

The Various Silver Linings of Covid-19 Mitigation

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Acknowledgements

CHP Officers – Source of crash data in real-time

CDPH – CMOD – Drs. Nana Tufuoh and Orion Stewart

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Tricia Nguyen, Malak Saleh, Min-Khant Kyaw, Gabrielle Trujillo, Mireya Bejarano, & Karla Tapia (Road Ecology Center Interns)

Data and Methods

Streetlightdata.com – Source of VMT data, based on anonymized movement of cell phones

PemS – Source of highway traffic volumes and speeds

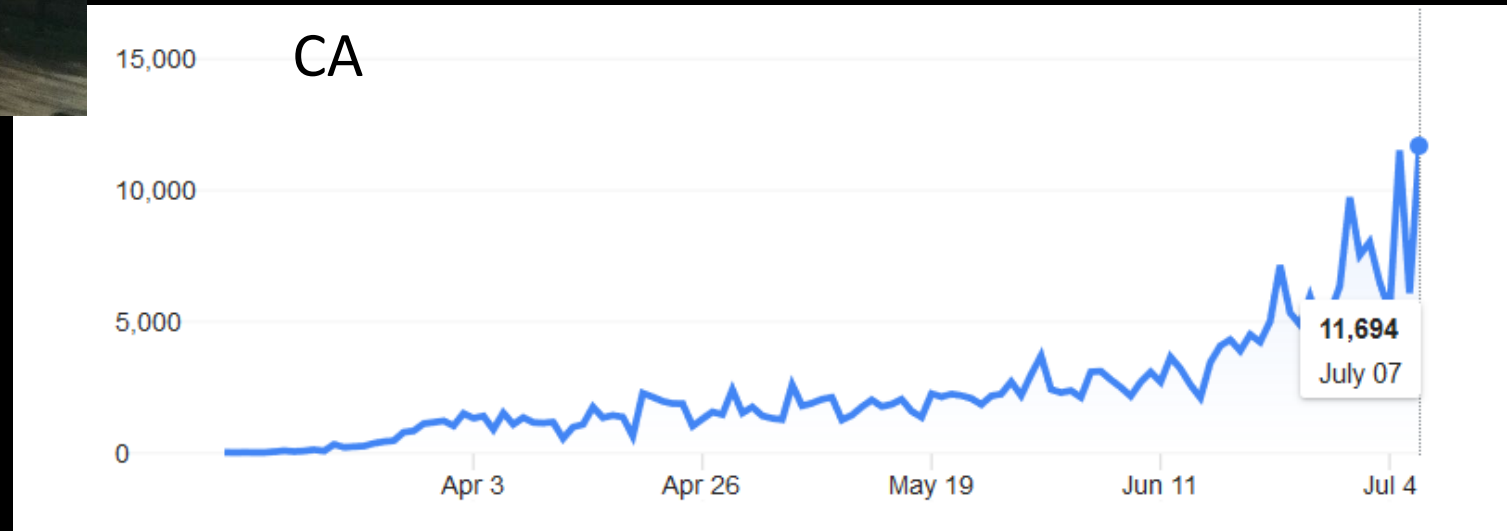
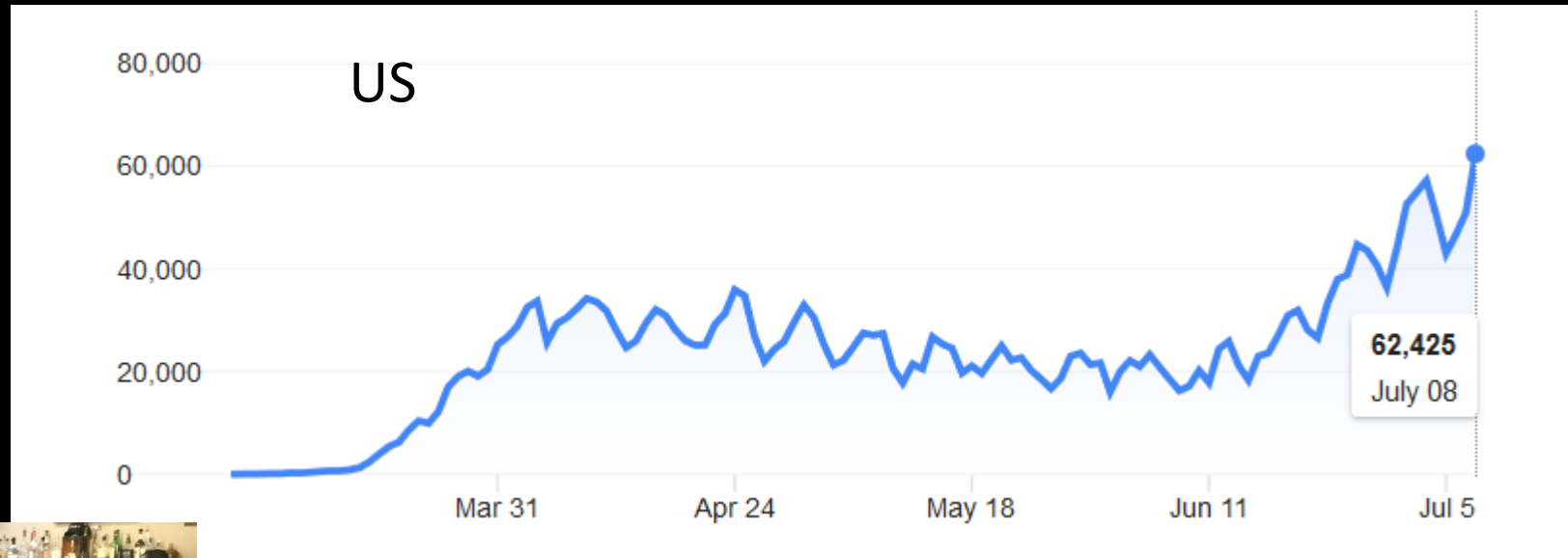
[California Highway Incident Processing System](#) – Source of crash data, reported by CHP officers in real-time, custom system designed by Road Ecology Center

