

**Motor Vehicle Deer Collisions (VDCs)**  
**Analytics to Discover as Much Information as Possible**  
**2017-2021 Crash Data**  
By David B. Brown ([brown@cs.ua.edu](mailto:brown@cs.ua.edu))  
February 15, 2023

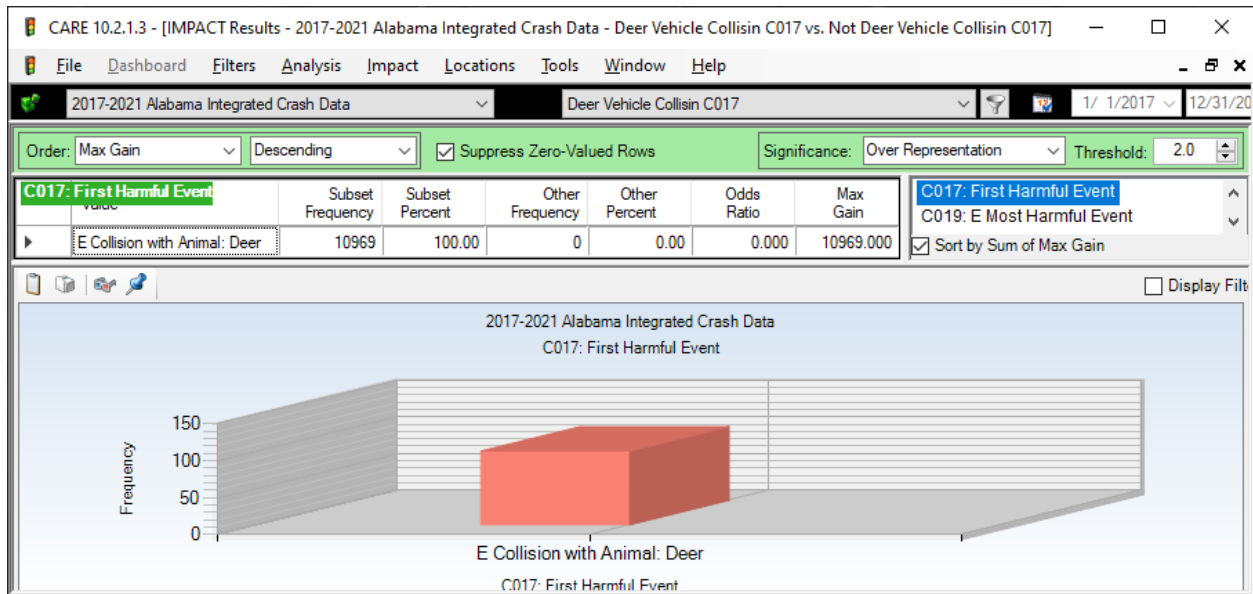
## **Introduction and Executive Summary**

The purpose of this study was to produce as much information as possible to enable drivers to avoid vehicle Deer Vehicle Collisions (DVCs). An attempt was made to include all attributes in the study that could in any way have an influence on these types of crashes. While generally DVCs are not as severe as many other crash types they should not be dismissed as being mere irritations. On average one DVC per year was fatal over the past five years and about 150 per year caused injury.

Over 90% of the DVC crashes are property damage only, which can be substantial. The occurrence of some fatalities and other very serious injury crashes make their avoidance quite beneficial. Quite often the attempt to avoid a deer will lead to crashes with fixed obstacles or other vehicles. A cross-tab of severity by most harmful event showed that two fatalities were caused by Overturn/Rollover, while the other three were collisions with the deer itself as opposed to any other secondary crash. This demonstrates that potential lethality of the event itself, such as the struck deer coming through the windshield, which has been reported in a few cases.

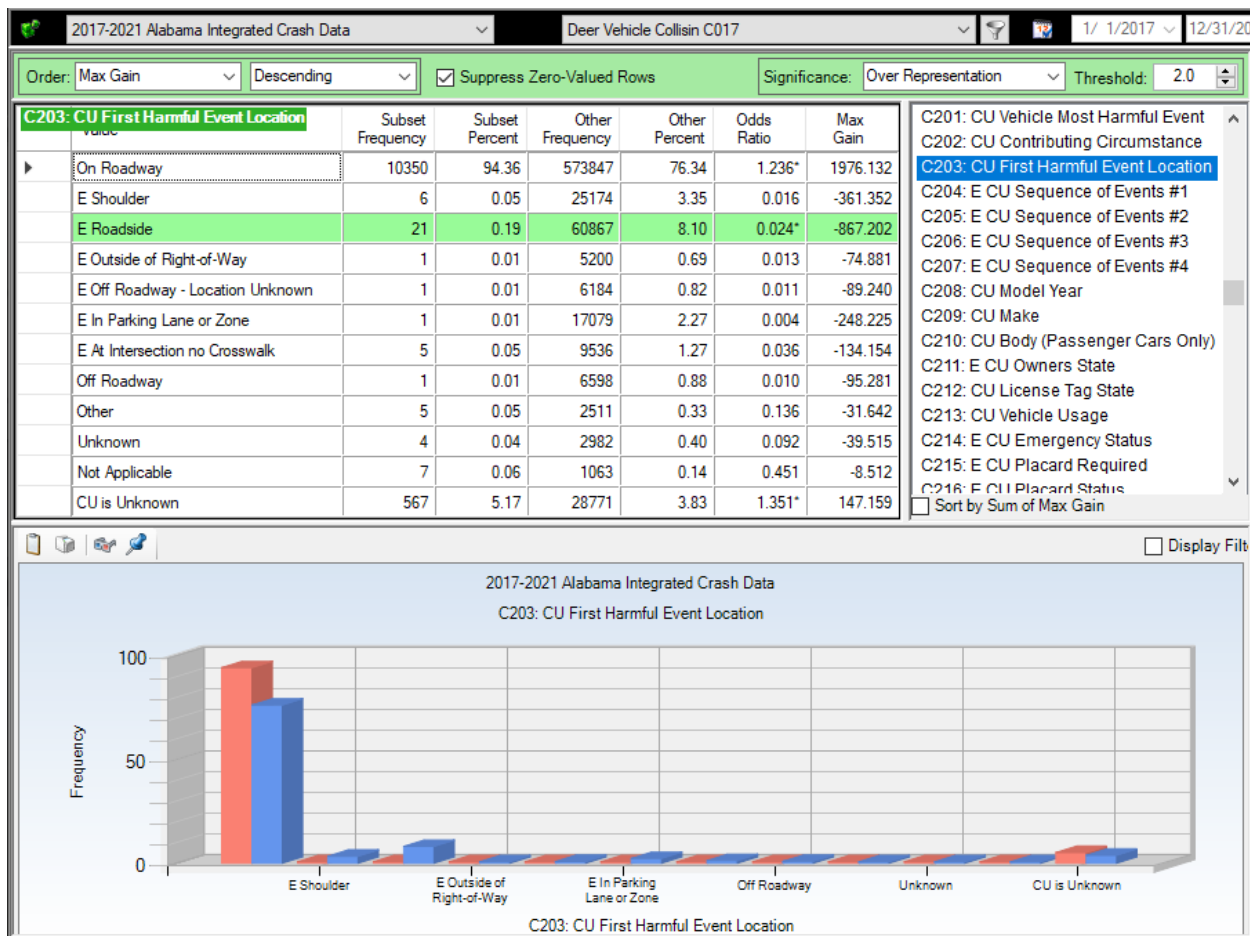
For orientation, we will consider the First Harmful event and the First Harmful Event Location before getting into the IMPACT analyses.

## C017 First Harmful Event



All of the qualifying collisions had “Collision with Animal Deer” as the First Harmful Event. Deer are mentioned in this qualifying event description because it has been estimate that well of 95% and perhaps as high as 98% of the animals struck causing damage were deer. It is true that dogs and other animals probably have a significant number of crashes, but their probability of causing the type of damage that deer cause it low. For more on severity, see C025, C226 and C227. Thus, smaller animal crashes are rarely reported as highway traffic crashes. Over the five years of the study the number that has been reported in the deer category (10,969) is very close to 11 thousand, or 2,193.8 per year.

## C203 CU First Harmful Event Location



Of these crashes 94.26% occur on the roadway, and 5.17% have unknown locations that were either on the roadway or close to the traffic way. Either the struck deer was not found or else it was far enough off the right-of-way for the reporting officer to not know where it was struck. A few (21) were reported to have been struck on the roadside, possibly after the causal driver took evasive action.

The term causal unit (CU) is used here accommodatively to indicate the unit or driver that first struck the deer. There is no implication in these types of crashes that the driver had any intent to strike the deer, which can cause extensive damage. These crashes are different from most that are caused by driver error.

The next major section contains the IMPACT analyses that were performed for this study. IMPACT in this context stands for *Information Mining Performance Analysis Control Technique*. To understand how IMPACT is used to create information from the comparison of two datasets, please see *TECHNOLYTICS*, which is available on Safe Home Alabama at [Technolytix - Home](http://Technolytix - Home) or <https://technolytics.net>.

## **Executive Summary: IMPACT Brief General Findings**

As a general description, IMPACT is a convenient and simple way of comparing data in two subsets in order to determine what the differences are between them. In this example all Deer Vehicle Collisions is the one subset that will be compared to the same attribute for all collisions that did not involve deer. The attributes are characteristics that appear in both datasets, such as County, City, Year, Month, Day of the Week, Time of Day, etc. We will have over 40 such comparisons in the IMPACT Results section below. Why so many? Since the goal of this report is to reduce the number of Vehicle-Deer strikes, we elected to consider all attributes that could in any way reduce the frequency or severity of these crashes. If it was something that had any effect on driver or passenger behavior, it was included. More information will be given on IMPACT in terms of the examples presented in the C002 City Location section.

### **Brief Summary of IMPACT Findings for DVC Reduction**

This section will provide a very brief statement of the findings within each of the IMPACT analyses, which might be helpful in traversing the study. Some items that were indented five columns to show a deviation from the normal CARE IMPACT ordering.

C002 City Location. With a few exceptions, the virtual rural areas of counties, which are viewed as cities for comparative purposes, were the areas most over-represented in DVCs.

C003 Year. Years 2019, 2020, and 2021 are significantly higher in their proportions than those of 2017 and 2018. As urban areas increase, more conflicts between vehicle travel and deer wandering is to be expected.

C004 Month. December and January, the two months when deer hunting pressure is greatest are significantly over-represented. This could be as much caused by deer returning to their natural habitat in the evening as their being stampeded into roadways by hunters.

C006 Day of the Week. Two things determine when most DVCs occur: time of day when deer are not just resting, and the deer and vehicles being in a common location. The data indicate that Sunday is the only significantly over-represented day of the week. Thursday and Friday were significantly under-represented.

C007 Week of the Year. The first five weeks of the year and the last seven weeks of the year are very nearly identical in their over-representation of DVCs.

C008 Time of Day. The late evening and early morning hours are over-represented showing those times when deer are more apt to wander into the roadways.

C031 Lighting Conditions. This confirms the time of day findings, and it also indicates the positive effects that roadway lighting can have. There are two problems in the most over-represented item "Dark – Roadway Not Lighted." The deer are more apt to frequent these areas, and drivers have the most difficulty in seeing them.

C110 Rural or Urban. Rural areas are over-represented by a factor of almost three (2.889) times their expected number.

C033 Locale. The only locale that is over-represented is Open Country, which is a more specific result reflecting the Rural/Urban finding. All other items were significantly under-represented.

C036 Police Arrival Delay. All items 10 minutes or less were significantly under-represented; all items from 31 to 180 minutes were over-represented by at least factors of 2, and even Over 180 minutes was also significantly over-represented.

C038 Adjusted EMS Arrival Delay. A cross-tabulation between EMS and police arrival time showed a strong correlation between them, and also that the EMS quite often arrived prior to the police. People might put off calling the police, but when an injury is involved, they recognize the need for prompt action. The following items appear here because they might have an effect on arrival times.

C011 Highway Classification. County roads had the higher over-representation with an Odds Ratio of 2.362. At the other end are under-represented Municipal roads with nearly the opposite Odds Ratio (0.325). Both were highly statistically significant. Table ordering returns to Max Gain.

C412 CU Trafficway Lanes. Almost all country roads are two lanes, which explains their highest over-representation (65.55%) of all categories. The next highest frequency category is Four Lanes, with 24.47%, although four lane roads were significantly under-represented.

C030 Functional Class. This attribute shows the use of the various roadway types. Minor collectors were the only highly significant Functional Class despite having one of the lowest frequency of DVCs (382, 3.71%) compared to this Functional Class for all crashes. (6,541, 0.98%). Major Collector and Minor Arterial were the only other two that were over-represented, both significantly so.

C030 by C011 Cross-tabulation (Functional Class by Highway Classification. This was run because few people have a working knowledge of Functional Class categories.

C0208a Non-interstate Mileposted Roads. The purpose of this and the next listing is to advise drivers of the relative proportion of crashes on the mileposted roadways that they might frequently travel. The first list is ordered by Odds Ratio for all mileposted roadways with at least 20 crashes (lower numbered crashes are not processed), and, of which the Odds Ratio is at least two. Odds Ratio represents a comparison in probabilities, thus these would be the roadways with the greatest odds of a crash.

C028b Interstate Mileposted Roads. C028b is reduced to just the Interstates, and includes all of them in Odds Ratio order (top-down). IN0022 was found to be the one to avoid at those times of day when deer are most active.

C015 Primary Contributing Circumstances. The major advantage of this attribute is in discovering what events other than the DVC was instrumental in either causing or increasing the

severity of the crashes. All of these crashes are DVCs although this is not one of the items in the list. Generally, we have seen that DVCs occur at locations and under lighting conditions when it is difficult to see the deer. So, Unseen Object/Person/Vehicle is the obvious category for most (7,072) of these crashes. Other items also indicate that the “causal” driver does not necessarily have to be at-fault for causing these crashes. The following attributes affect not only the Primary Contributing Circumstance, but also Severity (see C025).

C224 CU Estimated Speed at Impact. C015 above indicated that only 21 DVCs occurred over the speed limit, and only 4 were driving too fast for conditions. Only 76 had crashes that would be considered over the speed limit. It is important that drivers reduce their speeds to well under the speed limits if they are aware that deer frequent the area in which they are driving.

C223 CU Speed Limit. This attribute provides a further basis of comparison for the crash speeds given above.

C052 Number of Vehicles. It is clear that multiple-vehicle crashes involving deer will generally result in a higher severity crash. Only 83 DVCs involved more than one vehicle.

C019 Most Harmful Event. Officers ranked 96.08% of the Most Harmful Events to be the Collision with Animal Deer itself as opposed to any secondary crash. Looking down the list, there are a number of possibilities. Once control is lost, any obstacle in the path of the vehicle is destined to be struck.

C023 Manner of Crash. Because of its potential severity, the manner of crash that is the most significant is the 189 Head On (Front to front only) crashes that results from either the causal vehicle swerving or else some other loss of control after the deer was struck.

C025 Crash Severity. All of the injury type crashes are under-represented demonstrating that DVCs tend to be some of the least severe that occur on the roadways. The fact that there are some fatalities and hundreds of injury crashes, however, is ample reason to not take these crashes lightly.

C323 CU Driver/Non-Motorist Safety Equipment. This study has shown that DVCs are typically not caused by drivers assuming greater risks than they normally would. Usually it is the risk takers, and often those guilty of DUI, who fail to buckle up. Only 140 out of the over 10,969 DVCs were totally without safety equipment, which is one reason that severe DVC

C205 and C323 Cross Tabulation. This analysis was performed to see the effects of all of the listed safety equipment types. Any use of a motor vehicle without the appropriate Safety Equipment multiplies the chance of a fatality or serious injury by several orders of magnitude. This cross-tabulation demonstrates this with real DVC data. Please see the blurb under this cross tabulation for more details

C226 CU Vehicle Damage. Damage was major in 63.16% of all of the cases. This should clearly reinforce the necessity to buckle up regardless of the duration or destination of the trip. It

is also a further reminder that DVC crashes are often quite severe and risk death and very serious injury to the vehicle occupants who are not protected to the maximum extent possible.

C227 Vehicle Towed. This is a further objective observation with regard to potential injury and death. The fact that 41.10% of the vehicles involved in DVC crashes had to be towed is further evidence of the damage that occurs in a large proportion of DVC crashes. To be disabled means that the vehicle cannot be safely driven away from the scene.

C101 Causal Unit (CU) Type. The top four over-represented vehicle types (Passenger Car, Sport Utility Vehicle, Motorcycle and Mini-van) account for 83.93% of the DVCs.

C080 Commercial Motor Vehicle (CMV) Involved. This attribute was included at this point just to take a quick look at how much CMVs enter into the vehicle type cause. It is clear with only 1.38% of the DVC crashes as opposed to 5.55 non-DVC crashes, that Commercial vehicles play a very small part. We expect this is because of their prevalence on Interstate highways (see C011, Highway Classification)

C104 CU Left Scene. The proportion of causal drivers who left the scene is significantly under-represented with DVC crashes having a proportion of 0.67, while the non-DVC crashes had a Left Scene rate of 10.30.

C107 CU Driver Raw Age. The youngest drivers (16-18) are under-represented as can be seen on the chart. The chart also shows the 19 and 20 year-olds to be about the same as the 35-50 age group that we see from the table, have consistent over-representations in DVC crashes.

C108 CU Driver Race. White/Caucasian was significantly over-represented (Odds Ratio 1.036). Hispanic was significantly under-represented (Odds Ratio 0.614). All others were as expected from their proportions of crashes in general.

C109 CU Driver Gender. This is one of the very few crash types in which females are significantly over-represented. Females had over 16% more DVC crashes than would typically be expected from their general crash proportion. The major conclusion would seem to be that females tend to be driving at the same times and in similar areas as those frequented by deer.

C110 CU Driver Residence Distance. Greater than 25 Miles is over-represented by 35.9%, while Less than 25 Miles for DVCs is about the same as the proportion of crashes in general. This indicates that in general, drivers would know of the deer concentrations in their local areas and avoid the times and places where/when they might be struck.

C111 Driver License State. As expected, drivers from states proximal to Alabama have the greatest numbers of DVCs in Alabama. Georgia and Florida were the only two states that were significantly over-represented.

C122/C123 Alcohol and Non-Alcohol Drugs. This particular subject is a demonstration that DVCs in most cases are not the fault of the drivers, as is the case in most non-DVC crashes. If it were, we would expect that alcohol and non-alcohol drugs would increase the DVC crash

frequency. In most cases, the DVC is the result of an unexpected appearance of a deer in the pathway of the vehicle.

C204 CU Sequence of Events. The sequence of events variables give the idea of what accompanies the DVC crashes. Another vehicle, a tree or other fixed object, and especially, a collision with another vehicle, are often far more lethal than the deer itself.

