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National Park Service
U.S. Department of the Interior

Final Report
NOVEMBER 2019

Yellowstone National Park Summer 2018 Visitor Use Surveys



***In the Moment Park
Experiences and Perceptions***



Prepared for Yellowstone National Park by the Summer Visitor Use Research Team:
Otak Inc. | RRC Associates | University of Montana—Institute for Tourism and Recreation Research



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Introduction



Introduction

Annual Yellowstone National Park (Yellowstone) visitation has increased close to 45% since the early 2000s with much of the increase in the past five years. Yellowstone visitation rose to historic levels of use at 4.2 million visits in 2016. Based on historical visitation trends, growing international visitation, the retirement of Baby Boomers, and high levels of visitation from Gen X, demand for visitation is expected to continue to increase. In addition, a 2016 traffic mobility study (Otak) found the level of service on most Yellowstone roads rated a D during peak times, indicating serious platooning and delays causing safety issues for visitors. Using data garnered from the transportation mobility study, park management identified multiple areas of concern as “focal congested corridors.” These congested corridors are largely stemming from either dense vehicular traffic or wildlife jams. With this knowledge, Yellowstone managers identified a desire and need to evaluate experiences of different visitor segments at a subset of attractions within the park’s focal congested corridors. At the time, a gap existed in the knowledge of how visitor experiences are impacted by conditions in real-time and across time and space. Thus, the park’s stated goal was to understand the specific experiences of the visitor during the experience itself, not after leaving the park and reflecting back on their overall experience, and to identify how different groups of people experience the park across the season and across crowding gradients. In preparation for future management plans, park managers seek to capture data about their summer visitor as closely as possible to the actual times, locations, and situations in which visitors experience the park.



In order to address Yellowstone’s gaps in research, the 2018 Yellowstone National Park Summer Visitor Use project aimed to capture an array of information specific to sites spread across the park and across the entire summer season. Visitor research in Yellowstone has been intermittent with summer visitor research conducted in both 2015 and 2016. However, the previous studies have focused on park-wide issues and did not delve into site-specific research. Thus, the 2018 Summer Visitor Use project utilized multiple methodologies to obtain data from summer visitors at a number of sites in Yellowstone.

Methodology:

Visitor preference research is generally conducted using either intercept surveys (visitors contacted on-site to complete a survey on their experience) or through post-visit surveys (surveys completed once the visitor completes their trip). Both methodologies provide valuable insight but have their own challenges with collecting



data while events unfold. Yellowstone was interested in understanding the “in-the-moment” experiences of park visitors. To do this, a new methodology was needed. The 2018 Summer Visitor Use project utilized two methodologies:

- 1) A geofenced, tablet-based survey. (Defined as the Geofence Surveys throughout)
- 2) A traditional intercept survey at sites within Yellowstone. (Defined as Intercept Survey throughout)

Researchers and park managers chose to use both of these methodologies because managers wanted real-time information from visitors and also the ability to segment results by a variety of different groups including first-time/repeat, by residency, and time spent in the park. Achievement of both goals, real-time information and segmentation, was only possible through two methodologies.

Geofence Surveys:

Real-time visitor experiences were captured through the geofenced tablet methodology. The research team partnered with an application development firm to create a project-specific tablet application that would deliver surveys to visitors as they traveled through Yellowstone. Geofencing technology is commonly used in the business world to push notifications to customers at shops, deliver information to visitors on-site, and record feedback. A geofence is a polygon on a map created by latitude and longitude vectors. As a mobile device passed/exited through the geofence specified, the respondents were prompted to provide insights into their current experience in Yellowstone. This methodology not only allowed for surveys delivered at specific sites across the park but also recorded the GPS location from the visitor (see Appendix A for geofence locations).

Geofences were created based on internal research from Yellowstone on specific attraction areas of interest. A balance of high use, moderate use, and low use areas were selected for geofenced surveys. In addition, geofences were created on specific roadways to inquire about visitors’ current experience on the roadway. Thus, a total of 23 geofences (10 roadways, 13 attractions) were developed to deliver surveys related to the site to visitors.

The Geofence Survey methodology was conducted by surveyors who were stationed at pullouts slightly past each of the five entrance gates to the park (see Appendix B for staging area location). As vehicles approached the staging area pullout in the park, surveyors flagged the vehicles into the pullout to ask if they would participate in a tablet-based survey for one day of their Yellowstone experience. If the participant agreed, a tablet was given to the individual to carry for the day, which would deliver surveys along roadways and attractions of interest. A demographic/traveler characteristic survey was first presented to respondents to capture their demographic information, trip characteristics, and other basic information. As they traveled throughout the park, the tablet presented them with short surveys about the area recently passed based on their GPS location in the park. For instance, if a visitor passed through Mammoth Hot Springs, a short survey would be asked of the visitor on their perception of crowding, problems experienced, and if they stopped at the site (see Appendix C for Geofence Surveys).



Intercept Survey:

A second methodology was needed to sufficiently segment survey results of specific groups, especially of more niche groups in Yellowstone. The Geofence Survey allowed for a park-wide representation of results, but the Intercept Survey aimed to provide additional data at select sites on similar questions. In addition, the Intercept Survey allowed for more in-depth segmentation by demographics and visitor characteristics. Thus, the Intercept Survey was developed to complement the attraction surveys on the Geofence Survey. Nearly identical questions, plus more in-depth choices, were included in the Intercept Survey. Further, the Intercept Survey site locations were selected based on the geofences created for the tablet methodology.

Surveyors would approach visitors at the site to ask them to participate in a short survey about their experience both park-wide and at that specific attraction. Sites included high, moderate, and low use areas to gain a full picture of how intercepted visitors perceived crowding, expectations, and ratings of their experience. Sampling dates were stratified and represented a complete picture of summer visitation (see Appendix D for Intercept Survey locations).

The Role of Both Samples

As described above, this study contains **two different methodologies with two separate populations of respondents**. The population of users for the Geofence survey were all visitors who entered the park had a potential chance to participate during the sampling period. The Intercept Study's population are all visitors who visited a specific attraction site during the sampling period. Therefore, the Intercept Study represents a segment of only visitors who would have stopped at one of the attraction sites being surveyed. Those who participated in the Geofence Study are separate visitors from those who participated in the Intercept Study. The purpose of using two methodologies was to capture the widest range of visitors plus build a sample for group comparisons. The Geofence Study is intended to serve as the broader, park-wide results. Since respondents were contacted near the entrance, all visitors were potentially able to participate in this methodology. The Intercept Study's primary purpose was to build a large sample of visitors at specific sites to compare groups in addition to asking some more general questions. Both studies utilized a random sample methodology, but the universe of respondents differs. The Intercept Study population is a subset of the Geofence Study's and reflects respondents to attractions within the park. Though slightly different, the population within the two studies tell a similar story overall.

Because these two studies are comprised of two different populations, two sets of demographics and characteristics are presented. Both samples have separate demographics/characteristics, which are specific to their own methodology. There are differences between some demographics and characteristics due to the differences in methodology, approach, and general variation in the data. **This does not imply that one set of demographics and/or associated data is more accurate than the other. Each set represents a different sub-set of Yellowstone visitors.** The demographics and characteristics of the Geofence Study represent those who were intercepted at one of the five entrance gates. The demographics and characteristics of those in the Intercept Study represent respondents who were intercepted at specific attractions across the park.



Sampling and Daily Schedules

One week each month, May through September 2018, was assigned by the park as the sampling days for this study. The following dates were chosen using recent historical entrance data in order to sample weeks that allow differences in months and differences in usage levels to be observed throughout the season.

- May 20-26
- June 10-16
- July 7-13
- August 19-25
- September 15-21

One surveyor was assigned to the north entrance for tablet distribution and to Mammoth, Tower Falls, and Norris Geyser for intercept surveys.

One surveyor was assigned to the East and Northeast entrances for tablet distribution and to Canyon Village, North and South Canyon Rims, Hayden Valley, and Lamar Valley for intercept surveys.

One surveyor was assigned to the south entrance for tablet distribution and to West Thumb Geyser Basin, Lake Village/Fishing Bridge, and Old Faithful for intercept surveys.

Two surveyors were assigned to the West entrance for tablet distribution and to Midway Geyser, Fairy Falls, Fountain Paint Pot, and Old Faithful for intercept surveys. Two surveyors were needed at the West entrance due to the high volume of traffic that enters at that gate. In addition, one of these surveyors was a Mandarin speaker to enable conversation with the high volume of Asian visitors to Yellowstone, a majority of whom enter the park from the West entrance.

Each sampling day started at different times in the morning from 8:00 am to 10:00 am. Upon completion of the tablet distribution, the surveyor would drive to the assigned attraction for intercept surveys. Most days there was more than one attraction site in which to collect data. At the end of their intercept data collection, the surveyor would drive to the Geofence Survey drop-off boxes in their district to collect all tablets dropped off that day. Upon arrival at their overnight location, the surveyor would connect to the internet, upload all the data from each tablet, and re-set them for the next day of distribution. This would be repeated each day (with one day off during the 7-day survey week). See Appendix E for the entire summer sampling schedule.



Nonresponse testing and weighting:

Throughout the survey process for both the Intercept and Geofence Surveys, counts were recorded for visitors who did not wish to participate in the survey process. These were recorded as either individuals who answered the non-response bias questions and those who outright refused to participate at all. Non-response bias questions are asked of visitors who are not willing to participate in the study, but are willing to share details about themselves or their trip to compare against those who do participate. The purpose of these questions is to test whether those who agreed to participate are different from those who did not participate. For this study, four primary questions were asked as non-response bias questions: 1) What language do you prefer to use in the park? 2) How many adults, 18 and older are in your group? 3) How many children, under 18, are in your group? 4) Are you a first-time visitor to Yellowstone? If respondents were willing to provide answers to these questions, they were considered “non-response participant.” If they were not willing to provide any answers, they were counted as “refusals.” The total sample size among these groups alongside the total counts are displayed below:

- Intercept Survey respondents: 2,738 respondents
 - Intercept non-response participants: 345 respondents
 - Intercept refusals: 538 individuals
 - Intercept overall response rate: 76%
- Geofence total respondents: 1,425
 - Geofence non-respondents: 291
 - Geofence refusals: 226
 - Geofence overall response rate: 73%

Weighting was applied to both data sets by comparing five non-response bias questions asked of non-respondents. For the Geofence Study, one question was found to be significantly different between respondents and non-respondents, while two questions were found for the Intercept Survey. These questions are displayed below:

Geofence Survey:

- Preferred language in the park

Intercept Survey:

- Preferred language in the park
- Previous visitation

In order to reflect some of the differences in the population of visitors for both methodologies, datasets were weighted against the non-response sample. Thus, the Geofence Surveys are weighted by preferred language in the park and the Intercept Survey is weighted by preferred language and previous visitation. Weighting the data provides a more accurate reflection of visitors who responded and those who did not respond; however, survey research has limitations in capturing all potential differences between groups.



This report provides results in four sections. Section 1 is the Geofence Survey results. Section 2 is the GPS analysis on speed and parking times. Section 3 is the Intercept Survey results plus group testing. Section 4 is an overall summary of the full complement of data.



SECTION 1

Geofence Survey Results

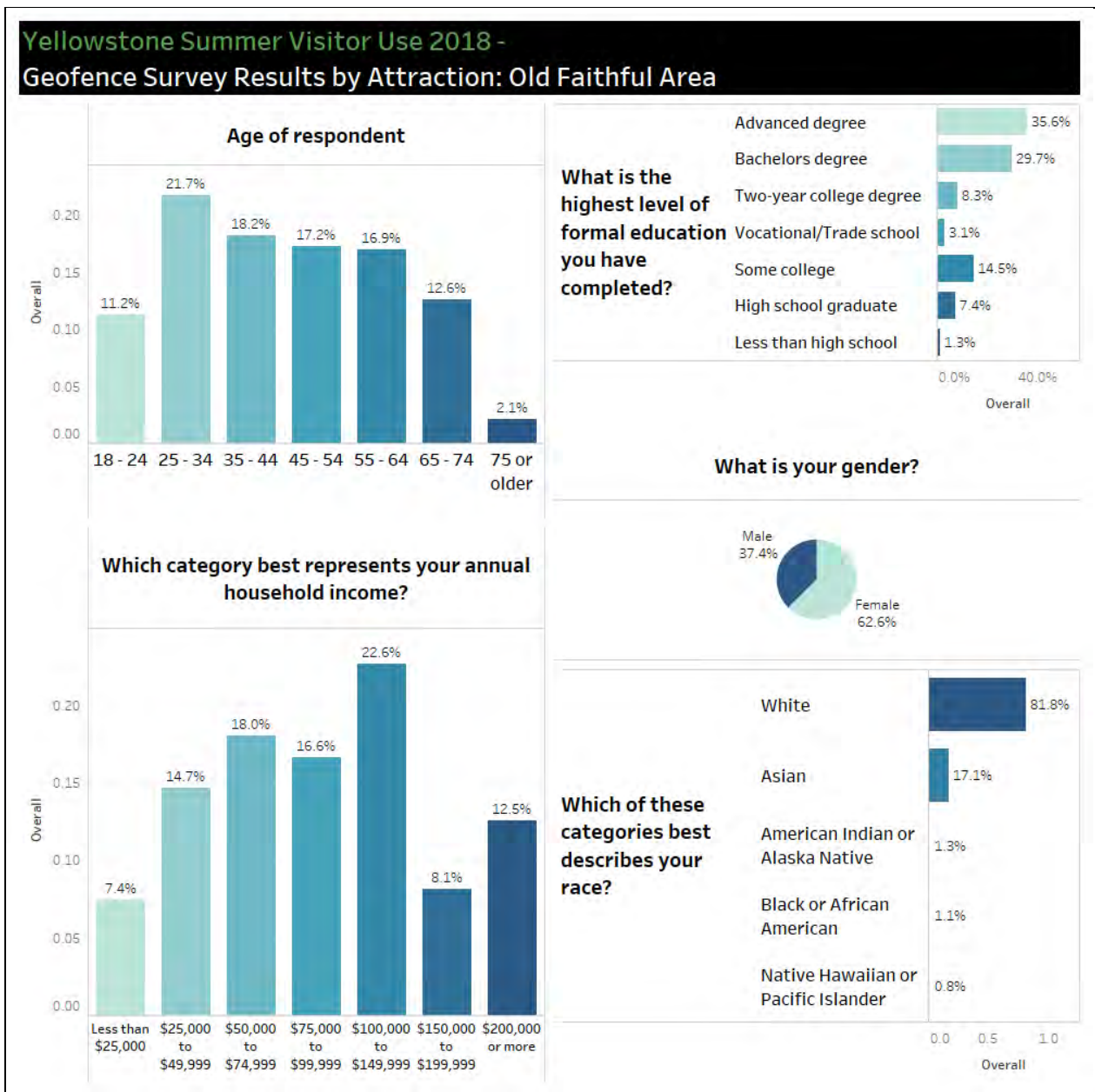


1. Section 1: Geofence Survey Results

1.1 Geofence Demographics:

The demographic information presented is a summary of the overall Geofence Survey research effort during the summer of 2018. Respondents first completed a demographic survey after the initial intercept at the staging area. Upon completion, the tablet would then only deliver individual site/roadway surveys as they drove throughout the park and through specific geofences. Respondents carried the tablet within their vehicle for one day of their trip. Data were weighted by preferred language as the non-response data had a significantly higher percentage of those who preferred to speak another language besides English than those who responded.

Figure 1.1: Geofence Demographics Dashboard





- **Age:** Overall, age was well distributed with 11% of respondents between the ages of 18-24, 22% between 25-34 years old, a combined 54% for those aged between 35-64, and 15% over 65. The average age was 44.8 years old. By month, the age distribution was relatively similar with a slight decrease in average age in July and August. August had the lowest average age (42.6 years old) and September the highest average age (47.9 years old). (Figure 1.1)
- **Education:** Most respondents (66%) are well-educated with a college degree (Bachelor’s or advanced degree), while 22% have some college or a two-year degree. Percentages vary somewhat between months with July and August having a slightly higher percentage of respondents who have a college degree (68% and 71%, respectively). (Figure 1.1)
- **Gender:** Gender skews more female (63%) than male (37%). This finding is not uncommon in survey research as females are more likely than males to participate. However, the nature of this study involved the entire travel party, which would include all members of the vehicle (Figure 1.1).
- **Race:** The majority of respondents identified as White (82%) with the second-highest percentage identifying as Asian (17%). Three percent were another race (1% each option). By month, May had a higher percentage of respondents who identified as Asian (30%) compared to other months (8%-19%) and September was the lowest in respondents identifying as Asian (8%). (Figure 1.1)
- **Household Income:** Household income was generally balanced across the spectrum with 23% earning \$100k-\$149,999, 17% earning \$75k-\$99,999, and 18% earning \$50k-\$74,999. Respondents were generally well educated and have higher earnings than the general population, consistent with most tourism/visitor research. (Figure 1.1)

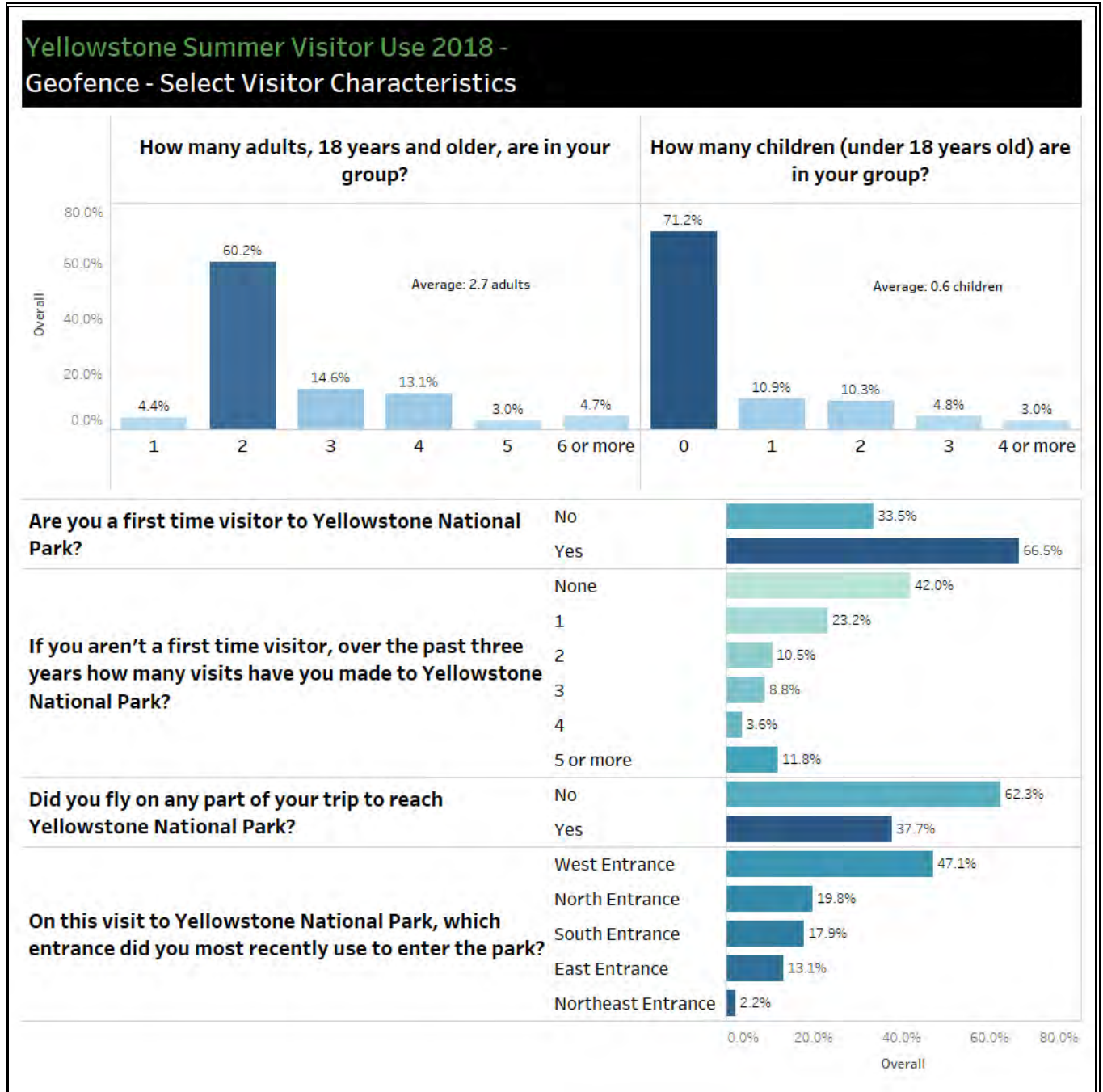




1.2 Visitor Characteristics:

The following section relates to visitor characteristics within the Geofence Survey methodology. In addition to respondent demographics, the initial demographic survey asked about respondents’ trip characteristics, values, and overall visit to Yellowstone. Results are displayed as an overall percentage and averages.

Figure 1.2: Geofence Visitor Characteristics - Part 1



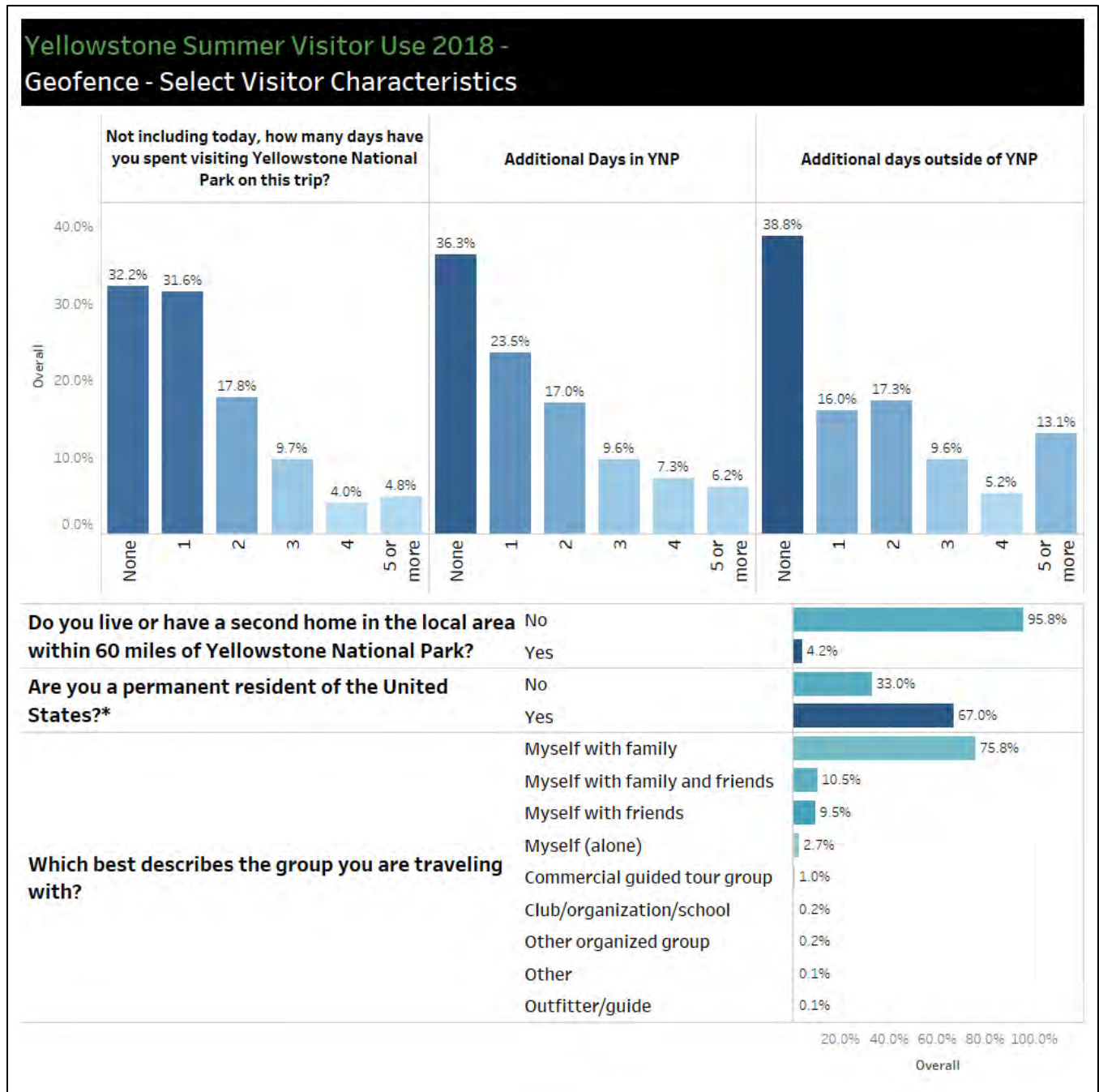


- Number of adults/children in group travel party: **On average, 2.7 adults and 0.6 children were within each travel group.** Over 60% of respondents had 1-2 adults and 71% did not have any children in their travel party. (Figure 1.2)
- Entrance used to enter Yellowstone: Respondents were asked to record which entrance they most recently used to enter Yellowstone prior to participating in the study. **Over the course of the summer season, 47% of respondents used the West Entrance, followed by 20% using the North Entrance, 18% using the South Entrance, 13% using the East Entrance, and only 2% using the Northeast Entrance.** The sampling plan was developed based on past entrance gate counts; therefore, these percentages are influenced by the overall sampling methodology. By month, small differences in entrance used do exist, with the proportion of respondents using the South Entrance rising over the course of peak season (July and August), but dipping during shoulder seasons. (Figure 1.2)
- Previous Visitation: **Overall, 66% of Geofence Survey participants were first-time visitors to Yellowstone while 34% had made at least one prior visit.** Of repeat visitors, 42% had not been to the park in the past three years, with 58% visiting at least once in the past three years. (Figure 1.2)
- Flying: Visitors were asked whether they flew on any part of their trip to reach Yellowstone National Park. Overall, 62% of visitors did not fly on their trip while 38% flew at some point. Therefore, Yellowstone is still a drive-to park with many people from surrounding states driving to enter the park. (Figure 1.2)





Figure 1.3: Geofence Visitor Characteristics - Part 2



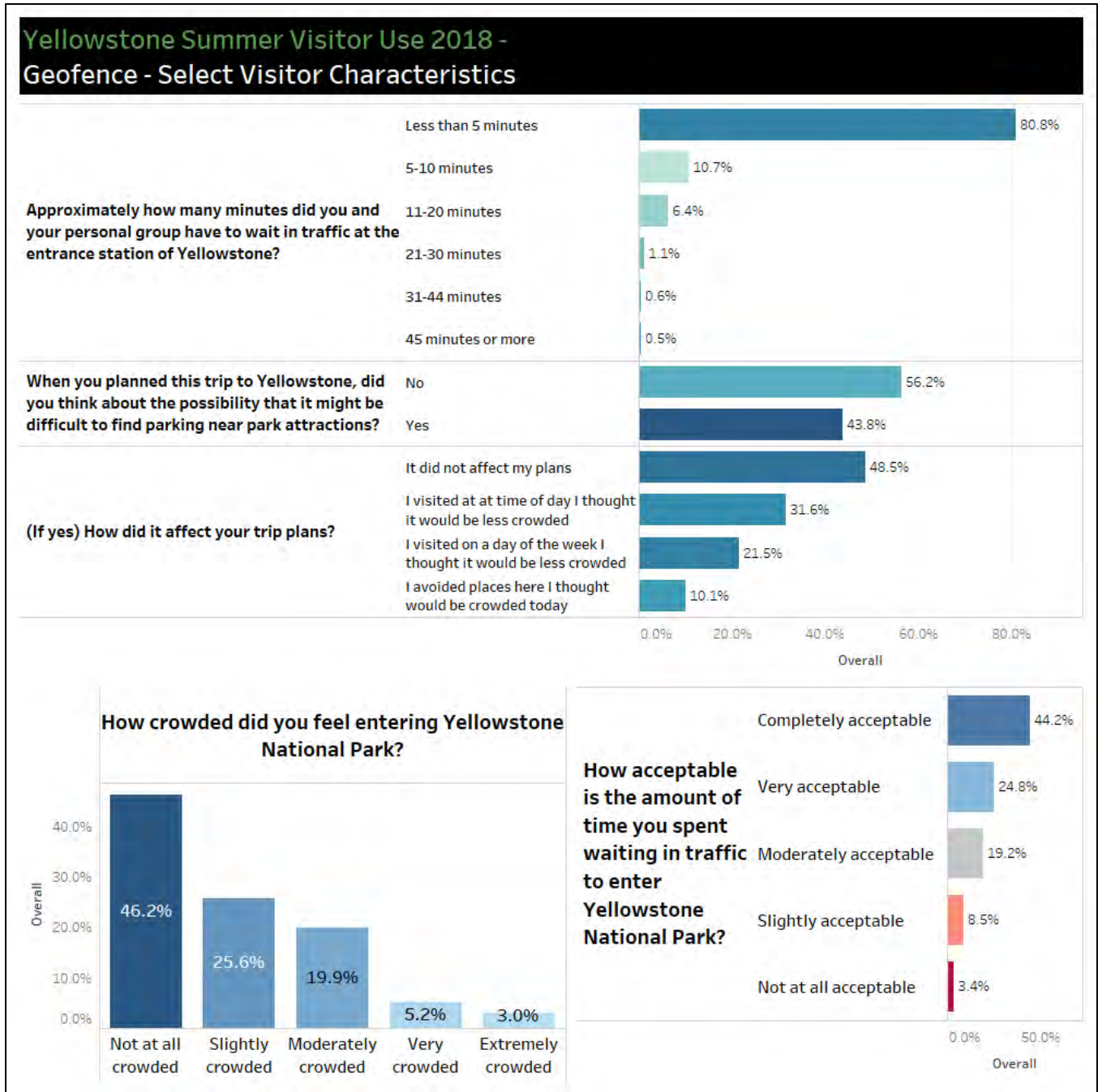
*Note: Variable is highly related to the weighting variable of preferred language. Thus, this variable was more impacted by the weighting than all other variables. Unweighted results for this question lead to 20% of residents who do not live in the U.S. and 80% who do live in the U.S.



- Days visiting Yellowstone and the local area: Geofence respondents were asked to state how many days they have spent visiting Yellowstone, how many additional days they will spend in the park, and how many additional days they will spend in the local area. Overall, 32% of respondents had not spent any days visiting Yellowstone prior to being intercepted, with an additional 32% spending at least 1 prior day. Approximately 36% of respondents had spent 2 or more days already visiting the park. Further, 36% of respondents were not staying any additional days within Yellowstone National Park while 64% were spending at least 1 more day visiting the park. Finally, 38% of respondents said they were not staying any additional days within the local area. About 62% said they were staying at least 1 more day in the local area. **In total, about 8% of respondents were only visiting the area (both inside and outside the park) for a day, 21% were staying 1 to 2 days in the area, 36% staying 3 to 5 days, 29% staying 6 to 10 days in the area, and about 7% staying 11 or more days. On average, respondents were spending 3.0 days within the park (including both prior and additional days).** With the surrounding area included, respondents spent an average of 5.04 days in the greater Montana/Wyoming/Idaho area. (Figure 1.3)
- Residency: **Only a small portion of Geofence respondents (4%) lived or owned a second home within 60 miles of the park boundaries during summer 2018. Higher percentages of second homeownership or residency were seen in June (7%) and September (6%) with August (1%) and July (2%) receiving slightly lower figures.** Overall, 67% of Geofence respondents permanently reside in the United States with 33% residing elsewhere. This figure is very influenced by the weighting of those who prefer to use another language other than English while in the park. Due to the nonresponse sample containing a significantly higher rate of respondents speaking another language other than English, weighting by this variable leads to an increase in those residing in another country. This is because almost all residents who said they prefer to speak another language live outside the United States. Note: This variable was most impacted by the weighting of the data. Unweighted results indicate those who live outside of the U.S. to be 20%. Therefore, this variable should be interpreted with caution as it was most effected overall. (Figure 1.3)
- Travel group: **Most Geofence respondents were traveling with family (76%) with 10% traveling with family and friends or just friends. One percent were traveling with a commercial/guided tour group, and 3% were traveling alone.** By month, May had fewer respondents traveling just with their family, more with friends. Furthermore, September had more respondents who traveled with family only (83%). **Because of the low sample size for commercial/guided tour groups, results are likely underrepresenting this segment of users.** Attempting to capture this user base was difficult for the Geofence Survey due to 1) the nature of experience is very different than those in private vehicles, 2) logistics of having the tour group/company allow for additional stops to drop the tablet off at the end of the day, and 3) safety issues with pulling tour bus users over in the pullouts. **Monthly breakouts are included in Appendix F.** (Figure 1.3)



Figure 1.4: Geofence Visitor Characteristics - Part 3



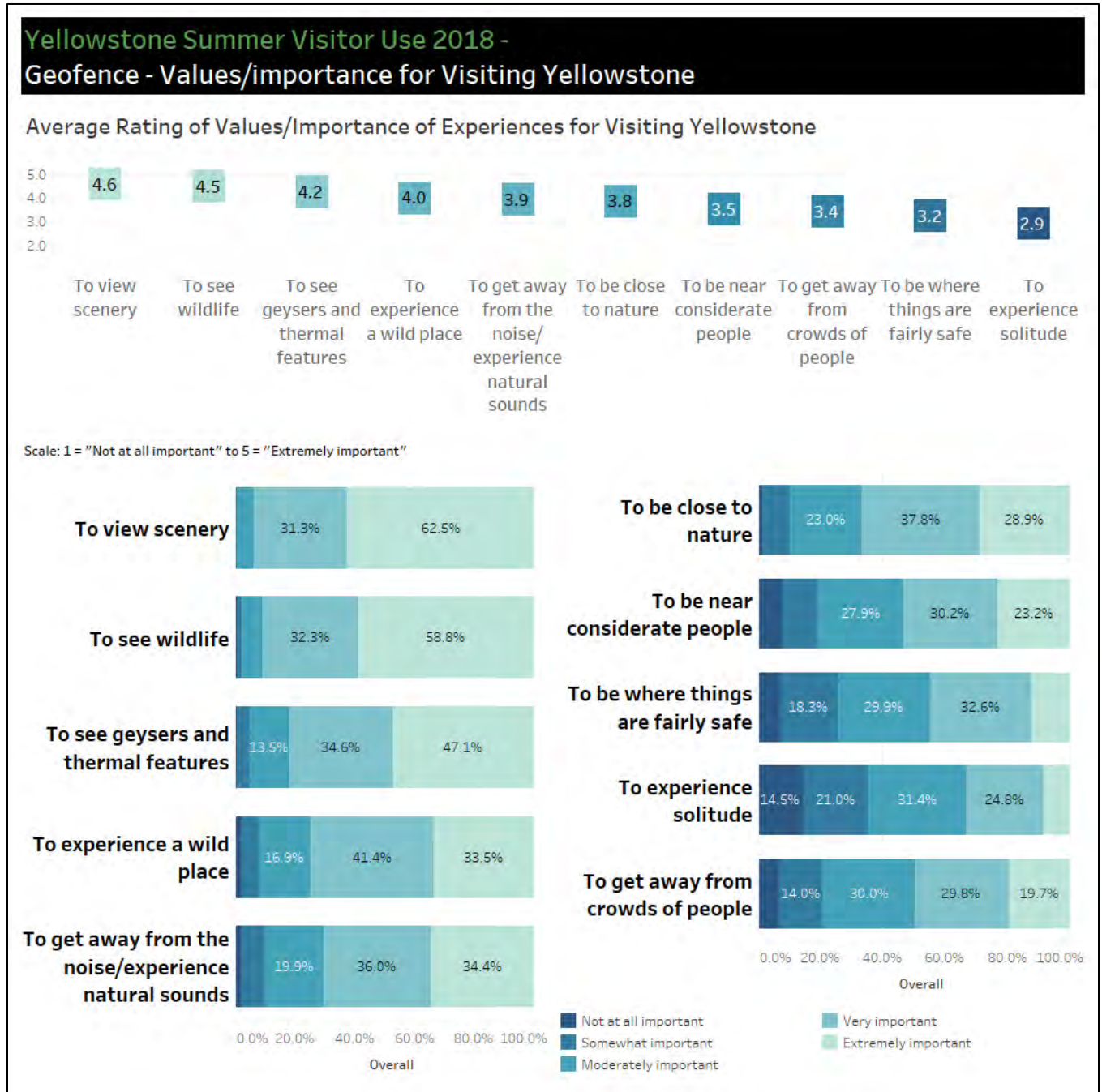


- Difficulties parking: Geofence respondents were asked to state whether they thought about the possibility of finding parking prior to visiting Yellowstone. In total, **44% said they had thought about the possibility of difficulties in finding parking, while 56% had not thought about parking difficulties.** Among those who thought about it prior to visiting, **48% said it did not affect their plans.** However, **32% visited at a time of day they thought would be less crowded, 22% visited on a day of the week they thought would be less crowded, and 10% avoided places they thought would be crowded on that day.** (Figure 1.4)
- Wait time acceptability at the entrance: Geofence respondents were asked how acceptable the time spent waiting to enter Yellowstone was to them on their most recent visit. In general, **most respondents were accepting of how long they waited with 44% saying “completely acceptable,” 25% saying “very acceptable,” 19% saying “moderately acceptable,” and only 11% saying “slightly” or “not at all acceptable.”** The majority of respondents (81%) waited less than 5 minutes when entering the park. (Figure 1.4)
- Crowding entering Yellowstone: Respondents felt uncrowded entering Yellowstone. In total, **46% said they felt “not at all crowded,” 26% felt “slightly crowded,” and 20% felt “moderately crowded.” Only 8% felt “very” or “extremely crowded” entering the park.** Most respondents felt they were not very crowded entering Yellowstone, which trends similar with results found in other surveys within the survey process. (Figure 1.4)





Figure 1.5: Geofence Visitor Characteristics - Part 4





- **Importance of Values for Visiting:** Respondents were asked on a 5-point scale of importance to rate how important specific experiences were to their visit to the park. The top values or motivations for visiting, below, are ranked by average importance across the summer season. **Geofence respondents place the highest amount of importance on the values that Yellowstone is best known for; scenery, wildlife, and thermal features. Less importance is placed on solitude (although experiencing a wild place is important), safety, and getting away from crowds.** (Figure 1.5)
 - To view scenery (4.6)
 - To see wildlife (4.5)
 - To see geysers and thermal features (4.2)
 - To experience a wild place (4.0)
 - To get away from the noise/experience natural sounds (3.9)
 - To be close to nature (3.8)
 - To be near considerate people (3.5)
 - To get away from crowds of people (3.4)
 - To be where things are fairly safe (3.2)
 - To experience solitude (2.9)





1.3 Overall Attraction Results and Key Facts:

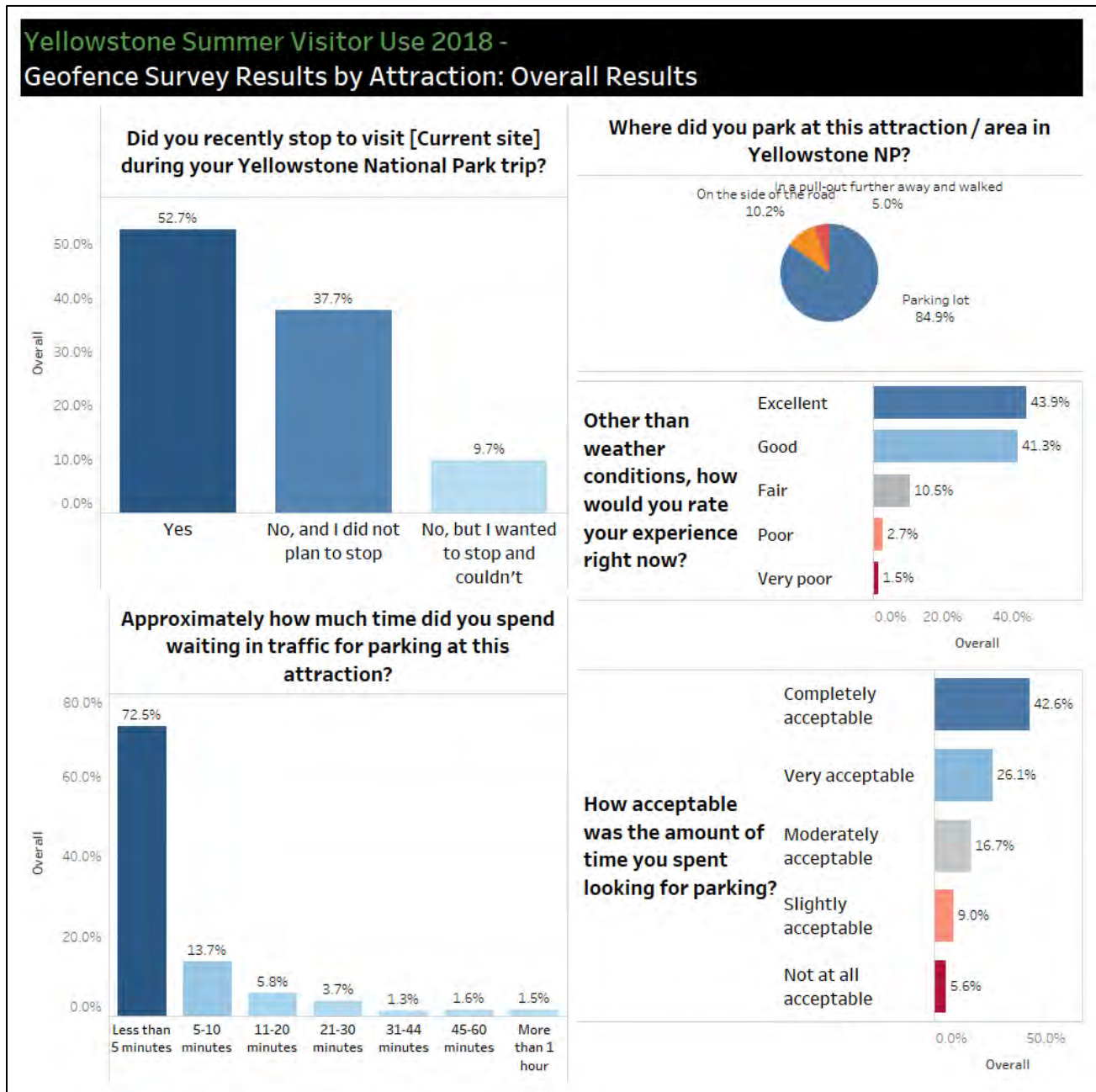
The following results highlight responses from the attraction Geofence survey for key locations of interest as defined by Yellowstone National Park. As a reminder, respondents who were at these sites completed the survey as they left the attraction. The sites included for the overall results are:

- Mammoth Hot Springs
- Boiling River
- Tower Falls
- North/South Rim Area (e.g., rims area of the Grand Canyon of the Yellowstone)
- Old Faithful Area
- Fairy Falls Area
- Midway Geyser Area
- Norris Geyser Area
- Canyon Village Area
- Lake Village
- West Thumb Geyser
- Hayden Valley
- Lamar Valley Pullouts

Overall results are summarized in two dashboards below. These questions contain all responses to the above sites and are reported in aggregate. Thus, this gives a more general view of respondent opinions prior to breaking down questions by site. In general, respondents were mostly positive in their responses across all sites. It should be noted that individual site-specific results do not include all sites, but rather key areas of interest to the park. The sites selected were considered potential areas of concern based on visitor feedback and previous studies that identified possible problems. Results for all other sites are included in the Appendix. Figures 1.6 and 1.7 display overall results.



Figure 1.6: Overall Geofence Attraction Results - Part 1



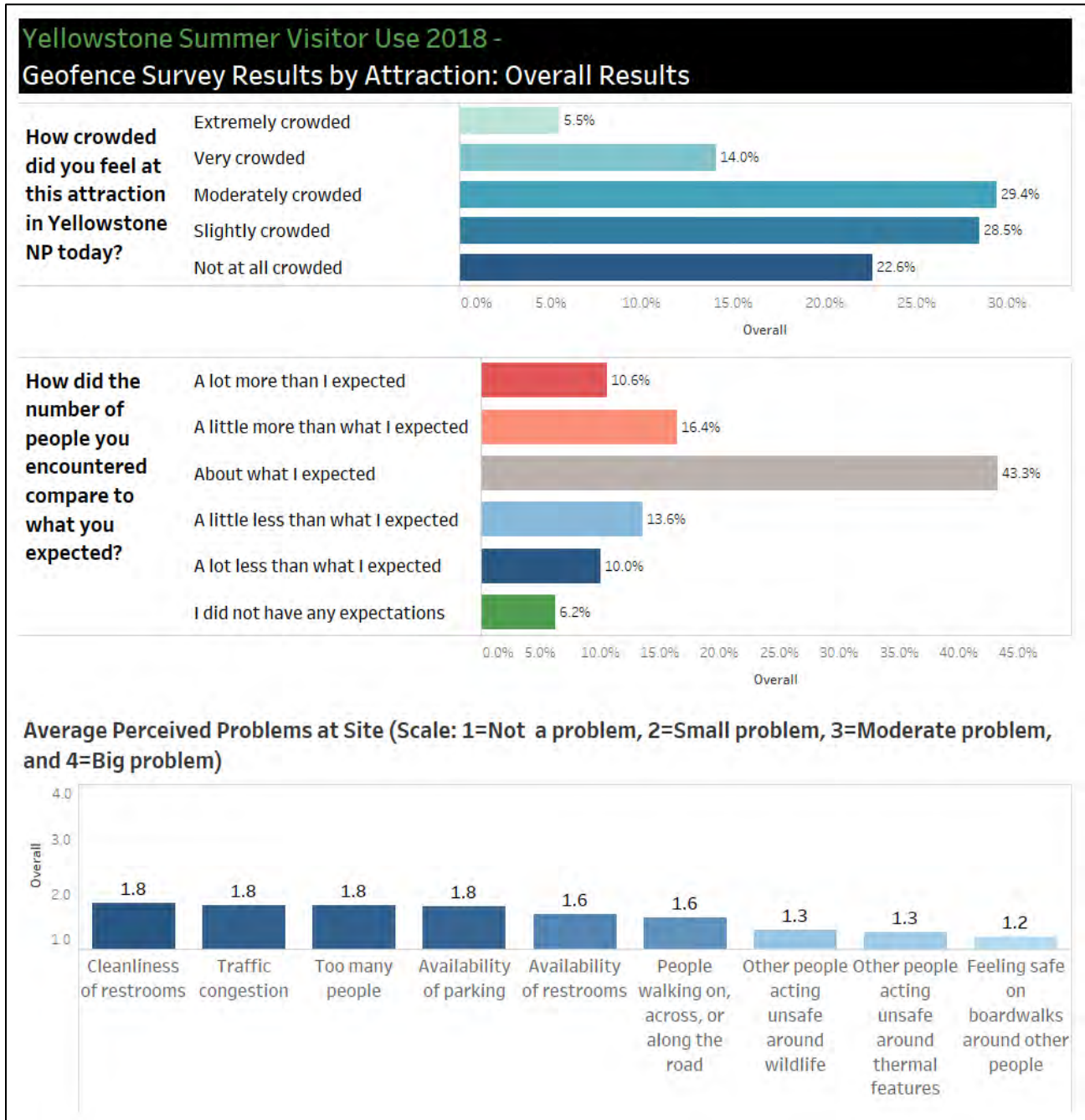
*Note: Respondents were asked whether they stopped to visit the specific attraction as they passed through the geofence. Thus, this question represents all sites and whether people stopped at the attraction when prompted. This does not mean 38% of respondents did not stop at any sites.

In total, 73% of Geofence respondents waited less than 5 minutes at the attraction to find parking, but 14% spent 5 to 10 minutes, and about 14% spent over 10 minutes looking for parking. About 85% of respondents parked in a parking lot, while 10% parked on the side of the road, and 5% at another pullout. When asked how acceptable the amount of time was, results indicated:



- 43% said 5 - completely acceptable
- 26% said 4 - very acceptable
- 17% said 3 - moderately acceptable
- 9% said 2 - slightly acceptable
- 6% said 1 - not at all acceptable

Figure 1.7: Overall Geofence Attraction Results - Part 2





When asked how crowded Geofence respondents felt across all sites, responses tended to hover at the moderate-to-lower end of the scale. In fact:

- 23% said 1 - not at all crowded
- 29% said 2 - slightly crowded
- 29% said 3 - moderately crowded
- 14% said 4 - very crowded
- 6% said 5 - extremely crowded

Compared to what respondents expected, **approximately 43% said that the number of people they encountered was “about what they expected.”** About **27% said it as slightly or a lot more than they expected, while approximately 23% said it was slightly or a lot less than they expected.** Based on these results, Yellowstone is doing a fairly good job at managing expectations. Respondents in this study were mostly informed about what to expect and did not perceive high levels of crowding when viewed across all sites.

1.4 Site Specific Attraction Results:

The following results highlight responses from the attraction tablet survey for key locations of interest as defined by Yellowstone National Park. As a reminder, respondents who were at these sites completed the survey as they left the attraction. The key areas of interest for Yellowstone National Park staff are:

- North/South Rim Area
- Old Faithful Area
- Fairy Falls Area
- Midway Geyser Area
- Norris Geyser Area
- Canyon Village Area

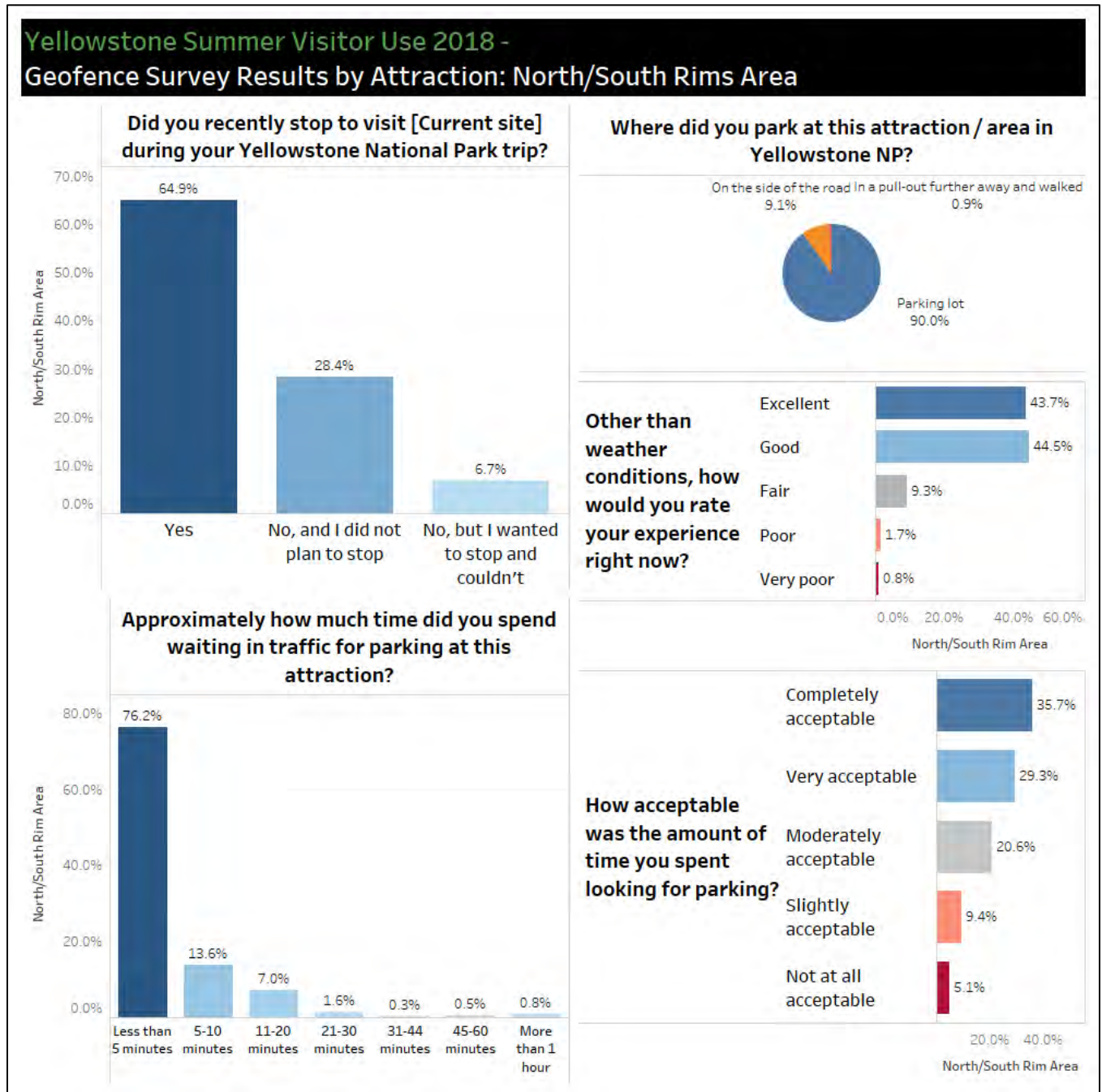




North / South Rim Area:

The North/South Rim area comprises both the North and South Rim parking/attraction areas near the Grand Canyon of the Yellowstone. Figures 1.8 and 1.9 display the results for this site.

Figure 1.8: North/South Rims Geofence Dashboard - Part 1





Of those who went through North /South Rim area:

- 65% stopped at the attraction
- 7% did not stop but wanted to stop
- 28% did not plan to stop

In total, 504 individuals traveled through this geofence and participated in this question. **Seventy-three percent of those who stopped at the North/South Rims were first-time visitors, while 27% were repeat visitors.**

The primary reason for not visiting for those who wanted to stop, but couldn't was:

- Trail closure (33%)
- Couldn't find a place to park (28%)
- Not enough time (24%)
- Traffic at the site (20%)
- Travel times inside the park greater than expected (5%)

The large majority of those who did stop parked in a parking lot (89%) while 10% parked on the side of the road.

When asked how long it took to find parking at North/South Rim:

- 76% found parking in less than 5 minutes
- 14% spent 5-10 minutes
- 7% spent 11-20 minutes
- 3% spent more than 20 minutes

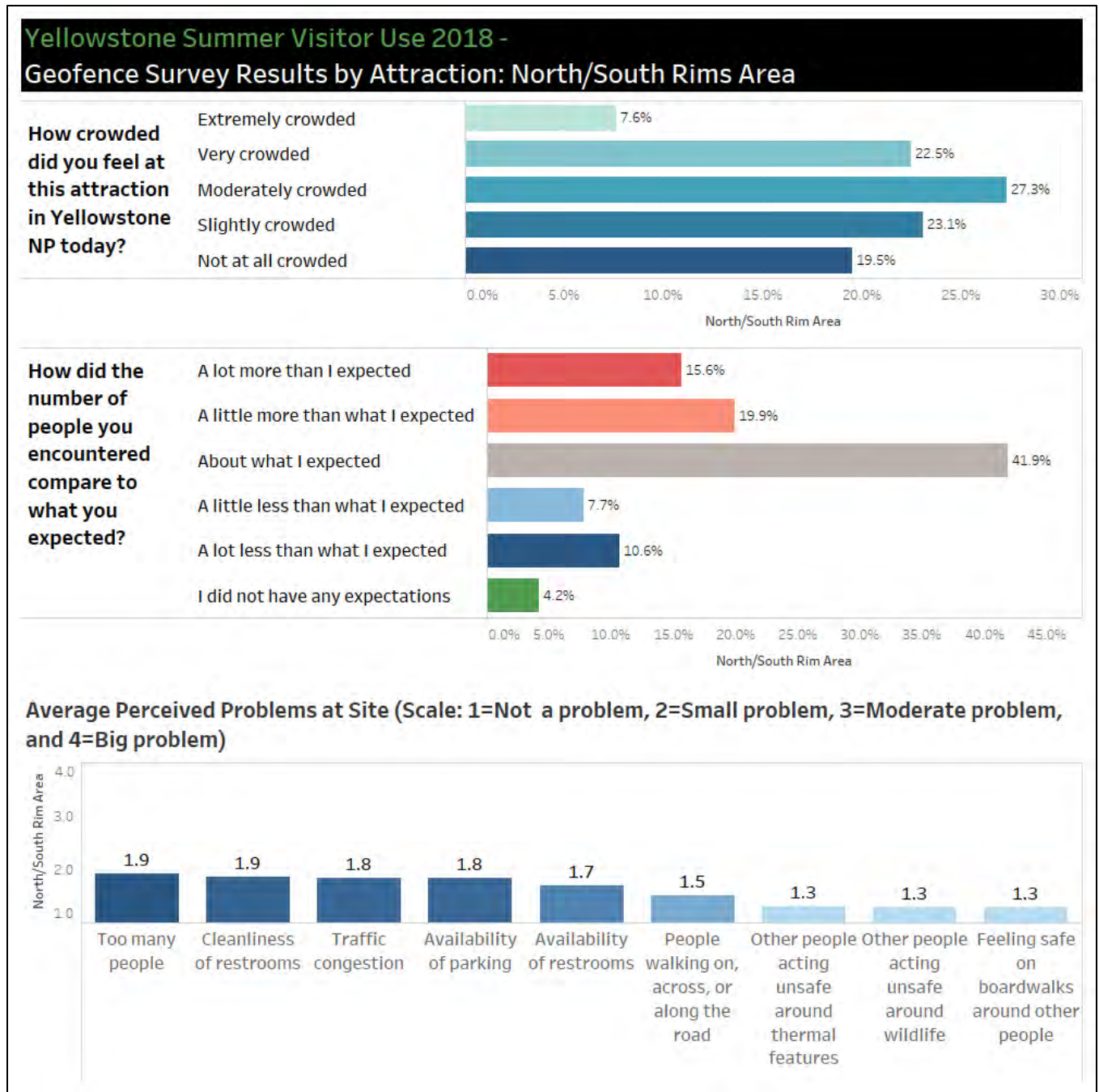
When asked how acceptable it was to spend this much time looking for parking North/South Rim:

- 5% said 1 - not at all acceptable
- 9% said 2 - slightly acceptable
- 21% said 3 - moderately acceptable
- 29% said 4 - very acceptable
- 36% said it was 5 - completely acceptable

The average rating for parking acceptability for North/South Rim was 3.8 (standard deviation=1.2).



Figure 1.9: North/South Rims Geofence Dashboard - Part 2





Overall, respondents were neutral to perceived crowding at North/South Rim:

- 20% said 1 - not at all crowded
- 23% said 2 - slightly crowded
- 27% said 3- moderately crowded
- 23% said 4 - very crowded
- 8% said 5 - extremely crowded

The average perceived crowding rating was 2.7 (standard deviation=1.3).

In regards to the number of people encountered compared to their expectations at North/South Rim:

- 42% said it was about what they expected
- 36% said it was a little or a lot more than they expected
- 19% said it was less than what they expected
- A total of 4% said they did not have any expectations.

In terms of perceived problems at the site, the North/South Rim area saw slight issues with a few topics.

Below is a list of perceived problems in order by average rating (scale: 1="not a problem" to 4="big problem"):

- Too many people (1.9)
- Traffic congestion (1.9)
- Cleanliness of restrooms (1.9)
- Availability of parking (1.8)
- Availability of restrooms (1.7)
- People walking on, across, or along the road (1.5)
- Other people acting unsafe around geothermal features (1.3)
- Other people acting unsafe around wildlife (1.3)
- Feeling safe on boardwalks around other people (1.3)

Upon leaving the Geofence site, respondents were asked, "Other than weather conditions, how would you rate your experience right now?" At the **North/South Rims, respondents were quite positive overall. The average experience rating for North/South Rims was 4.3 (standard deviation=0.8).** Below are summary statistics for this question:

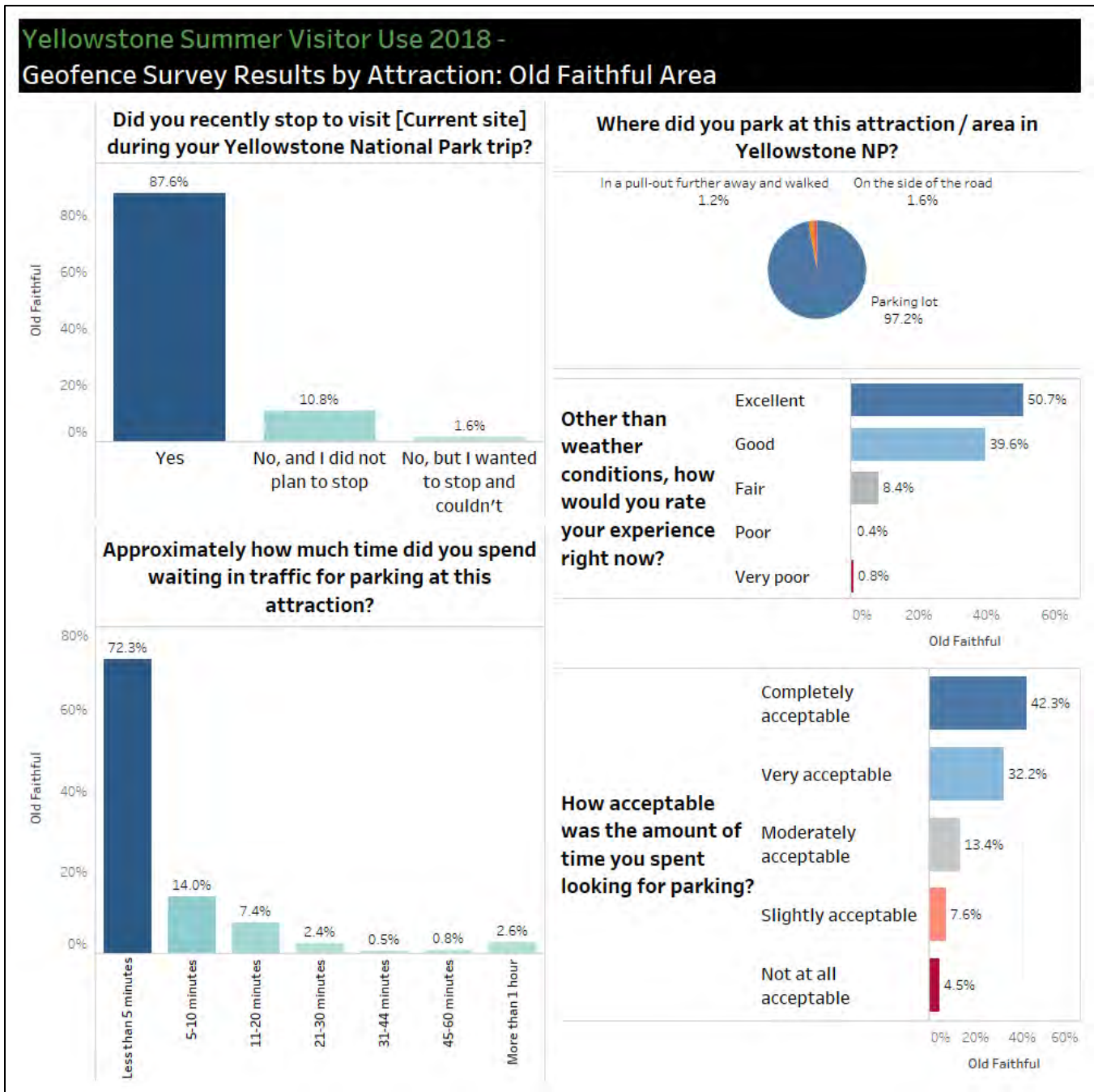
- 1 - Very poor (1%)
- 2 - Poor (2%)
- 3 - Fair (9%)
- 4 - Good (45%)
- 5 – Excellent (44%)

Old Faithful Area:

The Old Faithful Area was a top priority location selected by Yellowstone staff. Old Faithful is one of the most popular locations in the park for visitors, but it also has strong infrastructure built to support crowds. This location has a long history of high visitor use. Figures 1.10 and 1.11 display results for this site.



Figure 1.10: Old Faithful Area Geofence Dashboard - Part 1





Of respondents who traveled through this area:

- 88% stopped at the attraction
- 2% did not stop but wanted to stop
- 11% did not plan to stop

In total, 496 individuals traveled through this geofence and participated in this question. **About 68% of those who stopped at Old Faithful were first-time visitors, while 32% were repeat visitors.** The large majority of those who did stop parked in a parking lot (97%), while 2% parked on the side of the road, and 1% parked in a pull-out further away and walked.

When asked how long it took to find parking at Old Faithful:

- 72% found parking in less than 5 minutes
- 14% spent 5-10 minutes finding parking
- 7% spent 11-20 minutes finding parking
- 6% spent more than 20 minutes finding parking

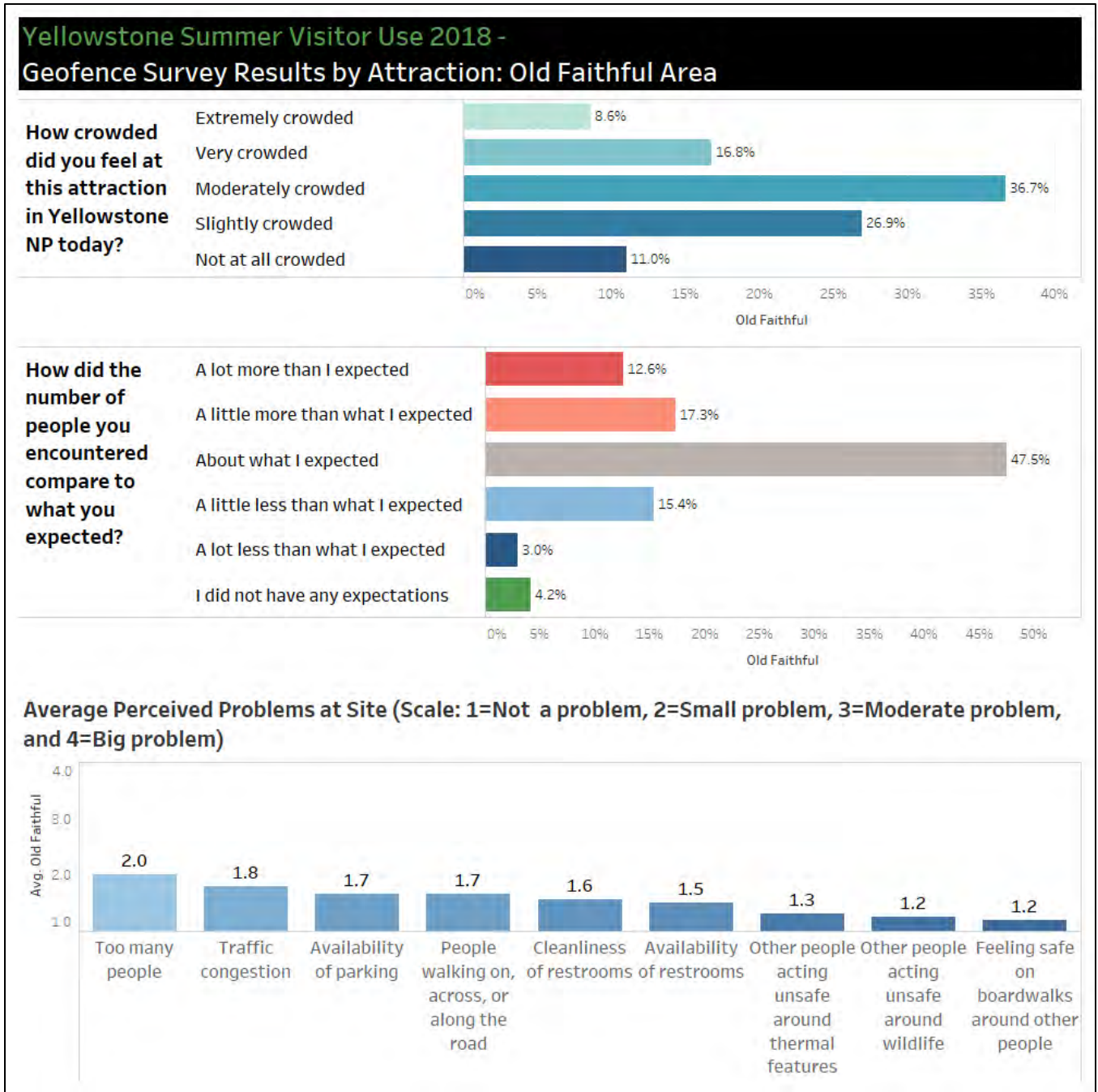
When asked how acceptable it was to spend this much time to spend looking for parking at Old Faithful on the 5-point scale:

- 5% said 1 - not at all acceptable
- 8% said 2 - slightly acceptable
- 13% said 3 - moderately acceptable
- 32% said 4 - very acceptable
- 42% said 5 - completely acceptable

Average parking acceptability at Old Faithful was 4.0 (standard deviation=1.1).



