



Developing a Regression Estimator for Acadia National Park Carriage Roads 2014 - 2015



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Executive Summary

The introduction of the Eagle Lake Bicycle Express van service from the Bar Harbor Village Green to the Eagle Lake carriage road access in 2006 changed the number of visitors entering at that location. Because of this, we conducted our third set of carriage road censuses in 2014 – 2015. The purpose of the censuses was to develop a new regression equation to estimate overall daily carriage road use by pairing the census counts with traffic counts from an electronic trail counter on the Eagle Lake carriage road. Daily traffic counts are then plugged into the regression equation to estimate overall daily use for July and August. These daily use estimates are then compared to a visitor capacity standard of 3,000 visitors per day to determine if the standard is violated.

We completed 10 of 14 scheduled censuses over the two seasons. 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 from 2006 through 2015 and for the next 5 – 10 years barring other changes in how visitors access and use the carriage road system.

Compared to the most recent regression equation, the new one will estimate *less* use because its coefficient and intercept are *smaller*. This finding is consistent with the reason we decided to conduct another set of censuses—the Eagle Lake Bicycle Express van delivering several hundred more bicyclists per day to the Eagle Lake Boat Launch and inflating estimates. Use at all other carriage road entrances did not increase at the same rate, but the regression equation assumed that it did.

As mentioned, we will apply this new equation to 2006 – 2015 data. We expect that it will show a couple of things. First, it will reduce daily estimates of carriage road use significantly. Because of this, we expect it will also show that we approached or exceeded our standard of 3,000 visitors per day less frequently than previously estimated. And second, it will still show an increase in carriage road use over that time period, but not as much as previous estimates.

This result may appear confounding given evidence of an increase in overall park use since 2006 and the anecdotal observations of many park staff that carriage road visitation has also increased. But we believe there is no inconsistency. It is just that overall carriage road use has probably not increased as much as previously thought, but it has increased. We will know more when the new regression equation is applied to the past ten years of data.

CONTENTS

INTRODUCTION	1
METHODS.....	1
2014 – 2015 MISSING DATA TREATMENT.....	3
RESULTS AND DISCUSSION	3
2014 – 2015 MISSING DATA TREATMENT.....	4
REGRESSION RESULTS	5
DISCUSSION	5
APPENDIX 1: CARRIAGE ROAD CENSUS INSTRUCTIONS	8
APPENDIX 2: REGRESSION STATISTICS 2014 – 2015.....	10
.....	13

TABLES

TABLE 1: Spreadsheet Showing Calculations for Transforming 2014 – 2015 Census Data to Account for Missing 5p – 6p Counts.....	4
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INTRODUCTION

Park managers established a carrying capacity for the Acadia National Park carriage road system in early 1997 after three years of research and application of the Visitor Experience Resource Protection (VERP) process (see Manning et al 1996, Manning et al 1998a, Manning et al 1998b, and Jacobi 1997). This carrying capacity was based on indicators and standards for a quality experience as outlined in VERP (National Park Service 1997). Crowding (number of people) and four problem behaviors were selected as indicators for a high quality carriage road experience.

As part of this process, park staff developed a regression equation to estimate daily carriage road use. The equation was based on eleven censuses of daily use conducted from 1995 – 1997 and concurrent carriage road traffic counts from an electronic trail counter on the east side of Eagle Lake. We used the equation to estimate carriage road use from 1997 – 2001. Statistical data on the regression is included as an appendix in each of the monitoring reports from these years. Although the information is available in park files, no formal report described the methods and results for using these censuses and the electronic trail counters to develop the regression equation.

In 2001, park staff determined that a new regression equation was needed because of the addition of the Island Explorer bus system to Mount Desert Island and the park in 1999. The main concern was that visitor use of carriage roads may have changed with the introduction of the bus, both in numbers of visitors and the distribution of their entry across the eleven major access points to the carriage road system. Twelve censuses conducted in 2001 – 2002 resulted in a revised regression equation (Jacobi 2003) that was used in all carriage road monitoring reports for the years 2002 – 2013 (see Jacobi 2005 for an example).

