

Arches National Park

2022 Pilot Timed-Entry Visitor Experience Survey Technical Report

April 14, 2023



Executive Summary

This report provides the findings of a study of visitor experiences with the pilot timed-entry system implemented in Arches National Park in 2022. Two visitor intercept surveys were conducted, one during the timed-entry time period (April-October 3, 2022), a second survey was conducted between October 4th and November 7th. The purpose of the Fall sampling was to understand the experiences and motivations of visitor who chose to come to Arches after the seasonal timed-entry system ended.

Primary Findings

- Summer visitors were highly supportive of the pilot timed-entry program. 57% reported that timed-entry made their experience in Arches NP somewhat or much better overall. Additionally, 84% of respondents indicated that on future visits to ARCH they would prefer for there to be a reservation of some kind in place.
- Most visitors were successful in acquiring a timed-entry ticket (89%), and of these respondents 98% were able to enter on their desired day, and 86% received their desired time. Overall, only 4% of respondents were not successful in acquiring a ticket. When asked to elaborate regarding not receiving their desired time, many respondents commented that they did not get to enter as early in the day as they would have liked to.
- Summer visitors reported that if they did not get a ticket for Arches NP they would be likely to visit during a different day or time, but would be very unlikely to not visit Arches NP during their trip to the area.
- Most visitors reported access to the visitor center (56%) and ease of obtaining tickets (50%) to be excellent. NPS communication of the system and its requirements had room for improvement with only 30% of respondents rating this as excellent.
- Many measures of crowding were not a problem for summer visitors, with the exception of wait time to enter the park, which 31% of visitors indicated was between a small and big problem. These measures were not as much of an issue in the Fall (16%). However, in the Fall survey, crowding on trails and at arches was more of a problem, (40%, and 46%, respectively). Notably, repeat visitors rated conditions within the park better on this trip than past visits.
- Summer visitors made the decision to visit Arches NP earlier, and planned their trip in general more carefully than Fall visitors.
- Fall visitors most frequently cited temperatures (80%) and vacation time (64%) as their reasons for visiting in October and November.

*Wayne Freimund, PhD
Iree Wheeler, MS*

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Summary: This section provides context on the purpose of this study

Introduction

1.1. Introduction

In 2022 the National Park Service piloted a timed-entry system for general admission to Arches National Park (ARCH). That system, designed to address ongoing problems with visitor congestion, allocated a discrete number of entrance permits per hour each day between the hours of 6 am and 5 pm. The pilot program ran from April 3, 2022 through October 3, 2022.

In the spring of 2022, Utah State University (USU) researchers entered into an agreement with the National Parks Conservation Association (NPCA) to examine how visitors to ARCH experienced the timed-entry system. Additionally, following the completion of the pilot program, the research team conducted an abridged survey in Arches to understand motivations and experiences of visitors in the season following the pilot-timed entry system. In this report the timed-entry period will be referred to as TE Summer, and the follow-up study will be referred to as Post-TE Fall.

One of the primary purposes of this report is to present the experiences of visitors during the summer 2022 pilot timed-entry system. This includes an exploration of the factors that influenced visitor ratings of experience with the system, as well as the planning characteristics of successful visitors, and general Arches visit experiences. As the reader will see in the report, visitors overall were satisfied with the timed-entry system and rated the system itself, and their experiences highly. However, there are some areas to improve upon as systems like ARCH timed-entry system move forward.

2

Summary: This section outlines the research approaches and methods for the design of the study, data collection, and analysis methods.

Approach & Methods

2.1. Research Questions

The following research questions were explored in this study. Research questions 1-5 were addressed using the summer timed-entry survey. Research question six was addressed using the October follow-up survey.

1. How do people find out about and use the system?
2. Does timed-entry add or detract from their overall experience?
3. Does the system impact perceptions of crowding?
4. How do visitors interact with the system?
5. Does the experience with the system vary by type of visitor?
6. What was the experience of visitors post-timed-entry in Arches? Did these visitors intentionally visit after timed entry?

2.2. Sampling Procedures

The timed-entry experience survey was administered by Utah State University (USU) researchers between July 6th and October 3rd, 2022. The follow-up survey was conducted in October and November of 2022 (post-timed-entry). In the summer sampling days were split to accommodate visitors who may have entered ARCH without a timed-entry reservation (post 5PM) and during the timed-entry period (between 6 AM and 5 PM).

Survey periods were split between three high use areas within ARCH: Delicate Arch, The Windows, and Devils Garden trail heads. Respondents were intercepted at randomly selected minutes-on-the-hour throughout the sampling period. Intercept times were generated daily using an online random number generator. Depending on the time of year and flow of visitors, 8 numbers were generated per hour. If no one was present at the intercept time, that number was skipped. If someone rejected the survey, the next group was intercepted.

The survey was conducted using Qualtrics software on an iPad tablet. Visitors who agreed to take the survey were provided a tablet to self-administer the survey or if requested a researcher would administer the survey to the respondent.

Summer 2022 Timed-Entry Sampling

During the three months of timed-entry data collection seventeen days were sampled. Sampling periods were split between weekends and weekdays, with 8 weekend days and 9 weekdays sampled. Ultimately 783 visitors to Arches were intercepted and 537 surveys were completed for a response rate of 69%. This survey instrument took respondents an average of 8 minutes to complete.

Fall 2022 Post-Timed-Entry Sampling

Between October 4th and November 7th, thirteen different days were sampled. The survey period was 4 hours, rotating between morning and afternoon shifts. The sampling periods were again split between weekends and weekdays. Due to the shorter days during this season, and the lack of necessity to be in the park early and late in the day, sampling occurred between 8:00 AM and 4:00 PM. During this season, 481 visitors were intercepted and 402 agreed to complete a survey for an overall response rate of 84%. This survey took visitors an average of 2.5 minutes.

2.3. Data Analysis

After completion of the study, survey responses were downloaded from Qualtrics' servers and prepared for analysis. Data analysis was conducted using IBM SPSS software for initial data cleaning and statistical analyses. Tableau was used for visualizations, and Nvivo was used for qualitative response analyses and visualizations.

3

Findings

Summary: This section provides highlights of the survey results. The findings are organized according to the surveys that occurred during timed-entry (Summer) and after timed-entry was completed (Fall).

3.1. Summer Timed-Entry Survey Results

3.1.1 Ticket Acquisition Experiences

Seventy-eight percent of visitors were aware of the timed-entry system before arriving in the Moab area (Figure 3.1). Respondents who were aware of the timed-entry system were asked if they attempted to acquire a timed-entry ticket prior to their visit. Of those who tried to get a ticket in advance of their visit, most (89%) were successful in obtaining a permit (Figure 3.2). When asked when they first tried to get a ticket, 40% of respondents reported trying when the tickets first became available (Figure 3.3). For those who were aware of the timed-entry system before arriving in the Moab area, their primary way of learning about it was through the NPS website (65%). Additionally, fifteen percent of respondents learned of the system by word of mouth, with 6% using social media and another 6% using websites such as Trip-Advisor (Figure 3.4).

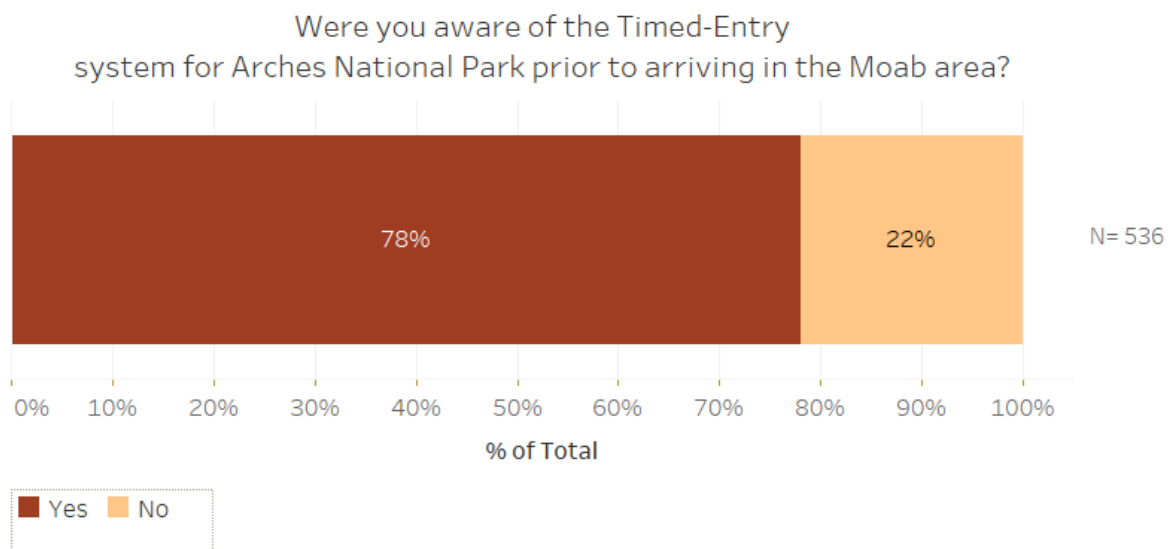


Figure 3.1: Pre-visit Awareness of Timed-Entry in ARCH

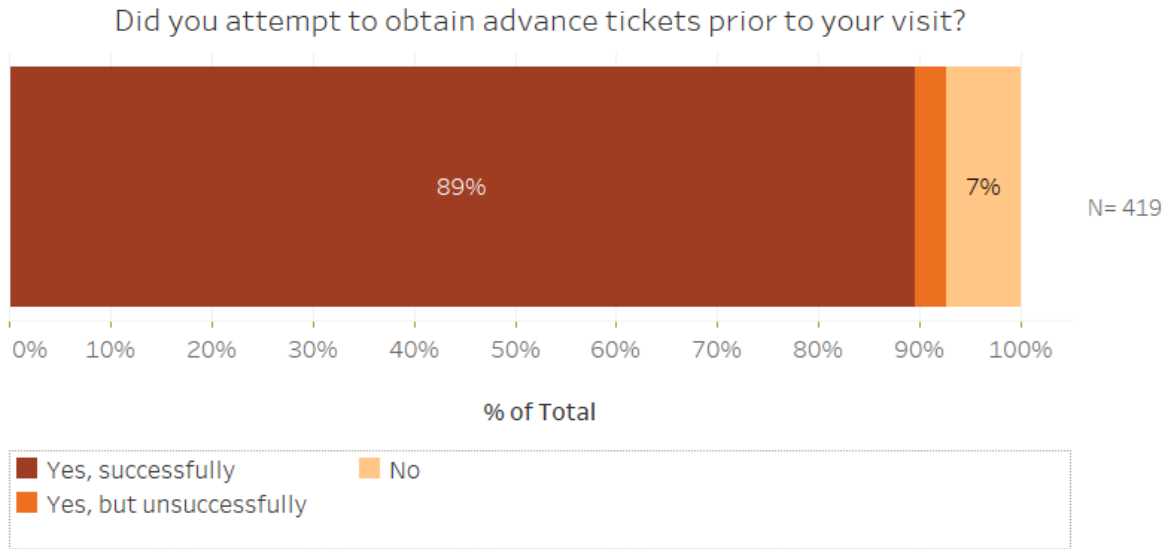


Figure 3.2: Timed-Entry Ticket Acquisition Success

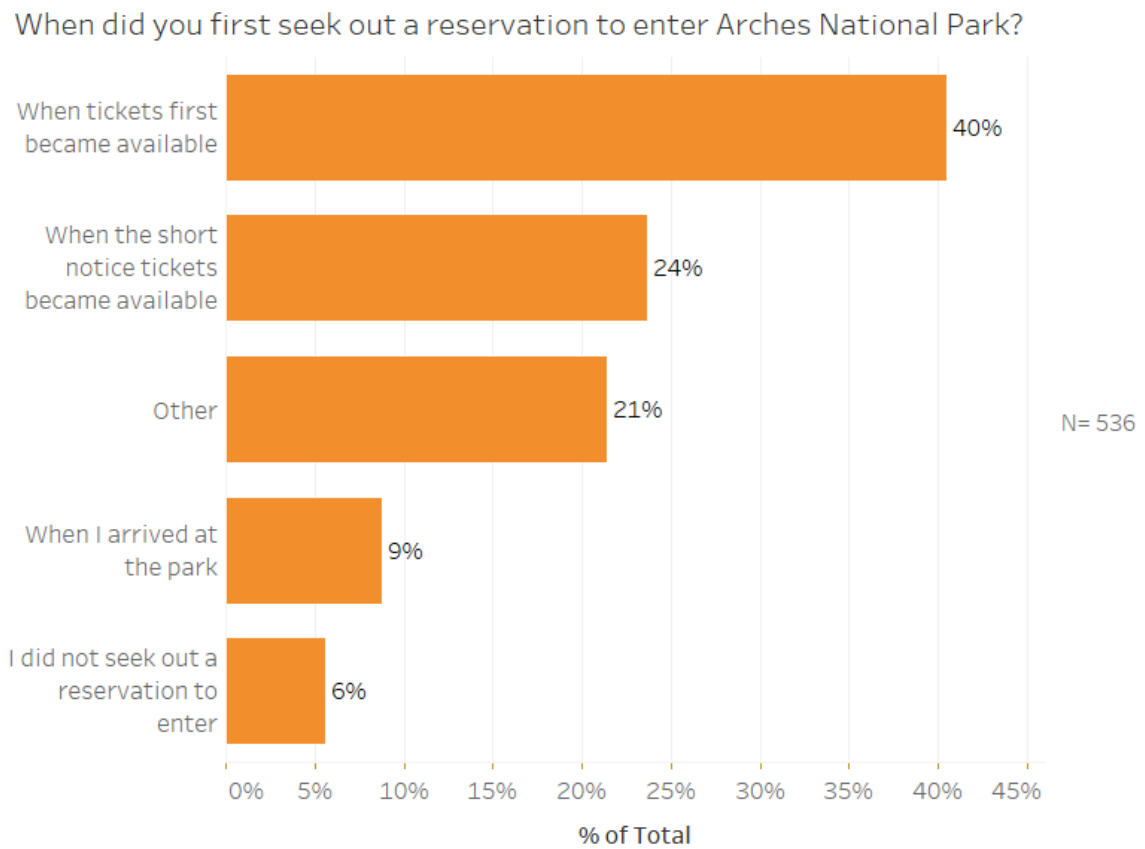


Figure 3.3: Time of Timed-Entry Attempt

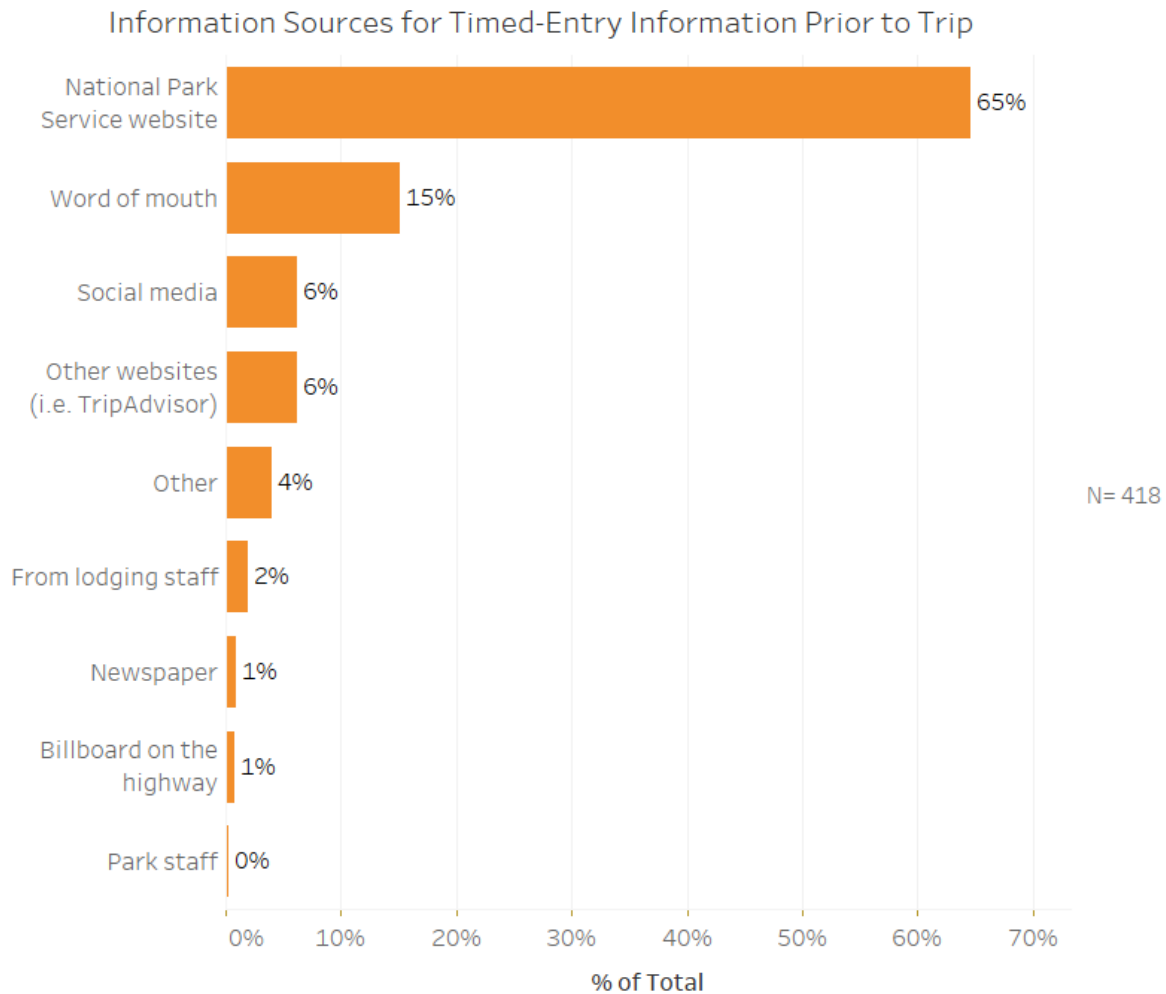


Figure 3.4: Information Sources Used to Learn About Timed-Entry

A majority of respondents indicated they were able to acquire a ticket for their desired day (98%) (Figure 3.5) or time of visit (86%) (Figure 3.7). If a respondent indicated they did not get their desired day or time they were asked if this alternative impacted their overall experience (Figures 3.6 and 3.8). Most visitors indicated that the alternative day did not impact their experience (88%) (Figure 3.6). Similarly, 76% of respondents who did not get their desired time indicated the new time did not impact the quality of their experience (Figure 3.8). Respondents were also asked what activities they participated in while waiting for their alternative day or time. Many respondents visited other public lands nearby, or went into town (Figures 3.9 and 3.10). Respondents who indicated "Other" were asked to elaborate, these responses are provided below. Depending on whether a participant modified their itinerary for an alternative time or day, the activities participated in varied between desired day and desired time. However, due to the high rate of ticket acquisition day success (98%), very few respondents indicated they needed to come up with an alternative day plan (N=7) as a result, very few qualitative comments were received regarding alternative days.

