



Monitoring Visitor Capacity for Acadia National Park Carriage Roads, 2014 and 2015

Crowding



Around Mountain Carriage Road

Executive Summary

Applying the new regression equation to July and August trail counter data in 2014 and 2015 showed that we did not violate the crowding standard of 3,000 carriage road visitors per day based on its 80% one-tailed confidence interval test. The same can be said for all other years back to 2006 when the Bicycle Express began delivering visitors to Eagle Lake in great numbers. During this period however, we exceeded an estimated 3,000 visitors per day on two days in August 2011, but neither met the 80% test. Before 2006, and using a different regression equation, we exceeded an estimated 3,000 visitors per day once in 2000, but this also failed to meet the 80% test.

The daily use estimates from the new regression equation have shown that the increase in carriage road use since 2006 was less than previously reported but still statistically significant. All previous estimates of daily use since 2006 were reduced a modest but noticeable amount as we predicted in our 2013 report (Jacobi 2014). This suggests that as long as *daily* use from the Bicycle Express does not increase substantially from the current level, we may have reached a new plateau where the experience relative to crowding has diminished somewhat in quality around Eagle Lake (and perhaps further into the High Use Zone of the carriage road system) but the Low Use Zone experience remains relatively intact. Put in more concrete terms, on an average busy, sunny day in August between 9:00 a.m. and 6:00 p.m., the carriage roads have about 100 – 300 more visitors compared with 10 - 15 years ago, or about a 10% increase.

On the positive side, user surveys in 2013 showed that we met the standards for the occurrence of four problem behaviors in spite of the increased use (Jacobi 2014). These surveys should be conducted again in 2017. Based on these behavior monitoring results, the park should continue to emphasize carriage road education annually and at every opportunity:

- seasonal park staff should be trained about courtesy guidelines and communicate them to visitors at every opportunity;
- local bike shops should be urged to continue their courtesy guidelines education for bike rental customers;
- courtesy guidelines should be posted prominently in the park visitor center and other contact areas;
- the presence of interpretation and visitor protection staff on the carriage roads should be continued at the highest level possible.

CONTENTS

INTRODUCTION	1
CROWDING STANDARDS.....	1
METHODS	3
CROWDING	3
<i>Monitoring Daily Carriage Road System Use</i>	<i>4</i>
<i>Regression Equation.....</i>	<i>4</i>
<i>Trail Counter Operations.....</i>	<i>5</i>
<i>Data Analysis.....</i>	<i>5</i>
RESULTS.....	6
CROWDING STANDARDS AND DAILY USE ESTIMATES – 2014, 2015, AND PRIOR YEARS	6
TRENDS	9
SUMMARY	17
LITERATURE CITED	18
APPENDIX 1: Statistical Analysis of Trail Counter and Census Data 1995 – 1997.	20
APPENDIX 2: Statistical Analysis of Trail Counter and Census Data 2001–2002.....	21
APPENDIX 3: Statistical Analysis of Trail Counter and Census Data 2014 – 2015.	22
APPENDIX 4: Statistical Analysis for Estimated Daily Carriage Road Use with Confidence Intervals: July 1– August 31, 2014.	23
APPENDIX 5: Statistical Analysis for Estimated Daily Carriage Road Use with Confidence Intervals: July 1– August 31, 2015.	24
APPENDIX 6: Estimated Daily Carriage Road Use and a Comparison of the Top Ten Days for July and August 1995, and 1997 – 2015.....	25
APPENDIX 7: Descriptive Statistics for Monthly Carriage Road Use and the Top Ten Days for July and August 1995, and 1997- 2015.	27

TABLES

TABLE 1: Estimated Monthly Carriage Road Use and Mean Daily Carriage Road Use with a 90% Confidence Intervals for July 1995, 1997 – 2015.....	10
TABLE 2: Estimated Monthly Carriage Road Use and Mean Daily Carriage Road Use with a 90% Confidence Intervals for August 1995, 1997 – 2015.....	11
TABLE 3: Coefficients, Standard Errors, and P Values for the Constants and Slopes of the Regression Estimates for Mean Daily Use in July and August, 2014 – 2015.....	13
TABLE 4: Top Ten Carriage Road Visitor Use Days for July 1995 and 1997 – 2015 Ranked 1 – 10 with 90% Confidence Intervals for Mean Daily Carriage Road Use and the Number of Days with More Than 2000 Visitors. ..	15
TABLE 5: Top Ten Carriage Road Visitor Use Days for August 1995 and 1997-2015 Ranked 1 – 10 with 90% Confidence Intervals for Mean Daily Carriage Road Use and the Number of Days with More Than 2000 Visitors. ..	16

FIGURES

FIGURE 1: Acadia National Park Carriage Road System and Monitoring Sites.....	2
FIGURE 2: Estimated Daily Carriage Road Visitor Use for July - August, 2014.	7
FIGURE 3: Estimated Daily Carriage Road Visitor Use for July - August, 2015.	8
FIGURE 4: Mean Daily Carriage Road Visitor Use for July 1995, 1997 - 2015 with 90% Error Bars.	12
FIGURE 5: Mean Daily Carriage Road Visitor Use for August 1995, 1997 - 2015 with 90% Error Bars.	12
FIGURE 6: Mean Daily Carriage Road Visitor Use for July, 2006 - 2015 with 90% Error Bars and Trend Line.....	13
FIGURE 7: Mean Daily Carriage Road Visitor Use for August, 2006 – 2014.	13

ACKNOWLEDGEMENTS

Once again, we thank Friends of Acadia for providing the Recreation Technician, Abby Seymour to implement this monitoring in 2014 and 2015.

INTRODUCTION

Park managers established a carrying capacity for the Acadia National Park carriage road system in 1997 after three years of research and application of the Visitor Experience Resource Protection (VERP) process (National Park Service 1997). Using an indicators and standards approach for achieving a high quality experience, crowding and four problem behaviors were selected as indicators for that experience (see Jacobi 1997a, Manning et al 1996, Manning et al 1998a, and Manning et al 1998b). Indicators and standards are described below.

From the VERP process, park staff decided to manage for a diversity of carriage road experiences based on existing use levels and patterns. To provide this diversity, the carriage road system was divided into two zones defined by geography and time. The High Use Zone defined the high visitor use areas and times on the carriage roads. It consisted of the carriage road segments connecting intersections 1-10 and 14-17 (Figure 1). This zone covered the Paradise Hill, Witch Hole Pond, Eagle Lake, Jordan Pond, and Bubble Pond areas. Temporally, the High Use Zone included only the hours between 10:00 a.m. and 5:00 p.m., and only the days between June 20 and Labor Day, plus two days each of the Memorial and Columbus Day weekends¹. All three conditions (location, time of day, and time of year) must occur together to define the High Use Zone. The Low Use Zone defined the lesser-used areas and times on the carriage roads, and consisted of all locations and times other than those of the High Use Zone. The same indicators for crowding and problem behaviors were used for both zones, but different standards were established.

The carriage road use monitoring program² seeks to answer two questions for the July - August period of peak use. First, when can we be reasonably sure that crowding and behavior standards have been violated? And second, is there an up or down trend in use or behaviors?

This report updates carriage road daily use estimates from 2006 to 2015 and compares them to established standards based on a new regression equation. Ten censuses conducted in July and August of 2014 and 2015 contributed to the development of this new regression equation (Jacobi 2015). The censuses were prompted by a change in the Island Explorer bus schedule in 2006.

We note here that previous carriage road use estimates from 2006 – 2013 presented in various reports are no longer valid. Use estimates for years prior to 2006 are still good. This report now serves as the primary source for carriage road use information, including years prior to 2006. None of this affects the results of behavior monitoring through visitor surveys.

CROWDING STANDARDS

Some background information is needed to better understand the crowding standard. A typical viewscape on the carriage roads is about 100 meters, and this is also the likely limit of the

¹ For simplicity and staffing reasons, we analyze and report data only for July and August, and keep an eye on the end of June and Holidays.

² Monitoring reports are available in park files and on line at Integrated Resource Management Applications (IRMA).

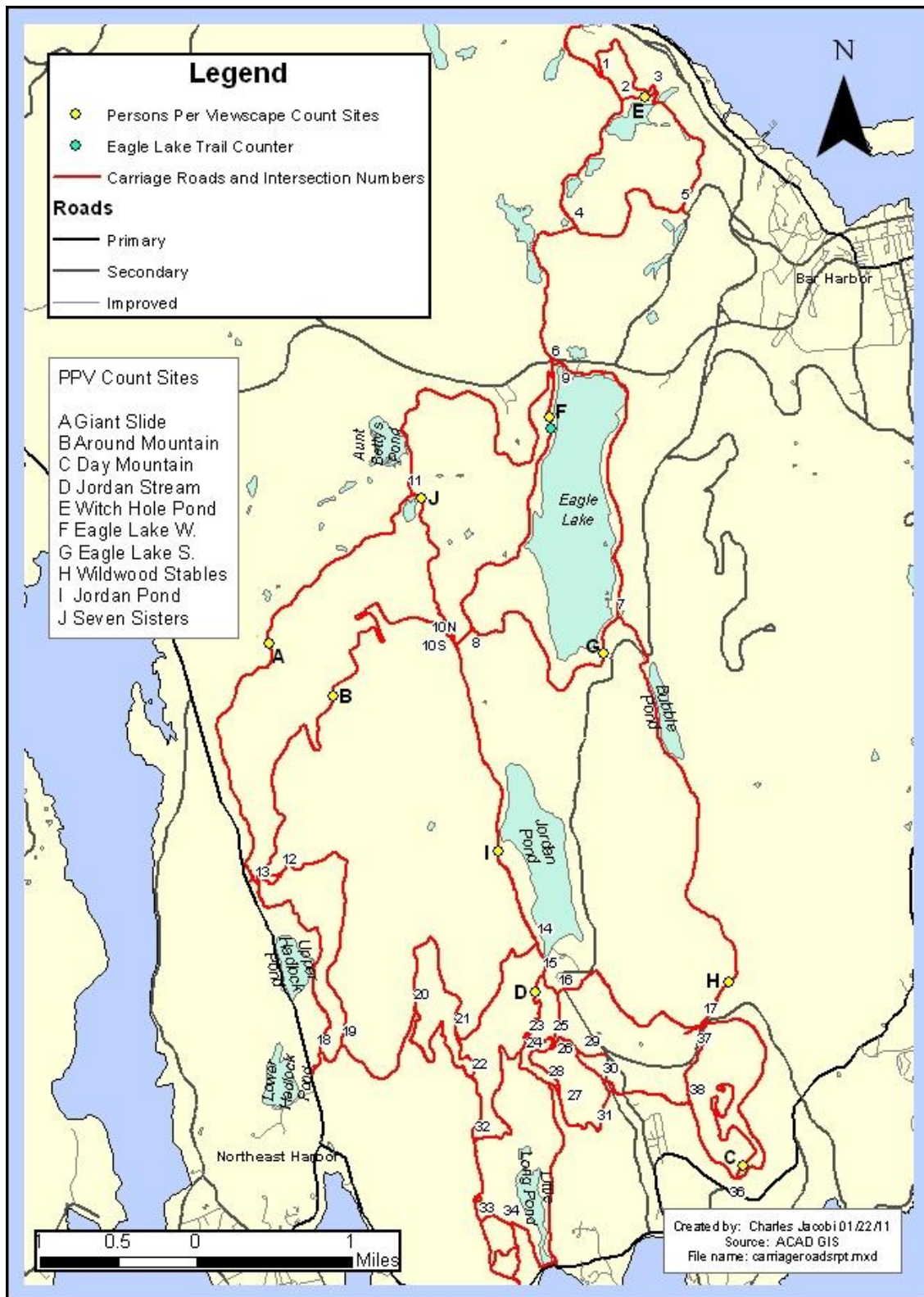


FIGURE 1: ACADIA NATIONAL PARK CARRIAGE ROAD SYSTEM AND MONITORING SITES.

effective viewscape. At 100 meters, people are far away and probably don't influence a sense of crowding. The number of persons seen per viewscape (PPV) at any moment was a concept developed through the research to measure crowding. In the research and in the establishment of standards, PPVs were grouped into ranges of 0, 1-5, 6-10, 11-15, 16-20, and 21-30, and expressed per unit of time. Thus, the number of minutes per hour visitors see 1-5 PPV, for example, is a measure of crowding.

Three expressions of crowding standards were developed for the visitor experience on the carriage roads:

- Eighty percent of visitors should have a high quality experience 90% of the summer season days (5/15-10/15).
- Total system wide use for the carriage roads should not exceed 3,000 visitors per day.
- PPV-related standards of quality for High and Low Use Zones are as follows:

In the *High Use Zone*, visitors should see 0 PPV at least 31 minutes of each hour, should see 1-5 PPV no more than 27 minutes of each hour, should see 6-10 PPV no more than 2 minutes out of each hour, and should never see more than 10 PPV.

In the *Low Use Zone*, visitors should see 0 PPV at least 48 minutes of each hour, should see 1-5 PPV no more than 11 minutes of each hour, should see 6-10 PPV no more than 1 minute out of each hour, and should never see more than 10 PPV.

Research showed these three expressions of standards for crowding (80%, 3,000 visitors/day, and PPVs) are related. Eighty percent of visitors should have a high quality experience and PPV standards should not be violated if total carriage road use does not exceed 3,000 visitors per day.

The 90% standard for summer season days recognizes that there are some peak use days during the main visitor season and accepts that use will exceed 3,000 per day 10% of the time. Ten percent represents an estimate of the normal number of peak use days (15) occurring between May 15 and October 15, a 150-day season. These peak use days generally occur for 2 days of the Memorial Day, Independence Day, Labor Day, and Columbus Day holidays (8 days total), and about 7 other days, usually in August. August is the busiest month in the park. Thus when total (system) use exceeds 3,000 per day for the *sixteenth* day during the season, the crowding standard is violated.

METHODS

CROWDING

Because of the relationships between the three expressions of crowding standards described above, monitoring was most easily done by estimating total or systemwide carriage road use on a daily basis. This measurement carries the greatest weight for determining when the crowding

standard is violated. Violation of the crowding standard will occur when we are 80%³ confident carriage road use exceeded 3,000 persons per day for the sixteenth day of the summer season, as described above.

