



# Mobile Geospatial Technology's Role in Tracking Pest and Disease Infestations In our Nation's Forests

Everett Hinkley  
USDA Forest Service – National Remote Sensing Program Manager

**Civil GPS Service Interface Committee (CGSIC)**

Fall 2020 Meeting  
September 22, 2020



# Mobile Geospatial in Forest Health

Geospatially enabled data gathering tools are crucial to mapping pest and disease outbreaks in our nation's forests.

The Forest Service developed and employs the Digital Mobile Sketch Mapping (DMSM) system, which comprises tablet hardware, software, and back end data support processes (ArcGIS Desktop Tools) which allows trained aerial surveyors, in light aircraft, and ground observers to record forest disturbances together with their causal agents.

This system greatly enhances the quality and quantity of forest health data while improving safety by leveraging satellite remote sensing capabilities to monitor forest disturbances.





# What is Aerial Sketchmapping?

Aerial Sketchmapping is simply having a “map in the lap” for recording observations of interest on the ground below.

Aerial Surveys are done on an annual basis with trained observers flying in light aircraft over our nation’s forests.

With our digital sketchmapping tools, **GPS is a critical part of accurately geolocating those observations.**

# Digital Aerial Sketchmapping

- The Digital Aerial Sketchmapping System offers several advantages over conventional paper maps.
  - Relieves the surveyor of having to track aircraft position, allowing more time to observe and map damage.
  - Wide array of base map options that may lead to more accurate mapping of features.
  - Data available for immediate use in a GIS environment
  - Data easily downloaded to GPS units for field checking or management action.





# Early Digital Aerial Sketch Mapping Tools



# Digital Mobile Sketch Mapping (DMSM)

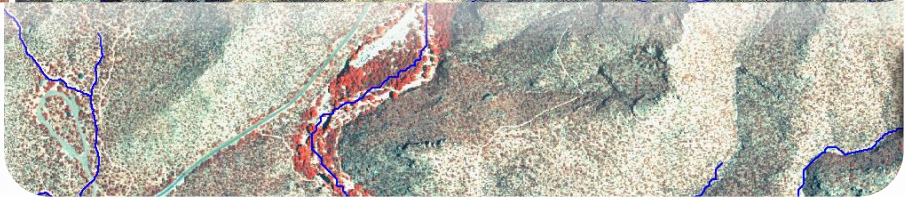
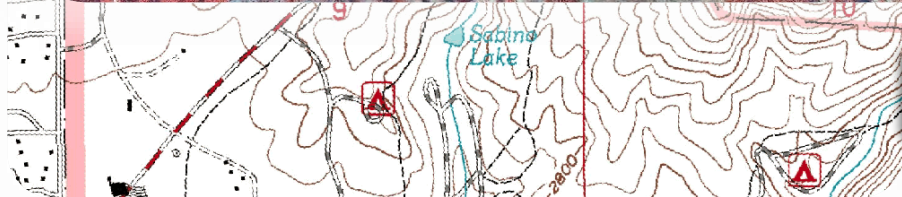
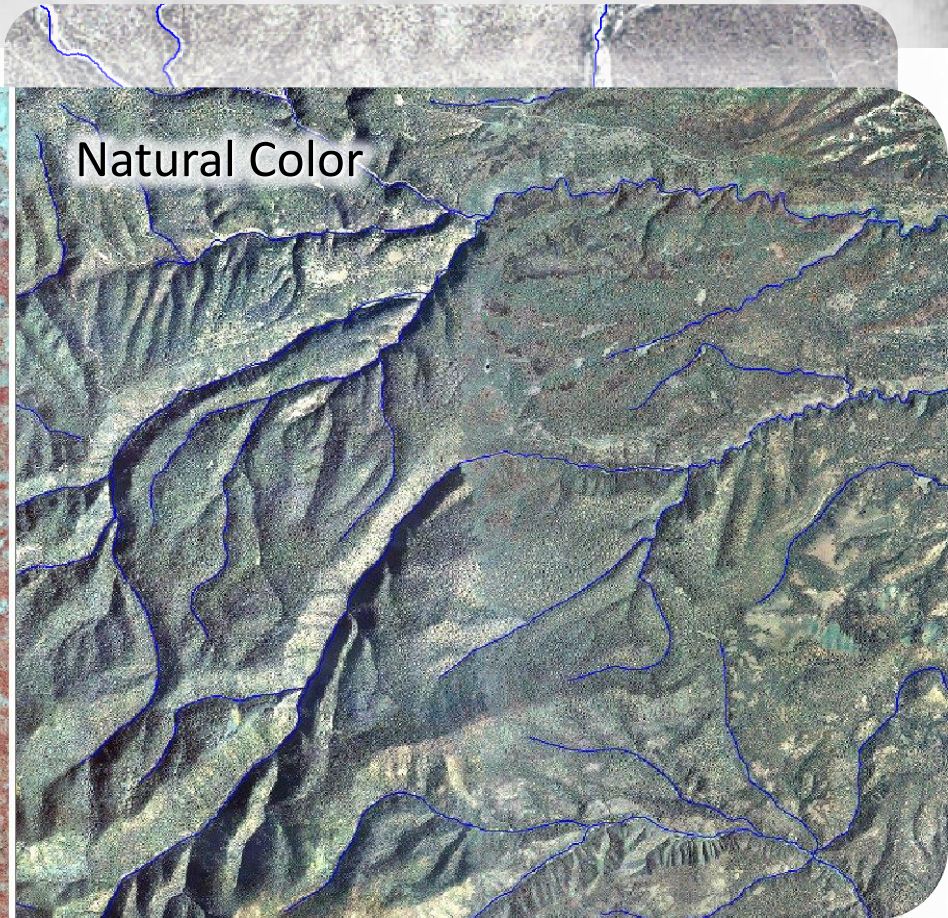
## Current System

