



United States Department of Agriculture  
**Forest Service**

# Understanding & Using MTBS Data

2018 Annual Webinar

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Geospatial Technology and Applications Center | GTAC  
USDA Forest Service

**GTAC** Mapping Our Future Together



# Webinar Housekeeping

## ■ Adobe Connect

- Pod visibility controlled by Pods menu in toolbar
- Feel free to use chat
- Closed captioning is available

## ■ Conference call

- All participants phones will be muted during presentation & GIS demo
- To unmute or re-mute your phone press \*6
- Please don't put your phone on hold

## ■ Webinar/Instructor evaluation

- SurveyMonkey link via email

# Postfire Mapping Programs

1. BAER: Emergency assessment  
[www.fs.fed.us/eng/rsac/baer](http://www.fs.fed.us/eng/rsac/baer)
2. RAVG: Rapid/Initial assessment  
[www.fs.fed.us/postfirevegcondition](http://www.fs.fed.us/postfirevegcondition)
3. MTBS: Long-term/Extended assessment  
[www.mtbs.gov](http://www.mtbs.gov)

BAER

RAVG

MTBS

At fire  
containment

Initial  
assessment

1<sup>st</sup> peak of green  
after fire



# Postfire Mapping Programs

## Post-fire Mapping Products: BAER, RAVG, and MTBS

The USDA Forest Service Remote Sensing Applications Center (RSAC) supports three major post-fire mapping programs

### BAER

(Burned Area Emergency Response)  
[www.fs.fed.us/eng/rsac/baer](http://www.fs.fed.us/eng/rsac/baer)

#### DESCRIPTION

The Burned Area Emergency Response (BAER) support at RSAC includes tracking fire progression, satellite overpasses, image acquisition, and Burned Area Reflectance Classification (BARC) creation. The BARC is a GIS layer used by BAER teams as they perform an emergency assessment of the burned area. The BARC is a first approximation at soil burn severity on the burned land.

#### MAPPING METHOD



#### AUDIENCE

The BARC is delivered to BAER teams. These teams are dispatched to make an assessment of the burned area within seven calendar days from fire containment. One of their first tasks is to create a soil burn severity map. The BARC is used to create that map.

#### TIMELINE

1 - 7 days after fire containment

#### DELIVERABLES

- Pre- and post-fire satellite imagery
- BARC layers (thematic and continuous)
- Metadata
- 3D image drapes

#### EXAMPLE

Trigo  
 Ignition: 4/15/2008  
 Contained: 5/11/2008



Perimeter Acres: N/A  
 Assessment Type: Emergency



Pre-fire Image Date: 5/21/2007  
 Post-fire Image Date: 5/15/2008



### RAVG

(Rapid Assessment of Vegetation Condition After Wildfire)  
[www.fs.fed.us/postfirevegcondition](http://www.fs.fed.us/postfirevegcondition)

The Rapid Assessment of Vegetation Condition after Wildfire (RAVG) program produces data describing post-fire vegetation conditions on National Forest System (NFS) lands. RAVG produces a suite of geospatial and tabular outputs that include standard vegetation mortality summary tables and maps. The tables and maps are produced by integrating existing vegetation maps and burn severity maps.



The primary audience for RAVG data and products are Regional Silviculturists who need to communicate yearly reforestation and restoration needs to the Washington Office and Congressional decision makers for specific funding requests.

30 - 45 days after fire containment

- Pre- and post-fire satellite imagery
- Fire perimeter shapefile
- dNBR and RdNBR (continuous)
- Composite Burn Index (CBI) layer
- % change in basal area layer
- % change in canopy cover layer
- Summary table and map
- Metadata

Perimeter Acres: 14,297  
 Assessment Type: Initial



Pre-fire Image Date: 5/21/2007  
 Post-fire Image Date: 5/7/2008



### MTBS

(Monitoring Trends in Burn Severity)  
[www.mtbs.gov](http://www.mtbs.gov)

Monitoring Trends in Burn Severity (MTBS) is a multi-year program designed to consistently map the burn severity and burn area boundaries of fires across all lands of the United States for the period spanning 1984 through 2010. The data generated by MTBS will be used to identify national trends in burn severity, providing information necessary to monitor the effectiveness and effects of the National Fire Plan and Healthy Forests Restoration Act.



The MTBS project serves four primary user groups:

1. National policies and policy makers
2. Field management units
3. Existing databases from other comparably scaled programs
4. Research and academic entities interested in fire severity.

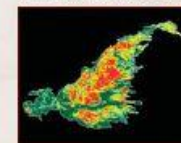
12 - 18 months after fire containment

- Pre- and post-fire satellite imagery
- dNBR and RdNBR (continuous)
- 5-class thematic thresholded dNBR
- Burn area boundaries
- Data summaries
- Metadata
- 3D image drapes

Perimeter Acres: 13,855  
 Assessment Type: Extended



Pre-fire Image Date: 7/8/2007  
 Post-fire Image Date: 7/29/2009



From MTBS to a better landscape (Landscape) and (Landscape)

CONTACT ■ For more information about any of these programs, please contact the USFS Remote Sensing Applications Center (RSAC) at 801-975-3750

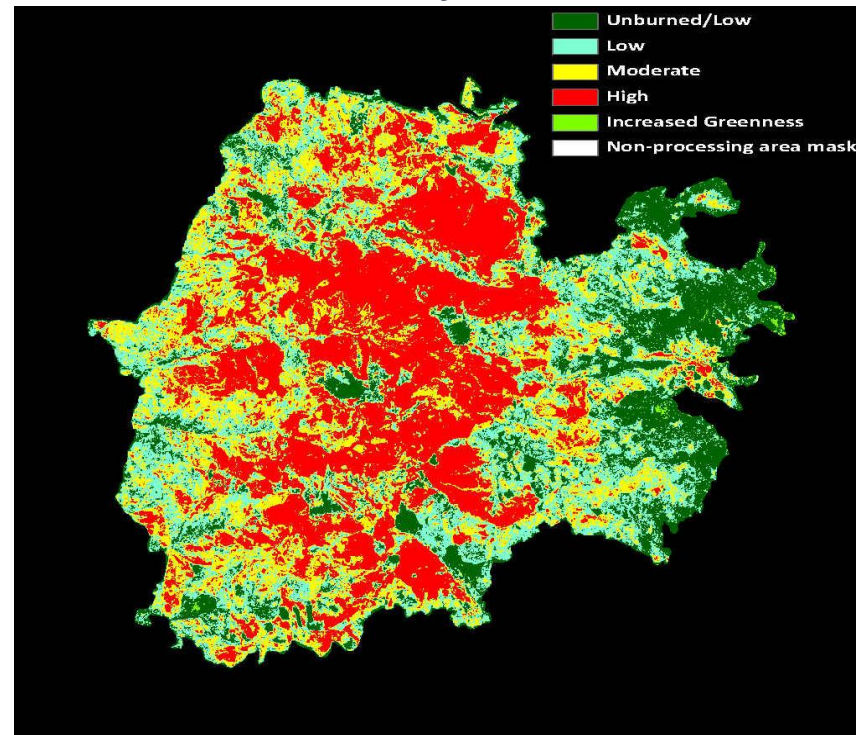


# Today's Agenda

- MTBS Program Overview
  - Background and Methods
- MTBS.gov
- Program Challenges and Limitations
- Applications of MTBS Data at Grand Canyon National Park
- Q & A

\*\*\**brief break*\*\*\*

- GIS Exercise Demo:  
Habitat Management
- Work on GIS Exercise  
(instructor available  
for questions)





# MTBS Background



# MTBS Objective

- Consistently map...
  - Location
  - Extent
  - Burn severity
- ...of “large fires” on all lands across the United States from 1984 thru 2018 and beyond
  - CONUS, Alaska, Hawaii & Puerto Rico
  - All documented wildfires
  - All documented Rx fires on Federal lands





# MTBS Mapping Size Criteria

West:  $\geq 1,000$  acres  
East:  $\geq 500$  acres

West

East

Alaska

West

Hawaii

West

Puerto Rico

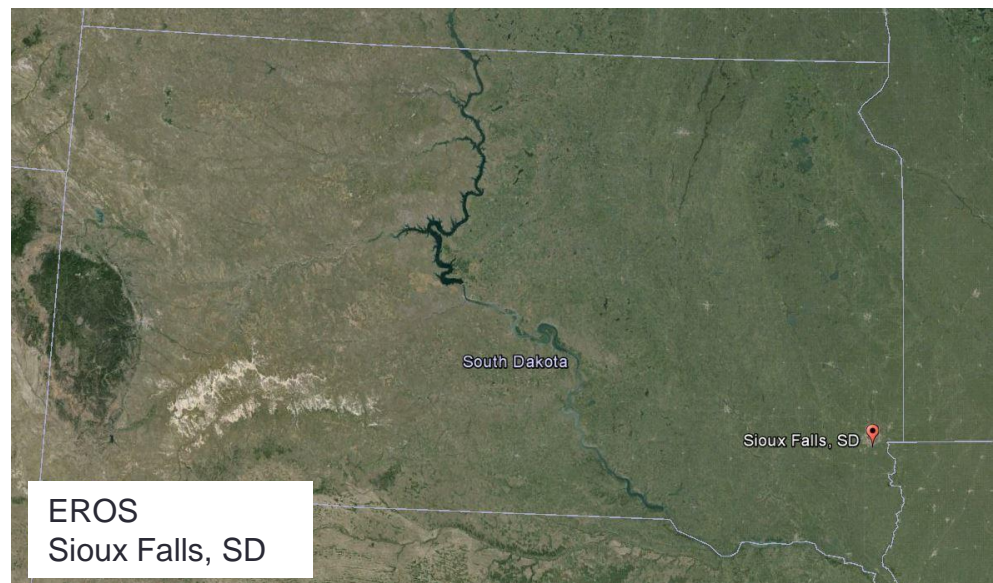
East





# MTBS Background

- Program duration
  - 1984 to 2010 data record completed between 2005 and 2012
  - Annual maintenance/updates planned for 2018 and beyond
- Jointly implemented by USDA Forest Service and Department of Interior
  - USFS – Geospatial Technology and Applications Center (GTAC)
  - USGS – Earth Resources Observation and Science (EROS) Center



# MTBS Background

- One element of a strategy monitoring the effectiveness of the National Fire Plan and Healthy Forests Restoration Act
  - Provide an information base to synoptically assess environmental impacts and trends
  - Required for all lands in CONUS, AK, HI and PR

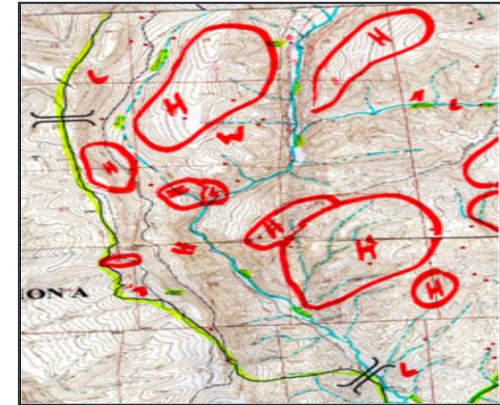


The screenshot displays the MTBS website interface. At the top, a banner reads "Forests and Rangelands Managing Our Natural Heritage" with logos for various agencies including the U.S. Forest Service and the U.S. Department of the Interior. Below the banner is a navigation menu with links such as Home, Overview, NFP Research, HFI Research, Technologies, Reports, Success Stories, Implementation Plan, Helping Communities, News & Events, Stewardship Contracting, Woody Biomass, Leadership Council, Resources, Contacts, and Links. The main content area is titled "Overview" and "National Fire Plan". It contains text about the integral role of wildland fires and the development of the National Fire Plan in August 2000. A sidebar on the right features a "SLIDESHOW" section with "NFP Success Stories by State", "Fuels Treatment Report by State", and "National Fire Plan Viewer by State", each with a "Select a state..." dropdown and a "Find" button. Below the main text, a list of five key points is provided, each with a blue link. The "Healthy Forests Initiative" section follows, stating it was launched in August 2002 by President Bush. It includes a photograph of a forest and a "Success Stories by State" section with a "Select a state..." dropdown and a "Find" button. The USA.gov logo is visible in the bottom left corner of the website screenshot.