Use monitoring has not been supplemented by direct counts of PPVs⁴ since 2007. Direct counts are used as spot checks of the computer simulation model of carriage road visitor use. Researchers developed the simulation model to estimate PPVs (Manning 1998a) and monitoring relies heavily on its validity and outputs. We are unable to conduct enough sample PPV spot counts in a season to represent the entire carriage road system effectively, but they are nonetheless informative. It would take a much greater effort to obtain a representative sample. These counts are ideally conducted every three years but they have been postponed several times. We hope to conduct some in 2016 if time permits.

Monitoring Daily Carriage Road System Use

The establishment of a “not-to-exceed” daily standard (limit) for carriage road use meant that we needed to estimate use as well as possible on the busiest days. We were not as interested in what happens on the low use (rainy or cool) days, or for that matter, in average daily use or monthly use. This provided the direction for the development of a regression equation based on censuses of carriage road use and trail counter counts. We will however still report on average daily use and total monthly use for July and August.

Regression Equation

We developed the first regression equation from 11 days of trail counter traffic counts and censuses conducted from 9:00 a.m. to 6:00 p.m. in 1995, 1996, and 1997 (Appendix 1). We conducted censuses only on days with good weather when higher levels of use might be expected. We recalibrated this regression equation in 2001 – 2002 (Appendix 2), a few years after the Island Explorer Bus was added to the park and Mount Desert Island in 1998. We did this by again conducting twelve censuses of carriage road use on good weather days over the two years and pairing the census data with traffic counts from the trail counter (Jacobi 2003).

In 2006 the Island Explorer bus began the Bicycle Express service to the Eagle Lake parking area. With extra vans put on to meet demand as needed, as many as 200 – 400 visitors were now dropped off daily between 9:00 a.m. and 4:00 p.m. Our carriage road use monitoring from 2006 – 2013 showed a well-defined trend of sharply increasing use in July and August. It seemed clear that the reason for this trend was that many of these Bicycle Express passengers (if not most of them) were triggering the electronic trail counter located on the carriage road on the west side of Eagle Lake. It seemed highly improbable that use at all other carriage road entrances increased at the same rate, but the regression equation assumed that it did. Thus, these use estimates were inflated because the initial conditions and assumptions of the regression had changed. We then conducted another ten censuses in 2014 – 2015 to develop our third regression to estimate overall carriage road use (Appendix 3), and as mentioned, we will apply this regression to trail counter data from 2006 to 2015 and report it here.

³ The application of a confidence limit to use estimations will be explained shortly.

⁴ Ten PPV count sites are mapped in the park’s GIS database and shown in Figure 1.

The 2014 – 2015 regression resulted in an r^2 of 0.86. The slope of the regression line was 2.16 and the intercept 587. The significance of the regression (F statistic) was 0.000105738. These results mean we can apply the regression equation $y = 2.16x + 587$ (x =trail counter count, y =daily use estimate) with confidence. A separate report (Jacobi 2015) describes in more detail the results of the censuses and the development of the revised regression equation.

It is important to restate the limitations of this regression equation. It is based on high use days and should be applied only with great caution beyond the high use days of summer and Holidays.

Trail Counter Operations

Eagle Lake is one of the busiest areas of the carriage roads. An electronic trail counter (Diamond Traffic Products, TCS 4420) located 0.3 miles south of the Route 233 overpass on the west side of Eagle Lake (Figure 1) monitored visitor traffic passing in both directions on the carriage road. The counter records data hourly and stores it. A hand held “Data Hog” was used to download the hourly data from the trail counter a few times during the season. The data is then uploaded into a computer using Centurion Parks software from Diamond Traffic Products, and exported to Excel for analysis. This trail counter is usually checked twice a week to confirm proper alignment and battery power.

There are some unavoidable weather-related problems when using these traffic counters. Rainy or foggy weather causes droplets to condense on the counter lenses and the reflector. When this occurs, the counter should stop counting and record zeroes. It usually does, but sometimes very high hourly counts are recorded during wet weather also. A check of park weather records shows a generally consistent correlation between rain/fog and counts of zero and overcounts.

Data Analysis

Our data protocol is to delete overcounts based on our experience with the normal range of variation of hourly data from previous years and a check of park weather records. We also require at least six hours of reliable data between 9:00 a.m. to 6:00 p.m. for the daily use dataset. That is, if we had to delete four hours or more of overcounts from a given day, we deleted data for the entire day. One problem which we have not addressed consistently over the years is how to handle days for which there are four or more hours of zero counts due to rain, but the remainder of the hourly data appears to be unaffected—that is, it is nonzero but not an obvious overcount. Traffic is usually low during these hours because of the still poor weather, but the traffic counter has resumed counting. Because the regression equation works best on moderate to high use days, we decided that the six hours of reliable daily data rule should apply not just to overcounts but to days with four or more hours with counts of zero without overcounts for the remaining hours. Using this unreliable data for those few hours of low use for a few days each month does not help our understanding of use on a typical July or August day. It would likely increase mean daily use somewhat, but not excessively unless there were many such rainy days. Thus, the mean monthly data we report for July and August better represents the typical summer use level.

After these quality control checks, for each day between July 1 and August 31, daily use at the trail counter was calculated by adding the hourly data from 9:00 a.m. to 6:00 p.m., the hours of

the censuses conducted in 2014 and 2015⁵. System-wide daily use estimates were obtained using this figure in the regression equation.

We then applied an 80% confidence limit test to these daily use estimates and compared them to the standard of 3,000 visitors per day. That is, we want to be 80% sure that we actually exceed the 3,000 visitor level for any given day, or alternatively, that eight times out of ten, we would exceed 3,000 visitors per day. Because we are only concerned about exceeding 3,000, this was a one-tailed level of confidence test. We are not interested in the lower bound of the confidence interval. Through an iterative process, we calculated the trail counter use level at which we would be 80% sure that a daily use estimate exceeded 3,000 visitors per day. This count level was 1,207 with the new regression equation.

We also calculated Mean Daily Use levels with 90% confidence intervals for the months of July and August. This allows us to look for evidence of increasing or decreasing use trends. We also ran a top ten days analysis, which eliminates most variation in weather from year to year. Finally, we ran a regression in Excel to look for trends since 2006, the earliest year we applied the new regression. For this we used all daily use numbers for July and August 2006 – 2015 (not just Mean Daily Use) as the dependent variable and year as the independent variable.

RESULTS

CROWDING STANDARDS AND DAILY USE ESTIMATES – 2014, 2015, AND PRIOR YEARS

The 2014 data was seldom compromised by bad weather. We lost one hour each on July 5 and 17, one hour on August 6 and three on the morning of August 14. Figure 2 shows estimated daily carriage road use calculated from the new regression equation for July and August 2014 (see Appendix 4 for details). Estimated visitation never exceeded 3,000 visitors per day, though there were two days over 2,600, and the highest use was 2,797. Thus, the crowding standard was not violated in 2014.

The 2015 data were also seldom compromised by bad weather. We lost two hours on July 19, one hour each on July 21 and 22, and two hours on August 26. Unfortunately we lost data in the critical period between July 28 and August 19 because the counter was misaligned. Figure 3 shows estimated daily carriage road use for July and August 2015 calculated from the new regression equation (see Appendix 5 for details). Estimated visitation never exceeded 3,000 visitors per day and did not come close because of the data loss during the busy first three weeks of August. The highest use was 2,440. Thus, for the data we have, the crowding standard was not violated in 2015 either.

Using the new regression equation, we have exceeded an estimated 3,000 visitors per day only twice since 2006 (and only once before 2006 using previous regression equations). Details are in Appendix 6. Each exceedance was in August 2011, with counts of 3,186 on August 17 and 3,089

⁵ Censuses conducted in 2014 and 2015 actually ended at 5:00 p.m. but we accounted for the missing last hour of data by adding 81 visitors to each census to develop the regression. See Jacobi 2015 for the calculations.

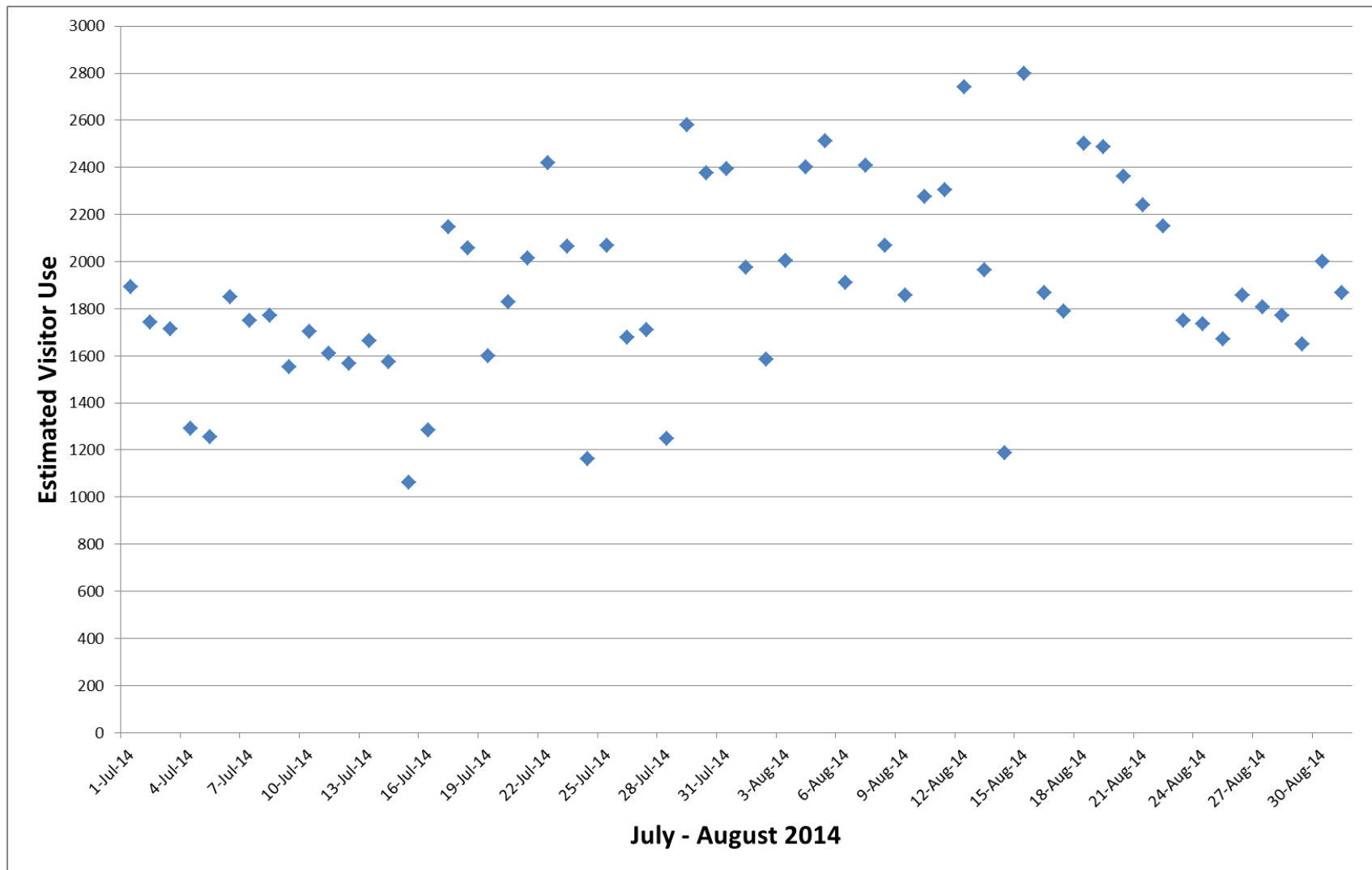


FIGURE 2: ESTIMATED DAILY CARRIAGE ROAD VISITOR USE FOR JULY - AUGUST, 2014.

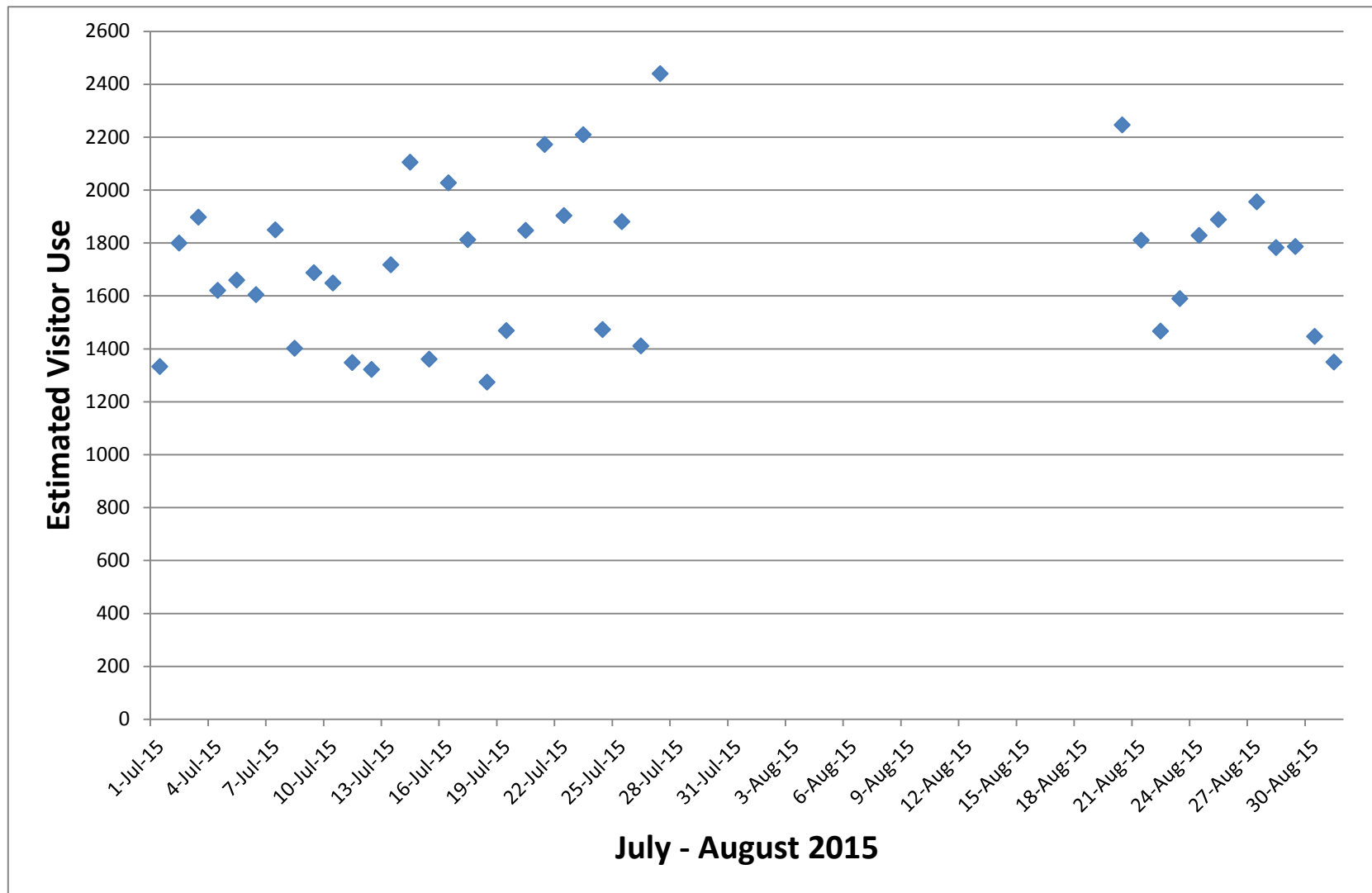


FIGURE 3: ESTIMATED DAILY CARRIAGE ROAD VISITOR USE FOR JULY - AUGUST, 2015.

on August 11. Neither of these counts met the 80% confidence level test but the first one was very, very close—only six trail counter clicks away.

