



***sUAS in support of
Department of the Interior Requirements***

<http://uas.usgs.gov>



**Michael E. Hutt
UAS National Project Office
Alaska Unmanned Aircraft Systems
(UAS) Interest Group and
Stakeholders Conference**

USGS – Land Remote Sensing Program

Unmanned Aircraft Systems Project Office

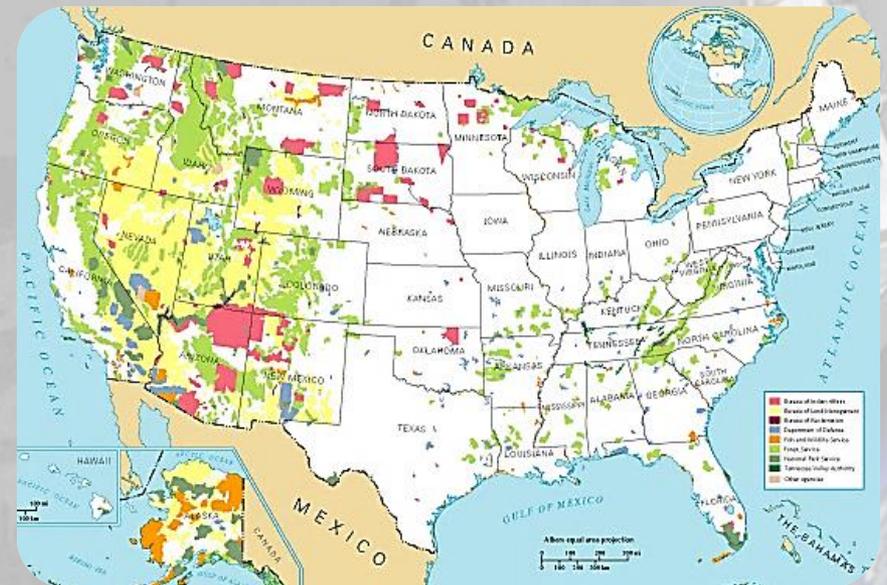


- Emerging Technology Investigation.....2005-2008
- UAS National Project Office Created.....May 2008
- First Systems Acquired.....December 2009
- Operational Procedures Memorandum.....March 2010
- Operator Training/ Demonstrations/ Introduction to COA.....2009 2010
- Roadmap Released.....July 2011
- Operations.....Spring 2011
- Formal Concept of Operations..... Spring 2012
- DOI Systems.....Anchorage, Denver, Boise, Bozeman, Flagstaff



USGS UAS Project Office Mission

The USGS Unmanned Aircraft Systems (UAS) National Project Office is implementing cost-effective, safe, and efficient technology into the Department of the Interior's decision making toolbox. UAS technology is being employed by scientists, resource managers and incident support teams across the Department for a wide range of applications. UAS provides the USGS and our partners with the opportunity to gain access to an increased level of persistent monitoring of earth surface processes in remote areas that have been difficult or nearly impossible to access before.



Office of Aviation Services



- Aviation Safety Programs
- Aircraft Management Services
- Procurement of Aircraft
- Service Contracts
- Coordination of Assets

Operational Procedures Memorandum 11-11

- Operator Certification
- Operator Currency Requirements
- Aircraft Safety Inspection Criteria
- Certificate of Authorization Process



Enhanced Earth Observations = New Science = More Informed Decisions



- Safety- alternative to aircraft missions
- Potential to dwell over areas of interest
- Support to both day & night operations
- Commercial Solution – readily available
- Cost Effective- sUAS
- Tactical Level- field use
- Observing wildfire behavior
- Verification- Validation of test sites
- Archeological Site Monitoring
- Habitat Monitoring
- Natural Hazard Damage Assessment
- Dam Inspections
- Monitoring Volcanic Activity
- Wildlife Inventories

Prediction: by 2020 UAS will emerge as the primary platform for all DOI Intelligence, Surveillance and Reconnaissance (ISR) applications