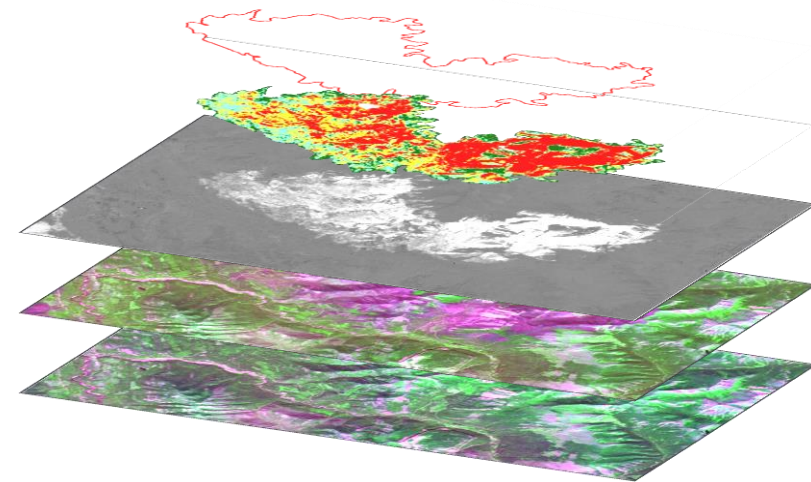


# MTBS Background

- Addresses recommendations in GAO report GAO-04-705 “Environmental Effects of Wildland Fire” (2004)
  - Federal land management agencies need to systematically compile consistent and comprehensive fire data at a landscape and ecosystem scale that characterize wildfire effects



Inconsistent, inaccurate & not comprehensive

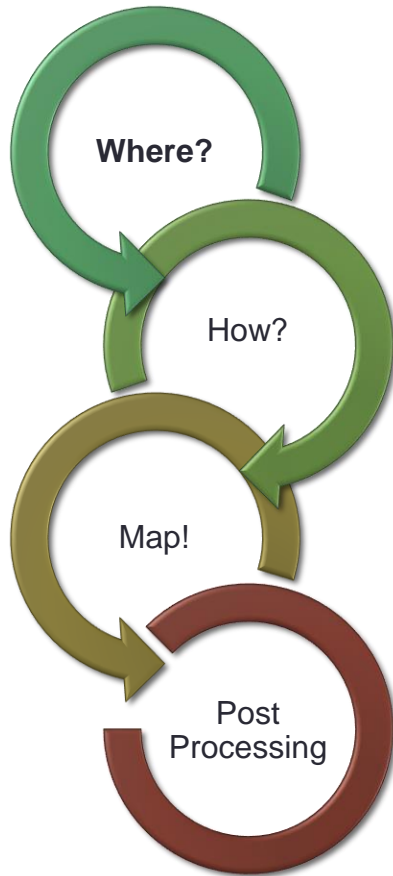


Consistent, accurate & comprehensive



# MTBS Fire Mapping Methods

# MTBS Fire Mapping Methods Overview



- Where are the fires to be mapped?
  - Compile a fire occurrence database (FOD) from existing data sources



# U.S. Fire Occurrence Data



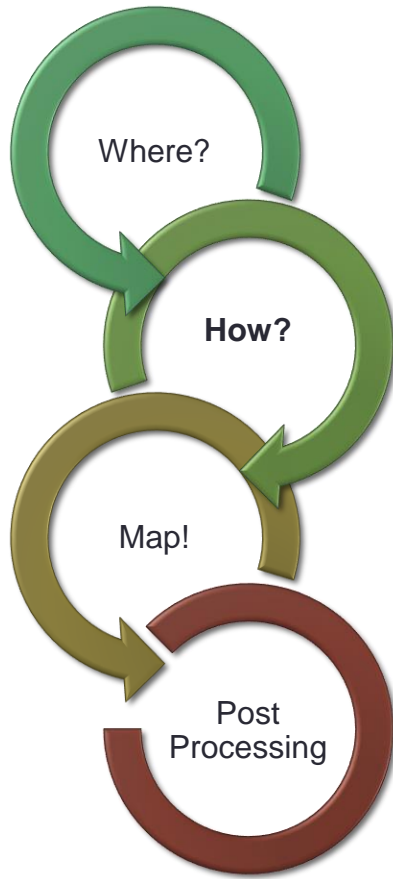
## **Integrated Reporting of Wildland Fire Information (IRWIN)**

- Wildland Fire Information and Technology (WFIT) investment
- Not a system of record for fire occurrence data, but a “System of systems”
- Provide data exchange capabilities between new & existing applications used to manage data related to wildland fire incidents
- Reduce redundant data entry & identify authoritative data sources

## **Key IRWIN information for MTBS mapping**

- Fire name/ID
- Fire size
- Fire location
- Fire ignition date
- Fire suppression date

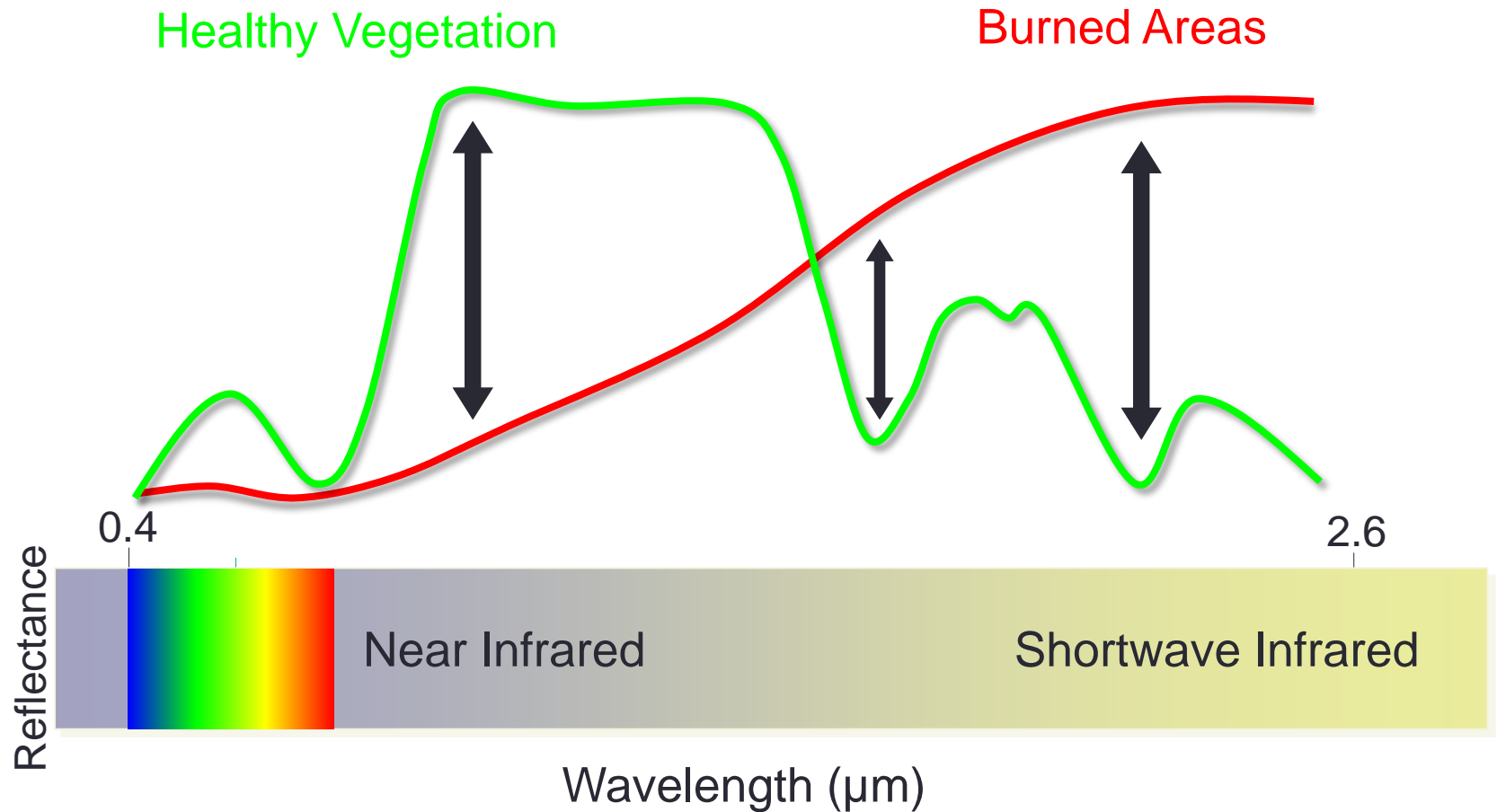
# MTBS Fire Mapping Methods Overview



- How should I map the fire?
  - Determine appropriate assessment strategy
  - Select prefire and postfire scenes

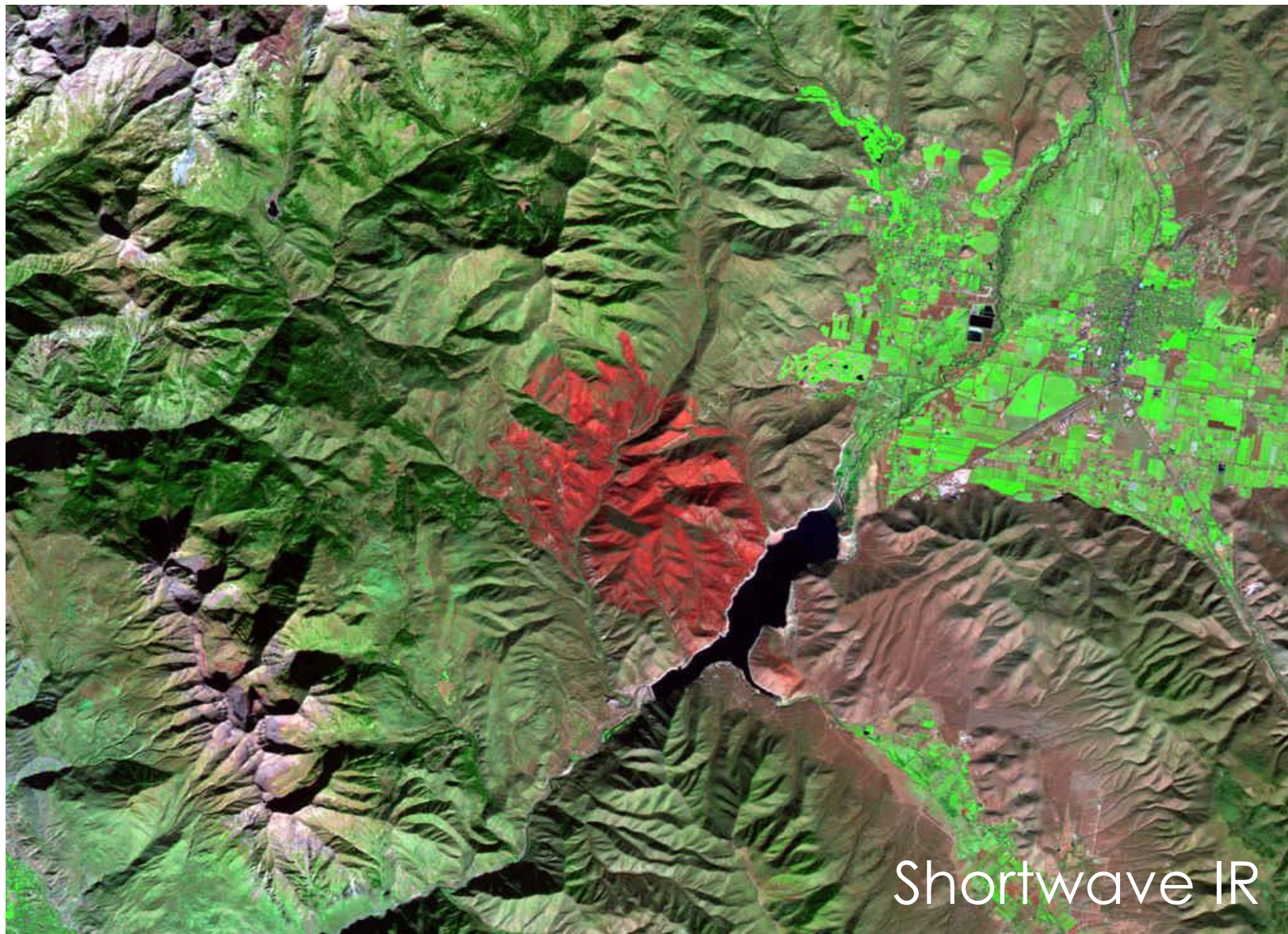
# Healthy Vegetation vs. Burned Areas

## Exploiting Spectral Response Curves





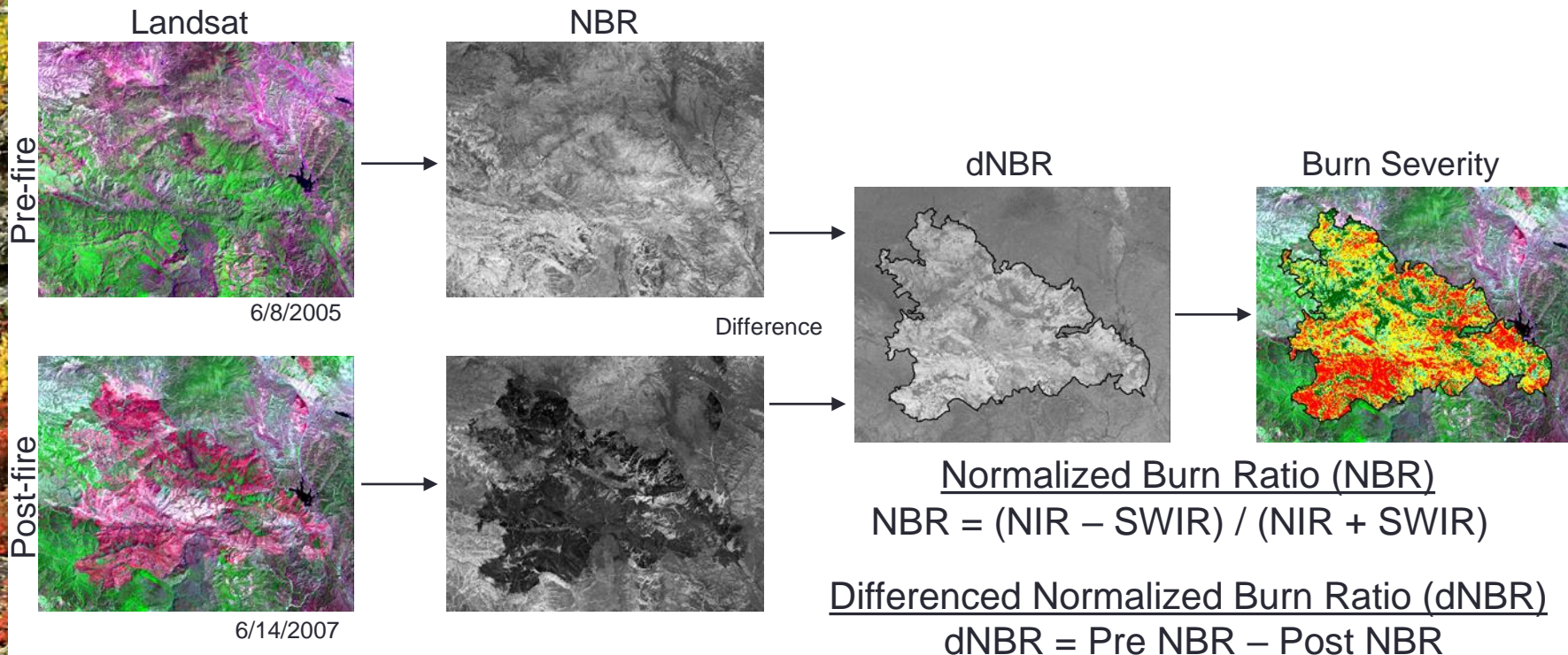
# Where's the wildfire?





