

ANALYSIS OF THE WET VS. DRY COUNTIES WITHIN ALABAMA

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INTRODUCTION AND BACKGROUND

CARE IMPACT analyses were performed to compare 13 dry counties with 13 wet counties over their various crash characteristics for a recent five-year (2003-2007) time period. The results fall into two logical categories: those that compare the demographics of the counties and those that compare the crash characteristics with regard to alcohol. A few of the nearly 200 attribute comparisons are presented in this document in order to guide the direction of the research project. Comments in this regard will be given under each of the outputs below.

As a preliminary discussion to this, it is good to observe the first output below and recognize its implication. The chart gives a comparison between the test areas (wet counties in red) and the control area (dry counties in blue). The variable being compared is Locale, which can have seven possible values: Open Country, Playground, School, etc. These values within the chart and the table will be arranged either “worst-first” as in the display below, or in a natural ordering for attributes that lend themselves to such an ordering.

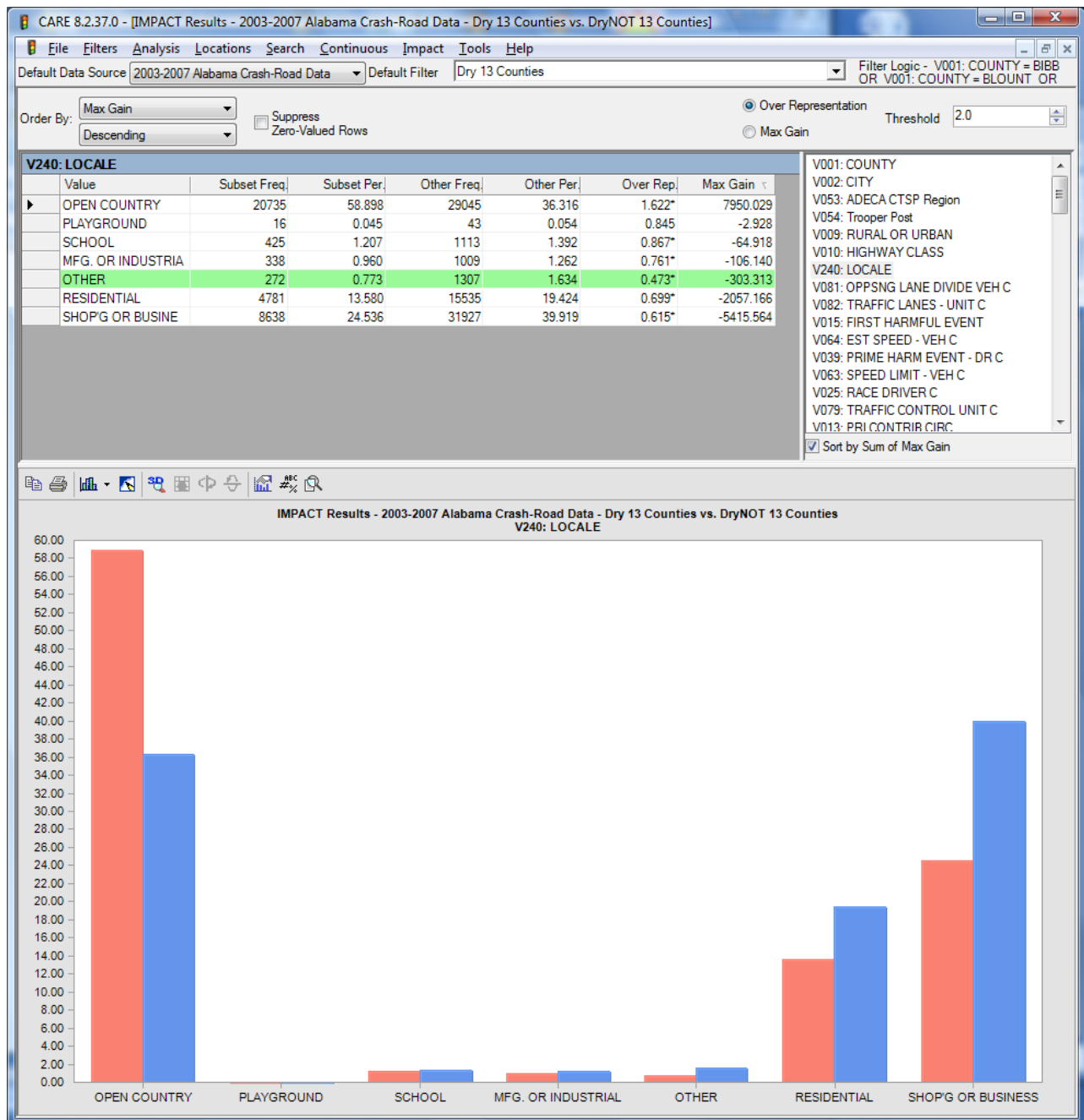
The “worst-first” ordering presents those values that are most *over-represented* at the top of the table and at the left of the chart. By *over-represented* we mean that there are proportionately more of these values occurring in the wet areas than is expected from the results observed in the dry area. As an example, “Open Country” is over-represented in the wet areas under consideration as compared to the dry areas under consideration.

The table above the chart further quantifies this over-representation. Let’s observe the values in the table for Open Country. We see that the wet counties had a “Subset Freq” (frequency of occurrences in the wet counties) of 20,735 crashes, and that this represents 58.898% of the crashes in the wet counties. The “Other Freq” and “Other Per” are the same respective numbers for the dry counties under consideration. In this case they had 29,045 crashes, which represent 36.316% of their crashes. Because the areas have different traffic densities and different population centers, the raw number of crashes are not comparable. However, the percentages are. All other things being equal, we would expect that the dry counties would have 36.316% of the Open Country crashes. However, it has a much higher proportion than this, and that is why we refer to it as being over-represented.

