
**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 5

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 interstates, US routes, and state routes in District 5 except for the US and State routes in Shelby, Miami, and Champaign counties.

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.

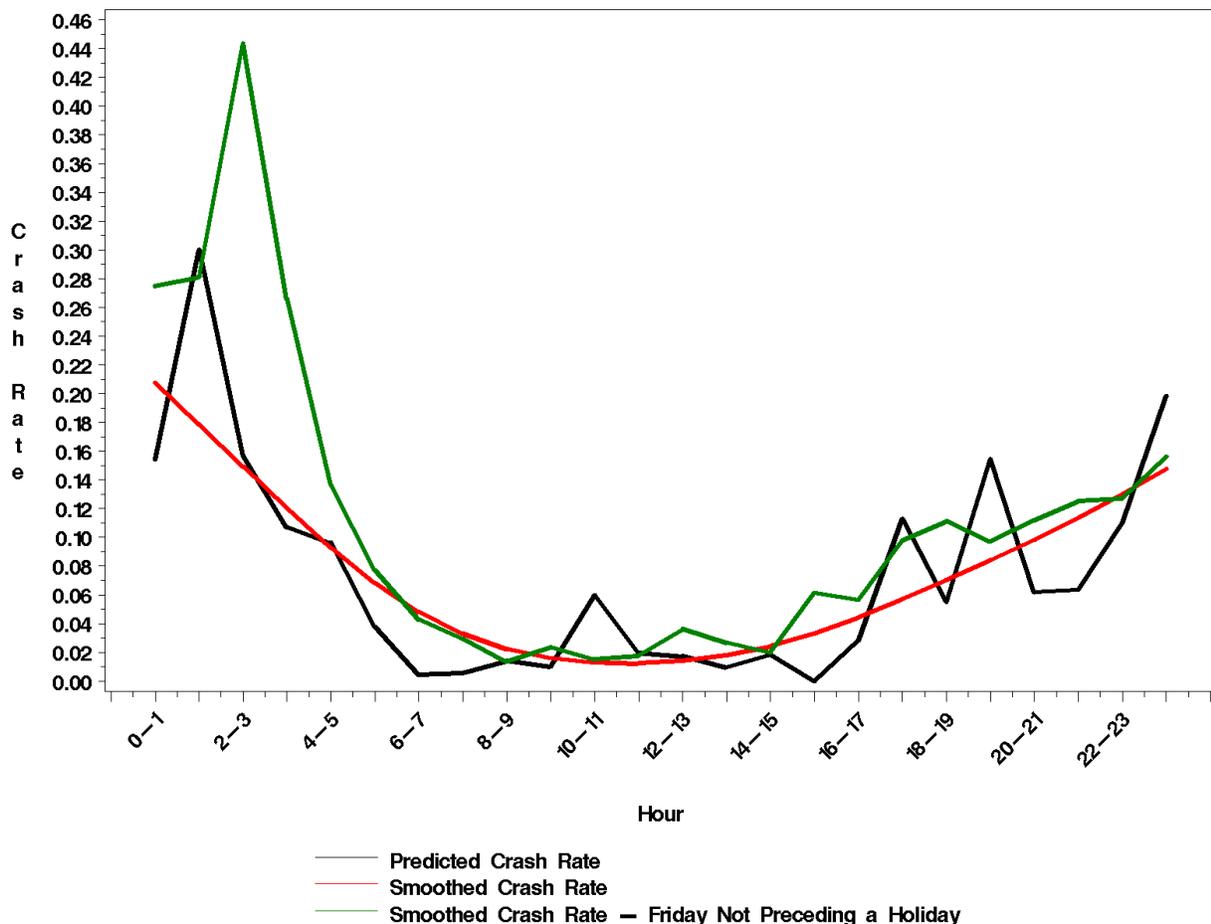


Figure 1. Forecasted OVI Fatal and Injury Crash Rates on December 29, 2006, by Hour.

