Motor Vehicle Deer Collisions (VDCs) Analytics to Discover as Much Information as Possible 2017-2021 Crash Data By David B. Brown (<u>brown@cs.ua.edu</u>) 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

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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.

6	2017-2021 Alabama Integrated Crash Data	3	\sim	Deer Vel	nicle Collisin C(017		✓ ♥ 1/ 1/2017 ∨ 12/31/2
Order:	Max Gain ~ Descending	~	Suppress	Zero-Valued F	Rows	Signific	ance: Over	Representation V Threshold: 2.0 美
C203:	CU First Harmful Event Location	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C201: CU Vehicle Most Harmful Event C202: CU Contributing Circumstance
•	On Roadway	10350	94.36	573847	76.34	1.236*	1976.132	C203: CU First Harmful Event Location
	E Shoulder	6	0.05	25174	3.35	0.016	-361.352	C204: E CU Sequence of Events #1
	E Roadside	21	0.19	60867	8.10	0.024*	-867.202	C205: E CU Sequence of Events #2 C206: E CU Sequence of Events #3
	E Outside of Right-of-Way	1	0.01	5200	0.69	0.013	-74.881	C207: E CU Sequence of Events #4
	E Off Roadway - Location Unknown	1	0.01	6184	0.82	0.011	-89.240	C208: CU Model Year
	E In Parking Lane or Zone	1	0.01	17079	2.27	0.004	-248.225	C209: CU Make
	E At Intersection no Crosswalk	5	0.05	9536	1.27	0.036	-134.154	C210: CU Body (Passenger Cars Only)
	Off Roadway	1	0.01	6598	0.88	0.010	-95.281	C211: E CU Owners State C212: CU License Tag State
	Other	5	0.05	2511	0.33	0.136	-31.642	C213: CU Vehicle Usage
	Unknown	4	0.04	2982	0.40	0.092	-39.515	C214: E CU Emergency Status
	Not Applicable	7	0.06	1063	0.14	0.451	-8.512	C215: E CU Placard Required
	CU is Unknown	567	5.17	28771	3.83	1.351*	147.159	C216: F CLI Placard Status
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			2017-2	2021 Alabama	Integrated Cra	ash Data		
			C20	3: CU First Ha	rmful Event Lo	ocation		
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				C203: CU Firs	t Harmful Eve	ent Location		

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 <u>Technolytix - Home or https://technolytics.net</u>.

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 factorss of 2, and even Over 180 minutest was also significantly over-represented.

C038 Adjusted EMS Arrival Delay. A cross-tabulation between EMS and police arrival time shwed 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 it 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 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.

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 it significantly underrepresented 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 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.

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

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C002	: City Value	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max 🚽 ^	C001: County	
Þ	Rural Lee	369	3.36	3972	0.53	6.366	* 311.038	C003: Year	
	Rural Montgomery	304	2.77	4016	0.53	5.187	* 245.396	C004: Month	
	Rural Houston	260	2.37	2240	0.30	7.954	* 227.313	C005: Day of Month C006: Day of the Week	
	Rural Russell	207	1.89	2416	0.32	5.871	171.744	C007: Week of the Year	
	Rural Talladega	212	1.93	4273	0.57	3.400	149.646	C008: Time of Day	
	Rural Calhoun	221	2.01	5030	0.67	3.011	147.600	C010: Rural or Urban	
	Rural Dallas	172	1.57	1717	0.23	6.865	146.945	C011: Highway Classifications	
	Rural Cherokee	153	1.39	1404	0.19	7.468	* 132.512	C012: Controlled Access C013: E Highway Side	
	Rural Henry	140	1.28	622	0.08	15.424	* 130.923	C015: Primary Contributing Circumstance	
	Rural Macon	164	1.50	2502	0.33	4.492	127.489	C016: Primary Contributing Unit Numbe	
	Rural Pike	148	1.35	1518	0.20	6.681	125.849	C017: First Harmful Event	
	Rural Limestone	198	1.81	4990	0.66	2.719	125.183	C018: Location First Harmful Event Rel t	
	Rural Elmore	162	1.48	3016	0.40	3.681	117.989	C019: E Most Harmful Event C020: E Distracted Driving Opinion	
	Rural Geneva	122	1.11	1130	0.15	7.399	105.510	C021: Distance to Fixed Object	
	Rural Coffee	126	1.15	1589	0.21	5.434	102.812	C022: E Type of Roadway Junction/Featu	
	Rural Walker	151	1.38	3320	0.44	3.117	102.553	C023: E Manner of Crash	
	Opelika	229	2.09	8689	1.16	1.806	102.206	C024: School Bus Related	
	Rural Dale	117	1.07	1265	0.17	6.338	98.540 🗸	C025: Crash Severity	
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	201	7-2021 Alabama lı	ntegrated Cra	ash Data - Filte	er = Deer Vehic C002: City		C017 vs. Not Deer V	∠ Dit	
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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 at 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.

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C003:	Year		Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C001: County C002: City	^
•	2017		1755	16.00	155448	20.68	0.774*	-513.373	C003: Year	
	2018		2065	18.83	158098	21.03	0.895*	-242.044	C004: Month	
	2019		2406	21.93	156719	20.85	1.052*	119.079	C005: Day of Month C006: Day of the Week	
	2020		2330	21.24	131882	17.54	1.211*	405.513	C007: Week of the Year	~
	2021		2413	22.00	149541	19.89	1.106*	230.824	Sort by Sum of Max Gain	
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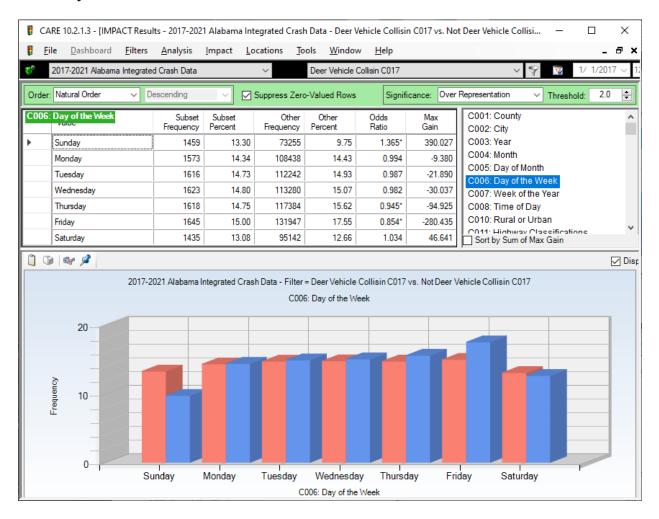
This chart indicates that the number of Deer Vehicle Collisions (DVCs) is on the increase. This is from 16.00% and 18.83% in the 2017-2018 time-frame to percentages above 21% (21.93%, 21.24% and 22.00) in the 2019-2021 time-frame. We know of no reason for this increase, but will continue to watch it when the 2022 data is ready for processing.

C003 Year



C004 Month

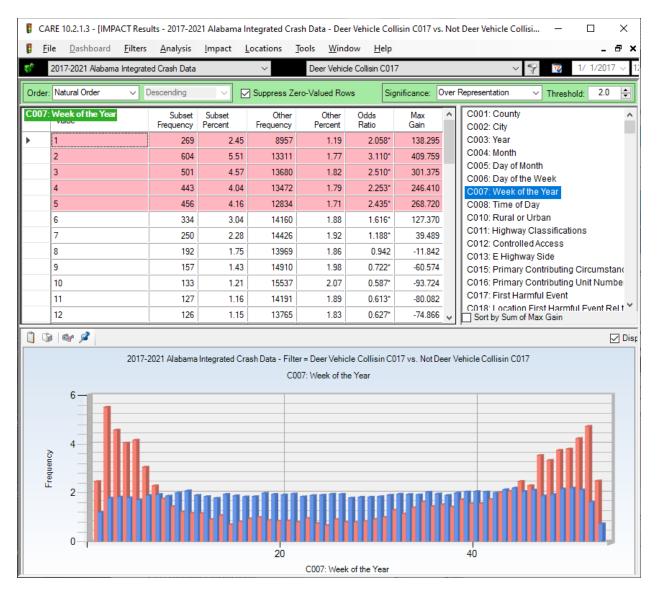
The red bars here are highly correlate with the "deer season" when many hunters go into the woods and stir the deer up. This does not cause more DVCs directly, but when the deer are driven to safer area in the daytime, they will start to move back to areas with more food as dusk approaches and progresses.