The Eagle Lake Bicycle Express van began service from the Village Green to the Eagle Lake carriage road access in 2006. Monitoring reports since then have showed a consistent increase in overall carriage road use, but it was only in 2013 that we belatedly realized the potential effect of this van service dropping off as many as 300 – 400 bicyclists daily at Eagle Lake, many of whom would then ride by our trail counter. This change in bus service prompted a third set of censuses conducted in 2014 – 2015, and this report describes the results. We will retroactively apply this new regression equation to all years from 2006 to 2015 and describe the results in the next monitoring report.

METHODS

Carriage road censuses were conducted in July and August of 2014 and 2015 on selected weekdays (convenience sample). Traffic counters and other visitor use statistics show that weekdays are little different from weekend days and are often busier, and we had to schedule the censuses around the availability of staff and volunteers. All censuses were conducted on days with good weather—that is, no significant rain events that would keep people away. We will count if there is fog and a close eye is kept on the weather forecast. Good weather and high

traffic volumes are essential because the goal is to ensure use does not exceed the visitor capacity of 3,000 persons/entries per day. Regression estimates of use will be more accurate and have smaller confidence intervals if censuses are conducted on days with high use.

Methods were essentially the same as in 1995 – 1997 and 2001 – 2002 with one exception. For this set of censuses, we counted between 9:00 a.m. and 5:00 p.m. instead of 9:00 a.m. and 6:00 p.m. We will shortly discuss how we analyzed the 2001 – 2002 and 2014 – 2015 census data to make them comparable. Complete instructions and a sample data sheet are in Appendix 1. Dates of the censuses are in Appendix 2. Volunteers and park staff counted all entries to the carriage road system between 9:00 a.m. and 5:00 p.m. in two 4-hour shifts with a change in staff at 1:00 p.m. All data was recorded hourly. Entries were classified and counted as either bicyclists, walkers, runners, horses, or carriages based on these guidelines: 1. A bicycle built for two counted as one entry regardless of the number of people riding (this was because the number of people on the bike was felt to be less important to a sense of crowding than the unit of entry itself); 2. Children were counted only if they were under their own power (this was because it was felt that children in backpacks or bike carriers did not add to a sense of crowding); 3. Rangers or volunteers in uniform were counted (they would add to a sense of crowding); and 4. A minimum time of five minutes use of the carriage roads was required in order to be counted (we wanted to be sure visitors used the carriage roads).

The censuses were conducted at the same eleven locations as previous censuses: the Visitor Center, Duck Brook Bridge, Eagle Lake, Eagle Lake Boat Launch, Bubble Pond North, Bubble Pond South, Jordan Pond East, Jordan Pond West, Brown Mountain, Parkman Mountain, and Wildwood Stables. Each location had specific guidelines as to the exact spot to count from and things to watch for (see Appendix 1). In order to get accurate counts at Jordan Pond and Bubble Pond, where there is much bicycle through-traffic and other visitor activity, the exact location for the count was critical, and each person entering had to be asked this question: Did you start your walk or ride here at Bubble/Jordan Pond? We asked census takers to use that exact wording.

Throughout the summer, an electronic trail counter (Diamond Traffic Products, TTC 4420) located on the west side of Eagle Lake monitored visitor use (traffic passing in both directions on the carriage road). This counter was located 0.3 south miles of the Route 233 overpass near Eagle Lake and has been housed in a wooden box at that location monitoring traffic every summer since 1994. Similar trail counters (different models) were used for past censuses.

Trail counter sensitivity, (the speed setting for traffic) remained the same for all three censuses, and the same counter was used in 2001 – 2002 as in 2014 – 2015. The sensitivity must stay the same from year to year in order to make valid analyses and comparisons of use estimates. The sensitivity for the counter is set by four white switches located inside the current TT4420. The correct setting for the carriage roads is for switches 1, 3, and 4 to be in the down, or off, position. Only switch two is in the up, or on, position.

