

Establishing a tribally operated drone program



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Establishing a tribally operated ~~drone~~ Unmanned Aircraft System (UAS) program



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BEFORE YOU ASK



- 1. ITS A DRONE**
2. YES, IT WAS EXPENSIVE
- 3. YES, IT HAS A CAMERA**
4. LEGALLY, 400 FEET HIGH
- 5. 25 MINUTES**
6. 35+ MPH
- 7. OVER A MILE AWAY**
8. NO, YOU CAN'T FLY IT

Overview

Motivation for Menominee's UAS program

UAS and resource management at Menominee

UAS capabilities

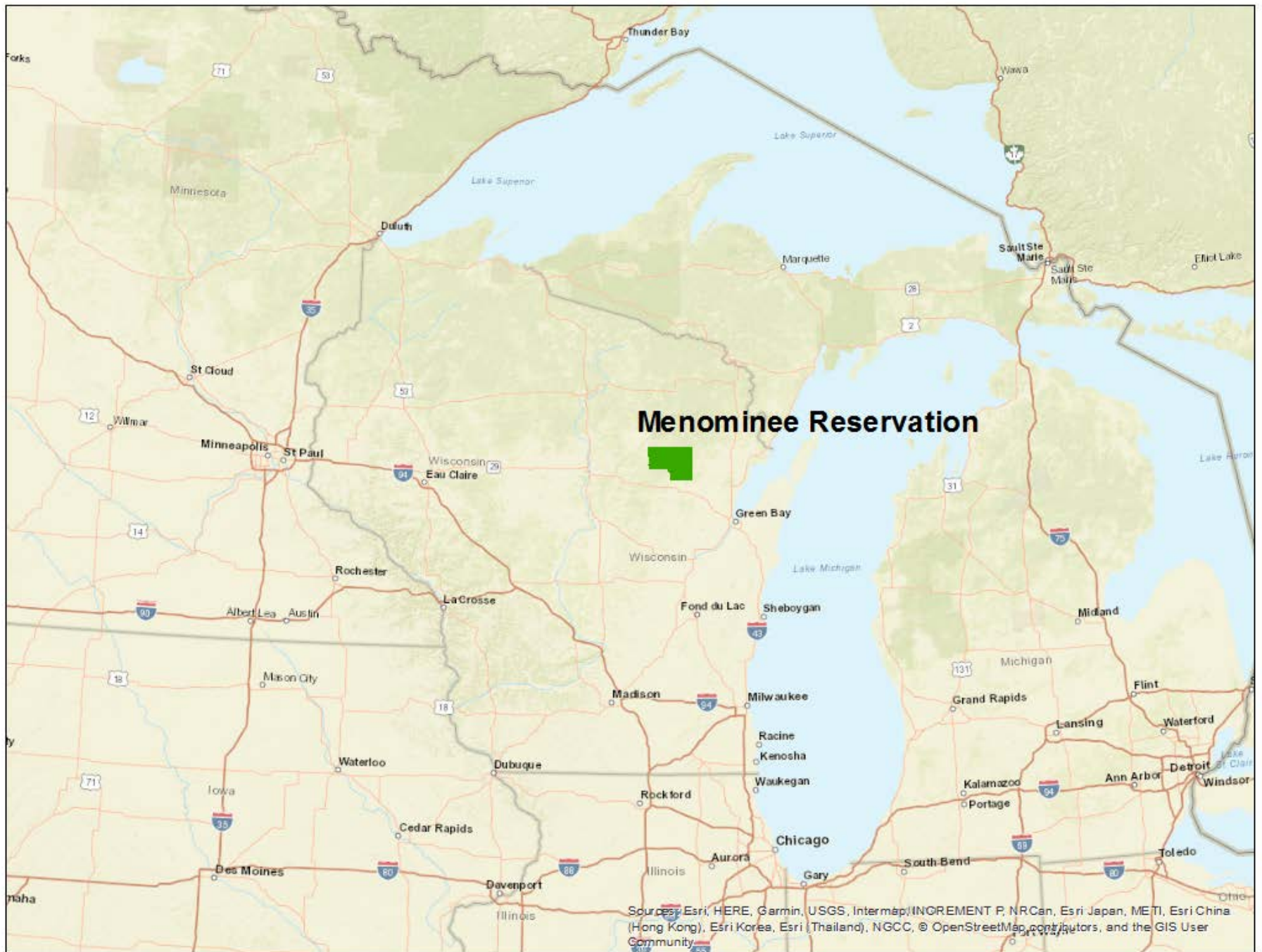
Hardware and software considerations

Regulations and policies

Challenges to UAS operations

Lessons learned

Conclusions and recommendations



Source: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

History & Motivation



Manage 220,000 acres of forest (about 7,000 acres harvested annually)

