



US Army Corps of Engineers New Mexico Silver Jackets

Flood After Fire

Please add your name and email address to the chat to receive a CEC Certificate for this webinar.



USACE Silver Jackets

- USACE Silver Jackets is a component of the National Flood Risk Management Program (NFRMP)
- State (NMDHSEM) Led Teams with regular meetings
- Interagency Program to Reduce Flood Risk throughout New Mexico
- Interagency Projects
 - Competitive Project Proposals
 - 12 to 18-month Projects

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Planner

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MID-REGION
Council of Governments



New Mexico Department of
Homeland Security and Emergency Management

New Mexico Post-Fire Flood Risk Education

Fill gaps for post-fire technical support to understand flood risk post-fire, possible mitigation strategies, and resources and programs to provide long-term fire recovery support. Topics will inform and address risks associated with:

- **dam safety**
- **floodplains**
- **flood after fire**
- **alluvial fans**

The New Mexico Post-Fire Flood Risk Education project will empower communities in New Mexico to be better prepared for flood events after wildfire season.

New Mexico Flood Risk Webinar Series

Please join us for a webinar series about different types of **Flood Risks** across the State of New Mexico.

DAM SAFETY



21 OCT 2025

FLOODPLAINS



18 DEC 2025

FLOOD AFTER FIRE



19 FEB 2026

ALLUVIAL FANS



23 APR 2026

9:00-10:00AM

Continuing Education Credits (CECs) will be offered through the US Army Corps of Engineers upon completion of individual sessions.

Sessions are **60** minutes, held virtually, with **30** minutes of recorded presentation and **30** minutes of question and discussion. Meeting instructions will be provided with individual series invites.

Interagency partners will present on **dam safety, floodplains, flood after fire,** and **alluvial fan** risks.

FEBRUARY PRESENTER: ANNE TILLERY
GEOMORPHOLOGIST

DEPUTY DIRECTOR NM WATER SCIENCE CENTER

UNITED STATES GEOLOGICAL SURVEY



US Army Corps
of Engineers
Albuquerque District

New Mexico Flood Risk Webinar Series

Flood After Fire

Anne Tillery, USGS

New Mexico Water Science Center



EARTH DATA
ANALYSIS CENTER

Flood After Fire



Aftermath of flooding on Rio Ruidoso, 2024. Photo Credit: Ryan Olona, USGS

Main Points for today

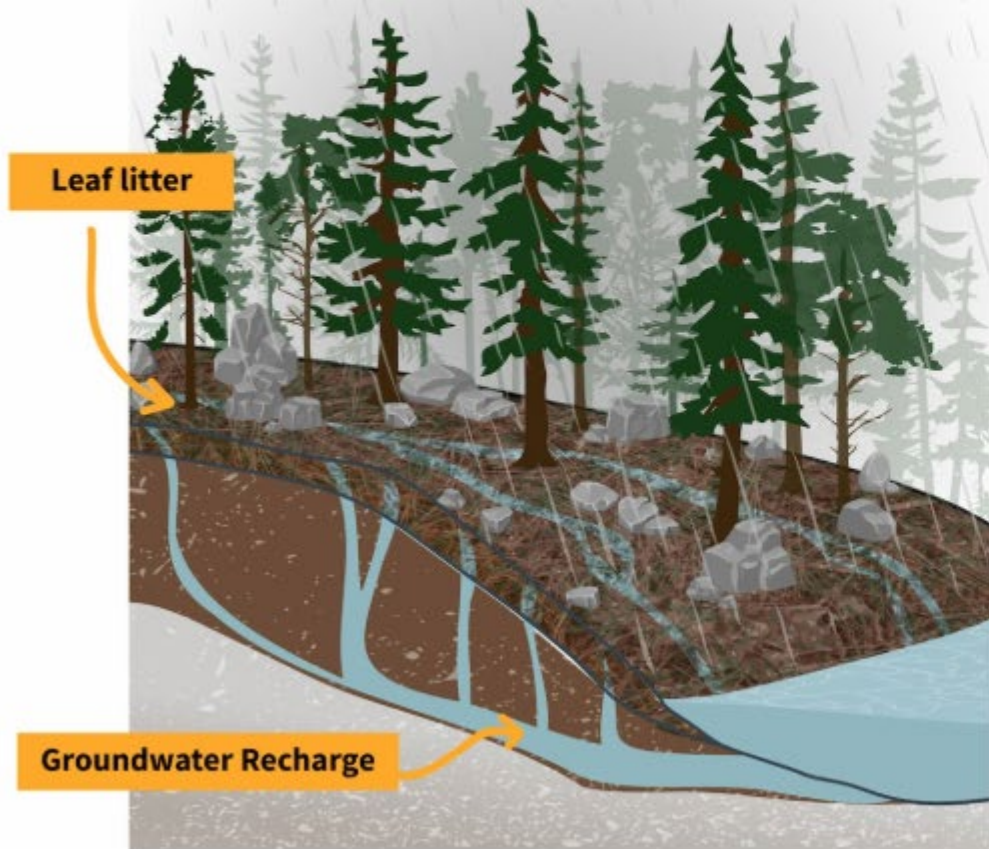
1. Post fire floods are much bigger and move downstream faster than pre-fire floods.
2. Post fire flooding is a repeating hazard.
3. Post fire flood hazards can persist for years.

Rain falling on areas burned by wildfires can produce stream peak discharges orders of magnitude (5-870 fold) beyond the typical values seen in systems with fully vegetated conditions (Moody and Martin, 2001)

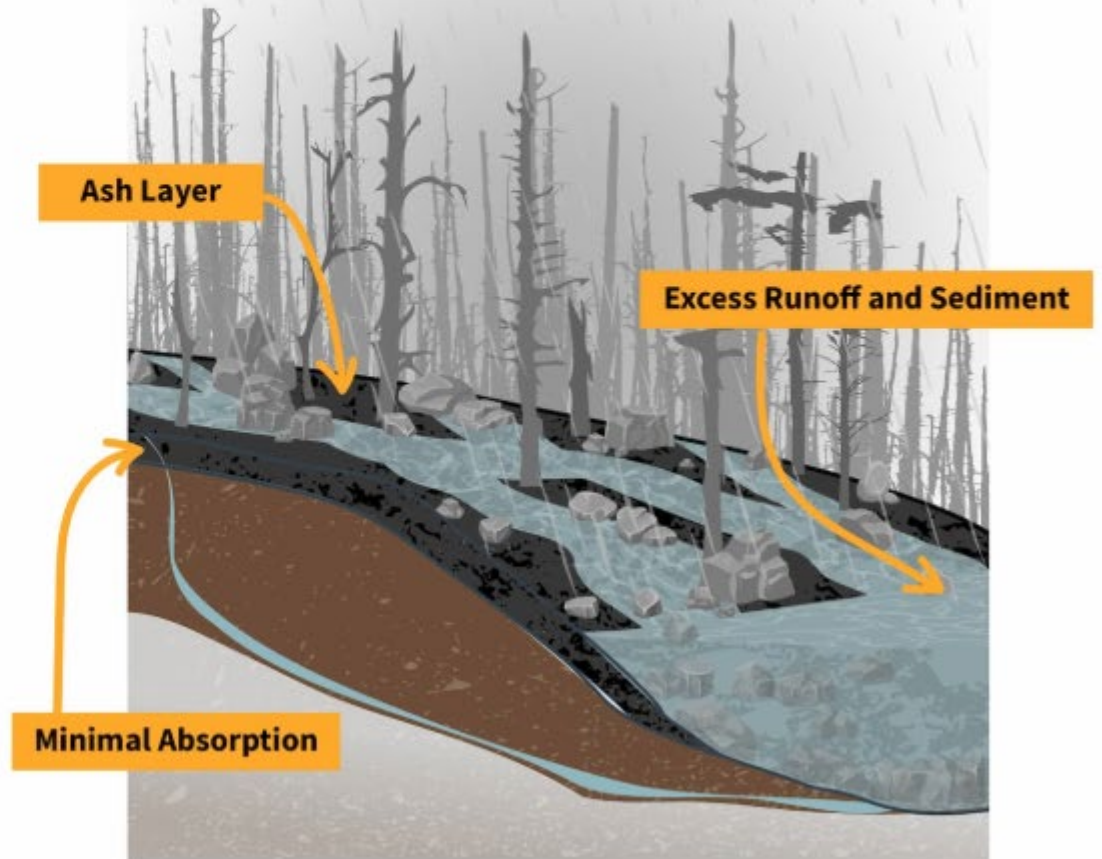


Pieces of machinery and a building after a flash flood came through the canyon at the Dixon Apple Orchard following the Las Conchas Fire. (Albuquerque Journal /Richard Pipes)