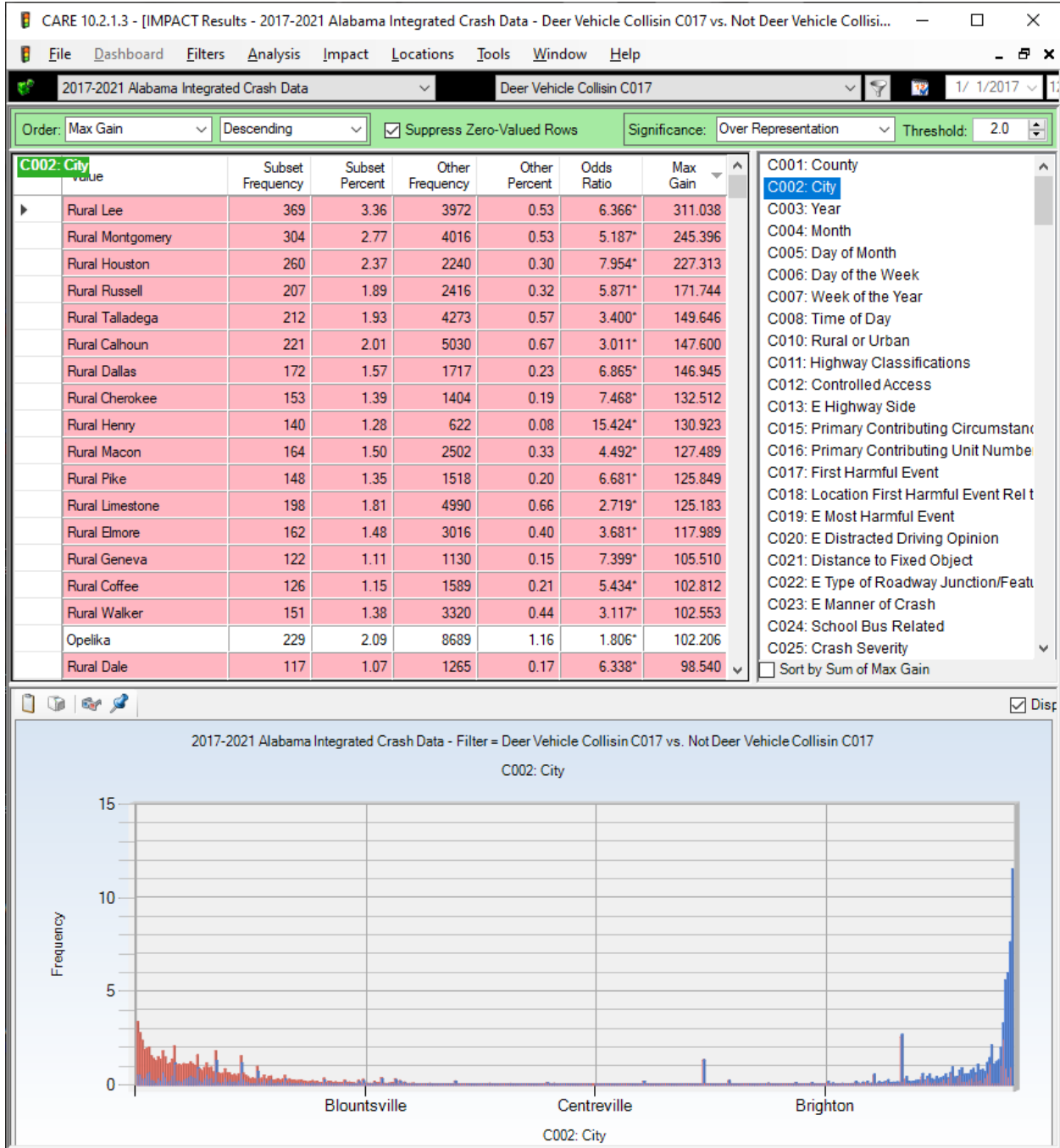
C213 CU Vehicle Usage. Most of these items are expected from the normal use of vehicles. The largest of these, Personal use, with 9,622 occurrences is actually slightly under-represented. The rest show the use to be that which is expected from normal operations. Police activity is discussed in the next attribute.

C214 CU Emergency Status. Emergency pursuits do not appear to be a major problem. Many police are on the road the major part of the day and they cover a wide range of both urban and rural areas. Of the 238 Police involved in DVCs, there were 33 emergency calls and 3 police pursuits, so these do not appear to be any special problem.



# IMPACT Results

## C002 City Location



The rural part of a county is considered to be a virtual city, and it is compared to all other cities. Clearly, the rural parts of most if not all counties account for the deer strikes. Opelika was included in the table listing to illustrate a real (as opposed to a virtual) city.

*General definitions for the IMPACT outputs.* These might be best understood in terms of a simple IMPACT output. Please use one that is fairly understandable to you.

*Ordering.* The ordering of the attributes (e.g., in the Word Navigation bar) will generally be in the same order as the attributes in the IMPACT attribute lists given above, and in the Word navigation bar. Exceptions have been made where certain attributes are closely related to others. In this case the attribute name is indented in the Word Navigation bar under the attribute that provides the major subject for the list.

*Max Gain.* Generally, the ordering within the tables will be by largest Max Gain first, since generally, this is the most critical item being compared. The Max Gain for items that tend to cause problems is calculated to be the reduction in crashes that would result if the percent by which the item is over-represented was reduced to one (no over- or under-representation of that item). Those that tend to be more favorable (at the bottom of the table listing) will have negative Max Gains indicating that changing their under-representation to one would result in an increase in crashes.

*Natural Order.* When the output will make more sense (such as time of day, day of the week, year and several others), the ordering will be in Natural Order as opposed to Max Gain order. See the Order specification immediately above the tables.

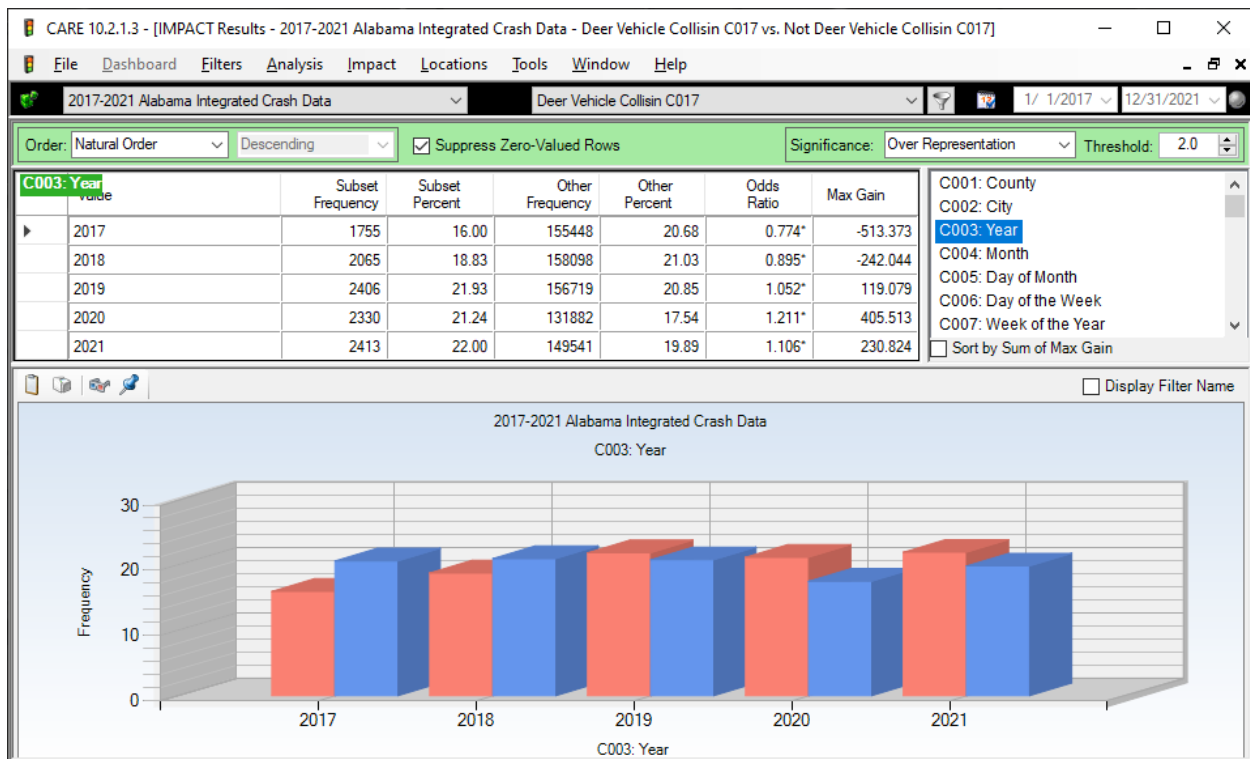
*Subset Frequency and Subset Percent.* These are the frequencies and percentages of the corresponding attributes.

*Other Frequency and Other Percent.* These are the values for which the subset is compared. For example, if the Subset Frequency for the Day of the Week deer-struck subset was for Sunday, the Other Frequency would be the number of non-deer-struck crashes for Sunday. In this respect, counting all of the values for the attributes that are not for deer-struck. The subset and other percentages are also called the Odds because they represent the probability (Odds) with which each of these events occur. The *Other Percent* serves as a control in that it tells us what the subset frequency would be if not affected by DVCs.

*Odds Ratio.* The Odds Ratio is the ratio between the *Subset* and *Other* percentages. This measures the degree to which the *Subset* is at variance with the *Other*. A large Odds Ratio indicates that there is a large disparity, and if it is over 2, then the background is colored red. At the other end, if the Odds Ratio is less than 0.50, then the background with a green background.

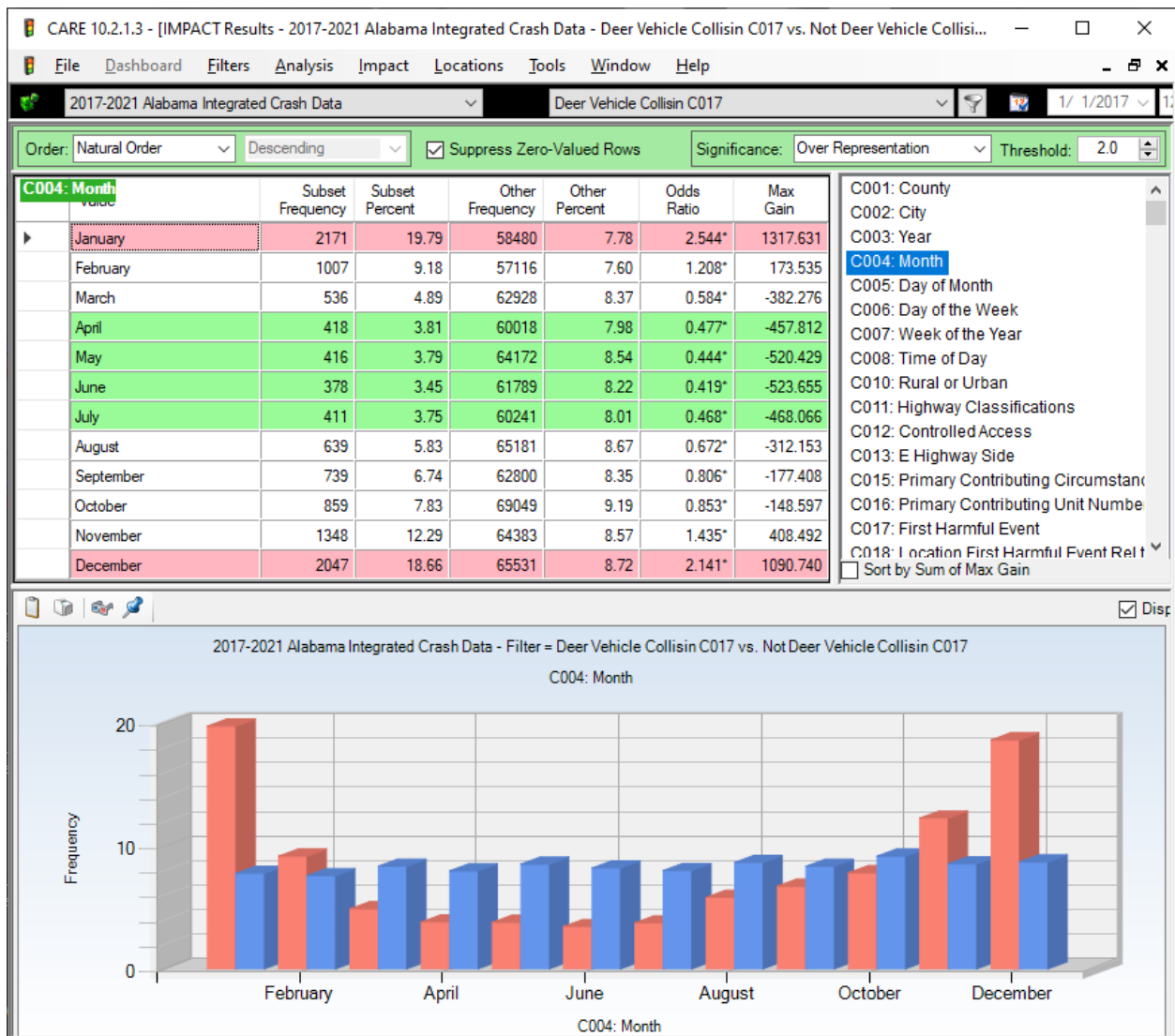
\*. An Odds Ratio with an asterisk on it is an indication that the *Subset* and *Other* data are significantly different from each other from a statistical point of view. No analysis is performed in this regard if the frequency for either Subset or Other of the given items is less than 20 cases.

## C003 Year



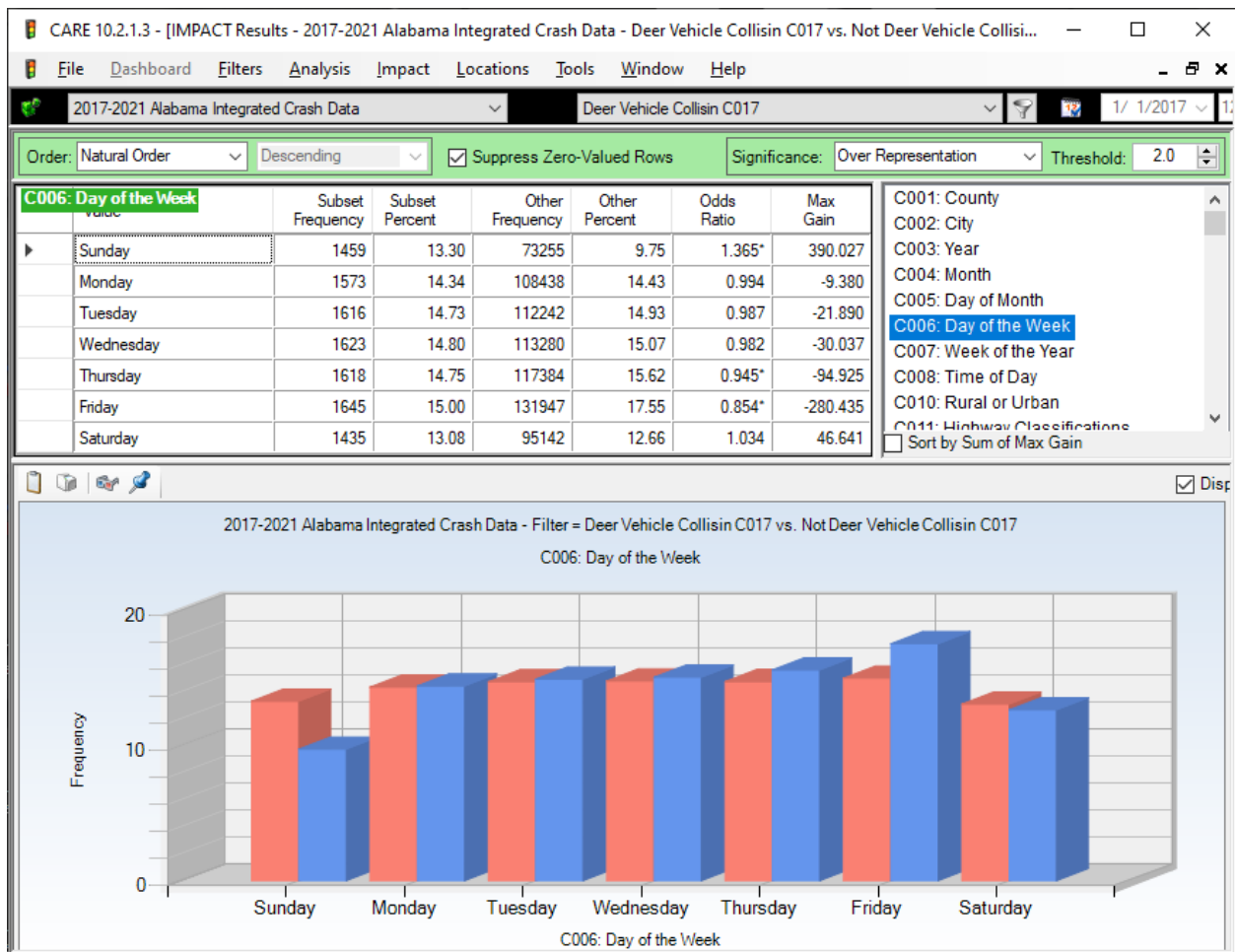
This chart indicates that the number of Deer Vehicle Collisions (DVCs) is on the increase. This is from 16.00% and 18.83% in the 2017-2018 time-frame to percentages above 21% (21.93%, 21.24% and 22.00) in the 2019-2021 time-frame. We know of no reason for this increase, but will continue to watch it when the 2022 data is ready for processing.

## C004 Month



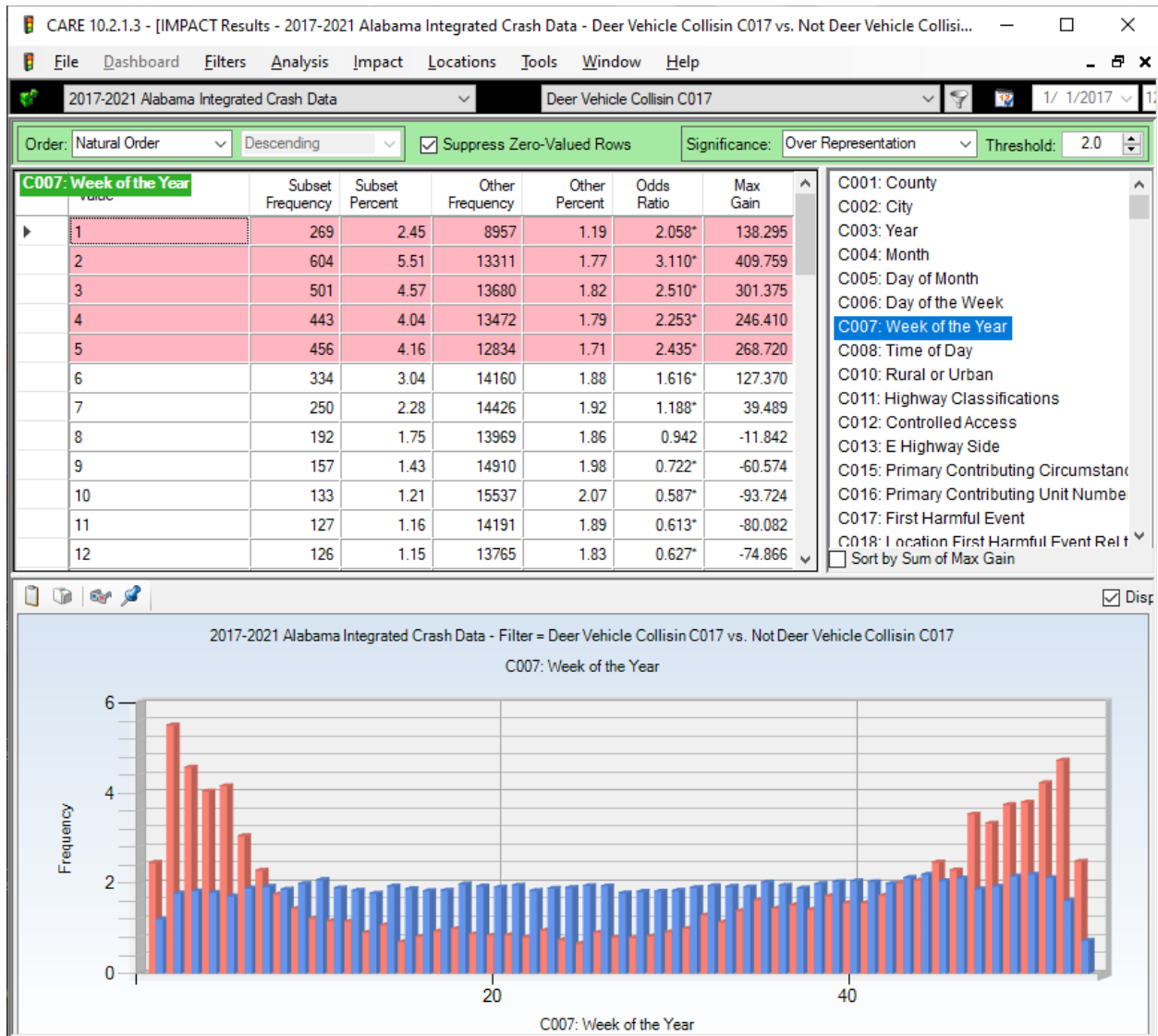
The red bars here are highly correlate with the “deer season” when many hunters go into the woods and stir the deer up. This does not cause more DVCs directly, but when the deer are driven to safer area in the daytime, they will start to move back to areas with more food as dusk approaches and progresses.

