



U.S. Department of the Interior
Bureau of Land Management

Use of Unmanned Aircraft in the BLM

A New Age of Remote Sensing
Jason Frels, BLM



Drones are coming!



- **There is nothing unmanned about an unmanned system!**
 - Pilots are still required
- What are they called?
 - Unmanned Aircraft Systems (UAS)
 - FAA and OAS
 - Unmanned Aerial Vehicle (UAV)
 - Drones
 - Remotely Piloted Aircraft System (RPAS)
 - ICAO and Air Force



BLM's Current UAS





Training



- Part 107 Certification (FAA) – Pre-work
- Basic Operator Course (DOI/BLM) – Week 1
- Advanced UAS Workshop (BLM) – Week 2
- Data Processing – Week 3+
 - Full Motion Video / Photogrammetric Processing *
 - Field Data Technician ?
- Proficiency (3 Months); Retraining (2 years)



General Categories of UAS Projects/Products

- Situational Awareness Video
- Spatially-enabled Video
- Orthoimagery 2D (High/Low Precision)

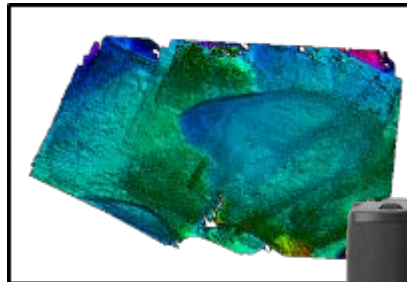


FULL-MOTION VIDEO

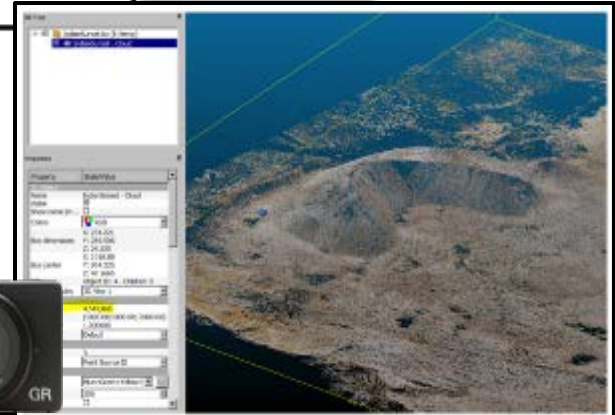
- Precision mapping 3D

Other types:

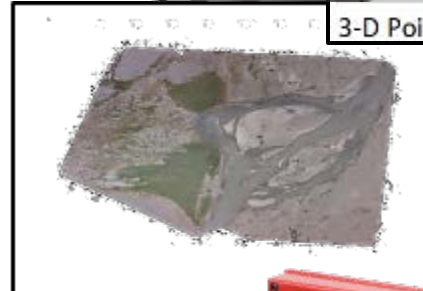
- LIDAR
- Hyperspectral
- Thermal
- Geophysical, air monitoring



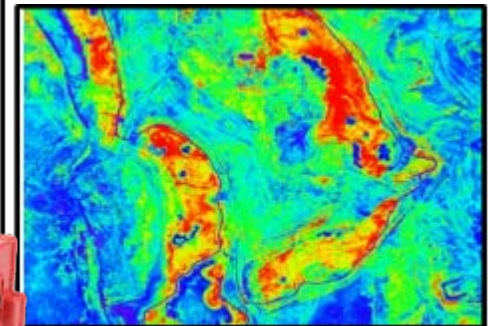
ELEVATION MODELS



3-D Point Cloud



ORTHOIMAGERY



SPECTRAL INDICES (NDVI)

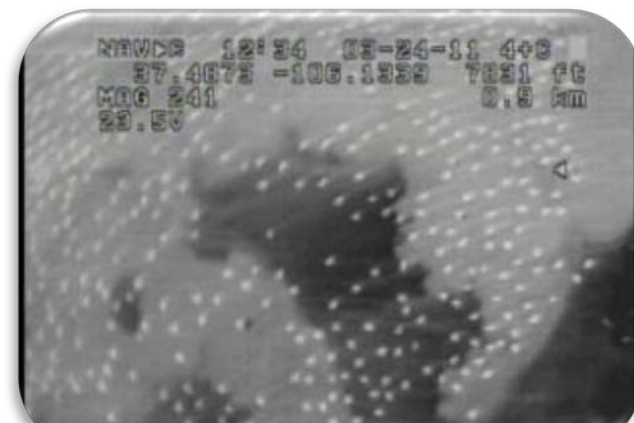


Sandhill Crane Population Count

Method	Costs
Fixed Wing Survey (Ocular Survey)	\$4,310
Fixed Wing Survey (Remote Sensing - Contractor)	\$35,000
UAV Survey (Remote Sensing)	\$2,645

