

# Dust, an emerging problem in the Great Basin: *insights from 2012*

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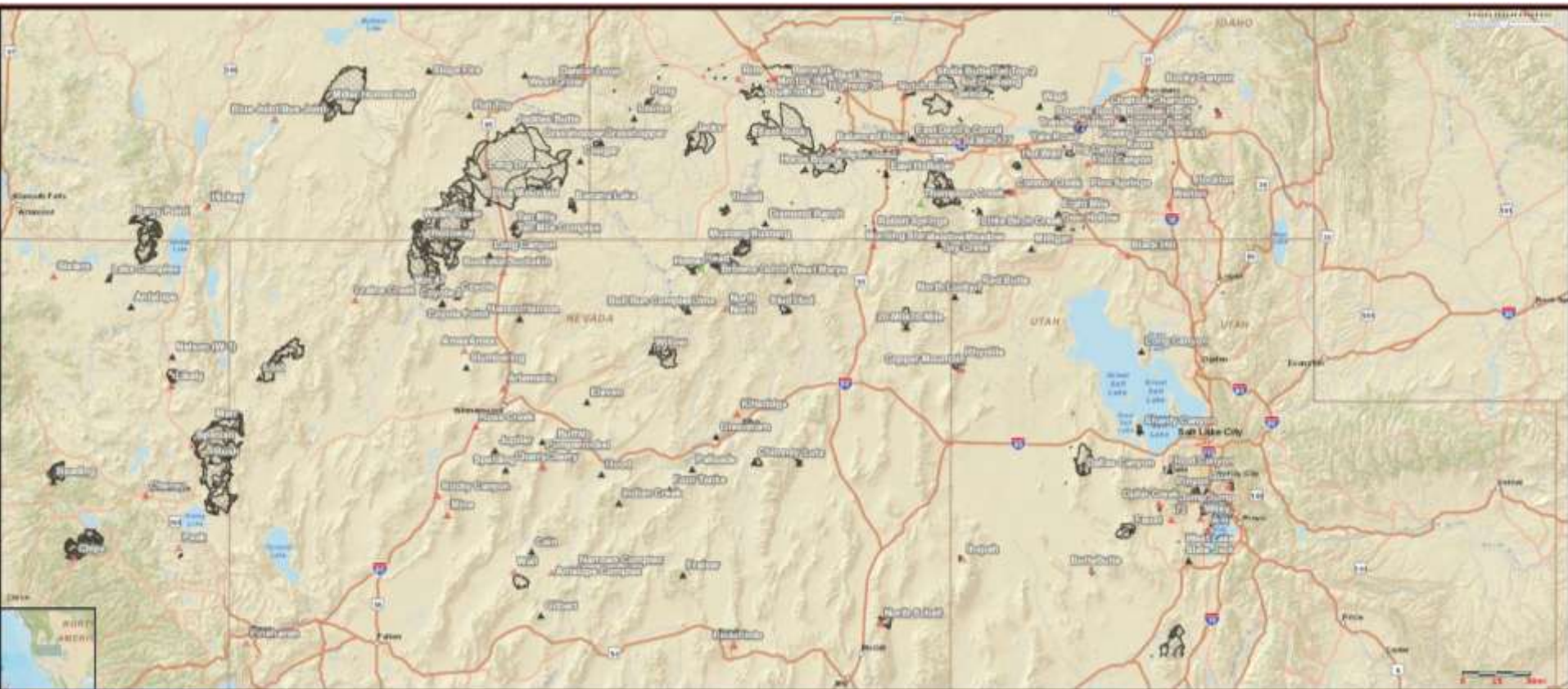
others in Boise Dust Group



# Brief intro on problem of dust



# 2012 Fires: the perfect storm?



Thermal Stresses 1013-10 18 917 (JSTF), Water 1013-10 18 999 (JSTF); Free Publications 1013-10 18 1000-1009 (JSTF)



# Storm winds blowing through Treasure Valley bring large amount of dust from the Owyhees

Published: August 5, 2012 Updated 17 minutes ago

Wind gusts of up to 60 miles per hour in the Owyhees created a dust cloud that reduced visibility at the Boise Airport to less than 1.5 miles Sunday night, according to the National Weather Service. Winds in the Boise area were recorded at 23 to 24 miles per hour. The high temperature in Boise Sunday was 100, and thunderstorms were expected to hit the area overnight. A red flag warning is in effect until 6 a.m. Monday. Officials are concerned about lightning from the thunderstorms starting more wildfires in the region. At 9 p.m. Sunday, the National Weather Service had not received any reports of damage from the dust storm. Have any photos from the dust storm you can share? Send them to [newsroom@idahostatesman.com](mailto:newsroom@idahostatesman.com)

Read more here: <http://www.idahostatesman.com/2012/08/05/2218309/weather-service-warns-of-scattered.html#storylink=cpy>

## Dust storm brings eerie evening to the Treasure Valley

By [Glen Beeby](#) Published: Aug 5, 2012 at 8:48 PM MDT Last Updated: Aug 5, 2012 at 9:31 PM MDT

BOISE, Idaho (KBOI) - A large dust storm blew through Owyhee County Sunday evening and pushed north into the Treasure Valley shortly before 9:00 pm. As of 9:30 pm the dust cloud is moving through the Boise mountains as well as Payette and Gem counties.

