# Special Study of
# Response of Various Traffic Sectors to COVID Quarantine

**Weeks Ending March 3 through June 2, 2020 Data (13 Weeks)**
**The First 13 Weeks of the general quarantine**

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# 1 Introduction

The purpose of this report is to present the results of several analyses that have been run during and subsequent to the COVID quarantine actions. The base week (Week 1 in the charts) is March 4-10, 2020, since this was the last week in which the traffic volume and mix were considered to be "normal." The questions to be answered relate to how the various types of crashes fell off with the decline in traffic after Week 1. This is given in the charts by Weeks 2, 3, … 13, the last of which is May 27 through June 2, 2020.

Many reports, such as that of fatalities going up and pedestrians walking out in the roadways to maintain social distancing, could lead to erroneous conclusions that might be harmful if used to modify enforcement policies in the short term. We are not claiming that articles that draw conclusions at variance to those given by the results in this report are in any way false; we expect they were just based on different data sources. These results could vary considerably from state to state. The data source for the results in this report are Alabama crashes as reported by eCrash, and thus the results obtained should only be applied directly within the state of Alabama.

How can metrics of extremely different values (e.g., all crashes and bicycle crashes) be compared on the same chart? The answer is that the number of crashes for each are not being compared. What is being compared is the *proportion* by which the particular metric increased or decreased in the weeks following initiation of the COVID quarantine. These proportions (e.g., 0.9, 0.8, … etc.) are given on the Y axis. Week 1 (March 4-10) was the baseline week chosen to gauge increases and decreases in the various types of crashes. It was considered representative of crash frequency (of the various types) under normal conditions.

All of the crash charts contain two lines representing *fatal* and *all crashes* in order to provide a common baseline for comparing how the various crash types changed with respect to all crashes and fatal crashes. In addition to all crashes and fatal crashes, which are in all of the charts, the following crash types are also compared (each independently, two lines per chart);

- Speeding Crashes and ID/DUI Crashes
- Pedestrian Crashes and Bicycle Crashes
- Motorcycle Crashes and Large Truck Crashes
- Aggressive Driving and Interstate Travel
- Young Driver Crashes and Federal/State Travel
- Rural Crashes and Urban Crashes.

All of these charts have a *Week 1*, which has a value of 1 for all crash types. Week 1 represents the level of crashes before the COVID quarantine took effect. It could be considered to be very close to the average of all of the weeks in 2020 prior to Week 1 (March 4-10, 2020).

The Y axis measures how much the particular crash type either increased (greater than1) or decreased (less than one) from Week 1. Multiply by 100 to turn these proportions into percentage increases or decreases.

Comments are given beneath each of the charts.

Four additional charts are included after the standardized charts:

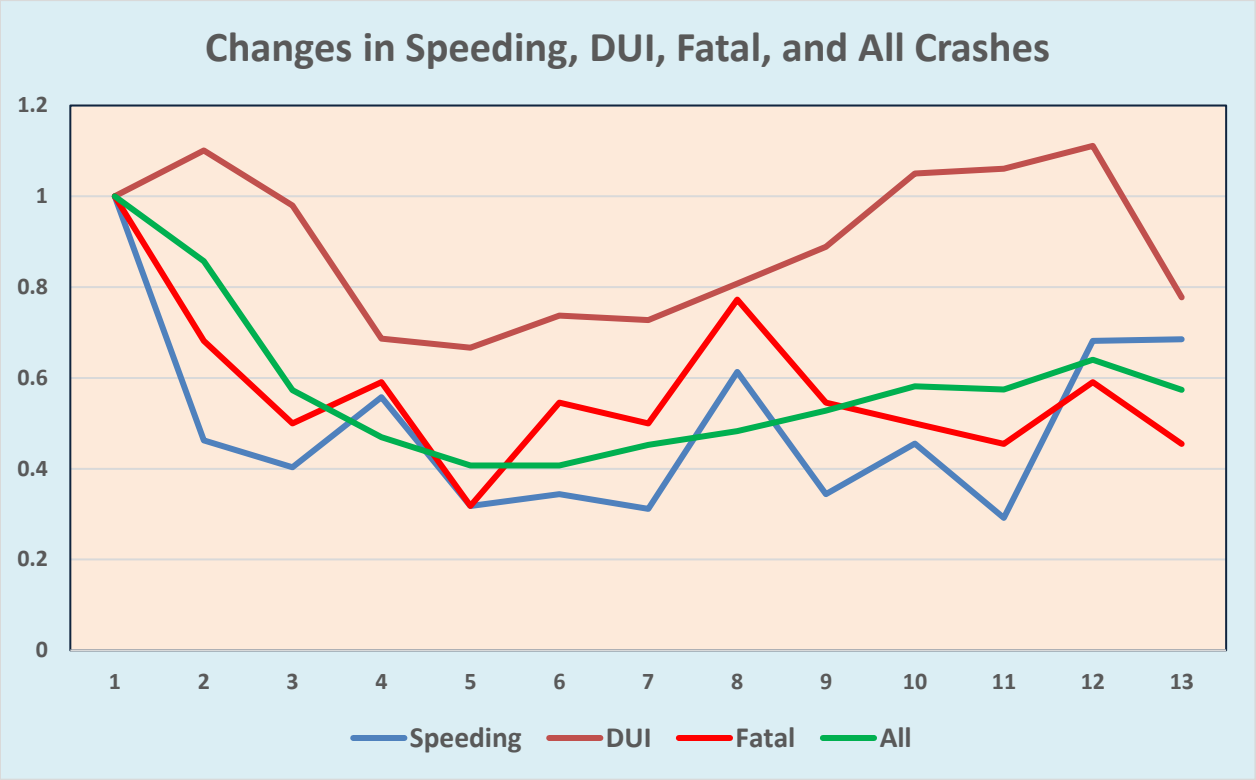
- Section 3. Weekly new COVID cases plotted on the same chart with weekly total crashes;
- Section 4. Daily comparison of 2020 fatalities against 2019 fatalities;
- Section 5. Updates to Section 3 beginning with April 1, 2020; and
- Section 6. Correlation analysis showing how total crashes predict AADT.