Fully Vegetated
Infiltration = ↑



Burned
Infiltration = ↓

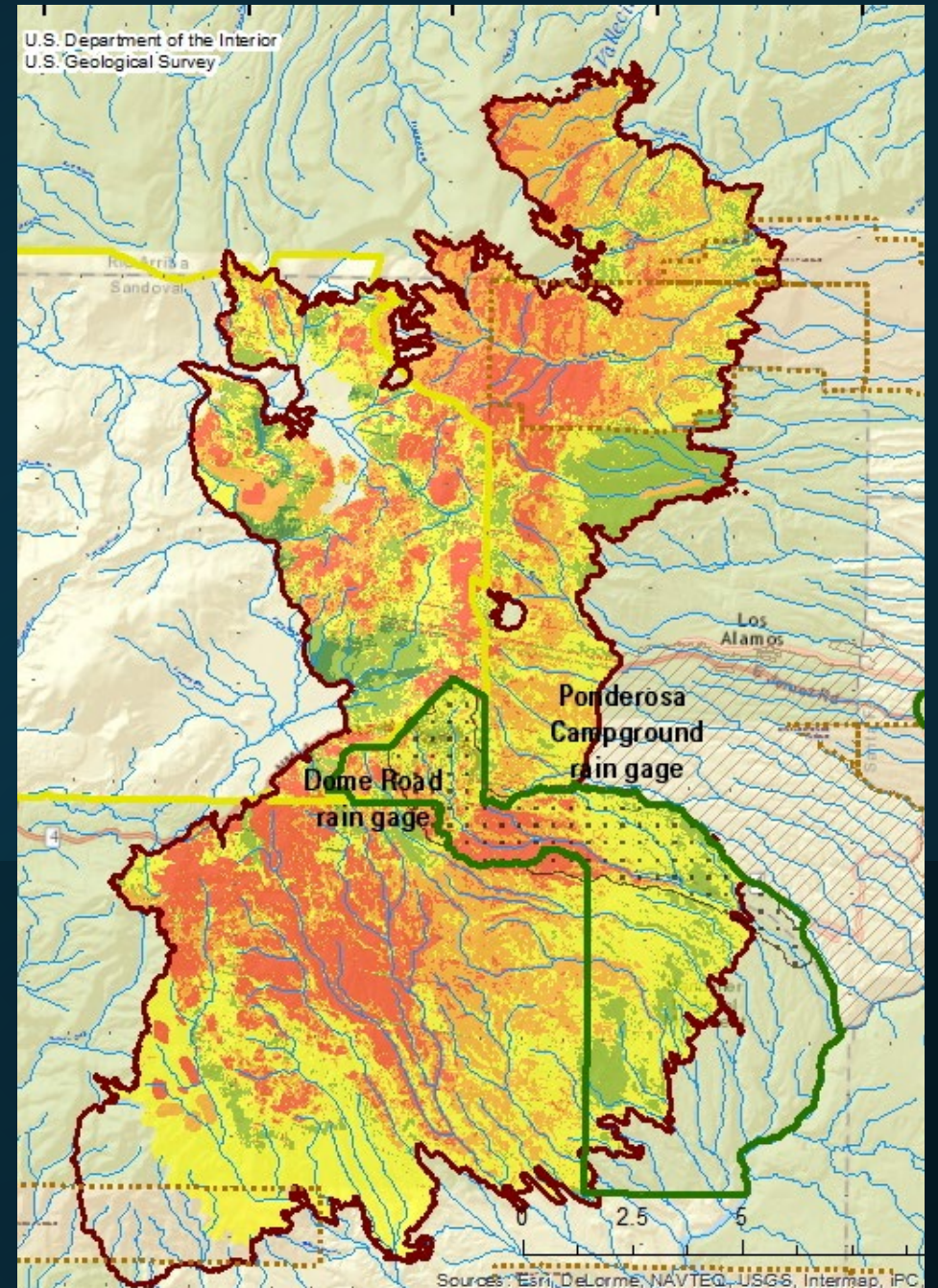


Las Conchas Wildfire - 2011

150,000 acres

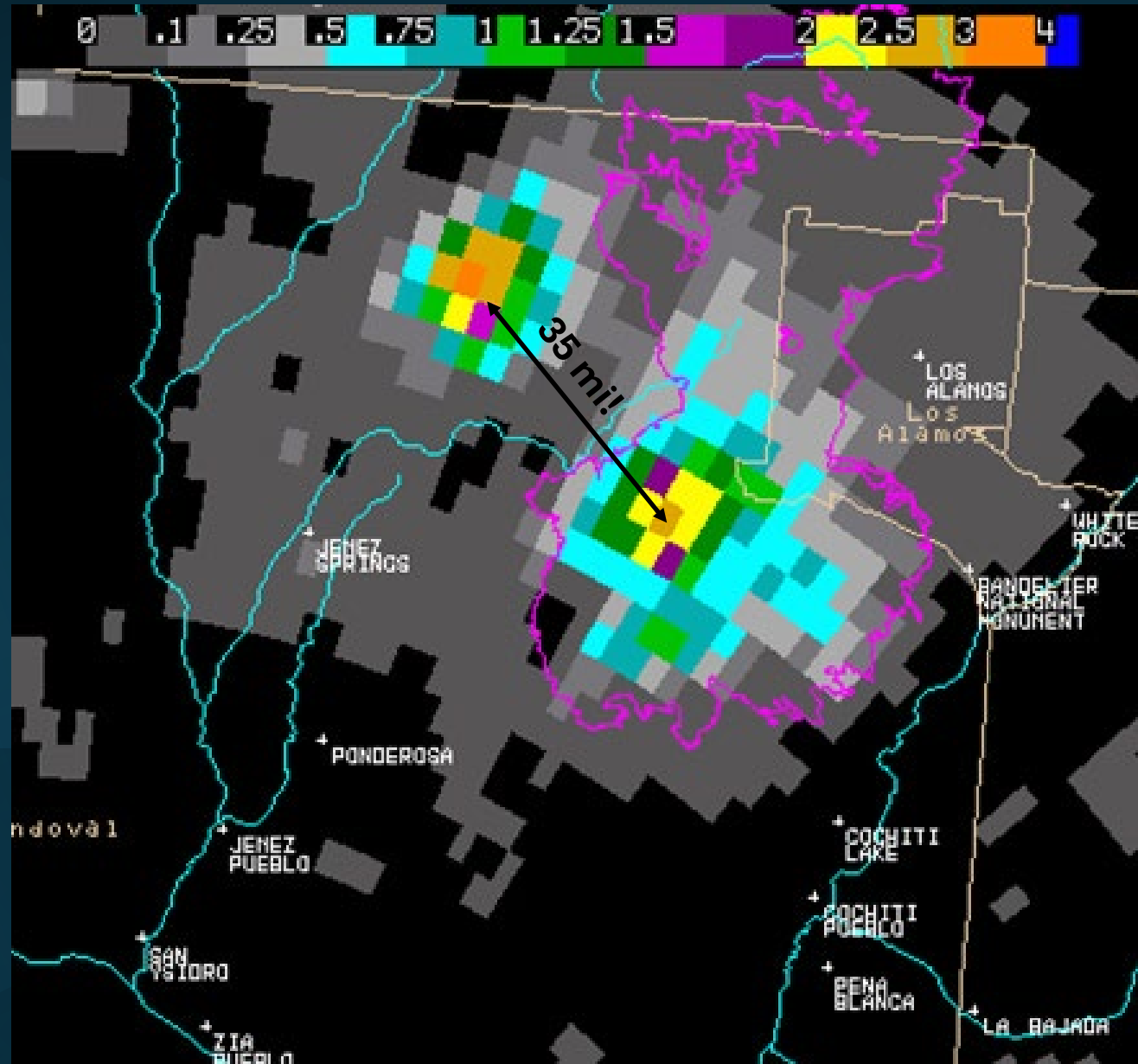


AP Photo / Jae C. Hong



Location, location, location

Strong, heavy-rain
producing
thunderstorms are
NOT uncommon
during the Southwest
Monsoon



August 22, 2011 – Dixon Apple Orchard Flood, Cochiti Canyon

EXPLANATION

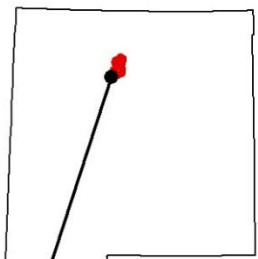
Monitoring Gages

- Streamgauge
- Rain gage
- Remote Automated Weather
- Fire Effects Plots
- Upper Crossing Watershed
- Headquarters Gage Watershed
- Reservation