Officials are asking people to be very careful while driving and to slow down on roadways because visibility can be low. The dust will settle to the ground overnight with noticeable improvement in visibility expected by midnight.

Dispatch received several calls because residents thought it was a large wildfire. Fire crews are on standby just in case a fire does spark and begins to spread.

## Massive dust storm blows through Treasure Valley

Credit: KTVB First Person

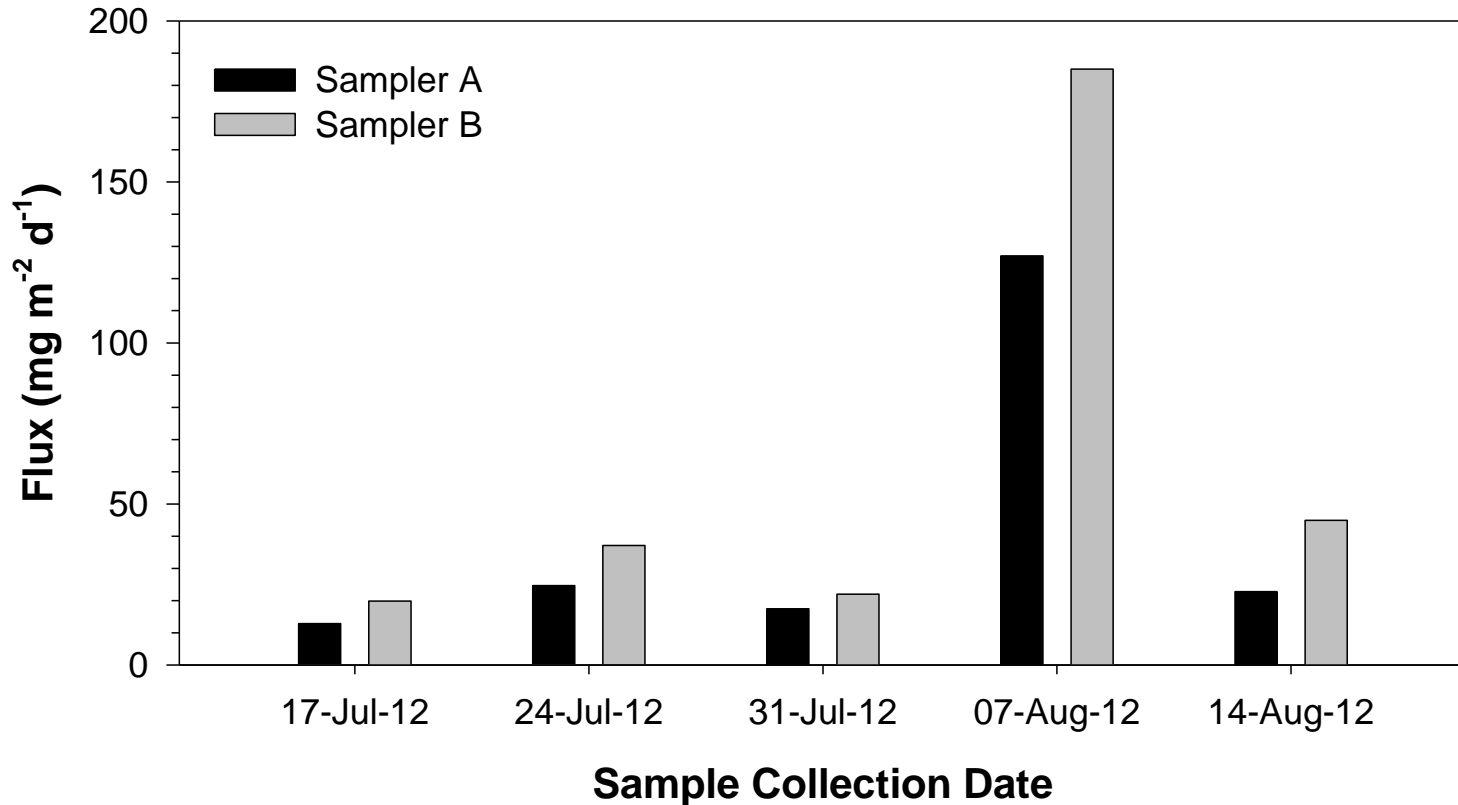
TREASURE VALLEY -- A massive dust storm swamped the Treasure Valley Sunday night.

The blowing dust was first reported around 8 p.m. when the Oregon Department of Transportation issued a warning for it along U.S. 95-107 north of the Nevada border.

Since then, multiple KTVB viewers have called in to report the dust storm, which has moved quickly from the areas surrounding Marsing through Nampa and on into Boise. If you are driving through the storm, you are advised to use extra caution. If possible, try to avoid the area where the dust storm is blowing.



## DCEW Tree Line Site



Total atmospheric particulate matter (PM) flux ( $\text{mg m}^{-2} \text{d}^{-1}$ ) estimates for replicate samplers deployed in Dry Creek Experimental (DCEW) at the Tree Line site.

