National Park Service
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Denali National Park and Preserve

Denali National Park and Preserve Spring Visitor Use

Spring Visitor Experience Survey and Road Ecology Collaborative Study

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ON THE COVER

A cyclist enjoys a desolate gravel road through spruce forest.
NPS photo.

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Executive Summary

Recent, persistent increases to visitation in Denali National Park and Preserve (hereafter, DENA) in the shoulder season prompted a collaborative study of spring visitors and associated effects on wildlife. In fact, compared to 2018, visitation was 10% higher in March, 8% higher in April, and 18% higher in May 2019. This increase in visitation necessitates a better understanding of visitor motivation for visiting the park, visitor recreation and its effect on wildlife and facility resources, and visitor needs and expectations during the shoulder season. Understanding conditions of visitation beyond visitor counts prepares management to mitigate pressures or changes associated with the season when park staffing is reduced and to encourage expectation-setting for a more diverse visitorship. This study follows the 2017–2018 winter visitation study, which addressed off-season visitation dynamics in relation to the early road opening, but is the first study to specifically analyze spring visitation and incorporate bicycle-based wildlife observations.

Demographics of Spring Visitors

1. Survey respondents were young (mode, M = 30), highly educated (69% had a bachelor's degree or greater), and independent (not reliant on commercial guiding or tours).

2. The majority of survey respondents were domestic visitors (87%). The greatest percentage of domestic respondents came from Alaska (38%). International visitors accounted for 13% of respondents of which 3% were from Canada.

Trip Characteristics

3. Nearly all survey respondents (92%) planned to stop in DENA; slightly higher than the 88% of winter survey respondents that planned to stop.

4. Most respondents traveled in small groups (average group size = 2.7 people) and the majority were in family groups (55%) or friend groups (22%).

5. Spring season attracts more repeat-visitors compared to other seasons. First-time visitors comprised only 60% of respondents, compared to 85% in summer and 76% in winter.

6. Respondents primarily drove the Park Road (91%), visited the visitor center (68%) or hiked on trails (66%) during their visit to DENA.

7. More than half (57%) listed driving as their primary activity and 21% listed hiking on trails as their primary activity. International respondents more frequently listed hiking as their primary activity (45%) than driving (40%).

8. A higher percentage of Alaskan respondents reported biking as a primary activity than any others.

Trip Motivations

9. Spring was the preferred by 60% of respondents who had visited DENA during both the spring and summer. Preference for spring was due to “lack of crowds”, cooler temperatures, fewer insects, and the presence of snow.

10. The majority of respondents (77%) expressed that encountering a large group would impact them negatively.

11. Visitors identified their needs of “access,” “good weather,” and “sightseeing” opportunities most frequently when considering the quality of their experience during the spring season.

Visitor Experience

12. Most respondents would possibly participate in guided off-trail hiking (74%), bike rentals (72%), and other services (71%), such as “snowshoeing trips” or “family-friendly options with kids.” Respondents were least likely to participation in outdoor gear rentals (61%), shuttle bus service to Teklanika (61%), and narrated bus tour to Teklanika (60%).

13. Activities with rangers (58%), access to Savage, Sanctuary or Teklanika campgrounds (52%), and food and beverage for purchase (48%) were the most often cited services that would contribute to an improved experience.

Vehicle- and Bicycle-based Wildlife Observations

14. The majority of animal behaviors to road-based stimuli were categorized as neutral (73%). However, wildlife were 3.5 times more likely to disperse from the road when negative behavioral responses were observed.

15. Bear wildlife viewing opportunities were the most crowded by vehicles of the target species with an average of five vehicles present.

16. Visitor behavior around wildlife differed on the open compared to the closed portion of the Park Road. Visitors frequently approached wildlife on foot or crowded wildlife with their vehicles on the open portion of the road, whereas visitors rarely approached or were loud around wildlife during wildlife events on the closed portion. Very few visitors were observed practicing wildlife safety precautions on the closed portion of the road.

17. Although respondents reported having sufficient knowledge, visitors were frequently observed behaving improperly around wildlife or not practicing wildlife safety.

18. Survey respondents’ perceptions of crowding at Teklanika rest stop aligned with higher numbers of visitors present at the rest stop.

The spring shoulder season presents several challenges for park management where balancing the desires, perceived needs, and motivations of different user groups (primarily Alaskans and non-Alaskans) will be imperative to successful resource and visitor experience protection. Some of these desired conditions are at odds with one another and reflect the dichotomy of the Organic Act's requirement to protect and provide access to federal land. With only POV access, an increase in spring season popularity has consequences for vehicle crowding, which has implications on the visitor experience and wildlife presence and behavior along the road corridor, which presents a paradox: the more popular the spring season becomes because it is recognized as a time of smaller crowds, the more that the opportunities for enjoying smaller crowds during spring diminish. Spring season popularity, visitor motivations, visitor activities, and vehicle access are all interconnected.

Acknowledgments

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1.0 List of Terms

POV: privately operated vehicle

GOV: government owned vehicle

Winter Shoulder Season: The period between October and mid-March**.**

Spring Shoulder Season: The period between mid-March and May 20th.

Rove: a scheduled observation period to monitor (1) the interaction of vehicles and wildlife along the road corridor, (2) use by and behavior of vehicles at rest stops, and (3) non-motorized visitor use.

Sample Universe: the projected population of spring visitors in 2019.

Hard Refusal: when an intercepted visitor refuses the survey and refuses follow-up questions verbally.

Soft Refusal: when an intercepted visitor refuses the survey but agrees to answer follow-up questions verbally. Data from soft refusals are used to evaluate how respondent and refusal populations differ and assess non-response bias.

Qualitative Content Analysis: a process by which qualitative material (observations, interviews) are distilled into themes and coded for use in quantitative applications or contextualizing findings.

Non-response Bias: the error in a sample that arises if individuals drawn to participate in the survey are very different from those who consistently do not participate in the survey.

Two-Way T-Test: tests if the means of two groups differ more than would be expected by chance.

2.0 Introduction

The spring shoulder season in Denali National Park and Preserve (DENA) has grown increasingly popular in recent years (Figure 1). With the persistent increase in visitation comes questions about pressures on park resources, how management can respond to these pressures, and what is driving the visitation increase. The most recent survey data (2011) on spring visitor demography and recreation is outdated and does not reflect present visitation conditions. Furthermore, divergent motivations, preferences, and expectations for different visitor populations could present management challenges for the spring season in the future.

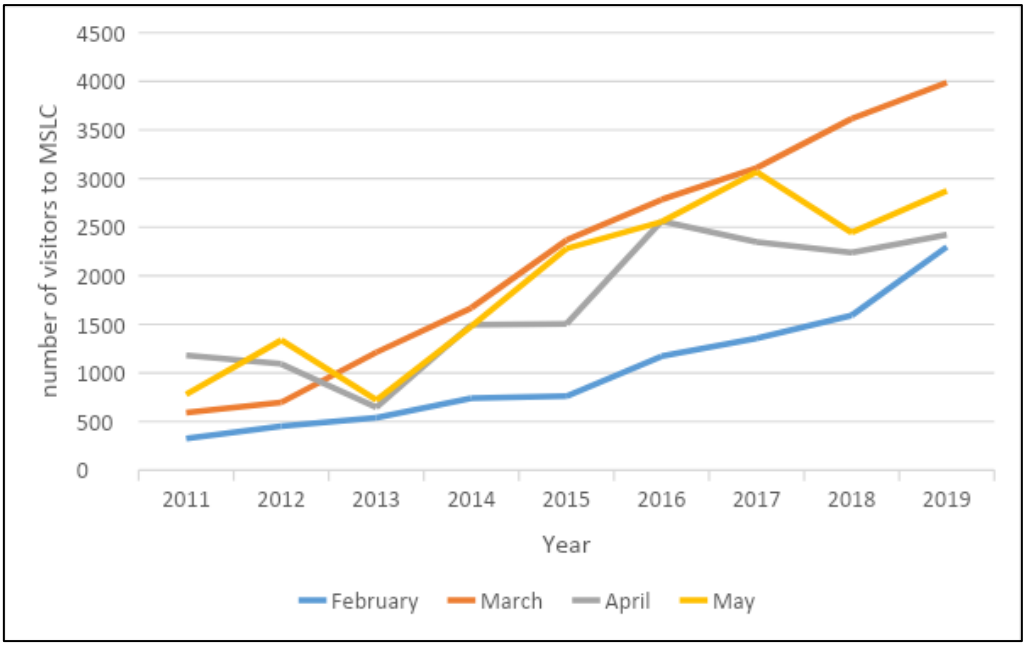

Figure 1. Shoulder season visitation to Denali's winter visitor center (the Murie Science and Learning Center, MSLC) is increasing. Visitation data is collected by the staff at the MSLC. From 2011–2014, staff counted each time a visitor entered the center. Since 2014, staff has counted each visitor once.

These changes motivated the National Park Service (NPS) to monitor spring use of facilities including the Denali Park Road (henceforth, Park Road). A visitor experience survey was distributed to visitors from April 10 to May 19, 2019, the day before the Park Road closed to POV traffic west of the Savage River. The visitor survey was paired with staff wildlife observations along highly traveled sections of the Park Road in the later spring shoulder season. These roves occurred in a GOV between park headquarters and the Teklanika rest stop (mile 30) and on a bicycle between Teklanika and Sable Pass - a portion of the Park Road popular for non-motorized recreation. Wildlife and visitor use observations as well as the visitor experience survey were distinct from previous studies of the Early Road Opening (Clark et al. 2018) and its effect on winter visitation.

The 2019 spring visitor study was refined to explore ways DENA can adapt spring operations to meet visitor needs while also meeting shoulder season management goals. A goal of the *Winter and Shoulder Season Plan* (in draft) is to "protect park resources and values while sustainably improving the quality of the winter and shoulder season visitor experience." Results from the spring use monitoring project allow managers to evaluate and analyze where the conditions of park wildlife resources and current visitor motivations, activities, and self-assessment of their experience during this season intersect. The following report integrates the results of the spring 2019 social science spring visitor survey and vehicle- and bicycle-based wildlife observations.

This project had a few challenges, which are discussed in the conclusion. However, some limitations should be noted here. The response sample size (n = 156) for the visitor survey was smaller than the target minimum sample size of 240. Although the data presented were indicative of the contacted visitors, it should not be broadly extrapolated to include all 2019 spring visitors to DENA. The data presented here cannot be used for robust statistical analysis. Instead, we provide an informal overview of DENA spring visitation. Secondly, the road ecology rest stop vehicle counts were not systematically randomized during the observation period because they were conducted while staff were traveling to survey distribution or bicycle rove sites.

Lastly, the spring monitoring project in 2019 was a pilot study. With more information about spring visitation and resource conditions, new questions and concerns will likely arise, leading to future studies and management goals to address this dynamic season.

3.0 Spring Visitor Experience Survey

Consistent changes to park visitation in the winter and shoulder seasons prompted a winter visitor study in 2017 and 2018. Results indicated that winter visitors were younger, more independent, and more frequently Alaskan compared to summer visitors.

This spring study built upon that winter visitor experience study by using surveys to examine visitor demography and recreation preferences in the park during the later spring shoulder season (mid-April to May 19). Visitor surveys provided information on how spring visitors self-assess their experience recreating in the park.

The goals of the survey were to address:

- Who are the spring shoulder season visitors?
- Why do they come to DENA at this time of year?
- What do visitors do in the park in spring?
- How do visitors self-evaluate their current experience?
- How would potential changes to park management and/or the services offered affect their experience?

3.1 Methods

This survey examined visitation by assessing why people came to the park (motivations), how they traveled (group size, cost, travel time, length of stay), what expectations of service and experience they had (knowledge, needs), and whether changes to management would improve or detract from the current experience. We conducted the spring visitor experience survey from April 10 to May 19, 2019 at various sites in the park important to the spring visitor such as the winter visitor center and rest stops accessible by POV.

3.2 Data Collection

We administered surveys to visitors and NPS staff prior to April 10 to test the instrument. This gave us insight into how people interpreted questions and their ease of answering questions with potentially unclear language. It also provided valuable information about visitors' comfort with sensitive questions.

We generated a stratified random sample to ensure each spring visitor had an equal chance of selection in the study. A random selection of days and times within days were generated using a Stata v. 15.1 random sample generator for clustered samples. Decisions about data collection and the sampling design were informed by the institutional knowledge of NPS staff.

A trained survey administrator approached every "n^{th}" individual over age 18 and asked if they would participate in the study. Survey distribution sites were varied throughout the sampling period: surveys were administered at the winter visitor center (Murie Science and Learning Center, hereafter, MSLC) (5 days), Savage River rest stop (2 days) and Teklanika rest stop (9 days). The

sampling period began before the road opened to mile 30 to POV traffic on April 25, 2019. The sampling method was not truly random. The sampling interval varied by distribution site and week of the season depending on how crowded the locations were; April 10–May 8, the intervals were shorter (1 to every 3rd group) whereas May 14–19 the intervals were longer (3rd to every 5th group). For groups, we asked the individual with the most recent birthday to complete the survey to minimize potential group leader bias (Battaglia et al., 2008). The schedule was stratified by day of the week for survey administration; data were collected in the mornings and afternoons of 12 weekdays and four weekend days. The surveys were mostly distributed in the afternoons at the Teklanika rest stop due to the amount of time it took to reach the area. Surveys were also opportunistically distributed by MSLC staff and either returned before visitors left the park or mailed back to the park after the visitor returned home.

Visitors could have refused the survey. “Soft refusals” occurred when visitors refused the survey but agreed to verbally answer four follow up questions relating to demographics, recreation, and need. Soft refusals were used to estimate non-response bias: visitors’ responses to four key questions were compared with the responses of visitors who took the full survey. “Hard refusals” occurred when visitors did not agree to take the survey or answer the follow up questions.

Visitors were encouraged to take the survey with them and complete it after recreating, especially if they were contacted upon their arrival to the park. In some cases, visitors took the survey from the survey distribution site with the intent of dropping it off at the MSLC as they exited the park. If a visitor physically took a survey, did not complete it on-site with the administrator, and did not return it to the MSLC, the survey was counted as a refusal.

We coded and entered responses into Stata v. 15.1 software for data storage and analysis. The survey took approximately 12 minutes to complete. We used contact logs to monitor response rates and potential non-response bias.

3.3 Data Analysis

Frequency distributions and percentages, excluding missing or non-applicable values, were calculated for various response categories. Descriptive statistics were calculated to illustrate mean values and standard deviations. Two-way t-tests were used to compare between group mean values. Scaled survey items were used to avoid list-wise deletion of missing survey observations. Qualitative content analysis was conducted on all open-ended responses. Similar responses were coded into broad categories such as “lack of crowds” or “access” and the categories’ frequencies were evaluated based on the total population and residency subgroups of respondents. Visitor residency was defined by how respondents identified their residency on the survey.

3.4 Results

From April 10, 2019 to May 19, 2019 we sampled 208 individuals. Data from 10 surveys that were distributed outside the sample intervals (i.e. opportunistic surveys) were included in the analysis for a total respondent pool of 218. There were 16 soft refusals and two hard refusals. Eighty-five visitors took the survey with them instead of completing it onsite with the administrator. Thirty-nine of these surveys were returned to a labeled vault at the MSLC, yielding a response rate of 46%. The total number of completed surveys was 156, yielding an overall response rate of 72% (Table 1).

Table 1. Sample sizes and response rates by survey distribution site (Denali National Park and Preserve, Denali Park, Alaska, USA).*

Survey Distribution Site	Days Surveys Administered	Days of Week Surveys Administered	Initial Contacts	Surveys Distributed	Surveys Collected	Site-Specific Response Rate (%)
Teklanika rest stop	9	Sun, Tues, Wed, Thurs, Fri, Sat	116	112	81	70
Murie Science and Learning Center (MSLC)	5	Sun, Mon, Tues, Wed	91	79	65	71
Savage River rest stop	2	Mon, Wed	11	11	10	91
Total	12	All	218	202	156	72

*Counts of the opportunistic surveys distributed by MSLC staff were included in the "initial contacts," in the "surveys distributed" count, and in the "surveys collected" categories. "Days surveys administered" only includes days when a trained survey administrator distributed surveys, therefore it does not capture the days surveys were opportunistically distributed by MSLC staff on behalf of the project.

3.4.1 Non-response Bias

The difference in responses between respondents and visitors who refused the survey (either through soft refusals or through non-returns) were not statistically significant except for one metric. Refusals had a statistically significant higher mean instance of perceived language barrier (M=0.05, SD=0.22) compared to survey respondents (M=0.01, SD=0.08) (t (206) = -2.0049, p=0.0463). The languages included Mandarin, Italian, and German.

A higher proportion of Alaskans refused the survey (41%) than those who responded (38%). Slightly more friend groups and solo travelers refused the survey (26% and 18%) than accepted the survey and responded (22% and 17%). Differences were not statistically significant.

The mean and median ages of refusals were slightly older than the respondents. Visitors who refused the survey were most frequently 30 to 39 years old (32% of all refusals). In contrast, those 30 to 39-years old that completed and returned the survey represented 25 percent of the population of respondents. More than a quarter of refusals (26%) were aged 60 to 69. This age class was over-represented in the refusals compared to the respondents (16%).

Most refusals (58%) did not give their primary activity for the day. These refusals were from surveys that visitors took with them and did not return ("non-returns"). The most frequently reported primary activity among soft refusals was "other" at 16%. Seven of the 10 refusals that cited "other" as their primary activity said their activity for the day was sightseeing. Ten percent of soft refusals and non-returns indicated that biking was their primary activity. This was higher than the percentage of bikers that responded to the survey (6%). Four of the six refusals where biking was a primary activity were approached at Teklanika as they were preparing for or packing after their bike trip.

3.4.2 Visitor Socio-demographic Information

Survey respondents were well educated, traveled in family groups, and predominantly were from the United States (Table 2). The mean age of survey participants was 43, older than the survey population of the 2017-2018 winter visitor study by 10 years. Thirty-six percent of respondents were over the age of 50. Families comprised more than half (55%) of the survey group types and the average group size was 2.7. Most spring visitors were white (88%), followed by Asian (6%), Hispanic or Latino (6%), American Indian or Alaska Native (2%), and another race (2%).

Sampled spring visitors were highly educated. Just under half (44%) reported having a bachelor's degree and a quarter reported having a graduate degree as their highest level of formal education. A plurality of visitors (22%) reported an annual household income between $70,000 and $99,999.

The majority (81%) of respondents were employed. Eighteen percent of visitors were retired. Respondents frequently identified working in legal or business fields and service or tourism industries for their occupations. Other listed occupations included science or medical fields, art or writing, maintenance, engineering, and the military.

Nearly half of survey respondents (49%) were from the United States outside of Alaska ("Lower 49"). Of the respondents from the Lower 49, 33% were from the southern US and 24% were from the western states. Thirty-eight percent of survey respondents were from Alaska, predominantly the greater Fairbanks area (61% of Alaskans) or Anchorage (17% of Alaskans). Two survey respondents were from the Denali Borough. Thirteen percent of respondents were from a country other than the United States. Other countries of residency included Australia, Germany, Canada, and Brazil, among others.

