Results of Thanksgiving Analytics Study
Using 2012-2017 Data

September 21, 2018

2 URLs need update – to 2016 study and to weather

Table of Contents

Introduction

This document contains the results of several CARE IMPACT comparisons and cross-tabulations that were performed using data from CY 2012-2017, with a concentration on a comparison of the 2017 Thanksgiving week crashes against all crashes in CY2017. The goal of this study was to update a five-year study that was dated September 21, 2017 that was based on CY 2012-2016 data. Both of these studies had the goal of surfacing information that would be useful in developing countermeasures for the reduced fatalities primarily in future Thanksgiving weeks.

The CY 2012-2016 study has been retained and is available on the following Safe Home Alabama web page at http://www.safehomealabama.gov/tag/caps-special-study/ and do a page search for the subject of interest. The 2012-2016 study is more detailed and covers more attributes. An effort was made not to unnecessarily duplicate the findings of that study in this one. In some cases where a comparison was beneficial, some of the results of that study have been brought into this one.

This report is organized in the following parts:

1. Recommendations;
2. General high-level analyses for general introductory and time-of-day purposes;
3. Comparisons of Thanksgiving week with non-Thanksgiving week for all five years and within 2017.

In all cases IMPACT analyses were performed where the IMPACT tool's capability to surface those attributes with the highest significance (sum Maximum Gain for each attribute) was exploited. Also, in some cases a cross-tabulation was performed to provide supplementary information. The conclusion for each of these analyses is presented immediately below each of the outputs.

Data for these studies have been provided by crash reports that are maintained by the Alabama Law Enforcement Agency (ALEA).

Recommendations

The following recommendations are made that specifically apply to the reduction of crashes during the Thanksgiving holiday week, with special emphasis on fatality reduction.

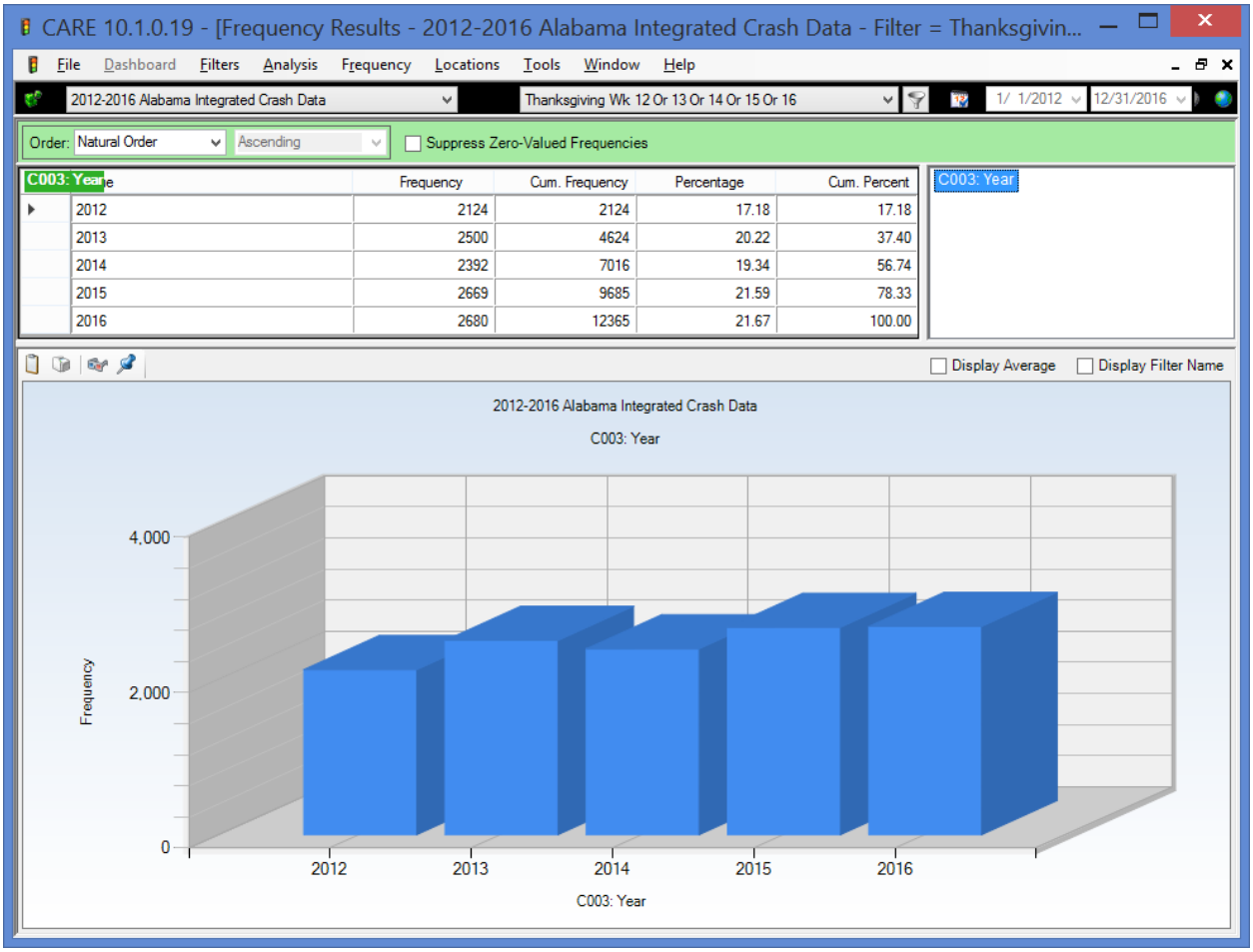
- **Avoid crashes altogether by traveling at the safer times.** See Section 1.6 for the recommended times of travel during Thanksgiving week. Notice that while fewer crashes are recorded to occur very late night and early morning, these times are not recommended for two reasons. Impaired driving (ID) is at its highest during these times, especially on holiday times, and it is very difficult for those who typically do not drive at these times to fight off drowsy driving, which can be as deadly as ID.
- **Reduce speed to the speed limit.** Even a 5 MPH reduction can make a big difference since generally the cruising speed is the greatest determinant of impact speed. Do not wait for an emergency to slow down. Constantly look ahead for brake lights going on. Most GPS systems clearly confirm that an extra 5 mph in speed generates only a very few minutes reduction in trip time, but in a crash it could result in the difference between a fatality and a severe injury.
- **Always use safety restraints**, and make sure everyone in the car uses theirs, even on the shortest of trips. This is the number one defense against becoming a fatality victim in crashes caused by other drivers. Very few passengers who are properly restrained suffer life-threatening injuries when driving at reasonable speeds.
- **Avoid all electronic distractions** by delegating all cell phone use to passengers. This has clearly become one of the major causes of crashes over the past five years. The problem is not just one of not having two hands on the wheel. It is caused by the same parts of the brain that are used in phone conversations being essential to safe driving. Texting worsens the problem even further with the travel of a half of a football field for every average five seconds of time that the driver's eyes are off the road.
- **Be particularly watchful for deer.** This is the number one over-represented First Harmful Event for the Thanksgiving week period. In addition, the highest odds ratio of statistical significance was "Swerved to Avoid Animal." While there were 71 deer strikes reported during Thanksgiving week in 2017, these are only reported when law enforcement are called to the scene, and traffic safety professionals have estimated that less than half of all deer strikes are reported. There are several potential reasons for this finding:
    - The time change has put more vehicles on the road at the time when deer are actively looking for food.
    - The worst time for deer activity is right after dark.
    - Hunting season is in and deer are not moving as much during the day as right after darkness falls.
    - Areas in or adjacent to where hunting is not allowed often generate an over-abundance of deer that tend to not fear humans, and are thus particularly vulnerable.

    - Area where rye grass has been planted to stabilize the roadside after construction attract deer very close to the roadside, and it is wise to note, slow down and use high beams (when there is no oncoming traffic) to take precautions to avoid deer.
- **Have no tolerance at all for impaired driving (ID).** Impairment here is from alcohol (which is a drug) or other drugs (even some prescription drugs). Do not drive impaired, and do not ride with anyone who has had any alcohol or drug use at all, including many prescription drugs. Avoid the late-night and early morning hours since this is when impaired driving is at a peak, and you are most likely to be involved by an ID driver.
- **Anticipate and avoid bad weather,** especially when coupled with darkness. If caught in a heavy storm, take a break from driving until the shower passes. In general, CAPS research has found crashes can increase by as much as 40 percent in wet weather. The dry weather in the 2017 Thanksgiving week was an anomaly. This is a time of year when at least two wet days might be expected.
- **Try to travel in the daylight.** Leave early enough, and allow for the time change, so that you accomplish most of your driving in the daylight. This is especially beneficial on long trips into unfamiliar areas.
- **Travel on the holiday itself.** Thanksgiving, Christmas and New Year's Days *during the daylight hours* are the best times to avoid potential crashes. Nighttime hours on these days is discouraged in that there is a higher probability at these times of encountering impaired drivers who may have been drinking or using recreational drugs for most of the day.
- **Drive defensively** to reduce risk, including: (1) special efforts to put distance between you and other vehicles, e.g., avoid tailgating, (2) learn where they are, and stay out of the blind spots of large trucks, and (3) let aggressive drivers pass by tapering off your speed until they do.

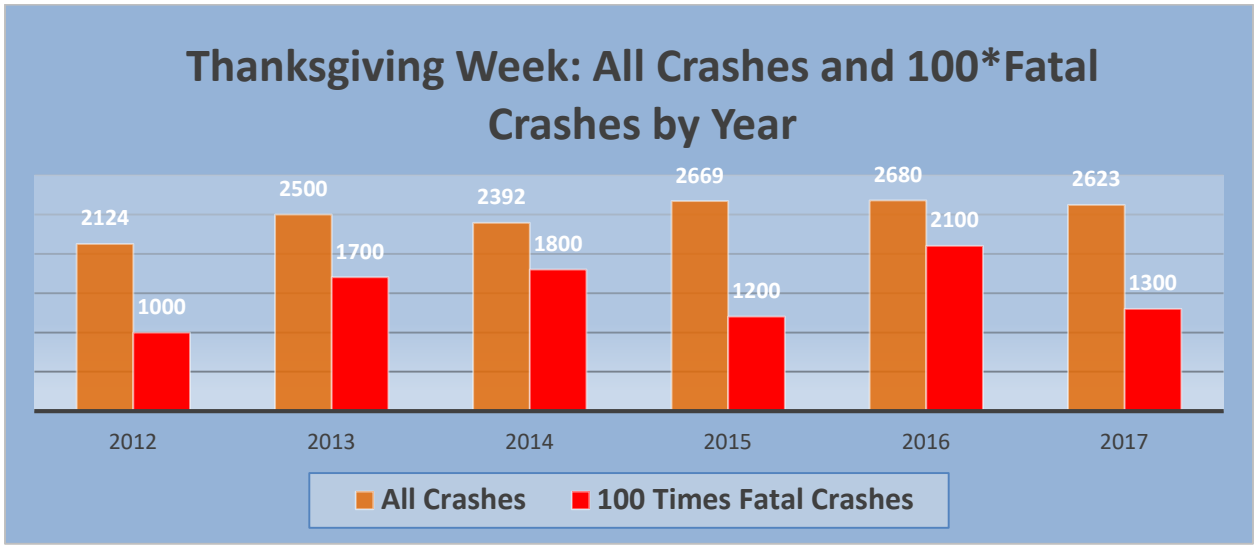
1.0 General High Level Analyses

The purpose of this section is to introduce the analyses by presenting some high level statistics to show the overall impact of crashes on Thanksgiving week.

1.1 C003 Overall Frequency by Year '12-17



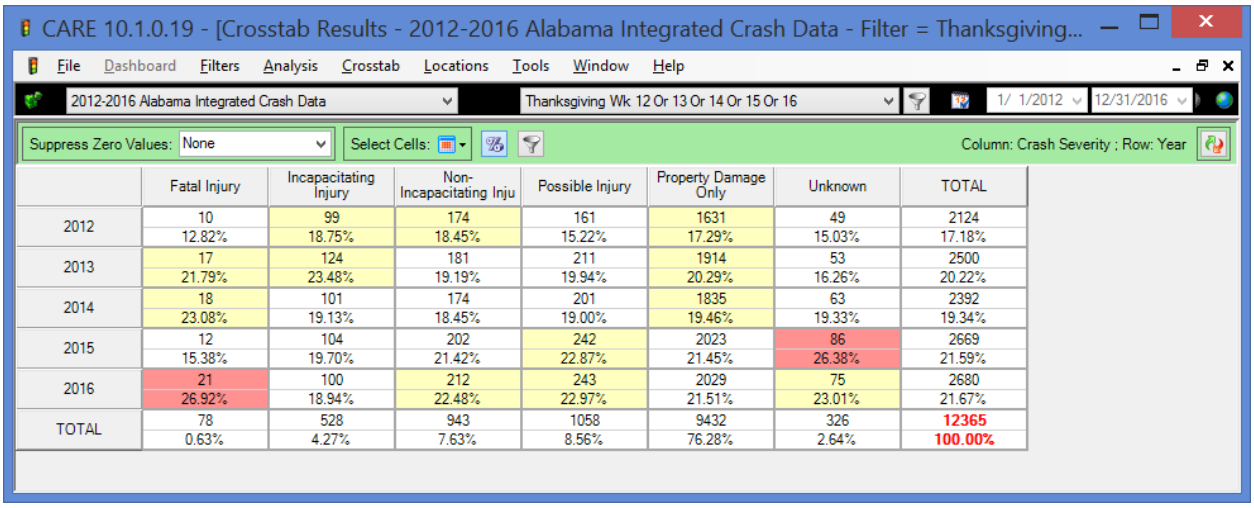
The overall Thanksgiving week crash frequency trend was generally increasing, leveling off in 2015-2016. The overall increase in Thanksgiving week crashes from 2012 to 2016 is 556 additional crashes or a 26.2% increase. The overall increase in ALL crashes from 2012 to 2016 is 27,339 crashes, which is 21.3%. This indicates that the Thanksgiving week per cent increase is almost 5% above the overall increase for the same time period.



