

# Response of Various Crash Types to COVID Quarantine

Weeks Ending March 10 through December 31, 2020 Data (43 Weeks)

The first 43 Weeks of Government Recommendations/Mandates

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# 1.0 Introduction and Major Recent Findings

## 1.1 Introduction

This is the final report in a series of reports that have been updated as the COVID period progressed. We are anticipating that this will be the last such report in that very close to steady states have been reached for most crash types, despite recent increases in COVID cases in Alabama (see Section 2.0).

In all of these reports we have referred to *Week 1* as representing the crash frequency as *the closest number that we could derive that approximated the crash levels in 2020 prior to the COVID quarantine actions (initiated March 10, 2020)*. The charts answer the questions as to how the various types of crashes were reduced (or increased) with the general decline in traffic after Week 1. This is given in each of the charts by week. The numbers on the X axis in the graphs in Section 3 indicate the number of weeks that elapsed after Week 1. Week 1 is the name we are giving to the baseline average that represents crash frequency (of various types) under normal (pre-COVID) conditions. Generally, the week ending March 10, 2020 can be viewed as Week 1, although that level was actually determined by an average of a prior weeks in 2020.

Many documents have been written regarding traffic volume ramifications of the COVID-19 virus. If this report is not totally consistent with those findings, this should not infer that either of these sources are incorrect. They are most likely based on different state or federal data sources, which often vary considerably from state to state. The data sources for the results in this report are Alabama crashes as reported by eCrash, and COVID cases in Alabama from Alabama Department of Public Health (ADPH) as well as sources given in Section 1.3. While the results obtained have their most direct application within the state of Alabama, there is much commonality between them and what has been observed in other states. The strongest evidence occurs when the results presented here validate those obtained elsewhere.

How can metrics of extremely different crash types (e.g., all crashes and bicycle crashes) be compared on the same chart? The answer is that the raw *numbers of crashes* are not being compared. What is compared are the *proportions* by which the number of crashes increased or decreased in the time periods following the initiation of COVID separation guidance. Proportions are given on the Y axis. To turn them into percentages, multiply by 100.

All of the crash charts (except the first) contain two thin lines representing *fatal* and *all crashes*. This was done to provide a common frame of reference for comparing how the various crash types changed. In addition to all crashes and fatal crashes that appear in all of the charts, the following crash types were displayed over time (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 Misjudged Stopping Distance
- Rural Crashes and Urban Crashes.

Week 1 estimates were updated, as described in the Week 15 report.

*Section 2* is a new section that has been added to show the growth of COVID cases and resulting deaths in Alabama. *Section 3* presents the crash charts that have recently been updated every four weeks. The results have been smoothed by averaging every two weeks rather than showing every week as a distinct point. Even though this is less detail, the overall shape of these curves conveys the trends better than weekly charts, which tend to be extremely choppy and difficult to read. The last two days of January were consolidated into the last (43<sup>rd</sup>) week of the study.

Five additional sections appear after the standardized charts in Section 3:

- Section 4. COVID Speeding Citation Analysis;
- Section 5. CARE IMPACT comparisons for several of the crash types plotted;
- Section 6. Daily comparison of fatalities in 2020 vs. 2019 starting April 1, 2020;
- Section 7. Same as Section 6, but for the earlier months of 2019 and 2020; and
- Section 8. Correlation analysis showing how total crashes predict AADT.

The chart in Section 8 demonstrates the very high correlation between traffic volume and crash frequency. Since crash frequency is an excellent proxy measure for traffic volume, the charts can be used to gauge the degree to which drivers of various demographics and vehicle types changed their behavior as a result of the COVID pandemic.

## 1.2 Major Recent Findings from the Week 43 Update

In order to match week numbers with actual dates, **Week 39** is the week ending on December 1; **Week 41** is the week ending on December 15; **Week 43** is the week ending on December 29 that was augmented by the crashes on December 30 and 31. In the discussions that follow, week numbers will be used rather than dates to make reference to the charts easier.

The following is a quick summary of the most significant findings for the first 43 weeks of the COVID protection measures (March 10, 2020 until the end of 2020), given according to the Section numbers for easy referencing to more detailed information:

- Overall summary. Weeks 36-43 generally saw a reduction closer to pre-COVID levels for most crashes. The exceptions were: DUI and aggressive driving. The expected increase in traffic volume during the Thanksgiving holiday week did not materialize, and generally, all crash types were down over the last few weeks of the year. All crashes had an up-tick in the final week driven mainly by DUI and Aggressive Driving.
- 3.0 All Crashes and Fatal Crashes. Crashes in general (All Crashes – yellow line) have dropped off after being above their pre-COVID levels (1.0). Fatal crashes have dropped

off with all crashes in weeks 39-43, heavily affected by reduced holiday traffic. Fatalities during the 2020 year fell behind their comparable days in 2019 (see Sections 6 and 7).

- 3.1 Speeding Crashes and Impaired Driving (DUI) Crashes. DUI and Speeding are well established to be major causes of fatal crashes. DUI causes crashes that are often at excessive speeds, and those in the causal vehicles are properly restrained less than half the time. The blue speeding line does not depart from the All Crash (yellow) line nearly as much as the red DUI line. DUIs came down to the all crash line in the most recent two weeks.
- 3.2 Pedestrians and Bicycles. Pedestrian crashes remain at about the All Crash level, while Bicycle crashes have leveled out from Week 25-33, to about 38% higher than its pre-COVID level, after which it had a sharp increase before dropping to almost 60% below its pre-COVID levels in Week 41. This could be due to the weather not being conducive to bicycling. It seems to have bounced back up after that in the last two weeks of the year, but not nearly to its all-time highs.
- 3.3 Motorcycles Involved Crashes and Large Truck Caused. Even though the Motorcycle crash proportion has declined significantly between Weeks 29 and 35, it was still twice its pre-COVID level. Most recently, it dropped precipitously in weeks 41 and 43, which might be due to novice motorcyclists avoiding the bad weather days in this time period. Large Truck proportions have not deviated significantly from the All crash proportions, showing their consistency over this of need for essential goods.
- 3.4 Aggressive Driving Crashes and Interstate Crashes. Aggressive Driving proportions each week remained up with Fatal Crashes, while Interstate Crashes are highly correlated with All Crashes during the COVID period. Interstate dropped at first, but has now come back to its expectation.
- 3.5 Misjudged Stopping Distance and Young (16-20) Driver Caused crashes. Misjudged stopping distance and Young Driver Caused crashes remain highly correlated with All crashes during the COVID period, with the most recent results showing Youth Caused Crashes to be slightly above the All Crash line, right up to the most recent weeks. Misjudge Stopping Distance continues to be slightly below the all crash line, with just one exception. Generally misjudging stopping distance is more of a problem with younger drivers than with those with are more experienced, and the correlation here is obvious.
- 3.6 Rural and Urban. Rural Crashes remain above the All line, while Urban Crashes did not get above it until after week 33. Both remain highly correlated with All Crashes during the COVID period.

### **1.3 Credits for data sources**

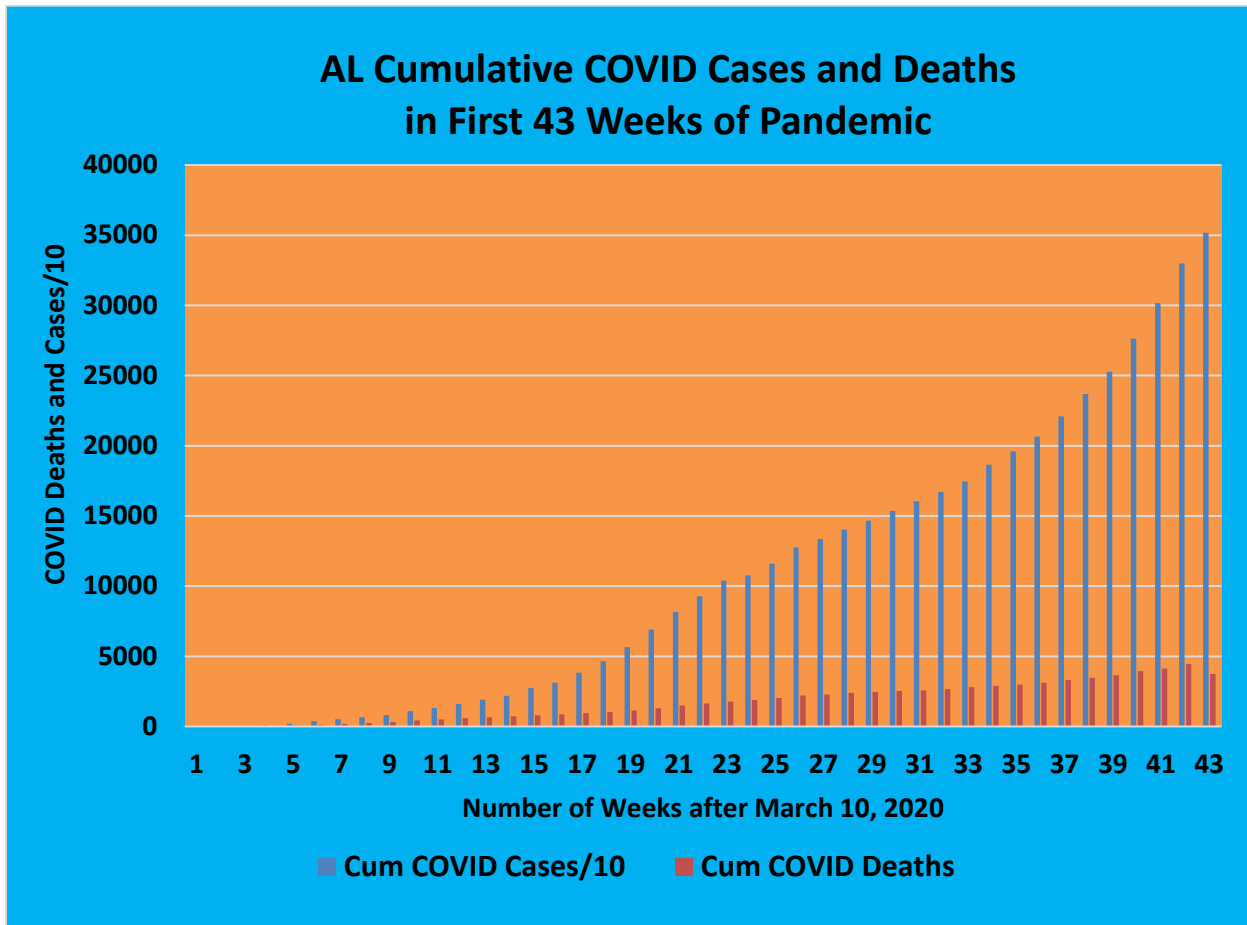
*(1) We appreciate the efforts of the Alabama Law Enforcement Agency (ALEA) and local law enforcement agencies in collecting crash data, and ALEA's role in maintaining the crash records.*

*(2) We also appreciate CAPS for the daily annual (2020 vs 2019) comparison of fatalities.*

