Region of Waterloo

Canadian Association of Road Safety Professionals

Using Red-light Cameras to Assess Pedestrian Countdown Signal Impacts on Driver Red-Light Running Behaviour

Robert Henderson, CET, LEL

Region of Waterloo

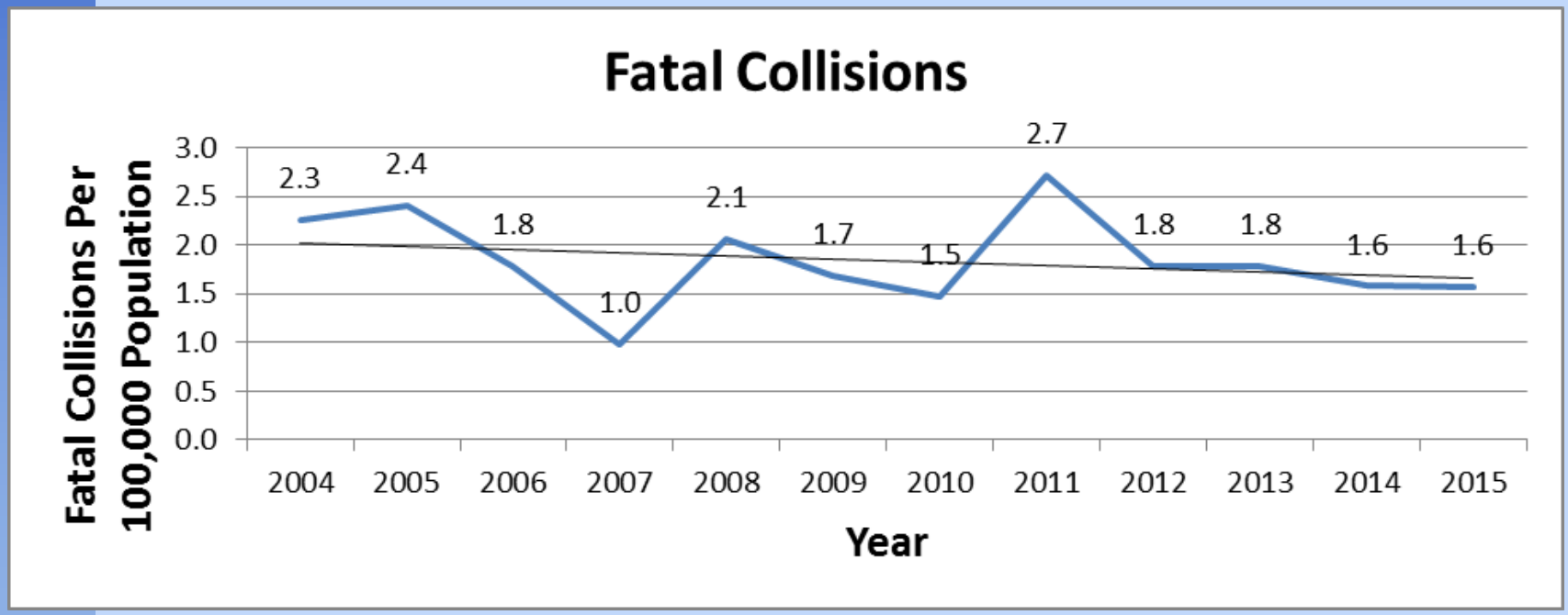
Region of Waterloo

Overview

1. Background
2. Study Methodology
3. Summary of Data
4. Results
5. Conclusions
6. Next Steps

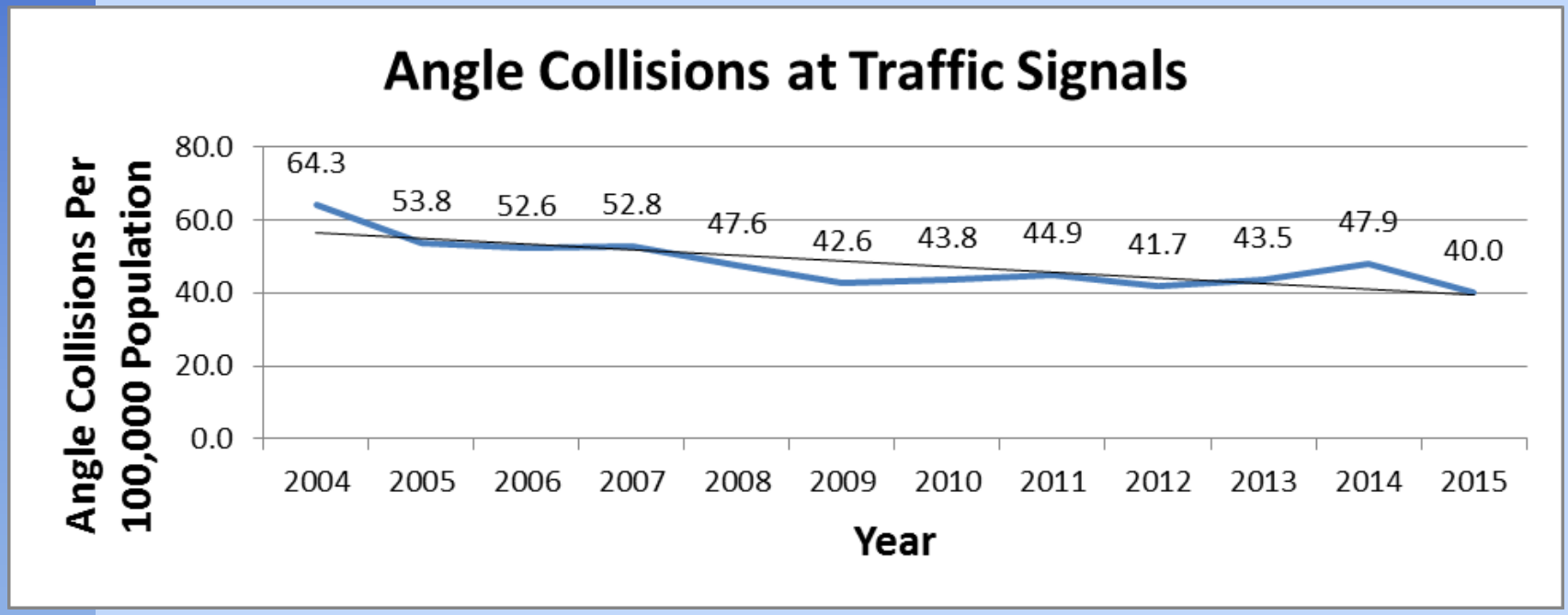
Background

Fatal Collisions



Background

Angle Collisions



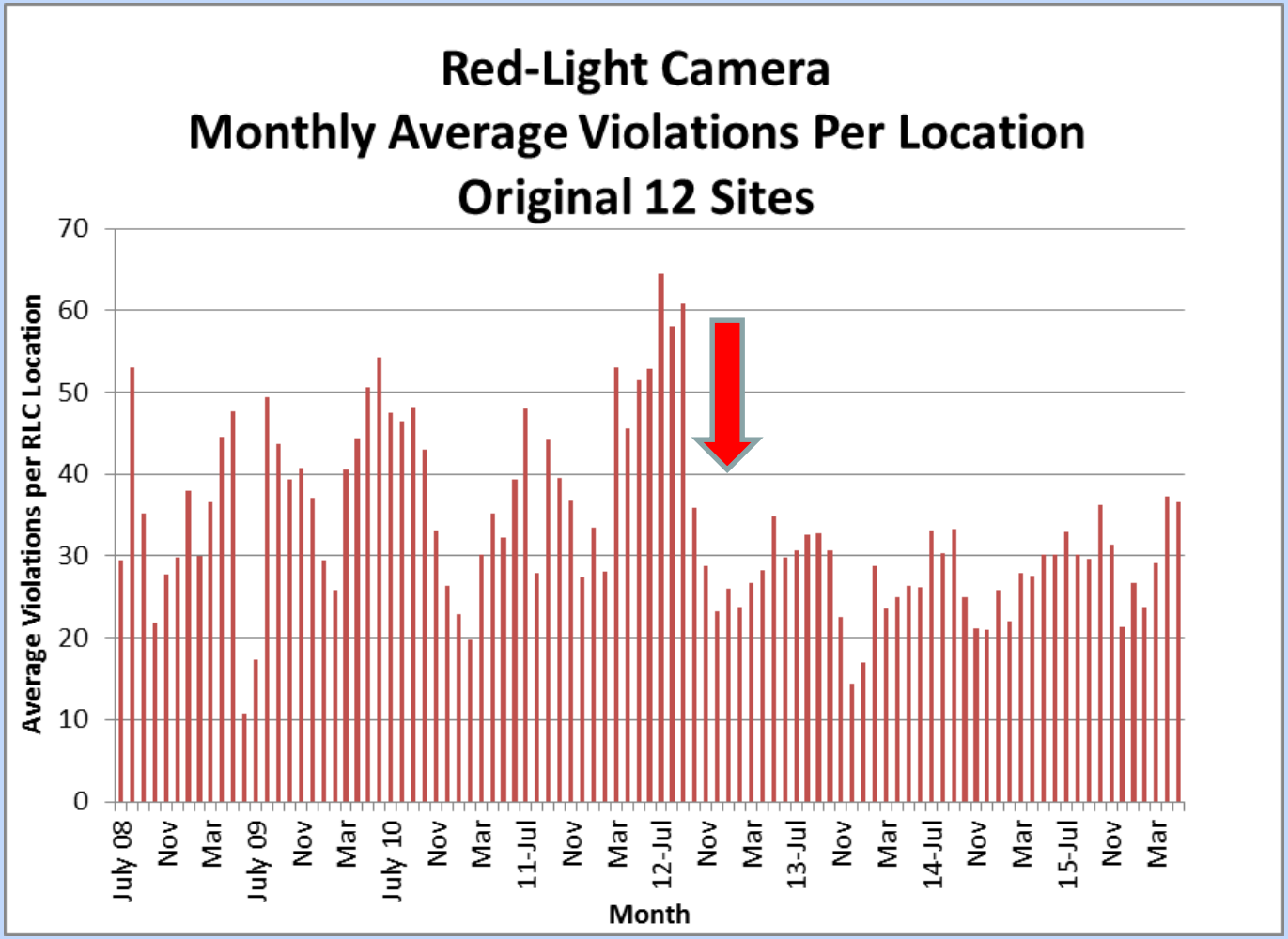
Region of Waterloo

Study Methodology

1. Assess Behavioural Change
   - Obtain red-light camera infraction data before and after installation of PCS
   - Before / After with Comparison Group Study
