



UNMANNED AERIAL SYSTEMS (UAS) FOR FORESTRY / AGRICULTURAL APPLICATIONS

AGENDA

- Introduction
- Forestry / Agricultural Uses
- FAA requirements
- Drone types
 - Platform
 - Sensor
 - Application
 - Software
 - Analytics
- Discussion



OVERVIEW

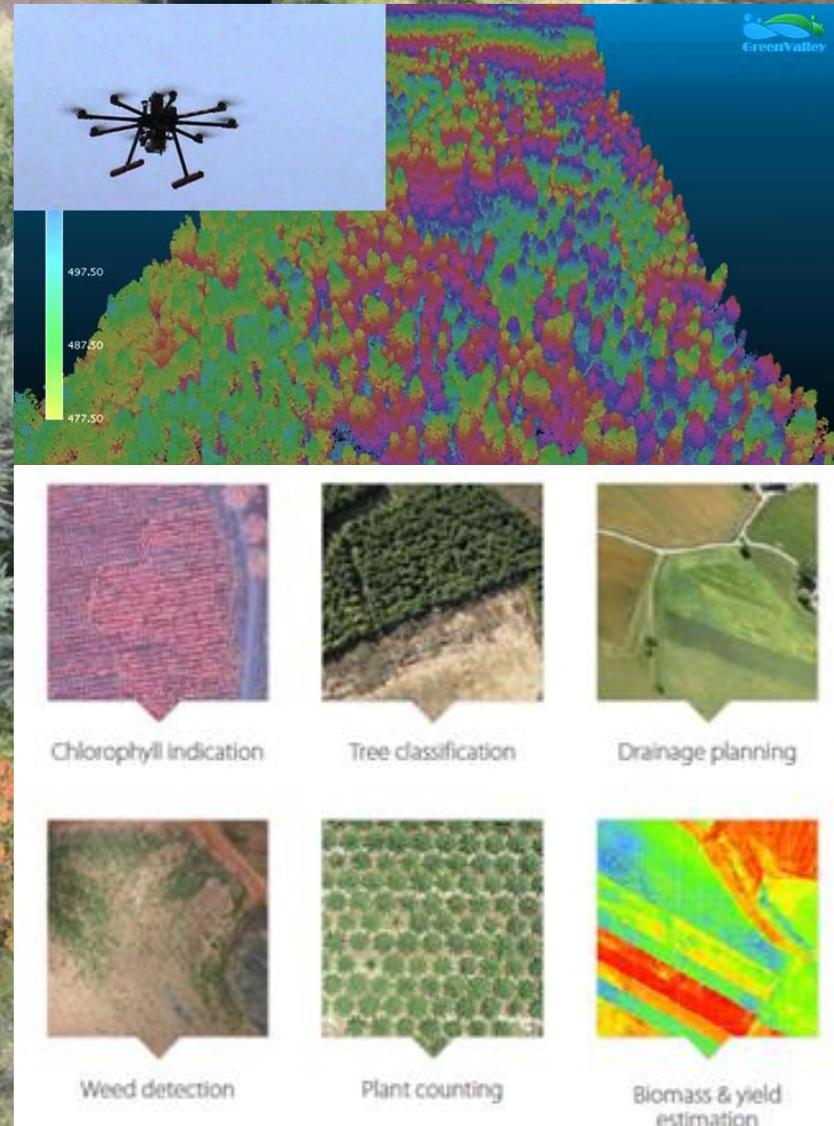
- Potential for use of Unmanned Aerial Systems (UAS/drones) in silvicultural and stand management activities by civil (commercial) and public (governmental) operations.



UAS FORESTRY / AG USES

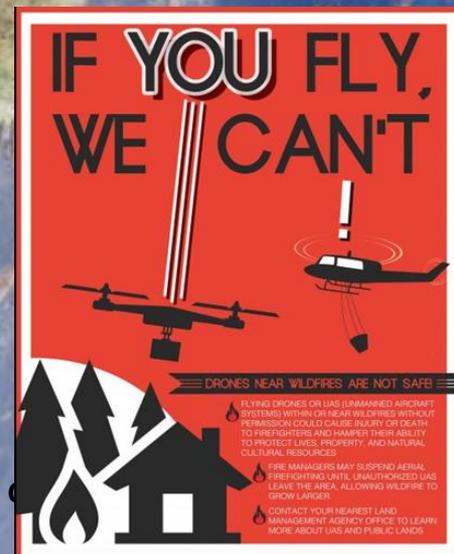
- Young Plantation Verification
- Clear Cut Area Delineation
- Pest Monitoring
- Weed Detection
- Real Time Photography
- Harvest Monitoring
- Biomass Measurement Post Harvest
- Forest Health
- Tree Height Monitoring
- Habitat Identification / Monitoring
- Stand Purchase Evaluation

(Some uses require higher end platforms with multiple sensors / multispectral sensors)



Federal Aviation Administration (FAA)

- Drone Operations.
 - 333 Exemption / Part 107 / Certificate of Authorization (COA)
- Drone Categories
 - Civil (non-governmental/commercial),
 - Public (governmental), and
 - Model aircraft (recreation/hobby).