In 2014 – 2015, we did not validate traffic counts to check the counter sensitivity. Validation consists of observing traffic at the counter site for 2 hours at a time and recording the actual traffic and the counter-recorded traffic. For most prior years, we validated the traffic counter

several times and the annual average ratio of observed traffic to counter-recorded traffic was consistently about 1.32 to 1 with some variation. The counter misses some traffic because it is too fast (bicycles), too short (children), or because visitors walk or ride side by side or cross in opposite directions in front of the counter. Occasionally, bright, reflective clothing also causes traffic to slip by without being counted. We are confident that the counter recorded data in 2014 and 2015 as it did in previous years.

After downloading trail counter data through Diamond Traffic Centurion Software and applying quality control checks, we calculated the census day traffic counts between 9:00 a.m. to 5:00 p.m. The regression equation is derived by the pairing this traffic counter count with census counts. Raw trail counter counts are used to develop the regression rather than corrected traffic counts based on the validation ratio described above. Such a transformation would increase variability and widen confidence intervals for use estimates. We are interested in estimating overall carriage road use, and not in accurate estimates of actual use at the trail counter site.

2014 – 2015 Missing Data Treatment

We analyzed our data to determine how many carriage road entries to add to the census total (or subtract) for the missing 5p - 6p hour in 2014 – 2015 because these censuses, unlike prior ones, did not include this hour. We did this so that use estimates with our 2014 – 2015 regression, which will be applied to all years since 2006 (when the Eagle Lake Bicycle Express began), are consistent with earlier efforts, which were based on a nine-hour census day.

For each set of census dates (1995 – 1997, 2001 – 2002), we compiled the total entries to the carriage road system by the hour, summed them, and calculated their means. We then calculated the difference in the means for each hour by subtracting the 2001 – 2002 means from the 2014 – 2015 means. We then divided each 2014 – 2015 mean by each 2001 – 2002 mean to calculate a ratio/percentage for each hour. We then averaged the eight ratios (for each hour from 9a – 5p) to find the mean hourly difference/increase in use from 2001 - 2002 to 2014 – 2015 for the first eight hours of the censuses. We then multiplied the mean use for the 5p – 6p hour from 2001 - 2002 by this ratio/percentage to calculate the amount to add to each of our 2014 – 2015 censuses for that hour. This transformation may be easier to understand as we explain the results.

RESULTS AND DISCUSSION

We completed 10 of 14 scheduled censuses over the two seasons. Two censuses were cancelled in 2014 because of weather. In 2015, four census days were cloudy and or foggy in part and July 15, 2015 had light rain for two hours. In spite of this weather, we recorded high trail counter and census counts with the exception of July 15, 2015. We also did not detect a trail counter failure for the first 19 days of August which unfortunately resulted in the census counts of August 2 and 12, 2015 being unusable. Thus ten census numbers were available to run the regression. All census data is located in an Excel file (2014-2015CarroadCensus.xlsx).

2014 – 2015 Missing Data Treatment

Table 1 shows the census data tables for 2001 – 2002 and 2014 – 2015 and the calculations made to determine how much to add or subtract from the 2014 – 2015 censuses for the missing 5p – 6p hour. Each column shows the number of entries to the carriage road system by census date with the sum and mean for all those entries by hour.

Table 1: Spreadsheet Showing Calculations for Transforming 2014 – 2015 Census Data to Account for Missing 5p – 6p Counts.

