aircraft. If the exact same type of unmanned aircraft is being operated for an authorized purpose such as a search and rescue mission, it is considered a small UAS.[24] The 2012 Act specifically prohibits FAA from promulgating rules regarding model aircraft that meet specific criteria, including model aircraft flown strictly for hobby or recreational use and operated in a manner that does not interfere with and gives way to any manned aircraft.[25] However, the proposed rule would incorporate the 2012 Act provisions that preserve FAA's authority to pursue enforcement against persons operating model aircraft who endanger the safety of the national airspace system.[26]

According to FAA, it may take 16 months to process the comments it receives on the NPRM and develop and issue the final rule for small UAS operations. If FAA takes 16 months, the final rule would be issued in late 2016 or early 2017, about two years beyond the requirement in the 2012

[23]See Pub. L. No. 112-95, §336(c), 126 Stat. 11, 77.

[24]FAA's *Advisory Circular 91-57* sets out model aircraft operating standards that encourage voluntary compliance with specified safety standards for model aircraft operators. In June 2014, FAA also clarified this guidance in its Notice of Interpretation of the 2012 Act's Special Rule for Model Aircraft. 79 Fed. Reg. 36172 (June 25, 2014). The Academy of Model Aeronautics has also published voluntary guidance documents for its members.

[25]More specifically, section 336(a) of the 2012 Act prohibits the FAA from promulgating rules regarding model aircraft that meet all of the following statutory criteria: The aircraft is flown strictly for hobby or recreational use; The aircraft is operated in accordance with a community-based set of safety guidelines and within the programming of a nationwide community-based organization; 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 aircraft is operated in a manner that does not interfere with and gives way to any manned aircraft; and 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.

[26]Section 336(b) of the 2012 Act provides that "[n]othing 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. The proposed rule provides that it is FAA's existing authority, under 49 U.S.C. §§ 40103(b) and 44701(a)(5) that provide the FAA with the power to pursue enforcement "against persons operating model aircraft who endanger the safety of the national airspace system."

Act. However, during the course of our work, FAA told us that the time needed to respond to a large number of comments could further extend the time to issue a final rule. When the comment period closed on April 24, 2015 FAA had received over 4,500 comments. FAA officials told us that it has taken a number of steps to develop a framework to efficiently process the comments it expects to receive. Specifically, they said that FAA has a team of employees assigned to lead the effort with contractor support to track and categorize the comments as soon as they are received.

Creating Test Sites

FAA has also met the requirement from the 2012 Act to create UAS test sites for research and development. Specifically, in December 2013 FAA selected six UAS test site locations, which all became operational between April 2014 and August 2014. According to FAA, these sites were chosen based on a number of factors including geography, climate, airspace use, and a proposed research portfolio that was part of the application. Under FAA policy, all UAS operations at a test site must be authorized by FAA through either the use of a COA or an experimental certificate. In addition, FAA does not provide funding to support the test sites. Thus, these sites rely upon revenue generated from entities, such as those in the UAS industry that are using the sites for UAS flights. The 2012 Act authorized the test sites to operate until February 14, 2017. FAA stated it is too early to assess the test sites' results and effectiveness and thus whether the test sites should be extended. According to FAA officials, FAA does not object to extending the test sites but may need additional resources if that happens.

Accommodating Limited UAS Operations

Although it still relies on case-by-case approvals, FAA has increased UAS operations during the accommodation phase of UAS integration. As we have previously noted, UAS operators can only gain access to the national airspace by obtaining a COA, an experimental certificate, or a section 333 exemption. From 2010 to 2014, the total number of COAs approved for public operations has increased each year, with FAA issuing 403 COAs thus far this year, as shown in table 4. Similarly, from 2011 to 2014, the total number of experimental certificates has increased each year, with FAA issuing 6 thus far this year.

Table 4: Total Number of Federal Aviation Administration-Issued Public Certificates of Waiver or Authorization (COA) and Special Airworthiness Certificates for Experimental Aircraft for Unmanned Aerial Systems

	2010	2011	2012	2013	2014	2015
Public COA	286	309	383	407	609	403[a]
Experimental certificate	15	14	18	26	39	6[b]

