

A Case Study of the Camp Fire –

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

Module 5: Summary

NIST WUI DAYS 2023 – Session 2.5

November 8, 2023



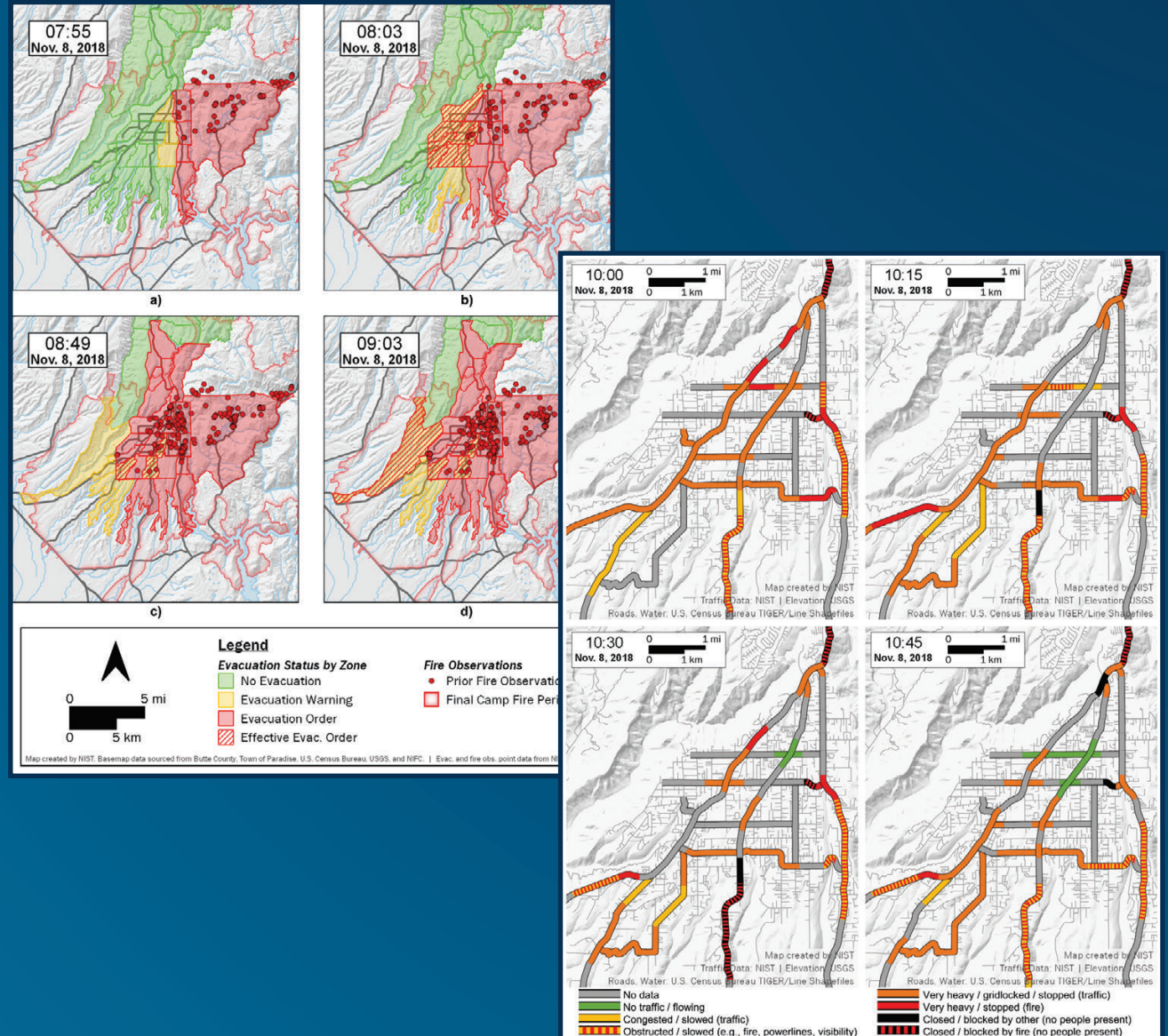
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Eric Link
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NETTRA Summary

- Overview
- Concow
- Paradise
- Magalia
- Paths Forward

64 Technical Findings
26 Recommendations



Fire Progression Timeline

+

NETTRA

Notification

Evacuation

Traffic

Temporary Refuge Areas

Rescues

Pulling It All Together

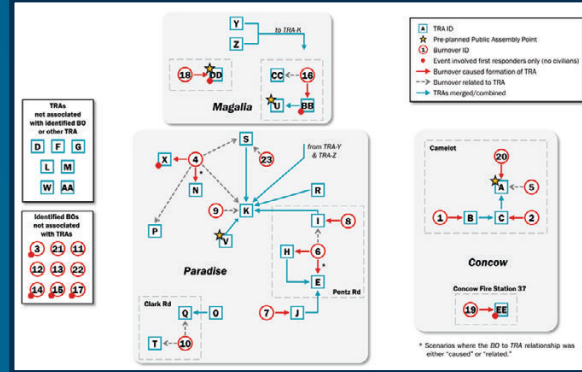
Pearson Rd Burnover – Entrapment – Rescue – TRA

Fire Progression Timeline

Photo courtesy of TD-122, 09:40. Used with permission.