Other sources cited during presentation

Differences – Students t-test, significance of slope, $P < 0.05$

Cases surging

New surge began after Memorial Day

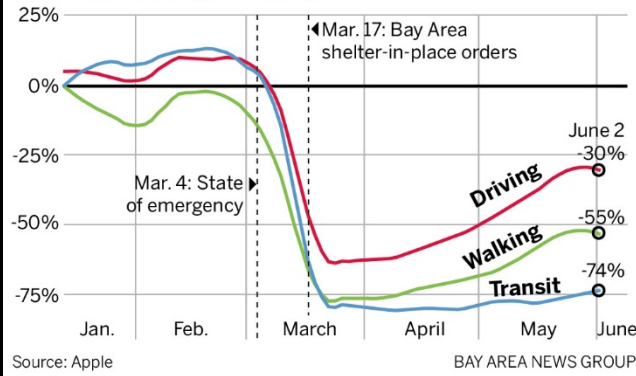


Transportation fundamentally changed

BAY AREA RESIDENTS ON THE MOVE

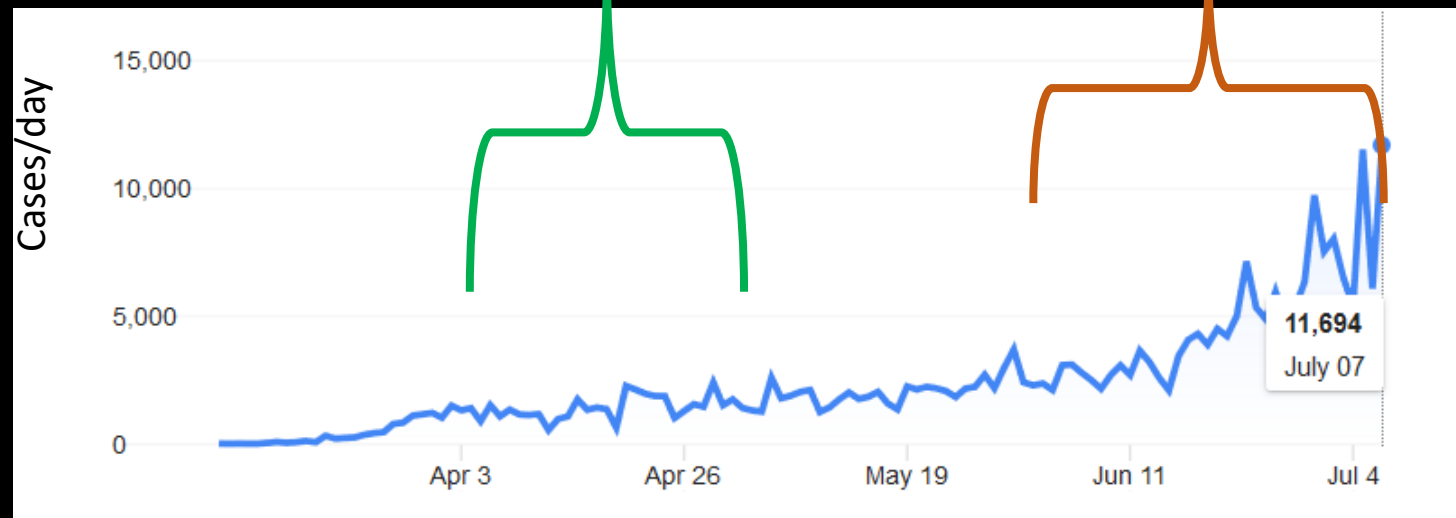
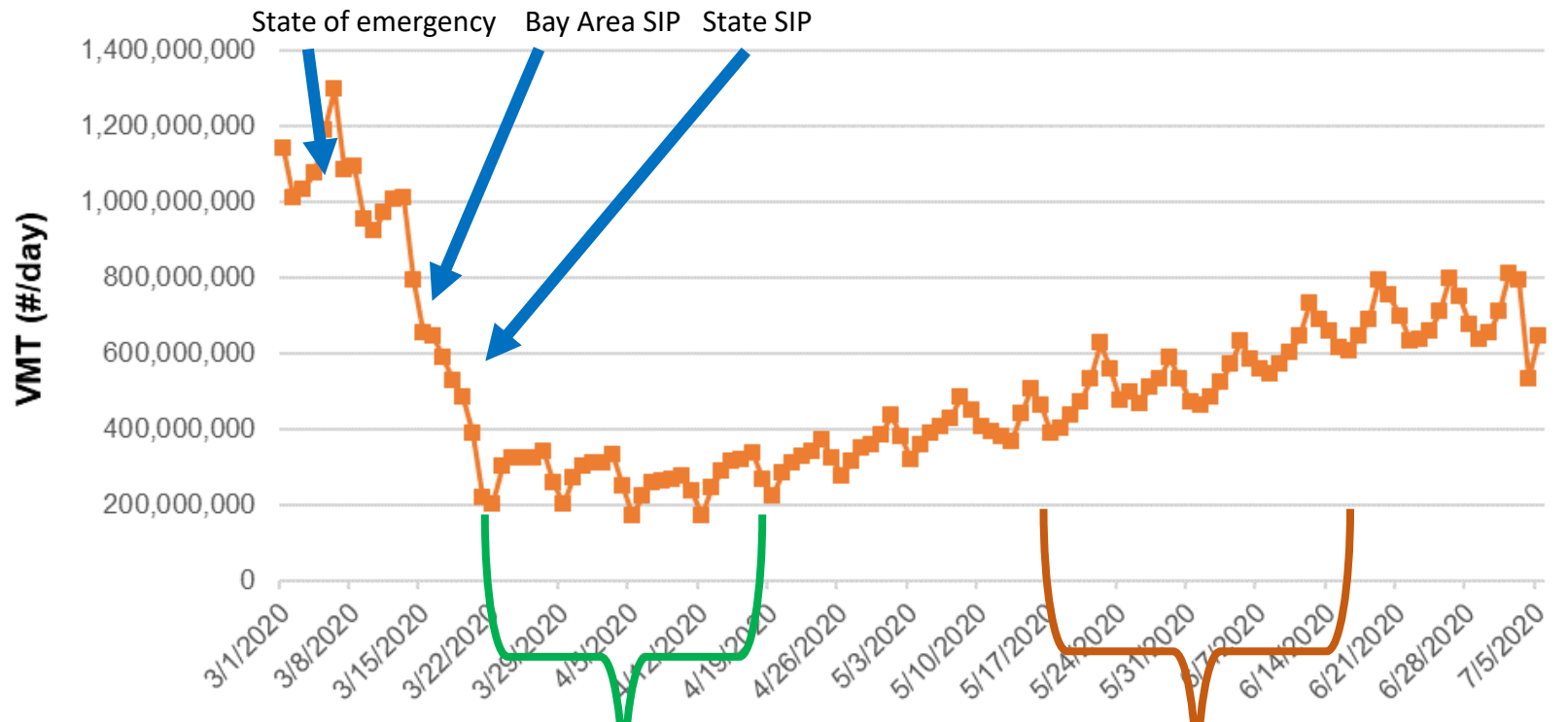
Data from Apple and Google show Bay Area residents began staying home en masse around March 4, when Gov. Gavin Newsom declared a state of emergency because of the pandemic. But residents began venturing out of their homes just days after shelter-in-place rules took effect nearly two weeks later. Travel by car and on foot gradually increased as the lockdown wore on, but residents are still avoiding public transit.

