



Georeferenced PDFs On Android And iOS Devices Support Wildfire Operations

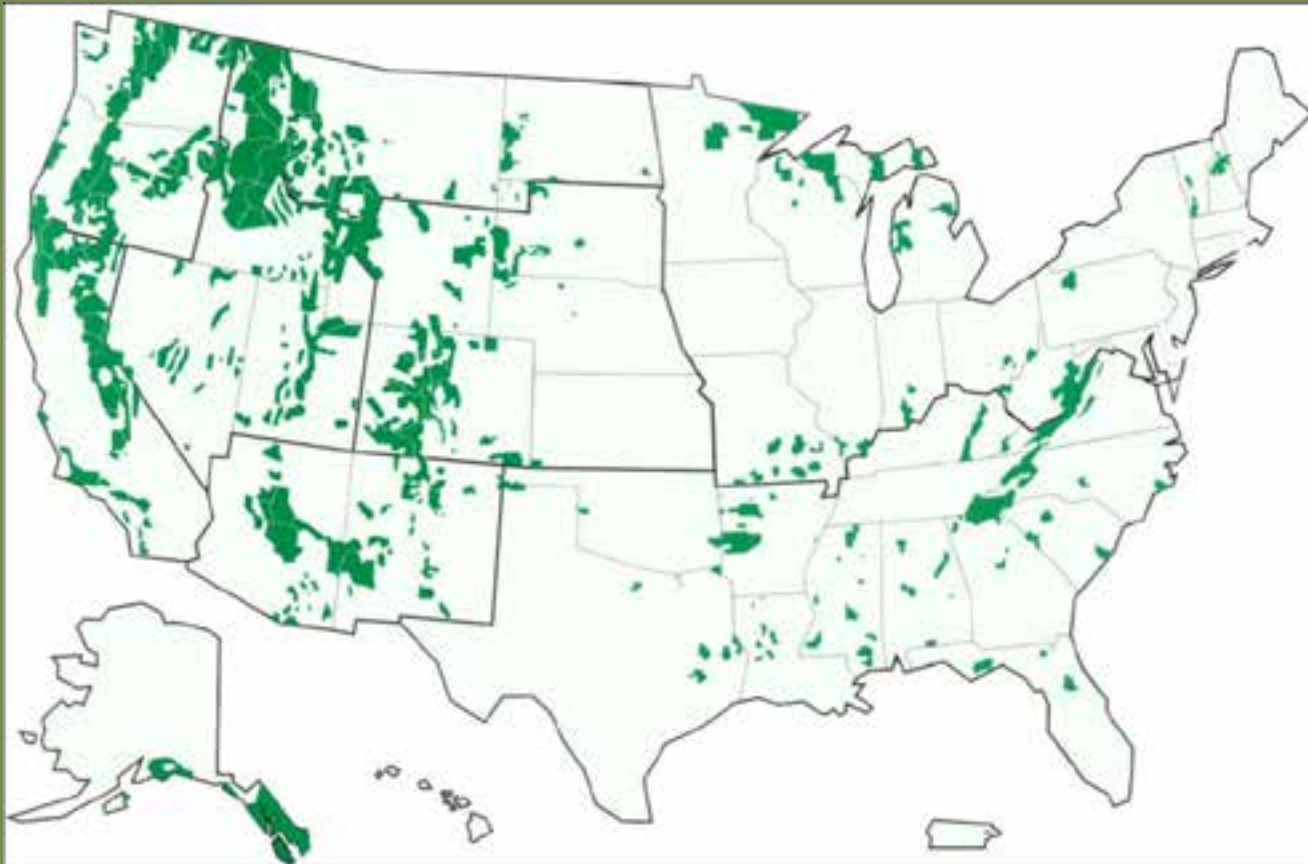


Carl Beyerhelm
Resource Information Specialist
Coconino National Forest



The National Forest System

- Part of the U.S. Forest Service, an agency within USDA
- 296 NFS units manage 193 million acres of forest and grassland in the U.S. and Puerto Rico





USDA FOREST SERVICE

Wildland Fire





Background...

- Wildland fire operations are carried out under the Incident Command System (ICS)
 - Planning
 - Operations
 - Logistics
 - Public Information
 - Finance
- Hundreds to thousands of personnel
- Thousands to hundreds of thousands of acres
- Self-sufficient fire camps spring up overnight





Maps Are Needed...