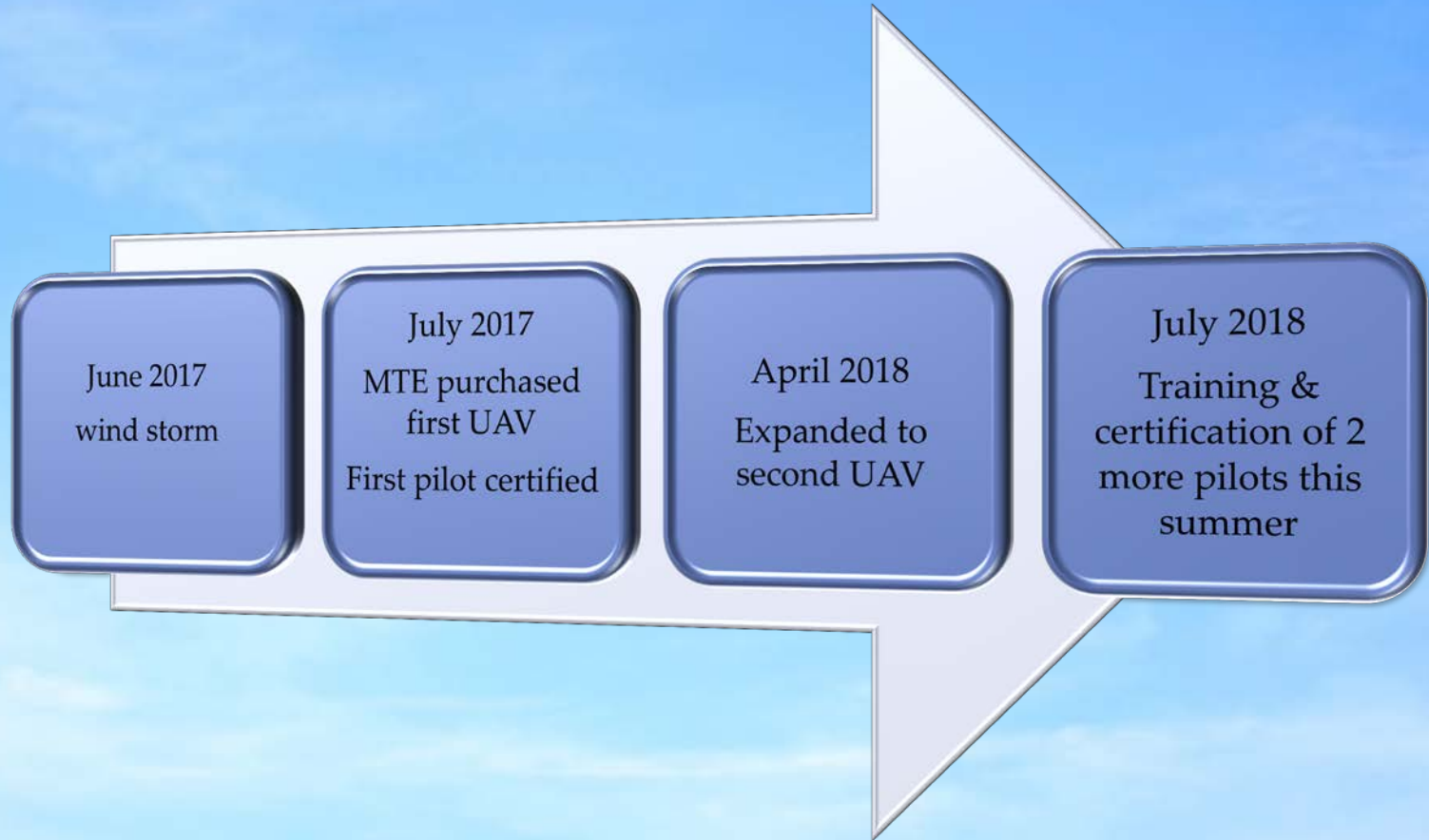


Utilize traditional aerial photography to supplement field data collection



Began considering a UAS program 3 years ago for small scale projects

History & Motivation for UAS at Menominee



UAS and resource management at Menominee

Photos and video
for outreach and
education
(combine with
story maps)

Storm damage
surveys

Forest health
surveys (e.g. oak
wilt and red pine
decline)