The degree of this over-representation can be established by the odds ratio of the wet to the dry counties for this value. In this case the odds ratio (listed in the table as “Over Rep”) is equal to $58.898\% / 36.316\% = 1.622$. The asterisk (*) after the 1.622 indicates that this is significant at a 99% significance level using the normal approximation to the binomial as the statistical test. Finally, the Max Gain number in the last column is the

number of crashes that would be eliminated if somehow we could eliminate just the over-representation. This would be the proportion represented by the red bar over and above the blue bar. In other words, of the 20,735 crashes that occurred in Open Country, if there were some countermeasure to just make the 58.889% drop down to the 36.316% of the wet counties, then we could reduce 7950.029 crashes.

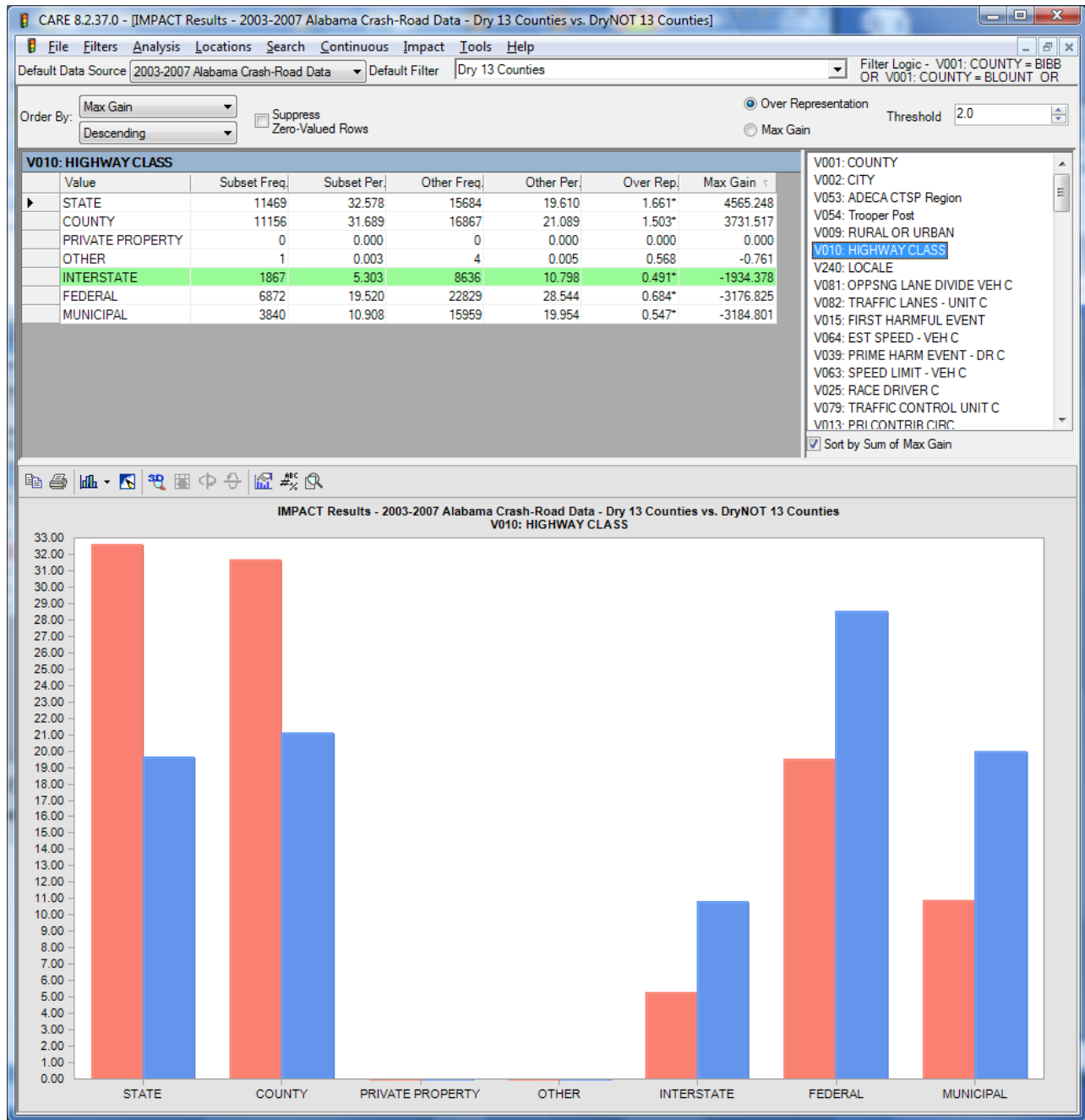
Locale of Crash (Red=Dry; Blue = Wet)



Of course, in this case the Locale variable is basically comparing the demographics of the two sets of counties and there is no way that these demographics are going to be changed. However, these numbers are significant in alerting us to the differences in the two sets of counties. For a fair comparison of alcohol involved crashes, we would want these demographic distributions to be as close to each other as possible. See the diagrams below for additional discussions.

