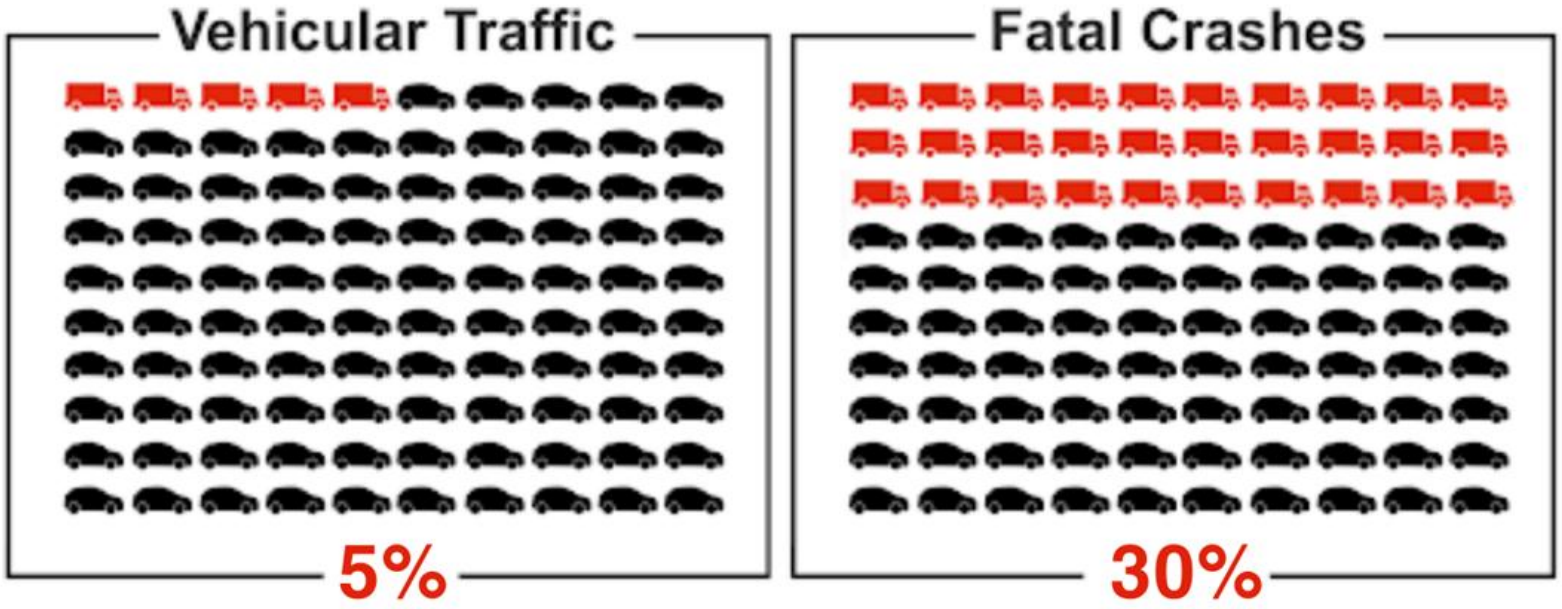
UC San Diego Health

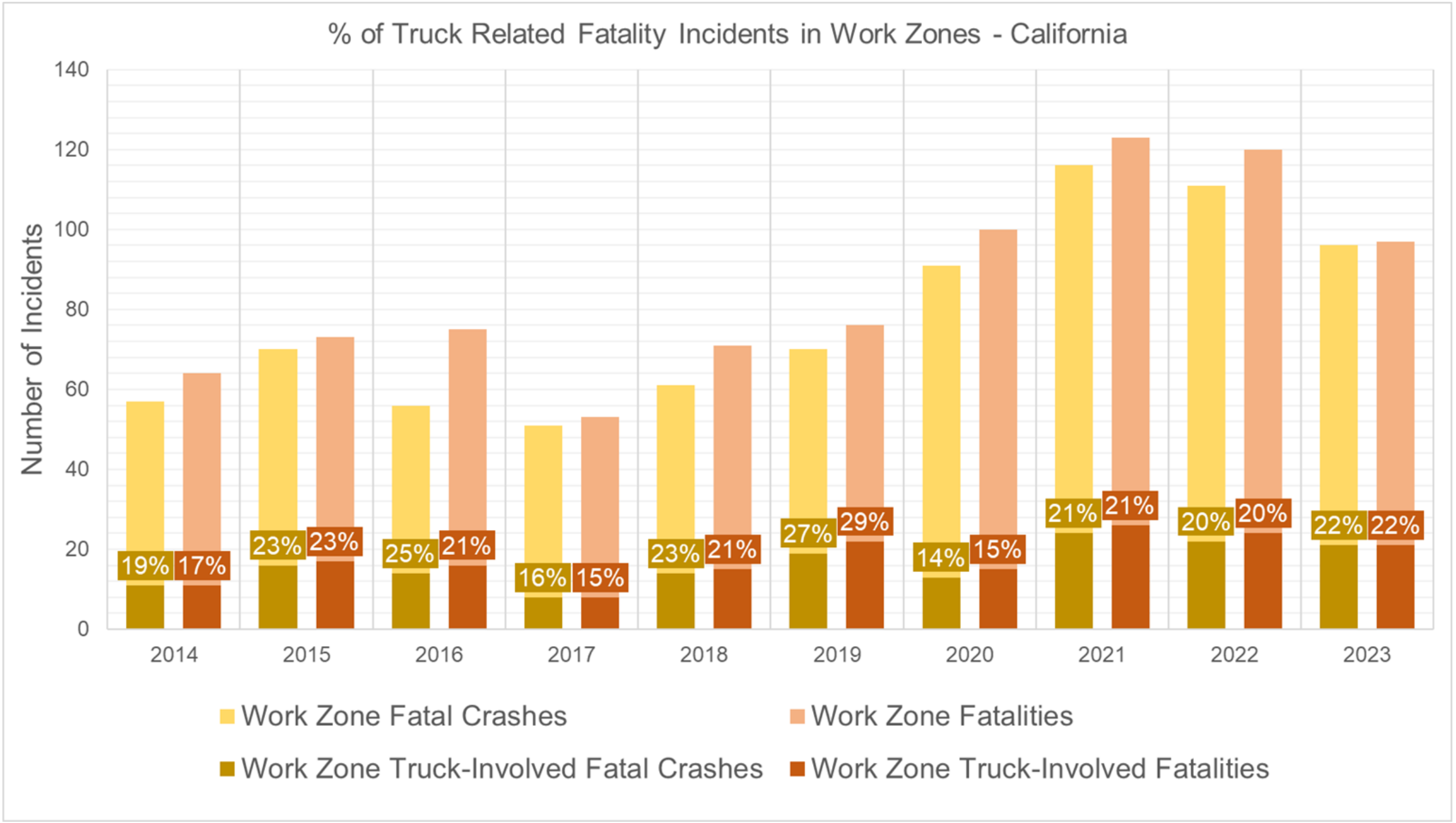
Use of Real-Time Driver Alerts to Improve Commercial Motor Vehicle Safety

Principal Investigators:
Linda Hill, MD, MPH
Ryan Moran, MD, MPH
Research Program Manager:
Julia McMillan, MA, MS
Data Analyst:
Sarah Hacker, BA