- OS
- Hardware
- “Cloud” data concept
- Standards & compliance





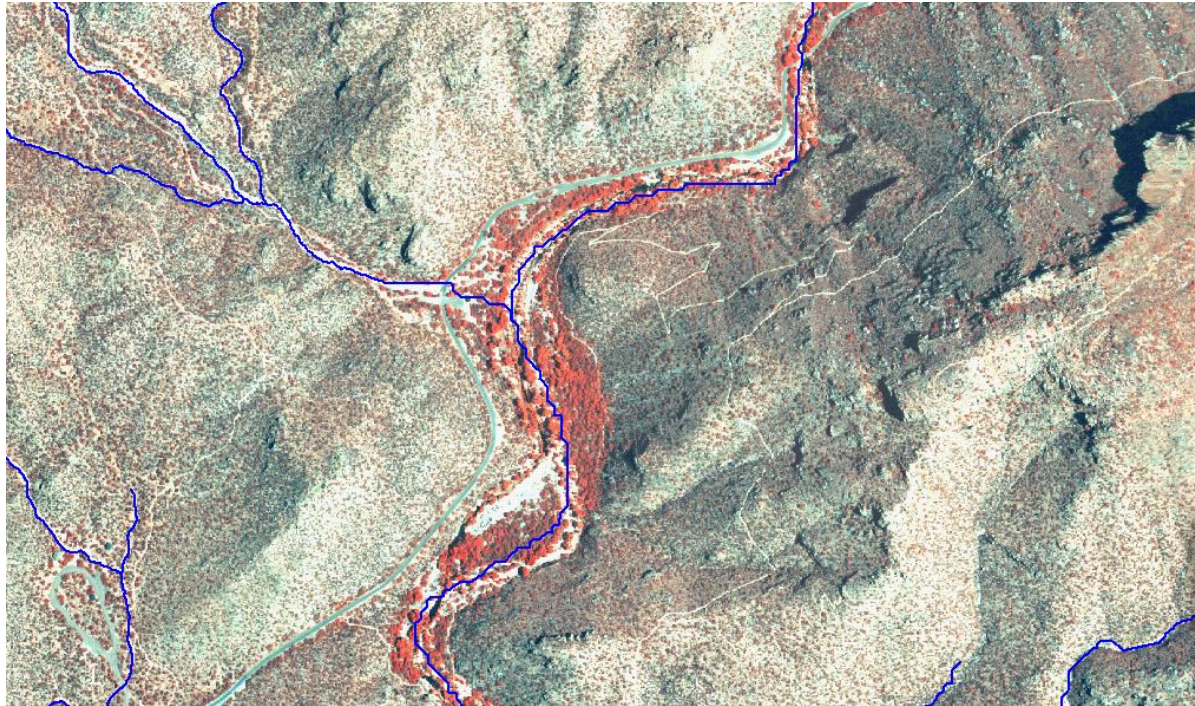
# Raster Map Backgrounds





# Vector Overlays

- Hydrography
- Roads
- Contours
- Survey boundaries
- Past year data
- Fires





# In the Aircraft





# In the Aircraft

1. Select Feature Type

2. Digitize the Feature

3. Code the Feature

4. Code Intensity Measure

5. Complete Feature

QUICK KEYS	LISTS	LAYERS
BB-PP	DFB	
FEB	WBBB	
SB	IPS-PIÑ	
BB-JUN	WSBW-H	
NC-PP	NC-MC	
DFTM-L	DFTM-H	
A-L	A-H	
AM	CWD-L	
CWD-H	CWDieb	

Number of trees affected:

