Managing for Future Risks of Fire, Post-Fire Flooding and Extreme Precipitation

September 22 – 23, 2014
Southern Nevada Water Authority
Las Vegas, NV

Case Study New Mexico - Watershed Responses following Major Wildfires of 2011 thru 2014 in the Albuquerque District AOR

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BUILDING STRONG®

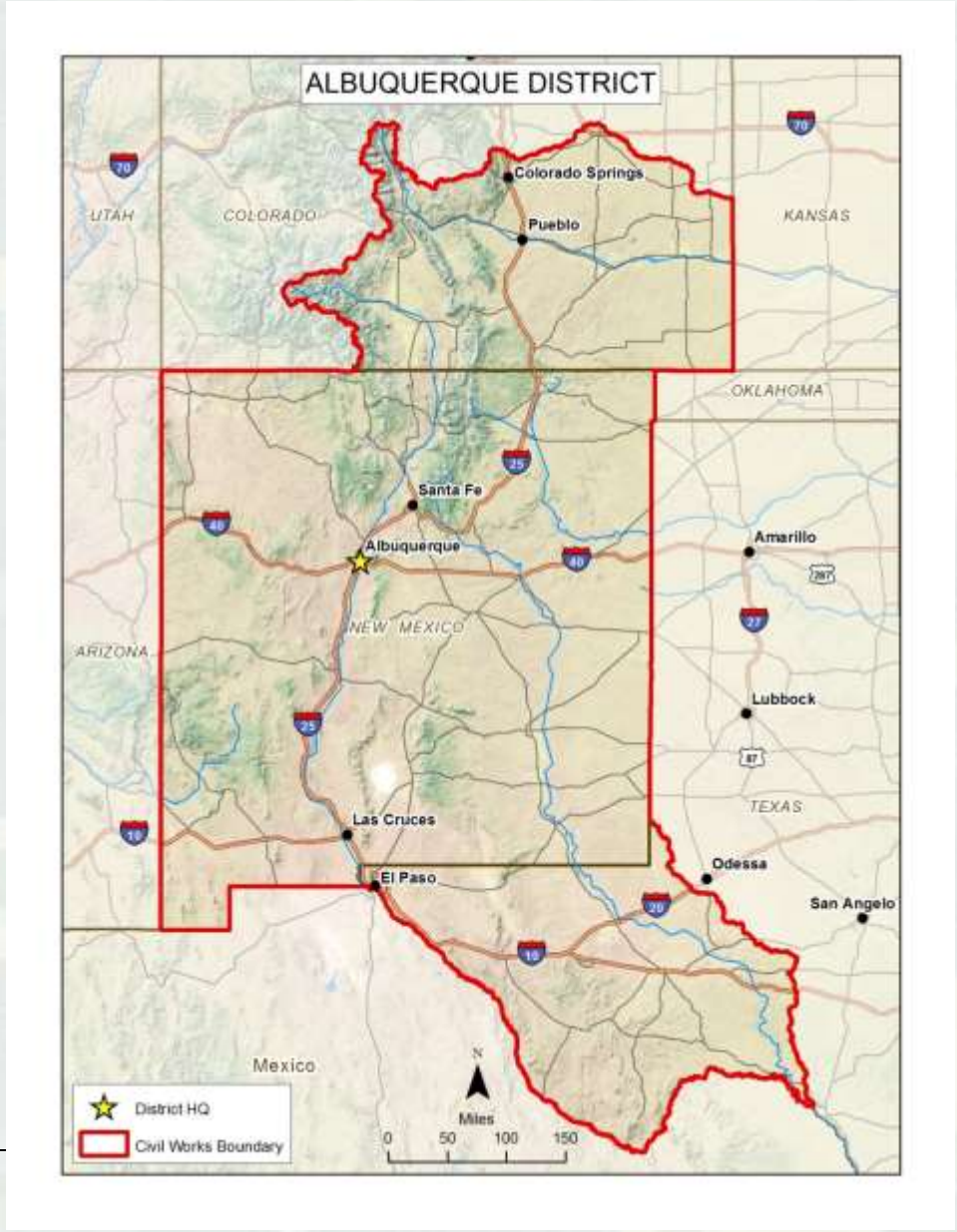
Presentation Overview

- ABQ District – AOR
- Major Wildfires – 2011 thru 2014
- Case Studies
- Watershed Characteristics
- Rainfall and Flooding Events
- Watershed Response
- Watershed Recovery
- Questions