This final chart is dedicated to illustrating the very high correlation between traffic volume and crash frequency. This demonstrates that crash frequency is an excellent proxy measure for traffic volume, and thus the charts can be used to gauge the degree to which the drivers of the various vehicle types conformed to the COVID quarantine, assuming that their occupation did not demand that they stay on the road.

*We appreciate the efforts of the Alabama Law Enforcement Agency (ALEA) and local law enforcement agencies in collecting these data, and ALEA's role in maintaining the crash records. We appreciate the daily annual (2020 vs 2019) comparison of fatalities maintained by CAPS. Also, we are updating the new Sate COVID case numbers from Bing:*
https://www.bing.com/search?q=number+covid+fatalities+in+United+states&FORM=BAWPGLM&u=&redir=2&frb=1

# 2 First 13 Weeks Response Temporal Displays

## 2.1 Speeding Crashes and Impaired Driving Crashes (ID/DUI)




How can crashes of different types be compared? Recognize that the charts do not measure absolute numbers of crashes for each type. Instead, they are being compared against their pre-COVID Week 1 baseline. The reason that dissimilar crash types can be compared is that they all measure proportions (up or down) from the base week (Week 1) as was described above.

Consider the *All crashes* (green) and the *fatal crashes* (bright red) lines first. Consistent with what has also been observed in traffic counts in most states, all crashes came down to about 40% of their pre-COVID levels. In Weeks 10-13, the two move together close to 60% of their pre-COVID levels. "All crashes" have now leveled out to just under 60%, but fatal crashes have fallen considerably. See Sections 3 and 4 for how the fatalities in 2020 compare by day to those of 2019.

According to the latest Alabama crash reports, our deaths this year as of May 26, 2020 are 10.1% lower than this day in 2019. However, the fatality rate per mile has increased significantly, as it has in all states according to the National Safety Council. The total crash frequency through

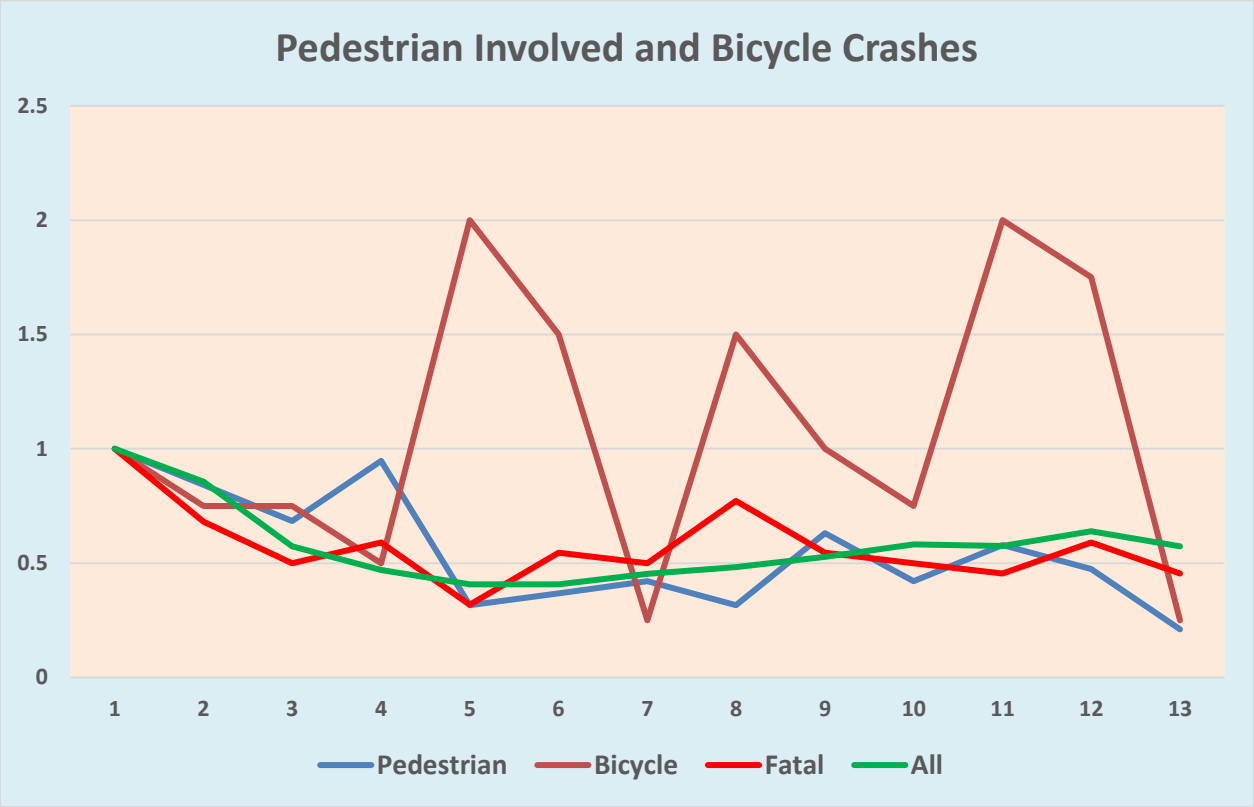
May 26, 2020 was 48,184, as compared to 63,663 for the same date in 2019. This is a 24.3% reduction in total crashes, which is an excellent proxy for traffic volume (see Section5 of this report).