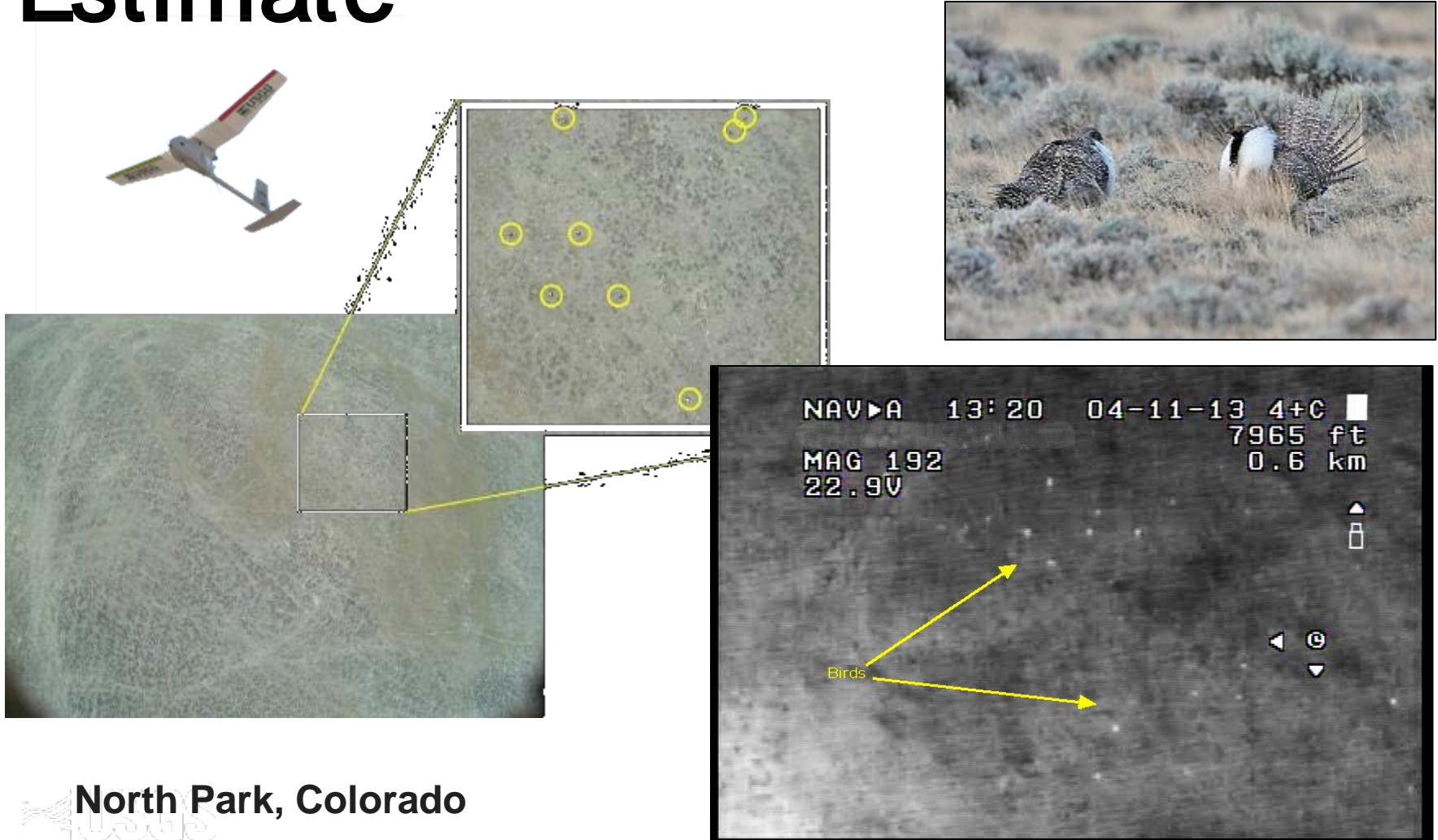
Benefits

- Aviation safety concerns were mitigated
- Refuge obtained a more accurate bird count
- Birds were not disturbed by the flight operations





