

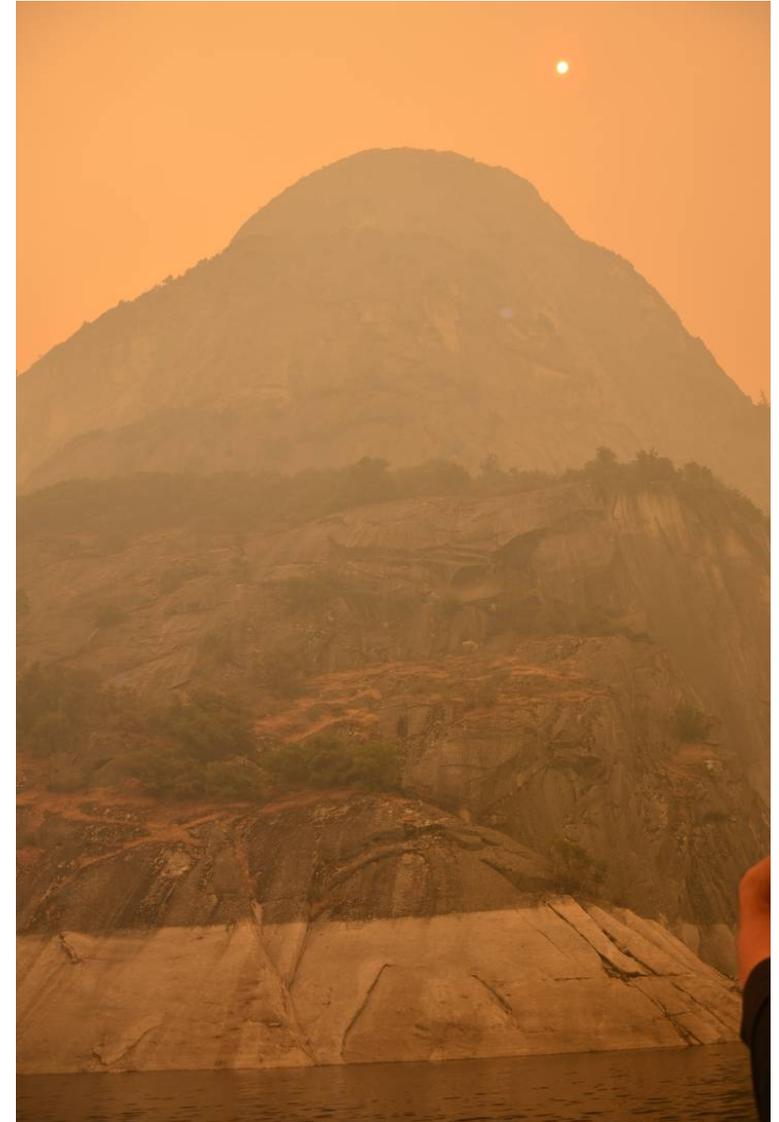
# **Rim Fire: Interactions with BAER Teams**

California Cooperative Snow Survey Meeting  
November 3, 2015

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Water Operations Analyst/Hydrologist  
Hetch Hetchy Water and Power  
Water Enterprise

# Outline

- BAER Teams
- HHWP response and interactions
- Watershed Impacts



## BAER Assessment Soils Report – Rim Fire

Stanislaus National Forest (R5-STF) – Mi-Wok and Groveland Ranger Districts  
Yosemite National Park and Wilderness

**\*\*DRAFT: To be finalized by 10/4/2013 when additional information is received\*\***  
September 27, 2013

- Burn Area Emergency Response (BAER)
- BAER reports
  - Soils
  - Recreation
  - Hydrology
  - Geology
  - Botany
  - Wildlife
  - Engineering



(Granite Creek Watershed above Holm Powerhouse, tributary to Cherry Creek;  
This area burned with similar stand-replacement severity in the 1973 Granite Fire)

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### Rim Fire BAER – USFS Soil Scientists

1. Modoc National Forest, Alturas CA (soils trainee)
2. Stanislaus National Forest, Groveland R.D., Sonora CA
3. Shasta-Trinity National Forest, Redding CA (Soils Team Leads)
4. Sierra National Forest, Fresno CA

Primary Follow-Up Contacts:

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- **BAER team – 5 members**
  - Stanislaus, Tahoe, El Dorado and Cleveland Forest Service
- **Motivation**
  - Identified at damaged recreation facilities
- **Deliverables**
  - Report on damaged resources with recommendations for rehab
  - Summary table of treatments
- **HHWP Response**
  - Hazard tree removal around roadways

# Hazard Tree Removal



- BAER team – 1 members
  - Inyo Forest Service
- Motivation
  - Fire created and revealed hazardous materials throughout fire zone
- Deliverables
  - Identified 4 potential hazardous material sites and recommendations for remediation
- HHWP Response
  - None of the identified sites were on HHWP property
  - We did remove / remediate several hazardous material sites

# HHWP Hazardous Materials



- BAER team – ?
  - Not listed on report
- Motivation
  - Fires are prime locations for dispersal of noxious weeds
- Deliverables
  - Descriptions of weeds in the area and their dispersal mechanisms and identification of possible remediation strategies
- HHWP Response
  - HHWP used seed free mulching under direction of USFS

- BAER team – 2 members
  - Stanislaus National Forest
- Motivation
  - Fires hurt critters and their habitat
- Deliverables
  - Identified threatened species, protected activity centers
  - Concluded no activity needed
- HHWP Response
  - None

- **BAER team – 8 members**
  - Tahoe, Plumas, Klamath, Lassen and Stanislaus National Forests
- **Motivation**
  - Fires damage bridges, increase runoff
- **Deliverables**
  - Matrix of locations and remediation needed
- **HHWP Response**
  - HHWP installed culverts, regraded roads, cleaned drainages

# Resized Culverts with Headwalls and Grizzlies



- BAER team – 4 members
  - FS geologists
- Motivation
  - Fires lead to rockslides / debris flows / etc...
- Deliverables
  - Matrix of potential values at risk, and remediation strategies
  - Notifications to HHWP about potential rockfall sites
- HHWP Response
  - Slope treatment
  - Culverts

# Bank Stabilization



- **BAER team – 5 members**
  - Stanislaus, Fresno, Alturas and Redding Forest Service
- **Motivation**
  - Soil burn severity controls revegetation, sheet erosion and rill development
- **Deliverables**
  - Soil burn severity classification
  - Burn Severity Map
- **HHWP Response**
  - Internal modeling
  - Funded research
  - Hella mulching, Hydromulching



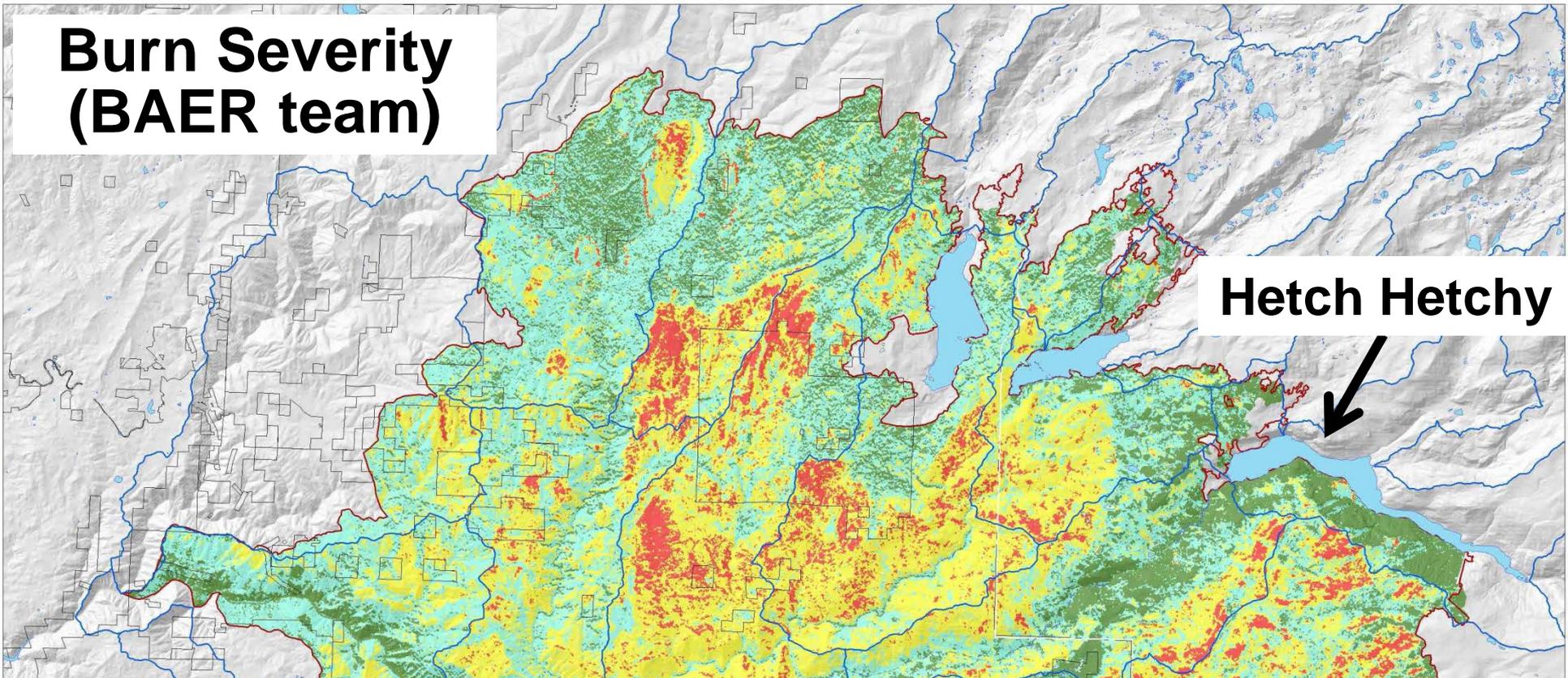
← Low: *surface material is not completely burned, structural stability of soil is unchanged*