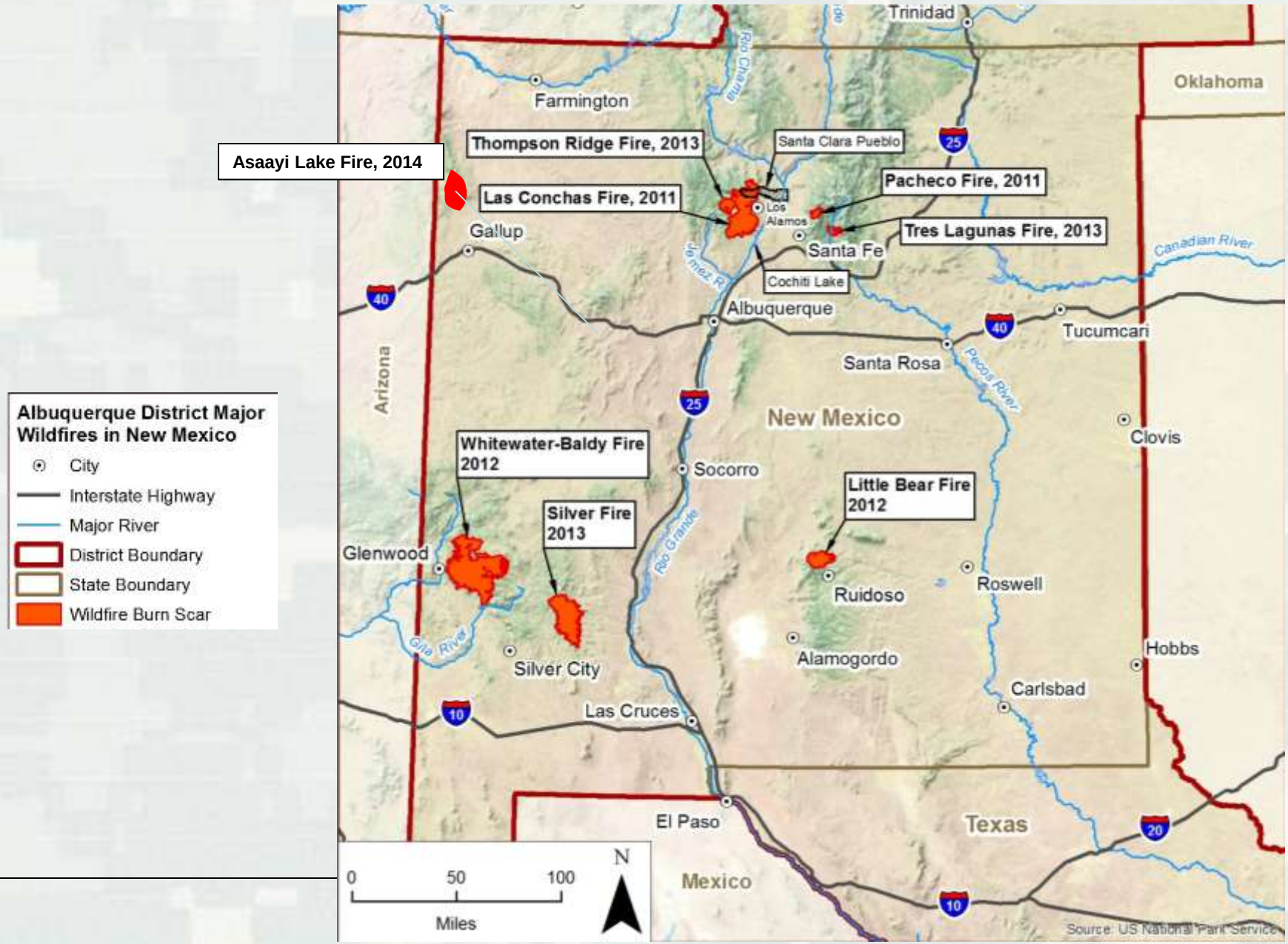
ABQ District – Area of Responsibility

- **South Pacific Division**
  - Sacramento District
  - Los Angeles District
  - San Francisco District
  - Albuquerque District

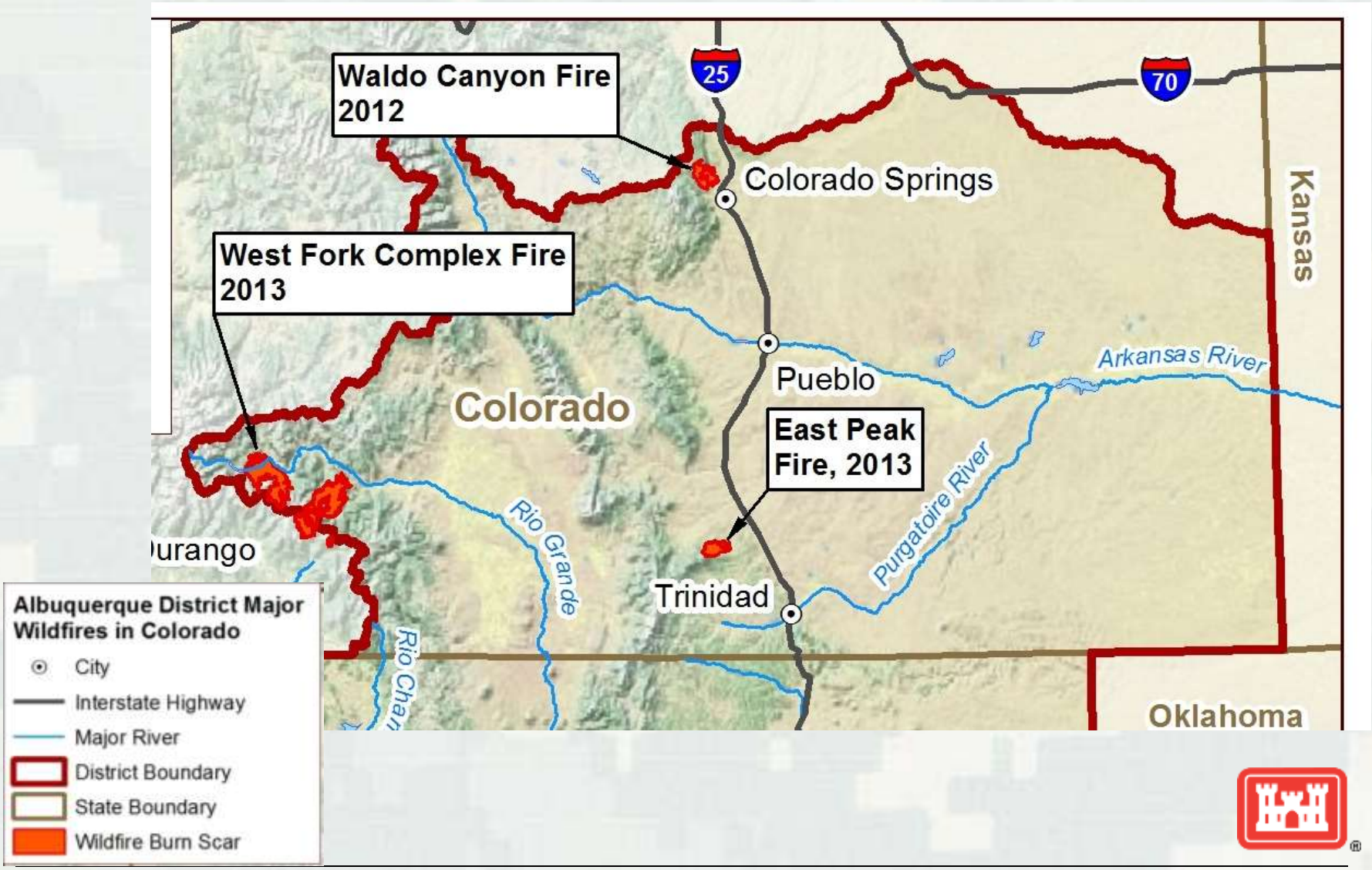
- **Colorado** – Arkansas, Upper Rio Grande
- **New Mexico** – Canadian, Pecos, Upper San Juan, Gila, & Rio Grande
- **Texas** – Pecos, Rio Grande