*(3) We are updating the daily State COVID case numbers with data from Bing:*

*[Coronavirus Alabama, United States - live map tracker from Microsoft Bing](#)*

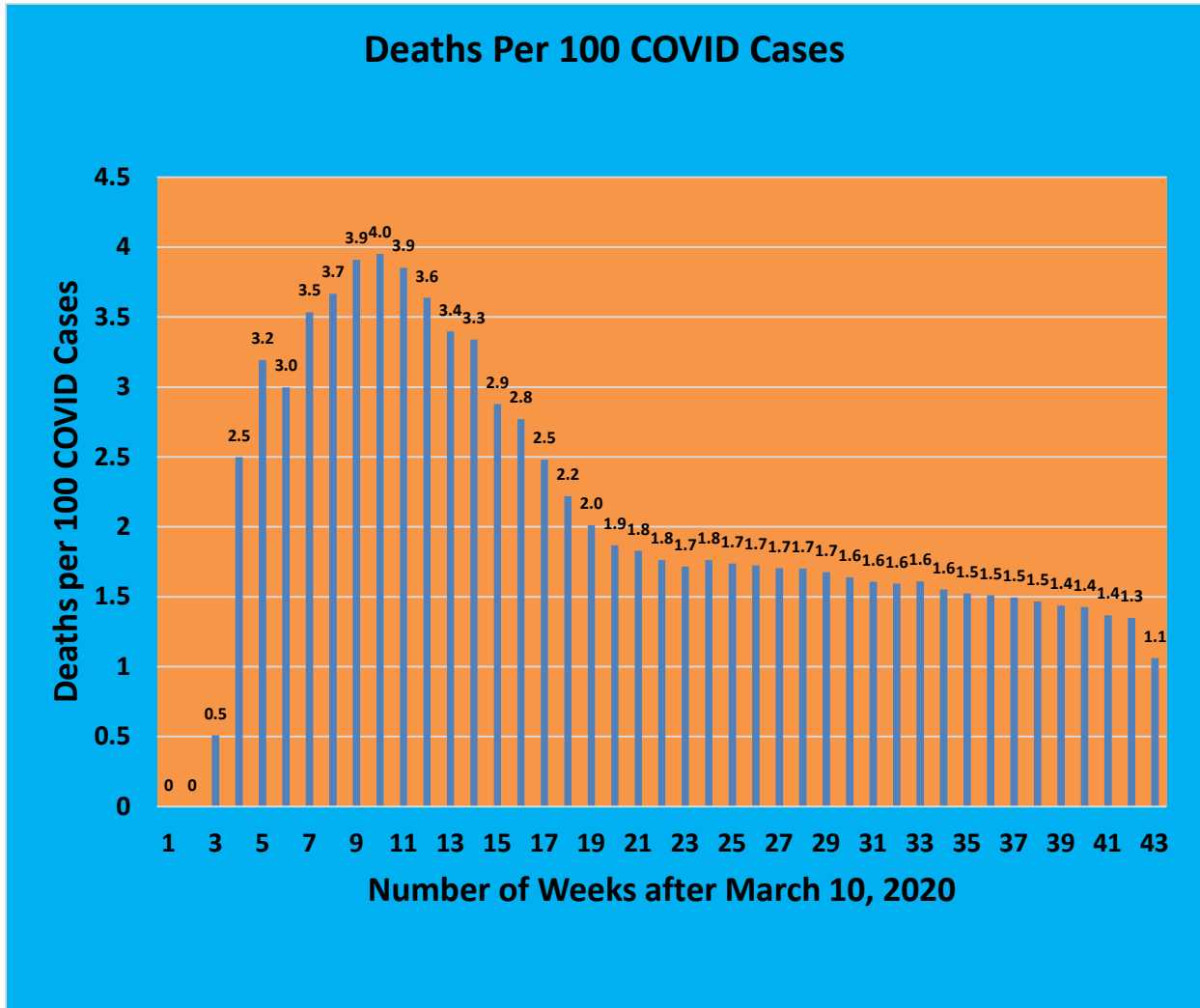
## 2.0 COVID Case Fatality Rate Change Over the 43 Weeks.



The chart above shows how the cumulative number of COVID cases and the cumulative number of COVID deaths have increased in Alabama over the first 43 weeks of the pandemic. Note that, while the Y-axis gives the actual number of deaths, for the case count, *the Y-axis numbers are only 1/10<sup>th</sup> of the case count*. This was done so that the cases and deaths could be shown on the same chart. Note how the number of cases has been increasing exponentially, especially in the most recent weeks. The actual cumulative numbers for Week 43 (ending December 31, 2020) were 351,804 cases and 3,737 fatalities.

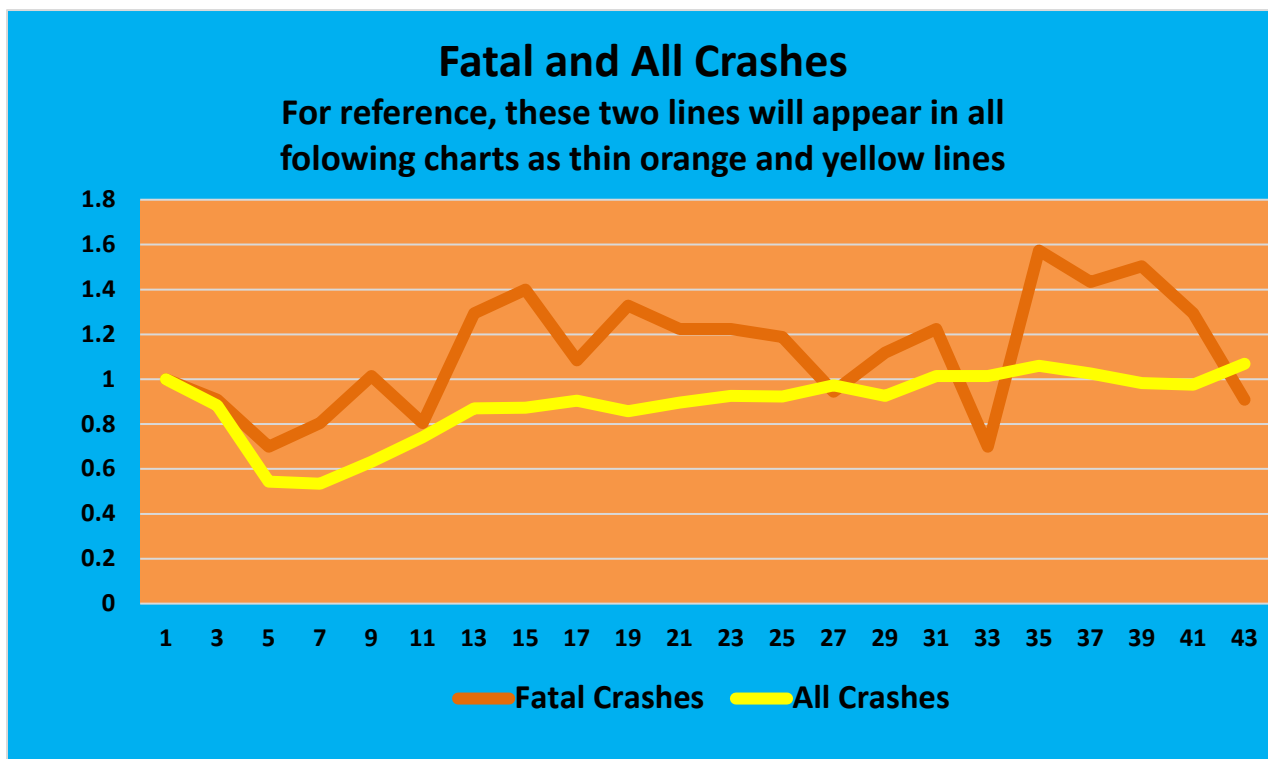
The chart below shows how the probability of survival has changed over the 43 weeks. The death rate got up to nearly 4 per hundred cases (4.0%) in weeks 9-11, but it is now down to about 1.1 deaths in 100 cases (1.1%). This shows how increased testing, improved testing techniques, and other medical advances have been beneficial in reducing the cases that result in death.

Increased testing heavily impacts the increased number of reported cases. However, we would not expect the numbers being tested to have much influence within the most recent week, which started out with a 7-day average 4,067 new cases per day, and ended the week (on December 31, 2020) with a seven-day average of 3,204. December 31, 2020 alone reported 4,406 new cases.



### 3.0 Crash Response Temporal Displays for the First 43 Weeks

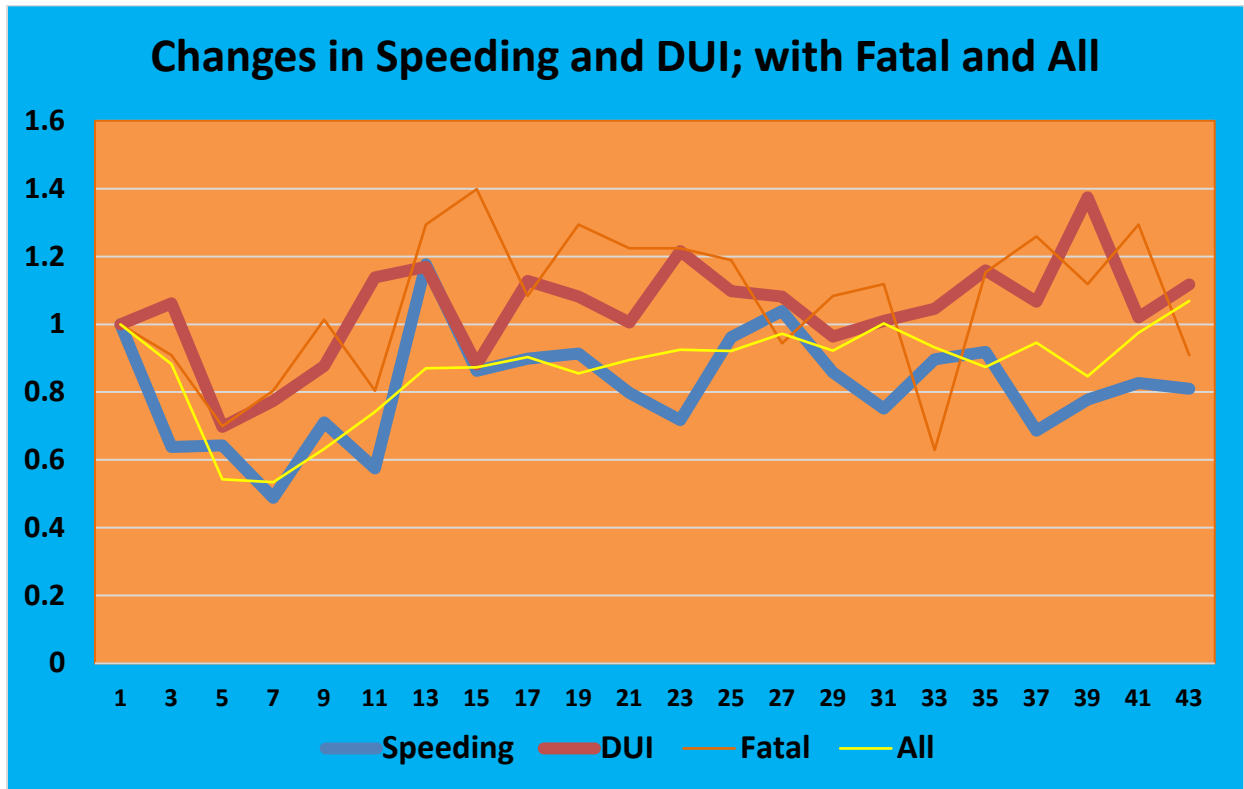
To set the stage for the comparisons to follow in this section, consider the *All Crashes* (yellow) and the *Fatal Crashes* (orange) lines in the chart displayed below. Lighter colors were chosen for these two lines so they would blend into the background of the charts that follow to prevent their being a distraction from the major two lines. Consistent with what has been observed in most states, All Crashes came down to about 50% of their pre-COVID levels in the first few weeks. The total crash number has now regressed to its former level. Fatal crashes have generally been higher than their 2019 counterparts (see Sections 6 and 7).



Fatal Crashes rose in Weeks 12-15 to about 40% higher than the pre-COVID level, and they did not drop until Week 27. As of December 31 (end of week 43), the number of fatalities in 2020 was effectively within 0.5% of its comparable 2019 value. Thus, the total number of crashes to this date in the two years provides an estimate of the crash rate (per MVM) increase. The totals through December 1 were 145,253 for 2019 and 120,455 for 2020, a reduction in estimated traffic volume of 17.1%. while the crash reduction for that day was only 2.2%. Adjusting for this, the fatality rate in 2020 increased by an estimated 15.2% over that of 2019.

See Sections 6 and 7 below for daily comparisons of fatalities in 2020 and 2019. The following subsections will present the changes in the various crash types. The “All” and “Fatal” crash lines will be displayed as thin lines so as not distract from the other lines in the charts.