Figure 1.11: Old Faithful Area Geofence Dashboard - Part 2





Overall, respondents felt slightly-to-moderately crowded at Old Faithful:

- 11% said 1 - not at all crowded
- 27% said 2 - slightly crowded
- 37% said 3 - moderately crowded
- 17% said 4 - very crowded
- 9% said 5 - extremely crowded

Most respondents reported that they had accurate expectations about the number of people encountered at Old Faithful:

- 18% said it was a little or a lot less than what they expected
- 48% said it was about what they expected.
- 30% said it was a little or a lot more than they expected
- 4% said they did not have any expectations.

In terms of perceived problems, the Old Faithful area saw slight issues on most problems. Below is the average ranking of problems based on a scale where 1 = “not a problem” and 4 = “big problem.”

- Too many people (2.0)
- Traffic congestion (1.8)
- Availability of parking (1.7)
- People walking on, across, or along the road (1.7)
- Cleanliness of restrooms (1.6)
- Availability of restrooms (1.5)
- Other people acting unsafe around thermal features (1.3)
- Other people acting unsafe around wildlife (1.2)
- Feeling safe on boardwalks around other people (1.2)

Upon leaving Old Faithful, respondents rated their experience at the time. Respondents were overall very positive. Below are summary statistics for this particular question (Average: 4.4):

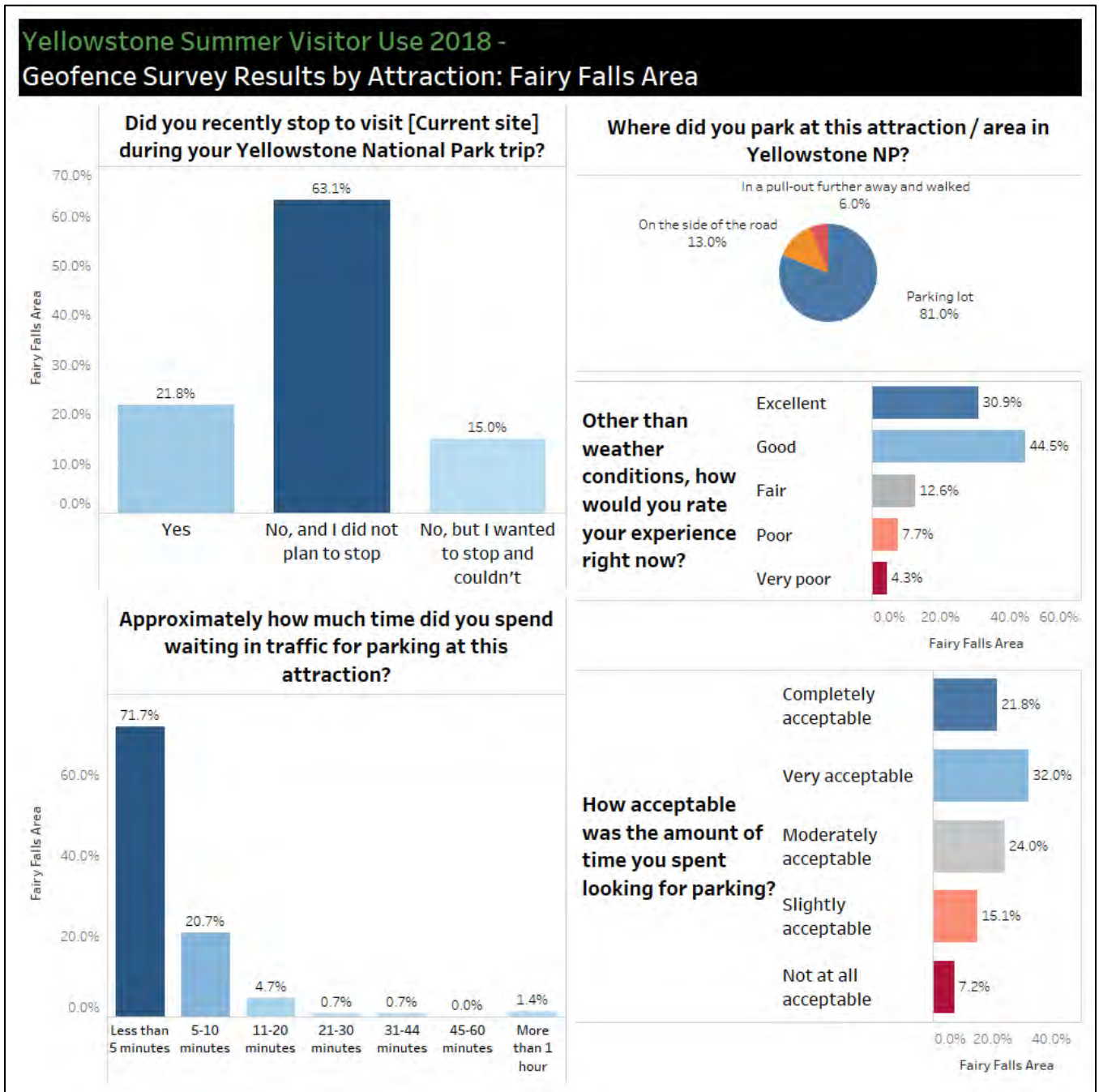
- 1 - Very poor (1%)
- 2 - Poor (0%)
- 3 - Fair (8%)
- 4 - Good (40%)
- 5 - Excellent (51%)



Fairy Falls Area:

The Fairy Falls Area was closed for parking during the early months of the season. Thus, the sample size is slightly smaller but is adequate to make comparisons across the summer season. Fairy Falls was identified by past Yellowstone staff as having potential issues with parking capacity and visitor use. Figures 1.12 and 1.13 display full results for this site.

Figure 1.12: Fairy Falls Geofence Dashboard - Part 1





Of those who went through this area:

- 22% stopped at the attraction
- 15% did not stop but wanted to stop
- 63% did not plan to stop

Of those who wanted to stop, but couldn't the primary reason was:

- Couldn't find a place to park (38%)
- Not enough time (25%)
- Traffic at the site (23%)

In total, 496 individuals traveled through this geofence and participated in this question. **About 69% of those who stopped at the Fairy Falls area were first-time visitors while 31% were repeat visitors.** Approximately 81% of those who stopped parked in a parking lot, 13% on the side of the road, and 6% at another pullout and walked.

When asked how long it took to find parking at this area:

- 72% found parking in less than 5 minutes
- 21% spent 5-10 minutes finding parking
- 5% spent 11-20 minutes finding parking
- 3% spent more than 20 minutes finding parking

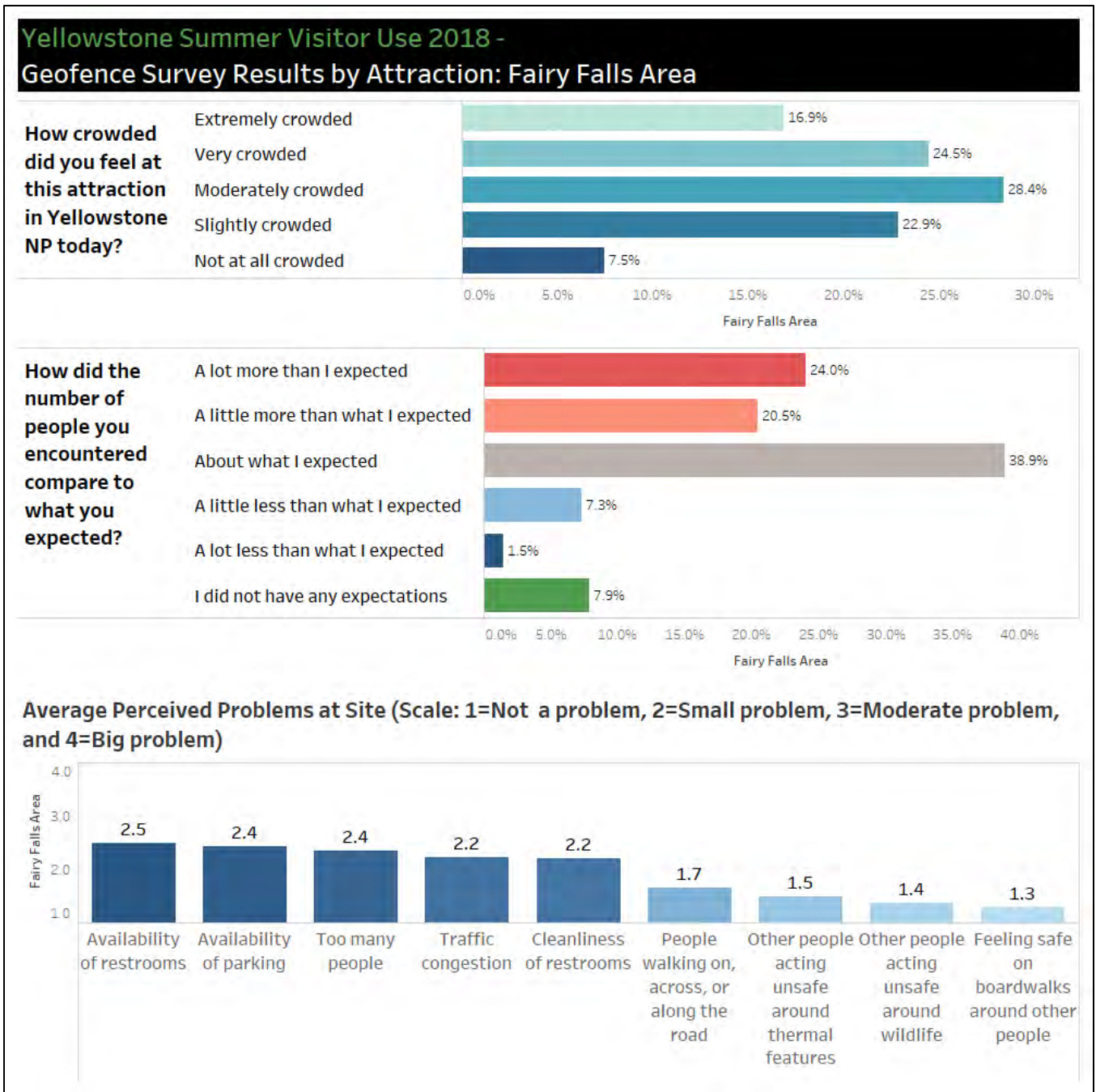
When asked how acceptable it was to spend this much time to spend looking for parking:

- 7% said 1 - not at all acceptable
- 15% said 2 - slightly acceptable
- 24% said 3 - moderately acceptable
- 32% said 4 - very acceptable
- 22% said 5 - completely acceptable

Average parking acceptability for Fairy Falls Area was 3.5 (standard deviation=1.2).



Figure 1.13: Fairy Falls Geofence Dashboard - Part 2





Overall, respondents felt moderate to very crowded at this site with:

- 8% said 1 - not at all crowded
- 23% said 2 - slightly crowded
- 28% said 3 - moderately crowded
- 25% said 4 - very crowded
- 17% said 5 - extremely crowded

Average perceived crowding at Fairy Falls was 3.2 (standard deviation=1.2).

In terms of respondent expectations of the number of people at Fairy Falls:

- 9% said was less than what they expected
- 39% of respondents said the number of people encountered Fairy Falls was what they expected
- 45% of respondents said it was a little or a lot more than they expected
- 8% said they did not have any expectations

In terms of problems, the Fairy Falls area saw larger issues than other sites on a number of topics. **Overall, Fairy Falls was identified as one of the sites that have some of the largest problems with restrooms, parking, and too many people.** Below is a ranking of perceived problems by average (Scale:1="not a problem" to 4="big problem").

- Availability of restrooms (2.5)
- Availability of parking (2.4)
- Too many people (2.4)
- Traffic congestion (2.2)
- Cleanliness of restrooms (2.2)
- People walking on, across, or along the road (1.7)
- Other people acting unsafe around thermal features (1.5)
- Other people acting unsafe around wildlife (1.4)
- Feeling safe on boardwalks around other people (1.3)

Despite the fact that respondents were able to identify a number of problem areas at Fairy Falls, they were positive overall about their experience. However, the average experience rating of 3.9 (standard deviation=1.1) is lower than most other sites, except for Midway Geyser Area.

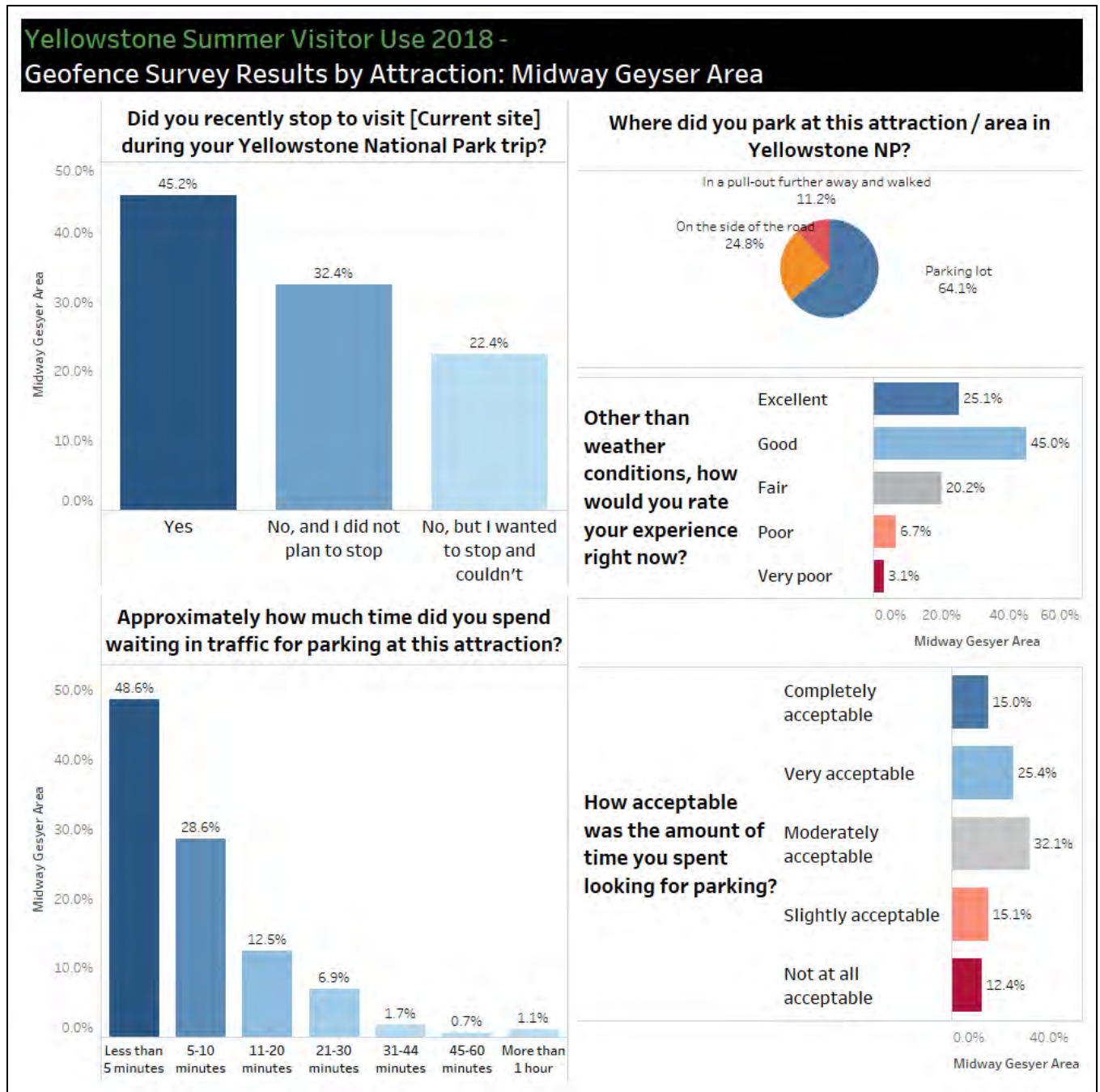
- 1 - Very poor (4%)
- 2 - Poor (8%)
- 3 - Fair (13%)
- 4 - Good (45%)
- 5 - Excellent (31%)

Midway Geyser Area:

The Midway Geyser Area has been identified as having parking, crowding, and capacity issues by Yellowstone staff. Results indicate similar frustrations from respondents at the site. The following results are an aggregate of respondents who were at Midway Geyser throughout the entire summer season. Figures 1.14 and 1.15 display full results for this site.



Figure 1.14: Midway Geysir Geofence Dashboard - Part 1



Of those who went traveled through the Midway Geysir area:

- 45% stopped at the attraction
- 22% did not stop but wanted to
- 32% did not plan to stop



Of those who wanted to stop, but couldn't, the primary reasons were:

- Couldn't find a place to park (71%)
- Traffic at the site (48%)
- Not enough time (23%)

In total, 542 individuals traveled through this geofence and participated. **Approximately 77% of those who stopped at Midway Geyser Basin area were first-time visitors while 23% were repeat visitors.** Further, 64% of those who stopped parked in a parking lot, 25% on the side of the road, and 11% at another pullout and walked. Out of the six selected sites, Midway Geyser had the largest percentage of respondents who parked somewhere else besides the parking lot.

When asked how long it took to find parking Midway Geyser:

- 49% found parking in less than 5 minutes
- 29% spent 5-10 minutes finding parking
- 13% spent 11-20 minutes finding parking
- 10% spent more than 20 minutes finding parking

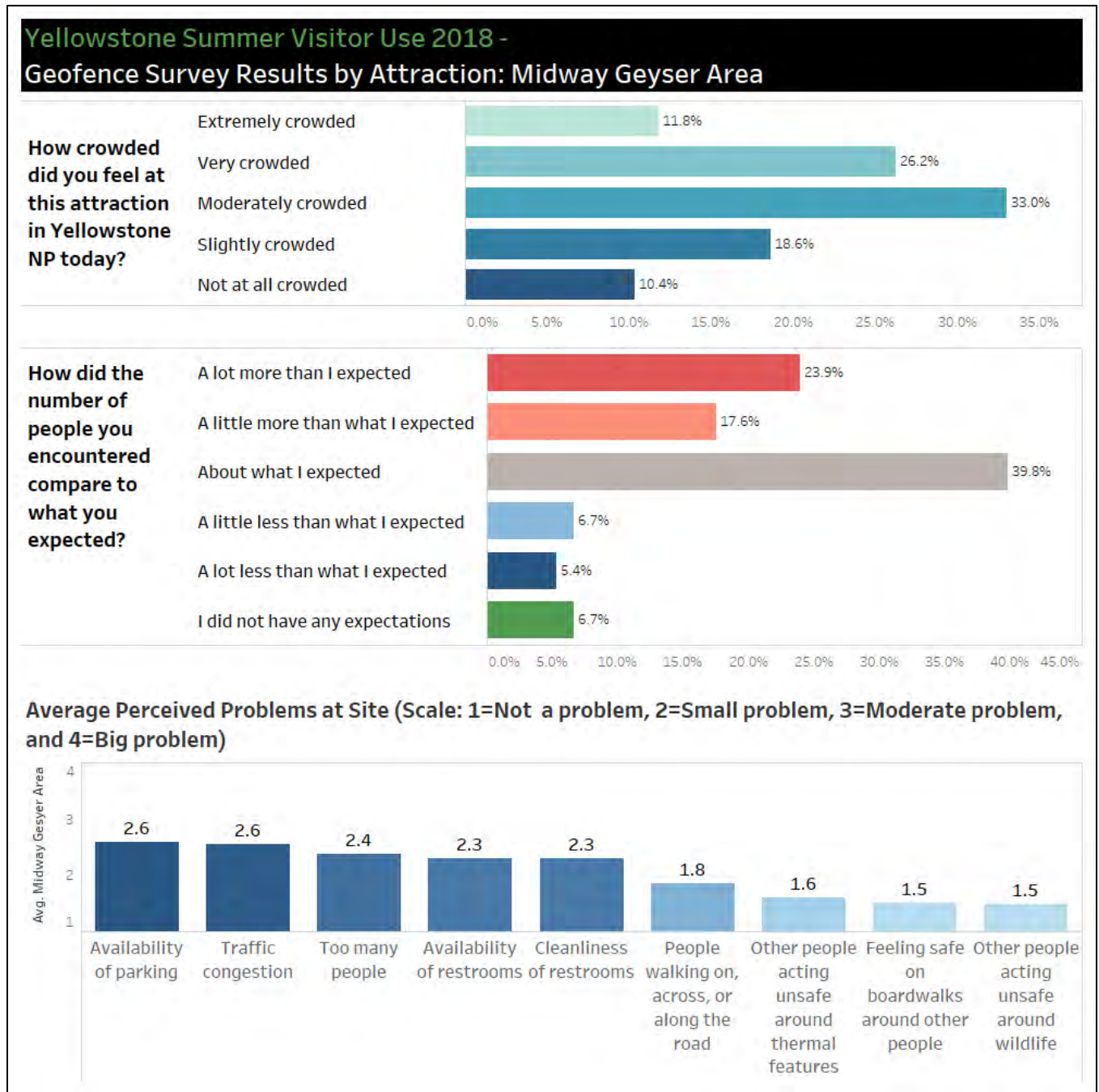
When asked how acceptable it was to spend this much time looking for parking:

- 12% said 1 - not at all acceptable
- 15% said 2 - slightly acceptable
- 32% said 3 - moderately acceptable
- 25% said 4 - very acceptable
- 15% said 5 - completely acceptable

Average parking acceptability at Midway Geyser was 3.2 (standard deviation=1.2).



Figure 1.15: Midway Geysers Geofence Dashboard - Part 2





Overall, respondents felt moderately to very crowded at Midway Geyser:

- 10% felt 1 - not at all crowded
- 19% felt 2 - slightly crowded
- 33% felt 3 - moderately crowded
- 26% felt 4 - very crowded
- 12% felt 5 - extremely crowded

Average perceived crowding at Midway Geyser was 3.1 (standard deviation=1.2). Average crowding at Midway Geyser was 2nd highest behind Fairy Falls.

In terms of respondent expectations of the number of people at Midway Geyser:

- 42% of respondents said there were more people than they expected
- 40% said it was about what expected
- 12% said they encountered less people than they expected
- 7% did not have any expectations

The Midway Geyser area saw some of the highest figures for perceived problems across all sites. Below is the ranking of problems based on a mean where 1 = “not a problem” and 4 = “big problem.”

- Availability of parking (2.6)
- Traffic congestion (2.6)
- Too many people (2.4)
- Availability of restrooms (2.3)
- Cleanliness of restrooms (2.3)
- People walking on, across, or along the road (1.8)
- Other people acting unsafe around thermal features (1.6)
- Feeling safe on boardwalks around other people (1.5)
- Other people acting unsafe around wildlife (1.5)

Again, respondents still provided rather high ratings of their satisfaction at Midway Geyser; however, the average rating of 3.8 (standard deviation=1.0) was the lowest experience rating out of the six sites. This drop in experience ratings is likely due to fewer respondents in the 4-5 rating and an elevated number of responses in the “3 - Fair” rating (20%).

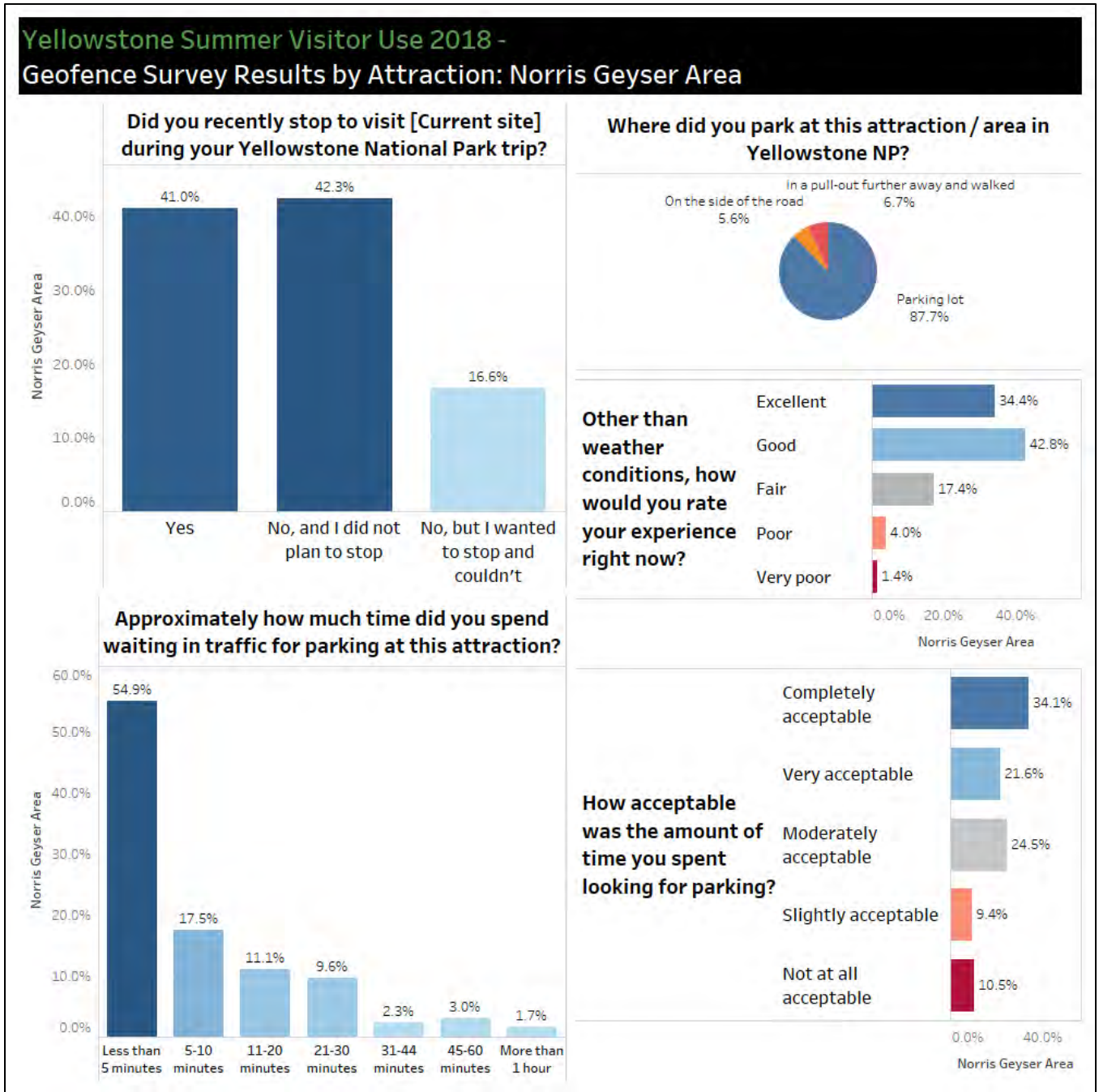
- 1 - Very poor (3%)
- 2 - Poor (7%)
- 3 - Fair (20%)
- 4 - Good (45%)
- 5 - Excellent (25%)

Norris Geyser Area:

In summer of 2018, the road to Norris from Mammoth was undergoing major construction that led to 30 minute wait times during peak season. As a note, construction in the area may have led to some additional issues that are a product of this process such as a line of cars all entering Norris at the same time due to construction stoppage backing up the normal traffic flow. Figures 1.16 and 1.17 display full results for this site.



Figure 1.16: Norris Geyser Area Geofence Dashboard - Part 1



Of those who went through the Norris area:

- 41% stopped at the attraction
- 17% did not stop but wanted to
- 42% did not plan to stop



Of those who wanted to stop at Norris, but couldn't, the primary reasons were:

- Couldn't find a place to park (43%)
- Not enough time (23%)
- Traffic at the site (21%)

In total, 625 individuals traveled through this geofence. **Eighty-one percent of those who stopped at Norris Geyser area were first-time visitors while 19% were repeat.** Eighty-eight percent of those who stopped parked in a parking lot, 6% on the side of the road, and 7% at another pullout and walked.

When asked how long it took to find parking at Norris:

- 55% found parking in less than 5 minutes
- 17% spent 5-10 minutes finding parking
- 11% spent 11-20 minutes finding parking
- 17% spent more than 20 minutes finding parking

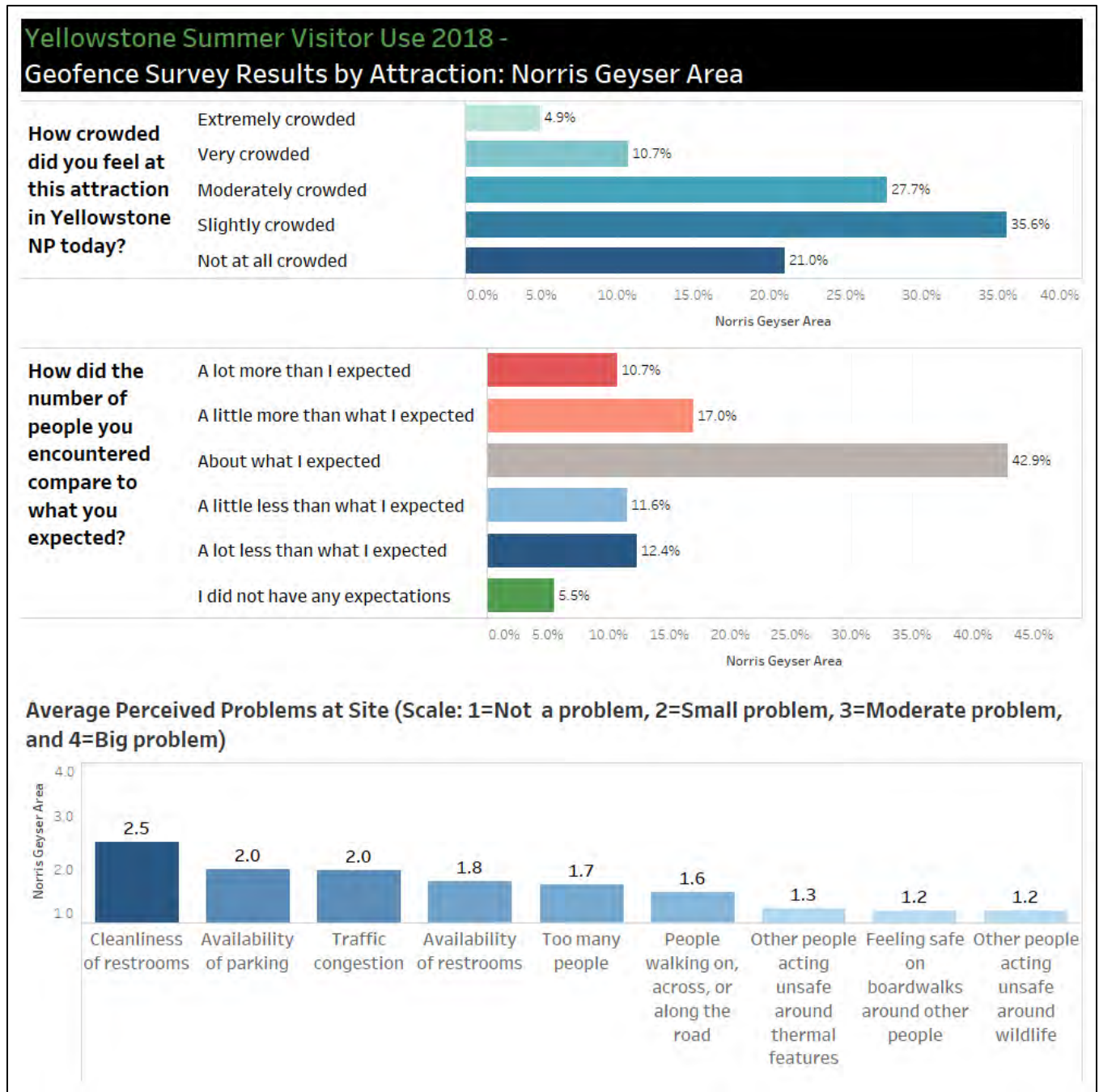
When asked how acceptable it was to spend this much time looking for parking at Norris:

- 11% said 1 - not at all acceptable
- 9% said 2 - slightly acceptable
- 25% said 3 - moderately acceptable
- 22% said 4 - very acceptable
- 34% said 5 - completely acceptable

Average parking acceptability at Norris Geyser was 3.6 (standard deviation=1.3).



Figure 1.17: Norris Geyser Area Geofence Dashboard - Part 2





Overall, respondents felt less crowded at Norris than other areas:

- 21% said 1- not at all crowded
- 36% said 2 - slightly crowded
- 28% said 3 - moderately crowded
- 11% said 4 - very crowded
- 5% said 5 - extremely crowded

Average perceived crowding at Norris Geyser was 2.4 (standard deviation=1.1).

In terms of respondent expectations of the number of people at Norris:

- 24% said there were less than they expected
- 43% said there were about what they expected
- 18% of respondents said there were more people than they expected
- 6% did not have any expectations.

For perceived problems, the **Norris Geyser area saw lower to more moderate problems when compared to the other sites. However, cleanliness of restrooms was higher than all other sites.** Below is the ranking of problems based on a mean where 1 = “not a problem” and 4 = “big problem.”

- Cleanliness of restrooms (2.5)
- Availability of parking (2.0)
- Traffic congestion (2.0)
- Availability of restrooms (1.8)
- Too many people (1.7)
- People walking on, across, or along the road (1.6)
- Other people acting unsafe around thermal features (1.3)
- Feeling safe on boardwalks around other people (1.2)
- Other people acting unsafe around wildlife (1.2)

When asked about their current experience, respondents were more positive about their experience than at Midway Geyser or Fairy Falls, but slightly less than at the other three sites. Average rating of the experience at Norris was 4.0 (standard deviation=0.9).

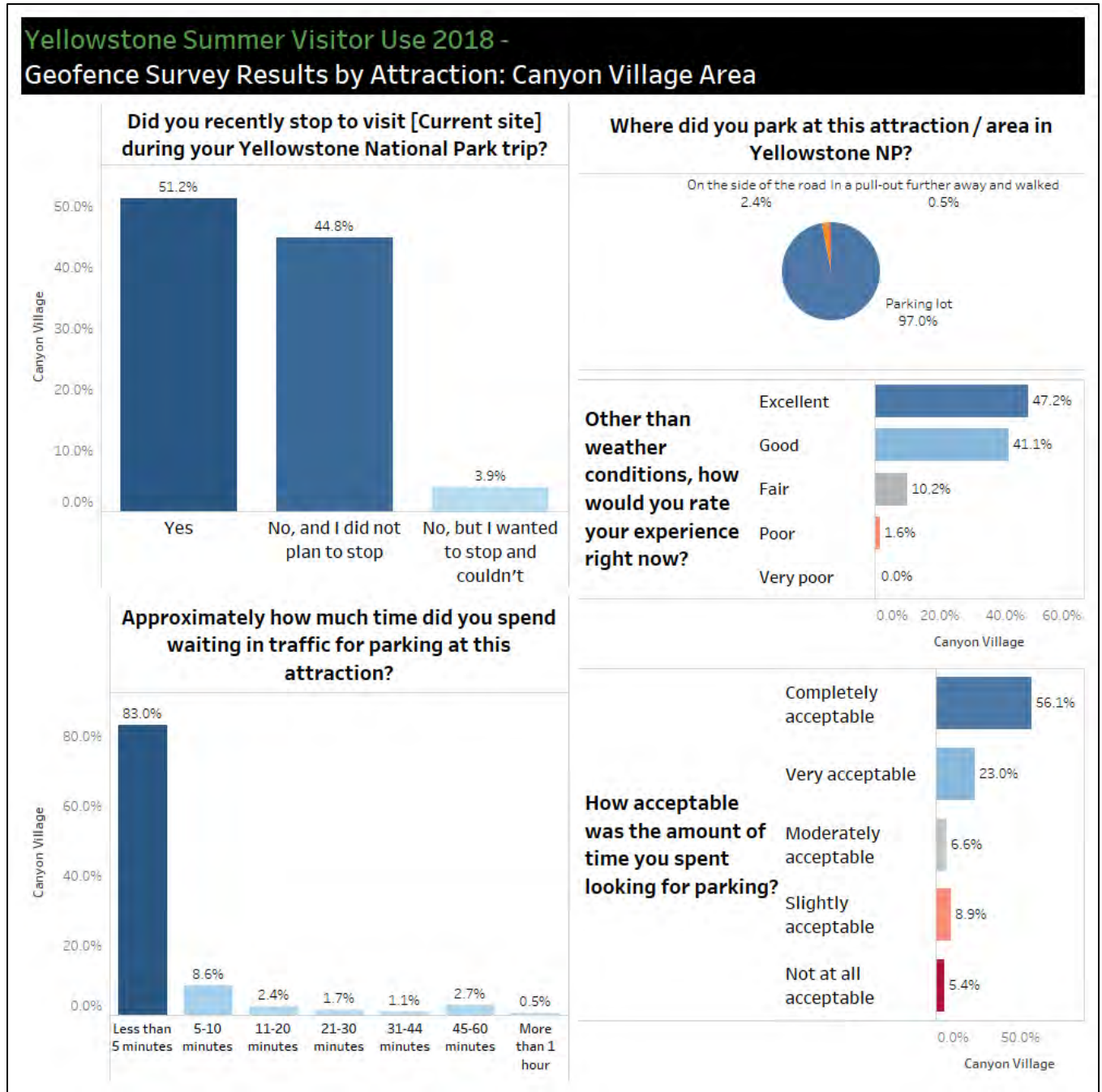
- 1 - Very poor (1%)
- 2 - Poor (4%)
- 3 - Fair (17%)
- 4 - Good (43%)
- 5 - Excellent (34%)

Canyon Village Area:

Canyon Village was an additional site to be of interest to Yellowstone staff. Overall, Canyon Village appears to have fewer issues than most sites and perceived to be less crowded than most other sites compared. Figures 1.18 and 1.19 display full results.



Figure 1.18: Canyon Village Geofence Dashboard - Part 1



Of those who went through Canyon Village:

- 51% stopped at the site
- 4% did not stop but wanted to
- 45% did not plan to stop.



Due to the small number of respondents who wanted to stop, but couldn't, the sample size of 23 is too low to display the reasons why people did not stop at the site.

In total, 584 individuals traveled through the Canyon Village geofence and participated. **About 66% of those who stopped at Canyon Village were first-time visitors, while 34% were repeat visitors.** Furthermore, 97% of those who stopped parked in a parking lot, 2% on the side of the road, and 1% parked at another pullout and walked.

When asked how long it took to find parking at Canyon Village:

- 83% found parking in less than 5 minutes
- 9% spent 5-10 minutes finding parking
- 2% spent 11-20 minutes finding parking
- 6% spent more than 20 minutes finding parking

Canyon Village had the shortest wait times for finding parking compared to other sites.

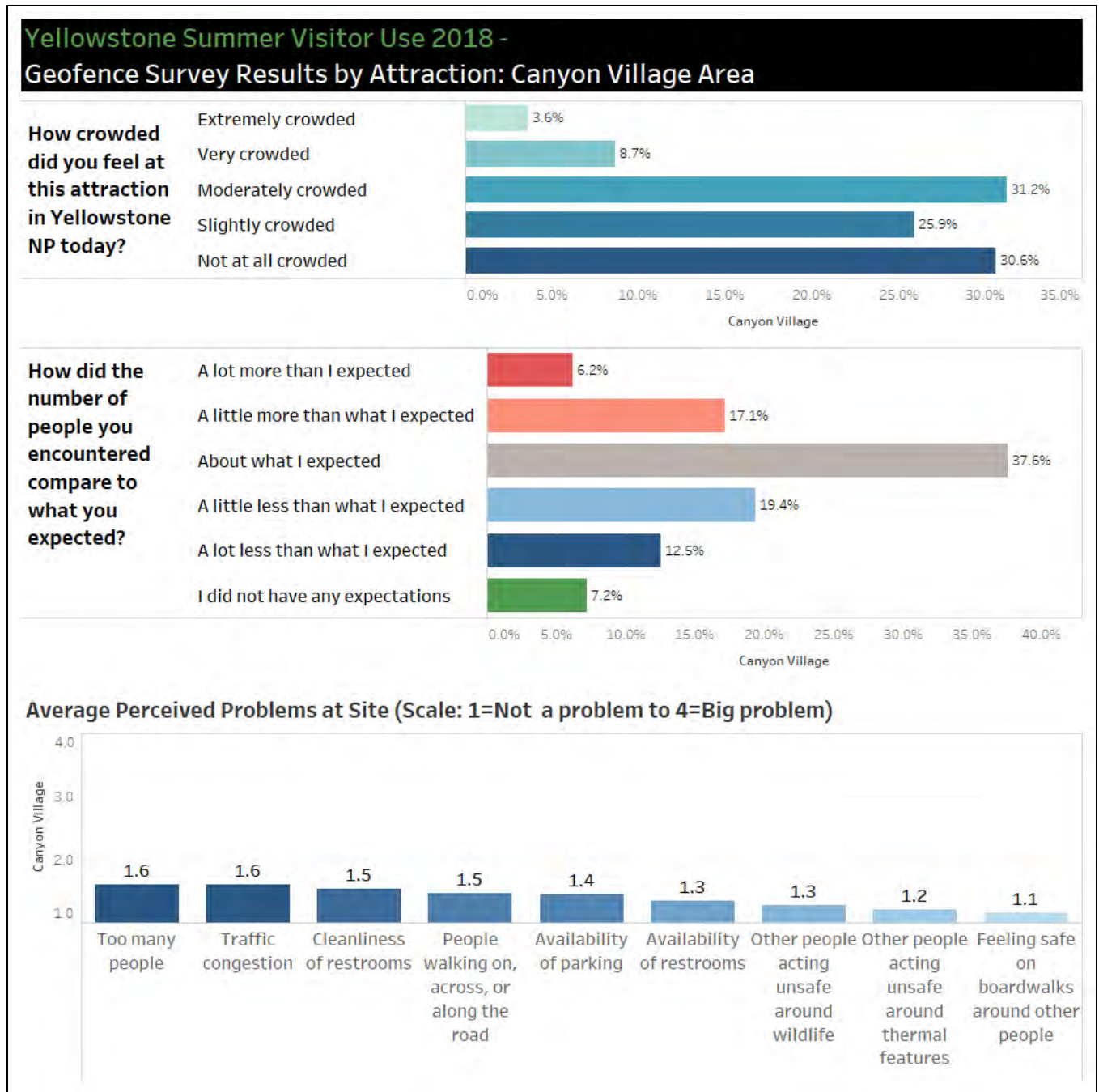
When asked how acceptable it was to spend this much time looking for parking at Canyon Village:

- 5% said 1 - not at all acceptable
- 9% said 2 - slightly acceptable
- 7% said 3 - moderately acceptable
- 23% said 4 - very acceptable
- 56% said it was 5 - completely acceptable

Average parking acceptability for Canyon Village was 4.2 (standard deviation=1.2). This was the most acceptable area across all six sites.



Figure 1.19: Canyon Village Geofence Dashboard - Part 2





Overall, respondents felt the least crowded at Canyon Village compared to other sites:

- 31% said 1 - not at all crowded
- 26% said 2 - slightly crowded
- 31% said 3 - moderately crowded
- 9% said 4 - very crowded
- 4% said 5 - extremely crowded

Average perceived crowding for Canyon Village was 2.3 (standard deviation=1.1). Again, this was the lowest perceived crowding across all six sites.

In terms of respondent expectations of the number of people at Canyon Village:

- 32% said there were less people than they expected
- 38% said the number was about what they expected
- 23% of respondents said there were more people than they expected
- 7% did not have any expectations

The Canyon Village area appears to have fewer issues of perceived crowding and parking availability than all other sites.

In terms of problems, Canyon Village had very low mean scores for specific problems at the site. In fact, none of the problems reached above an average of 2.0 out of 4.0. This further coincides with the absence of high levels of crowding and parking wait times. Below is the ranking of problems based on a mean where 1 = “Not a problem” and 4 = “Big problem.”

- Too many people (1.6)
- Traffic congestion (1.6)
- Cleanliness of restrooms (1.5)
- People walking on, across, or along the road (1.5)
- Availability of parking (1.4)
- Availability of restrooms (1.3)
- Other people acting unsafe around wildlife (1.3)
- Other people acting unsafe around thermal features (1.2)
- Feeling safe on boardwalks around other people (1.1)

Respondents were very positive and had the highest mean average for overall visitor experience, tied with the North/ South Rim area. The average rating for their experience at Canyon was 4.3 (standard deviation=0.7).

Below are summary statistics for this particular question:

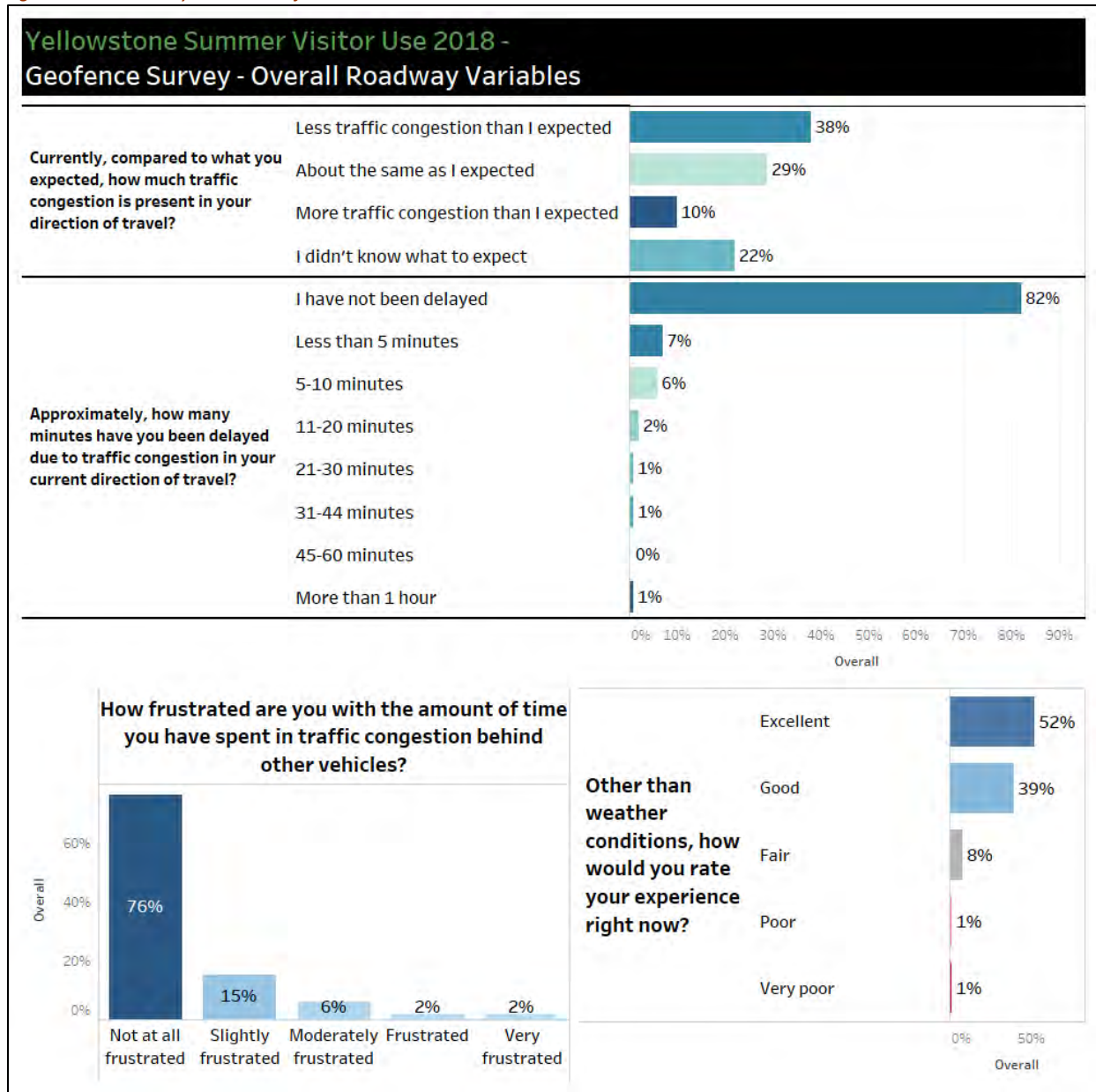
- 1 - Very poor (0%)
- 2 - Poor (2%)
- 3 - Fair (10%)
- 4 - Good (41%)
- 5 - Excellent (47%)



1.5 Roadway Results

The following results are displayed for the roadway survey. Respondents to the Geofence Survey methodology completed both roadway and attraction questions based on their current location. The survey for the Roadway portion differed from the Attractions presented previously; however, the theme (e.g., assessing crowding and issues along specific sitse) was the same across the entire process. Roadway surveys were provided to respondents as they entered one of 10 specific areas along the road. Questions were asked about current levels of traffic congestion, levels of frustration, and issues along the roadway they experienced. Thus, select results from the roadway survey are presented below and full tables can be found in the Appendix F. Results for this section are presented in dashboards 1.20 and 1.21.

Figure 1.20: Roadway Results Geofence Dashboard- Part 1





Expectations on the roadway:

Respondents were asked about their expectations on the traffic congestion on the roadway and whether there was less/more/about the same compared to their expectations, or whether they didn't have any expectations prior to driving.

Respondents felt there was less congestion than they expected or about what they expected. Overall, 29% of respondents thought there was about the amount of traffic that they expected at their current location, 38% felt there was less congestion than they expected, 10% said there was more than they expected, and 22% said they did not have any expectations. This finding suggests that respondents came in with the mindset that they had known what to expect or even had higher expectations for congestion prior to visiting.

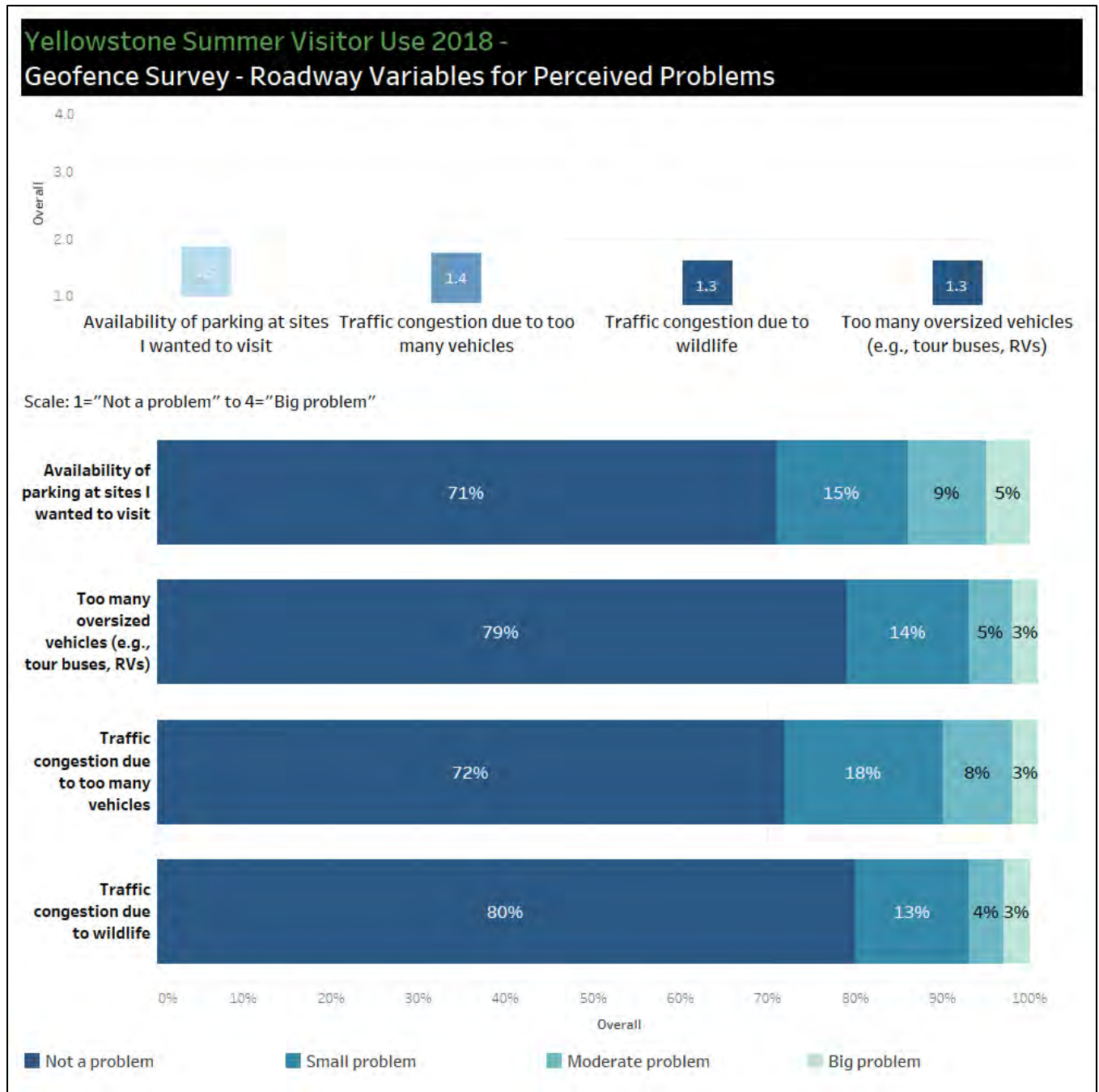


Delays:

Respondents were also asked how long they had been delayed due to traffic congestion at the current time. **Approximately 82% said they had not been delayed, while 7% said they were delayed less than 5 minutes, 6% said they were delayed 5-10 minutes, and 5% said they were delayed 11 or more minutes.** While most respondents thought they were not delayed, results indicate that respondents may not define a “delay” in the same way as when they are stuck in day-to-day traffic. For some, they may not have had any plans or deadlines they were attempting to meet and do not consider being slowed down as a delay. Respondents on vacations may not be as sensitive to traffic within a setting such as Yellowstone and may define delay differently.



Figure 1.21: Roadway Results Geofence Dashboard - Part 2





Problems encountered on the roadway:

Respondents were asked to rate how big of a problem four issues were along their specific stretch of roadway: 1) traffic congestion due to wildlife, 2) traffic congestion due to too many vehicles, 3) too many oversized vehicles (e.g., tour buses, RVs), and 4) availability of parking at sites they wanted to visit. Each item was rated on a 4-point scale of 1= “Not a problem,” 2= “Small problem,” 3= “Moderate problem,” and 4= “Big problem.” Results are summarized in Figure 1.21.

Traffic congestion due to wildlife saw 80% of people, across all sites, say that it was “not a problem,” while 13% said it was a “small problem,” 4% said a “moderate problem,” and 3% said a “big problem.” The sites with the highest average mean for this issue was the North entrance to Mammoth (1.5 average) and Tower Falls to Lamar Valley (1.5 average).

For traffic congestion due to too many vehicles, approximately 72% said it was “not a problem,” 18% stated a “small problem,” 8% a “moderate problem,” and 3% a “big problem.” The roadways with the highest average for this issue was the North entrance to Mammoth (1.7), followed by West Entrance to Madison and Madison to Old Faithful (1.6 each).

Approximately 79% of respondents said that too many oversized vehicles were “not a problem,” while 14% said a “small problem,” 5% said a “moderate problem,” and 3% said a “big problem.” The roadway with the highest average mean was the North entrance to Mammoth (1.6), followed by West entrance to Madison and Madison to Old Faithful (1.4 each).

Finally, 71% of respondents said that finding availability of parking for sites they had been traveling to was “not a problem,” with 15% saying a “small problem,” 9% stating a “moderate problem,” and 5% said a “big problem.” However, some respondents may not have had to try and find parking as of yet. The roadway with the highest average mean for parking availability was Madison to Old Faithful (1.8), followed by North entrance to Mammoth (1.7).

Overall, respondents did not specify many problems along the roadway. **Compared to the specific attractions, the roadways tended to have fewer perceived problems.** Specific sites, such as the Tower Falls to Lamar Valley road had unique issues, such as some perceived problems with wildlife congestion. However, the North entrance to Mammoth, Madison to Old Faithful, and West Entrance to Madison had the largest perceived problems across roadways.

Respondent frustration on the road:

Respondents were asked to rate their level of frustration on a scale where 1= “Not at all frustrated” to 5= “Very frustrated.” This question was unique and attempted to gain insight into how respondents’ perceived their personal frustration while traveling on a Yellowstone roadway.



Across all sites, 76% of respondents said they were “not at all frustrated,” with 15% saying “slightly frustrated,” 6% saying they were “moderately frustrated,” 2% stating “frustrated,” and 2% stating “very frustrated.” The mean for this frustration was 1.4 with a standard deviation of .7952 and a median of 1.0 across the season.

Across sites, the roadway with the highest level of frustration is the North Entrance to Mammoth (1.7) and the West Entrance to Madison (1.6). However, the range of averages is small across all road segments (1.1 to 1.7). Overall, respondents do not feel too frustrated about the amount of time they had spent in traffic behind other vehicles. For respondents on vacation, they may not consider being slowed in traffic frustrating as it’s a different type of experience than day-to-day traffic. This is further reinforced by the final variable asked of respondents on roadways below.

Ratings of the experience:

Similar to the attractions survey, respondents were asked to rate their current experience on the roadway they were traveling on. **Results were overall very positive with an average rating of 4.4 (standard deviation=0.7).** Results were broken down by rating option below:

- 1) Very poor (1%)
- 2) Poor (1%)
- 3) Fair (8%)
- 4) Good (39%)
- 5) Excellent (52%)

Across roadways, there was very little variation in the data. The range of averages between roadways only varied between 4.3-4.6 out of 5.0 for their experience ratings. **Because of this small difference, it is difficult to say whether there is any difference in the actual experience between respondents at these roadway segments.** Thus, it appears that the experience was quite positive for respondents on the roadway.

1.5b Select Roadway Segment Results

In addition to overall results, four roadway segments were analyzed individually. These four segments were chosen as they were identified by prior research and through internal scoping as areas of potential concern. The four segments reported below are:

- West Entrance to Madison Junction
- North Entrance to Mammoth Hot Springs
- Madison Junction to Old Faithful
- Madison Junction to Norris Geyser Basin



West Entrance to Madison Junction

The West Entrance to Madison Junction encounters a heavy volume of traffic during the summer season. Internal NPS statistics indicate the West Entrance sees the highest visitor use over the course of a year. Results are displayed in full below.

Figure 1.22: West Entrance to Madison Junction Geofence Dashboard - Part 1

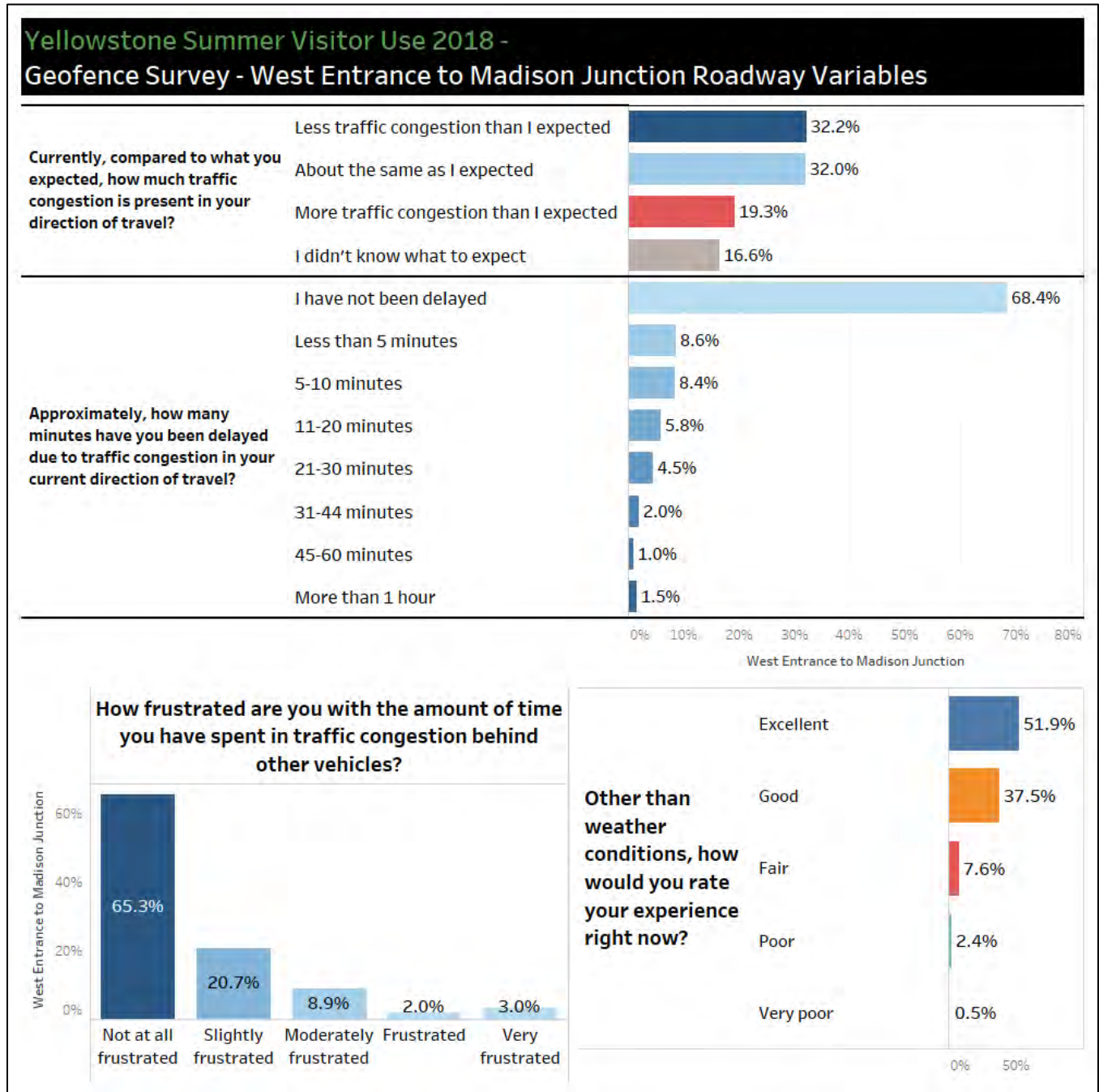
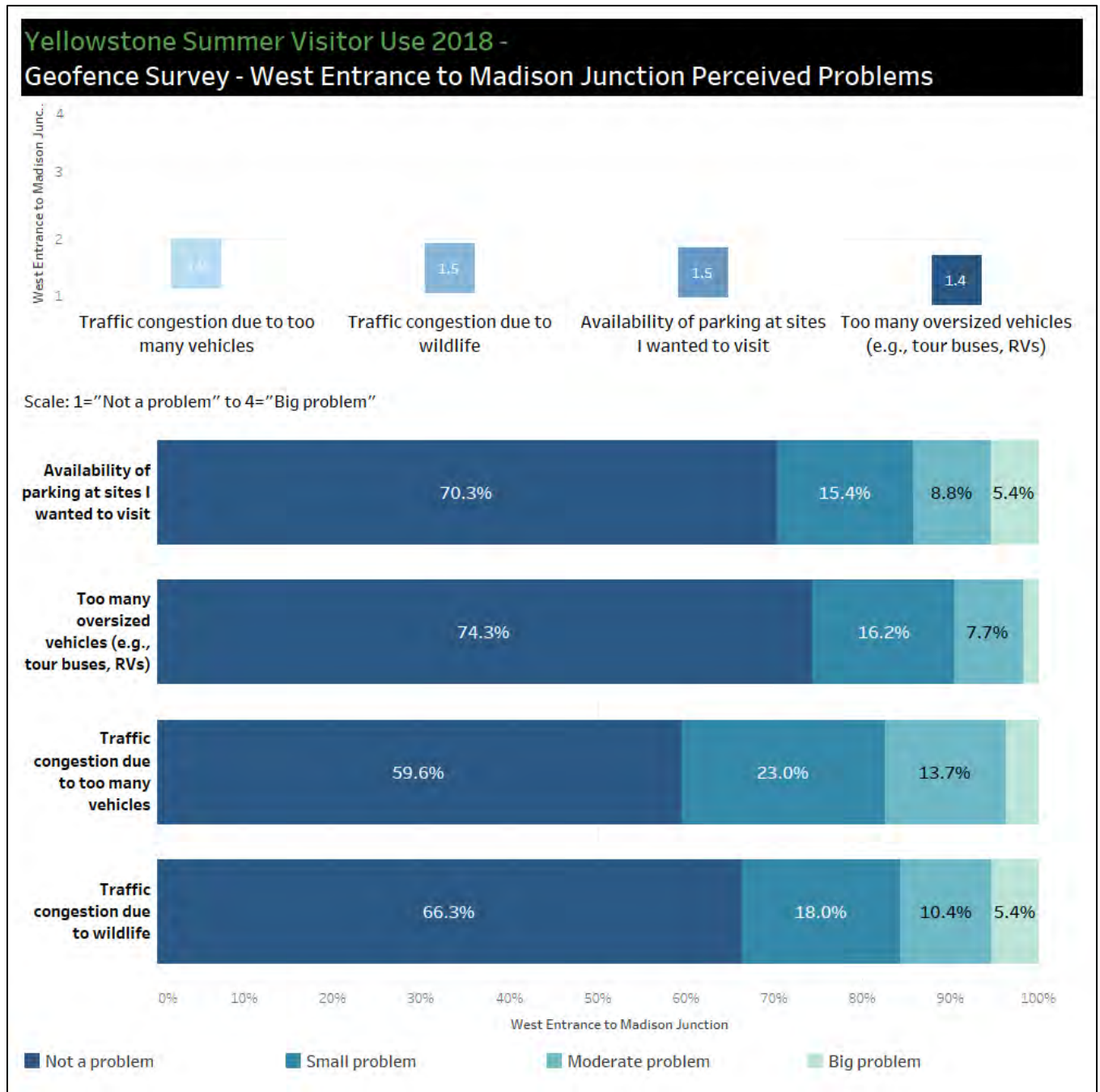




Figure 1.23: West Entrance to Madison Junction Geofence Dashboard - Part 2





North Entrance to Mammoth Hot Springs

The North Entrance of Yellowstone National Park is not as popular in terms of visitor use as the West Entrance. However, this entrance is also the primary location for employees and many service vehicles coming into Mammoth Hot Springs. Vehicular traffic can be busy during morning and evening times on this segment due to this combination of traffic types.