In order to compare the yearly increase and decreases in both total crashes and fatal crashes over the past six Thanksgiving weeks, the above chart was assembled. It reflects the total crashes given in the IMPACT table above, showing stability over the past three years for total crashes. Fatal crashes have been multiplied by 100 so that their variation could be compared to the total crashes. Multiplying by 100 essentially enables a visualization of the percent of fatalities for any given year. For example, in 2017, the red bar is about half of the orange bar, and the percentage of fatal crashes to all crashes was about half or 0.50% (one in every 200 crashes). Notice how this goes up and down compared to the total crashes, with 2016 having a particularly high ratio (21/2680=0.78%, or one in every 128 crashes). The general average of fatal crashes to all crashes over the 2013-2017 time period was 0.57, or about one in every 175 crashes.

Translating fatal crashes into fatalities, Thanksgiving week in 2017 had 18 fatalities, since 6 of the 13 fatal crashes had two fatalities, and 3 of them had three fatalities. This compares about even with the rest of the year, where the average fatalities per week over the other 51 weeks was 18.24 fatalities per week.

1.2 C025 Severity by Year for Thanksgiving Weeks 2012-2016



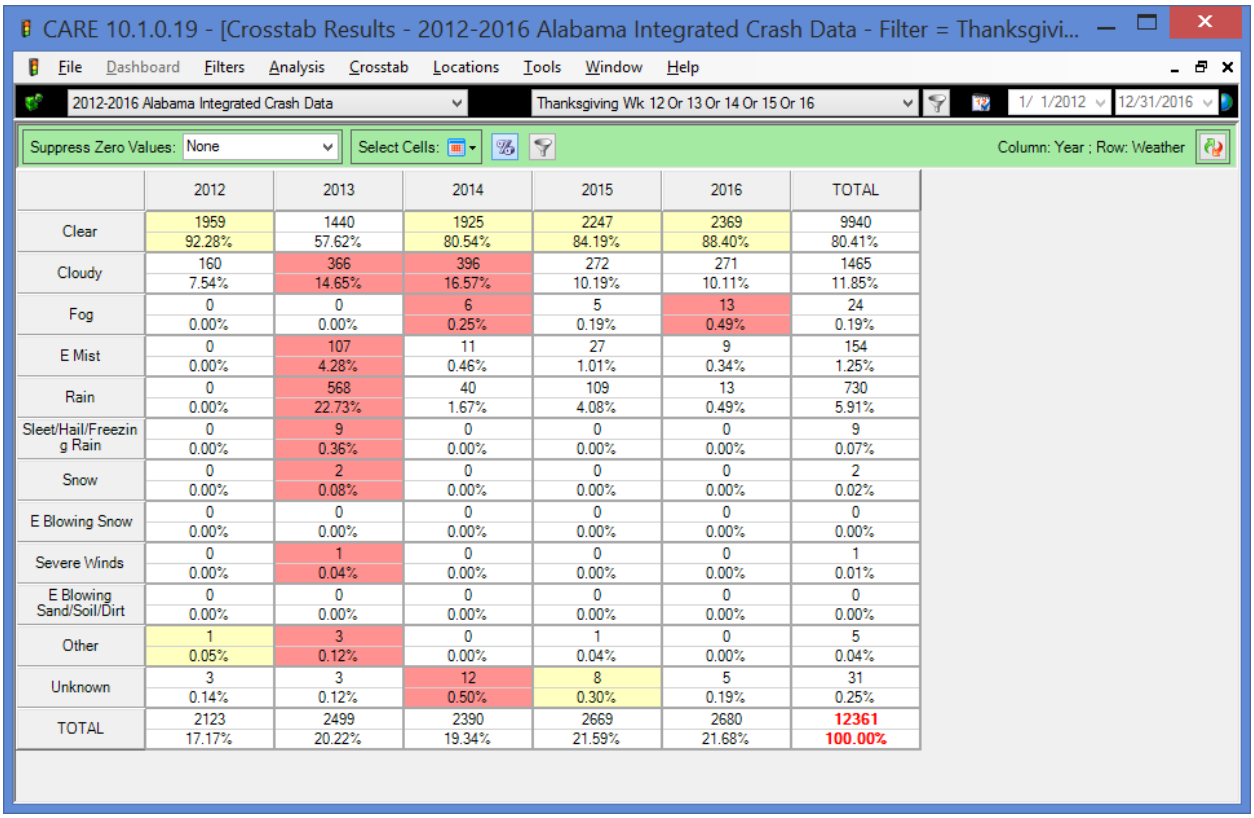
	Fatal Injury	Incapacitating Injury	Non-Incapacitating Inju	Possible Injury	Property Damage Only	Unknown	TOTAL
2012	10 12.82%	99 18.75%	174 18.45%	161 15.22%	1631 17.29%	49 15.03%	2124 17.18%
2013	17 21.79%	124 23.48%	181 19.19%	211 19.94%	1914 20.29%	53 16.26%	2500 20.22%
2014	18 23.08%	101 19.13%	174 18.45%	201 19.00%	1835 19.46%	63 19.33%	2392 19.34%
2015	12 15.38%	104 19.70%	202 21.42%	242 22.87%	2023 21.45%	86 26.38%	2669 21.59%
2016	21 26.92%	100 18.94%	212 22.48%	243 22.97%	2029 21.51%	75 23.01%	2680 21.67%
TOTAL	78 0.63%	528 4.27%	943 7.63%	1058 8.56%	9432 76.28%	326 2.64%	12365 100.00%

Severity increased in 2013 and 2014, regressed to the mean in 2015, but then dramatically increased by close to 100% in 2016, reflecting the dramatic increase in fatalities in 2016. Two of the fatal crashes in 2016 had two fatalities, so the number of Thanksgiving week fatalities in 2016 was 23.

The number of fatal crashes regressed to its mean in 2017, back down to just 13 fatalities, which is below its average over the past five years of 15.2 fatal crashes per year. The cause of fatalities during Thanksgiving week are essentially the same as those for the rest of the year. See special study for speed:

http://www.safehomealabama.gov/wp-content/uploads/2018/12/Speed-Study-PPT-CY2012-2016-v08.pdf

1.3 C030 Weather by Year for T Week 2012-2016

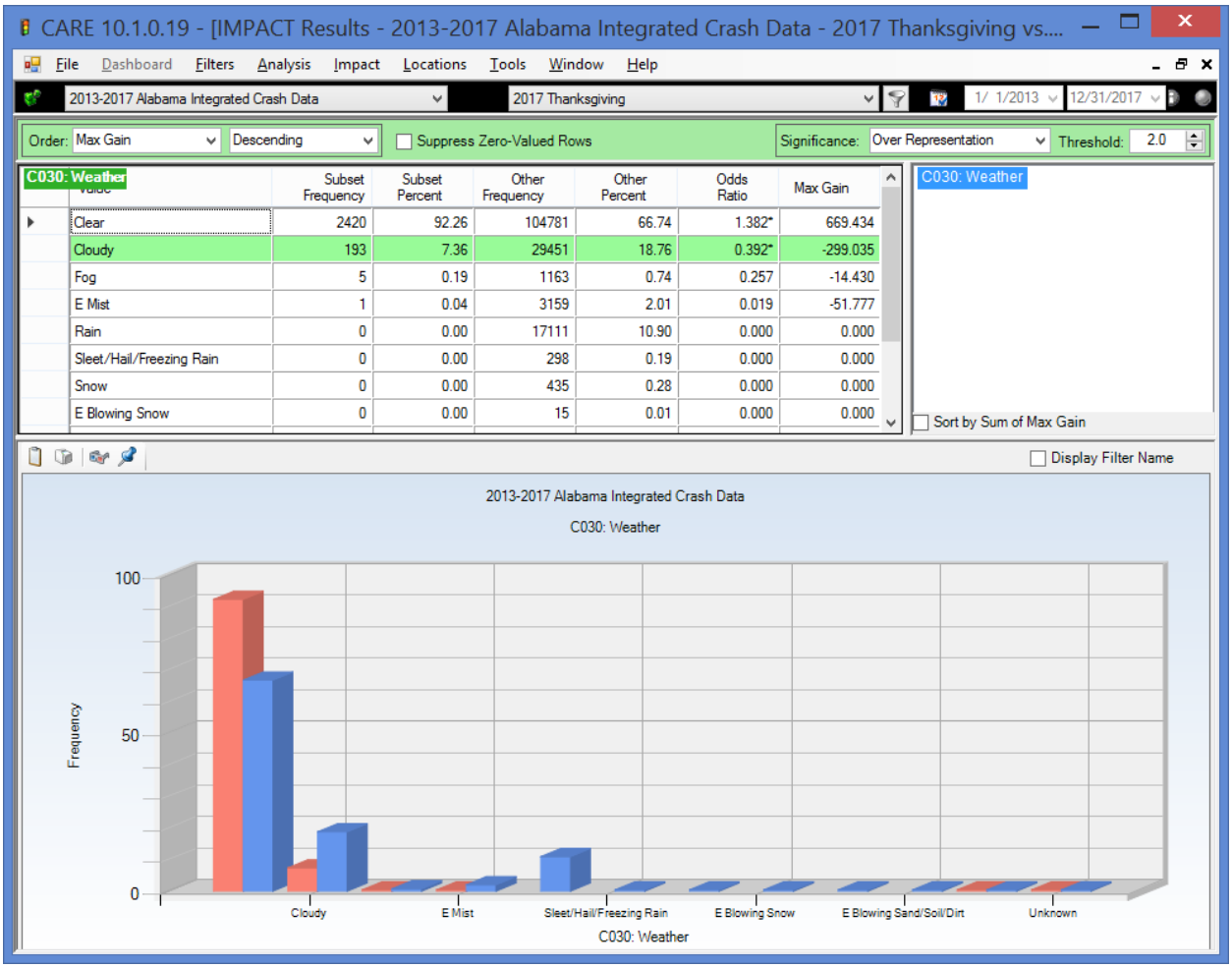


	2012	2013	2014	2015	2016	TOTAL
Clear	1959 92.28%	1440 57.62%	1925 80.54%	2247 84.19%	2369 88.40%	9940 80.41%
Cloudy	160 7.54%	366 14.65%	396 16.57%	272 10.19%	271 10.11%	1465 11.85%
Fog	0 0.00%	0 0.00%	6 0.25%	5 0.19%	13 0.49%	24 0.19%
E Mist	0 0.00%	107 4.28%	11 0.46%	27 1.01%	9 0.34%	154 1.25%
Rain	0 0.00%	568 22.73%	40 1.67%	109 4.08%	13 0.49%	730 5.91%
Sleet/Hail/Freezing Rain	0 0.00%	9 0.36%	0 0.00%	0 0.00%	0 0.00%	9 0.07%
Snow	0 0.00%	2 0.08%	0 0.00%	0 0.00%	0 0.00%	2 0.02%
E Blowing Snow	0 0.00%	0 0.00%	0 0.00%	0 0.00%	0 0.00%	0 0.00%
Severe Winds	0 0.00%	1 0.04%	0 0.00%	0 0.00%	0 0.00%	1 0.01%
E Blowing Sand/Soil/Dirt	0 0.00%	0 0.00%	0 0.00%	0 0.00%	0 0.00%	0 0.00%
Other	1 0.05%	3 0.12%	0 0.00%	1 0.04%	0 0.00%	5 0.04%
Unknown	3 0.14%	3 0.12%	12 0.50%	8 0.30%	5 0.19%	31 0.25%
TOTAL	2123 17.17%	2499 20.22%	2390 19.34%	2669 21.59%	2680 21.68%	12361 100.00%

CY2013 had 568 = 22.73% of its crashes in rain as opposed to the other years, which had 0%, 1.67%, 4.08% and 0.49%. The decision was made to compare 2016 with combined 2014 and 2015 to obtain a fairer comparison since the rain-caused crashes in these 3 years was comparable. Had 2013 been left in, many attributes would be over-shadowed by the dramatic high level of rain in 2013.

