



Estimating Visits to Denali National Park and Preserve

Spring/Summer 2011

Natural Resource Technical Report NPS/AKR/NRTR—2012/641



ON THE COVER

Denali National Park and Preserve visitors enjoy the view from the Eielson Visitor Center at mile 66 on the Denali Park Road.
NPS Photo

Estimating Visits to Denali National Park and Preserve

Spring/Summer 2011

Natural Resource Technical Report NPS/AKR/NRTR—2012/641

Peter J Fix
Department of Humans and the Environment
School of Natural Resources and Agricultural Sciences
University of Alaska Fairbanks
Fairbanks, AK 99775-7200

Andrew Ackerman
Social Scientist
Center for Resources, Science, and Learning
Denali National Park and Preserve

Ginny Fay
Institute of Social and Economic Research
University of Alaska Anchorage

November, 2012

U.S. Department of the Interior
National Park Service
Natural Resource Stewardship and Science
Fort Collins, Colorado

The National Park Service, Natural Resource Stewardship and Science office in Fort Collins, Colorado, publishes a range of reports that address natural resource topics. These reports are of interest and applicability to a broad audience in the National Park Service and others in natural resource management, including scientists, conservation and environmental constituencies, and the public.

The Natural Resource Technical Report Series is used to disseminate results of scientific studies in the physical, biological, and social sciences for both the advancement of science and the achievement of the National Park Service mission. The series provides contributors with a forum for displaying comprehensive data that are often deleted from journals because of page limitations.

All manuscripts in the series receive the appropriate level of peer review to ensure that the information is scientifically credible, technically accurate, appropriately written for the intended audience, and designed and published in a professional manner.

Views, statements, findings, conclusions, recommendations, and data in this report do not necessarily reflect views and policies of the National Park Service, U.S. Department of the Interior. Mention of trade names or commercial products does not constitute endorsement or recommendation for use by the U.S. Government.

This report is available from the Natural Resource Publications Management website (<http://www.nature.nps.gov/publications/nrpm>).

Please cite this publication as:

Fix, P. J., A. Ackerman, & G. Fay. 2012. Estimating visits to Denali National Park and Preserve: Spring/Summer 2011. Natural Resource Technical Report NPS/AKR/NRTR—2012/641. National Park Service, Fort Collins, Colorado.

Table of Contents

Figures	v
Tables.....	v
Abstract.....	vi
Acknowledgements.....	viii
List of Terms	ix
Introduction.....	1
Methods	3
Sampling.....	4
<i>Talkeetna</i>	5
<i>Main Entrance</i>	5
Spring Shoulder Season	5
Summer	6
<i>Denali Park Road</i>	6
<i>Bus Stop</i>	6
<i>Train Depot</i>	7
<i>Bike Path/Jonesville Trail</i>	7
<i>Savage River Kiosk</i>	7
<i>Determining how Many Time Blocks to Sample during the Summer Season</i>	9
Fall Shoulder Season.....	11
Survey Design.....	11
<i>Talkeetna Airport</i>	11
Non-Response Test at Talkeetna Airport.....	12
<i>Main Entrance</i>	12
Non Response Test at Main Entrance Area	13
Analysis.....	13
<i>Estimate of Ratio of Visits not Past Mile 15</i>	13
Results	15
Sampling.....	15
<i>Response Rate</i>	15
Non-response	17
Other Potential Sampling Error	17
<i>Confidence Interval</i>	19
<i>Representativeness of Sample</i>	21

Other Aspects of Sample Representation	22
Visitation Estimation.....	22
<i>Talkeetna</i>	22
<i>Spring Shoulder Season</i>	23
<i>Peak Season</i>	25
<i>Ratio of visits taking a bus past mile 15 to entrance area only visits (June 1 to September 15)</i>	25
<i>Multiplier to estimate total summer peak season use</i>	25
<i>Cruise Ship Package Tour Train Passengers</i>	26
Visit Differences by Month across Summer Season.....	26
<i>Fall Shoulder Season</i>	27
<i>Overall Estimate of Visits</i>	27
Discussion	29
Talkeetna.....	29
Spring Shoulder Season.....	29
Main Entrance Summer Season.....	29
Fall Shoulder Season	30
Seasons not Captured.....	31
Recommendations	32
Reporting Visits Rather than Visitors	32
Sampling.....	32
Remote Counters	33
Winter Season	33
Literature Cited	34
Appendix A. Additional Sample Information	35
Appendix B. Randomly Selected Sample Dates.....	37
Appendix C: Survey Instruments	41
OMB Statement	41
Talkeetna Airport.....	42
Main Entrance Area Sample Locations	46
Appendix D. Additional Confidence Interval Information	71
Outliers and Their Influence on the Confidence Interval.....	71
Treatment of Outliers.....	72
Stratification.....	72

Figures

Figure 1. Broad Overview of Main Entrance Area (first 15 miles of Denali Park Road) and 2011 Sample Locations.....	8
Figure 2. Locations of Main Entrance Area Summer Season Sample Sites.....	9
Figure 3. Sampling Passengers in a Private Vehicle on the Denali Park Road at the Post Office Site.....	16

Tables

Table 1. Summary of Sample Locations.....	4
Table 2. Number of Time Blocks Selected for the Main Entrance Summer Season Sample.....	11
Table 3. Number of Days Sampled During the Summer Season at the Main Entrance Area.....	15
Table 4. Response Rate by Sample Location.....	16
Table 5. Denali Park Road Exiting Vehicles by Percent of Total Traffic and People Per Vehicle for Peak Times Periods.....	19
Table 6. 90% Confidence Intervals for Estimating Total Visits at Sample Locations without Known Visitor Counts.....	21
Table 7. Estimate of VTS Ridership and Teklanika Campground Visits Compared to Use Records.....	21
Table 8. Occurrence of Double Counting at Talkeetna.....	23
Table 9. Completed Surveys and Total Recreation Visitors, Spring Shoulder Season..	24
Table 10. Total Average Vehicle Traffic Spring Shoulder Season.....	24
Table 11. Main Entrance Data Summary and Extrapolation to Total Visits Not Past Mile 15.....	25
Table 12. Percent of Visits Not Past Mile 15 by Sample Location and Month.....	27
Table 13. Total Recreation Visits 2011 Season.....	28

Abstract

This study was conducted to assist in refining Denali National Park and Preserve's visitation estimation. Visitation estimates to Denali National Park and Preserve are based on a formula that includes the number of riders on buses plus an estimation of the number of visitors who do not travel past mile 15 on buses. The primary objective of this study was to calculate the number of visitors to the park who do not take a bus during each visit into the park during the 2011 summer season using a comprehensive sample of exiting visitors. Additional specific objectives included:

- Revising park protocol to be more consistent with Director's Order 82 (National Park Service, Office of Policy n.d.) that specifies to count only one entry of one person within a 24 hour period as a recreation *visit*. A single visitor who stays in the area for multiple days may generate multiple visits to the park during their stay
- Estimate the potential rate of counting the same visit multiple times on the same day, i.e., by visitors who take a glacier landing flight and/or visit the Talkeetna Ranger Station, and/or visited the Denali Park Road entrance area
- Estimate the number of visitors using the park during the spring and fall when buses are not running
- Understand how visitation patterns and visit characteristics change throughout the visitor season

Visitor surveying took place at the Talkeetna Airport and the main entrance area to the Denali Park Road during the spring shoulder season, summer season, and fall shoulder season. During the summer season, exiting visitors to the entrance area were stratified into five groups based on how they exited the park: private vehicles, motorcycles, and cyclists on the Denali Park Road, hotel shuttle buses, Denali Star Train passengers, Bike Path/Jonesville Trail users, and Tundra Wilderness Tour (TWT) or Denali Natural History Tour (DNHT) tour bus passengers. Overall, the survey resulted in 5,125 completed surveys with a response rate of 95.4%.

The total estimate of recreation visits during the spring shoulder season, April 1, 2011 to May 19, 2011, was 6,885, with a high percentage of visitors being Alaska residents.

During the summer season, similar to other studies (Manni, et al. 2011, Valdez 1997), we found approximately 25% of *recreation visitors* did not take a bus at any point during their trip. However, many Denali visitors stay overnight outside the park and make multiple distinct *visits* into the park on separate days. We found that overall 41% of *recreation visits* are not traveling past mile 15. Double counting visits, while high within specific, small subgroups, i.e., climbers who visited the Talkeetna Ranger Station on the day they flew into the park, was not a significant source of error when viewed with total visits. The parkwide inflation to total visit estimates as a result of doubling counting using current methods is approximately 1%. However, implementing Director's Order 82 using the 2011 multiplier to estimate visits is significant and would increase 2011 visitation estimates an additional 25%, or result in annual total visits increase from the reported **404,209** to **509,921**.

The authors assert that, in addition to being consistent with DO 82, a count of recreation visits (rather than visitors) more accurately reflects pressure on park resources and facilities when assessed using a variety of key visitor use metrics (e.g., daily use of services and infrastructure, overnight vs. day-use, time spent engaged in various recreational activities, and total time in park.

In some parks this distinction would not be significant, however because the vast majority of visitors to Denali stay in lodging outside the park, it is demonstrated that use of visits results in at least a 25% increase in annual totals. Use of visits will allow park managers to understand more precisely how, and to what extent, frontcountry facility and infrastructure investments are being utilized by visitors.

Acknowledgements

Matthew Helt and Justin St. Onge, University of Alaska Fairbanks, were outstanding in their job surveying visitors to the park's primary entrance area and frontcountry. Surveying vehicles on the Denali Park Road at the post office was an especially challenging task and they executed the task in an exceptional manner. They also deserve thanks for persevering through a rainy June. Sue Krawicki gathered data at the Talkeetna Airport, where she waited out rain, followed by bursts of frantic activity. Lucy Terrell assisted with lodging and securing approval for sampling. Finally, we extend our gratitude to all the visitors who took the time to complete the survey.

List of Terms

Visitor: a person who enters the park, regardless of how many times.

Visit: The entry of a person into the park. Only one entry per 24 hour calendar day is counted, i.e., if a person enters and exits multiple times between the hours of 9 a.m. and 9 p.m. it is only counted as one visit.

Recreation Visit: Visits for the purpose of recreation or use of recreation facilities. These were the types of visits that were the focus of this study and our primary concern.

Non Recreation and Non Reportable Visit: Commuter, inholder, subsistence, commercial or government business traffic or NPS, concessionaire, and NPS contract/cooperator traffic.

Talkeetna Airport: The public airport located just east of downtown Talkeetna, Alaska. Talkeetna Air Taxi and K2 Aviation passengers on a day trip glacier landing flight, or who were returning from a multiday stay, were surveyed at this location.

Talkeetna Ranger Station: The National Park Service Ranger Station in Talkeetna, Alaska. A location where there is currently potential of double counting. An infrared remote counter is utilized to count visits to the Ranger Station. Calibration of the counter took place as part of this study in summer 2011, but visitors were not sampled at this location.

Main Entrance Area: Refers to the Denali Park Road entrance area, from mile 237 of the George Parks Highway where it intersects the Park Road, and all related visitor infrastructure along the first two miles, such as the Riley Creek Campground, Wilderness Access Center (WAC), Denali Visitor Center (DVC), Murie Science and Learning Center (MSLC), etc.

Spring shoulder season: The period between the plowing and opening of the Denali Park Road to vehicle traffic past mile 3.2, and when the park concession buses begin operation in May. This varies from year to year; in 2011, the Denali Park Road opened March 22 and the buses started carrying passengers past mile 15 on May 20th.

Summer peak season: The period when the Visitor Transportation Service (VTS) and tour buses are running. In 2011, this was May 20 to September 15. This is also generally the same time period during which NPS staff collect visitor data at the Savage River kiosk.

Fall shoulder season: The period in the fall after the buses stop running until the road is closed to vehicle traffic.

Savage River: Refers to the bridge where the Denali Park Road crosses the Savage River at mile 15. All westbound traffic is required to stop at a small NPS ranger kiosk where information is recorded. We sampled eastbound (exiting) Tundra Wilderness Tour (TWT), Denali Natural History Tour (DNHT), and Kantishna Experience (KE) buses at this location.

Denali Park Road: Refers to our sampling location at mile 0.3 of the Denali Park Road where it intersects the post office access road. We targeted all exiting private vehicles and bikes. Cones were set up in the eastbound lane of the Denali Park Road and vehicles were sampled by directing them into the post office spur road where they were surveyed. (see Figure 2).

Bus Stop: The shuttle bus stop located immediately east of the Denali National Park and Preserve Visitor Center (see Figure 2). This was a sampling site to target visitors exiting the park via hotel shuttle.

Train Depot: The Alaska Railroad Train Depot location within the park. However, our sampling effort was concentrated on the Denali Star rail cars (see Figure 2).

Bike Path/Jonesville Trail: A sample location that targeted visitors exiting the park by foot or bicycle along the Bike Path/Jonesville Trail. The sampling location was just to the north of the Denali Park Road, at the intersection of dirt footpath and the paved pedestrian trail (see Figure 2).

Time Blocks/Blocks: Refers to a period of time (measured in hours) in which sampling took place. The hours for each block were typically four hours, with some longer blocks during the spring shoulder season. On some days more than one time block was sampled.

Introduction

Denali National Park and Preserve (DENA) faces several challenges in estimating total visitation. DENA does not have an entrance station on the Park Road at its main entrance, and thus lacks a mechanism to count visitors as they arrive via private vehicles to that entrance. In addition, there are multiple entry points to the main entrance area (e.g., the Alaska Railroad, hotel shuttle buses, and bike and pedestrian trails), complicating counting visits. Multiple entry points also exist along the south side of the park, e.g., air taxi service from the Talkeetna Airport and the Talkeetna Ranger Station. DENA does, however, control access beyond mile 15 of the Denali Park Road and utilize NPS staff to monitor and collect accurate counts of visitors and vehicles past this point. Because of these particulars, the current DENA visitation estimation protocol builds on the number of passengers who take a bus (the predominant mode of travel) past mile 15, and then apply an estimation factor to account for those visitors utilizing the entrance area that do not go past mile 15 (i.e., non-bus riders), as well as add in those visits originating from other non-entrance area locations, including glacier landing flights and the Talkeetna Ranger Station.

Several problems were identified with the current protocol (National Park Service Public Use Statistics Office n.d.). First, while Director's Order 82 (DO 82) calls for reporting a *visit* as the entry of one person into the park in a 24 hour period, the current DENA protocol reports park visitors, not visits. Second, the non-bus rider estimation factor is based on a study that was conducted for only one week in 1996 (Valdez 1997). The 1996 study estimated visitors, not visits, past mile 15 and park scientists have some evidence to suggest that the sample was not highly representative of visitation during the entire summer. Further justifying the need to resurvey visitors, many significant changes have occurred to Denali's front country area since 1996 and regardless of whether the 1996 sample was representative of that summer, the proportion of visits not going past mile 15 likely has changed. Third, the current total visitation estimate is an aggregate of visitors at several locations (e.g., the main entrance, the Talkeetna Ranger Station, and air taxi glacier landings), and the extent that visits might be double counted among these locations is not known (e.g., counted both as an air taxi glacier landing visit and Talkeetna Ranger Station visit as well as in the main entrance on the same day). Fourth, visitation during the spring shoulder season has never been studied and therefore is not well understood, but is thought to be increasing as spring road opening dates are on average earlier, and therefore the length of the season for unrestricted Park Road access to Teklanika in spring is increasing.

This project sought to update the assumptions underpinning the DENA visitation estimation protocol and to develop a method to estimate the number of visits as opposed to visitors.

Specifically, the project sought to:

- Sample during the entire summer to ensure results are representative and to understand how visitation changes throughout the summer.
- Estimate visits at the main entrance area that are not part of a visit past mile 15 that are recorded in bus passenger counts.
- Estimate the extent to which visits may be double counted.

- Measure characteristics of visits (residence of visitors, nights in DENA/the surrounding area, visitor activities). Results of this objective are presented in a separate report (Fix and Ackerman, 2012).
- Estimate visits during the shoulder season and measure key characteristics of those visits.

Methods

To meet project objectives it was necessary to intercept visitors and ask them key questions regarding their visitation. In addition, it was critical to sample across the entire summer season. The visitor surveys took place at the Talkeetna Airport, to target visitors entering the park by air service (i.e., landing on a glacier in the park, including both mountaineers on multi-day trips and visitors on day trips) and the main entrance area targeting visitors who exit the park via the Denali Park Road in a private vehicle, by a hotel shuttle bus, the Alaska Railroad, on bicycle or foot using the Denali Park Bike Path (Bike Path) and Jonesville Trail, or a Tour Bus that originated at hotels outside the park (i.e., the Tundra Wilderness Tour (TWT) and Denali Natural History Tour (DNHT)). In addition, the main entrance survey went across the spring shoulder season, the summer season, and part of the fall shoulder season. As information gathered pertained to activities during the respondents' visit, we sampled visitors after their trip to obtain the most accurate information regarding visit characteristics as well as whether they had taken a bus past mile 15 during their current, surveyed visit to the park. Different methods were required for the Talkeetna and main entrance locations, and within the main entrance, different methods were used during the shoulder and summer seasons.

Sampling

Table 1. Summary of Sample Locations.