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

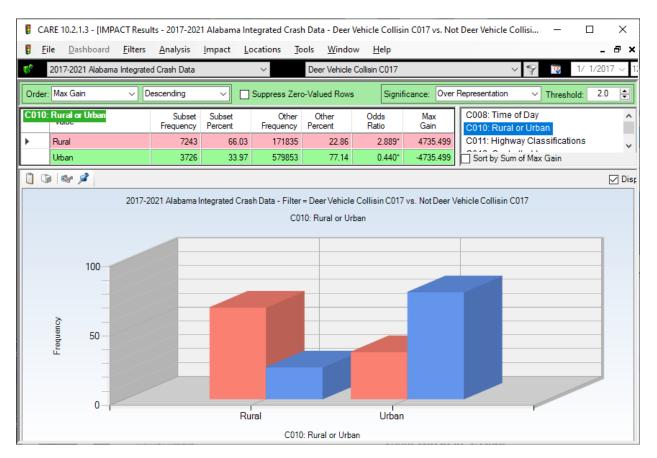
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C008:	Time of Day	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C001: County A C002: City
►	12:00 Midnight to 12:	391	3.56	9153	1.22	2.927*	257.435	C003: Year
	1:00 AM to 1:59 AM	317	2.89	7566	1.01	2.871*	206.593	C004: Month
	2:00 AM to 2:59 AM	293	2.67	6841	0.91	2.935*	193.173	C005: Day of Month
	3:00 AM to 3:59 AM	328	2.99	6092	0.81	3.690*	239.103	C006: Day of the Week C007: Week of the Year
	4:00 AM to 4:59 AM	465	4.24	6771	0.90	4.706*	366.194	C008: Time of Day
	5:00 AM to 5:59 AM	835	7.61	11951	1.59	4.788*	660.605	C010: Rural or Urban
	6:00 AM to 6:59 AM	876	7.99	20032	2.66	2.997*	583.683	C011: Highway Classifications
	7:00 AM to 7:59 AM	544	4.96	43435	5.78	0.858*	-89.825	C012: Controlled Access C013: E Highway Side
	8:00 AM to 8:59 AM	290	2.64	32062	4.27	0.620*	-177.864	C015: Primary Contributing Circumstance
	9:00 AM to 9:59 AM	252	2.30	28814	3.83	0.599*	-168.468	C016: Primary Contributing Unit Numbe
	10:00 AM to 10:59 AM	184	1.68	33245	4.42	0.379*	-301.127	C017: First Harmful Event
	11:00 AM to 11:59 AM	199	1.81	41059	5.46	0.332*	-400.153	C018: Location First Harmful Event Rel t C019: E Most Harmful Event
	12:00 Noon to 12:59	150	1.37	50105	6.67	0.205*	-581.157	C019: E Most Harmful Event C020: E Distracted Driving Opinion
	1:00 PM to 1:59 PM	156	1.42	49674	6.61	0.215*	-568.867	C021: Distance to Fixed Object
	2:00 PM to 2:59 PM	126	1.15	54135	7.20	0.160*	-663.964	C022: E Type of Roadway Junction/Featu
	3:00 PM to 3:59 PM	131	1.19	66629	8.86	0.135*	-841.283	C023: E Manner of Crash
	4:00 PM to 4:59 PM	225	2.05	64628	8.60	0.239*	-718.083	C024: School Bus Related C025: Crash Severity
	5:00 PM to 5:59 PM	791	7.21	68059	9.05	0.796*	-202.150	C025: Clash Seventy C026: Intersection Related
	6:00 PM to 6:59 PM	931	8.49	44453	5.91	1.435*	282.320	C027: At Intersection
	7:00 PM to 7:59 PM	925	8.43	30814	4.10	2.057*	475.347	C028: Mileposted Route
	8:00 PM to 8:59 PM	848	7.73	25445	3.39	2.284*	476.694	C029: National Highway System
	9:00 PM to 9:59 PM	692	6.31	20982	2.79	2.260*	385.820	C030: Functional Class C031: Lighting Conditions
	10:00 PM to 10:59 PM	561	5.11	16266	2.16	2.363*	323.639	C032: Weather
	11:00 PM to 11:59 PM	446	4.07	12035	1.60	2.540*	270.379	C033: Locale
	Unknown	13	0.12	1442	0.19	0.618	-8.042	C034: E Police Present at Time of Crask [♥] Sort by Sum of Max Gain
0	i 🕼 🖉							
			:			grated Crash	n Data	
				(C008: Time	of Day		
	10							
5	,					-		
Frequency	5							
Free		11	Lh					
	0							
		4:00 AM to 4	4:59 AM	9:00 AM to		2:00 PM to Time of Day	2:59 PM	7:00 PM to 7:59 PM Unknown

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

-	ARE 10.2.1.3 - [IMPACT Results - 20		-				sin C017 vs. N	
	ile <u>D</u> ashboard <u>F</u> ilters <u>A</u> na		<u>L</u> ocatio	-				_ 8 :
¢°	2017-2021 Alabama Integrated Crash	Data	~	D	eer Vehicle C	ollisin C017		✓
Order:	Max Gain 🗸 Descend	ing v	🛛 🖂 Supp	ress Zero-Va	alued Rows	Signific	ance: Over	Representation V Threshold: 2.0 🛓
C031:	Lighting Conditions	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain 👻	C027: At Intersection / C028: Mileposted Route
•	Dark - Roadway Not Lighted	5901	53.80	67361	8.96	6.003*	4918.035	C029: National Highway System
	Dawn	513	4.68	10620	1.41	3.310*	358.028	C030: Functional Class
	Dark - Roadway Lighted	133	1.21	2148	0.29	4.243*	101.655	C031: Lighting Conditions C032: Weather
	E Dark - Spot Illumination One Side.	. 461	4.20	24684	3.28	1.280*	100.799	C033: Locale
	E Dark - Unknown Roadway Lighti	75	0.68	2730	0.36	1.883*	35.163	C034: E Police Present at Time of Crash
	Dusk	327	2.98	22782	3.03	0.984	-5.446	C035: Police Notification Delay
	Other	2	0.02	686	0.09	0.200	-8.010	C036: Police Arrival Delay
	Not Applicable	7	0.06	1483	0.20	0.323	-14.641	C037: EMS Arrival Delay C038: Adjusted EMS Arrival Delay
	E Dark - Continuous Lighting One	39	0.36	3870	0.51	0.691	-17.473	C039: Non-Vehicular Property Damage
	Unknown	13	0.12	2655	0.35	0.336	-25.743	C040: Agency ORI
	E Dark - Spot Illumination Both Sid	427	3.89	47371	6.30	0.618*	-264.261	C042: Highway Patrol Troops
	E Dark - Continuous Lighting Both	91	0.83	24401	3.25	0.256*	-265.071	C043: Highway Patrol Posts C044: ALEA Division
	Daylight	2980	27.17	540897	71.96	0.378*	-4913.034	Sort by Sum of Max Gain
1) 🕼 🖉							
		ama Integrated	Crash Data		er Vehicle Co ting Conditio		vs. Not Deer	Vehicle Collisin C017
	80							
	60							
1	Auna do la comparación de la c							
	20							
	0 Dawn	Illum On	rk - Spot nination e Side padway	Dusk	No	ot Applicable	l Unkno	wn E Dark - Continuous Lighting Both Sides of Roadway
				C031:	Lighting Cor	nditions		

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 an uninhabited by humans.

C033 Locale

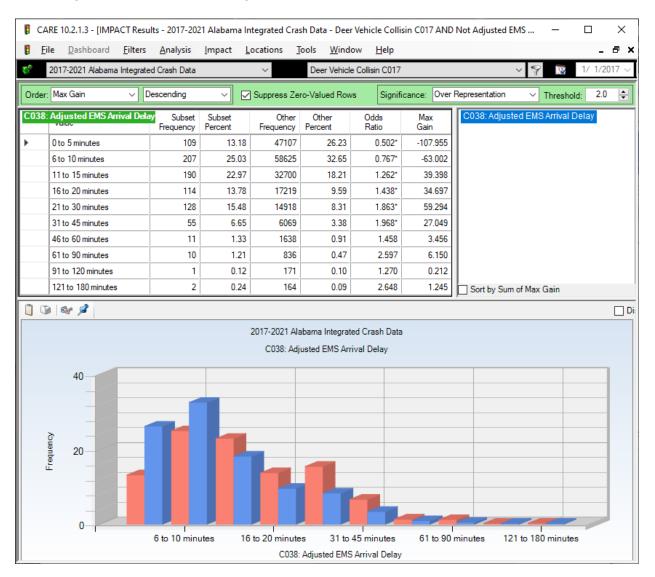
-	RE 10.2.1.3 - [IMPACT Res			2			isin C017 vs. N		×
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V	2017-2021 Alabama Integra	ted Crash Data		~	Deer Vehic	e Collisin C017		~ 🌱 🅎 1/ 1/20	17 ~
Order:	Max Gain 🗸 🗸	Descending	~ 2	Suppress Ze	ero-Valued Rov	vs Signifi	cance: Over	Representation V Threshold: 2.0	÷
C033:	Locale	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C030: Functional Class C031: Lighting Conditions	^
►	Open Country	8597	78.38	214630	28.55	2.745*	5465.014	C032: Weather	
	Manufacturing or Industrial	138	1.26	14284	1.90	0.662*	-70.439	C033: Locale	
	Other	31	0.28	8884	1.18	0.239*	-98.640	C034: E Police Present at Time of Cras C035: Police Notification Delay	sr
	School	33	0.30	9553	1.27	0.237*	-106.402	C036: Police Arrival Delay	
	Residential	1524	13.89	157450	20.95	0.663*	-773.588	C037: EMS Arrival Delay	~
	Shopping or Business	646	5.89	346678	46.12	0.128*	-4412.895	Sort by Sum of Max Gain	
	2017-2	021 Alabama li	ntegrated Cras	h Data - Filter	= Deer Vehicle C033: Locale		7 vs. Not Deer '	Vehicle Collisin C017	
	100 50 0	Open Country	Manufactu	ring (L School	Residentia	Shoping or Shoping or	

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.