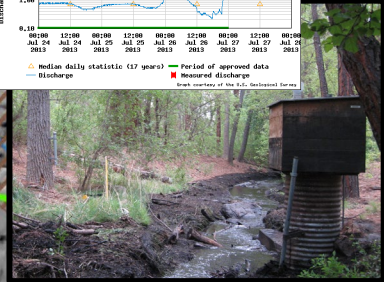
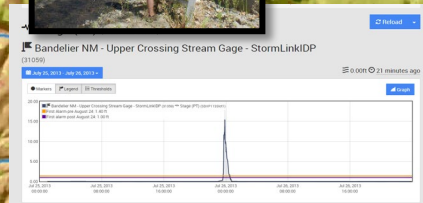
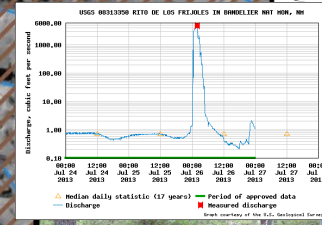
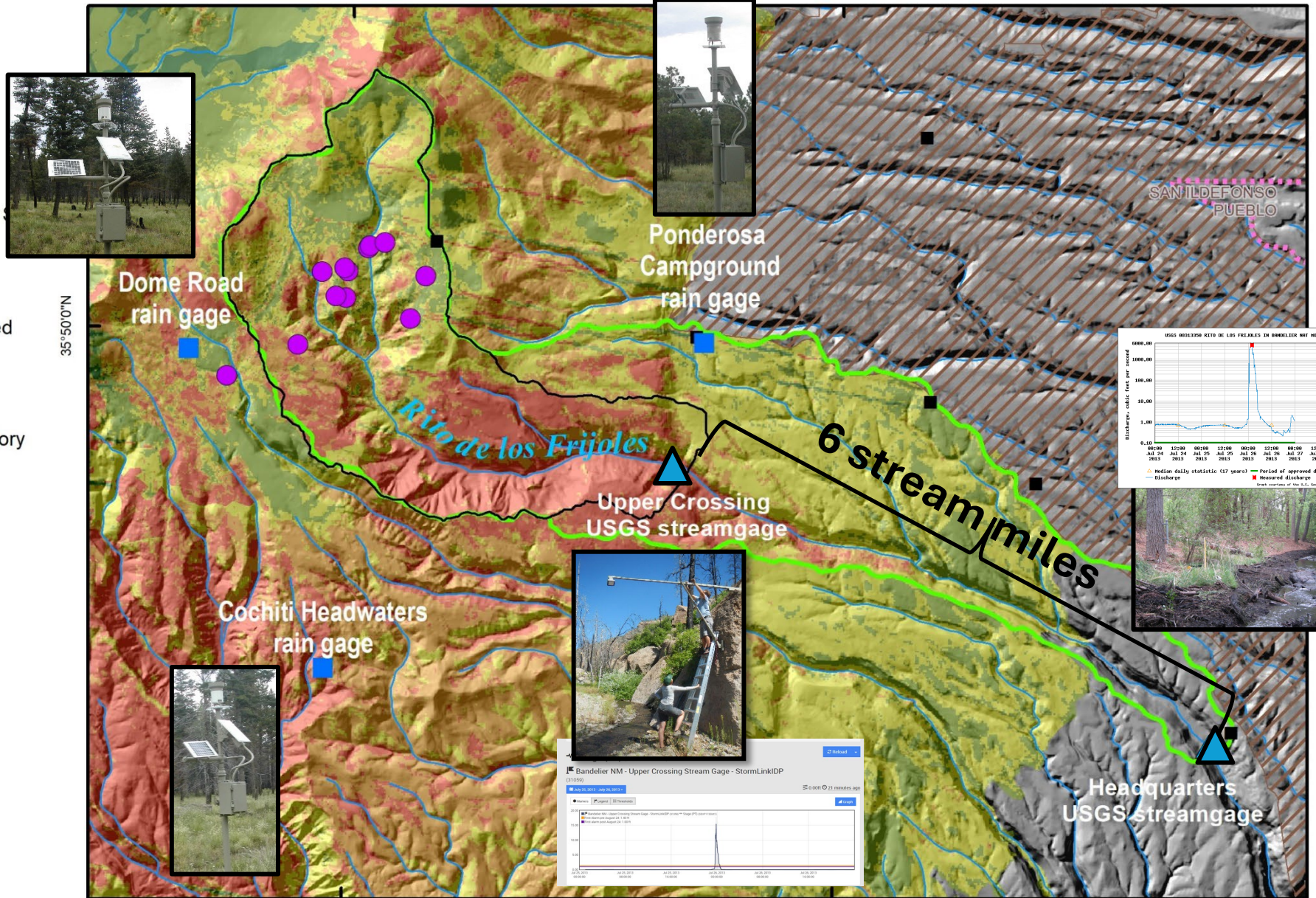
- Los Alamos National Laboratory
- STREAM

Burn Severity

- Unknown
- No change
- Low
- Moderate
- High



Location of Las Conchas Fire

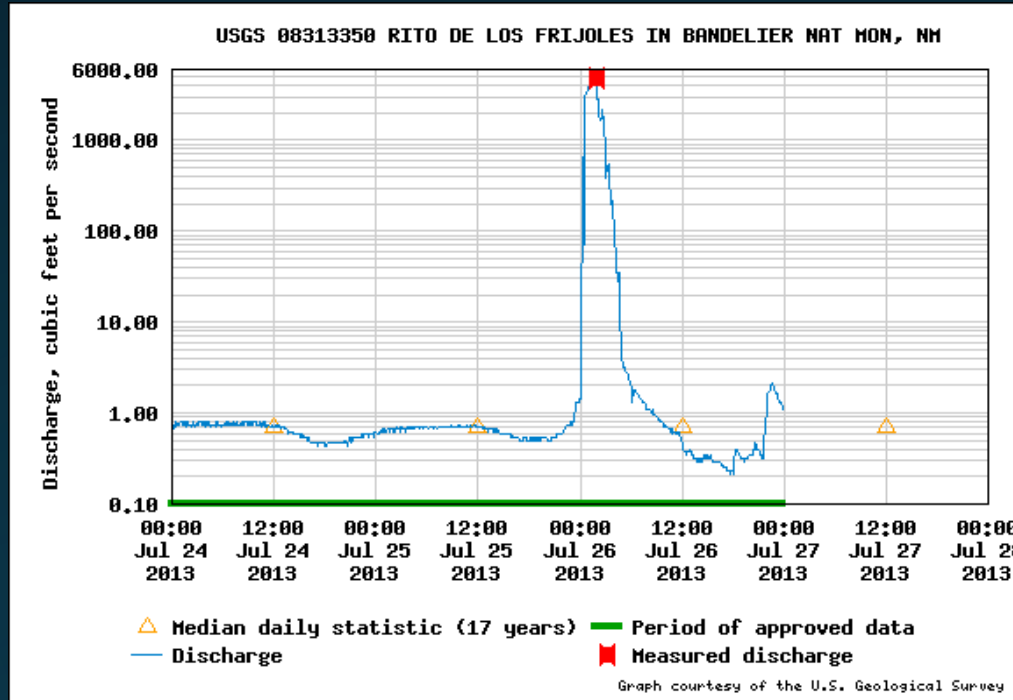
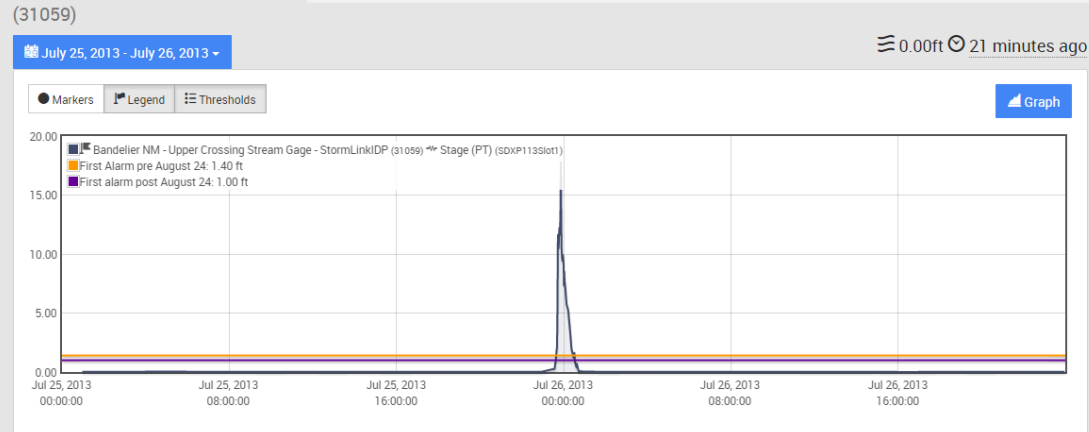