Figure 1.24: North Entrance to Mammoth Hot Springs Geofence Dashboard - Part 1

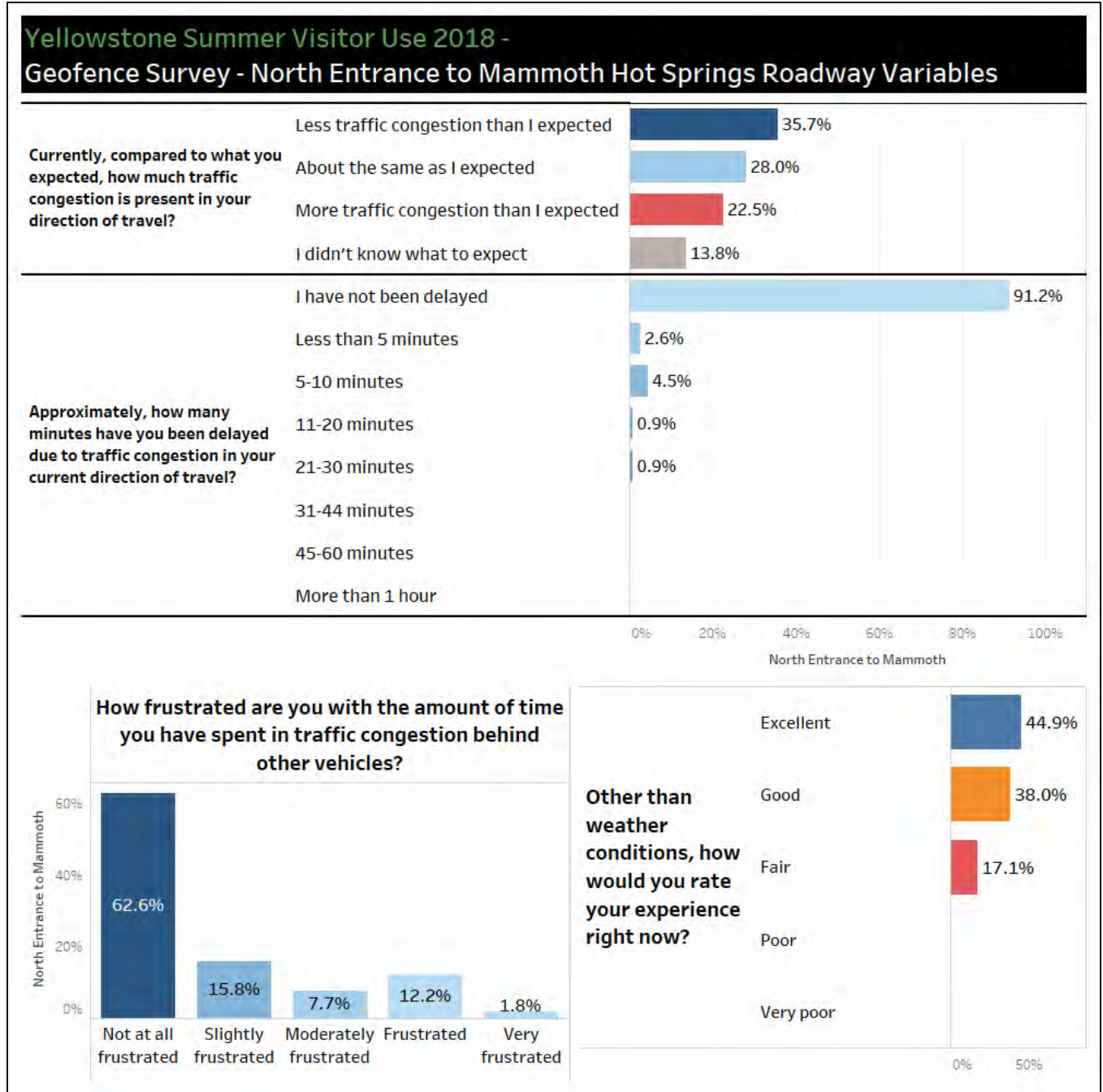
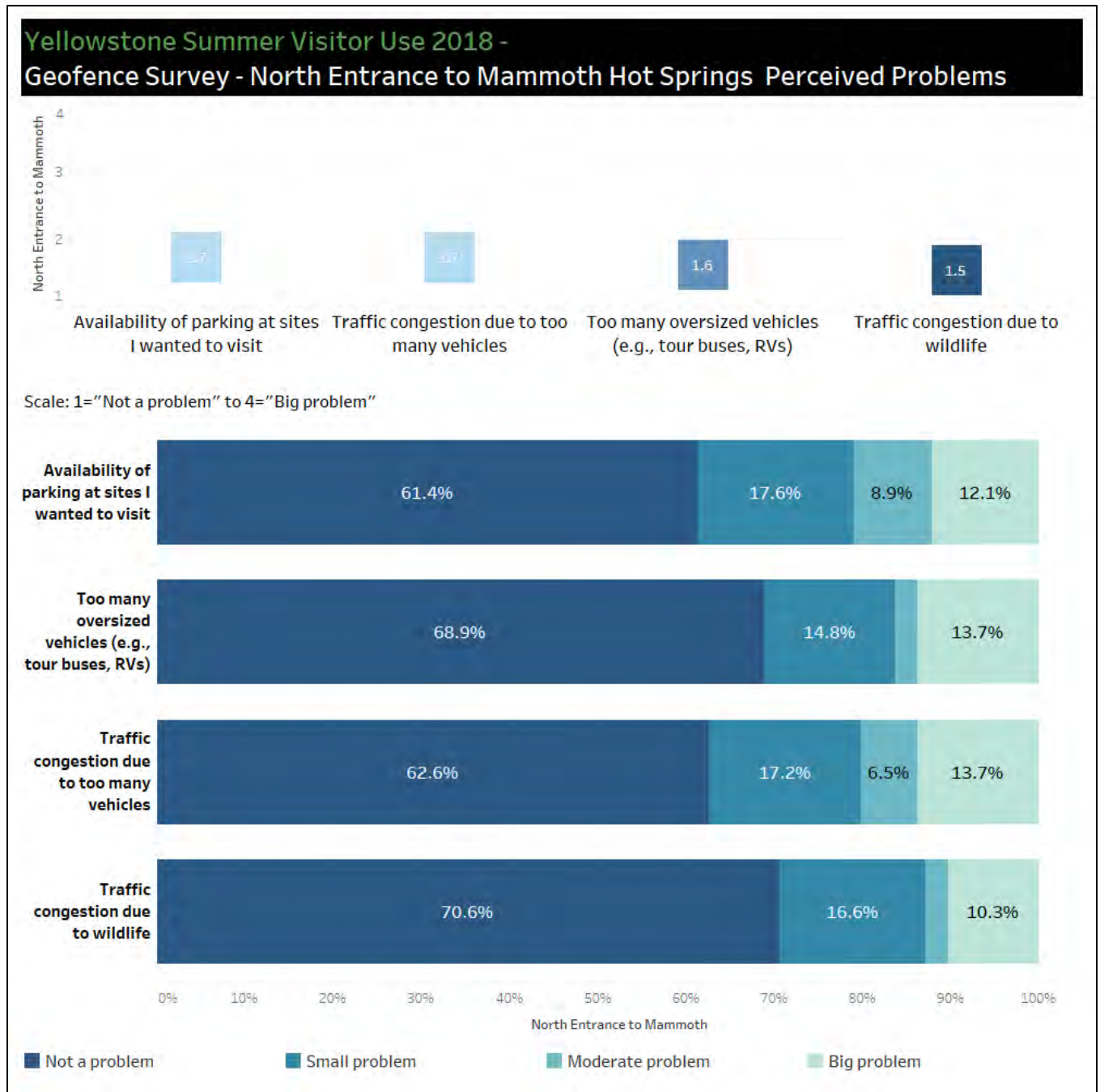




Figure 1.25: North Entrance to Mammoth Hot Springs Geofence Dashboard - Part 2





Madison to Old Faithful

The Madison to Old Faithful road corridor is a very popular route. Many visitors using the West Entrance are likely to travel straight towards Old Faithful upon entering the park. Therefore, sites along this route can be busier than others around the park.

Figure 1.26: Madison Junction to Old Faithful Geofence Dashboard - Part 1

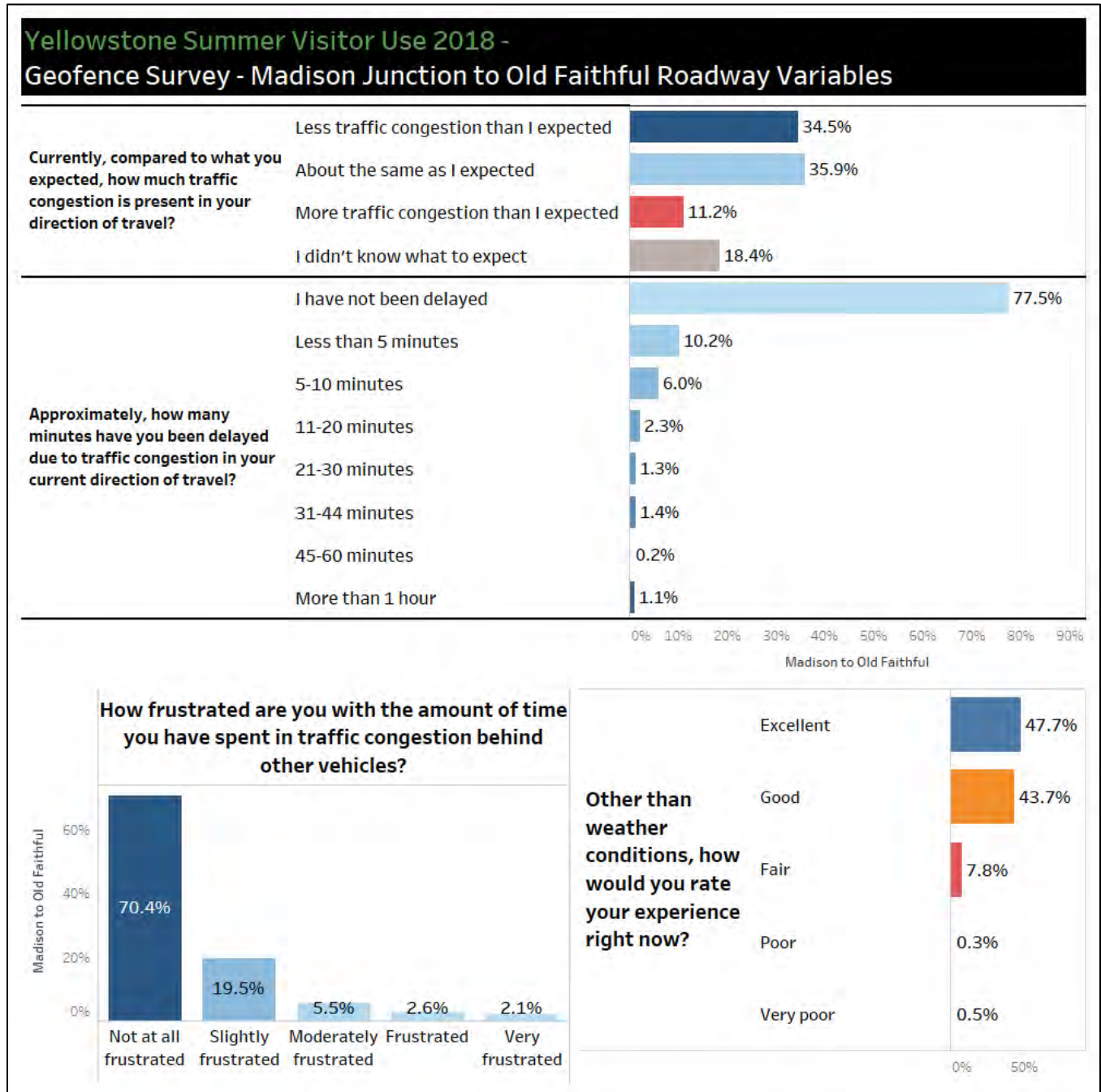
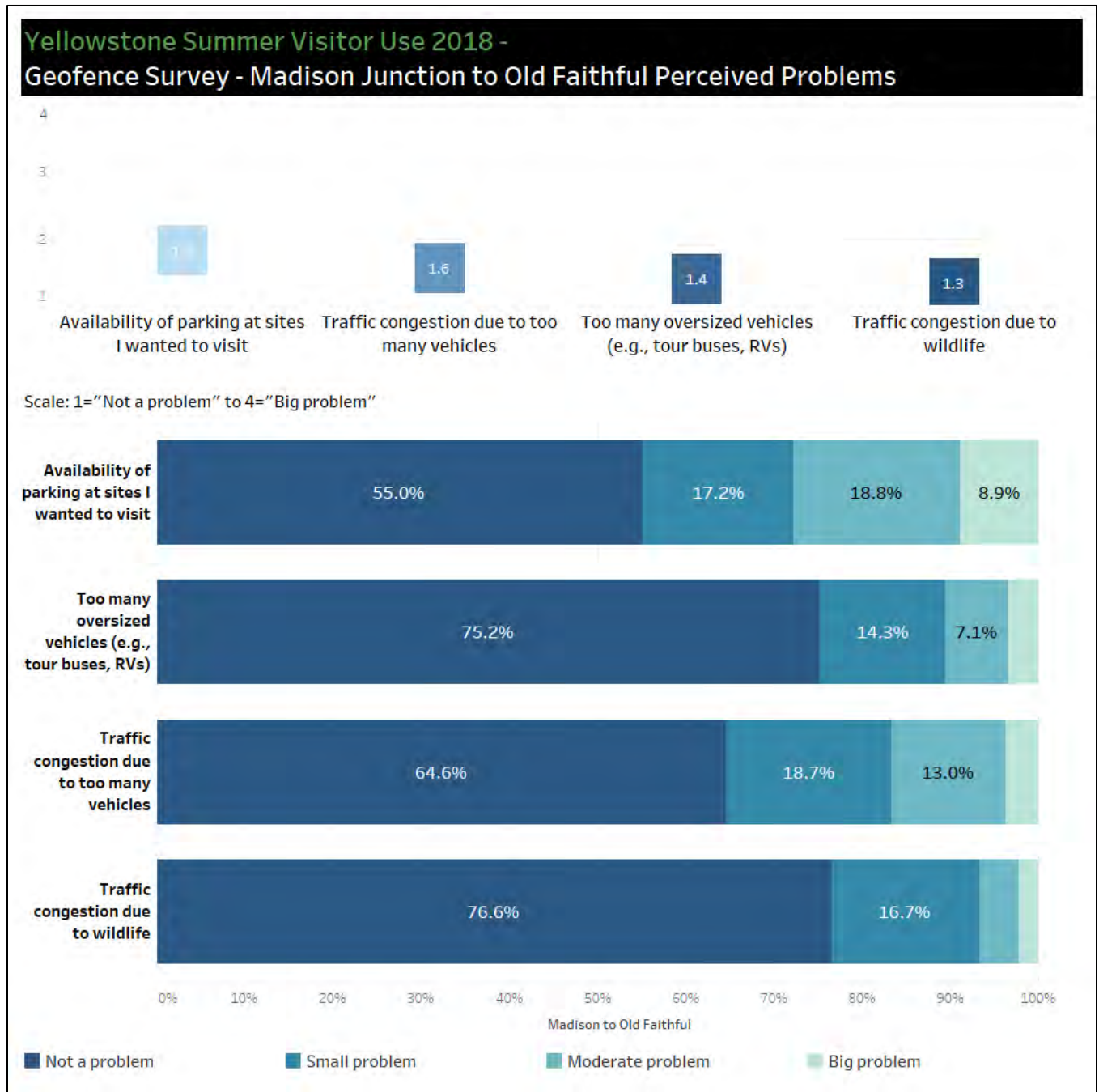




Figure 1.27: Madison Junction to Old Faithful Geofence Dashboard - Part 2





Madison to Norris Geyser Basin

In contrast to the previous segment, visitors can choose to travel north from Madison Junction towards Norris Geyser Basin. This route is part of larger "Grand Loop" of Yellowstone that takes visitors around the entire southern portion of the park including Canyon, Lake, and Old Faithful/geyser basins. Results are presented below.

Figure 1.28: Madison Junction to Norris Geyser Basin Geofence Dashboard - Part 1

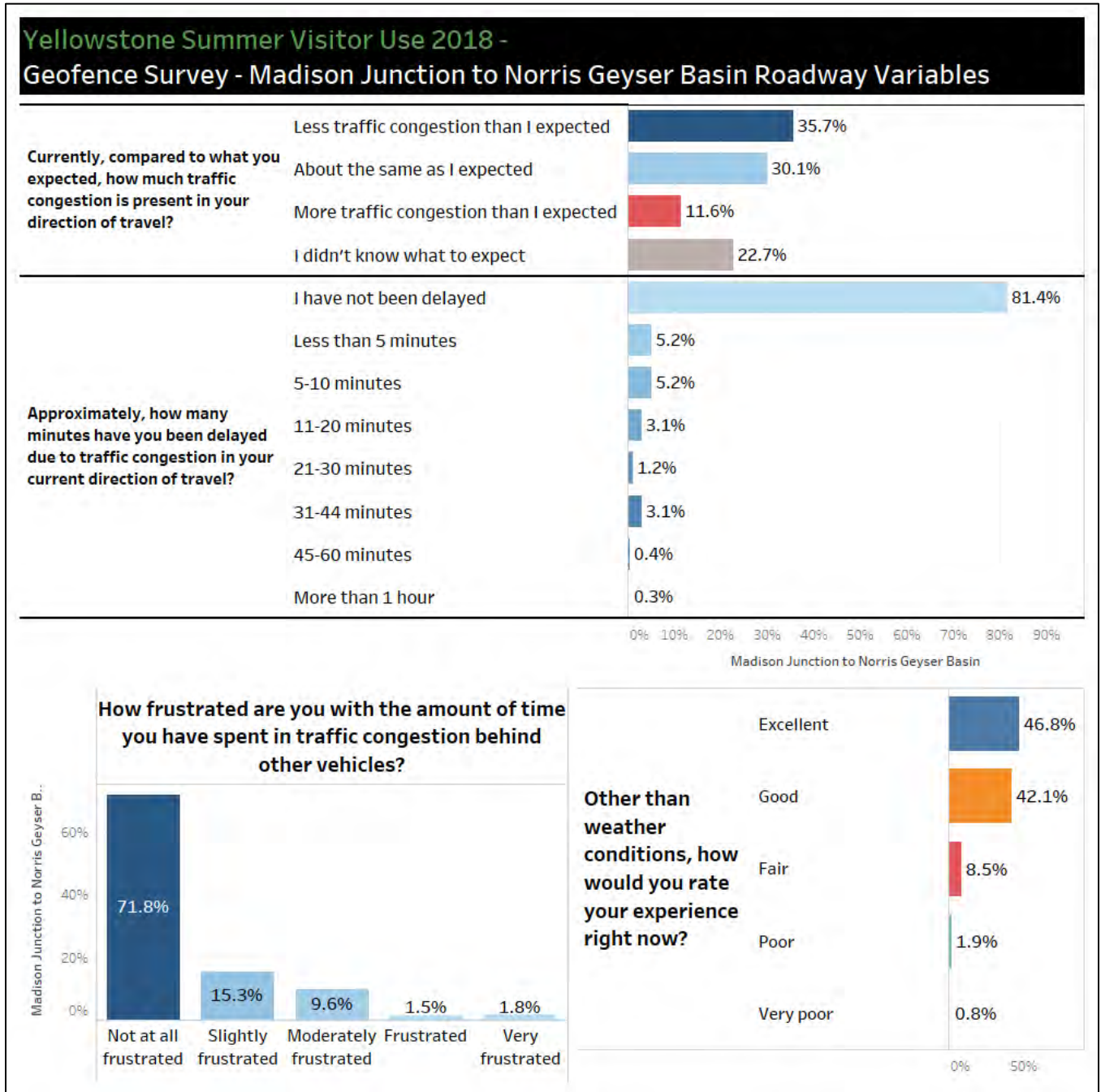
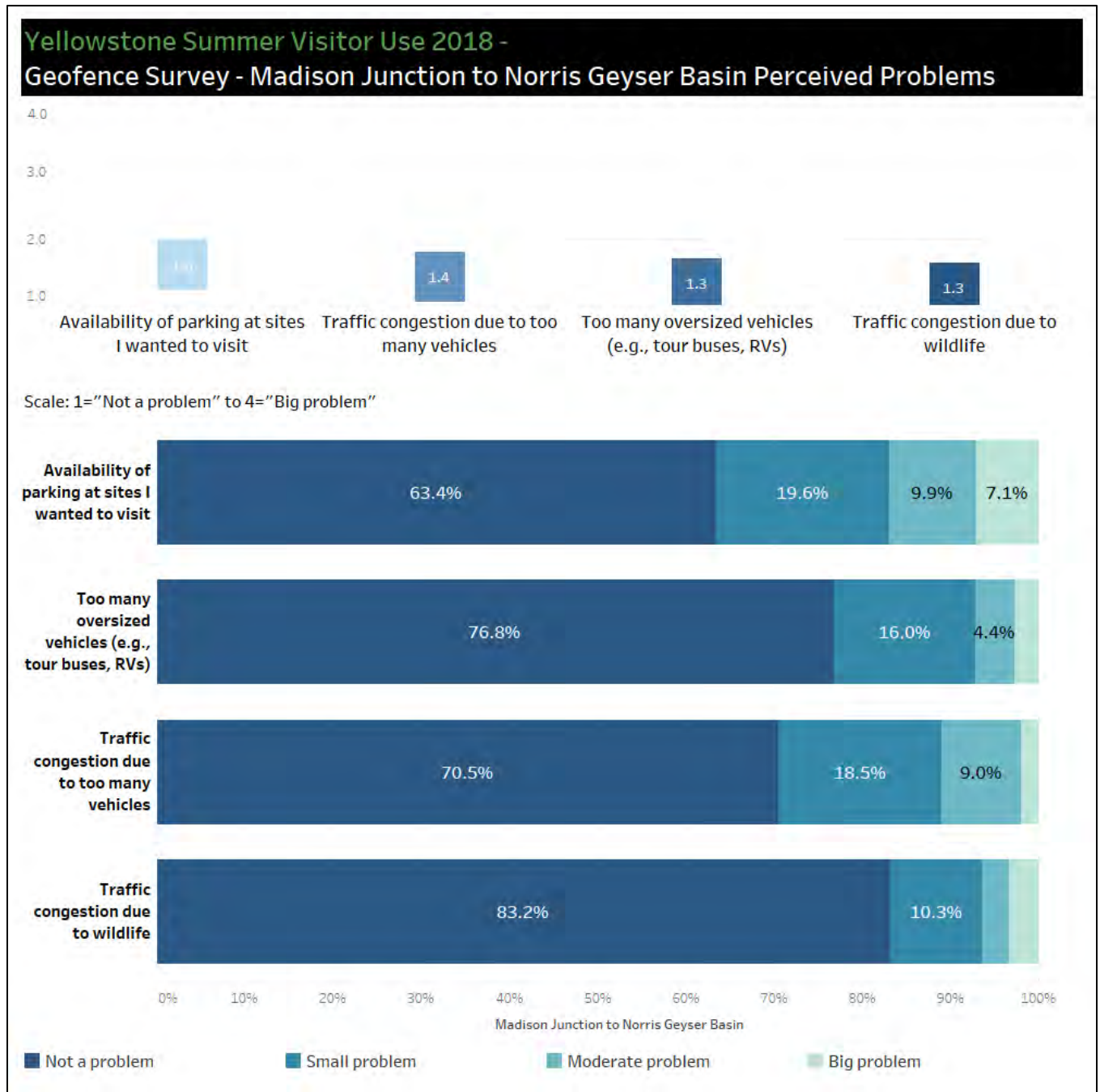




Figure 1.29: Madison Junction to Norris Geyser Basin Geofence Dashboard - Part 2





1.6 Key Findings from Significance Testing

The Key Differences found in the following tests are summarized below. For more detailed information on each test along with key results, sections 1.7 through 1.11 contain more information. Furthermore, full tables of results can be found in Appendix G beginning at Table G.1. Significance testing relates to testing of results between individual segments (e.g., individual sites, months, etc.). The purpose of significance testing is to assess whether there are statistically significant differences between groups on individual questions. While one mean might be higher or lower from one site to another, unless a significance test is conducted, it's unclear whether there is a statistically significant difference. Non-statistically significant differences are still important, but they are more likely to just be random variation in the data.

1) Midway Geyser and Fairy Falls were perceived as having significantly more issues with:

- Perceived crowding
- Lower acceptability of parking wait time
- Significantly higher perceived problems than most sites for issues of:
 - Too many people
 - Traffic congestion
 - Availability of parking
 - Availability of restrooms
 - People walking on, along, or across the road

While some variables were perceived more negatively in some categories, Midway Geyser and Fairy Falls consistently had higher perceived problems than other sites.

2) By month, some significant differences were found, but not as many as those found when results were examined by site.

- July had a significantly higher perception of crowding than all other months. May had the lowest perceived crowding.
- The rating of the respondent's experience did not vary by month. That's to say that despite some months having higher levels of crowding or parking wait times, the visitor experience remained largely consistent across the season.

July and, to a lesser degree, August have some higher perceived issues than other months. In general, the differences found in these months are not practically significant. They are more due to sample sizes than actual differences in perceptions.

3) When all 13 sites are classified into their appropriate usage category (High, Moderate, and Low Use), results identified a consistent trend of High use sites having significantly more issues than Moderate and Low Use sites.

- A potentially obvious, but reaffirming, finding was found when examining the 13 attraction sites when split into 3 categories based on visitor use. Areas that receive the most use tend to have significantly more perceived issues with crowding, traffic, and parking than Moderate and Low Use sites. Similarly, Moderate Use sites tended to have significantly higher perceived issues than Low Use sites.



1.7 Significance Testing: Individual Site Testing

The individual site profiles provide unique insights into the experiences and perspectives of respondents while they were at each individual site. However, there is value in exploring the differences in the main questions in common between these sites of interest. Analysis of Variance (ANOVA) tests were conducted using a Bonferroni posthoc test at the $p < .05$ level for significant differences across study variables for the six sites. An ANOVA tests whether the mean differs significantly (positive or negatively) between 3 or more groups. The following section tests the key variables asked of respondents among the six sites of interest displayed. For any significant difference reported, the threshold of $p < .05$ is used. Tables G.1 through G.15 display significance results by site in the Appendix.

Figure 1.30: Parking Acceptability and Perceived Crowding Averages by Site

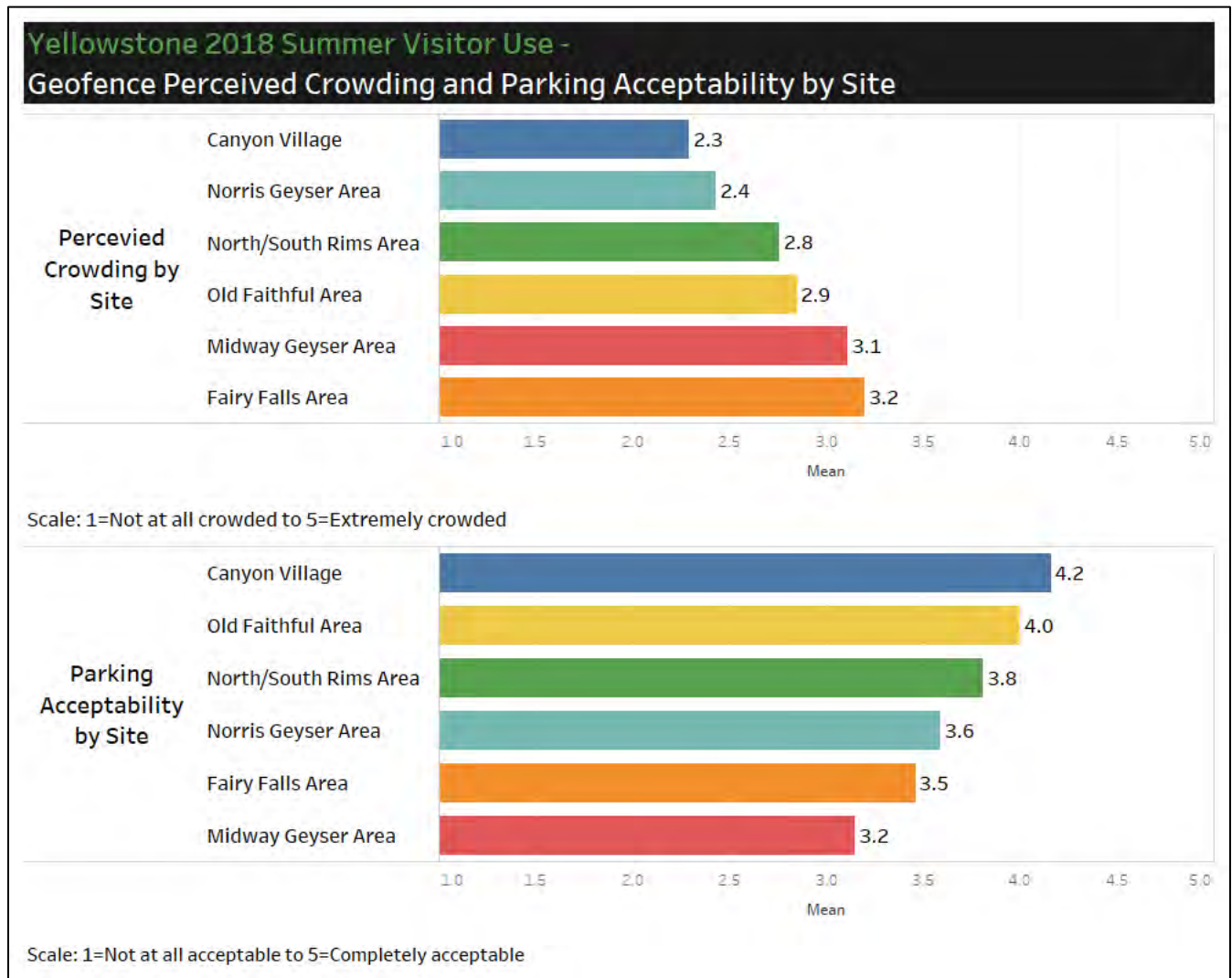
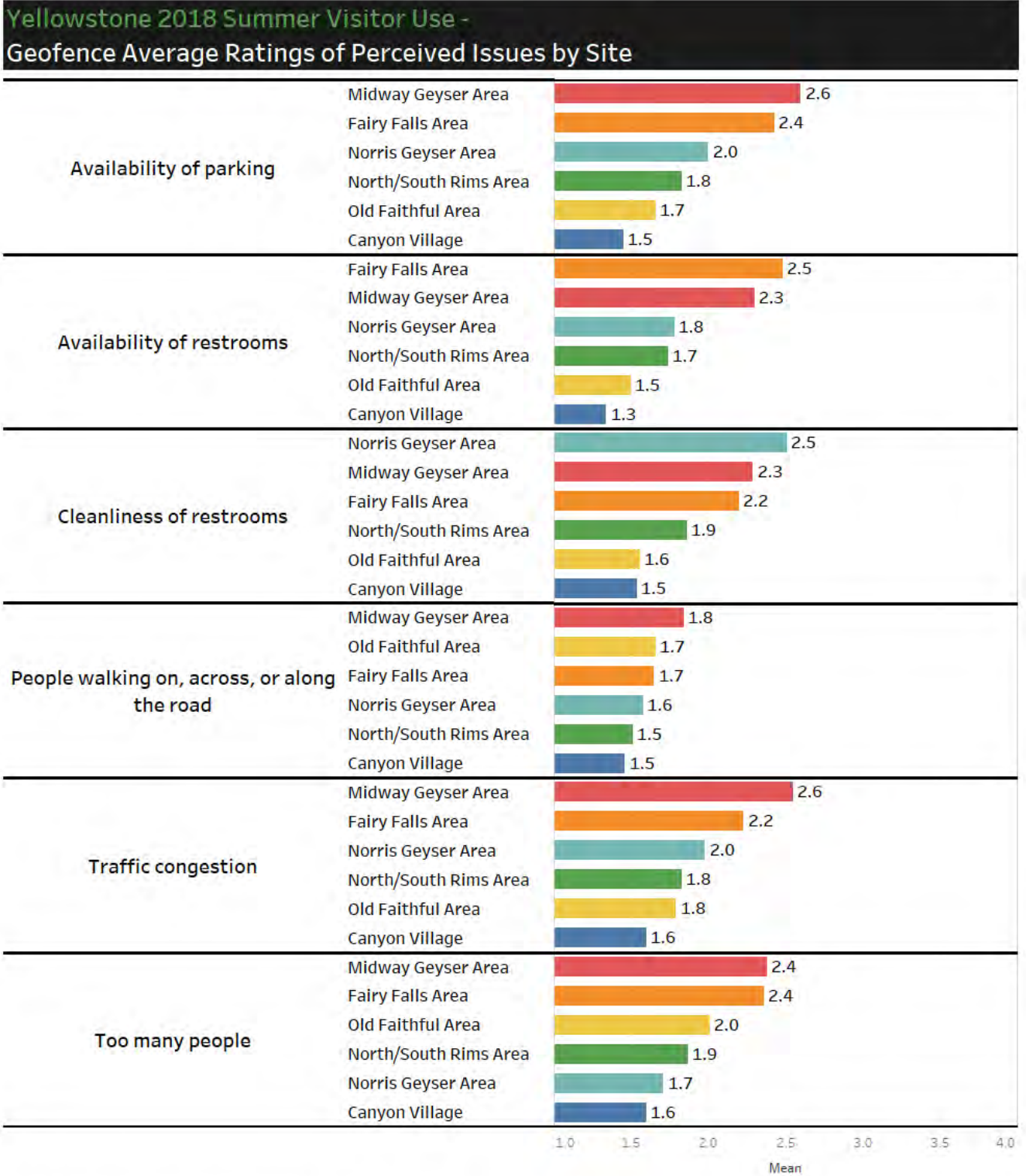




Figure 1.31: Average Ratings of Perceived Issues by Site



Scale: 1=Not a problem to 4=Big problem



Parking Acceptability by Site:

Parking acceptability was tested across sites for the entire summer season. The table below highlights the mean values for each area, the associated standard deviation, and sample size for each site. Parking acceptability was measured on a scale where 1= "Not at all acceptable" to 5= "Completely acceptable." Results are highlighted in Table 1.1.

Table 1.1: Mean Parking Acceptability by Site

Site	Mean	N	Std. Deviation
North/South Rim Area	3.81	259	1.167
Old Faithful Area	4.00	433	1.127
Fairy Falls Parking Area	3.46	111	1.195
Midway Geyser Area	3.15	243	1.217
Norris Geyser Area	3.59	249	1.321
Canyon Village	4.16	288	1.204
Total	3.76	1613	1.245

Scale: 1="Not at all acceptable" to 5="Completely acceptable"

The primary differences among sites for parking availability revolve around Canyon Village (4.16) and Old Faithful (4.00) having significantly higher ($p < .05$ threshold) mean scores of acceptability compared to Midway Geyser (3.15), Fairy Falls (3.46), and Norris (3.78). Midway Geyser had significantly lower parking acceptability than every other site, except for Fairy Falls. These findings highlight the perceived differences by respondents on their parking acceptability at each site. Old Faithful and Canyon Village both have the proper infrastructure (e.g., large parking lots) to accommodate a large volume of vehicles. Midway Geyser and Fairy Falls have small, typically full parking lots during the summer days, which would lead to lower parking acceptability from respondents.

Perceived Crowding by Site:

In addition to the acceptability of parking time, Geofence respondents were asked how crowded they felt at the attraction in Yellowstone today. This question was used to gauge whether specific sites made respondents feel more or less crowded. Across the six sites, mean values for perceived crowding range from 2.29 to 3.20 on a scale where 1="not at all crowded" and 5="extremely crowded." Results are highlighted in Table 1.2.

Table 1.2: Mean Perceived Crowding by Site

How crowded did you feel at this attraction in Yellowstone today?	Mean	N	Std. Deviation
North/South Rim Area	2.76	260	1.220
Old Faithful Area	2.85	434	1.097
Fairy Falls Parking Area	3.20	110	1.190
Midway Geyser Area	3.11	243	1.153
Norris Geyser Area	2.43	246	1.087
Canyon Village	2.29	286	1.101

*Scale: 1="Not at all crowded" to 5="Extremely crowded"



Using an ANOVA to test the differences in means between sites identifies similar results to those found for parking acceptability, with some main differences. Canyon Village (2.29) and Norris Geyser (2.43) have significantly lower mean perceptions of crowding than Old Faithful, Fairy Falls, and Midway Geyser (p < .05 thresholds). The North/South Rim (2.74) does not significantly differ from any site. Further, Old Faithful (2.85), Fairy Falls (3.20), and Midway Geyser (3.11) do not significantly differ from one another. This further identifies that the western corridor sites (primarily Fairy Falls and Midway Geyser) appear to be perceived as having significantly higher perceptions of crowding than most other sites.

Perceived Problems by Individual Site:

A larger set of ANOVA tests were conducted below on the individual problems perceived by respondents between the six sites. For each test, the individual problems were tested based on their mean scores between each site. This allows for a comparison of similar problems across the sites. As a reminder, the scale for this question was 1="Not a problem" to 4="Big problem." A complete table of all perceived problem means, sample sizes, and standard deviations are below In Tables 1.3 and 1.4.

Table 1.3: Perceived Problems by Site – Part 1

Site	Statistic	Availability of parking	People walking on, across, or along the road	Too many people	Traffic congestion
North/South Rim Area	Mean	1.83	1.51	1.87	1.83
	N	255	255	253	253
	St. D.	0.963	0.756	0.917	0.949
Old Faithful Area	Mean	1.66	1.66	2.01	1.79
	N	419	418	417	418
	St. D.	0.9297	0.8731	0.9915	0.9197
Fairy Falls Parking Area	Mean	2.43	1.65	2.36	2.22
	N	108	107	106	107
	St. D.	1.1189	0.9122	0.9637	0.8594
Midway Geyser Area	Mean	2.60	1.84	2.38	2.55
	N	238	235	235	235
	St. D.	1.0988	0.8945	1.0517	1.0549
Norris Geyser Area	Mean	2.00	1.58	1.71	1.98
	N	243	241	240	234
	St. D.	1.1128	0.8358	0.9490	1.0746
Canyon Village	Mean	1.45	1.46	1.60	1.60
	N	280	271	270	271
	St. D.	0.7523	0.7415	0.8471	0.8374

*Scale: 1="Not a problem" to 4="Big problem"



Table 1.4: Perceived Problems by Site - Part 2

Site	Statistic	Other people acting unsafe around thermal features	Other people acting unsafe around wildlife	Feeling safe on boardwalks around other people	Availability of restrooms	Cleanliness of restrooms
North/South Rim Area	Mean	1.26	1.27	1.27	1.74	1.86
	N	196	2003	234	213	174
	St. D.	0.661	0.649	0.599	1.047	0.994
Old Faithful Area	Mean	1.32	1.24	1.19	1.50	1.56
	N	401	349	403	388	378
	St. D.	0.7120	0.6566	0.5059	0.8277	0.8569
Fairy Falls Parking Area	Mean	1.47	1.35	1.26	2.47	2.18
	N	103	100	96	59	35
	St. D.	0.8244	0.7182	0.6682	1.1325	0.9922
Midway Geyser Area	Mean	1.60	1.48	1.50	2.30	2.29
	N	221	203	233	195	147
	St. D.	0.9759	0.9178	0.8039	1.2099	1.1882
Norris Geyser Area	Mean	1.26	1.22	1.22	1.78	2.51
	N	227	209	235	217	201
	St. D.	0.6707	0.6830	0.5849	1.0514	1.1839
Canyon Village	Mean	1.21	1.28	1.15	1.34	1.54
	N	216	220	213	262	252
	St. D.	0.5433	0.6751	0.4669	0.7271	0.8302

*Scale: 1="Not a problem" to 4="Big problem"

Availability of parking:

A number of significant differences were found on the issue of availability of parking when compared across sites. **Canyon Village (1.45) has a significantly lower perceived problem with parking availability than all sites except for Old Faithful (1.66), which is still higher in its average but not significantly higher. Midway Geyser (2.60) and Fairy Falls (2.42) have significantly higher mean scores than all other areas at the $p < .000$ level (except for Norris).** Fairy Falls and Midway Geyser do not significantly differ from each other. Norris Geyser (2.00) has a significantly higher perceived problem than Old Faithful, but lower than both Midway Geyser and Fairy Falls. Finally, the North/South Rim area (1.83) has a significantly higher mean than Old Faithful. Thus, this further establishes the trend highlighting Canyon Village as having fewer issues with parking than most other areas, and Midway Geyser/Fairy Falls seeing significantly higher perceived problems with parking.



People walking on, across, or along the road:

Few significant differences were found in the perceived problem of people walking on/along/across the road at sites. **The primary differences were found among Midway Geyser (1.84), which had a significantly higher mean than Canyon Village (1.46), Norris Geyser (1.58), and the North/South Rim (1.51) areas.** Outside of Midway Geyser, Canyon Village had a significantly lower mean score than Old Faithful. Midway Geyser has the highest percentage of individuals parking on the side of the road, which likely contributes to its perceived problem of people walking on/across/along the road.

Too many people:

For the issue of “too many people,” Midway Geyser (2.38) and Fairy Falls (2.35) had significantly higher mean issue scores than all other sites. This is similar to other patterns seen across the data. **Canyon Village (1.60) had significantly lower mean scores than all other sites except for Norris Geyser (1.71). Old Faithful (2.01) had a significantly higher mean score than Norris Geyser and Canyon Village.** Finally, The North/South Rims (1.87) had a significantly higher score than Canyon Village but not Norris Geyser. Overall, Midway Geyser and Fairy Falls continue to have significantly higher scores on the variable “too many people” than all other sites. Canyon Village appears to have significantly fewer problems with Old Faithful and Norris Geyser, while the North/South Rims in the middle of the pack.

Traffic congestion:

Midway Geyser (2.55) was found to have a significantly higher mean score for traffic congestion than any other site except for Fairy Falls (2.22). Fairy Falls rated second highest with a significantly higher mean than every site except for Norris Geyser (1.98) and Midway Geyser. Norris Geyser was only significantly higher than Canyon Village (1.60). Canyon Village had a significantly lower score for traffic congestion than all sites except for Old Faithful (1.79).

Other people acting unsafe around thermal features:

Respondents were asked whether they observed issues with people acting unsafe around thermal features. While not all areas have designated thermal feature areas, some respondents may have perceived areas to have thermal features, despite not being defined as a thermal feature. Thus, all sites were observed, but with the notion that not all sites have specific geothermal sites.

With that said, the main differences were found with Midway Geyser (1.60) having a significantly higher average problem rating than all other sites except Fairy Falls (1.47). This continues to be the case where Midway Geyser is perceived as having significantly larger problems than most sites. Thus, while Midway Geyser had a significantly higher mean, the other five sites were relatively similar to one another. In general, this variable had a low average rating for most sites. No site exceeded a 2.0 mean, which is only seen in a few perceived problem variables.



Other people acting unsafe around wildlife:

When testing for people acting unsafe around wildlife, significant differences between sites were found at a much lower frequency. **The only differences found were Midway Geyser (1.48) having a significantly higher mean than both Norris Geyser (1.22) and Old Faithful (1.19).** Outside of these differences, there was relatively similar data among all sites. These sites may not see as many issues with wildlife as they are not well-known for having as much wildlife present when compared to other sites within the park (e.g., Hayden Valley, Lamar Valley, etc.). Further, the average problem rating is low in relation to other problem variables.

Feeling safe on boardwalks around other people:

When asked about whether respondents perceived issues of feeling safe on boardwalks around other visitors, there was only one site that had significant differences from other sites; Midway Geyser (1.50). Midway Geyser had a significantly higher mean score than all other sites. All other sites had no significant differences between one another. Again, this variable saw overall low average scores, but the trend of Midway Geyser being perceived as having significantly higher perceived problems continues.

Availability of restrooms:

Testing the perceived problem of availability of restrooms continues to support the common trend seen across the analysis. **Midway Geyser (2.30) and Fairy Falls (2.47) are perceived to have significantly higher mean problems than all other sites.** Norris Geyser (1.78) is perceived to have a significantly higher mean problem score than both Old Faithful (1.56) and Canyon Village (1.54). Finally, the North/South Rims area (1.74) has a significantly higher mean than Old Faithful. Thus, the pattern of Midway Geyser/Fairy Falls being significantly higher with Norris and the North/South Rims falling in the middle with Canyon Village and Old Faithful near the bottom is still present with this perceived problem.

Cleanliness of restrooms:

The final test between sites was on the perceived problem of the cleanliness of restrooms. **Canyon Village (1.54) and Old Faithful (1.56) were found to have a significantly lower mean score (fewer issues with restroom cleanliness) than all other sites but did not differ between one another.** On the opposite end, Midway Geyser (2.29) had a significantly higher score (i.e., a larger problem) than the North/South Rims area (1.86). Norris Geyser (2.51) had a significantly higher mean than Old Faithful, Canyon Village, and the North/South Rims area. **In general, this variable had lower significant differences but had a quite high average mean score for most sites.**



Conclusions from Site Testing:

Through the testing of the six sites based on their parking acceptability, perceived level of crowding, and mean scores to individual problems, a common trend emerged. As **highlighted in nearly every test of individual problems, Midway Geyser and Fairy Falls were significantly higher in many of the issues and perceptions asked of respondents.** This isn't to say they are the highest in all, but in many cases, these two sites were significantly higher than all other sites compared against them. Conversely, Canyon Village, and in many cases Old Faithful, had a much lower overall perception of problems.

Although many significant differences were found, the scale of the mean differences is still somewhat small. Therefore, while Midway Geyser and Fairy Falls did have significantly higher means across many variables, most of their averages are still only in the 2.0 range with none of the averages exceeding 3.0. The trend among responses does tend to indicate these western corridor areas to have higher perceived problems with parking, crowding, and behaviors among people at the site. Thus, Yellowstone National Park managers should take these perceptions into account, and identify how best to address the highlighted concerns. Both Midway Geyser and Fairy Falls see much higher demand than what the parking lots and boardwalks can handle. This is likely contributing to, and compounding, a number of issues addressed above.

1.8 ANOVA Testing of Attraction Variables by Month:

An ANOVA test was conducted for all sites, including those not examined separately, by month. The Geofence Study took place for a week in Month through September. In addition, data from all 13 attraction sites was used in this analysis. Thus, the following test includes more sites than the six identified previously. For each test, a $p=.05$ was used as the threshold for significant differences. **Full results can be found in Appendix G (Tables G.16 through G.19).** Three variables were tested by month: 1) Acceptability of parking wait time, 2) perceptions of crowding, and 3) ratings of the overall experience.

- Mean scores were generated for each month, across all attraction types and tested using ANOVA or parking acceptability. **September saw the highest rating of parking acceptability (Scale:1="Not at all acceptable" to 5="Completely acceptable) at 4.12 and was significantly higher than all months except for May.** July had the lowest acceptability at 3.68 and was significantly lower than all other months. August, another usually busy month, saw acceptability of 3.89 and was significantly lower than September, significantly higher than July, but was not significantly different from May or June.
- **By month, July respondents had the highest rating of perceived crowding, across all sites, at 2.83, which was significantly higher than all other months.** May, on the other hand, saw the lowest perceived crowding (2.15) and was significantly lower than all other months.
- The overall experience was examined by month, across all possible sites. Few meaningful significant differences were found when analyzed by month; however, September had a significantly higher perceived experience than August and July.



1.9 ANOVA Testing of Attractions by Site Type:

An additional ANOVA test was conducted on three different site classifications based on all attractions sites. The three site types were defined based on estimated visitor use: High Use, Moderate Use, and Low Use. High Use areas include Old Faithful, Midway Geyser, Norris Geyser, Canyon Village, and the North/South Rims areas. Moderate Use areas include Fairy Falls, Mammoth Hot Springs, Tower Falls, Boiling River, and West Thumb. Low Usage areas include Hayden Valley, Lamar Valley, and Lake Village. Full results for this test can be found in Appendix G in Table G.20 and G.21.

- For acceptability of parking, High Use areas were significantly lower in respondents' acceptability than Low Use areas. Furthermore, Moderate Use areas were significantly lower in acceptability than Low Use, but did not differ from High Use. This may be due to Fairy Falls and Boiling River being classified as "Moderate Use" areas. NPS staff and additional survey results have indicated parking to be somewhat challenging for these two locations despite their lower use. **Therefore, both Moderate and High Use areas were significantly lower in acceptability than Low Use areas across the summer season.**
- On perceived crowding, High Use areas were perceived as significantly more crowded than Moderate and Low Use areas. Moderate Use was perceived as significantly more crowded than Low Use. **Therefore, there is a significant progression of perceived crowding between High, Moderate, and Low Use areas across the summer season.** Sites that are classified as "higher use" do see increased perceptions of crowding by respondents.
- Lastly, some significant differences were found in the rating of the experience between sites. High Use areas had a significantly lower rating of the visitor experience than Low Use areas, but not significantly lower than Moderate Use areas. **Low Use areas had a significantly higher rating of the visitor experience than both Moderate and High Use areas.**

1.10 ANOVA test of Perceived Problems by Site Type:

Similar to the analysis of site type, an ANOVA was performed on the perceived problems by site type. These variables were tested with ANOVA by site type across the summer season. Full results can be found in the Appendix G between Table G.22 through Table G.25.

- For "parking availability," **High Use areas were perceived as having a significantly higher problem than Low Use areas, but not Moderate Use areas.** Low Use areas were significantly lower in perceived problems in parking availability than both Moderate and High Use. This pattern is the same for "people walking on, across, or along the road."
- On the issue of "too many people," **High Use areas were perceived to have a significantly larger problem than Moderate and Low Use areas.** Similarly, Low Use areas were perceived to have a significantly lesser of a problem than both Moderate and High Use areas.
- "Traffic congestion" follows a similar pattern of response to "too many people." **High Use areas are perceived with significantly more problems than Moderate and Low Use areas.** In addition, Low Use areas have significantly lesser problems than Moderate and High Use areas.
- **"Other people acting unsafe around geothermal features" are perceived to have significantly more problems in High Use and Moderate Use areas than Low Use areas.** High Use and Moderate Use areas are not significantly different from each other.
- **"Other people acting Unsafe around wildlife" has an interesting trend where Low Use areas are perceived to have more of a problem than High Use areas, but not significantly different than**



Moderate Use areas. This may be due to the fact that Low Use areas are more likely to have visible wildlife than areas with more frequent visitor use.

- For the last three perceived problems, fewer differences are found. For “feeling safe on boardwalks around other people,” High Use areas, which are likely to have more individuals on boardwalks, have significantly more perceived issues than at Low Use areas. However, Moderate Use areas are not significantly different than either High or Low Use areas.
- **“Availability of restrooms” is perceived to be more a problem at High Use and Moderate Use areas than Low Use areas.** However, High and Moderate Use are not significantly different from one another.
- Finally, “cleanliness of restrooms” saw higher means overall for all groups. **There were no significant differences found between use sites, which suggests this may be a problem for some people across the entire park.**

1.11 Roadway testing by Month:

A series of ANOVA tests were conducted for the roadway survey. Results of a variety of issues occurred along the road segment (rated on 1 = “Not at all a problem” to 4 = “Big problem” scale) were asked of respondents while they were on the road segment and were tested by month.

In general, fewer significant differences were found on the roadway surveys than on the attractions. The primary differences are summarized below. **Full results can be found in Appendix G between tables G.26 and G.31.**

Traffic congestion due to wildlife: Traffic congestion due to wildlife did not have any significant differences between months. This issue appeared to be rather somewhat lower than other issues observed.

Traffic congestion due to too many vehicles: The primary differences for this variable were found in July and August. July was perceived to have significantly more issues of too many vehicles than May, June, and September.

Too many oversized vehicles: No significant differences were found between months based on too many oversized vehicles. July had the highest rating at 1.36 out of 4.0, but all months hovered between 1.28 and 1.36.

Availability of parking at sites I wanted to visit: A variety of significant differences were identified on parking availability as an issue on roadways. May had significantly less of a problem with parking availability while July had significantly more issues than any month besides August. Peak season (July and August) both had the highest means with July being significantly different than most months.

Frustration: Respondents were asked to rate how frustrated they were with the amount of time spent in traffic congestion on each roadway segment. Across the entire season, no significant differences in frustration of respondents along roadways were found. However, the highest mean ratings of frustration were in July (1.43) and September (1.41).

Overall experience: Finally, the ratings of their experience in the moment from the attractions survey were replicated on all roadways. Similar to attractions, only a few significant differences were found. Primarily, September had a higher rating of experience by respondents than June, July, and August. While September was busier than normal, people were still having a perceived high-quality experience.

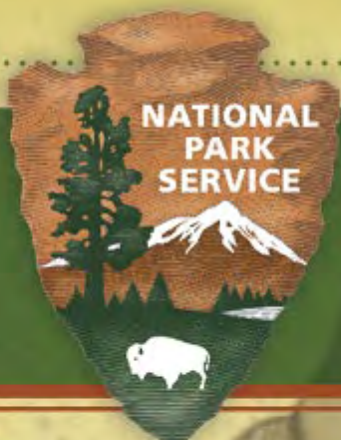


1.12 Effect Sizes and the Impact on Significant Findings:

Throughout each ANOVA analysis, effect sizes were examined and displayed for the associated test. The effect size informs to what extent the variation in the independent variable is explained by the dependent variable. Tests that contain large sample sizes, such as many of those presented in this study, are more likely to be flagged as significant due to the power of the sample size. The eta and eta squared figures throughout the appendix indicate a generally low effect size for many tests. While there are some moderate effect sizes, the tests conducted on the full sample lead to low effect sizes. Thus, the differences are driven more by a large sample size than by true effects between the variables. Significant differences do exist in many cases, but the effect size is small. Therefore, these findings should be taken into account when putting the results into practice. In other words, there are definite differences between groups, but much of the difference is accounted by the effect size. In general, there may be fewer practically significant differences. However, there is a pattern of sites having lower ratings (e.g., Midway and Fairy Falls) and July does appear to have more issues than other months.

Final Report

NOVEMBER 2019



SECTION 2

GPS Roadway and Length of Stay Results

SUMMER 2018 VISITOR USE SURVEYS

In the Moment Park Experiences and Perceptions



2. Section 2: GPS Roadway and Length of Stay Results

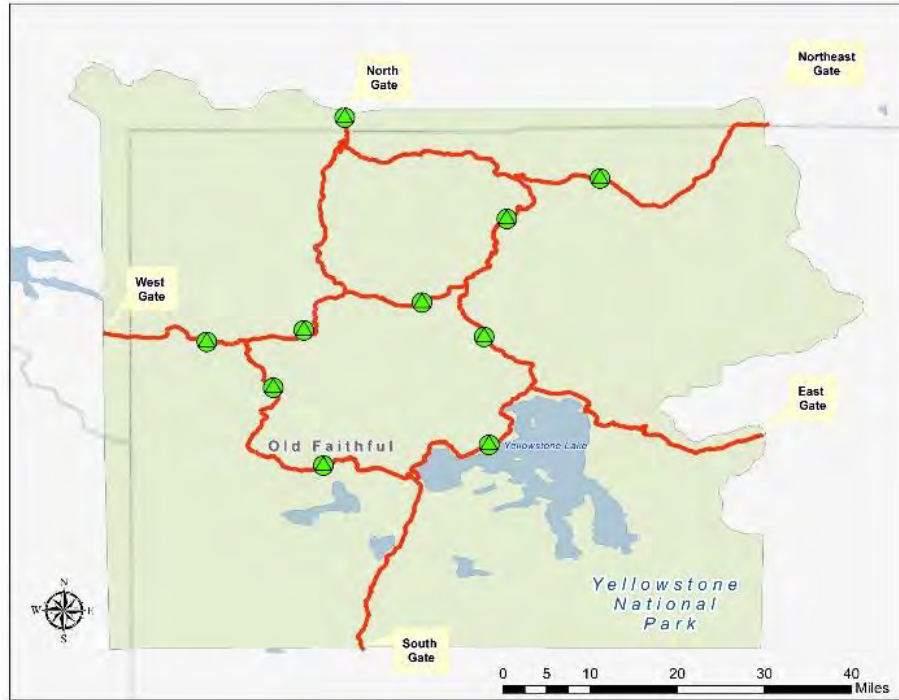
2.1 Geofence Locations

Geofences were established in ArcGIS that covered ten key segments of roadway (Figure 2.1). Each geofence is a circular polygon centered on the roadway and approximately a half mile in diameter. The size of the polygon was selected so as to minimize any missed GPS signals due to accuracy limitations of the devices. As each deployed device entered any given roadway geofence, a survey was delivered to the tablet and the participant was notified via an alarm tone. This same procedure was repeated for each roadway geofence entered by the device. Each respondent was assigned a unique identifier that was consistent across surveys and tracks. Additionally, each geofence was uniquely identified such that they may each be isolated from one another in the analysis.

Each deployed tablet generated GPS ‘pings’ (not heard by the respondent) at one-minute intervals and stored each device’s latitude and longitude with each ping. The time-stamped GPS pings permit the creation of a route each user took through the park, their length of stoppage at sites, and the creation of a speed profile based on distance covered per minute. Roadway segments were identified for each of the 10 geofences. These segments vary in length depending on several area attributes, primary being that the segments do not cross any attraction geofences and do not cross major intersections. Buffers were created around each line segment such that all GPS points associated with a traveling vehicle could be selected while minimizing the likelihood that a vehicle parked in a pullout was captured. Observations were spot checked to ensure appropriate capture of traveling vehicles. Due to the accuracy of the device’s GPS units, some observations had to be discarded as multiple pings occurred outside of the buffer area and thus resulted in unrealistic travel speeds (e.g., only five points over a ten-mile stretch, suggesting a 120-mph travel speed).



Figure 2.1: Roadway Geofence Locations



Similar to the roadways, 12 attraction sites were also geofenced. Geofences were constructed around the sites such that all cars passing all entryways into the site would have to enter the geofenced locations. Upon leaving the geofence, the appropriate survey was deployed to the participant. While parked within the attraction geofence, the tablet continued to record pings, thus allowing an accurate (to the minute) length of time the participant was at the site.

2.2 Speed Distribution by Roadway Segment

Summary

On typical roadways (e.g., those frequently used for commuting and moving goods), as the volume of traffic increases, the average speed decreases and the variability increases, leading to uncertainty in travel time. This often results in driver frustration and wasted time in traffic. In this light, one might expect that as speed declines, frustration would increase and the perceived visitor experience would decline. **However, across all roadway segments where a geofence was located, little-to-no correlations between travel speed and frustration levels or rated experience were detected** (Table 2.1). The maximum correlation values, in absolute terms, detected were at the West Gate to Madison junction roadway segment, yet these only yielded a -0.25 for speed to frustration correlation, and a 0.15 for speed to experience correlation. A value of 1(-1) correspond to perfect positive (negative) correlation and a zero indicates no correlation. Thus, values close to zero indicate that the measures of frustration and experience are not strongly related to speed. A positive correlation indicates that as one variable (e.g., speed) increases, so too does the other (e.g., experience). Meanwhile, a negative correlation indicates a decreasing value in one variable as the other increases.



Table 2.1: Frustration and Experience Level Correlations with Visitor Speed on Roadway Segment

Roadway Segment	Frustration	Experience
West Gate to Madison Junction	-0.25	0.15
Madison Junction to Old Faithful	-0.15	0.03
Old Faithful to West Thumb	0.10	-0.04
West Thumb to Lake Village	-0.03	-0.04
Lake Village to Canyon Village	-0.09	0.04
Canyon Village to Norris Geyser Basin	-0.03	0.04
Madison Junction to Norris Geyser Basin	-0.07	0.03
Dunraven Pass	-0.03	0.00
Lamar Valley	-0.02	-0.04
North Gate to Mammoth Hot Springs	0.14	-0.03

Overall, each roadway segment yielded average frustration levels of less than a 2.0 and average experience ratings in excess of 4.0. The median frustration rating for all segments is 1. The median experience rating is 5 for all segments, with the exception of the North Gate to Mammoth and Madison to Norris. These two roadway segments have a median of 4 (Table 2.2). **Combined, these results indicate that despite average speeds often significantly less than the posted travel speed, roadway congestion is not a detriment to experience for many respondents.**

Table 2.2: Roadway Segment Speed, Frustration, and Experience Observations

Roadway Segment	Speed Limit (MPH)	Average Speed	Mean Frustration*	Mean Experience**
West Gate to Madison Junction	45	36.3 (12.0)	1.7	4.4
Madison Junction to Old Faithful	45	34.6 (9.6)	1.5	4.4
Old Faithful to West Thumb	45	43.7 (7.7)	1.3	4.5
West Thumb to Lake Village	45	41.6 (7.9)	1.2	4.5
Lake Village to Canyon Village	35	27.1 (12.0)	1.3	4.5
Canyon Village to Norris Geyser Basin	45	44.9 (7.1)	1.2	4.4
Madison Junction to Norris Geyser Basin	45	36.1 (8.5)	1.4	4.4
Dunraven Pass	35	31.0 (7.9)	1.4	4.4
Lamar Valley	45	21.7 (12.2)	1.3	4.6
North Gate to Mammoth Hot Springs	35	24.9 (10.2)	1.6	4.3

() indicates the standard deviation of the observations.

* (1=Not at all frustrated, 2=Slightly frustrated, 3=Moderately frustrated, 4=Frustrated, 5=Very frustrated)

** (1=Very poor, 2=Poor, 3=Fair, 4=Good, 5=Excellent)



Most roadway segments yielded speed performance profiles that were similar across months, with a high density of travelers moving at or near the posted speed limit. Road segments in which there is relatively low levels of wildlife viewing tend to result in the most well-performing speed profiles. A well-performing speed profile suggests most respondents traveled at or near the posted speed limit as seen by high proportions near the speed limit and long tails to the left (lower speeds). For example, the average speed between Canyon Village and the Norris Geyser Basin is effectively the speed limit (45 mph) and low variation is observed (generally, lower variation yields lower standard deviation (Table 2.2)). Alternatively, Lamar Valley serves a large opportunity for wildlife viewing, creating frequent slowdowns. This is observed in the data where the average speed on the roadway segment is less than half of the posted speed limit and there is substantial variation. As variation in speed increases, the curve becomes wider, more sporadic, and the average speed declines considerably. In addition to Lamar Valley, the Hayden Valley is also a site of frequent wildlife jams and the slow average speed combined with a high standard deviation would suggest a poor performing roadway; however, respondents rate frustration rather low and experience is high. This would indicate that speeds are often voluntarily slow, and even welcomed, as they enjoy the experience provided.

In the following subsections, speed profiles are provided for each geofenced segment of roadway. Roadways that are well performing should be expected to have a majority of their observed travelers traveling at or near the speed limit, resulting in a high density (proportion) of observations centered about the right-hand side of each profile, with a long left-hand tail towards the slower speed. Refer to the Norris Geyser Basin to Canyon Village segment for an indication of a very well performing roadway.

Norris Geyser Basin to Canyon Village

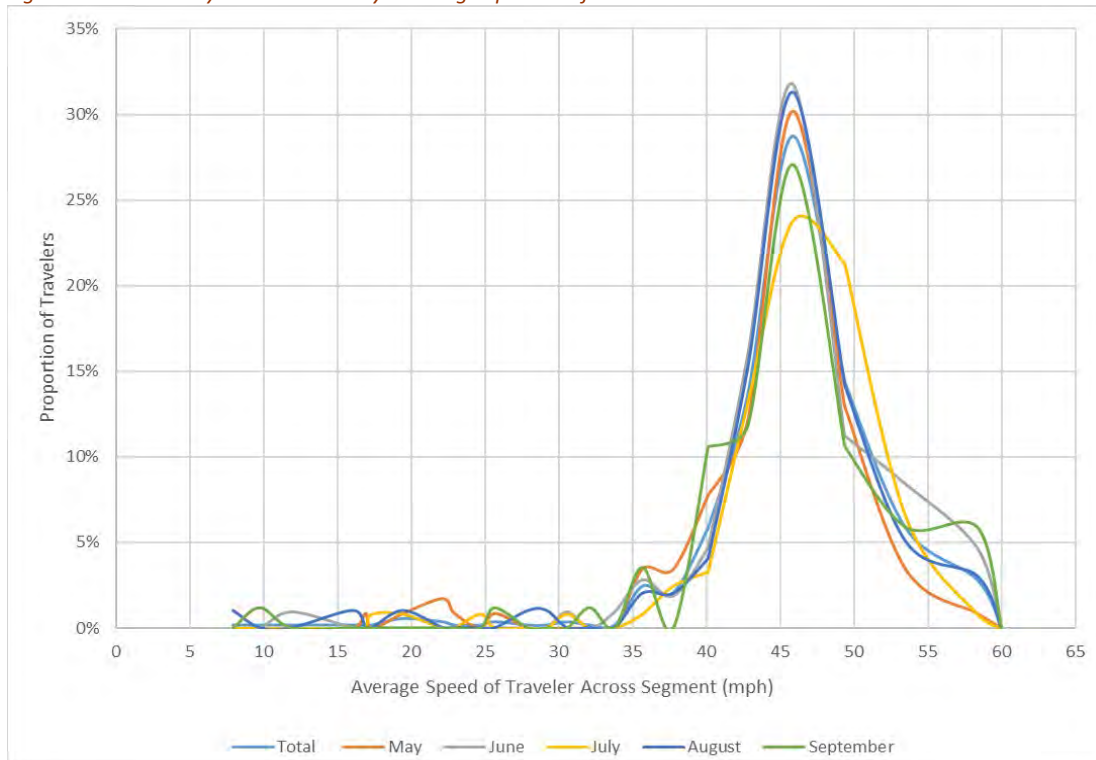
The Norris Geyser Basin to Canyon Village roadway segment is 10.7 miles long and spans from just east of the Norris junction to just west of the Canyon junction (Figure 2.2). The speed limit in this segment is 45 mph. The average speed (independent of direction) in this segment was 45 mph (Std. Dev = 7.1). Speed profiles across the observed months show little variation (Figure 2.3). The vast majority of travelers on this roadway segment are able to travel at the speed limit, with very few deviations. The road segment overall appears reliable, indicating a high consistency in expected travel time. A single factor ANOVA indicates no significant difference in average speed between months.



Figure 2.2: Norris Geyser Basin to Canyon Village Road Segment



Figure 2.3: Norris Geyser Basin to Canyon Village Speed Profile





In total, 330 respondents passed the geofence and answered the survey question: How frustrated are you with the amount of time you have spent in traffic congestion behind other vehicles? Among all respondents, the mean score was 1.25, with a standard deviation of .65 and a median score of 1.

Table 2.3: Norris Geyser Basin to Canyon Village Frustration Levels by Speed Quartile

Quartile	Speed Range (mph)	Average Speed (mph)	Frustration Average	1	2	3	4	5
Slowest 25% of Travelers	<40	34.1	1.30	41	14	0	1	0
26th-50th% of Travelers	43	42.8	1.26	49	5	3	0	1
51st-75th % of Travelers	46	45.9	1.22	104	14	3	1	1
Fastest 25% of Travelers	>46	51.5	1.25	80	7	3	2	1

1=Not at all Frustrated, 2=Slightly Frustrated, 3=Moderately Frustrated, 4=Frustrated, 5=Very Frustrated

In total, 327 respondents passed the geofence and answered the survey question: Other than weather conditions, how would you rate your experience right now? Among all respondents, the mean score was 4.47, with a standard deviation of 0.71 and a median score of 5.

Table 2.4: Norris Geyser Basin to Canyon Village Experience Levels by Speed Quartile

Quartile	Speed Range (mph)	Average Speed (mph)	Experience (Average)	1	2	3	4	5
Slowest 25% of Travelers	<40	34.1	4.42	0	0	6	20	29
26th-50th% of Travelers	43	42.8	4.50	0	2	1	20	33
51st-75th % of Travelers	46	45.9	4.41	1	0	9	50	63
Fastest 25% of Travelers	>46	51.5	4.47	1	1	6	30	55

Scale: 1=Very Poor, 2=Poor, 3=Fair, 4=Good, 5=Excellent

West Yellowstone to Madison Junction

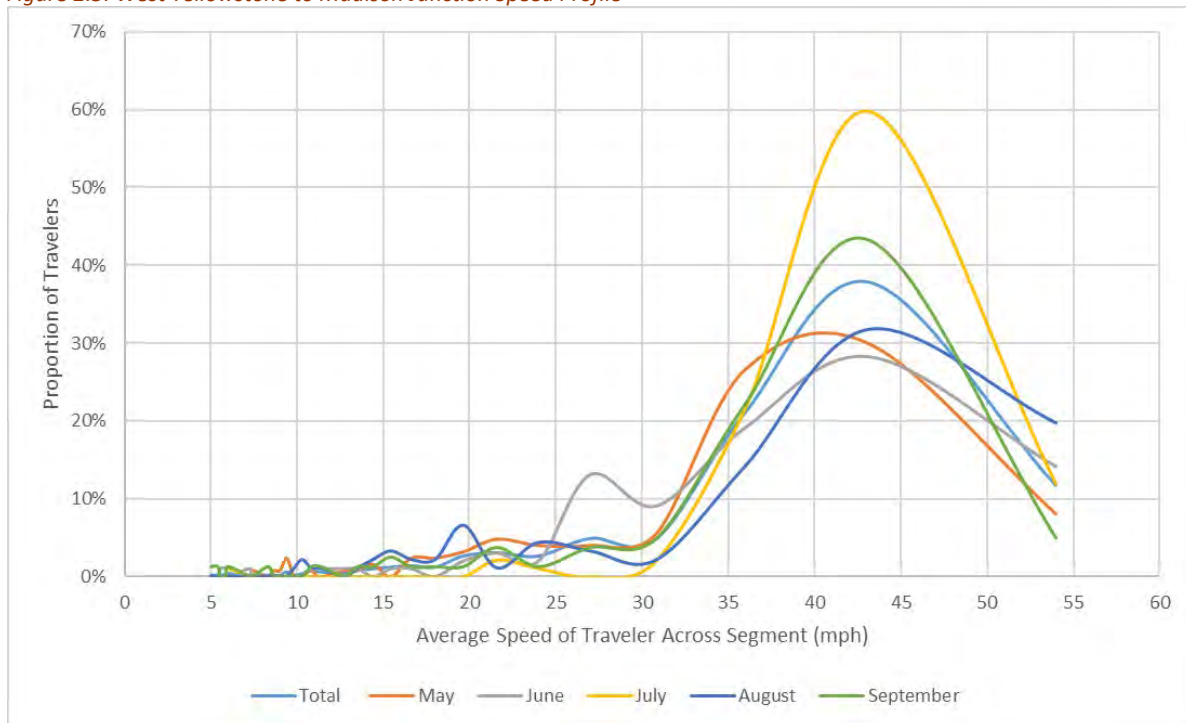
The West Yellowstone to Madison Junction road segment is 3.6 miles long and spans from just east of the 7-mile bridge to the Madison Junction (Figure 2.4). This short segment was chosen due to the location of the tablet distribution site. The speed limit in this segment was 45 mph. The average speed (independent of direction) in this segment is 36 mph (Std. Dev = 11.95). Speed profiles across the observed months show little variation (Figure 2.5). Though slowed by nearly 10 mph on average, the road segment overall appears reliable, indicating a high consistency in expected travel time. Significant differences in monthly speeds is indicated by a single factor ANOVA (P-value <0.001). Average speed ranged from a high of 41.6 mph in July to a low of 34.1 mph in May. This can be observed by the distinctly different speed profiles in May and July. Statistically (P-value <0.05) July experienced a faster average speed than the other four months. No differences are exhibited between any other months.