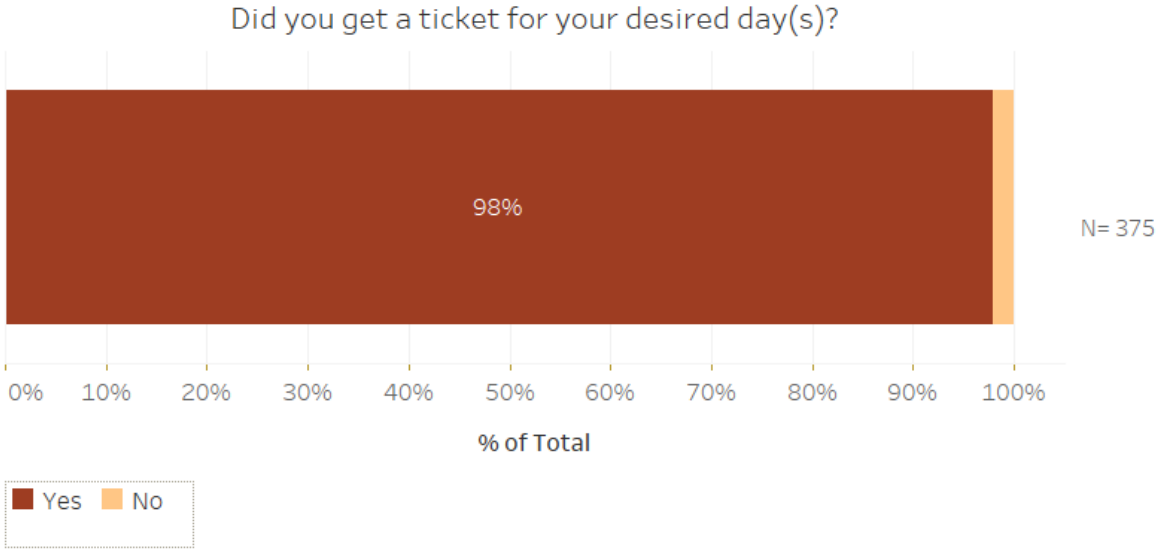


Figure 3.5: Desired-Day

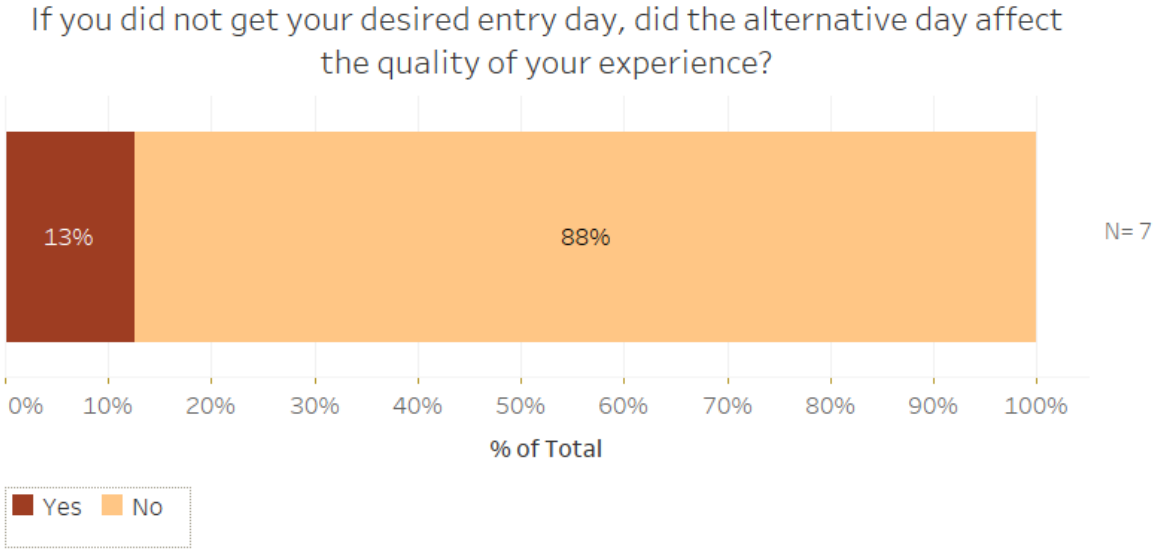


Figure 3.6: Alternative Day Experience

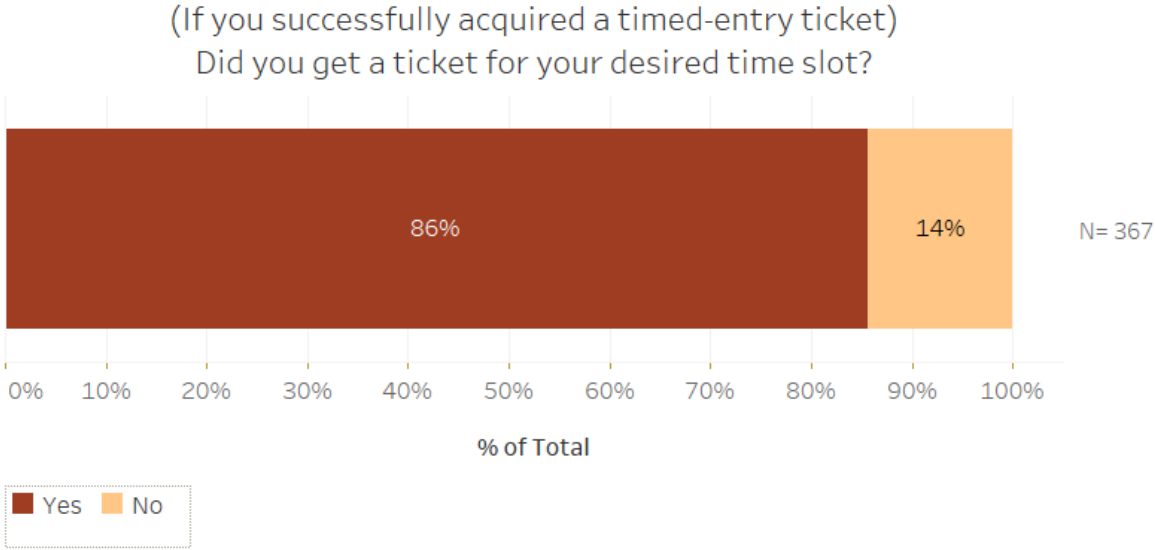


Figure 3.7: Desired-Time

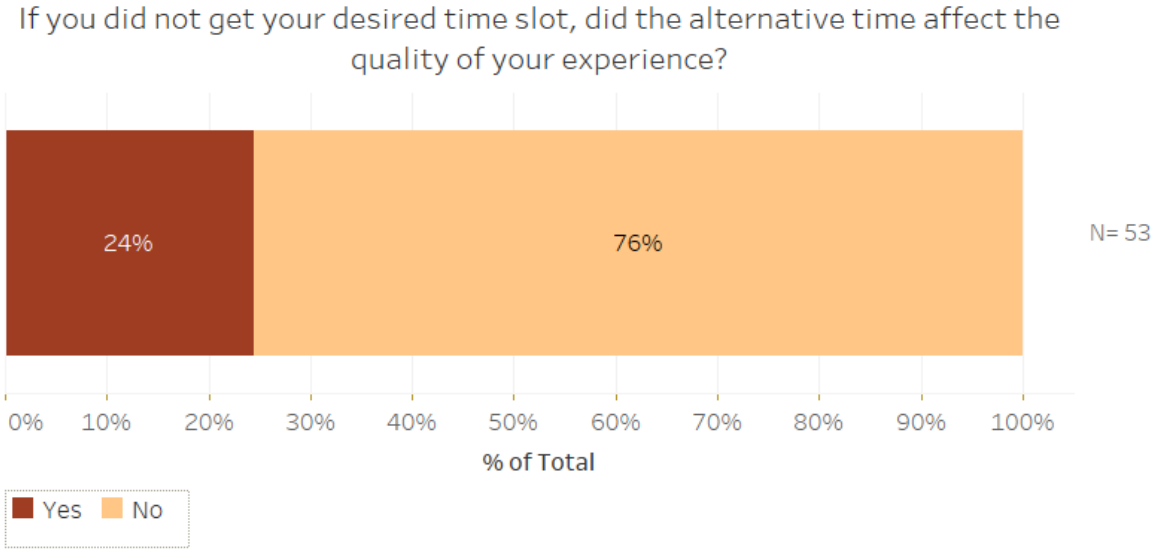


Figure 3.8: Alternative Time Experience

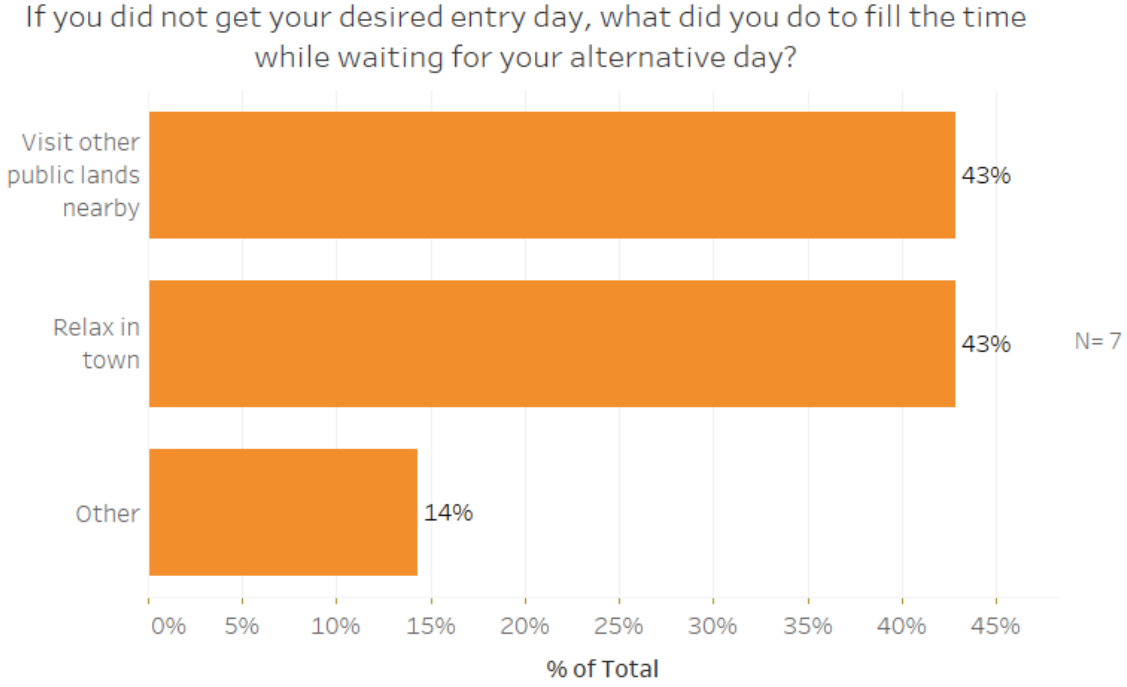


Figure 3.9: Alternative Day Activities

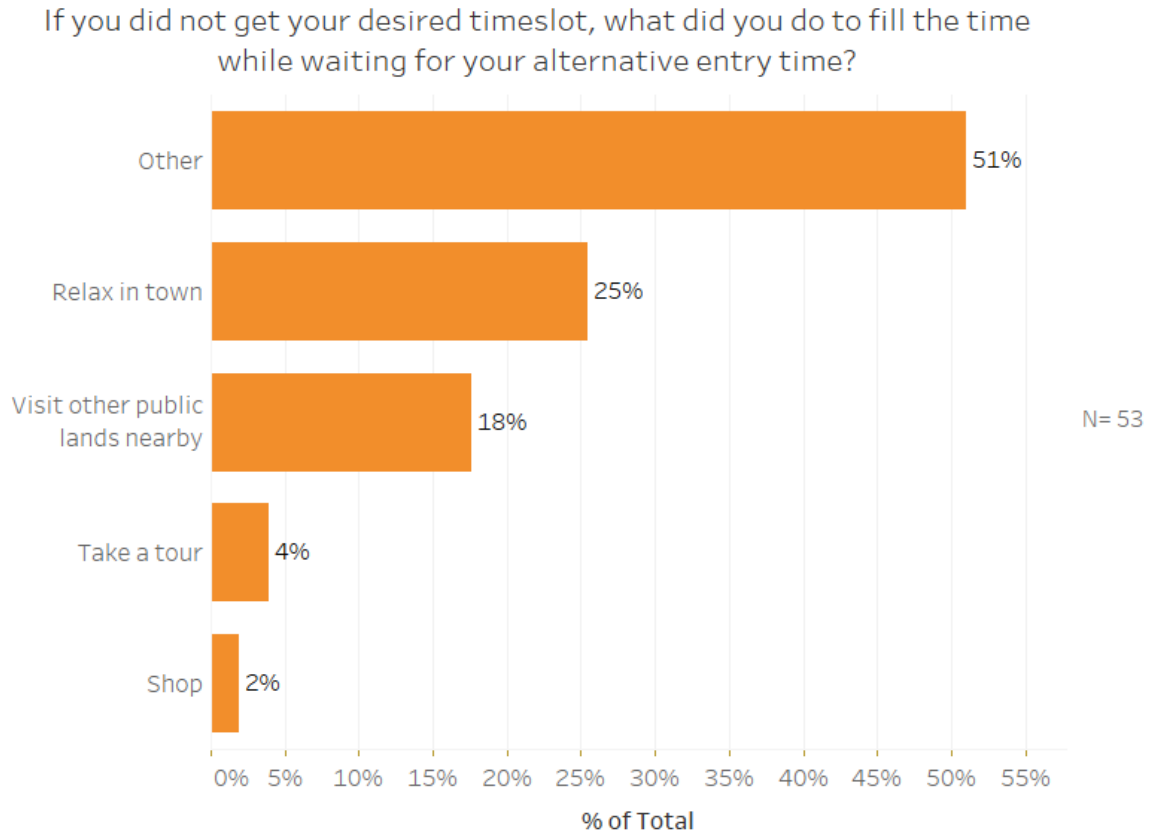


Figure 3.10: Alternative Time Activities

Comments regarding Alternative Time

Respondents left 52 comments regarding not receiving their desired time. Most (37) of these comments were regarding the available times being later in the day than was preferred. Several respondents indicated they would have liked a later in the day time slot. One respondent said they booked a Fiery Furnace reservation to get into the park.

When asked how the alternative time impacted their experience quality, 12 respondents commented. Five of these respondents said the alternative time was for the best, or enhanced their experience. Others indicated that the alternative time resulted in them visiting the park when it was too hot, or raining. One respondent commented that the pressure to make their time slot made the experience as a whole feel stressful.

3.1.2 Trip Planning

When asked about trip planning, many (40%) if visitors indicated they had decided to visit ARCH six months or more before their visit. Only five percent of visitors said they planned their trip the same day as their visit (Figure 3.11). Thirty-six percent of respondents described their trip to Moab as very carefully planned or carefully planned and only nine percent described their trip as spontaneous (Figure 3.12).

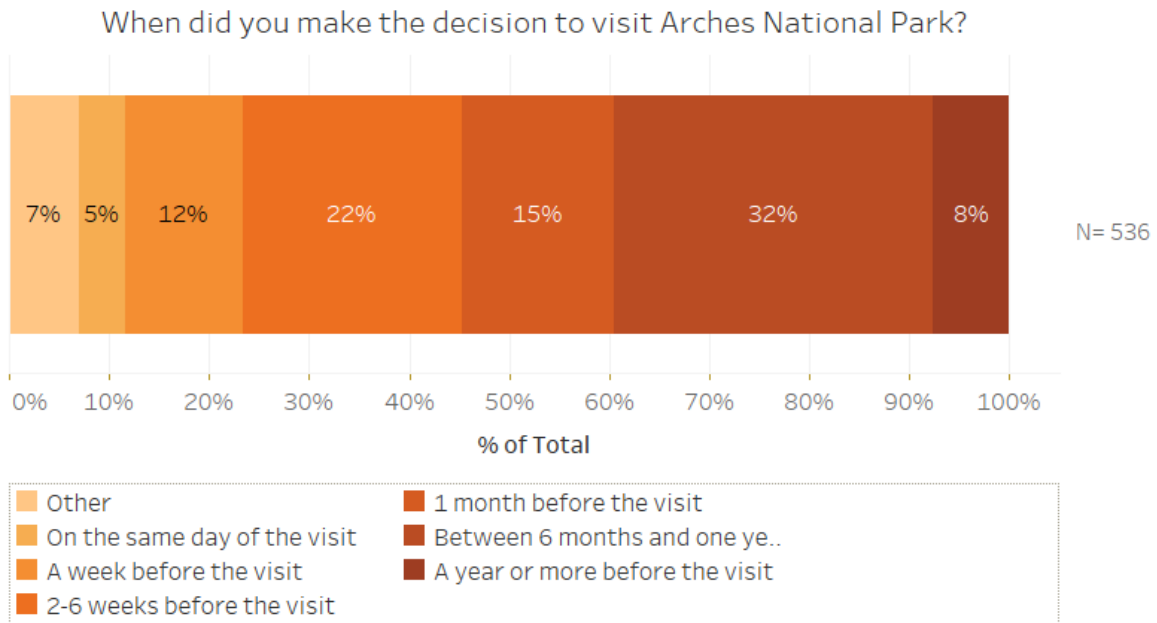


Figure 3.11: Time of Decision to Visit ARCH

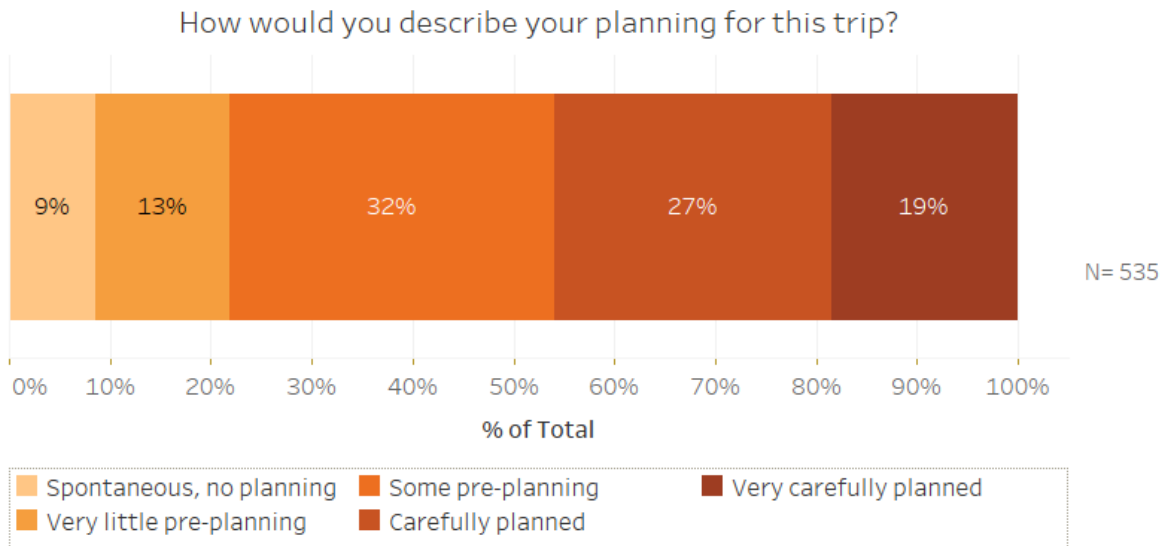


Figure 3.12: Planning for ARCH Trip

3.1.3 Coping with Changes in Plans

Overall, when visitors were asked to indicate what actions, they would have taken if they did not acquire a ticket for their desired time most respondents indicated they would be extremely or somewhat likely to either come to the park early or late when timed entry was not in place (73%, Mean: 3.88 SD: 1.126) or choose a different regional activity and return another day (63%, Mean: 3.64, SD: 1.09) or time (64%, Mean: 3.61, SD: 1.046) (Figure 3.13 and Table 3.1). This question was asked on a five-point Likert scale with (1) representing extremely unlikely, and (5) representing extremely likely. In addition to the series of questions about alternative actions, visitors were asked to rate a series of statements regarding their choice of response to obstacles in their recreation plans. This type of question is used often in the outdoor recreation literature to expand researcher understanding of crowding in outdoor recreation settings (Manning, 2022) The most frequent responses for methods used to cope with obstacles was “Decided that for Arches NP, the condition or situation was what it should be” (72%, Mean: 3.16 SD: 1.24) and “Told myself that there was nothing I could do about it, so I just enjoyed the experience for what it was” (66%, Mean: 3.13 SD: 1.36) followed closely by “realized that the condition or situation I experienced was really suitable after all” (69%, Mean: 3.1 SD: 1.236) (Figure 3.14 and Table 3.2). This question was also a five-point Likert scale, with (1) equalling never and (5) representing very often/always. See the discussion for a description of the possible implications of these coping types in the context of Arches NP timed-entry.

If you were not able to get a ticket for your desired time, how likely would you be to take the following actions?

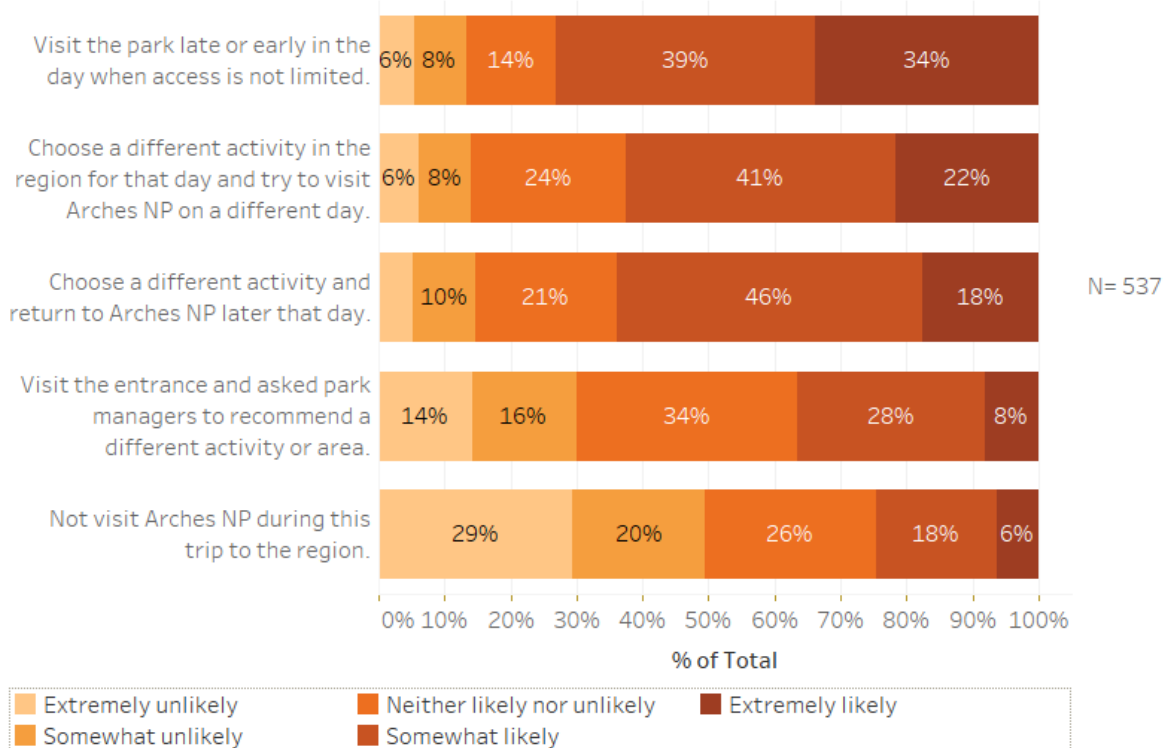


Figure 3.13: Alternatives if Preferred Option Not Available

Variable	N	Mean	Min	Max	Std. Dev.
Visit the park late or early in the day when access is not limited.	527	3.88	1	5	1.126
Decided to choose a different activity in the region for that day and try to visit Arches NP on a different day.	524	3.64	1	5	1.09
Decided to choose a different activity and return to Arches NP later that day.	522	3.61	1	5	1.046
Visited the entrance and asked park managers to recommend a different activity or area.	524	3	1	5	1.156
Decided not to visit Arches NP during this trip to the region.	523	2.52	1	5	1.257

Table 3.1: Descriptive Statistics for Alternative Activities(1 = Extremely Unlikely, 5 = Extremely Likely)

If you encountered obstacles in your recreation plans how often would you respond in the following ways?

