

FROM AIR TO GROUND

A white and blue helicopter with the registration N1610B is shown in flight, carrying a large white cylindrical object. The helicopter is flying over a field of tall grass and trees. The text "FROM AIR TO GROUND" is at the top, and "Aerial Application in IMM Kevin Card" is at the bottom.

Aerial Application in IMM
Kevin Card

Outline

- **The Role of Aerial Application in IMM**
- **Equipment & Technology**
- **Application Techniques**
- **Factors Affecting Efficacy**
- **Unmanned Aerial Systems (UAS)**



The Role of Aerial Application in IMM

➤ **Complementing Other Control Methods**

- Another Weapon in the Arsenal

➤ **Adulticide - Targeting Large Areas**

- Disease Outbreak
- Large Salt Marsh / Floodwater Hatch Off

➤ **Larvicide**

- Treat Areas Inaccessible by Ground
- Target historical breeding areas
- Single brood or pretreatment

➤ **Timing and Precision**

- Surveillance driven applications
- Precision applications per the label



Equipment and Technology

➤ Aircraft Types

- Fixed Wing
- Rotary Wing
- UAS





Adulticiding

- Ultra-Low Volume (ULV) spraying
- High / Low Pressure



2022 Hurricane Ian Emergency Response



11/4/2025



Larviciding

- Granular
- Liquid
- Wide Area Larviciding (WALS)





Spray Systems

- Adulterating – Mostly home-grown
- Larviciding – Home-grown and certified





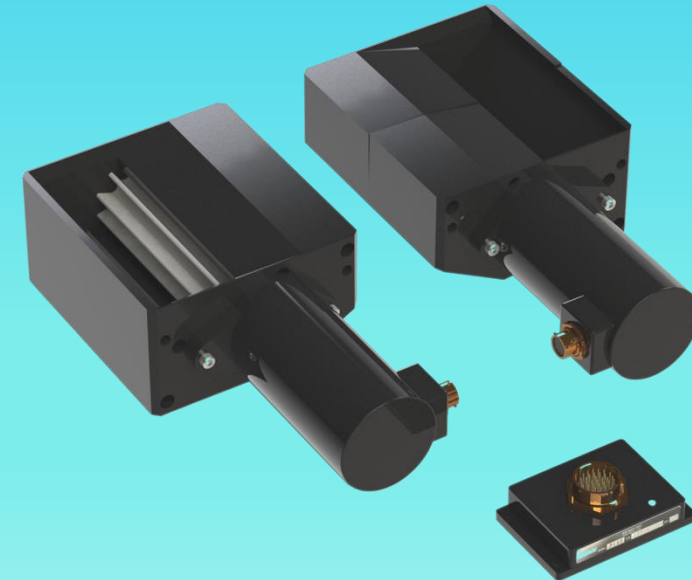
Spray Nozzles

- Adulticiding and Larviciding
 - Rotary atomisers – Electric and Air Driven
 - Fan nozzles (TeeJet)

