Visitor Characteristics Across and Within Seasons at Joshua Tree National Park

2019 Research Report

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Authors:

Project Directors and Principle Investigators
Elizabeth E. Perry, Ph.D.[1,4]
Matthew T.J. Brownlee, Ph.D.[1]
Robert Powell, Ph.D.[1]
Ryan Sharp, Ph.D.[2]

Project Coordinators
Aby Sene-Harper, Ph.D.[1]
Dani T. Dagan, M.S.[1]

Data Preparation and Presentation
(listed alphabetically)
Savannah Dopkins[1]
Carl Ehrett, Ph.D.[3]
Benjamin Fowler, M.S.[1]
Brittany Lacy[1]
Scott Ogletree, Ph.D.[1]
William Owen[3]
Kristen Sikorsky, M.S.[2]
Hudson Smith, Ph.D.[3]
Jennifer Smith[3]
Jacob Thompson[3]

Affiliations
[1]Park Solutions Lab
Institute for Parks
Department of Parks, Recreation, and Tourism Management
Clemson University
Clemson, South Carolina

[2]Park Management and Conservation Lab
Department of Horticulture and Natural Resources
Kansas State University
Manhattan, Kansas

[3]Watt Family Innovation Center
Clemson University
Clemson, South Carolina

[4]Department of Community Sustainability
Michigan State University
East Lansing, Michigan

PROJECT OVERVIEW

The goal of this project was to gather information about park visitors and visitor use to support management and planning at Joshua Tree National Park (JOTR). Specifically, this project focused on 2 questions:
1) What are the characteristics of the current visitor and the visitor experience and how has this changed since 2010?
2) What is the public support or opposition for a range of potential management actions pertaining to the visitor experience?

To answer these questions, the research team in collaboration with JOTR management developed two independent online surveys. The visitor characteristics survey replicated a survey used in 2010 conducted by the University of Idaho Visitor Studies Unit to identify the current characteristics and preferences of the visiting public, activities undertaken including specific climbing and bouldering participation, trip and travel details (including overnight use in and out of the park), and the information sources used to plan. The survey also supported the ability to identify changes in visitation since the 2010 study. The management survey adapted questions used in previous studies (e.g., Blacketer et al., 2019; Brownlee et al., 2019) to assess the public's level of support or opposition to a range of hypothetical or potential management actions pertaining to the visitor experience as well as visitation characteristics, activities participation, and conditions encountered during the visit. The study also used past social media posts to assess public sentiment in an effort to complement the survey data.

The research team collected data in the park for one week in June and November of 2019 by systematically intercepting adult visitors at exit locations and campgrounds in the park and alternately distributing business card invitations to participate in one of two online surveys, a general visitor survey and a management opinion survey. Our research team intercepted 5,431 park visitor groups. Of this, 2,007 intercepts were in June and 3,424 were in November. In total, 2,710 general visitor survey business card invitations and 2,721 management survey business card invitations were distributed. Of the 2,710 visitors that accepted an invitation to participate in the general visitor survey, 43% completed a survey. From the 2,721 visitors that accepted invitations for the management survey, 38% completed a survey.

The research team also harvested and analyzed Twitter social media posts for the entirety of 2017, 2018, and 2019 to identify and compare the attributes and sentiments of the social media posts across seasons and years.

The research team also collected and analyzed spatial data using anonymized mobile phone location and vehicle location information. These location data allowed for inquiry into spatial and temporal use patterns at key park locations. These spatial data and their analysis are presented in a separate, companion report.

Together, these data sources addressed the following project objectives:

1. Identify adult visitor demographics, preferences, and important experiences across multiple sites at JOTR;

2. Compare adult visitor characteristics and preferences across multiple user groups (e.g., overnight users, day users) and across multiple seasons (e.g., summer, fall);
3. Identify the level of support or opposition for a range of potential management actions pertaining to the visitor experience;
4. Explore the efficacy of using social media to explore public sentiment regarding JOTR management and the visitor experience;
5. Use phone and other remote sensing data to identify temporal and spatial patterns of visitor use.

The report is organized as follows: 1) introduction, objectives, and data presentation; 2) in-park data collection methods; 3) survey data results from both surveys which includes comparisons by season, activity group, and 2010 to 2019 responses; 4) social media data methods and findings; and 5) appendices of the two questionnaires, an examination of Twitter data for winter 2018-2019, a comparison of south entrance respondents versus those in other intercept locations, and a comparison of information sources by visitor age.

KEY FINDINGS

VISITORS IN 2019

Home Locations

- International visitors accounted for 22.7% of summer visitation and 13.4% of fall visitation, with the most frequent home countries being Canada, Germany, and the United Kingdom.
- Domestic visitors hailed from every state except Maine, and more than half (56%) reported Californian home zip codes. Although there were statistically significant differences between summer and fall visitors for many states, the differences in actual percentages tended to be small. Of the California visitors (56% of total), 57.1% came from Los Angeles, San Bernardino, and San Diego counties. These three counties were the most represented in both summer and fall.
- The three states with highest representation in the summer visitation were California, Arizona, and Texas. In the fall, these were California, Washington, and Oregon.

Visitor Characteristics

- Sixty percent of adult visitors identified as solely white and 30% identified as biracial.
- Average age of visitors was 43.8.
- 72.6% of adult visitors had at least a 4 year college degree.
- Most visitors (53.5%) travelled with family.
- The average group size was 2.45 with a significant but nominally higher mean during summer.

Trip Characteristics

- Three-quarters (75.5%) of visitors planned for their park visit in advance.
- Average visit time to the park was 5 hours.
- Across the two seasons, the three park locations that respondents reported to visit most were the Jumbo Rocks Area, West Entrance Station, and Cholla Cactus Garden.

- The majority (51.5%) indicated on a map that they visited at least one park visitor center, with similar rates between seasons. Overall, 11.8% of respondents indicated that Joshua Tree, Oasis, or Cottonwood Visitor Center was their most desired or planned for location to visit in the park. This was higher in the summer (16.8%) than in the fall (9.5%).
- Visitors who exited the South Entrance (Cottonwood) were very similar to other park visitors except they:
    - Were older, had a smaller group size, and were more likely to be traveling with family.
    - Spent significantly fewer days in the last month and fewer days in the last year in the park.
    - Participated less in climbing and bouldering as their primary activity.

Camping

- Among the 17.1% of visitors who attempted to make reservations for camping within JOTR, the majority (65.5%) were successful.
- Significantly more visitors have changed their camping plans in the fall (15.6%) than in the summer (11.1%) because a campsite in a campground was unavailable.
- 23.8% of visitors camped within the park and 46.0% stayed overnight in the JOTR area.
- Significantly more visitors camped in the fall (25.1%) than in the summer (20.9%).

Climbing/Bouldering

- 15.8% of respondents bouldered and 19.4% technical climbed in the park during the visit when intercepted, with some overlap in participation between the two activities. These percentages represent boulderers and technical climbers that also participated in other activities (e.g., hiking, stargazing).
- Across seasons, 4.8% of respondents reported technical climbing and 1.7% reported bouldering (1.7%) as their *primary* activity.
- Participation in bouldering and technical climbing was significantly greater in the fall as compared to the summer.
- Bouldering participation rates were similar between seasons.
- A quarter (26.0%) of technical rock climbers and 17.9% of boulderers reported having a preferred area to engage in this activity in the park.

Information

- Overall, 72.5% of visitors obtained information about the park prior to their visit and almost all (94.9%) obtained the information they needed.
- 64% of park visitors used the JOTR website for information prior to arrival.
- While in the park, 60.9% of visitors used information services or facilities.
- Approximately 44% of visitors received assistance and information from JOTR visitor center staff.
- 56% gained information during their visit from the park brochure and map.
- 2.8% of visitors participated in a ranger-led program.
- The most problematic conditions reported by visitors was the perception that there was not enough informational/directional signage, especially on trails.

Crowding

- Approximately 7% chose not to participate in desired activities because of 'too many people or crowding.'
- 8.5% reported changing the dates or seasons of their visit due to 'too many people or crowding.'
- Approximately 11.3% of visitors reported changing the order of places visited (resource-temporal coping or substitution), 10.8% forewent visiting desired places (resource coping or substitution), and 10% changed the time of day of visit (temporal coping or substitution) due to 'too many people or crowding.'

Support/Opposition to Potential Management Actions

- Park Access, Transportation, and Car Camping
    - For potential park access, transportation, and car camping management actions, most actions were opposed across seasons (i.e., 8 of the 11 actions were rated in some category of "oppose").
    - The three most opposed potential actions were related to reservations and fees: implementing a reservation system to enter the park, implementing a parking reservation or parking permit system, and increasing entry fees.
    - Greater communication (about campgrounds) and development of camping and parking facilities were the most supported.
- Trails and Wilderness Backpacking
    - For potential trails and Wilderness backpacking management actions, almost all were supported across seasons (8 of 9 actions).
    - The only opposed action was to reduce the number of trails in the park.
    - The most supported actions regarded more communication (about trails), human waste pack-out policies (backcountry area), and developing new trails in the southern portion of the park.
- Technical Climbing/Bouldering
    - For potential rock climbing and bouldering management actions, almost all were supported across seasons (11 of the 13 actions).
    - The two opposed actions concerned bouldering: requiring time-specific or location-specific permits for popular bouldering areas.
    - The most supported actions regarded human waste pack-out policies (climbing and bouldering areas) and resource protection policies: closing climbing and bouldering areas with sensitive resources, identifying designated crash pad areas, and removing illegal bolts in wilderness areas.
- Overall
    - The most opposed proposed management actions overall in 2019 were: Implementing a reservation system to enter the park, reducing the number of park trails, and requiring time-specific permits for climbing areas.

ACTIVITY GROUP COMPARISONS

Activities

- Altogether, 89.0% of visitors across the two sample periods in 2019 noted a daytime activity as their primary activity.

Information

- Most visitors, irrespective of user group, obtained information prior to this visit (71-75.0%) and overwhelmingly found the information that they were seeking (94.4-97.1%).
- Overnight visitors relied more on the information they obtained in past visits than daytime or climbing/bouldering user groups. They also relied more on information from school class/programs or TV/radio/DVDs, though the use of these resources were low for all user groups.
- Climbers/boulderers used highway signs less frequently than did daytime or overnight visitors. They were also the least likely to consult welcome centers, visitor bureaus, or chambers of commerce, though the use of these resources was low for all user groups.
- Significantly fewer climbers/boulderers used information services/facilities during their park visit (43.3%) than the other user groups (60.1-72.7%). Climbers/boulderers were particularly less likely to use assistance from visitor center staff, the JOTR website, roadside exhibits, or visitor center exhibits than the other user groups.

Potential Management Actions

- Technical climbers/boulders had significantly stronger opposition than other user groups for a reservation system to enter the park, development of paved access to more popular locations and attractions, a parking reservation or permit system, and decreasing the number of nights allowed in developed campgrounds.
- Irrespective of activity group, the most opposed potential management actions were: Reservation system to enter the park, reducing the number of park trails, and requiring time-specific climbing permits. There were some differences in the most supported actions by user group and the percentages of opposition to particular potential actions, as follows:
    - Daytime users most supported: Online park information about campgrounds, more trail information, and closing climbing areas with sensitive resources.
    - Climbers/boulderers most supported: Riding in-park shuttle buses on busiest days, developing new trails in the southern part of the park, and requiring climbers to pack out human waste.
    - Overnight users most supported: Online park information about campgrounds, and more trail information.
    - Visitors that used Facilities/staff most supported: increased online park information, developing new trails in the southern part of the park, and requiring climbers to pack out human waste.

FALL VISITORS IN 2019 COMPARED TO 2010

Home Locations

- There were significantly more visitors from Los Angeles, Orange, and San Bernardino counties in 2019. These three counties accounted for 43.1% of the Californian visitation in 2010, which increased to 53.0% in 2019.

Visitor Characteristics

- The average age of visitors was younger in 2019 (44.46) than in 2010 (49.12).
- The average group size was smaller in 2019 (2.36) than in 2010 (3.15).

Trip Characteristics

- Significantly more 2019 visitors reported that JOTR was the primary destination of their trip than in 2010, but the average length of stay was similar (~5 hours)
- Between 2010 and 2019, while visitation overall increased, the percentage of visitors visiting popular areas remained the same (the most popular areas in 2010 are still the most popular areas in 2019).

Overnight Accommodations

- Compared to 2010, a higher percentage of visitors attempted to make camping reservations in JOTR but significantly smaller percentage ended up camping within the park (33.3% in 2010 versus 25.1% in 2019). Note this represents an increase in overall number of campers when accounting for the increase in visitation.
- In 2019, a significantly greater percentage of visitors reported staying overnight in the area around the park. (33.7% in 2010 versus 46.5% in 2019).
- On average, the number of nights staying at the park (2.46) or in the area around the park (3.08) remained relatively constant between 2010 and 2019.

Technical Climbing

- In 2019, 19% of visitors reported that technical climbing was one of *several activities* during their visit, an increase of 4% since 2010 (15% in 2010).
- In 2019, only 4.8% of visitors reported technical climbing as their *primary activity* versus 14% in 2010.

Other Activities

- The percentage of respondents that reported dayhiking as part of their JOTR experience increased from 45.6% in 2010 to 93.9% in 2019.
- The percentage of respondents that reported stargazing as part of their JOTR experience increased from 24.5% in 2010 to 50.9% in 2019.

Information

- In 2010, 87.5% of visitors obtained park information ***before*** their visit, compared to 73.1% in 2019; and 96.0% obtained information ***during*** their visit in 2010, compared to 60.5% in 2019.
- Of those who obtained information before their visit in either year, almost all found the information they needed.

KEY RECOMMENDATIONS

The following recommendations are supported by the data and findings detailed in the report.

COMMUNICATION AND INFORMATION

Approximately two-thirds of visitors used the JOTR website to plan for their visit to JOTR. The website appears to be the primary platforms for communicating with visitors. Continued maintenance and updates to the park website may enhance the visitor experience.

The condition most reported to potentially detract from the visitor experience was the perception that there was not enough informational/directional signage, especially on trails. As resources allow, continue to review and consider opportunities for updated or additional signage where needed and appropriate, particularly directional signage on trails and roads.

Continue to update the consistency between online static maps, online interactive maps, and paper maps distributed at the park, including the park brochure which most visitors used. According to visitors, updates to these information sources could include a) ensuring that information presented online is consistent with recommendations from park staff during in-person contacts, b) recommendations about the amount of time to see the park and popular areas, c) informing visitors of conditions and what to expect during high use days or peak season, and d) more detail about hiking distances and hiking difficulty.

Continue to enhance the accuracy and provision of real time information about campsite availability and characteristics. Coupled with real time monitoring of campsite availability, consider adjusting the reservation system to accommodate same day and real time reservations.

Provide additional information regarding the conditions at different popular locations and how this will change based on the timing of a visit (e.g., day of week, time of the day) to facilitate informed decision-making by visitors. Such information could be provided outside of visitor center contacts as not all activity groups are stopping at visitor centers. Such information could also help distribute visitors, temporally or spatially, particularly during high use periods.

Visitors are increasingly using nearby lodging outside of the park, including rented homes. Consider engaging and encouraging private lodging entities outside the park to help distribute NPS created and approved information about the park, activities, and resource stewardship, including online resources.

Consider distributing information to climbers using communication mechanisms other than visitor centers, the park website, or roadside exhibits or kiosks. This could include roving personal contacts by NPS staff, a free climbing permit obtained at visitor centers, or a focused online and/or in-person information area designated specifically for climbers.

FACILITIES AND SERVICES

The data indicates that stargazing continues to increase in popularity. As a result, consider developing additional interpretive resources, activities, and programs to support visitors' night sky experiences while increasing safety and reducing the potential for visitor caused negative impacts.

Because visitors reported challenges with being able to secure a campsite in the summer consider increasing availability and reservation opportunities for park campgrounds during the summer months to accommodate visitors' desires (with consideration to ecological resource impacts and seasonal restoration).

Because approximately three out of four visitors reported too few parking spaces and indicated support for additional parking spaces at major attraction areas, carefully consider either a) intentionally maintaining the current level of spaces as a management approach for maintaining desired conditions at popular areas, or b) alternatively expanding some parking areas to accommodate more visitors. To inform such decisions, continued monitoring of parking capacity, availability, suitability, and the visitor experiences is recommended.

Approximately three out of four visitors reported too few restroom facilities (a finding consistent across many parks). Therefore, continue to carefully consider areas where additional restrooms may be appropriate as resources allow. Monitoring restroom use and availability is recommended as a next step to inform decision-making.

Because visitors rate the quality of current services and facilities as 'high,' continue dedication to park maintenance.

SOCIAL MEDIA

Consider ways to monitor external sources of information about the park being shared via social media. As policy allows, potentially work with these content providers to ensure accuracy and advance NPS created information about the park.

As policy allows, continue a strong social media presence during the spring, interacting with and amplifying tweets that are particularly aligned with park management goals and fundamental values.

VISITOR MANAGEMENT RECOMMENDATIONS

Based on visitor support for potential management actions related to **wilderness overnight use**, consider revisiting visitors' desires during park planning, such as a) creating new trails in the southern half of the park, b) implementing a reservation system for wilderness overnight use, c) establishing designated campsites, and d) requiring visitors to pack out human waste.

Based on the results of visitor support for potential management actions related to **rock climbing and bouldering**, consider revisiting visitors' desires during park planning, such as a) removing illegal bolts, b) closing climbing areas with sensitive resources, c) adding directional signs, d) identifying designated crash pad areas, and e) requiring visitors to pack out human waste.

If reservation or fees are implemented and used to manage use levels, consider additional communication with visitors. This includes location or time-specific permits for bouldering and climbing.

Moderate support exists for a visitor shuttle bus during high use periods. After sufficient planning and compliance, continue to consider a shuttle bus as one possibility to distribute use, concentrate use in other areas, provide information, and enhance visitor experiences.

If a reservation system to enter the park is considered, expect some potential opposition to this action, at least initially.

Although less than 10% of visitors expressed changing the times or locations visited due to high use conditions, or potentially feeling crowded, the park may consider further investigating visitors' perceptions of high use conditions, including important indicators and thresholds related to increasing use and the visitor experience. It is likely that park management and visitors have different evaluations of high use conditions and its level of impact on the visitor experience. To discern these differences and to identify visitors' perceptions, future investigations could gauge thresholds for one or more of the following indicators: a) people per viewshed, b) number of encounters on trails, c) density of people at spatially delineated attraction areas (e.g., visitor centers, Barker Dam), d) vehicles within view, e) wait or search time to find parking, f) percent of success in accessing desired location, and g) minutes per hour of anthropogenic sound.

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Introduction

Introduction and Rationale

The National Park Service's (NPS) enabling legislation (the Organic Act of 1916) mandates park managers protect and maintain the natural and scientific values of the park and to provide for public enjoyment, education, and inspiration (NPS, 2016). This protection-visitor use mandate is applicable to all NPS units, including Joshua Tree National Park (JOTR). JOTR features natural, cultural, and recreational resources that invite a diverse population of visitors.

Named after the iconic Joshua trees endemic to the area, JOTR comprises approximately 800,000 acres at the junction of the Mojave and Colorado desert ecosystems. Much of the park is federally designated Wilderness. Located in southern California, JOTR is within a few hours drive of major urban areas including Los Angeles, San Diego, Las Vegas, and Phoenix. JOTR is open year-round but receives the majority of its 2.8 million visitors in October through May. Multiple forms of recreation are available in the park, including day hiking, backpacking, camping, rock scrambling, rock climbing, bouldering, and scenic drives.

While annual visitation has doubled over the past five years, little is known about characteristics of these visitors, their recreational activities, how they differ between the busy and less busy times of year, and how they differ from visitors of a decade ago. Related questions about the acceptability of management actions, spatial use of the park, and sentiments about the park on social media are all areas that park managers require further information.

Objectives

The primary purpose of this research was to provide data to inform future management of visitor use at JOTR. The objectives of this study included:

1. Identify visitor demographics, preferences, and important experiences across multiple sites at JOTR;
2. Compare visitor characteristics and preferences across multiple user groups (e.g., overnight users, day users) and across multiple seasons (e.g., summer, fall);
3. Identify the level of support or opposition for a range of potential management actions pertaining to the visitor experience;
4. Explore the efficacy of using social media to explore public sentiment regarding JOTR management and the visitor experience;
5. Use phone and other remote sensing data to identify temporal and spatial patterns of visitor use.

Organization of the Report

The emphasis of this work is on understanding visitor characteristics, preferences, and use patterns. Additionally, we examined social media to explore the public's sentiment toward the park. Thus, the report is organized into two main areas of inquiry, plus a companion report on temporal and spatial visitation patterns.

Each chapter is a discrete presentation of results, prefaced by a summary of results. Survey methodology is described in an initial section, followed by a separate chapter on the results,

which includes comparisons of different user-groups as well as a comparison with data collected in 2010. Understanding visitor sentiments about the park using Twitter data is its own chapter and contains both the methodology and findings. Understanding visitor travel patterns using mobile phone location data and other location services data is presented in a companion report (Objective 5).

The survey instruments and additional secondary analyses from the survey and Twitter data are included as appendices.

DATA PRESENTATION

Data are presented primarily in tables and figures in this report, with summary statements and interpretations provided in the text at the beginning of each section or subsection.

The section on the seasonal comparisons of survey data encompasses all questions asked across the two surveys administered in the fall and summer. Following this complete listing of data, we compare activity groups and we compare Fall 2019 data with Fall 2010 data to highlight key questions from the surveys.

For all survey data presented, as well as portions of the social media data, the format is as follows in the tables. Captions include the survey questions presented in the table, which can be found in full in the appendices of this report. The first column contains the questions and items relating to those questions. The next set of columns present the frequencies of responses or the average (arithmetic means) of the responses for a particular group. Data where means are compared also contain the standard deviation in parentheses.

The final set of columns relate to comparisons of groups and the tests of significance. Identification of specific tests are found in the table footnotes if only one test was conducted for a table. These statistical analyses vary depending on the type of data and type of comparison (e.g., chi-square, t-test, ANOVA). For each, the appropriate test statistic is listed, along with the p-value, which indicates the degree of difference between groups, seasons, or years.

If the p-value is significant at the 95% confidence level ($p < 0.05$), the effect size is also listed. Effect sizes are a measure of the practical significance of differences seen between or among groups (Vaske, 2008). They provide additional information on how much emphasis should be placed on interpreting the groups as different from each other. Although there may be a statistically significant difference, factors such as sample size may overemphasize these differences. Thus, including the effect size allows for a better understanding of how large these differences actually are – or how much functional difference there is. Different measures of effect size accompany different statistical tests. The table below lists how to interpret the numbers across effect size measures (Cohen, 1988; Vaske, 2008). For example, a relationship with a Cramer's V of 0.075 is considered a small or minimal effect size and a relationship with a Cohen's d of 0.350 is considered a small to medium effect size. We advise readers of this report to consider not only the statistical difference between groups but also the functional difference among these groups as represented by the effect size.

Table 1. Effect size interpretation for measures presented in this report.

Effect size interpretation	Effect size measure		
	Cramer's V (V)	Eta (η)	Cohen's d (*d*)
Small (Minimal)	≤0.100	≤0.100	≤0.200
Medium (Typical)	0.300	0.243	0.500
Large (Substantial)	≥0.500	≥0.371	0.800

Figure 1. An example of the data presentation in this report is provided below with an interpretation guide for important elements in the table.

Table 1. Visitors' park visitation history by season and overall. *(General survey Q1a-d and Q2a, Management survey Q1a-e)*

Please tell us about your past visitation to Joshua Tree National Park	2019 Season[1]			Tests of significance[2]
	Summer	Fall	Total	
If you visited the park for only one day, how many hours did you spend in the park?	4.69 (3.14)	4.99 (3.66)	4.90 (1-24)	t: -1.379 p: 0.168
If you visited the park for more than one day, how many days did you spend in the park?	2.21* (1.98)	3.01* (2.09)	2.88 (1-15)	t: -2.583 p: 0.012 d: 0.391
Including today, how many days in the last month (30 days) have you visited the park?	1.90* (2.67)	2.41* (2.93)	2.25 (1-30)	t: -4.069 p: <0.001 d: 0.182
Including today, how many days in the last year (12 months) have you visited the park?	5.65 (20.86)	6.22 (21.24)	6.04 (1-338)	t: -0.589 p: 0.556
Including today, how many years (total) have you visited the park?	3.81* (7.44)	4.63* (9.14)	4.37 (1-150)	t: -2.207 p: 0.027 d: 0.098
In what year did you first visit the park?	2013.89 (10.54)	2013.09 (10.91)	2013.34 (1956-2013)	t: 1.612 p: 0.107

[1]Cells are reported in units of time: means followed by the (standard deviation) for summer and fall and means followed by the (range) for total.
[2]T test (t); p value (p); Cohen's d (d) for significant differences (p <0.05).
*Seasonal difference is significant at p <0.05.

The **test statistic** (t-value in this example) identifies the degree of differences between groups. In this example, the groups are Summer and Fall visitors.

The **p-value** indicates the level of statistical significance. Generally, a p-value less than 0.05 is considered statistically significant.

The **effect size** (Cohen's d in this example) helps identify the practical significance, or the magnitude of differences between groups (see Table 1 on previous page).

The **average response** (arithmetic mean)

The **range** identifies the lowest and highest responses.

Below each table, there is generally small section that identifies the meaning of the **notations** used in the table (e.g., *; [1] ; t; d)

The **standard deviation** is a measure of how far each visitor response is from the mean or average response. For most of the data in this report, it can be interpreted as the level of consensus or similarity among respondents.

In-park Data Collection Methods

DATA COLLECTION

The goal of this project was to gather information about park visitors and visitor use to support management and planning at Joshua Tree National Park (JOTR). Specifically, this project focused on 2 questions:
1) What are the characteristics of the current adult visitor and the visitor experience and how has this changed since 2010?
2) What is the public support or opposition for a range of potential management actions pertaining to the visitor experience?

To answer these questions, the research team in collaboration with the JOTR management team developed two independent online surveys. The visitor characteristics survey is largely based on a survey used in 2010 in a study conducted by University of Idaho Visitor Studies Unit and was used to identify the current characteristics and preferences of the visiting public, activities undertaken including specific climbing and bouldering participation, trip and travel details (including overnight use in and out of the park), and their sources of information. The survey also supported the ability to identify changes in visitation since the 2010 study. The management survey adapted questions used in previous studies (e.g., Blacketer et al., 2019; Brownlee et al., 2019) to assess the public's level of support or opposition to a range of management actions pertaining to the visitor experience as well as visitation characteristics, activities participation, and conditions encountered during the visit.

The research team collected data in the park for one week in June and November of 2019 by systematically intercepting adult (age 18 and older) visitors and alternately distributing business card invitations to participate in one of two online surveys, a general visitor survey and management opinion survey. The data collection team was comprised of six (June) or seven (November) crew-members, including a research leader. Prior to arriving in JOTR, the research team worked with park staff and was briefed on safety issues including weather and road conditions as well as radio operations. This team was supplemented by a park staff member on high visitation days (i.e., Friday – Sunday). Team members were placed at exit locations/stations to conduct visitor intercepts. The research leader also systematically collected data at each of the campgrounds and high use climbing areas as well as provided support for the crew operating at the entrance stations. The general staff distribution was:

- North Entrance Station: 2 people
- West Entrance Station: 2 people
- Cottonwood Entrance Station: 2 people
- Roving (Campgrounds and climbing areas): 1 person (research leader)

Sampling:
We used a stratified sampling approach to ensure that invitations to participate in each online survey were distributed systematically (by alternating distribution) and we intercepted adult visitors during different times of the day and days of the week. Each day's daylight hours were divided into three 4-hour blocks and sampling included two of these three blocks daily. Field researchers were assigned a location daily although staff were occasionally moved between locations as needed for safety concerns, coverage, and other logistics.

Table 2. Stratified sampling approach used at the park in 2019.

Times	Day						
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Morning	X	X	X				X
Mid-day	X				X	X	X
Afternoon		X	X		X	X	

*One weekday (Tuesday, Wednesday, or Thursday) off per sampling period for data organization and logistics.

Once on location, members of the research team intercepted vehicles at park exit locations, which included the west and north entrance/exit stations and a large pull out at the Cottonwood entrance. Traffic cones and signs (provided by the park) were placed leading up to each intercept area to alert drivers to decrease their driving speed. Research staff wore and carried appropriate safety gear for the weather and road conditions. They also worked with park staff to identify and avoid disturbing sensitive resources. Vehicles were directed to the farthest right lane or shoulder area depending upon location. During each intercept, a trained researcher approached the vehicle/visitor group and greeted them with a short script about the study. The visitors were asked if they were willing to complete a short online survey after their park visit. Willing participants were asked for their group size, group type, birth year, and email address. Unwilling participants were also asked for their group size, group type, and year of birth to control for the potential of non-response bias. The researcher then alternated distributing a business card for one of the two surveys, each with a unique survey link and QR code. As stated, there were two types of business cards, one for each type of survey (visitor survey and management survey), and each business card had a unique code identification number. All information (location, willingness to participate, group size, group type, birth year, email address (if appropriate), and unique survey identification code) from the intercept was recorded on a contact log. The intercept took between 1 and 3 minutes, similar to the intercept times reported in 2010. When one intercept was complete, the next available vehicle was approached. Once given a business card, visitors were encouraged to complete the survey.

The roving researcher was also the research leader and conducted visitor intercepts focusing on climbers and campers. In the first sampling block of the day, the rover focused on campgrounds, parking lots and climbing areas in the center junction area of the park. The roving researcher attempted to census all camping and climbing parties within an area before moving to the next. In the second sampling block of the day, the rover focused on the following front country campgrounds in a rotating order, attempting to census all camping parties within a campground before moving to the next: Cottonwood, Indian Cove, Black Rock, Hidden Valley, Jumbo Rocks, Belle, and White Tank Campground. Because visitors to JOTR may climb and/or camp for multiple days, the roving researcher remained the same for the data collection period to build familiarity with the population and not repeatedly contact the same visitors.

To encourage higher response rates, the research team modified the distributed cards for the November data collection. We increased the size of the business card to postcard size and on the back provided a list of incentives that respondents were eligible to win. One winner was randomly selected among those who had both provided an email address and completed the survey by the six-week response date.

INTERCEPT FOLLOW-UPS

Visitors intercepted at the park who provided a valid email address were contacted up to three times after their initial in-park contact, following a modified Dillman approach (Dillman, 2011). All communications were conducted through the Qualtrics online survey management interface. The research team used multiple measures to ensure the collection of correct and functional email addresses, including intercept and data entry protocols. We also generated alternate email addresses for all returned, undelivered emails.

The sample population was first contacted one week (7 days) after their initial in-park contact via personalized email, reminding them about the survey, providing the appropriate link and survey ID, and thanking them for their participation. They were again contacted 14 days and 21 days after the in-park intercept with a second and third reminder, respectively. Once a respondent completed the survey, they were no longer sent reminder message(s). The surveys were closed to responses six weeks (42 days) after the final in-park data collection day.

Figure 2. Images of the North Entrance, West Entrance, and South Entrance intercept locations and an example roadside intercept in 2019.

Figure 3. Example business cards distributed in June and postcards distributed in November 2019.

Spring Data Collection

This research originally intended to compare three seasons of visitation in 2019: spring, summer, and fall. Due to the December 2018-January 2019 federal government shutdown, there was not sufficient time for planning and approvals to conduct a spring 2019 in-park data collection. We attempted again in spring 2020 to conduct in-person data collection. Regrettably, due to the coronavirus (COVID-19) pandemic, we were unable to collect these data. This cancellation was out of consideration for human safety, visitor representativeness, and travel restriction considerations. The research team and JOTR management considered different approaches to collecting data but ultimately decided against these alternative data collection measures.

Response Rates

Our research team intercepted 5,431 park visitor groups. Of this, 2,007 intercepts were in June and 3,424 were in November. In total, fairly equal numbers of invitation cards for the two surveys were distributed (N = 2,710 general visitor surveys; N = 2,721 management surveys). Across both months, the West Entrance was the most frequent point of intercept, accounting for 42.1% of the total intercepts (N = 2,289). This was followed by 31.8% at the North Entrance (N = 1,726), 21.6% at the South Entrance (N = 1,171) and 4.5% while roving (N = 244).

In June, 94.9% of these intercepts resulted in an adult visitor group agreeing to take an invitation card with links to one of the two surveys. In November, the acceptance rate was 96.3%.

Response rates to the two surveys were similar. Of those who accepted a survey invitation card, the response rate for the visitor survey was 43% (n=1,165; 2.87% confidence interval at the 95% confidence level) and the response rate for the management survey was 38% (n=1,034; 3.05% confidence interval at the 95% confidence level). The combined response rate was 40.6%, with a 34.4% response rate in June and a 44.2% response rate in November. Response rates to both surveys followed a similar pattern. The tables in the following section contain details on the comparisons of these frequencies.

Bias

To assess how representative the respondents were of the total visitor population and what generalizations can be made from the survey data, we examined multiple areas of potential bias. The areas examined and detailed below are:

- Differences in response rates by elements of the study design
- Differences between respondents and non-respondents
- Differences between Visitor survey respondents and Management survey respondents
- Differences between respondents intercepted at the South Entrance versus those intercepted elsewhere (see Appendix C).

In brief, we do not suspect the data collected to be biased in any patterned, significant, and/or actionable way. Differences seen were not systematically patterned and were generally of low functional value. Therefore, we present the data from the surveys as frequencies, percentages, and means without giving extra consideration to subgroups within the data.

Response rates and elements of the study design

Response rates were similar across the two surveys. The response rate for the visitor survey was 43% and the response rate for the management survey was 38%. Although the response rates for both surveys were significantly higher across all locations in November than in June, this reflects the addition of an incentive and changing to color postcards vs. black and white business cards.

Overall, West Entrance intercepts yielded significantly lower response rates than the other locations. Although not consistently significant, intercepts at the South Entrance and in roving locations yielded the highest response rates. Together, these differences may be due to the length of interaction: shortest in the busy West Entrance, slightly longer in the less busy North Entrance, longer still in the least busy South Entrance, and longest in the in-person roving intercepts.

Overall, 90.2% of the visitors intercepted who accepted a survey card provided their email address. These visitors were substantially more likely to respond to the survey than the 9.8% who did not provide an email address – 43.3% of visitors who provided their email address completed the survey versus 13.0% of those who did not provide an email address ($p < 0.001$; X^2-value = 210.280; Cramer's V = 0.184). This increase in response may be due to factors including that those who provided an email address had a longer in-person interaction, potentially had more interest/commitment to completing the survey, received email reminders about the survey, and, for November respondents, were eligible to win a prize.

Table 3. Comparison of response rates (%) between months, by survey type and location.

Survey	Location	Jun	Nov	Total	X^2-value	p-value	Cramer's V
Management	West	25.2**	38.7**	34.3	19.855	< 0.001	0.133
	North	38.2	43.4	41.3	2.444	0.118	
	South	43.0	39.3	40.7	0.742	0.389	
	Roving	31.3*	50.9*	41.6	4.062	0.044	0.200
	Total	34.1*	40.7*	38.2	11.728	0.001	0.065
General	West	29.7**	43.3**	38.7	20.306	< 0.001	0.132
	North	37.1*	46.4*	42.4	7.252	0.007	0.093
	South	41.1*	55.5*	50.4	11.210	0.001	0.137
	Roving	32.1*	59.8*	49.0	10.583	0.001	0.270
	Total	34.8**	47.7**	43.0	43.680	< 0.001	0.126
Both	West	27.5**	41.0**	36.5	39.402	< 0.001	0.132
	North	37.6*	44.8*	41.8	8.628	0.003	0.072
	South	42.0*	47.6*	45.6	3.365	0.067	0.054
	Roving	31.7**	56.4**	45.9	14.891	< 0.001	0.245
	Total	34.4**	44.2**	40.6	50.422	< 0.001	0.096

*Seasonal difference significant at p<0.05; **Seasonal difference significant at p<0.001.

Table 4. Comparison of response rates (%) between locations, by survey type and month.

Survey	Month	West	North	South	Roving	Total	X^2-value	p-value	Cramer's V
Management	Jun	25.2	38.2	43.0	31.3	34.0	24.079	< 0.001	0.154
	Nov	38.7	43.4	39.3	50.9	40.7	5.462	0.141	
	Total	34.3	41.3	40.7	41.6	38.2	13.208	0.004	0.070
General	Jun	29.7	37.1	41.1	32.1	34.8	9.012	0.029	0.095
	Nov	43.3	46.4	55.5	59.8	47.7	20.573	< 0.001	0.110
	Total	38.7[a]	42.4	50.4	49.0	43.0	23.915	< 0.001	0.094
Both	Jun	27.5	37.6	42.0	31.7	34.4	31.042	< 0.001	0.124
	Nov	41.0	44.8	47.6	56.4	44.2	18.581	< 0.001	0.074
	Total	36.5	41.8	45.6	45.9	40.6	32.220	< 0.001	0.077

VISITOR SURVEY RESPONDENT VERSUS MANAGEMENT SURVEY RESPONDENT

To evaluate if the data collected from identical questions used in both surveys could be combined, we tested to see if there were any differences between the two respondent groups. The results of our analyses suggest that responses for questions common across both surveys can be pooled together, as

there were no significant differences between the two groups of respondents and their responses. Specifically, neither age, gender, education level, nor group size were significantly different between visitors who responded to a visitor or a management survey.

Similarly, we compared visitor and management survey responses to the 11 pooled questions. The responses did not vary significantly for any of the 11 questions examined: 1. Primary activity selected; 2. Participation in rock climbing at JOTR; 3. Participation in bouldering at JOTR; 4. Changing trip plans because a campsite was unavailable on a particular day; 5. Attempting to make camping reservations at JOTR; 6. Successfully making camping reservations at JOTR; 7. Pre-trip planning; 8. Use of information services or facilities during the trip; 9. Days spent in JOTR in the past month; 10. Hours spent in JOTR on this visit; or 11. Days spent in JOTR in the past year.

Because there were no significant differences found between respondents of the two surveys, results for responses to questions common across both surveys were pooled. For all tables, the survey type and question number is identified in the table heading, allowing a reader to easily determine if the displayed results are from both or only one survey.

RESPONDENT VERSUS NON-RESPONDENT CHARACTERISTICS

We also examined whether those responding to the survey were substantially different from those who were intercepted but did not respond to the survey, comparing ages, group sizes, and group types. Respondents were significantly older (M=43.70) than non-respondents (M=38.84), with significantly less representation of visitors under 30 and significantly more representation of visitors in their 50's, 60's, and 70's. The effect size for difference in average age respondents versus non-respondents was small to medium. Overall, group size of respondents was not significantly different than that of non-respondents.

Table 5. Average age and group size of non-respondents and respondents.

Characteristic	Non-respondents	Respondents	Total	t-value	p-value	Cohen's d
Age (years)	38.84**	43.70**	40.84	11.480	< 0.001	0.325
Group size (people)	2.48	2.40	2.45	1.859	0.063	

**Difference significant at p<0.001.

Table 6. Distribution (%) of non-respondents and respondents, by age group, group size, and group type.

Characteristic		Non-respondents	Respondents	Total	X^2-value	p-value	Cramer's V
Age group	< 20	1.9*	0.8*	1.4	11.057	0.001	0.045
	20-29	31.4**	20.9**	27.1	71.285	< 0.001	0.116
	30-39	27.0	26.3	26.7	0.352	0.553	
	40-49	16.7	17.0	16.8	0.110	0.740	
	50-59	10.8**	15.2**	12.6	22.486	< 0.001	0.066
	60-69	9.0**	13.5**	10.8	25.914	< 0.001	0.071
	70-79	2.9**	6.1**	4.2	31.319	< 0.001	0.078
	80-89	0.4	0.2	0.3	1.847	0.174	
	> 90	0.1	0.0	0.1	0.078	0.780	
Group type	Alone	17.3	17.2	17.3	0.011	0.917	
	Family	49.6**	55.1**	51.8	15.441	< 0.001	0.054
	Friends	26.5**	21.3**	24.4	19.408	< 0.001	0.060
	Family/friends	5.2	4.9	5.1	0.218	0.540	
	Other	1.4	1.5	1.4	0.263	0.608	

*Difference significant at $p<0.05$; **Difference significant at $p<0.001$.

Understanding Visitor Characteristics and Perceptions through Survey Data

INTRODUCTION

This chapter of the report focuses on results of the two surveys and differences among groups. Three sections are detailed, with subsections within each drawing attention to an area of focus within the survey questions (e.g., demographics, information sources, potential management actions). The first set of results contain all the survey questions (Appendices A and B). This section presents the total 2019 response frequencies and means and compares the summer (June) and fall (November) respondents. The second compares activity groups within the 2019 data. The third section compares the 2019 data to the 2010 data. The second and third sections each contain a subset of the total questions, constrained to those that are most relevant to actionable differences among activity groups or replicated from the previous survey, respectively. Summaries of key findings precede each of the three sections.

2019 VISITOR CHARACTERISTICS AND SEASONAL COMPARISONS

We compared responses across two distinct seasons – summer and fall – in 2019 to examine similarities and differences in key areas of management interest. The following presents the comparisons of responses from visitors in June (summer) and November (fall) of 2019, as well as averages across these two seasons (total). Question numbers presented in the caption for each table/figure in this section correspond to the 2019 survey question numbers in Appendices A and B.

KEY FINDINGS

The following presents key findings in this seasonal comparison, focusing on both general patterns and significant differences between the two seasons. Reference to the average response across the two time periods is also provided.

Demographics

International visitors accounted for 22.7% of summer visitation and 13.4% of fall visitation, with the most frequent home countries being Canada, Germany, and the United Kingdom.

Of the domestic visitors, they hailed from every state except Maine and more than half reported Californian home zip codes. The three states with highest representation in the summer visitation were California, Arizona, and Texas. In the fall, these were California, Washington, and Oregon. Within the California, Nevada, and Arizona region, visitors came from a broader number of counties in the fall than in the summer. For California itself, 57.1% of visitors came from Los Angeles, San Bernardino, and San Diego counties. These three counties were the most represented in both summer and fall. A significantly higher proportion of visitors came from Orange, San Diego, Santa Barbara, and Ventura counties in the fall than in the summer.

Visitors were significantly younger on average in the summer than in the fall, though the average age for both were in the early 40s and approximately a quarter of visitors in both seasons were in their 30s.

More than 75% of visitors reported having completed a four-year college degree or higher.

Sixty percent of visitors identified as solely white and 30% identified as biracial. Of those selecting one race, less than one percent selected only Hispanic/Latinx, Black/African American, Hawaiian/Pacific Islander, American Indian/Alaskan Native, or other.

The average group sizes were significantly smaller in the fall (M=2.36 people) than in the summer (M=2.64 people), driven by an increase in solo visitors. The majority in both seasons visited with family.

Visitation Frequency and Locations

Length of park day visit was similar in summer and fall, with a day visit lasting about 5 hours. Multi-day visits were significantly longer in the fall (M=3.01 days) than in the summer (M=2.21 days).

Visitors in the fall had spent significantly more days in the past month (M=2.41 versus 1.90) and total years (M=4.63 versus 3.81) visiting the park. Visitors in both seasons had spent about 6 days of the past year in the park and an average first visit year of 2013. Approximately 36% of visitors reported that it was their first visit to the park.

Overall, 74.1% of visitors indicated that visiting JOTR was the primary reason for coming to the area, with similar rates in summer and fall. However, when asked if JOTR was the primary destination, significantly more visitors reported that JOTR was the primary destination of their trip in the fall (62.6 versus 55.0%).

Across the two seasons, the three park locations with the most reported visitation were the Jumbo Rocks Area, West Entrance Station, and Cholla Cactus Garden. In general, visitation to a park location was similar between seasons. Black Rock Nature Center, locations within Indian Cove, Belle Campground, White Tank Campground, locations within Cottonwood, Lost Palms Oasis, and Ryan Mountain all saw significantly more visitation in the fall. Quail Springs and Jumbo Rocks Campground were the only to experience significant decreases in the fall, relative to overall visitation. Of the park attractions and locations listed in the survey, the five most desired/planned for were Hidden Valley, Cholla Cactus Garden, Keys View, Jumbo Rocks, and Joshua Tree Visitor Center.

- The majority (51.5%) indicated on the map that they visited at least one park visitor center, with similar rates between seasons. In the summer 16.8% and in the fall 9.5% of respondents indicated that Joshua Tree, Oasis, or Cottonwood Visitor Center was their most desired or planned for location to visit in the park.
- Overall, 61.7% of visitors indicated on the map that they visited at least one park campground, with 28.3% visiting two or more. Patterns were similar across summer and fall. Overall, a quarter (25.8%) of respondents indicated that a campground was their most desired or planned for park location to visit. However, campground visitation does not necessarily indicate an intent to camp or that the respondent participated in overnight camping within the park because some may have visited a campground for reasons other than camping.

Activities

Almost every respondent indicated that they participated in enjoying nature, day hiking, and/or sightseeing while in the park, and 54.2% of respondents indicated one of these activities was their primary activity during the visit. In general, rates of participation in all activities remained constant or increased between summer and fall.

Approximately 17% of respondents (17.3%) reported participating in technical climbing and approximately 15% reported participating in bouldering across both seasons. Participation in bouldering

(15.8% vs. 11.7%) and technical climbing (19.4% vs. 12.7%) significantly increased in the fall as compared to the summer. Across seasons, 6.5% of respondents reported technical climbing (4.8%) or bouldering (1.7%) as their ***primary activity***.

Lodging and Reservations

Of the 17.1% of visitors who attempted to make camping reservations within JOTR, the majority (65.5%) were successful. Significantly more visitors were successful in the fall than in the summer. Overall, 23.8% of visitors camped within the park and 46.0% stayed overnight in the JOTR area. Significantly more visitors camped in the fall (25.1%) than in the summer (20.9%).

Significantly more visitors have changed their camping plans in the fall (15.6%) than in the summer (11.1%) because a campsite in a campground was unavailable. The most common change was to camp at a location outside of the park (9.5%; intrasite spatial coping or substitution), followed by camping at another location inside the park (8.1%; intersite spatial coping or substitution), changing the dates of their trip (5%; temporal coping or substitution), and choosing not to camp (4.1%; activity coping or substitution).

Duration of overnight stays in the park was significantly greater in the fall (2.56 nights) than in the summer (1.31 nights). Those staying outside of the park averaged about 3 nights overall. The largest difference in overnight accommodations was the increase in RV/trailer camping in the park in the fall (8.0%) compared to the summer (4.3%) and the decrease in use of lodges, motels, cabins, rented homes, or bed and breakfasts outside of the park in the fall (43.2%) compared to the summer (49.1%). A fifth (20.1%) of visitors who stayed overnight used a tent in a developed campground in the park and 3.5% used a tent in a campground outside of the park. Low percentages of respondents spent the night(s) in other types of accommodations.

Information and Awareness

In general, three-quarters (75.5%) of visitors planned for their park visit in advance and 24.5% made the spontaneous decision to visit. Of those who planned, about equal percentages planned up to a week (averaging 6.51 days), up to a month (averaging 2.79 weeks), or more than a month (averaging 3.44 months) in advance. There were no significant differences in planning between summer and fall visitors.

Overall, 72.5% of visitors obtained information about the park prior to their visit and almost all (94.9%) obtained the information they needed. While in the park, 60.9% of visitors used information services or facilities. Types of information that visitors needed but did not obtain centered on more detailed maps with accurate descriptions of trail locations and lengths.

- For specific pre-visit information sources, the JOTR website was the most popular (64.2%), followed by friends and family, maps/brochures, and other websites. Summer visitors consulted other websites and travel guides significantly more than fall visitors did. Fall visitors consulted map/brochures and “other” sources of information significantly more than summer visitors did. In both seasons, only 3.0% of visitors consulted local businesses for park information. For information for future visits, the JOTR website was the most frequently preferred source (35.7%), followed by maps/brochures and friends and relatives.
- For specific during-visit information sources, the park brochure/map was the most consulted (56.4%), followed by assistance from visitor center staff (43.9%) and the JOTR website (34.1%).

Summer visitors consulted in-park information sources more, and sometimes significantly more, than did fall visitors.

Visitors rated highly the importance and quality of all services and facilities used during their visit. The quality of interactions with staff (rangers, visitor center staff, and entrance station staff) was of particularly high quality, according to visitors. Although only 2.8% of visitors engaged in ranger-led programs, they rated these programs to be of the highest importance and highest quality. The JOTR website and park brochure/map were also highly rated for importance and high quality after the personal interactions with park staff.

The most problematic conditions reported by visitors was the perception that there was not enough informational/directional signage. Specifically, questionnaire items included "too little directional signage on park trails" and "on the main park roads," followed by " too few parking spaces at pullouts and scenic areas." However, these conditions only slightly or moderately detracted from the quality of the visitor experience. There were no significant differences in experienced conditions or the amount they detracted from the experience between summer and fall visitors.

Crowding and Park Conditions

Crowding is a subjective evaluation of relatively higher visitation or use densities at a park or specific location within a park (Manning, 2011). Crowding has been studied extensively in parks and protected areas, supporting the notion that some levels of visitor use under certain conditions may lead to decreases in visitation quality or feeling crowded (for a review, see Manning, 2011). In this study, JOTR visitors reported adapting some visitation behaviors in response to crowding (e.g., coping). Of the visitors who have experienced crowding at the park, most still decided to visit on a previous visit (92.8%) or the current visit (93.1%).

- Crowding during a previous visit to the park resulted in a visitor most commonly changing the times of day they visited (9.8%; temporal coping or substitution), foregoing visiting desired places (9.8%; resource coping or substitution), changing the date/season of visit (9.7%; macro temporal coping or substitution), or changing the time of day of visit (8.9%; micro temporal coping or substitution).
- Crowding during the current visit resulted in a visitor most commonly changing the order of places visited (11.3%; resource-temporal coping or substitution), foregoing visiting desired places (10.8%; resource coping or substitution), or changing the time of day of visit (10.0%; micro temporal coping or substitution).

Management Actions

For potential park access, transportation, and car camping management actions, most actions were opposed across seasons (i.e., 8 of the 11 actions were rated in some category of "oppose"). The three most opposed potential actions were related to reservations and fees: implementing a reservation system to enter the park, implementing a parking reservation or parking permit system, and increasing entry fees. Greater communication (about campgrounds) and development of camping and parking facilities were the most supported. There were no significant differences between summer and fall for any of the potential actions, with respondents in both seasons rating their level of opposition or support similarly.

For trails and Wilderness backpacking potential management actions, almost all were supported across seasons (8 of 9 actions). The only opposed action was to reduce the number of trails in the park. The most supported actions regarded more communication (about trails), human waste pack-out policies

(backcountry area), and new trails in the southern portion of the park. There were no significant differences between summer and fall for any of the potential actions.

For rock climbing and bouldering potential management actions, almost all were supported across seasons (11 of the 13 actions). The two opposed actions concerned bouldering: requiring time-specific or location-specific permits for popular bouldering areas. The most supported actions regarded human waste pack-out policies (climbing and bouldering areas) and resource protection policies: closing climbing and bouldering areas with sensitive resources, identifying designated crash pad areas, and removing illegal bolts in wilderness areas. Levels of support were generally similar across seasons, with the exception of greater support for more signs/directions to climbing and bouldering formations and designated crash pad areas from summer visitors.