## C006 Day of the Week



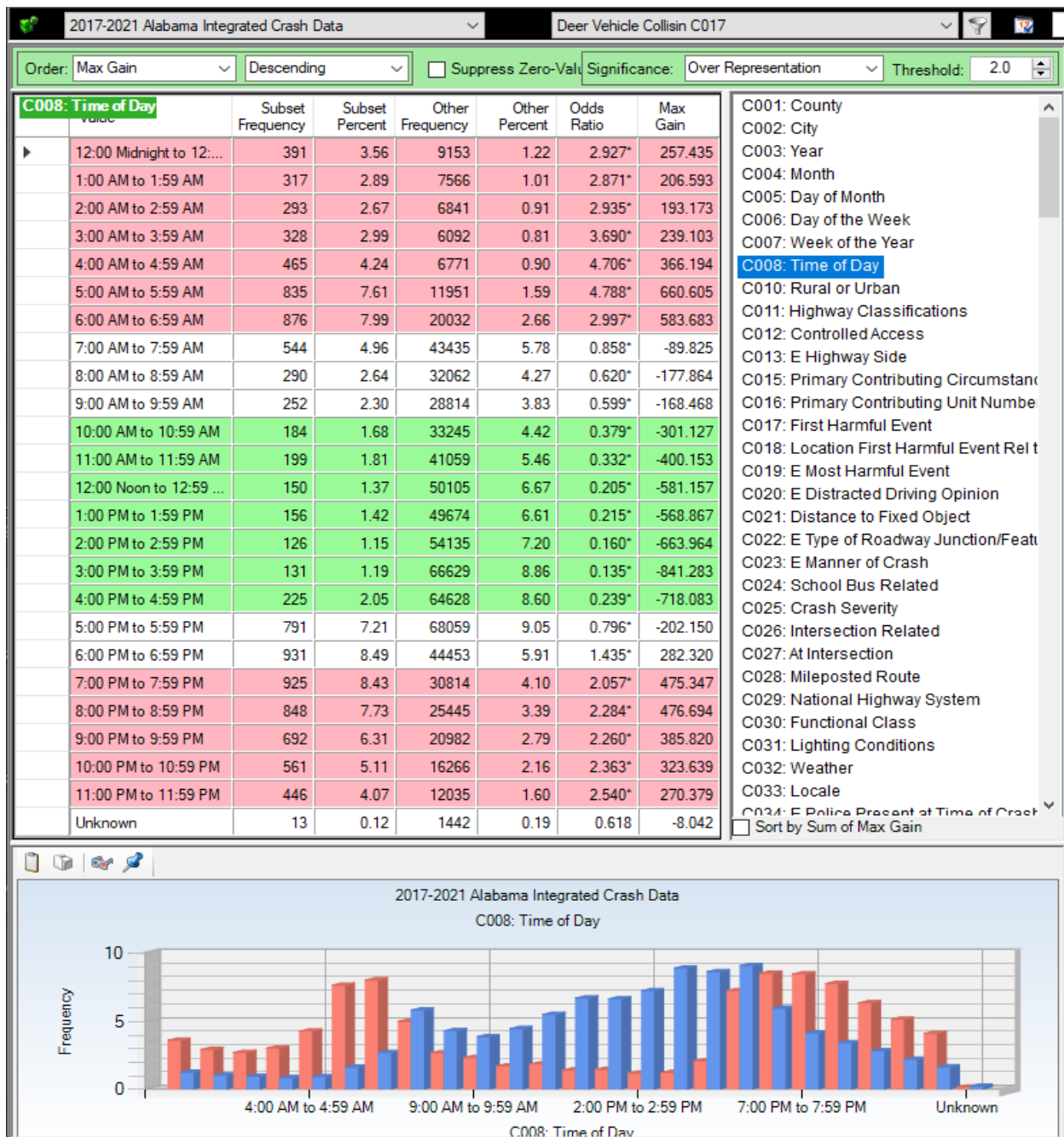
The heavier hunting days would typically be Saturday and Sunday. These are over-represented, Sunday significantly so. But probably not to the extent that a strong correlation can be inferred. Sunday might be high because it is a time when many are still returning into the dusk from a weekend outing.

## C007 Week of the Year



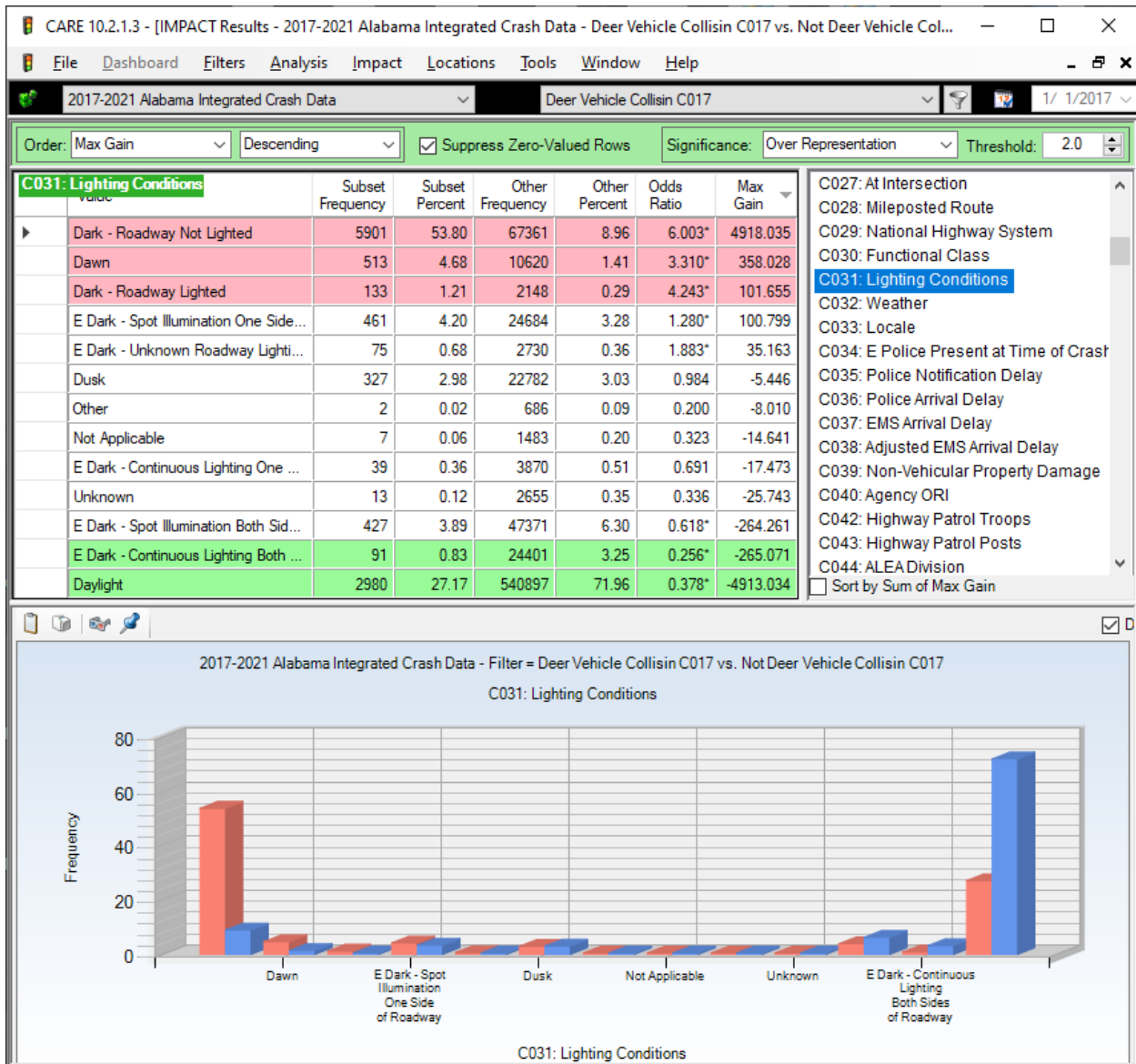
This shows a very strong correlation between the hunting season and the DVC frequencies. The deer hunting (gun) season starts in mid-November and continues into February.

## C008 Time of Day



Another very strong correlation is in the time of day. This is particularly true of dusk and dawn. All of the late-night hours are over-represented, caused by the tendency of the deer to move at these times coupled with a lower ability to see or make the deer out. The evening hours are largely those after dusk, from 5 PM on. Time changes make these hours difficult for many drivers.

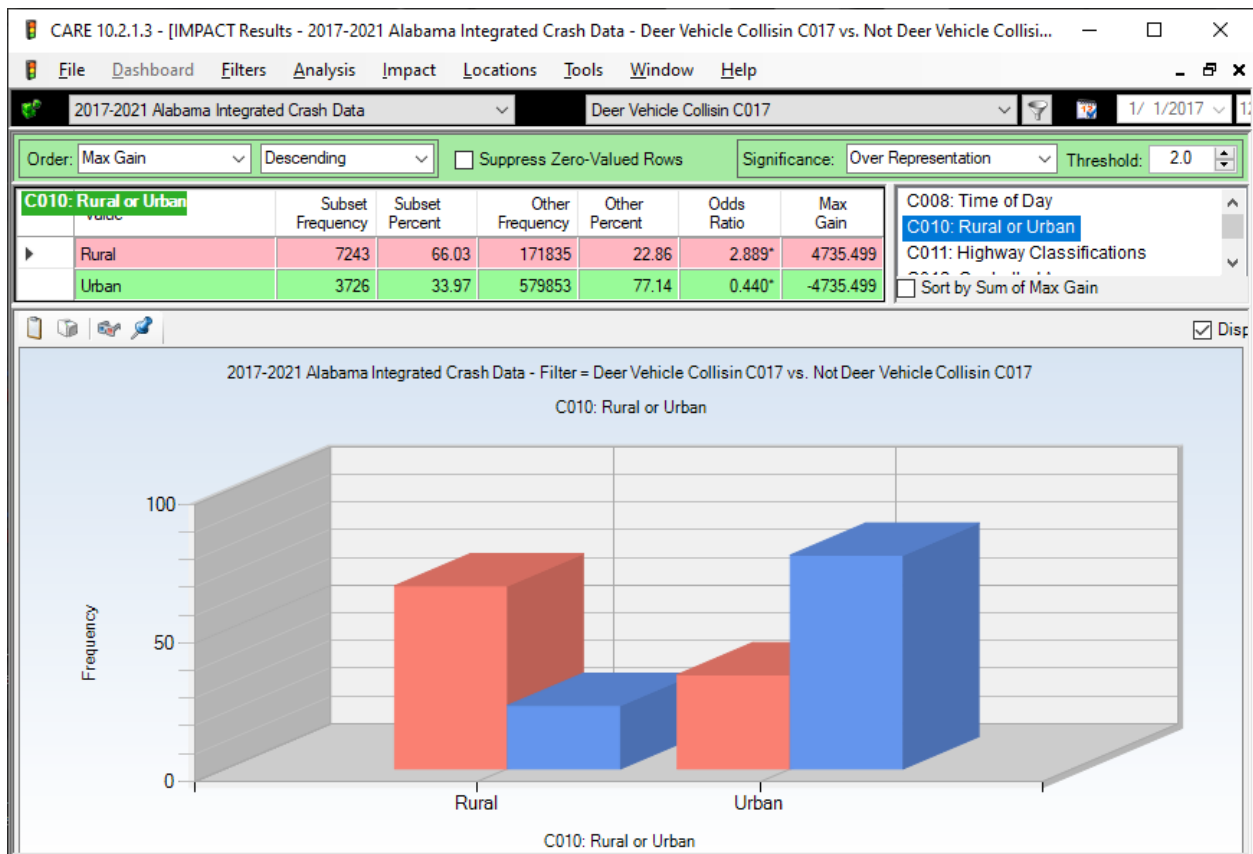
## C031 Lighting Conditions



Dusk and dawn are expectedly over-represented, but dark-not lighted has the largest number, Odds Ratio and Max Gain. For the traveler this means that while the transition hours

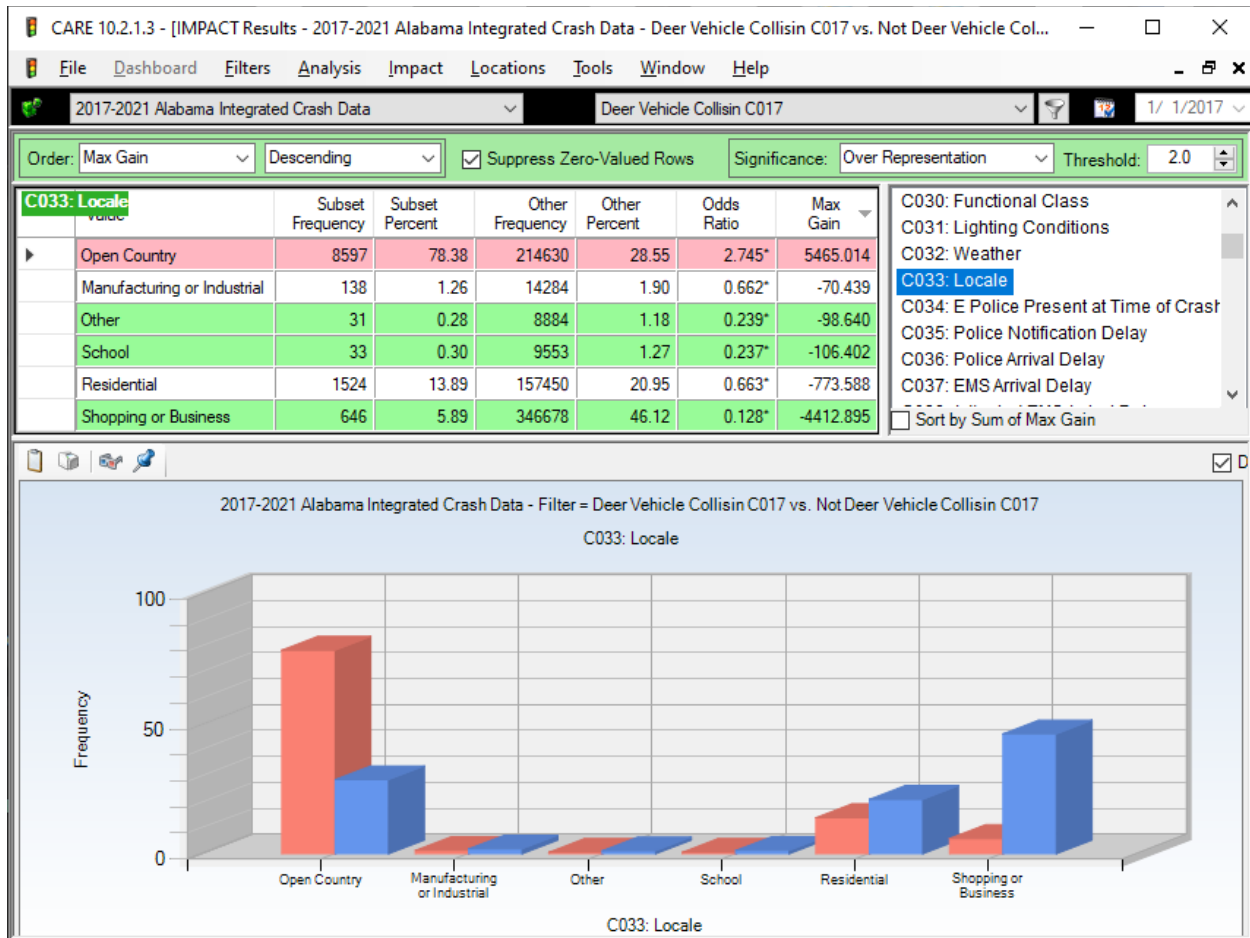


## C010 Rural or Urban



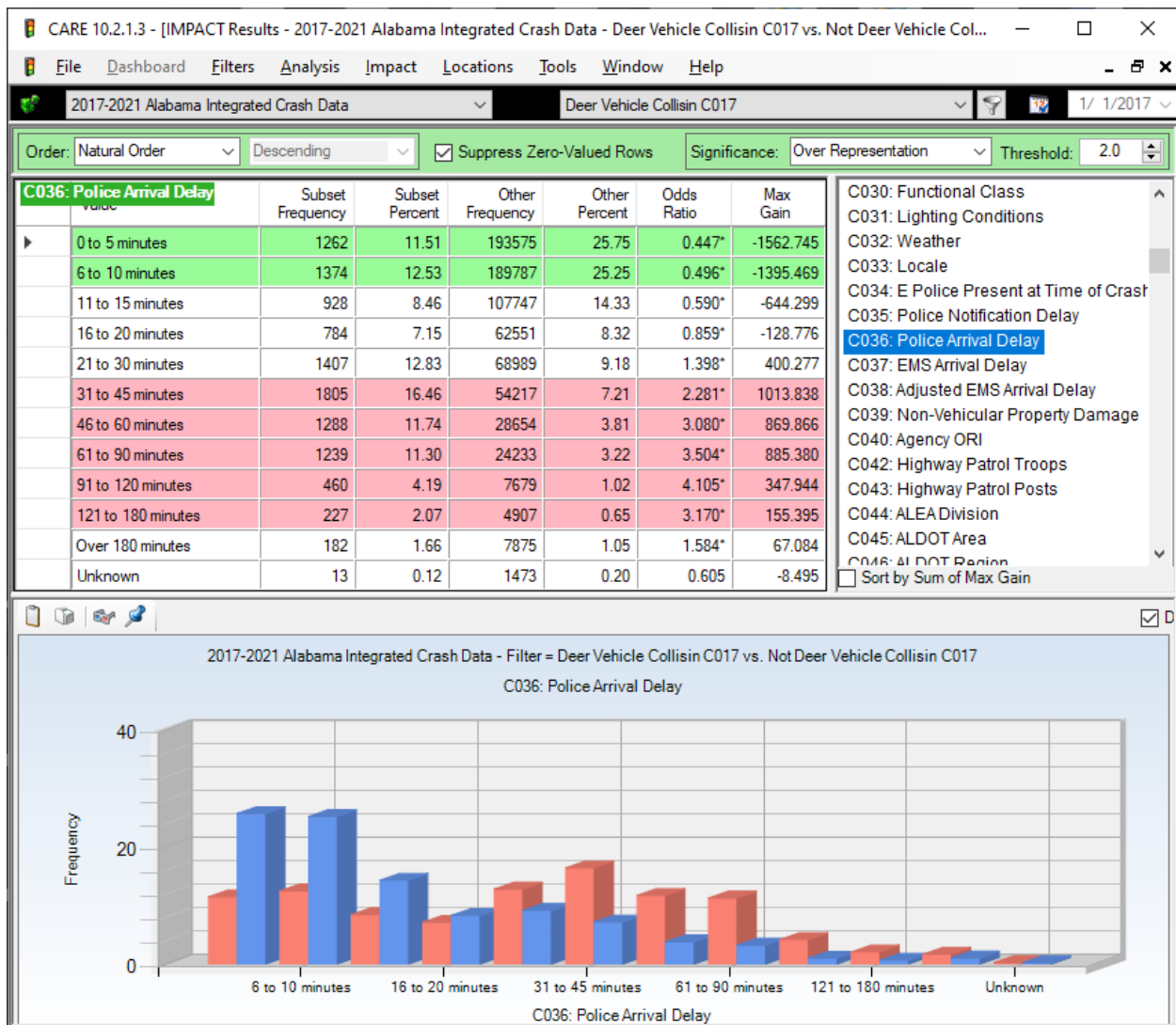
It comes as no surprise that Rural areas for DVCs are over-represented by a factor of nearly 3 to 1. Relatively few deer venture in urban areas, although many areas classified as urban are quite open and uninhabited by humans.

