

A large green circle containing the text for the Chicago Wilderness Cafe logo. The date '3.2.2022' is at the top, followed by 'CHICAGO WILDERNESS' in a sans-serif font, 'Cafe' in a large script font, and a tagline at the bottom. The background of the entire image is a photograph of a wetland with yellow wildflowers in the foreground and a pond in the background.

3.2.2022

CHICAGO WILDERNESS

Cafe

• DIVERSE VOICES •
GREEN VISION • UNITED REGION

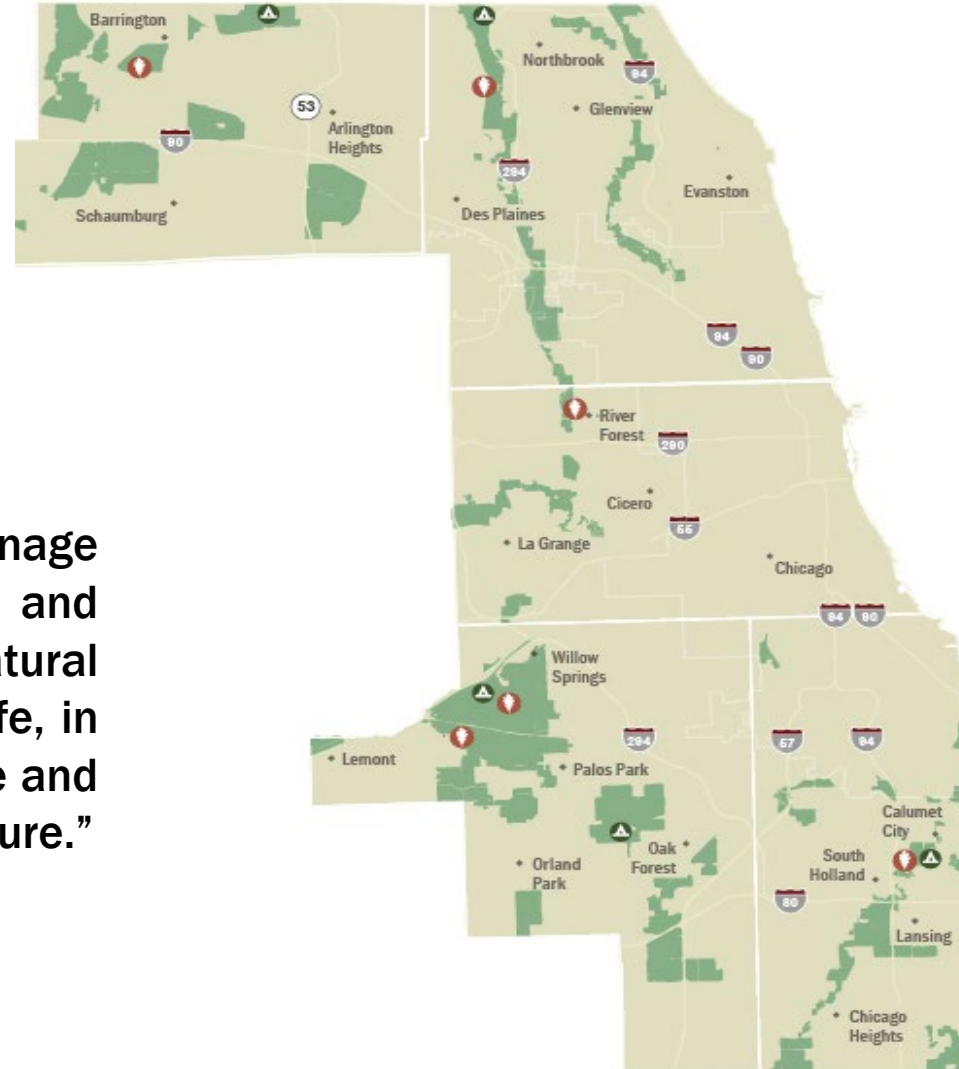


Drones and Public Lands



FOREST PRESERVES OF COOK COUNTY

Our Mission: “to acquire, restore and manage lands for the purpose of protecting and preserving public open space with its natural wonders... with all of its associated wildlife, in a natural state for the education, pleasure and recreation of the public now and in the future.”



What Are UAVs

Unmanned aerial vehicle systems (UAVs) are comprised of an unmanned aircraft and the equipment needed to control it remotely. Commonly known as “drones.”



The Many Uses of Drones

Recreational Use



Commercial Use



Military & Law Enforcement Use



Research & Planning Use



Regulations

Federal Regulator: Federal Aviation Administration (“FAA”)

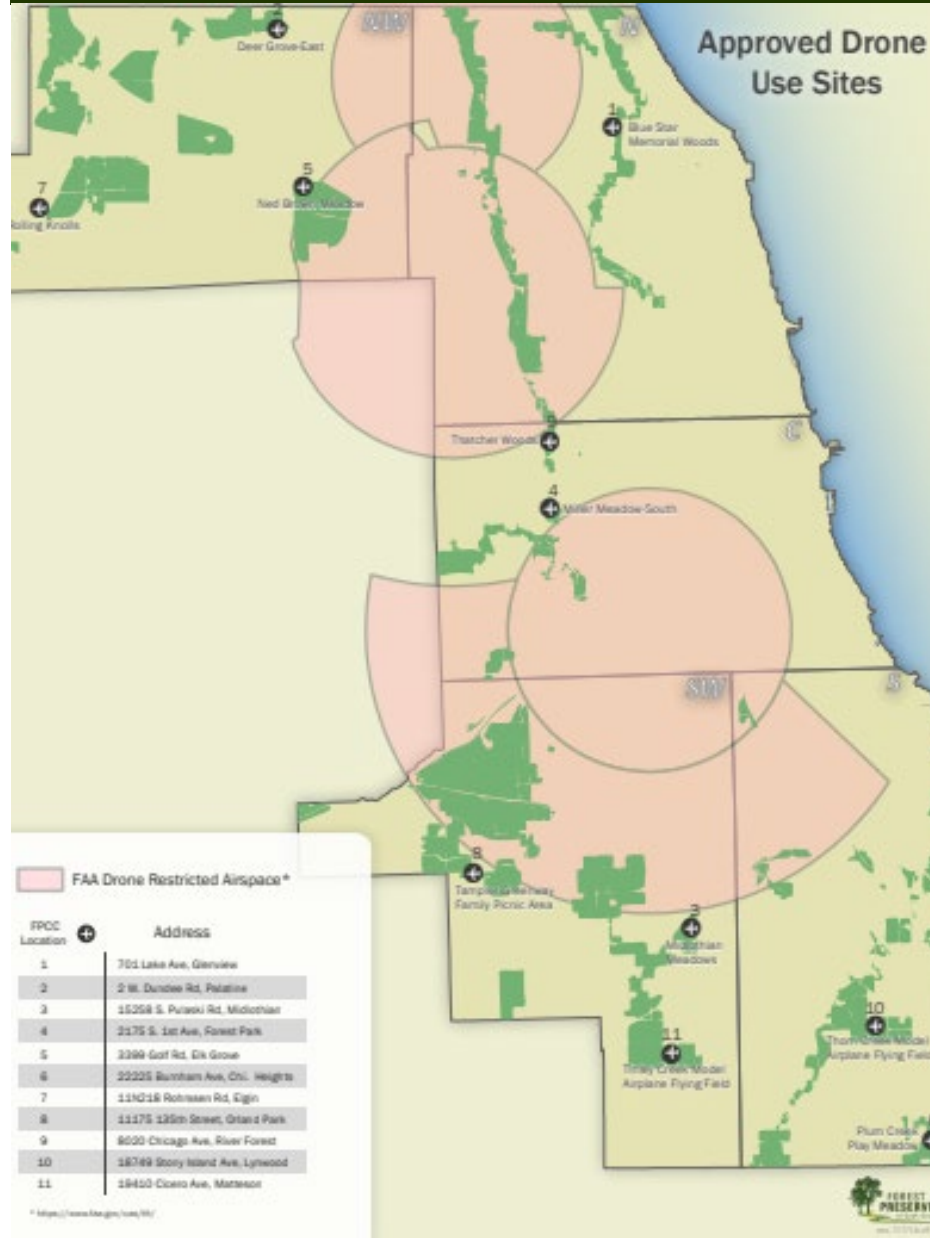
Other Regulators: State & Local Agencies

FAA Recreational Rules	FAA Non-Recreational Rules
Register & Label Drone	Register & Label Drone
Visual Line of Site	Become an FAA-certified drone pilot by passing the Part 107 Knowledge Test and obtaining your Remote Pilot Certificate
Pass the Recreational UAS Safety Test (TRUST)	
No Interference with Manned Aircrafts	
Fly at or below 400 Feet in Uncontrolled Airspace	Obtain Part 107 waiver(s), if needed
Night operations will require the aircraft to be equipped with functioning lighting visible for at least 3 statute miles.	
Allow routine operations over people .	

Forest Preserves of Cook County Public Position

- 1. FAA regulates the nations airspace.**
- 2. FPCC regulates who & what goes on & off its property.**
- 3. FPCC Drone Usage Policy for the General Public**
- 4. Goals:**
 - **Protect Nature/Wildlife**
 - **Safety & The Visitor Experience**
 - **Promote Appropriate Usage While in Nature**
 - **Reduce Inappropriate Usage While in Nature**
- 5. The FPCC has 12 authorized site locations for Drones to land from and/or take off its property.**

Recreation in the Natural World



Protect Nature & Wildlife

1. Endangered & Threatened Species

2. Chicago & Birds

3. Light Pollution & Dark Skies

ENDANGERED SPECIES



HINES EMERALD DRAGONFLY



BALD EAGLE



BLANDING'S TURTLE



BLACK CROWNED NIGHT HERON



RIVER OTTER

Endangered Species Act Penalties

ENDANGERED SPECIES ACT PENALTY SCHEDULE

16 U.S.C. §1531 *et seq.*

VIOLATION	VIOLATION HISTORY - PENALTY AMOUNT		
	FIRST	SECOND	THIRD
A. Taking			
Kill	\$3,500 - Statutory Maximum	\$7,500 - Statutory Maximum	\$13,000 - Statutory Maximum
Wound/Injure/Hunt/Capture	\$2,000 - Statutory Maximum	\$4,500 - Statutory Maximum	\$10,000 - Statutory Maximum
Taking via Significant Habitat Modification or Degradation	Penalties to fit the facts and circumstances of a particular case up to the statutory maximum.	Penalties to fit the facts and circumstances of a particular case up to the statutory maximum.	Penalties to fit the facts and circumstances of a particular case up to the statutory maximum
Harass	\$1,000 - \$10,500	\$2,000 - Statutory Maximum	\$7,500 - Statutory Maximum
Collect parts	\$500 - \$2,000	\$1,000 - \$5,500	\$2,000 - \$10,500
B. Transportation and Transactions			

Protecting Wildlife

To minimize negative impacts of drones on animals, studies have recommended some of the following codes of practices:

- 1. Anyone using drones should exercise caution to minimize disturbance of wildlife, particularly where endangered species or ecologically sensitive habitats are involved.**
- 2. Utilize drones with low noise production and size.**
- 3. Avoid moving directly toward the animal as it may mimic a predator's movements.**
- 4. Cease flying if animal become excessively disturbed.**
- 5. When conducting studies around animals with drones, the exact flight practices such as altitude and distance from animals and the responses of the animals should be reported as part of the study to assist future research and regulations.**

Reduce Inappropriate Usage While In Nature

yahoo!news

Los Angeles Times

A generation of seabirds was wiped out by a drone in O.C. Scientists fear for their future



Alex Wigglesworth

June 7, 2021 · 7 min read



As many as 2,000 elegant tern eggs were abandoned on a nesting island at Bolsa Chica Ecological Reserve in Huntington Beach after a drone crashed, scaring off the would-be parents. (California Department of Fish and Wildlife)

NEWS

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SCIENCE & NATURE

Chicago is Most Dangerous City for Migratory Birds, Study Finds

Alex Ruppenthal | April 4, 2019 4:09 pm



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you continue to the use of the website, we assume that you are okay with it.

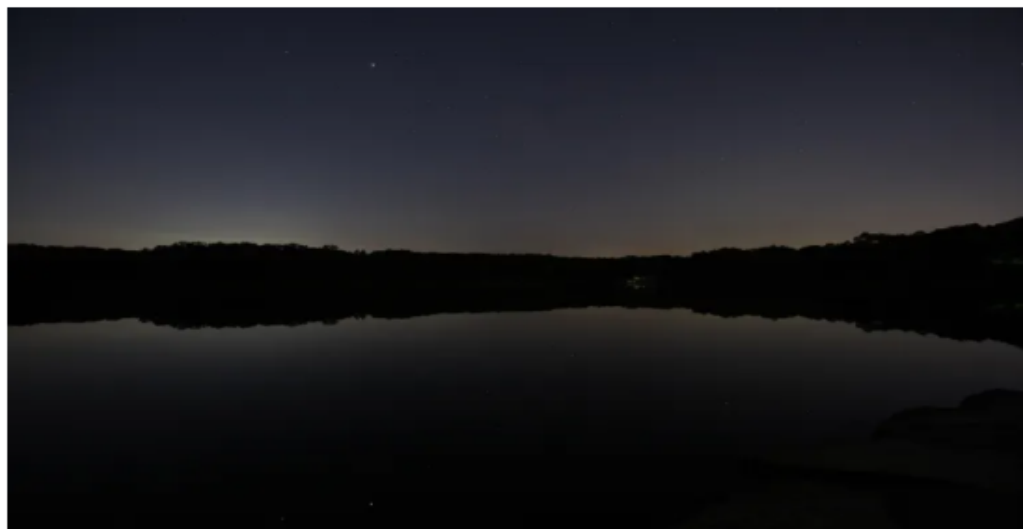
Reduce
Inappropriate
Usage While In
Nature





Star watchers, rejoice: Palos Preserves named largest Urban Night Sky Place in the world

By FOX 32 Digital Staff | Published August 25, 2021 | Palos Hills | FOX 32 Chicago



PALOS HILLS, Illinois - Under the bright lights of [Chicago](#), you can barely see any stars. But just 23 miles away in [Palos Preserves](#), the sky is so dark, the forest preserve has been designated the largest Urban Night Sky Place in the world.

