

Using UAVs for Aerial Photography and Video

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Presentation Contents

- Status of Federal Government Policy
- National Air Space
- Certificate of Waiver or Authorization (COA)
- UAV Monitoring Applications
- System Dynamics' Firebird UAS



Congressional Directive

- **February 2012: Congress directed Federal Aviation Administration (FAA) to accelerate integration of small, civil Unmanned Aircraft Systems (UAS) into National Airspace (NAS) by September 2015 ***

- Small UAS: < 55 lbs



- **Impediments to implementing directive (GAO-12-889T; 7/2012)**

- No sense-and-avoid capability to detect other airborne platforms
- Command and Control (C²) vulnerability
- Lack of technical operational standards
- Lack of regulation to ensure safe integration into NAS
- Privacy
- GPS spoofing and jamming



FAA's Implementation Plan

- Designate six sites to test UAS technologies
- Mandate for UAS test sites:
 - Ensure safe airspace for integrated manned/unmanned flight operations
 - Develop certification standards of UAS air traffic requirement
 - Leverage NASA and DoD resources
 - Ensure Coordination with Next Generation Air Transportation System
 - Address both civil and public UAS use in National Airspace



National Airspace (NAS)

Airspace at-a-Glance



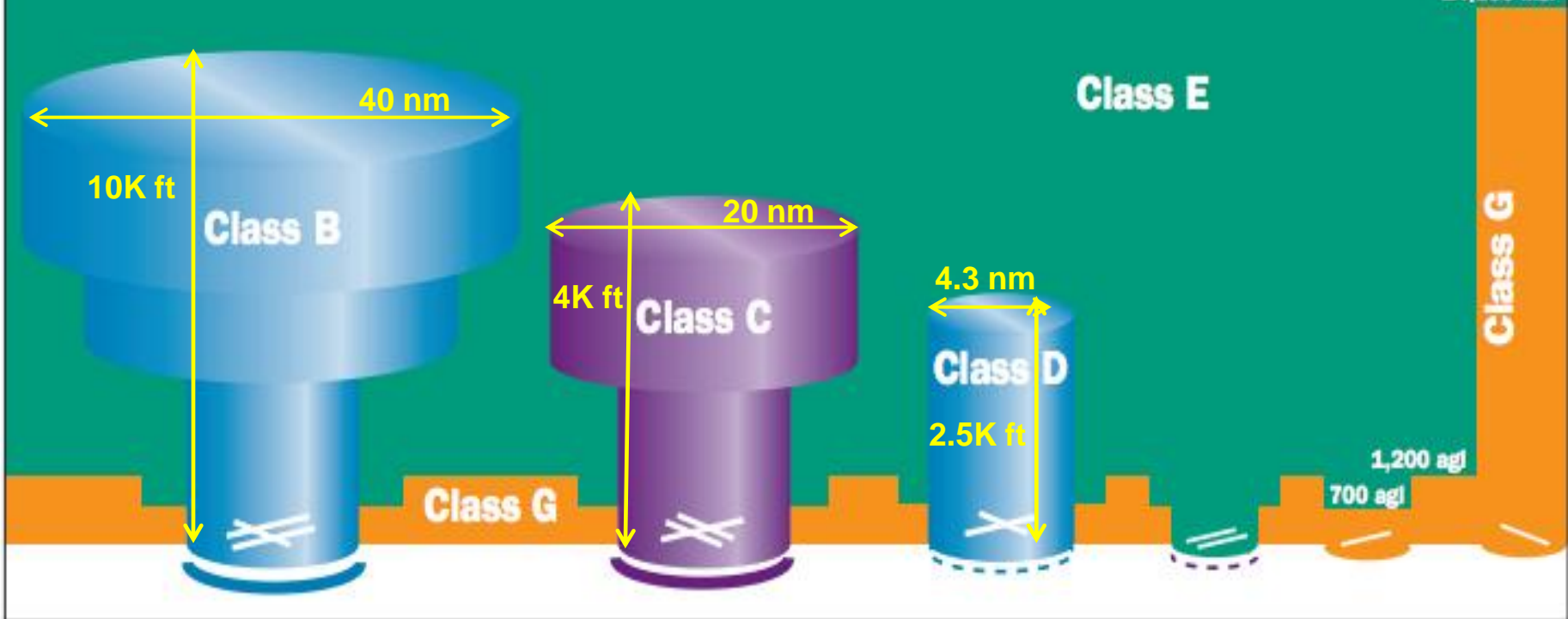
FL600

Class A

18,000 msl

AOPA Air Safety Foundation • 800-USA-AOPA • www.asf.org

14,500 msl



- Classes A, B, C, D, and E are **controlled** airspaces