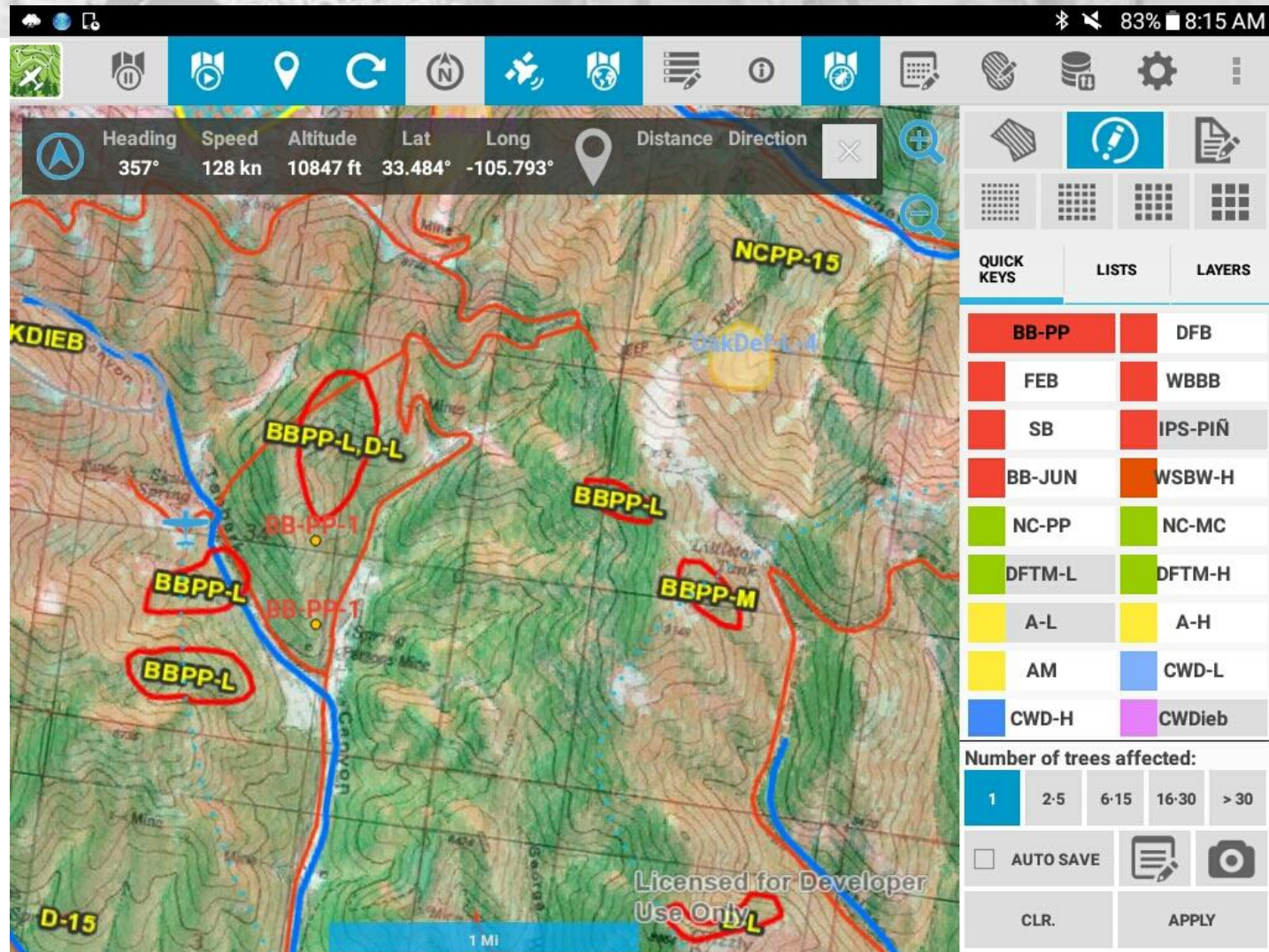
1    2-5    6-15    16-30    > 30

AUTO SAVE

