How the Department of the Interior is Using UAS for Conservation

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need for remote sensing data

- Satellites provide periodic observations over regional/continental areas at low spatial resolutions
- Manned aircraft can collect data over large spatial areas with a variety of sensors
- Field surveys acquire many types of information over small spatial areas
- UAS facilitate science driven remote sensing data acquisitions and compliment the other observations

Department of the Interior (DOI) manages more than one-fifth of U.S. land.
What is the DOI UAS Strategy

DOI’s UAS program strategy is tailored to the mission, funding, personnel, and infrastructure levels of the Department and is summarized as:

- **Focus on small UAS (sUAS),** which are more aligned with DOI’s decentralized mission execution strategy and more supportable by the Department’s funding, personnel and infrastructure levels.
- **Leverage available excess DOD sUAS** to minimize procurement, training, and support costs.
- **Establish partnerships** with Federal departments who possess UAS capabilities beyond DOI’s to support DOI missions that require more extensive UAS capabilities.
- **Conduct operational tests and evaluations** of various UAS technologies to support the development of long-range UAS requirements and strategy for the DOI UAS activities.
- **Based on the requirements and strategy developed above,** **procure (buy or contract) for UAS capabilities** that cannot be met either through excess DOD sUAS or those available through partnerships with other Federal agencies.
USGS National UAS Project Office

Supports the technology transfer of UAS capabilities to enhance the informed decision making across the Department

- Established in 2008
- Collaborates on operational test and evaluation missions with other DOI bureaus and Office of Aviation Services (OAS)
- Evaluates emerging technologies
- Develops new products and capabilities
- USGS UAS Roadmap 2014

http://uas.usgs.gov/
Boundary/Fenceline Inspections
Haleakala National Park, Maui

Infrastructure inspections maintaining 65 miles of fence line to exclude pigs, axis deer, predatory mammals, and invertebrate threats to the native resources
Abandoned Material Inventory
Mojave National Preserve, California

Geo-locating abandoned materials and Joshua Tree mapping
Pleistocene Trackway Mapping
White Sands National Monument, NM

Photogrammetric documentation using a UAS to aerial survey extremely fragile fossilized footprints from the late Ice Age.
Census of Ground-nesting Colonial Water Birds
Chase Lake National Wildlife Refuge, ND

Using UAS to aerial survey American White Pelicans, Double Crested Cormorants, Gulls and other ground nesting water birds.

Other applications included landscape change and power line surveys for bird strike detection.
Abundance Estimates of Ice Associated Seals: Bering Sea Populations that Inhabit the Chukchi Sea

Using visible and Infrared imaging conduct ice seal surveys & monitor haulouts

Courtesy Carol Fairfield
Geospatial Data Products

- Color Infrared - NDVI
- Point Cloud Generation
- Elevation Models
- Feature Extraction
- KML – 3D Modeling
- Orthophotography
- Volumetric Measurements
- Contour Generation
The tangible benefits can be summed up as: Science, Safety, and Savings

Science
• UAS are far less disruptive to sensitive animal species than manned aircraft. They carry high tech sensors and possess the ability to transmit real-time data that can also be recorded for future analysis. These unique characteristics enable UAS to gather repeatable, scientifically valid observations.

Safety
• DOI missions often expose personnel to significant safety hazards. From 1937 to 2000, 66% of all field biologist fatalities in DOI were aviation-related.

Savings
• The cost to operate sUAS is less than 10 percent of the cost to operate manned aircraft. FWS and USGS estimated the Sandhill Crane UAS mission costs at $2,500. Estimates to fly a similarly equipped manned aircraft were over $25,000.

Technology (sensor & aircraft) is constantly changing, moving to lighter, smaller, less power

Issues - FAA and regulation, data volumes & processing, data integration, data management, ...

UAS will be a standard piece of field equipment for scientists