- Class G is **uncontrolled**

How do we currently fly UAS in NAS?

- **Hobbyists permitted to fly UAS at remote locations -- below 400 ft, >3 miles from airport, and within visual flight rules (AC91-57)**
- **For all others, FAA authorizes flight for military & non-military UAS based on case-by-case safety review**
- **FAA issues two types of authorizations -- both specify times, locations, and permissible flight operations**
 1. **Certificate of Waiver or Authorization (COA)**
 - Issued to Federal, State, and local Government agencies
 - From 1/1/12 to 7/12/12, 201 COA's issued to 106 applicants (including 12 state and local law enforcement agencies)
 2. **Special Airworthiness Certificate – Experimental Category**
 - Issued to commercial companies operating UAS as part of business
 - From 1/1/12 to 7/12/12, 8 certificates issued to 4 UAS manufacturers



Certificate of Authorization (COA)

- SDI flying under COA for existing Air Force contract, authorized solely for our fully-autonomous SiteSeer UAS



- Our key COA requirements are:

- Class G airspace, UAV remains in visual range below 400 ft (AGL)
- Three personnel present:
 - Observer, Pilot-in-Command, Ground station operator
- Pilot must pass knowledge test for private pilot certificate
- Pilot and Observer must have 2nd Class Airman medical certificates



UAS Monitoring Applications

- Ecology of coastal salt marsh and mangroves



- Hurricane damage survey



- Wildlife monitoring in inaccessible areas, monitoring of invasive plant species



