OSU STATISTICAL CONSULTING SERVICE
MEMORANDUM REPORT

To: **The Ohio State Highway Patrol**

From: **Christopher Holloman**

Subject: **Predictive Model Results for New Year's Weekend, District 9**

Date: **December 18, 2006**

---

1. Overview

Over the past several months, the Ohio State Highway Patrol (OSHP) and the Statistical Consulting Service (SCS) at The Ohio State University have worked together to produce a probabilistic model for forecasting the likely locations of fatal and injury crashes. The model that was developed predicts the likelihood of crashes on interstates, US routes, and State routes throughout Ohio.

This report presents the model's OVI forecasts for the 2006-2007 New Year's weekend (Friday, December 29 through Monday, January 1). These results can be used to allocate troopers to different roadways throughout the day allowing OSHP to make the best use of available resources in preventing alcohol-related crashes. Crash forecasts are provided for all US routes and state routes in District 9 except for Vinton County.

Although the New Year's weekend covers four days, there are only three types of days that need to be analyzed. The first type of day is the last workday before the long weekend: Friday, December 29. The second type of day to be analyzed is the weekend preceding the holiday: Saturday, December 30, and Sunday, December 31. The third type of day to be analyzed is the actual holiday, Monday, January 1, 2007. Section 2 of this report gives OVI forecasts for each of these types of days separately.

The forecasts provided in this report can be applied to the immediately preceding weekend as well – the weekend of Christmas, 2006. The forecasts for Friday, December 29 through Sunday, December 31 are identical to what would be predicted for Friday, December 22 through Sunday, December 24, and the forecasts for December 25, 2006 would only vary slightly from what is presented for January 1, 2007.

2. Forecasts

The forecasts are broken down by the three types of days that occur over the New Year's weekend.

2.1. Friday, December 29, 2006

Friday, December 29 is the last working day before the long weekend, so the crash patterns are predicted to be different from the crash patterns on the other days of the holiday. Figure 1 shows the OVI crash rates for fatal and injury crashes expected throughout the day. These are the crash rates across all interstates, US routes, and state routes in the analysis. The black line in this figure shows the crash rates predicted by the model, and a smooth red curve has been superimposed to show the overall pattern. In addition, a smooth green line has been added to the plot showing the crash rates expected on an ordinary Friday in December, one not preceding a holiday weekend. It appears that on December 29 the highest risk will be in the early morning hours, but it will not be as large as on a usual Friday. The risk declines in the middle of the day, and increases again at the end of the day, although the increase is not larger than what is normally observed on a Friday evening.