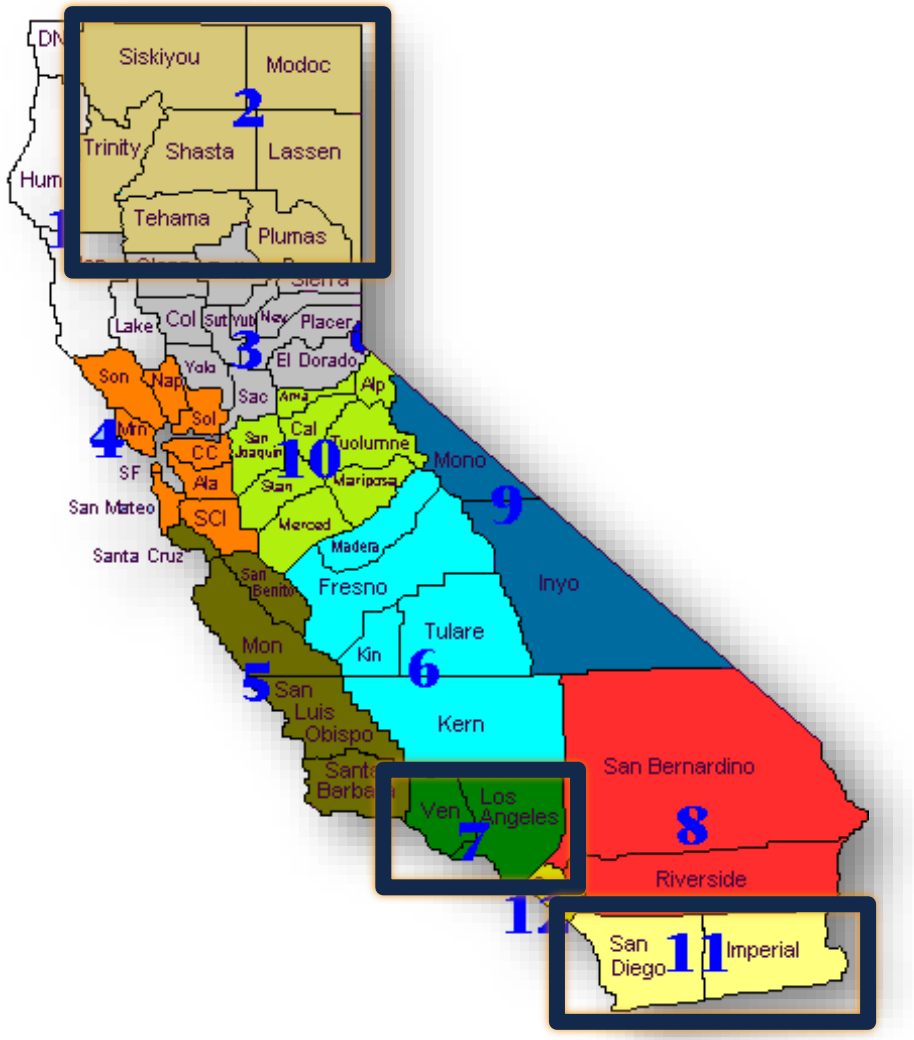
TREDS

CMVs: Overrepresented in Fatal Work Zone Crashes




% of Truck Related Fatality Incidents in Work Zones - California
Number of Incidents
140
120
100
80
60
40
20
0
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
19%
17%
23%
23%
25%
21%
16%
15%
23%
21%
27%
29%
14%
15%
21%
21%
20%
20%
22%
22%
Work Zone Fatal Crashes
Work Zone Fatalities
Work Zone Truck-Involved Fatal Crashes
Work Zone Truck-Involved Fatalities

Will active work zone alerts improve CMV driving safety?



- ➔ Caltrans Commercial Wholesale Web Portal Version 2 (CCWWP-2) provides real-time open source **active work zone data**
- ➔ **MUTCD-compliant** and hands-free alerts are delivered via in-cab Electronic Logging Device (ELD)
- ➔ **Anonymous** vehicle data are collected via app on ELD
- ➔ Impact of alerts on speed and hard braking is evaluated
- ➔ Deployed across Caltrans Districts 11 & 2 for 16 months
- ➔ Alerts will deploy in limited areas of District 7 for 4 weeks in August/September 2025

Will active work zone alerts improve CMV driving safety?

- ➔ Caltrans Commercial Wholesale Web Portal Version 2 (CCWWP-2) provides real-time open source **active work zone data**
- ➔ **MUTCD-compliant** and hands-free alerts are delivered via in-cab Electronic Logging Device (ELD)
- ➔ **Anonymous** vehicle data are collected via app on ELD
- ➔ Impact of alerts on speed and hard braking is evaluated
- ➔ Deployed across Caltrans Districts 11 & 2 for 16 months
- ➔ Alerts will deploy in limited areas of District 7 for 4 weeks in August/September 2025

Study Objectives

- Measurable changes in driver behavior (speed reduction, less frequent hard braking)
- Reduction in CMV-involved crashes
- Understanding the perception of in-cab alerting among key stakeholders such as participating fleets, driver supervisors, drivers, and road workers
- Disseminating detailed, data-driven information regarding the impact of free safety alerts to enable cost-effective investments

Work Zone Vehicle Visit Data Collection Process

Pre-alert data

DriveWyze collects vehicle behavior data such as speed, acceleration, and bearing at one-second intervals for 30 seconds before alerting.