CLR.   APPLY



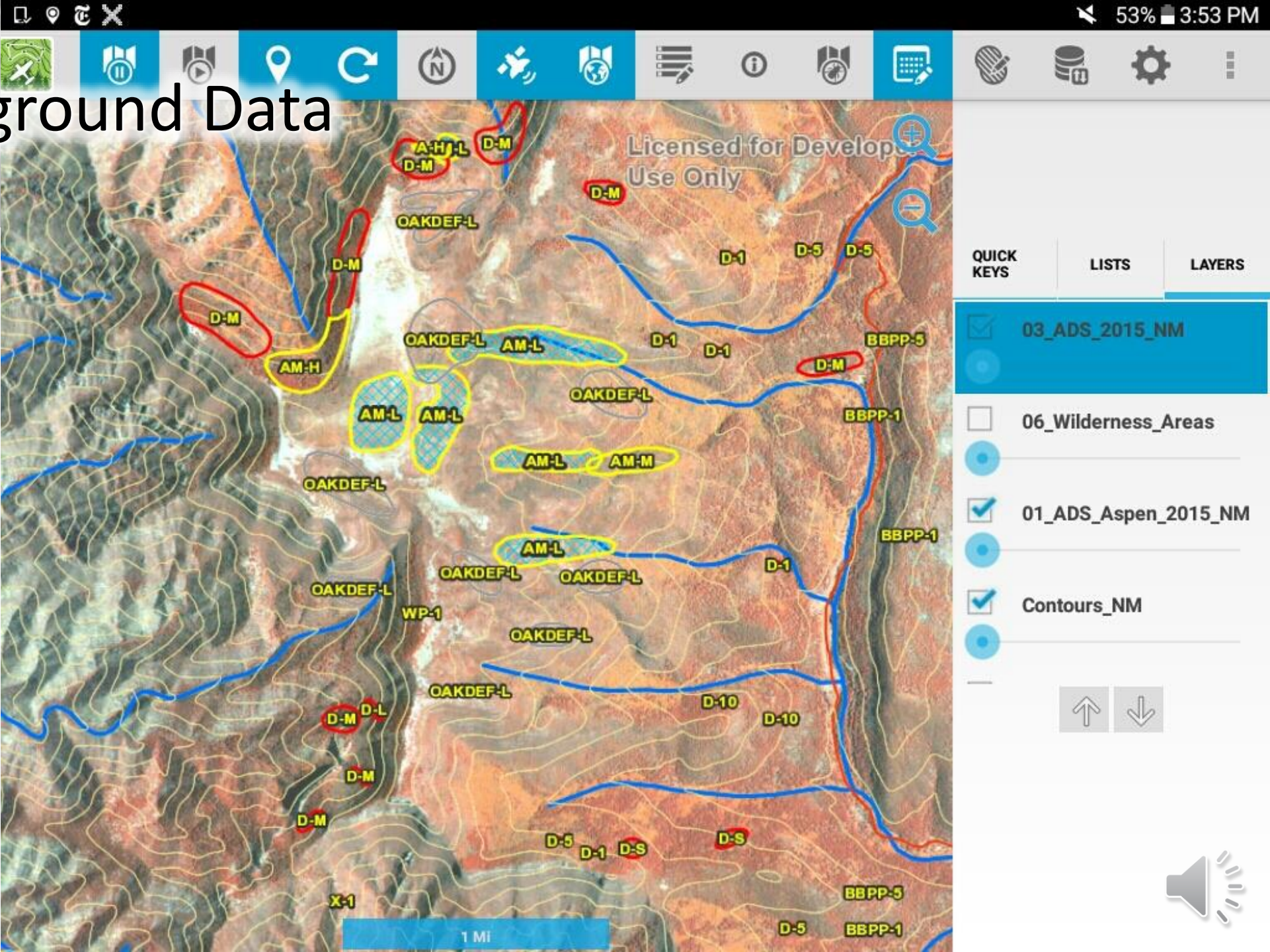
# Digital Mobile Sketch Mapping (DMSM)



