

Traffic Safety Effectiveness of Additional State Troopers in Alabama

Dana Steil and David Brown

May 2011

Summary of Study Results

On average, a conservative estimate of the effectiveness of adding ten state troopers to the state highway patrol force would result in the following savings each year:

- 805 crashes
- 263 injuries
- 7 fatalities

These are conservative estimates in that they are based on only the reduction of crashes during short term increases in the trooper patrol force. It does not take into account the cumulative effect of adding troopers over a longer time period, nor does it take into effect the reduced severity of crashes where a trooper is more readily available to arrive at the scene, administer first aid and otherwise mitigate the consequences of the crash. Finally, there should be no implications made from these study results that the enforcement performed by local law enforcement is any different in its effectiveness than that performed by the Alabama Department of Public Safety (DPS). In this case DPS units were used because all of them were using the state's electronic citation issuance system (eCite) during the data gathering for the study. See further discussion below.

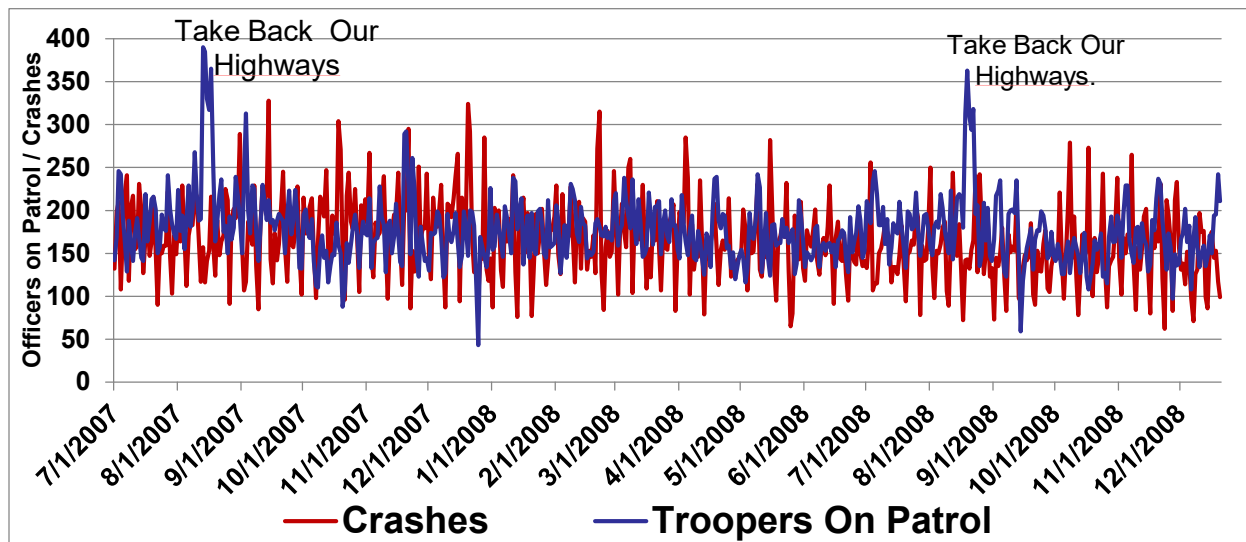
Graphical Analysis

The display on the following page presents the data used in this study in graphical form. The blue line indicates the number of officers on patrol for a given week. The red line indicates the number of crashes that occurred during that week. Generally, it can be seen that when there is a spike up on the number of officers there will be a spike down in the number of crashes, and vice versa.

Details of the Study

The details of this study will be presented below in a summary notes format for those who are interested in validating this study or moving forward with additional research. The time period for the analysis was the first eight months of 2008. The study was limited to those types of routes that are most typically patrolled by Alabama State Troopers, namely Interstate, state and federal roadways. It is recognized that troopers also patrol county roadways, and there is no reason to expect their effectiveness on these roadways to be any different from those studied.

Reduction in Crashes during Increased Patrol Periods



On average there are about 60,441 crashes per year that occurred in the 2007-2010 time frame on the roadways under consideration (Interstate, state and federal roadways). This formed the baseline for the estimates of crash reductions. This accounts for about 47% of all crashes statewide, the remaining occurring on country roads and city streets (with a few reported on private property). These 47% of crashes, however, constitute 55% of the fatal crashes statewide. Many factors go into determining these rates, including traffic volumes and number of miles of roadway, so there should be no implication from these numbers that a mile of any of these roadways is less safe than another.