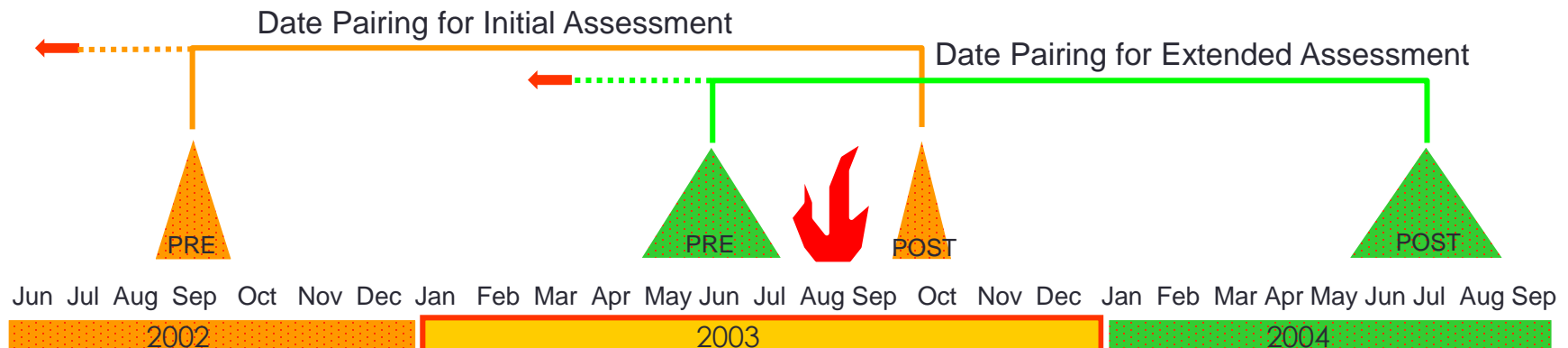
# MTBS Fire Mapping Methods Overview

- Burned area perimeter delineation and severity assessments are conducted using pre/postfire Landsat TM/ETM/OLI image pairs
- Normalized Burn Ratio (NBR)/differenced Normalized Burn Ratio (dNBR)



# MTBS Methods – Assessment Strategy

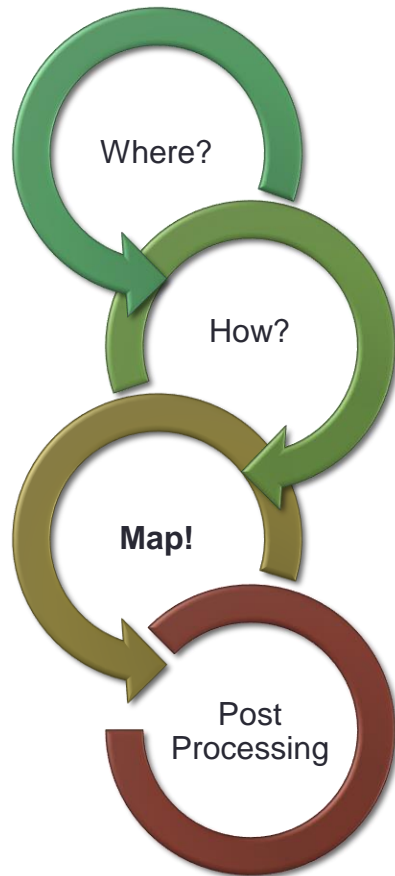
- Based on biophysical setting and fire type (WF, RX)
  - Extended Assessment (EA)
    - Severity based on post-fire assessment at peak of green of next growing season
    - Forests/shrublands
  - Initial Assessment (IA)
    - Severity based on immediate post-fire assessment
    - Grasslands/shrublands
  - “Single Scene” Assessment
    - Lack of suitable pre-fire imagery or other factors; use post-fire NBR
    - Conducted on a limited basis (EAs and IAs)



Carl Key 2006



# MTBS Fire Mapping Methods Overview



- **Map the fire**
  - Image selection
  - Perform image pre-processing
  - Perform image differencing
  - Delineate burned area
  - Threshold dNBR images into discrete burn severity classes.

# Landsat Scene Selection

**GloVis** Page Expires In 1:59:21

Home Take Tour Release Notes FAQ System Messages (1) Preferences Feedback Logout [bquayle] Help

**Interface Controls**

**Choose Your Data Set(s)**

Data Set Filter

- ☐ Landsat 1-5 MSS
- ☐ Landsat 4-5 TM C1 Level-1
- ☐ Landsat 7 ETM+ C1 Level-1
- ☒ Landsat 8 OLI/TIRS C1 Level-1  
4 scenes match your criteria.
- ☐ OrbView-3
- ☐ Sentinel-2

**Metadata Filter**

Date Range  
07/01/2015 to 08/01/2015

Cloud Cover  
0 to 80

Months  
Apr  
May

**Selected Scenes (0)**

Lat: 47.8030, Lon: -113.1736

**2015**

**GloVis** Page Expires In 1:58:18

Home Take Tour Release Notes FAQ System Messages (1) Preferences Feedback Logout [bquayle] Help

**Interface Controls**

**Choose Your Data Set(s)**

Data Set Filter

- ☐ Landsat 1-5 MSS
- ☐ Landsat 4-5 TM C1 Level-1
- ☐ Landsat 7 ETM+ C1 Level-1
- ☒ Landsat 8 OLI/TIRS C1 Level-1  
4 scenes match your criteria.
- ☐ OrbView-3
- ☐ Sentinel-2

**Metadata Filter**

Date Range  
07/01/2016 to 08/01/2016

Cloud Cover  
0 to 80

Months  
Apr  
May

**Selected Scenes (0)**

Lat: 48.0666, Lon: -113.8259

**2016**

Landsat 8 OLI/TIRS C1 Level-1 LC08\_L1TP\_041027\_20160724\_20170222\_01\_T1

Leaflet | Map data © OpenStreetMap contributors, USGS/EROS



# MTBS Mapping Interface

The MTBS Mapping Interface consists of three main components:

### Top-Left Window: Aerial Image View

Displays a grayscale aerial image of a forested area. The interface includes a menu bar (File, Home, Manage, Raster, Vector, Terrain, Toolbox, Help, Google E, Panchror, Drawing, Format, Table) and a toolbar with various tools like Select, Cut, Copy, Paste, Fit to Frame, Reset, Pan, Previous Extent, Window, View, Scale and Angle, and Roam. A 'Contents' panel on the left shows a tree view with '2D View #1' and 'Background' layers. A 'Retriever' panel is at the bottom left. The status bar at the bottom indicates coordinates: -1296201.29, 2887637.55 meters (Albers Conical Equal Area (GRS 1980)).

### Bottom-Left Window: Map View and Table of Contents

Displays a color-coded map of the same area, with a yellow outline indicating a specific region. The 'Table of Contents' panel on the left lists the following items:

- TRAIL CREEK (MT4794711342920150812)
  - M:\rds\_change\_detection\scratch\MTBS\_FOD
    - MTBS\_FOD
  - M:\rds\_change\_detection\ancillary\mtbs\_sl
    - mtbs\_previous\_year
  - M:\rds\_change\_detection\event\_prods\fire
    - Burn Area Bndy
    - Mask
  - M:\rds\_change\_detection\gis\albers\conus
    - admin\_owner
  - M:\rds\_change\_detection\img\_src\landsat
    - Pre\_Scene\_NBR (80400272015212)
      - Value
        - High: 1000

The status bar at the bottom indicates coordinates: -1291812.459, 2884286.246 Meters.

### Right-Hand Window: Event Mapping Tool - 1.70

This window contains two tables and several control panels.

#### Table 1: Event Data

Name	MTBS Status	Acres	Event Date	Event ID	P/R	Predicted Strategy	Validated Strategy	Latitude	Longitude	Report Date	id
TRAIL CREEK	complete	21482	2015-08-12	MT4794711342920150812	41/27	Extended Assessment	Extended Assessment	47.947	-113.423	2015-08-12	37322

Buttons: Create New Mapping, Set/Get Status Without Mapping, Validated Extended, Validated Initial, Incidents: 1

#### Table 2: Mapping Details

Id	Program	Assessment Type	Pre-fire Scene	Post-fire Scene	Perimeter Scene	Publication Date	Mapper	Date Created
22914	BAER	Emergency	80410272015219	80400272015244			calbury	2015-09-09T15:58:11...
23706	RAVG	Initial	80400272014257	80400272015244			orbaker	2015-11-17T16:57:58...
25787	MTBS	Extended	80400272015212	80410272016206		2017-05-01	andreperov	2016-08-24T22:00:43...

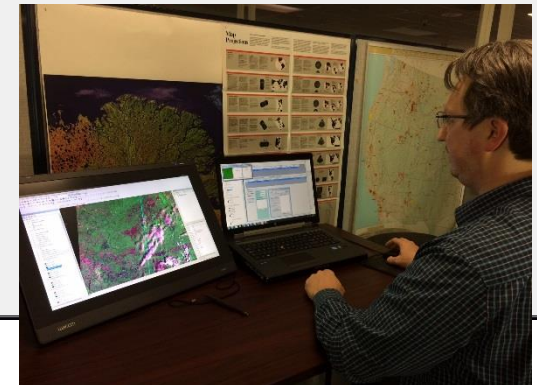
Buttons: Run Scene Prep, Scene Prep Overwrite, Run Fire Prep, Delineate Perimeter, Determine Offset, Open Event Folder, Delete Mapping

#### Mapping Controls Panel

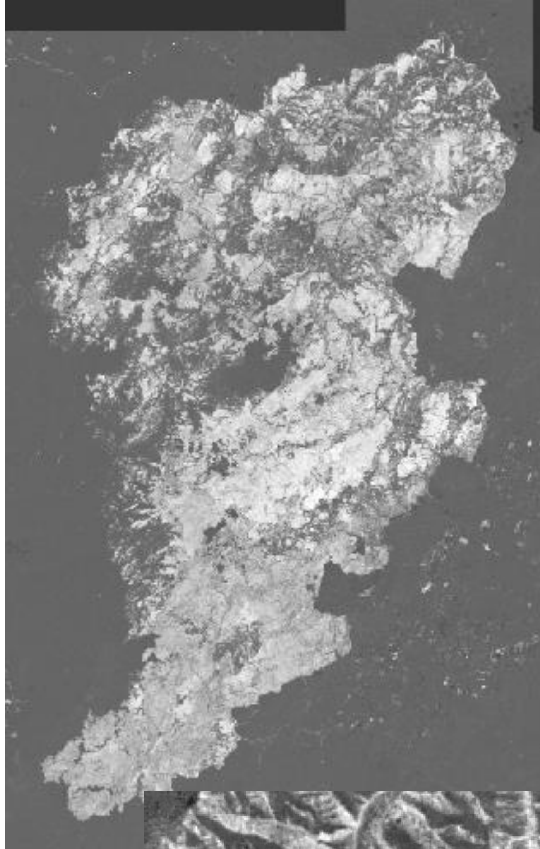
Analysis Type: dnbr  
 dNBR Offset: -21  
 SD Offset: 24  
 Perimeter Confidence: High  
 Mapping Comments (Internal):  
 Subset RfIs & Create RdNBR

#### MTBS Settings Panel

Thresholds: 50 (Low), 270 (Mod), 520 (High), -970 (No Data), -150 (IG)  
 Generate Moderate  
 Mapping Comments (Public):  
 Generate Severity Product, Thumbnails & Preliminary KMZ  
 Revised Fire: ☐  
 QA Checklist  
 Mapping Status: complete  
 Generate Final Products: Metadata, PDF & KMZ  
 Update Mapping