Trendline of % change in mobility



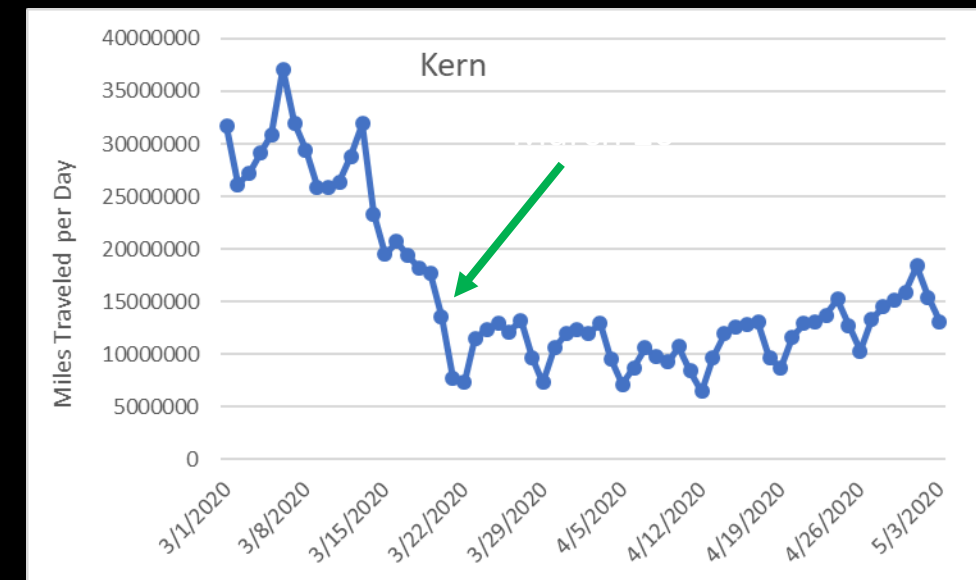
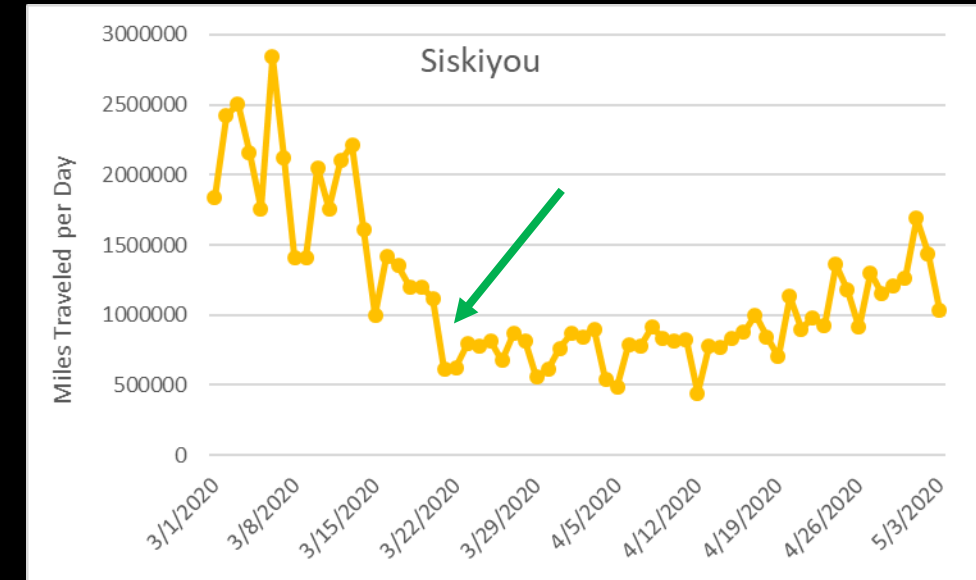
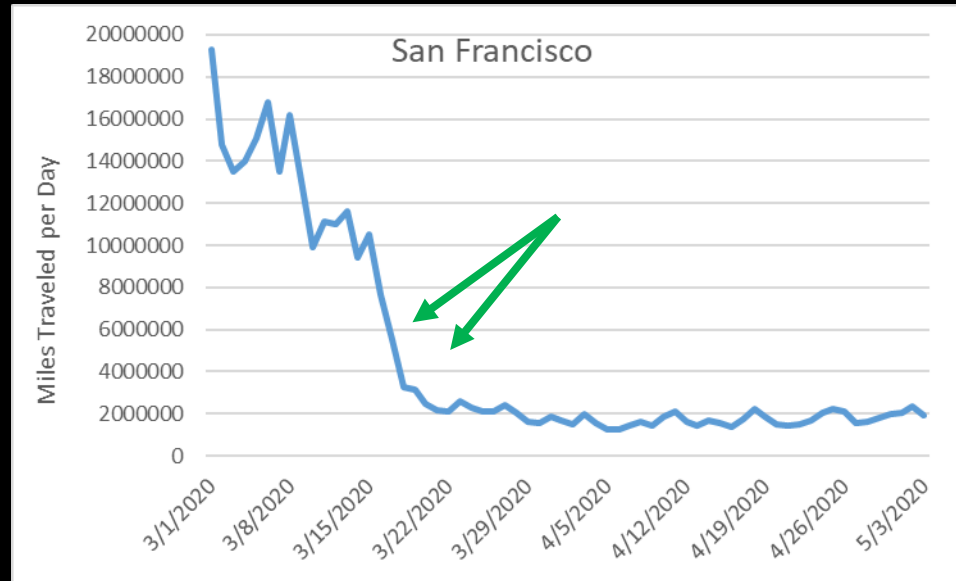
<https://www.mercurynews.com/2020/06/08/data-show-people-challenged-the-limits-of-shelter-in-place-orders/>

https://en.wikipedia.org/wiki/COVID-19_pandemic_in_the_United_States



CA – Counties

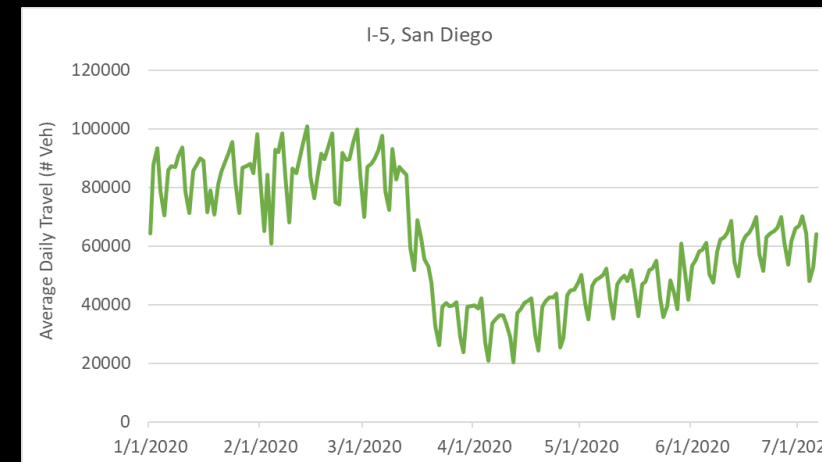
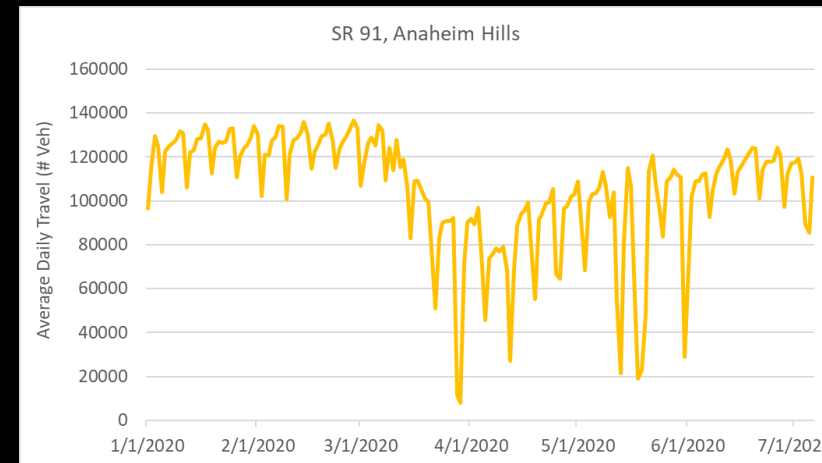
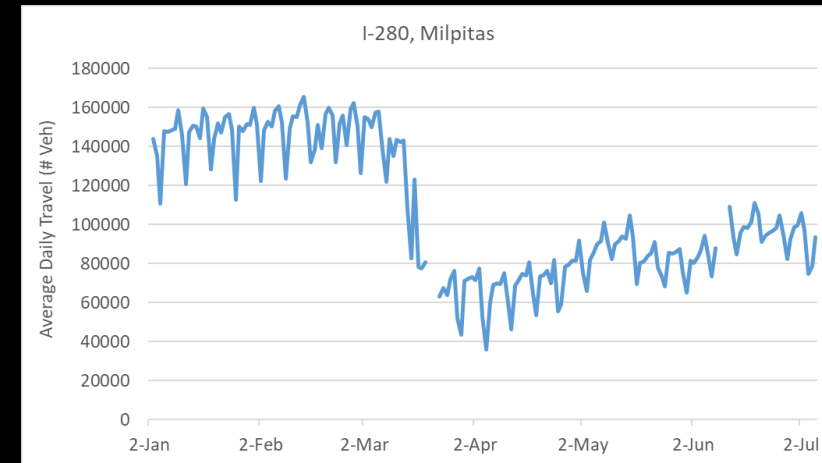
Not all counties responded the same