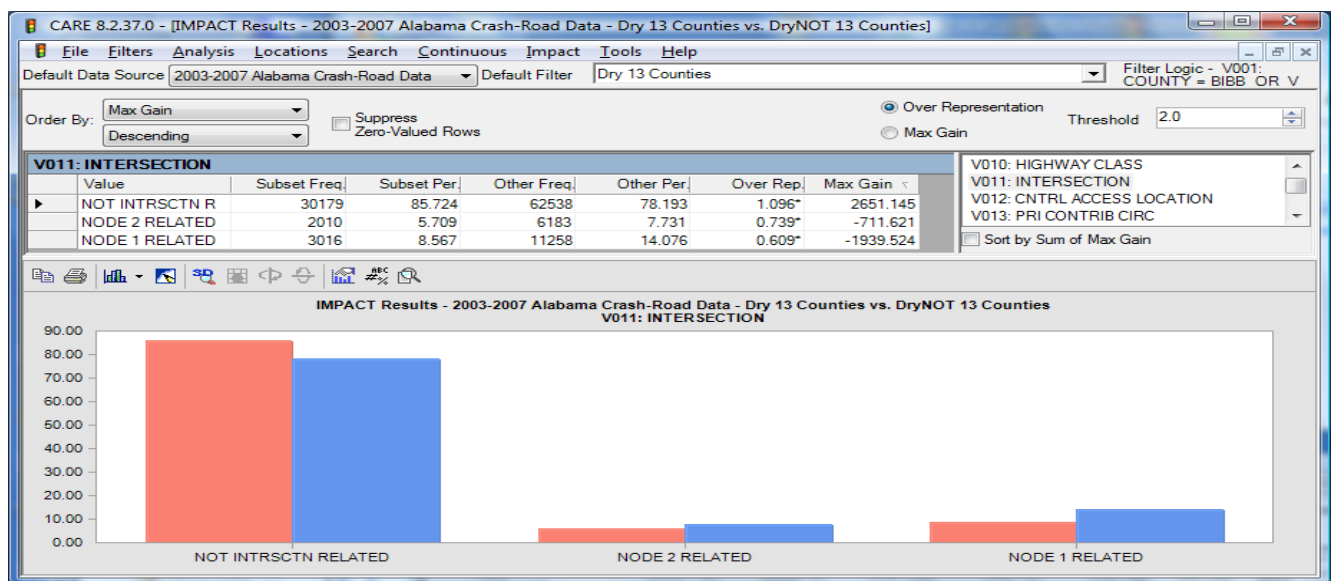
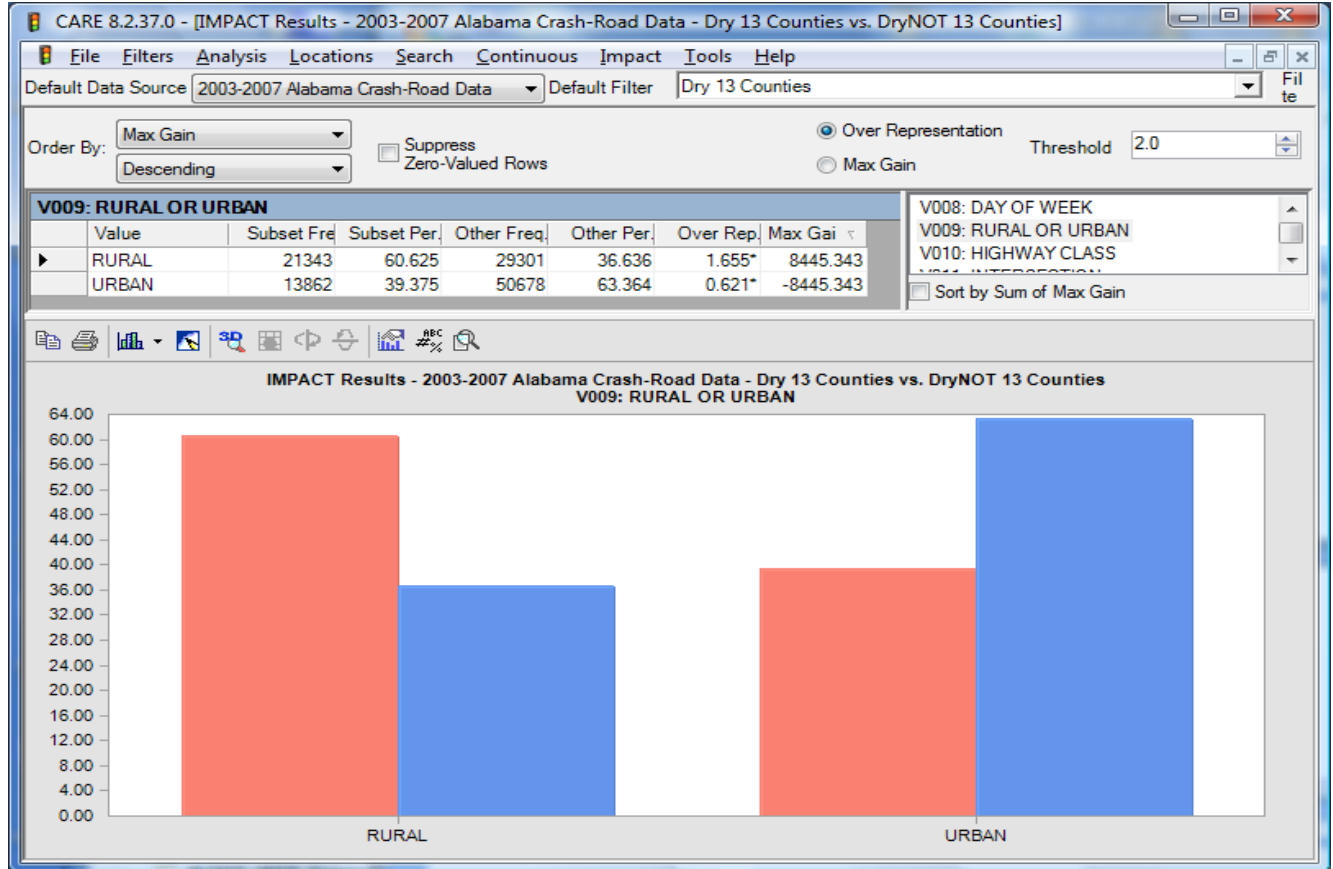
This variable indicates that the 13 dry counties had their crashes (alcohol caused or not) in open country as opposed to the other categories. This indicates that the dry counties are generally much more rural than the wet counties that were chosen for consideration. This might warrant another selection of either the wet or the dry counties in order to assure that they are comparable.