- Agriculture and farmland monitoring



- Monitoring ranch land



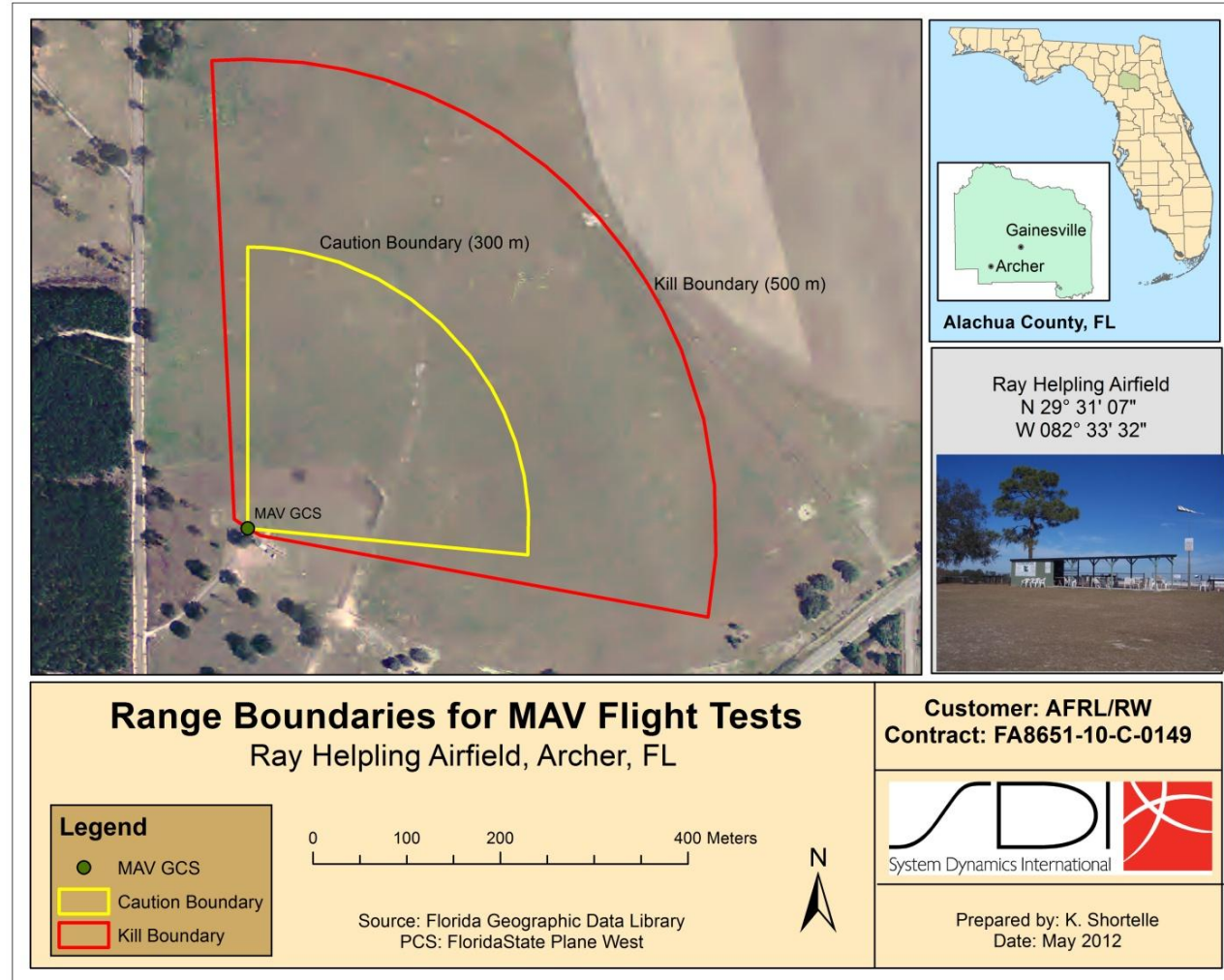
SDI's Firebird UAV



PARAMETER	VALUE
Fuselage	5.5 ft
Wingspan	8 ft
Takeoff Weight	10 lbs
Cruise Speed	15 - 25 m/sec
Altitude (AGL)	1200 ft (typical)
Endurance	~ 1 Hour

Flight Test Airfield

- Flight tests conducted at Ray Helping Airfield (aka, Archer Field)
- AMA-Chartered Site (Charter 202)
- 9 miles from SDI's Gainesville facility



Firebird Test Flights

- RC and autonomous flights conducted in Oct and Nov 2009
- Used low resolution CCD video camera and transmitter
(Photos extracted from video, post-test)