Moderate: *ground cover is consumed, ash may be blackened with patches of gray* →



← High: *all of the ground cover is consumed, bare soil and ash, loss of soil structure*

# Burn Severity (BAER team)

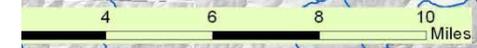


**Hetch Hetchy**

**Table 2. Acres burned by Soil Burn Severity**

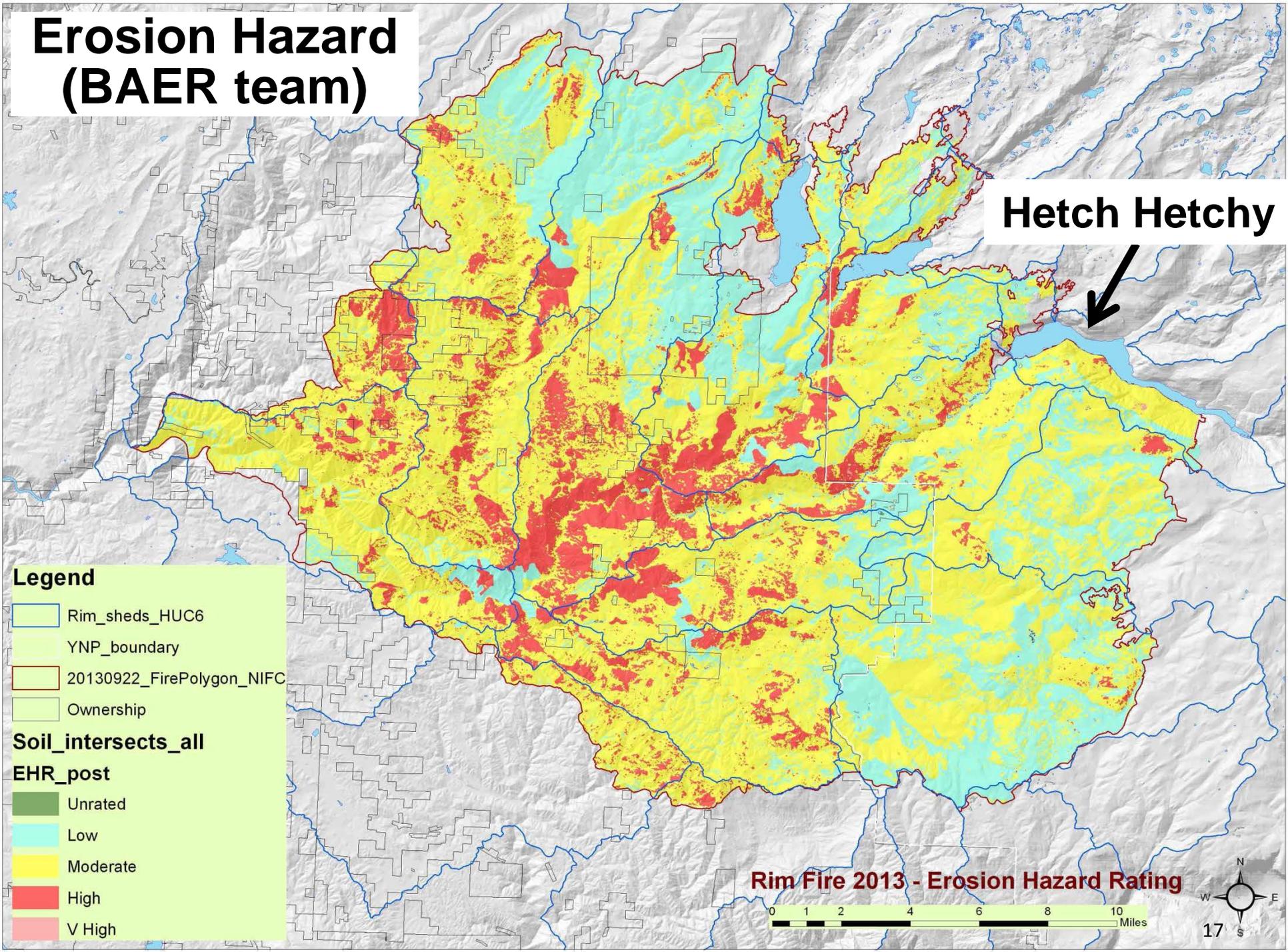
Soil Burn Severity	Acres
High	16,796
Moderate	94,940
Low	143,225
Unburned	1,934
<b>Total</b>	<b>256,895</b>

