

# USDA Forest Service Remote Sensing Applications Center Operational Remote Sensing Support Programs



USDA Imagery Planning and Coordination  
December 2-4, 2008

# Remote Sensing Applications Center (RSAC)

## RSAC Mission:

- Technical support - evaluating and developing remote sensing, image processing, GPS, and related geospatial technologies.
- Project support and assistance using remote sensing technologies.
- Technology transfer and training to field users.
- Operational support for active wildland fire management and post-fire assessment.

# RSAC Operations Program Support

## Active Fire Assessment

- MODIS Active Fire Mapping Program
  - ◆ Support USFS and all wildland fire management agencies
    - Near Real-time Assessment

## Post-fire Assessment

- Burned Area Emergency Response (BAER) Imagery Support
  - ◆ Support USFS BAER teams
    - Emergency Assessment
- Rapid Assessment of Vegetation Condition after Wildfire (RAVG)
  - ◆ Support Forest Silviculturists
    - Rapid Assessment

## Post-Catastrophic Wx Event Assessment

- Rapid Assessment of Forest Damage
  - ◆ Support USFS units (National Forests/Districts)
    - Rapid Assessment

# RSAC Operations Program Support

## Currently Leveraged Sensor Assets

Landsat 5 and Landsat 7 (SLC-Off)

ASTER

SPOT 4 and 5

AWiFS

NASA Ikhana AMS

Disaster Monitoring Constellation (DMC)

MASTER

IKONOS

Quickbird

MODIS

AVHRR

GOES



# Forest Service MODIS Active Fire Mapping Program

- Satellite-based operational detection and monitoring of wildland fire activity in CONUS, Alaska, Hawaii & Canada
- Generate and provide "value added" fire mapping and visualization products, and geospatial data
- Facilitates decision support for strategic wildfire planning and response for U.S. and Canadian fire agencies
  - ◆ Prioritize allocation of fire suppression assets
  - ◆ Focus tactical airborne reconnaissance assets
  - ◆ Supports several fire-related applications and decision support systems





# Forest Service MODIS Active Fire Mapping Program

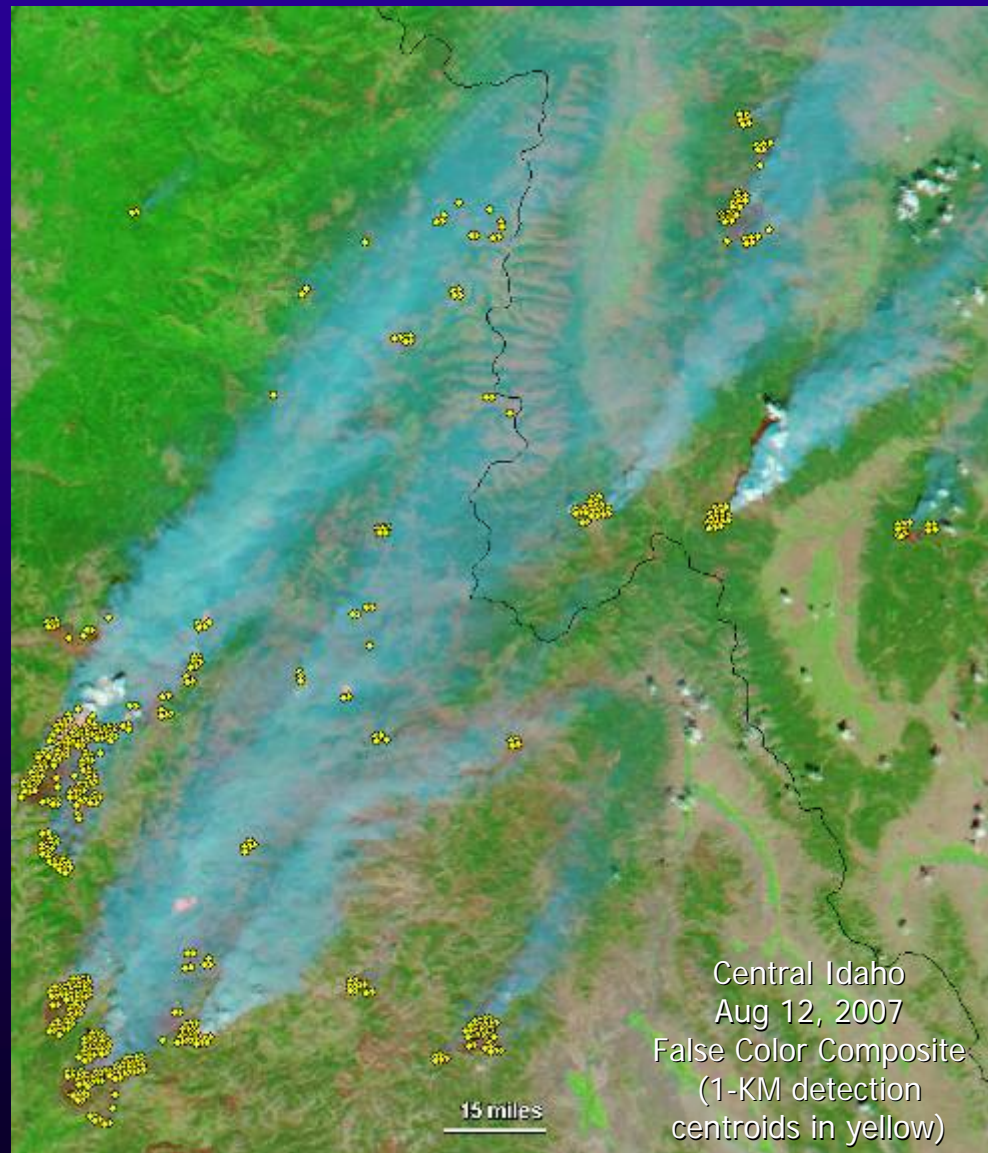
## Currently Leveraged Sensor Assets

Sensor	Platform Type	Spatial Resolution (Reflectance/TIR Bands)	Temporal Resolution (per instrument)	Fire Algorithm	Data Source
MODIS	Polar orbiting	250m, 500m, 1km/1km	2 times daily	MOD14/MYD14	Direct Readout; NASA Rapid Response System
AVHRR	Polar orbiting	1km/1km	2 times daily	FIMMA	NOAA NESDIS
GOES	Geostationary	1km/4km	4 times hourly	WF-ABBA	NOAA NESDIS
VIIRS*	Polar orbiting	375m/750m	2 times daily	TBD	Direct Readout; Rapid Response
GOES-R <sup>#</sup>	Geostationary	500m, 1km/2km	4 times hourly	TBD	Direct Readout; NOAA NESDIS

\* VIIRS launch on NPOESS Preparatory Project (NPP) mission in June 2010 and subsequent NPOESS missions

# GOES-R launch in 2015 and subsequent missions

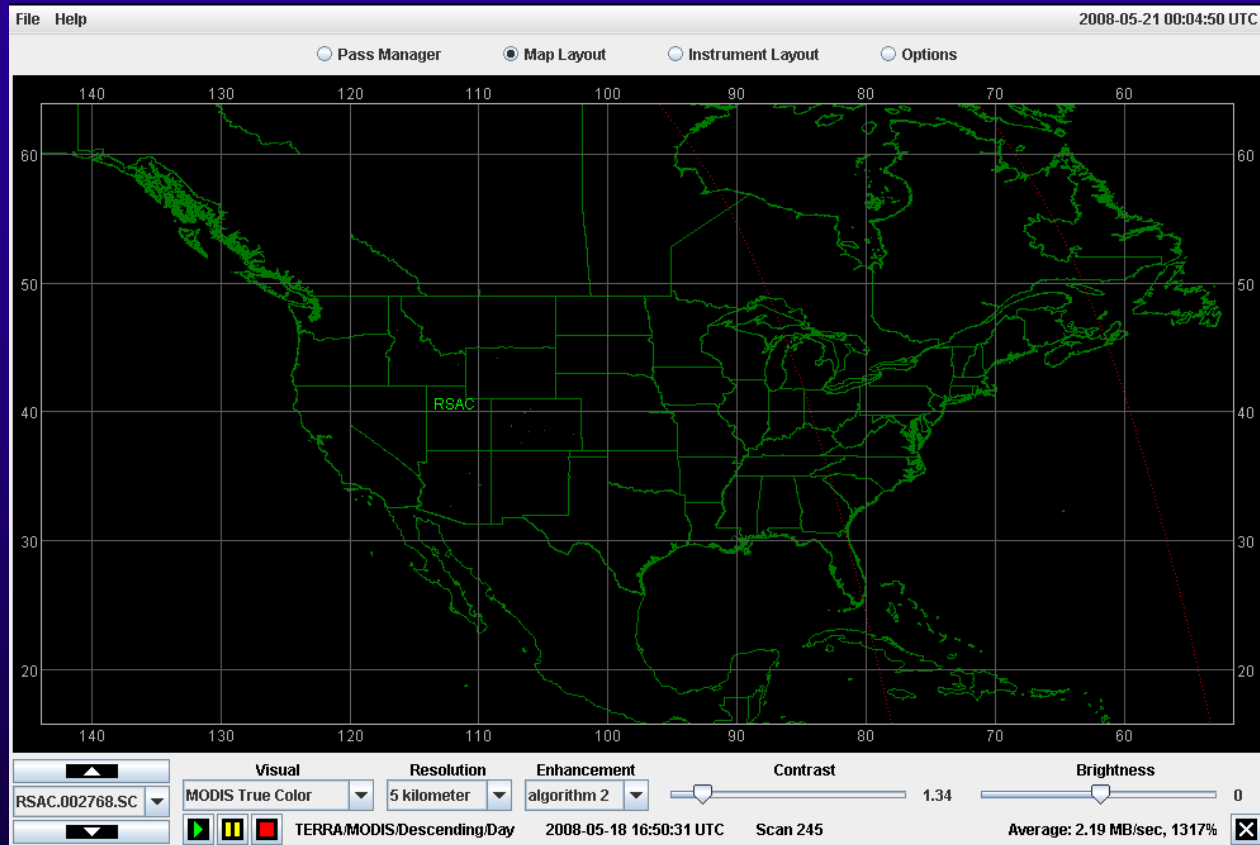
# MODIS Fire & Thermal Anomalies (MOD14/MYD14)



