THE ECONOMIC IMPACTS OF LARGE WILDFIRES

Max Nielsen-Pincus, Cassandra Moseley,
Emily Jane Davis, Pamela Jakes, and Laura Leete

Presentation at the conference, Exploring the Mega-Fire Reality 2011, Tallahassee, Florida, 14-17 November 2011

Outline

- The Wildfire Problem
- Community Impacts
- Research Questions
- Labor Markets
- Pilot Study – Trinity County, CA
- Empirical Study – Western US
- Policy Implications

Wildfire Suppression Costs

- **Suppression costs**
  - LT $400M/yr (1970-2000)
  - GT $1B/yr (since 2000)
- **Fire Management**
  - 1991: 13% USFS Budget
  - 2009: 48% USFS Budget
- **Large Wildfires (GT 300 acres)**
  - 1.4% of all wildfires
  - 93.8% of suppression costs
- **Cost containment motivates**
  - Policy, forest management, and suppression strategy

Lisa / Celtic Clicks Photography

…Lots of research…

Impacts of Wildfires to Communities

- Multiple and complex
  - Homes, forest resources, behavior, community relations
  - Work stoppages and slowdowns
    - Natural resource sectors
    - Recreation and tourism
    - Service sectors
  - Suppression spending
    - contracting
    - procurement

- Suppression spending decisions matters

© Lisa / Celtic Clicks Photography

Research Questions

- **What are the effects of large wildfires on local labor markets?**

© Lisa / Celtic Clicks Photography

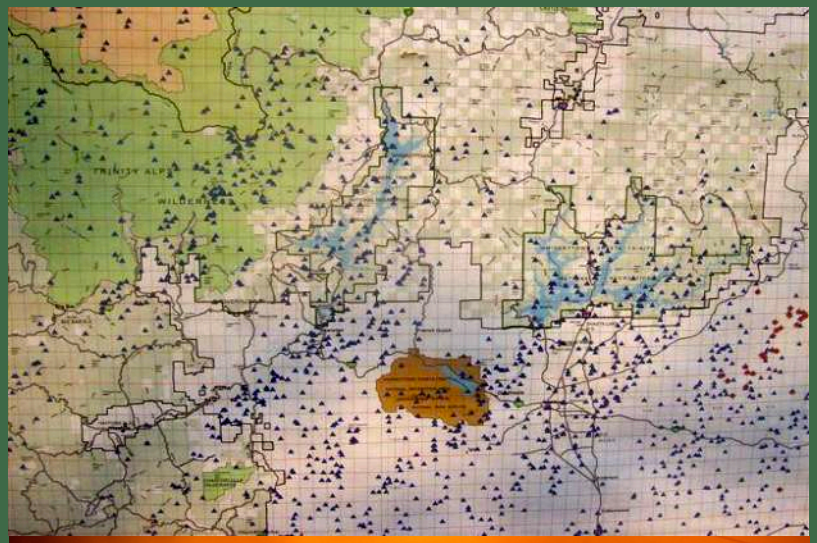
- **How do fire suppression expenses mediate the effect of large wildfires on local economies and labor markets?**

- Does community capacity matter?

