
**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 3
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 3.

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.

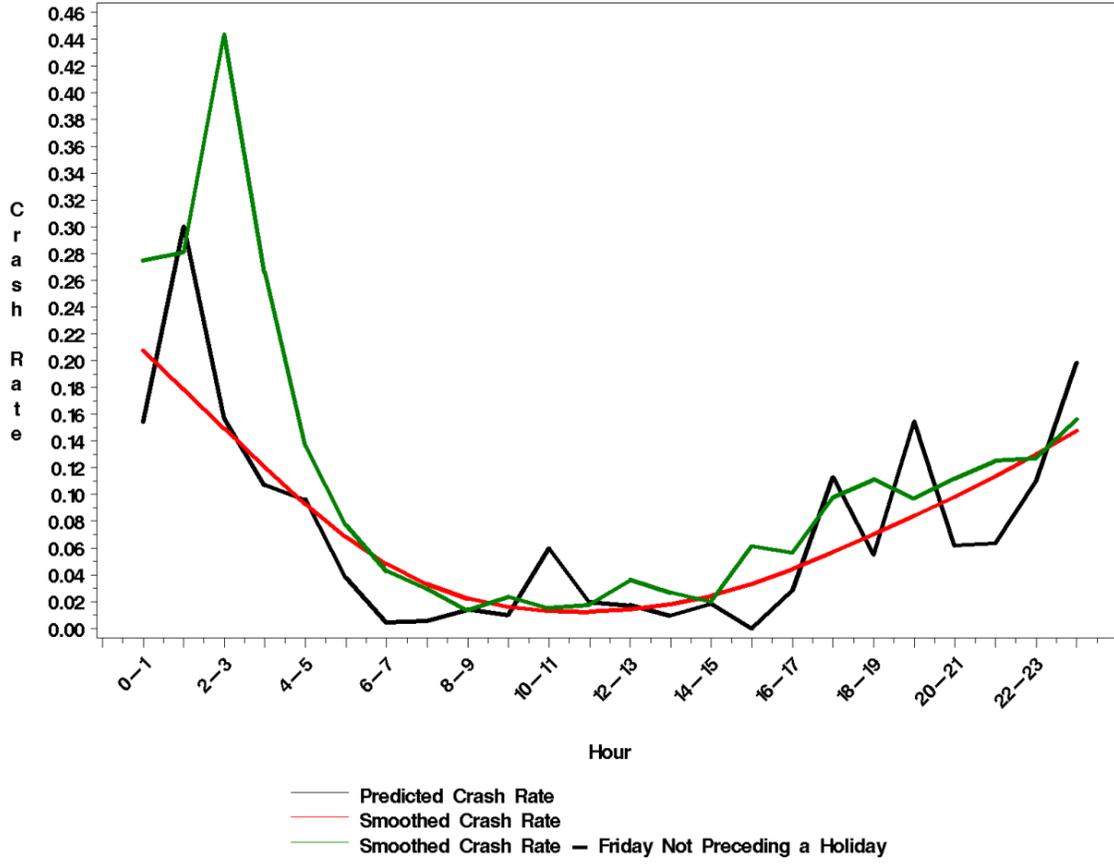


Figure 1. Forecasted OVI Fatal and Injury Crash Rates on December 29, 2006, by Hour.