## C033 Locale



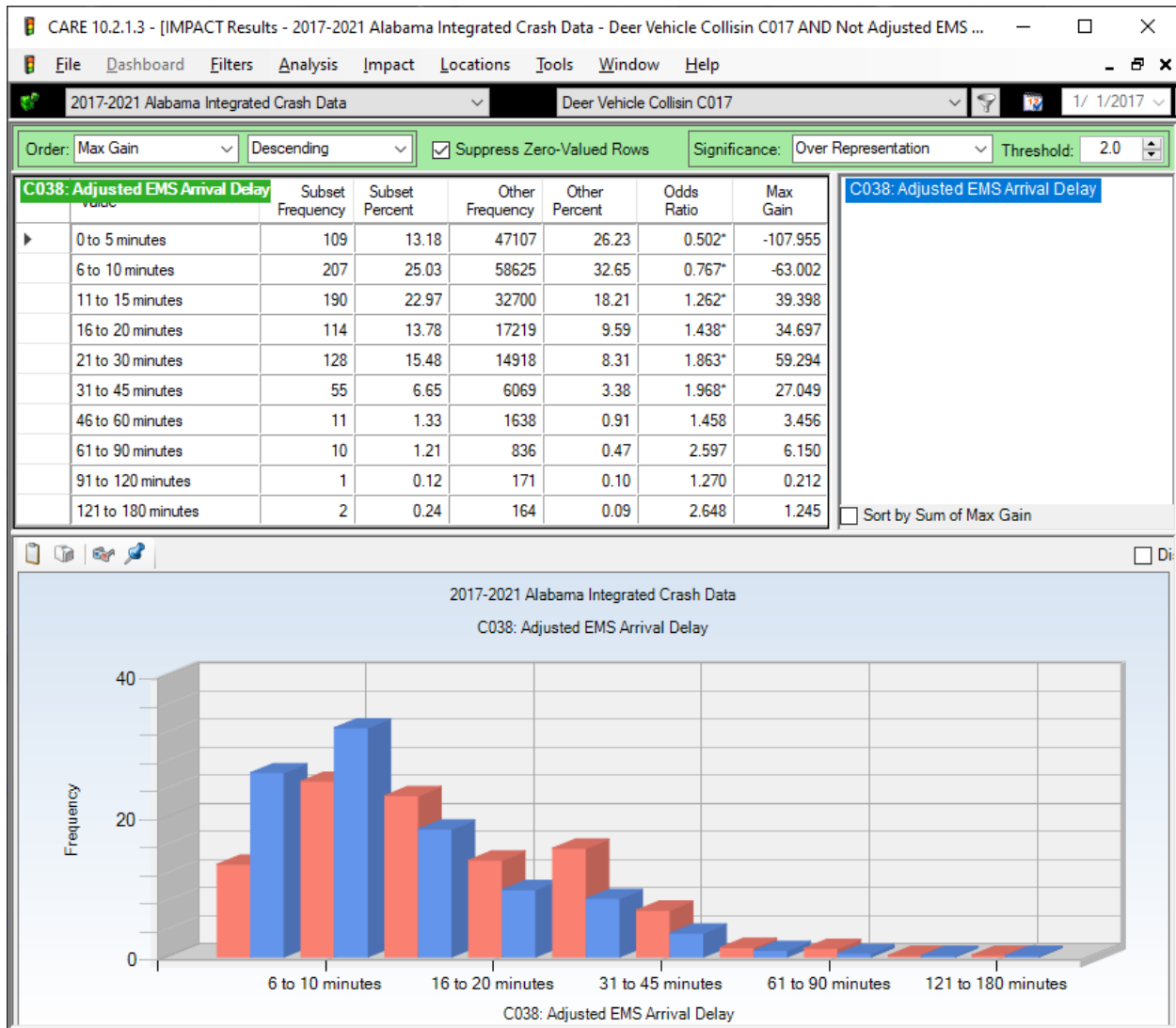
The locale of Open Country is consistent with the findings above. However, it is interesting that Residential has as many as it does. As residential areas increase they tend to infringe on deer habitat.

## C036 Police Arrival Delay



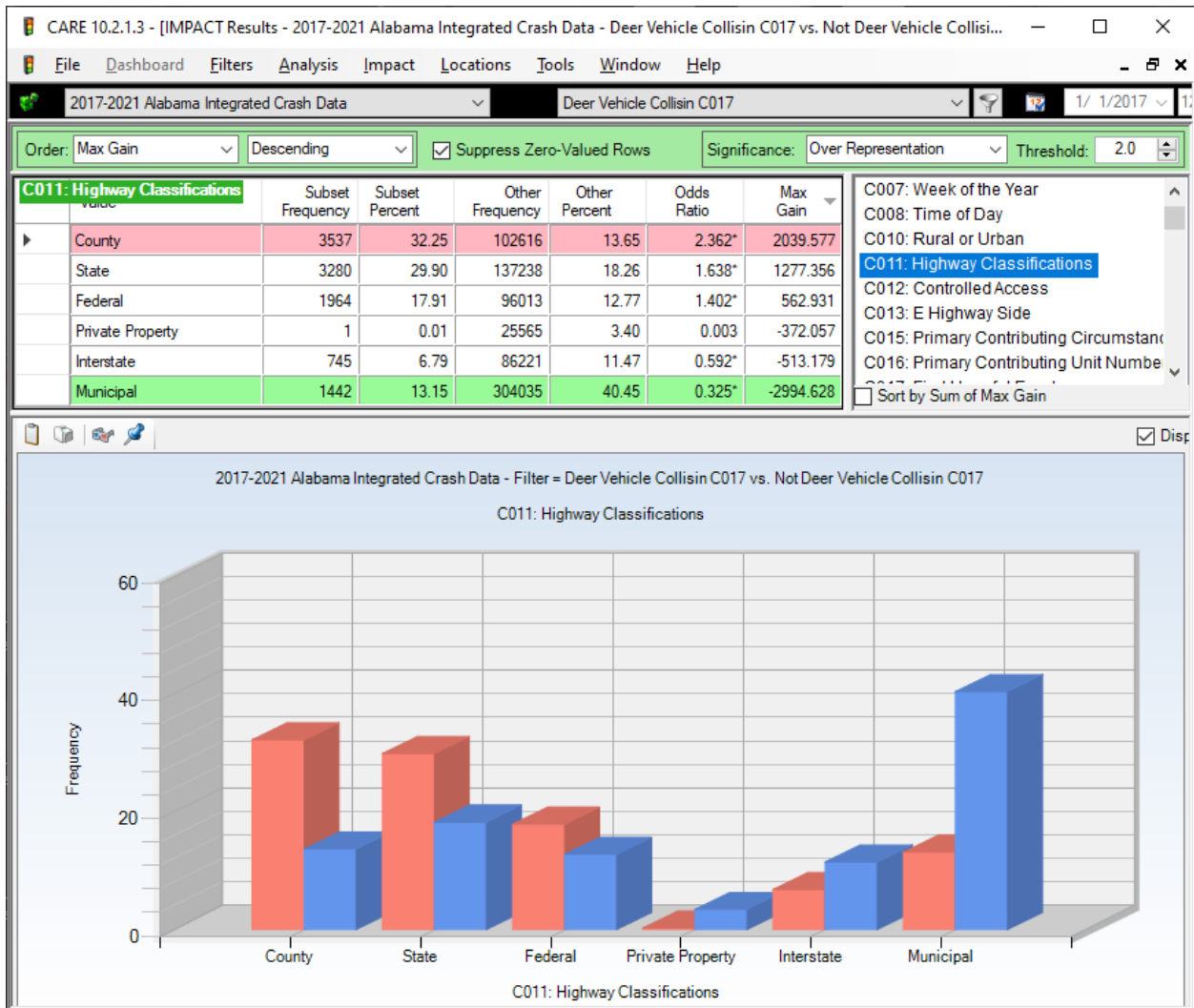
Police arrival delay reflects the rural nature of most DVCs, which generally require more time for police to arrive.

## C038 Adjusted EMS Arrival Delay



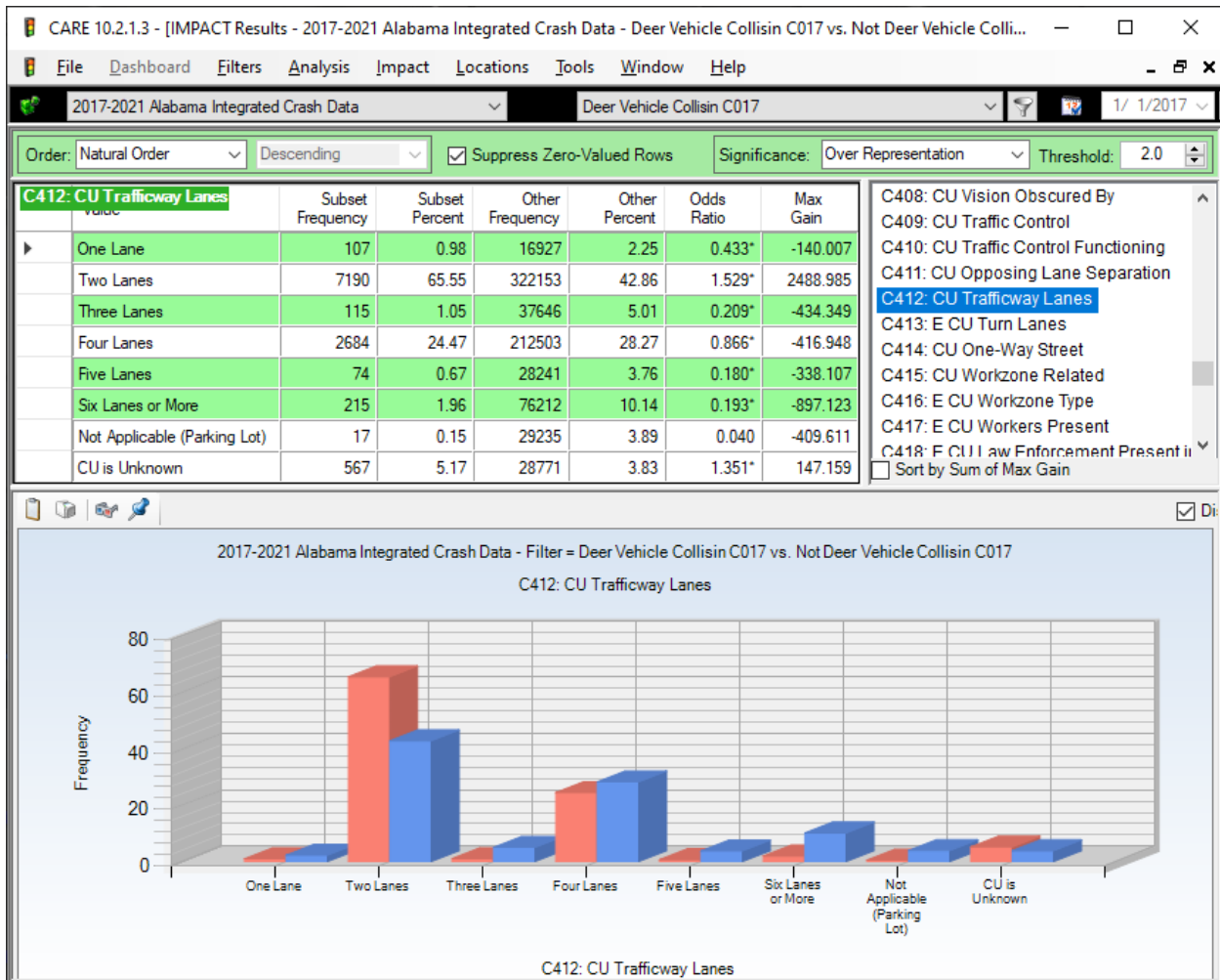
EMS Arrival Delay is generally slower than the average for the same rural reasons as the police arrival delay. In some cases this is because of a delay in reporting the crash to the proper EMS authority.

## C011 Highway Classification



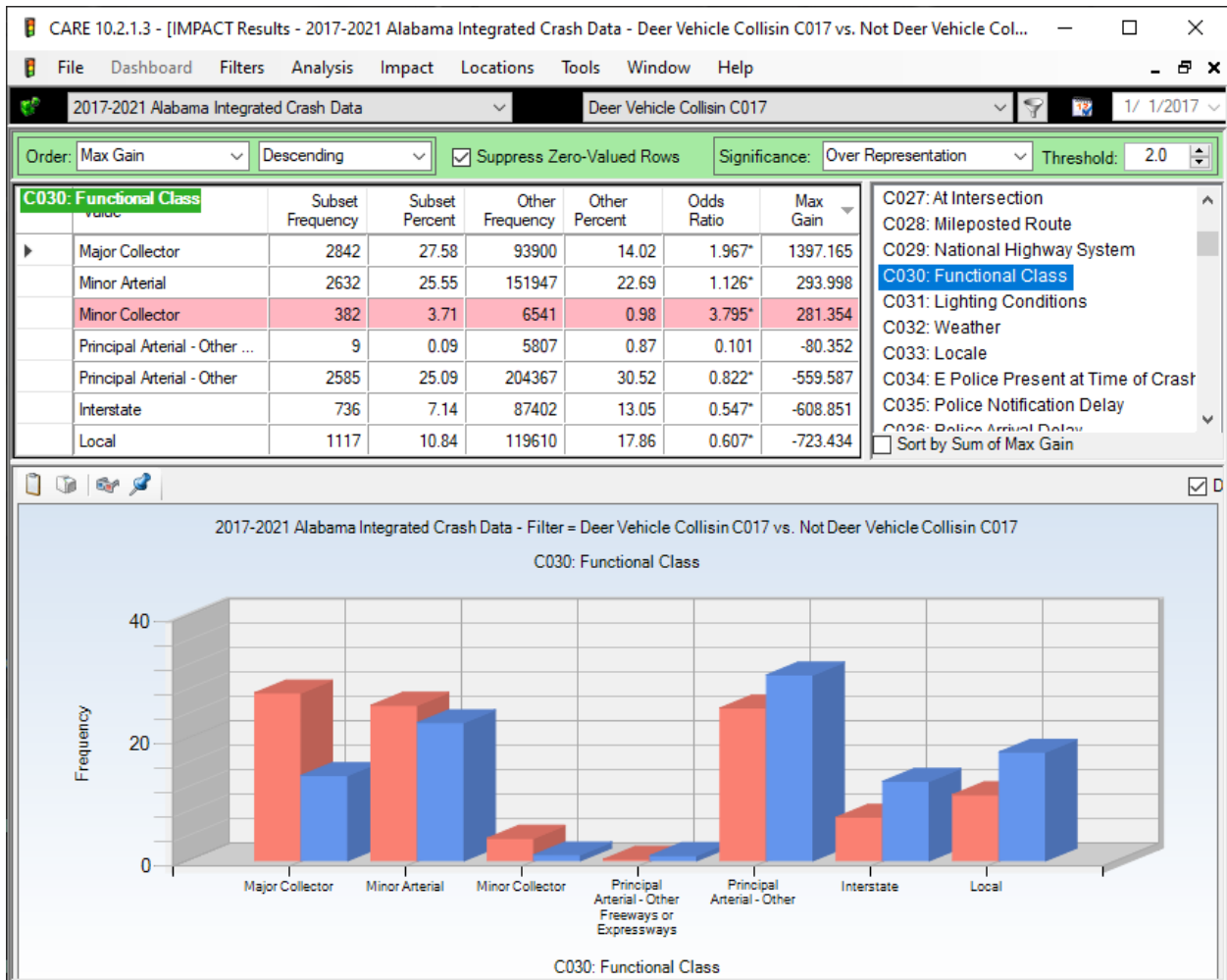
As would be expected in predominantly rural crashes, the over-represented roadway classifications are those in rural areas: County, State and Federal. Interstates have a higher traffic volume but for the most part they are fenced off to minimize DVCs. Motorists are urged to move to Federal and Interstates to minimize their likelihood for a DVC.

## C412 CU Trafficway Lanes



DVCs are significantly over-represented on two-lane roadways. To avoid these crashes, motorists are urged to move to roads with a higher number of lanes. Note that the table above and the chart are in natural order as opposed to Max Gain.

## C030 Functional Class



## C030 by C011 Cross-tabulation – Functional Class by Highway Classification

CARE 10.2.1.3 - [Crosstab Results - 2017-2021 Alabama Integrated Crash Data - Filter = Deer Vehicle Collisin C017]

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2017-2021 Alabama Integrated Crash Data Deer Vehicle Collisin C017 1/ 1/2017 12/31/2021

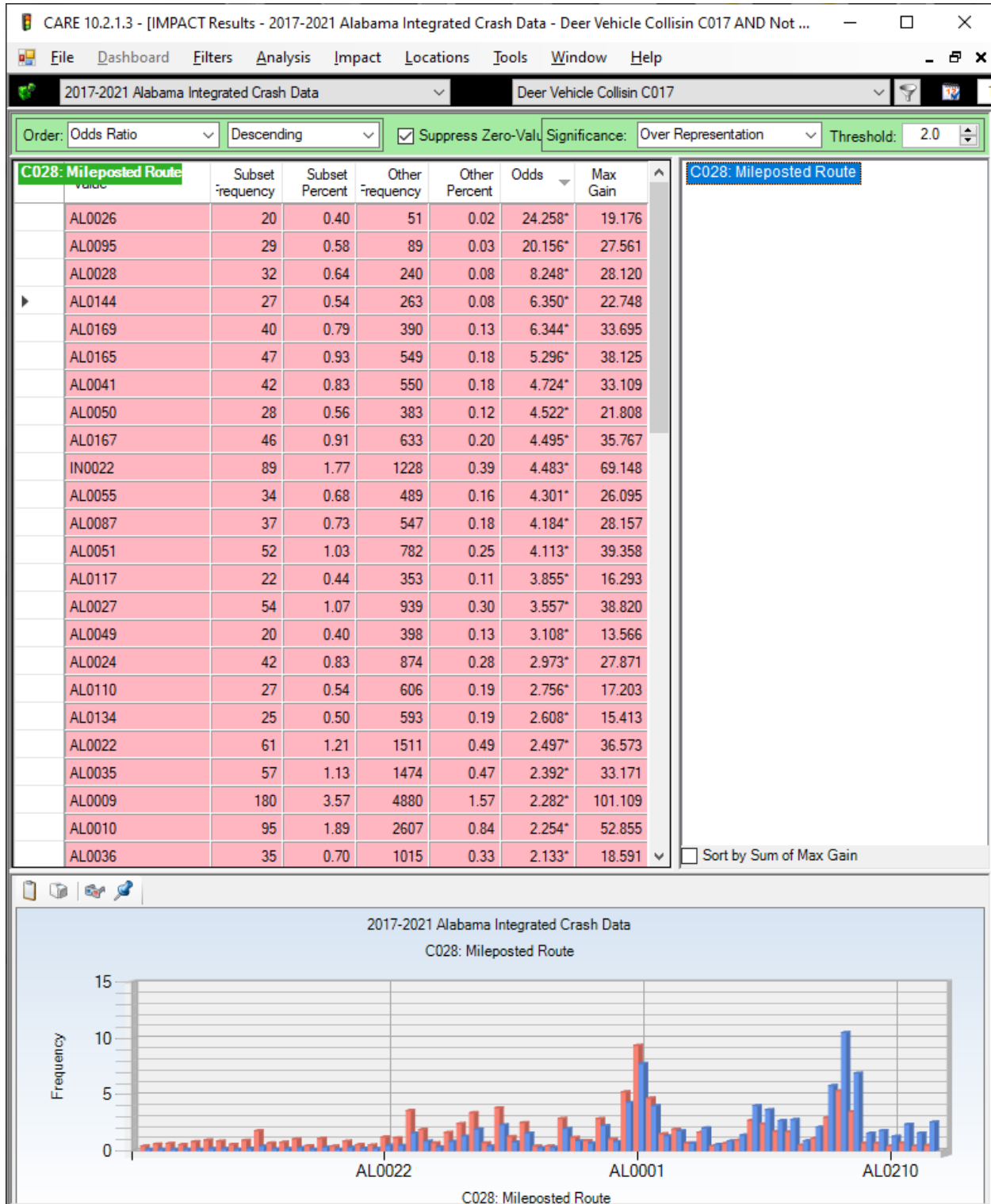
Suppress Zero Values: Rows and Columns Select Cells: Column: Functional Class ; Row: Highway Classifications

	Interstate	Principal Arterial - Other Freeways or Expressways	Principal Arterial - Other	Minor Arterial	Major Collector	Minor Collector	Local	TOTAL
Interstate	718	0	5	1	3	1	1	729
Federal	5	0	1457	332	86	2	13	1895
State	4	4	940	1696	513	1	30	3188
County	7	0	32	281	1811	363	788	3282
Municipal	2	5	151	322	429	15	285	1209
TOTAL	736	9	2585	2632	2842	382	1117	10303



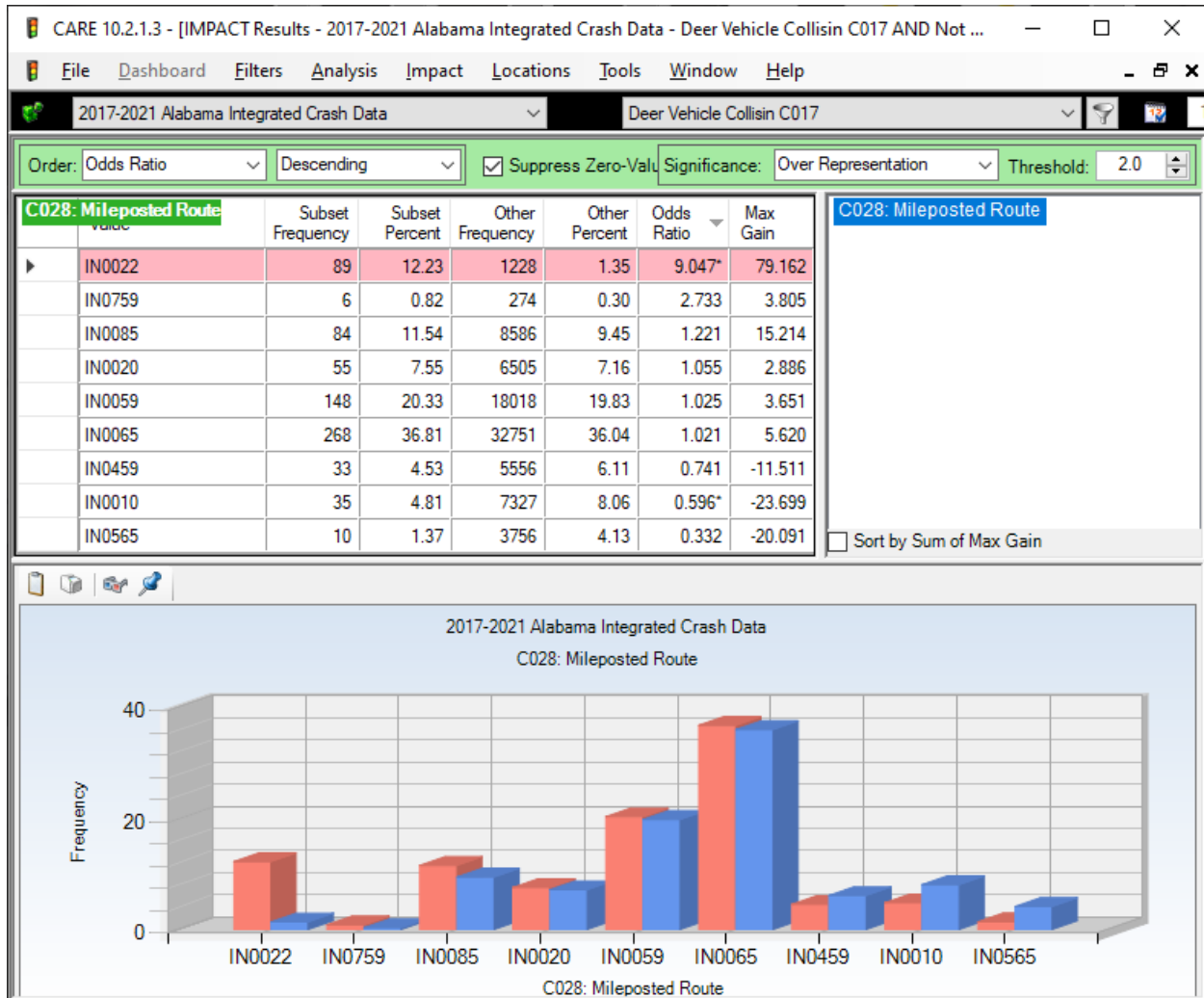
## C028a Mileposted Roads (Non-Interstate)

All Routes with at least twice their expected proportion (Odds Ratio) in the original list.



