


Monitoring Trends in Burn Severity (MTBS) Project Overview

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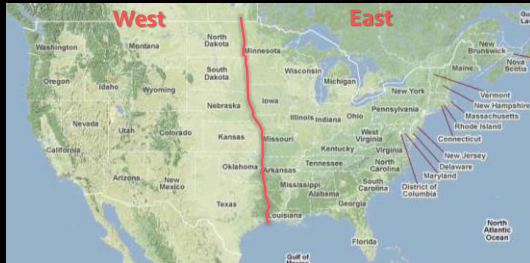

*Webinar for the Northern Rockies Fire
Science Network*

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MTBS Objective

- Consistently map...
 1. Location
 2. Extent
 3. Burn severity
- ...of large fires on all lands in the United States from 1984 thru 2010 (and beyond)
 - CONUS, AK, HI & Puerto Rico
 - > 1,000 acres in the western United States
 - > 500 acres in the eastern United States

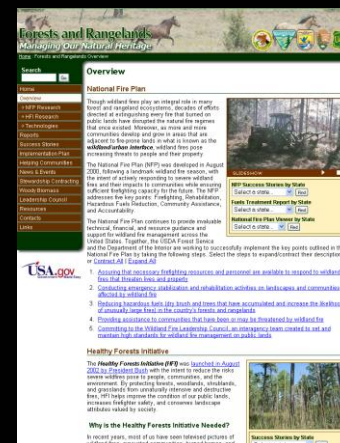
MTBS Background

- Project duration
 - 1984 to 2010 data record completed between 2005 and 2012
 - Annual maintenance/updates planned for 2011 and beyond
- Jointly implemented and equally funded by USDA Forest Service and Department of Interior
 - USFS - Remote Sensing Applications Center (RSAC)
 - USGS - Earth Resources Observation and Science (EROS) Center



MTBS Background

- Sponsored by the interagency Wildland Fire Leadership Council (WFLC)
- One element of a strategy monitoring the effectiveness of the National Fire Plan and Healthy Forests Restoration Act
 - WFLC 2004 Monitoring Proposal, Module 2.1
 - Provide an information base to synoptically assess environmental impacts and trends
 - Required for all lands in CONUS, AK, HI and PR
- **MTBS helps to identify nat'l trends in burn severity**



MTBS and Burn Severity

Burn Severity:

- ... relates to detectable changes in living and non-living above-ground biomass, fire by-products (ash) and soil exposure
- ... is a composite of 1st/2nd order fire effects on biomass that arise within one growing season
- ... occurs on a gradient or ordinal scale
- ... characterized as a mosaic of effects within a fire area
- ... is “mappable” using remote sensing and change detection methods

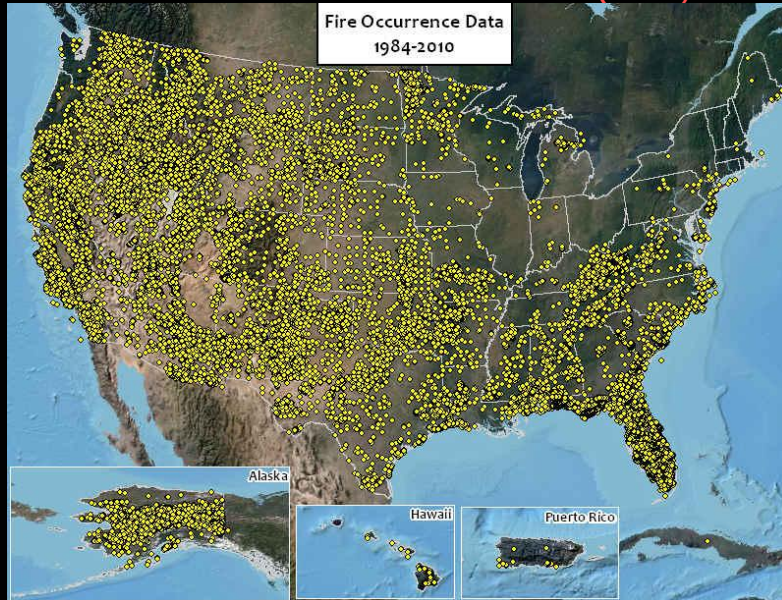


MTBS Fire Mapping Methods Overview

1. Compile fire occurrence database (FOD) from existing federal and state data sources
2. Determine appropriate assessment strategy and select prefire & postfire Landsat scenes
3. Perform image pre-processing, image differencing, burned area delineation and threshold dNBR images into burn severity classes
4. Create metadata, map products, burn severity data analysis and summary, and reporting



MTBS Fire Occurrence Data (FOD)