Work Zone Alert Trigger

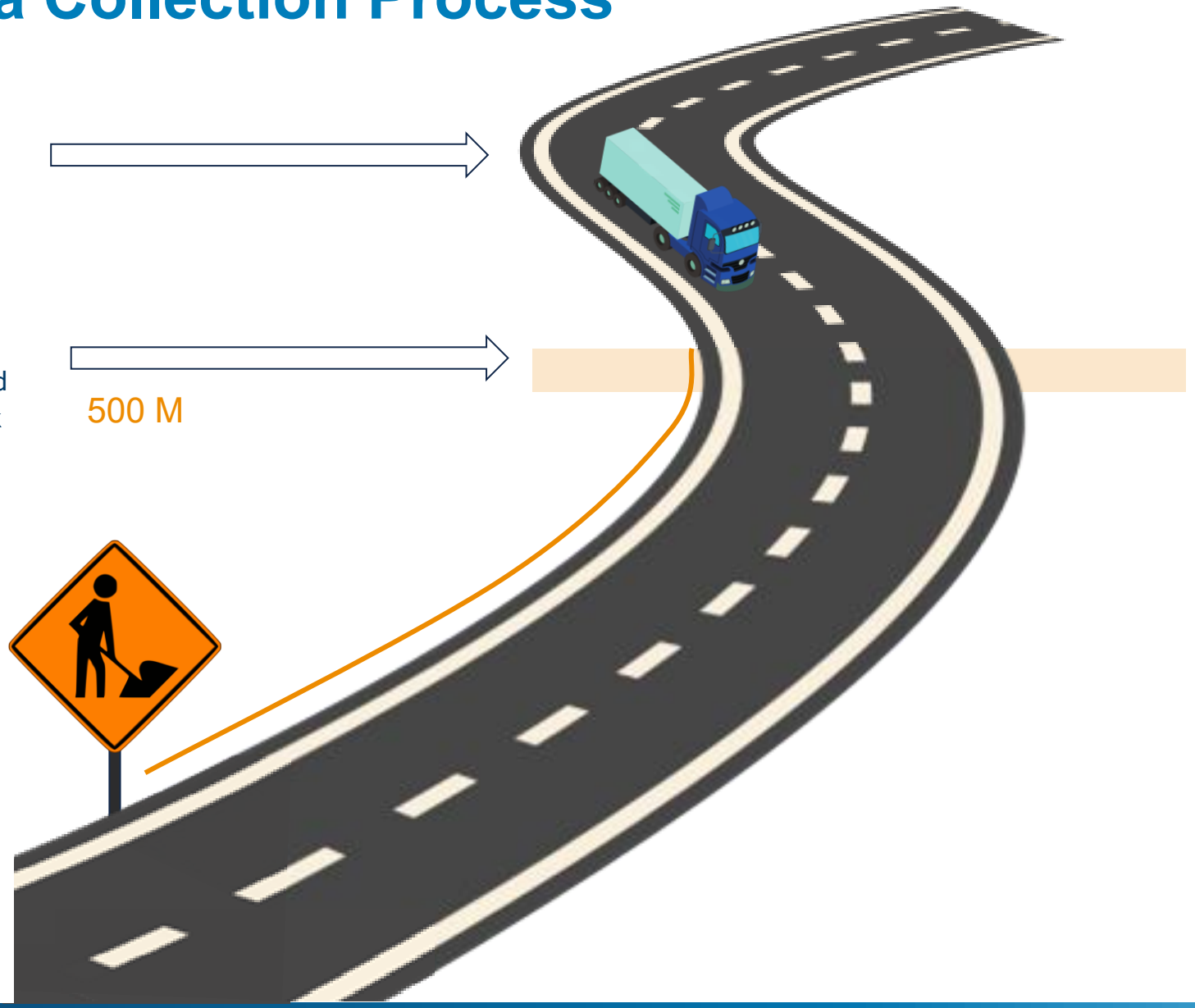
At 500 meters before CALTRANS-designated work zone location, alert for upcoming work zone is delivered to vehicle ELD.

Post-alert data

Data is collected on vehicle behavior each second for a 5-minutes after alert.

Control Group

The same data is collected pre-and post-alert, but no pop-up or chime given to driver



