Sonoma County, CA: Post-Wildfire Evacuation Survey

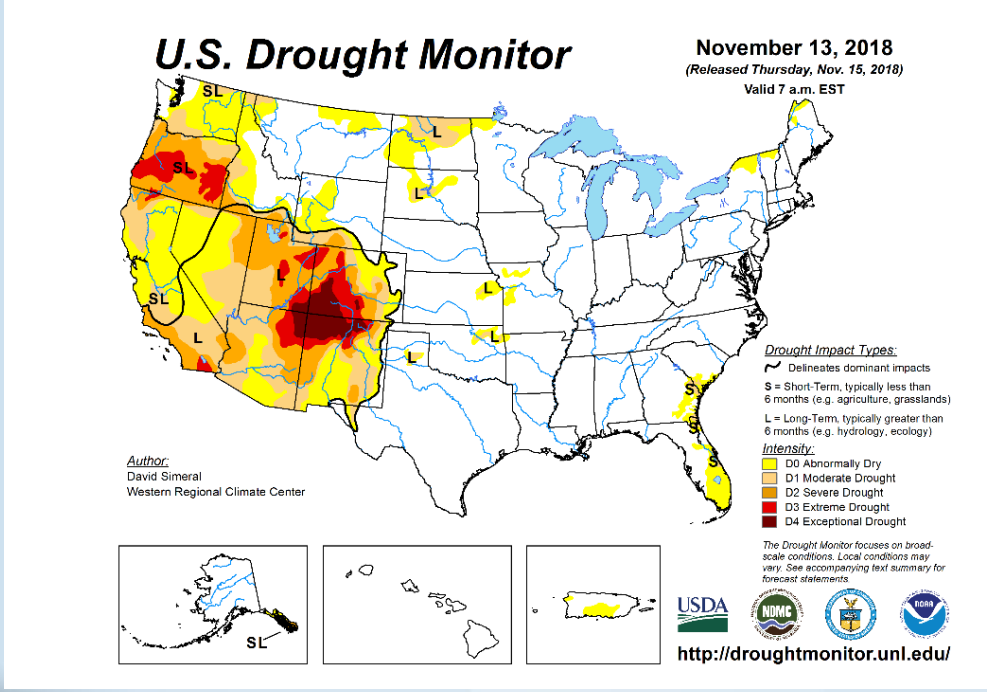
Chicago Area Model Users Group

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.

<u>Waldo Canyon Fire Statistics</u>

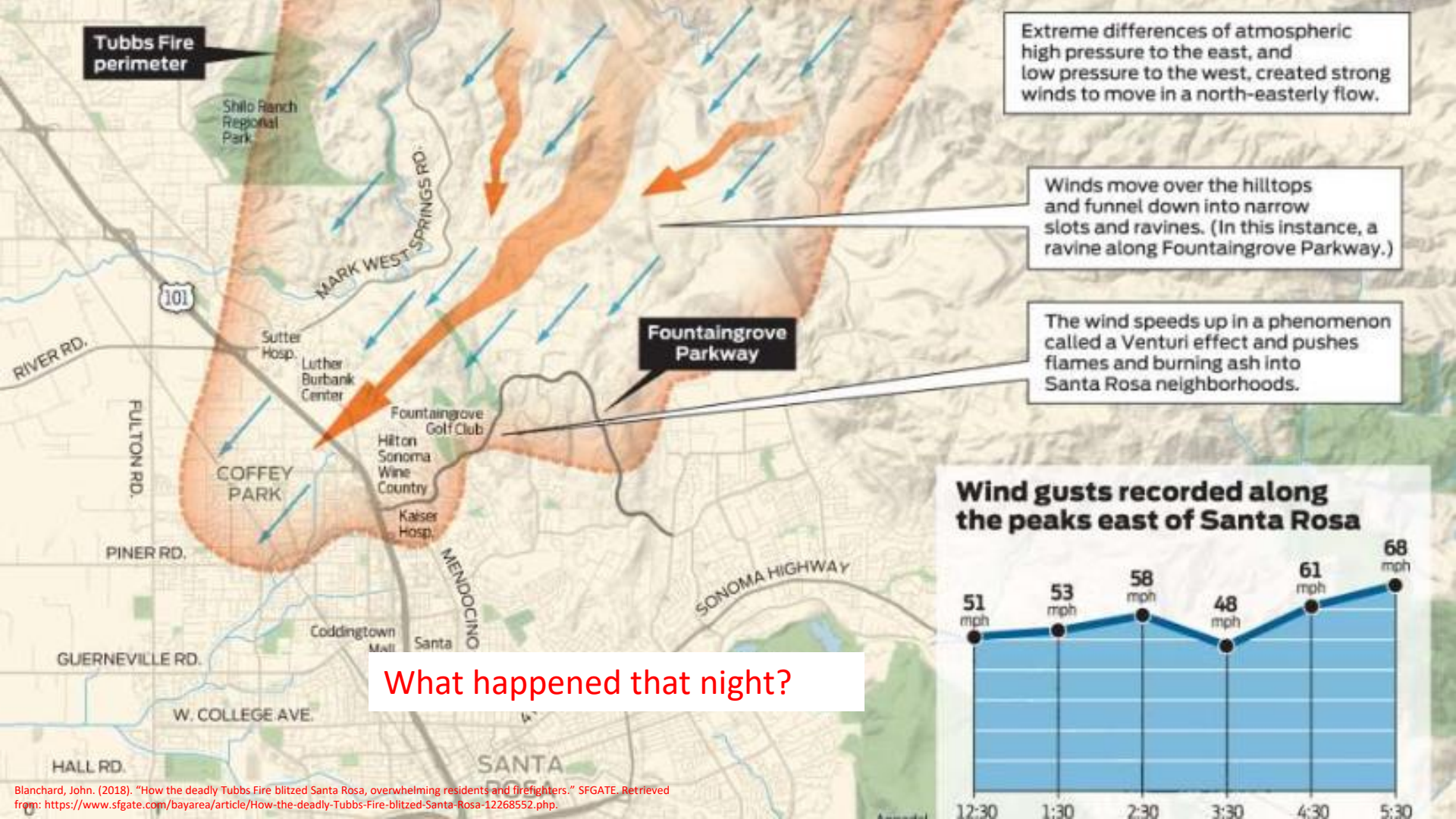
- 347 homes destroyed – **record**
- 2 fatalities, at least 6 injuries
- 32,000 persons evacuated - **record**
- Insurance claims total $352.6M - **record**