Sample location	Target population	Main research questions	2011 Season / Sample date range	Time blocks sampled
Talkeetna				
Glacier landing	Day and overnight visitors who landed in the park	If visitor entered ranger station or main entrance on the same day	April 1 – July 31 ¹ April 7 – July 31	49
Ranger station	All people entering ranger station	Calibration of infrared counter	April 1 – Aug. 31 ² April 7 – July 31	8
Main entrance				
Spring shoulder	Recreation visitors traveling on Denali Park Road	Estimate of visits, activities of visitors	March 21 – May 19 ³ April 7 – May 19	29
Peak Summer Post office	Visitors exiting the park in a private vehicle	If they traveled past mile 15, if they visited the Talkeetna Ranger Station and/or landed on a glacier in the park, activities	May 20 – Sept. 15 May 29 – Sept. 15	67
Bus Stop	Visitors exiting the park via a shuttle bus (i.e, hotels local businesses)	If they traveled past mile 15, if they visited the Talkeetna Ranger Station and/or landed on a glacier in the park, activities	May 20 – Sept. 15 May 29 – Sept. 15	25
Train Depot	Visitors exiting the park via the Denali Star train	If they traveled past mile 15, if they visited the Talkeetna Ranger Station and/or landed on a glacier in the park, activities	May 20 – Sept. 15 May 29 – Sept. 15	15
Bike Path/ Jonesville Trail	Visitors exiting the park by foot or bicycle	If they traveled past mile 15, if they visited the Talkeetna Ranger Station and/or landed on a glacier in the park, activities	May 20 – Sept. 15 ⁴ May 29 – Aug. 31	19
Savage River ranger kiosk	Visitors on a DNHT, TWT, or KE bus	If they visited the Talkeetna Ranger Station and/or landed on a glacier in the park, activities	May 20 – Sept. 15 May 29 – Aug. 31	16
Fall shoulder	Recreation visitors traveling on Denali Park Road	Estimate of visits, activities of visitors	Sept. 16 – Sept. 30 Sept. 20 – Sept. 30 ⁵	6

¹A very limited number of commercial glacier landings take place prior to April 1 (5 in 2011 as reported by the NPS Public Use Statistics Office).

²The Talkeetna Ranger Station is open year round, but 93% of the use occurred during this time period.

³The road was open to mile 12 on March 21 and to Teklanika River Rest Area on April 15.

⁴It is possible people could access the park by the Jonesville Trail or bike path after this date. However, as the lodging and shops in the canyon close after this date, use of this location is extremely low after Sept. 15.

⁵The road lottery was September 16 – 19, and we did not sample during that time. We initially planned to sample until October 15, but the Denali Park Road closed on October 1 because of construction.

Talkeetna

The target population at the Talkeetna Airport was park visitors who *landed* on or near a glacier located within DENA boundaries. Glacier landings are weather dependent; flights concentrate when the weather is clear. Because of this, a purely random sample of specific time blocks during specific days might not be productive (i.e., during any given time block and/or day there would be zero probability of a glacier landing flight during bad weather). To allow for a representative sample and account for the weather dependent character of glacier landings we developed a system in which days were randomly selected to be sampled, but the *times sampled within that day were determined by when the weather window allowed flights to land*. If a day selected for sampling was completely weathered out, the next available day was sampled. We sampled from April 7 (when use starts increasing) to July 31 (when most glacier landing flight activity ceased due to poor snow landing conditions). Forty-nine days were randomly selected to be sampled during this time period.

Main Entrance

Spring Shoulder Season

The spring shoulder season sampling period started April 7, 2011 and continued until May 19, 2011. At the very beginning of the sampling period, the weather was still winter conditions and the days were relatively short; this changed significantly to spring weather and longer days by May. This change in daylight hours and temperatures influenced the times when people might be arriving. Thus, during April we sampled a four-hour block, with the starting time randomly determined. During April weekdays we selected nine days to sample, with three days each starting at 10 a.m., 1 p.m., and 3 p.m. Five weekend days were randomly selected to be sampled, with three starting at 11 a.m. and two starting at 2 p.m. During May we assigned each day two time blocks: 10:30 a.m. to 3 p.m. and 3 p.m. to 8 p.m. We randomly selected seven time blocks during the week and eight blocks on weekends. See Appendix A for detailed sampling information. Weather permitting, the surveyor was stationed at an interpretive pull-out just east of the Mountain Vista Rest Area at mile 12 of the Denali Park Road (Figure 1). A large sign announced the survey, and the selected cars were sampled by directing them into the pull-out through the use of a handheld orange flag. Passengers in vehicles were screened to include only those on a recreation visit, read an introductory script and asked if they were willing to participate in the survey, and, if yes, read the survey questions and their answers noted by the surveyor. The number of vehicles passing by while a survey was being administered were recorded. After completion of a survey, the next passing vehicle was sampled.

Summer

To conduct a random sample, we divided the day into three time blocks, defined as follows.

- Morning: 9 a.m. to 1 p.m.
- Afternoon: 1 p.m. to 5 p.m.
- Evening: 5 p.m. to 9 p.m.

With the exception of the Savage River kiosk, these time blocks were sampled at all sample locations. The five sample locations, target populations, and survey methods are described in detail below. Additional information regarding the development of the sampling plan is found in Appendix A.

Denali Park Road

The target population at the Denali Park Road junction with the post office spur road was visitors exiting the park in private vehicles, motorcycles, or bicycles. The Denali Park Road was sampled in the morning, afternoon, and evening. During the selected times, signs were placed along the road announcing the presence of the survey crew, and cones were placed in the road to designate a lane for the single vehicle completing the survey. One member of the survey crew stood with a handheld stop sign and directed sampled vehicles into the post office road. The second survey crew member was stationed in a pull-out area on the post office road and upon stopping a vehicle, asked them to respond to a series of questions, which were then read to willing respondents. Vehicles that were known non-recreation visitors were not sampled, and passengers of sampled vehicles were screened to ensure they were recreation visits.¹ Vehicles on the Denali Park Road were allowed to pass by while a survey was being administered, with the number and type of vehicles passing recorded by the crew member holding the stop sign. Once a survey was complete, the next available passing vehicle was sampled. We assumed all passengers in the vehicle had the same trip characteristics (e.g., length of visit, whether they took a bus past mile 15, activities) and did not attempt to randomize within a group.

Bus Stop

The target population was visitors exiting the park to nearby lodges on hotel shuttle buses (including Princess, McKinley Chalet, Denali Bluffs and local businesses, e.g., Salmon Bake, if they were present), boarding from the Denali Bus Stop (subsequently referred to as just Bus Stop) located to the east of the visitor center (see Figure 2). It is important to note we were sampling buses at the actual bus stop, which does not include those tour company buses (i.e., Princess, Holland America, Royal Caribbean) picking up their train passengers departing from the tour company train cars. The Bus Stop was sampled in the morning, afternoon, and evening. During the selected blocks, both members of the survey crew were present and asked visitors waiting to board the bus if they were willing to complete the survey. The total number of buses, broken out by specific types, and the passengers on those buses were recorded. One survey was completed per group, with screening questions to ensure no group members had been sampled previously. We assumed all members of the group had the same trip characteristics (e.g., length of visit,

¹ A system was developed in which employees exiting work would signal they were non-recreation visitors. For example, NPS employees held up a cd. After the first few weeks, the survey crew was familiar with most recurring non-recreation visitors.

whether they took a bus past mile 15, activities) and did not randomize respondents within a group.

Train Depot

The noon southbound and 4 p.m. northbound departing Denali Star train cars were sampled. Both employees were present during the hour preceding the departure time. Visitors milling about in the passenger boarding area were asked to complete a survey. The survey crew attempted to survey as many passengers as possible. One survey was completed per group, with screening questions to ensure they, or other members of the group, had not been sampled. We assumed all members of the group had the same trip characteristics (e.g., length of visit, whether they took a bus past mile 15, activities) and did not randomize respondents within a group.

Bike Path/Jonesville Trail

The target population at the Bike Path/Jonesville Trail was visitors exiting the park by foot or bicycle on the trail (see Figure 2 for location). The trail was sampled in the morning, afternoon and evening. During the sampled times, one member of the survey crew was present. A large sign announced the survey and individuals or groups passing by were asked to complete the survey. If a group, one person was asked to complete the survey. The number of pedestrians passing while a survey was being administered were recorded. After a survey was completed, the next group or individual was sampled. One survey was completed per group. We assumed all members of the group had the same trip characteristics (e.g., length of visit, whether they took a bus past mile 15, activities) and did not randomize respondents within a group.

Savage River Kiosk

The target population at the Savage River kiosk was Tundra Wilderness Tour (TWT), Denali Natural History Tour (DNHT), and Kantishna Experience (KE) buses (Visitor Transportation Services (VTS) buses were not sampled as those passengers were captured in samples at the other locations). These buses stop at the Savage River bridge on their return trip and the surveyors boarded the bus while it was stopped. Questionnaires were read aloud to passengers and those with a “yes” response were instructed to raise their hands. The number of passengers and the number of yes responses to each question were recorded. TWT, DNHT, and KE buses were allowed to pass by when passengers on a bus were being sampled, however, once the surveyors were done with a bus, the next passing TWT, DNHT, or KE was sampled. Passengers on these buses were sampled at the Savage River kiosk as these buses pick up and drop off passengers at hotels outside the park; passengers taking the bus directly to their hotel would not be sampled at other locations. As we sampled these buses on their return trip, the relevant times were only in the afternoon. Thus, on days selected for sampling we sampled a time period covering all returning buses.

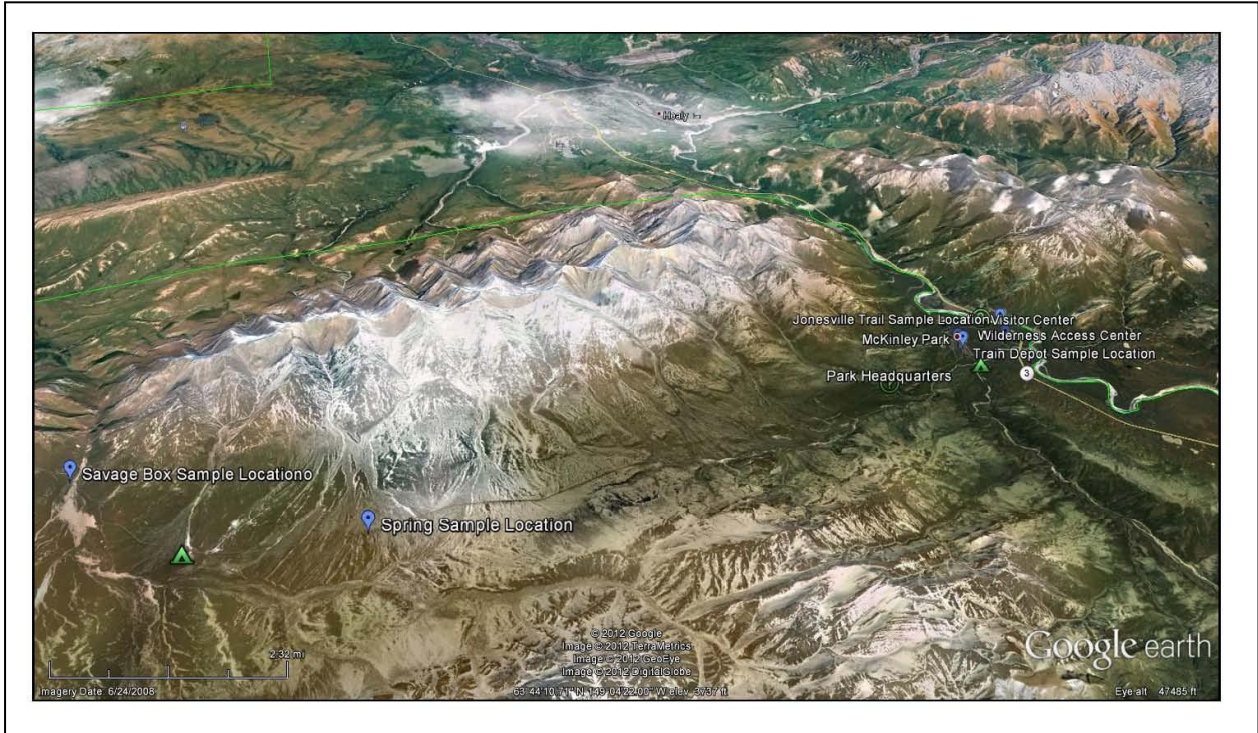


Figure 1. Broad Overview of Main Entrance Area (first 15 miles of Denali Park Road) and 2011 Sample Locations.

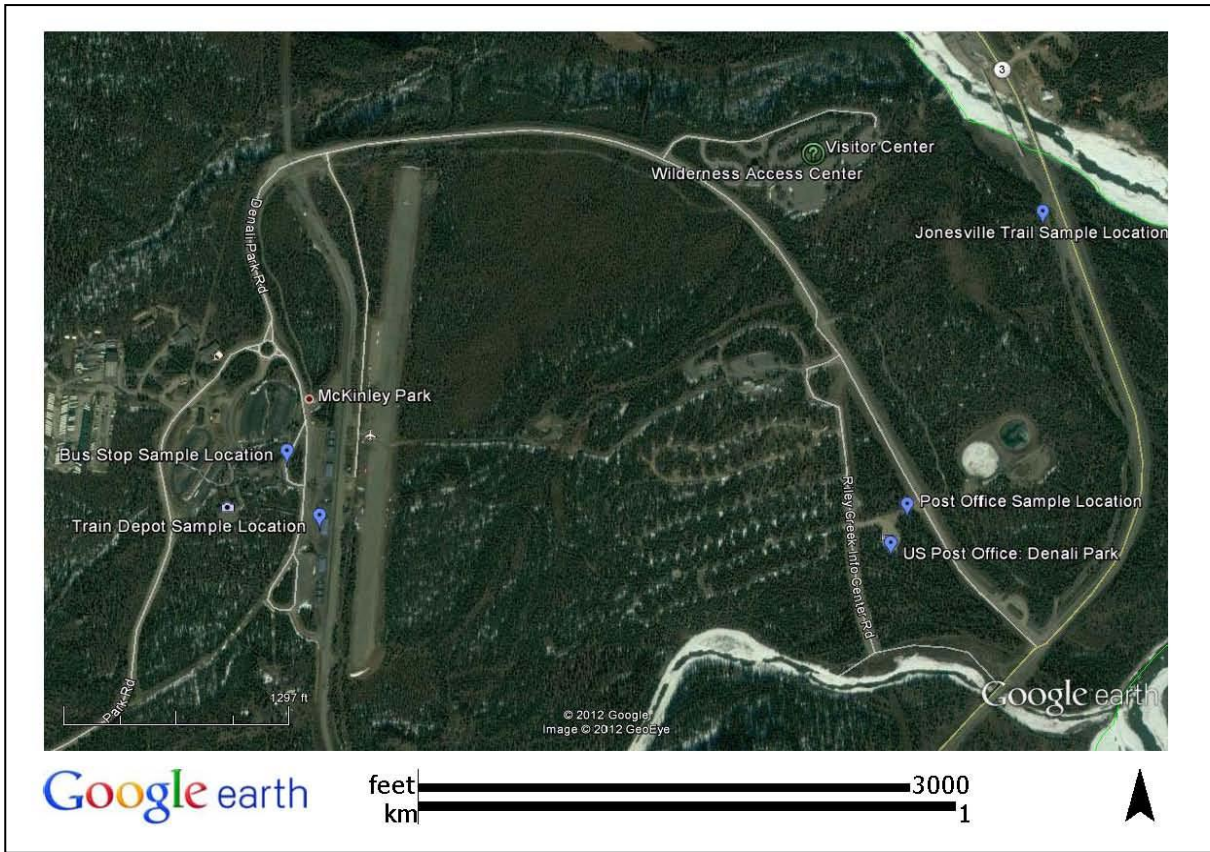


Figure 2. Locations of Main Entrance Area Summer Season Sample Sites.

Determining how Many Time Blocks to Sample during the Summer Season

The main goal of the study was to estimate the percent of visits that did not include a bus trip past mile 15 of the Denali Park Road. This required an estimate of vehicles or passengers, depending on the sample location, and the percent of visits that went past mile 15. Thus, two concerns with sampling were:

- 1) Sampling an adequate number of time blocks to capture variation in vehicles and/or passengers.
- 2) Sampling an adequate number of visits to capture variation in travel past mile 15.

For guidance regarding the number of time blocks to sample at the Denali Park Road, we followed Watson et al. (2000). Specifically, we used the following formula to estimate the required sample size for estimating visitation (pg. 117):

$$n \approx \frac{N * S^2}{S^2 + \frac{L^2 * N}{4(2)^2}}$$

Where:

N = the number of days in the season from which to sample

S² = variance

L = desired level of precision

We estimated variance in several ways. For the Denali Park Road sample, we looked at past traffic counter data to obtain a likely range in the number of vehicles. For the Bus Stop we used information from management of local hotels to obtain a likely range of buses and passengers; the Bike Path/Jonesville Trail variance estimation was based on NPS managers' experience, and the Savage kiosk and Train Depot were based on actual passenger counts from previous years' data. The estimate of variance was then used to estimate the required number of blocks to sample to estimate the number of vehicles in the population to within 10%.² The calculation revealed 59 blocks should be sampled. In anticipation of blocks being cancelled for various reasons, 67 blocks were selected at the Denali Park Road location.

Selection of sample blocks during the summer peak season was a process of allocating available labor across the five locations. The goal in selecting time blocks was to distribute time blocks in relation to expected variance: locations with greater variance should receive greater sampling effort. We determined the Denali Park Road location would have the greatest variance, followed by the Bus Stop, Train Depot, Bike Path/Jonesville Trail, and Savage River kiosk. We allocated approximately 50% of sampling effort to the Denali Park Road, 18% to the Bus Stop, and the remaining effort split approximately evenly among the remaining locations, with effort equally divided among the location's respective time blocks (Table 2). To allow for a random selection that was logistically feasible (i.e., only one location selected during a time block, travel between locations of consecutively selected time blocks minimized, etc.), we developed the following system:

- The peak season was divided into two-week periods corresponding to University of Alaska Fairbanks pay periods.

²Watson et al. (2000) state that obtaining estimates within 5% might not be practical and suggest using an estimate to within 30% of the population value. The initial implementation of the Forest Service's National Visitor Use Monitoring program estimated use to within 20%. We felt 5% was not practical, but 10% was a realistic goal.

- 14 possible blocks resulted for the morning, afternoon, and evening, respectively.
- Each of the 14 blocks per two-week period was assigned a random number, and then sorted in ascending order.
- For the morning and evening time periods, the blocks with the three lowest numbers were designated for the Denali Park Road, then the Bus Stop, followed by the Bike Path/Jonesville Trail. For the afternoon blocks, the block with the lowest number after the Bike Path/Jonesville Trail was designated as the Train Depot, followed by the Savage River kiosk.
- Minor adjustments were made to the sample blocks to better facilitate days off.

The specific dates of the selected blocks are shown in Appendix B.

Table 2. Number of Time Blocks Selected for the Main Entrance Summer Season Sample.

