

A Case Study of the Camp Fire –

Notification, Evacuation, Traffic, and Temporary Refuge Areas (NETTRA)

Module 4: Rescues

NIST WUI DAYS 2023 – Session 2.4

November 8, 2023



Eric Link
Alexander Maranghides
National Institute of Standards and Technology



WUI Fire Days: Camp Fire NETTRA

- Module 1: Notification and Evacuation Pre-Fire Conditions and Planning
- Module 2: Notification Timeline, Evacuations, Traffic Flow and Road Closures
- Module 3: Burnovers and TRAs
- Module 4: Rescues
- Module 5: NETTRA Summary

Last week, Nov 1

Methodology

Rescues Methodology

- Terminology “rescue events,” the acronym EA/R is introduced [meaning Evacuation Assistance or Rescue] to differentiate between the specific *Rescue* term
- *Rescue* takes on a specific meaning regarding the actual action of responding to an incident
- Event Type hierarchy depending on classification and action
- Event attributes include:
 - time and location, source,
 - number of civilians involved,
 - agency of participating first responder(s),
 - outcome, and
 - other circumstances including injuries, pre-existing conditions
- Documented events include:
 - completed rescues,
 - attempted rescues, and
 - notifications/communications of requests for rescue or evacuation assistance



Photo courtesy of TD-122, 09:41.



Photo courtesy of Paradise Police Department, 09:41.

EA/R Event Classes

- Entrapment** a person/reporting party was trapped by fire in the immediate proximity; in an immediate life-threatening situation (may include burn injuries); indicated fire was an issue; or required some sort of protective action beyond transportation or general assistance.
- Assistance** a person needed help evacuating due to pre-existing conditions (e.g., mobility impairment) or lack of transportation. Fire was not considered an imminent threat, although there may have been fire in the area. If data indicated fire became a threat before completion of the response, the event was classified as an entrapment. Assistance requests that were unresolved in the data may have turned into entrapments by our definition, although available data suggested that the local conditions were non-life threatening.
- Medical** the primary issue was a medical concern unrelated to fire exposure (although may have been exacerbated by fire issues or stress).
- Pick-up** a person encountered outside (i.e., on foot or in vehicle) by first responders, who were not responding to a specific location or report of someone needing assistance, was taken to a safer area or handed off to other transportation. In general, fire conditions were unspecified or not specifically identified as immediately life threatening. If available data indicated conditions were hazardous, those encounters were assigned to the entrapment classification. If an encounter was unclear in the data and the person was potentially a chance encounter and not the specific target of a rescue/assistance request, the event was categorized as a Pick-up.

EA/R Response Action

Rescue

Data includes **response actions taken** to rescue, guide, protect, assist, and/or transport a person to a safer location. EA/R in this category also include events where civilians elected not to leave with the responding emergency personnel.

Rescue Attempt

Data indicates **response action was taken; however, a Rescue was not completed**, or transportation was not provided, due to a number of potential reasons. Reasons may include that the responder was not able to access the location (fire conditions or blocked roadway); upon accessing a specified location, the person was unable to be located. Additionally, incomplete data may have prevented categorization as a Rescue.

No Data (Notification)

No data represents events where records show that first responders were notified of a request for evacuation assistance or rescue but **no data was available to determine whether a response was sent or initiated**.

Rescue Attempt or No Data (Notification) EA/R do not indicate a failure by a first responder.

EA/R Attributes

Rescue Data
Overview

Rescue Data
Analysis

Concow

Paradise

Overall

Fatalities

Technical
Findings

EA/R Attribute	Definition
Time of Notification / Direct Observation	Earliest time rescue request is communicated to or observed by first responders
Time of Rescue / Response Attempt	Time of the start of rescue activity/response (including travel time)
Time of Conclusion	Time when civilians reach a safe location such as a TRA, or when they are transferred to other first responders to be further transported (e.g., by helicopter)
Rescue Response Time (min)	Time between notification of emergency services and the start of rescue response/action; difference between Time of Rescue and Time of Notification
Rescue Duration (min)	Duration of first responder involvement; difference between Time of Rescue and Time of Conclusion
Event Duration (min)	Total duration; difference between Time of Conclusion and Time of Notification
Head Count	Known minimum head count of civilians involved in the incident (assuming one person per vehicle unless otherwise specified)
Est. Min. Reasonable Additional Head Count	Best estimate of the total number of civilians involved in addition to the absolute minimum Head Count (assuming one person per vehicle unless otherwise specified).
Notification/ Encounter Source	Source of how emergency services became aware of the need for assistance or rescue (911, FD Dispatch, LE Dispatch, Civilian, FD, LE, Other, Unknown Source)
Participating First Responder	Type of first responder performing the rescue/assistance (FD, LE, FD to LE, LE to FD, LE to Civilian, LE and FD, Civilian, Other, Unknown)
Rescue Circumstance	Situation of the civilian needing rescue (Vehicle, On foot, Residence, Structure, Other, Unknown)
Outcome	The outcome of the event (Formation of TRA, Transport to TRA, Transport to Other, Escort to TRA, Escort to Other, Medical Transport, Civilian Transport, Not Present, Fatality, Other, Unable to Access, Refuse to Leave, Unknown)
Injury	Was there a fire-related injury (burn or other injury inflicted during evacuation)?
Pre-X	Whether pre-existing conditions (not fire related) may have impacted civilian evacuation capabilities (e.g., mobility impairment or medical condition)
Animals	Whether animals (i.e., pets, livestock) were also rescued or accompanied civilians
Burnover ID	Indicates if the EA/R was associated with or the result of an identified burnover event (see Sec. 8 and Ref. [23])
TRA ID	Indicates if a TRA was utilized as part of the EA/R sequence of events (see Sec. 9)
Location	The community of the EA/R event (Concow, Paradise, Magalia, Other)
Source	The contributing data sources (TD, VTD, 911, PPD)
Complete	Indicates whether the available data describes a complete rescue sequence from notification through resolution, or is incomplete
Encounter	Indicates if the EA/R was an Encounter (i.e., unplanned meeting between first responder and civilian needing assistance), a Response (i.e., a <i>Rescue</i> or <i>Rescue Attempt</i> in response to a known request for EA/R), a Notification Only (no Response Action), or Undetermined
Data Points	The number of data points associated with the event

EA/R Attributes

Temporal Information

- Time of Notification / Observation
- Time of Rescue / Response Attempt
- Time of Conclusion
- Rescue Response Time
- Rescue Duration
- Event Duration

Participant Details

- Head Count
- Uncertainty in Count
- Injury
- Pre-existing Condition
- Animals
- Participating First Responder

Event Details

- Notification / Encounter Source
- Rescue Circumstance
- Outcome
- Location

- 198 EA/R events
- 406 data points identified through analysis of data sourced from TDs, emergency calls, and radio logs.