Upstream Gage

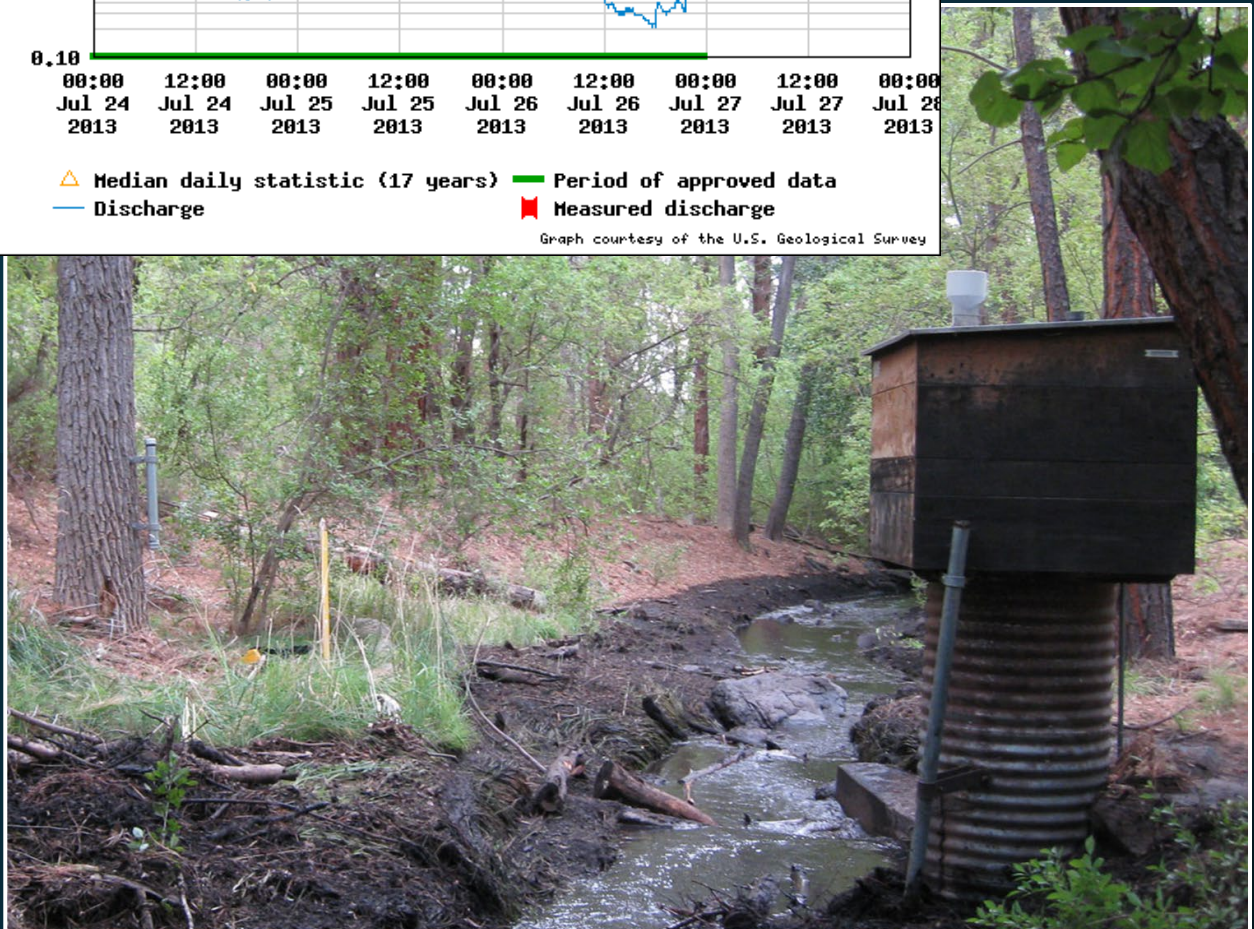


Stage (PT) (SDXP1133101)

Bandelier NM - Upper Crossing Stream Gage - StormLinkIDP (31059)



Downstream Gage

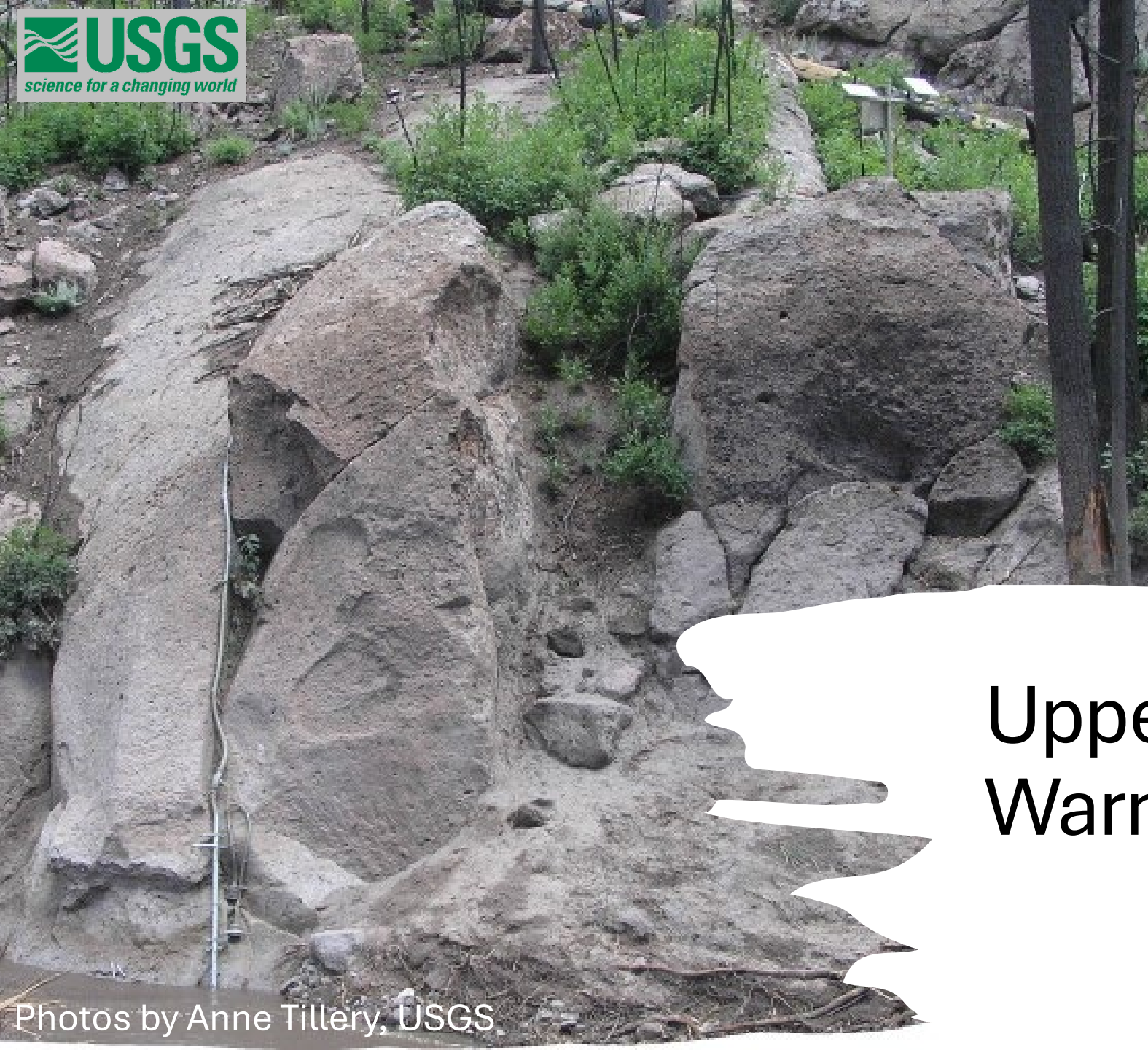




Flash flooding in response to short duration, high intensity rainfall events following catastrophic wildfires in New Mexico during summer 2011