2. Assess Collision Change
   - Obtain angle collisions before and after installation of PCS
   - Empirical Bayes Before / After Study
3. Compare Behavioural vs. Collision Change

Region of Waterloo

Summary of Data



Summary of Data

1. Behavioural Study Phase
    - 12 red-light camera locations (treated)
        - Average 2.5 years infraction data (before and after PCS)
    - 3 red-light camera locations (control)
        - Average 2.7 years infraction data (before and after)

Summary of Data (Treated Sites)

Site	Location	PCS Install Date	Before Infractions	After Infractions	Months Considered in Each Period
1	Weber Street and Union Street	May 24, 2013	462	234	12
2	Water Street and Park Hill Road	May 24, 2013	3359	1008	36
3	Homer Watson Boulevard and Pioneer Drive	May 24, 2013	1269	1101	31
4	Weber Street and Bridgeport Road	May 24, 2013	733	513	36
5	Erb Street and Regina Street	July 7, 2013	1945	1624	35
6	Bridgeport Road and Regina Street	July 7, 2013	844	804	35
7	Weber Street and Lincoln Road / Bridgeport Plaza	May 24, 2013	2088	1072	36
8	Bridgeport Road and Albert Street	July 7, 2013	1191	1110	33
9	University Avenue and Dale Crescent / Lincoln Road	July 7, 2013	2747	1217	25
10	Weber Street and Erb Street	July 7, 2013	1331	874	29
11	Hespeler Road and Lang's Drive / Sheldon Drive	July 7, 2013	1531	977	25
12	Frederick Street and Duke Street	July 7, 2013	43	49	21
		Total	17543	10583	354
		Average	1462	882	30