Family of Systems

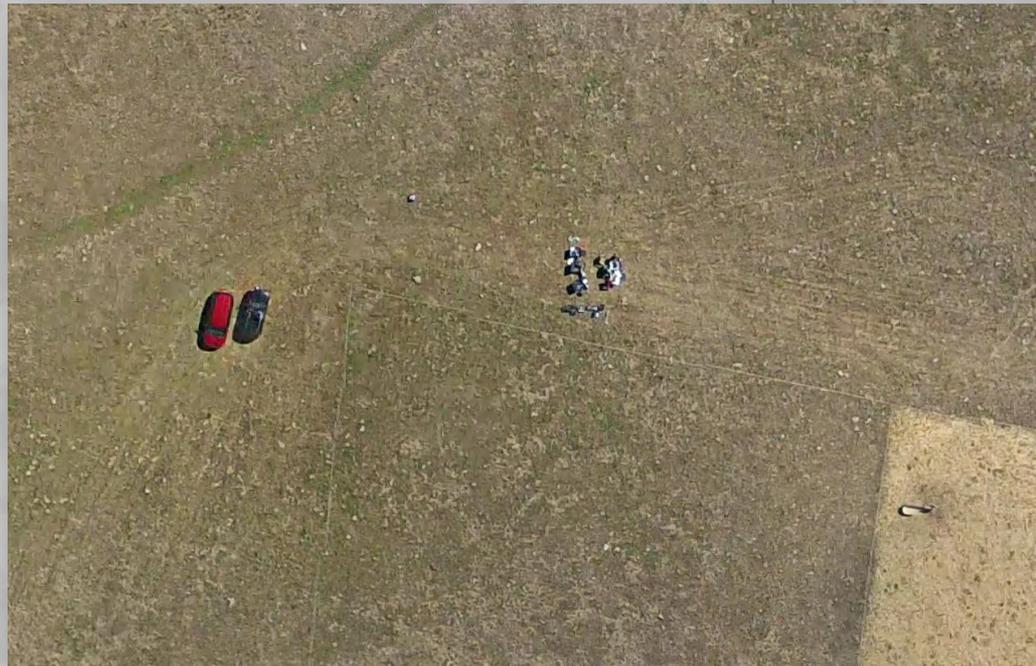
Platforms:

- Raven 4.2 lb, 36" wing span, battery powered
- T-Hawk 20 lb, 21" wide, gas powered
- High Altitude Long Endurance Systems (HALE) in collaboration with NASA, NOAA, DHS, University of Alaska



Enhancements & Investigations:

- GoPro - 1080P HD camera
- Chemical- Gas Plume Detection
- Radio Telemetry Sensor
- Electromagnetic Sensor
- Meteorological- temperature
- Synthetic Aperture Radar
- Photogrammetric Point Cloud
- Direct ingest of files into GIS



UAS Missions

Environmental

- Sandhill Crane Population Survey, CO
- Pygmy Rabbit Landscape Habitat Study, ID
- Riparian Survey John Day River, OR
- Grizzly Bear Monitoring, MT
- Elk Population Survey, MT
- Vegetation Inventory and Water Survey, MT
- Sage Grouse Inventory, CO

Public Safety

- Abandoned Mine Lands Survey, CO
- Coal Seam Fire Detection , CO, WV, MT
- Wildfire Incident Support, AZ
- Monitor Volcanic Activity, HI
- Survey Surface Mines, WV
- Flood Mapping- Missouri/Mississippi Rivers
- Levy Inspections- Mississippi River

Resource Management

- Fence Inspection, Invasive Surveys, HI
- Archeological Survey of Mohave Nat. Preserve, CA
- Environmental Survey of Palmyra Atoll, Northern Pacific Ocean

Scientific Research

- Assess Impacts of Elwha Dam Removal, WA
- Hydrographic Survey, MT
- Fire Science Research, FL
- Monitor Forest Health, CO
- Missouri River Bank Erosion Study, SD