### 3.1 Speeding Crashes and Impaired Driving (DUI) Crashes



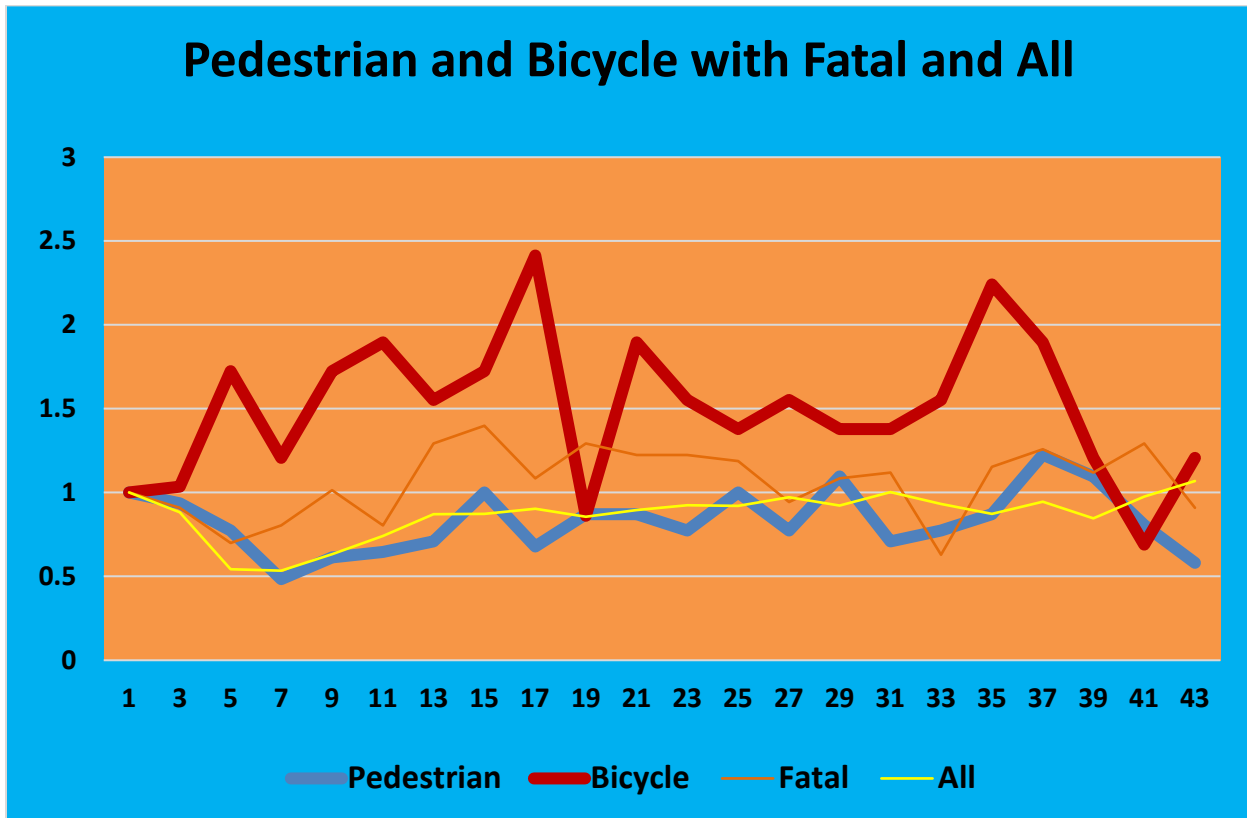
The dark blue speeding curve almost coincided with the red DUI in Weeks 13-15, and right after that it coincided with the All Crashes line. Generally, speeding has been fairly consistent with all crashes (thin yellow), although the fewer speeding crashes make this line much more jagged.

DUI Crashes (red) increased in the first week, and while they decreased for a few weeks after that, they became higher than its pre-COVID proportion from Weeks 11-13, Weeks 17-23, and the most recent Weeks of 33-43. It is clear that the DUI proportion has been consistently higher than the speeding values and as well as all crashes in general. It is important to realize that while speed within itself may not cause the crash (to the point it is recorded as the PCC), speed always increases crash severity. DUI, on the other hand actually causes crashes and quite often it is accompanied by excessive speed and a failure to be properly restrained.

For more details on Speeding and ID/DUI crashes, please see Section 5.1. See Section 5.5 for more on crash severity.



### 3.2 Pedestrians and Bicycles

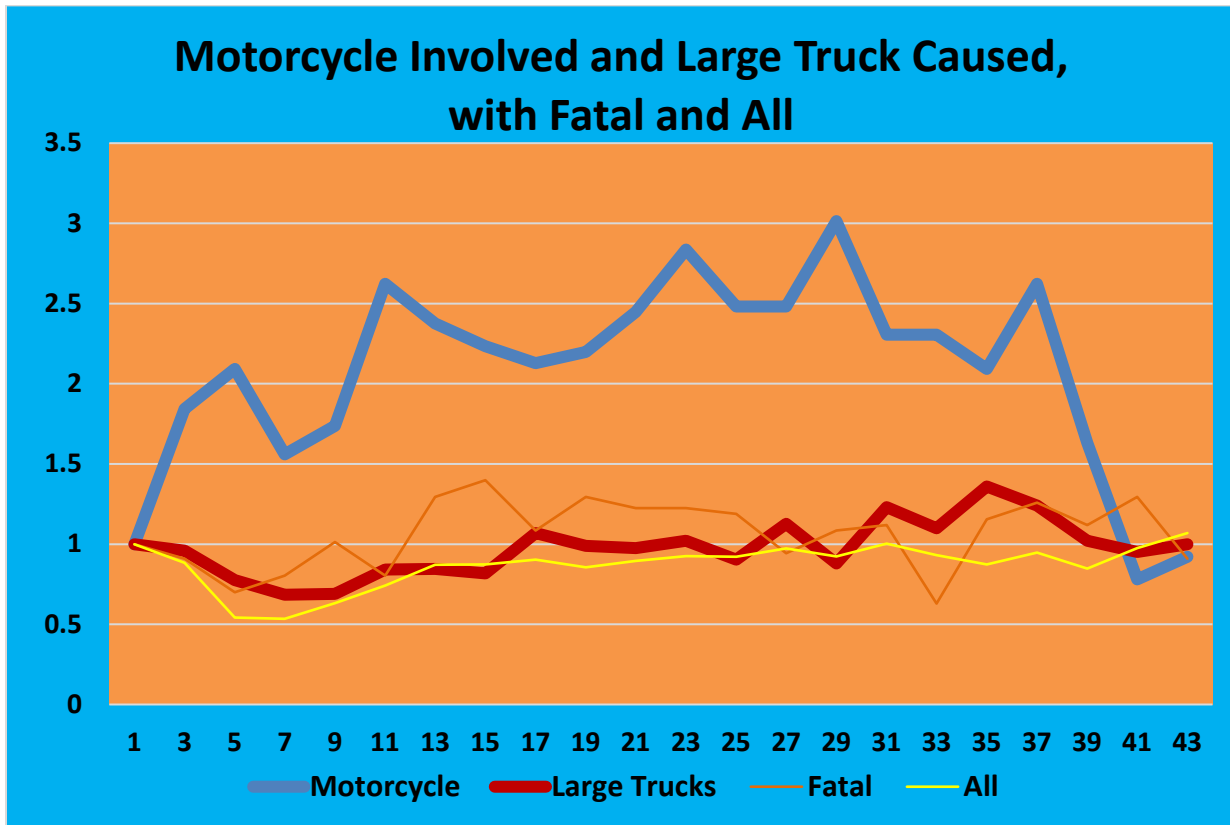


Pedestrian Crash proportions (blue) had more variability than all crashes because of their smaller numbers, but they were quite consistent with the All Crash line, indicating that pedestrian strikes were fairly sensitive to the increases and decreases in traffic volume.

Bicycles (red line), on the other hand, had a dramatic increase in its crash proportions relative to the other crash proportions, and currently it has remained higher than either All Crashes or Fatal Crashes. This indicates that a large number of new bicyclists began engaging in bicycling without having developed the normal crash avoidance habits of more experienced bicyclists. While this came down temporarily in Week 19, this was clearly an exception, and it has shown consistently higher levels in most of the following weeks. Even with the recent decline (perhaps due to the weather and holidays), they remain above their pre-COVID levels.

Pedestrians have averaged about 12 crashes per week during the COVID period, while bicycles have averaged about 4.5 crashes per week. For more details on Pedestrian and Bicycle crashes, please see Section 5.3.

### 3.3 Motorcycles Involved Crashes and Large Truck Caused

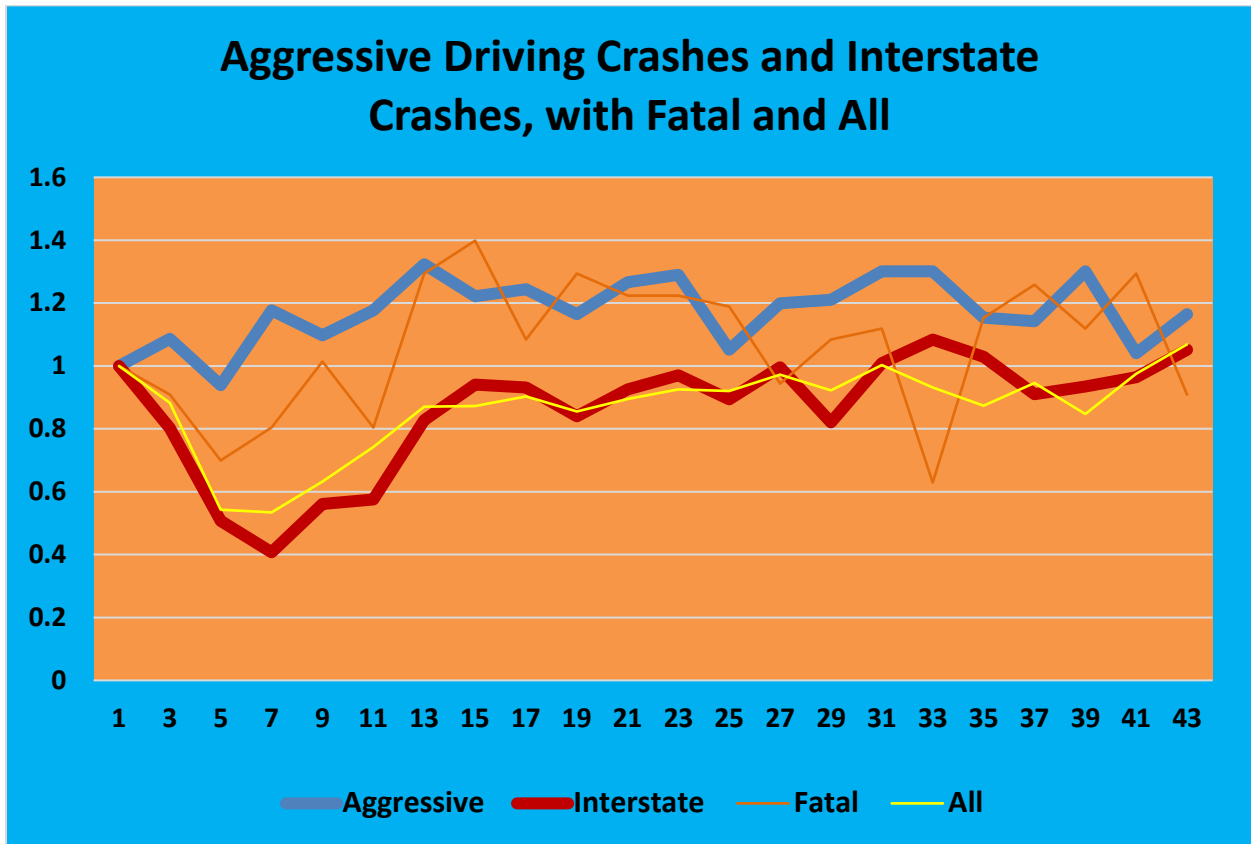


It was speculated that since the number of trucks on the road had not decreased nearly as much as passenger vehicles, that truck crashes might have relatively higher comparative proportion. This has not been the case, and large trucks have been almost totally consistent with All Crashes. A large proportion of two-vehicle crashes involving a truck and a passenger car have historically been caused by passenger cars (especially at the higher severity levels); so fewer cars on the road would help to reduce large truck crashes. 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 (blue) have a much different pattern, and we suspect that the cause would be the same as that discussed for bicycles above, i.e., a larger number of inexperienced motorcyclists have been on the road during the COVID period, which also might be an effort to save fuel costs. Motorcycle crash proportions came down significantly prior to and during the end-of-year holiday period. For more information on causal unit types, please see Section 5.4 as well as the link to SafeHomeAlabama.gov given above.