TRENDS

Twenty years of daily use estimates for 1995 and 1997 – 2013 are available to help understand trends in use, but they must be treated with caution because of problems with and variations in data collection. Estimates from 1997 (Jacobi 1997b), 1998 (Jacobi 1998) 1999 (Jacobi 2000), and 2008 (Jacobi 2008) were compromised to some extent by equipment problems creating data loss and overcounts. Estimates from 2002 - 2005 are derived from the second regression equation (Jacobi 2003) and those from 2006 - 2015 are derived from the third (Jacobi 2015). The 1995 data was also collected using different equipment. We used a TT501 computer in 1995, also manufactured by Diamond Traffic Products. This counter had not been upgraded at that time, and upgrading caused problems in 1996 resulting in complete data loss for the season. Even given all these issues with data, there is still value in the trend analysis.

Tables 1 and 2 show the Estimated Monthly Carriage Road Use and Mean Daily Carriage Road Use for July and August for twenty years including the 90% confidence intervals for mean daily use⁶. Because the number of days of the month we collected reliable data varied somewhat (N), the monthly use totals are only important in determining how high use can be over 31 days. For trends, the mean daily use should be used to assess changes.

Figures 4 and 5 show the mean daily use for July and August for these twenty years graphically with 90% error bars. Mean daily use in July since 2011 has been consistently in the mid-1,700s which does appear to be higher than most previous years. Mean daily use for August 2013 and 2014 was greater than 2,000, after approaching that level several times during the five prior years. Because of data loss, we do not have a valid mean daily use estimate for 2015. Nonetheless, August mean daily use since 2008 does appear to be higher than most previous years. August use is also always higher than July.

Regression analysis shows an upward trend since 2006 for July and August (Figures 6 and 7) that is statistically significant, as shown in Table 3, with all P values under 0.05. The extremely low Adjusted R square values indicate the huge amount of variability in the data, which include not just the really busy days, but also some of the lower use days of rain, drizzle, or fog which we did not remove from our dataset. In spite of this variability, there is an increasing use trend. We removed August 2015 from this analysis because we lacked any data from the very busy first three weeks of the month. We also lost data for July 2009.

⁶ Appendix 6 shows all the estimated daily use data for July and August for these 20 years. Appendix 7 shows the descriptive statistics for each year and month for all 20 years.

TABLE 1: ESTIMATED MONTHLY CARRIAGE ROAD USE AND MEAN DAILY CARRIAGE ROAD USE WITH A 90% CONFIDENCE INTERVALS FOR JULY 1995, 1997 – 2015.						
Year	Monthly Use	Mean Daily Use	90% Confidence Interval (+ or -)	Lower Bound	Upper Bound	N¹
1995	46,982	1,620	194	1,426	1,814	29
1997	48,236	1,663	114	1,549	1,777	29
1998	42,945	1,431	93	1,338	1,524	31
1999	42,298	1,567	103	1,464	1,670	27
2000	41,384	1,379	142	1,237	1,521	30
2001	39,505	1,362	76	1,286	1,438	29
2002²	50,596	1,632	88	1,544	1,720	31
2003	50,518	1,630	92	1,538	1,722	28
2004³	41,634	1,487	98	1,389	1,585	28
2005	44,067	1,520	65	1,455	1,585	29
2006⁴	45,591	1,471	84	1,387	1,555	30
2007	45,447	1,515	92	1,423	1,607	29
2008	45,331	1,462	151	1,311	1,613	25
2009⁵						
2010	49,672	1,596	109	1,487	1,705	30
2011	54,034	1,743	103	1,640	1,846	31
2012	54,813	1,768	93	1,675	1,861	31
2013	51,349	1,771	115	1,656	1,886	29
2014	54,631	1,761	117	1,644	1,878	31
2015	46,253	1,713	122	1,591	1,835	27

1. N equals the number of days in a particular month and year for which reliable data were collected. Monthly totals are not always easily compared because of missing data. Means should be used to make monthly use comparisons.

2. New regression equation developed in 2002.

3. New computer/counter.

4. New regression equation developed in 2015 applied from 2006 forward.

5. No data. Equipment malfunction.

TABLE 2: ESTIMATED MONTHLY CARRIAGE ROAD USE AND MEAN DAILY CARRIAGE ROAD USE WITH A 90% CONFIDENCE INTERVALS FOR AUGUST 1995, 1997 – 2015.						
Year	Monthly Use	Mean Daily Use	90% Confidence Interval (+ or -)	Lower Bound	Upper Bound	N¹
1995	54,995	1774	138	1,636	1,912	31
1997	41,668	1984	173	1,811	2,157	21
1998	48,489	1796	103	1,693	1,899	27
1999	57,376	1851	159	1,692	2,010	31
2000	52,642	1755	157	1,598	1,912	30
2001	46,568	1552	81	1,471	1,633	30
2002²	57,865	1867	93	1,774	1,960	31
2003	41,047	1785	98	1,687	1,883	23
2004³	50,199	1673	100	1,573	1,773	30
2005	50,294	1734	99	1,635	1,833	29
2006⁴	55,321	1785	104	1,681	1,889	31
2007	53,734	1791	110	1,681	1,901	30
2008	47,835	1913	157	1,756	2,070	25
2009⁵	56,167	1812	112	1,700	1,924	31
2010	61,798	1993	148	1,845	2,141	30
2011	58,712	1894	202	1,692	2,096	31
2012	61,824	1994	142	1,852	2,136	31
2013	60,414	2014	135	1,879	2,149	30
2014	63,488	2048	111	1,937	2,159	31
2015⁵						

1. N equals the number of days in a particular month and year for which reliable data were collected. Monthly totals are not always easily compared because of missing data. Means should be used to make monthly use comparisons.

2. New regression equation developed in 2002.

3. New computer/counter.

4. New regression equation developed in 2015 applied from 2006 forward.

5. No data. Equipment malfunction.

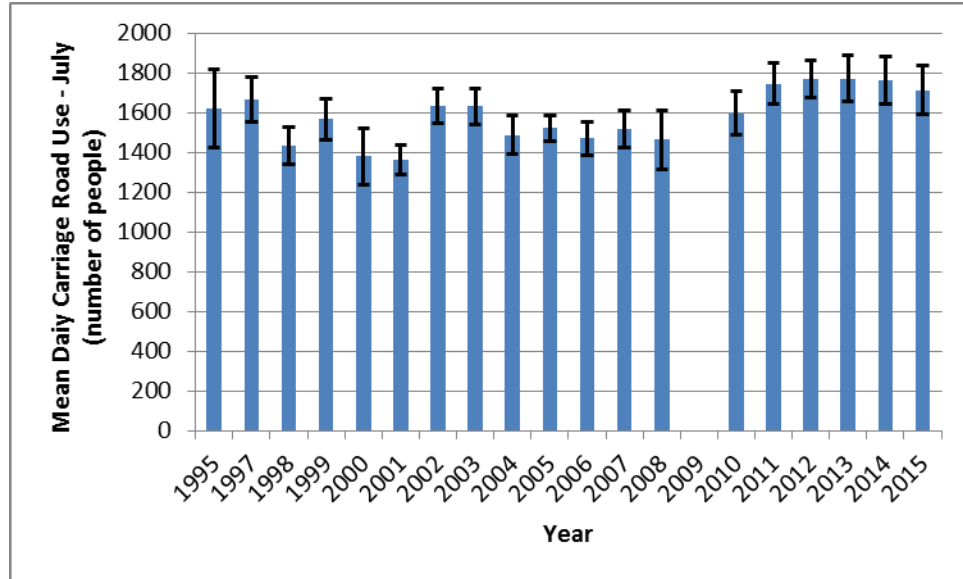


FIGURE 4: MEAN DAILY CARRIAGE ROAD VISITOR USE FOR JULY 1995, 1997 - 2015 WITH 90% ERROR BARS.

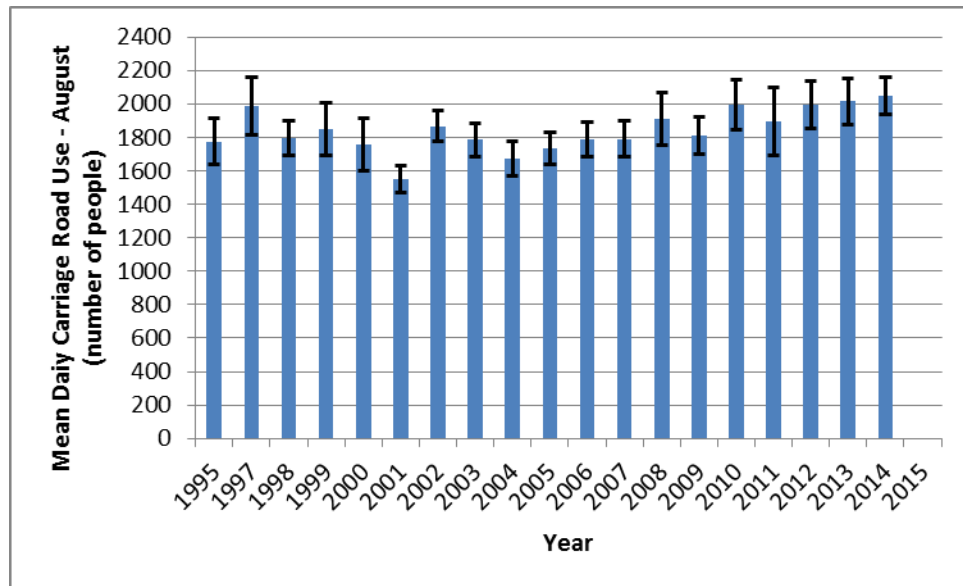


FIGURE 5: MEAN DAILY CARRIAGE ROAD VISITOR USE FOR AUGUST 1995, 1997 - 2015 WITH 90% ERROR BARS.

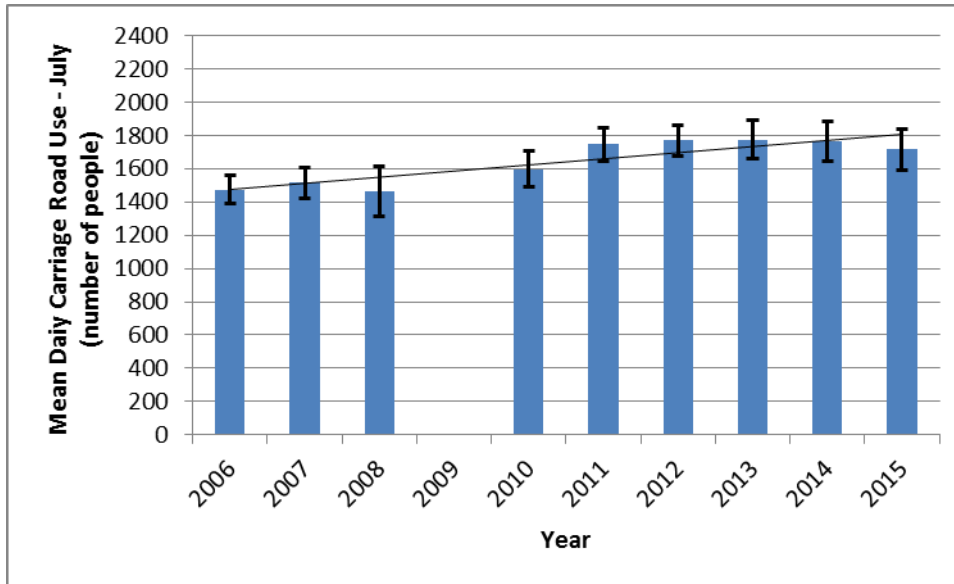


FIGURE 6: MEAN DAILY CARRIAGE ROAD VISITOR USE FOR JULY, 2006 - 2015 WITH 90% ERROR BARS AND TREND LINE.