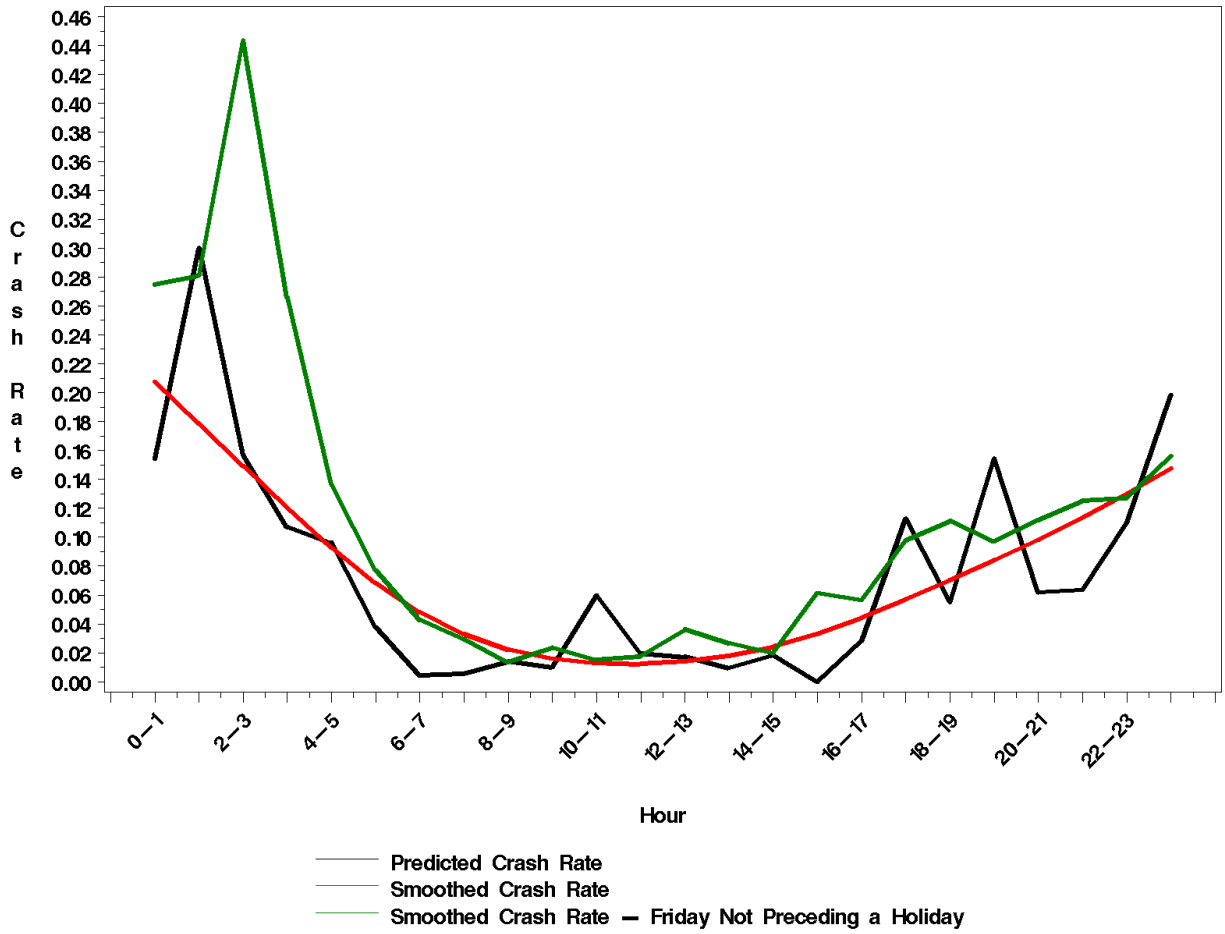

Figure 1. Forecasted OVI Fatal and Injury Crash Rates on December 29, 2006, by Hour.

Having determined the best allocation of resources throughout the day, the next question to answer is where those resources should be allocated. The top 20% of roadways that should be patrolled to prevent alcohol-related crashes on December 29, 2006, are in the following list.

1. SR 220 near milepost 15 in PIK.
2. SR 682 from milepost 5 in ATH to milepost 8 in ATH.
3. SR 588 from milepost 5 in GAL to milepost 12 in GAL.
4. SR 852 from milepost 0 in SCI to milepost 1 in SCI.
5. SR 139 from milepost 5 in SCI to milepost 10 in SCI.
6. SR 650 from milepost 0 in LAW to milepost 5 in LAW.
7. SR 788 from milepost 0 in JAC to milepost 6 in JAC.
8. SR 278 from milepost 5 in HOC to milepost 10 in HOC.
9. SR 664 from milepost 10 in HOC to milepost 15 in HOC.
10. US 23 from milepost 10 in PIK to milepost 15 in PIK.
11. SR 78 from milepost 10 in ATH to milepost 11 in ATH.
12. SR 772 from milepost 15 in ROS to milepost 16 in ROS.
13. SR 13 from milepost 5 in ATH to milepost 15 in ATH.
14. US 52 from milepost 20 in LAW to milepost 23 in LAW.
15. SR 139 from milepost 10 in JAC to milepost 15 in JAC.
16. SR 141 from milepost 5 in LAW to milepost 10 in LAW.
17. SR 685 from milepost 0 in ATH to milepost 5 in ATH.