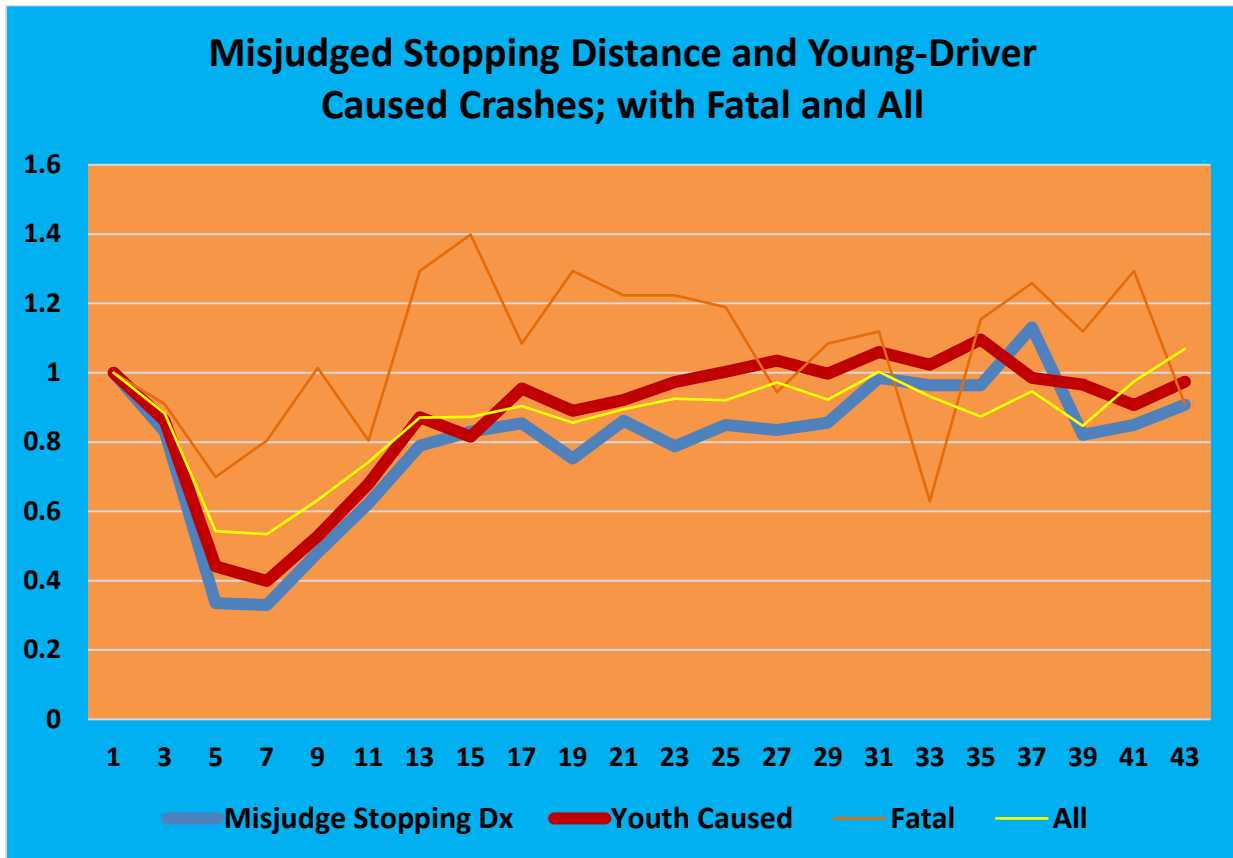
### 3.4 Aggressive Driving Crashes and Interstate Crashes



Prior to Week 13, Interstate travel (red line) crashes dropped off as much or more than either fatal crashes or total crashes, which probably indicates that fewer longer trips were being taken early in the COVID period. After week 13, Interstate crashes have been fairly consistent with the All Crashes.

On the other hand, the Aggressive Driving proportion rose after Week 5, and it has stayed well above the expected All-Crash level as well as its pre-COVID level with a few exceptions, including the most current weeks. Aggressive Driving is highly correlated with fatal crashes, while Interstate crashes have been highly correlated with All crashes during the COVID period.

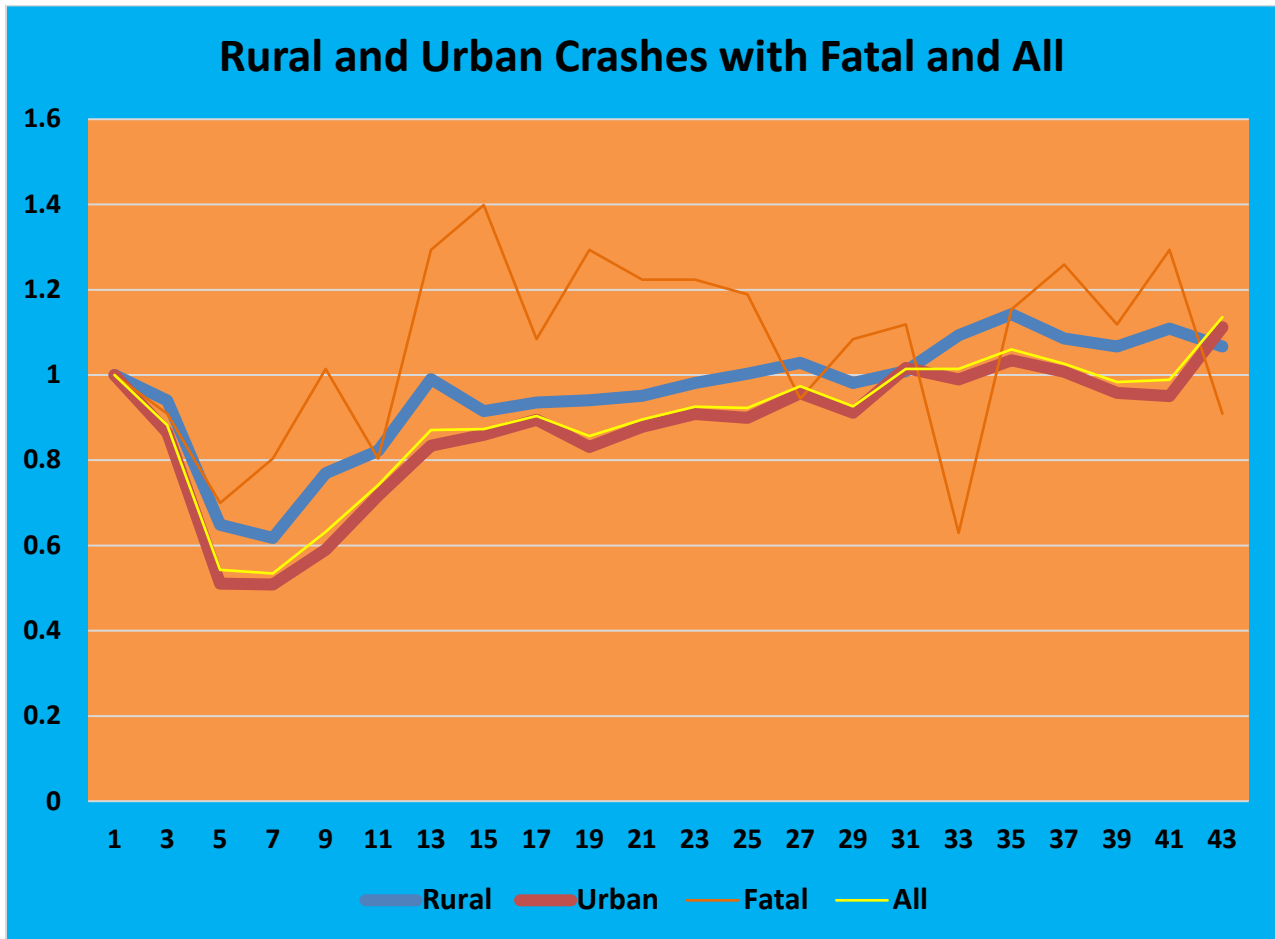
### 3.5 Misjudge Stopping Distance and Young (16-20) Driver Caused Crashes



Misjudging Stopping Distance and Youth Driver (aged 16-20) caused crashes were quite close to each other, both following the general All Crash trend in their reductions. Both of these generally had a greater proportionate reduction than the overall crashes in the first 15 weeks. After that Youth-Caused crashes have consistently exceeded the All Crash line, although the differences have not been nearly as great as many of the other disparities discussed above. We feel this has resulted from a greater number of younger drivers being on the road after Week 16, as opposed to (perhaps family) restrictions on them prior to that.

Misjudged stopping distance and Young Driver Caused crashes both remain highly correlated with All Crashes (and each other) during the COVID period.

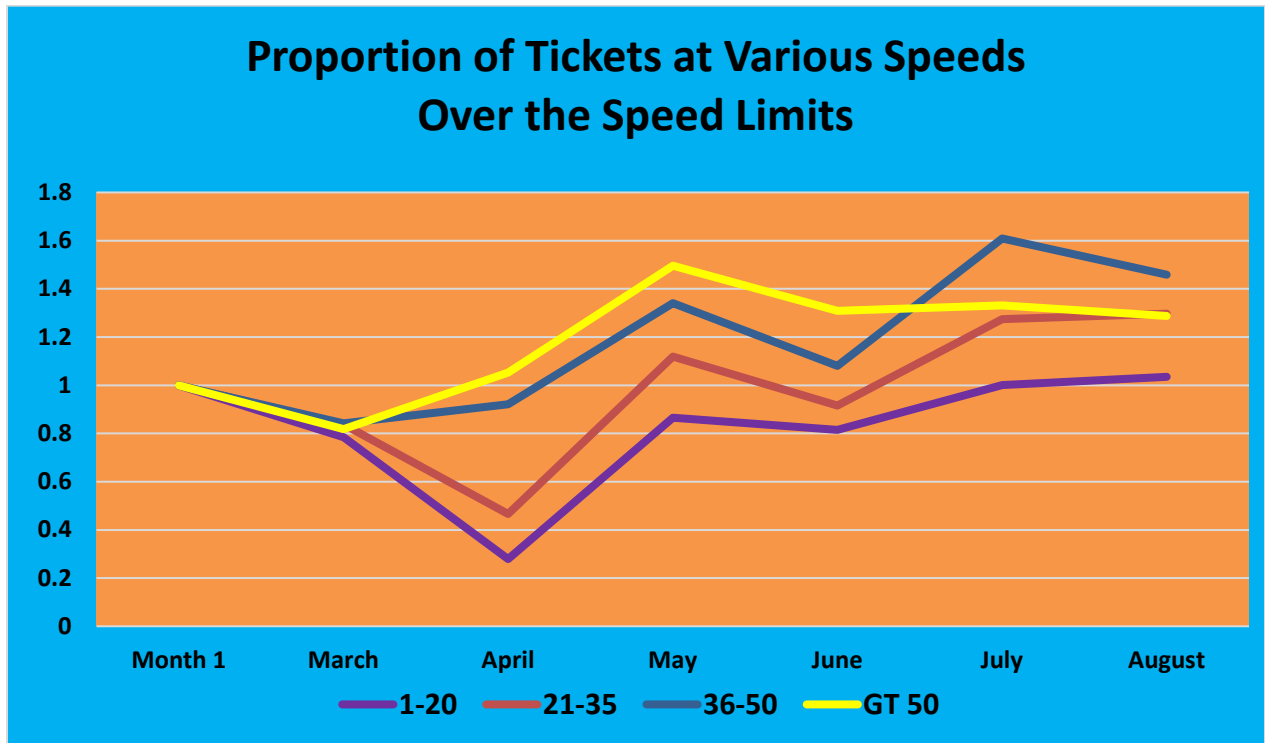
### 3.6 Rural and Urban



Since the total of Urban and Rural crashes equals All Crashes, it is expected that one of these will be above, and the other below, the yellow (All Crash) line. Since Week 1, the Rural crashes have been above this line, and the Urban crashes have been slightly below it. This indicates that rural driving did not fall off proportionally as much as city driving, a fact that could be due to the need for rural dwellers in securing the necessities of life. In the most recent weeks, Rural Crashes have remained above the All Crash line, while Urban Crashes remain below it, both being highly correlated with the All Crash proportions during the COVID period.

## 4.0 COVID Speeding Citation Analysis

This Section contains the results of an analysis that was performed using Alabama citation data. These data included the excess speed in Miles Per Hour (MPH) for which the citations were issued over the time period prior to the COVID period (referenced as “Month 1” in the chart) through August. The following chart plots these changes over the first five COVID months.