The conclusion that must be drawn is that while total traffic volume decreased nearly 25%, fatal crashes have only reduced about 10%. "The risk [of death per crash] on our roads has actually increased," according to the NSC's manager of statistics Ken Kolosh. He stated that "although an 8 percent decrease in deaths from one March to the next March is great news, that decrease should have been even greater if the risk on our roads had stayed the same. We should have seen closer to an 18 percent decrease in deaths." In Alabama, we should have seen over 20% decrease in fatalities as opposed to approximately 10%.

It is interesting to see the Speeding and Fatal crash line somewhat mirroring each other. Very few fatal crashes do not involve some degree of excessive speed. Speed-related crashes, the blue line, came down roughly the same as the All crashes and Fatal crashes. On the other hand, ID/DUI crashes actually increased in the first week, and while it decreased after that, it only got down to about the 0.6 line as opposed to the others that came down to 0.4. After that, it went back up again and seems to have leveled out above its pre-COVID level. This would indicate that ID/DUI crashes might need special consideration going forward, especially since CAPS studies have shown a major failure of ID/DUI passengers to be properly restrained.

The "All Crashes" and Fatal crashes curves identical to those above will be replicated in the same colors for reference purposes in the charts below. Look for the green and bright red lines, respectively.

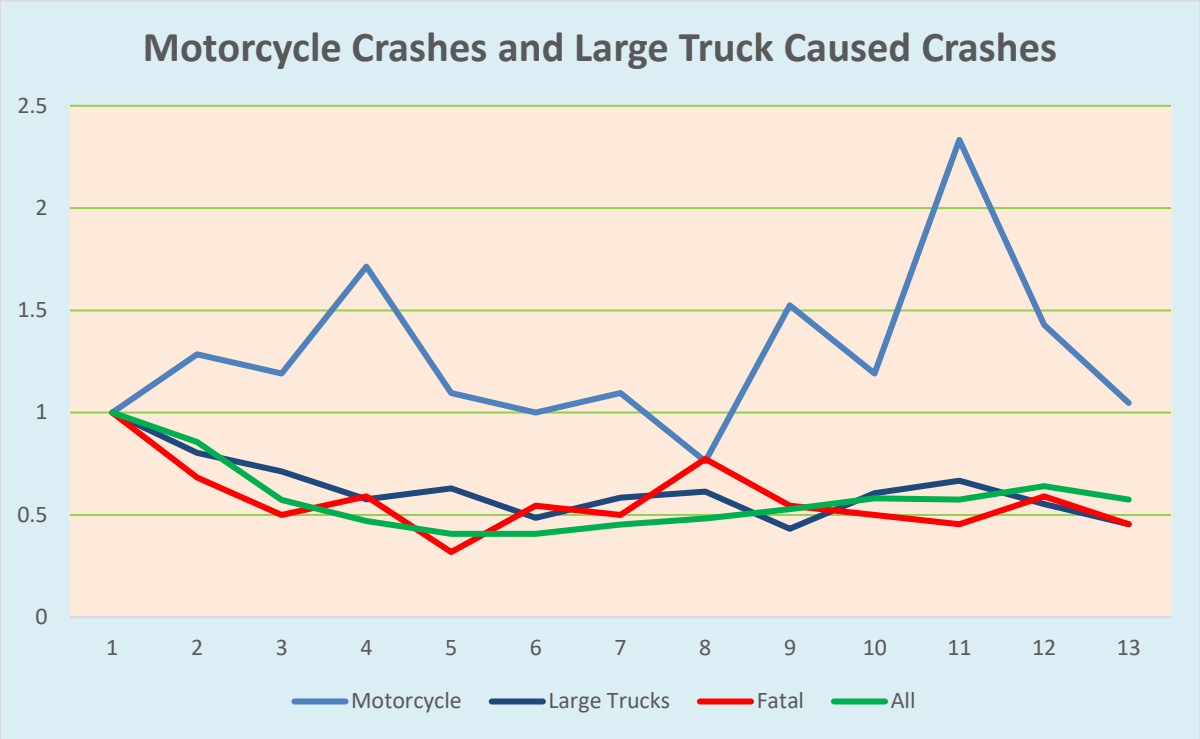
## 2.2 Pedestrian and Bicycles




Pedestrian collisions had a slight rise in the 4th week but then came down to the very near the All and Fatal crash levels. This seems to be confirmed by new data being added. In the addition of weeks 9 through 12, the pedestrian proportion remained about the same as all crashes before it fell in Week 13. There has not been the expected increase in pedestrian involvements that have occurred in other states.

Bicycles on the other hand had a dramatic increase in crashes relative to the other crash proportions, which might indicate that a large number of new bicyclists are engaging in this activity without the normal crash avoidance habits of more experienced bicyclists. While this came down in week 7, it went back up above its pre-COVID level in most of the weeks that followed, with the exception of the most recent week. This is the third week that raw bicycle data are being plotted without any smoothing, which (along with their relative small numbers per week), accounts for the jagged line.