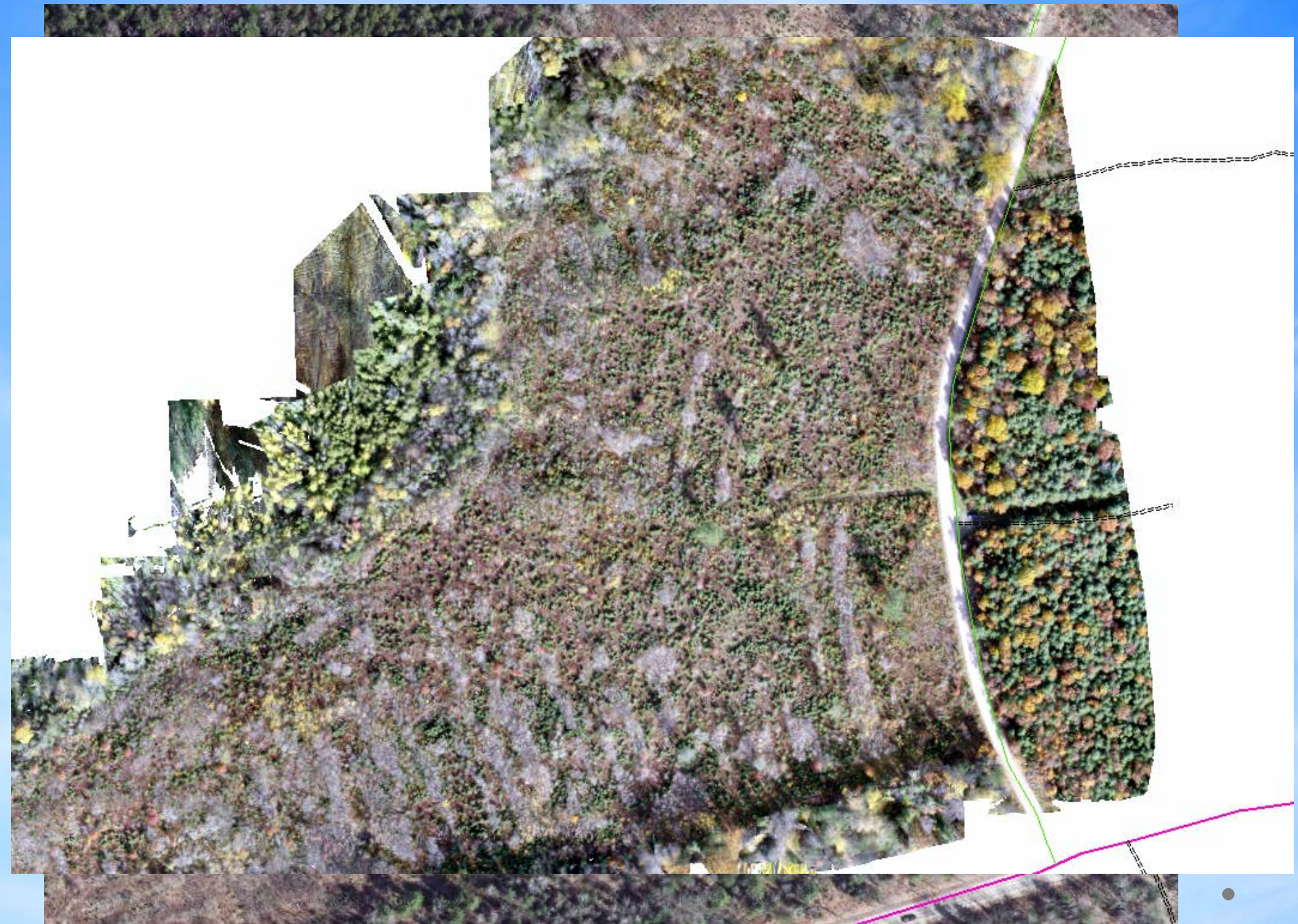
Fire suppression

Prescribed fire
monitoring and
documentation

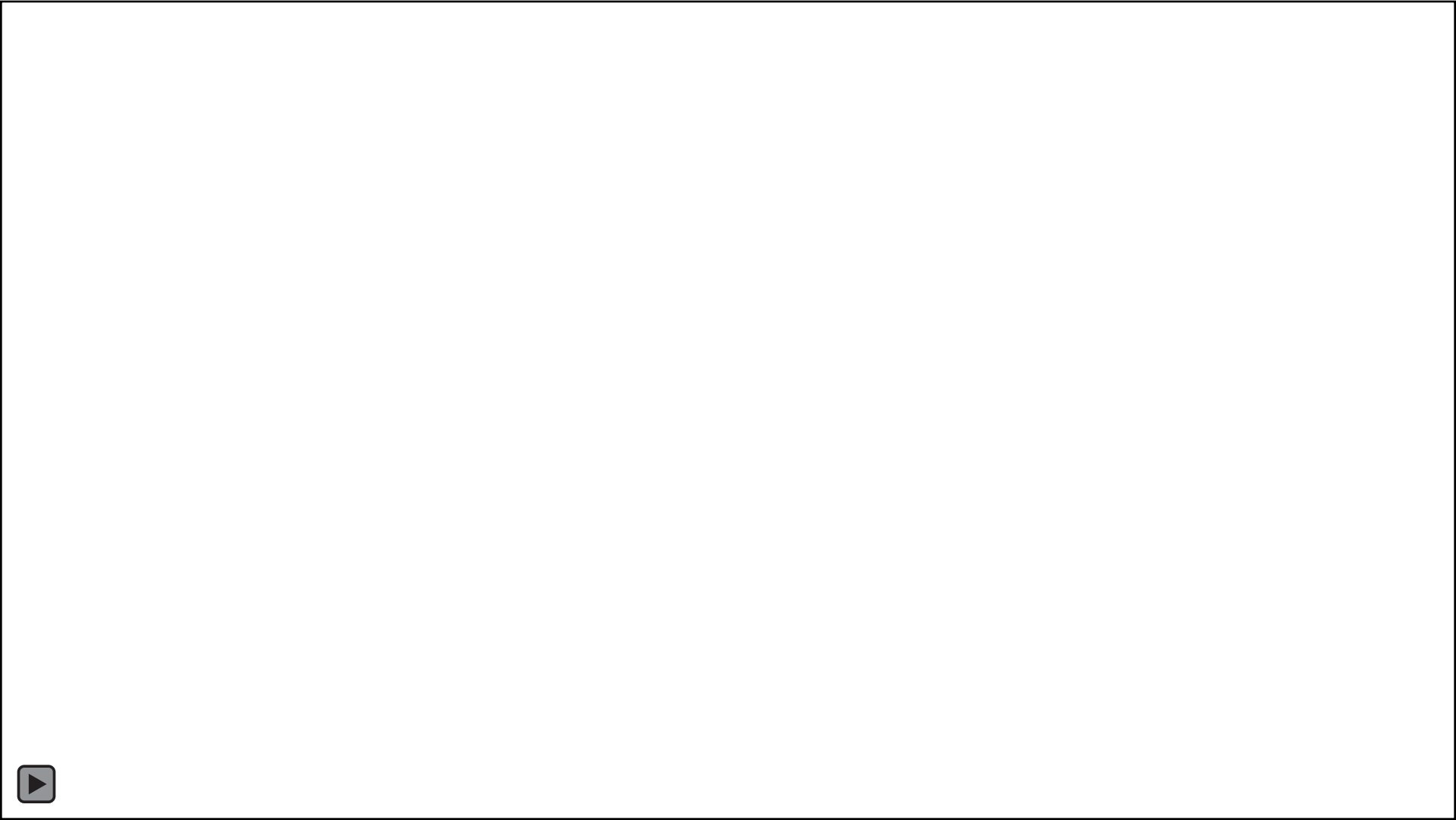
White pine
regeneration
surveys &
mapping

UAS and resource management at Menominee




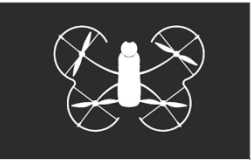






UAS capabilities



- fixed wing vs quadcopters

		
Projects	Mapping	Small area mapping & inspection
Applications	Land surveying (rural), agriculture, GIS, mining, environmental mgt, construction, humanitarian	Inspection, cinematography/videography, real estate, surveying (urban), construction, emergency response, law enforcement
Cruising speed	High	Low
Coverage	Large	Small
Object resolution	cm/inch per pixel	mm per pixel
Take-off/landing area	Large	Very small
Flight times & wind resistance	High	Low

© senseFly 2015





		
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Considerations

Rotary vs fixed wing

Mission dependent

Battery life

Matters less than
you may think! (in
forestry anyway)