2013 - Soil Burn Severity



# Erosion Hazard (BAER team)

Hetch Hetchy



**Legend**

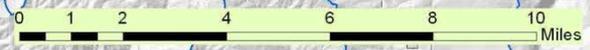
- Rim\_sheds\_HUC6
- YNP\_boundary
- 20130922\_FirePolygon\_NIFC
- Ownership

**Soil\_intersects\_all**

**EHR\_post**

- Unrated
- Low
- Moderate
- High
- V High

Rim Fire 2013 - Erosion Hazard Rating





# Hydrophobicity and Infiltration Tests

## Granite Creek Basin

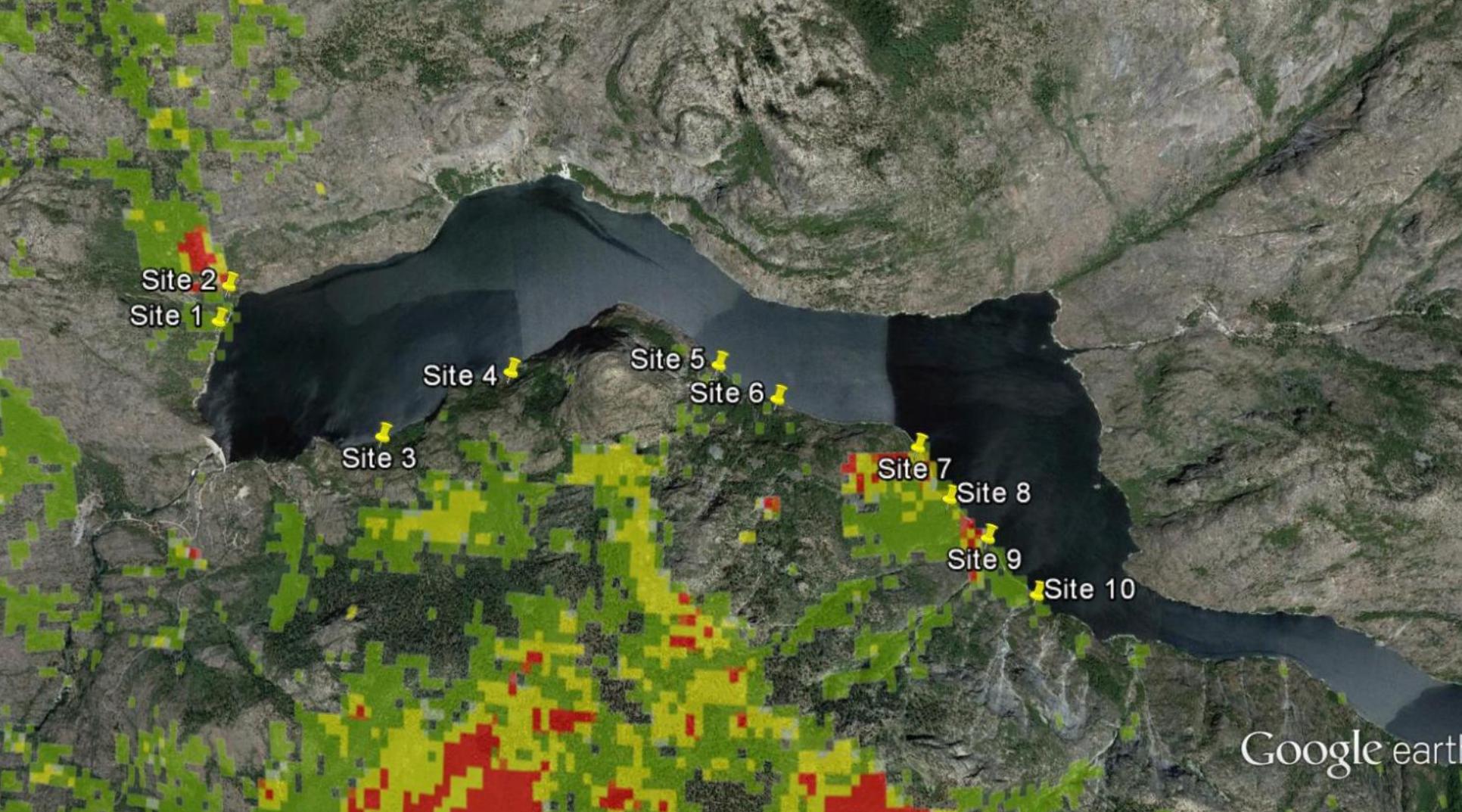
Location	Burn Intensity	Infiltration Rate	Hydrophobicity	Soil Type	Soil Structure
Granite Creek 5 miles up grade (1)	Medium	28.8 in/hr	Medium/High	Sandy Loam	Medium Granular
Granite Creek 5 miles up grade (2)	Medium	19.5 in/hr	Medium/High	Sandy Loam	Medium Granular
Granite Creek, 3 miles up grade	Medium	22.9 in/hr	Medium/High	Sandy Loam	Medium Granular
Granite Creek, 1 mile up grade	High	28.3 in/hr	Extreme	Sandy Loam	Coarse Granular

## Red Hill section of Cherry Lake Road

Location	Burn Intensity	Infiltration Rate	Hydrophobicity	Soil Type	Soil Structure
Red Hill by Transmission Lines (1)	Medium	6.6 in/hr	Extreme	Sandy Loam	Medium Granular
Red Hill by Transmission Lines (2)	Medium	6.1 in/hr	Extreme	Sandy Loam	Medium Granular

## Hetch Hetchy Reservoir

Location	Burn Intensity	Infiltration Rate	Hydrophobicity	Soil Type	Soil Structure
Hetch Hetchy South Shore	Light	7.6 in/hr	Extreme	Loamy Sand	No Soil Structure
Hetch Hetchy North Shore (1)	High	7.7 in/hr	Extreme	Sandy Loam	No Soil Structure
Hetch Hetchy North Shore (2)	High	3.0 in/hr	Extreme	Sandy Loam	No Soil Structure
Hetch Hetchy No Burn (1)	None	19.3 in/hr	High/Extreme	Sandy Loam	Fine Granular
Hetch Hetchy No Burn (2)	None	12.1 in/hr	High/Extreme	Sandy Loam	Fine Granular



Potential Sediment Increase @ affected locations  
2-3 times for low burn severity sites  
3-4 times for moderate severity sites