These data clearly indicate that for citations at all speeds over the speed limits, all speed violations dropped about the same in March 2020 due to the greatly reduced traffic in the early weeks of the COVID period: The following summarizes the effects for the various speed violations:

1. One to 20 MPH over the speed limit. [Approximate odds of crash resulting in death at this speed=1 in 500; these are best estimates, and they will also be given for the other speeds in brackets below.] This speed violation range, given by the purple line, continued to drop after March. It recovered to 80% of its pre-COVID level in May and June. In July and August, it was fairly stable near its Pre-COVID level.
2. 21 to 35 MPH over the speed limit. [1 in 30 probability of death.] Although not with the same degree of reduction, this level of violation (given by the red line) closely mirrors the One to 20 violation MPH line. However, it jumped slightly above its pre-COVID level in

May. It stayed at about that level until July, when it exceeded its pre-COVID level by about 30%, which is where it is was in August.

3. 36 to 50 MPH over speed limit (blue line). [1 in 15 chance of death.] Lower in March and April, it went up to slightly higher than 35% above its expected normal in May. After that, it dropped almost to its expected value in June before dramatically increasing to almost 60% higher than its expected normal in July. It then came down in August to slightly above the 40% level.
4. Greater than 50 MPH over speed limit. [1 in 5 chance of death.] From the dip seen in all other speed violations, GT 50 MPH (yellow line) increased to its expectation in April, and then went way beyond that in May and June, at 50% and 30% higher than expected, respectively. After that, it seems to have stabilized at about 30% higher than its pre-COVID expected value.

A study of speed caused fatal crashes is being performed that will give more clues to demographics. The common speculation on it is that drivers took advantage of there being fewer cars on the road as well as the unfounded belief that enforcement was down. The above chart confirms that enforcement has been fairly consistent throughout the COVID period. See a typical news article at <https://www.foxnews.com/us/speeding-violations-spiked-during-pandemic>.

The information value in the chart above comes from comparing the degrees of violation over time. It is interesting how well correlated the lower three speed violations are, as well as their inconsistency with the GT 50 category after June. All of the violation types had some decline early in the COVID period. However, the two lower violations (1-20 and 21-35) had steep declines in the next month (April). After that, the lowest violations came back to its expected pre-COVID level for July and August (purple line). However, in July and August the 21-35 exceeded its pre-COVID rates by about 30% for July and August (red line).

The top two violations (36-50 and GT 50) were well correlated through June. After that, the highest violation (yellow) leveled out at about 30% higher than its pre-COVID rate. The 36-50 (blue) topped out at 60% higher in July before coming back to about 40% higher in August.

How does all of this map collectively into the minds of the drivers who have an inclination to speed? That is hard to say, but starting with the extreme GT50, it seems that many drivers were just going wild with their new perceived freedom, and this lasted through May. At that point perhaps the increase in the fatality rate and safety warnings got through to them and they started to back off somewhat. They were still at 25% higher than pre-COVID in June through August.

It appears that those who chose not to be so excessive continued to speed, but at the 36-50 range, which can be a major improvement when it comes to fatality reduction. Of course, they might also have decided to stay within the One to 20 range, which would be a much wiser decision. The decrease in the highest speed violation range seems to be inversely correlated with increases in the other speeding ranges. So, viewing the increase in the lower violations as resulting from a decline in the higher violations would seem to be a logical conclusion.

## **5.0 CARE IMPACT Comparisons Relative to the Temporal Graphs**

The purpose of this section is to provide greater insight into the various categories of crashes that have been given in Section 3. These IMPACT analyses were performed in the heart of the COVID period.

Unless otherwise stated, the IMPACT displays in this section are comparisons of identical crash attributes for the then applicable COVID time frame in 2020 (March 11-July 14, 2020 = 18 weeks) against all crashes in 2018, 2019 and 2020 up to the COVID time frame (before March 11, 2020). The last three days of the COVID time frame (July 12-14, 2020) had only partial reporting in the crash database. Total crashes per day in these three days averaged only about 35.4% of the average crash counts for the first 11 days of July. This has no practical effect on the IMPACT comparisons.

The Pre-COVID time period is also referenced as “Normal” in some of the comments below.

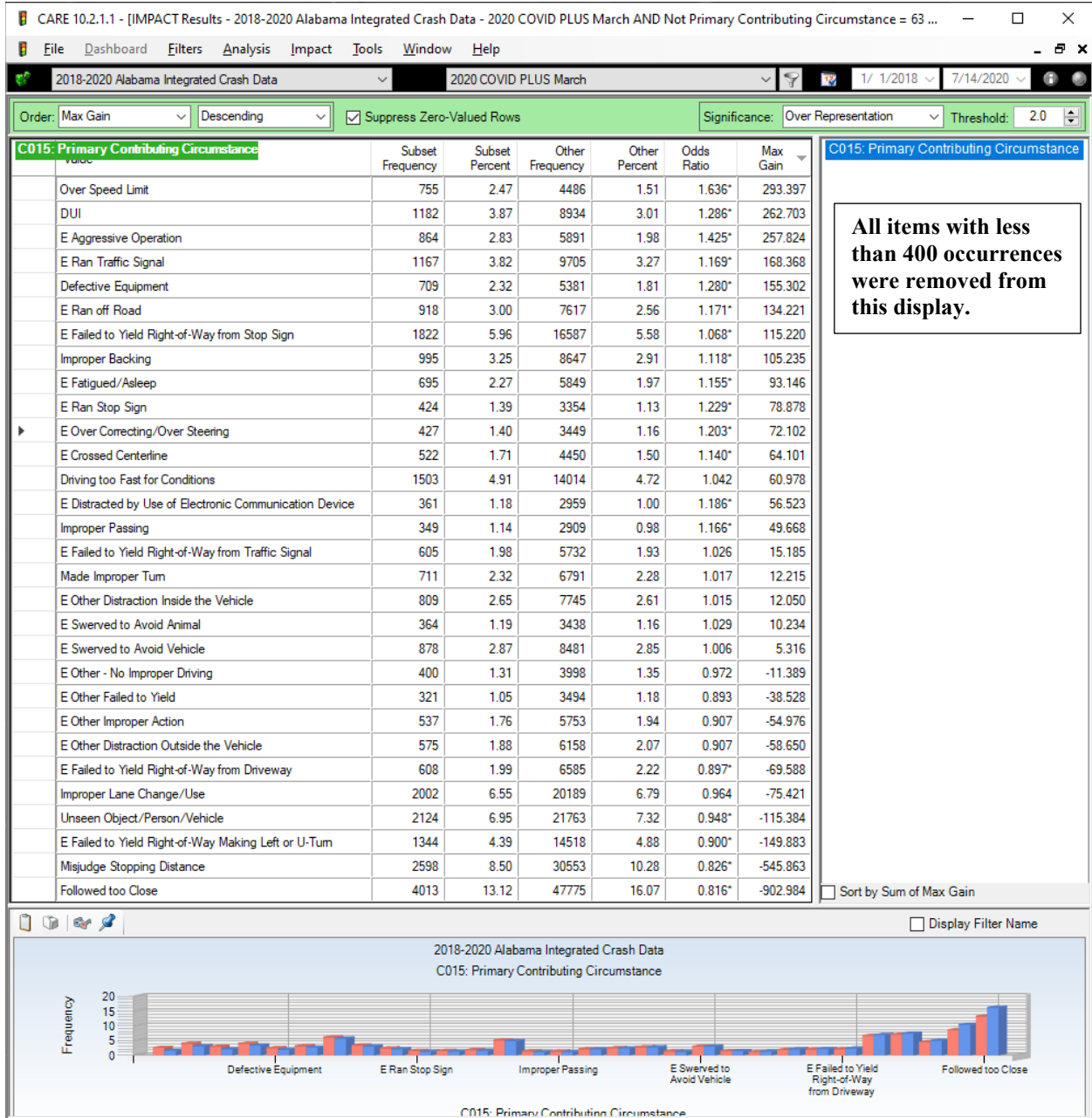
For instructions on reading and use of IMPACT, please click here:

[https://www.technolytix.net/uploads/2/2/7/6/22761914/description\\_of\\_care\\_impact\\_output.pdf](https://www.technolytix.net/uploads/2/2/7/6/22761914/description_of_care_impact_output.pdf)

Please contact us if you have any questions or see any way we can help.

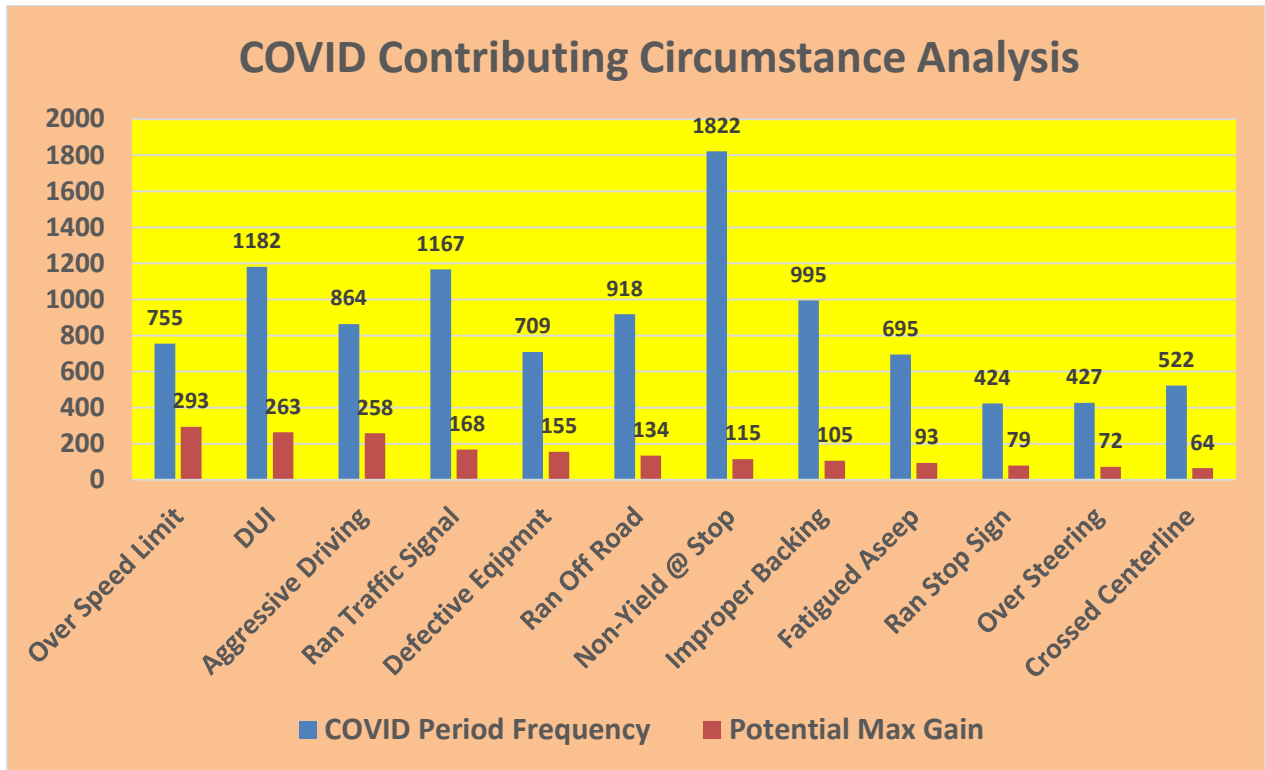


## 5.1 C015 Primary Contributing Circumstances (PCC) – See 2.1 and 2.4



Ordered by Max Gain. The most significant over-representations are seen in Speed, DUI and Aggressive Operation, which are consistent with the graphs in Sections 3.1 and 3.4. An asterisk (\*) on the Odds Ratio value indicates that there is a statistically significant difference in this item between the COVID and the Normal periods. There were 12 items that showed significant over-representations, the top three were Speed, DUI and Aggressive Operation. See the graph in the next section for a comparison of all of the significantly over-represented PCCs.