🔋 CA	RE 10.2.1.3 - [IMPACT	Results - 2017-202	1 Alabama Ir	itegrated Cra	sh Data - Dee	r Vehicle Coll	isin C017 vs. I	Not Deer Vehicle Col — 🗆 🗙
🔋 Ei	le <u>D</u> ashboard <u>F</u> ilt	ters <u>A</u> nalysis	<u>I</u> mpact <u>L</u>	ocations <u>]</u>	ools <u>W</u> ind	low <u>H</u> elp		_ & ×
6	2017-2021 Alabama Inte	grated Crash Data		\sim	Deer Vehic	le Collisin C017	,	✓ ♥ 1/ 1/2017 ∨
Order:	Natural Order ~	Descending	~ 2] Suppress Ze	ro-Valued Rov	vs Signifi	cance: Over	Representation V Threshold: 2.0
C036:	Police Arrival Delay	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C030: Functional Class C031: Lighting Conditions
•	0 to 5 minutes	1262	11.51	193575	25.75	0.447*	-1562.745	C032: Weather
	6 to 10 minutes	1374	12.53	189787	25.25	0.496*	-1395.469	C033: Locale C034: E Police Present at Time of Crast
	11 to 15 minutes	928	8.46	107747	14.33	0.590*	-644.299	C034. E Police Present at Time of Crash C035: Police Notification Delay
	16 to 20 minutes	784	7.15	62551	8.32	0.859*	-128.776	C036: Police Arrival Delay
	21 to 30 minutes	1407	12.83	68989	9.18	1.398*	400.277	C037: EMS Arrival Delay
	31 to 45 minutes	1805	16.46	54217	7.21	2.281*	1013.838	C038: Adjusted EMS Arrival Delay
	46 to 60 minutes	1288	11.74	28654	3.81	3.080*	869.866	C039: Non-Vehicular Property Damage C040: Agency ORI
	61 to 90 minutes	1239	11.30	24233	3.22	3.504*	885.380	C042: Highway Patrol Troops
	91 to 120 minutes	460	4.19	7679	1.02	4.105*	347.944	C043: Highway Patrol Posts
	121 to 180 minutes	227	2.07	4907	0.65	3.170*	155.395	C044: ALEA Division
	Over 180 minutes	182	1.66	7875	1.05	1.584*	67.084	C045: ALDOT Area
	Unknown	13	0.12	1473	0.20	0.605	-8.495	Sort by Sum of Max Gain
00) 🕼 🖉							
	201	7-2021 Alabama In	tegrated Cras	h Data - Filter	= Deer Vehicle	e Collisin C017	7 vs. Not Deer	Vehicle Collisin C017
				C036:	Police Arrival	Delay		
	40							
	20							
	ă –							
	0							
	U I	6 to 10 minutes	16 to 20	minutes 3	l 1 to 45 minutes	s 61 to 90	minutes 12	1 to 180 minutes Unknown
				C	036: Police Ar	rival Delay		

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 that 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.

🔋 CARE 10.2.1.3 - [IMPACT Results - 2017-2021 Alabama Integrated Crash Data - Deer Vehicle Collisin C017 vs. Not Deer Vehicle Collisi... × E <u>F</u>ile Dashboard <u>Filters</u> <u>A</u>nalysis Impact Locations Tools Window <u>H</u>elp 8× 2017-2021 Alabama Integrated Crash Data 22 Deer Vehicle Collisin C017 1/201 12 Significance: Over Representation Order: Max Gain Descending 2.0 ÷ \sim \sim Suppress Zero-Valued Rows \sim Threshold: C011: Highway Clas Odds Ratio C007: Week of the Year Subset Subset Other Other Max ~ Frequency Percent Frequency Percent Gain C008: Time of Day C010: Rural or Urban County 3537 32.25 102616 13.65 2.362* 2039.577 C011: Highway Classi 18.26 1.638* 1277.356 State 3280 29.90 137238 C012: Controlled Access Federal 1964 17.91 96013 12.77 1.402* 562.931 C013: E Highway Side 0.01 25565 3.40 0.003 -372.057 Private Property 1 C015: Primary Contributing Circumstance C016: Primary Contributing Unit Numbe Interstate 745 6.79 86221 11.47 0.592* -513.179 13.15 Municipal 1442 304035 40.45 0.325* -2994.628 Sort by Sum of Max Gain 📋 🕼 🚳 💋 🗹 Disp 2017-2021 Alabama Integrated Crash Data - Filter = Deer Vehicle Collisin C017 vs. Not Deer Vehicle Collisin C017 C011: Highway Classifications 60 40 Frequency 20 0 County State Private Property Federal Municipal Interstate C011: Highway Classifications

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.

🚦 CARE 10.2.1.3 - [IMPACT Results - 2017-2021 Alabama Integrated Crash Data - Deer Vehicle Collisin C017 vs. Not Deer Vehicle Colli... \times E <u>F</u>ile Dashboard Filters Analysis Impact Locations Tools Window <u>H</u>elp đΧ Deer Vehicle Collisin C017 2017-2021 Alabama Integrated Crash Data ۳0 1/2017 12 Order: Natural Order Descending Significance: Over Representation \sim Suppress Zero-Valued Rows Threshold: 2.0 + C412: CU Trafficv C408: CU Vision Obscured By Subset Subset Other Odds Other Max Frequency Percent Ratio Percent Frequency Gain C409: CU Traffic Control -140.007 C410: CU Traffic Control Functioning One Lane 107 0.98 16927 2.25 0.433* C411: CU Opposing Lane Separation 2488.985 Two Lanes 7190 65.55 322153 42.86 1.529* C412: CU Trafficway Lanes Three Lanes 115 1.05 37646 5.01 0.209* -434.349 C413: E CU Turn Lanes Four Lanes 2684 24.47 212503 28.27 0.866* -416.948 C414: CU One-Way Street 74 Five Lanes 0.67 28241 3.76 0.180* -338.107 C415: CU Workzone Related C416: E CU Workzone Type Six Lanes or More 215 1.96 76212 10.14 0.193* -897.123 C417: E CU Workers Present 29235 Not Applicable (Parking Lot) 0.15 3.89 0.040 -409.611 17 C418: F CU Law Enforcement Present ii * CU is Unknown 567 5.17 28771 3.83 1.351* 147.159 Sort by Sum of Max Gain 📋 🕼 🚳 🖉 🖂 Di 2017-2021 Alabama Integrated Crash Data - Filter = Deer Vehicle Collisin C017 vs. Not Deer Vehicle Collisin C017 C412: CU Trafficway Lanes 80 60 Frequency 40 20 0 CU is Unknow One Lane Two Lanes Three Lanes Four Lanes Five Lanes Six Lanes or More No Applicable (Parking Lot) C412: CU Trafficway Lanes

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: Functional Class Major Collector Minor Arterial Minor Collector	2 1	✓ Suppress Ze et Other frequency 93900 55 151947 71 6541		e Collisin C017		
Order: Max Gain D C030: Functional Class Value Major Collector Minor Arterial Minor Collector	Subset Subset Frequency Perce 2842 27. 2632 25. 382 3. 9 0.	Other et Other rrequency 93900 55 151947 71 6541	Other Percent 14.02 22.69	vs Signific Odds Ratio 1.967*	Max Gain 1397.165	Representation V Threshold: 2.0 C027: At Intersection C028: Mileposted Route C029: National Highway System
C030: Functional Class Value Major Collector Minor Arterial Minor Collector	Subset Frequency Subset Perce 2842 27. 2632 25. 382 3. 9 0.	et nt Other Frequency 58 93900 55 151947 71 6541	Other Percent 14.02 22.69	Odds Ratio 1.967*	Max Gain 1397.165	C027: At Intersection C028: Mileposted Route C029: National Highway System
Major Collector Minor Arterial Minor Collector	Frequency Perce 2842 27. 2632 25. 382 3. 9 0.	Frequency 58 93900 55 151947 71 6541	Percent 14.02 22.69	Ratio 1.967*	Gain 1397.165	C028: Mileposted Route C029: National Highway System
Minor Arterial Minor Collector	2632 25. 382 3. 9 0.	55 151947 71 6541	22.69			
Minor Collector	382 3. 9 0.	71 6541		1.126*	293.998	C030: Functional Class
	9 0.		0.98			C031: Lighting Conditions
		00 5007	0.00	3.795*	281.354	C031: Lighting Conditions C032: Weather
Principal Arterial - Other	2585 25	09 5807	0.87	0.101	-80.352	C033: Locale
Principal Arterial - Other	2000 20.	09 204367	30.52	0.822*	-559.587	C034: E Police Present at Time of Crash
Interstate	736 7.	14 87402	13.05	0.547*	-608.851	C035: Police Notification Delay
Local	1117 10.	84 119610	17.86	0.607*	-723.434	Sort by Sum of Max Gain
2017-20	021 Alabama Integrated C		·= Deer Vehicle 0: Functional C		'vs. Not Deer '	Vehicle Collisin C017
20 Dependence 20 Majo	or Collector Minor Arteria		r Principal Arterial - Oth Freeways o Expressway	r S	al Inter	state Local

CARE 10.2.1.3	- [Crosstab Results	- 2017-2021 Alabama Integ	grated Crash Data -	Filter = Deer Vehicl	e Collisin C017]		_	· 🗆 X					
🚦 <u>F</u> ile <u>D</u> ashb	ooard <u>Filters</u>	<u>A</u> nalysis <u>C</u> rosstab <u>L</u> oo	ations <u>T</u> ools	<u>W</u> indow <u>H</u> elp				_ <i>8</i> >					
2017-2021 /	2017-2021 Alabama Integrated Crash Data V Deer Vehicle Collisin C017 V 🖓 😨 1/ 1/2017 V 12/31/2021 V												
Suppress Zero Va	uppress Zero Values: Rows and Columns 🗸 Select Cells: 🖬 V 🌠 🌱 Column: Functional Class ; Row: Highway Classifications 👰												
	Interstate Principal Arterial - Other Principal Arterial - Other 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					
					-								