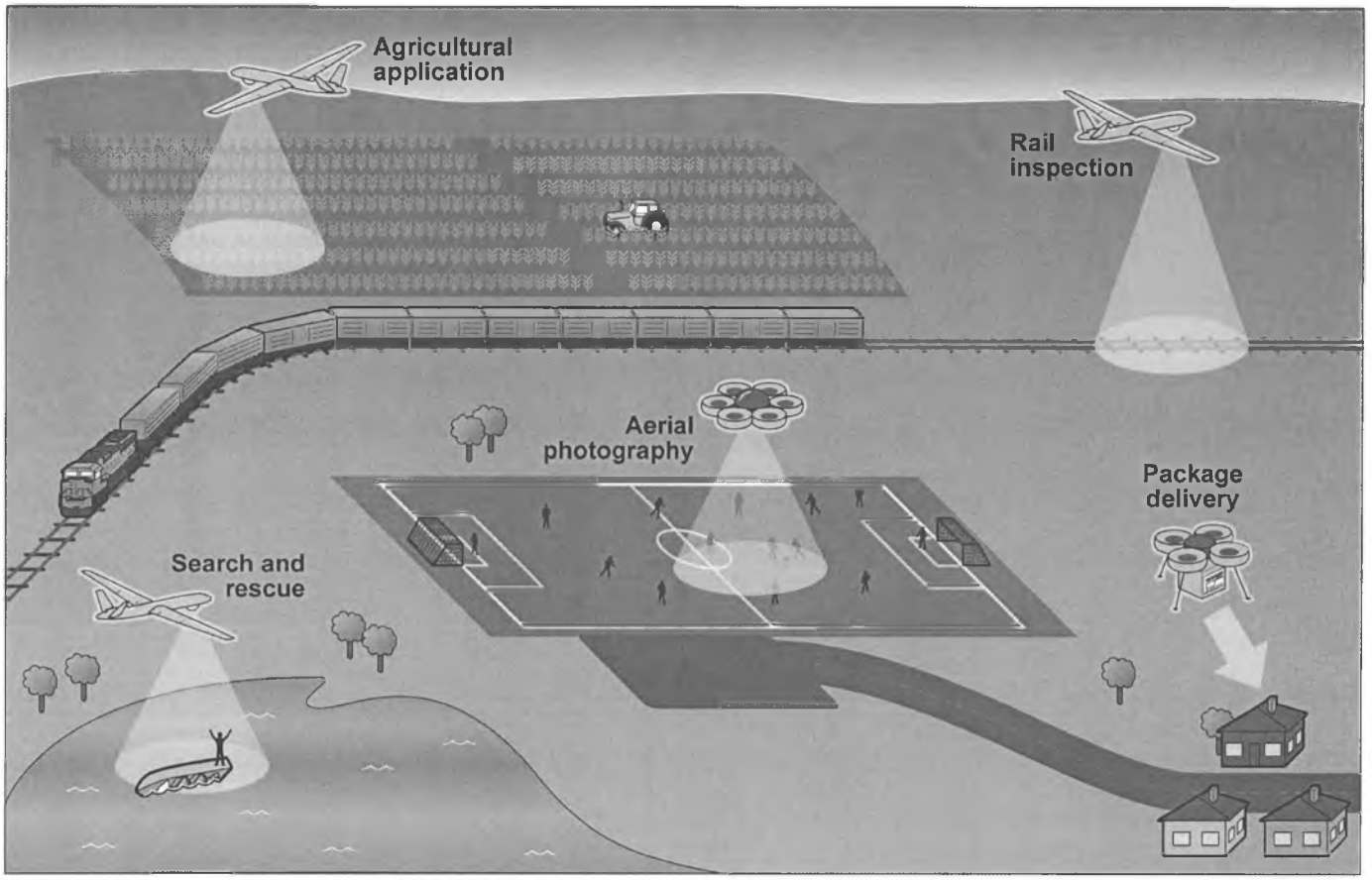
Source: FAA | GAO-15-610

[a]As of April 30, 2015.

[b]As of May 1, 2015.

In September 2014, FAA granted the first section 333 exemptions; at that time 6 total exemptions were granted for commercial UAS operations to movie and TV production companies. As of June 9, 2015, FAA had granted 548 section 333 exemptions to companies for a variety of additional commercial operations supporting the real estate, utility, and agriculture industries, among others. See figure 3 for examples of commercial uses, including some approved under section 333 exemptions.

Figure 3: Examples of Potential Commercial Unmanned Aerial Systems Operations



Source: GAO. | GAO-15-610

FAA has taken steps to make access easier for those operating UASs under a section 333 exemption. On March 23, 2015, FAA established an interim policy to speed up authorizations for certain commercial unmanned aircraft operators that request Section 333 exemptions. According to FAA, the new policy helps bridge the gap between the past "case-by-case" approval process, which evaluated every commercial UAS operation individually, and future operations after they publish a final version of the proposed small UAS rule. Under the new policy, the FAA will grant a COA for flights at or below 200 feet to any commercial UAS operator with a Section 333 exemption for aircraft that weigh less than 55 pounds, operate during the daytime, operate within visual line of sight of the pilots, and stay certain distances away from airports or heliports. According to FAA, the "blanket" 200-foot COA allows flights anywhere in

the country except restricted airspace and other areas, such as major cities, where the FAA prohibits commercial UAS operations.[27] The agency expects the new policy will allow companies and individuals who want to use UAS within these limitations to start flying much more quickly than before. A company wanting to operate above 200 feet, or outside the other rules set up by FAA, must obtain a separate COA.

FAA took additional steps in May 2015 to work with industry to safely expand UAS operations. FAA announced its Pathfinder Program that will partner FAA with companies to perform research in support of UAS integration. These companies will focus on using UAS for specific applications, such as news gathering and surveying crops. In addition, two will focus on applications for beyond the visual line of sight of the operator. One industry stakeholder stated the next step would be to develop additional mechanisms to allow UAS operations beyond the visual line of sight of the operator once technology supports greater use.

Potential Commercial Agriculture Use

The University of California-Davis has been conducting a demonstration project using a Yamaha RMAX helicopter to spray pesticides at its vineyard. The purpose of the project is to test the efficiency and safety of aerial spraying of grape crops. According to an official from Yamaha Motor Corporation, USA, initial tests have shown the RMAX can cover up to 12 times as much area in an hour compared with traditional spraying methods.

Source: Yamaha Motor Corporation, USA | GAO-15-610

While accommodating UAS access, FAA and industry have taken steps to educate UAS operators on how to safely operate. UAS industry stakeholders and FAA have begun an educational campaign that provides prospective users with information and guidance on flying safely and responsibly. Specifically, they launched an informational website for UAS operators to ease public concerns about privacy and support safer UAS operations in the national airspace.[28] In addition, in May 2015, FAA announced plans to develop the "B4UFLY" smartphone application designed to help UAS users, both model aircraft and recreational UAS operators, know where it is safe and legal to fly. The application is designed to let an operator know if it is safe and legal to fly in a specific location.

[27]Previously, an operator had to apply for and receive a COA for a particular block of airspace, a process that can take 60 days.

[28]Know Before You Fly (www.knowbeforeyoufly.org) was founded by three organizations with a stake in UAS safety: the Association for Unmanned Vehicle Systems International, the Academy of Model Aeronautics, and the Small UAV Coalition. The FAA is partnering with the founding members to spread the word about safe and responsible flying. FAA also stated that three manufacturers agreed to voluntarily include Know Before You Fly information for model aircraft operators in their packaging.

Collaborating with UAS Stakeholders

FAA has worked with federal and industry stakeholders to coordinate federal activities in support of conducting research and development and creating UAS standards to facilitate UAS integration. As with other large government-wide initiatives, achieving results for the nation increasingly requires that federal agencies and others work together. FAA has worked with the UAS Executive Committee to facilitate federal UAS activities and RTCA Special Committee 228, ASTM International Committee F38, and the UAS Aviation Rulemaking Committee to develop safety, reliability, and performance standards for UAS.

Each collaborative group has defined different long-term goals in support of UAS integration and has made progress toward the achieving these goals.

- The Executive Committee's long-term goals involve working to solve the broad range of technical, procedural, and policy issues affecting UAS integration into the national airspace. In support of this objective, the Executive Committee agencies, other public agencies, and industry have also developed processes and procedures to safely demonstrate small UAS operations in remote areas of the Arctic, including beyond-line-of-site operations. The UAS demonstration occurred in domestic and international airspace on and off the coast of Alaska.

- RTCA Special Committee 228 has set out its own goals across two phases. Currently working toward completion of the first phase, RTCA is developing minimum operational performance standards for detect and avoid and command and control technologies for UASs. RTCA has made progress toward this goal with help from the Executive Committee. Specifically, the Executive Committee's Science and Research Panel developed a definition of "well clear" to help inform RTCA Special Committee 228's work.[29]

- The UAS Aviation Rulemaking Committee has a goal to develop a report for FAA on its efforts to provide direction for UAS operational criteria, among other tasks, by April 18, 2016.