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 77 from milepost 135 in SUM to milepost 136 in SUM.
2. IR 77 from milepost 123 in SUM to milepost 124 in SUM.
3. IR 77 from milepost 104 in STA to milepost 107 in STA.
4. IR 76 from milepost 21 in SUM to milepost 25 in SUM.
5. IR 76 from milepost 11 in MED to milepost 12 in MED.
6. IR 76 from milepost 4 in MED to milepost 5 in MED.
7. IR 271 from milepost 18 in SUM to milepost 19 in SUM.
8. IR 90 from milepost 142 in LOR to milepost 143 in LOR.
9. IR 90 from milepost 155 in LOR to milepost 156 in LOR.
10. IR 80 from milepost 151 in LOR to milepost 152 in LOR.
11. IR 77 from milepost 111 in STA to milepost 113 in STA.
12. IR 76 from milepost 13 in SUM to milepost 18 in SUM.
13. IR 77 from milepost 117 in SUM to milepost 120 in SUM.
14. SR 800 from milepost 5 in STA to milepost 9 in STA.
15. IR 480 from milepost 36 in SUM to milepost 37 in SUM.
16. IR 271 from milepost 20 in SUM to milepost 21 in SUM.
17. IR 90 from milepost 138 in LOR to milepost 139 in LOR.
18. IR 80 from milepost 179 in SUM to milepost 180 in SUM.
19. IR 71 from milepost 205 in MED to milepost 206 in MED.
20. IR 71 from milepost 220 in MED to milepost 221 in MED.
21. IR 77 from milepost 108 in STA to milepost 109 in STA.
22. IR 76 from milepost 28 in SUM to milepost 29 in SUM.
23. SR 643 near milepost 5 in HOL.
24. IR 77 from milepost 133 in SUM to milepost 134 in SUM.
25. IR 77 from milepost 141 in SUM to milepost 142 in SUM.
26. US 6 from milepost 20 in LOR to milepost 21 in LOR.
27. SR 252 from milepost 5 in LOR to milepost 6 in LOR.
28. US 224 from milepost 0 in SUM to milepost 5 in SUM.
29. SR 57 from milepost 16 in LOR to milepost 20 in LOR.
30. SR 82 from milepost 5 in LOR to milepost 10 in LOR.
31. US 250 near milepost 30 in WAY.
32. SR 585 from milepost 0 in SUM to milepost 1 in SUM.
33. SR 2 from milepost 10 in LOR to milepost 11 in LOR.
34. US 20 from milepost 25 in LOR to milepost 26 in LOR.
35. SR 611 from milepost 10 in LOR to milepost 11 in LOR.
36. SR 93 from milepost 20 in STA to milepost 21 in STA.
37. SR 8 from milepost 5 in SUM to milepost 10 in SUM.
38. US 30 from milepost 30 in STA to milepost 33 in STA.
39. SR 241 from milepost 10 in SUM to milepost 11 in SUM.
40. SR 57 from milepost 10 in LOR to milepost 13 in LOR.

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.

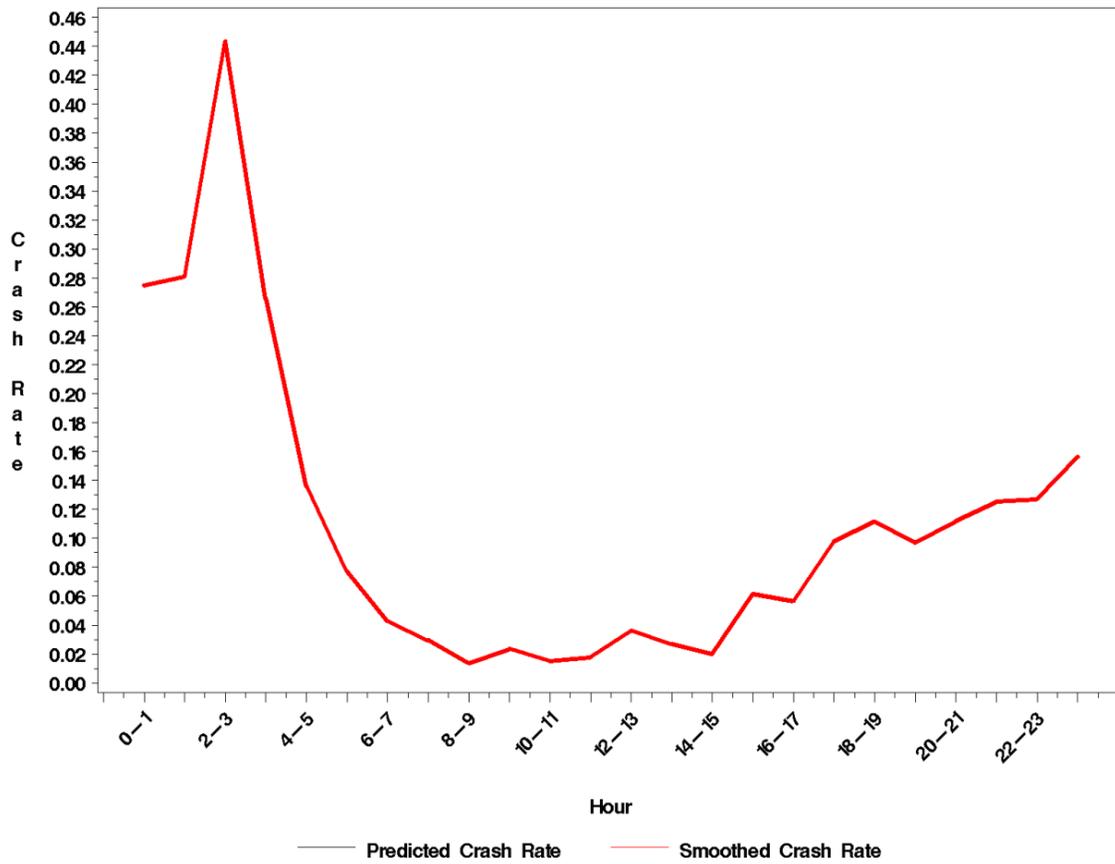


Figure 2. Forecasted OVI Fatal and Injury Crash Rates on December 30-31, 2006, by Hour.