Figure 2.4: West Yellowstone to Madison Roadway Segment



Figure 2.5: West Yellowstone to Madison Junction Speed Profile



In total, 384 respondents passed the geofence and answered the survey question: How frustrated are you with the amount of time you have spent in traffic congestion behind other vehicles? Among all respondents, the mean score was 1.7, with a standard deviation of 1.02 and a median score of 1 (Table 2.5).



Table 2.5: West Yellowstone to Madison Junction Frustration Levels by Speed Quartile

Quartile	Speed Range (mph)	Average Speed (mph)	Frustration Average	1	2	3	4	5
Slowest 25% of Travelers	<20	13.9	2.20	19	15	9	4	4
26th-50th% of Travelers	22-31	26.6	1.95	27	19	13	1	3
51st-75th % of Travelers	36	36	1.54	55	21	5	1	3
Fastest 25% of Travelers	>36	45.8	1.50	129	32	16	4	4

1=Not at all Frustrated, 2=Slightly Frustrated, 3=Moderately Frustrated, 4=Frustrated, 5=Very Frustrated

In total, 373 respondents passed the geofence and answered the survey question: Other than weather conditions, how would you rate your experience right now? Among all respondents, the mean score was 4.37, with a standard deviation of 0.79 and a median score of 5 (Table 2.6).

Table 2.6: West Yellowstone to Madison Junction Experience Levels by Speed Quartile

Quartile	Speed Range (mph)	Average Speed (mph)	Experience (Average)	1	2	3	4	5
Slowest 25% of Travelers	<20	13.9	4.15	1	2	5	21	19
26th-50th% of Travelers	22-31	26.6	4.20	0	2	10	23	26
51st-75th % of Travelers	36	36	4.40	2	0	6	30	46
Fastest 25% of Travelers	>36	45.8	4.47	0	4	9	65	102

1=Very Poor, 2=Poor, 3=Fair, 4=Good, 5=Excellent

Madison Junction to Old Faithful

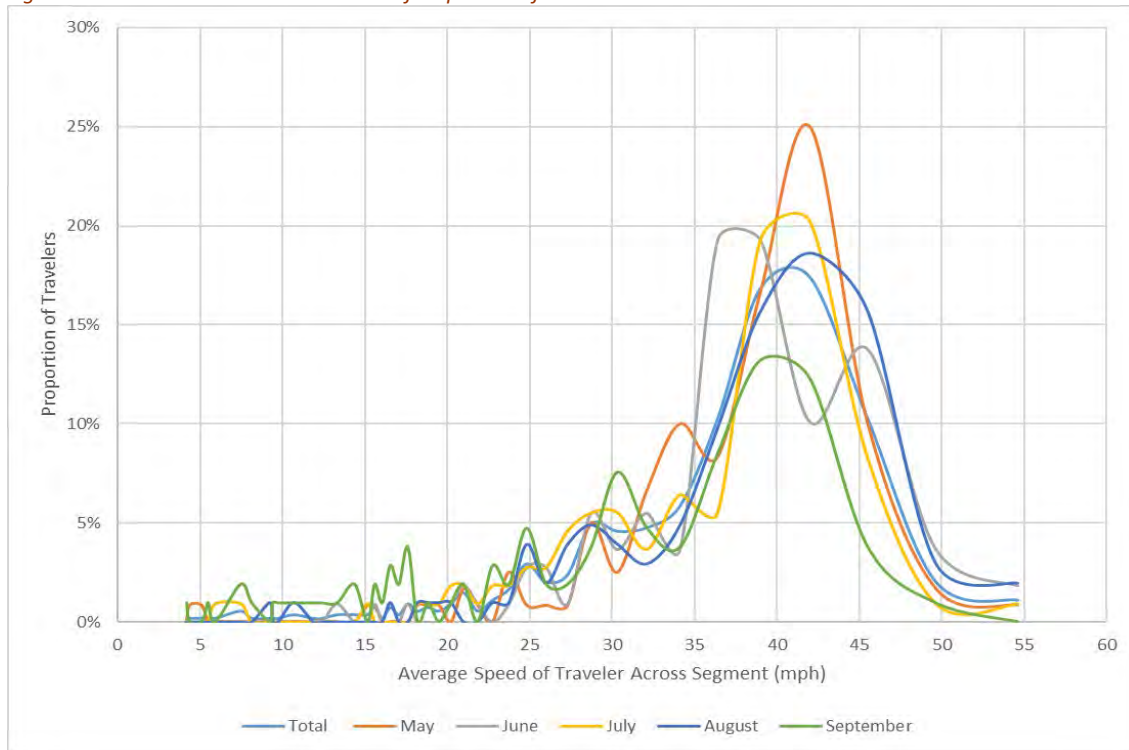
The Madison to Old Faithful road segment is 9.1 miles long and spans from the Madison Junction south to nearly Midway Geyser Basin (Figure 2.6). The speed limit in this segment is 45 mph. The average speed (independent of direction) in this segment was 34.6 mph (Std. Dev = 9.62). Speed profiles across the observed months show little variation (Figure 2.7). Though slowed by slightly more than 10 mph on average, the roadway segment overall appears reliable, indicating a high consistency in expected travel time across changing volumes of visitors. Significant differences in monthly speeds is indicated by a single factor ANOVA (P-value <.001). Average speed ranged from a high of 36.5 mph in August to a low of 29.0 in September. September has a much smaller density of travelers at or near the speed limit compared to other months. Statistically (at P <0.05) September experienced a slower average speed than the other four months. No differences are exhibited between any other months.



Figure 2.6: Madison to Old Faithful Roadway Segment



Figure 2.7: Madison Junction to Old Faithful Speed Profile



In total, 433 respondents passed the geofence and answered the survey question: How frustrated are you with the amount of time you have spent in traffic congestion behind other vehicles? Among all respondents, the mean score was 1.49, with a standard deviation of 0.90 and a median score of 1 (Table 2.7).



Table 2.7: Madison Junction to Old Faithful Frustration Levels by Speed Quartile

Quartile	Speed Range (mph)	Average Speed (mph)	Frustration Average	1	2	3	4	5
Slowest 25% of Travelers	<29	21.6	1.62	77	22	5	5	6
26th-50th% of Travelers	30-36	34	1.41	85	14	9	2	2
51st-75th % of Travelers	39	39	1.32	54	13	5	0	0
Fastest 25% of Travelers	>40	44.1	1.54	83	37	8	4	2

1=Not at all Frustrated, 2=Slightly Frustrated, 3=Moderately Frustrated, 4=Frustrated, 5=Very Frustrated

In total, 425 respondents passed the geofence and answered the survey question: Other than weather conditions, how would you rate your experience right now? Among all respondents, the mean score was 4.40, with a standard deviation of 0.72 and a median score of 5 (Table 2.8).

Table 2.8: Madison Junction to Old Faithful Experience Levels by Speed Quartile

Quartile	Speed Range (mph)	Average Speed (mph)	Experience (Average)	1	2	3	4	5
Slowest 25% of Travelers	<29	21.6	4.43	3	0	6	40	63
26th-50th% of Travelers	30-36	34	4.47	0	1	8	39	61
51st-75th % of Travelers	39	39	4.44	0	0	7	26	38
Fastest 25% of Travelers	>40	44.1	4.31	0	1	15	59	58

1=Very Poor, 2=Poor, 3=Fair, 4=Good, 5=Excellent

Old Faithful to West Thumb

The Old Faithful to West Thumb road segment is 15.8 miles long and spans from just east of the Old Faithful on-ramp to near the West Thumb intersection (Figure 2.8). The speed limit in this segment is 45 mph. The average speed (independent of direction) in this segment was 43.8 mph (Std. Dev = 7.74). Speed profiles across the observed months show little variation (Figure 2.9). Average travel speed in this road segment is nearly identical to the speed limit, with a fair proportion of travelers even over the speed limit. A single factor ANOVA indicates no significant difference in average speed between months.



Figure 2.8: Old Faithful to West Thumb Roadway Segment

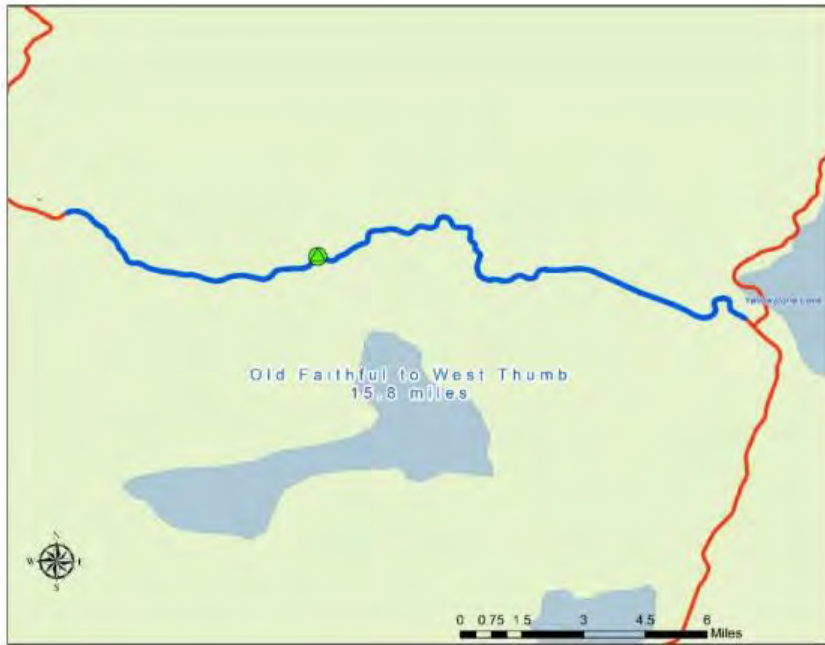
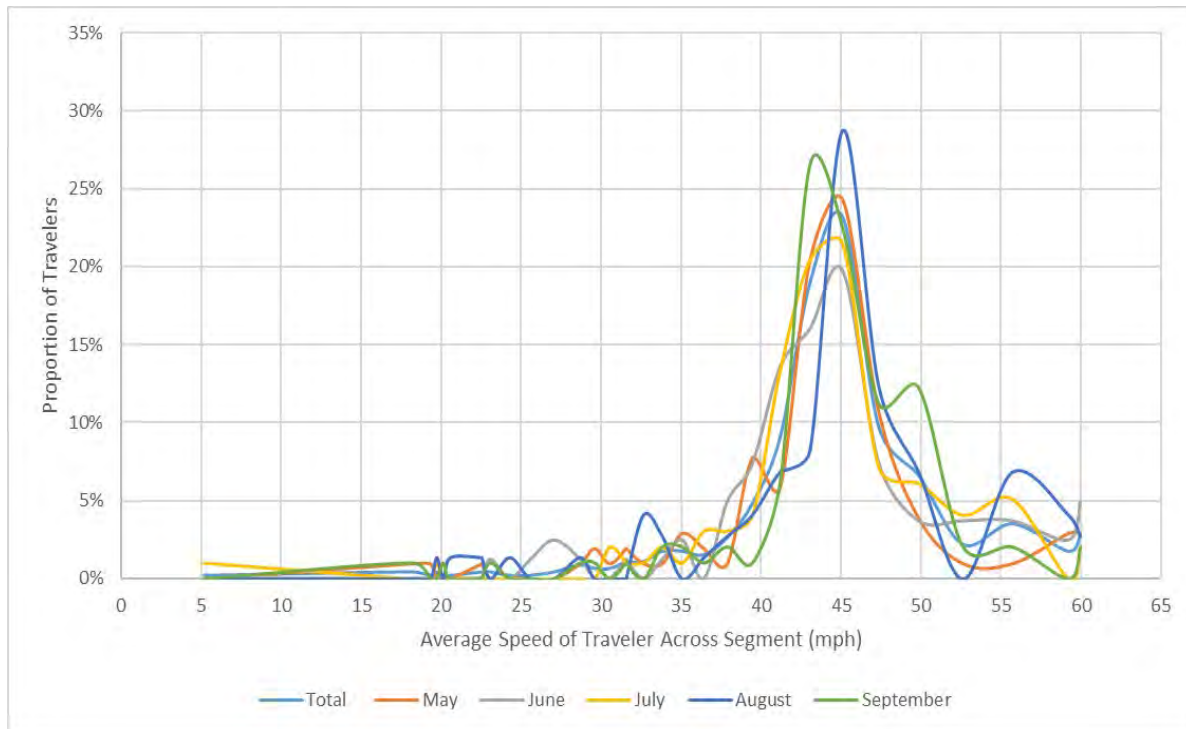


Figure 2.9: Old Faithful to West Thumb Speed Profile





In total, 343 respondents passed the geofence and answered the survey question: How frustrated are you with the amount of time you have spent in traffic congestion behind other vehicles? Among all respondents, the mean score was 1.3, with a standard deviation of 0.67 and a median score of 1 (Table 2.9).

Table 2.9: Old Faithful to West Thumb Frustration level by Speed Quartile

Quartile	Speed Range (mph)	Average Speed (mph)	Frustration Average	1	2	3	4	5
Slowest 25% of Travelers	<39.5	33.2	1.27	64	10	2	1	1
26th-50th% of Travelers	41.2-43.1	42.5	1.26	76	19	3	0	0
51st-75th % of Travelers	45.1	45.1	1.30	66	9	4	1	1
Fastest 25% of Travelers	>47.4	51.7	1.38	63	16	5	1	1

1=Not at all Frustrated, 2=Slightly Frustrated, 3=Moderately Frustrated, 4=Frustrated, 5=Very Frustrated

In total, 335 respondents passed the geofence and answered the survey question: Other than weather conditions, how would you rate your experience right now? Among all respondents, the mean score was 4.50, with a standard deviation of 0.61 and a median score of 5 (Table 2.10).

Table 2.10: Old Faithful to West Thumb Experience Level by Speed Quartile

Quartile	Speed Range (mph)	Average Speed (mph)	Experience (Average)	1	2	3	4	5
Slowest 25% of Travelers	<29	21.6	4.43	3	0	6	40	63
26th-50th% of Travelers	30-36	34	4.47	0	1	8	39	61
51st-75th % of Travelers	39	39	4.44	0	0	7	26	38
Fastest 25% of Travelers	>40	44.1	4.31	0	1	15	59	58

Scale: 1=Very Poor, 2=Poor, 3=Fair, 4=Good, 5=Excellent

West Thumb to Lake Village

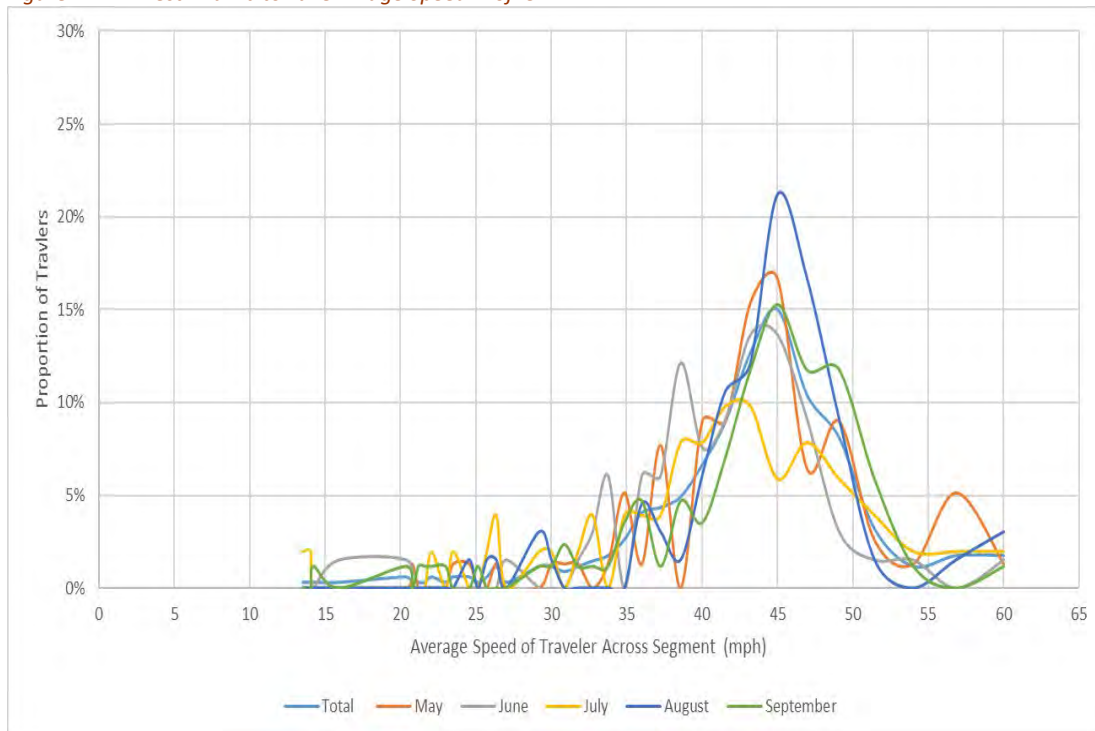
The Lake Village to West Thumb road segment is 18 miles long and spans from just north of the West Thumb main parking area to just south of the Lake Village entrance (Figure 3.10). The speed limit in this segment was 45 mph. The average speed (independent of direction) in this segment was 41.6 mph (Std. Dev = 7.94). Speed profiles across the observed months show some increased variation compared to other road segments. July has a distinctly reduced proportion of visitors traveling at the speed limit (Figure 2.11), leading to the lowest average speed of any month (39.3 mph). However, a single factor ANOVA indicates no significant difference in average speed between months at the P-Value < 0.05 level.



Figure 2.10: West Thumb to Lake Village Roadway Segment



Figure 2.11: West Thumb to Lake Village Speed Profile





In total, 276 respondents passed the geofence and answered the survey question: How frustrated are you with the amount of time you have spent in traffic congestion behind other vehicles? Among all respondents, the mean score was 1.16, with a standard deviation of 0.52 and a median score of 1 (Table 2.11).

Table 2.11: West Thumb to Lake Village Frustration Levels by Speed Quartile

Quartile	Speed Range (mph)	Average Speed (mph)	Frustration Average	1	2	3	4	5
Slowest 25% of Travelers	<37	31	1.25	64	7	4	0	1
26th-50th% of Travelers	39-42	40	1.07	54	4	0	0	0
51st-75th % of Travelers	43-45	44	1.13	69	4	1	0	1
Fastest 25% of Travelers	>45	52	1.18	57	8	2	0	0

Scale: 1=Not at all Frustrated, 2=Slightly Frustrated, 3=Moderately Frustrated, 4=Frustrated, 5=Very Frustrated

In total, 270 respondents passed the geofence and answered the survey question: Other than weather conditions, how would you rate your experience right now? Among all respondents, the mean score was 4.51, with a standard deviation of 0.63 and a median score of 5 (Table 2.12).

Table 2.12: West Thumb to Lake Village Experience Levels by Speed Quartile

Quartile	Speed Range (mph)	Average Speed (mph)	Experience (Average)	1	2	3	4	5
Slowest 25% of Travelers	<37	31	4.51	0	1	7	19	47
26th-50th% of Travelers	39-42	40	4.59	0	0	0	24	34
51st-75th % of Travelers	43-45	44	4.53	0	0	2	30	40
Fastest 25% of Travelers	>45	52	4.42	1	0	2	30	33

Scale: 1=Very Poor, 2=Poor, 3=Fair, 4=Good, 5=Excellent

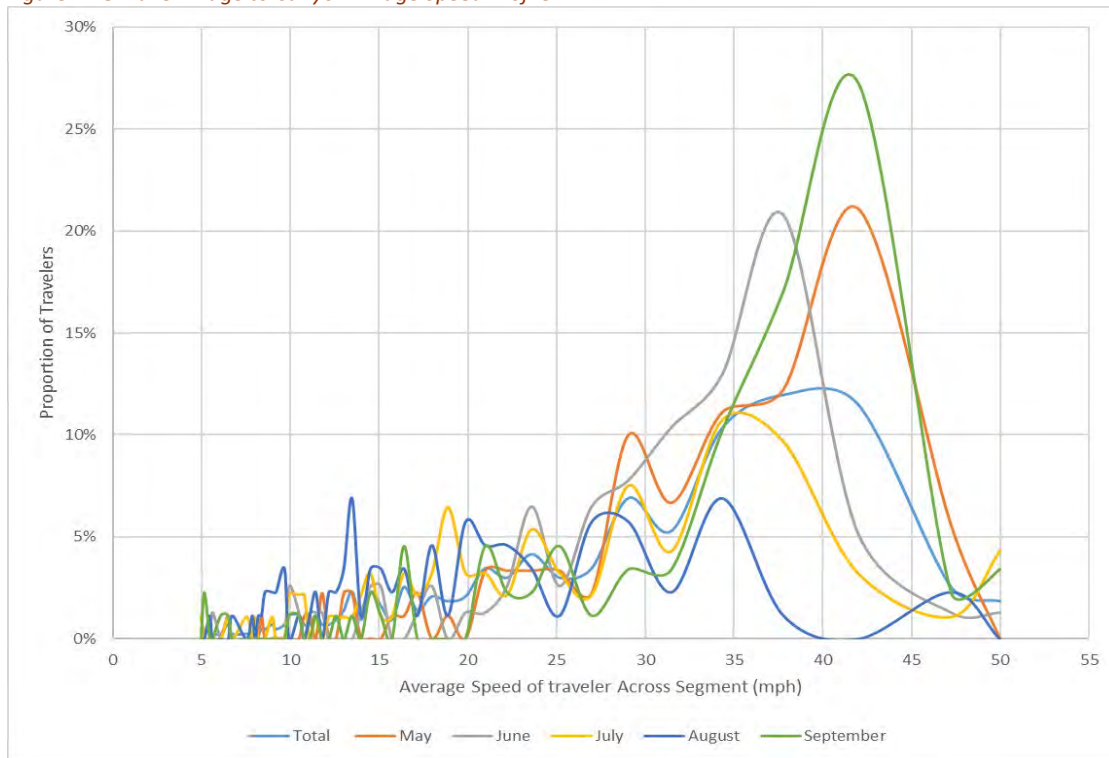
Lake Village to Canyon Village

The Lake Village to Canyon Village roadway segment is 6.3 miles long and spans from just north of the Mud Volcanoes to just south of South Rim Drive (Figure 3.12). The speed limit in this is 35 mph. The average speed (independent of direction) in this segment was 27.1 mph (Std. Dev = 12.02). Speed profiles across the observed months show reduced reliability, especially in high volume months like July and August. The reduced reliability is indicated by both the standard deviation as well as the significant proportions of travelers moving at the lower speeds. August has a distinctly reduced proportion of travels traveling at the speed limit (Figure 2.13), leading to the lowest average speed of any month (19.3 mph). September yielded the highest average speed by respondents, at 31.9 mph. Significant differences in monthly speeds is indicated by a single factor ANOVA (P-value <.001). August possessed a statistically significant (P-value <0.001) lower average speed than all other months. In fact, significant differences at the P < 0.05 level are observed between all months with the exception of May-June, and May-September.

Figure 2.12: Lake Village to Canyon Village Roadway segment



Figure 2.13: Lake Village to Canyon Village Speed Profile



In total, 333 respondents passed the geofence and answered the survey question: How frustrated are you with the amount of time you have spent in traffic congestion behind other vehicles? Among all respondents, the mean score was 1.30, with a standard deviation of 0.67 and a median score of 1 (Table 2.13).



Table 2.13: Lake Village to Canyon Village Frustration Levels by Speed Quartile

Quartile	Speed Range (mph)	Average Speed (mph)	Frustration Average	1	2	3	4	5
Slowest 25% of Travelers	<17	12.0	1.37	75	14	4	1	1
26th-50th% of Travelers	17-28	22.2	1.27	58	11	4	2	0
51st-75th % of Travelers	29-37	32.1	1.41	52	18	3	1	1
Fastest 25% of Travelers	>37	41.5	1.17	77	8	2	1	0

Scale: 1=Not at all Frustrated, 2=Slightly Frustrated, 3=Moderately Frustrated, 4=Frustrated, 5=Very Frustrated

In total, 324 respondents passed the geofence and answered the survey question: Other than weather conditions, how would you rate your experience right now? Among all respondents, the mean score was 4.47, with a standard deviation of 0.68 and a median score of 5 (Table 2.14).

Table 2.14: Lake Village to Canyon Village Experience Levels by Speed Quartile

Quartile	Speed Range (mph)	Average Speed (mph)	Experience (Average)	1	2	3	4	5
Slowest 25% of Travelers	<17	12.0	4.45	0	1	6	26	42
26th-50th% of Travelers	17-28	22.2	4.46	0	0	7	35	49
51st-75th % of Travelers	29-37	32.1	4.49	0	0	8	22	44
Fastest 25% of Travelers	>37	41.5	4.51	1	1	2	30	50

Scale: 1=Very Poor, 2=Poor, 3=Fair, 4=Good, 5=Excellent

Madison Junction to Norris Geyser Basin

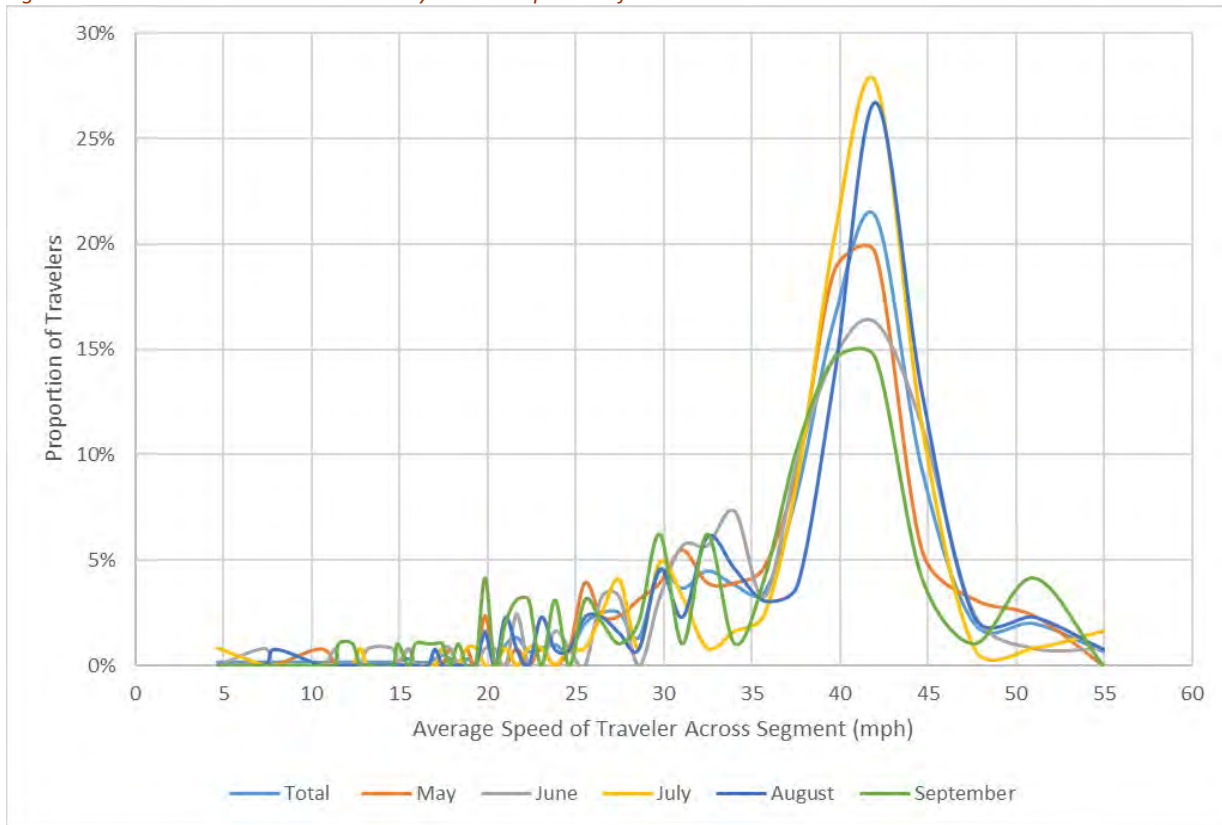
The Madison Junction to Norris Geyser Basin roadway segment is 11.9 miles long and spans from just north of the Madison Junction to just south of the Norris Intersection (Figure 2.14). The speed limit in this segment is 45 mph. The average speed (independent of direction) in this segment was 36.1 mph (Std. Dev = 8.49). Speed profiles across the observed months show little variation (Figure 2.15). Though slowed by nearly 10 mph on average, the road segment overall appears reliable, indicating a high consistency in expected travel time. Even with well-performing speed profiles, significant differences can be identified via a single factor ANOVA at the P < 0.01 level. September experienced the slowest average speed (33.3 mph) as it was statistically significantly lower than three of the other months at the P < 0.05 level. The only exception was June (35.6 mph). June (35.6 mph) and July (37.5 mph) are also significantly different at the P < 0.05 level.



Figure 2.14: Madison Junction to Norris Geyser Basin Roadway Segment



Figure 2.15: Madison Junction to Norris Geyser Basin Speed Profile



In total, 489 respondents passed the geofence and answered the survey question: How frustrated are you with the amount of time you have spent in traffic congestion behind other vehicles? Among all respondents, the mean score was 1.43, with a standard deviation of 0.82 and a median score of 1 (Table 2.15).



Table 2.15: Madison Junction to Norris Geyser Basin Frustration Levels by Speed Quartile

Quartile	Speed Range (mph)	Average Speed (mph)	Frustration Average	1	2	3	4	5
Slowest 25% of Travelers	<30	22.4	1.56	66	24	10	2	2
26th-50th% of Travelers	30-36	32.5	1.27	79	16	4	1	0
51st-75th % of Travelers	38-40	39	1.52	86	18	12	2	4
Fastest 25% of Travelers	>40	43.8	1.37	125	22	12	2	2

Scale: 1=Not at all Frustrated, 2=Slightly Frustrated, 3=Moderately Frustrated, 4=Frustrated, 5=Very Frustrated

In total, 479 respondents passed the geofence and answered the survey question: Other than weather conditions, how would you rate your experience right now? Among all respondents, the mean score was 4.37, with a standard deviation of 0.74 and a median score of 4 (Table 2.16).

Table 2.16: Madison Junction to Norris Geyser Basin Experience Levels by Speed Quartile

Quartile	Speed Range (mph)	Average Speed (mph)	Experience (Average)	1	2	3	4	5
Slowest 25% of Travelers	<30	22.4	4.34	1	1	6	48	45
26th-50th% of Travelers	30-36	32.5	4.35	0	0	11	42	46
51st-75th % of Travelers	38-40	39	4.39	1	2	8	47	62
Fastest 25% of Travelers	>40	43.8	4.37	2	2	13	60	82

Scale: 1=Very Poor, 2=Poor, 3=Fair, 4=Good, 5=Excellent

Canyon Village to Tower Falls (Dunraven Pass)

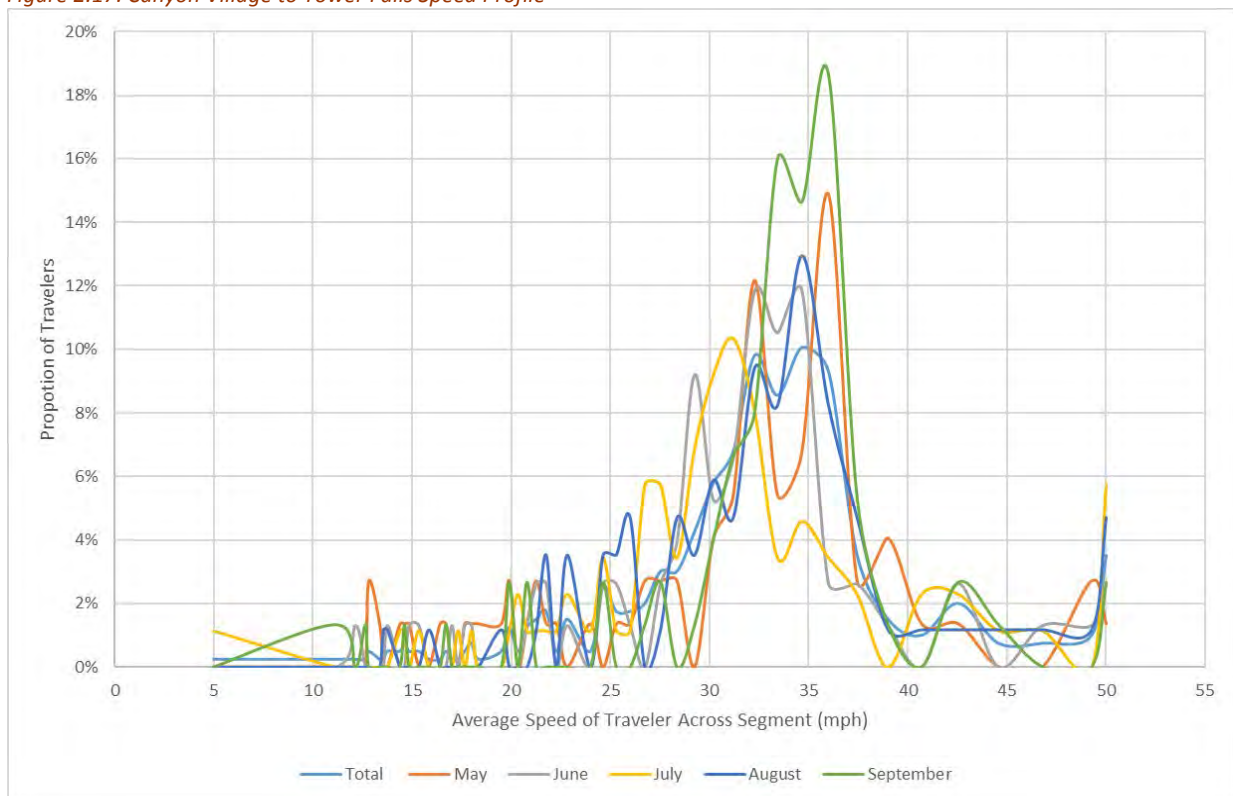
The Canyon Village to Tower Falls roadway segment is 15.6 miles long and spans from just north of the Canyon Village to just south of the Tower Falls parking area (Figure 2.16). The speed limit in this segment is 35 mph. The average speed (independent of direction) in this segment was 31 mph (Std. Dev = 7.89). Speed profiles across the observed months appear to show some variation; however, the average speed for each month ranges only from a low of 29.9 mph in May to a high of 32.6 mph in September showing little variation (Figure 2.17). A single factor ANOVA indicates no significant difference in average speed between months at the P-Value < 0.05 level.



Figure 2.16: Canyon Village to Tower Falls Roadway Segment



Figure 2.17: Canyon Village to Tower Falls Speed Profile





In total, 297 respondents passed the geofence and answered the survey question: How frustrated are you with the amount of time you have spent in traffic congestion behind other vehicles? Among all respondents, the mean score was 1.35, with a standard deviation of 0.77 and a median score of 1 (Table 2.17).

Table 2.17: Canyon Village to Tower Falls Frustration Levels by Speed Quartile

Quartile	Speed Range (mph)	Average Speed (mph)	Frustration Average	1	2	3	4	5
Slowest 25% of Travelers	<27	20.7	1.42	64	12	2	1	4
26th-50th% of Travelers	28-31	29.7	1.33	51	10	4	0	1
51st-75th % of Travelers	32-35	33.5	1.31	65	14	4	0	1
Fastest 25% of Travelers	>35	40.5	1.33	49	10	4	1	0

Scale: 1=Not at all Frustrated, 2=Slightly Frustrated, 3=Moderately Frustrated, 4=Frustrated, 5=Very Frustrated

In total, 296 respondents passed the geofence and answered the survey question: Other than weather conditions, how would you rate your experience right now? Among all respondents, the mean score was 4.42, with a standard deviation of 0.78 and a median score of 5 (Table 2.18).

Table 2.18: Canyon Village to Tower Falls Experience Levels by Speed Quartile

Quartile	Speed Range (mph)	Average Speed (mph)	Experience (Average)	1	2	3	4	5
Slowest 25% of Travelers	<27	20.7	4.35	1	2	8	27	44
26th-50th% of Travelers	28-31	29.7	4.47	0	0	3	29	34
51st-75th % of Travelers	32-35	33.5	4.39	2	2	5	28	48
Fastest 25% of Travelers	>35	40.5	4.48	0	0	8	17	38

Scale: 1=Very Poor, 2=Poor, 3=Fair, 4=Good, 5=Excellent

Lamar Valley

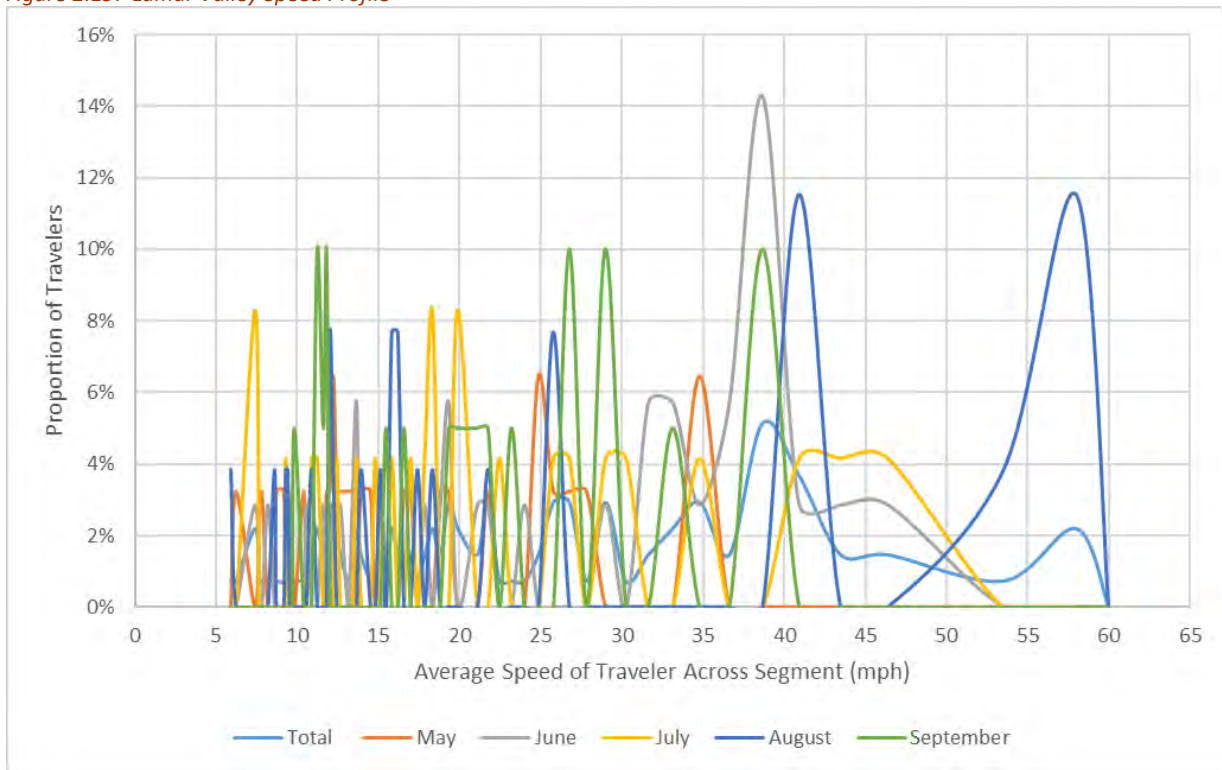
The Lamar Valley roadway segment is 11.6 miles long and spans from the Specimen parking area (location of tablet dissemination) east to near the old hitching post (location of tablet drop off point) (Figure 2.18). The speed limit in this segment is 45 mph. The average speed (independent of direction) in this segment was 21.7 mph (Std. Dev = 12.18). The speeds in Lamar Valley show to be highly variable, with little identifiable ‘typical’ speed (Figure 3.19). This observation is indicative of an area in which people routinely drive slowly in an effort to either actively watch wildlife or attempt to spot wildlife. May yielded the slowest average speed at 16.3 mph and was statistically significantly slower (P <0.05) than each of June (24.8mph), August (24.3 mph), and September (21.3 mph) but not July (21.4 mph). No other significant differences in means were identified.



Figure 2.18: Lamar Valley Roadway Segment



Figure 2.19: Lamar Valley Speed Profile



In total, 100 respondents passed the geofence and answered the survey question: How frustrated are you with the amount of time you have spent in traffic congestion behind other vehicles? Among all respondents, the mean score was 1.34, with a standard deviation of 0.76 and a median score of 1 (Table 2.19).



Table 2.19: Lamar Valley Frustration Levels by Speed Quartile

Quartile	Speed Range (mph)	Average Speed (mph)	Frustration Average	1	2	3	4	5
Slowest 25% of Travelers	<12	9.5	1.42	18	3	2	1	0
26th-50th% of Travelers	12-16.6	13.9	1.44	20	2	1	1	1
51st-75th % of Travelers	16.8-27	21.5	1.20	24	6	0	0	0
Fastest 25% of Travelers	>27	38.7	1.33	16	4	0	1	0

Scale: 1=Not at all Frustrated, 2=Slightly Frustrated, 3=Moderately Frustrated, 4=Frustrated, 5=Very Frustrated

In total, 99 respondents passed the geofence and answered the survey question: Other than weather conditions, how would you rate your experience right now? Among all respondents, the mean score was 4.65, with a standard deviation of 0.62 and a median score of 5 (Table 3.20).

Table 2.20: Lamar Valley Experience Levels by Speed Quartile

Quartile	Speed Range (mph)	Average Speed (mph)	Experience (Average)	1	2	3	4	5
Slowest 25% of Travelers	<12	9.5	4.75	0	0	2	2	20
26th-50th% of Travelers	12-16.6	13.9	4.48	0	0	3	7	15
51st-75th % of Travelers	16.8-27	21.5	4.72	0	0	0	8	21
Fastest 25% of Travelers	>27	38.7	4.62	0	1	0	5	15

Scale: 1=Very Poor, 2=Poor, 3=Fair, 4=Good, 5=Excellent

North Gate to Mammoth Hot Springs

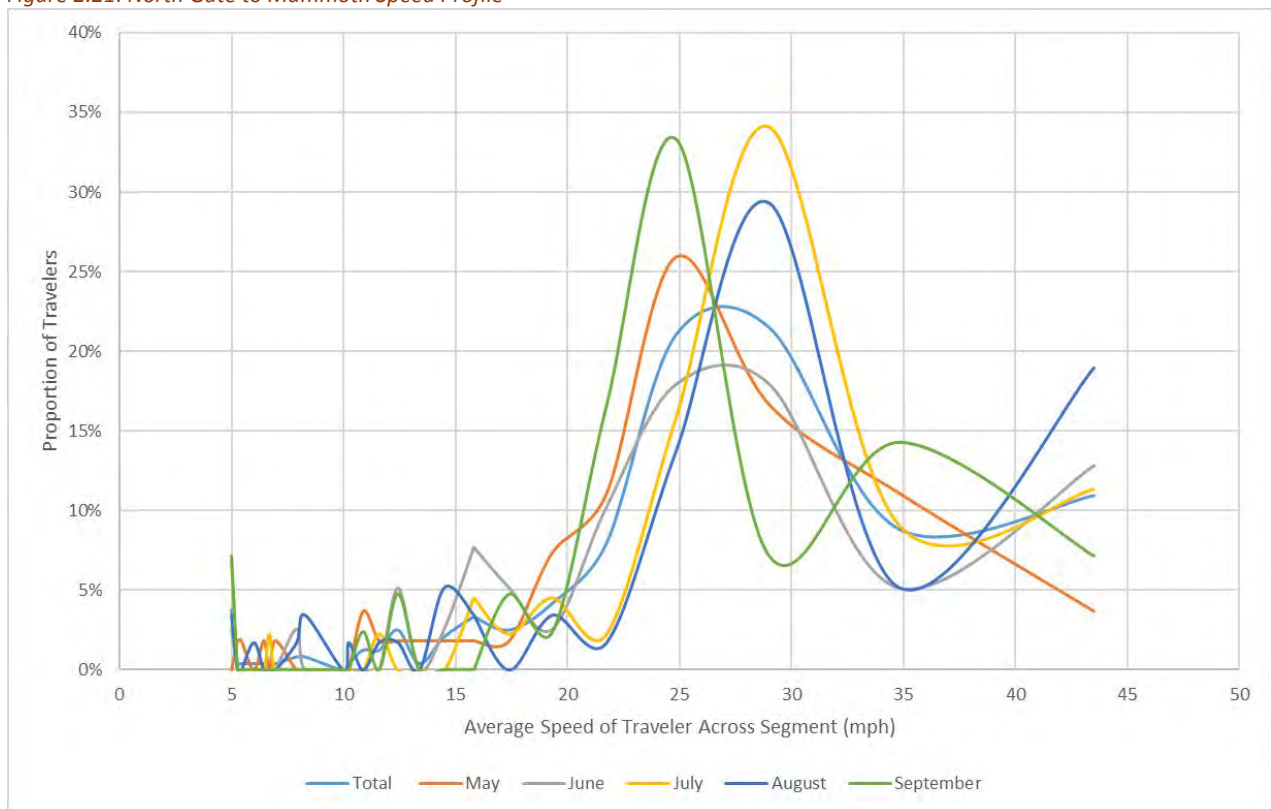
The North Gate to Mammoth Hot Springs roadway segment is 2.9 miles long and spans from the Gardiner Canyon to just south Mammoth Visitor Center (Figure 2.20). The speed limit in this segment is 35 mph. The average speed (independent of direction) in this segment was 24.9 mph (Std. Dev = 10.21). Speed profiles across the observed months appear to show some variation, the average speed for each month ranges from a low of 23.3 mph in May to a high of 26.1 mph in August (Figure 2.21). However, a single factor ANOVA does not yield statistically significant differences in means by month.



Figure 2.20: North Gate to Mammoth Hot Springs Roadway Segment



Figure 2.21: North Gate to Mammoth Speed Profile





In total, 81 respondents passed the geofence and answered the survey question: How frustrated are you with the amount of time you have spent in traffic congestion behind other vehicles? Among all respondents, the mean score was 1.59, with a standard deviation of 0.99 and a median score of 1 (Table 2.21).

Table 2.21: North Gate to Mammoth Hot Springs Frustration Levels by Speed Quartile

Quartile	Speed Range (mph)	Average Speed (mph)	Frustration Average	1	2	3	4	5
Slowest 25% of Travelers	<19	12.4	1.40	18	4	3	0	0
26th-50th% of Travelers	19-25	23.4	1.67	19	6	2	2	1
51st-75th % of Travelers	29	29	1.44	11	3	2	0	0
Fastest 25% of Travelers	>34	39.6	2.00	7	2	0	2	1

1=Not at all Frustrated, 2=Slightly Frustrated, 3=Moderately Frustrated, 4=Frustrated, 5=Very Frustrated

In total, 81 respondents passed the geofence and answered the survey question: Other than weather conditions, how would you rate your experience right now? Among all respondents, the mean score was 4.32, with a standard deviation of 0.66 and a median score of 4 (Table 2.22).

Table 2.22: North Gate to Mammoth Hot Springs Experience Levels by Speed Quartile

Quartile	Speed Range (mph)	Average Speed (mph)	Experience (Average)	1	2	3	4	5
Slowest 25% of Travelers	<19	12.4	4.29	0	0	3	11	10
26th-50th% of Travelers	19-25	23.4	4.33	0	0	2	16	12
51st-75th % of Travelers	29	29	4.50	0	0	1	6	9
Fastest 25% of Travelers	>35	40.5	4.48	0	0	8	17	38

1=Very Poor, 2=Poor, 3=Fair, 4=Good, 5=Excellent

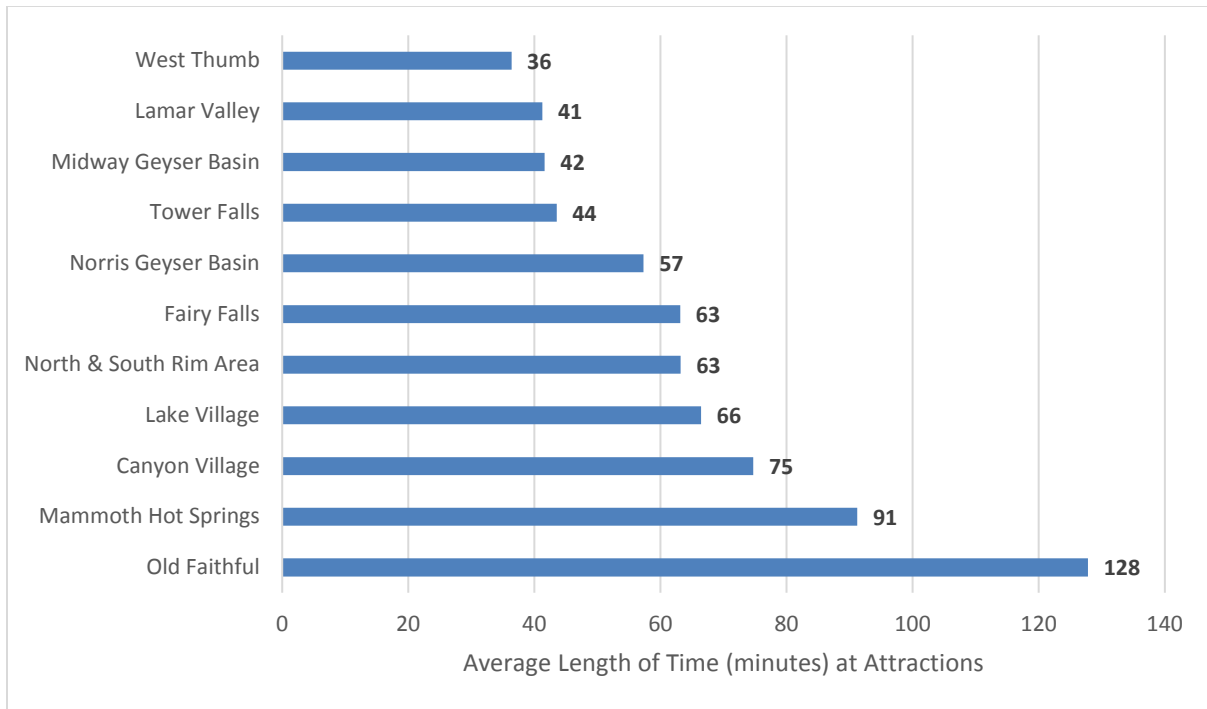
2.3 Length of Stay at Major Attractions

Summary

Old Faithful outpaced all other sites in terms of length of time spent at each attraction, averaging nearly two hours (median = 1.5 hours) (Figure 2.22). Across all of the sites, many observations were less than five minutes in length indicating either a pass-through or circling the lot and deciding to not visit (Table 2.23). These observations of less than five minutes are left out of the depictions of stay at the sites to follow. It is important to note that at attractions where there is lodging and dining there should be longer stay times. Participants were instructed to leave tablets in their vehicles until they were done for the day. Following their day, participants dropped the tablets off at one of eight drop boxes. In the event of a user keeping a tablet for longer than a single day’s travel in the park, data collected after 12 hours was dropped from consideration. Typically, such data resulted in continuous pings at the participant’s place of lodging. Additionally, algorithms were established to drop all data from observation once the tablet pinged within close proximity of a drop box.



Figure 2.22: Average Length of Stay at Major Attractions



Note: Stays of less than 5 minutes are not included in average. Boiling River not included due to small sample size. See Table 2.23



Table 2.23: Number of Respondents and their Length of Stay at Major Attraction Sites

	< 5 min	5-15 min	16-30 min	31-45 min	46-60 min	61-75 min	76-90 min	91-105 min	106-120 min	> 120 min
Mammoth Hot Springs	282	104	72	52	56	59	49	28	33	96
North & South Rim Area	203	50	82	80	64	58	29	27	18	59
Tower Falls	116	49	90	41	24	19	5	1	2	3
West Thumb	114	55	28	60	36	22	7	1	1	1
Lake Village	98	51	22	23	14	2	6	3	0	16
Lamar Valley	59	61	19	8	1	1	1	0	0	1
Boiling River	18	5	4	0	0	0	1	1	2	1
Old Faithful	396	17	23	30	39	56	51	44	42	202
Fairy Falls	85	18	6	7	21	21	18	0	1	10
Midway Geyser Basin	103	56	16	71	78	25	11	2	1	1
Norris Geyser Basin	172	59	22	30	43	32	20	11	18	28
Canyon Village	147	149	76	30	30	19	17	11	4	37



Geofence Attraction Locations

The geofences utilized for each attraction area are shown below in Figure 2.23 through Figure 2.31.

Figure 2.23: Boiling River and Mammoth Hot Springs



Figure 2.24: Norris Geyser Basin





Figure 2.25: Midway Geyser Basin and Fairy Falls



Figure 2.26: Old Faithful





Figure 2.27: West Thumb



Figure 2.28: Lake Village





Figure 2.29: Canyon Village and North & South Rims

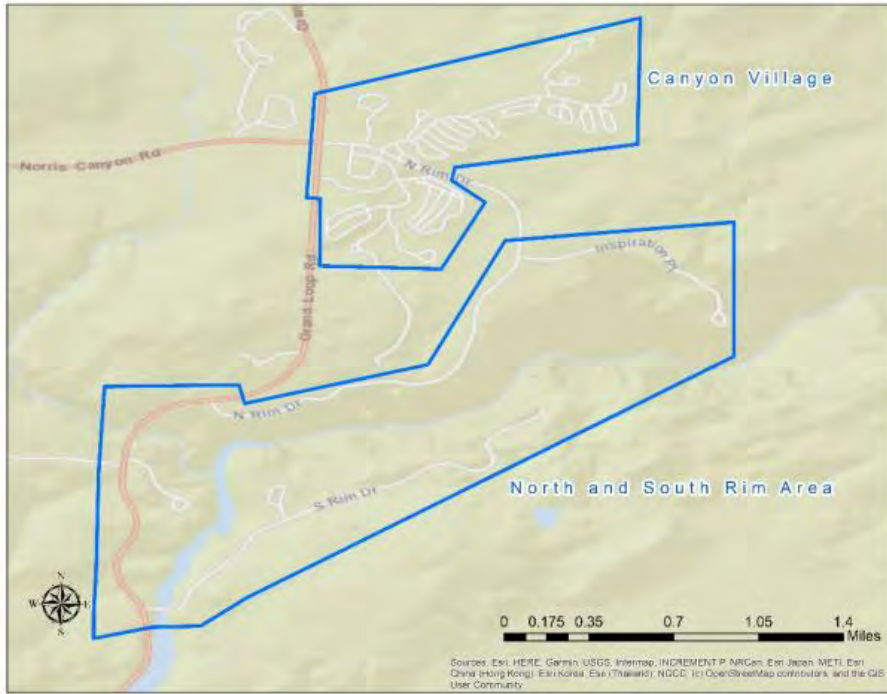
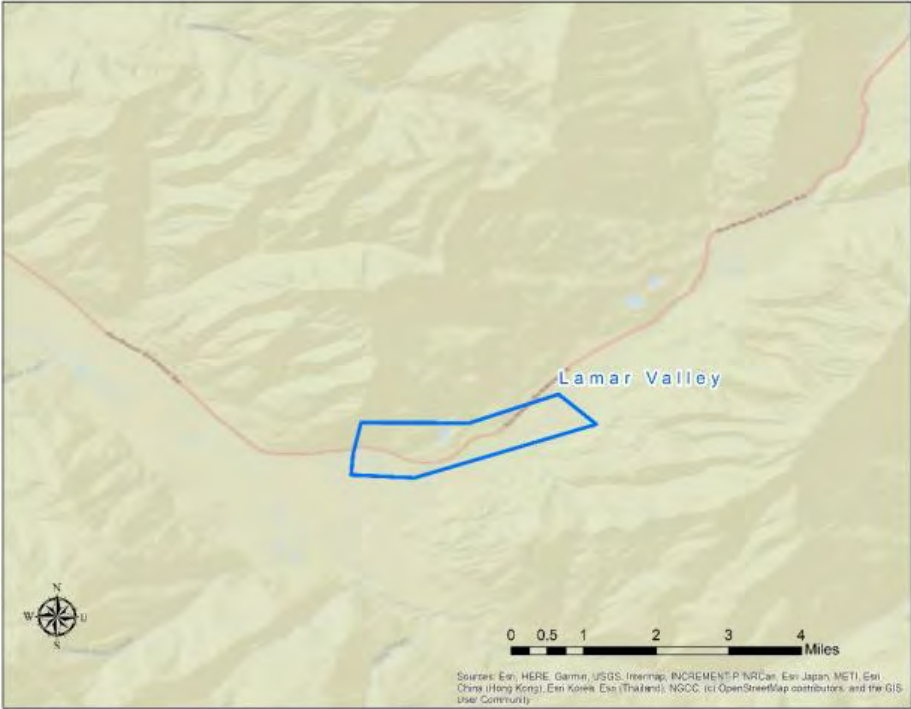


Figure 2.30: Tower Falls





Figure 2.31: Lamar Valley

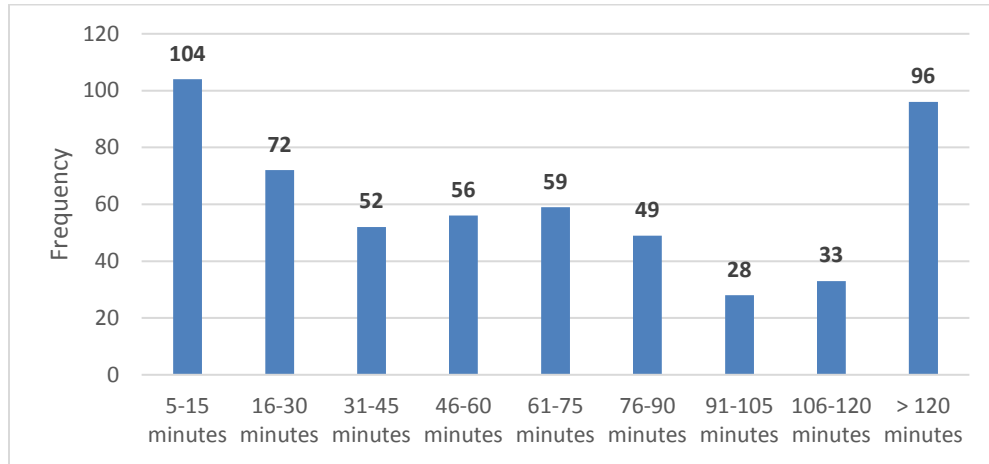




Mammoth Hot Springs¹

On average, respondents stayed at Mammoth Hot Springs for 91 minutes (Median=58, Std. Dev=96). The most frequent observations were at either end of the spectrum. Nineteen percent of respondents passed through in under 16 minutes, while 17% stayed for over two hours (Figure 2.32).

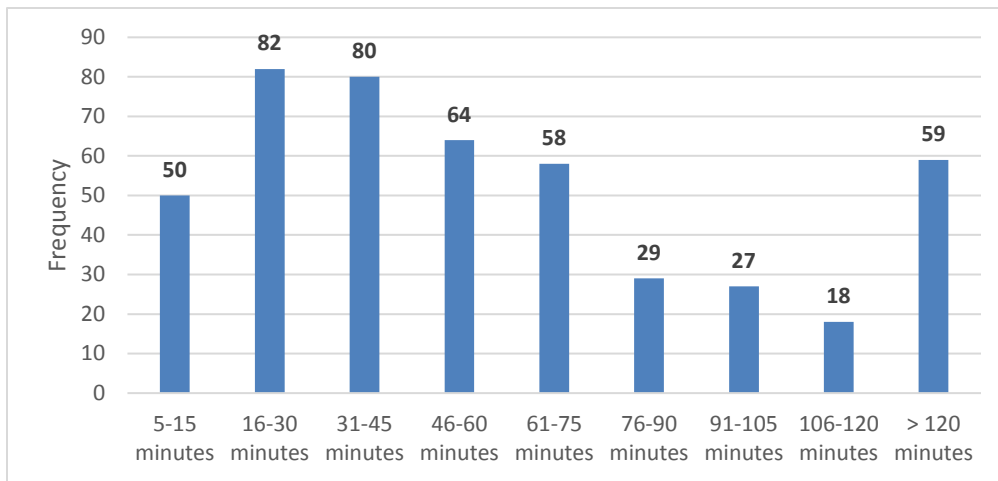
Figure 2.32: Mammoth Hot Springs Length of Stay Distribution



North and South Rims

On average, respondents stayed at the North & South Rims for 63 minutes (Median=50, Std. Dev=50). Most often respondents stayed between 16 and 45 minutes, with declining values out to two hours and then another large grouping (13%) who stayed in excess of two hours (Figure 2.33).

Figure 2.33: North and South Rims Length of Stay Distribution



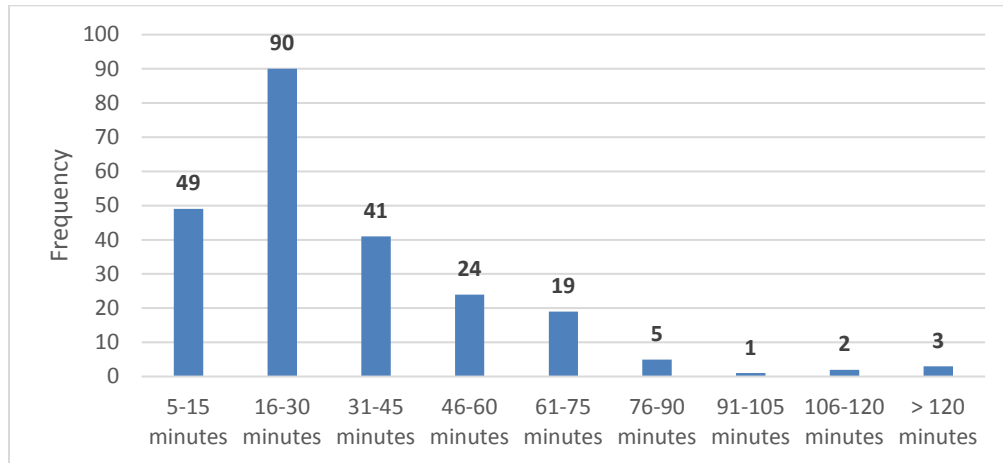
¹ Note: Observations of less than 5 minutes are not included in the following descriptive sections. Means, Medians, and Standard Deviations are calculated based on observations in excess of 4 minutes.



Tower Falls

On average, respondents stayed at Tower Falls for 44 minutes (Median=26, Std. Dev=28). By far, the most frequent observations were 16-30 minutes, accounting for 38 percent of all observations (Figure 2.34).

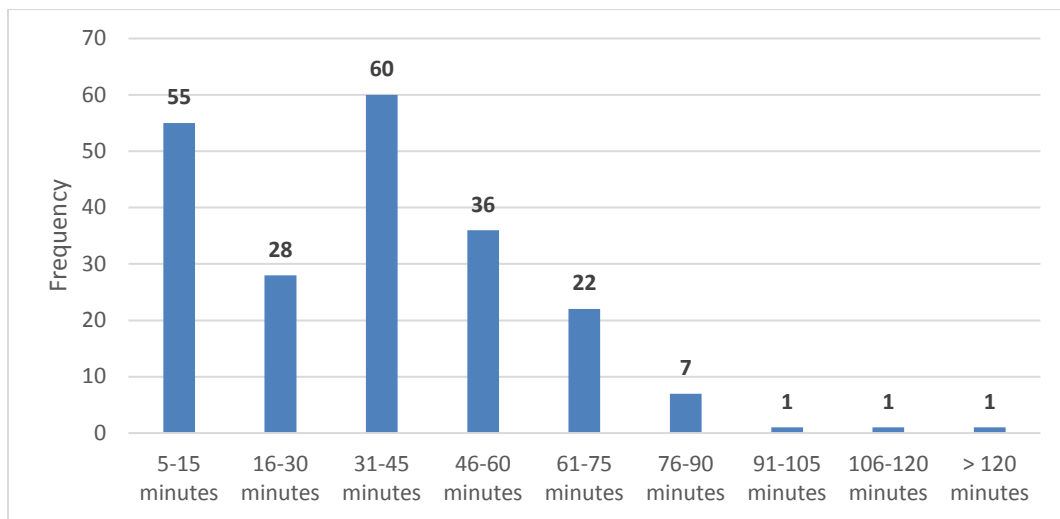
Figure 2.34: Tower Falls Length of Stay Distribution.



West Thumb

On average, respondents stayed at West Thumb for 36 minutes (Median=37, Std. Dev=23). The most frequent observations were 31-45 minutes followed by less than 16 minutes, accounting for 66% of all observations (Figure 2.35).

Figure 2.35: West Thumb Length of Stay Distribution.

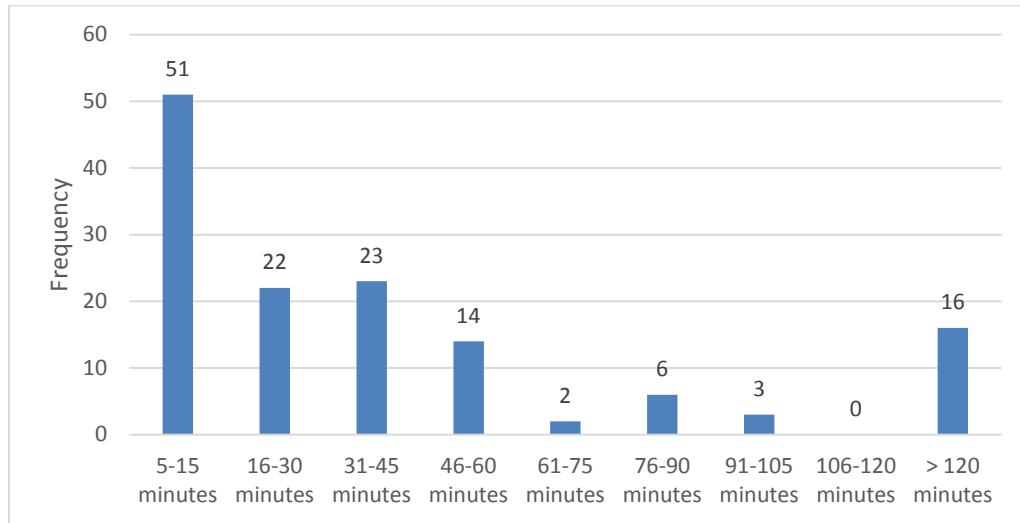




Lake Village

On average, respondents stayed at Lake Village for 66 minutes (Median=30, Std. Dev=83). By far, the most frequent observations were less than 16 minutes, accounting for 37% of all observations (Figure 2.36).