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. IR 75 from milepost 47 in MOT to milepost 51 in MOT.
2. IR 75 from milepost 65 in MIA to milepost 75 in MIA.
3. IR 75 from milepost 44 in MOT to milepost 46 in MOT.
4. IR 75 from milepost 52 in MOT to milepost 55 in MOT.
5. IR 70 from milepost 29 in MOT to milepost 30 in MOT.
6. IR 75 from milepost 56 in MOT to milepost 57 in MOT.
7. IR 75 from milepost 60 in MOT to milepost 65 in MOT.
8. IR 675 from milepost 2 in MOT to milepost 3 in MOT.
9. SR 364 from milepost 15 in AUG to milepost 16 in AUG.
10. IR 70 from milepost 34 in MOT to milepost 35 in MOT.
11. IR 75 from milepost 58 in MOT to milepost 59 in MOT.
12. SR 4 from milepost 25 in MOT to milepost 26 in MOT.
13. IR 75 from milepost 91 in SHE to milepost 92 in SHE.
14. IR 70 from milepost 36 in MOT to milepost 37 in MOT.
15. IR 75 from milepost 97 in SHE to milepost 98 in SHE.
16. IR 70 from milepost 44 in CLA to milepost 46 in CLA.
17. IR 675 from milepost 4 in MOT to milepost 5 in MOT.
18. IR 70 near milepost 41 in MOT.
19. IR 70 from milepost 27 in MOT to milepost 28 in MOT.
20. IR 70 from milepost 38 in MOT to milepost 39 in MOT.
21. SR 49 from milepost 15 in MOT to milepost 16 in MOT.
22. SR 725 from milepost 10 in MOT to milepost 15 in MOT.
23. SR 235 from milepost 0 in CLA to milepost 5 in CLA.
24. US 35 from milepost 20 in MOT to milepost 21 in MOT.
25. IR 675 near milepost 7 in MOT.
26. SR 741 from milepost 5 in MOT to milepost 10 in MOT.
27. IR 70 from milepost 52 in CLA to milepost 54 in CLA.
28. IR 75 from milepost 79 in MIA to milepost 80 in MIA.
29. SR 201 from milepost 5 in MOT to milepost 10 in MOT.
30. IR 70 from milepost 62 in CLA to milepost 64 in CLA.
31. IR 70 from milepost 10 in PRE to milepost 11 in PRE.
32. IR 70 from milepost 5 in PRE to milepost 6 in PRE.
33. IR 75 from milepost 113 in AUG to milepost 114 in AUG.
34. IR 75 from milepost 107 in AUG to milepost 108 in AUG.
35. IR 75 from milepost 87 in SHE to milepost 88 in SHE.
36. IR 75 from milepost 94 in SHE to milepost 95 in SHE.
37. IR 70 from milepost 24 in MOT to milepost 25 in MOT.
38. IR 70 from milepost 19 in MOT to milepost 20 in MOT.
39. IR 75 from milepost 82 in MIA to milepost 83 in MIA.
40. IR 75 from milepost 77 in MIA to milepost 78 in MIA.
41. IR 70 from milepost 66 in CLA to milepost 67 in CLA.

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.