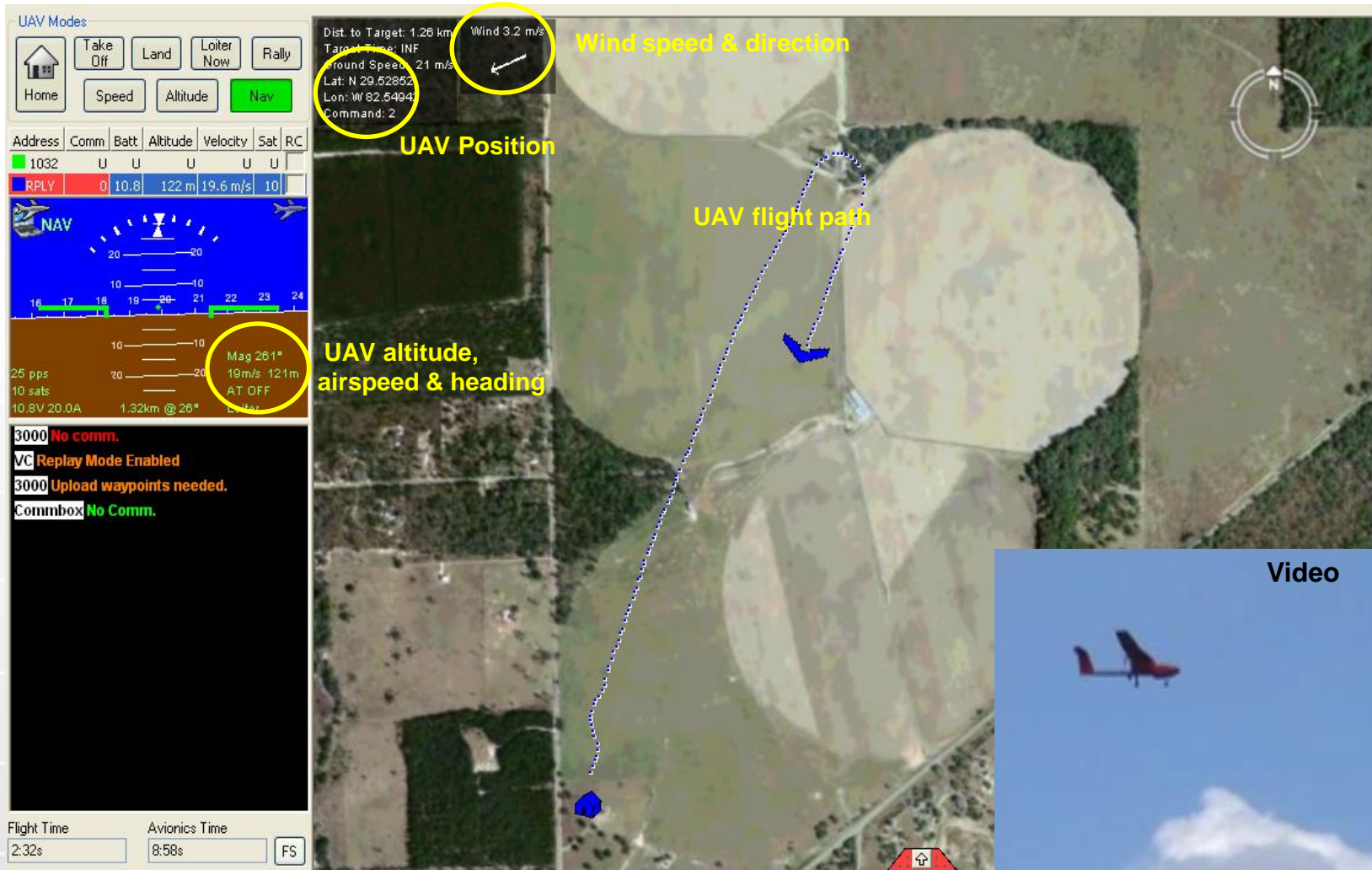
GPS coordinates correspond to Firebird's location

- Used Tetracam 'ADC Lite' multi-spectral camera for high-resolution photos
- Currently upgrading Firebird with:
 1. "Continuous shooting" GPS-equipped DSLR camera for overlapping, geo-tagged, hi-res, nadir views
 2. Az/EI panning video camera for oblique, geo-tagged, full-motion video