Highway Classification (Red=Dry; Blue = Wet)



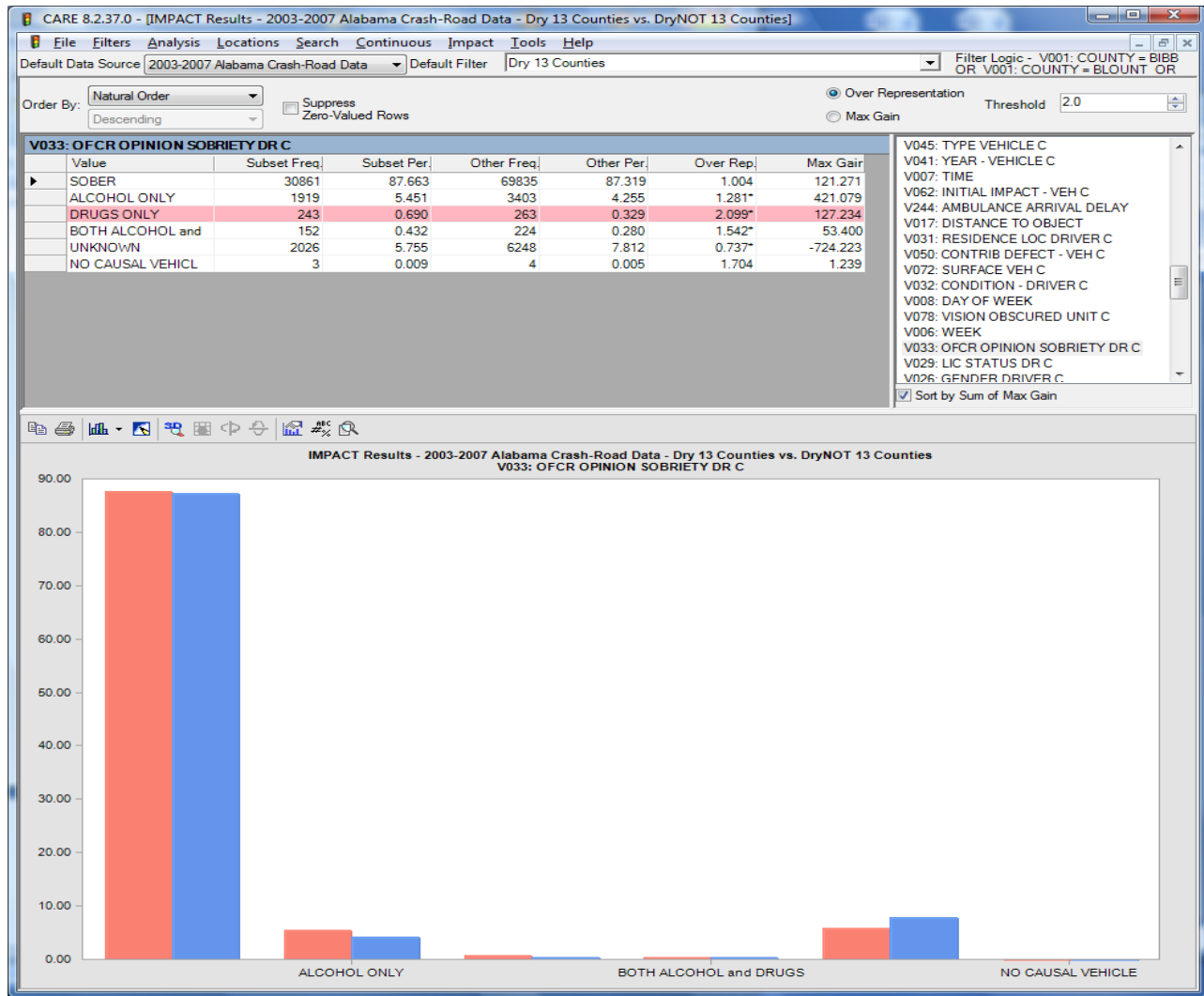
Most of the other demographic type variables will demonstrate much the same thing as illustrated above – the over-representation of rural characteristics. In this case crashes on state and county roads are over-represented. The chart below indicates over-representation of rural area crashes per se.

Rural and Urban Crashes (Red=Dry; Blue = Wet)



Intersection related crashes are more inclined to be in urban areas, so this is another confirming demographic related to the dry areas being more rural.

Alcohol Causation (Red = Dry; Blue = Wet)



