Fire! Lessons Learned from Extensive Fires in New Mexico

ASFPM Conference Hartford, CT
June 13, 2013

William Borthwick, CFM, NMDHSEM Floodplain Coordinator
Rigel Rucker, PE, CFM, URS Corporation
Philip Drazek, PE, CFM, URS Corporation
Introduction – Why is This Important to You?

New Mexico = desert?
Very diverse State
Historically, fires have been a big problem for the State
Average annual rainfall approx. 13 inches
Among 5 lowest States for precip.
Anyone remember Smokey?
Recent droughts have exacerbated the situation
2012 fire 465 square miles
This presentation aims to educate on interconnected disasters
Causes and effects of fire
Applicable everywhere
Discuss lessons learned
Overview

- Realities of Fire
- Recent New Mexico Fires
- Effects of Fires
- Response
- Recovery
- Preparedness
- Lessons Learned / Best Practices
Drying of Fire

Contributing Factors

Drought
- New Mexico drought worst in United States
- April 14, 2013 New Mexico passed Nebraska

Wind

Low Humidity
- Typically below 20% in summer

U.S. Drought Monitor

New Mexico

May 21, 2013
Valid 7 a.m. EST

Drought Conditions (Percent Area)

<table>
<thead>
<tr>
<th></th>
<th>None</th>
<th>D0-D4</th>
<th>D1-D4</th>
<th>D2-D4</th>
<th>D3-D4</th>
<th>D4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>0.00</td>
<td>100.00</td>
<td>100.00</td>
<td>98.17</td>
<td>81.79</td>
<td>44.87</td>
</tr>
<tr>
<td>Last Week (05/14/2013 map)</td>
<td>0.00</td>
<td>100.00</td>
<td>99.04</td>
<td>97.63</td>
<td>81.88</td>
<td>44.14</td>
</tr>
<tr>
<td>3 Months Ago (02/19/2013 map)</td>
<td>0.20</td>
<td>99.80</td>
<td>98.45</td>
<td>98.85</td>
<td>49.59</td>
<td>1.22</td>
</tr>
<tr>
<td>Start of Calendar Year (01/01/2013 map)</td>
<td>0.00</td>
<td>100.00</td>
<td>98.83</td>
<td>94.05</td>
<td>31.88</td>
<td>0.97</td>
</tr>
<tr>
<td>Start of Water Year (09/29/2012 map)</td>
<td>0.00</td>
<td>100.00</td>
<td>100.00</td>
<td>62.56</td>
<td>12.25</td>
<td>0.96</td>
</tr>
<tr>
<td>One Year Ago (05/15/2012 map)</td>
<td>0.00</td>
<td>100.00</td>
<td>96.20</td>
<td>62.63</td>
<td>23.99</td>
<td>0.67</td>
</tr>
</tbody>
</table>

Intensity:
- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://droughtmonitor.unl.edu

Released Thursday, May 23, 2013
Brad Rippey, U.S. Department of Agriculture
Droughts of Fire

Drought on Drought

Current drought 3 years

3rd driest since record-keeping began in New Mexico more than a century ago

Longest since 1950s New Mexico suffered 7 consecutive years

Largest State reservoir

• Used for irrigation
• Typical release 38.7%
• This year’s 4.2%

Farmers using groundwater

Allotments cut off

Shortened growing season) for Pecos and Rio Grande
Causes of Fires

- Human-caused – 9,443 nationwide in 2012
  - ATVs/machinery
  - Campfires
  - Cigarettes
  - Electrical, etc.

Thunderstorms/lightning
58,331 nationwide in 2012

Dry lightning
Recent Large New Mexico Fires

Large fires occurred in 2000s and 2010s

Tritlewater-Baldy Complex: Catron County, NM, 2012
297,845 acres
Largest, almost 10% of CT

Conchas: Los Alamos, NM, 2011
156,593 acres

Haldson: Lincoln County, NM, 2011
101,563 acres

3?

Tres Lagunas Silver Thompson Ridge
Fires to Note – New Mexico

- **Knight Fire**: Grant County, NM, 1951
  - 48,052 acres

- **Cerro Grande Fire**: Near Los Alamos, NM, 2000
  - 48,000 acres

- **Battle Bear Fire**: Lincoln County, NM, 2012
  - 44,330 acres
  - 224 residences

- **Capitan Gap Fire**: Lincoln County, NM, 1950
  - 17,000 acres

May 12, 2000 to May 19, 2000

Total resources: over 1,000 firefighters and equipment
Effects of Fires

Fires are Essential to Ecosystem

Over 9.3 Million Acres Burned Nationwide in 2012, Over 67,700 Fires
- Roughly size of MA and CT combined
- Only 3 times on record (After 60s)
- 400,000 acres in New Mexico

Lost to Life
- Human
- Nature

Economic Costs
- Infrastructure – over $1 billion damaged nationwide
- Homes – 2,125 homes lost nationwide
  - Compare to average of 2,600
- Businesses, power outages, evacuation, etc.
  - Some never recover
- Manpower – almost $2 billion in suppression
  - 23 million in New Mexico

Ritual and Cultural impact – Santa Clara Pueblo, Dixon Apple Orchard

*approximate locations of the 2009-12 NM wildfires that affected areas greater than 40k acres*
Ecological Costs of Fires

Environmental Costs

- Pollution
- Stream
- Water
- Increase in flooding
- Hydrophobic soils
- Runoff
- Sediment bulking
- Debris flow
- Erosion
- Silted reservoirs
  - Bonito Lake
  - Cochiti
Effects of Fires

Old fires change the hydrology and hydraulics of the watershed.

