Wildland Fire GIS: Day in the life of a GIS Specialist (a 16 hour day)

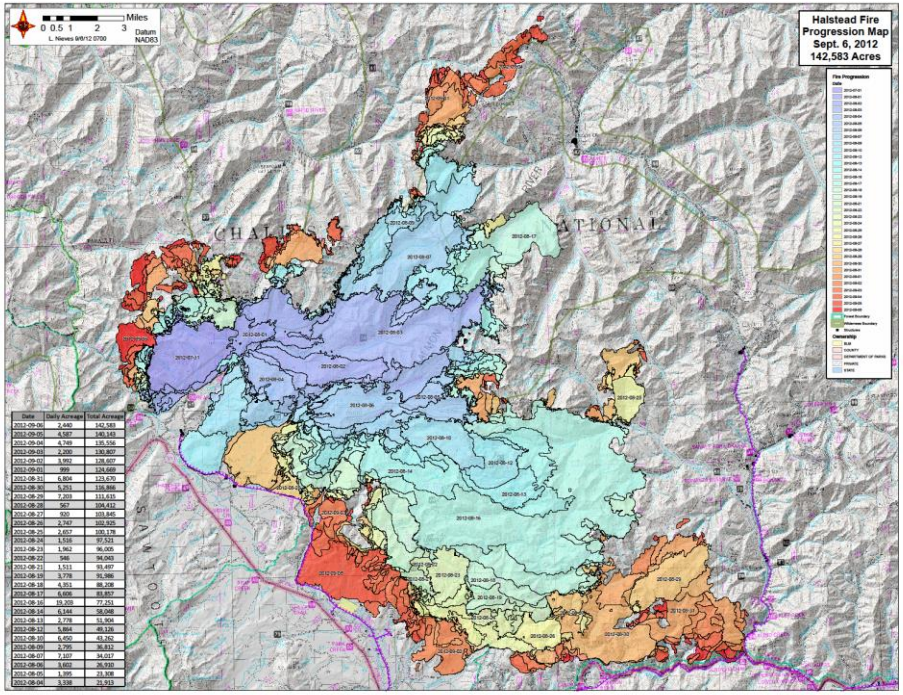
An out-of-office-experience!

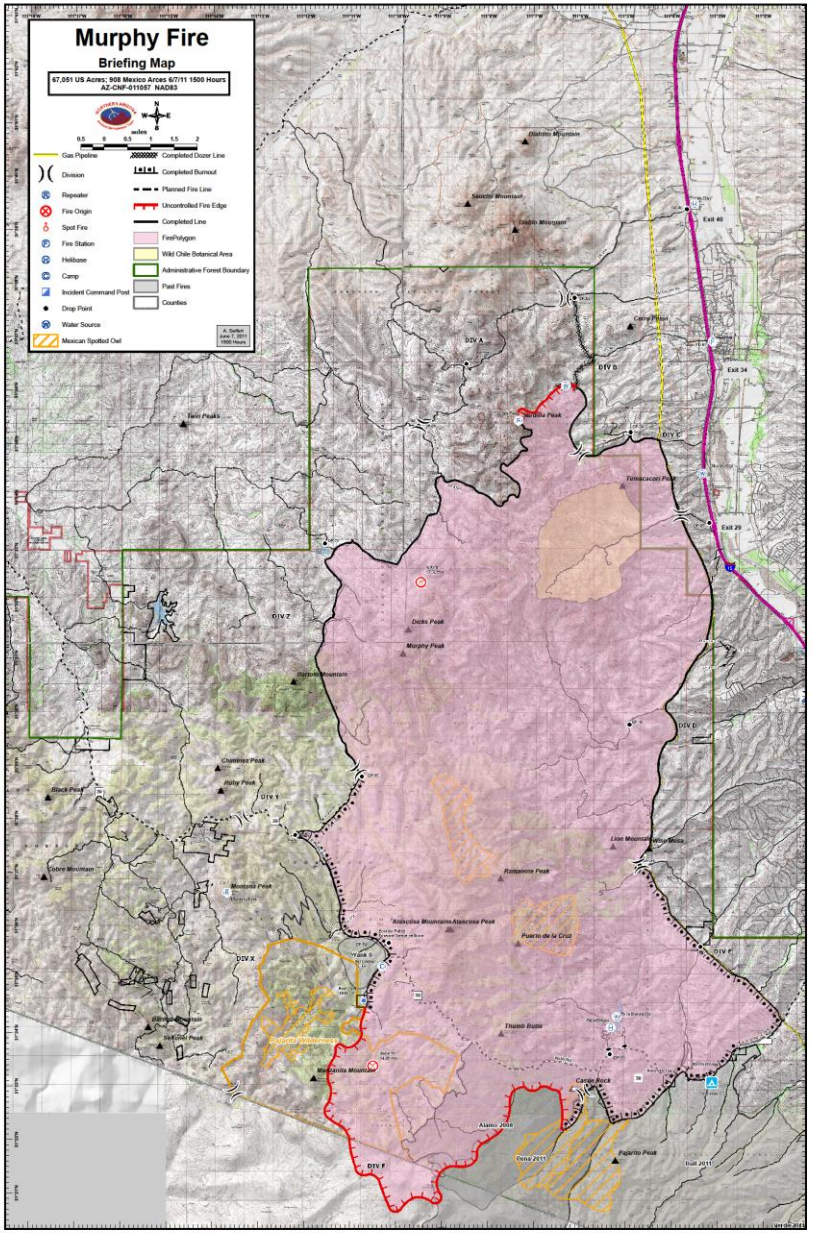
Aaron Seifert, GISP
GIS Specialist

Contents

- Overview Wildland Fire Incidents & ICS
- Agreements, Training, & Preparation
- The Assignment: 1st & 2nd operational periods
- Gathering updates – all the time
- Various Core, Additional, Mobile & Special Maps
- Daily Operations, Planning Cycle & Teamwork
- Rhythm (Groundhog Day) & Glide Path
- Transition – not there forever
- Checkout
- Recovery
- GIS Details
  - Setup
  - Standards
  - Tools

What does it take to setup a mobile GIS "office" and produce maps like these?





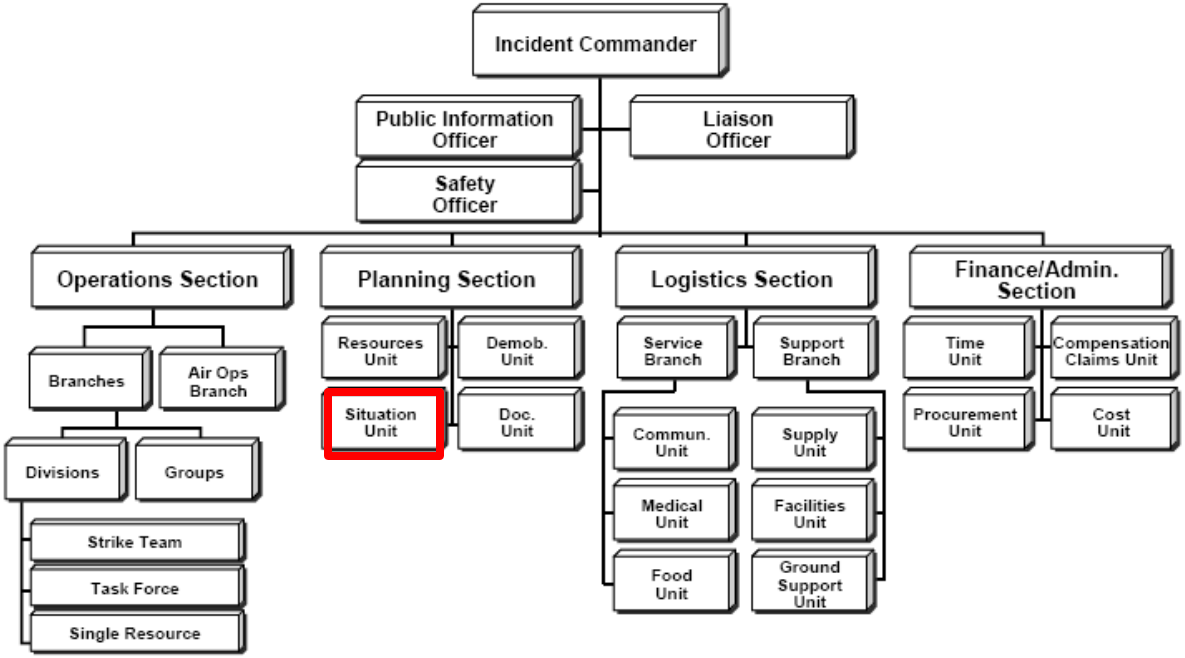
Overview of Wildland Fire Resources

- As the incident becomes more complex there is a need for more and more resources
- Resources are: Crews, Engines, Helicopters, & Incident Management Teams (IMT) They all have Types; 1 highest level to 4 or 5 at lowest level
- Resources can work for 14 days (can extend up to 21 days with approvals) plus 2 days of travel. Then require 2 days off before returning for another 14 days plus 2 days of travel
- Using Incident Command System, as more resources are added, more Overhead resources are required to properly manage those OPS resources and safely operate
- There are a many formal Type 1, 2, and 3 IMT of Overhead resources across the nation and divided up by geographic areas (1 highest level to 3 at lower level)
- Each geographic area has their IMT and set rotation schedules by area or date