Major Wildfires – 2011 thru 2014



Major Wildfires – 2011 thru 2014

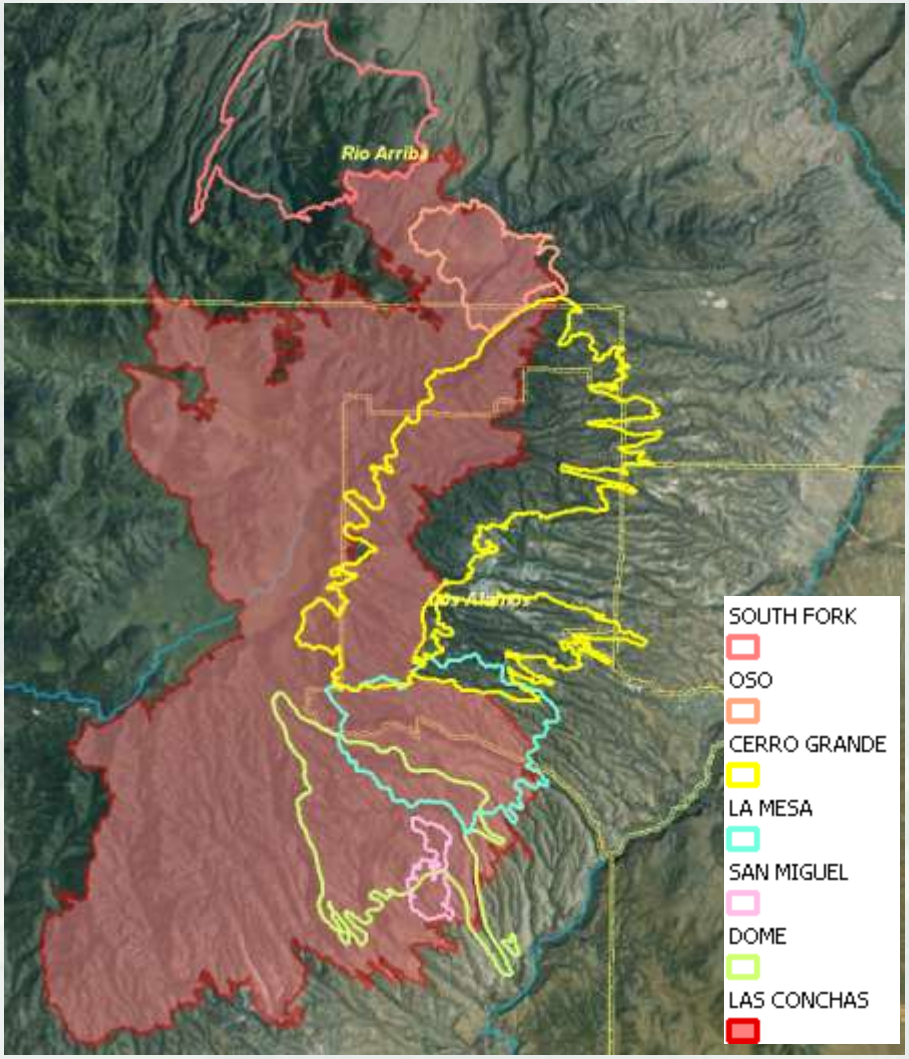


Case Studies

- Las Conchas Fire 2011
  - Central New Mexico – Jemez Mountains
  - ~160,000 acres (ac.)
  - Human Caused *(power line)*
  - <u>Discussion:</u>
    - Precipitation
    - Watershed / Geomorphology

- Whitewater-Baldy Complex 2012
  - Southwest New Mexico – Gila National Forest
  - ~300,000 ac.
  - Lightning caused
  - <u>Discussion:</u>
    - Precipitation