Eleven seasonal Alaska residents (individuals staying in the state for a minimum of four months up to one year) also completed the survey. This population was classified as residents of the Lower 49 despite their seasonal residency in Alaska.

Table 2. Demographic information of spring visitor survey respondents.

Socio-demographics	Percentage of Total Population
Gender	
Male	50
Female	49
Other (non-binary)	1
Age	
Less than 20 years old	<1
20 - 29	27
30 - 39	25
40 - 49	11
50 - 59	12
60 - 69	16
70 - 79	7
80+ years old	1
Mean age	43
Group Type	
Family	55
Friends	22
N/A, self	17
Family & Friends	7
Average Group Size	2.7
Race and Ethnicity	
White or Caucasian	88
Asian	6
Hispanic or Latino	6
American Indian or Alaska Native	2
Other	2
Black or African American	<1
Native Hawaiian or Pacific Islander	<1
Annual Household Income	
Under $25,000	7
$26,000 - $39,999	10
$40,000 - $69,999	16
$70,000 - $99,999	24
$100,000 - $150,000	18
$150,000 - $200,000	8
$200,000 or more	5
Prefer not to answer	13
Education	
High school graduate	7
Some college/vocational school	20
Four-year college degree [or Bachelor's degree]	44
Master's degree [or Graduate degree]	25

Socio-demographics	Percentage of Total Population
Ph.D., M.D., J.D., or equivalent	4
Occupation	
Retired	18
Legal/business	11
Service/tourism	10
Student	5
Unemployed	<1
Other fields	55
Residency	
U.S. State (non-Alaska)	49
Alaska	38
Other country	13

3.4.3 Trip Characteristics

Most survey respondents (92%) planned to stop in the park (Table 3). Forty-five percent of respondents spent up to two weeks in Alaska. Excluding seasonal and year-round Alaska residents, the average trip duration in Alaska was 12 days. Many respondents (49%) spent one or more nights in the Denali area. Excluding the 6% of respondents who defined themselves as local residents, the average duration of respondents' trips specifically in the Denali area was two days. The greatest percentage of respondents (45%) did not spend the night in the Denali area; they visited the park on a day trip.

Sixty percent of survey respondents had never visited DENA before (Table 3). Seventy-two percent of all visitors had never visited the park in spring, while 33% had visited previously in the summer. Six respondents wrote comments instead of providing a number of visits (e.g. "countless"), these were changed to "50" during the data cleaning process.

The number of previous spring visits ranged from one to 50, with a majority of return visitor respondents indicating less than five previous visits (57%). The number of previous summer visits ranged from one to 50, with a majority of respondents indicating less than five previous visits (76%).

On average, respondents reported an anticipated trip cost of approximately $2300. Fifty-two percent of respondents anticipated their trip costing $1000 or more.[1] Twenty-nine percent of visitors reported an anticipated trip cost of $100 or less.

Table 3. Trip Characteristics for spring survey respondents at Denali National Park and Preserve (Denali Park, Alaska, USA).

Trip Characteristics	Percentage of Total Population
Duration of Trip in Alaska	
Alaska resident	38

[1] The highest reported anticipated cost was $30,000 for a solo traveler staying in Alaska for four months.

Trip Characteristics	Percentage of Total Population
≤ 1 week	19
≤ 2 weeks	26
> 2 weeks	18
Average duration of trip	12 days
Duration of Trip in Denali area	
Denali area resident	6
only one day	45
1 night	13
2 nights	18
3 or more nights	18
Average duration of trip	2 days
Planned stop in the park	
Yes, planned stop in park	92
No, did not plan stop in park	8
Previous Visitation*	
First visit to Denali	60
First visit in spring	72
Visited previously in summer	33

*Previous visitation does not total to 100% because first time visitors in spring could also be first time visitors to the park in any season or could have visited the park previously during summer.

3.4.4 Motivations for Spring Visitation

Survey respondents were asked in an open-ended question to write in their reason(s) for visiting DENA during the spring shoulder season. Many respondents visited DENA during the spring to avoid crowds. All respondents, regardless of residency, frequently reported a lack of crowds as a motivating factor.

Other motivations included “timing,” when coming to DENA or Alaska worked well for respondents’ personal schedules; “already being in the area,” usually on a business trip; road access, either access in a POV or lack of bus traffic facilitating a better visitor experience for activities like biking; and “spring season” characteristics such as fewer insects, aurora borealis, or moderate weather. Less frequently cited motivations included “visiting friends or family”; a specific spring activity; “off-season/shoulder season”; “cost,” either the cost of an activity in the park like “free camping” or the cost to get to the park; and “other” motivations.

The motivations for visitors to come to DENA in the spring vary based on visitor residency. In the open-ended question, Alaskans most frequently cited a lack of crowds, road access in a POV, and specific activities that they wanted to participate in like free camping at Riley Creek, biking, or crust skiing. Non-Alaskan respondents also frequently cited a lack of crowds as a motivation, but the most frequently expressed reason was “timing” - their DENA visit coincided with previous travel plans in the state or this time of the year was the only time that worked in their personal schedules for a vacation. Non-Alaskans also frequently cited already being in the area as a motivating factor for their visits during the shoulder season. Most respondents who reported these motivating

factors were also first-time spring visitors. The factors motivating Alaskans to visit are primarily unique to the way the park is managed during this season, but external factors such as convenient timing (spring break, family visiting) draw non-Alaskans to DENA in spring.

If respondents had visited DENA during both spring and summer they were asked to indicate and explain their season preference. Almost twice as many Alaskans responded to this question compared to non-Alaskan visitors. Over half of the respondents did not answer a question on the survey about their season preference, because they had not previously visited the park in summer (Table 4).

Table 4. Respondent season preference for the Denali spring visitory survey (Denali National Park and Preserve, Denali Park, Alaska, USA).

Season preference	Percentage of Total Respondent Population
Spring	28
Summer	17
Both seasons	2
Not applicable	53

More respondents preferred spring over summer. Of those who had visited in spring and summer, 60% preferred visiting in spring and 36% preferred visiting in summer. This trend was true for both Alaskan and non-Alaskan respondents.

The most frequently stated reasons for season preference were categorized as a “lack of crowds” and “seasonal conditions” like temperature, “fewer bugs,” more greenery, and snow. Both Alaskans and non-Alaskans preferred spring specifically because of the lack of crowds. “Road access” in a private vehicle, wildlife sighting conditions, available “amenities and services,” specifically bike rentals and bus tour options, and deeper access into the park were also stated, but less frequently.

Respondents who preferred spring to summer reported a lack of crowds and road access in a POV most frequently to explain their preference. Respondents who preferred summer to spring reported seasonal conditions of warmer temperatures most frequently, followed by having all summer amenities (bus tours, an open visitor center as well as open businesses outside of the park) available, more wildlife viewing opportunities, and deeper access into the park to explain their preference.

Respondents reported “seasonal conditions” and “wildlife sighting” conditions in equal measure to explain their preferences regardless of the season. Those respondents who preferred spring described preferring snow, cooler weather, and fewer insects, while those who preferred summer enjoyed warmer temperatures. Alaskan respondents who reported “seasonal conditions” as the

reason for their preference preferred summer more frequently than spring. Non-Alaskans who reported “seasonal conditions” to explain their reasoning preferred each season equally.

Sixteen survey participants on their first visit to DENA still answered the season preference questions. Eight of these respondents preferred spring to summer and six of these respondents preferred summer to spring. One respondent reported preferring both seasons and one respondent left the season preference question blank while writing in why they enjoyed their visit.

3.4.5 Desired Experiences and Sights During Visit

Survey respondents were asked to choose up to three options for what they most wanted to experience and most wanted to see during their trip in the park.

Most Desired Experience

The most popular desired experience was a connection with nature, with non-Alaskan residents reporting this desire at higher proportions than Alaskans (Table 5). Respondents from the Lower 49 reported desiring a connection with nature (89%), being away from people and noise (40%), and learning about the park (45%) at higher proportions than visitors from other places.

Alaskans reported a desire to bond with friends and family at much higher proportions than visitors from other places (40% of Alaskans compared to 21% of visitors from the Lower 49 and 20% from other countries). Alaskans also reported solitude as a desired experience more frequently than other respondents.

A larger proportion of international visitors reported a desire to experience adventure (60%) and physical activity (45%) compared to respondents from the United States.

Table 5. The experience respondents to the Denali National Park and Preserve spring visitor survey most desired was a connection to nature (Denali Park, Alaska, USA).

Experience*	Residency			
	Lower 49	Alaska	International	Total Population
Connection with Nature	89	79	85	85
Adventure	55	38	60	49
Being Away from People & Noise	40	32	40	37
Physical Activity	36	34	45	36
Solitude	32	38	20	32
Learning About the Park	34	26	25	30
Bond with Friends and Family	21	40	20	27
Other	11	17	15	14

*Visitors were encouraged to check up to three options on this question which results in percentages totaling more than 100% in each category.

Twenty-two respondents wrote that they most wanted to experience something other than the pre-listed categories. Notably, 13 of the 22 write-in options for the other experience category were related to wildlife and six were related to natural scenery, both of which were categories in the most desired sight question. The most desired experience question preceded the most desired sight question in the survey.

Most Desired Sight

Wildlife was by far the most desired sight for all visitors who responded to the survey, followed by natural scenery and Denali (the mountain) itself (Table 6). Among the respondents who indicated that they most wanted to see wildlife, more than half (51%) expressed a desire to see a bear and 29% wrote in that they wanted to see a moose. Bears were a popular desired wildlife sighting regardless of residency. Just 11% of Alaskans who indicated that they wanted to see wildlife wanted to see moose.

Eighty-four percent of respondents from the Lower 49 reported wanting to see Denali itself. This was the second most popular desired sight after wildlife for these visitors, followed closely by natural scenery (82%).

Compared to visitors from the Lower 49, respondents from Alaska and outside of the US did not choose Denali (the mountain) as a desired sight as frequently. Natural scenery was the second most popular desired sight for both of these respondent groups: 74% for Alaskan and 75% for international respondents.

Table 6. The sight that respondents to the Denali National Park and Preserve spring visitor survey most desired was wildlife (Denali Park, Alaska, USA).

Sight*	Residency			
	Lower 49	Alaska	International	Total Population
Wildlife[2]	90	92	95	92
Bear	53	45	60	51
Moose	40	11	40	29
Natural scenery	82	74	75	78
Denali (the mountain)	84	62	60	73
Exhibits in the Visitor Center	0	8	0	5
Other	0	4	10	3
People recreating	1	4	0	2

[2] Of those reporting a desire to see wildlife, 32% of Alaskans, 22% of other US residents, and 20% of international visitors (25% of all respondents) did not specify the wildlife they most wanted to see.

*Visitors were encouraged to check up to three options on this question which results in percentages totaling more than 100% in each category.

3.4.6 Visitor Activities During the Shoulder Season

Recreation Activities

Visitors reported participating in a variety of activities during their visit, however, driving the Park Road was the most popular activity with nine in 10 respondents in the total sample population reporting participation in this activity and more than half (57%) reporting it as their primary activity (Figure 2).

Nine respondents wrote in multiple primary activities. Most commonly, driving the Park Road was paired with another activity such as hiking on trails. In these cases, the first listed primary activity was the only primary activity considered in the analysis.

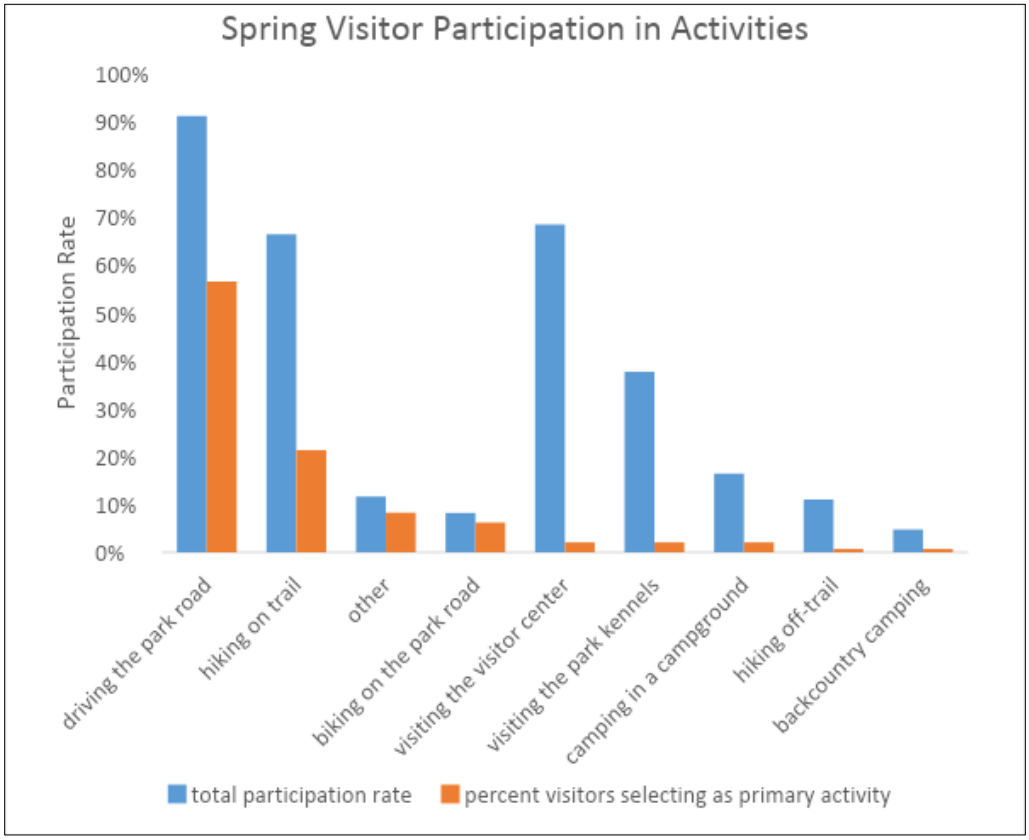

Figure 2. Respondent participation in activities and primary activity along the Denali Park Road (Denali National Park and Preserve, Denali Park, Alaska, USA). Survey participants were encouraged to check as many activities as applied to their trip in DENA; percentages of the total participation rate may tally to more than 100%.

Although a majority of respondents participated in on-trail hiking and visiting the visitor center, few selected it as their primary activity. In contrast, respondents who wrote in an activity that was not listed ("other") or selected biking as one of their activities more frequently selected these options as their primary activities as well. The high proportion of "other" activities listed as primary activities might be influenced by soft refusals. Many soft refusals indicated that "sightseeing" was their primary activity when asked the follow up questions. Differences in activity participation and primary activity emerged among different visitor residencies (Figure 3, Figure 4).

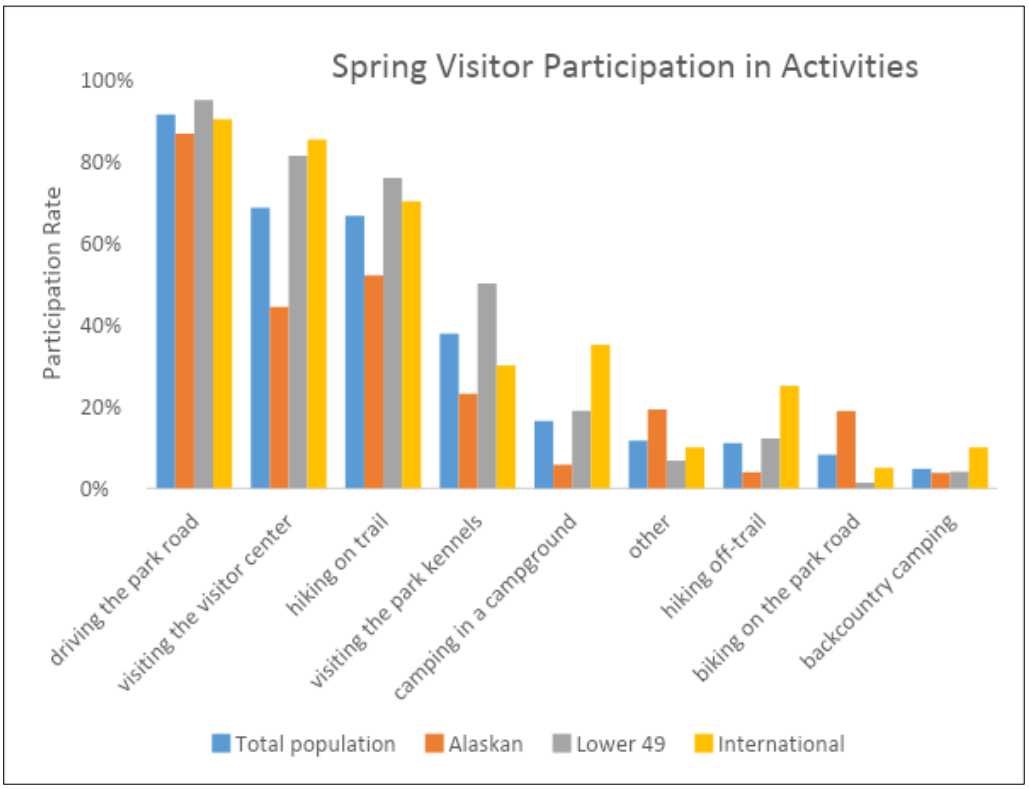

Figure 3. Visitor participation in activities by visitor residency (Denali National Park and Preserve, Denali Park, Alaska, USA). Survey participants were encouraged to check as many activities as applied to their trip in DENA, so percentages may tally to more than 100%.

Apart from driving the road, participation in all other activities strongly varied by respondent residency. For example, a larger proportion of visitors from the Lower 49 reported visiting the sled dogs in the park kennels (50%) compared to Alaskan and international respondents (23% and 30% respectively). International visitors reported hiking off-trail (25%) and camping in a campground (35%) or in the backcountry (10%) in larger proportions than domestic visitors. Alaskan respondents reported visiting the visitor center at lower proportions than other visitors (44% of Alaskans compared to 81% of other domestic respondents and 85% of international respondents).

Alaskan respondents also reported biking the park road at a larger proportion than other visitors (19% of Alaskans compared to a total population participation of 8%). During the shoulder season the survey administrator encountered many cyclists who explained that biking the Park Road was an annual spring ritual. One local cyclist wrote that he has biked and backcountry camped "every spring/fall for 38 years" and another cyclist, upon returning from a bike ride on May 1st said he would bike from Teklanika to Polychrome "10 more times before the road closes."