The Alabama eCite electronic citation system was used in this study since all DPS officers have access to this system. In the following, a trooper is counted as being on patrol if s/he wrote at least one citation in a given day. The following are averages for the numbers of troopers on patrol for the specific portions of the week:

- 169 troopers patrol during the weekends (Sunday - Saturday),
- 174 troopers patrol during the week (Monday - Friday), and
- 172 troopers patrol during the first four weekdays (Monday - Thursday).

While these are the averages, the actual number varies considerably from day to day, and week to week, as illustrated by the display above. This variation enabled a comparison to be made by comparing those days with greater trooper presence against those with fewer.

Friday might be considered a pseudo weekend day, and it is the day with the most crashes, having 25% more than expected. This is caused by the mix of both commuter and recreational travel on Friday afternoons. There is also an increase in the use of alcohol/drugs due to the majority of workers having Saturday off. Because of the diversion of officers to these increased crashes, it was determined to exclude Fridays from the comparison.

The process applied follows:

- The counts of the officers patrolling on each qualifying day (**i.e., Monday-Thursday**) were paired with the number of crashes that occurred on the same days.
- These paired numbers were formed into two groups for comparison.
- Group 1 contained the days when a relatively small number of officers (less than or equal to 150) were patrolling; the sample size obtained for this group was 23 days.
- Group 2 contained the days when a relatively large number of officers (greater than or equal to 194) were patrolling; the sample size for this group was 25 days.

The comparison resulted in the following findings:

- Group 1 had an average of 352 crashes per day with an average of 139 troopers working;
- Group 2 had an average of 322 crashes per day (30 fewer than Group 1) with an average of 203 troopers working (about 64 more troopers working);
- This meant that Group 2 had about 8.5% fewer crashes; per day on average.
- There is at least a 95% statistical confidence that Group 2 had a smaller average number of crashes than group 1.

So, in summary, this led to an estimate of a decrease in crashes on the studied highways given an average increase of 64 troopers per day.

If we prorate this 8.5% decrease out just for the highways studied, this amounts to a total potential impact on 60,441 crashes, and the increase of 64 officers is estimated to cause a reduction of 5,151 crashes per year, which on these roadway types would typically produce 45 fatalities and 1682 persons injured. On a per-trooper basis, this is about 80 crashes, 26 injuries and 0.7 fatalities per year.

Discussion

Readers should recognize that law enforcement benefits are not linear. It could be that adding one patrol officer results in a high return, or it may be necessary to add ten officers before these benefits are realized. Adding a single officer is not necessarily going to give the perception to the driving public that a speeding ticket is inevitable. Usually it takes several officers staged along a route to give this impression. It is our opinion that the “Take Back Our Highways” effort

put enough officers in the field to convey this major impression when coupled with the accompanying public information and education efforts. So there is a critical mass that is necessary before these (seemingly linear) results can be obtained. This is the main reason that we stated the conclusions above in terms of ten officers as opposed to a single officer. On the other end of the spectrum, there would be the normal diminishing marginal return as more and more officers were added, to the point that the addition of one more would result in negligible returns. However, since Alabama is not even close to that end of the spectrum, we need not be concerned with this non-linear aspect.

It was stated above that these results were conservative in that they only accounted for crash reductions and not severity reductions. While there is not enough data to draw conclusions with regard to the few weeks in which the TBOH effort was in effect, there was a dramatic reduction in fatalities during those time periods. The reason for this can be accounted for in terms of pure physics. It has been established that the effect of speed on severity is exponential, roughly doubling the probability of a fatality for every ten miles per hour of impact speed. This means that theoretically if impact speeds could be cut by ten miles per hour the number of fatalities would be cut in half. The presence of troopers reducing the impact speed by having an offenders reduce his/her speed from 85 MPH to 75 MPH (or any comparable ten MPH reduction) would produce this effect even if the number of crashes remained the same. Thus, this study is quite conservative in only focusing on the crash reduction that results from lower speed and, of course, the greater care that is generally exercised by drivers in the presence of law enforcement.