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)

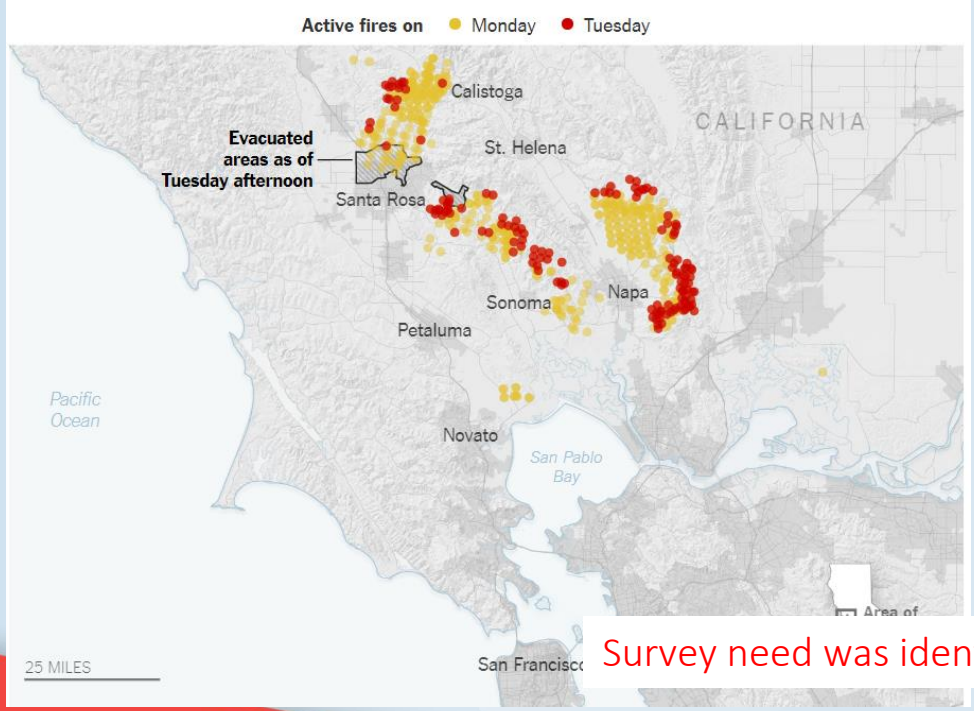
What would this road be like during a wildfire?



What happened that night?

Blanchard, John. (2018). "How the deadly Tubbs Fire blitzed Santa Rosa, overwhelming residents and firefighters." SFGATE. Retrieved from: https://www.sfgate.com/bayarea/article/How-the-deadly-Tubbs-Fire-blitzed-Santa-Rosa-12268552.php.