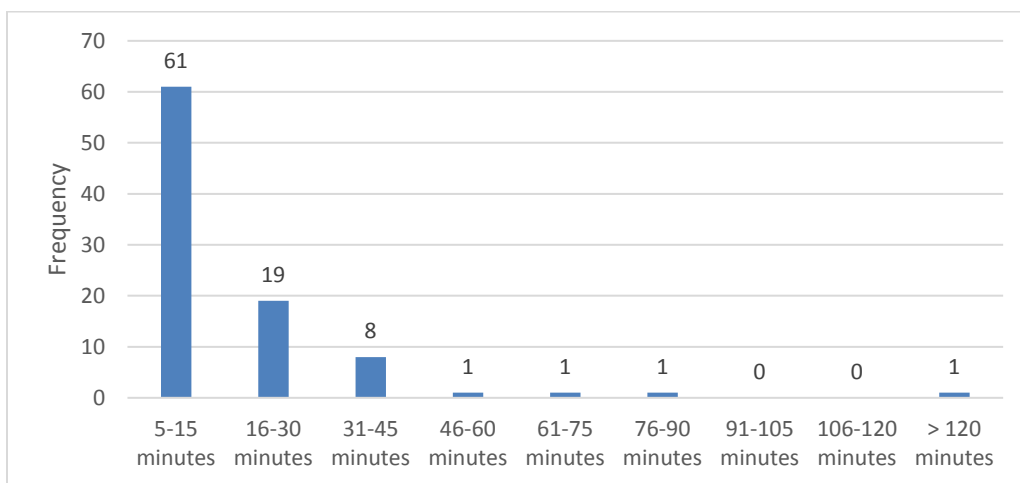
Figure 2.36: Lake Village Length of Stay Distribution



Lamar Valley

On average, respondents stayed in Lamar Valley for 41 minutes (Median11, Std. Dev=69). By far, the most frequent observations were less than 16 minutes, accounting for 66% of all observations (Figure 2.37). Within the 5 to 15-minute bin, most observations are centered around 6-7 minutes indicating likely slowing down while driving through the geofenced area. This observed time also reinforces those observations displayed in the roadway geofence and the lack of a definite shape to the speed profile.

Figure 2.37: Lamar Valley Length of Stay Distribution

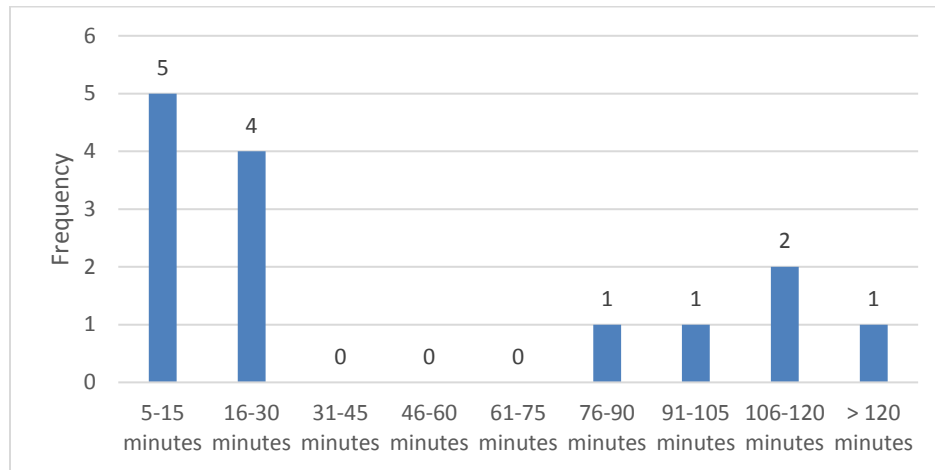




Boiling River

On average, respondents stayed at Boiling River for 48 minutes (Median=23, Std. Dev=48). Two distinct groups can be observed, those that are short staying, less than 30 minutes, and those centered around 1.5 to more than two hours. (Figure 2.38).

Figure 2.38: Boiling River Length of Stay Distribution*



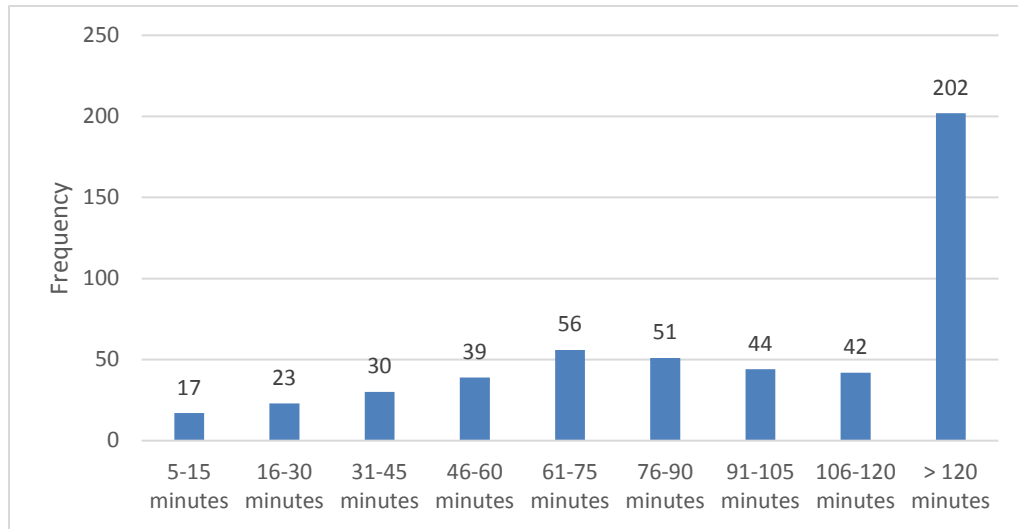
*Caution: Data represents only 14 observations. Boiling River was closed for portions of the 2018 data collection season.

Old Faithful

On average, respondents stayed at Old Faithful for 128 minutes (Median=104, Std. Dev=88). By far, the most frequent observations were more than two hours, accounting for 40% of all observations (Figure 2.39). Given that many tablets were distributed to visitors upon first entering the park, and that the Old Faithful area is a large lodging base, it is likely that many of those falling in the greater than 120-minute bin are individuals who were at their lodging locations rather than just at Old Faithful itself.



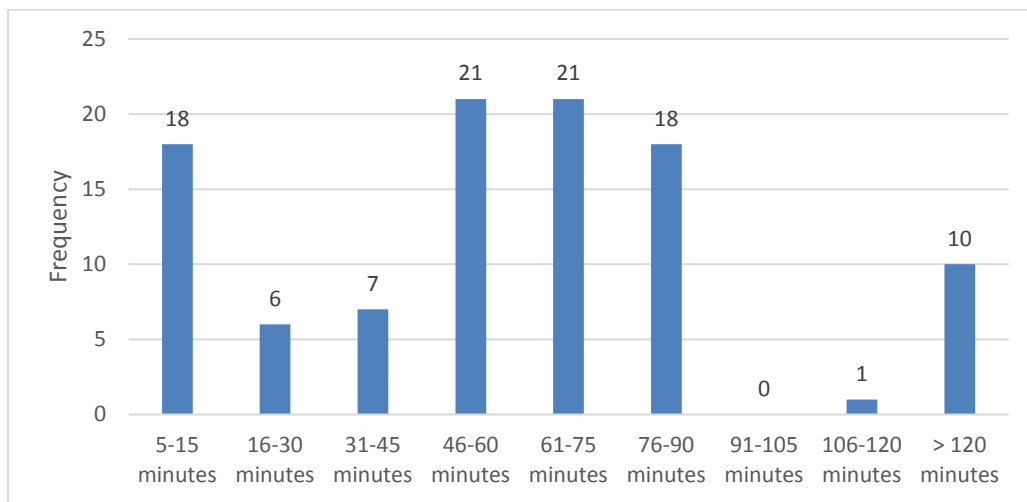
Figure 2.39: Old Faithful length of Stay Distribution



Fairy Falls

On average, respondents stayed at Fairy Falls for 63 minutes (Median=60, Std. Dev=48). Most observations ranged from 46-70 minutes (Figure 2.40).

Figure 2.40: Fairy falls Length of Stay Distribution

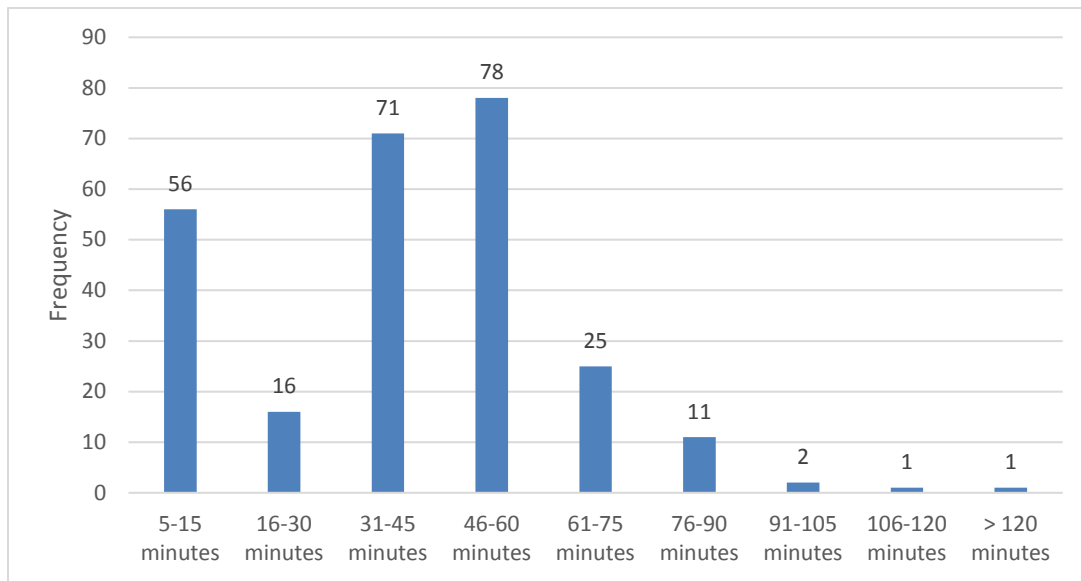


Midway Geyser Basin

On average, respondents stayed at the Midway Geyser Basin area for 42 minutes (Median=43, Std. Dev=24). Most observations ranged from 31-60 minutes (Figure 2.41).



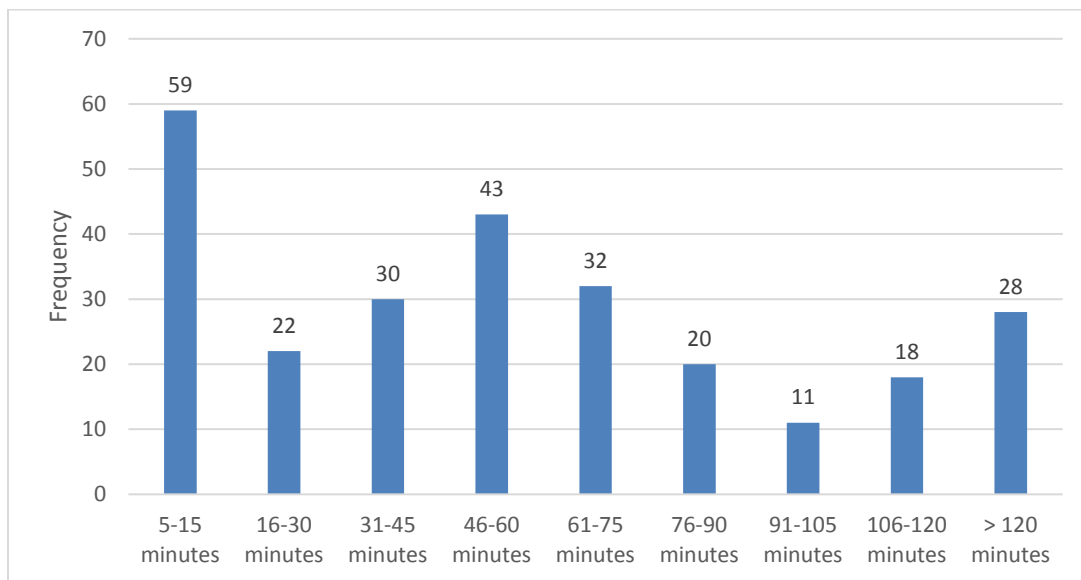
Figure 2.41: Midway Geyser Basin Length of Stay Distribution



Norris Geyser Basin

On average, respondents stayed at the Norris Geyser Basin area for 57 minutes (Median=51, Std. Dev=42). The most frequently observed group were those staying less than 15 minutes, followed by a secondary peak between 46-60 minutes (Figure 2.42).

Figure 2.42: Norris Geyser Basin Length of Stay Distribution

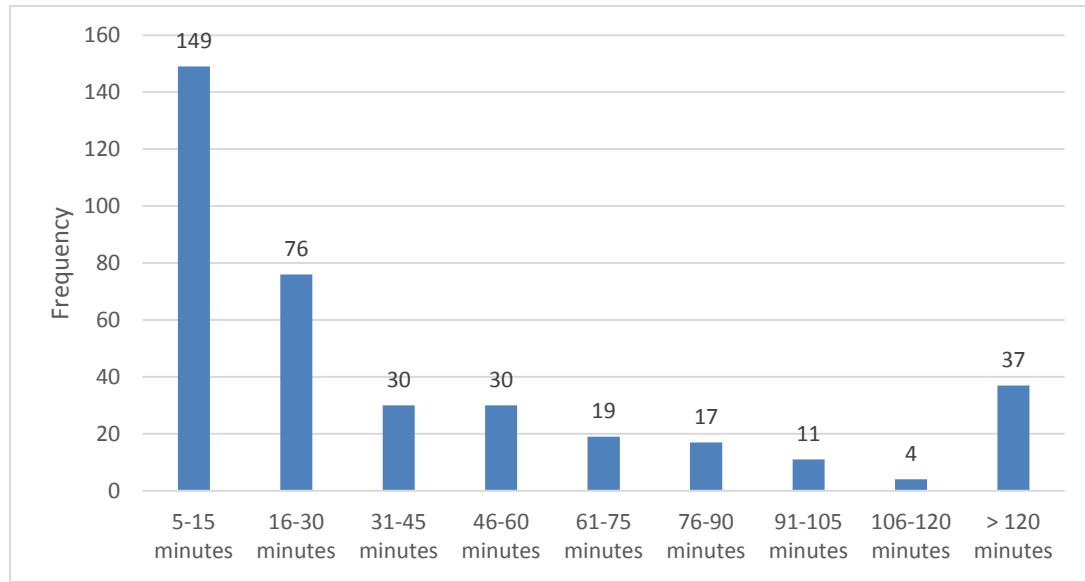


Canyon Village

On average, respondents stayed at Canyon Village for 75 minutes (Median=22, Std. Dev=105). By far, the most frequently observed length of stay at Canyon Village was less than 15 minutes. Similar to other locations with lodging, a secondary spike also occurs outside of two hours (Figure 2.43).



Figure 2.43: Canyon Village Length of Stay Distribution



2.4 Other Potential Explorations and Analyses with Current GPS Data

Analysis contained within section two are limited to the direct questions and areas of interest indicated in the original scope of work. However, additional explorations and analyses may be enabled with the collected GPS data. Examples of this are:

- Refinement on where an individual parked within a major parking area. Differentiation may be observed between parking in a lot versus on a roadway flowing from a lot.
- Additional attractions (trailheads, pullouts, etc.) may also be explored for frequency of stopping and length of stay. This is not limited to Geofenced areas shown in the report
- Travel speed in this report is shown independent of direction. Direction of travel may be determined and differences in speed or travel patterns may be explored.
- Turn by turn details may be explored. For instance, the rate at which people turn north at Madison Junction versus turning south.
- Typical travel patterns may be explored. This includes sequencing of stops, and total number of stops.

Detail available for each of the above points is dependent upon the sample size of tablets recorded within a certain area of interest within the park and each is limited to only a single day of a park visit.



SECTION 3

Intercept Survey Results



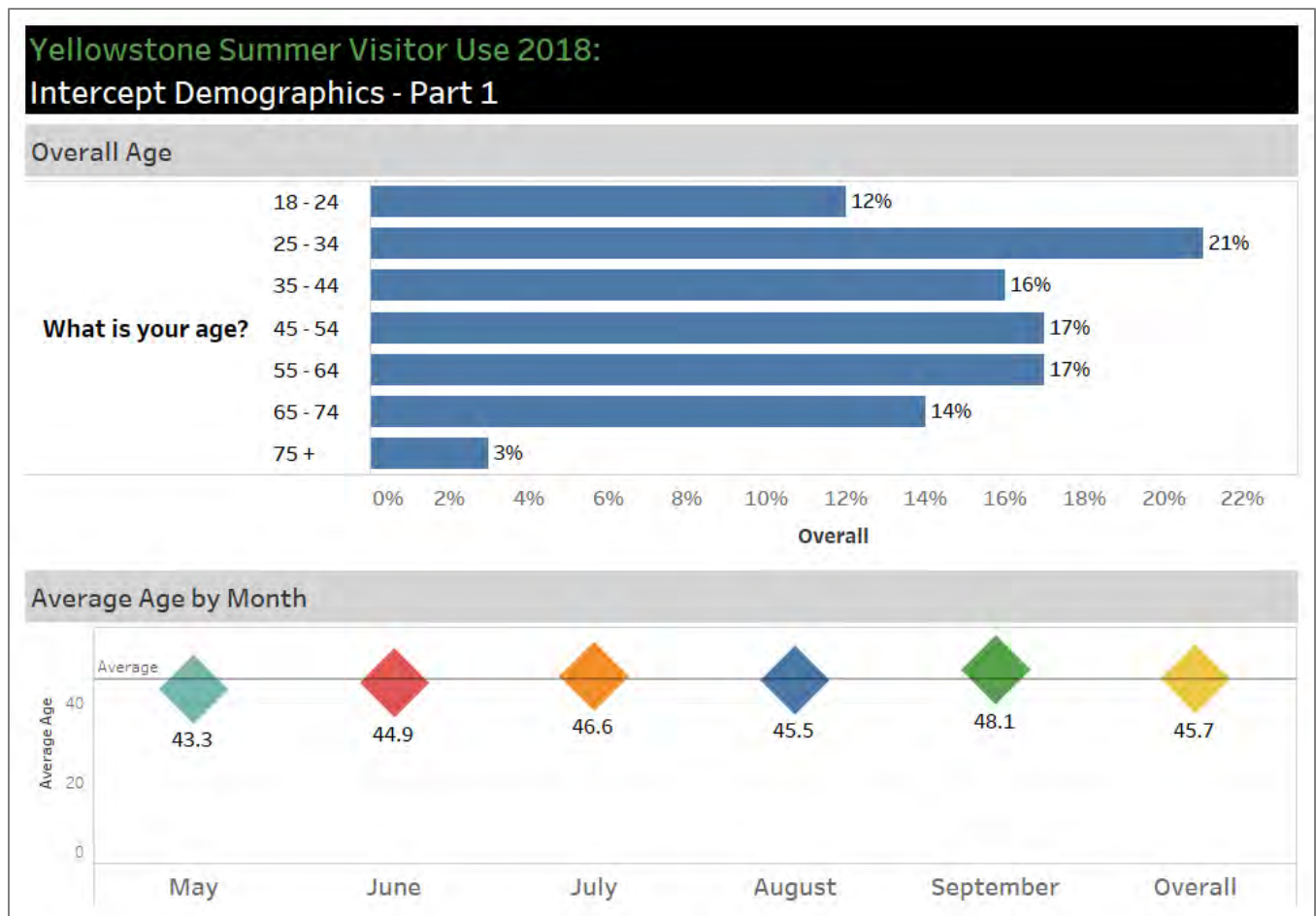
3. Section 3: Intercept Survey

This section provides results of the 2018 Summer Intercept Survey. The purpose of the intercept survey (unlike the Geofence survey) was to provide enough data to segment visitors into diverse groups to understand if these various groups of visitors experience the park differently. Visitors filled out this survey after being approached by surveyors at specific attractions in Yellowstone. See Appendix D for the survey instrument. This section includes a demographic description of respondents overall and by month, places they were not able to visit, and an analysis of visitor segments of interest to Yellowstone managers. After a nonresponse check with four variables, data were weighted by language and previous visitation to represent Yellowstone visitors. There were 2,738 respondents who completed the Intercept Survey. See Appendix H for detailed data tables for the Intercept Survey results.

3.1 Intercept Survey Demographics

On average, respondents were 45.7 years old, had a wide range of household income with the highest group (21%) earning between \$100K and \$150K, and were evenly represented with males (51%) and females (49%). The majority had a college degree (72%) and were white (82%).

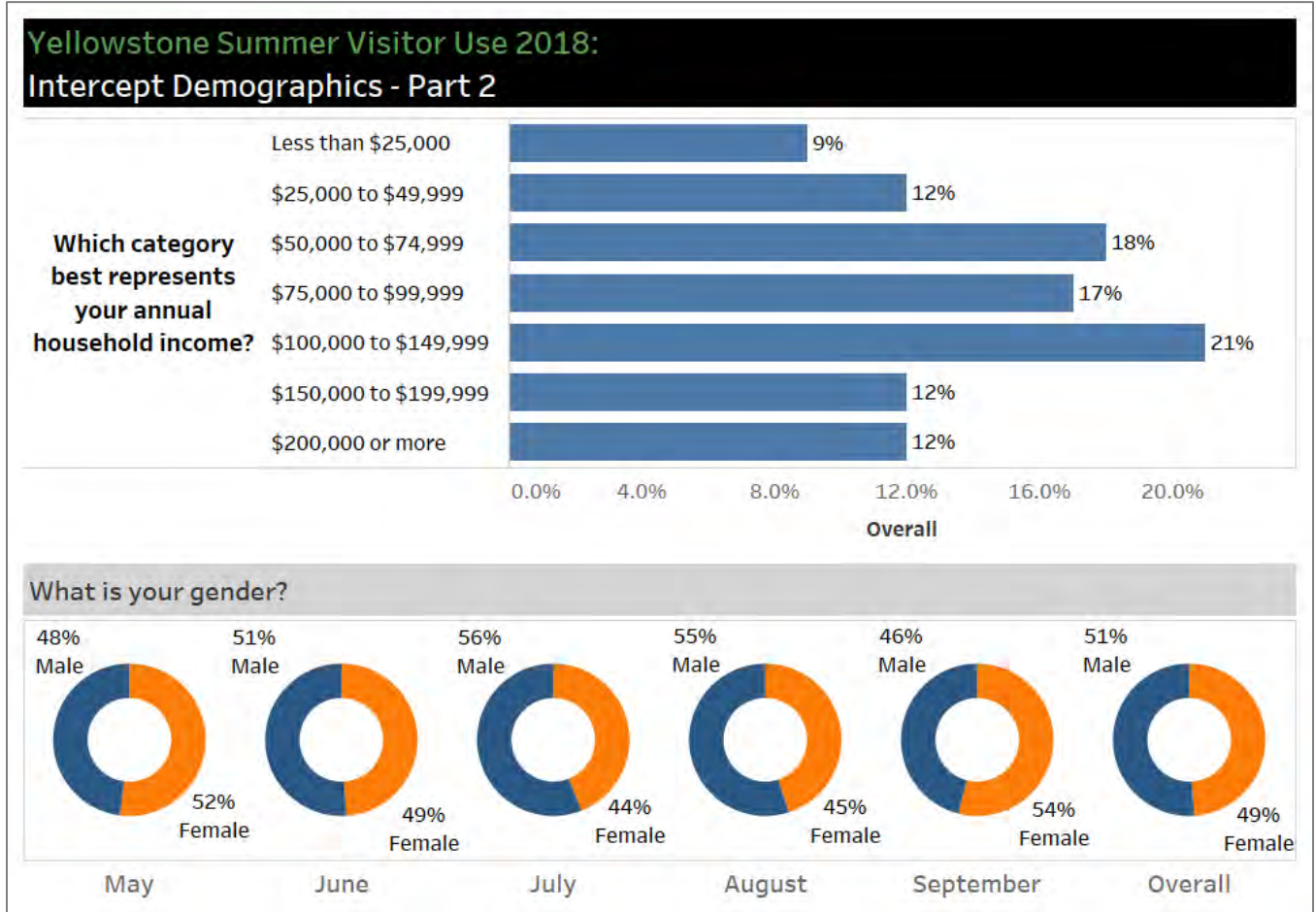
Figure 3.1: Intercept Survey Demographics - Age





- **Age:** Overall, age was well distributed with 12% of respondents between the ages of 18-24, 21% between 25-34 years old, a combined 49% for all age ranges between 35-64, and 17% over 65. Average age of respondents was 45.7 years old (Figure 3.1 and Appendix H: Table H.1).

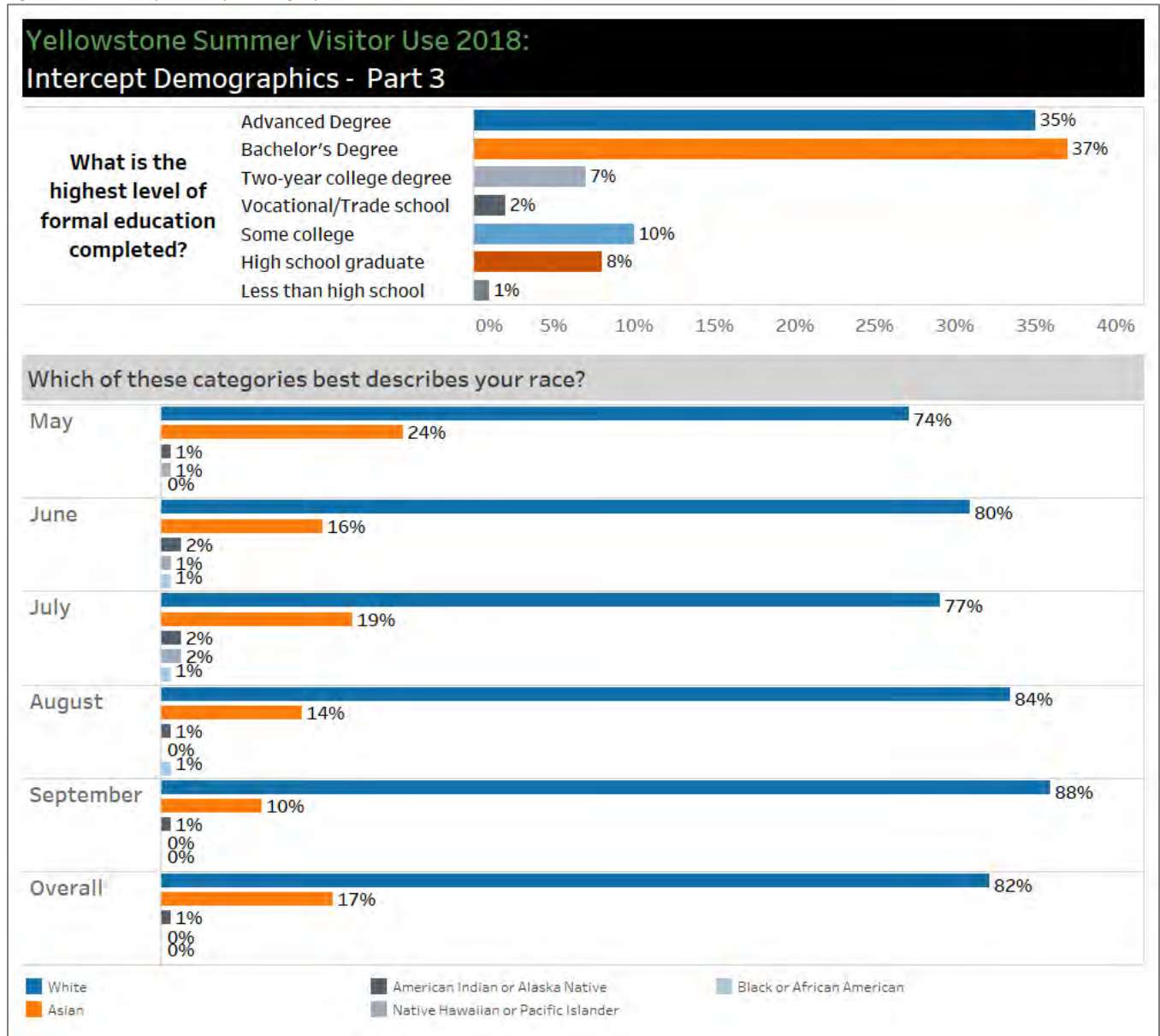
Figure 3.2: Intercept Survey Demographics – Annual Household Income and Gender



- **Household Income:** Household income was generally balanced across the spectrum of options with 21% earning \$100k-\$149,999, 17% earning \$75k-\$99,999, and 18% earning \$50k-\$74,999. Respondents generally tend to be well educated and have higher earnings than the general population, consistent with most tourism/visitor research (Figure 3.2).
- **Gender:** Gender was distributed fairly evenly between males (51%) and females (49%), with some variance during the months of July and August. A contributing factor may be that July and August were also the months where respondents were most likely to be traveling with children, and as a result, one partner was more likely to participate because the other partner was tending to children (Figure 3.2).



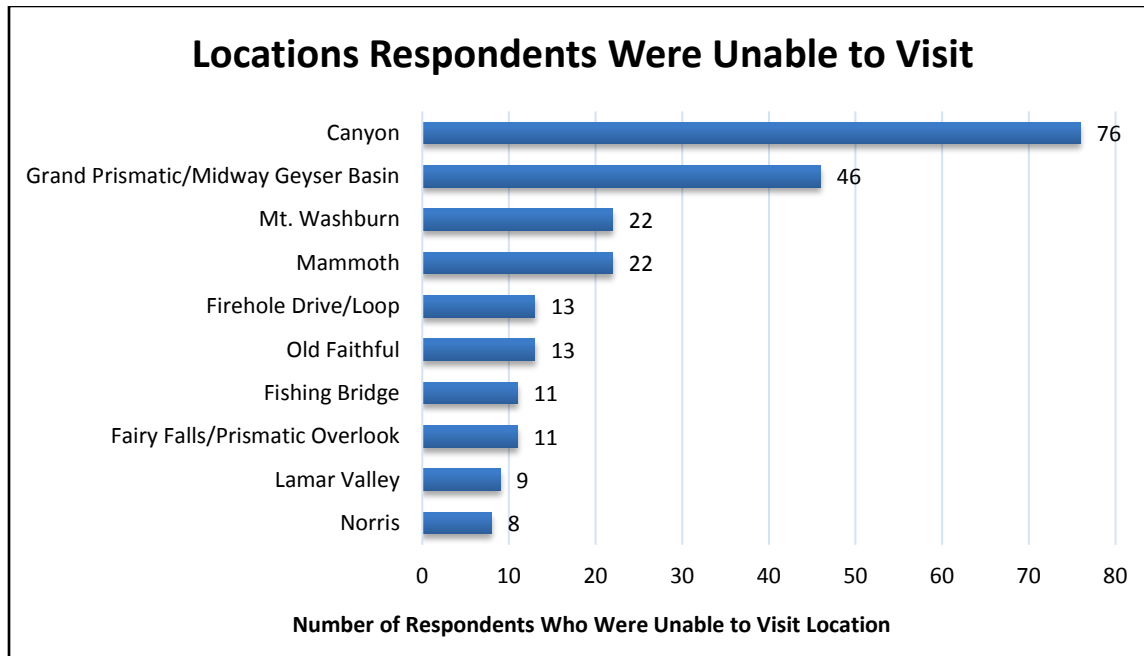
Figure 3.3: Intercept Survey Demographics – Education and Race



- **Education:** Most respondents (72%) were well-educated with a college degree (Bachelor's or advanced degree) while 17% have some college or a two-year degree (Figure 3.3). Percentages vary somewhat between months with May having a slightly higher percentage of respondents who have a college degree (76%), particularly advanced degrees (42%) (Figure 3.3).
- **Race:** The majority of respondents identified themselves as White (82%) with the second highest percentage as Asian (17%). One percent were another race (<1% each option) (Figure 3.3).



Figure 3.5: Locations Yellowstone Respondents were Not Able to Visit

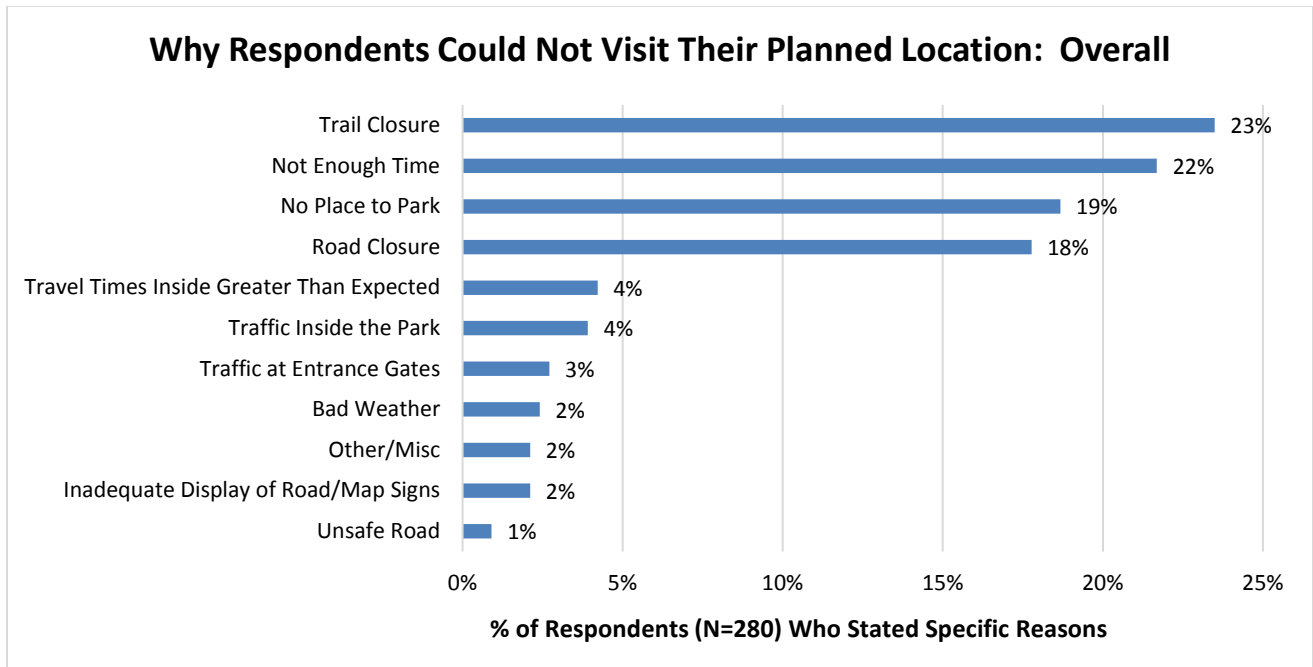


In addition to asking which locations respondents were unable to visit, respondents were also asked to provide a reason why they were unable to visit their planned location. Figure 3.6 lists the percentages of respondents who reported various reasons they were unable to visit. It should be mentioned that respondents were allowed to select more than one reason for not being able to visit their location. For the category “Other/Misc.,” examples of responses include:

- “Family illness”
- “Had a dog” (2)
- “Not handicap accessible”

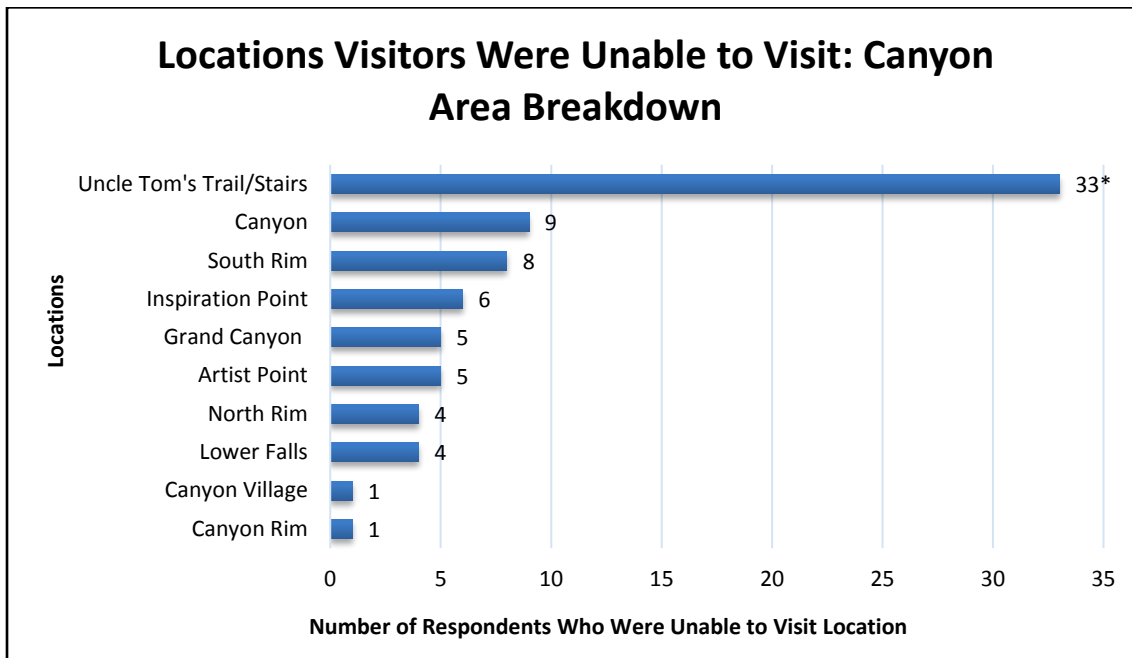


Figure 3.6: Reasons Why Respondents Could Not Visit Their Planned Location



The Canyon area had a variety of places in which respondents could not visit. Respondents provided further detail as shown in Figure 3.7.

Figure 3.7: Breakdown of Locations Respondents were Unable to Visit in the Canyon Area

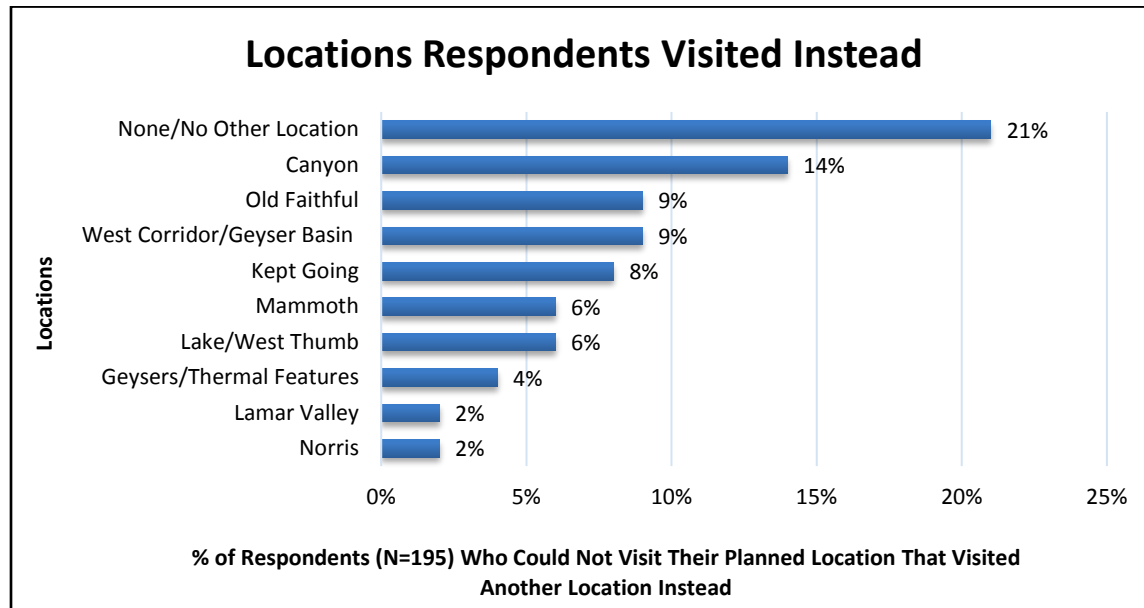


* Uncle Tom's Trail was closed during the 2018 season



Following the question regarding where they couldn't visit, respondents were asked where they went instead of their preferred site. There were 195 individuals who generated 230 comments on where they went instead. These comments were separated into 57 potential areas. Results were compiled into the top 10 areas respondents visited when unable to visit their preferred areas (Figure 3.8). It should be noted that many respondents simply said, "None, no other location" or "I kept going" and did not provide any specific site data.

Figure 3.8: Locations Visited Instead of their Preferred Site

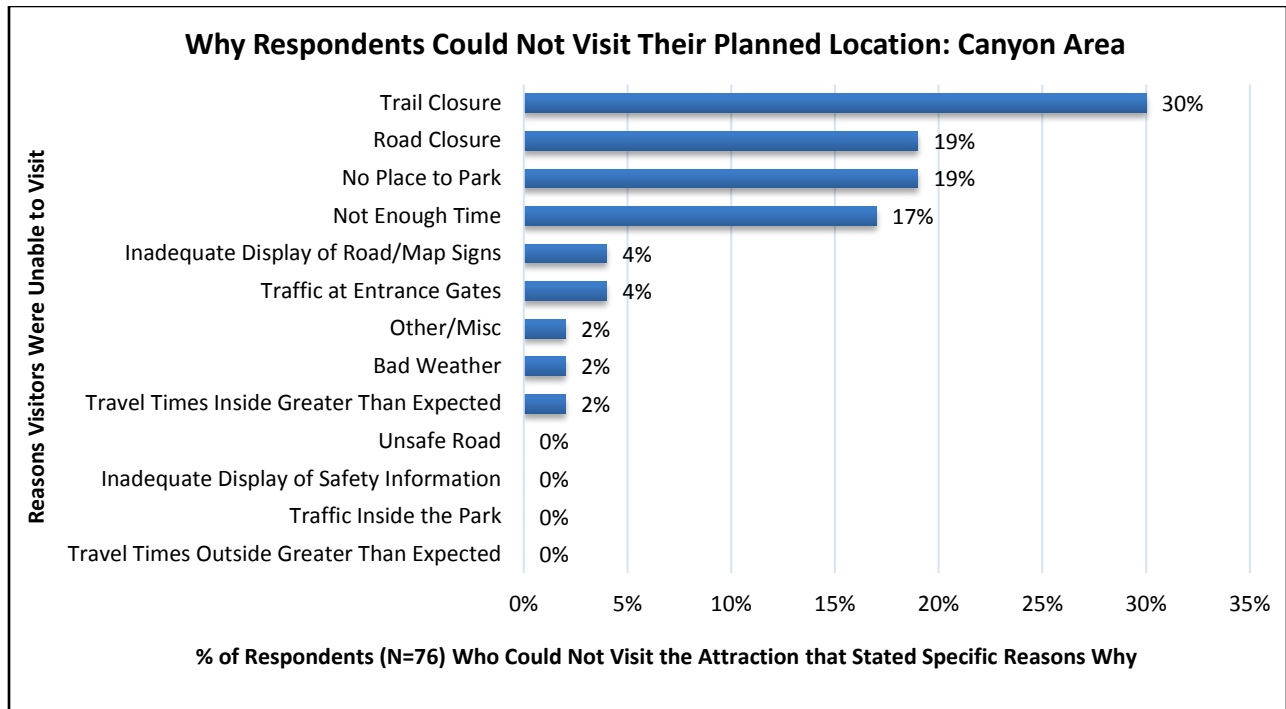


For a full view of the raw comments by visitors listing where they could not visit and where they went instead, look in Appendix H: Table H.7.

As for the two sites with the highest percentage of respondents who were unable to visit those locations, the Canyon Area and the Grand Prismatic/Midway Geysir, data were vague and do not provide robust information on where respondents chose to visit instead of those locations. However, of those who said they could not visit the Canyon Area (76 respondents), 30% reported they could not visit the area because of trail closures (Figure 3.9). Of the 76 respondents who answered which location they could not visit, 23 provided responses for where they went instead. The most common responses are the following: "none" (6), "just kept going" (3), "Artist Point" (3), and Old Faithful (2).



Figure 3.9: Reasons Why Respondents could not Visit their Planned Location – Canyon Area



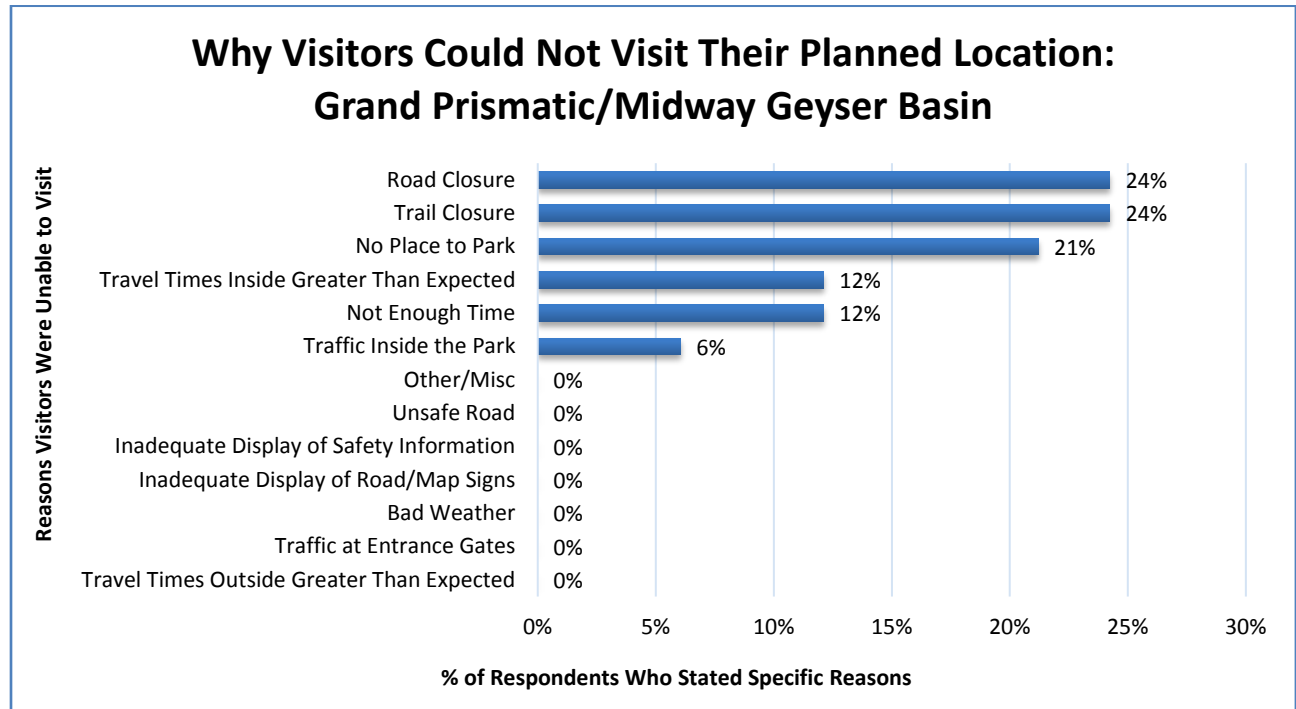
In regard to the Grand Prismatic/Midway Geyser, 46 respondents stated that they were unable to visit the attraction. The most commonly cited reasons for not being able to visit were ‘Road Closure’ (24%) and ‘Trail Closure’ (24%), followed by ‘No Place to Park’ (21%). It is difficult to say what respondents meant by ‘Road Closure’ and ‘Trail Closure’, as these are not common occurrences at the Grand Prismatic/Midway Geyser. It is possible that respondents interpreted their inability to access the attraction via the roadway as a ‘Road/Trail Closure’, but without further data this connection cannot be made with any certainty.





However, in comparison to the Canyon area, respondents for the Grand Prismatic/Midway Geyser attraction provided more concise information on where they visited instead. Out of the 46 respondents who stated they could not visit the attraction, 13 provided responses for where they went instead. Out of those 13 respondents, 10 stated that they either kept trying to visit the attraction or they remained in the Western Road Corridor (i.e. Old Faithful (3), Mystic Falls, Biscuit Basin, Firehole Loop). Listed below in Figure 3.10 is a breakdown of the reasons why respondents could not visit the Grand Prismatic/Midway Geyser attraction.

Figure 3.10: Reasons Why Respondents could not Visit their Planned Location – Grand Prismatic/Midway Geyser





3.3 Visitor Segmentation: Findings of Differences in Groups

In addition to the results presented in the sections above, there were several other interesting findings that emerged when segmenting and comparing groups with different visitation characteristics. We tested the following segments: 1) low use, medium use, and high use areas; 2) Respondents with children vs. no children; 3) Private vehicle respondents vs. tour bus/van respondents; 4) Peak vs. shoulder season; 5) Length of time in park when intercepted - 4 days or less vs. 5 or more days; 6) USA, China, other international respondents, and; 7) First time visitors, infrequent repeat visitor, frequent repeat visitor.

The following five groups provided the most useful results for park planners in terms of understanding differences in visitor segments and are reported on in this section:

- Respondents with children vs. no children
- Respondents that entered the park in their private vehicle vs. travelers that took a tour bus/van
- First-time visitors to Yellowstone vs. infrequent repeat visitors vs. frequent repeat visitors
- Length of time in the park when intercepted - 4 days or less vs. 5 or more days already in the park
- Respondents from the USA vs. Chinese respondents vs. all other international respondents

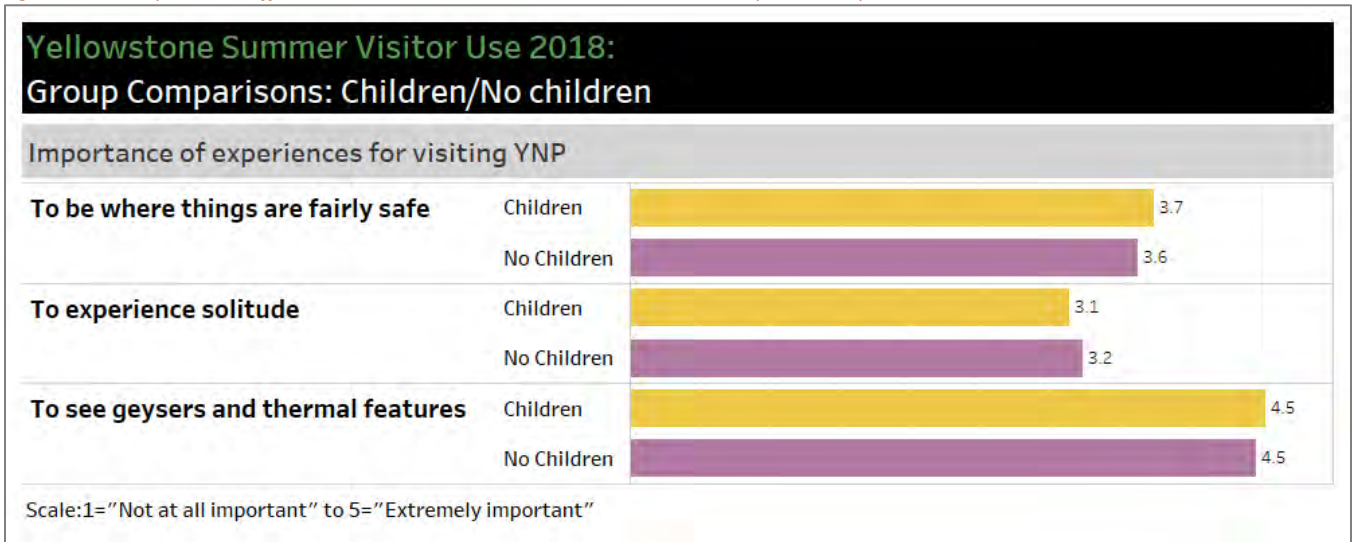
These group segments produced statistically significant findings using multiple methods. For analysis of travelers with children vs. no children, length of time in the park when intercepted, and travelers that entered the park through different vehicular means, t-tests were conducted using Levene’s test for equality of variances. For the analysis of different levels of visitation (first time or repeat and USA vs. China vs. International) to the park, analysis of variance (ANOVA) testing was used in conjunction with Bonferroni post-hoc tests.

Respondents with Children vs. No Children

- Sample size: Respondents with children = 817; respondents without children = 1,451.
- **Respondents with children were significantly more likely to say they were in Yellowstone to see geysers and thermal features and to be where things are fairly safe compared to respondents without children in their group.**
- **Respondents without children were significantly more likely to say they were in Yellowstone to experience solitude.**
- All other variables showed no differences between respondents with children and without.
- See Appendix H: Table H.8 for means, sample size and differences.



Figure 3.11: Respondent Differences with Children and without Children on Trip – Intercept Results



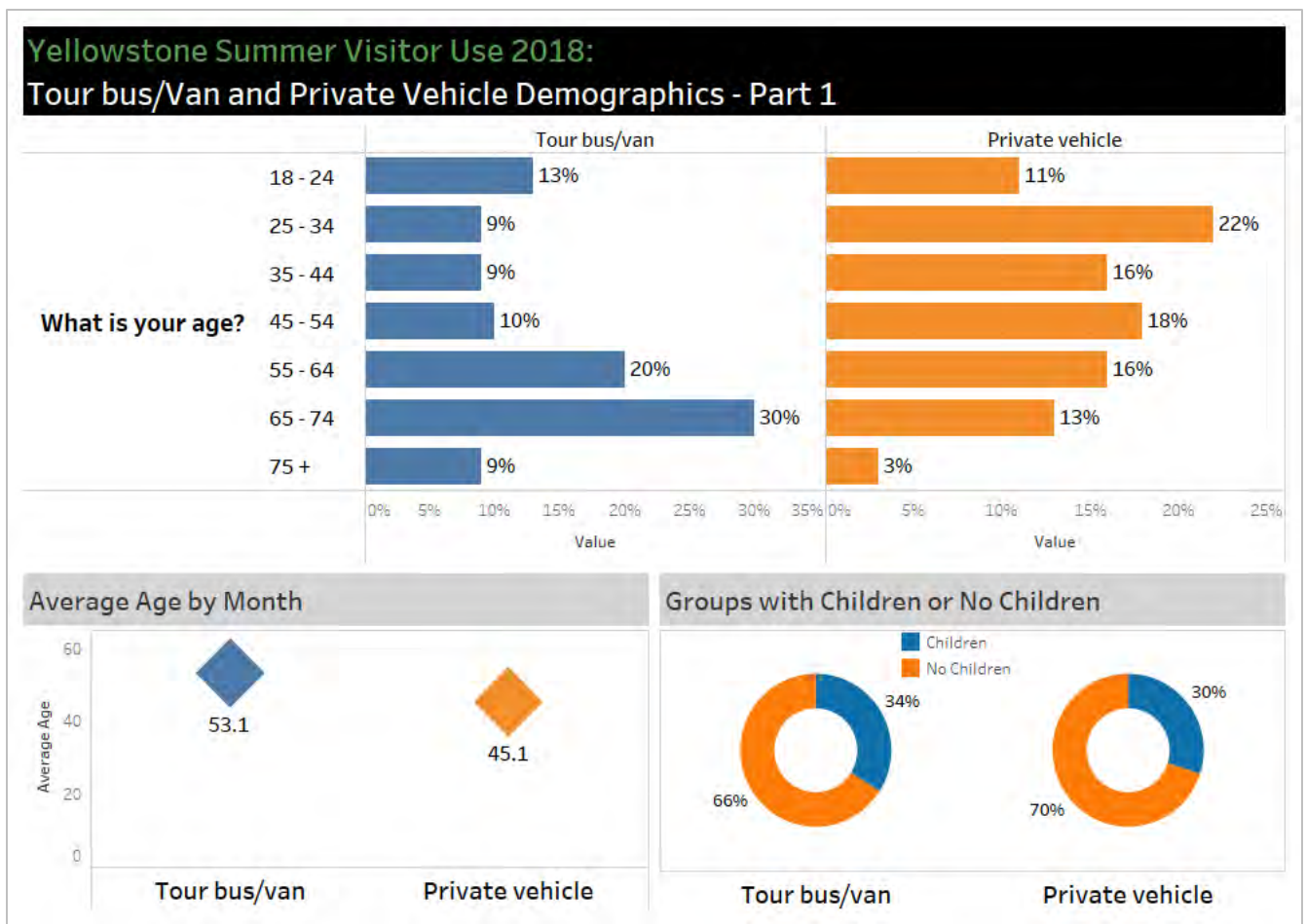


Respondents in Private Vehicles vs. Respondents on Tour Buses & Vans

Tour bus visitation has increased significantly over the past few years in Yellowstone, therefore park managers wondered whether this segment experiences the park differently. The following analysis provides comparative demographic information as well as the differences that emerged in visitor characteristics based on their transportation choice. **The sample size of private vehicle respondents was 2,540 and 187 for tour bus/van respondents.**

Comparing demographics of these two segments, respondents in a tour bus/van were older with a lower household income and had a noticeably higher percent of Asian respondents compared to respondents in their private vehicle. Tour bus/van respondents were 8% more likely to be first time visitors and 4% more likely to have children with them under 18 years of age.

Figure 3.12: Age Comparison between Types of Transportation in Yellowstone – Intercept Results

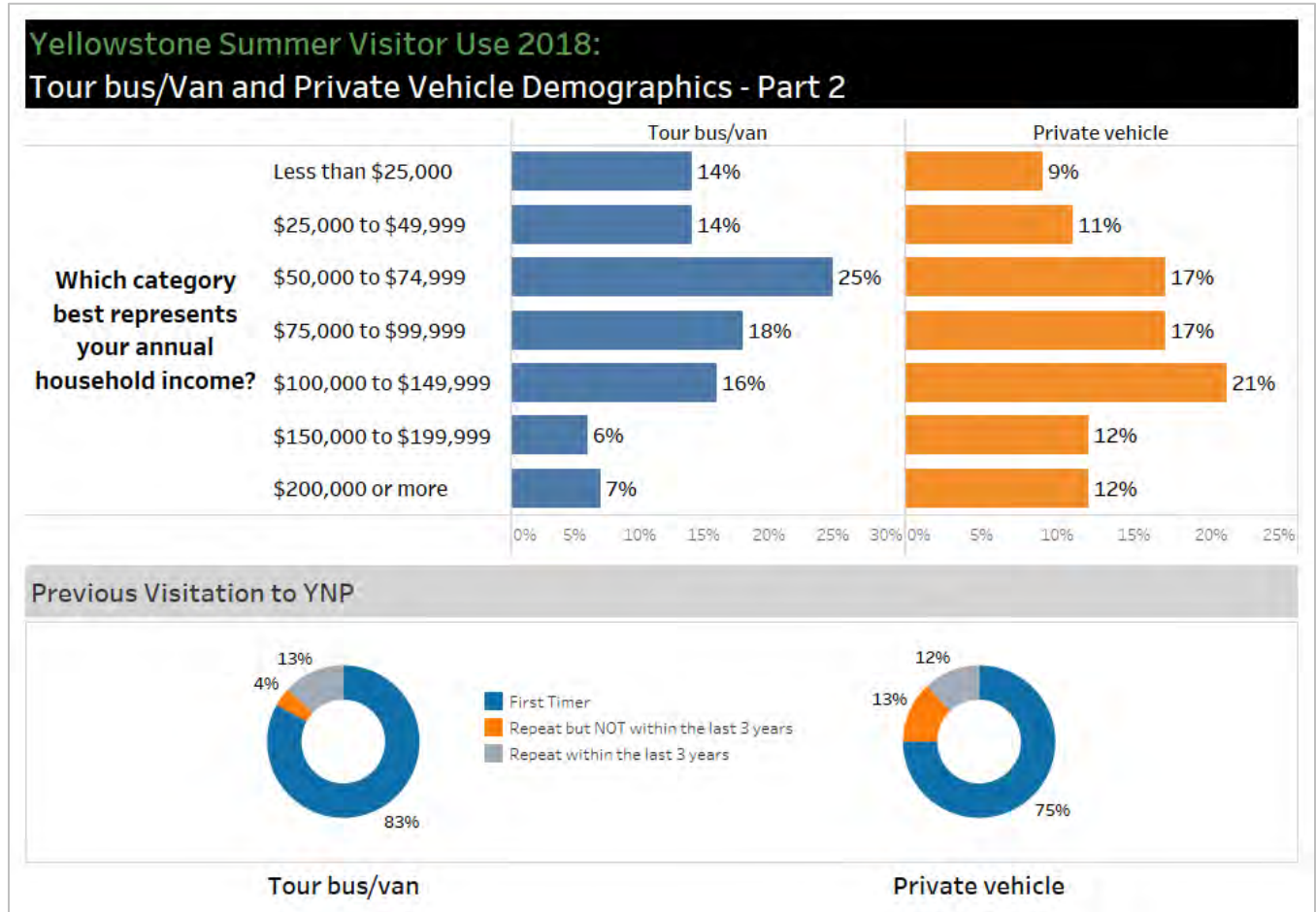


- **Age:** Those on tour buses/vans were more likely to be older, with a mean age of 53.1 years in comparison to the private vehicle group of 45.1 years. Twenty percent of those in the tour bus/van group were 55-64 years old, with another 30% reporting they were 65-74 years old. In comparison, 69% of tour bus/van respondents were over 45 years of age, where only 50% who used their private vehicle were over 45 years old. (Figure 3.12)



- **Group Characteristics:** The percentage of respondents who had children under the age of 18 in their group were almost identical, with 34% of tour bus/van respondents having children and 30% of private vehicle respondents having children. (Figure 3.12)

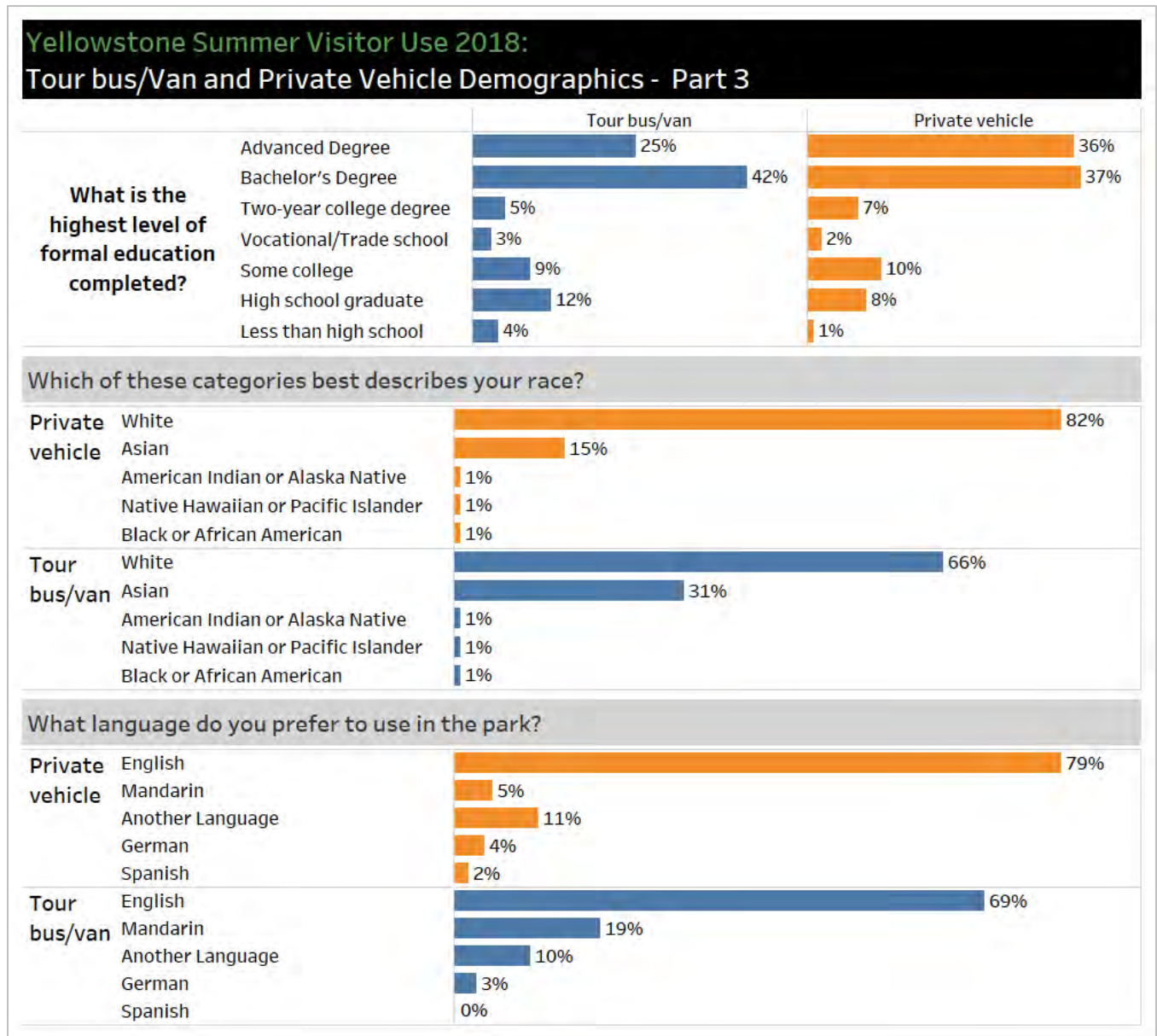
Figure 3.13: Annual Household Income and Visitation Comparison between Types of Transportation in Yellowstone – Intercept Results



- **Household Income:** Household income was generally balanced across the board, however those who chose to visit the park in their private vehicle reported higher annual household incomes than those who chose to take a tour bus/van. In comparison, 53% of respondents from the tour bus/van group had an annual household income of less than \$75,000, where only 37% of respondents reported the same annual household income for the private vehicle group. Park visitors generally tend to be well educated and have higher earnings than the general population, consistent with most tourism/visitor research (Figure 3.13).
- **Visitation Characteristics:** Those in the tour bus/van group (83%) were more likely to be first time visitors than those in their private vehicle (75%) (Figure 3.13).