# Sediment/Erosion Modeling Summary

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- A small area of the watershed is within the fire perimeter – 1.8%
- The results only represent “total erosion” and do not predict delivery to a watercourse
- The modeling results show only ~1% increase in total potential erosion over the entire watershed
  - NPS BAER conclusion: *“Given the highly dispersed nature of the burn within the watershed and very small amounts of moderate and high soil burn severity, risk to Hetch Hetchy Reservoir from increased post-fire watershed response and erosion is negligible to low.”*
- *Recovery of vegetation and ground cover over time decreases potential erosion*
- *Needle and litter cast from living vegetation will expedite recovery around Hetch Hetchy*

# Hydromulching



# Heli-mulching



# Monitoring Work

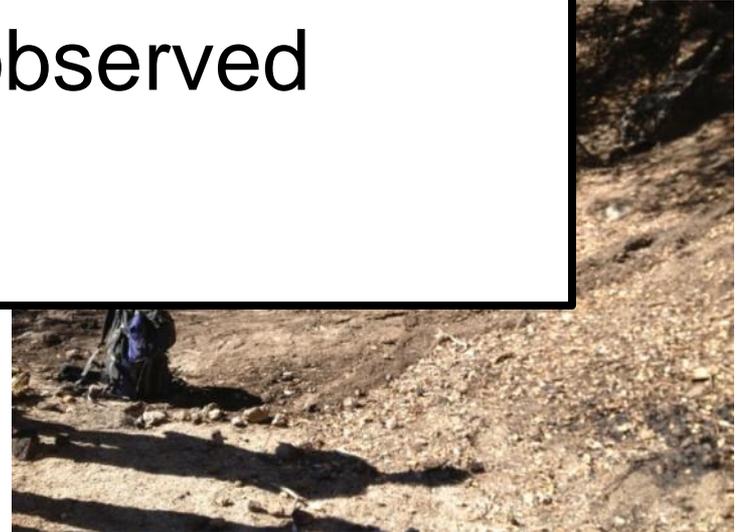
- Support to NPS for Hillslope Sedimentation & Erosion Study
  - To evaluate hillslope scale erosional processes



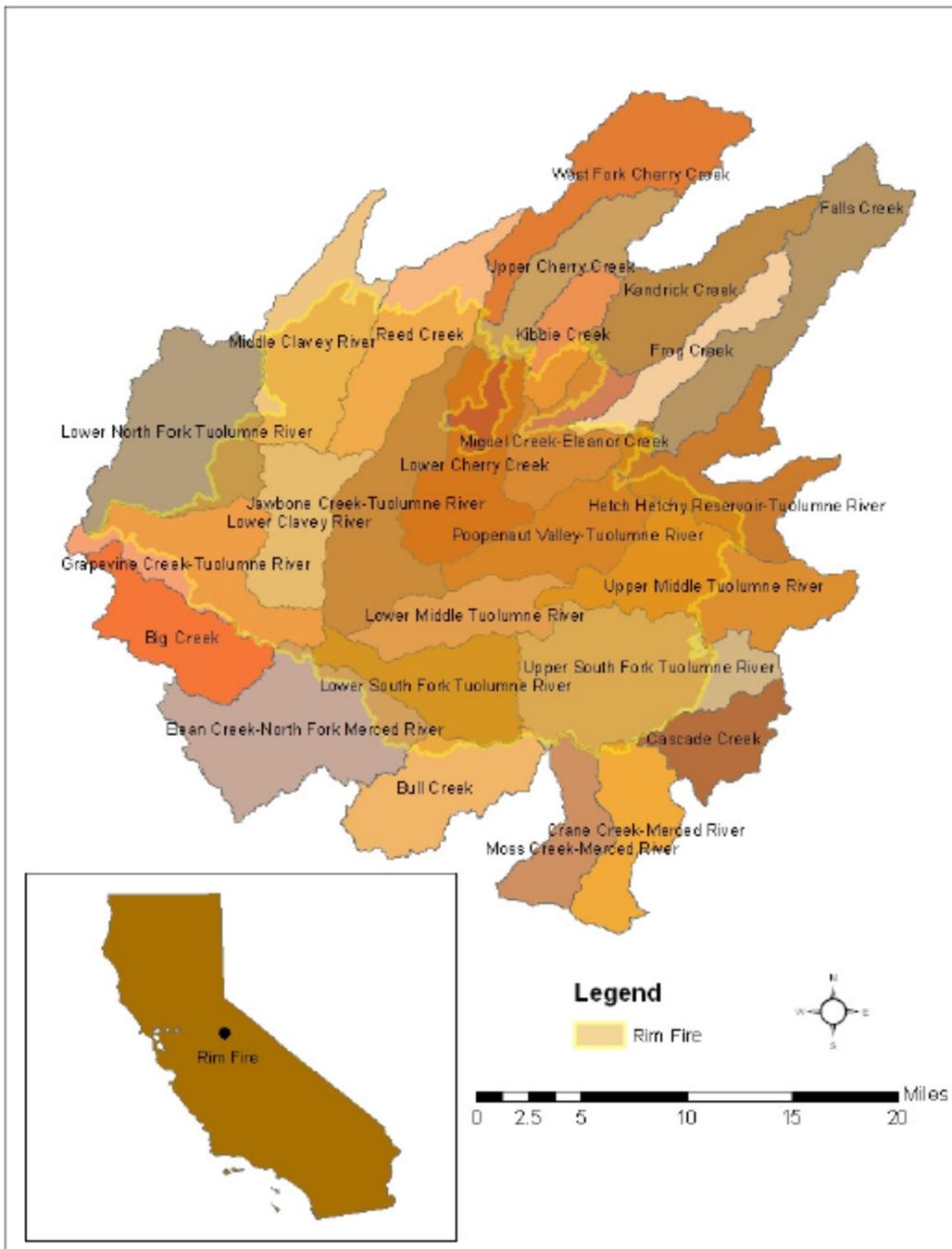
# Rill Erosion Observations – 9/25 & 9/26