## 2.3 Motorcycles and Large Trucks

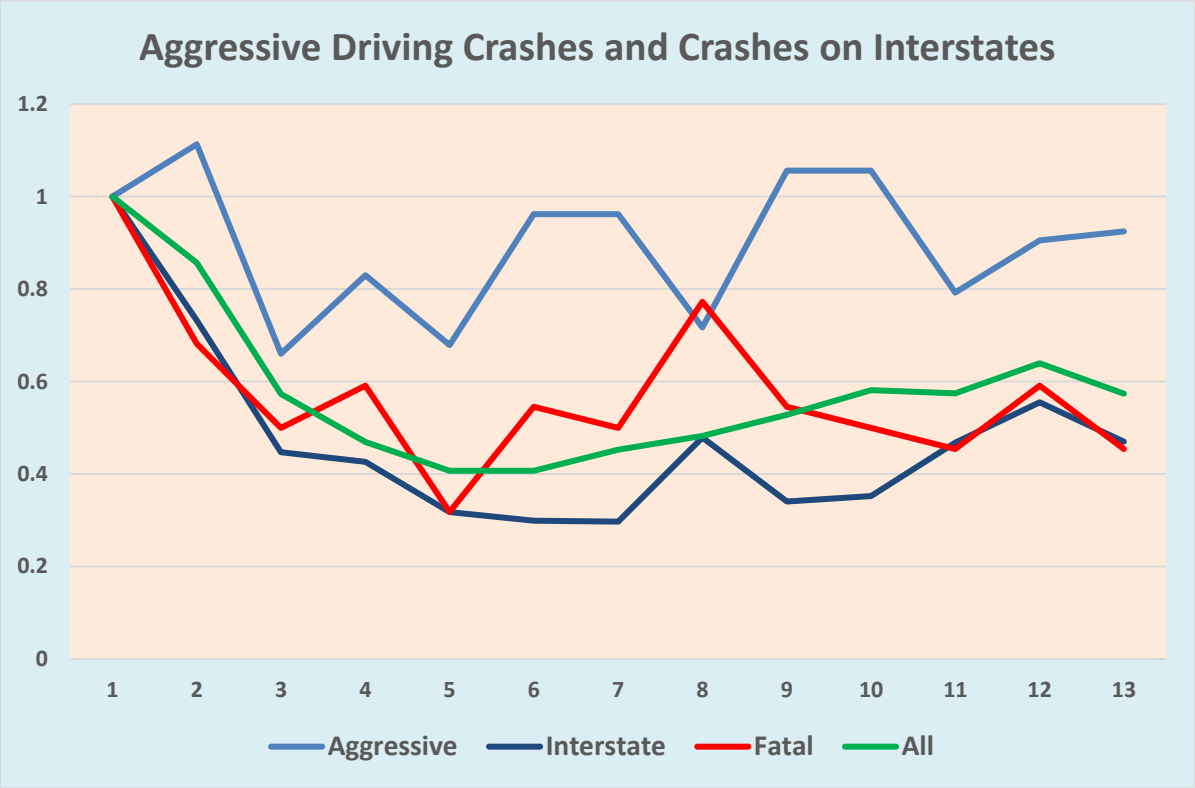



It was speculated that since the number of trucks on the road has not decreased nearly as much as passenger vehicles, that truck crashes might have relatively higher proportion. This has not been the case, as can be seen. It could be noted that a significant proportion of two-vehicle truck crashes have historically been caused by passenger cars (especially at the higher severity levels), so fewer cars on the road what help to reduce truck crashes as well. For a study of causative vehicle types in disparate two-vehicle crashes for a large variety of vehicle types and all severity classifications, please see:

http://www.safehomealabama.gov/wp-content/uploads/2018/12/At-Fault-Analyses-Discussion-v04.pdf

Clearly motorcycles have a much different pattern, and we suspect that the cause would be much the same as that discussed for bicycles above. There is a favorable point toward the end of the sequence in week 8, but alarming rises in weeks 9 and 11. Clearly the proportion of motorcycle crashes are now at least as high as their pre-COVID levels, and this has contributed to a relatively higher fatal crash rate.

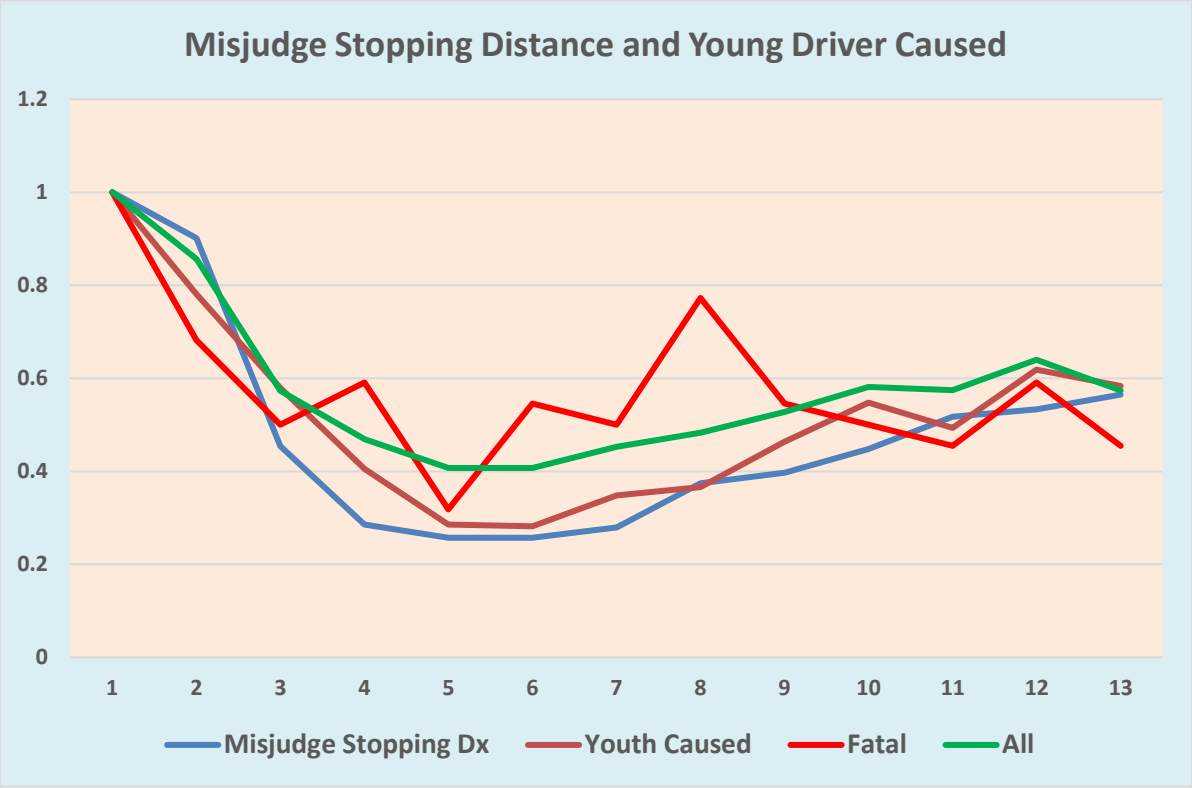
## 2.4 Aggressive Driving Crashes and Interstate Crashes