Sage Grouse Population Estimate



North Park, Colorado



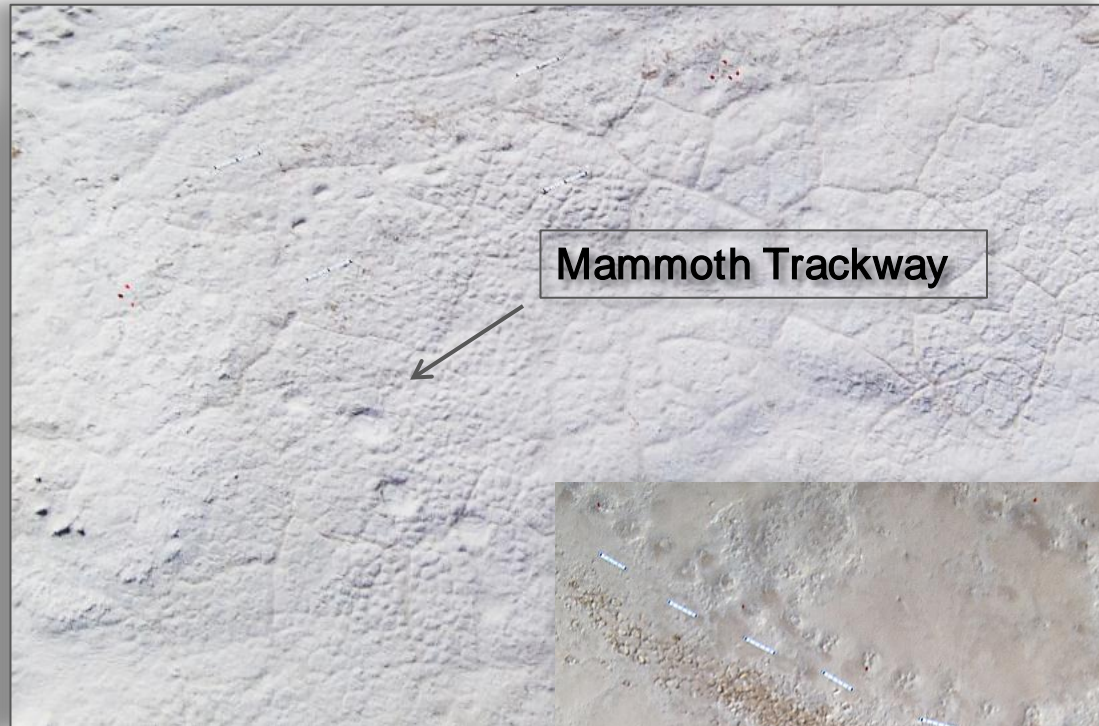
Elk Population Estimates





Pleistocene Trackway Mapping

White Sands National Monument

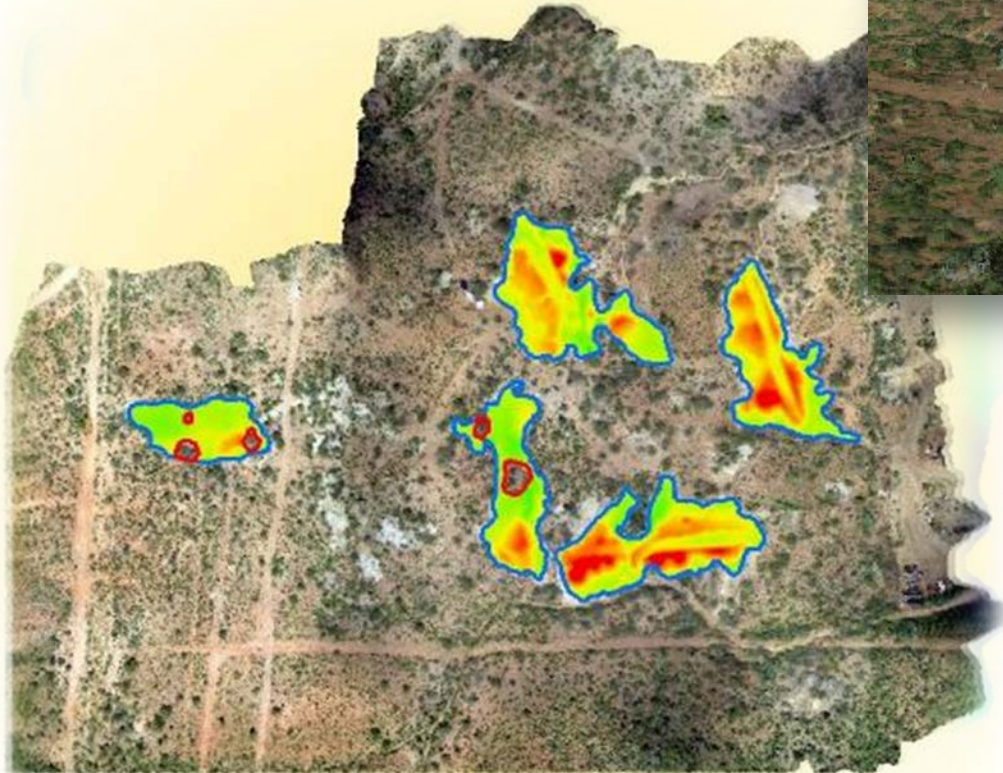


Photogrammetric documentation using a UAS to aerial survey extremely fragile fossilized footprints from the late ice age.



Dogtown Mine Site

Tucson Field Office, Arizona
September 2013



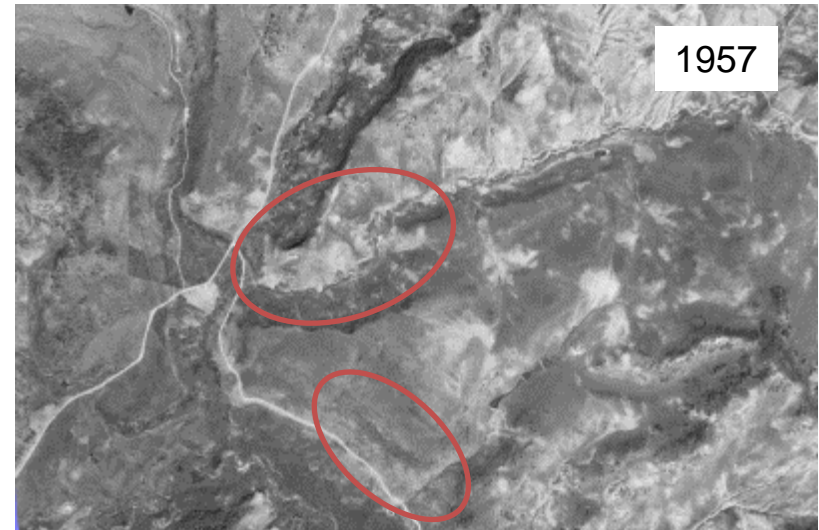
- BLM CERCLA authority
- 30 acre site contaminated with heavy metals including; lead, arsenic, antimony and mercury
- Volumetric calculation
 - Estimate = 6,456 cubic yards
 - Photogrammetry = 5,678 cubic yards



Gravel Pit Trespass



- Estimate volume of material removed off BLM Land.
- Pre-Litigation phase to see if it is worth pursuing
- Approximately \$93,000 mineral royalty being sought





Physical Safety Inventory

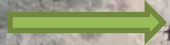


- BLM office in Elko, NV requested assistance to validate 61 features presenting potential safety hazards
 - AML features were located on steep/unstable slopes that would require significant safety gear, rappelling, etc.
- Pilots mobilized within a few weeks (based on their availability)





New Feature
Identified









Physical Safety Inventory



- 61 physical safety features assessed
 - Eliminated 28 from further evaluation
- Shadows presented difficulties in elimination
 - Could not determine whether they were hazardous
 - However, imagery provided an idea of what to expect
- Identified several other features in the vicinity that were not in known inventory



The Work Can Be Contracted



7,500+ Unmanned Aerial Systems with FAA Section 333 Exemptions for Commercial Work
FAA Part 107 - New Rules for Commercial Operators – August 2016



Contact Information

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