Summary of Data (Control Sites)

Site	Location	PCS Install Date	Before Infractions	After Infractions	Months Considered in Each Period
1	King Street and Bridgeport Road	October 28, 2008	1137	1062	36
2	Homer Watson Boulevard and Ottawa Street	September 30, 2008	1258	1063	35
3	Franklin Boulevard and Saginaw Parkway	October 24, 2008	828	1124	26
		Total	3223	3249	97
		Average	1074	1083	32

Summary of Data (Angle Collision Impact)

- 91 4-legged traffic signals
- Angle collisions only (collisions typically caused by red-light running)
  - Avg. 3.0 years before data
  - Avg. 2.2 years after data

Region of Waterloo

Results

Behavioural Change

Time Period	Treatment Group (12 Sites)	Control Group (3 Sites)
Before	17543	3223
After	10583	3249

Results

- Following the installation of PCS:
  - Red-light running (RLR) behaviour changed by a factor of 0.60 ± 0.03.
  - Reduced RLR by 40% ± 3%
  - Statistically significant at 95% confidence interval

Results

Angle Collision Change

Angle Crashes Observed		Angle Crashes Expected	
Before	**After**	**Before**	**After**
158	101	131	102

Results

- Following installation of PCS:
  - Angle collisions changed by a factor of 0.99 ± 0.23
  - Reduced angle collisions by 1% ± 23%
  - Not considered statistically significant at 95% confidence interval

Conclusions

- Pedestrian countdown signals:
  - Reduced red-light running behaviour by 40% ± 3%

but

  - Had no statistically significant influence on angle collisions

Conclusions

- The change in red-light running behaviour therefore:
  - Could not be considered a surrogate measure of safety
    - As there was no correlation between change in behaviour and safety

Conclusions

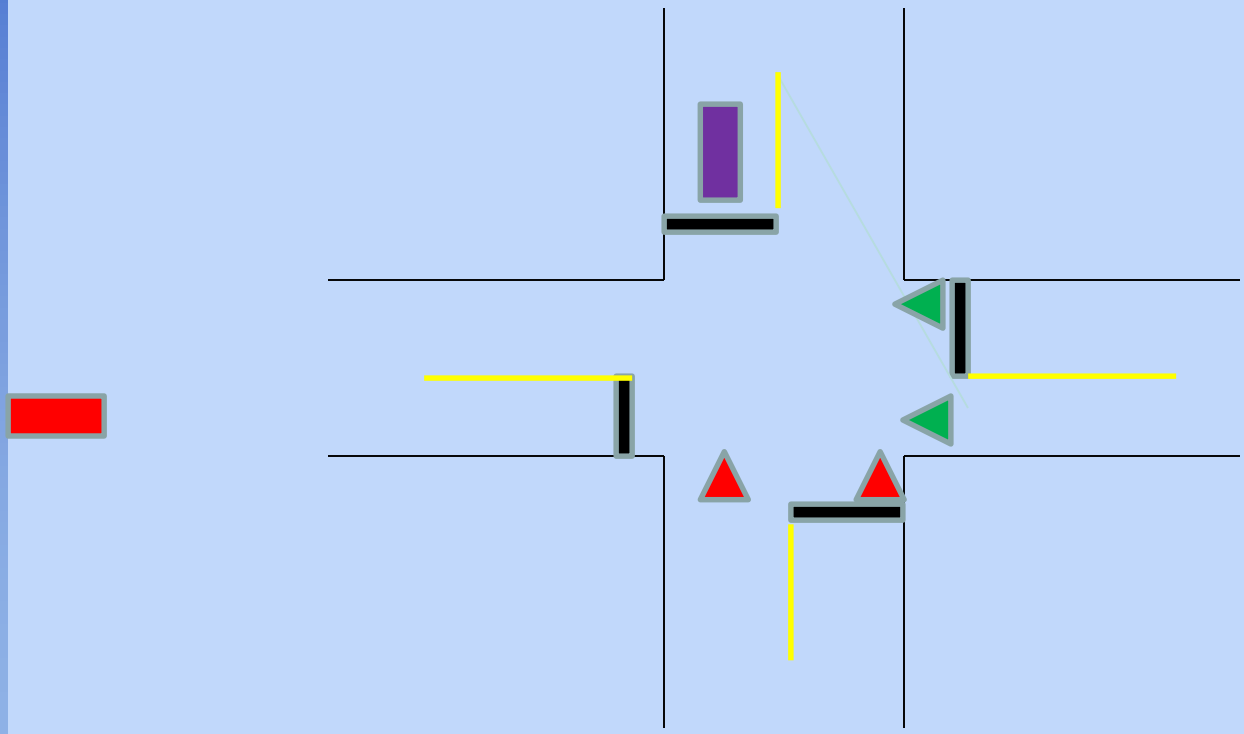
- Lack of correlation may be due to:
  - PCS only mitigating red-light violations during all-red interval.
    - An interval with a low probability of an angle crash.