Real time video feed

Recorded pictures
and video

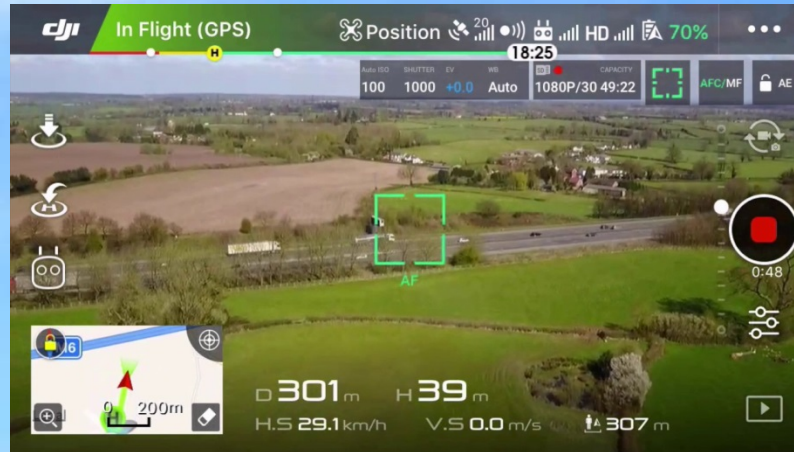
Camera options

Critical
consideration

Considerations

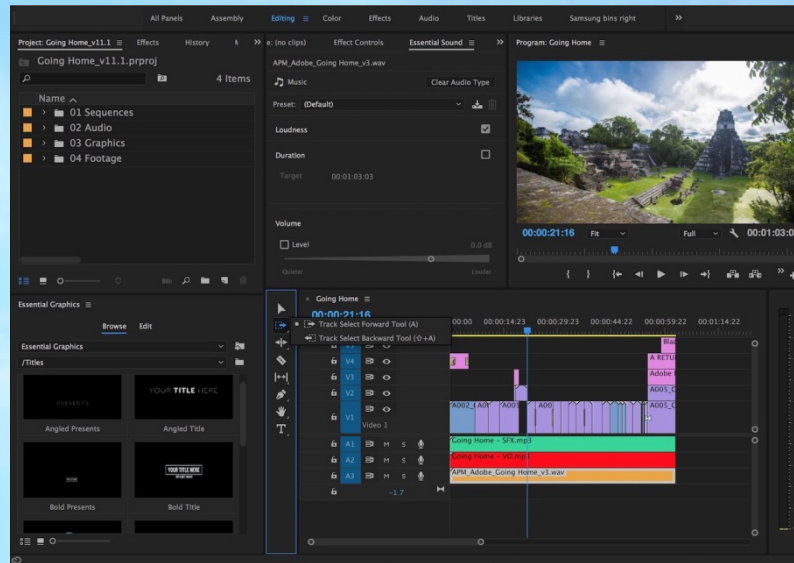
Flight control
software

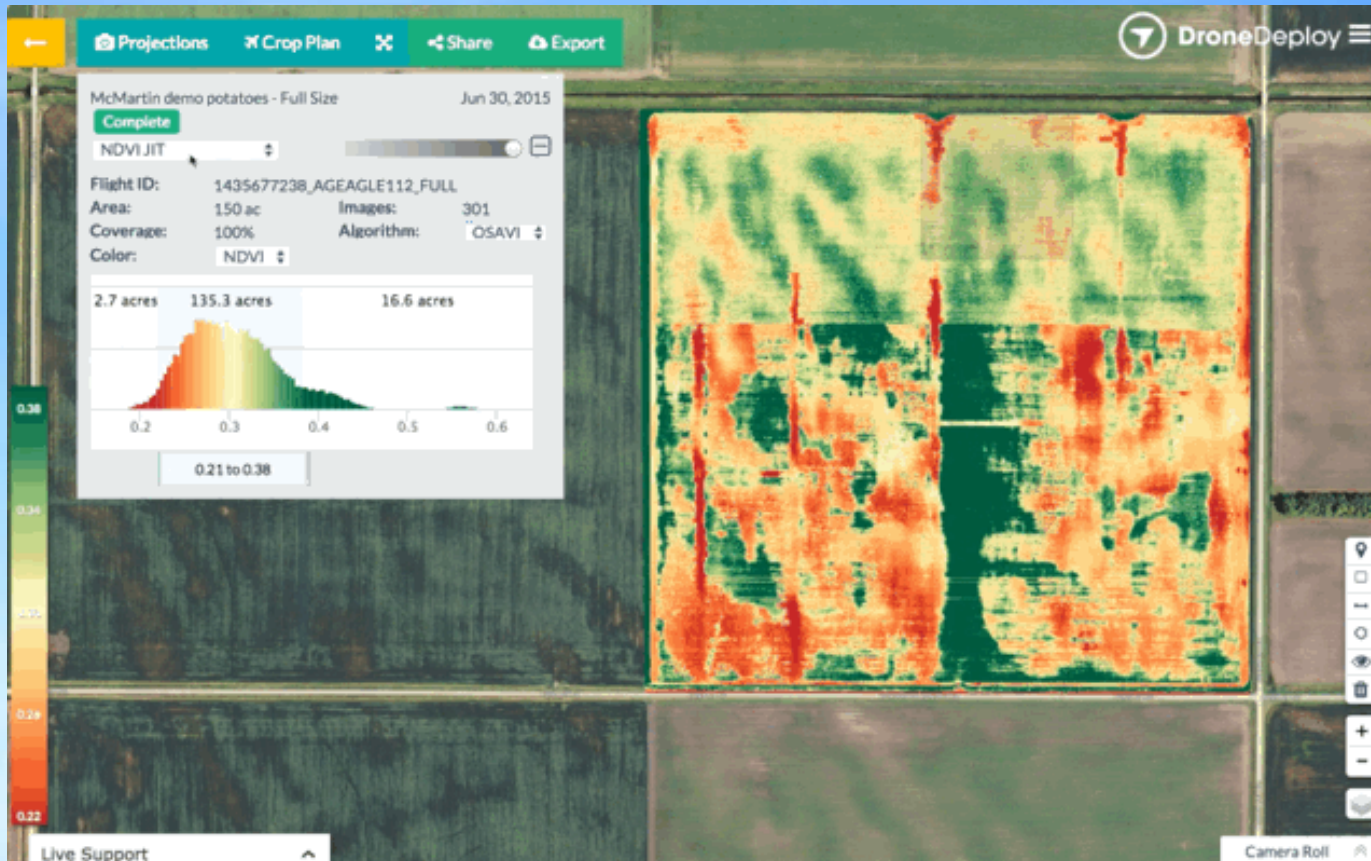
Proprietary or
3rd party

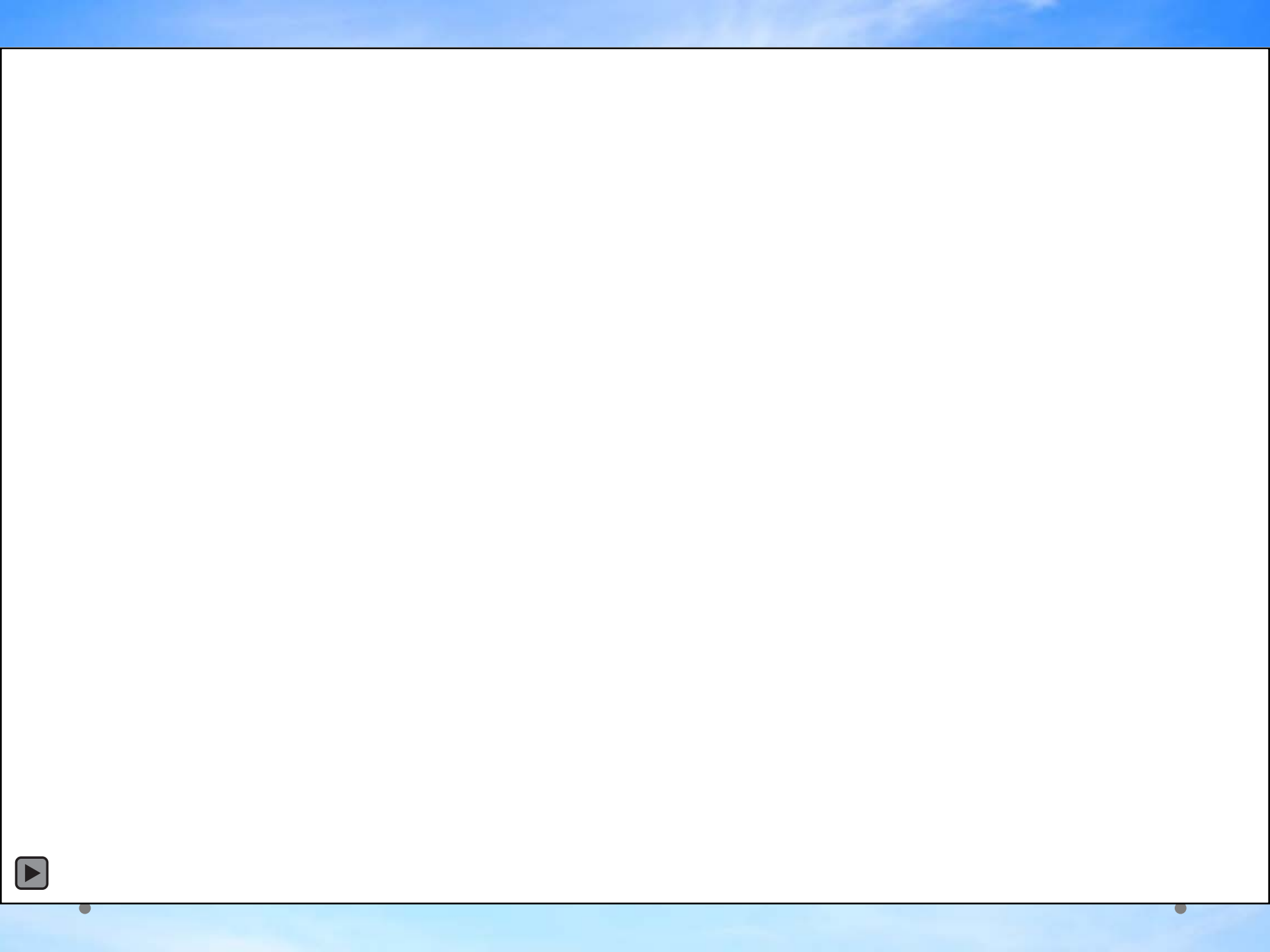


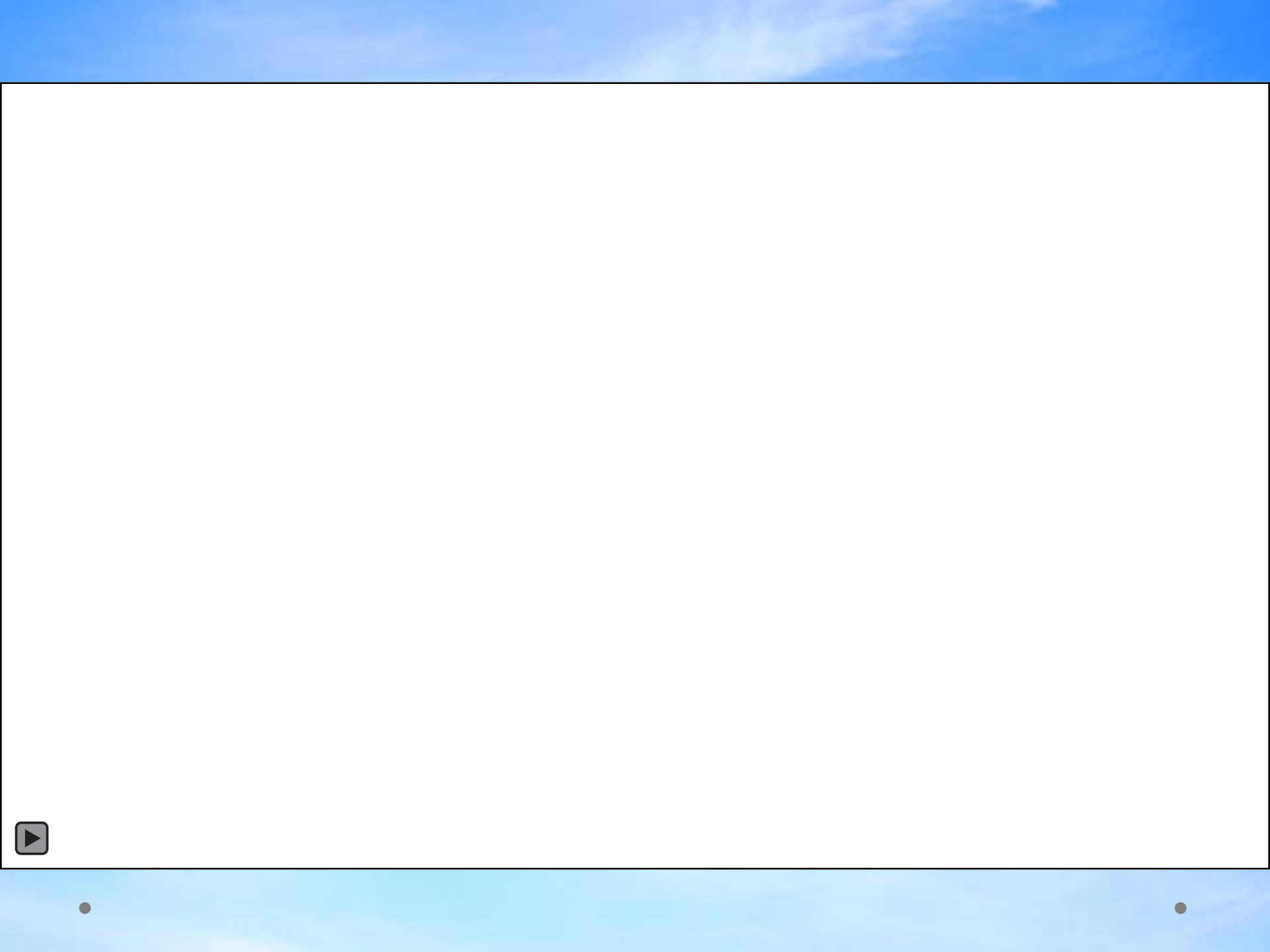
Post-processing
software

Photogrammetry
Stitching
Photo/video editing

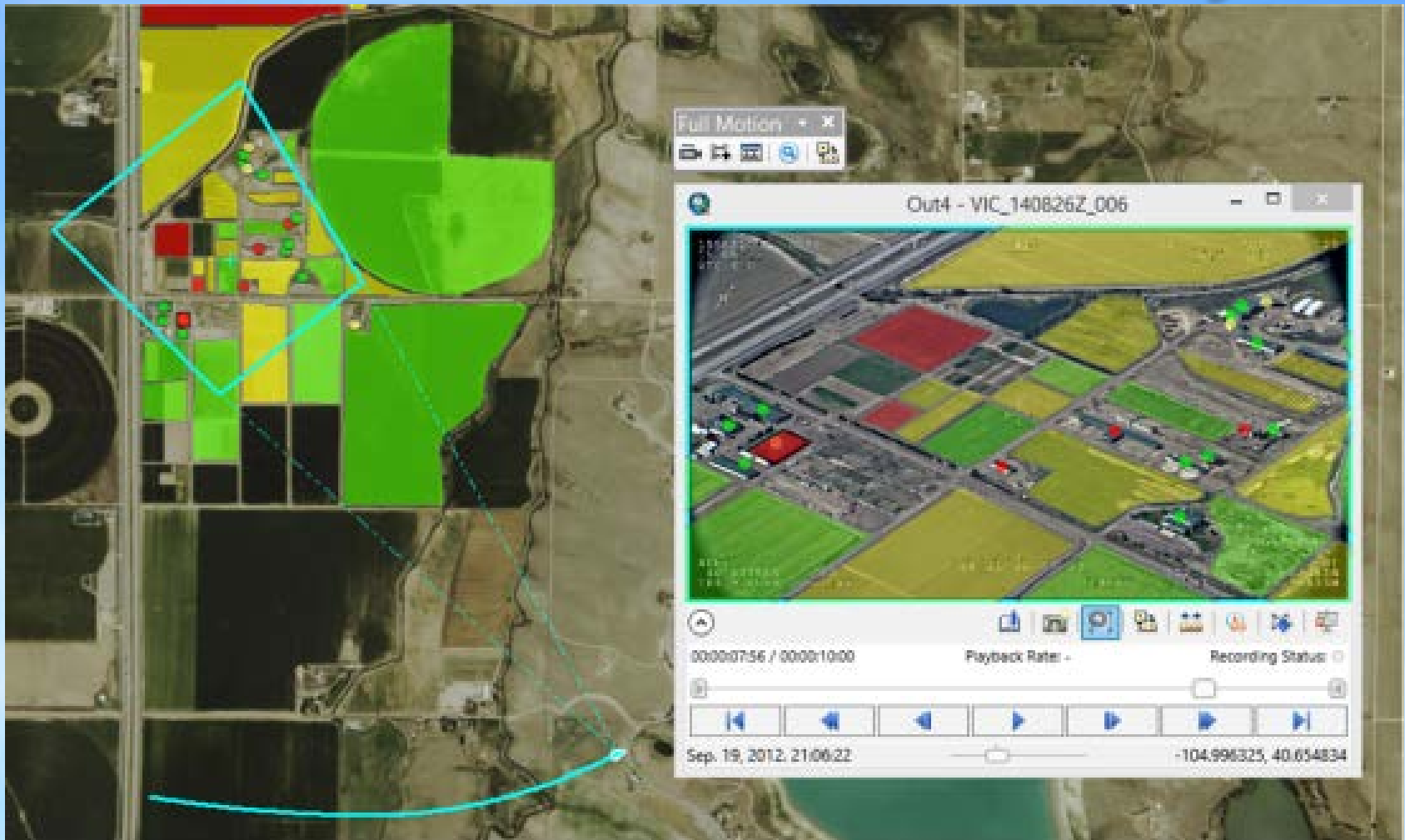








Full motion video analysis



Vendors

3DR

DJI

Yuneec

Parrot

Sentera

Pix4D

Kespry

sensefly

Many others

Vendors

Be cautious with smaller vendors!

Highly volatile and competitive market

Many companies will not be in the market in a few years
(future support?)

Many software or other established companies are attempting to enter the market...and are having a hard time competing with DJI, Parrot, etc.