- See Giglio et al. (2003) in *Remote Sensing of Environment*
- Detects & characterizes fire at 1km spatial resolution
- Leverages response of  $4\mu\text{m}$  and  $11\mu\text{m}$  bands to fire
- Absolute thresholds and contextual analysis
- Fire detection is affected by several variables
  - ♦ Atmospheric conditions, view angle, land cover, overpass time relative to fire activity, etc.
- Fire activity smaller than 1km can be detected
  - ♦  $100\text{m}^2$  flaming fire (50% probability)
  - ♦  $50\text{m}^2$  flaming fire in ideal viewing conditions ( $\sim 100\%$  probability)

# RSAC MODIS Direct Broadcast/Direct Readout

May 18, 2008 daytime MODIS acquisitions by RSAC ground station



**NASA Simulcast Viewer**

## Direct Broadcast (DB)

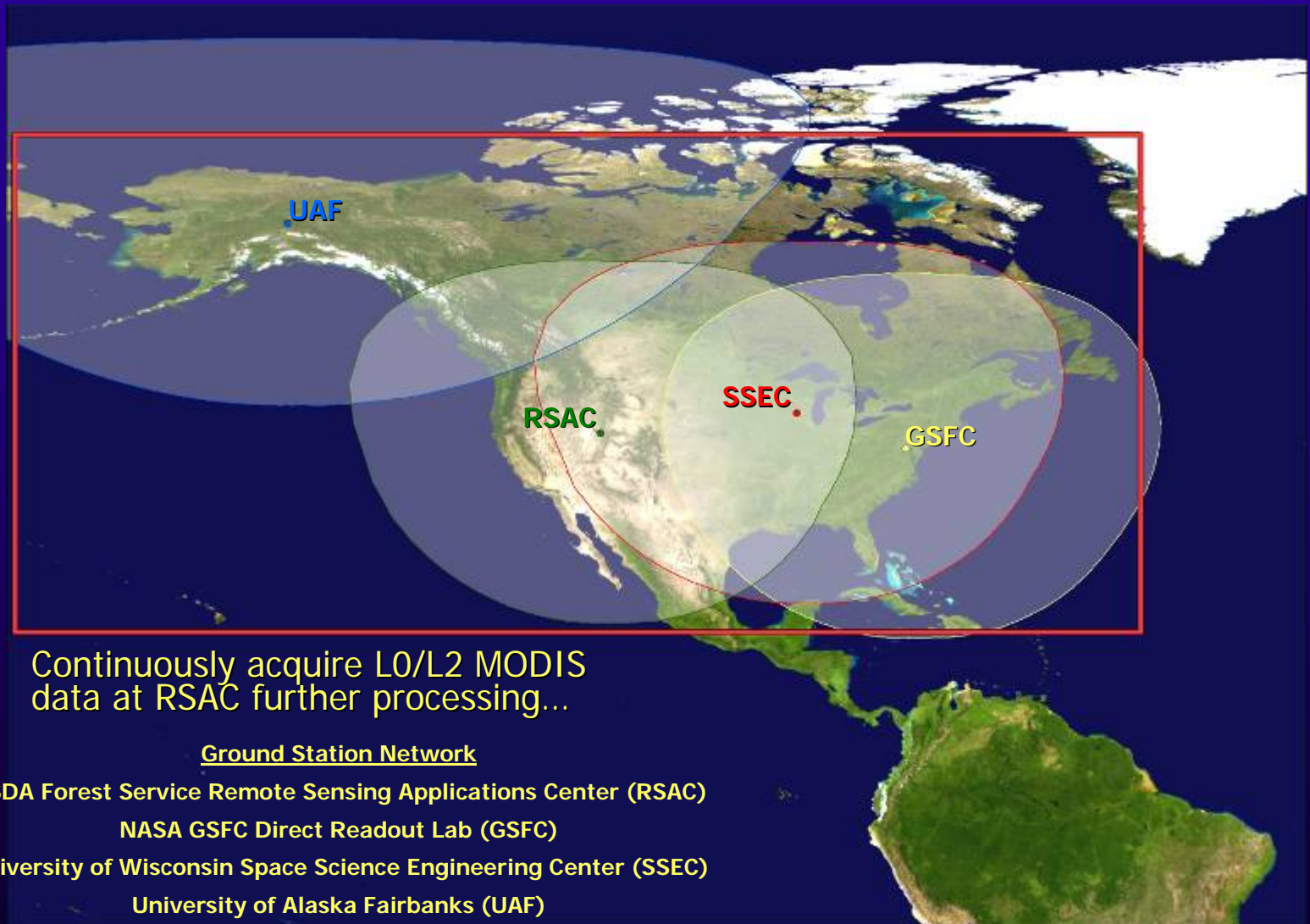
Real-time transmission of satellite data to the ground. As the Earth is being observed by the satellite, the data is formatted and transmitted to any user below in real-time.

## Direct Readout (DR)

Acquisition of freely transmitted live satellite data by users with compatible ground receiving equipment and direct line of sight to the satellite.



# MODIS Direct Readout Ground Station Network

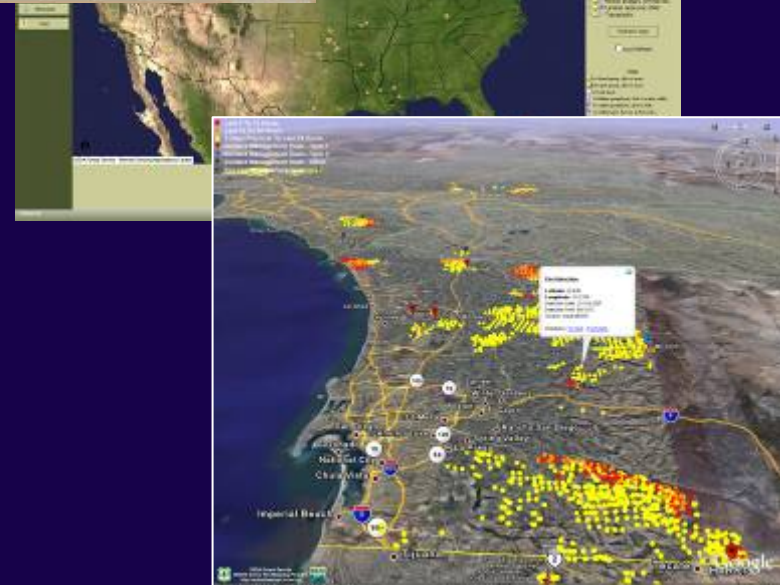


NASA MODIS Rapid Response System provides global coverage; backs up ground station network