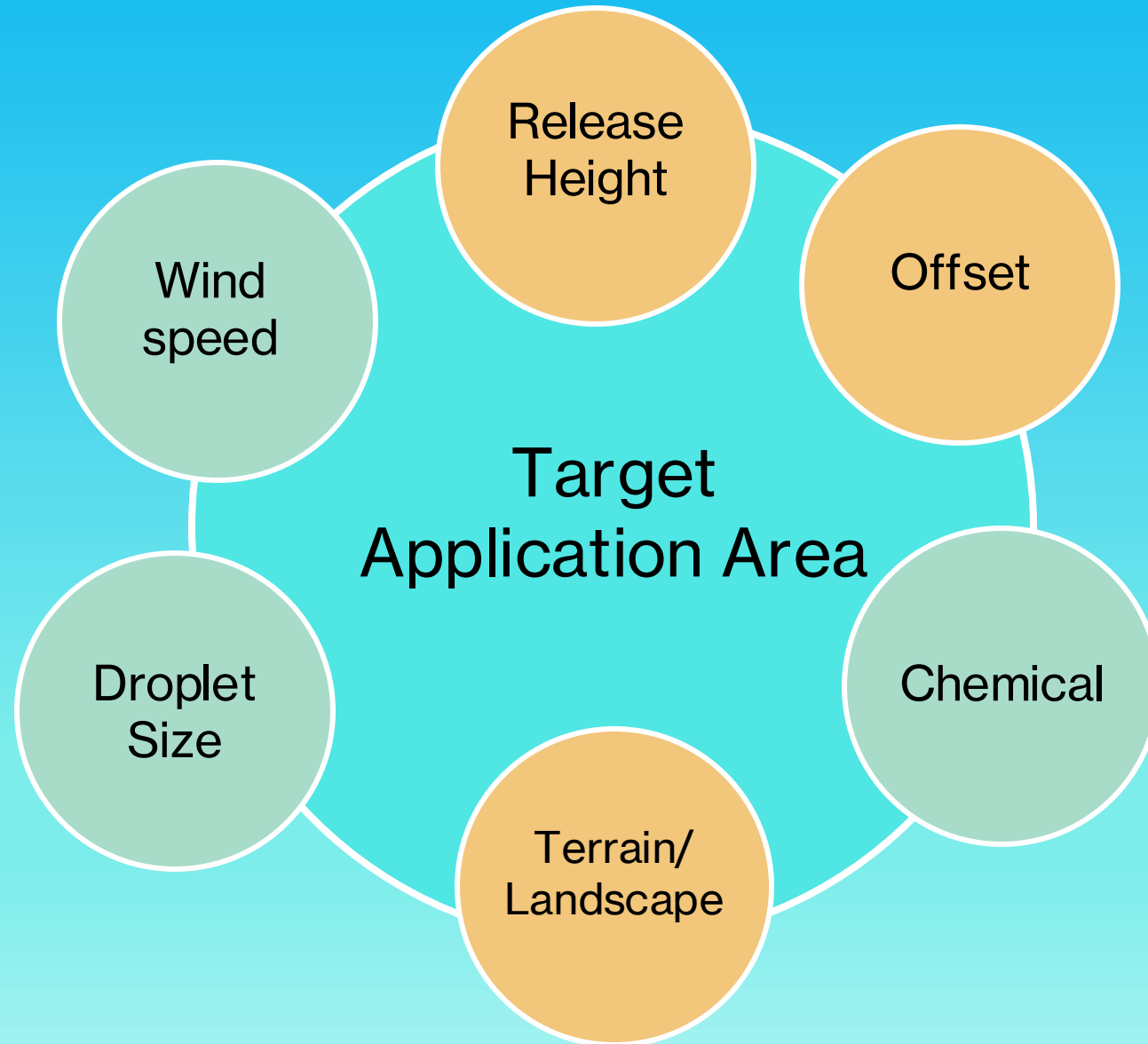


Aerial Application Management

- On-board weather
- Offset for drift control (ULV)
- Precision flow control
 - Granular
 - Liquid



Major Factors Affecting Efficacy



Drift

- Defined as the movement of spray material outside of the target area (EPA).
- Unlike Agricultural spraying we want drift
- Drift is necessary for proper application and efficacy of Adulticiding
- Drift must be managed