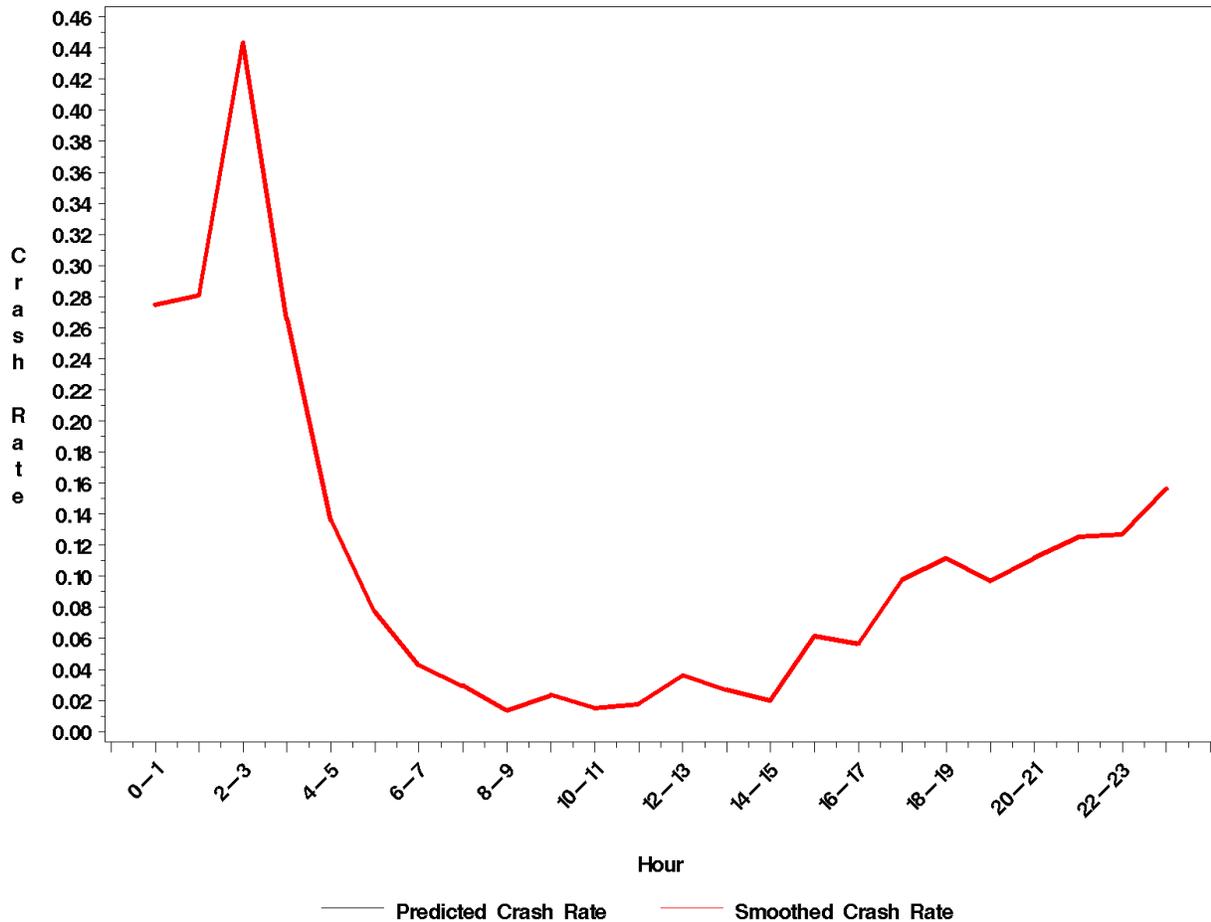


Figure 2. Forecasted OVI Fatal and Injury Crash Rates on December 30-31, 2006, by Hour.

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. IR 75 from milepost 47 in MOT to milepost 51 in MOT.
2. IR 75 from milepost 52 in MOT to milepost 55 in MOT.
3. IR 70 from milepost 29 in MOT to milepost 30 in MOT.
4. IR 75 from milepost 65 in MIA to milepost 75 in MIA.
5. IR 75 from milepost 44 in MOT to milepost 46 in MOT.
6. IR 75 from milepost 56 in MOT to milepost 57 in MOT.