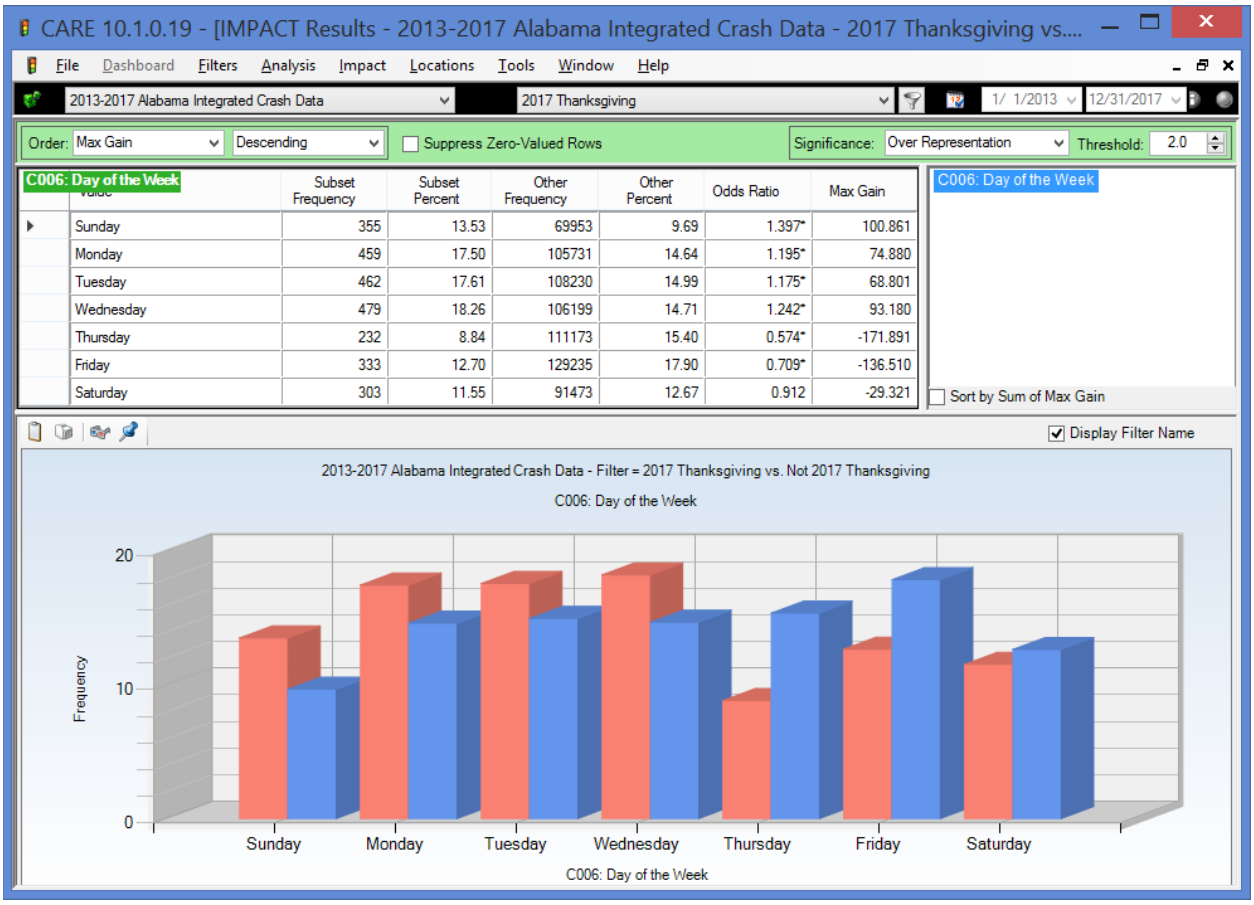
Interesting 2013 had 17 fatalities of which only two (2/17 = 12%) occurred in the rain – about half of the 22.73% that would be expected. Also, 14 fatalities occurred in clear weather, and one in mist. This shows the significant effect of rain in reducing the proportion of crashes that are fatal during rain days.

1.4 Weather for Thanksgiving Week 2017



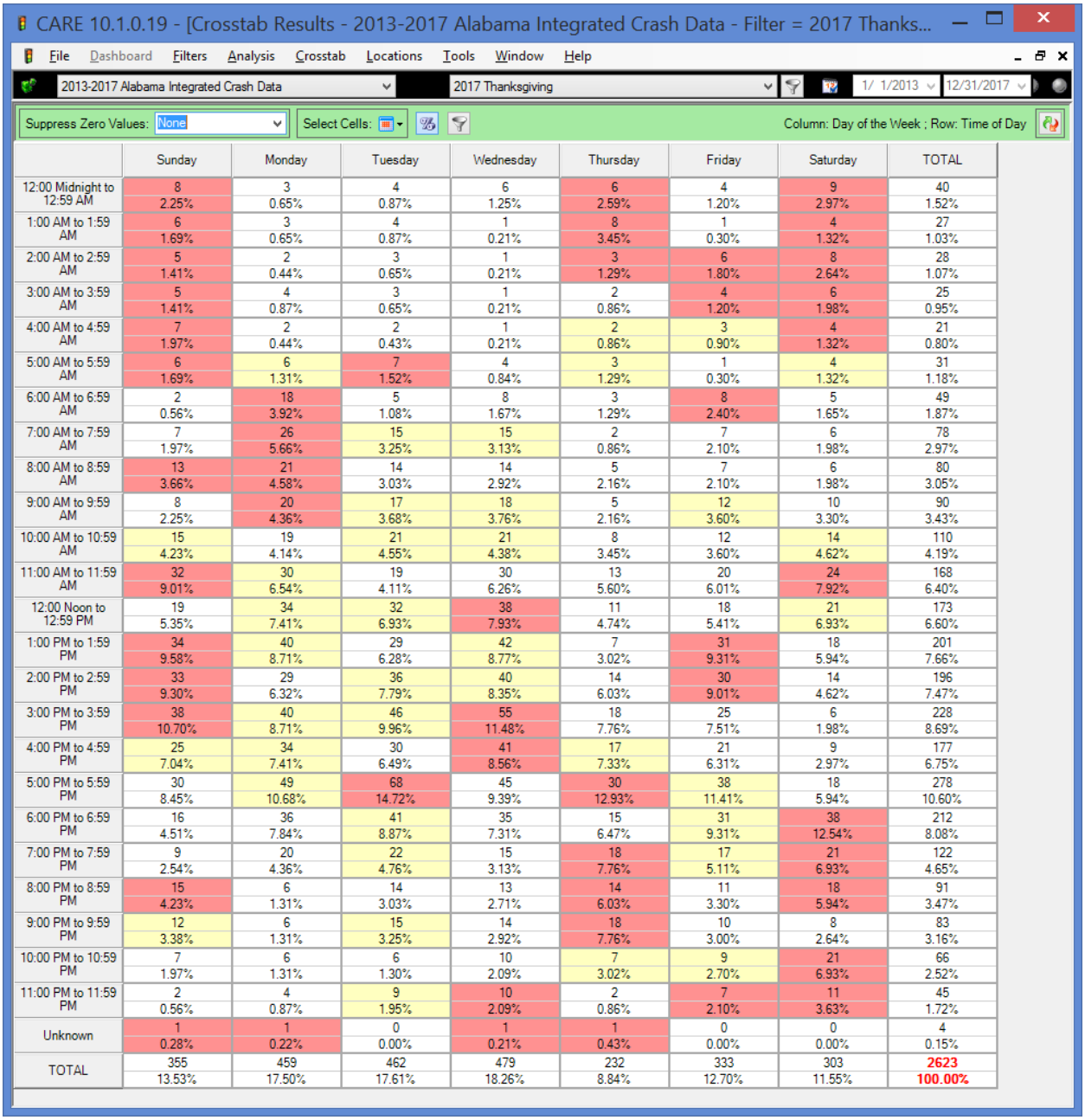
The weather results for 2017 show that the entire week had dry pavement and an absence of rain. This is the first time that these results have been obtained, and this is particularly relevant for determining the best and worst days of the week to drive, because the presence of rain on any given day can totally skew the results. This will be taken up further in the next section.

1.5 Day of the Week for 2017



Thanksgiving week in 2017 gave us virtual laboratory conditions to study the crash distributions by day and hour. This was because no crashes for thanksgiving week in 2017 were recorded to have occurred in wet weather, and thus weather did not impact the results. CAPS weather research has found that largely wet weather days can increase the number of crashes from weather alone by up to 40%, which would destroy any hope of accurately estimating general time patterns of travel. The cross-tabulation below of time of day by day of the week shows when the most crashes can be expected based solely on time. Please note that the "Sunday" is the Sunday *after* Thanksgiving, not the one before it. The table below the cross-tabulation gives the best and worst hours to be on the road for each day.

1.6 Time of Day by Day of the Week Crashes in 2017 Thanksgiving Week



CARE 10.1.0.19 - [Crosstab Results - 2013-2017 Alabama Integrated Crash Data - Filter = 2017 Thanks...

File Dashboard Filters Analysis Crosstab Locations Tools Window Help

2013-2017 Alabama Integrated Crash Data | 2017 Thanksgiving | 1/ 1/2013 | 12/31/2017

Suppress Zero Values: None | Select Cells: | Column: Day of the Week ; Row: Time of Day

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	TOTAL
12:00 Midnight to 12:59 AM	8 2.25%	3 0.65%	4 0.87%	6 1.25%	6 2.59%	4 1.20%	9 2.97%	40 1.52%
1:00 AM to 1:59 AM	6 1.69%	3 0.65%	4 0.87%	1 0.21%	8 3.45%	1 0.30%	4 1.32%	27 1.03%
2:00 AM to 2:59 AM	5 1.41%	2 0.44%	3 0.65%	1 0.21%	3 1.29%	6 1.80%	8 2.64%	28 1.07%
3:00 AM to 3:59 AM	5 1.41%	4 0.87%	3 0.65%	1 0.21%	2 0.86%	4 1.20%	6 1.98%	25 0.95%
4:00 AM to 4:59 AM	7 1.97%	2 0.44%	2 0.43%	1 0.21%	2 0.86%	3 0.90%	4 1.32%	21 0.80%
5:00 AM to 5:59 AM	6 1.69%	6 1.31%	7 1.52%	4 0.84%	3 1.29%	1 0.30%	4 1.32%	31 1.18%
6:00 AM to 6:59 AM	2 0.56%	18 3.92%	5 1.08%	8 1.67%	3 1.29%	8 2.40%	5 1.65%	49 1.87%
7:00 AM to 7:59 AM	7 1.97%	26 5.66%	15 3.25%	15 3.13%	2 0.86%	7 2.10%	6 1.98%	78 2.97%
8:00 AM to 8:59 AM	13 3.66%	21 4.58%	14 3.03%	14 2.92%	5 2.16%	7 2.10%	6 1.98%	80 3.05%
9:00 AM to 9:59 AM	8 2.25%	20 4.36%	17 3.68%	18 3.76%	5 2.16%	12 3.60%	10 3.30%	90 3.43%
10:00 AM to 10:59 AM	15 4.23%	19 4.14%	21 4.55%	21 4.38%	8 3.45%	12 3.60%	14 4.62%	110 4.19%
11:00 AM to 11:59 AM	32 9.01%	30 6.54%	19 4.11%	30 6.26%	13 5.60%	20 6.01%	24 7.92%	168 6.40%
12:00 Noon to 12:59 PM	19 5.35%	34 7.41%	32 6.93%	38 7.93%	11 4.74%	18 5.41%	21 6.93%	173 6.60%
1:00 PM to 1:59 PM	34 9.58%	40 8.71%	29 6.28%	42 8.77%	7 3.02%	31 9.31%	18 5.94%	201 7.66%
2:00 PM to 2:59 PM	33 9.30%	29 6.32%	36 7.79%	40 8.35%	14 6.03%	30 9.01%	14 4.62%	196 7.47%
3:00 PM to 3:59 PM	38 10.70%	40 8.71%	46 9.96%	55 11.48%	18 7.76%	25 7.51%	6 1.98%	228 8.69%
4:00 PM to 4:59 PM	25 7.04%	34 7.41%	30 6.49%	41 8.56%	17 7.33%	21 6.31%	9 2.97%	177 6.75%
5:00 PM to 5:59 PM	30 8.45%	49 10.68%	68 14.72%	45 9.39%	30 12.93%	38 11.41%	18 5.94%	278 10.60%
6:00 PM to 6:59 PM	16 4.51%	36 7.84%	41 8.87%	35 7.31%	15 6.47%	31 9.31%	38 12.54%	212 8.08%
7:00 PM to 7:59 PM	9 2.54%	20 4.36%	22 4.76%	15 3.13%	18 7.76%	17 5.11%	21 6.93%	122 4.65%
8:00 PM to 8:59 PM	15 4.23%	6 1.31%	14 3.03%	13 2.71%	14 6.03%	11 3.30%	18 5.94%	91 3.47%
9:00 PM to 9:59 PM	12 3.38%	6 1.31%	15 3.25%	14 2.92%	18 7.76%	10 3.00%	8 2.64%	83 3.16%
10:00 PM to 10:59 PM	7 1.97%	6 1.31%	6 1.30%	10 2.09%	7 3.02%	9 2.70%	21 6.93%	66 2.52%
11:00 PM to 11:59 PM	2 0.56%	4 0.87%	9 1.95%	10 2.09%	2 0.86%	7 2.10%	11 3.63%	45 1.72%
Unknown	1 0.28%	1 0.22%	0 0.00%	1 0.21%	1 0.43%	0 0.00%	0 0.00%	4 0.15%
TOTAL	355 13.53%	459 17.50%	462 17.61%	479 18.26%	232 8.84%	333 12.70%	303 11.55%	2623 100.00%

The Sunday here is the Sunday AFTER the Thanksgiving holiday (considerable traffic from those returning). See the table below for best and worst times to be on the highways. The Sunday before Thanksgiving had only 261 crashes, which made it an excellent choice for travel, comparable to Thanksgiving Day itself.