Incident Command System

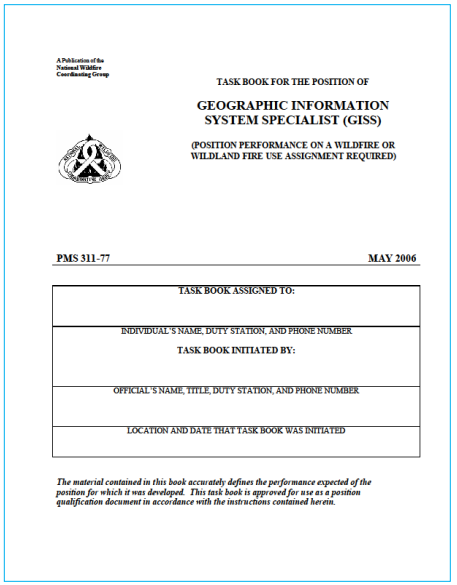
- Each IMT has Overhead resources in 4 Sections
- Each Section has it's Branches or Units
- A GIS Specialist (GISS) is part of the Situation Unit, within the Planning Section

An ICS is based upon a flexible, scalable response organization providing a common framework within which people can work together effectively. These people may be drawn from multiple agencies that do not routinely work together, and ICS is designed to give standard response and operation procedures to reduce the problems and potential for miscommunication on such incidents for a variety of events.



Training

- Many positions require specific training
- Required: S-190 & S-130 (Wildland Fire) with annual review and a Pack Test
- GIS Specialist for Incident Management S-341, not required but very, very helpful.
- Need to know data management, quick cartography, GPS use/data transfer, heads up digitizing, being able to troubleshoot problems a plus
- Start as a Trainee to become Qualified: Taskbook
- http://gis.nwcg.gov/index.html


A Publication of the National Wildfire Coordinating Group

TASK BOOK FOR THE POSITION OF

GEOGRAPHIC INFORMATION SYSTEM SPECIALIST (GISS)

(POSITION PERFORMANCE ON A WILDFIRE OR WILDLAND FIRE USE ASSIGNMENT REQUIRED)

PMS 311-77 MAY 2006

TASK BOOK ASSIGNED TO:
INDIVIDUAL'S NAME, DUTY STATION, AND PHONE NUMBER TASK BOOK INITIATED BY:
OFFICIAL'S NAME, TITLE, DUTY STATION, AND PHONE NUMBER
LOCATION AND DATE THAT TASK BOOK WAS INITIATED

The material contained in this book accurately defines the performance expected of the position for which it was developed. This task book is approved for use as a position qualification document in accordance with the instructions contained herein.

Agreement

- If with a Federal Agency, no agreement needed
- If with Fire District/Department, tied to State Forestry, no agreement needed
- For all others: An Emergency Equipment Rental Agreement is required to get reimbursed
- Details on equipment with operators with rates for mileage and daily costs
- Entered as a single resource in ROSS
  (Resource Ordering and Status System)

Page _1__ of _2__

ARIZONA STATE FORESTER'S

EMERGENCY EQUIPMENT RENTAL AGREEMENT

	STATE FORESTER'S AGREEMENT NUMBER 02-089-12
(1) CONTRACTOR Flagstaff Medical Center Guardian Medical Transport	(2) STATE FORESTER'S DISTRICT OFFICE Flagstaff
(3) ADDRESS PO Box 1905	(4) ADDRESS 3650 Lake Mary Road
(5) CITY, STATE, ZIP CODE Flagstaff, Arizona 86002-1905	(6) CITY, STATE, ZIP CODE Flagstaff, Arizona 86001
(7a) DAY PHONE NO. (7b) EMERGENCY PHONE 928-773-7868 24H 928-773-7868 24H 888-299-2145 928-606-6160 CELL	(8) PHONE and FAX 928-774-1425 PHONE
(7c) FAX NUMBER (7d) EMAIL ADDRESS 928-773-2308 mark.veriuti@nahealth.com	Arizona Forestry Division Website http://www.azsf.az.gov/
(9) CONTRACTOR SSN / FEDERAL EMPLOYER ID NUMBER 860110232	(10) EFFECTIVE DATES OF AGREEMENT BEGINNING 3/31/2012 ENDING 3/31/2013
(11) WORK RATE BASED ON ALL OPERATING SUPPLIES FURNISHED BY: [X] CONTRACTOR (WET) [ ] STATE (DRY)	(12) OPERATOR FURNISHED (PAID) BY [X] CONTRACTOR [ ]STATE

(13) EQUIPMENT DESCRIPTION List ICS Type, make, model, year, serial numbers, accessories, gross vehicle weight, horsepower, gallons, Unit #, License #, Vin. #	(14) NUMBER OF OPERATORS	RATES				
		(15) WORK OR DAILY		(16) SPECIAL		(17)GUARANTEE
		RATE	UNIT	RATE	UNIT	(See clause 7)

Prepare/Pack for an assignment

- Network to get an assignment or apply to an IMT as trainee/qualified
- Clothing – 14+ days
- Camping can be Cold/Hot/Wet/Windy

- Laptop w/ Admin rights
- ArcGIS, FIMT, DNRGPS
- General Office Supplies
- Optional: USB 1-2 TB External Drive with base data

The Incident Assignment…

- Orders
  - Will get a phone call from Dispatch, if available in ROSS they produce Orders
  - Emailed Orders with Location & Name of the Incident & Report time/date with location
  - Contacts are listed but ask how to contact SITL (Situation Unit Leader)

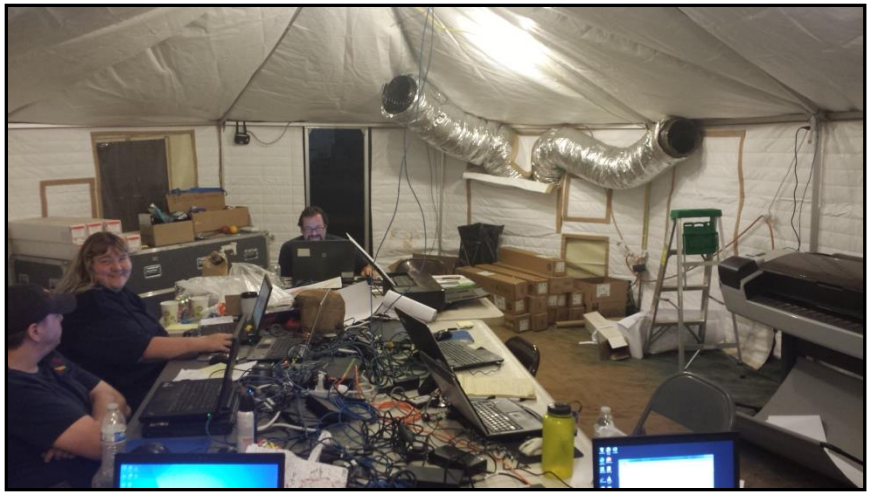
RESOURCE ORDER	Initial Date/Time	2. Incident / Project Na
OVERHEAD	06/14/12 1508	Poco
5. Descriptive Location Round Mountain on Pleasant Valley RD		6. TWN 10N
		LAT. 34 10 55 N LONG. 110 53 13 W
11. Aircraft Information		

- Transportation choices
  - Fly or Drive?
  - Travel could be out of pocket but will be reimbursed
  - Authorizations needed for flying or renting a vehicle when ordered
- Check incident information
- Arrival
  - Check In at Incident Command Post (ICP)
  - Meet SITL & other GISS
  - Go to work right away
  - Setup Tent and work location
  - Be prepared to be FLEXIBLE!

On Scene

- Getting local data
  - Already a GISS working on incident?
  - If not contact Local Agency for GIS data
  - Existing GIS work done?
  - Perhaps share a networked drive, laptop HD, or USB drives

- Setting up your workplace
  - Quiet as possible
  - Away from people & traffic
  - Clean power & isolated from the weather
  - Learn product daily deadlines from SITL & make a plan
  - Divide up work if multiple GISS at incident



Where will I work?

