

# NPS Report: Arches NP Economic Regional Data and Analysis

Prepared for: **National Park Service**  
**Arches National Park, Moab, UT**  
**Social Science Program, Ft. Collins, CO**

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## Executive Summary

The purpose of this report is to provide background information related to potential economic impacts associated with various visitor use management (VUM) scenarios at Arches National Park (ARCH). In preparing this document, information and data related to both State of Utah and local community taxable sales between 2010 and 2022 was examined as well as ARCH visitation between 2010 and 2022. Comparisons were made between ARCH visitation and other parks and park groupings. Further, trends in taxable sales in the gateway community of Moab, UT were compared with visitation trends in ARCH as a whole. Additionally, data and results from ARCH-specific and southern Utah-specific surveys and research were examined to supplement existing detailed tax and visitation data.

The analysis of potential economic impacts associated with alternative VUM scenarios in ARCH is aided by existing yearlong data from the 2022 pilot timed entry reservation system in the park as well as data from the April-October pilot timed entry system second year of 2023. Aspects of the timed entry pilots are relevant for long-term planning efforts. This existing data allowed the comparison of both visitation and taxable sales trends between a 2016-2019 pre-reservation comparison period and the 2022 experience. Additionally, April-October visitation for 2023 (which was a separate but similar pilot timed entry reservation system) was compared to the same months for 2022 to evaluate the representativeness of the 2022 data for analysis purposes. These comparisons provide a strong basis in observed visitor behavior from which to make well-informed estimates of future impacts associated with potential long term visitor access strategies the park could consider. The key findings from this analysis are summarized below.

- The appropriate economic analysis area for evaluating impacts from ARCH management changes is likely limited to the 2-county region surrounding the park (Grand and San Juan Counties, UT), and more specifically the gateway community of Moab, UT. Within the range of visitation changes and taxable sales seen from 1998-2022 there is, on average, a statistically significant direct relationship between ARCH visitation and taxable sales in the gateway community of Moab. That is, when ARCH visitation is higher Moab reports higher taxable sales.
- While ARCH saw a 9.4% decrease in annual visitation in 2022 compared to 2016-2019 average levels, there is no conclusive evidence that the pilot timed-entry system at ARCH in 2022 was either largely or significantly responsible for that decline. Other factors such as increasing gasoline prices, and the dramatic swings in visits to US parks by international visitors during and following the COVID-19 year of 2020 likely substantially impacted ARCH visitation as well. Although each NPS unit has its own unique setting and factors impacting recreational visitation, comparisons to other NPS units throughout Utah, the Intermountain Region, and the U.S. showed similar changes in visitation between the 2016-2019 comparison period and 2022. The choice of 2016-2019 as a comparison period for ARCH visitation was made because this was the most recent period without significant disruptions (for example, from COVID-19) that also showed a consistent visitation pattern. Visitation for the April-October 2023 timed entry reservation period showed a 4% increase over 2022 levels for those months, and thus supported and strengthened the conclusion that there was no statistically significant effect from the pilot reservation systems relative to the comparison period.
- Even when experiencing a moderate (9.4%) decrease in annual visitation in 2022 (when compared to 2016-2019 levels) there is no consistently measurable negative impact to local community taxable sales due to this decline because sales (adjusted for inflation) continued to

substantially exceed those reported in the 2016-2019 comparison period. Factors that likely insulate local Moab and Grand County taxable sales from moderate changes in ARCH visitation include the existence of high-quality substitute recreation sites (Canyonlands NP and UT State Parks, as well as recreation on BLM lands), and a growing and increasingly diverse local economy. In addition to the diverse availability of substitute recreation sites in the Moab area, visitors to the region engage in a wide range of recreational activities not necessarily tied to NPS visitation. These activities include mountain biking, ORV travel, and climbing among others. Even if visitation to ARCH were to decline slightly, the robust and growing local economy combined with the fact many visitors will still come to the area to visit other high-quality sites, minimizes any impacts to the local taxable spending levels.