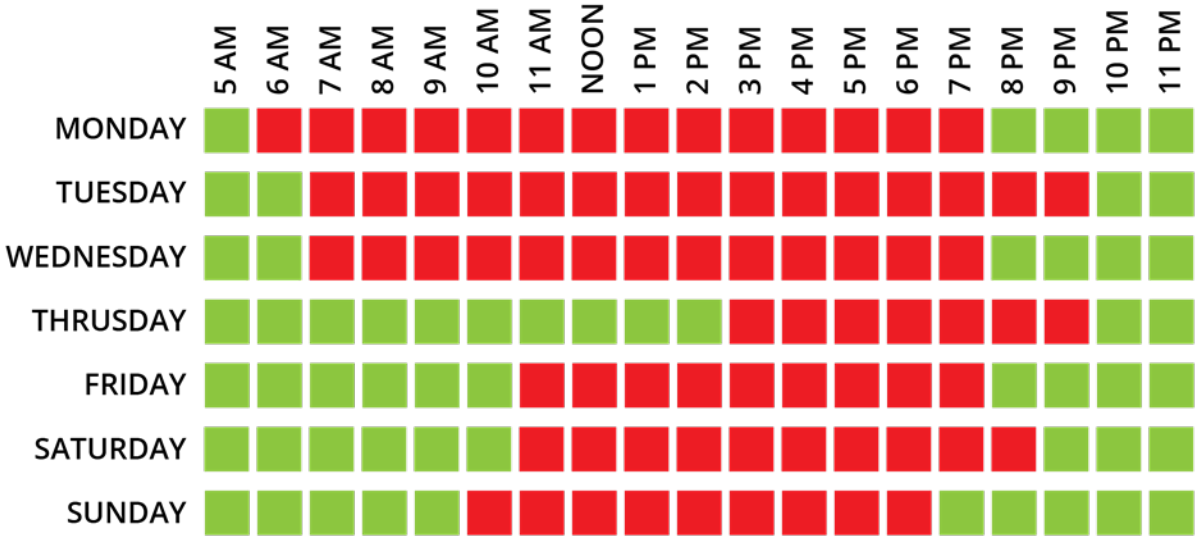
Best and Worst Times to Travel during Thanksgiving Week

Day	Best Times* to Travel	Worst Times* to Travel**
Monday	Before 6AM or After 8PM**	6AM until 8PM
Tuesday	Before 7AM or After 10PM**	7AM until 10PM
Wednesday	Before 7AM or After 8PM**	7AM until 8PM
Thanksgiving	Before 3PM or After 10PM	3PM until 10PM
Friday	Before 11AM or After 8PM	11AM until 8PM
Saturday	Before 11AM or After 9 PM	11AM until 9PM
Sunday Return	Before 10AM or After 7PM	10AM until 7PM

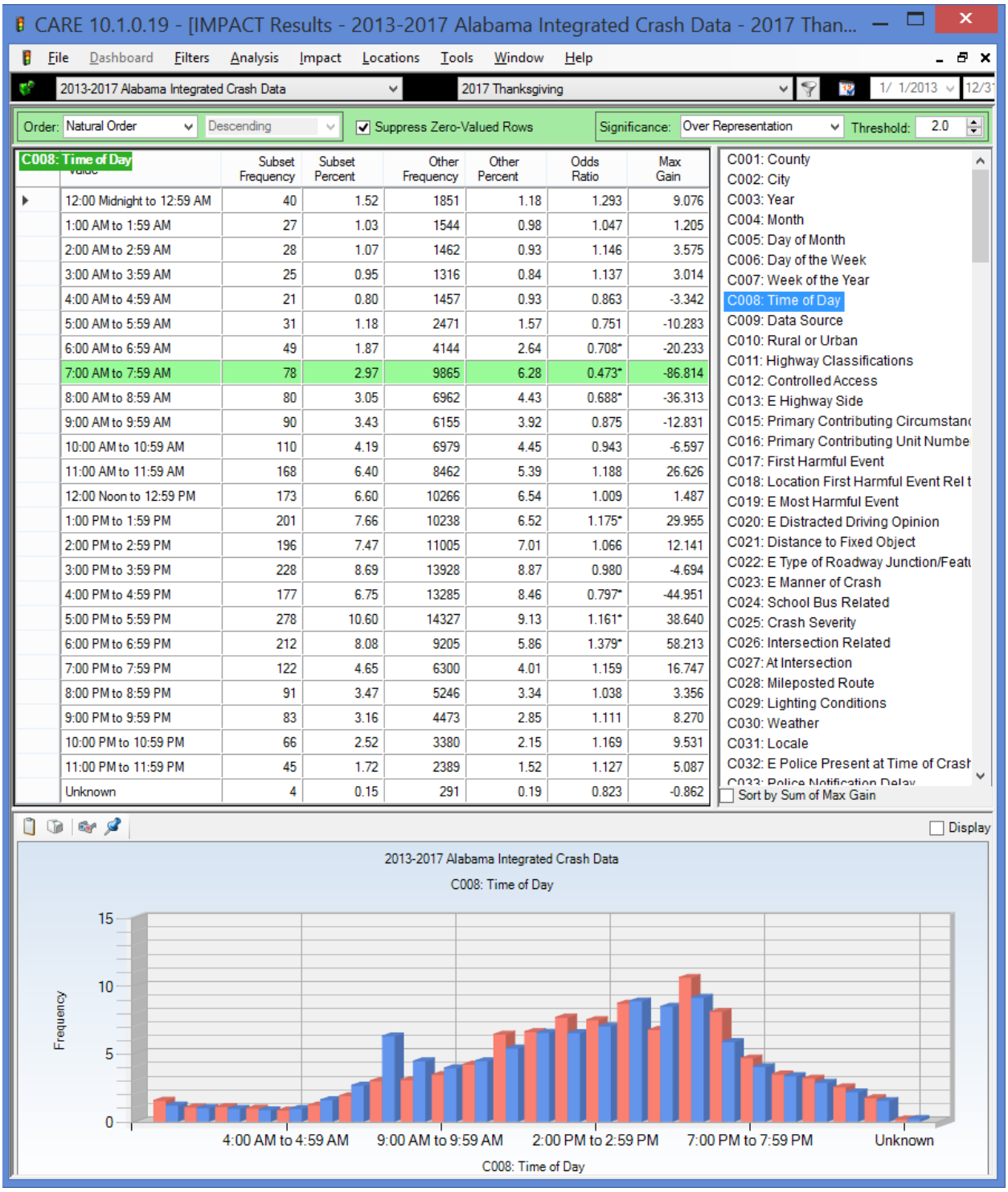
This information is presented graphically below.

*Times given are exact points in time (would include the hour after the time point).

**Late night (after11PM) and very early morning (before 5AM) hours should always be avoided because of increased Impaired and Drowsy Driving risks, especially in holiday periods.

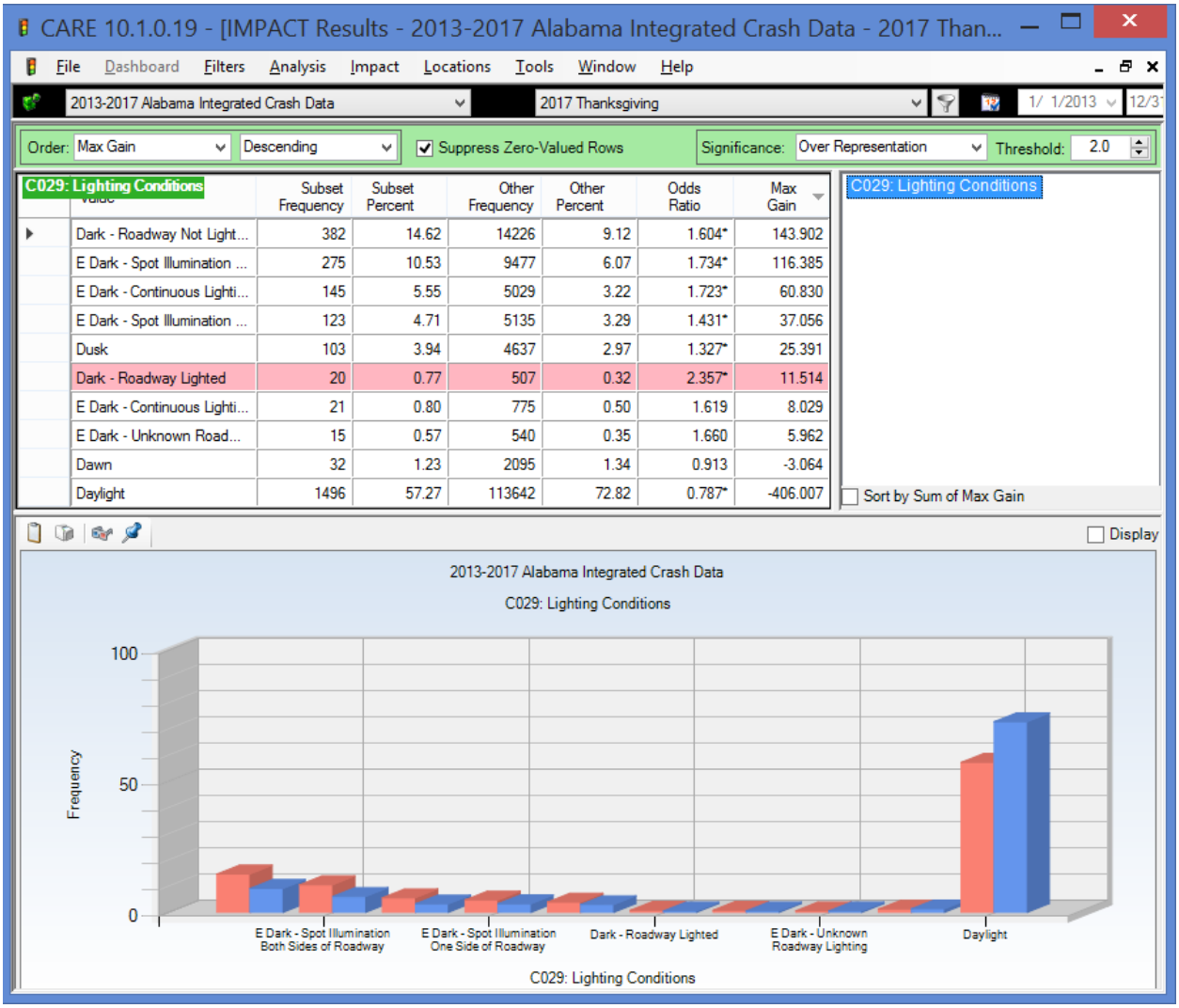


1.7 C008 Time of Day



Rush hours are not nearly as pronounced, especially the morning rush hours, which are actually significantly under-represented. The afternoon rush hours are shifted back somewhat to 5 PM until 7 PM. Late nights are not as over-represented as mid-day, but 1-2 PM is the only hour that has a significant over-representation. The major thing to recognize, however, is that although crashes are not high in frequency at night, neither are they under-represented, and darkness comes much earlier in the Thanksgiving week than many drivers might be anticipating because of the time change.

1.8 C029 Lighting Conditions

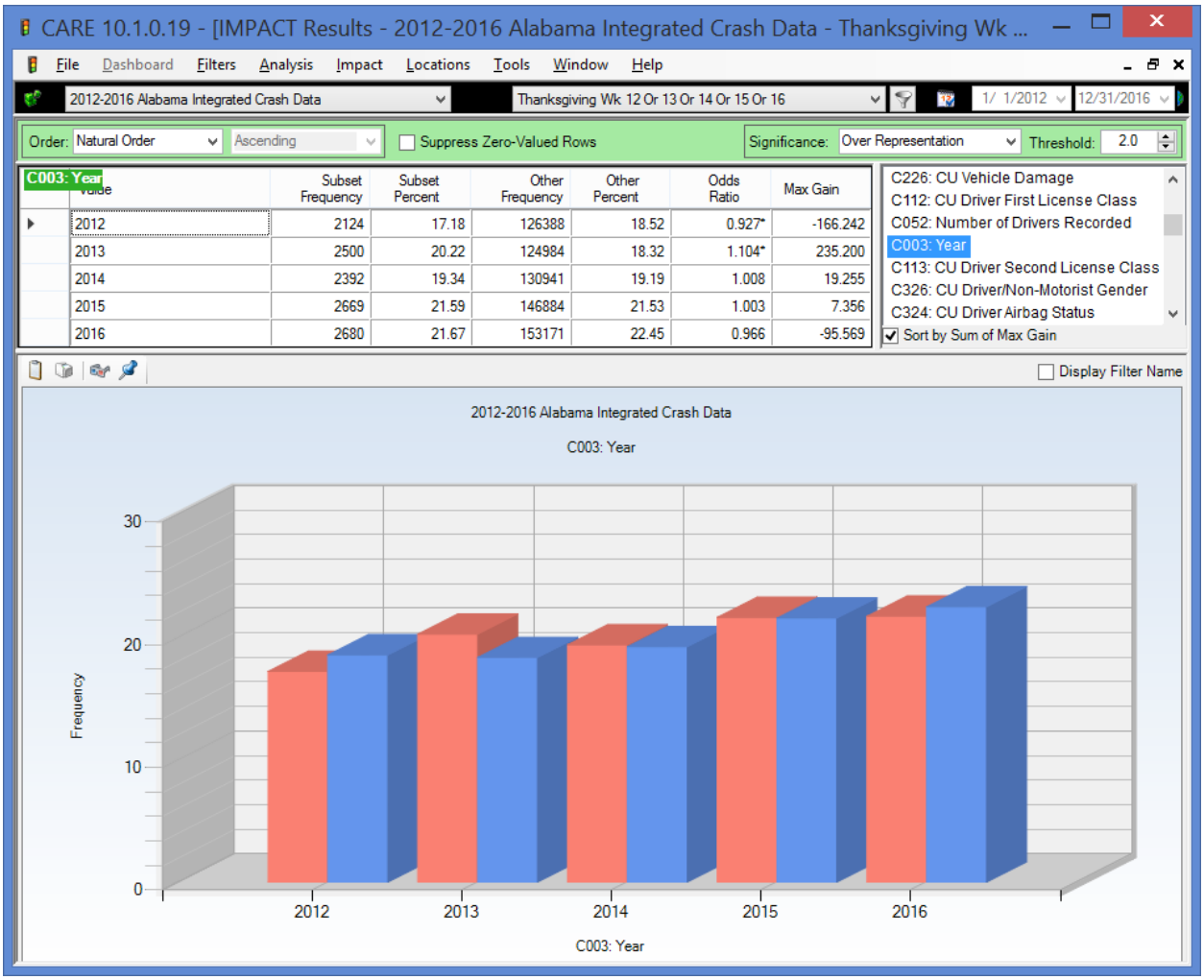


This should make it clear that travel is much safer in the day light. Adding to this, the fact that this is when more cars are on the road, further reinforces this finding.