2.2. Saturday, December 30, and Sunday, December 31, 2006

Saturday, December 30, and Sunday, December 31, are both considered ordinary weekend days in the crash model, so their predicted crash patterns are the same. Figure 2 shows the OVI crash rates for fatal and injury crashes expected throughout the day. These are the OVI crash rates across all interstates, US routes, and state routes in the analysis. The figure contains only one curve, a red curve, since the smoothed crash pattern lies directly on top of the raw (black) crash pattern.

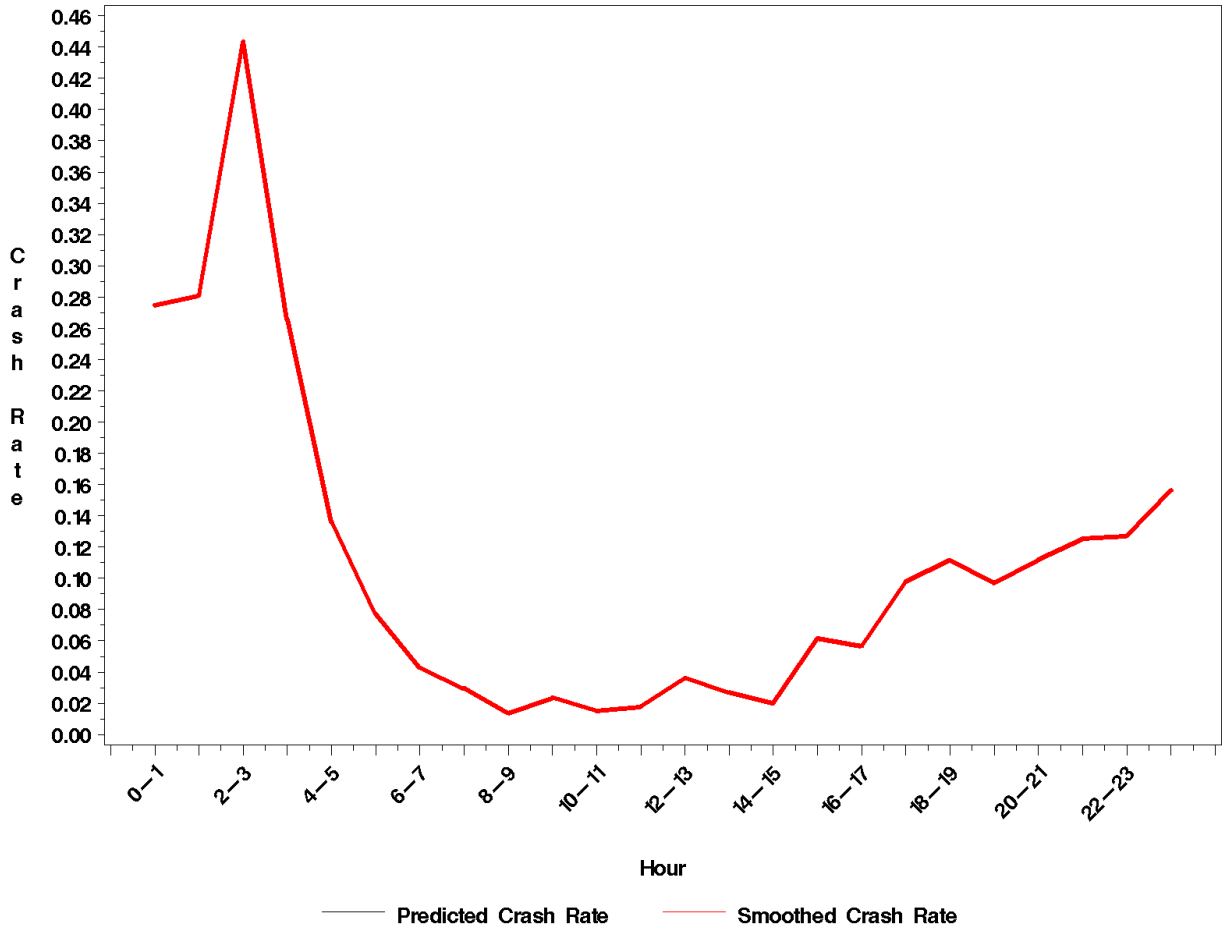

Figure 2. Forecasted OVI Fatal and Injury Crash Rates on December 30-31, 2006, by Hour.