Location	Number of Time Blocks Selected												
	Total	Morning				Afternoon				Evening			
		June	July	Aug	Sept	June	July	Aug	Sept	June	July	Aug	Sept
Denali Park Road	67	8	6	7	1	7	6	8	2	5	8	7	2
Bus Stop ¹	26	2	2	3	-	2	3	3	3	3	2	2	1
Train Depot ²	15	-	-	-	-	5	5	4	1	-	-	-	-
Bike Path/Jonesville Trail ³	19	2	2	3	-	2	2	2	-	2	2	2	-
Savage River ⁴	16	-	-	-	-	3	2	3	-	3	2	3	-

¹The Bus Stop was not sampled in the morning in September due to the shorter, colder days.

²The Train Depot was only sampled in the afternoon as that was the only time in which trains were departing.

³The Bike Path/Jonesville Trail was not sampled in September because only one employee was available.

⁴The afternoon and evening blocks were always sampled on the same day at the Savage River ranger kiosk. Morning blocks were not sampled as no buses were returning during that time. The Savage River ranger kiosk was not sampled in September as there was only one employee available.

Fall Shoulder Season

The sampling at the fall shoulder season was limited by the road construction on the Denali Park Road. Six days were sampled between September 20 and September 30, however, sampling did not take place after construction began on October 1.

Survey Design

The key elements of the survey varied by the Talkeenta Airport and main entrance locations. At both locations the goal was to keep the survey as short as possible to minimize time required of the respondents. At both locations an interviewer read the survey questions to the respondent and recorded the answers.

Talkeetna Airport

At the Talkeenta Airport, the main concern was double, or potentially triple, counting among glacier landings in the park, visits to the Talkeetna Ranger Station, and visits to the main entrance area. For day users, the double counting could potentially occur on the day of their

glacier landing, whereas for mountaineers on multi-day visits the double counting could potentially occur on the day they flew into the park (not when they returned as this crosses over the 24 hour period specified in Director's Order 82 and it would count as new visit). Because of this, slight modifications were made to questions directed toward day and multi-day users. The survey asked day visitors if they visited, or planned to visit, the Talkeetna Ranger Station and/or the main entrance area that day; multi-day visitors were asked if they visited those locations on the day they flew into the park. All visitors were asked the location of their landing and zip code of residence, multi-day visitors were asked about activities in which they participated. The surveyor confirmed with the respondent whether all members of the group did/did not enter the ranger stations or visit the north entrance and the respondent was asked to specify the zip code of each member of the group. The information for each group member was recorded on the survey.

Non-Response Test at Talkeetna Airport

As a nonresponse check (to assess how well respondents represented all visitors) for those who did not want to complete the survey, we asked if they would be willing to answer two questions:

- 1) If they went (or plan to go) into the Talkeetna Ranger Station on the same day.
- 2) If they went (or plan to go) to the main entrance area on the same day.

Main Entrance

All respondents at the main entrance area were screened for those on **recreation** visits. At the main entrance area, slightly different versions of the survey were required for the various seasons and sample locations. The spring and fall shoulder season surveys recorded information regarding the mode of transportation and the number of people in the vehicle and then asked if the group was independent, with a tour, or an educational group; length of their trip in Denali; activities participated in and main activity; turn around point on the Denali Park Road; residence zip code; and how the spring shoulder season recreation opportunities could be improved.

During the summer season, for all locations except the Savage River kiosk, the key question was whether the respondent traveled past mile 15 on *that visit*. To establish the parameters of the visit, a series of screening questions were asked. The logic of the screening was as follows:

1. Establish how long the visitor was in the park without exiting.
 - If less than 24 hours, establish whether they had already been sampled on their *visit* (i.e., did they answer the survey questions when previously exiting).
 - If they were previously sampled during the visit within the same 24 hour calendar day, they were not sampled again.
 - If it had been longer than 24 hours since they last exited, being sampled twice on the same visit was not an issue.

Respondents on a recreation visit, who had not been sampled previously on that visit, were then asked about:

- Length of stay in the Denali area
- Length of time in the park without exiting
- How they arrived in the park on the day of the visit
- If they took (or planned to take) a bus past mile 15 on that visit (note, in August we also asked if they took a bus at any point during their visit)
- If they visited the Talkeetna Ranger Station the same day as the visit

- If they took a glacier landing flight the same day as the visit
- Activities participated in and their main activity
- Residence zip code
- Recommendations for improving the park's recreational opportunities during the summer

For the Savage River ranger kiosk sample, as logistics required us to board the bus and sample all respondents on the bus, the survey was streamlined and a limited number of response categories was included for the questions.

The final survey instruments are shown in Appendix C.

Non Response Test at Main Entrance Area

To determine whether those who did not complete the survey were systematically different than those who completed the survey (which would limit the representation of our data), we recorded group size and, when applicable, method of transportation, and asked them why they did not want to participate.

Analysis

The analysis presented in this report consists of basic frequencies and cross-tabulations of the data, with results extrapolated across all days of the study period. Analysis was conducted with SPSS version 20.0 and Microsoft Excel 2007.

Estimate of Ratio of Visits not Past Mile 15

The primary goal of the study was to determine for each visit on a bus past Savage River, how many visits did not go past mile 15. The ratio of visits not past mile 15 to visits past mile 15 will be used to develop a multiplier to apply to Savage data and calculate total visits.

The surveys completed at the Park Road, Bus Stop, Train Depot and Jonesville Trail locations asked the respondents whether, on the unique visit sampled, they traveled past mile 15 (on a bus, on a bicycle, with a Teklanika campground private vehicle pass, etc.). For the surveys completed at the Savage River kiosk, it was a given that all respondents traveled past mile 15. Thus, from the data, a ratio of respondents who traveled past mile 15 to those who did not could be calculated. However, this ratio could not simply be used as the ratio for the multiplier because the data in its raw format does not necessarily represent the relative size of each sample location's contribution to total visits. Weighting is a commonly used and accepted statistical method to ensure data accurately represents the population. However, weighting requires the total population of each group of interest to be known; while the total number of DENA bus passengers and train passengers are known, the total number of visits not taking a bus is unknown (hence the need for this study). Thus, we took the following steps to estimate the total number of visits not past mile 15; it was not necessary to estimate total bus passengers from our data as that is known.

- 1) Respondents were grouped by the Park Road, Bus Stop, Train Depot and Bike Path/Jonesville Trail sample locations. Within each location-based group, respondents

were further grouped according to whether they were sampled in the morning, afternoon, or evening (noon or 4 p.m. train for the Train Depot).

- 2) Within each location-time block group, the percent that did not travel past mile 15 was calculated. The percent that did not travel past mile 15 was converted to the number of visits not past mile 15 per day, based on the total visitors observed during those sample blocks (i.e., the number of passengers in vehicles on recreation visits not sampled plus those sampled, the total number of bus passengers, the total number of train passengers, the total number of pedestrians passing by on the Jonesville Trail plus those sampled). This was calculated separately for each time block.
- 3) The per day number of visitors not traveling past mile 15 for each location and time block was extrapolated to all days during the sample period (which was 107).
- 4) The totals for each time block at each sample location were added together to estimate the total visits not past mile 15.

The final aggregated number can be compared to Savage River data to determine the overall ratio of visits not past mile 15.

Results

Sampling

The sampling plan was implemented mostly as designed. In a few instances days were cancelled due to weather, adjustments were made to answer questions related to the sampling³, and several days were cancelled in July because of the Visitor Services Project study. At Talkeetna we sampled 43 days of the 49 selected (six days were cancelled because of weather and were not able to be rescheduled). During the spring shoulder season at the main entrance we sampled eight weekdays and six weekends in April (a weather-cancelled weekday was made up during the weekend); during May, seven weekday and eight weekend time blocks were sampled. During the summer at the main entrance, we sampled 122 of the 142 time blocks scheduled (Table 3). Sampling during the fall shoulder season was stopped after September 30 because the Denali Park Road was closed at mile three due to construction and data would not be representative of a typical shoulder season.

Table 3. Number of Days Sampled During the Summer Season at the Main Entrance Area.

Location	Number of Time Blocks Sampled												
	Total	Morning				Afternoon				Evening			
		June	July	Aug	Sept	June	July	Aug	Sept	June	July	Aug	Sept
Denali Park Road	58	7 ¹	5 ²	7	1	5	3 ³	7	2	5	7 ²	7	2
Bus Stop	18	2	1 ²	2	-	2	2 ²	2	3	1	0 ⁴	2	1
Train Depot	13	-	-	-	-	5	3 ⁵	4	1	-	-	-	-
Bike Path/Jonesville Trail	17	1 ¹	2	3	-	2	2	2	-	2	1 ⁶	2	-
Savage River Kiosk	16	-	-	-	-	3	2	3	-	3	2	3	-

¹One block canceled because of weather.

²One block canceled because the Visitor Services Project study was taking place during this time.

³Two blocks canceled because of the VSP, another was canceled due to weather.

⁴One block canceled because of the VSP, another was canceled because of vehicles troubles.

⁵One block canceled because of the VSP, another was switched to observations at the WAC.

⁶One block switched to observations at the WAC and Riley Creek.

Response Rate

Response rates at all locations were at least 94% (Table 4). There were no differences of significance.

³ For example, the surveyors observed shuttles from local businesses, e.g., Salmon Bake, Denali Cabins, passing by the post office sample location, but these buses were not observed at the Bus Stop. There was one day in which we observed other locations, such as the WAC, to determine where these shuttles were picking up passengers.

Table 4. Response Rate by Sample Location.

Sample location	Completed surveys	Response rate
Spring shoulder season	974	95%
Talkeetna		
Day users	803	99%
Overnight users	163	98%
Denali Park Road	2,536	94%
Bus Stop	554	99%
Train Depot	475	96%
Bike Path/Jonesville Trail	202	95%
Savage River ranger kiosk ¹	185	100%
Fall Shoulder	199	100%

¹The surveys for Savage River represent buses, not individuals. The number of individuals covered by the Savage surveys was 8011. The response rate is in reference to buses that refused to stop/allow the survey crew to board. Some passengers might have refused by not raising their hands to the questions.

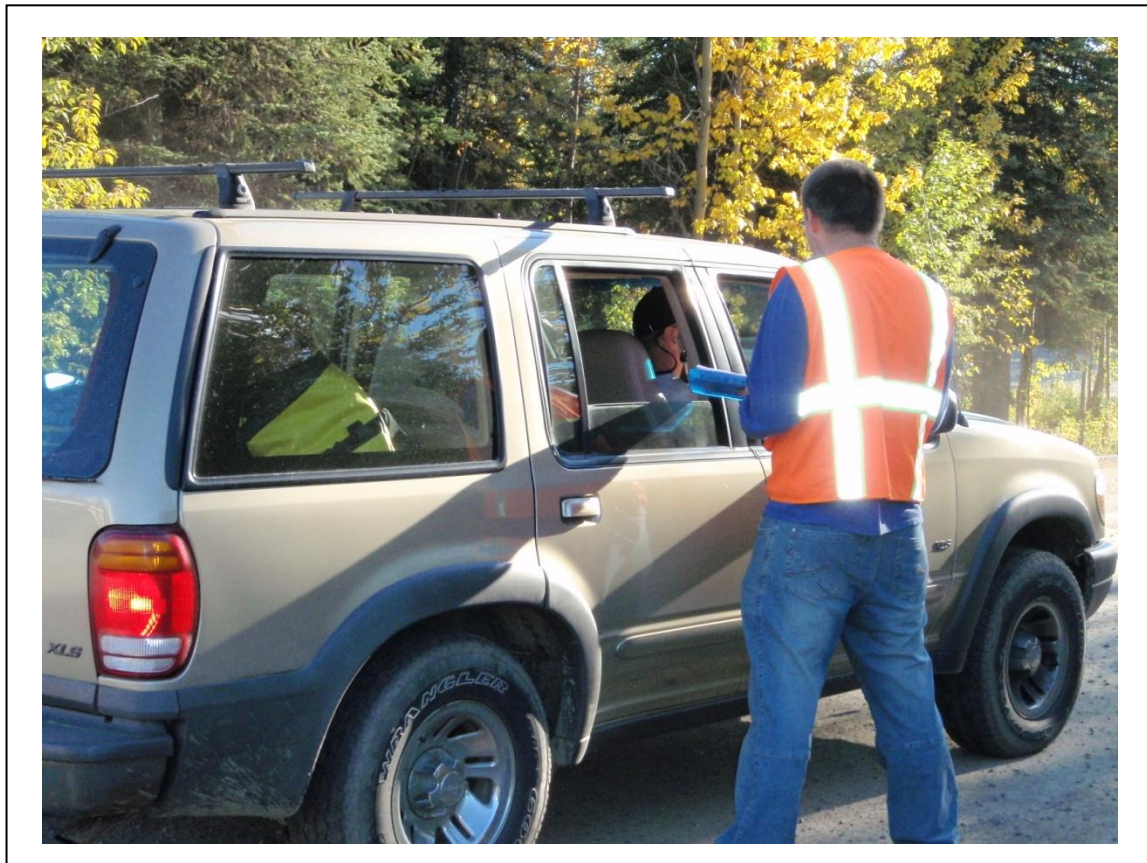


Figure 3. Sampling Passengers in a Private Vehicle on the Denali Park Road at the Post Office Site.

Non-response

Of the 13 who refused at Talkeetna, six were due to a lack of time, two were due to a language barrier, and five either did not specify or had other reasons. Although only five of the 13 were asked the non-response questions, only one visited/planned to visit the Talkeetna Ranger Station and none visited/planned to visit the main entrance area, characteristics similar to those who completed the survey. During the spring sample 63% of the 51 total refusals did not stop when requested to do so, 16% stopped but verbally refused, and 14% stopped but cited a lack of time. During the summer at the main entrance area, of the 172 who refused, 38% did not want to participate, 29% cited a lack of time, 17% had already completed the survey at a different time (presumably a previous day), and 13% had a language barrier. Eight, 11, and 17 visitors refused at the Bus Stop, Bike Path/Jonesville Trail, and the Train Depot, respectively. At these three locations most did not provide a reason for refusing, although three of the refusals at the Bike Path/Jonesville Trail came from runners and four of the refusals at the Train Depot were due to language barriers. Given the low number of refusals at the Bus Stop, Train Depot, and Bike Path/Jonesville Trail, statistical tests are difficult. Nonetheless mean group size of refusals and respondents was similar (2.4 vs. 2.6, 1.8 vs. 2.0, 2.7 vs. 3.0, for Bus Stop, Train Depot, and Bike Path/Jonesville Trail, respectively). The larger sample size of the Denali Park Road allowed statistical comparisons. While there was a statistical difference in group size of respondents and non-respondents (2.71 vs. 2.38, $t = 2.96$, $p = 0.003$), the type of vehicle (i.e., car/truck vs. RV) did not differ. As there was not a statistically significant difference in group size between those who took a bus and those who did not, and given the high response rate, non-response bias was determined not to be an issue. There were no refusals during the limited fall shoulder season sampling.

Other Potential Sampling Error

During the sampling several issues were noted that might result in coverage error:

- Visitors who left the Riley Creek Campground via the post office spur road and not past the sampling location.
- Visitors who left the park before 9 a.m., when sampling began, or after 9 p.m., when sampling ended.
- RVs on average move slower than passenger cars/trucks and, thus, might be more likely to be sampled.
- Visitors who did not take a bus past mile 15 and exited the park on a mid-sized hotel/local business shuttle bus/van (e.g., Salmon Bake, Bluffs, Denali River Cabins, Carlo Creek Cabins or Hostel) and were picked up at a location other than the Bus Stop. The potential sampling error is because we did not sample shuttle buses/vans at the Park Road location.

To address the above concerns the following actions were taken. To determine if visitors were exiting the Riley Creek campground by traveling past the post office, we conducted observations on several days (June 29 and 30 for one hour each, and July 28 for two hours). In total five vehicles associated with recreation visits exited the park past the post office during these three observation periods.

To assess if visitors were exiting the park before 9 a.m. an observation of exiting traffic was conducted from 8:10 a.m. to 8:55 a.m. on July 15. There were few vehicles that exited the park before 8:40 a.m., with traffic picking up between 8:40 and 9:00 a.m. In total, 21 non-commercial vehicles that would be included in the population at this sample location exited. Seven were RVs and 14 were personal vehicles, of which seven were judged to be recreation visits (rental cars), three were likely recreation visits (couples, some with recreation gear), and four could not be determined. While the observation on this day suggests we did miss some recreation visits with our 9:00 a.m. start to the sampling time, it is not known to what extent this occurred on other sample days. We did not conduct observations of vehicles exiting after 9 p.m. As we used actual bus ridership as our baseline for visits going past mile 15, the potential bias to results is an underestimate of visits not going past mile 15. To determine if this was an issue, an analysis was conducted based on DOT traffic counts for the hour preceding 9 a.m. and the hour after 9 p.m., data from the survey logs regarding the ratio of recreation vehicles to total vehicles exiting, and data from the survey regarding persons per vehicle and the percent of visits that took a bus past mile 15. This analysis resulted in an estimate of 11,767 additional recreation visits that did not take a bus during the entire summer sampling period. This would result in a 2% increase in total visits as presented later in this report. However, as this estimate extrapolates our empirical data outside of sample times, a correction was not applied. Nonetheless it appears our estimates are robust.

Regarding RVs, at the end of June we analyzed the proportion of RVs to passenger vehicles on recreation visits observed exiting on the Park Road during the sampling blocks compared to the proportions sampled. It was determined that while there was some error in individual blocks, overall the proportions matched. Thus, at that time no action was taken. Later in the summer the surveyors felt that at certain times RVs were being over sampled. In those situations the surveyors were instructed that if several RVs were consecutively sampled, and the next passing vehicle was an RV, to let the RV pass and sample the next passenger vehicle. Analyzing the ratio of passenger vehicles to RVs reveals that RVs were slightly oversampled as the ratio of passenger vehicles to RVs was 3.5:1 in the sample and 6:1 among all vehicles exiting during the sample periods. While those in a passenger vehicle were less likely to take a bus (68% vs. 52%, $\chi^2 = 52.0$, $p = < 0.001$), given that the proportion of passenger vehicles is already high in the sample, weighting the data to account for the under sampled passenger vehicles increases the estimate of those not past mile 15 by 1.5%. Given the low potential bias, data were not weighted.