About four times as many stars are visible over the forest preserve than you can see from Chicago, said the Adler Planetarium.

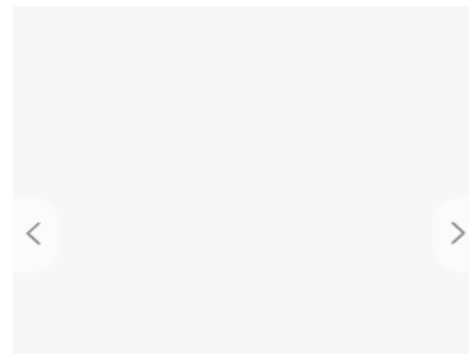


"How many vacation days do I have left?"

Get easy PTO reports



Hey check out these, shows



Safety & The Visitor Experience

1. Safety For Families & Visitors

2. Protect the Visitor Experience



Reduce
Inappropriate
Usage While In
Nature



Reduce Inappropriate Usage While In Nature



Advertisement

World

This was published 6 years ago

Sex offender flies drone with camera over North Carolina State Fair

Updated October 23, 2015 – 6.13am, first published at 6.02am

🔖 Save | ➦ Share | [A](#) [A](#) [A](#)

Raleigh, NC: Authorities in North Carolina have arrested a registered sex offender accused of flying a drone with a camera attached over the State Fair.

**Promote
Appropriate
Usage While in
Nature**

1. Know where and when to fly

2. Protect Wildlife & the Environment

3. Fly Safely, Stay in Control

**4. Follow Federal Aviation
Administration (FAA) guidelines**

How does the Forest Preserves use drones?

- 1. Restoration monitoring**
- 2. Prescribed burn training**
- 3. Construction Updates**
- 4. Plant health**
- 5. Adhoc Elevation data**

What we fly

DJI Matrice 100

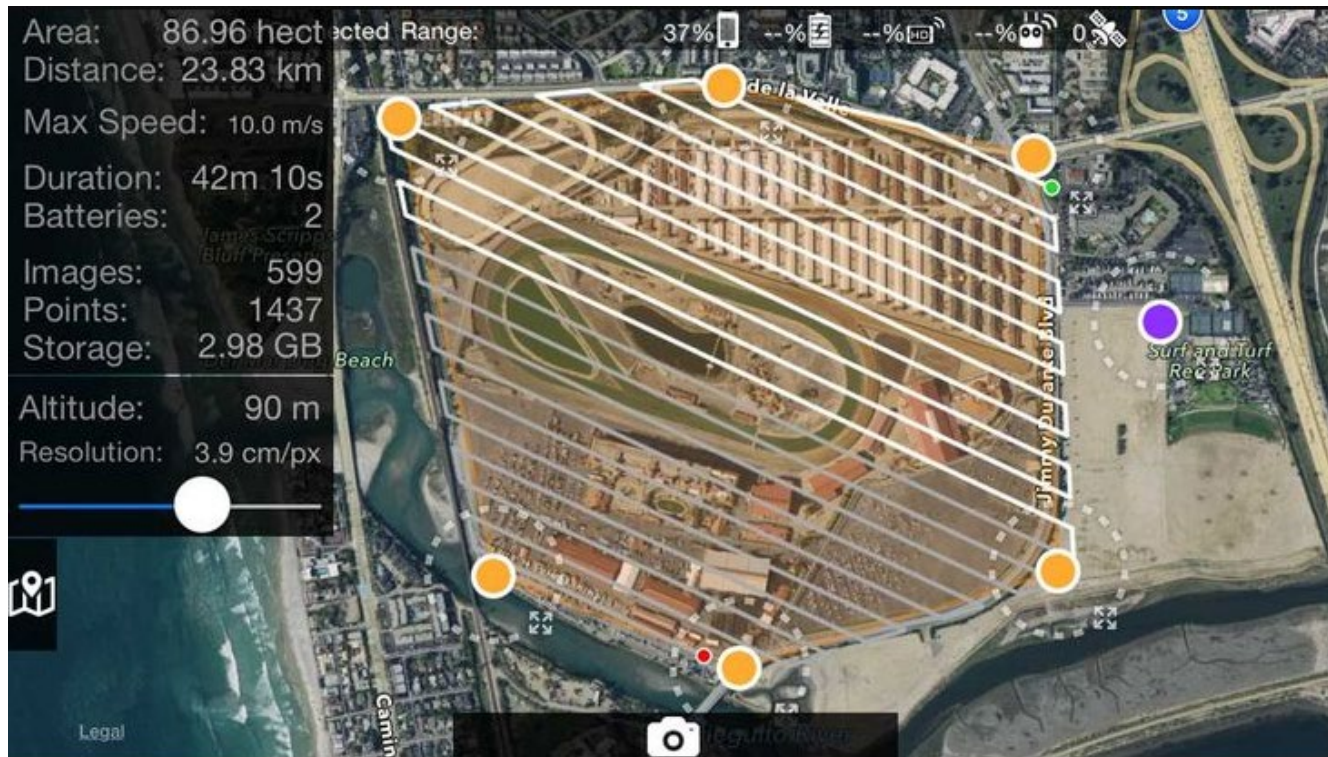


Parrot Sequoia Multi-Spectral Camera



Flight Control

IPad flight plan interface



Controls:

- Area to be flown
- Altitude
- Speed
- Image overlap
- Take-off / Landing area
- Battery Changes

Data Collection

Parrot Sequoia Camera

Details:

4 Band multi-spectral camera w/ RGB

- RGB – Full color image – 16MP
 - Green (550nm $\pm$ 40nm) – 1.2MP
 - Red (660nm $\pm$ 40nm)
 - Red edge (735nm $\pm$ 10nm)
 - Near infrared (790nm $\pm$ 40nm)
-
- Provides absolute reflectance measurements without the need for radiometric calibration.



Restoration Monitoring



Prescribed Burn Training



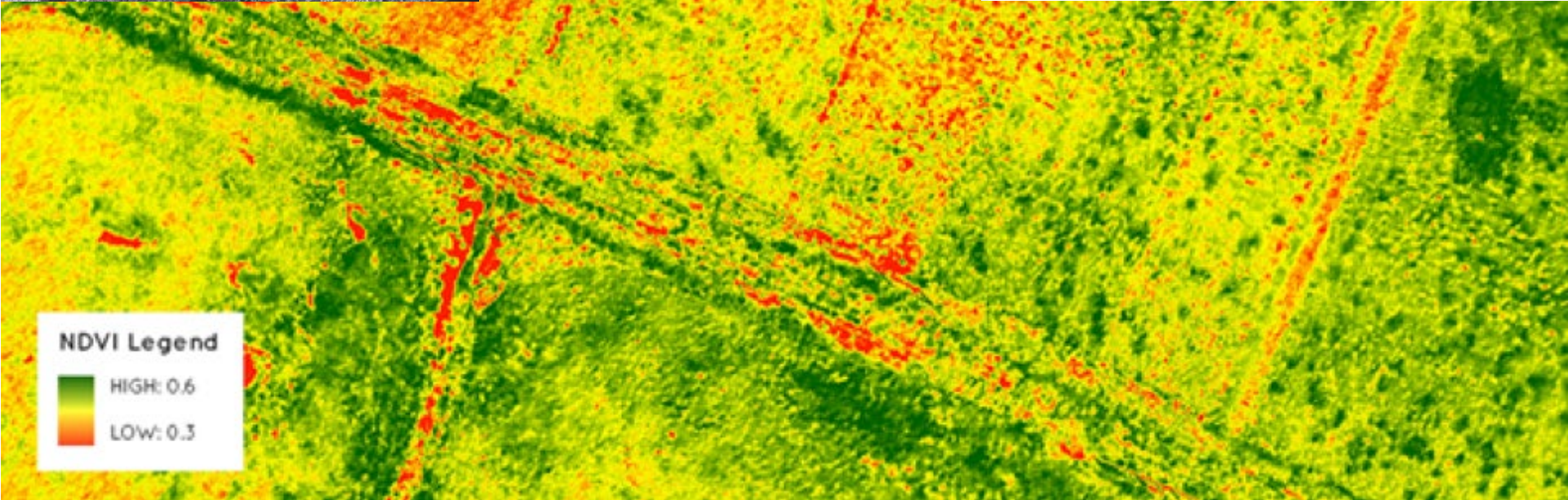
Construction Updates



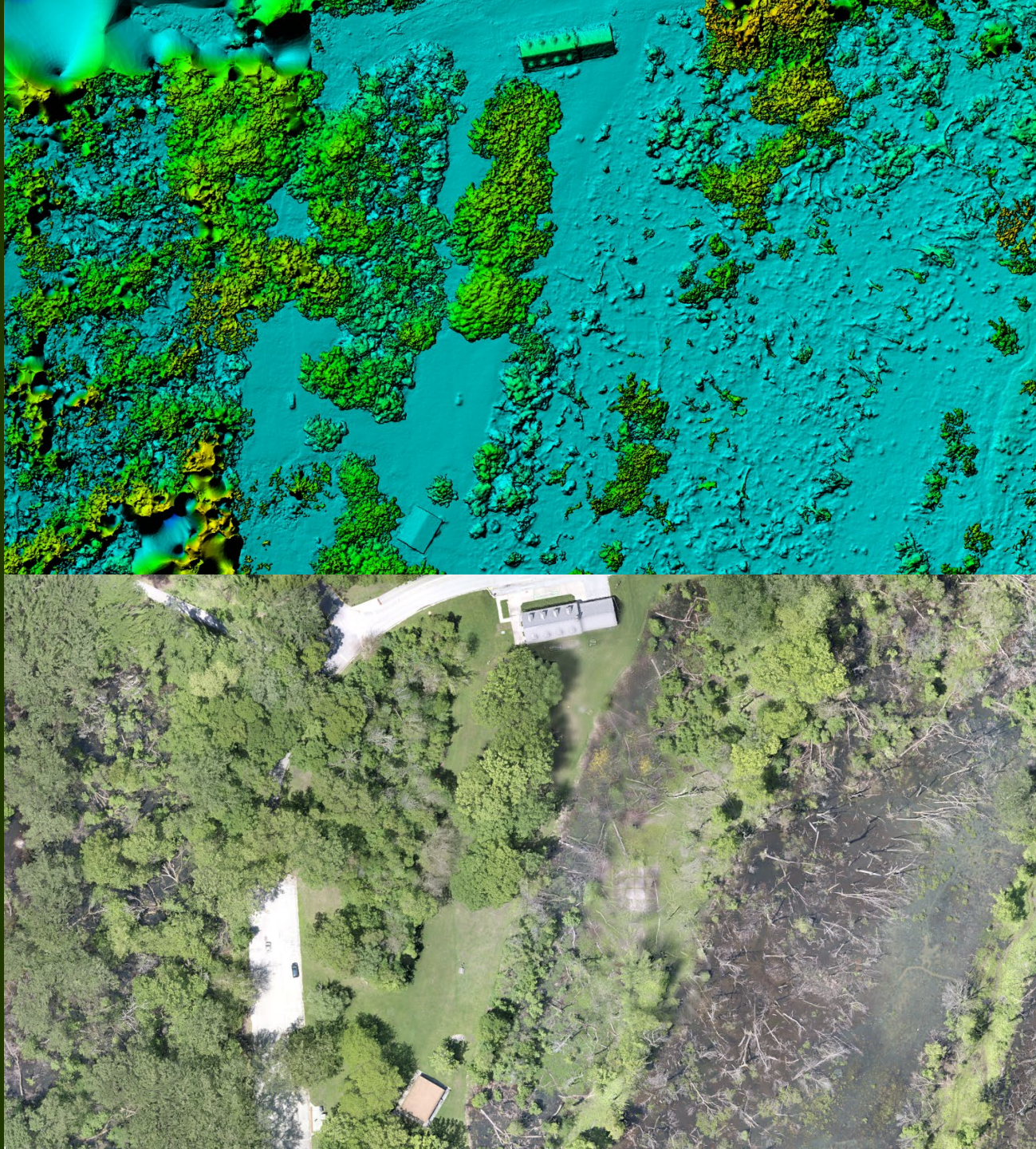
Plant Health



```
NDVI_COLORMAP="004000 008000 00B000 00FF00 00FF00 FFF000 FFC000 FF8000 FF0000 EE0000 DD0000 CC0000 BB0000 AA0000 900000 800000 700000"  
NIR_INPUT=IMG_171024_183605_0000_NIR.jpg  
NIR_OUTPUT=nir_output.tif  
RED_INPUT=IMG_171024_183605_0000_RED.jpg  
RED_OUTPUT=red_output.tif  
NDVI_IMAGE=new_ndvi.tif  
NDVI_COLOR=ndvi_color.tif  
  
python write_colormap_file.py "$NDVI_COLORMAP" custom.txt  
  
echo "NIR input: $NIR_INPUT"  
echo "Creating NIR part of the NDVI color image for red filtered image..."  
gdal_calc.py --calc="A" --A_band=1 --type=Float32 -A $NIR_INPUT --outfile  
echo "NIR output: $NIR_OUTPUT"  
  
echo "Red input: $RED_INPUT"  
echo "Creating VIS part of the NDVI color image for red filtered image..."  
gdal_calc.py --calc="A" --A_band=1 --type=Float32 -A $RED_INPUT --outfile  
echo "Red output: $RED_OUTPUT"  
  
echo "Doing the image math to create the NDVI image."  
gdal_calc.py --calc="((A-B)/(A+B))" --type=Float32 -A $NIR_OUTPUT -B $RED_OUTPUT --outfile $NDVI_IMAGE --overwrite --NoDataValue=1.001  
  
echo "Color mapping the NDVI image."  
# this one creates the version with the alpha channel. It gets up uploaded.  
qdsiden color-relief $NDVI_IMAGE custom.txt $NDVI_COLOR -alpha  
echo "Final output: $NDVI_COLOR"
```



Elevation



A close-up photograph of several purple thistle flowers. The central flower is in sharp focus, showing its intricate, spiky petals. Other flowers are visible in the background, slightly out of focus. The background is a soft, greenish-yellow blur.