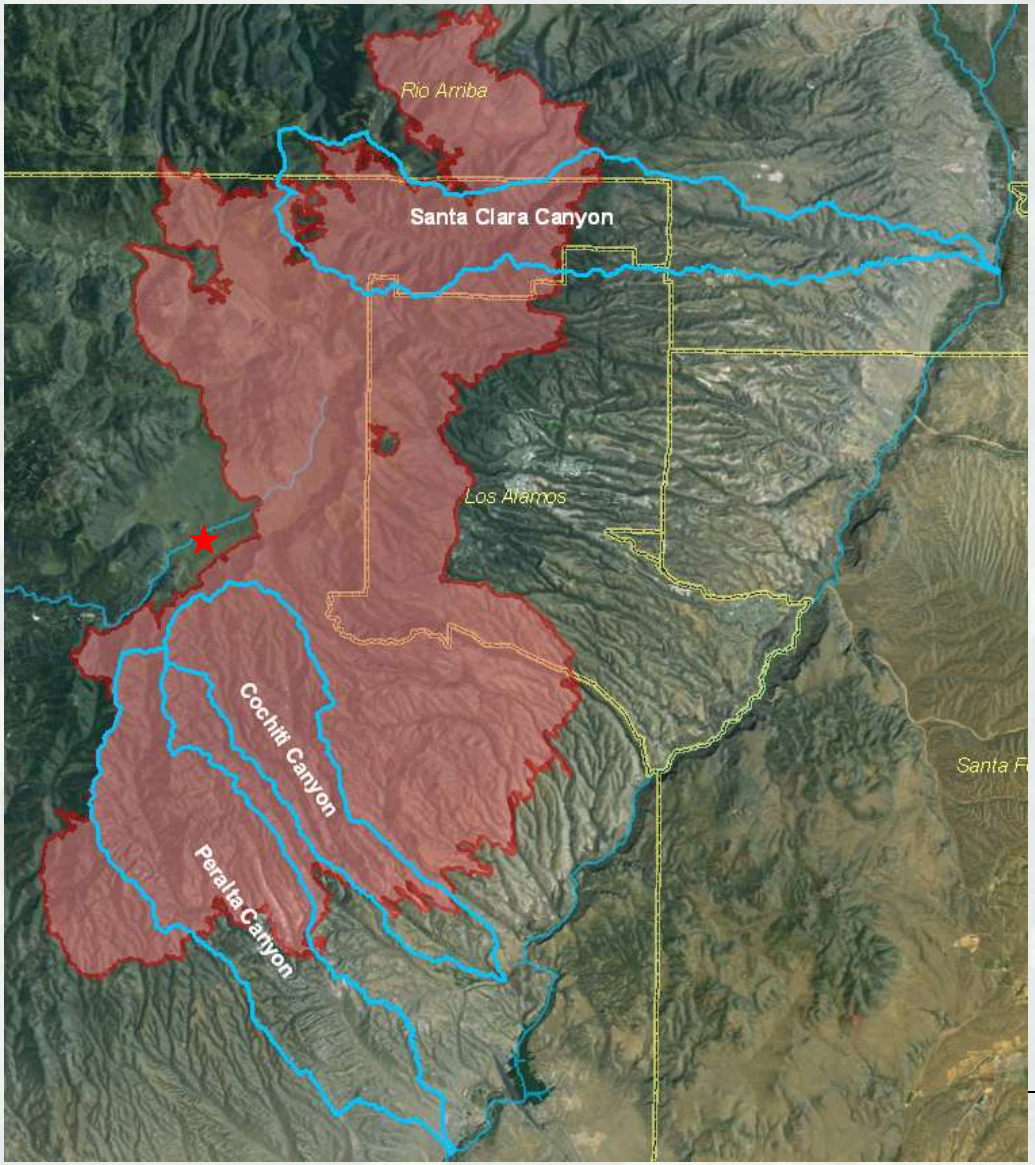
Watershed Characteristics
Fire History



Select Fires in the Jemez Mountains:

- **La Mesa** (1977) ~ 15,500 ac.
- **Dome** (1996) ~ 16,000 ac.
- **Oso** (1998) ~ 5,200 ac.
- **Cerro Grande** (2000) ~ 48,000 ac
- **San Miguel** (2009) ~1,700 ac.
- **South Fork** (2010) ~ 20,000 ac.
- **Las Conchas** (2011) ~ 156,600 ac.
- **Thompson Ridge** (2013) ~ 24,000 ac. *(not shown)*

Watershed Characteristics
Las Conchas Fire 2011



Started: 26 June 2011
Contained: 03 August 2011
Burn Area: 156,600 ac.
First Day: 40,000 ac.
First 2 Days: 60,000 ac.
Burn Rate (peak est.): ~ 1ac./second

- **Watersheds Impacted:** 20

Flow into Cochiti Reservoir – USACE

- **Santa Clara Canyon**
- **Peralta Canyon**

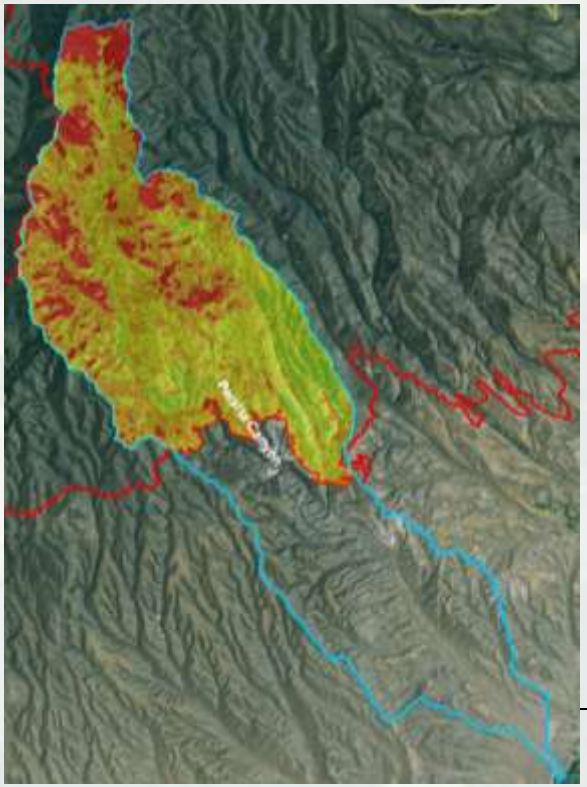
Watershed Characteristics
Las Conchas Fire 2011

Post-Las Conchas Fire
Bland Canyon
August 7, 2011

Post-Las Conchas Fire
Santa Clara Canyon
July 14, 2011

Post-Las Conchas Fire
Santa Clara Canyon
July 8, 2011

Watershed Characteristics
Las Conchas Fire 2011



Burn Severity Breakdown for two select watersheds

Santa Clara Canyon: 49 mi²		**Peralta Canyon: 48 mi²**	
Unchanged:	6%	Unchanged:	10%
Low:	17%	Low:	33%
Moderate:	47%	Moderate:	42%
High:	30%	High:	15%