Figure 3.14: Education, Race, and Language Preference Comparison between Visitation Types in Yellowstone – Intercept Results

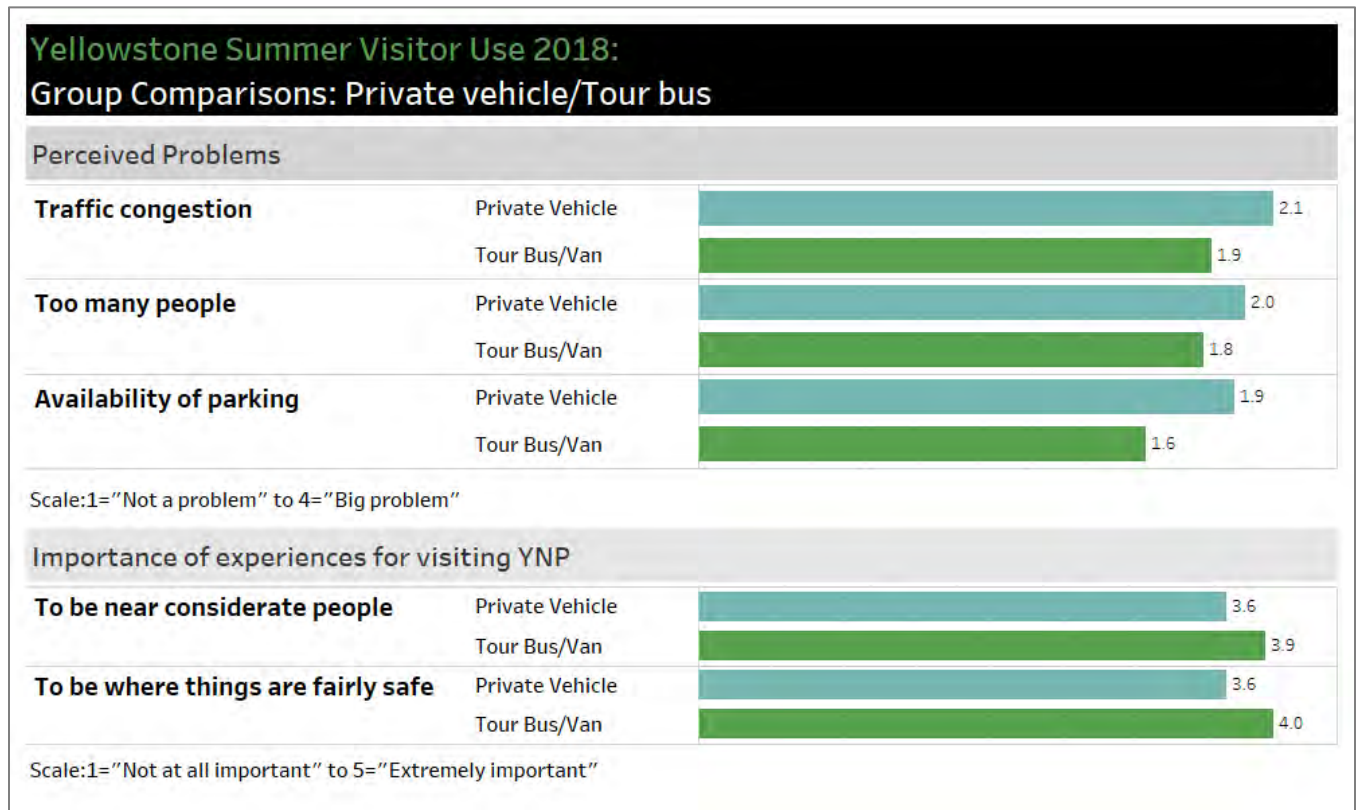


- **Education:** Most respondents who chose a tour bus/van (67%) were well-educated with a college degree (Bachelor's or advanced degree) while 14% have some college or a two-year degree. Overall, the tour bus/van group and the private vehicle group showed similar trends in educational background (Figure 3.14)
- **Race:** For both groups, the majority of respondents identified themselves as White (66% for tour bus/van & 82% for private vehicles). However, for the tour bus/van group respondents identified as Asian at almost twice the rate of private vehicles (31% and 15%, respectively). All other races remained at the same percentages, thereby only demonstrating differences between respondents who identified as Asian in comparison to respondents who identified as Caucasian. (Figure 3.14)



- Language:** In a similar finding to the race category, the preferred language for those on a tour bus/van was more likely to be English (69%) and Mandarin (19%), where those in their private vehicle preferred English (79%) or Another Language (11%). This finding is not surprising, as one would expect that a higher percentage of Asian respondents might produce a greater preference for Mandarin over English. (Figure 3.14)

Figure 3.15: Differences between Respondents Who Chose to Take a Tour Bus/Van vs. Respondents Who Chose to Take Their Private Vehicle – Intercept Results



Analysis of difference testing between the tour bus/van and the private vehicle respondents showed five variables with significant differences:

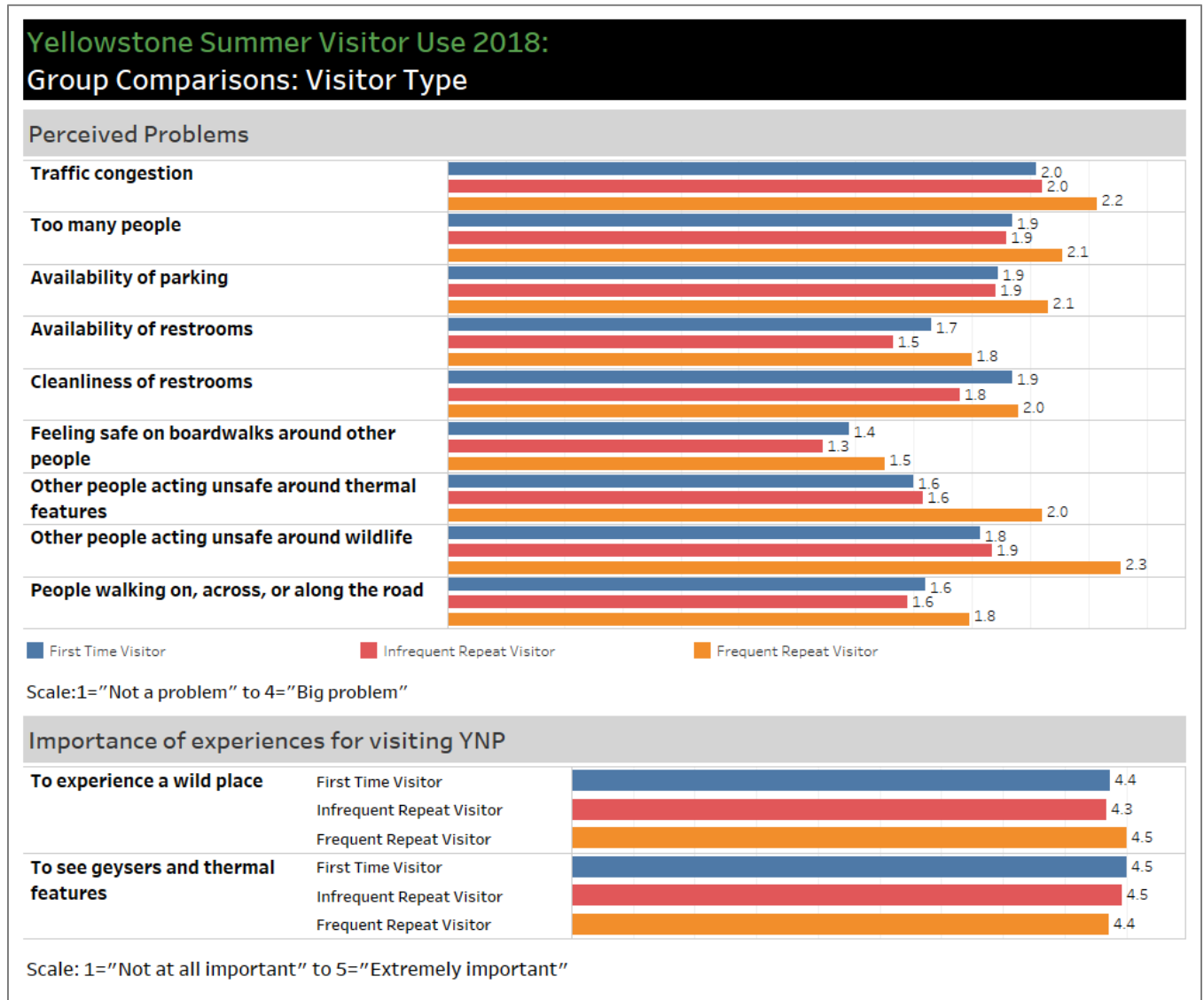
- Respondents riding in a tour bus or tour van were significantly more likely to agree that being near considerate people was important and to be where things were safe was important compared to those in private vehicles.
- Respondents driving their own vehicles were significantly more likely to say that parking was a problem, too many people were a problem, and that traffic congestion was a problem compared to those riding in a bus or tour van.
- All other variables showed no differences between the two groups.



First Time Visitors vs. Infrequent Visitors vs. Frequent Visitors

For this analysis, respondents were segmented into three different categories: first time visitors (N=2,042), repeat visitors who had **not** visited within the last three years referred to as infrequent visitors (N=329), and repeat visitors who had visited within the last three years (frequent visitors, N=330). Statistically significant differences between these groups in regard to their motivations for visiting and problems they perceived while in the park can be seen in Figure 3.16 and tables in Appendix H.

Figure 3.16: Respondent Differences between First-Time and Repeat Visitors – Intercept Results





Perceived Problems

- The **frequent repeat visitor** is significantly more likely to say the following are more of a problem than both the first-time visitor and the infrequent visitor:
 - traffic congestion
 - too many people
 - feeling safe on boardwalks
 - restroom availability
 - parking availability
 - other people acting unsafe around thermal features
 - other people acting unsafe around wildlife
 - people walking on, across, or along the road
- The infrequent repeat visitor was significantly LESS likely to say that cleanliness of restrooms was a problem compared to the first-time visitor and the frequent repeat visitor.

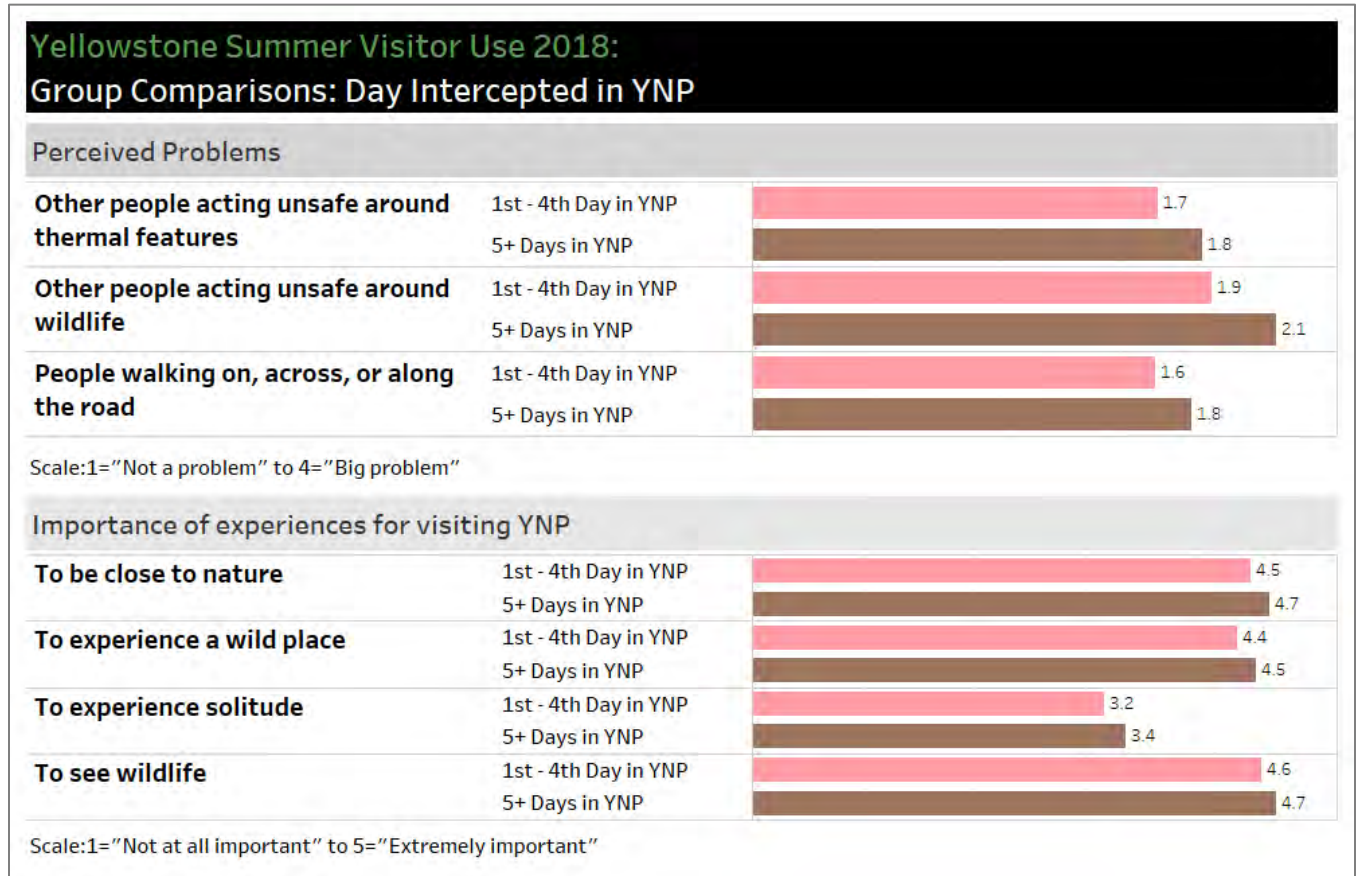
Importance of Experiences for Visiting Yellowstone

- Frequent repeat visitors are significantly different and more likely to want to experience a wild place than first-time visitors and infrequent repeat visitors.
- First-time visitors are significantly different and more likely to say they want to see geysers and thermal features compared to the frequent repeat visitor.



Number of Days Respondents Had Spent in Yellowstone National Park When Intercepted
Respondents were intercepted at various days during their full visit to Yellowstone. When analyzing the differences between the day of intercept (1st, 2nd, 3rd, 4th, or 5+ days), more differences emerged with those who had already spent 5 or more days in the park. Therefore, the following analysis grouped visitors on the 1st through 4th day in the park (N=2,462) and compared them to the 5th day or longer visitor (N=273) (Figure 3.17).

Figure 3.17: Differences between Respondents who were Intercepted During Various Days of their Trip – Intercept Results



Respondents who had already been in the park at least 5 days on their current Yellowstone trip felt the following were significantly more important to them than respondents who were intercepted earlier in their visit:

- experiencing solitude
- being close to nature
- seeing wildlife
- experiencing a wild place

In addition, the respondents who had already been in the park for 5 or more days were significantly more likely to perceive problems with the following:

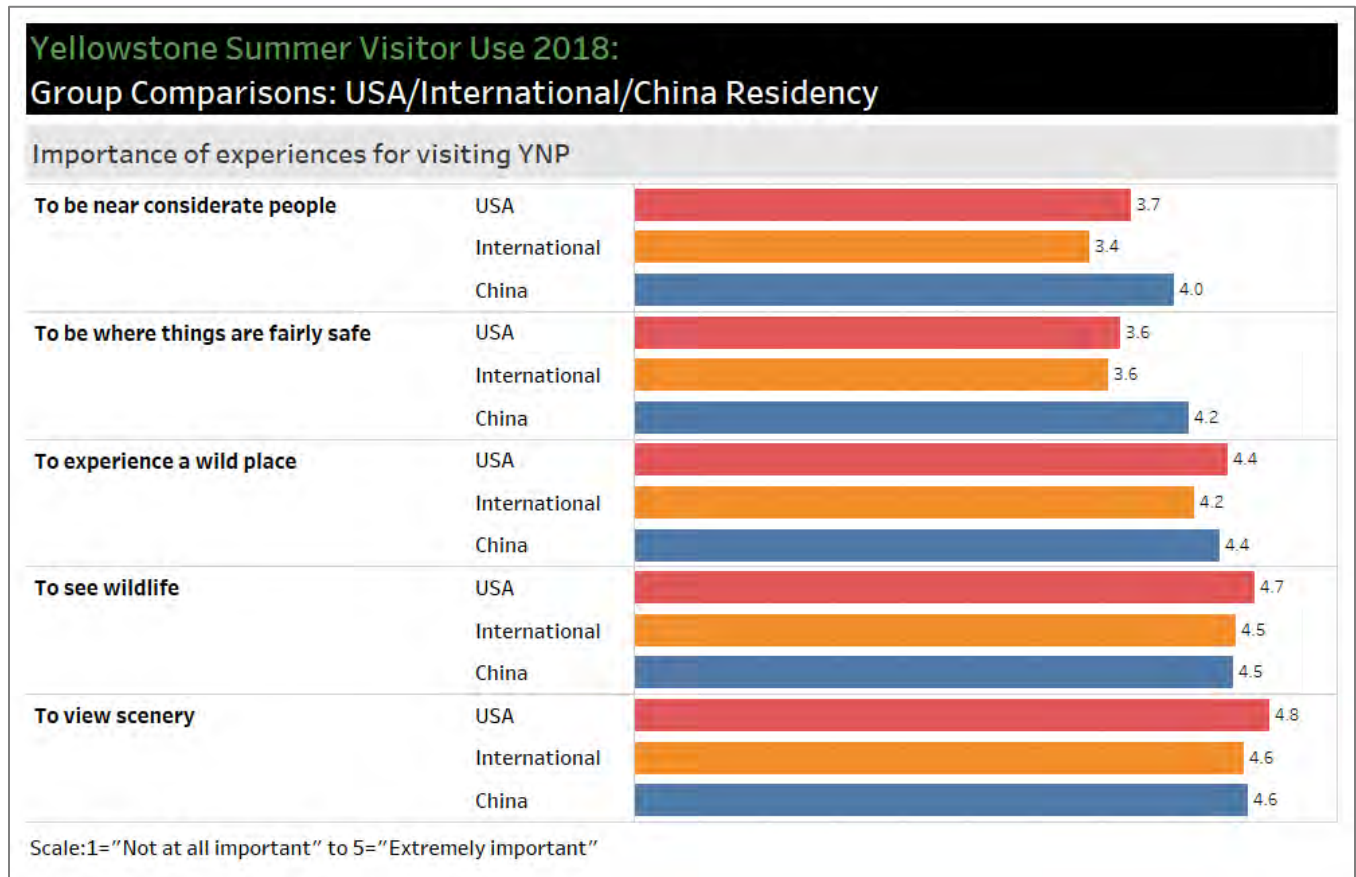
- people walking on, across, or along the road
- other people acting unsafe around thermal features
- other people acting unsafe around wildlife



Country of Residence Comparison – USA vs. China vs. All Other International Visitors

Where respondents live, showed some significant difference in the importance of certain Yellowstone experiences as well as perceived problems (Figures 3.18 & 3.19). Samples sizes for these three groups were: USA residents N=1,861; residents of China, N=156; all other international respondents N=510.

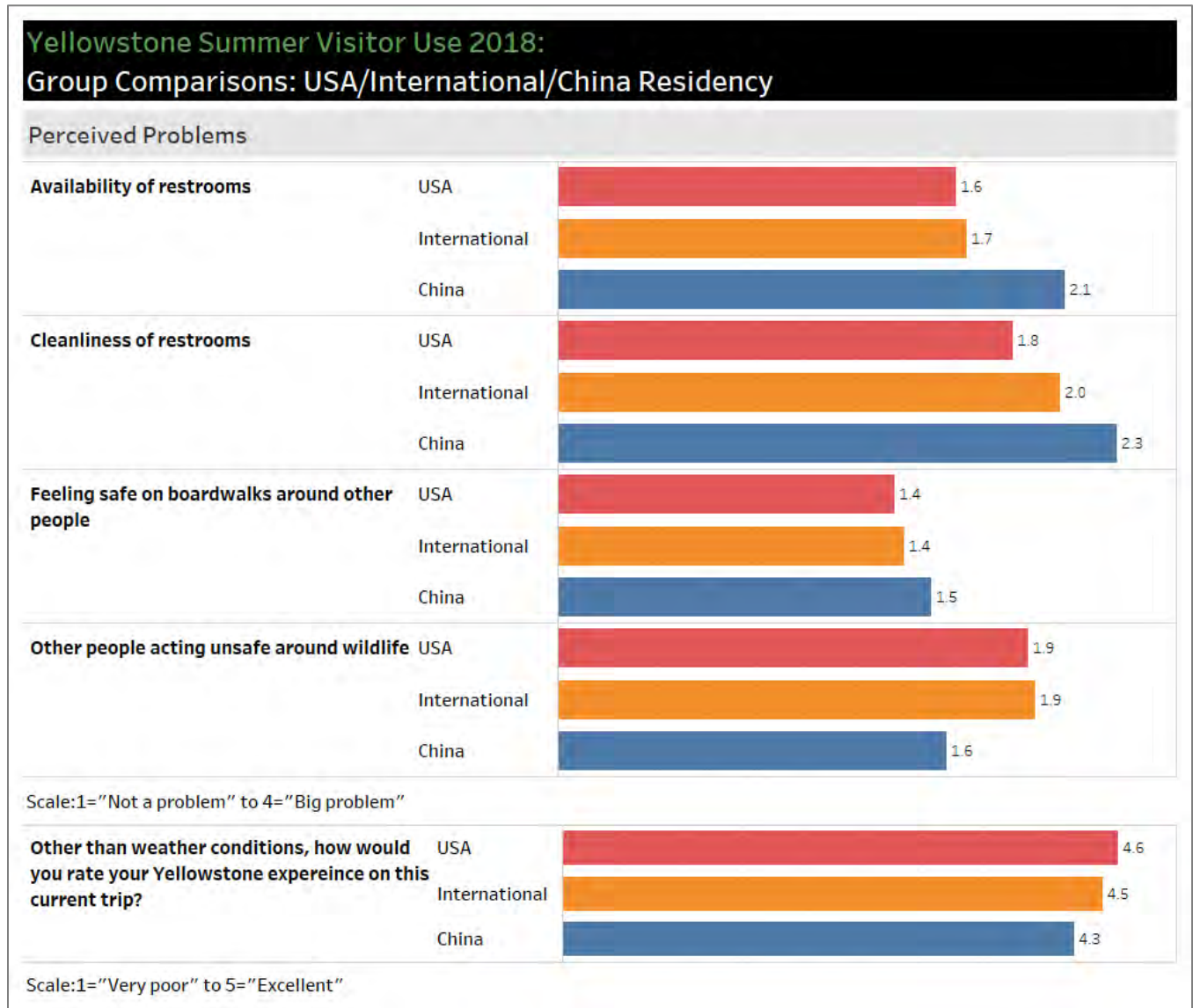
Figure 3.18: Differences between Respondents from USA vs. China vs. All Other International Locations – Importance of Experiences in Yellowstone – Intercept Results



- Significant differences between all three groups occurred with the respondents from China saying that to be near considerate people was more important to them than USA respondents and other international respondents.
- To be where things are fairly safe" was significantly MORE important to Chinese respondents than USA and other international.
- To experience a wild place" was significantly LESS important to all other international respondents than USA or China respondents.
- To see wildlife" was significantly MORE important to USA respondents than China and other international respondents.
- To view scenery" was significantly MORE important to USA respondents than China and other international respondents.

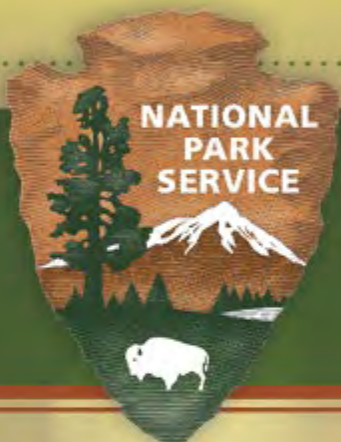


Figure 3.19: Differences between Respondents from USA vs. China vs. All Other International Locations – Perceived Problems in Yellowstone Intercept Results





- Respondents from China were significantly MORE likely to say that the availability of restrooms was a problem in comparison to respondents from the USA and other international locations.
- Respondents from China and International respondents were significantly MORE likely to say that the cleanliness of the restrooms was a problem in comparison to respondents from the USA.
- Respondents from China were significantly MORE likely to say that feeling safe on boardwalks around other people was a problem in comparison to respondents from the USA.
- Respondents from the USA and other international locations were significantly MORE likely to say that people acting unsafe around the wildlife was a problem in comparison to respondents from China.
- All three segments were significantly different from each other in regard to their rating for their overall experience in Yellowstone, with respondents from the USA being the MOST likely to report the highest score for their experience, followed by other international respondents and finally Chinese respondents.



Conclusions and Key Findings



Conclusions and Key Findings

Throughout the entirety of the report, the analysis conducted touched on three key areas: 1) site perceptions and issues, 2) visitor behaviors, and 3) comparisons between sites and roadway segments. These analyses aimed to provide Yellowstone with data to directly support management decisions as well as to provide insights into respondents' perceptions of their experience across multiple sites, at various times, and under changing conditions. The following section summarizes the key findings and primary takeaways the data infers for Yellowstone National Park managers.

The primary takeaway is the identification of multiple levels of issues facing individual sites at the park. These three levels are: 1) High issue sites, 2) Moderate issue sites, and 3) Low issue sites. These definitions are not overarching and literal. When looking at the means of most problem statements, they are on the lower end of the scale, but when comparing these means by site, we see some sites with much higher numbers. This allows for an ordering of sites that may require more immediate attention than others.

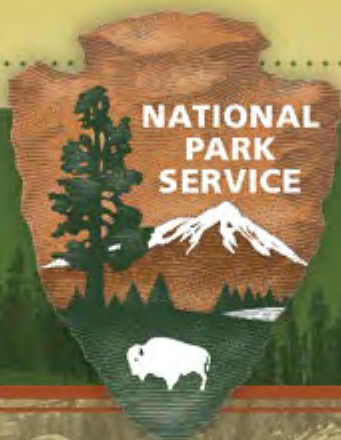
- Across nearly all variables, including perceptions of crowding, traffic congestion, parking acceptability and more, two sites rose to the top of most issues: 1) Midway Geyser, and 2) Fairy Falls. By far, these two locations were most likely to receive more negative ratings by park respondents. Following these two sites were the moderate issue locations: 1) North/South Rims area, and 2) Norris Geyser Basin. These two locations typically received less concern than Midway and Fairy Falls in their perceptions of crowding and primary issues, but they did have some areas that could need further improvement. Finally, the least problematic sites, of the six directly compared, are 1) Old Faithful and 2) Canyon Village. These two locations, while being two of the more popular places in the park, are not seen as having major issues with perceptions of crowding and other problems.
- Midway and Fairy Falls are most problematic likely due to the constraint on parking and the high use levels in confined areas compared to Old Faithful and Canyon Village. While Canyon Village and Old Faithful are very popular for visitors, there is ample infrastructure to support many vehicles, parking spots, and wide areas for crowds to gather.
- Given the size of Yellowstone and the diversity of scenic driving available, the drive can itself be an attraction rather than simply a means to get to and between attractions. Unlike commuters or commercial vehicles in which slowed traffic induces negative externalities, travelers like those in Yellowstone do not appear negatively impacted by reduced speeds. For these roadways, respondents do not appear to perceive nearly as many issues on the roadways as they do at the sites. In fact, little to no correlation exists between traveler speed and frustration or experience. Respondents, overall, are not frustrated, have high experience ratings, and do not perceive very many major problems on the road. On many road segments observed, traffic flows are not highly influenced by volume, potentially indicating collective self-slowness to take in scenery and wildlife. A stark contrast between the roadways and the attraction sites signal possible changes in perception once a respondent decides to visit a site. On the roadway, visitors may be more prepared to deal with traffic and traffic jams, but they are eager to get out of the car and participate in activities/sightseeing once they reach a specific attraction. This may cause more concern at specific locations due to the time spent to arrive at the destination.



- First-time visitors are less critical of issues at specific sites than repeat visitors. In many cases, first-time visitors are significantly different and more positive on site-specific issues than repeat visitors, especially the frequent repeat visitors. First-time visitors also had a significantly higher mean average than repeat visitors on their overall experience at the time. This further highlights the fact that first-time visitors may not have a baseline to compare current conditions. Repeat visitors, especially those who have been to the park many times, may be more sensitive to changes from their previous visits. Thus, they may perceive their visit to be slightly less optimal. This provides the park with a question: to whom do you manage, first timers or those with previous experience in the park? We argue that first time visitors have no reference except what they see and experience in the moment of this trip, therefore if managers make decisions on experiences from the majority of visitors (first timers) the experience will generally be a good one and any changes that have occurred over the years are not included in any visitor assessment. Repeat visitors are able to assess changes they have experienced but in the case of Yellowstone, the first-time visitor is the majority, therefore repeat visitor experiences will be understated or even dismissed. First time visitors cannot see that something has changed. Only repeat visitors have that wisdom. Yellowstone’s high proportion of first-time visitors necessitates consideration of these effects on management decisions.
- Monthly variations in issues seen by visitors were generally not significant. When differences occurred, July was the month where visitors were slightly or significantly more concerned about the problem. Since July receives the highest visitation of all months, it is not surprising that visitors were slightly more frustrated or concerned with other people’s behavior.
- Significance testing identified that visitors who have been at the park five or more days tended to see more issues with people walking on, across, or along the road, acting unsafe around wildlife, and acting unsafe around geothermal features. This may highlight the fact that visitors become more perceptive of specific behaviors from other visitors once they have had a chance to acclimatize themselves to the setting. This threshold of how many days they have been in the park may lead their perspectives to be similar to those of repeat visitors.
- In general, respondents are still very satisfied with their Yellowstone experience. Across most sites and especially when looked at on the aggregate, respondents continually stated they were having a “good” or “excellent” time within the park. Respondents were able to identify and state which sites could use some improvements, but it did not detract greatly from their experience. Midway and Fairy Falls did see a significantly lower average in the overall experience than almost all other sites compared. Therefore, while respondents are generally satisfied, there are some sites that may lead to a less desirable experience at the time.
- Future research can examine further differences between segment groups, along with previously identified GPS research. While the bulk of this analysis focused on sites identified with high use, there could be value in further exploring how lower use sites (e.g., Lake Village, Lamar Valley, etc.) are perceived by visitors and their associated behaviors.



Overall, the Yellowstone 2018 Summer Visitor Use research aimed to capture a deeper understanding of what visitors perceived, in the moment, about their park experience, across multiple sites, and throughout the entire summer season. This study provides new information on a site-specific and roadway-specific level that was previously unknown. Visitors are generally satisfied with their park experience, but the ability to recognize and communicate specific issues across the park allows for Yellowstone managers to make targeted changes to further improve the visitor experience and protect resources. Throughout time, perceptions may change and it would be beneficial to monitor how changes in park management strategies or new improvements influence visitor perceptions. The new methodologies developed here with tablet-based survey deployment may be employed in the future by park staff, volunteers or researchers to periodically update these results and identify where improvements have been made and where room still exists for improvement.



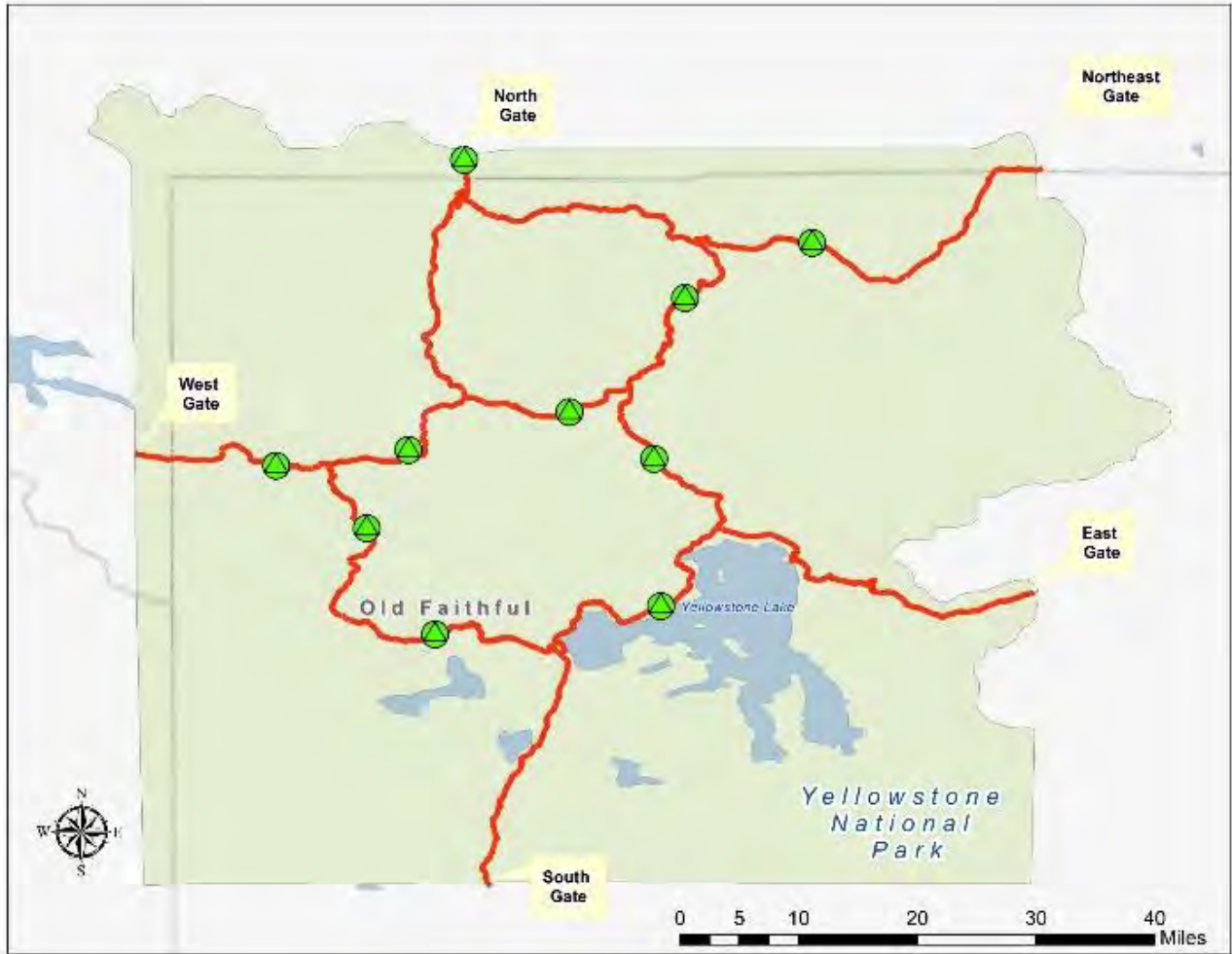
Appendices

SUMMER 2018 VISITOR USE SURVEYS

In the Moment Park Experiences and Perceptions



Appendix A: Geofence Roadway Locations





Appendix B: Tablet Staging Area Locations



Blue dots indicate approximate location of staging areas



Appendix C: Geofence Survey Instruments

OMB CONTROL NUMBER:1024-0224

Yellowstone Visitor Survey

GeoFenced Intro

Tablet opening script

"Hello, I am conducting a study for Yellowstone National Park on visitor experiences throughout their time in the park. We would like for you to use this tablet for today only. As you drive throughout the park, the tablet will automatically prompt you to respond to a few questions about your experience. The tablet is also equipped with a GPS that will track your movement through the park. We are doing this because we are interested in the most popular routes taken to get to certain destinations in the park and to also understand which areas in the park people visit the most and what their experiences are when they are there. This information is completely anonymous and will never be connected to you personally. The number of questions you answer is dependent on the route you take. It should take you no more than 60, 40 or 15 minutes depending on the route you take today to complete all of the questions you will be prompted to answer throughout the day. This is not intended to be intrusive, instead it is intended to provide park managers a better understanding of where management efforts should be focused to improve the visitor experience. At the end of the day, you can return the tablet at one of the five visitor center locations (Old Faithful, Mammoth, Fishing Bridge, Canyon Village, or Grant Village) or at the West Entrance (nearest to West Yellowstone, MT) or North Entrance (nearest to Gardiner, MT) there will be a volunteer there to receive it or a place designated where you can safely leave it.

→ If the visitor says **YES**: [continue by reading the following statement regarding the Paperwork Reduction and Privacy Act.]

→ If **NO** - interviewer will thank the visitor and ask non-response bias question. [The surveyor will ask the four non-response bias questions below and record observable characteristics (gender, age category, children in group) on the log sheet]

1. ***"What language would you prefer to use in the park?"***
2. ***"How many adults, 18 years and older, are in your group?"***
3. ***"How many children (under 18 years) are in your group?"***
4. ***"Over the past three years, how many visits have you made to Yellowstone National Park?"***

PAPERWORK REDUCTION and PRIVACY ACT STATEMENT: 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. We are authorized by the National Park Service Protection Interpretation and research in System (54 USC §100702) to collect this information. The routine uses of this information will be for the benefit of NPS Managers and Planning staff in Yellowstone National Park (YELL) in future initiatives related to the visitor use and resource management within the site. The data collected will be summarized to evaluate visitor uses and expectations during their visit at YELL. Your responses to this collection are completely voluntary and will remain anonymous. You can end the process at any time and will not be penalized in any way for choosing to do so. All contact information collected for the purpose of the follow-up survey will be destroyed at the end of the collection period and no personal identifiable records will be maintained or stored for any purposes. Data collected will only be reported in aggregates and no individually identifiable responses will be reported. 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 (1024-0224). We estimate that it will take about 6 minutes to complete this on-site questionnaire. You may send comments concerning the burden estimates or any aspect of this information collection to: Dr. Jake Jorgenson, Senior Research Analyst, RRC Associates, 4770 Baseline Road, Ste 360, Boulder, CO 80303; 303-396-1625 (phone) jake@rrcassociates.com (email); or Phadrea Ponds NPS Information Collection Coordinator at pponds@nps.gov (email).



PART 1: DEMOGRAPHICS AND CHARACTERISTICS

Topic Area 1: RES2, LANG1, ECON10

1. What language would you prefer to use in the park?

<input type="radio"/> English	<input type="radio"/> German
<input type="radio"/> Mandarin	<input type="radio"/> Another language
<input type="radio"/> Spanish	
2. How many adults, 18 years and older, are in your group? _____
3. How many children (under 18 years) are in your group? _____
4. What is the country of your residence and the zip code of your home address (If from U.S.)?
 - a) Country: _____
 - b) Zip Code (If U.S.): _____

Topic Area 4: DEST15

5. On this visit to Yellowstone National Park, which entrance did you use to enter the park today when you were asked to complete this survey?
 - West Entrance (nearest to West Yellowstone, MT)
 - North Entrance (nearest to Gardiner, MT)
 - South Entrance (nearest to Jackson, WY)
 - East Entrance (nearest to Cody, WY)
 - Northeast Entrance (nearest to Cooke City, MT)

Topic Area 4: DEST7 (variation)

6. Not including today, how many days have you spent visiting Yellowstone National Park on this trip?
 - a. _____ Number of days

Topic Area 2: ACCOM4

7. Please list the number of **additional days** you and your personal group plan to stay in Yellowstone National Park and in the area (away from your home if local resident).

_____ Number of additional days inside the park

_____ Number of additional days in the area (within 60 miles (100 km) outside the park)

**Topic Area 4: VISHIS1 and VISHIS3**

8. Are you a first time visitor to Yellowstone National Park?

Yes

No

9. If no, over the past three years how many visits have you made to Yellowstone National Park?

_____ Number of visits (including this one)

Topic Area 3: TRANSMODE6, TRANSMODE3 (variation)

10. Which of the following forms of transportation did you personally use to enter Yellowstone National Park today? (Select only one response)

11. Did you fly on any part of your trip to reach Yellowstone National Park?

Yes (Which **airport** did you fly into? _____)

No



Appendix D: Intercept Survey Instrument

OMB Control Number 1024-0224

Yellowstone Visitor Survey

(Intercept/on-site SURVEY)

On-Site Survey Script

“Hello, I am working with Yellowstone National Park conducting a 6-minute survey to improve visitor experiences in the park. May I ask you questions about your Yellowstone experience?”

➔ If the visitor says **YES**: [continue by reading the following statement regarding the Paperwork Reduction and Privacy Act.]

Before we begin, I would like to let you know that this survey has been approved by the Office of Management and Budget. It is important to note that a Federal agency may not conduct or sponsor, and you are not required to respond to, a collection of information unless it has a valid OMB control number. The control number for this collection is 1024-0224 and this number is valid through 05/31/19. Secondly, your participation is voluntary and your name will never be connected with your individual responses. This survey will only take 6 minutes of your time today.

Can we begin? (Go to Question #1 below)

➔ If **NO** - interviewer will thank the visitor and ask non-response bias question. [The surveyor will ask the four non-response bias questions below and record observable characteristics (gender, age category, children in group) on the log sheet]

- 1. “What language would you prefer to use in the park?”**
- 2. “How many adults, 18 years and older, are in your group?”**
- 3. “How many children (under 18 years) are in your group?”**
- 4. “Over the past three years, how many visits have you made to Yellowstone National Park?”**

PAPERWORK REDUCTION and PRIVACY ACT STATEMENT: 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. We are authorized by the National Park Service Protection Interpretation and research in System (54 USC §100702) to collect this information. The routine uses of this information will be for the benefit of NPS Managers and Planning staff in Yellowstone National Park (YELL) in future initiatives related to the visitor use and resource management within the site. The data collected will be summarized to evaluate visitor uses and expectations during their visit at YELL. Your responses to this collection are completely voluntary and will remain anonymous. You can end the process at any time and will not be penalized in any way for choosing to do so. All contact information collected for the purpose of the follow-up survey will be destroyed at the end of the collection period and no personal identifiable records will be maintained or stored for any purposes. Data collected will only be reported in aggregates and no individually identifiable responses will be reported. 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 (1024-0224). We estimate that it will take about 6 minutes to complete the initial contact and this on-site questionnaire. You may send comments concerning the burden estimates or any aspect of this information collection to: Dr. Jake Jorgenson, Senior Research Analyst, RRC Associates, 4770 Baseline Road, Ste 360, Boulder, CO 80303; 303-396-1625 (phone) jake@rrcassociates.com(email); or Phadrea Ponds NPS Information Collection Coordinator at pponds@nps.gov (email).



Yellowstone Visitor Survey – On-site Survey

Topic Area 1: LANG1 (Variation), ECON10, RES2

2. What language would you prefer to use in the park?

English	German
Mandarin	Another language
Spanish	

3. How many adults, 18 years and older, are in your group? _____

4. How many children (under 18 years) are in your group? _____

5. What is the country of your residence or what is the zip code of your home address (U.S. visitors)?

a. Country: _____

b. Zip Code: _____

Topic Area 4: DEST15

6. On this visit to Yellowstone National Park, which was the **most recent entrance** you used to enter the park?

- a. West Entrance (nearest to West Yellowstone, MT)
- b. North Entrance (nearest to Gardiner, MT)
- c. South Entrance (nearest to Jackson, WY)
- d. East Entrance (nearest to Cody, WY)
- e. Northeast Entrance (nearest to Cooke City, MT)

Topic Area 4: DEST7 (variation)

7. Prior to today, how many days have you spent visiting Yellowstone National Park on this trip?

a. _____ Number of days

Topic Area 2: ACCOM4

8. Please list the number of additional days you and your personal group plan to stay in Yellowstone National Park and in the area (away from your home if local resident).

_____ Number of additional days inside the park

_____ Number of additional days in the area within 60 miles (100 km) outside the park

Topic Area 4: VISHIS1 and VISHIS3

9. Are you a first time visitor to Yellowstone National Park?



- a. Yes
- b. No

10. If no, over the past three years how many visits have you made to Yellowstone National Park?

_____ Number of visits (including this one)

Topic Area 3: TRANSMODE6, TRANSMODE3 (Variation)

11. Which of the following forms of transportation did you personally use to enter Yellowstone National Park today? (Select only one response)

- Car, truck, or SUV
- Motorcycle
- Recreational vehicle or motorhome
- Bicycle
- Tour bus or tour van
- Walk/hike

12. Did you fly on any part of your trip to reach Yellowstone National Park?

- Yes (Which airport did you fly into? _____)
- No

Topic Area 9: RECEXP12

13. For each item below, please indicate how important the experience is to you on your visit to the park.

	Not at all important	Somewhat important	Moderately important	Very Important	Extremely Important
To experience solitude	1	2	3	4	5
To be close to nature	1	2	3	4	5
To be near considerate people	1	2	3	4	5
To see wildlife	1	2	3	4	5
To get away from noise/ experience natural sounds	1	2	3	4	5
To get away from crowds of people	1	2	3	4	5
To view scenery	1	2	3	4	5
To see geysers and thermal features	1	2	3	4	5
To experience a wild place	1	2	3	4	5



To be where things are fairly safe 1 2 3 4 5

Topic Area 3: TRAFFIC4, PARKING3 (variation)

14. Overall, compared to what you expected, how much traffic congestion did you experience in Yellowstone on your way to [YELLOWSTONE SITE]?
- I didn't know what to expect.
 - Less traffic congestion than I expected
 - About the same as I expected
 - More traffic congestion than I expected.
15. How acceptable was it to spend the amount of time you did in traffic within Yellowstone NP on your way to [YELLOWSTONE SITE]?
- Not at all acceptable
 - Slightly acceptable
 - Moderately acceptable
 - Very acceptable
 - Completely acceptable

Topic Area 3: TRAFFIC9, PARKING3

16. Approximately how many minutes did you spend in traffic looking for parking at [YELLOWSTONE SITE]?
- Less than 5 minutes
 - 5-10 minutes
 - 11-20 minutes
 - 21-30 minutes
 - 31-44 minutes
 - 45-60 minutes
 - More than 1 hour
17. How acceptable was the amount of time you spent looking for parking at [YELLOWSTONE SITE]?
- Not at all acceptable
 - Slightly acceptable
 - Moderately acceptable
 - Very acceptable
 - Completely acceptable

Topic Area 6: CROWD19, CROWD3

18. How crowded do you feel while at [YELLOWSTONE SITE] today? (Select one response)
- Not at all crowded
 - Slightly crowded
 - Moderately crowded
 - Very crowded



- e. Extremely crowded

19. How did/does the number of people you encountered during your visit to [YELLOWSTONE SITE] compare to what you expected?

- a. A lot less than what I expected
- b. A little less than what I expected
- c. About what I expected
- d. A little more than what I expected
- e. A lot more than I expected
- f. I did not have any expectations

Topic Area 3 and 9: LNT20 and TRAFFIC3

20. Please select one number for each statement that best describes how problematic each of the following issues was for you at this site.

	Not a problem	Small problem	Moderate problem	Big problem	N/A
Availability of parking	1	2	3	4	5
People walking on, across, or along the road	1	2	3	4	5
Too many people	1	2	3	4	5
Traffic congestion	1	2	3	4	5
Other people acting unsafe around thermal features	1	2	3	4	5
Other people acting unsafe around wildlife	1	2	3	4	5
Feeling safe on boardwalks around other people	1	2	3	4	5
Availability of restrooms	1	2	3	4	5
Cleanliness of restrooms	1	2	3	4	5

Topic Area 4: DEST3, DEST4, DEST4 (variation)

21. So far on this trip, were you able to visit all of the locations in Yellowstone NP that you planned to visit?

- a. Yes (Skip to Q21)
- b. No (Answer Q20) (Please specify location: _____)



22. If you were unable to visit a location that you had planned to visit, what prevented you from visiting it? (Check all that apply).

- a. Not enough time
- b. Could not find a place to park
- c. Travel times inside the park greater than expected
- d. Travel times outside the park greater than expected
- e. Trail closure
- f. Road closure
- g. Traffic at entrance gates
- h. Traffic inside park
- i. Bad weather
- j. Inadequate display of road/map signs
- k. Inadequate display of safety information
- l. Unsafe road
- m. Other (please specify) _____

23. If you were unable to visit your planned location, what location did you visit instead? (If you did not visit another location, please enter "N/A")

Topic Area 7: EVALSERV, EVALSERV14

24. Other than the weather conditions, how would you rate your Yellowstone experience on this current trip?

- 1. Very poor
- 2. Poor
- 3. Fair
- 4. Good
- 5. Excellent

25. Please share any reasons why you provided the above rating for your Yellowstone experience:

Topic Area 1: AGE1, EDUC1, GEND1, GROUP4, RACE/ETH2, RES3

26. What year were you born? _____



27. What is the highest level of formal education you have completed? (Select only one response)

- Less than high school
- High school graduate
- Vocational/trade school certificate
- Some college
- Two-year college degree
- Bachelor's degree
- Advanced Degree (M.S., Ph.D., M.D., J.D., or equivalent)

28. What is your gender?

- a. Female
- b. Male

29. Which of the following best describes the group you are traveling with? (Select one response)

- a. Myself (alone)
- b. Myself with family (including spouse/partner and/or other family members)
- c. Myself with family and friends
- d. Myself with friends
- e. Commercial guided tour group
- f. Outfitter/guide
- g. Club/organization/school
- h. Other organized group (e.g. business group, scout group, etc.)
- i. Other

30. Which of these categories best indicates your race? Answer only for yourself. (Check all that apply)

- a. American Indian or Alaska Native
- b. Asian
- c. Black or African American
- d. Native Hawaiian or Pacific Islander
- e. White

31. Do you live or have a second home in the local area within 60 miles of Yellowstone National Park?

- a. Yes
- b. No

Topic Area 10: ECON12

32. Which category best represents your annual household income? (Select one response)

- Less than \$25,000
- \$25,000 to \$49,999
- \$50,000 to \$74,999
- \$75,000 to \$99,999
- \$100,000 - \$149,999
- \$200,000 or more

"Thank you so much for your time. Your feedback will be used to improve the visitor experience at the park. We hope you enjoyed your stay at Yellowstone National Park." Thank you.



Appendix E: Additional Methodology Details

Project Methodologies and Sampling Period

The Geofencing Survey used a GPS based technology known as “geofencing” to deliver the desired surveys to respondents as they passed through key attractions and roadway segments in order to understand how visitors’ perceptions of crowding and their evaluation of the visitor experience changed based on location and conditions. A geofence is a virtual geographic boundary, defined by GPS, that enables software to trigger a response when an enabled device enters or leaves an area in Yellowstone. Participating respondents were asked to take a tablet with them for 1-day of their Yellowstone experience, and then dropped it off at one of several designated return boxes at the end of the day. Respondents who participated in the Geofenced-based methodology were notified to take a survey about their current experience as they left a geofenced attraction or passed through a geofence placed on key roadway segments. The tablet recognized when a visitor passed through a geofence location based on their GPS coordinates. In addition, an app installed on the electronic tablets recorded GPS data as visitors traveled throughout the park to understand traffic congestion in relation to their responses to the survey. Through this methodology, the travel pattern of visitors along with their quantitative responses to the geofencing surveys were analyzed together, giving a complete picture of how different locations, settings, and conditions impact the visitor experience.

Coinciding with the geofence surveys, an intercept-based survey was administered to a separate sample of visitors about their experience at specific attractions of interest in the park. The intercept survey was conducted across 13 sites that receive varying levels of use (defined as high use, moderate use, and low use). The areas were selected across three crowding gradients identified in previous park studies and internal scoping processes.

According to the NPS visitor use statistics, approximately 4,116,525 people visited Yellowstone National Park in 2017. The respondent universe for this collection was a systematic sample of all adult recreation users (age 18 and older), during the proposed study period (May 20-September 30, 2018). The population for the Geofencing Survey was all adults (18 and older) passing through one of Yellowstone’s five entrance gates during daylight hours and could safely pull into the staging area during the requested time. The population for the intercept surveys is all adult respondents (18 and older) visiting one of 13 attraction sites throughout the park at a given time.

A 35-day sampling period, one week (Sunday through Saturday) for each of the five months (May 20-September 30, 2018), was developed using internal park visitation estimates and random sampling techniques. During each sample period, a team of five researchers administered both the Geofencing Survey and the on-site intercept survey each day. Surveyors were assigned the following regions of the park based on their entrances to distribute tablets:

- West Entrance (Old Faithful, Midway Geyser Basin, Fairy Falls / Grand Prismatic Overlook, Fountain Paint Pot).
- North Entrance (Mammoth Hot Springs, Norris Geyser, Tower Falls).
- East/Northeast Entrances (Canyon Village, North/South Rim and Upper Falls, East entrance area, Hayden Valley, Northeast Entrance)



- South Entrance (West Thumb Geyser Basin, Old Faithful, Fishing Bridge & Lake Village, Hayden Valley).

Each surveyor sampled at their assigned entrance(s) 6-days per week with 1-day off per sampling week. The tablets for the Geofencing survey were delivered between 8:00 A.M. – 12:00 P.M., and the on-site survey between 12:00 P.M. – 5:00 P.M. at designated locations within the park for each sampling day. Following each survey day, surveyors collected returned tablets from drop boxes located in designated areas of the park (select visitor centers and exits), uploaded data and recharged tablets at their lodging for the evening.

Sampling Procedures: Geofencing Survey

This method required that a systematic sample of visitors using an Android tablet (provided to them) to monitor their movement throughout the park for one day of their visit. Survey questions were activated as the user passed designated “geofenced” areas inside the park. A stratified random sampling method (at least every 5th vehicle from the time the surveyor administers the tablet handout procedure) was used to stop visitors after they have entered one of the five entrances into the park. A staging area was set up at safe and unobtrusive locations inside each of the five park entrances. The surveyor began by flagging every 5th vehicle into the staging area. The surveyor closed the staging site by placing a traffic cone behind the vehicle that was flagged for initial contact. Once inside, the surveyors explained the purpose of the study and the use of the tablet. Visitors were asked if they would be interested in participating in the study where they would use an Android Tablet to complete a series of questions that automatically popped up when they passed key areas of interest while traveling throughout the park. Participants were informed they would only have use of the tablet for 1-day. Single-occupant vehicles were instructed to only use the tablet when parked in a safe location. In multiple-occupant vehicles, the adult passenger (18 years and older) with the closest birthday was asked to complete the survey. Finally, the respondents were instructed to return the tablet to one of the five visitor centers, or the North and West entrances of the park at the end of the day. If the respondent agreed to participate, a tablet was provided to them. Immediately after leaving the staging area, the tablet’s first prompt was to complete the *Demographic and Characteristic Survey* on the tablet. As the car exited the staging area the surveyor opened the area to begin the process again.

The surveyors proportionately distributed 100 tablets based on the proportion of vehicle traffic per gate during the sampling periods. The 2017 NPS Visitor Use Statistics were used to determine the proportionate visitor traffic at each sampling site during the sampling period. We expected to distribute all 100 tablets on the first day of the sampling week; however, during the following five tablet distribution days (with one day off in the survey week) we expected to distribute 50 tablets per day. In reality, the number of available tablets each day fluctuated based on returns from visitors. A lower number of tablets in subsequent days was due to not all respondents returning the tablet prior to the designated pick-up time by surveyors. Tablets that were dropped off after the designated pick-up time were available for the following day’s collection.

Sampling Procedures: Intercept Survey

The second phase of this collection was the intercept survey. Upon completion of handing out the tablets each morning, the surveyor would move to their pre-assigned intercept site for the day. While at the site, the surveyor randomly selected every 5th visitor near a parking or pull-out area throughout the sampling day. Park



managers identified areas of the park using a gradient to describe levels of use and crowding (high, moderate, and low) that served as the sample sites and primary focus for this collection.

For each site use group (high, moderate, low), on-site visitor surveys were conducted with the high use areas receiving more visitor contact than the moderate and low use areas. Visitation statistics at each site do not exist, but through a series of park planning initiatives, these sites have been identified as receiving a higher volume of visits on average.

At each of the on-site survey intercept locations, surveyors contacted potential respondents as they were leaving the site. Visitors were approached near the parking area of the site. The surveyor targeted people leaving the site in order to ask about their current experience both at the site and in the park. If the visitor agreed to participate in the study, surveyors verbally administered the survey questions and recorded responses on an Android Tablet. If the visitor did not agree, surveyors thanked them for their time, ask the four non-response bias questions, and then would sample the 5th next visitor.



MAY	5/20/2018	5/21/2018	5/22/2018	5/23/2018	5/24/2018	5/25/2018	5/26/2018
West Entrance: Kevin and Carter/Jessica							
Tablet Distribution times:	8:00 AM	9:00 AM	10:00 AM	DAY OFF	8:00 AM	9:00 AM	8:00 AM
Fountain Paint Pot	10:30-2:00						
Midway Geyser			1:00-4:00				
Old Faithful	11:30-3:30				10:30-2:30	10:00-2:30	
Fairy Falls/Grand Prismatic Overlook						11:00-3:00	
Tablet pickup times:	5:00-6:00	4:30-5:30	5:00-6:00		4:00-5:00	4:00-5:00 PM	3:00-4:00
JUNE	6/10/2018	6/11/2018	6/12/2018	6/13/2018	6/14/2018	6/15/2018	6/16/2018
West Entrance: Kevin and Carter							
Tablet Distribution times:	10:00 AM	8:00 AM	9:00 AM	8:00 AM	DAY OFF	8:00 AM	9:00 AM
Fountain Paint Pot	11:00 - 3:30						
Midway Geyser	12:00-4:00						
Old Faithful	10:00-2:30					12-4:30	11:00-2:30
Fairy Falls/Grand Prismatic Overlook				12:00-4:30			
Tablet pickup times:	5:00-6:00	4:30-5:30	5:00-6:00	5:00-6:00		4:00-5:00 PM	3:00-4:00
JULY	7/7/2018	7/8/2018	7/9/2018	7/10/2018	7/11/2018	7/12/2018	7/13/2018
West Entrance: Kevin and Carter							
Tablet Distribution times:	9:00 AM	10:00 AM	DAY OFF	8:00 AM	10:00 AM	8:00 AM	8:00 AM
Fountain Paint Pot	12:00-4:00						
Midway Geyser						10:30 - 2:30	
Old Faithful	12:00 - 4:00			11:30 - 3:30	12:00 - 4:00		
Fairy Falls/Grand Prismatic Overlook							10:30 - 2:30
Tablet pickup times:	5:00-6:00	4:30-5:30		5:00-6:00	5:00-6:00	4:00-5:00 PM	3:00-4:00
August	8/19/2018	8/20/2018	8/21/2018	8/22/2018	8/23/2018	8/24/2018	8/25/2018
West Entrance: Kevin and Carter							
Tablet Distribution times:	10:00 AM	8:00 AM	8:00 AM	DAY OFF	9:00 AM	8:00 AM	8:00 AM
Fountain Paint Pot					11:00 - 3:00		
Midway Geyser							12:30 - 4:00
Old Faithful	1:00 - 5:00	10:30 - 2:30	12:00-4:00				
Fairy Falls/Grand Prismatic Overlook						11:00 - 3:30	
Tablet pickup times:	5:00-6:00	4:30-5:30	5:00-6:00		5:00-6:00	4:00-5:00 PM	3:00-4:00
September	9/15/2018	9/16/2018	9/17/2018	9/18/2018	9/19/2018	9/20/2018	9/21/2018
West Entrance: Kevin and Carter							
Tablet Distribution times:	9:00 AM	10:00 AM	DAY OFF	8:00 AM	10:00 AM	8:00 AM	8:00 AM
Fountain Paint Pot	12:30 - 4:30						11:00-3:00
Midway Geyser							
Old Faithful				10:30 - 2:30	12:00 - 4:00	11:00 - 3:30	
Fairy Falls/Grand Prismatic Overlook	12:00 - 4:00						
Tablet pickup times:	5:00-6:00	4:30-5:30		5:00-6:00	5:00-6:00	4:00-5:00 PM	3:00-4:00



MAY	5/20/2018	5/21/2018	5/22/2018	5/23/2018	5/24/2018	5/25/2018	5/26/2018
South Entrance: Rosemary							
Tablet Distribution times:	9:00 AM	DAY OFF	10:00 AM	8:00 AM	9:00 AM	10:00 AM	8:00 AM
West Thumb Geyser basin	10:30-2:30					12:00 - 3:30	
Hayden Valley			12:00-4:00				
Lake Village/Fishing Bridge					11:30-2:30		10:00-2:30
Old Faithful				10:30-3:30			
Tablet pickup times:	5:00-6:00		5:00-6:00	4:00-5:00	5:00-6:00	5:00-6:00	3:00-4:00
June							
	6/10/2018	6/11/2018	6/12/2018	6/13/2018	6/14/2018	6/15/2018	6/16/2018
South Entrance: Rosemary							
Tablet Distribution times:	8:00 AM	10:00 AM	DAY OFF	10:00 AM	9:00 AM	8:00 AM	8:00 AM
West Thumb Geyser basin		12:00-4:00					10:00 - 2:30
Hayden Valley	11:00 - 3:30						
Lake Village/Fishing Bridge				12:30 - 4:00		11:00 - 2:30	
Old Faithful					11:30-3:00		
Tablet pickup times:	5:00-6:00	5:00-6:00		5:00-6:00	5:00-6:00	5:00-6:00	3:00-4:00
July							
	7/7/2018	7/8/2018	7/9/2018	7/10/2018	7/11/2018	7/12/2018	7/13/2018
South Entrance: Rosemary							
Tablet Distribution times:	10:00 AM	9:00 AM	10:00 AM	DAY OFF	10:00 AM	10:00 AM	8:00 AM
West Thumb Geyser basin	12--4:00						10:00 - 2:30
Hayden Valley					12:30 - 4:30		
Lake Village/Fishing Bridge		1:00 - 4:30	10:30 - 2:30				
Old Faithful						12:00 - 4:00	
Tablet pickup times:	5:00-6:00	5:00-6:00	5:00-6:00		5:00-6:00	5:00-6:00	3:00-4:00
August							
	8/19/2018	8/20/2018	8/21/2018	8/22/2018	8/23/2018	8/24/2018	8/25/2018
South Entrance: Rosemary							
Tablet Distribution times:	10:00 AM	10:00 AM	8:00 AM	8:00 AM	9:00 AM	DAY OFF	8:00 AM
West Thumb Geyser basin	12:00 - 4:00				11:30 - 3:30		
Hayden Valley		12:30 - 4:00					
Lake Village/Fishing Bridge			10:30 - 2:30				10:30 - 2:30
Old Faithful				12:00-4:00			
Tablet pickup times:	5:00-6:00	5:00-6:00	5:00-6:00	5:00 - 6:00	5:00-6:00		3:00-4:00
September							
	9/15/2018	9/16/2018	9/17/2018	9/18/2018	9/19/2018	9/20/2018	9/21/2018
South Entrance: Rosemary							
Tablet Distribution times:	8:00 AM	8:00 AM	10:00 AM	DAY OFF	9:00 AM	9:00 AM	9:00 AM
West Thumb Geyser basin		10:00 - 2:30					11:00-3:00
Hayden Valley	11:00 - 3:30						
Lake Village/Fishing Bridge					11:30-3:30	12:30 - 4:00	
Old Faithful			12:00 - 4:00				
Tablet pickup times:	5:00-6:00	5:00-6:00	5:00-6:00		5:00-6:00	5:00-6:00	3:00-4:00



MAY	5/20/2018	5/21/2018	5/22/2018	5/23/2018	5/24/2018	5/25/2018	5/26/2018
East & Northeast Entrance: Laura							
Tablet Distribution times:	9:00:00 AM East	8:00:00 AM East	8:00:00 AM East	10:00:00 AM East	DAY OFF	10:00:00 AM NE	8:00:00 AM NE
Canyon Village			10:00-2:30				10:30-2:30
North, South Rims and Upper Falls Area	11:00-3:00			11:30 - 3:30			
Dunraven						10:00-2:00	
Hayden Valley		10:30-2:30					
Tablet pickup times:	5:00-6:00	5:00-6:00	5:00-6:00	5:00-6:00		5:00-6:00	3:00-4:00
June	6/10/2018	6/11/2018	6/12/2018	6/13/2018	6/14/2018	6/15/2018	6/16/2018
East & Northeast Entrance: Laura							
Tablet Distribution times:	09:00:00 AM East	DAY OFF	8:00:00 AM East	9:00:00 AM East	8:00:00 AM NE	10:00:00 AM East	8:00:00 AM East
Canyon Village	11:30-3:30				11:00 - 3:00	12:30-3:30	
North, South Rims and Upper Falls Area			10:30 - 2:30				12:00-4:00
Dunraven							
Hayden Valley				11:00-2:30			
Tablet pickup times:	5:00-6:00		5:00-6:00	5:00-6:00	5:00-6:00	5:00-6:00	3:00-4:00
July	7/7/2018	7/8/2018	7/9/2018	7/10/2018	7/11/2018	7/12/2018	7/13/2018
East & Northeast Entrance: Laura							
Tablet Distribution times:	10:00:00 AM NE	9:00:00 AM East	8:00:00 AM NE	8:00:00 AM East	DAY OFF	09:00:00 AM East	8:00:00 AM East
Canyon Village				10:00-2:30		12:00 - 3:30	
North, South Rims and Upper Falls Area			10:30 - 3:00				10:00 - 2:30
Dunraven	12:00-4:00						
Hayden Valley		11:00 - 3:00					
Tablet pickup times:	5:00-6:00	5:00-6:00	5:00-6:00	5:00-6:00		5:00-6:00	3:00-4:00
August	8/19/2018	8/20/2018	8/21/2018	8/22/2018	8/23/2018	8/24/2018	8/25/2018
East & Northeast Entrance: Laura							
Tablet Distribution times:	08:00:00 AM East	9:00:00 AM NE	8:00:00 AM East	DAY OFF	8:00:00 AM NE	10:00:00 AM East	8:00:00 AM East
Canyon Village			12:00 - 4:00			12:00 - 4:00	
North, South Rims and Upper Falls Area	10:00 - 2:30				11:00 - 2:30		
Dunraven		11:00 - 3:00					
Hayden Valley							10:00 - 2:30
Tablet pickup times:	5:00-6:00	5:00-6:00	5:00-6:00		5:00-6:00	5:00-6:00	3:00-4:00
September	9/15/2018	9/16/2018	9/17/2018	9/18/2018	9/19/2018	9/20/2018	9/21/2018
East & Northeast Entrance: Laura							
Tablet Distribution times:	08:00:00 AM East	DAY OFF	8:00:00 AM East	9:00:00 AM East	8:00:00 AM NE	10:00:00 AM East	8:00:00 AM East
Canyon Village			10:30 - 2:30				10:00 - 2:30
North, South Rims and Upper Falls Area				11:00 - 3:00		12:00 - 3:30	
Dunraven					10:30 - 2:30		
Hayden Valley	10:30 - 2:30						
Tablet pickup times:	5:00-6:00		5:00-6:00	5:00-6:00	5:00-6:00	5:00-6:00	3:00-4:00



MAY	5/20/2018	5/21/2018	5/22/2018	5/23/2018	5/24/2018	5/25/2018	5/26/2018
North Entrance - Dulaney							
Tablet Distribution times:	9:00 AM	8:00 AM	9:00 AM	10:00 AM	10:00 AM	DAY OFF	8:00 AM
Mammoth Hot Spring Area	11:00-3:00			12:00-4:00			
Tower Falls		10:30-2:30			12:30-4:00		
Norris Geyser			11:00-3:00				10:30-2:30
Tablet pickup times:	5:00-6:00	5:00-6:00	5:00-6:00	5:00-6:00	5:00-6:00		4:00-5:00
June	6/10/2018	6/11/2018	6/12/2018	6/13/2018	6/14/2018	6/15/2018	6/16/2018
North Entrance - Dulaney							
Tablet Distribution times:	9:00 AM	10:00 AM	9:00 AM	DAY OFF	9:00 AM	10:00 AM	8:00 AM
Mammoth Hot Spring Area		12:00 - 3:30					10:00 - 2:30
Tower Falls	11:00 - 2:30		11:30 - 3:00				
Norris Geyser					11:00 - 2:30	12:00 - 3:30	
Tablet pickup times:	5:00-6:00	5:00-6:00	5:00-6:00		5:00-6:00	5:00-6:00	4:00-5:00
July	7/7/2018	7/8/2018	7/9/2018	7/10/2018	7/11/2018	7/12/2018	7/13/2018
North Entrance - Dulaney							
Tablet Distribution times:	8:00 AM	9:00 AM	8:00 AM	8:00 AM	10:00 AM	DAY OFF	8:00 AM
Mammoth Hot Spring Area			10:00 - 2:00		12:00 - 3:30		
Tower Falls				10:30 - 2:30			10:00 - 2:30
Norris Geyser	10:00 - 2:30	11:00 - 3:00					
Tablet pickup times:	5:00-6:00	5:00-6:00	5:00-6:00	5:00-6:00	5:00-6:00		4:00-5:00
August	8/19/2018	8/20/2018	8/21/2018	8/22/2018	8/23/2018	8/24/2018	8/25/2018
North Entrance - Dulaney							
Tablet Distribution times:	10:00 AM	8:00 AM	9:00 AM	10:00 AM	10:00 AM	DAY OFF	8:00 AM
Mammoth Hot Spring Area	12:00 - 3:30						10:30 - 2:30
Tower Falls		10:30 - 2:30			12:00 - 3:30		
Norris Geyser			11:00 - 3:00	12:00 - 3:30			
Tablet pickup times:	5:00-6:00	5:00-6:00	5:00-6:00	5:00-6:00	5:00-6:00		4:00-5:00
September	9/15/2018	9/16/2018	9/17/2018	9/18/2018	9/19/2018	9/20/2018	9/21/2018
North Entrance - Dulaney							
Tablet Distribution times:	9:00 AM	10:00 AM	10:00 AM	9:00 AM	8:00 AM	DAY OFF	9:00 AM
Mammoth Hot Spring Area			12:00 - 3:30		10:00 - 2:00		
Tower Falls	11:00 - 2:30	12:00 - 3:30					
Norris Geyser				11:00 - 2:30			11:00 - 2:30
Tablet pickup times:	5:00-6:00	5:00-6:00	5:00-6:00	5:00-6:00	5:00-6:00		4:00-5:00



Appendix F: Additional Data

Overall Geofence Survey - Attraction Tables

Table F. 1: Did you recently stop at this attraction on your Yellowstone National Park trip?

Variable	Response	OVERALL	May	June	July	August	September
Did you recently stop to visit an attraction on your Yellowstone National Park trip?	Yes	53%	50%	52%	47%	59%	54%
	No, and I did not plan to stop	38%	40%	37%	41%	32%	39%
	No, but I wanted to stop and couldn't	10%	10%	11%	11%	9%	8%
	TOTAL	100%	100%	100%	100%	100%	100%
	n =	5,581	1,129	1,186	1,069	1,136	1,055

Table F. 2: If not, what prevented you from visiting?