## 5.2 Comparison of All Significantly Over-Represented PCCs.

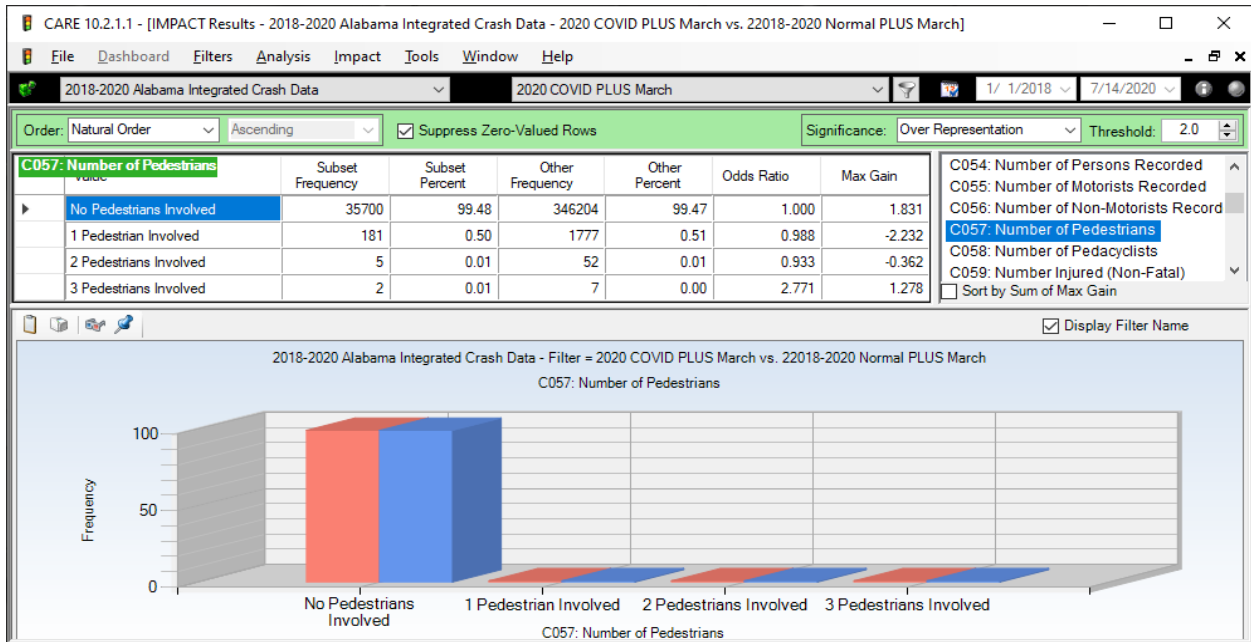


This chart has been updated with data to the middle of July, with reporting drop-off on July 12-14 due to reports not getting into the system at the time of data availability. The over-represented PCCs are ordered left to right from those that have the highest potential for crash reduction (Max Gain) to those with the least. In this application, Max Gain is defined as the expected number of crashes that would be reduced if drivers in the COVID time period behaved as those in the Normal time period (i.e., pre-COVID 2018, 2019 and 2020 through March 10, 2020). The higher the red bar (Max Gain) the greater the potential for reducing the blue bar (total crashes due to this PCC).

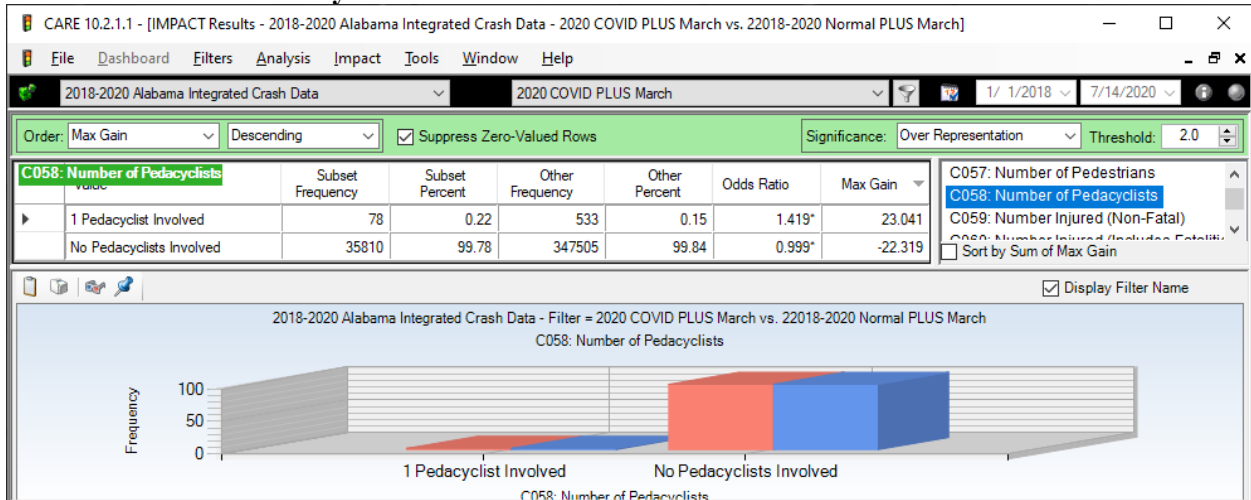
The top three (Over Speed Limit, DUI and Aggressive Operation) have well over 200 potential crash reductions each, and they largely account for the reason that fatalities have not gone down as much as overall crashes have. The next tier of three (Ran Traffic Signal, Defective Equipment, and Ran off Road) also have nearly identical Max Gains at 168, 155 and 134. Failure to Yield at a Stop Sign also shows a fairly large gain with 115, but its gain is smaller than those to the left of it even though it has the highest frequency of all of the PCCs shown. Improper Backing comes next with a 105 potential gain. The rest have fewer than 100 each, but their importance should not be disregarded, since collectively they still represent significantly more occurrences in the COVID time period than in the Normal pre-COVID period.

### 5.3 C057 and 58 Pedestrians and Bicycles Involved – Compare with 3.2

#### C057 Number of Pedestrians

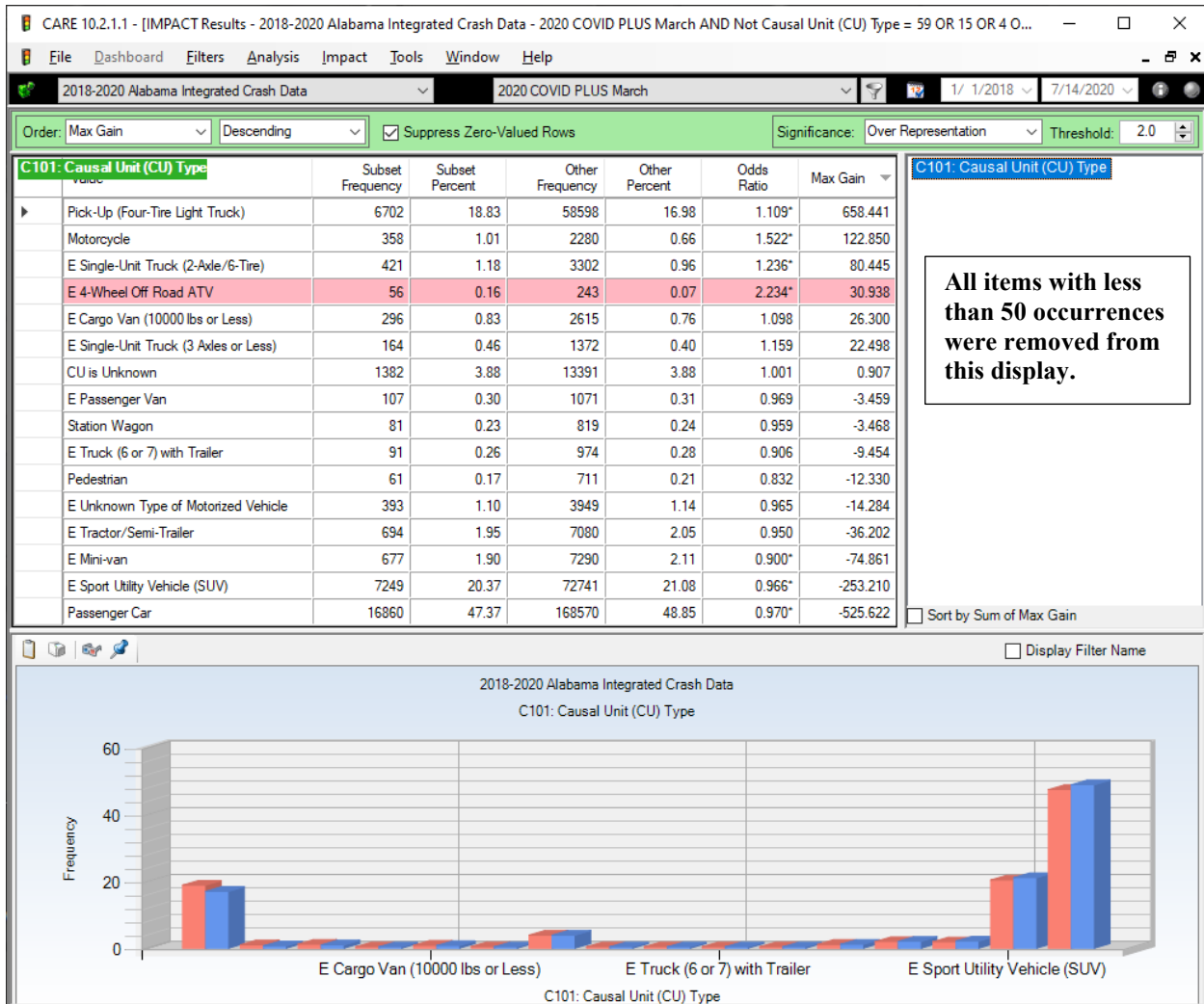


#### C058 Number of Pedacyclists



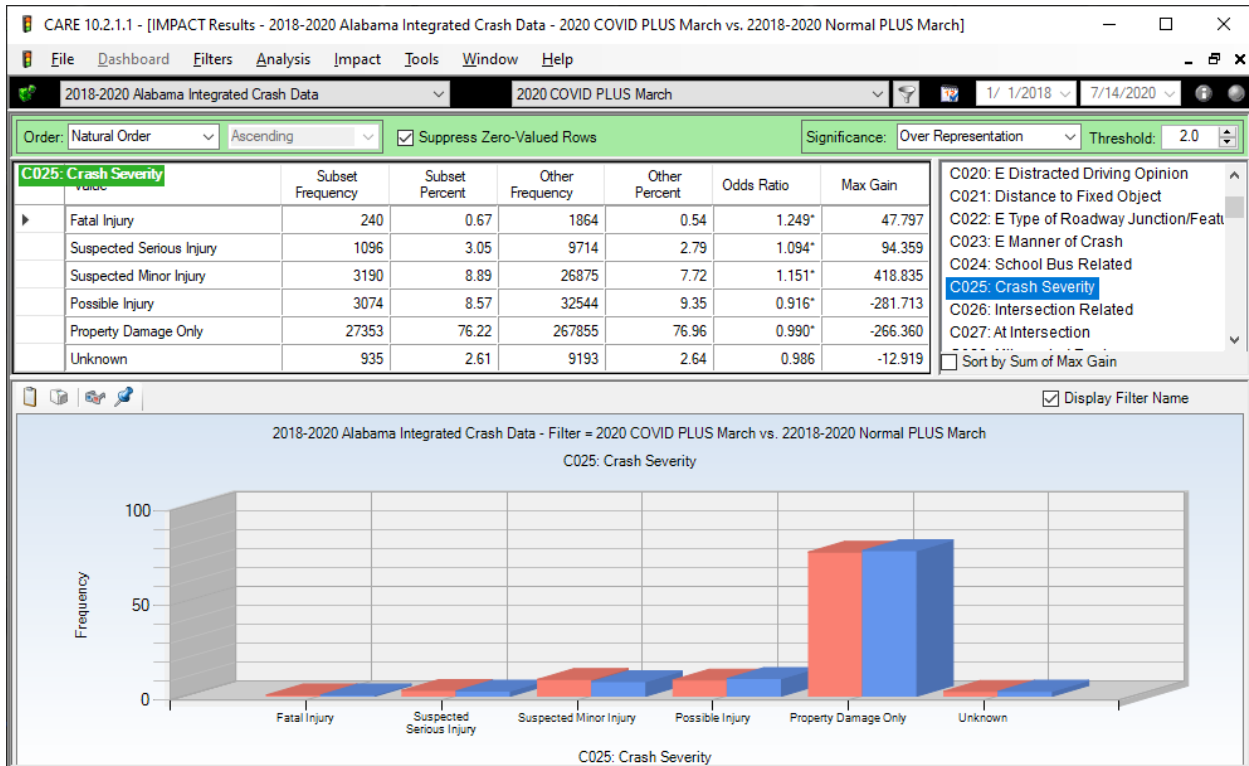
Bicycles had a much greater proportionate increase than did pedestrians as was shown in Section 3.2. Pedestrian count changes were not above what could be expected from random variation. On the other hand, the bicycle proportion increased by a factor that was 41.9% higher for the COVID period than for the Normal period, which is shown as a statistically significant increase by an asterisk on its Odds Ratio of 1.419.