Most companies lack the vertical integration that is required to compete in a rapidly evolving market (they depend on too many partners)

Behind The Crash Of 3D Robotics, North America's Most Promising Drone Company



EDITOR'S PICK

Ryan Mac Forbes Staff

Oct 5, 2016, 09:00am • 142,876 views • #CuttingEdge

<https://www.forbes.com>



American drone companies aren't built to compete

33

What GoPro's failed ambitions tell us about making drones

By Casey Newton | @CaseyNewton | Jan 11, 2018, 3:28pm EST

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<https://www.theverge.com>



Data when you need it,
savings when you don't

MTE's Inventory

DJI
Phantom 4 Pro
(~\$2K)

- 3.1 pounds
- Max speed: 45 mph
- Max flight time: 30 minutes
- Operating temperature: 32 to 104 deg F
- Camera: 4K RGB still and video (non-interchangeable)



DJI
Inspire 2
(~\$7K to \$10K)

- 7.6 pounds
- Max speed: 58 mph
- Max flight time: 27 minutes
- Operating temperature: -4 to 104 deg F
- Camera: **multiple, interchangeable** (MTE has two: a 4K RGB and a NIR camera)



Regulatory & policies



Company
policies

Tribal

Local (usually privacy)

State (sovereignty? 4th amendment?)

Federal (FAA, DOI rules)

Regulatory issues



Federal, state and local regulations – research what's applicable for your area!



FAA 14 CFR Part 107 is **required** for anyone not flying recreationally (includes law enforcement)



State and local regulations (usually related to 4th amendment, privacy and hunting regulations)



Tribal ordinances?

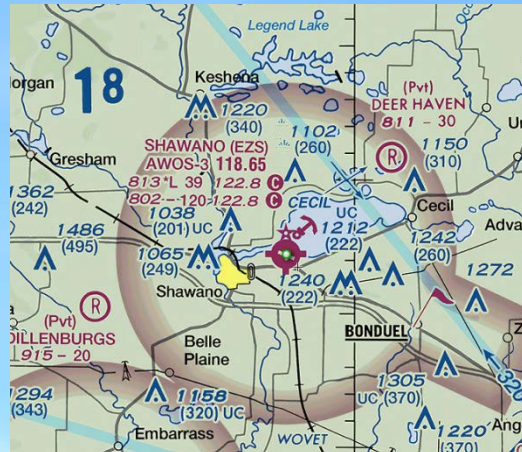


Special rules and requirements for DOI (affects BIA personnel and tribal fire programs on federal funding)

Federal



FAA 14 CFR Part 107 is **required** for all non-recreational (includes law enforcement)



Airspace constraints



Temporary Flight Restrictions (TFRs)