Watershed Characteristics

- **Hydrologic Modeling Context**
  - HEC-HMS used to model runoff
  - Vegetation
  - Organic layer
  - Hydrophobic soil layers
  - Altered runoff characteristics
  - Using burn severity mapping:
    - Severe – infiltration set to zero
    - Moderate – infiltration reduced by 50%
    - Low – infiltration reduced by 20%

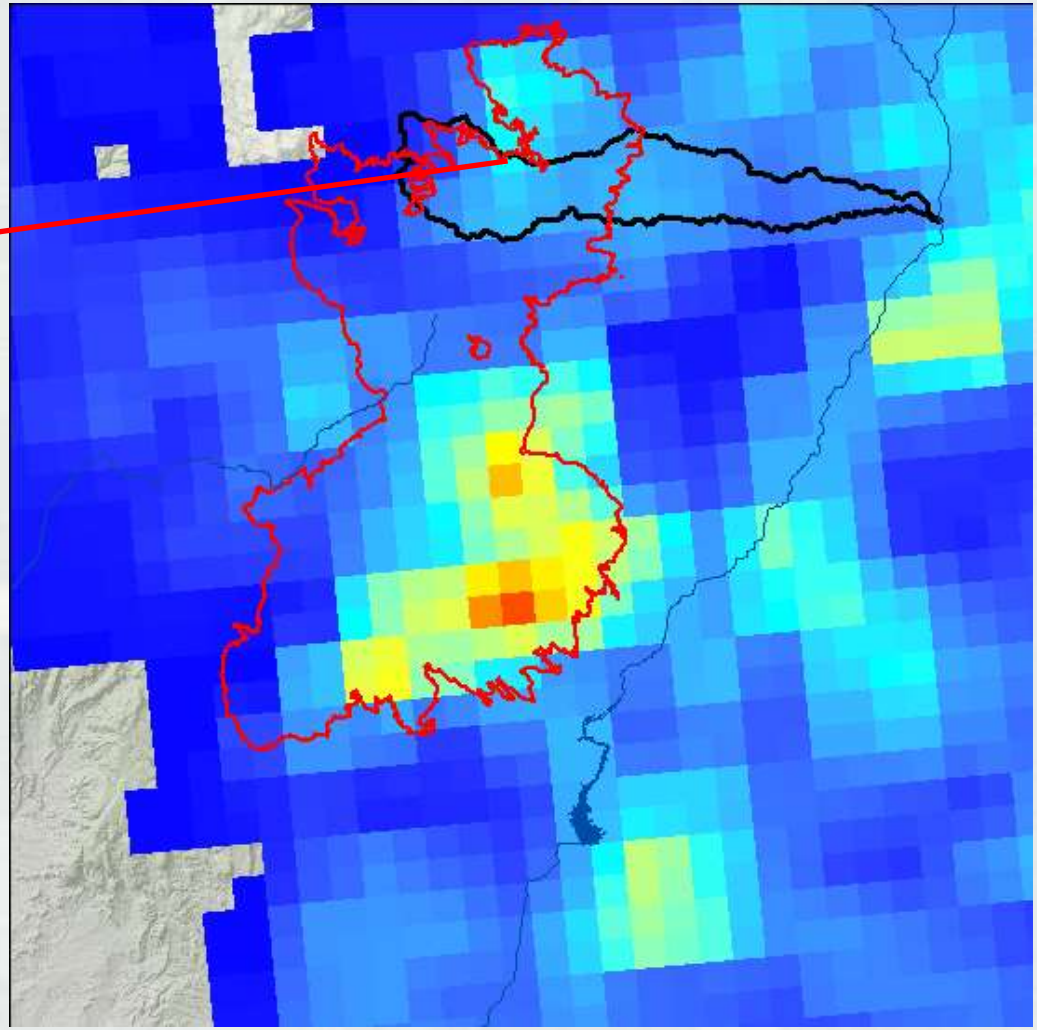
Watershed Characteristics

- **Hydrologic Modeling Context**
  - Example of Results
  - Santa Clara Canyon (immediately following the fire)

	Rainfall Event, 24-hour Duration		
	50% Chance	10% Chance	1% Chance
Pre-fire	300 cfs	1,900 cfs	5,000 cfs
Post-fire	2,650 cfs	8,500 cfs	20,300 cfs

