



21<sup>st</sup> Annual Summit

# Advancing Aquatics: Drone spraying for Florida government agencies

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# Objectives

- Provide a quick glimpse of UAS operations in Aquatic plant management
- Identify pathways to begin using UAS in your program
- Provide perspectives on how different agencies are accomplishing similar goals
  - In-house vs Contracted



LCHCD  
Drone Program  
2019 - 2023

- Large area plant assessment
  - Monitor treatment progression
  - Plant ID
  - Real time mapping
- Water quality monitoring
  - Surface grab samples
- Herbicide application
  - Liquid applications – 2.5 gal
  - Granular applications – 20 lbs



DJI Agras MG-1P



SwellPro Splash Drone



DJI Mavic 2 Pro



# Licenses Required

- Remote Pilots License (14 CFR § 107) (FAA)
- Aerial Applicator License (FDACS)
- Aquatics License (FDACS)



# Applying “Economic Poisons” from Drones

## Agricultural Aircraft Operator

### (14 CFR § 137)

Allows for herbicide application from aircraft

- Must petition for exemption from:
  - 14 C.F.R. § 137.19(c)
  - 14 C.F.R. § 137.19(d)
  - 14 C.F.R. §§ 137.19(e)(2)(ii), (iii) and (v)
  - 14 C.F.R. §§ 137.31(a) and (b)
  - 14 C.F.R. §§ 137.33(a) and (b)
  - 14 C.F.R. §§ 137.41(c)
  - 14 C.F.R. §§ 137.42

Private sector or Government

## Certificate of Authorization (COA)

- Governmental Agencies can apply for a Public operator Certificate of Authorization (COA) from the FAA
- Allows agency to apply herbicides from drone within agreed upon parameters

Government Only



# CERTIFICATE OF WAIVER OR AUTHORIZATION

ISSUED TO

Public Agency – Lee County Hyacinth Control District

Part 91

ADDRESS

Lee County Hyacinth Control District  
15191 Homestead Rd  
Lehigh Acres, FL 33971

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 the Leading Edge PV40X Unmanned Aircraft System (UAS) in Class G airspace at or below 400 feet Above Ground Level (AGL) and in Class C, D and E airspace in accordance with UAS Facility Map (UASFM) altitudes, within the Florida Counties of Lee, Hendry and Glades under the jurisdiction of Fort Myers Airport Traffic Control Tower (RSW ATCT), Page FAA-Contract Tower (FMY FCT) and Miami Air Route Traffic Control Center (ZMA ARTCC). See Special Provisions and Attachments.

## Air Traffic Control Special Provisions.

### A. Coordination Requirements.

- Unless otherwise directed the ATC contact phone numbers are as follows:
  - RSW ATCT – (239) 768-1377.
  - FMY FCT – (239) 936-7867.
  - ZMA ARTCC – (305) 716-1588.
- For operations in Class G airspace, or in Class C, D and E airspace in accordance with UASFM altitudes, the issuance of the (D) NOTAM will serve as notification to ATC. The Cancelling of the (D) NOTAM will serve as notification to ATC that operations are complete.

### B. Operations.

- The UA must be operated within visual line of sight (VLOS) of the Pilot in Command (PIC) and the person manipulating the flight controls at all times unless otherwise specified in a

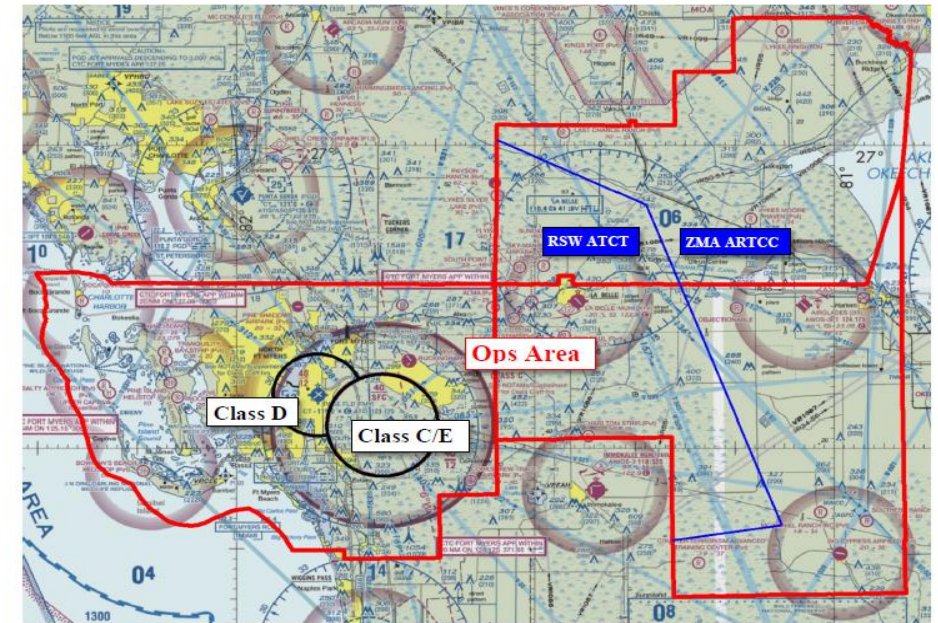
### E. Night small UAS Operations.