7. IR 75 from milepost 60 in MOT to milepost 65 in MOT.
8. IR 75 from milepost 58 in MOT to milepost 59 in MOT.
9. IR 675 from milepost 2 in MOT to milepost 3 in MOT.
10. IR 70 from milepost 34 in MOT to milepost 35 in MOT.
11. IR 70 from milepost 36 in MOT to milepost 37 in MOT.
12. IR 75 from milepost 91 in SHE to milepost 92 in SHE.
13. IR 675 from milepost 4 in MOT to milepost 5 in MOT.
14. IR 70 near milepost 41 in MOT.
15. IR 70 from milepost 27 in MOT to milepost 28 in MOT.
16. IR 70 from milepost 38 in MOT to milepost 39 in MOT.
17. SR 4 from milepost 25 in MOT to milepost 26 in MOT.
18. IR 75 from milepost 97 in SHE to milepost 98 in SHE.
19. IR 70 from milepost 44 in CLA to milepost 46 in CLA.
20. IR 70 from milepost 32 in MOT to milepost 33 in MOT.
21. IR 75 from milepost 77 in MIA to milepost 78 in MIA.
22. IR 70 from milepost 19 in MOT to milepost 20 in MOT.
23. IR 675 near milepost 7 in MOT.
24. SR 725 from milepost 10 in MOT to milepost 15 in MOT.
25. IR 675 from milepost 0 in MOT to milepost 1 in MOT.
26. IR 75 from milepost 79 in MIA to milepost 80 in MIA.
27. IR 70 from milepost 52 in CLA to milepost 54 in CLA.
28. US 35 from milepost 20 in MOT to milepost 21 in MOT.
29. SR 741 from milepost 5 in MOT to milepost 10 in MOT.
30. SR 201 from milepost 5 in MOT to milepost 10 in MOT.
31. SR 235 from milepost 20 in LOG to milepost 24 in LOG.
32. IR 70 from milepost 10 in PRE to milepost 11 in PRE.
33. IR 70 from milepost 5 in PRE to milepost 6 in PRE.
34. IR 75 from milepost 113 in AUG to milepost 114 in AUG.
35. IR 75 from milepost 107 in AUG to milepost 108 in AUG.
36. IR 75 from milepost 87 in SHE to milepost 88 in SHE.
37. IR 75 from milepost 94 in SHE to milepost 95 in SHE.
38. IR 70 from milepost 24 in MOT to milepost 25 in MOT.
39. IR 75 from milepost 82 in MIA to milepost 83 in MIA.
40. IR 70 from milepost 66 in CLA to milepost 67 in CLA.
41. IR 70 from milepost 63 in CLA to milepost 64 in CLA.

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.