- Maps to support
 - Planning
 - Operations
 - Logistics
 - Public information

- Two map cycles per day
 - Update content
 - Print or plot hundreds of maps





USDA FOREST SERVICE

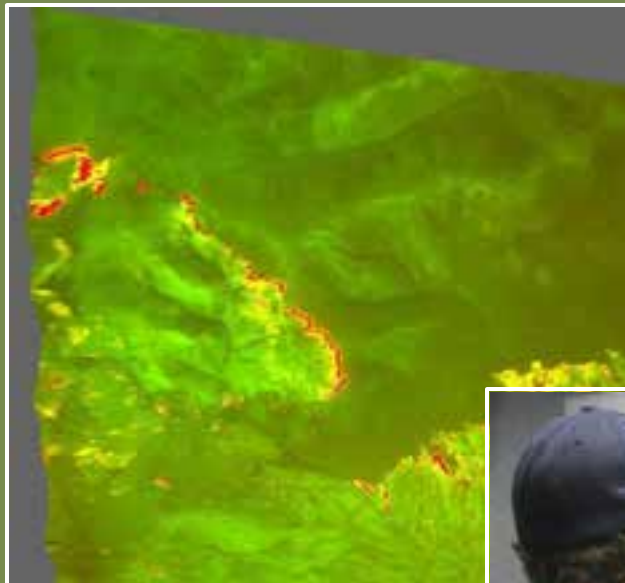
Many Customers...





Map Intel Sourced From...

- Nightly IR flights



- Aerial recon



- Debrief line personnel



- Talking with locals



Not A Job For Slackers...



- GIS specialists may be on staggered 16-hour shifts, 24/7

- On-site copy service for small format maps
- Plotters for large format map orders





Hardcopy Map Limitations...

- Plotters are slow, require attention
- Contract plotter service is expensive
- Maps can be bulky, inconvenient to handle
- Reduced situational awareness
 - Dark
 - Smokey
 - Unfamiliar with local terrain, features, access routes
 - Inexperienced navigating by reference to a map
- Travel time required for physical delivery of hardcopy maps to outlying locations requires compressed map production schedule
- Georeferenced PDFs on mobile devices offer alternative