Conclusions

- Lack of correlation may be due to:
  - Angle collisions more likely to occur:
    - After the all-red interval;
    - When a truly distracted driver enters the intersection; and
    - When a motorist from the conflicting roadway enters the intersection with the right-of-way.

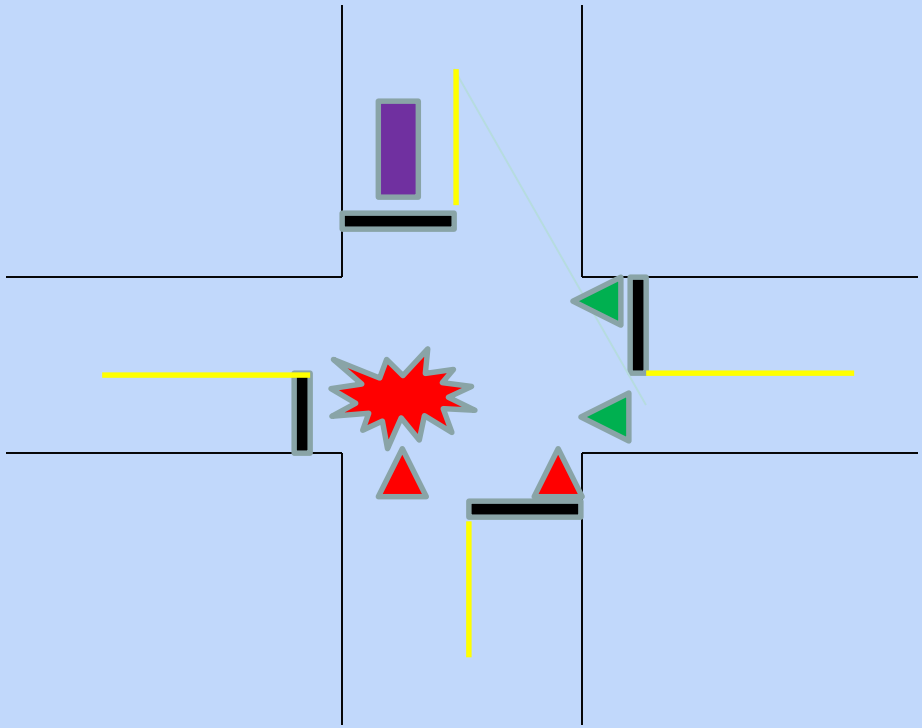
Conclusions

- To illustrate this theory:



Conclusions

- To illustrate this theory:



Next Steps

- If angle collisions are truly a product of distracted driving:
  - Encourage strategies to mitigate distracted driving on approaches to traffic signals.

Next Steps

- If angle collisions are truly a product of distracted driving:
  - Use red-light camera data to determine what strategies could reduce average intrusion time after onset of red.
    - Correlate reduction in average intrusion times with angle crash data

Region of Waterloo

Canadian Association of Road Safety Professionals

Questions