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 77 from milepost 133 in SUM to milepost 137 in SUM.
2. IR 90 from milepost 154 in LOR to milepost 156 in LOR.
3. IR 77 from milepost 121 in SUM to milepost 125 in SUM.
4. IR 77 from milepost 111 in STA to milepost 113 in STA.
5. IR 77 from milepost 103 in STA to milepost 110 in STA.
6. IR 76 from milepost 21 in SUM to milepost 25 in SUM.
7. IR 271 from milepost 20 in SUM to milepost 21 in SUM.
8. IR 71 from milepost 220 in MED to milepost 222 in MED.
9. IR 77 from milepost 117 in SUM to milepost 120 in SUM.
10. IR 76 from milepost 11 in MED to milepost 12 in MED.

11. IR 76 from milepost 4 in MED to milepost 5 in MED.
12. IR 271 from milepost 18 in SUM to milepost 19 in SUM.
13. IR 90 from milepost 142 in LOR to milepost 143 in LOR.
14. IR 80 from milepost 151 in LOR to milepost 152 in LOR.
15. IR 76 from milepost 13 in SUM to milepost 18 in SUM.
16. IR 90 from milepost 136 in LOR to milepost 139 in LOR.
17. SR 800 from milepost 5 in STA to milepost 9 in STA.
18. SR 643 near milepost 5 in HOL.
19. US 250 near milepost 30 in WAY.
20. IR 480 from milepost 32 in SUM to milepost 33 in SUM.
21. US 20 from milepost 25 in LOR to milepost 26 in LOR.
22. IR 77 from milepost 138 in SUM to milepost 139 in SUM.
23. IR 480 from milepost 35 in SUM to milepost 37 in SUM.
24. IR 90 from milepost 152 in LOR to milepost 153 in LOR.
25. IR 80 from milepost 136 in LOR to milepost 137 in LOR.
26. IR 80 from milepost 149 in LOR to milepost 150 in LOR.
27. US 6 from milepost 20 in LOR to milepost 21 in LOR.
28. IR 77 from milepost 114 in SUM to milepost 115 in SUM.
29. IR 80 from milepost 179 in SUM to milepost 180 in SUM.
30. IR 71 from milepost 205 in MED to milepost 206 in MED.
31. IR 77 from milepost 140 in SUM to milepost 142 in SUM.
32. IR 76 from milepost 28 in SUM to milepost 29 in SUM.
33. US 224 from milepost 0 in SUM to milepost 5 in SUM.
34. SR 57 from milepost 16 in LOR to milepost 20 in LOR.
35. SR 82 from milepost 5 in LOR to milepost 10 in LOR.
36. SR 252 from milepost 5 in LOR to milepost 6 in LOR.
37. IR 271 from milepost 0 in MED to milepost 1 in MED.
38. IR 271 from milepost 3 in MED to milepost 4 in MED.

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.