**DATA OF SONDRA MILLER, Boise St U and her students, Tawna Groom and Trevor Anderson, 5500 ft ASL in Boise Foothills**

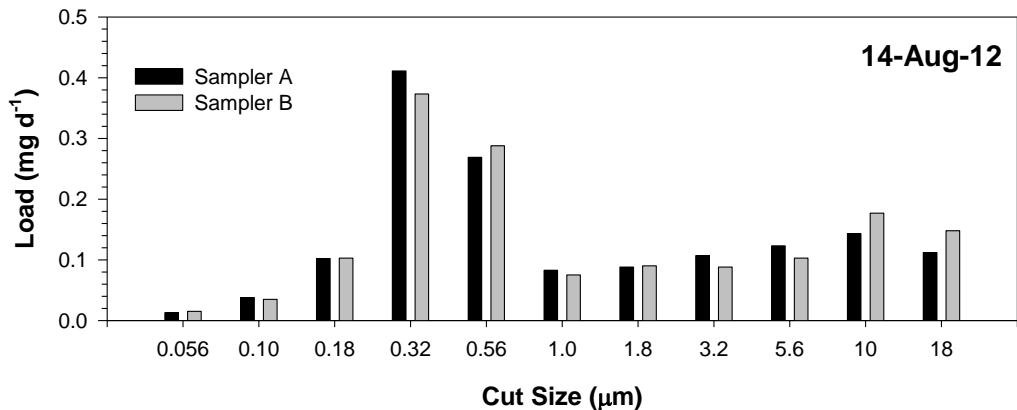
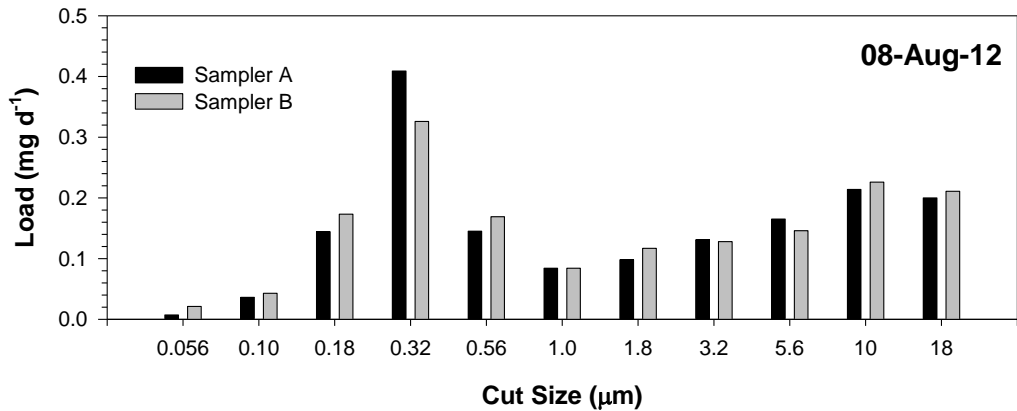
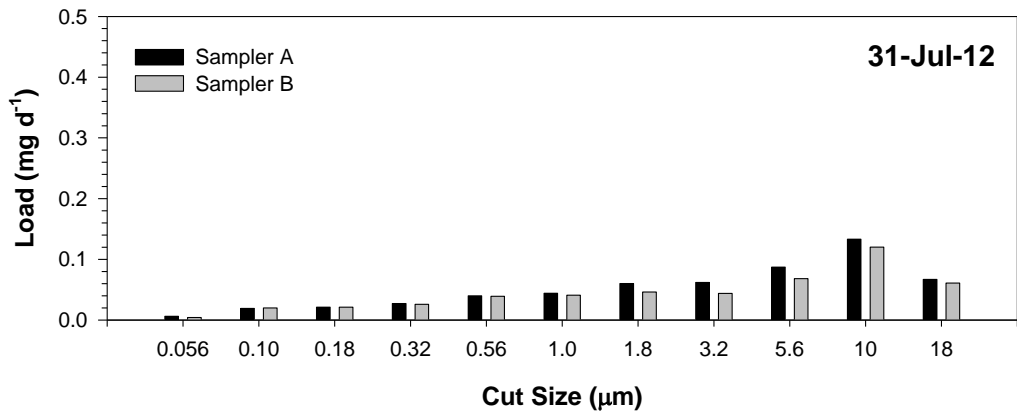
**NADP Wet/Dry deposition collector**

M Germino, USGS, Dust in Boise

**DATA OF SONDRA MILLER, Boise St U and her students, Tawna Groom and Trevor Anderson**

**MOUDI on building at BSU Campus**

**Figure 5:** Size-fractionated atmospheric PM load measured atop the Environmental Research Building (ERB) on the Boise State University campus.