To Do

1st operational period products (what is left of it)

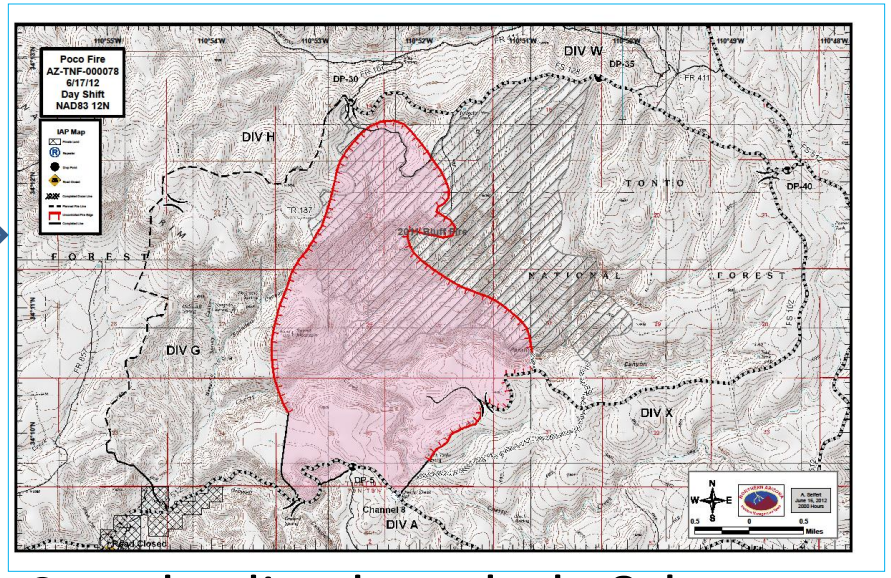
- Update maps with current status/data
- If nothing mapped yet - quick & dirty with whatever intelligence you get/find about fire perimeter and Operational Divisions via Situation Unit Leader (SITL)
- Better to get maps out in time then get everything perfect
- At least “STANDD”: Scale, Title, Author, North Arrow, Date & Time, Datum, plus Legend, and Lat/Long Grid with tic marks
- Fire is moving fast and it will be different only hours later to change, fix, and reprint new maps for the next operational period in the morning
- Only have “16 hours” a day to travel, arrive, setup, and produce products

Work Quickly & Efficient

Just “Import” information into GIS so maps can be quickly printed

Updates drawn on a map

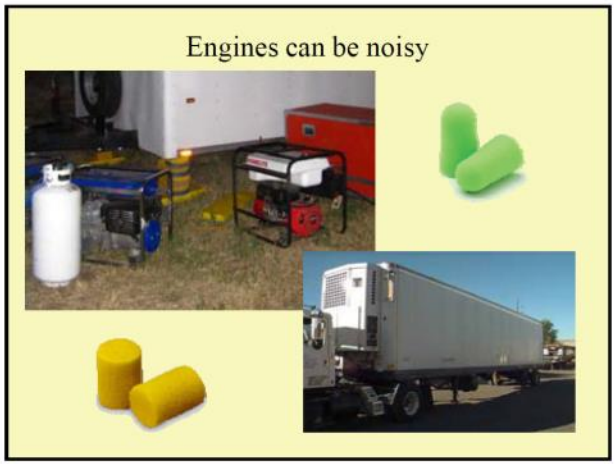
(take a picture of it)



Standardized symbols & layout

Oh yea, we are Camping

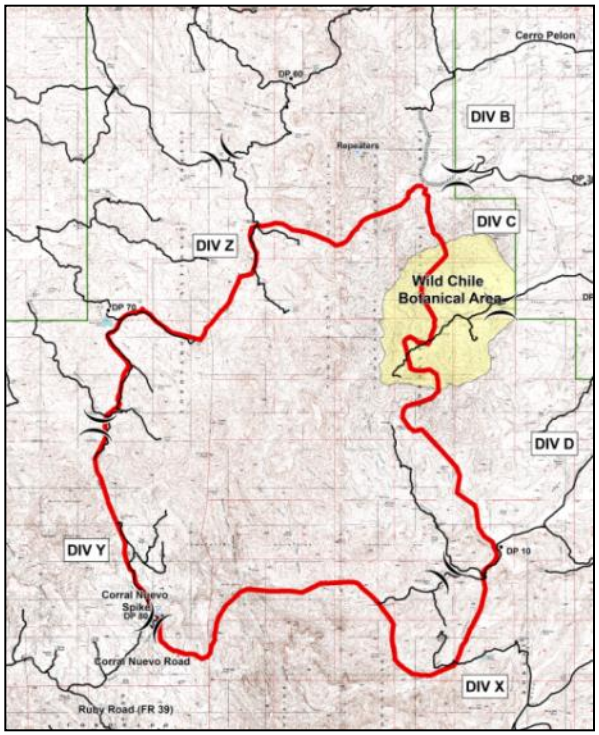
- Setup the tent – could be crowded and noisy
- Sleep & Breaks are important – don't get too far behind
- Rest could be short overnight and mid-day

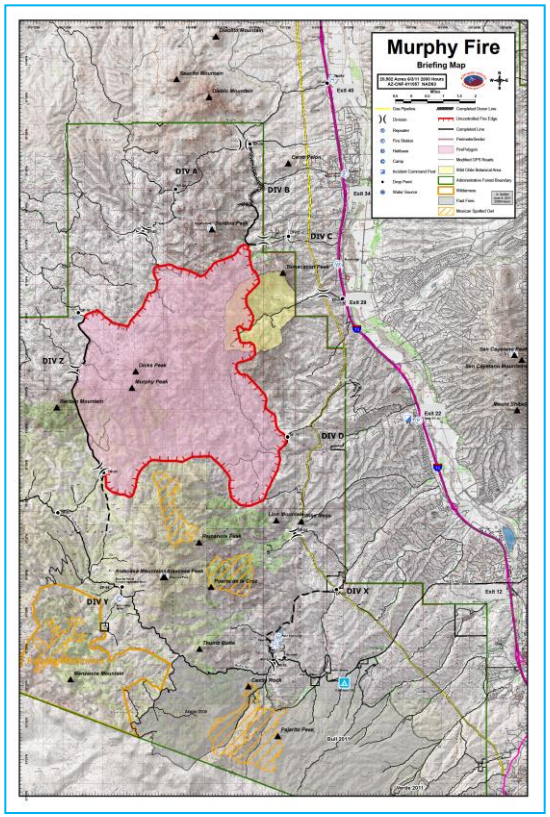


Next Day

2nd operation period: Standardization & into a Geodatabase using

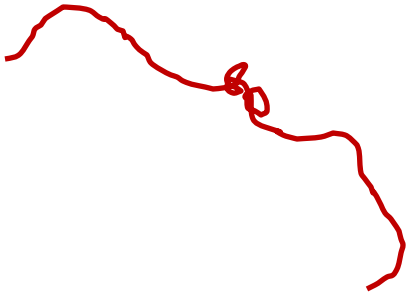
- FIMT (**F**ire **I**ncident **M**anagement **T**ools) a free Addin for ArcGIS
- GSTOP (federal **G**IS **ST**andard **O**perating **P**rocedures)





Updates come in Various Ways

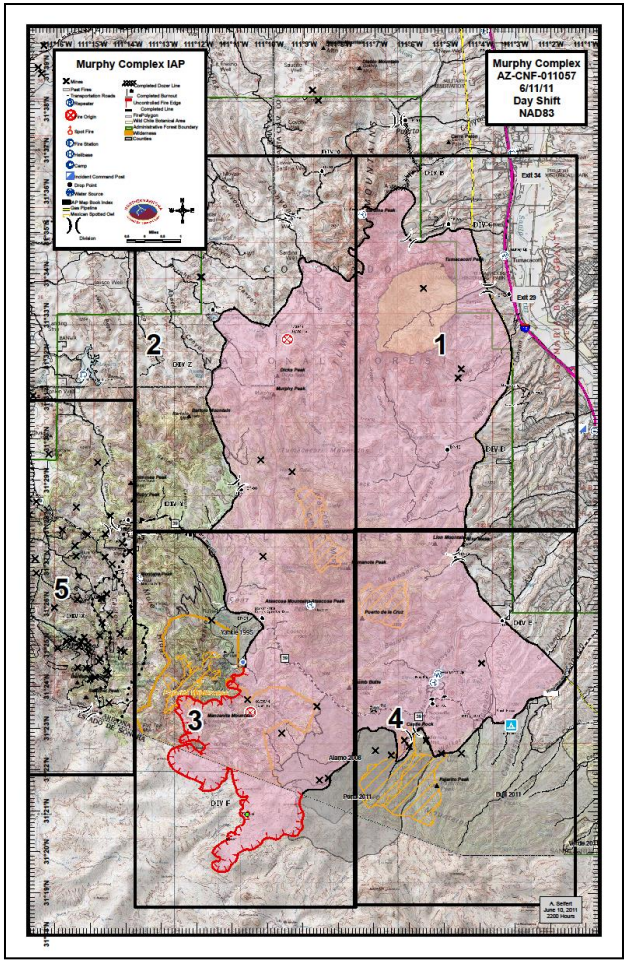
- Digitally
  - GPS tracks & waypoints, import with DNRGPS
  - Shapefiles via email or USB stick from others
  - Overnight Infrared Imagery captured & processed then delivered via National Interagency Fire Center (NIFC) FTP site



- Visually/Verbally
  - Hand-drawn on a map (take a picture with a smartphone)
  - Listing of coordinates (correct format?) or landmarks/roads