Bandelier National Monument following
Las Conchas Fire



Upper Crossing Early Warning Flood Gage





Approximate High-Water Mark

Upper Crossing
Early Warning
System Stream
Gage

July 26, 2013
Gage Height
= 17.78 ft
Frijoles
Canyon,
Bandelier



Photo by Dave Lutz, USGS



Brian for scale

Photo by Anne Tillery, USGS



Photo by Anne Tillery, USGS

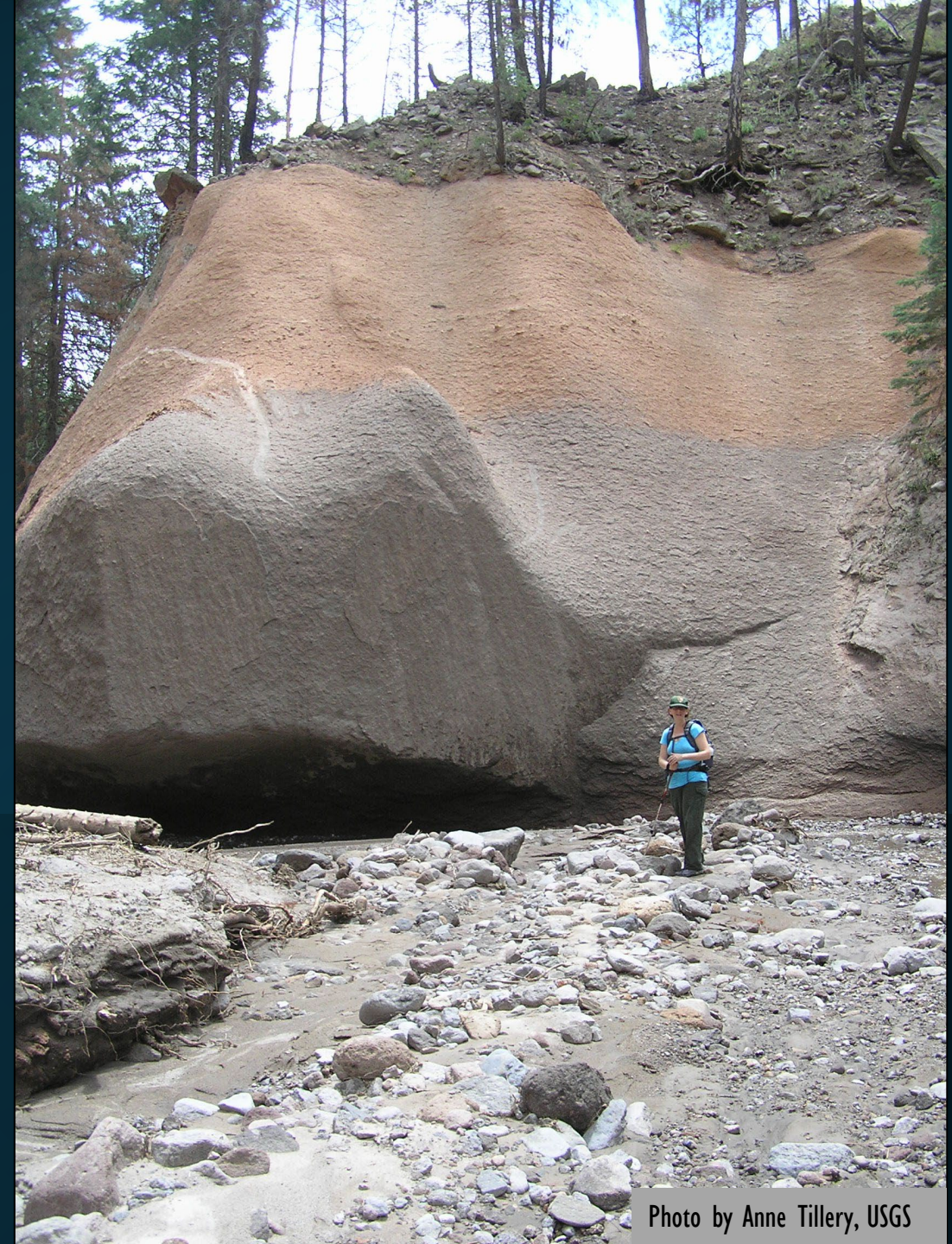


Photo by Anne Tillery, USGS

Extensive aggradation at Upper Crossing stream gage from September 13th, 2013, flood



Photo by Anne Tillery, USGS



Photo by Anne Tillery, USGS



Table of Selected Floods

DRAFT data – not for distribution

Flood Label	Upper Crossing Stream Gage			Headquarters Stream Gage				
	Date	Peak time (MDT)	Peak Stage (m)	Date	Peak Time (MDT)	Peak Stage (m)	Peak Discharge (f ³ /s)	Peak Discharge (m ³ /s)
2012								
1	8/15/12	1418	0.55	8/15/12	1630	0.85	40	1.13
2	8/16/12	1858	0.79	8/16/12	2045	0.79	29	0.82
3	8/19/12	1422	0.85	8/19/12	1600	0.85	44	1.25
4	9/10/12	1223	0.32	9/10/12	1415	0.96	89	2.52
5	9/12/12	1514	0.28	9/12/12	1735	0.76	21	0.59
6	9/12/12	2355	0.25	9/13/12	0205	0.88	47	1.33
7	9/28/12	1543	0.12	9/28/12	1745	0.74	12	0.34
8	10/12/12	1453	0.51	10/12/12	1705	1.00	106	3.00
2013								
9	7/25/13	2351	5.42	7/26/13	2430	3.17	5,410	153.19
10	8/5/13	1854	0.77	8/5/13	2000	0.89	80	2.26
11	9/2/13	1352	0.79	9/2/13	1515	1.07	142	4.02
12	9/10/13	1847	0.41	9/10/13	2000	1.06	139	3.94
13	9/10/13	2145	0.65	9/10/13	2305	1.00	91	2.58
14	9/10/13	2357	0.43	9/11/13	0135	0.87	38	1.08
15	9/12/13	1616	1.65	9/12/13	1710	2.15	2,140	60.60
16	9/13/13	0217	1.11	9/13/13	0320	1.36	350	9.91
17	9/13/13	0800	2.67	9/13/13	0850	4.15	11,100	314.32
2014								
18	7/8/14	1513	0.72	7/8/14	1625	1.09	162	4.59
19	7/9/14	0255	0.57	7/9/14	0510	0.81	30	0.85
20	7/15/14	2355	0.46	7/16/14	0125	0.86	42	1.19
21	7/16/14	1512	0.38	7/16/14	1710	0.65	7	0.21
22	7/17/14	1355	0.31	7/17/14	1550	0.62	5	0.14
23	7/19/14	1331	1.12	7/19/14	1435	1.67	1,040	29.45
24	7/29/14	1355	0.85	7/29/14	1450	1.21	228	6.46
25	8/4/14	1354	0.27	8/4/14	1500	1.58	581	16.45
26	9/5/14	1811	0.11	9/5/14	1925	1.17	241	6.82
2015								
27	7/4/15	1219	0.27	7/4/15	1345	1.07	147	4.16
28	7/20/15	2024	0.33	7/20/15	2140	1.09	170	4.81
29	8/2/15	1518	0.41	8/2/15	1645	1.05	139	3.94
30	8/30/15	1326	0.19	8/30/15	1530	0.75	32	0.91