Source: Streetlightdata.com

CA -- Highways

Highways varied in how much traffic declined and how much it has come back up



Reduction in traffic → reduction in GHG emissions

US emissions 44 million metric tons CO₂e (first week of March) declined to 12 million metric tons CO₂e (second week of April)

Over 8 weeks = 4% decline in GHG for US, putting us on track for Paris Climate Accord commitments

CA – GHG emissions from vehicles dropped from 400,000 to 100,000 metric tons CO₂e/day

Avoided cost 300,000 tons X \$75/ton* X 120 days = \$2.7 billion

* <https://www.imf.org/external/pubs/ft/fandd/2019/12/the-true-cost-of-reducing-greenhouse-gas-emissions-gillingham.htm>

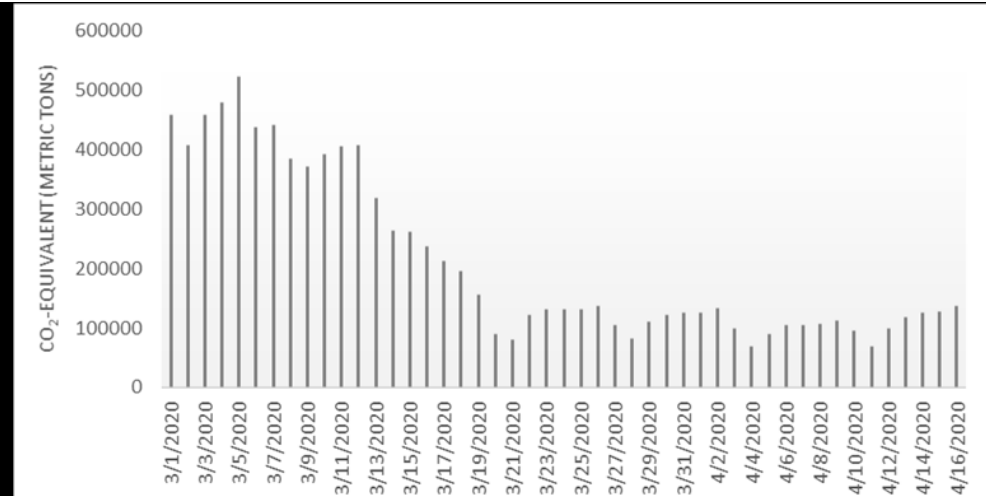
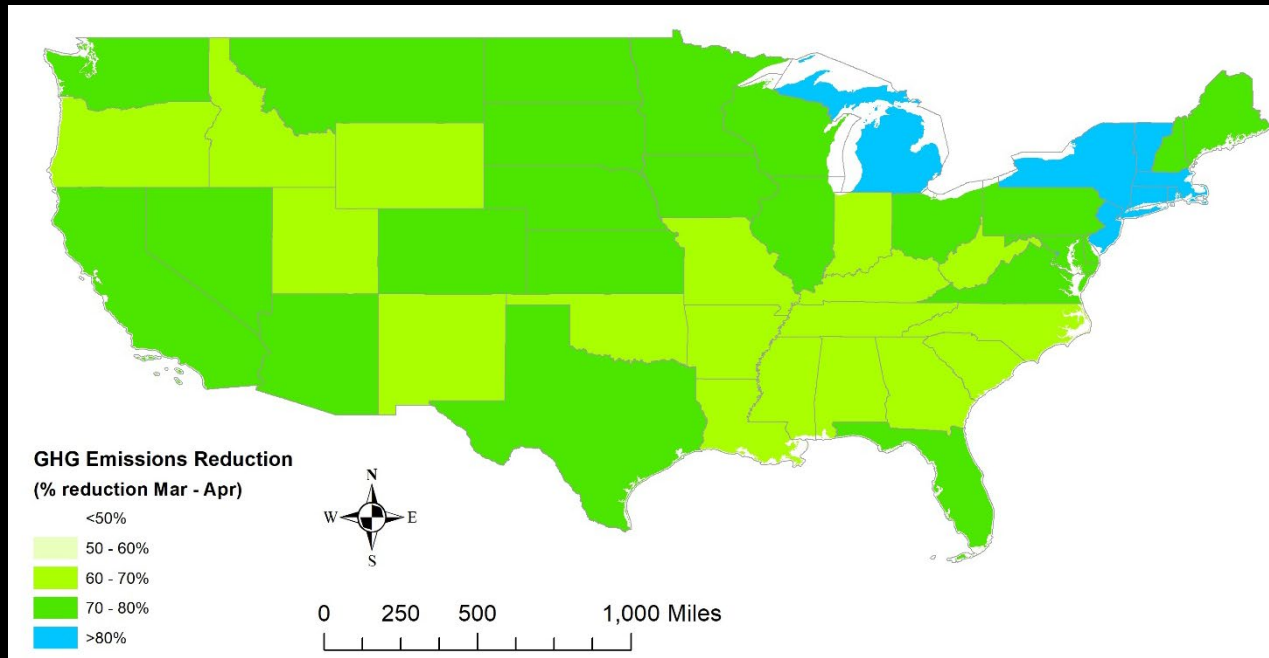


Figure 2. Estimated change in California greenhouse gas emissions as carbon dioxide-equivalents for March 1, 2020 to April 17, 2020.