TRAs Evacuation – Section 9



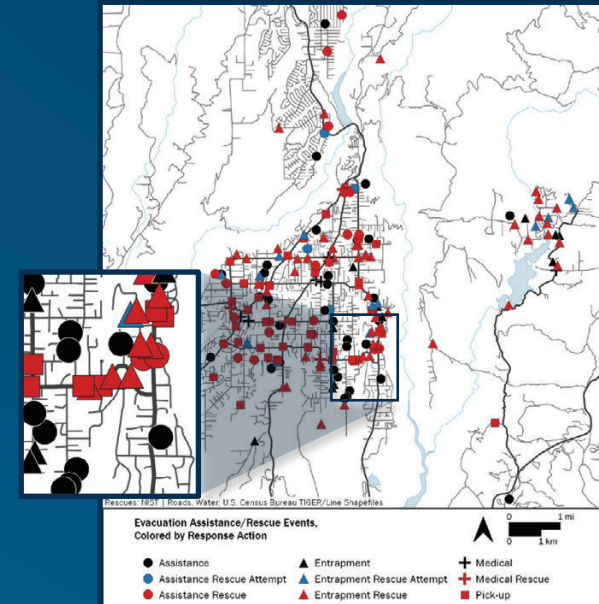
TRA Details – Appendix I

Burnover – Section 8

| ID ^a | Location ^b | Community | Severity Category | Burnover Initiation | Burnover Duration (min) | Road Width (m) | Vegetation Setback (m) | Roadway Length Affected ^c (m) | Im Cr Era (Y) |
|-----------------|-----------------------|-----------|-------------------|---------------------|-------------------------|----------------|------------------------|--|---------------|
| 1 | Hoffman Rd | Concow | 1 | 07:50 | 40 | 3 | 0–2, more at creek | 250 | |
| 2 | Concow Rd | Concow | 2 | 07:50 | 70 | 7 | 0–1 | 1000 | |
| 20 | Camelot Ln | Concow | 1 | 07:55 ^c | 50 | 6 | 0 (in grass) | n/a | |
| 3 | Chapman Ln | Paradise | 1 | 08:30 | n/d ^f | 3 | 0–3 | 250 | |
| 4 | Skyway (upper) | Paradise | 1 | 08:30 | 360 | 8 | 0–10 | 2600 | Y Y Y |
| 5 | Windermere Ln | Concow | 1 | 08:35 ^c | n/d | 4 | 0–2 | 1100 | Y 1 |
| 6 | Pentz Rd | Paradise | 1 | 08:45 | 150 | 8 | 0–1 | 1300 | Y Y Y |
| 7 | Pearson Rd | Paradise | 1 | 09:15 | 60 | 11 | 1–3 | 800 | Y Y Y Y 1 |

| Cross Street | Total Lanes | Time | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--|--|--|
| | | 06:30 | 06:45 | 07:15 | 07:30 | 07:45 | 08:00 | 08:15 | 08:30 | 08:45 | 09:00 | 09:15 | 09:30 | 09:45 | 10:00 | 10:15 | 10:30 | 10:45 | 11:00 | 11:15 | 11:30 | 11:45 | 12:00 | 12:15 | 12:30 | 12:45 | 13:00 | 13:15 | 13:30 | 13:45 | 14:00 | | | |
| Pentz Rd | 2 | | | | | 2 | 4 | 4 | 4 | 3 | | | | | | | | | | | | | | | | | | | | | | | | |
| Hilbe Dr | 2 | | | | | | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 3 | 3 | 3 | | | | | | 3 | 3 | | | | | | | | | | |
| Cherry Ln | 2 | | | | | | 2 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 3 | | | | | | | | | | | | | | | | | |
| Edgewood Ln | 2 | | | | | | 2 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 3 | | | | | | | | | | | | | | | | | | | |
| Sawmill Rd | 2 | | | | | | 2 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | | | | | | | | | | | | | | | | | |
| South Libby Rd | 2 | | | | | | | | | | | | | | 4 | 4 | 4 | 4 | | | | | | | | | | | | | | | | |
| Newland Rd | 2 | | | | | | | | | | | | | | 4 | 4 | 4 | 4 | | | | | | | | | | | | | | | | |
| Clark Rd | 2 | | | | | | 2 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | | | | | | | | | | | | | | | | |
| Academy Dr | 3* | | | | | | | | | | | | | | 4 | 4 | 4 | 4 | | | | | | | | | | | | | | | | |
| Black Olive Dr | 4 | | | | | | | | | | | | | | 4 | 4 | 4 | 4 | | | | | | | | | | | | | | | | |
| Skyway | 4 | | | | | | | | | | | | | | 4 | 4 | 4 | 4 | | | | | | | | | | | | | | | | |