# Forest Service MODIS Active Fire Mapping Program

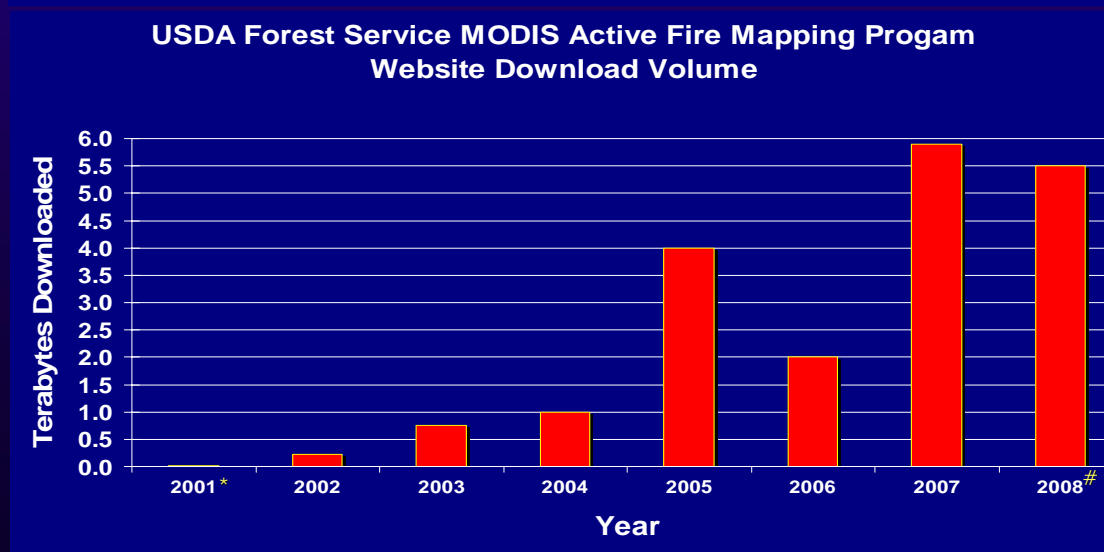
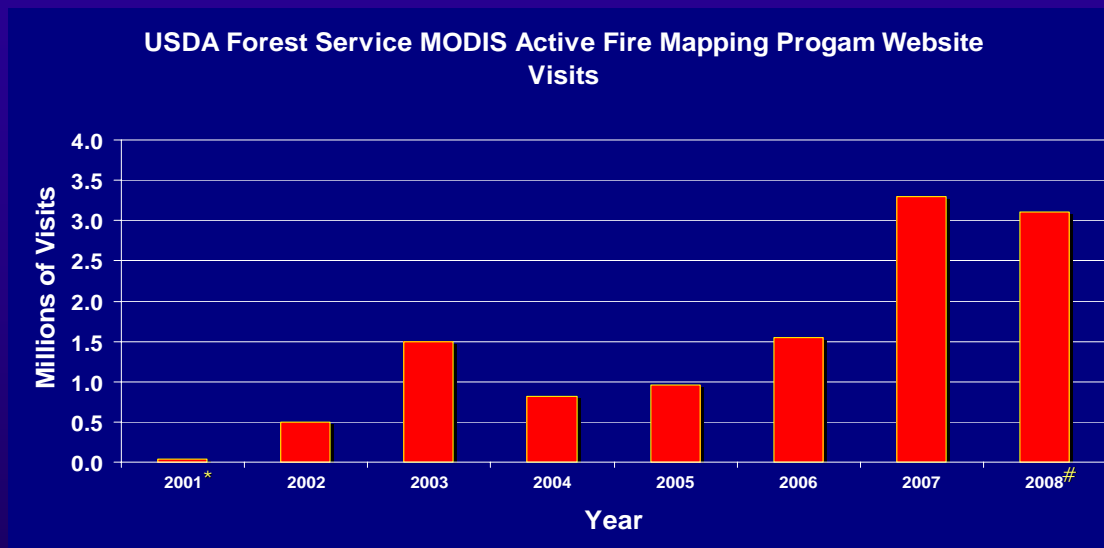
## Value-Added Mapping/Visualization Products and Geospatial Data

- Printable maps
- Interactive web maps
- KMLs
- Fire detection GIS data
- True & False color image subsets
- Analysis Products



# MODIS Active Fire Mapping Program Usage

## USDA MODIS Active Fire Mapping Program Website Stats 2001-2008



\* - complete statistics not available for 2001; # - statistics through November 27, 2008



# Burned Area Emergency Response (BAER)

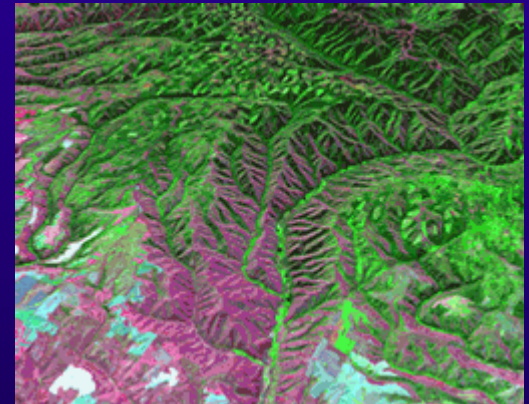
- Objective is to prescribe and implement emergency stabilization measures in order to prevent further damage to life, property and natural resources
- BAER teams are deployed to fires where special efforts are required to mitigate potential hazards resulting from fire effects
- Post-fire damage assessment
  - ◆ Focus on soil and water quality effects
  - ◆ Calculate potential erosion and debris flows
  - ◆ Determine values at risk downstream
  - ◆ Identifies priority areas to be treated
  - ◆ Determine appropriate treatments that help to mitigate some of the risk
- Response plan is required within 7 days of fire containment
- RSAC remote sensing support is critical in generating the BAER response plan





# Burned Area Emergency Response Imagery Support

- Objective is to provide rapid delivery of remote sensing products to Forest Service BAER teams
  - ◆ Pre-/Post-fire satellite imagery
  - ◆ Burned Area Reflectance Classifications (BARC)
  - ◆ Other relevant geospatial data and products
- RSAC remote sensing support provided at or immediately after fire containment
- RSAC provides imagery and data products within 24 hours of image acquisition
- Multiple BAER teams/wildland fire incidents are supported simultaneously by RSAC
- Critical technical factors:
  - ◆ Spatial resolution – 20 to 30m
  - ◆ Spectral resolution – SWIR band
  - ◆ Acquisition timing – at or near fire containment
  - ◆ Delivery from provider – FTP; same day of acquisition



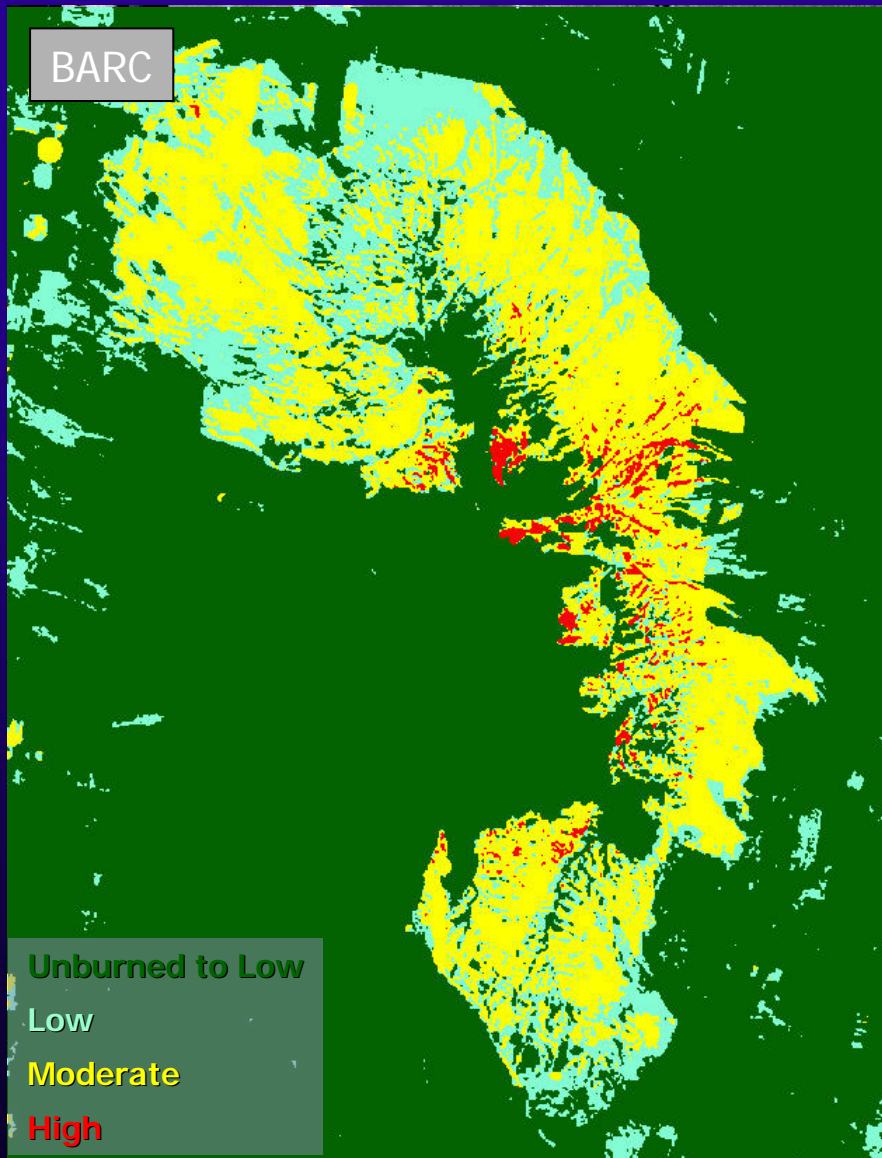
# Burned Area Emergency Response Imagery Support

## Frequently Leveraged Sensor Assets

Sensor	Platform Type	Spatial Resolution (Reflectance Bands)	Temporal Resolution (per instrument)	Data Source
Landsat 5	Polar orbiting	30m	16 days	USGS EROS
Landsat 7 (SLC-off)	Polar orbiting	30m	16 days	USGS EROS
AWiFS	Polar orbiting	56m	5 days	USDA-FAS-SIA
SPOT 4	Polar orbiting	20m	2-3 days (pointable)	SPOT Image
SPOT 5	Polar orbiting	10m/20m	2-3 days (pointable)	SPOT Image
ASTER <sup>1</sup>	Polar orbiting	15m/30m	4-16 days (pointable)	NASA/USGS EROS
NASA AMS	Airborne (UAV)	~ 21m	--	NASA
LDCM <sup>2</sup>	Polar orbiting	30m	16 days	USGS EROS