2.0 Comparison of T Week with Non-T Week (2012-2016 updated with 2017)

The purpose of these comparisons was to determine what in Thanksgiving week was "different." What about the crashes during Thanksgiving week over the past five years had attributes so out of line as to make their odds ratios statistically significant (either greater than or less than 1.0, which would be the odds ratio if Thanksgiving week proportion were identical to the non-Thanksgiving week proportion.

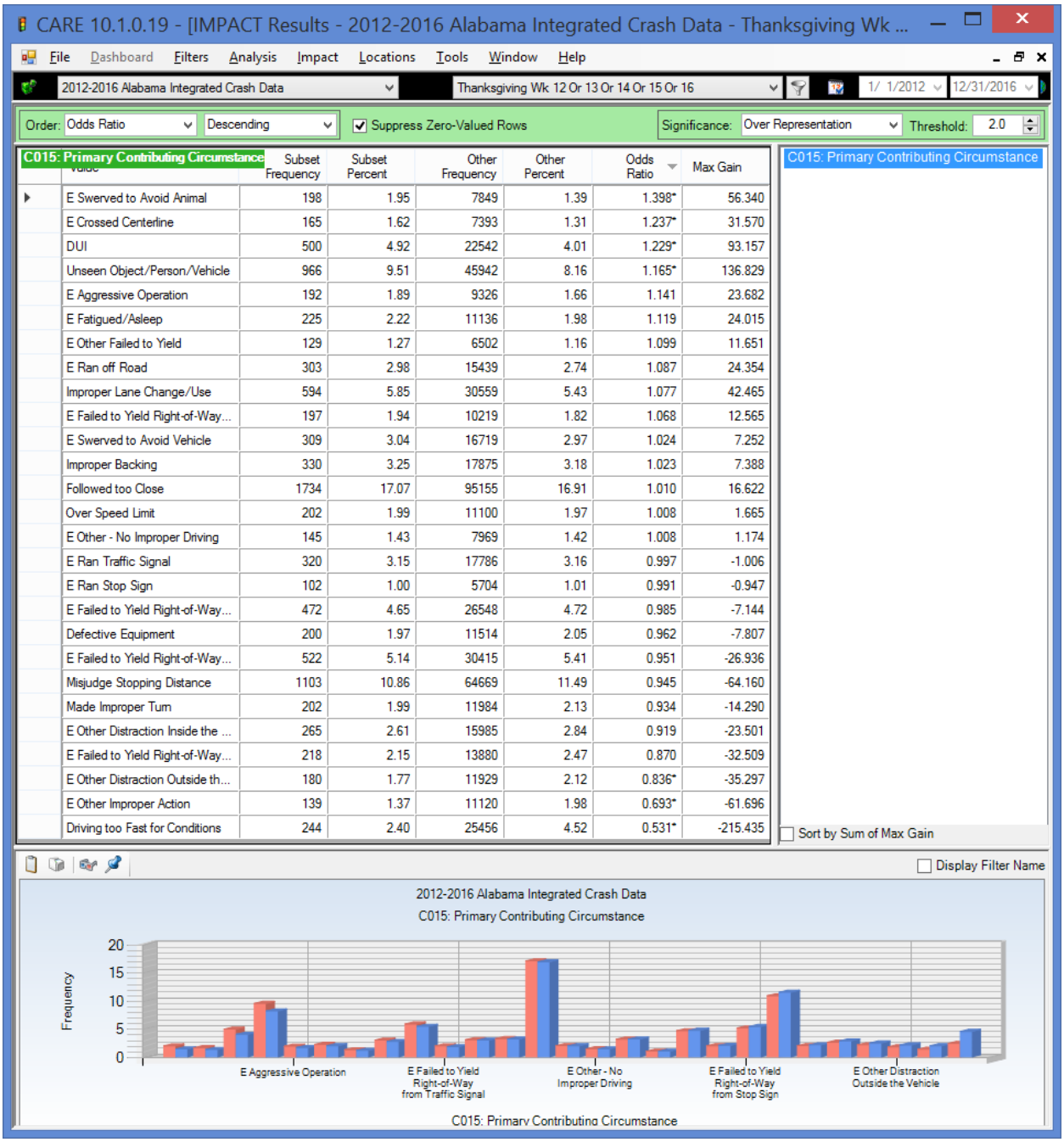
2.1 C003 Year



The Thanksgiving week proportions were only significantly different in 2012 and 2013, indication that Thanksgiving week total crashes followed the same trend as non-Thanksgiving week overall crash frequencies.

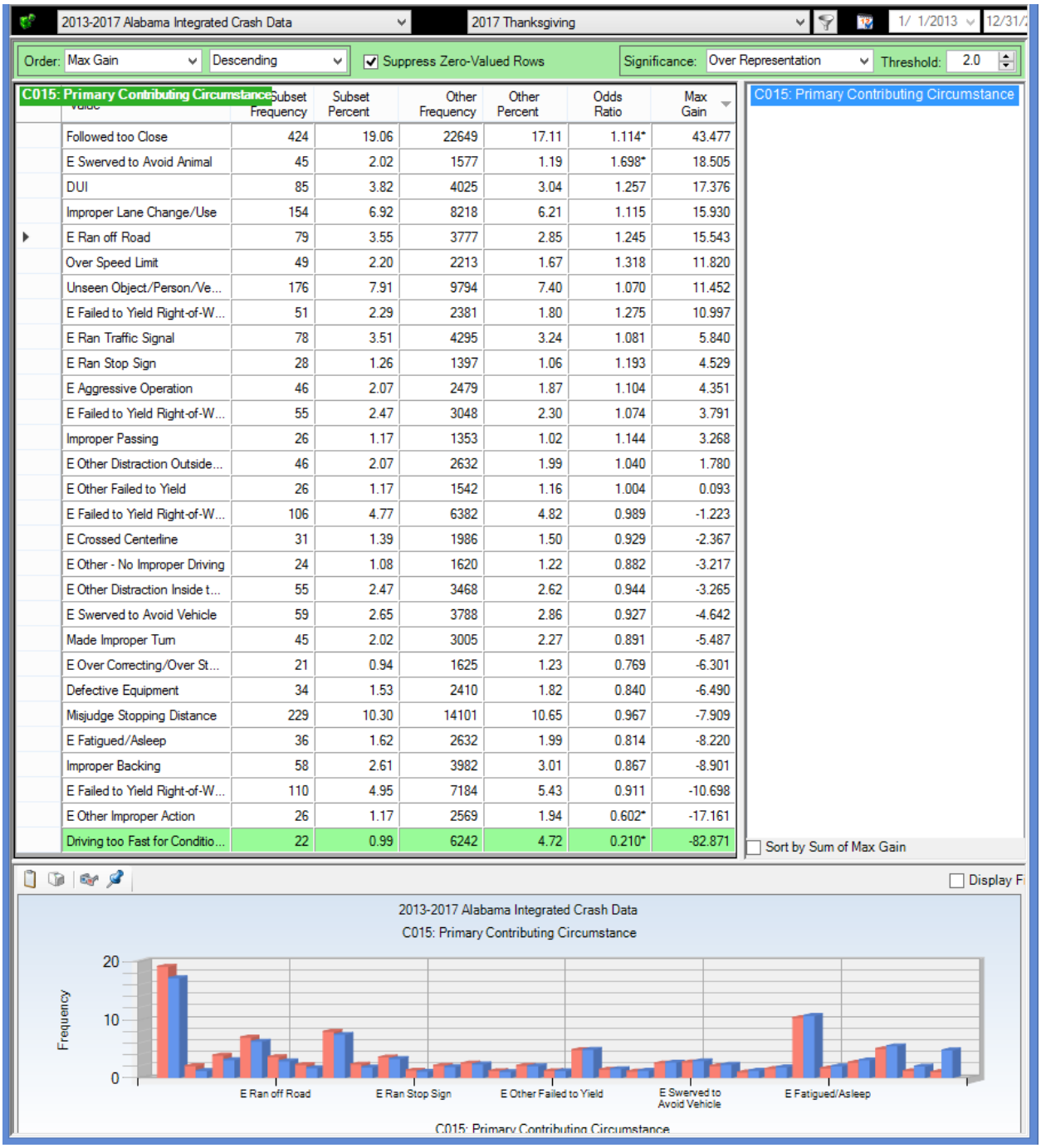
Other comparisons by year (including 2017) are given in Section 1.2.

2.2 C015 Primary Contributing Circumstance (2012-2016)



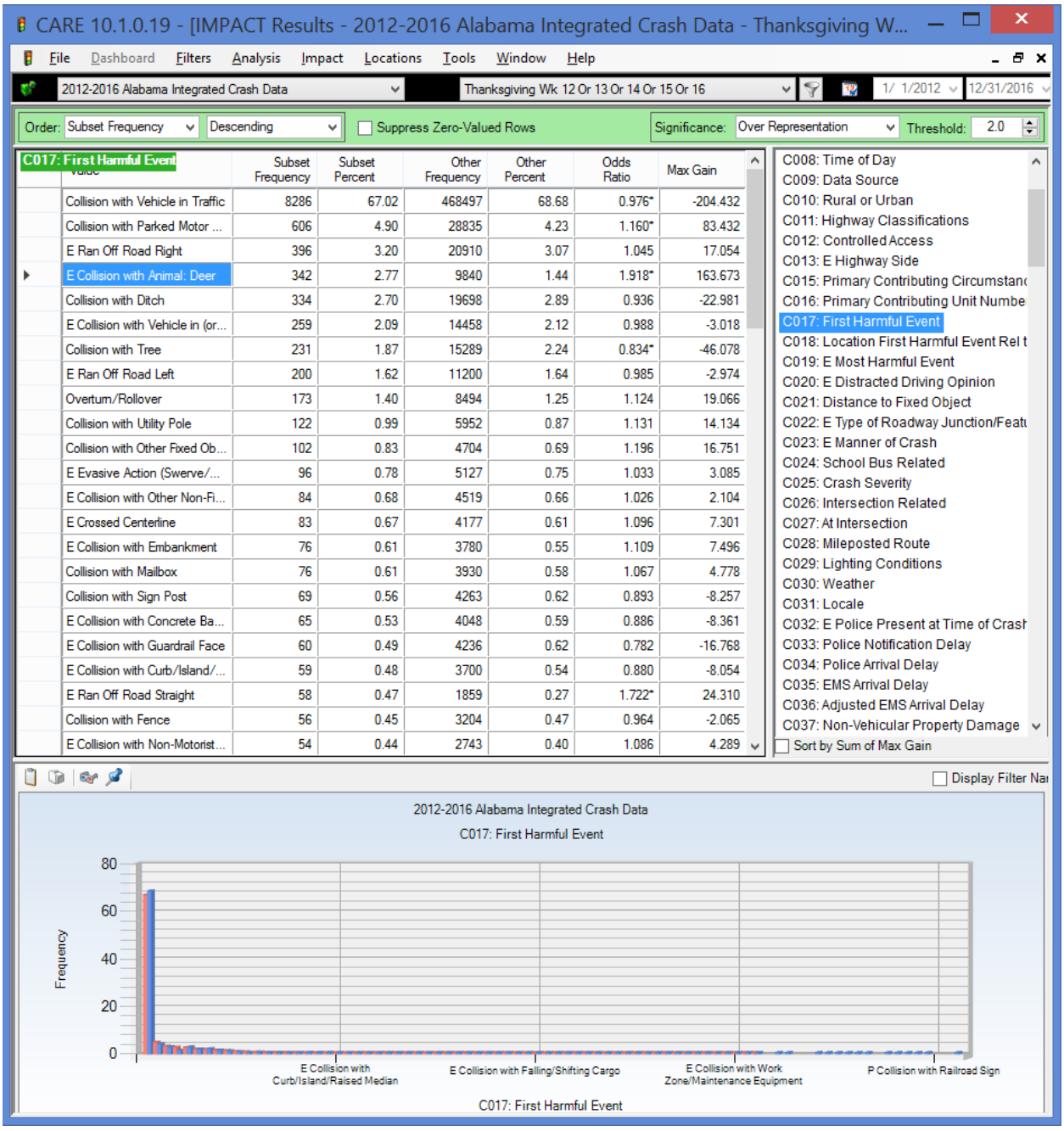
Pruning from the analysis was to all attributes with at least 100 crashes. Note the influence of deer, speed, ID and darkness. These will be seen in many of the results below.