Fire Demonstrations – Utah, Florida, Colorado, California

Raven Images: Electro-Optical & Infrared Video of Prescribed Burn

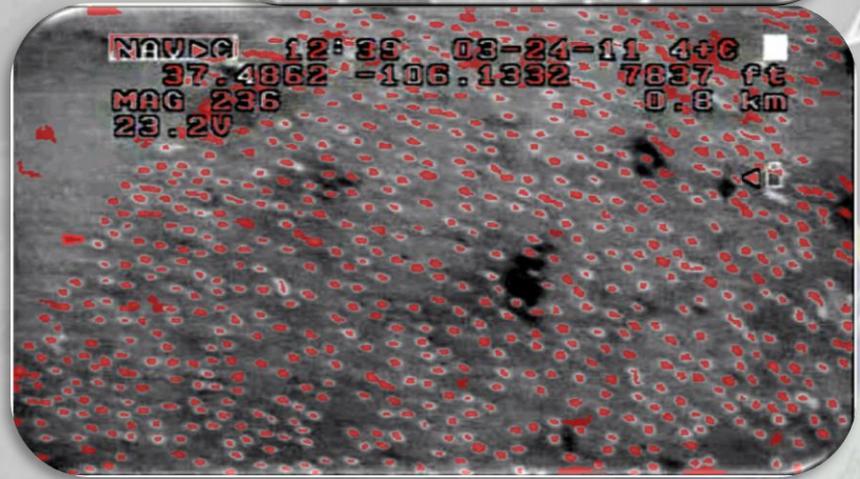
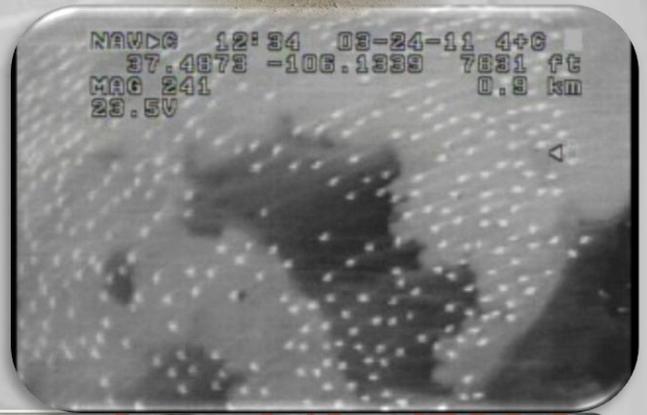


Infrared Video of Prescribed Burn

Sandhill Crane Population Count – Monte Vista National W.R.

“ALCON - this is a great example of teamwork and the power of collaboration. My hat's off to each of you for a successful mission. The work you do is not only important, it is vital to the success of the Department and the nation! Good stuff! Thanks much!”

-Joseph Ward Director DOI National Business Center



Mine Surveys – West Virginia

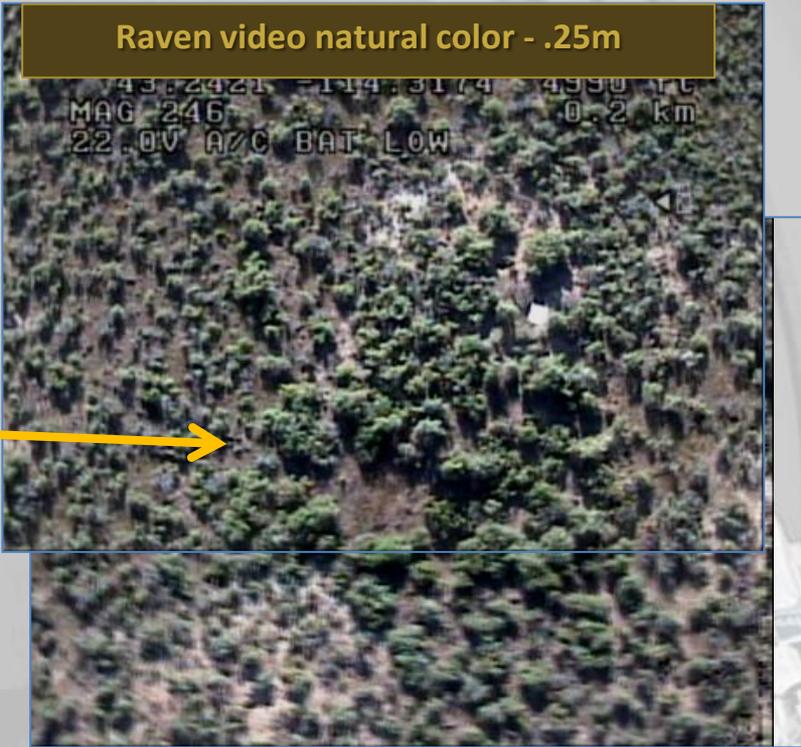
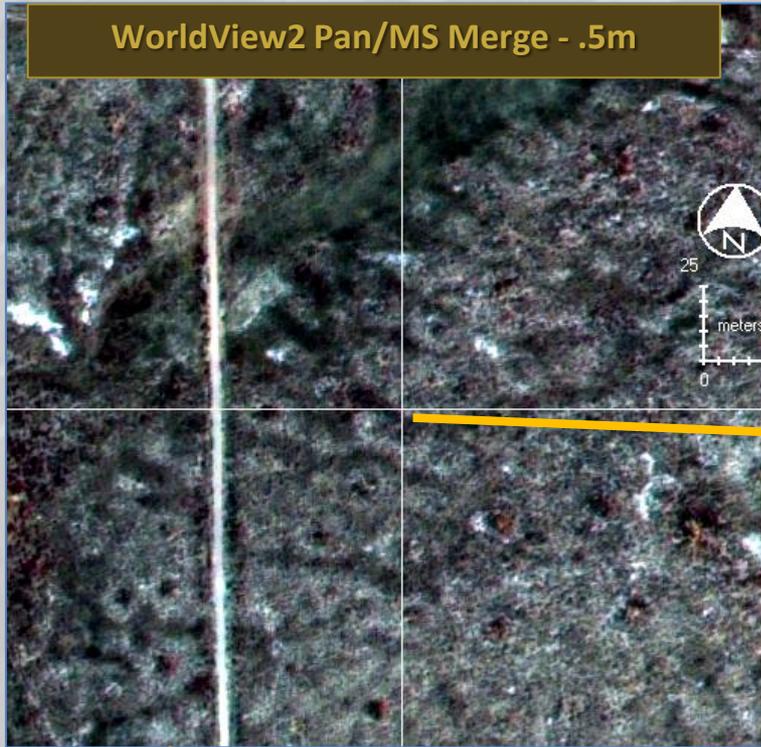