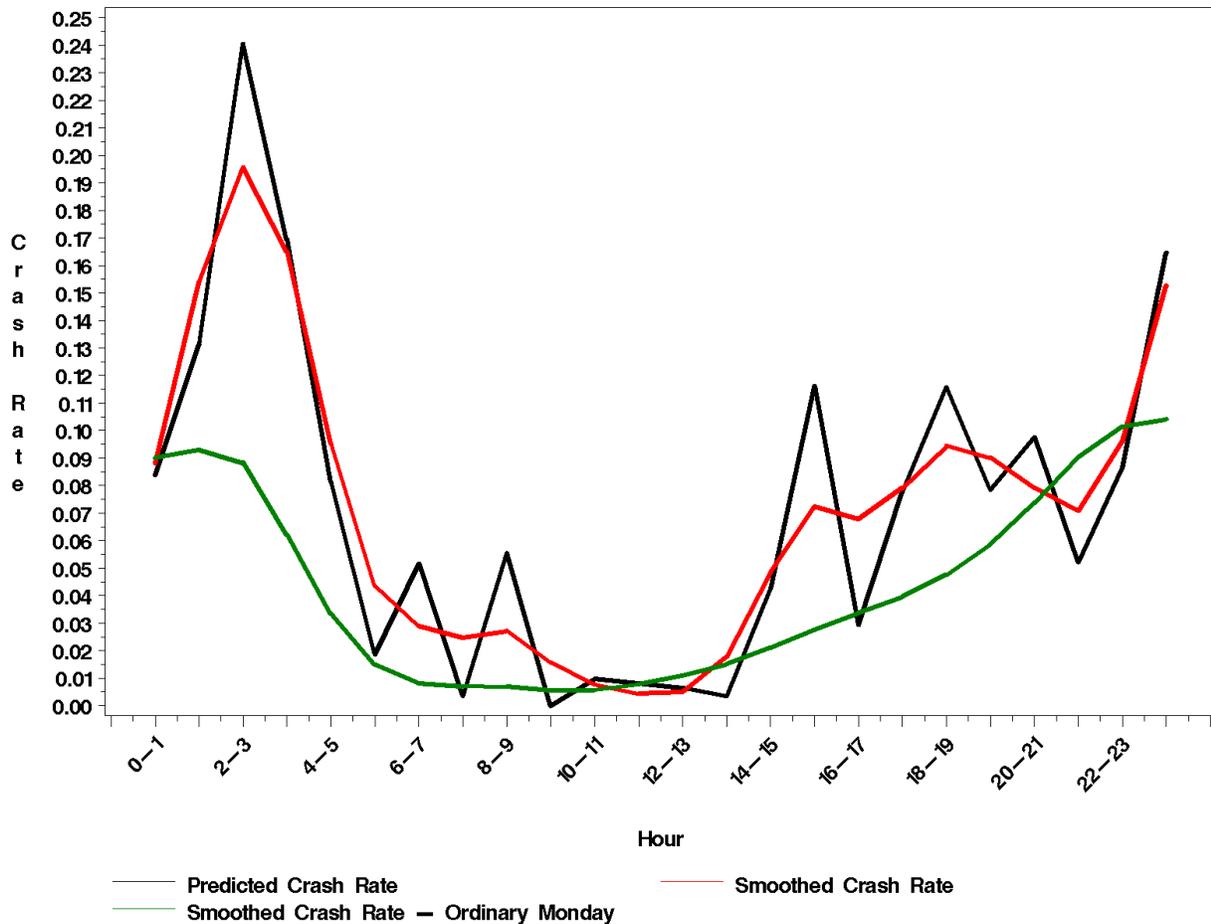


Figure 3. Forecasted OVI Fatal and Injury Crash Rates on January 1, 2007, by Hour.

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. IR 75 from milepost 47 in MOT to milepost 51 in MOT.
2. IR 75 from milepost 52 in MOT to milepost 55 in MOT.
3. IR 75 from milepost 68 in MIA to milepost 69 in MIA.
4. IR 75 from milepost 44 in MOT to milepost 46 in MOT.
5. IR 75 from milepost 56 in MOT to milepost 57 in MOT.
6. IR 75 from milepost 65 in MIA to milepost 67 in MIA.
7. IR 70 from milepost 32 in MOT to milepost 35 in MOT.
8. IR 75 from milepost 60 in MOT to milepost 65 in MOT.
9. IR 75 from milepost 58 in MOT to milepost 59 in MOT.
10. IR 70 from milepost 36 in MOT to milepost 37 in MOT.
11. IR 70 from milepost 25 in MOT to milepost 30 in MOT.
12. IR 675 from milepost 0 in MOT to milepost 1 in MOT.
13. IR 75 from milepost 81 in MIA to milepost 82 in MIA.
14. IR 75 from milepost 91 in SHE to milepost 92 in SHE.

15. SR 4 from milepost 25 in MOT to milepost 26 in MOT.
16. IR 675 near milepost 7 in MOT.
17. IR 75 from milepost 78 in MIA to milepost 80 in MIA.
18. IR 70 from milepost 51 in CLA to milepost 53 in CLA.
19. IR 70 from milepost 44 in CLA to milepost 45 in CLA.
20. IR 675 from milepost 2 in MOT to milepost 3 in MOT.
21. SR 725 from milepost 10 in MOT to milepost 15 in MOT.
22. IR 675 from milepost 4 in MOT to milepost 6 in MOT.
23. SR 741 from milepost 5 in MOT to milepost 10 in MOT.
24. SR 235 from milepost 20 in LOG to milepost 24 in LOG.
25. IR 70 near milepost 41 in MOT.
26. IR 75 from milepost 71 in MIA to milepost 73 in MIA.
27. IR 70 from milepost 38 in MOT to milepost 39 in MOT.
28. SR 201 from milepost 5 in MOT to milepost 10 in MOT.
29. US 35 from milepost 20 in MOT to milepost 21 in MOT.
30. US 40 from milepost 5 in CLA to milepost 10 in CLA.
31. SR 235 from milepost 0 in CLA to milepost 5 in CLA.