Source	Number with EA/R	Notes
Firefighters	55 of 100 TDs	
Law Enforcement	9 of 19 TDs	
Other	5 of 33 TDs	
911 Calls	49 calls	PPD 911 from 07:07 to 08:20 BC ECC 911 from 06:25 to 09:22
PPD	Dashboard cameras	select footage provided by PPD
VTD	6 of 32 VTDs	Including 1 radio recording
Other supporting data sources	CAL FIRE AVL CAL FIRE DINS Butte County DA Report Google Maps and Earth	Used for data cross-referencing

Rescue Data
Methodology

**Rescue Data
Overview**

Rescue Data
Analysis

Concow

Paradise

Overall

Fatalities

Technical
Findings

Evacuation Assistance and Rescues

Module Overview

- 198 identified rescue events involved over 1000 civilians [*underestimate*]
- Events ranged from well-documented efforts to rescue entrapped civilians to chance encounters
- 44 % of those rescued were associated with TRAs; represents only 36 % of civilians involved in TRAs
- 50 % of rescues occurred before 10:30, and 85 % occurred before 15:00

EA/R Location by Event Type

Rescue Data Methodology

Rescue Data Overview

Rescue Data Analysis

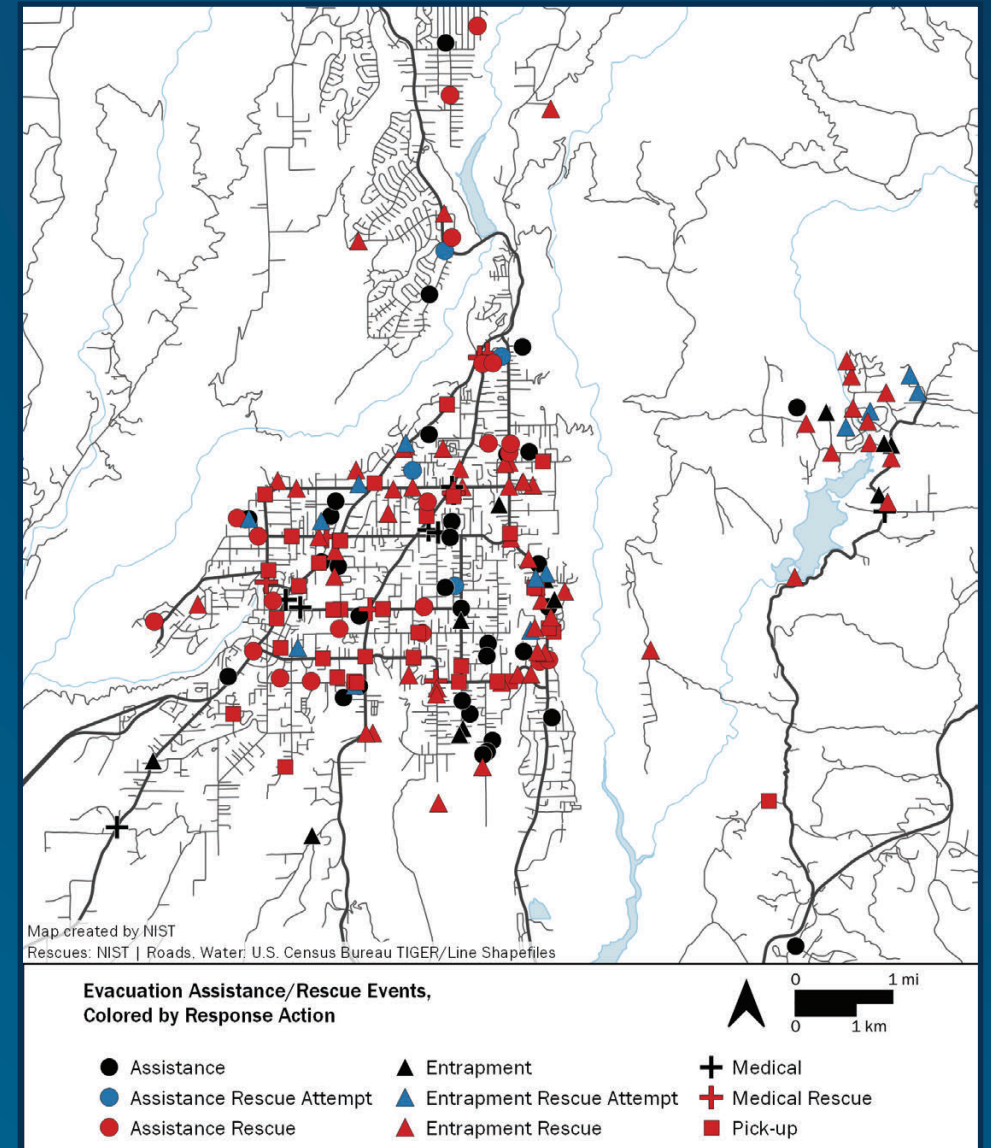
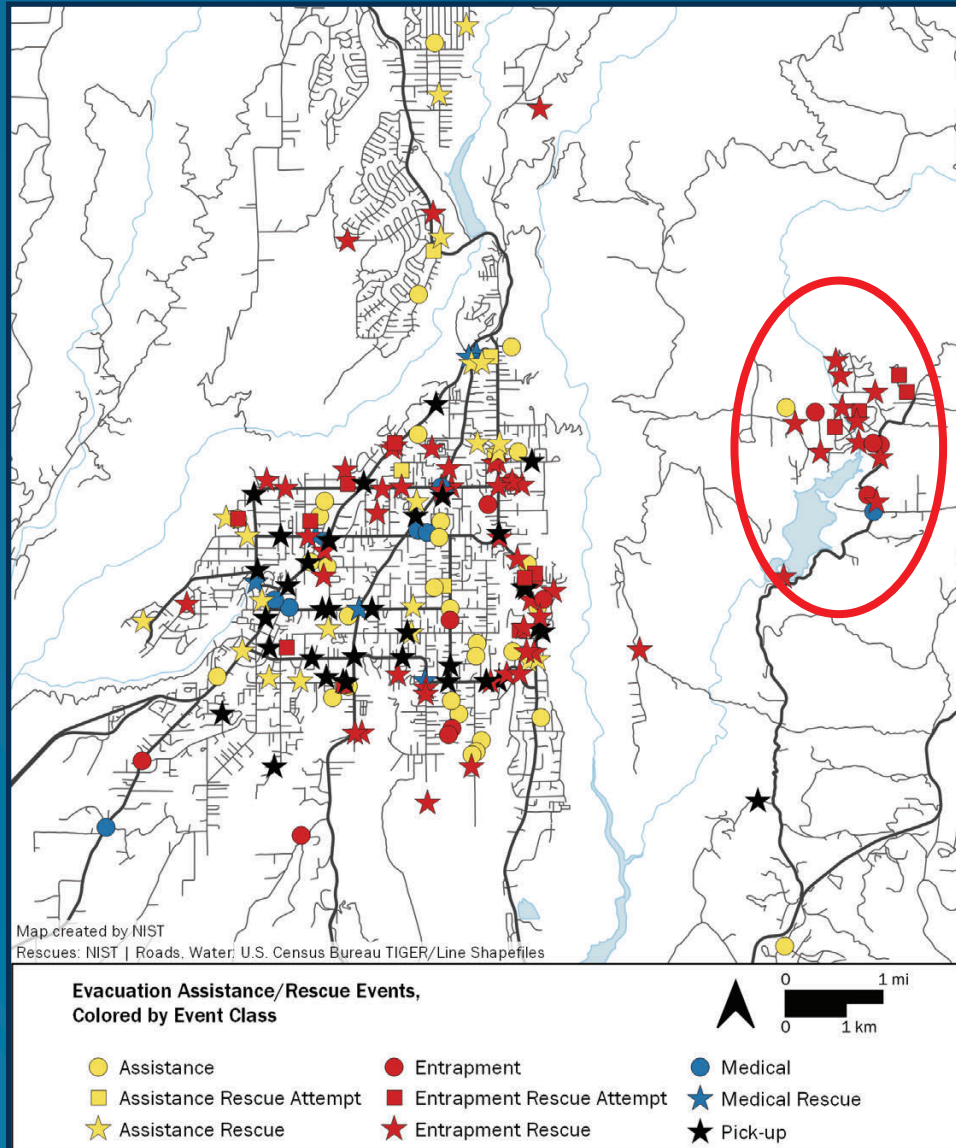
Concow