2.2a C015 Primary Contributing Circumstance (2017 update)



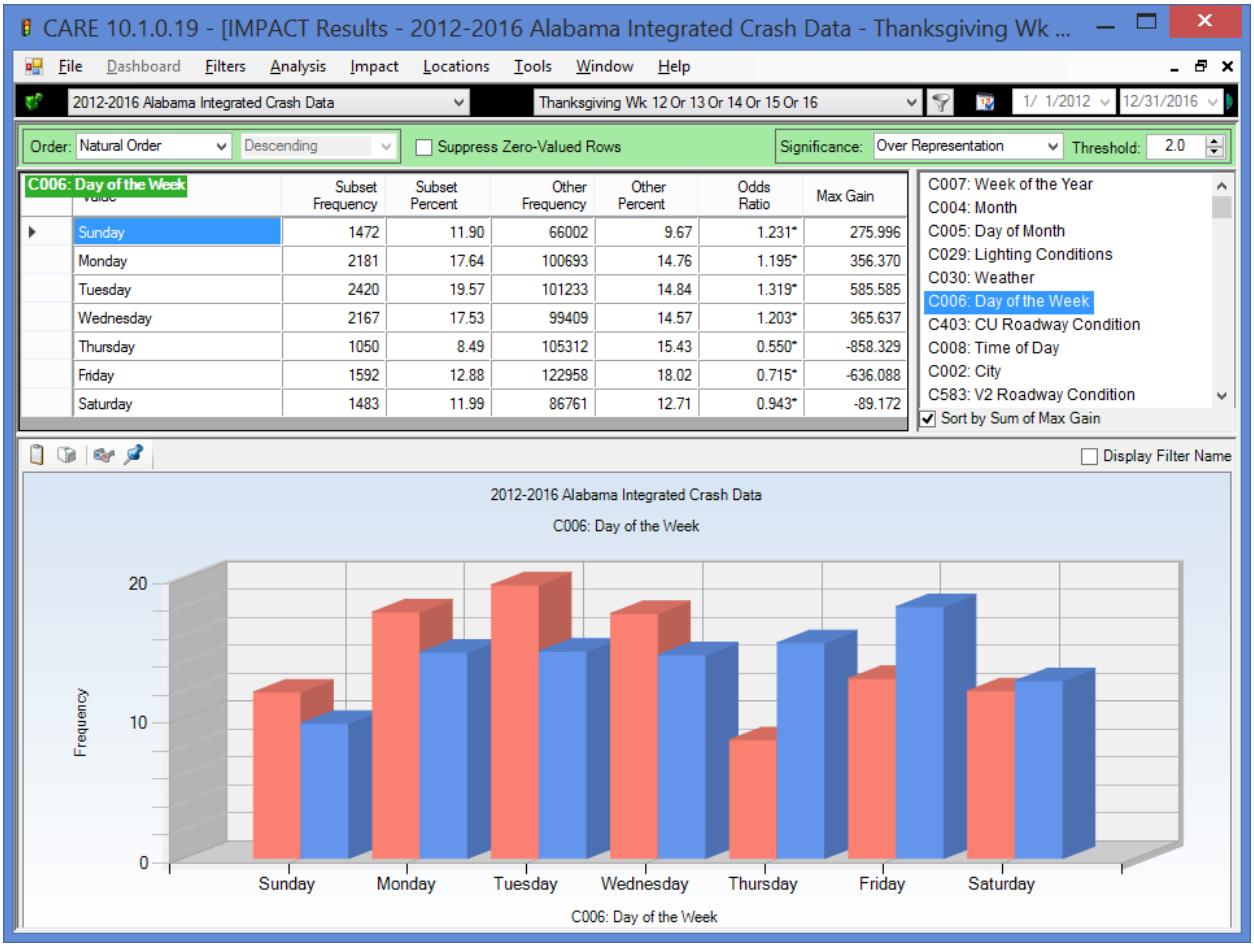
Pruned: all items with less than 20 crashes. The only major difference in a significantly over-represented item was: Following Too Close.

2.3 C017 First Harmful Event



This output was pruned to only attributes with 50 or more crashes over the 5 Thanksgiving weeks. Attributes are ordered above by highest frequency first. Some of the highest frequencies are not over-represented (i.e., they occur in this proportion effectively all the time). Deer strikes are the most over-represented category. No significant changes in the 2017 data.

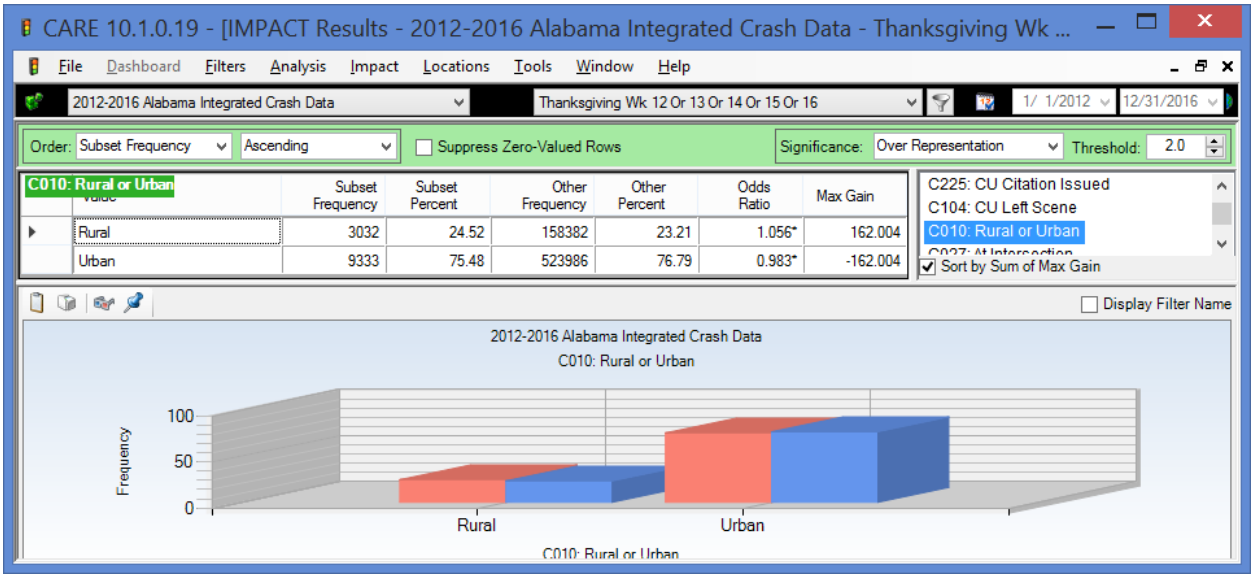
2.4 C006 Day of the Week 2012-2016



Results for 2017 are discussed in Section 1.5 and 1.6 above.

Relevant results from 2012-2016. This shows that travelers are leaving earlier in the week, which is a very good trend. It spreads out the traffic and results in fewer overall crashes. Tuesday is the high day, indicating that many get Wednesday off and leave after work on Tuesday. Thanksgiving Day is the best day to drive, although many services are not available during the holiday itself, so take what you need either for the vehicle or your family. The Sunday in the above chart is the Sunday AFTER Thanksgiving despite it being shown before. It is the only over-represented day after T day, which indicates a spreading of the traffic coming back both by time and day, with a slight concentration on the last day of the holiday week.

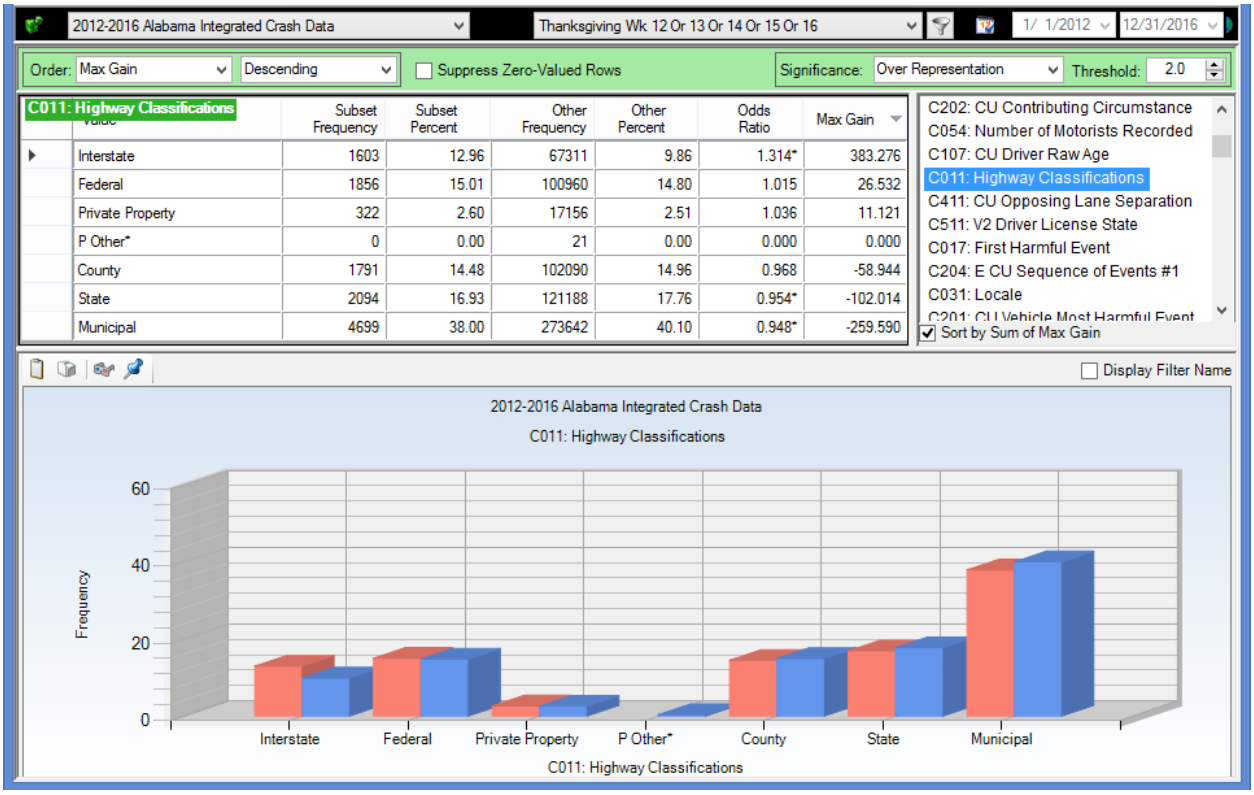
2.5 C010 Rural or Urban



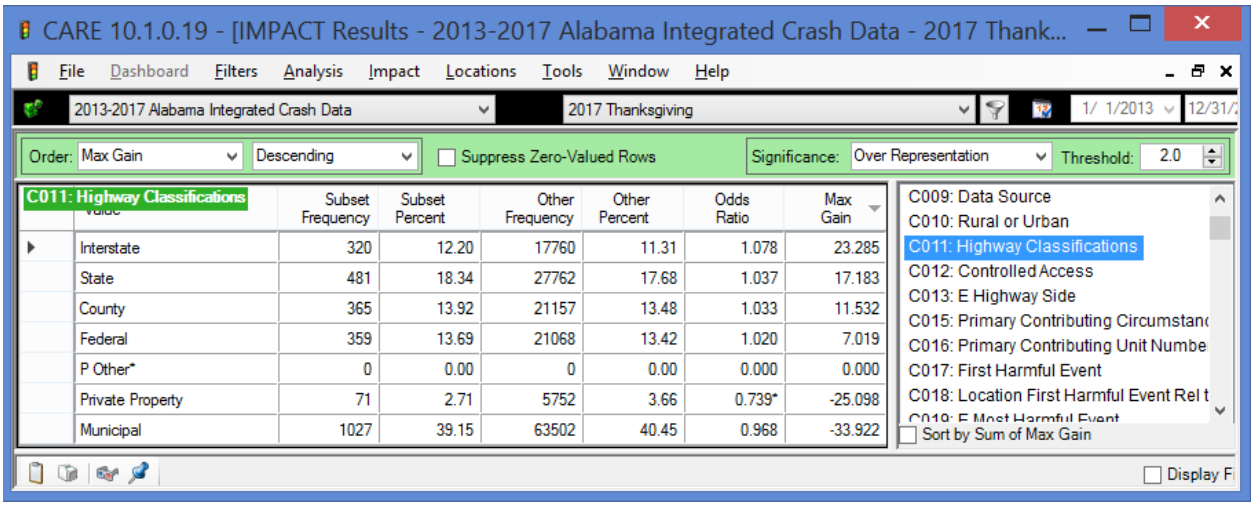
A slight increase is expected in Rural areas with more use of Interstate. The increase is only about 5.6%

No significant changes were found in the 2017 data.

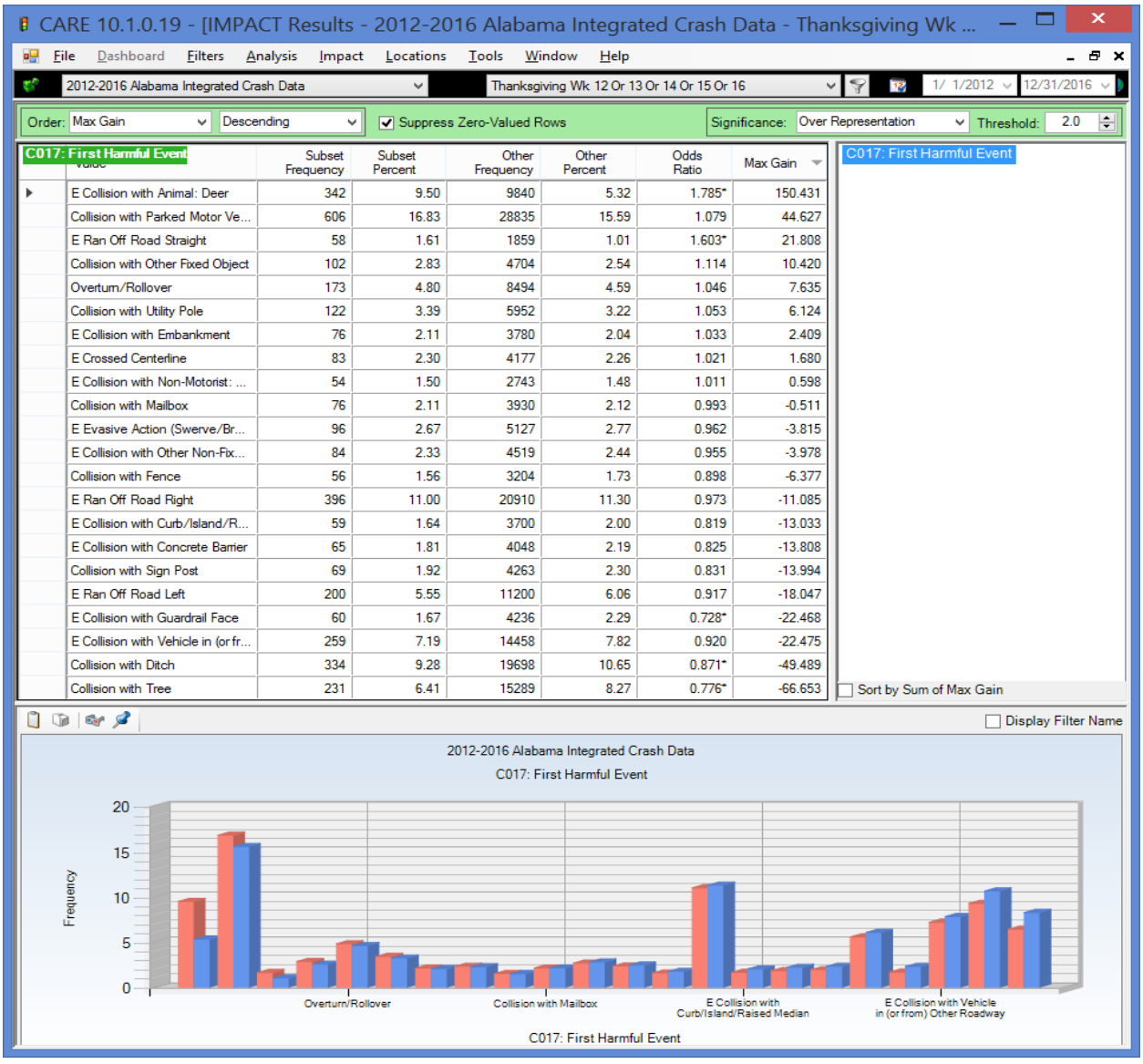
2.6 C011 Highway Classification (2012-2016 and 2017)



A major over-representation (of 31.4%) is found in the Interstate system. The other differences, while statistically significant, are not large. The large Interstate over-representation became in-significant in 2017 (see below), and most items were about as expected.