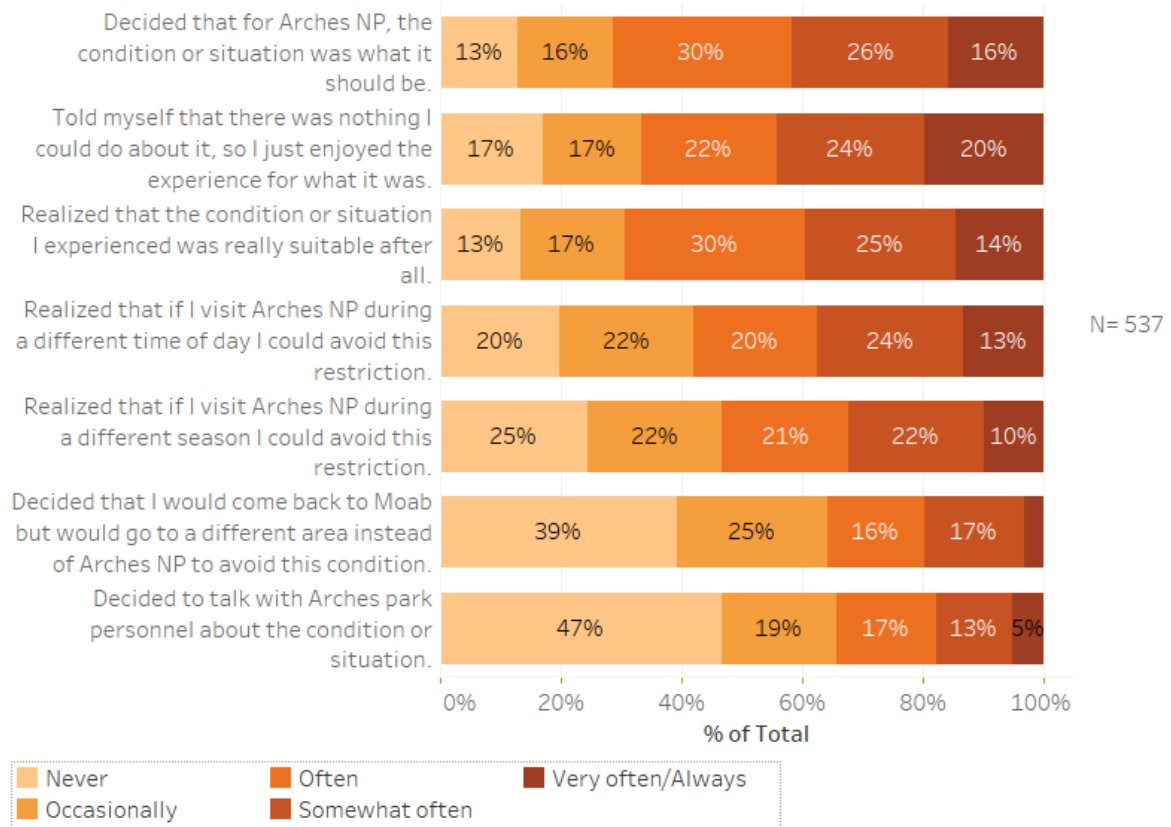


Figure 3.14: Obstacles to Recreation Plans

Variable	N	Mean	Min	Max	Std. Dev.
Decided that for Arches NP, the condition or situation was what it should be.	505	3.16	1	5	1.24
Told my self there was nothing I could do about it so enjoyed the experience for what it was.	508	3.13	1	5	1.364
Realized that the condition or situation I experienced was really suitable after all.	507	3.1	1	5	1.236
Realized that if I visit Arches NP during a different time of day I could avoid this restriction.	514	2.89	1	5	1.334
Realized that if I visit Arches NP during a different season I could avoid this restriction.	506	2.71	1	5	1.319
Decided that I would come back to Moab at the same season but would go to a different area instead of Arches NP to avoid this condition or situation	508	2.19	1	5	1.211
Decided to talk with Arches park personnel about the condition or situation.	503	2.1	1	5	1.261

Table 3.2: Descriptive Statistics for Obstacles (1 = Never, 5 = Very often)

3.1.4 ARCH Experience Quality

The experience of visitors was dominantly favorable, when asked how timed-entry improved or detracted from their experience in ARCH on the whole. Fifty-seven percent of visitors said that timed-entry made their experience in ARCH much or somewhat better. An additional 38% said they experience was about the same as they expected it to be without timed-entry (Figure 3.15). When asked about preferences for a reservation system on future trips, 84% indicated they would like there to be a reservation system (Figure 3.16). Visitors were asked to rate 10 experience components of the timed-entry system on a 5-point Likert scale from 1 (Very poor) to 5 (Excellent) (Figure 3.17 and Table 3.3). Most components were rated highly with a Mean of 4.16-4.47 with the exception of “NPS communication of there being a new system and the requirement of tickets” which had a Mean of 3.93.

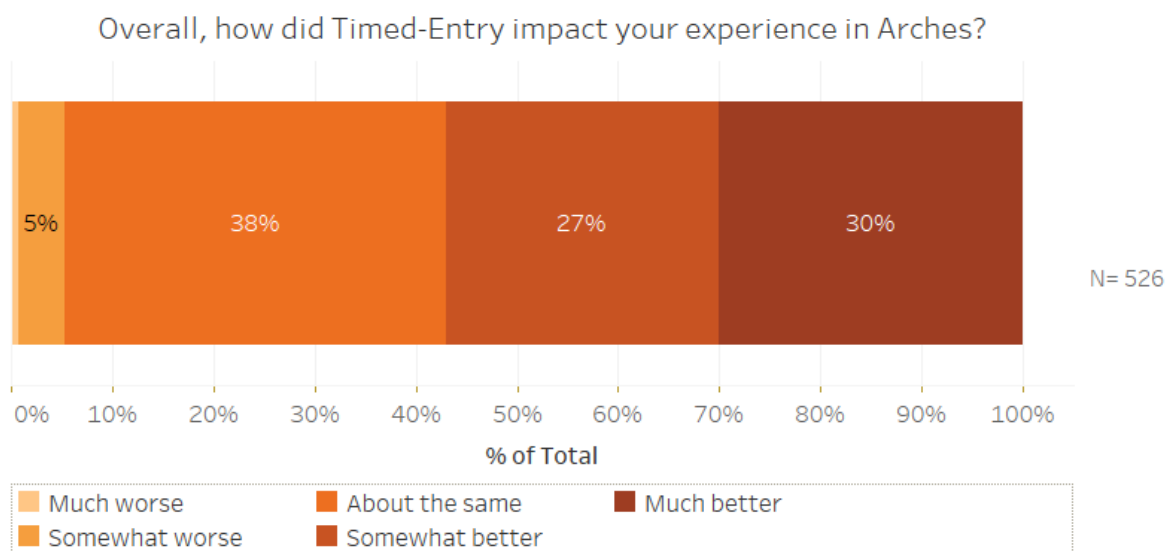


Figure 3.15: Timed-Entry and ARCH Experience

Would you prefer to have a system in place to obtain a reservation to enter Arches on future visits?

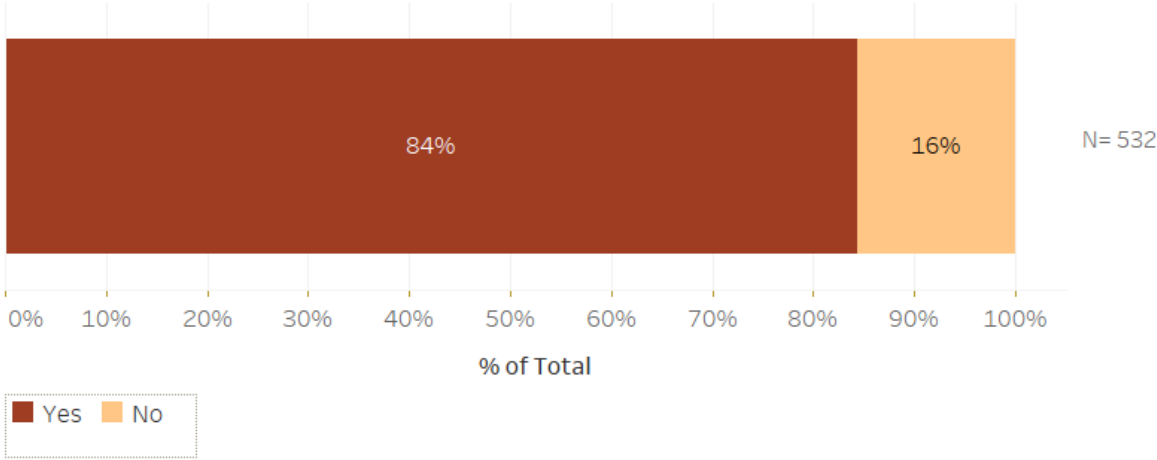


Figure 3.16: Support for Timed-Entry in the Future

How would you rate your experience with the following aspects of the Timed-Entry system?

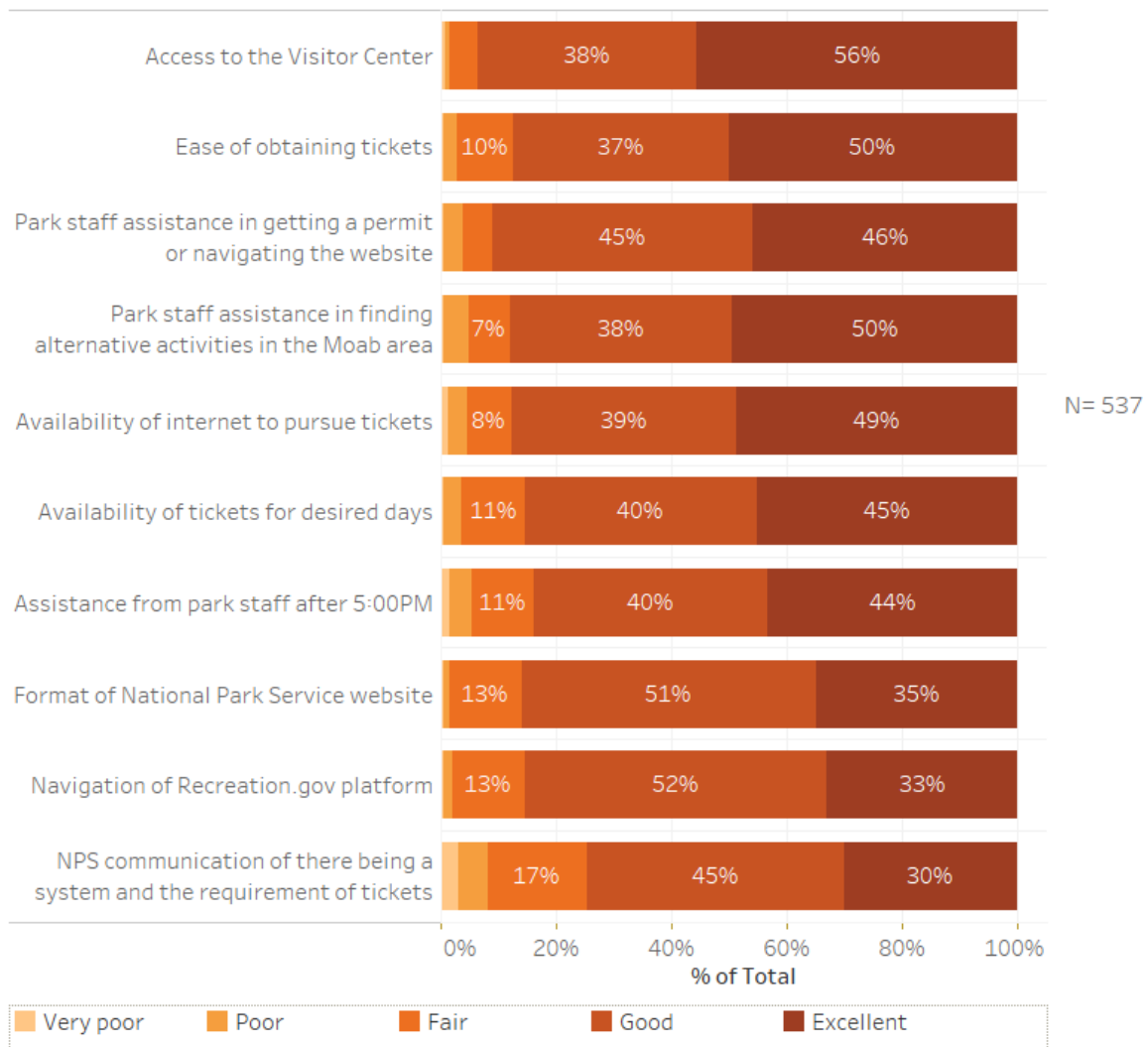


Figure 3.17: Timed-Entry Component Ratings

Variable	N	Mean	Min	Max	Std. Dev
Access to the Visitor Center	434	4.47	1	5	0.697
Ease of obtaining tickets	516	4.34	1	5	0.781
Park staff assistance in getting a permit or navigating the website upon arrival	213	4.33	1	5	0.762
Park staff assistance in finding alternative activities in Moab area	226	4.32	1	5	0.826
Availability of internet to pursue tickets	489	4.31	1	5	0.844
Availability of tickets for desired days	510	4.26	1	5	0.816
Assistance from park staff after 5:00	131	4.21	1	5	0.892
Format of NPS website	500	4.19	1	5	0.725
Navigation of Recreation.gov platform	512	4.16	1	5	0.74
NPS communication of there being a new system and the requirement of tickets	483	3.93	1	5	0.978

Table 3.3: Descriptive Statistics for Timed-Entry Component Ratings (1 = Very Poor, 5 = Excellent)

3.1.5 Problems on Current and Past Trips

All respondents were asked to rate seven dimensions of their experience on their current trip to ARCH (Figure 3.18). Sixty to sixty-nine percent of visitors saw no problem with crowding at the arches, trail crowding, or wait time to enter the park. Over 79% did not consider parking, people walking on the road, too many people in the park, or traffic congestion to be a problem. The 111 repeat visitors were also asked to rate these dimensions on previous trips. Generally, this sample rated conditions better on this trip than previous visits (Figure 3.19). With the exception of *people walking on, across, or along the road* all crowding problems showed statistically significant differences between current and past trips. With the exception of *wait time to enter the park* ratings of all crowding components improved between past and current trips (Table 3.4).

Variable	N	Mean	SD	p
Wait time to enter the park	97	1.44	0.629	<.001
Wait time to enter the park in the past	97	1.35	0.662	
Availability of parking	96	1.14	0.401	<.01
Availability of parking in the past	96	1.48	0.808	
People walking on, across, or along the road	95	1.13	0.419	0.539
People walking on, across, or along the road in the past	95	1.43	0.724	
Too many people in the park	97	1.37	0.682	<.001
Too many people in the park in the past	97	1.69	0.961	
Traffic congestion	96	1.25	0.543	<.001
Traffic congestion in the past	96	1.6	0.934	
Trail crowding	95	1.49	0.713	<.001
Trail crowding in the past	95	1.71	0.944	
Crowding at the arches you visited	97	1.6	0.745	<.001
Crowding at the arches you visited in the past	97	1.81	0.982	

Table 3.4: Paired Samples T Test Problems on Current and Past Trips for Returning Visitors

How problematic were each following were while in Arches National Park during this trip.

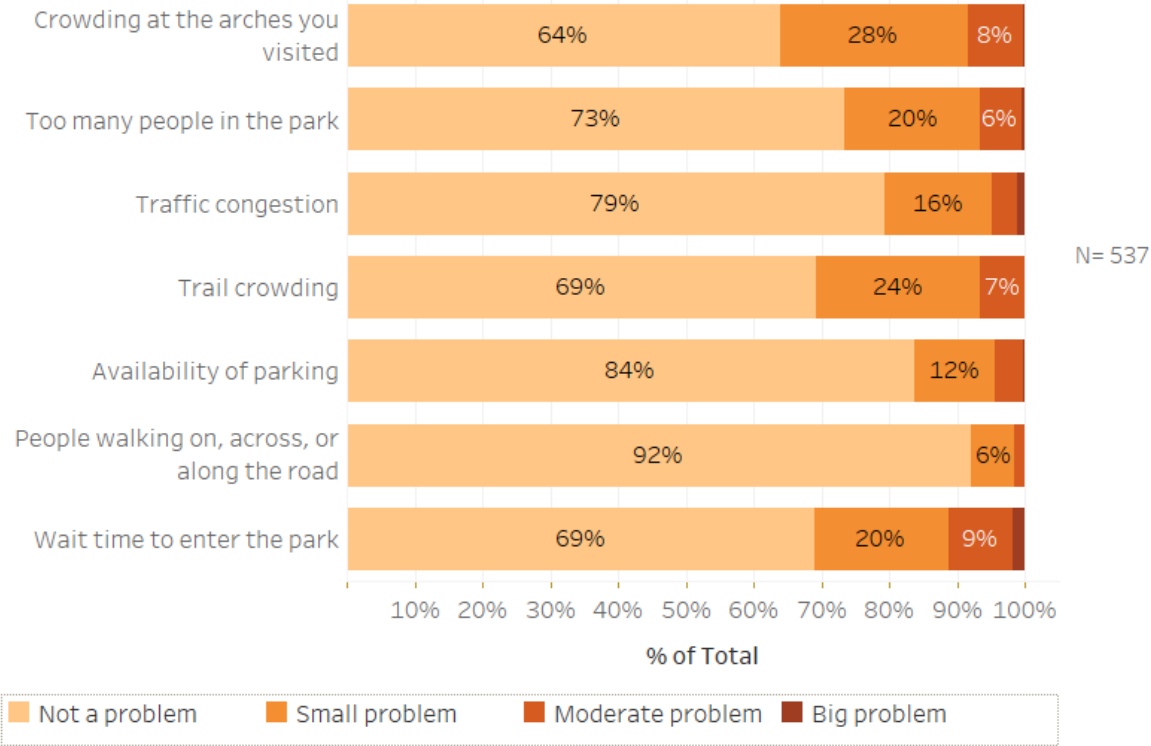


Figure 3.18: Problems on current trip

How problematic were each following while in Arches National Park on past trips.