Data Collection & Analysis

Alerts sent out April 1 - December 23, 2024

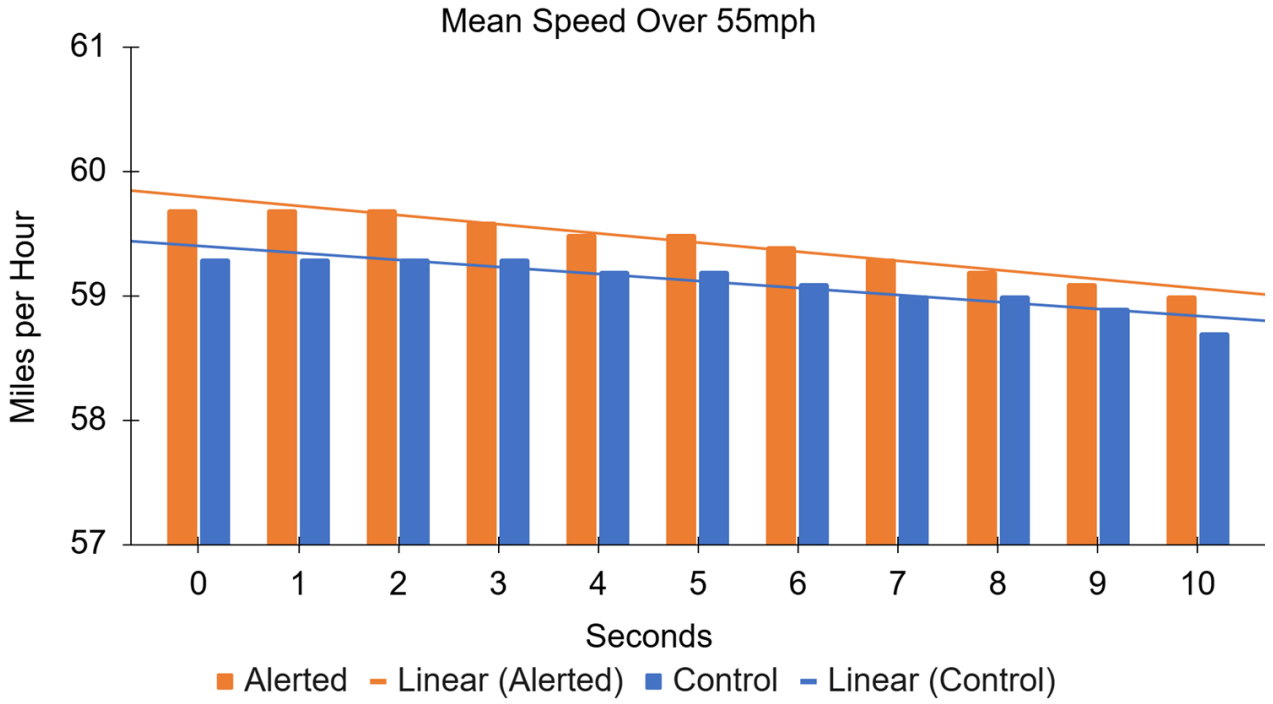
228,713 vehicle visits for 4,040 work zones

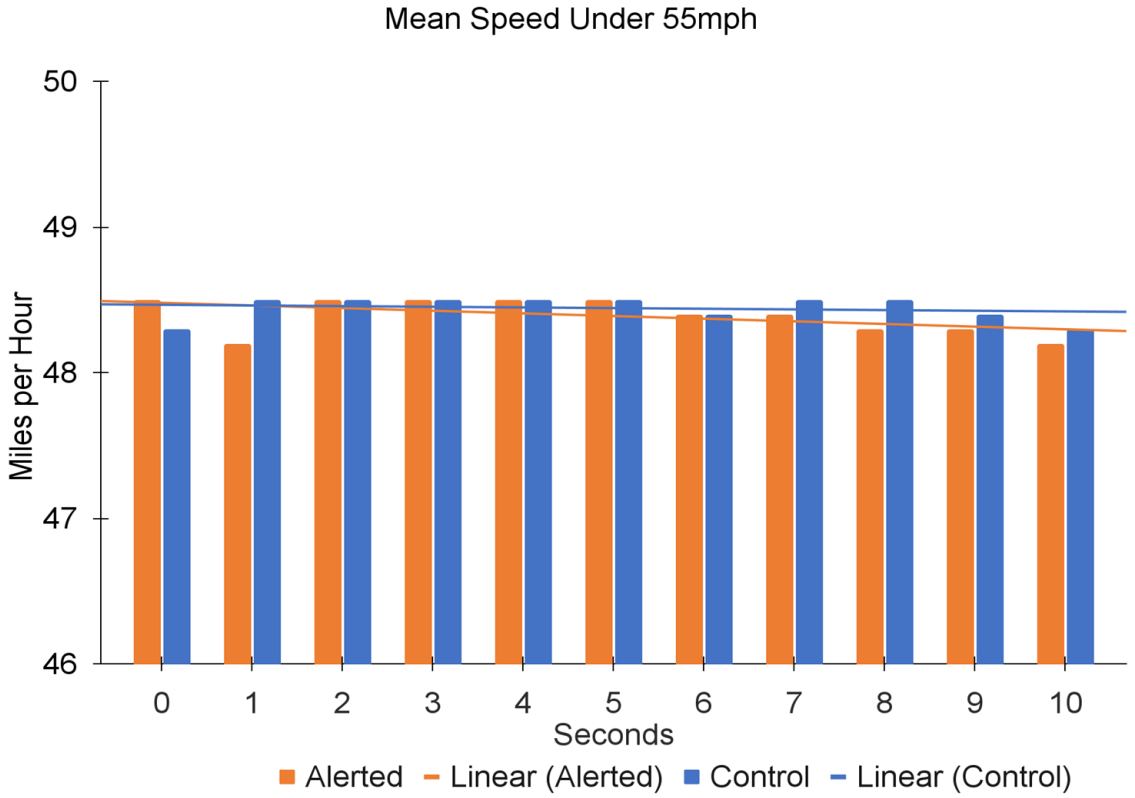
Alerts went out 500 m (0.31 mi) before work zone