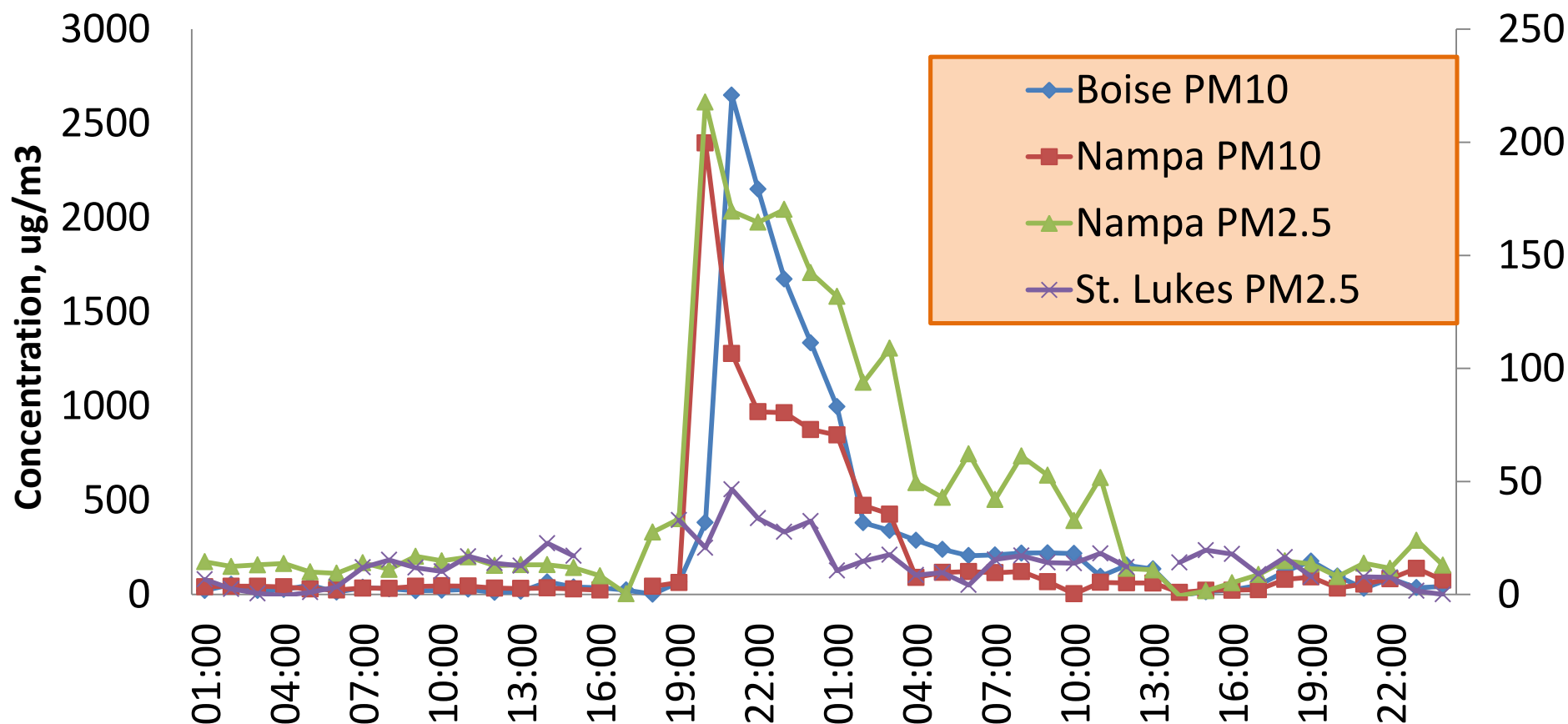
DATA OF SONDRA MILLER, Boise St U and her students, Tawna Groom and Trevor Anderson