Night operations are not authorized under this COA.

#### Operations Area

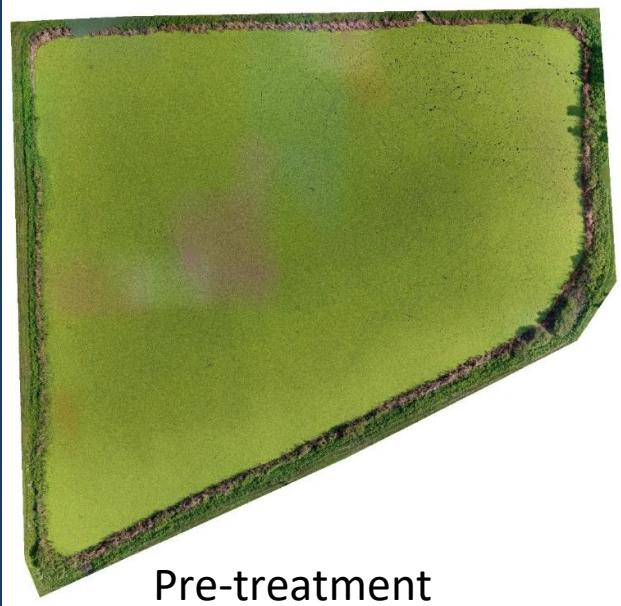
Attachment 1

Class C, D, E and G Airspace  
At or Below 400 Feet AGL in Class G airspace and  
In Accordance with UASFM Altitudes in Class C, D and E Airspace  
Within the Lateral Boundaries of the Florida Counties of Lee, Hendry and Glades





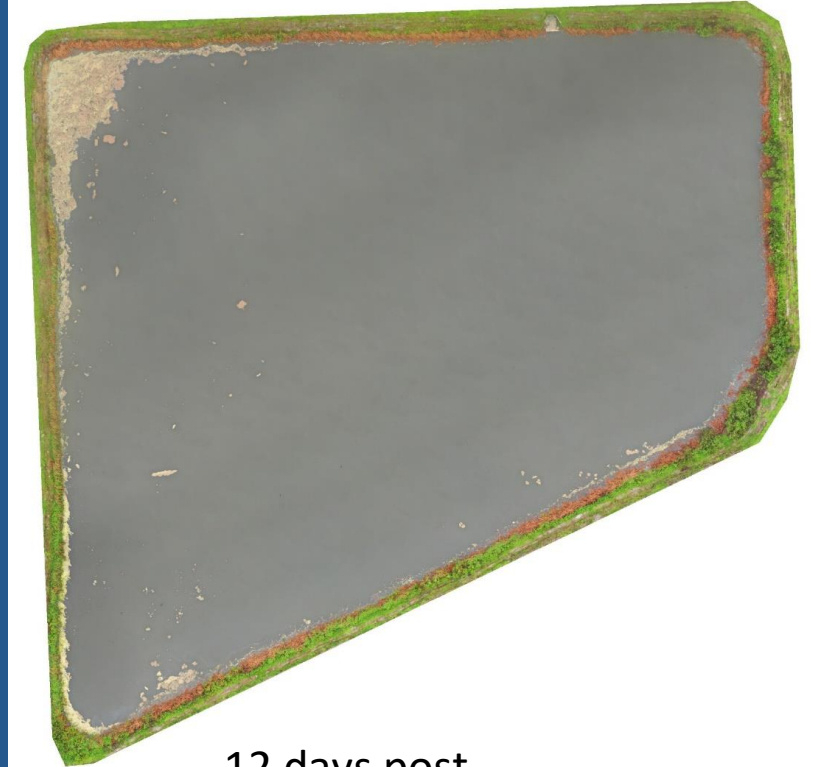
Everglades Cooperative Invasive Species Management Area