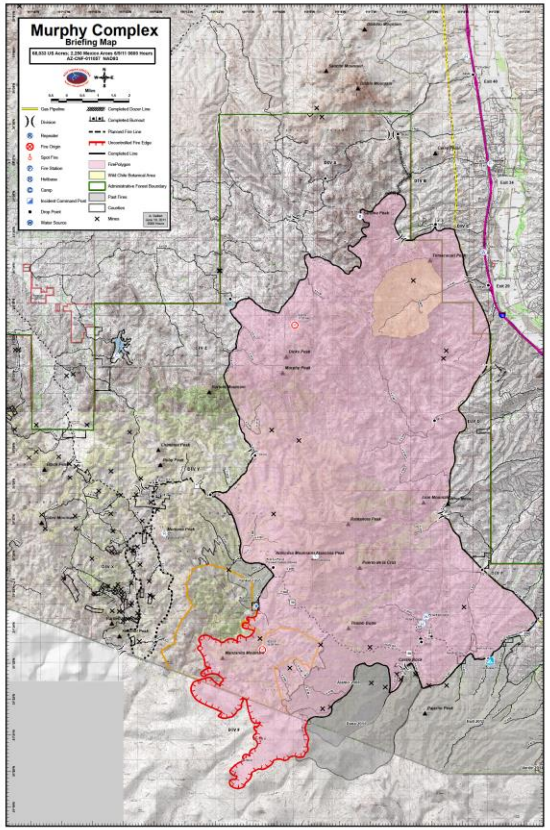
Core Maps…

- IAP Map
  (Incident Action Plan Map)
  - First map to make
  - 24k scale if can –> mapbook (determined by SITL)
  - Part of IAP document
  - Copied in mass amounts by others could be 100s/day – (from SITL)
  - Usually about 1 copy for each crew
  - Larger size map made for Operations

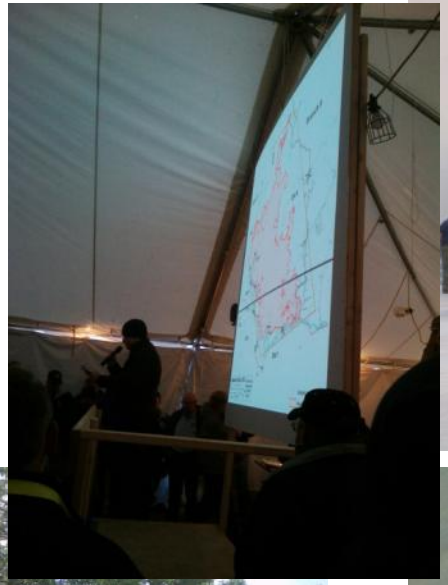


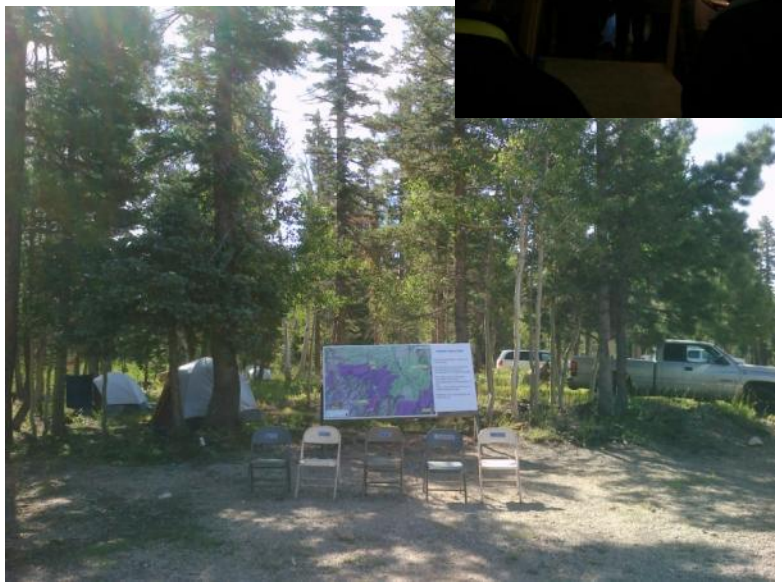
More Core Maps

- Briefing Map
  - As large as possible
  - “BAM” - Big A#$ Map
    Taped together large sheets/panels
  - Be able to read from across the room
- Planning Map
  - Same information but E Size (36x48)
  - Additional information for
    Strategy and Long Term Planning



Locations of Briefings & other meetings



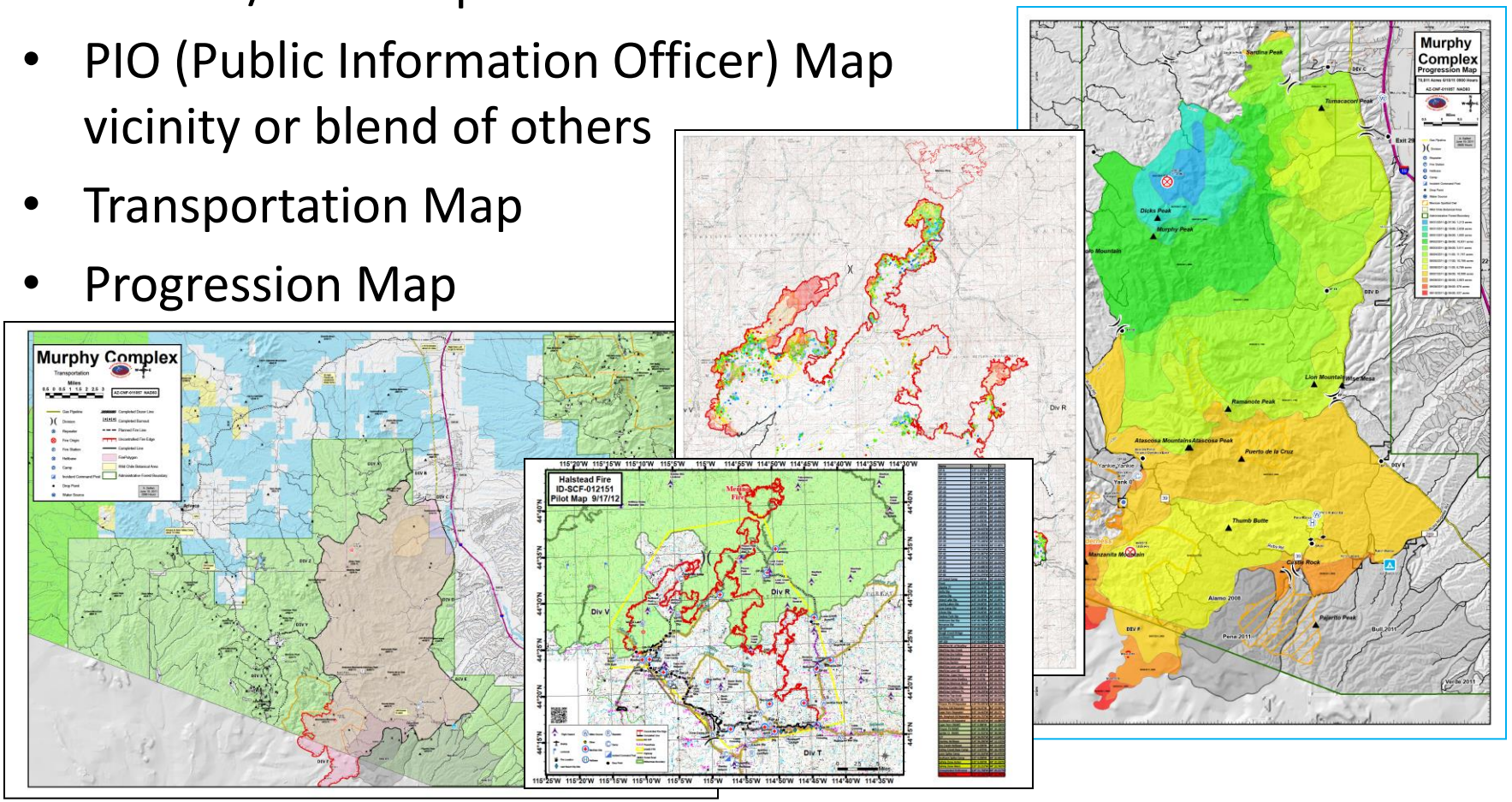


The real customers are on the line.