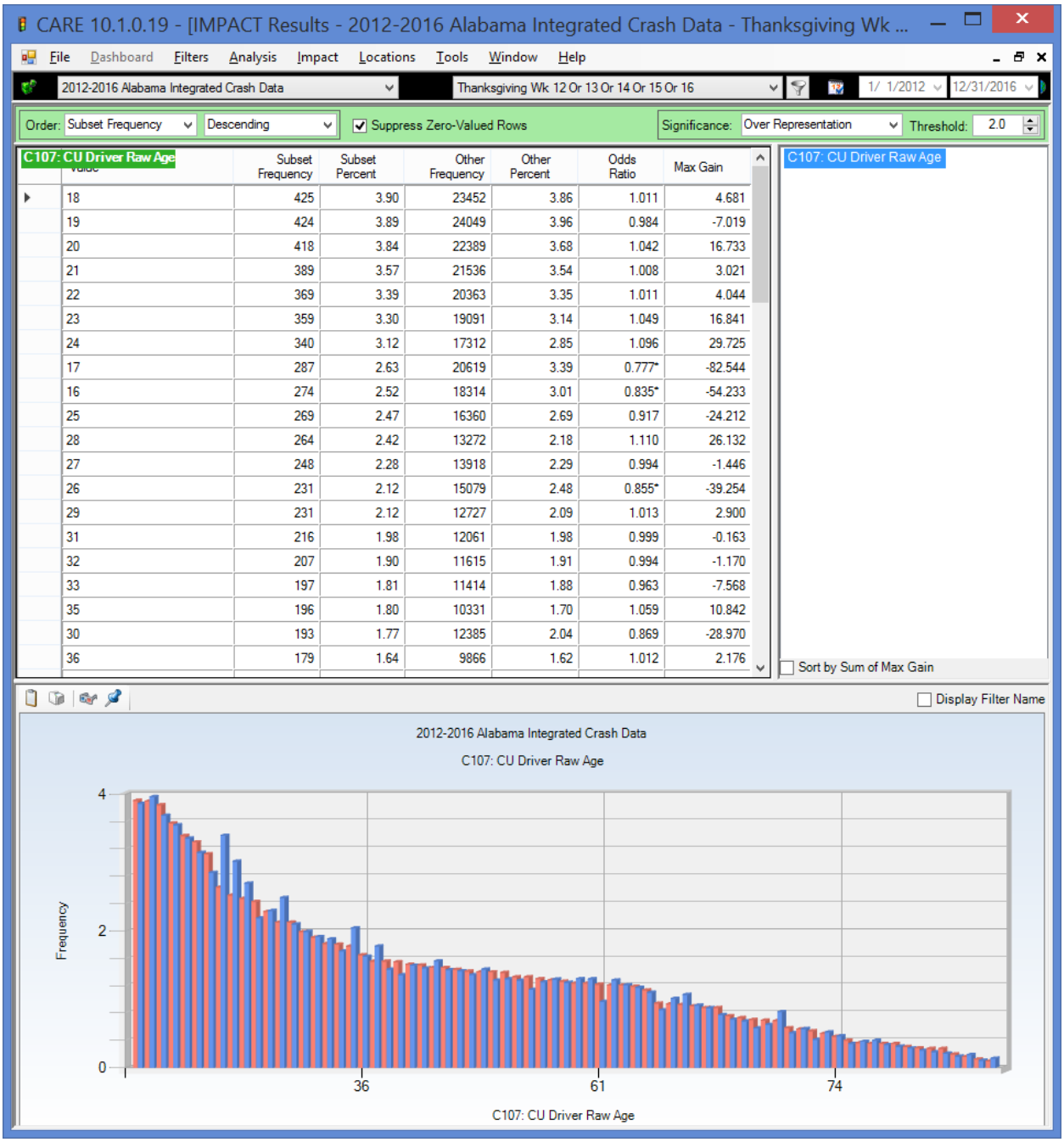


2.7 C017 First Harmful Event for Single Vehicle



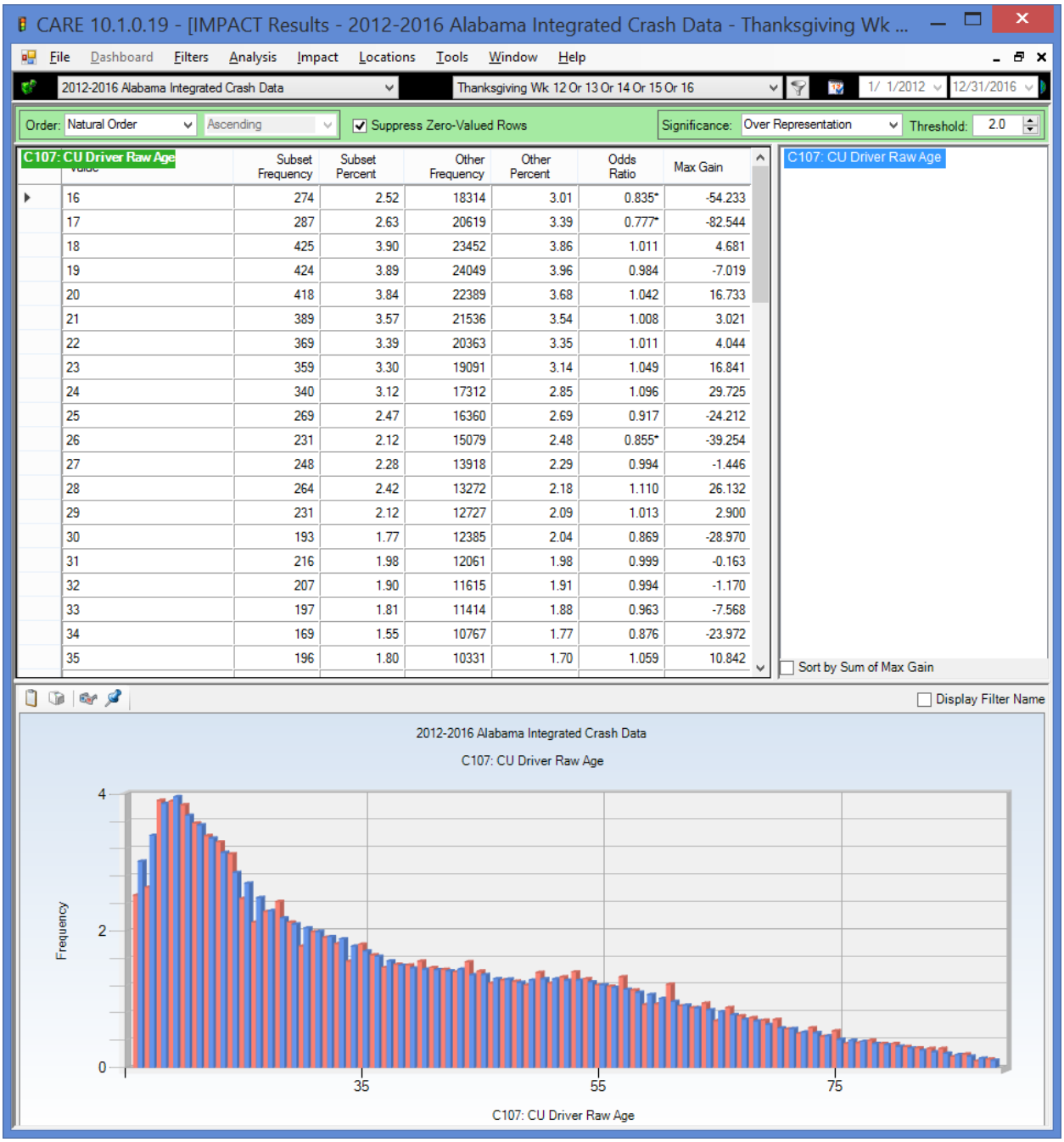
The largest occurrence of First Harmful Event was Collision with Vehicle in Traffic, which accounted for 8,286 T day crashes over the five years. This was about 67% of the crashes, and it was almost exactly the same for the non-T day crashes. For that reason, this was pruned from the above output, and therefore what remains above are the attributes for single-vehicle crashes. The ordering above is by Max Gain, showing the attributes with the highest potential for crash reduction at the top of the list. Other than deer, most of the attributes that follow can be related to some combination of speed, impaired driving or distracted driving. Generally, these same results were found to hold for the 2017 data.

2.8 C107 CU Driver Raw Age – Max First



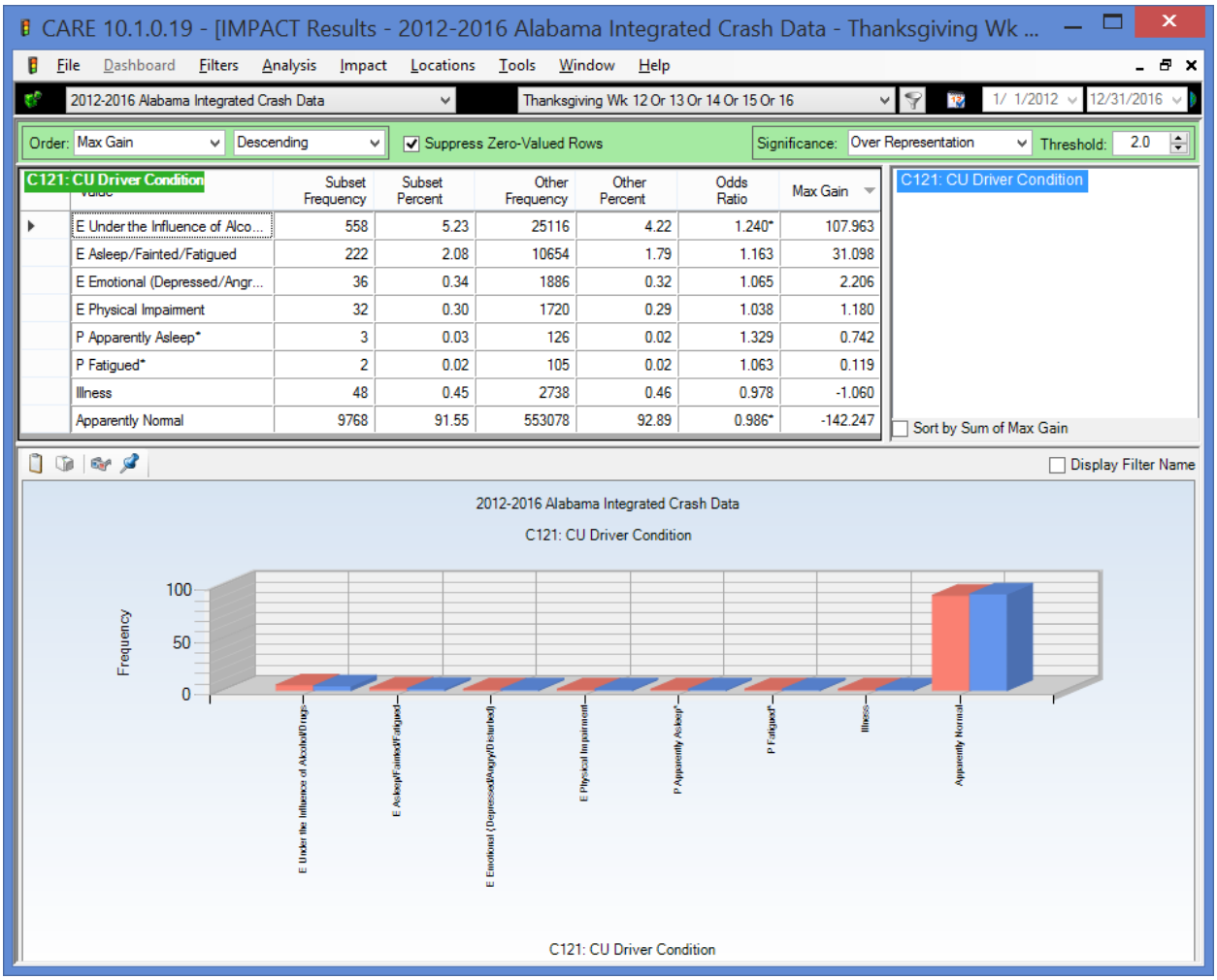
Arranged higher frequency first, younger drivers produce the greatest problem, which in comparison to the blue bars, is not unique to the Thanksgiving week. We expect the 16-17 age is down on the list only because they have less exposure (drive fewer miles) during Thanksgiving week.