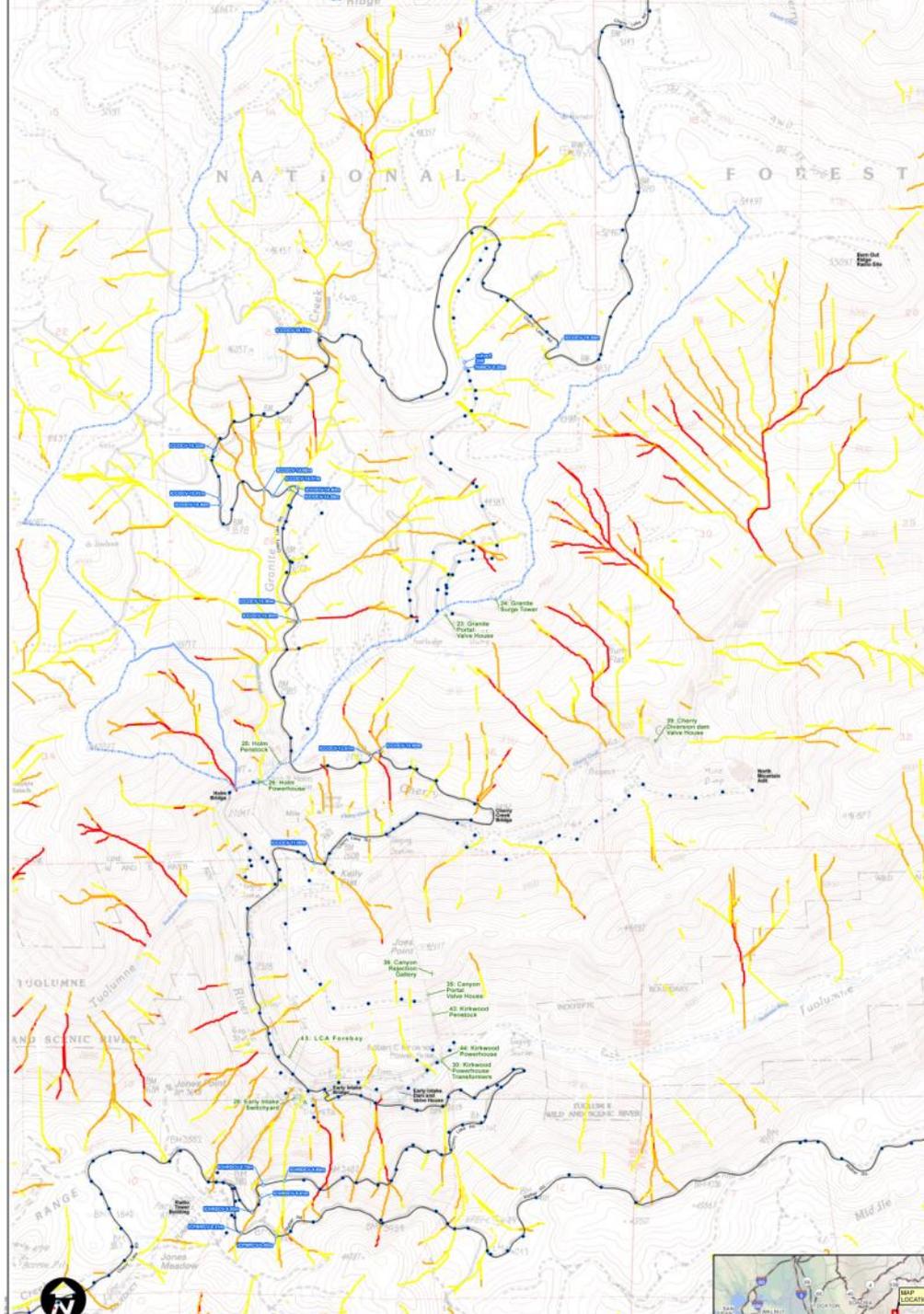


Little hillslope scale solute  
transport observed



- BAER team – 9 members
  - Stanislaus, Modoc, Klamath, Cleveland, Inyo, Pacific Southwest Forest Service, Central Valley Regional Water Quality Control Board
- Motivation
  - Decreased vegetation and soil hydrophobicity can lead to increased streamflows / storm response. Increased sediment transport to and in streams.
- Deliverables
  - Map of Potential Debris Flows
  - Table of expected increase in streamflows
- HHWP Reponse





Watershed	Watershed acres	Pre Fire Discharge	Post Fire Discharge	Times Increase
21. Lake Eleanor Dam	49,510	710	796	1.12
22. Hillslope Above open ditch	0.32	0.02	0.05	2.88
23. Hillslope Between Powerhouse and Bridge	169	4	18	4.11
24. Cherry Creek at Dion Holm Power House	148,077	1887	3016	1.60
25. Granite Creek at Dion Holm Power House	4,045	76	374	4.93
26. Cherry RD Lower Granite Culvert (ID:ICCOCD14.4)	2,509	50	245	4.94
27. Culvert Cherry Lake Road	122	3	15	4.38
28. Stream Crossing 1N96 (ID: 01N96CD.30)	902	20	86	4.30
29. Cherry RD Upper Granite Culvert (ID: ICCOCD16.11)	1,043	23	117	5.17
30. Cherry Lake Road Crossing (ID: ICCOCD18.30)	32	1	4	4.04