Paradise

Overall

Fatalities

Technical Findings



EA/R Event Type Distribution

Table 47. EA/R event frequency by community, organized by Event Class / Response Action.

Event Type Class / Action	Concow	Paradise	Magalia	Other	Total
Assistance	1	55	6	2	64
Notification	1	31	2	2	36
Rescue Attempt		5	1		6
Rescue		19	3		22
Entrapment	20	58	3	1	82
Notification	4	10			14
Rescue Attempt	4	9			13
Rescue	12	39	3	1	55
Medical	1	13			14
Notification	1	6			7
Rescue		7			7
Pick-up	1	37			38
Notification		1			1
Rescue	1	36			37
Total	23	163	9	3	198

Note: "Other" events occurred in Yankee Hill, Stilson Canyon, and an undetermined location.

EA/R Example

Rescue Data Methodology

Rescue Data Overview

Rescue Data Analysis

Concow

Paradise

Overall

Fatalities

Technical Findings

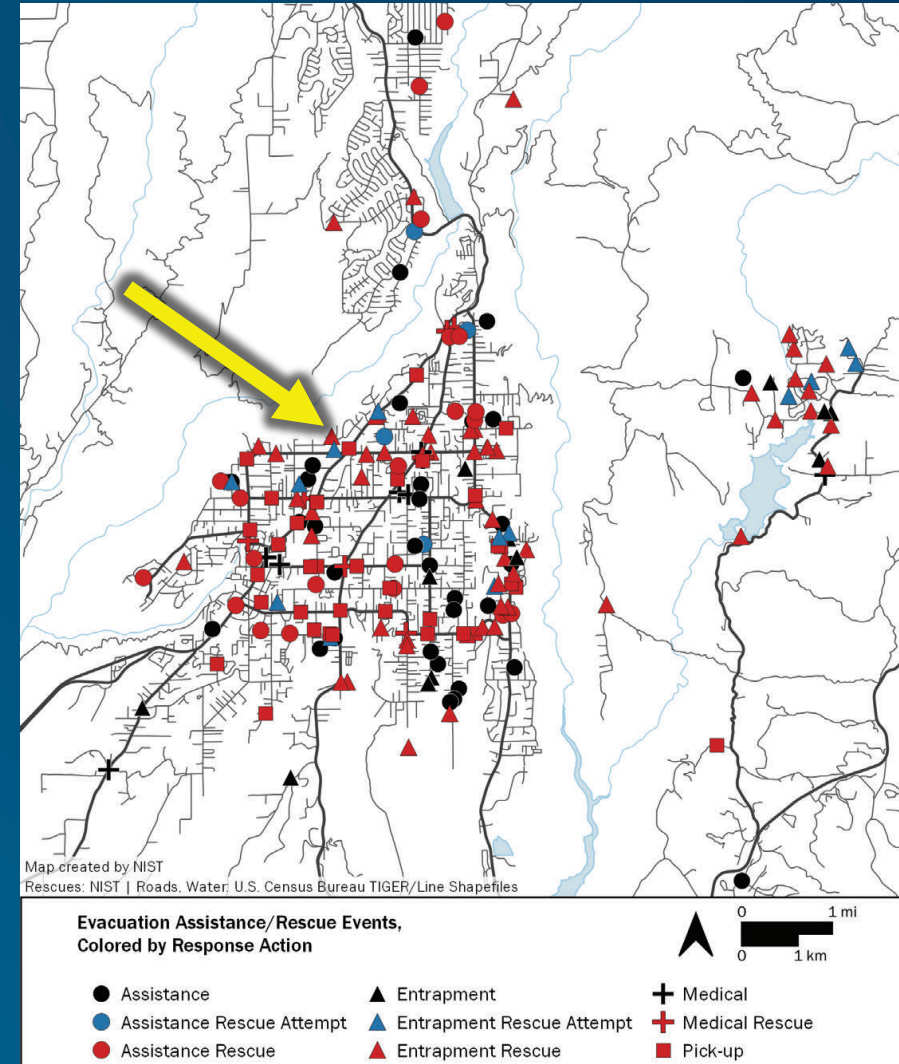


driver told us rescue needed in Paradise (DUM) — boy of 15
drove off road through yards to get around traffic
before this rescue fire established spotty along driveway [17-18]
fire on both sides Paradise, wind is howling, thought might not get out.
GPS said he arrived, but looking for numbers, they house numbers would have gotten in trouble, stopped in parking area.
heavy fire and embers, embers entering vehicle door
screaming civilians, house on fire, elderly couple standing on porch of my
→ impossible of walking.
slow moving through the narrows
fire man in car, wife leads & followed.
lots of fire around truck, scared her to follow
once everything was burning, smoke cleared a bit but heat was more intense
no room in back seat, got her on his lap.
dropped them off @ Butte & Clark, ambulance [17-18]



EA/R Example

Attribute	Value
Event Type	Entrapment Rescue
Location	NW Paradise
Duration	11:00–11:10, 3 minutes on scene [from AVL]
Head Count	2 civilians
Notification Source	Unknown
Participating First Responder	Fire Department
Rescue Circumstance	Residence
Outcome	Transport to TRA [Walgreens, TRA-P]
Injury	Not specified
Pre-existing Condition	Yes
Animals	No