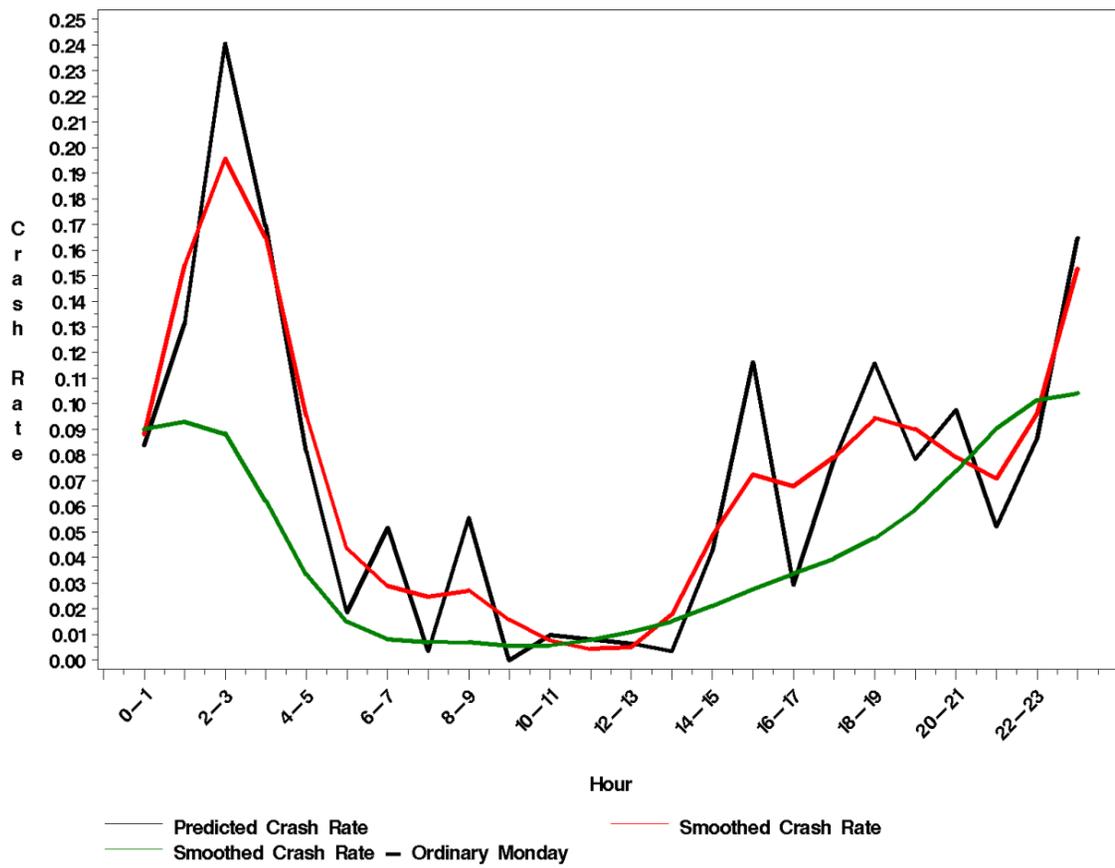


Figure 3. Forecasted OVI Fatal and Injury Crash Rates on January 1, 2007, by Hour.

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 77 from milepost 135 in SUM to milepost 137 in SUM.
2. IR 77 from milepost 108 in STA to milepost 110 in STA.
3. IR 71 from milepost 220 in MED to milepost 222 in MED.
4. IR 90 from milepost 155 in LOR to milepost 156 in LOR.
5. IR 77 from milepost 111 in STA to milepost 113 in STA.
6. IR 77 from milepost 123 in SUM to milepost 124 in SUM.
7. IR 77 from milepost 104 in STA to milepost 107 in STA.
8. IR 76 from milepost 21 in SUM to milepost 25 in SUM.
9. SR 800 from milepost 5 in STA to milepost 9 in STA.
10. IR 90 from milepost 136 in LOR to milepost 137 in LOR.
11. IR 271 from milepost 0 in MED to milepost 1 in MED.
12. IR 271 from milepost 3 in MED to milepost 4 in MED.
13. IR 76 from milepost 11 in MED to milepost 12 in MED.
14. IR 76 from milepost 4 in MED to milepost 5 in MED.

15. IR 80 from milepost 179 in SUM to milepost 181 in SUM.
16. IR 80 from milepost 172 in SUM to milepost 173 in SUM.
17. IR 77 from milepost 117 in SUM to milepost 120 in SUM.
18. IR 271 from milepost 18 in SUM to milepost 19 in SUM.
19. IR 271 from milepost 20 in SUM to milepost 21 in SUM.
20. IR 71 from milepost 185 in ASD to milepost 186 in ASD.
21. IR 90 from milepost 142 in LOR to milepost 143 in LOR.
22. IR 80 from milepost 151 in LOR to milepost 152 in LOR.
23. IR 77 from milepost 138 in SUM to milepost 139 in SUM.
24. IR 71 from milepost 227 in MED to milepost 228 in MED.
25. IR 71 from milepost 224 in MED to milepost 225 in MED.
26. IR 76 from milepost 13 in SUM to milepost 18 in SUM.
27. IR 77 from milepost 133 in SUM to milepost 134 in SUM.
28. IR 77 from milepost 115 in SUM to milepost 116 in SUM.
29. SR 82 from milepost 5 in LOR to milepost 10 in LOR.
30. IR 480 from milepost 36 in SUM to milepost 37 in SUM.
31. IR 90 from milepost 138 in LOR to milepost 139 in LOR.
32. SR 252 from milepost 5 in LOR to milepost 6 in LOR.
33. US 6 from milepost 20 in LOR to milepost 21 in LOR.
34. US 224 from milepost 0 in SUM to milepost 5 in SUM.
35. IR 71 from milepost 205 in MED to milepost 206 in MED.
36. SR 57 from milepost 16 in LOR to milepost 20 in LOR.
37. IR 76 from milepost 28 in SUM to milepost 29 in SUM.
38. SR 183 from milepost 5 in STA to milepost 10 in STA.
39. SR 585 from milepost 0 in SUM to milepost 1 in SUM.
40. IR 77 from milepost 141 in SUM to milepost 142 in SUM.
41. SR 2 from milepost 10 in LOR to milepost 11 in LOR.
42. IR 77 from milepost 121 in SUM to milepost 122 in SUM.
43. SR 611 from milepost 10 in LOR to milepost 11 in LOR.