Analyzed impact 10 seconds before through 10 seconds after alerting

Driver survey (Nov - Dec 2024)

Alerted vehicles traveling over 55 MPH: Slow more than control vehicles 10 sec post alerting





Alerted drivers traveling above 55 mph reduce speed by a magnitude of about 1.5 mph compared to control group in advance of work zones ($p < .01$).

Data: April 1 - December 23, 2024

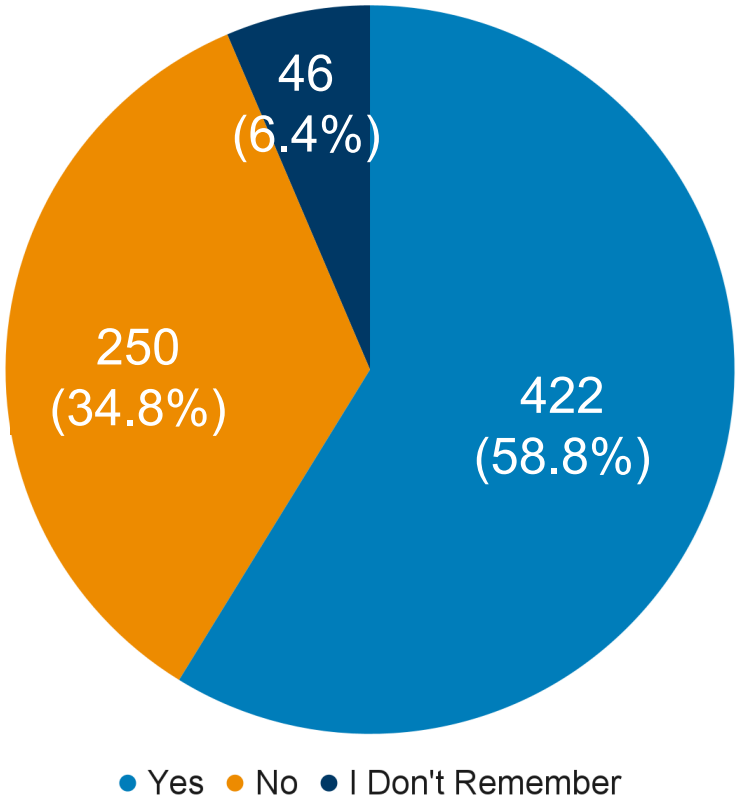
Lane-Specific Alerts May Be More Effective

	Pre-Alert Speed Under 55 MPH	Pre-Alert Speed Over 55 MPH
Message	**Slope**	**Slope**
Control (no message)	-.02	-.07
Left Lane Closed	-.09	-.09
Right Lane Closed	-.09	-.09
Slow Down	.01	-.06