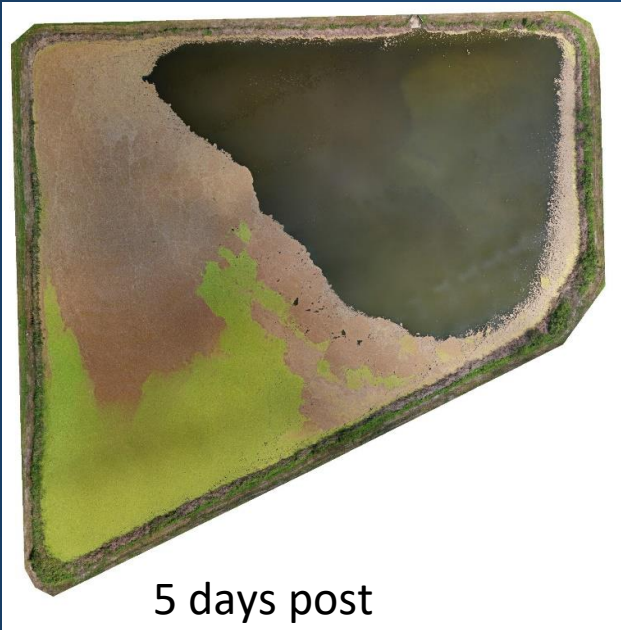
Pre-treatment



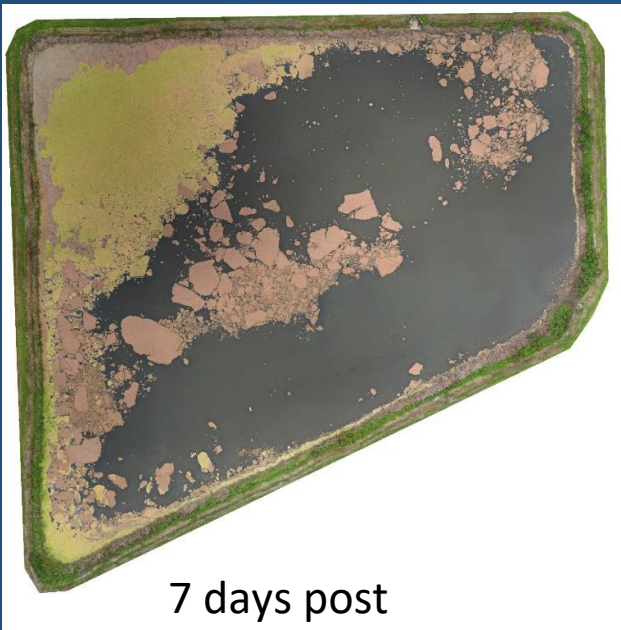
2 days post



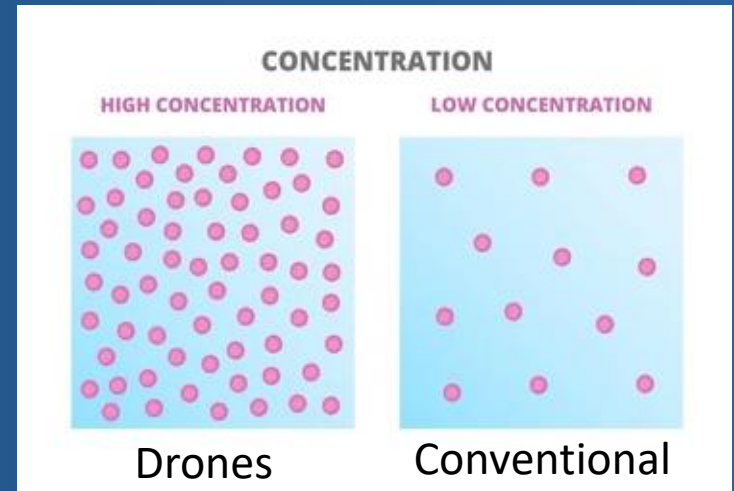
12 days post



5 days post



7 days post



# Everglades Cooperative Invasive Species Management Area





Pre-treatment



7 days post treatment 1



32 days post (Treatment #2)