Screen view

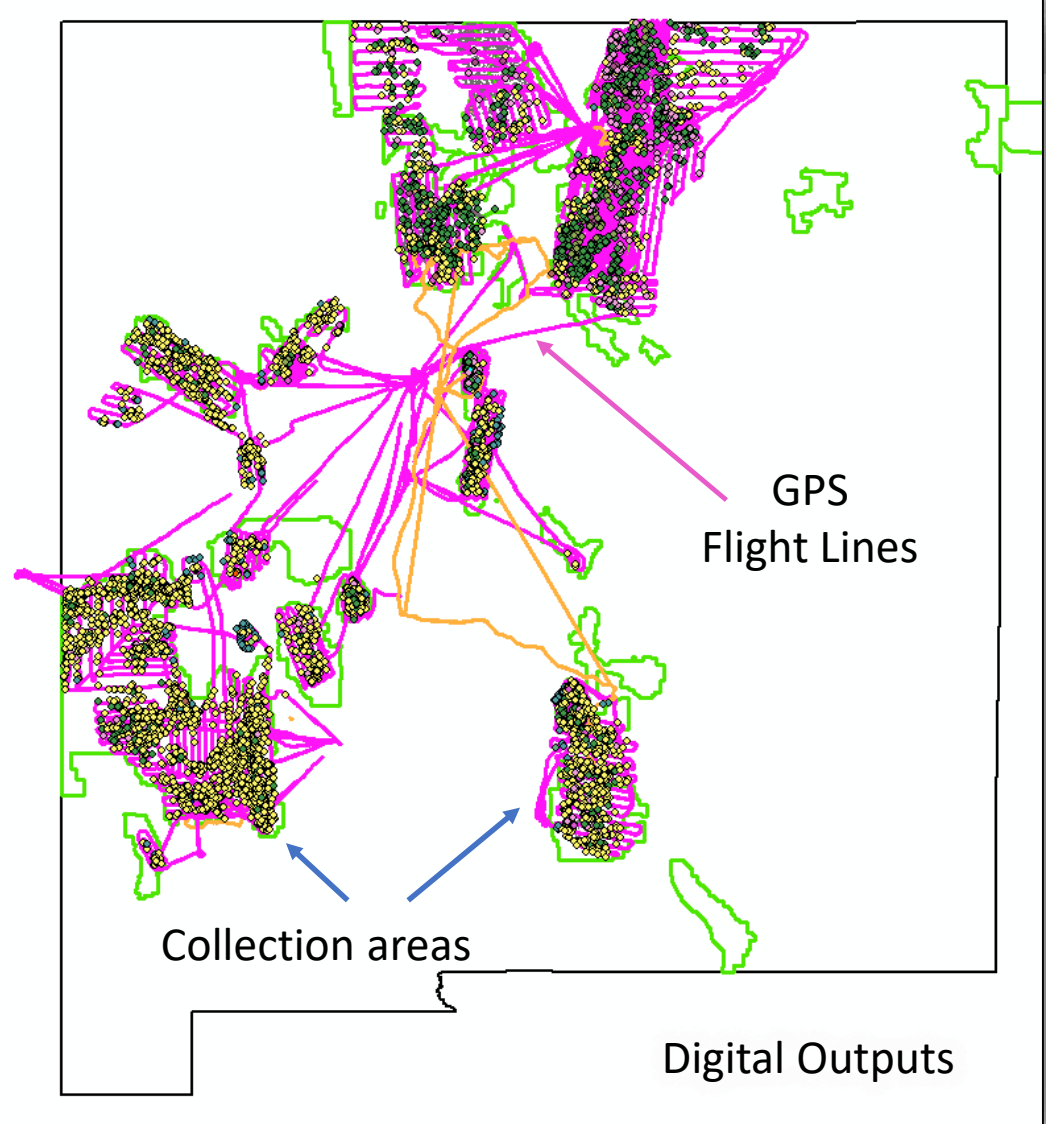