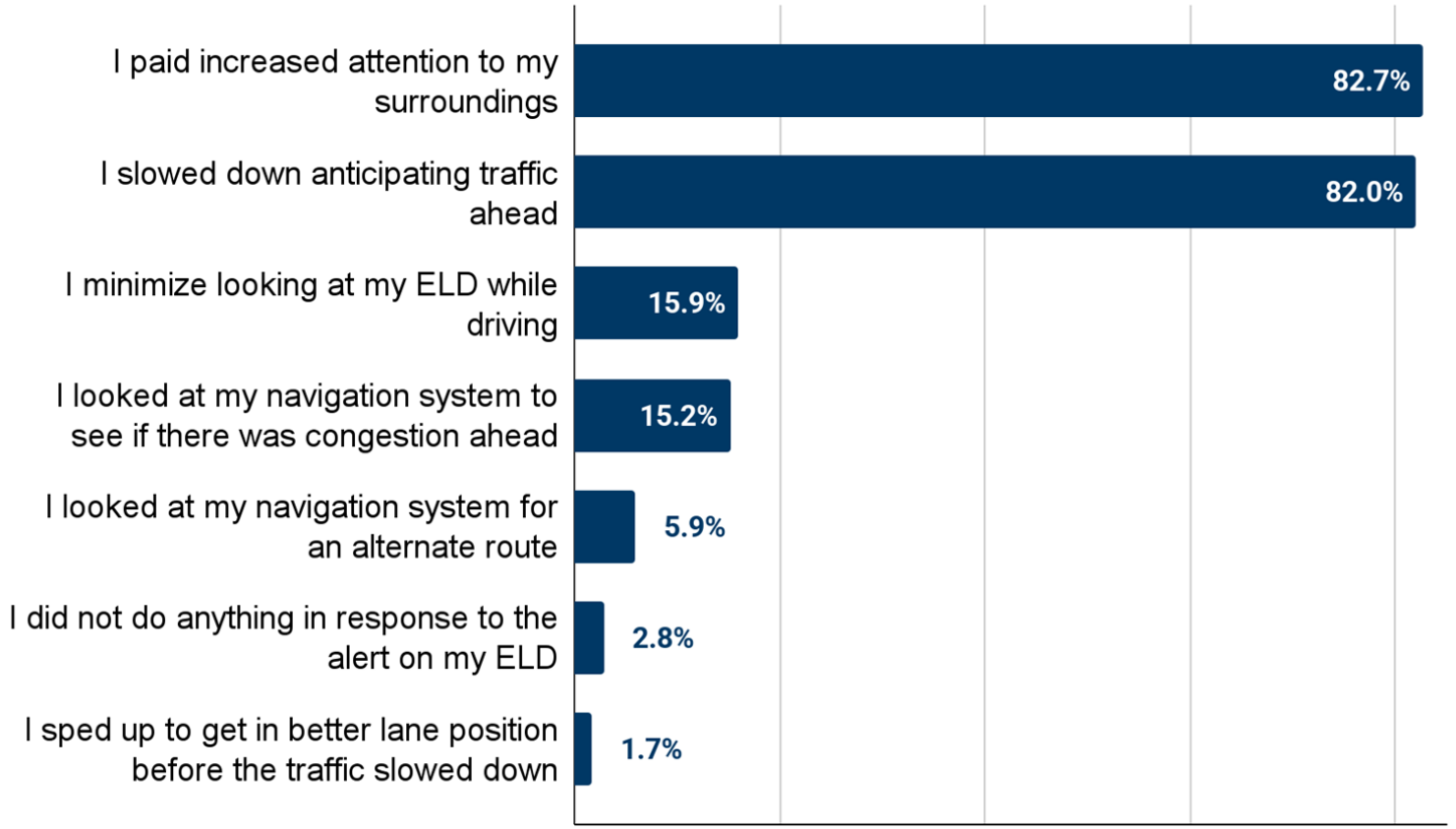
Data: April 1 - December 23, 2024

Average rate of deceleration for lane-specific alerts is greater than a generic 'slow down' message in CMVs traveling both over and under 55 ($p < .001$).