The most supported overall and seasonally in 2019 for each category of potential management actions were: Online park information about campgrounds, more trail information for visitor preferences, and establishing human waste pack-out policies for climbing areas. The three actions garnering "most supported" by 10% or more of visitors were more trail information for visitor preferences (14.4%), online park information about campgrounds (13.5%), and requiring shuttle buses in the park on the busiest days (10.2%). There were no significant differences between summer and fall visitors in their selections.

Visitors in both seasons generally rated the issue uncertainty, impact risk, stakeholder involvement, and controversy/potential for litigation similarly for the most supported potential management action in each of the three areas. The exception was for the impact risk and stakeholder involvement for providing more trail information for visitor preferences, where summer visitors rated the impact risk as significantly lower and stakeholder involvement as significantly higher than did fall visitors. Overall out of the most supported potential actions, online park information about campgrounds was the least contentious (overall lowest average ratings for uncertainty, risk, involvement, and controversy) and establishing human waste pack-out policies for climbing areas was the most contentious (highest average ratings).

The most opposed overall and seasonally in 2019 for each category of potential management actions were: Implementing a reservation system to enter the park, reducing the number of park trails, and requiring time-specific permits for climbing areas. Opposition was more concentrated than support, with more visitors selecting the same actions. Notably, over a quarter (26.1%) of visitors overall and seasonally most opposed a reservation system to enter the park, followed by increasing entry fees (13.5%) and developing more paved access to popular locations (11.9%). There were no significant differences seasonally. Visitors in both seasons rated the issue uncertainty, impact risk, stakeholder involvement, and controversy/potential for litigation similarly for the most opposed potential management action in each of the three areas. Overall out of the most opposed potential actions, implementing a reservation system to enter the park was the most contentious (overall highest average ratings for uncertainty, risk, involvement, and controversy) and reducing the number of trails in the park was the least contentious (lowest average ratings).

DEMOGRAPHICS[1]

Table 7. Visitors' country of primary residence by season and overall. *(General survey Q12, Management survey Q8)*

Country	2019 Season[1]		
	Summer	Fall	Total
United States	77.3**	86.6**	83.7
Other countries[2]	22.7**	13.4**	16.3

[1]Cells reported as percentages (%) of affirmative (yes) responses. $X^2 = 28.957$; $p < 0.001$; Cramer's V = 0.118.
[2]Countries listed in decreasing frequency of response: Canada, Germany, United Kingdom, Australia, The Netherlands, Switzerland, China, France, Denmark, Poland, Belgium, Czech Republic, Japan, Ireland, Latvia, Slovakia, Sweden, Italy, New Zealand, Norway, Turkey, Austria, Brazil, French Caribbean, Guam, Hungary, Israel, Lithuania, Romania, Serbia, and Slovenia.
**Seasonal difference is significant at $p < 0.001$.

[1] Larger, scalable, and interactive versions of the home residence maps are available at the Clemson Park Solutions Laboratory Tableau account: https://public.tableau.com/profile/cpsl#!/

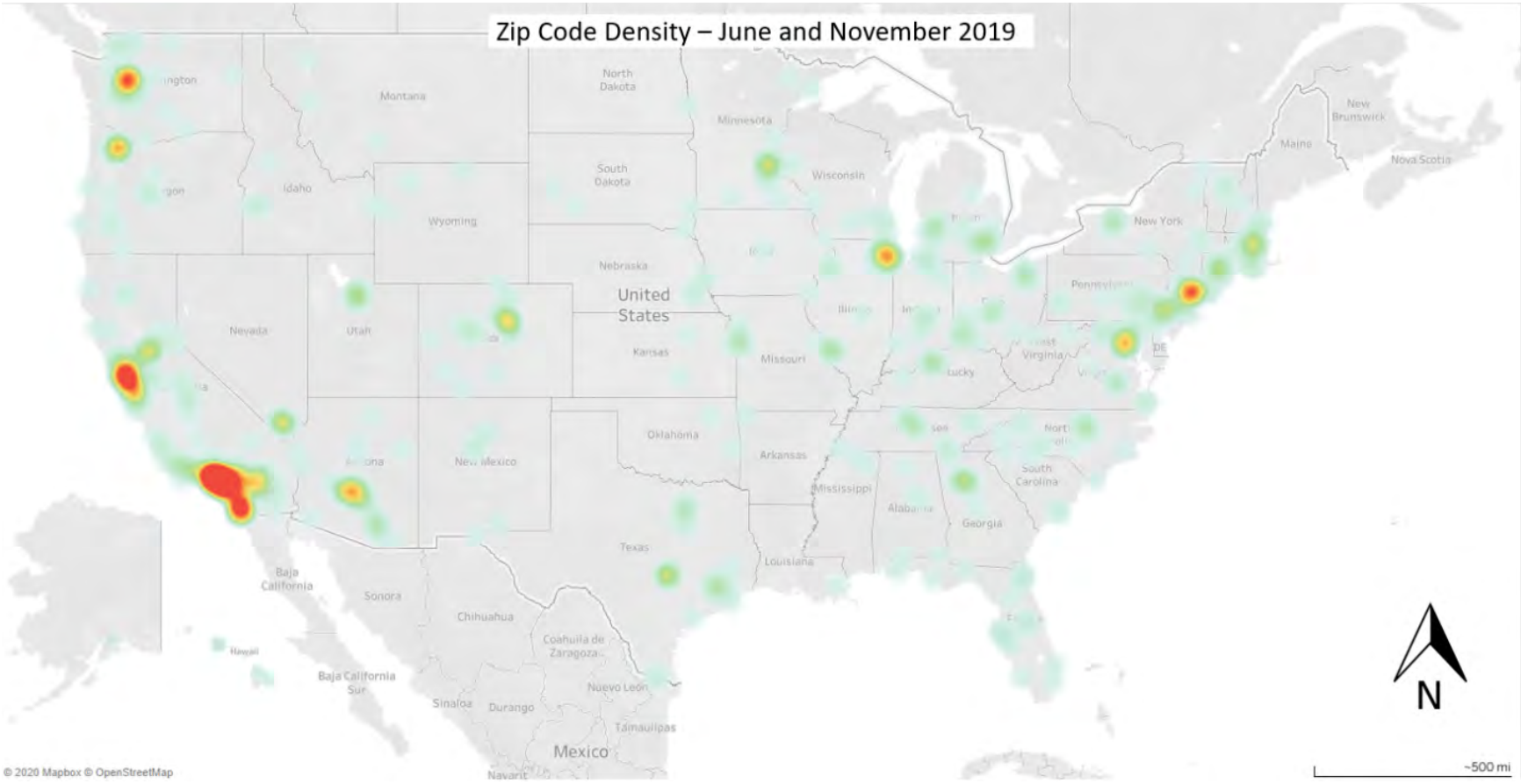


Figure 5. Density map of U.S. home location zip codes reported in 2019.

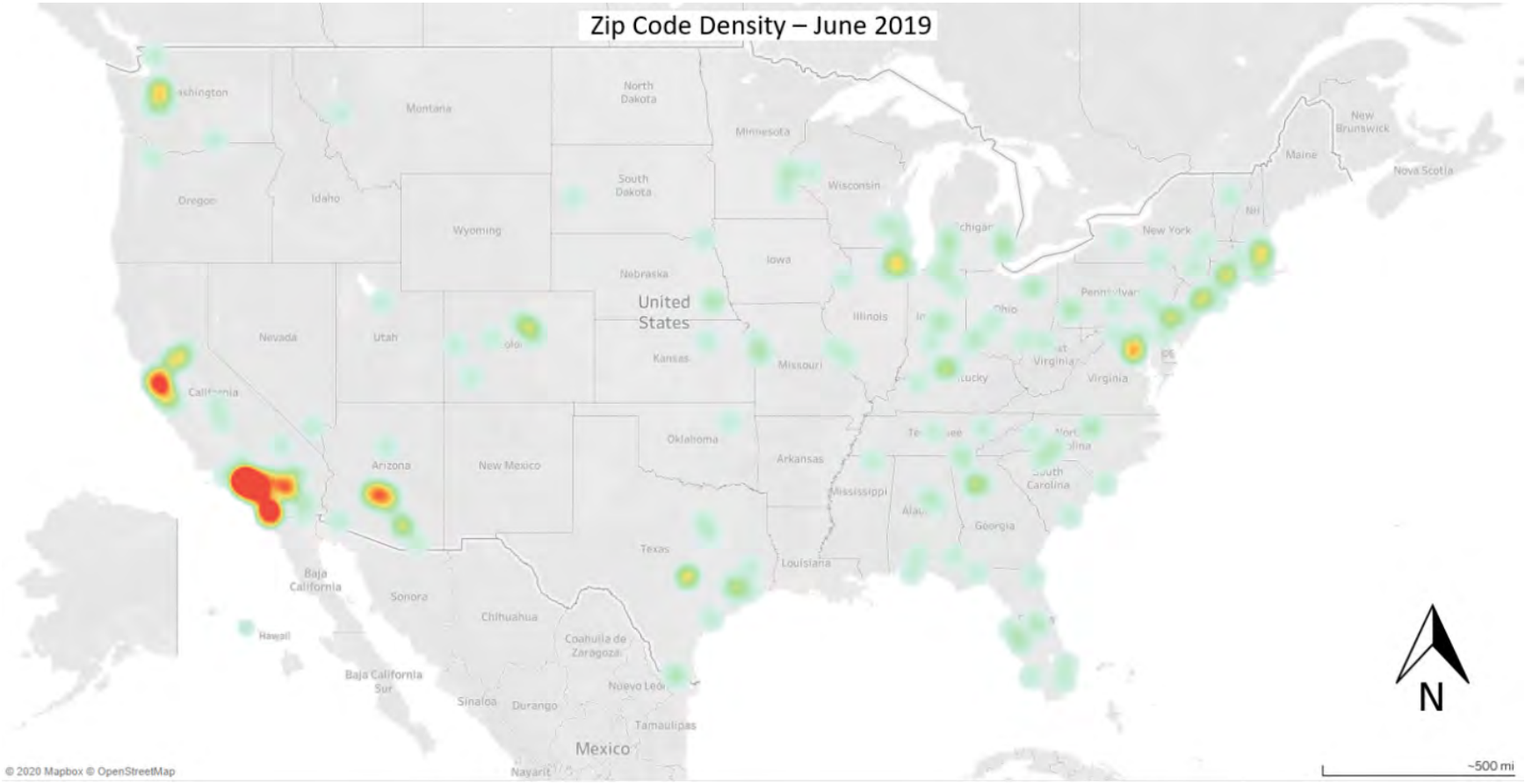


Figure 6. Density map of U.S. home location zip codes reported in June 2019.

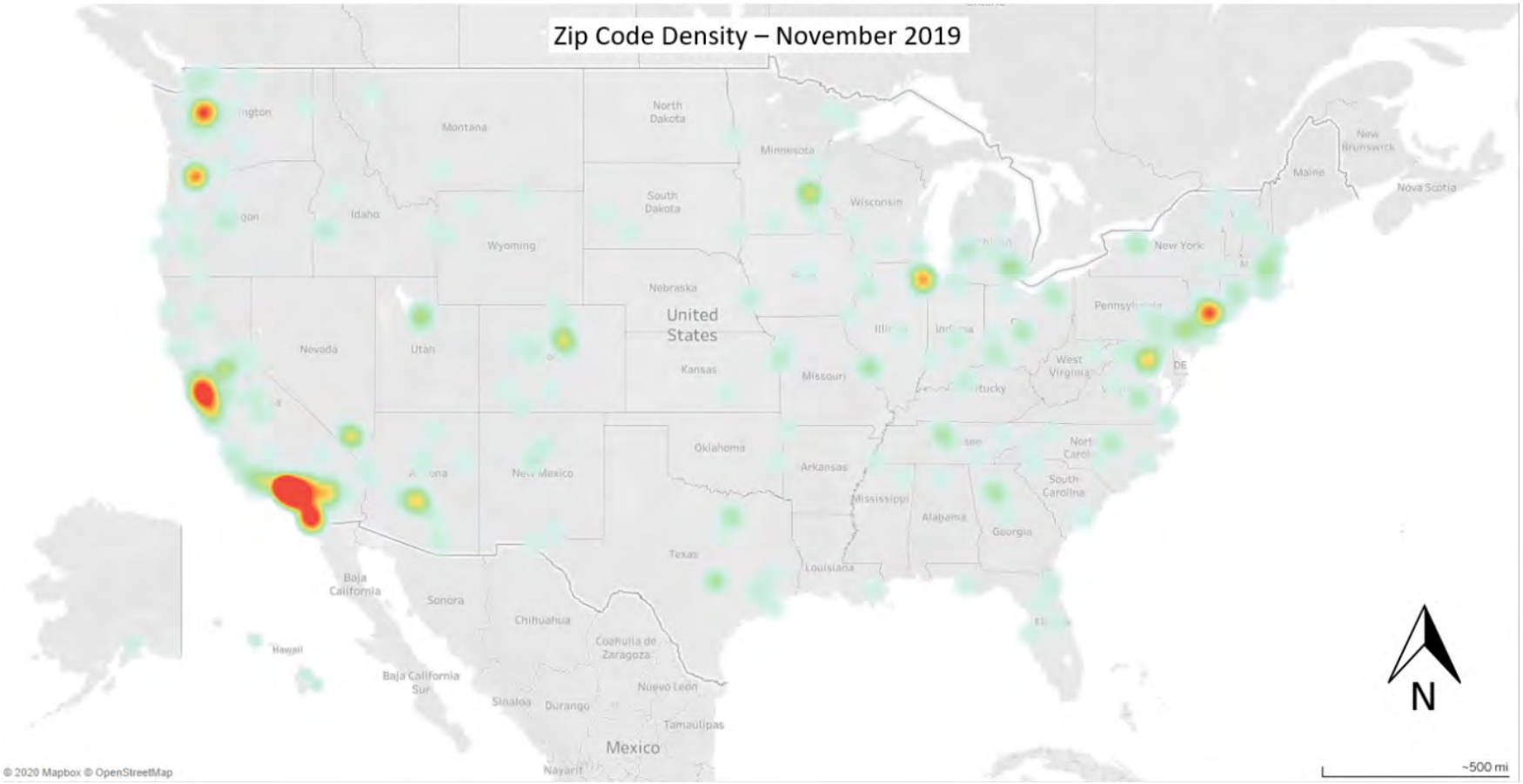


Figure 7. Density map of U.S. home location zip codes reported in November 2019.

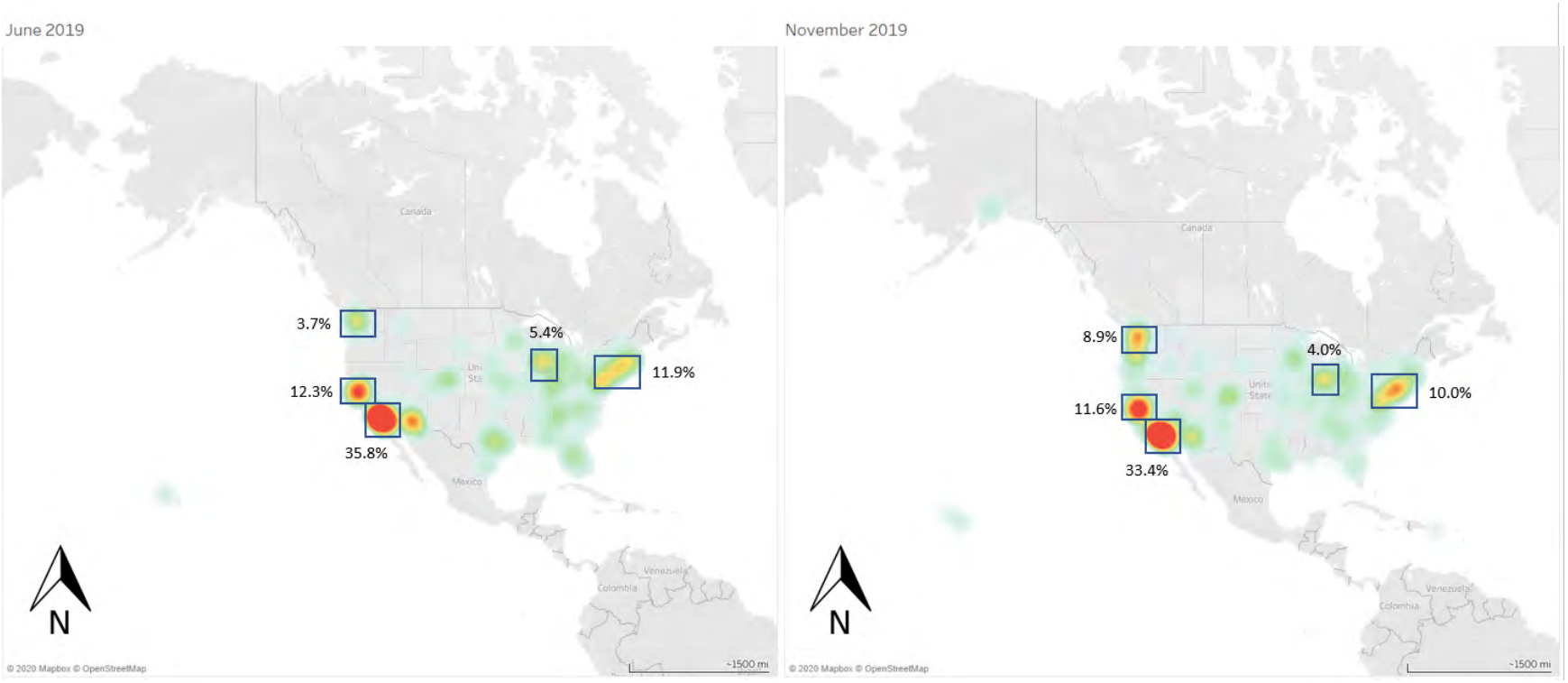


Figure 8. Density map of change in U.S. home location zip codes between June 2019 and November 2019.

Table 8. US visitors' state/territory of primary residence by season and overall. *(from zip codes in General survey Q12a, Management survey 8a)*

US state	2019 Season[1]		
	Summer	Fall	Total
Alabama	0.9*	0.1*	0.3
Alaska	0.0*	0.7*	0.5
Arizona	6.0*	2.7*	3.6
Arkansas	0.0	0.2	0.1
California	52.5	57.6	56.2
Colorado	2.1	2.4	2.3
Connecticut	1.6*	0.4*	0.7
District of Columbia	0.7	0.4	0.4
Delaware	0.2	0.0	0.1
Florida*	2.5*	0.7*	1.2
Georgia	1.4	0.6	0.8
Hawaii	0.2	0.3	0.3
Idaho	0.0*	0.5*	0.4
Illinois	2.1	2.0	2.0
Indiana	1.4*	0.4*	0.6
Iowa	0.0	0.4	0.3
Kansas	0.2	0.2	0.2
Kentucky	0.9*	0.2*	0.4
Louisiana	0.0	0.1	0.1
Maine	0.0	0.0	0.0
Maryland	0.9	0.7	0.8
Massachusetts	1.8*	0.6*	1.0
Michigan	1.6	1.4	1.5
Minnesota	0.7	1.4	1.2
Mississippi	1.1	0.9	1.0
Missouri	0.2	0.1	0.1

US state	2019 Season[1]		
	Summer	Fall	Total
Montana	0.2	0.4	0.4
Nebraska	0.5	0.2	0.3
Nevada*	0.2	1.2	0.9
New Hampshire	0.0	0.4	0.3
New Jersey	0.2*	1.4*	1.1
New Mexico	0.0*	0.5*	0.4
New York	2.3	2.3	2.3
North Carolina	1.4	0.8	1.0
North Dakota	0.0	0.1	0.1
Ohio	1.6	1.4	1.5
Oklahoma	0.2	0.1	0.1
Oregon	0.2**	3.4**	2.5
Pennsylvania	2.1	1.5	1.7
Puerto Rico	0.0	0.1	0.1
Rhode Island	0.2	0.3	0.3
South Carolina	0.5	0.2	0.3
South Dakota	0.5	0.3	0.3
Tennessee	0.9	1.0	1.0
Texas	4.1*	1.5*	2.2
Utah	0.2	0.8	0.6
Vermont	0.2	0.3	0.3
Virginia	0.7	1.2	1.0
Washington	3.0	5.1	4.5
West Virginia	0.5	0.2	0.3
Wisconsin	1.1	0.4	0.6
Wyoming	0.0	0.4	0.3

[1]Cells reported as percentages (%) of affirmative (yes) responses. $X^2 = 125.601$; $p < 0.001$; Cramer's V = 0.271. Shading highlights the three highest (blue) percentages per season and overall.
*Seasonal difference is significant at $p < 0.05$; **Seasonal difference is significant at $p < 0.001$.

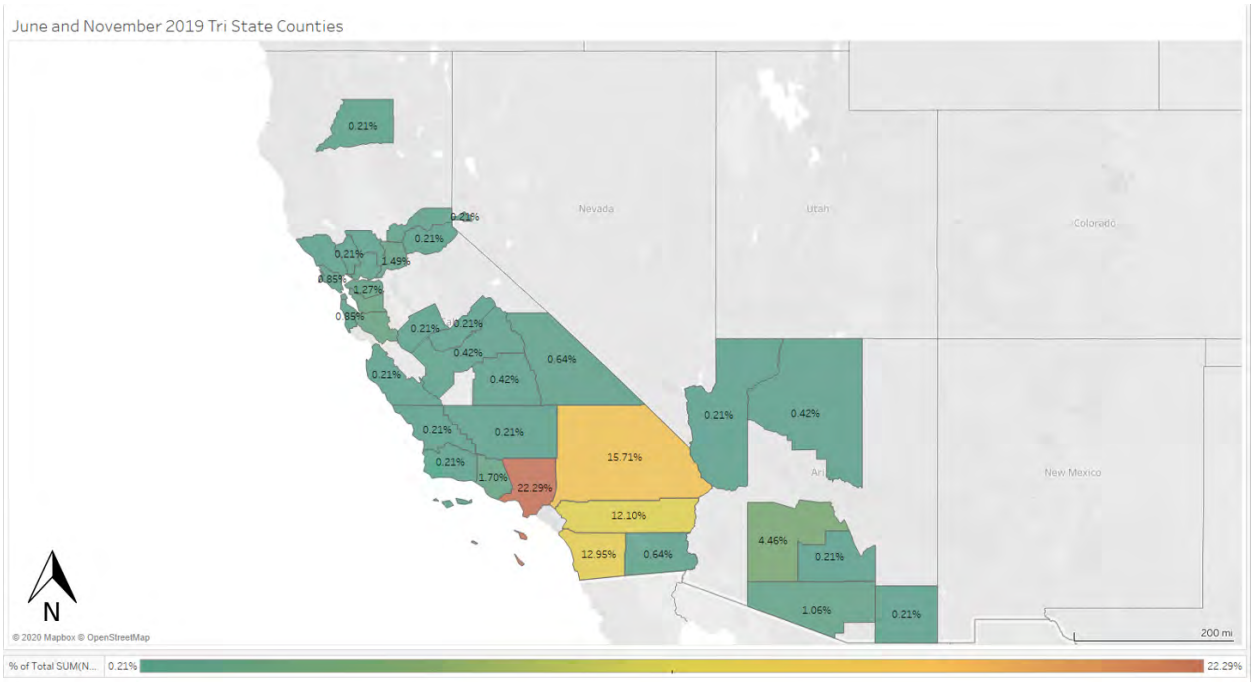


Figure 9. Map of U.S. home zip codes reported for California, Arizona, and Nevada by county and percentage of the total listed for 2019.

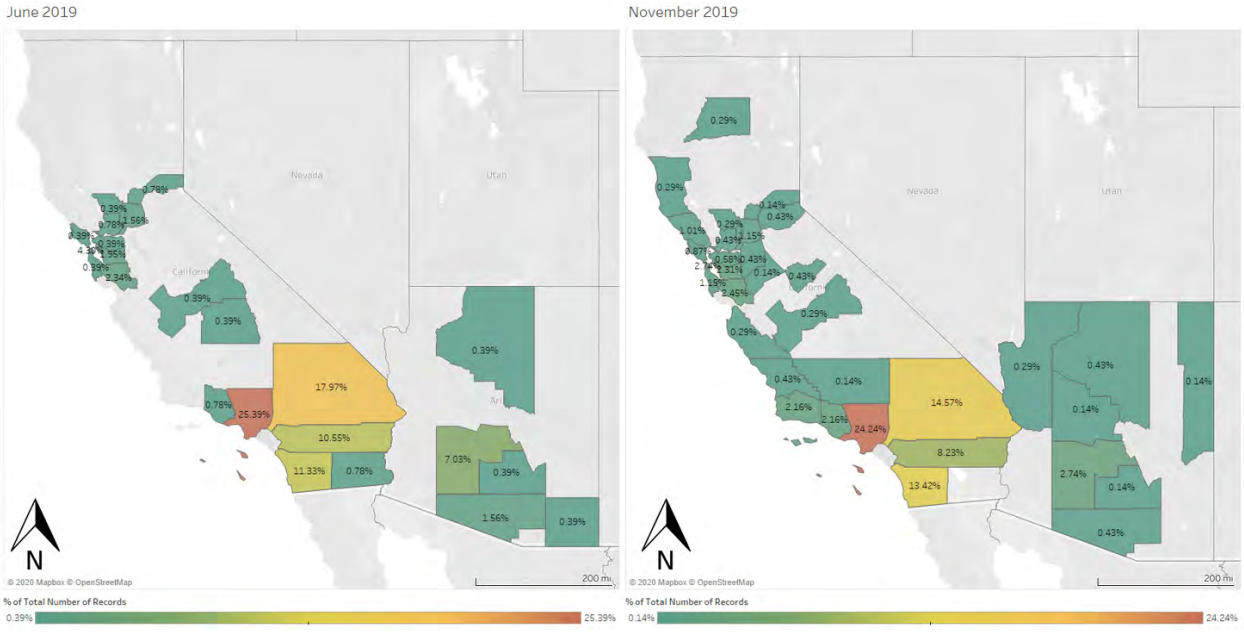


Figure 10. Maps of U.S. home zip codes reported for California, Arizona, and Nevada by county in June 2019 (left) and November 2019 (right).

Table 9. California visitors' county of primary residence by season and overall. *(derived from zip codes reported in General survey Q12a, Management survey 8a)*

California county	2019 Season[1]		
	Summer	Fall	Total
Alameda	2.2	2.5	2.4
Contra Costa	0.4	0.6	0.6
El Dorado	0.0	0.5	0.3
Fresno	0.4	0.3	0.3
Humboldt	0.0	0.2	0.1
Imperial	0.9*	0.0*	0.2
Kern	0.0	0.2	0.1
Los Angeles	28.4*	25.8*	26.5
Marin	0.4	0.9	0.8
Mariposa	0.0	0.5	0.3
Mendocino	0.0	0.3	0.2
Monterey	0.0	0.3	0.2
Nevada	0.0*	0.8*	0.6
Orange	9.2**	11.7**	11.0
Placer	0.9	0.2	0.3
Riverside	11.8	8.8	9.6
Sacramento	1.7	1.2	1.4

California county	2019 Season[1]		
	Summer	Fall	Total
San Bernardino	20.1	15.5	16.7
San Diego	12.7*	14.3*	13.9
San Francisco	4.8	2.9	3.4
San Joaquin	0.0	0.5	0.3
San Luis Obispo	0.0	0.5	0.3
San Mateo	0.4	1.2	1.0
Santa Barbara	0.0**	2.3**	1.7
Santa Clara	2.6	2.6	2.6
Santa Cruz	0.4	0.9	0.8
Shasta	0.0	0.3	0.2
Solano	0.9	0.5	0.6
Sonoma	0.0*	1.1*	0.8
Stanislaus	0.0	0.2	0.1
Tulare	0.4	0.0	0.1
Ventura	0.9*	2.3*	1.9
Yolo	0.4	0.3	0.3

[1]Cells reported as percentages (%) of affirmative (yes) responses. $X^2 = 51.745$; $p = 0.015$; Cramer's $V = 0.214$. Shading highlights the three highest (blue) percentages per season and overall.
*Seasonal difference is significant at $p < 0.05$; **Seasonal difference is significant at $p < 0.001$.

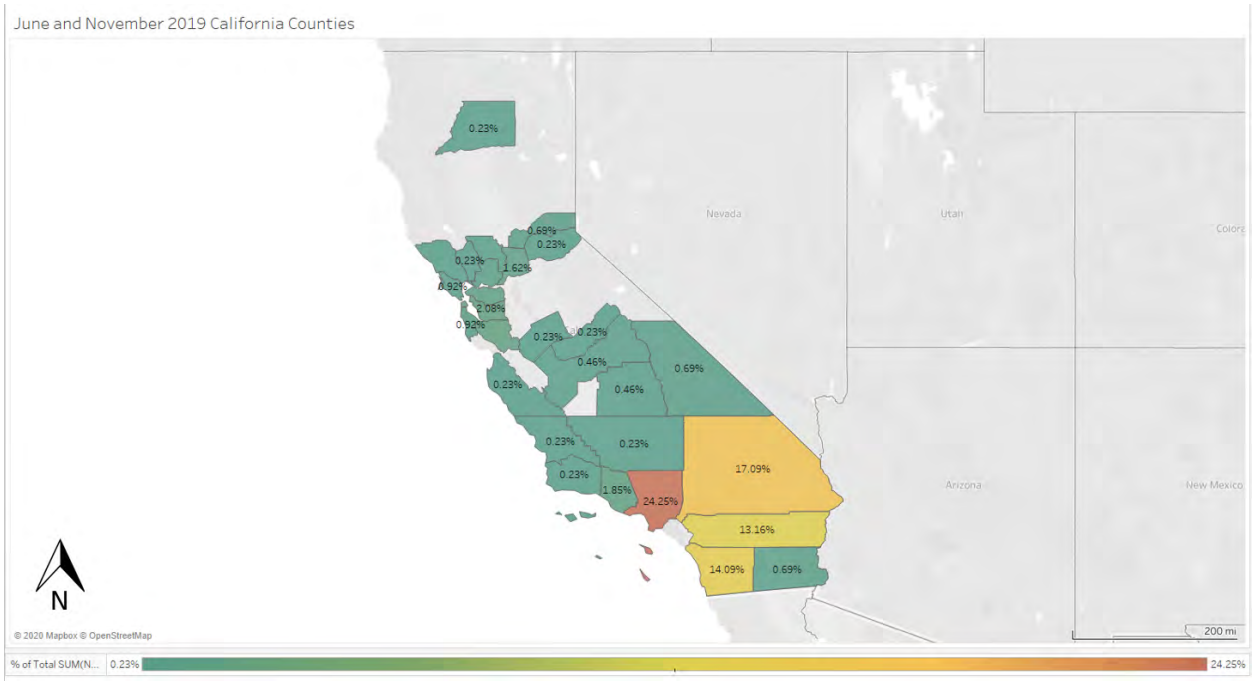


Figure 11. Map of U.S. home zip codes reported for California by county and percentage of the total listed for 2019.

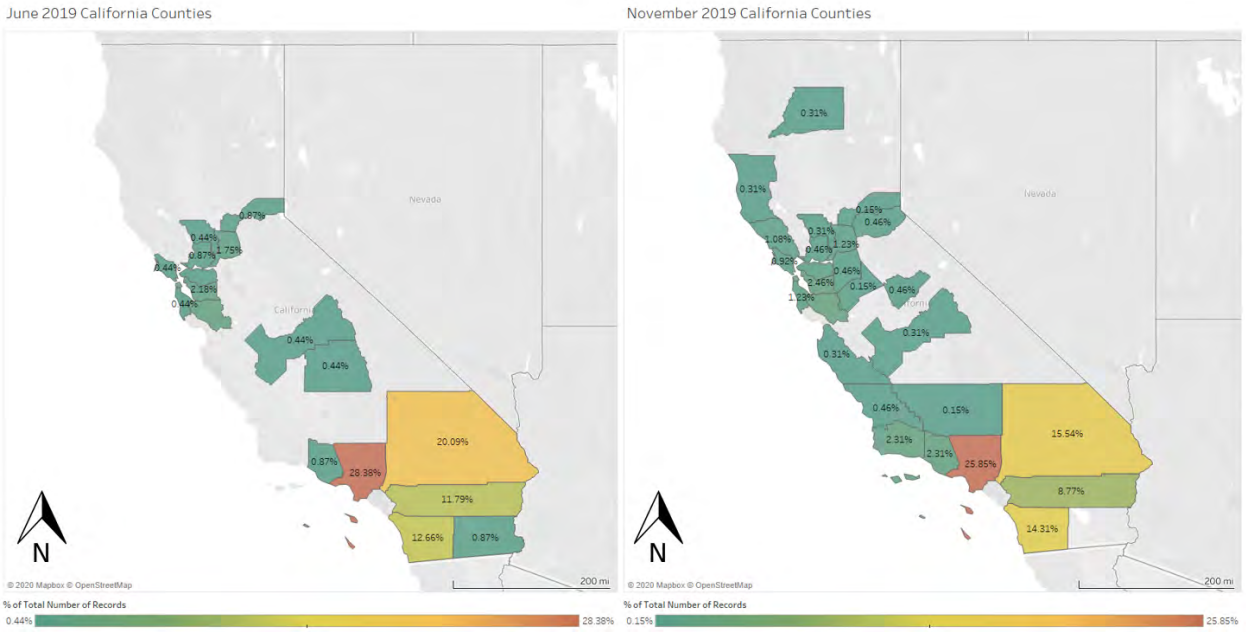


Figure 12. Maps of U.S. home zip codes reported for California by county in June 2019 (left) and November 2019 (right).

Table 10. Age of visitors by season and overall. *(General survey Q12b, Management survey Q8b)*

Age of visitors	2019 Season[1]		
	Summer	Fall	Total
< 20	1.5*	0.3*	0.7
20-29	21.4	19.7	20.2
30-39	26.1	28.0	27.4
40-49	18.2*	14.5*	15.6
50-59	16.8	15.5	15.9
60-69	10.6*	14.9*	13.5
70-79	5.2	6.9	6.4
80-89	0.1	0.3	0.2
Average age[2]	42.49* (14.84)	44.46* (15.51)	43.84 (16-83)

[1]Cells reported as percentages (%) of affirmative (yes) responses. $X^2 = 22.747$; $p = 0.002$; Cramer's V = 0.103. Shading highlights the highest (blue) and lowest (red) percentage per season and overall.
[2]Cells are reported in years, means (M) followed by the (standard deviation) for summer and fall and means followed by the (range) for total. $t = -2.833$; $p = 0.005$; Cohen's $d = 0.130$.
*Seasonal difference is significant at $p < 0.05$.

Table 11. Gender of respondents. *(General survey Q12c, Management survey Q8c)*

Gender	2019 Season[1]		
	Summer	Fall	Total
Male	51.3	49.5	50.0
Female	46.9	48.8	48.2
Other	0.1	0.3	0.3
Don't wish to say	1.6	1.4	1.5

[1]Cells reported as percentages (%) of affirmative (yes) responses. $X^2 = 1.468$; $p = 0.690$.

Table 12. Education of visitors, by season and overall. *(General survey Q12d, Management survey Q8d)*

Highest level of school completed	2019 Season[1]		
	Summer	Fall	Total
Less than high school	0.1	0.0	<0.1
Some high school	1.0	0.3	0.5
High school graduate	4.5	3.1	3.5
Some college	10.6	12.1	11.6
Two-year college graduate	5.5	6.9	6.5
Four-year college graduate	32.1*	37.3*	35.6
Graduate or professional degree	44.2*	38.9*	40.6
Do not wish to answer	1.9	1.4	1.6

[1]Cells reported as percentages (%) of affirmative (yes) responses. $X^2 = 18.486$; $p = 0.010$; Cramer's V = 0.093. Shading highlights the highest (blue) and lowest (red) percentage per season and overall.
*Seasonal difference is significant at $p < 0.05$.

Table 13. Race of visitors by season and overall. *(General survey Q12e, Management survey Q8e)*

Race	2019 Season[1]		
	Summer	Fall	Total
Monoracial (one race selected)[2]	63.4	63.5	63.4
---White	59.9	60.3	60.2
---Asian	1.0	1.2	1.1
---Hispanic or Latinx	0.7	0.6	0.6
---Other	0.1	0.1	0.1
---Black or African American	0.1	0.1	0.1
---Hawaiian or Pacific Islander	0.0	0.2	0.1
---American Indian or Alaskan Native	0.1	0.0	<0.1
Biracial (two races selected)	32.1	29.6	30.4
Multiracial (three or more races selected)	4.6	6.9	6.2

[1]Comparison among mono, bi, and multiracial categories: $X^2 = 5.201$; $p = 0.074$.
[2]Comparison among racial groups within the monoracial category: $X^2 = 4.889$; $p = 0.674$. Shading highlights the highest (blue) and lowest (red) percentage per season and overall.

Table 14. Group size of visitors by season and overall. *(Intercept control logs)*

Group size	2019 Season[1]		
	Summer	Fall	Total
Number of people	2.64** (1.63)	2.36 **(1.59)	2.45 (1-30)

[1]Cells reported as means (M) followed by (standard deviation) for summer and fall and by (range) for overall. $t = 5.173$, $p < 0.001$, Cohen's $d = 0.174$.
**Seasonal difference is significant at $p < 0.001$.

Table 15. Group type by season and overall. *(Intercept control logs)*

Group type	2019 Season[1]		
	Summer	Fall	Total
Alone	13.2**	18.4**	15.4
Family	51.9*	55.3*	53.4
Friends	29.2**	19.5**	25.1
Family/friends	4.3	5.4	4.7
Other	1.4	1.4	1.4

[1]Cells are reported as percentages (%) for affirmative (yes) responses. Shading highlights the highest (blue) and lowest (red) percentage per season and overall. $X^2 = 51.167$, $p < 0.001$; Cramer's $V = 0.121$.
*Seasonal difference is significant at $p < 0.05$; **Seasonal difference is significant at $p < 0.001$.

VISITATION FREQUENCY AND LOCATIONS

Table 16. Visitors' park visitation history by season and overall. *(General survey Q1a-d and Q2a, Management survey Q1a-e)*

Please tell us about your past visitation to Joshua Tree National Park	2019 Season[1]			Tests of significance[2]
	Summer	Fall	Total	
If you visited the park for only one day, how many hours did you spend in the park?	4.69 (3.14)	4.99 (3.66)	4.90 (1-24)	t: -1.379 p: 0.168
If you visited the park for more than one day, how many days did you spend in the park?	2.21* (1.98)	3.01* (2.09)	2.88 (1-15)	t: -2.583 p: 0.012 d: 0.391
Including today, how many days in the last month (30 days) have you visited the park?	1.90* (2.67)	2.41* (2.93)	2.25 (1-30)	t: -4.069 p: <0.001 d: 0.182
Including today, how many days in the last year (12 months) have you visited the park?	5.65 (20.86)	6.22 (21.24)	6.04 (1-338)	t: -0.589 p: 0.556
Including today, how many years (total) have you visited the park?	3.81* (7.44)	4.63* (9.14)	4.37 (1-150)	t: -2.207 p: 0.027 d: 0.098
In what year did you first visit the park?	2013.89 (10.54)	2013.09 (10.91)	2013.34 (1956-2013)	t: 1.612 p: 0.107

[1]Cells are reported in units of time: means followed by the (standard deviation) for summer and fall and means followed by the (range) for total.
[2]T test (t); p value (p); Cohen's d (d) for significant differences ($p < 0.05$).
*Seasonal difference is significant at $p < 0.05$.

Table 17. Percent of visitors reporting the park as primary destination by season and overall. *(General survey Q2b)*

On this trip…	2019 Season[1]		
	Summer	Fall	Total
Joshua Tree NP was the primary destination	55.0**	62.6**	60.2
Joshua Tree NP was one of several destinations	40.8*	34.3*	36.4
Joshua Tree NP was not a planned destination	4.2	3.1	3.4

[1] Cells are reported as percentages (%) for affirmative (yes) responses. $X^2 = 11.166$, $p = 0.004$, Cramer's $V = 0.072$.
*Seasonal difference is significant at $p < 0.05$; **Seasonal difference is significant at $p < 0.001$.

Table 18. Primary reason in the area by season and overall. *(General survey Q4)*

On this trip, what was the primary reason that you and your personal group came to the Joshua Tree NP area (Yucca Valley, Joshua Tree, Twentynine Palms)?	2019 Season[1]		
	Summer	Fall	Total
Resident of the area (Yucca Valley, Joshua Tree, Twentynine Palms)	7.6	6.3	6.7
Visit Joshua Tree NP	72.4	74.9	74.1
Visit other attractions in the area	7.3	6.4	6.7
Visit friends / relatives at the Twentynine Palms U.S. Marine Corps base	0.3	0.6	0.5
Visit friends / relatives in the area (other than the Marine Corps base)	2.9	3.2	3.1
Traveling through – unplanned visit	6.2	4.3	4.9
Business	2.0	1.8	1.8
Other[2]	1.4	2.6	2.2

[1] Cells are reported as percentages (%) for affirmative (yes) responses. Shading highlights the highest (blue) and lowest (red) percentage per season and overall. $X^2 = 9.804$, $p = 0.200$.
[2]Most frequently listed: Climbing and Wedding.

Table 19. Locations visited in the park by season and overall. *(General survey Q3a-b, Management survey Q2a-b)*

For this trip, select the locations in Joshua Tree NP that you and your personal group visited.	2019 Season[1]			Tests of significance[2]
	Summer	Fall	Total	
Joshua Tree Visitor Center	28.5	26.7	27.3	X^2: 0.727, p: 0.422
Black Rock Canyon Area	4.8	6.6	6.0	X^2: 2.499, p: 0.114
Black Rock Nature Center	1.0**	3.9**	3.0	X^2: 12.563, p: <0.001, V: 0.078
Black Rock Campground	3.9	5.0	4.6	X^2: 1.188, p: 0.276
West Entrance Station	41.4	41.6	41.5	X^2: 0.004, p: 0.952
Indian Cove Area	4.8*	8.1*	7.0	X^2: 8.378, p: 0.004, V: 0.060
Indian Cove Ranger Station	2.2*	3.9*	3.4	X^2: 4.671, p: 0.031, V: 0.044
Indian Cove Campground	2.9**	6.2**	5.1	X^2: 11.298, p: 0.001, V: 0.068
Fortynine Palms Oasis	6.7	7.9	7.5	X^2: 0.983, p: 0.322
Oasis Visitor Center	14.7	14.8	14.7	X^2: 0.002, p: 0.962
North Entrance Station	23.1	21.4	22.0	X^2: 0.762, p: 0.383
Covington Flats	1.2	1.5	1.4	X^2: 0.455, p: 0.500
Quail Springs	25.4*	20.5*	22.1	X^2: 6.538, p: 0.011, V: 0.055
Keys View	28.8	29.9	29.6	X^2: 0.293, p: 0.588
Keys Ranch	10.5	12.2	11.7	X^2: 1.474, p: 0.225
Barker Dam	29.4	28.7	28.9	X^2: 0.093, p: 0.760
Hidden Valley Area	35.9	36.9	36.6	X^2: 0.228, p: 0.633
Hidden Valley Campground	31.4	31.8	31.7	X^2: 0.030, p: 0.862
Sheep Pass Group Camp	9.2	7.7	8.2	X^2: 1.234, p: 0.267
Belle Campground	4.1*	6.6*	5.8	X^2: 5.688, p: 0.017, V: 0.049
Lost Horse Mine	7.0	9.1	8.4	X^2: 2.766, p: 0.096
Jumbo Rocks Area	47.3*	41.8*	43.6	X^2: 5.789, p: 0.016, V: 0.051
Jumbo Rocks Campground	41.0*	36.2*	37.7	X^2: 4.587, p: 0.032, V: 0.046
White Tank Campground	5.7**	9.6**	8.4	X^2: 10.157, p: 0.001, V: 0.066
Geology Tour Road	5.5	7.1	6.6	X^2: 2.077, p: 0.150
Pinto Basin Road	18.0	17.1	17.4	X^2: 0.295, p: 0.587
Cholla Cactus Garden	40.3	39.0	39.4	X^2: 0.324, p: 0.569
Bajada Nature Trail	3.6	3.2	3.4	X^2: 0.219, p: 0.640
Cottonwood Visitor Center	22.4*	27.2*	25.7	X^2: 5.843, p: 0.016, V: 0.051
Cottonwood Campground	4.2*	6.8*	6.0	X^2: 5.759, p: 0.016, V: 0.050
Cottonwood Spring	9.2*	13.1*	11.9	X^2: 7.340, p: 0.007, V: 0.057
Lost Palms Oasis	4.8*	7.9*	6.9	X^2: 7.416, p: 0.006, V: 0.056
Ryan Mountain	14.4*	19.7*	18.1	X^2: 9.391, p: 0.002, V: 0.064
Other[3]	6.4**	12.0**	10.2	X^2: 17.508, p: <0.001, V: 0.086

[1]Cells are reported as percentages (%) for affirmative (yes) responses. Shading highlights the highest (blue) and lowest (red) percentage per season and overall.

[2]Chi-square (X^2); p value (p); Cramer's V (V) for significant differences ($p < 0.05$).

[3]Most frequently listed (in descending order): Hall of Horrors Area, Arch Rock Nature Trail, Boy Scout Trail, Desert Queen Mine, Wonderland of Rocks Area, Wall Street Mill, Ocotillo Patch, California Riding and Hiking Trail, and Queen Valley Road Area.

*Seasonal difference is significant at $p < 0.05$; **Seasonal difference is significant at $p < 0.001$.

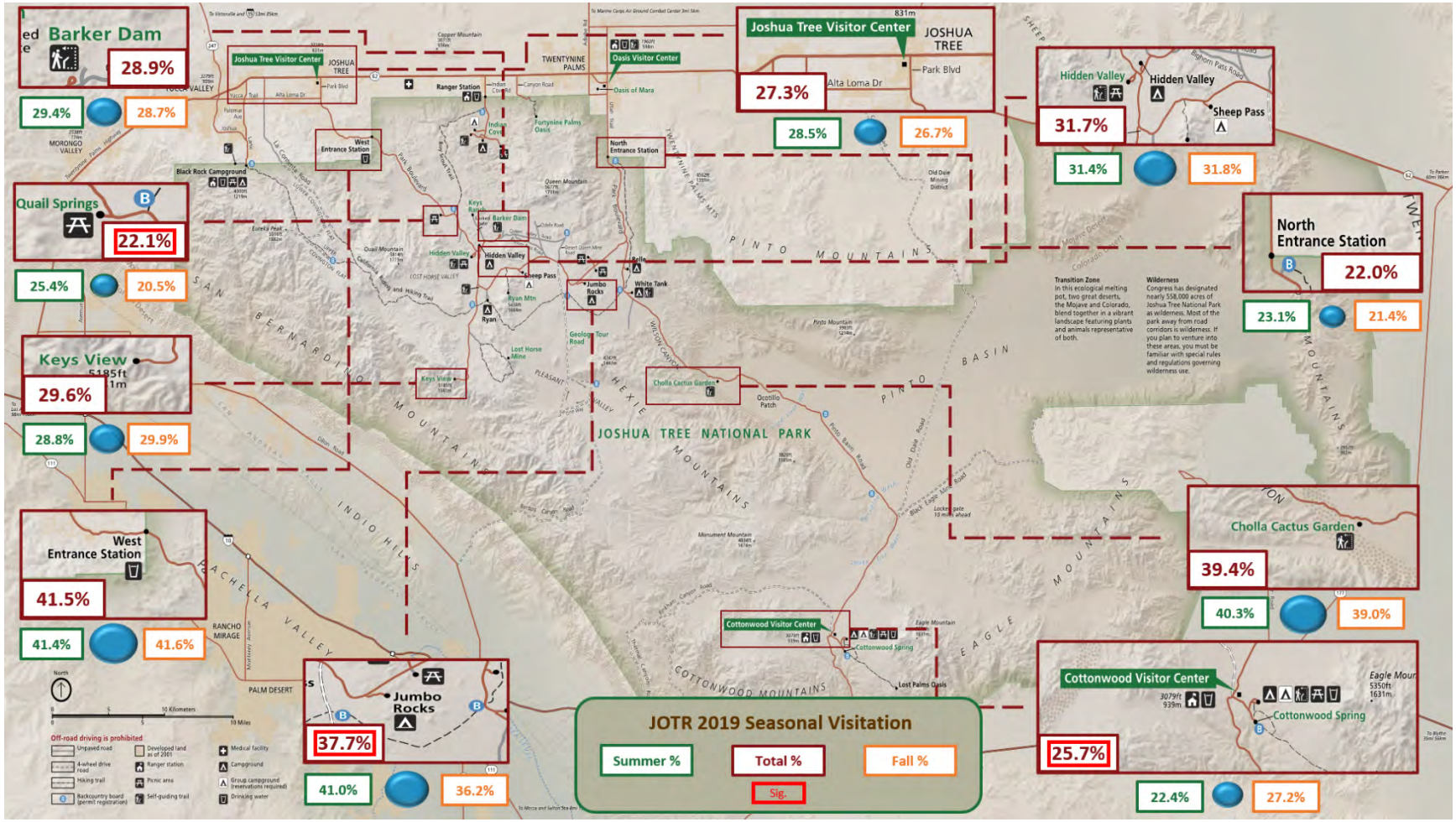


Figure 13. The ten park locations most visited in 2019, with differences in seasonal visitation rates highlighted.

Table 20. Number of visitor centers visited in the park by season and overall. *(General survey Q3a-b, Management survey Q2a-b)*

Number of visitor centers visited	2019 Season[1]		
	Summer	Fall	Total
0	48.8	48.4	48.5
1	38.2	36.3	36.9
2	11.5	13.6	13.0
3	1.5	1.7	1.6

[1]Cells are reported as percentages (%) for affirmative (yes) responses. Chi-square (X^2) = 2.445, p value (p) = 0.485.

Table 21. Number of campgrounds visited in the park by season and overall. *(General survey Q3a-b, Management survey Q2a-b)*

Number of campgrounds visited	2019 Season[1]		
	Summer	Fall	Total
0	40.8	38.6	39.3
1	32.7	32.3	32.4
2	16.3	18.3	17.7
3	6.4	6.0	6.1
4	2.0	2.6	2.4
5	1.0	1.2	1.1
6	0.6	0.6	0.6
7	0.0	0.3	0.2
8	0.1	0.1	0.1

[1]Cells are reported as percentages (%) for affirmative (yes) responses. Chi-square (X^2) = 6.672, p value (p) = 0.572. The data also suggests that some visited a park campground but did not stay overnight in a park campground.