- Previous NPS visitor surveys show park visitors avoid congestion and crowding. This commonsense finding suggests policies aimed at reducing park congestion will also be positively valued by park visitors. In ARCH, a study of the impacts of the 2022 timed entry system found consistent improvements in visitor access to the park (entrance stations), visitor parking access, and visitor experience at key destinations.<sup>1</sup> While these findings have not been formally quantified in the context of impacts on ARCH visitor net economic values, they provide strong support for the conclusion that reductions in park congestion related to the timed entry system would be associated with positive impacts on visitor experiences and economic values associated with those experiences.

As of the drafting of this report, the park has been testing actions and is evaluating options/alternatives for long term management. Based on the data reviewed and the likely scope of action alternatives which may be included in the NEPA analysis of actions or strategies to manage visitor use at ARCH, the following guidance is provided as to the likely economic impacts associated with alternatives.

- 1) A Timed-entry Reservation System for the park (continuation of PTES):** 2023 was the second year of a pilot timed-entry system (PTES) from April 1 to October 31. Visitors arriving by private vehicle between 07:00 and 16:00 daily during these dates require a timed entry reservation. Timed entry reservations are allotted in hourly entry time blocks. This alternative would resemble previous pilot timed-entry systems in 2022 and 2023.

*As noted, the 2022 pilot timed entry system did not result in a statistically significant and measurable negative change in local area economic activity relative to the 2016-2019 comparison period. Visitation under timed entry relative to a previous (2016-2019) comparison period did not decrease substantially more than was the experience for groups of parks without a reservation system. If anything, economic activity in gateway communities has increased substantially over the 2016-2019 comparison period during the period of the pilot program (2022) even while visitation decreased moderately. This underscores how relatively insulated the local economy is to minor changes in ARCH visitation. Further,*

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<sup>1</sup> The primary findings of the review of the ARCH timed entry system are outlined in the “Key Findings” section in Tendick, A., Meyer, C., & Miller, Z.D. 2023. Pilot Timed Entry System at Arches National Park in 2022. Natural Resource Report NPS/NRSS/ARD/NRR—2023/2490. National Park Service, Fort Collins, Colorado. <https://doi.org/10.36967/2297386>

*the impact of a reservation system is also mitigated by visitors shifting use patterns to ARCH for entry outside the reservation windows (early or late in the day) or before or after the April-September reservation season.*

**2) Mandatory Shuttle Bus access to the park:** This management action would replace private vehicle access to the park with shuttle bus access. The mandatory shuttle system would be accessed via first-come, first-serve approaches without any reservations.

*At present there is no basis on which to base estimates of changes specifically with respect to ARCH visitation (and associated economic impacts to the local area) from adoption of a mandatory shuttle bus system. However, experience from other NPS units that have adopted shuttle systems (voluntary) suggests the potential for the system leading to reduced visitation. A 2018 study by Paterson<sup>2</sup> indicates that based in simple trend models for Acadia, Rocky Mountain and Zion NPs, the introduction of shuttle access to the parks was correlated with short term reductions in recreational visitation compared to what would be predicted under the pre-shuttle policy trends.*

*The 2022 Summer visitor survey at ARCH found a striking difference between levels of support for voluntary vs. mandatory shuttle bus access to the park. While 69% of respondents expressed some support for “a voluntary shuttle system to increase modes of access,” only 25% supported “a mandatory shuttle system to reduce traffic congestion.” These results suggest that a mandatory system would be more likely to lead to reduced visitation to ARCH than would a voluntary shuttle system. Support for prospective policy changes (such as a shuttle service) often poll worse before they are enacted than after visitors have an opportunity to experience the changes. For example, the Summer 2021 ARCH visitor survey asking about a potential timed entry reservation system to reduce congestion found 59% either strongly or somewhat supported the policy change. However, in the Summer of 2022, a survey of visitors who had actually utilized the timed entry system found 85% strongly or somewhat supported continuation of the policy.*

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<sup>2</sup> Paterson, R. 2018. “Evaluation of Potential Economic Impacts Associated with the Proposed Arches NP Reservation System.” Industrial Economics, Cambridge, MA.

## 1.0 Introduction

Visitation to national parks has increased rapidly over the past decade. At Arches National Park (ARCH) visitation increased from one million to 1.8 million visits per year—a 73% increase—from 2010 to 2021. This increase in visitation created issues like long entrance line wait times, parking lot congestion, and increased crowding at key resources, which can negatively impact visitor experiences, visitor safety, staff safety, park operations, and park resources.