Hydrologic Impacts

Burned Area Emergency Response (BAER) teams use regression or SCS methods for development of peak flows.

Different studies used to calculate the impact to CNs.

Few studies demonstrate post-fire runoff CNs.

Ro Grande Fire

200-year event est. 30 cfs for Pueblo Canyon Watershed above Diamond Drive.

Post-fire 100-year event peak est. at 3,000 cfs.

July 2001, 25-year event produced 2,000 cfs.

After Livingston and others (2005)
## Impacts of Fires

### Hydrologic Impacts

- Hydrophobic soils
- **Livingston and others (2005)**
  - Study results applicable to the Los Alamos area and other areas in the southwest

<table>
<thead>
<tr>
<th>Soil burn severity</th>
<th>Estimated CN</th>
</tr>
</thead>
<tbody>
<tr>
<td>High, with water repellent soils</td>
<td>95</td>
</tr>
<tr>
<td>High, without water repellent soils</td>
<td>92</td>
</tr>
<tr>
<td>Moderate, with water repellent soils</td>
<td>89</td>
</tr>
<tr>
<td>Moderate, without water repellent soils</td>
<td>87</td>
</tr>
<tr>
<td>Low</td>
<td>80-83</td>
</tr>
<tr>
<td>Unburned</td>
<td>55-75</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hydrologic Soil</th>
<th>Pre-fire CN</th>
<th>Post-fire CN Low Burn Severity</th>
<th>Post-fire CN Medium Burn Severity</th>
<th>Post-fire CN High Burn Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>56</td>
<td>65</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>67</td>
<td>70-75</td>
<td>80</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>77</td>
<td>80-85</td>
<td>90</td>
<td>95</td>
</tr>
</tbody>
</table>
Dixon Apple Orchard Flooding Video
Incident Management System (NIMS)

Assumption: all incidents begin and end locally

Incident Command System (ICS)

Type 1: National and State Level
- Large-scale National or State incident

Type 2: National and State Level
- Smaller scale National or State incident

Type 3: State or Metropolitan Area Level

Type 4: City, County, or Fire District Level

Type 5: Local Village and Township Level

FS Experts!

Functional: manage complex wildland fire

Conchas Fire – 1st time NIMO in NM

Threat to Los Alamos National Laboratory

Physical land size of the fire
Responders typically at local level

State Forestry / NM DHSEM

Federal Partnerships

National Interagency Fire Center (NIFC)

BLM, BIA, NASF, NPS, NWS, USFA, SFS, USFWS

Geographic Area Coordination Center

Southwest Coordination Center (SWCC)

BLM, BIA, USFS, USFWS, NPS, NM Forestry and AZ Forestry
InciWeb

New Mexico Incidents

Viewing 1-7 of 7 incidents sorted by MODIFIED in DESCENDING order.

Sort this table by clicking a column header. Clicking the header a second time sorts the table in the opposite direction. You can view a specific incident by clicking the incident name.

<table>
<thead>
<tr>
<th>Incident</th>
<th>Type</th>
<th>Location</th>
<th>Status</th>
<th>Active</th>
<th>Updated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trees Laguna Fire</td>
<td>Wildfire</td>
<td>Santa Fe National Forest</td>
<td>Active</td>
<td>3,680</td>
<td>17 min. ago</td>
</tr>
<tr>
<td>Thompson Ridge Fire</td>
<td>Wildfire</td>
<td>Santa Fe National Forest</td>
<td>Active</td>
<td>1,906</td>
<td>3 hrs. ago</td>
</tr>
<tr>
<td>Las Conchas</td>
<td>Wildfire</td>
<td>Santa Fe National Forest</td>
<td>Inactive</td>
<td>154,953</td>
<td>1 day ago</td>
</tr>
<tr>
<td>Carls Fire</td>
<td>Wildfire</td>
<td>Lincoln National Forest</td>
<td>Active</td>
<td>188</td>
<td>4/22/2013</td>
</tr>
<tr>
<td>Horse Canyon</td>
<td>Wildfire</td>
<td>Lincoln National Forest</td>
<td>Active</td>
<td>327</td>
<td>4/21/2013</td>
</tr>
<tr>
<td>Little Bear Fire</td>
<td>Wildfire</td>
<td>Lincoln National Forest</td>
<td>Active</td>
<td>426</td>
<td>4/20/2013</td>
</tr>
<tr>
<td>Little Bear RFD FIre</td>
<td></td>
<td>Lincoln National Forest</td>
<td>Active</td>
<td>44,300</td>
<td>4/20/2013</td>
</tr>
</tbody>
</table>

Due to high demand this Web site may become unresponsive. Thank you for your patience.

