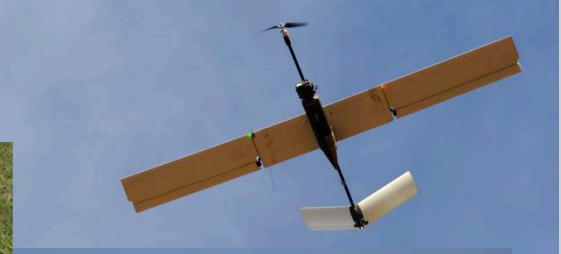


How the Department of the Interior is Using UAS for Conservation



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Department of the Interior
U.S. Geological Survey

October 29, 2015

The infographic on the left displays the altitudes of various aircraft and satellites relative to the Earth's surface. The altitudes are as follows:

| Vehicle | Altitude |
|---------------|--------------------|
| GOES | 35,800 km |
| Landsat 8 | 705 km |
| edge of space | 100 km ~330,000 ft |
| Global Hawk | 66,000 ft |
| Predator B | 45,000 ft |
| Predator A | 25,000 ft |
| ScanEagle | 16,000 ft |
| Raven | 1,000 ft |

The infographic also includes the USGS and n2c2 logos at the bottom.

The map on the right shows the Department of the Interior (DOI) managing more than one-fifth of U.S. land. The map is color-coded to show different land management areas, including National Forests, National Monuments, and National Wildlife Refuges. A legend in the bottom right corner provides details on the color coding and land management areas.