Table 22. Most desired/planned for location in the park by season and overall. *(General survey Q3c, Management survey Q2c)*

For this trip, what was your most desired/planned for location	2019 Season[1]		
	Summer	Fall	Total
Joshua Tree Visitor Center	10.8**	5.8**	7.4
Black Rock Nature Center	0.1	0.1	0.1
Black Rock Campground	2.0	1.1	1.4
West Entrance Station	7.3*	4.9*	5.6
Indian Cove Ranger Station	0.0*	0.4*	0.3
Indian Cove Campground	1.3*	2.7*	2.2
Fortynine Palms Oasis	0.3	0.9	0.7
Oasis Visitor Center	1.3	1.0	1.1
North Entrance Station	5.6**	1.9**	3.1
Covington Flats	0.0	0.2	0.1
Quail Springs	2.8	1.5	1.9
Keys View	9.8	7.6	8.3
Keys Ranch	0.7	1.5	1.2
Barker Dam	7.6	6.8	7.0
Hidden Valley Campground	2.3**	12.5**	9.3
Sheep Pass Group Camp	1.0	0.5	0.7
Belle Campground	0.0**	0.9**	0.6
Lost Horse Mine	1.6	2.9	2.5
Jumbo Rocks Campground	3.7**	10.2**	8.1
White Tank Campground	0.7	1.3	1.1
Geology Tour Road	2.8*	1.3*	1.7
Pinto Basin Road	0.4	0.7	0.6
Cholla Cactus Garden	8.9	8.2	8.5
Bajada Nature Trail	0.1	0.3	0.3
Cottonwood Visitor Center	4.7*	2.7*	3.3
Cottonwood Campground	0.9*	2.5*	2.0
Cottonwood Spring	1.5	1.3	1.3
Lost Palms Oasis	1.0	1.9	1.6
Ryan Mountain	5.3	5.5	5.4
Other[2]	15.4*	11.0*	12.3

[1]Cells are reported as percentages (%) for affirmative (yes) responses. Shading highlights the highest (blue) and lowest (red) percentage per season and overall. $X^2 = 204.455$, $p < 0.001$, Cramer's $V = 0.288$.

[2]Most frequently listed (in descending order): Hall of Horrors Area, Arch Rock Nature Trail, Boy Scout Trail, Desert Queen Mine, Wonderland of Rocks Area, Wall Street Mill, Ocotillo Patch, California Riding and Hiking Trail, and Queen Valley Road Area.

*Seasonal difference is significant at $p < 0.05$; **Seasonal difference is significant at $p < 0.001$.

Table 23. Location where longest amount of time was spent, by season and overall. *(General survey Q3d, Management survey Q2d)*

For this trip, where did you and your personal group spend the longest amount of time?	2019 Season[1]		
	Summer	Fall	Total
Joshua Tree Visitor Center	2.7	1.5	1.8
Black Rock Nature Center	0.0	0.1	0.1
Black Rock Campground	2.4	1.6	1.8
West Entrance Station	1.8	1.1	1.3
Indian Cove Ranger Station	0.1	0.1	0.1
Indian Cove Campground	1.0	2.0	1.7
Fortynine Palms Oasis	1.2	1.3	1.2
Oasis Visitor Center	1.3*	0.3*	0.6
North Entrance Station	1.2**	0.1**	0.5
Covington Flats	0.0	0.1	0.0
Quail Springs	5.0**	2.3**	3.1
Keys View	9.0**	5.0**	6.3
Keys Ranch	1.3	1.5	1.4
Barker Dam	12.7**	7.5**	9.1
Hidden Valley Campground	2.4**	12.1**	9.1
Sheep Pass Group Camp	1.2	0.5	0.7
Belle Campground	0.9	1.7	1.4
Lost Horse Mine	1.6*	3.7*	3.1
Jumbo Rocks Campground	4.7**	11.3**	9.3
White Tank Campground	1.0	1.9	1.7
Geology Tour Road	2.7	1.5	1.8
Pinto Basin Road	2.2	1.1	1.5
Cholla Cactus Garden	8.1*	5.8*	6.5
Bajada Nature Trail	0.0	0.1	0.0
Cottonwood Visitor Center	2.4	1.5	1.8
Cottonwood Campground	0.9**	3.1**	2.4
Cottonwood Spring	1.0*	2.6*	2.1
Lost Palms Oasis	1.2*	2.4*	2.0
Ryan Mountain	6.4	6.8	6.6
Other	23.6*	19.3*	20.7

[1]Cells are reported as percentages (%) for affirmative (yes) responses. Shading highlights the highest (blue) and lowest (red) percentage per season and overall. $X^2 = 201.998$, $p < 0.001$, Cramer's V = 0.293.

*Seasonal difference is significant at $p < 0.05$; **Seasonal difference is significant at $p < 0.001$.

ACTIVITIES

Table 24. Activities by season and overall. *(General survey Q5a, Management survey Q3a)*

On this visit, in which activities did you and your personal group participate within Joshua Tree NP?	2019 Season[1]			Tests of significance
	Summer	Fall	Total	
Attended field classes or other guided activities	1.9*	3.6*	3.0	X^2: 4.994, p: 0.025, V: 0.046
Attended ranger-led programs	5.1	6.3	5.9	X^2: 1.429, p: 0.232
Backpacking overnight	4.9	6.5	6.0	X^2: 2.282, p: 0.131
Bicycling	3.9	3.6	3.7	X^2: 0.152, p: 0.697
Bouldering (using pads and bouldering guides)	11.7*	15.8*	14.5	X^2: 6.557, p: 0.010
Camping[2]	39.5**	48.2**	45.5	X^2: 14.480, p: <0.001, V: 0.081
Created content for social media / blogs	20.4	19.6	19.8	X^2: 0.210, p: 0.646
Day hiking	89.1**	93.9**	92.4	X^2: 12.133, p: <0.001, V: 0.082
Enjoyed nature	97.4	98.3	98.0	X^2: 1.821, p: 0.177
Exercised to promote physical fitness	48.8**	60.3**	56.7	X^2: 25.766, p: <0.001, V: 0.108
Family / friend gathering or celebration	28.5**	36.2**	33.8	X^2: 12.596, p: <0.001
Horseback riding	0.1	0.3	0.3	X^2: 0.676, p: 0.411
Photography / videos	83.6	82.7	83.0	X^2: 0.314, p: 0.575
Picnicking	26.2**	33.0**	30.9	X^2: 10.421, p: <0.001, V: 0.068
Rock scrambling (without specialized gear or skills)	55.7	59.9	58.6	X^2: 3.380, p: 0.066
Seeking spiritual connections	30.8*	35.4*	34.0	X^2: 4.517, p: 0.034, V: 0.045
Sightseeing	91.0	90.0	90.3	X^2: 0.558, p: 0.455
Slacklining	0.4	0.6	0.5	X^2: 0.236, p: 0.627
Stargazing / viewing night sky	46.7	50.9	49.6	X^2: 3.267, p: 0.071
Technical climbing (with specialized gear or skills)	12.7**	19.4**	17.3	X^2: 15.258, p: <0.001, V: 0.081
Trail running	3.8*	6.5*	5.7	X^2: 7.362, p: 0.007, V: 0.056
Viewed plants and/or wildlife	87.1	88.8	88.2	X^2: 1.219, p: 0.270
Visited historical or archaeological sites	32.4*	38.9*	36.9	X^2: 8.733, p: 0.003, V: 0.063
Walking self-guided nature trails (with brochures/signs)	67.0	65.6	66.0	X^2: 0.439, p: 0.508
Other[3]	9.7	10.6	10.3	X^2: 0.401, p: 0.527

[1]Cells are reported as percentages (%) for affirmative (yes) responses. Shading highlights the highest (blue) and lowest (red) percentage per season and overall.
[2]There is a bias for overreporting camping in this question, based on responses to other questions in the survey, potentially due to respondents conflating camping in the park with camping in the general area.
[3]All listed Other activities with more than one mention (listed in descending order): Off-roading, Driving through, Junior Ranger Program, Bird watching, Dogs, Motorcycling, Painting.
*Seasonal difference is significant at p <0.05; **Seasonal difference is significant at p <0.001.

Table 25. Primary activity by season and overall. *(General survey Q5b, Management survey Q3b)*

Which activity was the primary activity in which you and your personal group participated at Joshua Tree NP on this visit?	2019 Season[1]		
	Summer	Fall	Total
Attended field classes or other guided activities	0.1	0.5	0.4
Attended ranger-led programs	0.0*	0.5*	0.3
Backpacking overnight	0.3**	1.8**	1.3
Bicycling	0.9	0.3	0.5
Bouldering (using pads and bouldering guides)	1.3	1.9	1.7
Camping	6.5*	9.0*	8.2
Created content for social media / blogs	0.1	0.1	0.1
Day hiking	18.8**	27.8**	25.0
Enjoyed nature	14.0*	10.7*	11.7
Exercised to promote physical fitness	0.6	0.9	0.8
Family / friend gathering or celebration	1.6*	3.5*	2.9
Horseback riding	0.0	0.0	0.0
Photography / videos	7.0	5.5	6.0
Picnicking	0.7*	0.1*	0.3
Rock scrambling (without specialized gear or skills)	2.9	3.4	3.2
Seeking spiritual connections	1.3	1.5	1.4
Sightseeing	23.3**	14.9**	17.5
Slacklining	0.0	0.0	0.0
Stargazing / viewing night sky	2.2	1.1	1.5
Technical climbing (with specialized gear or skills)	1.2**	6.4**	4.8
Trail running	0.1	0.5	0.4
Viewed plants and/or wildlife	6.0**	2.1**	3.3
Visited historical or archaeological sites	0.4	0.1	0.2
Walking self-guided nature trails (with brochures/signs)	6.5	4.7	5.3
Other	2.8	2.0	2.2

[1]Cells are reported as percentages (%) for affirmative (yes) responses. Shading highlights the highest (blue) and lowest (red) percentage per season and overall. $X^2 = 146.742$, $p < 0.001$, Cramer's V = 0.250

*Seasonal difference is significant at $p < 0.05$; **Seasonal difference is significant at $p < 0.001$.

LODGING AND RESERVATIONS

Table 26. Overnight plans in the park and in the area by season and overall. *(General survey Q7a, Q7b, Q8a, and Q8b; Management survey Q5a)*

Campsite reservations question	2019 Season[1]			Tests of significance[2]
	Summer	Fall	Total	
Did you or members of your personal group attempt to make reservations for campsites at Joshua Tree NP for this trip?	15.2	17.9	17.1	X^2: 2.267 p: 0.132
Were you able to make campsite reservations at Joshua Tree NP for this trip?	52.8**	70.6**	65.5	X^2: 12.547 p: <0.001 V: 0.170
On this trip, did you and your personal group camp overnight within Joshua Tree NP?	20.9*	25.1*	23.8	X^2: 4.649 p: 0.031 V: 0.047
On this visit, did you and your personal group stay overnight away from home in the area surrounding Joshua Tree NP (Yucca Valley, Joshua Tree, Twentynine Palms)?	44.8	46.5	46.0	X^2: 0.508 p: 0.476
Have you ever changed your trip plans because a campsite in a particular campground at Joshua Tree NP was not available on the date you initially desired?	11.1*	15.6*	14.2	X^2: 8.021 p: 0.005 V: 0.059

[1]Cells are reported as percentages (%) for affirmative (yes) responses.
[2]Chi-square test (X^2); p value (p);Cramer's V (V) for significant differences (p <0.05).
*Seasonal difference is significant at p <0.05; **Seasonal difference is significant at p <0.001.

Table 27. Changes to trip plans if a campsite at a particular campground in the park was not available on the date initially desired, by season and overall. *(Management survey Q5b)*

If yes, please tell us how you changed your trip plans. Select all that apply.	2019 Season[1]			Tests of significance[2]
	Summer	Fall	Total	
I changed the dates of my trip	3.2*	5.9*	5.0	X^2: 7.825 p: 0.005 V: 0.057
I camped at another location within Joshua Tree NP	6.7	8.7	8.1	X^2: 2.821 p: 0.093
I camped at a location other than Joshua Tree NP	6.1**	11.1**	9.5	X^2: 14.973 p: <0.001 V: 0.079
I came to Joshua Tree NP but chose not to camp	2.6*	4.8*	4.1	X^2: 6.082 p: 0.014 V: 0.050

[1]Cells are reported as percentages (%) for affirmative (yes) responses.
[2]Chi-square test (X^2); p value (p);Cramer's V (V) for significant differences (p <0.05).
*Seasonal difference is significant at p <0.05; **Seasonal difference is significant at p <0.001.

Table 28. For those who stayed overnight on this trip, the number of nights spent in the park and/or in the area by season and overall. *(General survey Q8a and Q8b)*

Overnight lodging	2019 Season[1]			Tests of significance[2]
	Summer	Fall	Total	
On this trip, how many nights did you and your personal group camp overnight within Joshua Tree NP?	1.31** (0.51)	2.56** (2.37)	2.31 (1-14)	t: -6.910 p: <0.001 d: 0.728
On this visit, how many nights did you and your personal group stay overnight away from home in the area surrounding Joshua Tree NP (Yucca Valley, Joshua Tree, Twentynine Palms)?	2.51 (2.95)	3.28 (6.22)	3.06 (1-90)	t: -1.405 p: 0.161

[1]Cells are reported in means (M) followed by the (standard deviation) for summer and fall and means followed by the (range) for total.
[2]T test (t); p value (p); Cohen's d (d) for significant differences (p <0.05).
**Seasonal difference is significant at p <0.001.

Table 29. Types of lodging inside and outside of the park by season and overall. *(General survey Q9)*

In what type of lodging did you and your personal group spend the night(s)…		2019 Season[1]			Tests of significance[2]
		Summer	Fall	Total	
Inside the park?	RV/trailer camping	4.3**	8.0**	6.9	X^2: 10.741, p: 0.001, V: 0.067
	Tent camping in developed campground	20.0	20.1	20.1	X^2: 0.004, p: 0.947
	Backcountry campsite	2.7	3.4	3.2	X^2: 0.739, p: 0.390
	Personal seasonal residence	0.1	0.3	0.2	X^2: 0.326, p: 0.568
	Residence of friends or relatives	0.4	0.2	0.3	X^2: 0.901, p: 0.342
	Other[3]	0.0	0.1	0.1	X^2: 1.506, p: 0.220
Outside the park?	Lodge, motel, cabin, rented condo/home, or bed & breakfast	49.1*	43.2*	45.1	X^2: 6.508, p: 0.011, V: 0.054
	RV/trailer camping	6.7	7.4	7.2	X^2: 0.401, p: 0.527
	Tent camping in developed campground	3.0	3.8	3.5	X^2: 0.757, p: 0.384
	Backcountry campsite	3.0	4.7	4.2	X^2: 3.429, p: 0.064
	Personal seasonal residence	2.6	2.7	2.7	X^2: 0.020, p: 0.887
	Residence of friends or relatives	8.2	6.3	6.9	X^2: 2.588, p: 0.108
	Other[3]	3.0	2.2	2.5	X^2: 1.182, p: 0.277

[1]Cells are reported as percentages (%) for affirmative (yes) responses. Shading highlights the highest (blue) and lowest (red) percentage per season and overall.
[2]Chi-square test (X^2); p value (p);Cramer's V (V) for significant differences (p <0.05).
[3]All listed Other locations inside/outside the park: Dr. Luckie Research Station and Home.
*Seasonal difference is significant at p <0.05; **Seasonal difference is significant at p <0.001.

INFORMATION AND AWARENESS

Table 30. Whether visitors obtained necessary information before or during their visit to the park, by season and overall. *(General survey Q10a-b and Q11)*

Information question	2019 Season[1]			Tests of significance[2]
	Summer	Fall	Total	
Prior to this visit, did you and your personal group obtain information about the park?	71.2	73.1	72.5	X^2: 0.827 p: 0.363
From the sources used prior to this visit, did you and your personal group obtain the type of information about the park that you needed?	95.3	94.8	94.9	X^2: 0.207 p: 0.649
Did you or your personal group use any information services or facilities during this visit to Joshua Tree NP?	61.8	60.5	60.9	X^2: 0.311 p: 0.577

[1]Cells are reported as percentages (%) for affirmative (yes) responses.
[2]Chi-square test (X^2); p value (p).

Table 31. Sources of information used for this park visit, by season and overall. *(General survey Q10b)*

Prior to this visit, how did you and your personal group obtain information about the park?	2019 Season[1]			Tests of significance[2]
	Summer	Fall	Total	
Joshua Tree NP website: www.nps.gov/jotr	66.1	63.3	64.2	X^2: 1.647, p: 0.199
Social media – Any	18.2	18.7	18.6	X^2: 0.070, p: 0.792
---Facebook	7.4	6.7	6.9	X^2: 0.363, p: 0.547
---Twitter	1.6	1.5	1.5	X^2: 0.060, p: 0.806
---Instagram	10.6	11.2	11.0	X^2: 0.179, p: 0.672
---Reddit	1.9	2.9	2.6	X^2: 2.102, p: 0.147
---Flickr	0.1	0.3	0.3	X^2: 0.676, p: 0.411
---Other	2.6	3.2	3.0	X^2: 0.664, p: 0.415
Other websites (Trip Advisor, Hotels.com, Expedia, etc.)	29.7**	23.2**	25.2	X^2: 10.328 p: 0.001, V: 0.069
Friends / relatives / word of mouth	35.2	34.4	34.7	X^2: 0.112, p: 0.738
Highway signs	10.7	9.5	9.8	X^2: 0.834, p: 0.361
Inquiry to park via phone, mail, or email	3.3	2.4	2.7	X^2: 1.580, p: 0.209
Local businesses (hotels, motels, restaurants, etc.)	2.6	3.2	3.0	X^2: 0.539, p: 0.463
Maps / brochures	30.2*	34.7*	33.3	X^2: 4.274, p: 0.039, V: 0.044
Newspaper / magazine articles	4.3	3.6	3.9	X^2: 0.626, p: 0.429
Other National Park Service sites / units	9.4	7.7	8.2	X^2: 1.863, p: 0.172
Previous visits	18.5	20.9	20.1	X^2: 1.664, p: 0.197
School class / program	1.2	1.6	1.5	X^2: 0.634, p: 0.426
State or local welcome center / visitors bureau / chamber of commerce	4.3	5.2	4.9	X^2: 0.688, p: 0.407
Television / radio programs / DVDs	1.7	1.5	1.6	X^2: 0.140, p: 0.708
Travel guides / tour books (AAA, Fodor's, Lonely Planet, etc.)	19.0*	14.7*	16.1	X^2: 6.118, p: 0.013, V: 0.053
Other[3]	4.3**	8.5**	7.2	X^2: 13.169, p: <0.001, V: 0.074

[1]Cells are reported as percentages (%) for affirmative (yes) responses.
[2]Chi-square test (X^2); p value (p); Cramer's V (V) for significant differences (p <0.05).
[3]All listed information sources with more than one mention (listed in descending order): All Trails App, Climbing guide, Hiking guide, Google, Google Earth, blogs, eBird, Internet, Joshua Tree Rock Climbs book, and YouTube.
*Seasonal difference is significant at p <0.05; **Seasonal difference is significant at p <0.001.

Table 32. Sources of information preferred for future visits, by season and overall. *(General survey Q10b)*

If you were to visit Joshua Tree NP in the future, how would you and your personal group prefer to obtain information about the park?	2019 Season[1]			Tests of significance[2]
	Summer	Fall	Total	
Joshua Tree NP website: www.nps.gov/jotr	36.8	35.2	35.7	X^2: 0.483, p: 0.487
Social media – Any	9.4	10.3	10.0	X^2: 0.434, p: 0.510
---Facebook	2.2	3.2	2.9	X^2: 2.021, p: 0.155
---Twitter	1.2	1.1	1.1	X^2: 0.044, p: 0.834
---Instagram	6.2	5.6	5.8	X^2: 0.314, p: 0.575
---Reddit	1.0	1.9	1.6	X^2: 2.629, p: 0.105
---Flickr	0.0	0.2	0.1	X^2: 2.259, p: 0.133
---Other	1.4	1.8	1.7	X^2: 0.336, p: 0.562
Other websites (Trip Advisor, Hotels.com, Expedia, etc.)	12.9	10.6	11.3	X^2: 2.318, p: 0.128
Friends / relatives / word of mouth	10.9*	14.0*	13.0	X^2: 4.298, p: 0.038, V: 0.044
Highway signs	2.9	3.4	3.3	X^2: 0.451, p: 0.502
Inquiry to park via phone, mail, or email	2.5	1.9	2.1	X^2: 0.666, p: 0.414
Local businesses (hotels, motels, restaurants, etc.)	0.6	0.7	0.6	X^2: 0.051, p: 0.821
Maps / brochures	17.2	19.2	18.6	X^2: 1.201, p: 0.273
Newspaper / magazine articles	3.0	2.4	2.6	X^2: 0.636, p: 0.425
Other National Park Service sites / units	4.9	5.6	5.4	X^2: 0.379, p: 0.538
Previous visits	7.7	9.8	9.1	X^2: 2.627, p: 0.105
School class / program	0.4	0.7	0.6	X^2: 0.691, p: 0.406
State or local welcome center / visitors bureau / chamber of commerce	3.2	3.4	3.3	X^2: 0.052, p: 0.819
Television / radio programs / DVDs	0.9	0.5	0.6	X^2: 0.822, p: 0.365
Travel guides / tour books (AAA, Fodor's, Lonely Planet, etc.)	13.6*	10.4*	11.4	X^2: 4.763, p: 0.029, V: 0.047
Other[3]	3.0*	4.9*	4.3	X^2: 4.194, p: 0.041, V: 0.042

[1]Cells are reported as percentages (%) for affirmative (yes) responses. Shading highlights the highest (blue) and lowest (red) percentage per season and overall.
[2]Chi-square test (X^2); p value (p); Cramer's V (V) for significant differences ($p < 0.05$).
[3]All listed information sources with more than one mention (listed in descending order): All Trails App, Climbing guide, Hiking guide, Google, Google Earth, blogs, eBird, Internet, Joshua Tree Rock Climbs book, and YouTube.
*Seasonal difference is significant at $p < 0.05$.

Table 33. Types of park information needed in 2019 that were not available, with examples. *(General survey Q10b)*

Type of information	Example responses
Trail locations/lengths	• We needed the exact location of the hike and everything we found only seemed to be an estimated location. Then using our GPS, the estimated location was off by a half a mile. • Wasn't easy to find lengths for the hikes as it has been for other National Parks • Updated map which include all the trails, we found almost no maps that covered the hikes we had planned to do. We found panorama loop to be the outright most beautiful part of the park (it was even recommended by some park rangers) but was never mentioned on any brochures or maps. • The Guide for Joshua Tree (detailed trail information); trail lengths and level of difficulty • The different spots and hiking time PRIOR to the visit, only found out most of that information on entering the park
Detailed maps	• The map provided at the gate is poor - the names on the map do not match signage on the road, hard to find info on how far off the road the parking and/or the walks are before you get there. The brochures look lovely but are not very useful. • Maps on the website were difficult to view and expand. Overall views of the campgrounds would be very helpful when choosing - individual site photos do not give a good representation. Also information about the trails (e.g., easy, hard, sites to be seen) could be better represented on the website. The paper handout at the park was excellent! • It would be great to find an easy use interactive map with all points of interest with click on information
Campground reservations	• We were surprised that all campgrounds were full by 1:00 pm on Thursday- website said that the campgrounds often fill on weekends, but my impression was that we would be able to get a campsite on a Thursday. • The park website said, in different areas on the site, that Jumbo Rocks campsite was both open first-come first-served in the summer and closed entirely. I called the park, and the automated answering system was completely unhelpful. The reservation site also said the campground was closed for both reservation and first-come first-served walk-ups. I called the reservation site and they said it was closed as well. When we got there we had no idea what to expect, and the campsite ended up being open.
Visitor center hours	• Clear understanding on closing times of business versus closing time of park (we did not know the park would be open when the business center was closed), and what time is best to enter for both sightseeing and stargazing • There was NOWHERE to purchase passes online and there was no clear information on the opening times of the park-.ie. if it was open for dawn when the visitors centers were closed!
Trip planning	• We needed to understand how large the park was and how much time was needed to see it all. We only had a day and were coming from the South Entrance, so it would have been nice to understand that we wouldn't have time to see the actual Joshua Trees. But we did have a great time hiking at Cottonwood. • Top 5 recommended stops for short visit
Dog regulations	• Specific areas allowed for dogs • More specific info on trails where dogs can walk. The trail listed on pet brochure is not listed on large map. At the south visitor center a ranger circled areas on my map where dogs could go, but these were not listed on any materials.
Heat safety	• How much water to bring • it is extremely hot in the middle of the day

Table 34. Timeframes of advanced planning for park visit, by season and overall. *(General survey Q10d)*

How far in advance, if at all, did you begin planning your most recent visit to Joshua Tree NP?	2019 Season[1]		
	Summer	Fall	Total
Didn't plan in advance	25.6	24.1	24.5
Planned days in advance	26.2	27.1	26.8
Planned weeks in advance	21.9	23.2	22.8
Planned months in advance	26.3	25.5	25.8

[1]Cells are reported as percentages (%) for affirmative (yes) responses. X^2: 1.021; p = 0.796.

Table 35. Average timeframe of advanced planning for park visit, by season and overall. *(General survey Q10d)*

How far in advance, if at all, did you begin planning your most recent visit to Joshua Tree NP?	2019 Season[1]			Tests of significance[2]
	Summer	Fall	Total	
Number of days in advance	5.53 (8.30)	6.98 (10.83)	6.51 (1-90)	t: -1.739, p: 0.083
Number of weeks in advance	2.86 (1.86)	2.75 (1.78)	2.79 (1-12)	t: 0.690, p: 0.491
Number of months in advance	3.61 (2.52)	3.36 (2.43)	3.44 (1-12)	t: 1.253, p: 0.211

[1]Cells reported as means (M) for each corresponding unit of time, followed by the (standard deviation) for summer and fall and (range) for overall.
[2]T test (t); p value (p).

Table 36. Information and facilities used during this visit to the park, by season and overall. *(General survey Q11b)*

Please mark all the information series and facilities that you or your personal group used during this visit to Joshua Tree NP	2019 Season[1]			Tests of significance
	Summer	Fall	Total	
Assistance from visitor center staff	48.3*	41.8*	43.9	X^2: 8.110 p: 0.004 V: 0.061
Assistance from entrance station staff	24.6	22.0	22.8	X^2: 1.793 p: 0.181
Bulletin boards	20.8	19.0	19.6	X^2: 0.972 p: 0.324
Joshua Tree NP website: www.nps.gov/jotr (used before or during visit)	36.2	33.2	34.1	X^2: 1.890 p: 0.169
Park brochure / map	61.1*	54.4*	56.5	X^2: 8.648 p: 0.003
Park newspaper	12.0	11.0	11.3	X^2: 0.507 p: 0.476
Ranger-led programs (walks, talks, etc.)	2.6	2.8	2.8	X^2: 0.100 p: 0.752
Roadside exhibits	33.0*	28.8*	30.1	X^2: 3.900 p: 0.048 V: 0.042
Sales items in visitor center	9.3	7.9	8.3	X^2: 1.079 p: 0.299
Trailside exhibits / signs	33.3	30.7	31.5	X^2: 1.423 p: 0.233
Visitor center exhibits	29.8*	25.0*	26.5	X^2: 5.604 p: 0.018 V: 0.051
Other park publications (plant lists, dog information, camping brochure, etc.)	8.0	7.9	7.9	X^2: 0.006 p: 0.939

[1]Cells are reported as percentages (%) for affirmative (yes) responses. Shading highlights the highest (blue) and lowest (red) percentage per season and overall.
[2]Chi-square test (X^2); p value (p); Cramer's V (V) for significant differences ($p < 0.05$).
*Seasonal difference is significant at $p < 0.05$.

Table 37. Perceived importance and quality of services and facilities used, by season and overall *(General survey Q11c-d)*

For those services and facilities that you or your personal group used, please rate their…		2019 Season[1]			Tests of significance[2]
		Summer	Fall	Total	
Importance	Assistance from visitor center staff	4.09* (0.91)	3.95* (0.94)	4.00	t: 2.268, p: 0.024, d: 0.151
	Assistance from entrance station staff	3.99* (0.89)	3.75* (0.98)	3.83	t: 2.734, p: 0.007, d: 0.257
	Bulletin boards	3.45 (1.03)	3.34 (0.98)	3.38	t: 1.058, p: 0.291
	Joshua Tree NP website: www.nps.gov/jotr (used before or during visit)	4.05 (0.84)	4.03 (0.89)	4.03	t: 0.279, p: 0.780
	Park brochure / map	4.34** (0.83)	4.16** (0.87)	4.22	t: 3.503, p: <0.001, d: 0.213
	Park newspaper	3.79 (1.10)	3.59 (1.14)	3.66	t: 1.339, p: 0.182
	Ranger-led programs (walks, talks, etc.)	4.06 (0.75)	4.34 (0.76)	4.26	t: -1.293, p: 0.201
	Roadside exhibits	3.60 (0.98)	3.48 (0.99)	3.52	t: 1.471, p: 0.142
	Sales items in visitor center	2.87 (1.02)	2.95 (1.05)	2.92	t: -0.503, p: 0.616
	Trailside exhibits / signs	3.88 (0.96)	3.81 (0.91)	3.83	t: 0.932, p: 0.352
	Visitor center exhibits	3.52 (0.91)	3.47 (0.94)	3.49	t: 0.635, p: 0.525
	Other park publications (plant lists, dog information, camping brochure, etc.)	3.80 (0.83)	3.54 (1.01)	3.63	t: 1.713, p: 0.089
Quality	Assistance from visitor center staff	4.60 (0.71)	4.54 (0.72)	4.56	t: 1.163, p: 0.245
	Assistance from entrance station staff	4.73** (0.51)	4.50** (0.72)	4.57	t: 4.105, p: <0.001, d: 0.369
	Bulletin boards	4.06 (0.78)	3.96 (0.79)	4.00	t: 1.267, p: 0.206
	Joshua Tree NP website: www.nps.gov/jotr (used before or during visit)	4.27 (0.76)	4.26 (0.73)	4.26	t: 0.305, p: 0.760
	Park brochure / map	4.37 (0.75)	4.31 (0.82)	4.33	t: 1.256, p: 0.209
	Park newspaper	4.07 (0.72)	4.16 (0.75)	4.13	t: -0.905, p: 0.366
	Ranger-led programs (walks, talks, etc.)	4.75 (0.45)	4.74 (0.44)	4.75	t: 0.049, p: 0.961
	Roadside exhibits	4.05 (0.80)	4.05 (0.83)	4.05	t: -0.061, p: 0.951
	Sales items in visitor center	4.05 (0.74)	4.12 (0.81)	4.10	t: -0.560, p: 0.576
	Trailside exhibits / signs	4.00 (0.89)	3.94 (0.88)	3.96	t: 0.879, p: 0.380
	Visitor center exhibits	4.18 (0.64)	4.22 (0.74)	4.21	t: -0.671, p: 0.503
	Other park publications (plant lists, dog information, camping brochure, etc.)	3.82 (0.82)	3.90 (0.83)	3.87	t: -0.580, p: 0.562

[1]Cells reported as means (M) on a five-point scale, followed by the (standard deviation) for summer and fall:
Importance: Not important (1); Somewhat important (2); Moderately important (3); Very important (4); and Extremely important (5).
Quality: Very poor (1); Poor (2); Average (3); Good (4); and Very good (5).
Shading highlights the highest (blue) and lowest (red) percentage per season and overall.
[2]T test (t); p value (p); Cohen's d (d) for significant differences (p <0.05).
*Seasonal difference is significant at p <0.05; **Seasonal difference is significant at p <0.001

IMPORTANCE-QUALITY ANALYSES

In some cases, we asked visitors to rate the importance of a particular service and the perceived quality of those services. We provide a way of visually presenting this data to facilitate understanding and identifying areas that may require future management action (i.e., services that were rated as highly important but of poor quality). The importance-quality analysis (IQA) grids contain four quadrants, labeled to indicate the recommended management actions for a specific attribute based on visitor ratings of the importance of the attribute and the quality of the attribute. For example, if an attribute is placed in the "low priority" quadrant (low quality, low importance), management should prioritize improving other attributes first such as those found in the "concentrate here" quadrant (high importance, low quality).

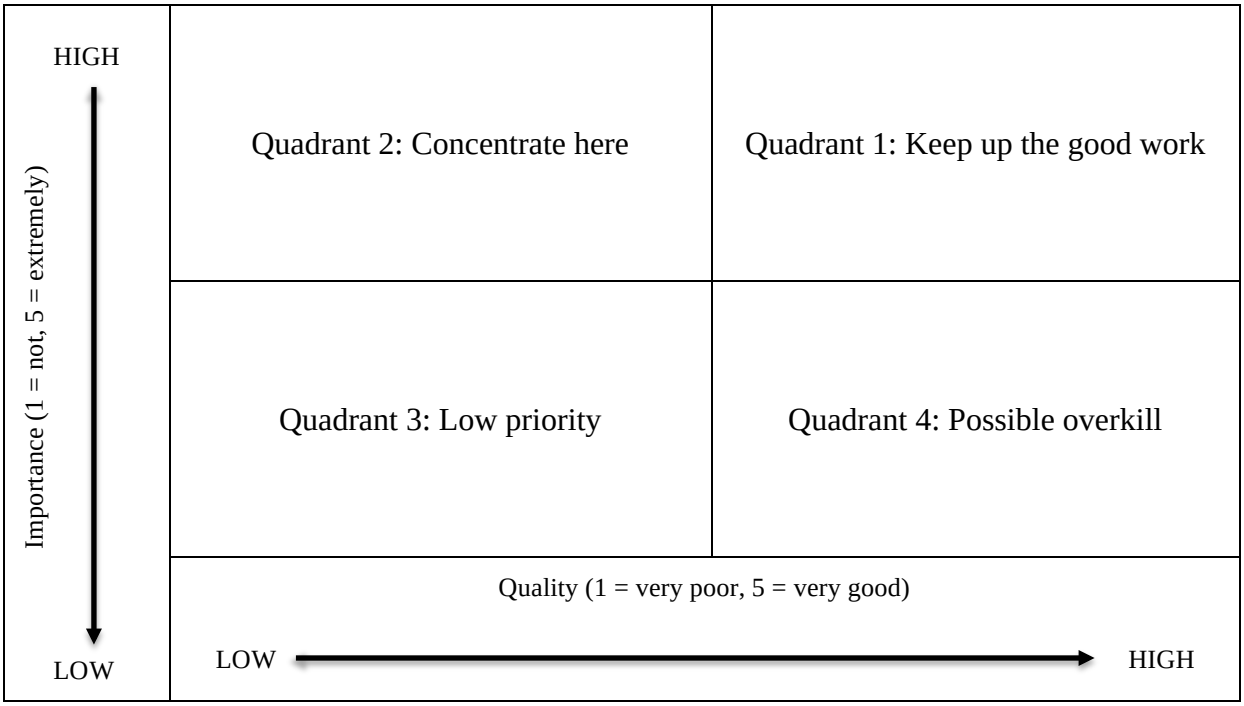
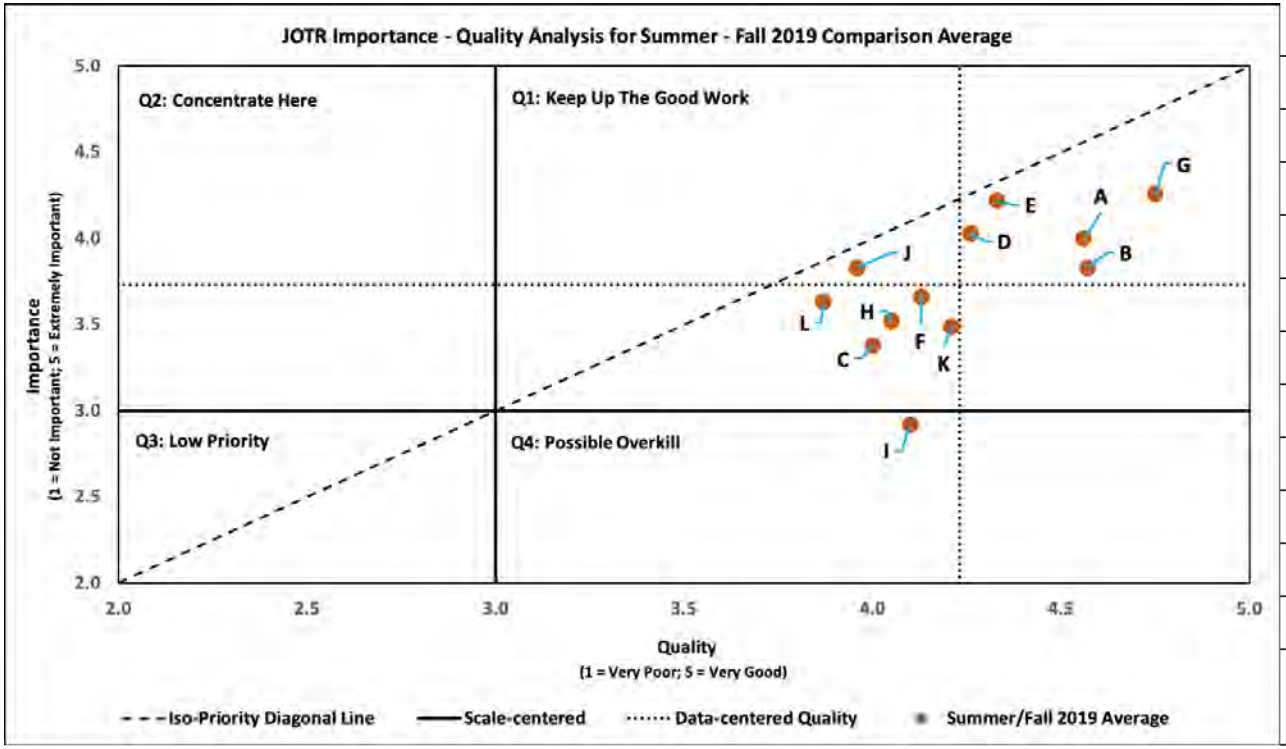


Figure 14. Example importance-quality grid with four quadrants

Three grid lines in the IQAs provide further information for interpreting the data based on a scale-centered, data-centered, or iso-rating line approach, depending on how the means for importance and quality are calculated (Azzopardi & Nash, 2013).

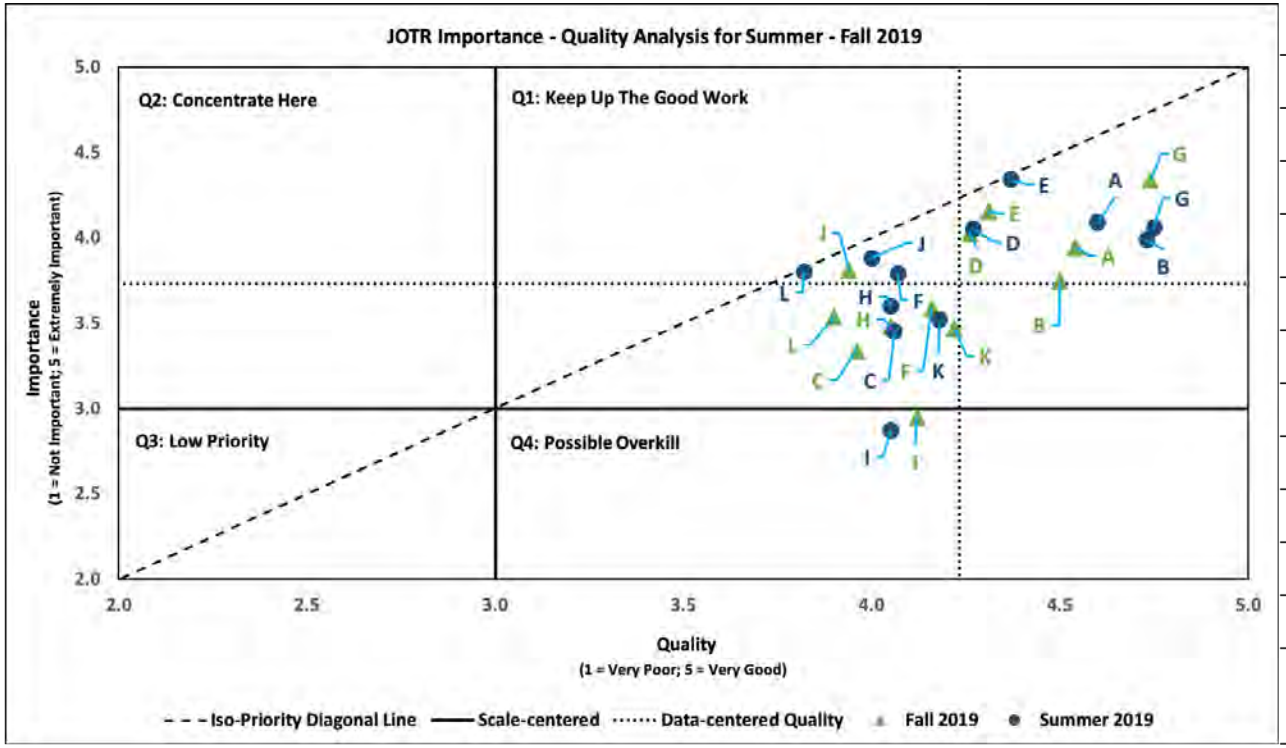
- Scale-centered: Places the mean line at 3, which is the numeric mean of the 1-5 Likert scale typically used for the attribute ratings.
- Data-centered: Places the mean line at the combined attribute ratings for each importance or quality construct (i.e., the total mean of all A – L attribute ratings).
- Iso-rating: Places the mean line diagonally through the origin of the IQA grid, representing where quality and importance are equal.

We present all three lines so that JOTR park managers may consider which approach is best suited to their inquiries about information sources used by visitors. Depending on the method used, it can affect the placement and interpretation of JOTR service and facility attributes. For example, an attribute in the "keep up the good work" quadrant utilizing a scale-centered line could be in a "concentrate here" quadrant when choosing the data-centered method (see attribute J – "Trailside exhibits and signs" in the grids).



Letter	Park services and facilities
A	Assistance from visitor center staff
B	Assistance from entrance station staff
C	Bulletin boards
D	Joshua Tree NP website: www.nps.gov/jotr
E	Park brochure / map
F	Park newspaper
G	Ranger-led programs (walks, talks, etc.)
H	Roadside exhibits
I	Sales items in visitor center
J	Trailside exhibits / signs
K	Visitor center exhibits
L	Other park publications (plant lists, dog information, camping brochure, etc.)

Figure 15. Importance/Quality matrix of the average 2019 responses.



Letter	Park services and facilities
A	Assistance from visitor center staff
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D	Joshua Tree NP website: www.nps.gov/jotr
E	Park brochure / map
F	Park newspaper
G	Ranger-led programs (walks, talks, etc.)
H	Roadside exhibits
I	Sales items in visitor center
J	Trailside exhibits / signs
K	Visitor center exhibits
L	Other park publications (plant lists, dog information, camping brochure, etc.)

Figure 16. Importance/Quality matrix of the summer and fall 2019 responses, depicting shifts in perceptions of importance and/or quality.

CROWDING AND PARK CONDITIONS

Table 38. Changes in visitation because of too many people/crowding, by season and overall. *(Management survey Q4)*

Please indicate if you changed your visitation to Joshua Tree National Park because of too many people/crowding		2019 Season[1]			Tests of significance[2]
		Summer	Fall	Total	
During a previous visit(s)	Chose not to visit the park	4.9*	8.2*	7.2	X^2: 8.153, p: 0.004, V: 0.059
	Changed the times of the day that you visited the park	7.5*	10.8*	9.8	X^2: 6.156, p: 0.013, V: 0.052
	Changed the dates or seasons that you visited the park	6.2**	11.3**	9.7	X^2: 15.024, p: <0.001, V: 0.080
	Chose not to visit your desired places at the park	6.5**	11.4**	9.8	X^2: 13.491, p: <0.001, V: 0.076
	Changed the times of day that you visited places at the park	5.8**	10.3**	8.9	X^2: 12.862, p: <0.001, V: 0.074
	Changed the order of places visited at the park	4.9*	8.1*	7.1	X^2: 7.581, p: 0.006, V: 0.057
	Chose not to participate in your desired activities at the park	4.9	5.7	5.4	X^2: 0.547, p: 0.460
During your current visit	Chose not to visit the park	2.3	3.2	2.9	X^2: 1.475, p: 0.225
	Changed the times of the day that you visited the park	5.2**	9.3**	8.0	X^2: 11.343, p: 0.001, V: 0.069
	Changed the dates or seasons that you visited the park	6.5*	9.5*	8.5	X^2: 5.495, p: 0.019, V: 0.049
	Chose not to visit your desired places at the park	7.2**	12.4**	10.8	X^2: 13.842, p: <0.001, V: 0.077
	Changed the times of day that you visited places at the park	6.9**	11.4**	10.0	X^2: 10.957, p: 0.001, V: 0.068
	Changed the order of places visited at the park	6.9**	13.2**	11.3	X^2: 20.208, p: <0.001, V: 0.092
	Chose not to participate in your desired activities at the park	5.4*	7.9*	7.1	X^2: 4.998, p: 0.025, V: 0.046

[1]Cells are reported as percentages (%) for affirmative (yes) responses. Shading highlights the highest (blue) and lowest (red) percentage per season and overall.
[2]Chi-square test (X^2); p value (p); Cramer's V (V) for significant differences ($p < 0.05$).
*Seasonal difference is significant at $p < 0.05$; **Seasonal difference is significant at $p < 0.001$.

Table 39. Percentage of respondents reporting experiencing potential conditions while visiting the park by season and overall. *(Management survey Q7)*

Park condition	2019 Season[1]			Tests of significance[2]
	Summer	Fall	Overall	
Too few parking spaces at pullouts and overlooks along scenic drives	73.5	73.6	73.5	X^2: 0.001, p: 0.971
Too few parking spaces at trailheads	69.9	70.5	70.3	X^2: 0.062, p: 0.804
Too few restrooms	72.2	73.6	73.2	X^2: 0.305, p: 0.581
Congestion on park roads	68.2	69.1	68.8	X^2: 0.112, p: 0.738
Too little directional signage on park trails	80.7	79.8	80.0	X^2: 0.177, p: 0.674
Confusion about wilderness backpacking rules and regulations	45.5	40.6	41.9	X^2: 3.046, p: 0.081
Confusion about camping rules and regulations	43.8	44.0	43.9	X^2: 0.004, p: 0.950
Not enough ranger-led activities	47.3	47.6	47.5	X^2: 0.013, p: 0.911
Congestion in the visitor centers	62.8	61.3	61.7	X^2: 0.303, p: 0.582
Too little directional signage on the main park roads	78.2	74.9	75.8	X^2: 1.927, p: 0.165
Vandalism (e.g., graffiti, tire tracks, illegal campfire scars)	55.9	57.3	56.9	X^2: 0.262, p: 0.609
Limited information to plan your trip before you enter the park	67.3	66.5	66.7	X^2: 0.089, p: 0.766
Too little signage on wilderness / backcountry trails in the park	53.7	49.6	50.7	X^2: 2.126, p: 0.145
Too few informational signs	74.4	70.7	71.7	X^2: 2.170, p: 0.141
Too few directional signs on trails	72.2	71.6	71.7	X^2: 0.066, p: 0.797
Conflicts with other visitors on park roads or trails	46.7	45.4	45.8	X^2: 0.205, p: 0.650

[1]Cells reported in percentages (%) of affirmative (yes) responses (i.e., all responses except "Did not experience."). Shading highlights the highest (blue) and lowest (red) percentage per season and overall.
[2]Chi-square test (X^2); p value (p).

Table 40. The degree to which different park conditions experienced detracted from the visitor experience by season and overall. *(Management survey Q7)*

Below is a list of possible conditions you may have experienced while visiting Joshua Tree NP. Please indicate how much each potential action detracted from your experience during your current visit to the park.[1]	2019 Season[1]			Tests of significance[2]
	Summer	Fall	Overall	
Too few parking spaces at pullouts and overlooks along scenic drives	1.66 (0.95)	1.73 (1.01)	1.71	t: -1.098, p: 0.273
Too few parking spaces at trailheads	1.73 (1.04)	1.81 (1.10)	1.79	t: -1.169, p: 0.243
Too few restrooms	1.71 (1.02)	1.62 (0.93)	1.64	t: 1.466, p: 0.143
Congestion on park roads	1.64 (0.95)	1.64 (0.95)	1.64	t: -0.130, p: 0.897
Too little directional signage on park trails	1.91 (1.05)	1.87 (0.99)	1.88	t: 0.624, p: 0.533
Confusion about wilderness backpacking rules and regulations	1.55 (0.95)	1.42 (0.84)	1.46	t: 1.627, p: 0.105
Confusion about camping rules and regulations	1.51 (0.94)	1.37 (0.79)	1.41	t: 1.758, p: 0.080
Not enough ranger-led activities	1.39 (0.80)	1.41 (0.83)	1.40	t: -0.225, p: 0.822
Congestion in the visitor centers	1.44 (0.74)	1.54 (0.87)	1.51	t: -1.734, p: 0.083
Too little directional signage on the main park roads	1.68 (0.95)	1.63 (0.86)	1.64	t: 0.944, p: 0.346
Vandalism (e.g., graffiti, tire tracks, illegal campfire scars)	1.84 (1.10)	1.85 (1.07)	1.85	t: -0.102, p: 0.918
Limited information to plan your trip before you enter the park	1.63 (0.89)	1.61 (0.90)	1.61	t: 0.315, p: 0.753
Too little signage on wilderness / backcountry trails in the park	1.59 (0.94)	1.62 (0.96)	1.61	t: -0.400, p: 0.689
Too few informational signs	1.71 (0.89)	1.62 (0.86)	1.65	t: 1.475, p: 0.141
Too few directional signs on trails	1.81 (0.98)	1.78 (0.98)	1.79	t: 0.368, p: 0.713
Conflicts with other visitors on park roads or trails	1.44 (0.90)	1.39 (0.80)	1.40	t: 0.810, p: 0.418

[1]Cells reported as means (M) on a 5-point scale, followed by (standard deviation) for summer and fall:
Didn't detract at all (1), Slightly detracted (2), Moderately detracted (3), Seriously detracted (4), Very seriously detracted (5). Shading highlights the highest (blue) and lowest (red) means per season and overall.
[2]T test (t); p value (p).

MANAGEMENT ACTIONS

Table 41. Support for potential park access, transportation, and car camping future management actions at the park, by season and overall. *(Management survey Q6a, Q6b, and Q6c).*

Please indicate your level of opposition or support for the following park access, transportation, and car camping potential future management actions at Joshua Tree NP.	2019 Season[1]			Tests of significance[2]
	Summer	Fall	Total	
Implement reservation system to enter the park	2.87 (1.78)	2.88 (1.82)	2.88	t: -0.101 p: 0.920
Add parking spaces at major attractions	4.27 (1.76)	4.22 (1.77)	4.23	t: 0.610 p: 0.542
Add additional traffic lanes at park entrances	3.96 (1.79)	3.93 (1.77)	3.94	t: 0.260 p: 0.795
Increase entry fees to enhance visitor experiences	3.23 (1.71)	3.14 (1.73)	3.17	t: 0.906 p: 0.365
Temporarily close specific roads and parking areas based on congestion (e.g., Keys View, road to Barker Dam)	3.83 (1.61)	3.85 (1.68)	3.85	t: -0.261 p: 0.794
Require riding shuttle buses within the park on the park's busiest days (e.g., weekends, holidays, spring break)	3.91 (1.98)	4.00 (2.04)	3.98	t: -0.859 p: 0.390
Develop paved access to more popular locations and attractions	3.32 (1.87)	3.15 (1.84)	3.19	t: 1.716 p: 0.086
Implement a parking reservation or parking permit system	3.12 (1.59)	3.03 (1.60)	3.06	t: 0.938 p: 0.348
Decrease the number of nights that visitors can stay at developed campgrounds	3.46 (1.54)	3.52 (1.60)	3.51	t: -0.624 p: 0.533
Develop more campsites in existing campgrounds like Hidden Valley	4.54 (1.60)	4.51 (1.70)	4.51	t: 0.315 p: 0.753
Use online park communications to inform visitors about the availability and characteristics of sites in developed campgrounds	5.86 (1.16)	5.84 (1.16)	5.84	t: 0.311 p: 0.756

[1]Cells reported as means (M) on a seven-point scale, followed by the (standard deviation) for summer and fall: Strongly oppose (1), Oppose (2), Somewhat oppose (3), Neither Oppose nor Support (4), Somewhat support (5), Support (6), and Strongly support (7). Responses of "I don't know / need more information" were excluded from this analysis. Shading highlights the highest (blue) and lowest (red) means per season and overall.
[2]T test (t); p value (p).