31. Cherry Lake Dam	73,875	1015	1124	1.11
32. Cherry Valley Campground	883	20	37	1.90
33. San Jose Family Camp - Yosemite Riverside Inn	40,864	598	1582	2.65
34. San Jose Family Camp Ampletheater	95	3	7	2.64
35. Spinning Wheel Campground	39,168	576	1497	2.60
36. Culvert A 1S30	813	18	74	4.07
37. Culvert B 1S30	109	3	12	4.06
38. Camp Tawonga	34,778	518	1250	2.41
39. Carlon Picnic Area	29,946	453	849	1.87
40. Ackerson Meadow Residence	6,259	112	361	3.22
41. Stream Crossing Soldier	1,146	25	83	3.36
42. Yosemite Lakes Camp	49,792	713	1682	2.36
43. Berkeley Tuolumne Camp	43,686	635	1460	2.30

# Granite Creek

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# Granite Creek



- Instrumentation within the Granite Creek Basin
  - Stage measurements at numerous culverts
  - New precipitation gage within the basin
  - Tracking of debris removal



# BAER interactions

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- Generally positive
- Helpful with ERMiT modeling
- Identification of at risk facilities was helpful, and assisted justification of remediation work to FEMA and internally
- Generally used in house expertise for remediation (culvert sizing, etc...)

# Questions?