- 

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



Boundary/Fenceline Inspections

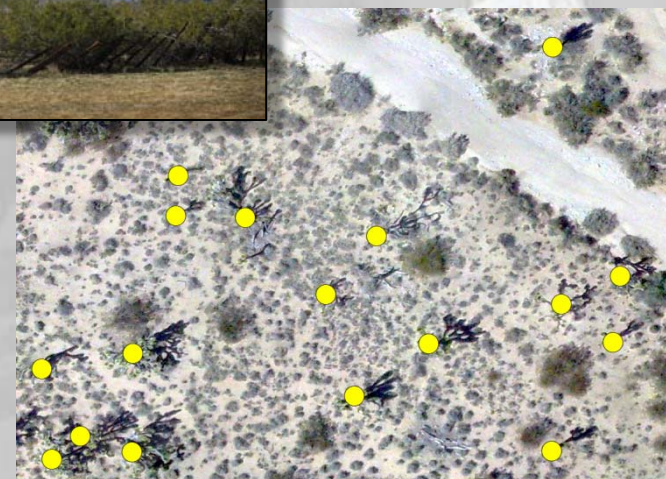
Haleakala National Park, Maui

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

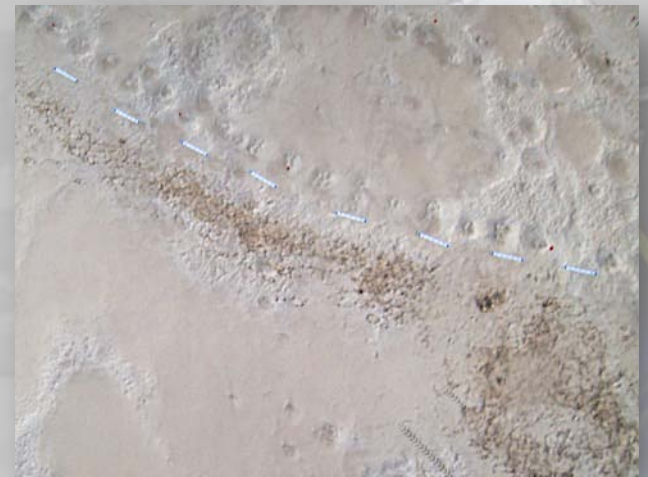


Pleistocene Trackway Mapping

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

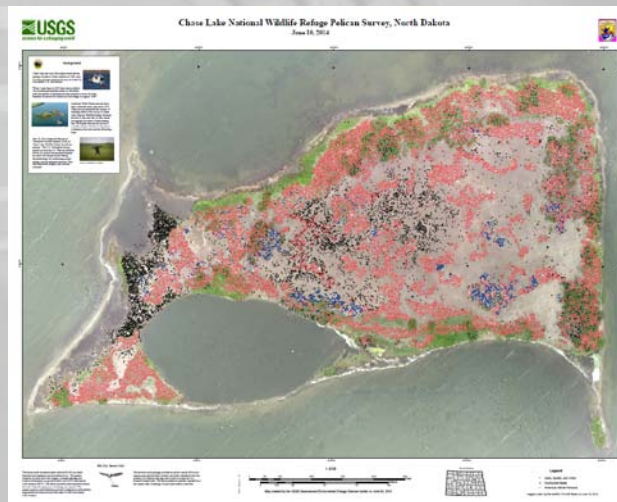
Chase Lake National Wildlife Refuge, ND



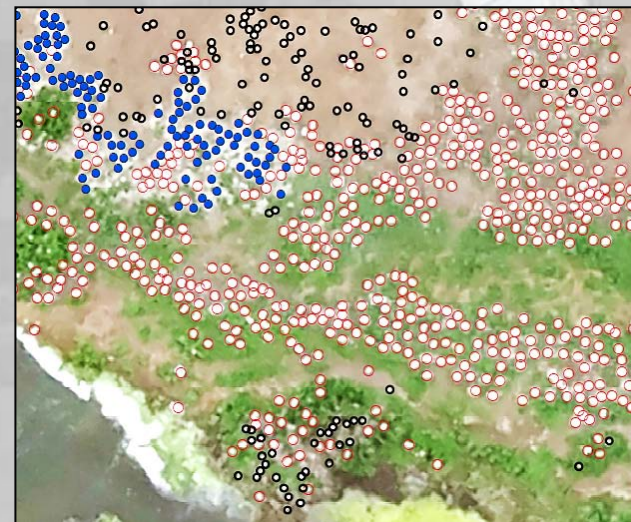
Using UAS to aerial survey American White Pelicans, Double Crested Cormorants, Gulls and other ground nesting water birds.



Monitoring Habitat Change



Other applications included landscape change and power line surveys for bird strike detection.

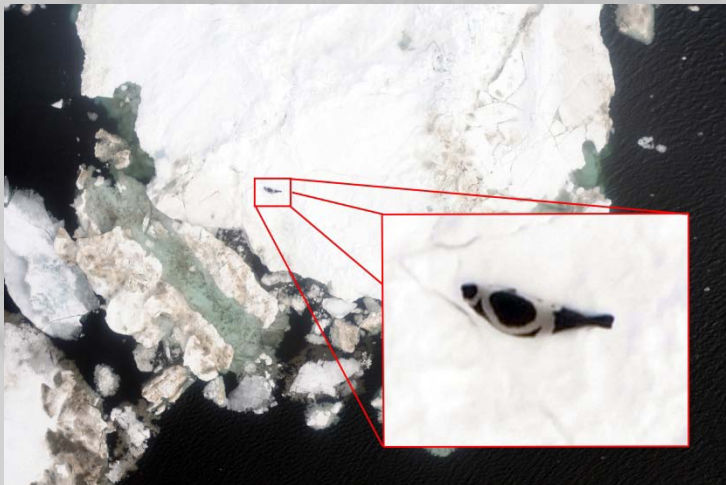
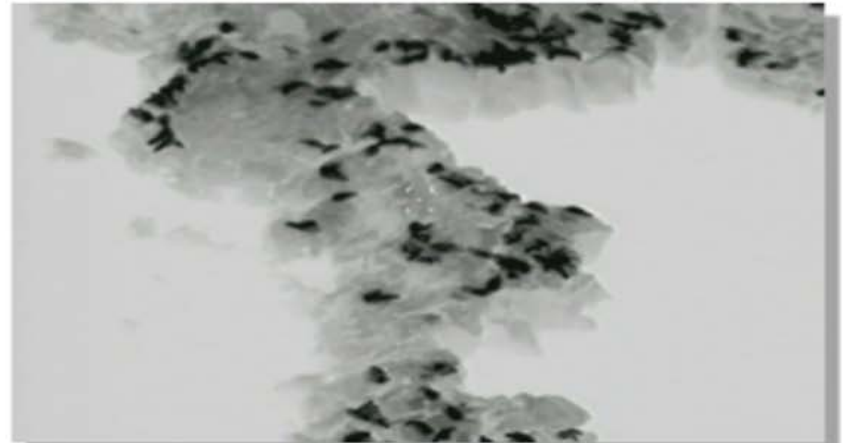