Trinity County, CA – Pilot Case Study

- Population: 13,000
- USFS and BLM: 89%

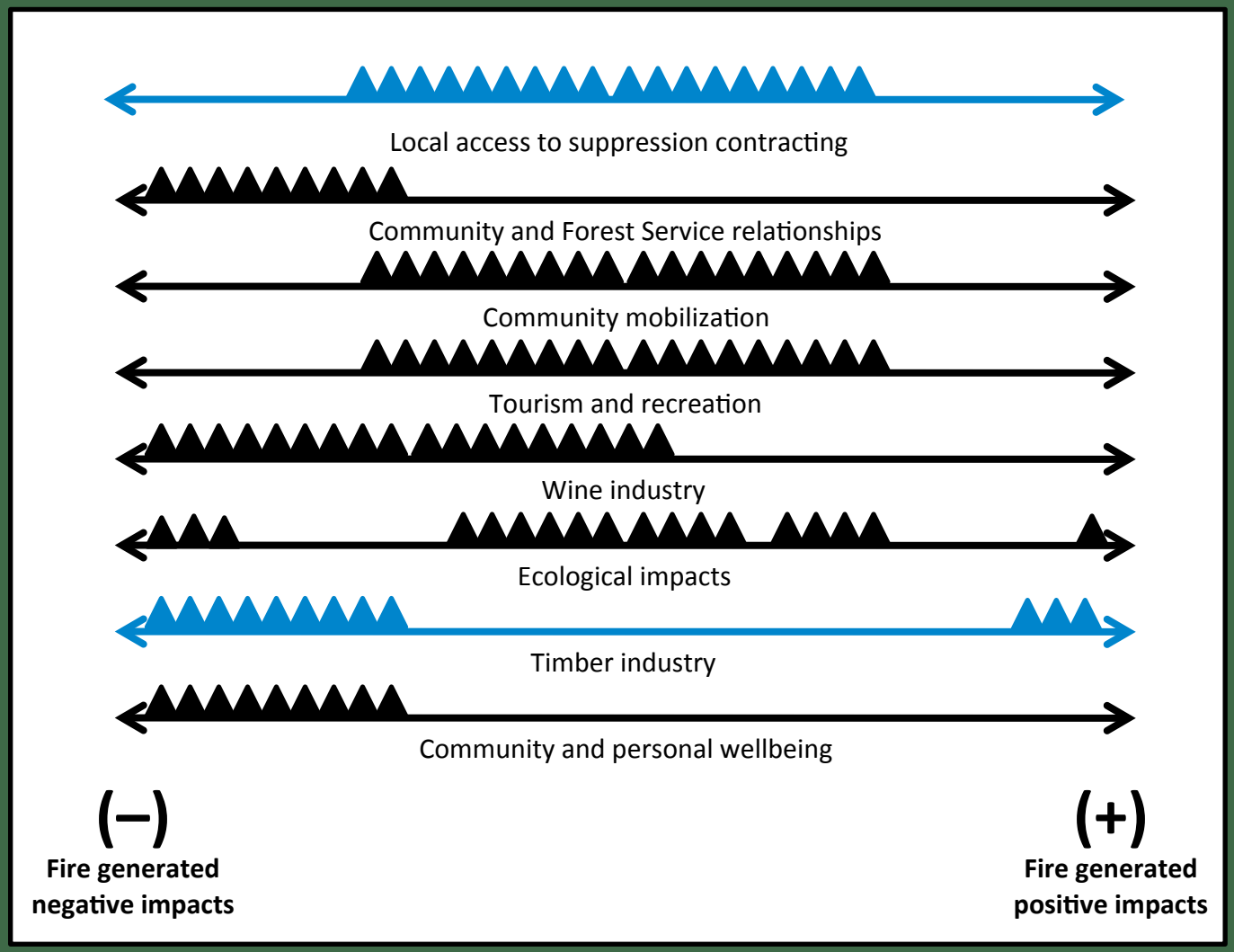
- June 20th 2008:
  - **3000 lightning strikes**
- Fire Duration:
  - **June to October**
- Fire Extent:
  - **250,000 acres**
- USFS Suppression Costs:
  - **$155,000,000**



Data Collection

- Community Experience
  - Key informant interviews (n=23)
    - Community economic impacts
    - Opportunities and challenges
- Suppression Spending
  - Fire Attributes
    - Location, Size, Duration… (NIFMID)
  - Fire Expenditure Records
    - BOC by Zip Code (FFIS)
- Labor Market Indicators
  - Employment and Wages (BLS QCEW)

Community Experience – Impacts to socioeconomic sectors



Work in the Woods

<u>During the fires</u>

"It shut down projects. We had [fuels projects] that were downriver, that we couldn't get to 'cause of the fire."