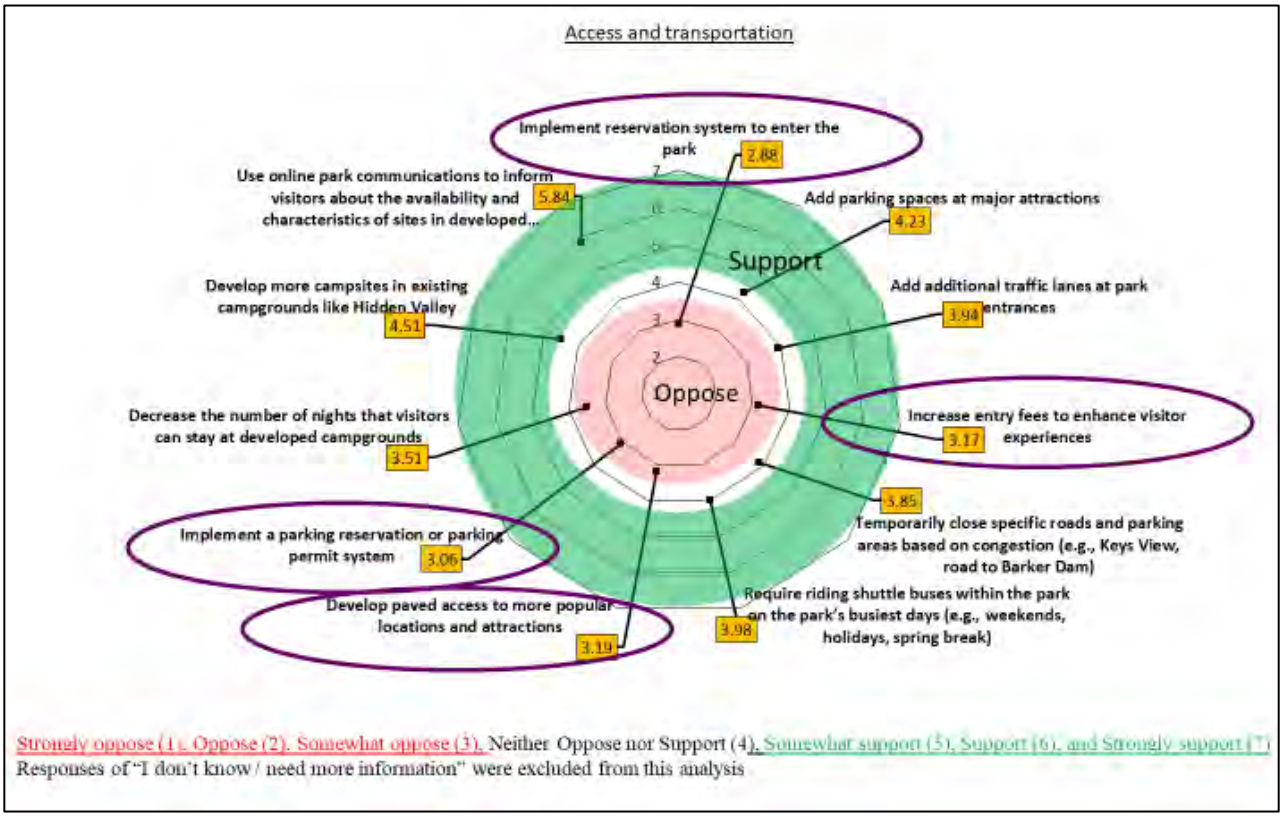


Figure 17. Support for potential park access, transportation, and car camping future management actions at the park, by season and overall. *(Management survey Q6a, Q6b, and Q6c)*.

Table 42. Support for potential trails and wilderness backpacking future management actions at the park, by season and overall. *(Management survey Q6a, Q6b, and Q6c)*

Please indicate your level of opposition or support for the following trails and wilderness backpacking potential future management actions at Joshua Tree NP.	2019 Season[1]			Tests of significance[2]
	Summer	Fall	Total	
Reduce the number of trails in the park to provide better conditions on fewer trails	2.84 (1.44)	2.81 (1.46)	2.82	t: 0.285 p: 0.776
Develop new trails in the southern half of the park	5.23 (1.32)	5.23 (1.32)	5.23	t: 0.055 p: 0.956
Provide more information about trails to help visitors find trails that match their preferences for length and things they can see and enjoy	5.92 (1.05)	5.88 (1.07)	5.89	t: 0.639 p: 0.523
Expand and develop new trailhead parking lots for existing trails	4.67 (1.57)	4.70 (1.49)	4.69	t: -0.344 p: 0.731
Implement a wilderness backpacking reservation system	4.58 (1.56)	4.53 (1.59)	4.54	t: 0.544 p: 0.586
Establish designated and assigned wilderness camping sites	4.80 (1.55)	4.71 (1.53)	4.73	t: 1.126 p: 0.260
Introduce fees for overnight backpacking to support wilderness services	4.66 (1.67)	4.61 (1.66)	4.62	t: 0.578 p: 0.564
Require mandatory wilderness backpacking orientation to receive a wilderness backpacking permit	4.56 (1.76)	4.55 (1.76)	4.56	t: 0.050 p: 0.960
Require visitors to pack out human waste when using the backcountry	5.24 (1.68)	5.28 (1.74)	5.27	t: -0.377 p: 0.706

[1]Cells reported as means (M) on a seven-point scale, followed by the (standard deviation) for summer and fall: Strongly oppose (1), Oppose (2), Somewhat oppose (3), Neither Oppose nor Support (4), Somewhat support (5), Support (6), and Strongly support (7). Responses of "I don't know / need more information" were excluded from this analysis. Shading highlights the highest (blue) and lowest (red) means per season and overall.
[2]T test (t); p value (p).

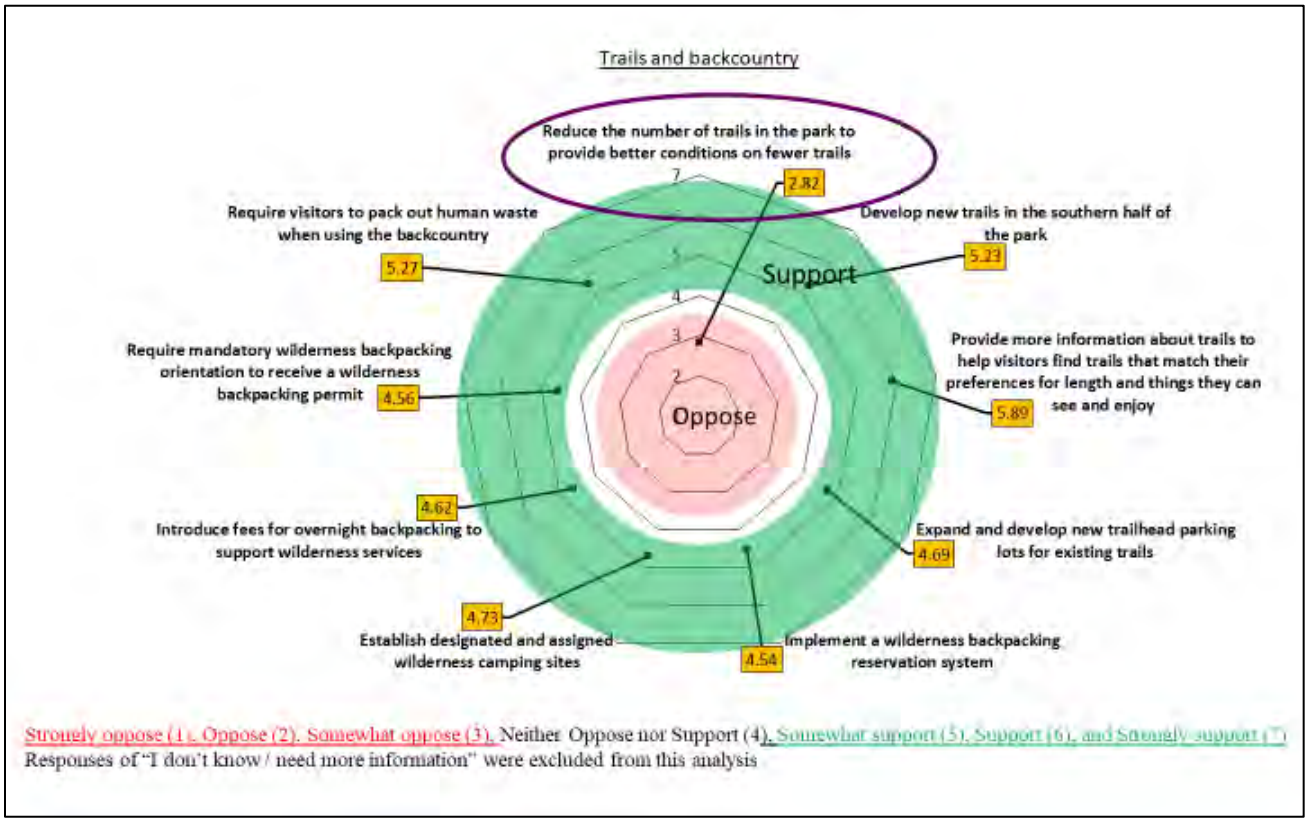


Figure 18. Support for potential trails and wilderness backpacking future management actions at the park, by season and overall. *(Management survey Q6a, Q6b, and Q6c)*

Table 43. Support for potential rock climbing and bouldering future management actions at the park, by season and overall. *(Management survey Q6a, Q6b, and Q6c)*

Please indicate your level of opposition or support for the following rock climbing and bouldering potential future management actions at Joshua Tree NP.	2019 Season[1]			Tests of significance[2]
	Summer	Fall	Total	
Limit the addition of new fixed anchors / bolts in wilderness areas	4.77 (1.52)	4.69 (1.63)	4.71	t: 0.888 p: 0.375
Remove illegally installed (unpermitted) bolts from wilderness areas	5.40 (1.50)	5.29 (1.60)	5.32	t: 1.185 p: 0.236
Require visitors to pack out human waste when using popular climbing areas	5.72 (1.37)	5.74 (1.38)	5.73	t: -0.303 p: 0.762
Close climbing routes / staging areas with sensitive cultural or natural resources	5.54 (1.40)	5.54 (1.43)	5.54	t: 0.065 p: 0.948
Provide signs and directions to all climbing rock formations	5.00* (1.46)	4.81* (1.53)	4.86	t: 2.276 p: 0.023 d: 0.127
Require time-specific permits for climbing on popular routes and walls	4.26 (1.72)	4.10 (1.70)	4.14	t: 1.567 p: 0.117
Require location-specific permits for climbing on popular routes and walls	4.22 (1.71)	4.13 (1.72)	4.15	t: 0.839 p: 0.402
Require location-specific permits for popular bouldering areas	3.97 (1.74)	3.99 (1.76)	3.98	t: -0.158 p: 0.875
Require visitors to pack out human waste when using popular bouldering areas	5.59 (1.43)	5.65 (1.45)	5.63	t: -0.661 p: 0.509
Close bouldering routes / staging areas with sensitive cultural or natural resources	5.33 (1.48)	5.36 (1.50)	5.35	t: -0.305 p: 0.760
Improve signs and directions to all bouldering formations	5.12* (1.47)	4.94* (1.50)	4.99	t: 2.055 p: 0.040 d: 0.121
Require time-specific permits for popular bouldering areas	3.99 (1.75)	3.91 (1.71)	3.93	t: 0.792 p: 0.429
Identify designated crash pad areas free from vegetation and sensitive soil	5.63* (1.22)	5.46* (1.30)	5.51	t: 2.250 p: 0.025 d: 0.135

[1]Cells reported as means (M) on a seven-point scale, followed by the (standard deviation) for summer and fall: Strongly oppose (1), Oppose (2), Somewhat oppose (3), Neither Oppose nor Support (4), Somewhat support (5), Support (6), and Strongly support (7). Responses of "I don't know / need more information" were excluded from this analysis. Shading highlights the highest (blue) and lowest (red) means per season and overall.
[2]T test (t); p value (p); Cohen's d (d) for significant differences ($p < 0.05$).
*Seasonal difference is significant at $p < 0.05$.

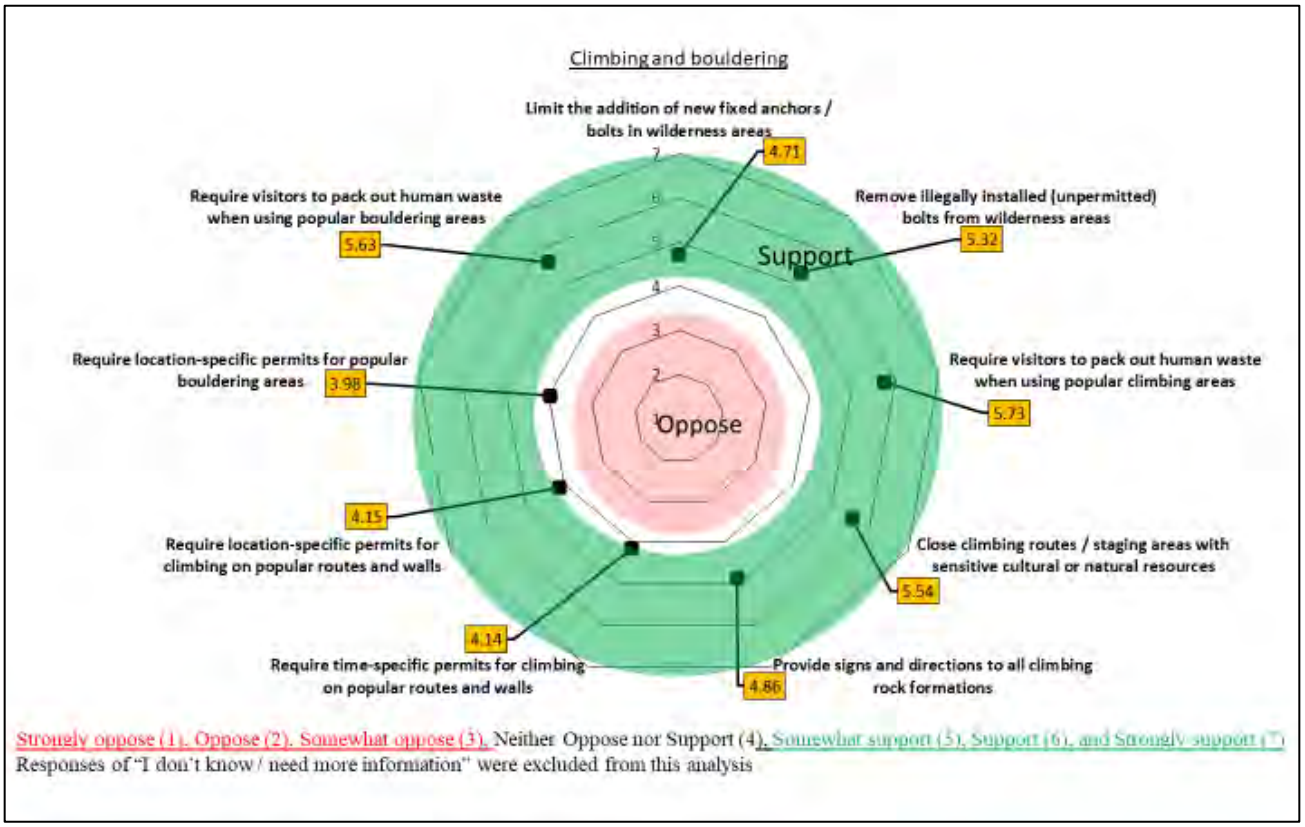


Figure 19. Support for potential rock climbing and bouldering future management actions at the park, by season and overall. *(Management survey Q6a, Q6b, and Q6c)*

Table 44. Most supported potential future management actions at the park, by season and overall. *(Management survey Q6d)*

Please identify the management action that you most support.		2019 Season[1]		
		Summer	Fall	Total
Park access, transportation, and car camping	Implement reservation system to enter the park	0.3	1.3	1.0
	Add parking spaces at major attractions	5.8	6.0	6.0
	Add additional traffic lanes at park entrances	4.9	3.2	3.6
	Increase entry fees to enhance visitor experiences	2.9	2.6	2.7
	Temporarily close specific roads and parking areas based on congestion (e.g., Keys View, road to Barker Dam)	1.2	1.8	1.6
	Require riding shuttle buses within the park on the park's busiest days (e.g., weekends, holidays, spring break)	6.6	11.5	10.2
	Develop paved access to more popular locations and attractions	2.9	2.2	2.4
	Implement a parking reservation or parking permit system	0.0	0.0	0.0
	Decrease the number of nights that visitors can stay at developed campgrounds	1.4	2.0	1.9
	Develop more campsites in existing campgrounds like Hidden Valley	5.2	5.7	5.6
	Use online park communications to inform visitors about the availability and characteristics of sites in developed campgrounds	16.7	12.3	13.5
Trails and wilderness backpacking	Reduce the number of trails in the park to provide better conditions on fewer trails	0.0	0.3	0.2
	Develop new trails in the southern half of the park	6.6	9.5	8.8
	Provide more information about trails to help visitors find trails that match their preferences for length and things they can see and enjoy	16.1	13.8	14.4
	Expand and develop new trailhead parking lots for existing trails	1.4	1.6	1.5
	Implement a wilderness backpacking reservation system	1.2	0.5	0.7
	Establish designated and assigned wilderness camping sites	2.0	2.0	2.0
	Introduce fees for overnight backpacking to support wilderness services	0.6	1.1	0.9
	Require mandatory wilderness backpacking orientation to receive a wilderness backpacking permit	1.7	1.5	1.5
	Require visitors to pack out human waste when using the backcountry	7.5	6.0	6.4
Rock climbing and bouldering	Limit the addition of new fixed anchors / bolts in wilderness areas	0.9	1.5	1.3
	Remove illegally installed (unpermitted) bolts from wilderness areas	1.2	2.2	1.9
	Require visitors to pack out human waste when using popular climbing areas	1.7	3.2	2.8
	Close climbing routes / staging areas with sensitive cultural or natural resources	2.9	2.2	2.4
	Provide signs and directions to all climbing rock formations	0.9	0.5	0.6
	Require time-specific permits for climbing on popular routes and walls	0.0	0.0	0.0
	Require location-specific permits for climbing on popular routes and walls	0.0	0.0	0.0
	Require location-specific permits for popular bouldering areas	0.0	0.0	0.0
	Require visitors to pack out human waste when using popular bouldering areas	2.6	1.7	1.9
	Close bouldering routes / staging areas with sensitive cultural or natural resources	2.3	1.6	1.8
	Improve signs and directions to all bouldering formations	2.3	1.9	2.0
	Require time-specific permits for popular bouldering areas	0.0	0.0	0.0
	Identify designated crash pad areas free from vegetation and sensitive soil	0.3	0.1	0.2

[1]Cells reported as percentages (%) of affirmative (yes) responses. $X^2 = 33.130$; $p = 0.193$. Shading highlights the most supported management action per category per season and overall.

Table 45. Most opposed potential future management actions at the park, by season and overall. *(Management survey Q6f)*

Please identify the management action that you most oppose.		2019 Season[1]		
		Summer	Fall	Total
Park access, transportation, and car camping	Implement reservation system to enter the park	25.3	26.4	26.1
	Add parking spaces at major attractions	1.9	3.3	2.9
	Add additional traffic lanes at park entrances	3.0	3.2	3.1
	Increase entry fees to enhance visitor experiences	14.0	13.3	13.5
	Temporarily close specific roads and parking areas based on congestion (e.g., Keys View, road to Barker Dam)	1.9	2.0	1.9
	Require riding shuttle buses within the park on the park's busiest days (e.g., weekends, holidays, spring break)	11.3	9.1	9.7
	Develop paved access to more popular locations and attractions	11.3	12.1	11.9
	Implement a parking reservation or parking permit system	5.9	3.8	4.3
	Decrease the number of nights that visitors can stay at developed campgrounds	3.0	2.3	2.5
	Develop more campsites in existing campgrounds like Hidden Valley	1.9	2.3	2.2
	Use online park communications to inform visitors about the availability and characteristics of sites in developed campgrounds	0.0	0.0	0.0
Trails and wilderness backpacking	Reduce the number of trails in the park to provide better conditions on fewer trails	10.8	9.2	9.6
	Develop new trails in the southern half of the park	0.3	1.8	1.4
	Provide more information about trails to help visitors find trails that match their preferences for length and things they can see and enjoy	0.3	0.3	0.3
	Expand and develop new trailhead parking lots for existing trails	1.3	0.8	1.0
	Implement a wilderness backpacking reservation system	0.5	0.5	0.5
	Establish designated and assigned wilderness camping sites	0.0	0.5	0.3
	Introduce fees for overnight backpacking to support wilderness services	1.1	0.8	0.8
	Require mandatory wilderness backpacking orientation to receive a wilderness backpacking permit	0.5	0.5	0.5
	Require visitors to pack out human waste when using the backcountry	0.5	0.8	0.7
Rock climbing and bouldering	Limit the addition of new fixed anchors / bolts in wilderness areas	0.3	0.6	0.5
	Remove illegally installed (unpermitted) bolts from wilderness areas	0.0	0.3	0.2
	Require visitors to pack out human waste when using popular climbing areas	0.0	0.5	0.3
	Close climbing routes / staging areas with sensitive cultural or natural resources	0.5	0.3	0.3
	Provide signs and directions to all climbing rock formations	0.0	0.5	0.3
	Require time-specific permits for climbing on popular routes and walls	1.9	2.4	2.3
	Require location-specific permits for climbing on popular routes and walls	0.5	0.9	0.8
	Require location-specific permits for popular bouldering areas	1.1	0.6	0.7
	Require visitors to pack out human waste when using popular bouldering areas	0.0	0.2	0.1
	Close bouldering routes / staging areas with sensitive cultural or natural resources	0.5	0.2	0.3
	Improve signs and directions to all bouldering formations	0.0	0.0	0.0
	Require time-specific permits for popular bouldering areas	0.3	0.8	0.7
	Identify designated crash pad areas free from vegetation and sensitive soil	0.0	0.0	0.0

[1]Cells reported as percentages (%) of affirmative (yes) responses. $X^2 = 32.880$; $p = 0.283$. Shading highlights the most opposed management action per category per season and overall.

Table 46. Visitor use management matrix for considering the three most supported potential management actions by season and overall. *(Management survey Q6e and Q6g)*

Managers at Joshua Tree NP and elsewhere consider four broad categories when examining visitor use management issues. Please provide a rating to each of these four categories for the action you most support.			2019 Season[1]			Tests of significance[2]
			Summer	Fall	Total	
Park access, transportation, and car camping	Use online park communications to inform visitors about the availability and characteristics of sites in developed campgrounds	Issue uncertainty: What do you feel is the level of uncertainty regarding the facts pertaining to this action?	1.49 (0.60)	1.48 (0.60)	1.48	t: 0.104 p: 0.917
		Impact risk: What do you feel is the level of threat to the park's natural and cultural resources and visitor experiences in this action?	1.73 (0.87)	1.68 (0.85)	1.70	t: 0.323 p: 0.747
		Stakeholder involvement: What do you feel is the level of public / stakeholder interest in this action?	2.21 (0.80)	2.15 (0.80)	2.17	t: 0.382 p: 0.703
		Controversy / Potential for litigation: What do you feel is the level of controversy and potential for legal action regarding this action?	1.30 (0.55)	1.25 (0.46)	1.27	t: 0.639 p: 0.524
Trails and wilderness backpacking	Provide more information about trails to help visitors find trails that match their preferences for length and things they can see and enjoy	Issue uncertainty: What do you feel is the level of uncertainty regarding the facts pertaining to this action?	1.73 (0.72)	1.73 (0.73)	1.73	t: 0.000 p: 1.000
		Impact risk: What do you feel is the level of threat to the park's natural and cultural resources and visitor experiences in this action?	1.66* (0.89)	2.02* (0.86)	1.91	t: -2.309 p: 0.022 d: 0.412
		Stakeholder involvement: What do you feel is the level of public / stakeholder interest in this action?	2.48* (0.63)	2.15* (0.74)	2.24	t: 2.511 p: 0.013 d: 0.479
		Controversy / Potential for litigation: What do you feel is the level of controversy and potential for legal action regarding this action?	1.39 (0.62)	1.42 (0.59)	1.41	t: -0.349 p: 0.728
Rock climbing and bouldering	Require visitors to pack out human waste when using popular climbing areas	Issue uncertainty: What do you feel is the level of uncertainty regarding the facts pertaining to this action?	1.50 (0.71)	1.48 (0.60)	1.48	t: 0.053 p: 0.958
		Impact risk: What do you feel is the level of threat to the park's natural and cultural resources and visitor experiences in this action?	2.17 (0.75)	2.19 (0.69)	2.19	t: -0.080 p: 0.936
		Stakeholder involvement: What do you feel is the level of public / stakeholder interest in this action?	2.33 (1.16)	2.26 (0.54)	2.27	t: 0.107 p: 0.924
		Controversy / Potential for litigation: What do you feel is the level of controversy and potential for legal action regarding this action?	1.25 (0.50)	1.57 (0.68)	1.52	t: -0.898 p: 0.378

[1]Cells reported as means (M) on a 3-point scale, followed by the (standard deviation) for summer and fall: Low (1), Medium (2), or High (3). Shading highlights the highest (blue) and lowest (red) means per category per season and overall.
[2]T test (t); p value (p); Cohen's d (d) for significant differences ($p < 0.05$).

Table 47. Visitor use management matrix for considering the three most opposed potential management actions by season and overall. *(Management survey Q6e and Q6g)*

Managers at Joshua Tree NP and elsewhere consider four broad categories when examining visitor use management issues. Please provide a rating to each of these four categories for the action you most oppose.			2019 Season[1]			Tests of significance[2]
			Summer	Fall	Total	
Park access, transportation, and car camping	Implement reservation system to enter the park	Issue uncertainty: What do you feel is the level of uncertainty regarding the facts pertaining to this action?	1.92 (0.88)	2.03 (0.78)	2.01	t: -0.912 p: 0.364
		Impact risk: What do you feel is the level of threat to the park's natural and cultural resources and visitor experiences in this action?	2.12 (0.81)	2.11 (0.89)	2.11	t: 0.051 p: 0.960
		Stakeholder involvement: What do you feel is the level of public / stakeholder interest in this action?	2.43 (0.79)	2.45 (0.71)	2.45	t: -0.222 p: 0.825
		Controversy / Potential for litigation: What do you feel is the level of controversy and potential for legal action regarding this action?	2.10 (0.84)	2.06 (0.81)	2.07	t: 0.275 p: 0.783
Trails and wilderness backpacking	Reduce the number of trails in the park to provide better conditions on fewer trails	Issue uncertainty: What do you feel is the level of uncertainty regarding the facts pertaining to this action?	1.63 (0.72)	1.78 (0.67)	1.74	t: -0.997 p: 0.321
		Impact risk: What do you feel is the level of threat to the park's natural and cultural resources and visitor experiences in this action?	1.92 (0.83)	1.99 (0.80)	1.96	t: -0.420 p: 0.676
		Stakeholder involvement: What do you feel is the level of public / stakeholder interest in this action?	2.33 (0.59)	2.19 (0.59)	2.24	t: 1.177 p: 0.242
		Controversy / Potential for litigation: What do you feel is the level of controversy and potential for legal action regarding this action?	1.67 (0.68)	1.69 (0.73)	1.69	t: -0.192 p: 0.848
Rock climbing and bouldering	Require time-specific permits for climbing on popular routes and walls	Issue uncertainty: What do you feel is the level of uncertainty regarding the facts pertaining to this action?	2.17 (0.75)	2.45 (0.67)	2.39	t: -0.909 p: 0.372
		Impact risk: What do you feel is the level of threat to the park's natural and cultural resources and visitor experiences in this action?	2.50 (0.55)	2.14 (0.79)	2.22	t: 1.028 p: 0.314
		Stakeholder involvement: What do you feel is the level of public / stakeholder interest in this action?	2.67 (0.52)	2.27 (0.88)	2.36	t: 1.394 p: 0.185
		Controversy / Potential for litigation: What do you feel is the level of controversy and potential for legal action regarding this action?	1.40 (0.55)	1.91 (0.87)	1.81	t: -1.245 p: 0.225

[1]Cells reported as means (M) on a 3-point scale, followed by the (standard deviation) for summer and fall: Low (1), Medium (2), or High (3). Shading highlights the highest (blue) and lowest (red) means per category per season and overall.
[2]T test (t); p value (p).

2019 Activity Group Comparisons

Visitors in 2019 were grouped by which activity they noted as their primary activity (derived from General survey Q5b, Management survey Q3b) while in the park. We grouped visitors based on "primary" activity rather than participation in any activity (General survey Q5a, Management survey Q3a) to ensure that each visitor was only represented in one group, and that the group we placed them in was one that encompassed what they had selected as their primary recreation activity in the park during their visit.

Altogether, 89.0% of visitors across the two sample periods in 2019 noted a daytime activity as their ***primary activity***, with the other 11.0% specifically noting a nighttime/overnight activity as their primary activity. We categorized those who noted a ***primary*** daytime activity into three main categories: general (i.e., "daytime") (78.1%), climbing/bouldering (6.5%), park facility/staff interaction (2.1%), and other (2.3%). For the purposes of this comparison, we have presented four categories for consideration: daytime, climbing/bouldering, facilities/staff, and overnight. "Other" activities were omitted from this comparison, as they are not a visitor segment that can be managed for in particular.

Key findings

The following are key findings from this comparison among user groups. As total patterns mirror the total patterns presented in the 2019 total data, these key findings focus on the user group differences rather than overall visitor patterns.

<u>Information and Awareness</u>

Similar percentages of respondents in each user group obtained information prior to this visit (71.6-75.0%) and found the information that they were seeking (94.4-97.1%). Sources of information consulted prior to the park visit were generally similar across user groups, and prioritized the JOTR website as the most frequently used information source (64.2%). The "other" information sources utilized were mainly related to climbing and hiking guides and maps. Beyond the park website and "other" information sources, a few distinctions to note:

- Daytime users consulted websites like Trip Advisor, Hotels.com, and Expedia more frequently than did overnight users. They also consulted local businesses more frequently, though percentages were low for all user groups.
- Climbers/boulderers used highway signs less frequently than did daytime or overnight visitors. They were also the least likely to consult welcome centers, visitors bureaus, or chambers of commerce, though percentages were low for all user groups.
- Overnight visitors relied more on the information they obtained in past visits than daytime or climbing/bouldering user groups. They also relied more on information from school class/programs or TV/radio/DVDs, though the percentages were low for all user groups.

Sources of information preferred for future visits were also generally similar across user groups, again with the JOTR website being the most preferred information source. Two areas of user group distinctions are noteworthy. First, climbers/boulderers would rely less on information from their friends/relatives than other user groups. Second, overnight visitors would rely more on both highway signs and previous visits than would daytime or climbing/bouldering user groups, though less than 15% of overnight visitors would rely on either source.

In the park, climbers/boulderers ***(primary activity)*** again were a different user group than the others in terms of the information used. Significantly fewer climbers and boulderers used information services/facilities during their park visit (43.3%) than the other user groups (60.1-72.7%). Climbers/boulderers were particularly less likely to use assistance from visitor center staff, the JOTR website, roadside exhibits, or visitor center exhibits than the other user groups. Across groups, the park brochure/map was the most frequently used (56.6%).

Management Actions

For potential park access, transportation, and car camping management actions, most actions were opposed across user groups (i.e., 8/11 actions were rated in some category of "oppose"). Climbers/boulders consistently had the strongest opposition among the user groups, and this was significantly stronger opposition for a reservation system to enter the park, development of paved access to more popular locations and attractions, a parking reservation or permit system, and decreasing the number of nights allowed in developed campgrounds. Overnight users are most supportive of developing more campsites in existing campgrounds.

For trails and wilderness backpacking potential management actions, almost all were supported across user groups (8/9 actions). While they were generally supportive, climbers/boulderers expressed lower levels of support than the other groups, and particularly lower on actions of providing more information about trails, expanding/developing trailhead parking for existing trails, and requiring a wilderness backpacking orientation.

For rock climbing and bouldering potential management actions, almost all were supported across user groups (11/13 actions). However, climbers/boulderers expressed lower levels of support for each potential action than did the other user groups, and were the only group to express opposition to specific actions. This difference in support between climbers/boulderers and the other groups was significant for both limiting new anchors/bolts and removing unpermitted bolts in wilderness, providing signs and directions to climbing or bouldering formations, requiring both time-specific or location-specific climbing permits, requiring time-specific bouldering permits, and designating crash pad areas.

Across the three categories of potential management actions, the most opposed by all activity groups were: Reservation system to enter the park, reducing the number of park trails, and requiring time-specific climbing permits. There were some differences in the most supported actions by user group and the percentages of opposition to particular potential actions, as follows:

- Daytime users most supported: Online park information about campgrounds, more trail information for visitor preferences, and closing climbing areas with sensitive resources. Compared to other user groups, daytime users were significantly more likely to identify their most supported management action as providing more trail information for visitor preferences or closing climbing areas with sensitive resources. Also, compared to other user groups, daytime users were significantly more likely to identify their most opposed management action as increasing entry fees or decreasing the allowed number of nights in developed campgrounds.
- Climbers/boulderers most supported: Riding in-park shuttle buses on busiest days, developing new trails in the southern part of the park, and requiring climbers to pack out human waste. Compared to other user groups, climbers/boulderers were significantly more likely to identify their most supported management action as adding traffic lanes at park entrances and closing climbing routes with sensitive resources. Also, compared to other user groups, climbers/boulderers were significantly more likely to identify their most opposed management action as requiring time-specific or location-specific climbing permits.

- Overnight users most supported: Online park information about campgrounds, more trail information for visitor preferences, and a few of the climbing/bouldering actions. Compared to other user groups, overnight users were significantly more likely to identify their most supported management action as developing more campsites in existing campgrounds. Also, compared to other user groups, overnight users were significantly more likely to identify their most opposed management action as decreasing the allowed number of nights in developed campgrounds or establishing designated and assigned wilderness camping sites.
- Facilities/staff users most supported: Online park information to enter the park, developing new trails in the southern part of the park, and requiring climbers to pack out human waste. Compared to other user groups, facilities/staff users were significantly more likely to identify their most opposed management action as establishing designated and assigned wilderness camping sites.

All four user groups rated the issue uncertainty, impact risk, stakeholder involvement, and controversy/potential for litigation similarly for the most supported potential management action in each of the three areas (park access, trails and wilderness, and climbing/bouldering), and generally rated stakeholder involvement/interest as the highest and controversy/potential for litigation as the lowest for each of the three. Again, all user groups similarly rated these four categories for management issues for the most opposed potential management action in each of the three areas, though the highest and lowest rated categories of the four varied inconsistently among user groups.

ACTIVITIES

Table 48. User group categories based on ***primary activity*** participated in at the park on this visit. *(derived from General survey Q5b, Management survey Q3b)*

User group categories, with categories of primary activity included in each	2019 Total[1]
Daytime activities	78.1
--Day hiking	25.0
--Sightseeing	17.5
--Enjoyed nature	11.7
--Photography / videos	6.0
--Walking self-guided nature trails (with brochures/signs)	5.3
--Viewed plants and/or wildlife	3.3
--Rock scrambling (without specialized gear or skills)	3.2
--Family / friend gathering or celebration	2.9
--Exercised to promote physical fitness	0.8
--Trail running	0.4
--Bicycling	0.5
--Visited historical or archaeological sites	0.2
--Picnicking	0.3
--"Other" – daytime activities-related	1.0
Climbing/Bouldering	6.5
--Technical climbing (with specialized gear or skills)	4.8
--Bouldering (using pads and bouldering guides)	1.7
--"Other" – climbing/bouldering-related	0.0
Overnight activities	11.0
--Camping	8.2
--Stargazing / viewing night sky	1.5
--Backpacking overnight	1.3
--"Other" – Overnight activities-related	<0.1
Park facility/staff interaction	2.1
--Attended field classes or other guided activities	0.4
--Attended ranger-led programs	0.3
--"Other" – park facility/staff interaction-related	1.4
Other activities[2]	2.3
--Seeking spiritual connections	1.4
--Created content for social media / blogs	0.1
--Slacklining	0.0
--Horseback riding	0.0
--"Other " – not related to any other user group category	0.8

[1]Cells are reported as percentages (%) for affirmative (yes) responses.

[2]Other activities, including the write-ins provided for "Other" that could not be meaningfully re-categorized into one of the other main user group categories, have been excluded from subsequent comparisons/analyses, as this is not a group that can be distinctly communicated to nor managed for.

INFORMATION AND AWARENESS

Table 49. Whether visitors obtained necessary information before or during their visit to the park, by user group. *(General survey Q10a-b and Q11)*

Information question	User group[1]					Tests of significance[2]
	Daytime	Climb/ Boulder	Overnight	Facilities/ Staff	Total	
Prior to this visit, did you and your personal group obtain information about the park?	72.3	71.6	73.6	75.0	72.5	X^2: 0.366 p: 0.947
From the sources used prior to this visit, did you and your personal group obtain the type of information about the park that you needed?	94.6	94.4	96.2	97.1	94.9	X^2: 1.369 p: 0.713
Did you or your personal group use any information services or facilities during this visit to Joshua Tree NP?	62.3	43.3	60.1	72.7	61.0	X^2: 21.502 p: <0.001 V: 0.103

[1]Cells are reported as percentages (%) for affirmative (yes) responses. [2]Chi-square test (X^2); p value (p); Cramer's V (V) for significant differences ($p < 0.05$).

Table 50. Sources of information used for this park visit, by user group. *(General survey Q10b)*

Prior to this visit, how did you and your personal group obtain information about the park?	User group[1]					Tests of significance[2]
	Daytime	Climb/ Boulder	Overnight	Facilities/ Staff	Total	
Joshua Tree NP website: www.nps.gov/jotr	64.1	57.7	68.7	64.4	64.2	X^2: 4.726, p: 0.193
Social media – Any	18.1	15.5	23.0	17.8	18.5	X^2: 4.202, p: 0.240
---Facebook	7.0	8.5	6.2	8.9	7.0	X^2: 0.921, p: 0.820
---Twitter	1.6	0.7	1.6	0.0	1.5	X^2: 2.328, p: 0.507
---Instagram	10.8	7.7	13.6	8.9	10.9	X^2: 3.499, p: 0.321
---Reddit	2.3	1.4	4.1	2.2	2.5	X^2: 3.215, p: 0.360
---Flickr	0.2	0.0	0.8	0.0	0.3	X^2: 2.872, p: 0.412
---Other	3.0	2.8	3.7	4.4	3.1	X^2: 0.579, p: 0.901
Other websites (Trip Advisor, Hotels.com, Expedia, etc.)	26.9	21.8	18.1	28.9	25.6	X^2: 10.523, p: 0.015, V: 0.068
Friends / relatives / word of mouth	34.2	31.7	39.9	35.6	34.7	X^2: 3.618, p: 0.306
Highway signs	10.3	3.5	10.7	4.4	9.8	X^2: 10.735, p: 0.013, V: 0.063
Inquiry to park via phone, mail, or email	2.6	0.7	3.7	4.4	2.6	X^2: 4.366, p: 0.225
Local businesses (hotels, motels, restaurants, etc.)	3.4	0.0	1.2	2.2	2.9	X^2: 13.146, p: 0.004, V: 0.062
Maps / brochures	32.9	26.1	37.0	37.8	33.0	X^2: 5.448, p: 0.142
Newspaper / magazine articles	4.3	3.5	1.2	2.2	3.9	X^2: 7.442, p: 0.059
Other National Park Service sites / units	8.3	4.2	10.3	4.4	8.2	X^2: 5.891, p: 0.117
Previous visits	19.0	16.9	29.2	22.2	20.0	X^2: 13.930, p: 0.003, V: 0.084
School class / program	0.9	0.7	4.1	2.2	1.3	X^2: 12.275, p: 0.006, V: 0.090
State or local welcome center / visitors bureau / chamber of commerce	5.2	0.7	4.9	6.7	4.9	X^2: 8.871, p: 0.031, V: 0.053
Television / radio programs / DVDs	1.3	0.7	4.1	0.0	1.5	X^2: 10.316, p: 0.016, V: 0.077
Travel guides / tour books (AAA, Fodor's, Lonely Planet, etc.)	15.7	17.6	19.8	11.1	16.2	X^2: 3.625, p: 0.305
Other[3]	6.4	12.7	9.1	13.3	7.2	X^2: 10.399, p: 0.015, V: 0.075

[1]Cells are reported as percentages (%) for affirmative (yes) responses. Shading highlights the highest (blue) and lowest (red) percentage per user group and overall.
[2]Chi-square test (X^2); p value (p); Cramer's V (V) for significant differences ($p < 0.05$).
[3]All listed information sources with more than one mention (listed in descending order): All Trails App, Climbing guide, Hiking guide, Google, Google Earth, blogs, eBird, Internet, Joshua Tree Rock Climbs book, and YouTube.

Table 51. Sources of information preferred for future visits, by user group. *(General survey Q10b)*

If you were to visit Joshua Tree NP in the future, how would you and your personal group prefer to obtain information about the park?	User group[1]					Tests of significance[2]
	Daytime	Climb/ Boulder	Overnight	Facilities/ Staff	Total	
Joshua Tree NP website: www.nps.gov/jotr	36.3	26.8	38.7	35.6	35.9	X^2: 6.307, p: 0.098
Social media – Any	10.0	7.7	12.3	8.9	10.1	X^2: 2.288, p: 0.515
---Facebook	3.0	2.1	2.9	2.2	2.9	X^2: 0.457, p: 0.928
---Twitter	1.3	0.0	0.4	0.0	1.1	X^2: 6.378, p: 0.095
---Instagram	6.0	3.5	7.0	2.2	5.9	X^2: 3.629, p: 0.304
---Reddit	1.6	1.4	2.9	0.0	1.7	X^2: 3.460, p: 0.326
---Flickr	0.2	0.0	0.0	0.0	0.1	X^2: 1.343, p: 0.719
---Other	1.7	0.7	2.1	4.4	1.7	X^2: 2.656, p: 0.448
Other websites (Trip Advisor, Hotels.com, Expedia, etc.)	11.9	10.6	9.1	11.1	11.5	X^2: 1.919, p: 0.589
Friends / relatives / word of mouth	12.6	9.2	18.5	17.8	13.1	X^2: 8.973, p: 0.030, V: 0.066
Highway signs	2.9	2.1	7.0	2.2	3.3	X^2: 9.929, p: 0.019, V: 0.076
Inquiry to park via phone, mail, or email	2.3	0.7	1.6	2.2	2.1	X^2: 2.319, p: 0.509
Local businesses (hotels, motels, restaurants, etc.)	0.8	0.0	0.0	0.0	0.6	X^2: 5.837, p: 0.120
Maps / brochures	18.5	16.2	20.6	22.2	18.7	X^2: 1.535, p: 0.674
Newspaper / magazine articles	2.8	1.4	2.1	4.4	2.7	X^2: 1.990, p: 0.574
Other National Park Service sites / units	5.7	3.5	5.8	2.2	5.5	X^2: 2.588, p: 0.460
Previous visits	8.6	9.2	14.0	4.4	9.1	X^2: 8.146, p: 0.043, V: 0.064
School class / program	0.4	0.7	2.1	2.2	0.7	X^2: 7.583, p: 0.055
State or local welcome center / visitors bureau / chamber of commerce	3.7	0.7	2.9	4.4	3.4	X^2: 5.341, p: 0.148
Television / radio programs / DVDs	0.5	0.0	1.6	2.2	0.7	X^2: 5.969, p: 0.113
Travel guides / tour books (AAA, Fodor's, Lonely Planet, etc.)	11.8	11.3	10.3	8.9	11.5	X^2: 0.823, p: 0.844
Other[3]	3.7	7.0	7.4	4.4	4.3	X^2: 8.630, p: 0.035, V: 0.068

[1]Cells are reported as percentages (%) for affirmative (yes) responses. Shading highlights the highest (blue) and lowest (red) percentage per user group and overall.
[2]Chi-square test (X^2); p value (p); Cramer's V (V) for significant differences ($p < 0.05$).
[3]All listed information sources with more than one mention (listed in descending order): All Trails App, Climbing guide, Hiking guide, Google, Google Earth, blogs, eBird, Internet, Joshua Tree Rock Climbs book, and YouTube.

Table 52. Information and facilities used during this visit to the park, by user group. *(General survey Q11b)*

Please mark all the information series and facilities that you or your personal group used during this visit to Joshua Tree NP	User group[1]					Tests of significance
	Daytime	Climb/ Boulder	Overnight	Facilities/ Staff	Total	
Assistance from visitor center staff	44.8	29.6	42.0	55.6	43.7	X^2: 15.717 p: 0.001 V: 0.084
Assistance from entrance station staff	22.8	16.2	27.2	17.8	22.8	X^2: 7.002 p: 0.072
Bulletin boards	18.8	17.6	24.3	33.3	19.6	X^2: 9.004 p: 0.029 V: 0.068
Joshua Tree NP website: www.nps.gov/jotr (used before or during visit)	33.5	24.6	42.4	37.8	34.0	X^2: 13.658 p: 0.003 V: 0.080
Park brochure / map	57.3	39.4	58.8	68.9	56.6	X^2: 20.570 p: <0.001 V: 0.098
Park newspaper	11.1	9.9	13.6	20.0	11.5	X^2: 4.367 p: 0.224
Ranger-led programs (walks, talks, etc.)	2.7	2.1	3.3	6.7	2.8	X^2: 2.276 p: 0.517
Roadside exhibits	31.2	17.6	29.6	33.3	30.2	X^2: 12.879 p: 0.005 V: 0.074
Sales items in visitor center	8.7	4.9	7.4	13.3	8.4	X^2: 4.388 p: 0.223
Trailside exhibits / signs	32.2	22.5	31.7	35.6	31.6	X^2: 6.391 p: 0.094
Visitor center exhibits	27.6	10.6	27.2	33.3	26.6	X^2: 24.460 p: <0.001 V: 0.098
Other park publications (plant lists, dog information, camping brochure, etc.)	7.8	6.3	9.1	13.3	7.9	X^2: 2.520 p: 0.472

[1]Cells are reported as percentages (%) for affirmative (yes) responses. Shading highlights the highest (blue) and lowest (red) percentage per user group and overall.
[2]Chi-square test (X^2); p value (p); Cramer's V (V) for significant differences ($p < 0.05$).

MANAGEMENT ACTIONS

Table 53. Support for potential park access, transportation, and car camping future management actions at the park, by user group. *(Management survey Q6a, Q6b, and Q6c)*

Please indicate your level of opposition or support for the following park access, transportation, and car camping potential future management actions at Joshua Tree NP.	User group[1]					Tests of significance[2]
	Daytime	Climb/ Boulder	Overnight	Facilities/ Staff	Total	
Implement reservation system to enter the park	2.93[a] (1.83)	2.39[b] (1.56)	2.84[a,b] (1.71)	3.03[a,b] (1.94)	2.88	F: 3.458 p: 0.016 η: 0.080
Add parking spaces at major attractions	4.23 (1.78)	4.09 (1.83)	4.30 (1.72)	4.40 (1.57)	4.23	F: 0.453 p: 0.715
Add additional traffic lanes at park entrances	3.94 (1.76)	3.96 (1.96)	3.97 (1.75)	3.72 (1.73)	3.94	F: 0.231 p: 0.875
Increase entry fees to enhance visitor experiences	3.19 (1.74)	3.04 (1.72)	3.11 (1.68)	3.13 (1.70)	3.17	F: 0.356 p: 0.785
Temporarily close specific roads and parking areas based on congestion (e.g., Keys View, road to Barker Dam)	3.86 (1.68)	3.61 (1.58)	4.06 (1.62)	3.54 (1.35)	3.86	F: 2.234 p: 0.082
Require riding shuttle buses within the park on the park's busiest days (e.g., weekends, holidays, spring break)	4.01 (2.03)	3.57 (2.10)	4.16 (1.95)	3.84 (2.01)	3.99	F: 2.335 p: 0.072
Develop paved access to more popular locations and attractions	3.22[a] (1.84)	2.55[b] (1.76)	3.36[a,c] (1.88)	3.49[a] (1.78)	3.19	F: 6.076 p: <0.001 η: 0.104
Implement a parking reservation or parking permit system	3.09[a] (1.59)	2.66[b] (1.48)	3.18[a,b] (1.70)	3.25[a,b] (1.56)	3.07	F: 3.175 p: 0.023 η: 0.078
Decrease the number of nights that visitors can stay at developed campgrounds	3.57[a] (1.59)	3.12[b] (1.66)	3.41[a,b] (1.55)	3.51[a,b] (1.22)	3.51	F: 3.280 p: 0.020 η: 0.080
Develop more campsites in existing campgrounds like Hidden Valley	4.45[a] (1.65)	4.41[a,b] (1.84)	4.88[b] (1.64)	4.83[a,b] (1.50)	4.50	F: 4.294 p: 0.005 η: 0.091
Use online park communications to inform visitors about the availability and characteristics of sites in developed campgrounds	5.84 (1.13)	5.73 (1.35)	5.97 (1.03)	5.58 (1.59)	5.84	F: 1.788 p: 0.147

[1]Cells reported as means (M) on a seven-point scale, followed by the (standard deviation) for summer and fall: Strongly oppose (1), Oppose (2), Somewhat oppose (3), Neither Oppose nor Support (4), Somewhat support (5), Support (6), and Strongly support (7). Responses of "I don't know / need more information" were excluded from this analysis. Superscripts denote user group differences significant at $p < 0.05$ based on Tamhane's T2 (unequal variances) or Scheffe's (equal variances) post-hoc tests. Shading highlights the most (green) and least (red) supported management action per category per user group and overall.

[2]ANOVA test (F); p value (p); Eta (η) for significant differences ($p < 0.05$).