3 days post T2



# Selectivity Demonstration – LCHCD,FWC,USACE

- 3 treatment sites
- Targeting water lettuce in dense cattail
- Flumioxazin



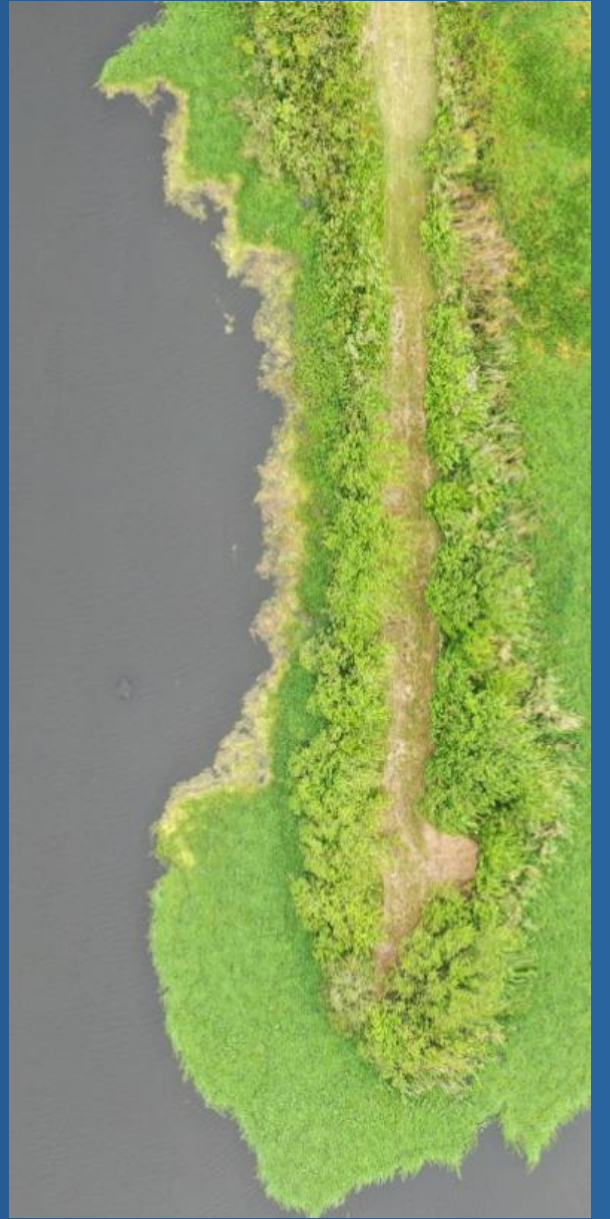
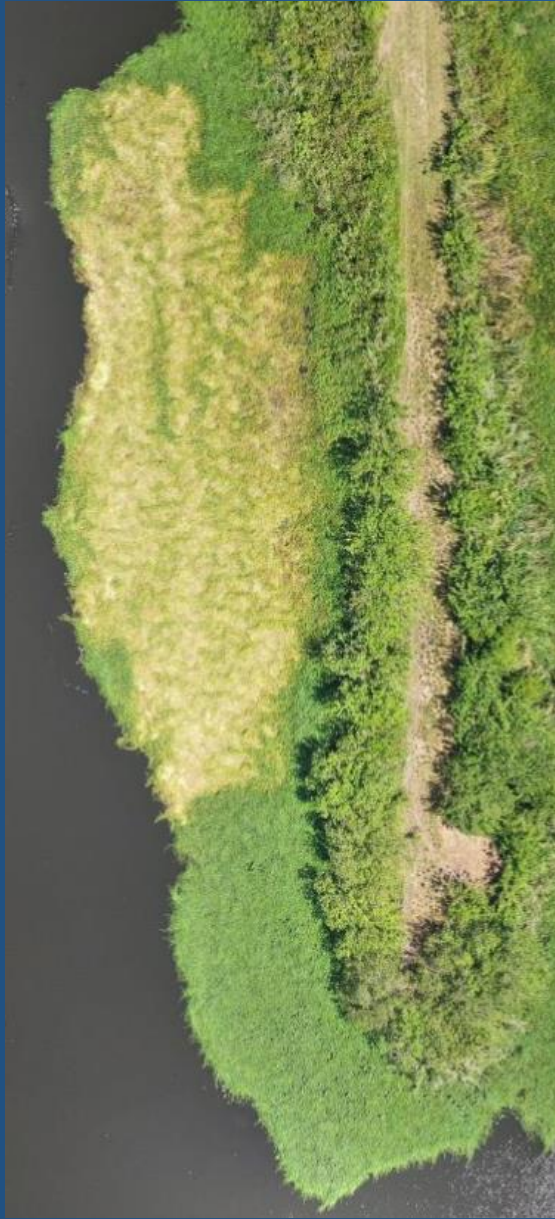
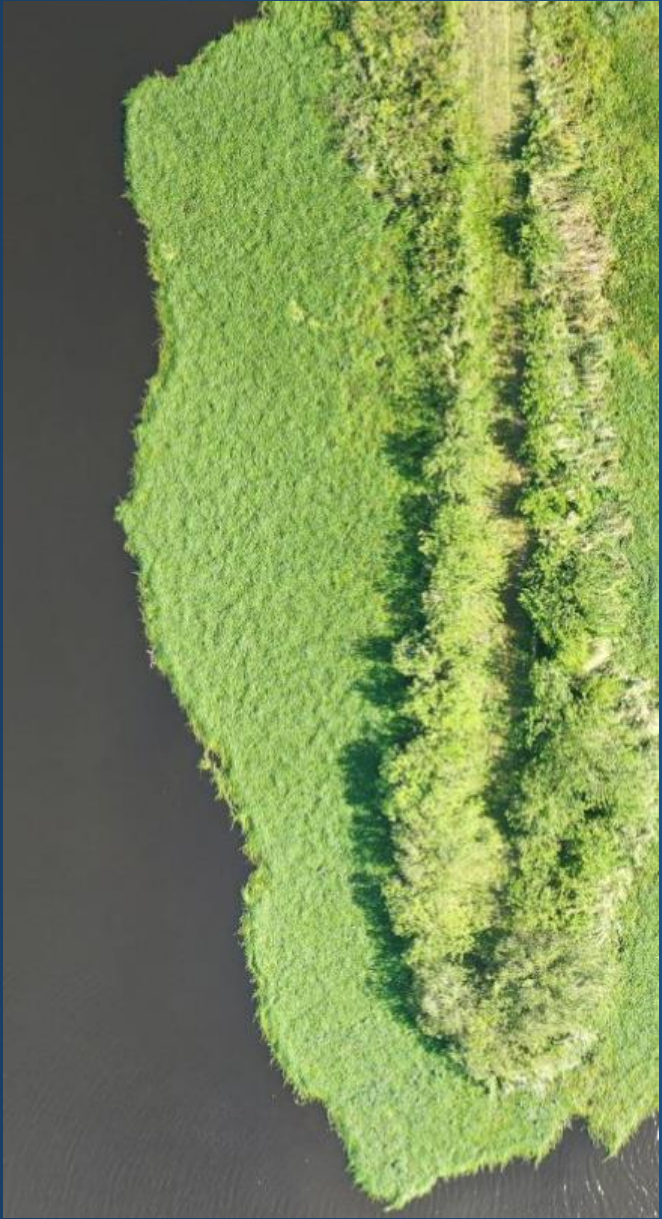
Everglades Cooperative Invasive Species Management Area