"They were afraid of any other fires starting, so they shut down all the logging. So if you weren't able to get on the fire, which you of course weren't…"

<u>Post-fire Recovery and Restoration</u>

"Many displaced loggers were on the verge of losing everything they had, had their houses mortgaged up to the hilt, and it pulled 'em out. It was actually a saving grace for those small businesses. Some of my friends who I know, it got 'em out of debt for about a year or so"

"Their scale is too big! They could break it up into four contracts. They had a masticating project that stretched out from Burnt Ranch to the Yolla Bollys. I mean, a huge area…I mean, it's 15,000 acres under one contract…forget it."

Incident Command Teams

- Type I and II – *"Self-contained" fire camps*

- Type III – State and local teams
  - Mop up in last several weeks of fires
  - Stayed in local hotels, purchased local provisions
  - Generally more positive perception

Suppression Contracting & Policy

"So historically, what would happen is the locals would make all the sandwiches and stuff like that… [in 2008] there was a state-wide list … and there wasn't any preference give to locals… the Forest Service management were new, and … didn't have any feeling for who wasn't local."

"An awful lot of our locals still don't know how to get on that BizOpps…"

"However, in their defense, we're a small county, and to gear up to feed, to have our grocery stores be able to gear up to provide, that's a catch-22 in a small rural county."

Trinity County Perspectives

- Generally negative
  - Fires created a hardship for the community
  - Procurement and technical challenges to

- Recognition that small isolated counties like Trinity have limited capacity to fulfill major suppression functions, which limits potential benefits

Generalized Economic Model of Wildfire

- Labor supply likely to shrink
  - Labor displacement
  - People evacuate
- Labor demand likely to grow
  - Business may slow or cease
  - Some firms evacuate
  - **Growth to support the suppression effort**
  - **Growth to support post fire recovery**

H_1: Earnings increase during wildfire due labor constraint

H_2: Employment will decrease because more local people lose work than gain work

A Road Map to Economic Impacts

Bureau of Labor Statistics

– Quarterly Census of Employment and Wages

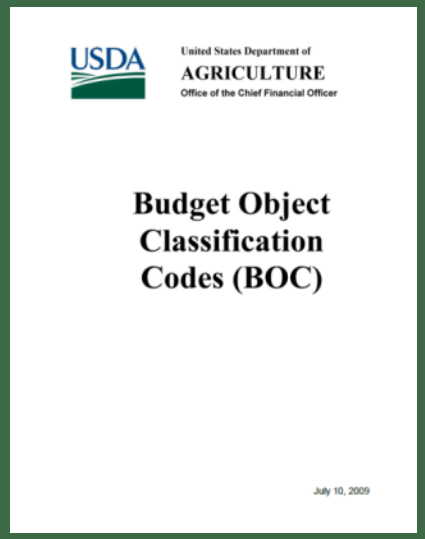
Western US Large Wildfire Panel

2003 – 2008

232 large fires in 150 counties

$2.4 Billion in suppression costs

155 fires sampled for transaction data


USDA
United States Department of
AGRICULTURE
Office of the Chief Financial Officer

Budget Object Classification Codes (BOC)