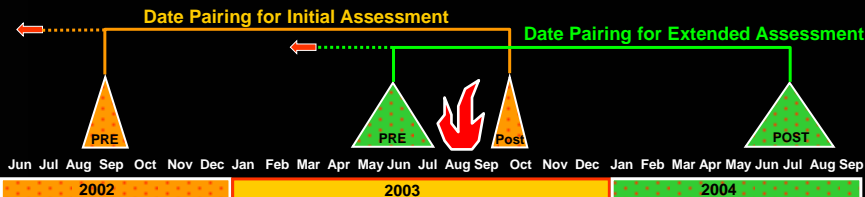
Fire occurrence locations provided by Federal, State Agencies, and other organizations

Over 35,000 fire occurrence points assessed for 1984 -2010



MTBS Methods – Assessment Strategy

- Based on biophysical setting and fire type
 - 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)

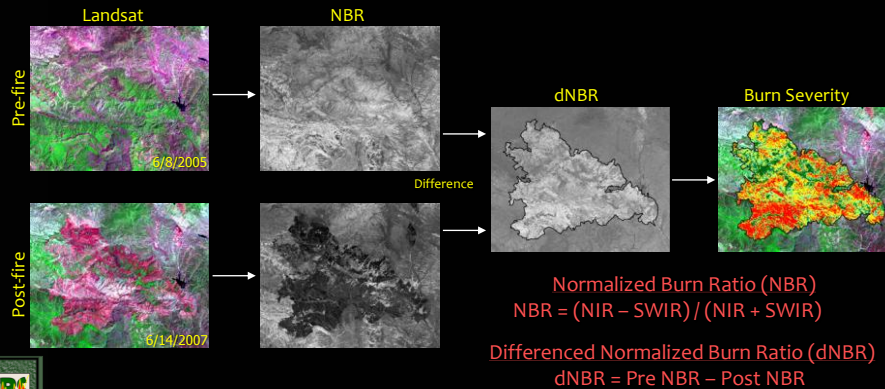


Carl Key 2006



MTBS Fire Mapping Methods Overview

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



MTBS Methods

Why differenced Normalized Burn Ratio (dNBR)?







- Mature science established in the literature
 - Lopez-Garcia and Caselles, 1991; Brewer et al., 2005; Cocke et al., 2005; others
- Operational precedent
 - Implemented by Key and Benson for development of NPS fire atlases
 - USFS/DOI BAER Programs
- Landsat TM/ETM data record
 - Consistent data record spanning ecologically and possibly climatically significant time frame
- Resolution synergy
 - Spatial and spectral resolutions comparable to other national scale data

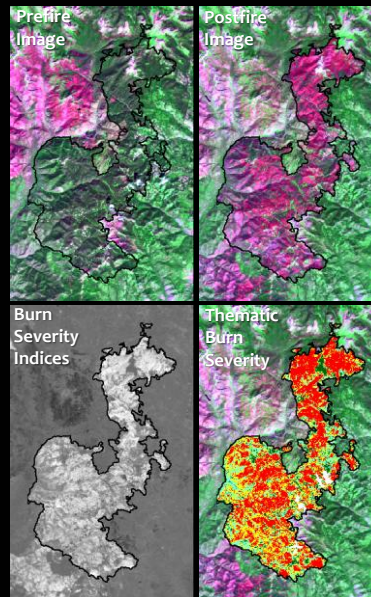


MTBS Geospatial Products

Fire Level Datasets

- Available from <http://www.mtbs.gov>
- Pre/Post-fire Landsat imagery
 - Bands 1-5, 7
- 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

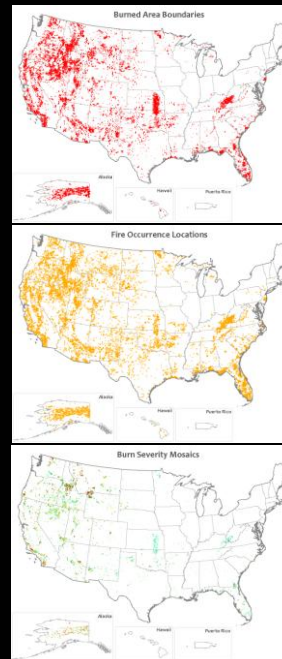
	Unburned/Low
	Low
	Moderate
	High
	Increased Greenness
	Non-mappable area
- Map, visualization and reporting products