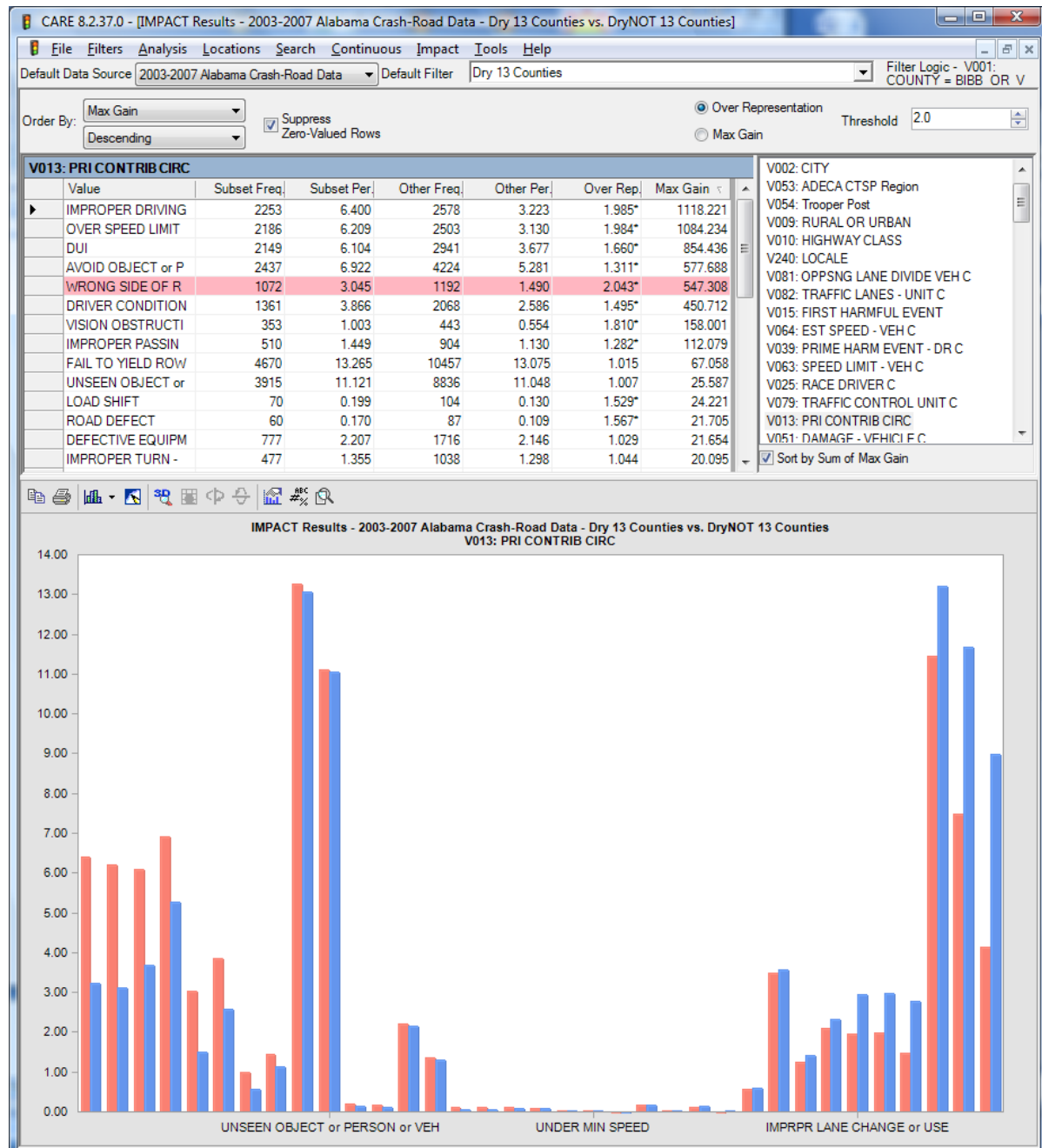
This is the first display that represents crash causation, in this case alcohol/drug involvement. Note that the dry counties have 5.451% reported alcohol-caused crashes as opposed to the 4.255% for the dry counties, or a 1.291 odds ratio, which is highly significant. Both of the proportional estimates are for reported alcohol involvement, which is probably less than actual due to officer reluctance to indicate DUI if it cannot be totally proven. However, we would not expect the reporting tendencies to vary between the dry and wet county areas.

Note also that drugs only are over-represented in the dry counties by an odds ratio of over two (indicated by the red bar in the table). Finally, the "Both Alcohol and Drugs" is also over-represented by an odds ratio of over 1.5.

There is no question that the dry counties that were selected show no advantage over the wet counties when it comes to either alcohol or drug causation. The only question is