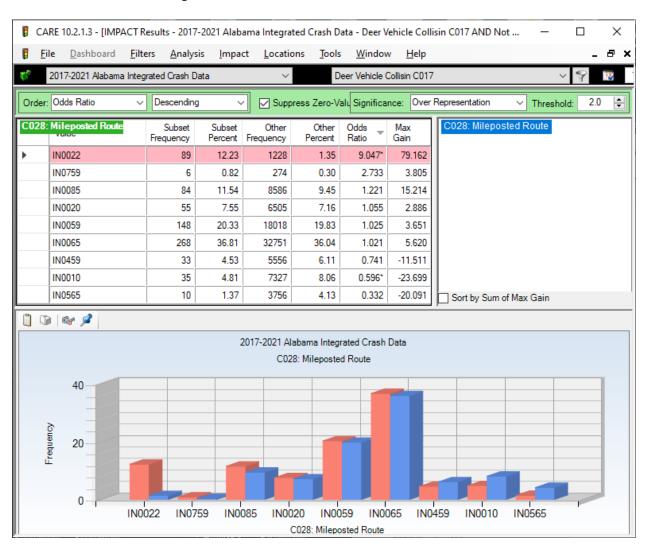
C030 by C011 Cross-tabulation – Functional Class by Highway Classification

C028a Mileposted Roads (Non-Interstate)

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

8	CARE 10.2.1.3 - [IN	/IPACT Results - 20	17-2021 Ala	abama Inte	grated Cras	sh Data - De	er Vehicle	Collis	sin C017 AND Not – 🗆 🗙
•					-		dow <u>H</u> e		_ & ×
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		1.							
Or	rder: Odds Ratio	✓ Descend	ling	<u> </u>	uppress Zer	ro-Valı Signi	ficance: C	Over F	Representation V Threshold: 2.0
C)28: Mileposted Ro	ute Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds 🚽	Max Gain	^	C028: Mileposted Route
	AL0026	20	0.40	51	0.02	24.258*	19.176		
	AL0095	29	0.58	89	0.03	20.156*	27.561		
	AL0028	32	0.64	240	0.08	8.248*	28.120		
	AL0144	27	0.54	263	0.08	6.350*	22.748		
	AL0169	40	0.79	390	0.13	6.344*	33.695		
	AL0165	47	0.93	549	0.18	5.296*	38.125		
	AL0041	42	0.83	550	0.18	4.724*	33.109		
	AL0050	28	0.56	383	0.12	4.522*	21.808		
	AL0167	46	0.91	633	0.20	4.495*	35.767		
	IN0022	89	1.77	1228	0.39	4.483*	69.148		
	AL0055	34	0.68	489	0.16	4.301*	26.095		
	AL0087	37	0.73	547	0.18	4.184*	28.157		
	AL0051	52	1.03	782	0.25	4.113*	39.358		
	AL0117	22	0.44	353	0.11	3.855*	16.293		
	AL0027	54	1.07	939	0.30	3.557*	38.820		
	AL0049	20	0.40	398	0.13	3.108*	13.566		
	AL0024	42	0.83	874	0.28	2.973*	27.871		
	AL0110	27	0.54	606	0.19	2.756*	17.203		
	AL0134	25	0.50	593	0.19	2.608*	15.413		
	AL0022	61	1.21	1511	0.49	2.497*	36.573		
	AL0035	57	1.13	1474	0.47	2.392*	33.171		
	AL0009	180	3.57	4880	1.57	2.282*	101.109		
	AL0010	95	1.89	2607	0.84	2.254*	52.855		
	AL0036	35	0.70	1015	0.33	2.133*	18.591	~	Sort by Sum of Max Gain
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				2017-2021	Alabama Ir	ntegrated Cra	ash Data		
				C	028: Milep	osted Route			
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				AL0022			ALOO	01	AL0210
					C028:	Mileposted F	Route		

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

6	2017-2021 Alabama Integrated Crash Data		\sim	Deer \	/ehicle Collis	sin C017		✓ ♥ 1/ 1/20	
Order	Max Gain V Descending	~ 🗹	Suppress	Zero-Valueo	d Rows Sign	nificance: [Over Repres	sentation V Threshold: 2.0 🛓	
C015:	Primary Contributing Circumstance	Subset requency	Subset Percent	Other requency	Other Percent	Odds Ratio	Max Gain 👻	5: Primary Contributing Circumstance	
•	Unseen Object/Person/Vehicle	7072	64.64	40591	8.43	7.671*	6150.123		
	E Other - No Improper Driving	1493	13.65	7022	1.46	9.362*	1333.521		
	Not Applicable	1117	10.21	3809	0.79	12.912*	1030.492		
	E Swerved to Avoid Animal	543	4.96	7043	1.46	3.395*	383.044		
	Other	578	5.28	25083	5.21	1.015	8.331		
	E Swerved to Avoid Object	5	0.05	1471	0.31	0.150	-28.408		
	Vision Obstructed	8	0.07	3690	0.77	0.095	-75.805		
	Over Speed Limit	21	0.19	10758	2.23	0.086*	-223.329		
	E Other Improper Action	9	0.08	11879	2.47	0.033	-260.788		
	E Other Distraction Outside the Vehicle	8	0.07	13150	2.73	0.027	-290.655		
	E Ran off Road	5	0.05	17035	3.54	0.013	-381.888		
	DUI	10	0.09	20707	4.30	0.021	-460.284		
	Driving too Fast for Conditions	4	0.04	29977	6.22	0.006	-676.819		
	Unknown	67	0.61	40650	8.44	0.073*	-856.217	Sort by Sum of Max Gain	
0) @ Ø							,	
		201	7-2021 Ala	bama Integr	ated Crash	Data			
		C0	15: Primary	/ Contributir	ig Circumst	tance			
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	0	Other E Other Distraction Outside the Vehicle							
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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

CA	RE 10.2.1.3 - [IMPACT	Results - 2017-2021	Alabama Inte	egrated Crash	Data - Deer Ve	hicle Collisin	C017 AND No	t CU Estimated	Spe — 1	o x
🔋 Ei	e <u>D</u> ashboard <u>F</u> ilt	ters <u>A</u> nalysis	<u>I</u> mpact <u>L</u> o	cations <u>T</u> oo	ols <u>W</u> indow	<u>H</u> elp			_	- 8
¢°	2017-2021 Alabama Inte	grated Crash Data		\sim	Deer Vehicle C	ollisin C017		~	🌱 🌇 1/ 1	/2017 ~ 1
Order:	Natural Order 🗸 🗸	Ascending	⊠ :	Suppress Zero	Valued Rows	Signifi	cance: Over	Representation	✓ Threshold:	2.0 🛟
C224:	CU Estimated Speed	at Impact Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C224: CU Es	timated Speed at	Impact
•	1 to 5 MPH	3	0.03	59824	16.41	0.002	-1496.763			
	6 to 10 MPH	6	0.07	42914	11.77	0.006	-1069.836			
	11 to 15 MPH	28	0.31	29238	8.02	0.038*	-704.985			
	16 to 20 MPH	49	0.54	20804	5.71	0.094*	-472.548			
	21 to 25 MPH	136	1.49	18298	5.02	0.296*	-322.723			
	26 to 30 MPH	275	3.01	19007	5.21	0.577*	-201.498			
	31 to 35 MPH	552	6.04	22408	6.15	0.983	-9.759			
	36 to 40 MPH	841	9.20	20686	5.67	1.622*	322.410			
	41 to 45 MPH	2068	22.62	33336	9.14	2.475*	1232.280			
	46 to 50 MPH	829	9.07	16591	4.55	1.993*	413.070			
	51 to 55 MPH	2310	25.27	25939	7.11	3.552*	1659.720			
	56 to 60 MPH	452	4.94	13046	3.58	1.382*	124.942			
	61 to 65 MPH	958	10.48	15043	4.13	2.540*	580.878			
	66 to 70 MPH	558	6.10	18144	4.98	1.227*	103.137			
	71 to 75 MPH	60	0.66	4310	1.18	0.555*	-48.050			
	76 to 80 MPH	13	0.14	2732	0.75	0.190	-55.490			
	81 to 85 MPH	2	0.02	871	0.24	0.092	-19.836			
	86 to 90 MPH	1	0.01	657	0.18	0.061	-15.471	Sort by Sum	of Max Gain	
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				C224: CU E	stimated Speed	l at Impact				
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	0									
	0-1		21 to 25 MPH	1	46 to 5	0 MPH		71 to 75 MPH		
				C224:	CU Estimated S	Speed at Impac	t			