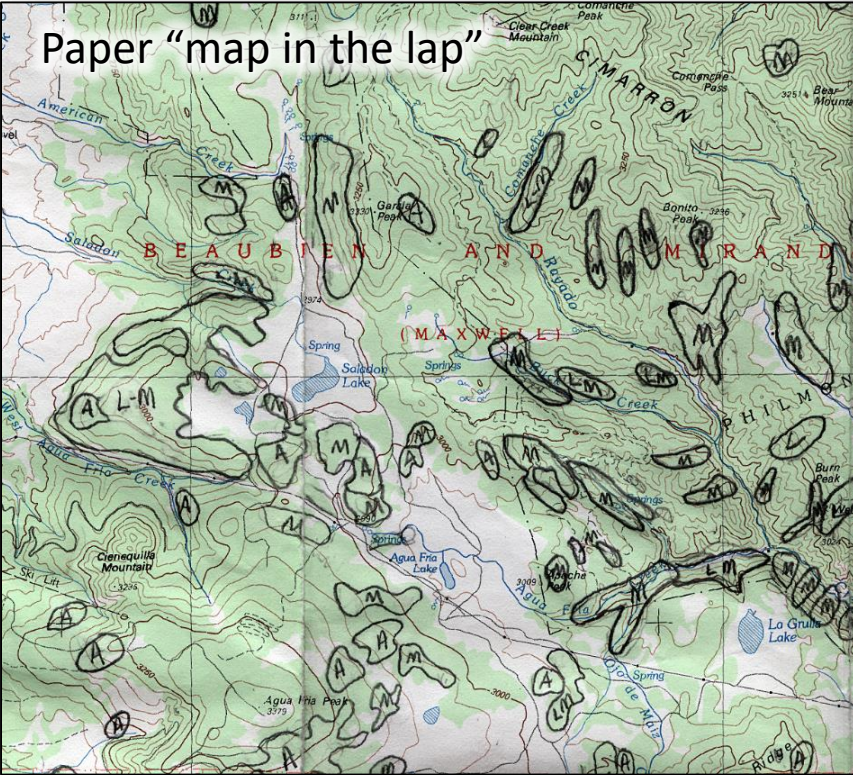