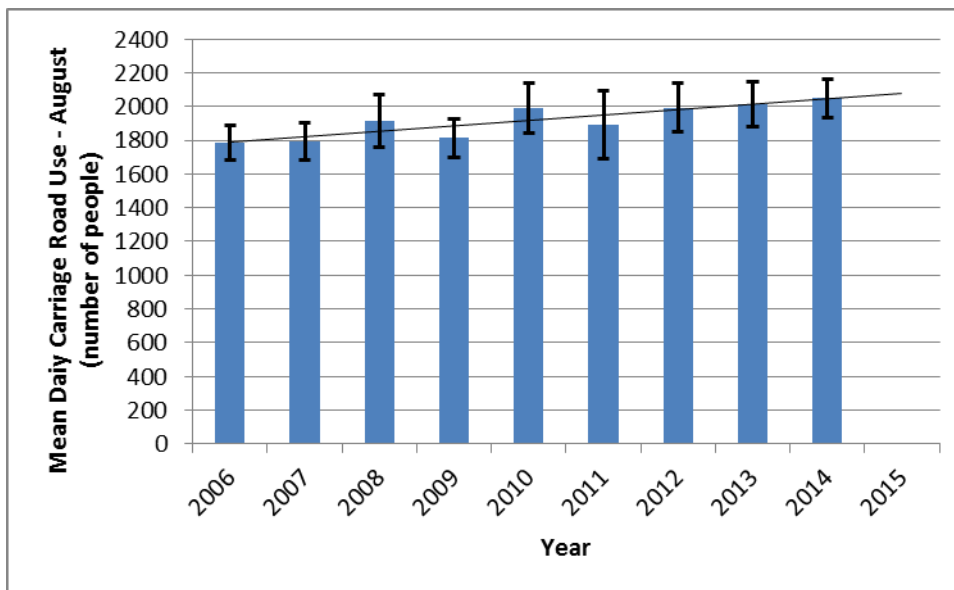


FIGURE 7: MEAN DAILY CARRIAGE ROAD VISITOR USE FOR AUGUST, 2006 – 2014.

TABLE 3: COEFFICIENTS, STANDARD ERRORS, AND P VALUES FOR THE CONSTANTS AND SLOPES OF THE REGRESSION ESTIMATES FOR MEAN DAILY USE IN JULY AND AUGUST, 2014 – 2015.

July	Coefficient	Standard Error	P Value	August	Coefficient	Standard Error	P Value
Constant	-34366.8493	14319.09648	0.017093	Constant	-48971.379	22795.86983	0.03259
Slope	17.97612709	7.121469062	0.012189	Slope	25.3866829	11.34096856	0.02601
Adjusted R Square		0.020091		Adjusted R Square		0.014691	
Sample Size n = 263*				Sample Size n = 270			

* Note that we used all the data (not monthly means) for the regression.

Two more ways of monitoring visitor use trends are a comparison of the top ten busiest days of each month and the number of days per month with use more than 2000 visitors per day. A top ten analysis helps understand what use is like on the busiest warm sunny days in these months, and reduces the impact of bad weather years such as 2004 or 2008. Tables 4 and 5 show the data for the top ten busiest days of July and August for 1995 and 1997-2015, including the Mean Daily Carriage Road Use each year for these ten days with a 90% confidence interval⁷, and the number of days of 2000 or more persons per day.

Mean daily use for the top ten days in July has been above 2,000 for the past five years which is higher than most previous years. Mean daily use for the top ten days in August has been above 2,000 for all but three of the twenty years of monitoring. It is also substantially and consistently higher than July. We looked at testing for the significance of “top ten” differences but the samples were too small (n=10) and the distributions did not always appear normal. There is less variation in the data, but with fewer data points, confidence intervals are often wider because of a higher t-value.

The number of days with 2,000 or more estimated carriage road visitors in July and August has increased in both months when compared with earlier years. The number of 2,000 plus days in July has reached nine. For August, the number of 2,000 plus days is usually greater than 10 and has hit 17 three times.

⁷ Appendix 7 shows the descriptive statistics for the top ten days of the month for each year and month.

TABLE 4: TOP TEN CARRIAGE ROAD VISITOR USE DAYS FOR JULY 1995 AND 1997 – 2015 RANKED 1 – 10 WITH 90% CONFIDENCE INTERVALS FOR MEAN DAILY CARRIAGE ROAD USE AND THE NUMBER OF DAYS WITH MORE THAN 2000 VISITORS.

Rank #	1995	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
1	2937	2384	1930	2099	2273	2066	2299	2114	2198	1979	2124	2020	2199
2	2758	2344	1927	2023	2036	1827	2116	2088	2052	1859	1842	1922	2037
3	2616	2088	1849	1927	1862	1598	2066	2015	1905	1784	1812	1894	2022
4	2125	2012	1759	1849	1862	1596	1931	2011	1854	1741	1803	1836	1970
5	2056	1990	1732	1808	1849	1587	1866	1996	1828	1693	1646	1829	1959
6	2018	1966	1672	1808	1813	1579	1849	1938	1729	1683	1607	1795	1922
7	1949	1960	1672	1775	1802	1566	1844	1924	1674	1678	1589	1782	1922
8	1894	1919	1636	1751	1721	1511	1842	1895	1630	1662	1565	1706	1808
9	1832	1884	1606	1745	1715	1484	1808	1796	1621	1647	1553	1693	1806
10	1801	1876	1582	1721	1704	1460	1806	1796	1577	1611	1550	1654	1795
Mean	2199	2042	1737	1851	1864	1627	1943	1957	1807	1734	1709	1813	1944
90% CI ¹	+/- 240	+/- 105	+/- 74	+/- 73	+/- 101	+/- 107	+/- 95	+/- 63	+/- 117	+/- 65	+/- 100	+/- 65	+/- 72
N=2000+ ²	6	4	0	2	2	1	3	4	2	0	1	1	3

TABLE 4 (CONT.): TOP TEN CARRIAGE ROAD VISITOR USE DAYS FOR JULY 1995 AND 1997-2015 RANKED 1 – 10 WITH 90% CONFIDENCE INTERVALS FOR MEAN DAILY CARRIAGE ROAD USE AND THE NUMBER OF DAYS WITH MORE THAN 2000 VISITORS.

Rank #	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2121
1	-- ³	2334	2587	2450	2717	2580	2440						
2	--	2109	2325	2340	2340	2418	2208						
3	--	2076	2189	2249	2243	2392	2171						
4	--	2070	2167	2202	2167	2375	2104						
5	--	2039	2093	2171	2132	2148	2026						
6	--	1864	2080	2061	2119	2070	1903						
7	--	1801	2016	1996	2083	2065	1897						
8	--	1771	1966	1966	2018	2057	1879						
9	--	1767	1948	1862	1970	2013	1849						
10	--	1758	1942	1862	1920	1892	1847						
Mean	--	1959	2131	2116	2171	2201	2032						
90% CI		113	117	116	132	129	141						
N=2000+	--	5	7	6	8	9	5						

1= confidence interval for the mean number of visitors for the top ten days. 2=number of days with the number of visitors 2,000 or more. 3= No data, equipment malfunction.

TABLE 5: TOP TEN CARRIAGE ROAD VISITOR USE DAYS FOR AUGUST 1995 AND 1997-2015 RANKED 1 – 10 WITH 90% CONFIDENCE INTERVALS FOR MEAN DAILY CARRIAGE ROAD USE AND THE NUMBER OF DAYS WITH MORE THAN 2000 VISITORS.

Rank #	1995	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
1	2561	2795	2333	2613	3132	2142	2663	2246	2237	2396	2409	2667	2773
2	2460	2714	2292	2613	2811	2072	2367	2165	2201	2393	2396	2396	2487
3	2357	2616	2267	2504	2504	1941	2254	2112	2008	2102	2342	2215	2472
4	2315	2512	2267	2330	2431	1933	2227	2076	1999	2061	2312	2154	2448
5	2198	2325	2246	2319	2403	1857	2148	2059	1991	2020	2113	2076	2437
6	2153	2289	2189	2316	2112	1756	2124	2006	1970	1977	2072	2050	2238
7	2084	2270	2069	2205	2017	1732	2107	1984	1943	1974	2013	2046	2191
8	2070	2229	1985	2191	1985	1699	2051	1871	1890	1936	1970	2039	2156
9	2046	2004	1966	2180	1933	1680	2044	1871	1854	1917	1920	2009	2150
10	1970	1998	1898	2164	1930	1677	2020	1859	1847	1912	1892	2000	2041
Mean	2221	2375	2151	2344	2326	1849	2201	2025	1994	2069	2144	2165	2339
90% CI ¹	113	161	91	101	237	97	113	77	77	106	117	124	128
N=2000+ ²	9	9	7	16	7	2	11	6	3	5	7	10	11

TABLE 5 (CONT.): TOP TEN CARRIAGE ROAD VISITOR USE DAYS FOR AUGUST 1995 AND 1997-2015 RANKED 1 – 10 WITH 90% CONFIDENCE INTERVALS FOR MEAN DAILY CARRIAGE ROAD USE AND THE NUMBER OF DAYS WITH MORE THAN 2000 VISITORS.

Rank #	2009	2010	2011	2012	2013	2014	2015 ³	2016	2017	2018	2019	2020	2121
1	2344	2952	3186	2870	2688	2797	2245						
2	2325	2736	3089	2665	2675	2740	1955						
3	2290	2600	2942	2485	2615	2511	1888						
4	2269	2455	2868	2485	2479	2502	1827						
5	2228	2390	2665	2461	2461	2485	1810						
6	2180	2357	2498	2442	2440	2409	1786						
7	2132	2334	2310	2342	2403	2401	1782						
8	2029	2318	2271	2338	2399	2362	1589						
9	1981	2312	2221	2334	2394	2305	1466						
10	1974	2221	2156	2310	2189	2275	1446						
Mean	2175	2468	2621	2473	2474	2479	1779						
90% CI	81	132	222	102	88	100	170						
N=2000+	8	17	12	17	17	15	1						

1= confidence interval for the mean number of visitors for the top ten days. 2=number of days with the number of visitors 2,000 or more. 3=Missing first (and busiest) three weeks of month.

SUMMARY

Applying the new regression equation to July and August trail counter data in 2014 and 2015 showed that we did not yet violate the crowding standard of 3,000 carriage road visitors per day based on its 80% one-tailed confidence interval test. The same can be said for all other years back to 2006 when the Bicycle Express began delivering visitors to Eagle Lake in great numbers. During this period however, we exceeded an estimated 3,000 visitors per day on two days in August 2011, but neither met the 80% test. Before 2006, and using a different regression equation, we exceeded an estimated 3,000 visitors per day once in 2000, but this also failed to meet the 80% test.

The daily use estimates from the new regression equation have shown that the increase in carriage road use since 2006 was less than previously reported but still statistically significant. All previous estimates of daily use since 2006 were reduced a modest but noticeable amount as we predicted in our 2013 report (Jacobi 2014). This suggests that as long as *daily* use from the Bicycle Express does not increase substantially from the current level, we may have reached a new plateau where the experience relative to crowding has diminished somewhat in quality around Eagle Lake (and perhaps further into the High Use Zone of the carriage road system) but the Low Use Zone experience remains relatively intact. Put in more concrete terms, on an average busy, sunny day in August between 9:00 a.m. and 6:00 p.m., the carriage roads have about 100 – 300 more visitors compared with 10 - 15 years ago, or about a 10% increase.

On the positive side, user surveys in 2013 showed that we met the standards for the occurrence of four problem behaviors in spite of the increased use (Jacobi 2014). These surveys should be conducted again in 2017. Based on these behavior monitoring results, the park should continue to emphasize carriage road education annually and at every opportunity:

- seasonal park staff should be trained about courtesy guidelines and communicate them to visitors at every opportunity;
- local bike shops should be urged to continue their courtesy guidelines education for bike rental customers;
- courtesy guidelines should be posted prominently in the park visitor center and other contact areas;
- the presence of interpretation and visitor protection staff on the carriage roads should be continued at the highest level possible.

LITERATURE CITED

- Jacobi, C.
2015 Developing a Regression Estimator for Acadia National Park carriage roads 2014 - 2015. Acadia National Park Natural Resources Report Number 2015 - 3. October. 14pp.
- Jacobi, C.
2014 Monitoring visitor capacity for Acadia National Park carriage roads: 2013 (crowding and behaviors). Acadia National Park Natural Resources Report Number 2014-1. January. 47pp.
- Jacobi, C.
2008 Monitoring visitor capacity for Acadia National Park carriage roads: 2008 (crowding). Acadia National Park Natural Resources Report Number 2008-7. December. 25pp.
- Jacobi, C.
2003 Developing a regression equation to estimate Acadia National Park carriage road use using censuses and electronic trail counters: 2001-2002. Acadia National Park Natural Resources Report Number 2003-1. March. 7pp.
- Jacobi, C.
2000 Monitoring carrying capacity on Acadia National Park carriage roads: 1999 (crowding). Acadia National Park Natural Resources Report Number 2000-4. April. 22pp.
- Jacobi, C.
1998 Monitoring carrying capacity on Acadia National Park carriage roads: 1998 (crowding). Acadia National Park Natural Resources Report Number 98-5. December. 15pp.
- Jacobi, C.
1997a Applying the visitor experience resource protection process to Acadia National Park carriage roads: a summary of research and decision-making. Acadia National Park Natural Resources Report Number 97-10. December. 23pp.
- Jacobi, C.
1997b Monitoring carrying capacity on Acadia National Park carriage roads: 1997. Acadia National Park Natural Resources Report 97-11. December 1997. 20pp.
- Manning, R., W. Valliere, B. Wang, N. Ballinger, and C. Jacobi
1998a Acadia National Park carriage road study: phase II research. Technical Report NPS/NESO-RNR/NRTR/98-3.

Manning, R., W. Valliere, N. Ballinger, and C. Jacobi

1998b Acadia National Park carriage road study: phase III research. Technical Report NPS/NESO-RNR/NRTR/98-1..

Manning, R., C. Negra, W. Valliere and C. Jacobi

1996 Acadia National Park carriage road study: phase I research. Technical Report NPS/NESO-RNR/NRTR/96-07. January. Department of the Interior. National Park Service. 61pp.

National Park Service

1997 The visitor experience and resource protection (VERP) framework: a handbook for planners and managers. Denver Service Center. Denver, Colorado. 103pp.

APPENDIX 1: STATISTICAL ANALYSIS OF TRAIL COUNTER (TC) AND CENSUS DATA 1995 – 1997.