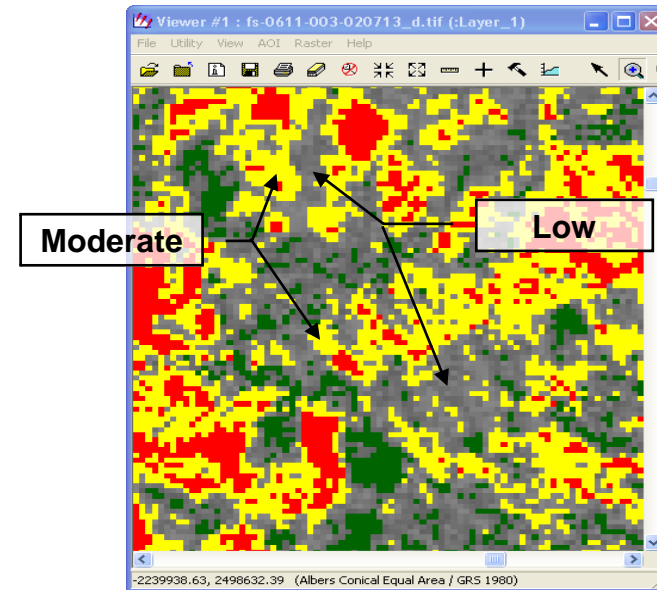
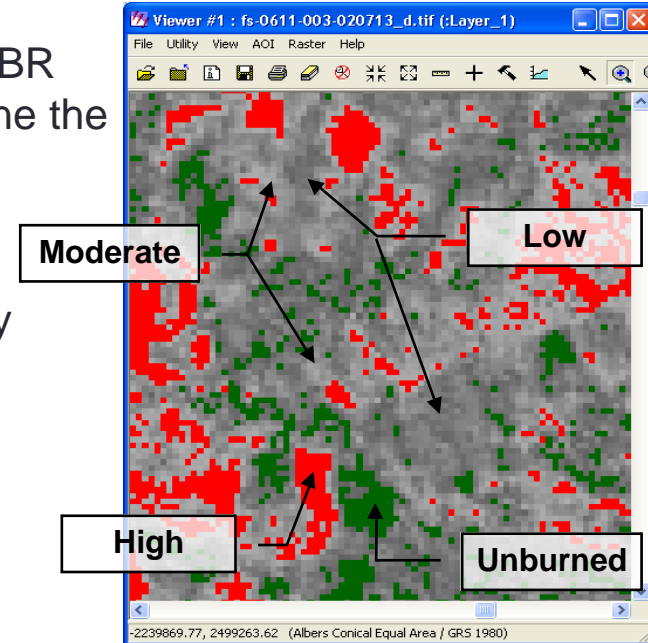
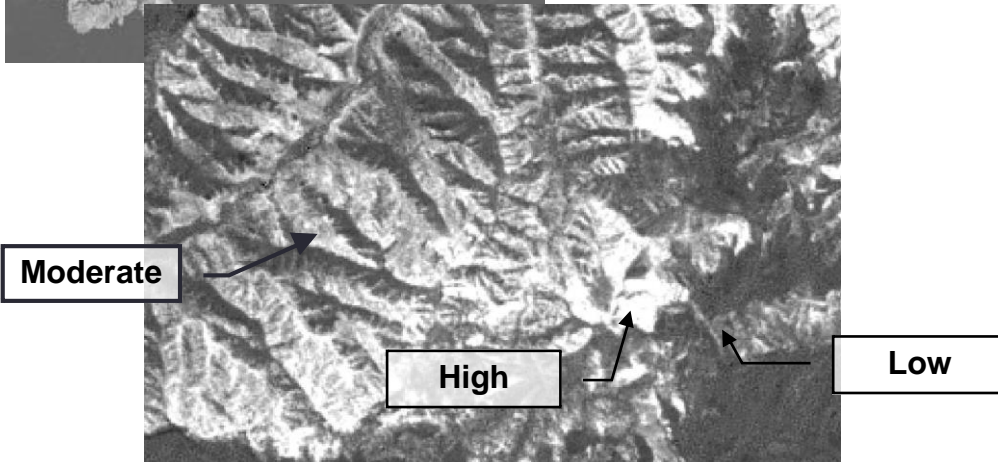
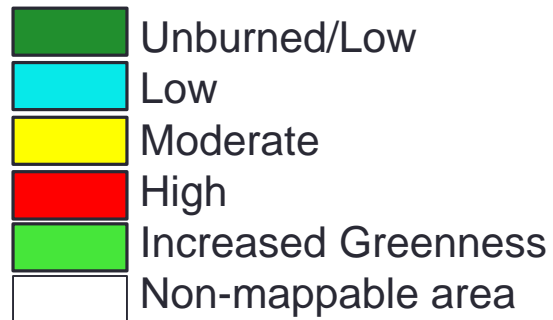


# Burn Severity Thresholding



Mapping analyst identifies dNBR grayscale patterns to determine the low/moderate/high severity class thresholds

Lighter tones = higher severity  
Darker tones = unburned/low





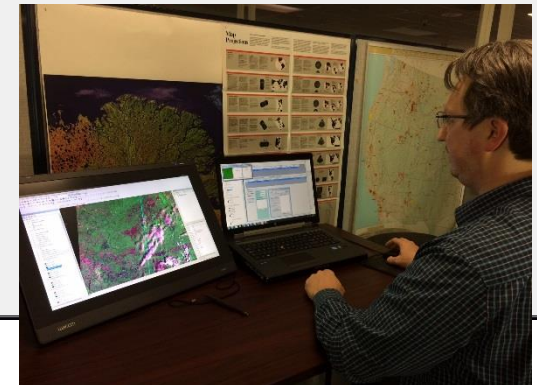
# MTBS Mapping Interface

The MTBS Mapping Interface consists of three main components:

- Top-Left Map Window:** Displays a grayscale aerial image of a forested area. The status bar at the bottom indicates coordinates: -1296201.29, 2887637.55 meters (Albers Conical Equal Area (GRS 1980)).
- Bottom-Left Table of Contents Window:** Lists the project structure for "TRAIL CREEK (MT4794711342920150812)". The tree includes folders for "M:\rds\_change\_detection\scratch\MTBS\_FOD", "M:\rds\_change\_detection\ancillary\mtbs\_s", "M:\rds\_change\_detection\event\_prods\fire", "M:\rds\_change\_detection\gis\albers\conus", and "M:\rds\_change\_detection\img\_src\landsat". The "Burn Area Bndy" folder is currently selected.
- Right-Hand Control Panel:** Contains several sections:
  - Event Mapping Tool - 1.70:** A table listing mapping events.
 

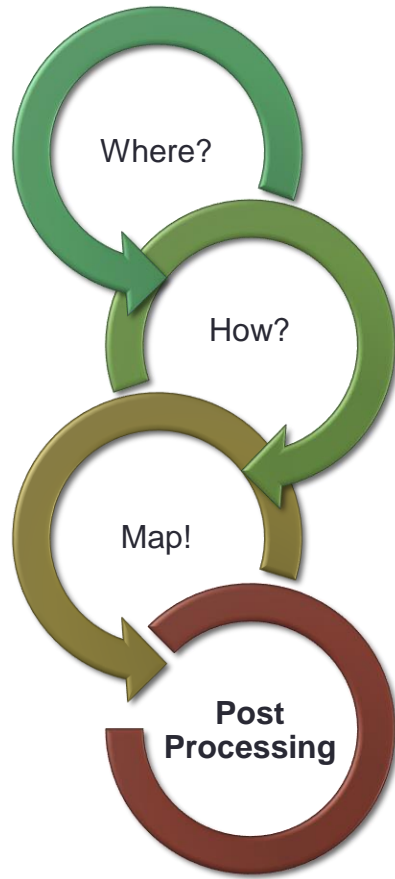
Name	MTBS Status	Acres	Event Date	Event ID	P/R	Predicted Strategy	Validated Strategy	Latitude	Longitude	Report Date	id
TRAIL CREEK	complete	21482	2015-08-12	MT4794711342920150812	41/27	Extended Assessment	Extended Assessment	47.947	-113.423	2015-08-12	37322
  - Run Scene Prep:** A section with buttons for "Run Fire Prep", "Delineate Perimeter", "Determine Offset", "Open Event Folder", and "Delete Mapping".
  - Analysis Type:** A dropdown menu set to "dnbr".
  - Thresholds:** A table with values for "dnbr", "SD", and "Perimeter Confidence".
 

Analysis Type	dnbr	SD	Perimeter Confidence
dnbr	-21	24	High
  - Mapping Status:** A dropdown menu set to "complete".
  - Generate Final Products:** A section with buttons for "Generate Severity Product, Thumbnails & Preliminary KMZ", "QA Checklist", and "Update Mapping".





# MTBS Fire Mapping Methods Overview

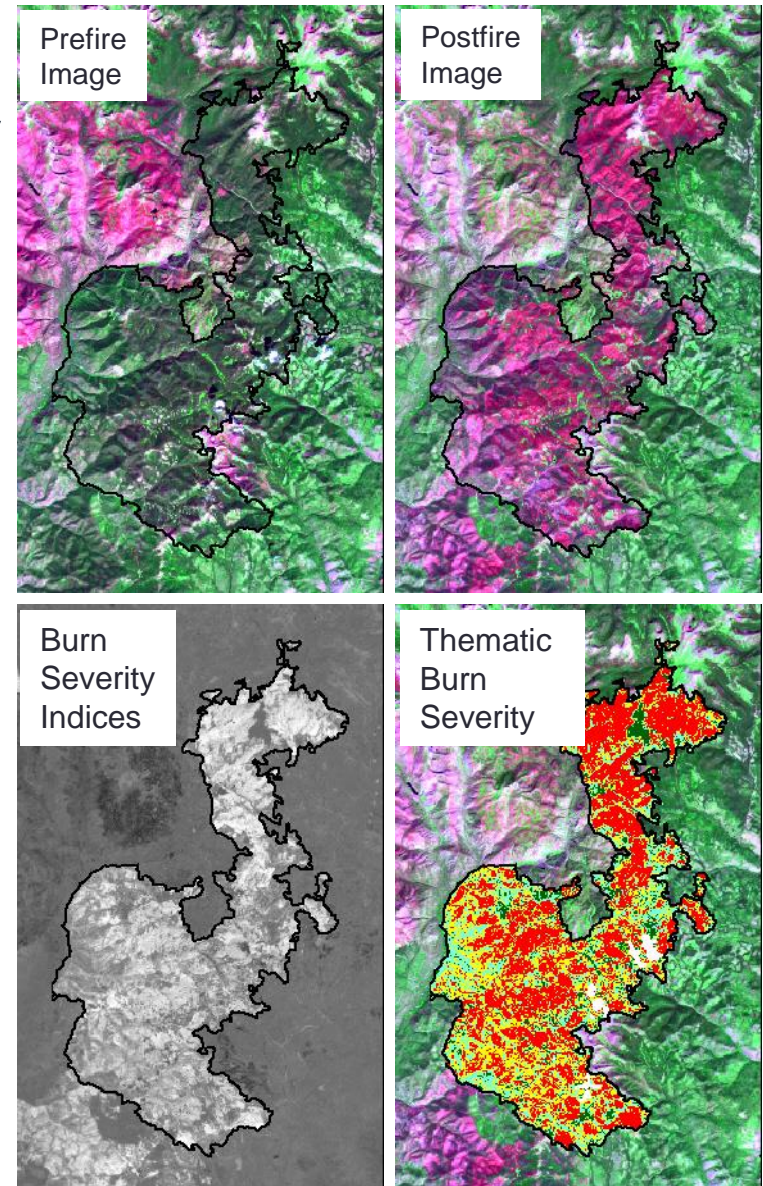


- **Perform post processing**
  - Create metadata
  - Create map products
  - Generate summary and reporting data
  - Products made available for download

# MTBS Geospatial Products

## Fire Level Datasets

- Available from <http://www.mtbs.gov>
- Pre/Post-fire Landsat imagery
  - Bands dependent on sensor
- Burned area boundary
  - Vector delineation of burned area extent based on image analysis
- Continuous burn severity indices
  - dNBR/RdNBR
- 6 class thematic burn severity data
  - Unburned/Low
  - Low
  - Moderate
  - High
  - Increased Greenness
  - Non-mappable area
- Map, visualization and reporting products