2001 - 2002									
Date	9a - 10a	10a - 11a	11a - 12n	12n - 1p	1p - 2p	2p - 3p	3p - 4p	4p - 5p	5 p -6p
3-Jul-01	246	351	336	258	217	193	168	109	78
13-Jul-01	154	207	297	180	137	161	98	91	49
19-Jul-01	264	315	270	282	228	166	79	101	65
27-Jul-01	179	365	360	298	241	218	126	97	72
2-Aug-01	266	336	332	225	184	133	112	80	68
16-Aug-01	259	390	407	299	226	169	159	130	88
9-Jul-02	91	184	189	147	131	169	167	57	43
18-Jul-02	191	296	277	190	164	140	117	69	43
25-Jul-02	208	270	330	232	139	154	155	78	68
2-Aug-02	162	384	338	218	232	151	111	70	38
13-Aug-02	274	460	394	306	178	146	150	107	89
16-Aug-02	356	347	199	251	158	159	137	132	101
Sum	2650	3905	3729	2886	2235	1959	1579	1121	802
Mean	220.8333	325.4167	310.75	240.5	186.25	163.25	131.5833	93.41667	66.83333
2014 - 2015									
Date	9a - 10a	10a - 11a	11a - 12n	12n - 1p	1p - 2p	2p - 3p	3p - 4p	4p - 5p	
18-Jul-14	367	400	392	269	201	137	114	163	
23-Jul-14	343	412	297	224	171	160	116	94	
31-Jul-14	440	492	496	320	234	218	158	110	
18-Aug-14	355	394	419	355	310	241	152	128	
26-Aug-14	229	344	409	233	175	128	88	77	
7-Jul-15	306	377	343	290	181	159	136	121	
15-Jul-15	186	212	214	145	77	146	128	113	
21-Jul-15	417	355	398	323	272	154	129	156	
27-Jul-15	318	439	436	364	287	209	174	132	
20-Aug-15	354	455	457	325	284	217	178	134	
Sum	3315	3880	3861	2848	2192	1769	1373	1228	
Mean	331.5	388	386.1	284.8	219.2	176.9	137.3	122.8	
Mean 2014-2015	331.5	388	386.1	284.8	219.2	176.9	137.3	122.8	
Mean 2001-2002	220.8333	325.4167	310.75	240.5	186.25	163.25	131.5833	93.41667	
Difference	110.6667	62.58333	75.35	44.3	32.95	13.65	5.716667	29.38333	
									Average%
Percent 0102/1415	0.666164	0.838703	0.804843	0.844452	0.849681	0.922838	0.958364	0.760722	0.830721
Percent 1415/0102	1.501132	1.192318	1.242478	1.1842	1.176913	1.083614	1.043445	1.314541	1.21733
2014 - 2015 add on for each census for 5p -6p									81.35822

Using the 9a – 10a hour as an example, we summed the all the entries for each hour on each census day and calculated the means, which were 220.83 for 2001 – 2002 and 331.5 for 2014 – 2015. We then divided each hourly mean for 2014 – 2015 by each hourly mean for 2001 – 2002. For the 9a - 10a hour the result was 1.5. This is a correction factor and if multiplied by 100, it gives the percent change from 2001 – 2002 to 2014 – 2015, in this case an increase. We then calculated the mean change for all eight hours and it was 1.21733. All changes were positive (increases) and their range was between 1.04 (3p – 4p) and 1.5 (9a – 10a). We multiplied this 1.21733 correction factor by the mean hourly use from 5p – 6p in 2001 – 2002 (66.833) to calculate the number of visitors to add to each census from 2014 – 2015 for the 5p – 6p hour. This number was 81.35822. Therefore, we added 81 visitors to each 2014 – 2015 census counts before running the regression with the trail counter counts. These numbers are shown in the table in Appendix 2.

Regression Results

Details of the regression and a scatter plot of points are in Appendix 2 (along with the 1995 – 1997 and 2001 – 2002 regression data). 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. At this point we should also remember that new censuses were conducted in 2014 – 2015 because of concerns that Eagle Lake Bicycle Express was sending more bicyclists past the trail counter. The new regression now reflects this change, and we will apply the equation use estimates from 2006 forward in our next monitoring report.