Date	Raw TC Count	Census	Ratio
June 18, 1995	327	950	0.34421053
July 9, 1995	398	1189	0.33473507
July 26, 1995	500	1798	0.27808676
August 15, 1995	539	1721	0.31319001
August 29, 1995	415	1409	0.29453513
Sept. 8, 1995	229	957	0.23928945
August 13, 1996	844	2346	0.3597613
October 2, 1996	257	787	0.32655654
July 6, 1997	520	1803	0.28840821
July 25, 1997	426	1328	0.32078313
August 13, 1997	718	2241	0.32039268

Descriptive Statistics on Ratio Data		n=11	
Mean	0.3109	Kurtosis	0.7174
Standard Error	0.0102	Skewness	-0.7717
Median	0.3204	Range	0.1205
Mode	0	Minimum	0.2393
Standard Deviation	0.0339	Maximum	0.3598
Variance	0.0011	Sum	3.4199
Confidence Level(0.95)	0.0200	Count	11

Regression Statistics for Trail Counter and Census Data

Multiple R	0.9655
R Square	0.9322
Adjusted R Square	0.9247
Standard Error	143.5356
Observations	11

Analysis of Variance for Trail Counter and Census Data

	<i>df</i>	<i>Sum of Squares</i>	<i>Mean Square</i>	<i>F</i>	<i>Significance F</i>		
Regression	1	2549056.211	2549056.21	123.7257	1.466E-06		
Residual	9	185422.3345	20602.4816				
Total	10	2734478.545					

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Statistic</i>	<i>P-value</i>	<i>Lower 95.00%</i>	<i>Upper 95.00%</i>
Intercept	221.7137	123.02133	1.8022	0.1017	-56.5799	500.0027
x1	2.7238	0.2449	11.1232	5.943E-07	2.1698	3.2778

APPENDIX 2: STATISTICAL ANALYSIS OF TRAIL COUNTER (TC) AND CENSUS DATA 2001–2002.

Date	Trail Counter	Census	Ratio
July 3, 2001	502	1956	25.66%
July 13, 2001	335	1374	24.38%
July 19, 2001	419	1770	23.67%
July 27, 2001	464	1956	23.72%
August 2, 2001	403	1736	23.21%
August 16, 2001	649	2127	30.51%
July 9, 2002	374	1178	31.75%
July 18, 2002	471	1487	31.67%
July 25, 2002	422	1643	25.68%
August 2, 2002	511	1704	29.99%
August 13, 2002	636	2104	30.23%
August 16, 2002	531	1840	28.86%
Average	476.41667		

Regression Statistics

Multiple R	0.806966402277151
R Square	0.651194774404128
Adjusted R Square	0.616314251844541
Standard Error	178.25915838376
Observations	12

Analysis of Variance

	<i>df</i>	<i>Sum of Squares</i>	<i>Mean Square F</i>	<i>Significance F</i>
Regression	1	593241.641593241	593241.641189818	0.001511224265161
Residual	10	189804.31776327531776	18980.4317754768	0.61
Total	11	911004.9166667		

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Statistic</i>	<i>P-value</i>	<i>Lower 95.00%</i>	<i>Upper 95.00%</i>
Intercept	592.880626068	270.3342972	2.1931387616000	0.050689774844	-9.46172463692743	1195.22297677416
x1	2.40693239236	0.557057374	4.3207979885190	0.001213053021	1.16573120916797	3.64813357557111

APPENDIX 3: STATISTICAL ANALYSIS OF TRAIL COUNTER (TC) AND CENSUS DATA 2014 – 2015.

Date	Trail Counter	Census+81	Census	Ratio
7/18/2014	679	2124	2043	0.31968
7/23/2014	683	1898	1817	0.359852
7/31/2014	834	2549	2468	0.327187
8/18/2014	885	2435	2354	0.36345
8/26/2014	586	1764	1683	0.3322
7/7/2015	583	1994	1913	0.292377
7/15/2015	357	1302	1221	0.274194
7/21/2015	876	2285	2204	0.38337
7/27/2015	856	2412	2331	0.354892
8/20/2015	766	2485	2404	0.308249

Census + 81 is correction factor for not counting 5p - 6p as in earlier censuses. See associated Excel file.

SUMMARY OUTPUT					
Regression Statistics					
Multiple R	0.928340488				
R Square	0.861816062				
Adjusted R S	0.84454307				
Standard Err	154.9379099				
Observation	10				

ANOVA					
	df	SS	MS	F	Significance F
Regression	1	1197739.553	1197740	49.89385	0.000105738
Residual	8	192046.0473	24005.76		
Total	9	1389785.6			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	587.4027685	223.0985284	2.63293	0.030041	72.93663945	1101.8689	72.93663945	1101.869
X Variable 1	2.163824393	0.306336333	7.063558	0.000106	1.457411542	2.8702372	1.457411542	2.870237

Scatter Plot 2014 - 2015

RESIDUAL OUTPUT				PROBABILITY OUTPUT	
Observation	Predicted Y	Residuals	Standard Residuals	Percentile	Y
1	2056.639532	67.36046839	0.46113	5	1302
2	2065.294829	-167.294829	-1.14525	15	1764
3	2392.032313	156.9676874	1.074555	25	1898
4	2502.387357	-67.3873567	-0.46131	35	1994
5	1855.403863	-91.403863	-0.62572	45	2124
6	1848.91239	145.0876102	0.993228	55	2285
7	1359.888077	-57.8880769	-0.39629	65	2412
8	2482.912937	-197.912937	-1.35485	75	2435
9	2439.636449	-27.6364492	-0.18919	85	2485
10	2244.892254	240.1077462	1.643708	95	2549

APPENDIX 4: STATISTICAL ANALYSIS FOR ESTIMATED DAILY CARRIAGE ROAD USE WITH CONFIDENCE INTERVALS: JULY 1– AUGUST 31, 2014.

SUMMARY OUTPUT		2014							
ANOVA		df	SS	MS	F	Significance F			
Regression		1	1197739.553	1197740	49.89384866	0.00011			
Residual		8	192046.0473	24005.8					
Total		9	1389785.6						
	Coefficients		Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95%	Upper 95.0%
Intercept	587.40277		223.0985284	2.63293	0.030041225	72.9366	1101.87	72.9366	1101.87
X Variable 1	2.1638244		0.306336333	7.06356	0.000105738	1.45741	2.87024	1.45741	2.87024
					Regression Statistics		x	x-xbar	x-xbar2
							679	-31.5	992.25
							683	-27.5	756.25
x ave	710.5				Multiple R	0.92834	834	123.5	15252.3
sum x-xbar squared	255810.5				R Square	0.86182	885	174.5	30450.3
numb of obs	10				Adjusted R Square	0.84454	586	-124.5	15500.3
					Standard Error	154.938	583	-127.5	16256.3
my x observations	1207				Observations	10	357	-353.5	124962
							876	165.5	27390.3
predicted y	3199.1388						856	145.5	21170.3
							766	55.5	3080.25
error of y	222.57475					Mean	710.5		255811
					80% CI	90% CI	95% CI	60% CI	
				t8	1.397	1.86	2.306	0.889	
					310.9369326	413.989	513.257	197.869	
July	Obsv'd x	Pred y	Error of Y	80%CI	90%CI	95% CI	60%CI		Top Ten
1	603	1892	165.80	231.63	308.39	382.34	147.40		2580.29
2	533	1741	171.36	239.38	318.72	395.15	152.34		2418.00
3	520	1713	172.66	241.21	321.15	398.16	153.50		2392.03
4	325	1291	200.88	280.63	373.63	463.23	178.58		2374.72
5	309	1256	203.80	284.71	379.07	469.96	181.18		2147.52
6	584	1851	167.06	233.38	310.73	385.23	148.51		2069.62
7	537	1749	170.97	238.85	318.01	394.26	151.99		2065.29
8	547	1771	170.04	237.55	316.28	392.12	151.17		2056.64
9	446	1552	181.58	253.67	337.74	418.73	161.43		2013.36
10	516	1704	173.08	241.79	321.93	399.12	153.87		1892.19
11	473	1611	178.04	248.73	331.16	410.57	158.28		1851.08
12	453	1568	180.63	252.35	335.98	416.54	160.58		1829.44
13	498	1665	175.05	244.55	325.60	403.67	155.62		1771.01
14	456	1574	180.23	251.79	335.24	415.62	160.23		1749.38
15	220	1063	221.32	309.19	411.66	510.37	196.76		1740.72
16	322	1284	201.42	281.38	374.64	464.48	179.06		1712.59
17	721	2148	162.53	227.06	302.31	374.80	144.49		1708.26
18	679	2057	162.79	227.41	302.78	375.39	144.72		1703.94
19	468	1600	178.68	249.61	332.34	412.02	158.84		1677.97
20	574	1829	167.79	234.41	312.10	386.93	149.17		1664.99
21	659	2013	163.26	228.08	303.67	376.49	145.14		1610.89
22	846	2418	167.72	234.30	311.96	386.76	149.10		1600.07
23	683	2065	162.72	227.32	302.66	375.23	144.66		1574.11
24	266	1163	212.01	296.18	394.34	488.89	188.48		1567.62
25	685	2070	162.69	227.27	302.60	375.16	144.63		1552.47
26	504	1678	174.38	243.61	324.34	402.12	155.02		1290.65
27	518	1708	172.87	241.50	321.54	398.64	153.68		1284.15
28	306	1250	204.35	285.48	380.10	471.24	181.67		1256.02
29	921	2580	174.83	244.23	325.18	403.15	155.42		1249.53
30	826	2375	166.31	232.33	309.33	383.51	147.85		1162.98
31	834	2392	166.85	233.08	310.33	384.75	148.33		1063.44
August	Obsv'd x	Pred y	Error of Y	80%CI	90%CI	95% CI	60%CI		
1	642	1977	163.85	228.90	304.76	377.84	145.66		2796.67
2	461	1585	179.58	250.87	334.01	414.11	159.64		2740.41
3	654	2003	163.42	228.30	303.96	376.85	145.28		2511.04
4	838	2401	167.13	233.48	310.86	385.40	148.58		2502.39
5	889	2511	171.45	239.52	318.90	395.37	152.42		2485.08
6	611	1909	165.33	230.97	307.52	381.26	146.98		2409.34
7	842	2409	167.42	233.88	311.40	386.07	148.84		2400.69
8	684	2067	162.70	227.30	302.63	375.19	144.64		2361.74
9	586	1855	166.92	233.18	310.46	384.91	148.39		2305.48
10	780	2275	163.89	228.95	304.83	377.93	145.70		2275.19
11	794	2305	164.50	229.81	305.97	379.34	146.24		2238.40
12	995	2740	184.40	257.60	342.98	425.22	163.93		2151.85
13	636	1964	164.10	229.24	305.22	378.40	145.88		2067.46
14	277	1187	209.86	293.17	390.34	483.94	186.57		2002.54
15	1021	2797	188.29	263.04	350.22	434.20	167.39		2000.38
16	592	1868	166.51	232.61	309.70	383.96	148.02		1976.58
17	556	1790	169.25	236.45	314.81	390.30	150.47		1963.60
18	885	2502	171.07	238.98	318.18	394.48	152.08		1909.50
19	877	2485	170.32	237.93	316.79	392.75	151.41		1868.39
20	820	2362	165.93	231.80	308.62	382.63	147.51		1866.22
21	763	2238	163.29	228.12	303.73	376.56	145.17		1855.40
22	723	2152	162.55	227.08	302.33	374.83	144.50		1855.40
23	537	1749	170.97	238.85	318.01	394.26	151.99		1805.64
24	530	1734	171.65	239.80	319.27	395.82	152.60		1790.49
25	501	1671	174.71	244.08	324.97	402.89	155.32		1771.01
26	586	1855	166.92	233.18	310.46	384.91	148.39		1749.38
27	563	1806	168.67	235.63	313.72	388.94	149.94		1734.23
28	547	1771	170.04	237.55	316.28	392.12	151.17		1671.48
29	491	1650	175.86	245.68	327.10	405.54	156.34		1649.84
30	653	2000	163.45	228.34	304.02	376.92	145.31		1584.93
31	591	1866	166.57	232.70	309.82	384.12	148.08		1186.78

APPENDIX 5: STATISTICAL ANALYSIS FOR ESTIMATED DAILY CARRIAGE ROAD USE WITH CONFIDENCE INTERVALS: JULY 1– AUGUST 31, 2015.

[illegible]

APPENDIX 6: ESTIMATED DAILY CARRIAGE ROAD USE AND A COMPARISON OF THE TOP TEN DAYS FOR JULY AND AUGUST 1995, AND 1997 – 2015.