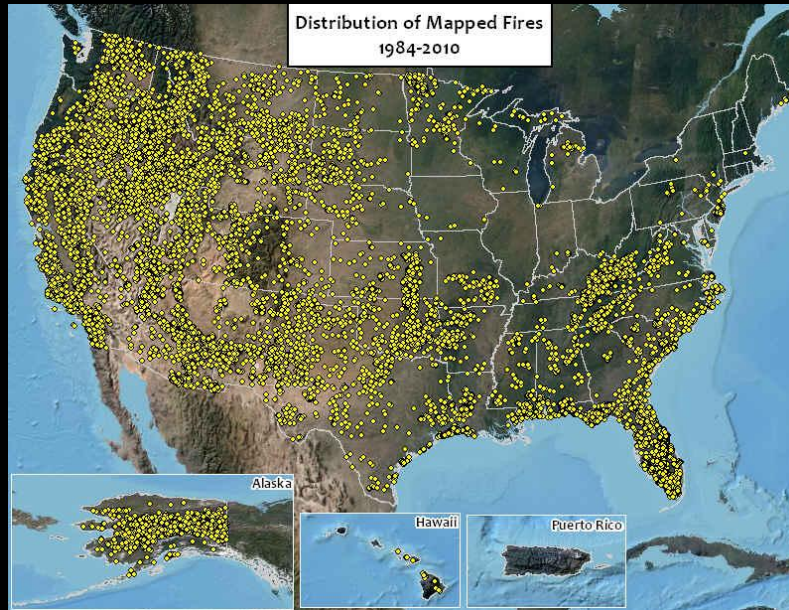
MTBS Geospatial Products

National Fire Datasets

- Burned Area Boundaries
 - ESRI Polygon Shapefile w/metadata
 - Fire attributes
- Fire Occurrence Database
 - ESRI Point Shapefile w/metadata
 - Geographic centroid of burned area for each mapped fire
 - Fire and MTBS processing attributes
- Thematic Burn Severity Image Mosaics
 - Seamless, 6 class, thematic raster w/metadata
 - ERDAS Imagine .img file format
 - Available on an annual basis by MTBS region (CONUS, AK, HI, Puerto Rico)

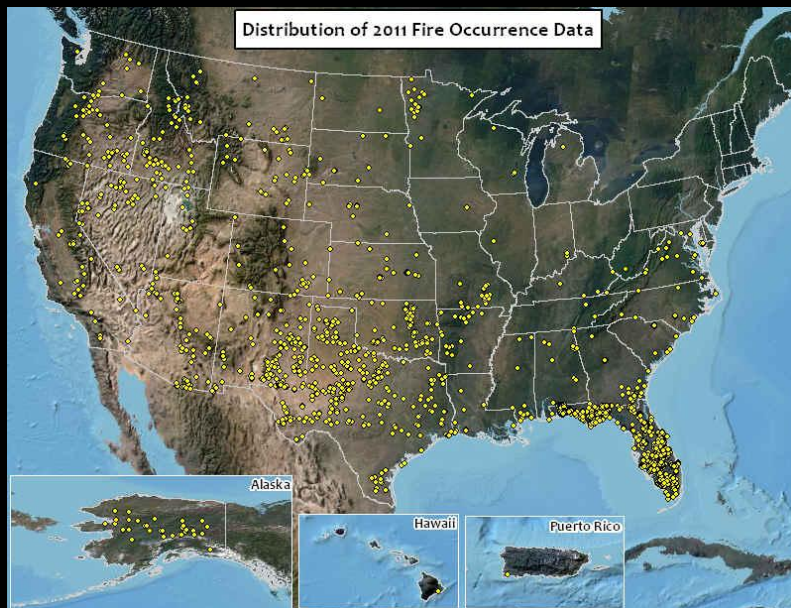


MTBS Production Status



14,945 fires have been mapped covering nearly 111 million acres

MTBS Production Status



1,881 fire occurrence points will be assessed for the 2011 fire season

MTBS Project Challenges and Limitations

- FOD accuracy/completeness
 - Erroneous locations
 - Incorrect acreage reports
 - Source database revisions/updates
- Landsat data continuity/quality
 - L7 SLC-off data
- 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



MTBS Project Challenges and Limitations

- Consistency in thresholding severity classes
 - Feedback from regional experts
 - MTBS internal calibration
 - Apply regional threshold models calibrated using plot data
- Assessment timing relative to burned area perimeter delineation and severity characterization
 - Challenges to obtaining appropriate imagery (cloud cover, lack of data coverage, etc.)
 - Postfire management activities
- 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 – Looking Forward

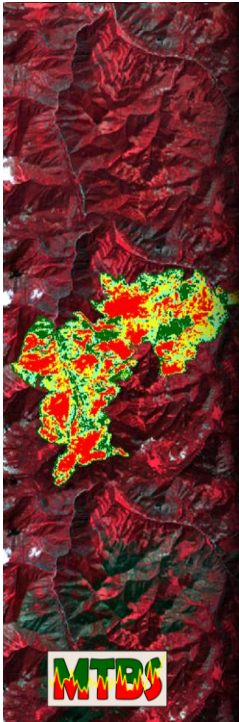
- Data production continues...
 - 2011 and beyond annual mapping
 - Review of “unmappable” fires
- Calibration/Validation efforts
 - Field visits and coordination with regional collaborators
- Technology transfer
 - Enhancements to tutorials/training modules will be coming to MTBS project website in the future



MTBS Project

- Project/Data Distribution Website
 - <http://www.mtbs.gov>
- Contact:
 - mtbs@fs.fed.us
- Training Opportunity:
 - Geospatial Assessment and Application of Burn Severity Data training webinar
 - <http://www.fs.fed.us/eng/rsac/baer/training.html>





Comments / Questions?

<http://www.mtbs.gov>