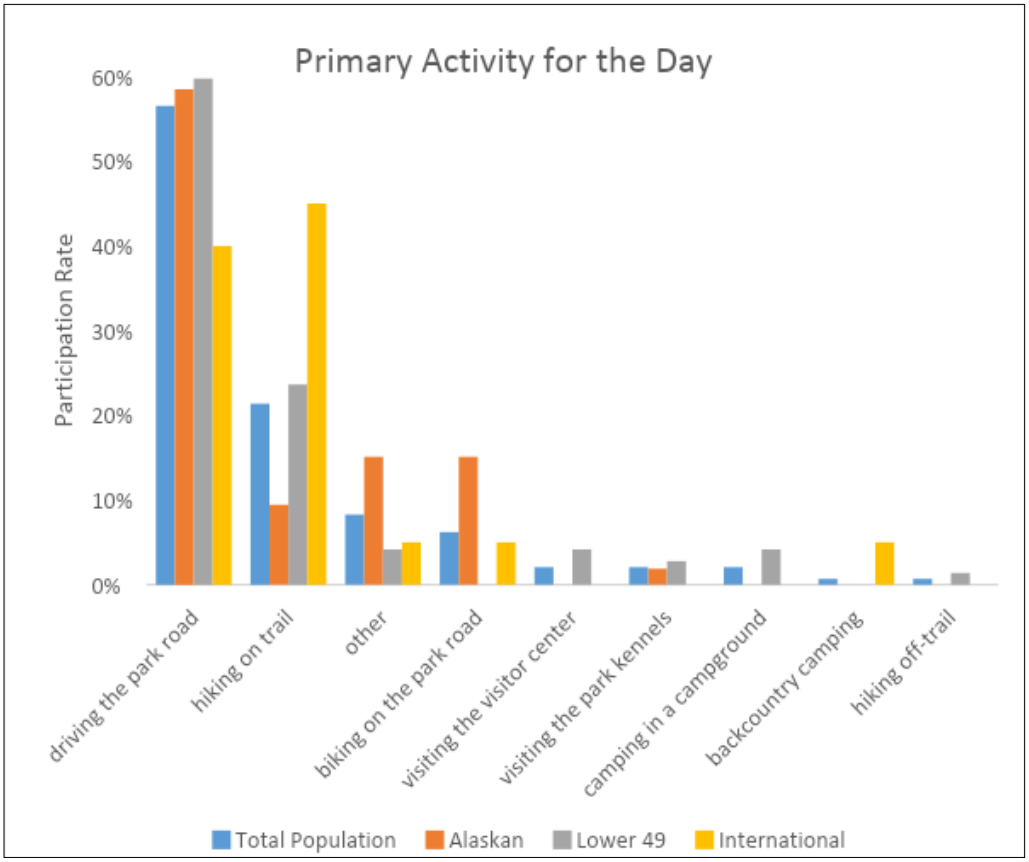

Figure 4. Visitor participation in primary activity by visitor residency (Denali National Park and Preserve, Denali Park, Alaska, USA). Survey participants were encouraged to check as many activities as applied to their trip in DENA, so percentages may total to more than 100%.

Driving the Park Road was the most frequently listed primary activity for the total population (57%) and for American visitor subpopulations (60% for Lower 49 and 58% for Alaskans). Hiking on-trail was the most frequently listed primary activity for international respondents (45%). Only respondents from the Lower 49 listed camping in a campground and visiting the Visitor Center as primary activities. Among Alaskan respondents, biking on the road (15%) and other activities such as photography and sightseeing (15%) were the second most popular activities after driving. A much smaller proportion of Alaskan respondents reported hiking on-trail as a primary activity compared

to other respondents (9% of Alaskans compared to 24% of other domestic respondents and 45% of international respondents).

3.4.7 Information Needs

Visitors who took the survey were asked about their interaction with park rangers while in DENA and their needs for information during the present and future trips.

A slight majority of the respondents had an in-person interaction with a ranger before they were intercepted with the spring visitor survey (Table 7). Personal interaction with a ranger was not distinct among sites; 60 - 67% of respondents reported that they had interacted with NPS staff prior to receiving the survey at each survey distribution site.

Table 7. Personal interaction with NPS park ranger while at DENA (Denali National Park and Preserve, Denali Park, Alaska, USA).

Visitor Type	Percentage respondents who interacted with NPS prior to receiving survey
Non-Alaska Resident	73
First Time Visitor	70
Alaska Resident	40
Total Visitor Population	62

Among non-Alaskan respondents and first-time visitors, the percentage of visitors who had interacted with NPS staff was higher than in the total population, while among Alaskans the percentage of visitors who interacted with NPS staff was lower than in the total population. Additionally, a few visitors at the Teklanika rest stop asked the survey administrator about paying an entrance fee or for directions to the visitor center. One couple from California said that they thought there should be a mandatory gate or fee station at the entrance to the park, similar to Yosemite National Park.

When asked whether they had the information they needed for their current trip, 90% of respondents reported that they had sufficient information (Table 8). Information needs for the 10% of respondents that reported having inadequate information addressed road conditions, advice on animal sightings, lodging and surrounding businesses, better signage for trails, and an open visitor center campus. NPS websites and the visitor center were the most popular methods for obtaining information for future visits while the park information line and other websites were least popular. The other information category had two write-in responses: “long term planning” and “Alaska Tour.”

Table 8. The information that respondents desired for present and future trips (Denali National Park and Preserve, Denali Park, Alaska, USA).

Trip Type	Percentage of population
Present Trip	
Yes, had the needed information for trip	90
No, did not have the needed information for trip	10
Future Trips Preferred Information Source	
NPS.gov websites	74
Future Trips Preferred Information Source	
Visitor center	64
Park brochure	44
Ranger	41
Social Media	31
Signs in the park	30
Guidebook	20
Other websites	14
Park information phone line	12
Not sure	2
Other	1

Survey participants were encouraged to check as many information methods as applied, so percentages may tally to more than 100%.

3.4.8 Spring Visitor Evaluation of Their Experience

The majority of respondents were highly satisfied with their trip experience (Table 9)[3].

Table 9. Overall satisfaction with trip by visitor residency (percentages of subpopulation) for respondents (Denali National Park and Preserve, Denali Park, Alaska, USA).

Residency	Very Dissatisfied	Somewhat Dissatisfied	Neutral	Somewhat Satisfied	Very Satisfied
Lower 49	1	0	1	18	80
Alaska	0	0	5	19	75
International	5	0	0	30	65
Total population	1	0	3	20	76

[3] One family group wrote in an extra number off the scale ("6") to evaluate their experience.

While this metric is helpful in providing a snapshot of respondent satisfaction, it does not reveal satisfaction with various aspects of the visitor experience in the park. An importance-satisfaction analysis was conducted to analyze components contributing to the overall experience (information availability, infrastructure or facility condition, and opportunities to escape crowds) and reveals respondent expectation and park performance in these areas (Figure 5).

Respondents were somewhat to very satisfied with park services and facilities relating to information, facility infrastructure, contact with NPS rangers and staff, and crowding. Some respondents did not rate their satisfaction with services or facilities if they did not use them; instead, respondents wrote in "not applicable" by the scale. This occurred most frequently for ranger programs (37 blank values, 24% of samples), camping opportunities (29 blank values, 19%), and parking at Teklanika rest stop (27 blank values, 17%).

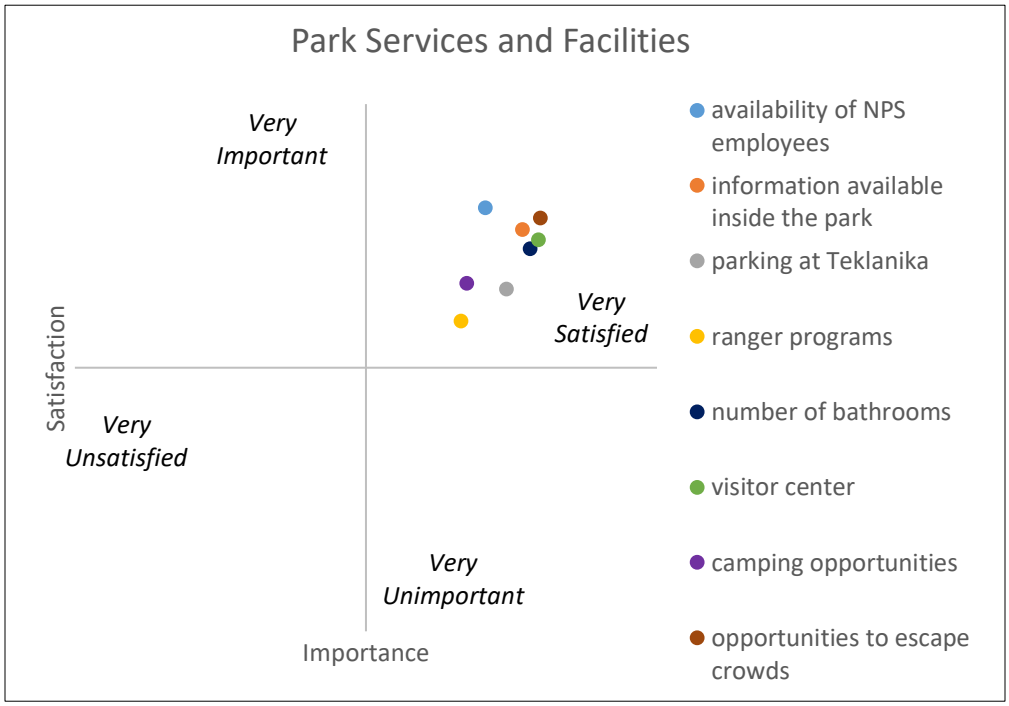

Figure 5.The importance-satisfaction matrix for the total population of spring survey respondents of Denali National Park and Preserve (Denali Park, Alaska, USA).

Ranger programs were rated the least important, which also had the lowest satisfaction rating. However, this service also had the most missing values in the dataset. Availability of NPS employees and opportunities to escape crowds were the most important services or conditions identified. The visitor center and the opportunities to escape crowds were cited with high satisfaction.

3.4.9 Large Groups: Definition and Impact on the Visitor Experience

The impact of crowding on the visitor experience is a management concern associated with the increase in visitation during the shoulder season. Survey respondents were asked to define what "large group" meant to them and evaluate the impact of encountering a large group on their experience while recreating outside (Figure 6,

Table *10*). Respondents were also asked to rate how crowded they felt at various sites throughout their time recreating in DENA (Table 11).

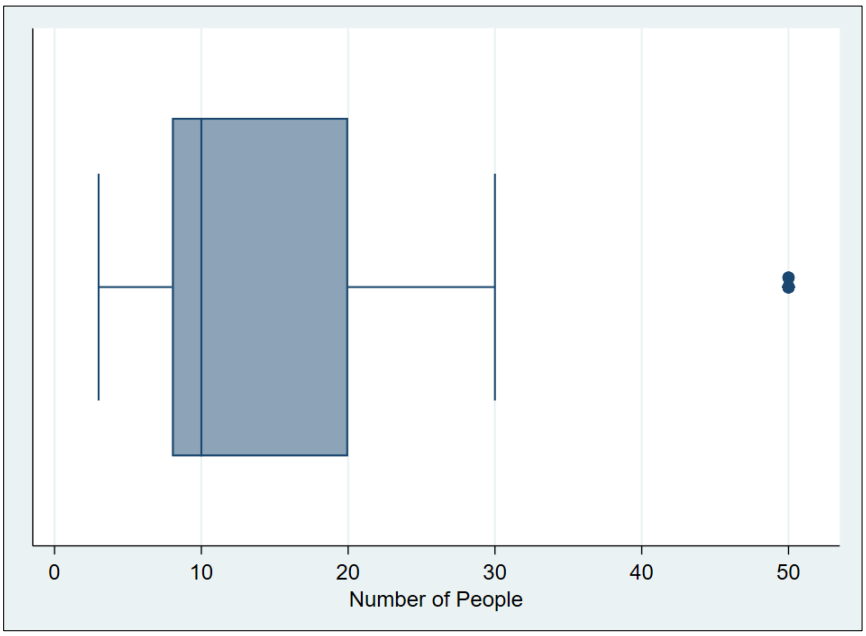

Figure 6. Number of people that spring survey participants consider to be a "large group" at Denali National Park and Preserve (Denali Park, Alaska, USA).

Respondents defined "large group" ranging from three to 52 people; the most common response was 10 and averaged 14.1 (standard deviation, SD of 10.7). Alaskans defined a large group as slightly less fewer (13.7 people, SD = 10.2) while non-Alaskan visitors defined a large group as slightly more (14.3 people, SD = 11.0). Visitors who reported being negatively impacted by large groups while recreating defined a large group as 13.8 (SD = 10.6), while those who reported being positively impacted or not impacted at all defined a large group as 15.2 (SD = 11.2). Visitors responding to the survey who wanted to experience solitude reported the lowest threshold (10.8, SD = 6.3).

Few respondents reported they would be positively impacted by encountering a large group while recreating. In contrast, more than three-fourths (77%) of the total population reported that encountering a large group would negatively impact them. Thirty percent of Alaskans indicated that encountering a large group would very negatively impact their experience, a higher proportion than respondents from other places. Five percent of Alaskan respondents indicated that a large group

would impact their experience very positively. None of the international respondents reported that large groups would positively impact their experience.

Table 10. Impact of encountering a large group while recreating (in percent) at Denali National Park and Preserve (Denali Park, Alaska, USA).

Residency	Very Negatively	Somewhat Negatively	No Impact	Somewhat Positively	Very Positively
Lower 49	19	57	17	4	3
Alaska	30	45	18	2	5
International	26	58	16	0	0
Total population	24	53	17	3	3

Respondents also rated how crowded they felt at various sites throughout the park during their visit (Table 11). The majority of respondents rated their entire visit to DENA as not at all crowded; however, 17% rated their visit as either somewhat crowded or crowded. The visitor center parking lot was most frequently rated as somewhat crowded to extremely crowded (38%), followed by the Teklanika parking lot (29%). Hiking trails (93%) and the closed portion of the road beyond the Teklanika gate (90%) were rated as the least crowded areas overall. Compared to visitors from the Lower 49, Alaskan and international respondents more frequently rated locations as crowded. Respondents that were not first-time visitors also commented on how crowded the park felt on their 2019 visit compared to previous spring visits.

Table 11. Percentage of respondents reporting crowding throughout Denali National Park and Preserve during a spring season survey (Denali Park, Alaska, USA).

Location	Not at all Crowded	Somewhat Crowded	Crowded	Extremely Crowded
During entire visit	83	13	4	0
On hiking trails	93	5	2	0
Open portion of the park road	77	19	3	<1
Closed portion of the park road	90	9	1	0
Teklanika parking lot	71	21	7	<1
Visitor Center parking lot	62	28	10	<1
In the Visitor Center	73	23	3	<1

3.4.10 Needs and Potential Changes to the Spring Visitor Experience

Visitor Needs

Respondents were asked to describe three features they needed in order to have a high-quality experience in the park specific to the spring shoulder season. This question was also a verbal follow up question for soft refusals.

The most frequently reported needs were “access,” “weather,” “sightseeing” opportunities for viewing wildlife and the landscape, “information,” and “personal preparedness”. Facilities and amenities, a lack of crowds, intangibles such as “appreciation for nature,” and other needs were also reported in the open-ended question.

The access category included road and trail specific needs such as the ability to drive a POV on the Park Road, access further into the park “all the way to Denali” on the Park Road, and “maintained” trails. A few road-specific access responses reflected a desire to limit vehicle or bus traffic.

The need for “good” or “clear” weather was the second most frequently reported visitor need after access. Many stated sightseeing needs that visitors recognized were outside of NPS control (e.g. “to see Denali (good weather),” “beauty of the mountains,” or “to see lots of wildlife”). However, some of the needs in the sightseeing category could be interpreted as action items to address visitor needs: “information where wildlife has been seen,” “look offs,” and “knowledge of best times and areas to see wildlife.”

The information category encompassed a desire for contact with rangers (“access to chat with a ranger about the park”), up to date information regarding trail and road conditions, wildlife details (“moose warning”), as well as recommendations for activities to do during the spring.

The most commonly reported facilities and amenities needs were food or beverage services, including water, followed by an open visitor center campus during the spring. A few visitors suggested opening the main visitor center campus earlier in the season “depending on the weather” instead of depending on a calendar date. Visitors reported needing the visitor center open for various reasons including “guidance,” “education and restrooms,” and a “larger gift shop.” Notably, a few visitors described the need for cleanliness or clean restrooms.

Visitors also commented on the need for “proper clothing for time of year” or “cold weather gear.” These responses, along with binoculars, camera, boots, camping gear, etc. were included in the “personal preparedness” category. “Other” responses included “good company,” “camping,” or “to be able to get outside.”

Non-Alaskan visitors reported needing information (“information where wildlife has been seen,” “advice on where to go,” etc.) more frequently than Alaskans, whereas Alaskans reported needing a lack of crowds, quiet, or solitude more than non-Alaskans.

Visitor Suggestions for Improving Their Experience

Respondents were asked to evaluate their overall satisfaction with their trip to DENA. Nearly all respondents (96%) were either somewhat or very satisfied with their overall experience. Next, respondents were asked to identify one suggestion for DENA managers to improve their experience in an open-ended question. Just over 60% of survey participants responded – more non-Alaskans (54 responses) responded than Alaskans (38 responses). The suggestions concerned "information," "nothing," "facilities and amenities," "access," and "other." Respondents who physically wrote in "not applicable" or "none" on the survey were still counted as responding to the open-ended question. Non-Alaskan respondents more frequently suggested improvements concerning information, "nothing," and facilities or amenities, while Alaskan respondents more frequently wrote in improvements concerning access or other suggestions.

Information was the most frequently cited suggestion among the respondents. Information improvements included suggestions for more or more clear directional signage on trails and on the park road, clarification on the bus system, guidance on wildlife viewing, and information on activities during the shoulder season, for example: "better external info (brochure) – what to plan in a day." Many of these referred to interpretative rangers and the interactions survey respondents had with them during their trip. The other most common category ("nothing") included responses that ranged from "not applicable" or "none" to responses that evaluated the respondents' overall trip satisfaction, for example: "I'm already satisfied with my experience here".

Other responses included concerns about resource protection ("Greater presence of LEO. Too many speeders and people passing illegally." / "keep visitors from harassing wildlife"), suggestions for potential activities and services ("provide option of guided tour for wildlife viewing") and park administration relationships with locals. Suggestions relating to facilities and amenities most often concerned opening the main visitor center campus earlier in the season, followed by suggestions for food or beverage services.

Access suggestions most frequently concerned access on the Park Road. These responses included suggestions for information about the road opening ("let me know how open the road is - I didn't know it was partially closed"), road signage ("roadside signs to point out certain lookout points" and "more visible mile markers"), and more access in a POV ("allow residents to drive further into the park in the off season"). A few responses specifically referred to a "pre-season" road lottery or more frequent road access in POV throughout the year.

Effect of Commercial Services on the Visitor Experience

Respondents were also asked to assess their participation in potential commercial services on a scale from one to five ("definitely not," "probably not," "possibly," "probably," "definitely") (Table 12). The listed potential services included services available in summer (e.g., shuttle or tour bus services to Teklanika) and services that are not currently offered such as guided biking on the closed portion of the Park Road. The "outdoor gear" and "other" options also included a write-in section.