Line staff depend on our maps to do their jobs

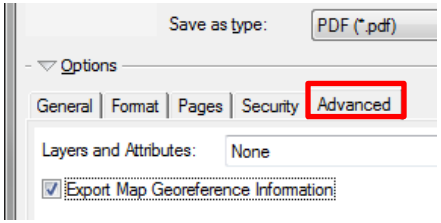
Additional Maps

- Aircraft/Pilot Map
- PIO (Public Information Officer) Map vicinity or blend of others
- Transportation Map
- Progression Map

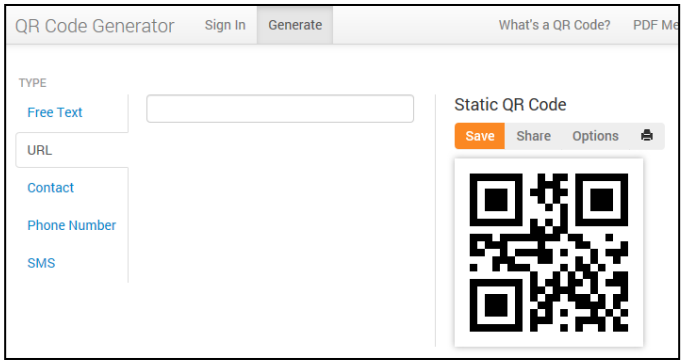


QR Codes & GeoPDFs

- Desktop Tools
  - Any map from ArcGIS in a Geographic or UTM Coordinate System then select export Georeference Information setting



  - Free internet QR Code creator using a URL to create the image file



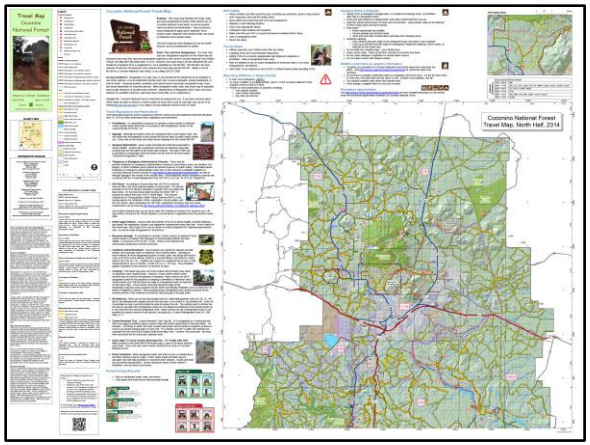
- Mobile Tools
  - Free QR Code scanning App to locate URL to download

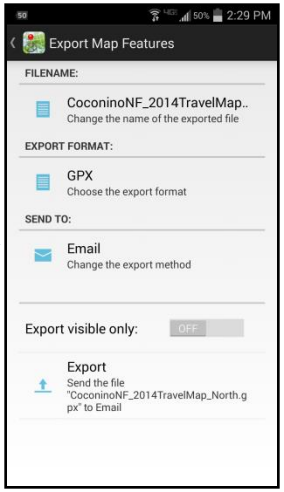
  - Avenza's free PDF Maps App for iOS/Android

QR Codes & GeoPDFs

- At Incident
  - How do field personnel get to cell service or WiFi to download daily updated maps
    - Incident Wifi?
    - Spotty cell service
    - Personal USB Wifi?
  - Once download & imported, PDF Maps just uses GPS on the device for location
  - In PDF Maps, placemarks (waypoints) & tracks can be saved & exported to send via email/Dropbox

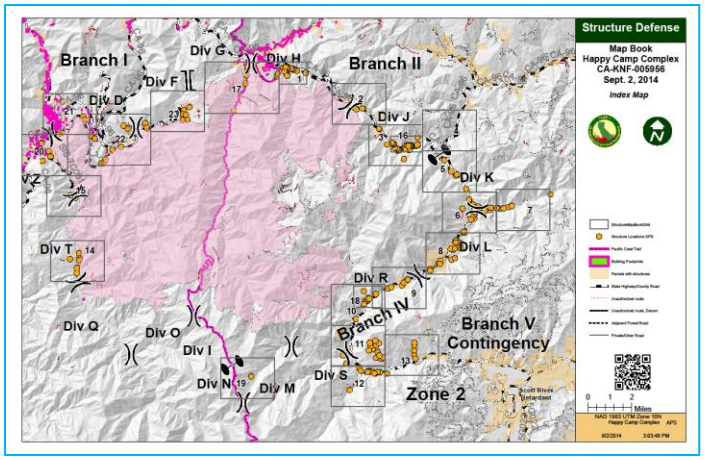
i.e. Motor Vehicle Use Maps:



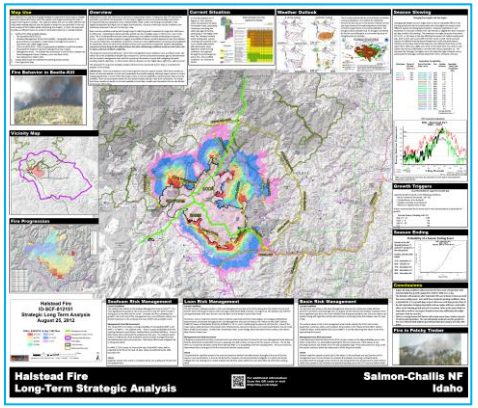


Special Projects

- Structure Protection/Defense Maps
  - Always a Map Book
  - Version of an Operations Map
  - Building footprints/point numbered to link to a list of details about each structure
  - FOBS/OPs gather and GISS assembles and links information
  - In testing with Southwest Fire IMTs: doForms App (custom form framework) for field collection by iOS/Android then uploaded to the cloud. Downloadable GPS coordinates, geocoded pictures, and text via a website by a GISS



- GIS Support for Fire Behavior
  - Fire Behavior several day forecast
  - Models using weather, vegetation, slope



We are part of the team

They must be right handed

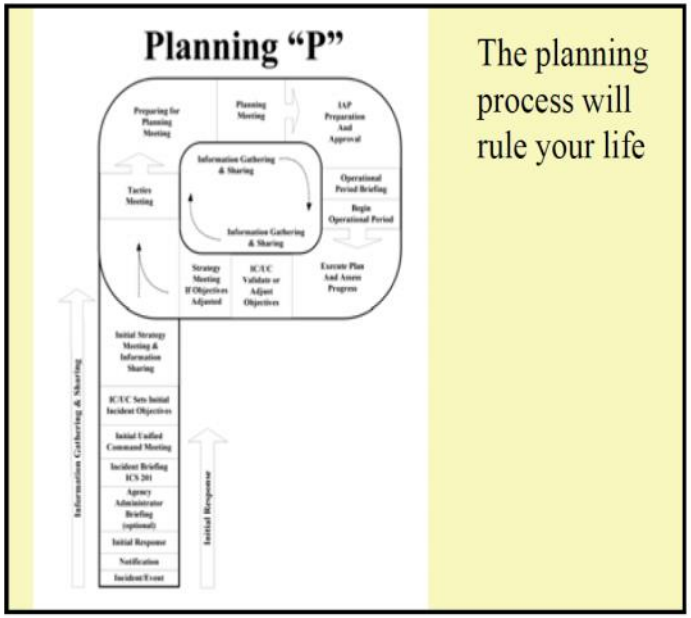
Sometimes there is a photocopy trailer

Early mornings of smoke – Briefing

Food is plentiful &
easy to get (so are germs)

Daily Operations

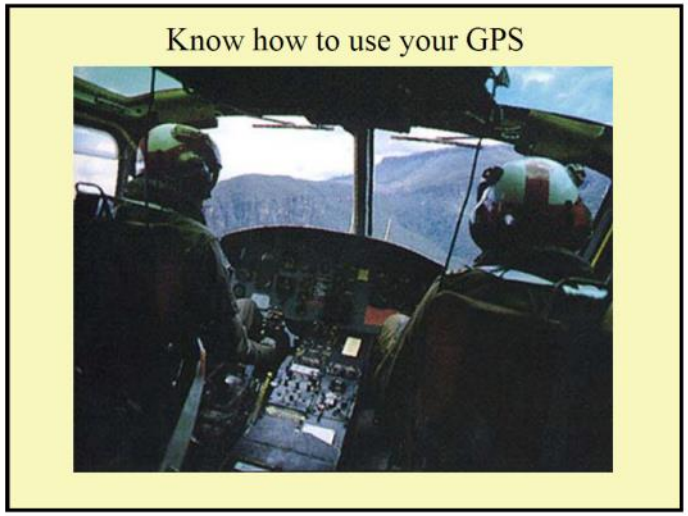
- Initial Response
  - Local Agency Briefing
  - Command Meeting
  - Information Gathering & Sharing
- Daily Cycle
  - Tactics Meeting
  - Pre-Plan & Planning Meeting
  - **IAP Preparation & Production**
  - Briefing & Begin Operation Period (Day/Night)
  - Execute Plan & Assess Progress
  - Strategy Meeting as Objectives need adjustment
  - All in a “maximum of 16 hours”