Driver Survey - Round #1

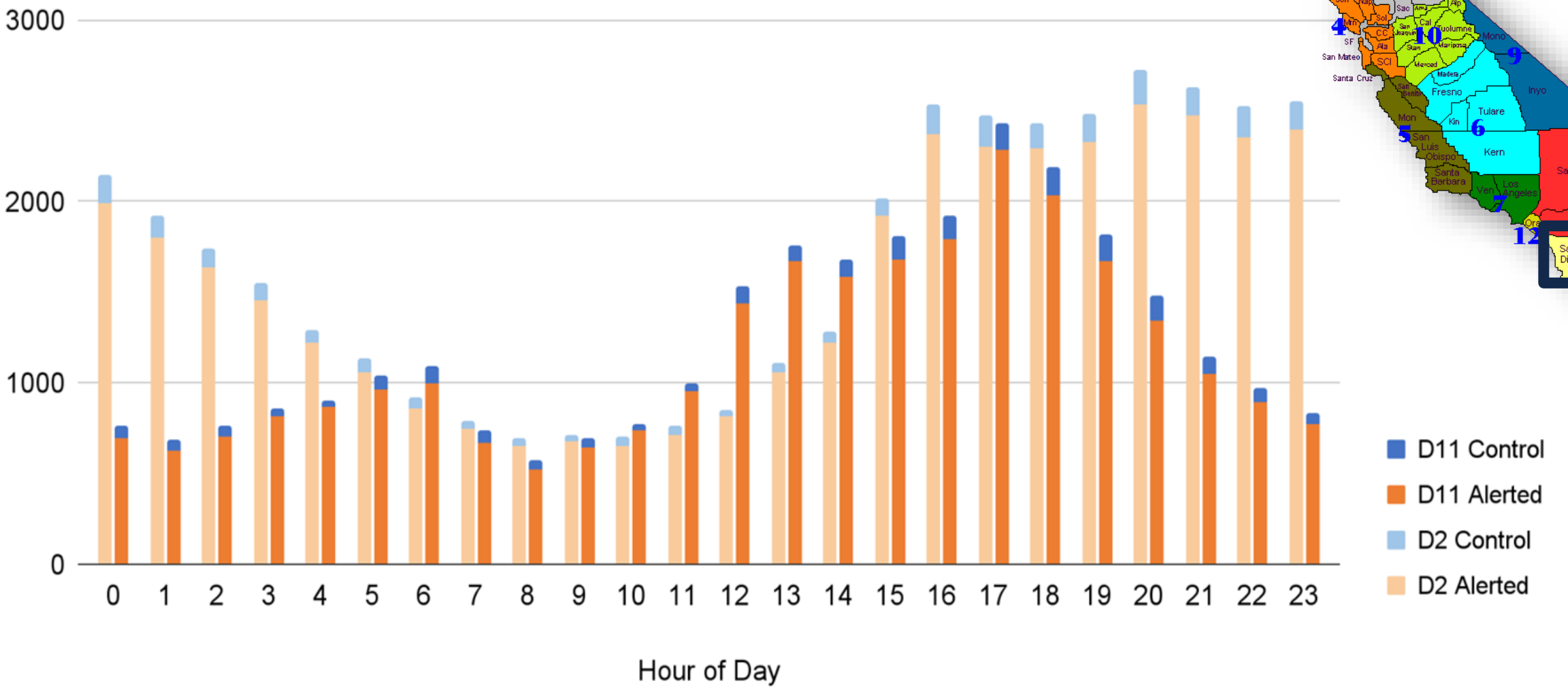


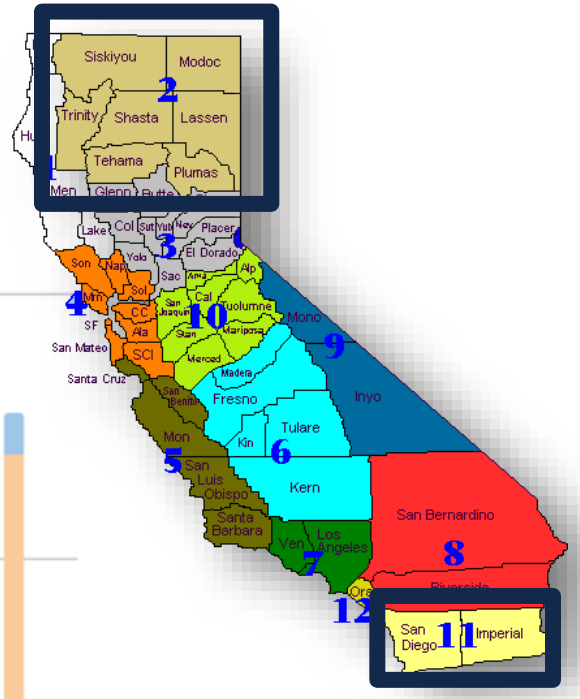
Proportion of surveyed drivers who reported seeing active work zone alerts in California within the past 3 weeks (718 total responses)



Responses of drivers who received alerts (*N* = 422) to question "Thinking of the times in the past three weeks when you received a work zone alert, how did you respond to the alert? Please select as many as apply:"

District Analysis is Key





Moving Forward: Next Steps

1. Deeper comparison of change in distance alerting
2. District 7 data collection & analysis
3. Individual vehicle speed pattern analysis
4. In-depth work zone crash data & state-level analyses