Reduction in traffic → reduction in wildlife impacts

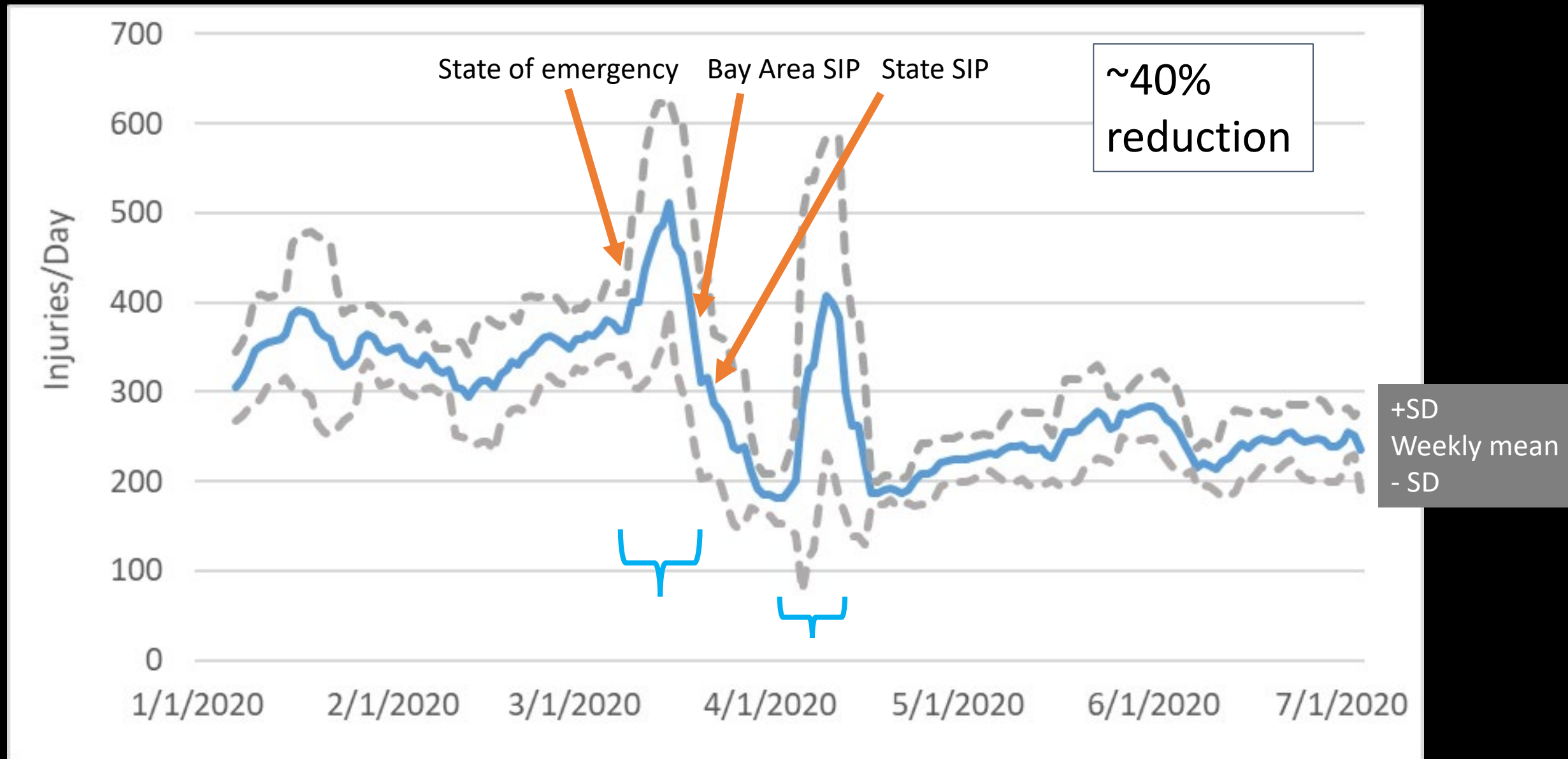
Wildlife mortality on roads declined 21% in CA between pre and post-statewide shelter-in-place order; 34% averaged across CA, ID, and ME

Mountain lion (proposed for listing) mortality declined 58%

Total decline in wildlife mortality on roads and highways in US estimated to be in the tens of millions during traffic reduction so far