Inciweb.org

Interagency all-risk incident information management system provide the public a single source of incident information provide a standardized reporting tool for the Public Affairs community

Fire info

http://nmfireinfo.com/

PS, USFWS, BIA, BLM,NM
Response

Significant Manpower required
- Tres Lagunas:
  - Over 1000 personnel
- 5 Hand Crews
- Helicopters
  - 3 engines
  - 1 bulldozers
  - 3 water tenders
- 40% contained

Over 10,000 acres burned

From Santa Fe New Mexican, Photo By Nicholas Generous:
An air tanker drops fire retardant on the Tres Lagunas Fire in Pecos Canyon.
Recovery
Watershed Recovery of Burned Areas

- Raking
- Seeding and Mulching
- Tree Planting

- 2001 Cerro Grande

From: KRQE
RE: The U.S. Forest Service

can planting small trees in the area to help reforestation. Lasted about three weeks from to May 1. Roughly 451,000 new trees planted.

CE: Debris flow following Las Conchas fire in Cochiti Lake

- Little Bear Fire
  - Bonito Lake impacted
  - City of Alamogordo water supply threatened

- Las Conchas Fire
  - Cochiti Reservoir damaged
    - Log-boom installed
  - Santa Clara Pueblo
    - Hazard Mitigation Work Underway
      - Stream bank stabilization
      - Debris catchment
Grande-Pueblo Canyon

Road Reconstruction

Culvert replaced w/ 2-10'x10'
US and 12'x12' CBC DS

Bankment:

west side, 140’ east side

From: Kyle Zimmerman Los Alamos County Engineer
Recovery

State/Federal Partnerships

State of NM tailors activity with agencies in ICS during recovery phase

The Silver Jackets stakeholders serve as part of the mitigation phase

• Joint Federal operation: NOAA/USGS/USFS/BOR/BIA/USACE
• Crowd source as much as possible

SFS BAER

Protect life, property, water quality, and deteriorated ecosystems

From: http://lasconchasbaer.info
Preparedness
Preparedness: if you have drought need to do treach and flood outreach

USDA Forest Service
US Forest Service
US Fire Administration
National Fire Protection Association
Community Wildfire Protection Plan

Firewise.org
Fireadapted.org/
Firerestrictions.us/nm
Flash.org
NMDHSEM.org/Mitigation.aspx
//www.ready.gov/wildfires
USFA.FEMA.gov/citizens/home_fire_prev/we/
NMWatch.org
MFireInfo
Paredness

Federal

Budget constraints – NM uses creative funding options resulting in piggybacking funding with federal agencies

Ver Jackets – share resources ($) and empower

Emergency watershed protection program

Storm: NOAA, NWS, and State of NM

Work with Emergency Managers

briefings/year: wildfire and winter storms

State of NM and USACE – sand bag training communities in Whitewater-Baldy watershed after the fire but prior to the monsoon season

/ State of NM: Erosion Control / Debris studies after Las Conchas

From: The Forestry Division of the New Mexico Energy, Minerals and Natural Resources Department
Lessons Learned / Best Practices
Living with Wildfire: A Shared Community Experience

Recording personal stories of wildfire to understand the effects a wildfire has on community and the environment

Table

Technology developed at LANL and table technology simulates wildland fire response and mitigation training

Planning and mitigation of multiple hazards: wildfire, flood, erosion

Community outreach component

From: www.simtable.com

http://livingwithwildfire.org/

http://www.lanl.gov/museum/participate/share-stories.shtml
Lessons Learned / Best Practices

Los Alamos, NM

Emergency Operations at LANL continually plans and prepares for the yearly NM wildfire season.

Zimmerman, Los Alamos County, NM Engineer:

- Know your watersheds
- Build GIS network with footprints
- Know your fire risk
- Form clearing
- Know what to do after a disaster – Who, What, When, Where, Why
- Participate in Emergency Response Tabletops
- Learn how to design for post-fire conditions – build structures with sedimentation capability or move structures that would be lost but cause damage to other infrastructure.

From: Kyle Zimmerman Los Alamos County Engineer
Grande

- Coordinate stakeholders about interconnected hazards
- Fire curve numbers generate much higher flows and large amounts of debris
- Larger floodplains
- Federal
- Silver Jackets
- Bring multiple agencies together for an emergency phase
- Coordinate/collaborate and build relationships in preparedness for the next disaster
- Such
- Every and often!
Why is this Important?: Future...