Response categories were grouped into two categories to reflect unlikely participation ("definitely not" and "probably not") and possible participation ("possibly," "probably," and "definitely"). Disaggregated percentages are available in table format in Appendix C.

Table 12. Visitors' evaluation of participation in commercial services (percentage of subpopulations) at Denali National Park and Preserve (Denali Park, Alaska, USA).

Commercial Service	Likelihood of Participation	
	Unlikely Participation	Possible Participation
Guided biking		
Lower 49	31	69
Alaska	39	61
International	45	55
Total Population	36	64
Narrated bus tour to Teklanika		
Lower 49	39	61
Alaska	42	58
International	40	60
Total Population	40	60
Shuttle bus to Teklanika		
Lower 49	34	66
Alaska	42	58
International	50	50
Total Population	39	61
Bike rentals		
Lower 49	20	80
Alaska	36	64
International	32	68
Total Population	28	72
Outdoor gear rentals		
Lower 49	41	59
Alaska	33	67
International	50	50
Total Population	39	61
Guided off-trail hiking		
Lower 49	23	77
Alaska	27	73
International	30	70
Total Population	26	74
Other Commercial Service		
Lower 49	22	78
Alaska	27	73
International	50	50
Total Population	29	71

Between 60 to 74% of respondents indicated possible participation in each service. The services with the highest proportion of visitors reporting possible participation were guided off-trail hiking (74%), bike rentals (72%), and other services (71%, e.g. “snowshoeing trips” or “family-friendly options with kids”). The services with the highest proportion of visitors reporting unlikely participation were a narrated bus service to Teklanika (40%), shuttle bus service to Teklanika (39%), and outdoor gear rentals (39%).

Survey respondents most frequently reported probable or definite participation in guided off-trail hiking and “other” commercial services. Thirty-one percent of the total respondent population indicated that they would probably participate in guided off-trail hiking and 25% indicated they would definitely participate in this service. “Other” commercial services included desired facilities like a “lodge in park” or activities like kayaking, “winter tours on a track vehicle,” and “adventure motorcycles.” An outdoor gear rental service was not popular. For the few that indicated they would use outdoor gear rentals, responses included gear such as skis, tents, binoculars, and bear spray.

Respondents from the Lower 49 indicated higher possible participation in all services except outdoor gear rentals compared to visitors from Alaska and abroad. Respondents from the Lower 49 also stated they would participate in a bike rental service and shuttle bus services to Teklanika at higher proportions than other respondent populations.

Alaskan respondents indicated that they would definitely not participate in bus services as well as bike and other gear rentals at higher proportions than visitors from other places. One Alaskan respondent explicitly wrote in “keep them out this time of year!!” next to the narrated bus tour option on the survey. Alaskan respondents also indicated that they definitely would participate in guided services like guided biking or off-trail hiking in higher proportions than other visitors.

International respondents reported unlikely and possible participation in equal proportions for three commercial services: shuttle bus service to Teklanika, outdoor gear rentals, and “other” commercial services. The services that the highest percentage of international respondents reported possible participation in were guided off-trail hiking (70%) and bike rentals (68%).

Lastly, to evaluate the effect of the possible addition of other services on visitor experience, survey respondents were asked to rate how five potential services would change their experience in DENA from “greatly detract” to “greatly improve” (

Table *13*). Response categories were grouped into three categories to reflect how services would change visitor experience: detract (“greatly detract” and “somewhat detract”) no change (“no change”) and improve (“somewhat improve” and “greatly improve”). Disaggregated percentages are available in table format in Appendix C.

Table 13. Percentage of visitors' evaluations of potential services changing their experience for spring season visits at Denali National Park and Preserve (Denali Park, Alaska, USA).

Service	Detract	No Change	Improve
Access to Savage, Sanctuary, or Teklanika campgrounds			
Lower 49	1	56	43
Alaska	4	29	67
International	6	53	41
Total Population	3	45	52
More parking at Teklanika rest stop			
Lower 49	3	67	30
Alaska	6	63	31
International	7	93	0
Total Population	4	68	28
Shuttle bus to Teklanika			
Lower 49	4	63	33
Alaska	9	56	35
International	13	80	7
Total Population	7	62	31
Activities with Rangers			
Lower 49	0	37	63
Alaska	11	35	54
International	6	44	50
Total Population	5	37	58
Food and beverage for purchase			
Lower 49	5	42	52
Alaska	18	35	47
International	24	47	29
Total Population	12	40	48

The majority of responses for each listed commercial service predominantly ranged between “no change” at all to “somewhat improve” the visitor experience. Overall, respondents said activities with rangers and access to more campgrounds would somewhat to greatly improve their experience at higher percentages than any other listed services. Non-Alaskan respondents reported

that activities with rangers would greatly improve their experience in higher proportions than Alaskan respondents and respondents from the US reported that campground access would greatly improve their experience at higher proportions than international respondents. No international respondents reported that access to more campgrounds would “greatly improve” their experience.

More than half of the respondents in the total sample indicated that more parking at Teklanika rest stop and a shuttle bus to Teklanika would not affect their experience recreating in the park (68% and 62%, respectively). Eighty to 93% of international respondents indicated that these services would not change their experience at all, whereas 31 to 35% of Alaskan respondents indicated that these services would improve their experience.

Food and beverage for purchase had the most distinct responses among visitor residencies. Alaskan and international respondents indicated that food and beverage for purchase would greatly detract from their experience more so than for any other service and at larger proportions than visitors from other states. A quarter of respondents from the Lower 49 indicated that food purchase options would “greatly improve” their experience and 27% indicated that this service would somewhat improve their experience.

3.4.11 Additional Comments

In the additional comments section at the end of the survey a few respondents commented on commercialization in and around the park. Those respondents most frequently commented on a desire to limit commercialization, though some respondents stated a desire for businesses outside of the park to be open during their visit. Comments also addressed road access, food services within the park, and wildlife sightings. Other additional comments concerned park interpretation staff. While the majority of these comments praised rangers one group of visitors from Hawaii wrote that there should be “more indigenous park interpreters, innovation of cultural practices and natural environments in park.”

3.5 Discussion

The data and our observations suggest that several elements of spring visitation observed in 2019 were distinct compared to other seasons. Themes of crowding and access frequently arose throughout the survey responses (and may have translated to negative responses by wildlife). Slight differences in motivations and activities were also discovered among residency subgroups (e.g. Alaskans compared to all others). All these elements have management implications as DENA conceptualizes the winter and shoulder season plan, which are outlined at the end of this section.

The sample size for respondents to the 2019 spring survey was much smaller than previous studies assessing visitation in spring (Fix et al., 2013) and other seasons (Aberg et al., 2019; Manni et al., 2012; Meldrum et al., 2006; and van Riper et al., 2017). As such, it is noted that the trends reported here should not be applied to all visitors to DENA in the 2019 shoulder season, only to the survey respondents.

3.5.1 DENA Spring Visitors

Spring visitors are distinct from visitors in other seasons, notably in their level of independence from commercial guidance and their familiarity with the park. There are also some similarities among visitors, regardless of when they choose to visit, which indicates that some expectations of the park experience transcend seasons (e.g. accessing DENA primarily via the Park Road, a desire to connect with nature and see charismatic wildlife or Denali).

Respondents predominantly were from the United States, highly educated, and traveled in small family groups. On average, spring respondents were older than winter visitors by 10 years (Aberg et al., 2019) and younger than summer visitors by 11 years (Manni et al., 2012). Seventeen percent of respondents defined themselves as solo travelers as opposed to 8% in winter and 12% in summer (Aberg et al., 2019 and Van Riper et al., 2017). Just four respondents in the spring survey reported being part of a commercial guided tour, in contrast with 11% of winter visitors and 51% of summer visitors who were part of a commercial tour (Aberg et al., 2019; Meldrum et al., 2006). A higher proportion of respondents also reported expecting solitude and escaping people and noise during their spring visit compared to winter visitors. This might be influenced by a larger subpopulation of Alaskans in the spring survey.

Spring survey participants were also more familiar with DENA than visitors in other seasons and stayed in the area longer than winter visitors, but for shorter periods than summer visitors. The percentage of first-time visitors in the spring sample (60%) was less than winter (76%) and summer visitation trends (80%) (Aberg et al., 2019; Manni et al., 2012). Half of the spring survey respondents (51%) reported being in the area on a day trip or being a local resident. The remaining respondents reported staying in the Denali area for one to three or more nights, which was a higher proportion compared to winter visitors, 72% of whom did not stay overnight at all (Aberg et al., 2019). Spring visitors on average spent one less night in the Denali area than summer visitors (van Riper et al., 2017).

Most visitors reported a desire for a connection with nature and wildlife sightings, mostly bears. Visitors in all seasons reported similar participation rates in popular activities. The most popular activities for both winter and spring were driving the park road and hiking. The most popular activities for summer visitors were photography, viewing wildlife, and hiking (Van Riper et al., 2017), wildlife viewing on a park bus (Ackerman et al., 2011), or viewing scenery (Manni et al., 2012). Spring survey respondents primarily spent their time driving the Park Road, visiting the visitor center, or hiking on front-country trails, but participation in other activities and primary activities varied by residency subgroup. In addition to these differences, motivations for visiting the park, information needs, and stated needs for a high-quality experience varied across subgroups. These distinctions suggest that subgroups of visitors expect or desire a different off-season recreation experience in DENA.

Visitor Motivations and Expectations

Visitors prefer visiting DENA in spring specifically because it is not as crowded as summer. A lack of crowds was the most frequently reported reason respondents provided for planning their visit during the spring and for preferring spring over summer. More than one third (37% of the total population) reported expectations of being away from people and noise. Respondents in spring also reported a much lower tolerance for large groups than winter visitors. In winter, equal populations of approximately 30% each said encountering a large group would impact their experience negatively or not at all. In the spring sample, 77% of respondents reported that encountering a large group would negatively affect them. Spring was the more popular season among respondents who had visited the park during both spring and summer. Avoiding crowding was an influential motivation for survey participants and an important condition for a high-quality experience in DENA. Therefore, having clear capacity management goals during the shoulder season will help ensure high quality experiences continue to occur for most visitors.

Other factors such as access and environmental conditions (e.g. fewer insects, presence of aurora borealis) were mentioned by survey respondents to explain why they planned their visit, but not at the same frequency as escaping crowds. Apart from fewer people, the factors motivating Alaskans to visit during the shoulder season were primarily unique to the way the park is managed during this season (i.e. road access in a POV or activities like biking a bus-free road). For non-Alaskans, external factors such as convenient timing (e.g. spring break, visiting family) or environmental factors were a draw in spring.

The type of access available to visitors is also an important motivating factor in determining when they are more likely to visit the park. Respondents preferred spring because of the style of access available (i.e. in a POV instead of on a bus), but respondents reported preferring summer because of the amount of access available (i.e. access to more mileage on the Park Road).

Visitor Activities

Apart from driving preferences, we found that residency influenced the primary activity sought be respondents. The majority of surveyed bicyclists (83%) were Alaskan.

Perceptions of crowding could also affect visitors' recreation experience in the park. Hiking trails were rated as the least crowded location by visitors - 93% of the total sample rated hiking trails as not at all crowded. Crowding is more likely to affect visitors who drive or park at the visitor center - two of the most popular activities among survey respondents. Almost a quarter of survey respondents (23%) rated the open portion of the Park Road as somewhat to extremely crowded. Although this location was not most frequently rated as crowded, the majority of visitors recreate on the open portion of the road by conducting their sightseeing in a POV. Increased POV traffic (and people behaving improperly around wildlife) could also have a negative impact on wildlife close to the road corridor and eventually reduce visitors' chances to see wildlife, which was a core desired

sight. The visitor center parking lot and the visitor center were also frequently rated crowded by 2019 survey respondents (38% and 27% of respondents rated these areas as crowded, respectively).

"Access" was the most frequently stated visitor need to have a good experience during the shoulder season. This need encompasses multiple facets of Park Road-specific "access;" including access further into the park, the "style" of access in a POV rather than a bus, a desire for a spring road lottery, and even a few desires to limit vehicular or bus traffic. Regardless of what flavor of access survey respondents wanted, this was front-of-mind for them in the 2019 shoulder season.

Respondent Evaluation of the Current Experience

Overall, respondents expressed high degrees of satisfaction with their experience in DENA. The majority of respondents (76%) indicated that, overall, they were very satisfied with their trip and somewhat to very satisfied with various park services and facilities relating to information, facility infrastructure, contact with NPS rangers and staff, and crowding. The majority of visitors (90%) reported having the information that they needed on their current trip and a desire to use NPS resources (most commonly the NPS.gov site and the visitor center) to attain information for future trips.

Almost half of the sample of spring visitors did not offer an improvement suggestion and of those who did, "nothing" was a popular response. Visitors most frequently reported that they either had no suggestions since they were already satisfied or they reported that they needed information. Information improvements included suggestions both in DENA and online, for example: more signage on trails and on the Park Road, advice on wildlife viewing, clarification on the bus system, and suggestions for spring activities.

Most visitors (83%) rated their entire visit as not crowded at all. This lack of crowding is likely related to why people come to DENA in spring (to avoid the crowds seen in summer). However, as visitation increases in the off-season, areas like the front country campus and the road will have more concentrated use. Visitor satisfaction with the ability to escape crowds will likely diminish.

Respondent Evaluation of Potential Changes

Although the current assessment of the spring visitor experience is positive, several elements, including visitor-reported needs and responses to potential commercial offerings, should be considered for the future of the shoulder season. Survey respondents in 2019 most frequently stated that they needed "access" in order to have a good time visiting DENA in the spring. Most of these stated "access" needs were related to the way the spring is currently managed (the ability to drive POVs to Teklanika) and reflected a motivation for visitors to come to the park during this season. Some "access" needs reflected a desire to have more access on the Park Road in POVs. Other common needs included things outside of management control like "good weather" and sightseeing opportunities.

A slight majority of respondents reported possible participation in bus services to Teklanika (60% for narrated services and 61% for shuttle services) but a similar proportion (62%) reported that a shuttle service would not change their recreational experience. Although visitors indicated they would use these services, they are not calling out for them. Respondents appeared to value the opportunity to drive POVs and go at their own pace along the open portion of the road. This further suggests the "style" of access is important to visitors who choose to come in spring.

Different visitor subgroups in the 2019 spring survey perceived potential commercial service offerings differently. The most notable distinctions concerned access to campgrounds, food and beverage for purchase, and parking at Teklanika rest stop.

Although few Alaskans (6% compared to 16% of the total sample) reported camping in a campground and none rated this as their primary activity, more Alaskans indicated that access to Savage, Sanctuary, and Teklanika campgrounds would improve their experience than respondents from any other place (67% of Alaskans compared to 43% of other domestic and 41% of international visitors). Alaskan spring visitors might have a preference for campgrounds further into the park based on previous visitation and may decide not to camp at Riley Creek overall because of this preference.

Food and beverage for purchase was the most controversial listed potential service, with both positive and negative reactions from survey respondents. Respondents from the Lower 49 more frequently indicated that this service would "greatly improve" their experience compared to respondents from other places (25% of respondents from the Lower 49 compared to 15% of Alaskans and 12% of international respondents). On the other hand, a higher proportion of respondents (mostly Alaskans and international visitors) indicated that this service would detract from their experience than any other listed service. Some visitors commented on being unprepared to recreate without food purchasing options nearby. Any changes to the current food offerings within DENA will probably be met with both praise and criticism. A desire for more food availability during the shoulder season could be met by businesses outside of the park.

Guided off-trail hiking was the most popular potential service with 74% of the total sample reporting possible participation. Paired with the fact that off-trail hiking was one of the least popular reported activities among respondents (11% of the total population), this suggests that visitors want to explore off-trail recreation but prefer to do it with some guidance instead of on their own. One visitor expressed concern that guided off-trail hiking could lead to informal trail creation. Bike rentals were the second most popular service with more respondents from the Lower 49 reporting possible participation (80%) than respondents from Alaska (64%) or abroad (68%). While biking is already a popular spring activity among Alaskans – in some cases a "spring ritual" for returning visitors – this was the least popular reported activity among respondents from other states (1% respondents from the Lower 49 reported participating). This discrepancy indicates that the lack of proper gear might be a barrier for some visitors to participate in a desired activity.

In addition to different motivations for visiting and different rates of participation in activities in spring, respondents from different places expressed different expectations for their visit (desired experiences and sights, amenities) and perceived certain commercial services differently. On one hand, some respondents wanted their spring experience to remain the same with vehicle access limited to Teklanika. Other respondents wanted to be able to drive to the end of the road and wanted their amenities needs met within the park. As managers work to define the shoulder season experience, these distinctions in visitor groups should be remembered and potential conflicts should be mitigated.

3.5.2 Comparing the 2019 Results to Previous Spring Visitation

Results suggest that DENA's spring visitor demography has changed from previously assessed springs. Compared to a previous study of spring visitation (Fix et al., 2013), there was a smaller proportion of Alaskan respondents in the 2019 survey. The proportion of spring visitors from US states other than Alaska and from other countries has grown since the last time spring visitation was assessed. In 2011 only slightly more than a quarter (27%) of survey respondents were from the Lower 49 and 68% were Alaska residents. Since then, the proportion of spring visitors from US states other than Alaska has almost doubled to 49%. Spring international visitation has also nearly tripled since 2011 from 5% to 13% of the respondent population in the 2019 spring visitor survey.

The way we conducted the sampling effort might have contributed to this observed change. We sampled visitors at the furthest rest stop accessible by POV on the park road (Savage or Teklanika rest stops) and at the MSLC. Informal observations and previous studies suggest that Alaskans often do not stop at the visitor center unless they use the restroom or ask about trail conditions. Additionally, although there was not a statistically significant difference, slightly more Alaskans were represented in the population of refusals than in the respondent sample. This suggests that we may have underrepresented Alaskans while sampling for the 2019 spring survey.

Spring visitor activities are similar from 2011 and 2019. Driving the Park Road remains the most popular activity and although few respondents (less than 10% of the total sampled populations) biked in 2011 and 2019, the majority of respondents who biked the Park Road rated it as their primary activity while recreating in DENA both years.

3.6 Implications for Management

3.6.1 Crowding

Crowding around the park will require attention and mitigation as spring further increases in popularity. Visitors came in spring 2019 in large part to avoid summer crowds. Respondents most frequently reported being motivated by this seasonal condition (i.e. fewer people), but they also expressed expectations of solitude and getting away from people, desires (or stated needs) of reduced crowding, and a far lower tolerance for large groups compared to winter visitors.

In 2019, the majority of respondents (70%) were very satisfied with the opportunity to escape crowds. However, 17% of respondents still rated their entire visit as crowded. Moreover, return visitors occasionally commented to the survey administrator on feeling more crowded during their 2019 visit compared to previous springs, suggesting that a desired condition (i.e. fewer people) is already changing in some return visitors' eyes.