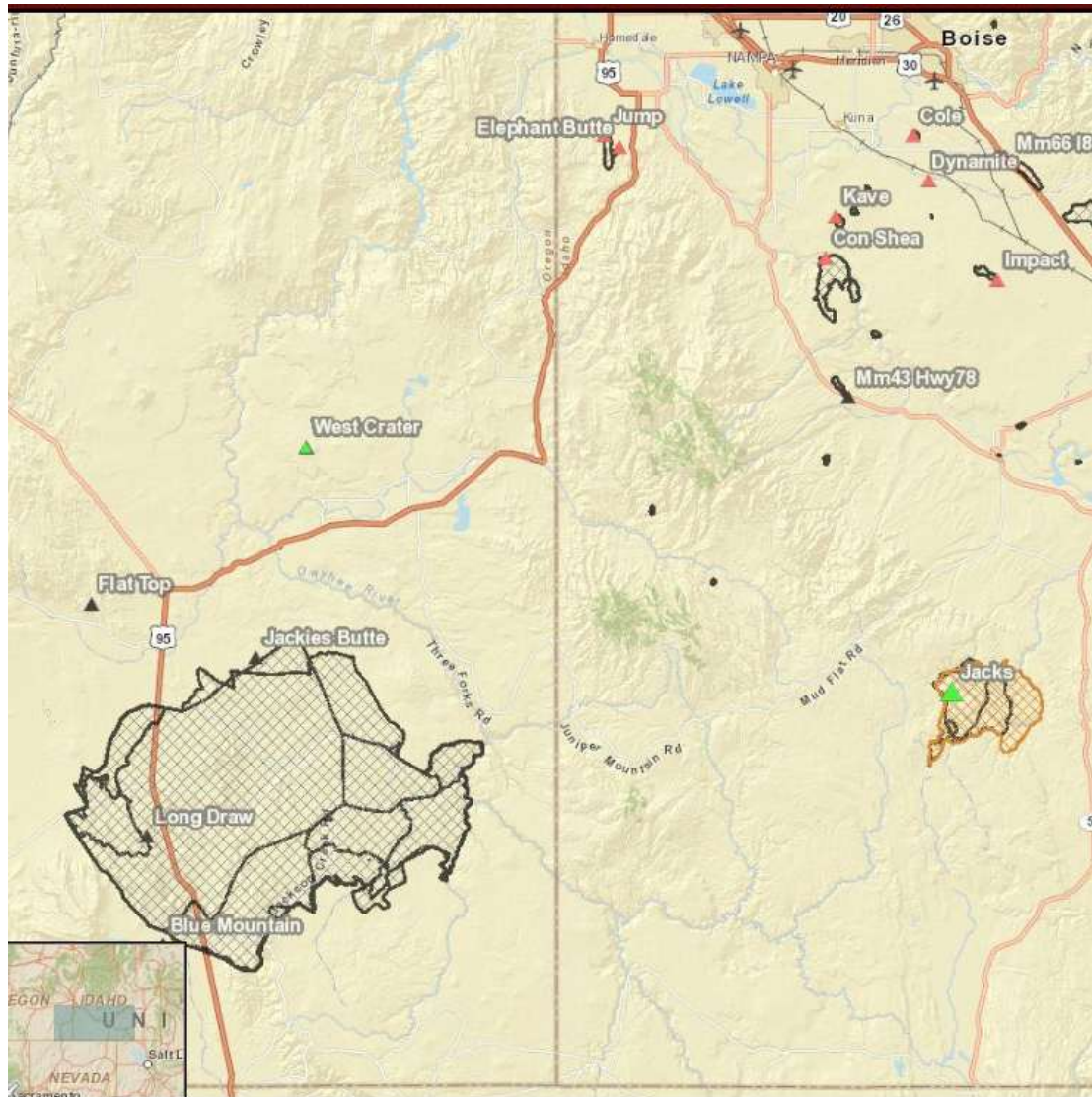


# DEQ TEOM DATA FROM RICK HARDY

## Preliminary Boise and Nampa PM<sub>10</sub> Aug 5-6, 2012



# Source of dust: Longdraw fire?



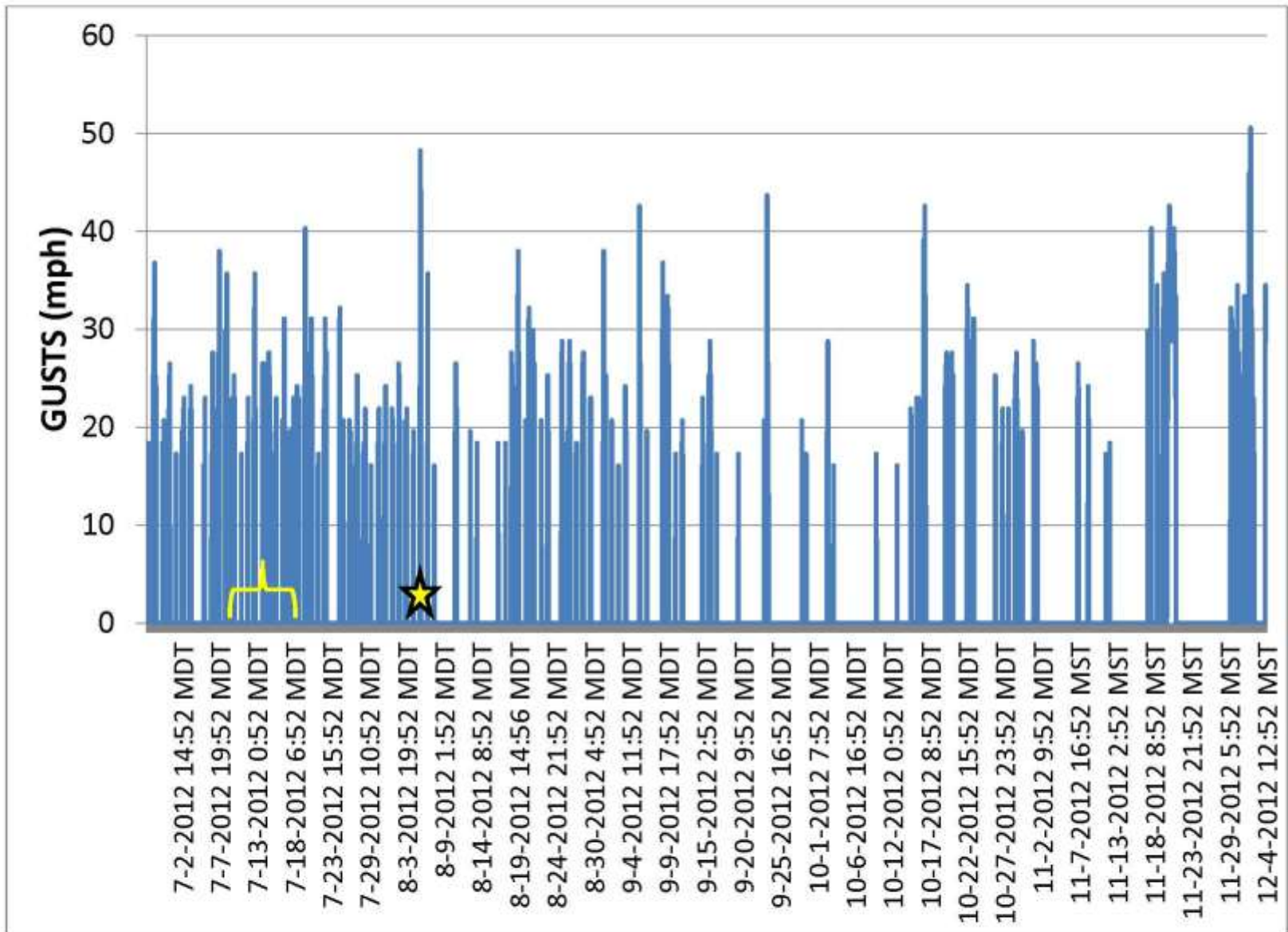
<http://www.youtube.com/watch?v=vAtdZwaBTXc> –

<http://www.youtube.com/watch?v=nQ1bIPbYY10>





What was so exceptional about the climate? Wind, thermal lift?