Raven Thermal IR

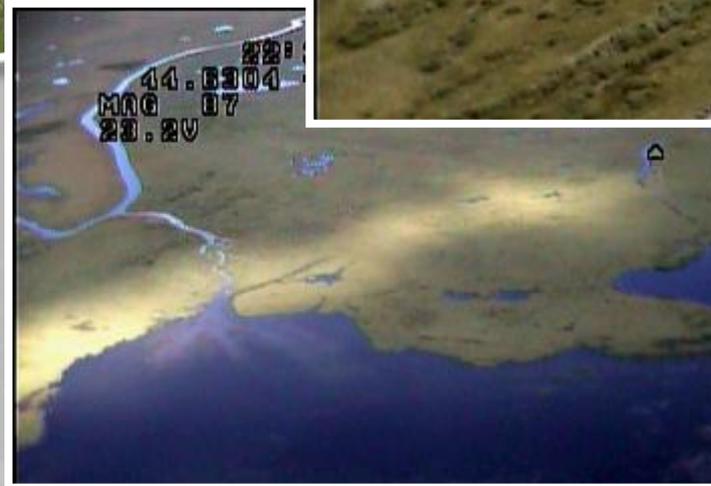


Raven video natural color

Landscape Habitats (Pygmy Rabbit)- Magic Reservoir, Idaho



Water Thermal Discharge – Red Rock Lakes, Montana



Raven Natural Color Video Capture



Raven IR Video Capture

Haleakala National Park – Maui, Hawaii



Lower Brule, South Dakota – Missouri River Erosion



Mosaic Raven Natural Color Video Capture



← 2012 Shoreline

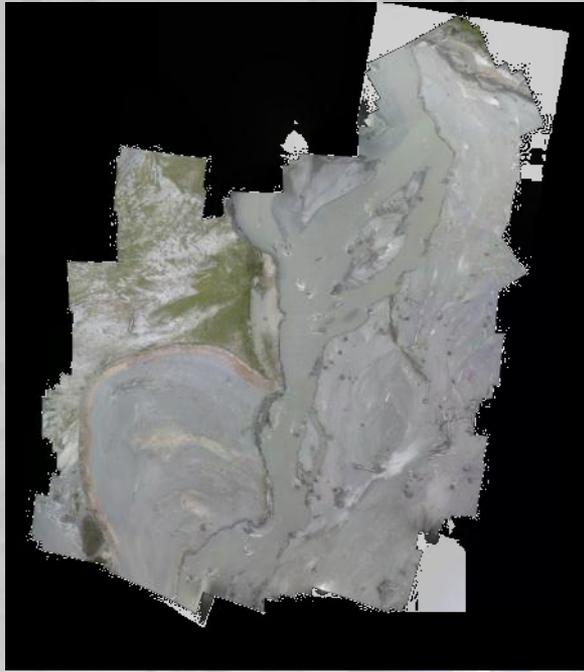
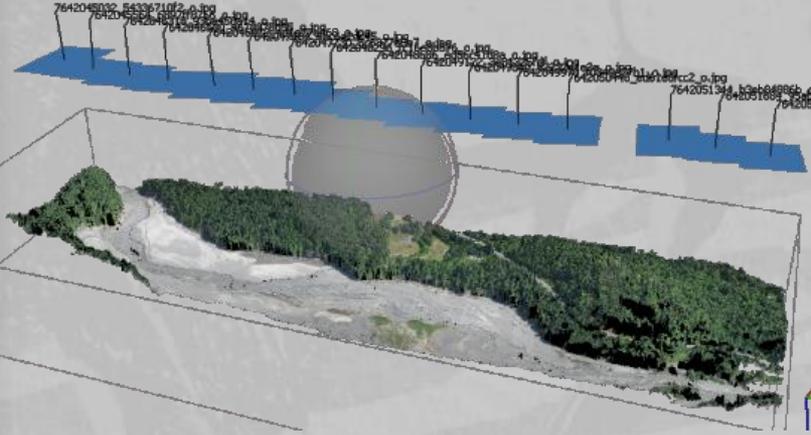
← 2004 Shoreline