The regression will estimate use best within the range of the highest and lowest census counts. Confidence intervals will widen beyond this range especially on the low use end, because no censuses were conducted on low use days. For example, with such a high intercept, even with zero use recorded at the trail counter (e.g. a rainy day), the equation will estimate 587 visitors to the carriage roads. Use estimates from low trail counter counts (perhaps < 200) should be considered much less reliable. The number of low use days in any given month thus influences the accuracy of any monthly use totals reported. Our main concern, however, is that daily use does not exceed 3,000 visitors per day (Jacobi 1997a).

We expect to use the 2014 – 2015 regression equation for the next 5-10 years to estimate overall carriage road use from the count on the electronic trail counter and compare daily use estimates to the 3,000 visitors/day standard. We will also apply it to traffic count data back to 2006. If changes in how visitors use the carriage roads occur again (for example, a significant increase in Island Explorer buses, a change in bus routes, promotion of low entry access points, the development of any new, significant, and appropriate type of use), a new regression would be warranted.

Discussion

Compared to the most recent regression equation, the new one will estimate *less* use because its coefficient and intercept are *smaller*. This finding is consistent with the reason we decided to conduct another set of censuses—the Eagle Lake Bicycle Express van delivering several hundred

more bicyclists per day to the Eagle Lake Boat Launch and inflating estimates. Use at all other carriage road entrances did not increase at the same rate, but the regression equation assumed that it did.

As mentioned, we will apply this new equation to 2006 – 2015 data. We expect that it will show a couple of things. First, it will reduce daily estimates of carriage road use significantly. Because of this, we expect it will also show that we approached or exceeded our standard of 3,000 visitors per day less frequently than previously estimated. And second, it will still show an increase in carriage road use over that time period, but not as much as previous estimates.

This result may appear confounding given evidence of an increase in overall park use since 2006 and the anecdotal observations of many park staff that carriage road visitation has also increased. But we believe there is no inconsistency. It is just that overall carriage road use has probably not increased as much as previously thought, but it has increased. We will know more when the new regression equation is applied to the past ten years of data.

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APPENDIX 1: CARRIAGE ROAD CENSUS INSTRUCTIONS

COUNT RULES

1. Count **entries** only.
2. Count shifts are for one of these 4 hour blocks: 9:00 am - 1:00 pm or 1:00 pm - 5:00 pm.
3. Complete a data sheet for each hour. Be sure to fill in the information at the top of the sheet. Early shift leaves all sheets to the 1:00 shift.
4. A bicycle built for two is counted as one bike. Children are counted only if they are under their own power. Rangers or volunteers in uniform or on other official duties are counted.
5. "Dabblers" are not counted. When someone enters your area think of what their main purpose is. If it was just to look at Eagle Lake or Bubble Pond don't count them, they are dabblers; if it was to use the carriage road for at least five minutes, even if they don't go far, count them.
6. If weather forces a cancellation we will call you by 8:30 am. Be prepared with food and drink, fly dope, and rain gear. A lawn chair is also helpful. Call 288-8727 with questions.

Site	Exact Location/Special Instructions
Visitor Center	Set up chair down access trail out of sight to avoid many questions.
Duck Brook Bridge	At bridge. Don't count dabblers.
Eagle Lake	At end of access off parking area near Rt. 233 bridge underpass.
Eagle Lake Boat Launch	At launch area. Don't count dabblers, paddlers, or other boaters.
Bubble Pond	1. On north side of Park Loop Road at gate 2. At the carriage road bridge At the gate on the north side of the Park Loop Road, we are only interested in those going north to Eagle Lake. At the carriage road bridge, we are only interested in those going south towards Wildwoods. Ask everyone entering this question: <i>Are you starting your ride/walk here at Bubble Pond?</i> Count only those starting from Bubble Pond Parking. Most traffic will be through traffic from somewhere else. Don't count trail users ascending Pemetic Mtn. Trail. If necessary, ask if they are hiking the trail. Don't count dabblers going to the pond. Remember the time criteria also – 5 minutes. <i>Please ask the question exactly as described above for consistency.</i>
Jordan Pond	1. Jordan Pond House (west) - at jct. with dorm trail by Rules sign 2. Gate House (east) - at gate At the Gatehouse side, we are only interested in those going east towards Wildwoods. At the Jordan Pond House side, we are only interested in those going west towards Intersection 16. Ask everyone entering this question: <i>Are you starting your ride/walk here at Jordan Pond?</i> Count only those starting from the Jordan Pond area. Most traffic will be through traffic from somewhere else. Remember the time criteria also – 5 minutes. <i>Please ask the question exactly as described above for consistency.</i>
Brown Mtn.	At junction of carriage road and walking trail from parking area. At this location all foot and bike traffic funnels by you.
Parkman Mtn.	At access road.
Wildwood Stables	At top of hill near bridge over Park Loop Road Record the number of carriages and also count the number of people on each one. Watch for and count bicyclists entering from the Park Loop Road. Don't count traffic coming across bridge from Day Mountain area, or other through traffic from Bubble Pond or Jordan Pond areas.