July 10, 2009

- Trinity County:
  - $155,000,000 – 5% locally, 23% regionally

A Road Map to Economic Impacts

Bureau of Labor Statistics

– Quarterly Census of Employment and Wages

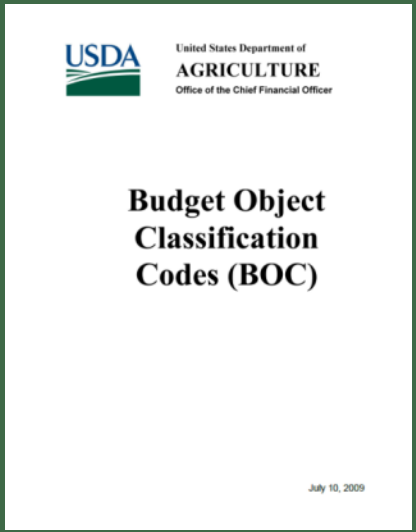
Western US Large Wildfire Panel

2003 – 2008

232 large fires in 150 counties

$2.4 Billion in suppression costs

155 fires sampled for transaction data

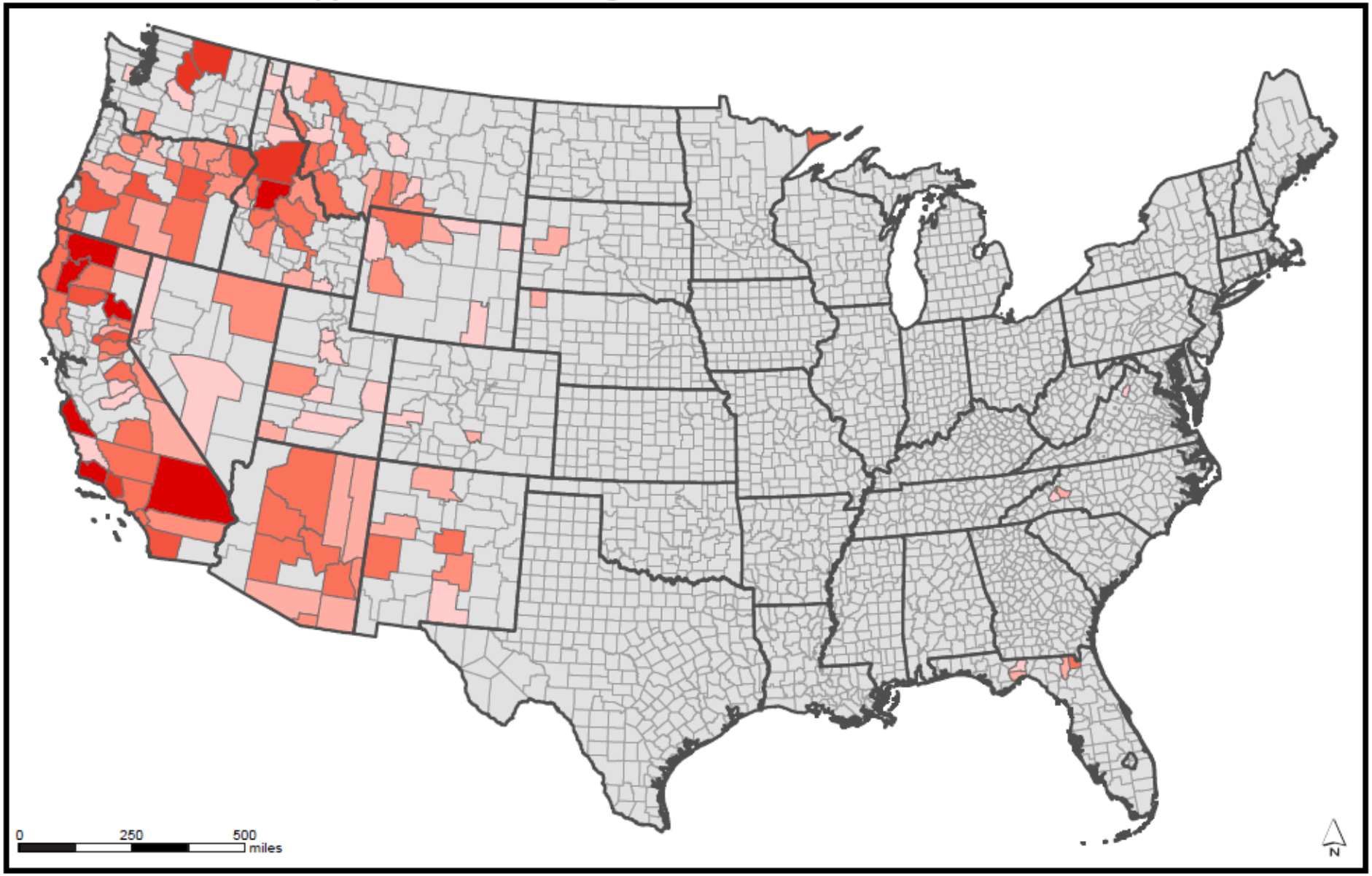

USDA
United States Department of
AGRICULTURE
Office of the Chief Financial Officer

Budget Object Classification Codes (BOC)

July 10, 2009

Category	% Total	% Local
Private Suppression Services	47	7
Federal Personnel and Cooperative Agreements	37	5
Flying Contracts	9	0
Other	7	<1

Total Forest Service suppresion costs for large fires* in US counties between 2003 and 2008



*Large fires are defined as Forest Service suppression costs greater than $1 million dollars

Data Source: NIFMID

Total spent (in millions of dollars)

1 | 2.5 | 5 | 10 | 25 | 50 | 100 | 200.2

EWP

UNIVERSITY OF OREGON

Generalized Difference-in-Difference – AR Random Effect Model

Dependent variable

Difference in the change in **average wages/employment** from the average change in average wages/employment in western US

$$(\Delta \ln Y_{it} - \Delta \ln Y_t) = \alpha_1 \Delta F^D_{it} + \alpha_2 \Delta F^N_{it} + \boldsymbol{\alpha_3 Z_i} + \boldsymbol{\alpha_4 X_{it}} + (AR(1) + \omega_i) + \varepsilon_{it}$$

$$(\Delta \ln Q_{it} - \Delta \ln Q_t) = \alpha_1 \Delta F^D_{it} + \alpha_2 \Delta F^N_{it} + \boldsymbol{\alpha_3 Z_i} + \boldsymbol{\alpha_4 X_{it}} + (AR(1) + \omega_i) + \varepsilon_{it}$$

F^d_{it} = *County i is has a large fire in time t*