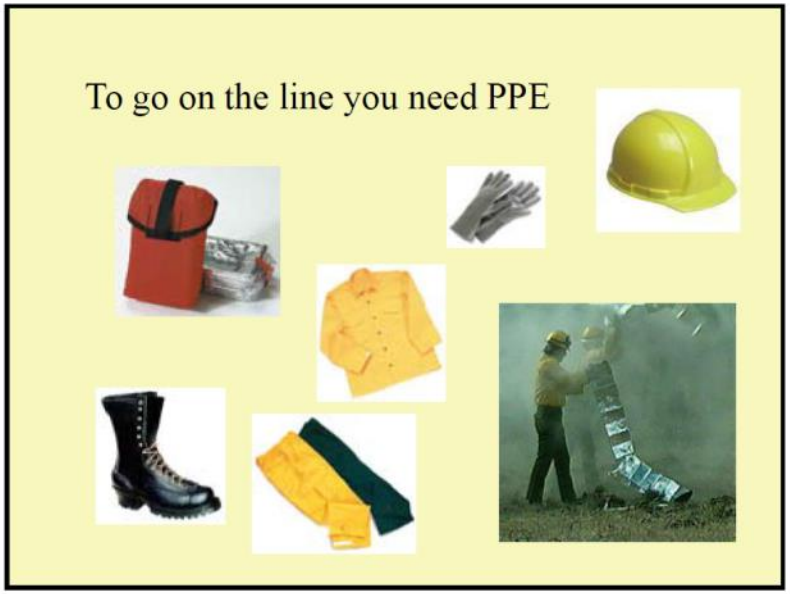


What the Daily Operations means to GIS

- About 4:00am processed Infrared Imagery available to download shapefiles & update maps then print some before morning briefing about 6-7am
- *Breakfast*
- By mid-morning Update Progression & Public Information Maps
- Mid-day update special project maps as needed, complete special requests as time permits – sleep?
- Throughout afternoon receive/collect map features to update
- About 5pm start getting information from management meetings and field operations
- *Dinner*
- Update maps – check with SITL/Planning for numbers of printouts
- Export & Print/Plotting (printing could take hours)
- Upload products and data to FTP site
- Backup external hard drives – printing done yet?
- 11pm-1am Go to sleep? If work not done yet stagger shifts with multiple GISS?

- There are times to get out of the “office”
- But if you go, know your stuff (GPS) and take your PPE (Personal Protective Equipment)
- Most of the time others bring data or sketches to you





Blackened fire perimeter from the air

Fire running in grass

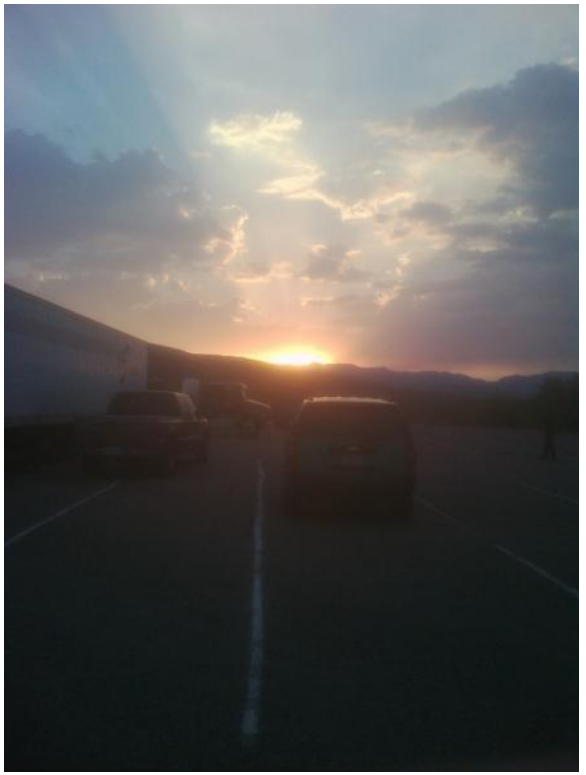
DC-10 “VLAT” dropping retardant

Pile burning to remove piles of fuels

- Other customers of our maps are the general public
- Public Meetings = additional requests for really big, entire wall maps – perhaps biggger BAMS or screen projection
- Smaller maps posted various places around the area
- Be mindful of your time:
  1st Operational maps
  2nd Special Requests and Public Maps unless fire management changes priorities (helped by SITL)

The Daily Grind/Repetition

- Each day forward will become steady rhythm (or Groundhog Day)
- Will find time during the day to get needed rest, especially if up early and to bed late



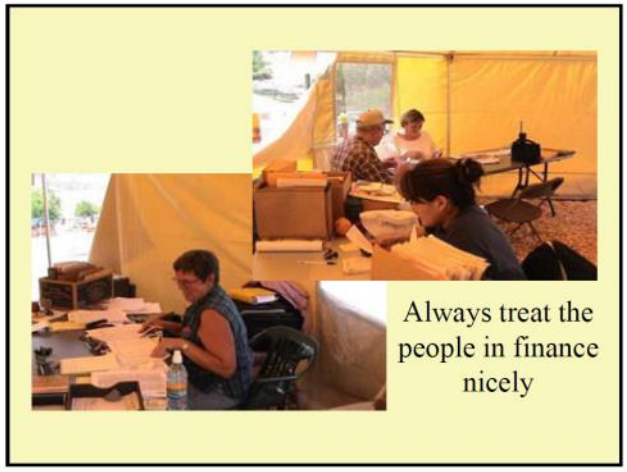
- Glidepath – as containment gets past ~50%
  - If maps were NOT made with relative paths and saved all layers within the GSTOP directories this is the time to do this or trouble to come
  - Gradual slow down of production however, rehabilitation of fire lines produces a steady flow of field information and have new need of maps to edit and print

Handing off your work

- Transition
  - Transition at the end of your 14+ days, to a smaller or larger IMT, or to the local agency
  - All GIS information needs to be standalone & portable, within GSTOP directory structure (remember this is why it was such a pain to start using naming conventions in the beginning)
  - Data is exchanged by the incident USB External Drive
  - Methods and major events are handed off by quick, concise conversation with the replacement GISS
  - Important to know what ArcGIS & FIMT versions incoming resources will be using (and GIS experience)

How many hours did I work?

- Things will slow down if the fire is past 50% contained - so get extra rest
- Need to checkout properly
- Travel home
  - After 14 days x 16 hours you have compressed a month of regular work into 2 weeks YOU WILL BE TIRED
  - Most of the accidents related to a wildland fire incident are traveling to and FROM the incident so take your time



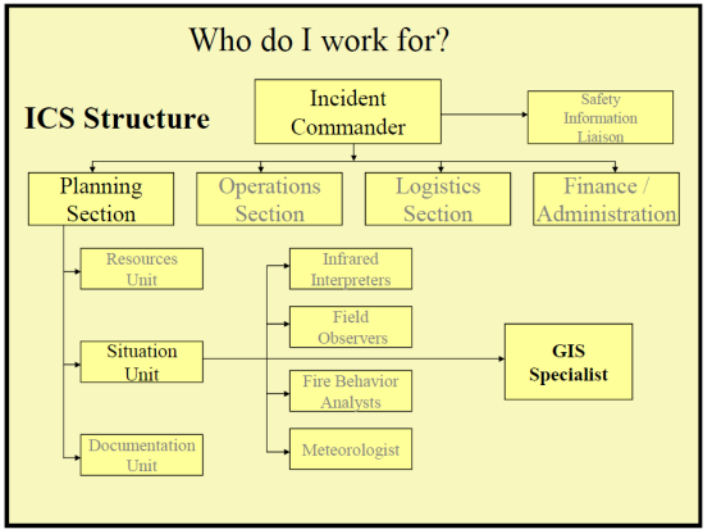
Recovery

- Ahhh, just take a couple days off when you return and think of the extra money that will be soon in a paycheck!