Table 54. Support for potential trails and wilderness backpacking future management actions at the park, by user group. *(Management survey Q6a, Q6b, and Q6c)*

Please indicate your level of opposition or support for the following trails and wilderness backpacking potential future management actions at Joshua Tree NP.	User group[1]					Tests of significance[2]
	Daytime	Climb/ Boulder	Overnight	Facilities/ Staff	Total	
Reduce the number of trails in the park to provide better conditions on fewer trails	2.80 (1.45)	2.89 (1.62)	2.85 (1.41)	3.06 (1.49)	2.82	F: 0.517 p: 0.671
Develop new trails in the southern half of the park	5.22 (1.34)	5.24 (1.25)	5.22 (1.24)	5.19 (1.06)	5.23	F: 0.013 p: 0.998
Provide more information about trails to help visitors find trails that match their preferences for length and things they can see and enjoy	5.93[a] (1.04)	5.63[b] (1.14)	5.83[a,b] (1.00)	5.87[a,b] (1.28)	5.90	F: 3.509 p: 0.015 η: 0.079
Expand and develop new trailhead parking lots for existing trails	4.69[a,b] (1.52)	4.33[b] (1.63)	4.85[a] (1.35)	5.05[a] (1.34)	4.69	F: 3.823 p: 0.010 η: 0.084
Implement a wilderness backpacking reservation system	4.56 (1.57)	4.30 (1.55)	4.72 (1.51)	4.21 (1.61)	4.55	F: 2.103 p: 0.098
Establish designated and assigned wilderness camping sites	4.77 (1.50)	4.50 (1.65)	4.84 (1.55)	4.30 (1.76)	4.75	F: 2.347 p: 0.071
Introduce fees for overnight backpacking to support wilderness services	4.68 (1.66)	4.31 (1.66)	4.50 (1.68)	4.46 (1.57)	4.63	F: 2.471 p: 0.060
Require mandatory wilderness backpacking orientation to receive a wilderness backpacking permit	4.64[a] (1.73)	4.02[b] (1.91)	4.59[a,b] (1.76)	4.24[a,b] (1.62)	4.57	F: 5.257 p: 0.001 η: 0.100
Require visitors to pack out human waste when using the backcountry	5.29 (1.73)	5.38 (1.65)	5.13 (1.72)	4.94 (1.84)	5.27	F: 1.038 p: 0.375

[1]Cells reported as means (M) on a seven-point scale, followed by the (standard deviation) for summer and fall: Strongly oppose (1), Oppose (2), Somewhat oppose (3), Neither Oppose nor Support (4), Somewhat support (5), Support (6), and Strongly support (7). Responses of "I don't know / need more information" were excluded from this analysis. Superscripts denote user group differences significant at $p < 0.05$ based on Tamhane's T2 (unequal variances) or Scheffe's (equal variances) post-hoc tests. Shading highlights the most (blue) and least (red) supported management action per category per user group and overall.

[2]ANOVA test (F); p value (p); Eta (η) for significant differences ($p < 0.05$).

Table 55. Support for potential rock climbing and bouldering future management actions at the park, by user group. *(Management survey Q6a, Q6b, and Q6c)*

Please indicate your level of opposition or support for the following rock climbing and bouldering potential future management actions at Joshua Tree NP.	User group[1]					Tests of significance[2]
	Daytime	Climb/ Boulder	Overnight	Facilities/ Staff	Total	
Limit the addition of new fixed anchors / bolts in wilderness areas	4.79[a] (1.55)	4.04[b] (1.93)	4.70[a] (1.48)	4.62[a,b] (1.55)	4.71	F: 7.799 p: <0.001 η: 0.133
Remove illegally installed (unpermitted) bolts from wilderness areas	5.39[a] (1.51)	4.60[b] (2.08)	5.45[a] (1.41)	5.07[a,b] (1.53)	5.33	F: 9.252 p: <0.001 η: 0.140
Require visitors to pack out human waste when using popular climbing areas	5.74 (1.39)	5.64 (1.46)	5.75 (1.27)	5.82 (1.29)	5.73	F: 0.229 p: 0.876
Close climbing routes / staging areas with sensitive cultural or natural resources	5.56 (1.39)	5.23 (1.63)	5.67 (1.30)	5.27 (1.61)	5.54	F: 2.955 p: 0.031 η: 0.077
Provide signs and directions to all climbing rock formations	4.92[a] (1.47)	4.45[b] (1.86)	4.74[a,b] (1.52)	4.91[a,b] (1.33)	4.86	F: 3.873 p: 0.009 η: 0.088
Require time-specific permits for climbing on popular routes and walls	4.27[a] (1.64)	2.93[b] (1.79)	4.18[a] (1.73)	4.40[a] (1.59)	4.15	F: 23.384 p: <0.001 η: 0.221
Require location-specific permits for climbing on popular routes and walls	4.28[a] (1.64)	2.91[b] (1.84)	4.22[a] (1.72)	4.47[a] (1.38)	4.16	F: 20.932 p: <0.001 η: 0.226
Require location-specific permits for popular bouldering areas	4.11 (1.69)	2.80 (1.83)	3.97 (1.80)	4.20 (1.38)	3.98	F: 0.810 p: 0.488
Require visitors to pack out human waste when using popular bouldering areas	5.62 (1.47)	5.59 (1.51)	5.79 (1.15)	5.63 (1.45)	5.63	F: 1.913 p: 0.126
Close bouldering routes / staging areas with sensitive cultural or natural resources	5.36 (1.48)	5.08 (1.75)	5.47 (1.40)	5.58 (1.09)	5.36	F: 4.263 p: 0.005
Improve signs and directions to all bouldering formations	5.06[a] (1.45)	4.59[b] (1.82)	4.84[a,b] (1.52)	5.00[a,b] (1.39)	4.99	F: 19.746 p: <0.001 η: 0.093
Require time-specific permits for popular bouldering areas	4.05[a] (1.67)	2.80[b] (1.80)	3.95[a] (1.73)	4.30[a] (1.29)	3.94	F: 19.746 p: <0.001 η: 0.202
Identify designated crash pad areas free from vegetation and sensitive soil	5.54[a] (1.27)	5.15[b] (1.41)	5.51[a,b] (1.23)	5.46[a,b] (1.11)	5.50	F: 3.276 p: 0.020 η: 0.084

[1]Cells reported as means (M) on a seven-point scale, followed by the (standard deviation) for summer and fall: Strongly oppose (1), Oppose (2), Somewhat oppose (3), Neither Oppose nor Support (4), Somewhat support (5), Support (6), and Strongly support (7). Responses of "I don't know / need more information" were excluded from this analysis. Superscripts denote user group differences significant at p <0.05 based on Tamhane's T2 (unequal variances) or Scheffe's (equal variances) post-hoc tests. Shading highlights the most (blue) and least (red) supported management action per category per user group and overall.

[2]ANOVA test (F); p value (p); Eta (η) for significant differences (p <0.05).

Table 56. Most supported potential future management actions at the park, by user group. *(Management survey Q6d)*

Please identify the management action that you most support.		User group[1]				
		Daytime	Climb/ Boulder	Overnight	Facilities/ Staff	Total
Park access, transportation, and car camping	Implement reservation system to enter the park	1.0	0.0	2.0	0.0	1.0
	Add parking spaces at major attractions	6.1	4.0	6.0	8.0	6.0
	Add additional traffic lanes at park entrances	3.7	7.0	0.7	4.0	3.6
	Increase entry fees to enhance visitor experiences	2.6	4.0	2.0	4.0	2.7
	Temporarily close specific roads and parking areas based on congestion (e.g., Keys View, road to Barker Dam)	1.6	1.0	1.3	0.0	1.5
	Require riding shuttle buses within the park on the park's busiest days (e.g., weekends, holidays, spring break)	9.7	13.0	13.3	8.0	10.4
	Develop paved access to more popular locations and attractions	2.2	1.0	2.7	8.0	2.3
	Implement a parking reservation or parking permit system	0.0	0.0	0.0	0.0	0.0
	Decrease the number of nights that visitors can stay at developed campgrounds	1.7	3.0	2.7	0.0	1.9
	Develop more campsites in existing campgrounds like Hidden Valley	4.4	9.0	11.3	8.0	5.6
	Use online park communications to inform visitors about the availability and characteristics of sites in developed campgrounds	14.0	8.0	14.0	20.0	13.7
Trails and wilderness backpacking	Reduce the number of trails in the park to provide better conditions on fewer trails	0.1	1.0	0.7	0.0	0.2
	Develop new trails in the southern half of the park	8.6	9.0	7.3	8.0	8.5
	Provide more information about trails to help visitors find trails that match their preferences for length and things they can see and enjoy	16.0	6.0	12.0	0.0	14.4
	Expand and develop new trailhead parking lots for existing trails	1.6	1.0	1.3	4.0	1.6
	Implement a wilderness backpacking reservation system	0.8	1.0	0.0	0.0	0.7
	Establish designated and assigned wilderness camping sites	1.9	3.0	2.0	4.0	2.1
	Introduce fees for overnight backpacking to support wilderness services	0.9	2.0	0.7	0.0	1.0
	Require mandatory wilderness backpacking orientation to receive a wilderness backpacking permit	1.3	0.0	3.3	4.0	1.5
	Require visitors to pack out human waste when using the backcountry	6.8	3.0	6.7	0.0	6.3
Rock climbing and bouldering	Limit the addition of new fixed anchors / bolts in wilderness areas	1.2	3.0	1.3	0.0	1.3
	Remove illegally installed (unpermitted) bolts from wilderness areas	1.9	2.0	2.0	4.0	2.0
	Require visitors to pack out human waste when using popular climbing areas	2.3	5.0	2.0	12.0	2.7
	Close climbing routes / staging areas with sensitive cultural or natural resources	2.7	3.0	0.0	0.0	2.4
	Provide signs and directions to all climbing rock formations	0.4	3.0	0.7	0.0	0.6
	Require time-specific permits for climbing on popular routes and walls	0.0	0.0	0.0	0.0	0.0
	Require location-specific permits for climbing on popular routes and walls	0.0	0.0	0.0	0.0	0.0
	Require location-specific permits for popular bouldering areas	0.0	0.0	0.0	0.0	0.0
	Require visitors to pack out human waste when using popular bouldering areas	2.3	2.0	0.0	0.0	2.0
	Close bouldering routes / staging areas with sensitive cultural or natural resources	1.6	3.0	2.0	0.0	1.7
	Improve signs and directions to all bouldering formations	1.9	3.0	2.0	4.0	2.1
	Require time-specific permits for popular bouldering areas	0.0	0.0	0.0	0.0	0.0
	Identify designated crash pad areas free from vegetation and sensitive soil	0.2	0.0	0.0	0.0	0.2

[1]Cells reported as percentages (%) of affirmative (yes) responses. $X^2 = 110.130$; $p = 0.017$, Cramer's $V = 0.166$. Shading highlights the most supported management action per category per user group and overall.

Table 57. Most opposed potential future management actions at the park by user group. *(Management survey Q6f)*

Please identify the management action that you most oppose.		User group[1]				
		Daytime	Climb/ Boulder	Overnight	Facilities/ Staff	Total
Park access, transportation, and car camping	Implement reservation system to enter the park	26.2	23.0	25.8	35.7	26.1
	Add parking spaces at major attractions	3.2	2.7	1.8	0.0	2.9
	Add additional traffic lanes at park entrances	3.1	1.8	4.3	3.6	3.1
	Increase entry fees to enhance visitor experiences	14.8	8.0	12.9	3.6	13.8
	Temporarily close specific roads and parking areas based on congestion (e.g., Keys View, road to Barker Dam)	1.7	3.5	0.6	3.6	1.8
	Require riding shuttle buses within the park on the park's busiest days (e.g., weekends, holidays, spring break)	9.9	8.0	7.4	14.3	9.6
	Develop paved access to more popular locations and attractions	11.9	13.3	11.7	10.7	11.9
	Implement a parking reservation or parking permit system	4.5	1.8	5.5	3.6	4.4
	Decrease the number of nights that visitors can stay at developed campgrounds	2.4	0.0	4.9	3.6	2.5
	Develop more campsites in existing campgrounds like Hidden Valley	2.4	0.9	2.5	3.6	2.3
	Use online park communications to inform visitors about the availability and characteristics of sites in developed campgrounds	0.0	0.0	0.0	0.0	0.0
Trails and wilderness backpacking	Reduce the number of trails in the park to provide better conditions on fewer trails	9.4	10.6	10.4	3.6	9.5
	Develop new trails in the southern half of the park	1.6	0.9	0.6	0.0	1.4
	Provide more information about trails to help visitors find trails that match their preferences for length and things they can see and enjoy	0.3	0.0	0.6	0.0	0.3
	Expand and develop new trailhead parking lots for existing trails	1.1	0.0	0.6	0.0	0.9
	Implement a wilderness backpacking reservation system	0.5	0.9	0.6	0.0	0.5
	Establish designated and assigned wilderness camping sites	0.1	0.0	1.8	3.6	0.4
	Introduce fees for overnight backpacking to support wilderness services	0.8	0.9	0.6	0.0	0.8
	Require mandatory wilderness backpacking orientation to receive a wilderness backpacking permit	0.5	0.9	0.6	0.0	0.5
	Require visitors to pack out human waste when using the backcountry	0.6	0.9	0.6	3.6	0.7
Rock climbing and bouldering	Limit the addition of new fixed anchors / bolts in wilderness areas	0.4	2.7	0.0	0.0	0.5
	Remove illegally installed (unpermitted) bolts from wilderness areas	0.1	0.9	0.0	0.0	0.1
	Require visitors to pack out human waste when using popular climbing areas	0.5	0.0	0.0	0.0	0.4
	Close climbing routes / staging areas with sensitive cultural or natural resources	0.3	0.9	0.0	3.6	0.4
	Provide signs and directions to all climbing rock formations	0.4	0.9	0.0	0.0	0.4
	Require time-specific permits for climbing on popular routes and walls	1.3	11.5	3.1	3.6	2.4
	Require location-specific permits for climbing on popular routes and walls	0.5	5.3	0.6	0.0	0.9
	Require location-specific permits for popular bouldering areas	0.9	0.0	0.0	0.0	0.7
	Require visitors to pack out human waste when using popular bouldering areas	0.2	0.0	0.0	0.0	0.1
	Close bouldering routes / staging areas with sensitive cultural or natural resources	0.3	0.0	0.6	0.0	0.3
	Improve signs and directions to all bouldering formations	0.0	0.0	0.0	0.0	0.0
	Require time-specific permits for popular bouldering areas	0.5	0.0	1.8	0.0	0.6
	Identify designated crash pad areas free from vegetation and sensitive soil	0.0	0.0	0.0	0.0	0.0

[1]Cells reported as percentages (%) of affirmative (yes) responses. $X^2 = 128.651$; $p = 0.002$; Cramer's $V = 0.202$. Shading highlights the most opposed management action per category per user group and overall.

Table 58. Visitor use management matrix for considering the three most supported potential management actions by user group. (*Management survey Q6e and Q6g*)

Managers at Joshua Tree NP and elsewhere consider four broad categories when examining visitor use management issues. Please provide a rating to each of these four categories for the action you most support.			User group[1]					Tests of significance[2]
			Daytime	Climb/ Boulder	Overnight	Facilities/ Staff	Total	
Park access, transportation, and car camping	Use online park communications to inform visitors about the availability and characteristics of sites in developed campgrounds	Issue uncertainty: What do you feel is the level of uncertainty regarding the facts pertaining to this action?	1.49 (0.60)	1.33 (0.52)	1.43 (0.65)	1.50 (0.71)	1.48	F: 0.172 p: 0.915
		Impact risk: What do you feel is the level of threat to the park's natural and cultural resources and visitor experiences in this action?	1.70 (0.85)	1.43 (0.79)	1.72 (0.90)	2.33 (1.16)	1.71	F: 0.784 p: 0.505
		Stakeholder involvement: What do you feel is the level of public / stakeholder interest in this action?	2.18 (0.78)	2.33 (0.82)	2.05 (0.91)	1.75 (0.50)	2.16	F: 0.598 p: 0.617
		Controversy / Potential for litigation: What do you feel is the level of controversy and potential for legal action regarding this action?	1.28 (0.51)	1.00 (0.00)	1.25 (0.45)	1.50 (0.58)	1.27	F: 0.908 p: 0.439
Trails and wilderness backpacking	Provide more information about trails to help visitors find trails that match their preferences for length and things they can see and enjoy	Issue uncertainty: What do you feel is the level of uncertainty regarding the facts pertaining to this action?	1.73 (0.74)	2.00 (0.71)	1.64 (0.63)	--	1.74	F: 0.444 p: 0.642
		Impact risk: What do you feel is the level of threat to the park's natural and cultural resources and visitor experiences in this action?	1.86 (0.88)	2.20 (0.84)	2.19 (0.91)	--	1.91	F: 1.240 p: 0.291
		Stakeholder involvement: What do you feel is the level of public / stakeholder interest in this action?	2.28 (0.73)	2.40 (0.55)	2.06 (0.77)	--	2.26	F: 0.726 p: 0.486
		Controversy / Potential for litigation: What do you feel is the level of controversy and potential for legal action regarding this action?	1.41 (0.60)	1.40 (0.55)	1.47 (0.64)	--	1.42	F: 0.057 p: 0.945
Rock climbing and bouldering	Require visitors to pack out human waste when using popular climbing areas	Issue uncertainty: What do you feel is the level of uncertainty regarding the facts pertaining to this action?	1.40 (0.51)	1.00 (0.00)	1.50 (0.71)	2.00 (1.00)	1.45	F: 1.332 p: 0.295
		Impact risk: What do you feel is the level of threat to the park's natural and cultural resources and visitor experiences in this action?	2.14 (0.73)	2.00 (1.00)	2.33 (0.58)	2.67 (0.58)	2.20	F: 0.558 p: 0.647
		Stakeholder involvement: What do you feel is the level of public / stakeholder interest in this action?	2.18 (0.64)	2.50 (0.71)	2.50 (0.71)	2.33 (0.58)	2.25	F: 0.297 p: 0.827
		Controversy / Potential for litigation: What do you feel is the level of controversy and potential for legal action regarding this action?	1.59 (0.62)	1.00 (0.00)	1.00 (0.00)	1.67 (1.16)	1.50	F: 0.923 p: 0.448

[1]Cells reported as means (M) on a 3-point scale, followed by the (standard deviation) for user groups: Low (1), Medium (2), or High (3).
[2]ANOVA test (F); p value (p). Shading highlights the highest (blue) and lowest (red) means per category per user group and overall.

Table 59. Visitor use management matrix for considering the three most opposed potential management actions by user group. (*Management survey Q6e and Q6g*)

Managers at Joshua Tree NP and elsewhere consider four broad categories when examining visitor use management issues. Please provide a rating to each of these four categories for the action you most oppose.			User group[1]					Tests of significance[2]
			Daytime	Climb/ Boulder	Overnight	Facilities/ Staff	Total	
Park access, transportation, and car camping	Implement reservation system to enter the park	Issue uncertainty: What do you feel is the level of uncertainty regarding the facts pertaining to this action?	2.02 (0.81)	1.94 (0.75)	1.86 (0.80)	2.29 (0.76)	2.00	F: 0.739 p: 0.529
		Impact risk: What do you feel is the level of threat to the park's natural and cultural resources and visitor experiences in this action?	2.14 (0.87)	1.95 (0.92)	1.97 (0.90)	2.33 (1.03)	2.11	F: 0.733 p: 0.533
		Stakeholder involvement: What do you feel is the level of public / stakeholder interest in this action?	2.43 (0.73)	2.41 (0.67)	2.57 (0.77)	2.25 (1.04)	2.44	F: 0.569 p: 0.636
		Controversy / Potential for litigation: What do you feel is the level of controversy and potential for legal action regarding this action?	2.08 (0.82)	2.42 (0.69)	1.83 (0.83)	1.88 (0.99)	2.07	F: 2.189 p: 0.090
Trails and wilderness backpacking	Reduce the number of trails in the park to provide better conditions on fewer trails	Issue uncertainty: What do you feel is the level of uncertainty regarding the facts pertaining to this action?	1.72 (0.69)	1.90 (0.57)	2.09 (0.70)	1.00 (--)	1.78	F: 1.492 p: 0.223
		Impact risk: What do you feel is the level of threat to the park's natural and cultural resources and visitor experiences in this action?	1.99 (0.79)	2.00 (0.89)	1.80 (0.86)	--	1.96	F: 0.355 p: 0.702
		Stakeholder involvement: What do you feel is the level of public / stakeholder interest in this action?	2.22 (0.57)	2.45 (0.52)	2.29 (0.61)	1.00 (--)	2.24	F: 2.140 p: 0.100
		Controversy / Potential for litigation: What do you feel is the level of controversy and potential for legal action regarding this action?	1.61 (0.69)	2.10 (0.74)	1.93 (0.59)	1.00 (--)	1.70	F: 2.521 p: 0.062
Rock climbing and bouldering	Require time-specific permits for climbing on popular routes and walls	Issue uncertainty: What do you feel is the level of uncertainty regarding the facts pertaining to this action?	2.15 (0.80)	2.64 (0.51)	2.33 (0.58)	3.00 (--)	2.39	F: 1.302 p: 0.297
		Impact risk: What do you feel is the level of threat to the park's natural and cultural resources and visitor experiences in this action?	2.33 (0.65)	2.18 (0.87)	2.33 (0.58)	1.00 (--)	2.22	F: 1.003 p: 0.409
		Stakeholder involvement: What do you feel is the level of public / stakeholder interest in this action?	2.54 (0.78)	2.27 (0.91)	1.67 (0.58)	3.00 (--)	2.36	F: 1.169 p: 0.342
		Controversy / Potential for litigation: What do you feel is the level of controversy and potential for legal action regarding this action?	1.67 (0.78)	1.91 (0.94)	1.67 (0.58)	3.00 (--)	1.81	F: 0.865 p: 0.474

[1]Cells reported as means (M) on a 3-point scale, followed by the (standard deviation) user groups: Low (1), Medium (2), or High (3).
[2]ANOVA test (F); p value (p). Shading highlights the highest (blue) and lowest (red) means per category per user group and overall.

FALL 2010 TO FALL 2019 COMPARISONS

We compared responses to the general visitor survey and management survey (shared questions between both surveys) from 2019 to those published a decade prior to examine similarities and differences in key areas of management interest. The following presents the comparisons of responses from visitors in November 2019 to those sampled in the same corresponding time (the week before Thanksgiving) in 2010. More visitor groups were intercepted in 2019 (N = 3,424) than in 2010 (N = 837). Acceptance rates were also slightly higher in 2019 (96.3%) than in 2010 (91.6%). Response rates were lower in 2019 (44.2%) than in 2010 (65.5%), though the number of responses was higher in 2019. For more information specific to the 2010 study, including specific key findings and the survey instrument, please refer to Jette, Blotkamp, Le, & Hollenhorst, 2011 in the references section of this report. Question numbers presented in the caption for each table/figure in this section correspond to the 2019 survey question numbers in Appendices A and B and to the question numbers listed on the questionnaire in Jette et al., 2011.

Considerations for comparing 2019 to 2010

Although we attempted to replicate many of the conditions of the 2010 study, two important changes should be considered when interpreting the results. Perhaps most importantly, visitors in 2010 were contacted only at visitor centers in the park, as they entered/exited the visitor center on foot. This sampling strategy may have biased the 2010 toward older individuals as 2019 results suggest that older individuals used the visitor center more frequently than younger individuals (see table 105). In 2019, we intercepted visitors at park entrance stations in their vehicles as they exited the park. Thus, the 2019 respondents may represent a broader sample of visitors than the 2010 respondents. To assess any potential non-response bias in Fall 2019 data, we also compared Fall 2019 non-respondents with respondents on age, group size, and group type. The average age of non-respondents was 3.5 years younger (significant at $p \leq .001$, cohen's $d = .22$) than respondents. Because of the small effect size and the fact that no other differences were found, we proceeded with the comparison. Lastly, because the 2019 intercepts were on roadways with moving vehicles, we limited the sampling to daylight hours for safety, whereas the 2010 sampling was until 9pm daily.

Second, particulars about the survey design (2 surveys) and administration were different. The 2010 survey was mailed to intercepted visitors after the visit (visitors that provided a mailing address) whereas the 2019 survey was available for visitors to complete online after their intercept leaving the park (visitors used a link/QR code to one of two surveys provided in-park and, if they provided an email address, were emailed up to three reminders). Respondents in 2019 were offered a chance to win a prize if they provided their email address and completed the survey, which was not provided in 2010. Though both administrations followed a modified Dillman approach (2007, 2011), and we attempted to maintain fidelity to the survey question phrasings, ordering, and presentation, some adjustments were made for this online format and for ease of response.

Comparisons in this section are from the raw 2010 data provided by the Social and Economic Sciences Research Center at Washington State University, which serves as the repository for data and reports compiled by the now-closed Park Studies Unit at the University of Idaho, who completed the 2010 study. These data were transformed into the same format as the 2019 data for comparison. Efforts have

been taken to minimize errors in these transformations and comparisons. However, the 2010 data are taken at face value for their correctness and completeness.

When interpreting tables and figures in the section, it is important to remember that the displayed numbers in a table or figure often represent the percentage of visitors and that several questions ask respondents similar questions but with important distinctions. This is critical because the estimated JOTR recreation visitation in November 2010 was 134,653 and 291,230 in November 2019 (IRMA, 2020). Therefore, although a given *proportion* (percent) of visitors responding to a question on the survey may change between 2010 and 2019, the ***actual number of visitors*** may increase, decrease, or remain relatively stable because November visitation has increased by approximately 157,000.

To illustrate the implications, we can use survey responses focused on technical climbing. For example, technical climbing as a ***primary activity*** decreased from 14% in 2010 to 4.8% in 2019, thus the number of primary activity climbers also likely decreased from approximately 18,000 in 2010 to 14,000 climbers in 2019. However, other questions also ask about climbing. Specifically, 19.4% of 2019 November visitors (~56,000) reported technical climbing as *one of several activities*, compared to 14.9% in 2010 (~20,000 climbers). This results in a functional increase of approximately 36,000 climbers in November between 2010 and 2019 but a decrease of 4,000 visitors reporting climbing as their ***primary activity***. The implication is that 36,000 more climbers are coming to the park in November when compared to 2010. This suggests, but does not confirm, that more climbers, potentially those less experienced, are probably in popular climbing areas contributing to potentially more perceptions of crowding and other impacts to the climbing experience.

To accurately assess the potential changes in the ***number of visitors*** between years, as opposed to changes in the proportion displayed in this section, one should use the estimated visits recorded in November 2010 (134,653) and November 2019 (291,230), not the annual visitation estimate in 2010 and 2019. The following equation may assist in determining the increase, decrease, or stability in the frequency or number of visitors between November 2010 and November 2019.

Equation	Example
(291,230 x 2019 proportion or percent in table) -- (134,653 x 2010 proportion or percent in the table) Frequency difference between 2010 and 2019	(291,230 x 0.194 climbers) = 56,498 - (134,653 x 0.149 climbers) = 20,063 36,434 climbers

***At times, the 2010 data presented here differ from the data presented in the 2010 final report (Jette et al., 2011). We believe this is due to how the data was presented in the 2010 report and we will make notes where there are differences. This is particularly prominent in the overnight lodging and reservation results.

KEY FINDINGS

The following presents key findings in this decadal comparison, focusing on both general patterns and significant differences between the two time points. Where appropriate/meaningful, reference to the average response across the two time points is also provided.

Demographics

International visitors accounted for similar percentages of visitation in both years, with 86.0% of visitors from the US and 14.0% from other countries. The following are domestic patterns seen as a proportion of the total visitation (rather than net numbers of visitors). Within the US, more than half of visitors in both years were from California. There were no significant differences in the state-by-state differences in visitation between the years. However, at the zip code level, there are fewer visitors in 2019 from southern and central California and more from other locations such as the Seattle-Portland area and the northeastern corridor. This decrease in Californian visitation in 2019 compared to 2010 is seen at the county-level, with significantly less visitation from people residing in Contra Costa, Humboldt, Inyo, Riverside, San Diego, and Ventura counties. However, there were significantly more visitors in 2019 from Los Angeles, Orange, and San Bernardino counties. These three counties accounted for 43.1% of the Californian zip codes in 2010 and increased to 53.0% in 2019.

Visitors were significantly younger on average in 2019 than in 2010, at 44 versus 49 years old. In general, there was a significant shift from 2010 to 2019 toward a younger visitor population, with significantly more visitors in their 20s and 30s and fewer visitors in their 50s and 60s. Group sizes were also smaller in 2019, driven by an increase in solo visitors.

Visitation Frequency and Locations

Significantly more 2019 visitors reported that JOTR was the primary destination of their trip than in 2010, with almost two-thirds of visitors focusing on JOTR as the main attraction of their trip, and three-quarters of visitors coming to the area specifically to visit the park. Fewer 2019 visitors also reported that visiting JOTR was a spontaneous decision while on a trip. Even with this increase toward JOTR being a planned and central trip destination, the length of park visit was similar in 2010 and 2019, with a day visit lasting about 5.5 hours and a multi-day visit lasting about 3 days.

Many locations in the park experienced changes in visitation rates between 2010 and 2019, though these changes tended to be of little functional difference (i.e., still similar rates of visitation and small effect sizes for those that varied significantly). Though fewer visitors reported visiting the Joshua Tree or Oasis Visitor Centers, visitation increased slightly to the Cottonwood Visitor Center. Visitation to the ten most visited general park locations was spatially spread across the main park roads and features near these roads.

Activities

Participation in every activity (Table 70) except bicycling or horseback riding increased from 2010 to 2019, and almost all of them to a statistically significant degree. Most of the significant increases had medium or large effect sizes, indicating a true and potentially practical difference. Particular activities of note for this are day hiking (from 45.6% to 93.9%), sightseeing (from 57.4% to 90.0%), rock scrambling (from 24.9% to 59.9%), technical climbing (from 14.9% to 19.4%), and stargazing (from 24.5 to 50.9%).

Respondents also reported their primary activity. In 2019 respondents reported lower recreational specialization (primary activity) for sightseeing (23% in 2010 to 15% in 2019), technical climbing (14% in 2010 to 4.8% in 2019) and walking self-guided nature trails (13% in 2010 to 5% in 2019).

Information and Awareness

In 2019, significantly fewer percentages of visitors obtained park information before or during their visit to JOTR compared to 2010. Specifically, 87.5% of visitors in 2010 obtained park information before their visit, compared to 73.1% in 2019, and 96.0% obtained information during their visit in 2010, compared to 60.5% in 2019. However, of those who obtained information before their visit in either year, almost all found the information they needed.

For specific pre-visit information sources, the JOTR website remained the most popular. There were significant increases in use of the JOTR website and social media in 2019 and significant decreases in use of personal contacts, highway signs, park inquiries, local businesses, newspapers, knowledge from previous visits, welcome centers, and travel guides.

For information for future visits, the JOTR website was the most frequently preferred source across 2010 and 2019, although a significantly lower percentage of 2019 visitors would consult the park website. With the exception of social media platforms, significantly fewer percentages of visitors in 2019 would use each of the specific sources to inform future visits.

Similar to out-of-park information sources, significantly fewer percentages of visitors used specific in-park information sources in 2019 compared to 2010. Despite this decrease in use, visitors rated both the importance and quality of the sources they did consult as similar and high in both years. The importance from visitor center staff and the quality of the park website and ranger-led programs were all rated significantly higher in 2019.

DEMOGRAPHICS[2]

Table 60. Visitors' country of primary residence by year and overall. *(General survey Q12, Management survey Q8, 2010 survey Q20b)*

Country	Year[1]		
	Fall 2010	Fall 2019	Total
United States	83.8	86.6	86.0
Other countries[2]	16.2	13.4	14.0

[1]Cells reported as percentages (%) of affirmative (yes) responses. $X^2 = 2.122$; $p = 0.145$.
[2]Countries listed in decreasing frequency of response for 2019: Canada, Germany, United Kingdom, Australia, The Netherlands, Switzerland, China, France, Denmark, Poland, Belgium, Czech Republic, Japan, Ireland, Latvia, Slovakia, Sweden, Italy, New Zealand, Norway, Turkey, Austria, Brazil, French Caribbean, Guam, Hungary, Israel, Lithuania, Romania, Serbia, and Slovenia.
Countries listed in decreasing frequency of response for 2010: Canada, Germany, Switzerland, France, Australia, The Netherlands, Chile, China, Denmark, Italy, Luxembourg, and Pakistan.

[2] Larger, scalable, and interactive versions of the home residence maps are available at the Clemson Park Solutions Laboratory Tableau account: https://public.tableau.com/profile/cpsl#!/

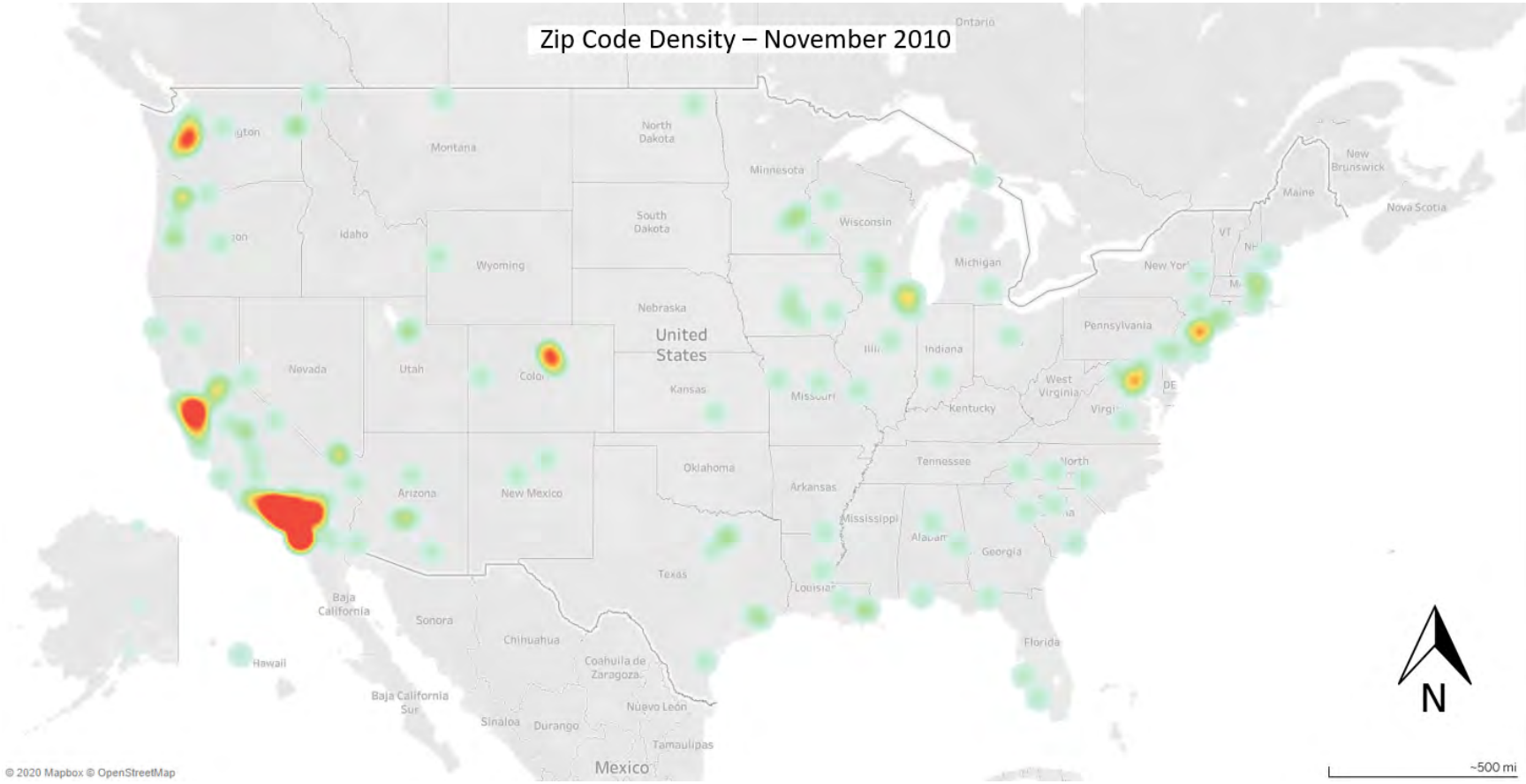


Figure 20. Density map of U.S. home location zip codes reported in Fall 2010.

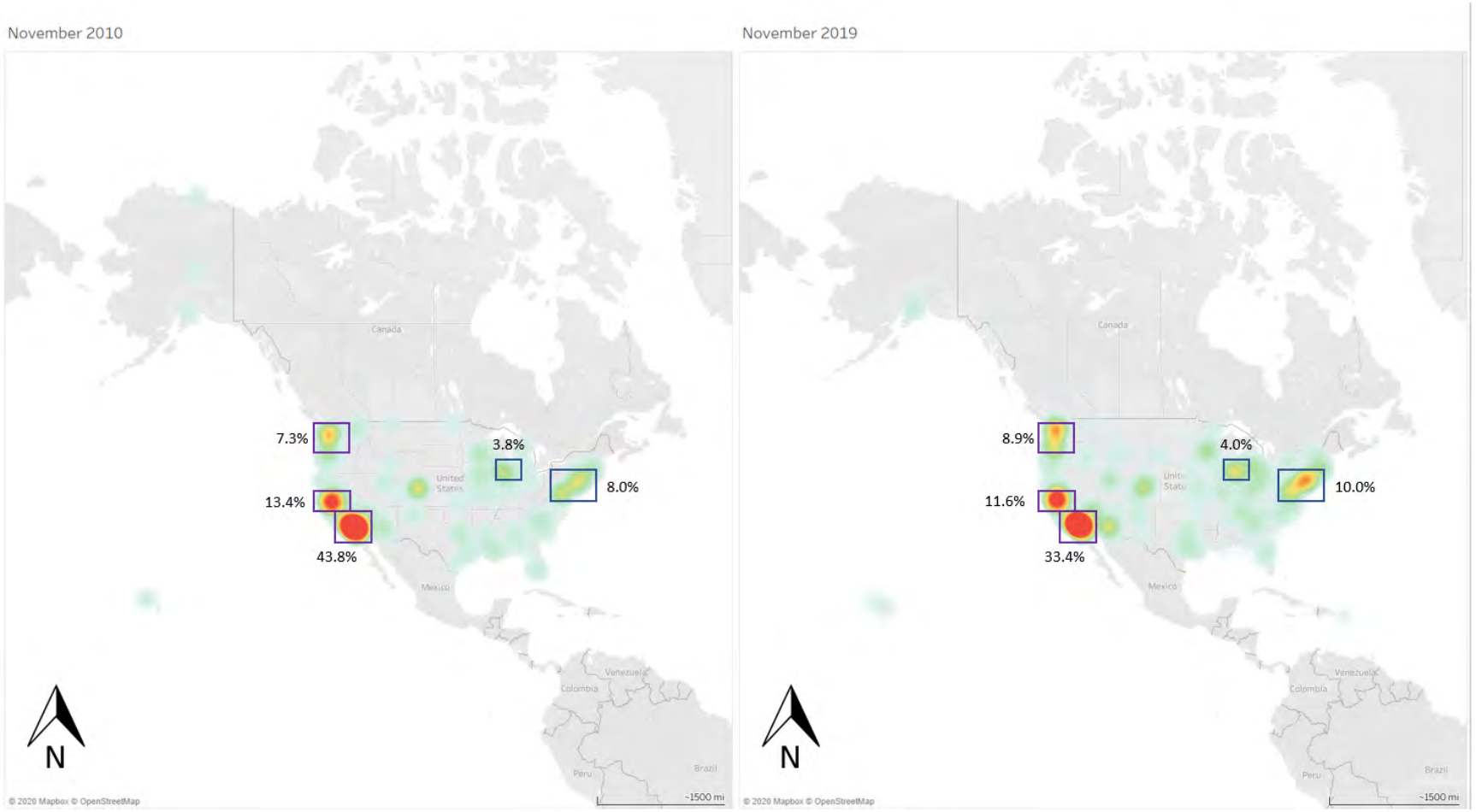


Figure 21. Density map of change in U.S. home location zip codes between Fall November 2010 and Fall November 2019.

Table 61. US visitors' state/territory of primary residence by year and overall. *(from zip codes in General survey Q12, Management survey 8a, 2010 survey Q20b)*

US state	Year[1]		
	Fall 2010	Fall 2019	Total
Alabama	0.6	0.1	0.2
Alaska	0.9	0.7	0.7
Arizona	2.0	2.7	2.5
Arkansas	0.6	0.2	0.3
California	59.0	57.6	57.9
Colorado	3.5	2.4	2.6
Connecticut	0.6	0.4	0.4
District of Columbia	0.6	0.4	0.4
Delaware	0.0	0.0	0.0
Florida	1.2	0.7	0.8
Georgia	0.0	0.6	0.5
Hawaii	0.3	0.3	0.3
Idaho	0.3	0.5	0.5
Illinois	2.3	2.0	2.1
Indiana	0.3	0.4	0.3
Iowa	1.2	0.4	0.6
Kansas	0.3	0.2	0.2
Kentucky	0.0	0.2	0.1
Louisiana	1.2	0.1	0.3
Maine	0.3	0.0	0.1
Maryland	0.9	0.7	0.7
Massachusetts	0.6	0.6	0.6
Michigan	0.9	1.4	1.3
Minnesota	1.2	1.4	1.4
Mississippi	0.9	0.9	0.9
Missouri	0.0	0.1	0.1

US state	Year[1]		
	Fall 2010	Fall 2019	Total
Montana	0.3	0.4	0.4
Nebraska	0.0	0.2	0.1
Nevada	1.2	1.2	1.2
New Hampshire	0.3	0.4	0.3
New Jersey	0.6	1.4	1.2
New Mexico	0.6	0.5	0.5
New York	2.0	2.3	2.2
North Carolina	0.9	0.8	0.8
North Dakota	0.3	0.1	0.1
Ohio	0.3	1.4	1.2
Oklahoma	0.0	0.1	0.1
Oregon	2.6	3.4	3.2
Pennsylvania	0.6	1.5	1.3
Puerto Rico	0.0	0.1	0.1
Rhode Island	0.3	0.3	0.3
South Carolina	0.9	0.2	0.3
South Dakota	0.0	0.3	0.2
Tennessee	0.0	1.0	0.7
Texas	1.7	1.5	1.6
Utah	0.6	0.8	0.7
Vermont	0.0	0.3	0.2
Virginia	0.9	1.2	1.1
Washington	5.5	5.1	5.2
West Virginia	0.3	0.2	0.2
Wisconsin	0.9	0.4	0.5
Wyoming	0.3	0.4	0.3

[1]Cells reported as percentages (%) of affirmative (yes) responses. $X^2 = 51.109$, $p = 0.430$. Shading highlights the three highest (blue) percentages per year and overall.

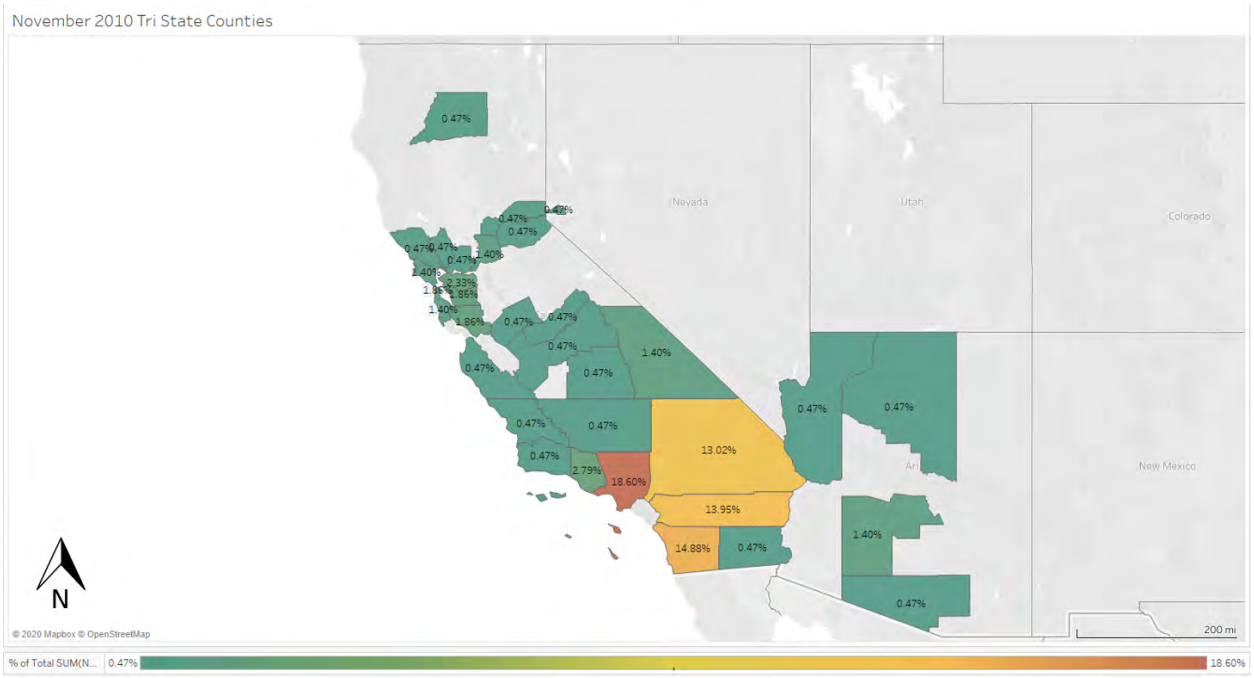


Figure 22. Map of U.S. home zip codes reported for California, Arizona, and Nevada by county and percentage of the total listed for Fall November 2010.

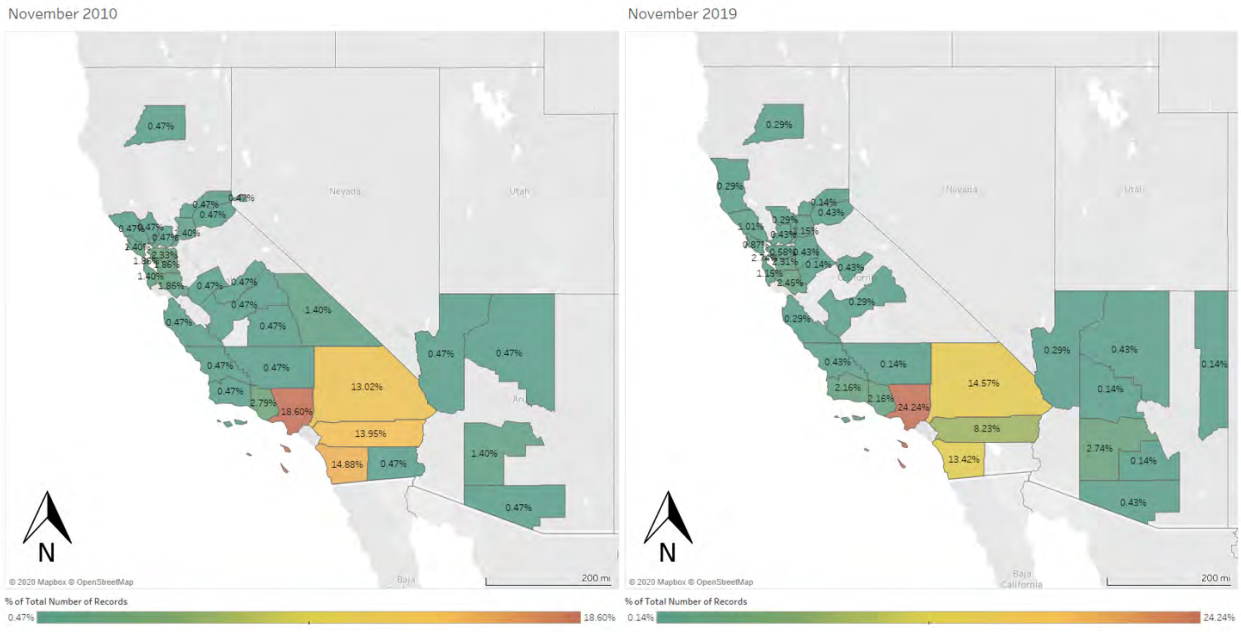


Figure 23. Maps of U.S. home zip codes reported for California, Arizona, and Nevada by county in Fall November 2010 (left) and Fall November 2019 (right).

Table 62. California visitors' county of primary residence by year and overall. *(derived from zip codes reported in General survey Q12a, Management survey 8a, 2010 survey Q20b)*

California county	Year[1]		
	Fall 2010	Fall 2019	Total
Alameda	2.0	2.5	2.3
Contra Costa	2.5*	0.6*	1.1
El Dorado	0.5	0.5	0.5
Fresno	0.5	0.3	0.4
Humboldt	1.0*	0.2*	0.4
Imperial	0.5	0.0	0.1
Inyo	1.5*	0.0*	0.4
Kern	0.5	0.2	0.2
Los Angeles	19.6*	25.8*	24.4
Madera	0.5	0.0	0.1
Marin	1.5	0.9	1.1
Mariposa	0.0	0.5	0.4
Mendocino	0.0	0.3	0.2
Merced	0.5	0.0	0.1
Monterey	0.5	0.3	0.4
Napa	0.5	0.0	0.1
Nevada	0.0	0.8	0.6
Orange	9.8*	11.7*	11.2
Placer	0.5	0.2	0.2

California county	Year[1]		
	Fall 2010	Fall 2019	Total
Riverside	14.7**	8.8**	10.2
Sacramento	1.5	1.2	1.3
San Bernardino	13.7*	15.5*	15.1
San Diego	15.7**	14.3**	14.6
San Francisco	2.0	2.9	2.7
San Joaquin	0.0	0.5	0.4
San Luis Obispo	0.5	0.5	0.5
San Mateo	1.5	1.2	1.3
Santa Barbara	0.5	2.3	1.9
Santa Clara	2.0	2.6	2.5
Santa Cruz	1.0	0.9	0.9
Shasta	0.5	0.3	0.4
Solano	0.5	0.5	0.5
Sonoma	0.5	1.1	0.9
Stanislaus	0.0	0.2	0.1
Tulare	0.5	0.0	0.1
Ventura	2.9*	2.3*	2.5
Yolo	0.0	0.3	0.2

[1]Cells reported as percentages (%) of affirmative (yes) responses. $X^2 = 54.571$; $p = 0.024$; Cramer's $V = 0.253$. Shading highlights the three highest (blue) percentages per year and overall.
*Yearly difference is significant at $p < 0.05$; **Yearly difference is significant at $p < 0.001$.

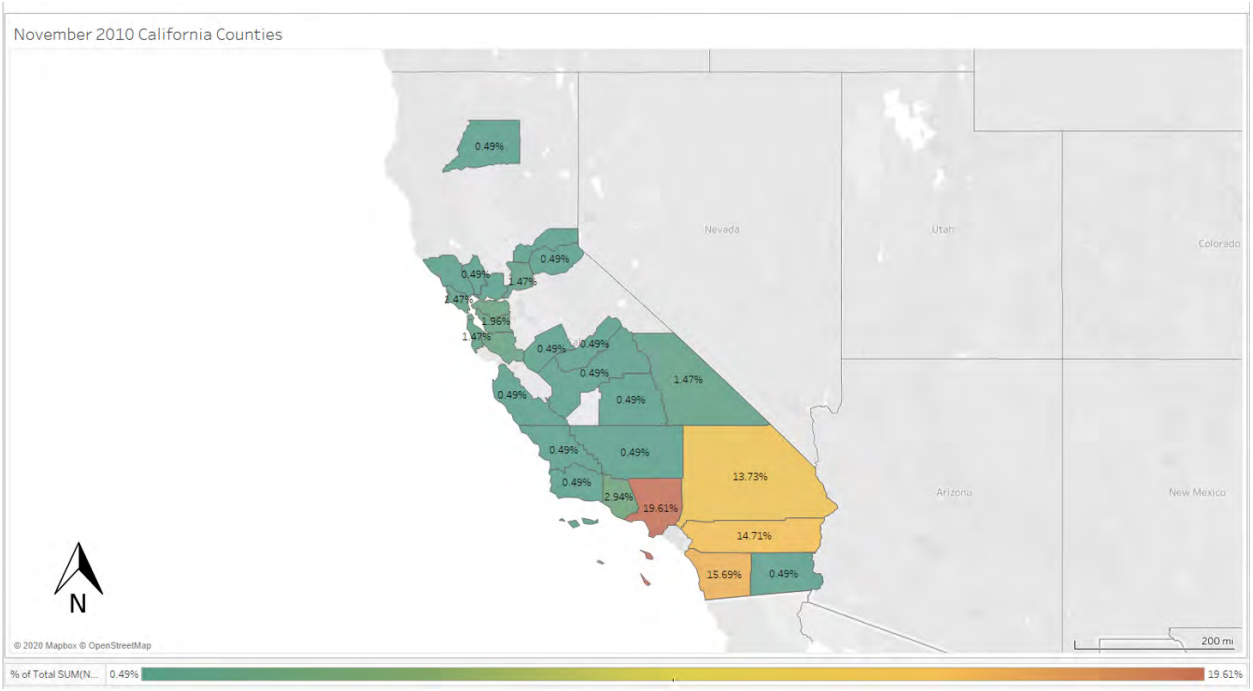


Figure 24. Map of U.S. home zip codes reported for California by county and percentage of the total listed for Fall November 2010.