[29]The Federal Aviation Regulations generally require that pilots remain "well clear" of other aircraft when flying in the national airspace system. 14 C.F.R. §§ 91.115, 91.181. RTCA will use a definition of well clear provided by the UAS Executive Committee's Science and Research Panel as a baseline for detect and avoid standards.

- ASTM International F38's long-term goal involves developing and publishing voluntary consensus standards for small and large UASs as FAA requests them. ASTM International Committee F38 has developed standards and recommendations to support FAA's small UAS rulemaking that cover elements such as systems design, construction, and testing.

FAA has applied other interagency collaborative methods in support of UAS integration including memorandums of understanding or agreement (MOU)[30] and conferences. FAA entered into MOUs with DOD and NASA to expedite the COA process and ensure the availability of DOD's data.[31] According to FAA officials, the MOUs eased collaboration with DOD and NASA because the MOUs established roles and responsibilities for each agency as well as procedures for DOD to obtain COAs. In addition, FAA convenes meetings with test site officials and attends conferences where UAS issues are discussed. For example, FAA regularly holds conference calls and convenes technical interchange meetings with test site officials to address test site issues. According to FAA, the technical interchange meetings are opportunities for FAA to provide updates to the test sites and discuss common areas of research interest. The manager of the FAA's UAS Integration Office has presented information about its UAS efforts during industry conferences, such as the Association for Unmanned Vehicle Systems International's annual meeting. These conferences allow FAA to provide guidance and updates directly to the industry and public.

[30]A memorandum of understanding is a written agreement between more than one federal agency or department that defines the roles, responsibilities, and how each party will act for specific aspects of the relationship between the two participants.

[31]FAA also has UAS related memorandums of agreement or understanding with the U.S. Department of Justice, the U.S. Department of the Interior, the National Oceanic and Atmospheric Administration within the U.S. Department of Commerce, and the Academy of Model Aeronautics.

FAA's Designated Test Sites Have Conducted UAS Test Flights and Addressed Challenges

FAA's Designated Test Sites Are Operating and Conducting UAS Operations

Since being named in December 2013, the six designated test sites have become operational, applying for and receiving authorization from FAA to conduct test flights. Specifically, from April through August 2014, each of the six test sites became operational and signed an Other Transaction Agreement with FAA, establishing their research and development relationship. All flights at a test site must be authorized under the authority of a COA or an experimental certificate approved by FAA.[32] Since becoming operational, five of the six test sites received 48 COAs and one experimental certificate in support of UAS operations resulting in over 195 UAS flights across the five test sites. These flights provide the operations and safety data to FAA as required by the COA. While there are only a few contracts with industry thus far, according to test site operators, these will be important if the test sites are to generate sufficient revenue to remain in operation. Table 5 provides an overview of test-site activity since the sites became operational.

[32]All test sites are operated by public entities (academic institutions or federal, state, or local governments) and thus all aircraft must be public aircraft—unless they are operating under a special certificate.

Table 5: Overview of Activity at Five of Six Designated Unmanned Aerial Systems (UAS) Test Sites, as of March 2015

Type of test site activity	Overview since becoming operational in 2014
Total unmanned aerial systems (UAS) flights at FAA designated test sites	• Over 195 total UAS flights. • One test site has had over 80 UAS flights.
Number and types of certificates of waiver or authorizations (COA) received	• Five test sites hold 48 COAs. • One test site held 4 broad area COAs allowing flights over nearly the entire state by specific aircraft. • Four other test sites were seeking COAs for large flight ranges that could apply to any aircraft.
Number of special airworthiness certificates for experimental aircraft	• A certified representative reviewed and approved an aircraft to operate under an experimental certification at one test site. • Three test sites have representatives affiliated with the test site to review and approve aircraft for experimental certification.
Signed contracts with UAS companies	• Five test sites have 22 contracts with industry groups and companies to conduct UAS operations at their respective test site thus generating revenue for the test sites. • All test sites have additional negotiations with companies under way.

Source: FAA designated test sites. | GAO- 15-610

Note: Of FAA's six designated test sites, one— Texas A&M University-Corpus Christi test site—did not respond to our request for this information.

According to all test sites, FAA approval for access to the airspace can be a lengthy process taking 90 days or even longer. FAA and the test sites have found ways to allow quicker access to the test site airspace and relieve some administrative burden from FAA.

- In February 2015, FAA awarded the Northern Plains Test Site in North Dakota four broad area COAs that were aircraft specific. According to a test site official, these COAs allowed designated aircraft to fly over nearly the entire state of North Dakota and will make it easier to accommodate industry for research. Furthermore, these COAs were a positive step in allowing quicker access to the airspace at test sites. Reducing FAA's role in the process creates more certainty regarding how long it will take an operator to access airspace at the test sites. Specifically, the test site representative indicated FAA's role was reduced because there was a process that allowed aircraft to be added to these existing COAs that was simpler than applying for individual COAs.

- In May 2015, FAA approved a "blanket" COA allowing the test sites to conduct UAS operations at or below 200 feet anywhere in the national airspace, similar to the authority provided to Section 333 exemptions. In particular, these COAs will be for small UAS operations, during the

day, within line of sight of the operator, and the operations cannot occur in restricted airspace and areas close to airports. According to FAA, this will help improve UAS access allowing more operations in support of research that can further the UAS integration process. Previously, all UASs needed their own COA when operating at a test site but this action by FAA will allow any small UASs to operate at the test sites within the COA's requirements.

- The use of designated airworthiness representatives by the test sites to review and approve experimental certificates may be quicker for industry and relieve some of FAA's workload.[33] Industry benefits from not having to lease its aircraft to the test site, as all test sites are operated by public entities (academic institutions or federal, state, or local governments) and thus all aircraft must be public aircraft, unless they are operating under a special certificate.[34] In addition, any industry group working with the test site would not have to go through FAA to receive the experimental certificate. The Nevada test site has affiliated itself with a designated airworthiness representative, who has approved an aircraft to operate under an experimental certificate for the Nevada test site. According to FAA, the use of a designated airworthiness representative allows it to better leverage its resources.

FAA officials and some test site officials told us that progress has been made in part because of FAA's and test sites' efforts to work together. Test site officials meet every 2 weeks with FAA officials to discuss current issues, challenges, and progress. According to meeting minutes, these meetings have been used to discuss many issues from training for designated airworthiness representatives to processing of COAs. In addition, the six test sites have developed operational and safety processes that have been reviewed by FAA. Thus, while FAA has no funding directed to the test sites to specifically support research and development activities, FAA dedicates time and resources to supporting the test sites, and FAA staff we spoke to believe test sites are a benefit to the integration process and worth this investment.

[33]Designated airworthiness representatives are individuals acting as a representative of FAA trained to examine, inspect, test and issue aircraft certificates.