Respondents most frequently rated parking lots as somewhat to extremely crowded. Although visitors notice crowding at the Teklanika parking lot while recreating, they do not feel that increasing capacity would improve their visit. This may indicate that respondents expect parking lot crowding as a condition for their visit.The front-country visitor campus (the visitor center and the parking lot) and the Teklanika parking lot should continue to be monitored to assess visitor perceptions of crowding. The open portion of the park road should also be monitored because it is a high use area for visitor recreation – more than half of the survey respondents (57%) reported driving the park road as a primary activity. Lastly, a shoulder season plan must outline desired vehicle capacity limits in these locations as they will likely continue to be crowded or become more crowded with increased visitation.

3.6.2 Access

Results from this study do not answer how much increased access is responsible for increased spring visitation. Some visitors come to DENA during the shoulder season specifically because of the type of road access uniquely available to them during this period. For these visitors, the recreation experience they have in the spring is not replicable during the peak season, making spring their preferred time to visit. Many returning spring visitors expressed a desire for further access into the park in their POVs.

Alternatively, many visitors were *not* aware of the type of access available to them during the shoulder season until they arrived in the park. Some visitors were excited that they could drive as far as Teklanika in a POV while others wanted still deeper access "all the way in" to the park. A few visitors expressed confusion about shoulder season road access; they thought the road was open to POVs as far as Wonder Lake before arriving at the park and being told otherwise.

Road access has implications for most of the activities that visitors participate in, from driving the road to biking or hiking on the closed portion of the road to off-trail hiking. Any considerations for changing access should also account for the effect on visitors' participation in various activities.

Because visitors rated their experience of their park activity (including driving the road) as satisfactory, it is prudent to consider how expanding vehicle use in the shoulder season would impact perceptions of crowding on the road and activities that are valued spring experiences (like biking on a road closed to traffic) albeit less universally popular than driving.

Access (both on the road and on trails) was also the most frequently stated need among all survey respondents regardless of residency for a good shoulder season experience. Once visitors are aware that access to Teklanika in a POV is not available year-round they seem to appreciate this spring offering. Survey respondents indicated that a shuttle service to Teklanika would not change their experience and reported the lowest rates of possible participation in bus services (shuttle or narrated tour) among listed commercial services. Even if bus services were offered, spring visitors would probably opt to recreate in POVs.

3.6.3 More Information

Lastly, although 90% of the total sample of respondents indicated that they had the information they needed during their trip, information was still reported as a need and an area for improvement by respondents. The need for information is also reflected in informal conversations the survey administrator had with visitors at Teklanika, ranging from basic topics like how far they could drive on the road to specific questions about animal territory and behavior. Respondents reported needing an open visitor center and advice from rangers, trail condition reports, and a list of spring activities. Suggested information improvements included more and more clear signage for trails, a "24 hour information center," and improvements in materials like brochures pertaining to activities and local businesses.

Visitors from places other than Alaska cited information needs or improvements at higher rates than Alaskan respondents. Management should address messaging on what to expect in spring, particularly for first-time visitors. Respondents reported relying primarily on NPS resources (the NPS.gov website and the visitor center) for trip planning, so expectation-setting with NPS-produced materials should not be difficult.

4.0 Spring Road Ecology Observations

4.1 Introduction

The spring season is distinct from the winter and peak seasons because of the greater extent of POV access on the Park Road available to park visitors. During the winter, at most the road is plowed to Mt. Vista rest stop (mile 12.8) and during the peak season visitors access the park almost exclusively by bus service beyond Savage River rest stop (mile 15). Between these seasons, during the spring, visitors can drive as far as Teklanika rest stop (mile 30) in a POV. The spring is also a time when wildlife increases in activity after winter. Together, there is an increased likelihood for visitor-wildlife interactions. The resource impacts from increases in spring visitation in DENA – including impacts to wildlife, infrastructure, and facilities – are unknown. Anecdotal evidence of increased vehicle pressures in the park (POV crowding at rest stop and visitor center parking lots as well as traffic jams along the open portion of the park road) prompted a need to study the later spring shoulder season specifically. Observations of vehicle-wildlife and visitor-wildlife interactions were conducted during the spring 2019 season using a mix of established winter and summer road ecology protocols.

4.2 Methods

4.2.1 Study Area

The study area was from Headquarters (mile 3.4) to Sable Pass (mile 38.5). From April 16 to May 19 staff conducted wildlife observations via GOV or bicycle on highly traveled sections between these points. Headquarters to Teklanika rest stop (mile 30) observations were conducted during vehicle-based roves throughout the sampling timeframe. Vehicle-based roves were conducted en route to Teklanika rest stop on wildlife observation sampling days and visitor survey distribution days. Two bicycle-based roves were conducted between Savage River rest stop and mile 25 before the road opened to Teklanika rest stop on April 25. After the road opened to mile 30, all bicycle-based roves were conducted between Teklanika and Sable Pass, a section of road popular for non-motorized recreation during the shoulder season.

Road closures beyond headquarters only occurred once on April 23 due to inclement weather. Although it did not cause a road closure, inclement weather on May 3 also prevented staff from conducting a planned bicycle-based observational rove.

4.2.2 Data Collection

Wildlife Sightings and General Observations

Road Ecology Program (REP) staff used Apple iPads (Apple, Cupertino, CA) to gather data on vehicle-based roves along the park road between Headquarters and Teklanika and on bicycle-based roves between Teklanika and Sable Pass. A Visitor and Resource Protection (VRP) ranger and a wildlife technician also recorded observations during their patrols from May 4 to May 19. We assessed vehicle counts at rest stops, wildlife presence and behavior, and visitor use and visitor-wildlife interactions on the portion of the park road closed to POV traffic.

Wildlife sighting data included species, count, age (adult vs. young), sex, behavior, change in behavior, milepost, side of road, and distance (m) from road. Target wildlife species included moose (*Alces alces*), caribou (*Rangifer tarandus*), wolf (*Canis lupis*), Dall sheep (*Ovis dalli*), and grizzly bears (*Ursus arctos*). Other species, including coyotes, ptarmigan, snowshoe hares, porcupines, and gyrfalcons, were also observed. We considered different species occurring in the same location as different events.

Because more than one observer may have gathered data on a given day and because we gathered data on both westbound and eastbound trips, wildlife sightings do not represent unique counts of individuals. The goal of wildlife sightings data was to document the occurrence of wildlife viewable from the park road and describe their behavior with respect to vehicle presence.

Vehicle Counts

From April 16 to May 19, staff recorded the number and type of vehicles parked at Mountain Vista, Savage River, and Teklanika rest stops. Vehicle types included POVs, GOVs, equipment, buses (tour, visitor transit service, or in-holder lodge buses). Mountain Vista has striping for approximately 12 vehicles and the east lot of the Savage River stop has striping for approximately 14 vehicles. Teklanika does not have striping because it is gravel and not accessible by POV during the peak summer season.

Rest stop vehicle counts were conducted whenever staff were traveling to Teklanika for spring visitor survey distribution or bicycle-based roves or by VRP and wildlife staff as they were conducting patrols. While vehicle counts at Teklanika were always recorded, vehicle counts at Savage River and Mt. Vista were not recorded every time staff conducted vehicle-based roves.

Observation periods were determined by when staff arrived at the rest stop. Vehicles were counted when staff first arrived (time = 0), after 15 minutes, and after 30 minutes. Total vehicle counts included vehicles in the lot but did not include the monitoring vehicle. We did not count vehicles observed driving through the parking lot without stopping.

Wildlife Behavior

When wildlife were present within 500 meters of the road staff stopped and recorded behavioral observations for 15 minutes or until the animal(s) moved out of view. Wildlife behaviors were chosen from the closest option from a list of 13 behaviors and were categorized as either negative or neutral behavior. For example, a lone boar was observed running down a slope but it was not running away from a stimulus. “Run away” was the behavior that most effectively described the observed behavior, but in this case the behavior was categorized as neutral. However, in general, neutral behaviors were “lay down,” “group split up,” “brief glance,” feeding,” “stare,” “drift away,” “other behavior” and negative behaviors were “group bunch,” “run away,” “walk away,” “startled,” “group reverse direction,” and “trot away.”

Each change in behavior was recorded separately. We used Bushnell rangefinders (Bushnell, Overland Park, KS) to determine distances. Wildlife beyond 500 meters of the park road was deemed too distant to be accurately described. (Presumably, too, vehicles are less likely to pause for and less likely to impact wildlife at that distance.) Behavioral observations were based on protocols modified from Fortier and Tomkiewicz, 1995.

Fifteen-minute observation periods began once staff sighted one of the target species. Observers recorded initial behavior as well as behavior associated with the approaching monitoring vehicle. We documented all stimuli (e.g., vehicles passing, vehicles stopping, visitors exiting vehicles) and responses. For groups of animals, the behavior of the individual closest to the road was recorded. If this proved impossible (e.g., due to group bunching), observers recorded behavior of the group collectively.

Visitor Use and Visitor-wildlife Interaction

From May 4 to May 19, visitor use was also observed during bicycle-based roves and opportunistic VRP and wildlife patrols on the portion of the road that was closed to vehicle traffic. Total counts of visitors, direction of travel, visitor use (hiking or biking), and visitor-wildlife interactions were recorded. Visitor-wildlife interaction observations included whether a visitor stopped for, approached toward, or retreated away from wildlife and whether they were quiet or loud around wildlife during the interaction. “Being quiet” was recorded if visitors reduced their volume during the interaction. Only initial visitor behavior around wildlife was recorded for interaction events.

4.2.3 Data Analysis

Observation surveys were downloaded into ArcMap, cleaned, and integrated into datasets based on feature observation instead of the date that the survey was conducted. The data was then exported into Excel where pivot tables were used for analysis.

4.3 Results

Staff conducted 48 roves of vehicle counts at rest stops, wildlife behavior, visitor use, and visitor-wildlife interactions from April 16 to May 19. On some days more than one observer conducted a rove. April and May were warm and dry. Average temperatures were above freezing at headquarters every day the road was open to Teklanika. The highest daily temperature in April was 60 F and the highest in May was 73 F. Snowpack melt-out date at park headquarters was March 31, the earliest melt-out date on record. The average melt-out date is May 4. The warm conditions likely contributed to visitor use, particularly on the closed portion of the road, since the weather was ideal for biking.

4.3.1 Rest Stops

Staff recorded 177 vehicle counts between April 16 and May 19. More than half of the counts (105) were recorded at Teklanika rest stop (Table 14).

Table 14. Average and maximum vehicle counts by rest stop throughout the spring shoulder season on the Denali Park Road (Denali National Park and Preserve, Denali Park, Alaska, USA).

Teklanika Rest Stop									
	POV		GOV		Bus (VTS and Tour)		Total Vehicles		
Day of Week	Mean (SD)	Max	Mean (SD)	Max	Mean (SD)	Max	Mean (SD)	Max	*n*
Sunday	29.4 (10.3)	45	0.1 (0.3)	1	0.5 (0.9)	2	30 (9.9)	45	14
Monday	--	--	--	--	--	--	--	--	0
Tuesday	23.2 (2.7)	27	0.1 (0.3)	1	0.0 (0.0)	0	23 (2.6)	27	9
Wednesday	7.6 (3.2)	14	0.2 (0.4)	1	0.6 (1.3)	4	8 (3.4)	14	22
Thursday	6.5 (3.8)	13	0.2 (0.4)	1	0.2 (1.0)	5	7 (3.9)	14	24
Friday	9.8 (8.5)	22	0.1 (0.3)	1	0.2 (0.4)	1	10 (8.7)	22	12
Saturday	24.2 (19.9)	73	0.3 (1.0)	5	0.0 (0.2)	1	25 (19.8)	73	24
Savage River Rest Stop									
	POV		GOV		Bus (VTS and Tour)		Total Vehicles		
Day of Week	Mean (SD)	Max	Mean (SD)	Max	Mean (SD)	Max	Mean (SD)	Max	*n*
Sunday	--	--	--	--	--	--	--	--	0
Monday	4.3 (0.9)	6	0.0 (0.0)	0	0.0 (0.0)	0	4.3 (0.9)	6	9
Tuesday	1.5 (0.8)	3	0.5 (0.5)	1	0.0 (0.0)	0	2.0 (1.3)	4	6
Wednesday	4.4 (4.9)	14	0.4 (0.7)	2	0.0 (0.0)	0	4.8 (4.6)	14	12
Thursday	--	--	--	--	--	--	--	--	0
Friday	4.6 (3.3)	13	0.1 (0.3)	1	0.1 (0.3)	1	4.8 (3.4)	13	10
Saturday	5.0 (5.0)	15	0.7 (1.4)	4	0.0 (0.0)	0	5.7 (6.2)	19	15
Mt. Vista Rest Stop									
	POV		GOV		Bus (VTS and Tour)		Total Vehicles		
Day of Week	Mean (SD)	Max	Mean (SD)	Max	Mean (SD)	Max	Mean (SD)	Max	*n*
Sunday	--	--	--	--	--	--	--	--	0
Monday	1 (0.6)	2	0.0 (0.0)	0	0.0 (0.0)	0	1 (0.6)	2	6
Tuesday	1.7 (0.6)	2	0.0 (0.0)	0	0.0 (0.0)	0	1.7 (0.6)	2	3
Wednesday	0.2 (0.4)	1	0.5 (0.5)	1	0.0 (0.0)	0	0.7 (0.5)	1	6
Thursday	11.5 (0.7)	12	0.0 (0.0)	0	0.0 (0.0)	0	11.5 (0.7)	12	2
Friday	--	--	--	--	--	--	--	--	0
Saturday	1.3 (0.6)	2	0.0 (0.0)	0	0.0 (0.0)	0	1.3 (0.6)	2	3

"--" Indicates that observations were not conducted

Tour buses did not start running with passengers until May 12, though bus driver training began May 2. Shuttle bus services to Savage River began May 15. POVs outnumbered all other vehicle types by a large margin, regardless of rest stop. The highest mean number of vehicles at Teklanika and Savage River rest stops occurred on weekends (Sunday and Saturday, respectively). The highest mean total vehicle count for Mt. Vista occurred on a Thursday. Teklanika rest stop consistently had the highest maximum number of vehicles out of all rest stops. The maximum number of recorded vehicles during the observation period was 73 POVs at Teklanika rest stop on Saturday, May 11, 2019. A maximum of 19 vehicles was observed at Savage River rest stop (15 POVs and four GOVs) on Saturday May 18, 2019. A maximum of 12 vehicles was observed at Mountain Vista rest stop (all POVs) on Thursday May 9, 2019. The average, median, and maximum number of vehicles present at Teklanika rest stop increased over the observation period (Figure 7).

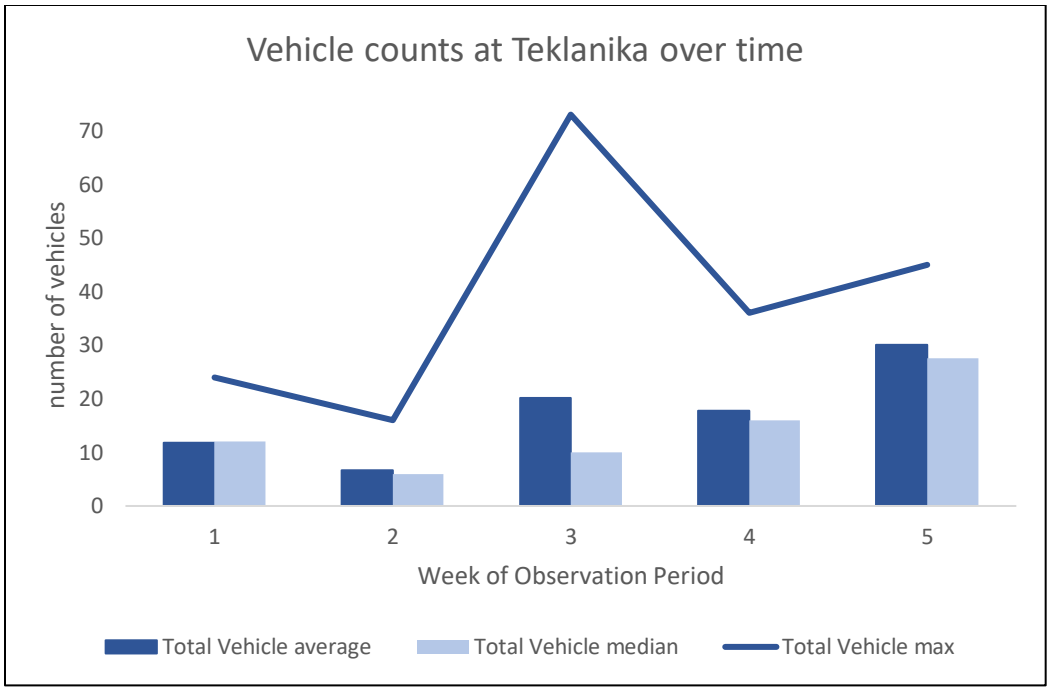

Figure 7. Vehicle counts at Teklanika rest stop throughout the observation period (Denali Park, Alaska, USA).

4.3.2. Wildlife Sightings, Traffic at Wildlife Stops, and Animal Behavior

There were 158 wildlife sightings throughout the observation period. Four of the five target species (caribou, bear, moose, and Dall sheep) were observed 145 times. Wolves were not observed during this study. Nine wildlife stops were recorded but the wildlife associated with the stop was not either by omission or the animal was not identifiable. These nine events were not considered in the analysis. Wildlife were observed each date that vehicle-based roves were conducted but were only observed during half of the bicycle-based roves. Caribou were the most frequently observed target species (Table 15). Caribou and Dall sheep consistently had the largest groups of individuals during the observation period.

Table 15. Number of wildlife sightings, species, and average and max group size on the Denali Park Road (Denali Park, Alaska, USA).

Species	Number of sightings	Average group size	Largest group of individuals
Caribou	82	5.6	25
Bear	31	1.3	3
Moose	23	1.5	3
Sheep	9	4.8	11
Other species*	13	1.0	2

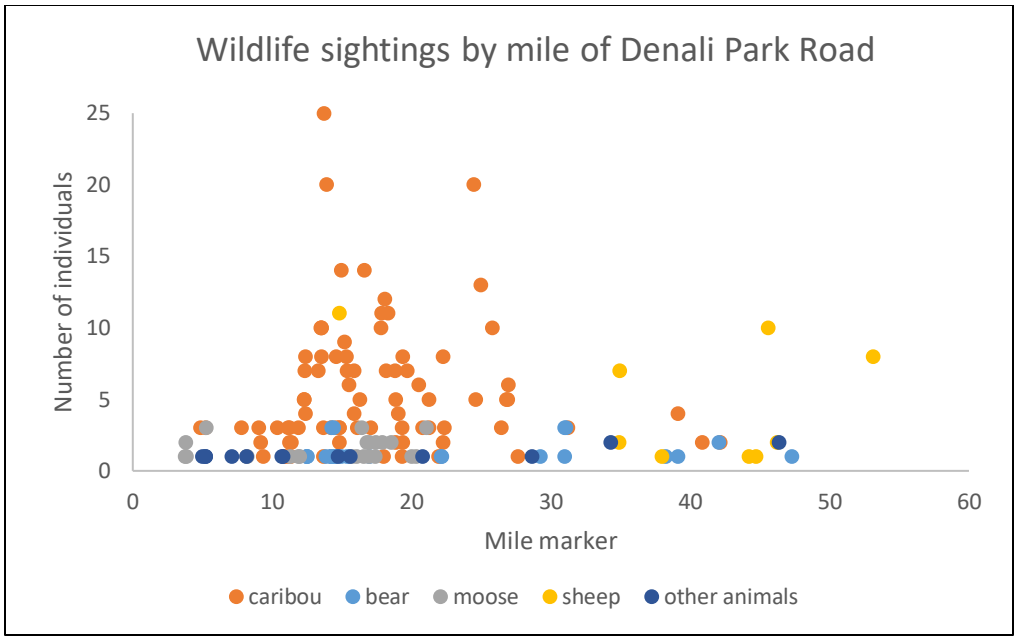

Figure 8. Wildlife sightings by location along the Park Road from April 16 to May 19, 2019 on the accessible portion of the Denali Park Road (Denali Park, Alaska, USA).