Rainfall Event
Santa Clara Canyon August 21, 2011

Largest Cell:
1in/8hr
NEXRAD



Flooding Event
Santa Clara Canyon August 21, 2011

http://www.youtube.com/user/spausace

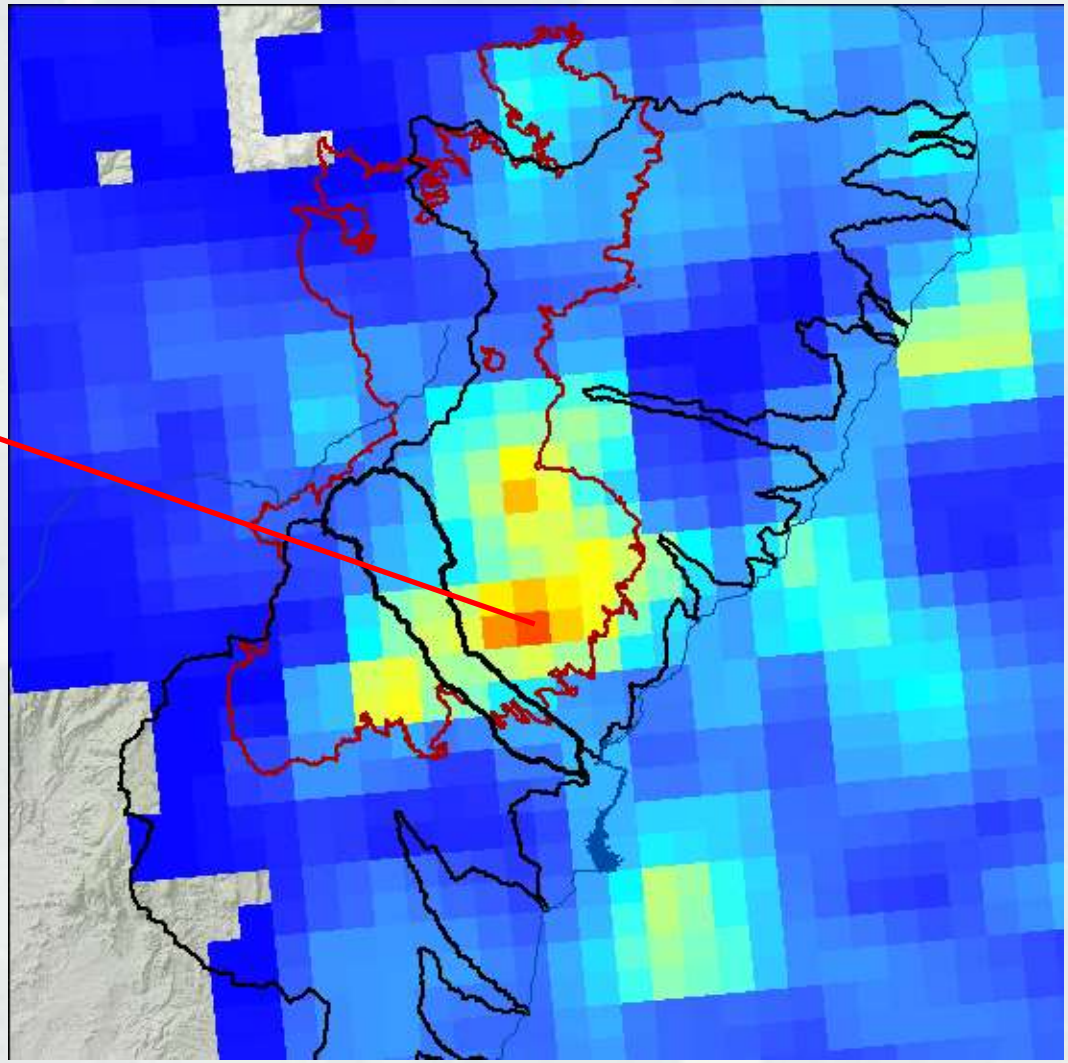
Flooding Event
Santa Clara Canyon August 21, 2011

Cochiti Canyon / Dixon Orchard

Post-Fire/Pre-Flood Photo Taken 07 Aug 11

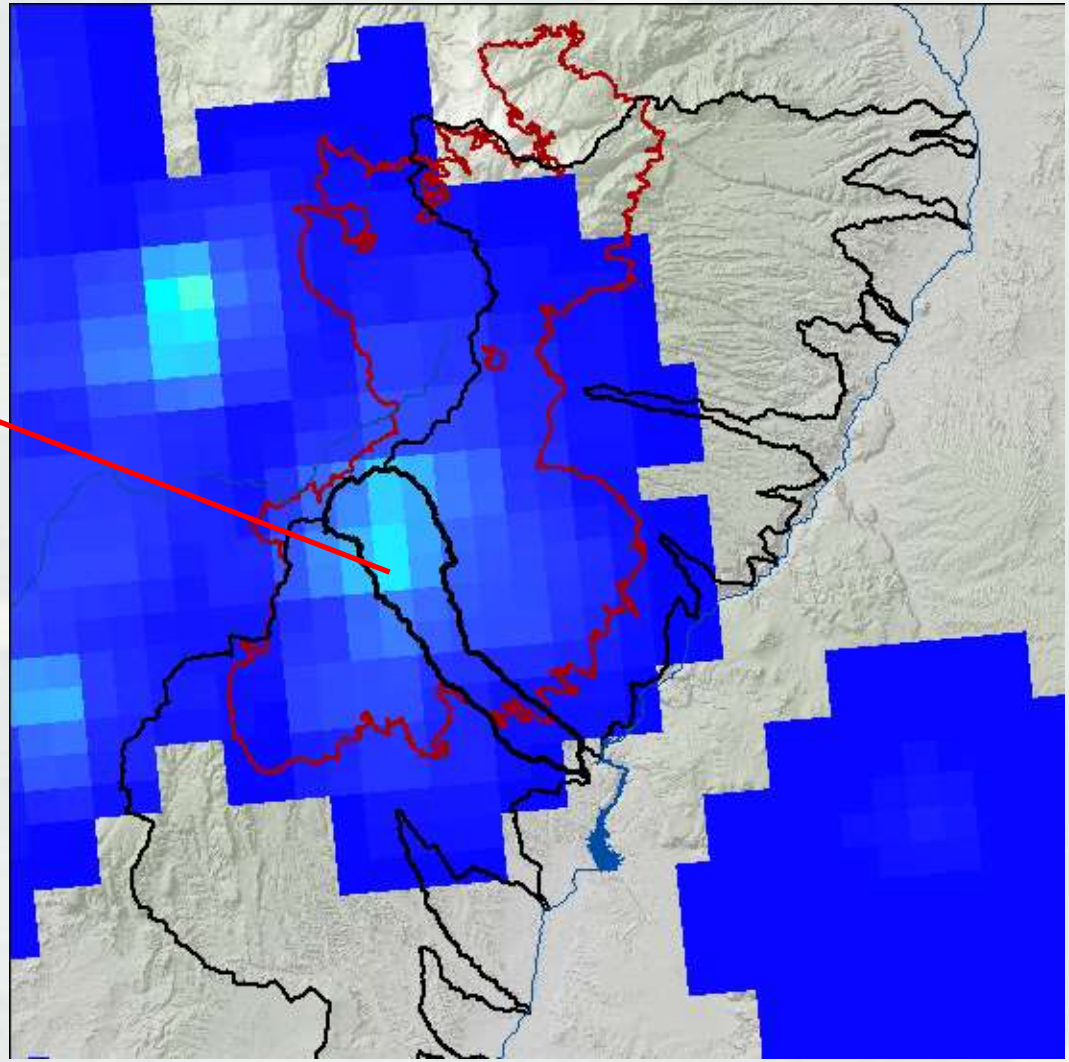
Rainfall Event
Cochiti Canyon August 21, 2011