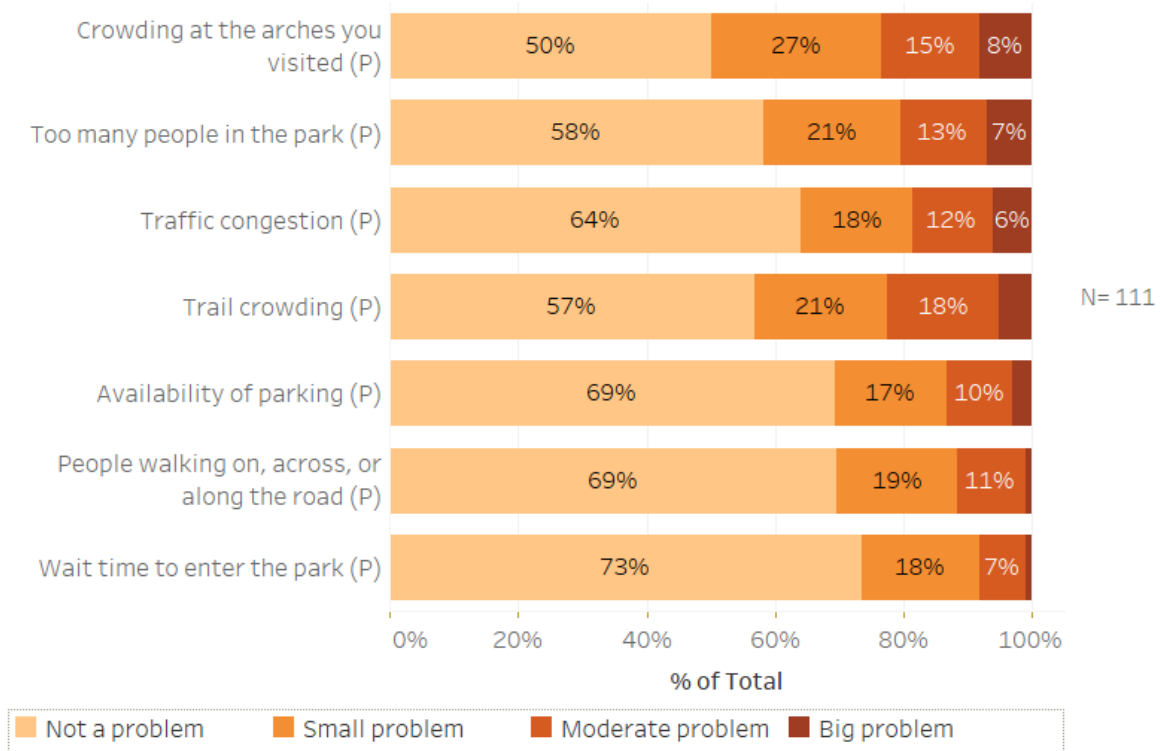


Figure 3.19: Problems on past trip

3.1.6 Place Attachment

Respondents were asked about their attachment to Arches as a place. The purpose of this question-set was to better understand how attachment to ARCH impacted other ratings of their visit, and of the pilot-timed entry system. Most respondents either somewhat or strongly agreed that prior to their visit, seeing images of ARCH increased their attachment to the landscape (71%). This question was asked on a five-point Likert agreement scale from (1) strongly disagree to (5) strongly agree (Figure 3.20) (Mean: 4.01 SD: .934). Additionally, respondents were asked to rank on another five-point Likert agreement scale, their agreement with a series of statements regarding their attachment to ARCH. These questions were asked because place attachment has been indicated in the literature to be related to various components of recreation experience including sensitivity to and critical of resource and social conditions (Manning, 2022). The most frequently agreed upon place attachment statements were: "Being able to recreate in ARCH Means a lot to me" (Mean: 3.92 SD: 1.029) and "I get more satisfaction out of visiting ARCH than other public open spaces or land" (Mean: 3.46 SD: .913) (Figure 3.21 and Table 3.5)

Please describe your level of agreement with the following statement...
Seeing images of Arches National Park prior to my visit increased how attached I felt to the landscape.

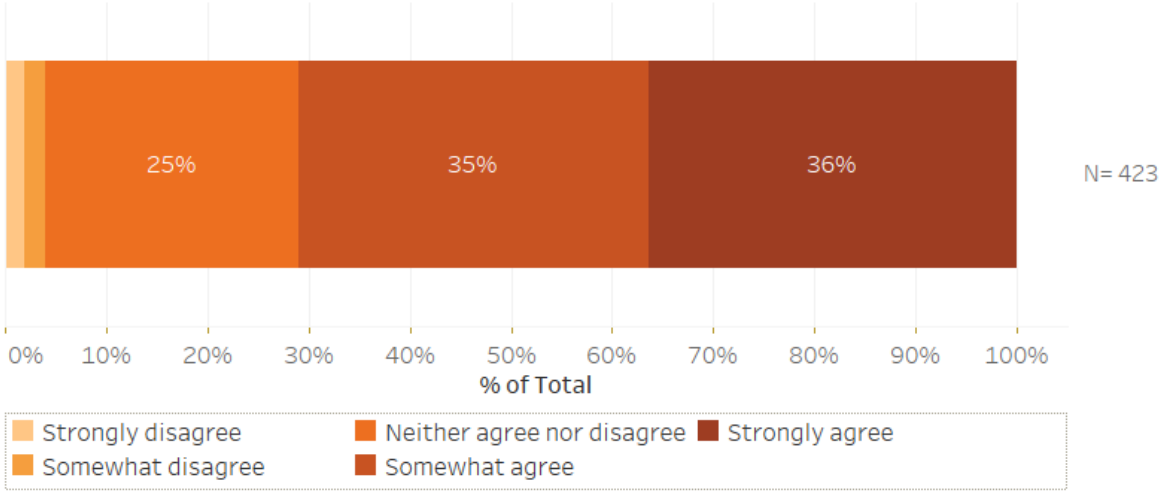


Figure 3.20: Place Attachment due to Images

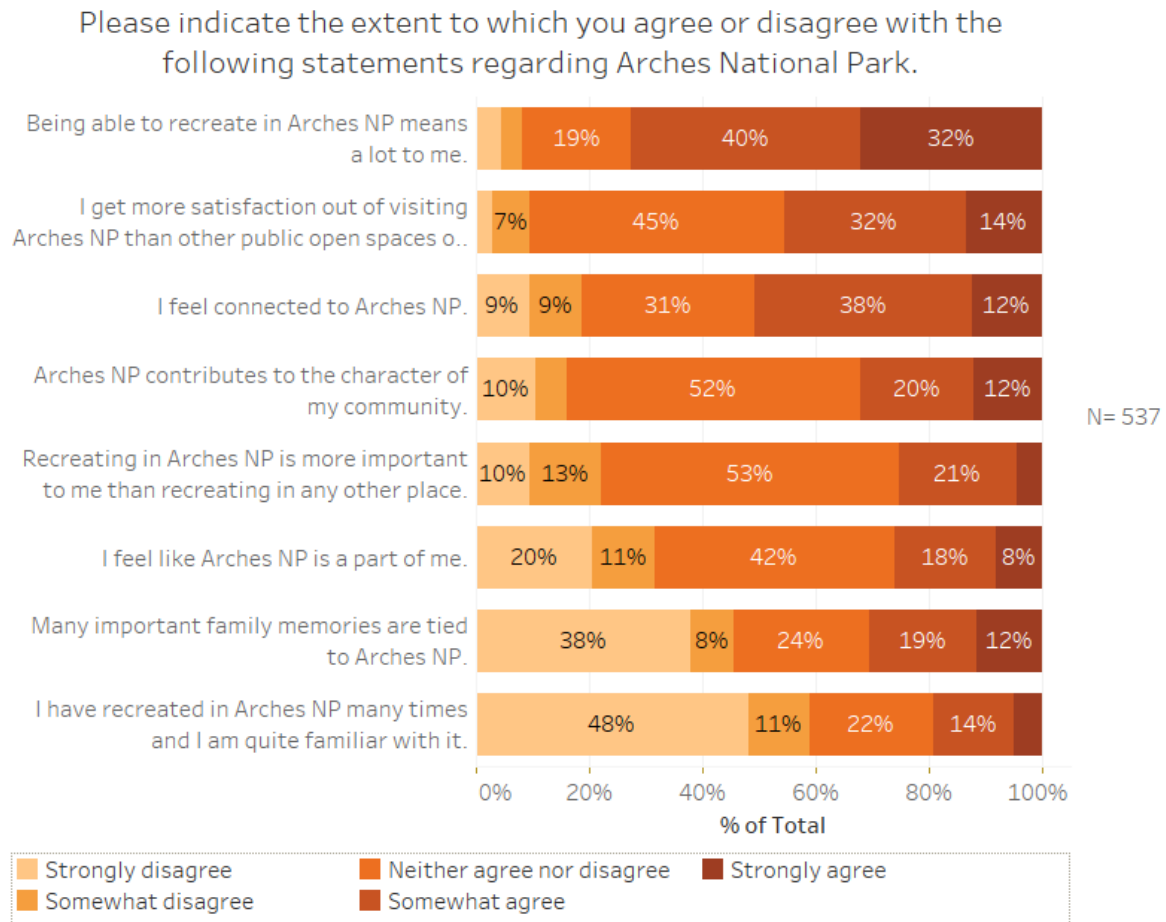


Figure 3.21: Place Attachment to ARCH

Variable	N	Mean	Min	Max	Std. Dev.
Being able to recreate in Arches NP Means a lot to me.	532	3.92	1	5	1.029
I get more satisfaction out of visiting Arches NP than other public open spaces or land.	532	3.46	1	5	0.913
I feel connected to Arches NP.	534	3.35	1	5	1.107
Arches NP contributes to the character of my community.	529	3.18	1	5	1.062
Recreating in Arches NP is more important to me than recreating in any other place.	533	2.98	1	5	0.947
I feel like Arches NP is a part of me.	533	2.82	1	5	1.187
Many important family memories are tied to Arches NP.	532	2.59	1	5	1.442
I have recreated in Arches NP many times and I am quite familiar with it.	533	2.17	1	5	1.299

Table 3.5: Descriptive Statistics for Place Attachment (1= Strongly Disagree, 5 = Strongly Agree)

3.1.7 Support for Timed-Entry as a Management Action

Visitors were asked to rate their agreement with a series of reasons why NPS managers may need to implement a management action such as timed-entry (Figure 3.22 and Table 3.6) on a five-point Likert agreement scale with (1) indicating strongly disagree and (5) indicating strongly agree. Visitors generally were supportive of using timed-entry as a management tool. The most favorable reason was "If congestion and crowding cause delays in the ability to respond to an emergency situation" Figure 3.22 shows that 83% of respondents either somewhat or strongly agreed that this was a reason to implement timed-entry (Mean: 4.26 SD: 0.971). The least favorable reason for implementing timed-entry was to maintain solitude with 66% of respondents either somewhat or strongly agreeing with this reason. However, 13% of respondents either strongly or somewhat disagreed with maintaining solitude as a reason for timed-entry (Mean: 3.8 SD: 1.081). Finally, respondents were given the option to state that timed-entry should never be imposed. Most respondents either strongly or somewhat disagreed with this statement (72%, Mean: 2.03 SD: 1.184) (Figure 3.22 and Table 3.6).

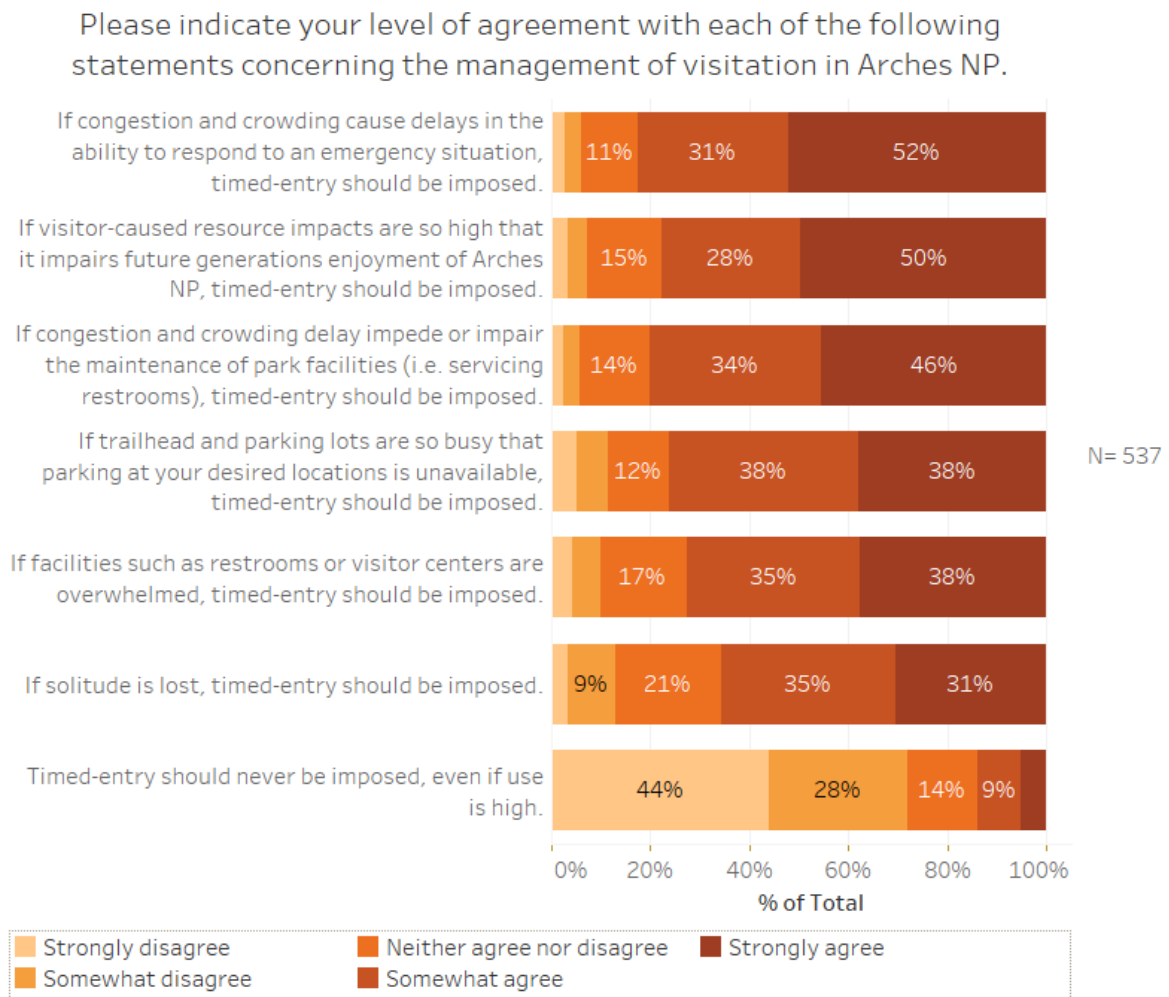


Figure 3.22: Support for Management Actions

Variable	N	Mean	Min	Max	Std. Dev.
If congestion and crowding cause delays in the ability to respond to an emergency situation, timed-entry should be imposed.	518	4.26	1	5	0.971
If visitor-caused resource impacts are so high that it impairs future generations opportunities to enjoy Arches NP timed-entry should be imposed.	520	4.17	1	5	1.038
If congestion and crowding delay impede or impair the maintenance of park facilities (i.e. servicing restrooms), timed-entry should be imposed.	517	4.17	1	5	0.963
If trailhead and parking lots are so busy that parking at your desired locations is unavailable, timed-entry should be imposed.	522	3.98	1	5	1.102
If facilities such as restrooms or visitor centers are overwhelmed timed-entry should be imposed.	521	3.96	1	5	1.077
If solitude is lost, timed-entry should be imposed.	521	3.8	1	5	1.081
Timed-entry should never be imposed, even if use is high.	521	2.03	1	5	1.184

Table 3.6: Descriptive Statistics for Support for Management Actions (1 = Strongly Disagree, 5 = Strongly Agree)

3.1.8 Visitor Characteristics

Most (79%) respondents were first time visitors to Arches National Park (Figure 3.23). If visitors indicated they had visited in the past, they were asked when their first visit to ARCH was, a majority of respondents had first visited more than 5 years ago (65%) (Figure 3.24). Visitors were also asked how many trips they had made in the last 5 years. Most respondents had visited once or twice in the last five years (83%) (Figure 3.25). The visitors sampled in this study were dominantly white (91%) (Figure 3.26) and evenly split between male and female (Figure 3.27). Respondents were also well educated (80% have a B. S degree or beyond) (Figure 3.28), with 55% of respondents reporting a household income of \$100,000 or more (Figure 3.29). The average age of respondents is 43 (Figure 3.30). Most respondents (84%) currently lived in the United States (Figure 3.31).