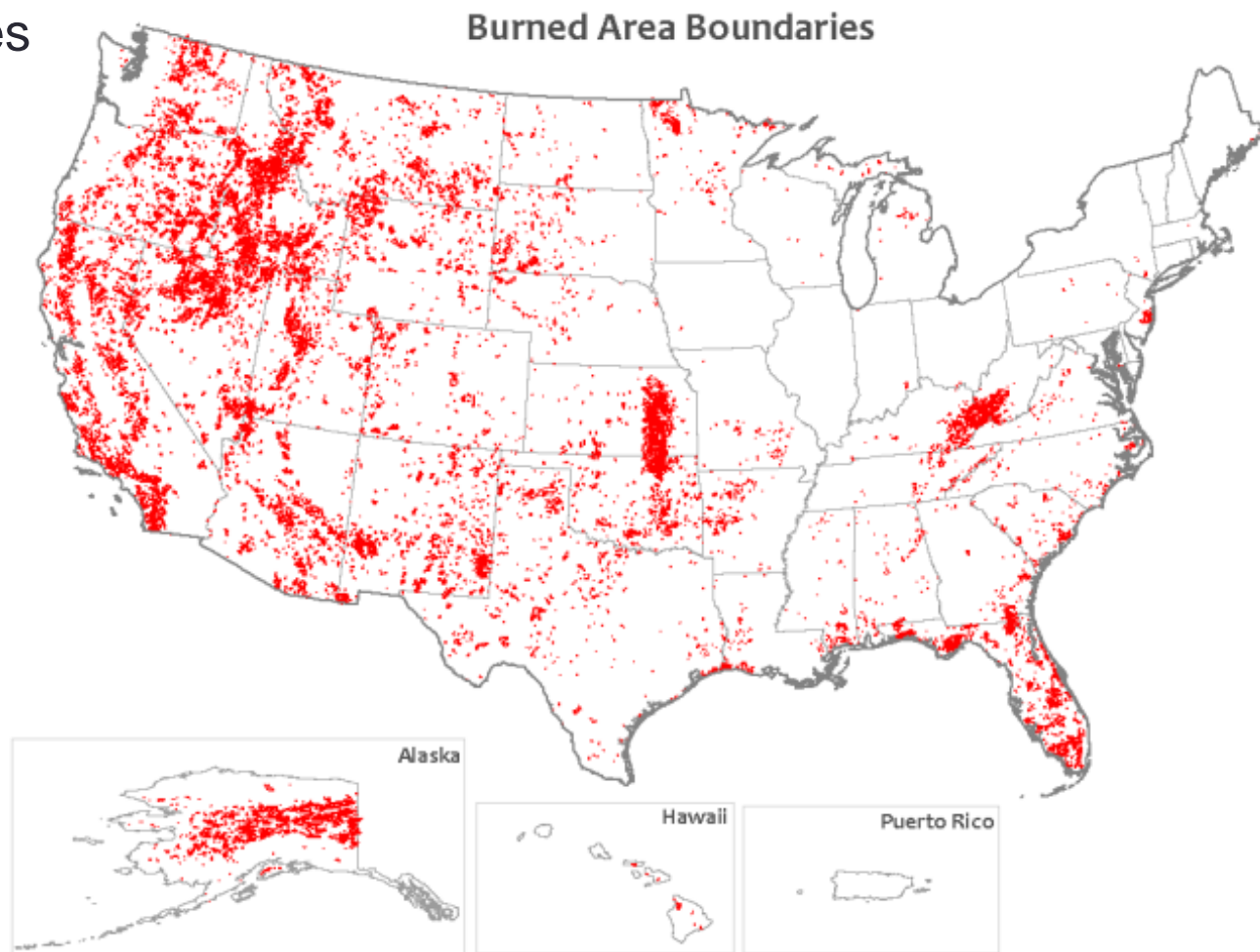


# MTBS Geospatial Products

## National Fire Data

### Burned Area Boundaries

- Polygon Shapefile w/metadata
- Fire attributes



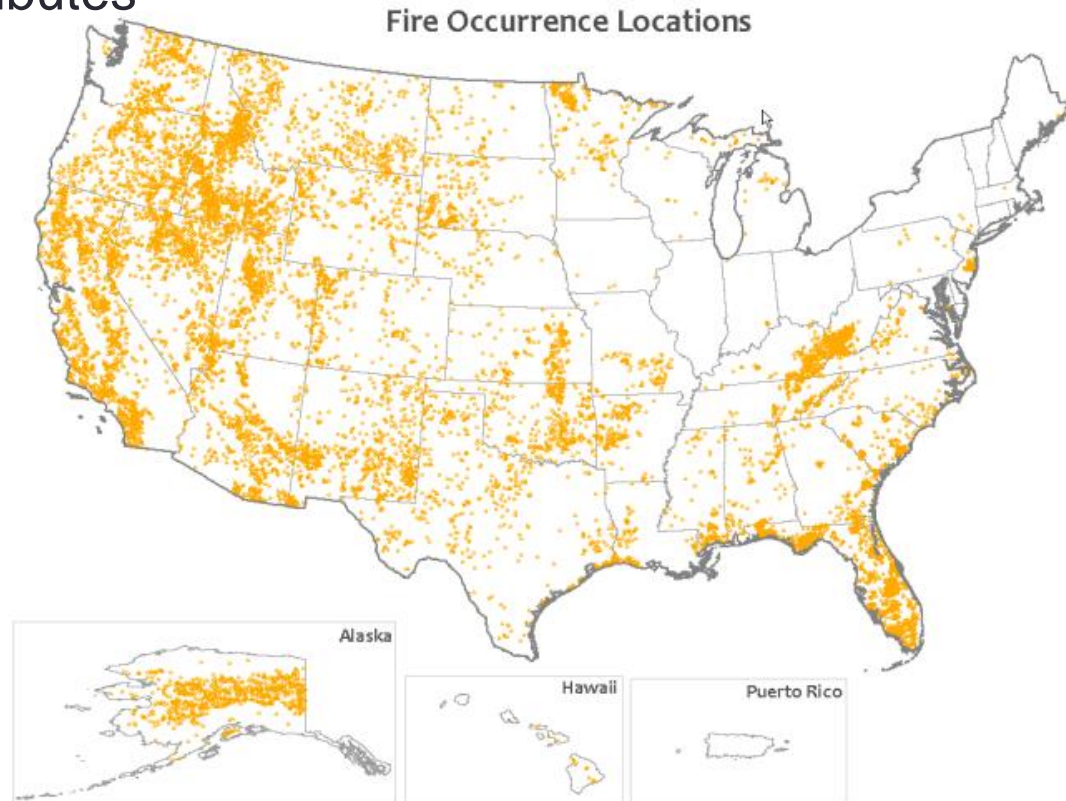


# MTBS Geospatial Products

## National Fire Data

### Fire Occurrence Data

- Point Shapefile w/metadata
- Geographic centroid of burned area for each mapped fire
- Fire and mapping attributes

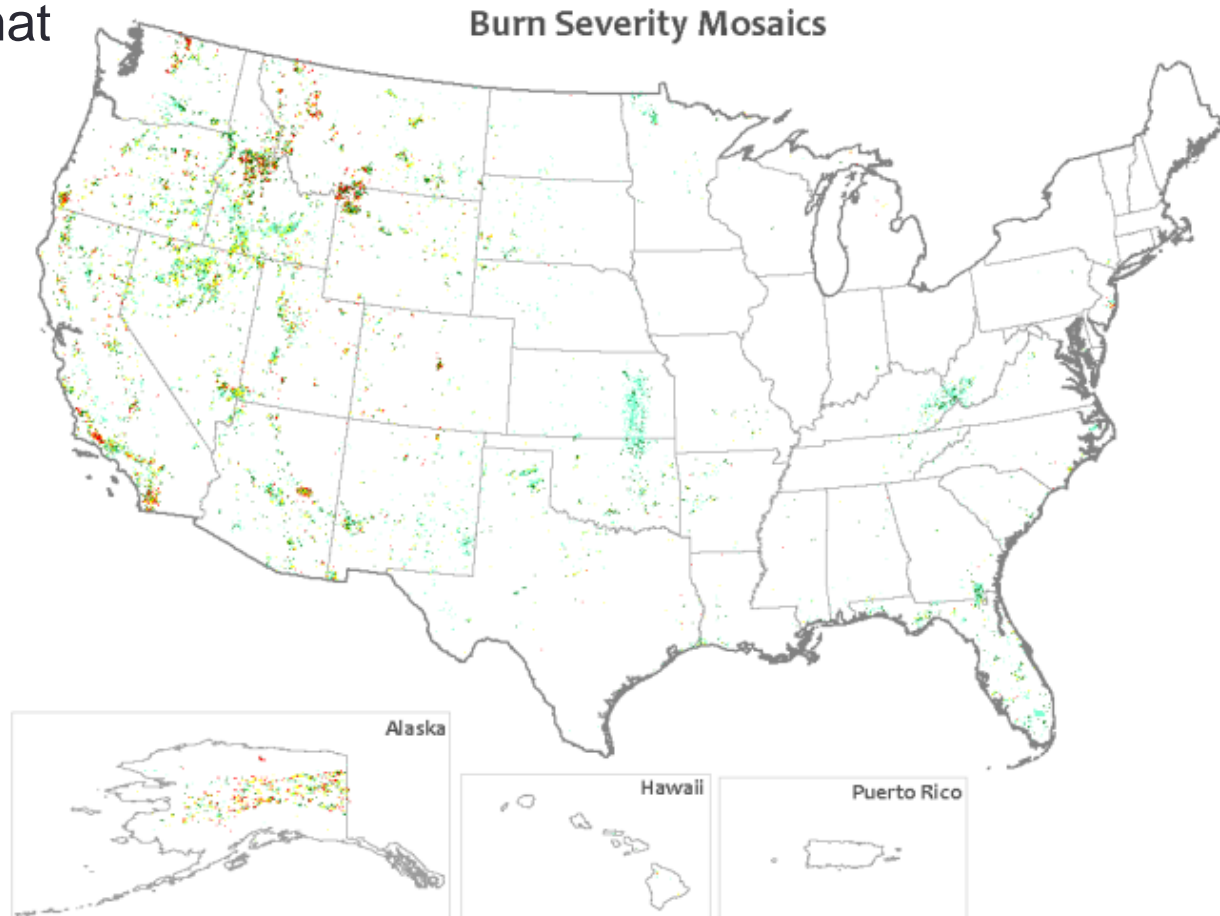


# MTBS Geospatial Products

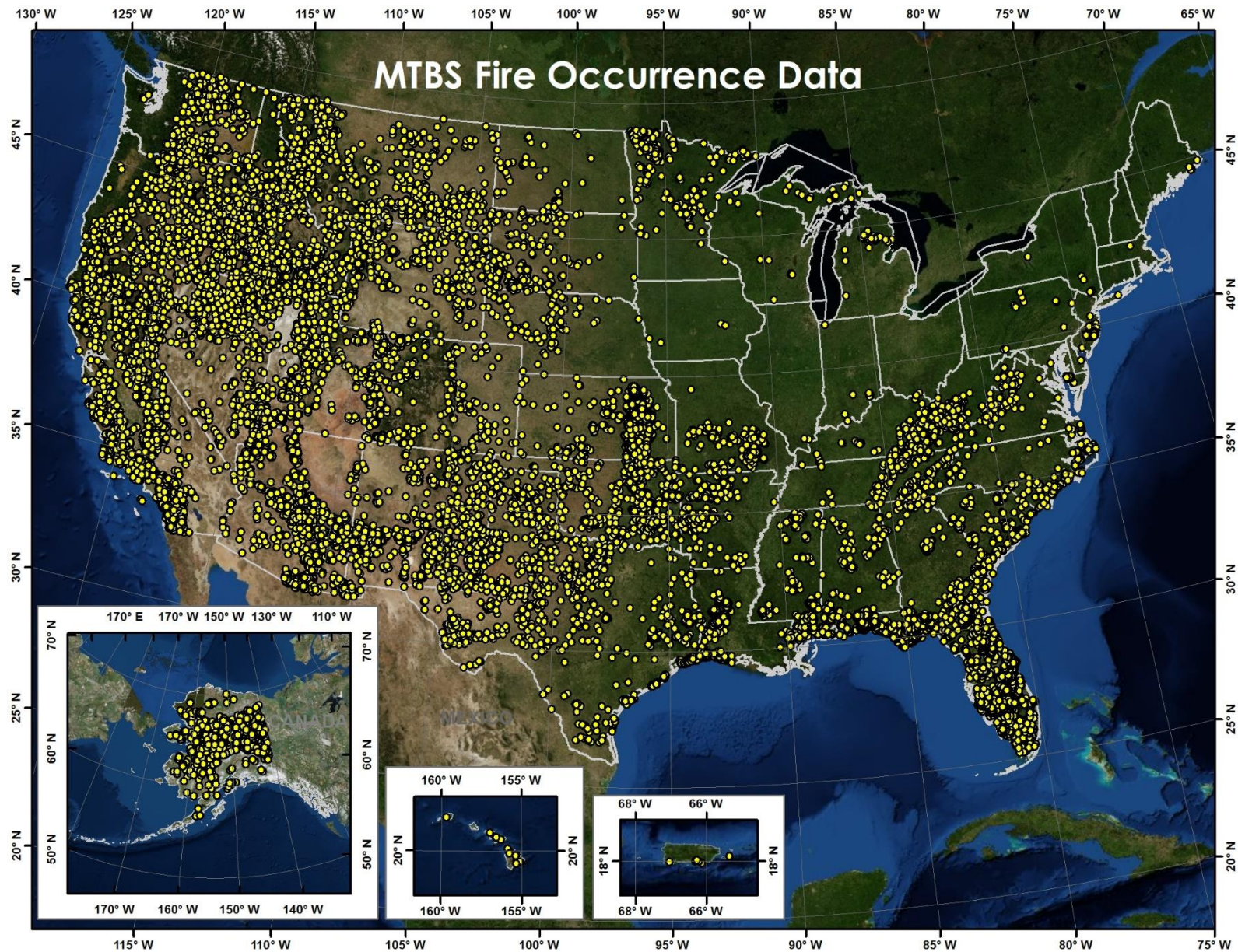
## National Fire Data

### Thematic Burn Severity Mosaics

- Seamless, 6 class, thematic raster w/metadata
- GeoTiff file format
- Available on an annual basis by State and MTBS region (CONUS, AK, HI, Puerto Rico)