Interstate travel crashes apparently dropped off more than either fatal crashes or total crashes, which probably indicates that fewer longer trips are being taken.

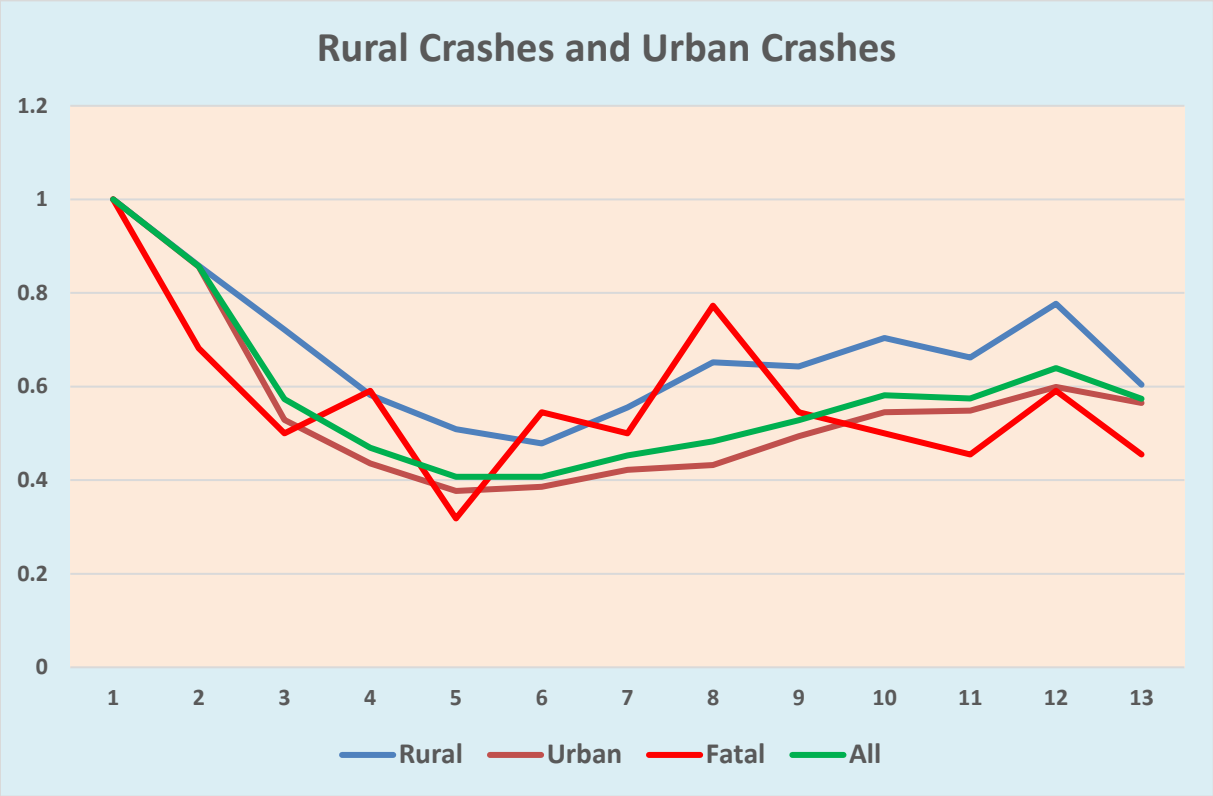
On the other hand, aggressive driving rose in Week 2, and then fell, but clearly not as much as crashes in general, and interstate crashes in particular. The aggressive driving line is choppy because of the relatively few crashes that typically fall into this category. It was good to see the reduction in week 8, but it rose again in Weeks 9 through 13. We expect that there is considerable frustration on the roadways, and we appeal to everyone to be patient and have consideration for other drivers on the road.