2.9 C107 CU Driver Raw Age – Natural Order



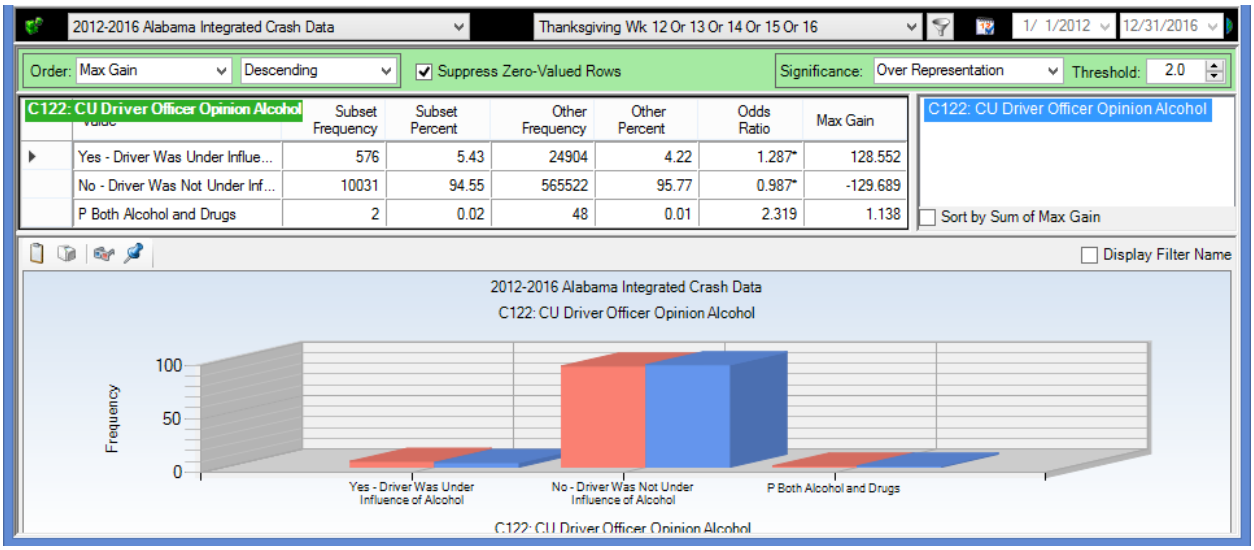
Putting the results in natural order shows no definitive patterns in the over-representations than those that are expected at other times. Generally, these same results for both age comparisons were found to hold for the 2017 data.

2.10 C121 CU Driver Condition



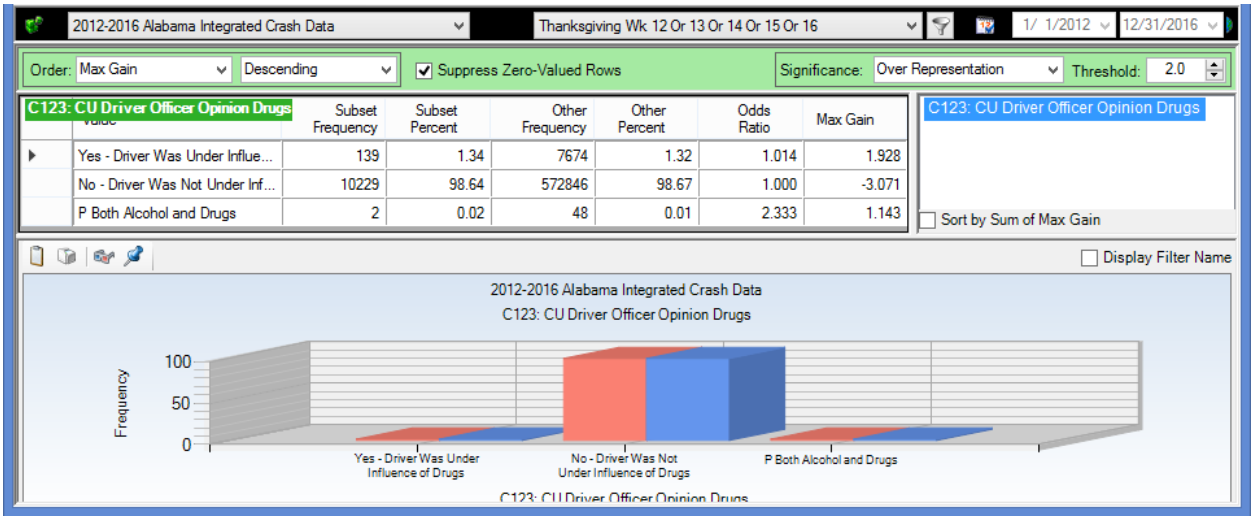
The reason that extended holiday periods tend to be over-represented in impaired driving is two-fold: (1) the tendency or excuse to use drugs (this includes alcohol) for purposes of celebration, and (2) the increased number of days that their use is tolerated. For many people who do not have to go to work over extended holiday multiple-day periods, every day behaves like a Saturday, in which ID is over-represented both in the morning and the night-time hours. ID was the only significantly over-represented item for this attribute, producing 24% more crashes during Thanksgiving week than what normally occurs. For the 2017 data, impaired driving was also over-represented by an odds ratio of 1.212, or about 21% higher than expected.

2.11 C122 CU Officer Opinion Alcohol



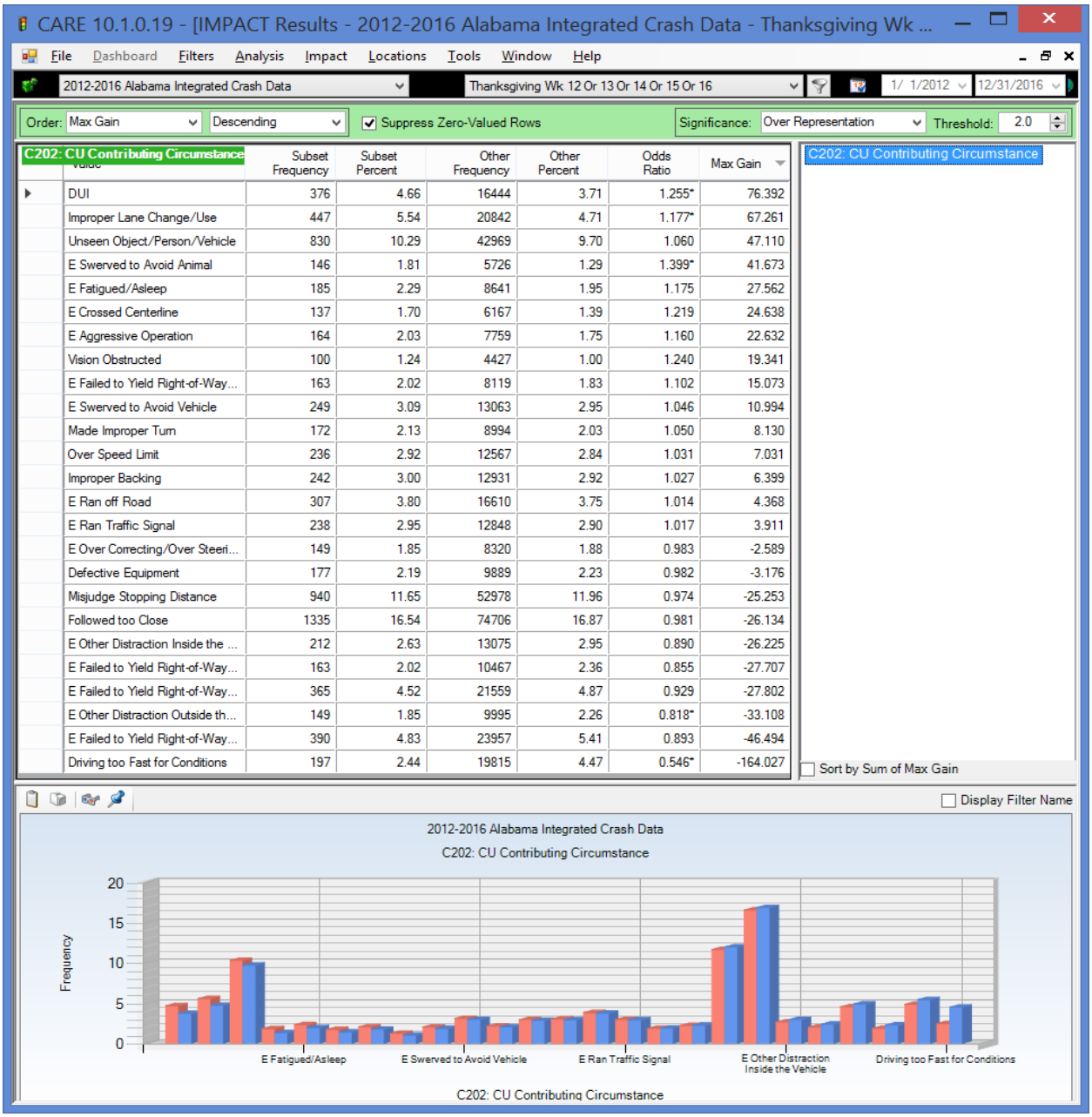
The alcohol over-representation in 2017 increased to 1.350 (from 1.287).

2.12 C123 CU Officer Opinion Drugs



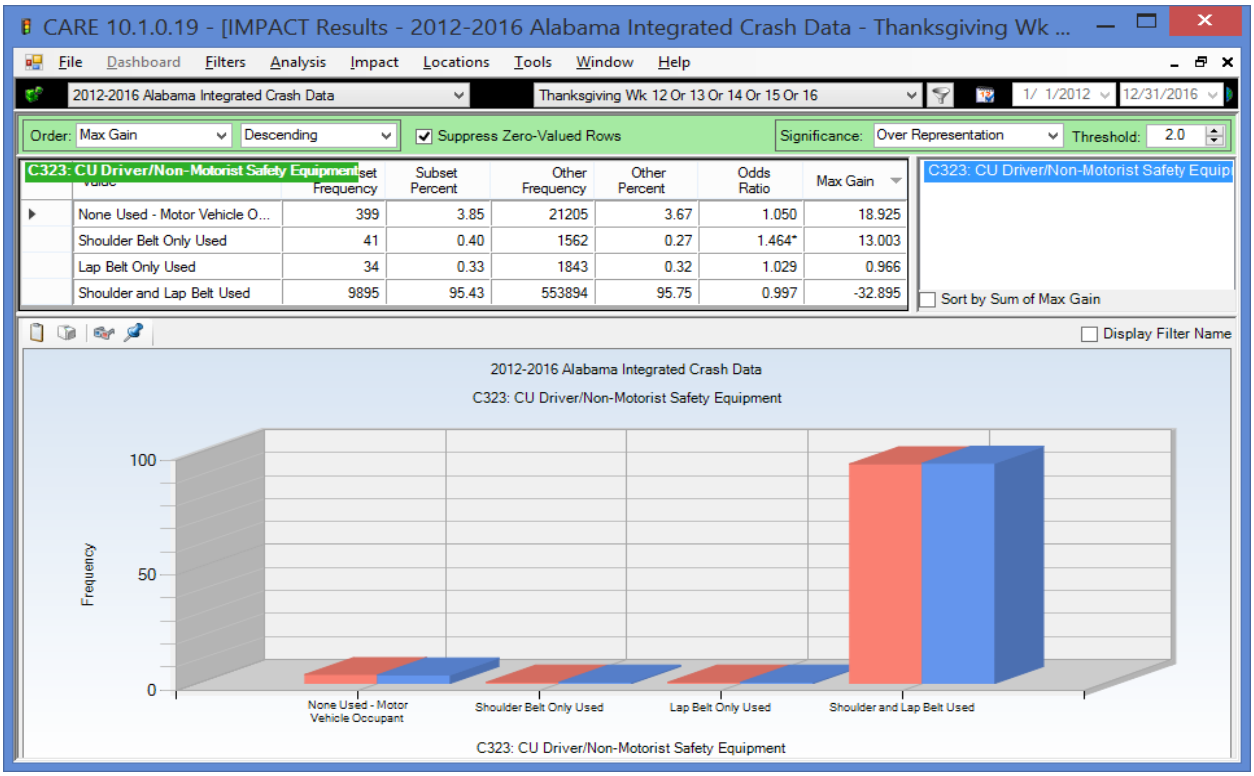
Unlike alcohol use, officers have no easy way to determine drug use, so C123 is only useful in a relative sense (e.g., over time or comparing specific times). No significant over-representation was found, and that found above for alcohol (C122) confirms the results of C121 (Section 2.10). The results for the 2017 data found an Odds Ratio of 1.102, which indicates a small relative increase in reported drug use associated with the Thanksgiving-week crashes.

2.13 C202 CU Contributing Circumstances



The results above are for all CU-CC items that had at least 100 crashes. It further confirms the ID findings of the previous three sections. It is interesting to observe that ID and speed could have played a part in most of the items that followed, but in most cases officers will (understandably) select the CC that is the most obvious and easiest to prove. Generally, these same results were found to hold for the 2017 data.

2.14 C323 CU Driver Seatbelts



Generally seatbelt use was as would be expected throughout the year. The Shoulder Belt Only was somewhat alarming in that it was suspected with more family travel this might involve young children. However, drill-down revealed that the ages involved of these 41 persons was only eight 13 or less, and the rest were 16 and above (driving age). If anything the concentration seemed to be in the 18-23, 28-33 and 48-54. Further, none of these persons suffered fatal injuries. So we recommend that this particular behavior (Shoulder Belt Only) be studied as a separate topic. The table below for 2017 shows several changes, with the None Used category rising to an over-representation of 30% more than expected, and a corresponding significant under-representation of both lap and shoulder use.