CARRIAGE ROAD CENSUS DATA SHEET

Please fill in completely!

Your Name _____	Telephone Number _____	
Location _____	Date _____	Hour _____

[illegible]

Use tick marks in the columns (groups of five) to record entries. As each hour ends, write the number of entries in the appropriate #### column and enter the grand hourly total.

GOOD LUCK, AND THANKS FOR YOUR HELP

APPENDIX 2: REGRESSION STATISTICS 2014 – 2015

Trail Counter	Census+81	Census	Ratio
679	2124	2043	0.31968
683	1898	1817	0.359852
834	2549	2468	0.327187
885	2435	2354	0.36345
586	1764	1683	0.3322
583	1994	1913	0.292377
357	1302	1221	0.274194
876	2285	2204	0.38337
856	2412	2331	0.354892
766	2485	2404	0.308249

SUMMARY OUTPUT									
<i>Regression Statistics</i>									
Multiple R	0.92834								
R Square	0.861816								
Adjusted R Square	0.844543								
Standard Error	154.9379								
Observations	10								
ANOVA									
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>				
Regression	1	1197740	1197740	49.89385	0.000106				
Residual	8	192046	24005.76						
Total	9	1389786							
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>	
Intercept	587.4028	223.0985	2.63293	0.030041	72.93664	1101.869	72.93664	1101.869	
X Variable 1	2.163824	0.306336	7.063558	0.000106	1.457412	2.870237	1.457412	2.870237	
RESIDUAL OUTPUT					PROBABILITY OUTPUT				
<i>Observation</i>	<i>Predicted Y</i>	<i>Residuals</i>	<i>Standard Residuals</i>		<i>Percentile</i>	<i>Y</i>			
1	2056.64	67.36047	0.46113		5	1302			
2	2065.295	-167.295	-1.14525		15	1764			
3	2392.032	156.9677	1.074555		25	1898			
4	2502.387	-67.3874	-0.46131		35	1994			
5	1855.404	-91.4039	-0.62572		45	2124			
6	1848.912	145.0876	0.993228		55	2285			
7	1359.888	-57.8881	-0.39629		65	2412			
8	2482.913	-197.913	-1.35485		75	2435			
9	2439.636	-27.6364	-0.18919		85	2485			
10	2244.892	240.1077	1.643708		95	2549			

APPENDIX 2 (cont.): REGRESSION STATISTICS 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%
	476.416666666667		

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	66929525759	0.001511224265161	
		189804	04	49	61	
Residual	10	317763.27531776	32754768			
		476863	63			
Total	11	911004.916				
		66667				
	<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	1.931387616	0.0000050689774844	-9.46172463692743	1195.22297677416
	614	331919	31	6512		
x1	2.40693239236	0.557057374	3.207979885	0.001213053021	1.16573120916797	3.64813357557111
	954	6615334	59	39851		

APPENDIX 2 (cont.): REGRESSION STATISTICS
1995-1997

Date	Trail Counter	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

Regression Statistics

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

Analysis of Variance

	<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: REGRESSION STATISTICS (Cont.)
Scatter Plots