Frijoles Canyon Headquarters gage

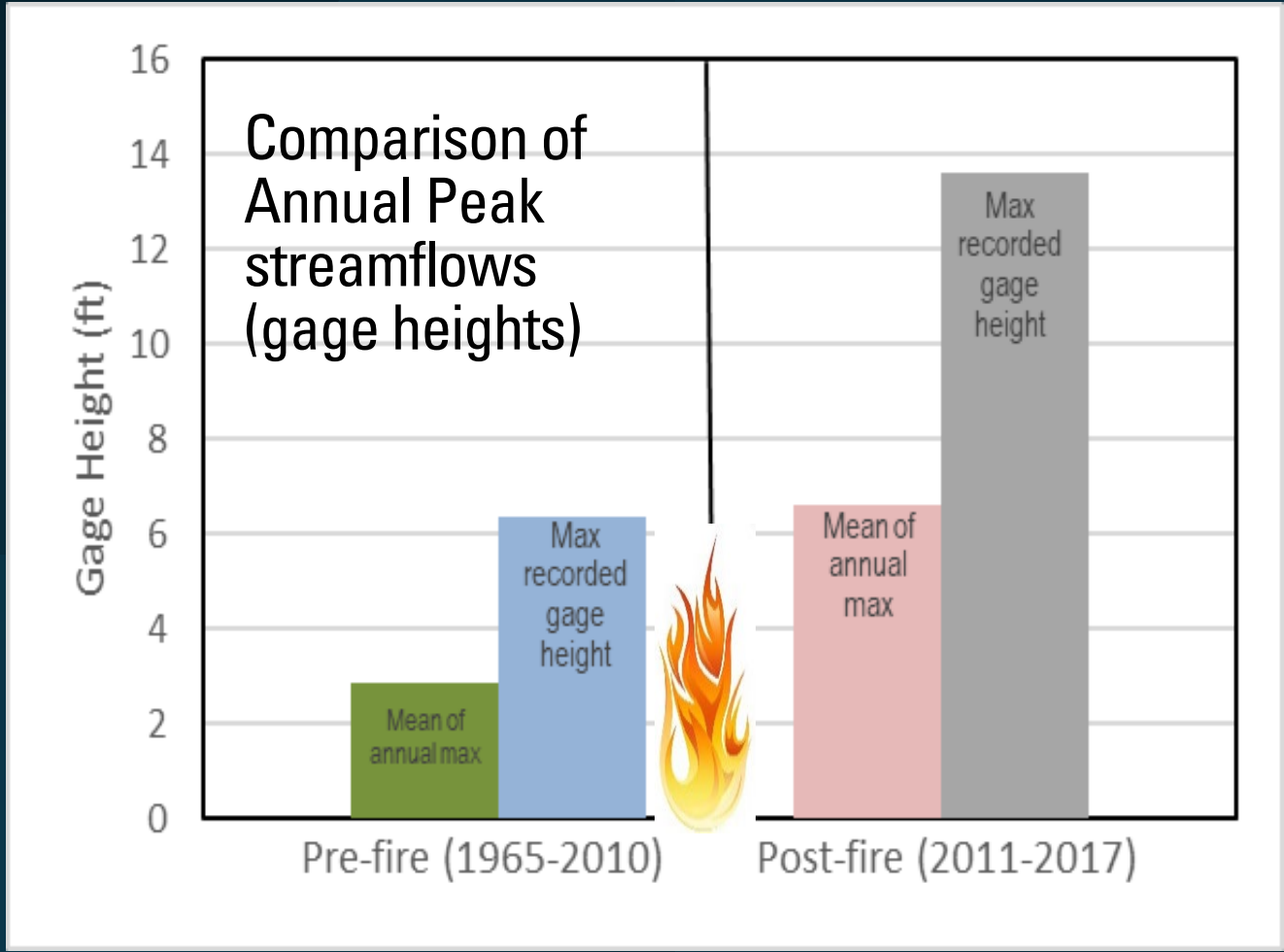


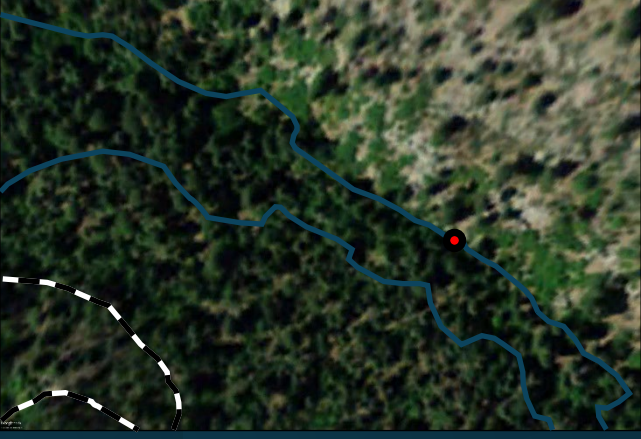
Photo by Anne Tillery, USGS





Google Earth imagery

06.June.2011
(pre-fire)



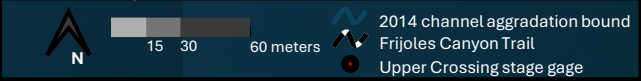
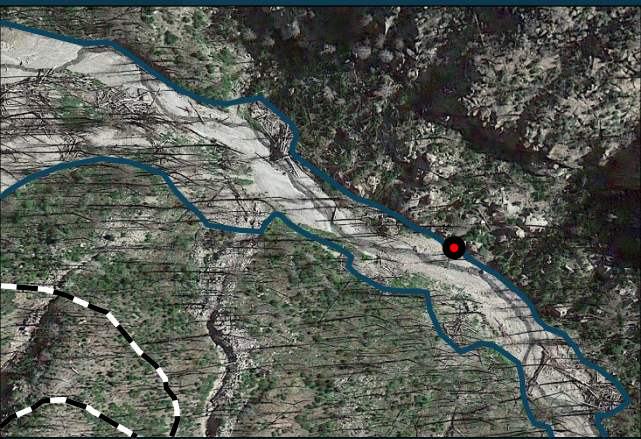
04.May.2012
(277 days after fire)

Tt = 2.03 hours
RE = 0.08



25.June.2014
(1059 days after fire)

Tt = 1.5 hours
RE = 0.28



Courtesy of Stephen Monroe, National Park Service



Ground photos looking downstream from Upper Crossing stage gage

October.2010
(pre-fire)



15, June.2012 (319 days after fire)

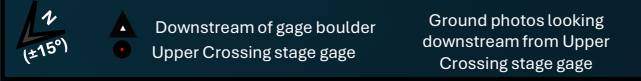
Tt = 2.03 hours
RE = 0.08

26, June.2013
Tt = 0.67



15.August.2014
(1100 days after fire)

Tt = 1.5 hours
RE = 0.27



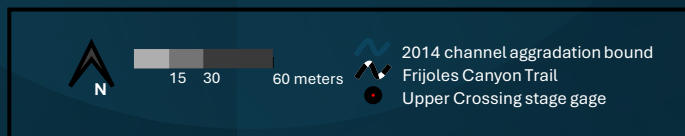
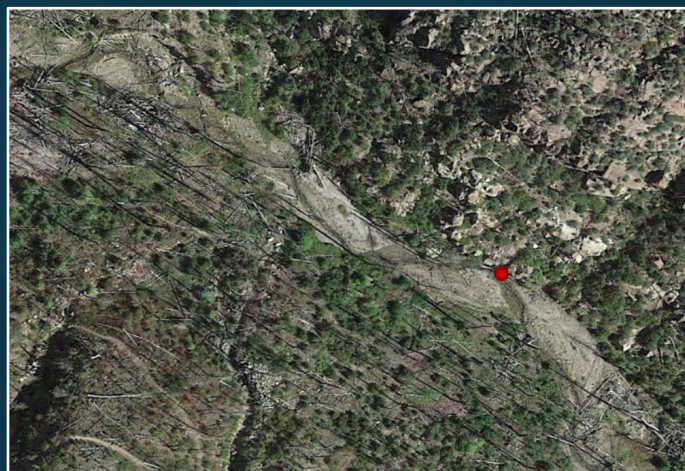
Ground photos looking
downstream from Upper
Crossing stage gage

15.April.2015
(1353 days after fire)

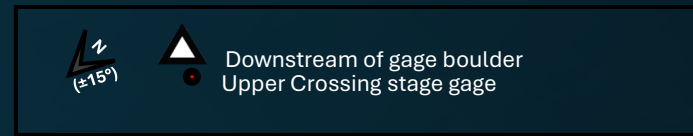
Tt = 1.55
hours
RE = 0.21



19 September 2017
(2241 days after fire)

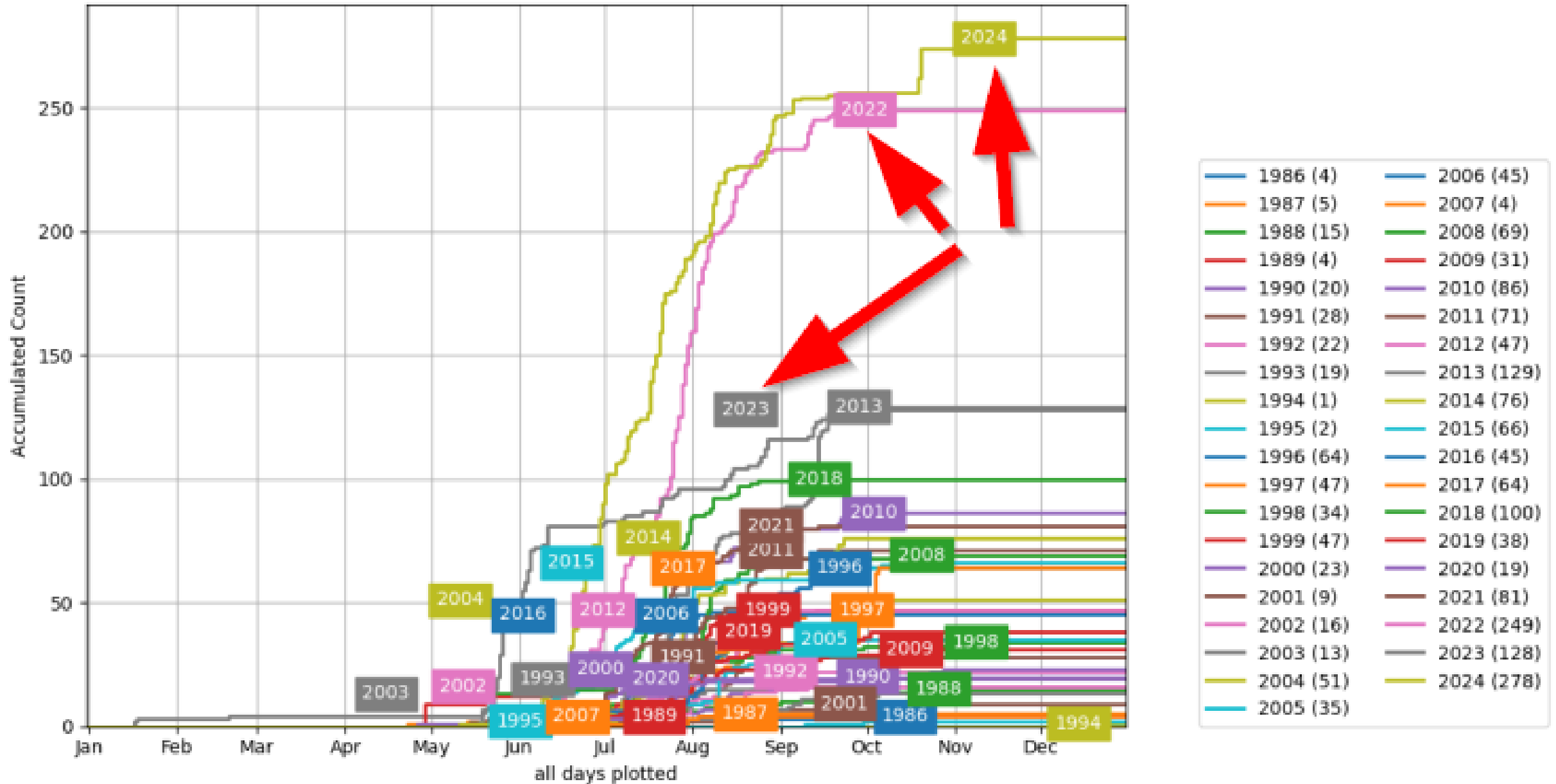


15.July.2016
(1810 days after fire)