Regulatory issues

FAA 14 CFR Part 107 constraints

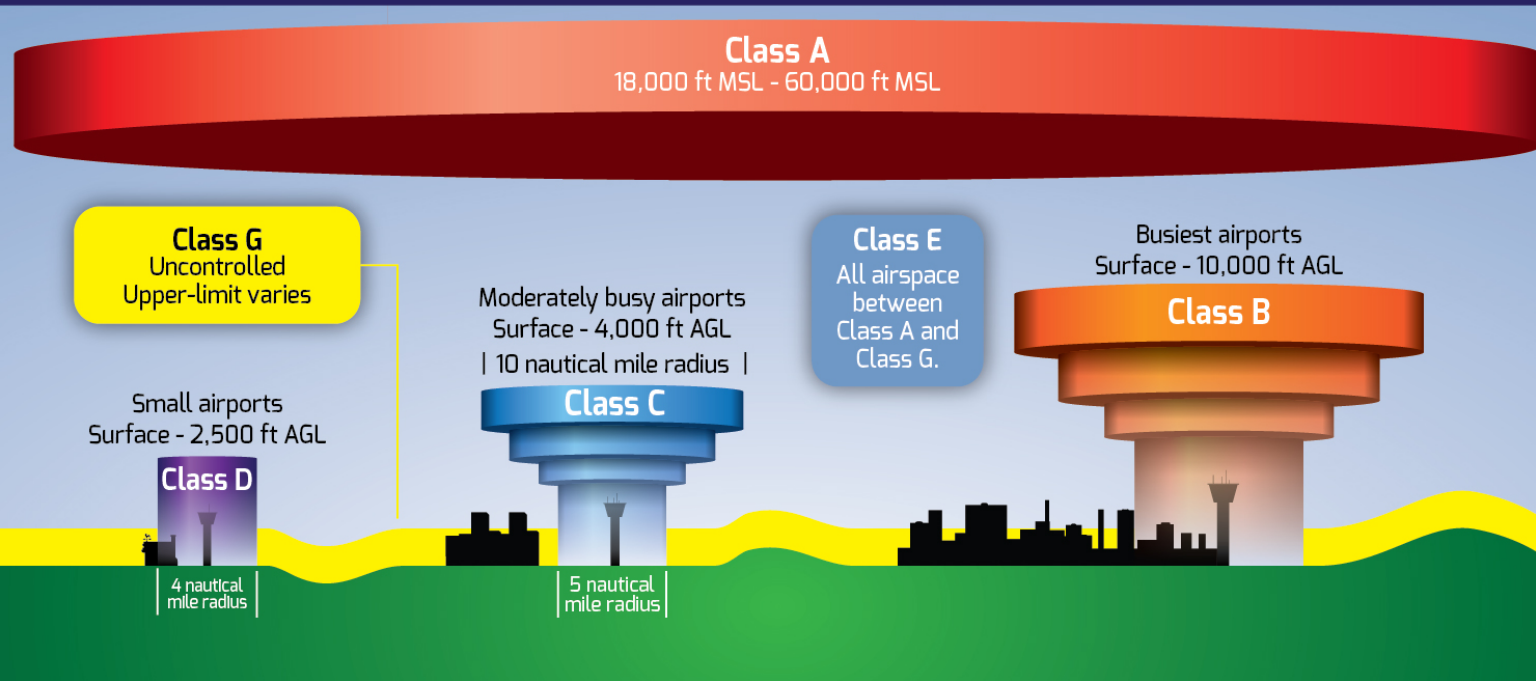
- Pilot must have UAS Certification or operate directly with someone who has certification
- Yield to manned aircraft (real danger here...some aircraft fly very low over 'uninhabited' forest cover)
- Fly under 400' AGL
- Maintain visual line of sight (VLOS)...an issue when operating in a forested environment

Regulatory issues

FAA 14 CFR Part 107 constraints

- Operations in Class B, C, D and E airspace require ATC approval (Anywhere near an airport)
- Do not fly over people
- Fly during daylight (waivers are relatively easy to acquire)