Controlling Drift

- **Adulticiding is conducted using the technique referred to as ULV spraying**

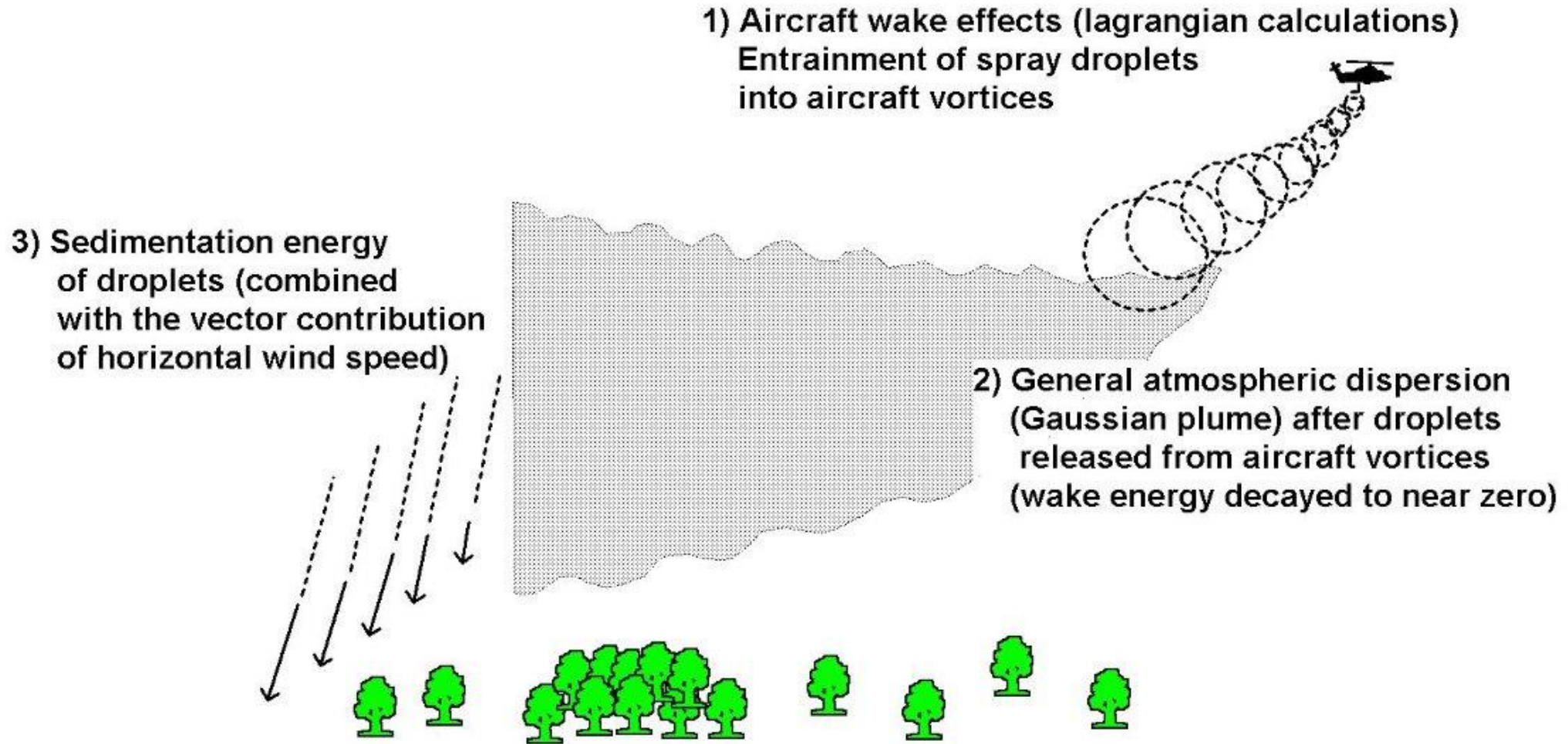
- Small amounts of concentrated product dispersed over a large area
- The aerosol is released to drift through the target zone
- The aerosol persists in a column of air for a length of time to impinge on a mosquito
- Droplets must be airborne – Minimize deposition