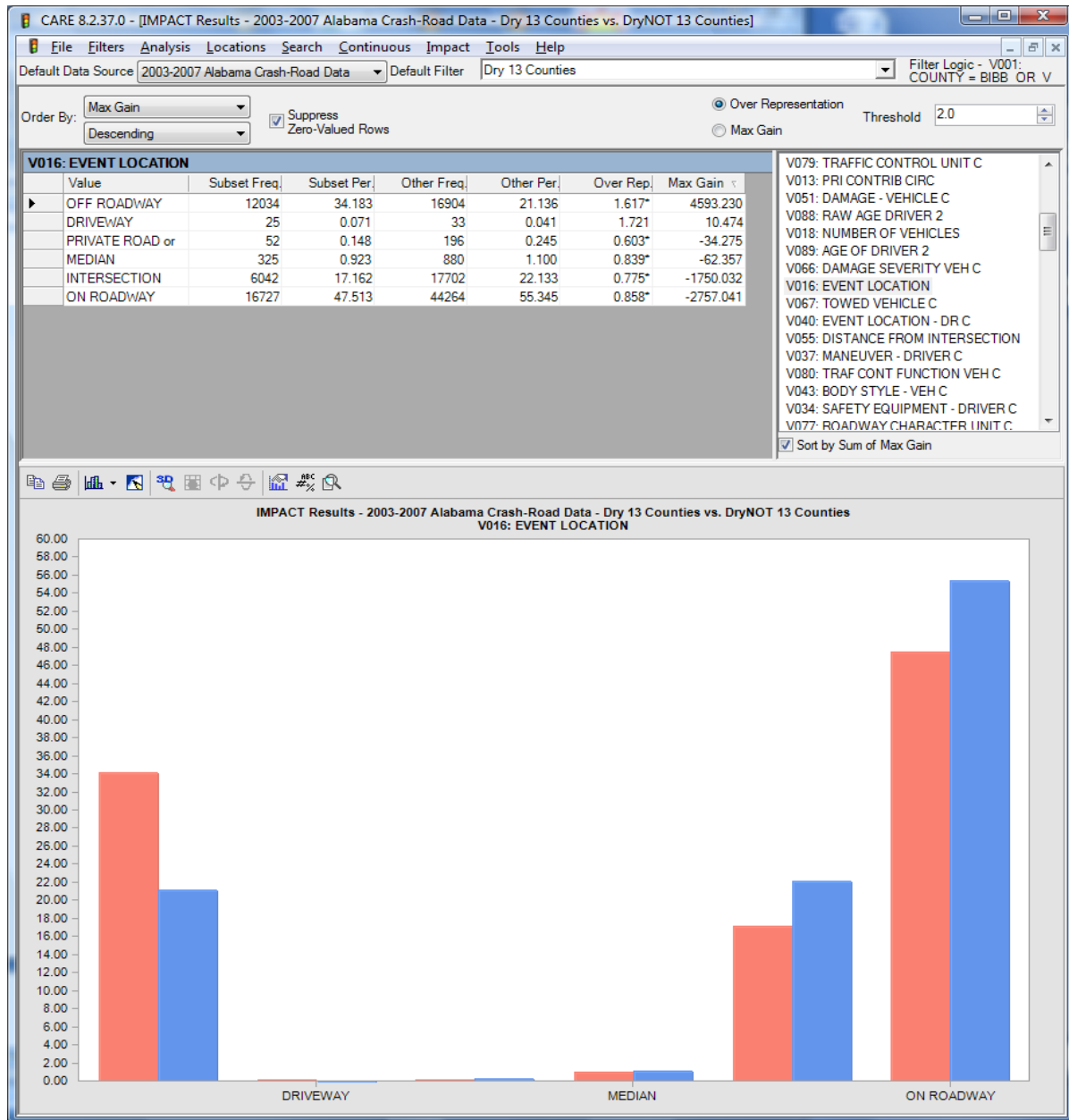
whether they were selected to create a fair test. Most of the following tend to further confirm these findings.

Primary Contributing Circumstance (Red = Dry; Blue = Wet)



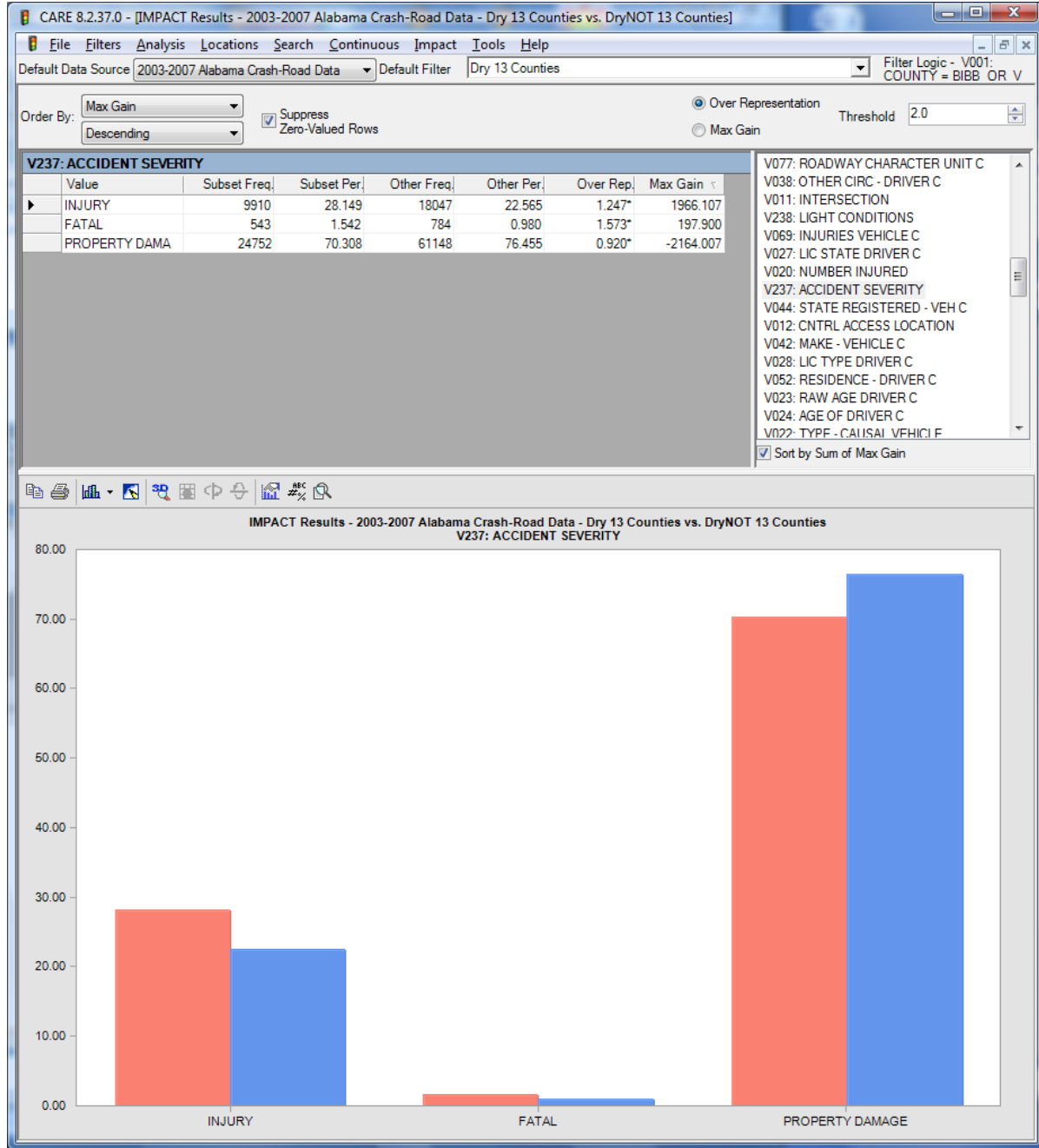
DUI is over-represented by a factor of 1.660; several of the other categories are clearly related and quite often occur in conjunction with alcohol use, e.g., over the speed limit and especially driving on the wrong side of the road.