Archie Carr National Wildlife Refuge – Nesting Sea Turtle Tracks



Burgess, et al 2015

Abundance Estimates of Ice Associated Seals: Bering Sea Populations that Inhabit the Chukchi Sea

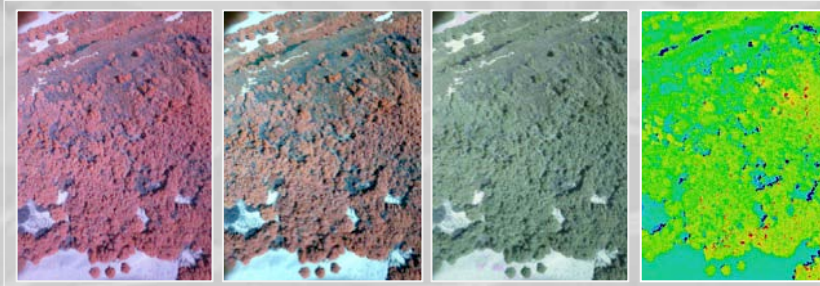


Using visible and Infrared imaging
conduct ice seal surveys &
monitor haulouts

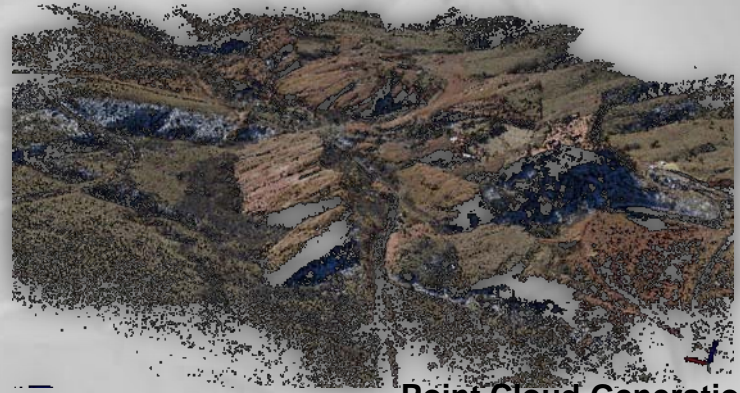
Courtesy Carol Fairfield



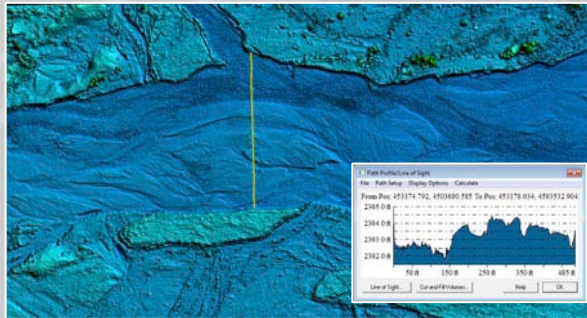
Geospatial Data Products



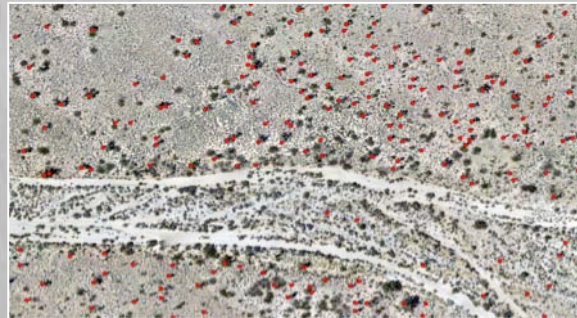
Color Infrared - NDVI