The majority of wildlife sightings occurred east of Teklanika, though this is probably due to a disparity in rove effort on the east side (*n* = 35) versus west side (*n* = 13) of the Teklanika gate (Figure 8). Additionally, every rove that travelled west of the Teklanika gate had to travel the section east of the gate. To control for effort, the number of sightings of each species were divided by the number of observations that occurred along that section of roadway (
Table *16*). Caribou and moose were the only species observed during every week of the observation period (Figure 9).

Table 16. Rate of observation (number of animals per survey) observed on Denali Park Road wildlife roves in spring 2019 (Denali Park, Alaska, USA). Sheep were much more often observed west of Teklanika, whereas caribous were more frequently seen east of Teklanika.

Species	East of Teklanika	West of Teklanika
Caribou	1.73	0.14
Bear	0.53	0.25
Moose	0.51	0.00
Sheep	0.02	0.29
Other Species	0.24	0.07

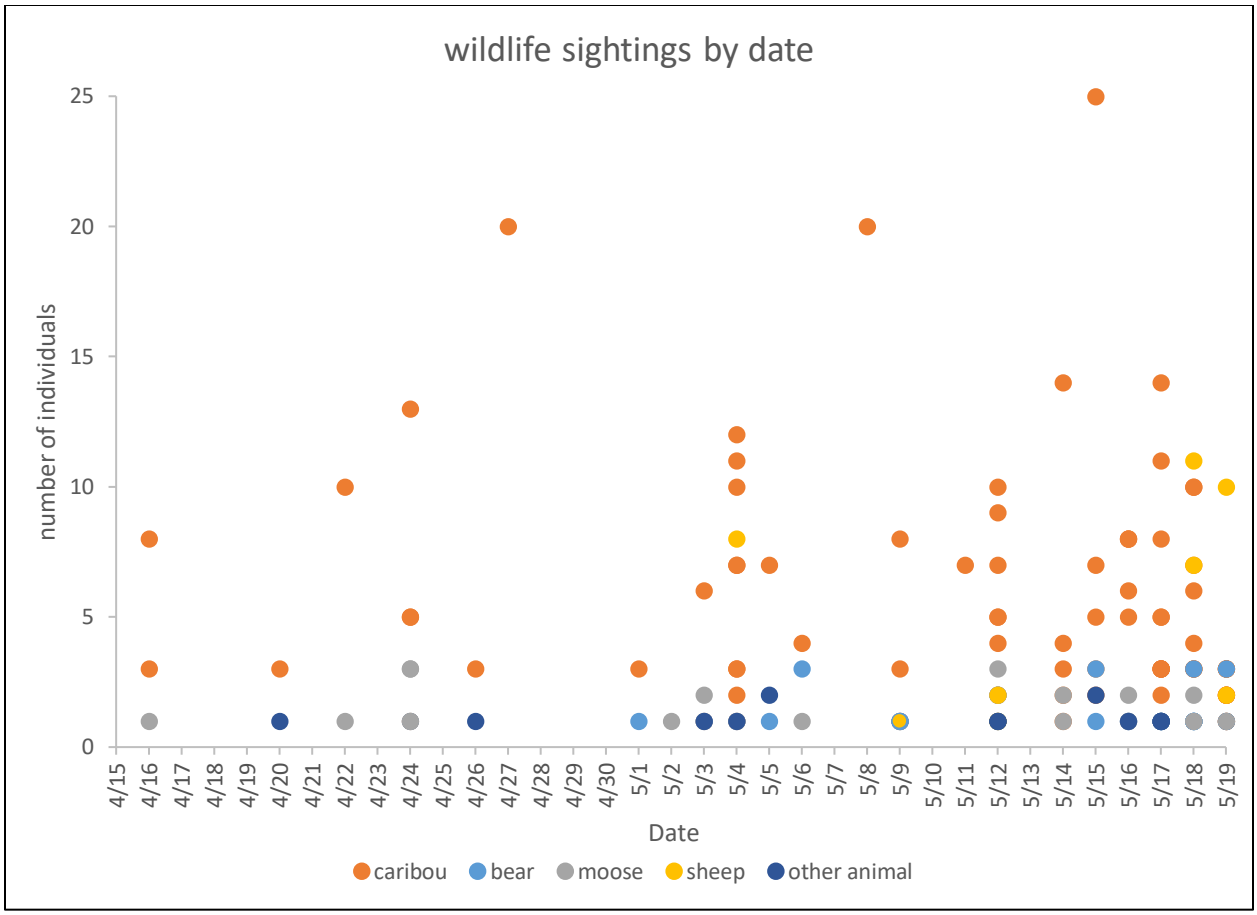

Figure 9. Wildlife sightings by date along the Park Road from April 16 to May 19, 2019 (Denali National Park, Denali Park, Alaska, USA). Several dates did not have a rove (April 17-19, 21, 23, 25, 28-30, May 7, 10, and 13). The road was only closed due to inclement weather once during the observation period (April 23).

Wildlife and Traffic

Initial counts of vehicles were also observed at each wildlife stop (Table 17). Vehicles were observed at approximately 67% of wildlife stops. Buses were not observed at wildlife stops until May 14. Visitor transit service (hereafter, VTS) and lodge buses were observed at wildlife stops only once during the observation period. POVs were observed 98 times. Distance from the road affected the mean number of vehicles present at wildlife stops: the closer that caribou, bear, or moose were to the road, the higher the average number of total vehicles were recorded at the observation (Table 18).

Table 17. Mean (and standard deviation, SD) and maximum number of vehicles initially observed at wildlife stops by species on the Denali Park Road (Denali National Park and Preserve, Denali Park, Alaska, USA).

Species	Buses		POV		GOV		Total Vehicles	
	Mean (SD)	Max	Mean (SD)	Max	Mean (SD)	Max	Mean (SD)	Max
bear	0.4 (1.0)	4	4.4 (6.0)	30	0.2 (0.5)	2	5.0 (7.0)	35
moose	0.1 (0.5)	2	1.7 (2.9)	12	0.2 (0.5)	2	2.0 (3.1)	14
caribou	0.1 (0.4)	2	1.4 (2.0)	12	0.2 (0.4)	1	1.7 (2.2)	12
sheep	0.1 (0.3)	1	0.4 (1.0)	3	0.1 (0.3)	1	0.7 (1.1)	3
other species	0.0 (0.0)	0	0.6 (0.2)	3	0.1 (0.4)	1	0.7 (0.2)	3

Table 18. Mean (and standard deviation, SD) and maximum number of vehicles initially observed at wildlife stops within 100 meters of the Denali Park Road (Denali National Park and Preserve, Denali Park, Alaska, USA).

Species	Buses		POV		GOV		Total Vehicles	
	Mean (SD)	Max	Mean (SD)	Max	Mean (SD)	Max	Mean (SD)	Max
bear	0.5 (1.2)	3	5.5 (9.1)	30	0.4 (0.7)	2	6.4 (10.4)	35
moose	0.2 (0.6)	2	1.6 (3.2)	12	0.3 (0.6)	2	2.1 (3.6)	14
caribou	0.2 (0.5)	2	2.5 (2.8)	12	0.3 (0.5)	1	3.0 (3.2)	12
sheep	0.3 (0.6)	1	0.0 (0.0)	0	0.3 (0.6)	1	0.7 (1.2)	2
other species	0.0 (0.0)	0	0.6 (0.2)	3	0.1 (0.4)	1	0.7 (0.3)	3

Additionally, we found a temporal effect; the average and maximum number of vehicles initially present at wildlife stops increased later in the season (Figure 10). Overall, the majority of vehicles present at wildlife stops were POVs. Bears were the most crowded wildlife events (average of 16 vehicles).

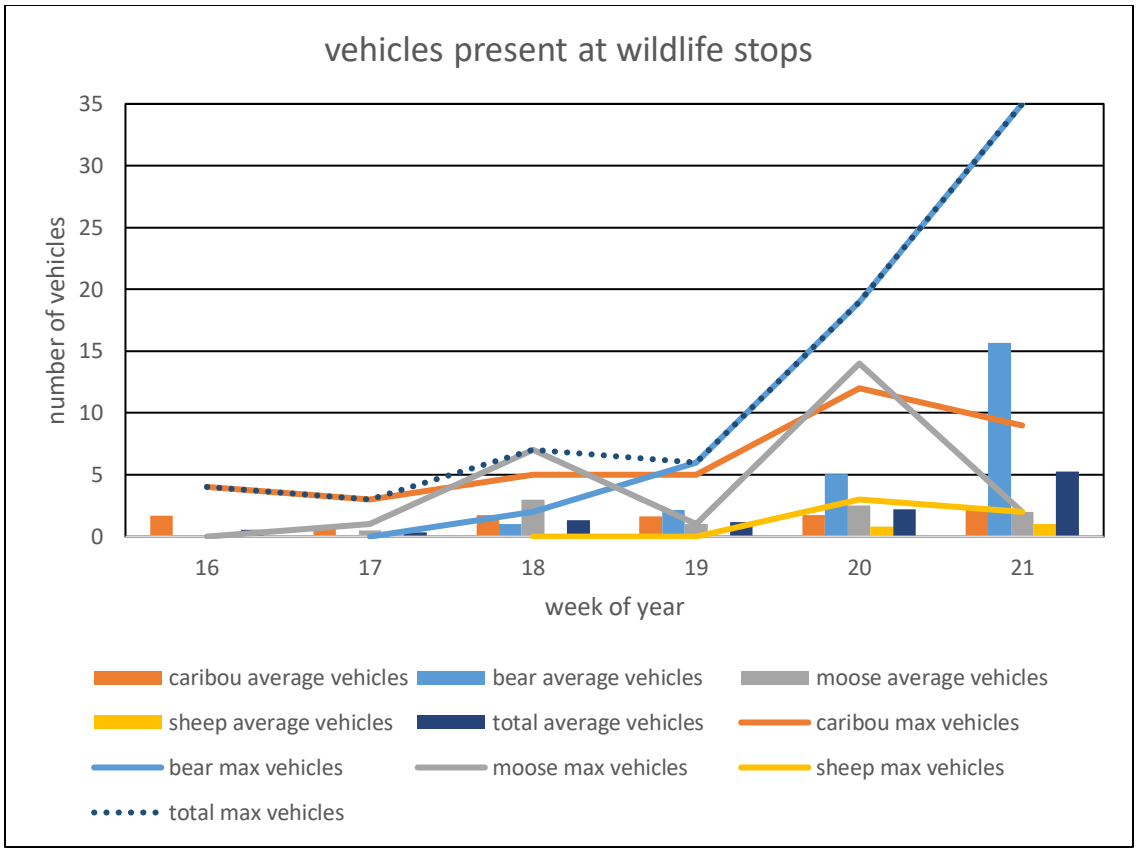

Figure 10. Average and maximum number of vehicles initially present at wildlife stops as a function of time of year on Denali Park Road (Denali National Park and Preserve, Denali Park, Alaska, USA). Week 16 is approximate to April 15th.

Animal Behavior

We initiated 15-minute behavioral observations on 124 wildlife stops. Nine of these observations were conducted on bicycle-based roves. Caribou was the most frequently observed species, followed by bear and moose. “Group bunch up,” “run away,” “walk away,” and “startled” were mostly classified as negative behaviors (Table 19). The most frequently recorded behavior was “brief glance” for caribou (44% of behavior), bear (51%), and moose (36%), but the most frequent behavior recorded for sheep was “stare” (50%). More than a quarter (27%) of all behavior observations were categorized as a negative response (
Table *20*). Target species returned to their initial behavior (most commonly, feeding and traveling) 77% of the time. There was no difference for wildlife returning to their initial behavior whether observed by bicycle or vehicle.

Table 19. Animal behavior and response to stimuli on Denali Park Road (Denali National Park and Preserve, Denali Park, Alaska, USA).

Behavior	Total Number of Instances	Neutral Response	Percentage Neutral	Negative Response	Percentage Negative
brief glance	148	147	99%	1	<1%
stare	50	43	86%	7	14%
walk away	48	10	21%	38	79%
feeding	28	27	96%	1	4%
group bunch	18	1	6%	17	94%
run away	15	1	7%	14	93%
lay down	10	10	100%		0%
trot away	8	3	38%	5	63%
startled	8	2	25%	6	75%
drift away	7	6	86%	1	14%
group reverse direction	3	1	33%	2	67%
other behavior	3	2	67%	1	33%
group split up	2	2	100%		0%
	348	255	73%	93	27%

Table 20. Animal behavior and response to stimuli by species observed on Denali Park Road (Denali National Park and Preserve, Denali Park, Alaska, USA).

Species	Behavior		
	Neutral	Negative	Total
Caribou	170 (75%)	58 (25%)	228
Bear	54 (76%)	17 (24%)	71
Moose	20 (71%)	8 (29%)	28
Sheep	7 (70%)	3 (30%)	10
Other species	4 (36%)	7 (64%)	11
All species	255 (73%)	93 (27%)	348

A Getis-Ord General G High/Low Clustering analysis showed random dispersal or significant clustering of neutral behaviors depending on the specified neighborhood distance among points was performed on animal behavior to determine statistically significant clustering of negative or neutral behaviors. Global Moran's I spatial autocorrelation test indicated there was a less than 1% likelihood that the observed clustering of neutral and negative behaviors was the result of random chance. Most behaviors were clustered in two areas: 1) the greater Savage River area displayed the highest density of both neutral and negative behaviors and 2) there was a cluster of negative behaviors from mile 25 to Teklanika Bridge (mile 32) caused by a series of visitor-wildlife interactions with a bear on the Teklanika River and a group of caribou running from a VTS bus.

Wildlife moving further from the road edge was much more frequently associated with observed negative responses to stimuli than neutral responses (Table 21).

Table 21. The correlation between wildlife response to visitor stimuli and their increased displacement from the road edge on the Denali Park Road (Denali National Park and Preserve, Denali Park, Alaska, USA).

Species	Response	Total Counts of Behavior Observations	Behavior Observations with Movement	Percentage of Behavior Observations with Movement
Caribou	Total	228	80	35%
	Neutral	170	34	20%
	Negative	58	46	79%
Bear	Total	71	29	41%
	Neutral	54	15	28%
	Negative	17	14	82%
Moose	Total	28	14	50%
	Neutral	20	7	35%
	Negative	8	7	88%
Sheep	Total	10	1	10%
	Neutral	7	0	0%
	Negative	3	1	33%
Other species*	Total	11	8	73%
	Neutral	4	2	50%
	Negative	7	6	86%

The small sample size of wildlife sightings and associated observed behaviors for bicycle-based roves limit the power of these results. However, some behaviors were not observed on bicycle-based roves ("lay down," "startled," "drift away," "group reverse direction," and "group split up") and "brief glances" were more frequent on bicycle-based roves, whereas, "walking away" and "group bunching" were more frequently observed in vehicle-based roves. The proportion of negative behaviors observed on bicycle-based roves were nearly the same as observed from vehicles (30% and 27%, respectively).

Chasing Events

Groups of wildlife were "chased" down the park road on four occasions. "Chasing" refers to wildlife using the road as a travel corridor and being herded down the road because of a stimulus. Two moose got separated and one was chased down the road by a POV near mile four. Three caribou were chased by a POV attempting to pass the group near mile nine. Six caribou were pushed by two tour buses and eventually surrounded by six POVs before they ran off the road near mile 20. Lastly,

four caribou were chased by two bicyclists attempting to pass near mile 40. All instances occurred later in the spring season in mid-May.

4.3.3 Shoulder Season Visitor Use West of Teklanika

Visitor use and visitor interaction with wildlife west of the Teklanika gate (mile 30) was observed via bicycle-based roves (*n* = 5) and vehicle-based roves (*n* = 5). From May 4 to May 19, staff recorded a total of 135 separate instances of visitor use with a total of 329 recreationists. More than half of these instances (92) were recorded on the weekend before the peak season began and the Park Road closed to POV traffic west of Savage River rest stop. Overall, visitor use was highest on Saturdays (Figure 11). The maximum number of visitors was observed on weekends. Bicycle-based surveys were primarily conducted on weekends when visitor use was predicted to be highest (Table 22). Visitor use on the portion of the park road west of the Teklanika gate was skewed toward biking, with 59% of all recorded visitor groups participating in that activity (Table 23).

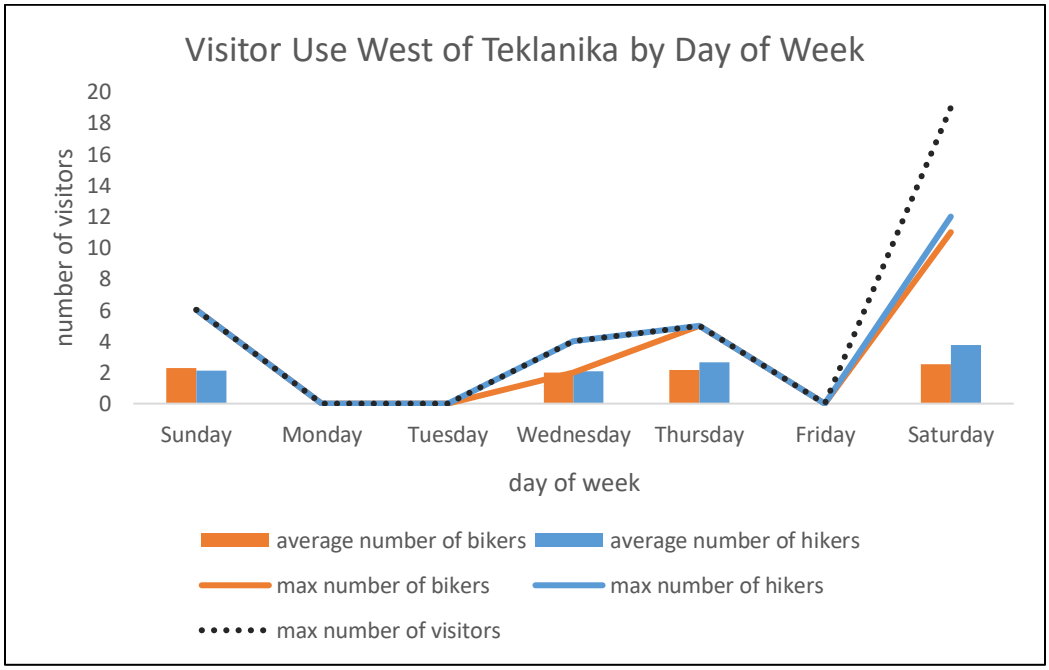

Figure 11. Visitor use by day of week on the Denali Park Road (Denali National Park and Preserve, Denali Park, Alaska, USA).