# From Nat'l Center for Atmo. Research, "Comet" program:

Maps Fire websites climate and conservati... literature libraries USGS GBLCC GB resour... Equipment, erosion, pl... Pages - USGS Collaboratio... Matt G sharepoint site - H...

## FORECASTING DUST STORMS v2

- Introduction
- Physical Processes
- Dust Source Regions
- Synoptically Forced Dust Storms
- Dust Storms Caused by Mesoscale Systems
  - Downslope Winds
  - Gap Flows
  - Habooob
    - Description
    - Properties
    - Different Regions
- Forecasting**
- Inversion Downburst Storms
- Dust Devils
- Climatology
- Satellite Detection of Dust
- Forecasting Dust Storms
- Summary

HOME  
PRINT VERSION  
QUIZ  
SURVEY  
MIDDLE EAST MAPS  
DUST FORECAST PROCESS

### Forecasting Haboobs

1:54 / 2:01

#### Forecasting haboobs from ongoing thunderstorms

- 1) Look for signs of instability aloft. Use the Best Lifted Index (the Most Unstable Lifted Index).
- 2) Look for high environmental relative humidity between 700 and 500 mb and/or high values of simulated radar reflectivity from WRF/COAMPS or actual reflectivity from a nearby EWR radar if it's available. Also look for steep lapse rates between the surface and approximately 18,000 feet (5 km).
- 3) Find the strongest wind at any level aloft where the wet bulb potential temperature is less than the (surface potential temperature + 39 degrees F or 4 degrees C). It's possible that this wind may be brought to the surface.
- 4) Determine if your forecast area is located in or near a dust source region.

If these conditions are met, haboobs may result from any ongoing thunderstorms.

#### Forecasting haboobs from collapsing thunderstorms

- 1) At what time of day is the thunderstorm occurring? Thunderstorm collapse is most likely after sunset.
- 2) Determine the cloud base height of the thunderstorm. The higher it is (greater than 10,000 feet or 3 km above ground level), the warmer the resultant outflow at the surface due to adiabatic compression, and the weaker the potential haboob. Downdraft acceleration will mitigate the warming issue to a limited extent.
- 3) Check for rapidly warming cloud tops in looped geostationary infrared imagery, which are indicative of thunderstorm collapse.
- 4) Determine if the thunderstorm is occurring over a dust source region.

Produced by The COMET® Program

PREVIOUS NEXT

## **Lessons from Aug 5 “haboob” dust event in Boise**

A new climate-land condition event , caught us by surprise!

Range fires can have appreciable impact on downwind airshed, long after fire and smoke are gone, and are an ecosystem risk factor.

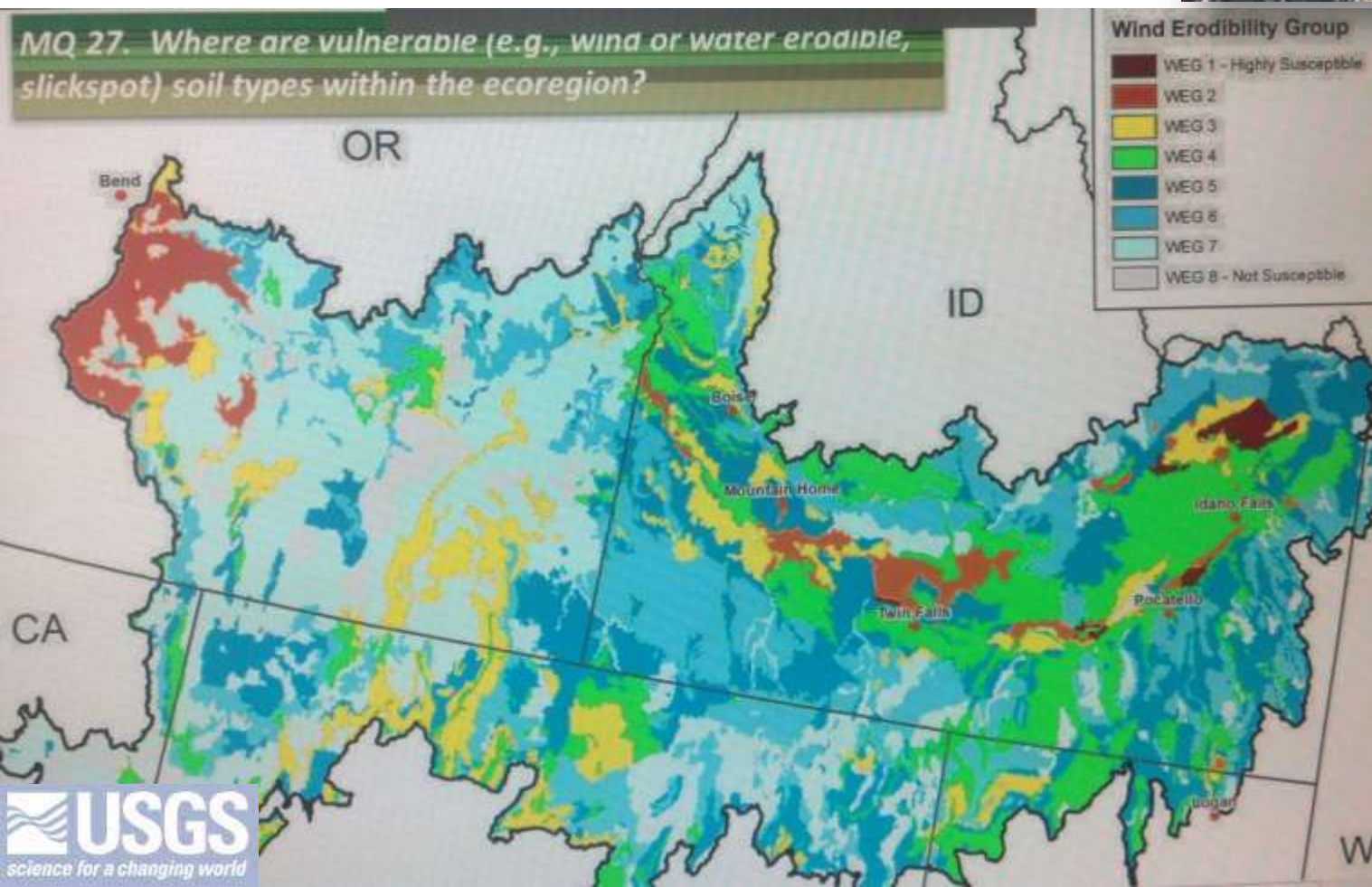
Of 4 air-quality exceedences for fine particulate in last 10 years, all appear traceable to upwind desert areas (two 2-d events, Aug 5-6 2012, Feb 2011)