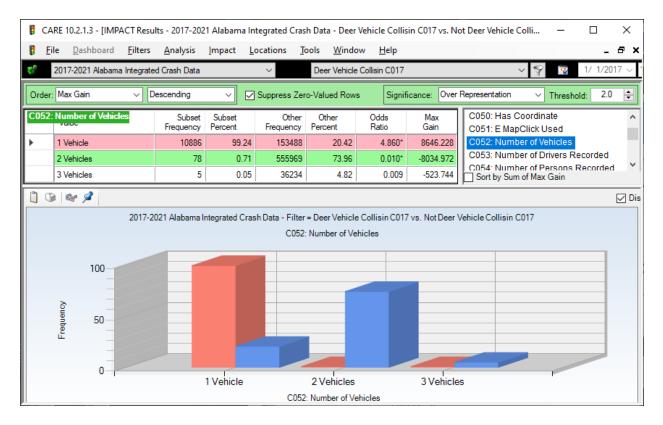
Speed can be a factor not only in the crash cause but also in the crash severity. It goes without saying that there is no reason to be traveling at the speed limit if there as heavy chances of deer being in the area. A comparison of this attribute with the next one shows that relatively few of the vehicles 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

-	RE 10.2.1.3 - [IMPACT Resu			-			in C017 vs. N	
E Ei	e <u>D</u> ashboard <u>F</u> ilters	<u>A</u> nalysis	Impact L	ocations <u>1</u>	ools <u>W</u> indo	w <u>H</u> elp		
6	2017-2021 Alabama Integrate	d Crash Data		\sim	Deer Vehicle	Collisin C017		✓ ♥ 〒 1/ 1/2017 ∨
Order:	Natural Order 🗸 🗸	lescending	~ 🗹	Suppress Ze	ro-Valued Row	s Signific	cance: Over	Representation V Threshold: 2.0
C223:	CU Speed Limit	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C219: CU Attachment C220: CU Oversized Load Requiring Pe
•	15 MPH	4	0.04	4959	0.66	0.055	-68.364	C221: CU Had Oversized Load Permit
	20 MPH	5	0.05	5145	0.68	0.067	-70.078	C222: CU Contributing Vehicle Defect
	25 MPH	102	0.93	66159	8.80	0.106*	-863.425	C223: CU Speed Limit C224: CU Estimated Speed at Impact
	30 MPH	113	1.03	43148	5.74	0.179*	-516.637	C225: CU Citation Issued
	35 MPH	604	5.51	104371	13.88	0.397*	-919.033	C226: CU Vehicle Damage
	40 MPH	468	4.27	67381	8.96	0.476*	-515.257	C227: CU Vehicle Towed
	45 MPH	2970	27.08	156646	20.84	1.299*	684.145	C230: CU Areas Damaged #1
	50 MPH	284	2.59	34543	4.60	0.563*	-220.068	C231: E CU Areas Damaged #2 C232: E CU Areas Damaged #3
	55 MPH	3449	31.44	84599	11.25	2.794*	2214.490	C233: CU Point of Initial Impact
	60 MPH	109	0.99	12697	1.69	0.588*	-76.281	C301: CU Non-Motorist Prior Action
	65 MPH	1296	11.82	22611	3.01	3.928*	966.049	C303: E CU K-12 Child W/C To/From Sc
	70 MPH	697	6.35	46983	6.25	1.017	11.401	C304: E CU Non-Motorist Action at Time C305: E CU Non-Motorist Action at Time
	75 MPH	2	0.02	105	0.01	1.305	0.468	C306: CU Non-Motorist Location at Time
	Unknown	296	2.70	67080	8.92	0.302*	-682.864	C307: E Vehicle Unit That Struck CU Nor
	CU is Not a Vehicle	3	0.03	2119	0.28	0.097	-27.921	C308: CU Non-Motorist Condition
	CU is Unknown	567	5.17	28771	3.83	1.351*	147.159	Sort by Sum of Max Gain
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		021 Alabama lı	ntegrated Cras		= Deer Vehicle 23: CU Speed L		'vs. Not Deer '	Vehicle Collisin C017
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Loonor	20-							
	0			1			L	
			35 MP	Н		60 MPH		CU is Not a Vehicle
					C223: CU Spe	ed 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

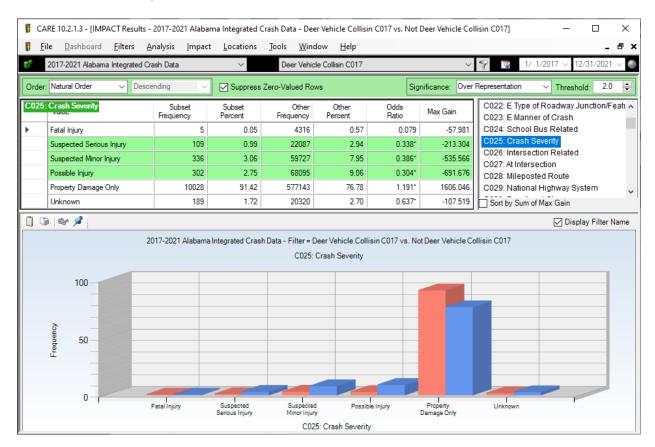
CA	RE 10.2.1.3 - [IMPACT Results - 2017-2021 A le <u>D</u> ashboard <u>F</u> ilters <u>A</u> nalysis <u>I</u> r				er Vehicle (dow <u>H</u> e		7 AND Not E	E Most Harmful Eve — 🗆 🗙
¢°	2017-2021 Alabama Integrated Crash Data		\sim	Deer Vehi	cle Collisin C	017		✓ ♥ 1/ 1/2017 ∨ 12/
Order:	Max Gain V Descending	✓ Ø Si	uppress Zei	ro-Valued Ro	ws	Significa	ance: Over	Representation V Threshold: 2.0
C019:	E Most Harmful Event	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds	Max Gain	C019: E Most Harmful Event
•	Collision with Animal: Deer	10504	96.08	117	0.02	5659.704*	10502.1	
	Fell/Jumped from Motor Vehicle	9	0.08	536	0.08	1.059	0.498	
	Evasive Action (Swerve/Brake)	11	0.10	1188	0.17	0.584	-7.845	
	Collision with Animal: Other	11	0.10	1448	0.21	0.479	-11.969	
	Fire/Explosion	10	0.09	2073	0.30	0.304	-22.883	
	Collision with Guardrail End	5	0.05	1806	0.26	0.175	-23.648	
	Collision with Bridge Abutment/Rail	6	0.05	2068	0.30	0.183	-26.804	
	Collision with Culvert Headwall	10	0.09	3164	0.46	0.199	-40.189	
	Collision with Mailbox	7	0.06	3153	0.46	0.140	-43.015	
	Collision with Embankment	9	0.08	3646	0.53	0.156	-48.835	
	Collision with Fence	6	0.05	3942	0.57	0.096	-56.530	
	Ran Off Road Left	11	0.10	4376	0.63	0.158	-58.415	
	Collision with Guardrail Face	6	0.05	5552	0.81	0.068	-82.069	
	Ran Off Road Right	17	0.16	7679	1.11	0.140	-104.809	
	Collision with Other Fixed Object	5	0.05	7307	1.06	0.043	-110.908	
	Collision with Utility Pole	14	0.13	10284	1.49	0.086	-149.131	
	Collision with Ditch	37	0.34	17717	2.57	0.132*	-244.038	
	Overtum/Rollover	83	0.76	21892	3.18	0.239*	-264.265	
	Collision with Tree	93	0.85	24111	3.50	0.243*	-289.464	
	Collision with Vehicle in Traffic	78	0.71	530835	77.03	0.009*	-8342.438	Sort by Sum of Max Gain
0) @ <i>\$</i>							Displa
			2017-2021	Alabama Inte	egrated Cra	sh Data		
			C01	9: E Most Ha	armful Event			
	100							
	50 50							
Ľ								
	0	xplosion	C-1	ision with Em		Callinia	at Other Fi	ed Object Collision with Vehicle in Traffic
	Fire/E	vbiosion.		019:EMost			vith Other Fixe	eu object Collision with Venicle in Traffic

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

-	RE 10.2.1.3 - [IMPACT Results - 2017-20 ile <u>D</u> ashboard <u>F</u> ilters <u>A</u> nalysis		-	n Data - Deer Ve ols <u>W</u> indow		C017 vs. Not De	eer Vehicle Col	isin C017] — 🗆 🗙
¢?	2017-2021 Alabama Integrated Crash Data	I	\sim	Deer Vehicle C	Collisin C017		~	
Order	Max Gain V Descending	~ 2	Suppress Zero	-Valued Rows		Signit	ficance: Over	Representation V Threshold: 2.0 🖨
C023:	E Manner of Crash	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C018: Location First Harmful Event Rel t C019: E Most Harmful Event
۱.	Single Vehicle Crash (all types)	9942	90.64	139417	18.55	4.887*	7907.559	C020: E Distracted Driving Opinion
	Other	290	2.64	18899	2.51	1.052	14.217	C021: Distance to Fixed Object
	Non-Collision	70	0.64	5299	0.70	0.905	-7.326	C022: E Type of Roadway Junction/Featu C023: E Manner of Crash
	Head-On (front to front only)	189	1.72	16159	2.15	0.802*	-46.800	C024: School Bus Related
	Unknown	9	0.08	4997	0.66	0.123	-63.919	C025: Crash Severity
	Causal Veh Backing: Rearto Side	1	0.01	13468	1.79	0.005	-195.532	C026: Intersection Related
	Angle Oncoming (frontal)	68	0.62	18389	2.45	0.253*	-200.341	C027: At Intersection C028: Mileposted Route
	Sideswipe - Opposite Direction	6	0.05	14172	1.89	0.029	-200.805	C029: National Highway System
	Angle (front to side) Same Direction	9	0.08	21099	2.81	0.029	-298.887	C030: Functional Class
	Angle (front to side) Opposite Direction	21	0.19	23100	3.07	0.062*	-316.087	C031: Lighting Conditions
	Side Impact (90 degrees)	209	1.91	69144	9.20	0.207*	-799.983	C032: Weather
	Side Impact (angled)	126	1.15	65912	8.77	0.131*	-835.820	C033: Locale C034: E Police Present at Time of Crash
	Sideswipe - Same Direction	9	0.08	72419	9.63	0.009	-1047.774	C035: Police Notification Delay
	Rear End (front to rear)	20	0.18	264772	35.22	0.005*	-3843.683	Sort by Sum of Max Gain
00) 🗞 🖉							Display Filter Name
		1 Alabama Integ	rated Crash Dat		r Vehicle Collisin nner of Crash	n C017 vs. Not [Deer Vehicle Co	Ilisin C017
	Summer So							
			Unknowr		-	(front to side)) Opposite Dir	rection
				C023: I	E Manner of Cra	sh		