Having determined the best allocation of resources throughout the day, the next question to answer is where those resources should be allocated. The top 20% of roadways that should be patrolled to prevent alcohol-related crashes on December 30-31, 2006, are in the following list.

1. SR 220 near milepost 15 in PIK.
2. SR 682 from milepost 5 in ATH to milepost 8 in ATH.
3. SR 588 from milepost 5 in GAL to milepost 12 in GAL.
4. SR 139 from milepost 5 in SCI to milepost 10 in SCI.
5. SR 852 from milepost 0 in SCI to milepost 1 in SCI.
6. SR 650 from milepost 0 in LAW to milepost 5 in LAW.
7. SR 788 from milepost 0 in JAC to milepost 6 in JAC.
8. SR 772 from milepost 15 in ROS to milepost 16 in ROS.
9. US 23 from milepost 10 in PIK to milepost 15 in PIK.
10. SR 664 from milepost 10 in HOC to milepost 15 in HOC.
11. SR 278 from milepost 5 in HOC to milepost 10 in HOC.
12. SR 13 from milepost 5 in ATH to milepost 15 in ATH.
13. SR 139 from milepost 10 in JAC to milepost 15 in JAC.
14. US 52 from milepost 20 in LAW to milepost 23 in LAW.

15. SR 78 from milepost 10 in ATH to milepost 11 in ATH.
16. US 52 from milepost 20 in SCI to milepost 25 in SCI.
17. SR 335 from milepost 0 in SCI to milepost 5 in SCI.

2.3. Monday, January 1, 2007

Monday, January 1 is treated as a holiday in the crash model. Figure 3 shows the OVI crash rates for fatal and injury crashes expected throughout the day. These are the crash rates across all interstates, US routes, and state routes in the analysis. The black line in this figure shows the crash rates predicted by the model, and a smooth red curve has been superimposed to show the overall pattern. In addition, a smooth green line has been added to the plot showing the crash rates expected on an ordinary Monday in January. This figure shows that crash risk from alcohol will be higher during most of the day than it is on an ordinary Monday with the highest risk during the early morning hours and mid-afternoon.