Variable	Response	OVERALL	May	June	July	August	September
(If wanted to stop but couldn't) What prevented you from visiting this site?	Not enough time	29%	31%	26%	30%	32%	24%
	Could not find a place to park	46%	18%	47%	57%	57%	52%
	Travel times inside the park greater than expected	6%	4%	6%	8%	5%	8%
	Travel times outside the park greater than expected	1%		1%	1%	1%	
	Trail closure	4%	17%	1%	2%		2%
	Road closure	5%	11%	3%	3%	1%	4%
	Traffic at the site	25%	18%	23%	30%	29%	27%
	Inadequate display of road/map signs	5%	6%	8%	3%	3%	7%
	Inadequate display of safety information	0%	0%	0%	0%	1%	1%
	Other	12%	14%	14%	12%	4%	15%
	TOTAL	133%	119%	129%	147%	131%	141%
	n =	565	88	133	129	130	84



Table F. 3: Parking and Wait Times

Variable	Response	OVERALL	May	June	July	August	September
Approximately how much time did you spend waiting in traffic for parking at this attraction?	Less than 5 minutes	72%	75%	72%	69%	71%	76%
	5-10 minutes	14%	11%	13%	16%	15%	13%
	11-20 minutes	6%	3%	6%	8%	8%	4%
	21-30 minutes	4%	5%	5%	4%	3%	3%
	31-44 minutes	1%	3%	1%	1%	1%	1%
	45-60 minutes	2%	2%	1%	1%	1%	2%
	More than 1 hour	2%	2%	2%	2%	1%	1%
	TOTAL	100%	100%	100%	100%	100%	100%
	n =	2,805	558	587	517	594	545
How acceptable was the amount of time you spent looking for parking?	Not at all acceptable	6%	5%	5%	7%	6%	4%
	Slightly acceptable	9%	9%	10%	12%	9%	6%
	Moderately acceptable	17%	14%	16%	23%	18%	13%
	Very acceptable	26%	28%	26%	24%	26%	27%
	Completely acceptable	43%	44%	42%	35%	42%	50%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	3.9	4.0	3.9	3.7	3.9	4.1
	n =	2,705	530	573	498	575	526
Where did you park at this attraction / area in Yellowstone National Park?	Parking lot	85%	87%	85%	83%	84%	87%
	On the side of the road	10%	9%	11%	13%	11%	7%
	In a pull-out further away and walked	5%	5%	4%	4%	5%	5%
	TOTAL	100%	100%	100%	100%	100%	100%
	n =	2,692	525	574	491	575	525



Table F. 4: Crowding and Expectations

Variable	Response	OVERALL	May	June	July	August	September
How crowded did you feel at this attraction in Yellowstone NP today?	Not at all crowded	23%	31%	24%	15%	22%	20%
	Slightly crowded	28%	35%	29%	24%	22%	35%
	Moderately crowded	30%	24%	28%	33%	32%	29%
	Very crowded	14%	6%	12%	21%	17%	11%
	Extremely crowded	6%	3%	6%	7%	6%	4%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	2.5	2.2	2.5	2.8	2.6	2.5
	n =	2,666	517	568	494	570	515
How did the number of people you encountered at this attraction compare to what you expected?	A lot less than what I expected	10%	12%	14%	6%	7%	12%
	A little less than what I expected	14%	18%	13%	11%	14%	13%
	About what I expected	43%	39%	38%	45%	47%	47%
	A little more than what I expected	16%	17%	16%	20%	14%	16%
	A lot more than I expected	11%	7%	10%	14%	12%	9%
	I did not have any expectations	6%	7%	9%	5%	7%	3%
	TOTAL	100%	100%	100%	100%	100%	100%
	n =	2,646	510	564	490	567	513



Table F. 5: Perceived Problems at Site – Part 1

Perceived Problem	Response	OVERALL	May	June	July	August	September
Availability of parking	Not a problem	55%	65%	57%	40%	53%	59%
	Small problem	22%	20%	20%	24%	22%	25%
	Moderate problem	15%	11%	15%	25%	16%	10%
	Big problem	8%	5%	8%	11%	10%	6%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	1.8	1.5	1.7	2.1	1.8	1.6
	n =	2,589	492	553	481	555	506
People walking on, across, or along the road	Not a problem	60%	61%	56%	49%	61%	72%
	Small problem	27%	28%	27%	31%	29%	20%
	Moderate problem	10%	8%	12%	15%	8%	6%
	Big problem	3%	3%	5%	5%	1%	2%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	1.6	1.5	1.7	1.8	1.5	1.4
	n =	2,574	493	549	477	552	501
Too many people	Not a problem	51%	54%	54%	36%	52%	57%
	Small problem	26%	25%	25%	29%	25%	25%
	Moderate problem	17%	15%	13%	24%	18%	14%
	Big problem	6%	5%	8%	10%	5%	4%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	1.8	1.7	1.8	2.1	1.8	1.7
	n =	2,561	493	545	477	546	498



Table F. 6: Perceived Problems – Part 2

Perceived Problem	Response	OVERALL	May	June	July	August	September
Traffic congestion	Not a problem	50%	58%	52%	34%	49%	58%
	Small problem	27%	26%	24%	34%	26%	24%
	Moderate problem	16%	12%	17%	21%	18%	13%
	Big problem	7%	4%	6%	12%	6%	5%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	1.8	1.6	1.8	2.1	1.8	1.7
	n =	2,574	495	547	478	554	498
Other people acting unsafe around thermal features	Not a problem	80%	76%	82%	75%	80%	86%
	Small problem	13%	12%	10%	16%	15%	9%
	Moderate problem	5%	8%	5%	4%	4%	3%
	Big problem	3%	4%	3%	5%	1%	2%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	1.3	1.4	1.3	1.4	1.3	1.2
	n =	2,268	438	481	418	501	428
Other people acting unsafe around wildlife	Not a problem	79%	76%	79%	69%	81%	88%
	Small problem	13%	14%	11%	17%	14%	7%
	Moderate problem	5%	5%	7%	7%	4%	3%
	Big problem	4%	5%	4%	7%	2%	2%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	1.3	1.4	1.3	1.5	1.3	1.2
	n =	2,181	430	471	398	478	402



Table F. 7: Perceived Problems at Site – Part 3

<i>Perceived Problem</i>	<i>Response</i>	OVERALL	May	June	July	August	September
Feeling safe on boardwalks around other people	Not a problem	83%	82%	83%	80%	82%	88%
	Small problem	12%	13%	10%	13%	14%	9%
	Moderate problem	4%	4%	4%	6%	3%	2%
	Big problem	1%	1%	3%	1%	1%	1%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	1.2	1.2	1.3	1.3	1.2	1.2
	n =	2,340	457	493	435	506	447
Availability of restrooms	Not a problem	64%	60%	61%	62%	67%	68%
	Small problem	19%	21%	21%	18%	18%	16%
	Moderate problem	10%	12%	10%	12%	8%	7%
	Big problem	8%	7%	7%	9%	7%	10%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	1.6	1.7	1.6	1.7	1.6	1.6
	n =	2,242	456	468	402	477	437
Cleanliness of restrooms	Not a problem	52%	50%	50%	52%	57%	50%
	Small problem	23%	21%	24%	21%	27%	18%
	Moderate problem	14%	16%	13%	14%	10%	20%
	Big problem	11%	13%	12%	14%	6%	12%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	1.8	1.9	1.9	1.9	1.6	1.9
	n =	1,983	412	418	355	418	378



Table F. 8: Overall Experience

Variable	Response	OVERALL	May	June	July	August	September
Other than weather conditions, how would you rate your experience right now?	Very poor	1%	2%	1%	3%	1%	1%
	Poor	3%	2%	3%	3%	3%	2%
	Fair	11%	13%	12%	11%	9%	8%
	Good	41%	36%	41%	42%	48%	37%
	Excellent	44%	47%	44%	41%	39%	52%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	4.2	4.2	4.2	4.1	4.2	4.4
	n =	3,057	567	657	592	676	563



Overall Data Tables for Visitor Characteristics

Table F. 9: Second Homeownership

Variable	Response	OVERALL	May	June	July	August	September
Do you live or have a second home in the local area within 60 miles of Yellowstone National Park?	Yes	4%	4%	7%	2%	1%	6%
	No	96%	96%	93%	98%	99%	94%
	TOTAL	100%	100%	100%	100%	100%	100%
	n =	1,049	210	224	196	231	188

Table F. 10: Adults in Travel Party

Variable	Response	OVERALL	May	June	July	August	September
How many adults, 18 years and older, are in your group?	1	4%	6%	5%	5%	4%	2%
	2	60%	55%	55%	51%	64%	76%
	3	15%	16%	22%	16%	11%	9%
	4	13%	10%	11%	17%	16%	11%
	5	3%	5%	5%	3%	2%	1%
	6	3%	6%	2%	6%	1%	1%
	7	0%	0%	1%	1%	1%	0%
	8	0%	1%	0%	0%	0%	0%
	9 or more	1%	0%	0%	1%	3%	0%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	2.7	2.8	2.6	2.9	2.7	2.4
	Std. Dev.	1.3	1.4	1.1	1.5	1.5	0.9
	Median	2.0	2.0	2.0	2.0	2.0	2.0
	n =	1,306	259	276	245	274	252



Table F. 11: Children in Travel Party

Variable	Response	OVERALL	May	June	July	August	September
How many children (under 18 years old) are in your group?	0	71%	85%	62%	54%	70%	86%
	1	11%	7%	15%	16%	12%	5%
	2	10%	4%	11%	20%	9%	7%
	3	5%	2%	7%	5%	8%	2%
	4	1%	1%	1%	3%	1%	0%
	5	1%	2%	4%	0%	0%	0%
	6	0%	0%	0%	0%	0%	0%
	7	0%	0%	0%	0%	0%	0%
	8	0%	0%	0%	0%	0%	0%
	9 or more	0%	0%	0%	1%	0%	0%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	0.6	0.3	0.9	1.0	0.6	0.2
	Std. Dev.	1.2	1.0	1.4	1.4	1.1	0.7
	Median	0.0	0.0	0.0	0.0	0.0	0.0
	n =	1,310	259	278	247	274	252

Table F. 12: Most Recently Used YNP Entrance

Variable	Response	OVERALL	May	June	July	August	September
On this visit to Yellowstone National Park, which entrance did you most recently use to enter the park?	West Entrance (nearest to West Yellowstone, MT)	47%	56%	47%	37%	51%	42%
	North Entrance (nearest to Gardiner, MT)	20%	17%	18%	22%	21%	20%
	South Entrance (nearest to Jackson, WY)	18%	13%	20%	24%	15%	18%
	East Entrance (nearest to Cody, WY)	13%	13%	11%	14%	10%	18%
	Northeast Entrance (nearest to Cooke City, MT)	2%	1%	4%	3%	2%	2%
	TOTAL	100%	100%	100%	100%	100%	100%
	n =	1,357	276	288	249	280	264



Table F. 13: Previous days in YNP on Current Trip

Variable	Response	OVERALL	May	June	July	August	September
Not including today, how many days have you spent visiting Yellowstone National Park on this trip?	None	32%	31%	32%	37%	28%	35%
	1	32%	34%	29%	32%	32%	30%
	2	18%	15%	18%	15%	23%	17%
	3	10%	11%	13%	6%	10%	7%
	4	4%	4%	3%	2%	6%	4%
	5	2%	1%	2%	5%	1%	2%
	6	1%	1%	1%	0%	0%	5%
	7	0%	0%	0%	1%	0%	1%
	8	0%	0%	0%	0%	0%	0%
	9	0%	0%	0%	0%	0%	0%
	10	0%	0%	0%	0%	0%	0%
	17	0%	0%	0%	1%	0%	0%
	20	0%	0%	0%	0%	0%	0%
	21	0%	0%	0%	0%	0%	0%
	23	0%	0%	0%	0%	0%	0%
	25	0%	0%	0%	0%	0%	0%
30 or more	0%	0%	0%	0%	0%	0%	
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	1.5	1.5	1.6	1.4	1.4	1.4
	Std. Dev.	2.2	2.3	2.7	2.3	1.9	1.7
	Median	1.0	1.0	1.0	1.0	1.0	1.0
	n =	1,321	269	281	239	273	259



Table F. 14: Additional Days in YNP on Current Trip

Variable	Response	OVERALL	May	June	July	August	September
Please list the number of additional days you and your personal group plan to stay in Yellowstone National Park (away from home if local resident)	None	36%	29%	36%	44%	33%	41%
	1	24%	23%	21%	18%	33%	20%
	2	17%	24%	17%	11%	14%	18%
	3	10%	12%	12%	8%	8%	7%
	4	7%	5%	7%	14%	4%	8%
	5	3%	4%	2%	3%	5%	3%
	6	1%	2%	2%	1%	1%	1%
	7	1%	1%	1%	0%	0%	1%
	8	0%	0%	0%	0%	0%	0%
	9	0%	0%	0%	0%	0%	0%
	10	0%	0%	0%	0%	0%	0%
	13	0%	0%	0%	0%	0%	0%
	14	0%	0%	1%	0%	0%	0%
	15	0%	0%	0%	0%	1%	0%
	17	0%	0%	0%	0%	0%	0%
	20	0%	0%	0%	0%	0%	0%
	30 or more	0%	0%	0%	0%	0%	0%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	1.6	1.8	1.8	1.4	1.5	1.5
	Std. Dev.	2.2	2.3	2.7	1.7	2.0	2.0
	Median	1.0	1.0	1.0	1.0	1.0	1.0
	n =	1,262	254	267	229	266	246



Table F. 15: Additional Days in YNP Region

Variable	Response	OVERALL	May	June	July	August	September
Please list the number of additional days you and your personal group plan to stay outside of Yellowstone National Park in the area (away from home if local resident)	None	39%	39%	37%	36%	36%	47%
	1	16%	16%	15%	17%	16%	17%
	2	17%	21%	17%	20%	16%	13%
	3	10%	9%	13%	10%	10%	6%
	4	5%	4%	7%	6%	3%	6%
	5	4%	5%	3%	4%	6%	4%
	6	2%	1%	2%	4%	1%	1%
	7	2%	1%	2%	2%	2%	2%
	8	1%	1%	1%	0%	0%	0%
	9	0%	0%	1%	0%	0%	1%
	10	1%	0%	0%	0%	2%	1%
	11	0%	0%	0%	0%	0%	0%
	12	0%	0%	0%	0%	1%	0%
	13	0%	0%	0%	0%	0%	0%
	14	1%	1%	1%	0%	1%	0%
	15	2%	0%	0%	0%	6%	0%
	16	0%	0%	0%	0%	0%	0%
	17	0%	0%	0%	0%	0%	0%
	19	0%	0%	0%	0%	0%	0%
	20	0%	0%	0%	0%	1%	0%
	21	0%	1%	0%	0%	0%	0%
	28	0%	0%	0%	0%	0%	0%
30 or more	0%	1%	1%	0%	0%	0%	
TOTAL		100%	100%	100%	100%	100%	100%
Average		2.2	2.2	2.2	1.9	2.8	1.6
Std. Dev.		3.5	4.0	3.4	2.4	4.2	2.7
Median		1.0	1.0	1.0	1.0	1.0	1.0
n =		1,253	254	265	225	266	243

Table F. 16: Previous YNP Visitation

Variable	Response	OVERALL	May	June	July	August	September
Are you a first-time visitor to Yellowstone National Park?	Yes	66%	70%	66%	60%	72%	61%
	No	34%	30%	34%	40%	28%	39%
TOTAL		100%	100%	100%	100%	100%	100%
n =		1,131	230	232	210	248	211



Table F. 17: Repeat Visitors' Number of Previous Visits in Past 3 Years

Variable	Response	OVERALL	May	June	July	August	September
If you aren't a first time visitor, over the past three years how many visits have you made to Yellowstone National Park?	None	42%	19%	39%	48%	52%	51%
	1	23%	22%	24%	26%	20%	23%
	2	11%	11%	15%	9%	12%	6%
	3	9%	8%	6%	9%	11%	10%
	4	4%	17%	1%	0%	0%	1%
	5	4%	10%	2%	3%	2%	2%
	6	3%	2%	5%	3%	1%	2%
	8	1%	1%	1%	1%	1%	0%
	9	0%	1%	0%	0%	0%	0%
	10	0%	0%	1%	0%	0%	0%
	12	0%	0%	2%	0%	0%	0%
	15	1%	1%	0%	0%	0%	2%
	20	0%	0%	1%	0%	1%	0%
	21	0%	1%	0%	0%	0%	0%
	22	0%	1%	0%	0%	0%	0%
	24	0%	0%	0%	1%	0%	0%
	30 or more	1%	4%	1%	0%	0%	2%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	3.0	4.5	2.6	1.4	1.2	5.7
	Std. Dev.	15.5	8.0	6.3	2.9	2.5	33.1
	Median	1.0	2.0	1.0	1.0	0.0	0.1
	n =	381	64	79	75	81	82

Table F. 18: Percent of Respondents who Flew to Reach YNP

Variable	Response	OVERALL	May	June	July	August	September
Did you fly on any part of your trip to reach Yellowstone National Park?	Yes	38%	35%	39%	29%	42%	42%
	No	62%	65%	61%	71%	58%	58%
	TOTAL	100%	100%	100%	100%	100%	100%
	n =	1,088	221	223	203	243	198



Table F. 19: Importance of Values in YNP Experience - Part 1

Variable	Response	OVERALL	May	June	July	August	September
To experience solitude	Not at all important	14%	18%	15%	13%	13%	14%
	Somewhat important	21%	19%	29%	25%	18%	15%
	Moderately important	31%	29%	29%	31%	31%	37%
	Very important	25%	25%	20%	23%	31%	25%
	Extremely important	8%	9%	8%	8%	7%	10%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	2.9	2.9	2.8	2.9	3.0	3.0
	Std. Dev.	1.2	1.2	1.2	1.1	1.1	1.2
	Median	3.0	3.0	3.0	3.0	3.0	3.0
	n =	1,354	274	288	247	278	267
To be where things are fairly safe	Not at all important	7%	7%	8%	10%	4%	6%
	Somewhat important	18%	16%	19%	20%	17%	21%
	Moderately important	30%	26%	30%	27%	34%	32%
	Very important	33%	35%	28%	30%	36%	32%
	Extremely important	12%	15%	14%	13%	9%	10%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	3.2	3.4	3.2	3.2	3.3	3.2
	Std. Dev.	1.1	1.1	1.1	1.2	1.0	1.1
	Median	3.0	4.0	3.0	3.0	3.0	3.0
	n =	1,352	275	284	247	278	268
To experience a wild place	Not at all important	2%	3%	1%	3%	2%	2%
	Somewhat important	6%	8%	5%	6%	5%	7%
	Moderately important	17%	19%	15%	17%	19%	14%
	Very important	41%	36%	39%	41%	48%	41%
	Extremely important	33%	33%	40%	34%	26%	36%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	4.0	3.9	4.1	4.0	3.9	4.0
	Std. Dev.	1.0	1.1	0.9	1.0	0.9	1.0
	Median	4.0	4.0	4.0	4.0	4.0	4.0
	n =	1,348	273	284	247	278	266
To see geysers and thermal features	Not at all important	1%	1%	1%	2%	0%	1%
	Somewhat important	4%	5%	5%	4%	3%	4%
	Moderately important	14%	15%	14%	14%	15%	10%
	Very important	35%	38%	27%	33%	37%	38%
	Extremely important	47%	42%	54%	48%	46%	47%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	4.2	4.2	4.3	4.2	4.3	4.3
	Std. Dev.	0.9	0.9	0.9	0.9	0.8	0.9
	Median	4.0	4.0	5.0	4.0	4.0	4.0
	n =	1,334	267	282	246	276	263



Table F. 20: Importance of Values in YNP Experience - Part 2

<i>Variable</i>	<i>Response</i>	OVERALL	May	June	July	August	September
To view scenery	Not at all important	0%	1%	0%	0%	0%	1%
	Somewhat important	0%	0%	1%	1%	0%	0%
	Moderately important	5%	4%	6%	5%	3%	11%
	Very important	31%	31%	25%	35%	42%	20%
	Extremely important	63%	65%	68%	59%	55%	68%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	4.6	4.6	4.6	4.5	4.5	4.6
	Std. Dev.	0.6	0.6	0.7	0.7	0.6	0.7
	Median	5.0	5.0	5.0	5.0	5.0	5.0
	n =	1,342	276	281	246	274	265
To get away from crowds of people	Not at all important	7%	6%	8%	7%	5%	7%
	Somewhat important	14%	21%	14%	12%	11%	11%
	Moderately important	30%	23%	38%	30%	32%	26%
	Very important	30%	27%	24%	32%	35%	31%
	Extremely important	20%	23%	16%	20%	16%	25%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	3.4	3.4	3.2	3.5	3.5	3.5
	Std. Dev.	1.1	1.2	1.1	1.1	1.1	1.2
	Median	3.0	3.2	3.0	4.0	4.0	4.0
	n =	1,332	274	277	244	274	263
To be close to nature	Not at all important	1%	1%	1%	2%	1%	3%
	Somewhat important	9%	11%	9%	9%	10%	6%
	Moderately important	23%	16%	22%	32%	21%	24%
	Very important	38%	37%	36%	31%	44%	38%
	Extremely important	29%	35%	32%	26%	24%	28%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	3.8	3.9	3.9	3.7	3.8	3.8
	Std. Dev.	1.0	1.0	1.0	1.0	0.9	1.0
	Median	4.0	4.0	4.0	4.0	4.0	4.0
	n =	1,332	274	276	245	274	263



Table F. 21: Importance of Values in YNP Experience - Part 3

Variable	Response	OVERALL	May	June	July	August	September
To be near considerate people	Not at all important	8%	5%	5%	4%	14%	9%
	Somewhat important	11%	13%	10%	15%	8%	10%
	Moderately important	28%	29%	26%	28%	28%	29%
	Very important	30%	32%	30%	32%	28%	29%
	Extremely important	23%	22%	30%	20%	21%	23%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	3.5	3.5	3.7	3.5	3.3	3.5
	Std. Dev.	1.2	1.1	1.1	1.1	1.3	1.2
	Median	4.0	4.0	4.0	4.0	3.0	4.0
	n =	1,308	270	270	243	269	256
To see wildlife	Not at all important	1%	0%	0%	4%	0%	0%
	Somewhat important	1%	1%	1%	2%	1%	1%
	Moderately important	7%	10%	6%	5%	7%	5%
	Very important	32%	28%	24%	31%	39%	39%
	Extremely important	59%	61%	69%	59%	52%	56%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	4.5	4.5	4.6	4.4	4.4	4.5
	Std. Dev.	0.7	0.7	0.7	1.0	0.7	0.6
	Median	5.0	5.0	5.0	5.0	5.0	5.0
	n =	1,282	265	267	236	266	248
To get away from the noise/experience natural sounds	Not at all important	2%	0%	2%	3%	2%	6%
	Somewhat important	7%	12%	6%	8%	5%	7%
	Moderately important	20%	17%	21%	20%	23%	17%
	Very important	36%	33%	36%	38%	41%	31%
	Extremely important	34%	38%	36%	31%	29%	40%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	3.9	4.0	4.0	3.9	3.9	3.9
	Std. Dev.	1.0	1.0	1.0	1.0	0.9	1.2
	Median	4.0	4.0	4.0	4.0	4.0	4.0
	n =	1,281	265	267	237	266	246

Table F. 22: Consideration of Difficulty in Finding Parking

Variable	Response	OVERALL	May	June	July	August	September
When you planned this trip to Yellowstone, did you think about the possibility that it might be difficult to find parking near park attractions?	Yes	44%	40%	49%	51%	43%	36%
	No	56%	60%	51%	49%	57%	64%
	TOTAL	100%	100%	100%	100%	100%	100%
	n =	1,349	277	288	244	278	262



Table F. 23: (If considered parking challenges) Trip Behavior Modifications

Variable	Response	OVERALL	May	June	July	August	September
If you thought about the possibility that it might be difficult to find parking here when you planned this trip to Yellowstone, how did it affect your trip plans?	It did not affect my plans	48%	32%	56%	55%	52%	43%
	I visited at a time of day I thought it would be less crowded	32%	43%	28%	30%	31%	26%
	I visited on a day of the week I thought it would be less crowded	22%	34%	17%	14%	20%	26%
	I avoided places I thought would be crowded today	10%	12%	8%	13%	7%	14%
TOTAL		112%	121%	108%	112%	110%	109%
n =		610	106	145	124	134	101

Table F. 24: Time Spent at Entrance Gate in Traffic

Variable	Response	OVERALL	May	June	July	August	September
Approximately how many minutes did you and your personal group have to wait in traffic at the entrance station of Yellowstone?	Less than 5 minutes	81%	85%	80%	67%	87%	83%
	5-10 minutes	11%	9%	14%	13%	7%	12%
	11-20 minutes	6%	4%	3%	17%	6%	3%
	21-30 minutes	1%	2%	2%	1%	0%	1%
	31-44 minutes	1%	1%	1%	1%	0%	0%
	45 minutes or more	1%	1%	1%	1%	0%	0%
TOTAL		100%	100%	100%	100%	100%	100%
n =		1,425	300	302	255	295	273



Table F. 25: Acceptability of Time Spent at Entrance Gate

Variable	Response	OVERALL	May	June	July	August	September
How acceptable is the amount of time you spent waiting in traffic to enter Yellowstone National Park?	Not at all acceptable	3%	2%	6%	3%	3%	2%
	Slightly acceptable	8%	16%	6%	10%	6%	5%
	Moderately acceptable	19%	21%	16%	26%	19%	15%
	Very acceptable	25%	24%	28%	28%	19%	26%
	Completely acceptable	44%	37%	44%	32%	53%	52%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	4.0	3.8	4.0	3.8	4.1	4.2
	Std. Dev.	1.1	1.2	1.2	1.1	1.1	1.0
	Median	4.0	4.0	4.0	4.0	5.0	5.0
	n =	1,306	269	278	239	269	251

Table F. 26: Perceptions of Crowding at Entrance Gate

Variable	Response	OVERALL	May	June	July	August	September
How crowded did you feel entering Yellowstone National Park?	Not at all crowded	46%	40%	43%	31%	58%	57%
	Slightly crowded	26%	33%	27%	29%	17%	24%
	Moderately crowded	20%	20%	19%	31%	18%	13%
	Very crowded	5%	5%	5%	8%	4%	4%
	Extremely crowded	3%	2%	6%	1%	4%	2%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	1.9	2.0	2.1	2.2	1.8	1.7
	Std. Dev.	1.1	1.0	1.2	1.0	1.1	1.0
	Median	2.0	2.0	2.0	2.0	1.0	1.0
	n =	1,225	251	256	229	260	229



Table F. 27: Travel Group Composition

Variable	Response	OVERALL	May	June	July	August	September
Which best describes the group you are traveling with?	Myself (alone)	3%	5%	2%	2%	2%	2%
	Myself with family (including spouse/partner and/or other family members)	76%	68%	79%	73%	76%	83%
	Myself with family and friends	10%	10%	12%	13%	12%	6%
	Myself with friends	10%	16%	7%	7%	9%	9%
	Commercial guided tour group	1%	0%	0%	4%	0%	0%
	Outfitter/guide	0%	0%	0%	0%	0%	0%
	Club/organization/school	0%	1%	0%	0%	0%	0%
	Other organized group (e.g. business group, scout group, etc.)	0%	0%	0%	0%	1%	0%
Other	0%	0%	0%	0%	0%	0%	
TOTAL		100%	100%	100%	100%	100%	100%
n =		1,071	215	230	201	233	192

Data Tables for Geofence Attraction Results – Site-Specific

Table F. 28: Recently Stopped at Site

Variable	Response	North/South Rim Area	Old Faithful Area	Fairy Falls Parking Area	Midway Geyser Area	Norris Geyser Area	Canyon Village
Did you recently stop to visit an attraction on your Yellowstone National Park trip?	Yes	65%	88%	22%	45%	41%	51%
	No, and I did not plan to stop	28%	11%	63%	32%	42%	45%
	No, but I wanted to stop and couldn't	7%	2%	15%	22%	17%	4%
Total		100%	100%	100%	100%	100%	100%
n =		504	496	513	542	625	584



Table F. 29: (If respondent wanted to stop, but couldn't) Reason for not stopping at site

<i>Variable</i>	<i>Response</i>	North/South Rim Area	Old Faithful Area	Fairy Falls Parking Area	Midway Geyser Area	Norris Geyser Area	Canyon Village	
(If visitors wanted to visit, but couldn't) What prevented you from visiting this site?	Not enough time	24%	44%	25%	23%	27%	42%	
	Could not find a place to park	28%	32%	39%	71%	43%	29%	
	Travel times inside the park greater than expected	5%	18%	6%	9%	4%	0%	
	Travel times outside the park greater than expected	0%	0%	1%	1%	0%	8%	
	Trail closure	33%	10%	7%	1%	1%	0%	
	Road closure	3%	0%	17%	1%	2%	0%	
	Traffic at the site	20%	0%	23%	48%	21%	24%	
	Inadequate display of road/map signs	3%	0%	7%	5%	5%		
	Inadequate display of safety information	0%	0%	1%	0%	0%	0%	
	Other	8%	24%	9%	7%	13%	16%	
	Total		123%	128%	135%	165%	116%	120%
	n =		29	12	84	134	109	23



Table F. 30: Parking Time, Acceptability, and Location at Site

<i>Variable</i>	<i>Response</i>	North/South Rim Area	Old Faithful Area	Fairy Falls Parking Area	Midway Geyser Area	Norris Geyser Area	Canyon Village
Approximately how much time did you spend waiting in traffic for parking at this attraction?	Less than 5 minutes	76%	72%	72%	49%	55%	83%
	5-10 minutes	14%	14%	21%	29%	17%	9%
	11-20 minutes	7%	7%	5%	12%	11%	2%
	21-30 minutes	2%	2%	1%	7%	10%	2%
	31-44 minutes	0%	1%	1%	2%	2%	1%
	45-60 minutes	1%	1%	0%	1%	3%	3%
	More than 1 hour	1%	3%	1%	1%	2%	1%
TOTAL	Total	100%	100%	100%	100%	100%	100%
	n =	330	435	87	214	229	293
How acceptable was the amount of time you spent looking for parking?	Not at all acceptable	5%	5%	7%	12%	10%	5%
	Slightly acceptable	9%	8%	15%	15%	9%	9%
	Moderately acceptable	21%	13%	24%	32%	25%	7%
	Very acceptable	29%	32%	32%	25%	22%	23%
	Completely acceptable	36%	42%	22%	15%	34%	56%
TOTAL	TOTAL	100%	100%	100%	100%	100%	100%
	Average	3.8	4.0	3.5	3.2	3.6	4.2
	Std. Dev.	1.2	1.1	1.2	1.2	1.3	1.2
	Median	4.0	4.0	4.0	3.0	4.0	5.0
	n =	268	428	86	208	225	291



Table F. 31: Where did you park at this attraction?

<i>Variable</i>	<i>Response</i>	North/South Rim Area	Old Faithful Area	Fairy Falls Parking Area	Midway Geyser Area	Norris Geyser Area	Canyon Village
Where did you park at this attraction / area in Yellowstone National Park?	Parking lot	90%	97%	81%	64%	88%	97%
	On the side of the road	9%	2%	13%	25%	6%	2%
	In a pull-out further away and walked	1%	1%	6%	11%	7%	1%
	Total	100%	100%	100%	100%	100%	100%
	n =	266	428	86	206	224	289



Table F. 32: Crowding and Expectations at Site

<i>Variable</i>	<i>Response</i>	North/South Rim Area	Old Faithful Area	Fairy Falls Parking Area	Midway Geyser Area	Norris Geyser Area	Canyon Village
How crowded did you feel at this attraction in Yellowstone NP today?	Not at all crowded	20%	11%	7%	10%	21%	31%
	Slightly crowded	23%	27%	23%	19%	36%	26%
	Moderately crowded	27%	37%	28%	33%	28%	31%
	Very crowded	23%	17%	24%	26%	11%	9%
	Extremely crowded	8%	9%	17%	12%	5%	4%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	2.8	2.9	3.2	3.1	2.4	2.3
	Std. Dev.	1.2	1.1	1.2	1.2	1.1	1.1
	Median	3.0	3.0	3.0	3.0	2.0	2.0
	n =	2689	429	84	207	221	289
How did the number of people you encountered at this attraction compare to what you expected?	A lot less than what I expected	11%	3%	1%	5%	12%	13%
	A little less than what I expected	8%	15%	7%	7%	12%	19%
	About what I expected	42%	48%	39%	40%	43%	38%
	A little more than what I expected	20%	17%	20%	18%	17%	17%
	A lot more than I expected	16%	13%	24%	24%	11%	6%
	I did not have any expectations	4%	4%	8%	7%	6%	7%
	Total	100%	100%	100%	100%	100%	100%
	n =	265	422	84	205	219	290



Table F. 33: Perceived Problems - Part 1

<i>Variable</i>	<i>Response</i>	North/ South Rim Area	Old Faithful Area	Fairy Falls Parking Area	Midway Geyser Area	Norris Geyser Area	Canyon Village
Availability of parking	Not a problem	48%	60%	28%	22%	48%	68%
	Small problem	28%	20%	24%	22%	19%	23%
	Moderate problem	15%	13%	26%	30%	19%	6%
	Big problem	8%	6%	22%	26%	14%	3%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	1.8	1.7	2.4	2.6	2.0	1.4
	Std. Dev.	1.0	0.9	1.1	1.1	1.1	0.8
	Median	2.0	1.0	2.0	3.0	2.0	1.0
	n =	263	411	82	202	217	283
People walking on, across, or along the road	Not a problem	62%	57%	59%	43%	60%	66%
	Small problem	26%	25%	24%	35%	26%	24%
	Moderate problem	9%	14%	11%	17%	10%	8%
	Big problem	2%	4%	6%	6%	4%	2%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	1.5	1.7	1.7	1.8	1.6	1.5
	Std. Dev.	0.8	0.9	0.9	0.9	0.8	0.7
	Median	1.0	1.0	1.0	2.0	1.0	1.0
	n =	263	410	80	199	215	282
Too many people	Not a problem	43%	41%	22%	27%	57%	59%
	Small problem	34%	26%	32%	26%	22%	26%
	Moderate problem	17%	26%	34%	31%	14%	10%
	Big problem	6%	8%	12%	17%	7%	4%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	1.9	2.0	2.4	2.4	1.7	1.6
	Std. Dev.	0.9	1.0	1.0	1.1	0.9	0.8
	Median	2.0	2.0	2.0	2.0	1.0	1.0
	n =	261	408	79	198	214	280



Table F. 34: Perceived Problems - Part 2

<i>Variable</i>	<i>Response</i>	North/ South Rim Area	Old Faithful Area	Fairy Falls Parking Area	Midway Geyser Area	Norris Geyser Area	Canyon Village
Traffic congestion	Not a problem	47%	49%	20%	24%	46%	59%
	Small problem	29%	28%	44%	16%	24%	25%
	Moderate problem	16%	17%	28%	41%	18%	12%
	Big problem	7%	6%	7%	19%	13%	3%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	1.8	1.8	2.2	2.6	2.0	1.6
	Std. Dev.	0.9	0.9	0.9	1.1	1.1	0.8
	Median	2.0	2.0	2.0	3.0	2.0	1.0
	n =	262	410	81	199	216	282
Other people acting unsafe around thermal features	Not a problem	83%	80%	70%	66%	84%	84%
	Small problem	11%	12%	15%	16%	9%	12%
	Moderate problem	3%	5%	12%	9%	4%	3%
	Big problem	3%	3%	3%	9%	3%	1%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	1.3	1.3	1.5	1.6	1.3	1.2
	Std. Dev.	0.7	0.7	0.8	1.0	0.7	0.5
	Median	1.0	1.0	1.0	1.0	1.0	1.0
	n =	212	389	76	191	207	205
Other people acting unsafe around wildlife	Not a problem	82%	85%	76%	73%	88%	81%
	Small problem	11%	8%	14%	12%	7%	13%
	Moderate problem	4%	4%	9%	7%	1%	3%
	Big problem	2%	3%	2%	7%	5%	3%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	1.3	1.2	1.4	1.5	1.2	1.3
	Std. Dev.	0.6	0.7	0.7	0.9	0.7	0.7
	Median	1.0	1.0	1.0	1.0	1.0	1.0
	n =	211	343	72	170	186	210



Table F. 35: Perceived Problems - Part 3

<i>Variable</i>	<i>Response</i>	North/ South Rim Area	Old Faithful Area	Fairy Falls Parking Area	Midway Geyser Area	Norris Geyser Area	Canyon Village
Feeling safe on boardwalks around other people	Not a problem	79%	85%	82%	67%	85%	89%
	Small problem	16%	12%	11%	20%	10%	7%
	Moderate problem	3%	3%	5%	10%	4%	3%
	Big problem	2%	1%	3%	3%	1%	0%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	1.3	1.2	1.3	1.5	1.2	1.1
	Std. Dev.	0.6	0.5	0.7	0.8	0.6	0.5
	Median	1.0	1.0	1.0	1.0	1.0	1.0
	n =	239	391	77	196	208	211
Availability of restrooms	Not a problem	59%	67%	24%	39%	58%	78%
	Small problem	19%	19%	31%	17%	17%	14%
	Moderate problem	10%	10%	19%	21%	15%	5%
	Big problem	12%	4%	27%	24%	11%	3%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	1.7	1.5	2.5	2.3	1.8	1.3
	Std. Dev.	1.0	0.8	1.1	1.2	1.1	0.7
	Median	1.0	1.0	2.0	2.0	1.0	1.0
	n =	215	383	51	160	196	261
Cleanliness of restrooms	Not a problem	48%	64%	30%	36%	28%	64%
	Small problem	26%	22%	29%	21%	21%	22%
	Moderate problem	16%	10%	31%	19%	22%	10%
	Big problem	9%	5%	10%	23%	29%	4%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	1.9	1.6	2.2	2.3	2.5	1.5
	Std. Dev.	1.0	0.9	1.0	1.2	1.2	0.8
	Median	2.0	1.0	2.0	2.0	3.0	1.0
	n =	167	372	32	131	177	250



Table F. 36: Ratings of the Experience While at Site

Variable	Response	North/ South Rim Area	Old Faithful Area	Fairy Falls Parking Area	Midway Geyser Area	Norris Geyser Area	Canyon Village
Other than weather conditions, how would you rate your experience right now?	Very poor	1%	1%	4%	3%	1%	0%
	Poor	2%	0%	8%	7%	4%	2%
	Fair	9%	8%	13%	20%	17%	10%
	Good	44%	40%	44%	45%	43%	41%
	Excellent	44%	51%	31%	25%	34%	47%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	4.3	4.4	3.9	3.8	4.0	4.3
	Std. Dev.	0.8	0.7	1.1	1.0	0.9	0.7
	Median	4.0	5.0	4.0	4.0	4.0	4.0
	n =	287	413	151	318	313	301

Data Tables for Geofence Survey – Lower Use Attractions

Table F. 37: Recently Stop to Visit Site

Variable	Response	Mammoth Hot Springs Area	Tower Falls Parking Area	West Thumb Geyser Basin Area	Lake Village	Hayden Valley Parking	Lamar Valley Pullouts	Boiling River
Did you recently stop to visit this attraction on your Yellowstone National Park trip?	Yes	82%	59%	48%	37%	53%	82%	14%
	No, and I did not plan to stop	11%	31%	44%	57%	43%	14%	72%
	No, but I wanted to stop and couldn't	7%	10%	8%	6%	4%	4%	14%
	Total	100%	100%	100%	100%	100%	100%	100%
	n =	453	370	472	365	400	92	156



Table F. 38: Reasons for Not Being Able to Stop

<i>Variable</i>	<i>Response</i>	Mammoth Hot Springs Area	Tower Falls Parking Area	West Thumb Geyser Basin Area	Lake Village	Hayden Valley Parking	Lamar Valley Pullouts	Boiling River
(If visitors wanted to visit, but couldn't) What prevented you from visiting this site?	Not enough time	27%	18%	39%	60%	65%	33%	21%
	Could not find a place to park	38%	68%	36%	9%	35%	67%	29%
	Travel times inside the park greater than expected	13%	0%	2%	8%	6%	0%	0%
	Travel times outside the park greater than expected	0%	0%	0%	4%	0%	0%	0%
	Trail closure	0%	0%	0%	0%	0%	0%	22%
	Road closure	9%	0%	0%	10%	0%	0%	8%
	Traffic at the site	30%	26%	2%	0%	12%	33%	4%
	Inadequate display of road/map signs	5%	2%	7%	4%		33%	21%
	Inadequate display of safety information	0%	0%	0%	0%	0%	0%	4%
	Other	24%	7%	20%	8%	12%	0%	21%
	Total	146%	121%	107%	104%	129%	167%	129%
	n =	37	40	32	20	17	3	24



Table F. 39: Parking Wait Time and Acceptability

Variable	Response	Mammoth Hot Springs Area	Tower Falls Parking Area	West Thumb Geyser Basin Area	Lake Village	Hayden Valley Parking	Lamar Valley Pullouts	Boiling River
Approximately how much time did you spend waiting in traffic for parking at this attraction?	Less than 5 minutes	65%	76%	82%	89%	85%	87%	83%
	5-10 minutes	18%	14%	5%	2%	7%	3%	12%
	11-20 minutes	7%	5%	2%	2%	1%	0%	0%
	21-30 minutes	3%	3%	6%	4%	2%	3%	0%
	31-44 minutes	1%	0%	3%	1%	3%	1%	0%
	45-60 minutes	4%	2%	2%	0%	1%	0%	0%
	More than 1 hour	3%	0%	0%	2%	1%	5%	5%
TOTAL	Total	100%	100%	100%	100%	100%	100%	100%
	n =	358	211	205	130	210	74	21
How acceptable was the amount of time you spent looking for parking?	Not at all acceptable	5%	5%	1%	2%	4%	1%	4%
	Slightly acceptable	16%	4%	5%	2%	4%	2%	18%
	Moderately acceptable	18%	17%	17%	4%	9%	10%	12%
	Very acceptable	29%	33%	15%	18%	24%	18%	24%
	Completely acceptable	32%	42%	61%	73%	58%	68%	42%
	TOTAL	100%	100%	100%	100%	100%	100%	100%
	Average	3.7	4.0	4.3	4.6	4.3	4.5	3.8
	Std. Dev.	1.2	1.1	1.0	0.8	1.1	0.9	1.3
	Median	4.0	4.0	5.0	5.0	5.0	5.0	4.0
	n =	350	210	203	127	207	74	21



Table F. 40: Parking Location at Site

Variable	Response	Mammoth Hot Springs Area	Tower Falls Parking Area	West Thumb Geyser Basin Area	Lake Village	Hayden Valley Parking	Lamar Valley Pullouts	Boiling River
Where did you park at this attraction / area in Yellowstone National Park?	Parking lot	80%	84%	97%	88%	70%	42%	63%
	On the side of the road	9%	13%	2%	10%	24%	40%	22%
	In a pull-out further away and walked	11%	3%	1%	2%	6%	17%	16%
	Total	100%	100%	100%	100%	100%	100%	100%
	n =	347	210	200	127	207	74	21



Table F. 41: Crowding and Expectations at Site

Variable	Response	Mammoth Hot Springs Area	Tower Falls Parking Area	West Thumb Geyser Basin Area	Lake Village	Hayden Valley Parking	Lamar Valley Pullouts	Boiling River
How crowded did you feel at this attraction in Yellowstone NP today?	Not at all crowded	12%	20%	39%	55%	32%	55%	48%
	Slightly crowded	34%	27%	33%	26%	34%	33%	26%
	Moderately crowded	33%	36%	19%	16%	27%	12%	22%
	Very crowded	17%	11%	8%	2%	6%	0%	0%
	Extremely crowded	3%	5%	0%	1%	1%	0%	4%
	TOTAL	100%	100%	100%	100%	100%	100%	100%
	Average	2.6	2.5	2.0	1.7	2.1	1.6	1.9
	Std. Dev.	1.0	1.1	1.0	0.9	1.0	0.7	1.1
	Median	3.0	3.0	2.0	1.0	2.0	1.0	1.9
	n =	336	208	192	125	207	72	20
How did the number of people you encountered at this attraction compare to what you expected?	A lot less than what I expected	6%	14%	13%	25%	17%	11%	26%
	A little less than what I expected	12%	13%	15%	24%	12%	32%	0%
	About what I expected	50%	35%	47%	35%	51%	42%	51%
	A little more than what I expected	17%	24%	12%	4%	12%	7%	10%
	A lot more than I expected	10%	7%	2%	1%	5%	2%	9%
	I did not have any expectations	5%	7%	11%	11%	4%	6%	4%
	Total	100%	100%	100%	100%	100%	100%	100%
	n =	336	207	190	125	205	71	20



Table F. 42: Perceived Problems at Site – Part 1

Variable	Response	Mammoth Hot Springs Area	Tower Falls Parking Area	West Thumb Geyser Basin Area	Lake Village	Hayden Valley Parking	Lamar Valley Pullouts	Boiling River
Availability of parking	Not a problem	44%	57%	72%	81%	72%	74%	55%
	Small problem	21%	28%	21%	16%	20%	12%	36%
	Moderate problem	27%	9%	6%	3%	8%	11%	5%
	Big problem	8%	7%	0%	1%	0%	2%	5%
	TOTAL	100%	100%	100%	100%	100%	100%	100%
	Average	2.0	1.7	1.4	1.2	1.4	1.4	1.6
	Std. Dev.	1.0	0.9	0.6	0.5	0.6	0.8	0.8
	Median	2.0	1.0	1.0	1.0	1.0	1.0	1.0
	n =	328	203	187	120	201	67	19
People walking on, across, or along the road	Not a problem	51%	55%	65%	81%	70%	75%	86%
	Small problem	35%	31%	30%	17%	23%	14%	14%
	Moderate problem	11%	9%	3%	2%	6%	7%	
	Big problem	2%	4%	2%		0%	4%	
	TOTAL	100%	100%	100%	100%	100%	100%	100%
	Average	1.6	1.6	1.4	1.2	1.4	1.4	1.1
	Std. Dev.	0.8	0.8	0.7	0.5	0.6	0.8	0.4
	Median	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	n =	329	200	186	119	199	67	19
Too many people	Not a problem	46%	53%	68%	81%	67%	71%	76%
	Small problem	26%	31%	23%	17%	21%	19%	14%
	Moderate problem	21%	11%	7%	1%	10%	9%	9%
	Big problem	7%	5%	2%	1%	2%	1%	
	TOTAL	100%	100%	100%	100%	100%	100%	100%
	Average	1.9	1.7	1.4	1.2	1.5	1.4	1.3
	Std. Dev.	1.0	0.9	0.7	0.5	0.7	0.7	0.7
	Median	2.0	1.0	1.0	1.0	1.0	1.0	1.0
	n =	327	202	184	120	197	67	18



Table F. 43: Perceived Problems at Site –Part 2

Variable	Response	Mammoth Hot Springs Area	Tower Falls Parking Area	West Thumb Geyser Basin Area	Lake Village	Hayden Valley Parking	Lamar Valley Pullouts	Boiling River
Traffic congestion	Not a problem	42%	54%	68%	76%	62%	76%	73%
	Small problem	36%	28%	24%	19%	25%	18%	23%
	Moderate problem	14%	14%	7%	5%	11%	5%	5%
	Big problem	8%	5%	1%	1%	2%	1%	
	TOTAL	100%	100%	100%	100%	100%	100%	100%
	Average	1.9	1.7	1.4	1.3	1.5	1.3	1.3
	Std. Dev.	0.9	0.9	0.7	0.6	0.8	0.6	0.6
	Median	2.0	1.0	1.0	1.0	1.0	1.0	1.0
	n =	326	202	184	120	201	66	19
Other people acting unsafe around thermal features	Not a problem	75%	85%	82%	84%	83%	94%	86%
	Small problem	15%	12%	12%	13%	14%	5%	9%
	Moderate problem	7%	1%	3%	2%	2%	0%	0%
	Big problem	2%	2%	3%		1%	2%	5%
	TOTAL	100%	100%	100%	100%	100%	100%	100%
	Average	1.4	1.2	1.3	1.2	1.2	1.1	1.2
	Std. Dev.	0.7	0.5	0.7	0.4	0.5	0.4	0.7
	Median	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	n =	300	155	179	94	185	51	19
Other people acting unsafe around wildlife	Not a problem	72%	80%	79%	81%	68%	63%	91%
	Small problem	16%	17%	15%	16%	15%	21%	5%
	Moderate problem	8%	2%	3%	2%	12%	12%	0%
	Big problem	5%	2%	2%	1%	5%	4%	5%
	TOTAL	100%	100%	100%	100%	100%	100%	100%
	Average	1.5	1.3	1.3	1.2	1.5	1.6	1.2
	Std. Dev.	0.8	0.6	0.6	0.5	0.9	0.9	0.7
	Median	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	n =	297	158	157	103	187	64	18



Table F. 44: Perceived Problems at Site – Part 3

Variable	Response	Mammoth Hot Springs Area	Tower Falls Parking Area	West Thumb Geyser Basin Area	Lake Village	Hayden Valley Parking	Lamar Valley Pullouts	Boiling River
Feeling safe on boardwalks around other people	Not a problem	81%	86%	86%	88%	86%	95%	100%
	Small problem	17%	12%	6%	10%	9%	5%	0%
	Moderate problem	2%	1%	7%	2%	4%	0%	0%
	Big problem	1%	0%	1%	0%	1%	0%	0%
	TOTAL	100%	100%	100%	100%	100%	100%	100%
	Average	1.2	1.2	1.2	1.1	1.2	1.0	1.0
	Std. Dev.	0.5	0.4	0.6	0.4	0.5	0.2	0.0
	Median	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	n =	309	187	181	90	178	49	19
Availability of restrooms	Not a problem	73%	65%	48%	78%	80%	77%	47%
	Small problem	15%	22%	33%	14%	13%	17%	23%
	Moderate problem	8%	8%	9%	6%	3%	4%	30%
	Big problem	4%	6%	10%	2%	3%	1%	0%
	TOTAL	100%	100%	100%	100%	100%	100%	100%
	Average	1.4	1.5	1.8	1.3	1.3	1.3	1.8
	Std. Dev.	0.8	0.9	1.0	0.7	0.7	0.6	0.9
	Median	1.0	1.0	2.0	1.0	1.0	1.0	1.9
	n =	294	177	162	103	159	61	14
Cleanliness of restrooms	Not a problem	66%	49%	34%	69%	44%	55%	79%
	Small problem	20%	31%	22%	18%	22%	36%	21%
	Moderate problem	8%	11%	22%	13%	22%	7%	0%
	Big problem	7%	10%	22%	1%	12%	1%	0%
	TOTAL	100%	100%	100%	100%	100%	100%	100%
	Average	1.6	1.8	2.3	1.5	2.0	1.6	1.2
	Std. Dev.	0.9	1.0	1.2	0.7	1.1	0.7	0.4
	Median	1.0	2.0	2.0	1.0	2.0	1.0	1.0
	n =	259	150	148	98	128	54	12



Table F. 45: Overall Experience Ratings

Variable	Response	Mammoth Hot Springs Area	Tower Falls Parking Area	West Thumb Geyser Basin Area	Lake Village	Hayden Valley Parking	Lamar Valley Pullouts	Boiling River
Other than weather conditions, how would you rate your experience right now?	Very poor	0%	2%	4%	2%	0%	0%	0%
	Poor	3%	1%	5%	0%	0%	0%	2%
	Fair	8%	8%	7%	6%	4%	4%	5%
	Good	44%	49%	33%	26%	38%	35%	36%
	Excellent	45%	40%	51%	65%	58%	62%	57%
	TOTAL	100%	100%	100%	100%	100%	100%	100%
	Average	4.3	4.3	4.2	4.5	4.5	4.6	4.5
	Std. Dev.	0.7	0.8	1.0	0.8	0.6	0.6	0.7
	Median	4.0	4.0	5.0	5.0	5.0	5.0	5.0
	n =	357	238	210	138	216	70	39



Overall Data Tables for Geofence Survey – Roadway Survey

Table F. 46: Roadway Expectations and Wait Times

Variable	Response	OVERALL	May	June	July	August	September
Currently, compared to what you expected, how much traffic congestion is present in your direction of travel?	Less traffic congestion than I expected	38%	37%	39%	42%	40%	35%
	About the same as I expected	29%	28%	28%	28%	31%	32%
	I didn't know what to expect	22%	26%	24%	22%	19%	21%
	More traffic congestion than I expected	10%	9%	9%	8%	11%	12%
	TOTAL	100%	100%	100%	100%	100%	100%
	n =	3,663	764	800	691	748	659
Approximately, how many minutes have you been delayed due to traffic congestion in your current direction of travel?	I have not been delayed	82%	87%	82%	78%	82%	79%
	Less than 5 minutes	7%	4%	7%	8%	7%	9%
	5-10 minutes	6%	3%	5%	10%	5%	5%
	11-20 minutes	2%	4%	2%	2%	3%	2%
	21-30 minutes	1%	1%	1%	1%	2%	1%
	31-44 minutes	1%	1%	1%	1%	1%	2%
	45-60 minutes	0%	0%	0%	0%	0%	0%
	More than 1 hour	1%	0%	1%	0%	0%	2%
	TOTAL	100%	100%	100%	100%	100%	100%
	n =	3,663	764	800	691	748	659



Table F. 47: Perceived Issues on the Roadway

Variable	Response	OVERALL	May	June	July	August	September
Traffic congestion due to wildlife	Not a problem	80%	83%	79%	78%	80%	79%
	Small problem	13%	9%	15%	16%	13%	14%
	Moderate problem	4%	5%	4%	4%	4%	4%
	Big problem	3%	2%	2%	2%	3%	4%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	1.3	1.3	1.3	1.3	1.3	1.3
	Std. Dev.	0.7	0.7	0.6	0.6	0.7	0.7
	Median	1.0	1.0	1.0	1.0	1.0	1.0
	n =	3,613	752	792	678	740	650
Traffic congestion due to too many vehicles	Not a problem	72%	75%	74%	65%	71%	75%
	Small problem	18%	16%	17%	22%	18%	16%
	Moderate problem	8%	7%	8%	10%	8%	7%
	Big problem	3%	1%	2%	3%	4%	3%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	1.4	1.3	1.4	1.5	1.5	1.4
	Std. Dev.	0.7	0.7	0.7	0.8	0.8	0.7
	Median	1.0	1.0	1.0	1.0	1.0	1.0
	n =	3,603	746	788	675	741	652
Too many oversized vehicles (e.g., tour buses, RVs)	Not a problem	79%	80%	81%	76%	79%	77%
	Small problem	14%	13%	12%	15%	13%	16%
	Moderate problem	5%	4%	5%	7%	5%	4%
	Big problem	3%	2%	2%	3%	3%	3%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	1.3	1.3	1.3	1.4	1.3	1.3
	Std. Dev.	0.7	0.7	0.6	0.7	0.7	0.7
	Median	1.0	1.0	1.0	1.0	1.0	1.0
	n =	3,601	746	790	676	740	648
Availability of parking at sites I wanted to visit	Not a problem	71%	79%	72%	63%	68%	72%
	Small problem	15%	13%	15%	15%	16%	16%
	Moderate problem	9%	6%	8%	16%	9%	9%
	Big problem	5%	2%	5%	6%	7%	3%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	1.5	1.3	1.5	1.6	1.6	1.4
	Std. Dev.	0.9	0.7	0.9	1.0	0.9	0.8
	Median	1.0	1.0	1.0	1.0	1.0	1.0
	n =	3,539	744	771	663	729	631



Table F. 48: Roadway Frustration and Overall Experience

Variable	Response	OVERALL	May	June	July	August	September
How frustrated are you with the amount of time you have spent in traffic congestion behind other vehicles?	Not at all frustrated	76%	76%	78%	73%	78%	74%
	Slightly frustrated	15%	18%	12%	15%	14%	17%
	Moderately frustrated	6%	4%	6%	8%	4%	6%
	Frustrated	2%	1%	2%	1%	3%	1%
	Very frustrated	2%	1%	1%	2%	1%	2%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	1.4	1.3	1.4	1.4	1.3	1.4
	Std. Dev.	0.8	0.7	0.8	0.9	0.7	0.8
	Median	1.0	1.0	1.0	1.0	1.0	1.0
	n =	3,499	729	763	659	720	627
Other than weather conditions, how would you rate your experience right now?	Very poor	1%	0%	0%	0%	0%	2%
	Poor	1%	1%	2%	1%	1%	0%
	Fair	8%	10%	8%	7%	8%	5%
	Good	39%	33%	38%	47%	43%	32%
	Excellent	52%	55%	52%	45%	47%	61%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	4.4	4.4	4.4	4.4	4.4	4.5
	Std. Dev.	0.7	0.7	0.7	0.7	0.7	0.7
	Median	5.0	5.0	5.0	4.0	4.0	5.0
	n =	3,435	714	748	650	710	612



Table F. 49: Roadway Expectations and Wait Times by Segment -Part 1

<i>Variable</i>	<i>Response</i>	West Entrance to Madison Junction	Madison to Old Faithful	Old Faithful to West Thumb Geyser Basin	Lake Village to West Thumb Geyser Basin	Canyon Village to Fishing Bridge
Currently, compared to what you expected, how much traffic congestion is present in your direction of travel?	Less traffic congestion than I expected	32%	35%	44%	52%	34%
	About the same as I expected	32%	36%	25%	22%	29%
	I didn't know what to expect	17%	18%	26%	24%	25%
	More traffic congestion than I expected	19%	11%	5%	2%	11%
	TOTAL	100%	100%	100%	100%	100%
	n =	464	512	414	339	396
Approximately, how many minutes have you been delayed due to traffic congestion in your current direction of travel?	I have not been delayed	68%	78%	86%	90%	80%
	Less than 5 minutes	9%	10%	5%	7%	8%
	5-10 minutes	8%	6%	6%	2%	7%
	11-20 minutes	6%	2%	2%	0%	3%
	21-30 minutes	4%	1%	1%	0%	1%
	31-44 minutes	2%	1%	0%	0%	0%
	45-60 minutes	1%	0%	0%	0%	0%
	More than 1 hour	1%	1%	0%	0%	0%
	TOTAL	100%	100%	100%	100%	100%
	n =	464	512	414	339	396



Table F. 50: Roadway Expectations and Wait Times by Segment – Part 2

Variable	Response	North Entrance to Mammoth	Norris Geyser Basin to Canyon Village	Madison Junction to Norris Geyser Basin	Dunraven Pass	Tower Falls to Lamar Valley
Currently, compared to what you expected, how much traffic congestion is present in your direction of travel?	Less traffic congestion than I expected	36%	46%	36%	36%	34%
	About the same as I expected	28%	26%	30%	30%	30%
	I didn't know what to expect	14%	24%	23%	27%	26%
	More traffic congestion than I expected	23%	4%	12%	7%	10%
	TOTAL	100%	100%	100%	100%	100%
	n =	103	390	563	353	129
Approximately, how many minutes have you been delayed due to traffic congestion in your current direction of travel?	I have not been delayed	91%	90%	81%	86%	78%
	Less than 5 minutes	3%	4%	5%	6%	11%
	5-10 minutes	5%	4%	5%	5%	6%
	11-20 minutes	1%	1%	3%	1%	2%
	21-30 minutes	1%	1%	1%	1%	1%
	31-44 minutes	0%	0%	3%	0%	1%
	45-60 minutes	0%	0%	0%	0%	1%
	More than 1 hour	0%	0%	0%	1%	0%
	TOTAL	100%	100%	100%	100%	100%
	n =	103	390	563	353	129



Table F. 51: Perceived Problems on Roadway by Segment – Part 1

<i>Variable</i>	<i>Response</i>	West Entrance to Madison Junction	Madison to Old Faithful	Old Faithful to West Thumb Geyser Basin	Lake Village to West Thumb Geyser Basin	Canyon Village to Fishing Bridge	North Entrance to Mammoth
Traffic congestion due to wildlife	Not a problem	66%	77%	87%	92%	71%	71%
	Small problem	18%	17%	10%	7%	20%	17%
	Moderate problem	10%	4%	2%	1%	5%	3%
	Big problem	5%	2%	0%	0%	3%	10%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	1.5	1.3	1.2	1.1	1.4	1.5
	n =	457	504	406	334	391	103
Traffic congestion due to too many vehicles	Not a problem	60%	65%	72%	88%	71%	63%
	Small problem	23%	19%	20%	9%	20%	17%
	Moderate problem	14%	13%	6%	2%	7%	6%
	Big problem	4%	4%	1%	0%	2%	14%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	1.6	1.6	1.4	1.2	1.4	1.7
	n =	456	501	406	333	387	103
Too many oversized vehicles (e.g., tour buses, RVs)	Not a problem	74%	75%	80%	90%	76%	69%
	Small problem	16%	14%	14%	8%	15%	15%
	Moderate problem	8%	7%	4%	2%	7%	3%
	Big problem	2%	3%	2%	1%	2%	14%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	1.4	1.4	1.3	1.1	1.3	1.6
	n =	455	501	405	331	390	103
Availability of parking at sites I wanted to visit	Not a problem	70%	55%	74%	89%	74%	61%
	Small problem	15%	17%	14%	8%	18%	18%
	Moderate problem	9%	19%	9%	3%	6%	9%
	Big problem	5%	9%	3%	0%	2%	12%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	1.5	1.8	1.4	1.1	1.4	1.7
	n =	449	496	389	326	385	102



Table F. 52: Perceived Problems on Roadway by Segment – Part 2

<i>Variable</i>	<i>Response</i>	North Entrance to Mammoth	Norris Geyser Basin to Canyon Village	Madison Junction to Norris Geyser Basin	Dunraven Pass	Tower Falls to Lamar Valley
Traffic congestion due to wildlife	Not a problem	71%	88%	83%	85%	64%
	Small problem	17%	9%	10%	10%	28%
	Moderate problem	3%	3%	3%	4%	5%
	Big problem	10%	1%	3%	1%	4%
	TOTAL	100%	100%	100%	100%	100%
	Average	1.5	1.2	1.3	1.2	1.5
	n =	103	386	556	347	129
Traffic congestion due to too many vehicles	Not a problem	63%	82%	70%	74%	76%
	Small problem	17%	13%	19%	19%	15%
	Moderate problem	6%	3%	9%	4%	7%
	Big problem	14%	1%	2%	3%	2%
	TOTAL	100%	100%	100%	100%	100%
	Average	1.7	1.2	1.4	1.4	1.4
	n =	103	387	556	345	129
Too many oversized vehicles (e.g., tour buses, RVs)	Not a problem	69%	84%	77%	78%	80%
	Small problem	15%	11%	16%	13%	11%
	Moderate problem	3%	3%	4%	5%	6%
	Big problem	14%	2%	3%	4%	3%
	TOTAL	100%	100%	100%	100%	100%
	Average	1.6	1.2	1.3	1.3	1.3
	n =	103	387	553	347	129
Availability of parking at sites I wanted to visit	Not a problem	61%	75%	63%	74%	78%
	Small problem	18%	12%	20%	15%	12%
	Moderate problem	9%	10%	10%	7%	8%
	Big problem	12%	2%	7%	5%	3%
	TOTAL	100%	100%	100%	100%	100%
	Average	1.7	1.4	1.6	1.4	1.4
	n =	102	383	533	347	129



Table F. 53: Roadway Frustration and Overall Experience by Segment - Part 1

<i>Variable</i>	<i>Response</i>	West Entrance to Madison Junction	Madison to Old Faithful	Old Faithful to West Thumb Geyser Basin	Lake Village to West Thumb Geyser Basin	Canyon Village to Fishing Bridge	North Entrance to Mammoth
How frustrated are you with the amount of time you have spent in traffic congestion behind other vehicles?	Not at all frustrated	65%	70%	80%	90%	79%	63%
	Slightly frustrated	21%	19%	14%	7%	14%	16%
	Moderately frustrated	9%	5%	4%	2%	4%	8%
	Frustrated	2%	3%	1%	0%	1%	12%
	Very frustrated	3%	2%	1%	1%	1%	2%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	1.6	1.5	1.3	1.1	1.3	1.7
	n =	452	480	390	329	377	101
Other than weather conditions, how would you rate your experience right now?	Very poor	1%	0%	0%	0%	0%	0%
	Poor	2%	0%	1%	0%	1%	0%
	Fair	8%	8%	6%	4%	8%	17%
	Good	38%	44%	40%	43%	37%	38%
	Excellent	52%	48%	53%	52%	55%	45%
	TOTAL	100%	100%	100%	100%	100%	100%
	Average	4.4	4.4	4.4	4.5	4.4	4.3
	n =	439	472	381	322	368	99



Table F. 54: Roadway Frustration and Overall Experience by Segment - Part 2

Variable	Response	North Entrance to Mammoth	Norris Geyser Basin to Canyon Village	Madison Junction to Norris Geyser Basin	Dunraven Pass	Tower Falls to Lamar Valley
How frustrated are you with the amount of time you have spent in traffic congestion behind other vehicles?	Not at all frustrated	63%	83%	72%	79%	80%
	Slightly frustrated	16%	13%	15%	13%	14%
	Moderately frustrated	8%	2%	10%	4%	3%
	Frustrated	12%	1%	1%	1%	2%
	Very frustrated	2%	1%	2%	3%	1%
	TOTAL	100%	100%	100%	100%	100%
	Average	1.7	1.2	1.5	1.3	1.3
	n =	101	375	541	333	121
Other than weather conditions, how would you rate your experience right now?	Very poor	0%	0%	1%	2%	0%
	Poor	0%	1%	2%	1%	1%
	Fair	17%	8%	8%	8%	4%
	Good	38%	38%	42%	33%	29%
	Excellent	45%	53%	47%	56%	67%
	TOTAL	100%	100%	100%	100%	100%
	Average	4.3	4.4	4.3	4.4	4.6
	n =	99	372	531	332	119



Appendix G: Geofence Significance Testing Tables

Table G. 1: ANOVA Posthoc – How acceptable was the amount of time you spent looking for parking? By Site

Site	Item	Mean Difference	Std. Error	Sig.
North/South Rim Area	North/South Rim Area	N/A	N/A	N/A
	Old Faithful Area	-0.188	0.094	0.686
	Fairy Falls Parking Area	0.351	0.136	0.149
	Midway Geyser Area	.658*	0.107	0.000
	Norris Geyser Area	0.217	0.106	0.616
	Canyon Village	-.344*	0.103	0.013
Old Faithful Area	North/South Rim Area	0.188	0.094	0.686
	Old Faithful Area	N/A	N/A	N/A
	Fairy Falls Parking Area	.539*	0.127	0.000
	Midway Geyser Area	.846*	0.096	0.000
	Norris Geyser Area	.406*	0.095	0.000
	Canyon Village	-0.155	0.091	1.000
Fairy Falls Area	North/South Rim Area	-0.351	0.136	0.149
	Old Faithful Area	-.539*	0.127	0.000
	Fairy Falls Parking Area	N/A	N/A	N/A
	Midway Geyser Area	0.307	0.137	0.380
	Norris Geyser Area	-0.133	0.137	1.000
	Canyon Village	-.694*	0.134	0.000
Midway Geyser Area	North/South Rim Area	-.658*	0.107	0.000
	Old Faithful Area	-.846*	0.096	0.000
	Fairy Falls Parking Area	-0.307	0.137	0.380
	Midway Geyser Area	N/A	N/A	N/A
	Norris Geyser Area	-.440*	0.108	0.001
	Canyon Village	-1.001*	0.104	0.000
Norris Geyser Area	North/South Rim Area	-0.217	0.106	0.616
	Old Faithful Area	-.406*	0.095	0.000
	Fairy Falls Parking Area	0.133	0.137	1.000
	Midway Geyser Area	.440*	0.108	0.001
	Norris Geyser Area	N/A	N/A	N/A
	Canyon Village	-.561*	0.104	0.000
Canyon Village	North/South Rim Area	.344*	0.103	0.013
	Old Faithful Area	0.155	0.091	1.000
	Fairy Falls Parking Area	.694*	0.134	0.000
	Midway Geyser Area	1.001*	0.104	0.000
	Norris Geyser Area	.561*	0.104	0.000
	Canyon Village	N/A	N/A	N/A

*Scale: 1="Not at all acceptable" to 5="Completely acceptable."