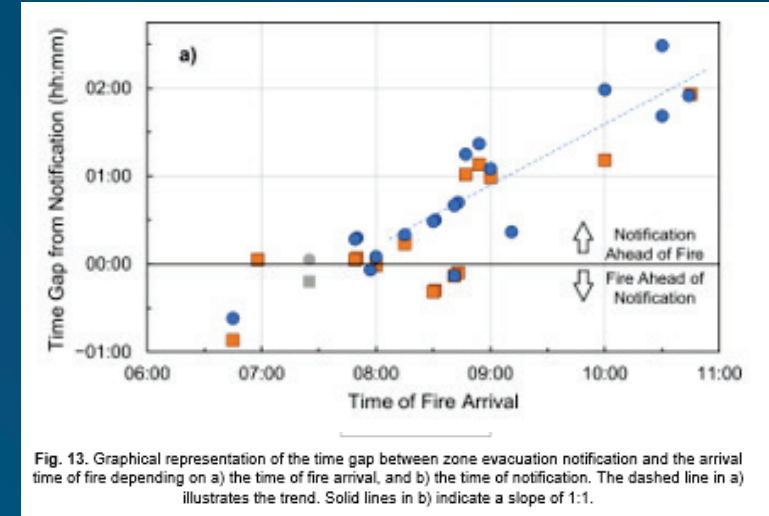
Traffic – Section 7



Rescues – Section 10

NETTRA Summary

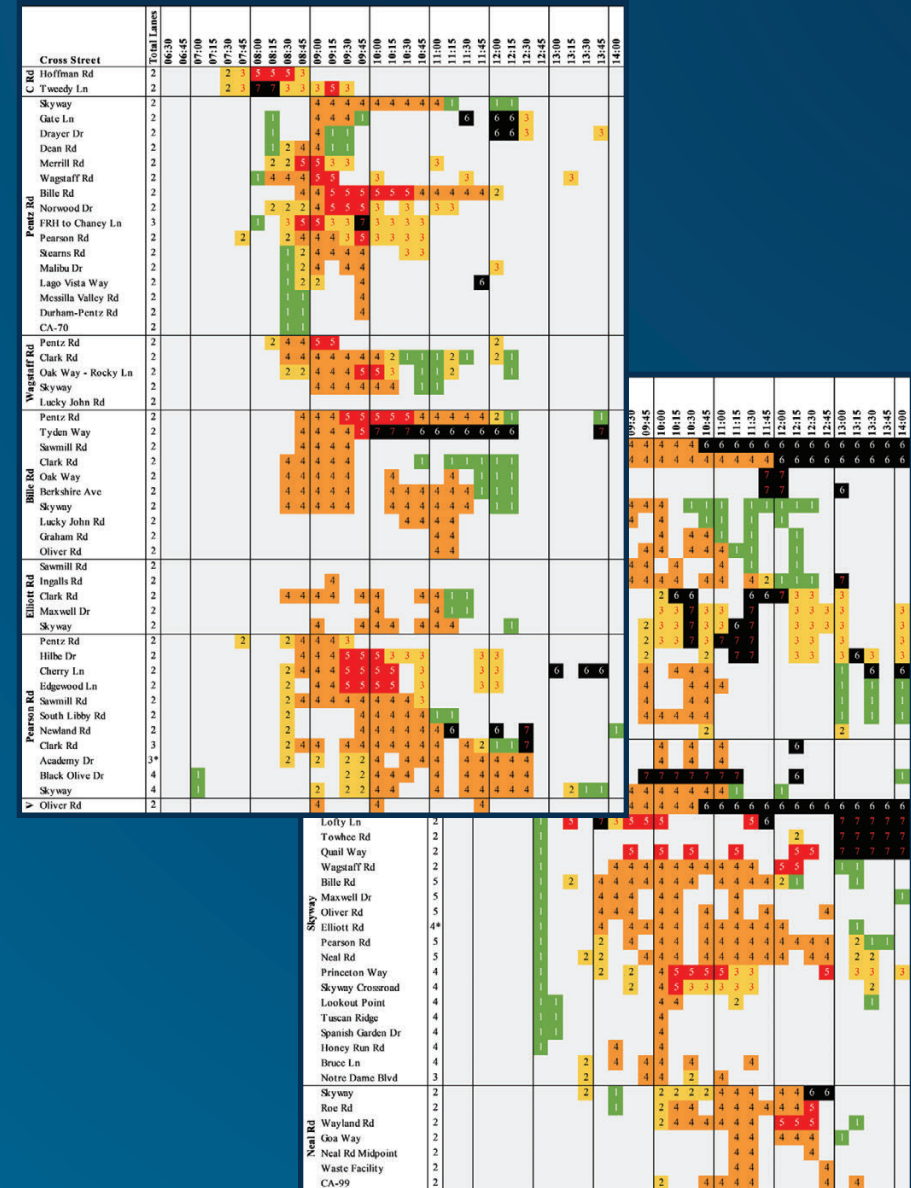
- The path and timing of the 2018 Camp Fire through communities in Butte County, California presented a significant threat to life safety.
- This case study report examined the pre-fire preparations, notification, and evacuation activities in Concow, Paradise, and Magalia, the three communities initially impacted by the Camp Fire.
- The report identified the relationship between the notification timeline and the time of fire arrival as a function of evacuation zones.