Detection capability - Situational awareness - Monitoring are all critical needs

Extrapolating in time and space: what  
can we expect from this and other  
burn sites?

# Management Implications

- Landscape Assessments – can we do them?
- Management: herbicides, aerial seeding, drill seeding



# Future direction:

With Great Basin Science Delivery, “Field Guide to Post-Fire Wind Erosion”

Modeling erosion risk with weather data; NIFA project with S Hardegree, M Brunson, J Abatazglou

Learning from our own management experiments: ESR monitoring, synthesis, and updating future practices

Key research questions:

- Remote measurement capabilities, eg. via remote sensing

- Model to predict risks – 2012 fires were perfect opportunity!

- Impact of pre-fire vegetation/management conditions

- Impact of post-fire management

- Implications of erosion for theory on succession/ S-T models



# The end

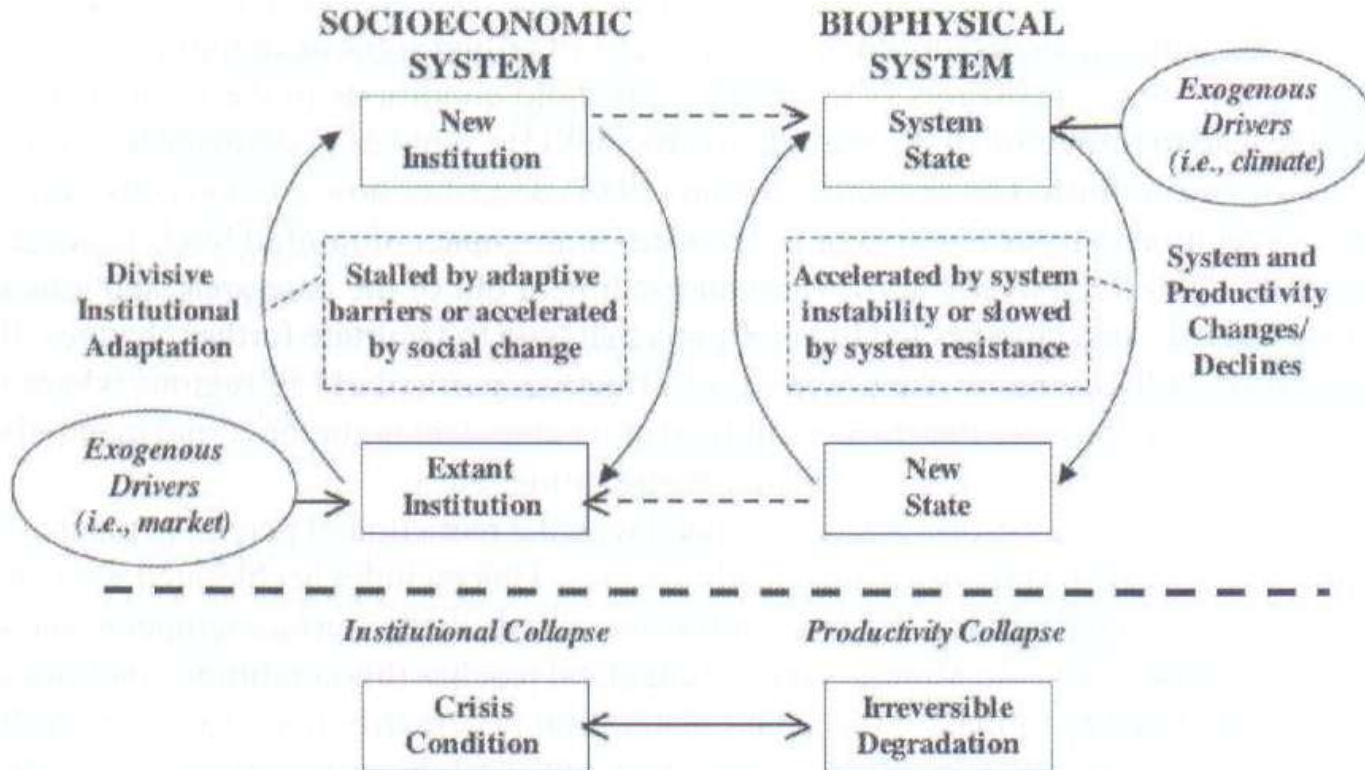
[mgermino@usgs.gov](mailto:mgermino@usgs.gov)