To address the issues described above, ARCH is considering various visitor use management strategies through formal planning processes. An assessment of local tourism and economic information is necessary to identify potential socioeconomic impacts of visitor use management strategies at ARCH. This report has been prepared to help the NPS better understand local and regional socioeconomic measures that could be affected by potential ARCH visitor use management strategies. The report compiles and analyzes existing relevant socioeconomic information for both the local and the greater ARCH area (Local area including Grand and San Juan Counties, and greater Southern Utah area including Washington, Iron, Garfield, Kane, San Juan, Grand, Piute, Sevier, and Emery Counties). Existing socioeconomic information reviewed included tourism and economic data from the NPS, the State of Utah, local counties, communities, and other relevant local and regional data sources. Overall, the data found most relevant to the analysis of economic impacts associated with potential ARCH visitation changes included State of Utah tax collection data, NPS visitation level data, NPS analyses of the ARCH pilot timed entry reservation system, and Socioeconomic monitoring visitor surveys at ARCH for 2021 and 2022.

### 1.1 Approach and Organization

This paper is divided into two primary sections. The first major section of the paper addresses the application of standard economic impact analysis methods, data, and tools to the case of ARCH and the park's current planning process, the Visitor Access and Experience Plan. In this section, data was collected to determine and describe current and historic socioeconomic conditions, and preliminary analyses to determine potential impacts on socioeconomic impacts from proposed approaches. A second major section of the paper discusses suggested approaches to analyzing the ARCH management alternatives in the context of the preceding data and associated management analysis steps.

## 2.0 Analyzing economic impacts from ARCH visitor use management scenarios.

### 2.1 Definition of ARCH economic analysis region.

A key decision in any economic impact/significance analysis is the choice of the local economic area in which any changes are to be estimated. The larger the defined economic impact area is, the more diluted will be any measured percentage changes in employment and income resulting from management changes. Additionally, the closer defined areas are to park entrances the more concentrated visitor spending is likely to be. In many western (and other) NP units, a very large share of park visitor spending occurs in relatively narrowly defined gateway communities and the counties that contain them. In the case of ARCH, the nearby town of Moab, UT (in Grand County, UT) receives the large majority of direct visitor spending impacts as 88% of summer visitors and 94% of winter visitors reported staying overnight in Moab on their 2021 trips to ARCH.<sup>3</sup> For an analysis of the significance of tourism-related economic activity in the region, the following discussion focuses on the three spatial areas: a 10 county Southern Utah region, the 2-county (Grand and San Juan) region most proximate to ARCH, and the gateway town of Moab, UT.<sup>4</sup>

#### 2.1.1 Recreational setting of the ARCH economic region

ARCH is located within Grand County, UT which also includes the park's single gateway community of Moab. Grand County is comprised of a very large share of public lands, including 72% Federal and 15% State of Utah lands (Table 1, Figure 1).<sup>5</sup> This large share of proximate public land provides a disproportionately greater opportunity for public recreational access (outside of ARCH) as compared to most other NPS units.

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<sup>3</sup> Otak 2023. 2022 Arches National Park Visitor Spending and Experience Study: Final report on 2022 Data Collection. National Park Service.

<sup>4</sup> Nearly all employment-generating business tied to ARCH visitation is located in Grand County or in far northern San Juan County.

<sup>5</sup> Source: Headwaters Economics, Economic Profile System. <https://headwaterseconomics.org/apps/economic-profile-system/>

Table 1. Land Ownership in Grand and San Juan Counties.