Table G. 2: ANOVA Effect Sizes: Parking Acceptability by Site

<u>Variable</u>	<u>Eta</u>	<u>Eta Squared</u>
How acceptable was the amount of time you spent looking for parking?	.268	.072



Table G. 3: ANOVA Posthoc – Perceived Crowding by Site

Site	Item	Mean Difference	Std. Error	Sig.
North/South Rim Area	North/South Rim Area	N/A	N/A	N/A
	Old Faithful Area	-0.093	0.089	1.000
	Fairy Falls Parking Area	-.447*	0.129	0.008
	Midway Geyser Area	-.349*	0.101	0.009
	Norris Geyser Area	.328*	0.101	0.017
	Canyon Village	.469*	0.097	0.000
Old Faithful Area	North/South Rim Area	0.093	0.089	1.000
	Old Faithful Area	N/A	N/A	N/A
	Fairy Falls Parking Area	-0.354	0.121	0.052
	Midway Geyser Area	-0.256	0.091	0.074
	Norris Geyser Area	.421*	0.090	0.000
	Canyon Village	.562*	0.086	0.000
Fairy Falls Area	North/South Rim Area	.447*	0.129	0.008
	Old Faithful Area	0.354	0.121	0.052
	Fairy Falls Parking Area	N/A	N/A	N/A
	Midway Geyser Area	0.098	0.130	1.000
	Norris Geyser Area	.775*	0.130	0.000
	Canyon Village	.916*	0.127	0.000
Midway Geyser Area	North/South Rim Area	.349*	0.101	0.009
	Old Faithful Area	0.256	0.091	0.074
	Fairy Falls Parking Area	-0.098	0.130	1.000
	Midway Geyser Area	N/A	N/A	N/A
	Norris Geyser Area	.677*	0.102	0.000
	Canyon Village	.818*	0.099	0.000
Norris Geyser Area	North/South Rim Area	-.328*	0.101	0.017
	Old Faithful Area	-.421*	0.090	0.000
	Fairy Falls Parking Area	-.775*	0.130	0.000
	Midway Geyser Area	-.677*	0.102	0.000
	Norris Geyser Area	N/A	N/A	N/A
	Canyon Village	0.141	0.098	1.000
Canyon Village	North/South Rim Area	-.469*	0.097	0.000
	Old Faithful Area	-.562*	0.086	0.000
	Fairy Falls Parking Area	-.916*	0.127	0.000
	Midway Geyser Area	-.818*	0.099	0.000
	Norris Geyser Area	-0.141	0.098	1.000
	Canyon Village	N/A	N/A	N/A

*Scale: 1="Not at all crowded" to 5="Extremely crowded"



Table G. 4: ANOVA Effect Sizes: Perceived Crowding by Site

<u>Variable</u>	<u>Eta</u>	<u>Eta Squared</u>
How crowded did you feel at this attraction in Yellowstone NP today?	.257	.066



Table G. 5: ANOVA Posthoc - Availability of Parking by Site

Site	Item	Mean Difference	Std. Error	Sig.
North/South Rim Area	North/South Rim Area	N/A	N/A	N/A
	Old Faithful Area	0.172	0.078	0.411
	Fairy Falls Parking Area	-.600*	0.112	0.000
	Midway Geyser Area	-.767*	0.088	0.000
	Norris Geyser Area	-0.168	0.088	0.843
	Canyon Village	.384*	0.085	0.000
Old Faithful Area	North/South Rim Area	-0.172	0.078	0.411
	Old Faithful Area	N/A	N/A	N/A
	Fairy Falls Parking Area	-.772*	0.106	0.000
	Midway Geyser Area	-.938*	0.080	0.000
	Norris Geyser Area	-.340*	0.079	0.000
	Canyon Village	0.212	0.076	0.077
Fairy Falls Area	North/South Rim Area	.600*	0.112	0.000
	Old Faithful Area	.772*	0.106	0.000
	Fairy Falls Parking Area	N/A	N/A	N/A
	Midway Geyser Area	-0.167	0.114	1.000
	Norris Geyser Area	.432*	0.113	0.002
	Canyon Village	.983*	0.111	0.000
Midway Geyser Area	North/South Rim Area	.767*	0.088	0.000
	Old Faithful Area	.938*	0.080	0.000
	Fairy Falls Parking Area	0.167	0.114	1.000
	Midway Geyser Area	N/A	N/A	N/A
	Norris Geyser Area	.599*	0.089	0.000
	Canyon Village	1.150*	0.086	0.000
Norris Geyser Area	North/South Rim Area	0.168	0.088	0.843
	Old Faithful Area	.340*	0.079	0.000
	Fairy Falls Parking Area	-.432*	0.113	0.002
	Midway Geyser Area	-.599*	0.089	0.000
	Norris Geyser Area	N/A	N/A	N/A
	Canyon Village	.552*	0.086	0.000
Canyon Village	North/South Rim Area	-.384*	0.085	0.000
	Old Faithful Area	-0.212	0.076	0.077
	Fairy Falls Parking Area	-.983*	0.111	0.000
	Midway Geyser Area	-1.150*	0.086	0.000
	Norris Geyser Area	-.552*	0.086	0.000
	Canyon Village	N/A	N/A	N/A

*Scale: 1="Not a problem" to 4="Big problem"



Table G. 6: ANOVA Posthoc - People Walking On, Across, or Along the Road by Site

Site	Item	Mean Difference	Std. Error	Sig.
North/South Rim Area	North/South Rim Area	N/A	N/A	N/A
	Old Faithful Area	-0.143	0.066	0.461
	Fairy Falls Parking Area	-0.139	0.096	1.000
	Midway Geyser Area	-.330*	0.075	0.000
	Norris Geyser Area	-0.067	0.075	1.000
	Canyon Village	0.049	0.073	1.000
Old Faithful Area	North/South Rim Area	0.143	0.066	0.461
	Old Faithful Area	N/A	N/A	N/A
	Fairy Falls Parking Area	0.004	0.090	1.000
	Midway Geyser Area	-0.187	0.068	0.089
	Norris Geyser Area	0.076	0.067	1.000
	Canyon Village	.192*	0.065	0.047
Fairy Falls Area	North/South Rim Area	0.139	0.096	1.000
	Old Faithful Area	-0.004	0.090	1.000
	Fairy Falls Parking Area	N/A	N/A	N/A
	Midway Geyser Area	-0.191	0.097	0.742
	Norris Geyser Area	0.072	0.097	1.000
	Canyon Village	0.188	0.095	0.727
Midway Geyser Area	North/South Rim Area	.330*	0.075	0.000
	Old Faithful Area	0.187	0.068	0.089
	Fairy Falls Parking Area	0.191	0.097	0.742
	Midway Geyser Area	N/A	N/A	N/A
	Norris Geyser Area	.263*	0.076	0.009
	Canyon Village	.379*	0.074	0.000
Norris Geyser Area	North/South Rim Area	0.067	0.075	1.000
	Old Faithful Area	-0.076	0.067	1.000
	Fairy Falls Parking Area	-0.072	0.097	1.000
	Midway Geyser Area	-.263*	0.076	0.009
	Norris Geyser Area	N/A	N/A	N/A
	Canyon Village	0.116	0.074	1.000
Canyon Village	North/South Rim Area	-0.049	0.073	1.000
	Old Faithful Area	-.192*	0.065	0.047
	Fairy Falls Parking Area	-0.188	0.095	0.727
	Midway Geyser Area	-.379*	0.074	0.000
	Norris Geyser Area	-0.116	0.074	1.000
	Canyon Village	N/A	N/A	N/A

*Scale: 1="Not a problem" to 4="Big problem"



Table G. 7: ANOVA Posthoc - Too Many People by Site

Site	Item	Mean Difference	Std. Error	Sig.
North/South Rim Area	North/South Rim Area	N/A	N/A	N/A
	Old Faithful Area	-0.141	0.076	0.958
	Fairy Falls Parking Area	-.489*	0.111	0.000
	Midway Geyser Area	-.512*	0.087	0.000
	Norris Geyser Area	0.155	0.086	1.000
	Canyon Village	.264*	0.084	0.024
Old Faithful Area	North/South Rim Area	0.141	0.076	0.958
	Old Faithful Area	N/A	N/A	N/A
	Fairy Falls Parking Area	-.347*	0.104	0.013
	Midway Geyser Area	-.371*	0.078	0.000
	Norris Geyser Area	.296*	0.077	0.002
	Canyon Village	.405*	0.075	0.000
Fairy Falls Area	North/South Rim Area	.489*	0.111	0.000
	Old Faithful Area	.347*	0.104	0.013
	Fairy Falls Parking Area	N/A	N/A	N/A
	Midway Geyser Area	-0.023	0.112	1.000
	Norris Geyser Area	.643*	0.112	0.000
	Canyon Village	.753*	0.110	0.000
Midway Geyser Area	North/South Rim Area	.512*	0.087	0.000
	Old Faithful Area	.371*	0.078	0.000
	Fairy Falls Parking Area	0.023	0.112	1.000
	Midway Geyser Area	N/A	N/A	N/A
	Norris Geyser Area	.667*	0.088	0.000
	Canyon Village	.776*	0.085	0.000
Norris Geyser Area	North/South Rim Area	-0.155	0.086	1.000
	Old Faithful Area	-.296*	0.077	0.002
	Fairy Falls Parking Area	-.643*	0.112	0.000
	Midway Geyser Area	-.667*	0.088	0.000
	Norris Geyser Area	N/A	N/A	N/A
	Canyon Village	0.109	0.085	1.000
Canyon Village	North/South Rim Area	0.109	0.085	1.000
	Old Faithful Area	-.264*	0.084	0.024
	Fairy Falls Parking Area	-.405*	0.075	0.000
	Midway Geyser Area	-.753*	0.110	0.000
	Norris Geyser Area	-.776*	0.085	0.000
	Canyon Village	N/A	N/A	N/A

*Scale: 1="Not a problem" to 4="Big problem"



Table G. 8: ANOVA Posthoc - Traffic Congestion by Site

Site	Item	Mean Difference	Std. Error	Sig.
North/South Rim Area	North/South Rim Area	N/A	N/A	N/A
	Old Faithful Area	0.040	0.076	1.000
	Fairy Falls Parking Area	-.396*	0.110	0.005
	Midway Geyser Area	-.721*	0.086	0.000
	Norris Geyser Area	-0.151	0.087	1.000
	Canyon Village	0.232	0.083	0.081
Old Faithful Area	North/South Rim Area	-0.040	0.076	1.000
	Old Faithful Area	N/A	N/A	N/A
	Fairy Falls Parking Area	-.435*	0.103	0.000
	Midway Geyser Area	-.761*	0.078	0.000
	Norris Geyser Area	-0.190	0.078	0.219
	Canyon Village	0.193	0.074	0.146
Fairy Falls Area	North/South Rim Area	.396*	0.110	0.005
	Old Faithful Area	.435*	0.103	0.000
	Fairy Falls Parking Area	N/A	N/A	N/A
	Midway Geyser Area	-0.326	0.111	0.051
	Norris Geyser Area	0.245	0.111	0.416
	Canyon Village	.628*	0.109	0.000
Midway Geyser Area	North/South Rim Area	.721*	0.086	0.000
	Old Faithful Area	.761*	0.078	0.000
	Fairy Falls Parking Area	0.326	0.111	0.051
	Midway Geyser Area	N/A	N/A	N/A
	Norris Geyser Area	.571*	0.088	0.000
	Canyon Village	.954*	0.085	0.000
Norris Geyser Area	North/South Rim Area	0.151	0.087	1.000
	Old Faithful Area	0.190	0.078	0.219
	Fairy Falls Parking Area	-0.245	0.111	0.416
	Midway Geyser Area	-.571*	0.088	0.000
	Norris Geyser Area	N/A	N/A	N/A
	Canyon Village	.383*	0.085	0.000
Canyon Village	North/South Rim Area	-0.232	0.083	0.081
	Old Faithful Area	-0.193	0.074	0.146
	Fairy Falls Parking Area	-.628*	0.109	0.000
	Midway Geyser Area	-.954*	0.085	0.000
	Norris Geyser Area	-.383*	0.085	0.000
	Canyon Village	N/A	N/A	N/A

*Scale: 1="Not a problem" to 4="Big problem"



Table G. 9: ANOVA Posthoc - Other People Acting Unsafe Around Thermal Features by Site

Site	Item	Mean Difference	Std. Error	Sig.
North/South Rim Area	North/South Rim Area	N/A	N/A	N/A
	Old Faithful Area	-0.056	0.064	1.000
	Fairy Falls Parking Area	-0.222	0.089	0.194
	Midway Geyser Area	-.341*	0.072	0.000
	Norris Geyser Area	0.004	0.072	1.000
	Canyon Village	0.051	0.072	1.000
Old Faithful Area	North/South Rim Area	0.056	0.064	1.000
	Old Faithful Area	N/A	N/A	N/A
	Fairy Falls Parking Area	-0.166	0.081	0.610
	Midway Geyser Area	-.285*	0.062	0.000
	Norris Geyser Area	0.060	0.061	1.000
	Canyon Village	0.107	0.062	1.000
Fairy Falls Area	North/South Rim Area	0.222	0.089	0.194
	Old Faithful Area	0.166	0.081	0.610
	Fairy Falls Parking Area	N/A	N/A	N/A
	Midway Geyser Area	-0.119	0.088	1.000
	Norris Geyser Area	0.226	0.087	0.144
	Canyon Village	.273*	0.088	0.029
Midway Geyser Area	North/South Rim Area	.341*	0.072	0.000
	Old Faithful Area	.285*	0.062	0.000
	Fairy Falls Parking Area	0.119	0.088	1.000
	Midway Geyser Area	N/A	N/A	N/A
	Norris Geyser Area	.345*	0.069	0.000
	Canyon Village	.392*	0.070	0.000
Norris Geyser Area	North/South Rim Area	-0.004	0.072	1.000
	Old Faithful Area	-0.060	0.061	1.000
	Fairy Falls Parking Area	-0.226	0.087	0.144
	Midway Geyser Area	-.345*	0.069	0.000
	Norris Geyser Area	N/A	N/A	N/A
	Canyon Village	0.047	0.070	1.000
Canyon Village	North/South Rim Area	-0.051	0.072	1.000
	Old Faithful Area	-0.107	0.062	1.000
	Fairy Falls Parking Area	-.273*	0.088	0.029
	Midway Geyser Area	-.392*	0.070	0.000
	Norris Geyser Area	-0.047	0.070	1.000
	Canyon Village	N/A	N/A	N/A

*Scale: 1="Not a problem" to 4="Big problem"



Table G. 10: ANOVA Posthoc - Other People Acting Unsafe Around Wildlife by Site

Site	Item	Mean Difference	Std. Error	Sig.
North/South Rim Area	North/South Rim Area	N/A	N/A	N/A
	Old Faithful Area	0.021	0.063	1.000
	Fairy Falls Parking Area	-0.101	0.087	1.000
	Midway Geyser Area	-.220*	0.071	0.030
	Norris Geyser Area	0.045	0.070	1.000
	Canyon Village	-0.017	0.070	1.000
Old Faithful Area	North/South Rim Area	-0.021	0.063	1.000
	Old Faithful Area	N/A	N/A	N/A
	Fairy Falls Parking Area	-0.122	0.081	1.000
	Midway Geyser Area	-.241*	0.063	0.002
	Norris Geyser Area	0.024	0.063	1.000
	Canyon Village	-0.038	0.062	1.000
Fairy Falls Area	North/South Rim Area	0.101	0.087	1.000
	Old Faithful Area	0.122	0.081	1.000
	Fairy Falls Parking Area	N/A	N/A	N/A
	Midway Geyser Area	-0.119	0.088	1.000
	Norris Geyser Area	0.146	0.087	1.000
	Canyon Village	0.084	0.086	1.000
Midway Geyser Area	North/South Rim Area	.220*	0.071	0.030
	Old Faithful Area	.241*	0.063	0.002
	Fairy Falls Parking Area	0.119	0.088	1.000
	Midway Geyser Area	N/A	N/A	N/A
	Norris Geyser Area	.264*	0.070	0.003
	Canyon Village	0.203	0.070	0.054
Norris Geyser Area	North/South Rim Area	-0.045	0.070	1.000
	Old Faithful Area	-0.024	0.063	1.000
	Fairy Falls Parking Area	-0.146	0.087	1.000
	Midway Geyser Area	-.264*	0.070	0.003
	Norris Geyser Area	N/A	N/A	N/A
	Canyon Village	-0.061	0.069	1.000
Canyon Village	North/South Rim Area	0.017	0.070	1.000
	Old Faithful Area	0.038	0.062	1.000
	Fairy Falls Parking Area	-0.084	0.086	1.000
	Midway Geyser Area	-0.203	0.070	0.054
	Norris Geyser Area	0.061	0.069	1.000
	Canyon Village	N/A	N/A	N/A

*Scale: 1="Not a problem" to 4="Big problem"



Table G. 11: ANOVA Posthoc - Feeling Safe on Boardwalks Around Other People by Site

Site	Item	Mean Difference	Std. Error	Sig.
North/South Rim Area	North/South Rim Area	N/A	N/A	N/A
	Old Faithful Area	0.077	0.049	1.000
	Fairy Falls Parking Area	-0.006	0.073	1.000
	Midway Geyser Area	-.230*	0.055	0.001
	Norris Geyser Area	0.046	0.055	1.000
	Canyon Village	0.120	0.057	0.516
Old Faithful Area	North/South Rim Area	-0.077	0.049	1.000
	Old Faithful Area	N/A	N/A	N/A
	Fairy Falls Parking Area	-0.083	0.068	1.000
	Midway Geyser Area	-.307*	0.049	0.000
	Norris Geyser Area	-0.031	0.049	1.000
	Canyon Village	0.044	0.051	1.000
Fairy Falls Area	North/South Rim Area	0.006	0.073	1.000
	Old Faithful Area	0.083	0.068	1.000
	Fairy Falls Parking Area	N/A	N/A	N/A
	Midway Geyser Area	-.224*	0.073	0.032
	Norris Geyser Area	0.052	0.073	1.000
	Canyon Village	0.126	0.074	1.000
Midway Geyser Area	North/South Rim Area	.230*	0.055	0.001
	Old Faithful Area	.307*	0.049	0.000
	Fairy Falls Parking Area	.224*	0.073	0.032
	Midway Geyser Area	N/A	N/A	N/A
	Norris Geyser Area	.276*	0.055	0.000
	Canyon Village	.350*	0.057	0.000
Norris Geyser Area	North/South Rim Area	-0.046	0.055	1.000
	Old Faithful Area	0.031	0.049	1.000
	Fairy Falls Parking Area	-0.052	0.073	1.000
	Midway Geyser Area	-.276*	0.055	0.000
	Norris Geyser Area	N/A	N/A	N/A
	Canyon Village	0.074	0.057	1.000
Canyon Village	North/South Rim Area	-0.120	0.057	0.516
	Old Faithful Area	-0.044	0.051	1.000
	Fairy Falls Parking Area	-0.126	0.074	1.000
	Midway Geyser Area	-.350*	0.057	0.000
	Norris Geyser Area	-0.074	0.057	1.000
	Canyon Village	N/A	N/A	N/A

*Scale: 1="Not a problem" to 4="Big problem"



Table G. 12: ANOVA Posthoc - Availability of Restrooms by Site

Site	Item	Mean Difference	Std. Error	Sig.
North/South Rim Area	North/South Rim Area	N/A	N/A	N/A
	Old Faithful Area	0.238	0.082	0.057
	Fairy Falls Parking Area	-.739*	0.142	0.000
	Midway Geyser Area	-.557*	0.095	0.000
	Norris Geyser Area	-0.038	0.093	1.000
	Canyon Village	.401*	0.089	0.000
Old Faithful Area	North/South Rim Area	-0.238	0.082	0.057
	Old Faithful Area	N/A	N/A	N/A
	Fairy Falls Parking Area	-.977*	0.135	0.000
	Midway Geyser Area	-.795*	0.085	0.000
	Norris Geyser Area	-.276*	0.082	0.011
	Canyon Village	0.163	0.077	0.527
Fairy Falls Area	North/South Rim Area	.739*	0.142	0.000
	Old Faithful Area	.977*	0.135	0.000
	Fairy Falls Parking Area	N/A	N/A	N/A
	Midway Geyser Area	0.182	0.143	1.000
	Norris Geyser Area	.701*	0.141	0.000
	Canyon Village	1.140*	0.139	0.000
Midway Geyser Area	North/South Rim Area	.557*	0.095	0.000
	Old Faithful Area	.795*	0.085	0.000
	Fairy Falls Parking Area	-0.182	0.143	1.000
	Midway Geyser Area	N/A	N/A	N/A
	Norris Geyser Area	.519*	0.095	0.000
	Canyon Village	.958*	0.091	0.000
Norris Geyser Area	North/South Rim Area	0.038	0.093	1.000
	Old Faithful Area	.276*	0.082	0.011
	Fairy Falls Parking Area	-.701*	0.141	0.000
	Midway Geyser Area	-.519*	0.095	0.000
	Norris Geyser Area	N/A	N/A	N/A
	Canyon Village	.439*	0.088	0.000
Canyon Village	North/South Rim Area	-.401*	0.089	0.000
	Old Faithful Area	-0.163	0.077	0.527
	Fairy Falls Parking Area	-1.140*	0.139	0.000
	Midway Geyser Area	-.958*	0.091	0.000
	Norris Geyser Area	-.439*	0.088	0.000
	Canyon Village	N/A	N/A	N/A

*Scale: 1="Not a problem" to 4="Big problem"



Table G. 13: ANOVA Posthoc - Cleanliness of Restrooms by Site

Site	Item	Mean Difference	Std. Error	Sig.
North/South Rim Area	North/South Rim Area	N/A	N/A	N/A
	Old Faithful Area	.299*	0.090	0.014
	Fairy Falls Parking Area	-0.345	0.184	0.910
	Midway Geyser Area	-.436*	0.110	0.001
	Norris Geyser Area	-.653*	0.102	0.000
	Canyon Village	.320*	0.097	0.015
Old Faithful Area	North/South Rim Area	-.299*	0.090	0.014
	Old Faithful Area	N/A	N/A	N/A
	Fairy Falls Parking Area	-.645*	0.176	0.004
	Midway Geyser Area	-.735*	0.095	0.000
	Norris Geyser Area	-.953*	0.086	0.000
	Canyon Village	0.021	0.080	1.000
Fairy Falls Area	North/South Rim Area	0.345	0.184	0.910
	Old Faithful Area	.645*	0.176	0.004
	Fairy Falls Parking Area	N/A	N/A	N/A
	Midway Geyser Area	-0.091	0.187	1.000
	Norris Geyser Area	-0.308	0.182	1.000
	Canyon Village	.665*	0.179	0.003
Midway Geyser Area	North/South Rim Area	.436*	0.110	0.001
	Old Faithful Area	.735*	0.095	0.000
	Fairy Falls Parking Area	0.091	0.187	1.000
	Midway Geyser Area	N/A	N/A	N/A
	Norris Geyser Area	-0.217	0.107	0.627
	Canyon Village	.756*	0.102	0.000
Norris Geyser Area	North/South Rim Area	.653*	0.102	0.000
	Old Faithful Area	.953*	0.086	0.000
	Fairy Falls Parking Area	0.308	0.182	1.000
	Midway Geyser Area	0.217	0.107	0.627
	Norris Geyser Area	N/A	N/A	N/A
	Canyon Village	.973*	0.093	0.000
Canyon Village	North/South Rim Area	-.320*	0.097	0.015
	Old Faithful Area	-0.021	0.080	1.000
	Fairy Falls Parking Area	-.665*	0.179	0.003
	Midway Geyser Area	-.756*	0.102	0.000
	Norris Geyser Area	-.973*	0.093	0.000
	Canyon Village	N/A	N/A	N/A

*Scale: 1="Not a problem" to 4="Big problem"



Table G. 14: ANOVA Posthoc - Overall Experience by Site

Site	Item	Mean Difference	Std. Error	Sig.
North/South Rim Area	North/South Rim Area	N/A	N/A	N/A
	Old Faithful Area	-0.107	0.066	1.000
	Fairy Falls Parking Area	.384*	0.083	0.000
	Midway Geyser Area	.463*	0.068	0.000
	Norris Geyser Area	.237*	0.069	0.009
	Canyon Village	-0.054	0.070	1.000
Old Faithful Area	North/South Rim Area	0.107	0.066	1.000
	Old Faithful Area	N/A	N/A	N/A
	Fairy Falls Parking Area	.491*	0.078	0.000
	Midway Geyser Area	.569*	0.062	0.000
	Norris Geyser Area	.343*	0.063	0.000
	Canyon Village	0.052	0.064	1.000
Fairy Falls Area	North/South Rim Area	-.384*	0.083	0.000
	Old Faithful Area	-.491*	0.078	0.000
	Fairy Falls Parking Area	N/A	N/A	N/A
	Midway Geyser Area	0.078	0.080	1.000
	Norris Geyser Area	-0.147	0.081	1.000
	Canyon Village	-.438*	0.082	0.000
Midway Geyser Area	North/South Rim Area	-.463*	0.068	0.000
	Old Faithful Area	-.569*	0.062	0.000
	Fairy Falls Parking Area	-0.078	0.080	1.000
	Midway Geyser Area	N/A	N/A	N/A
	Norris Geyser Area	-.226*	0.066	0.009
	Canyon Village	-.517*	0.067	0.000
Norris Geyser Area	North/South Rim Area	-.237*	0.069	0.009
	Old Faithful Area	-.343*	0.063	0.000
	Fairy Falls Parking Area	0.147	0.081	1.000
	Midway Geyser Area	.226*	0.066	0.009
	Norris Geyser Area	N/A	N/A	N/A
	Canyon Village	-.291*	0.068	0.000
Canyon Village	North/South Rim Area	0.054	0.070	1.000
	Old Faithful Area	-0.052	0.064	1.000
	Fairy Falls Parking Area	.438*	0.082	0.000
	Midway Geyser Area	.517*	0.067	0.000
	Norris Geyser Area	.291*	0.068	0.000
	Canyon Village	N/A	N/A	N/A

*Scale: 1="Very poor" to 5="Excellent"



Table G. 15: ANOVA Effect Sizes: Perceived Problems by Site

<u>Variable</u>	<u>Eta</u>	<u>Eta Squared</u>
Availability of parking	.363	.132
People walking on/across/ along the road	.136	.018
Too many people	.267	.071
Traffic congestion	.299	.089
Other people acting unsafe around thermal features	.174	.030
Other people acting unsafe around wildlife	.121	.015
Feeling safe on boardwalks around other people	.186	.035
Availability of restrooms	.334	.111
Cleanliness of restrooms	.366	.134



Table G. 16: ANOVA Posthoc - Parking Acceptability by Month

<i>Month</i>	<i>Mean</i>	<i>Item</i>	<i>Mean Difference</i>	<i>Std. Error</i>	<i>Sig.</i>
May	3.96 (SD=1.185)	June	0.054	0.073	1.000
		July	.279*	0.075	0.002
		August	0.069	0.068	1.000
		September	-0.162	0.074	0.290
June	3.91 (SD=1.207)	May	-0.054	0.073	1.000
		July	.225*	0.074	0.025
		August	0.012	0.068	1.000
		September	-.224*	0.073	0.023
July	3.69 (SD=1.252)	May	-.279*	0.075	0.002
		June	-.225*	0.074	0.025
		August	-.210*	0.070	0.027
		September	-.441*	0.075	0.000
August	3.89 (SD=1.215)	May	-0.070	0.068	1.000
		June	-0.015	0.068	1.000
		July	.210*	0.070	0.027
		September	-.231*	0.069	0.008
September	4.12 (SD=1.108)	May	0.162	0.074	0.290
		June	.216*	0.073	0.033
		July	.441*	0.075	0.000
		August	.231*	0.069	0.008

Scale: 1="Not at all acceptable" to 5="completely acceptable"



Table G. 17: ANOVA Posthoc – How crowded did you feel at this attraction in Yellowstone NP today? by Month

Month	Mean	Item	Mean Difference	Std. Error	Sig.
May	2.15 (SD=1.03)	June	-.324	0.069	0.000
		July	-.673	0.071	0.000
		August	-.478	0.065	0.000
		September	-.297	0.070	0.000
June	2.48 (SD=1.17)	May	.324*	0.069	0.000
		July	-.349	0.070	0.000
		August	-.154	0.065	0.171
		September	.027	0.070	1.000
July	2.83 (SD=1.15)	May	.673	0.071	0.000
		June	.349	0.070	0.000
		August	.195	0.066	0.032
		September	.376	0.072	0.000
August	2.63 (SD=1.18)	May	.478	0.065	.000
		June	.154	0.065	.171
		July	-.195	0.066	.032
		September	.181	0.066	0.058
September	2.45 (SD=1.068)	May	.297	0.070	0.000
		June	-.027	0.070	1.000
		July	-.376	0.072	0.000
		August	-.186*	0.066	0.058

*Scale: 1="Not at all crowded" to 5="Extremely crowded"



Table G. 18: ANOVA Posthoc - Overall Experience by Month

Month	Mean	Item	Mean Difference	Std. Error	Sig.
May	4.24 (SD=.881)	June	0.003	0.050	1.000
		July	0.095	0.050	0.593
		August	0.024	0.047	1.000
		September	-0.115	0.051	0.237
June	4.24 (SD=.829)	May	-0.003	0.050	1.000
		July	0.092	0.050	0.636
		August	0.021	0.046	1.000
		September	-0.118	0.050	0.190
July	4.15 (SD=.940)	May	-0.095	0.050	0.593
		June	-0.092	0.050	0.636
		August	-0.071	0.046	1.000
		September	-.210*	0.051	0.000
August	4.22 (.804)	May	-0.024	0.047	1.000
		June	-0.021	0.046	1.000
		July	0.071	0.046	1.000
		September	-.139*	0.047	0.033
September	4.36 (SD=.819)	May	0.115	0.051	0.237
		June	0.118	0.050	0.190
		July	.210*	0.051	0.000
		August	.139*	0.047	0.033

*Scale: 1="Very poor" to 5="Excellent"

Table G. 19: ANOVA Effect Sizes: Parking, Crowding, and Experiences by Month

Variable	Eta	Eta Squared
How acceptable was the amount of time you spent looking for parking?	.112	.012
How crowded did you feel at this attraction in Yellowstone NP today?	.192	.037
Other than weather conditions, how would you rate your experience right now?	.075	.006

Table G. 20: ANOVA Posthoc - Parking Acceptability, Perceived Crowding, Overall Experience by Site Type



<i>Variable</i>	<i>Site Type</i>	<i>Mean</i>	<i>Item</i>	<i>Mean Difference</i>	<i>Std. Error</i>	<i>Sig.</i>
How acceptable was the amount of time you spent looking for parking?	High use	3.79 (SD=1.243)	Moderate use	-0.104	0.050	0.111
			Low use	-.642*	0.067	0.000
	Moderate use	3.89 (SD=1.169)	High use	0.104	0.050	0.111
			Low use	-.538*	0.071	0.000
	Low use	4.43 (SD=.961)	High use	.642*	0.067	0.000
			Moderate use	.538*	0.071	0.000
How crowded did you feel at this attraction in Yellowstone NP today?	High use	2.70 (SD=1.161)	Moderate use	.183*	0.047	0.000
			Low use	.824*	0.064	0.000
	Moderate use	2.51 (SD=1.107)	High use	-.183*	0.047	0.000
			Low use	.641*	0.068	0.000
	Low use	1.86 (SD=.916)	High use	-.824*	0.064	0.000
			Moderate use	-.641*	0.068	0.000
Other than weather conditions, how would you rate your experience right now?	High use	4.18 (SD=.854)	Moderate use	-0.030	0.034	1.000
			Low use	-.354*	0.047	0.000
	Moderate use	4.21 (SD=.899)	High use	0.030	0.034	1.000
			Low use	-.324*	0.050	0.000
	Low use	4.53 (SD=.675)	High use	.354*	0.047	0.000
			Moderate use	.324*	0.050	0.000

*Scale for parking acceptability: 1="Not at all acceptable" to 5="Completely acceptable"

*Scale for crowding: 1="Not at all crowded" to 5="Extremely crowded"

*Scale for experience: 1="Very poor" to 5="Excellent"



Table G. 21: ANOVA Effect Sizes: Parking, Crowding, and Experience by Site Type

Variable	Eta	Eta Squared
How acceptable was the amount of time you spent looking for parking?	.178	.032
How crowded did you feel at this attraction in Yellowstone NP today?	.239	.057
Other than weather conditions, how would you rate your experience right now?	.135	.018

Table G. 22: ANOVA Posthoc - Perceived Problems by Site Type – Part 1

Variable	Site Type	Mean	Item	Mean Difference	Std. Error	Sig.
Parking availability	High use	1.86 (SD=1.036)	Moderate use	0.060	0.042	0.448
			Low use	.535*	0.056	0.000
	Moderate use	1.81 (SD=.980)	High use	-0.060	0.042	0.448
			Low use	.475*	0.060	0.000
	Low use	1.33 (SD=.638)	High use	-.535*	0.056	0.000
			Moderate use	-.475*	0.060	0.000
People walking on, across, or along the road	High use	1.61 (SD=.835)	Moderate use	0.041	0.034	0.670
			Low use	.299*	0.046	0.000
	Moderate use	1.58 (SD=.778)	High use	-0.041	0.034	0.670
			Low use	.257*	0.049	0.000
	Low use	1.32 (SD=.610)	High use	-.299*	0.046	0.000
			Moderate use	-.257*	0.049	0.000
Too many people	High use	1.92 (SD=.987)	Moderate use	.149*	0.040	0.001
			Low use	.558*	0.054	0.000
	Moderate use	1.78 (SD=.926)	High use	-.149*	0.040	0.001
			Low use	.410*	0.058	0.000
	Low use	1.37 (SD=.668)	High use	-.558*	0.054	0.000
			Moderate use	-.410*	0.058	0.000

*Scale: 1="Not a problem" to 4="Big problem"



Table G. 23: ANOVA Posthoc - Perceived Problems by Site Type - Part 2

Variable	Site Type	Mean (SD)	Item	Mean Difference	Std. Error	Sig.
Traffic Congestion	High use	1.92 (SD=1.007)	Moderate use	.173*	0.040	0.000
			Low use	.508*	0.054	0.000
	Moderate use	1.75 (SD=.886)	High use	-.173*	0.040	0.000
			Low use	.335*	0.058	0.000
	Low use	1.42 (SD=.697)	High use	-.508*	0.054	0.000
			Moderate use	-.335*	0.058	0.000
Other people acting unsafe around geothermal features	High use	1.33 (SD=.737)	Moderate use	0.010	0.031	1.000
			Low use	.152*	0.043	0.001
	Moderate use	1.32 (SD=.692)	High use	-0.010	0.031	1.000
			Low use	.142*	0.046	0.006
	Low use	1.18 (SD=.484)	High use	-.152*	0.043	0.001
			Moderate use	-.142*	0.046	0.006
Other people acting unsafe around wildlife	High use	1.26 (SD=.719)	Moderate use	-0.103	0.034	0.186
			Low use	-.141*	0.045	0.005
	Moderate use	1.36 (SD=.727)	High use	0.103	0.034	0.186
			Low use	-0.077	0.048	0.313
	Low use	1.44 (SD=.785)	High use	.141*	0.045	0.005
			Moderate use	0.077	0.048	0.313

*Scale: 1="Not a problem" to 4="Big problem"



Table G. 24: ANOVA Posthoc – Perceived Problems by Site Type – Part 3

Variable	Site Type	Mean	Item	Mean Difference	Std. Error	Sig.
Feeling safe on boardwalks around other people	High use	1.26 (SD=.603)	Moderate use	0.052	0.025	0.111
			Low use	.110*	0.035	0.005
	Moderate use	1.21 (SD=.528)	High use	-0.052	0.025	0.111
			Low use	0.058	0.037	0.345
	Low use	1.15 (SD=.785)	High use	-.110*	0.035	0.005
			Moderate use	-0.058	0.037	0.345
Availability of restrooms	High use	1.68 (SD=.999)	Moderate use	0.033	0.043	1.000
			Low use	.372*	0.059	0.000
	Moderate use	1.65 (SD=.937)	High use	-0.033	0.043	1.000
			Low use	.339*	0.063	0.000
	Low use	1.31 (SD=.680)	High use	-.372*	0.059	0.000
			Moderate use	-.339*	0.063	0.000
Cleanliness of Restrooms	High use	1.86 (SD=1.049)	Moderate use	0.002	0.050	1.000
			Low use	0.139	0.069	0.130
	Moderate use	1.86 (SD=1.045)	High use	-0.002	0.050	1.000
			Low use	0.137	0.074	0.189
	Low use	1.72 (SD=.933)	High use	-0.139	0.069	0.130
			Moderate use	-0.137	0.074	0.189

*Scale: 1="Not a problem" to 4="Big problem"

Table G. 25: ANOVA Effect Sizes: Perceived Problems by Site Type

Variable	Eta	Eta Squared
Availability of parking	.181	.033
People walking on/across/ along the road	.125	.016
Too many people	.197	.039
Traffic congestion	.182	.033
Other people acting unsafe around thermal features	.073	.005
Other people acting unsafe around wildlife	.068	.005
Feeling safe on boardwalks around other people	.068	.005
Availability of restrooms	.130	.017
Cleanliness of restrooms	.045	.002



Table G. 26: ANOVA Posthoc - Roadway Problems by Month – Traffic Congestion Due to Wildlife

Month	Mean	Item	Mean Difference	Std. Error	Sig.
May	1.27 (SD=.667)	June	-0.024	0.035	1.000
		July	-0.030	0.036	1.000
		August	-0.023	0.034	1.000
		September	-0.061	0.037	0.993
June	1.29 (SD=.643)	May	0.024	0.035	1.000
		July	-0.006	0.036	1.000
		August	0.001	0.034	1.000
		September	-0.037	0.037	1.000
July	1.3 (SD=.637)	May	0.030	0.036	1.000
		June	0.006	0.036	1.000
		August	0.007	0.034	1.000
		September	-0.031	0.037	1.000
August	1.29 (SD=.671)	May	0.023	0.034	1.000
		June	-0.001	0.034	1.000
		July	-0.007	0.034	1.000
		September	-0.038	0.036	1.000
September	1.33 (SD=.727)	May	0.061	0.037	0.993
		June	0.037	0.037	1.000
		July	0.031	0.037	1.000
		August	0.038	0.036	1.000

*Scale: 1="Not a problem" to 4="Big problem"



Table G. 27: ANOVA Posthoc - Roadway Problems by Month – Traffic Congestion Due to Too Many Vehicles

Month	Mean	Item	Mean Difference	Std. Error	Sig.
May	1.34 (SD=.662)	June	-0.035	0.039	1.000
		July	-.157*	0.040	0.001
		August	-.114*	0.038	0.025
		September	-0.033	0.041	1.000
June	1.38 (SD=.708)	May	0.035	0.039	1.000
		July	-.123*	0.040	0.021
		August	-0.079	0.038	0.356
		September	0.001	0.041	1.000
July	1.5 (SD=.779)	May	.157*	0.040	0.001
		June	.123*	0.040	0.021
		August	0.043	0.038	1.000
		September	.124*	0.042	0.030
August	1.46 (SD=.813)	May	.114*	0.038	0.025
		June	0.079	0.038	0.356
		July	-0.043	0.038	1.000
		September	0.080	0.040	0.425
September	1.38 (SD=.734)	May	0.033	0.041	1.000
		June	-0.001	0.041	1.000
		July	-.124*	0.042	0.030
		August	-0.080	0.040	0.425

*Scale: 1="Not a problem" to 4="Big problem"



Table G. 28: ANOVA Posthoc - Roadway Problems by Month – Too Many Oversized Vehicles

Month	Mean	Item	Mean Difference	Std. Error	Sig.
May	1.29 (SD=.657)	June	0.006	0.036	1.000
		July	-0.078	0.037	0.347
		August	-0.034	0.035	1.000
		September	-0.051	0.038	1.000
June	1.28 (SD=.645)	May	-0.006	0.036	1.000
		July	-0.084	0.037	0.223
		August	-0.041	0.035	1.000
		September	-0.057	0.038	1.000
July	1.36 (SD=.725)	May	0.078	0.037	0.347
		June	0.084	0.037	0.223
		August	0.043	0.036	1.000
		September	0.027	0.039	1.000
August	1.32 (SD=.708)	May	0.034	0.035	1.000
		June	0.041	0.035	1.000
		July	-0.043	0.036	1.000
		September	-0.017	0.037	1.000
September	1.34 (SD=.702)	May	0.051	0.038	1.000
		June	0.057	0.038	1.000
		July	-0.027	0.039	1.000
		August	0.017	0.037	1.000

*Scale: 1="Not a problem" to 4="Big problem"



Table G. 29: ANOVA Posthoc - Roadway Problems by Month - Availability of Parking at Sites I Wanted to Visit

Month	Mean	Item	Mean Difference	Std. Error	Sig.
May	1.31 (SD=.672)	June	-.156*	0.045	0.005
		July	-.335*	0.045	0.000
		August	-.236*	0.043	0.000
		September	-0.115	0.047	0.144
June	1.47 (SD=.856)	May	.156*	0.045	0.005
		July	-.179*	0.046	0.001
		August	-0.080	0.043	0.630
		September	0.041	0.047	1.000
July	1.65 (SD=.834)	May	.335*	0.045	0.000
		June	.179*	0.046	0.001
		August	0.099	0.044	0.243
		September	.221*	0.048	0.000
August	1.55 (SD=.918)	May	.236*	0.043	0.000
		June	0.080	0.043	0.630
		July	-0.099	0.044	0.243
		September	0.122	0.046	0.076
September	1.43 (SD=.786)	May	0.115	0.047	0.144
		June	-0.041	0.047	1.000
		July	-.221*	0.048	0.000
		August	-0.122	0.046	0.076

*Scale: 1="Not a problem" to 4="Big problem"



Table G. 30: ANOVA Posthoc - Roadway Frustration by Month

Month	Mean	Item	Mean Difference	Std. Error	Sig.
May	1.34 (SD=.733)	June	-0.029	0.042	1.000
		July	-0.093	0.043	0.309
		August	0.002	0.041	1.000
		September	-0.073	0.044	0.994
June	1.37 (SD=.808)	May	0.029	0.042	1.000
		July	-0.064	0.043	1.000
		August	0.031	0.041	1.000
		September	-0.045	0.045	1.000
July	1.43 (SD=.852)	May	0.093	0.043	0.309
		June	0.064	0.043	1.000
		August	0.095	0.041	0.226
		September	0.019	0.045	1.000
August	1.34 (SD=.745)	May	-0.002	0.041	1.000
		June	-0.031	0.041	1.000
		July	-0.095	0.041	0.226
		September	-0.075	0.043	0.807
September	1.41 (SD=.848)	May	0.073	0.044	0.994
		June	0.045	0.045	1.000
		July	-0.019	0.045	1.000
		August	0.075	0.043	0.807

*Scale: 1="Not at all frustrated" to 5="Very frustrated"



Table G. 31: ANOVA Posthoc - Overall Experience on Roadway by Month

Month	Mean	Item	Mean Difference	Std. Error	Sig.
May	4.42 (SD=.733)	June	0.026	0.039	1.000
		July	0.068	0.039	0.793
		August	0.057	0.037	1.000
		September	-0.093	0.041	0.219
June	4.39 (SD=.734)	May	-0.026	0.039	1.000
		July	0.042	0.039	1.000
		August	0.031	0.037	1.000
		September	-.119*	0.041	0.034
July	4.35 (SD=.674)	May	-0.068	0.039	0.793
		June	-0.042	0.039	1.000
		August	-0.011	0.038	1.000
		September	-.161*	0.041	0.001
August	4.36 (SD=.708)	May	-0.057	0.037	1.000
		June	-0.031	0.037	1.000
		July	0.011	0.038	1.000
		September	-.150*	0.039	0.001
September	4.51 (SD=.737)	May	0.093	0.041	0.219
		June	.119*	0.041	0.034
		July	.161*	0.041	0.001
		August	.150*	0.039	0.001

*Scale: 1="Very poor" to 5="Excellent"



Appendix H: Intercept Study and Additional Segmentation Data

Table H. 1: Age Category by Month

Variable	Response	OVERALL	May	June	July	August	September
Age of respondent (Mean = 45.51)	18 - 24	12%	17%	13%	9%	11%	7%
	25 - 34	21%	28%	19%	14%	22%	24%
	35 - 44	16%	10%	16%	22%	15%	14%
	45 - 54	17%	11%	21%	25%	19%	10%
	55 - 64	16%	16%	14%	14%	17%	20%
	65 - 74	14%	15%	12%	10%	12%	22%
	75 +	3%	2%	3%	5%	3%	2%
	n=	2673	499	605	485	543	528
	Mean	45.51	43.3	44.86	46.6	45.54	48.1
	Standard Deviation	16.81	17.43	16.59	15.62	16.56	17.44

Table H. 2: Annual Household Income

Variable	Response	OVERALL	May	June	July	August	September
Which category best represents your annual household income?	Less than \$25,000	9%	13%	10%	7%	9%	7%
	\$25,000 to \$49,999	12%	10%	12%	11%	10%	14%
	\$50,000 to \$74,999	18%	20%	18%	17%	15%	19%
	\$75,000 to \$99,999	17%	18%	17%	16%	15%	21%
	\$100,000 to \$149,999	21%	22%	20%	19%	25%	19%
	\$150,000 to \$199,999	12%	17%	10%	14%	10%	10%
	\$200,000 or more	12%	0%	14%	16%	16%	12%
	TOTAL	100%	100%	100%	100%	100%	100%
	n =	2,283	469	519	407	470	418



Table H. 3: Respondent Gender

Variable	Response	OVERALL	May	June	July	August	September
What is your gender?	Male	51%	48%	51%	56%	55%	46%
	Female	49%	52%	49%	44%	45%	54%
	TOTAL	100%	100%	100%	100%	100%	100%
	n =	2,638	488	618	475	536	521

Table H. 4: Respondent Education

Variable	Response	OVERALL	May	June	July	Aug.	Sept.
What is the highest level of formal education completed?	Less than high school	1%	1%	2%	1%	1%	1%
	High school graduate	8%	8%	8%	8%	7%	11%
	Vocational/Trade school	2%	1%	2%	2%	2%	2%
	Some college	10%	9%	10%	10%	8%	11%
	Two-year college degree	7%	5%	7%	6%	9%	7%
	Bachelor's Degree	37%	34%	38%	39%	37%	37%
	Advanced Degree (M.S., Ph. D., M.D., JD, or equivalent)	35%	42%	33%	34%	36%	32%
	TOTAL	100%	100%	100%	100%	100%	100%
	n =	2,683	507	613	491	547	525

Table H. 5: Respondent Race

Variable	Response	OVERALL	Percent
Which of these categories best indicates your race?	American Indian or Alaska Native	34	1%
	Asian	444	17%
	Black or African American	21	<1%
	Native Hawaiian or Pacific Islander	16	<1%
	White	2178	82%
	TOTAL		
	Number of respondents who answered race question	2,648	
	Number of respondents who selected more than one race	39	
	Number of individuals who <i>did not</i> answer racial category	45	



Table H. 6: Top 10 Visitor Residence by State and International Country

US State	Frequency	Percent of U.S.	% out of all International: Country	Frequency	Percent of International
California	248	13%	China	149	23%
Texas	98	5%	Germany	93	14%
Florida	84	4%	Canada	92	14%
Washington	77	4%	France	74	11%
Utah	71	4%	Switzerland	38	6%
Colorado	70	4%	United Kingdom	35	5%
New York	69	4%	Netherlands	31	5%
Minnesota	63	3%	Denmark	15	2%
Idaho	63	3%	Australia	15	2%
Montana	56	3%	Spain	13	2%



Table H. 7: Where Visitors Could Not Visit and Where They Visited Instead

What Areas Visitors Could Not Visit	Where Visitor Went Instead
all but this old faithful area	na
All of them, didn't plan for how spread-out attractions are, old faithful timing was off and parking to bad to get into another	first geyser stop
along road to see wildlife	kept going
along road where wildlife was spotted	just kept today
artist point	no
artist point was closed	no
bike trails	geyser area
black sand	no
Blacktail drive	no
boiling river	none
boiling river	old faithful grand prismatic a picnic area mammoth hot springs biscuit basin
canyon lower falls hike. mt Washburn rd	clear lake hike
canyon	canyon visitor center
canyon	no
canyon area	kept going
canyon area	kept going
Canyon village	biscuit basin
canyon, lake, and mammoth	none
closed vista points	other vista points and trails
don't k	na
Dunraven pass,	all of them
eastern side	all western side locations
fairy falls	old faithful
fairy falls, mystic falls plus one other then also lake lookout. four locations we were unable to go along	west thumb old faithful biscuit basin
fairy falls, uncle toms	saw more thermal features
faithful	na
fire hole lake, rapids	everything else
Firehole canyon drive, fire lake loop, fairy falls	black sand basin then old faithful
Firehole falls	Grand Canyon
Firehole lake loop	fountain paint pot
Firehole loop, fountain flats	Grand prismatic
fireside drive	none
fishing bridge	kept going
fishing bridge visitor center was closed	canyon village
fishing village visitors center and museum	lake hotel
forces northern range being paved, fishing bridge area under const.	none
geysers	Norris geyser basin



What Areas Visitors Could Not Visit	Where Visitor Went Instead
gibbon falls	none, will try and go back later today
grand canyon	just kept trying
Grand Canyon	Norris
Grand Canyon of Yellowstone	All of the geysers
grand canyon,	no
Grand perismice hot springs	old faithful
grand prismatic	old faithful
grand prismatic	old faithful portion of park
Grand prismatic spring	mammoth terrace
Grand Prismatic spring because rain created thick fog around it.	mammoth springs
heydey valley	not sure
I love the lake areas, and it has been rainy. I have been laying low, so I haven't done a lot	near North entrance
inspiration point	artist point
inspiration point	none
inspiration point	upper falls
inspiration point,	rims trail
Inspiration Point, Artists Point.	All along the geyser drive
juststarred	dream to get here
lake	west thumb hike
lamaar	na
lamar	Hayden
Lamar	not sure yet
lamar	old faithful lake lodge
Lamar valley	midway
lewis lake	no
lone star-snow	no
lots of trails	moved towards tetons
lower and middle	up to Lamar Valley
lower falls	mammoth hot springs
lower falls overlook (inspiration point)	none
mamath	Canyon
mammoth	closest site
mammoth	go faster
mammoth	lamar
mammoth	no
mammoth	Norris old faithful east entry
mammoth hot sprimvs	lamar valley



What Areas Visitors Could Not Visit	Where Visitor Went Instead
mammoth springs	old faithful, Norris, canyon, upper and lower falls, lake, west thumb
Mid geyser basin, south rim	all others
Mid Gyser Basin	None
midway	All the others.
midway	drove on past stopped at biscuit basin
midway	just kept going
midway	just kept trying to go back
midway	kept going
midway	kept on going
midway	kept on going
midway	no
midway	no
midway	no
midway	none
midway	rearrange schedule
midway basin	old faithful
Midway Geyser	Old Faithful
midway geyser badin	on their way back to cg
midway geyser basin	no
midway geyser basin	other geyser basins
midway, biscuit basin	kept going
most of the geysers	not instead. just haven't gotten there yet
mount washburn	canyon village
Mount Washburn	Cascade Lake Trail
mount washburn	Osprey falls
mount washburn	upper loop Lamar valley, canyon waterfall
mount washburn, toms thumb	grand canyon
mount Washburn,uncle Tom trail	none
mt washburn	madison camo spot
mt washburn	mammoth
mt washburn closed	more time at canyon
mt washburn,vuncle Toms	no
mud pots and grand prismatic. too many cars backed up, could not enter.	fire hole loop, bisquit basin
mystic falls, fairy falls, a couple more hiking trails and some road drives	biscuit basin and black sand basin
na	Yellowstone
norris	kept going
norris	kept going
norris	kept on going



What Areas Visitors Could Not Visit	Where Visitor Went Instead
Norris geyser and Mammoth	none
Norris, Inspiration Point (closed)	Old Faithful area
norris, mammoth	canyon
north entrance	none
north rim canyon trail	lower falls overlook
north rim, south rim	West thumb
northern park	faithful
not enough time	kept gong
not yet finished	na
obsidian cliffs	mammoth
old faithfall	canyon
old faithful	fountain paint pot
old faithful	just kept going
old faithful	mammoth hot springs
old faithful	na
old faithful	no, will visit OF earlier in the day later
old faithful	towe falls
old faithful, canyon area, mammoth springs.	paint pots, Aldridge visitor center.
old faithful, tower fall, grand prismatic spring, inspiration point	grand view, look out point, yellowstone lake, upper falls, mud volcano, roaring mountain
onevpullboff at Lewis Canyon	next pull off
osprey falls, sky rim	a lot
other parking areas, midway geyser basin	mystic falls
paint pots	grand prismatic
petrified tree	next stop
picnic area	next picnic area
picnic area by fishing bridge	came to lake
prism	nothing yet
prismatic	old faithful
Prysam, different trails were closed	non
pull off by lake	West thumb
pull offs	keep going
ran out of time	none
road to mount washburn	fire exhibit
roaring mt,	no
Roosevelt	Mammoth
roosevelt tower	all the rest
scenic overlook, uncle tom, artist and inspiration	north rim
some of the spots i wanted to see are still closed for the winter	the north loop due to snow
some of the trails as they are still closed	falls



What Areas Visitors Could Not Visit	Where Visitor Went Instead
south rim closed	mud volcano
South Rim Trail	Artists Point
south rim trail	Lamarr Valley
south side	north ans west
the rest of the park because we only have time for on loop.	gysers
tom area	many other locations
too far distances for two days	lower terrace. prismatic hole.bisons.marmot
too much	San Francisco.las vegas.monument valley. national parcs
tower falls	mammoth geysirs
tower falls	not surevyet
tower falls, could not get through uncle tom's area on rim trail	none
trails	go to thermal features, lake Yellowstone
trails	old faithful
trails by old faithful area	norris and mammoth springs
trails, fairy falls, grand prismatic overlook, uncle tom	instead of canyon went to artist point to fishing bridge.
trails, fountain flats	old faithful
uncle tpms cabin. s rim trail inspiration point	boiling river or firehole
uncle tom	artist point
uncle tom	kept moving to next destination
uncle tom s trail	artist point
uncle tom s trail	artist poiny
uncle tom trail	na
uncle tom trail	none
uncle tom trail, south rim and inspiration artistic point	kept driving, unsure of specific location
uncle toms	just moved on
uncle toms	none
uncle tom's point	continued
uncle toms trail	artist point
uncle toms trail	noRTH RIM
unclebtoms, btink of the lower falls	inspiration point
unclebtoms, north rim	no
upper geyser	Canyon tower mammoth old faithful
virginia cascade	what ever was available, gysers, rocks
washburn	Shoshone lake
washburn, trails along the canyon	elephant back
west thumb	no



Table H. 8: Visitor Differences with Children and without Children in Trip

Significant differences between travelers with kids and those without kids		Variable	N	Mean	Summary statements
To experience solitude	No kids	1887	3.23	Those without children were significantly more likely to agree that to experience solitude was important.	
	Kids	803	3.13		
To see geysers and thermal features	No kids	1883	4.46	Those with children were significantly more likely to agree that to see geysers and thermal features was important.	
	Kids	805	4.53		
To be where things are fairly safe	No kids	1882	3.62	Those with children were significantly more likely to agree it was important to be where things are fairly safe.	
	Kids	806	3.73		

Scale: 1="Not at all important" to 5="Extremely important"



Table H. 9: Visitor Differences between Types of Transportation in YNP

Significant differences between travelers on tour buses/tour van and those driving their own vehicle				
	Item	N	Mean	Significance statement
Availability of parking	Tour bus/van	151	1.61	Those driving their own vehicles were significantly more likely to say parking was a problem.
	Private vehicle	2448	1.93	
Too many people	Tour bus/van	166	1.82	Those driving their own vehicles were significantly more likely to say too many people was a problem.
	Private vehicle	2445	1.97	
Traffic congestion	Tour bus/van	166	1.85	Those driving their own vehicles were significantly more likely to say traffic congestion was a problem.
	Private vehicle	2449	2.07	
To be near considerate people	Tour bus/van	184	3.9	Those in a bus/tour van were significantly more likely to agree that being near considerate people was important.
	Private vehicle	2506	3.63	
To be where things are fairly safe	Tour bus/van	176	3.95	Those in a bus/tour van were significantly more likely to agree that being where things are fairly safe was important.
	Private vehicle	2515	3.63	

Problem scale: 1= not a problem at all to 4= big problem
 Importance scale: 1=strongly disagree to 5=strongly agree



Table H. 10: Important Experiences in YNP – Visitor Differences between First-Time and Repeat

Dependent Variable	Variable	Mean	Item	Mean Difference (I-J)	Std. Error	Sig.*
To see geysers and thermal features	First timer	4.5	Infrequent repeat visitor	0.041	0.049	1
			Frequent visitor	.133*	0.049	0.018
	Infrequent repeat visitor	4.46	First timer	-0.041	0.049	1
			Frequent visitor	0.093	0.064	0.441
	Frequent visitor	4.36	First timer	-.133*	0.049	0.018
			Infrequent repeat visitor	-0.093	0.064	0.441
To experience a wild place	First timer	4.37	Infrequent repeat visitor	0.03	0.05	1
			frequent visitor	-.129*	0.05	0.028
	Infrequent repeat visitor	4.34	First timer	-0.03	0.05	1
			Frequent visitor	-.159*	0.065	0.044
	Frequent visitor	4.5	First timer	.129*	0.05	0.028
			Infrequent repeat visitor	.159*	0.065	0.044
Availability of parking	First timer	1.89	Infrequent repeat visitor	0.015	0.058	1
			Frequent visitor	-.166*	0.058	0.014
	Infrequent repeat visitor	1.88	First timer	-0.015	0.058	1
			Frequent visitor	-0.181	0.076	0.053
	Frequent visitor	2.06	First timer	.166*	0.058	0.014
			Infrequent repeat visitor	0.181	0.076	0.053

*Variables are statistically significant below a p value of .05



Table H. 11: Concerns with YNP – Visitor Differences between First-Time and Repeat

Dependent variable	Variable	Mean	Item	Mean Difference	Std. error	Sig.
People walking on, across, or along the road	First timer	1.64	Infrequent repeat visitor	0.068	0.051	0.544
			Frequent visitor	-.147*	0.051	0.013
	Infrequent repeat visitor	1.58	First timer	-0.068	0.051	0.544
			Frequent visitor	-.215*	0.067	0.004
	Frequent repeat visitor	1.79	First timer	.147*	0.051	0.013
			Infrequent repeat visitor	.215*	0.067	0.004
Too many people	First timer	1.94	Infrequent repeat visitor	0.014	0.056	1
			Frequent visitor	-.171*	0.057	0.008
	Infrequent repeat visitor	1.92	First timer	-0.014	0.056	1
			Frequent visitor	-.185*	0.074	0.037
	Frequent visitor	2.11	First timer	.171*	0.057	0.008
			Infrequent repeat visitor	.185*	0.074	0.037
Traffic congestion	First timer	2.02	Infrequent repeat visitor	-0.013	0.057	1
			Frequent visitor	-.209*	0.058	0.001
	Infrequent repeat visitor	2.04	first timer	0.013	0.057	1
			frequent visitor	-.196*	0.076	0.028
	Frequent visitor	2.23	first timer	.209*	0.058	0.001
			Infrequent repeat visitor	.196*	0.076	0.028

Variables are statistically significant below a p value of .05



Table H. 12: Concerns with Other’s Behavior – Visitor Differences between First-Time and Repeat

Dependent variable	Variable	Mean	Item	Mean difference	Std. error	Sig.
Other people acting unsafe around thermal features	first timer	1.6	Infrequent repeat visitor	-0.023	0.066	1
			Frequent visitor	-.439*	0.067	0
	Infrequent repeat visitor	1.63	First timer	0.023	0.066	1
			Frequent visitor	-.416*	0.087	0
	frequent visitor	2.04	First timer	.439*	0.067	0
			Infrequent repeat visitor	.416*	0.087	0
Other people acting unsafe around wildlife	first timer	1.83	Infrequent repeat visitor	-0.035	0.065	1
			Frequent visitor	-.474*	0.064	0
	Infrequent repeat visitor	1.87	First timer	0.035	0.065	1
			Frequent visitor	-.439*	0.085	0
	frequent visitor	2.31	First timer	.474*	0.064	0
			Infrequent repeat visitor	.439*	0.085	0
Feeling safe on boardwalks around other people	first timer	1.38	Infrequent repeat visitor	0.094	0.046	0.117
			Frequent visitor	-.122*	0.045	0.021
	Infrequent repeat visitor	1.29	First timer	-0.094	0.046	0.117
			Frequent visitor	-.216*	0.059	0.001
	frequent visitor	1.5	First timer	.122*	0.045	0.021
			Infrequent repeat visitor	.216*	0.059	0.001

Variables are statistically significant below a p value of .05



Table H. 13: Restrooms and Time Spent Parking – Visitor Differences between First-Time and Repeat

Dependent variable	Variable	Mean	Item	Mean difference	Std. error	Sig.
Availability of restrooms	First timer	1.66	Infrequent repeat visitor	0.127	0.057	0.073
			frequent visitor	-.140*	0.056	0.04
	Infrequent repeat visitor	1.53	first timer	-0.127	0.057	0.073
			frequent visitor	-.267*	0.074	0.001
	Frequent visitor	1.8	first timer	.140*	0.056	0.04
			repeat but not in past 3 years	.267*	0.074	0.001
Cleanliness of restrooms	First timer	1.94	Infrequent repeat visitor	.179*	0.065	0.018
			frequent visitor	-0.027	0.064	1
	Infrequent repeat visitor	1.76	first timer	-.179*	0.065	0.018
			frequent visitor	-.205*	0.084	0.045
	Frequent visitor	1.96	first timer	0.027	0.064	1
			Infrequent repeat visitor	.205*	0.084	0.045
Approximately how many minutes did you spend in traffic looking for parking at this site?	First timer	1.74	Infrequent repeat visitor	.202*	0.073	0.018
			frequent visitor	0.035	0.073	1
	Infrequent repeat visitor	1.54	first timer	-.202*	0.073	0.018
			frequent visitor	-0.166	0.096	0.25
	Frequent visitor	1.7	first timer	-0.035	0.073	1
			Infrequent repeat visitor	0.166	0.096	0.25

Variables are statistically significant below a p value of .05



Table H. 14: Error Size for ANOVA Comparisons of Different Visitor Characteristics

Measures of Association	Eta	Eta Squared
To see geysers and thermal features	0.054	0.003
To experience a wild place	0.054	0.003
Availability of parking	0.057	0.003
People walking on, across, or along the road	0.066	0.004
Too many people	0.061	0.004
Traffic congestion	0.071	0.005
Other people acting unsafe around thermal features	0.149	0.022
Other people acting unsafe around wildlife	0.148	0.022
Feeling safe on boardwalks around other people	0.075	0.006
Availability of restrooms	0.072	0.005
Cleanliness of restrooms	0.060	0.004



Table H. 15: Differences between Shorter vs. Longer Stay Visitors

Variable	Item	N	Mean	Significant differences between visitors who had been in the park 1-4 days when intercepted compared with those who had already been in the park 5 or more days when intercepted.
To experience solitude	Intercepted on 1st thru 4th day in park	2424	3.18	Visitors who had already been in the park at least 5 days were significantly more likely to say that experiencing solitude was important to them.
	Intercepted on 5th or longer day in the park	269	3.37	
To be close to nature	Intercepted on 1st thru 4th day in park	2428	4.5	Visitors who had already been in the park at least 5 days were significantly more likely to say that being close to nature was important to them.
	Intercepted on 5th or longer day in the park	270	4.66	
To see wildlife	Intercepted on 1st thru 4th day in park	2424	4.59	Visitors who had already been in the park at least 5 days were significantly more likely to say that seeing wildlife was important to them.
	Intercepted on 5th or longer day in the park	268	4.72	
To experience a wild place	Intercepted on 1st thru 4th day in park	2424	4.37	Visitors who had already been in the park at least 5 days were significantly more likely to say that to experience a wild place was important to them.
	Intercepted on 5th or longer day in the park	269	4.54	
People walking on, across, or along the road	Intercepted on 1st thru 4th day in park	2363	1.64	Visitors who had already been in the park at least 5 days were significantly more likely to say that people walking on, across, or along the road was a problem.
	Intercepted on 5th or longer day in the park	260	1.79	
Other people acting unsafe around thermal features	Intercepted on 1st thru 4th day in park	1770	1.65	Visitors who had already been in the park at least 5 days were significantly more likely to say that other people acting unsafe around thermal features was a problem.
	Intercepted on 5th or longer day in the park	170	1.83	
Other people acting unsafe around wildlife	Intercepted on 1st thru 4th day in park	2234	1.87	Visitors who had already been in the park at least 5 days were significantly more likely to say that other people acting unsafe around wildlife was a problem.

Problem scale: 1= not a problem at all to 4= big problem

Importance scale: 1=Not at all important to 5=Extremely important



Table H. 16: Differences between Visitors from USA vs. China vs. All Other International

Dependent Variable	Variable	Mean		Mean Difference	Std. Error	Sig.
To be near considerate people	USA	3.72	China	-.318*	0.101	0.005
			all other international	.303*	0.06	0
	China	4.04	USA	.318*	0.101	0.005
			all other international	.621*	0.111	0
	all other international	3.41	USA	-.303*	0.06	0
			China	-.621*	0.111	0
To see wildlife	USA	4.65	China	.163*	0.061	0.023
			all other international	.139*	0.036	0
	China	4.49	USA	-.163*	0.061	0.023
			all other international	-0.024	0.067	1
	all other international	4.51	USA	-.139*	0.036	0
			China	0.024	0.067	1
To view scenery	USA	4.76	China	.157*	0.051	0.006
			all other international	.195*	0.03	0
	China	4.6	USA	-.157*	0.051	0.006
			all other international	0.038	0.056	1
	all other international	4.57	USA	-.195*	0.03	0
			China	-0.038	0.056	1
To experience a wild place	USA	4.44	China	0.053	0.069	1
			all other international	.248*	0.041	0
	China	4.38	USA	-0.053	0.069	1
			all other international	.195*	0.076	0.032
	all other international	4.19	USA	-.248*	0.041	0
			China	-.195*	0.076	0.032
To be where things are fairly safe	USA	3.64	China	-.509*	0.102	0
			all other international	0.085	0.06	0.475
	China	4.15	USA	.509*	0.102	0
			all other international	.595*	0.111	0
	all other international	3.55	USA	-0.085	0.06	0.475
			China	-.595*	0.111	0
Other than the weather conditions, how would you rate your Yellowstone experience on this current trip?	USA	4.62	China	.366*	0.052	0
			all other international	.123*	0.031	0
	China	4.26	USA	-.366*	0.052	0
			all other international	-.243*	0.057	0
	all other international	4.5	USA	-.123*	0.031	0
			China	.243*	0.057	0



Table H. 17: Differences between Visitors from USA vs. China vs. All Other International

Dependent Variable	Variable	Mean		Mean Difference	Std. Error	Sig.
Availability of restrooms	USA	1.61	China	-.438*	0.08	0
			all other international	-0.04	0.048	1
	China	2.05	USA	.438*	0.08	0
			all other international	.398*	0.088	0
	all other international	1.65	USA	0.04	0.048	1
			China	-.398*	0.088	0
Cleanliness of restrooms	USA	1.84	China	-.421*	0.09	0
			all other international	-.191*	0.056	0.002
	China	2.26	USA	.421*	0.09	0
			all other international	0.229	0.1	0.066
	all other international	2.03	USA	.191*	0.056	0.002
			China	-0.229	0.1	0.066
Feelings safe on boardwalks around other people	USA	1.36	China	-.150*	0.063	0.049
			all other international	-0.049	0.039	0.622
	China	1.51	USA	.150*	0.063	0.049
			all other international	0.101	0.07	0.437
	all other international	1.4	USA	0.049	0.039	0.622
			China	-0.101	0.07	0.437
Other people acting unsafe around the wildlife	USA	1.9	China	.330*	0.094	0.001
			all other international	-0.03	0.056	1
	China	1.57	USA	-.330*	0.094	0.001
			all other international	-.360*	0.103	0.001
	all other international	1.93	USA	0.03	0.056	1
			China	.360*	0.103	0.001



Table H. 18: Error Size for ANOVA Comparisons of Visitors from USA vs. China vs All Other International Locations

Measures of Association	Eta	Eta Squared
To be near considerate people	0.126	0.016
To see wildlife	0.088	0.008
To view scenery	0.136	0.018
To experience a wild place	0.120	0.014
To be where things are fairly safe	0.108	0.012
Other than the weather conditions, how would you rate your Yellowstone experience on this current trip?	0.153	0.023
Availability of restrooms	0.112	0.012
Cleanliness of restrooms	0.116	0.014
Feeling safe on boardwalks around other people	0.055	0.003
Other people acting unsafe around wildlife	0.076	0.006