July	1995	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
1	1894	1136		1152	1111	1076	1604	1796	1284	997	1607	1382	1808		1310	1516	1652	1589	1892	1332
2	2758	1495	1416	937	2273	2066	1134	1796	1146	1683	1468	1894	1795		1438	1795	1996	1098	1741	1799
3	2937	1090	1672	1680	2036	1587	1175	1772	1392	1741	2124	1782	1613		1561	2325	2171	2119	1713	1897
4	1631	1446	1927	1721	1721	1362	1481	1674	1854	1462	1431	1336	1479		1715	1401	1193	1360	1291	1620
5	1607	2384	663	1359	1862	1598	2299	1734	1674	1611	1589		1959		1511	1665	1819	2132	1256	1658
6	2018	1819	1438		1862	1511	1931	1551	1168	1341	1509	1654	1479		1546	1756	2061	1920	1851	1604
7		1476	1490		875	1294	1385	1512	1274	1536	1490	1585	587		1626	1527	1429	1371	1749	1849
8		1990	1432		1215	1041	1806	1924	1288	1486	1120	986	587		1479	1775	1490	1440	1771	1401
9	1597	924	1060	1495	1272	1111	1493	1532	976		1353	1343	587		1386	1059	1535	1793	1552	1687
10	723	1228	888		1011		1842	1387	1279		1418	1620	1438		1139	1583	1862	1888	1704	1648
11	2125	1606	970	1677	1688	1250	1705	834	1481	1209	1425	1189	1306		890	1628	1799	1524	1611	1347
12	1576	1647	1389	1634	1536	1193	1464	1544	1568	1421	1340	1241	587		1529	1496	1583	1475	1568	1321
13	1497	1234	1636	1680	1188	1160	1471	1484	1577	1548	1224	1429	1449		1758	1656	1379	1405	1665	1717
14	1155	1606	1427	1808	837	1237	1366	1782	1344	1510	1286	1375	1165			1793	1420	1503	1574	2104
15	1234	1876	1226	1541	1011	1111	1650	2088		1450	1061	1332	1674		1613	1524	1628	1628	1063	1360
16	1559	1359	1258	1490	774	1130	1777	1570		1211	1444	1693	1598		1695	1505	1966	1682	1284	2026
17	457	1650	1275	1111	752	1163	1844	1163	1349	1252	1565	1829	1516		1226	1587	1754	1970	2148	1812
18	277	1413	1492	970	546	1337	1727	1476	1452	1678	1529	1552	1496		1472	1942	1797	1648	2057	1273
19	2616	1585	1408	1745	1642	1362	1274	1580		1647	1646	1382	1371		1771	2016	1838	1637	1600	1468
20	1801	1966	1095	1751	1555	1460	1508	1508	1430	1418	1542		1418		2076	2080	1771	1288	1829	1847
21	1327	1669	1849	1927	1296	1315	1688	2011	1729	1693		1438	1745		2070	1948	1583	1909	2013	2171
22	1832		1582	1808	657	1253	1849	1618	1539	1457	1455	1440	1970		1801	1498	1739	2167	2418	1903
23	1752	2088	1492	1509	1479	1566	1866	1293	1621	1433	1252	1836	2022		1581	1217	1862		2065	2208
24	1656	1960	1220	1392	1704	1359	2066	1135	930	1430	1842	1922	587		1345	1966	1754	2717	1163	1472
25	2056	1552	1672	992	1849	1579	1609	2015	1828	1527	1812	1706	587		1607	2189	2450	2243	2070	1879
26	1949	1919	1606	2099	1715	1073	1633	1469	1905	1979	1803	1555	1806		2334	1639	2202		1678	1410
27	1645	1878	1759	2023		1484	1397	1325	2198	1662	1589	1617	1620		2039	2587	1524	2083	1708	2440
28	1358	1884	1930	1849	891	1596	1623	1938	1202	1859	1516	1446	2037		2109	2167	1591	1587	1250	
29	540	2344	1519	1775	1411	1827	1004	2114	2051	1587	1247	1481	1922		1628	2093	1375	1814	2580	
30	1645	2012	1732	1525	1813		1808	1996	1630	1452	1544	1795	2199		1864	1239	2340	2340	2375	
31	1759		1422	1650	1802	1402	2116	1895	1714	1784	1771	2020	1922		1767	1862	2249	2018	2392	
Total	46981	48236	42945	42300	41384	39503	50595	50516	41883	44067	45003	44859	45331	0	48885	54034	54813	51349	54631	46253
Average	1620	1663	1432	1567	1379	1362	1632	1630	1496	1520	1500	1547	1462	#DIV/0!	1630	1743	1768	1771	1762	1713
+2000 Days	6	4	0	2	2	1	3	4	2	0	1	1	3		5	7	6	8	9	5
n	29	29	30	27	30	29	31	31	28	29	30	29	31		30	31	31	29	31	27
Top Ten																				
July	1995	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
	2937	2384	1930	2099	2273	2066	2299	2114	2198	1979	2124	2020	2199		2334	2587	2450	2717	2580	2440
	2758	2344	1927	2023	2036	1827	2116	2088	2051	1859	1842	1922	2037		2109	2325	2340	2340	2418	2208
	2616	2088	1849	1927	1862	1598	2066	2015	1905	1784	1812	1894	2022		2076	2189	2249	2243	2392	2171
	2125	2012	1759	1849	1862	1596	1931	2011	1854	1741	1803	1836	1970		2070	2167	2202	2167	2375	2104
	2056	1990	1732	1808	1849	1587	1866	1996	1828	1693	1646	1829	1959		2039	2093	2171	2132	2148	2026
	2018	1966	1672	1808	1813	1579	1849	1938	1729	1683	1607	1795	1922		1864	2080	2061	2119	2070	1903
	1949	1960	1672	1775	1802	1566	1844	1924	1674	1678	1589	1782	1922		1801	2016	1996	2083	2065	1897
	1894	1919	1636	1751	1721	1511	1842	1895	1630	1662	1565	1706	1808		1771	1966	1966	2018	2057	1879
	1832	1884	1606	1745	1715	1484	1808	1796	1621	1647	1553	1693	1806		1767	1948	1862	1970	2013	1849
	1801	1876	1582	1721	1704	1460	1806	1796	1577	1611	1550	1654	1795		1758	1942	1862	1920	1892	1847
Total	21986	20423	17365	18506	18637	16274	19427	19573	18067	17338	17091	18132	19441	0	19588	21313	21159	21709	22010	20324
Average	2199	2042	1737	1851	1864	1627	1943	1957	1807	1734	1709	1813	1944	0	1959	2131	2116	2171	2201	2032
+2000 Days	6	4	0	2	2	1	3	4	2	0	1	1	3	-	5	7	6	8	9	5

APPENDIX 6 (cont): ESTIMATED DAILY CARRIAGE ROAD USE AND A COMPARISON OF THE TOP TEN DAYS FOR JULY AND AUGUST 1995, AND 1997 – 2015.

Aug	1995	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
1	1628	1,998	1549	1460	1889	1857	2044	1787	1503	1344	1858	2009	1029	1591	1957	2122	1771	2150	1977	
2	1611	1,685	1479	2066	1022	1318	1823		1847	2396	1561	1799		1717	2152	1654	2485	901	1585	
3	2357	1,887	1783	2137	1389	1419	1705	1871	1991	1909	1754	1602		2132	2390	2868	1992	1868	2003	
4	315	2,616	2292	2205	1655	1443	1779	1163	2201	1977	1734	1496		2344	2357	2221	1905	1864	2401	
5	2561	1,900	2333	2107	1451	1680	2051		1794	1339	1790	1598	2487	1981	2154	2061	2072	2399	2511	
6	2163		1985	1998	1530	1677	2367	1534	1837	1565	1581	2046	2156	2325	2089	1845	2206	2688	1909	
7	1953		1653	1892		2072	2663		1527	1486	1747	1888	2005	1894	1912	1118	2665	2479	2409	
8	2070	1,558	1593	973	3132	1756	2227		1512	1678	2409			1676	2124	962	2461	1382	2067	
9	1466	1,881	1547	2330	2403	1245	2006		1999	1917	2013	2667	1219	1974	1970	2942	2342		1855	
10	754	2,325	2069	2613	2431	1541	1917		1890	1912	1790	2050	1974	2290	2736	1189	2013	2130	2275	
11	1783	2,714	1492	2316	2504	1571	1628		1970	1936	1782	1756	2150	2180	2455	3089	1012	2078	2305	
12	1956	2,795	2246	1704	1710	1732	2254		2008	1698	1563	1868		2029	2312	2271	1137	2440	2740	
13	2198	2,512	2267	2319	1985	1549	2124	1272		1546	1825	1717	2773	2269	2065	1849	2870	2050	1964	
14	1970		1781	1302	1933	2142	1873	2059	1211	1459	1920	2396	2472	1855	1836	1985	2485	2675	1187	
15	2084	2,229	1783	578	1626	1933	2148	2165	937	1832	1600	1884	2191	1535	2044	1797	2212	2615	2797	
16	2460		1294	2504	1609	1699	1871	1544	1471	2102	2396	2154	1293	1665	1163	587	1349	2189	1868	
17	2046	1,650	1966	2613	2811	1408	1565	1871	2237	2393	2072	1944	2041	1801	2952	3186	2442	1836	1790	
18	1552	2,270	1422	2118	1802	1354	1654	2112	1943	1830	1842	1066	2448	1745	2600	2498	1600	2065	2502	
19	2315		2189	2191	1751	1359	1972	2076	1753	1573	1892	2215	1366	1922	2334	1957	2035	2394	2485	
20	1911	2,289	2267	1868	1198	1190	1895	2247	1854	1488	1037	2039	2437	2228	2195	1732	2338	2461	2362	2245
21	1635		1674	1492	2017		2020	1984	1313	1486	1572	2076	2238	1946	1868	2156	2310	2403	2238	1810
22	1770		1729	1291	2112	1941	2107	1859	1808	2061	2312	2000	1987	1628	1693	1771	2234	2074	2152	1466
23	1514		1898	2164	1930	1606	1739	1775	1799	1974	2342	1855	1676	1189	1964	2665	2334	1894	1749	1589
24	1604			2180	1538	1636	1565	1731	1779	1782	2113	1291	1784	1829	2318	2310	1905	1700	1734	1827
25	1576		1688	2115	1519	1245	1139	1765	1640	2020	1970	1509	1648	1888	1600		1762	1667	1671	1888
26	1714	2,004	1642	2295	1422	1451	1447	1681	1719	1599	1587	1234	1790	1884		1942	1713	1598	1855	
27	1683	1,748	1503	1536	1291	1258	1676	1695	1515	1532	1552	1710	1858	1754	2221	1288	1646	1918	1806	1955
28	1552	1,160	1367	1348	1400	1544	1775	1789	1211	1339	884	1565	1420	1697	1578	667	1102	2013	1771	1782
29	1656	1,209		1136	1277	1419	1681	1488	1548	1120	1706	1557	1563	717	1535	1252	2191	1176	1650	1786
30	1745	1,558		1179	1095	1397	1438	1573	1168		1678	1427	1827	1230	1377	1514	1849	1565	2000	1446
31	1393	1,680		1345	1207	1125	1712	2006	1209		1436	1314		1250	1258	1453	1481	1721	1866	1349
Total	54995	41668	48491	57375	52639	46567	57865	41047	50196	50294	55321	53734	47835	56167	61210	58712	61824	60414	63488	19144
Average	1774	1984	1796	1851	1755	1552	1867	1785	1673	1734	1785	1791	1913	1812	2040	1894	1994	2014	2048	1740
+2000 Days	9	9	7	16	7	2	11	6	3	5	7	10	11	8	17	12	17	17	15	1
n	31	21	27	31	30	30	31	23	30	29	31	30	25	31	30	31	31	30	31	11
Top Ten																				
Aug	1995	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
	2561	2795	2333	2613	3132	2142	2663	2246	2237	2396	2409	2667	2773	2344	2952	3186	2870	2688	2797	2245
	2460	2714	2292	2613	2811	2072	2367	2165	2201	2393	2396	2396	2487	2325	2736	3089	2665	2675	2740	1955
	2357	2616	2267	2504	2504	1941	2254	2112	2008	2102	2342	2215	2472	2290	2600	2942	2485	2615	2511	1888
	2315	2512	2267	2330	2431	1933	2227	2076	1999	2061	2312	2154	2448	2269	2455	2868	2485	2479	2502	1827
	2198	2325	2246	2319	2403	1857	2148	2059	1991	2020	2113	2076	2437	2228	2390	2665	2461	2461	2485	1810
	2153	2289	2189	2316	2112	1756	2124	2006	1970	1977	2072	2050	2238	2180	2357	2498	2442	2440	2409	1786
	2084	2270	2069	2205	2017	1732	2107	1984	1943	1974	2013	2046	2191	2132	2334	2310	2342	2403	2401	1782
	2070	2229	1985	2191	1985	1699	2051	1871	1890	1936	1970	2039	2156	2029	2318	2271	2338	2399	2362	1589
	2046	2004	1966	2180	1933	1680	2044	1871	1854	1917	1920	2009	2150	1981	2312	2221	2334	2394	2305	1466
	1970	1998	1898	2164	1930	1677	2020	1859	1847	1912	1892	2000	2041	1974	2221	2156	2310	2189	2275	1446
Total	22214	23752	21512	23435	23259	18488	22005	20248	19940	20688	21441	21653	23395	21752	24675	26205	24732	24743	24788	17795
Average	2221	2375	2151	2344	2326	1849	2201	2025	1994	2069	2144	2165	2339	2175	2468	2621	2473	2474	2479	1779
+2000 Days	9	9	7	16	7	2	11	6	3	5	7	10	11	8	17	12	17	17	15	1

**APPENDIX 7: DESCRIPTIVE STATISTICS FOR MONTHLY CARRIAGE ROAD USE AND THE TOP TEN DAYS
FOR JULY AND AUGUST 1995, AND 1997- 2015.**

All Days		All Days		All Days		All Days		All Days	
<i>July</i>	<i>1995</i>	<i>July</i>	<i>1997</i>	<i>July</i>	<i>1998</i>	<i>July</i>	<i>1999</i>	<i>July</i>	<i>2000</i>
Mean	1620.03	Mean	1663.31	Mean	1431.5	Mean	1566.67	Mean	1379.467
Standard Error	114.222	Standard Error	66.76263	Standard Error	54.5557	Standard Error	60.3017	Standard Error	83.30158
Median	1645	Median	1647	Median	1435	Median	1650	Median	1445
Mode	1645	Mode	1606	Mode	1672	Mode	1680	Mode	1862
Standard Deviation	615.105	Standard Deviation	359.5278	Standard Deviation	298.814	Standard Deviation	313.337	Standard Deviation	456.2616
Sample Variance	378355	Sample Variance	129260.2	Sample Variance	89289.8	Sample Variance	98180	Sample Variance	208174.6
Kurtosis	0.66564	Kurtosis	-0.32609	Kurtosis	0.39047	Kurtosis	-0.2259	Kurtosis	-0.99074
Skewness	-0.17863	Skewness	-0.01676	Skewness	-0.5572	Skewness	-0.62122	Skewness	-0.12108
Range	2660	Range	1460	Range	1267	Range	1162	Range	1727
Minimum	277	Minimum	924	Minimum	663	Minimum	937	Minimum	546
Maximum	2937	Maximum	2384	Maximum	1930	Maximum	2099	Maximum	2273
Sum	46981	Sum	48236	Sum	42945	Sum	42300	Sum	41384
Count	29	Count	29	Count	30	Count	27	Count	30
Confidence Level(90.0%)	194.307	Confidence Level(90.0%)	113.572	Confidence Level(90.0%)	92.6971	Confidence Level(90.0%)	102.852	Confidence Level(90.0%)	141.54
Top Ten		Top Ten		Top Ten		Top Ten		Top Ten	
<i>July</i>	<i>1995</i>	<i>July</i>	<i>1997</i>	<i>July</i>	<i>1998</i>	<i>July</i>	<i>1999</i>	<i>July</i>	<i>2000</i>
Mean	2198.6	Mean	2042.3	Mean	1736.5	Mean	1850.6	Mean	1863.7
Standard Error	130.738	Standard Error	57.15827	Standard Error	40.3094	Standard Error	40.0661	Standard Error	54.95373
Median	2037	Median	1978	Median	1702	Median	1808	Median	1831
Mode	#N/A	Mode	#N/A	Mode	1672	Mode	1808	Mode	1862
Standard Deviation	413.43	Standard Deviation	180.7503	Standard Deviation	127.47	Standard Deviation	126.7	Standard Deviation	173.7789
Sample Variance	170924	Sample Variance	32670.68	Sample Variance	16248.5	Sample Variance	16052.9	Sample Variance	30199.12
Kurtosis	-0.73391	Kurtosis	0.493375	Kurtosis	-1.13526	Kurtosis	0.12307	Kurtosis	2.965065
Skewness	0.95374	Skewness	1.313349	Skewness	0.54527	Skewness	1.09039	Skewness	1.668593
Range	1136	Range	508	Range	348	Range	378	Range	569
Minimum	1801	Minimum	1876	Minimum	1582	Minimum	1721	Minimum	1704
Maximum	2937	Maximum	2384	Maximum	1930	Maximum	2099	Maximum	2273
Sum	21986	Sum	20423	Sum	17365	Sum	18506	Sum	18637
Count	10	Count	10	Count	10	Count	10	Count	10
Confidence Level(90.0%)	239.657	Confidence Level(90.0%)	104.7776	Confidence Level(90.0%)	73.8917	Confidence Level(90.0%)	73.4457	Confidence Level(90.0%)	100.7364
Top Ten CL is:	wider		less wide		less wide		less wide		less wide