C028a gives all of the mileposted roads that had Odds Ratios of 7 or more. Because the Odds Ratio reflects that road's DVC crash probability, When that list was reduced the resulting mileposted roads were compared against each other to obtain the Odds Ratios, so they are not all shown with a red background above. High Odds Ratio roads would be those to avoid if traveling in times of semi- or complete-darkness.

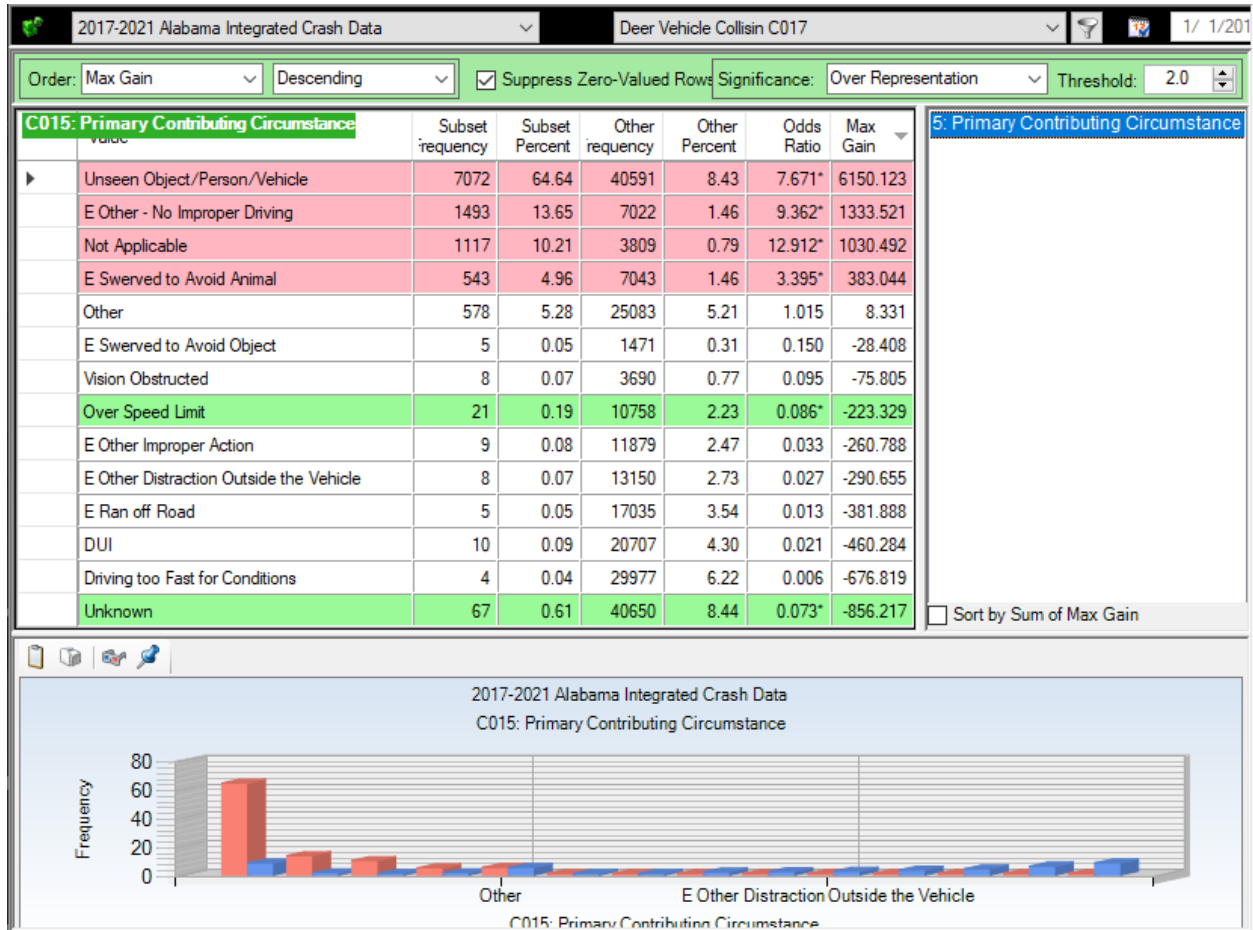
### C028b Interstate Mileposted Roads -- All Interstates



C028b is reduced to just the Interstates, and includes all of them in Odds Ratio order (top-down). IN0022 was found to be the one to avoid at those times of day when deer are most active.

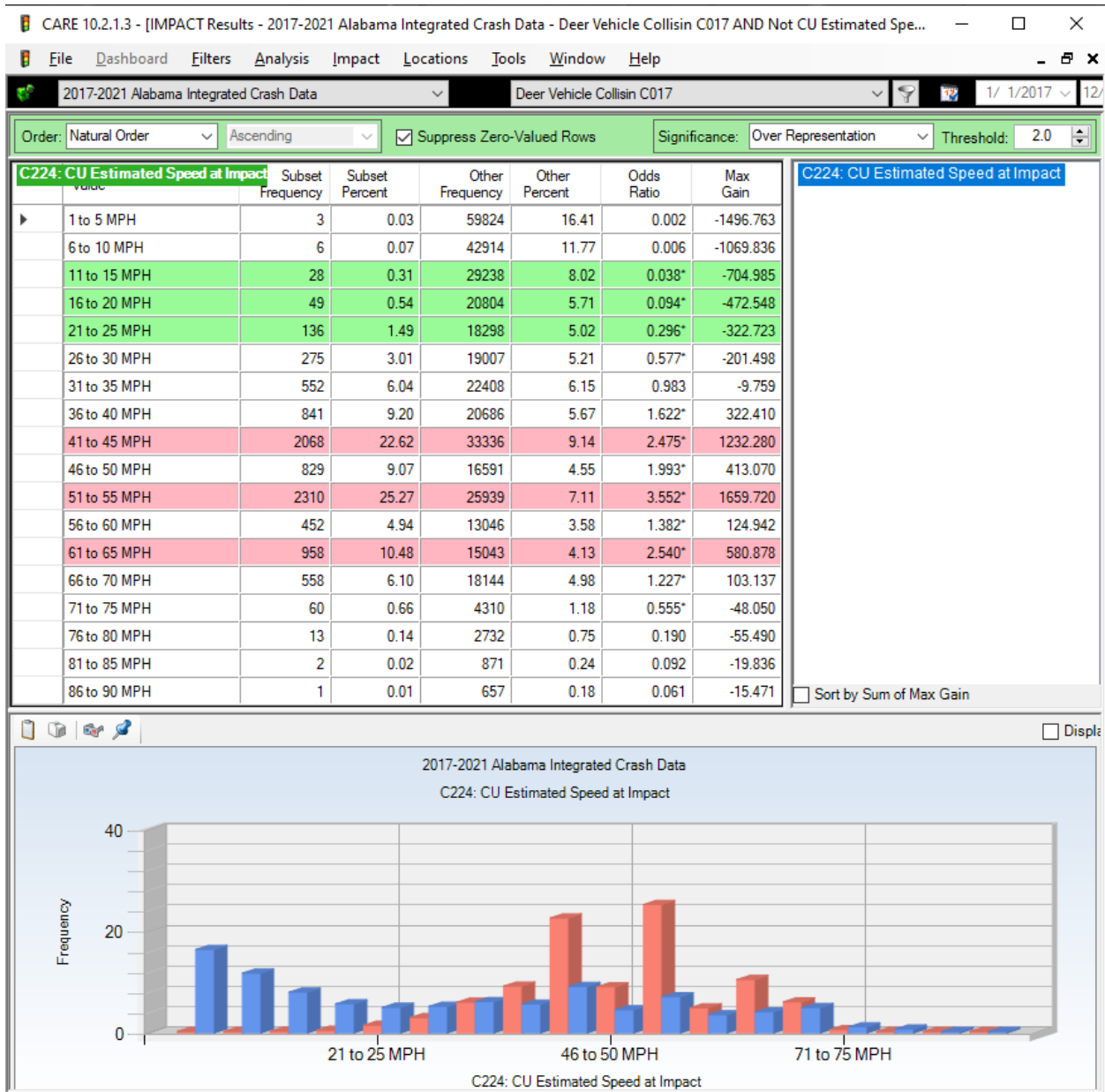
## C015 Primary Contributing Circumstances

All items with less than 4 occurrences were removed



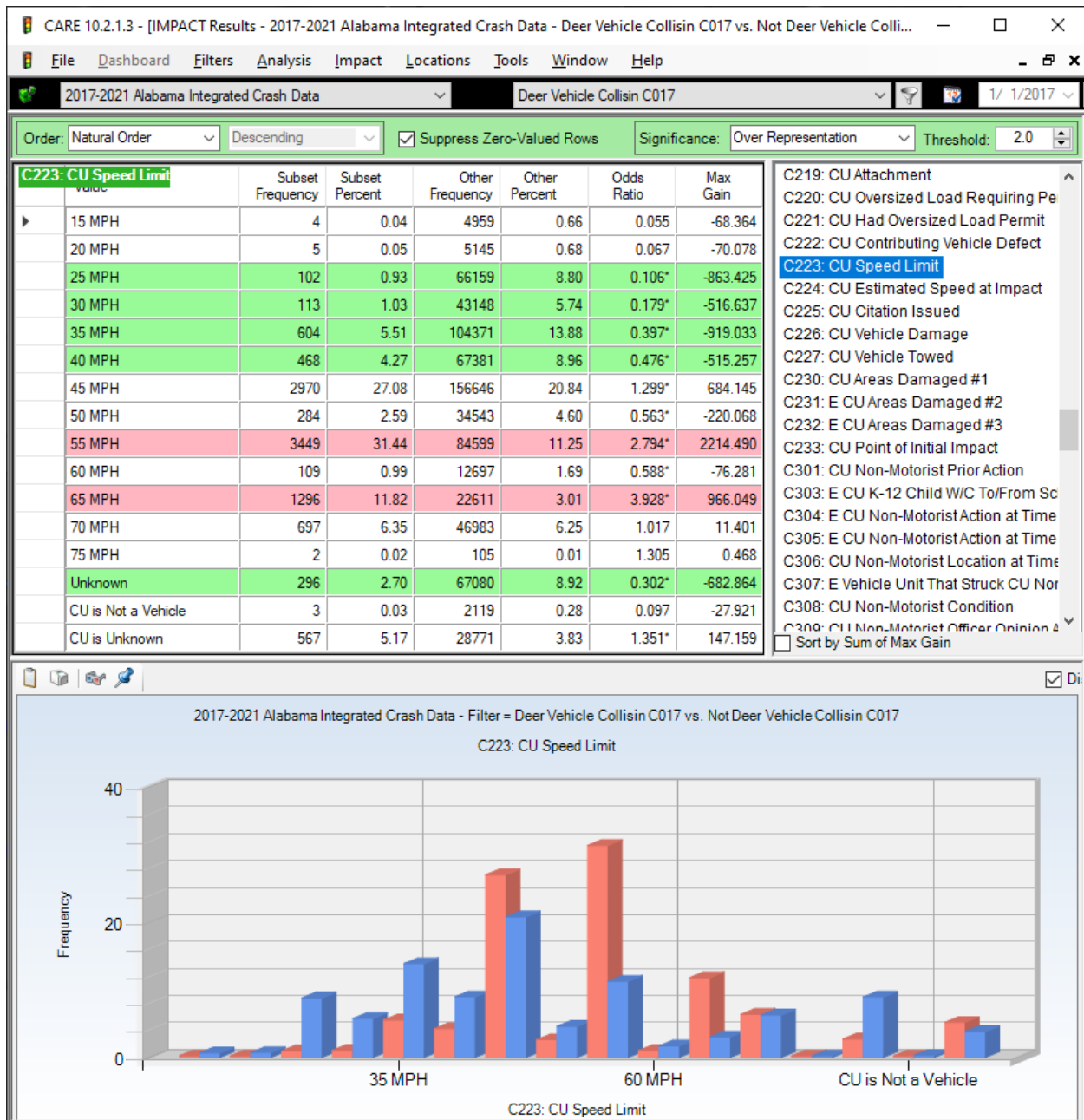
C015 does not have a DVC category, which is quite helpful since it provides the errors that may have lead up to each of the DVCs. Generally, we have seen that DVCs occur at locations and under lighting conditions when it is difficult to see the deer. So, Unseen Object/Person/Vehicle is the obvious category for most (7,072) of these crashes. While the second, third and fourth items as not as frequent, they are still over-represented by more than twice their expected number. No Improper Driving and Not Applicable are probably two ways of coding the same thing. Swerved to Avoid Animal also does not indicate fault on the part of the causal driver, although more caution and lower speed could prevent at least some of these crashes. Speed is under-represented as is DUI.

## C224 CU Estimated Speed at Impact



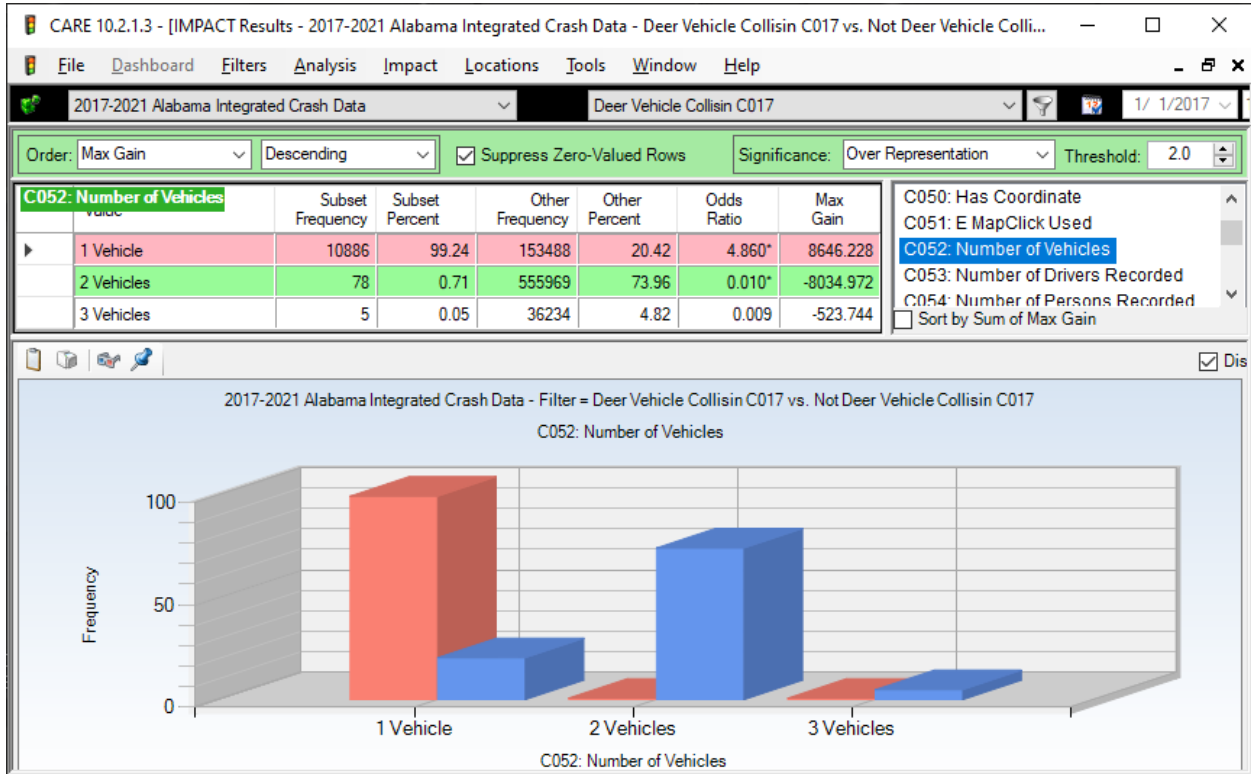
Speed can be a factor not only in the crash cause but also in the crash severity. It goes without saying that there is no reason to be traveling at the speed limit if there are heavy chances of deer being in the area. A comparison of this attribute with the next one shows that relatively few of the vehicles that got in DVCs were exceeding the speed limit at the time. Instead the over-represented speeds most often fall at the speed limit.

## C223 CU Speed Limit



This is quite useful for comparing against the estimate impact speed, C224 immediately above. It seems clear that excessive speed was not the cause of most of these crashes. It is true that about 76 of them could have been avoided by lower speeds (within the speed limits), but this is a small proportion of the DVC crashes in general.