[34]For a private company to operate under a public COA at a test site, it must lease the aircraft to the public entity. A concern of some private companies has been the protection of proprietary or sensitive data when they lease the aircraft to the public operator of the test site. The experimental certificate eliminates this concern of protecting proprietary technology.

Test Sites Faced Challenges during Their First Year

Despite the progress made since they began operating, according to test site operators, they faced a number of challenges in the first year of operations:

- Guidance on research: According to FAA, because the test sites receive no federal funding, FAA can neither direct specific research to be conducted nor direct the test sites to share specific research data, other than the operations and safety data required by the COA. The Other Transaction Agreement for each test site defines the purpose of the test sites as a place to conduct research and testing under FAA safety oversight to support UAS integration into the national airspace. The Other Transaction Agreement indicates the test sites will provide FAA with UAS research and operational data to support the development of procedures, standards, and regulations. However, FAA officials told us that the Antideficiency Act may prevent the agency from directing specific test site activities without providing compensation.[35] In October 2014, FAA provided a list of potential research areas to the test sites to guide the research that each test site may conduct. According to FAA, this document was not to be construed as a directive but more as guidance for possible research areas. However, three test sites told us this document was too broad to be considered guidance for the research test sites should conduct.

- Incentives for industry to use test sites: Five test sites told us that the UAS industry gains little advantage to using the test sites for research because they must follow similar processes to access the airspace anywhere. As previously indicated, all flights at a test site must be authorized under the authority of a COA or an experimental certificate, two means the industry can use to access the airspace anywhere, not just at the test sites. All six test sites are seeking to make it easier for companies to access the airspace at a test site rather than working external of the test sites. For example, all test sites told us a COA applicable to any aircraft and covering large flight areas would be beneficial. This would be similar to the two COAs previously discussed, the COA received by the Northern Plains test site and the "blanket" 200-foot COA recently authorized by FAA. However, representatives from two test sites indicated that the "blanket" 200-foot COA meets some of their needs as it is applicable only to public

[35]The Antideficiency Act prohibits federal officers and employees from, among other things, accepting voluntary services except for emergencies involving the safety of human life or the protection of property. 31 U.S.C. § 1342.

aircraft, meaning that civil operators still have to lease the aircraft to the test site for operations. But, as one test site representative stated a broad area COA, allowing civil operations at the test site would be even more beneficial. Another test site representative indicated that they will continue to work with FAA to make access easier allowing flights at higher altitude with different aircraft.

- Maintaining operations: While all the test sites had some level of initial funding, from either private industry or state legislatures, to become operational, they must attract UAS industry to the test sites to generate enough revenue to maintain operations. However, test site operators reported that test sites have additional requirements as opposed to operating outside the test sites, including leasing the aircraft to the test site to operate under the public COA. While test sites have signed 22 contracts, there is a chance that some test sites will not survive due to the financial burden. Some companies have made a decision to go to other countries to conduct UAS testing because they believe it takes less time to be approved for test flights. For example, Amazon has reported it has testing under way in multiple countries outside the United States, including a site in Canada. In an effort to attract some industry operators, the Pan Pacific Test Site has a location in Iceland where, according to the Director, review and approval for test flights can happen much faster, in as few as 10 days, relative to over 90 days a COA may take in this country. In addition, the UAS industry is conducting tests in this country outside the test sites. For example, CNN worked with Georgia Institute of Technology.

Companies Conducting Beyond-Visual-Line-of-Sight Testing Overseas

Insitu, Inc., a Boeing subsidiary, conducted beyond-visual-line-of-sight testing in Denmark in May, 2015 with a ScanEagle UAS. The flights took place in cooperation with the Danish Transport Authority as part of an agreement signed by Boeing and the airport to develop a UAS Test Center in Denmark, which is used for training, testing, and development. The activity included members of the public and private sector, including the UAS Denmark Consortium, a group of companies, government organizations, and other entities supporting UAS industry development. The testing demonstrated capabilities for a variety of industries, including agriculture and aerial surveying, emergency and natural-disaster response, and defense and Arctic surveillance.

[An Insitu, Inc. ScanEagle UAS launch at sea.]

Source: Insitu, Inc. | GAO-15-610

FAA Supports Additional Research and Development Efforts

FAA has used cooperative research and development agreements, federally funded research and development centers, and grants to conduct other UAS research and development. These agreements for research are similar to the Other Transaction Agreement that directs the purpose and goals of the relationship between FAA and the research entities. However, unlike the Other Transaction Agreement in place for the test sites, according to FAA, many of these agreements have language specifically addressing the sharing of research and data. The following are examples of other resources FAA has devoted to UAS integration research and development:

- Cooperative research and development agreement: New Mexico State University has had a flight test center operating for several years under a cooperative research and development agreement with FAA. The center serves a similar purpose to the designated test sites but has been operating since 2007. The flight test center has conducted research in many areas including nighttime flying and more recently research into long-endurance UAS flights operating between 10,000 and 17,000 feet. According to an official, the New Mexico State University's flight test center has challenges with getting access to the airspace for customers because the process to receive a COA can be lengthy. In addition, this official told us the flight test center would like authority to approve COAs to operate at the test center because the FAA is backlogged and therefore approvals are delayed. Finally, according to the flight test center operators, FAA can get data from the research being conducted at the test site but does not direct them what to provide. While the flight test center has operated under a Cooperative Research and Development Agreement since 2007, in May 2015 the Flight Test Center switched to an Other Transaction Agreement to continue UAS testing.

- Federally funded research and development center: MITRE manages federal funded research and development centers for multiple federal agencies including FAA and DOD. MITRE has ongoing work supporting FAA's UAS integration effort by supporting UAS standards and rulemaking and supporting research planning and progress, among other efforts. MITRE brings together the federal agencies—FAA, NASA, DOD, DHS, and others—to advance UAS integration. In its role, according to MITRE officials, one of the biggest challenges is how to integrate all the UAS-related work across the federal government, academia, and private sector.

- Grants: In August 2014, FAA awarded two grants to Georgia Tech Research Corporation and the University of North Dakota to conduct literature reviews of UAS issues. Georgia Tech is collecting information on research being conducted on the effect of UAS collisions on other airborne and ground based objects. The University of North Dakota is looking at the UAS safety criteria and particularly if UASs could be deadly. According to FAA, both studies will support ongoing UAS research and help determine the applicability of past studies.

- Center of Excellence: In May 2015, FAA selected a team led by Mississippi State University as the Center of Excellence for UAS.[36] According to FAA, the goal of the Center of Excellence will be to create a cost-sharing relationship among academia, industry, and government that will focus on the primary research areas needed to support UAS integration. FAA hopes the center could provide both short- and long-term research through testing and analysis. In support of it serving this purpose, the Center of Excellence has an annual $500,000 budget for the next 10 years.