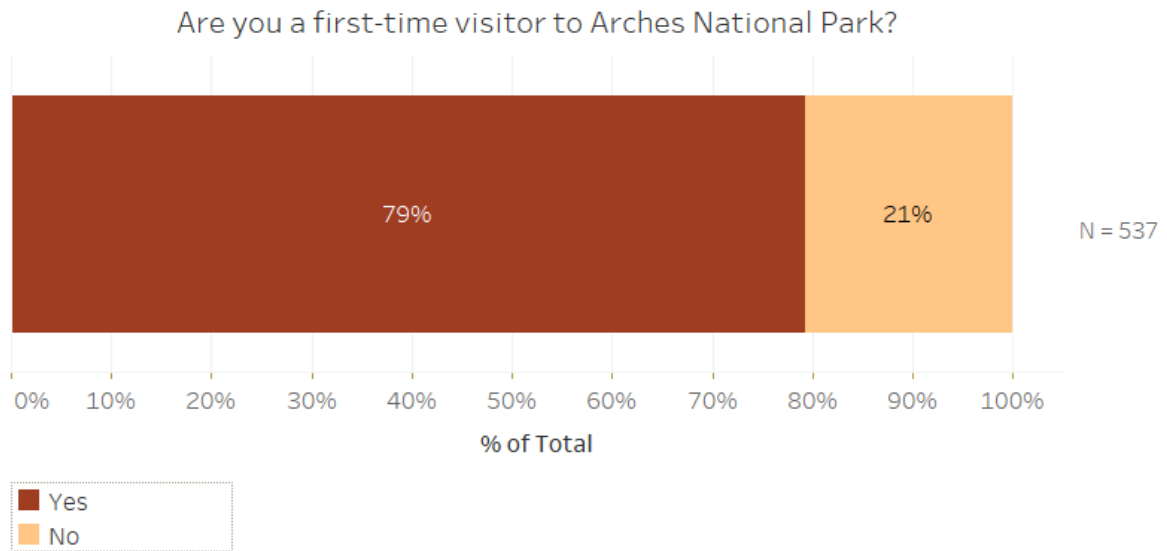


Figure 3.23: First-Time or Returning Visitor

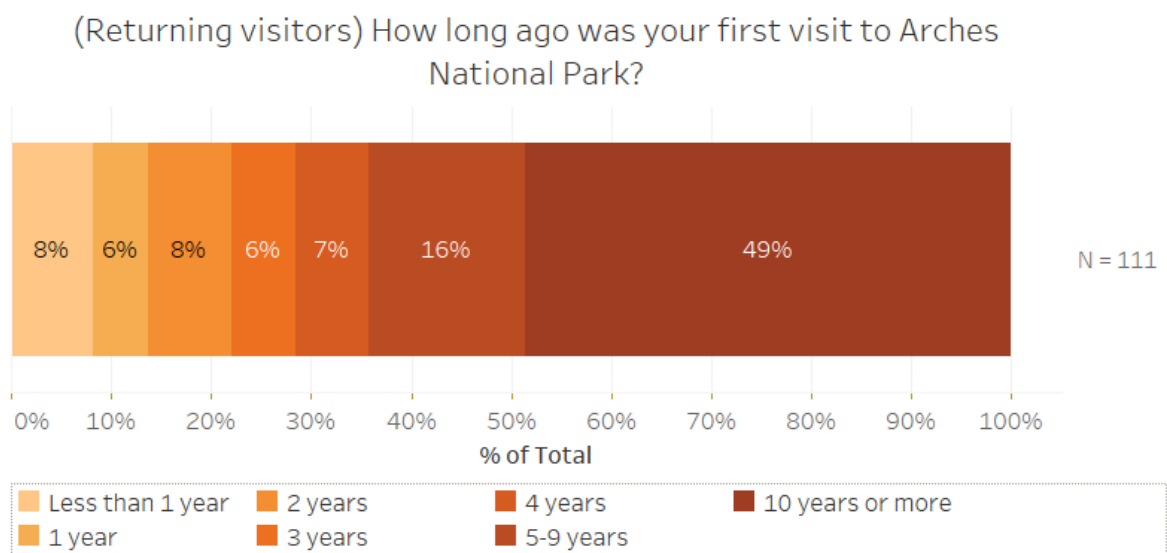


Figure 3.24: Returning Visitor Time of First Visit

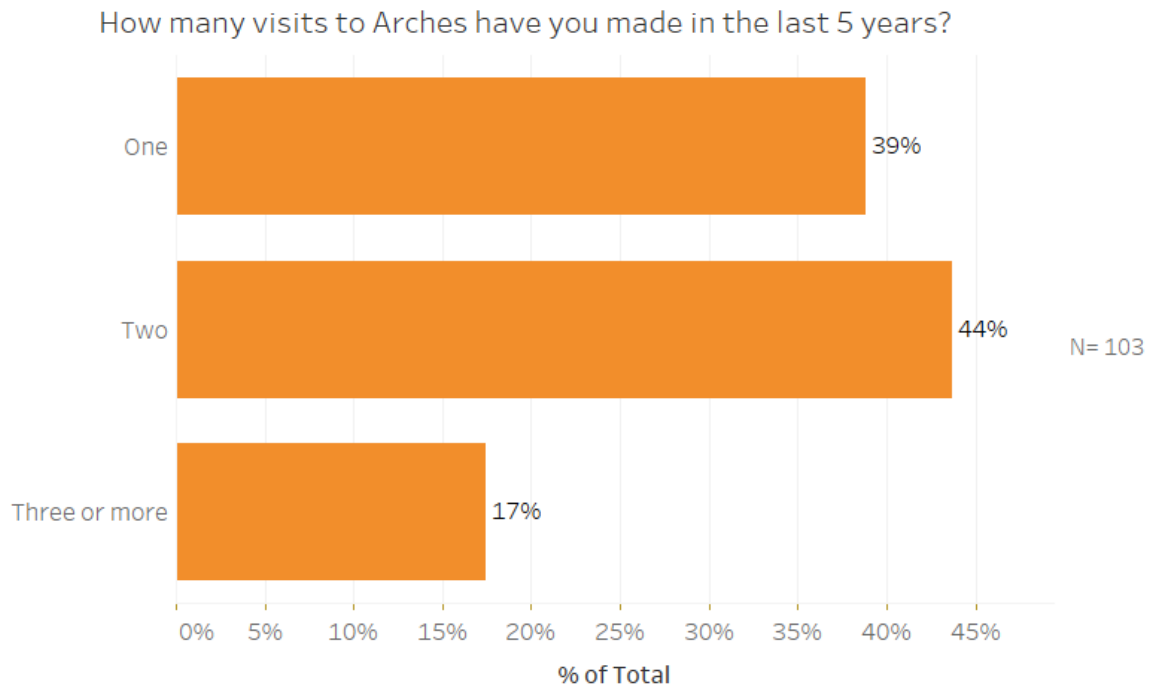


Figure 3.25: Returning Visitor Visits in last 5 years

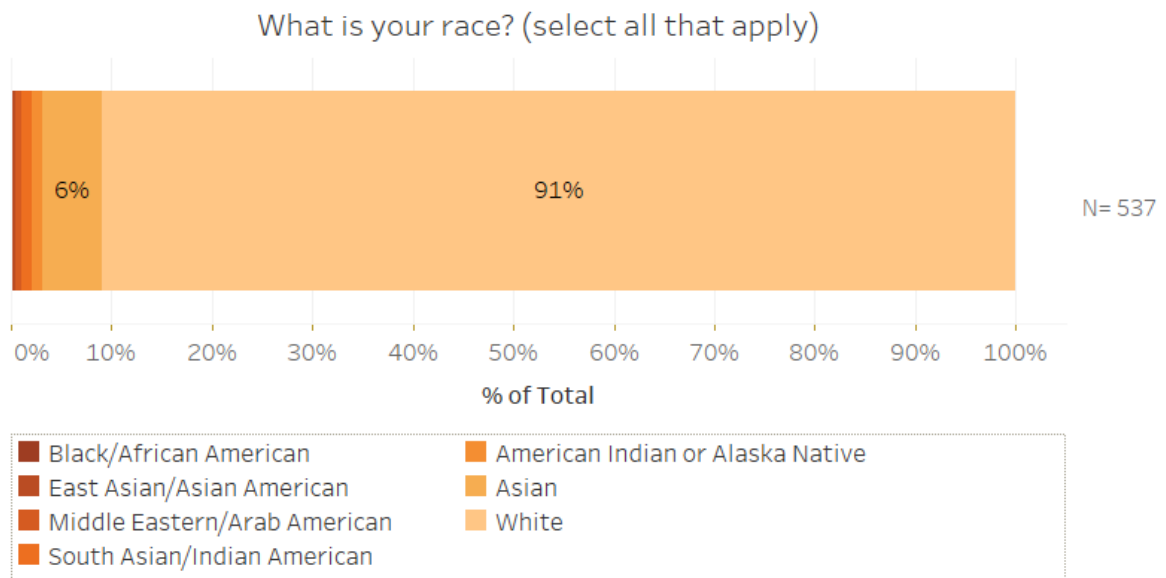


Figure 3.26: Respondents' Race

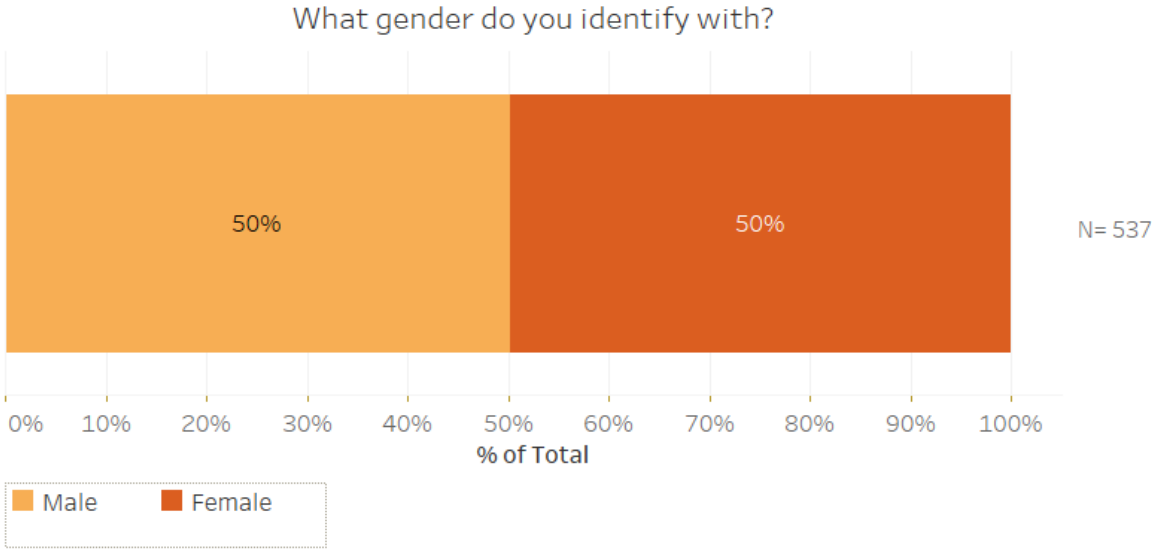


Figure 3.27: Gender Respondent Identifies With

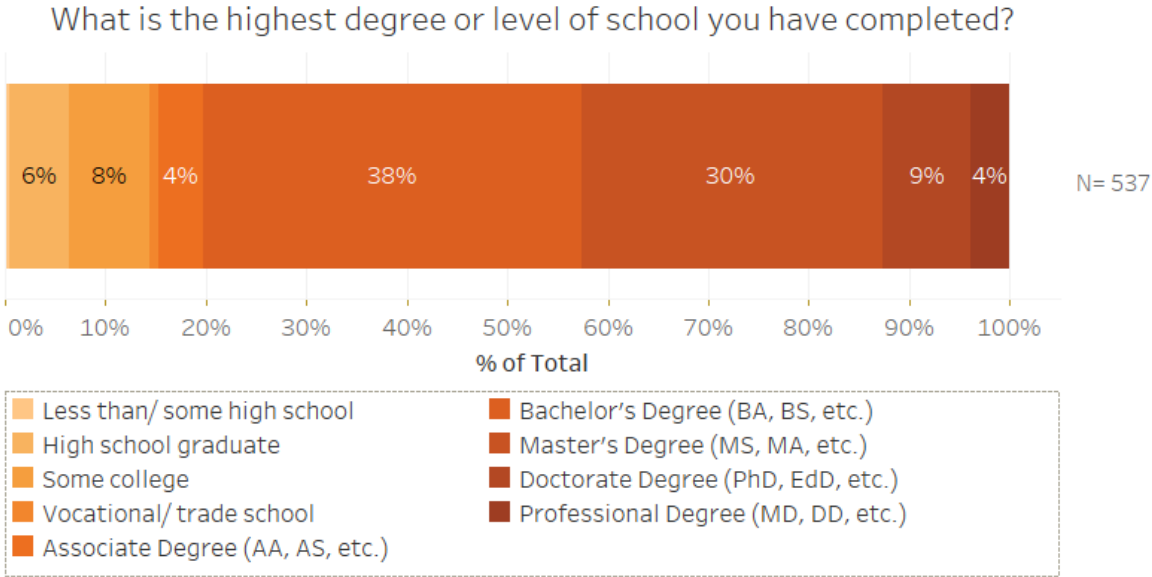


Figure 3.28: Education Level

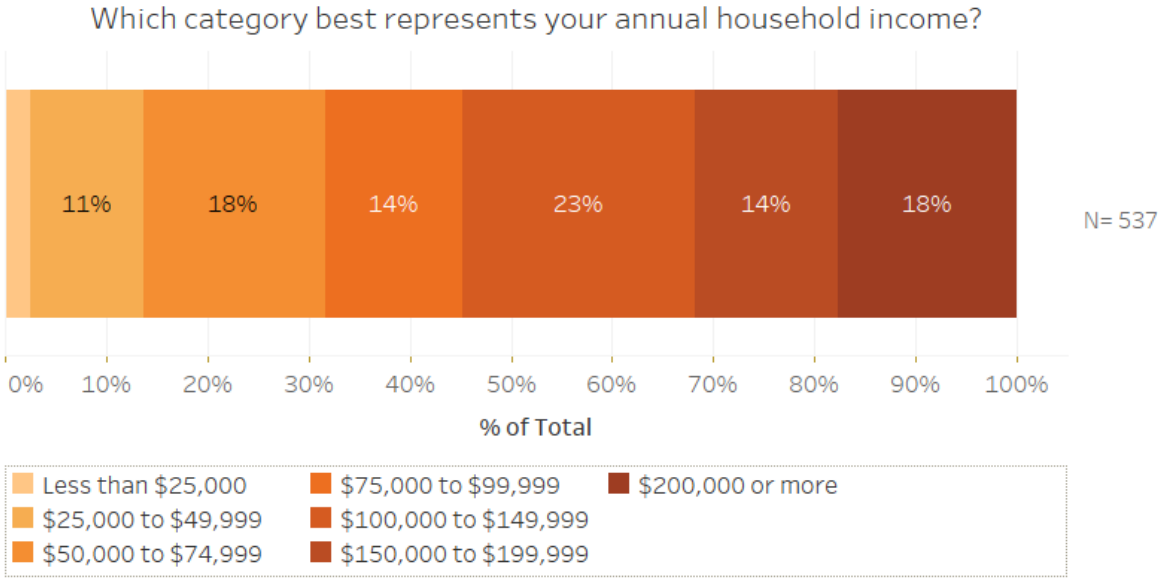


Figure 3.29: Household Income

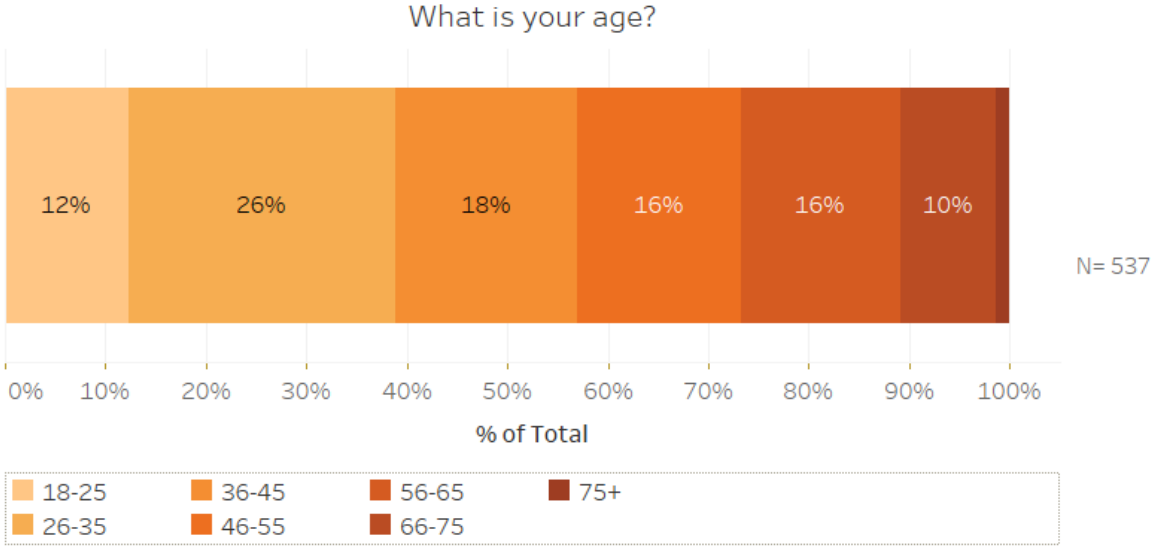


Figure 3.30: Respondent Age

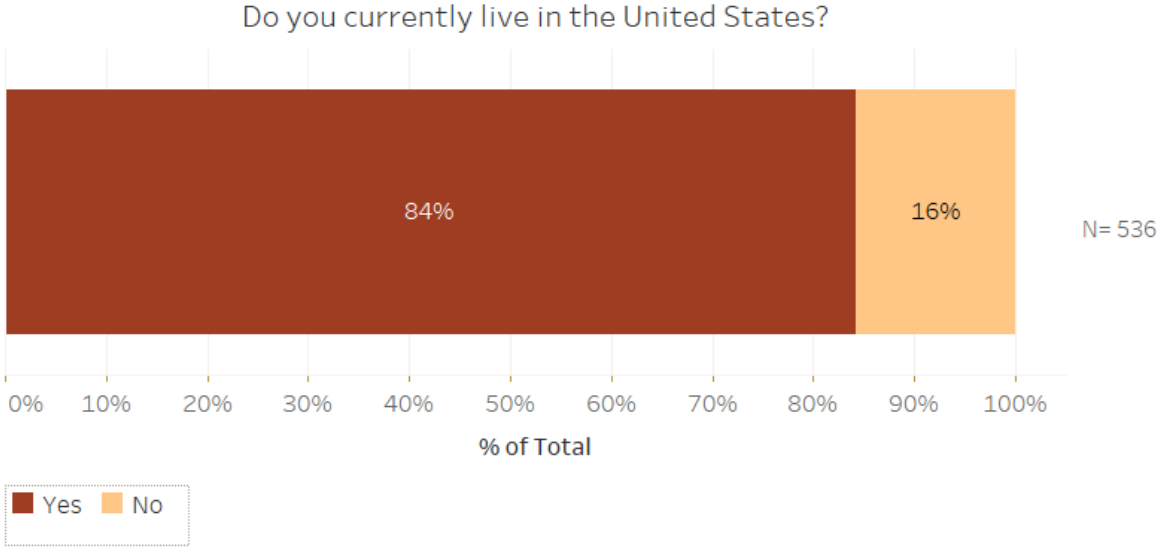


Figure 3.31: Living in the United States

Differences in Means between Groups in the Summer Survey

Comparisons were conducted to determine if there were statistically significant differences in response types between groups in the summer survey. Several groups were compared using independent sample t-tests. The first group-set analyzed was first-time and returning visitors. No statistically significant differences were found in ratings of timed-entry components or support for management actions. Two of the problems with crowding showed statistically significant differences: trail crowding and crowding at the arches visited (Table 3.7). First time visitors were less likely to report problems generally, and rated trail crowding (Mean: 1.34 SD: .574) and crowding at arches visited (Mean: 1.41 SD: .636) as less of a problem than returning visitors (Mean: 1.51 SD: .704; Mean: 1.59 SD: .723). Despite the statistically significant difference, the Cohen's d was low, which indicates this difference was minor.

Variable	t	sig	df	Effect Size (Cohen's d)
Trail Crowding	-2.315	<0.01	527	-.281
Crowding at the arches I visited	-2.292	<0.05	528	-.265

Table 3.7: Independent Samples T Test for Summer First Time or Returning Visitors and Crowding

Support for a reservation system in the future was also compared to ratings of timed-entry components, problems with crowding, support for management actions, and planning for trip. There were no statistically significant differences in Means in responses to problems with crowding or planning for trip between visitors who would prefer a reservation system on future trips and those who would not. However, there were statistically significant differences between groups for ratings of their experience with specific timed-entry components (Table 3.8), and general support for management actions (Table 3.9). Respondents who would prefer a reservation system on future visits rated all components of timed-entry higher than those who would not prefer a reservation system. Additionally, the pro-reservation system respondents also were more supportive of using timed-entry to resolve specific management issues, and were less likely to report that timed-entry should never be used (Table 3.8 and 3.9). The differences in Means for statistically significant variables are presented below in Table ??.

Additionally, in order to understand how the number of previous visits influenced ratings of problems, management support, and ratings of timed-entry components, the number of previous visits variable was categorized into three groups: single visitors (one trip on the last 5 years), multiple visitors (two trips in the last 5 years), and frequent visitors (three or more trips in the last 5 years). One way Analysis of Variance (ANOVA) tests were run across these three groups. No statistically significant results were found.

Variable	t	sig	df	Effect size (Cohen's d)
Ease of obtaining tickets	4.462	<.001	511	0.667
Availability of tickets for desired days	4.77	<.001	505	0.523
Park staff assistance in getting a permit or navigating the website upon arrival	1.017	<.05	222	0.192
Format of NPS website	3.278	<.001	494	0.412
NPS communication of there being a new system and the requirement of tickets	5.628	<.001	478	0.831
Availability of internet to pursue tickets	5.703	<.001	483	0.733
Navigation of Recreation. gov platform	4.052	<.001	506	0.507
Access to the Visitor Center	3.094	<.005	430	0.406
Assistance from park staff after 5:00	3.409	<.001	129	0.77

Table 3.8: T Test for Reservation Preference and Timed-Entry Ratings

Variable	t	sig	df	Effect size (Cohen's d)
If trailhead and parking lots are so busy that parking at your desired locations is unavailable, timed-entry should be imposed.	5.453	<.001	516	0.663
If visitor-caused resource impacts are so high that it impairs future generations opportunities to enjoy Arches NP, timed-entry should be imposed.	5.296	<.001	514	0.644
Timed-entry should never be imposed, even if use is high.	-6.466	<.001	515	-0.786
If solitude is lost, timed-entry should be imposed.	4.258	<.001	515	0.52
If facilities such as restrooms or visitor centers are overwhelmed timed-entry should be imposed.	4.14	<.001	515	0.506
If congestion and crowding cause delays in the ability to respond to an emergency situation, timed-entry should be imposed.	2.991	<.005	512	0.366
If congestion and crowding delay impede or impair the maintenance of park facilities (i.e. servicing restrooms), timed-entry should be imposed.	4.236	<.001	511	0.518

Table 3.9: T Test for Reservation System Support and Support for Management Actions

Variable	Reservation Preference	N	Mean	SD
Ease of obtaining tickets	Yes	433	4.42	0.716
	No	80	3.91	0.97
Availability of tickets for desired days	Yes	428	4.35	0.746
	No	79	3.78	1.009
Park staff assistance in finding alternative activities in Moab area	Yes	191	4.34	0.843
	No	33	4.18	0.727
Park staff assistance in getting a permit or navigating the website upon arrival	Yes	177	4.37	0.766
	No	35	4.09	0.702
Format of NPS website	Yes	419	4.23	0.716
	No	77	3.94	0.732
NPS communication of there being a new system and the requirement of tickets	Yes	408	4.04	0.905
	No	72	3.26	1.113
Availability of internet to pursue tickets	Yes	414	4.39	0.785
	No	71	3.79	0.999
Navigation of Recreation.gov platform	Yes	433	4.21	0.7
	No	75	3.84	0.886
Access to the Visitor Center	Yes	363	4.51	0.658
	No	69	4.23	0.843
Assistance from park staff after 5:00	Yes	107	4.33	0.798
	No	24	3.67	1.09
If trailhead and parking lots are so busy that parking at your desired locations is unavailable, timed-entry should be imposed.	Yes	438	4.1	1.063
	No	80	3.39	1.097
If visitor-caused resource impacts are so high that it impairs future generations opportunities to enjoy Arches National Park, timed-entry should be imposed.	Yes	436	4.28	0.981
	No	80	3.64	1.105
Timed-entry should never be imposed, even if use is high.	Yes	437	1.89	1.137
	No	80	2.79	1.144
If solitude is lost, timed-entry should be imposed.	Yes	438	3.88	1.062
	No	79	3.33	1.083
If facilities such as restrooms or visitor centers are overwhelmed, timed-entry should be imposed.	Yes	438	4.04	1.066
	No	79	3.51	1.036
If congestion and crowding cause delays in the ability to respond to an emergency situation, timed-entry should be imposed.	Yes	435	4.31	0.967
	No	79	3.96	0.953
If congestion and crowding delay impede or impair the maintenance of park facilities (i.e. servicing restrooms), timed-entry should be imposed.	Yes	434	4.25	0.946
	No	79	3.76	0.964

Table 3.10: Comparison of Means for Variables by Reservation Preference

3.2. Fall 2022 Post-TE Survey Results

3.2.1 Purpose for Fall Survey

With the implementation of a new management action, such as timed-entry in ARCH, there are inevitably many questions asked in the public land management and tourism industries regarding how this action will impact visitor experience, local economic opportunities, and management. In the case of timed-entry in ARCH many managers, industry professionals, and researchers were interested in whether or not timed-entry was causing a seasonal displacement to the fall post-timed entry months. To contribute to the understanding of these potential impacts, a follow-up survey was conducted in October and November of 2022. This abridged survey instrument was used to address research question six, regarding visitor experience in the park post-timed entry, and reasons for choosing to visit during that season.