Federal Aviation Administration (FAA)

- **Operational Limitations**
 - Less than 55lbs (24.95kg)
 - Visual Line-of-sight (VLOS) only (pilot or observer)
 - May not operate over any person not directly participating in operation
 - Daylight only
 - Yield right-of-way (see and avoid)(first person view does not meet requirement)
 - Maximum speed 100mph (87kts)
 - Maximum altitude 400 Above Ground Level (AGL) or within 400 ft of structure
 - Minimum visibility is 3 miles
 - Operations in controlled airspace requires prior approval
 - No carriage of hazardous materials



DRONE TYPES

- **Fixed-wing**
 - Mapping
 - Detection
- **Rotary-wing**
 - Mapping
 - Detection
 - Spraying



Chupacabra Drones

Green Crow Corporation



ADVANTAGES / LIMITATIONS

Fixed-Wing

• ADVANTAGES

- Ease of Use
- Flight time = area covered
- Multiple sensor types
- Speed
- Analytical Software

• LIMITATIONS

- Spraying
- Landing area
- Price
- Obscuration
(weather/ground cover)



ADVANTAGES / LIMITATIONS

Rotary-Wing

- **ADVANTAGES**

- Ease of Use
- Multiple sensor types
- Analytical Software
- Cost (non application)
- 1st person view
- Landing area

- **LIMITATIONS**

- Flight time = area covered
- Price (application)
- Obscuration (weather/ground cover)



OTHER CONSIDERATIONS

- Time of year
 - Detection (leaf, flowering)
 - Spraying
- Foliage density
- Minimized impact / disturbance
- Access difficulty
- Spot spraying
- GPS spray record

SENSORS

Typical Mapping Sensors

Off-the-shelf Digital RGB Cameras

Critical specifications:

- Cost/Weight/Sensor Size
- Lens Quality



Small NIR/IR Cameras

- Video FPS Restrictions
- Stills? Triggering?
- On board storage

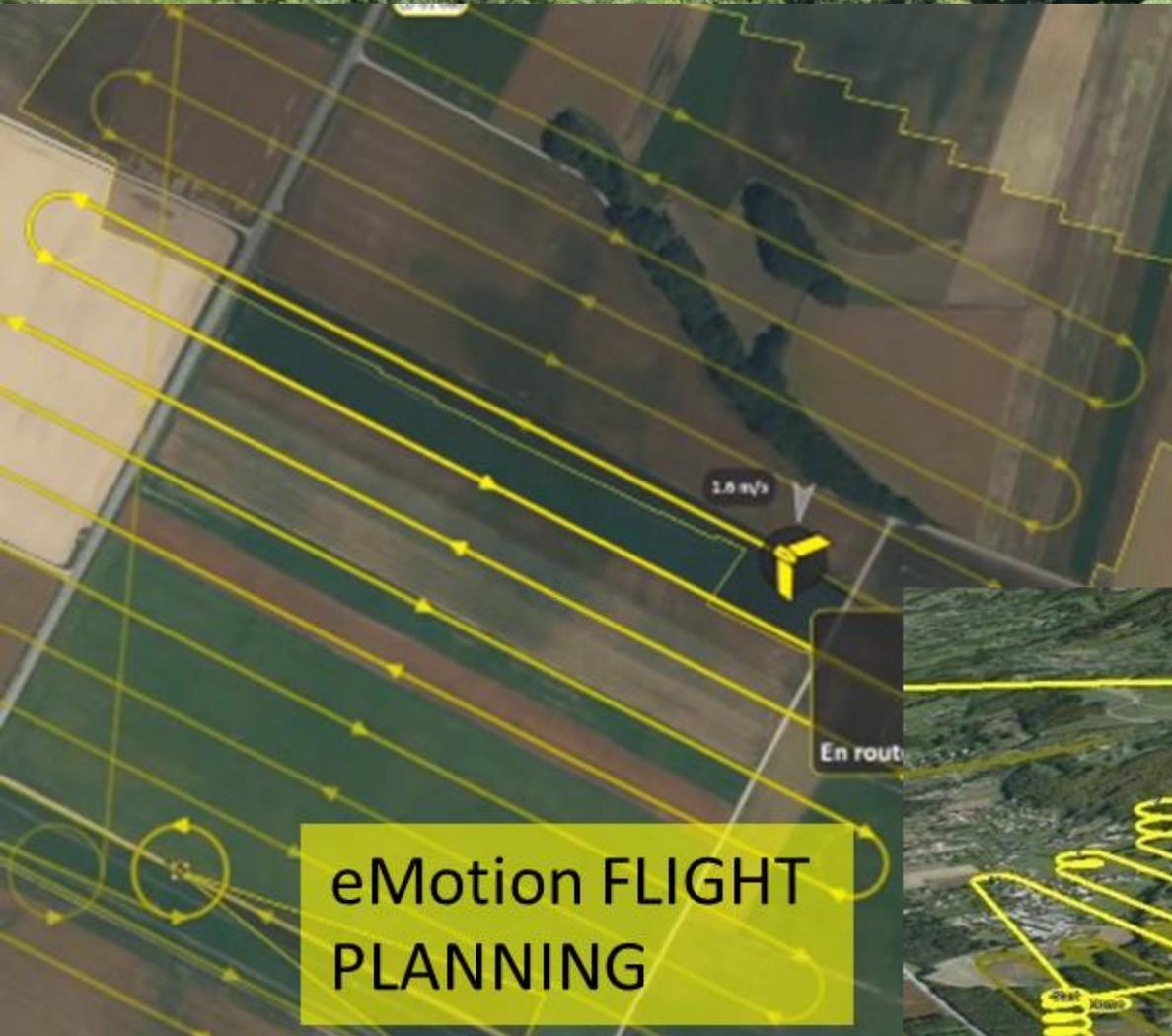


Multi-spectral Cameras

- Weight?
- Size?
- Image Storage?