NWS WFO: Albuquerque (ABQ) Flash Flood Warning Count



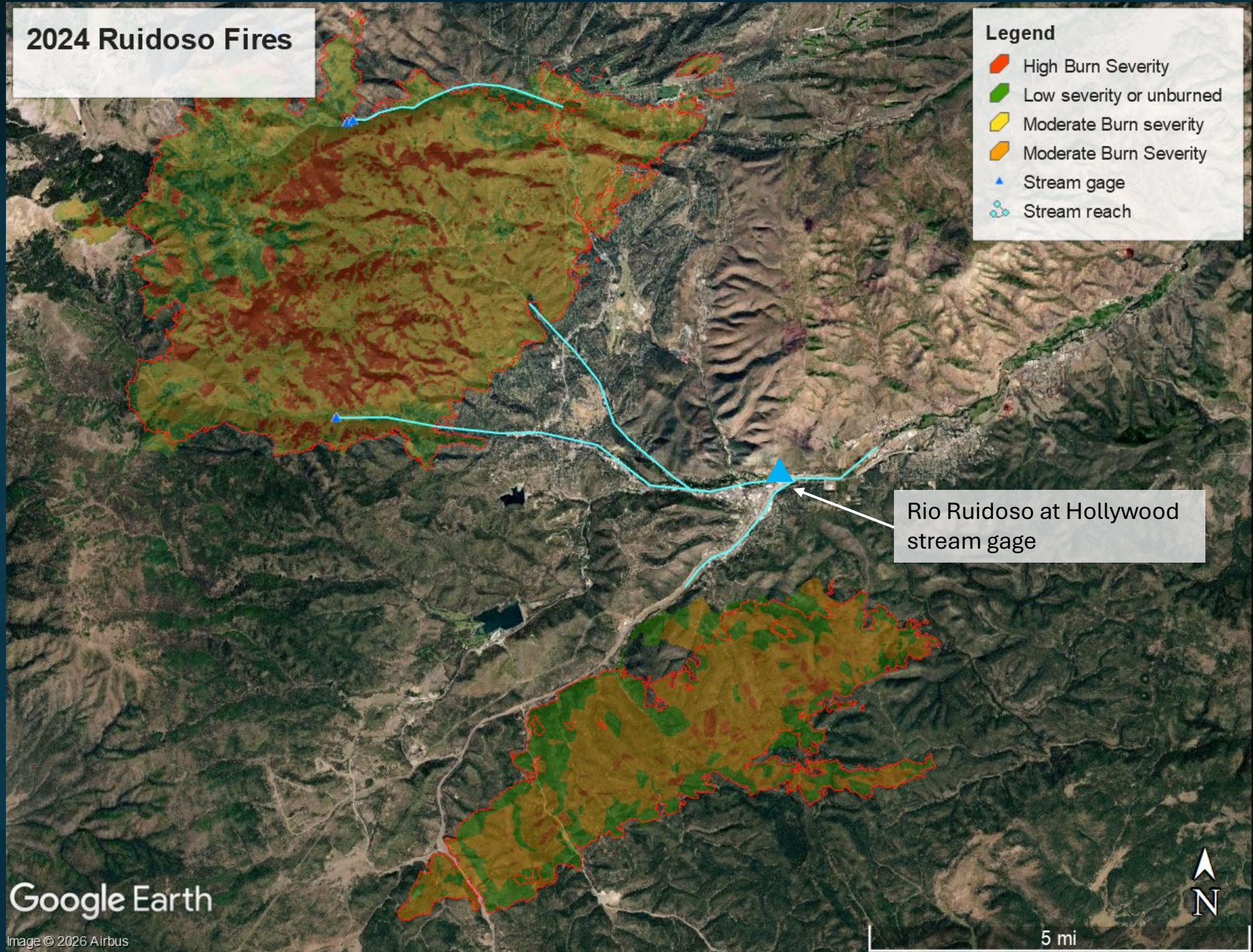
RUIDOSO, NM
Kaitlyn Carpenter
July 8



2024 Ruidoso Fires

Legend

- High Burn Severity
- Low severity or unburned
- Moderate Burn severity
- Moderate Burn Severity
- Stream gage
- Stream reach



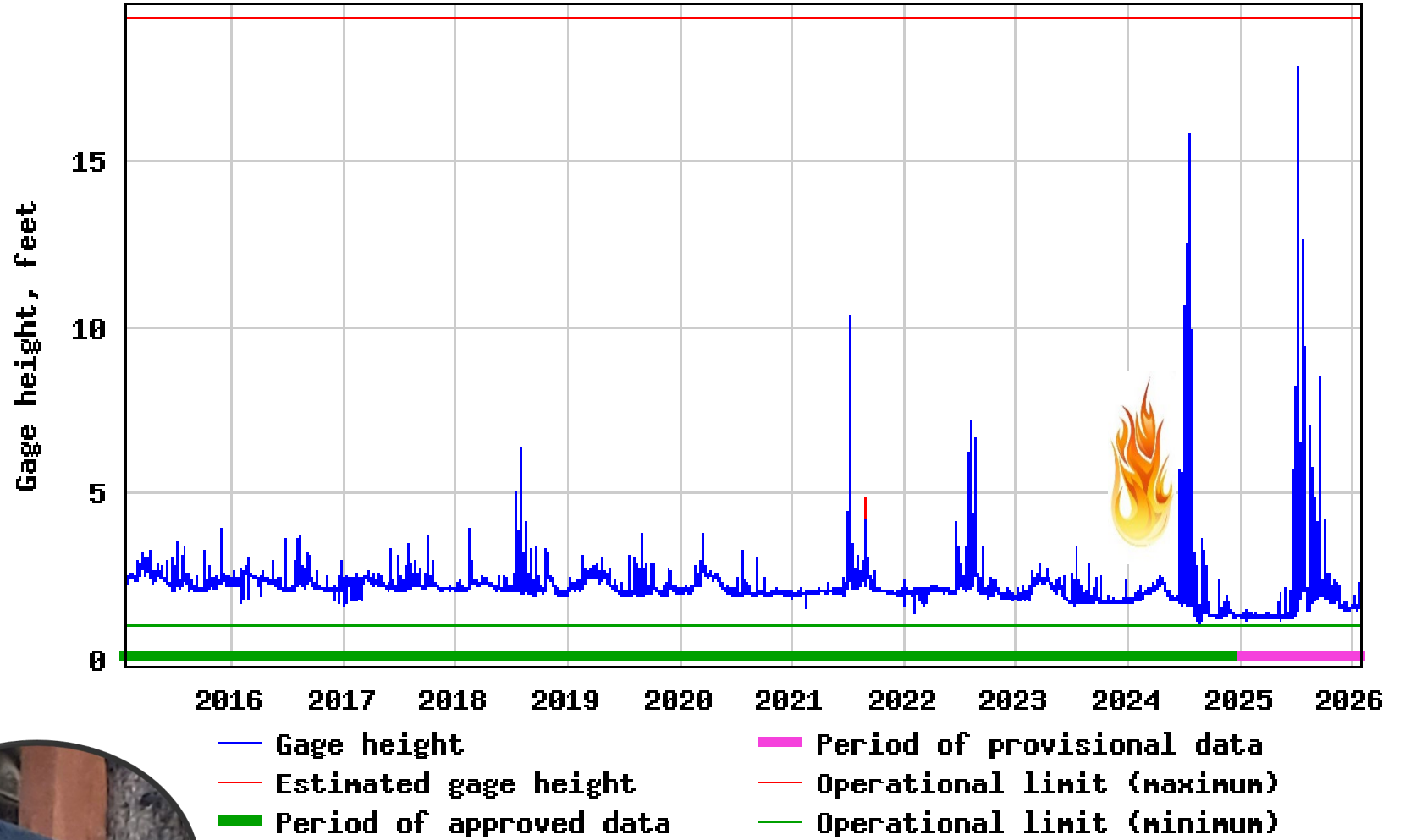
Rio Ruidoso at Hollywood stream gage

Ruidoso, NM

20-year stream gage record Chart shows last 11 years



USGS 08387000 RIO RUIDOSO AT HOLLYWOOD, NM



Flood Stages in feet

In the 10 years prior to the fire:

Action stage (9') – 0x

Minor flood (10') – 0x

Moderate flood (13') – 1x

Major flood (15') – 0x

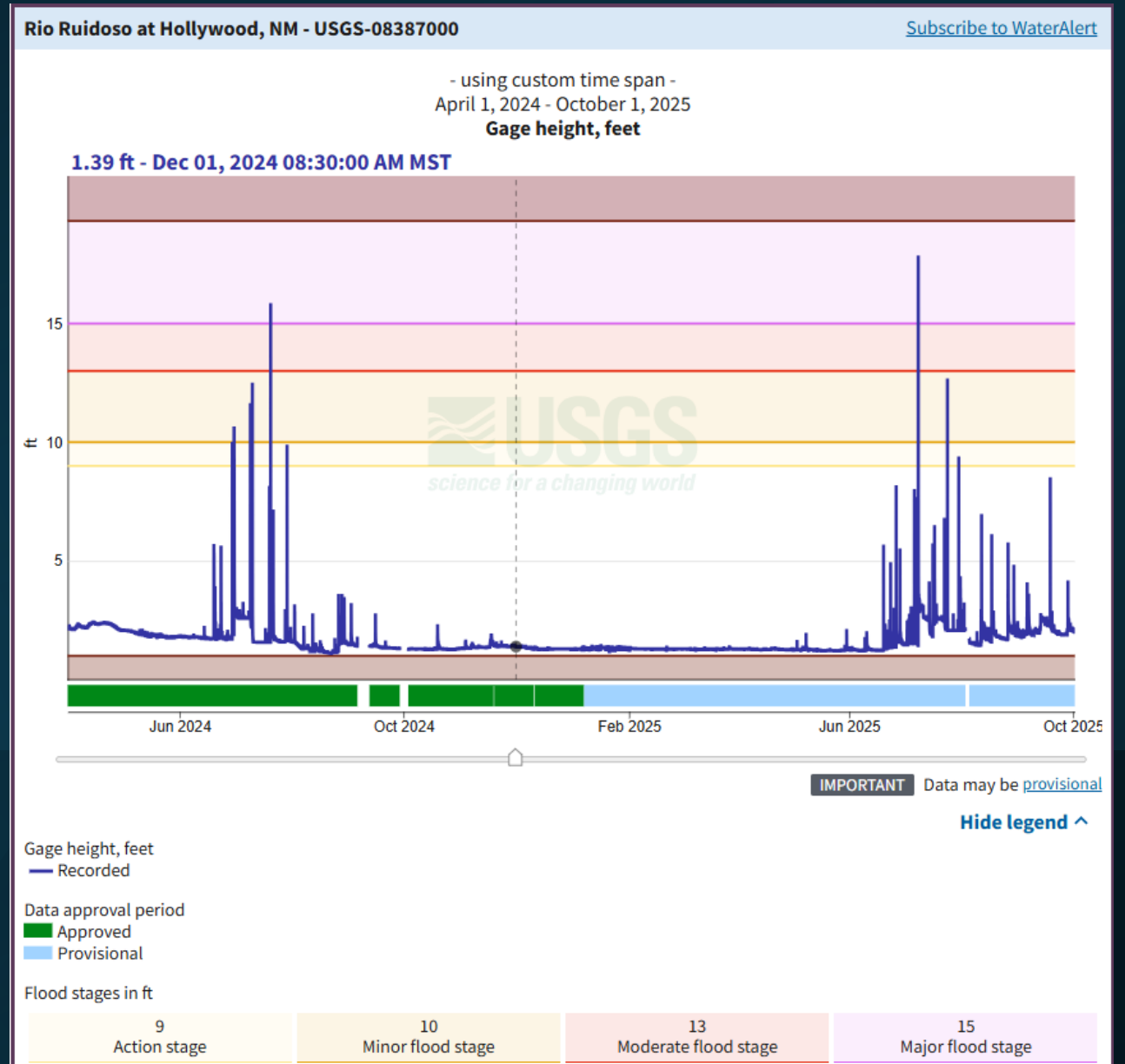
In first 2 years following fire:

Action stage (9') – 3x

Minor flood (10') – 4x

Moderate flood (13') – 0x

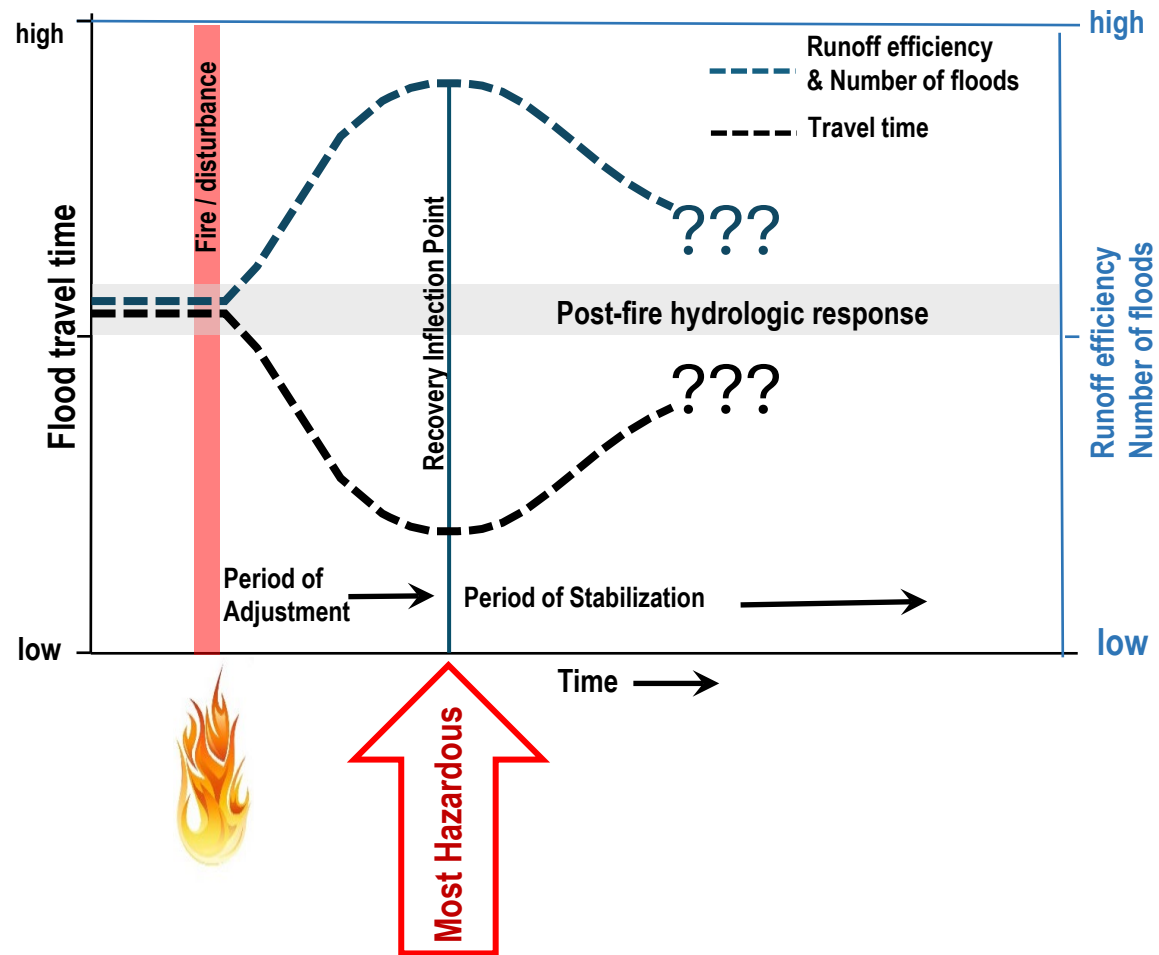
Major flood (15') – 2x



How long does a watershed take to “recover”?

Conceptual Model of Watershed “Recovery”

DRAFT data – not for distribution



Wildfire Frequency and Climate

Warming temperatures lead to more, larger, and hotter wildfires (Westerling, 2016; Williams et al, 2013)

Increased burn severity enhances the propensity for and magnitude of surface runoff generation (Robichaud et al, 2000).



Questions?

Anne C. Tillery
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USGS
New Mexico Water Science Center



Brian for scale

New Mexico Flood Risk Webinar Series

Flood After Fire



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ANALYSIS CENTER

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