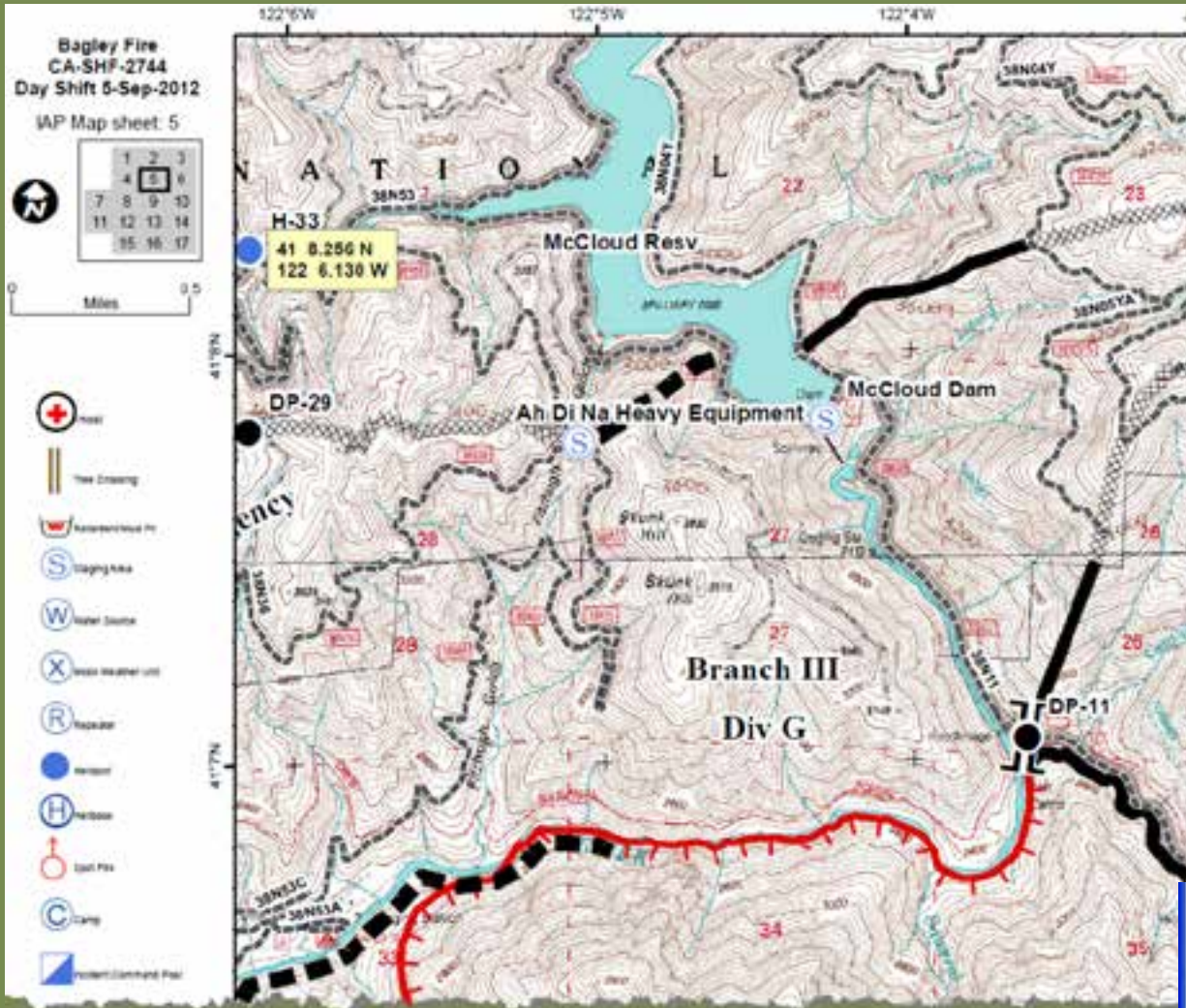


Mobile Map Advantages...

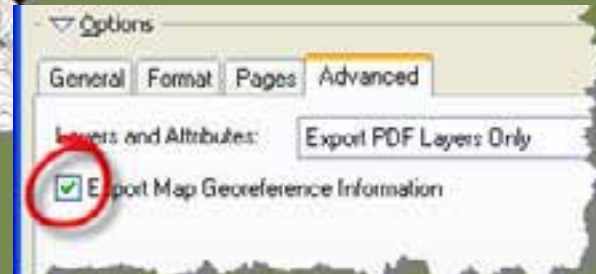
- Map content is cached on device
 - Continuous data streaming is not required
 - Data service coverage is not required
- Android and iOS devices are becoming common
- Indicates current GPS position
- Content is easy to:
 - Produce
 - Distribute
 - Retrieve
- Content is free
- Maps are easy to use
- Opportunities for feedback



Create Map Content...



- Use ArcMap to create map layout
- Export layout as georeferenced PDF
- Super-easy








Distribute Map Content...





- Post
 - HTTP(S), FTP, IP
 - DropBox, Google Drive, etc.
- Retrieve (the weak link)
 - Wireless – QR, WiFi, 3/4G
 - Wired – PC, iTunes account

**Whitewater-Baldy
Complex
NM-143-GU3S
Air Attack Map**
6-8/2012 Day Shift
UTM Zone 12 NAD 83



Legend

 Camp	Fire Line
 Drop Point	 Uncontrolled Fire Edge
 Helispot	 Completed Dozer Line
 Incident Command Post	 Completed Line





View And Use Map Content...



Avenza PDF Maps app - Free

For iPhone, iPad,
and iPod Touch
running iOS 5.0+

For Android 4.0+





Geospatial PDFs At Work...