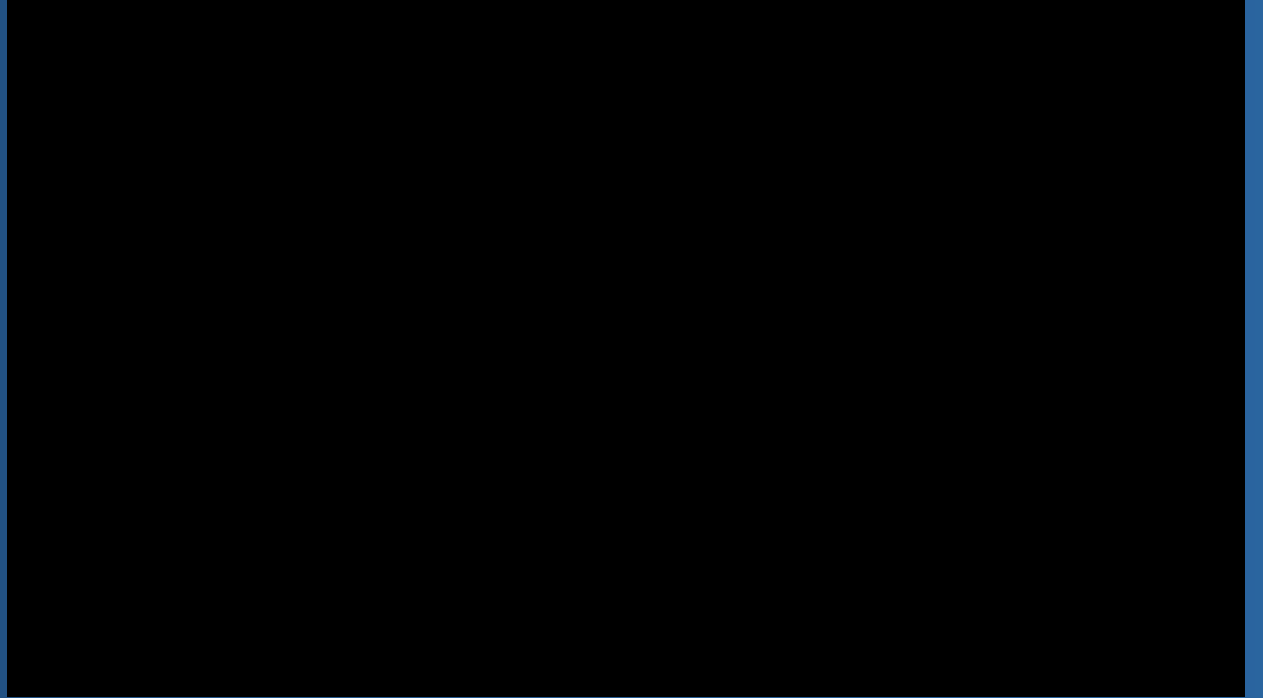
Treatment 3



Everglades Cooperative Invasive Species Management Area



Everglades Cooperative Invasive Species Management Area



Everglades Cooperative Invasive Species Management Area

# What Changed?

2019-2020:

- ▶ Drones generally had very little regulation
  - ▶ FAA- Registration, exemptions depending on drone, license
  - ▶ FDACS – Exemptions depending on drone, license if applying, registration.