Rescue Data
Methodology

Rescue Data
Overview

**Rescue Data
Analysis**

Concow

Paradise

Overall

Fatalities

Technical
Findings

Analysis

Concow | Paradise | Overall

Rescue Data
Methodology

Rescue Data
Overview

Rescue Data
Analysis

Concow

Concow

Paradise

Overall

Fatalities

Technical
Findings

Concow EA/R

Rescue Data Methodology

Rescue Data Overview

Rescue Data Analysis

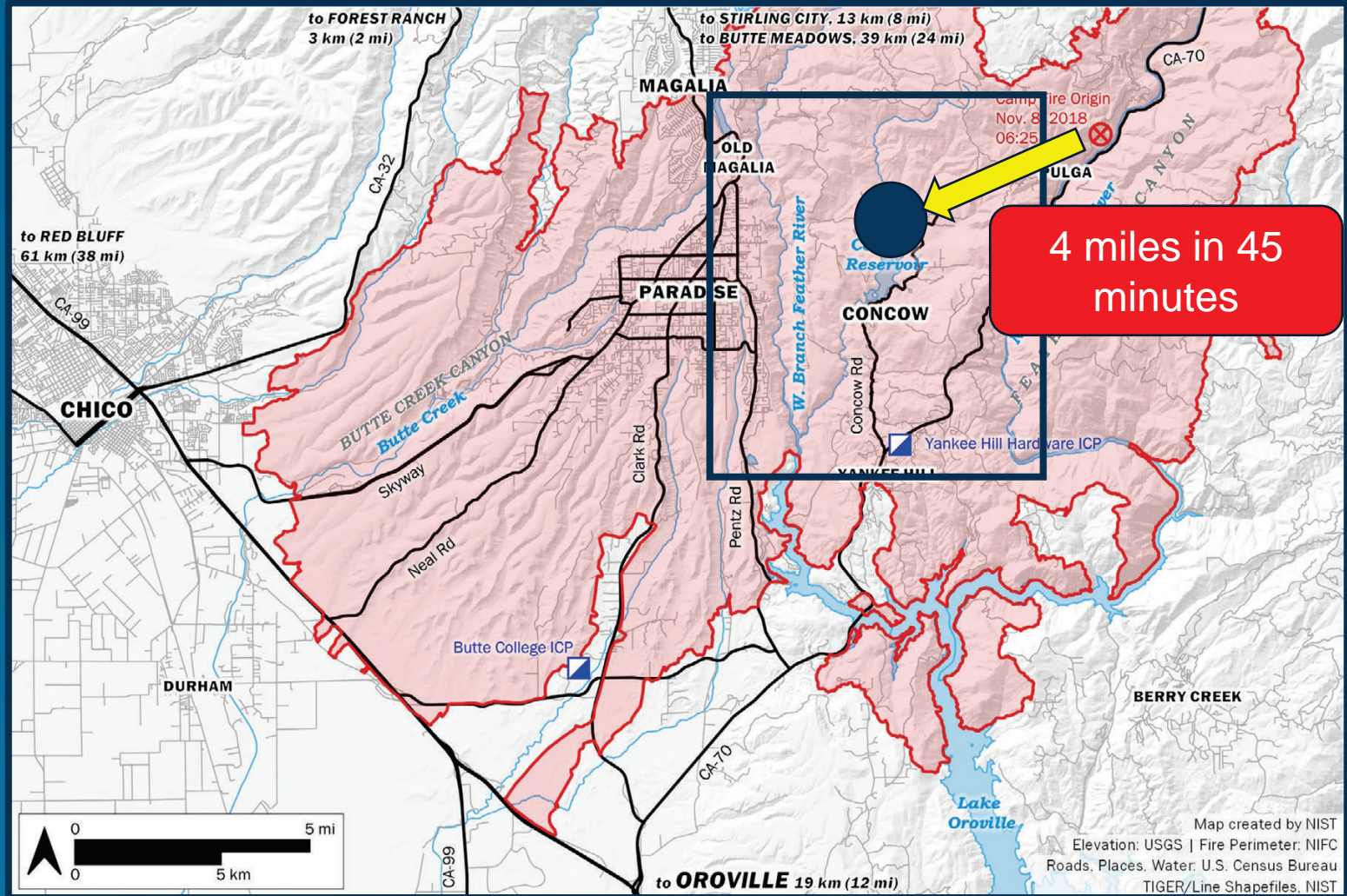
Concow

Paradise

Overall

Fatalities

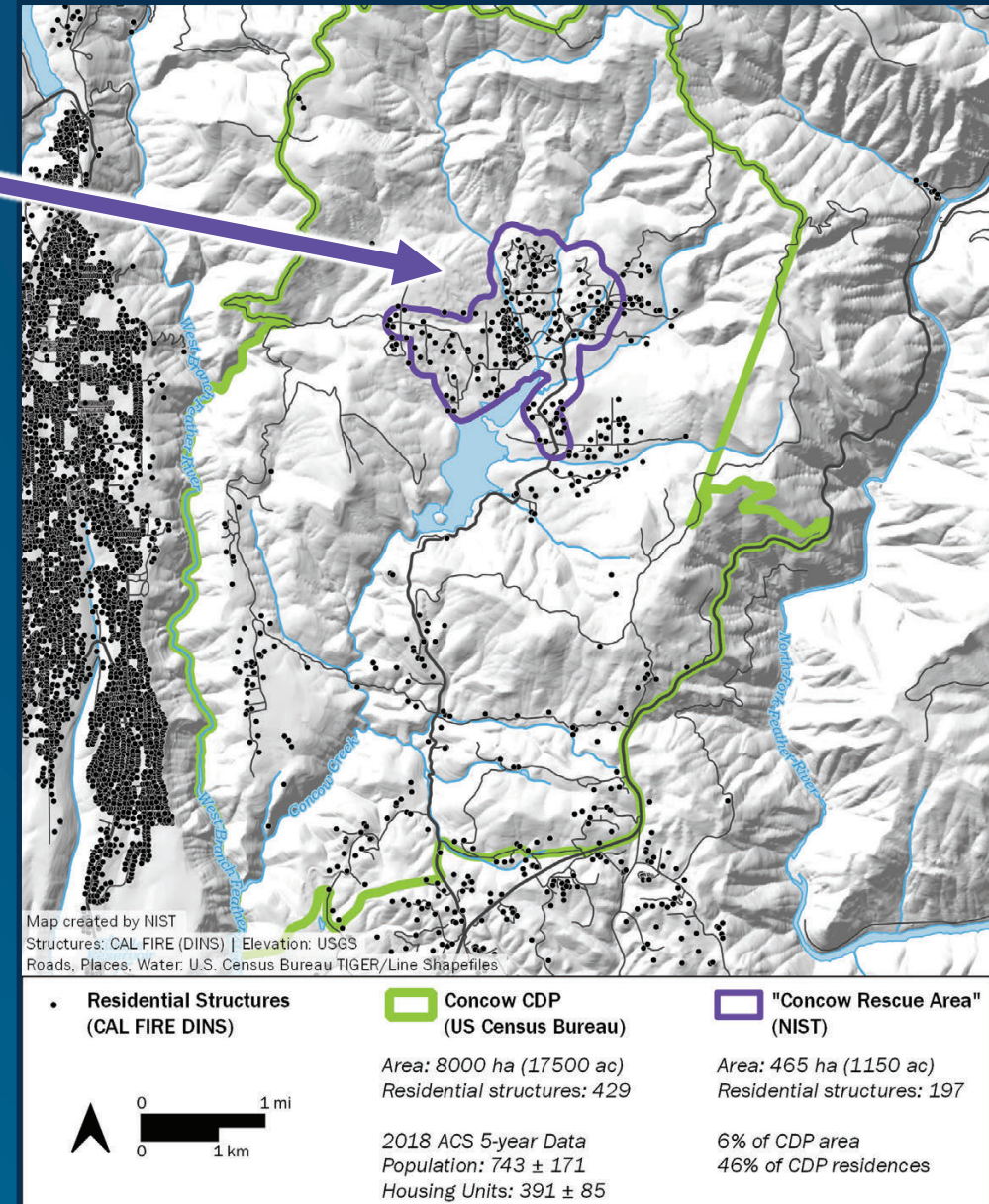
Technical Findings



Spot fires igniting in Concow by 07:15

Concow Rescue Area

- 200 m buffer around roadways involved in EA/Rs or known to have been patrolled or accessed by first responders
- 1.80 mi² with 13.5 mi of roadways
- 6 % of the Concow CDP administrative land area
- 46 % of residential structures in the CDP