National Airspace System



sUAS Operation Requirements

Class A ■
Prohibited

Class B/C/D ■ ■ ■
May operate with permission from local Air Traffic Control

Class E/G ■ ■
May operate while following all other regulations

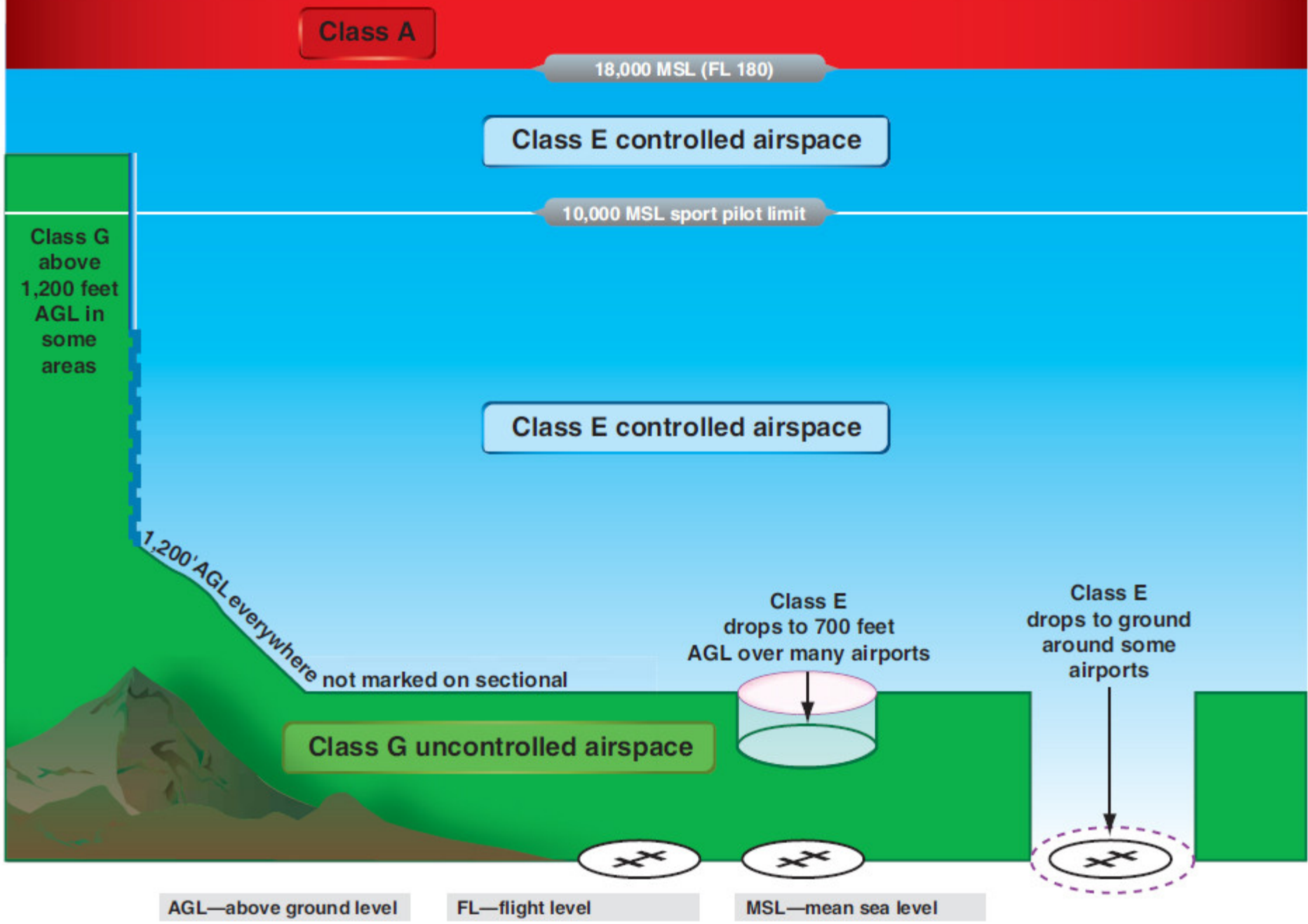
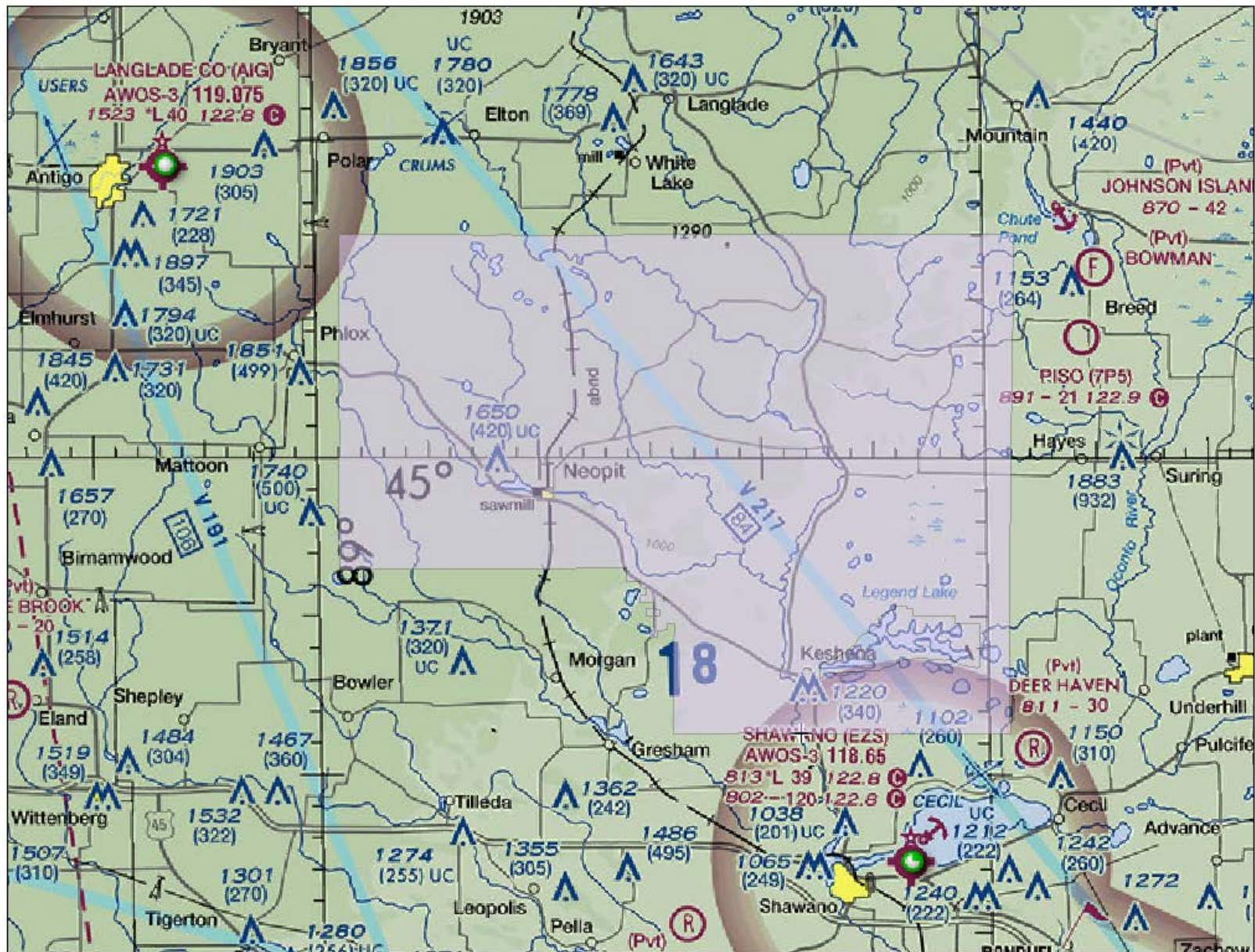


Figure 8-2. Class G uncontrolled airspace and Class E controlled airspace. <https://aviation.stackexchange.com>



DOI Policies

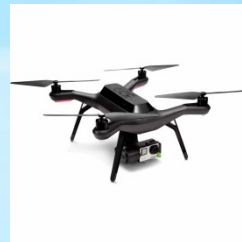
(especially for BIA employees and tribes operating under federal fire funding)



Part 107 isn't enough!



Limited options



Here's your option

Challenges to UAS operations

FAA restrictions (e.g. VLOS)

Weather (especially cold and high winds)

Local concerns and regulations (especially privacy)

Software (learning curve, especially with remote sensing)

Computer hardware (image and video processing)

Funding

Lessons learned

Be proactive!

- Education and outreach...debunk common myths about drones
- Promote the professional and technical nature of your UAS operations to differentiate your organization from reckless/clueless hobby use
- Help shape local policies to minimize disruptions
- Log all flight operations!
- File NOTAMs
- Promote safety (minimize risks)



Lessons learned

Build your program incrementally

- Start with small, basic system
- Use achievements to refine your list of requirements and sell the value of the program to management
- Network with others, use online resources to keep abreast of technological and regulatory developments
- Think 'outside the box'



Conclusions and recommendations

UAS is a valuable tool for resource management, law enforcement and other needs

Carefully list and **prioritize** your needs

Do your research! Rapid changes and wide variety of options in the market

Conclusions and recommendations

Plan to incrementally implement a system that addresses your needs

Build on success and experience through successive budget cycles (learn what does and does not work for your situation)

Focus on **work flows**, not just equipment or end products (you spend more time planning, documenting and processing than you do flying)