## 2.5 Misjudge Stopping Distance and Young (16-20) Driver Caused Crashes



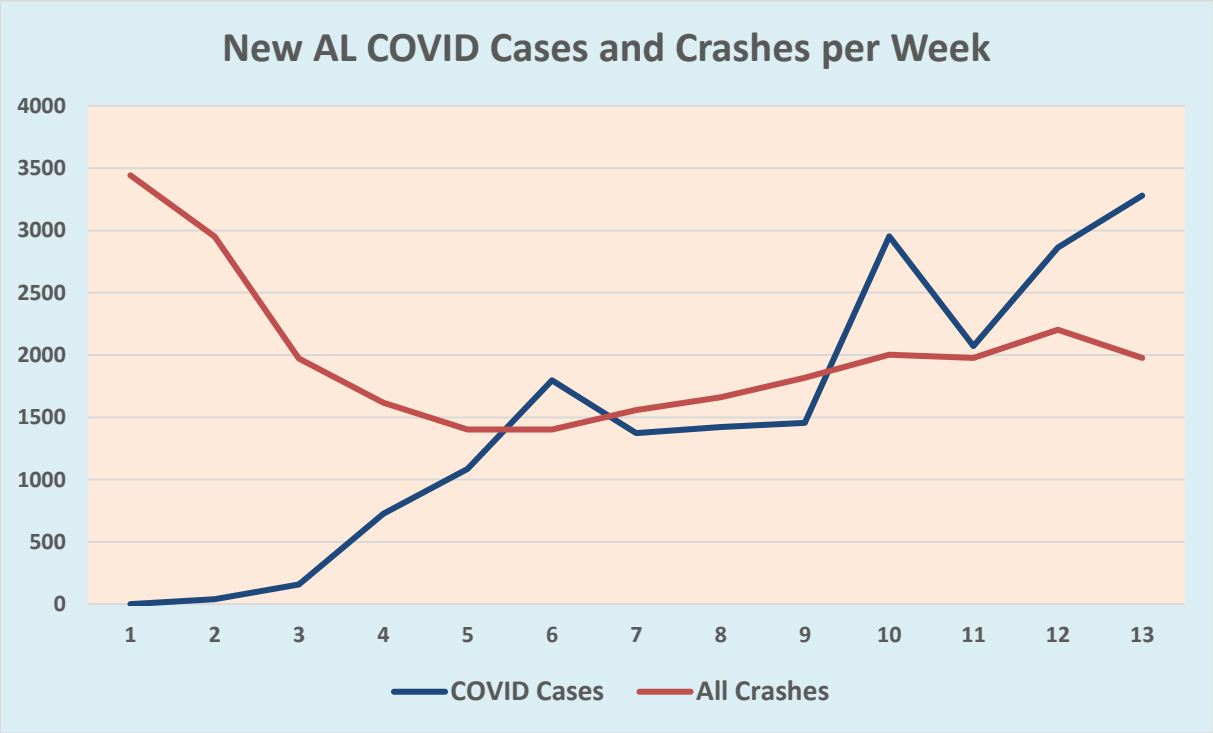

Misjudging stopping distance and youth driver (aged 16-20) caused crashes both followed the general crash and fatal crash trends in their reductions, as far as the shapes of the curves are concerned. However, both of these had a greater reduction than the overall crash trend, and these reductions seem to be continuing.