3.2.2 Comparisons between Summer and Fall Responses

Chi-square test of homogeneity were run to see if there were differences between seasons for questions that were asked in the same way in the summer survey as well as the fall survey. The questions tested were: first-time vs. returning visitor; number of visits in the past five years; planning for trip; time of decision to visit ARCH; support for management actions; Age; Income; and Education level. Results of these tests are provided below:

- There was no statistically significant difference between groups for first-time vs returning visitors. ($X^2(1, N=939)=2.609, p=.106$)
- There was also not a statistically significant difference between groups of returning visitors regarding the number of previous visits in the last 5 years ($X^2(4, N=122)=3.842, p=.428$).
- There was a statistically significant difference between groups for description of trip planning ($X^2(4, N=935)=20.764, p<.001$). This difference is also reflected in the descriptive and summary statistics presented for this question; Summer visitors planned ahead more with 36% of visitors describing their trip as very carefully, or carefully planned and only 9% described their trip as spontaneous (Figure 3.12). Fall visitors were more spontaneous (12%) and less frequently described their trip as very carefully or carefully planned (31%) (Figure 3.33).
- There was also a statistically significant difference between groups for time of decision to visit ARCH ($X^2(7, N=938)=28.959, p<.001$). Similar to planning, this difference is reflected in the percentage distributions, 32% of respondents to the Fall survey indicated they made the decision to visit more than 6 months ahead of time, and 10% made the decision on the day of their visit (Figure 3.32). This is compared to summer respondents wherein 40% made the decision 6 months or more before their trip, and 5% made their decision on the day of their visit (Figure 3.11).

The survey questions related to the level of acceptability/support for managed access questions were posed slightly different between summer and fall, the word “timed-entry” was changed for the fall survey to “reservations”. This change was made with the expectation that fall visitors may not be familiar with the term timed-entry as they did not personally have to navigate the system. Despite the change in that word, the rest of the question structure was the same, therefore comparisons were made. Overall, when comparing management support questions, the Summer respondents, who were visiting the park in the midst of a management action, were generally more supportive of using a management restriction system. There were statistically significant differences for all of the management action support questions. Additionally, the means were substantially different between the summer and fall respondents for many of the components.

- If congestion and crowding cause delays in the ability to respond to an emergency situation a reservation (Timed-Entry) should be imposed ($X^2(4, N=915)=32.659, p<.001$). Summer Mean: 4.26, Fall Mean: 3.89
- If congestion and crowding delay impede or impair maintenance of park facilities... ($X^2(4, N=911)=56.766, p<.001$). Summer Mean: 4.17, Fall Mean: 3.79

- If facilities such as restrooms or visitor centers are overwhelmed... (X2 (4,N=918)=84.041, p<.001). Summer Mean: 3.96, Fall Mean: 3.34
- If solitude is lost... (X2 (4,N=918)=48.494, p<.001). Summer Mean: 3.80, Fall Mean 3.36
- Reservations (Timed-Entry) should never be imposed, even if use is high. (X2 (4,N=917)=11.718, p<.05). Summer Mean: 2.20, Fall Mean: 2.03
- If visitor-caused resource impacts are so high that it impairs future generations opportunities to enjoy ARCH... (X2 (4,N=917)=48.813, p<.001). Summer Mean: 4.17, Fall Mean: 3.68
- If trailheads and parking lots are so busy that parking at your desired location is unavailable... (X2(4,N=922)=140.411, p<.001). Summer Mean: 3.98 Fall Mean: 3.10

Additionally, select demographic variables were asked in summer and fall. There were not statistically significant differences between groups for age (X2 (64,N=903)=54.789, p=.787) or education level (X2 (8,N=902)=13.849, p=.086). There was a difference between groups for income (X2 (7,N=887)=20.370, p<.005). This difference was also reflected in the summary statistics, with the Summer visitors representing a lower income distribution than the Fall visitors (55% and 60% reporting more than \$ 100,000 a year, respectively) (Figures 3.29 and 3.41).

3.2.3 Fall Post-TE Descriptive Results

Trip Planning

In the fall data collection period, the distribution of respondents decision to visit was varied between the same day and year or more. Many respondents (32%) indicated they decided to visit more than six months before their visit. Ten percent of visitors said they planned their trip the same day as their visit to ARCH (Figure 3.32). Thirty-one percent of respondents described their trip to Moab as very carefully planned or carefully planned. Additionally, twelve percent described their trip as spontaneous (Figure 3.33).

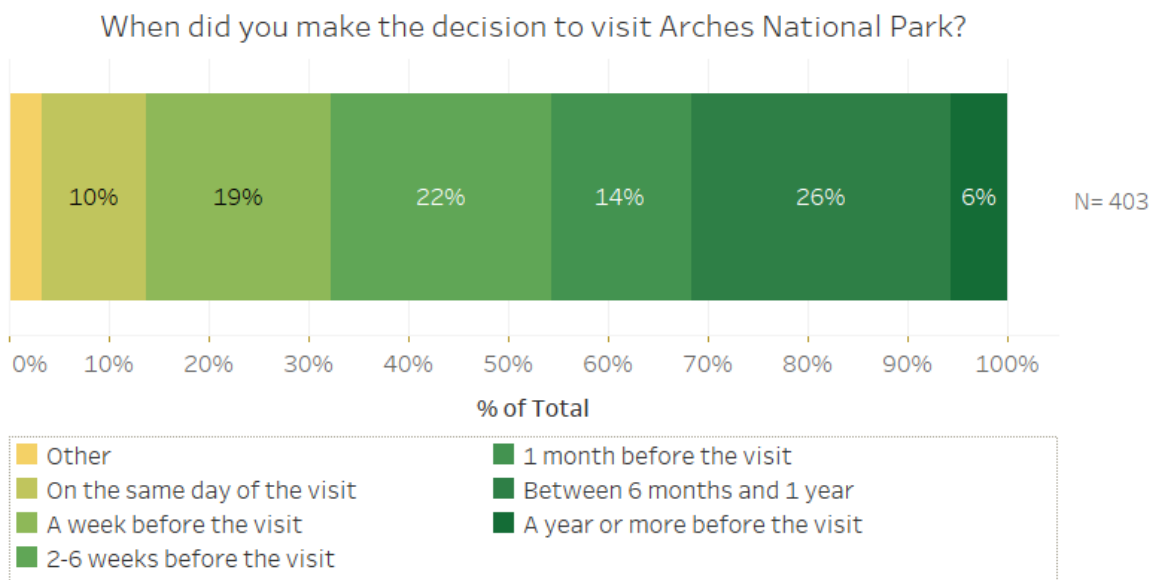


Figure 3.32: Time of Decision to Visit ARCH - Fall

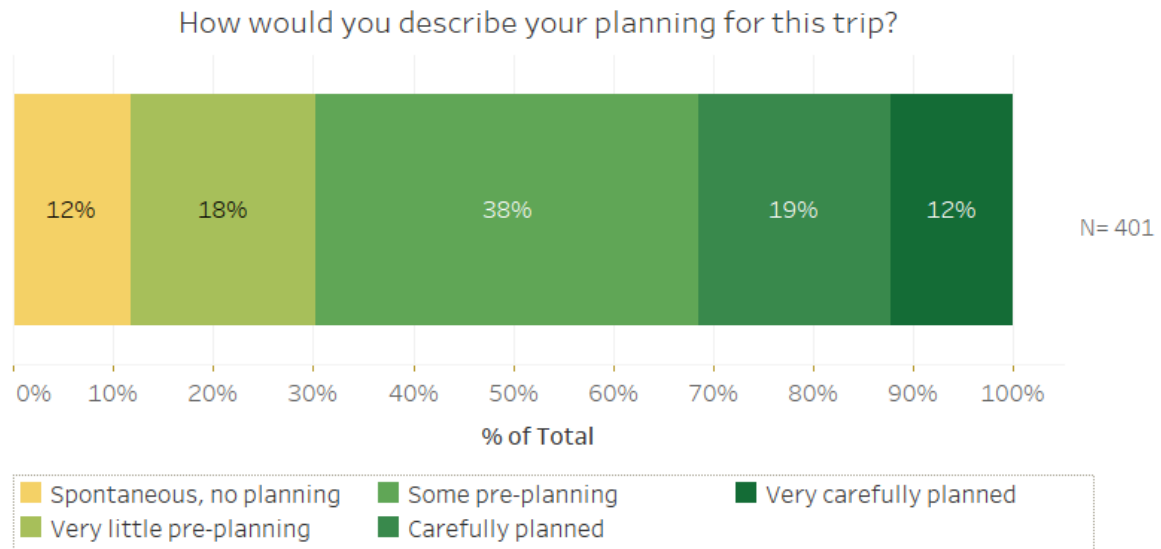


Figure 3.33: Planning for ARCH Trip - Fall

Problems on this Trip

All respondents of the fall survey were asked to rate eight dimensions of their experience and how potential issues impacted their experience on a five-point Likert scale (1 No effect - 5 Extreme effect)(Figure 3.34). Most respondents did not have problems with any of the listed potential problems. However, 46% of respondents indicated that crowding at the arches they visited had some-extreme effect on their experience. Additionally, 40% indicated some to extreme effects on experience due to crowds of people along the trail (Figure 3.34).

Please describe how each of the following affected your experience while in Arches National Park during this trip.

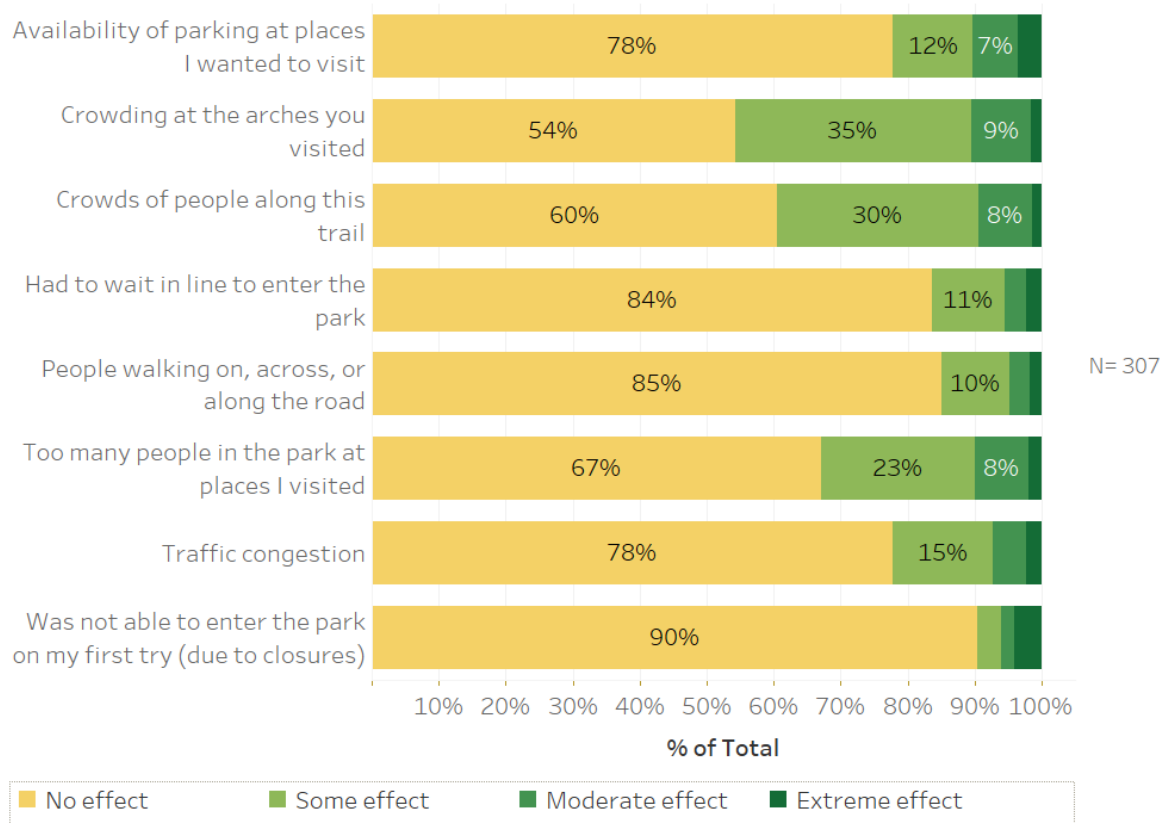


Figure 3.34: Problems on trip - Fall

Support for Reservations as a Management Action

Visitors were asked to rate their level of agreement with a series of reasons why NPS managers may need to implement a management action such as timed-entry (Figure 3.35 and Table 3.11) on a five-point Likert agreement scale with (1) indicating strongly disagree and (5) indicating strongly agree. Visitors generally were supportive of using timed-entry as a management tool. The most favorable reason was *If congestion and crowding cause delays in the ability to respond to an emergency situation* Figure 3.35 shows that 72% of respondents either somewhat or strongly agreed that this was a reason to implement timed-entry (Mean: 3.89 SD: 1.123). The least favorable reason for implementing timed-entry was to maintain solitude with 56% of respondents either somewhat or strongly agreeing with this reason. However, 10% of respondents either strongly or somewhat disagreed with maintaining solitude as a reason for timed-entry (Mean: 3.36 SD: 1.176). Finally, respondents were given the option to state that timed-entry should never be imposed. Most respondents either strongly or somewhat disagreed with this statement (67%, Mean: 2.2 SD: 1.155).

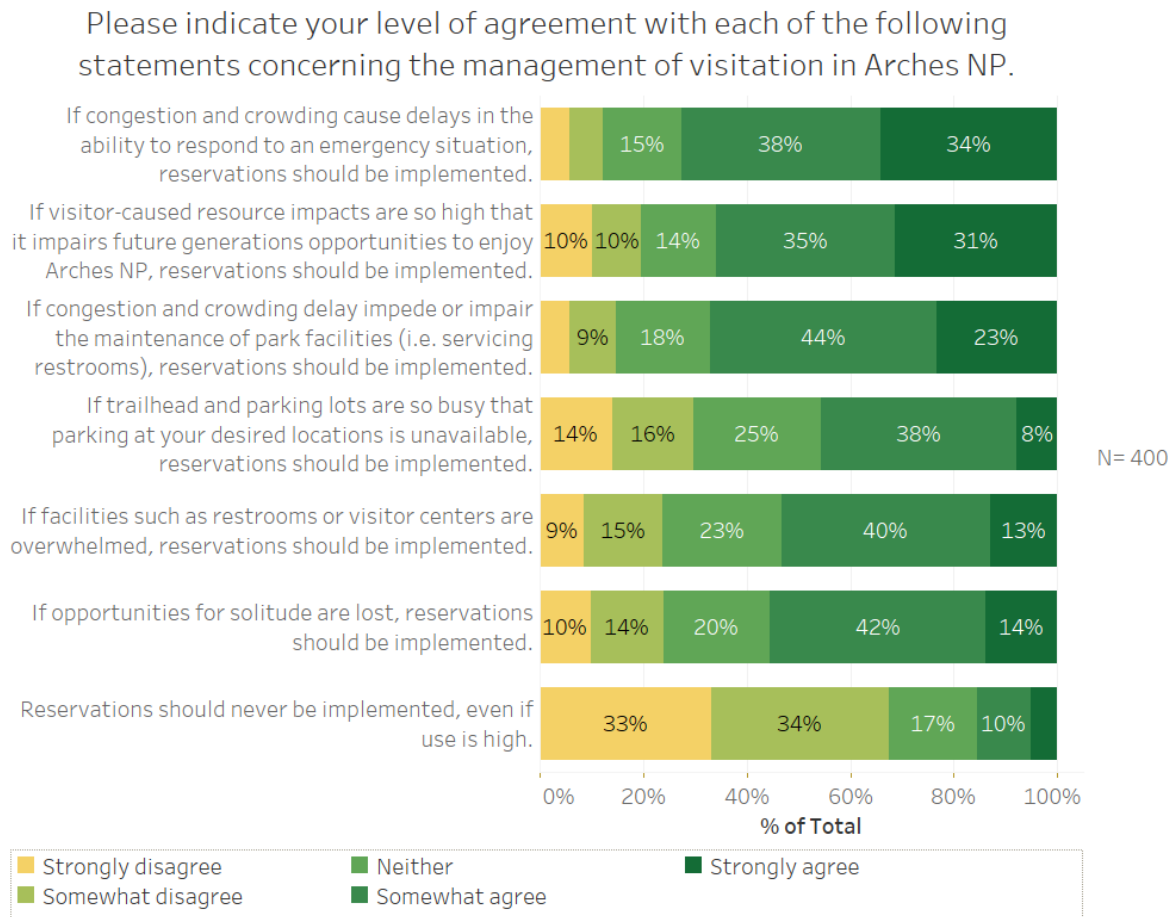


Figure 3.35: Support for Management Actions - Fall

Variable	N	Mean	Min	Max	Std. Dev.
If congestion and crowding cause delays in the ability to respond to an emergency situation, reservations should be implemented.	397	3.89	1	5	1.123
If visitor-caused resource impacts are so high that it impairs future generations opportunities to enjoy Arches NP, reservations should be implemented.	397	3.68	1	5	1.284
If congestion and crowding delay impede or impair the maintenance of park facilities (i.e. servicing restrooms), reservations should be implemented.	394	3.7	1	5	1.099
If trailhead and parking lots are so busy that parking at your desired locations is unavailable, reservations should be implemented.	400	3.1	1	5	1.187
If facilities such as restrooms or visitor centers are overwhelmed, reservations should be implemented.	397	3.34	1	5	1.14
If opportunities for solitude are lost, reservations should be implemented.	397	3.36	1	5	1.176
Reservations should never be implemented, even if use is high.	396	2.2	1	5	1.155

Table 3.11: Descriptive Statistics for Fall Support for Management Actions (1 = Strongly Disagree, 5 = Strongly Agree)

Reasons for Visiting During This Season

Respondents were asked to rate different statements regarding reasons for their choice to visit ARCH in the Fall rather than a different season, on a five-point Likert scale (1) Not at all to (5) Very much (Figure 3.36 and Table 3.12). The most frequently cited reason was temperature, 57% of respondents indicated that the cooler temperatures somewhat or very much influenced their choice of when to visit. The lack of a reservation system during this season was not at all a factor for 51% of the respondents, with an additional 10% indicating this only factored in to their decision a little. The least cited factor was *I saw an ad for the Moab area recently and decided to visit* with 83% of respondents indicating this did not influence their decision at all (Figure 3.36 and Table 3.12).

To what extent did each of the following influenced your decision to visit the Moab area during this season rather than a different one.

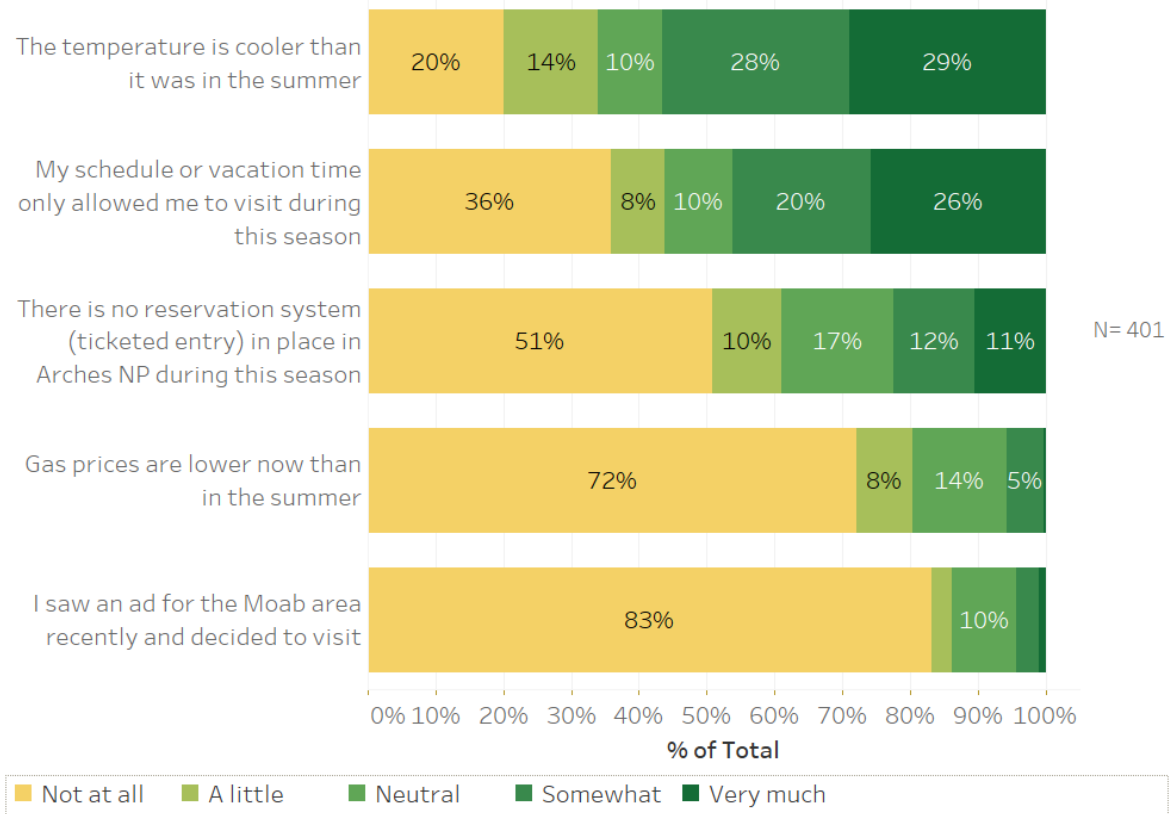


Figure 3.36: Reasons for Visit

Reason	N	Mean	Min	Max	Std. Dev
The temperature is cooler than it was in the summer	400	3.31	1	5	1.51
My schedule or vacation time only allowed me to visit during this season	399	2.92	1	5	1.658
There is no reservation system (ticketed-entry) in place in Arches NP during this season	400	2.21	1	5	1.434
Gas prices are lower now than in the summer	401	1.54	1	5	0.943
I saw an ad for the Moab area recently and decided to visit	400	1.36	1	5	0.858

Table 3.12: Descriptive Statistics for Fall Reasons for Visiting (1 = Not at all, 5 = Very much)

Visitor Characteristics

Most (75%) of the fall respondents were first time visitors to Arches National Park (Figure 3.37). If visitors indicated they had visited in the past, they were asked how many trips they made in the last five years, most respondents had visited one or two times (76%) (Figure 3.38). Visitors were asked if they had visited Canyonlands on their current trip to the area, 45% of respondents indicated that they had visited Canyonlands (Figure 3.39). Most respondents (60%) had a reported household income of \$100,000 or more (Figure 3.41). Respondents were also well educated (83% have a B. S degree or beyond) (Figure 3.42). The average age of respondents is 44 (Figure 3.40).