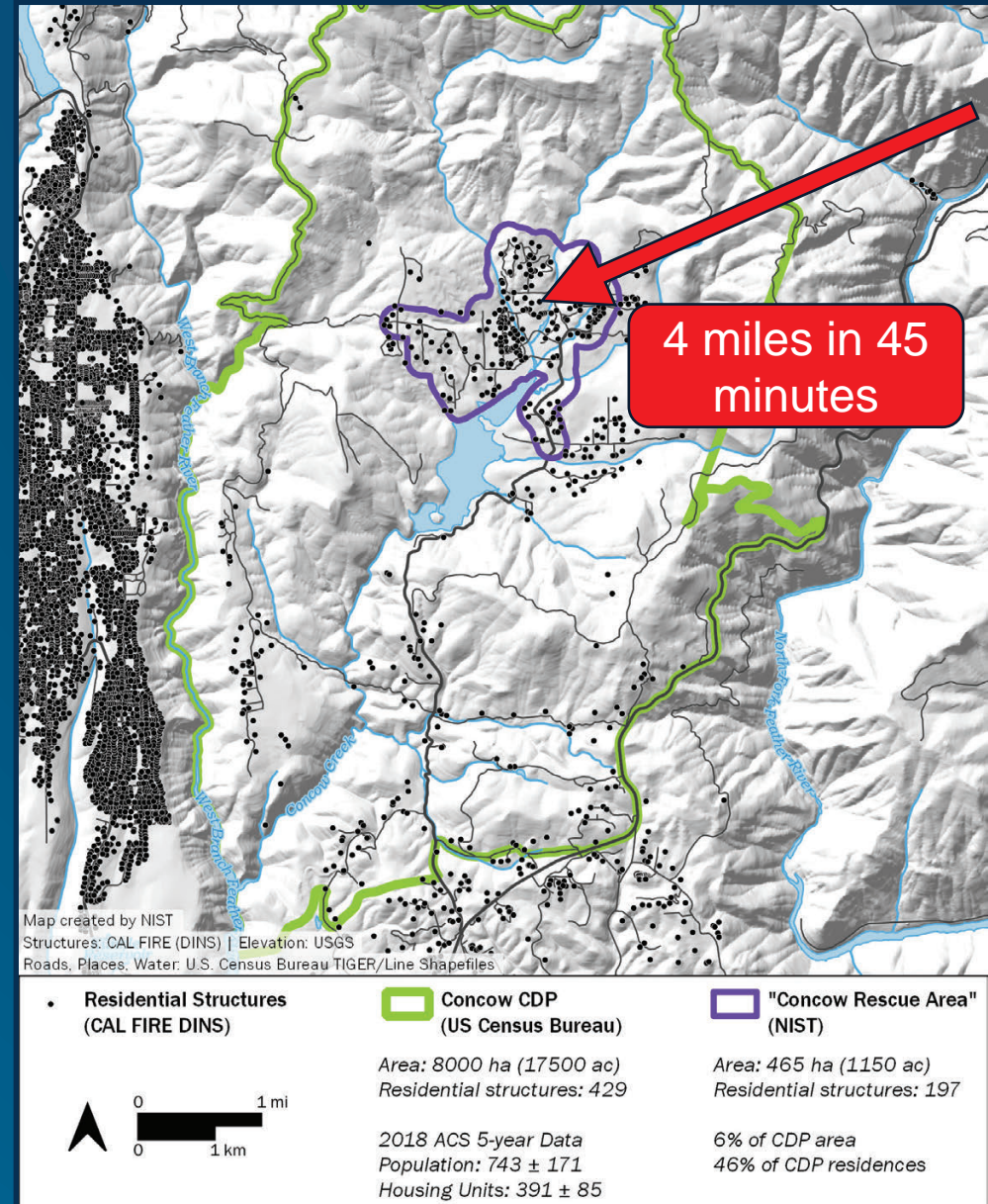


Concow Rescue Area

- Concow population: 743
- Identified EA/R activities involved a total of 110 civilians
 - 15 % of the entire Concow population
- CRA population*: 342
- 110/342 involved in EA/R

32 % of residents in the CRA involved in EA/Rs activities in the 4.5 hours after the fire arrived

*Assuming population is evenly distributed among residential structures



Rescue Data Methodology

Rescue Data Overview

Rescue Data Analysis

Concow

Paradise

Overall

Fatalities

Technical Findings

Rescues in Concow vs. Paradise

Table 47. EA/R event frequency by community, organized by Event Class / Response Action.

Event Type Class / Action	Concow	Paradise	Magalia	Other	Total
Assistance	1	55	6	2	64
Notification	1	31	2	2	36
Rescue Attempt		5	1		6
Rescue		19	3		22
Entrapment	20	58	3	1	82
Notification	4	10			14
Rescue Attempt	4	9			13
Rescue	12	39	3	1	55
Medical	1	13			14
Notification	1	6			7
Rescue		7			7
Pick-up	1	37			38
Notification		1			1
Rescue	1	36			37
Total	23	163	9	3	198

Note: "Other" events occurred in Yankee Hill, Stilson Canyon, and an undetermined location.

Rescue Data Methodology

Rescue Data Overview

Rescue Data Analysis

Concow

Paradise

Overall

Fatalities

Technical Findings

Rescues in Concow vs. Paradise

Table 47. EAVR event frequency by community, organized by

Event Type Class / Action	Concow	Paradise	M
Assistance	1	55	
Notification	1	31	
Rescue Attempt		5	
Rescue		19	
Entrapment	20	58	
Notification	4	10	
Rescue Attempt	4	9	
Rescue	12	39	
Medical	1	13	
Notification	1	6	
Rescue		7	
Pick-up	1	37	
Notification		1	
Rescue	1	36	
Total	23	163	

Note: "Other" events occurred in Yankee Hill, Stilson Canyon

Location	Population	Rescues	Rescues per capita
Paradise	26543	39	0.0015
Concow	743	12	0.016



10x more Rescue events per capita in Concow than in Paradise

Rescue Data Methodology
 Rescue Data Overview
 Rescue Data Analysis
 Concow
 Paradise
 Overall
 Fatalities
 Technical Findings

Concow Summary

- At least $\frac{1}{4}$ of residents in the CRA were rescued through the implementation of TRAs
 - ➔ *Life safety hazards exist in intermix communities with high fuel loadings during high wind / low fuel moisture events.*
- Severe hazards can be particularly impactful when there is little time to evacuate or to get to a safety zone.
- 95 % of people rescued in Concow were rescued within a 90-minute window.