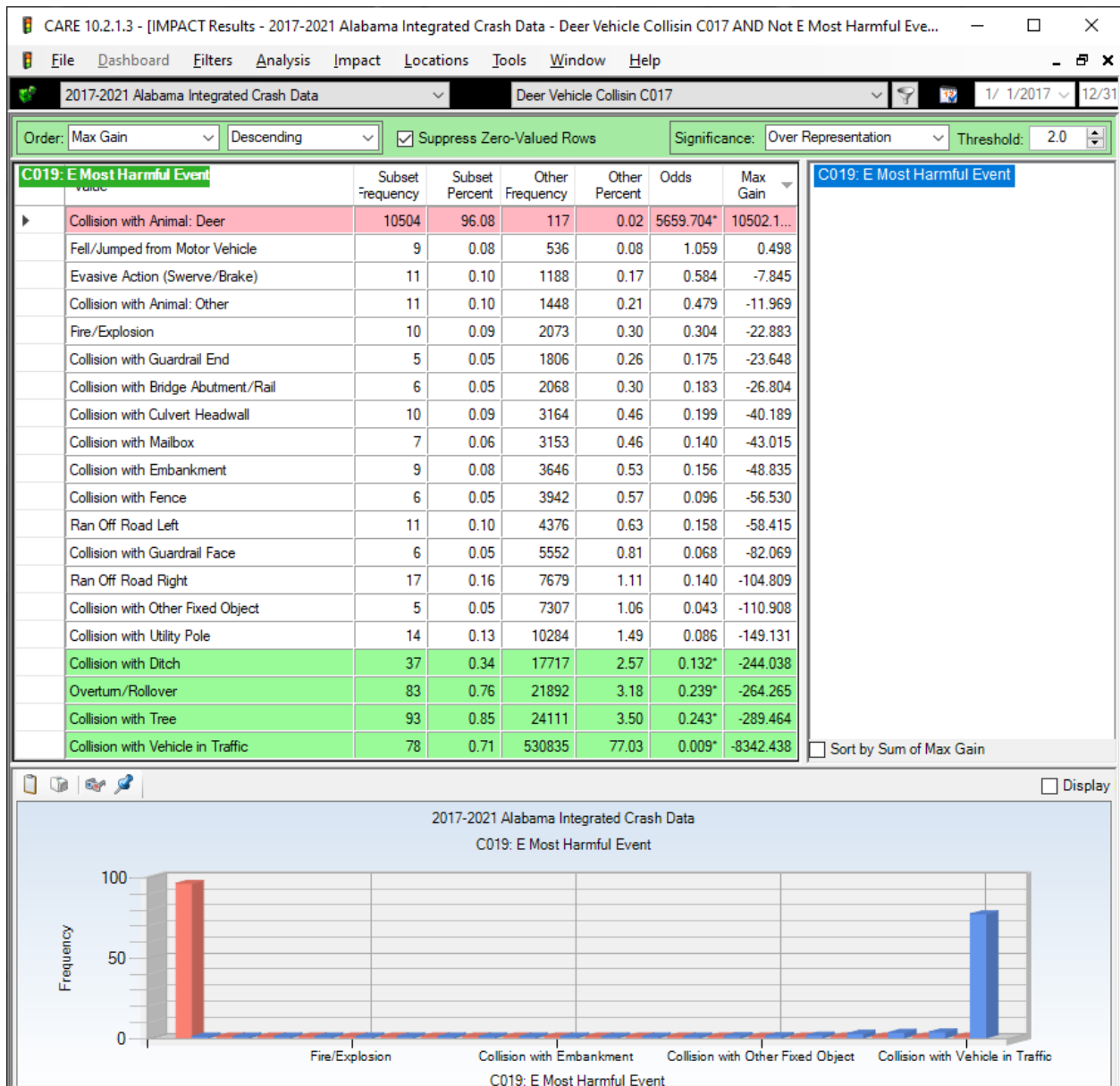
## C052 Number of Vehicles



It is reasonable that most (over 99%) of DVCs only involve one vehicle. Only 83 crashes involve more than one vehicle. Some of the most

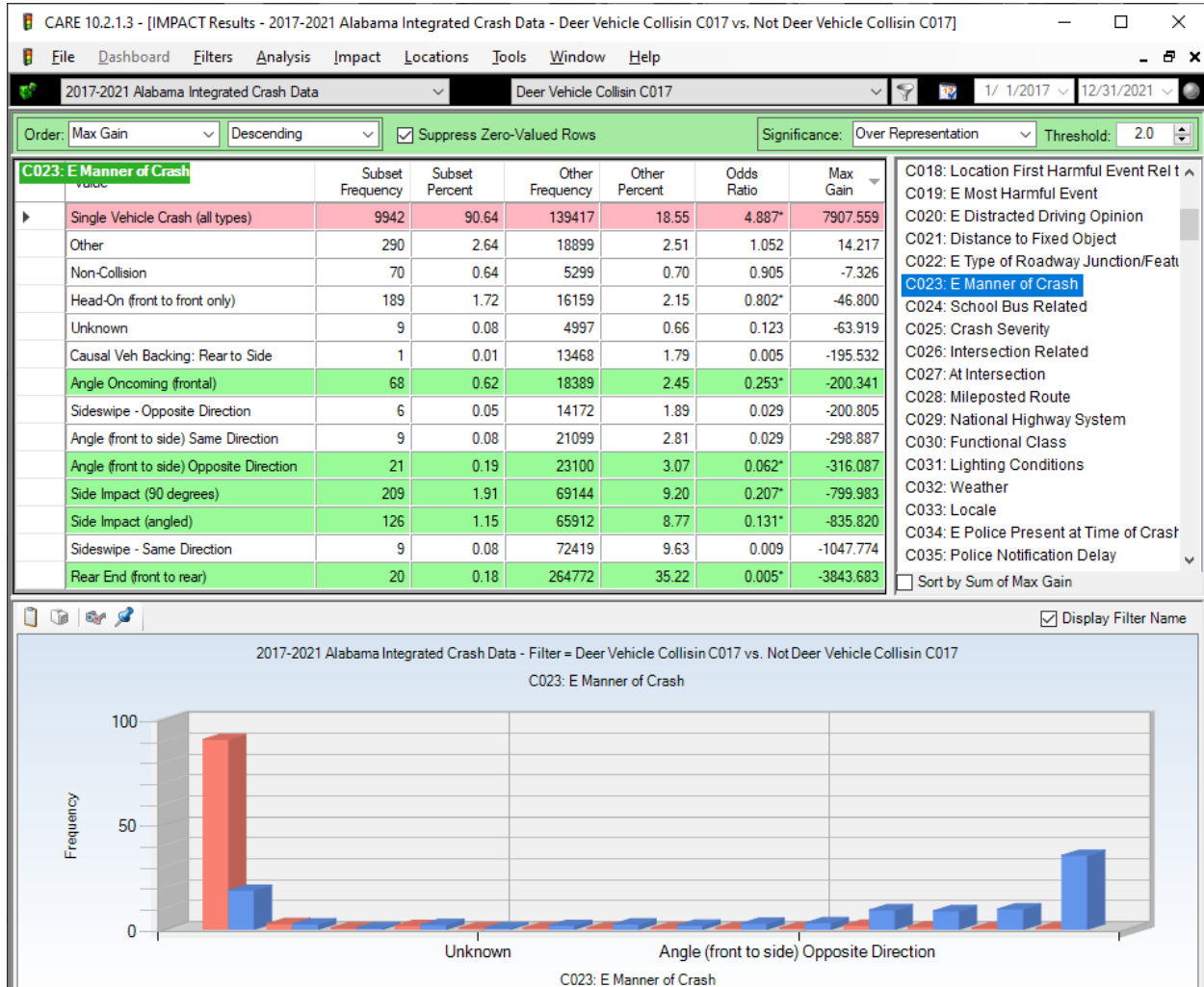
## C019 Most Harmful Event

All items with less that 5 occurrences were removed



This attribute has Collision with Animal Deer as a major category that tends to make the other values of secondary importance. However, by going through the others, and especially those with relatively high numbers, some factors may be surfaced to determine what secondary effects arise from DVC crashes. For example, we saw in C052 that 78 crashes involved two vehicles. Here we see that 78 involved Collision with Vehicle in Traffic. Other single vehicle crashes resulted in a number of different outcomes, including collision with trees, poles, ditches and other obstacles, all of which would generally cause much more damage than the DVC.

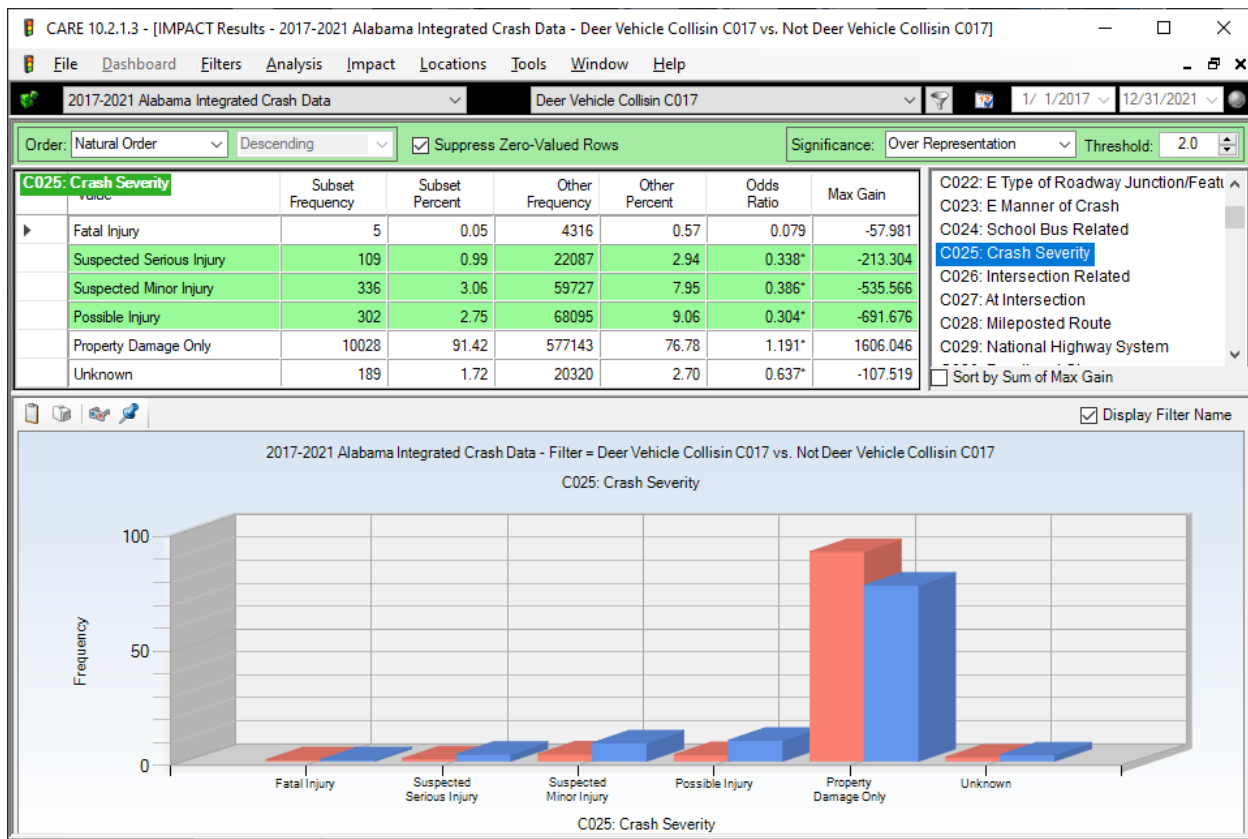
## C023 Manner of Crash



Of these, the manner of crash that would seem to be the most significant is the 189 Head On (Front to front only) crashes that results from either the causal vehicle swerving or else some other loss of control after the deer was struck. These types of crashes tend to be the most severe in terms of causing fatalities or severe injuries. While side impacts are high (126+209=335), these may well have been the result of deer strikes on the side of the vehicle, which would not cause nearly the damage as a head-on.



## C025 Crash Severity



While over 90% of the DVC crashes are property damage only, the presence of some fatalities and other very serious injury crashes make their avoidance quite beneficial. A cross-tab of severity by most harmful event showed that two fatalities were caused by Overturn/Rollover, while the other three were with the collision with the deer itself as opposed to any other secondary crash. This demonstrates that potential lethality of an event such as a deer coming through the windshield. The suspected Serious Injury severity category were caused by Collisions with Deer – no further qualifier (73), Over-turned/Rollover (14), Collisions with a Tree (9), Fell/Jumped from Motor Vehicle (4), Other Non-collision (2), Collision with Other Fixed Object (2), Collision with a Non-Motorist Pedestrian (1), and several others with one crash each.

## C323 CU Driver/Non-Motorist Safety Equipment



See the C025 vs C323 cross-tabulation – next item.



## C025 and C323 Cross-Tab of Severity by Safety Equipment

CARE 10.2.1.3 - [Crosstab Results - 2017-2021 Alabama Integrated Crash Data - Filter = Deer Vehicle Collisin C017]

File Dashboard Filters Analysis Crosstab Locations Tools Window Help

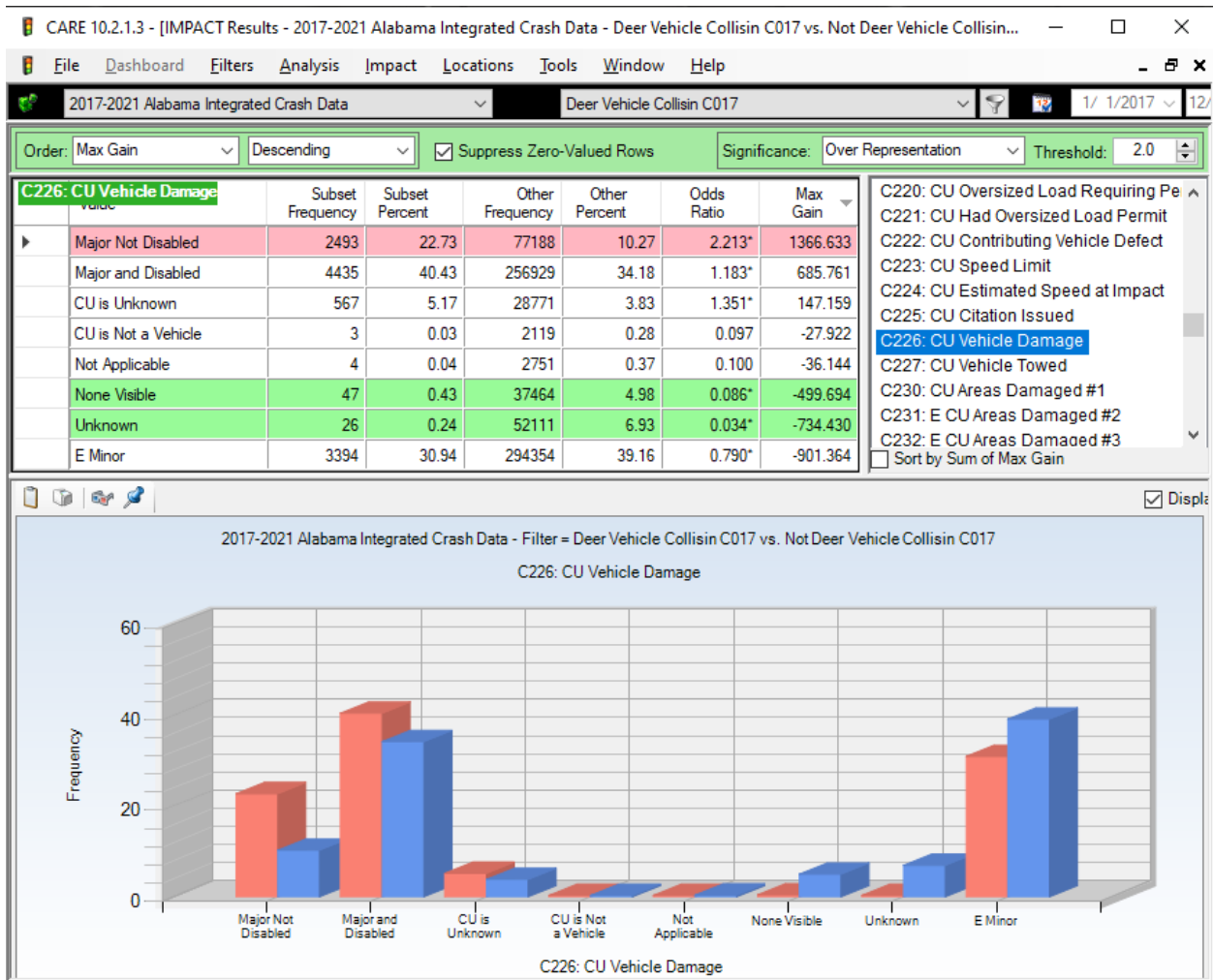
2017-2021 Alabama Integrated Crash Data Deer Vehicle Collisin C017 1/ 1/2017 12/31/2021

Suppress Zero Values: Rows and Columns Select Cells: Column: Crash Severity ; Row: CU Driver/Non-Motorist Safety Equipment

	Fatal Injury	Suspected Serious Injury	Suspected Minor Injury	Possible Injury	Property Damage Only	Unknown	TOTAL
None Used - Motor Vehicle Occupant	1	9	17	18	94	1	140
Shoulder and Lap Belt Used	0	40	248	258	9238	138	9922
Lap Belt Only Used	0	0	0	0	14	3	17
Shoulder Belt Only Used	0	0	1	0	24	1	26
Dot-Compliant Motorcycle Helmet Used	3	44	40	7	11	1	106
E Helmet Used	0	4	2	0	0	0	6
E Other Motorcycle Helmet Used	1	3	1	0	0	0	5
No Motorcycle Helmet Used	0	1	0	0	1	0	2
Unknown	0	1	3	3	121	7	135
Not Applicable	0	4	7	1	19	3	34
CU is Unknown	0	3	17	15	497	35	567
E CU Driver Not Recorded	0	0	0	0	7	0	7
E CU Non-Motorist Not Recorded	0	0	0	0	2	0	2
TOTAL	5	109	336	302	10028	189	10969

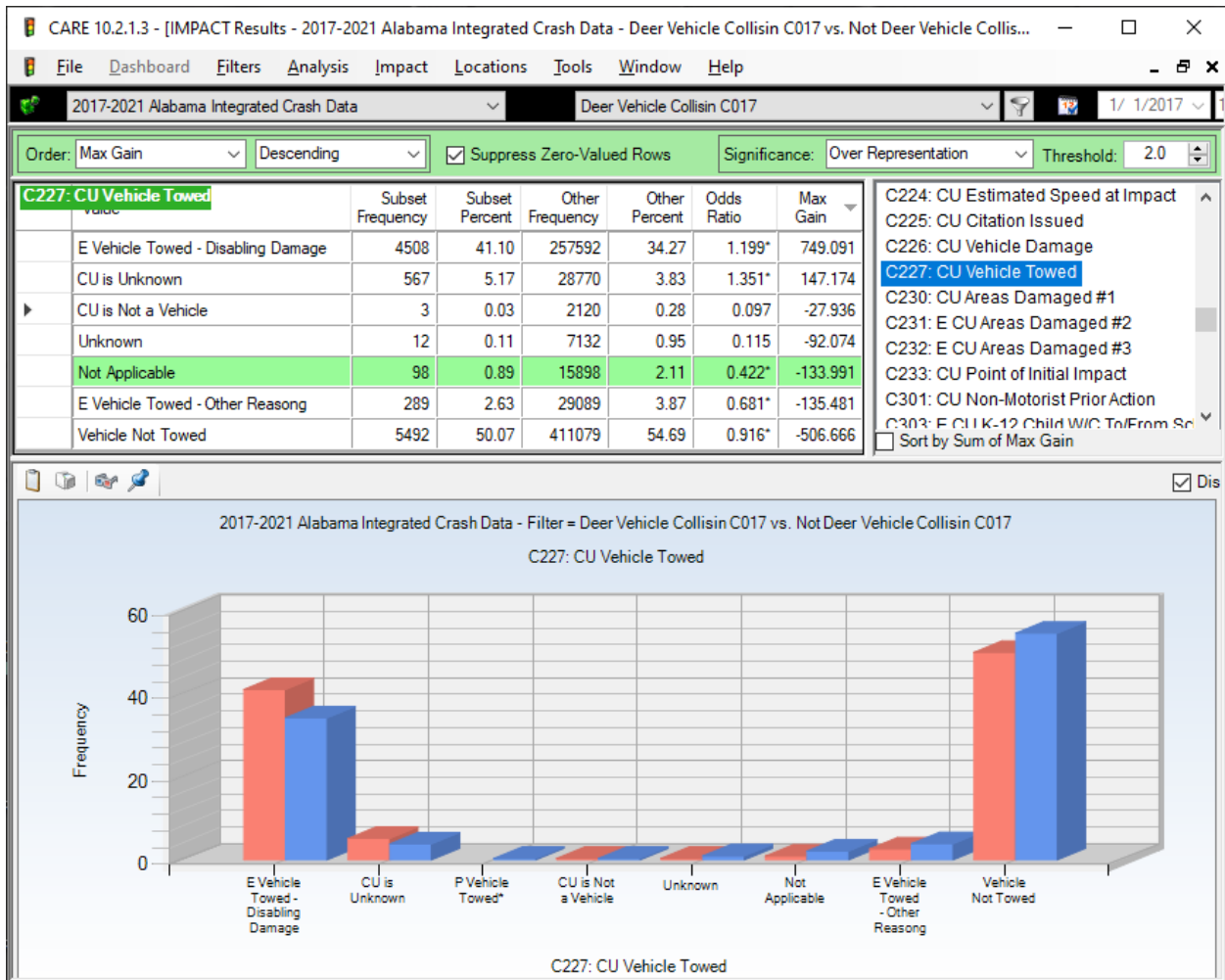
Any use of a motor vehicle without the appropriate Safety Equipment multiplies the chance of a fatality or serious injury by several orders of magnitude. The cross-tabulation above demonstrates this with real data. The only fatality and 9 of the Suspected Serious Injury victim passengers in a non-motorcycle vehicle involved someone who was not using a seat belt. All of the other fatality victims were motorcycle drivers or passengers. Three of them were killed even though they were wearing a DOT- Compliant motorcycle helmet. The 44 motorcycle Suspected Serious Injury and the 40 Suspected Minor Injury may well have been killed it not wearing an appropriate helmet. The important thing to recognize from these data are the danger of venturing out in the times and places that are frequented by deer. If it is a necessity, extreme reductions in speed are warranted.