**APPENDIX 7 (cont): DESCRIPTIVE STATISTICS FOR MONTHLY CARRIAGE ROAD USE AND THE TOP TEN DAYS
FOR JULY AND AUGUST 1995, AND 1997- 2015.**

All Days		All Days		All Days		All Days		All Days	
July	2001	July	2002	July	2003	July	2004	July	2005
Mean	1362.17	Mean	1632.097	Mean	1629.55	Mean	1486.8	Mean	1519.55
Standard Error	44.5914	Standard Error	52.13001	Standard Error	54.1367	Standard Error	57.425	Standard Error	38.4226
Median	1337	Median	1633	Median	1580	Median	1456.97	Median	1509.92
Mode	1362	Mode	#N/A	Mode	1796	Mode	#N/A	Mode	#N/A
Standard Deviation	240.132	Standard Deviation	290.2476	Standard Deviation	301.421	Standard Deviation	303.865	Standard Deviation	206.912
Sample Variance	57663.5	Sample Variance	84243.69	Sample Variance	90854.4	Sample Variance	92333.7	Sample Variance	42812.7
Kurtosis	1.24597	Kurtosis	0.113982	Kurtosis	0.22495	Kurtosis	0.04646	Kurtosis	0.69404
Skewness	0.99744	Skewness	-0.00215	Skewness	-0.46942	Skewness	0.40818	Skewness	-0.1973
Range	1025	Range	1295	Range	1280	Range	1268.45	Range	982.028
Minimum	1041	Minimum	1004	Minimum	834	Minimum	929.851	Minimum	997.245
Maximum	2066	Maximum	2299	Maximum	2114	Maximum	2198.3	Maximum	1979.27
Sum	39503	Sum	50595	Sum	50516	Sum	41630.3	Sum	44066.9
Count	29	Count	31	Count	31	Count	28	Count	29
Confidence Level(90.0%)	75.8559	Confidence Level(90.0%)	88.47823	Confidence Level(90.0%)	91.8842	Confidence Level(90.0%)	97.8114	Confidence Level(90.0%)	65.3619
Top Ten		Top Ten		Top Ten		Top Ten		Top Ten	
July	2001	July	2002	July	2003	July	2004	July	2005
Mean	1627.4	Mean	1942.7	Mean	1957.3	Mean	1806.7	Mean	1733.77
Standard Error	58.113	Standard Error	52.03611	Standard Error	34.4393	Standard Error	63.9166	Standard Error	35.5325
Median	1583	Median	1857.5	Median	1967	Median	1778.29	Median	1688.03
Mode	#N/A	Mode	#N/A	Mode	1796	Mode	#N/A	Mode	#N/A
Standard Deviation	183.769	Standard Deviation	164.5526	Standard Deviation	108.907	Standard Deviation	202.122	Standard Deviation	112.364
Sample Variance	33771.2	Sample Variance	27077.57	Sample Variance	11860.7	Sample Variance	40853.3	Sample Variance	12625.6
Kurtosis	3.31722	Kurtosis	1.089472	Kurtosis	-0.79159	Kurtosis	-0.0903	Kurtosis	1.43068
Skewness	1.84947	Skewness	1.373238	Skewness	-0.23589	Skewness	0.82334	Skewness	1.33574
Range	606	Range	493	Range	318	Range	620.989	Range	368.261
Minimum	1460	Minimum	1806	Minimum	1796	Minimum	1577.32	Minimum	1611.01
Maximum	2066	Maximum	2299	Maximum	2114	Maximum	2198.3	Maximum	1979.27
Sum	16274	Sum	19427	Sum	19573	Sum	18067	Sum	17337.7
Count	10	Count	10	Count	10	Count	10	Count	10
Confidence Level(90.0%)	106.528	Confidence Level(90.0%)	95.38806	Confidence Level(90.0%)	63.1312	Confidence Level(90.0%)	117.166	Confidence Level(90.0%)	65.1351
Top Ten CL is:	wider		wider		less wide		wider		less wide

**APPENDIX 7 (cont): DESCRIPTIVE STATISTICS FOR MONTHLY CARRIAGE ROAD USE AND THE TOP TEN DAYS
FOR JULY AND AUGUST 1995, AND 1997- 2015.**

All Days		All Days		All Days				All Days	
July	2006	July	2007	July	2008	No data available for July 2009		July	2010
Mean	1470.66	Mean	1514.89	Mean	1462.29			Mean	1595.88
Standard Error	49.599	Standard Error	53.9333	Standard Error	89.0506			Standard Error	63.9573
Median	1489.72	Median	1516.77	Median	1515.68			Median	1606.56
Mode	1589.25	Mode	1381.53	Mode	587.403			Mode	#N/A
Standard Deviation	276.155	Standard Deviation	295.405	Standard Deviation	495.813			Standard Deviation	356.099
Sample Variance	76261.8	Sample Variance	87263.9	Sample Variance	245830			Sample Variance	126807
Kurtosis	2.96867	Kurtosis	2.16407	Kurtosis	-0.43175			Kurtosis	1.42434
Skewness	-0.6788	Skewness	-0.9364	Skewness	-0.78165			Skewness	-0.5476
Range	1536.32	Range	1432.45	Range	1612.05			Range	1746.21
Minimum	587.403	Minimum	587.403	Minimum	587.403			Minimum	587.403
Maximum	2123.72	Maximum	2019.85	Maximum	2199.45			Maximum	2333.61
Sum	45590.5	Sum	45446.7	Sum	45330.9			Sum	49472.4
Count	31	Count	30	Count	31			Count	31
Confidence Level(90.0%)	84.1824	Confidence Level(90.0%)	91.6394	Confidence Level(90.0%)	151.142			Confidence Level(90.0%)	108.552
Top Ten		Top Ten		Top Ten				Top Ten	
July	2006	July	2007	July	2008			July	2010
Mean	1734.88	Mean	1813.21	Mean	1944.12			Mean	1958.83
Standard Error	54.8036	Standard Error	35.671	Standard Error	39.695			Standard Error	61.6171
Median	1708.26	Median	1812.13	Median	1940.87			Median	1951.69
Mode	1589.25	Mode	#N/A	Mode	1922.48			Mode	#N/A
Standard Deviation	173.304	Standard Deviation	112.802	Standard Deviation	125.527			Standard Deviation	194.85
Sample Variance	30034.4	Sample Variance	12724.2	Sample Variance	15756.9			Sample Variance	37966.7
Kurtosis	1.73649	Kurtosis	-0.3084	Kurtosis	0.55974			Kurtosis	-0.4719
Skewness	1.25409	Skewness	0.35402	Skewness	0.6606			Skewness	0.61794
Range	558.267	Range	365.686	Range	404.635			Range	575.577
Minimum	1565.45	Minimum	1654.17	Minimum	1794.82			Minimum	1758.03
Maximum	2123.72	Maximum	2019.85	Maximum	2199.45			Maximum	2333.61
Sum	17348.8	Sum	18132.1	Sum	19441.2			Sum	19588.3
Count	10	Count	10	Count	10			Count	10
Confidence Level(90.0%)	100.461	Confidence Level(90.0%)	65.389	Confidence Level(90.0%)	72.7655			Confidence Level(90.0%)	112.951
Top Ten CL is:	wider		less wide		less wide				wider

**APPENDIX 7 (cont): DESCRIPTIVE STATISTICS FOR MONTHLY CARRIAGE ROAD USE AND THE TOP TEN DAYS
FOR JULY AND AUGUST 1995, AND 1997- 2015.**

All Days		All Days		All Days		All Days		All Days	
July	2011	July	2012	July	2013	July	2014	July	2015
Mean	1743.02	Mean	1768.15	Mean	1770.64	Mean	1762.29	Mean	1713.072
Standard Error	60.6309	Standard Error	54.6314	Standard Error	67.6092	Standard Error	68.7431	Standard Error	59.34406
Median	1664.99	Median	1753.7	Median	1682.3	Median	1712.59	Median	1686.626
Mode	#N/A	Mode	1861.9	Mode	#N/A	Mode	#N/A	Mode	#N/A
Standard Deviation	337.579	Standard Deviation	304.175	Standard Deviation	364.087	Standard Deviation	382.746	Standard Deviation	308.3608
Sample Variance	113959	Sample Variance	92522.2	Sample Variance	132559	Sample Variance	146494	Sample Variance	95086.38
Kurtosis	0.20497	Kurtosis	-0.2285	Kurtosis	0.15149	Kurtosis	-0.3045	Kurtosis	-0.3744
Skewness	0.34531	Skewness	0.44065	Skewness	0.50459	Skewness	0.25347	Skewness	0.470839
Range	1527.66	Range	1257.18	Range	1618.54	Range	1516.84	Range	1166.301
Minimum	1059.12	Minimum	1193.27	Minimum	1098.07	Minimum	1063.44	Minimum	1273.335
Maximum	2586.78	Maximum	2450.46	Maximum	2716.61	Maximum	2580.29	Maximum	2439.636
Sum	54033.8	Sum	54812.7	Sum	51348.6	Sum	54631	Sum	46252.95
Count	31	Count	31	Count	29	Count	31	Count	27
Confidence Level(90.0%)	102.907	Confidence Level(90.0%)	92.7237	Confidence Level(90.0%)	115.012	Confidence Level(90.0%)	116.675	Confidence Level(95.0%)	121.9835
Top Ten		Top Ten		Top Ten		Top Ten		Top Ten	
July	2011	July	2012	July	2013	July	2014	July	2015
Mean	2131.29	Mean	2115.93	Mean	2170.89	Mean	2200.97	Mean	2032.405
Standard Error	63.5641	Standard Error	63.1881	Standard Error	72.2743	Standard Error	70.5192	Standard Error	62.18443
Median	2086.93	Median	2116.14	Median	2125.88	Median	2108.57	Median	1964.677
Mode	#N/A	Mode	1861.9	Mode	#N/A	Mode	#N/A	Mode	#N/A
Standard Deviation	201.007	Standard Deviation	199.818	Standard Deviation	228.551	Standard Deviation	223.001	Standard Deviation	196.6444
Sample Variance	40404	Sample Variance	39927.4	Sample Variance	52235.8	Sample Variance	49729.5	Sample Variance	38669.03
Kurtosis	2.05177	Kurtosis	-0.98771	Kurtosis	3.3175	Kurtosis	-1.1116	Kurtosis	0.382258
Skewness	1.41638	Skewness	0.24036	Skewness	1.62204	Skewness	0.414	Skewness	1.007527
Range	644.82	Range	588.56	Range	796.287	Range	688.096	Range	592.8879
Minimum	1941.96	Minimum	1861.9	Minimum	1920.32	Minimum	1892.19	Minimum	1846.749
Maximum	2586.78	Maximum	2450.46	Maximum	2716.61	Maximum	2580.29	Maximum	2439.636
Sum	21312.9	Sum	21159.3	Sum	21708.9	Sum	22009.7	Sum	20324.05
Count	10	Count	10	Count	10	Count	10	Count	10
Confidence Level(90.0%)	116.52	Confidence Level(90.0%)	115.831	Confidence Level(90.0%)	132.487	Confidence Level(90.0%)	129.27	Confidence Level(95.0%)	140.671
	wider		wider		wider		wider		wider

**APPENDIX 7 (cont): DESCRIPTIVE STATISTICS FOR MONTHLY CARRIAGE ROAD USE AND THE TOP TEN DAYS
FOR JULY AND AUGUST 1995, AND 1997- 2015.**