To determine if we were excluding a large number of visitors who left on shuttles that originated at locations other than the Bus Stop, we observed the shuttle bus stops at the Mercantile on July 29 from 5:00 p.m. to 9:00 p.m. and Riley Creek and the Wilderness Access Center (WAC) from 1:00 p.m. to 5:00 p.m. on August 5. No shuttles departed from the Mercantile on July 29. At the WAC, while ten shuttles stopped by the bus stop, only ten visitors departed via the shuttles. At Riley Creek, five shuttles stopped by the bus stop, but only three visitors departed via the shuttles. Informal conversations with the shuttle bus drivers confirmed this pattern is representative of the entire summer and we concluded visitors exiting the park by shuttle bus from these locations were not biasing results.

As a result of collecting vehicle type data for all vehicles on the Denali Park Road passing our sampling site at the post office, we were able to develop a calibration table for use with an

automated traffic counter, should one be installed for the eastbound lane of the Park Road east of the post office. Table 5 provides the percentages by vehicle class of the total vehicle traffic counts for the respective time blocks along with the average people per vehicle (PPV) during the summer peak season, 2011. Data in the table could also be used to calculate the distinction between recreation visit vehicles to non-recreation visit vehicles within each class. Therefore, Table 5 can be used with future traffic count data to estimate number of recreation visits exiting the park. Once the total vehicle counts are distributed based upon the percentages in Table 5, the recreation visit vehicle categories will need to be multiplied by their respective PPV to get recreation visits for each vehicle category. These data can then be summed to get total recreation visits.

Table 5. Denali Park Road Exiting Vehicles by Percent of Total Traffic and People Per Vehicle for Peak Times Periods.

	Non-Reportable Visit Vehicles			Recreation Visit Vehicles					
	Passenger vehicles/trucks	Delivery vans (18'-23' may have dual rear axle)	Large construction trucks (40'+) or semi and trailer (multi-axle)	RV 40' (dual rear axle)	RV 24'	Passenger vehicles/trucks	JV Tours, KE Tour and Kantishna Day Tour buses (36'-40')	Hotel, Tour, or Travel Vans (18'-20')	Lodge Coach or Shuttle (45'+ e.g. Princess shuttle)
Morning (9 am to 1 pm)	17.1%	3.0%	1.1%	4.9%	7.3%	40.2%	2.8%	17.7%	5.9%
Afternoon (1 pm to 5 pm)	15.6%	3.2%	0.8%	3.4%	5.2%	49.4%	5.7%	12.5%	4.2%
Evening (5 pm to 9 pm)	15.7%	0.8%	0.6%	3.3%	4.9%	63.7%	1.8%	7.0%	2.3%
PPV Multiplier	NA	NA	NA	2.9	2.9	2.7	46.8	5	50

Note. Data based on sampling that took place May 31 through September 15, 2011.

Confidence Interval

The goal of the project was to estimate the portion of park visits that do not include a bus trip past mile 15. As highlighted in the methods section, we first estimated the per-day average number of visits that do not include a bus trip past mile 15, and then extrapolated to all days in the summer to estimate the total number of visits not past mile 15. (While we used the sample for the estimate of visits not past mile 15, we used actual bus tickets sales for the number of visits that took a bus.) Thus, two potential sources of sampling error impact our estimate: 1) error associated with the questions asking respondents if they traveled past mile 15, and 2) adequately capturing day to day variation in visits to accurately estimate the total. Different procedures were required to estimate the respective confidence intervals of each of the potential sources of error.

Regarding the proportion of visitors taking a bus versus not traveling past mile 15, the confidence interval formula for a proportion was used. If the sample is representative of the visitor population, the confidence interval will depend on the variance of the proportion and the sample size. Population size is only a significant factor when sampling populations under approximately 1,000. The most conservative method for estimating the confidence interval is to assume a 50/50 split in the population, which is the maximum variance (Vaske 2008). At the 95%

confidence level the margin of error for the post office spur road survey location was less than 5% for the morning, afternoon and evening time blocks, while the Bus Stop varied between 5% and 11% across the time blocks due to difference in sample sizes, although several of the Bus Stop blocks were cancelled due to the Visitor Services Project (VSP) study that took place in July (see Appendix D for confidence intervals by time block). The Bike Path/Jonesville Trail, and to a less degree, the afternoon Train Depot sample had larger confidence intervals. However, the sample proportion of visits past mile 15 was low for the Bike Path/Jonesville Trail and Train Depot strata, and given the characteristics of these populations, it is likely low in the population. Given this, the 50/50 split assumption likely overstates the variance, resulting in an inflated margin of error.

The confidence interval for an estimate of the total population depends on the variability of daily use and the number of days from the possible total sampled. The following calculation for a confidence interval for total populations was used to determine the confidence interval at the 90% level for total use (Levy & Lemeshow 1999).⁴

$$\bar{x} \pm Z_{1-(\alpha/2)}(N) \sqrt{\frac{N-n}{N} \left(\frac{s_x}{\sqrt{n}} \right)}$$

During the sample times (i.e., 9 a.m. to 9 p.m.) the total estimate of visits associated with the Park Road, Bus Stop and Jonesville trail (the locations for which actual visit counts are not available) was 253,078; the confidence interval at the 90% confidence level⁴ is +/- 35,300 (14%). However, the confidence interval varies across location and time blocks (Table 6), and the Bus Stop in particular is strongly influenced by five dates that appear to be outliers. As data is extrapolated across these dates, outliers were not removed from the calculations in Table 6. Appendix D contains additional information on outliers and confidence interval calculations with outliers removed.

Appendix D also contains the number of surveys completed each day and estimated use per day. A few important conclusions about variation in use:

- While the percent of respondents who stated they traveled past mile 15 did not vary by month, the total number of visits was highly variable within months.
- A short-term study of the proportion of visits not past mile 15 (e.g., one or two weeks) might have adequately estimated the proportion, but the estimate of total visits not past mile 15 would be severely biased.
 - The accompanying report for this project (Fix & Ackerman in preparation), which focuses on visitor characteristic, will discuss implications of short term samples on measuring visitor characteristics.
- Recommendations for future sampling are included in the discussion.

⁴ See the methods section for details on why the 90% confidence level was selected.

Table 6. 90% Confidence Intervals for Estimating Total Visits at Sample Locations without Known Visitor Counts.

	Blocks sampled (n)	Total days (N)	Ave visits per block	Total visits (X')²	90% CI
Park Road					
Morning	20	107	384 ¹	41,101	± 4,200
Afternoon	17	107	667 ¹	71,368	± 8,029
Evening	21	107	885 ¹	94,657	± 9,341
Bus Stop					
Morning ³	5	107	123	13,182	± 3,748
Afternoon ³	9	107	117	12,507	± 2,246
Evening ³	4	107	104	11,075	± 4,822
Jonesville Trail					
Morning	6	107	18	1,962	± 518
Afternoon ³	6	107	22	2,390	± 931
Evening	5	107	45	4,836	± 1,465
Total ⁴				253,078	± 35,300

¹ For the Park Road location, the average per block was calculated by averaging the daily estimate of total visits for the time block. This differs slightly from Table 11.

²Total visits are for each sample location, and, thus, will not sum to total Denali visits. When available (i.e., the Train Depot and Savage River ranger kiosk) actual visitor counts were used.

³One block each cancelled because of VSP.

⁴Total visits associated with the Train Depot and Savage River kiosk are known, and thus are not included in this table.

Representativeness of Sample

Our random selection of time blocks across the entire summer and high response rate help ensure representation. When conducting a random sample, the characteristics of the sample should match the characteristics of the population. Assessing representation can be a challenge for on-site samples in which the population characteristics are not known. In Denali, the total number of people who ride each type of bus (e.g., VTS, TWT, DNHT) is known. Our raw data should approximate the number of people who rode a VTS and who had a pass to travel to the Teklanika campground. Results show the estimate of VTS ridership is within nine percent of the actual and the estimate of those staying at the Teklanika Campground is within 30% of actual (Table 7). Thus the error on our estimate of VTS ridership is much smaller than the bound suggested by the confidence interval. The estimate of the Teklanika Campground visitors is off by a larger amount. However, the small percent of visits with a Teklanika Campground pass would be more subject to sampling error.

Table 7. Estimate of VTS Ridership and Teklanika Campground Visits Compared to Use Records.

	Estimate	Actual¹	% Difference
VTS	60,830 ²	66,478 ¹	8.5%
Teklanika Campground	5,249	4,109 ³	27.7%

¹VTS Excludes 5,202 visits returning after 9 pm. Uses tickets sold of 71,680 (provided by NPS) as the base.

²Estimate would increase to 60,918 excluding the outlier on Sept. 15.

³Data from Andrew Ackerman, NPS.

Other Aspects of Sample Representation

The results demonstrated a high degree of face validity (i.e., do the results make sense given what is known about the study population). Evidence of face validity includes the following. The pattern of those taking a bus past mile 15 in the results is as expected by anecdotal observation of park managers: lower proportions of visits on buses past mile 15 for the Train Depot and Bike Path/Bike Path/Jonesville Trail samples—likely due to the train passengers having less time to take a bus on the day of departure—and the Bike Path/Jonesville Trail visitors high use by locals on days off and/or visitors using the frontcountry on days other than arrival and departure days. The pattern of residency across the sample location is also as expected with the Denali Park Road sample of exiting visitors having the highest percent of Alaska residents, the Bike Path/Jonesville Trail sample of walkers and bicyclists having a high percent of local residents, and the shuttle bus stop location having the highest percent of non-Alaskans. This expectation is based on the assumption that non-Alaskans would be less likely to have private vehicles due to the large proportion of that group who arrive on package cruise ship tours. In addition, the visitor activities matched what would be expected from the sample locations (i.e., those visitors from Alaska, traveling the Denali Park Road, were more likely to be camping and were more active during their visit, while those non-Alaskans visitors were more likely to be using the shuttle buses and to be on tours).

Given the relatively close estimation when comparing our sample to that of the actual VTS manifest of bus passengers, we are able to have high levels of confidence that the number of visits that did not take a bus past mile 15 was adequately represented. Further, we are confident extrapolations of sample to data to population estimates will be accurate.

Visitation Estimation

Talkeetna

At Talkeetna the 803 surveys completed by day users across 43 different days represented 2,448 individuals, an average of 57 per day. The number of completed surveys per day varied significantly, ranging from 1 to 66. Extrapolating the daily average to the 112 days covered by the sample period (April 10 to July 31) is complicated by the fact that a few sampling days were cancelled because of poor flying conditions were made up on days in which flights could occur. While making up the cancelled days when flights could occur might lead to overcounting, 21% of the sample days had two or fewer completed surveys, indicating a low level of flying activity. Nonetheless extrapolating the average of 57 to all days in the sample period resulted in an estimate of visits of 6,384 visits. The Public Use Statistics Office reported 8,493 visitors arrived by aircraft. As the goal was not to estimate total use, it appears our sample has adequate representation.

The 163 surveys completed by overnight users across 43 different sample blocks represented 633 individuals, an average of 14.7 per day. Similar to day users, extrapolation is complicated by days of little or no activity because of weather (12 days had zero climbers and an additional seven days only had one completed survey). Extrapolating to the 112 days in which we sampled results in an estimate of 1,646 visits, compared to 1,274 who obtained a Special Use Permit to climb Mt. McKinley (22 SUPs were for Foraker) and 968 registered backcountry users at

Talkeetna. As the goal was not to estimate total use, it appears our sample has adequate representation.

The main goal of the survey at Talkeetna was to estimate any potential double counting of visitors who took a flight that landed on a glacier and also visited the Talkeetna Ranger Station and/or the main park entrance on the same day. The occurrence of double counting appears to be high within specific groups (i.e., climbers), but given the contribution of Talkeetna visitation to overall visitation, it is not a large factor in calculating total visitation statistics (Table 8).

Table 8. Occurrence of Double Counting at Talkeetna.

	Type of visit	
	Day (glacier land flights)	Overnight (climbers, skiers, etc.)
Percent within group visiting ranger station	17%	74%
Percent within group visiting main entrance	13%	0.6%
Percent group is of overall visitation ¹	2%	0.3%
Resulting overestimation of visitation statistics	0.6%	0.2%

¹Based on 2011 data from NPS Public Use Statistics Office.

We also calibrated the counter at the Talkeetna Ranger station. Calibrations took place on 18 separate days, of which the times varied between 8:00 a.m. and 5:30 p.m. Across the 18 days, due to visitors leaving and returning, visitors hovering in front of the counter and thus triggering it multiple times, and staff entering and leaving, visits were 75% percent of what was recorded on the infrared counter (Standard Deviation = .096; 83% of the days were within the range of 68% to 85%).

Spring Shoulder Season

For the spring shoulder season, the average number of passengers per vehicle on a recreation trip was multiplied by the total number of recreation vehicles during a time block. This estimate of visitation was then extrapolated to all days during the sample period. From April 1 to May 19 we estimated 6,885 recreation visitors were on the Denali Park Road (Table 9). The sample was conducted at approximately mile 13 on the Denali Park Road; we might have missed recreation visitors who did not travel that far on the Denali Park Road.

Table 9. Completed Surveys and Total Recreation Visitors, Spring Shoulder Season.

	Days sampled	n	PPV¹	Ave. # vehicles²	Total days³	Total vehicles⁴	Recreation visitors⁵
April weekdays	8	71	1.83	20	21	420	769
April weekends	6	157	2.24	63	9	567	1,270
May weekday a.m.	4	138	2.42	40	14	553	1,338
May weekday p.m.	3	121	2.31	47	14	658	1,520
May weekend a.m.	5	243	2.32	57	5	285	661
May weekend p.m.	3	244	2.51	106	5	529	1,327

¹Passengers per vehicle.

²Calculated as completed surveys plus vehicles associated with recreation trips that drove by during the sampling period. During April, as only one-four- hour block per day was sampled; the estimate of vehicles was doubled to reflect the entire day.

³Total number of days during the sample period.

⁴Included only vehicles associated with recreation visits. Calculated by the multiplying the average number of vehicle by the total days.

⁵Calculated by multiplying the PPV by total vehicles.

However, during the spring shoulder season we did not emphasize distinct “visits” (e.g., the unique entry of one person per 24 hours into the park). If people camped in the park without leaving, NPS protocol specifies they should be counted as only one visit if driving the Denali Park Road on consecutive days, but not exiting and re-entering. We did gather information on whether people camped in the park, but we did not ask those camping if they exited the park during their multi-day stay. If a visitor did not exit the park, but drove up and down the first 15 miles of the road multiple times, they are only one unique visit, however our method may have counted them as multiple visits if we sampled them twice or recorded them as passing vehicles more than once. However, this error is likely very low as only 11% of the sample was camped within the park during the spring sample period.

In addition to recording vehicles that appeared to be on a recreation visit, we also recorded NPS vehicles, concessionaire vehicles, and non-reportable vehicles. This information will assist in calibrating remote vehicles counters (pneumatic, inductive loop, etc.) that might be used during the shoulder season. The correction factor varies by time of season and day (Table 10).

Table 10. Total Average Vehicle Traffic Spring Shoulder Season.

	Days sampled	Ave. # recreation vehicles	Ave. # total vehicles	Ratio
April weekdays	8	20	36	0.56
April weekends	6	63	70	0.90
May weekday a.m.	4	40	69	0.58
May weekday p.m.	3	47	73	0.64
May weekend a.m.	5	57	67	0.85
May weekend p.m.	3	106	120	0.88

Peak Season

The total number of visits not past mile 15 from June 1 to September 15 was 174,450 (Table 11).

Table 11. Main Entrance Data Summary and Extrapolation to Total Visits Not Past Mile 15.

	During Sample blocks				Extrapolated
	Blocks sampled	n	Ave visits per block ¹	% not past mile 15 ¹	June 1 – Sept. 15 ² Total visits not past mile 15 ²
Park Road					
Morning	20	783	382	62%	25,195
Afternoon	17	757	659	76%	53,604
Evening	21	1,041	886	58%	55,284
Bus Stop					
Morning	5	158	123	48%	6,341
Afternoon	9	310	117	47%	5,853
Evening	4	86	104	57%	6,346
Jonesville Trail					
Morning	6	51	18	75%	1,461
Afternoon	6	61	22	72%	1,723
Evening	5	90	45	71%	3,439
Train Depot					
Noon train	13	317	124	77%	10,243
4 pm train	12	158	56	83%	4,961
Total					174,450

¹Figures are rounded to the nearest whole number. For the post office, the average number of visits per block was calculated using the aggregate vehicles across all time blocks times the average people per vehicle across all time blocks; the product was then divided by the number of blocks sampled. The average in Table 6 was calculated by averaging daily totals, and, thus, there are some small differences.

²Calculated as: average visitors per block x percent not traveling past mile 15 x 107 (total days during the sampling period).

Ratio of visits taking a bus past mile 15 to entrance area only visits (June 1 to September 15)

The 2011 bus ridership between June 1 and September 15 was 247,911. Thus, the ratio of bus trips to non bus trips was 1:0.704. Viewed differently, the total visits associated with these two groups was 422,361 and 59% of visits were associated with a bus trip and 41% did not travel past mile 15.

Multiplier to estimate total summer peak season use

The main entrance area “not past mile 15 multiplier” to estimate visits during the summer peak season, based on 2011 data, is 1.7. This is an increase from the current multiplier of 1.33, which was based on the assumption that 75% of park visitors during the summer season take a bus.⁵ However, the visitor use statistics associated with DENA were never clear as to whether visitors or visits were reported.

⁵ This multiplier was calculated as: $1 + (\% \text{ of visits not past mile 15} / \% \text{ of visits past mile 15})$; $1 + (.25/.75) = 1.33$.