Event Location (Red = Dry; Blue = Wet)



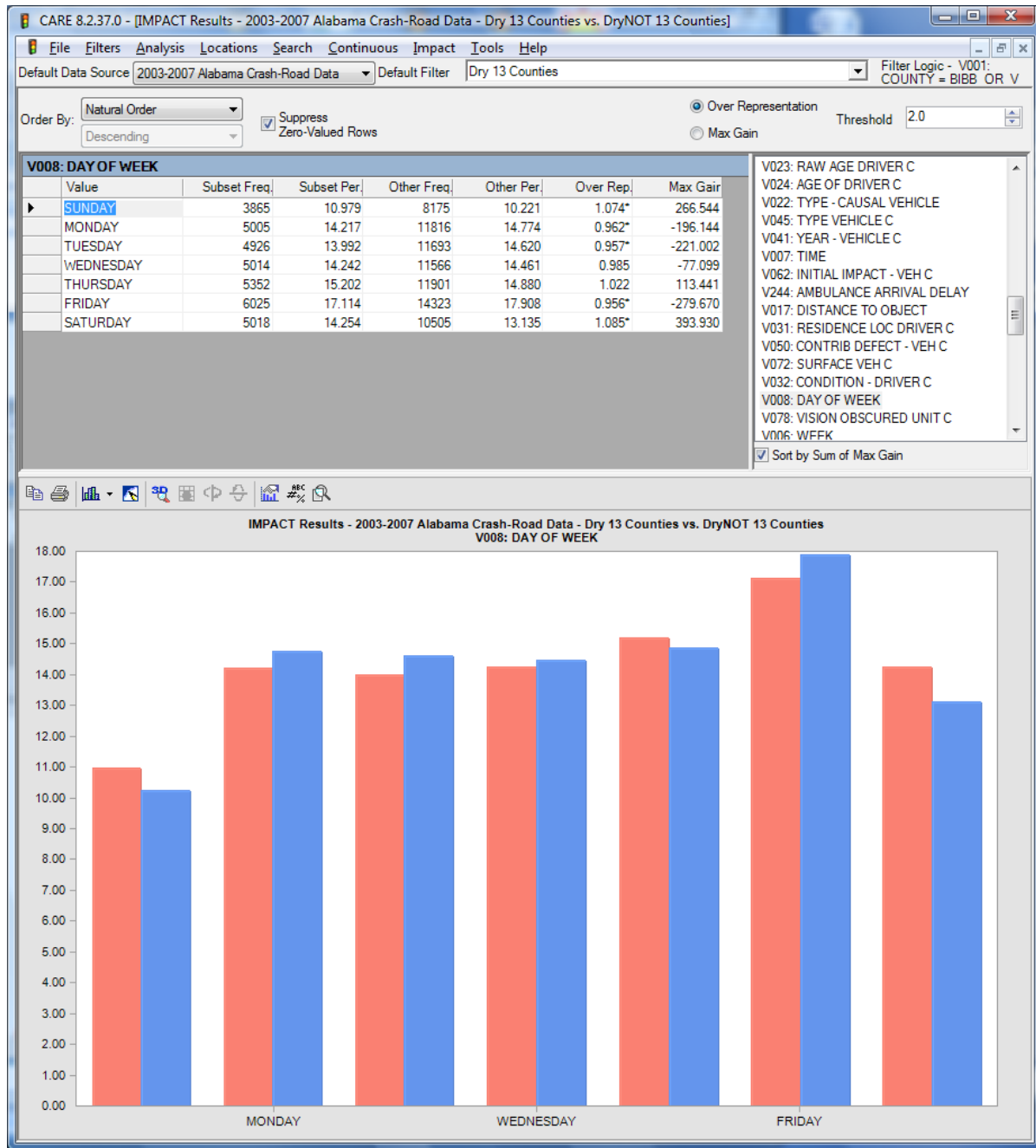
Running off the roadway is a proxy for DUI. This tends to confirm the findings above.

Crash Severity (Red = Dry; Blue = Wet)