Thank you

fpdcc.com

National Park Service

Unmanned Aircraft Systems

Chicago Wilderness Café Series

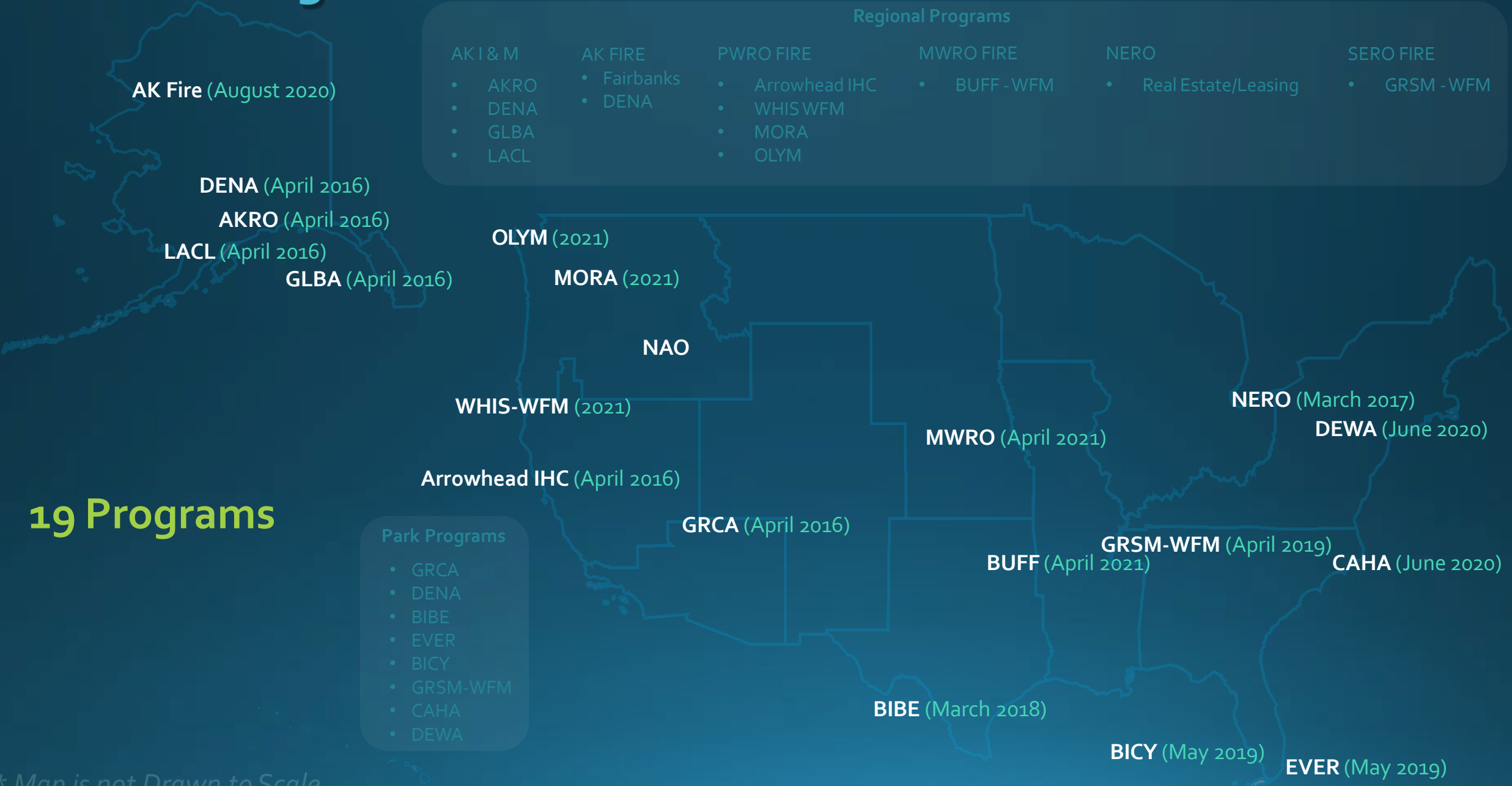
Science and Natural Resource Management Use Cases, Planning and Policy

Kristin Swoboda

National Park Service
Fixed Wing Fleet Specialist
UAS Program Manager
National Aviation Office
Boise, Idaho
February 2022



NPS UAS Programs

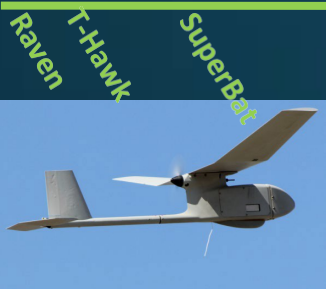


* Map is not Drawn to Scale

Science and Resource Management Use Cases

Unmanned Aircraft Systems: DOI History

DOI Current



Aeroenvironment RQ-11
Raven A



Honeywell T-Hawk RQ-16B



MLB SuperBat



Pulse Vapor 55 TM Helicopter



Falcon Hover



Falcon Fixed Wing

3DR Solo



3DR Solo

Phased Out Systems

Birdseye Firefly

Parrot Anafi

Autel Evo

Yuneec

DJI Mavic

DJI 600



Parrot Anafi



Autel Evo



Birdseye Firefly6 Pro/S



DJI Mavic Pro



DJI Matrice 600 (M600)



Yuneec H520-G

Science and Resource Management Use Cases

Sensors/Cameras:



LiDAR YellowScan



LiDAR Velodyne



FLIR DUO Series with Natural Color



FLIR TAU Radiometric Series



MicaSense 5 Band Multispectral



Natural Color Cameras

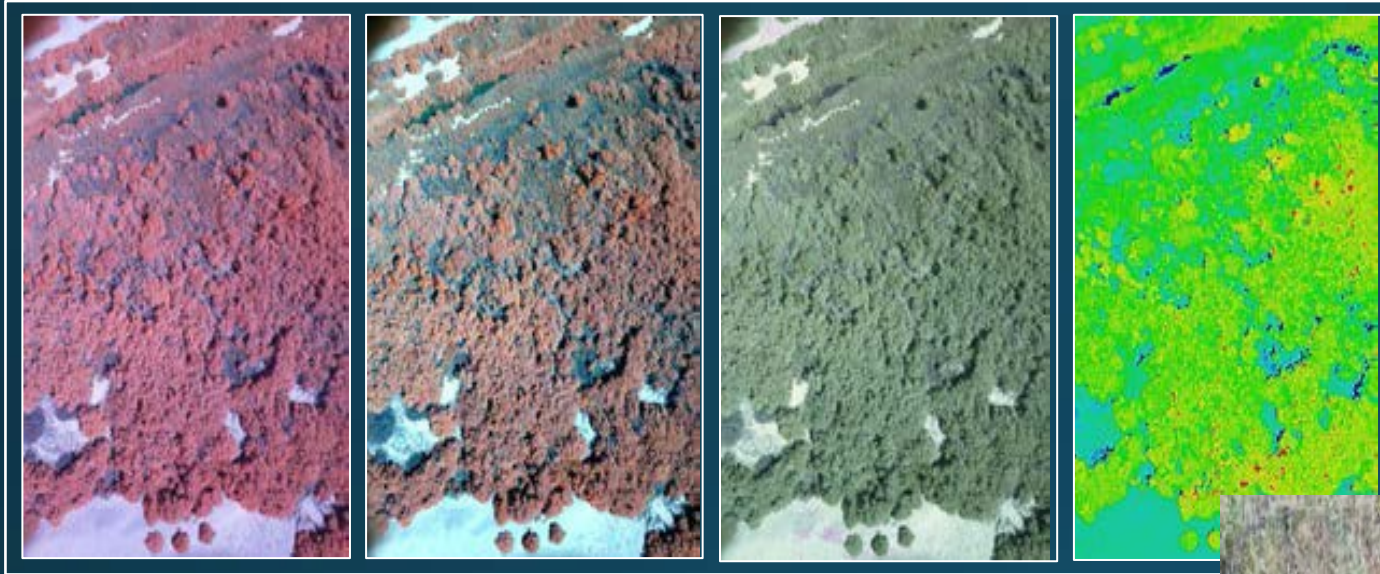


MicaSense 10 Band Multispectral



Science and Resource Management Use Cases

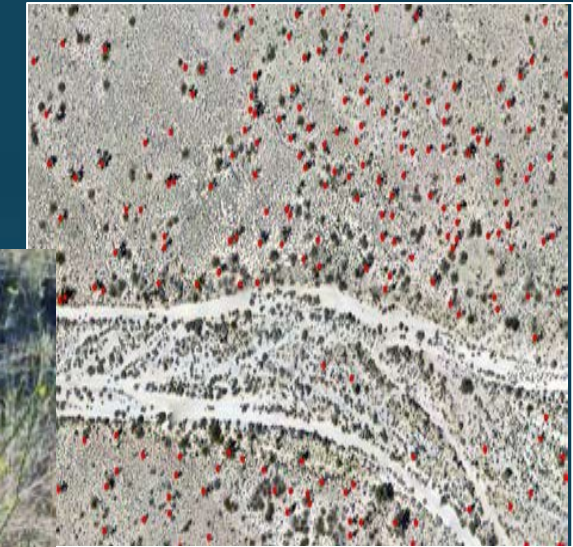
Vegetation Surveys:



Color Infrared Camera – NDVI (Normalized Difference Vegetation Index)

Vegetation:

- Types
- Species
- Composition
- Coverage



Natural Color Camera
Desert Vegetation - Feature Extraction

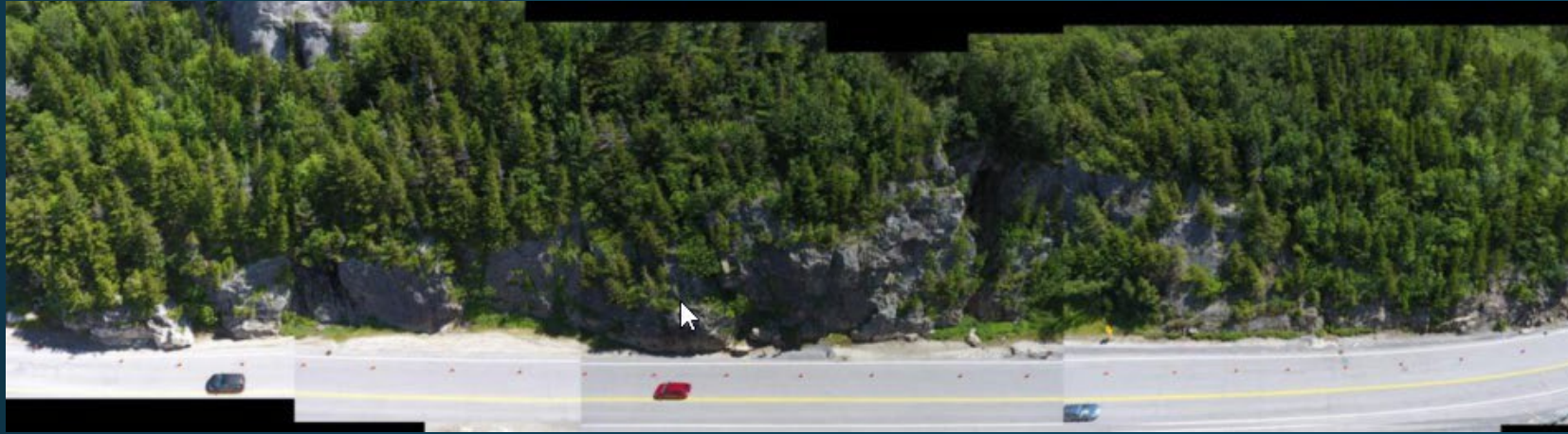
- Species Counts
- Invasive Species Mapping