1 – Anomalous SWIR band issues since April 2008; 2 - LDCM launch currently scheduled for July 2011

# Creation of the BARC



## Black Pine 2 Fire Sawtooth NF 73,000 Acres

Normalized Burn Ratio (NBR)  
Differenced Normalized Burn Ratio (dNBR)

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$$\text{NBR} = (\text{NIR} - \text{SWIR}) / (\text{NIR} + \text{SWIR})$$

$$\text{dNBR} = \text{Pre NBR} - \text{Post NBR}$$

Normalized Difference Vegetation Index (NDVI)  
Differenced NDVI (dNDVI)

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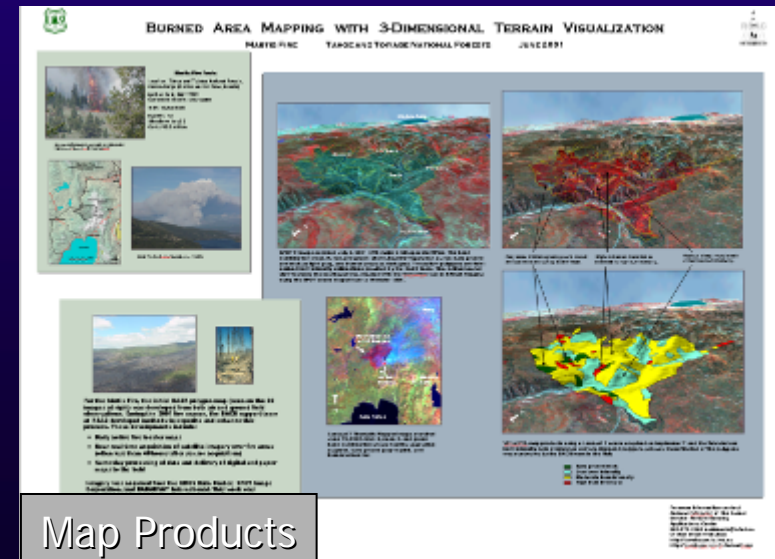
$$\text{NDVI} = (\text{NIR} - \text{Red}) / (\text{NIR} + \text{Red})$$

$$\text{dNDVI} = \text{Pre NDVI} - \text{Post NDVI}$$

*dNDVI is utilized when appropriate  
SWIR band is not available*



## BAER Support Rapid Delivery Products





# Burned Area Emergency Response Imagery Support

## BAER Imagery Support Statistics (2001-2008)

	USGS-EROS		USFS-RSAC		Sum	
Year	Fires	Acres	Fires	Acres	Fires	Acres
2001	5	N/A	15	310,500	20	310,500
2002	10	500,000	73	2,710,599	83	3,210,599
2003	17	307,034	54	1,637,471	71	1,944,505
2004	24	5,000,000	25	471,102	49	5,471,102
2005	23	800,000	46	734,559	69	1,534,559
2006	61	2,532,907	115	2,470,856	176	5,003,763
2007	48	2,422,130	106	3,508,407	154	5,930,537
Sum	188	11,562,071	434	11,841,324	622	23,405,565



Collaborative effort between USFS-RSAC and USGS-EROS

So far this year (2008): 97 fires, 1.7 million acres of USFS support

# Post-Fire Vegetation Management on National Forest System Lands

- Available resources to support reforestation in burned areas are limited, consequently, better prioritization is needed
- USFS Region 5 facilitated a protocol for rapid identification of deforestation and reforestation need on National Forest System lands
- Post-fire damage assessment
  - ◆ Leverage relationship of satellite-based burn severity observations to CBI field data that quantify fire effects to vegetation (deforestation)
  - ◆ Spatially represent forested vs. deforested areas following wildfire
    - Levels of deforestation
  - ◆ Silviculturists use as a tool to identify and prioritize land suitable for reforestation
    - Natural Recovery
    - Assisted Recovery (planting, seeding or site preparation for natural recovery)



# Rapid Assessment of Vegetation Condition after Wildfire (RAVG)

- Objective is to provide timely geospatial and tabular summary products of fire effects on forest resources to silviculturists
  - ◆ Pre-Fire/Post-fire imagery and burn severity data
  - ◆ % basal area loss data/maps
  - ◆ Summary tables of vegetation groups, by % basal area change (basal area loss) land status and slope
- RSAC conducts a RAVG assessment on fires where > 1,000 acres of NFS forested land is affected
- RSAC provides RAVG data and summary products within 30 days of fire containment
- Multiple fires are supported simultaneously by RSAC
- Critical technical factors:
  - ◆ Spatial resolution – 20 to 30m
  - ◆ Spectral resolution – SWIR band
  - ◆ Acquisition timing - ~ 2 weeks following fire containment

# Rapid Assessment of Vegetation Condition after Wildfire

## Frequently Leveraged Sensor Assets

Sensor	Platform Type	Spatial Resolution (Reflectance Bands)	Temporal Resolution (per instrument)	Data Source
Landsat 5	Polar orbiting	30m	16 days	USGS EROS
Landsat 7 <sup>1</sup> (SLC-off)	Polar orbiting	30m	16 days	USGS EROS
AWiFS	Polar orbiting	56m	5 days	USDA-FAS-SIA
LDCM <sup>2</sup>	Polar orbiting	30m	16 days	USGS EROS

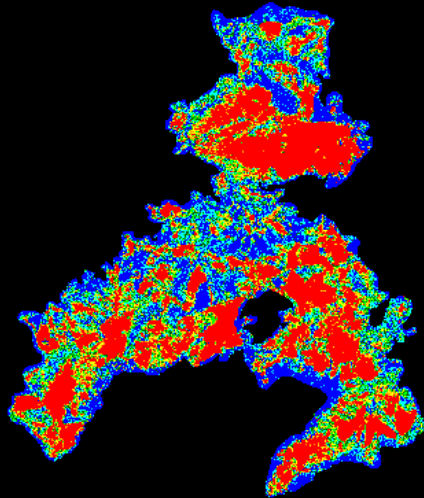
1 - Used only if fire area is outside of SLC-off affected area of image

2 – LDCM launch currently scheduled for July 2011



# Creation of RAVG Analysis Products

7 Class Basal Area Mortality Image



Rombo Mtn Fire  
Bitterroot NF  
28,000 Acres

Normalized Burn Ratio (NBR)

$$\text{NBR} = (\text{NIR} - \text{SWIR}) / (\text{NIR} + \text{SWIR})$$

Relative Differenced Normalized Burn Ratio (RdNBR)

$$\text{RdNBR} = \frac{(\text{Pre NBR} - \text{Post NBR})}{\text{SquareRoot}(\text{ABS}(\text{Pre NBR} / 1000))}$$

## Summary GIS Analysis Using:

- 7 Class % Change in Basal Area
- Ownership / Land Status
- LANDFIRE Existing Vegetation Groups
- Slope

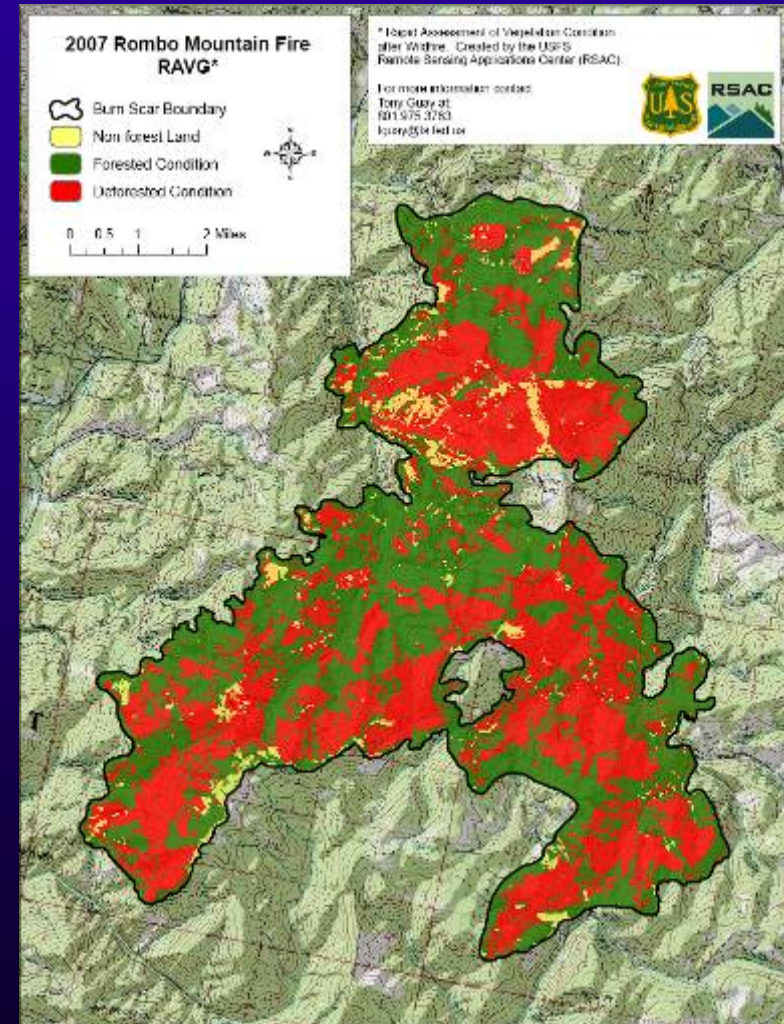
# Rapid Assessment of Vegetation Condition after Wildfire