- **This is the job of the Applicator**

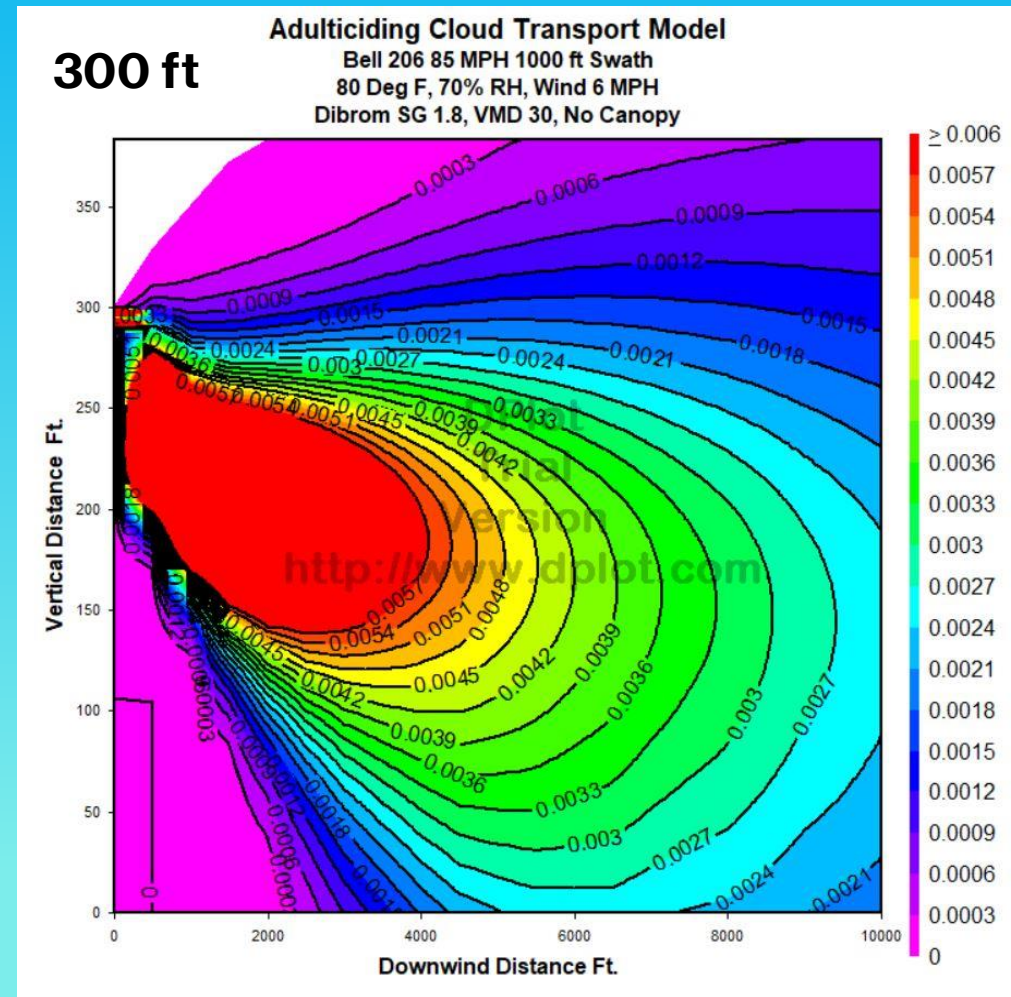
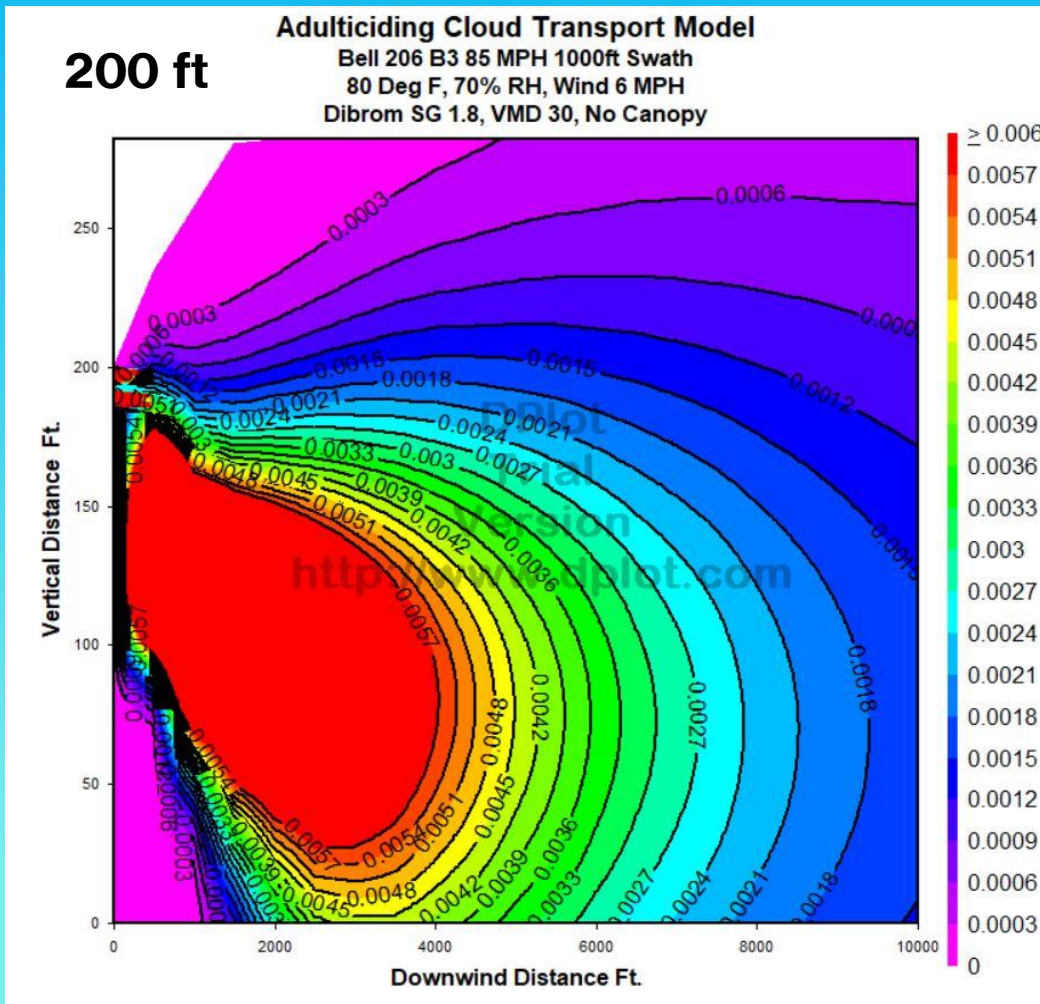
- Understand the methods and equipment
- Prepare in advance
 - Droplet testing/characterization
 - Meteorological conditions
 - Product label
- Have the right tools
 - Spray computer
 - What's my offset for this application?