FLIGHT PLANNING



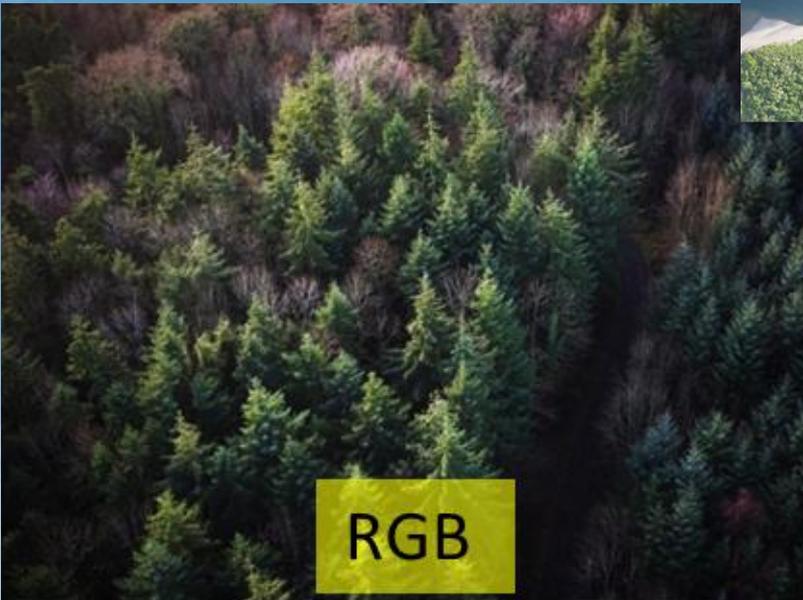
eMotion FLIGHT
PLANNING



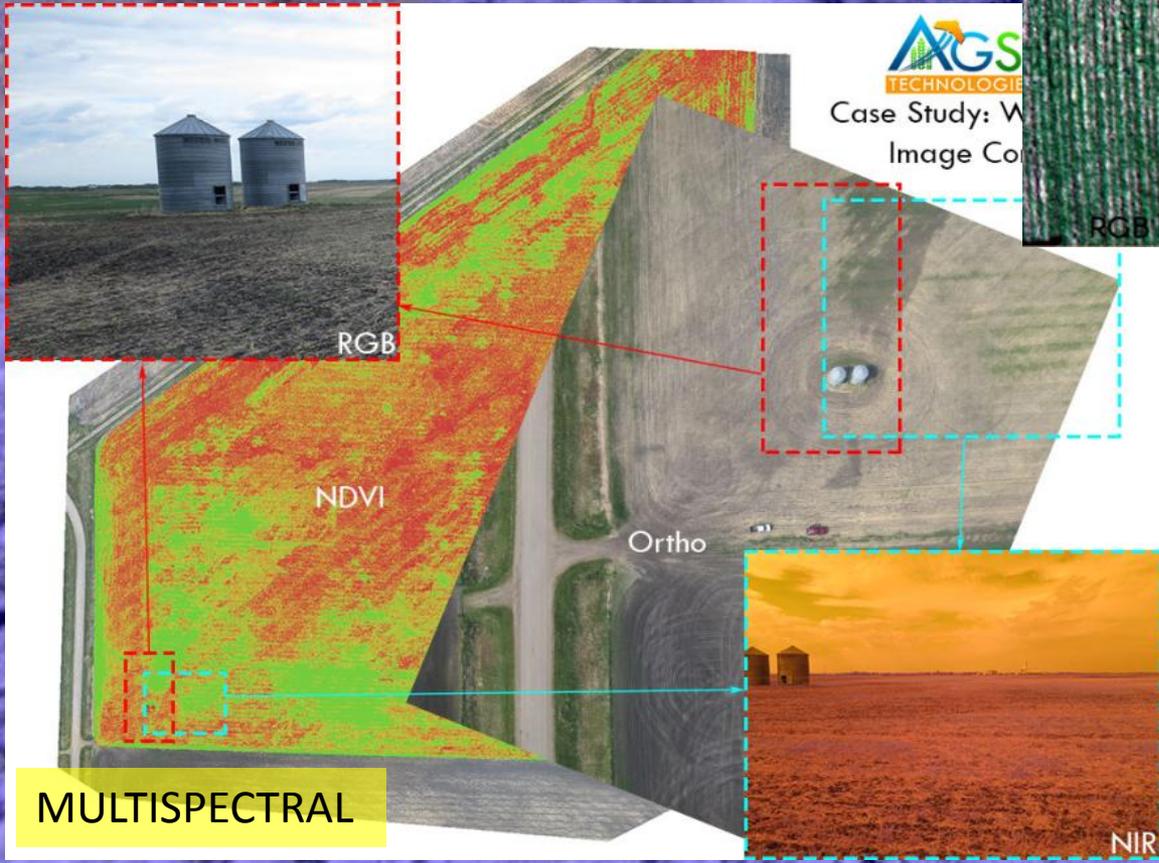
SLOPE MAPPING FLIGHT PLAN



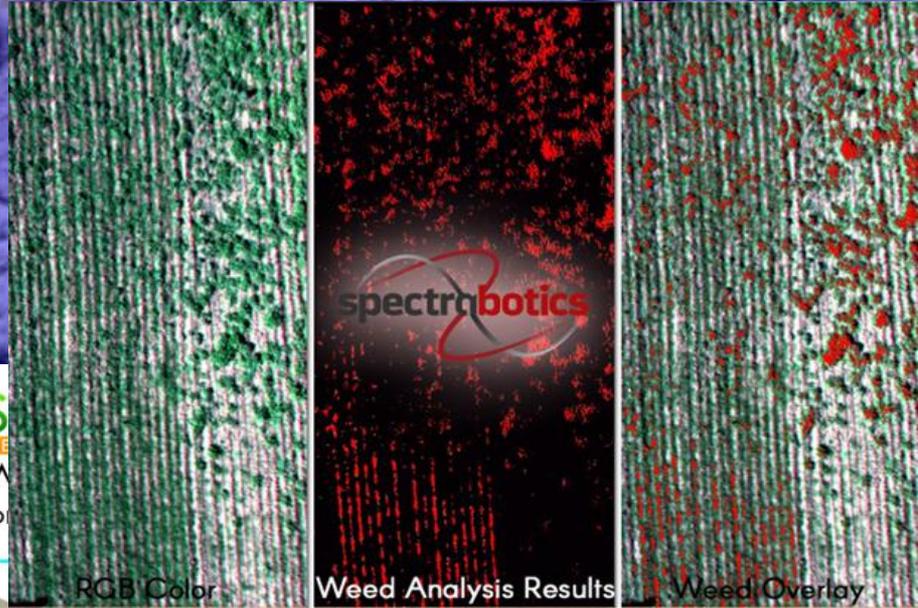
RGB / ORTHOMOSAIC



MULTISPECTRAL



AGS
TECHNOLOGIES
Case Study: Weed
Image Co



Green Crow Corporation



DISCUSSION / QUESTIONS