Cruise Ship Package Tour Train Passengers

Potential sources of visitation that are not included in the above calculation are the Holland America, Princess, and Royal Caribbean/Celebrity cruise tour train cars that are pulled by the Alaska Railroad. There are several possible itineraries for these passengers on their first and last day in the Denali Park Road area: arrive and depart on the train, arrive on the train and depart by bus, arrive by bus and depart by train. Conversations with Ed Bohner, Manager, Denali Princess Lodge, located outside of Denali, (personal communication 5/12/11) indicated that the majority of these train passengers immediately depart the park by lodge shuttle bus (after arriving), and on the last day they enter the park by lodge shuttle bus and directly board the train. At issue is whether passengers who only exit/enter the park for the single purpose of disembarking/boarding a train should be counted as a recreation visit. Arguments could be made on both sides of the issue. The fact that seeing the national park vistas are an important aspect of the train trip supports counting them as recreation visits. Alternatively, they are traveling through the park on the Alaska Railroad right of way, and their exit out of the park could be viewed as being brief, incidental visits into the park, or as visits that are more of a commuter nature or purely for transportation purposes, and, thus, they should be counted as “non-recreation” visits or not reported at all. We felt that these visits were most consistent with the NPS definition of non-recreation visits. As such, while not counted in our recreation use estimate, these numbers (176,808 arriving and departing passengers) will factor into Denali use statistics reported nationally.

It is possible a small percentage of the Holland America, Princess, and Royal Celebrity train car passengers either took a hotel shuttle (which is different from the dedicated buses for train arrivals) or walked back to the hotel. In these cases, they would have become recreation visitors and we would have sampled them at either the Bus Stop or Bike Path/Jonesville Trail sample location. We did ask a question regarding how people arrived in the park on the visit for which they were sampled. Just under 10% of the Bus Stop, Bike Path/Jonesville Trail, and 0.3% of the Park Road sample arrived by train. While we cannot distinguish between the Denali Star and the Holland America, Princess, and Royal Celebrity train car passengers, it appears likely our sample captured these train car passengers who spent additional time in the park upon arrival.

Visit Differences by Month across Summer Season

Analyses were conducted to determine if visitation characteristics change throughout the summer season. The percent not traveling past mile 15 within the Denali Park Road sample were relatively consistent across the months. The Bus Stop sample showed greater variability. The Train Depot showed some variability in the percent not traveling past mile 15, but results were not statistically different. Comparison of the Bike Path/Jonesville Trail location across months is difficult because of the low sample size (Table 12).

Table 12. Percent of Visits Not Past Mile 15 by Sample Location and Month.

	June		July		August		September	
	n	% < m15	n	% < m15	n	% < m15	n	% < m15
Park road								
Morning	272	60%	187	69%	253	59%	26	54%
Afternoon	249	76%	135	78%	273	77%	100	71%
Evening	204	58%	409	58%	333	59%	95	58%
Bus Stop								
Morning	69	39%	44	52%	45	58%	-	-
Afternoon**	73	52%	81	46%	72	57%	84	35%
Evening*	27	41%	- ¹	-	46	63%	9	78%
Jonesville Tail								
Morning	7	57%	20	85%	24	71%	-	-
Afternoon	27	67%	30	73%	4	100%	-	-
Evening	48	71%	19	79%	23	65%	-	-
Train Depot								
Noon train	135	80%	73	67%	97	81%	11	73%
4 pm train	67	78%	32	88%	52	85%	6	100%

¹Cancelled because of VSP.

Note, A Chi-square test was conducted comparing the % < m 15 by month for each time block within each sample location. Significant results are marked as:

* significant at $p = 0.10$

** significant at $p = 0.05$

Fall Shoulder Season

During the 2011 fall shoulder season culverts between mile 3 and mile 4 of the Denali Park Road were replaced. This resulted in the Denali Park Road being closed. Given that data gathered during this period would not represent a typical year, results are not presented. In past years the Denali Park Road has been open to Teklanika into November, so this could be a significant source of visitation.

Overall Estimate of Visits

The overall estimate of recreation visits for the 2011 season from this study was 509,921, an increase of 105,712 from the prior formula's estimate of recreation visitors of 404,209 (Table 13). One source of increase, although small, was a more accurate estimate of spring visits. Note that winter and fall visits are not included, and, thus, the survey estimate is slightly underreported. Almost all of the increase in annual visitation can be attributed to the increase in the main entrance visit estimate resulting from the new multiplier.

Table 13. Total Recreation Visits 2011 Season.

Location / Season	Visits (survey)	Visitors (PUSO)
Main entrance Spring	6,885	3,291 ¹
Talkeetna Airport day users ²	8,493	8,493
SUP McKinley Foraker ²	1,274	1,274
B/C at Talkeetna Ranger Station ²	968	968
Talkeetna Ranger Station	36,499 ³	36,793
Main entrance summer	455,802 ⁴	353,390 ⁴
Total recreation visits 2011	509,921	404,209

¹Includes winter and fall.

²From PUSO, survey not intended to estimate total use.

³Applies a double count correction factor of 0.992 to the PUSO data.

⁴Survey estimate applied the multiplier of 1.7 to total bus passengers past mile 15 of 265,707 and adds in 85 handicap permits, 284 bicycles, and 3,828 Teklanika Campground users who traveled past mile 15 but not on a bus. PUSO visitor estimate applied a multiplier of 1.33.

Discussion

Talkeetna

Double counting was prevalent when looking within a group of visitors, i.e., those who entered the park on a day fly in landing or those on overnight air taxi trips. However, these two visitor groups constitute a small percentage of all visits (26% of Talkeetna Ranger Station visits) and the resulting overestimation is of a small magnitude (.8% of Talkeetna Ranger Station visits). Survey methods to capture users at the airport were successful and could be utilized with few modifications in the future. Given the few who took a flight and went to the main entrance, sampling to estimate doubling counting could take place at the ranger station. However, if new visitor facilities are constructed (e.g., the visitor center at Curry Ridge in Denali State Park specified in Alternative C in the South Denali Implementation Plan (NPS 2006)) potential for double counting increases and it would be more critical to sample at the airport. To estimate double counting one less than the total number of sites where visitors are counted would need to be sampled. In addition, if more sites are added, the questions would need to be modified. If additional information regarding visitors is desired, sample locations within Talkeetna could be expanded to locations such as the museum.

Spring Shoulder Season

The spring shoulder season, while a relatively small percent of overall visits, represents an important visitor group. Analysis shows a higher proportion of spring visitors compared to main entrance summer peak season visitors are from Alaska (68% vs. 11.3%). In addition, improvements to the Denali Park Road (e.g., culverts) and improved snow and ice removal techniques allow the park the road to be open earlier, publicity (newspaper articles, word of mouth, guidebooks), and a slightly earlier onset of spring due to climate change (Buckley & Foushee 2011, National Park Service Alaska Regional Office n.d.) might increase Denali Park Road access and result in increased visitation during the spring shoulder season. It will be especially important to repeat this part of the study, as this was the first attempt to establish a baseline inventory of conditions. To determine if spring shoulder season visitation is steady or increasing, this study could be repeated. Survey methods to capture spring shoulder season visitors were successful and could be utilized with few modifications in the future. However, sampling should start in late March to represent the season.

Main Entrance Summer Season

Measuring visits as opposed to visitors at the main entrance area during the summer season increases the “visitor use estimate” by approximately 100,000 from the PUSO 2011 estimate of 404,209 to 509,921, a 25% increase. This puts 2011 visitation near their highest historic level. These visits, although some were found to be short, represent a use of park infrastructure. For example, an analysis of visitor characteristics revealed a group of visitors (9% of all visits) that entered and exited the park for the purpose of using the visitor center and/or the Murie Science and Learning Center. Although these trips were relatively short, averaging 2.2 hours, 62% entered in a private vehicle. Thus this represents a use of the Park Road, use of parking spaces, and implies use of other infrastructure near the visitor center such as rest rooms and trash cans. Similarly, 2.4% of visits were for the purpose of purchasing tickets for buses or making

campground reservations. These visits averaged just less than one hour and 97% entered in a private vehicle, again making use of the road and related infrastructure.

Methods for surveying during the summer season were complicated by the buses and multiple methods visitors use to exit the park (i.e., via a hotel shuttle, the TWT or DNHT tour bus, private vehicle, pedestrian or bicycle, Bike Path/Jonesville Trail or train). The initial study design, based on the 1996 study (Valdez 1997) proposed to sample all departing traffic on the Denali Park Road along with the Train Depot and the Bike Path/Jonesville Trail. While this would have simplified the logistics of sample block selection, several challenges are associated with this method:

- Finding a safe area to pull over buses.
- Even if an area to pull over buses was found, bus drivers might be resistant to pulling over and the time it takes to sample a bus would result in many private vehicles passing. Sampling on a bus requires two surveyors to board the bus, however, this makes it difficult to count traffic that passes while the bus is being sampled. Adding a third surveyor to count vehicles would add to study costs.
- Many passenger vehicles would pass by when a bus is sampled, potentially resulting in underrepresentation of that group.

In general, the survey methods were successful. Given that there was little variation in activities of the TWT and DNHT passengers, those passengers who got off the TWT and DNHT in the park where sampled at other locations, the total number of TWT and DNHT passengers are known, and weights can be created to correct summary statistics to accurately represent the population, there might not be many advantages to surveying all exiting vehicles near the junction of the Park Road and the Parks Highway.

Although it took several days to refine methods at the Park Road sample location, a functional system was implemented and surveys could be completed within two minutes. While this minimized the time required for completion it limited the amount of information that could be collected. Due to the intensive sampling effort, a longer survey of all exiting visitors would likely not be successful. Although a few visitors expressed annoyance with the survey, by far most were not only accepting, but thankful for being provided the opportunity to improve management of the park. A longer survey might not be viewed positively by visitors. The revised traffic flows associated with the Park Road sample disrupted and affected NPS staff. It is critical to communicate to staff the purpose and benefits of the study, and what to expect so as not to surprise the staff.

Park data suggests bicycle use, both in general and past mile 15, has been increasing. It is important to monitor bicycle use in future years to determine if this trend is continuing.

Fall Shoulder Season

Methods utilized during the fall shoulder were successful. However, road construction and the resulting early closure of the Denali Park Road resulted in the inability to draw conclusions from our data. Like the spring shoulder season, the fall is likely dominated by Alaskans and has the potential to see an increase in use if the season gets extended due to climate change (Buckley & Foushee 2011, National Park Service Alaska Regional Office n.d.).

Seasons not Captured

We did not sample during the winter season, thus we missed visits associated with winter activities along the Park Road (skiing, snowshoeing, dog sledding) and snowmobiling on the south side of the park.

Recommendations

Reporting Visits Rather than Visitors

Data show there is a clear pattern of particular individuals making multiple visits to the park. This should be no surprise given the lack of lodging inside the park. Also, visitors spend multiple days in the area (on average 2.4 days), resulting in the availability of more than one day for a visit to the park. Analysis of activities (reported in the accompanying report regarding visitor characteristics (Fix and Ackerman 2012) shows distinct activities engaged in on visits. For example, taking a bus trip on one day and then returning to the park on a separate day to hike on the entrance area trails or visit the Denali Visitor Center and Murie Science and Learning Center. Some visits were for the purposes of gathering information or purchasing bus tickets.

Reporting visits accurately represents the pressure on park resources. For example, if visitors drive into the park to purchase tickets or gather information they are using the Denali Park Road, requiring a parking spot, and adding to congestion in the park. Likewise when these same visitors return by private vehicle the next day to take a bus trip or engage in some other activity. Stating differently, the infrastructure is impacted by *visits* to the park made by *visitors*. Reporting visits more accurately captures the impacts to park resources than reporting visitors. In addition, analysis by visits better captures how visitors are using the park. Understanding these use patterns allows services and interpretation to be enhanced respective to how the visitor uses the park.

Sampling

The Talkeenta and shoulder season survey efforts were straightforward and other than changes to starting dates, few changes are recommended. However, the main entrance peak summer season presents more challenges. Recommendations are as follows.

- For the purposes of estimating use, sampling at the Savage River kiosk could be eliminated. The main goal of sampling this population was to estimate double counting. However, very few reported visiting the Talkeetna Ranger Station the same day (< .1%) or taking a glacier landing flight the same day (1.3%). This percentage likely will not change in the future, and double counting can be estimated through a survey in Talkeenta. However, these visitors might not be contacted at other locations (if they do not re-enter the park). If data regarding characteristics of this group are desired (although not the purview of this report), then the location should be sampled. However, the variables of interest will influence the number of blocks to be sampled. Our data showed very little variation in the number participating in other activities that take place along the road beyond mile 15 (typically less than 1 percent). As visitors participating in activities near the visitor center (e.g., hiking, visiting the kennels) can be sampled at the Bus Stop or Jonesville Trail it likely is not necessary to sample Savage River kiosk for the purpose of activities. However, while most visitors were on 2 night trips, the ratio of one to two night trips ranged from 0.08 to 0.48 and sampling should likely remain at eight days to accurately estimate this variable. In contrast, the ratio of US visitors to International visitors ranged from 0.08 to 0.31, and sampling across few days could adequately capture this variation.
- The Denali Star passengers are an important visitor segment to survey. With this segment, though, total passengers are known so estimating the total is not necessary.

Differences in visitor characteristics (e.g., taking bus, main activity, etc.) were somewhat similar across visitors and dominant characteristics did not vary by month. Thus, the number of blocks sampled at this site could be reduced. However, it should be cautioned that 13 days in which the noon and 4 p.m. train were sampled resulted in only 475 completed surveys. A strategy for this visitor segment might be to reduce the number of days but increase sampling intensity on those days. Perhaps a third survey person could be utilized. If the completed surveys could remain near 400 (with a high response rate), nine days of sampling might be adequate.

- While many of the days sampled at the Bus Stop had remarkably similar number of visitors exiting, there were several days that were radically different. A better understanding of the variation in shuttle bus passengers is needed. In addition to the number of blocks that were initially selected to be sampled (i.e., before cancellation because of the VSP and other reasons), additional blocks should be sampled at the Bus Stop. At the minimum, an additional block in the morning, afternoon and evening should be selected for June, July, and August. The Bus Stop time blocks do not need to start earlier in the morning or extend later in the evening. In addition, the Bus Stop location might have less variation within stratum if stratified by month.
- The Park Road location showed a relatively high degree of stability in traffic patterns across the three time blocks, but there was some degree of variability across time. A recommendation would be to keep the morning, afternoon and evening blocks, but to also stratify according to variance across time. This could decrease the number of blocks to be sampled at the Park Road location. In addition, the at least some sample periods should start earlier in the morning, at 8 a.m., and extend later in the evening, until 10 p.m.

Remote Counters

Remote traffic counters (e.g., infrared, pneumatic traffic counters, inductive loop counters, etc.) could be utilized to monitor visits during the shoulder seasons and at the Bike Path/Jonesville Trail during the summer. A critical aspect of using remote counters is to calibrate the counters for non-recreation visits. Our data can provide a baseline for calibration factors. However, they would need to be updated periodically.

Winter Season

Our study did not estimate use during the winter. Some locations might receive significant use during winter (e.g., snowmachine use on the southside). These locations should be studied to test assumptions used when reporting use as well as better understanding how use might be changing.

Literature Cited

- Buckley, L. B. & M. S. Foushee. 2011. Footprints of climate change in US national park visitation. *International Journal of Biometeorology*, online, available at: <http://www.springerlink.com/content/b770030681w50t6p/?MUD=MP> (accessed September 7, 2012).
- Fix, P.J., & A. Ackerman. 2012. 2011 Denali National Park visitor characteristics. NPS Technical Report.
- Levy, P. S. & S. Lemeshow. 1999. Sampling of populations: methods and application. John Wiley & Sons, New York, NY.
- Manni, M., Y. Lin, G. Vander Stoep, & S. J. Hollenhorst. 2011. Denali National Park and Preserve Visitor Study Summer 2011. Natural Resource Report NPS/NRSS/EQD/NRR—2012/524. University of Idaho, Park Studies Unit, Moscow, Idaho.
- National Park Service. 2006. Final South Denali Implementation Plan and Environmental Impact Statement, April 2006. Department of the Interior National Park Service, U.S., Denali Park, Alaska.
- National Park Service Alaska Regional Office. n.d. Alaska Region Climate Change Response Strategy. U.S. Department of the Interior, National Park Service, Alaska Regional Office. Available at: <http://www.nps.gov/akso/nature/climate/index.cfm>. (accessed September 17, 2012).
- National Park Service Office of Policy. (n.d.). Director's Orders and Related Documents. Available at: <http://home.nps.gov/applications/npspolicy/DOrders.cfm>, accessed September 7, 2012.
- National Park Service Public Use Statistics Office. n.d.. Denali National Park Public Use Counting and Reporting Instructions. Available at: <http://nature.nps.gov/stats/CountingInstructions/DENACI2010.pdf>. (accessed September 7, 2012).
- Vaske, J. J. 2008. Survey research and analysis: Applications in parks, recreation and human dimensions. Venture Publishing, State College, PA.
- Watson, A. E., D. N. Cole, D. L. Turner, & P. S. Reynolds. 2000. Wilderness recreation use estimation: a handbook of methods and systems. General Technical Report RMRS-GTR-56. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Ogden, UT.
- Valdez, S. D. 1997. Denali National Park Visitor Use Survey: 1996. US Department of the Interior, National Park Service, Public Use Statistics Program Center (WASO), Denver, CO.

Appendix A. Additional Sample Information

The study was initially designed to sample at three locations: the Denali Park Road near the post office, pulling over and surveying all exiting vehicles, including buses; the Bike Path/Jonesville Trail, surveying visitors exiting by foot or bicycle; and the Train Depot, surveying visitors exiting on the Denali Star train. The preferred method for the Denali Park Road location was to construct a temporary pull-out large enough to accommodate buses. However, constructing a temporary pull-out was not feasible, and it was decided to utilize the post office road and parking lot as an area to pull over vehicles and allow them to turn around. Discussions with Doyon/Aramark revealed that the post office sample location would not be large enough for buses to pull over and turn around. In addition, even if buses could turn around, there was concern as to whether the buses would be willing to alter their route by that degree. Thus, we added two additional locations to sample tour buses: the Denali Bus Stop near the visitor center and Savage River.