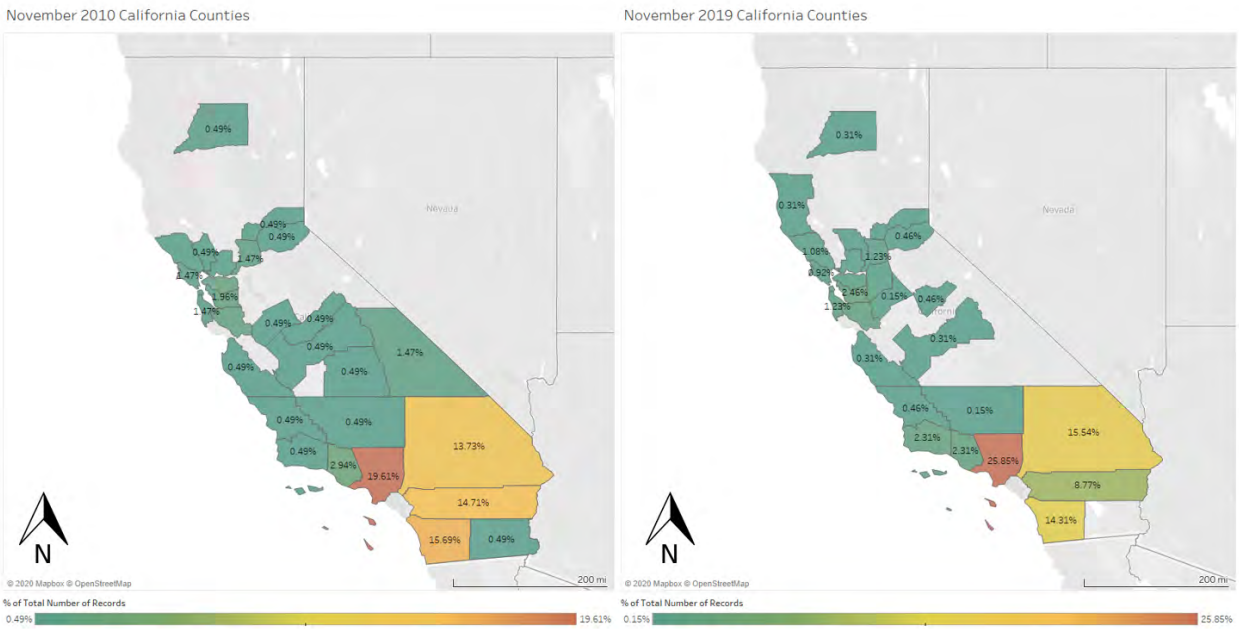


Figure 25. Maps of U.S. home zip codes reported for California by county in Fall November 2010 (left) and Fall November 2019 (right).

Table 63. Age of visitors by year and overall. *(General survey Q12b, Management survey Q8b, 2010 survey Q20a)*

Age of visitors	Year[1]		
	Fall 2010	Fall 2019	Total
< 20	1.6*	0.3*	0.6
20-29	12.7**	19.7**	18.1
30-39	17.4**	28.0**	25.6
40-49	14.1	14.5	14.4
50-59	22.1*	15.5*	17.0
60-69	24.5**	14.9**	17.0
70-79	6.8	6.9	6.9
80-89	0.7	0.3	0.4
Average age[2]	49.12** (15.75)	44.46** (15.51)	45.49 (10-88)

[1]Cells reported as percentages (%) of affirmative (yes) responses. $X^2 = 58.701$; $p < 0.001$; Cramer's V = 0.178. Shading highlights the highest (blue) and lowest (red) percentage per year and overall.
[2]Cells are reported in years, means (M) followed by the (standard deviation) for summer and fall and means followed by the (range) for total. $t = 5.406$; $p < 0.001$; Cohen's d = 0.298.
*Yearly difference is significant at $p < 0.05$. **Yearly difference is significant at $p < 0.001$.

Table 64. Group size of visitors by year and overall. *(Intercept control logs, 2010 survey Q19b)*

Group size	Year[1]		
	Fall 2010	Fall 2019	Total
Number of people	3.15** (2.66)	2.36 **(1.59)	2.45 (1-30)

[1]Cells reported as means (M) followed by (standard deviation) for 2010 and 2019 and by (range) for overall. $t = 6.103$, $p < 0.001$, Cohen's d = 0.361.
**Yearly difference is significant at $p < 0.001$.

Table 65. Group type of visitors by year and overall. *(Intercept control logs, 2010 survey Q19a)*

Group type	Year[1]		
	Fall 2010	Fall 2019	Total
Alone	10.2**	18.4**	16.5
Family	56.6	55.3	55.6
Friends	24.5*	19.5*	20.7
Family/friends	8.7*	5.4*	6.1
Other	0.0*	1.4*	1.1

[1]Cells are reported as percentages (%) for affirmative (yes) responses. $X^2 = 36.300$, $p < 0.001$; Cramer's V = 0.126. Shading highlights the highest (blue) and lowest (red) percentage per year and overall.
*Yearly difference is significant at $p < 0.05$; **Yearly difference is significant at $p < 0.001$.

VISITATION FREQUENCY AND LOCATIONS

Table 66. Time spent in the park on this trip by year and overall. *(General survey Q2a, 2010 survey Q7)*

On this trip, how long did you and your personal group spend visiting Joshua Tree National Park? *List partial hours / days as .25, .50, .75*	Year[1]			Tests of significance[2]
	Fall 2010	Fall 2019	Total	
Number of hours, if fewer than 24 hours	5.49 (3.91)	5.55 (3.92)	5.53 (0.25-23.00)	t: -0.224 p: 0.823
If you visited the park for more than one day, how many days did you spend in the park?	3.25 (2.12)	3.01 (2.09)	3.11 (1-15)	t: 1.225 p: 0.221

[1]Cells are reported in units of time: means followed by the (standard deviation) for 2010 and 2019 and means followed by the (range) for total.
[2]T test (t); p value (p).

Table 67. Percent of visitors reporting the park as primary destination by year and overall. *(General survey Q2b, 2010 survey Q2)*

On this trip…	Year[1]		
	Fall 2010	Fall 2019	Total
Joshua Tree NP was the primary destination	42.7**	62.6**	57.6
Joshua Tree NP was one of several destinations	48.7**	34.3**	37.9
Joshua Tree NP was not a planned destination	8.7**	3.1**	4.5

[1] Cells are reported as percentages (%) for affirmative (yes) responses. $X^2 = 68.718$, $p < 0.001$, Cramer's V = 0.190.
*Yearly difference is significant at $p < 0.05$; **Yearly difference is significant at $p < 0.001$.

Table 68. Primary reason in the area by year and overall. *(General survey Q4, 2010 survey Q5)*

On this trip, what was the primary reason that you and your personal group came to the Joshua Tree NP area (Yucca Valley, Joshua Tree, Twentynine Palms)?	Year[1]		
	Fall 2010	Fall 2019	Total
Resident of the area (Yucca Valley, Joshua Tree, Twentynine Palms)	6.2	6.3	6.3
Visit Joshua Tree NP	70.4	74.9	73.8
Visit other attractions in the area	7.7	6.4	6.7
Visit friends / relatives at the Twentynine Palms U.S. Marine Corps base	0.6	0.6	0.6
Visit friends / relatives in the area (other than the Marine Corps base)	3.0	3.2	3.2
Traveling through – unplanned visit	6.6*	4.3*	4.8
Business	0.4*	1.8*	1.5
Other[2]	4.9*	2.6*	3.2

[1] Cells are reported as percentages (%) for affirmative (yes) responses. $X^2 = 16.870$, $p = 0.018$, Cramer's V = 0.093. Shading highlights the highest (blue) and lowest (red) percentage per year and overall.
[2]Most frequently listed: Climbing and Wedding.

Table 69. Locations visited in the park by year and overall. *(General survey Q3a-b, Management survey Q2a-b, 2010 survey Q8a-b and Q9)*

For this trip, select the locations in Joshua Tree NP that you and your personal group visited.	Year[1]			Tests of significance[2]
	Fall 2010	Fall 2019	Average	
Joshua Tree Visitor Center	45.2**	26.7**	31.3	X^2: 57.559, p: <0.001, V: 0.172
Black Rock Canyon Area	8.2	6.6	7.0	X^2: 1.362, p: 0.243
Indian Cove Area	12.9*	8.1*	9.3	X^2: 10.000, p: 0.002, V: 0.073
Fortynine Palms Oasis	8.0	7.9	7.9	X^2: 0.004, p: 0.947
Oasis Visitor Center	23.3**	14.8**	16.9	X^2: 18.549, p: <0.001, V: 0.099
Covington Flats	2.2	1.5	1.7	X^2: 0.960, p: 0.327
Keys View	38.8**	29.9**	32.1	X^2: 13.496, p: <0.001, V: 0.083
Keys Ranch	13.5	12.2	12.6	X^2: 0.573, p: 0.449
Barker Dam	34.1*	28.7*	30.1	X^2: 5.035, p: 0.025, V: 0.050
Hidden Valley Area	46.4**	36.9**	39.3	X^2: 14.006, p: <0.001, V: 0.084
Lost Horse Mine	7.0	9.1	8.5	X^2: 2.204, p: 0.138
Jumbo Rocks Area	52.2**	41.8**	44.4	X^2: 16.292, p: <0.001, V: 0.090
Geology Tour Road	7.0	7.1	7.1	X^2: 0.018, p: 0.894
Cholla Cactus Garden	33.7*	39.0*	37.7	X^2: 4.583, p: 0.032, V: 0.047
Cottonwood Visitor Center	21.7*	27.2*	25.8	X^2: 6.076, p: 0.014, V: 0.054
Cottonwood Spring	17.3*	13.1*	14.2	X^2: 5.336, p: 0.021, V: 0.052
Lost Palms Oasis	6.0	7.9	7.4	X^2: 2.072, p: 0.150
Other[3]	4.4**	12.0**	10.1	X^2: 27.948, p: <0.001, V: 0.109

[1]Cells are reported as percentages (%) for affirmative (yes) responses. Percentages for 2019 are for the truncated list of 17 comparative locations (plus "Other") to 2010, rather than the full list of 33 locations (plus "Other") presented in 2019. Shading highlights the highest (blue) and lowest (red) percentage per year and overall.

[2]Chi-square (X^2); p value (p); Cramer's V (V) for significant differences (p <0.05).

[3]Most frequently listed for 2019 (in descending order): Hall of Horrors Area, Arch Rock Nature Trail, Boy Scout Trail, Desert Queen Mine, Wonderland of Rocks Area, Wall Street Mill, Ocotillo Patch, California Riding and Hiking Trail, and Queen Valley Road Area.

Most frequently listed for 2010 (in descending order, from Table 12 in the 2010 final report): Ryan Mountain, Arch Rock Nature Trail, Jumbo Rocks Area, Boy Scout Trail, Wall Street Mill, Hall of Horrors Area, and multiple other specific sites/features with a single mention.

*Yearly difference is significant at p <0.05; **Yearly difference is significant at p <0.001.

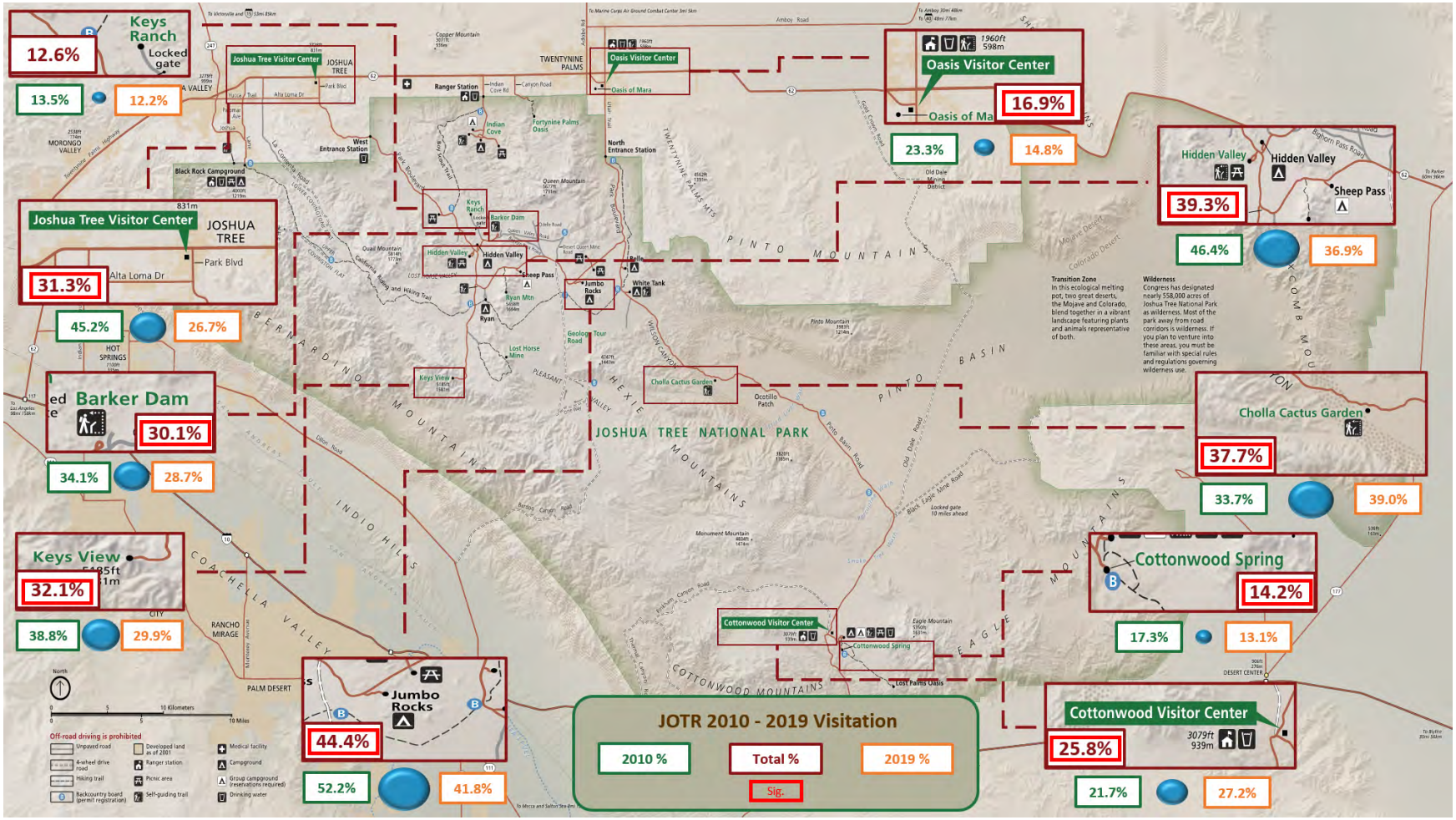


Figure 26. The ten park locations most visited overall in Fall November 2010 and 2019, with differences in annual visitation rates highlighted. Percentages for 2019 are for the truncated list of 17 comparative locations (plus “Other”) to 2010, rather than the full list of 33 locations (plus “Other”) presented in 2019.

ACTIVITIES

Table 70. Activities participated in during this visit to the park, by year and overall. *(General survey Q5a, Management survey Q3a, 2010 survey Q10a)*

On this visit, in which activities did you and your personal group participate within Joshua Tree NP? **	Year[1]			Tests of significance
	Fall 2010	Fall 2019	Total	
Attended field classes or other guided activities	2.4	3.6	3.3	X^2: 1.767, p: 0.184
Attended ranger-led programs	5.8	6.3	6.2	X^2: 0.212, p: 0.645
Backpacking overnight	1.0**	6.5**	5.2	X^2: 31.736, p: <0.001, V: 0.108
Bicycling	7.8**	3.6**	4.6	X^2: 13.554, p: <0.001, V: 0.087
Bouldering (using pads and bouldering guides)	8.0**	15.8**	13.8	X^2: 21.427, p: <0.001, V: 0.098
Camping[2]	23.9**	48.2**	42.1	X^2: 95.666, p: <0.001, V: 0.213
Day hiking	45.6**	93.9**	81.8	X^2: 518.666, p: <0.001, V: 0.541
Horseback riding	1.4*	0.3*	0.6	X^2: 6.064, p: 0.014, V: 0.060
Picnicking	26.3*	33.0*	31.3	X^2: 8.008, p: 0.005, V: 0.062
Rock scrambling (without specialized gear or skills)	24.9**	59.9**	51.2	X^2: 190.819, p: <0.001, V: 0.303
Sightseeing	57.4**	90.0**	81.9	X^2: 239.320, p: <0.001, V: 0.367
Stargazing / viewing night sky	24.5**	50.9**	44.3	X^2: 111.295, p: <0.001, V: 0.230
Technical climbing (with specialized gear or skills)	14.9*	19.4*	18.3	X^2: 5.120, p: 0.024, V: 0.050
Visited historical or archaeological sites	22.3**	38.9**	34.8	X^2: 48.301, p: <0.001, V: 0.151
Walking self-guided nature trails (with brochures/signs)	54.2**	65.6**	62.7	X^2: 20.553, p: <0.001, 0.102
Other[3]	14.1*	10.6*	11.5	X^2: 4.541, p: 0.033, V: 0.048

[1]Cells are reported as percentages (%) for affirmative (yes) responses. Shading highlights the highest (blue) and lowest (red) percentage per year and overall.
[2]There is a bias for overreporting camping in this question, based on responses to other questions in the survey, potentially due to respondents conflating camping in the park with camping in the general area.
[3]All listed Other activities with more than one mention for 2019 (listed in descending order): Off-roading, Driving through, Junior Ranger Program, Bird watching, Dogs, Motorcycling, Painting.
All listed Other activities for 2010 (from Figure 39 in the 2010 final report, no frequencies provided): 4-wheel driving, Bird watching, Community service, Driving, Educating about desert ecology, Engagement, Learning about geology, Motorcycling, Night fires, Photography, Viewing plants/wildlife, Talking to a ranger, Trail running, Watching the climbers.
*Yearly difference is significant at p <0.05; **Yearly difference is significant at p <0.001.

Table 71. Primary activity participated in during this visit to the park, by year and overall. *(General survey Q5b, Management survey Q3b, 2010 survey Q10b)*

Which activity was the primary activity in which you and your personal group participated at Joshua Tree NP on this visit?	Year[1]	
	Fall 2010	Fall 2019
Attended field classes or other guided activities	<1	<1
Attended ranger-led programs	1	<1
Backpacking overnight	<1	2
Bicycling	0	<1
Bouldering (using pads and bouldering guides)	1	2
Camping	9	9
Day hiking	27	28
Horseback riding	<1	0
Picnicking	<1	<1
Rock scrambling (without specialized gear or skills)	4	3
Sightseeing	23	15
Stargazing / viewing night sky	1	1
Technical climbing (with specialized gear or skills)	14	4.8
Visited historical or archaeological sites	1	<1
Walking self-guided nature trails (with brochures/signs)	13	5
Other	3	2

[1]Cells are reported as percentages (%) for affirmative (yes) responses. Statistical comparisons and Total not provided, as the 2010 data for this question was not available. 2010 results are from Figure 40 in the 2010 final report. Shading highlights the highest (blue) and lowest (red) percentage per year.

LODGING AND RESERVATIONS

Table 72. Overnight plans in the park and in the area by year and overall. *(General survey Q7a, Q7b, Q8a, and Q8b; Management survey Q5a; 2010 survey Q6a, Q6b, and Q9b)*

Campsite reservations question	Year[1]			Tests of significance[2]
	Fall 2010	Fall 2019	Total	
Did you or members of your personal group attempt to make reservations for campsites at Joshua Tree NP for this trip?	10.7**	17.9**	16.1	X^2: 15.625 p: <0.001 V: 0.087
Were you able to make campsite reservations at Joshua Tree NP for this trip?	79.2	70.6	71.8	X^2: 1.760 p: 0.185
On this trip, did you and your personal group camp overnight within Joshua Tree NP?	33.3**	25.1**	27.1	X^2: 11.494 p: 0.001 V: 0.079
On this visit, did you and your personal group stay overnight away from home in the area surrounding Joshua Tree NP (Yucca Valley, Joshua Tree, Twentynine Palms)?	33.7**	46.5**	43.3	X^2: 24.269 p: <0.001 V: 0.112

[1]Cells are reported as percentages (%) for affirmative (yes) responses.
[2]Chi-square test (X^2); p value (p);Cramer's V (V) for significant differences (p <0.05).
*Yearly difference is significant at p <0.05; **Yearly difference is significant at p <0.001.

Table 73. For those who stayed overnight on this trip, the number of nights spent in the park and/or in the area by year and overall. *(General survey Q8a and Q8b, 2010 survey Q9b)*

Overnight lodging question	Year[1]			Tests of significance[2]
	2010	2019	Total	
On this trip, how many nights did you and your personal group camp overnight within Joshua Tree NP?	2.33 (1.78)	2.56 (2.37)	2.46 (1-14)	t: -1.035 p: 0.301
On this visit, how many nights did you and your personal group stay overnight away from home in the area surrounding Joshua Tree NP (Yucca Valley, Joshua Tree, Twentynine Palms)?	2.63 (2.38)	3.28 (6.22)	3.08 (1-90)	t: -1.289 p: 0.198

[1]Cells are reported in means (M) followed by the (standard deviation) for summer and fall and means followed by the (range) for total.
[2]T test (t); p value (p); Cohen's d (d) for significant differences (p <0.05).

Table 74. Types of lodging used to spend the night inside and outside of the park by year and overall. *(General survey Q9, 2010 survey Q9c)*

In what type of lodging did you and your personal group spend the night(s)…		Year[1]			Tests of significance[2]
		Fall 2010	Fall 2019	Total	
Inside the park?	RV/trailer camping	8.0	8.0	8.0	X^2: 0.00, p: 0.983
	Tent camping in developed campground	19.5	20.1	20.0	X^2: 0.077, p: 0.781
	Backcountry campsite	4.0	3.4	3.6	X^2: 0.320, p: 0.572
	Residence of friends or relatives	1.0*	0.2*	0.4	X^2: 5.056, p: 0.027, V: 0.055
	Other[3]	0.8*	0.1*	0.3	X^2: 4.643, p: 0.037, V: 0.053

[1]Cells are reported as percentages (%) for affirmative (yes) responses. Shading highlights the highest (blue) and lowest (red) percentage per year and overall.
[2]Chi-square test (X^2); p value (p);Cramer's V (V) for significant differences (p <0.05).
[3]All listed Other locations inside/outside the park for 2019: Dr. Luckie Research Station and Home.
All listed Other locations inside/outside the park for 2010 (from Figure 33 in the 2010 final report): BLM land, Pulled off on roadside.
*Yearly difference is significant at p <0.05; **Yearly difference is significant at p <0.001.

INFORMATION AND AWARENESS

Table 75. Whether visitors obtained necessary information before or during their visit to the park, by year and overall. *(General survey Q10a-b and Q11a, 2010 survey Q1, Q1c, and Q11)*

Information question	Year[1]			Tests of significance[2]
	Fall 2010	Fall 2019	Total	
Prior to this visit, did you and your personal group obtain information about the park?	87.5**	73.1**	76.8	X^2: 47.438 p: <0.001 V: 0.149
From the sources used prior to this visit, did you and your personal group obtain the type of information about the park that you needed?	93.3	94.8	94.4	X^2: 1.179 p: 0.277
Did you or your personal group use any information services or facilities during this visit to Joshua Tree NP?	96.0**	60.5**	69.0	X^2: 257.251 p: <0.001 V: 0.327

[1]Cells are reported as percentages (%) for affirmative (yes) responses.
[2]Chi-square test (X^2); p value (p); Cramer's V (V).
**Yearly difference is significant at p <0.001.

Table 76. Sources of information used for this park visit, by year and overall. *(General survey Q10b, 2010 survey Q1a-b)*

Prior to this visit, how did you and your personal group obtain information about the park?	Year[1]			Tests of significance[2]
	Fall 2010	Fall 2019	Total	
Joshua Tree NP website: www.nps.gov/jotr	54.1**	63.3**	61.2	X^2: 12.070, p: 0.001, V: 0.079
Social media – Any	2.7**	18.7**	15.1	X^2: 89.821, p: <0.001, V: 0.186
-- Facebook	3.2*	6.7*	5.9	X^2: 8.547, p: 0.003, V: 0.062
-- Twitter	0.2*	1.5*	1.2	X^2: 5.942, p: 0.015, V: 0.047
-- Flickr	0.7	0.3	0.4	X^2: 0.942, p: 0.332
-- Other	0.2**	3.2**	2.6	X^2: 18.272, ,p: <0.001, V: 0.079
Other websites (Trip Advisor, Hotels.com, Expedia, etc.)	22.1	23.2	22.9	X^2: 0.246, p: 0.620
Friends / relatives / word of mouth	43.7**	34.4**	36.5	X^2: 12.252, p: <0.001, V: 0.080
Highway signs	13.6*	9.5*	10.4	X^2: 5.807, p: 0.016, V: 0.056
Inquiry to park via phone, mail, or email	5.1*	2.4*	3.0	X^2: 7.419, p: 0.006, V: 0.066
Local businesses (hotels, motels, restaurants, etc.)	6.7*	3.2*	4.0	X^2: 9.639, p: 0.002, V: 0.075
Maps / brochures	37.2	34.7	35.3	X^2: 0.951, p: 0.329
Newspaper / magazine articles	8.2**	3.6**	4.7	X^2: 13.974, p: <0.001, V: 0.090
Other National Park Service sites / units	5.5	7.7	7.2	X^2: 2.658, p: 0.103
Previous visits	35.0**	20.9**	24.1	X^2: 35.075, p: <0.001, V: 0.138
School class / program	0.9	1.6	1.4	X^2: 1.225, p: 0.268
State or local welcome center / visitors bureau / chamber of commerce	7.7*	5.2*	5.7	X^2: 3.902, p: 0.048, V: 0.046
Television / radio programs / DVDs	2.3	1.5	1.7	X^2: 1.084, p: 0.298
Travel guides / tour books (AAA, Fodor's, Lonely Planet, etc.)	26.4**	14.7**	17.4	X^2: 29.742, p: <0.001, V: 0.128
Other[3]	3.9**	8.5**	7.4	X^2: 11.989, p: 0.001, V: 0.073

[1]Cells are reported as percentages (%) for affirmative (yes) responses. Shading highlights the highest (blue) and lowest (red) percentage per year and overall.
[2]Chi-square test (X^2); p value (p); Cramer's V (V) for significant differences (p <0.05).
[3]All listed information sources for 2019 with more than one mention (listed in descending order): All Trails App, Climbing guide, Hiking guide, Google, Google Earth, blogs, eBird, Internet, Joshua Tree Rock Climbs book, and YouTube.
All listed information sources for 2010 (from Figure 18 in the 2010 final report): GPS, NOAA weather, Scouts, U2 album/cover, Vertical Adventures.
*Yearly difference is significant at p <0.05; **Yearly difference is significant at p <0.001.

Table 77. Sources of information preferred for future visits, by year and overall. *(General survey Q10b, 2010 survey Q1a-b)*

If you were to visit Joshua Tree NP in the future, how would you and your personal group prefer to obtain information about the park?	Year[1]			Tests of significance[2]
	Fall 2010	Fall 2019	Total	
Joshua Tree NP website: www.nps.gov/jotr	71.8**	35.2**	42.7	X^2: 169.577, p: <0.001, V: 0.298
Social media – Any	5.4*	10.3*	9.3	X^2: 9.761, p: 0.002, V: 0.068
Other websites (Trip Advisor, Hotels.com, Expedia, etc.)	21.4**	10.6**	12.8	X^2: 28.832, p: <0.001, V: 0.130
Friends / relatives / word of mouth	25.8**	14.0**	16.4	X^2: 28.712, p: <0.001, V: 0.129
Highway signs	9.6**	3.4**	4.7	X^2: 21.823, p: <0.001, V: 0.117
Inquiry to park via phone, mail, or email	7.2**	1.9**	3.0	X^2: 24.224, p: <0.001, V: 0.126
Local businesses (hotels, motels, restaurants, etc.)	5.2**	0.7**	1.6	X^2: 30.654, p: <0.001, V: 0.146
Maps / brochures	36.2**	19.2**	22.6	X^2: 47.044, p: <0.001, V: 0.164
Newspaper / magazine articles	10.3**	2.4**	4.1	X^2: 39.555, p: <0.001, V: 0.161
Other National Park Service sites / units	9.8*	5.6*	6.4	X^2: 8.451, p: 0.004, V: 0.070
Previous visits	33.3**	9.8**	14.6	X^2: 116.494, p: <0.001, V: 0.269
School class / program	0.5	0.7	0.7	X^2: 0.214, p: 0.4643
State or local welcome center / visitors bureau / chamber of commerce	13.4**	3.4**	5.4	X^2: 49.310, p: <0.001, V: 0.179
Television / radio programs / DVDs	3.1**	0.5**	1.1	X^2: 15.119, p: <0.001, V: 0.101
Travel guides / tour books (AAA, Fodor's, Lonely Planet, etc.)	28.9**	10.4**	14.2	X^2: 75.547, p: <0.001, V: 0.214
Other[3]	1.8*	4.9*	4.3	X^2: 8.632, p: 0.003, V: 0.061

[1]Cells are reported as percentages (%) for affirmative (yes) responses. Shading highlights the highest (blue) and lowest (red) percentage per year and overall.
[2]Chi-square test (X^2); p value (p); Cramer's V (V) for significant differences (p <0.05).
[3]All listed information sources for 2019 with more than one mention (listed in descending order): All Trails App, Climbing guide, Hiking guide, Google, Google Earth, blogs, eBird, Internet, Joshua Tree Rock Climbs book, and YouTube.
All listed information sources for 2010 (from Figure 18 in the 2010 final report): GPS, NOAA weather, Scouts, U2 album/cover, Vertical Adventures.
*Yearly difference is significant at p <0.05; **Yearly difference is significant at p <0.001.

Table 78. Information and facilities used during this visit to the park, by year and overall. *(General survey Q11b, 2010 survey Q11a)*

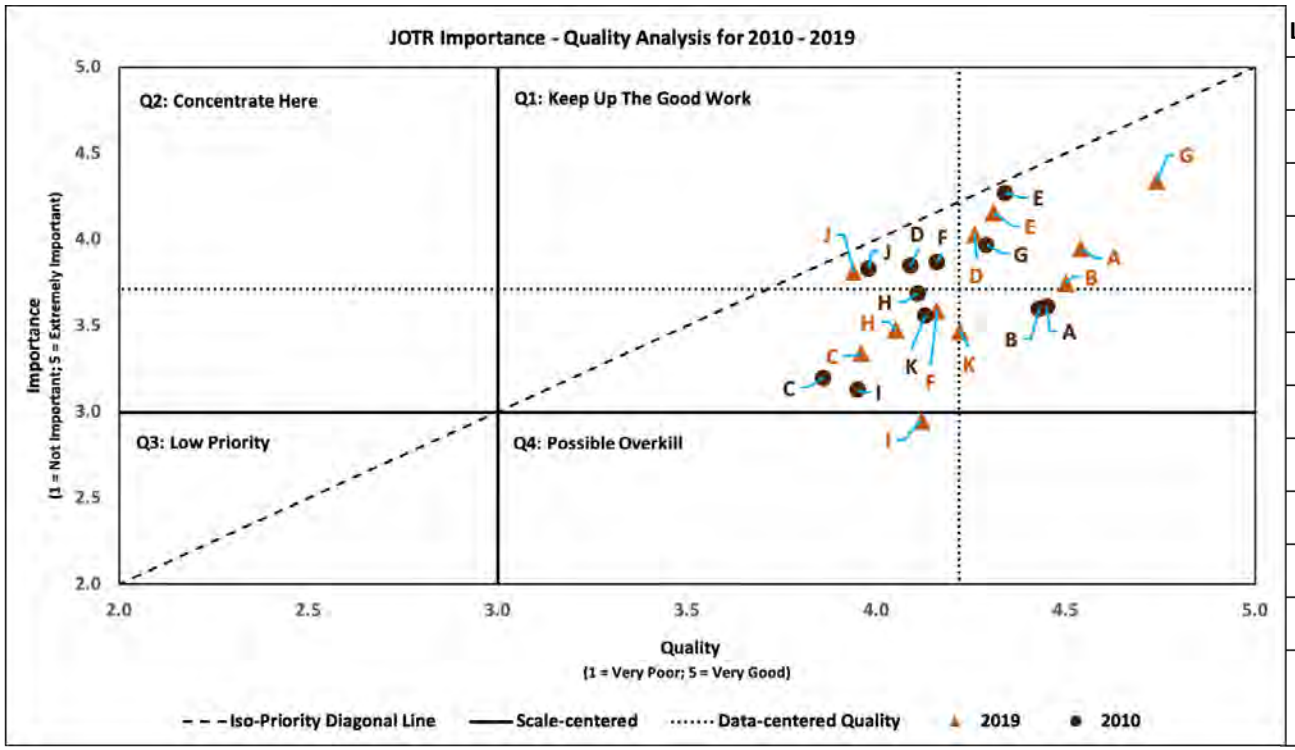
Please mark all the information series and facilities that you or your personal group used during this visit to Joshua Tree NP	Year[1]			Tests of significance
	Fall 2010	Fall 2019	Total	
Assistance from visitor center staff	66.2**	41.8**	47.4	X^2: 83.326 p: <0.001 V: 0.205
Assistance from entrance station staff	42.3**	22.0**	26.7	X^2: 68.604 p: <0.001 V: 0.193
Bulletin boards	28.1**	19.0**	21.1	X^2: 16.138 p: <0.001 V: 0.093
Joshua Tree NP website: www.nps.gov/jotr (used before or during visit)	38.3*	33.2*	34.3	X^2: 3.928 p: 0.047 V: 0.045
Park brochure / map	70.5**	54.4**	58.0	X^2: 37.630 p: <0.001 V: 0.137
Park newspaper	40.3**	11.0**	17.6	X^2: 177.326 p: <0.001 V: 0.323
Ranger-led programs (walks, talks, etc.)	9.7**	2.8**	4.4	X^2: 32.179 p: <0.001 V: 0.140
Roadside exhibits	44.8**	28.8**	32.4	X^2: 38.727 p: <0.001 V: 0.143
Sales items in visitor center	20.9**	7.9**	10.9	X^2: 52.519 p: <0.001 V: 0.175
Trailside exhibits / signs	45.0**	30.7**	34.0	X^2: 30.462 p: <0.001 V: 0.127
Visitor center exhibits	40.5**	25.0**	28.5	X^2: 38.926 p: <0.001 V: 0.144

[1]Cells are reported as percentages (%) for affirmative (yes) responses. Shading highlights the highest (blue) and lowest (red) percentage per year and overall.
[2]Chi-square test (X^2); p value (p); Cramer's V (V) for significant differences (p <0.05).
*Yearly difference is significant at p <0.05; **Yearly difference is significant at p <0.001.

Table 79. Perceived importance and quality of services and facilities used, by year and overall *(General survey Q11c-d, 2010 survey Q11b-c)*

For those services and facilities that you or your personal group used, please rate their…		Year[1]			Tests of significance[4]
		Fall 2010	Fall 2019	Total	
Importance	Assistance from visitor center staff	3.61** (1.29)	3.95** (0.94)	3.84	t: -4.033, p: <0.001, d: 0.301
	Assistance from entrance station staff	3.60 (1.25)	3.75 (0.98)	3.70	t: -1.469, p: 0.143
	Bulletin boards	3.20 (1.24)	3.34 (0.98)	3.30	t: -1.115, p: 0.266
	Joshua Tree NP website: www.nps.gov/jotr (used before or during visit)	3.85 (1.14)	4.03 (0.89)	3.98	t: -1.827, p: 0.069
	Park brochure / map	4.27 (0.91)	4.16 (0.87)	4.19	t: 1.732, p: 0.084
	Park newspaper	3.87* (1.04)	3.59* (1.14)	3.74	t: 2.412, p: 0.016, d: 0.257
	Ranger-led programs (walks, talks, etc.)	3.97 (1.09)	4.34 (0.76)	4.16	t: -1.74, p: 0.086
	Roadside exhibits	3.69* (0.97)	3.48* (0.99)	3.55	t: 2.431, p: 0.015, d: 0.215
	Sales items in visitor center	3.13 (1.10)	2.95 (1.05)	3.03	t: 1.238, p: 0.217
	Trailside exhibits / signs	3.83 (0.93)	3.81 (0.91)	3.82	t: 0.225, p: 0.822
	Visitor center exhibits	3.56 (1.04)	3.47 (0.94)	3.50	t: 1.027, 0.305
Quality	Assistance from visitor center staff	4.45 (0.77)	4.54 (0.72)	4.51	t: -1.793, p: 0.074
	Assistance from entrance station staff	4.43 (0.84)	4.50 (0.72)	4.47	t: -0.900, p: 0.369
	Bulletin boards	3.86 (0.88)	3.96 (0.79)	3.93	t: -1.068, p: 0.287
	Joshua Tree NP website: www.nps.gov/jotr (used before or during visit)	4.09* (0.83)	4.26* (0.73)	4.22	t: -2.416, p: 0.016, d: 0.219
	Park brochure / map	4.34 (0.77)	4.31 (0.82)	4.32	t: 0.470, p: 0.638
	Park newspaper	4.16 (0.82)	4.16 (0.75)	4.16	t: -0.078, p: 0.938
	Ranger-led programs (walks, talks, etc.)	4.29* (0.77)	4.74* (0.44)	4.52	t: -3.169, p: 0.002, d: 0.726
	Roadside exhibits	4.11 (0.77)	4.05 (0.83)	4.07	t: 0.820, p: 0.412
	Sales items in visitor center	3.95 (0.90)	4.12 (0.81)	4.05	t: -1.393, p: 0.165
	Trailside exhibits / signs	3.98 (0.83)	3.94 (0.88)	3.95	t: 0.571, p: 0.568
	Visitor center exhibits	4.13 (0.85)	4.22 (0.74)	4.19	t: -1.375, p: 0.170

[1]Cells reported as means (M) on a five-point scale, followed by the (standard deviation) for summer and fall:
Importance: Not important (1); Somewhat important (2); Moderately important (3); Very important (4); and Extremely important (5).
Quality: Very poor (1); Poor (2); Average (3); Good (4); and Very good (5).
Shading highlights the highest (blue) and lowest (red) percentage per year and overall.
[2]T test (t); p value (p); Cohen's d (d) for significant differences (p <0.05).
*Yearly difference is significant at p <0.05; **Yearly difference is significant at p <0.001.



Letter	Park services and facilities
A	Assistance from visitor center staff
B	Assistance from entrance station staff
C	Bulletin boards
D	Joshua Tree NP website: www.nps.gov/jotr
E	Park brochure / map
F	Park newspaper
G	Ranger-led programs (walks, talks, etc.)
H	Roadside exhibits
I	Sales items in visitor center
J	Trailside exhibits / signs
K	Visitor center exhibits
L	Other park publications (plant lists, dog information, camping brochure, etc.)

Figure 27. Importance/Quality matrix of the 2010 and 2019 responses, depicting shifts in perceptions of importance and/or quality.

Understanding Beyond-visitor Park Discussions through Social Media Data

INTRODUCTION

Social media offers a platform for visitors and other individuals to share perspectives, experiences, and information related to JOTR. Understanding attributes of this larger conversation in general and how it varies seasonally can help park managers gain insight on how the park is discussed in broad contexts. In the following, we present a large, novel data set (i.e., big data) harvested from online text sources (i.e., Twitter) to examine and map attributes of each post about JOTR and the sentiments expressed overall and by season.

As user-generated content online increasingly shapes conversations about parks, and significant events spur real-time reactions, our study provides insight into analysis methods to categorize and map the sentiments in these conversations over time. Aided by this type of analysis, scientists and managers may better understand relative frequencies of sentiments across different populations and craft relevant messages to address this range of sentiments.

METHODS

We analyzed the collection of tweets mentioning JOTR from January 1, 2017 to February 29, 2020. Tweets were identified first by the researchers familiarizing themselves with what frequently used terminology was present in the tweets and then using Twitter's Advanced Search and the following query:
(jtnp OR joshua_tree OR joshuatree OR "joshua tree") -U2 -album
This allowed us to collect tweets that referenced the park by its name ("Joshua Tree"), common acronym (JTNP), or frequently used hashtags (joshua_tree and joshuatree) and to omit those that were in reference to the rock band U2's album titled "Joshua Tree."

TWINT (Twitter Intelligence Tool) was used as an advanced Twitter harvesting and OSINT tool (Open Source Intelligence Tool), written in specialized code using Python, that is not reliant on Twitter's API (Application Programming Interface) to function. TWINT returned the tweets, dates, time stamps, URLs, links, hashtags, usernames, counts of replies and retweets, and other data.

Once this dataset was harvested, we cleaned the text of the tweets to remove special characters (e.g., â, €, ¢) except for a few that denote emotion (e.g., !) and any line breaks. A second round of data cleaning removed all URLs and links to images (captured elsewhere in the dataset) and email addresses. This allowed the text of each tweet to be more readily interpreted by automated sentiment coding programs. We used IBM Watson's Natural Language Understanding (NLU) Analysis to code for sentiment in an automated fashion. NLU is a pre-trained model and API for test analysis. It applies a label to each tweet's sentiment, returning a value between -1 (most negative) and +1 (most positive) according to its reading of the tweet's content. Small values are rounded to 0 for a neutral tweet. The NLU also codes for emotion, detecting anger, disgust, fear, joy, and sadness and returning a value from 0 (weak) to 1 (strong) for each.

Because the federal government shutdown of December 2018 – January 2019 was a significant event in the Twitter conversation about JOTR – both in terms of the frequency of tweets and their content – we opted to remove the dates of the shutdown from this body of tweets for

analysis. This was done to better account for typical patterns of tweets instead of having the data weighted toward the anomaly of the federal government shutdown in winter 2018-2019. We attend to this anomaly specifically in Appendix C, examining the dates of and around this shutdown in comparison to the same time period in the year before and after.

Using the dates for solstices and equinoxes for each of the years, we segmented the remaining tweets by season: spring, summer, fall, and winter. Thus, each season is comprised of multiple years (e.g., spring = all spring dates in 2017, 2018, and 2019).

For tests of statistical significance between seasons, we have opted for a very conservative measure – $p < 0.001$ – or that there is 99.9% confidence that the differences seen between seasons are statistically different. We have chosen this level to better separate out differences within this large sample.

RESULTS

Altogether, the TWINT harvested 191,487 tweets for the three years and two-month period (January 1, 2017 – February 29, 2020), 99.2% of which were usable for this analysis. The most prolific year was 2017, with 38.0% of the total tweets, 54.8%, and the remaining tweets almost evenly split between 2018 and 2019. We then removed tweets posted during the recent federal government shutdown from the dataset (14,285 tweets), yielding a final dataset of 175,754 tweets, or 91.8% of the tweets harvested.

Table 80. Harvested tweets and final dataset composition by year.

Tweets…	2017	2018	2019	2020 (Jan & Feb)	Total
Overall	72,769	50,025	60,576	8,117	191,487
Eligible for NLU Sentiment	72,297	49,611	60,182	8,023	190,113
AND In English	72,220	49,577	60,140	8,017	189,954
AND Outside of the federal government shutdown 12/8/18 – 1/25/19	72,220	46,175	49,342	8,017	**175,754**

These ~176,000 tweets were distributed across the seasons, with relatively more tweets in the spring and winter than in the summer and fall:

- Spring – 29.0%
- Summer – 20.5%
- Fall – 19.8%
- Winter – 30.7%

TWEET COMPOSITION

Overall, 61.7% of tweets linked to a URL, 37.1% contained hashtag(s), 31.5% contained image(s), 25.9% mentioned another Twitter account/handle, and 12.1% contained a location.

Tweet composition for these elements varied across seasons. Spring tweets (i.e., posted in the spring season) had significantly more URLs, images, and hashtags. Summer and fall tweets had significantly more mentions of other accounts. Fall tweets also had significantly more mentions of specific locations. These differences described above had a small effect size.

Table 81. Tweet elements and frequency (%) of distribution by season and overall.

Contains	Season*					Tests of significance		
	Spring	Summer	Fall	Winter	Total	X^2	p	Cramer's V
Location(s)	11.8	12.2	13.2	11.7	12.1	52.826	<0.001	0.017
Mention(s)	22.4	29.2	28.2	25.7	25.9	619.793	<0.001	0.059
URL(s)	65.1	57.8	59.0	63.0	61.7	624.321	<0.001	0.060
Image(s)	38.1	29.2	25.0	31.1	31.5	1811.932	<0.001	0.102
Hashtag(s)	43.1	34.7	32.6	36.1	37.1	1185.237	<0.001	0.082

* Shading indicates highest (darkest) to lowest (lightest) significantly different percentages for each year.

TWEET SENTIMENT

Overall, tweets were more positive (45.8%) than neutral (33.8%) or negative (20.8%). However, the seasonal comparison was pronounced, with a greater proportion of the spring tweets being positive, a greater proportion of the summer and fall tweets being neutral, and a greater proportion of the fall and winter tweets being negative.

We then examined the overall categories of "positive" and "negative" further, to see the strength of the positivity or negativity expressed. Overall, tweets were more positive than negative, and the overall strength of positivity was greater than the strength of negativity. Therefore, the average of the dataset was positive. Tweets were most positive in the spring and most negative in the fall and winter. These differences generally had a small effect size.

Finally, we examined five emotions coded in the tweets: anger, disgust, fear, joy, and sadness. Among the five, the average strength of "joy" was strongest and the average strength of "fear" was weakest overall and in each season. Although all five emotions are present, the strength of joy in the tweets is overwhelmingly higher than any of the other four emotions, indicating that when an emotion is detected, the emotion of joy is expressed much more strongly than expressions of any of the other emotions. Specifically, by season, spring had significantly more joy, fall had significantly more sadness, and winter had significantly more anger and disgust. Each had a small effect size.

Taken together, tweets tended to be more positive and joyful in the spring, more neutral in the summer, and more negative with associated emotions (sadness, anger, and disgust) in the fall and winter.

Table 82. Sentiment (overall positive, neutral, or negative) frequency (%) distribution of tweets by season and overall.

Sentiment	Season*					Tests of significance
	Spring	Summer	Fall	Winter	Total	
Positive (+)	51.3	44.2	41.8	44.4	45.8	X^2: 1148.544
Neutral (0)	31.7	34.8	34.6	33.0	33.3	p: < 0.001
Negative (-)	17.0	21.0	23.5	22.6	20.8	V: 0.057

* Shading indicates highest (darkest) to lowest (lightest) significantly different percentages for each year.

Table 83. Strength of sentiment (mean value) of tweets by season and overall. Values are on a scale of -1 (most negative) to +1 (most positive).

Average Sentiment	Season*					Tests of significance		
	Spring	Summer	Fall	Winter	Total	F	p	Eta (η)
Positive	0.821	0.768	0.757	0.794	0.791	443.260	< 0.001	0.127
Negative	-0.675	-0.678	-0.695	-0.697	-0.687	29.303	< 0.001	0.049
Overall	0.306	0.197	0.153	0.195	0.219	544.749	< 0.001	0.096

* Shading indicates highest (darkest) to lowest (lightest) significantly different percentages for each year.

Figure 28. Strength of positivity and negativity (mean value) and overall emotion of tweets by season. Values are on a scale of -1 (most negative) to +1 (most positive).

Table 84. Specific emotions (mean value) detected within tweets by season. Values are on a scale of 0 (emotion absent) to +1 (emotion strongest).

Average Emotion	Season*					Tests of significance		
	Spring	Summer	Fall	Winter	Total	F	p	Eta (η)
Anger	0.058[a]	0.061[b]	0.064[c]	0.066[d]	0.063	75.929	< 0.001	0.036
Disgust	0.081[a]	0.070[b]	0.073[c]	0.091[d]	0.080	479.389	< 0.001	0.090
Fear	0.011[a]	0.012[b]	0.012[b]	0.012[c]	0.012	172.719	< 0.001	0.054
Joy	0.614[a]	0.590[b]	0.568[c]	0.564[c]	0.585	474.577	< 0.001	0.090
Sadness	0.011[a]	0.013[b]	0.015[c]	0.014[d]	0.013	542.114	< 0.001	0.096

*Superscripts designate significant differences at $p < 0.001$. Shading indicates highest (darkest) to lowest (lightest) significantly different percentages for each year.