Largest Cell:
1.6in/8hr
NEXRAD



Rainfall Event
Cochiti Canyon August 22, 2011

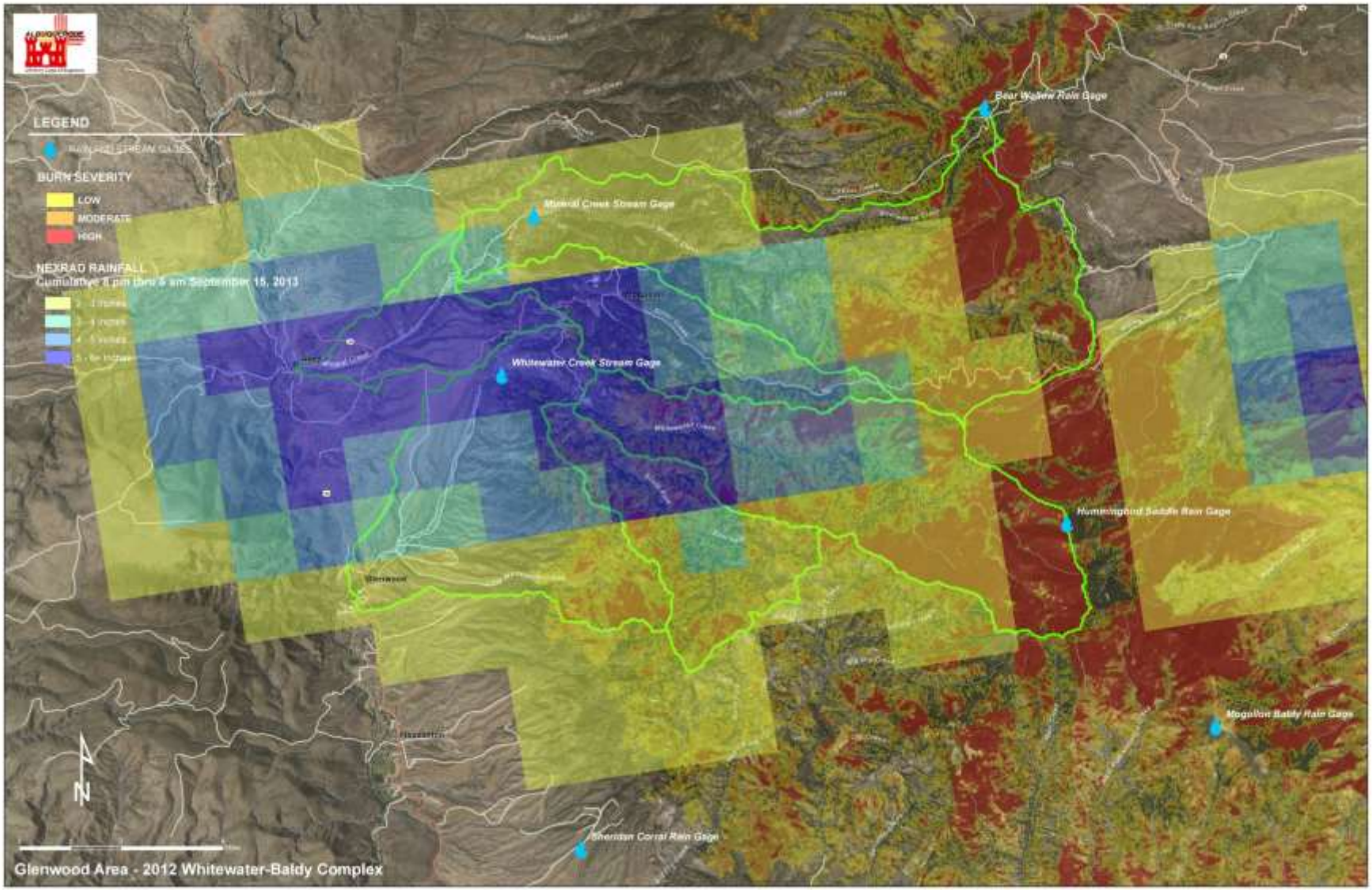
Largest Cell:
1.5in/8hr
NEXRAD



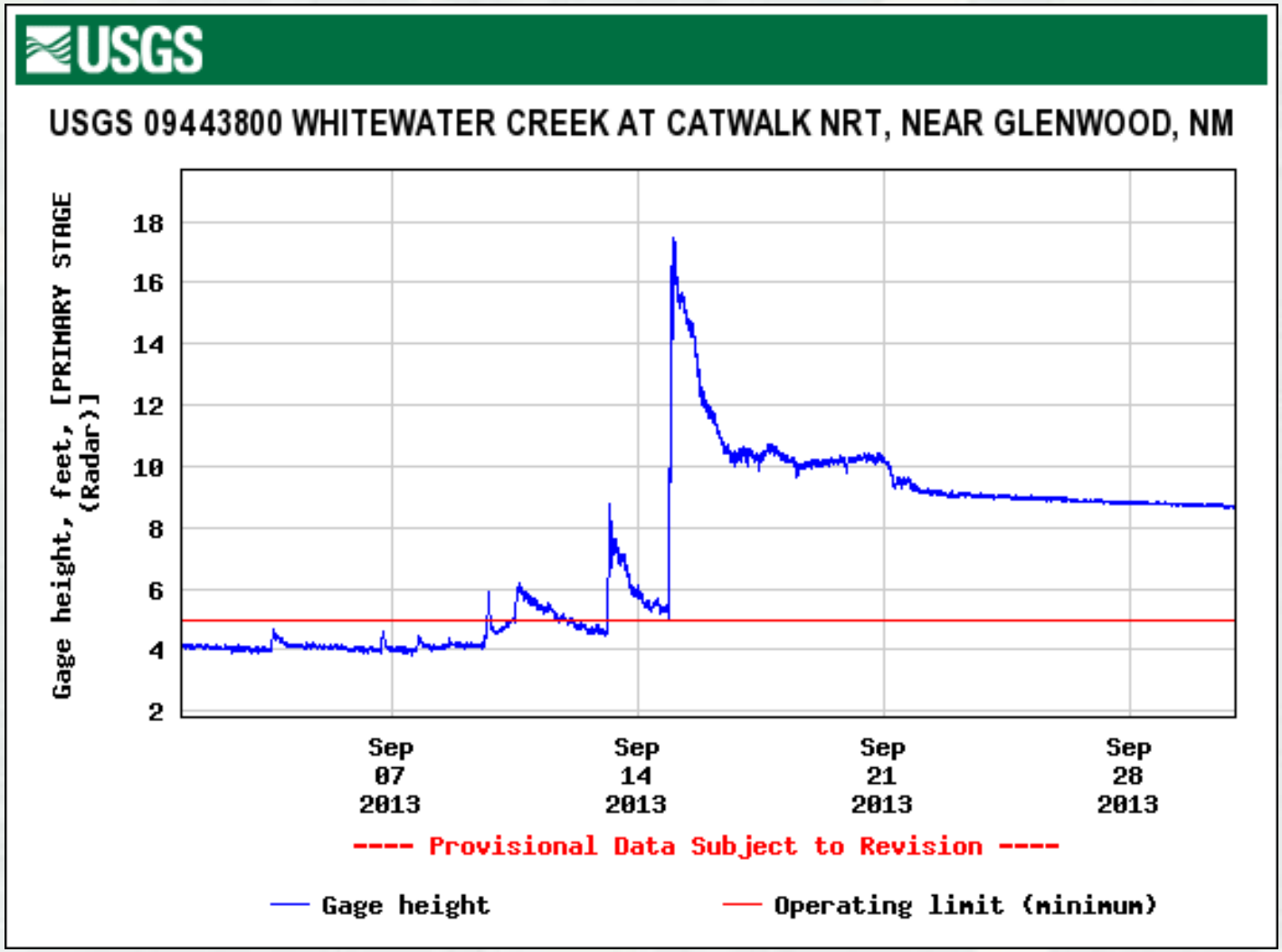
Flooding Event
Cochiti Canyon August 22, 2011

http://www.youtube.com/user/spausace

Rainfall Event
Whitewater Creek



Flooding Event
Whitewater Creek July 2012



Watershed Response Geomorphology

Cochiti Canyon
Post-Flood
August 25, 2011

Watershed Response Geomorphology

Peralta Creek, Culvert Crossing, July 21, 2011

Watershed Response Geomorphology

Watershed Response Geomorphology

Peralta Creek, Culvert Crossing, March 6, 2012

Watershed Response Geomorphology

Peralta Creek, SP-85 Culvert Crossing, 2013

Watershed Response Geomorphology

Culvert Crossing Kee St. – Santa Clara Creek
July 26, 2013

Village Reach - Santa Clara Creek
July 26, 2013

Watershed Response Geomorphology

Pond 4 – Santa Clara Canyon
July 26, 2013

Pond 3 – Santa Clara Canyon
July 26, 2013

Watershed Response Geomorphology

Pond 1 – Santa Clara Canyon – July 26 2013

Watershed Response Geomorphology

Bland Canyon Confluence with the Rio Grande
Pre-fire and Pre-Flooding

Watershed Response Geomorphology

Bland Canyon Confluence with the Rio Grande
October 2011

Watershed Response Geomorphology