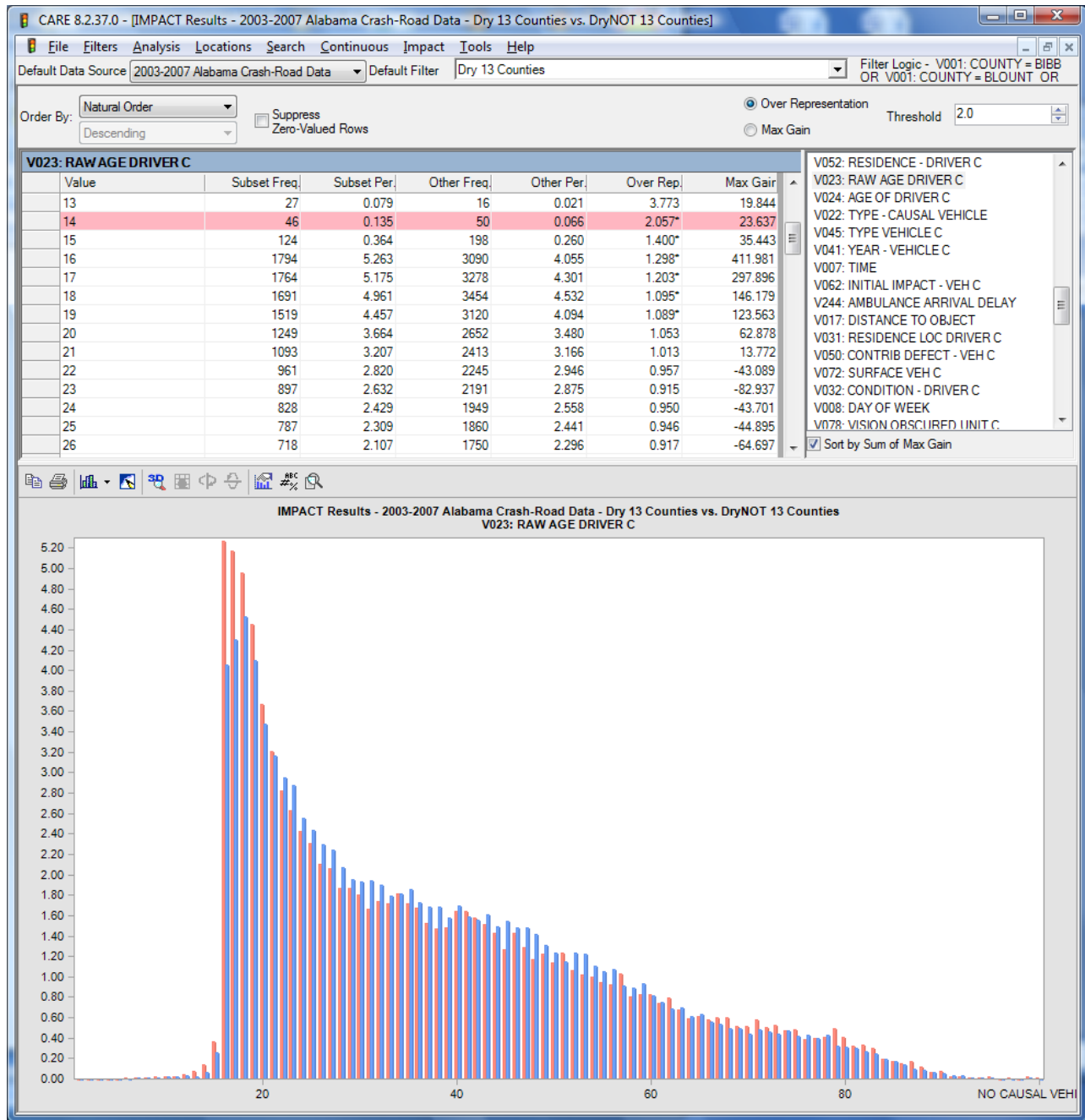
It might be argued that the crashes in the dry counties are less severe. This display clearly indicates that this is not the case. Both injury and fatal crashes are significantly over-represented in the dry counties. Since DUI causes between 40-50% of fatal crashes, the over-representation in DUI crashes noted above would contribute to the higher severity over-representations.

Day of the Week (Red = Dry; Blue = Wet)



It is well known that DUI crashes are over-represented on Saturdays and Sundays and under-represented the other days of the week. The above is not nearly as pronounced as DUI, but it is certainly indicative of more of an alcohol problem in the dry counties than in the wet counties.

Causal Driver Age (Red = Dry; Blue = Wet)



This result is independent of the alcohol findings, and at this point there should be no implication that the younger drivers in the dry counties are causing the alcohol-related crashes. This will be determined in further analyses. However, it is being presented at this point because it was unexpected. Alcohol/drug related crashes usually do not become over-represented until the 21 and older age group. However, the red bars here are not alcohol, they are all crashes in the dry counties.

From this we can observe the following:

- The very young ages of 13-14 (before any licensing can take place) are over-represented, indicating that in the more rural areas there might be more use of three and four wheeled vehicles, if not actual driving of normal motor vehicles. No significance test is done if the sample size is less than 20, as in the case of the 13 year old drivers.
- Age 15 shows the strongest over-representation, although the numbers are still relatively low for these drivers, who can only legally operate a motorcycle at this age without adult supervision.
- Ages 16-20, the normal “youthful driver” are all significantly over-represented, although the trend seems to be that it tapers off with age.

GENERAL FINDINGS AND RECOMMENDATIONS

This is a preliminary study and no general conclusions should be drawn from it about wet and dry counties in general. It was conducted only to guide the further studies that are recommended, and in this regard the following should be considered:

- First, it seems clear that the wet and dry counties are significantly different in their rural-urban mix, and this could dramatically skew the results. The first recommendation is to re-select either the wet, the dry, or both of the county subsets to assure a better comparison. Hopefully the rural-urban comparison as well as many other demographic factors will not be significantly different (in proportion) between the two groups being compared, further insuring that the results obtained are the result of the counties being wet or dry and no other factors.
- It is recommended that no further study be done using these particular subsets of counties since any results could lead to erroneous conclusions being drawn.
- It does seem that a set of counties being “wet” or “dry” does not have the anticipated effect on the driving population. While we cannot draw any firm conclusions with regard to which type of county is typically worse, it is quite clear that *this* particular set of dry counties was in no way superior to *this* particular set of wet counties. So perhaps, as a counterexample, the conclusion could be drawn that a set of dry counties exists that has a significantly higher proportion of alcohol/drug involved crashes than a set of wet counties of equal number. This might be counterintuitive to some, and as a result it definitely justifies addition research effort.
- The age variable also needs more work since it too could be the result of the disparity in the rural-urban mix of the two county subsets. However, future studies will definitely look at age correlations, especially for those crashes related to alcohol. This was not done here due to the other disparities that were found.