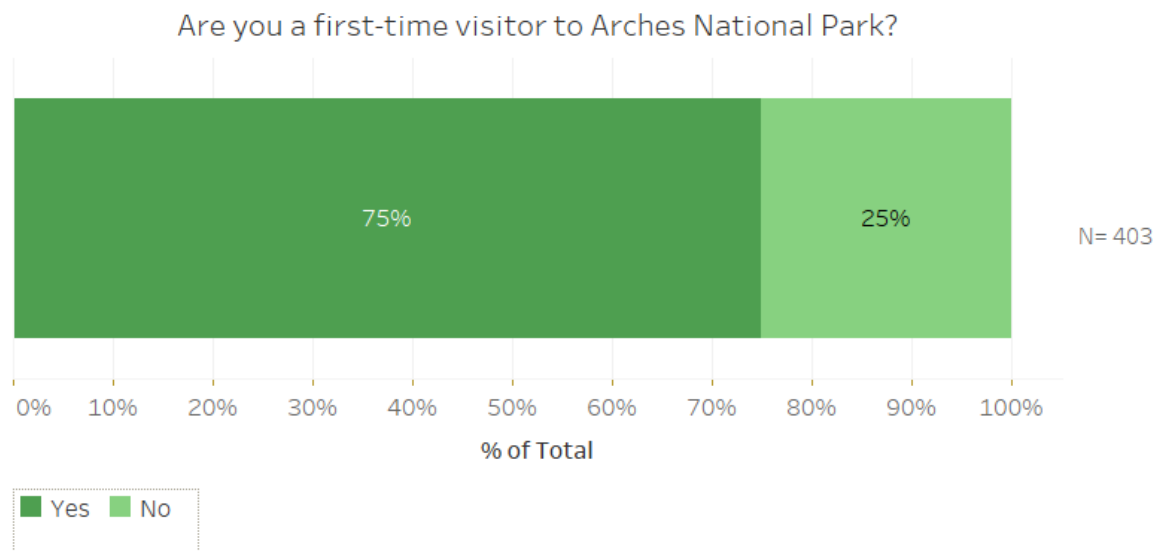


Figure 3.37: First-Time or Returning Visitor - Fall

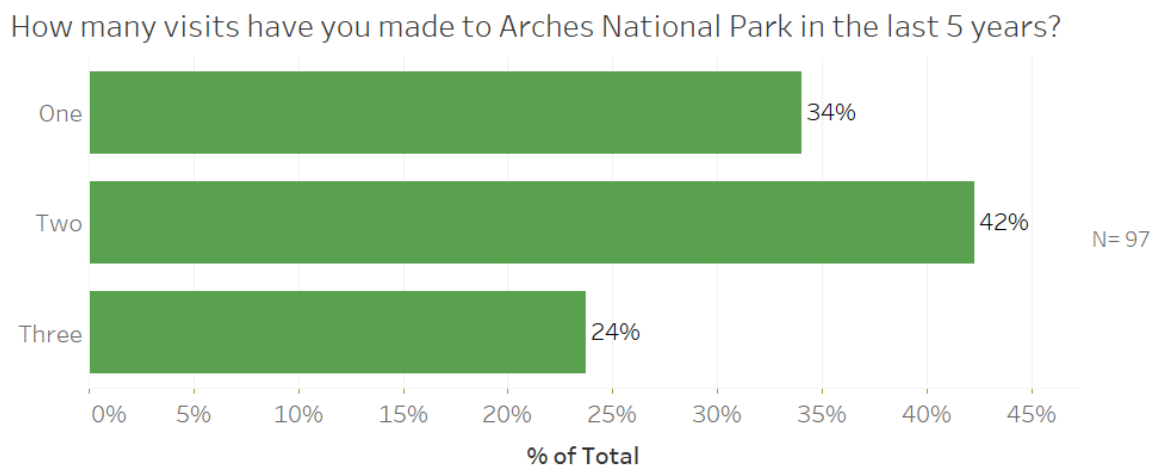


Figure 3.38: Returning Visitor Number of Visits - Fall

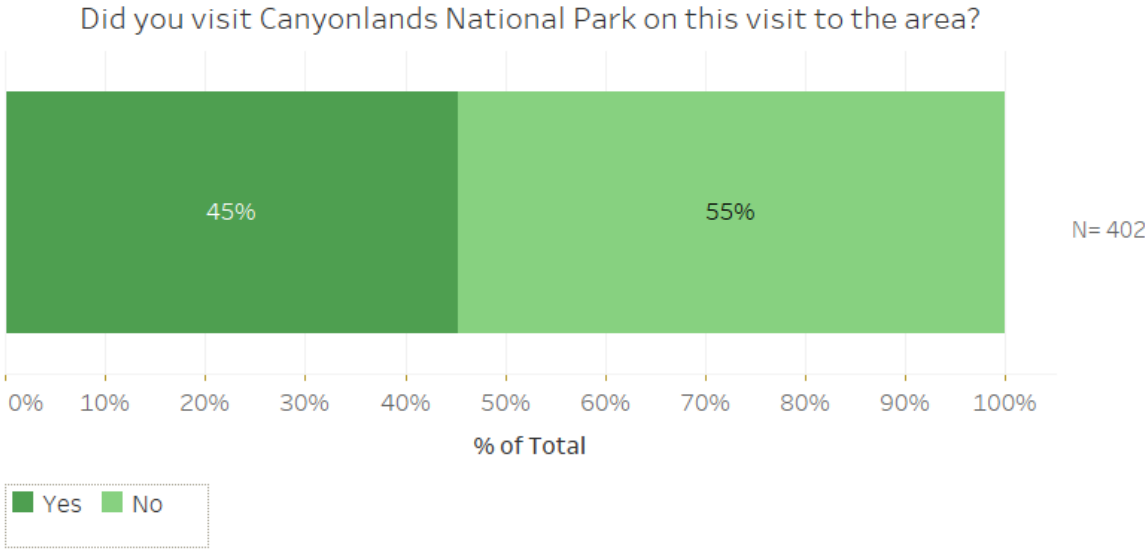


Figure 3.39: Canyonlands Visitation

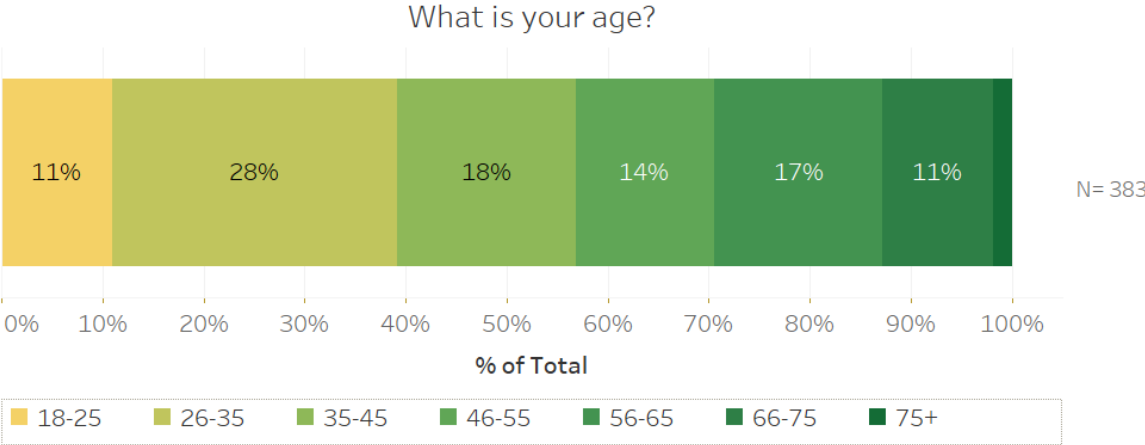


Figure 3.40: Respondent Age - Fall

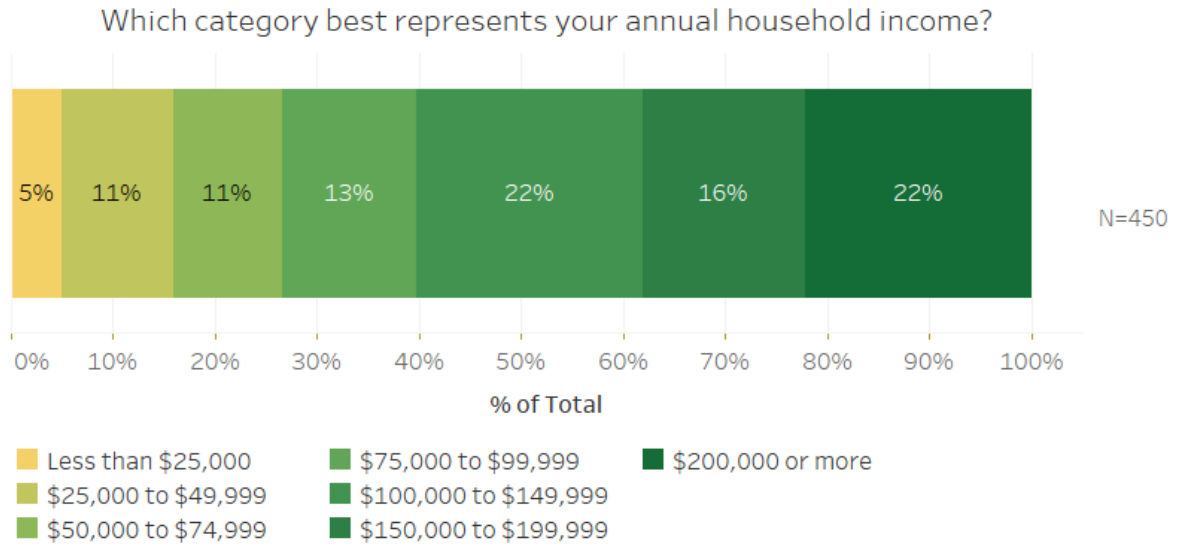


Figure 3.41: Household Income - Fall

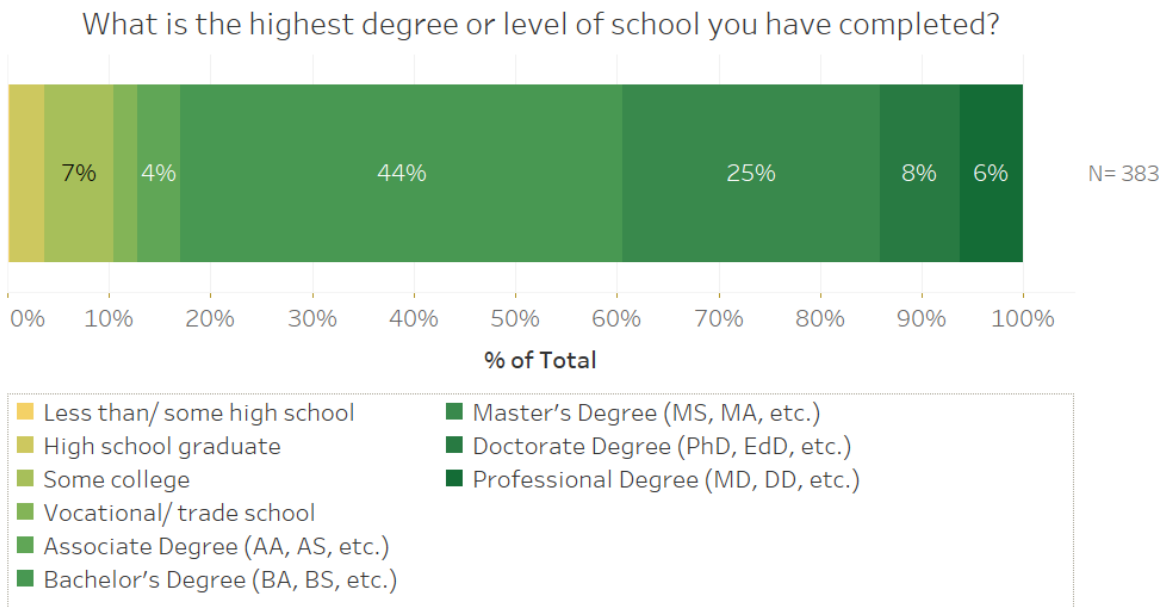


Figure 3.42: Education Level - Fall

What is your zipcode?

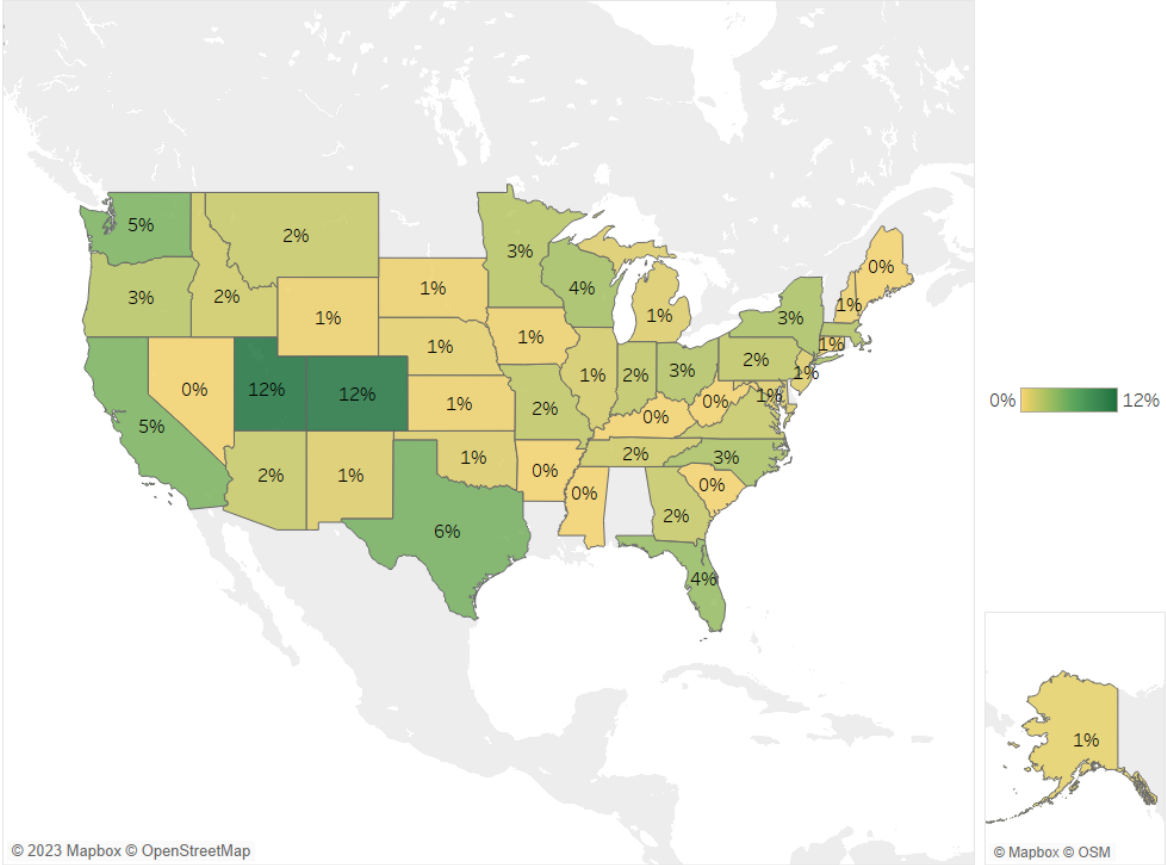


Figure 3.43: State of Residence - Fall

Differences in Means between Groups in the Fall Survey

Several comparisons were conducted to determine if there were statistically significant differences in response types between groups. Independent samples t-tests were run to see if there were differences between first-time or returning visitors in the fall season and their ratings of problems, support for management actions, or reasons for visiting in the Fall season. No statistically significant results were found for ratings of problems or support for management actions between first time and returning visitors. There were differences in Means for two reasons for visiting in the fall between first time and returning visitors (Table 3.13). First-time visitors rated schedule as a more influential reason for their trip during the fall season (Mean: 3.08, SD: 1.66) than returning visitors (Mean: 2.47, SD: 1.58). Returning visitors were more likely to indicate that temperatures were an influential factor on their choice to visit during the fall (Mean: 3.58, SD: 1.51) than first-time visitors (Mean: 3.22, SD: 1.50). Although there were statistically significant differences, the small Cohen's d suggests that the effect of this difference is low.

Additionally, in order to understand how the number of previous visits influenced ratings of problems, management support, and reasons for visiting in the fall season, the number of previous visits variable was categorized into three groups: single visitors (one trip on the last 5 years), multiple visitors (two trips in the last 5 years), and frequent visitors (3 or more trips in the last 5 years). One way Analysis of Variance (ANOVA) tests were run across these three groups. No statistically significant results were found.

Reason for visiting in the post-TE season	t	sig	df	Effect Size (Cohen's d)
The temperature is cooler than it was in the summer	-2.080	<0.05	398	-.239
My schedule or vacation time only allowed me to visit during this season	3.242	<0.001	397	.373

Table 3.13: Independent Samples T Test for Fall First Time or Returning Visitors

3.2.4 Predictors of timed-entry improving or detracting from visitor experience

A multiple linear regression model was created using respondents' ratings of how timed-entry influenced their visit to Arches NP on a whole (5-point Likert scale from much worse to much better) as the dependent variable. Other survey variables that conceptually were potentially relevant to the visitors' experience were included in the model. These variables were, place attachment, coping, preference for timed entry in the future, experiences with components of timed-entry, and demographics. Non-statistically significant predictors were removed, and the following final model was completed with seven-statistically significant predictor variables. Overall, 29% of the variance in the dependent variable was explained with this model ($r^2 = .285$, $F(7,364) = 22.013$, $p < .001$) (Table 3.14). In other words, 29% of the variance in visitors ratings of how timed-entry influenced their experience in Arches NP can be explained by their responses to the following variables.

The components included in the final linear regression model did not include any place attachment components, demographics, or ratings of problems in the park. The categories included were several coping variables, ratings of components of timed-entry, general reservation preferences, and support for management actions. The most important predictor was general preference for a reservation on future trips to ARCH. This predictor had the highest standardized beta coefficient ($\beta = .27$, $p < .001$) indicating that the effect of this independent variable on the dependent variable was highest. Visitors who rated their experience highly also indicated they would prefer a reservation system in the future. This was followed by three components of timed-entry experience: the ease of obtaining a ticket ($\beta = .197$, $p < .001$); format of the NPS website ($\beta = .124$, $p < .05$); and access to the visitor center ($\beta = .116$, $p < .05$). The standardized beta coefficients for these three variables show that for every one point increase in the visitors' rating of these specific components of timed-entry, their rating of experience increased by .197 to .116, respectively. In other words, being able to obtain a ticket easily, navigate the website, and access the visitor center were more important factors influencing the visitors rating of experience than

other timed-entry components that did not make it into the regression model. Two coping components were also significant: visit during a different time of day ($\beta=.116$, $p < .01$) and accepted the experience for what it was ($\beta=-.094$, $p < .05$). This indicates that the way visitors react to impacts in their recreation activities influences their experience. The positive standardized beta coefficient for visiting during a different time of day indicates that visitors who reacted in this way still had a positive experience in ARCH. However, the negative coefficient for enjoyed the experience for what it was indicates that this reaction to timed-entry negatively influenced their overall experience. Finally, one management support component, support for timed-entry as a management action if facilities are overwhelmed ($\beta=.094$, $p < .05$) was a significant predictor (Table 3.14). the standardized beta coefficients are plotted below in Figure 3.44 Generally what this model suggests is that there are both practical components influenced by the experience with the system, and in the park as well as philosophical components related to the visitors preferences and perspectives that influenced their experience with timed-entry.