F^n_{it} = *County i is adjacent to a county with fire in time t*

X_{it} = *A matrix of time variant covariates*

Z_{it} = *A matrix of time invariant covariates (drops out of differenced model)*

Wildfire Effects on Labor Markets

- H_1: Increased Wages
  - Large wildfires increase wages by about 1.2%
  - Being near a wildfire increases wages by 0.9%

- H_2: More locals lose work than gain work
  - Large wildfires decrease employment by 0.6%
  - Being near a wildfire decreases employment by 2.4%

Do More Expensive Wildfires Have More Effects?

- **No effect on local wages or employment** from suppression expenditures ($p>0.5$)

- Borderline regional effect on
  - Employment: ~4% per $100M ($p=0.10$)
  - Wages: ~3% per $60M ($p=0.14$)

Transaction Data – 155 large fires

- Only 8% of suppression expenses were spent locally
- About 15% of suppression expenses were spent regionally

Next Steps

- Add explanatory variables to the model
  - Seasonality of Fires (spring –)
  - Post Fire Lags (1st quarter after)
  - County Types
    - (**Government**, Recreation, etc….)
  - Local spending

- Accounting for capacity
  - Developing a county level suppression capacity index

Wildfire Suppression Policy

- Wildfires appear to cause labor displacements greater than any benefits created by the suppression effort.
- Challenges of utilizing local capacity.
- What is the role for local communities in wildfire response?

Acknowledgements

United States Department of Agriculture – Forest Service
Rocky Mountain Research Station

Joint Fire Science Program

Krista Gebert
Liz Podowski
Nina Rinaldi

THE WATERSHED CENTER
HAYFORK, CALIFORNIA

Max Nielsen-Pincus
maxn@uoregon.edu