	Grand County, UT	San Juan County, UT	Combined Counties	Utah
Total Acres	2,358,353	5,077,211	7,435,564	56,952,598
Private Lands	108,597	400,805	509,402	14,144,156
Federal Lands	1,699,274	3,118,898	4,818,172	34,990,802
Forest Service	57,247	450,195	507,442	8,192,572
BLM	1,551,898	2,079,449	3,631,347	22,781,030
National Park Service	87,735	589,254	676,989	2,109,532
Military	2,394	0	2,394	1,804,511
State Lands	351,494	266,591	618,085	5,395,512
State Trust Lands*	324,950	259,770	584,720	3,385,731
Other State	26,544	6,821	33,365	2,009,781
Tribal Lands	198,985	1,290,915	1,489,900	2,411,366

### Percent of Total

Private Lands	4.6%	7.9%	6.9%	24.8%
Federal Lands	72.1%	61.4%	64.8%	61.4%
Forest Service	2.4%	8.9%	6.8%	14.4%
BLM	65.8%	41.0%	48.8%	40.0%
National Park Service	3.7%	11.6%	9.1%	3.7%
Military	0.1%	0.0%	0.0%	3.2%
State Lands	14.9%	5.3%	8.3%	9.5%
State Trust Lands*	13.8%	5.1%	7.9%	5.9%
Other State	1.1%	0.1%	0.4%	3.5%
Tribal Lands	8.4%	25.4%	20.0%	4.2%

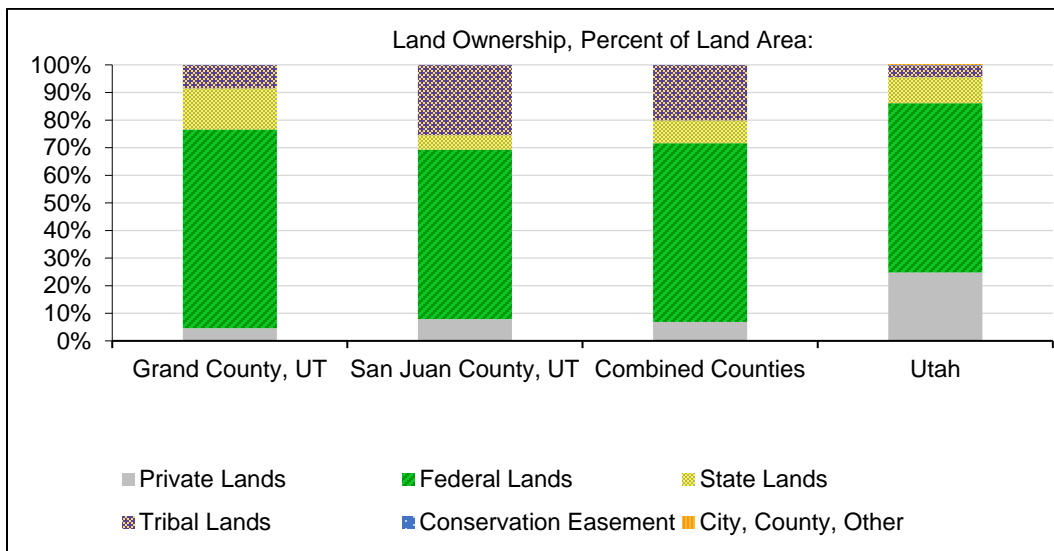


Figure 1. ARCH area land ownership percentages.

Arches NP region is clustered with both developed and dispersed outdoor recreational opportunities. This 10-county<sup>6</sup> area includes a wide array of well-known recreational opportunities. These include 10 NPS units. Included in these are the “Mighty Five” -- Arches, Canyonlands, Bryce Canyon, Capitol Reef and Zion National Parks. In 2023, these five parks received a total of 10.6 million recreational visits. Overall, the 10 Utah NP units received over 16.6 million recreational visits in 2023 (Figure 2).