## Adaptation of land use

“sustainable land use is possible when environmental change and institutional adaptation are synchronous”

Maestre et al. 2006, from Robbins et al. 2002

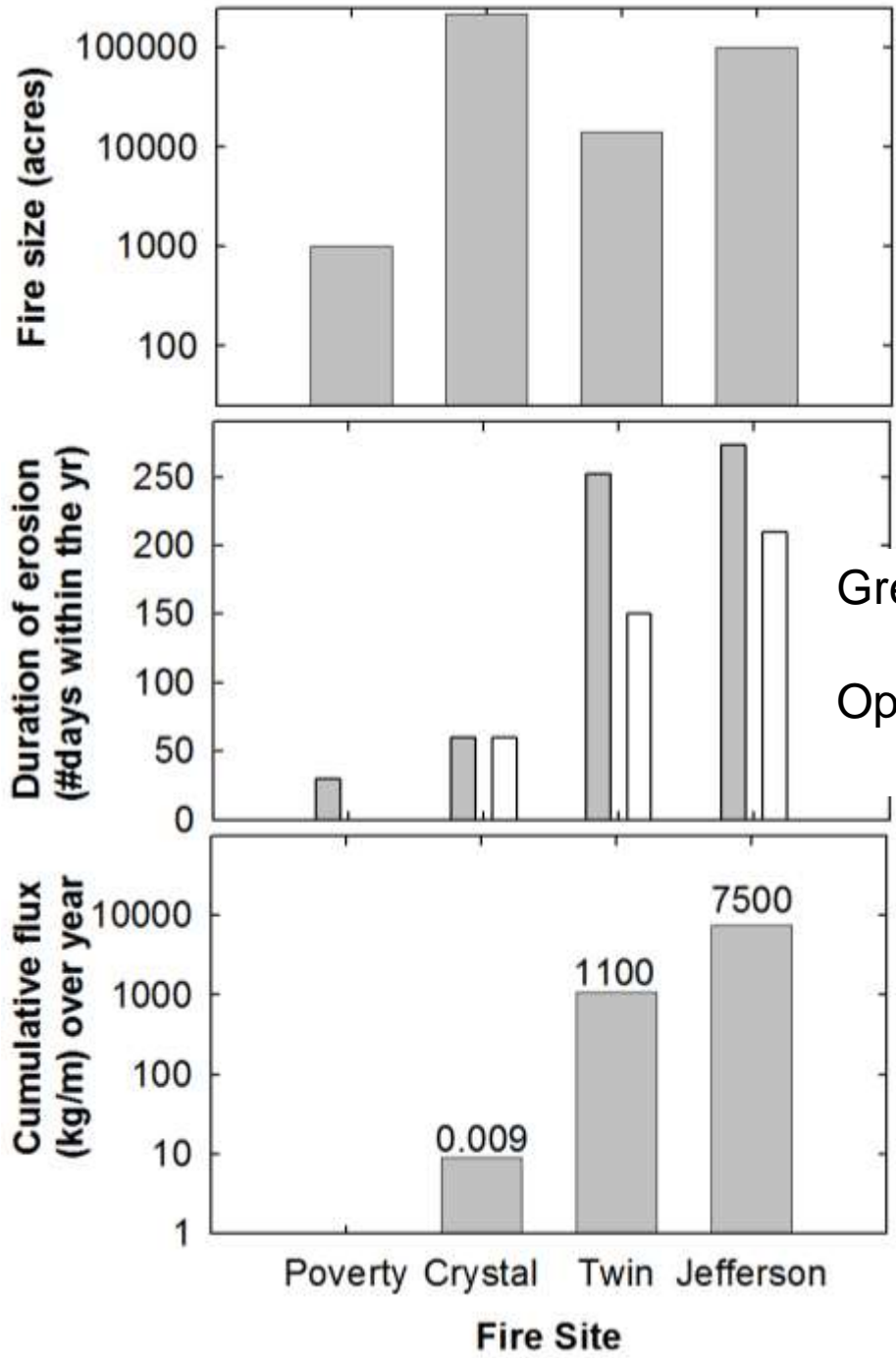


- Temporal coupling is key
- Focus of this presentation:

*response to emergence of an environmental problem*

Threshold effects of fire size on erosion: not all areas vulnerable

Pre-fire site condition also matters



Grey: #snow-free days in observation period  
Open: #days that erosion was substantive

Repeat burn effects: a negative feedback?  
(less erosion following subsequent fires?)