Path and timing of Camp Fire presented significant threat to life safety

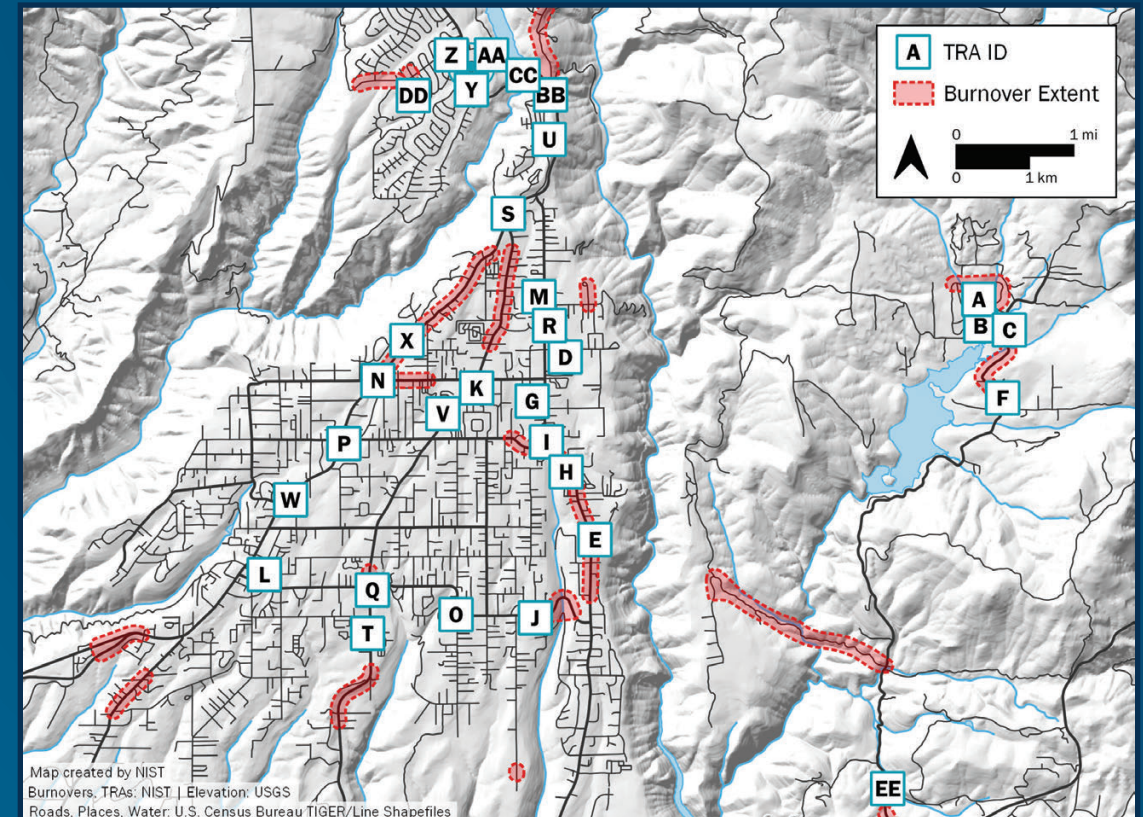
NETTRA Summary

- The three impacted communities (Concow, Paradise, and Magalia) experienced the Camp Fire very differently.
- Evacuation was constrained by burnovers that closed the main egress arteries.
- Rescue activities were impacted by the intensity of the rapidly moving fire.



