Blue-Sky, Megan

From:	Loomis, Ross [rloomis@rti.org]
Sent:	Tuesday, June 29, 2010 8:42 PM
To:	Mansfield, Carol A.; Fox, Lori
Subject:	RE: more detailed vehicle numbers and sampling description

Lori, somehow in the e-mail, the table got cut off. Here it is in all it's glory.

Ramps	Vehicle Trips			Passengers		
	Estimate	**Lower Bound**	**Upper Bound**	**Estimate**	**Lower Bound**	**Upper Bound**
2, 4	78,550	35,149	121,950	174,949	77,174	272,725
23, 27, 30	49,273	16,596	81,950	112,702	39,863	185,542
34, 38	48,778	13,214	84,341	103,171	30,092	176,250
43, 44, 45	51,277	11,277	91,277	117,030	17,262	216,797
49, 55	52,318	13,358	91,278	123,355	26,888	219,822
59, 67	20,447	4,356	36,538	45,152	9,824	80,480
68, 70, 72	44,358	14,090	74,625	92,588	29,933	155,243

From: Mansfield, Carol A.
Sent: Tuesday, June 29, 2010 9:46 PM
To: lfox@louisberger.com
Cc: Loomis, Ross; Mansfield, Carol A.
Subject: more detailed vehicle numbers and sampling description

Hi Lori,

Below is the text we are using for the benefit-cost analysis:

To determine the magnitude of proposed changes in ORV management, we needed a key component—the number of vehicles driven on the beach. Previous attempts to quantify the number of vehicles have not generated reliable data; therefore, between April 2009 and March 2010, RTI counted vehicles at a random sample of ramps to estimate the total ORV trips taken on the beach.

Weeks for counting at ramps were sampled sequentially with probability proportional to size (the number of rental homes occupied by nonowners) and with minimum replacement. To sample with more than one counting trip over the low season, December through March, we stratified the sample into low (December through March) and shoulder/high seasons (April through November).

Based on this sample, we estimated that 344,999 vehicle trips with 768,948 passengers were taken on the beach in CAHA between April and November 2009. The 95% confidence interval ranges from 285,696 vehicle trips to 405,302 vehicle trips and 625,928 passengers to 911,968 passengers.

Between December 2009 and March 2010, we estimated that 154,803 vehicle trips containing 225,656 passengers were taken on the beach. Because of the small sample size, however, the 95% confidence

interval around this number contains negative values, between −82,987 vehicle trips to 392,594 vehicles and −115,872 passengers to 567,184 passengers.

Table 2-4 provides estimates and confidence intervals for the combinations of ramps. The ramps on Bodie Island, Ramps 2 and 4, account for approximately 23% of vehicle trips and passengers.

Table 2-4. Estimates and Confidence Intervals for Ramp Combinations between April 2009 to November 2009

Vehicle Trips		Passengers		
Lower Bound	Upper Bound	Estimate	Lower Bound	Upper Bound
35,149	121,950	174,949	77,174	272,725
16,596	81,950	112,702	39,863	185,542
13,214	84,341	103,171	30,092	176,250
11,277	91,277	117,030	17,262	216,797
13,358	91,278	123,355	26,888	219,822
4,356	36,538	45,152	9,824	80,480
14,090	74,625	92,588	29,933	155,243

A limitation of the study is that it was done in 2009 and 2010, when the consent decree was in place. It does not provide us information about the quantity of vehicle trips prior to the consent decree.

Sampling design

Nineteen three day trips will be taken to CAHA to count at beaches and ramps, for a total of 57 days of counting. Accounting for the logistical difficulties of travel on the island, we grouped the ORV ramps into clusters of two or three adjacent ramps and their nearby beach segments. Each day, counters will travel to two clusters and count at two ramps and four beach segments at each cluster. We will thus sample 114 clusters, counting at ramps 228 times and at beach segments 456 times.

Since travel to and from Ocracoke is by ferry only, we ensured that counters would count at clusters either on Ocracoke Island or Bodie and Hatteras Islands each day. Weighting this stratification according to the number of ramps present on Ocracoke Island and Bodie and Hatteras Islands, we will count on Ocracoke Island 18 days, and on Bodie and Hatteras Islands the remaining 39 days.

To determine the number of times we would count at each cluster, we stratified the clusters according to whether they are on Ocracoke Island or Bodie and Hatteras Island, and specified that we would count 36 times at clusters on Ocracoke and the remaining 78 times at clusters on Bodie and Hatteras Islands. We then weighted each cluster by the number of ramps within it, and used probability proportional to size sampling with replacement to determine the number of times we would count at each cluster.

To determine what clusters would be counted each day, we first randomly selected where to count that day, on Ocracoke Island or Bodie and Hatteras Islands. Then, we randomly selected the two clusters to visit that day.

To determine when during the day the clusters would be counted, a day was divided into four four-hour segments. Two of these four were randomly selected for each day. Within each four hour segment, two hours will be spent counting at two ramps, and the other two will be spent counting at four beach segments. Whether the ramps are counted in the first or second half of the segment was determined randomly. To determine which beach segments, and in clusters with three ramps, ramps would be counted during a given four hour segment, we randomly selected four beach segments within the cluster (Table 3-2) and two of the three ramps in the cluster.

To determine when during the week trips would occur, we designated three days of the week as trip start days, Tuesday, Friday and Saturday. Based on personal communication and ramp counter data, we estimate use of ORV ramps to be twice as high on weekend days as on weekdays. With three day trips starting on Tuesday, Friday and Saturday, the probability of counting on a weekday would be 1/9 and 2/9 for weekend days. We randomly select the start date for each trip taken.

To determine which weeks of the year we will schedule a trip, we generated a population of 52 weeks, each starting on a Tuesday and ending on a Monday, from March 17, 2009 to March 15 2010. To ensure that we had at least two counting trips taken during the off season, we used village rental occupancy data to stratify the bottom third separately and assign two trips to that strata, and the remaining 17 trips to the upper two thirds. We then used probability proportional to size sequential sampling according to the village rental occupancy data to estimate which remaining weeks would be selected.

Carol Mansfield, Ph.D. | Senior Economist | RTI International
Social and Statistical Sciences Division | Hobbs Building, 3040 Cornwallis Road | Durham, NC 27709
P 919-541-8053 | F 919-541-6683 | carolm@rti.org