Science and Resource Management Use Cases

Slope Stability Analysis: Rockfall

Collected Photos



Point Cloud Data



Rockfall Formations:

- Hazards to the Public
- Road Systems
- Rocks to be Pinned or Blasted



Science and Resource Management Use Cases

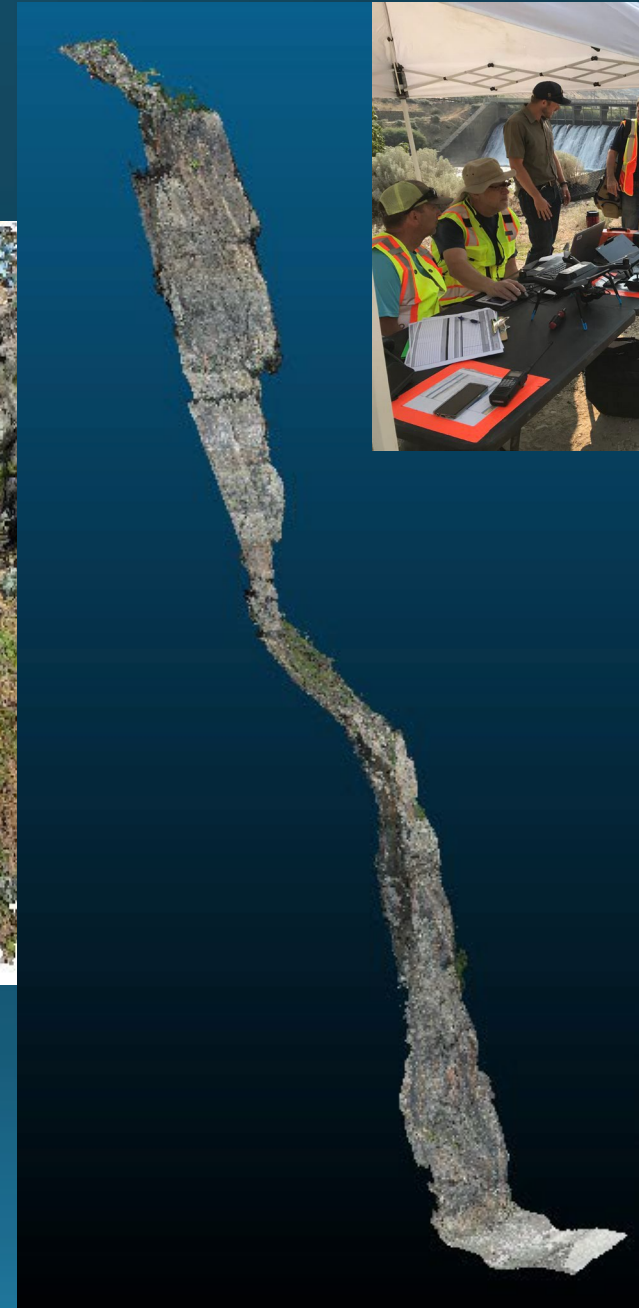
Change Detection - Erosion Landslide Analysis

Profile

Profile



- Hazards to Infrastructure
- Hazards to Diversion Dam Workers
- Monitoring over Time



Science and Resource Management Use Cases

Bird Surveys:



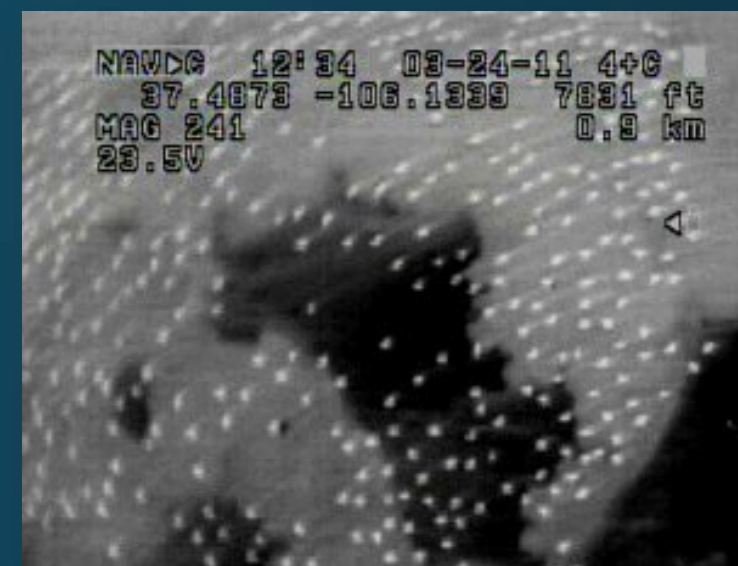
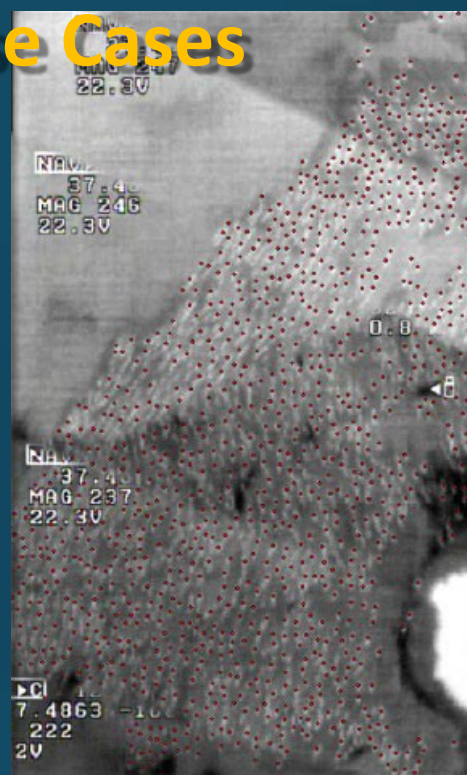
Feature Extraction



Population:

- Nesting Sites
- Species Count
- Coverage
- Decline/Increase

Developing methods to estimate Sandhill Crane abundance for natural resource management.



Thermal Infrared Video

Sandhill Crane
Population Estimates



Flying this Project with a Fixed Wing Aircraft Caused Noise Disruption to the Nesting Sandhill Cranes. UAS Provided a Way to Collect this Data Without Causing Disruption.



Science and Resource Management Use Cases

Pleistocene Trackway Mapping:

Mammoth Trackway

Aerial Survey:

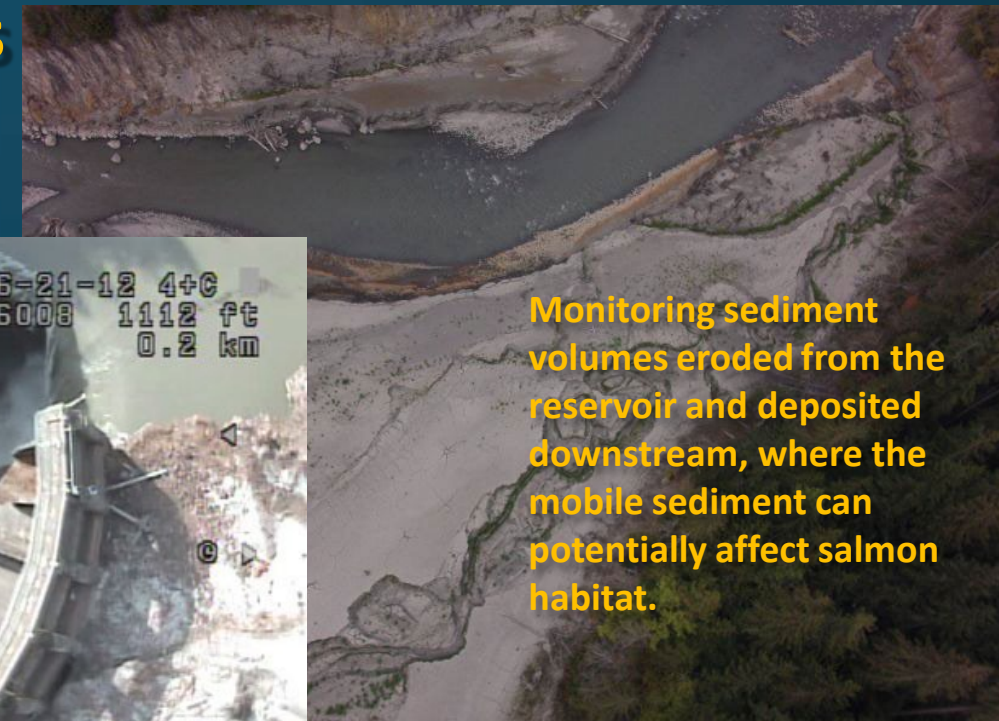
- Extremely Fragile Soils
- Protection from Damage
- Type of Footprints
- Measure Distance

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



Science and Resource Management Use Cases

Dam Removal – Sedimentation Flow:



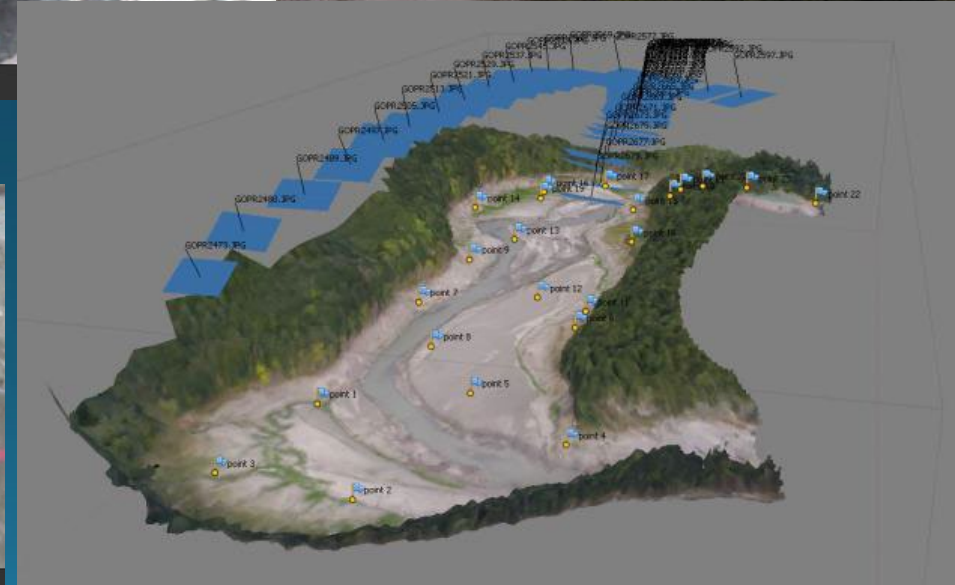
Monitoring sediment volumes eroded from the reservoir and deposited downstream, where the mobile sediment can potentially affect salmon habitat.



Raven A Color Camera Image, Glines Dam



Raven A Color Camera Image, Lake Mills

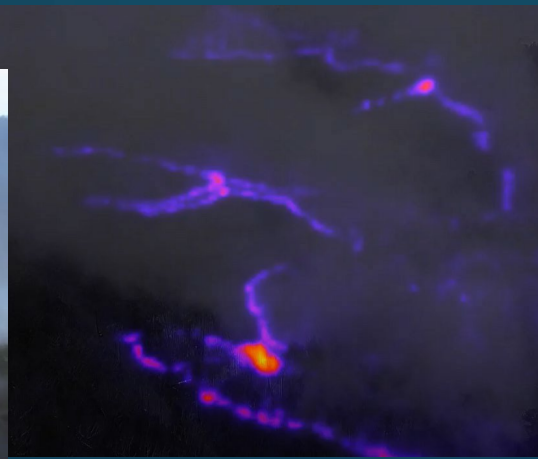


Sediment Movement:

- Silt Deposits
- Channel Creation
- Flow Volume
- Fisheries Habitat

Science and Resource Management Use Cases

Wildland Fire:



- Situational Awareness
- Hotspot Detection
- Mapping of Fire Perimeters
- Aerial Ignition



Science and Resource Management Use Cases

Post Fire Data Collection:



Forest Health

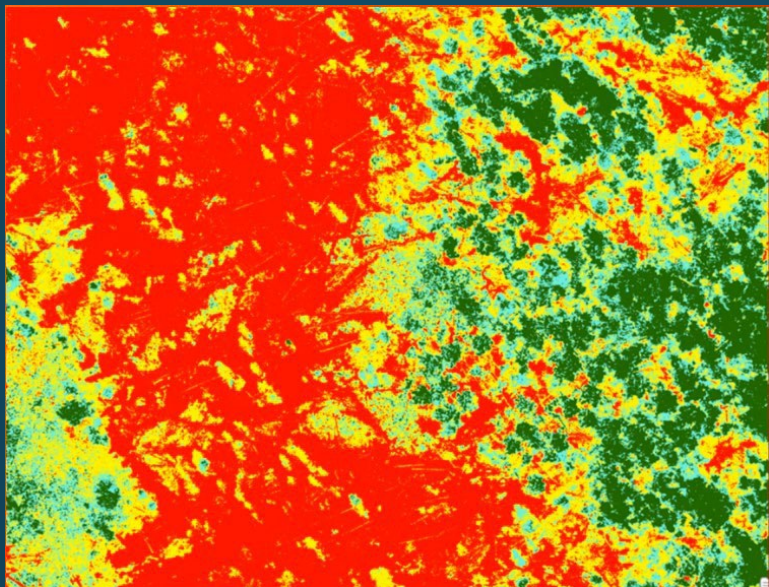
- Survival/Mortality
- Fire Behavior Calculations
- Soils Severity
- Fire Intensity