Of these, the manner of crash that would seem to be the most significant is thee 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 of 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

🚦 CA	RE 10.2.1.3 - [IMPACT Result	s - 2017-20	21 Alab	ama Inte	egrated (Crash Dat	a - Deer	Vehicle C	ollisin C017 vs. Not 🗕 🗆 🗙				
🚦 Fi	ile Dashboard Filters	Analysis	Impa	ct Lo	cations	Tools	Windo	w Hel	p _ @ >				
¢°	2017-2021 Alabama Integrated	Crash Data			\sim	Dee	er Vehicle	Collisin C(017				
Order	: Max Gain 🗸 De	scending	``	<u>_</u> .	Suppress	Zero-\Si	ignificand	e: Over	Representation V Threshold: 2.0 숮				
C323:	CU Driver/Non-Motorist Sa	fety Equipm	ent _{set}	Subset	Other quency	Other Percent	Odds Ratio	Max Gain	C311: CU Non-Motorist Most Harmful Ev A C321: CU Driver/Non-Motorist Seating P				
•	Shoulder and Lap Belt Used		9922	90.45	585167	77.85	1.162*	1382	C322: CU Driver/Non-Motorist Victim/Oc				
	CU is Unknown		567	5.17	28771	3.83	1.350*	147.1	C323: CU Driver/Non-Motorist Safety Eq				
	Dot-Compliant Motorcycle Helr	met Used	106	0.97	3400	0.45	2.136*	56.385	C324: CU Driver Airbag Status				
	E Other Motorcycle Helmet Us	ed	5	0.05	220	0.03	1.557	1.790	C325: CU Driver/Non-Motorist Age C326: CU Driver/Non-Motorist Gender				
	E Helmet Used		6	0.05	471	0.06	0.873	-0.873	C327: CU Driver Ejection Status				
	No Motorcycle Helmet Used		2	0.02	290	0.04	0.473	-2.232	C328: CU Driver/Non-Motorist Injury Type				
	E CU Non-Motorist Not Record	ded	2	0.02	295	0.04	0.465	-2.305	C329: CU Driver/Non-Motorist First Aid B				
	Lap Belt Only Used		17	0.15	1886	0.25	0.618	-10.522	C330: CU Driver/Non-Motorist Transport C331: E CU Driver/Non-Motorist Transpo				
	Shoulder Belt Only Used		26	0.24	2815	0.37	0.633*	-15.079	C401: E CU Involved Road/Bridge				
	Not Applicable		34	0.31	5764	0.77	0.404*	-50.113	C402: E CU Road Surface Type				
	E CU Driver Not Recorded		7	0.06	12413	1.65	0.039	-174	C403: CU Roadway Condition				
	None Used - Motor Vehicle Occupant		140	1.28	23224	3.09	0.413*	-198	C404: E CU Environmental Contributing C405: CU Contributing Material in Road				
	Unknown		135	1.23	86359	11.49	0.107*	-1125	Sort by Sum of Max Gain				
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		Jnknown	E Oth Motorcy Helmet 0	ycle	No Motore Helmet U		Lap Bel Only Use		ot Applicable None Used - Motor Vehicle Occupant				
				C323: C	U Driver/	Non-Moto	rist Safe	ty Equipme	ent				

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

CARE 10.2.1.3 - [Crosstab Results - 20		-					- 0
<u>File D</u> ashboard <u>Filters A</u> naly	/sis <u>C</u> rosstab	Locations Tools					_ '
2017-2021 Alabama Integrated Crash	Data	∨ Dee	r Vehicle Collisin C01	7	~ 9	1/ 1/201	7 ~ 12/31/2021
Suppress Zero Values: Rows and Columns	Select Cells	s: 🔳 🕶 🌃 🌱		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

C025 and C323 Cross-Tab of Severity by Safety Equipment

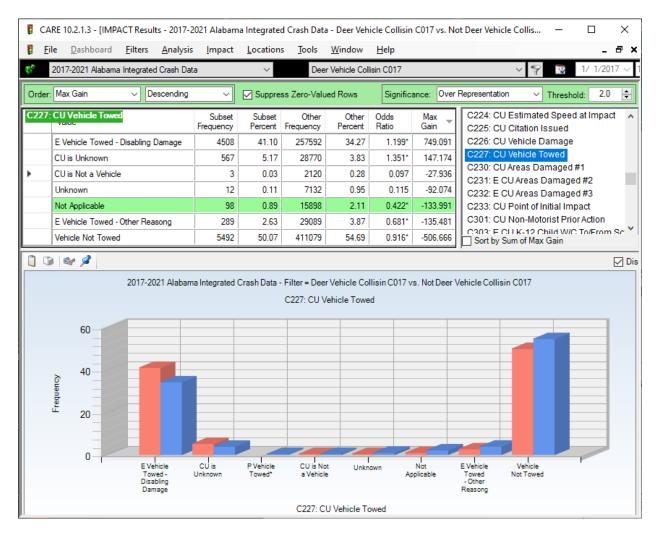
Any use of a motor vehicle without the appropriate Safety Equipment multiplies the chance of a fatality or serious injury by several orders of magnitude. The cross-tabulation above demonstrates this with real data. The only fatality and 9 of the Suspected Serious Injury victim passengers in a non-motorcycle 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

C/	ARE 10.2.1.3 - [IMF	ACT Resul	ts - 2017-2021	Alabama Inte	egrated Crash	Data - Deer Ve	hicle Collisin	C017 vs. Not E	Deer Vehicle Collisin — 🗆 🗙				
B E	<u>F</u> ile <u>D</u> ashboard	<u>F</u> ilters	<u>A</u> nalysis	<u>I</u> mpact <u>L</u> oo	cations <u>T</u> oo	ols <u>W</u> indow	<u>H</u> elp		_ 8 ×				
6	2017-2021 Alabam	a Integrated	d Crash Data		\sim	Deer Vehicle C	ollisin C017		✓ ♥ 1/ 1/2017 ∨ 12/				
Orde	r: Max Gain	∼ De	escending	✓ Ø 5	ouppress Zero	Valued Rows	Signifi	icance: Over F	Representation V Threshold: 2.0				
C226	6: CU Vehicle Dan	age	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C220: CU Oversized Load Requiring Pe				
	Major Not Disable	d	2493	22.73	77188	10.27	2.213*	1366.633	C222: CU Contributing Vehicle Defect				
	Major and Disable	ed	4435	40.43	256929	34.18	1.183*	685.761	C223: CU Speed Limit C224: CU Estimated Speed at Impact				
	CU is Unknown		567	5.17	28771	3.83	1.351*	147.159	C225: CU Citation Issued				
	CU is Not a Vehic	le	3	0.03	2119	0.28	0.097	-27.922	C226: CU Vehicle Damage				
	Not Applicable		4	0.04	2751	0.37	0.100	-36.144	C227: CU Vehicle Towed				
	None Visible		47	0.43	37464	4.98	0.086*	-499.694	C230: CU Areas Damaged #1 C231: E CU Areas Damaged #2				
	Unknown		26	0.24	52111	6.93	0.034*	-734.430	C232: E CU Areas Damaged #2				
	E Minor		3394	30.94	294354	39.16	0.790*	-901.364	Sort by Sum of Max Gain				
	📋 🕼 🞯 🖉												
	60	2017-2	2021 Alabama I	ntegrated Cras		= Deer Vehicle CU Vehicle Da		vs. Not Deer Ve	shicle Collisin C017				
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	20		H										
	0	Majo Disa	rNot Majo abled Disa		CU is Ci known a	U is Not Vehicle A	Not No pplicable	one Visible	Unknown E Minor				
					C22	26: 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