Focused Effort: Santa Rosa CA: Uncovering the missing information on evacuation



Survey need was identified

- 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

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

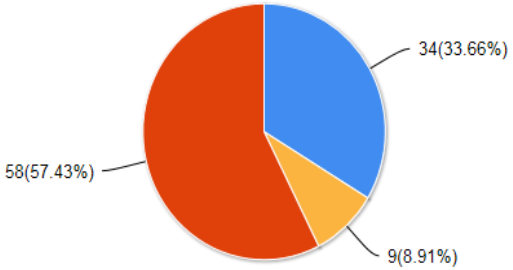
Special Tools

- 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)

Post-Wildfire Evacuation Survey of Households - Sonoma County, CA

Page 1

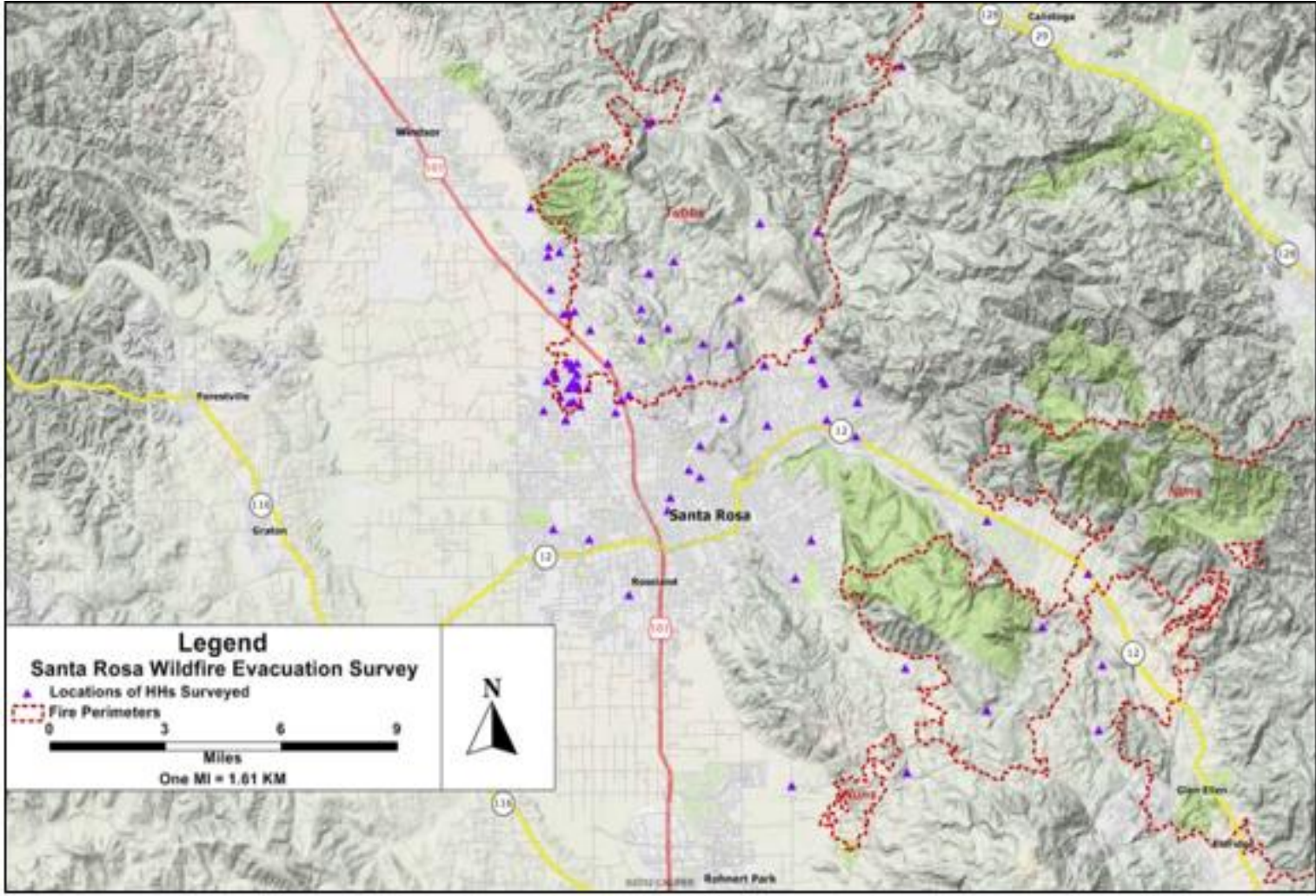
What is the condition of your home?