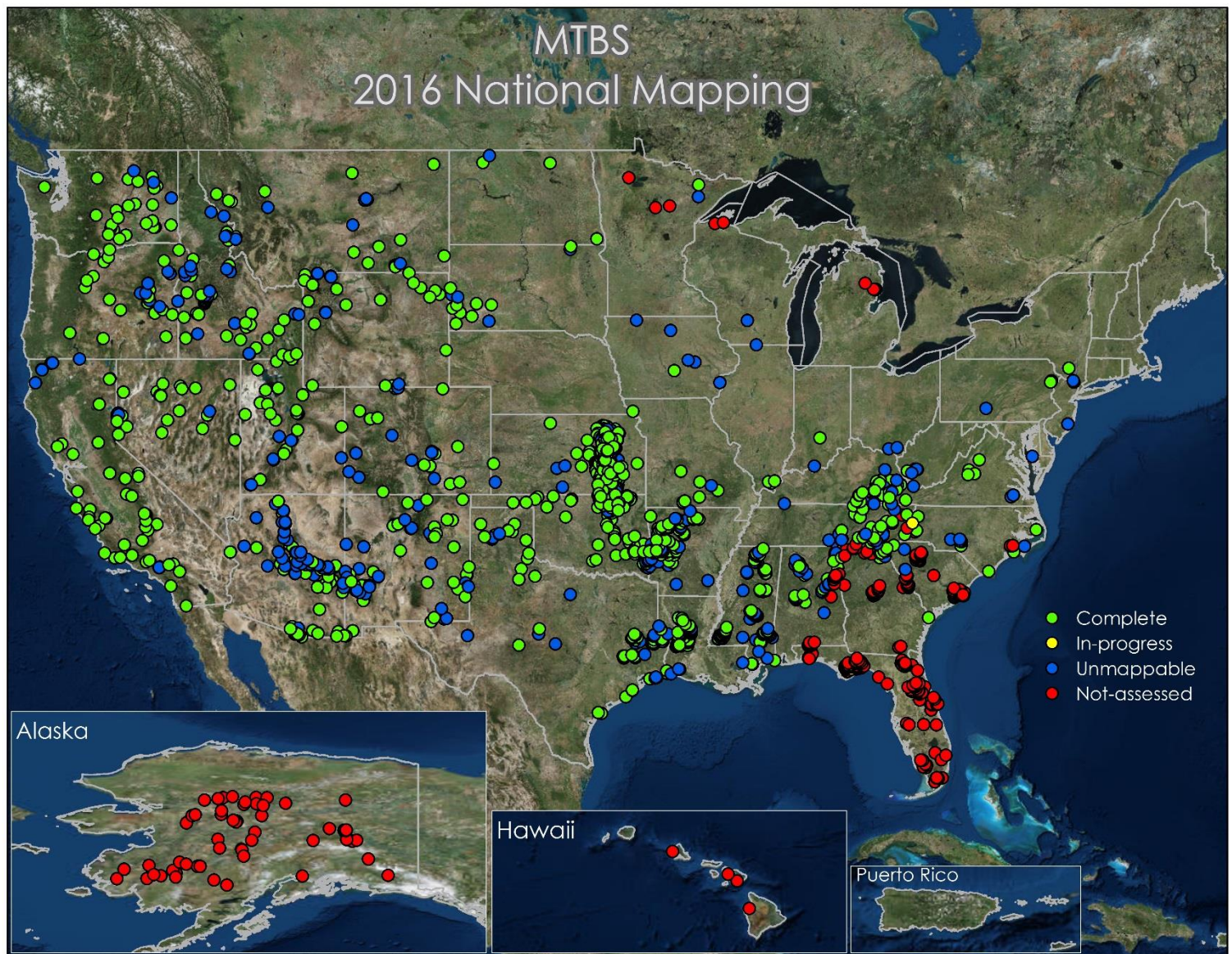




1984-2015 Complete

~20,000 fires mapped and available for download from [MTBS.gov](https://www.mtbs.gov)





2016  
1,841 Fires

Mapping began: January 2017  
Approx. 62% complete  
Projected release: Summer 2018



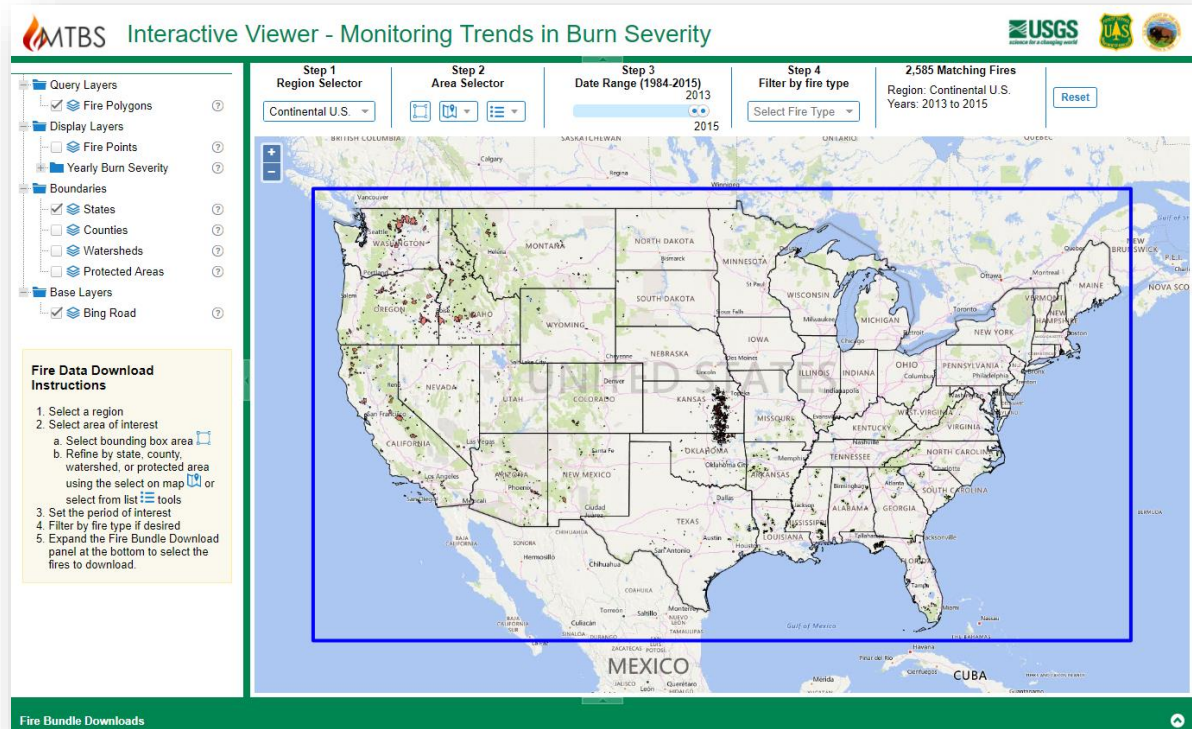


# MTBS Website Overview and Demo

MTBS website:  
<http://www.mtbs.gov>

# MTBS Website

- Product Descriptions
- FAQs
- Data Access



MTBS website:  
<http://www.mtbs.gov>





# Challenges and Limitations



# MTBS Program Challenges and Limitations

- Consistency in thresholding severity classes
  - MTBS internal calibration
  - Apply regional threshold models calibrated using plot data
- Inclusion of “small” fires (< 500 and < 1,000 acre fires)
  - Significant costs involved to capture these additional fires
  - ~5% of the fire occurrences and ~95% of burned area is captured by MTBS



# MTBS Program Challenges and Limitations

- FOD accuracy/completeness
  - Erroneous locations
  - Incorrect acreage reports
  - Source database revisions/updates
- Landsat data continuity/quality
  - L7 SLC-off data
  - Smoke, clouds, cloud shadows
  - Landsat 8 launched Feb. 2013
- Limitations of sensor characteristics
  - Detection of low intensity/understory fire areas
- Ability of NBR/dNBR to characterize fire effects
  - Adaptability to wide range of biophysical settings
  - Prefire/postfire imagery provided by MTBS to facilitate application of other methods