## Primary RAVG Product Deliverables

2007 Rombo Mountain Fire - Bitterroot NF Rapid Assessment of Vegetation Condition after Wildfire (RAVG)				
Vegetation Group (LANDFIRE)*	Ownership / Status	Vegetation Condition	Slope	Acres
Grassland / Shrubland / Non Veg Total				1,578
Deciduous Open Tree Canopy	USFS	Forested	Flat (< 30%)	3
			Steep (> 30%)	2
		Deforested	Flat (< 30%)	2
			Steep (> 30%)	3
Deciduous Open Tree Canopy Total				9
Evergreen Closed Tree Canopy	USFS	Forested	Flat (< 30%)	4,116
			Steep (> 30%)	4,446
		Deforested	Flat (< 30%)	3,284
			Steep (> 30%)	4,217
Evergreen Closed Tree Canopy Total				16,062
Evergreen Open Tree Canopy	USFS	Forested	Flat (< 30%)	2,717
			Steep (> 30%)	3,277
		Deforested	Flat (< 30%)	2,279
			Steep (> 30%)	3,197
Evergreen Open Tree Canopy Total				11,470
Mixed Evergreen - Deciduous Open Tree Canopy	USFS	Forested	Flat (< 30%)	197
			Steep (> 30%)	58
		Deforested	Flat (< 30%)	85
			Steep (> 30%)	28
Mixed Evergreen - Deciduous Open Tree Canopy Total				368
Grand Total				29,488
* See RAVG - LANDFIRE Crosswalk worksheet (below) for Vegetation Group definitions.				

\* See RAVG - LANDFIRE Crosswalk worksheet (below) for Vegetation Group definitions.

Vegetation/Burn Severity Summaries



Forested/Deforested Map Products

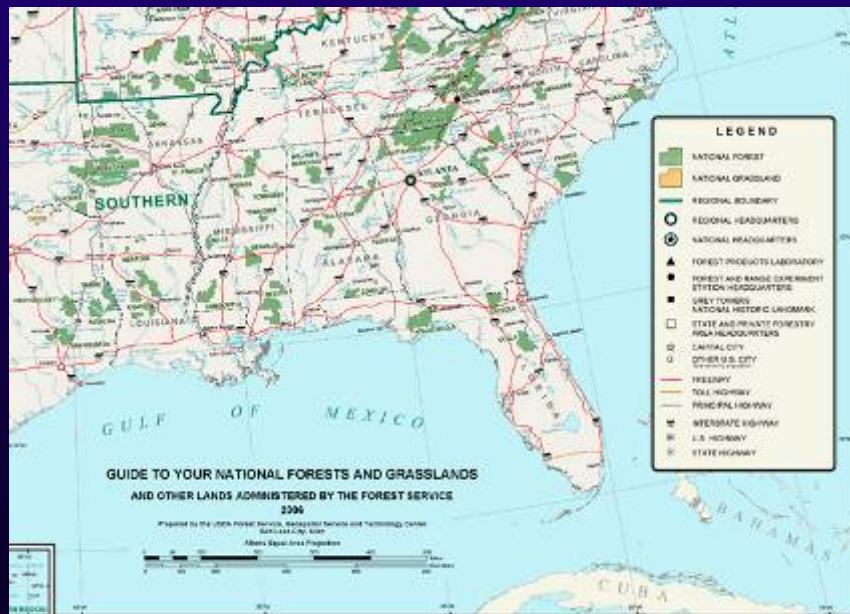
# Rapid Assessment of Vegetation Condition after Wildfire

## RAVG Support Statistics (2007-2008)

Year	Fires	Acres
2007	63	2,819,158
2008	54	1,369,677
Sum	117	4,188,835

# Post-Catastrophic Wx Event Assessments

- Hurricanes can cause significant forest damage in National Forest System Lands of the southeastern United States
- RSAC is currently evaluating rapid response, moderate resolution change detection assessments for forested areas in the immediate aftermath of hurricanes and other catastrophic weather events (ice storms, etc.)
- Post Wx event damage assessment
  - ◆ Identify areas of potential forest damage that can be targeted/evaluated for salvage harvesting, fuel treatments and habitat restoration





# Post-Catastrophic Wx Event Assessments

- Objective is to provide change detection products to NFS units within two weeks of storm event
  - ◆ Pre-Fire/Post-event imagery
  - ◆ Change detection products
- Feasibility evaluation is ongoing
  - ◆ Analysis of 2008 events
  - ◆ Analysis of selected pre-2008 events
- Conduct on impacted NFS lands and utilize field verification data provided by National Forests
- Critical technical factors:
  - ◆ Spatial resolution –moderate to coarse
  - ◆ Spectral resolution – SWIR band is desirable
  - ◆ Acquisition timing - ~ 2 weeks following fire containment
  - ◆ Pre/Post-event images – near nadir observations (optimum) with similar sensor geometry characteristics

# Post-Catastrophic Wx Event Assessments

## Frequently Leveraged Sensor Assets

Sensor	Platform Type	Spatial Resolution (Reflectance Bands)	Temporal Resolution (per instrument)	Data Source
MODIS	Polar orbiting	250m/500m	2 times daily	RSAC/NASA
AWiFS	Polar orbiting	56m	5 days	USDA-FAS-SIA
VIIRS <sup>1</sup>	Polar orbiting	375m	2 times daily	Direct Readout; NOAA/NASA

<sup>1</sup> - VIIRS launch on NPOESS Preparatory Project (NPP) mission in June 2010 and subsequent NPOESS missions

MODIS

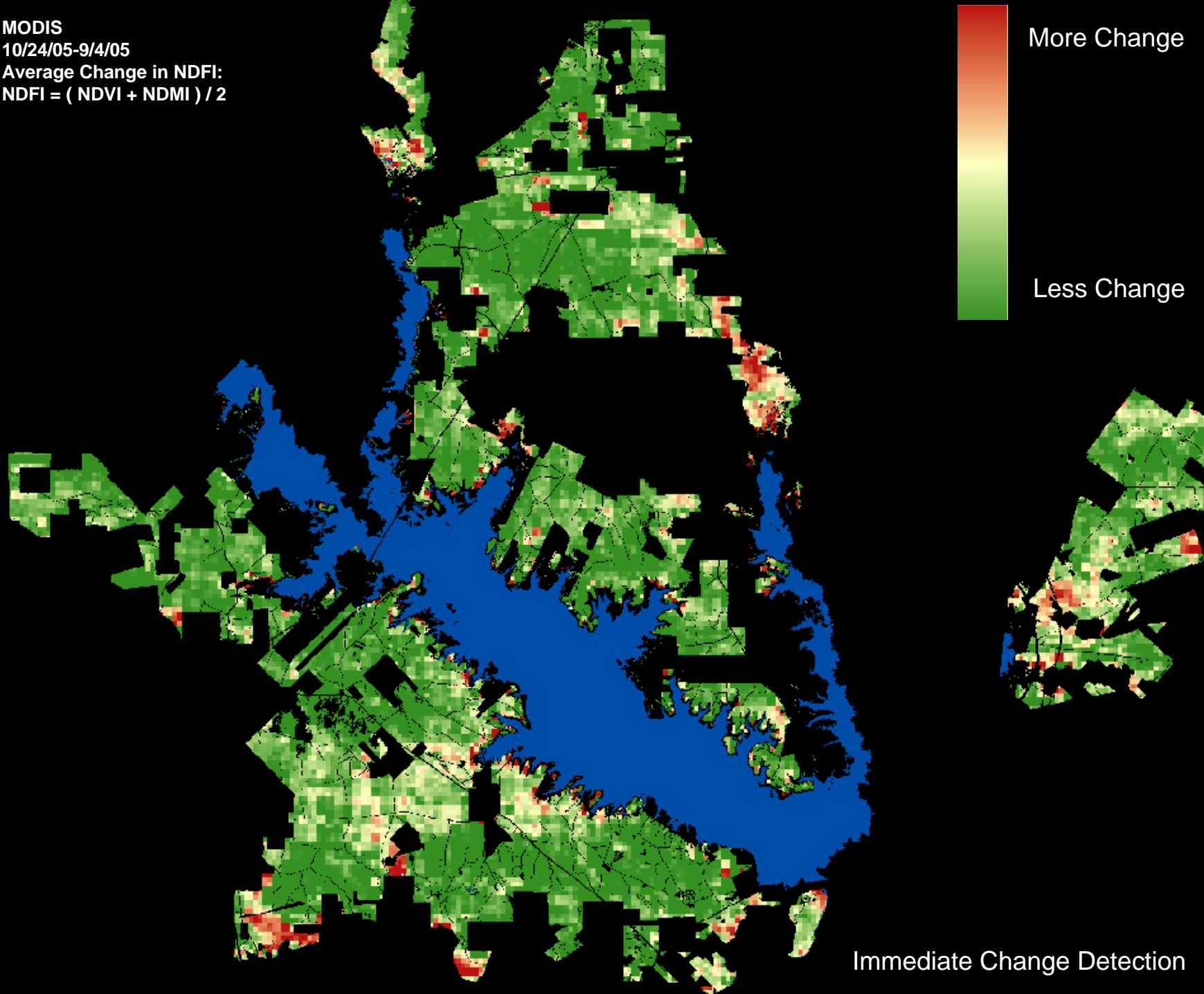
10/24/05-9/4/05

Average Change in NDFI:

$\text{NDFI} = (\text{NDVI} + \text{NDMI}) / 2$

More Change

Less Change

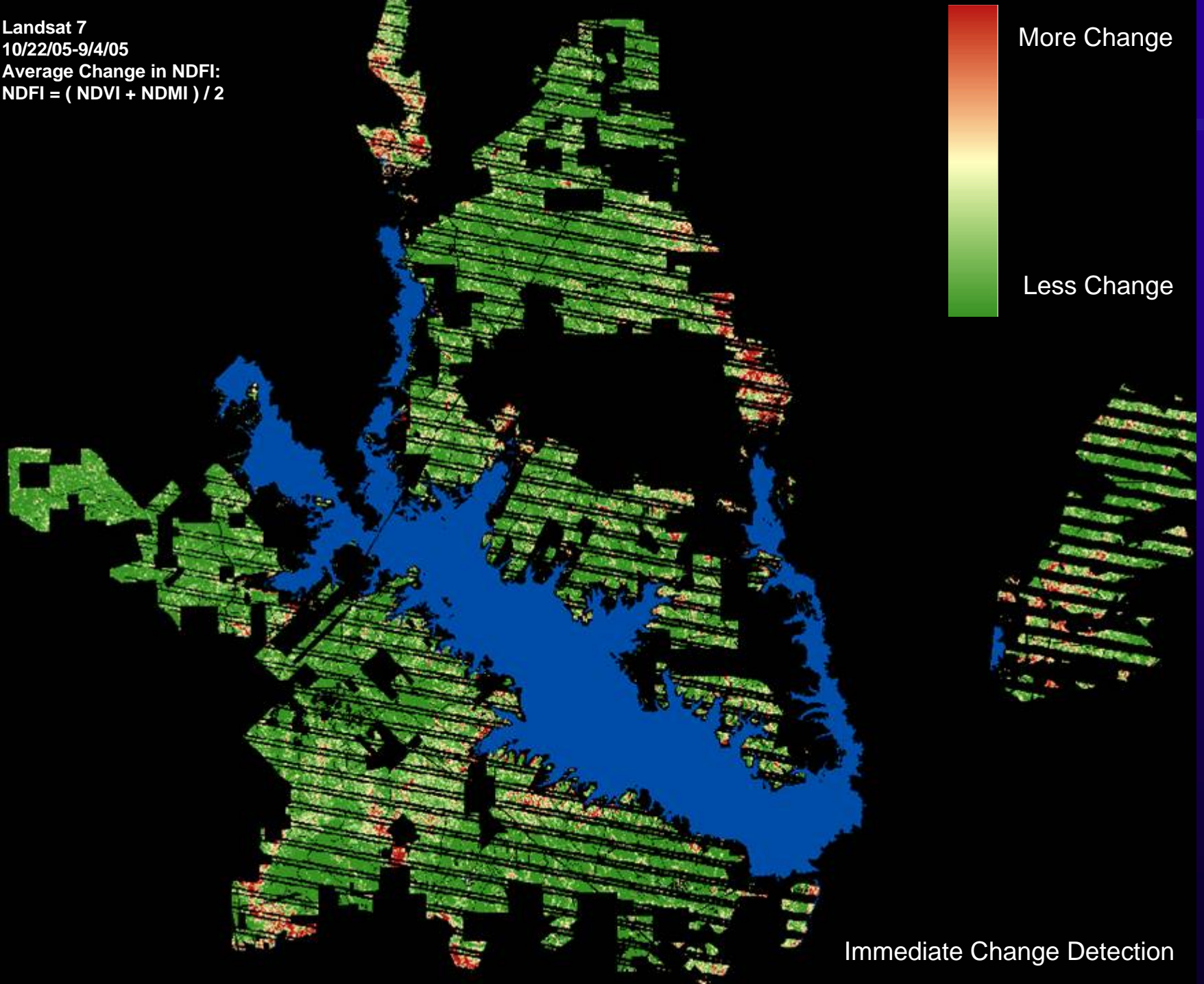


Immediate Change Detection

Landsat 7  
10/22/05-9/4/05  
Average Change in NDFI:  
 $\text{NDFI} = (\text{NDVI} + \text{NDMI}) / 2$

More Change

Less Change



Immediate Change Detection



MODIS

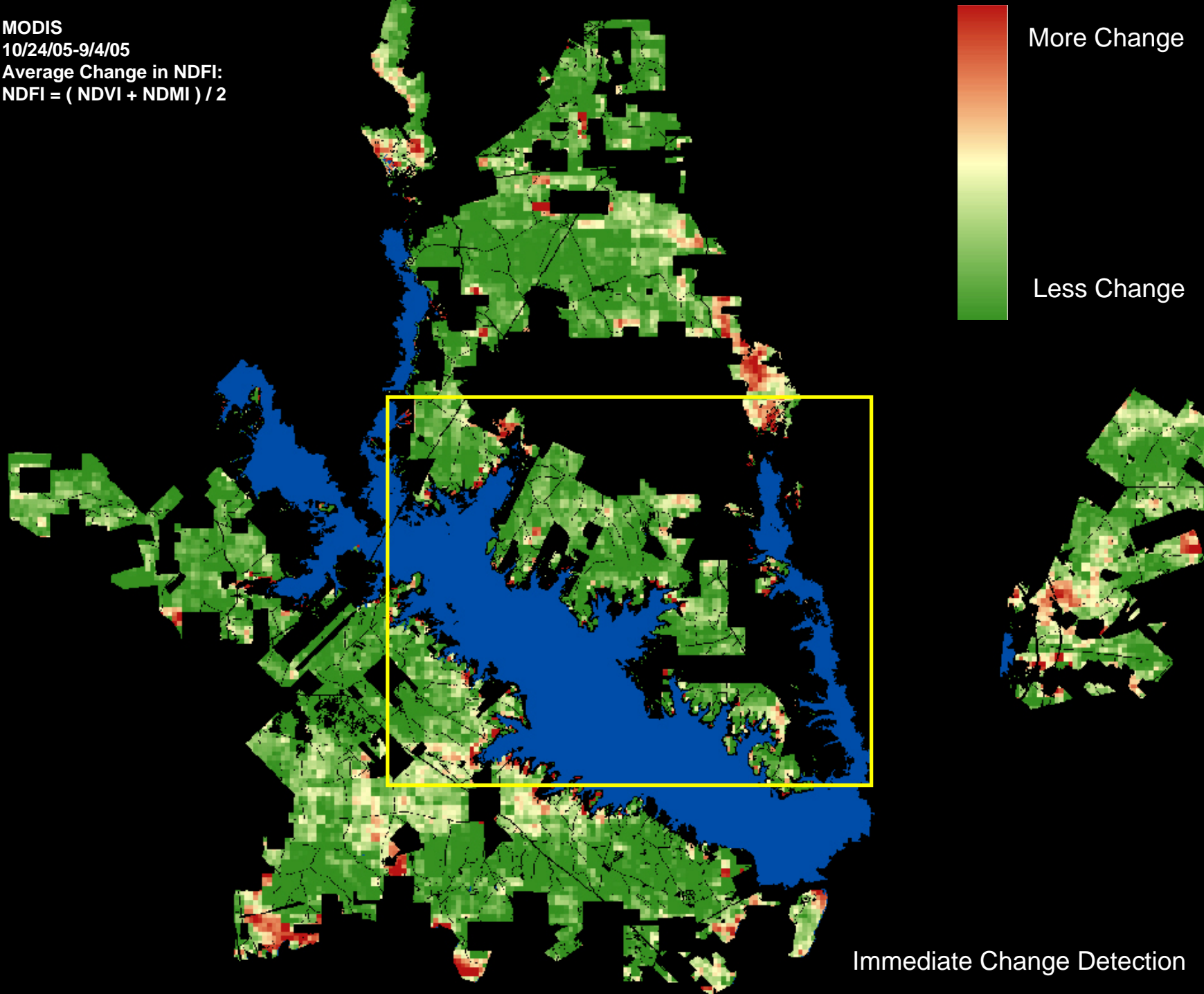
10/24/05-9/4/05

Average Change in NDFI:

$\text{NDFI} = (\text{NDVI} + \text{NDMI}) / 2$

More Change

Less Change



Immediate Change Detection

MODIS

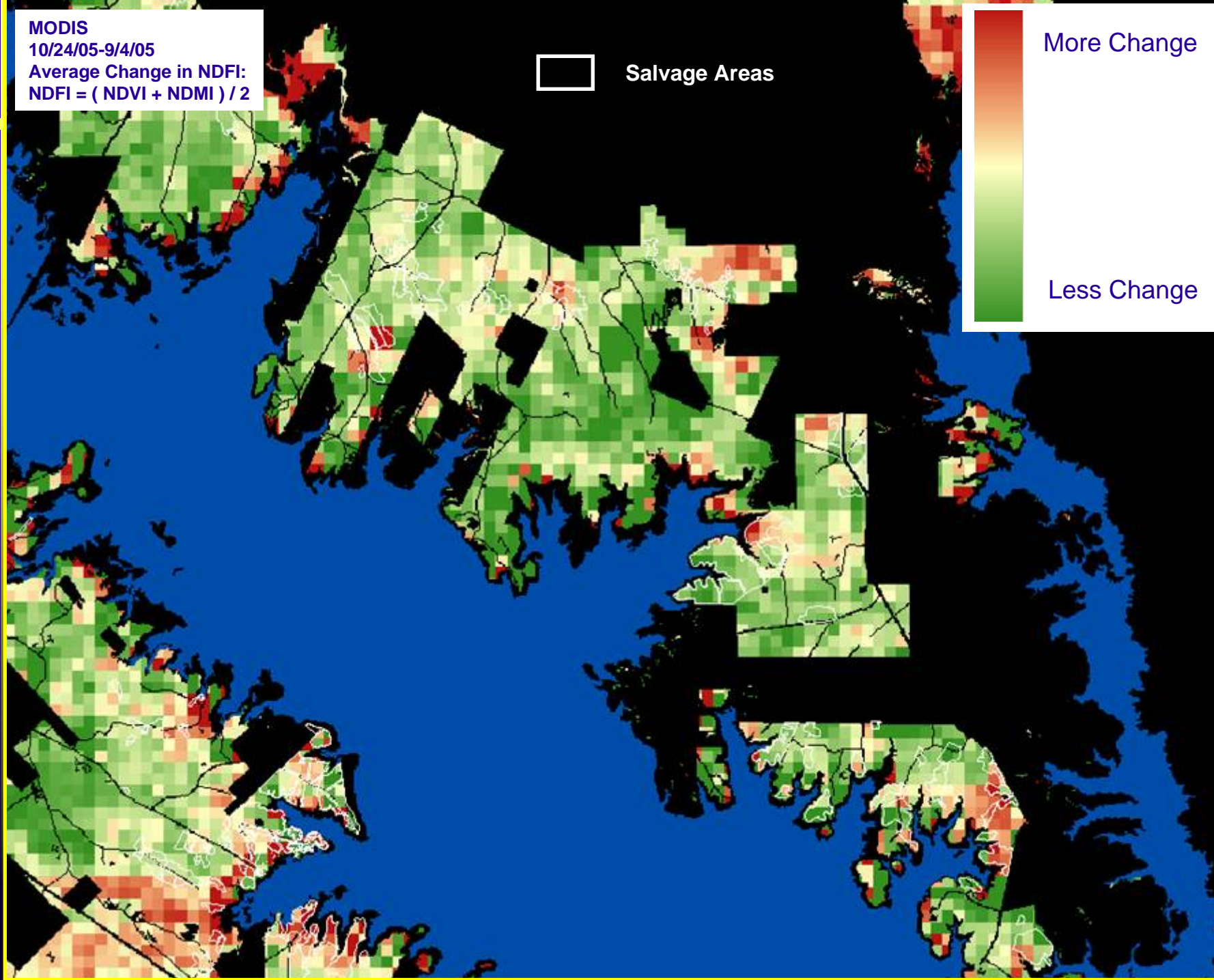
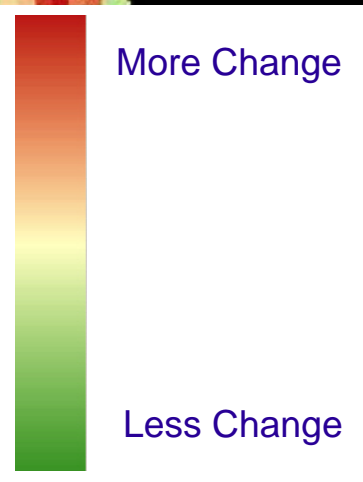
10/24/05-9/4/05

Average Change in NDFI:

$\text{NDFI} = (\text{NDVI} + \text{NDMI}) / 2$



Salvage Areas





LANDSAT  
10/22/05-9/4/05

Average Change in NDFI:  
 $\text{NDFI} = (\text{NDVI} + \text{NDMI}) / 2$

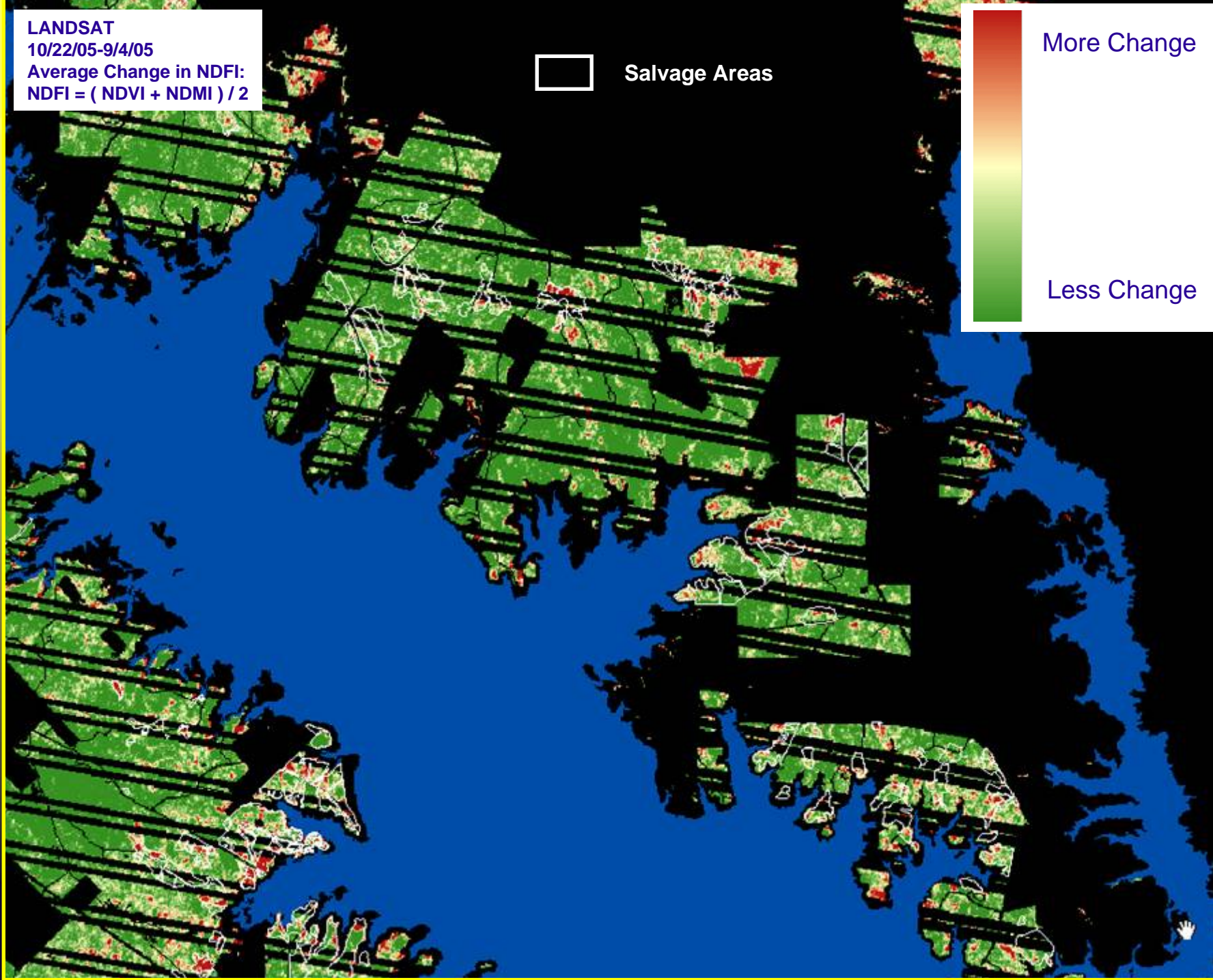


Salvage Areas



More Change

Less Change



# RSAC Operations Program Support

## Challenges and Concerns

- Landsat data continuity
  - ◆ Landsat 5 longevity
  - ◆ LDCM launch schedule
- Transition to commercial assets
  - ◆ Availability of 2.1 micron SWIR band
  - ◆ Image costs
  - ◆ Timely product delivery
  - ◆ Availability of data archive
- Transition from MODIS to VIIRS
  - ◆ Terra and Aqua MODIS longevity
  - ◆ Launch schedule for NPP/NPOESS VIIRS
  - ◆ VIIRS technical issues



# Additional Information

## RSAC Operations Program

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## BAER Imagery Support

Jess Clark

[jtclark@fs.fed.us](mailto:jtclark@fs.fed.us)

<http://www.fs.fed.us/eng/rsac/baer>

## MODIS Active Fire Mapping

Brad Quayle

[bquayle@fs.fed.us](mailto:bquayle@fs.fed.us)

<http://activefiremaps.fs.fed.us>

## RAVG Support

Tony Guay

[tguay@fs.fed.us](mailto:tguay@fs.fed.us)

<http://frdev.ftcol.wo.fs.fed.us/postfirevegcondition/index.php>

## Post-Catastrophic Storm Assessment

Chuck Werstak

[cwerstak@fs.fed.us](mailto:cwerstak@fs.fed.us)



Extra

# Burned Area Emergency Response Imagery Support

## Web site and product distribution

USDA FOREST SERVICE

### Remote Sensing Applications Center

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- Burned Area Emergency Response**
- Geospatial Clearinghouse
- Active Fire Maps
- Digital Aerial Sketch Mapping
- Lidar Introduction
- Lidar Fusion Tutorial
- Monitoring Trends in Burn Severity (NTBS)

### Burned Area Emergency Response (BAER) Imagery Support

The BAER Imagery Support program is a cooperative effort between the USDA Forest Service Remote Sensing Applications Center and the US Geological Survey Center for Earth Resources Observation and Science. The Centers have teamed up to provide rapid delivery of satellite imagery, Burned Area Reflectance Classifications (BARC), and other geospatial data to Forest Service and DOI BAER teams.