FAA also has additional resources to support the UAS integration, including facilities working on research and development and management of FAA's other research and development efforts for UAS integration. FAA's William J. Hughes Technical Center houses staff in charge of supporting and managing FAA's designated test sites.[37] While the test sites do not have specific funding, FAA has dedicated resources located at Hughes Technical Center to support the set up and ongoing operations of the test sites. For example, COA data are collected and analyzed at the Hughes Technical Center. In addition, FAA has participated in the twice-a-year technical interchange meetings with the test sites. These meetings have brought together the test sites and FAA to address issues in the set-up and operation of the test sites. Furthermore, FAA has staff supporting the test sites through review of test site operation and safety procedures and manuals to support the monthly reporting of the operational and safety data required by each COA.

[36]In addition to Mississippi State University, the other team members include: Drexel University; Embry Riddle Aeronautical University; Kansas State University; Kansas University; Montana State University; New Mexico State University; North Carolina State University; Oregon State University; University of Alabama, Huntsville; University of Alaska, Fairbanks; University of North Dakota; and Wichita State University.

[37]The William J. Hughes Technical Center is located in Atlantic City, New Jersey, and contains laboratories supporting aviation research, development, testing, and evaluation of air traffic control and aircraft safety among other aviation areas. It also serves as the primary facility supporting the Next Generation Air Traffic System.

Other Countries Have Established Regulations, and Some Allow More Commercial Operations Than the United States

Numerous Countries Allow UAS Operations

According to numerous studies and stakeholders we interviewed, many countries around the world, have been allowing commercial UAS operations in their airspace for differing purposes. We also identified a number of countries that allow commercial UAS operations and have done so for years. Specifically, Canada and Australia have regulations pertaining to UAS that have been in place since 1996 and 2002, respectively. According to a recent MITRE study, the types of commercial operations allowed vary by country and include aerial surveying, photography, and other lines of business.[38] For example, Japan has allowed UAS operations in the agriculture industry since the 1980's to help apply fertilizer and pesticide.[39]

In March 2015, the European Aviation Safety Agency (EASA) issued a proposal for UAS regulations that creates three categories of UAS operations—open, specific, and certified.[40] This proposal seeks the safe integration of UAS into national airspace, as well as support for the UAS industry in Europe. Generally, the open category would not require authorization from an aviation authority but would have basic restrictions including altitude and distance from people. The specific category would

[38]MITRE Corporation, *UAS International Harmonization: A Comparative Policy Assessment of Selected Countries*, Outcome 6, Output 4 (fiscal year 2014).

[39]According to the MITRE study, Japan's regulations also allow UAS operations for agricultural purposes with UASs weighing less than 220 pounds.

[40]EASA is the European Union Authority in aviation safety. The main activities of the organization include the strategy and safety management, the certification of aviation products and the oversight of approved organizations and EU Member States.

require a risk assessment of the proposed operation and an approval to operate under restrictions specific to the operation. The final proposed category, certified operations, would be required for those higher-risk operations, specifically when the risk rises to a level comparable to manned operations. This category goes beyond FAA's proposed rules by proposing regulations for large UAS operations and operations beyond the pilot's visual line of sight. As other countries work toward integration, standards organizations from Europe and the United States are coordinating to try and ensure harmonized standards. Specifically, RTCA and the European Organization for Civil Aviation Equipment (EUROCAE) have joint committees focused on harmonization of UAS standards.[41]

UAS Regulations in Australia, Canada, France, and the United Kingdom Are Similar to Each Other and to Proposed Regulations in This Country

We studied the UAS regulations of Australia, Canada, France, and the United Kingdom and found that these countries impose similar types of requirements and restrictions on commercial UAS operations. For example, all these countries except Canada require government-issued certification documents before UASs can operate commercially.[42] In addition, each country requires that UAS operators document how they ensure safety during flights and their UAS regulations go into significant detail on subjects such as remote pilot training and licensing requirements. For example, the United Kingdom has established "national qualified entities" that conduct assessments of operators and make recommendations to the Civil Aviation Authority as to whether to approve that operator. Similar regulations in these countries continue to evolve. In November 2014, Canada issued new rules creating exemptions for commercial use of small UASs weighing 4.4 pounds or less and from 4.4 pounds to 55 pounds. UASs in these categories can commercially operate without a government-issued certification but must still follow operational restrictions, such as a height restriction and a requirement to operate within line of sight. Transport Canada officials told us this arrangement allows them to use scarce resources to regulate situations

[41]RTCA is a private non-profit organization consisting of industry experts. RTCA provides a venue for public-private collaboration supporting consensus building on aviation modernization issues. EUROCAE is a non-profit organization dedicated to aviation standards. The organization is composed of members, who are specialized in technical fields of aeronautics.

[42]UASs lighter than 55 pounds are exempt from Canada's requirement to obtain a Special Flight Operations Certificate. Those heavier than 55 pounds or otherwise not complying with the exemption requirements must obtain a Special Flight Operations Certificate.

Firefighting with UASs In Australia

Firefighters in Western Australia have used small UASs during their firefighting operations. The UASs provide intelligence on hot spots and containment lines at night when manned aircraft are not permitted to fly.

[An unmanned Lockheed Martin/Kaman K-MAX helicopter extinguishes several fires, aided by the small unmanned Indago Quad Rotor, also from Lockheed Martin, during a demonstration.]

[The Lockheed Martin Indago Quad Rotor.]

Source: Furnished with permission of Lockheed Martin Corporation. Copyright © 2015 Lockheed Martin Corporation. All rights reserved.

of relatively high risk. Australia, in similar fashion, is considering relieving UASs lighter than 4.4 pounds from its requirement to obtain a UAS Operator's certificate. France's regulation describes 4 weight-based categories of UAS as well as 4 operational scenarios of increasing complexity. The regulations then discuss which UAS categories can operate in each scenario. FAA, by electing to focus on UASs up to 55 pounds in its Small UAS NPRM, has taken a similar risk-based approach.

The United States has not yet finalized regulations specifically addressing its small UAS operations, but if UASs were to begin flying today in the national airspace system under the provisions of FAA's proposed rules, their operating restrictions would be generally similar to regulations in these other four countries. However, there would be some differences in the details. For example, FAA proposes altitude restrictions of below 500 feet, while Australia, Canada, and the United Kingdom restrict operations to similar but slightly lower altitudes. Other proposed regulations require that FAA certify UAS pilots prior to commencing operations, while Canada and France do not require pilot certification in certain low risk scenarios. While FAA continues to finalize the small UAS rule—a process that could take until late 2016 or early 2017—other countries continue to move ahead with UAS integration. Thus, when the rule is finalized the operating restrictions in this country may be well behind what exists in other countries if the final rule reflects the proposed rule. Table 6 shows how FAA's proposed rules compare with the regulations of Australia, Canada, France, and the United Kingdom.