2021 - State regulations begin

- ▶ **FL Statue 934.50**: By January 1<sup>st</sup> 2022, all governmental agency may only purchase from 5 approved companies. (none had spray drones)
  - ▶ Mirrored federal government regulations at the time
  - ▶ Intended to block adversarial countries from collecting government data.
- ▶ **FL Statue 934.50**: By January 1<sup>st</sup> 2023, all governmental agencies must discontinue use of drones not produced by approved manufacturer

2023

- ▶ **60GG-2.0075** - Unmanned Aerial Systems (UAS) Minimum Security Requirements.
  - ▶ Eliminates the previous list of approved drones
  - ▶ Sets standards for data safety depending on who you are and the missions you will be flying
    - ▶ Highly sensitive data – Your drone requires high levels of safety
    - ▶ Broken into 3 tiers with varying levels of safety
    - ▶ Offers a roadmap for companies to implement required safety changes and qualify for government contracts



No data

A lot of data

Less req.

More req.

Tiers and Exceptions	Description	Applicable Minimum Security Requirements
<b>Tier One</b>	A Drone that does not collect, transmit, or receive Data during flight. Examples of such Drones include Drones that navigate along pre-programmed waypoints and tethered Drones. A Drone used by a School exclusively as Instructional Technology shall be classified as Tier One Drone use.	Subsection (4), Foreign Countries of Concern; subsection (5), Standard Precautions.
<b>Tier Two</b>	A Drone that may collect, transmit, or receive only flight control Data, excluding visual and auditory Data.	Subsection (4), Foreign Countries of Concern; subsection (5), Standard Precautions; subsection (6), Tier Two.
<b>Tier Three</b>	A Drone that may collect, transmit, or receive any Data, including visual and auditory Data.	Subsection (4), Foreign Countries of Concern; subsection (5), Standard Precautions; subsection (6), Tier Two; subsection (7), Tier Three.
<b>Research and Accountability Purposes Exception</b>	<p>Drones used for Research and Accountability Purposes are exempt from the requirements in subsection (4), (6), and (7). If using otherwise prohibited Drones for Research and Accountability Purposes, the Governmental Agency should weigh the goals of the research against the risk to networks and Data.</p> <p>A Governmental Agency using otherwise prohibited Drones under this exception must provide written notice to the Department of such use via email to <a href="mailto:drones@dms.fl.gov">drones@dms.fl.gov</a> no later than 30 days prior to utilizing the exception. Such notice must state the intended purpose, participants, and ultimate beneficiaries of the research.</p> <p>To the extent allowable by law and existing agreement between the parties to the research, the State University or Florida College System Institution conducting research under this exception must, upon request of the Department, provide access to the research findings.</p>	Subsection (5), Standard Precautions.



# Precision Vision PV40X

Granular or Liquid Payload: 40lbs/5 gal.

Flight time (max payload): 13-15 min

Approx. ½-1 acres/min or 6-15 acres per flight



Everglades Cooperative Invasive Species Management Area



Everglades Cooperative Invasive Species Management Area

# SFWMD's Angle of Attack



- SFWMD currently contracts all UAS Spray treatments
- Statements of Work outline objectives, materials required, work structure, deliverables, and safe and lawful UAS operations
- SFWMD has utilized 2 different contractors for a total of 8 UAS spray treatments

Leading Edge Aerial Technologies	Agricultural Air Services	Applied Aquatics Inc.
PV40 & PV30 3 & 5 gal cap. Day Rate	Hyllo 8 gal cap. Day Rate	Hyllo 8 gal cap.

Florida Statute 934.50 forbids government entities from utilizing drones made in "Foreign Countries of Concern"



# Treatment Setup



Everglades Cooperative Invasive Species Management Area

# Another Setup

- This contractor has a trailer with an integrated batching and clean water tank
- AC system that runs to a secured and insulated cooling cabinet for batteries
- Generator with external exhaust and CO detectors
- Spill mat landing pad not pictured



# UAS Treatment Considerations

- UAS tank capacity is low
- UAS need clean water
- UAS still have a limited range (about a mile)
- Most UAS have a max broadcast swath of around 20'
- Interchangeable nozzles and booms to comply with labels
- Certain labels flat out block the use of UAS (Vastlan Aquatic Sites)
- Certain labels have high minimum GPAs (Vastlan 10 GPA Forestry Sites)
- You are dealing with concentrates
- A good adjuvant can be important, but you will generally need less as you are fixing less liquid



# Herbicides & UAS Labelling

## Aquatic and Wetland Sites

Use Vastlan for control of emerged, submersed and floating aquatic plants in aquatic sites such as ponds, lakes, reservoirs, non-irrigation canals, and ditches which have little or no continuous outflow, marshes and wetlands, including broadleaf and woody vegetation on banks and shores within or adjacent to these and other aquatic sites.

**Obtain Required Permits:** Consult with appropriate state or local water authorities before applying this product to public waters. State or local public agencies may require permits.

## Aquatic Application Methods

Use a non-ionic surfactant in the spray mixture to improve control with foliar applications. Follow all directions and use precautions on the aquatic surfactant label.