No damage | Minor damage (still livable) | Destroyed (must be repaired or rebuilt)

Total Response Count	101	
Answer	**Count**	**Percent**
No damage	34	33.66%
Minor damage (still livable)	9	8.91%
Destroyed (must be repaired or rebuilt)	58	57.43%

Results: Coverage



Source: CAL FIRE GIS Fire Perimeters; WSP Wildfire Evacuation Survey Location of Households, 2018.

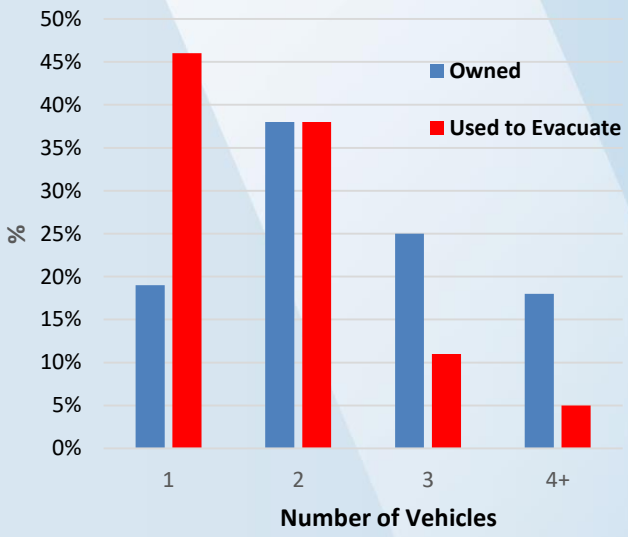
Results: Reason to Evacuate

Reason to Evacuate	%
Saw orange glow or flames	25%
Smelled smoke	20%
Heard explosions/noise	20%
Neighbor called or came over	16%
Phone call from friends or family	7%
Social Media	7%
Other	5%

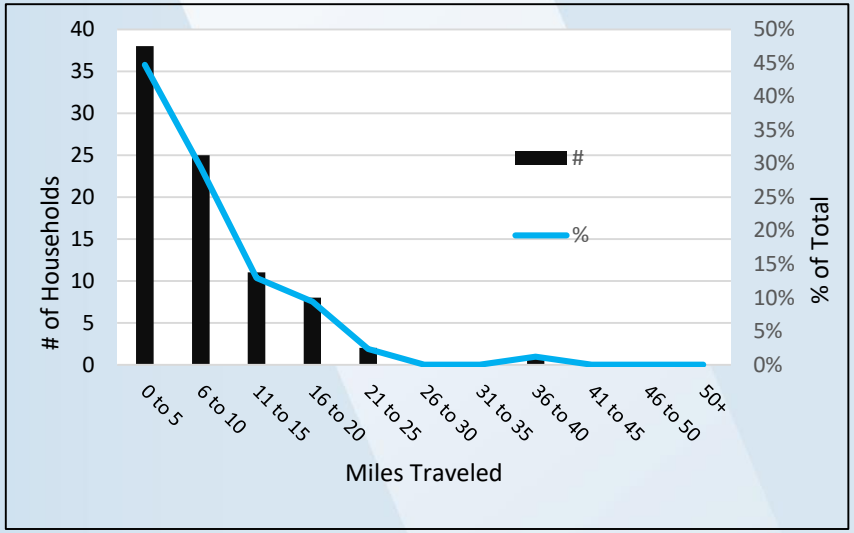
Results: Number of Vehicles Used

# of Vehicles	Owned	Used to Evacuate
1	19%	46%
2	38%	38%
3	25%	11%
4+	18%	5%
All	100%	100%

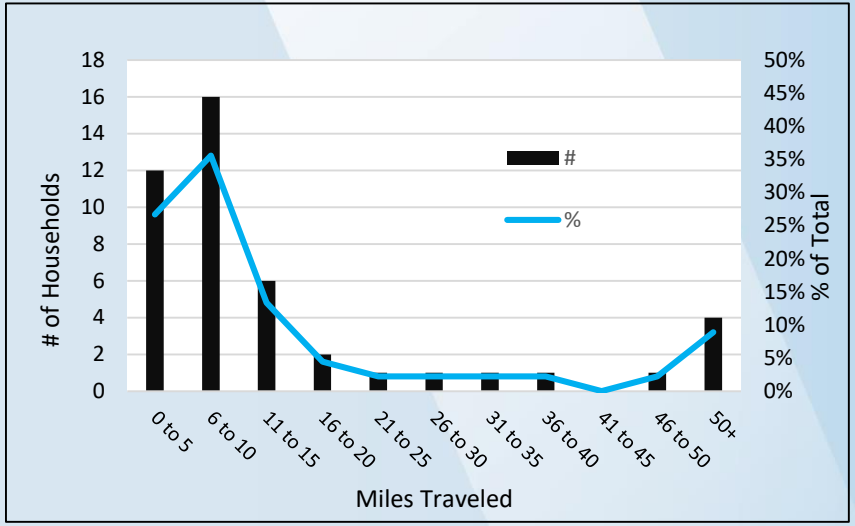
Evacuees used one vehicle, even if leaving vehicles behind meant losing them to fire