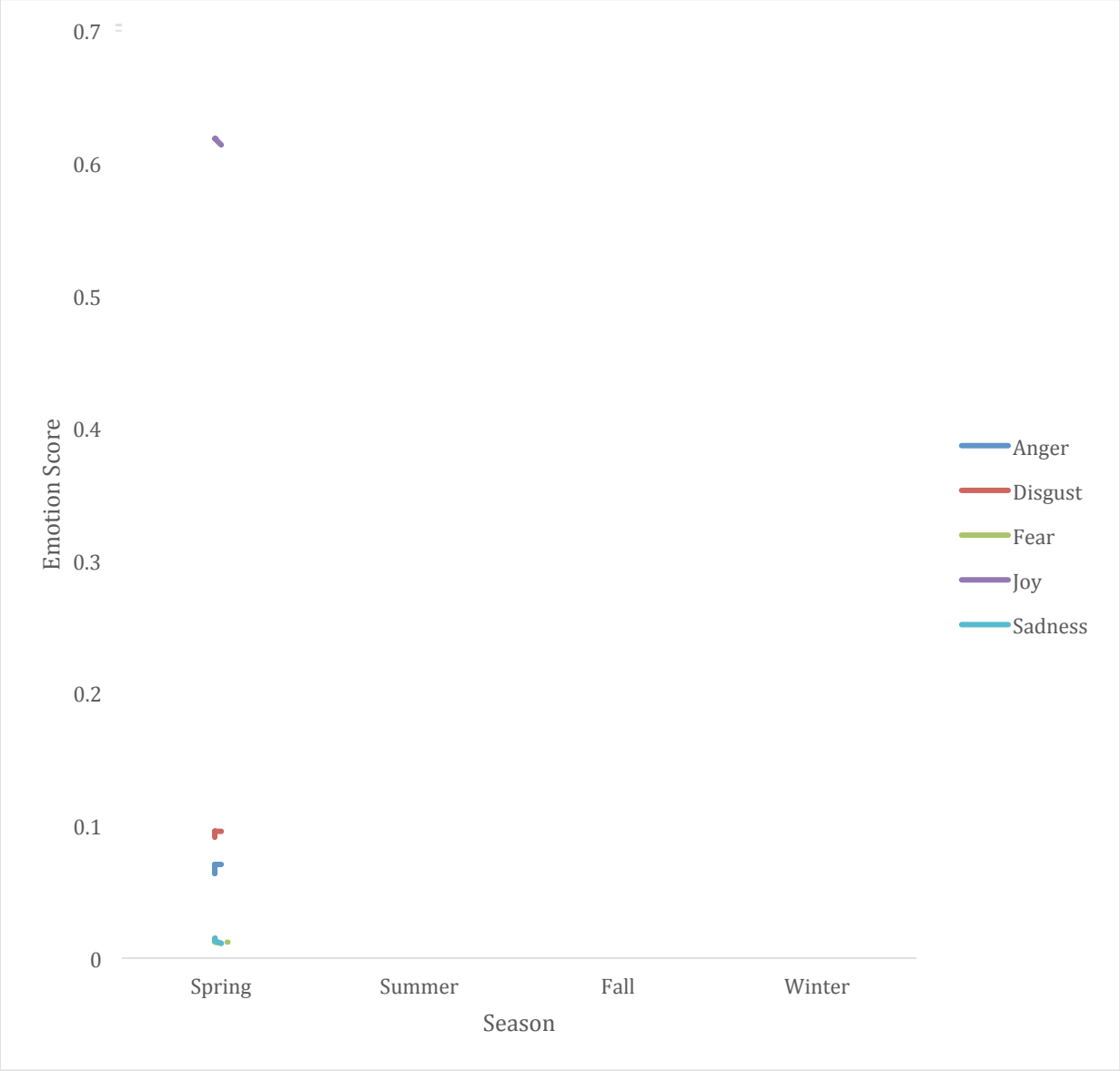


Figure 29. Specific emotions (mean value) detected within tweets by season. Values are on a scale of 0 (emotion absent) to +1 (emotion strongest).

ENGAGEMENT WITH TWEETS

Comparing the seasons, there were differences in how other Twitter users engaged with the tweets. Overall, tweets averaged 0.31 replies, 0.89 retweets, and 4.45 likes each. There were no significant differences among seasons, although tweets in winter had slightly more replies and retweets and those summer had slightly more likes. However, these averages are all skewed by a portion of the tweets having much more engagement than others. For example, one tweet garnered the most replies, retweets, and likes.

https://twitter.com/RepAdamSchiff/status/1090643179286736903
Most replies: 2,027, Most retweets: 7,772, Most likes: 16,294

Figure 30. A single tweet from January 2017 – February 2020, excluding the federal government shutdown period in December 2018 – January 2019, had the most replies, retweets, and likes as of the dataset harvesting date (March 1, 2020).

To examine patterns among the more characteristic tweets by users, we examined the lower frequencies of replies, retweets, and likes. Overall, more than half of tweets (51.5%) had no engagement at all and 85.4% of tweets had no replies, 85.1% had no retweets, and 56.4% had no likes. For the main significant patterns seen, spring had lower levels of each engagement, winter had the most replies, and fall was the most polarized. Tweets in fall fell at both ends of the spectrum for each engagement and overall engagement – most with no engagements or three or more engagements. All differences observed had a small effect size.

Table 85. Others' engagement with tweets, with means of replies, retweets, and likes.

Measure		Season					Tests of significance
		Spring	Summer	Fall	Winter	Total	
Replies	Mean	0.24	0.30	0.34	0.36	0.31	F: 4.535 p: 0.003
	Std. Dev.	1.944	2.160	2.973	9.073	5.393	
	Range	0-285	0-177	0-243	0-2027	0-2027	
Retweets	Mean	0.67	0.89	0.99	1.03	0.89	F: 1.964 p: 0.117
	Std. Dev.	10.925	20.311	25.989	37.006	25.949	
	Range	0-1789	0-3254	0-3835	0-7772	0-7772	
Likes	Mean	3.66	5.07	5.01	4.41	4.45	F: 3.252 p: 0.021
	Std. Dev.	39.819	90.751	91.149	80.597	76.080	
	Range	0-4578	0-10450	0-14317	0-16294	0-16294	

*Shading indicates highest (darkest) to lowest (lightest) percentages for each year, though no significant differences exist at $p < 0.001$.

Table 86. Others' engagement with tweets, with frequencies (%) within categories of replies, retweets, and likes.

Measure		Season*					Tests of significance
		Spring	Summer	Fall	Winter	Total	
Replies	0	87.2	84.4	84.2	85.3	85.4	X^2: 235.436 $p < 0.001$ V: 0.021
	1	9.3	11.7	11.4	10.6	10.6	
	2	1.8	2.1	2.3	2.1	2.1	
	3+	1.6	1.8	2.1	2.0	1.9	
Retweets	0	85.0	84.8	85.7	84.8	85.1	X^2: 82.633 $p < 0.001$ V: 0.012
	1	8.6	8.1	7.2	8.3	8.1	
	2	2.5	2.5	2.4	2.4	2.4	
	3+	4.0	4.6	4.6	4.4	4.4	
Likes	0	55.3	57.3	57.4	56.2	56.4	X^2: 225.228 $p < 0.001$ V: 0.021
	1	20.2	17.8	17.4	19.4	18.9	
	2	8.3	7.5	7.1	7.6	7.7	
	3+	16.2	17.4	18.0	16.8	17.0	
Total engagement (replies + retweets + likes)	0	50.6	52.0	53.0	51.2	51.5	X^2: 212.619 $p < 0.001$ V: 0.020
	1	19.2	17.1	16.1	18.3	17.9	
	2	9.9	9.3	8.9	9.4	9.4	
	3+	20.3	21.7	22.0	21.1	21.2	

* Shading indicates highest (darkest) to lowest (lightest) significantly different percentages for each year.

Summary of Key Findings

We examined tweets from multiple years, grouped by season, and examined their composition, emotion, and engagement. To summarize key points of the highest values from our findings, we found the following.

Table 87. Summary characteristics of Tweets' composition, emotion, and engagement across seasons and overall.

Tweets…	Spring	Summer	Fall	Winter	Total
Composition	more URLs, images, and hashtags	more mentions of other accounts	more mentions of location(s) and other accounts	medium for all metrics	URLs more often than not, images and hashtags in 1/3, mentioning another account or a specific location in a ≤1/4
Emotion	more positive, strongly positive, and joy	more neutral	more neutral and negative, strongly negative, and sadness	more negative, strongly negative, and anger and disgust	Most tweets positive and stronger joy than any other emotion
Engagement	least replies, medium total engagement	medium total engagement	most replies and both most and least retweets, likes, and total engagement	most replies and medium total engagement	Wide range, though most tweets had little engagement by metric and in total

Discussion

Given these key points from the data, we present three areas for consideration.

First, we suggest that Twitter conversations about JOTR are characterized by positivity, joy, and information-sharing through URLs. Although a few tweets gained traction with engaging other Twitter users, most did not draw other users into the conversation by mention of those account or through engagement metrics. The park may want to consider ways to maintain awareness about the links to external information being shared and then work with these content providers for further information about the park or reference back to NPS and preferable partner websites.

Second, spring is the most prolific and visual season. Tweets in the spring were characterized by more URLs, images, hashtags, strong positivity, and joy. Taken together, these attributes suggest a more personal narrative and potentially one based on actual visitation. However, these tweets tended to receive only medium levels of engagement. The park may want to consider a more robust social media response during the spring, interacting with and amplifying tweets that are particularly aligned with park management goals and fundamental values. Targeted campaigns

about sharing along certain themes of experience may also be particularly well received during the spring.

Third, fall was the most polarizing season. Fall tweets generally mention more specific locations and other Twitter accounts and are also the most negative and sad. This seems to have created conversations that either garner very low or very high engagement. Although the overall level of sadness is low, park managers may want to pay particular attention to events during this time that may influence this emotion and what particular events and perspectives are garnering the most engagement. This time-sensitive engagement may have reverberations into the winter, where the negativity remains and anger and disgust are elevated.

Further research into the content of the tweets and contextual data are necessary to understand additional details about these conversations and validate the above points of discussion. We suggest this could be through automated coding of other attributes, such as a) mentions of family or park accounts, b) targeted coding by researchers to validate and extend themes surfaced by the automated coding, c) and/or manager interviews to provide contextual data about particular themes in the conversation that may or may not have been highlighted in this high-level analysis.

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Appendix A: General Visitor Questionnaire

Joshua Tree National Park
General Visitor Survey 2019

Please enter the 4-digit code from the business card you received at Joshua Tree National Park, or the email follow-up you received afterward. _____

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 data collected in this study will assist managers in understanding how the recent increase in visitation to Joshua Tree National Park may be impacting the visitor experience. 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 10 minutes to complete and return this on-site questionnaire. You may send comments concerning the burden estimates or any aspect of this information collection to: Dr. Ryan Sharp, Assistant Professor, Park Management and Tourism, 221 Throckmorton, Manhattan, KS 66506, Kansas State University (address) or ryansharp@ksu.edu (email); or Phadrea Ponds NPS Information Collection Coordinator at pponds@nps.gov (email). OMB Number: 1024-0224; Expiration Date: 05/01/2020

Section 1: Your Past and Current Visit to Joshua Tree National Park

NOTE: In this questionnaire, "personal group" is defined as anyone that you are visiting the park with, such as spouse, family, friends, etc. This does not include the larger group that you might be traveling with, such as school, church, scouts, or tour group.

Q1. Please tell us about your past visitation to Joshua Tree National Park (referred to as "the park" in the survey).

O a. Including today, how many days in the last month (30 days) have you visited the park?
_____

O b. Including today, how many days in the last year (12 months) have you visited the park?
_____

O c. Including today, how many years (total) have you visited the park?
_____

O d. In what year did you first visit the park? (YYYY)
_____

Q2a. On this trip, how long did you and your personal group spend visiting Joshua Tree NP? List partial hours / days as .25, .50, .75.

O Number of hours, if fewer than 24 hours
_____

O Number of days, if 24 hours or more
_____

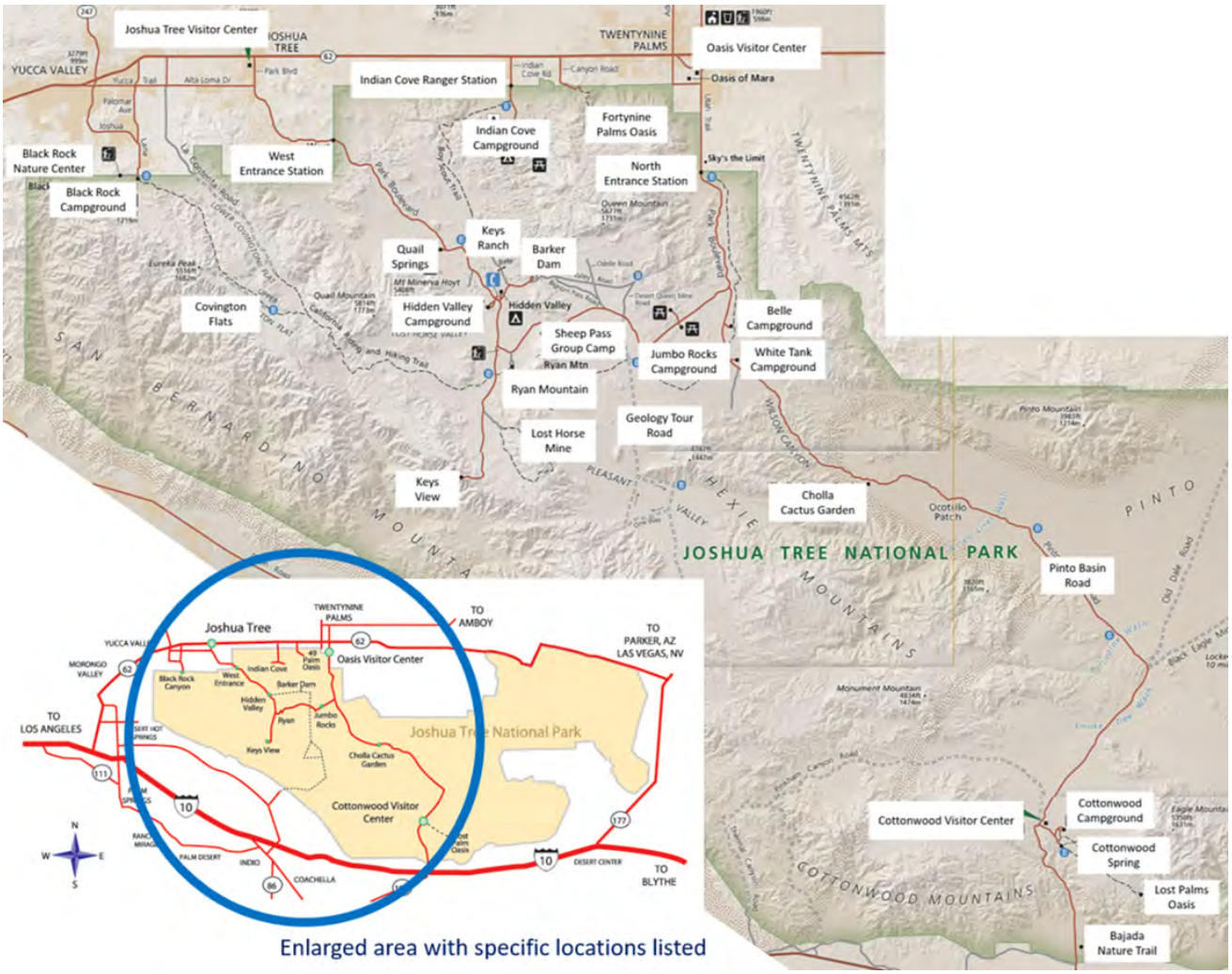
Q2b. On this trip...

O Joshua Tree NP was the primary destination

O Joshua Tree NP was one of several destinations

O Joshua Tree NP was not a planned destination

Q3a. For this trip, select the locations in Joshua Tree NP that you and your personal group visited. Select all white boxes with location names that apply.



Q3b. Please list any other locations visited in the park on this trip.

_____

Q3c. For this trip, what was your most desired / planned for location?

- O North Entrance Station
- O West Entrance Station
- O Indian Cove Ranger Station
- O Cottonwood Visitor Center
- O Joshua Tree Visitor Center
- O Oasis Visitor Center
- O Black Rock Nature Center
- O Belle Campground
- O Black Rock Campground
- O Cottonwood Campground
- O Hidden Valley Campground
- O Indian Cove Campground
- O Jumbo Rocks Campground
- O White Tank Campground
- O Ryan Mountain
- O Sheep Pass Group Camp
- O Bajada Nature Trail
- O Barker Dam
- O Cholla Cactus Garden
- O Cottonwood Spring
- O Covington Flats
- O Fortynine Palms Oasis
- O Geology Tour Road
- O Keys Ranch
- O Keys View
- O Lost Horse Mine
- O Lost Palms Oasis
- O Pinto Basin Road
- O Quail Springs
- O Other _____

Q3d. For this trip, where did you and your personal group spend the longest amount of time?

- O North Entrance Station
- O West Entrance Station
- O Indian Cove Ranger Station
- O Cottonwood Visitor Center
- O Joshua Tree Visitor Center
- O Oasis Visitor Center
- O Black Rock Nature Center
- O Belle Campground
- O Black Rock Campground
- O Cottonwood Campground
- O Hidden Valley Campground
- O Indian Cove Campground
- O Jumbo Rocks Campground
- O White Tank Campground
- O Ryan Mountain
- O Sheep Pass Group Camp
- O Bajada Nature Trail
- O Barker Dam
- O Cholla Cactus Garden
- O Cottonwood Spring
- O Covington Flats
- O Fortynine Palms Oasis
- O Geology Tour Road
- O Keys Ranch
- O Keys View
- O Lost Horse Mine
- O Lost Palms Oasis
- O Pinto Basin Road
- O Quail Springs
- O Other _____

Q4. On this trip, what was the primary reason that you and your personal group came to the Joshua Tree NP area (Yucca Valley, Joshua Tree, Twentynine Palms)?

- O Resident of the area (Yucca Valley, Joshua Tree, Twentynine Palms, Indio)
- O Visit Joshua Tree NP
- O Visit other attractions in the area
- O Visit friends / relatives at the Twentynine Palms U.S. Marine Corps base
- O Visit friends / relatives in the area (other than the Marine Corps base)
- O Traveling through – unplanned visit
- O Business
- O Other (Please specify) _____

Section 2: Your Motivations and Activities

Q5a. On this visit, in which activities did you and your personal group participate within Joshua Tree NP? *Mark all that apply.*

- O Attended field classes or other guided activities
- O Attended ranger-led programs
- O Backpacking overnight
- O Bicycling
- O Bouldering (using pads and bouldering guides)
- O Camping
- O Created content for social media / blogs
- O Day hiking
- O Enjoyed nature
- O Exercised to promote physical fitness
- O Family / friend gathering or celebration
- O Horseback riding
- O Photography / videos
- O Picnicking
- O Rock scrambling (without specialized gear or skills)
- O Seeking spiritual connection
- O Sightseeing
- O Slacklining
- O Stargazing / viewing night sky
- O Technical climbing (with specialized gear or skills)
- O Trail running
- O Viewed plants and/or wildlife
- O Visited historical or archaeological sites
- O Visited visitor center(s)
- O Walking self-guided nature trails (with brochures/signs)
- O Other (Please specify) _____

Q5b. Which one of the above activities was the primary activity in which you and your personal group participated at Joshua Tree NP on this visit?

- O Attended field classes or other guided activities
- O Attended ranger-led programs
- O Backpacking overnight
- O Bicycling
- O Bouldering (using pads and bouldering guides)
- O Camping
- O Created content for social media / blogs
- O Day hiking
- O Enjoyed nature
- O Exercised to promote physical fitness
- O Family / friend gathering or celebration
- O Horseback riding
- O Photography / videos
- O Picnicking
- O Rock scrambling (without specialized gear or skills)
- O Seeking spiritual connection
- O Sightseeing
- O Slacklining
- O Stargazing / viewing night sky
- O Technical climbing (with specialized gear or skills)
- O Trail running
- O Viewed plants and/or wildlife
- O Visited historical or archaeological sites
- O Visited visitor center(s)
- O Walking self-guided nature trails (with brochures/signs)
- O Other (Please specify) _____

Q6a. Did anyone in your personal group participate in rock climbing in Joshua Tree NP on this visit or past visit(s)?

O No, have not participated in climbing activities.

O Climbed on both this visit and past visit(s).

O This is our first time climbing here.

O Have climbed in the past, but not on this visit.

Q6b. Where is your personal group's preferred area to climb in Joshua Tree NP?

O Don't have a preferred area.

O List one area. _____

Q6c. Has anyone in your personal group ever installed or replaced a fixed anchor in Joshua Tree NP?

O Yes O No

Q6d. Did anyone in your personal group participate in bouldering in Joshua Tree NP on this visit or past visit(s)?

O No, have not participated in bouldering activities.

O Bouldered on both this visit and past visit(s).

O This is our first time bouldering here.

O Have bouldered in the past, but not on this visit.

Q6e. Where is your personal group's preferred area to boulder in Joshua Tree NP?

O Don't have a preferred area.

O List one area _____

Section 3: Your Lodging and Reservations

Q7a. Did you or members of your personal group attempt to make reservations for campsites at Joshua Tree NP for this trip?

O Yes O No

Q7b. Were you able to make campsite reservations at Joshua Tree NP for this trip?

O Yes O No

Q8a. On this visit, how many nights, if any, did you and your personal group camp overnight within Joshua Tree NP?

O None

O Number of nights _____

Q8b. On this visit, how many nights, if any, did you and your personal group stay overnight away from home in the area surrounding Joshua Tree NP (Yucca Valley, Joshua Tree, Twentynine Palms)?

O None

O Number of nights _____

Q9.In what type of lodging did you and your personal group spend the night(s) inside and/or outside the park in the surrounding area (Yucca Valley, Joshua Tree, Twentynine Palms)? *Mark all that apply.*

	Inside the park	Outside the park
Lodge, motel, cabin, rented condo/home, or bed & breakfast	O	O
RV / trailer camping	O	O
Tent camping in developed campground	O	O
Backcountry campsite	O	O
Personal seasonal residence	O	O
Residence of friends or relatives	O	O
Other (Please specify)	O	O

Section 4: Information and Awareness

Q10a. Prior to this visit, did you and your personal group obtain information about the park?

O Yes O No

Q10b. Prior to this visit, how did you and your personal group obtain information about the park?
If you were to visit Joshua Tree NP in the future, how would you and your personal group prefer to obtain information about the park? Mark all that apply.

	Prior to this visit	Preferred for future visits
Joshua Tree NP website: www.nps.gov/jotr	O	O
Social media - Facebook	O	O
Social media - Twitter	O	O
Social media - Instagram	O	O
Social media - Reddit	O	O
Social media - Flickr	O	O
Social media - Other	O	O
Other websites (Trip Advisor, Hotels.com, Expedia, etc.)	O	O
Friends / relatives / word of mouth	O	O
Highway signs	O	O
Inquiry to park via phone, mail, or email	O	O
Local businesses (hotels, motels, restaurants, etc.)	O	O
Maps / brochures	O	O
Newspaper / magazine articles	O	O
Other National Park Service sites / units	O	O
Previous visits	O	O
School class / program	O	O
State or local welcome center / visitors bureau / chamber of commerce	O	O
Television / radio programs / DVDs	O	O
Travel guides / tour books (AAA, Fodor's, Lonely Planet, etc.)	O	O

Other (Please specify) _____ O O

Q10c. From the sources used prior to this visit, did you and your personal group obtain the type of information about the park that you needed?

O Yes O No

Q10c. What type of park information did you and your personal group need that was not available? *Please be specific.*

_____

Q10d. How far in advance, if at all, did you begin planning your most recent visit to Joshua Tree NP?

O Didn't plan in advance

O Days _____

O Weeks _____

O Months _____

Q11a. Did you or your personal group use any information services or facilities during this visit to Joshua Tree NP?

O Yes O No

Q11b. Please mark all the information services and facilities that you or your personal group used during this visit to Joshua Tree NP.

O Assistance from visitor center staff

O Assistance from entrance station staff

O Bulletin boards

O Joshua Tree NP website: www.nps.gov/jotr (used before or during visit)

O Park brochure / map

O Park newspaper

O Ranger-led programs (walks, talks, etc.)

O Roadside exhibits

O Sales items in visitor center

- Trailside exhibits / signs
- Visitor center exhibits
- Other park publications (plant lists, dog information, camping brochure, etc.)

Q11c. For those services and facilities that you or your personal group used, please rate their importance.

	Not important	Somewhat important	Moderately important	Very important	Extremely important
Assistance from visitor center staff	O	O	O	O	O
Assistance from entrance station staff	O	O	O	O	O
Bulletin boards	O	O	O	O	O
Joshua Tree NP website: www.nps.gov/jotr (used before / during visit)	O	O	O	O	O
Park brochure / map	O	O	O	O	O
Park newspaper	O	O	O	O	O
Ranger-led programs (walks, talks, etc.)	O	O	O	O	O
Roadside exhibits	O	O	O	O	O
Sales items in visitor center (selection, price, etc.)	O	O	O	O	O
Trailside exhibits / signs	O	O	O	O	O
Visitor center exhibits	O	O	O	O	O
Other park publications (plant lists, dog information, camping brochure, etc.)	O	O	O	O	O

Q11d. For those services and facilities that you or your personal group used, please rate their quality.

	Very poor	Poor	Average	Good	Very good
Assistance from visitor center staff	O	O	O	O	O
Assistance from entrance station staff	O	O	O	O	O
Bulletin boards	O	O	O	O	O
Joshua Tree NP website: www.nps.gov/jotr (used before / during visit)	O	O	O	O	O
Park brochure / map	O	O	O	O	O
Park newspaper	O	O	O	O	O
Ranger-led programs (walks, talks, etc.)	O	O	O	O	O
Roadside exhibits	O	O	O	O	O
Sales items in visitor center (selection, price, etc.)	O	O	O	O	O
Trailside exhibits / signs	O	O	O	O	O
Visitor center exhibits	O	O	O	O	O
Other park publications (plant lists, dog information, camping brochure, etc.)	O	O	O	O	O

Section 5: About You

Q12. Is your primary residence located within the United States?

O Yes O No

What country is your primary residence?

_____

Q12a. What is your zip code?

_____

Q12b. What year were you born? *(YYYY)*

_____

Q12c. What is your gender?

O Male
O Female
O Other
O Do not wish to answer

Q12d. What is the highest level of school you have completed?

O Less than high school
O Some high school
O High school graduate
O Some college
O Two-year college graduate
O Four-year college graduate
O Graduate or professional degree
O Do not wish to answer

Q12e. What is your race? *Select all that apply.*

O American Indian or Alaska Native
O Asian
O Black or African American
O Hawaiian or Pacific Islander
O Hispanic or Latino/Latina
O White
O Other
O Do not wish to answer

Thank you for your help with this survey!

Please click "next" to finalize your response.

PRIVACY ACT and PAPERWORK REDUCTION ACT statement: 16 U.S.C. 1a-7 authorizes collection of this information. This information will be used by park managers to better serve the public. Response to this request is voluntary and anonymous. Your name will never be associated with your answers, and all contact information will be destroyed when the data collection is concluded. No action may be taken against you for refusing to supply the information requested. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. BURDEN ESTIMATE STATEMENT: Public reporting burden for this form is estimated to average 10 minutes per response.

Appendix B: Management Questionnaire

Joshua Tree National Park Management Survey 2019

Please enter the 4-digit code from the business card you received at Joshua Tree National Park, or the email follow-up you received afterward. _____

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 data collected in this study will assist managers in understanding how the recent increase in visitation to Joshua Tree National Park may be impacting the visitor experience. 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 10 minutes to complete and return this on-site questionnaire. You may send comments concerning the burden estimates or any aspect of this information collection to: Dr. Ryan Sharp, Assistant Professor, Park Management and Tourism, 221 Throckmorton, Manhattan, KS 66506, Kansas State University (address) or ryansharp@ksu.edu (email); or Phadrea Ponds NPS Information Collection Coordinator at pponds@nps.gov (email). OMB Number: 1024-0224; Expiration Date: 05/01/2020

Section 1: Your Visits to Joshua Tree National Park

NOTE: In this questionnaire, "personal group" is defined as anyone that you are visiting the park with, such as spouse, family, friends, etc. This does not include the larger group that you might be traveling with, such as school, church, scouts, or tour group.

Q1. Please tell us about your past visitation to Joshua Tree National Park (referred to as "the park" in the survey).

O a. Including today, how many days in the last month (30 days) have you visited the park?
_____

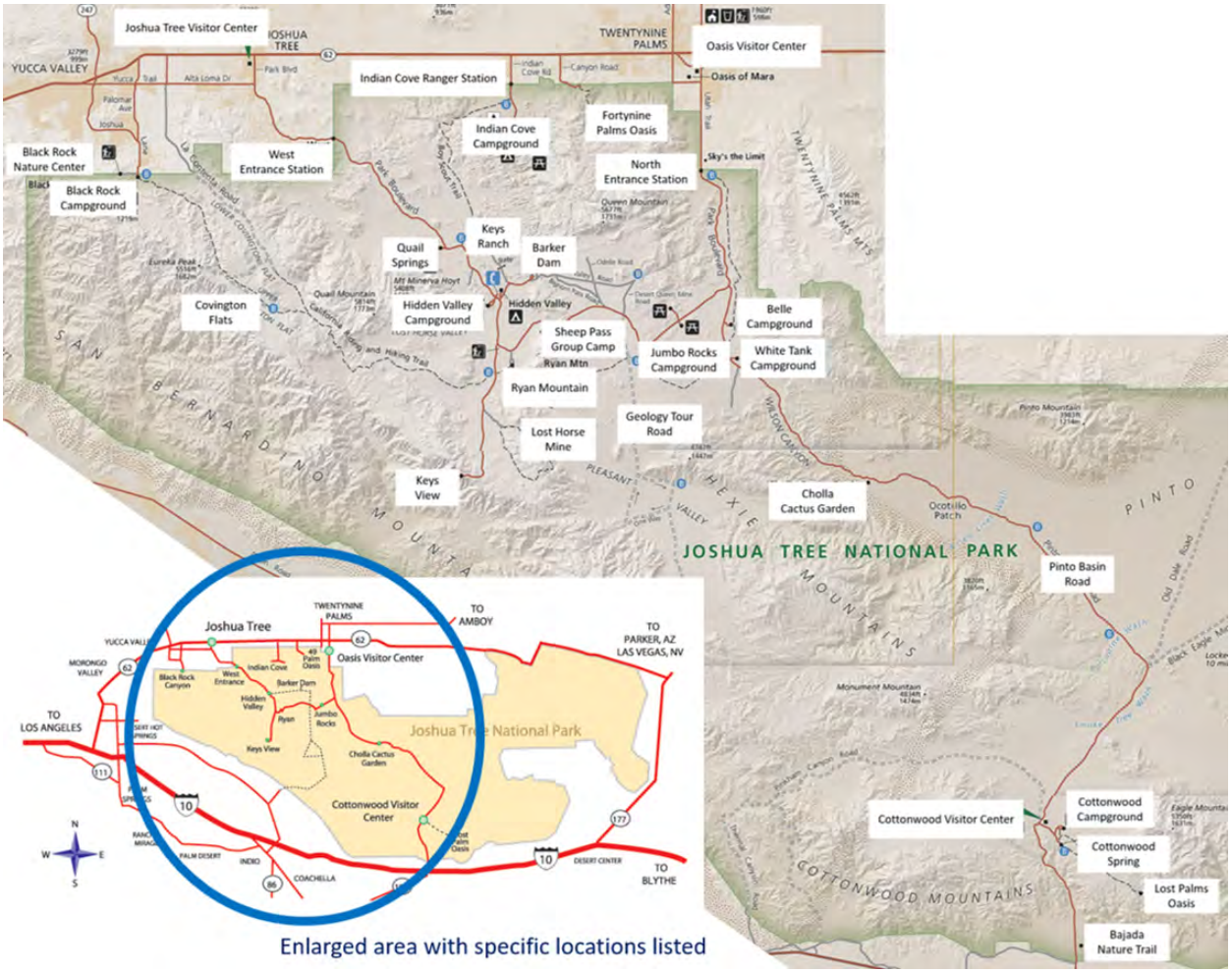
O b. If you visited the park for only one day, how many hours did you spend in the park?
_____

O c. Including today, how many days in the last year (12 months) have you visited the park?
_____

O d. Including today, how many years (total) have you visited the park?
_____

O e. In what year did you first visit the park? (YYYY)
_____

Q2a. For this trip, select the locations in Joshua Tree NP that you and your personal group visited. *Select all white boxes with location names that apply.*



Q2b. Please list any other locations visited in the park on this trip.

_____

Q2c. For this trip, what was your most desired / planned for location?

- O North Entrance Station
- O West Entrance Station
- O Indian Cove Ranger Station
- O Cottonwood Visitor Center
- O Joshua Tree Visitor Center
- O Oasis Visitor Center
- O Black Rock Nature Center
- O Belle Campground
- O Black Rock Campground
- O Cottonwood Campground
- O Hidden Valley Campground
- O Indian Cove Campground
- O Jumbo Rocks Campground
- O White Tank Campground
- O Ryan Mountain
- O Sheep Pass Group Camp
- O Bajada Nature Trail
- O Barker Dam
- O Cholla Cactus Garden
- O Cottonwood Spring
- O Covington Flats
- O Fortynine Palms Oasis
- O Geology Tour Road
- O Keys Ranch
- O Keys View
- O Lost Horse Mine
- O Lost Palms Oasis
- O Pinto Basin Road
- O Quail Springs
- O Other _____

Q2d. For this trip, where did you and your personal group spend the longest amount of time?

- O North Entrance Station
- O West Entrance Station
- O Indian Cove Ranger Station
- O Cottonwood Visitor Center
- O Joshua Tree Visitor Center
- O Oasis Visitor Center
- O Black Rock Nature Center
- O Belle Campground
- O Black Rock Campground
- O Cottonwood Campground
- O Hidden Valley Campground
- O Indian Cove Campground
- O Jumbo Rocks Campground
- O White Tank Campground
- O Ryan Mountain
- O Sheep Pass Group Camp
- O Bajada Nature Trail
- O Barker Dam
- O Cholla Cactus Garden
- O Cottonwood Spring
- O Covington Flats
- O Fortynine Palms Oasis
- O Geology Tour Road
- O Keys Ranch
- O Keys View
- O Lost Horse Mine
- O Lost Palms Oasis
- O Pinto Basin Road
- O Quail Springs
- O Other _____

Section 2: Your Motivations and Activities

Q3a. On this visit, in which activities did you and your personal group participate within Joshua Tree NP? *Mark all that apply.*

- O Attended field classes or other guided activities
- O Attended ranger-led programs
- O Backpacking overnight
- O Bicycling
- O Bouldering (using pads and bouldering guides)
- O Camping
- O Created content for social media / blogs
- O Day hiking
- O Enjoyed nature
- O Exercised to promote physical fitness
- O Family / friend gathering or celebration
- O Horseback riding
- O Photography / videos
- O Picnicking
- O Rock scrambling (without specialized gear or skills)
- O Seeking spiritual connection
- O Sightseeing
- O Slacklining
- O Stargazing / viewing night sky
- O Technical climbing (with specialized gear or skills)
- O Trail running
- O Viewed plants and/or wildlife
- O Visited historical or archaeological sites
- O Visited visitor center(s)
- O Walking self-guided nature trails (with brochures/signs)
- O Other (Please specify) _____

Q3b. Which one of the above activities was the primary activity in which you and your personal group participated at Joshua Tree NP on this visit?

- O Attended field classes or other guided activities
- O Attended ranger-led programs
- O Backpacking overnight
- O Bicycling
- O Bouldering (using pads and bouldering guides)
- O Camping
- O Created content for social media / blogs
- O Day hiking
- O Enjoyed nature
- O Exercised to promote physical fitness
- O Family / friend gathering or celebration
- O Horseback riding
- O Photography / videos
- O Picnicking
- O Rock scrambling (without specialized gear or skills)
- O Seeking spiritual connection
- O Sightseeing
- O Slacklining
- O Stargazing / viewing night sky
- O Technical climbing (with specialized gear or skills)
- O Trail running
- O Viewed plants and/or wildlife
- O Visited historical or archaeological sites
- O Visited visitor center(s)
- O Walking self-guided nature trails (with brochures/signs)
- O Other (Please specify) _____

Q4. Please indicate if you changed your visit(s) to Joshua Tree NP because of too many people / crowding? *Select all that apply.*

	Changed during a previous visit to the park	Changed during this current visit to the park
Chose not to visit the park	O	O
Changed the times of the day that you visited the park	O	O
Changed the dates or seasons that you visited the park	O	O
Chose not to visit your desired places at the park	O	O
Changed the times of day that you visited places at the park	O	O
Changed the order of places visited at the park	O	O
Chose not to participate in your desired activities at the park	O	O

Q5a. Have you ever changed your trip plans because a campsite in a particular campground at Joshua Tree NP was not available on the date you initially desired?

O Yes O No

O Not applicable - I did not plan to camp

Q5b. Please tell us how you changed your trip plans. *Select all that apply.*

O I changed the dates of my trip

O I camped at another location within Joshua Tree NP

O I camped at a location other than Joshua Tree NP

O I came to Joshua Tree NP but chose not to camp

Section 3: Your Preferences for Potential Scenarios

Q6a. Please indicate your level of opposition or support for the following potential future management actions concerning park access, transportation, and car camping at Joshua Tree NP. The list of items below are not necessarily actions that are going to occur at the park. However, we are interested in your opinions about these potential actions.

	Strongly oppose	Oppose	Somewhat oppose	Neither oppose nor support	Somewhat support	Support	Strongly support	I don't know / need more information
Implement reservation system to enter the park	○	○	○	○	○	○	○	○
Add parking spaces at major attractions	○	○	○	○	○	○	○	○
Add additional traffic lanes at park entrances	○	○	○	○	○	○	○	○
Increase entry fees to enhance visitor experiences	○	○	○	○	○	○	○	○
Temporarily close specific roads and parking areas based on congestion (e.g., Keys View, road to Barker Dam)	○	○	○	○	○	○	○	○
Require riding shuttle buses within the park on the park's busiest days (e.g., weekends, holidays, spring break)	○	○	○	○	○	○	○	○
Develop paved access to more popular locations and attractions	○	○	○	○	○	○	○	○
Implement a parking reservation or parking permit system	○	○	○	○	○	○	○	○
Decrease the number of nights that visitors can stay at developed campgrounds	○	○	○	○	○	○	○	○
Develop more campsites in existing campgrounds like Hidden Valley	○	○	○	○	○	○	○	○
Use online park communications to inform visitors about the availability and characteristics of sites in developed campgrounds	○	○	○	○	○	○	○	○

Q6b. Please indicate your level of opposition or support for the following potential future management actions concerning trails and wilderness backpacking at Joshua Tree NP. The list of items below are not necessarily actions that are going to occur at the park. However, we are interested in your opinions about these potential actions.

	Strongly oppose	Oppose	Somewhat oppose	Neither oppose nor support	Somewhat support	Support	Strongly support	I don't know / need more information
Reduce the number of trails in the park to provide better conditions on fewer trails	○	○	○	○	○	○	○	○
Develop new trails in the southern half of the park	○	○	○	○	○	○	○	○
Provide more information about trails to help visitors find trails that match their preferences for length and things they can see and enjoy	○	○	○	○	○	○	○	○
Expand and develop new trailhead parking lots for existing trails	○	○	○	○	○	○	○	○
Implement a wilderness backpacking reservation system	○	○	○	○	○	○	○	○
Establish designated and assigned wilderness camping sites	○	○	○	○	○	○	○	○
Introduce fees for overnight backpacking to support wilderness services	○	○	○	○	○	○	○	○
Require mandatory wilderness backpacking orientation to receive a wilderness backpacking permit	○	○	○	○	○	○	○	○
Require visitors to pack out human waste when using the backcountry	○	○	○	○	○	○	○	○

Q6c. Please indicate your level of opposition or support for the following potential future management actions concerning rock climbing and bouldering at Joshua Tree NP. The list of items below are not necessarily actions that are going to occur at the park. However, we are interested in your opinions about these potential actions.

	Strongly oppose	Oppose	Somewhat oppose	Neither oppose nor support	Somewhat support	Support	Strongly support	I don't know / need more information
Limit the addition of new fixed anchors / bolts in wilderness areas	○	○	○	○	○	○	○	○
Remove illegally installed (unpermitted) bolts from wilderness areas	○	○	○	○	○	○	○	○
Require visitors to pack out human waste when using popular climbing areas	○	○	○	○	○	○	○	○
Close climbing routes / staging areas with sensitive cultural or natural resources	○	○	○	○	○	○	○	○
Provide signs and directions to all climbing rock formations	○	○	○	○	○	○	○	○
Require time-specific permits for climbing on popular routes and walls	○	○	○	○	○	○	○	○
Require location-specific permits for climbing on popular routes and walls	○	○	○	○	○	○	○	○
Require location-specific permits for popular bouldering areas	○	○	○	○	○	○	○	○
Require visitors to pack out human waste when using popular bouldering areas	○	○	○	○	○	○	○	○
Close bouldering routes / staging areas with sensitive cultural or natural resources	○	○	○	○	○	○	○	○
Improve signs and directions to all bouldering formations	○	○	○	○	○	○	○	○
Require time-specific permits for popular bouldering areas								
Identify designated crash pad areas free from vegetation and sensitive soil	○	○	○	○	○	○	○	○

Q6d. Please identify the management action that you most support.

- ○ Implement reservation system to enter the park
- ○ Add parking spaces at major attractions
- ○ Implement a parking reservation or parking permit system
- ○ Increase entry fees to enhance visitor experiences
- ○ Temporarily close specific roads and parking areas based on congestion (e.g., Keys View, road to Barker Dam)
- ○ Require riding shuttle buses within the park on the park's busiest days (e.g., weekends, holidays, spring break)
- ○ Develop paved access to more popular locations and attractions
- ○ Add additional traffic lanes at park entrances
- ○ Decrease the number of nights that visitors can stay at developed campgrounds
- ○ Develop more campsites in existing campgrounds like Hidden Valley
- ○ Use online park communications to inform visitors about the availability and characteristics of sites in developed campgrounds
- ○ Implement a wilderness backpacking reservation system
- ○ Establish designated and assigned wilderness camping sites
- ○ Introduce fees for overnight backpacking to support wilderness services
- ○ Require mandatory wilderness backpacking orientation to receive a wilderness backpacking permit
- ○ Require visitors to pack out human waste when using the backcountry
- ○ Limit the addition of new fixed anchors / bolts in wilderness areas
- ○ Remove illegally installed (unpermitted) bolts from wilderness areas
- ○ Require visitors to pack out human waste when using popular climbing areas
- ○ Close climbing routes / staging areas with sensitive cultural or natural resources
- ○ Provide signs and directions to all climbing rock formations
- ○ Require time-specific permits for climbing on popular routes and walls
- ○ Require location-specific permits for climbing on popular routes and walls
- ○ Require location-specific permits for popular bouldering areas
- ○ Require visitors to pack out human waste when using popular bouldering areas
- ○ Close bouldering routes / staging areas with sensitive cultural or natural resources
- ○ Improve signs and directions to all bouldering formations
- ○ Require time-specific permits for popular bouldering areas
- ○ Identify designated crash pad areas free from vegetation and sensitive soil
- ○ Reduce the number of trails in the park to provide better conditions on fewer trails
- ○ Develop new trails in the southern half of the park
- ○ Provide more information about trails to help visitors find trails that match their preferences for length and things they can see and enjoy
- ○ Expand and develop new trailhead parking lots for existing trails

Q6e. Managers at Joshua Tree NP and elsewhere consider four broad categories when examining visitor use management issues. Please provide a rating to each of these four categories for the action you most support.

	Low	Medium	High	Don't know
Issue uncertainty: What do you feel is the level of uncertainty regarding the facts pertaining to this action?	O	O	O	O
Impact risk: What do you feel is the level of threat to the park's natural and cultural resources and visitor experiences in this action?	O	O	O	O
Stakeholder involvement: What do you feel is the level of public / stakeholder interest in this action?	O	O	O	O
Controversy / Potential for litigation: What do you feel is the level of controversy and potential for legal action regarding this action?	O	O	O	O

Q6f. Please identify the management action that you most oppose.

- ○ Implement reservation system to enter the park
- ○ Add parking spaces at major attractions
- ○ Implement a parking reservation or parking permit system
- ○ Increase entry fees to enhance visitor experiences
- ○ Temporarily close specific roads and parking areas based on congestion (e.g., Keys View, road to Barker Dam)
- ○ Require riding shuttle buses within the park on the park's busiest days (e.g., weekends, holidays, spring break)
- ○ Develop paved access to more popular locations and attractions
- ○ Add additional traffic lanes at park entrances
- ○ Decrease the number of nights that visitors can stay at developed campgrounds
- ○ Develop more campsites in existing campgrounds like Hidden Valley
- ○ Use online park communications to inform visitors about the availability and characteristics of sites in developed campgrounds
- ○ Implement a wilderness backpacking reservation system
- ○ Establish designated and assigned wilderness camping sites
- ○ Introduce fees for overnight backpacking to support wilderness services
- ○ Require mandatory wilderness backpacking orientation to receive a wilderness backpacking permit
- ○ Require visitors to pack out human waste when using the backcountry
- ○ Limit the addition of new fixed anchors / bolts in wilderness areas
- ○ Remove illegally installed (unpermitted) bolts from wilderness areas
- ○ Require visitors to pack out human waste when using popular climbing areas
- ○ Close climbing routes / staging areas with sensitive cultural or natural resources
- ○ Provide signs and directions to all climbing rock formations
- ○ Require time-specific permits for climbing on popular routes and walls
- ○ Require location-specific permits for climbing on popular routes and walls
- ○ Require location-specific permits for popular bouldering areas
- ○ Require visitors to pack out human waste when using popular bouldering areas
- ○ Close bouldering routes / staging areas with sensitive cultural or natural resources
- ○ Improve signs and directions to all bouldering formations
- ○ Require time-specific permits for popular bouldering areas
- ○ Identify designated crash pad areas free from vegetation and sensitive soil
- ○ Reduce the number of trails in the park to provide better conditions on fewer trails
- ○ Develop new trails in the southern half of the park
- ○ Provide more information about trails to help visitors find trails that match their preferences for length and things they can see and enjoy
- ○ Expand and develop new trailhead parking lots for existing trails

Q6g. Managers at Joshua Tree NP and elsewhere consider four broad categories when examining visitor use management issues. Please provide a rating to each of these four categories for the action you most oppose.

	Low	Medium	High	Don't know
Issue uncertainty: What do you feel is the level of uncertainty regarding the facts pertaining to this action?	O	O	O	O
Impact risk: What do you feel is the level of threat to the park's natural and cultural resources and visitor experiences in this action?	O	O	O	O
Stakeholder involvement: What do you feel is the level of public / stakeholder interest in this action?	O	O	O	O
Controversy / Potential for litigation: What do you feel is the level of controversy and potential for legal action regarding this action?	O	O	O	O

Section 4: Your Opinions about the Park

Q7. Below is a list of possible conditions you may have experienced while visiting Joshua Tree NP. Please indicate how much each potential action detracted from your experience during your current visit to the park.

	Didn't detract at all	Slightly detracted	Moderately detracted	Seriously detracted	Very seriously detracted	Didn't experience
Too few parking spaces at pullouts and overlooks along scenic drives	O	O	O	O	O	O
Too few parking spaces at trailheads	O	O	O	O	O	O
Too few restrooms	O	O	O	O	O	O
Congestion on park roads	O	O	O	O	O	O
Too little directional signage on park trails	O	O	O	O	O	O
Confusion about wilderness backpacking rules and regulations	O	O	O	O	O	O
Confusion about camping rules and regulations	O	O	O	O	O	O
Not enough ranger-led activities	O	O	O	O	O	O
Congestion in the visitor centers	O	O	O	O	O	O
Too little directional signage on the main park roads	O	O	O	O	O	O
Vandalism (e.g., graffiti, tire tracks, illegal campfire scars)	O	O	O	O	O	O
Limited information to plan your trip before you enter the park	O	O	O	O	O	O
Too little signage on wilderness / backcountry trails in the park	O	O	O	O	O	O
Too few informational signs	O	O	O	O	O	O
Too few directional signs on trails	O	O	O	O	O	O
Conflicts with other visitors on park roads or trails	O	O	O	O	O	O

Section 5: About You

Q8. Is your primary residence located within the United States?

O Yes O No

What country is your primary residence?

_____

Q8a. What is your zip code?

_____

Q8b. What year were you born? *(YYYY)*

_____

Q8c. What is your gender?

O Male
O Female
O Other
O Do not wish to answer

Q8d. What is the highest level of school you have completed?

O Less than high school
O Some high school
O High school graduate
O Some college
O Two-year college graduate
O Four-year college graduate
O Graduate or professional degree
O Do not wish to answer

Q8e. What is your race? *Select all that apply.*

O American Indian or Alaska Native
O Asian
O Black or African American
O Hawaiian or Pacific Islander
O Hispanic or Latino/Latina
O White
O Other
O Do not wish to answer

Thank you for your help with this survey!

Please click "next" to finalize your response.

PRIVACY ACT and PAPERWORK REDUCTION ACT statement: 16 U.S.C. 1a-7 authorizes collection of this information. This information will be used by park managers to better serve the public. Response to this request is voluntary and anonymous. Your name will never be associated with your answers, and all contact information will be destroyed when the data collection is concluded. No action may be taken against you for refusing to supply the information requested. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. BURDEN ESTIMATE STATEMENT: Public reporting burden for this form is estimated to average 10 minutes per response.

Appendix C: South Entrance Visitor Comparisons

Did respondents intercepted at the South Entrance (Cottonwood) differ substantially from respondents intercepted elsewhere (West Entrance, North Entrance, and roving)?

Age

In general, visitors intercepted at the South Entrance were significantly older (M=44.19) than those intercepted elsewhere (M=39.94), with significantly more representation from age groups starting at 40 years. Visitors intercepted at the South Entrance who responded to the survey were also significantly older (M=46.57) than those responding from intercepts elsewhere (M=42.77), with significantly less representation of visitors in their 20's and more representation of visitors in their 50's. However, the effect size for difference in average age of both visitor intercepts and responses from the South Entrance were small to medium. Differences seen in the age groupings for intercepts and responses all had small effect sizes though, suggesting that these particular differences are not functionally distinct.

Group Size

In general, visitors intercepted at the South Entrance were in significantly smaller groups (M=2.32) than those intercepted elsewhere (M=2.48), with significantly less representation from groups of six or more people. Visitors intercepted at the South Entrance who responded to the survey were also in significantly smaller groups (M=2.31) than those responding from intercepts elsewhere (M=2.43), with significantly more representation from visitors in a group size of three and less representation from visitors in group sizes of six or more people. The effect size for difference in average group size of both visitor intercepts and responses from the South Entrance were small. Differences seen in the group size for intercepts and responses also all had small effect sizes, suggesting that these differences are not functionally distinct.

Group Type

More than half of visitors intercepted and responding to the survey traveled to the park with their family. This was even more pronounced with those intercepted and responding from the South Entrance, where they were significantly more likely to be traveling with family and significantly less likely to be traveling with friends than visitors intercepted and responding to the survey from elsewhere. Differences seen in these two group types for intercepts and responses had small effect sizes though, suggesting that the differences seen are not functionally distinct.

Table 88. Average age and group size of visitors intercepted at the South Entrance and elsewhere.

Population	Characteristics	Location[1]			Tests of significance[2]		
		South Entrance	Elsewhere	Total	t-value	p-value	Cohen's d effect size
Intercepted	Age (years)	44.19**	39.94**	40.84	8.256	< 0.001	0.282
	Group size (people)	2.32**	2.48**	2.45	3.900	< 0.001	0.116
Responded	Age (years)	46.57**	42.77**	43.70	4.946	< 0.001	0.251
	Group size (people)	2.31	2.43	2.40	2.159	0.031	0.090

[1]Cells reported as means (M).
[2]T test (t); p value (p); Cohen's d (d) for significant differences (p <0.05).
**Location difference is significant at p <0.001.

Table 89. Age group and group size and type distributions (%) of intercepted visitors at the South Entrance and elsewhere.