## 2.6 Rural and Urban



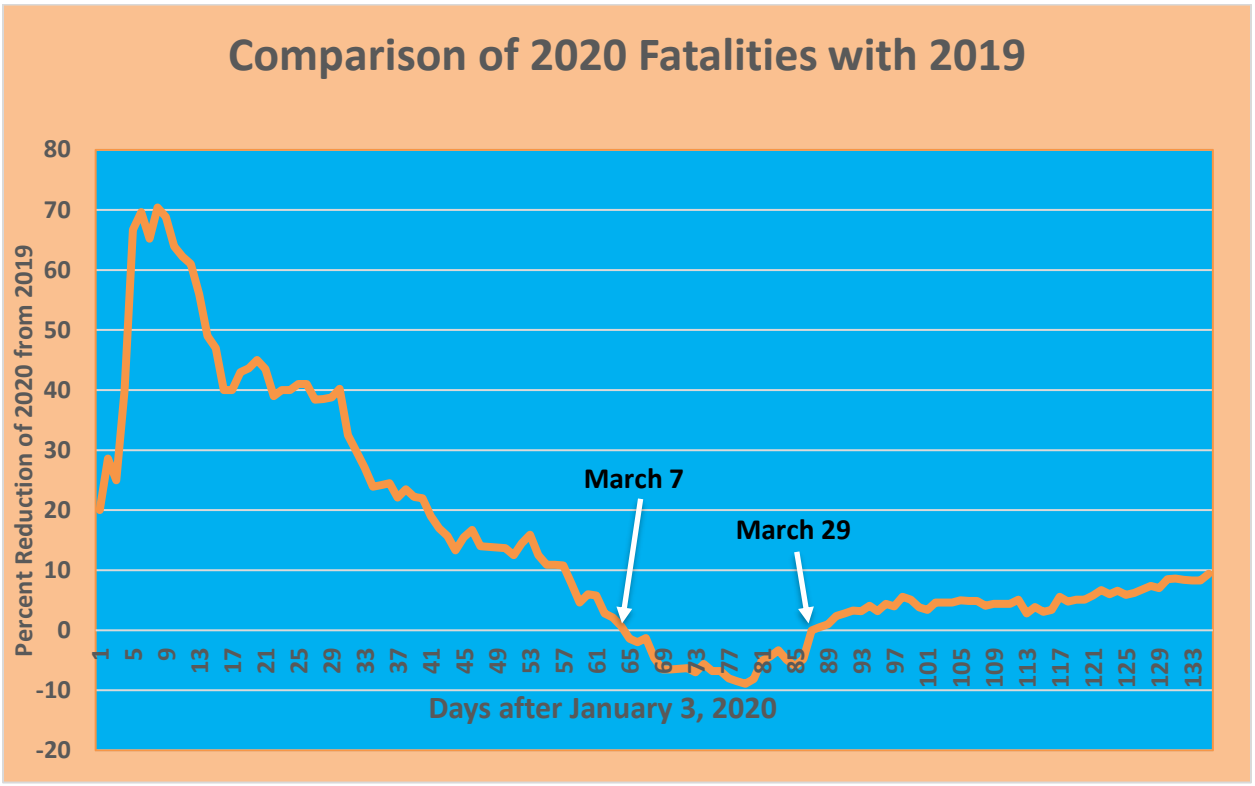

Urban crashes fell off by approximately the same proportion as Fatal and ALL. The All Crash and the Urban crash lines are nearly congruent, indicating the proportionately larger number of urban than rural crashes in the All-Crash total. Rural crashes generally stayed slightly above all of the others, indicating that rural driving did not fall off as much as city driving, a fact that could be out of necessity for rural dwellers in securing the necessities of life.

## 3 Comparing COVID Case and Crash Changes over the 13 Weeks




The chart above shows that over the first 6 weeks there was a fairly strong inverse correlation between the number of crashes (a proxy measure for traffic volume) and the number of COVID cases. In week 4-5 the number of crashes sank to less than 1500 per week. The number of COVID cases rose in the first 6 weeks to almost 2000 cases per week, and then leveled out somewhat through week 9, when it then resumed its upward course. No inferences should be made from this chart as to cause and effect. It is clear that during the first few weeks of the COVID event there was a strong push for a voluntary quarantine that included a dramatic reduction in all types of travel. There may be more inferences that can be drawn from this relationship as it moves into a steady state. During the most recent week (Week 13) there were a total of 3,280 new COVID cases reported, and there were 1,976 crashes reported in Alabama.

## 4 Comparing Percent Reduction in Fatalities 2020 vs. 2019



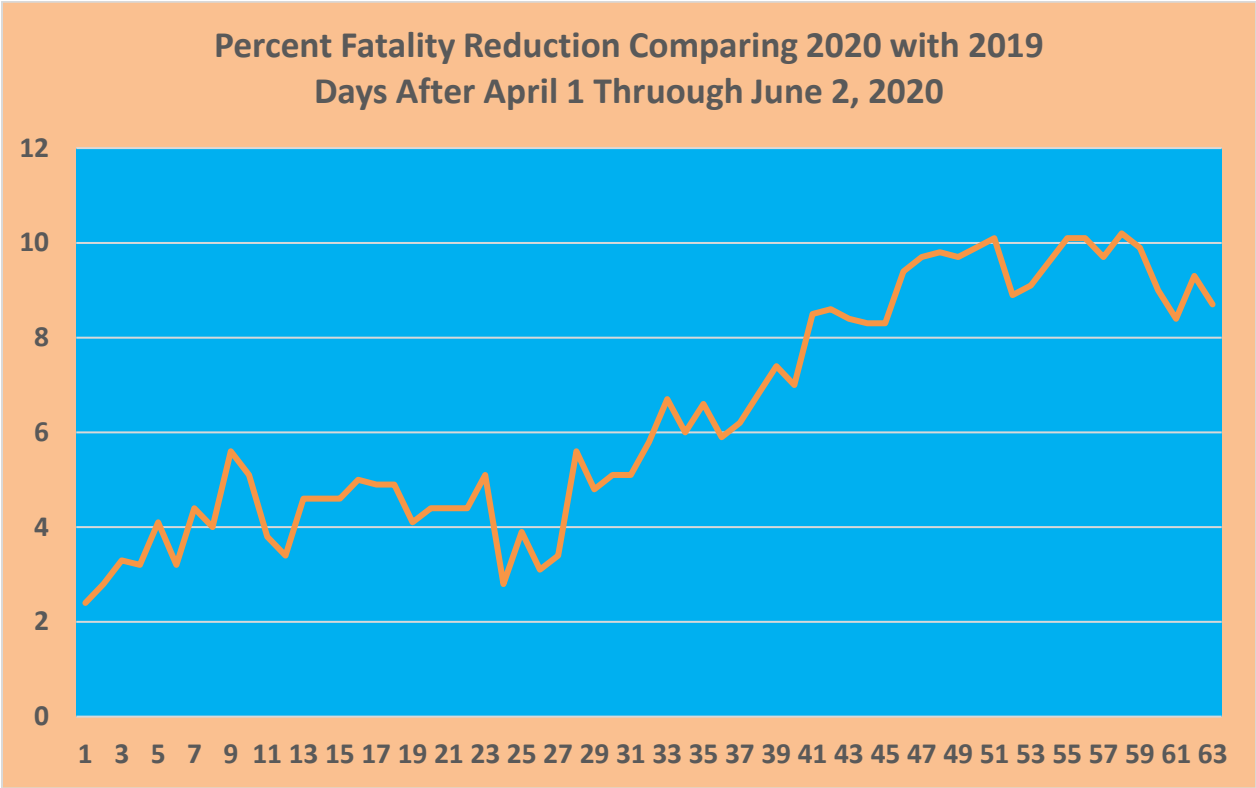

The current reduction in 2020 from 2019, as of May 21, 2020, is 10.1% fewer in 2020 than 2019.

Alabama started off year 2020 with major reductions in fatalities compared to 2019. At one point it had a 70% reduction, but this was early in the year before there were enough daily numbers to do any reasonable statistical comparison. From this high, it slid down in almost a straight line until March 7, when it reached the zero break-even point. At this time the 2020 fatalities numbered exactly what they did in 2019 – no percent reduction.