- Live, in-hand map



- Burning out line



- ID retardant avoidance

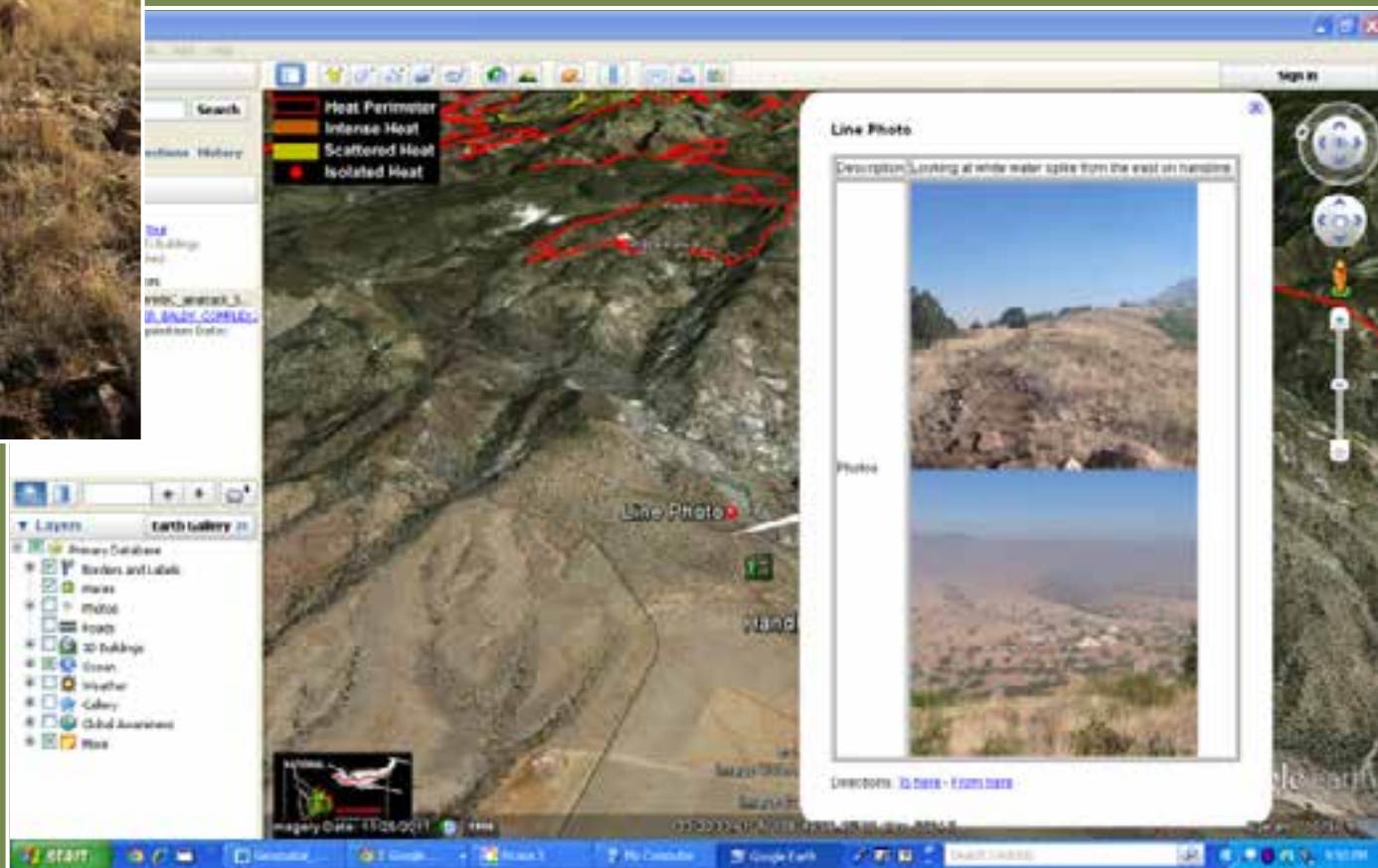
- Helo recon



A Little Crowd Sourcing...



- E-mail waypoints and photos as KMZ
- Python script sweeps KMZ folder and appends to ArcGIS feature class





Pros...

- + Content is easy to produce and distribute
- + Data service is not required to use maps
- + Bypass the overhead and costs of other map services
- + All marginalia is included
- + Map insets are active
- + Waypoints and photos can be e-mailed
- + App is easy to use, and has good support
- + GPS positioning increases situational awareness
- + Print fewer hardcopy maps
- + Maps can be released immediately
 - No plotter, printer, or publishing delay
 - No assembly required
 - No shipping or transportation required



Cons...

- Large file size can slow wireless download
- Wireless service may be limited, or non-existent
- Content is not live or interactive, like map services are
- May be hard to get the “big picture” on a small screen
- No “track up” with centered GPS positioning
- Feature labels may be off-screen
- No auto-update of expired maps
- Opportunity for user distraction
- Device battery life may compromise extended map use
- Depends on PC, WiFi, or 3/4G to cache map content



So, Tell Me How It Works Again...

- Create georeferenced PDF content using ArcMap
- Post content to http, ftp, DropBox, Google Drive, etc.
- Retrieve content
 - Wireless – QR code, WiFi, 3/4G
 - Wired – PC, iTunes account
- View and use map content in Avenza PDF Maps app
- A quick demo if time permits...