Need for easily and rapidly accessible safety zones

Concow Summary

- Concow rescues were made possible by:
 - Rapid and effectively coordinated response of emergency personnel, including both LE and fire service
 - Community evacuation notifications were performed before and during the arrival of the fire.
- There is a need to quickly engage in life safety operations

Critical need for advance planning of response

Rescue Data
Methodology

Rescue Data
Overview

Rescue Data
Analysis

Concow

Paradise

Overall

Fatalities

Technical
Findings

Paradise

Paradise EA/R Overview

- 163 EA/R events documented
- 82% of all identified EA/R events

Paradise EA/R Overview

- The arrival of the fire front in Paradise later that morning gave civilians more time to prepare and begin evacuating.
 - The fire first reached the eastern part of Paradise at 07:50 and spread and spotted westward into town.
 - The fire reached the center and western part of town when most residents were awake.
- Evacuation warning notifications to Paradise initiated ahead of the fire (with the exception of Zone 6 and Upper Honey Run)

Residents had more time to begin evacuating before smoke and fire impacted egress arteries and entrapped civilians.

Paradise EA/R Overview

- Paradise had multiple egress arteries.
- Additionally, a number of multilane roads and multiple large parking lots associated with commercial buildings, places of worship, schools, and municipal buildings.
- Documented EA/R in this section likely represent only a fraction of all the individual rescues that occurred in Paradise.

Paradise EA/R Statistics

- 881 identified civilians involved in EA/R events in Paradise
- 622 identified civilians involved in Entrapments

Table 52. Event and civilian counts by EA/R Event Type in Paradise, organized by Event Class / Response Action.

Event Type Class / Action	Event Count		Civilian Headcount	
	<i>n</i>	%	<i>n</i>	%
Assistance	55	34	176	20
Notification	31	56	102	58
Rescue Attempt	5	9	6	3
Rescue	19	35	68	39
Entrapment	58	36	622	71
Notification	10	17	48	8
Rescue Attempt	9	16	14	2
Rescue	39	67	560	90
Medical	13	8	17	2
Notification	6	46	6	35
Rescue	7	54	11	65
Pick-up	37	23	66	7
Notification	1	3	2	3
Rescue	36	97	64	97
Total	163	100	881	100

Note: Percentages are listed for each Event Class, e.g., 56 % (31/55) of Assistance events were Notification Only.

Rescue Data
Methodology

Rescue Data
Overview

Rescue Data
Analysis

Concow

Paradise

Overall

Fatalities

Technical
Findings

Overall

circumstances / outcomes / summary

Circumstances of Civilians

Table 62. Circumstance of civilians involved in EA/R events.

Circumstance	Event Count		Civilian Head Count	
	<i>n</i>	%	<i>n</i>	%
Residence ^a	110	56	404	40
Vehicle	28	14	406	40
On foot	42	21	67	7
Other Circumstance	6	3	97	10
Unknown Circumstance	12	6	33	3
Total	198	100	1007	100

^a Residence category includes 2 events and 3 civilians in non-residential structures.

4x more residential EA/R events compared to vehicles for same number of civilians

EA/R Event Outcomes

- 13 categories
- 35% of time, transported by first responder (>300 civilians)
- 4% of events but 24% people – formation of TRA
- 44% all EA/R civilians related to TRAs – not uniform by location (Concow 76%, Paradise 40%)
- In *Rescue Attempts*, 26% of the time, civilians were not present at the reported location when first responders arrived