March 7 is in our "Week 1" (March 3-9, 2020) for the charts above. Recall that Week 1 was the last week before the COVID quarantines took effect. It is strictly coincidental that this was the week in which the fatality counts for 2019 and 2020 became identical.

We say "became" because the count of traffic crash fatalities is dynamic, and it is not constant over days, weeks or months. As can be seen from the chart, the 2020 increase in fatalities continued past March 7, and it was not zero again until March 29, well after the first quarantines had taken effect. See the next section for an update of the chart above.

## 5 UPDATED: Reduction in % Fatalities 2020 vs. 2019 from April 1, 2020

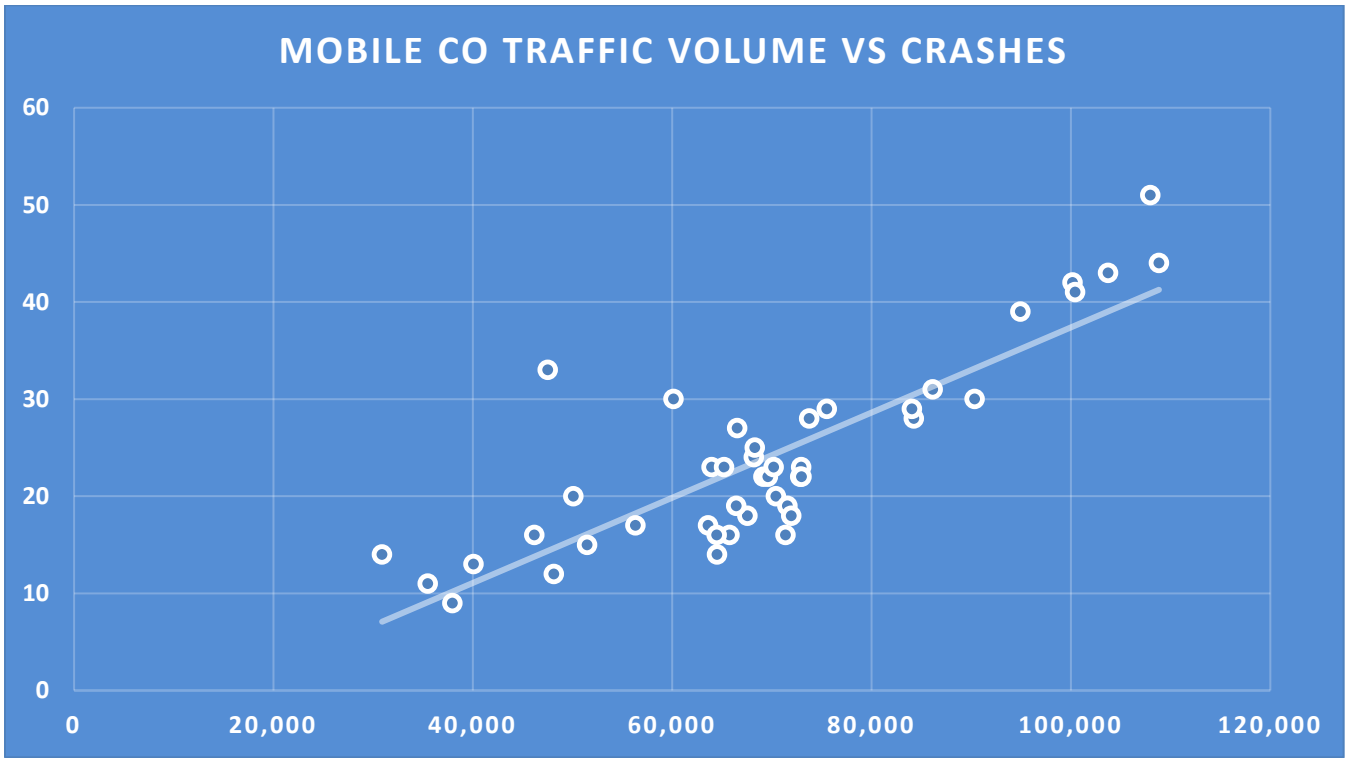



This chart is an update to that in the Section 4, which will be held constant and not updated weekly like this one. These are *daily readings* as opposed to the other charts above, which are weekly changes in the various types of crashes. These two charts are also reporting *actual fatalities* as opposed to fatal crashes, which are reported in the previous charts in Section 2.

Rather than starting on January 3, 2020 (as is true of the graph in the previous section, this graph starts in April 1, 2020, so it is redundant with the part of the previous graph that appears after March 29, 2020. The numbers on the X-axis here are the number of days after April 1,2020.

This chart includes an update to June 2, 2020, which is the last day reported (Day 63). The exact readings for this day were: 368 fatalities in 2019; 336 fatalities in 2020; Reduction = 8.7%.

## 6 Correlation Analysis: Relationship between ADT and Crash Frequency




The regression above, with a correlation coefficient = 0.8430, indicates a nearly perfect relationship between Crashes and Average Daily Traffic (ADT). This analysis, which considered the identical roadway and a similar traffic mix, was performed where the differences in traffic volumes were due solely to the quarantine caused by COVID. Volume and crashes were compared over 43 days from 3/9/2020 to 4/23/2020, and the correlation coefficient of the resulting least-squares regression line was 0.8430, which indicates an extremely high correlation. The sample of traffic volume was obtained from I-10, Milepost 3.

The conclusion that can be drawn from this is that the major portion (virtually all) of the variations experienced after Week 1 (March 3-9) were due to the reduction in traffic volume. The only other cause of it could have been that the drivers remaining on the road (after the COVID quarantine went into effect) were of superior skill and experience. While we believe this is true, and that it had some effect, its effect would be relatively small compared to the reduction in traffic volume.