Fuels Mapping

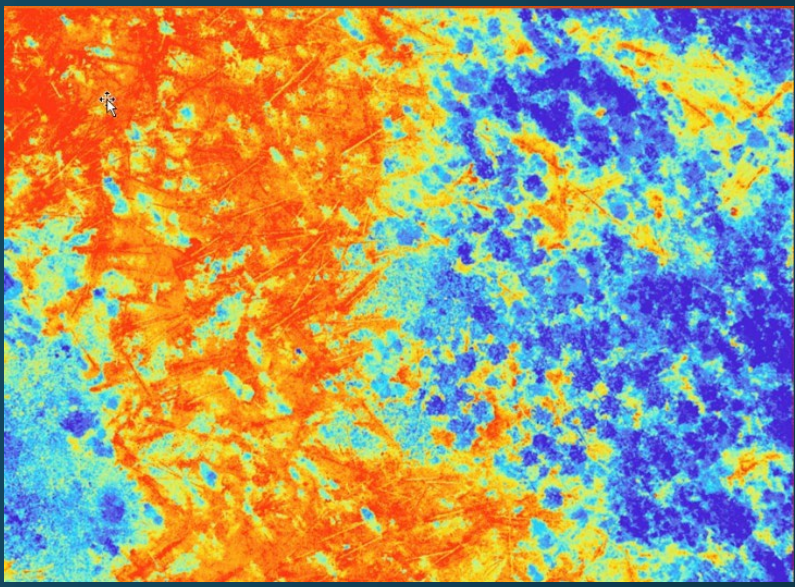




Post Fire Image



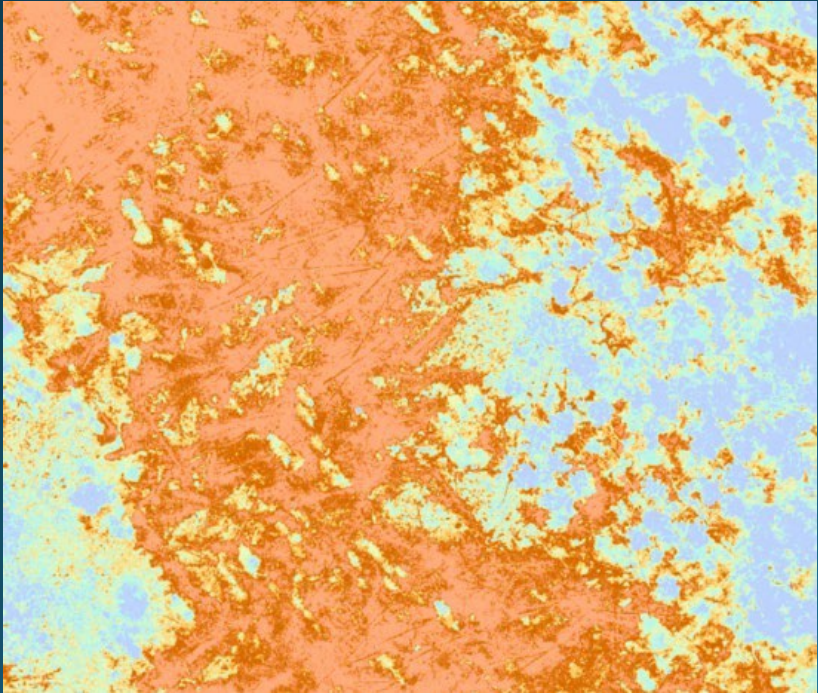
Burn Severity



Fire Line Intensity

Grass-Shrub	GS1	121
	GS2	122
	GS3	123
	GS4	124
Timber Understory	TU1	161
	TU2	162
	TU3	163
	TU4	164
	TU5	165
Timber-Litter	TL1	181
	TL2	182
	TL3	183
	TL4	184
	TL5	185
	TL6	186
	TL7	187
	TL8	188
	TL9	189

Fuel Models



- Burn/No Burn Contacts
- Fuel Load Determination
- Fire Behavior Calculations

10 Band Multispectral



Science and Resource Management Use Cases

Post Fire Data Collection:



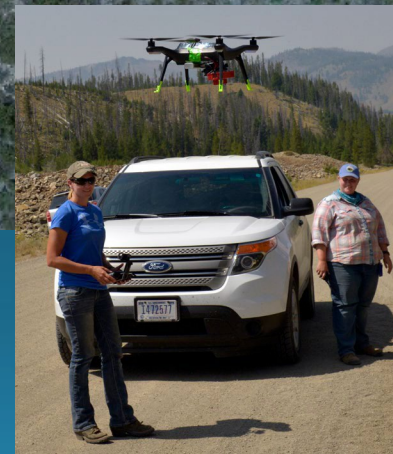
Forest Health

- Erosion & Stabilization of the Soils
- Rehabilitation

Science and Resource Management Use Cases

80 ft AGL - 1.68 cm Resolution

Archeology/Cultural Resource Inventories:



- Detection
- Identification
- Placement
- Sensitive Areas
- Item Classification

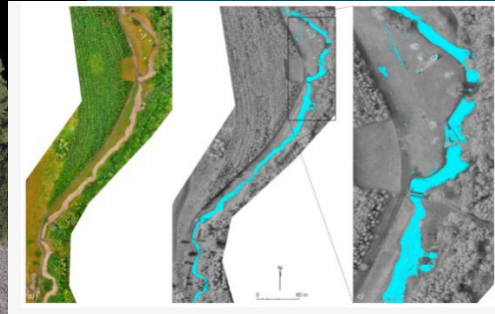
Science and Resource Management Use Cases

Water Management:

- Flood Plain Mapping
- Turbidity
- Flood Modeling (Hydrologic)
- Discharge & Temperature



KML – 3D Modeling

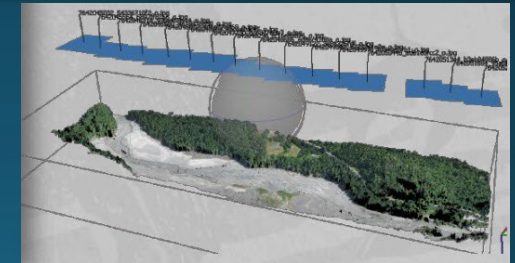


Elevation Models – River Flood Stages



Sedimentation – Water Turbidity

Mapping Water Discharge

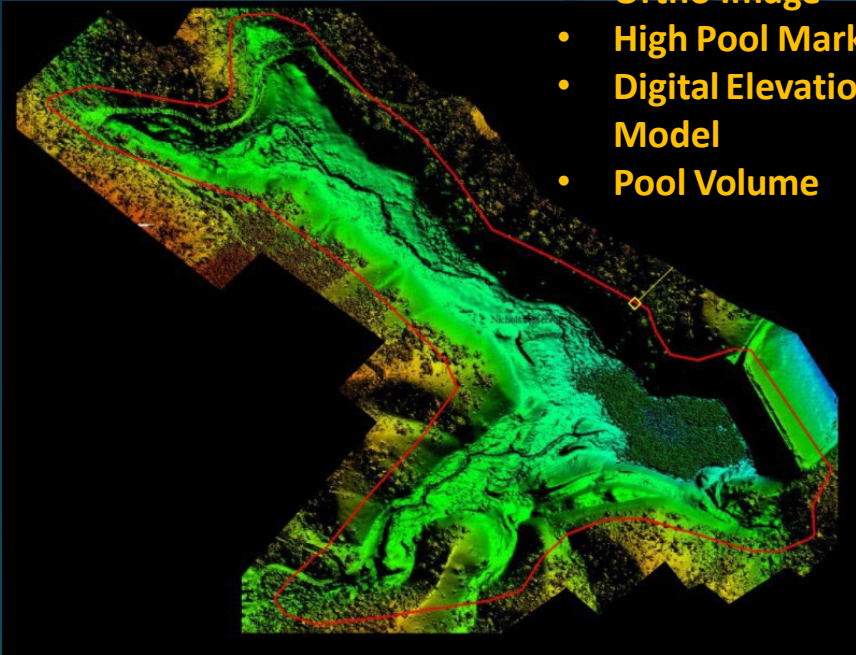


Science and Resource Management Use Cases

Reservoir Operations:



- Ortho Image
- High Pool Mark
- Digital Elevation Model
- Pool Volume



- Reservoir Levels
- Discharge Rates
- Pool Volume (Acre/Ft)
- High/Low Pool Heights



Science and Resource Management Use Cases

Dam Inspections:



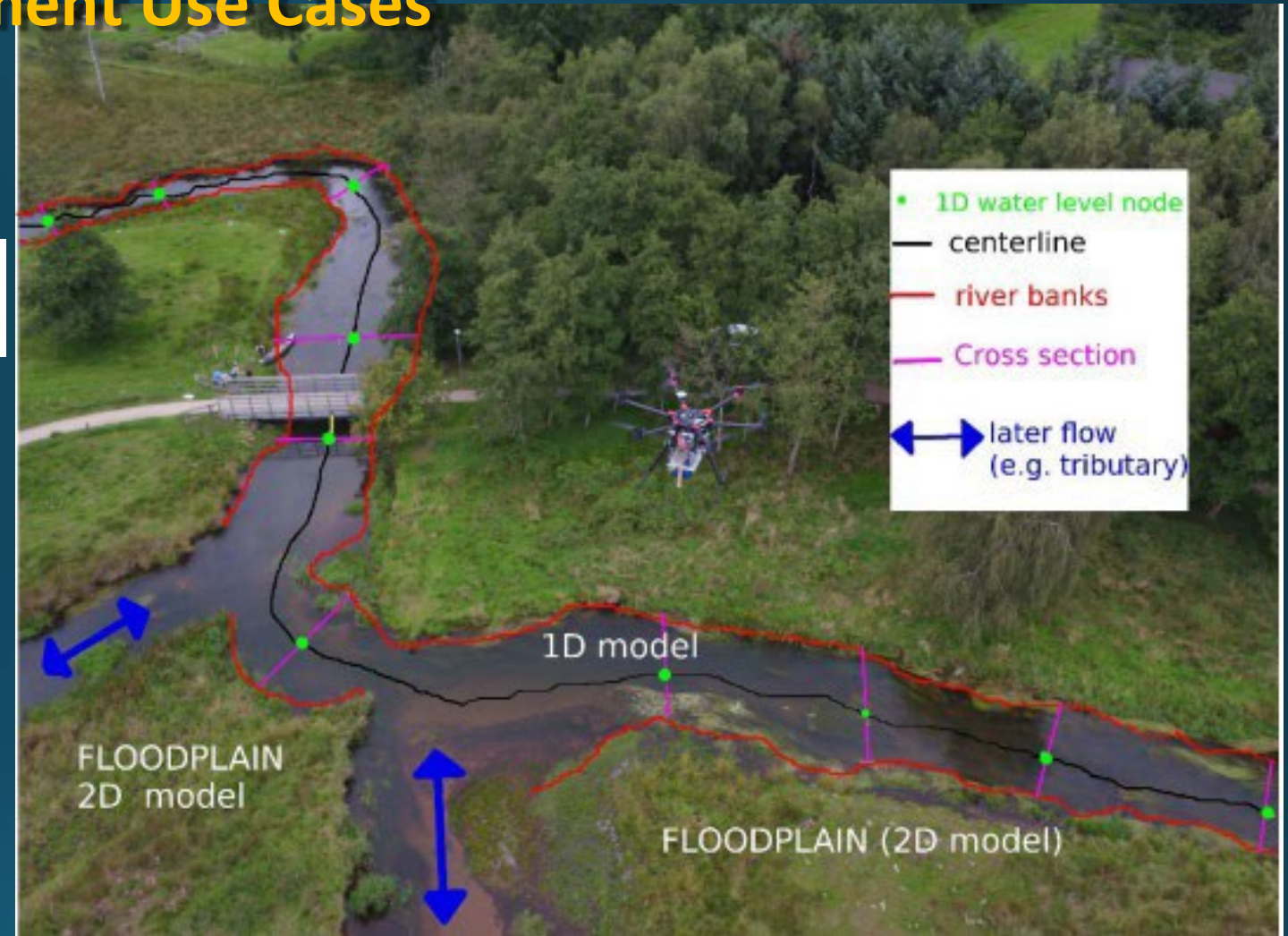
Detection of:

- Leakage or Seepage
- Concrete Deterioration
- Settling
- Erosion/Landslides
- Cracking
- Hydraulic Failure



Science and Resource Management Use Cases

River Systems:



Health of Streams/Rivers

- Flow/Velocity
- Floodplain Mapping
- Channel Widths
- Pool Health
- Spawning/Redd Locations
- Floodplain Mapping
- Instream Habitat (Fisheries)



Western Water Project



Science and Resource Management Use Cases

River Systems:



- Flood Stage Monitoring



Science and Resource Management Use Cases

Riparian Zones:



Restoration Project

- Areas Marked by Disturbance
- Cattle/People/etc
- Mapping:
 - Vegetation
 - Soils
 - Geology
 - Roads
 - River Channel Corridors



Human Disturbance

- Fence Line
- Roads
- Trails

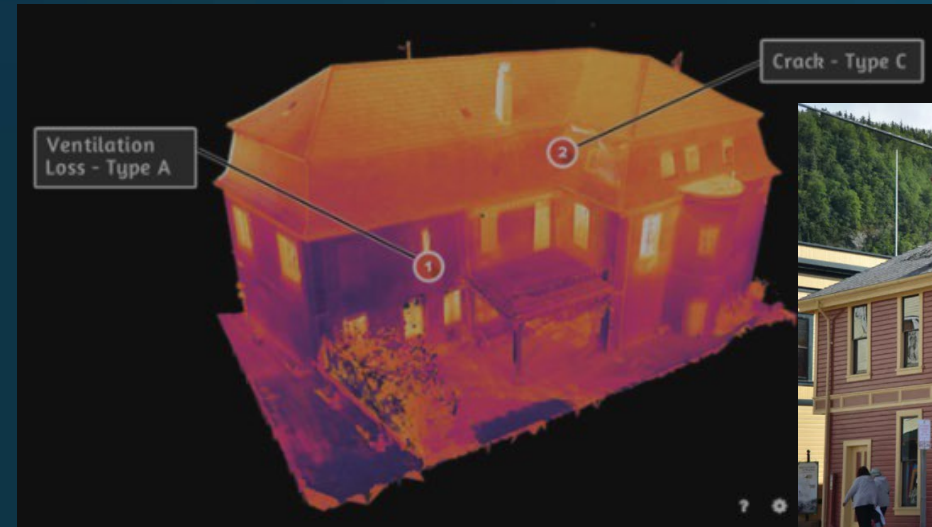
Other Disturbance

- Grazing
- Animal Paths
- Vegetation
- Soil Compaction



Science and Resource Management Use Cases

Facilities Inspections:



Skagway Historic Building

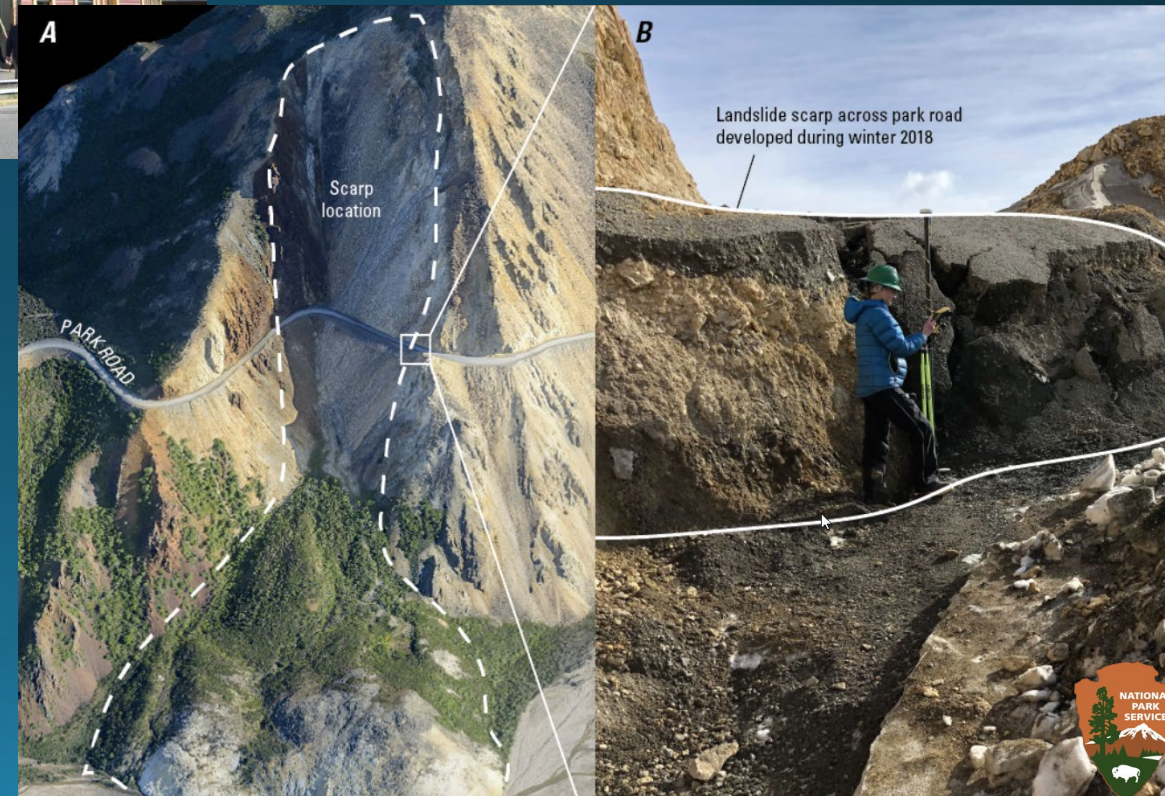


Zion Road Closure from Landslide



Denali Road Closure from Landslide

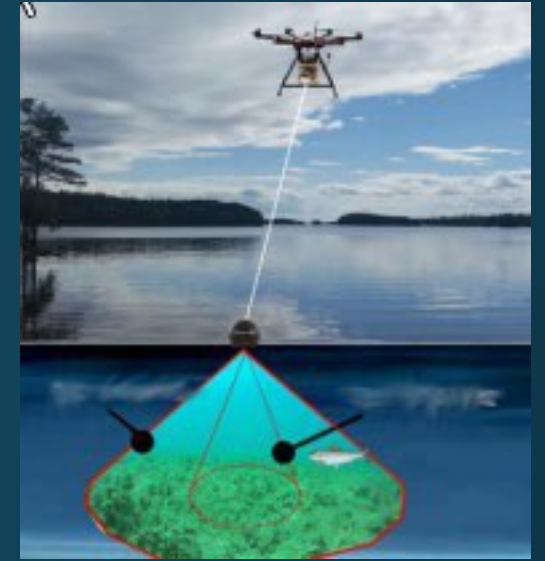
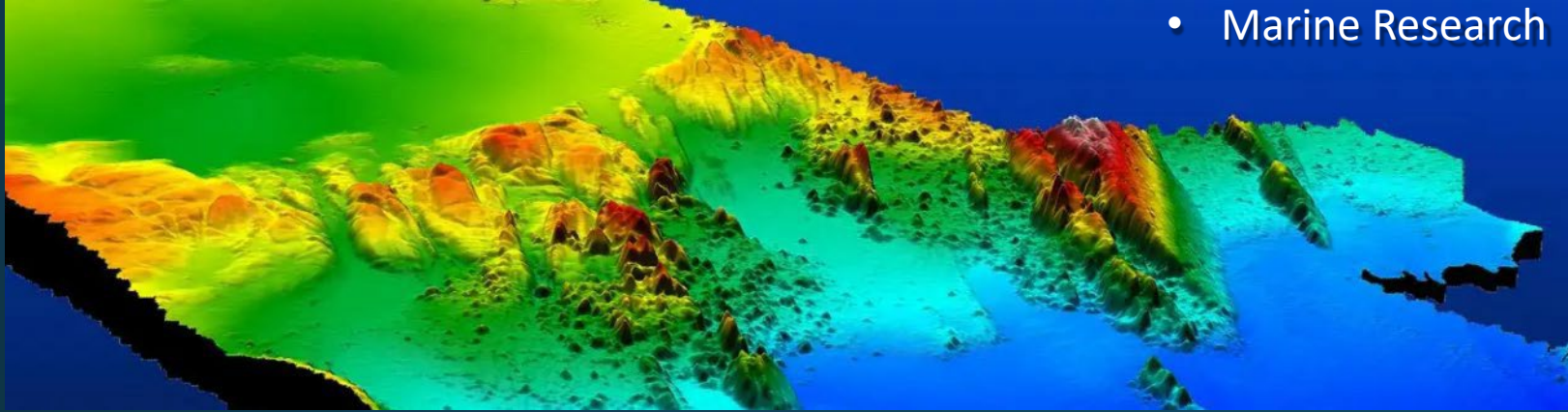
- Thermal Mapping
 - Energy Consumption
 - Leaks/Cracks for Maintenance
- Structural repairs
 - Roof/Windows/Walls
 - Historic Building 3D Models
- Bridges/Roads/Trails
- Wastewater/Drinking Water Mgmt Systems



Science and Resource Management Use Cases

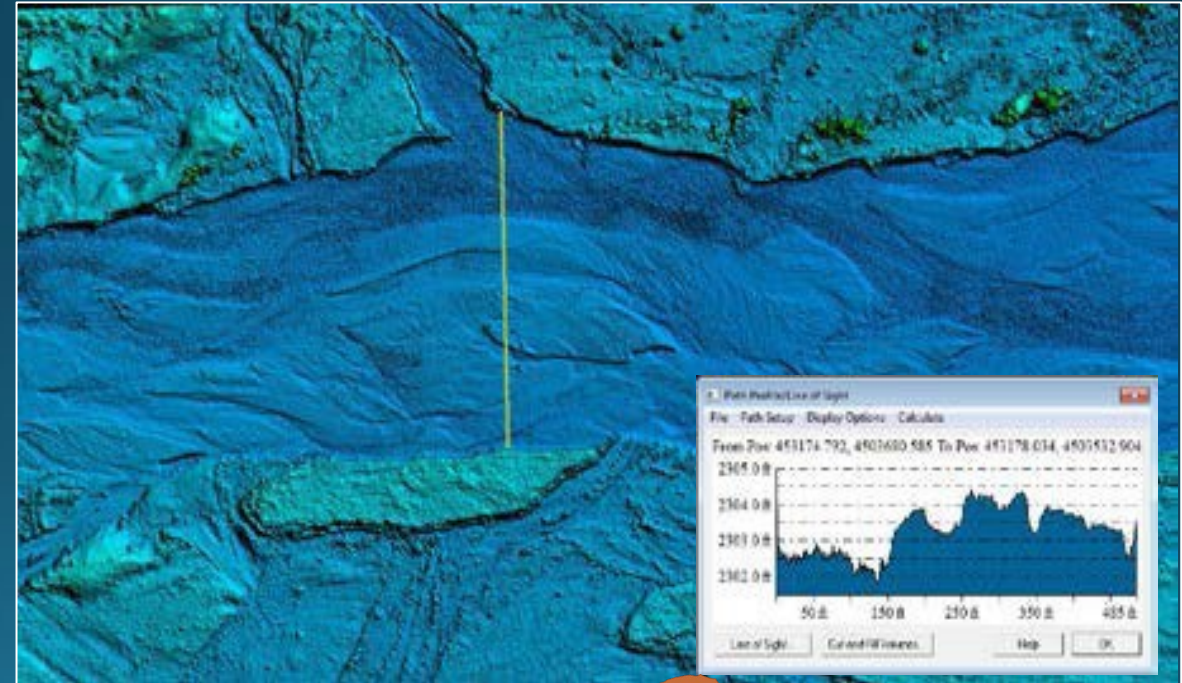
Bathymetry (Underwater Mapping):

- Coastal Mapping
- Marine Research



Under Water Terrain:

- Mapping of River/Reservoirs
- Hydrography Charts
- Elevation Profiles
- Sediment Transport
- Water Depth versus Surface Velocities
- Vegetation
- Silt