## 5.4 C101 Causal Unit (CU) Type – Compare with 3.3



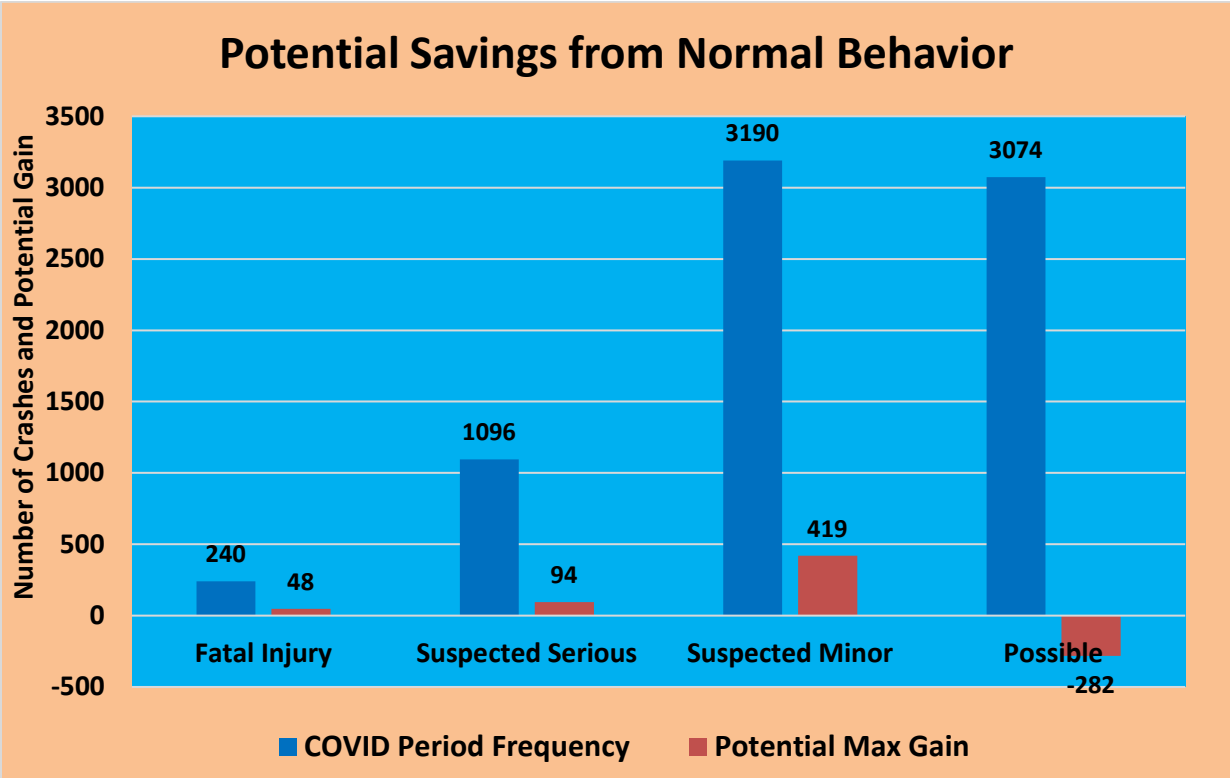
There was a significant increase in pick-ups and motorcycles; and a reduction in SUVs and passenger cars. The increase in the proportion of motorcycles was an additional 52.2% compared to the normal time period (see Section 3.3), which was over 4 times the increase seen in pick-ups. The larger trucks did not appear to have significant increases, as was shown in Section 3.3.

## 5.5 Crash Severity



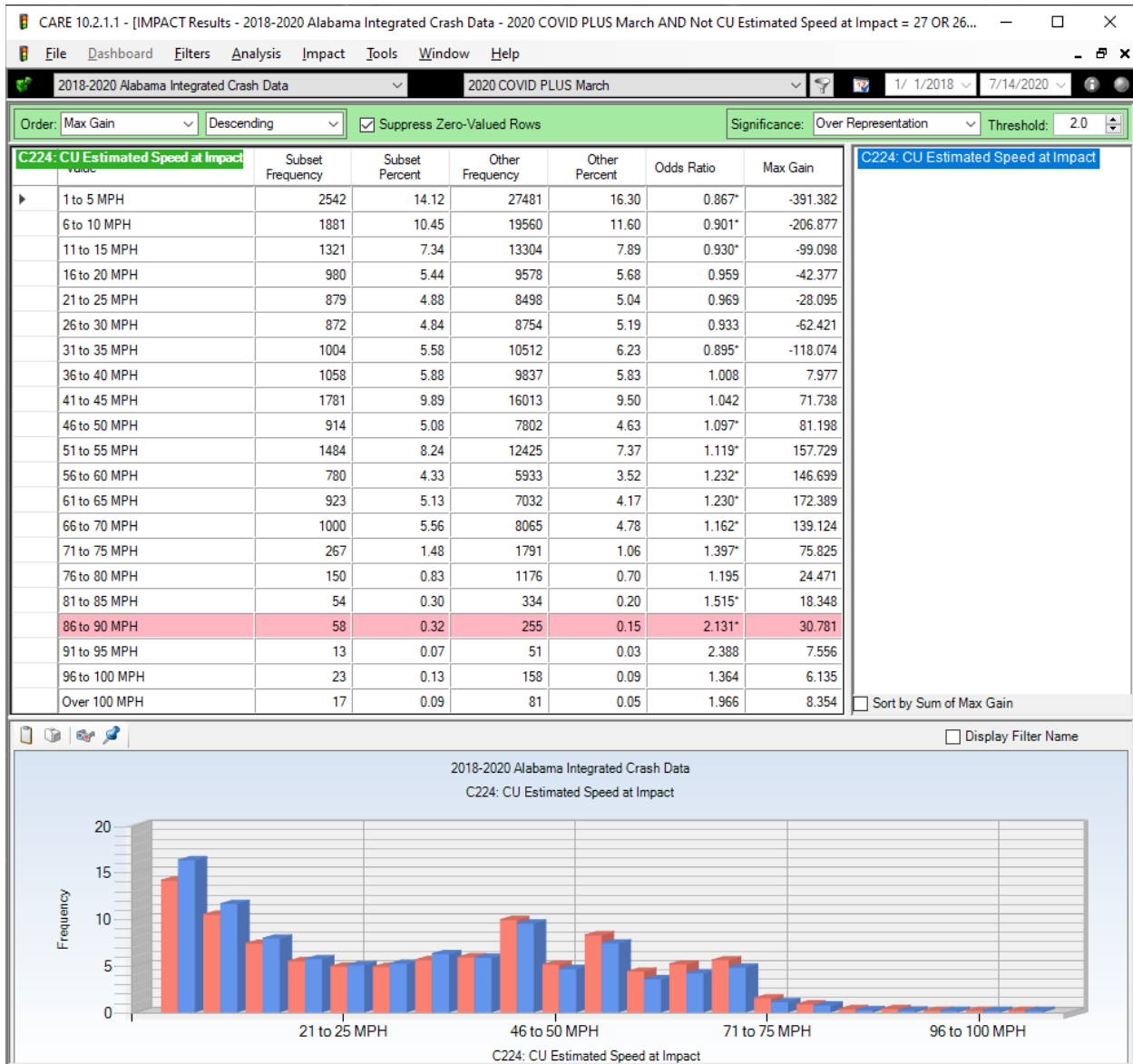
This result indicates that the proportion of fatal injury crashes for the COVID period is 1.249 times that of the Normal comparison period, which is being used for the control. Its Max Gain is 47.8, which indicates that had the same driving habits and environment been in effect in the COVID period as the Normal period, about 48 fatal crashes would have been reduced. See the chart on the next page for the estimates for all of the injury classifications of the effect of COVID period drivers maintaining their pre-COVID behaviors.

Generally, the causes of this severity increase in these crashes are given by the Primary Contributing Circumstances covered in Section 5.1. Suspected Serious Injury and Suspected Minor Injury were also both over-represented, adding more evidence that the COVID period crashes produced greater injury than Normal. On the other hand, the under-representation in Possible Injury and Property Damage Only were both statically significant.



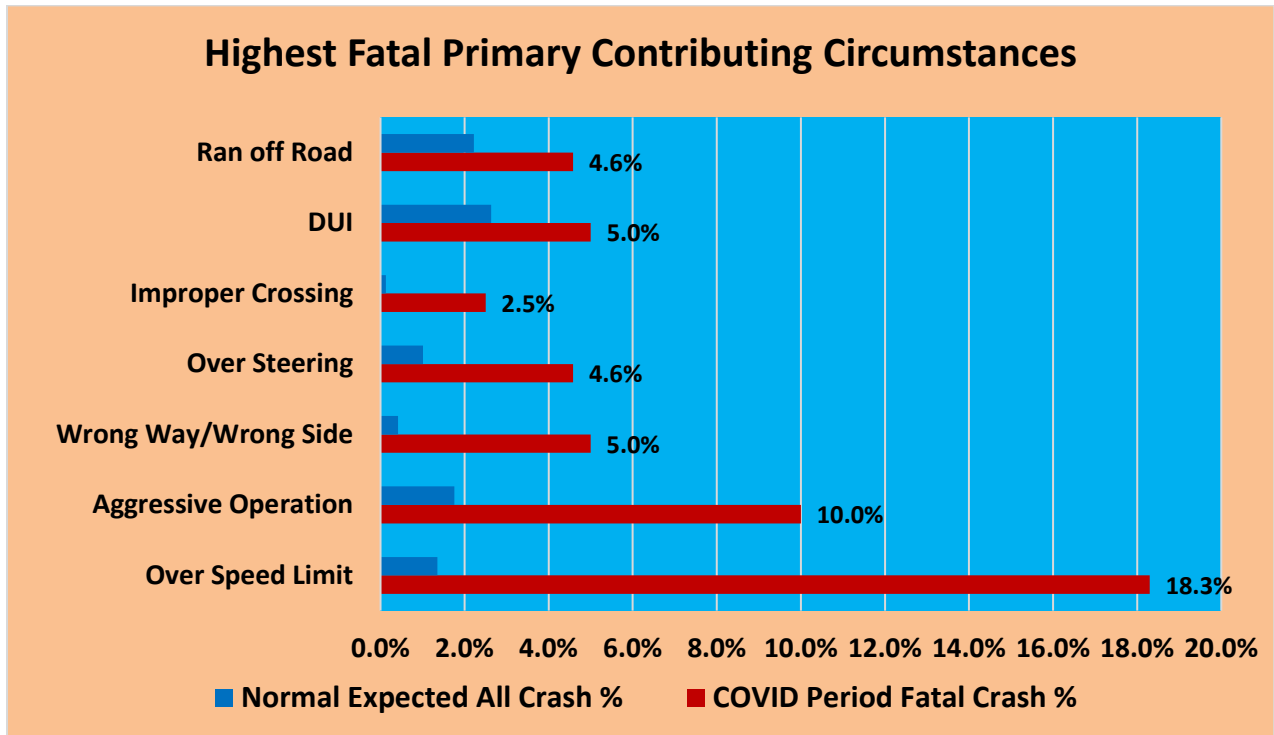
The blue bars on the chart above show the actual number of crashes in each of the severity classifications. The red bars show the effect of a resumption of behavior of drivers to before the COVID period.

## 5.6 Causal Unit Estimated Speed at Impact



Alabama data has shown that for every ten miles per hour of impact speed over 45 MPH, the probability doubles that the crash will be fatal. There can be no doubt that impact speeds during the COVID period have been significantly higher than Normal. All of the impact speed above 46-50 (effectively 50 MPH) showed significant increases in their proportions during the COVID period. The only exceptions are the three highest speeds, two for which significance is not calculated (less than 20 sample size). However, these Odds Ratios are quite high, and the Max Gains show the consequences of such excessive speeds.