All Days		All Days		All Days		All Days		All Days	
Aug	1995	Aug	1997	Aug	1998	Aug	1999	Aug	2000
Mean	1774.03	Mean	1984.19	Mean	1795.96	Mean	1850.81	Mean	1754.633
Standard Error	81.4585	Standard Error	100.4661	Standard Error	60.6145	Standard Error	93.5307	Standard Error	92.68985
Median	1745	Median	1900	Median	1729	Median	2066	Median	1640.5
Mode	1552	Mode	1558	Mode	1783	Mode	2613	Mode	#N/A
Standard Deviation	453.542	Standard Deviation	460.3937	Standard Deviation	314.962	Standard Deviation	520.757	Standard Deviation	507.6832
Sample Variance	205700	Sample Variance	211962.4	Sample Variance	99201.1	Sample Variance	271188	Sample Variance	257742.2
Kurtosis	2.97448	Kurtosis	-0.64309	Kurtosis	-1.07356	Kurtosis	-0.46283	Kurtosis	0.747216
Skewness	-1.11426	Skewness	0.078359	Skewness	0.37135	Skewness	-0.58987	Skewness	0.976768
Range	2246	Range	1635	Range	1039	Range	2035	Range	2110
Minimum	315	Minimum	1160	Minimum	1294	Minimum	578	Minimum	1022
Maximum	2561	Maximum	2795	Maximum	2333	Maximum	2613	Maximum	3132
Sum	54995	Sum	41668	Sum	48491	Sum	57375	Sum	52639
Count	31	Count	21	Count	27	Count	31	Count	30
Confidence Level(90.0%)	138.256	Confidence Level(90.0%)	173.2758	Confidence Level(90.0%)	103.385	Confidence Level(90.0%)	158.746	Confidence Level(90.0%)	157.4918
Top Ten		Top Ten		Top Ten		Top Ten		Top Ten	
Aug	1995	Aug	1997	Aug	1998	Aug	1999	Aug	2000
Mean	2221.4	Mean	2375.2	Mean	2151.2	Mean	2343.5	Mean	2325.8
Standard Error	61.4998	Standard Error	87.57077	Standard Error	49.7661	Standard Error	55.1715	Standard Error	129.1993
Median	2175.5	Median	2307	Median	2217.5	Median	2317.5	Median	2257.5
Mode	#N/A	Mode	#N/A	Mode	2267	Mode	2613	Mode	#N/A
Standard Deviation	194.479	Standard Deviation	276.9231	Standard Deviation	157.374	Standard Deviation	174.468	Standard Deviation	408.5641
Sample Variance	37822.3	Sample Variance	76686.4	Sample Variance	24766.6	Sample Variance	30438.9	Sample Variance	166924.6
Kurtosis	-0.86049	Kurtosis	-1.08017	Kurtosis	-1.48454	Kurtosis	-1.07054	Kurtosis	-0.01511
Skewness	0.53587	Skewness	0.127682	Skewness	-0.53164	Skewness	0.70317	Skewness	0.9044
Range	591	Range	797	Range	435	Range	449	Range	1202
Minimum	1970	Minimum	1998	Minimum	1898	Minimum	2164	Minimum	1930
Maximum	2561	Maximum	2795	Maximum	2333	Maximum	2613	Maximum	3132
Sum	22214	Sum	23752	Sum	21512	Sum	23435	Sum	23258
Count	10	Count	10	Count	10	Count	10	Count	10
Confidence Level(90.0%)	112.736	Confidence Level(90.0%)	160.5271	Confidence Level(90.0%)	91.2268	Confidence Level(90.0%)	101.136	Confidence Level(90.0%)	236.8369
Top Ten CL is:	less wide		less wide		less wide		less wide		wider

**APPENDIX 7 (cont): DESCRIPTIVE STATISTICS FOR MONTHLY CARRIAGE ROAD USE AND THE TOP TEN DAYS
FOR JULY AND AUGUST 1995, AND 1997- 2015.**

All Days		All Days		All Days		All Days		All Days	
<i>Aug</i>	<i>2001</i>	<i>Aug</i>	<i>2002</i>	<i>Aug</i>	<i>2003</i>	<i>Aug</i>	<i>2004</i>	<i>Aug</i>	<i>2005</i>
Mean	1552.23	Mean	1866.613	Mean	1784.65	Mean	1673.19	Mean	1734.26
Standard Error	47.56	Standard Error	55.0568	Standard Error	57.2747	Standard Error	58.8102	Standard Error	57.9311
Median	1542.5	Median	1871	Median	1787	Median	1766.26	Median	1697.66
Mode	1419	Mode	1565	Mode	1871	Mode	1211.46	Mode	1339.03
Standard Deviation	260.497	Standard Deviation	306.5433	Standard Deviation	274.68	Standard Deviation	322.117	Standard Deviation	311.968
Sample Variance	67858.7	Sample Variance	93968.78	Sample Variance	75449	Sample Variance	103759	Sample Variance	97324.3
Kurtosis	-0.26102	Kurtosis	0.791206	Kurtosis	0.01394	Kurtosis	-0.3872	Kurtosis	-0.2466
Skewness	0.54211	Skewness	0.206935	Skewness	-0.45031	Skewness	-0.4292	Skewness	0.29191
Range	1017	Range	1524	Range	1084	Range	1299.74	Range	1275.67
Minimum	1125	Minimum	1139	Minimum	1163	Minimum	937.072	Minimum	1120
Maximum	2142	Maximum	2663	Maximum	2247	Maximum	2236.82	Maximum	2395.67
Sum	46567	Sum	57865	Sum	41047	Sum	50195.8	Sum	50293.7
Count	30	Count	31	Count	23	Count	30	Count	29
Confidence Level(90.0%)	80.8106	Confidence Level(90.0%)	93.44575	Confidence Level(90.0%)	98.3489	Confidence Level(90.0%)	99.926	Confidence Level(90.0%)	98.5483
Top Ten		Top Ten		Top Ten		Top Ten		Top Ten	
<i>Aug</i>	<i>2001</i>	<i>Aug</i>	<i>2002</i>	<i>Aug</i>	<i>2003</i>	<i>Aug</i>	<i>2004</i>	<i>Aug</i>	<i>2005</i>
Mean	1848.9	Mean	2200.5	Mean	2024.9	Mean	1993.96	Mean	2068.81
Standard Error	53.1397	Standard Error	61.64112	Standard Error	41.7395	Standard Error	41.7764	Standard Error	57.582
Median	1806.5	Median	2136	Median	2032.5	Median	1980.48	Median	1998.53
Mode	#N/A	Mode	#N/A	Mode	1871	Mode	#N/A	Mode	#N/A
Standard Deviation	168.043	Standard Deviation	194.9263	Standard Deviation	131.992	Standard Deviation	132.108	Standard Deviation	182.09
Sample Variance	28238.3	Sample Variance	37996.28	Sample Variance	17421.9	Sample Variance	17452.6	Sample Variance	33156.9
Kurtosis	-0.9364	Kurtosis	3.039906	Kurtosis	-0.943	Kurtosis	0.15997	Kurtosis	0.44665
Skewness	0.64378	Skewness	1.673727	Skewness	0.14863	Skewness	0.9631	Skewness	1.32621
Range	465	Range	643	Range	387	Range	389.923	Range	483.793
Minimum	1677	Minimum	2020	Minimum	1859	Minimum	1846.89	Minimum	1911.88
Maximum	2142	Maximum	2663	Maximum	2246	Maximum	2236.82	Maximum	2395.67
Sum	18489	Sum	22005	Sum	20249	Sum	19939.6	Sum	20688.1
Count	10	Count	10	Count	10	Count	10	Count	10
Confidence Level(90.0%)	97.4111	Confidence Level(90.0%)	112.9951	Confidence Level(90.0%)	76.5133	Confidence Level(90.0%)	76.5808	Confidence Level(90.0%)	105.554
Top Ten CL is:	wider		wider		less wide		less wide		wider

**APPENDIX 7 (cont): DESCRIPTIVE STATISTICS FOR MONTHLY CARRIAGE ROAD USE AND THE TOP TEN DAYS
FOR JULY AND AUGUST 1995, AND 1997- 2015.**

All Days		All Days		All Days		All Days		All Days	
Aug	2006	Aug	2007	Aug	2008	Aug	2009	Aug	2010
Mean	1784.56	Mean	1791.14	Mean	1913.39	Mean	1811.8	Mean	2040.34
Standard Error	61.325	Standard Error	64.9221	Standard Error	89.0305	Standard Error	65.728	Standard Error	76.2817
Median	1781.83	Median	1827.27	Median	1974.41	Median	1855.4	Median	2077.2
Mode	1790.49	Mode	#N/A	Mode	#N/A	Mode	#N/A	Mode	#N/A
Standard Deviation	341.443	Standard Deviation	355.593	Standard Deviation	445.153	Standard Deviation	365.96	Standard Deviation	417.812
Sample Variance	116583	Sample Variance	126446	Sample Variance	198161	Sample Variance	133924	Sample Variance	174567
Kurtosis	1.13431	Kurtosis	0.17308	Kurtosis	-0.55534	Kurtosis	1.4884	Kurtosis	0.03931
Skewness	-0.3435	Skewness	0.15688	Skewness	-0.12686	Skewness	-0.948	Skewness	-0.1625
Range	1525.5	Range	1601.23	Range	1744.04	Range	1627.2	Range	1789.48
Minimum	883.847	Minimum	1065.61	Minimum	1028.82	Minimum	717.23	Minimum	1162.98
Maximum	2409.34	Maximum	2666.84	Maximum	2772.87	Maximum	2344.4	Maximum	2952.46
Sum	55321.2	Sum	53734.1	Sum	47834.9	Sum	56167	Sum	61210.2
Count	31	Count	30	Count	25	Count	31	Count	30
Confidence Level(90.0%)	104.084	Confidence Level(90.0%)	110.311	Confidence Level(90.0%)	152.321	Confidence Level(90.0%)	111.56	Confidence Level(95.0%)	156.014
Top Ten		Top Ten		Top Ten		Top Ten		Top Ten	
Aug	2006	Aug	2007	Aug	2008	Aug	2009	Aug	2010
Mean	2144.06	Mean	2165.26	Mean	2339.45	Mean	2175.2	Mean	2467.55
Standard Error	63.9923	Standard Error	67.5329	Standard Error	69.8752	Standard Error	44.378	Standard Error	72.1242
Median	2092.34	Median	2063.13	Median	2337.94	Median	2203.8	Median	2373.64
Mode	#N/A	Mode	#N/A	Mode	#N/A	Mode	#N/A	Mode	#N/A
Standard Deviation	202.361	Standard Deviation	213.558	Standard Deviation	220.965	Standard Deviation	140.33	Standard Deviation	228.077
Sample Variance	40950.2	Sample Variance	45606.9	Sample Variance	48825.4	Sample Variance	19694	Sample Variance	52019
Kurtosis	-1.8521	Kurtosis	2.81462	Kurtosis	-0.01749	Kurtosis	-1.469	Kurtosis	0.98978
Skewness	0.20393	Skewness	1.77415	Skewness	0.58509	Skewness	-0.401	Skewness	1.28112
Range	517.154	Range	666.458	Range	731.373	Range	370.01	Range	731.373
Minimum	1892.19	Minimum	2000.38	Minimum	2041.49	Minimum	1974.4	Minimum	2221.09
Maximum	2409.34	Maximum	2666.84	Maximum	2772.87	Maximum	2344.4	Maximum	2952.46
Sum	21440.6	Sum	21652.6	Sum	23394.5	Sum	21752	Sum	24675.5
Count	10	Count	10	Count	10	Count	10	Count	10
Confidence Level(90.0%)	117.305	Confidence Level(90.0%)	123.795	Confidence Level(90.0%)	128.089	Confidence Level(90.0%)	81.35	Confidence Level(90.0%)	132.212
	wider		wider		less wide		less wide		less wide

**APPENDIX 7 (cont): DESCRIPTIVE STATISTICS FOR MONTHLY CARRIAGE ROAD USE AND THE TOP TEN DAYS
FOR JULY AND AUGUST 1995, AND 1997- 2015.**

All Days		All Days		All Days		All Days		All Days	
Aug	2011	Aug	2012	Aug	2013	Aug	2014	Aug	2015
Mean	1893.93	Mean	1994.31	Mean	2013.8	Mean	2047.98	Mean	1740.328
Standard Error	118.76	Standard Error	83.5595	Standard Error	79.322	Standard Error	65.5139	Standard Error	78.40573
Median	1848.91	Median	2035	Median	2057.72	Median	1976.58	Median	1786.161
Mode	#N/A	Mode	2485.08	Mode	#N/A	Mode	1855.4	Mode	#N/A
Standard Deviation	661.225	Standard Deviation	465.24	Standard Deviation	434.464	Standard Deviation	364.766	Standard Deviation	260.0424
Sample Variance	437219	Sample Variance	216448	Sample Variance	188759	Sample Variance	133054	Sample Variance	67622.05
Kurtosis	-0.258	Kurtosis	-0.31452	Kurtosis	0.23741	Kurtosis	-0.1097	Kurtosis	0.026319
Skewness	0.05645	Skewness	-0.45055	Skewness	-0.55134	Skewness	0.14138	Skewness	0.231616
Range	2598.75	Range	1858.73	Range	1787.32	Range	1609.89	Range	895.8233
Minimum	587.403	Minimum	1011.51	Minimum	901.157	Minimum	1186.78	Minimum	1349.069
Maximum	3186.16	Maximum	2870.24	Maximum	2688.48	Maximum	2796.67	Maximum	2244.892
Sum	58712	Sum	61823.5	Sum	60413.9	Sum	63487.5	Sum	19143.61
Count	31	Count	31	Count	30	Count	31	Count	11
Confidence Level(90.0%)	201.566	Confidence Level(90.0%)	141.822	Confidence Level(90.0%)	134.778	Confidence Level(90.0%)	111.194	Confidence Level(95.0%)	174.6989
Top Ten		Top Ten		Top Ten		Top Ten		Top Ten	
Aug	2011	Aug	2012	Aug	2013	Aug	2014	Aug	2015
Mean	2620.53	Mean	2473.18	Mean	2474.26	Mean	2478.8	Mean	1779.454
Standard Error	120.855	Standard Error	55.5112	Standard Error	47.8863	Standard Error	54.4918	Standard Error	75.11685
Median	2581.37	Median	2451.54	Median	2450.46	Median	2447.21	Median	1798.063
Mode	#N/A	Mode	2485.08	Mode	#N/A	Mode	#N/A	Mode	#N/A
Standard Deviation	382.177	Standard Deviation	175.542	Standard Deviation	151.43	Standard Deviation	172.318	Standard Deviation	237.5403
Sample Variance	146059	Sample Variance	30815	Sample Variance	22931	Sample Variance	29693.5	Sample Variance	56425.41
Kurtosis	-1.6663	Kurtosis	2.07847	Kurtosis	0.18246	Kurtosis	0.05784	Kurtosis	0.547944
Skewness	0.23274	Skewness	1.484	Skewness	-0.15579	Skewness	0.92298	Skewness	0.34208
Range	1029.98	Range	560.431	Range	499.843	Range	521.482	Range	798.4512
Minimum	2156.18	Minimum	2309.81	Minimum	2188.63	Minimum	2275.19	Minimum	1446.441
Maximum	3186.16	Maximum	2870.24	Maximum	2688.48	Maximum	2796.67	Maximum	2244.892
Sum	26205.3	Sum	24731.8	Sum	24742.6	Sum	24788	Sum	17794.54
Count	10	Count	10	Count	10	Count	10	Count	10
Confidence Level(90.0%)	221.541	Confidence Level(90.0%)	101.758	Confidence Level(90.0%)	87.7811	Confidence Level(90.0%)	99.8896	Confidence Level(95.0%)	169.9261
	wider		less wide		less wide		less wide		less wide