# Background Data





# Post-Processing





# ArcGIS Online

Home Gallery Map Scene Groups My Content My Organization ☰ Daniel



## U.S. FOREST SERVICE

Caring for the land and serving people

USDA HELENA-LEWIS & CLARK NF

DISCOVER OUR RENTAL CABINS AND LOOKOUTS

Discover Rental Cabins and Lookouts on the Helena-

2016 ANNUAL REPORT

CONNECTING PEOPLE TO THE

work together through PARTNERSHIPS AND COLLABU

USDA Web App Southern Research Station

Experimental Forests of the Southern Research Station

### Welcome to the U.S. Forest Service on ArcGIS Online

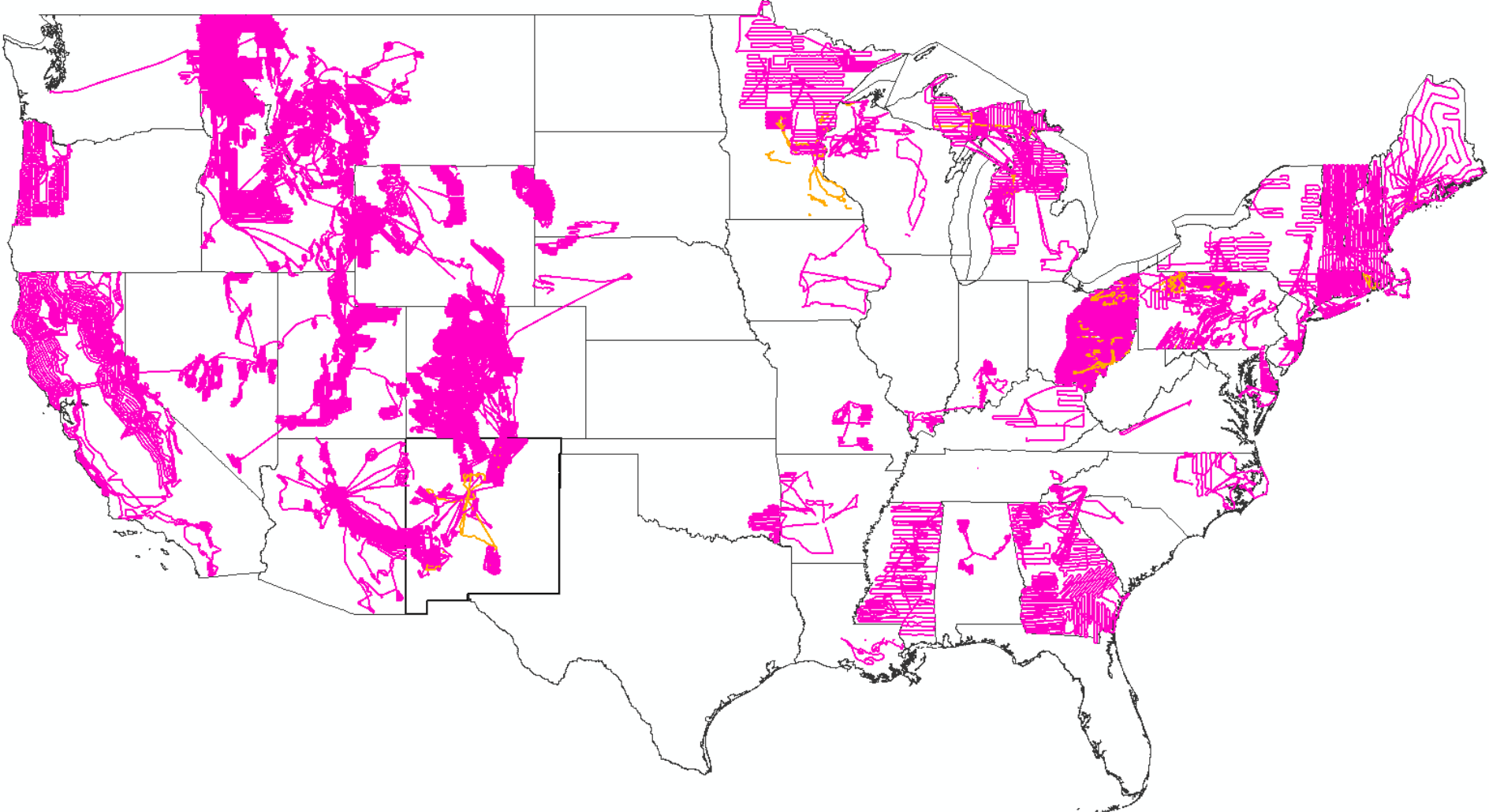
The U.S. Forest Service is using ArcGIS Online to share maps, data, and applications for use by other federal agencies, partners, and the public. Users can find and use map services published by the Agency, together with their own data, to create web maps and web mapping applications.

[Request Access to USFS ArcGIS Online - Internal Site](#)

Esri.com | ArcGIS Marketplace | Help | Terms of Use | Privacy | Contact Esri | Contact Us | Report Abuse