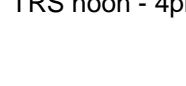












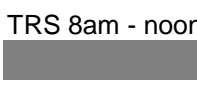








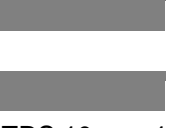















The addition of those two sampling location complicated the random assignment of blocks. However, evaluation of the methods post-study reveal sampling buses on the Park Road near the exit would not have provided additional information, and might actually have been detrimental to the study. First, data from the Savage River ranger kiosk revealed passengers on the DNHT and TWT did not participate in a wide variety of activities. For those who disembarked the bus at the Denali Visitor Center and participate in other activities, the Bus Stop or Bike Path/Jonesville Trail sample locations were a better spot to gather information from this group. Second, it is known visitors on a DHNT and TWT went past mile 15, thus it is not necessary to survey them for the purpose of the past mile 15 to not past mile 15 ratio. Third, sampling passengers on the buses requires two surveyors to be present on the bus. This would complicate tracking vehicles that pass by as passengers on buses are being sampled. Finally, sampling passengers on the buses was time consuming, which would allow many private vehicles to pass, compromising data from that group.

Appendix B. Randomly Selected Sample Dates

TALKEETNA SAMPLE


 = Sample at airport

TR = counter calibration at Ranger Station


























<u>April (10 am 6 pm)</u>		<u>May (10 am 8 pm)</u>		<u>June (10 am 8 pm)</u>		<u>July (10 am 8 pm)</u>	
1	--	1		1		1	
2	--	2	TRS noon - 3 pm	2		2	
3	--	3		3		3	
4	--	4		4		4	
5	--	5		5		5	
6	--	6		6		6	
7		7		7		7	
8		8		8		8	
9		9		9	TRS noon - 4pm	9	
10		10		10		10	TRS noon - 4pm
11		11	TRS noon - 4pm	11		11	
12		12		12		12	
13		13		13		13	
14		14		14	TRS 8am - noon	14	TRS optional
15		15		15		15	
16		16		16		16	
17		17		17		17	
18		18	TRS 8am - noon	18		18	
19		19		19		19	
20		20		20		20	
21		21		21		21	
22		22		22		22	
23		23		23		23	
24		24		24		24	
25	TRS 10am - 1 pm	25		25		25	
26		26		26		26	
27		27		27		27	
28		28		28		28	
29		29		29		29	
30		30		30		30	
		31				31	

Spring Shoulder Season Sampling Schedule

Location: Interpretive pull-out just east of the Mountain Vista Rest Area

 = sampled blocks

we = weekend

April				May			
	Day	4 hours	start time		Day	M: 10a-3p	A: 3-8p
	1	--		we	1		
	2	--			2		
	3	--			3		
	4	--			4		
	5	--			5		
	6	--			6		
	7		1 PM	we	7		
	8			we	8		
we	9				9		
we	10		2 PM		10		
	11		3 PM		11		
	12		10 AM		12		
	13		1 PM		13		
	14			we	14		
	15		3 PM	we	15		
we	16		11 AM		16		
we	17				17		
	18				18		
	19		10 AM		19		
	20		10 AM				
	21						
	22						
we	23		11 AM				
we	24		2 PM				
	25						
	26		1 PM				
	27						
	28						
	29		3 PM				
we	30		11 AM				

Main Entrance, Summer Peak Season Schedule

M = 9 a.m. to 1 p.m.

PO = Post Office

SAV = Savage River

A = 1 p.m. to 5:00 p.m.

BS = Bus Stop

JT = Bike

E = 5:00 p.m. to 9 p.m.

TD = Train Depot

Path/Jonesville Trail

May and June				June				June and July			
	M	A	E		M	A	E		M	A	E
				Su 5				Su 19		TD	JT
				M 6	BS	BS	PO	M 20	PO	JT	
				Tu 7		PO	PO	Tu 21	JT	PO	
				W 8		SAV	SAV	W 22			
				Th 9		TD	BS	Th 23		TD	BS
				F 10				F 24		SAV	SAV
				Sa 11				Sa 25	PO		
Su 29		TD	BS	Su 12	PO			Su 26			
M 30				M 13				M 27			
Tu 31	PO			Tu 14	PO	JT	JT	Tu 28	PO	PO	
W 1		BS	PO	W 15	JT	PO		W 29	BS	PO	PO
Th 2	PO	PO		Th 16				Th 30			
F 3				F 17	PO	PO		F 1		BS	PO
Sa 4		SAV	SAV	Sa 18		TD	PO	Sa 2			PO
July				July				July and August			
	M	A	E		M	A	E		M	A	E
Su 3		SAV	SAV	Su 17				Su 31			
M 4	BS	BS	PO	M 18				M 1	JT	PO	
Tu 5	JT	PO		Tu 19		SAV	SAV	Tu 2		PO	PO
W 6				W 20				W 3			
Th 7	PO	PO		Th 21		BS*	PO	Th 4		SAV	SAV
F 8	PO	JT	JT	F 22	BS*	PO*	PO	F 5	BS**	BS**	PO
Sa 9				Sa 23				Sa 6		TD	PO
Su 10		PO	PO	Su 24	PO*	PO*		Su 7	PO	PO	
M 11		TD	PO	M 25		TD*	BS*	M 8			
Tu 12				Tu 26	JT	PO		Tu 9	PO		
W 13				W 27	PO			W 10			
Th 14				Th 28	PO	JT		Th 11			
F 15	PO			F 29		TD	JT**	F 12		TD	BS
Sa 16		TD	BS	Sa 30			PO	Sa 13	PO	JT	JT

* Cancelled because of VSP

** switched to shuttle bus observation

August				August and September				September						
		M	A	E			M	A	E			M	A	E
Su	14	JT	PO		Su	28		SAV	SAV	Su	11		BS	
M	15	PO	JT		M	29	BS	BS	PO	M	12		BS	
Tu	16				Tu	30	PO	PO		Tu	13	PO		
W	17	BS	PO	PO	W	31	JT	PO		W	14			
Th	18				Th	1				Th	15		BS	BS
F	19		SAV	SAV	F	2								
Sa	20			PO	Sa	3								
Su	21		TD	BS	Su	4			PO					
M	22		TD	JT	M	5			PO					
Tu	23	PO	PO		Tu	6		PO						
W	24	PO			W	7		TD						
Th	25				Th	8								
F	26				F	9								
Sa	27		BS	PO	Sa	10			PO					

Appendix C: Survey Instruments

OMB Statement

The following language regarding the Privacy Act and Paperwork Reduction Act was printed a card and made available to respondents.

PRIVACY ACT and PAPERWORK REDUCTION ACT statement: 16 U.S.C. 1a-7 authorizes collection of this information. This information will be used by park managers to better serve the public. Response to this request is voluntary. No action may be taken against you for refusing to supply the information requested. Permanent data will be anonymous. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

Burden estimate statement: Public reporting for this form is estimated to average 4 minutes per response. Direct comments regarding the burden estimate or any other aspect of this form to: Peter Fix, 323 O'Neill, University of Alaska Fairbanks, Fairbanks, AK 99775, pjfix@alaska.edu
OMB Approval number: 1024-0224 Expiration Date: 10/30/2011

Talkeetna Airport

The protocol script, survey log, and survey for the Talkeetna Airport follow. It is important to note the survey administrator read the questions to the respondent and recorded their answers. Thus, the survey was not formatted as a self-administered survey.

Protocol for visitor survey at Talkeetna Airport

Where and When to Sample

During selected times sample at Talkeetna Air Taxi and K2 Aviation; Sheldon Air Service and Fly Denali to be determined.

- If slow rotate between the respective hangers when flights are arriving; if busy stay in one location for several hours
- Sample on back deck; morning through early evening after flight, late evening before flight
 - Do not interfere with crew operations or prevent visitors from purchasing souvenirs
- 8 hour time blocks are scheduled through April, 10 hour blocks after that
- Flights will be weather dependent
 - Talkeetna Air Taxi and possibly K2 will be in contact to let you know when flights are taking off, you will also be able to monitor the radio
 - Typically flights do occur each day, but may be scheduled into a short period of time because of weather
 - In this situation you will be “on call” (and getting paid)
 - Monitor the radio, wait for the call from TAT, etc. survey when flights are returning/departing (or head over if you hear flights)
 - Enter data and do other tasks while waiting
 - If there is a long delay, take a long (unpaid) lunch, break, etc. during the day then continue working when flights resume
- Some days there might not be any flights. You will need to determine in the a.m. if there does not appear to be a possibility of any flights going out.
 - By 10 a.m. determine, let Peter Fix know each day it happens
 - Work at TRS to calibrate counter, catch up on data entry, other tasks, take the day off?
- On days indicated, you will go to the Talkeetna Ranger Station and count visitors to calibrate the remote counter.
 - This will take place for 2 hours, for the times listed on the schedule

Administering the Survey

- Each survey pertains to a “group” and one person can answer for the entire group
- A script is provided, modify as you see fit, but be consistent, however the following are needed:
 - Make sure respondents are over 18 (but they can answer questions about minors in group)
 - Don’t forget about the OMB paperwork

- Depending on time of day ask “if they intend to enter the park entrance,” “did they enter the park entrance area,” that day
- Ask as many groups as feasible during a sampling period
- We need information on refusals
 - A log is provided, complete the log for any group that refuses
 - For those who do refuse, try to complete the nonresponse questions (see script)

Script for Talkeetna Airport

Hello, I work for the University of Alaska Fairbanks, and we are conducting a short survey for the National Park Service regarding recreation visitors to Denali. Before going further explaining the survey, are you landing on a glacier today?

If not landing on a glacier thank respondent, and end interview.

If landing on a glacier, continue...

The survey consists of seven questions. The information will be used for management, participation is voluntary, and all responses will be anonymous. Would you be willing to participate in the survey? First I need to make sure you are over 18.

If no → Would you be willing to answer two quick questions?

If yes →

1. Did you [do you plan to visit] the Talkeetna Ranger Station **today**?
2. Do you plan to go to the main entrance area and take a bus into the park **today**?

Thank you and have a great day/evening.

If no → Thank you and have a great day/evening.

If yes → Thank you.

This card contains statements from the Paperwork Reduction Act, would you like to see it?

I will read the questions and record the answers. The questions will be asked for all members of your group.

After survey is complete: Thank you and a great day/evening.

Record appropriate information in the survey log.

Talkeetna Airport Survey. (Note, font was reduced from 12 pt. to 11 pt. to facilitate this report's format.)

Denali National Park and Preserve VISITOR USE *Talkeetna Airport*

Date: _____ Time: _____ Interviewer: _____

1. Did you land / are you landing in Denali NPP today? Yes (Continue) No (End here)
2. How many people are in your group? (If obvious count and confirm with respondent) _____
3. TODAY have you, and the others in your group, visited the Talkeetna Ranger Station and/or the (north) Main Entrance area to Denali NPP OR do you plan to visit TODAY?

	Person 1	Person 2	Person 3	Person 4	Person 5	Person 6	Person 7
Talkeetna RS	Y N	Y N	Y N	Y N	Y N	Y N	Y N
North Entrance	Y N	Y N	Y N	Y N	Y N	Y N	Y N

4. Were / are you on a day trip into Denali NPP? Yes No (If no, skip to air taxi questions)

Ask the following questions regarding location, group size and length of stay

		Location (of landing)	Group size (confirm if same as above)	Length of stay (days)
Day trip				-----
<i>If not a day trip ask the following</i>				
<i>Were / are you taking an...</i>				
Air taxi to/from climbing route?	Y N			
Air taxi to/from skiing area?	Y N			
Air taxi to/from other recreation area? (describe) _____	Y N			

5. (If taking an air taxi and are NOT climbing Denali or Foraker) Did you or your guide voluntarily register your trip with NPS? Yes No

If no, how many people are in your group/immediate traveling party who did not register? _____

6. Is your group on a package tour to DENA (e.g., Princess, Holland America?) Yes No

7. What is the residential zip code of each person in your group? (or country name of origin).

P1:	P2:	P3:	P4:	P5:	P6:	P7:

Those are all of my questions. Thank you very much for taking the time to answer them. Have a great day.

Main Entrance Area Sample Locations

The protocol script, survey log, and survey for the main entrance sample locations follow. It is important to note the survey administrator read the questions to the respondent and recorded their answers. Thus, the survey was not formatted as a self-administered survey.

Protocol for visitor survey during main entrance area shoulder seasons

Where and When to Sample

- Pull-out before Mountain Vista Rest area (as you're heading into the Park)
- Follow Schedule
- 4 hour time blocks through April, 5 hour blocks in May
- Set up "survey ahead" sign about 50 ft. up the road
- Set up white UAF survey sign near vehicle
- Use stop sign to pull vehicles over
- Pull over as many vehicles as possible

Administering the Survey

- Each survey pertains to the person with the nearest birthday in the vehicle
 - Ask if everyone's activity and days in the park was the same (mark on survey)
- A script is provided, modify as you see fit, but be consistent, however the following are needed:
 - Make sure respondents are over 18 (but they can answer questions about minors in group)
 - Don't forget about the OMB paperwork
- We need information on refusals
 - A log is provided, complete the log for any group that refuses
 - For those who do refuse, try to complete the nonresponse questions (see script)

Script for visitor survey during main entrance area shoulder seasons

Hi, I work for the University of Alaska Fairbanks and we're conducting a short recreation survey for the Park Service.

Are you on a recreation visit to the park today?

If no → What is the purpose of your visit?

Thank you, have a great day. *Record information.*

If yes → continue

Would you be interested in participating?

If no → Ok, just two quick questions if you will. (Are you over 18 years old?)

What is your zip code/country of residence?

What was your main activity today?

Thank you, have a great day/afternoon/evening.

If yes → continue below

For randomization, which of you has the most recent birthday? Are you over 18 years old?

If no → Move on to next most recent birthday.

Or, if no one is of age 18 do not complete survey.

Would you like to see the Paperwork Reduction Act and Privacy Act statement?

If no → continue below

If yes → show statement and continue below

Start Questionnaire

Daily survey log, main entrance area shoulder seasons

Data Collector:
Date:
Start Time:
Location:

Skies:
Precipitation:
Road Open To:

Contact Time	Number in Vehicle	Primary Activity	Zip Code	Comments

Gov't Vehicles:
Rejections:
Drive By/Didn't Stop:
Surveys Completed:
TOTAL:

Denali National Park and Preserve

**VISITOR USE SURVEY: private vehicles, bicycles/pedestrians or small numbers
Shoulder season when buses are not running**

Do not ask the following two questions, just record the information.

Interview Location: _____ Interview Date: _____ Time: _____ Interviewer: _____

What type of vehicle?

- ____ Private Auto/Truck/Motorcycle
- ____ RV
- ____ Hotel Shuttle Van/Courtesy Bus
- ____ Tour Motor Coach
- ____ Park Tour Bus (TWS, DNHT, KE)
- ____ Bicycle/Pedestrian
- ____ Other (List):

How many people are traveling in vehicle? _____

Ask the following question in conjunction with the script.

What was the purpose of this visit into the park?

- ____ Recreation visit to the park
- ____ Professional photographer with a permit
- ____ Business (1): working NPS employees or family members residing in park, volunteers, NPS contractors, Joint Venture employees, AK Geographic employees, or NPS researchers or researcher in support of NPS mission
- ____ Business (2): Kantishna owners or Kantishna employees in transit to work, non-NPS contracted workers, non-NPS gov't employees working
- ____ Local citizen use of Post Office or NPS bldg for public meeting
- ____ Other (list):

(IF VISITOR IS NOT HERE FOR A RECREATIONAL VISIT, SAY: Thank you very much for your time that is all the information I need. I hope you enjoy your visit to the park. IF visitor is here for a recreation visit continue with script.)

Ask the following questions.

1. Is your group traveling independently, part of an organized tour, part of an education group, or other?

Independent
 Organized tour
 Education
 Other:

2. How many days is your trip to Denali? _____ # days

2a. How many nights were/will be spent camping in Denali? _____ nights

3. What was your main activity today during your Denali NP&P visit?

3a. What other activities did you participate in today?

Note, list of activities ordered differently depending for the fall and spring shoulder seasons.

<input type="checkbox"/> Sightseeing	<input type="checkbox"/> Photography
<input type="checkbox"/> Wildlife Viewing	<input type="checkbox"/> Driving along road
<input type="checkbox"/> Day hiking on trails	<input type="checkbox"/> Picnic
<input type="checkbox"/> Day hiking off trails	<input type="checkbox"/> Visit Kennels
<input type="checkbox"/> Walking along Denali Park Road	<input type="checkbox"/> Snowshoeing
<input type="checkbox"/> Bicycling	<input type="checkbox"/> Skiing/Skijoring
<input type="checkbox"/> Rock/Ice climbing	<input type="checkbox"/> Dog Mushing
<input type="checkbox"/> Camping in campgrounds	<input type="checkbox"/> Ice skating
<input type="checkbox"/> Overnight backpacking in the backcountry	
<input type="checkbox"/> Attend Murie/Denali Education Center/Alaska Geographic program	
<input type="checkbox"/> Flightseeing/Taking a scenic (only flying in the air, not touching down in the park)	
<input type="checkbox"/> Air tour/landing in park (landing in Kantishna, glacier landing)	
<input type="checkbox"/> Other:	

4. What was your turn around point on the Denali Park Road? _____

5. What is your residential zip code? (or Country (name) of origin)

6. Do you have any recommendations for how the park could improve shoulder season recreational opportunities? (facilities, designated activity locations, ranger lead activities, use of the Denali Park Road, etc.)

The script and surveys for the main entrance area summer season follow.

Script for private vehicles and small groups at the Bus Stop, Train Depot and Bike Path/Jonesville Trail

For question 1, you will only need to ask about being sampled “today” on the days in which we sample twice in one day. For people who state they were sampled today, which is likely to be a small number, you will need to find out if when they were sampled previously it was after being in the park for 1 day or more without exiting. In these situations, they are now on a new visit and you will sample them again. If this situation should occur, state “For the purposes of reporting visits, you are now on a new visit to the park, and I would like to record your information for this visit.”

Script begins here

Hello, I work for the University of Alaska Fairbanks, and we are conducting a short survey for the National Park Service regarding recreation visitors to Denali. Before going further explaining the survey, what is the purpose of your visit?

*If non-recreation visit, record information, thank respondent, and end interview.
If recreation visit, continue...*

The survey consists of seven questions. The information will be used for management, participation is voluntary, and all responses will be anonymous. Would you be willing to participate in the survey?

If no → Would you be willing to answer two quick questions? (Confirm they are 18 or older.)