Population	Characteristic		Location[1]			Tests of significance[2]		
			South Entrance	Elsewhere	Total	X^2-value	p-value	Cramer's V effect size
Intercepted	Age group	< 20	1.1	1.5	1.4	1.224	0.269	
		20-29	19.5**	29.1**	23.1	43.227	< 0.001	0.089
		30-39	23.1*	27.7*	26.7	9.678	0.002	0.043
		40-49	20.3*	15.9*	16.8	11.590	0.001	0.048
		50-59	16.3**	11.6**	12.6	16.316	< 0.001	0.058
		60-69	13.5*	10.1*	10.8	9.829	0.002	0.045
		70-79	5.9*	3.7*	4.2	9.145	0.002	0.044
		80-89	0.5	0.3	0.3	0.866	0.352	
		> 90	0.0	0.1	0.1	1.436	0.231	
	Group size	1	17.8	17.2	17.3	0.260	0.610	
		2	54.0	52.5	52.9	0.831	0.362	
		3	13.2	11.8	12.1	1.489	0.222	
		4	10.5	11.4	11.2	0.768	0.381	
		5	2.8	3.8	3.6	3.043	0.081	
		> 5	1.7*	3.2*	2.9	8.448	0.004	0.037
	Group type	Alone	17.6	17.2	17.3	0.100	0.751	
		Family	58.8**	49.9**	51.8	28.905	< 0.001	0.073
		Friends	17.0**	26.4**	24.4	46.674	< 0.001	0.091
		Family/friends	4.6	5.3	5.1	0.869	0.351	
		Other	2.1*	1.2*	1.4	4.091	0.043	0.029
Responded	Age group	< 20	1.0	0.7	0.8	0.219	0.640	
		20-29	14.1**	23.1**	20.9	20.351	< 0.001	0.094
		30-39	23.1	27.3	26.3	3.586	0.058	
		40-49	19.7	16.2	17.0	3.422	0.064	
		50-59	19.7*	13.8*	15.2	10.140	0.001	0.070
		60-69	14.7	13.1	13.5	0.925	0.336	
		70-79	7.3	5.7	6.1	1.649	0.119	
		80-89	0.4	0.1	0.2	1.213	0.271	
		> 90	0.0	0.1	< 0.1	0.561	0.454	
	Group size	1	15.8	17.9	17.3	1.216	0.270	
		2	56.0	54.8	55.1	0.246	0.620	
		3	14.1*	9.9*	10.9	7.019	0.008	0.058
		4	10.9	10.8	10.8	0.006	0.940	
		5	2.3	3.4	3.1	1.903	0.168	
		> 5	0.9*	3.3*	2.7	10.381	0.001	0.062
	Group type	Alone	15.6	17.7	17.2	1.285	0.257	
		Family	62.2**	52.7**	55.1	14.738	< 0.001	0.082
		Friends	15.0**	23.3**	21.3	17.311	< 0.001	0.087
		Family/friends	4.3	5.2	4.9	0.600	0.438	
		Other	2.8*	1.1*	1.5	6.887	0.009	0.060

[1]Cells are reported as percentages (%) for affirmative (yes) responses.
[2]Chi-square test (X^2); p value (p).
*Location difference is significant at p <0.05; **Location difference is significant at p <0.001.

Survey Responses

To examine if visitors intercepted at the South Entrance responded to the survey in ways different than visitors intercepted and responding to the survey from elsewhere, we compared these two groups of respondents on a few key measures across the survey.

Patterns noted are as follows. Respondents from the South Entrance:

- Spent significantly fewer days in the last month and days in the last year in the park.
- Participated less in climbing and bouldering as their primary activity and at all in the park.
- Did not vary significantly in their support/opposition for potential future management actions.

Table 90. Time spent in the park by respondents intercepted at the South Entrance and elsewhere.

Time spent in the park	Location[1]			Tests of significance[2]			
	South Entrance	Elsewhere	Total	Range	t-value	p-value	Cohen's d effect size
On this visit, how many nights did you and your personal group camp overnight within Joshua Tree NP?	1.81	2.43	2.32	1-14 nights	1.756	0.080	
Including today, how many days in the last month (30 days) have you visited the park?	1.67**	2.44**	2.25	1-30 days	6.701	< 0.001	0.038
If you visited the park for only one day, how many hours did you spend in the park?	4.80	4.93	4.90	1-24 hours	0.592	0.554	
Including today, how many days in the last year (12 months) have you visited the park?	3.17**	6.97**	6.04	1-338 days	4.919	< 0.001	0.205

[1]Cells reported as means (M).
[2]T test (t); p value (p); Cohen's d (d) for significant differences ($p < 0.05$).
**Location difference is significant at $p < 0.001$.

Table 91. Levels of support for potential future management actions for South Entrance and other respondents. Means reported on a 7-point scale from 1 (strongly oppose) to 7 (strongly support), with the "I don't know / need more information" responses omitted.

Please indicate your level of opposition or support for the following potential future management actions concerning…		Location[1]			Tests of significance[2]	
		South Entrance	Elsewhere	Total	t-value	p-value
Park access, transportation, and car camping	Implement reservation system to enter the park	2.79	2.91	2.88	1.149	0.251
	Decrease the number of nights that visitors can stay at developed campgrounds	3.53	3.50	3.51	0.335	0.738
	Require riding shuttle buses within the park on the park's busiest days	3.94	3.99	3.98	0.453	0.651
Trails and wilderness backpacking	Reduce the number of trails in the park to provide better conditions on fewer trails	2.80	2.82	2.82	0.789	0.825
	Implement a wilderness backpacking reservation system	4.55	4.54	4.54	0.042	0.966
	Introduce fees for overnight backpacking to support wilderness services	4.70	4.60	4.62	1.058	0.290
Rock climbing and bouldering	Require time-specific permits for climbing on popular routes and walls	4.30	4.10	4.14	1.877	0.061
	Require location-specific permits for climbing on popular routes and walls	4.21	4.11	4.15	1.857	0.064
	Close bouldering routes / staging areas with sensitive cultural or natural resources	5.37	5.35	5.35	0.262	0.794

[1]Cells reported as means (M).
[2]T test (t); p value (p).

Appendix D: Government Shutdown Park Social Media Discussion

Introduction

The 2019 federal government shutdown was the longest in US history, lasting 35 days (December 22, 2018 – January 25, 2019). Although effects from this shutdown varied, its potential influence on US national parks was extensively covered in media and generated significant social media discussion. Joshua Tree National Park (JOTR), a park emblematic of open western landscapes and desert recreation, received considerable national media attention and was highlighted in nationwide stewardship-focused reactions. Stories about the impact of the shutdown on the park were shared on social media, blogs, and news outlets, eliciting an array of sentiments (e.g., concern, fear, pride, love).

In the following section, we present a large, novel data set (i.e., big data) harvested from online text sources to examine and map types of sentiments expressed during the shutdown about this national park. We quantitatively compare the prevalence of these sentiments during the shutdown to the months before and after the event to contextualize the influence of the shutdown on the general online conversation.

As user-generated content online increasingly shapes conversations about parks, and significant events spur real-time reactions, our study provides insight into analysis methods to categorize and map the sentiments in these conversations over time. Aided by this type of analysis, scientists and managers may better understand relative frequencies of sentiments across different populations and craft relevant messages to address this range of sentiments.

We addressed the following research questions:

1. What are characteristics of the online conversation about JOTR during the 2019 shutdown?
2. How do these characteristics vary from the same time periods in other years?

Methods

An analysis within the Tweets collected for the full range of dates was conducted for the 2019 federal government shutdown and the same corresponding weeks of 2018 and 2020. We included the five weeks of the shutdown and a two week period on either end to capture the tail ends of the data as well. This nine week period was as follows for 2018, 2019, and 2020:

- December 8-21
- December 22 – January 25 (2019: park partial and full facilities closures and staff restrictions)
- January 26 – February 8

The specific methods for data analysis followed the same methods presented in this report for the automated coding of sentiments across the full dataset. TWINT (Twitter Intelligence Tool) was used as an advanced Twitter scraping and OSINT tool, written in Python, that is not reliant on Twitter's API to function. This harvesting tool returned the tweets, dates, time stamps, URLs, links, hashtags, usernames, counts of replies and retweets, and other data. Once this dataset was harvested, we used IBM Watson's

Natural Language Understanding (NLU) Analysis to code for sentiment in an automated fashion. NLU is a pre-trained model and API for test analysis. It applies a label to each tweet's sentiment, returning a value between -1 (most negative) and +1 (most positive) according to its reading of the tweet's content. Small values are rounded to 0 for a neutral tweet. The NLU also codes for emotion, detecting anger, disgust, fear, joy, and sadness and returning a value from 0 (weak) to 1 (strong) for each.

RESULTS

Altogether, the TWINT harvested 36,598 tweets for the nine-week period across the three years, 99.3% of which were usable for this analysis. The majority of these, 54.8%, were from 2019, and the remaining tweets almost evenly split between 2018 and 2020.

Table 92. Harvested tweets and final dataset composition.

Tweets…	2018	2019	2020	Total
Overall	7,947	20,037	8,614	36,598
Eligible for NLU Sentiment	7,882	19,927	8,545	36,354
AND In English	7,875	19,917	8,540	**36,332**

TWEET COMPOSITION

Overall, one out of ten tweets linked to a location and about two-thirds linked to a URL. A fifth to a quarter of tweets mentioned other Twitter account handles, accompanied an image, or used hashtags.

Tweets composition was different during the shutdown than before or after. During the 2019 shutdown, tweets had significantly fewer links to JOTR locations, more links to URLs (e.g., media articles), fewer images, and fewer hashtags than the same time period in the year before and after, all with a small to medium effect size. In 2020, the prevalence of links to locations and hashtags increased again compared to 2019, and links to URLs again decreased, but all three measures were still significantly less than the pre-shutdown comparison period.

Table 93. Tweet elements and frequency (%) of distribution for 2018, 2019, 2020, and overall.

Contains	Year[1]				Tests of significance[2]		
	2018	2019	2020	Total	X^2	p	Cramer's V
Location(s)	15.0	7.5	11.6	10.1	366.657	< 0.001	0.102
Mention(s)	26.6	26.9	31.4	27.9	67.253	< 0.001	0.043
URL(s)	59.7	70.3	47.9	62.7	1313.762	< 0.001	0.191
Image(s)	26.3	15.9	27.0	20.8	635.995	< 0.001	0.133
Hashtag(s)	32.8	23.1	26.6	26.0	271.714	< 0.001	0.088

[1]Cells are reported as percentages (%) for affirmative (yes) responses.
[2]Chi-square test (X^2); p value (p).

TWEET SENTIMENT

Overall, tweets were split about evenly among positive, neutral, and negative sentiments. However, the year-to-year comparison was pronounced, with significantly fewer positive and neutral tweets and significantly more negative tweets during the shutdown, with medium to large effect sizes. Whereas more tweets in 2018 and 2020 were positive than neutral or negative (42.2% and 44.9%, respectively), tweets in 2019 were more apt to be neutral or negative. In fact, more than half (50.1%) of the tweets in 2019 were negative, versus only 183% in 2018 and 23.4% in 2020.

We then examined the overall categories of "positive" and "negative" further, to see the strength of the positivity or negativity expressed. Overall, tweets were significantly more negative during the shutdown than in 2018 or 2020. Although the tweets in 2020 were overall more positive than in the shutdown, they were still significantly less positive than in 2018. These differences had a large effect size. The tweets labeled as positive were significantly less positive during the shutdown than in 2018 or 2020. Positive tweets in 2020 were more positive than during the shutdown but still significantly less positive than in 2018. Negative tweets during the shutdown were the most negative of the three years, but only significantly more negative than those of 2018. In other words, the extent of negativity expressed in the negative tweets of the shutdown remained the same in the following year, with a medium effect size.

Finally, we examined five emotions coded in the tweets: anger, disgust, fear, joy, and sadness. Among the five, the average strength of "joy" was strongest and the average strength of "anger" was weakest overall and in each year. In 2019, "disgust" was expressed more strongly relative to fear, whereas fear was more strongly expressed than disgust in 2018 and 2020. A pattern exists in the year-by-year comparisons for anger, disgust, fear, and sadness: the strength of each of these emotions was strongest in 2019 and weakest in 2018, with 2020 returning almost to 2018 levels. The converse is apparent with joy: joy was weakest in 2019 and strongest in 2018, with 2020 returning almost to 2018 levels. In all these cases, the differences among the three years were significant with medium to large effect sizes.

Taken together, during the 2019 shutdown, there was a pronounced "sentiment trough," with the average sentiment expressed in the Tweets being more negative and characterized by less joy and more anger, disgust, fear, and sadness.

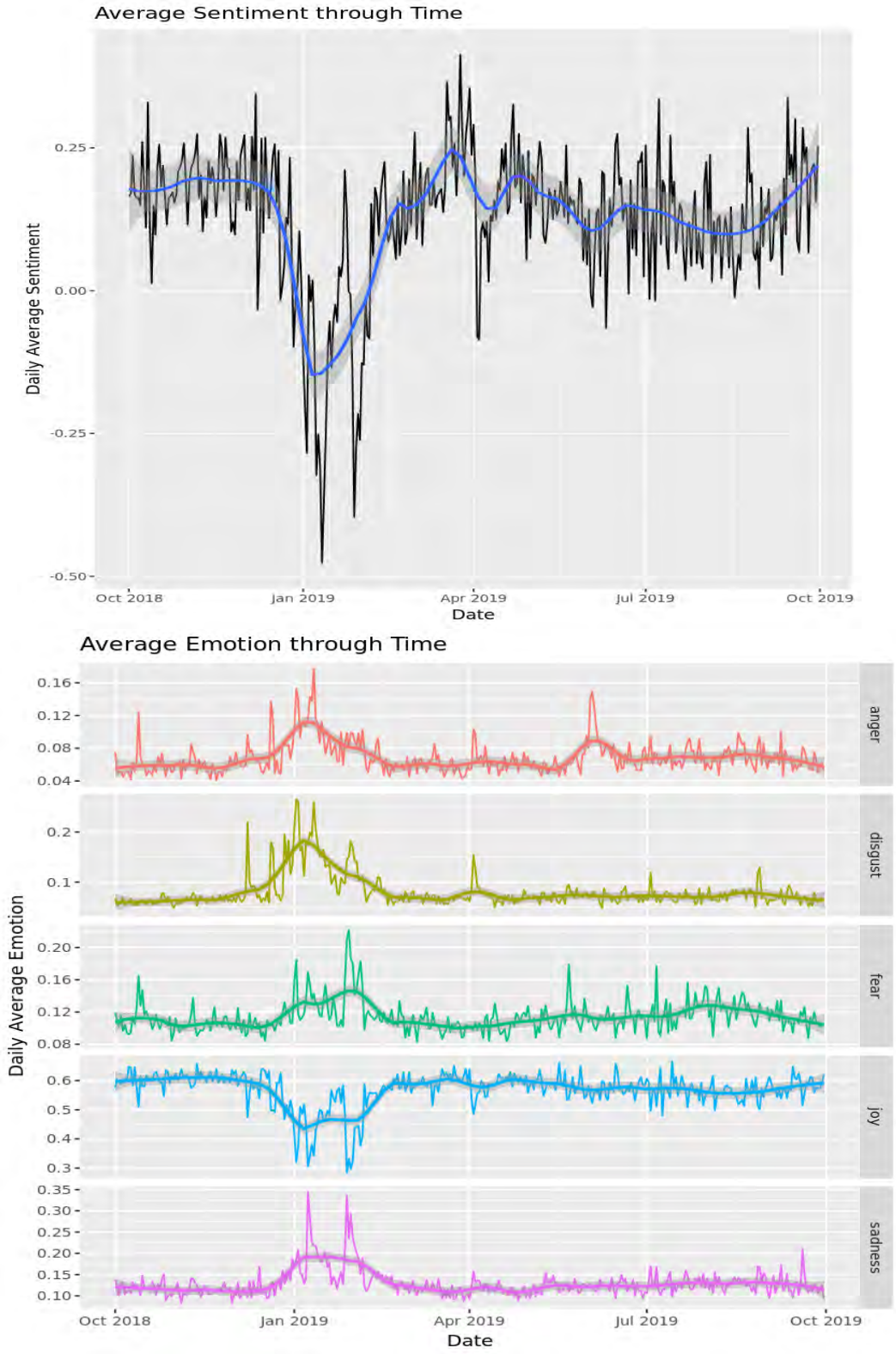


Figure 31. Average sentiment and particular emotion scores for fiscal year 2019 (October 2018 – September 2019), including the shutdown period examined. Scales are not equal for daily average emotion scores.

Table 94. Sentiment (overall positive, neutral, or negative) frequency (%) distribution of tweets for 2018, 2019, 2020, and overall.

Sentiment	Year[1]				Tests of significance[2]		
	2018	2019	2020	Total	X^2	p	Cramer's V
Positive (+)	42.2	23.3	44.9	32.5	1711.824	< 0.001	0.217
Neutral (0)	39.6	25.8	31.7	30.2	509.415	< 0.001	0.120
Negative (-)	18.3	50.9	23.4	37.4	3642.391	< 0.001	0.311

[1]Cells are reported as percentages (%) for affirmative (yes) responses.
[2]Chi-square test (X^2); p value (p).

Table 95. Strength of sentiment (mean value) of tweets for 2018, 2019, 2020, and overall. Values are on a scale of -1 (most negative) to +1 (most positive).

Average Sentiment	Year[1]				Tests of significance[2]		
	2018	2019	2020	Total	F	p	Eta (η)
Positive	0.766[a]	0.732[b]	0.748[c]	0.747	28.483	< 0.001	0.069
Negative	-0.668[a]	-0.761[b]	-0.676[b]	-0.738	309.418	< 0.001	0.209
Overall	0.201[a]	-0.217[b]	0.178[c]	-0.034	2017.132	< 0.001	0.316

[1]Cells reported as means (M) for each corresponding unit of time, followed by the (standard deviation) for summer and fall and (range) for overall.
[2]ANOVA F test (F); p value (p); Eta (η) effect size.

Table 96. Specific emotions (mean value) detected within tweets for 2018, 2019, and 2020. Values are on a scale of 0 (emotion absent) to +1 (emotion strongest).

Average Emotion	Year[1]				Tests of significance[2]		
	2018	2019	2020	Total	F	p	Eta (η)
Anger	0.006[a]	0.011[b]	0.006[c]	0.009	831.249	< 0.001	0.209
Disgust	0.070[a]	0.168[b]	0.075[c]	0.125	2306.900	< 0.001	0.336
Fear	0.111[a]	0.148[b]	0.117[c]	0.133	473.945	< 0.001	0.159
Joy	0.601[a]	0.414[b]	0.589[c]	0.496	2390.437	< 0.001	0.341
Sadness	0.121[a]	0.212[b]	0.135[c]	0.174	1255.704	< 0.001	0.254

[1]Cells reported as means (M) for each corresponding unit of time, followed by the (standard deviation) for summer and fall and (range) for overall.
[2]ANOVA F test (F); p value (p); Eta (η) effect size.

ENGAGEMENT WITH TWEETS

Comparing the three years, there were differences in how other Twitter users engaged with the tweets. Overall, tweets from 2019 received more replies than tweets in 2018 and 2019. Although the number of replies had a much higher range in 2019 than in the 2020, the difference was significant between 2018 and two other years. Tweets from 2019 also had significantly more retweets and a larger range (a few shared more than 10,000 times), averaging almost four retweets each as compared to one retweet each in 2018 and 2020. The effect sizes for both the replies and retweets were small. On average, tweets in 2019 received 9.23 "likes" each, compared to 4.31 in 2018 and 7.70 in 2020, but these differences were not statistically significant.

To parse the patterns of engagement in a manner where the large range of measures would not obscure finer patterns in the data, we examined the same characteristics (replies, retweets, and likes) in groups of

none, one, two, or three or more. In general, most tweets across all three years do not garner any replies (83.3%), retweets (84.2%), and/or likes (58.6%). The same is true for each of the individual years. Compared to 2018, the 2019 data depict a time of more engagement in the form of a higher percentage of tweets having three or more replies, more retweets overall and especially pronounced in the three or more retweets category. However, the 2019 tweets had significantly fewer likes overall and in each category than in 2018. In general, a higher proportion of tweets was engaged with in 2020 than in the previous years. Significantly more tweets had replies, especially one or two replies, and likes, especially three or more likes. Increases in engagement seen in 2019 remained in 2020 and, although lower by most measures than in 2019, remained significantly higher than 2018 levels. All the significant differences observed had small effect sizes.

Table 97. Others' engagement with tweets, with means of replies, retweets, and likes.

Measure		Year[1]				Tests of significance[2]
		2018	2019	2020	Total	
Replies	Mean	0.31[a]	0.93[b]	0.47[b]	0.69	F: 3.101
	Std. Dev.	(3.104)	(27.891)	(3.422)	(20.769)	p: 0.045
	Range	0-243	0-2,877	0-213	0-2,877	η: 0.013
Retweets	Mean	1.14[a]	3.84[b]	1.01[a]	2.59	F: 4.267
	Std. Dev.	(43.773)	(117.066)	(25.757)	(89.920)	p: 0.014
	Range	0-3,835	0-12,138	0-2,321	0-12,138	η: 0.015
Likes	Mean	4.31	9.23	7.70	7.81	F: 1.939
	Std. Dev.	(56.562)	(228.233)	(161.473)	(188.096)	p: 0.144
	Range	0-3,379	0-19,249	0-14,317	0-19,249	

[1]Cells reported as means (M) for each corresponding unit of time, followed by the (standard deviation) for summer and fall and (range) for overall.
[2]ANOVA F test (F); p value (p); Eta (η) effect size.

Table 98. Others' engagement with tweets, with frequencies (%) within categories of replies, retweets, and likes.

Measure		Year[1]				Tests of significance[2]		
		2018	2019	2020	Total	X^2	p	Cramer's V
Replies	0	85.0	84.8	78.1	83.3	207.173	< 0.001	0.077
	1	11.1	10.3	15.8	11.8	168.026	< 0.001	0.070
	2	2.1	2.0	3.2	2.3	36.806	< 0.001	0.033
	3+	1.8	2.9	2.9	2.6	33.865	< 0.001	0.029
Retweets	0	86.9	82.9	84.8	84.2	71.371	< 0.001	0.044
	1	7.1	8.2	8.0	7.9	10.291	0.006	0.017
	2	2.1	2.7	2.4	2.5	9.086	0.011	0.016
	3+	3.9	6.2	4.8	5.4	63.270	< 0.001	0.041
Likes	0	57.2	63.2	49.2	58.6	488.987	< 0.001	0.116
	1	17.5	15.4	19.3	16.8	67.141	< 0.001	0.043
	2	7.8	6.1	8.0	6.9	42.278	< 0.001	0.034
	3+	17.5	15.3	23.5	17.7	272.789	< 0.001	0.089

[1]Cells are reported as percentages (%) for affirmative (yes) responses.
[2]Chi-square test (X^2); p value (p).

Summary of Key Findings

We examined Tweets from the same 9-week period in 2018, 2019, and 2020 to compare the government shutdown of 2019 to comparable times in the year before and after. To summarize key points from our findings, we found that:

- Tweet composition
  - Shutdown: More URLs
  - Pre and Post-shutdown: More locations and images
- Sentiment frequency
  - Shutdown: Most negative; least positive or neutral
  - Pre and Post-shutdown: Most positive; negative did not return to pre-shutdown frequency
- Sentiment strength
  - Shutdown: Overall negative average
  - Pre and Post-shutdown: Overall positive average; post-shutdown as negative as shutdown and not as positive as pre-shutdown
- Emotion scores
  - Shutdown: Joy strength the strongest and anger the weakest out of the emotions; stronger negative emotions; disgust and sadness were more strongly expressed
  - Pre and Post-shutdown: Joy strength the strongest and anger the weakest out of the emotions; no emotions post-shutdown have returned to pre-shutdown levels
- Others' engagement
  - Shutdown: More replies and retweets in general and in higher volumes per tweet; fewer tweets were liked
  - Pre and Post-shutdown: Average number of replies post-shutdown remained at shutdown levels; more tweets had replies than previous years, especially one or two replies per tweet; retweets post-shutdown did not return to pre-shutdown levels; more tweets were liked in general and in higher volumes per tweet specifically than in previous years

Discussion

Given these findings, we present three areas for consideration.

First, we suggest that Twitter conversations about JOTR during the 2019 shutdown were characterized by more impersonal than personal narratives. That fewer locations and images of the park were shared, and more URLs were shared, implies that the increased volume of conversation was more related to sharing content from third-party external links than to sharing content related to personal park experiences.

Second, there are differences within negative tweets. Although the tweets during the shutdown were more strongly negative than before or after, this negativity was characterized more by disgust, sadness, and fear than anger. Disgust and sadness were especially strong during the shutdown. This may indicate more negativity and associated emotions toward the shutdown situation and its consequences than toward the park and its management.

Third, the shutdown shifted the online JOTR conversation in ways still seen one year afterward. The volume of tweets, variety of responses to JOTR-related content, and number of users interacting with the

tweets indicates not only a larger but also a potentially different engaged Twitter population about the park. It may also indicate that JOTR has more prominence as a symbol of issues and perspectives related to those seen in the shutdown and that JOTR is invoked as such in other conversations that do not particularly relate to the park. In either case, the shutdown appears to have acted as a catalyst for more exposure of JOTR in online conversations.

Further research into the content of the tweets and contextual data are necessary to understand further details about these conversations and validate the above points of discussion. We suggest this could be accomplished using automated coding of other attributes, such as mentions of a) family or governance, b) targeted coding by researchers to validate and extend themes surfaced by the automated coding, and/or c) manager interviews to provide contextual data about particular themes in the conversation that may or may not have been highlighted in this high-level analysis.

Appendix E: Park Information Sources by Age Groups

Introduction

To assist JOTR Interpretation in targeting specific age groups with specific communications before and during a visit, we have compared the frequencies of use of each information source used and desired for future visits by the general age group of a visitor. We have grouped the ages by 10-year increments.

Table 99. Age of visitors by decade and overall. *(General survey Q12b, Management survey Q8b)*

Age of visitors	Total[1]
< 29	20.9
30-39	27.4
40-49	15.6
50-59	15.9
60-69	13.5
> 70	6.6
Average age	43.84 (16-83)

[1]Cells reported as percentages (%) of affirmative (yes) responses and age in years followed by (range).

Key Findings

Beyond the patterns in most and least consulted information sources already described in this report, the following specifies significant differences among age groups for information sources. All significant findings had a low to medium effect size.

- Consulting any information source before or during a park visit, and finding the needed information, was high and did not vary significantly across age groups.
- Visitors under 50 consulted social media (any) before their visit more frequently, and Instagram and Reddit specifically. They would also prefer these information sources before a future visit.
- Visitors in their 30s-60s are less likely to obtain information from friends/relatives/word of mouth.
- Visitors 60 and older are more likely to consult state or local welcome centers, visitor bureaus, or chambers of commerce before their current visit and before future visits.
- There were no significant differences in the proportions of visitors who did not plan or planned days, weeks, or months in advance of their most recent visit to the park. However, of those who planned weeks in advance, those in their 40s and 50s planned slightly further out than other age groups and of those who planned months in advance, those in their 30s and over planned slightly further out than those in their 20s or younger.
- During their most recent visit to the park, those in their 40s and 50s were more likely to use the JOTR website. Those in their 40s and older were more likely to use visitor center exhibits.
- Perceived importance and quality of information sources used during their park visit did not generally or systematically vary by age group.

RESULTS

Table 100. Whether visitors obtained necessary information before or during their visit to the park, by season and overall. *(General survey Q10a-b and Q11)*

Information question	Age[1]							Tests of significance[2]
	< 29	30s	40s	50s	60s	> 70	Total	
Prior to this visit, did you and your personal group obtain information about the park?	73.3	72.6	69.8	72.5	74.3	71.9	72.5	X^2: 1.848 p: 0.870
From the sources used prior to this visit, did you and your personal group obtain the type of information about the park that you needed?	94.6	94.7	96.5	94.7	95.5	92.7	94.9	X^2: 2.759 p: 0.737
Did you or your personal group use any information services or facilities during this visit to Joshua Tree NP?	57.8	61.0	63.4	64.4	59.2	59.4	60.9	X^2: 4.815 p: 0.439

[1]Cells are reported as percentages (%) for affirmative (yes) responses.
[2]Chi-square test (X^2); p value (p).

Table 101. Sources of information used for this park visit, by season and overall. *(General survey Q10b)*

Prior to this visit, how did you and your personal group obtain information about the park?	Age[1]							Tests of significance[2]
	< 29	30s	40s	50s	60s	> 70	Total	
Joshua Tree NP website: www.nps.gov/jotr	65.9	62.9	68.1	66.7	60.8	62.8	64.7	X^2: 5.630, p: 0.344
Social media – Any	22.8	21.4	21.6	16.4	10.1	10.3	18.7	X^2: 34.761, p: < 0.001, V: 0.121
---Facebook	7.9	6.8	7.6	7.2	5.7	4.8	7.0	X^2: 2.672, p: 0.750
---Twitter	1.3	2.2	1.5	1.1	1.4	0.0	1.5	X^2: 6.441, p: 0.266
---Instagram	13.8	13.2	13.5	9.5	5.7	2.8	11.1	X^2: 32.813, p: < 0.001, V: 0.113
---Reddit	3.9	3.5	2.9	1.4	0.7	0.7	2.6	X^2: 15.957, p: 0.007, V: 0.079
---Flickr	0.4	0.3	0.3	0.3	0.0	0.0	0.3	X^2: 2.878, p: 0.719
---Other	3.7	3.5	3.5	2.9	1.0	2.8	3.1	X^2: 6.934, p: 0.226
Other websites (Trip Advisor, Hotels.com, Expedia, etc.)	27.1	25.2	25.4	25.9	24.7	21.4	25.4	X^2: 2.135, p: 0.830
Friends / relatives / word of mouth	37.0	39.4	32.5	31.9	28.0	36.6	34.9	X^2: 14.936, p: 0.011, V: 0.082
Highway signs	12.5	9.2	9.1	9.2	9.5	9.7	9.9	X^2: 4.060, p: 0.541
Inquiry to park via phone, mail, or email	3.1	1.5	4.1	2.6	1.7	5.5	2.7	X^2: 11.019, p: 0.051
Local businesses (hotels, motels, restaurants, etc.)	3.5	2.2	3.2	4.6	2.7	1.4	3.0	X^2: 6.349, p: 0.274
Maps / brochures	35.9	33.2	32.2	35.1	31.1	32.4	33.6	X^2: 2.689, p: 0.748
Newspaper / magazine articles	4.2	3.5	5.6	2.0	3.0	6.9	3.9	X^2: 10.035, p: 0.074
Other National Park Service sites / units	8.5	9.0	6.4	9.8	6.8	8.3	8.3	X^2: 4.034, p: 0.544
Previous visits	23.9	18.7	19.9	20.7	17.9	20.7	20.3	X^2: 5.555, p: 0.352
School class / program	2.0	1.2	1.8	1.4	1.7	0.0	1.5	X^2: 5.686, p: 0.338
State or local welcome center / visitors bureau / chamber of commerce	4.2	4.7	3.8	3.2	8.8	7.6	4.9	X^2: 13.927, p: 0.016, V: 0.084
Television / radio programs / DVDs	1.8	2.5	1.5	1.1	0.7	0.7	1.6	X^2: 6.279, p: 0.280
Travel guides / tour books (AAA, Fodor's, Lonely Planet, etc.)	16.2	15.9	18.4	15.8	14.2	17.2	16.2	X^2: 2.318, p: 0.804
Other[3]	7.0	7.8	7.6	6.9	6.8	6.2	7.2	X^2: 0.832, p: 0.975

[1]Cells are reported as percentages (%) for affirmative (yes) responses. highlights the highest (blue) and lowest (red) percentage per age group and overall.
[2]Chi-square test (X^2); p value (p); Cramer's V (V) for significant differences ($p < 0.05$).
[3]All listed information sources with more than one mention (listed in descending order): All Trails App, Climbing guide, Hiking guide, Google, Google Earth, blogs, eBird, Internet, Joshua Tree Rock Climbs book, and YouTube.

Table 102. Sources of information preferred for future visits, by season and overall. *(General survey Q10b)*

If you were to visit Joshua Tree NP in the future, how would you and your personal group prefer to obtain information about the park?	Age[1]							Tests of significance[2]
	< 29	30s	40s	50s	60s	> 70	Total	
Joshua Tree NP website: www.nps.gov/jotr	31.7	34.9	38.0	39.7	38.5	35.2	36.0	X^2: 7.443, p: 0.190
Social media – Any	10.7	10.7	14.3	8.6	6.1	7.6	10.1	X^2: 14.477, p: 0.013, V: 0.081
---Facebook	2.6	3.2	4.1	2.6	3.0	0.7	2.9	X^2: 5.568, p: 0.351
---Twitter	0.9	1.0	1.5	1.1	1.7	0.0	1.1	X^2: 4.683, p: 0.456
---Instagram	6.1	6.3	9.1	4.9	3.0	3.4	5.9	X^2: 13.352, p: 0.020, V: 0.077
---Reddit	2.0	2.0	3.2	0.6	0.3	0.7	1.6	X^2: 13.766, p: 0.017, V: 0.075
---Flickr	0.4	0.0	0.3	0.0	0.0	0.0	0.1	X^2: 6.162, p: 0.291
---Other	2.4	1.3	2.3	1.1	0.7	2.8	1.7	X^2: 6.410, p: 0.268
Other websites (Trip Advisor, Hotels.com, Expedia, etc.)	10.3	11.2	12.0	13.2	12.8	7.6	11.4	X^2: 4.731, p: 0.450
Friends / relatives / word of mouth	14.0	15.2	11.7	11.8	10.1	14.5	13.1	X^2: 6.375, p: 0.271
Highway signs	3.7	3.3	2.0	3.2	3.7	4.1	3.3	X^2: 2.657, p: 0.753
Inquiry to park via phone, mail, or email	1.5	2.0	2.0	1.4	3.7	2.8	2.1	X^2: 5.007, p: 0.415
Local businesses (hotels, motels, restaurants, etc.)	0.4	0.8	0.3	0.3	1.0	0.7	0.6	X^2: 2.813, p: 0.729
Maps / brochures	16.4	20.0	17.3	19.8	19.9	17.9	18.7	X^2: 3.429, p: 0.634
Newspaper / magazine articles	2.2	3.5	3.8	0.9	2.0	3.4	2.7	X^2: 10.131, p: 0.072
Other National Park Service sites / units	6.1	6.0	3.5	6.0	3.7	6.9	5.4	X^2: 6.279, p: 0.280
Previous visits	7.9	8.7	12.0	10.9	7.8	7.6	9.2	X^2: 6.537, p: 0.257
School class / program	0.7	0.7	0.9	1.1	0.0	0.0	0.6	X^2: 7.091, p: 0.214
State or local welcome center / visitors bureau / chamber of commerce	2.4	2.5	2.0	4.9	4.7	6.2	3.3	X^2: 11.625, p: 0.040, V: 0.075
Television / radio programs / DVDs	0.4	1.2	0.3	0.3	0.3	1.4	0.6	X^2: 5.566, p: 0.351
Travel guides / tour books (AAA, Fodor's, Lonely Planet, etc.)	12.3	10.7	11.4	10.9	12.5	11.7	11.5	X^2: 1.060, p: 0.958
Other[3]	3.9	5.0	5.0	4.9	2.4	4.1	4.3	X^2: 4.678, p: 0.456

[1]Cells are reported as percentages (%) for affirmative (yes) responses. Shading highlights the highest (blue) and lowest (red) percentage per age group and overall.
[2]Chi-square test (X^2); p value (p); Cramer's V (V) for significant differences ($p < 0.05$).
[3]All listed information sources with more than one mention (listed in descending order): All Trails App, Climbing guide, Hiking guide, Google, Google Earth, blogs, eBird, Internet, Joshua Tree Rock Climbs book, and YouTube.

Table 103. Timeframes of advanced planning for park visit, by season and overall. *(General survey Q10d)*

How far in advance, if at all, did you begin planning your most recent visit to Joshua Tree NP?	Ages[1]						
	< 29	30s	40s	50s	60s	> 70	Total
Didn't plan in advance	23.1	23.3	26.0	24.0	27.9	24.6	24.5
Planned days in advance	30.4	27.6	22.7	21.9	28.3	31.9	26.9
Planned weeks in advance	22.7	22.6	20.5	28.1	19.4	23.9	22.8
Planned months in advance	23.8	26.5	30.8	26.0	24.4	19.6	25.8

[1]Cells are reported as percentages (%) for affirmative (yes) responses. X^2: 23.967; p = 0.066.

Table 104. Average timeframe of advanced planning for park visit, by season and overall. *(General survey Q10d)*

How far in advance, if at all, did you begin planning your most recent visit to Joshua Tree NP?	Ages[1]							Tests of significance[2]
	< 29	30s	40s	50s	60s	> 70	Total	
Number of days in advance	5.82	6.08	9.22	6.20	5.60	7.51	6.50	F 1.866, p: 0.098
Number of weeks in advance	2.83[a]	2.63[a,b]	3.14[a,b]	3.17[b]	2.69[a,b]	2.95[a,b]	2.79	F 13.207, p: 0.007, η: 0.165
Number of months in advance	3.00[a]	3.36[a,b]	3.41[a,b]	3.58[a,b]	4.19[b]	3.76[a,b]	3.44	F 2.574, p: 0.026, η: 0.137

[1]Cells reported as means (M) for each corresponding age group and overall.
[2]ANOVA F test (F); p value (p); Eta (η) effect size.

Table 105. Information and facilities used during this visit to the park, by season and overall. *(General survey Q11b)*

Please mark all the information series and facilities that you or your personal group used during this visit to Joshua Tree NP	Age[1]							Tests of significance
	< 29	30s	40s	50s	60s	> 70	Total	
Assistance from visitor center staff	39.2[a]	40.7[a]	49.1[b]	46.0[a,b]	46.6[b]	53.8[b]	44.2	X^2: 17.521 p: 0.004 V: 0.090
Assistance from entrance station staff	23.9	23.0	22.8	24.1	20.9	21.4	23.0	X^2: 1.381 p: 0.926
Bulletin boards	17.9	19.4	23.1	20.1	20.6	16.6	19.8	X^2: 4.489 p: 0.481
Joshua Tree NP website: www.nps.gov/jotr (used before or during visit)	34.6	29.5	40.9	41.4	29.1	32.4	34.4	X^2: 24.128 p: <0.001 V: 0.105
Park brochure / map	54.7	53.6	63.2	59.2	56.8	57.2	56.9	X^2: 9.859 p: 0.079
Park newspaper	11.6	9.3	13.2	11.5	11.5	14.5	11.4	X^2: 4.934 p: 0.424
Ranger-led programs (walks, talks, etc.)	3.3	2.8	4.4	2.3	0.7	2.8	2.8	X^2: 10.446 p: 0.064
Roadside exhibits	29.5	27.0	30.4	33.3	32.4	35.2	30.4	X^2: 6.898 p: 0.228
Sales items in visitor center	8.8	6.2	9.4	10.6	9.5	6.9	8.4	X^2: 7.632 p: 0.178
Trailside exhibits / signs	30.9	30.7	32.5	35.3	31.1	30.3	31.8	X^2: 2.775 p: 0.735
Visitor center exhibits	22.8	23.4	30.1	29.3	30.1	31.7	26.7	X^2: 13.894 p: 0.016 V: 0.080
Other park publications (plant lists, dog information, camping brochure, etc.)	8.8	8.5	7.3	6.3	8.1	8.3	8.0	X^2: 2.221 p: 0.818

[1]Cells are reported as percentages (%) for affirmative (yes) responses. Shading highlights the highest (blue) and lowest (red) percentage per age group and overall.
[2]Chi-square test (X^2); p value (p); Cramer's V (V) for significant differences ($p < 0.05$).

Table 106. Perceived importance and quality of services and facilities used, by season and overall *(General survey Q11c-d)*

For those services and facilities that you or your personal group used, please rate their…		Age[1]							Tests of significance
		< 29	30s	40s	50s	60s	> 70	Total	
Importance	Assistance from visitor center staff	3.99 (1.02)	3.99 (0.89)	4.07 (0.91)	3.97 (0.99)	3.91 (0.94)	4.10 (0.78)	4.00	F: 0.644 p: 0.667
	Assistance from entrance station staff	3.75 (1.00)	3.85 (1.00)	3.83 (0.90)	3.84 (0.99)	3.95 (0.90)	3.76 (0.74)	3.83	F: 0.394 p: 0.853
	Bulletin boards	3.56 (1.04)	3.39 (0.96)	3.28 (1.00)	3.32 (1.01)	3.29 (1.00)	3.46 (0.93)	3.38	F: 0.886 p: 0.491
	Joshua Tree NP website: www.nps.gov/jotr (used before or during visit)	4.06 (0.87)	3.96 (0.89)	4.03 (0.93)	4.08 (0.86)	4.00 (0.79)	4.15 (0.81)	4.03	F: 0.537 p: 0.749
	Park brochure / map	4.18 (0.95)	4.15 (0.93)	4.26 (0.80)	4.32 (0.79)	4.27 (0.76)	4.24 (0.76)	4.22	F: 1.349 p: 0.241
	Park newspaper	3.33 (1.15)	3.89 (1.14)	3.47 (1.18)	3.90 (1.05)	3.62 (0.99)	3.90 (1.09)	3.66	F: 2.232 p: 0.052
	Ranger-led programs (walks, talks, etc.)	4.53 (0.74)	4.13 (0.72)	4.07 (0.92)	4.14 (0.69)	4.50 (0.71)	4.50 (0.58)	4.26	F: 0.795 p: 0.558
	Roadside exhibits	3.48[a,b] (1.01)	3.63[a,b] (0.99)	3.51[a,b] (0.93)	3.35[a] (1.01)	3.45[a,b] (1.02)	3.86[b] (0.85)	3.52	F: 2.405 p: 0.036 η: 0.136
	Sales items in visitor center	2.95 (1.08)	2.95 (1.13)	3.00 (0.95)	2.74 (1.15)	2.85 (0.86)	3.30 (0.82)	2.92	F: 0.539 p: 0.746
	Trailside exhibits / signs	3.73 (0.96)	3.91 (0.95)	3.77 (0.93)	3.93 (0.85)	3.79 (0.94)	3.84 (0.89)	3.83	F: 0.970 p: 0.435
	Visitor center exhibits	3.50 (0.94)	3.47 (0.93)	3.45 (1.01)	3.42 (0.90)	3.56 (0.94)	3.59 (0.86)	3.49	F: 0.365 p: 0.872
	Other park publications (plant lists, dog information, camping brochure, etc.)	3.46 (0.97)	3.72 (0.97)	3.79 (0.72)	3.75 (0.97)	3.42 (1.06)	3.64 (1.12)	3.63	F: 0.760 p: 0.580
Quality	Assistance from visitor center staff	4.56 (0.73)	4.56 (0.74)	4.56 (0.71)	4.52 (0.77)	4.56 (0.61)	4.68 (0.73)	4.56	F: 0.496 p: 0.780
	Assistance from entrance station staff	4.63 (0.60)	4.57 (0.71)	4.46 (0.68)	4.54 (0.72)	4.60 (0.64)	4.71 (0.53)	4.57	F: 0.939 p: 0.456
	Bulletin boards	3.95 (0.77)	3.97 (0.78)	4.13 (0.77)	4.01 (0.80)	3.88 (0.87)	4.04 (0.69)	4.00	F: 0.795 p: 0.554
	Joshua Tree NP website: www.nps.gov/jotr (used before or during visit)	4.28[a,b] (0.74)	4.21[a,b] (0.79)	4.26[a,b] (0.66)	4.14[a] (0.78)	4.39[a,b] (0.69)	4.55[b] (0.62)	4.26	F: 2.981 p: 0.011 η: 0.141
	Park brochure / map	4.40 (0.80)	4.33 (0.75)	4.30 (0.75)	4.26 (0.85)	4.28 (0.91)	4.50 (0.72)	4.33	F: 1.562 p: 0.168
	Park newspaper	4.09 (0.82)	4.20 (0.73)	4.09 (0.70)	4.08 (0.84)	4.09 (0.67)	4.33 (0.58)	4.13	F: 0.524 p: 0.758
	Ranger-led programs (walks, talks, etc.)	4.93 (0.27)	4.73 (0.46)	4.62 (0.51)	4.57 (0.54)	5.00 (0.00)	4.75 (0.50)	4.75	F: 1.077 p: 0.385
	Roadside exhibits	3.99 (0.88)	4.05 (0.80)	4.15 (0.73)	3.96 (0.86)	4.02 (0.86)	4.31 (0.68)	4.05	F: 1.847 p: 0.102
	Sales items in visitor center	4.21 (0.77)	4.22 (0.76)	3.96 (0.74)	3.91 (0.85)	4.04 (0.82)	4.50 (0.54)	4.10	F: 1.335 p: 252
	Trailside exhibits / signs	3.97 (0.87)	4.10 (0.85)	3.94 (0.89)	3.78 (0.94)	3.96 (0.89)	3.93 (0.79)	3.96	F: 2.080 p: 0.066
	Visitor center exhibits	4.29[a,b] (0.66)	4.15[a,b] (0.74)	4.08[a] (0.74)	4.14[a,b] (0.71)	4.40[a] (0.62)	4.30[a,b] (0.70)	4.21	F: 2.702 p: 0.020 η: 0.152
	Other park publications (plant lists, dog information, camping brochure, etc.)	3.75 (0.74)	3.80 (0.90)	4.00 (0.83)	3.95 (0.84)	3.92 (0.88)	4.09 (0.54)	3.87	F: 0.575 p: 0.719

[1]Cells reported as means (M) on a five-point scale, followed by the (standard deviation) for age groups:
Importance: Not important (1); Somewhat important (2); Moderately important (3); Very important (4); and Extremely important (5).
Quality: Very poor (1); Poor (2); Average (3); Good (4); and Very good (5).
Superscripts denote significant differences among age groups at $p < 0.05$. Shading highlights the highest (blue) and lowest (red) percentage per age group and overall.
[2]ANOVA F test (F); p value (p); Eta (η) effect size for significant differences ($p < 0.05$).

Appendix F: Potential Management Actions Frequency Tables

INTRODUCTION

To assist JOTR Interpretation in interpreting support or opposition to potential management actions, we have provided the percentage of respondents that indicated each level of support or opposition to each potential action.

Table 107: Support for potential park access, transportation, and car camping; trails, backcountry, and wilderness; and climbing and bouldering future management actions at the park. *(Management survey Q6a, Q6b, and Q6c)*.

Visitor Access management actions Percent Support/Oppose	Mean	I don't know / need more information	Strongly oppose	Oppose	Somewhat oppose	Neither oppose nor support	Somewhat support	Support	Strongly support
Implement reservation system to enter the park	2.88	8.7	27.4	21.0	11.2	13.5	6.4	8.4	3.4
Add parking spaces at major attractions	4.23	4.2	7.4	12.7	13.4	16.4	16.4	21.7	7.8
Add additional traffic lanes at park entrances	3.94	5.6	9.1	17.0	7.7	27.8	9.3	16.3	7.1
Increase entry fees to enhance visitor experiences	3.17	3.8	19.0	23.4	13.2	19.3	8.8	9.3	3.2
Temporarily close specific roads and parking areas based on congestion	3.85	9.9	6.9	17.7	12.1	20.7	14.1	15.4	3.2
Require riding shuttle buses within the park on the park's busiest days	3.98	6.6	14.3	16.5	9.3	9.1	15.3	19.2	9.8
Develop paved access to more popular locations and attractions	3.19	4.8	22.3	21.1	12.8	12.6	10.8	12.4	3.2
Implement a parking reservation or parking permit system	3.06	8.8	17.9	22.6	14.8	17.5	10.0	7.6	.8
Decrease the number of nights that visitors can stay at developed campgrounds	3.51	12.2	9.6	18.8	11.6	27.2	9.6	8.2	2.9
Develop more campsites in existing campgrounds like Hidden Valley	4.51	11.5	6.0	8.0	6.2	21.3	16.0	23.5	7.6
Use online park communications to inform visitors about the availability and characteristics of sites in developed campgrounds	5.84	4.7	1.3	.6	.3	11.4	10.8	42.5	28.4
Trails and wilderness management actions Percent Support/Oppose	Mean	I don't know / need more information	Strongly oppose	Oppose	Somewhat oppose	Neither oppose nor support	Somewhat support	Support	Strongly support
Reduce the number of trails in the park to provide better conditions on fewer trails	2.82	6.4	16.4	32.4	15.5	18.3	4.7	5.0	1.3
Develop new trails in the southern half of the park	5.23	9.0	1.2	3.9	3.0	16.6	16.2	40.3	9.8
Provide more information about trails to help visitors find trails that match their preferences for length and things they can see and enjoy	5.89	2.3	.4	1.0	.5	10.7	9.5	47.4	28.1
Expand and develop new trailhead parking lots for existing trails	4.69	6.3	3.1	7.6	7.5	20.4	19.8	29.0	6.3
Implement a wilderness backpacking reservation system	4.54	15.1	4.6	7.7	3.9	24.8	13.9	24.8	5.2
Establish designated and assigned wilderness camping sites	4.73	11.2	3.7	6.3	5.2	21.5	18.5	25.7	7.9
Introduce fees for overnight backpacking to support wilderness services	4.62	5.7	6.0	8.4	6.8	16.5	20.9	28.1	7.7

Require mandatory wilderness backpacking orientation to receive a wilderness backcountry permit	4.56	8.1	6.1	9.8	8.1	16.3	17.4	22.5	11.5
Require visitors to pack out human waste when using the backcountry	5.27	9.9	2.4	6.3	6.5	14.4	9.2	22.7	28.6
Climbing and Bouldering Management Actions Percent Support/Oppose	Mean	I don't know/need more information	Strongly oppose	Oppose	Somewhat oppose	Neither oppose nor support	Somewhat support	Support	Strongly support
Limit the addition of new fixed anchors / bolts in wilderness areas	4.71	19.9	3.3	5.3	5.1	26.0	9.4	19.8	11.2
Remove illegally installed (unpermitted) bolts from wilderness areas	5.32	14.4	2.9	3.7	3.0	15.4	9.8	30.2	20.6
Require visitors to pack out human waste when using popular climbing areas	5.73	8.9	1.2	2.1	2.9	11.7	10.8	29.4	33.0
Close climbing routes / staging areas with sensitive cultural or natural resources	5.54	9.9	1.2	3.0	3.3	13.3	12.8	30.7	25.7
Provide signs and directions to all climbing rock formations	4.86	7.5	2.5	7.0	6.8	17.6	17.8	32.5	8.4
Require time-specific permits for climbing on popular routes and walls	4.14	16.4	8.5	9.4	6.3	23.1	14.4	17.3	4.6
Require location-specific permits for climbing on popular routes and walls	4.15	15.6	8.4	9.8	6.2	23.1	14.2	17.8	4.8
Require location-specific permits for popular bouldering areas	3.98	15.8	9.4	12.3	7.0	22.5	12.7	15.6	4.7
Require visitors to pack out human waste when using popular bouldering areas	5.63	9.4	1.4	3.5	1.9	12.0	12.9	28.4	30.5
Close bouldering routes / staging areas with sensitive cultural or natural resources	5.35	10.1	1.7	4.7	3.3	13.4	16.0	29.3	21.5
Improve signs and directions to all bouldering formations	4.99	8.4	2.7	5.4	5.0	17.9	17.3	32.7	10.6
Require time-specific permits for popular bouldering areas	3.93	13.4	9.1	13.1	8.6	24.4	11.5	15.4	4.7
Identify designated crash pad areas free from vegetation and sensitive soil	5.51	14.8	1.4	1.4	1.6	14.7	12.4	36.7	17.0