THREE "PHASES" OF DROPLET MOVEMENT FROM AIRCRAFT TO GROUND



Spray Drift Modeling



When viewed on a XYZ Surface plot, we can visualize how the concentration of the spray cloud changes over a downwind range of 0 - 10,000ft.

It is significant to note in the 200ft plot, the concentration of spray reaching the ground is higher than in the 300ft plot.

Unmanned Aerial Systems (UAS) in Mosquito Control



Brief History

- 2012 FAA Remodernization and Reform Act
 - Stabilized Funding
 - Improve safety and capacity in the National Airspace (NAS)
 - Integrate Civil UAS in the NAS
- 2016 Part 107 for Small Unmanned Aerial Systems
 - Established laws for commercial operations
 - Drones <55lbs.
 - 400 ft. AGL or less
 - Visual line-of-sight
- 2018 FAA Reauthorization Act
 - Extended the FAA funding until 2023
 - Increased the safety and pace of UAS Integration
- 2024 FAA Reauthorization Act
 - Promote UAS integration
 - Finalize Beyond Visual Line of Sight (BVLOS) Rules
 - Inspections and workforce development

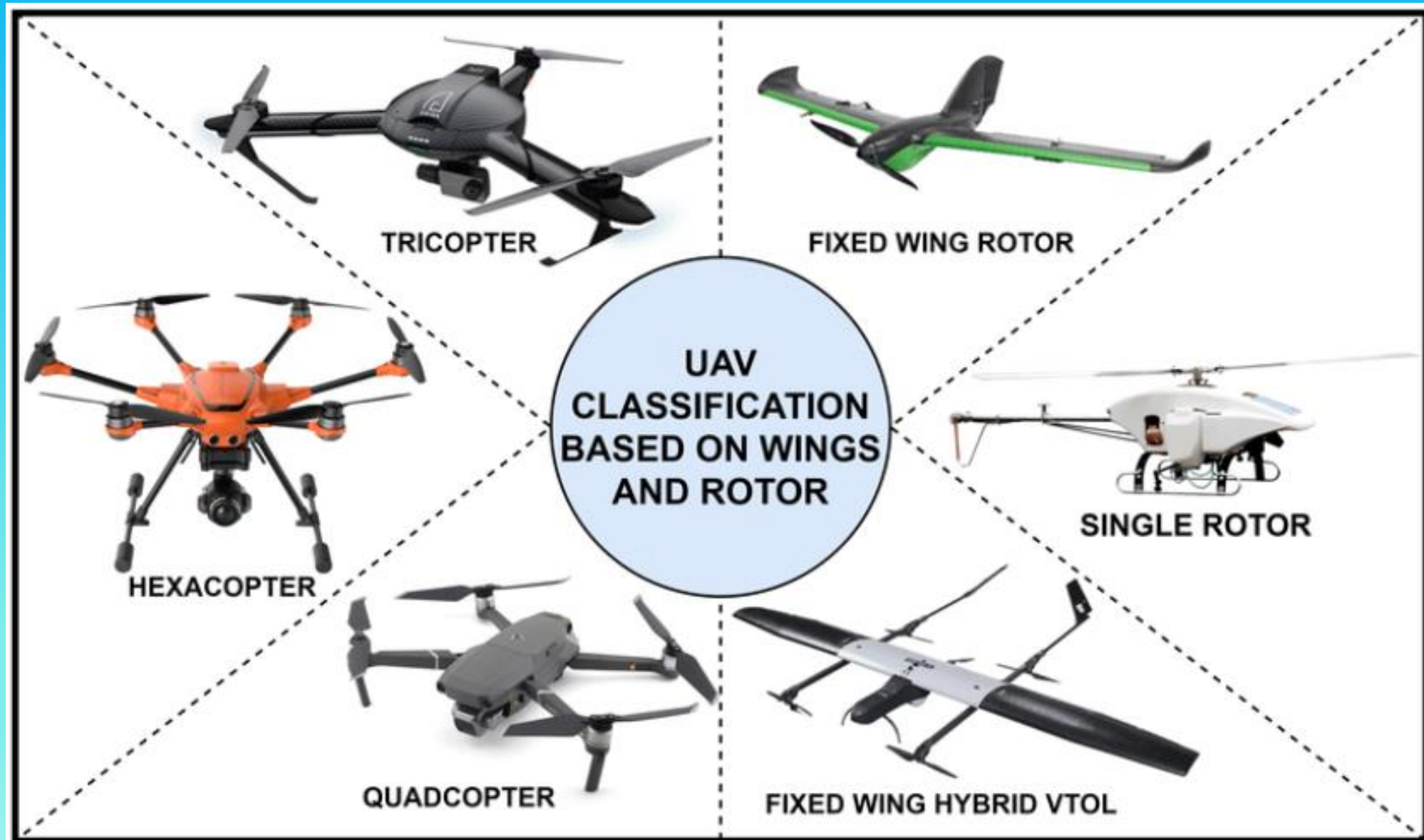


U.S. Department
of Transportation
**Federal Aviation
Administration**

Integration of Civil Unmanned Aircraft Systems (UAS) in the National Airspace System (NAS) Roadmap

First Edition – 2013

Types of UAS by Wing



Advantages of UAS Use

- Faster, precise and more efficient applications
- Less obtrusive to the environment
- Cost effective alternative for smaller acreage
- Safer for the public and applicators
- Optimized product use to help maximize budget



Disadvantages of UAS Use

- Treats smaller areas vs. manned aircraft
- Short flight time
- Small load capacity
- Logistics – On site application
- More regulatory requirements vs. manned aircraft



The Logistics of UAS Use

- Personnel
 - Remote Pilot-In Command
 - Visual Observers or BVLOS
 - Loader and Battery changer
- Equipment
 - Truck and trailer
 - Generators and chargers
 - Remote Pilot in Command and Visual Observers
- Launching Area
 - Accessible by truck and trailer
 - Clear of pedestrians



Types and Uses of Drones

- Surveillance
 - Splash Drone
- Mapping
 - LiDAR – larval habitats
 - Orthomosaic – Straight-down imagery
- Treatments
 - Larviciding - Granular and Liquid
 - ULV currently not available due to EPA labeling
 - Precision applications over backpack or hand treatments
 - Areas impassable on foot
 - Too small for helicopter
 - Highly congested areas