Reduction in traffic → reduction in injury crashes



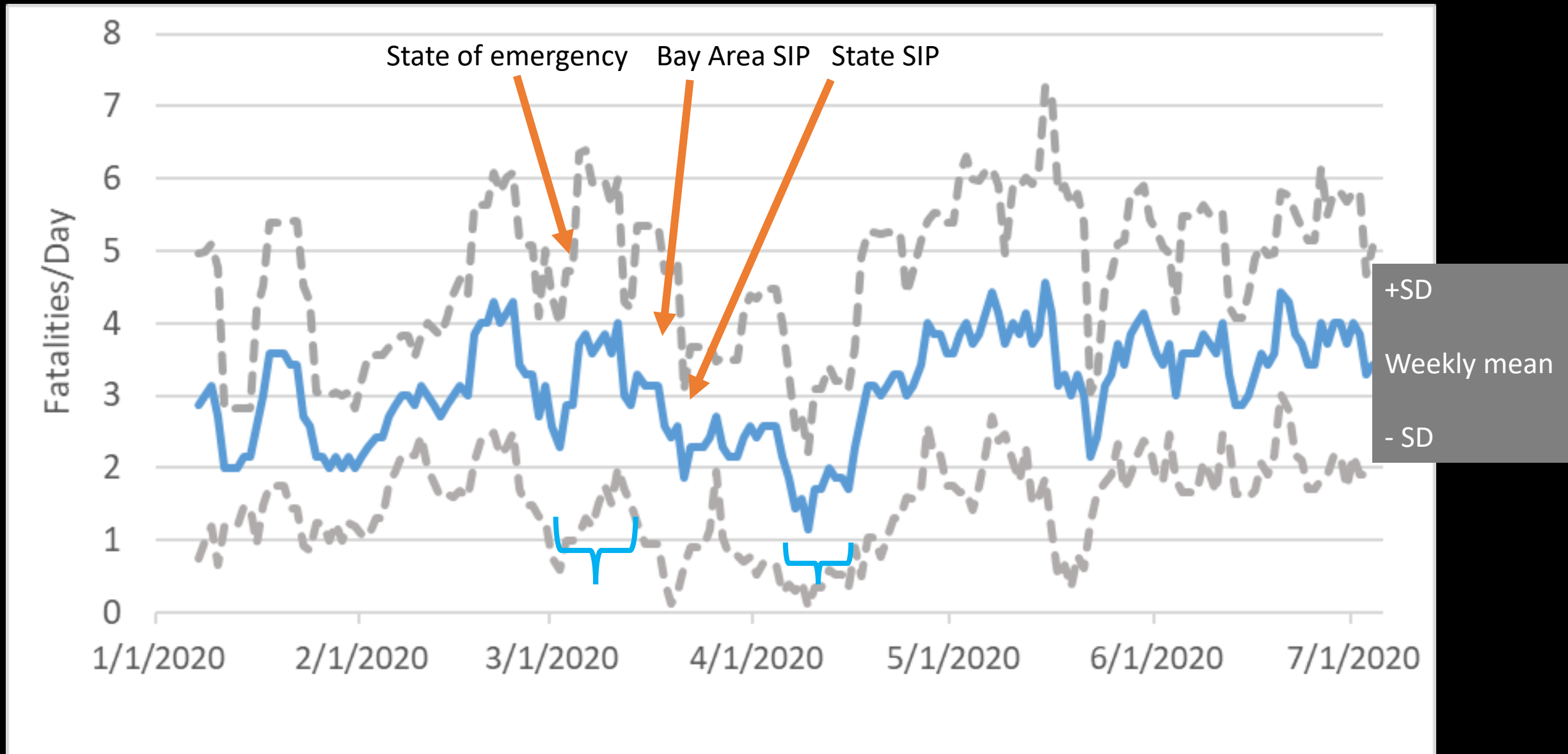
Trauma Center Independent Confirmation

Sacramento regional hospitals reported 38% reduction in injuries in/on vehicles (auto/truck/MC) and 46% reduction in injuries to pedestrians and cyclists between early March and mid-April

There was no difference between early March 2019 and mid-April 2019

(preliminary results)

