The Various Silver Linings of Covid-19 Mitigation

Fraser Shilling
Road Ecology Center
University of California, Davis
https://roadecology.ucdavis.edu

CTC/CARB/HCD Joint Conference 7/17/2020
Acknowledgements

CHP Officers – Source of crash data in real-time

CDPH – CMOD – Drs. Nana Tufuoh and Orion Stewart

UCDMC – Drs. Christy Adams and David Shatz

Dr. David Waetjen

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

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


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

Not all counties responded the same

Source: Streetlightdata.com
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 CO$_2$e (first week of March) declined to 12 million metric tons CO$_2$e (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 CO$_2$e/day

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

Reduction in traffic $\rightarrow$ 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 $\rightarrow$ reduction in injury crashes

State of emergency    Bay Area SIP    State SIP

~40% reduction
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 $\rightarrow$ little change in fatal crashes
Reduction in traffic → reduction in crash costs

22% decrease

~$24 million/day

$2.9 billion/120 days

<table>
<thead>
<tr>
<th></th>
<th>Pre-Order (1/01 - 3/19)</th>
<th>Post-Order (3/21 - 6/7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sum Cost</td>
<td>$8,802,165,940</td>
<td>$6,892,169,500</td>
</tr>
<tr>
<td>Daily Cost</td>
<td>$111,419,822</td>
<td>$87,242,652</td>
</tr>
</tbody>
</table>
CA – Crash Distribution

March 1-14, 2020 (12,990 crashes) April 1-14, 2020 (7,962 crashes)

Reductions in crashes were evenly distributed throughout state
Accounting for Costs: Lost Fuel-Tax Revenue

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

Lost fuel tax revenue = ~$26 million/day = $3.1 billion/120 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

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical costs, Covid-19 treatment</td>
<td>$1.8 billion/120 days</td>
</tr>
<tr>
<td>Lost fuel tax revenue</td>
<td>$2.4 billion/120 days</td>
</tr>
<tr>
<td>Reduced crash costs</td>
<td>$2.9 billion/120 days</td>
</tr>
<tr>
<td>Reduced fuel cost</td>
<td>$12 billion/120 days</td>
</tr>
<tr>
<td>Reduced GHG emissions</td>
<td>$2.7 billion/120 days</td>
</tr>
</tbody>
</table>
Contact fmshilling@ucdavis.edu
https://roadecology.ucdavis.edu
Coronavirus Locations: COVID-19 Map by County and State

Data Updated Jun 28, 2020