Results: Distance Traveled



First stop



Second stop

Results: Items Carried Out

Items Carried Out	% of Evacuees Who Took These Items
Wallet & Cellphone	85%
Pets	58%
Clothing	45%
Other items	40%
Medication	39%
Important Documents	39%
Photo Albums	27%
Jewelry	16%
Food & Drink	9%

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

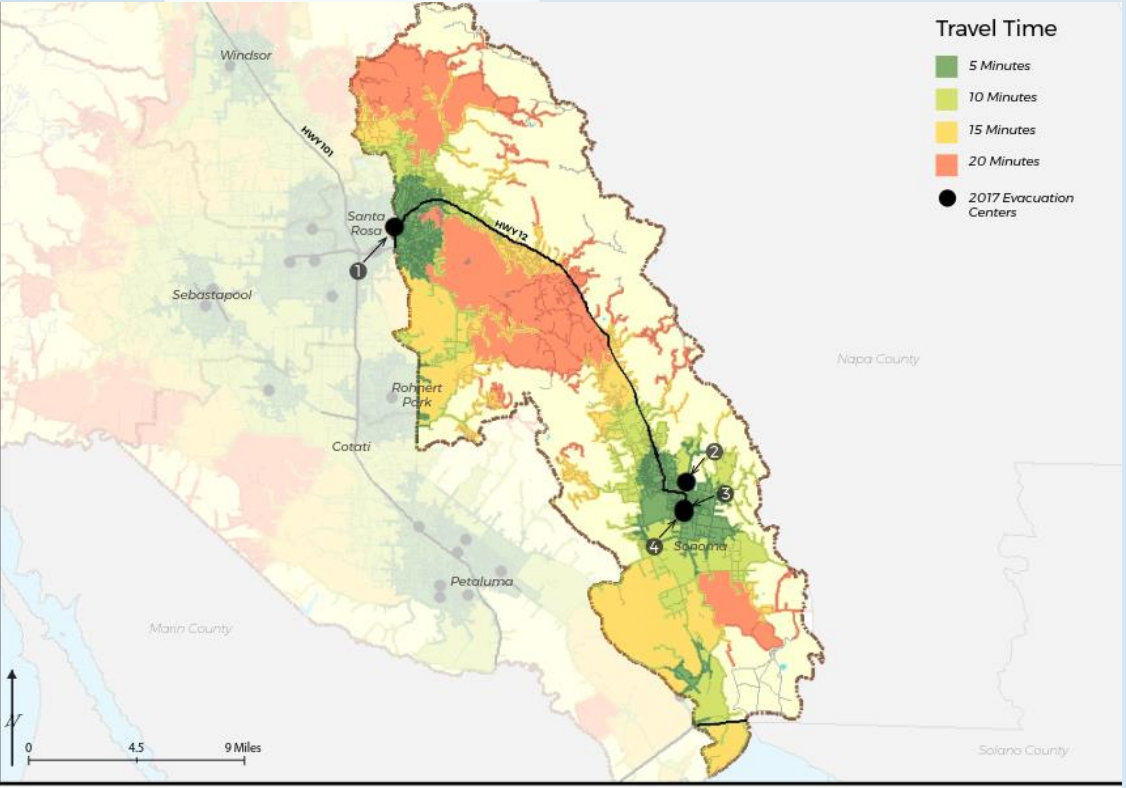
Household Profile in the Evacuating Area

17 EvacuSpot sculptures in New Orleans identify meeting places for bus pickup in emergencies

The 14-foot tall steel sculpture marks an EvacuSpot in New Orleans.

- 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

GIS Plots of Travel Time to Evacuation Centers



District 1 Travel Time to Existing Evacuation Centers
Sonoma County, CA

1. St. Eugene Cathedral School
2. Sonoma Veterans Memoral Hall
3. Sonoma Valley High School
4. Adele Harrison Middle School

Steps

- 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