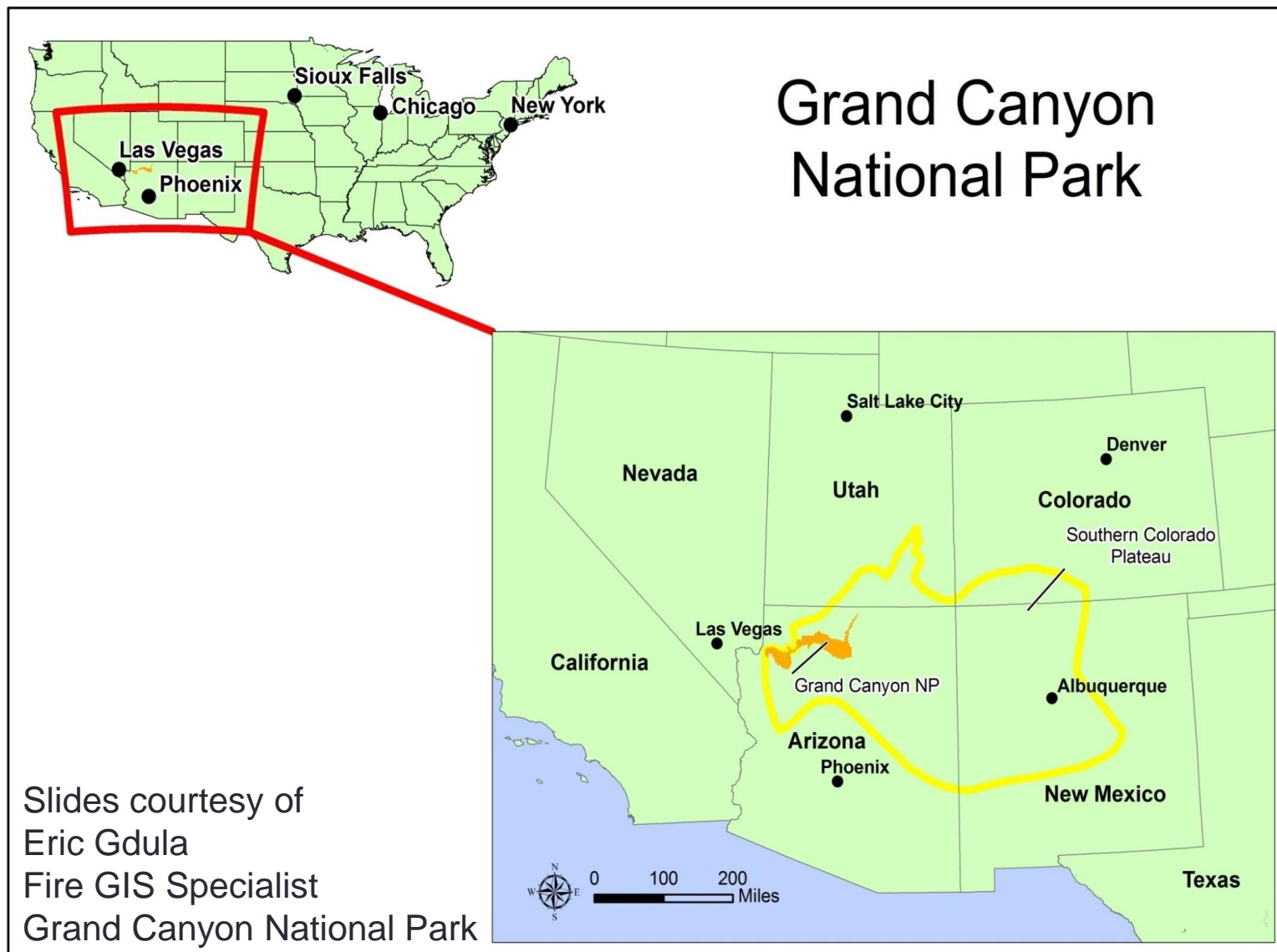




# Applications of MTBS Data

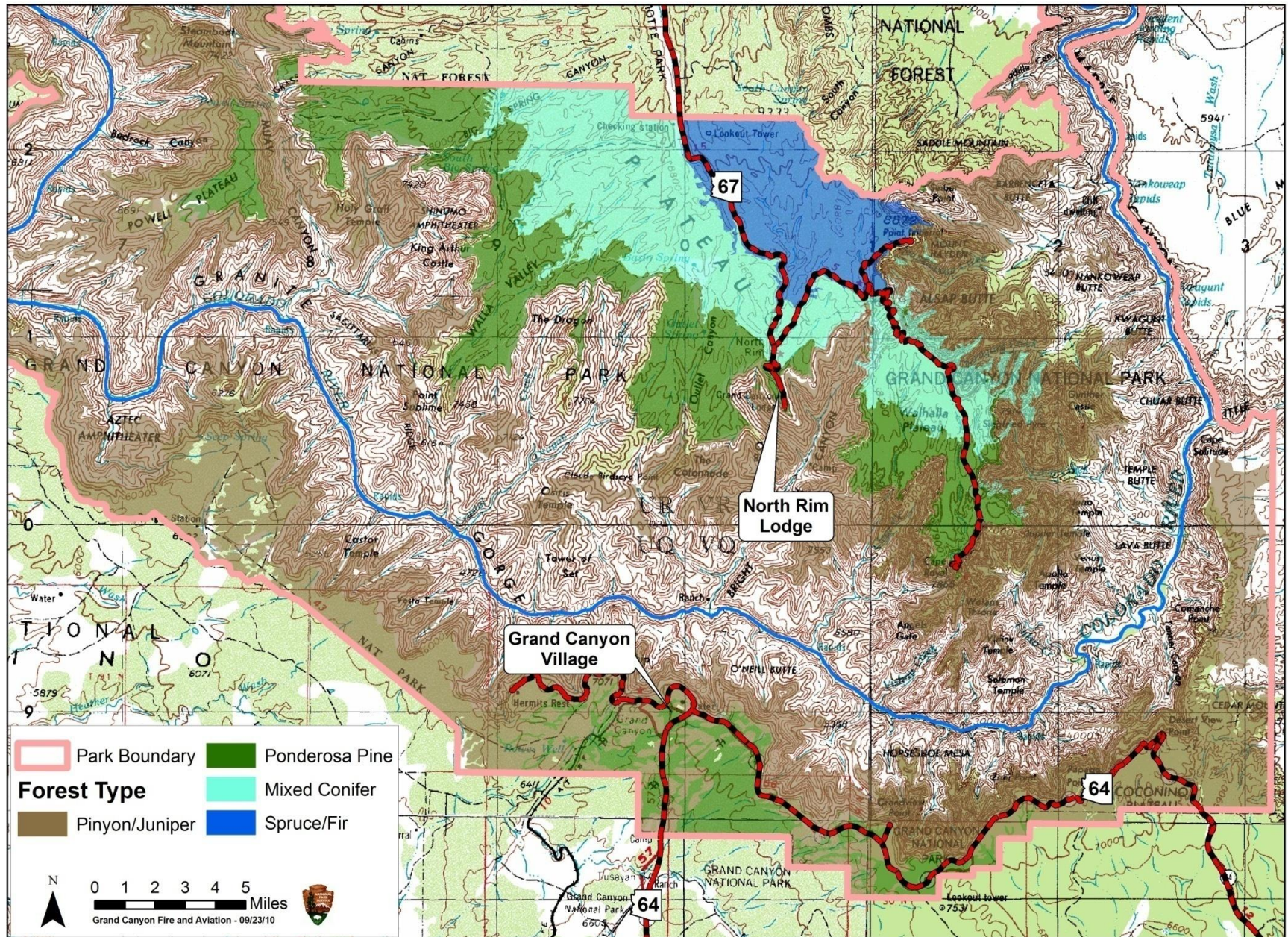


# Applying MTBS Data



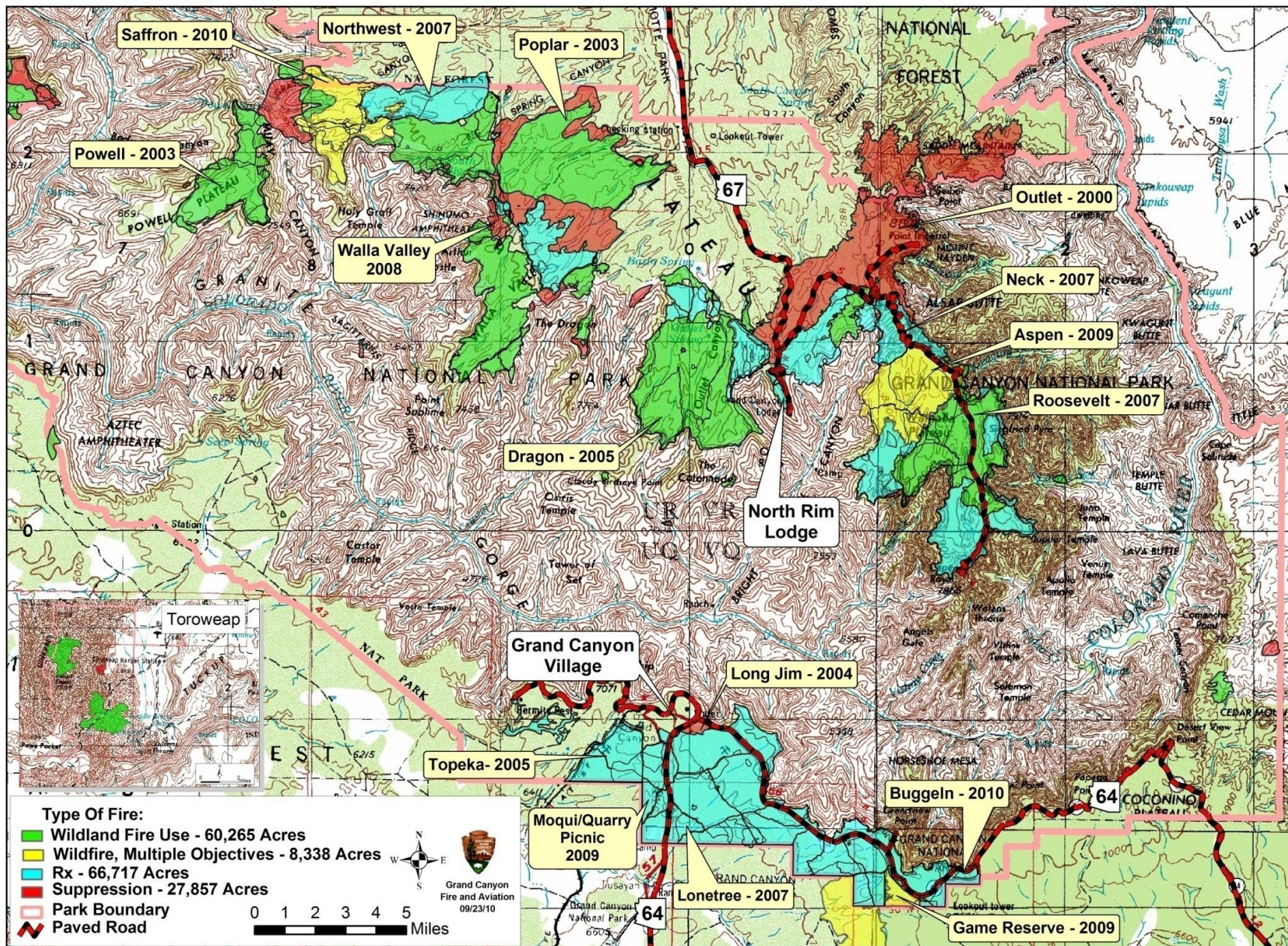


# Major Forest Types - Grand Canyon National Park



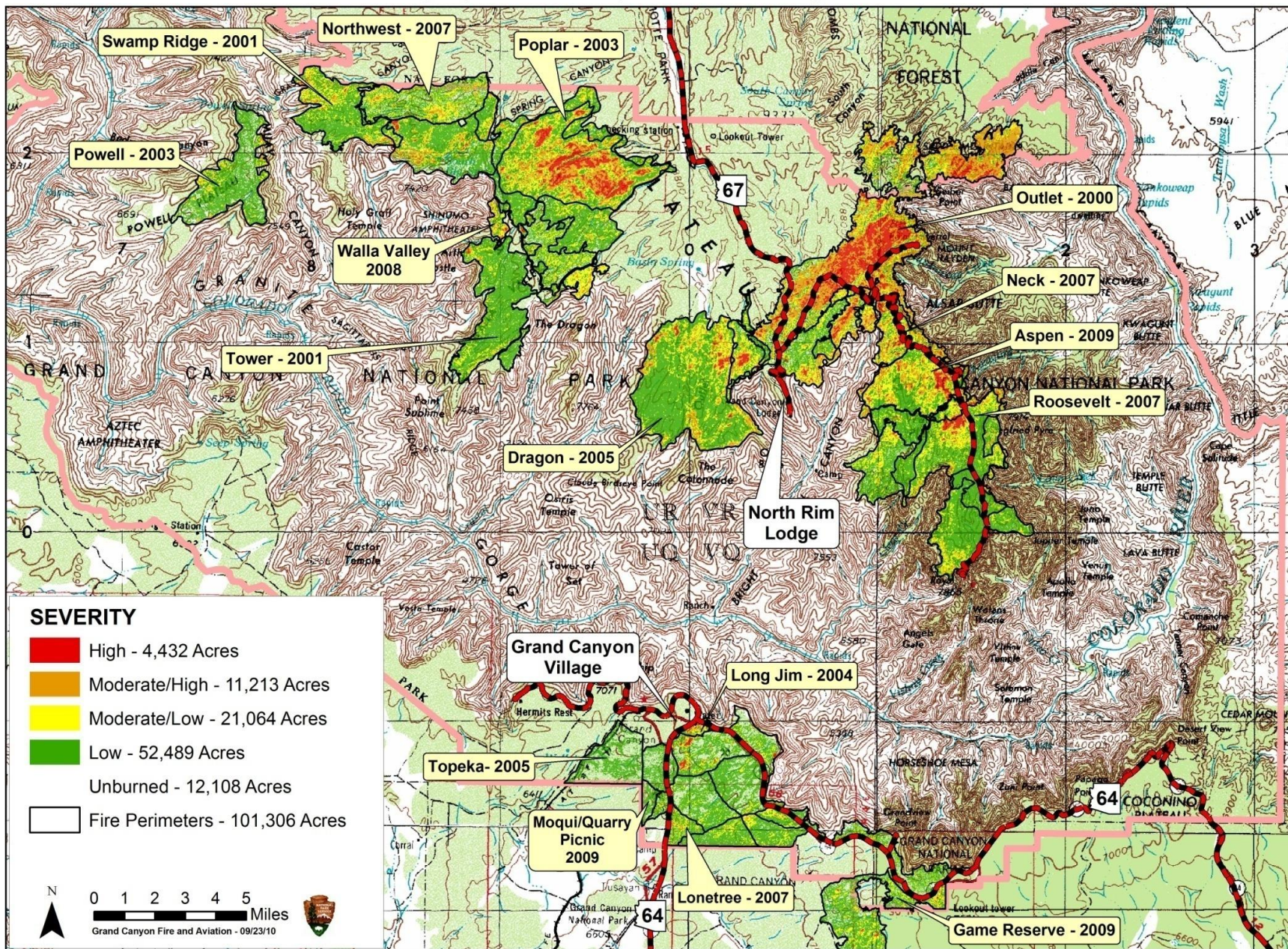


# Fire History (1980-2010) - Grand Canyon National Park



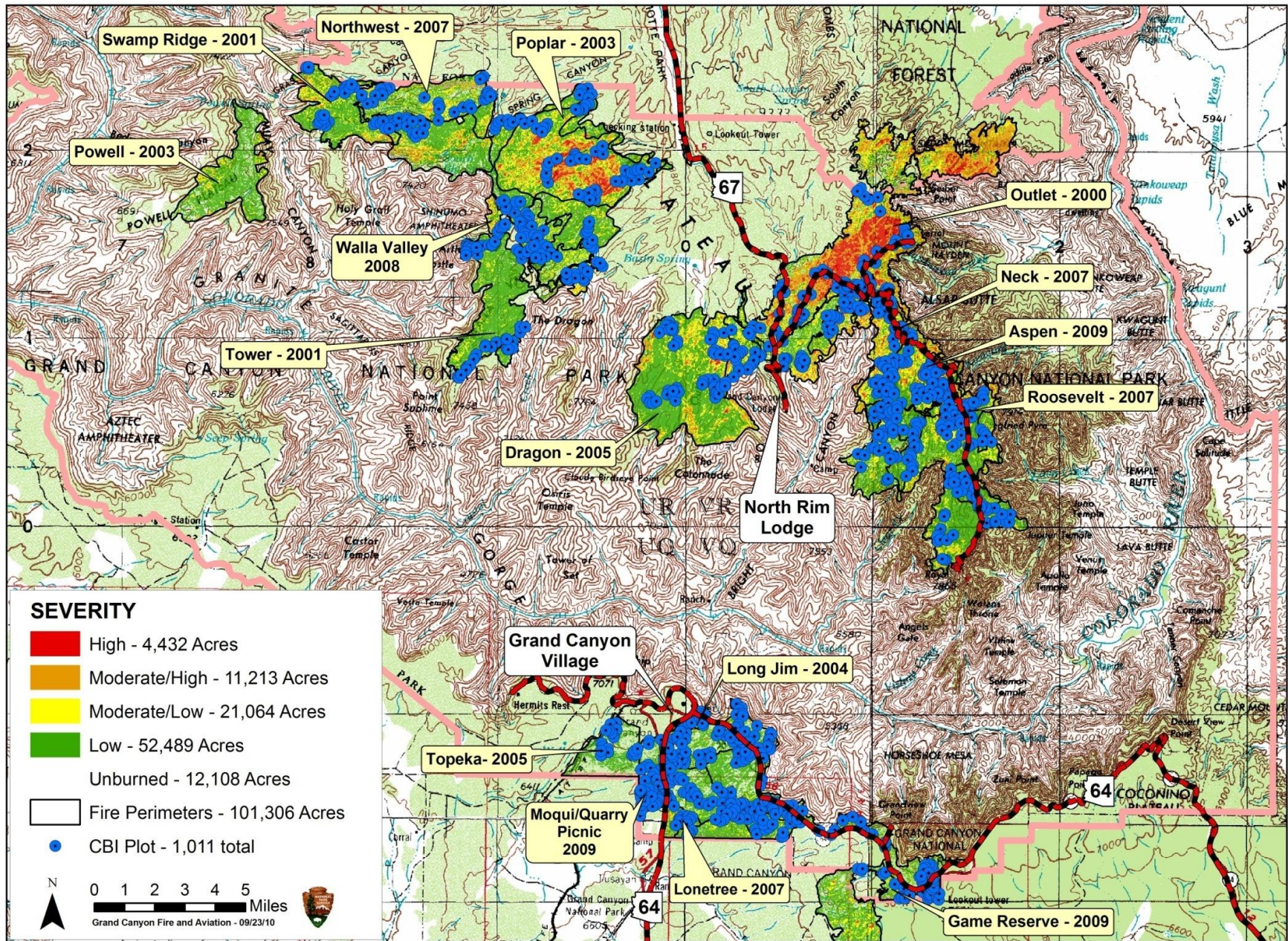


# Burn Severity (2000 - 2009) - Grand Canyon National Park



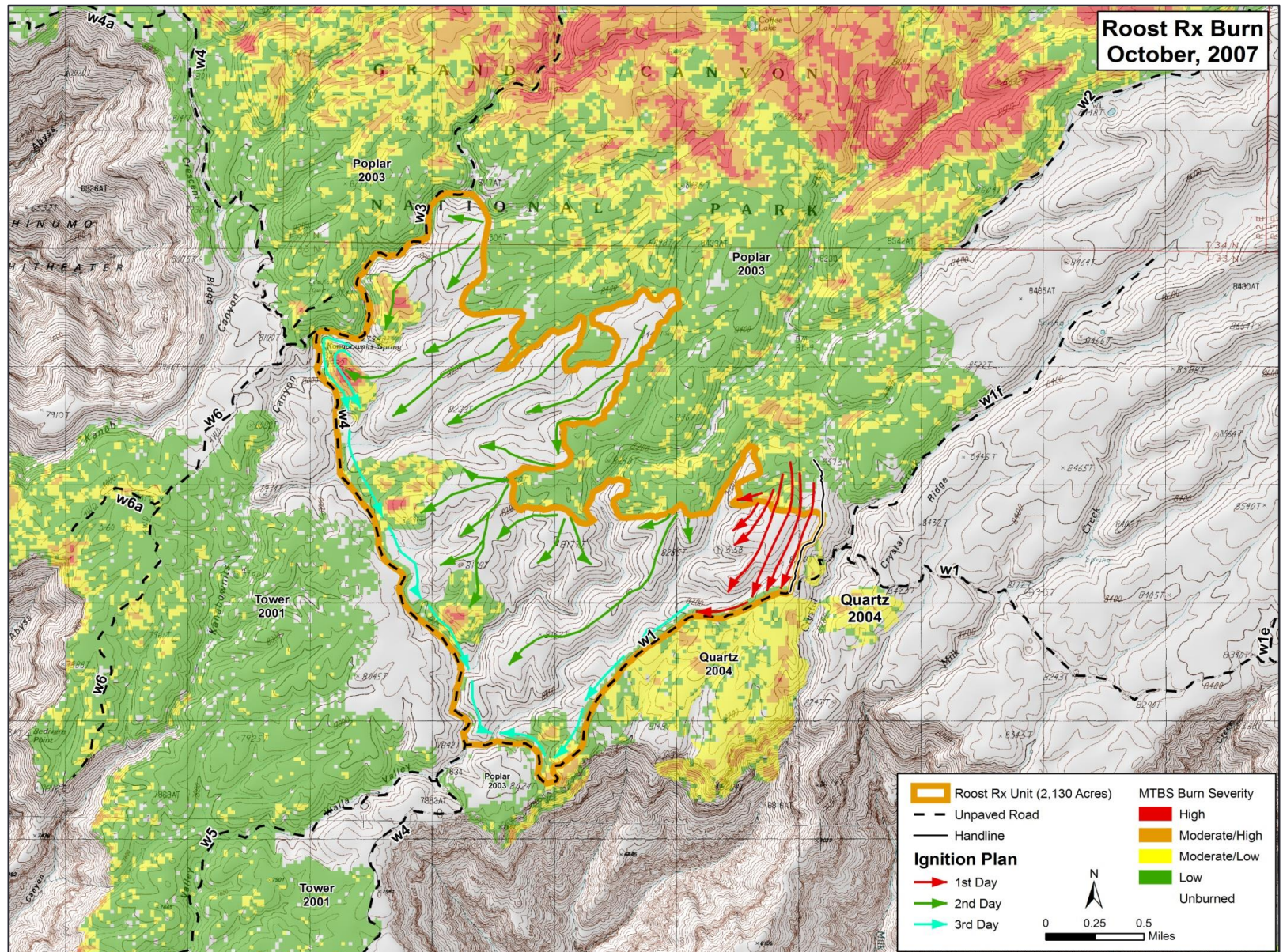


# Burn Severity (2000 - 2009) - Grand Canyon National Park





# Applying MTBS Data

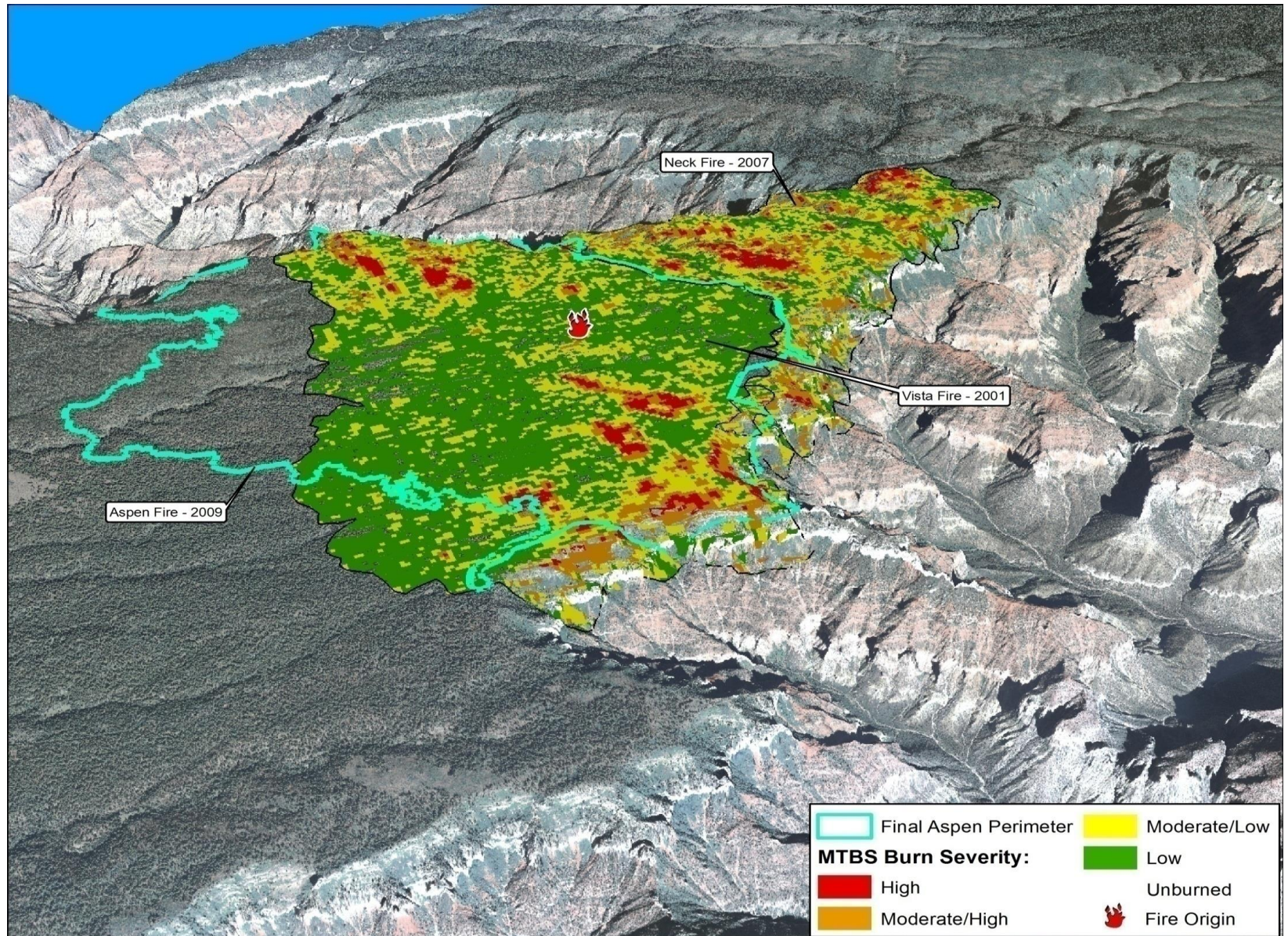








# Applying MTBS Data





# Applying MTBS Data

National Park Service  
U.S. Department of the Interior  
Grand Canyon National Park



## Final Environmental Impact Statement and Assessment of Effect

### Fire Management Plan Volume One



National Park Service  
Grand Canyon National Park

June 2009  
Final Fire Management Plan EIS/AEF

process will be critical to managing protection of habitat for a threatened species while restoring a mixed-severity fire regime. To reduce potential effects of fire on MSO habitat elements, **Alternatives 2 through 5 include a mitigation measure to limit amount of moderate/high and high severity fire in the mixed-conifer forest type and MSO mixed-conifer restricted habitat to less than 30% across the landscape.** The following adaptive management steps will be taken to ensure this mitigation measure is met.

- **Assess Issue** Balance programmatic objectives (Section 1.4) of maintaining critical habitat for listed species, conducting fire management activities in proposed wilderness in a manner that will not diminish suitability for designation, minimizing smoke impacts on human health and air quality values, restoring and maintaining ecosystems within the range of desired conditions, and setting priorities for treatment activities based on departure from natural fire return intervals and desired conditions. **Ensure effects to MSO restricted mixed-conifer habitat elements are minimized by limiting moderate/high and high severity fires to less than 30% of the mixed-conifer forest type and MSO mixed-conifer restricted habitat.**
- **Plan Treatments and Design Monitoring** Treatment plans will be developed for prescribed fires in the mixed-conifer forest type. Plans will include the objective of minimizing moderate/high and high severity fire effects. Various implementation activities designed to reduce amount of moderate/high and high severity fire effects, such as developing prescriptions that meet burn objectives and reduce crown fire amount, developing ignition strategies likely to minimize head fires, and igniting fires at various times of day or in various seasons, will be considered during the planning phase. All treatment plans will be reviewed by a park interdisciplinary team prior to implementation. **Seventy percentages will be monitored using the national burn severity mapping protocol.** In addition, with implementation of this Fire Management Plan, newly designed rapid assessment protocol (RAP) plots will be installed in mixed-conifer restricted habitat to provide unit-specific information on fire effects. Variables monitored with RAP plots will include tree basal area, canopy cover, tree size class distribution, and large downed woody debris.