Elevation Models



Policy & Planning: Flying over NPS Lands & Waters

FAA: 14CFR, Part 107

DOI: DMs 350-353; OPM-11

Presidential Memorandum: PII & Data Retention

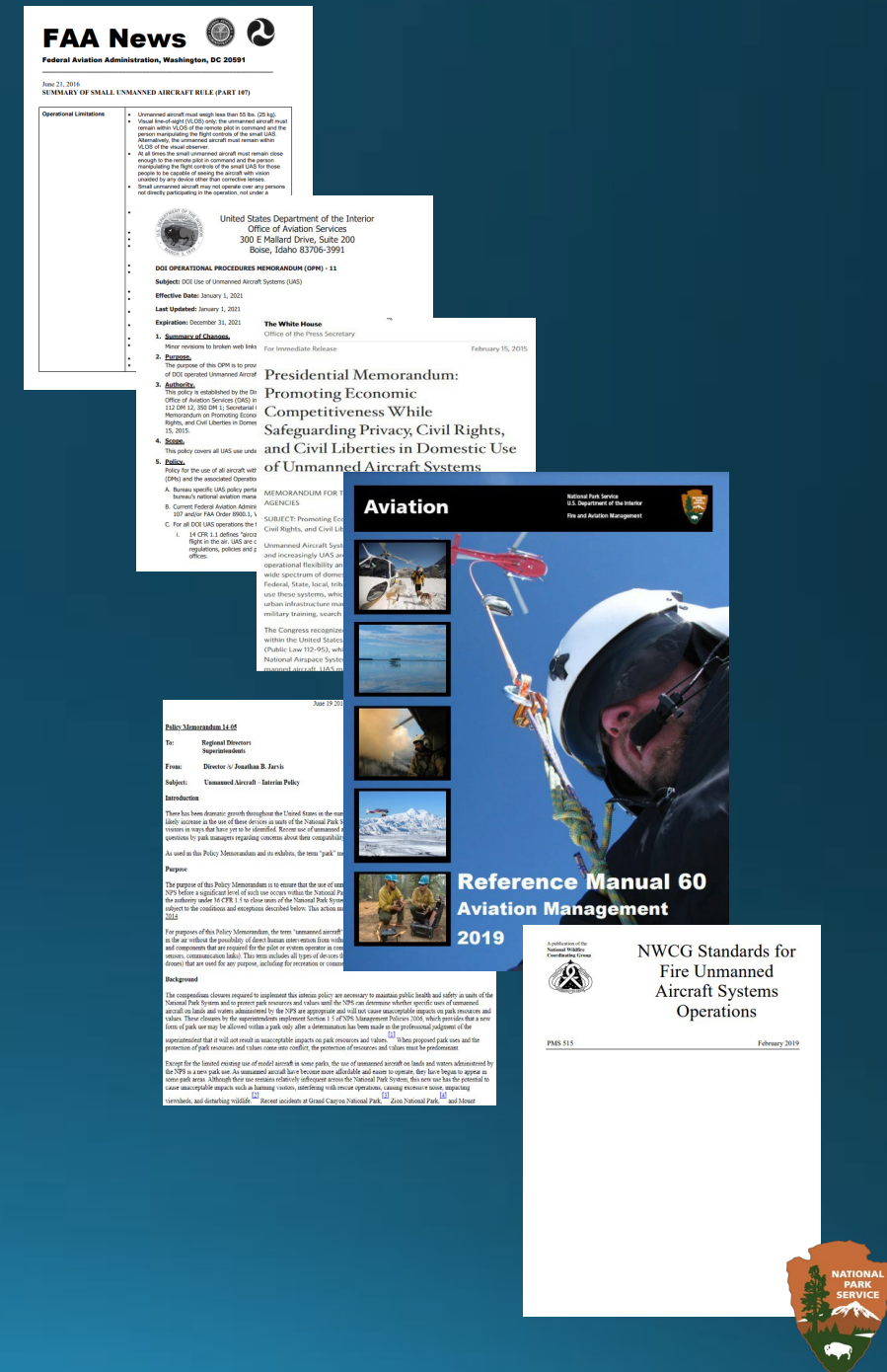
NPS:

Reference Manual (RM)-60 Aviation
Management
Regional, Park and Unit Aviation Plans
Policy Memo (PM)14-05
Aviation Enhancements (Appendix 5/7
Delegation of Authority Memos
Compliance Processes

NWCG Standards for Fire UAS Ops (PMS 515)

Secretarial Order 3379 (SO3379)

Executive Order 13981



Policy & Planning: Flying over NPS Lands & Waters

Appendix 7 - “Take-off/Landing Approval”

- Park Superintendent Approval for UAS Missions to Take Off, Land and/or Operate from NPS Lands and Waters

1. Allowed for Pre-existing **Hobby/Rec Use** via SUP
2. **Administrative Use** Scientific study, SAR, Fire, LE
3. Activities Conducted under a **Scientific Research and Collecting Permits**
4. **Commercial Use Authorizations** via SUP “Filming” (Nat Geo, Discovery, IMAX)

Best Practices for Avoiding Impacts to Natural, Cultural, and Historic Resources when Using Unmanned Aircraft Systems

In compliance with Policy Memorandum 14-05, *Unmanned Aircraft – Interim Policy* (June 19, 2014) and pursuant to subsequent direction to Regional Directors (April 5, 2017), use of unmanned aircraft systems (UAS) is permitted if approved in writing by Regional Directors. The following best practices were developed to supplement the requirements in Appendix 7, *NPS Approval Template and Guidance For the Use of Unmanned Aircraft Systems*, in RM-60, *Aviation Management*. The best practices are intended to assist personnel developing and approving requests for UAS operations to avoid impacts to natural, cultural, and historic resources. Superintendents may adopt more protective measures to address park-specific concerns.

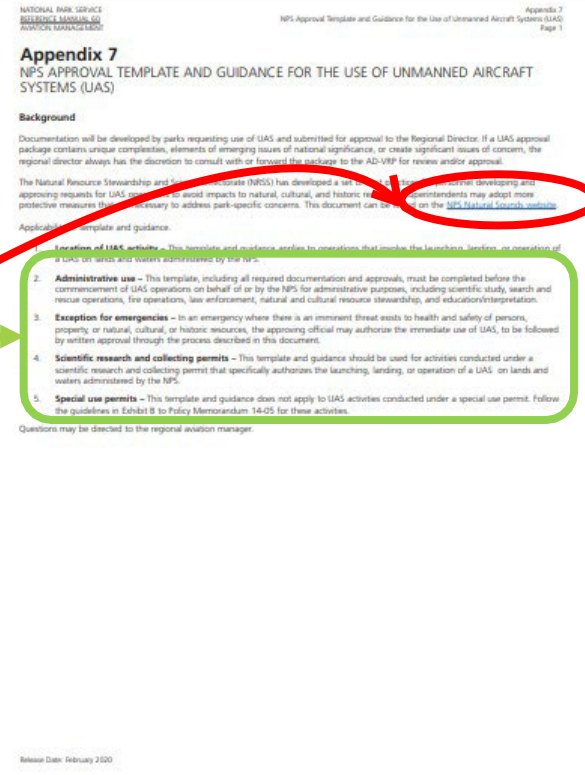
Because UAS technology and the state of knowledge are evolving rapidly, these best practices were developed to be flexible and may be updated as more information becomes available. They are consistent with Federal Aviation Administration, National Transportation Safety Board, Presidential Memoranda, the Department of Interior, and NPS requirements.

NPS staff may also access the Fish and Wildlife Service Unmanned Aerial Systems Resource Guide for information on minimizing wildlife disturbance (<https://sites.google.com/a/fws.gov/region-1/unmanned-aerial-systems-uas-resource-guide/wildlife-disturbance>).

PRE-FLIGHT PLANNING

1. Become familiar with the presence of the following in the mission area: noise-sensitive species, habitat, or nesting areas; cultural areas or events; archaeological and paleontological sites; and caves. Assess potential impacts of the mission on resources such as air, archaeological, biological, cultural, geological, hydrological, lightscapes, paleontological, soundscapes, viewsheds, and wilderness. Plan the mission to avoid direct and cumulative impacts by optimizing the route, speed, timing and frequency of flights, and employ technologies and operational parameters that help avoid impacts.
2. Complete a Minimum Requirements Analysis (MRA) in accordance with NPS Management Policies 6.3.5 and 6.3.6 if UAS operations occur within or over designated wilderness or areas managed as wilderness and may impact wilderness character and values. This MRA is a documented, two-step process that determines:
 - a. Whether the use is necessary for the administration of the area as wilderness and does not cause a significant impact to the wilderness character and values.
 - b. The activity (method or tool) to accomplish the action (project) with the least negative impact to the wilderness character and values.

If the proposed use is deemed necessary under the first step of the analysis, UAS may only be used to accomplish that action if the analysis shows that the use of UAS, as compared to other alternatives, is the least impactful management method or tool to wilderness character and values.



**Natural Sounds
& Night Skies –
Best Practices**



Policy & Planning: Flying over NPS Lands & Waters

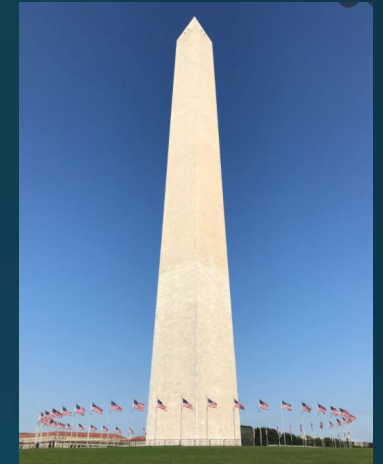
Natural Values

- Expanses or features of land or water of great **scenic and scientific quality**
- View of **geological history**; they may contain imposing landforms like mountains, mesas, thermal areas, and caverns
- **Habitats** of abundant or rare wildlife and plant life
- **Land or water** areas to help provide adequate protection of the resource

- A National Monument
- National Preserves
- National Reserves
- National Lakeshores
- National Seashores
- National Rivers
- Wild and Scenic Riverways
- National Scenic Trails
- National Historic Trails



Cape Cod National Seashore.
Photo courtesy of NPS



Washington National Monument.
Photo courtesy of NPS



Vegetative Species Monitoring.
Photo courtesy of NPS



Policy & Planning: Flying over NPS Lands & Waters

Importance in History

- Preserve places and commemorate persons, events, and activities important in the nation's history
- Archeological sites associated with prehistoric Indian civilizations
- Sites related to the lives of modern Americans
 - National Historic Site
 - National Battlefield Site
 - National Battlefield
 - National Monuments
 - National Historical Parks
 - International Historic Site
 - National Memorial
 - National Recreation Areas
 - National Parkways
 - Performing Arts



Blue Ridge Parkway.
Photo courtesy of blueridgeparkway.org



Dr. Martin Luther King Jr. National Historic Site.
Photo courtesy of [Discover Atlanta](http://DiscoverAtlanta.com)



Appendix 7- "Take-off/Landing Approval"

Natural Sounds and Night Skies - Best Practices

- Consistent with the Organic Act
- Compliance with:
 - ✓ Wilderness Act/Minimum Requirements Analysis (MRA)
 - ✓ Endangered Species Act (ESA)
 - ✓ National Environmental Policy Act (NEPA)
 - ✓ National Historic Preservation Act (NHPA)
 - ✓ Marine Mammal Protection Act (MMPA)
 - ✓ Archeological Resource Protection Act (ARPA)
 - ✓ Park System Resource and Protection Act (PSRPA)
 - ✓ Migratory Bird Treaty Act (MBTA)

Approval Request Package:

Briefing Statement with the following information:

1. The purpose of the mission or project.
2. Designated locations, dates, and times of use for the UAS.
 - Requests may cover more than one mission over a period of time if the impacts and risks of the operation can be properly evaluated at the time of the request.
3. Confirmation that the operation complies with current:
 - DOI and NPS policies regarding UAS operations (applies to NPS or other DOI pilots).
 - FAA policy regarding UAS operations (applies to outside agency/entity cooperator operations).
4. Confirmation that the operation will not interfere with the visitor experience, interpretive programs, or concession or other park operations.
5. Procedures for data management and processing.
6. Why the use of a UAS is appropriate and consistent with the Organic Act and NPS authorities related to the protection of park resources and values, and visitor enjoyment.
7. Confirmation of compliance with relevant laws and regulations including the Wilderness Act, ESA, NHPA, MMPA, ARPA, PSRPA, MBTA.
8. Potential for controversy.
9. Compliance with NEPA, by one of the following:
 - a. Citing a categorical exclusion.
 - b. Explaining that use of the UAS was necessary to control the immediate impacts of an emergency under 43 CFR 46.150.
 - c. Referring to an EA/EIS that has been prepared.
 - d. Contacts at the park or program for further questions.

Required Documentation:

- Copy of the FAA 14 CFR Part 107 Remote Pilot Certificate and FAA Certificate of Waiver or Authorization (as applicable). Attached ☐ N/A ☐
- For UAS operations under NPS operational control a completed and signed PASP with a risk analysis (see RM-60, Appendix 3). Attached ☐ N/A ☐
- For UAS operations NOT under NPS operational control a completed safety brief or operation plan acknowledged by the applicable park. Attached ☐ N/A ☐
- Copy of scientific research and collecting permit, if applicable. Attached ☐ N/A ☐
- Minimum Requirements Analysis – required for all NPS actions within wilderness or areas managed as wilderness that may impact wilderness character and values. Attached ☐ N/A ☐
- Aviation enhancement application, (RM-60, Appendix 5) if applicable. Attached ☐ N/A ☐

Additional Comments:



Policy & Planning: Flying over NPS Lands & Waters

Best Practices - Avoiding Impacts to Natural, Cultural, and Historic Resources when Using UAS

- Best practices to assist personnel approving or requesting UAS operations
- Protective measures for park-specific concerns (depending on what the park is protecting)
- Consistent with:
 - National Transportation Safety Board
 - Federal Aviation Administration
 - Presidential Memoranda (PII & Cyber-Security)
 - Department of Interior
 - NPS Requirements



Kennecott Mines National Historic Landmark mill buildings. Wrangell - St Elias National Park & Preserve, Alaska.
Credit: NPS Photo



Policy & Planning: Flying over NPS Lands & Waters

Pre-Flight Mission Planning

What are we protecting?

These resources may include:

- An Atmosphere of Peace and Tranquility
- Visual Resources
- Natural Resources
- Historic Resources
- Commemorative Locations within the Park

Consider information about Impacts to Resources Found in Park:

- General Management Plans
- Foundation Documents
- Natural Resource Condition Assessments
- Other Planning Documents



A naturally dark night sky is more than a scenic canvas; it is part of a complex ecosystem that supports both natural and cultural resources. - NPS NSNS



World War II Memorial at National Mall & Memorial Parks.
Credit: NPS Photo.