Peralta Canyon Confluence with the Rio Grande
Pre-fire and Pre-Flooding

Watershed Response Geomorphology

Peralta Canyon Confluence with the Rio Grande
October 2011

Watershed Response
Urban Areas / Values at Risk

Dixon Conference Center
Pre-Fire

Dixon Conference Center
Post-Fire & Post-Flood

Watershed Response
Urban Areas / Values at Risk

- Cultural Importance – Way of life
- NM SJ – www.afterwildfirenm.org
- Rainfall Forecasting – Monsoon Season
- Early Warning Systems
- Evacuation Planning
- Floodplain Delineation
- Sediment Risks
  - Decreased channel capacity
  - Loss of storage in retention ponds

Watershed Recovery Discussion

- Number One Question: How long?
  - Temporal Scale: Temporary vs. Permanent
  - Climate Change
  - Watershed Resilience
- Sediment Issues
  - Mass Wasting
  - Sediment Movement
  - Where do we put it?
- Engineering: 50-yr?, 100-yr event?
- Data Collection – What do we do with it?

Acknowledgments

- Pueblo of Santa Clara, NM
  - Forestry Department
  - Office of Emergency Management
- Pueblo of Cochiti, NM
- US Forest Service – Southwestern Regional Office
  - Gila Ranger District
  - Other Ranger Districts in NM
- US Bureau of Reclamation – ABQ Office
- NM Silver Jackets

Questions

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