- **Implement Treatments and Monitoring** Treatment implementation will follow the sequence outlined in the long-term treatment schedule described in Appendix D. Monitoring implementation and data management will follow guidelines in the revised GRCA Wildland and Prescribed Fire Monitoring Plan (NPS 2009). Possibility exists for unplanned ignitions in the mixed-conifer forest type prior to prescribed fire implementation. If this occurs, fire and resource managers will assess ignition location, time of year, location of fire sensitive natural and cultural resources, past seasonal precipitation amounts and precipitation forecasts, number and effects of past fire events in and near the fire area, potential for positive and negative effects on resources, and potential to meet programmatic objectives (including the limit on higher severity fire) prior to a decision to suppress or manage the fire. If a decision is made to manage an unplanned fire, fire managers may choose to use additional firing operations from defensible control lines to back fire into the wind or direct fire into previously burned areas to minimize potential for higher severity fire effects. Tactical areas may be created through fuel reduction projects near roads to create defensible areas to contain fire spread or facilitate potential firing operations. Containment and control operations may occur on sections of a fire with potential for higher severity effects. Burn severity monitoring will be completed for unplanned fire events, and plot-based monitoring may occur if there are established plots in the fire area.
- **Analyze Data and Communicate Results** Quantitative burn severity mapping data are available 8 to 13 months following fire; however, qualitative information on burn severity can be obtained through aerial reconnaissance during or immediately after fire events. RAP plot data on prescribed fires will be available by January of the year following the fire for variables assessed immediately post-fire. Some variables, such as overstory tree mortality, may be best assessed several years following fire, and data on those variables will be available when ecologically appropriate. During unplanned fire events, the park interdisciplinary team will be notified as the ground situation changes and will be updated on fire behavior, weather, and real-time fire effects observations. Information on burn severity and plot-based monitoring data in mixed-conifer restricted habitat will be included in the annual report to the U.S. Fish and Wildlife Service, and the annual Fire Ecology Program report.
- **Evaluate** Evaluation of treatment implementation and real-time fire effects will occur continuously during prescribed fires and unplanned events. Post-fire evaluations of treatment implementation and qualitative fire effects will occur during an AAR involving both fire and resource management personnel. Annual meetings will occur with USFWS to review and assess yearly and cumulative The

Chapter 2

2 - 18

Alternatives







## A vertical photograph of a rocky hillside covered in dense foliage with vibrant autumn foliage in shades of yellow, orange, and red. The image is oriented vertically, showing a steep slope with large, grey, craggy rocks. The vegetation is thick, with many trees and shrubs displaying bright yellow and orange leaves, interspersed with some green foliage. The lighting suggests a bright day, highlighting the textures of the rocks and the colors of the leaves.

- [illegible]



United States Department of Agriculture  
**Forest Service**

# Thank you

## Understanding & Using MTBS Data

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Geospatial Technology and Applications Center | GTAC  
USDA Forest Service

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