¢?	2017-2021 Alabama Integrated Crash D	ata		\sim	Deer	v 💡 🚏		
Order:	Max Gain ~ Descending)	- - -	Suppress	Zero-Valı	Significan	ce: Over	Representation V Threshold: 2.0
C101:	Causal Unit (CU) Type	Subset equency	Subset Percent	Other equency	Other Percent	Odds Ratio	Max Gain	C101: Causal Unit (CU) Type
•	Passenger Car	5638	54.28	360338	50.63	1.072*	379.121	
	E Sport Utility Vehicle (SUV)	2672	25.73	157577	22.14	1.162*	372.275	
	Motorcycle	139	1.34	5191	0.73	1.835*	63.241	
	E Mini-van	268	2.58	15572	2.19	1.179*	40.738	
	E Tractor/Doubles	6	0.06	201	0.03	2.045	3.067	
	E Truck Tractor Only (Bobtail)	6	0.06	405	0.06	1.015	0.089	
	E Other Passenger Vehicle	13	0.13	958	0.13	0.930	-0.981	
	E Cargo Van (10000 lbs or Less)	83	0.80	5847	0.82	0.973	-2.333	
	E Passenger Van	30	0.29	2272	0.32	0.905	-3.158	
	E Van or Mini-Van	6	0.06	771	0.11	0.533	-5.252	
	Station Wagon	12	0.12	1833	0.26	0.449	-14.751	
	E Truck (6 or 7) with Trailer	11	0.11	2174	0.31	0.347	-20.728	
	E Single-Unit Truck (3 Axles or Less)	8	0.08	3150	0.44	0.174	-37.972	
	E Single-Unit Truck (2-Axle/6-Tire)	38	0.37	7558	1.06	0.345*	-72.304	
	E Tractor/Semi-Trailer	99	0.95	14953	2.10	0.454*	-119.2	
	Pick-Up (Four-Tire Light Truck)	1357	13.07	129058	18.14	0.720*	-526.5	Sort by Sum of Max Gain
0	i 🗇 🖉							
			2017-202	21 Alabam	a Integrate	ed Crash [Data	
			C	101: Causa	al Unit (Cl	J) Type		
Freedom								
	-	E Tracto	r/Double			Van or N it (CU) Tvi		E Tractor/Semi-Trailer

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-

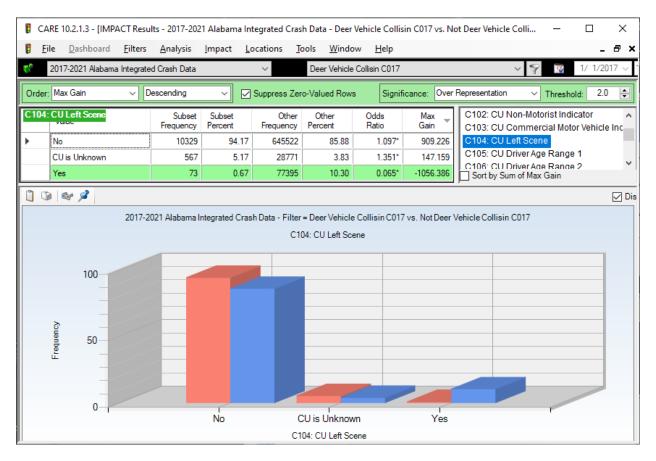
ups and some larger trucks had significantly fewer. This is not to say that the over-represented vehicles are to be avoided, but that the times and areas in which they are used might be given consideration for changes.



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.

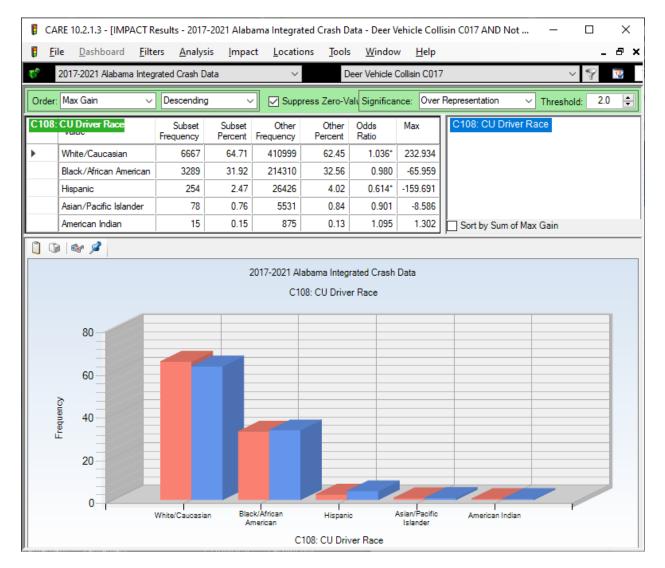
🔋 CA	RE 10.2.1.3 - [IMPACT	Results - 201	17-2021 Ala	bama Integ	rated Crasł	n Data - Dee	er Vehicle	Coll	lisin C017 AND Not 🗕 🗆 🗙		
🔋 Ei	le <u>D</u> ashboard <u>F</u> ilt	ters <u>A</u> nal	ysis <u>I</u> mp	act <u>L</u> oca	itions <u>T</u> o	ols <u>W</u> ind	low <u>H</u>	elp	_ 8		
6 8	2017-2021 Alabama Inte	grated Crash	Data		~	Deer Vehic	le Collisin	C017	7 🗸 🎖 🏆		
Order:	Max Gain 🗸 🗸	Descendi	ng	✓ ☑ Su	ppress Zero	o-Valı Signifi	icance:	Over	Representation V Threshold: 2.0		
C107:	CU Driver Raw Age	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds	Max Gain		C107: CU Driver Raw Age		
•	35	225	2.17	11451	1.75	1.240*	43.536	- 1			
	36	224	2.16	11169	1.71	1.266*	47.005				
	37	205	1.98	10912	1.67	1.186*	32.078				
	38	191	1.85	10414	1.59	1.157	25.969				
	39	223	2.15	10248	1.57	1.373*	60.600				
	40	199	1.92	9787	1.50	1.283*	43.906				
	41	176	1.70	9231	1.41	1.203*	29.716				
	42	199	1.92	8935	1.37	1.405*	57.407				
	43	169	1.63	8562	1.31	1.246*	33.318				
	44	212	2.05	8260	1.26	1.620*	81.104				
	45	174	1.68	8019	1.23	1.369*	46.923				
	46	224	2.16	8337	1.28	1.695*	91.884				
	47	220	2.13	8143	1.25	1.705*	90.958				
	48	202	1.95	8068	1.24	1.580*	74.146				
	49	216	2.09	7888	1.21	1.728*	90.999				
	50	195	1.88	7815	1.20	1.575*	71.156	×	Sort by Sum of Max Gain		
0	1 🗇 🖉										
				2017-2021	Alabama Int	tegrated Cra	sh Data				
				C1	07: CU Driv	ver Raw Age					
C107: CU Driver Raw Age											
			35		C107: CU	55 I Driver Raw	Ane		75		

C107 CU Driver Raw Age

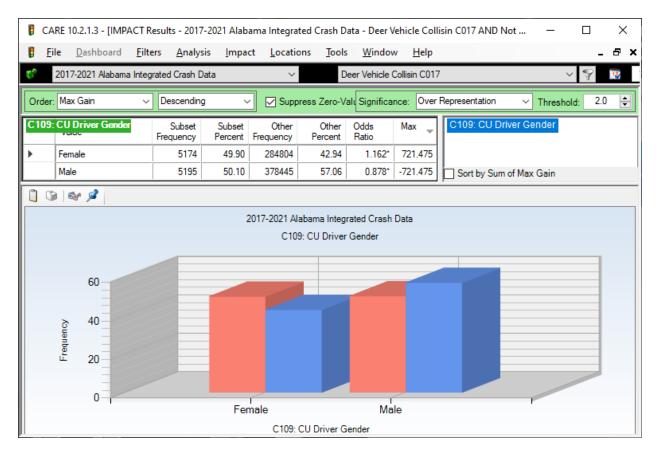
Ages 16-18 are very significantly under-represented compared to their crashes in general. The over-representation problem seems to be in the 35 through 50 age groups, which are consistently over-represented as shown in the table and the chart. This gives the collective age groups that are driving at 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 underrepresentation 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.

🚦 CARE 10.2.1.3 - [IMPACT Results - 2017-2021 Alabama Integrated Crash Data - Deer Vehicle Collisin C017 vs. Not De... \times ∂ × Eile Dashboard Filters <u>A</u>nalysis Impact Locations Tools <u>W</u>indow <u>H</u>elp 2017-2021 Alabama Integrated Crash Data Deer Vehicle Collisin C017 12 Order: Max Gain + Descending Suppress Zero-Valu Significance: Over Representation Threshold: 2.0 \sim ~ C110: CU Driver Reside C107: CU Driver Raw Age nce Di stance_{set} Subset Other Other Odds Max ۸ Frequency Percent Frequency Percent Ratio Gain C108: CU Driver Race C109: CU Driver Gender 26.76 771.851 Greater than 25 Miles 2924 147025 19.69 1.359* C110: CU Driver Residence D 145.851 CU is Unknown 567 5.19 1.346* 28771 3.85 C111: CU Driver License State Less than 25 Miles 66.33 48.806 7248 491816 65.88 1.007 C112: CU Driver First License Class CU is Not a Vehicle 0.03 3 2119 0.28 0.097 -28.018 C113: CU Driver Second License Class 🗸 Unknown 186 1.70 76820 10.29 0.165* -938.490 Sort by Sum of Max Gain 📋 🕼 | 🎯 💋 2017-2021 Alabama Integrated Crash Data C110: CU Driver Residence Distance 80 60 Frequency 40 20 0 Greater than CU is Unknown Less than 25 Miles CU is Not a Vehicle Unknown 25 Miles C110: CU Driver Residence Distance

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.