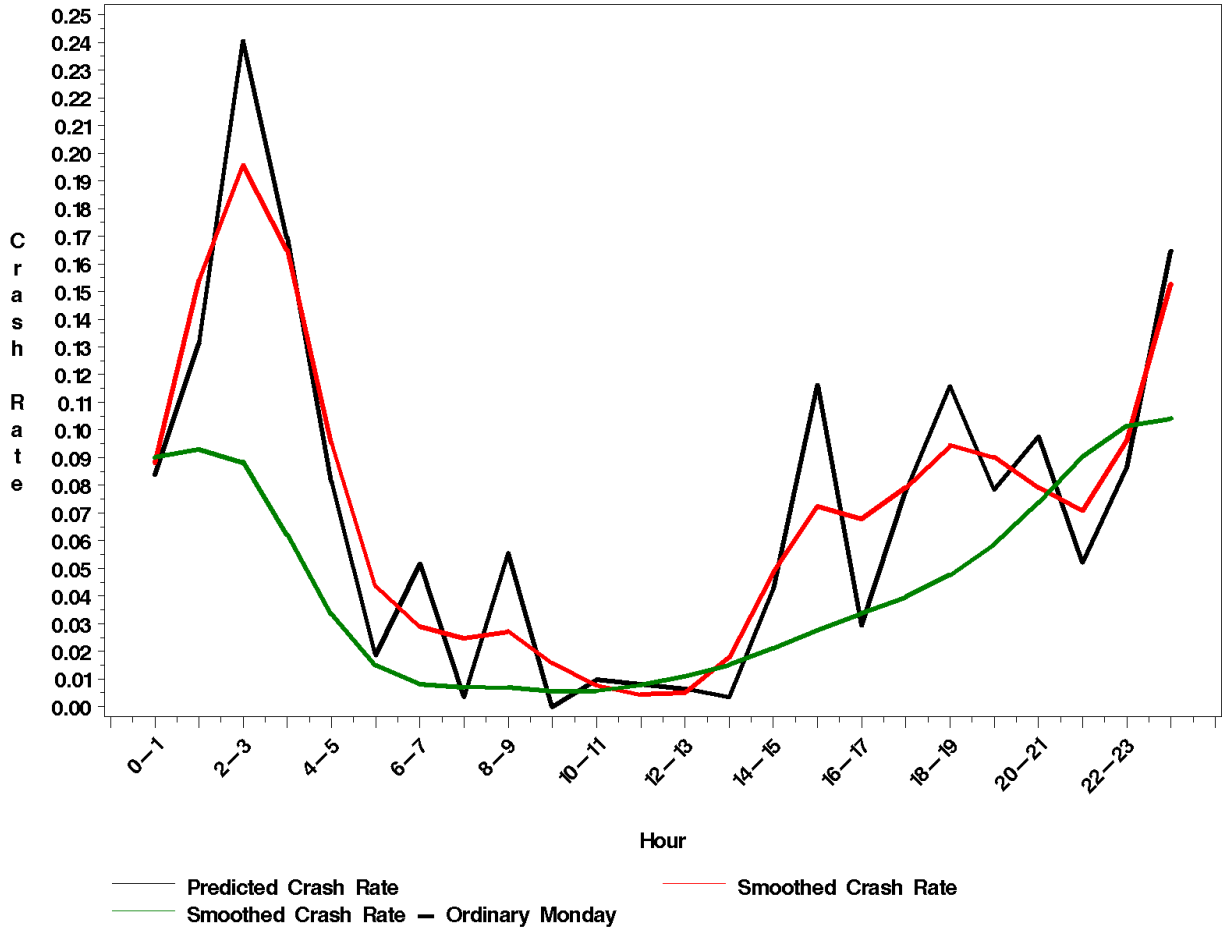

Figure 3. Forecasted OVI Fatal and Injury Crash Rates on January 1, 2007, by Hour.

Having determined the best allocation of resources throughout the day, the next question to answer is where those resources should be allocated. The top 20% of roadways that should be patrolled to prevent alcohol-related crashes on January 1, 2007, are in the following list.

1. SR 56 from milepost 10 in ATH to milepost 11 in ATH.

2. SR 220 near milepost 15 in PIK.
3. US 23 from milepost 10 in PIK to milepost 15 in PIK.
4. SR 682 from milepost 5 in ATH to milepost 8 in ATH.
5. SR 13 from milepost 5 in ATH to milepost 10 in ATH.
6. SR 852 from milepost 0 in SCI to milepost 1 in SCI.
7. SR 588 from milepost 5 in GAL to milepost 12 in GAL.
8. SR 73 from milepost 20 in SCI to milepost 25 in SCI.
9. SR 139 from milepost 5 in SCI to milepost 10 in SCI.
10. SR 32 from milepost 10 in PIK to milepost 15 in PIK.
11. SR 56 from milepost 5 in HOC to milepost 10 in HOC.
12. SR 664 from milepost 10 in HOC to milepost 15 in HOC.
13. SR 650 from milepost 0 in LAW to milepost 5 in LAW.
14. SR 159 from milepost 5 in ROS to milepost 10 in ROS.
15. US 52 from milepost 20 in LAW to milepost 23 in LAW.
16. SR 788 from milepost 0 in JAC to milepost 6 in JAC.
17. SR 139 from milepost 10 in JAC to milepost 15 in JAC.
18. US 23 from milepost 0 in SCI to milepost 5 in SCI.