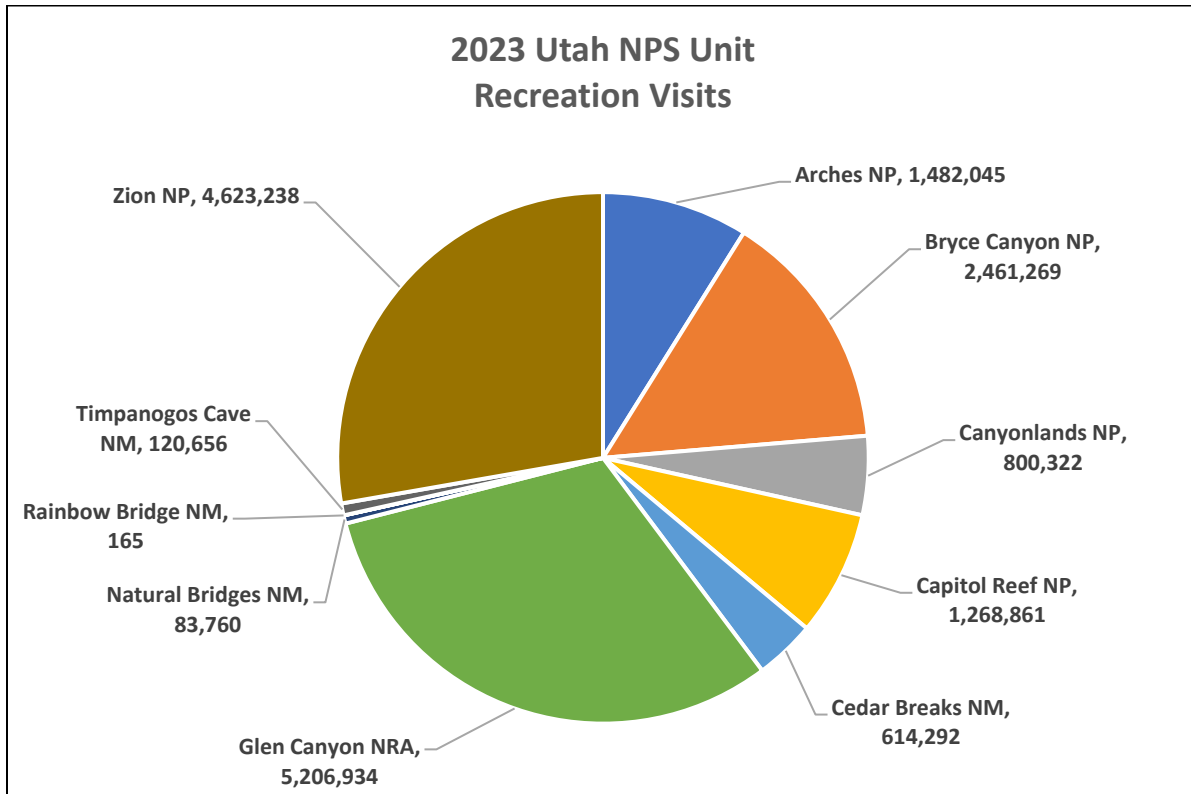


Figure 2. 2023 Recreational Visitation to Southern Utah National Park Units.

One important finding from the 2022 ARCH visitor survey was that trips to ARCH are most often made in conjunction with trips to other nearby NP units. Eighty percent of visitor respondents to the 2022 survey listed at least one other recreational area visited on their trip (Figure 3). Adjusting these percentages to account for the 20% of ARCH visitors who did not visit other sites (Table 2), shows large percentages of ARCH visitors also visiting other parks on their trips.

<sup>6</sup> The 10-county region is defined as San Juan, Grand, Emery, Sevier, Garfield, Kane, Washington, Iron, Piute, and Wayne.