Table 6: Comparison of Regulatory Requirements for Commercial Unmanned Aerial Systems (UAS) Operations in Select Countries

Regulatory requirements for commercial Unmanned Aerial Systems (UAS)	United States (proposed)	Australia	Canada	France	United Kingdom
Weight classifications (in pounds)	< 55	≤ 0.2 0.2 < ≥ 331 > 331[a]	<4.4 4.4 <> 55 >55	<4.4 4.4 ≤> 55 55 ≤ > 331 ≥ 331	≤15 15 < ≥ 44 44 <> 331 ≥ 331
Government-issued documents for airspace access	Unmanned aircraft operator certificate	UAS operator certificate	None; meet specified conditions for < 55 lbs.[b]	Authorization	Permission from Civil Aviation Authority
Pilot training or certification required	Certification[c]	Certification	Training	Operator certifies pilot qualification[d]	Certification[e]
Pilot proficiency check	Biennially	Annually	Upon application	None[f]	Noneg
Airworthiness certification required	No	No, for < 331 lbs.	No, for < 55 lbs.	No < 55 lbs.	Depends upon the weight of the UAS [h]
Beyond line of sight operations allowed by regulation	No	Not specifically addressed in regulation[i]	No	No[j]	No[k]
Restrictions from congested or built-up area	May operate over congested area but not over any persons not involved with the operations.	Unless specifically authorized must fly at sufficient height where, if any of its components fail, it would be able to clear the area.	5.75 miles	Do not allow flying over these areas without special permission	Limited, based on case-by-case review
Altitude restrictions	500 ft.	Unless specifically authorized, 400 ft.	300 ft. if < 55 lbs.	492 ft.	400 ft.

Source: GAO analysis of UAS regulations in foreign countries. | GAO-15-610

Note: In certain instances, UASs may operate outside the requirements shown in this table with prior approval from the cognizant authority, e.g., the civil aviation authority or air traffic control. This table shows regulatory requirements for the UAS category used most frequently in each country.

[a]Regulations for large fixed-wing UASs (exceeding 331 pounds) apply to helicopters or rotary wing UASs heavier than 221 pounds.

[b]Operators must have certain documents available, including the exemption regulation and proof of liability insurance.

[c]Pilot must pass a test at an FAA-approved testing center.

[d]Owner of the UAS must self-certify that the UAS pilots have the required training.

[e]Pilot qualifications are determined on a case-by-case basis based a number of factors including pilot experience and aircraft weight. Permission is not required for aircraft 44 pounds or less being flown within direct unaided line of sight and away from people, property, and congested areas.

[f]Owner of the UAS must self-certify that the UAS pilots have the required training if the pilot has not flown the UAS in the preceding 12 months.

[g]Self-certification accepted using logbook entries unless the pilot changes aircraft type, or the pilot has less than 2-hours experience logged in preceding 3 months on same aircraft type.

[h]An airworthiness certification is not required for UAS weighing less than 44 pounds but is required for UAS weighing more than 44 pounds Exemptions may be available in specified circumstances.

[i]An Advisory Circular issued by Australia's Civil Aviation Safety Authority (AC 101-1(0)) provides for beyond line of sight operations under certain circumstances.

[j]UAS operations beyond line of sight are very limited and allowed only on a case-by-case basis, according to a French civil aviation official.

[k]Beyond line of sight operations are allowed with aircraft fitted with a detect-and-avoid system or, operated within a segregated airspace. The Civil Aviation Authority has noted that it is not aware of any detect-and-avoid system with adequate performance and reliability, but has several areas of segregated airspace.

While regulations in these countries generally require that UAS operations remain within the pilot's visual line of sight, some countries are moving toward allowing limited operations beyond the pilot's visual line of sight. For example, according to Australian civil aviation officials, they are developing a new UAS regulation that would allow operators to request a certificate allowing beyond-line-of-sight operations. However, use would be very limited and allowed only on a case-by-case basis. Similarly, according to a French civil aviation official, France approves on a case-by-case basis, very limited beyond-line-of-sight operations. Finally, in the United States, there have been beyond-line-of-sight operations in the Arctic, and NASA, FAA and the UAS industry have successfully demonstrated detect-and-avoid technology, which is necessary for beyond line-of-sight operations.

Like the United States, Australia, Canada, France, and the United Kingdom distinguish between recreational model aircraft and commercial UASs and have issued guidelines for safe operation.[43] For example, the United Kingdom defines model aircraft as any small unmanned aircraft, weighing less than 44 pounds, or large unmanned aircraft weighing more than 44 pounds, that is used for sporting and recreational purposes. Australia makes no practicable distinction between a small UAV and a model aircraft except that of use—model aircraft are flown only for the

[43]As discussed earlier, for the United States, the model aircraft definition is in the 2012 Act. Rules for flying model aircraft are advisory, and compliance is voluntary. However, FAA has enforcement authority over persons operating model aircraft who endanger the safety of the national airspace system.

sport of flying them. However, Australia also defines a giant model aircraft as one weighing between 55 pounds and 331 pounds.

Approvals for commercial UAS operations have increased in these four countries and some allow more commercial operations. Since 2011 the number of approvals for commercial operations in France has increased every year. According to a Civil Aviation Authority official, in 2014, there were about 3,600 commercial UAS operators. In Canada, according to a Transport Canada official, there were over 1,600 approvals for commercial and research related UAS operations in 2014. As previously mentioned, certain commercial operations in Canada do not need approval as of November 2014 and there may be even more UAS operations. The United Kingdom's Civil Aviation Authority attributes the growth to UASs in their country to the UASs' becoming less expensive and simpler to operate. In the United Kingdom, as of February 2015, there were 483 commercial UAS operators, and this number has increased every year since 2010. Similar to the United Kingdom, Australia has seen an increase in commercial UAS operators since 2010 with currently over 200 approved commercial operators. Australia's Parliament attributes the growth to improvements in UASs' piloting and control technologies, as well as reductions in UAS prices. With FAA's approvals for commercial exemptions exceeding 500 as of June 9, 2015, the United States has closed the gap with some other countries' level of commercial use.