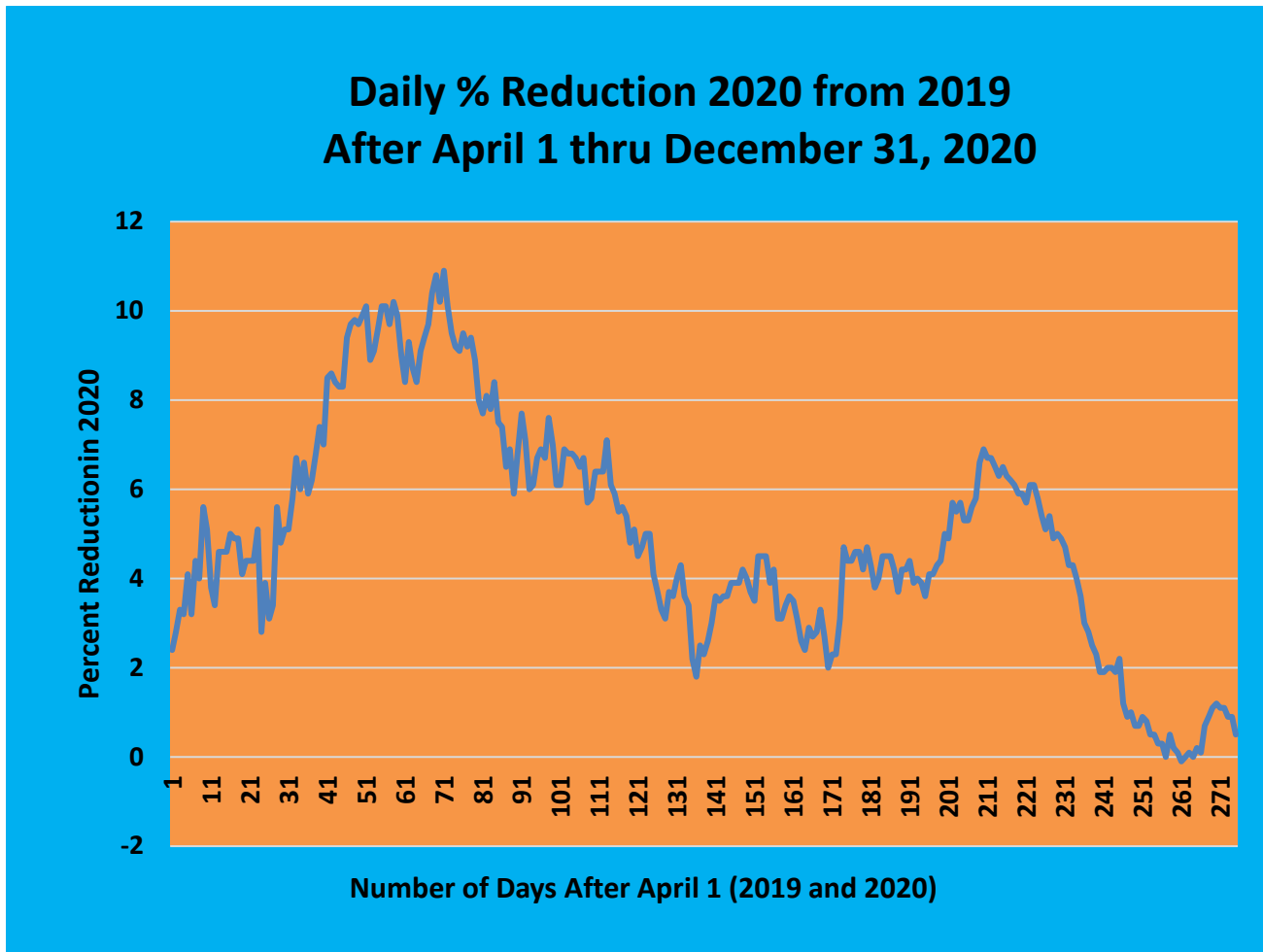
## 5.7 C015 Analysis of Fatal Crashes



Clearly speed is the primary cause of the increased severity during the COVID period. Surprisingly, crash reports indicate that Aggressive Operation is the second most critical cause. Four of the remaining five are in the 4.6% to 5.0% range, while Improper Crossing (an issue only with pedestrians) is the least frequency, it is still a very important factor in fatality reduction.



## 6.0 Daily % Reductions in Crash Fatalities after April 1, 2020.

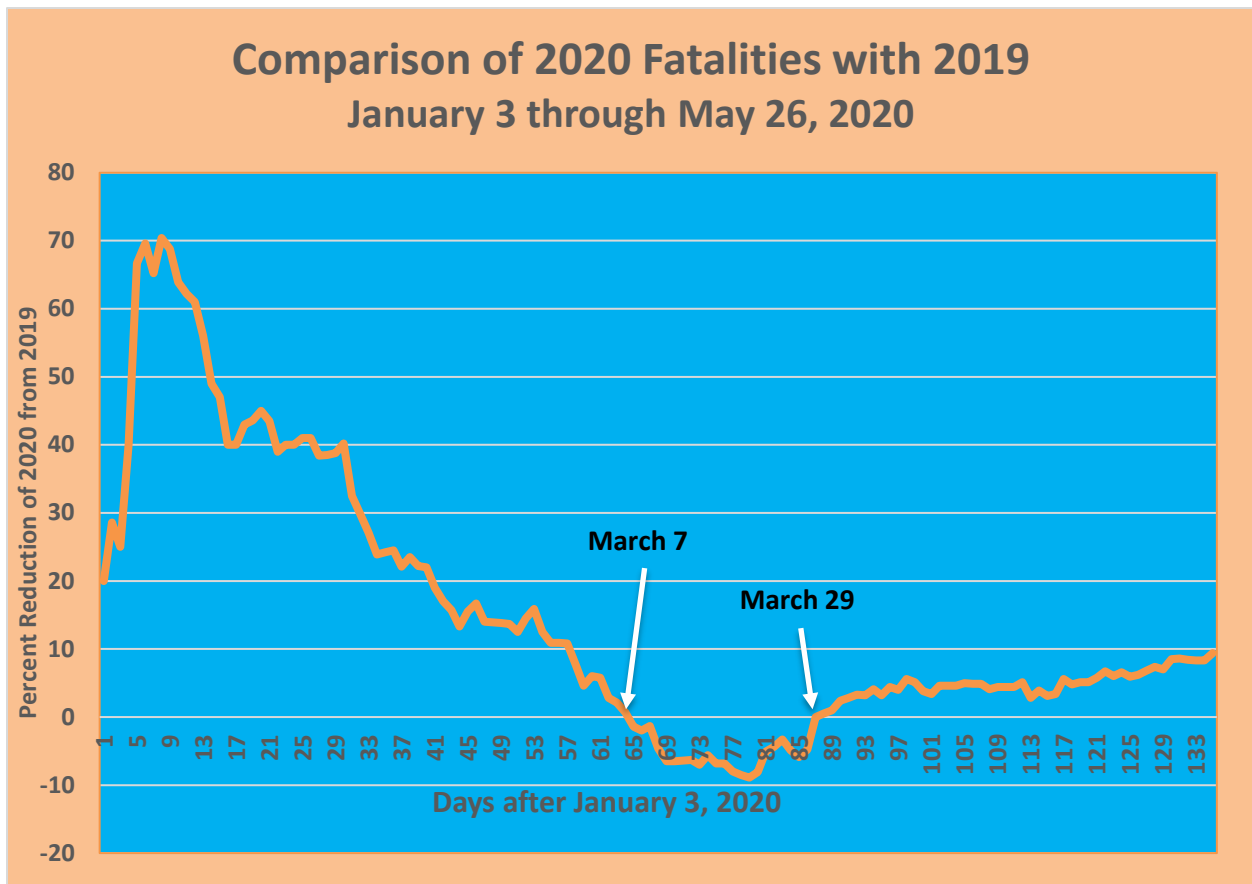


The chart above gives the percent fatality reduction for each day in 2020 compared to each identical day in 2019 from April 1 through December 31 of both years. These are *daily readings* as opposed to the charts in Section 3 that are the changes in the various types of crashes over two-week periods. This chart, as well as the one on the following page, are also comparing *actual fatalities* as opposed to *fatal crashes*, which are reported in the charts in Section 3.

Rather than starting on January 3, 2020 (like the graph in the next section), the chart above starts in April 1, 2020. The numbers on the X-axis here are the number of *days* after April 1, 2020. The exact readings for December 31 was: 932 fatalities in 2019; and 927 fatalities in 2020; a reduction of 0.5% as of that date. The general trend of this metric has been down from above its 10% reduction high in June 7-11, 2020, which is the high on the chart (Days 69-71).

## 7.0 Percent Reduction in 2020 Traffic Fatalities vs. 2019.

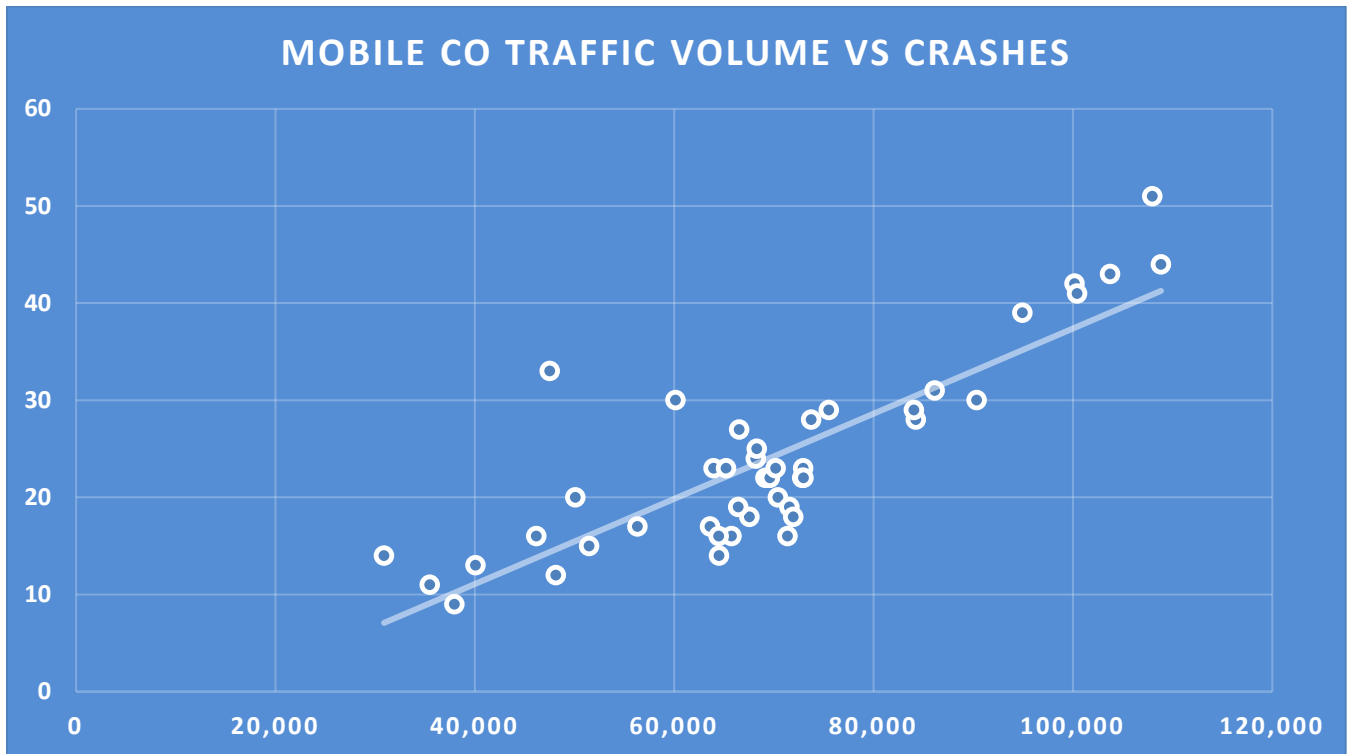
This is the same metric as given in Section 6. but from the beginning of the year until May 26, 2020, i.e., the first four months of 2019 and 2020. It is quite interesting how fatalities were increasing dramatically prior to the COVID period (which started March 10, 2020), but this was reversed over the next few weeks by the overall reduction in traffic. According to the chart above, the increase in the size of 2020 reductions over those of 2019 peaked on October 27<sup>th</sup> and then continued its downward trend, where it went into negative territory for one day (December 17, 2020; -0.1%).



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 (same in both years). At that point in time the 2020 fatalities numbered exactly what they did in 2019 – no percent reduction.

March 7 is within our “Week 1” (March 3-9, 2020) for the charts in Section 3. Recall that Week 1 was the last week before the COVID quarantines took effect, but the number of crashes for the comparisons have been updated to be the average of the first ten weeks in 2020. It is strictly coincidental that this was the week in which the fatality counts for 2019 and 2020 became identical. 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. This chart extends until May 16, 2020.

## 8.0 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 at 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.