Jump back into the details…

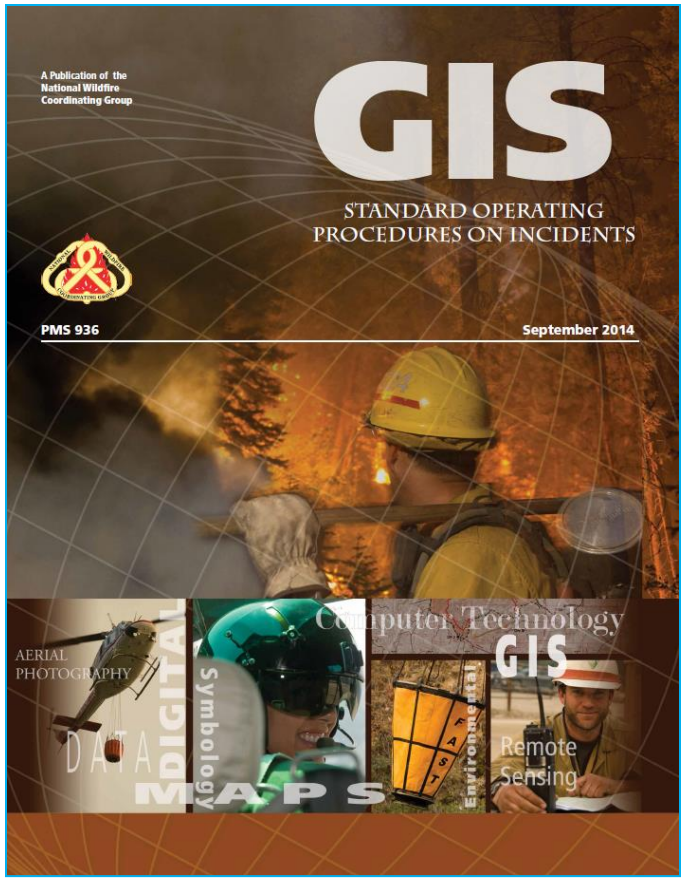
Further Details - Setup

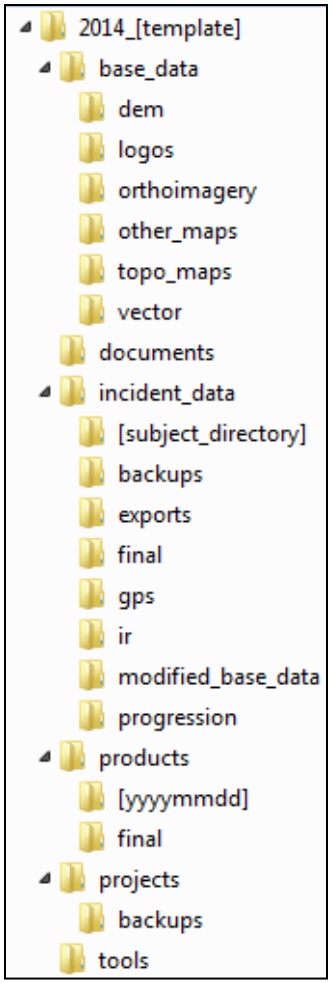
- Good to have Minimum Essential Datasets (USGS Topo image files, Statewide roads, lakes, streams, ownership, federal & state boundaries, cities, Geographic Names) on an External USB Drive
- Multiple GISS only way to share is networked external drive (NAS) or shared laptop drive hooked to a switch with Ethernet cables
- Plotters can be directly connected a laptop or to a switch with Ethernet cables
- USB is used for smaller format printers
- Internet? So many tasks need internet but it can take days to setup it can't use the building's internet therefore satellite
- Good to have a 3G or 4G hotspot to connect to (if cell reception)
- Work with SITL to learn who get updates to/from, when, how, where (Use ICS)



Further Details – Standards…

- GSTOP (**G**IS **St**andard **O**perating **P**rocedures)





Further Details – Standards…

More GSTOP & aids

Sample File Names: (Linville and Timbered Rock incidents)

Master map document: (c:\2007_linville\projects)
2007_linville_NC-NCF-75008_iap_11x17_land.mxd

Map document backup file: (c:\2007_linville\projects\20070613)
20070613_2245_linville_NC-NCF-75008_iap_11x17_land.mxd

Master incident geospatial data file: (c:\2007_linville\incident_data)
2007_linville_NC-NCF-75008_fimt9204.mdb

Incident geospatial data backup file: (c:\2007_linville\incident_data\20070614)
20070614_0530_linville_NC-NCF-75008_fimt9204.mdb

Incident perimeter export file: (c:\2007_linville\incident_data\20070614)
20070614_0630_linville_NC-NCF-75008_per_ncspn83.zip

Incident geospatial theme data file: (c:\2002_timbered_rock\incident_data\20020724)
20020724_1330_timbered_rock_ OR-ODF-711060_ per_fobs_ln_u10n27.shp

Map product file: (c:\2002_timbered_rock\products\20020724)
20020724_1545_timbered_rock_ OR-ODF-711060_20020725day_iap_11x17_land.pdf

Non Spatial Document: (c:\2002_timbered_rock\documents)
20020807_1423_timbered_rock_OR-ODF-711060_ownership.xls

Auto Date & Time	20141125 1303	*Incident Folder Name*
Enter Year	**2012**	2012_Wolf
Enter Incident Name	**Wolf**	*Master Incident Geospatial Data File (stored under incident_data)*
Enter Unit ID (State + 3 or 4 digit code)	**IDNIA**	2012_Wolf_IDNIA0503_fimt100011.gdb
Enter Local Incident ID (1 to 6 digits)	**0503**	*Incident Geospatial Data Backup Files (stored under incident_data/backups)*
Enter Software tool	**fimt100011**	20121125_1303_Wolf_IDNIA0503_fimt100011.gdb
Choose Product Type	ops	*Master Map Documents (stored under projects)*
Choose Page Size	ansi_e	2012_Wolf_IDNIA0503_ops_ansi_e_land.mxd
Choose Page Orientation	land	*Map Document Backup Files (stored under projects/backups)*
		20121125_1303_Wolf_IDNIA0503_ops_ansi_e_land.mxd
Choose Date of Operational Period	0112	*Map Product Files (stored under products/yyyymmdd)*
Choose Operational Period	day	20121125_1303_Wolf_IDNIA0503_0112day_ops_ansi_e_land.pdf
Choose Page Size	11x17	*Multi Page **IAP** Map Product Files stored under products/yyyymmdd)*
Choose Page Orientation	port	
Choose Multi Page Number	index	20121125_1303_Wolf_IDNIA0503_0112day_iap_11x17_port_MPindex.pdf
Choose Multi Page Number	2	20121125_1303_Wolf_IDNIA0503_0112day_iap_11x17_port_MP2.pdf
Choose Feature Type	GPS_lin	*GPS Data Files (stored under incident_data/gps)*
Choose Data Source	divs	20121125_1303_Wolf_IDNIA0503_GPS_lin_divs_Powell_llw84.shp
Choose File Type	shp	
Choose GPS Collection Name	Powell	
Choose Feature Type	GPS_feat	20121125_1303_Wolf_IDNIA0503_GPS_feat_divs_Powell_llw84.gpx
Choose Coordinate System / Datum	llw84	
Choose File Type	gpx	
Choose Incident Data Type	per	*Incident Data Theme Files (stored under incident_data/exports)*
Choose Feature Type	poly	20121125_1303_Wolf_IDNIA0503_per_poly_u11n83.shp
Choose File Type	shp	
Choose Coordinate System / Datum	u11n83	
Choose Incident Data Type	contin	20121125_1303_Wolf_IDNIA0503_contin_poly_u11n83.kmz
Choose File Type	kmz	
Choose Infrared Feature	IntenseHeat_pol	*Infrared Data Products (stored under incident_data/ir)*
Choose IR Map type	ir_ortho	20121125_1303_Wolf_IDNIA0503_ir_IntenseHeat_pol_u11n83.shp
Choose IR Map Size	11x17	*Infrared Data Products (stored under products/yyyymmdd)*
Choose IR Map Orientation	land	20121125_1303_Wolf_IDNIA0503_ir_ortho_11x17_land.pdf
November 25, 2014 13:03		
GIS Standard Operating Procedures (GSTOP 2) File Naming, January 11, 2012		

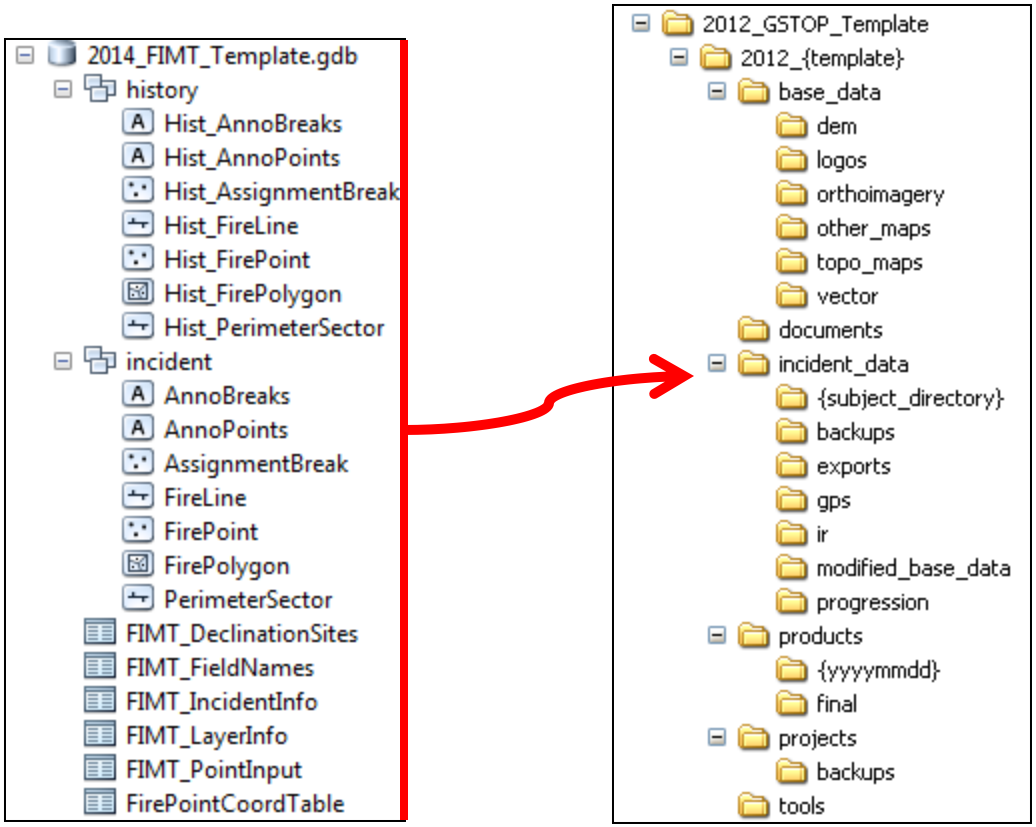
Current Date & Time		Product Types	
Time	1303	Aviation Map	airops
Month	11	Briefing Map	brief
Day	25	Damage Assessment Map	dam
		Facilities Map	facil
Today plus 1 Day		Fuels Map	fuels
Auto Time & Date	11/26/2014 13:03	Incident Action Plan Map	iap
Auto Month	11	Infrared Interpretation Ortho Imagery base	ir_ortho
Auto Day	26	Infrared Interpretation Topo Map base (DRG)	ir_topo
		Operations Map	ops
Date of Operational Period		Ownership Map	owner
1125		Progression Map	prog
1126		Rehabilitation	rehab
		Situation- Plans Map	plans
Operational Period		Structural Protection Map	struct
day		Transportation Map	trans
night		Vegetation Map	veg
		Wildfire Situation Analysis Map	wfsa
Page Size		Wildland Fire Implementation Plan	wfip
8 1/2 X 11	8X11		
11 X 17	11x17		