Other Countries Face Common Challenges to UAS Integration

Other countries face challenges that are common across some countries, including the United States, trying to integrate UAS operations. Specifically, some of the challenges are:

- Technology shortfalls and unresolved spectrum issues. Technology needs and concerns about available spectrum constrain full integration of UASs into airspace with manned aircraft in the United States and in countries around the world. UASs' current inability to detect and avoid other aircraft, the lack of a standard for command and control systems, and no dedicated and secure frequency spectrum are technical challenges preventing full UAS integration into the national airspace. However, organizations around the world are looking to address these technology issues and develop standards to support safe UAS operations. At the worldwide level, the International Civil Aviation Organization is addressing how UAS integration would affect its existing standards. At the European level, the European UAS Roadmap contains a strategic research and development plan that

describes anticipated deliverables along with key milestones, timelines, and resources needed. Separate from the international organizations, researchers in individual countries are also addressing these challenges. For example, in February 2014, Australian researchers achieved what was then believed to be a world-first breakthrough for small UASs by developing an onboard system that has enabled a UAS to detect another aircraft using vision while in flight.

- Safe operations by recreational users. Countries around the world also face challenges in ensuring that UAS purchasers operate them safely. As UASs become more affordable, and increasingly available some individuals are conducting unsafe or illegal UAS operations. In July 2014, Australia's Parliament reported on testimony, from several witnesses, that UASs are being flown by operators who unknowingly break safety rules, thereby posing a safety risk to manned aircraft and persons on the ground. In response to unsafe operations, a few countries have placed outright bans on UAS operations. For example, in India, in response to the surge in interest for commercial and recreational use, the government placed an outright ban on any UAS use until its civil aviation agency issues regulations. Similar to the "Know Before You Fly" education campaign in this country, other countries have sought to educate operators. For example, the United Kingdom has developed and distributed a brochure describing safe flying practices. In Australia, UAS purchasers receive a similar document when they purchase the product. Canada has launched a national safety awareness campaign for UASs, which aims to help Canadians better understand the risks and responsibilities of flying UASs. In addition, Transport Canada has set up a web page that provides safe guidelines for flying UASs and answers frequently asked questions

While countries face some UAS integration challenges that are similar to the United States, other challenges such as airspace complexity and ease of regulatory change, can make integration in this country more difficult. Airspace complexity is one aspect in which the United States differs from other countries. According to FAA, the U.S. airspace is the busiest and most complex in the world, where UASs, after integration, would share with more than 300,000 general aviation aircraft, ranging from amateur-built aircraft, rotorcraft, and balloons, to highly sophisticated

turbojets (executive jets).[44] Introducing potentially large numbers of UAS by hobbyists, farmers, law enforcement agencies, and others would add to this complexity. In contrast, according to a study by MITRE, other countries have fewer aviation aircraft, a situation that may make integrating UAS easier. For example, the U.K. has about 20,000 registered general aviation aircraft, while Australia has around 8,400. A study conducted by MITRE for FAA indicated this factor as one that can affect the speed of change and adaptation in various aviation environments.

Agency Comments

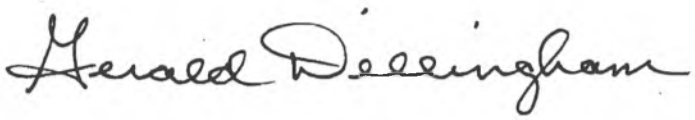
We provided a draft of this report to Department of Transportation (DOT) for review and comment. In comments, which were provided in an email, DOT stated that the report addresses many of the challenges of UAS integration but does not address any environmental concerns and that the report should state that it did not examine the environmental considerations of UAS integration. DOT further noted that FAA is conducting research to understand the environmental impacts of UAS integration, the role that UASs play in National Environmental Policy Act compliance, and the applicability of noise standards regulations to UASs.[45] We did not examine the environmental considerations of UAS integration. The discussion of challenges in the report does not mention environmental concerns because it focuses on challenges the test sites faced during their first year of operation, as reported by the test site operators. We did clarify in our scope and methodology description that we did not cover environmental considerations of UAS integration. DOT also provided technical comments on the draft that we incorporated as appropriate.

As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies to the Secretary of Transportation and the appropriate congressional committees. In addition, the report will be available at no charge on the GAO website at http://www.gao.gov.

[44]General aviation includes all civil aviation operations other than scheduled air services and non-scheduled air transport operations for remuneration or hire.

[45]14 CFR Part 36.

If you or your staff have any questions about this report, please contact me at (202) 512-2834 or dillinghamg@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix III.



Gerald L. Dillingham, Ph.D.
Director, Physical Infrastructure Issues

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Appendix I: Objectives, Scope, and Methodology

This report focuses on FAA's efforts to develop procedures to allow UAS use within the national airspace system. Specifically, we reviewed (1) the status of FAA's progress toward safe integration of UAS into the national airspace, (2) research and development support from FAA's test sites and other resources, and (3) how other countries have progressed toward UAS integration into their airspace for commercial purposes.

To address the three objectives, we reviewed and synthesized a range of published reports from GAO[1] and FAA that included general background information on a variety of related issues, such as FAA's framework for UAS integration, efforts to accommodate ongoing research and commercial UAS use, and UAS technology challenges.[2] We reviewed other relevant background literature on related issues, including results from databases, such as ProQuest® and Nexis®, trade publications, literature from industry stakeholder groups, and information from the Internet. We also reviewed provisions of the FAA Modernization and Reform Act of 2012,[3] and the Notice of Proposed Rulemaking for small UAS operations.[4] In addition, we reviewed more detailed and specific documentation related to the different objectives, as described below.

To determine FAA's progress toward safe integration of UAS into the national airspace, we:

- Reviewed documents provided by officials and conducted semi-structured interviews with officials at federal agencies, including the FAA's Unmanned Aircraft Systems Integration and Research and Development Offices, the Department of Defense (DOD), the National Aeronautics and Space Administration (NASA), and the Department

[1]GAO, *Unmanned Aircraft Systems: Continued Coordination, Operational Data, and Performance Standards Needed to Guide Research and Development*, GAO-13-346T (Washington, DC: Feb. 15, 2013); *Unmanned Aircraft Systems: Measuring Progress and Addressing Potential Privacy Concerns Would Facilitate Integration into the National Airspace System*, GAO-12-981 (Washington, DC: Sept. 14, 2012); and *FAA Reauthorization Act: Progress and Challenges Implementing Various Provisions of the 2012 Act*, GAO-14-285T (Washington, DC: Feb. 5, 2014).

[2]We did not review the environmental challenges of UAS integration.

[3]Pub. L. No. 112-95, 126 Stat. 11.