Indian paintbrush and penstemon with Crater Lake in the background. Credit: NPS Photo.



Policy & Planning: Flying over NPS Lands & Waters

Pre-Flight Mission Planning

Become familiar with the mission area:

- Noise-sensitive Species
- Habitat
- Nesting Areas
- Cultural Areas or Events
- Archaeological/Paleontological Sites and Caves

Employ quiet technologies or tactics for noise reduction.

Dawn Chorus at
Hawaii Volcanoes
National Park
Credit: NPS Photo.



Beaver Survey at
Voyageurs National
Park
Credit: NPS Photo.



Wolf Den
Credit: NPS Photo.



Black Bear
Credit: NPS Photo.



Canyon de Chelly
Credit: NPS Photo.



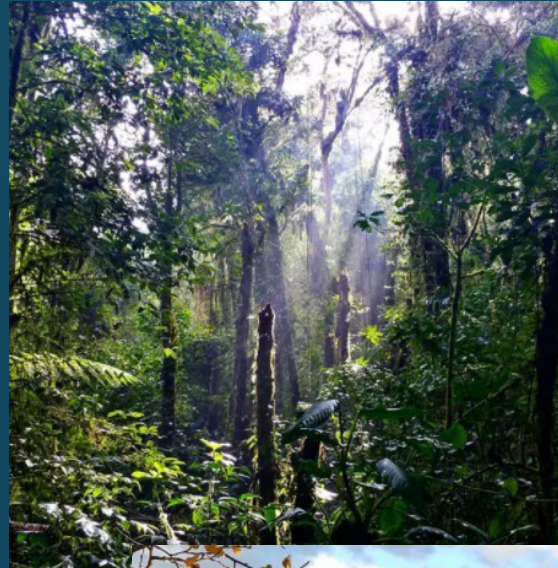
Underground Railroad. George Washington Carver National Monument
Credit: NPS Photo.

Policy & Planning: Flying over NPS Lands & Waters

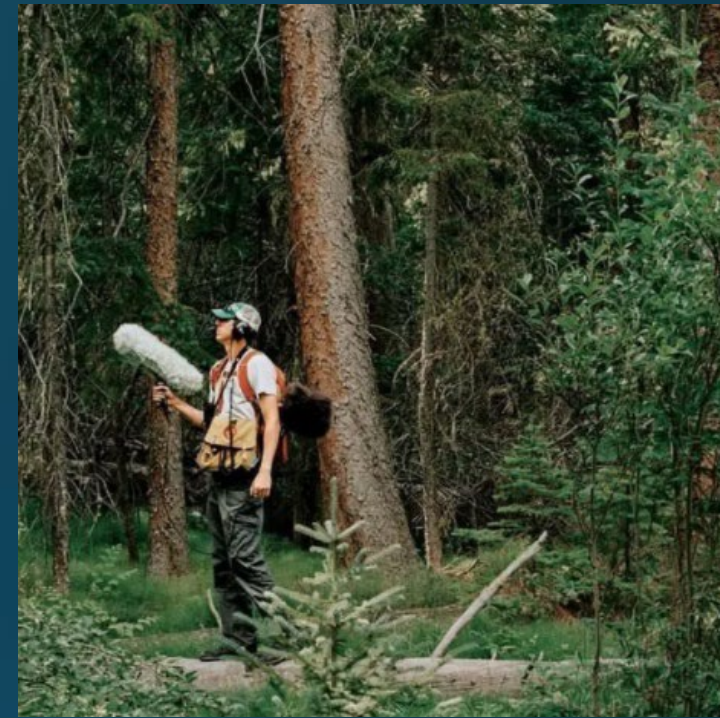
Pre-Flight Mission Planning

Assess potential impacts of the mission on all resources:

- Air
- Archaeological
- Paleontological
- Biological
- Cultural
- Geological
- Hydrological
- Lightscapes
- Soundscapes
- Viewsheds
- Wilderness



Tropical rainforest, La Selva Biological Research Station, Costa Rica
Photo courtesy of Jacob Job



Jacob Job recording in a forest at Wild Basin, Rocky Mountain National Park, Colorado.

Photo courtesy of Jacob Job



Elk at Rocky Mountain National Park, Colorado.

Photo courtesy of Jacob Job



An apapane bird sits in a ōhia tree, Hawaii Volcanoes National Park.



Vegetative Species Monitoring.

Photo courtesy of NPS

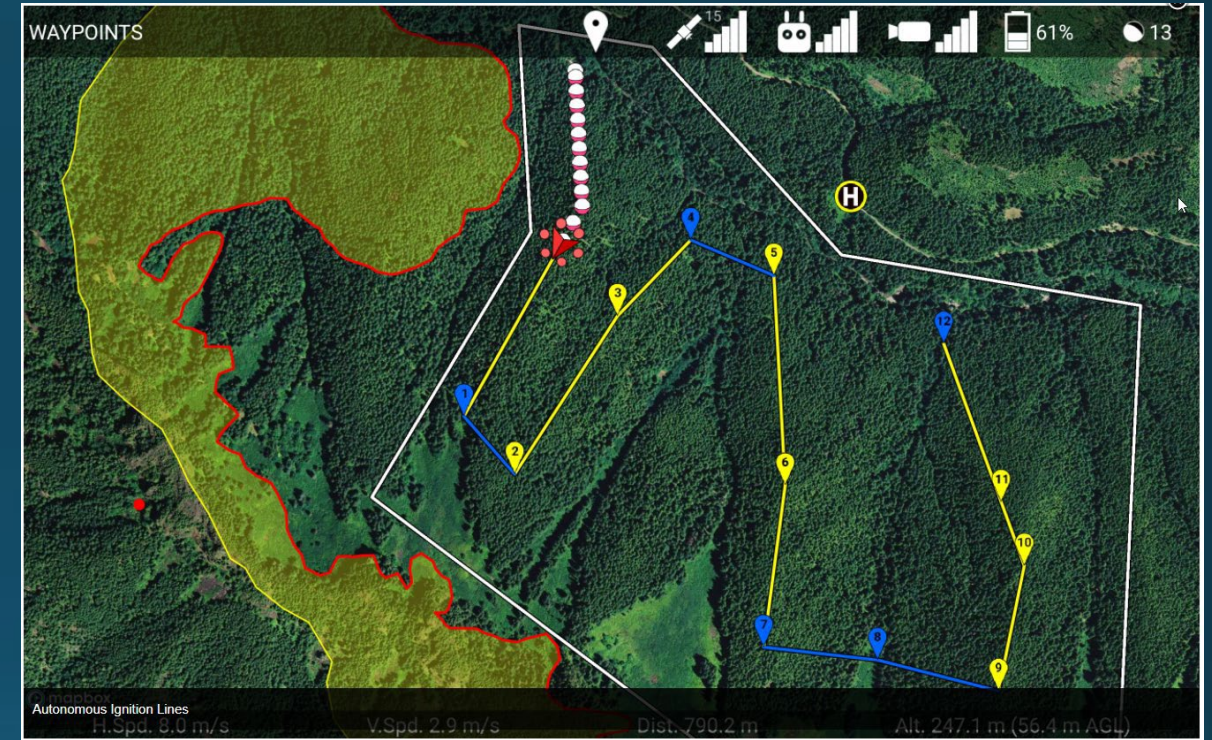
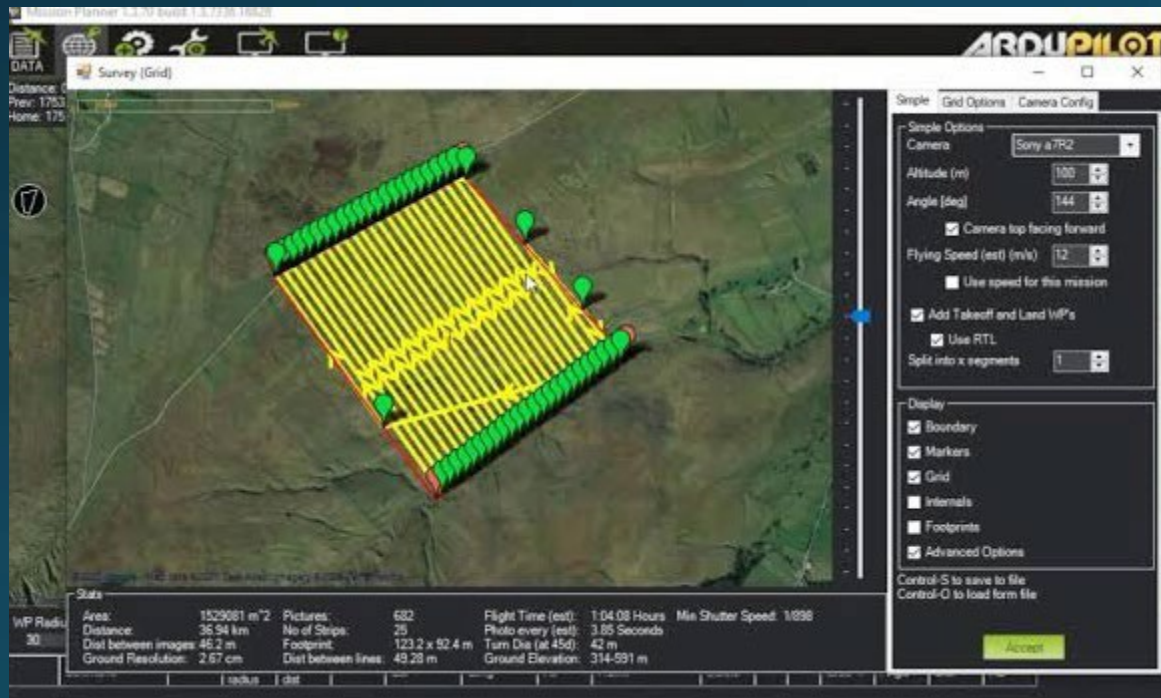


Policy & Planning: Flying over NPS Lands & Waters

Pre-Flight Mission Planning

Employ techniques that help avoid impacts:

- Flight Path
- Altitude
- Speed
- Timing
- Frequency of Flights



Birds at Fire Island
National Seashore
Credit: Derek Rodgers



UAS Policy: Flying over NPS Lands & Waters

Pre-Flight Mission Planning

Wilderness:

- Complete **Minimum Requirements Analysis (MRA)** to assess the impact **Wilderness Character and Values**
 - Is this flight necessary for the Administration of the area?
 - Will it cause significant impact to the Wilderness Character and Values?
 - What tool will provide for the **least negative** impact to the Wilderness Character and Values?



Policy & Planning: Flying over NPS Lands & Waters

Pre-Flight Mission Planning

Wilderness: Minimum Requirements Analysis (MRA)

UAS may only be used to accomplish the mission if:

- The MRA demonstrates that UAS compared to other alternatives, is the LEAST impactful management method or tool to **Wilderness Character and Values**



******NOTE:** When making this determination, the potential disruption of **Wilderness Character and Values** will be considered before, and given significantly more weight, than economic efficiency and convenience gained by using UAS.



Policy & Planning: Flying over NPS Lands & Waters

Pre-Flight Mission Planning

Consider Impacts to Resources that May Occur From:

- “Lost Link” Situations
- Downed Aircraft
- Fly-Aways
- Utilize GCS Apps that track UAS (Retrieval) to avoid resource impacts



NPS UAS Pilots, North Carolina

Morning Glory Pool, Yellowstone National Park. Photo Credit: NPS



Policy & Planning: Flying over NPS Lands & Waters

Mission

Operate:

In a manner Not to impact wildlife or other Resources

Use the **Quietest** UAS available

Fly at **altitudes** that are appropriate for the mission

Be aware of the various models of UAS with **different noise characteristics**

Example: Fixed-wing UAS tend to be quieter than rotary and tend to evoke less of a response in wildlife



Policy & Planning: Flying over NPS Lands & Waters

Mission

Operate in a Manner that:

- Minimizes audible and visual impacts to resources and wildlife
- Note any valuable resource information viewed from the UAS in any post flight communications (1 Flight could benefit more than one mission profile)
 - Wildlife sightings
 - Identification or condition of Natural, Cultural, or Historical Resources
 - Document any impacts to Resources (Including changes in wildlife behavior) resulting from the UAS flights
- Implement safeguards to ensure that locations of sensitive resource areas will NOT be made public in accordance with existing policies and laws



Policy & Planning: Flying over NPS Lands & Waters

Illegal Overflight of NPS Lands and Waters

Counter-UAS System Reporting

UAS Detection System

- Placed on a water tower on the South Rim
- Captured flights up to 10 NM away on the North Rim
- Affected by terrain from detecting on East Rim Drive



Policy & Planning: Flying over NPS Lands & Waters

Illegal Overflight of NPS Lands and Waters

- NPS Law Enforcement Contacts
- Investigative Services Tip Hotline – Public Contacts

ISB: the Investigative Services Branch of the National Park Service

[Who We Are](#) | [What We Do](#) | [News](#) | [Submit a Tip](#)

Want to report a crime in a national park?

go.nps.gov/SubmitATip or  888-653-0009

Questions?