🔋 CA	RE 10.2.1.3 - [IMPACT Resu	ults - 2017-202	1 Alabama li	ntegrated Cra	sh Data - Deer	Vehicle Collis	sin C017 AND) Not CU Driver Lice – 🗆 🗙		
🖡 Ei	ile <u>D</u> ashboard <u>F</u> ilters	<u>A</u> nalysis	<u>I</u> mpact <u>I</u>	ocations <u>1</u>	ools <u>W</u> indo	w <u>H</u> elp		_ & >		
😵 2017-2021 Alabama Integrated Crash Data 🗸 Deer Vehicle Collisin C017 🗸 🖓 😨 1										
Order	: Max Gain 🗸 🗸	Descending	~ 2	Suppress Ze	ro-Valued Rows	Signific	cance: Over	Representation V Threshold: 2.0		
C111:	CU Driver License State	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C111: CU Driver License State		
•	Georgia	484	35.46	15695	26.16	1.355*	126.915			
	Florida	295	21.61	10764	17.94	1.205*	50.103			
	Tennessee	192	14.07	7561	12.60	1.116	19.976			
	Indiana	25	1.83	883	1.47	1.244	4.910			
	Arkansas	19	1.39	803	1.34	1.040	0.731			
	Virginia	18	1.32	848	1.41	0.933	-1.293			
	Ohio	18	1.32	854	1.42	0.926	-1.430			
	Missouri	14	1.03	810	1.35	0.760	-4.429			
	New York	11	0.81	683	1.14	0.708	-4.539			
	North Carolina	29	2.12	1512	2.52	0.843	-5.400			
	Illinois	23	1.68	1308	2.18	0.773	-6.759			
	South Carolina	15	1.10	1095	1.83	0.602	-9.913			
	Kentucky	13	0.95	1053	1.76	0.543	-10.957			
	California	10	0.73	1348	2.25	0.326	-20.669			
	Louisiana	23	1.68	2525	4.21	0.400*	-34.448			
	Texas	49	3.59	3756	6.26	0.573*	-36.455			
	Mississippi	127	9.30	9.30 7884		0.708*	-52.373	Sort by Sum of Max Gain		
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				2017-2021 Ala	bama Integrate	d Crash Data				
				C111: C	U Driver Licens	e State				
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			Arkansa			th Carolina		Louisiana		
				C1	11: CU Driver Li	cense 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.

CA	RE 10.2.1.3 - [IMP/	ACT Results	- 2017-2	021 Alaban	na Integrate	d Crash Data	a - Deer Vehi	cle Collisin C	017 vs. Not	Deer Vehicle Collisin — 🛛 🗙	
🖡 Ei	le <u>D</u> ashboard	<u>F</u> ilters <u>/</u>	<u>A</u> nalysis	<u>I</u> mpact	Location	s <u>T</u> ools	<u>W</u> indow	<u>H</u> elp			
¢°	2017-2021 Alabama	a Integrated C	Crash Dat	a	~	Dee	r Vehicle Colli	sin C017		✓ ♥ 1/ 1/2017 ∨ 12	
Order:	Max Gain	✓ Desc	cending	~	Suppre	ss Zero-Valu	ied Rows	Signific	ance: Over	Representation V Threshold: 2.0	
C204:	ECU Sequence	of Events #1		Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C201: CU Vehicle Most Harmful Event C202: CU Contributing Circumstance	
•	Collision with Anima	al: Deer		9426	85.93	29	0.00	22274.092*	9425.577	C203: CU First Harmful Event Location	
	Evasive Action (Sv	werve/Brake)		942	8.59	38043	5.06	1.697*	386.858	C204: E CU Sequence of Events #1	
	CU is Unknown			567	5.17	28770	3.83	1.351*	147.174	C205: E CU Sequence of Events #2 C206: E CU Sequence of Events #3	
	Not Applicable			4	0.04	731	0.10	0.375	-6.667	C207: E CU Sequence of Events #4	
	Non-Contact Vehic	de		1	0.01	1204	0.16	0.057	-16.569	C208: CU Model Year	
	Collision with Anima	al: Other		2	0.02	1313	0.17	0.104	-17.160	C209: CU Make	
	Overtum/Rollover			1	0.01	1280	0.17	0.054	-17.678	C210: CU Body (Passenger Cars Only) C211: E CU Owners State	
	Collision with Anima	al: Farm/Rand	ch	1	0.01	1326	0.18	0.052	-18.350	C212: CU License Tag State	
	Collision with Other	r Fixed Object	t	1	0.01	2753	0.37	0.025	-39.173	C213: CU Vehicle Usage	
	Other Non-Collision Crossed Centerline			4	0.04	4035	0.54	0.068	-54.881	C214: E CU Emergency Status	
				3	0.03	18747	2.49	0.011	-270.565	C215: E CU Placard Required C216: E CU Placard Status	
	Ran Off Road Left			1	0.01	29457	3.92	0.002	-428.851	C216. E CO Placard Status C217: CU Hazardous Cargo	
	Collision with Parke	ed Motor Vehi	icle	1	0.01	33063	4.40	0.002	-481.472	C218: E CU Hazardous Released	
	Ran Off Road Righ	nt		3	0.03	53707	7.14	0.004	-780.719	C219: CU Attachment	
	Collision with Vehic	de in Traffic		12	0.11	474328	63.10	0.002	-6909.627	Sort by Sum of Max Gain	
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		2017-202	21 Alabar	na Integrate	d Crash Data	- Filter = De	er Vehicle Co	llisin C017 ve	s. Not Deer Ve	ehicle Collisin C017	
				-	C2	04: E CU Se	quence of Ev	ents #1			
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	100										
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	U T			Non-C	ontact Veh	icle	Oth	er Non-Coll	ision	Collision with Vehicle in Traffic	
					0	204: E CU S	equence of E	vents #1			

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

CA	RE 10.2.1.3 - [IMPACT Result	ts - 2017-2021	Alabama Inte	egrated Crash	Data - Deer Ve	hicle Collisin	C017 AND No	ot CU Vehicle Usage — 🔲 🗙
🕴 Ei	e <u>D</u> ashboard <u>F</u> ilters	<u>A</u> nalysis	<u>I</u> mpact <u>L</u> o	cations <u>T</u> oo	ols <u>W</u> indow	<u>H</u> elp		_ @ ×
e	2017-2021 Alabama Integrated	d Crash Data		\sim	Deer Vehicle C	ollisin C017		✓ ♥ 1/ 1/2017 ∨ 12
Order:	Max Gain 🗸 De	~ 🖂	Suppress Zero	-Valued Rows	Signifi	cance: Over	Representation V Threshold: 2.0 ᆃ	
C213:	CU Vehicle Usage	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C213: CU Vehicle Usage
•	Police	238	2.30	2570	0.39	5.954*	198.028	
	Other Business	163	1.57	9071	1.36	1.155	21.915	
	E Other Personal Use	38	0.37	1539	0.23	1.588*	14.063	
	E Rental Truck (Personal	35	0.34	1632	0.24	1.379	9.617	
	Ambulance/Paramedic	13	0.13	383	0.06	2.182	7.043	
	Military	7	0.07	56	0.01	8.037	6.129	
	E Other Bus	6	0.06	157	0.02	2.457	3.558	
	Fire Fighting	7	0.07	355	0.05	1.268	1.479	
	E Motor Home/Recreatio	10	0.10	745	0.11	0.863	-1.587	
	E Rental Truck (Commerci	9	0.09	769	0.12	0.752	-2.961	
	E Construction/Maintenan	9	0.09	853	0.13	0.678	-4.267	
	E Construction (Not Road	24	0.23	2663	0.40	0.579*	-17.419	
	Personal	9622 181	92.86	622894 21351	93.50 3.20	0.993*	-66.103 -151.080	
	Transport Property	101	1.75	21551	3.20	0.345	-131.000	Sort by Sum of Max Gain
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				2017-2021 Ala	bama Integrate	d Crash Data		
				C213	: CU Vehicle U	sage		
	100							
	-							
	50 50 Solution							
	0	<u> </u>	Ambulo	nce/Parame	lic	E Dontal Tr	uck (Commo	
			Ambula	•	IIC C213: CU Vehi		uck (Comme	aciai Osej
					CZ13, CU Veni	cie usage		

Items with less that 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

CA	ARE 10.2.1.3 - [IMPACT R	esults - 2017	-2021 Alaba	ama Integ	rated Cras	h Data - De	er Vehicle	Collisin C	017 vs. Not Deer Veh — 🗆 🗙
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*	2017-2021 Alabama Integ	rated Crash D	ata		~	Deer Vehi	cle Collisin	C017	✓ ♥ 1/ 1/1
Order	: Max Gain 🗸 🗸	Descending	ı ~	Su	ippress Zer	o-Valued R	Significa	nce: Over	Representation V Threshold: 2.0
C214	ECU Emergency Statu	S	Subset requency	Subset Percent	Other requency	Other Percent	Odds Ratio	Max 🚽	C211: E CU Owners State C212: CU License Tag State
	No Emergency or Pursuit		246	2.24	3319	0.44	5.079*	197.568	C213: CU Vehicle Usage
	CU is Unknown		567	5.17	28770	3.83	1.351*	147.174	C214: E CU Emergency Status
	On an Emergency Call		33	0.30	825	0.11	2.741*	20.961	C215: E CU Placard Required C216: E CU Placard Status
	In Police Pursuit		3	0.03	232	0.03	0.886	-0.385	C217: CU Hazardous Caroo
	CU is Not a Vehicle		3	0.03	2119	0.28	0.097	-27.921	C218: E CU Hazardous Released
	Not Applicable/Not Emer	gency Veh	10117	92.23	714751	95.09	0.970*	-312.997	Sort by Sum of Max Gain
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	0 No Emergen or Pursuit		y CU is Unknown		On an Emergency Call		n Police Pursuit	CU is I a Vehi	
					C214: E C	U Emerger	cy 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.