Table 22. Visitor use on the closed portion of the Denali Park Road during May 2019 (Denali National Park and Preserve, Denali Park, Alaska, USA).

Day of Week	Number of times GIP/VIP conducted rove on this day	Count of visitor groups	Total number of visitors observed	Average number of visitor groups per day
Sunday	2	61	134	30.5
Monday	1	0	0	0
Tuesday	--	--	--	--

Wednesday	1	13	27	13
Thursday	2	18	44	9
Friday	1	0	0	0
Saturday	3	43	124	14.3

"--" Indicates that observations were not conducted

Table 23. Frequency of visitor group size based on visitor activity (Denali National Park and Preserve, Denali Park, Alaska, USA).

Bikers					Hikers			
Group Size	Frequency of the group size	Percentage of all biker groups	Percentage of all visitor groups		Group Size	Frequency of the group size	Percentage of all hiker groups	Percentage of all visitor groups
1	28	35	21		1	12	21	9
2	30	38	22		2	31	53	23
3	9	11	7		3	4	7	3
4	2	3	1		4	8	14	6
5	3	4	2		5	1	2	<1
6	3	4	2		6	1	2	<1
7	3	4	2		12	1	2	<1
11	1	1	<1					
Total	79		59		Total	58		43

Note: The sum of the percentages of all visitor groups for bikers and hikers is 101.5 %. This is because there were two instances of a group with both bikers and hikers present.

4.3.4 Visitor and Wildlife Interaction West of Teklanika

Eighteen visitor-wildlife interaction events involving 65 visitors were recorded on the portion of the park road closed to POV traffic. Additionally, five unknown events when it was not apparent if visitors were stopped for wildlife or other reasons with 17 visitors were recorded. Unknown events were excluded from the wildlife interaction analysis. Three groups of visitors told staff they saw wildlife while biking. These events were not recorded as wildlife contact events because they were not directly observed.

During four of the 18 interaction events the visitors did not change their behavior around the wildlife. Two of these events were with bikers and Dall sheep far away from the road, one was with two bikers and a bear approximately 160 meters from the road, and one was with a hiker and a bear approximately 200 meters from the road. These events were still included in the overall analysis of visitor-wildlife interactions. Wildlife responded differently to stimuli observed during bicycle roves than vehicle roves, but sample size was small (Table *24*).

Table 24. Wildlife behavioral response to road-based stimuli based on type of rove on the Denali Park Road (Denali National Park and Preserve, Denali Park, Alaska, USA).

Behavior	All Roves		Vehicle Roves		Bicycle Roves	
Brief Glance	148	43%	135	41%	13	65%
Stare	50	14%	48	15%	2	10%
Walk Away	48	14%	47	14%	1	5%
Feeding	28	8%	27	8%	1	5%
Group Bunch	18	5%	17	5%	1	5%
Run Away	15	4%	14	4%	1	5%

Behavior	All Roves		Vehicle Roves		Bicycle Roves	
Lay Down	10	3%	10	3%		
Trot Away	8	2%	7	2%	1	5%
Startled	8	2%	8	2%		
Drift Away	7	2%	7	2%		
Other Behavior*	3	<1%	3	<1%		
Group Reverse Direction	3	<1%	3	<1%		
Group Split Up	2	<1%	2	<1%		
Total	348		328		20	

*other behaviors include getting up and scratching

Visitor-wildlife interaction events were recorded between mile 30 and mile 47 from May 15 to May 19, 2019. Ten of the interaction events occurred on May 18th and seven occurred on May 19th. There was a statistically significant cluster of interaction events on the east side of the Teklanika bridge (mile 32) and a cluster of events at mile 35. More than half of the interaction events (*n* = 10) were observed while visitors were observing bears. The remaining events occurred at sheep (*n* = 6) or caribou (*n* = 2) events.

The majority of visitor groups (72%) stopped and were not loud (83%) during interaction events. Few groups approached (*n* = 3) and or retreated from wildlife (*n* = 1). A slight majority of visitors reduced their volume and were quiet (56%).

Most wildlife interaction events were with one individual visitor or with groups of two to three (*n* = 14). A mixed group of 12 hikers and 7 bikers was observed at a sow and 2 cubs near Teklanika rest stop. The interaction events with the largest groups of visitors also had negative behavioral responses from the wildlife. An event with 11 bikers included four caribou being chased down the road by two bikers while the rest of the bikers watched. The event with 19 visitors, many of whom had dogs, resulted in a sow and two cubs “becoming agitated” when the dogs barked loudly.

4.4 Discussion

The spring period is outside the allocation season of the Vehicle Management Plan (VMP), which begins the Saturday before Memorial Day. Recent anecdotal information indicates that there are increased vehicle pressures both along the road and at rest stops during the spring when there is no monitoring protocol in place and reduced capacity to protect visitor experience or the resource.

This study includes the first wildlife observations conducted during the shoulder season period of mid-April through May 19 and is the first to include bicycle-based roves. As such, this dataset is not directly comparable to previous assessments of vehicle presence or effects of visitor use on animal behavior along the Park Road corridor. We note that the small sample sizes of observations from bicycle roves limit the interpretability of distinct trends between vehicle- and bicycle-based observations but may still provide insights and prompt further research.

4.4.1 Wildlife Tolerance and Location of Wildlife Events

Wildlife appear to have some level of tolerance to vehicles and visitor activities on the Park Road (e.g. vehicle noise, talking, camera noise, etc.). The majority of behavioral responses exhibited were neutral (73%) and the majority of animals returned to their initial behavior (77%). Nonetheless, more than one third (38%) of behavioral observations included movement away from the road. Moreover, wildlife were 3.5 times more likely to disperse from the road corridor if a negative response to stimuli was observed. Part of this large difference in reaction may be contributable to classifying "walk away" and "run away" as negative behaviors but it does suggest that once wildlife reach some tolerance limit, they will disperse from the road whether slowly or quickly. Over time, this dispersal may result in lower-quality wildlife viewing opportunities.

Respondents most desired to see grizzly bears on their trip to DENA in spring and grizzly bear sighting events had the highest mean, median, and maximum vehicle crowding of all wildlife events observed. A significant cluster of visitor-wildlife interactions occurred with grizzly bears between Teklanika rest stop and Teklanika Bridge the closed portion of the road.

4.4.2 Wildlife Behavior and Visitor Interactions

Generally, visitors did not practice appropriate wildlife safety on the roadway east of Teklanika. Visitors were frequently observed leaving their vehicles to approach wildlife, and there were three observations of vehicle chasing or herding wildlife. In contrast, few visitors approached wildlife west of Teklanika on the portion of the road closed to POV traffic, though sample size was small. The majority of visitors who interacted with wildlife on the closed portion of the road were not loud during the wildlife interaction.

We hypothesize two factors that could explain this difference. First, visitor familiarity with wildlife safety and practices varied between the user groups. Bicyclists on the closed portion of the Park Road were most frequently Alaskan, who were also frequently return visitors with previous knowledge of the park and presumably of wildlife safety. Second, it appeared some visitors felt a sense of security when their vehicle was nearby, which emboldened them to approach wildlife.

4.4.3 Different Sampling Methods

Bicycle-based Observations

Although wildlife were observed on almost every vehicle-based rove, wildlife were only observed on half of the bicycle roves. Vehicle-based roves allowed staff to move more quickly while conducting observations, potentially allowing for a "sneak up" effect on wildlife. Additionally, vehicle-based roves covered more mileage than bicycle-based roves. Approximately half of the route for the bicycle-based roves was through forested areas where visibility was limited.

4.5 Implications for Management

Visitor use (predominantly bicyclists) west of Teklanika, vehicle crowding at wildlife stops, and visitor-wildlife interaction events on the closed portion of the Park Road all increased as the

shoulder season progressed. Both the annual and inter-seasonal visitation increases have management implications regarding staffing, resource protection, visitor services, and facilities.

4.5.1 NPS Presence

No NPS staff other than the study's observers, a wildlife technician, and occasionally road crew were present at or west of Teklanika rest stop during the shoulder season. Many visitors approached the observer with questions about the wildlife, DENA in general, and spring activities. More NPS presence at Teklanika during the shoulder season, particularly later in the season when visitation is highest, could improve the visitor experience by addressing visitor's information needs. This desire was similarly reflected by the respondents to the spring survey when assessing their experience. Low staffing during this period, paired with vehicle crowding near wildlife and higher potential for visitor-wildlife interactions, makes enforcing safety practices difficult. Over the long-term, this could lead to problem wildlife and safety incidents. NPS presence, whether in the form of interpretation or VRP rangers, along both the open and closed portions of the road could help remediate this risk.

4.5.2 Rest Stop Crowding

Average and median vehicle counts at Teklanika rest stop also increased through the observation period, though the absolute maximum of observed vehicles on the fourth week of the observation period. We used VMP rests stop standards to compare to since they were developed to a desired condition for the both resource protection (e.g. vehicles parking on vegetation) and visitor experience (e.g. not having to wait in line for long periods) that in applies to any time of year. The mean number of vehicles parked on weekends and the maximum number of vehicles parked at Teklanika during the shoulder season far exceeded VMP desired conditions – a concern primarily for resource protection.

5.0 Synthesis and Conclusion

We found two primary user groups (broadly, Alaskans and non-Alaskans) that should be considered in management decisions for spring season access and services. Alaskans and non-Alaskans share a common primary activity (driving the road) but different secondary activity sets (biking and hiking on trails, respectively) and they view commercial needs drastically different. While a majority of both groups are driven by connecting to nature, Alaskans have a much higher propensity to also be motivated by social interaction, i.e. bonding with friend or family groups: Alaskans are more likely to use spring access opportunities to strengthen their community ties, whereas non-Alaskans use these opportunities for vacationing. Both groups are motivated by the lack of crowds (both vehicles and visitors) during spring and encountering large groups negatively affects their overall experience at DENA. At the same time, neither group is greatly interested in bus service, which would reduce road traffic further. Interestingly, about 1 in 6 respondents felt at least somewhat crowded on their DENA visit.

Apart from fewer people, the most common motivating factors for Alaskans to visit in spring are based on factors influenced by DENA management: POV access to Teklanika combined with the ability to bicycle without bus traffic west of the rest stop. Conversely, non-Alaskans visited DENA in spring because of reasons outside the control of management: e.g. “timing” in their personal lives for a vacation. While considering both user groups during decision-making is important, it may be that decisions to change management of the spring visitor experience will most directly affect the local community.

While a core desire of respondents was seeing wildlife, animals at more than one third of all wildlife observations moved away from the road (though not necessarily out of view or permanently) because of stimuli originating from the road and animals that displayed negative responses to stimuli almost certainly increased their distance from the road. Otherwise unnecessary movement by wildlife expends valuable energy and has the potential to stress wildlife, which negatively effects their health. Thus, visitor behavior at wildlife events and the amount and kind of vehicle access can negatively affect the quality of the opportunities most desired by 2019 spring visitors.

Observed visitor behavior at wildlife viewing opportunities supports that either the majority of visitors do not have sufficient information – as was self-reported in the survey – or they do not use their knowledge appropriately. Visitor behavior and survey results (fewer than 80% of respondents visited the MSLC) indicate a need to deliver wildlife safety information on the open portion of roadway to reinforce good wildlife safety and driving habits and to reduce the risk of wildlife-human conflict. The appropriate level of staffing is important to visitor experiences because our data suggest that visitors are satisfied with the amount of NPS staff presence and also that interactions with park rangers may not be desired.

This study was the first to assess spring visitation characteristics during the late spring shoulder season through simultaneous visitor experience surveys and road ecology wildlife observations. In

addition to the number of spring visitors, the characteristics of visitation appear to be also changing. Even with small sample sizes, we observed differences between respondents to the spring survey and visitors in other seasons in addition to parking constraints and some negative behavioral responses among wildlife. Thus, the spring shoulder season should be systematically studied. Continuing to study visitor demography, motivation, activity, and evaluation of their DENA experience will help to inform management of visitation changes to this season. As visitation in the shoulder season increases the visitor experience and park resource conditions could be affected. Continued monitoring of vehicle use and wildlife response to visitors' recreation, whether motorized or non-motorized, in the shoulder season will help to inform resource protection needs. Further study will also help management decipher if the results from this spring season were indicative of broader trends or uniquely apply to the visitors in 2019.

The spring shoulder season presents several challenges for park management: 1) balancing access with protecting opportunities to avoid crowds; 2) balancing POV access and maintaining high-quality visitor experiences including wildlife viewing opportunities; and 3) balancing staff presence for wildlife safety messaging and management with providing for opportunities to not interact with NPS staff. Some of these desired conditions are at odds with one another and similar to the issues that led to the development of the Vehicle Management Plan. Without public buses running, an increase in spring season popularity has consequences for vehicle crowding, which has implications on the visitor experience and wildlife presence and behavior along the road corridor. This presents a paradox: the more popular the spring season becomes because it is recognized as a time of smaller crowds, the more that the opportunities for enjoying smaller crowds during spring diminish. Spring season popularity, user group motivations, visitor activities, and vehicle access are all interconnected.

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Appendix A: Spring Visitor Experience Survey

National Park Service
U.S. Department of the Interior

OMB Control Number: xxxx-xxxx
Expiration Date: xx/xx/xxxx

Denali National Park and Preserve
Spring Visitor Survey

Paperwork Reduction and Privacy Act Statements: The Paperwork Reduction Act requires us to tell you why we are collecting this information, how we will use it, and whether or not you have to respond. This information will be used by the National Park Service as authorized by 54 USC 100702. Park managers will use this information to understand visitors' preferences of spring activities in Denali National Park and Preserve. Additional your input will be critical in understand possible future management scenarios at the park. Your responses are voluntary and anonymous. Your name and address will not be collected. At the completion of this collection all personal information will be destroyed and in no way be connected with the results of this survey. A Federal agency may not conduct or sponsor and you are not required to respond to, a collection of information unless it displays a currently valid OMB Control Number.

BURDEN ESTIMATE: We estimate that it will take an average of 12 minutes to complete this questionnaire. You may send comments concerning the burden estimates or any aspect of this information collection to: Dr. Rose Keller, Denali National Park &Preserve Social Scientist; rose_keller@nps.gov (email), or the Social Science Branch, National Park Service, 1201 Oakridge Drive, Fort Collins, CO, 80525-5596; nps_nrss_social_science@nps.gov (email).

Welcome to Denali National Park and Preserve! We hope you will take a few minutes to tell us about your experience in Denali, how you decided to come to Denali, and what is most important for your visit. Your responses will help us improve our services. Please complete and return this survey before you leave the park.

Start Here.

How many times have you visited Denali National Park **in spring** (April 1 – May 20)?

☐First visit OR _____visits *(# of times)*

Did you plan to stop in Denali today?

☐ Yes ☐ No

If you planned your visit, why did you decide to visit Denali **at this time of the year**?

_____

_____

_____

Have you ever visited Denali **in the summer** (May 15 – September 15)?

☐ Yes: _____ *(# of times)* OR ☐ No

a) If yes, do you **prefer to visit** Denali in the…
(choose ONE)

☐ **spring** (April 1 – May 20) OR ☐ **summer** (May 20 – September 15)

b) Why?

_____

_____

How long is your trip **in Alaska**?
_____ (*write number of days*) OR ☐ I live in Alaska

How long do you plan to stay in the Denali area (in the park or in the surrounding communities)?

☐ only today ☐ 1 night ☐ 2 nights ☐ 3 or more nights OR ☐ I live in the Denali area

What activities did you participate in or do you plan to participate in during this trip to Denali?
a) ***Choose all that apply***

☐ A. hiking on trails
☐ B. hiking off-trail
☐ C. biking on the park road
☐ D. camping in a campground
☐ E. backcountry camping
☐ F. visiting the visitor center
☐ G. visiting the park kennels (sled dogs)
☐ H. driving the park road
☐ I. other: _____

b) What is your **primary** activity today in Denali? (***write the letter from part a above***) Primary activity today: _____

During this visit to Denali, did you have any personal interaction with a park ranger before receiving this survey?
☐ Yes ☐ No

Did you have the information about Denali that you needed during your trip?
☐ Yes
☐ No (*please specify information you needed but didn't have*)
_____
_____
_____

For future visits, what would be the best way for you to obtain information about Denali? ***(Choose all that apply)***

- ☐ NPS.gov websites
- ☐ Other websites
- ☐ Social media
- ☐ Park brochure
- ☐ Signs or kiosks in the park
- ☐ Visitor center
- ☐ Ranger
- ☐ Guidebook
- ☐ Park information line (907-683-9532)
- ☐ Not sure
- ☐ Other: _____

From the options given, what do you most want to **experience** in Denali? ***(Choose up to three)***

- ☐ A connection with nature
- ☐ Solitude
- ☐ Physical activity
- ☐ A sense of adventure
- ☐ Bond with my friends/family
- ☐ Being away from people and noise
- ☐ Learning about the park
- ☐ Other: I want most to experience _____

From the options given, what do you most want to **see** in Denali? ***(Choose up to three)***

- ☐ Wildlife: *which animal(s)?* _____
- ☐ Denali (the mountain)
- ☐ Natural scenery
- ☐ People recreating
- ☐ Exhibits in the visitor center
- ☐ Other: *I most want to see* _____

What are the 3 main things you need in order to have a high quality experience in Denali during this time of the year? *(please be specific)*

1._____

2._____

3._____

Overall, how satisfied are you with your trip in Denali?

a)

Very dissatisfied	Somewhat dissatisfied	Neutral	Somewhat satisfied	Very satisfied
1	2	3	4	5

b)

Please describe an important thing Denali managers could do to improve your experience:

_____

_____

_____

Please tell us how you feel about the following services and facilities offered in Denali

- First **rate how important** each item is to you when visiting Denali
- Then **rate how satisfied** you are with the way Denali is managing for each item

Importance						Satisfaction				
Very unimportant	Somewhat unimportant	Neither	Somewhat important	Very important	Park Services and Facilities	Very unsatisfied	Somewhat unsatisfied	Neither	Somewhat satisfied	Very satisfied
1	2	3	4	5	Availability of NPS employees	1	2	3	4	5
1	2	3	4	5	Information available inside park	1	2	3	4	5
1	2	3	4	5	Parking at Teklanika	1	2	3	4	5
1	2	3	4	5	Ranger programs	1	2	3	4	5
1	2	3	4	5	Number of bathrooms	1	2	3	4	5
1	2	3	4	5	Visitor center	1	2	3	4	5
1	2	3	4	5	Camping opportunities	1	2	3	4	5
1	2	3	4	5	Opportunities to escape crowds	1	2	3	4	5

Denali managers would like to understand what visitors most want to do in the park.