FAA requirements for drone uses

- Public vs. Commercial
 - **Public** - all liability is on the organization (No FAA oversight)
 - **Commercial** is monitored by the FAA and can charge for service
- Public
 - Must be a government agency (Federal, State, Local)
 - 49 USC 40102(a) and 40125 Public Aircraft Operations
 - Certificate of Authorization for Public Use (Blanket COA)
 - Self Certifying
- Commercial
 - FAA Part 137 Operating Certificate
 - Exemption under 49 USC 44807 (Special Authority for Certain UAS)
 - UAS over 55lbs.
 - Airworthiness
 - Minimum Safe Altitudes
 - Carriage of Hazardous Materials
 - COA for the specific area you are working in controlled airspace

FAA Form 7711-1 UAS COA Page 1 of 5

DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION	
CERTIFICATE OF WAIVER OR AUTHORIZATION	
ISSUED TO:	Any Operator with a valid 49 USC 44807 Grant of Exemption
This certificate is issued for the operations specifically described hereinafter. No person shall conduct any operation pursuant to the authority of this certificate except in accordance with the standard and special provisions contained in this certificate and such other requirements of the Federal Aviation Regulations not specifically waived by this certificate.	
OPERATIONS AUTHORIZED	
Operation of Unmanned Aircraft System(s) (UAS) in accordance with the operators' 49 USC 44807 Grant of Exemption in Class G airspace at or below 400 feet Above Ground Level (AGL) in the National Airspace System (NAS).	
LIST OF WAIVED REGULATIONS BY SECTION AND TITLE	
N/A	
STANDARD PROVISIONS	
1. A copy of the application, made for this certificate shall be attached and become a part hereof. 2. This certificate shall be presented for inspection upon the request of any authorized representative of the Federal Aviation Administration, or of any State or municipal official charged with the duty of enforcing local laws or regulations. 3. The holder of this certificate shall be responsible for the strict observance of the terms and provisions contained herein. 4. This certificate is nontransferable.	
Note: This certificate constitutes a waiver of those Federal rules or regulations specifically referred to above. It does not constitute a waiver of any State law or local ordinance.	
SPECIAL PROVISIONS	
Special Provisions Nos. A to G, inclusive, are set forth on the attached pages.	
This Certificate of Waiver or Authorization (COA) is valid for two years from the issuance of a 49 USC 44807 Grant of Exemption and is subject to cancellation at any time upon notice by the Administrator or his/her authorized representative.	
BY DIRECTION OF THE ADMINISTRATOR	
FAA Headquarters (Region)	/S/ Joseph Maibach (Signature) Acting Manager, UAS Policy Team, AIV-P22 (Title)

FAA Form 7711-1 (7-74)

THE END

QUESTIONS?

Considerations

- Regulations
 - FAA
 - EPA
 - State and Local
- Community Acceptance
 - Privacy and ethical issues
 - Some States have laws
 - Outreach program
- Feasibility and Equipment
 - What size Drone?
 - Support equipment
 - Budget



Federal Aviation
Administration



What you need to become a drone pilot

- FAA 107 Certificate
 - Pass the Aeronautical Test
 - Recurrent training every two years
- FAA Medical Certificate
- FAA 137 Knowledge and Skills Endorsement (Chief Supervisor)
- Aerial Application License for the Appropriate State
 - Commercial or Public
 - State requirements vary
 - Nevada - Principle licensee with background check
 - MS and NJ do not allow drones for aerial application yet
- Public operators



Planning an Aerial Mission

Questions we ask ourselves

1) What is the reason?

- Disease case
- Large floodwater nuisance hatch-off
- Salt marsh hatch-off

2) Where are the people living?

- Are there roads?
- Is this in large acreage areas?
- Can spray cloud reach houses from the road?

3) Are there any other concerns with an area?

- Conservation/protected areas
- Organic farms
- Endangered species
- Events

4) Timing

- Peak of mosquito hatch off
- Availability of aircraft/pilots
- Weather Forecast
- Notification requirements