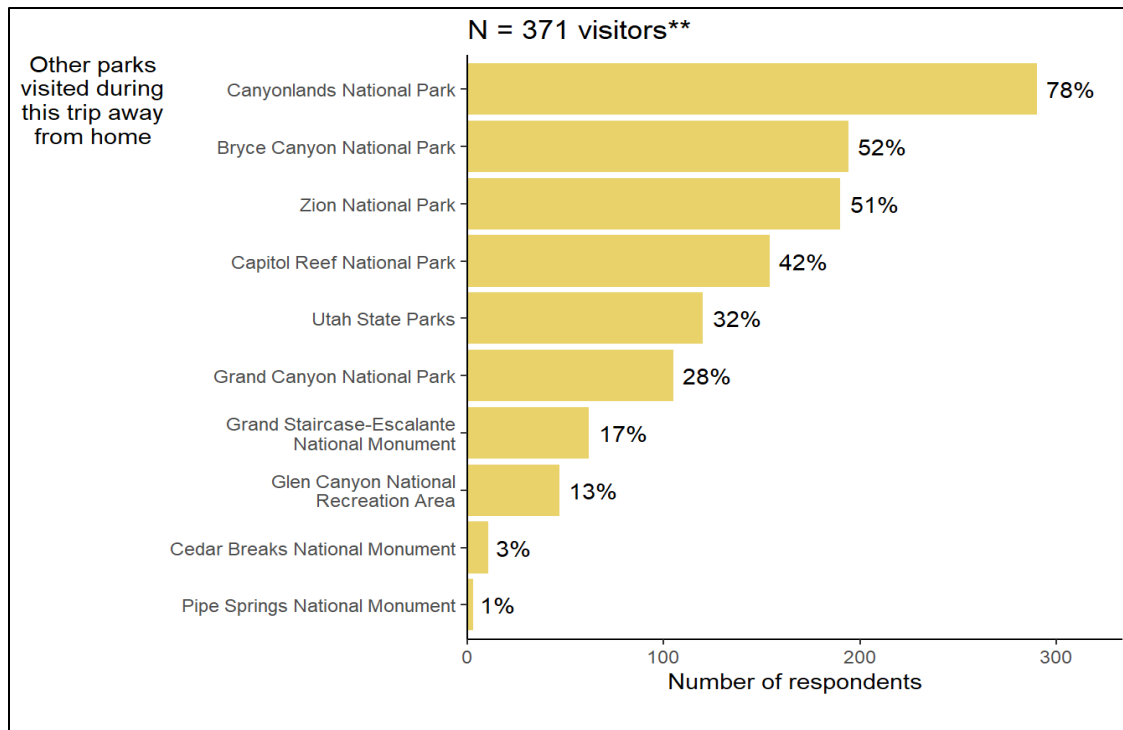


Figure 3. 2022 ARCH Visitor Survey: reported visits to other nearby recreation sites on same trip.

Recent research into NPS visitor behavior has treated visitation decisions to Southern Utah NP units as decisions to visit a “portfolio” of different park units.<sup>7</sup> This method of viewing recreational visitation choices recognizes that an individual park unit might be important in visitation decisions, but other nearby units also have importance as to whether the trip (and associated visitor spending) is actually made. This conclusion is supported by both the reported patterns of NP visitation shown in Figure 3 and Table 2, and the very high correlations between monthly visitation levels for Southern Utah NP units, shown in Table 3. The correlations are estimated using the Pearson’s correlation coefficient for the pairwise data series (denoted as “*r*”). This statistic ranges from -1.0 (a perfect negative correlation), to 1.0 (a perfect positive correlation).

<sup>7</sup> Parsons, George, Christopher Leggett, Joe Herriges, Kevin Boyle, Nancy Bockstael, and Zhe Chen. 2020. “A Site-Portfolio Model for Multiple-Destination Recreation Trips: Valuing Trips to National Parks in the Southwestern United States.” *Journal of the Association of Environmental and Resource Economists* 8: 1–25. <https://doi.org/https://doi.org/10.1086/710714>.

Table 2. Total percent of ARCH 2022 visitors who also visited other Utah parks on their trips.

Park Visited	Adjusted share of ARCH visitors reporting visiting
Canyonlands NP	62%
Bryce Canyon NP	42%
Zion NP	41%
Capitol Reef	34%
Utah State Parks	26%
Grand Canyon NP	22%
Grand Staircase-Escalante NM	14%
Glen Canyon NRA	10%
Cedar Breaks NM	2%
Pipe Springs NM	1%

Overall, the strong correlation in Utah NP visitation as well as the findings from the 2022 ARCH visitor survey provide substantial support for the conclusion that these parks are often viewed as complements to one another rather than as substitutes.

Table 3. Correlations of Monthly visitation levels (1998-2022) to selected NP units (Pearson's r).

<b>Arches NP</b>	1.000					
<b>Bryce Canyon NP</b>	0.939	1.000				
<b>Canyonlands NP</b>	0.965	0.930	1.000			
<b>Capitol Reef NP</b>	0.962	0.937	0.970	1.000		
<b>Grand Canyon NP</b>	0.663	0.781	0.669	0.587	1.000	
<b>Zion NP</b>	0.959	0.934	0.972	0.975	0.609	1.000
	<b>Arches NP</b>	<b>Bryce Canyon NP</b>	<b>Canyonlands NP</b>	<b>Capitol Reef NP</b>	<b>Grand Canyon NP</b>	<b>Zion NP</b>

In addition to NPS units in Southern Utah-ARCH region, Utah State Parks also offer a wide range of recreational opportunities in the local area. In 2023, the 12 Utah state parks located in Southern Utah received nearly 5 million recreational visits (Table 4).