NETTRA Summary

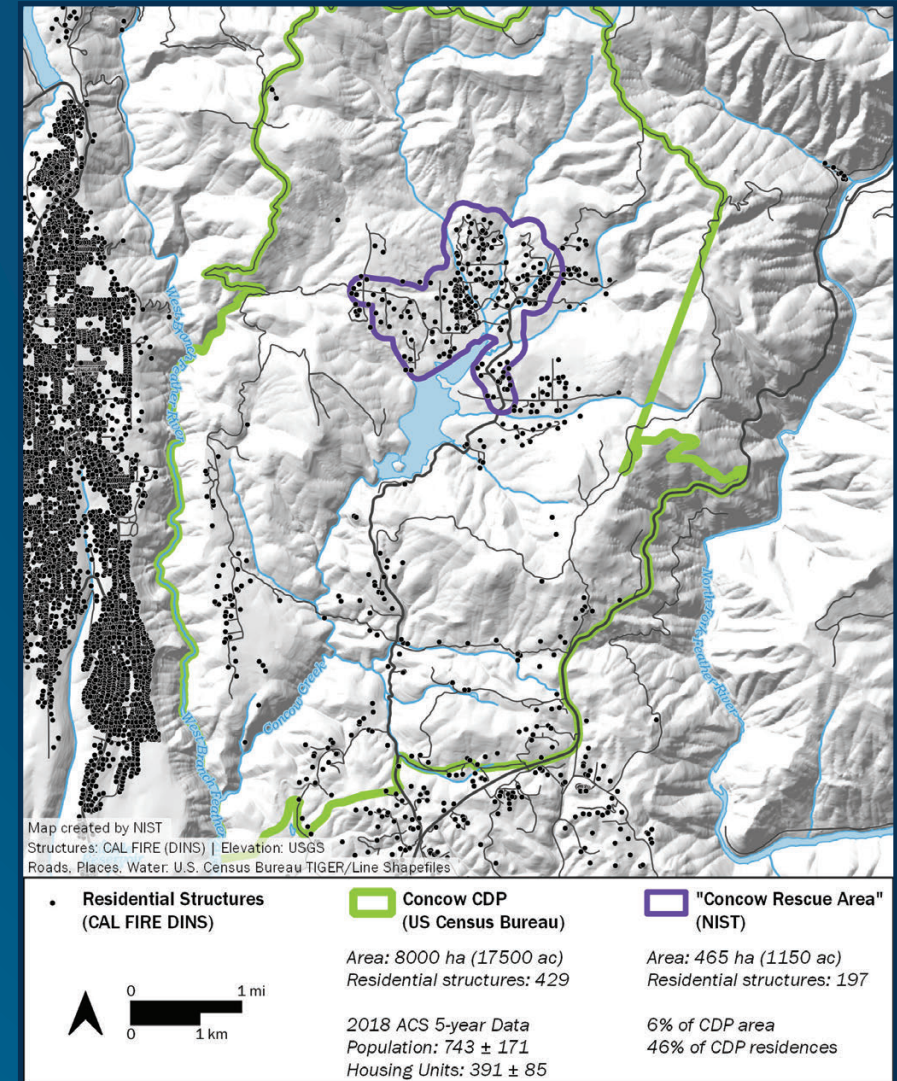
- A total of at least 1200 civilians were involved in 31 TRAs, including over 200 civilians in high-risk environments.
- Additionally, 198 distinct evacuation assistance/rescue (EA/R) events were identified and classified. The unique dataset was analyzed with respect to response actions, outcomes, and circumstances of each rescue.
- At least 1000 civilians were involved in EA/R events, many independent of the civilians included in TRAs.
- A limited analysis was performed on the available information regarding the 85 fatalities suffered in the fire.