## C226 CU Vehicle Damage



Damage was major in  $2,493 + 4,435 = 6,928$ , which is 63.16% of all of the cases. Most of these were major and disabled, which is a good indication that the vehicle had to be towed. This should clearly reinforce the necessity to buckle up regardless of the duration or destination of the trip. It is also a further reminder that DVC crashes are often quite severe and risk death and very serious injury to the vehicle occupants.

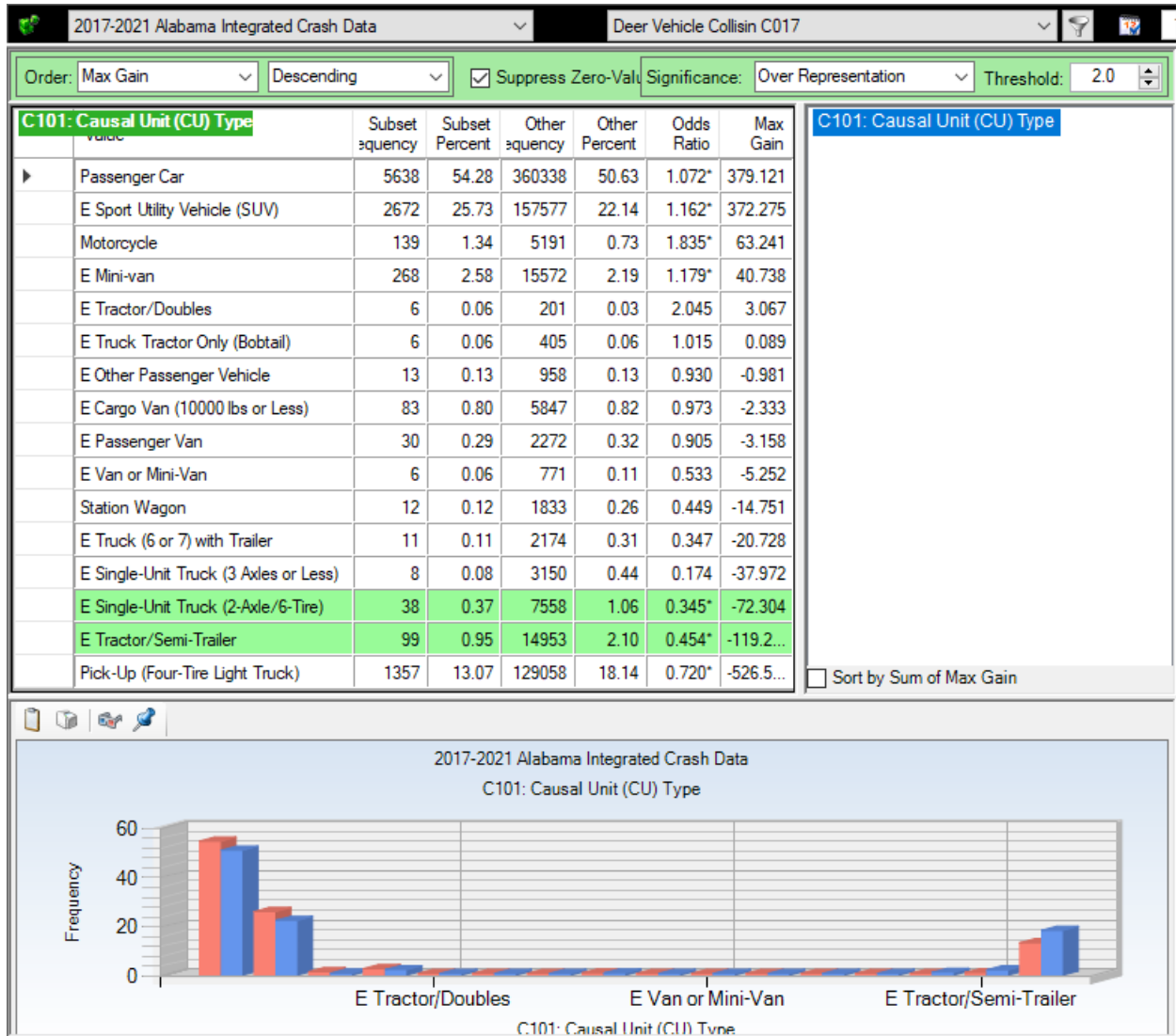
## C227 Vehicle Towed



The fact that 41.10% of the vehicles involve in DVC crashes had to be towed is further evidence of the damage that occurs in a large proportion of DVC crashes. To be disabled means that the vehicle cannot be safely driven away from the scene. Other reasons for a functional vehicle to be towed involves the inability of the driver to continue due to trauma or DUI.

## C101 Causal Unit (CU) Type

All items with three or fewer crashes have been removed



All other things being equal, we would expect the number of DVCs to be directly proportional to the presence of the various potential causal units on the roadway. This result shows that while there is a strong correlation of that effect, for many factors, all other things are not equal. For example, the specific times that the various vehicles are on the road, and their presence at locations that have concentrations of deer. A quick eye-ball comparison of the Subset Percent column against the Other Percent column shows that there is a correlation, but the many exceptions show that the relationship is not as strong as might be expected. Passenger Cars, SUVs, Motorcycles and Mini-vans have significantly more than their expectation, while Pick-

ups and some larger trucks had significantly fewer. This is not to say that the over-represented vehicles are to be avoided, but that the times and areas in which they are used might be given consideration for changes.

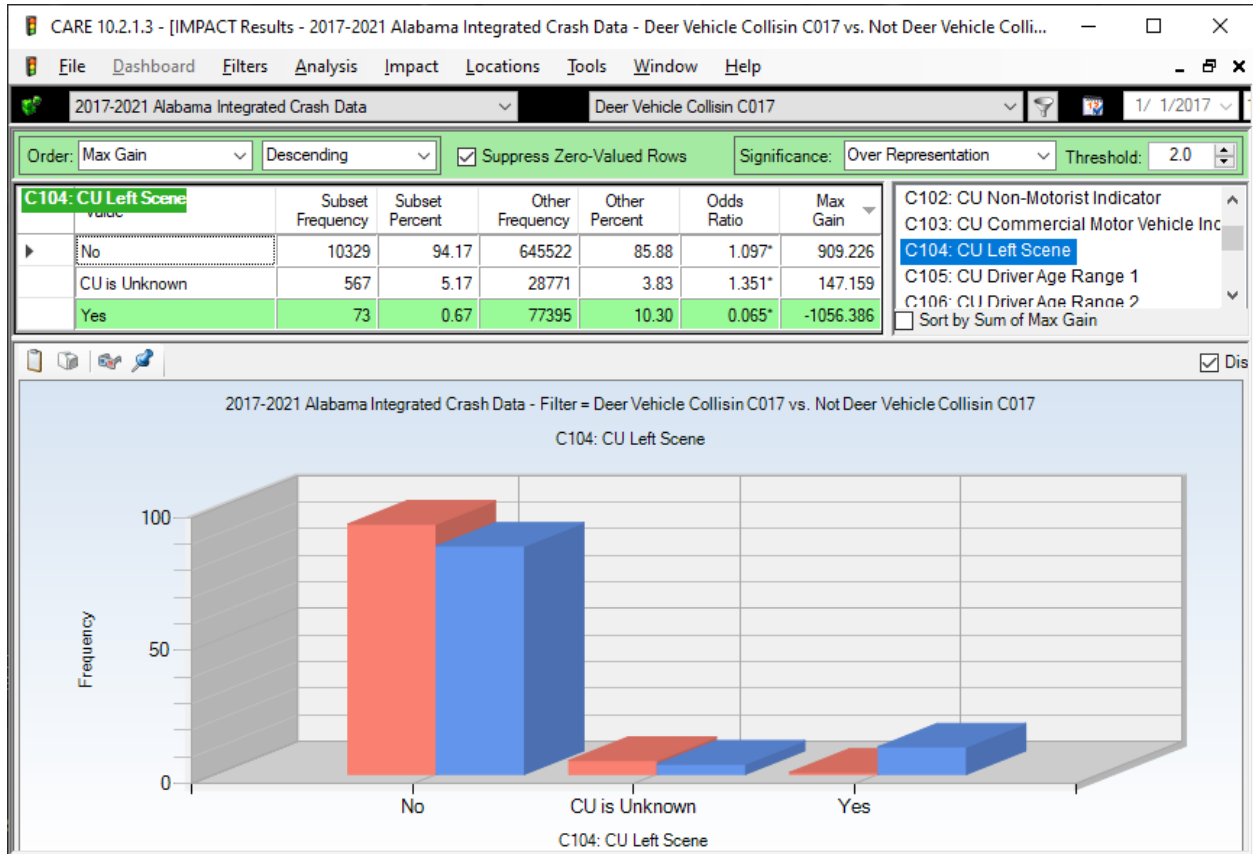
### C080 Commercial Motor Vehicle (CMV) Involved



It is possible from C101 that up to 156 CMVs were involved over the five years. The number given here is 151, which is quite close. Generally speaking, however, CMVs rarely travel in areas that include deer. Most of their travel is on Interstates, which we saw in C011 is dramatically under-represented in DVCs.

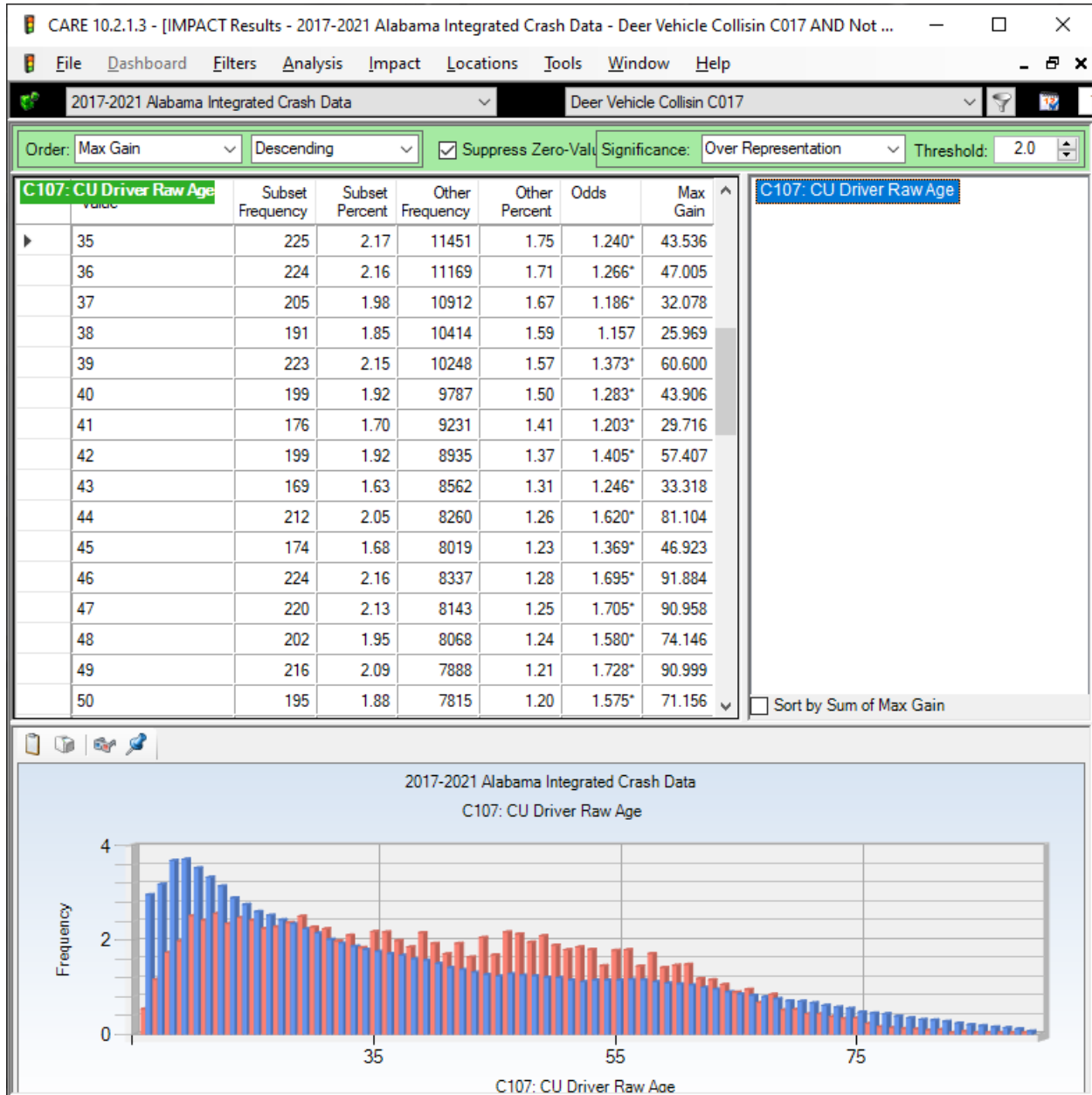


## C104 CU Left Scene



The total number of DVC crashes from C017 was 10,969. Given that 10,329 did not leave the scene, and 73 left the scene. There are a large number of cases (567) where the causal unit was unknown. This indicates the potential confusion when multiple vehicles are involved, and it might be difficult for the reporting officer to determine which vehicle had arrived at the scene first.

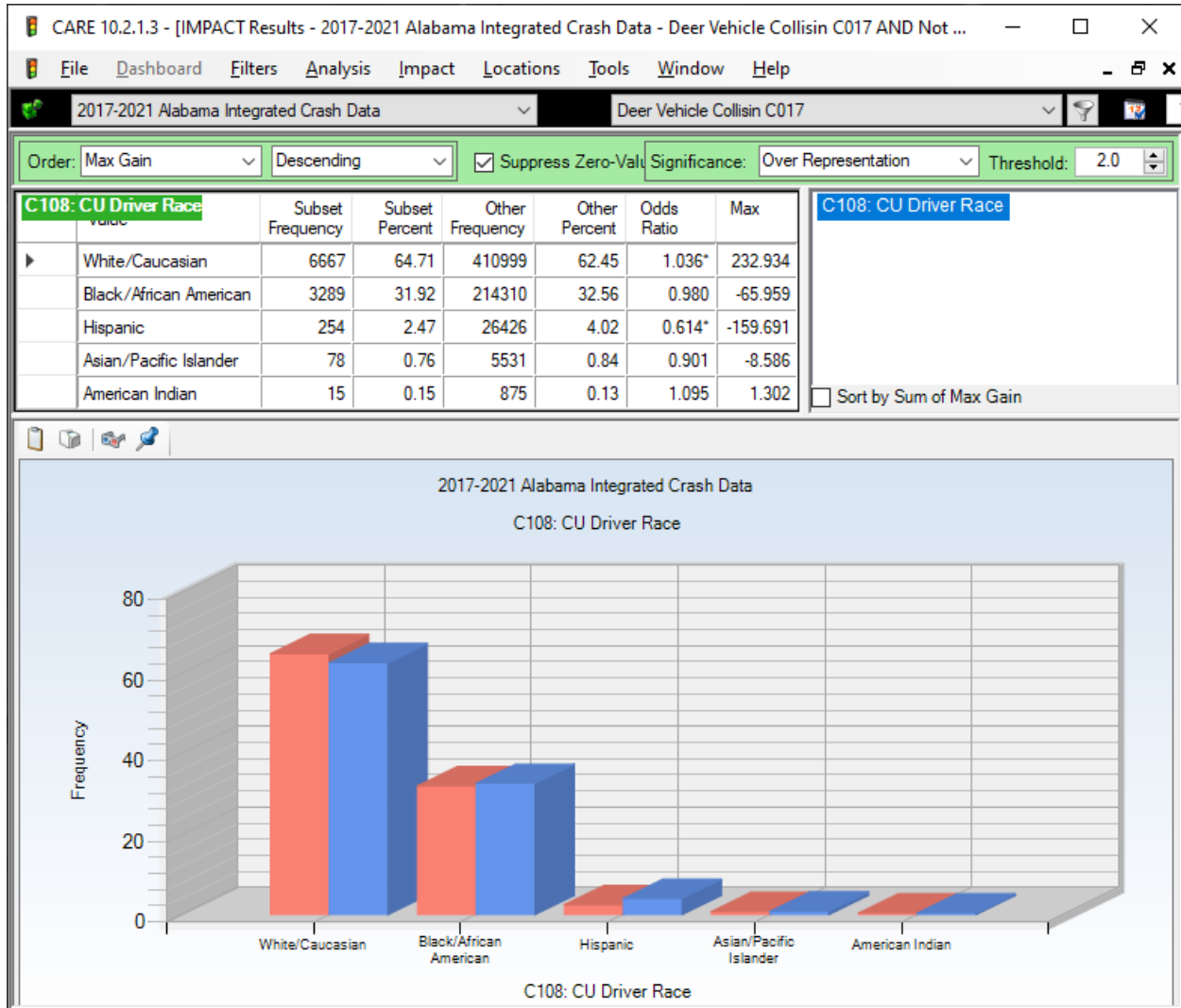
## C107 CU Driver Raw Age



Ages 16-18 are very significantly under-represented compared to their crashes in general. The over-representation problem seems to be in the 35 through 50 age groups, which are consistently over-represented as shown in the table and the chart. This gives the collective age groups that are driving at the times and in the places where deer wander. The blue bars for this age group

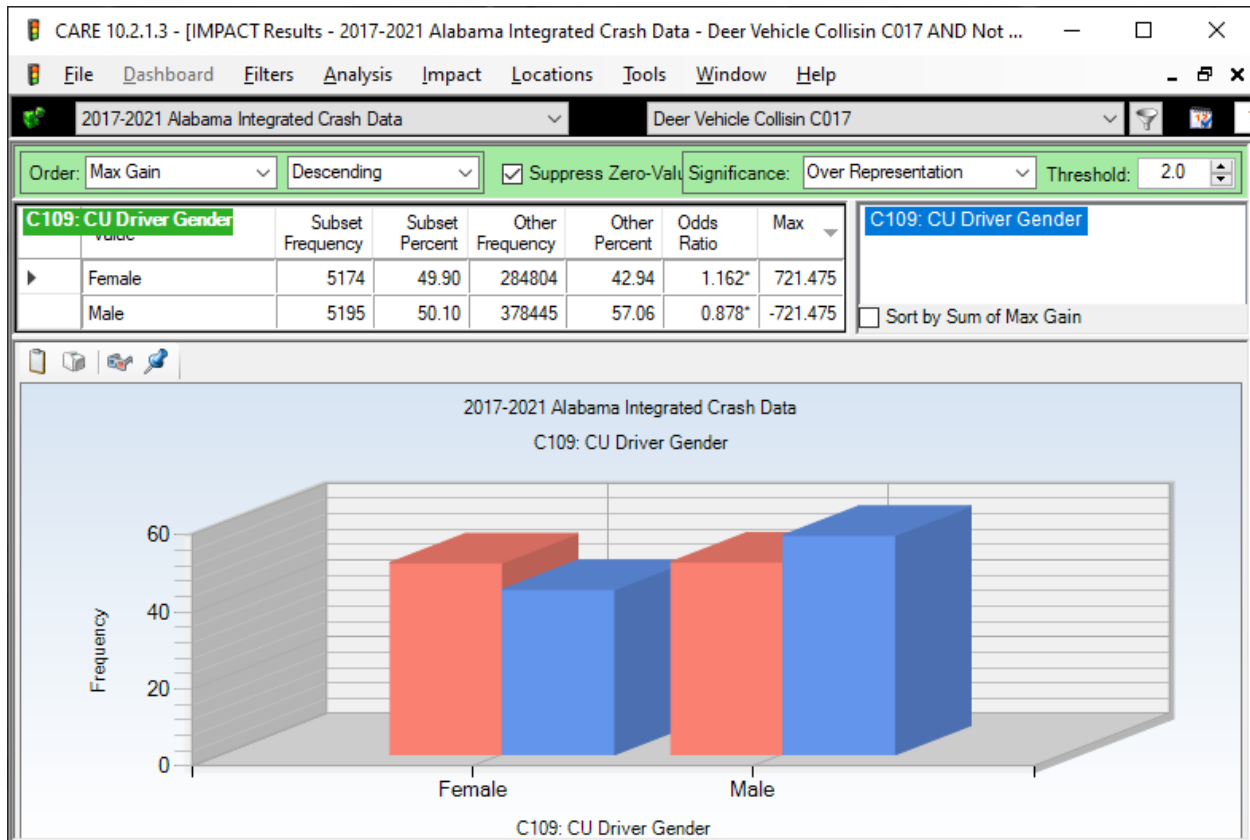
indicates that 35-50 year olds generally have about average crash records, so this distribution is unusual for them. They should be particularly aware of their collective vulnerability to be involved in DVCs.