Further Details – FIMT

FIMT (Fire Incident Mapping Tools):
http://gacc.nifc.gov/rmcc/fire_incident/index.html

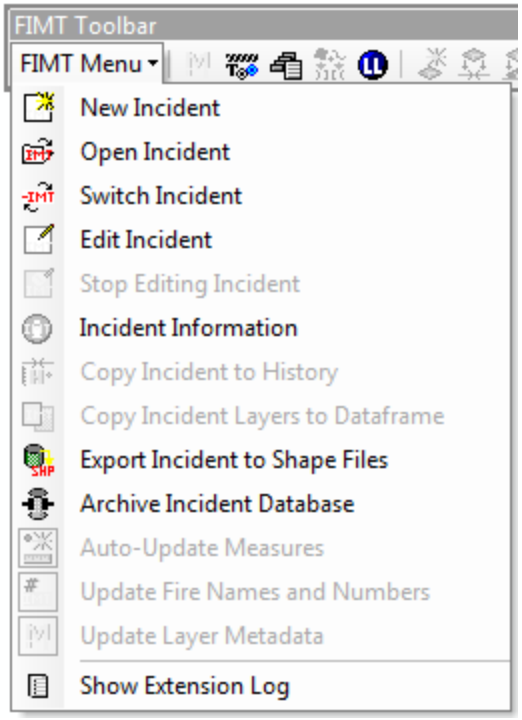
FIMT Continued

- FIMT GeoDatabase default contents (right)
- This GeoDatabase is saved within the incident_data folder (far right)



FIMT Toolbar

- Functions
  - Programmatically handles coincidence between polygon, unit lines, unit divisions
  - Uses full Incident Command System (ICS) symbols and incorporates GSTOP standards
  - Tracks complete history and support ANSI and ISO standards
  - At 10.0 became an ArcGIS Addin
- Incident Tools (Database setup & Management)
- Utility Tools
- Perimeter Tools
- Fire Line Tools
- Fire Point Tools



FIMT Toolbar Continued

Utility Tools

- Feature Level Metadata
- Incident symbols
- Label Multiple Field
- Assign to Unit
- Latitude Longitude

Perimeter Tools

- Create Polygon
- Import to Polygon Layer
- change Polygon Attributes
- Split Assignment Line
- Update Assignment Breaks
- Floating Assignment
- Create Island
- Remove Island
- Copy Perimeter to Line
- Perimeter Report
- Perimeter Change Report
- Export Polygon to Database
- Draw Fire History

FIMT Toolbar Continued

Fire Line Tools

Create Fire Line

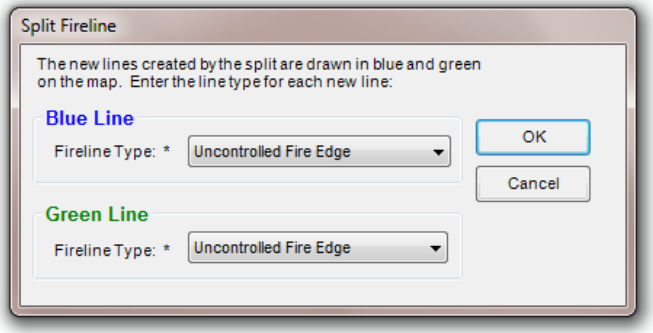
Import Line to Fire Line

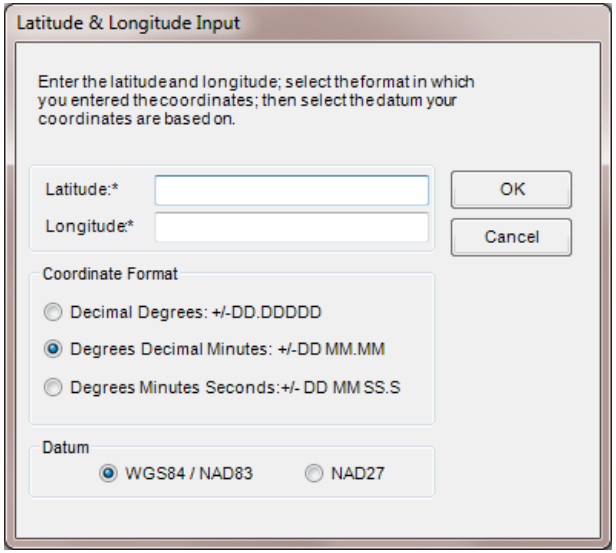
Change Fire Line Attributes

Split Fire Line

Join Fire Line

Fire Line Report





Fire Point Tools

Create Fire Point

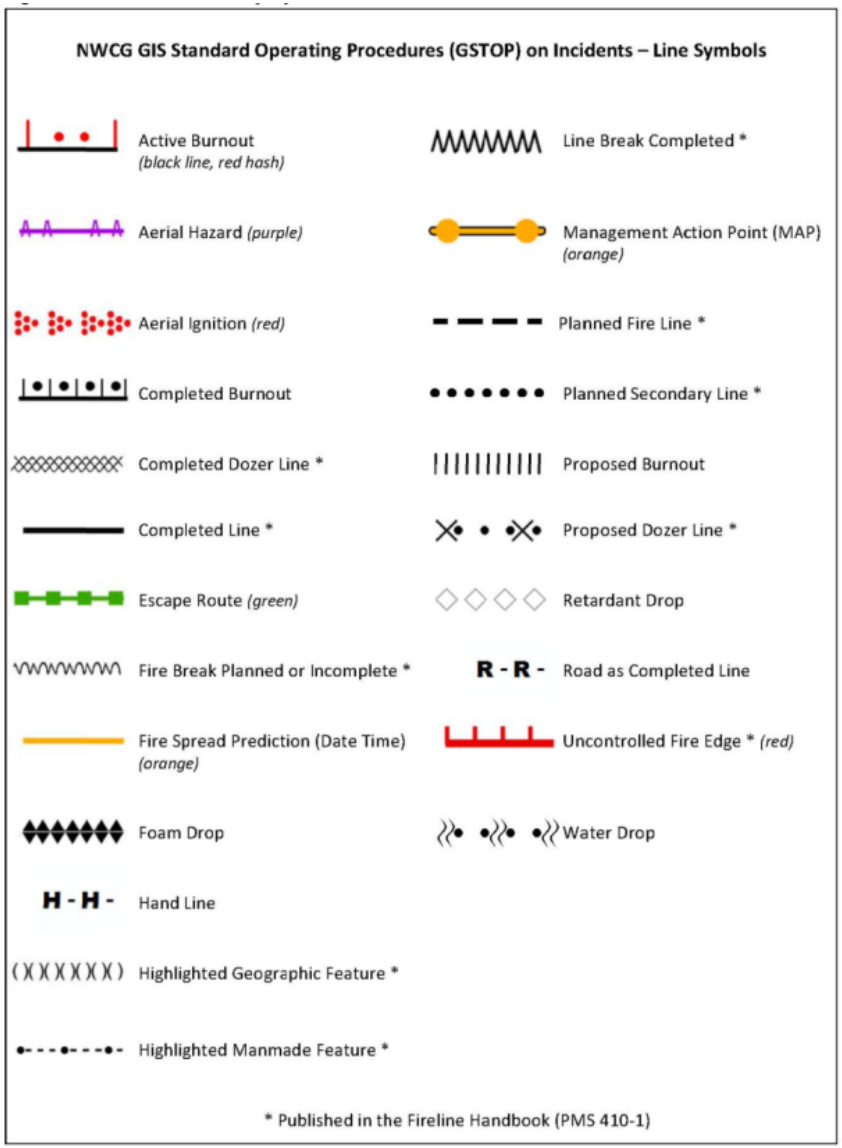
Create Fire Point From Lat/Long

Import Point to Fire Point

Move Fire Point to Lat/Long

Change Fire Point Attributes

Symbology Standards



Thanks for attending!

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For more information about becoming a GIS Specialist visit:
http://gis.nwcg.gov/index.html

Questions?