NETTRA Summary

Concow (1 of 2)

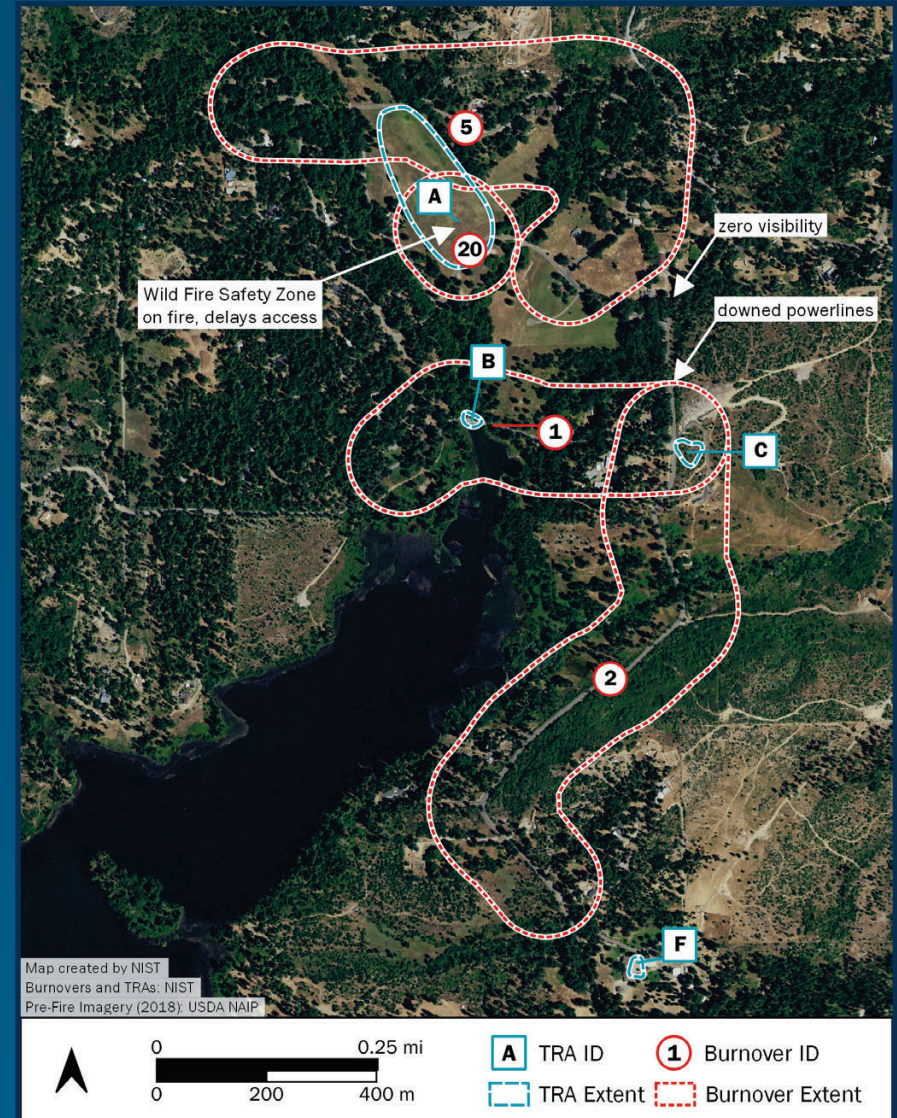
- Located near the fire origin (6.5 km [4 mi]), Concow was impacted within 1 hour of ignition.
- There was little time for widespread community notification. Door-to-door notification activities by first responders and neighbors were instrumental in informing residents.
- A large fraction of the population in the Concow Rescue Area (CRA; the area surrounding Camelot and near the reservoir) was caught in high hazard conditions.



NETTRA Summary

Concow (2 of 2)

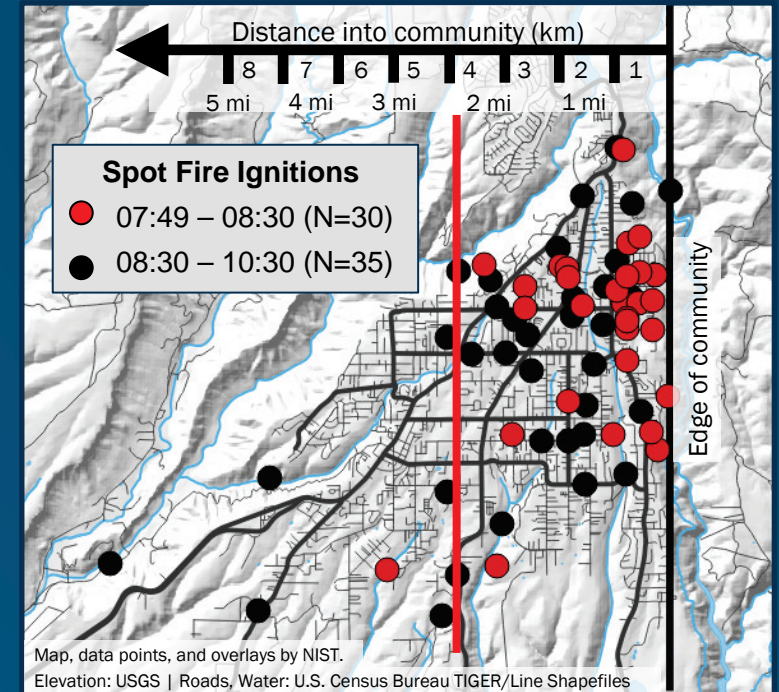
- 110 civilians, representing approximately 32 % of the population in the CRA, were involved in evacuation assistance or rescue (EA/R) events.
- Multiple TRAs in close proximity to each other had to be formed to maintain life safety for both civilians and first responders.
- Rescue activities were impacted by the intensity of the rapidly moving fire.
- Evacuation was constrained by burnovers that closed the main egress artery (Concow Road).