Elwha Dam Removal and River Restoration – Olympic N.P. Washington



Raven Imagery over Glines Canyon Dam



Pitkin County, Colorado - AML Survey



Live Streaming of UAS Video in the Field

Laptop connected to the Remote Video Terminal



Streaming Live UAS Video on the Internet



Wireless 3G Mifi



Livestream Software

doi.gov/live

The Way Forward... Collaboration is the Key

- Improve awareness of potential applications- projects
- Pool assets and leverage resources
- Develop Standard Tasking, Processing, Exploitation & Dissemination (TPED) Procedures
- Develop Data Sharing Agreements across military, civil, private industry & academia
- Assist the FAA in collecting the data necessary to develop UAS operating plans and procedures
- Pursue enhanced relationship with contractor community

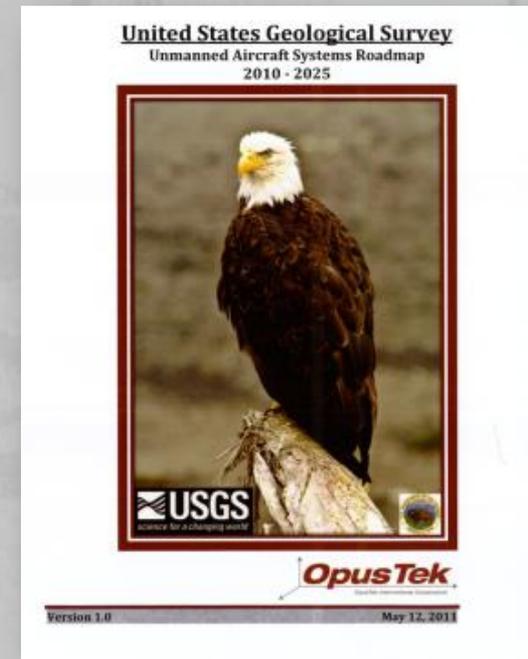


U.S. Geological Survey – UAS Roadmap

USGS has worked with many partners to develop a report that will serve as a roadmap for the development of UAS applications.

The intent of the report is to:

- Document potential future civil missions for UAS technology based on user defined requirements
- Document the technologies necessary to support those requirements
- Discuss the present state of UAS capabilities
- Identify those technologies in development and those for which no current plans exist
- Provide the foundations for development of a comprehensive civil UAS roadmap
- Will be updated in 2013
- Will serve as the foundation for 2014 USGS-DOI UAS related budget proposal



Contact Information:

Mike Hutt	(303) 236-1203	mehutt@usgs.gov
Jill Cress	(303) 236-1248	jicress@usgs.gov
Jeff Sloan	(303) 236-1308	jlsloan@usgs.gov
Susan Goplen	(303) 236-1231	segoplen@usgs.gov
Mark Bauer	(303) 236-1247	mabauer@usgs.gov
Mark Feller	(303) 236-1302	mrfeller@usgs.gov
Todd Preston	(406) 994-5034	tmpreston@usgs.gov
Bruce Quirk	(703) 648-5736	quirk@usgs.gov
David Johncox	(720) 841-3096	djohncox@usgs.gov
Tom Ricks	(208) 433-5097	thomas_ricks@nbc.gov
Brad Koeckeritz	(208) 433-5091	Bradley S Koeckeritz@nbc.gov
Harry Kieling	(907) 271-5626	harry_kieling@nbc.gov