### C108 CU Driver Race



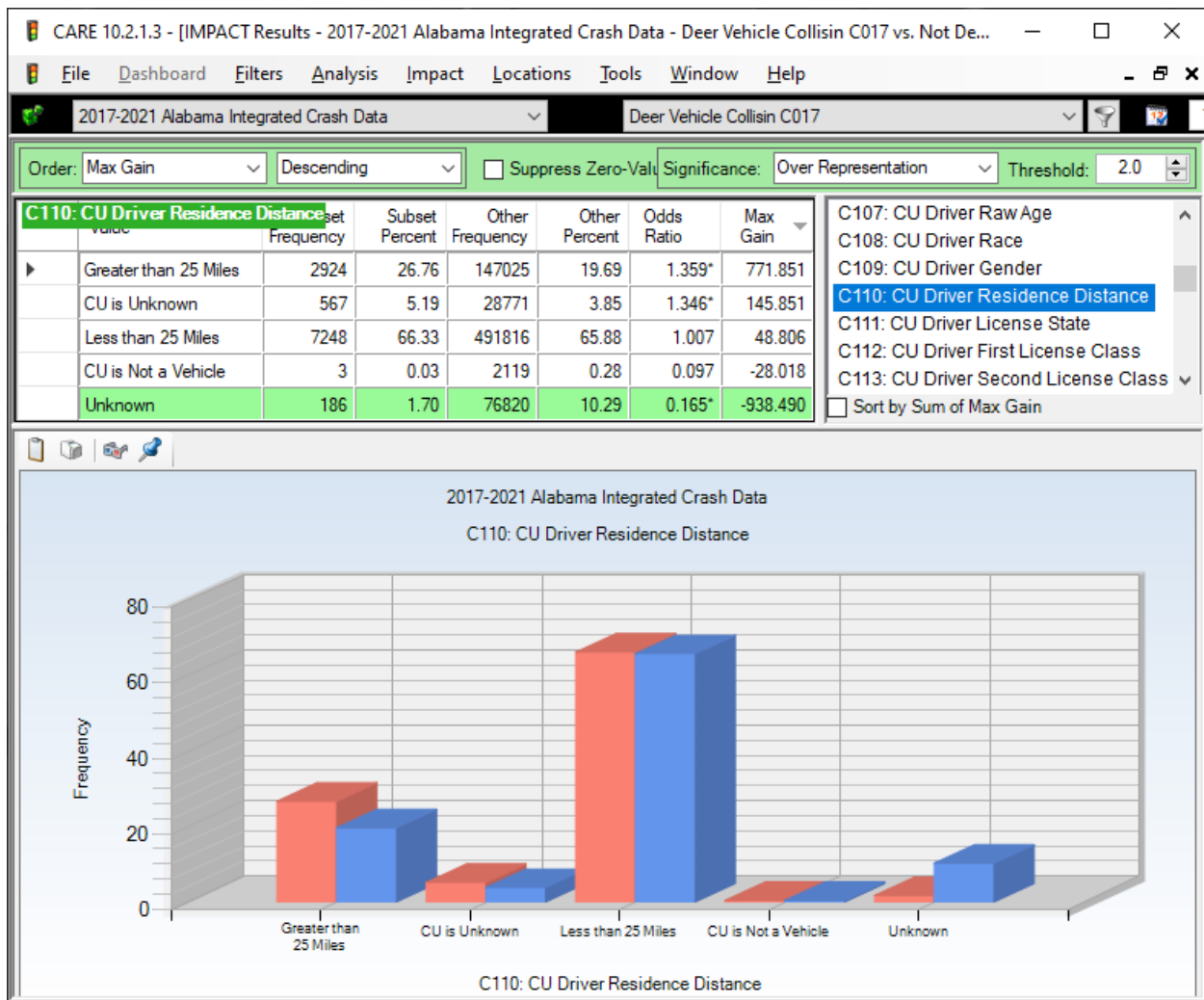
The racial distribution reflects the overall driver distribution, with the only significant under-representation being in the Hispanic classification. White/Caucasian was over-represented by about 3.6%.

## C109 CU Driver Gender



As can be seen from the blue bars, men are typically over-represented in most crash types. Thus, it comes as a surprise to see females significantly over-represented in DVCs, with over 16% more DVC crashes than would typically be expected. Their frequency in these crashes is effectively the same as the males. The major conclusion would seem to be that they are driving at the same times and similar areas as those frequented by deer.

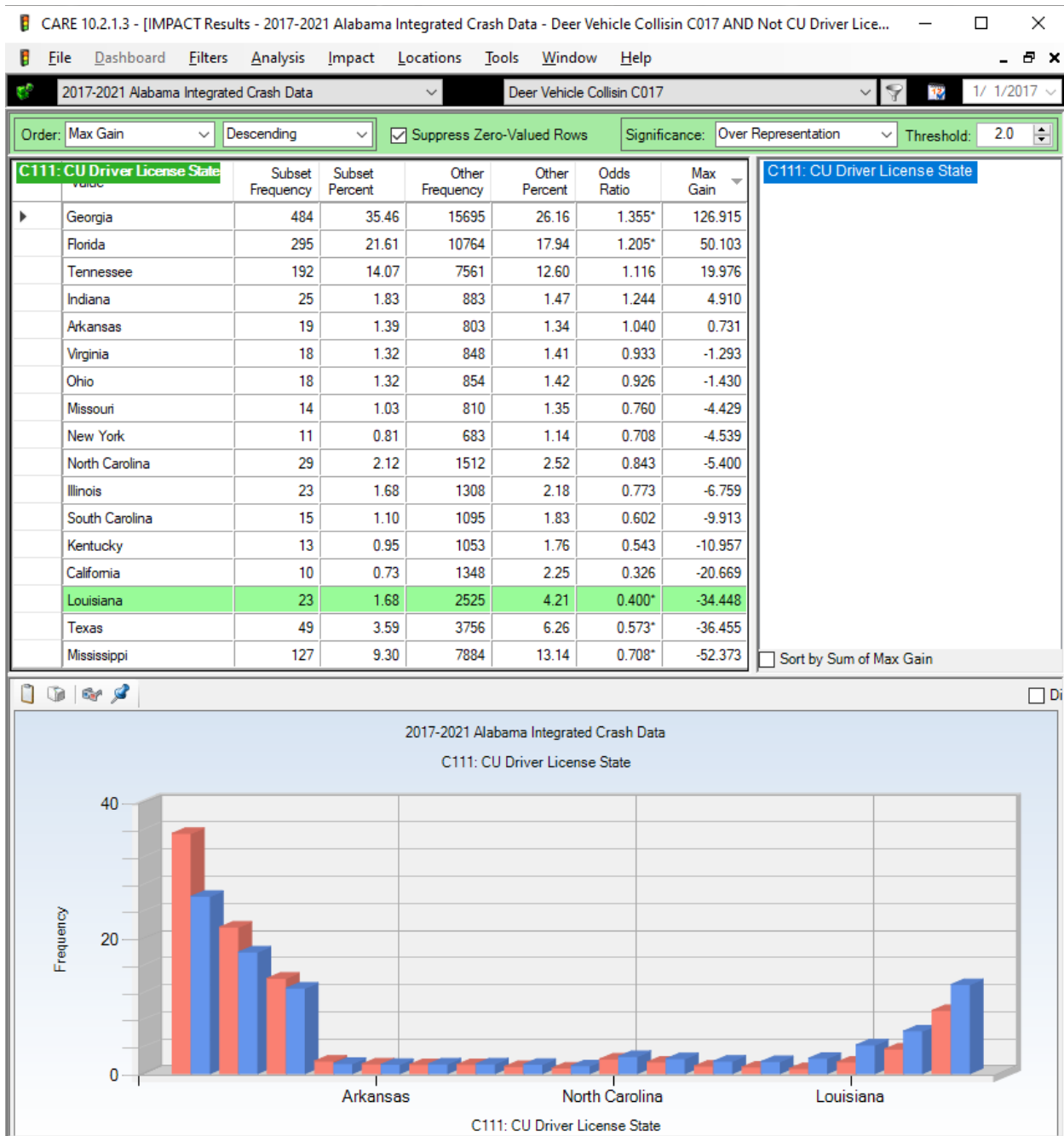
## C110 CU Driver Residence Distance



This indicates that drivers probably know the areas that deer frequent in their local areas, as well as the fact that “Less than 25 Miles” might still be in urban areas for many drivers.

## C111 Driver License State

All states with less than 10 crashes were removed as was Alabama in order to get better relative estimates of the DVCs occurring out of state.

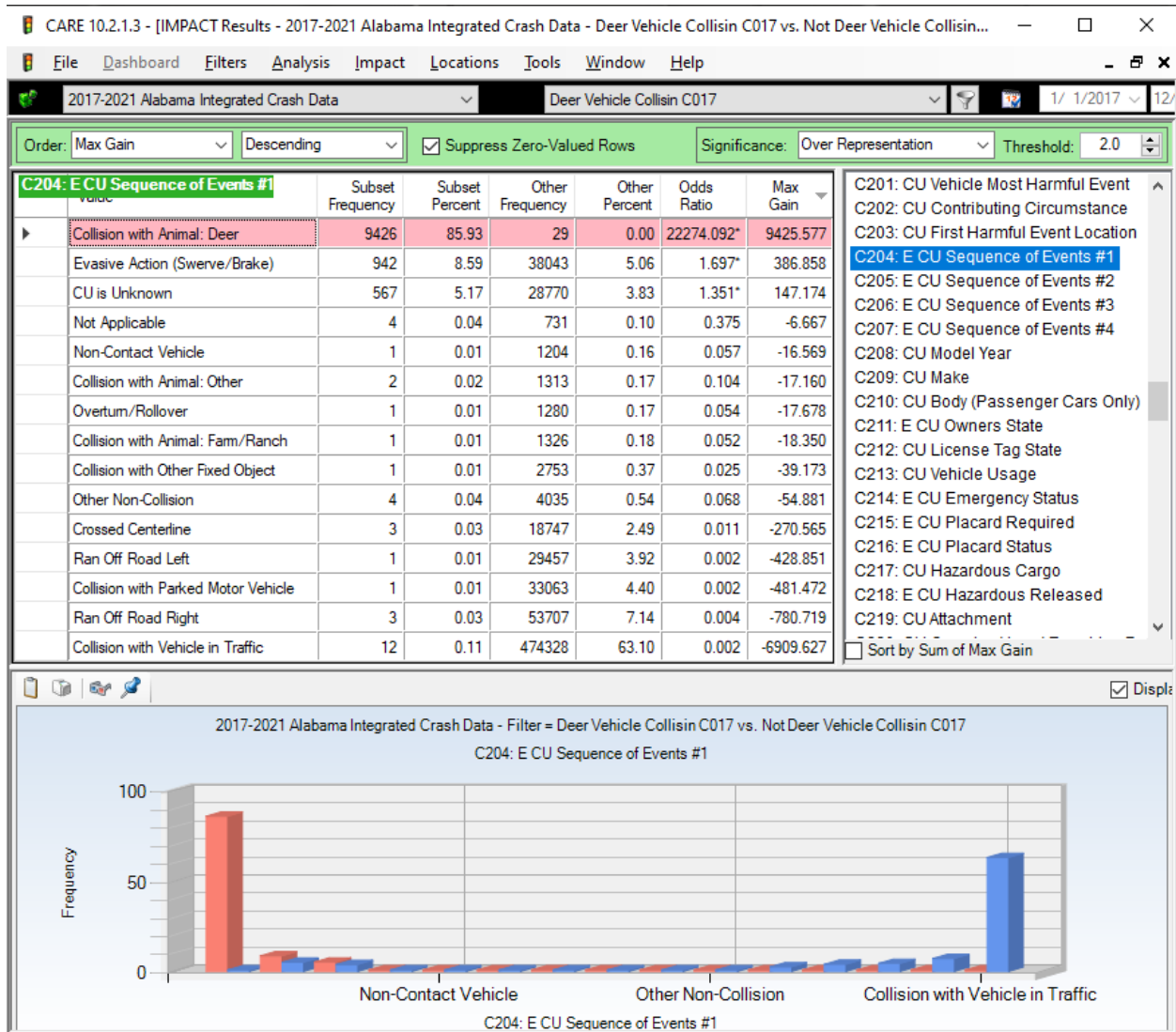


As expected, drivers from states proximal to Alabama have the greatest numbers of DVCs in Alabama. Georgia and Florida were the only two states that were significantly over-represented.

## C122 and C123 Alcohol and Non-Alcohol Drugs

Alcohol and non-alcohol drugs were combined for this analysis. There were only 12 causal drivers under the influence of alcohol and only 5 under the influence of drugs. This demonstrates that a driver does not have to be inebriated in order to hit a deer. However, staying away from alcohol or drugs may well enable the driver to see a deer sooner and to avoid the collision.

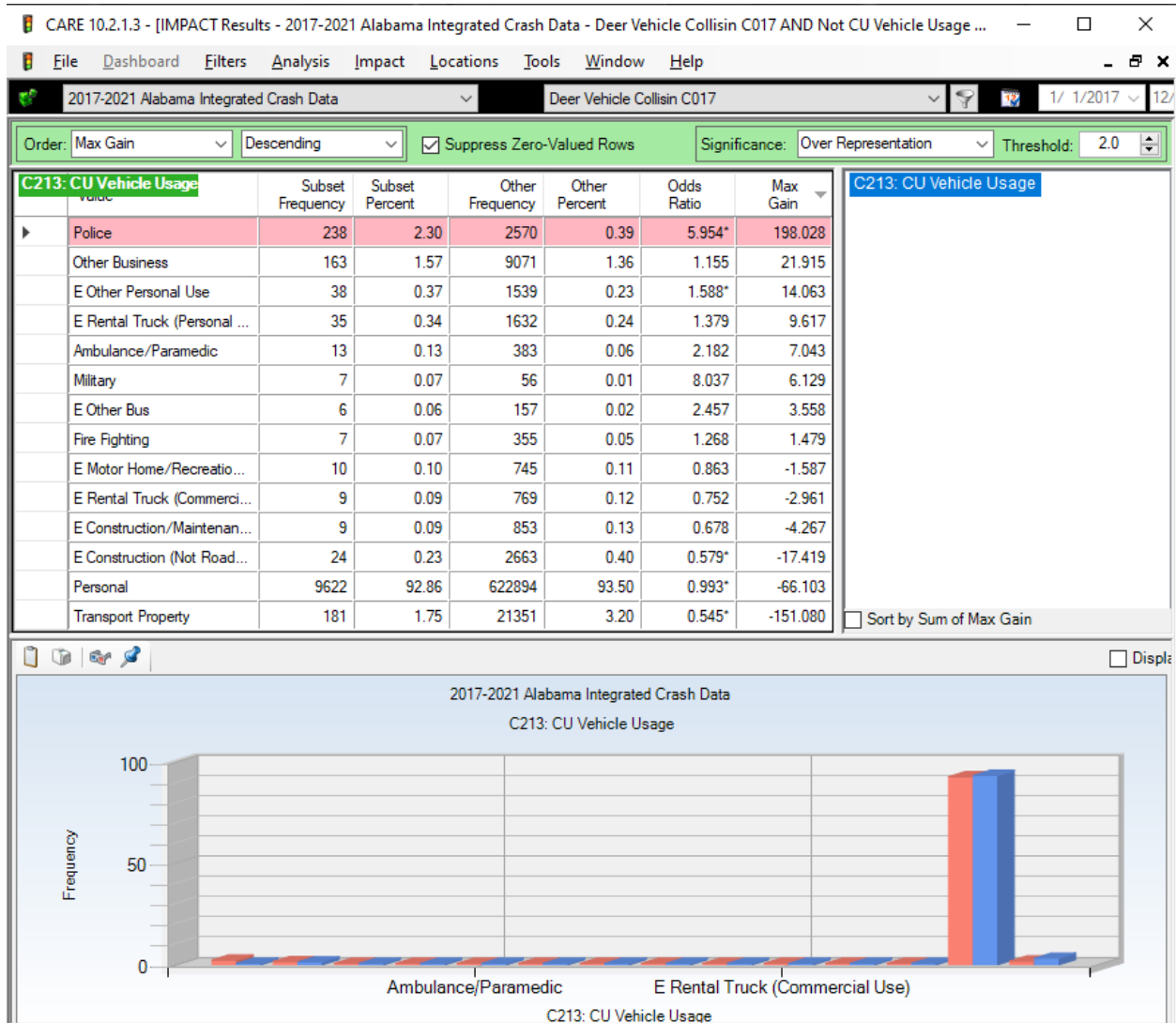
## C204 CU Sequence of Events #1



The sequence of events variables give the idea or what accompanies the DVC crashes. Another vehicle, a tree or other fixed object, and especially, a collision with another vehicle, are often far more lethal than the deer itself. The second most over-represented event is Evasive Action (Swerve/Brake), with 942 (8.59%) occurrences.

## C213 CU Vehicle Usage

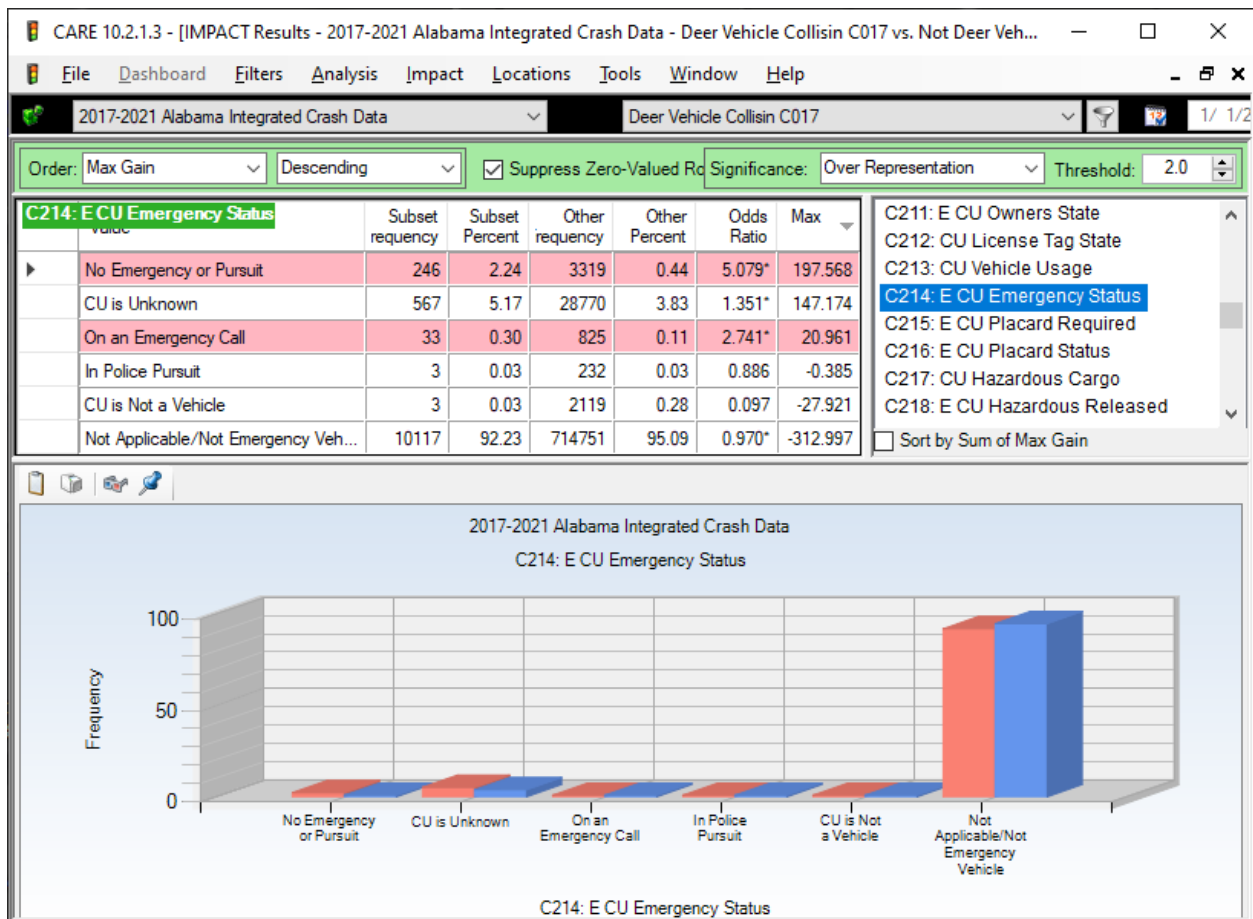
Items with less than 5 occurrences have been removed.



All but 36 of the police DVCs were normal police activity. See CU Emergency Status, C214 below.



## C214 CU Emergency Status



Emergency pursuits do not appear to be a major problem. Many police are on the road the major part of the day and they cover a wide range of both urban and rural areas.