NETTRA Summary

Paradise (1 of 3)

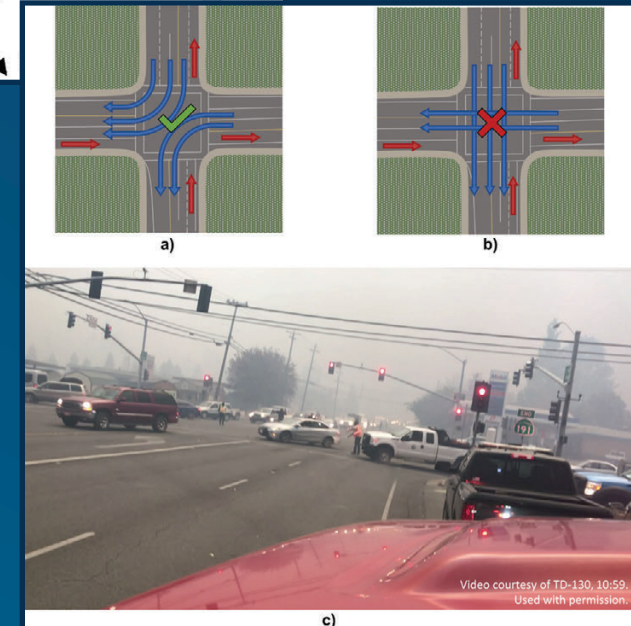
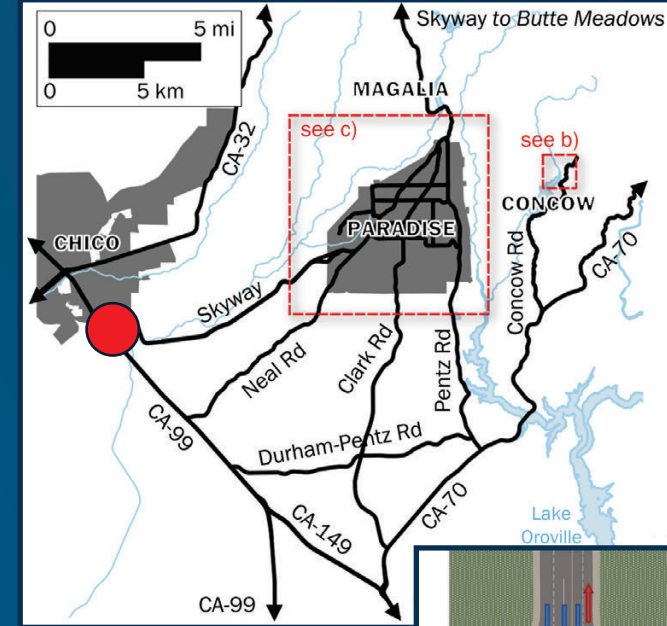
- Spot fires began impacting Paradise at 07:49, 35 minutes after Concow. The fire front arrived approximately 40 minutes later at around 08:30.
- The fire significantly impacted evacuations along the Pentz Road corridor (eastern Paradise) where multiple burnovers occurred, trapping and endangering dozens of civilians.
- Evacuation notifications caught up with the fire progression, and by 09:00 CodeRED reverse 911 evacuation notifications were sent to the public ahead of the fire.



NETTRA Summary

Paradise (2 of 3)