If yes →

1. How many people in your vehicle took a bus trip past mile 15 today? (Record number).
2. What is your zip code (or country of residence if not from US)?

Thank you and have a great day/evening.

If no → Thank you and have a great day/evening.

If yes → Thank you. (Confirm they are 18 or older.)

This card contains statements from the Paperwork Reduction Act, would you like to see it?

After survey is complete: Thank you and a great day/evening.

Record appropriate information in the survey log.

Script for buses at the Savage River ranger kiosk:

Ask driver for permission to survey bus/van.

If driver says no → Ask if visitors are recreation visitors and if the visitors went past mile 15.

If driver gives permission to survey bus/van.

Enter bus/van.

Hello, I work for the University of Alaska Fairbanks, and we are conducting a short survey for the National Park Service regarding your visit to Denali. The survey consists of six questions. The information will be used for management, participation is voluntary, and all responses will be anonymous. I will read the questions to you and ask for a show of hands for those with “yes” responses to the questions. Only those 18 years of age or older are allowed to participate.

I have cards containing statements from the Paperwork Reduction Act, let me know if you would like to see it.

Are there any questions, if not, let’s begin.

After survey is complete: Thank you and a great day/evening.

Record appropriate information in the survey log.

Vehicle Count Form, main entrance area shoulder season and Park Road during the summer season.

Date: _____ Weather _____ Int. _____ Sign _____

<u>Recreation Visits</u>	
Personal Vehicle:	
Motorcycle:	
RV:	
P.O. (while exiting):	
Pedestrian:	
Bicycle:	
DNP Tour Bus (TWT, DNHT):	
DNP Courtesy Shuttle (SRS, RCL):	
Hotel/Tour Shuttles:	
<u>Non-Reportables</u>	
NPS employee:	
NPS Vehicle:	
JV employee:	
JV vehicle:	
AK Railroad Employee:	
AK Railroad Vehicle:	
Construction:	
Delivery (box trucks, fuel, septic, etc.):	
<u>Non-Recreation visits</u>	
Post office (only) User:	
Private citizen attending public meeting in park:	
<u>Refusals</u>	
Would not pull over:	

Bus stop sample location passenger count form.

Date: _____ Weather _____ Int. _____

Total Passengers Departing Park	
Princess:	
Chalet/Lodge:	
Grande/Bluffs:	
BC Lodge/Denali Cabins:	
Crow's Nest:	
Denali Education Center:	
Other:	
Total Buses	
Princess:	
Chalet/Lodge:	
Grande/Bluffs:	
BC Lodge/Denali Cabins:	
Crow's Nest:	
Denali Education Center:	
Other:	
Non-Reportable Visits	
Hotel/JV Employee:	
NPS Employee:	
Refusals	
Refusal:	

Train depot sample location passenger count form.

Date: _____ Weather _____ Int. _____

12 Noon Train

<u>Recreation Visits</u>	
Surveys completed:	
People covered by surveys:	
<u>Non-Reportable Visits</u>	
Hotel/JV Employee:	
NPS Employee:	
Other:	
<u>Refusals</u>	
Refusal:	

4 PM Train

<u>Recreation Visits</u>	
Surveys completed:	
People covered by surveys:	
<u>Non-Reportable Visits</u>	
Hotel/JV Employee:	
NPS Employee:	
Other:	
<u>Refusals</u>	
Refusal:	

Bike Path/Jonesville Trail sample location passenger count form.

Date: _____ Weather _____ Int. _____

<u>Recreation Visits</u>	
Pedestrians:	
Bicycle:	
Other:	
<u>Non-Reportables</u>	
Hotel/JV Employee:	
NPS Employee:	
Other:	
<u>Non-Recreation Visits</u>	
Post Office (only) User:	
Public Meeting Attendee:	
<u>Refusal</u>	
Refusal:	

Park road Survey Form

DENALI NATIONAL PARK AND PRESERVE – VISITOR USE SURVEY PARK ROAD SURVEY: private vehicles, bicycles, pedestrians

Interview Location: Park Road Interview Date: _____ Time: _____
Interviewer: _____

1. What type of vehicle?
 Private auto/truck/motorcycle Bicycle
 RV On foot (pedestrian)
 Other (*list*): _____
2. How many people are traveling in the vehicle?
 # of people
3. What was the purpose of this visit into the park?
 Recreation visit Business 2 (non NPS working)
 ProPho w/ permit Local citizen use of PO or NPS building
 Business 1 (NPS working / family) Other: _____
4. Have we sampled you today?
 No (*If no → continue to question 6*)
 Yes (*If yes next question.*)
5. Did you spend last night camping in a tent or RV in the park or did you spend last night elsewhere?
 In the park (*→continue*)
 Elsewhere (*→ stop survey*)
6. Have we sampled you twice today?
 No (*→ continue*)
 Yes (*→ stop survey*)
7. How many nights are you staying in the Denali area (20 miles north and south of the park, from Healy to McKinley Village)?
 # of Nights Local (Seasonal / Year Round).
8. On this particular visit into the park, how long have you been in the park without exiting?
 # of days or _____ hours (*use hours:minutes, e.g., 1:15, 4:30, etc.*).
9. How did you arrive into the park today? (*****MORE than 1 day-** on your 1st day?)
 Denali NP&P Train Depot Tour Motor Coach
 Park Tour Bus (TWT, DNHT, KE) Bicycle
 Private Auto/Truck/Motorcycle On foot (Pedestrian)
 Hotel Shuttle Van/Courtesy Bus Other (*list*): _____

10. **LESS than 1 day** - Did you or are you planning to ride a bus ride past Savage River/Mile 15, drive to the Teklanika campground, or bike past Savage River/Mile 15 today?
 Yes No # of people Total # of times riding a bus during trip
11. **LESS than 1 day** - Which bus(es) did you take or are you planning on taking today?
 NPS VTS Bus (Green) Denali Natural History Tour (Brown)
 Kantishna Experience (Green) Kantishna Lodge Bus
 Tundra Wilderness Tour (Brown) Teklanika Bus Pass (Private Vehicle)
 Doesn't Know Other (list):
12. **LESS than 1 day** - Did you visit, or are you going to visit, the Talkeetna Ranger station today?
 Yes No
13. **LESS than 1 day** - Did you take a flight, or are you going to take a flight, that landed on a glacier in the park today (Fly Denali, Talkeetna Air Taxi, K2, Sheldon Air)?
 Yes No
14. **MORE than 1 day** – During this visit, how many days did you ride a bus ride past Savage River/Mile 15, drive to the Teklanika campground, and bike past Savage River/Mile 15?
 # days crossed Savage River # of people Total # of times riding a bus during trip
15. **MORE than 1 day** - Which bus(es) did you take?
 NPS VTS Bus (Green) Denali Natural History Tour (Brown)
 Kantishna Experience (Green) Kantishna Lodge Bus
 Tundra Wilderness Tour (Brown) Teklanika Bus Pass (Private Vehicle)
 Doesn't Know Other (list):
16. **MORE than 1 day** - On your first day in the park did you visit the Talkeetna Ranger Station?
 Yes No
17. **MORE than 1 day** - Again, on the first day in the park did you take a flight that landed on a glacier in the park (Fly Denali, Talkeetna Air Taxi, K2, Sheldon Air)?
 Yes No
18. What was your main activity today (***)**MORE than 1 day** – on their entire visit)?

19. What other activities did you participate in today (****MORE than 1 day** – on their entire visit)?

- Sightseeing/Wildlife Viewing on a Bus
- Sightseeing/Wildlife Viewing in a Personal Vehicle
- Photography
- Day Hiked
 - Trails - Entrance Area (Savage to Parks Highway)
 - Trails – Past Savage Box
 - Off Trail
 - On Road
- Overnight Hiking and Backpacking in the Backcountry
- Camping in Campgrounds
- Bicycling Biked past Savage River/Mile 15 Mile biked to
- Visit Kennels
- Attend Murie/Denali Education Center/Alaska Geographic program
- Flightseeing/Scenic Flight (only flying in the air, not touching down in the park)
- Other (list):

20. What is your ZIP code (or Country of residence)?

21. Any recommendations for improving the park's recreational opportunities during the summer?

Bus Stop Survey Form

DENALI NATIONAL PARK AND PRESERVE – VISITOR USE SURVEY

BUS DEPOT: individuals and groups boarding buses

Interview Location: DVC Bus Stop Interview Date: _____ Time: _____
Interviewer: _____

1. What bus are you taking, where are you heading?
2. How many people are traveling in the group?
_____ # of People
3. What was the purpose of this visit into the park?
_____ Recreation visit
_____ ProPho w/ permit
_____ Business 1 (NPS working / family)
_____ Business 2 (non NPS working)
_____ Local citizen use of PO or NPS building
_____ Other:
4. Have we sampled you today?
_____ No (→ *continue to question 6*)
_____ Yes (→ *go to next question.*)
5. Did you spend last night camping in a tent or RV in the park or did you spend last night elsewhere?
_____ In the park (→ *continue*)
_____ Elsewhere (→ *stop survey*)
6. Have we sampled you twice today?
_____ No (→ *continue*)
_____ Yes (→ *stop survey*)
7. How many nights are you staying in the Denali area (20 miles north and south of the park, from Healy to McKinley Village)?
_____ # of Nights _____ Local (Seasonal /Year Round).
8. On this particular visit into the park, how long have you been in the park without exiting?
_____ # of Days or _____ hours (*use hours:minutes, e.g., 1:15, 4:30, etc.*).
9. How did you arrive into the park today? (*****MORE than 1 day-** on your 1st day?)
_____ Denali NP&P Train Depot
_____ Park Tour Bus (TWT, DNHT, KE)
_____ Private Auto/Truck/Motorcycle
_____ Hotel Shuttle Van/Courtesy Bus
_____ Tour Motor Coach
_____ Bicycle
_____ On foot (Pedestrian)
_____ Other (list):

10. **LESS than 1 day** - Did you or are you planning to ride a bus ride past Savage River/Mile 15, drive to the Teklanika campground, or bike past the Savage River/Mile 15 today?
 Yes No # of people Total 3 of times riding a bus during trip
11. **LESS than 1 day** - Which bus(es) did you take or are you planning on taking today?
 NPS VTS Bus (Green) Denali Natural History Tour (Brown)
 Kantishna Experience (Green) Kantishna Lodge Bus
 Tundra Wilderness Tour (Brown) Teklanika Bus Pass (Private Vehicle)
 Doesn't Know Other (list):
12. **LESS than 1 day** - Did you visit, or are you going to visit, the Talkeetna Ranger station today?
 Yes No
13. **LESS than 1 day** - Did you take a flight, or are you going to take a flight, that landed on a glacier in the park today (Fly Denali, Talkeetna Air Taxi, K2, Sheldon Air)?
 Yes No
14. **MORE than 1 day** - During this visit, how many days did you ride a bus ride past Savage River/Mile 15, drive to the Teklanika campground, and bike past Savage River/Mile 15?
 # days crossed Savage River # of people Total # of times riding a bus during trip
15. **MORE than 1 day** - Which bus(es) did you take?
 NPS VTS Bus (Green) Denali Natural History Tour (Brown)
 Kantishna Experience (Green) Kantishna Lodge Bus
 Tundra Wilderness Tour (Brown) Teklanika Bus Pass (Private Vehicle)
 Doesn't Know Other (list):
16. **MORE than 1 day** - On your first day in the park did you visit the Talkeetna Ranger Station?
 Yes No
17. **MORE than 1 day** - Again, on the first day in the park did you take a flight that landed on a glacier in the park (Fly Denali, Talkeetna Air Taxi, K2, Sheldon Air)?
 Yes No
18. What was your main activity today (****MORE than 1 day** – on their entire visit)?

19. What other activities did you participate in today (****MORE than 1 day** – on their entire visit)?

- Sightseeing/Wildlife Viewing on a Bus
- Sightseeing/Wildlife Viewing in a Personal Vehicle
- Photography
- Day Hiked
 - Trails - Entrance Area (Savage to Parks Highway)
 - Trails – Past Savage Box
 - Off Trail
 - On Road
- Overnight Hiking and Backpacking in the Backcountry
- Camping in Campgrounds
- Bicycling
- Visit Kennels
- Attend Murie/Denali Education Center/Alaska Geographic program
- Flightseeing/Scenic Flight (only flying in the air, not touching down in the park)
- Other (list):

20. What is your ZIP code (or Country of residence)?

21. Any recommendations for improving the park’s recreational opportunities during the summer?

Train Depot Survey Form

DENALI NATIONAL PARK AND PRESERVE – VISITOR USE SURVEY

TRAIN DEPOT SURVEY: individuals and groups boarding the Denali Star train

Interview Location: Train Depot Interview Date: _____ Time: _____
Interviewer: _____

1. How many people are in your group?
____ # of People
2. What was the purpose of this visit into the park?

____ Recreation visit	____ Business 2 (non NPS working)
____ ProPho w/ permit	____ Local citizen use of PO or NPS building
____ Business 1 (NPS working / family)	____ Other:
3. Have we sampled you today?
____ No (*If no → continue to question 6*)
____ Yes (*If yes next question.*)
4. Did you spend last night camping in a tent or RV in the park or did you spend last night elsewhere?
____ In the park (*→continue*)
____ Elsewhere (*→ stop survey*)
5. Have we sampled you twice today?
____ No (*→ continue*)
____ Yes (*→ stop survey*)
6. How many nights are you staying in the Denali area (20 miles north and south of the park, from Healy to McKinley Village)?
____ # of Nights ____ Local (Seasonal / Year Round).
7. On this particular visit into the park, how long have you been in the park without exiting?
____ # of days or _____ hours (*use hours:minutes, e.g., 1:15, 4:30, etc.*).
8. How did you arrive into the park today? (****MORE than 1 day**- on your 1st day?)

____ Denali NP&P Train Depot	____ Tour Motor Coach
____ Park Tour Bus (TWT, DNHT, KE)	____ Bicycle
____ Private Auto/Truck/Motorcycle	____ On foot (Pedestrian)
____ Hotel Shuttle Van/Courtesy Bus	____ Other (list):
9. **LESS than 1 day** - Did you ride a bus ride past Savage River/Mile 15, drive to the Teklanika campground, or bike past Savage River/Mile 15 today?
____ Yes ____ No ____ # of people ____ Total # of times riding a bus during trip

10. **LESS than 1 day** - Which bus(es) did you take today?

- | | |
|---|---|
| <input type="checkbox"/> NPS VTS Bus (Green) | <input type="checkbox"/> Denali Natural History Tour (Brown) |
| <input type="checkbox"/> Kantishna Experience (Green) | <input type="checkbox"/> Kantishna Lodge Bus |
| <input type="checkbox"/> Tundra Wilderness Tour (Brown) | <input type="checkbox"/> Teklanika Bus Pass (Private Vehicle) |
| <input type="checkbox"/> Doesn't Know | <input type="checkbox"/> Other (list): |

11. **LESS than 1 day** - Did you visit, or are you going to visit, the Talkeetna Ranger station today?

- Yes No

12. **LESS than 1 day** - Did you take a flight, or are you going to take a flight, that landed on a glacier in the park today (Fly Denali, Talkeetna Air Taxi, K2, Sheldon Air)?

- Yes No

13. **MORE than 1 day** – During this visit, how many days did you take a bus trip past Savage River/Mile 15, drive to Teklanika campground, and bike past Savage River/Mile 15?

- # days crossed Savage River # of people Total # of times riding a bus during trip

14. **MORE than 1 day** - Which bus(es) did you take?

- | | |
|---|---|
| <input type="checkbox"/> NPS VTS Bus (Green) | <input type="checkbox"/> Denali Natural History Tour (Brown) |
| <input type="checkbox"/> Kantishna Experience (Green) | <input type="checkbox"/> Kantishna Lodge Bus |
| <input type="checkbox"/> Tundra Wilderness Tour (Brown) | <input type="checkbox"/> Teklanika Bus Pass (Private Vehicle) |
| <input type="checkbox"/> Doesn't Know | <input type="checkbox"/> Other (list): |

15. **MORE than 1 day** - On your first day in the park did you visit the Talkeetna Ranger Station?

- Yes No

16. **MORE than 1 day** - Again, on the first day in the park did you take a flight that landed on a glacier in the park (Fly Denali, Talkeetna Air Taxi, K2, Sheldon Air)?