Request Imagery & BARC Maps

Image Acquisition Status & Summary

Download BARC Data

About BARC

Remote Sensing Training Module

Joint Fire Science Program

Links

Remote Sensing Applications Center  
2222 W. 2300 South  
Salt Lake City, UT  
84119 - 2020  
voice: (801) 975-3750  
fax: (801) 975-3478  
[RSAC Website](#)

USGS Center for EROS  
47914 252nd Street  
Sioux Falls, SD  
57198 - 0001  
800-252-4547  
605-594-6589 fax  
[EROS Website](#)



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USDA FOREST SERVICE REMOTE SENSING APPLICATIONS CENTER

### Burned Area Emergency Response

Search

### BAER Imagery Support Data Download

This is a portal for data created by RSAC in support of BAER teams. The data is organized by year and Forest Service Region. Included in the zip files are pre- and post-fire image subsets, metadata, BARC256, and dNBR layers. Everything is projected in USGS Albers unless specifically noted otherwise in the provided metadata. This page is updated at least weekly during the active fire season. Please contact the [RSAC BAER Imagery Support Team](#) with any questions.

Select a year: 2008

Number of Fires: 96  
Total Acres: 1,723,077  
Average Size: 17,949

#### Region 1

Fire Name	Size (acres)	Ignition Date	Containment Date	Forest	City	State	Preview	Download
Bear Gulch	755	08/18/2008	08/24/2008	Helena	Townsend	MT	<a href="#">Preview</a>	<a href="#">Download</a>
Cascade	10,173	07/26/2008	08/09/2008	Custer	Red Lodge	MT	<a href="#">Preview</a>	<a href="#">Download</a>
Porcupine	2,147	08/18/2008	08/23/2008	Nez Perce	Elk City	ID	<a href="#">Preview</a>	<a href="#">Download</a>
Rattlesnake	2,400	08/05/2008	08/19/2008	Nez Perce	Darby	MT	<a href="#">Preview</a>	<a href="#">Download</a>

Number of Fires: 4  
Total Acres: 15,675  
Average Size: 3,919

#### Region 2

Fire Name	Size (acres)	Ignition Date	Containment Date	Forest	City	State	Preview	Download
Coal Creek	1,632	07/03/2008	07/21/2008	GM-Uncom-Gunnison	Grand Junction	CO	<a href="#">Preview</a>	<a href="#">Download</a>
Gunbarrel	67,141	07/26/2008	10/15/2008	Shoshone	Cody	WY	<a href="#">Preview</a>	<a href="#">Download</a>

Number of Fires: 2  
Total Acres: 68,773  
Average Size: 34,387

#### Region 3

Fire Name	Size (acres)	Ignition Date	Containment Date	Forest	City	State	Preview	Download
Cumaro	689	06/22/2008	06/30/2008	Coronado	Mescal	AZ	<a href="#">Preview</a>	<a href="#">Download</a>
Distillery	8,075	06/21/2008	07/01/2008	Coronado	Vail	AZ	<a href="#">Preview</a>	<a href="#">Download</a>
Eagle	3,860	04/22/2008	04/28/2008	Apache-Sitgreaves	Alpine	AZ	<a href="#">Preview</a>	<a href="#">Download</a>
Frye Mesa	3,495	05/20/2008	05/25/2008	Coronado	Safford	AZ	<a href="#">Preview</a>	<a href="#">Download</a>
Hot Air	8,300	06/22/2008	07/07/2008	Apache-Sitgreaves	Alpine	AZ	<a href="#">Preview</a>	<a href="#">Download</a>
Lane2	9,629	06/26/2008	07/11/2008	Prescott	Black Canyon City	AZ	<a href="#">Preview</a>	<a href="#">Download</a>
Ojo Peak - 2007	6,062	11/19/2007	11/29/2007	Cibola	Mountainair	NM	<a href="#">Preview</a>	<a href="#">Download</a>
Roddy	49,132	06/18/2008	06/25/2008	Lincoln	Carlsbad	AZ	<a href="#">Preview</a>	<a href="#">Download</a>
Trigo	4,130	04/15/2008	05/11/2008	Cibola	Belen	NM	<a href="#">Preview</a>	<a href="#">Download</a>

Number of Fires: 9  
Total Acres: 92,302  
Average Size: 10,367

#### Region 4

Fire Name	Size (acres)	Ignition Date	Containment Date	Forest	City	State	Preview	Download
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<http://www.fs.fed.us/eng/rsac/baer>

# Rapid Assessment of Vegetation Condition after Wildfire

## Web site and product distribution

US FOREST SERVICE

Post-Fire Vegetation Conditions

(enter query) Search

Forest Service Home  
Post-Fire Vegetation Conditions  
Home  
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Post-Fire Vegetation Conditions on the National Forests

This website offers an initial description of post-fire vegetation conditions using the [Rapid Assessment of Vegetation \(RAVG\)](#) product. RAVG analysis looks at fires that burned more than 1,000 acres of [National Forest System \(NFS\) lands](#), beginning with fires that occurred in 2007. These fires resulted in direct losses of vegetation cover and many of the benefits associated with forested ecosystems.

NPS lands experience thousands of wildfires every year, most of which are relatively small. The largest fires typically account for 50% of the total acreage burned. The RAVG analysis provides a first approximation of areas that due to severity of the fire may require re-vegetation treatments. These treatments would reestablish forest cover to pre-fire conditions or provide the opportunity to reintroduce species lost due to post management or lack of management. This initial approximation would be followed by a site specific diagnosis and development of a [rehabilitation prescription](#) certifying reforestation needs.

Search for forest fires meeting these criteria using either the [Select Forest Fires...](#) "By Year...", "By State...", "By National Forest/Grassland...", or "By Fire..." (does not show multi criteria selection). You may also select a Forest Service Region on the map below to display forest fire reports for that region of the United States.

Select Forest Fires...

2008 Go  
By State Go  
By National Forest/Grassland... Go  
By Fire Go

Select Forest Fires by Region...

USA Forest Service Regions  
Legend: 1 Northwest, 2 Pacific Southwest, 3 Southwest, 4 North Central, 5 Central, 6 South Central, 7 Southeast, 8 Northeast, 9 New England, 10 Alaska, 11 Hawaii

US FOREST SERVICE

Post-Fire Vegetation Conditions

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2007 Jungle Fire - Manti-La Sal National Forest, Utah

2007 - Jungle Fire - Manti-La Sal National Forest  
Rapid Assessment of Vegetation Condition after Wildfire (RAVG)

Vegetation Group	Ownership / Status	Vegetation Condition	Slope	Acres
Grassland / Shrubland / Non-Veg Total				859
Pinyon - Juniper Woodland	USFS	Forested	Flat (< 30%)	57
		Deforested	Slope (> 30%)	14
		Deforested	Flat (< 30%)	23
		Deforested	Slope (> 30%)	6
Pinyon - Juniper Woodland Total				111
Deciduous Open Tree Canopy	USFS	Forested	Flat (< 30%)	833
		Deforested	Slope (> 30%)	41
		Deforested	Flat (< 30%)	230
		Deforested	Slope (> 30%)	40
Deciduous Open Tree Canopy Total				640
Evergreen Closed Tree Canopy	USFS	Forested	Flat (< 30%)	239
		Deforested	Slope (> 30%)	120
		Deforested	Flat (< 30%)	627
		Deforested	Slope (> 30%)	393
Evergreen Closed Tree Canopy Total				1,379
Evergreen Open Tree Canopy	USFS	Forested	Flat (< 30%)	0
		Deforested	Flat (< 30%)	2
Evergreen Open Tree Canopy Total				2
Mixed Evergreen - Deciduous Open Tree Canopy	USFS	Forested	Flat (< 30%)	955
		Deforested	Slope (> 30%)	57
		Deforested	Flat (< 30%)	1,415
		Deforested	Slope (> 30%)	121
Mixed Evergreen - Deciduous Open Tree Canopy Total				2,578
<b>Grand Total</b>				<b>5,579</b>

<http://frdev.ftcol.wo.fs.fed.us/postfirevegcondition/index.php>