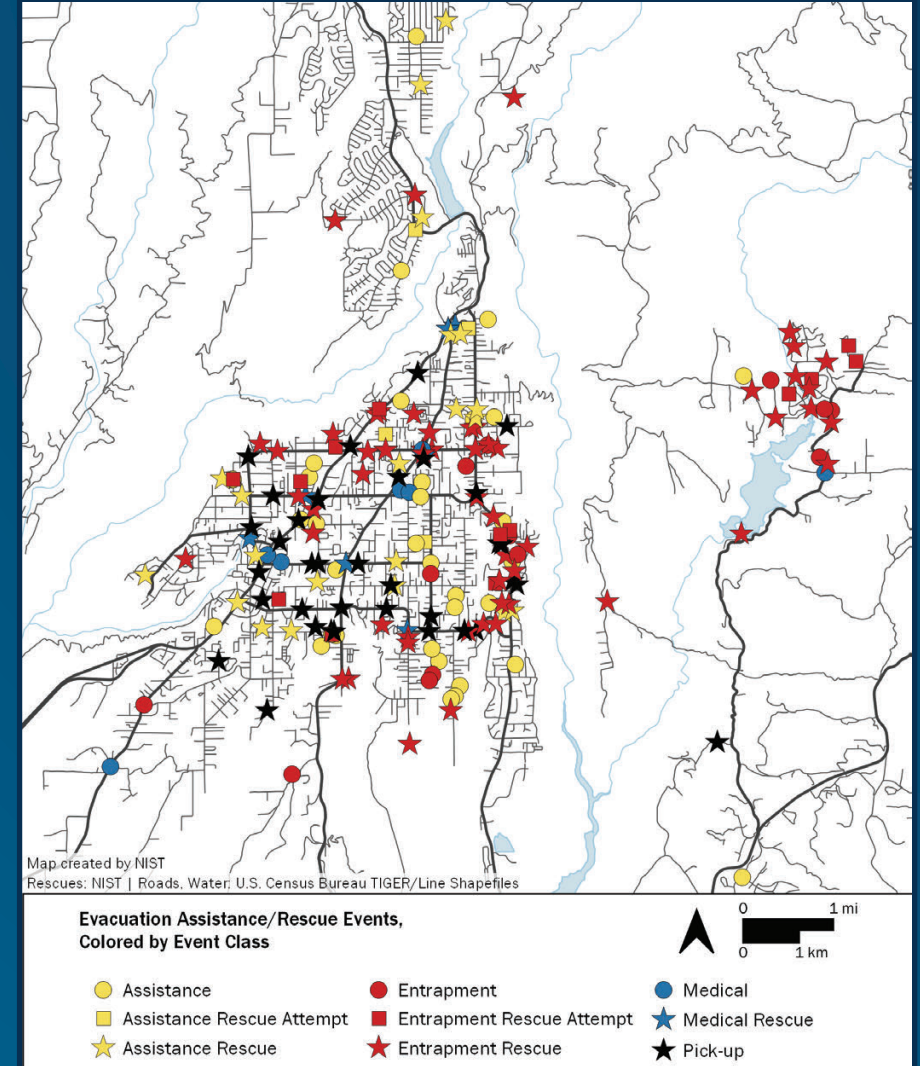
- Traffic was pushed to the west, first to Clark Road then to Skyway as the fire generally progressed southwest.
- Traffic leaving Paradise gridlocked in Chico and the valley, and the backup extended all the way up Skyway into Paradise.
- Traffic management by first responders was used to shuffle vehicles and evacuating civilians away from fire exposures as much as possible.



NETTRA Summary

Paradise (3 of 3)

- Rescues and the use of TRAs occurred throughout the morning of November 8 as burnovers entrapped civilians and closed many of the egress arteries.
- Mutual aid responders were instrumental in conducting numerous rescues.
- First responder access was restricted by fire, road closures, and heavy evacuating traffic.
- Most civilians had evacuated by 14:00.



NETTRA Summary

Magalia (1 of 2)

- The southern extent of Magalia and the Old Magalia neighborhood also experienced fire the morning of November 8.
- The closure of Skyway through Paradise prevented civilians from evacuating using the southern routes after 10:00. Many residents in Magalia felt that the fire was not going to reach their community. The southern evacuation route reopened after 17:30 and was passable with an escort through Paradise.



Photo courtesy of TD-041, 14:12.
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Magalia (2 of 2)

- Intense fire pushed deeper into Magalia overnight after fire flared up along Coutolenc Road and progressed north and west.
- The delayed arrival of the fire to parts of Magalia enabled the communication of notification information to the public well ahead of the fire.
- Most civilians had evacuated by that time; however, there were evacuations and rescues into the night and through the morning of November 9.



Lessons Learned and Paths Forward

Goal: Facilitate the use of lessons learned from Camp Fire NETTRA.

➔ Assembled a methodology for small to intermediate sizes intermix communities to help with Evacuation Sheltering Considerations: Assessment, Planning and Execution (ESCAPE).

NIST Technical Note
NIST TN 2262

WUI Fire Evacuation and Sheltering Considerations

Assessment, Planning, and Execution (ESCAPE)

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This publication is available free of charge from:
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Thank You

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Camp Fire



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Direct links to NETTRA reports:

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

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