### Surface Application

Use a spray boom, handgun or other similar suitable equipment mounted on a boat or vehicle. Thorough wetting of foliage is essential for maximum effectiveness. Use 20 to 200 gallons per acre of spray mixture. Special precautions such as the use of low spray pressure, large droplet producing nozzles, or addition of a labeled thickening agent may minimize spray drift in areas near sensitive crops.

### Aerial Application (Helicopter Only)

Apply with a helicopter using a Microfoil or Thru-Valve boom, or a drift control additive in the spray solution. Apply in a minimum of 10 gallons of total spray mix per acre. Do not apply when weather conditions favor drift to sensitive areas. See label section on aerial application directions and precautions.

FLUMIOXAZIN	GROUP	14	HERBICIDE
IMAZAPYR	GROUP	2	HERBICIDE

## PRODUCT INFORMATION BULLETIN

### BALLAST™ Herbicide

EPA Reg. No. 81927-85

FIFRA 2(ee) Recommendation†

For Distribution and Use Only in the State of Florida

### Application of BALLAST Herbicide Using Unmanned Aerial Aircraft

#### ATTENTION

† This recommendation is made as permitted under FIFRA 2(ee) and has not been submitted to or approved by the EPA.

- It is a violation of Federal law to use this product in a manner inconsistent with its labeling.
- Read and follow all applicable directions for use, precautions, and limitations on the product label attached to the container for this product.

#### Directions for Use

BALLAST Herbicide may be applied by unmanned aerial systems to labelled use sites where aerial application is permitted by the product label.

Follow applicable use directions, precautions, and limitations on the BALLAST Herbicide product label.



# Maximizing Treatment Efficiency

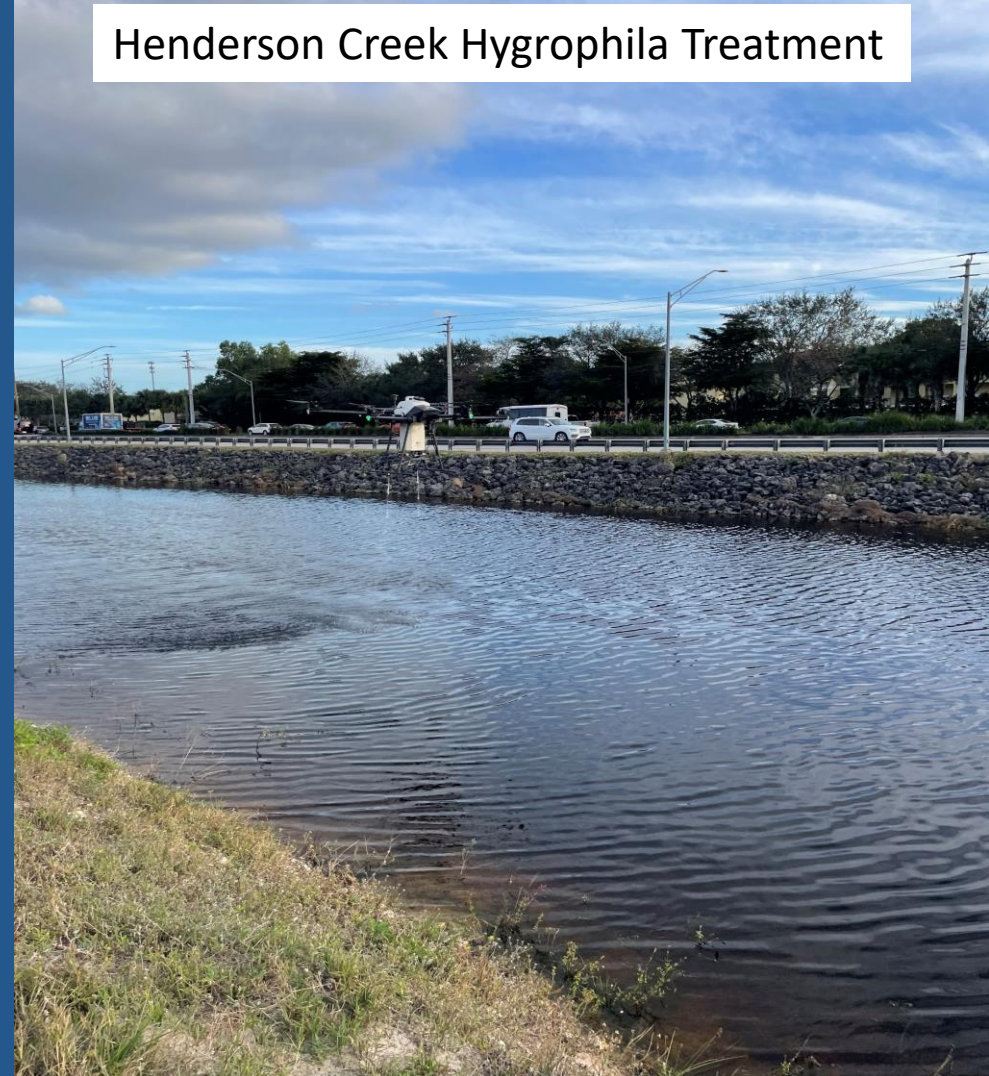
- Make sure contractors bring enough supplies to not slow the operation (charged batteries, water quantities, gas, etc.)
- Create accurate KMLs/shp. and strategically plan your staging point(s) to reduce travel
- Batch mix if possible. This will save significant time. Remember, your spray UAS will aide to record chemical usage.
- A higher GPA rate will increase time spent but may be necessary to achieve full coverage in denser vegetation
- Check the weather!