	B	SE	95% CI		Standardized Coefficients		
			LL	UL	β	t	p
Constant	0.418	0.348	-0.267	1.103		1.201	0.231
General Preference for Reservation	0.708	0.122	0.469	0.947	0.27	5.821	<.001
TE component rating: Ease of obtaining ticket	0.241	0.066	0.112	0.371	0.197	3.674	<.001
TE component rating: Format of NPS website	0.159	0.068	0.025	0.293	0.124	2.341	<.05
TE component rating: Access to the Visitor Center	0.155	0.066	0.025	0.284	0.116	2.344	<.05
Coping: Visit during different time of day	0.084	0.033	0.019	0.15	0.116	2.523	<.01
Coping: Accepted experience for what it was	-0.066	0.032	-0.13	-0.003	-0.094	-2.049	<.05
Support for management actions: If facilities are overwhelmed	0.083	0.041	0.003	0.163	0.094	2.041	<.05

Table 3.14: Factors Predicting Timed-Entry Impact on Experience

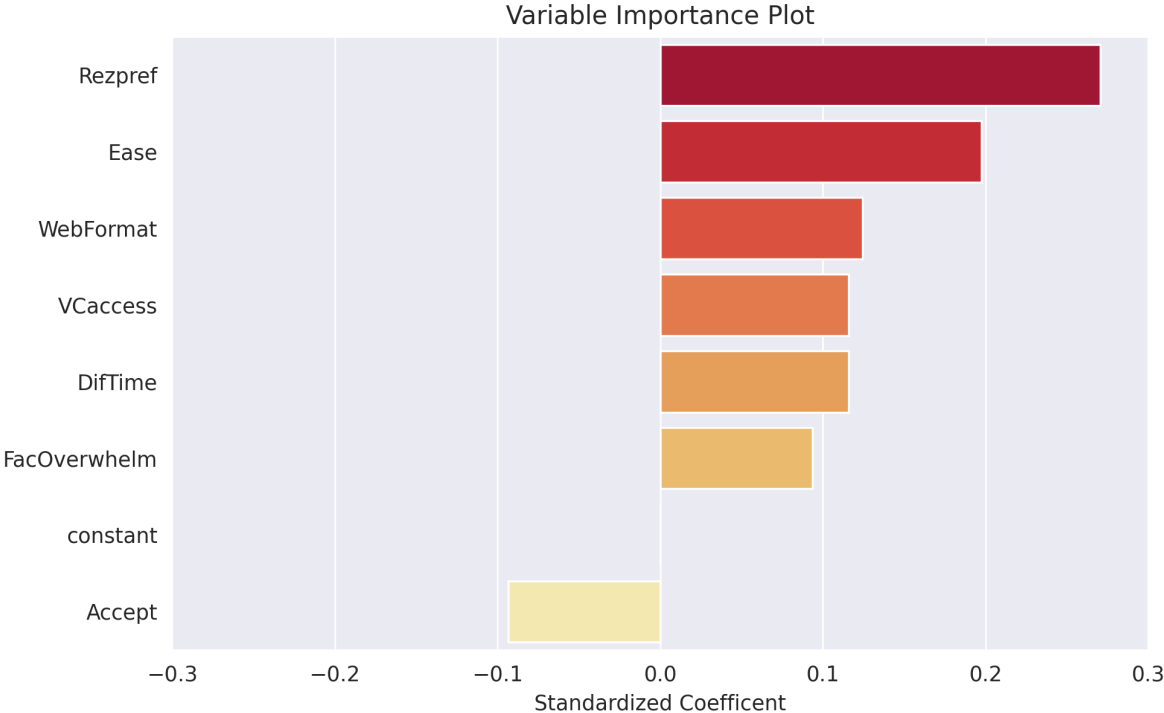


Figure 3.44: Variable Importance Plot - Standardized Beta Coefficients

3.3. Qualitative Comments

Respondents left 153 comments at the end of the survey. The overwhelming majority of these were positive comments (112).

- "Thank you for imposing this - last time was crazy"
- "Very enjoyable. I am reluctant to say timed entry helped... but I think it did"
- "We went in an early time slot and felt that the parking and trail crowding was minimal. We found booking a time slot to be very easy to access and use."
- "I thought it worked great and we had a very pleasant experience here today! I appreciated that more times became available the evening before otherwise we would have been stuck with a 3pm entry, kind of late for a one day visit."
- "I like the timed entry system considerably, and wish you'd implemented it sooner."
- "Excellent system, keep it going. But may be a little more advertising required to generate awareness about the system"
- "Great experience it made the park enjoyable and it should be permanently done. Other people we met during the day were also happy the day we visited."

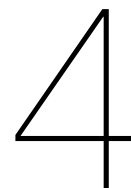
Some areas for improvement from the comments included the communication of timed-entry to international travelers, not knowing about the system prior to arrival, and frustration with wait times at the entrance despite having acquired a timed-entry permit.

- "More advanced notice about the timed entry would have been good, but now that I am aware it's no problem. We arrived yesterday and turned around after finding out about the timed entry and planned for today instead."
- "Like it, just didn't know about it ahead of time. Once figured it out, it was easy. My opinion may be different had we not been able to get in."
- "It's a good idea, love the idea but if you don't live in America it is hard to understand how it works. We got an email but no code to scan, was confusing, but the ranger was able to find us in the system but took a long time."
- "I think it makes planning a large trip harder and much less flexible. It didn't seem to make entry any faster as we still waited an hour and I would like a mechanism to exchange or trade time slots to add flexibility without increasing the total people for the day. I understand the need to keep the park controlled and manageable but did not enjoy the system as a whole when planning my trip."
- "I thought that having timed entry Meant that I would not have to wait to enter the park. I had to wait approximately 40 minutes to get in the park. Since I did not arrive on the hour, I was concerned that I would not be allowed in the park."
- "Access needed to visitors center for non timed entry folks. Improve website for up to date information. One entry lane needed for previous hour permit entry and One lane for next hour permit entry."

Below is a word cloud of the top 30 words in the comments (Figure 3.45)



Figure 3.45: Word Cloud of Top 30 Words



Summary: This section provides a discussion of the results of the two surveys.

Discussion and Future Research

4.1. Discussion

The overall strong visitation numbers, high-quality experience ratings, and willingness to support timed-entry or reservations in the future indicate that many visitors are enjoying the timed-entry system. This study echoes previous findings in Glacier National Park that managed access systems are viewed favorably by a growing type of visitors who are seeking predictability, generally like to plan ahead, and accept structured systems. This visitor will likely communicate positively about ARCH timed-entry and contribute to the spread of information regarding timed-entry and other managed access systems. In this study the 84% of respondents who said they would prefer a reservation system on a future visit, and the 57% of respondents who indicated that timed-entry made their ARCH experience somewhat or much better exemplifies this. The high success rate also likely contributed to these positive ratings of the system in general, and their experience in particular, 89% of respondents were successful in acquiring a ticket. Almost all of these successful visitors were able to enter through timed-entry on their desired day (98%).

Operational components of park management (such as emergency access and facilities capacity) appeared to be more salient in respondents reported support for management actions than more abstract components such as opportunities for solitude. Many respondent rated the operational components highly, and repeat visitors rated many crowding issues to be less of a problem on this trip compared to previous trips with the exception of wait time to enter the park which all respondents rated as an issue.

The coping with obstacles in recreation plans and propensity for alternative recreation activities components have implications for displacement both from the region altogether, as well as within the region, and across seasons and times of day. Managed access clearly redistributes use patterns and displaces visitors. We saw this in people taking different time slots than desired, returning after hours and visiting other areas while waiting to get in. This is in line with the stated goals of the pilot timed-entry system provided by the National Park Service. Overall, visitors indicated that the timed-entry might change their visitation pattern, but would not prevent them from visiting ARCH on their trip to the Moab region.

The Fall post-timed-entry survey does not validate concerns that timed-entry is causing large volumes of people to visit during a different season. Rather, vacation time and weather seem to be more limiting factors for many people. The absence of timed-entry somewhat or very much influenced 27% of respondents decision to visit during the shoulder season, indicating some seasonal visitation shifts. However, temperature and personal schedules were substantially more influential with 57% of respondents stating cooler temperatures were the most influential in their choice of visiting in the fall, and 46% attributing the choice of their schedules. Depending on the goals of managers and the interests of local business owners, the shift in seasonality may be a positive thing. With more visitors choosing to visit in the shoulder season, the conflicts regarding congestion in town and queuing at the ARCH entrance may be alleviated like previously stated in regard to inter-season temporal and spatial displacement.

Additional findings from comparing the summer and fall survey results shows that visitors in the summer season are more likely to plan ahead than fall visitors, summer visitors made their decision to visit

ARCH earlier, and described their trip planning as less spontaneous. Fall visitors reported a higher income than summer visitors which may indicate that higher income is not positively associated with managed access system use, as has been suggested in discourse around this topic.

The regression model (Table 3.14) indicates that factors influencing timed-entry's impact on ARCH experience include both practical management components as well as specific perspectives and philosophical inclinations of visitors. Regarding practical management component: ticket availability, access to the visitor center, and ease of navigating the website to collect information, as well as availability of alternatives to timed-entry (i.e. ability to visit early or late) were important influences on experience. Facilities and ease of navigating and acquiring timed-entry tickets may be more important indicators of visitor experience. Therefore, managers should focus on streamlining these practical components of timed-entry. The additional significant components of the experience model are less dependent on management action and related more to visitor perspectives and preferences.

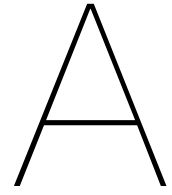
4.2. Limitations and Future Research

This study was designed to address specific components of the visitor experience with the pilot-timed entry system at Arches National Park. This study provided insight into the experience of visitors who chose to visit ARCH in the summer months, needing timed-entry and visitors in the fall shoulder season following timed-entry. This does not capture the perspectives of potential or past visitors who chose not to visit ARCH, or the Moab area due to timed-entry. With these limitations in mind, this study has led to several future research question ideas:

- How do these systems affect the surrounding resources? How do we influence visitor behavior while waiting for access?
- How does visitor perceptions of these systems evolve overtime? Do people get used to them, if so, why? Does communication and planning improve among the government and service providers? How?
- Are there groups that are being disproportionately impacted? Those we will not likely find in the parks with the methods we are using? Those who cannot plan ahead? Or don't like permits?
- How do these systems affect management and managers? What tolls do they take on staff and how does political pressure affect management?
- How are these systems viewed at the community level?
- What information would be most useful to organize a monitoring program to develop around? How do we measure on-going improvement and success of these systems?

References

Manning, R. E. (2022). *Studies in outdoor recreation: Search and research for satisfaction* (Fourth edition). Oregon State University Press.



Appendix A: Survey Instrument (Summer)

"Hello, I am working with Utah State University to conduct an 8-minute survey to better understand visitor experiences with the timed-entry system in Arches National Park. The purpose of this survey is to help the park service understand visitor experiences with this system. May I ask you questions about your experience?"

- Yes
- No

"Before we begin, I would like to let you know that this survey has been approved by the National Park Service and Utah State University IRB. Secondly, your participation is voluntary, and your name will never be connected with your individual responses. This survey will only take about 8 minutes of your time today."

- Yes
- No

May I ask you three quick questions?

- Yes
- No

Are you a first time visitor to Arches National Park?

- Yes
- No

Do you currently live in the United States?

- Yes
- No

Were you aware of the Timed-Entry System for Arches National Park prior to arriving in the Moab area?

- Yes
- No

Visitor Characteristics

Are you a first-time visitor to Arches National Park?

- Yes
- No

How long ago was your first visit to Arches National Park? (in years)

Including the current trip, how many visits have you made to Arches National Park over the past five years?

Do you currently live in the United States?

- Yes
- No

What was your primary reason for visiting Arches National Park?

Trip Planning/Communication

Were you aware of the Timed-Entry system for Arches National Park prior to arriving in the Moab area?

- Yes
- No

How did you hear about the Timed-Entry system?

Did you attempt to obtain advance tickets prior to your visit?

- Yes, successfully
- Yes, but unsuccessfully
- No

Did you get a ticket for your desired day(s)?

- Yes
- No

Did you get a ticket for your desired time slot?

- Yes
- No

If you did not get your desired time slot please explain

What did you do to fill the time while waiting for your time slot?

- Shop
- Relax in town
- Take a tour
- Visit other public lands nearby (Please specify)
- Other (Please specify)

Did the alternative time affect the quality of your experience?

- Yes
- No
- Please explain

What did you do to fill the time while waiting for the day you were entering Arches NP?

- Shop
- Relax in town
- Take a tour
- Visit other public lands nearby
- Other

Did the alternative day affect the quality of your experience?

- Yes
- No
- Please explain

When did you seek out a reservation to enter Arches NP?

- When tickets first became available
- When the short notice tickets became available
- When I arrived at the park
- I did not seek out a reservation to enter
- Other

Did you book a guided trip after you were not able to get your desired timed-entry slot?

- Yes
- No

How would you describe your planning for this trip?

When did you make the decision to visit Arches National Park?

- On the same day of the visit
- A week before the visit
- 1 month before the visit
- 2-6 weeks before the visit
- More than 6 months but less than a year before the visit
- A year or more before the visit
- Don't know/Don't recall
- Other

Quality of Experience

How would you rate your experience on your trip with the following aspects of the Timed-Entry system?

	Very poor	Poor	Fair	Good	Excellent	N/A
Ease of obtaining tickets	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Availability of tickets for desired days	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Park staff assistance in finding alternative activities in Moab area	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Park staff assistance in getting a permit or navigating the website upon arrival	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Format of NPS website	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NPS communication of there being a new system and the requirement of tickets	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Availability of internet to pursue tickets	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Navigation of Recreation. Gov platform	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Access to the Visitor Center	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Assistance from park staff after 5:00	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please describe how problematic each of the following were while in Arches National Park during this trip.

	Not a problem	Small problem	Moderate problem	Big problem	N/A
Wait time to enter the park	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Availability of parking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
People walking on, across, or along the road	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Too many people in the park	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Traffic congestion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Trail crowding	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Crowding at the Arches you visited	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please describe how problematic each of the following were while in Arches National Park on past trips.

	Not a problem	Small problem	Moderate problem	Big problem	N/A
Wait time to enter the park	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Availability of parking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
People walking on, across, or along the road	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Too many people in the park	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Traffic congestion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Trail crowding	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Crowding at the Arches you visited	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

After entering the park did the timed-entry system improve or detract from your experience on the whole?

If you were to visit in the future, would you prefer to have a system in place to obtain a reservation to enter Arches before you arrive?

- Yes
- No

Place attachment and behavior

Please describe your level of agreement with the following statement...

Seeing images of Arches National Park prior to my visit increased how attached I felt to the landscape

Please indicate the extent to which you agree or disagree with the following statements regarding Arches National Park.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I have recreated in Arches NP many times and I am quite familiar with it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Many important family memories are tied to Arches NP.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel like Arches NP is a part of me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel connected to Arches NP.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Being able to recreate in Arches NP means a lot to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I get more satisfaction out of visiting Arches NP than other public open spaces or land.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Recreating in Arches NP is more important to me than recreating in any other place.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Arches NP contributes to the character of my community.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If you were not able to get a ticket for your desired time, how likely would you be to take the following actions?

	Extremely unlikely	Somewhat unlikely	Neither likely nor unlikely	Somewhat likely	Extremely likely
Visit the park late or early in the day when access is not limited.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Visited the entrance and asked park managers to recommend a different activity or area.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Decided to choose a different activity in the region for that day and try to visit Arches NP on a different day.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Decided to choose a different activity and return to Arches NP later that day.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Decided not to visit Arches NP during this trip to the region.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If you encountered obstacles in your recreation plans how often would you respond in the following ways?

	Never/NA	Occasionally	Often	Somewhat often	Very often/Always
Realized that if I visit Arches NP during a different time of day I could avoid this restriction.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Realized that if I visit Arches NP during a different season I could avoid this restriction.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Decided that I would come back to Moab at the same season but would go to a different area instead of Arches NP to avoid this condition or situation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Told myself that there was nothing I could do about it, so I just enjoyed the experience for what it was.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Realized that the condition or situation I experienced was really suitable after all.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Decided that for Arches NP, the condition or situation was what it should be.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Decided to talk with Arches park personnel about the condition or situation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please indicate the extent to which you agree or disagree with each of the following statements concerning the management of visitation in Arches NP.

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
If trailhead and parking lots are so busy that parking at your desired locations is unavailable, timed-entry should be imposed.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If visitor-caused resource impacts are so high that it impairs future generations opportunities to enjoy Arches National Park, timed-entry should be imposed.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Timed-entry should never be imposed, even if use is high.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If solitude is lost, timed-entry should be imposed.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If facilities such as restrooms or visitor centers are overwhelmed, timed-entry should be imposed.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If congestion and crowding cause delays in the ability to respond to an emergency situation, timed-entry should be imposed.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If congestion and crowding delay impede or impair the maintenance of park facilities (i.e. servicing restrooms), timed-entry should be imposed.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Demographics

What year were you born?

What gender do you identify with?

Are you of Hispanic or Latino origin?

- Yes
 No

What is your race? (Select one or more)

- American Indian or Alaska Native
- Asian
- Black/African American
- Native Hawaiian/Pacific Islander
- White
- East Asian/Asian American
- South Asian/Indian American
- Middle Eastern/Arab American
- Other
- Prefer not to answer

Which category best represents your annual household income?

What is the highest degree or level of school you have completed?

What is your zipcode?

Is there anything else you would like to tell Arches National Park about your experience with the timed-entry system?

B

Appendix B: Survey Instrument (Fall)

Intro

Intercept Location

- Windows
- Delicate Arch
- Devil's Garden
- Other

"Hello, I am working with Utah State University to conduct an 3-minute survey to better understand visitor experiences in Arches National Park. The purpose of this survey is to help the park service understand visitor experiences. May I ask you questions about your experience?"

- Yes
- No

"Before we begin, I would like to let you know that this survey has been approved by the National Park Service and Utah State University IRB. Secondly, your participation is voluntary, and your name will never be connected with your individual responses. This survey will only take about 3 minutes of your time today."

- Yes
- No

May I ask you two quick questions?

- Yes
- No

Are you a first time visitor to Arches National Park?

- Yes
- No

Did you choose to visit Arches in October due to the lack of a reservation?

- Yes
- No
- I did not know there was one

Visitor Characteristics

Are you a first-time visitor to Arches National Park?

- Yes
- No

Including the current trip, how many visits have you made to Arches National Park over the past five years?

Did you visit Canyonlands NP during this trip to the area?

- Yes
- No

Which areas of Canyonlands NP did you visit? (Select all that apply)

- The Needles
- Island in the Sky
- The Maze

Trip Planning/Communication

How would you describe your planning for this trip?

When did you make the decision to visit Arches National Park?

- On the same day of the visit
- A week before the visit
- 1 month before the visit
- 2-6 weeks before the visit
- More than 6 months but less than a year before the visit
- A year or more before the visit
- Don't know/Don't recall
- Other

Quality of Experience

Please describe to what extent each of the following influenced your decision to visit the Moab area during this season rather than a different one.

	Not at all	A little	Neutral	Somewhat	Very much
Gas prices are lower now than in the summer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There is no reservation system (ticketed entry) in place in Arches NP during this season	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I saw an ad for the Moab area recently and decided to visit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The temperature is cooler than it was in the summer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My schedule or vacation time only allowed me to visit during this season	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Are there other reasons for your decision to visit during this season not listed above?

Please describe how each of the following affected your experience while in Arches National Park during this trip.

	No effect	Some effect	Moderate effect	Extreme effect	N/A
Had to wait in line to enter the park	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Was not able to enter the park on my first try (due to closures)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Availability of parking at places I wanted to visit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
People walking on, across, or along the road	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Too many people in the park at places I visited	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Traffic congestion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Crowds of people along this trail	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Crowding at the arches you visited	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Management Support

Please indicate the extent to which you agree or disagree with each of the following statements concerning the management of visitation in Arches NP.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
If trailhead and parking lots are so busy that parking at your desired locations is unavailable, reservations should be implemented.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If visitor-caused resource impacts are so high that it impairs future generations opportunities to enjoy Arches National Park, reservations should be implemented.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reservations should never be implemented, even if use is high.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If opportunities for solitude are lost, reservations should be implemented.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If facilities such as restrooms or visitor centers are overwhelmed, reservations should be implemented.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If congestion and crowding cause delays in the ability to respond to an emergency situation, reservations should be implemented.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If congestion and crowding delay impede or impair the maintenance of park facilities (i.e. servicing restrooms), reservations should be implemented.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Demographics

What year were you born?

What gender do you identify with?

Which category best represents your annual household income?

What is the highest degree or level of school you have completed?

What is your zipcode? (If United States resident)

(If not United States resident) What is your country of origin?

Is there anything else you would like to tell Arches National Park about your experience?