Reduction in traffic → little change in fatal crashes

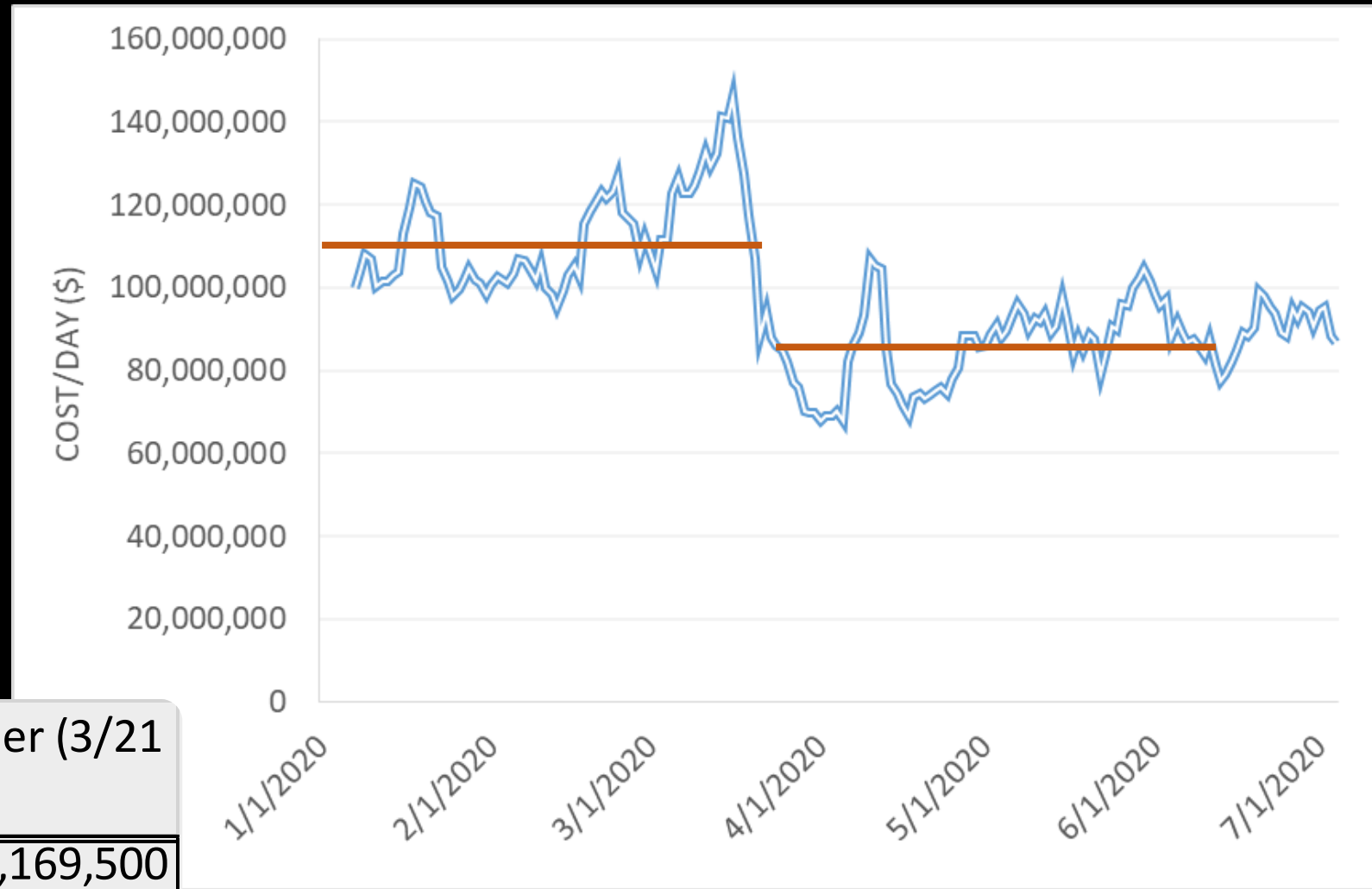


Reduction in traffic → reduction in crash costs

22% decrease

~\$24 million/day

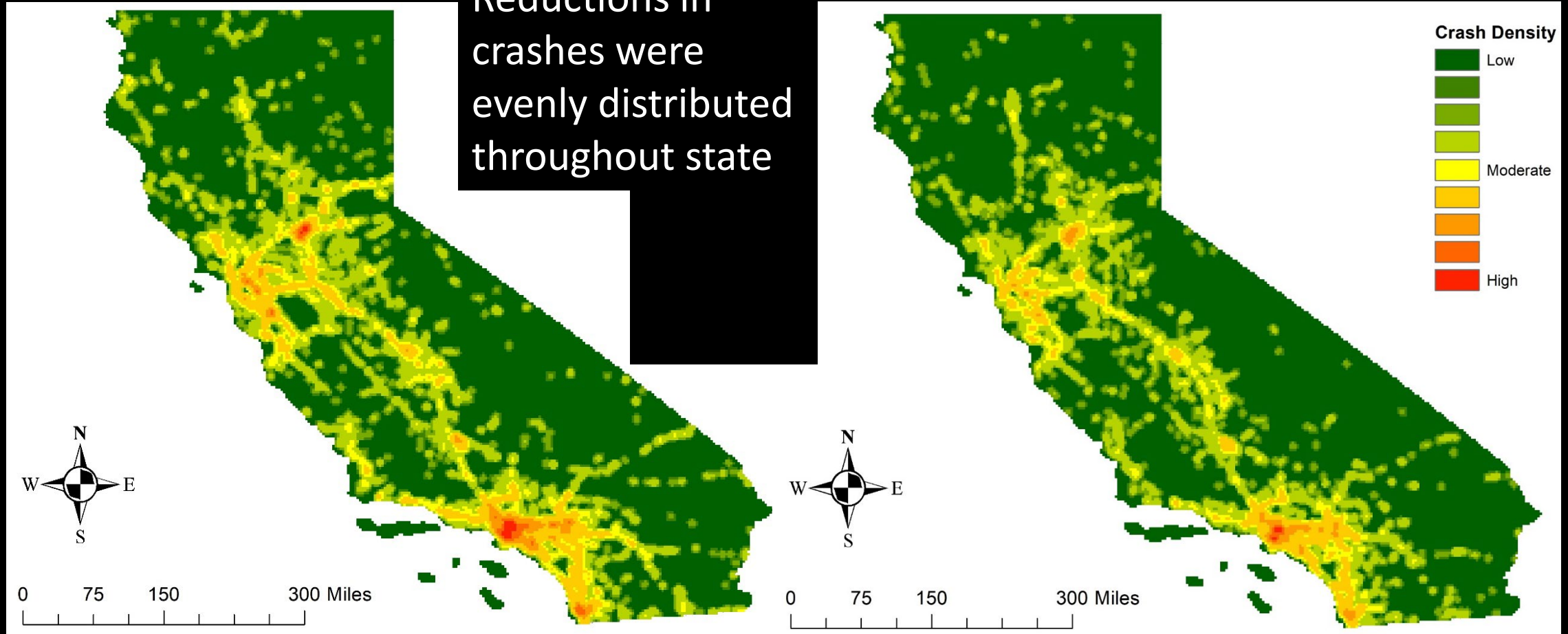
\$2.9 billion/120 days



	Pre-Order (1/01 - 3/19)	Post-Order (3/21 - 6/7)
Sum Cost	\$8,802,165,940	\$6,892,169,500
Daily Cost	\$111,419,822	\$87,242,652

CA – Crash Distribution

Reductions in crashes were evenly distributed throughout state



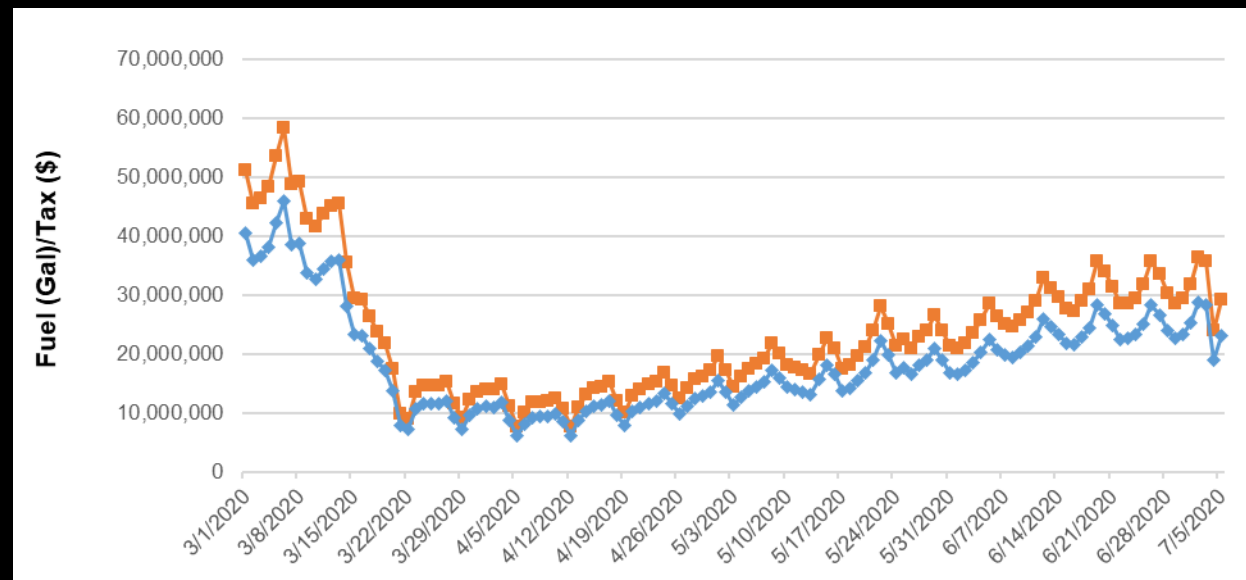
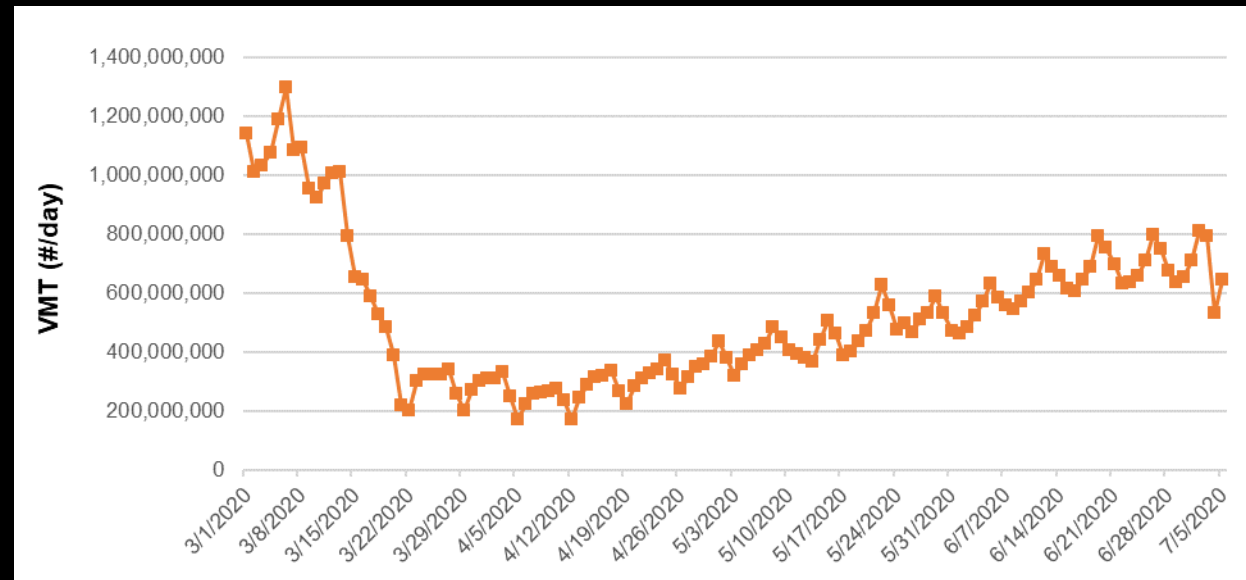
March 1-14, 2020 (12,990 crashes)

April 1-14, 2020 (7962 crashes)

Accounting for Costs: Lost Fuel-Tax Revenue

Californians spent LESS on fuel
 $\$3/\text{gal} * 4 \text{ billion gal}$
 $= \$12 \text{ billion}/120 \text{ days}$

