Sonoma County, CA: Post-Wildfire Evacuation Survey
Chicago Area Model Users Group
April 3, 2019
Overview

• Climate change overview
• Colorado efforts, Waldo Canyon Fire, 2012
• California statewide research initiatives
• Santa Rosa, Sonoma County, Tubbs Fire, 2017
  – Survey efforts
  – Findings
  – Next steps
A Changing Trend in Wildfire Incidence

Changing Trend in Wildfire Incidence

- In the past wildfire incidence primarily affected rural areas - fires in the past decade signal a change in this pattern
- Warmer summers and warmer winters in some areas grow the insect population.
- Extreme drought conditions increase fuel availability
- Urban areas that are located at edge of wildland are placed at risk
First Effort: Colorado Springs

• In 2010 WSP conducted traffic modeling for Colorado Springs and helped develop their evacuation plans

• Two years later their worst-case scenario actually happened

• WSP’s evacuation modeling proved accurate and the evacuation went smoothly

• Missing information for the city: How to prepare households for evacuation.

Waldo Canyon Fire Statistics

• 347 homes destroyed – record
• 2 fatalities, at least 6 injuries
• 32,000 persons evacuated - record
• Insurance claims total $352.6M - record
Second Effort: Northern California

- The on-going tree die-off has left many foothills communities surrounded by tens of millions of dead trees.
- Officials are concerned about the adequacies of their evacuation plans, especially in light of the poorly-managed Oroville Dam evacuation (Feb 2017).
- Evacuation planning is eligible for California state sustainability and transportation grants.

*Sierra National Forest (US Forest Service)*

*What would this road be like during a wildfire?*
What happened that night?
Focused Effort: Santa Rosa CA: Uncovering the missing information on evacuation

- Population 175,000 in 2016
- In Sonoma County, CA
- 100 miles west of Sacramento
- 60 miles north of San Francisco
- Tubbs and Nuns Fires hit October 8-9, 2017

Survey need was identified
Goals of the Survey

- To identify critical issues in the transportation aspects of household emergency evacuation
- To identify critical issues in the communications aspects of household emergency evacuation
Survey Approach & Limitations

- Mix social media outreach and friends and family for identification of candidate households
- Find the evacuees wherever they had settled – FEMA trailer park, shelter, other.
- Conduct a pilot survey to refine the questions
- Keep the survey short and focused
- No survey weighting
- Mix quantitative and qualitative questions
Survey questions

- What prompted the household to evacuate?
- How did they receive updates on the wildfire?
- How many cars did they take?
- What important items were brought/left behind?
- How did they handle pets?
- Where did they drive to?
- Did the household have a “plan”?
- Did the household have a “go-bag”?

Goal – 100 completed surveys
Special Tools

- The team traveled to and stayed in Santa Rosa for three 2-day trips.
- WSP Sacramento and San Francisco office had a number of employees with family members affected by the fires who volunteered to respond to the survey.
- Cash ($5), flashlight, batteries or go-bag provided for face-to-face respondents.
- WSP cloud survey and reporting tool.
- UC Berkeley team member (intern).
Results:
Coverage

Legend
Santa Rosa Wildfire Evacuation Survey
Locations of HHs Surveyed

Fire Perimeters

## Results: Reason to Evacuate

<table>
<thead>
<tr>
<th>Reason to Evacuate</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saw orange glow or flames</td>
<td>25%</td>
</tr>
<tr>
<td>Smelled smoke</td>
<td>20%</td>
</tr>
<tr>
<td>Heard explosions/noise</td>
<td>20%</td>
</tr>
<tr>
<td>Neighbor called or came over</td>
<td>16%</td>
</tr>
<tr>
<td>Phone call from friends or family</td>
<td>7%</td>
</tr>
<tr>
<td>Social Media</td>
<td>7%</td>
</tr>
<tr>
<td>Other</td>
<td>5%</td>
</tr>
</tbody>
</table>
Results: Number of Vehicles Used

<table>
<thead>
<tr>
<th># of Vehicles</th>
<th>Owned</th>
<th>Used to Evacuate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>19%</td>
<td>46%</td>
</tr>
<tr>
<td>2</td>
<td>38%</td>
<td>38%</td>
</tr>
<tr>
<td>3</td>
<td>25%</td>
<td>11%</td>
</tr>
<tr>
<td>4+</td>
<td>18%</td>
<td>5%</td>
</tr>
<tr>
<td>All</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Evacuees used one vehicle, even if leaving vehicles behind meant losing them to fire.
Results: Distance Traveled

First stop

Second stop
## Results: Items Carried Out

<table>
<thead>
<tr>
<th>Items Carried Out</th>
<th>% of Evacuees Who Took These Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wallet &amp; Cellphone</td>
<td>85%</td>
</tr>
<tr>
<td>Pets</td>
<td>58%</td>
</tr>
<tr>
<td>Clothing</td>
<td>45%</td>
</tr>
<tr>
<td>Other items</td>
<td>40%</td>
</tr>
<tr>
<td>Medication</td>
<td>39%</td>
</tr>
<tr>
<td>Important Documents</td>
<td>39%</td>
</tr>
<tr>
<td>Photo Albums</td>
<td>27%</td>
</tr>
<tr>
<td>Jewelry</td>
<td>16%</td>
</tr>
<tr>
<td>Food &amp; Drink</td>
<td>9%</td>
</tr>
</tbody>
</table>

80% of evacuees had one or more pets; 68% of Americans own a pet*.  

---

*American Pet Products Association, 2017*
Knowledge Gained from the Current Work

Evacuation

- Type of preparation work done in the household (go-bag)
- Why did they evacuate?
- # of persons evacuated
- Mode of transport used
- Persons per vehicle
- Time to evacuate
- Type of first stop made
- Personal goods taken with

Communications

- Type of communication used during the run-up to the evacuation
- Family communication protocol in place?
- Ideas for the next time
How can this emergency evacuation work inform Chicago regional planning?

- We can share our household emergency evacuation survey results to:
  - Inform public outreach efforts already in place
  - Estimate evacuation travel assumptions:
    - # of autos likely to be used, tactics for zero vehicle households, handling of pets, what happens when a disaster occurs while people are not at home
- GIS maps of evacuation centers
- Design of memorable preparation reminders

Midwest areas such as the Chicago region may suffer floods, terrorist events, large scale accidents and similar disasters requiring evacuation.
Products Requested by Clients

– Profile of evacuating households and routes (household size, disabled population, transit dependence, other)
– GIS maps of homes and evacuation centers
– Communications framework for evacuation planning
17 EvacuSpot sculptures in New Orleans identify meeting places for bus pickup in emergencies

Household Profile in the Evacuating Area

- There are planned and unplanned evacuations
- In many cases, motorized escape is not available to households needing to evacuate
- All households members may not be at home at the time of crisis
- Emerging areas of research & need are location-specific
Establish logical “districts”
- Integrate road network with speed and capacity
- Place point data of evacuation centers
- Plot travel time sheds
Communications Framework for Evacuation Planning

- Get Prepared
- Heed Natural Warnings
- Heed Official Warnings
Questions?

Mary Lupa, AICP
WSP, Chicago
Mary.Lupa@wsp.com

Yosef Yip
WSP, San Francisco
Yosef.Yip@wsp.com