Rescue Data Methodology

Rescue Data Overview

Rescue Data Analysis

Concow

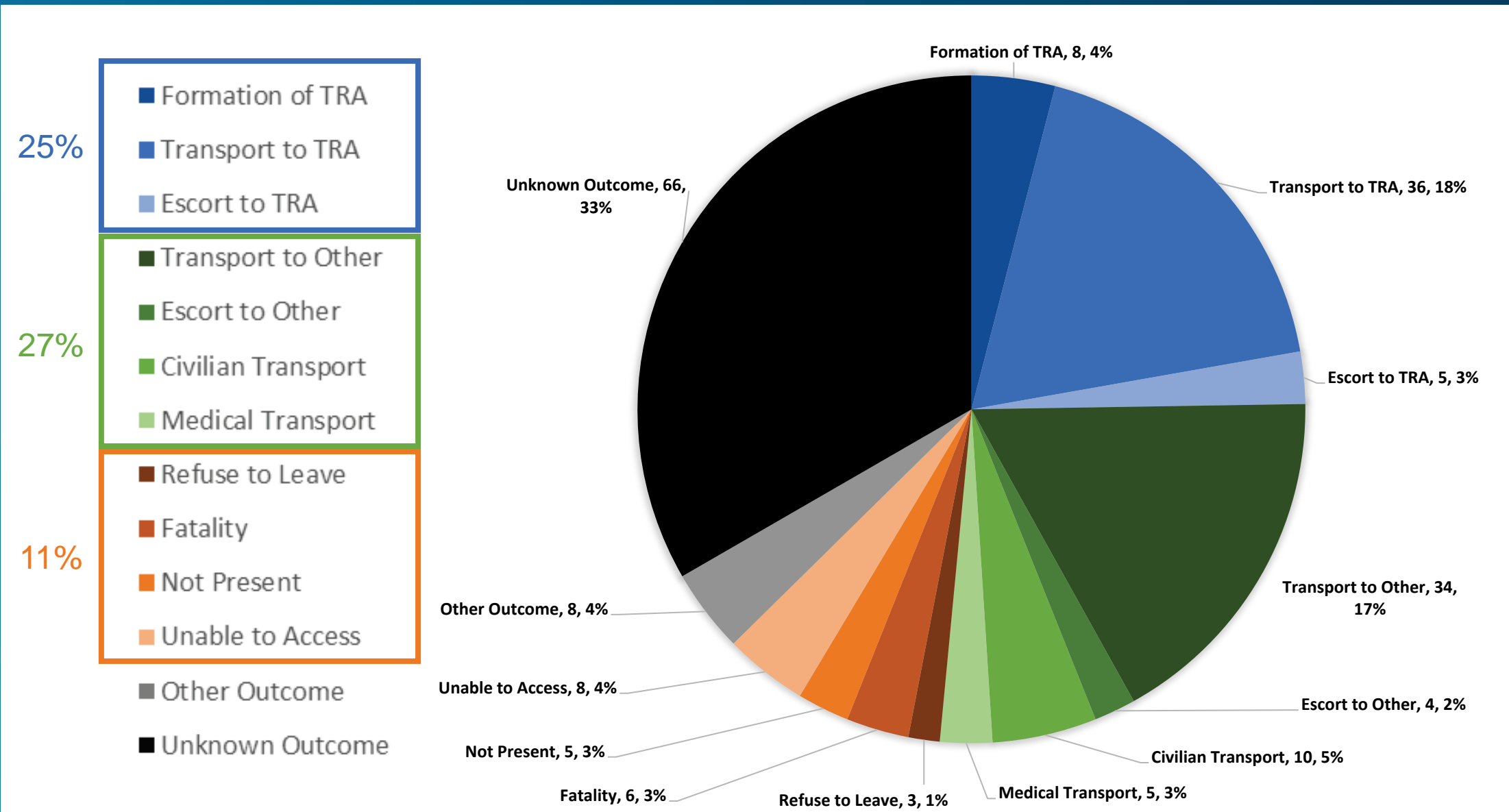
Paradise

Overall

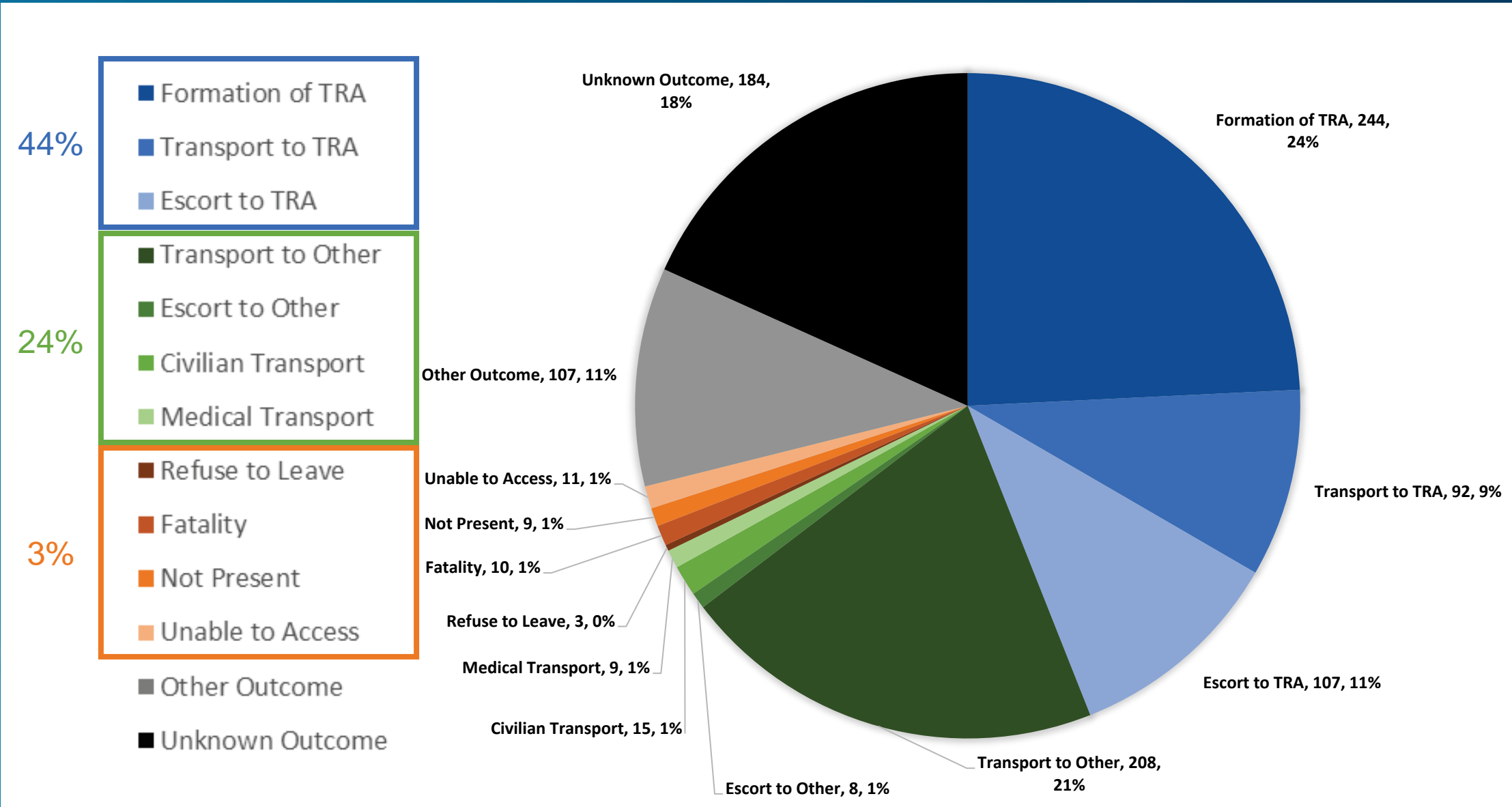
Fatalities

Technical Findings

Outcome by Event



Outcome by Civilian Count



Rescue Data Methodology

Rescue Data Overview

Rescue Data Analysis

Concow

Paradise

Overall

Fatalities

Technical Findings

Additional Analyses

- 10.6.1. Population Fraction
- 10.6.2. Response Action
- 10.6.3. Outcome
- 10.6.4. Time of Day
- 10.6.5. Notification Source
- 10.6.6. Group Size
- 10.6.7. Circumstance
- 10.6.8. Pre-existing conditions
- 10.6.9. Complete EA/R Accounts

Rescue Data
Methodology

Rescue Data
Overview

Rescue Data
Analysis

Concow

Paradise

Overall

Fatalities

Technical
Findings

EA/R Summary

- Over 1000 civilians involved in 198 identified events
- 44 % of all civilians in EA/R (443/1007) were involved in TRAs.
- 55 % of civilians *Rescued* (443/809) were involved in TRAs.
- 58 events had no identified response action, with most of them (62 %) being requests for evacuation *Assistance*.
 - Most had unknown, but non-fatal, outcomes
 - 4 of the 58 events were associated with seven fatalities

9 out of 10 civilians in *Entrapment* EA/R events were *Rescued* (659/733)

EA/Rs Summary - Concow

- 32 % of the civilians living in the selected Concow Rescue Area (CRA) were associated with EA/R events in the first 4.5 hours after the fire reached the CRA
- 25 % of the estimated population of the CRA were rescued via TRAs
- 97 % of people involved in EA/R events in Concow were Entrapments
- 95 out of the 107 civilians Entrapped in Concow, were Rescued

Rescue Data
Methodology

Rescue Data
Overview

Rescue Data
Analysis

Concow

Paradise

Overall

Fatalities

Technical
Findings

EA/Rs Summary – Paradise

- At least 881 total civilians were involved in known EA/R in Paradise, with a reasonable estimate of 1188 when including potential uncertainty in the data.
- 71 % of people involved in events in Paradise were Entrapments (622/881)
- ➔ 90 % of people involved in Entrapments in Paradise were Rescued (560/622)
- 89 % of the people involved in Entrapment EA/R in Paradise occurred between 08:00 and 12:00 (556/622)
- ➔ 12 % of rescue responses (14/115) were incomplete and therefore are categorized as Rescue Attempts—there are no fatalities associated with these 14 events.