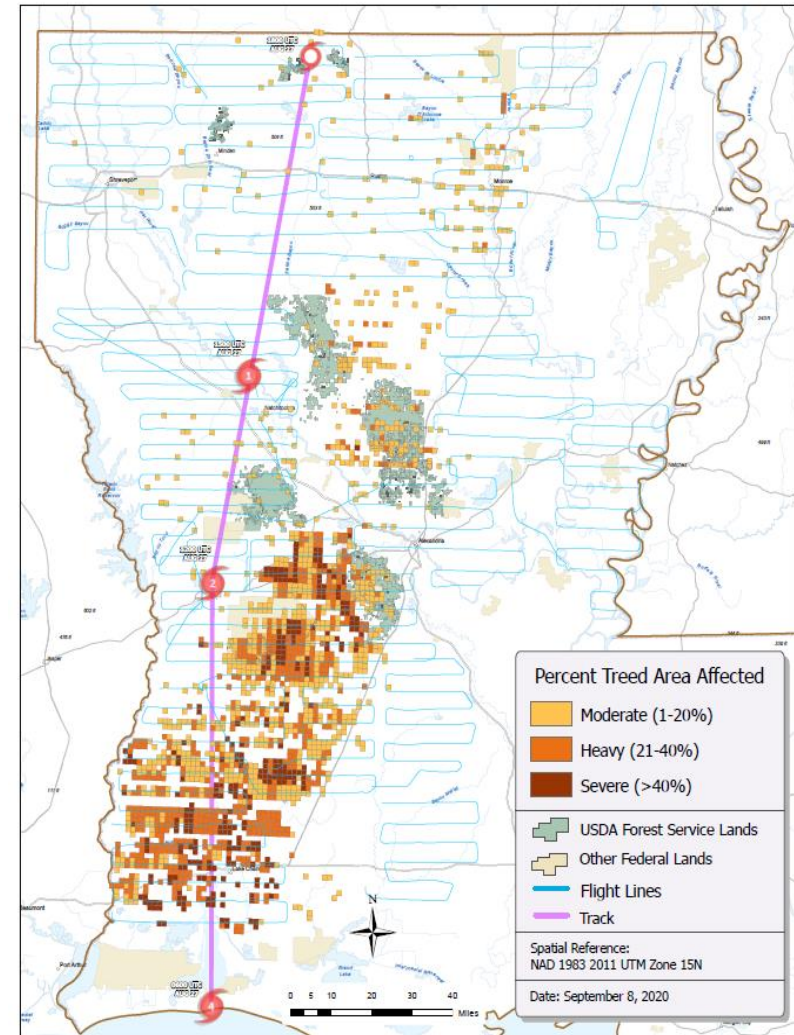
# National Database





# Other Applications

- Can also be tailored to serve in other mapping applications:
  - Invasive plant species
  - Wildfires
  - Hurricanes
  - Tornados
  - Floods



Hurricane Laura Damage  
Louisiana



Louisiana Department of  
Agriculture and Forestry



USDA Forest Service  
Forest Health Protection  
Southern Region



# Equipment Recommendations

## Recommended Equipment

### Tablets

Samsung Galaxy Tab S4 10.5" [SM-T830NZKAXAR](#)

SCREEN SIZE	RAM (GB)	CPU (GHz)	OS	POWER (HOURS)
10.5	4	2.35	Android 8.0 Oreo	~18
INTERNAL STORAGE (GB)	EXTERNAL STORAGE (GB)	PRICE	OTTERBOX	NOTES
64 or 256	400	\$600-\$700	<a href="#">\$90</a>	S-pen



*Note: Samsung no longer makes the S4 tablet and it's no longer available on contract. Our tech specialists will be testing Samsung ActivePro tablets soon and are looking forward to Samsung's new S7 tablets.*



# Equipment Recommendations

## Additional Recommendations

---

### Memory Card

#### 128GB

- [Sandisk Extreme 128GB microSDXC UHS-I Card](#)
- [Samsung 128GB 95MB/s PRO Select Micro SDXC Memory Card](#)
- [SanDisk Extreme Plus 128GB Micro SDXC UHS-1 Card](#)
- [Samsung 128GB 100MB/s \(U3\) MicroSDXC EVO Select Memory Card](#)

#### 64GB

- [SanDisk Extreme 64GB microSDXC UHS-I Card](#)
- [Samsung PRO Select 64GB 95MB/s MicroSDXC Memory Card](#)
- [SanDisk Extreme PLUS 64GB microSDXC UHS-I/U3 Card](#)
- [Samsung 64GB 100MB/s \(U3\) MicroSDXC EVO Select Memory Card](#)

#### 32GB

- [SanDisk Extreme PLUS 32GB microSDXC UHS-I/U3 Card](#)
- [Samsung 32GB 95MB/s PRO Select Micro SDHC Memory Card](#)
- [SanDisk Extreme 32GB microSDHC UHS-I Card](#)



# Equipment Recommendations

## Bluetooth GPS

### [Bad Elf GPS Pro](#)

**FHAAST recommends this unit** because it features a large, backlit LCD screen that lets you see your location, speed, heading, altitude, and GPS lock status at a glance, which can be very helpful.

FHAAST has also successfully tested the DMSM application with some older GPS receivers from Emtac, Garmin, G-Sat, Holux and Qstarz.

There is an additional requirement of the application "[Bluetooth GPS](#)" from GG MobLab being installed on the tablet which can be found for free in the Google Play Store.



**FHAAST** = Forest Health Assessment & Applied Sciences Team



# Questions

---

Everett Hinkley

National Remote Sensing Program  
Manager

[Everett.Hinkley@usda.gov](mailto:Everett.Hinkley@usda.gov)