If the following commercial services were available today, how likely would you be to participate?

	Definitely Not	Probably Not	Possibly	Probably	Definitely
Guided biking on the closed portion of the park road (past Teklanika)	1	2	3	4	5
Narrated bus tour to Teklanika	1	2	3	4	5
Shuttle bus to Teklanika	1	2	3	4	5
Bike rentals	1	2	3	4	5
Outdoor gear rentals:_____	1	2	3	4	5
Guided off-trail hiking	1	2	3	4	5
Other:_____	1	2	3	4	5

How would the following services *change* your experience in Denali?

	Greatly Detract	Somewhat Detract	Not at All	Somewhat Improve	Greatly Improve
Access to Savage, Sanctuary, or Teklanika campgrounds	1	2	3	4	5
More parking at Teklanika	1	2	3	4	5
Shuttle to Teklanika	1	2	3	4	5
Activities with Rangers	1	2	3	4	5
Food and beverage for purchase	1	2	3	4	5

We manage the park to maintain a true wilderness experience for our visitors. This means we occasionally ask visitors what they see, hear, and feel about their time recreating and exploring in the park.

How would encountering large groups while recreating outside impact your experience?

Very negatively	Somewhat negatively	Not at all	Somewhat positively	Very positively
1	2	3	4	5

In your opinion, how many people would make up a "large group?"

_____ (*write in # of people*)

How crowded did you feel at the following sites?

	Not at all crowded	Somewhat Crowded	Crowded	Extremely Crowded	Not Applicable
On hiking trails	1	2	3	4	N/A
On the open portion of the park road (entrance to Teklanika rest area)	1	2	3	4	N/A
On the closed portion of the park road (past the Teklanika rest area)	1	2	3	4	N/A
In Teklanika rest area parking lot	1	2	3	4	N/A
In visitor center parking lot	1	2	3	4	N/A
In the visitor center	1	2	3	4	N/A
During your entire visit	1	2	3	4	N/A

What is your gender? (*write in*) _____

In what year were you born? (*write in*) _____

Which category best fits your household's total income in the past 12 months

☐under $25,000
☐$26,000—39,999
☐$40,000– 69,999
☐$70,000—99,999
☐$100,000—150,000
☐$150,000—200,000
☐$200,000 or more
☐prefer not to answer

10

How many people are in your household? _____

What is the total anticipated cost of this trip from when you left home to when you return? ($)_____

Where is your primary residence? (***Check one, and write in***)

- ☐ Alaska (*provide zip code)* _____
- ☐ Other U.S. State (*provide State)* _____
- ☐ Canada (*provide Province/Territory)* _____
- ☐ Other country (*provide Country)*_____

What is your level of formal education? ***(Check one)***

- ☐ some high school
- ☐ high school graduate
- ☐ some college/vocational school
- ☐ four-year college degree [or Bachelor's degree]
- ☐ master's Degree [or Graduate degree]
- ☐ Ph.D., M.D., J.D., or equivalent

What kind of group are you traveling with on this trip? ***(Check one)***

- ☐ family
- ☐ family and friends
- ☐ friends
- ☐ N/A, self

How many are in your group? _____

Are you part of a guided tour?

☐ No ☐ Yes (*name of company*) _____

What is your occupation? _____

Which of these categories best indicates your race or ethnicity? Answer only for yourself. ***(Check one or more)***

- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Black or African American
- ☐ Hispanic or Latino
- ☐ Native Hawaiian or other Pacific Islander
- ☐ White
- ☐ Other _____

Do you have any additional comments? We would love to hear about your experience: good and bad!

THANK YOU for your help and feedback. Your experience in Denali truly matters!

END

Appendix B: Spring Visitor Experience Survey (Uncollapsed Percentages)

National Park Service
U.S. Department of the Interior

OMB Control Number: xxxx-xxxx
Expiration Date: xx/xx/xxxx

Denali National Park and Preserve
Spring Visitor Survey

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Welcome to Denali National Park and Preserve! We hope you will take a few minutes to tell us about your experience in Denali, how you decided to come to Denali, and what is most important for your visit. Your responses will help us improve our services. Please complete and return this survey before you leave the park.

Start Here.

How many times have you visited Denali National Park **in spring** (April 1 – May 20)?

60% First visit OR *M=3.62* visits *(# of times)*

Did you plan to stop in Denali today?

92% Yes 8% No

If you planned your visit, why did you decide to visit Denali **at this time of the year**?

See report

Have you ever visited Denali **in the summer** (May 15 – September 15)?

37% Yes: *M=2.88* visits *(# of times)* OR 63% No

a) If yes, do you **prefer to visit** Denali in the…
(choose ONE)
60% **spring** (April 1 – May 20) OR 36% **summer** (May 20 – September 15)

b) Why?

See report

3

How long is your trip **in Alaska**?
M=19.49 (*write number of days*) OR 37% I live in Alaska

How long do you plan to stay in the Denali area (in the park or in the surrounding communities)?

45% only today 13% 1 night 18% 2 nights 18% 3 or more nights
OR 6% I live in the Denali area

What activities did you participate in or do you plan to participate in during this trip to Denali?

a) ***Choose all that apply***

66% A. hiking on trails
11% B. hiking off-trail
8% C. biking on the park road
16% D. camping in a campground
5% E. backcountry camping
68% F. visiting the visitor center
38% G. visiting the park kennels (sled dogs)
91% H. driving the park road
12% I. other: *See report*

b) What is your **primary** activity today in Denali? (***write the letter from part a above***) Primary activity today: _____

21% A. hiking on trails
1% B. hiking off-trail
6% C. biking on the park road
2% D. camping in a campground
1% E. backcountry camping
2% F. visiting the visitor center
2% G. visiting the park kennels (sled dogs)
57% H. driving the park road
8% I. other: *See report*

During this visit to Denali, did you have any personal interaction with a park ranger before receiving this survey?

62% Yes 38% No

Did you have the information about Denali that you needed during your trip?

89% Yes
10% No (*please specify information you needed but didn't have*)
See report

For future visits, what would be the best way for you to obtain information about Denali? ***(Choose all that apply)***

74% NPS.gov websites
14% Other websites
31% Social media
44% Park brochure
30% Signs or kiosks in the park
64% Visitor center
41% Ranger
20% Guidebook
12% Park information line (907-683-9532)
2% Not sure
1% Other: *See report*

From the options given, what do you most want to **experience** in Denali? ***(Choose up to three)***

85% A connection with nature
32% Solitude
36% Physical activity
49% A sense of adventure
27% Bond with my friends/family
37% Being away from people and noise
30% Learning about the park
14% Other: I want most to experience *See report*

From the options given, what do you most want to **see** in Denali? ***(Choose up to three)***

92% Wildlife: *which animal(s)?* 51% bear, 29% moose, 16% wolf, 15% caribou, 12% other wildlife, 11% sheep, 8% "all"

73% Denali (the mountain)
78% Natural scenery
2% People recreating
5% Exhibits in the visitor center
3% Other: *I most want to see See report*

What are the 3 main things you need in order to have a high quality experience in Denali during this time of the year? *(please be specific)*

See report

Overall, how satisfied are you with your trip in Denali?

a)

Very dissatisfied	Somewhat dissatisfied	Neutral	Somewhat satisfied	Very satisfied
1%	0%	3%	20%	76%

b)

Please describe an important thing Denali managers could do to improve your experience:

See report

Please tell us how you feel about the following services and facilities offered in Denali

- First **rate how important** each item is to you when visiting Denali
- Then **rate how satisfied** you are with the way Denali is managing for each item

Importance						Satisfaction				
Very unimportant	Somewhat unimportant	Neither	Somewhat important	Very important	**Park Services and Facilities**	Very unsatisfied	Somewhat unsatisfied	Neither	Somewhat satisfied	Very satisfied
4%	7%	8%	42%	38%	Availability of NPS employees	<1%	1%	12%	20%	67%
5%	4%	4%	28%	58%	Information available inside park	2%	3%	10%	32%	53%
5%	8%	28%	24%	34%	Parking at Teklanika	3%	<1%	27%	16%	53%
11%	10%	30%	23%	27%	Ranger programs	2%	2%	50%	13%	34%
6%	3%	12%	30%	49%	Number of bathrooms	3%	<1%	11%	24%	61%
6%	3%	9%	27%	56%	Visitor center	4%	<1%	8%	20%	68%
9%	4%	28%	15%	44%	Camping opportunities	2%	6%	38%	9%	45%
5%	2%	7%	17%	69%	Opportunities to escape crowds	1%	5%	8%	16%	70%

Denali managers would like to understand what visitors most want to do in the park.

If the following commercial services were available today, how likely would you be to participate?

	Definitely Not	Probably Not	Possibly	Probably	Definitely
Guided biking on the closed portion of the park road (past Teklanika)	14%	23%	29%	18%	16%
Narrated bus tour to Teklanika	18%	22%	30%	18%	12%
Shuttle bus to Teklanika	17%	22%	28%	18%	15%
Bike rentals	9%	19%	36%	20%	17%
Outdoor gear rentals: *See report*	12%	28%	33%	15%	12%
Guided off-trail hiking	11%	15%	19%	31%	25%
Other: *See report*	25%	4%	21%	13%	38%

How would the following services *change* your experience in Denali?

	Greatly Detract	Somewhat Detract	Not at All	Somewhat Improve	Greatly Improve
Access to Savage, Sanctuary, or Teklanika campgrounds	1%	1%	45%	33%	19%
More parking at Teklanika	1%	3%	68%	20%	8%
Shuttle to Teklanika	4%	4%	62%	21%	11%
Activities with Rangers	1%	4%	37%	38%	20%
Food and beverage for purchase	9%	3%	40%	28%	19%

We manage the park to maintain a true wilderness experience for our visitors. This means we occasionally ask visitors what they see, hear, and feel about their time recreating and exploring in the park.

How would encountering large groups while recreating outside impact your experience?

Very negatively	Somewhat negatively	Not at all	Somewhat positively	Very positively
24%	53%	17%	3%	3%

In your opinion, how many people would make up a "large group?"

M=14.10 (write in # of people)

How crowded did you feel at the following sites?

	Not at all crowded	Somewhat Crowded	Crowded	Extremely Crowded	Not Applicable
On hiking trails	67%	3%	1%	0%	28%
On the open portion of the park road (entrance to Teklanika rest area)	70%	17%	3%	<1%	9%
On the closed portion of the park road (past the Teklanika rest area)	54%	6%	<1%	0%	39%
In Teklanika rest area parking lot	60%	18%	6%	<1%	15%
In visitor center parking lot	58%	26%	9%	<1%	7%
In the visitor center	67%	21%	3%	<1%	9%
During your entire visit	81%	13%	4%	0%	2%

What is your gender? (*write in*): 50% Male 49% Female 1% non-binary

In what year were you born? (*write in*): *M=43 years old*

Which category best fits your household's total income in the past 12 months

7% under $25,000
10% $26,000—39,999
16% $40,000– 69,999
24% $70,000—99,999
18% $100,000—150,000
8% $150,000—200,000
5% $200,000 or more
13% prefer not to answer

10

How many people are in your household? *M=2.33*

What is the total anticipated cost of this trip from when you left home to when you return? *M= $2318.74*

Where is your primary residence? (***Check one, and write in***)

38% Alaska (*provide zip code)* 45% from Fairbanks
49% Other U.S. State (*provide State)* 33% from the South
3% Canada (*provide Province/Territory)*
10% Other country (*provide Country)*

What is your level of formal education? ***(Check one)***

0% some high school
7% high school graduate
20% some college/vocational school
44% four-year college degree [or Bachelor's degree]
25% master's Degree [or Graduate degree]
4% Ph.D., M.D., J.D., or equivalent

What kind of group are you traveling with on this trip? ***(Check one)***

55% family
22% friends
7% family and friends
17% N/A, self

How many are in your group? *M=2.66 people*

Are you part of a guided tour?

98% No 2% Yes (*name of company*)
Holland America Princess and other

11

What is your occupation? *See report*

Which of these categories best indicates your race or ethnicity? Answer only for yourself. ***(Check one or more)***

2% American Indian or Alaska Native
6% Asian
<1% Black or African American
6% Hispanic or Latino
<1% Native Hawaiian or other Pacific Islander
88% White
2% Other *See report*

Do you have any additional comments? We would love to hear about your experience: good and bad!

See Report

THANK YOU for your help and feedback. Your experience in Denali truly matters!

END

Appendix C: Disaggregated Percentages for Commercial Services Survey Questions

Appendix C Table 1. Visitors' evaluation of participation in commercial services (percentage of subpopulations) at Denali National Park during spring shoulder season (Denali Park, Alaska, USA).

Commercial Service	Likelihood of Participation				
	Definitely Not	Probably Not	Possibly	Probably	Definitely
Guided biking					
Lower 49	10	21	36	21	11
Alaska	16	23	27	13	21
International	20	25	15	25	15
Total Population	14	23	29	18	16
Narrated bus tour to Teklanika					
Lower 49	16	23	23	21	17
Alaska	22	20	36	13	9
International	15	25	35	20	5
Total Population	18	22	30	18	12
Shuttle bus to Teklanika					
Lower 49	14	20	29	21	16
Alaska	22	20	27	16	15
International	17	33	28	11	11
Total Population	17	22	28	18	15
Bike rentals					
Lower 49	6	14	40	21	19
Alaska	13	23	30	20	14
International	11	21	37	16	16
Total Population	9	19	36	20	17
Outdoor gear rentals					
Lower 49	10	31	32	12	15
Alaska	15	19	37	17	13
International	6	44	25	25	0
Total Population	12	28	33	15	12
Guided off-trail hiking					
Lower 49	7	16	16	36	25
Alaska	15	13	27	18	27
International	15	15	5	45	20
Total Population	11	15	19	31	25
Other Commercial Service					
Lower 49	11	11	33	11	33
Alaska	27	0	18	9	45
International	50	0	0	25	25
Total Population	25	4	21	13	38

Appendix C Table 2. Percentage of visitors' evaluations of potential services changing their experience at Denali National Park and Preserve during the spring shoulder season (Denali Park, Alaska, USA).

Commercial Service	Greatly Detract	Somewhat Detract	No Change	Somewhat Improve	Greatly Improve
Access to Savage, Sanctuary, or Teklanika campgrounds					
Lower 49	0	1	56	24	19
Alaska	4	0	29	44	24
International	0	6	53	41	0
Total Population	1	1	45	33	19
More parking at Teklanika rest stop					
Lower 49	0	3	67	22	9
Alaska	4	2	63	22	9
International	0	7	93	0	0
Total Population	1	3	68	20	8
Shuttle bus to Teklanika					
Lower 49	0	4	63	22	11
Alaska	7	2	56	24	11
International	7	7	80	0	7
Total Population	4	4	62	21	11
Activities with Rangers					
Lower 49	0	0	37	38	25
Alaska	4	7	35	43	11
International	0	6	44	25	25
Total Population	1	4	37	38	20
Food and beverage for purchase					
Lower 49	3	3	42	27	25
Alaska	16	2	35	33	15
International	12	12	47	18	12
Total Population	9	3	40	28	19

Appendix D: Survey Distribution and Road Ecology Rove Sampling Schedule

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			April 10	11	12	13
14	15	16	***13:15 - 15:15*** 17	18	19	20
21	22	***1200*** 23	24	25	26	***1000*** 27
10:00 - 16:15	***1000*** ***12:30 - 13:30*** ***1300*** ***1400*** ***15:30 - 16:00***	road closed: inclement weather	***800*** ***1600*** ***16:15 - 17:15***	road opened to Teklanika (mile 30)	***1000*** ***13:00 - 15:30***	***1000*** ***1300*** ***1600***
28	29	30	**May** 1	2	3	4
10:15 - 16:15 5	***10:00 - 16:00*** 6	7	***1000*** ***13:00 -17:00*** ***1400*** 8	***900*** ***1100*** ***15:00 - 15:30*** ***1500*** 9	***1200*** 10	***900*** ***900*** ***12:00 - 16:30*** ***1400*** 11
800 12	***1200*** 13	***9:45 - 16:30*** 14	***1400*** ***15:45 - 17:45*** 15	***900*** ***1100*** ***1500*** 16	17	***1400*** 18
900 ***1400*** 19	20	***900*** ***1600***	***1000***	***800*** ***1100*** ***1500***	***800*** ***13:15 - 17:15*** ***1600***	***800*** ***1000*** ***1100*** ***1600***
800 ***1000*** ***11:30 - 12:15*** ***1200*** ***17:45 - 19:00*** ***1800***	Peak season start date - road closed to POV traffic past mile 15					

KEY:

survey distribution sites: **Teklanika** **MSLC** **Savage**

wildlife observation roves: **vehicle rove** **bicycle rove** **VRP or wildlife**

Appendix E: Recommendations

Future Studies

- A second interception with respondents may improve the low response rate from visitors who took a survey with them but did not return it to the MSLC, especially if that interception also offers directions for the front country campus. Some visitors indicated confusion about the visitor center location and hours of business.
- Establish a standardized visitor counting system at Teklanika rest stop that includes returning bikers. Bikers returning from a trip often would load their gear and quickly use the restroom before leaving the rest stop. On busy days the survey administrator would count visitors based on when they approached the overlook, thus the returning biker population was excluded from the sample on busy days.
- Standardize a road ecology rest stop vehicle count schedule that includes Savage River and Mountain Vista rest stops. These rest stops and surrounding trails were not as frequently observed as Teklanika rest stop and measures of visitor use in these areas during the shoulder season could be missing from the observations of shoulder season use.
- Set up a traffic counter at Savage box when the road opens to POV traffic to Teklanika to get a sense of actual vehicle counts on the open portion of the Park Road. This would be an interesting comparison to visitor perceptions of crowding at this location.

Management Actions

- Expand interpretation program offerings during shoulder season. Many visitors noted their appreciation for contact with park rangers. A majority of survey participants indicated that ranger programs would improve their experience.
- Regularly roving the trails could improve the ranger's ability to give visitors trail information, particularly when spring conditions are changing frequently. This could also provide more opportunities for visitors to learn about wildlife safety and Leave No Trace principles.
- Focus on messaging and managing expectations as the shoulder season becomes more popular for first-time visitors. Messaging should primarily focus on best practices of behavior near wildlife (particularly for motorized activity), trail condition, and the services available in the park and surrounding communities during the shoulder season.
- Increase law enforcement and wildlife technician presence to enforce wildlife safety practices and speed limits. Patrols should be concentrated on weekends.
- Continue to monitor vehicle counts at rest stops and vehicle-wildlife or non-motorized visitor-wildlife interactions during the shoulder season.

- Develop a winter and shoulder season plan to address visitor management, particularly vehicle management, during this period.
- Encourage expanded shoulder season business operations outside DENA. Bike rentals had the highest rate of possible participation among survey respondents from the Lower 49, the largest subpopulation of survey participants. Additionally, food and beverage services within the park are controversial, but they were also identified as a need by spring visitors.