[4]80 Fed. Reg. 9544 (Feb. 23, 2015).

of Homeland Security. We reviewed FAA's Comprehensive Plan[5] and Roadmap for UAS integration.[6]

- Interviewed representatives from FAA's Joint Planning and Development Office, the UAS Aviation Rulemaking Committee, RTCA, and MITRE Corporation as well as voluntary standards development organization ASTM International. We interviewed representatives from the Association for Unmanned Vehicle Systems International, Aircraft Owners and Pilots Association, American Institute of Aeronautics and Astronautics, and the Academy of Model Aeronautics. We also obtained information on the Federal Modernization and Reform Act of 2012 Section 333 exemptions FAA granted from FAA and http://www.regulations.gov[7] from September 2014 to May 2015.

- Reviewed documents provided by and interviewed federal and industry representatives from the collaborative groups—the Executive Committee, RTCA Special Committee 228, UAS Aviation Rulemaking Committee, and ASTM International Committee F38—and industry groups that are involved in FAA's efforts to integrate UAS into the national airspace system

To identify research and development support from FAA's test sites and other resources, we:

- Reviewed and analyzed documents from each of the six test sites where FAA has recently allowed UAS operations including the applications submitted by the selected test sites and quarterly reports provided to FAA.

- Conducted semi-structured interviews with officials from the test sites, including the State of Nevada, the University of Alaska, the North Dakota Department of Commerce, Griffiss International Airport, the Virginia Polytechnic Institute & State University, and Texas A&M

[5]Joint Planning and Development Office, *Unmanned Aircraft Systems Comprehensive Plan: A Report on the Nation's UAS Path Forward* (Washington, D.C.: September 2013).

[6]FAA, *Integration of Civil Unmanned Aircraft Systems in the National Airspace System Roadmap: First Edition—2013* (Washington, D.C.: November 2013).

[7]Regulations.gov is a website that allows the pubic to access and submit comments on agencies' regulatory documents published in the Federal Register.

University Corpus Christie to determine the issues encountered in an effort to become operational, conduct research, share the research results with FAA, and receive support or guidance from FAA.

- Spoke with representatives from other universities with centers of research on UAS technology and issues, including New Mexico State University, Massachusetts Institute of Technology Lincoln Laboratory, the Humans and Autonomy Lab at Duke University, and the Georgia Institute of Technology to obtain information about the resources FAA has dedicated to conducting other UAS research and development.

To identify how the United States compares to other countries in the progress and development of UAS use for commercial purposes, we:

- Developed case studies for four countries that have made progress in integrating UASs into their national airspace—France (Direction générale de l'aviation civile); the United Kingdom (UK Civil Aviation Authority); Australia (Australia Civil Aviation Safety Authority); and Canada (Transport Canada Civil Aviation). We selected these countries based on several factors including the status of regulatory requirements for commercial UASs, beyond-line-of-site activities, and whether the country allows non-military UAS to operate in the airspace. We obtained the UAS regulations of each country and interviewed civil aviation authorities in each to obtain additional information about the issues encountered with UAS.

- Interviewed other stakeholders familiar with the UAS activities currently occurring in other countries to determine the factors that influenced their country's policies regarding UASs including the International Civil Aviation Organization (ICAO).[8]

We conducted this performance audit from January 2014 to July 2015 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

[8]ICAO is the international body that, among other things, promulgates international standards and recommended practices in an effort to harmonize global aviation standards.

Appendix II: Selected Requirements and Status for Unmanned Aerial Systems (UAS) Integration under the Federal Aviation Administration (FAA) Modernization and Reform Act of 2012, as of December 2014

Deadline	FAA Modernization and Reform Act of 2012 requirement	Status of action
05/14/2012	Enter into agreements with appropriate government agencies to simplify the process for issuing Certificates of Waiver or Authorization (COA) or waivers for public unmanned aerial systems (UAS).	In process—memorandum of agreement (MOA) with DOD signed Sept. 2013; MOA with Department of Justice signed Mar. 2013; MOA with NASA signed Mar. 2013; MOA with Department of Interior signed Jan. 2014; MOA with the Office of the Director, Operational Test and Evaluation (DOD) signed Mar. 2014; MOA with National Oceanic and Atmospheric Administration still in draft.
05/14/2012	Expedite the issuance of COAs for public safety entities	Completed
08/12/2012	Establish a program to integrate UASs into the national airspace at six test ranges. This program is to terminate 5 years after date of enactment.	Completed
08/12/2012	Develop an Arctic UAS operation 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.	Completed
08/12/2012	Determine whether certain UAS can fly safely in the national airspace before the completion of the Act's requirements for a comprehensive plan and rulemaking to safely accelerate the integration of civil UASs into the national airspace or the Act's requirement for issuance of guidance regarding the operation of public UASs including operating a UAS with a COA or waiver.	Completed
11/10/2012	Develop a comprehensive plan to safely accelerate integration of civil UASs into national airspace.	Completed
11/10/2012	Issue guidance regarding operation of civil UAS to expedite COA process; provide a collaborative process with public agencies to allow an incremental expansion of access into the national airspace as technology matures and the necessary safety analysis and data become available, until standards are completed and technology issues are resolved; facilitate capability of public entities to develop and use test ranges; provide guidance on public entities' responsibility for operation.	Completed
02/12/2013	Make operational at least one project at a test range.	Completed
02/14/2013	Approve and make publically available a 5-year road map for the introduction of civil UAS into national airspace, to be updated annually.	Completed
02/14/2013	Submit to Congress a copy of the comprehensive plan.	Completed
08/14/2014	Publish in the Federal Register the Final Rule on small UAS.	In process

Deadline	FAA Modernization and Reform Act of 2012 requirement	Status of action
08/14/2014	Publish in the Federal Register a Notice of Proposed Rulemaking to implement recommendations of the comprehensive plan.	None to date
08/14/2014	Publish in the Federal Register an update to the Administration's policy statement on UAS in Docket No. FAA-2006-25714.	None to date
09/30/2015	Achieve safe integration of civil UAS into the national airspace.	In process
12/14/2015	Publish in the Federal Register a Final Rule to implement the recommendations of the comprehensive plan.	None to date
12/31/2015	Develop and implement operational and certification requirements for public UAS in national airspace.	In process
05/14/2017	Report to Congress on the test ranges	None to date

Source: GAO analysis of FAA information. | GAO-15-610

Appendix III: GAO Contacts and Staff Acknowledgments

GAO Contact

Gerald L. Dillingham, Ph.D., at (202)512-2834 or dillinghamg@gao.gov

Staff Acknowledgments

In addition to the contact named above, the following individuals made important contributions to this report: Brandon Haller, Assistant Director; Geoffrey Hamilton, Daniel Hoy, Eric Hudson, Bonnie Pignatiello Leer, Ed Menoche, Josh Ormond, Amy Rosewarne, Andrew Stavisky, and Sarah Veale.

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