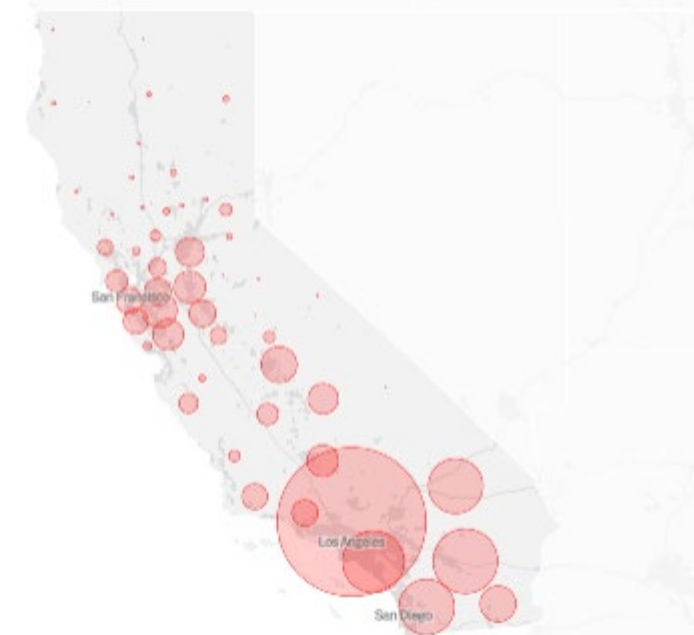
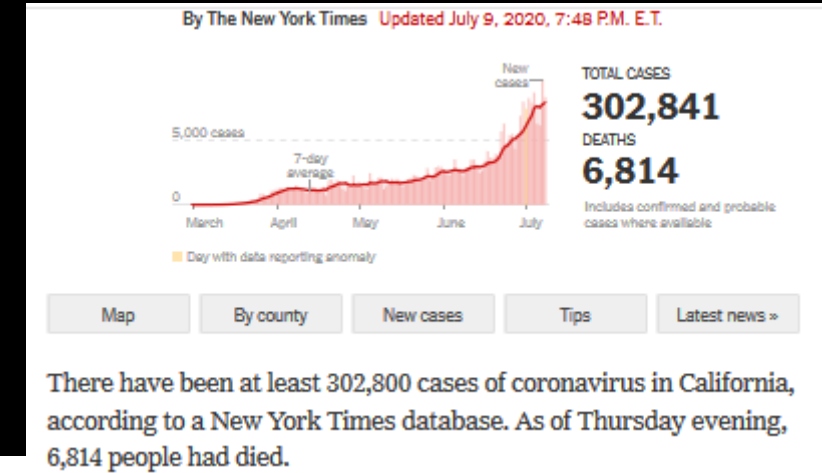
Lost fuel tax revenue = $\sim \$26$
million/day = $\$3.1 \text{ billion}/120 \text{ days}$



Accounting for Costs: Covid-19 Treatment

20% of cases require treatment and average cost of treatment = \$30,000 (insurer and cost-share/individuals)

\$30k x 60,568 = \$1.8 billion/120 days



Accounting for Costs and Benefits

Medical costs, Covid-19 treatment	\$1.8 billion/120 days
Lost fuel tax revenue	\$2.4 billion/120 days
Reduced crash costs	\$2.9 billion/120 days
Reduced fuel cost	\$12 billion/120 days
Reduced GHG emissions	\$2.7 billion/120 days

Contact

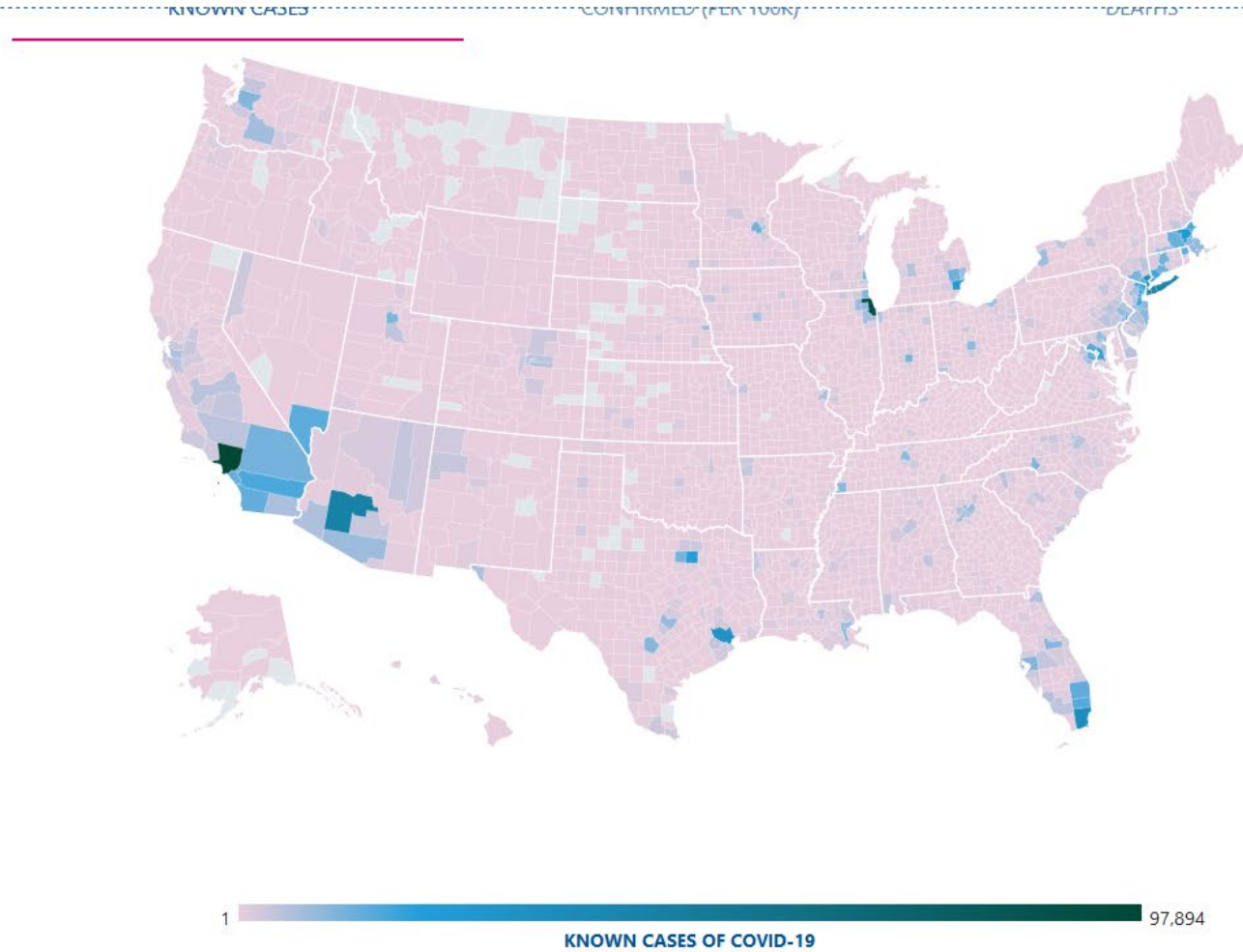
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Coronavirus Locations: COVID-19 Map by County and State

Data Updated Jun 28, 2020



More Info

[COVID-19 ISSUE PAGE](#)

Download Data

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