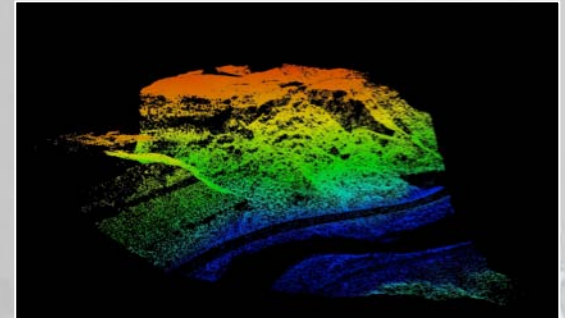
Point Cloud Generation



Elevation Models



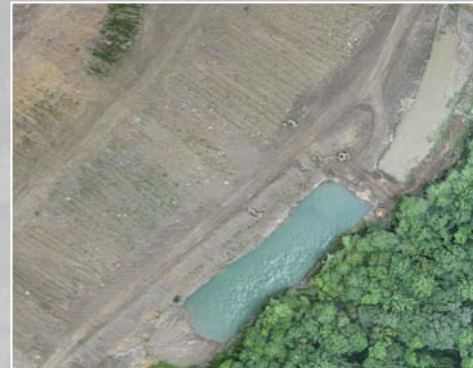
Feature Extraction



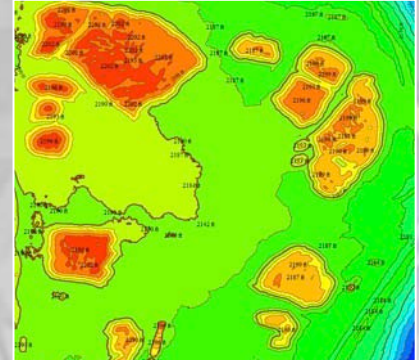
Volumetric Measurements



KML - 3D Modeling



Orthophotography



Contour Generation

Summary

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.**

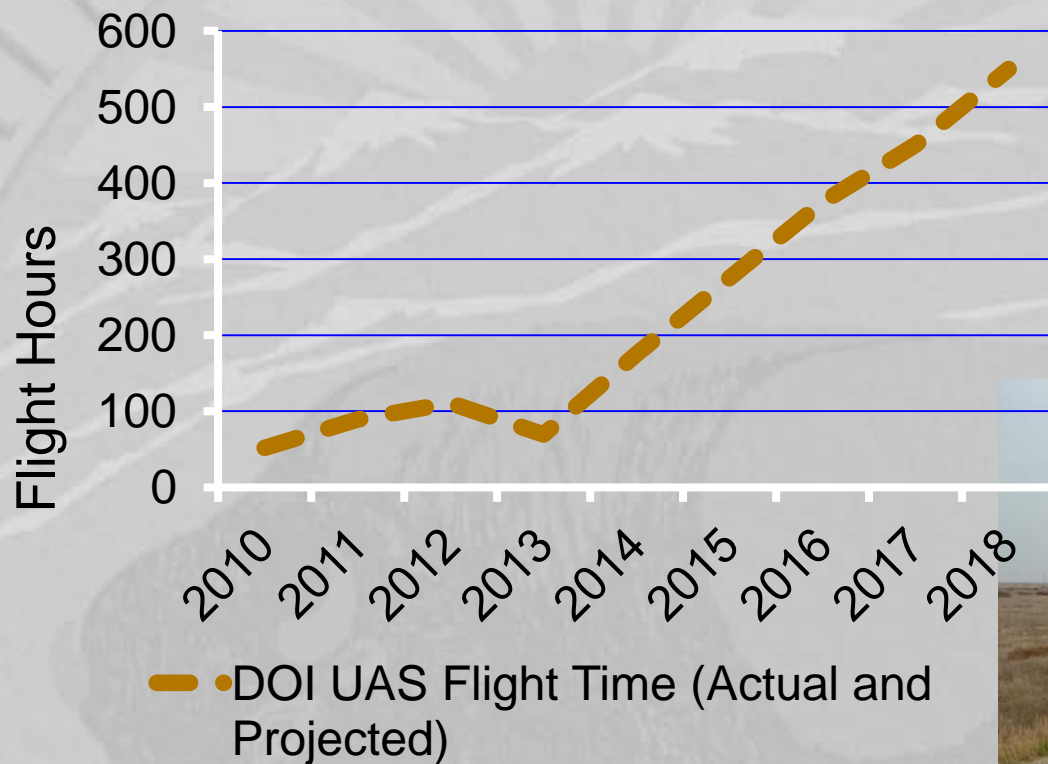
Savings

- **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, ...

Questions?



Website: <http://uas.usgs.gov/>

Kern NWR 2013