- Yes No

17. What was your main activity today (****MORE than 1 day** – on their entire visit)?

18. What other activities did you participate in today (****MORE than 1 day** – on their entire visit)?

- Sightseeing/Wildlife Viewing on a Bus
- Sightseeing/Wildlife Viewing in a Personal Vehicle
- Photography
- Day Hiked
 - Trails - Entrance Area (Savage to Parks Highway)
 - Trails – Past Savage Box
 - Off Trail
 - On Road
- Overnight Hiking and Backpacking in the Backcountry
- Camping in Campgrounds
- Bicycling Biked past Savage River/Mile 15 Mile biked to
- Visit Kennels
- Attend Murie/Denali Education Center/Alaska Geographic program
- Flightseeing/Scenic Flight (only flying in the air, not touching down in the park)
- Other (list):

19. What is your ZIP code (or Country of residence)?

20. Any recommendations for improving the park’s recreational opportunities during the summer?

Bike Path/Jonesville Trail Survey Form

DENALI NATIONAL PARK AND PRESERVE – VISITOR USE SURVEY

BIKE PATH/JONESVILLE TRAIL SURVEY: bicyclists/pedestrians

Interview Location: Bike Path/Jonesville Trail Interview Date: _____ Time: _____
Interviewer: _____

1. What type of vehicle?
 On foot (Pedestrian) Bicycle Other (list):
2. How many people are traveling in the group?
 # of People
3. What was the purpose of this visit into the park?
 Recreation visit Business 2 (non NPS working)
 ProPho w/ permit Local citizen use of PO or NPS building
 Business 1 (NPS working / family) Other:
4. Have we sampled you today?
 No (*If no → continue survey.*)
 Yes (*If yes next question.*)
5. Did you spend last night camping in a tent or RV in the park or did you spend last night elsewhere?
 In the park (*→continue*)
 Elsewhere (*→ stop survey*)
6. Have we sampled you twice today?
 No (*→ continue*)
 Yes (*→ stop survey*)
7. How many nights are you staying in the Denali area (20 miles north and south of the park, from Healy to McKinley Village)?
 # of Nights Local (Seasonal / Year Round).
8. On this particular visit into the park, how long have you been in the park without exiting?
 # of Days or _____ hours (*use hours:minutes, e.g., 1:15, 4:30, etc.*).
9. How did you arrive into the park today? (*****MORE than 1 day-** on your 1st day?)
 Denali NP&P Train Depot Tour Motor Coach
 Park Tour Bus (TWT, DNHT, KE) Bicycle
 Private Auto/Truck/Motorcycle On foot (Pedestrian)
 Hotel Shuttle Van/Courtesy Bus Other (list):

10. **LESS than 1 day** - Did you or are you planning to ride a bus ride past Savage River/Mile 15, drive to the Teklanika campground, or bike past Savage River/Mile 15 today?
 Yes No # of people Total # of times riding a bus during trip
11. **LESS than 1 day** - Which bus(es) did you take or are you planning on taking today?
 NPS VTS Bus (Green) Denali Natural History Tour (Brown)
 Kantishna Experience (Green) Kantishna Lodge Bus
 Tundra Wilderness Tour (Brown) Teklanika Bus Pass (Private Vehicle)
 Doesn't Know Other (list):
12. **LESS than 1 day** - Did you visit, or are you going to visit, the Talkeetna Ranger station today?
 Yes No
13. **LESS than 1 day** - Did you take a flight, or are you going to take a flight, that landed on a glacier in the park today (Fly Denali, Talkeetna Air Taxi, K2, Sheldon Air)?
 Yes No
14. **MORE than 1 day** - During this visit, how many days did you ride a bus ride past Savage River/Mile 15, drive to the Teklanika campground, and bike past Savage River/Mile 15?
 # days crossed Savage River # of people Total # of times riding a bus during trip
15. **MORE than 1 day** - Which bus(es) did you take?
 NPS VTS Bus (Green) Denali Natural History Tour (Brown)
 Kantishna Experience (Green) Kantishna Lodge Bus
 Tundra Wilderness Tour (Brown) Teklanika Bus Pass (Private Vehicle)
 Doesn't Know Other (list):
16. **MORE than 1 day** - On your first day in the park did you visit the Talkeetna Ranger Station?
 Yes No
17. **MORE than 1 day** - Again, on the first day in the park did you take a flight that landed on a glacier in the park (Fly Denali, Talkeetna Air Taxi, K2, Sheldon Air)?
 Yes No
18. What was your main activity today (***)**MORE than 1 day** – on their entire visit)?

19. What other activities did you participate in today (****MORE than 1 day** – on their entire visit)?

- Sightseeing/Wildlife Viewing on a Bus
- Sightseeing/Wildlife Viewing in a Personal Vehicle
- Photography
- Day Hiked
 - Trails - Entrance Area (Savage to Parks Highway)
 - Trails – Past Savage Box
 - Off Trail
 - On Road
- Overnight Hiking and Backpacking in the Backcountry
- Camping in Campgrounds
- Bicycling
- Visit Kennels
- Attend Murie/Denali Education Center/Alaska Geographic program
- Flightseeing/Scenic Flight (only flying in the air, not touching down in the park)
- Other (list):

20. What is your ZIP code (or Country of residence)?

21. Any recommendations for improving the park’s recreational opportunities during the summer?

Savage River ranger kiosk survey form

DENALI NATIONAL PARK AND PRESERVE – VISITOR USE SURVEY

SAVAGE Ranger Kiosk: tour buses

Location: Savage Box Interview Date: _____ Time: _____
Interviewer: _____

1. What type of bus?
 Tundra Wilderness Tour (TWT-Tan)
 Denali Natural History Tour (DNHT-Tan)
 Kantishna Experience (KE-Green)
2. How many people are on the bus? (*Ask driver, or count if the driver does not know*)
 # of Passengers
3. These questions are only for visitors recreating in Denali NP&P. Please raise your hand if you are an NPS or concessionaire employee, or you are in the park for business.
 # of Non-Recreation Visitors

For those non-recreation visitors please don't answer the following questions.

4. Please raise your hand if you camped in the park last night.
 # of people
5. By a show of hands who is staying in the Denali area, which is from Healy, to the north, and McKinley Village Chalet to the south, for:
 Day Trip (0 nights)
 1 night
 2 nights
 3 nights
 More than 3 Nights
 Local (Lives in the Area)
6. Please raise your hand if you arrived in Denali today by train, at the Denali Park Train Depot. This does not include the Talkeetna train depot. *****CAMPERS- 1st day in park.**
 # of People
7. Please raise your hand if you visited the Talkeetna Ranger Station today, or are going to visit it today. That's today only. *****CAMPERS- 1st day in park.**
 # of People

8. Please raise your hand if you took a flight, or are you going to take a flight, that landed on a glacier in the park today (Fly Denali, Talkeetna Air Taxi, K2, Sheldon Air. Again, that's today only.

*****CAMPERS- 1st day in park.**

___ # of People

9. Please raise your hand if you ___ today in the Park.

___ Drove to Mile 15 in Personal Vehicle

Day Hiked

___ Trails - Entrance Area (Savage to Parks Highway)

___ Trails – Past Savage Box

___ Off Trail

___ On Road

___ Biked

___ Visited the Kennels

___ Attend a Murie/Denali Education Center/Alaska Geographic program

___ Flightseeing/Scenic Flight (only flying in the air, not touching down in the park)

___ Other (list):

10. Please raise your hand if you're:

___ A Local (Nenana to Cantwell (Healey, McKinley Village, Cantwell, Clear, Nenana)

___ From Alaska (but Not a Local)

___ American/Residing in the US (non-Alaskan)

___ Foreigner (Including Canada)

Appendix D. Additional Confidence Interval Information

Nine-five percent confidence interval for percent not traveling past mile 15 by time block.

Table 1d. 95% Confidence Interval for Percent Not Traveling Past Mile 15, by Time Block.

	n	95% CI (50/50) ¹
Post Office		
Morning	783	3.5%
Afternoon	757	3.6%
Evening	1,041	3.0%
Bus Stop		
Morning	158	7.8%
Afternoon	310	5.5%
Evening	86	10.5%
Jonesville Trail		
Morning	51	13.6%
Afternoon	61	12.5%
Evening	90	10.2%
Train Depot		
Noon Train	317	5.5%
4 PM Train	158	7.7%
Total	3812	1.6%

¹Calculated assuming a 50/50 split of those who went past mile 15 versus not. A finite population correction factor was applied for the Bus Stop and Bike Path/Jonesville Trail samples.

Outliers and Their Influence on the Confidence Interval

For the Park Road there are a few days in which visitation does appear to be lower than the range of the majority of days. These days tended to be associated with the tail ends of the season. For the morning time block, May 31, June 2, and September 13 had low visitation; during the afternoon time block June 2 and September 6 had low visitation, and June 1 and September 10 exhibited low visitation during the evening time blocks (Tables 4d-6d). Removing these dates results in a small decrease in the confidence interval (Table 2d).

For the Bus Stop, total passengers on 13 of the 18 days fall with the range of 118 to 168, with a standard deviation of 16.5. A time block on August 17, August 27, September 12, and two blocks on Sept 15 (afternoon and evening) have total passengers of 39, 61, 60, 88, and 20, respectively (Table 7d). The August 17 is a Wednesday, a transition day for Princess in which there are few Princess visitors present in the morning. However, other Wednesday mornings sampled still fall within the range of the other sampled days. August 27 is a Saturday, also a transition day for Princess, but we have no other Saturday Bus Stop samples to compare. The September days are likely influenced by the end of the season. Regardless of why these days had so many fewer Bus Stop users than the others, the standard deviation increased to 43.8 with their inclusion. The 90% confidence intervals without those dates would decrease by 66%, 34%, and 89%, for the morning, afternoon, and evening, respectively (Table 2d).

The Jonesville Trail had one date during the morning with low visitation (August 11), two dates in August (the 13th and 15th) with low visitation during the afternoon, and during the evening

June 19 exhibited high visitation (Table 8d). The 90% confidence intervals without those dates would decrease by 3%, 68%, and 53% for the morning, afternoon, and evening, respectively (Table 2d).

Treatment of Outliers

No adjustments for the Park Road data or stratification in future surveys (i.e., stratify by time or month) is recommended.

It is not surprising the evening September 15th bus depot was low, as this was the last day the hotel shuttles were running. This day perhaps should have been excluded from the sample. The Wednesdays and Saturdays could represent systematic fluctuations due to Princess' schedule, or random fluctuations in the data. However, more information is needed to determine which situation is the cause of those low numbers.

Table 2d. 90% Confidence Intervals with Outliers Removed.

	Blocks sampled (n)	Ave visits per block	Total visits (X')²	90% CI outliers removed	90% CI with outliers	% decrease
Park Road						
Morning	17	416	44,479	± 3,830	± 4,200	9%
Afternoon	16	708	75,728	± 7,364	± 8,029	8%
Evening	21	935	100,035	± 7,905	± 9,341	15%
Bus Stop						
Morning	4	144	15,435	± 1,272	± 3,748	66%
Afternoon	6	141	15,034	± 1,486	± 2,246	34%
Evening	3	131	14,053	± 552	± 4,822	89%
Jonesville Trail						
Morning	5	20	2161	502	± 518	3%
Afternoon	4	31	3,290	± 294	± 931	68%
Evening	4	37	3,986	± 685	± 1,465	53%
Total ¹			274,201	± 23,890	± 35,300	32%

¹In all cases but one the outliers were associated with lower visitation, thus the total visits associated with these locations increased. The percent decreases column compares the absolute value of the confidence intervals. This does not account for the fact that the narrower confidence intervals are also for increased visits, further reducing their relative size.

Stratification

The assumption was that time blocks (i.e., morning, afternoon, and evening) would have similar traffic flows and, therefore, should be the units for stratification. This appeared to be true for the Denali Park Road and Bike Path/Jonesville Trail; the Bus Stop appeared to be more similar within months than within time blocks, with 90% confidence intervals within 7.3%, 6.4%, 22.2%, and 31.4% of total visits for June, July, August and September, respectively (Table 3c). Removing two outliers in August and one in September reduced the confidence intervals to within 7.3% and 23.1% of total visits, respectively.

Table 3d. 90% Confidence Interval for Bus Stop, Stratified by Month.

	Blocks sampled (n)	Ave visits per block	Total visits (X')²	90% CI
With outliers				
June	5	133	11,952	± 948
July	3	157	14,570	± 1,000
August	6	110	10,261	± 2,926
September	4	72	3,218	1,474
Without outliers				
August	4	141	13,067	± 1,027
September	3	89	3,990	± 1,198

The use recorded and extrapolation to total visits follows.

Table 4d. Completed Surveys and Total Visits Per Day at the Park Road Sample Location, Morning time Block.

Park Road Morning Time Block				
Date	Surveys Completed	Total Recreation Vehicles	Persons Per Vehicle	Total Visits
Tuesday, May 31, 2011	28	88	2.43	214
Thursday, June 02, 2011	31	79	2.55	201
Sunday, June 12, 2011	51	155	2.49	386
Tuesday, June 14, 2011	39	123	2.59	319
Friday, June 17, 2011	38	137	2.53	346
Saturday, June 25, 2011	41	166	3.27	543
Tuesday, June 28, 2011	44	141	2.36	333
Thursday, July 07, 2011	44	201	3.05	612
Friday, July 08, 2011	36	165	2.78	458
Friday, July 15, 2011	37	180	2.59	467
Wednesday, July 27, 2011	39	190	2.90	551
Thursday, July 28, 2011	31	130	3.19	415
Tuesday, August 02, 2011	40	165	2.58	425
Sunday, August 07, 2011	35	176	2.94	518
Saturday, August 13, 2011	41	153	2.68	410
Monday, August 15, 2011	33	111	2.70	299
Tuesday, August 23, 2011	42	131	2.81	368
Wednesday, August 24, 2011	40	142	2.50	355
Tuesday, August 30, 2011	22	125	2.09	261
Tuesday, September 13, 2011	26	90	2.23	201
		2848	AVE	384
			VAR	14008
			SD	118

Table 5d. Completed Surveys and Total Visits Per Day at the Park Road Sample Location, Afternoon Time Block.

Park Road Afternoon Time Block

Date	Surveys Completed	Total Recreation Vehicles	Persons Per Vehicle	Total Visits
Thursday, June 02, 2011	41	140	2.54	355
Friday, June 17, 2011	57	283	2.44	690
Tuesday, June 21, 2011	60	274	2.85	781
Tuesday, June 28, 2011	39	244	2.56	626
Wednesday, June 29, 2011	52	264	2.38	630
Tuesday, July 05, 2011	48	351	2.96	1038
Thursday, July 07, 2011	48	332	2.73	906
Tuesday, July 26, 2011	39	261	3.10	810
Monday, August 01, 2011	40	286	2.60	744
Tuesday, August 02, 2011	38	246	3.00	738
Sunday, August 14, 2011	39	218	2.72	593
Wednesday, August 17, 2011	40	196	2.65	519
Tuesday, August 23, 2011	37	247	2.84	701
Tuesday, August 30, 2011	43	171	2.40	410
Wednesday, August 31, 2011	36	168	2.67	448
Monday, September 05, 2011	58	350	2.81	984
Tuesday, September 06, 2011	42	166	2.21	368
			AVE	667
			VAR	42054
			SD	205

Table 6d. Completed Surveys and Total Visits Per Day at the Park Road Sample Location, Evening Time Block.

Park Road Evening Time Block				
Date	Surveys Completed	Total Recreation Vehicles	Persons Per Vehicle	Total Visits
Wednesday, June 01, 2011	30	119	2.60	309
Monday, June 06, 2011	47	196	2.85	559
Tuesday, June 07, 2011	34	188	2.44	459
Saturday, June 18, 2011	49	353	2.88	1016
Wednesday, June 29, 2011	44	379	2.61	991
Friday, July 01, 2011	65	312	2.88	898
Saturday, July 02, 2011	60	521	2.90	1511
Monday, July 04, 2011	62	376	2.95	1110
Sunday, July 10, 2011	50	372	2.70	1004
Monday, July 11, 2011	63	323	2.82	912
Thursday, July 21, 2011	57	340	3.23	1098
Saturday, July 30, 2011	52	287	2.75	789
Tuesday, August 02, 2011	50	340	2.76	938
Friday, August 05, 2011	36	305	2.97	907
Saturday, August 06, 2011	57	385	2.96	1141
Wednesday, August 17, 2011	57	306	2.82	864
Saturday, August 20, 2011	47	340	2.70	919
Saturday, August 27, 2011	34	322	2.47	796
Monday, August 29, 2011	52	317	2.27	719
Sunday, September 04, 2011	57	428	2.65	1134
Saturday, September 10, 2011	38	234	2.16	505
			AVE	885
			VAR	73579
			SD	271.2545

Table 7d. Completed Surveys and Total Visits Per Day at the Bus Stop Sample Location.

Bus Stop Sample		
Date	Surveys Completed	Total Passengers
Morning time block		
Monday, June 06, 2011	45	157
Wednesday, June 29, 2011	24	131
Monday, July 04, 2011	44	157
Wednesday, August 17, 2011	15	39
Monday, August 29, 2011	30	132
	AVE	123.2
	STDEV	48.8
Afternoon time block		
Wednesday, June 01, 2011	36	118
Monday, June 06, 2011	37	133
Friday, July 01, 2011	46	145
Monday, July 04, 2011	35	168
Saturday, August 27, 2011	26	61
Monday, August 29, 2011	46	161
Sunday, September 11, 2011	39	118
Monday, September 12, 2011	17	60
Thursday, September 15, 2011	28	88
	AVE	116.9
	STDEV	40.0
Evening time block		
Thursday, June 09, 2011	27	125
Friday, August 12, 2011	25	134
Sunday, August 21, 2011	25	135
Thursday, September 15, 2011	9	20
	AVE	103.5
	STDEV	55.8

Table 8d. Completed Surveys and Total Visits Per Day at the Jonesville Trail Sample Location.

Bike Path/Jonesville Trail Sample	
Date	Total Pedestrians
Morning time block	
Tuesday, June 21, 2011	12
Tuesday, July 05, 2011	29
Tuesday, July 26, 2011	19
Monday, August 01, 2011	24
Sunday, August 14, 2011	9
Wednesday, August 31, 2011	17
AVE	18.33333
STDEV	7.420692
Afternoon time block	
Tuesday, June 14, 2011	26
Monday, June 20, 2011	31
Friday, July 08, 2011	34
Thursday, July 28, 2011	32
Saturday, August 13, 2011	7
Monday, August 15, 2011	4
AVE	22.33333
STDEV	13.33667
Evening time block	
Tuesday, June 14, 2011	44
Sunday, June 19, 2011	77
Friday, July 08, 2011	43
Saturday, August 13, 2011	27
Monday, August 22, 2011	35
AVE	45.2
STDEV	19.05781

For future iterations of the survey, an alternative possibility for sampling is to combine all blocks into one estimate of use. The confidence interval decreased when the morning, afternoon, and evening time blocks were combined (Tables 9d-10d). However, the estimate of VTS ridership was further from the actual number, decreasing to 60,320, compared to the estimate by time block of 60,808.

Table 9d. 90% Confidence Interval for Total Visits, Combining Time Blocks.

	Blocks sampled (n)	Total Blocks (N)	Ave visits per block¹	Total visits (X')²	90% CI
Post Office	58	321	648	208,090	± 18,591
Bus Stop	18	321	116	37,129	± 5,292
Bike Path/ Jonesville Trail	17	321	28	8,875	± 2,169

Table 10d. 95% Confidence Interval for Proportion Past Mile 15, Combining Time Blocks.

	n	95% CI¹
Post Office	2581	1.9%
Bus Stop	554	4.2%
Bike Path/Jonesville Trail	202	6.9%
Train Depot	475	4.5%

¹Calculated assuming a 50/50 split of those who went past mile 15 versus not.

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

NPS 184/117710, November 2012

National Park Service
U.S. Department of the Interior



Natural Resource Stewardship and Science

1201 Oakridge Drive, Suite 150
Fort Collins, CO 80525

www.nature.nps.gov

EXPERIENCE YOUR AMERICA™