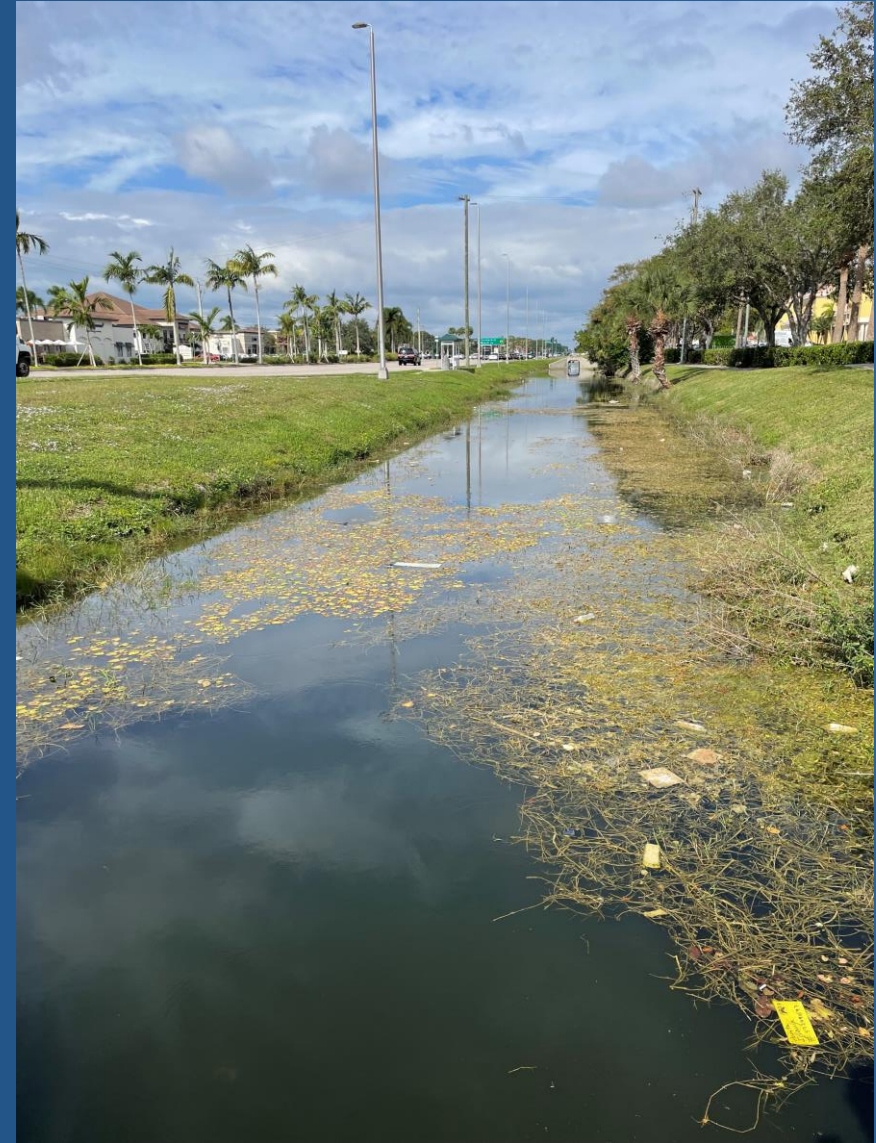
# Treatment Spotlight: Big Cypress Basin Aquatics

- Two successful treatments on two aquatic invasive species of SAV (Hydrilla & Hygrophila)
- Utilized straight-stream nozzles and ProcellaCor at 5GPA (one surface acre per tank)
- Both treatments in mostly closed, shallow water systems where ground contractor access is limited
- Covered about 20 surface acres/day
- Reduced time, resources, and costs

Henderson Creek Hygrophila Treatment



# Before & After



Everglades Cooperative Invasive Species Management Area

# Steamed Veggies



Everglades Cooperative Invasive Species Management Area



Everglades Cooperative Invasive Species Management Area

## Questions



UF UNIVERSITY of FLORIDA



*Think locally, Act neighborly*  
invasive species know no boundaries!



FAIRCHILD TROPICAL BOTANIC GARDEN  
Exploring, Explaining and Conserving the World of Tropical Plants