9 out of 10 Entrapment EA/R events in Paradise occurred in four hours (08:00 to noon)

EA/R Summary – Paradise

- The EA/R from Paradise illustrate the large number of simultaneous Entrapments and Assistance requests, and the rapid and effective response by LE and fire department personnel to get civilians to safety.
- Successful responses in part attributed to pre-fire planning and joint training exercises
- Proximity of Paradise to the larger population centers of Chico and Oroville significantly enhanced the EA/R operations in Paradise.

Significant number of LE resources were able to arrive quickly and respond to the large number of simultaneous EA/R events.

Rescue Data
Methodology

Rescue Data
Overview

Rescue Data
Analysis

Concow

Paradise

Overall

Fatalities

Technical
Findings

Fatalities

Relation to EA/R

Of the 85 fatalities, 10 fatalities (7 events) were associated with the 198 identified EA/R events.

- 2 were unable to be rescued in time
- 1 was Rescued, but did not recover from their injuries
- 4 fatalities (2 events) were documented in 911 calls but were unable to be rescued
- The remaining 3 events were known to law enforcement dispatch at undetermined time from an undetermined source

Fatalities

- Seven of the nine fatalities in Concow are not linked to any documented notification, rescue request, or rescue action.
- EA/R data included 58 instances where the only data point was notification of emergency personnel, only 4 of these events (7 people) are linked to the 85 fatalities.

Fatalities

Age

- Range – 20 to 99
Average and Median – 72 years old
- 16 individuals were under age 65

Pre-existing Conditions

- At least 42 % of the victims were reported to have a mobility or medical condition, and it was less likely that they were attempting to evacuate. Nearly everyone with an identified pre-existing mobility and/or medical condition was found at home.
- Of the 66 people (78%) not evacuating, at least half had a pre-existing condition.
- 5 of 6 EA/R with fatal outcomes involved victims with pre-existing conditions

Location

- Most fatalities (87%) were found at home.
- A smaller number were located with their vehicles, attempting to evacuate.

Table 63. Summary of fatalities with respect to location found and pre-existing (pre-x) conditions.

Location	Count	Any Pre-X Condition	Pre-X Mobility Impairment	Pre-X Medical Limitation
Home – inside	59	29	19	16
Home – outside	15	6	3	5
Vehicle – inside	7	1	0	1
Vehicle – outside	3	0	0	0
Unknown	1	0	0	0
Total	85	36	22	22

Table 64. Summary of fatalities with respect to evacuation and pre-existing (pre-x) conditions.

Evacuation Circumstance	Count	Any Pre-X Condition	No Known Pre-X Condition
Attempting evacuation	19	4	15
Undetermined/Not attempting evacuation	66	32	34
Total	85	36	49

Rescue Data
Methodology

Rescue Data
Overview

Rescue Data
Analysis

Concow

Paradise

Overall

Fatalities

**Technical
Findings**

Evacuation Assistance and Rescues

technical findings & recommendations

Technical Findings

Evacuation Assistance/Rescues

TF-R 1. Rapid fire progression, burnovers, and traffic restrictions significantly impacted rescue actions in Concow and Paradise, by both causing the need for rescues and preventing access to areas in need.

 **TF-R 2.** Over 1000 civilians were involved in 198 identified EA/R events on November 8 and early November 9.

TF-R 3. 61 % of EA/R events are characterized by Rescue response actions (121/198).

 **TF-R 4.** 90 % of civilians involved in Entrapment events were Rescued (659/733).


TF-R 5. Overall, at least 30 % (59/198) of all events involved a civilian with a pre-existing condition which may have caused difficulty in evacuating or prompted a request for assistance or rescue. Five of the 59 EA/R events with pre-existing conditions resulted in fatalities; however, five of the six EA/R events with a fatal outcome involved pre-existing conditions.

Technical Findings

Evacuation Assistance/Rescues

TF-R 6. Only 14 % of identified EA/R events involved civilians in vehicles (28/198); however, these events accounted for 40 % of the civilians involved, the same total number as those at a residence (~400/1007).

TF-R 7. The EA/R events involving civilians in their vehicles often resulted in the use of TRAs. This was the outcome 46% of the time (13/28), accounting for 69% of civilians in vehicles (280/406).

 **TF-R 8.** First responders independently found or identified the need for evacuation assistance or rescue without information from 911 or dispatch 37 % of the time (73/198). Events were reported via 911 or dispatch with the same frequency (73/198).

TF-R 9. Only 34 % of Entrapment events were reported via 911 or dispatch. First responders encountered Entrapment events with the same frequency (34 %).

 **TF-R 10.** 81 % of all EA/R events involved 1 or 2 people (161/198), totaling 21 % of the EA/R head count (210/1007).

Technical Findings

Evacuation Assistance/Rescues

Concow – 110 civilians in EA/R

TF-R 11. 92 % of civilians Rescued in Concow were rescued in a 90-minute period between 07:45 and 09:15 (88/96), mostly through formation of TRAs (84/88).

TF-R 12. 77 % of civilians in EA/R in Concow were Rescued through involvement in TRAs (85/110).

TF-R 13. 18 of 20 events in the selected Concow Rescue Area (CRA) were Entrapment events (107/110 civilians).

 **TF-R 14.** Over 25 % of the estimated population of the CRA was Rescued (95/342).

Technical Findings


Evacuation Assistance/Rescues

Paradise – 881 civilians in EA/R

TF-R 15. 80 % of civilians Rescued in Paradise were in Entrapment events (560/703).

TF-R 16. 89 % of the people involved in Entrapment EA/R in Paradise occurred between 08:00 and 12:00 (556/622).

TF-R 17. 40 % of civilians in EA/R in Paradise were Rescued through involvement in TRAs (353/881), including 18 % involved in the immediate formation of TRAs (162/881).

 **TF-R 18.** There is a significant difference between the number of response actions (Rescues plus Rescue Attempts) to Entrapments versus Assistance requests. Responses were identified in 83 % of Entrapments compared to the 44 % of Assistance requests. This highlights the effective decision making by first responders in addressing risk to civilians, prioritizing high hazard situations for rescue by the limited number of available responders

Recommendations

Evacuation Assistance/Rescues

R-R 1. First responders should plan for partial or complete loss of communications with dispatch.

R-R 2. Additional post-fire studies on these types of EA/R events should be conducted to further assess Notification, Rescue, Rescue Attempt, and Entrapment frequency and outcomes in different WUI fire incidents.

Rescue Data
Methodology

Rescue Data
Overview

Rescue Data
Analysis

Concow

Paradise

Overall

Fatalities

Technical
Findings

Thank You

Contact Information:

Eric Link

eric.link@nist.gov

Alexander Maranghides

alexm@nist.gov

Camp Fire



[https://www.nist.gov/el/fire-research-division-73300/
wildland-urban-interface-fire-73305/nist-investigation-california](https://www.nist.gov/el/fire-research-division-73300/wildland-urban-interface-fire-73305/nist-investigation-california)

Direct links to NETTRA reports:

<https://doi.org/10.6028/NIST.TN.2252>

<https://doi.org/10.6028/NIST.TN.2252sup>