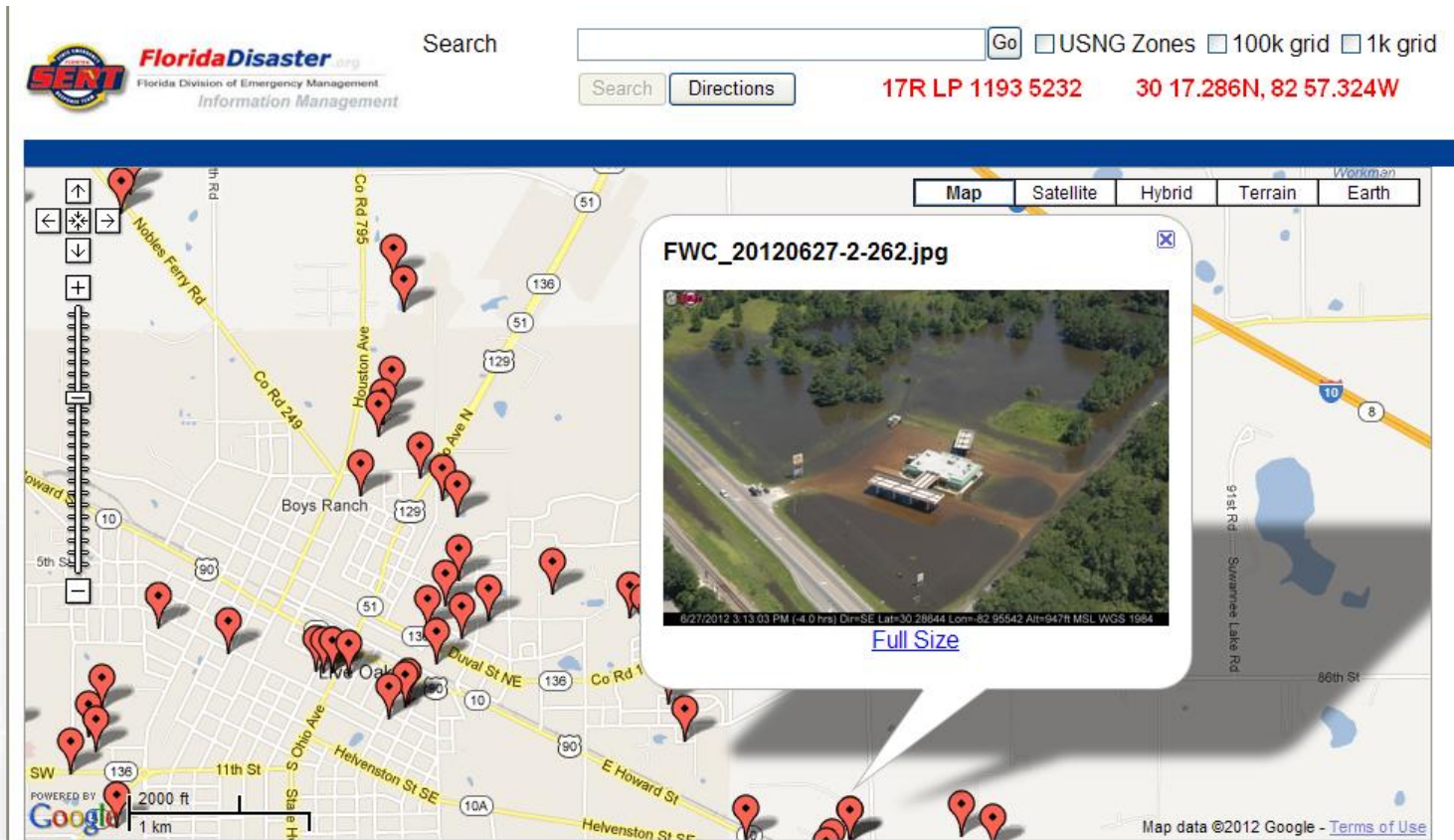
Tetracam False Color Photo
(Red, Green, NIR)



Firebird Ground Station Display



Recent example where UAS would have been valuable: Tropical Storm Flooding in North Florida



- Oblique aerial photos taken by Florida Wildlife Commission manned aircraft (<http://map.floridadisaster.org/mapper/>)
- Balloon markers in interactive map are clicked to see oblique views of flooded area
- Photo coordinates correspond to aircraft position

Questions?