Table 4. 2023 Recreational visits to Southern Utah state park units.

<b>Park</b>	<b>Total 2023 visitation</b>
Coral Pink Sand Dunes State Park	223,368
Dead Horse Point State Park	1,037,485
Escalante Petrified Forest State Park	72,343
Goblin Valley State Park	413,376
Kodachrome Basin State Park	146,380
Quail Creek State Park	335,064
Sand Hollow State Park	1,333,838
Snow Canyon State Park	950,564
Gunlock State Park	254,899
Anasazi Indian Village State Park	16,601
Edge Of The Cedars State Park	13,315
Goosenecks State Park	53,474
<b>Total</b>	<b>4,850,706</b>

Filling much of the non-Tribal lands between southern Utah NPS units and Utah State Park units is Bureau of Land Management (BLM) land. These BLM lands also offer a wide range of both camping and dispersed recreational opportunities. In the most recently reported year of 2022, BLM lands in the entire state of Utah received 11,723,000 recreational visits. Of these, three million visits (25% of the statewide total) were to BLM lands in the Moab District (Figure 4).

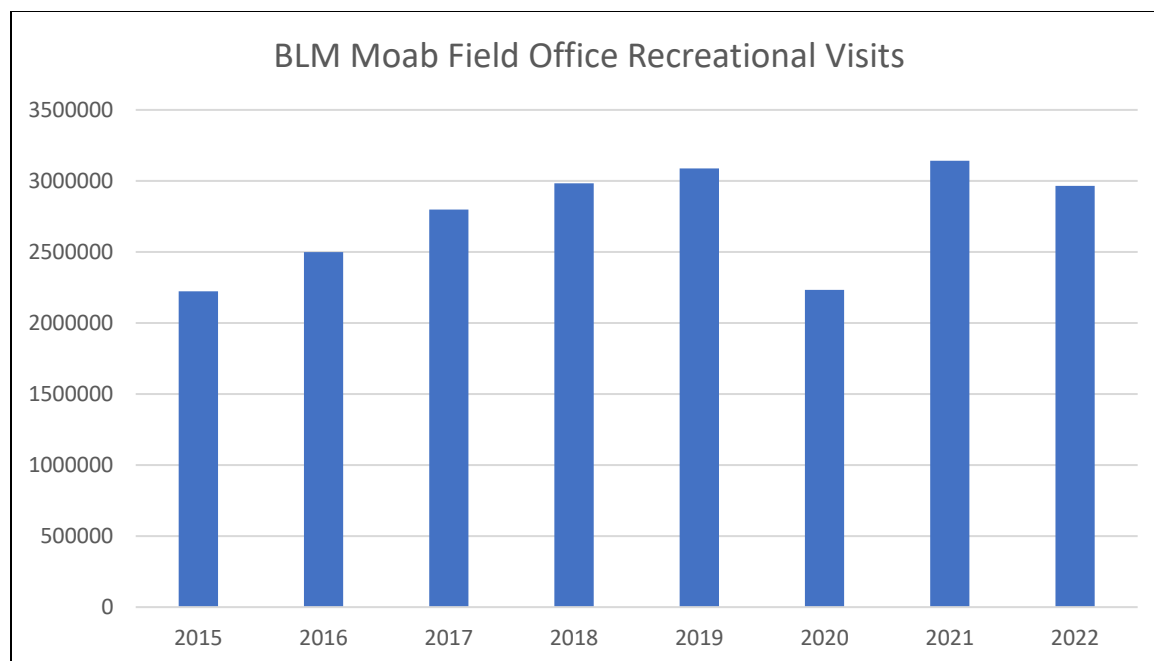


Figure 4. BLM Moab Field Office reported recreational visits: 2015-2022. Source: BLM Recreation Management Information System, Report # 23c—2015-2022.

Regarding the narrow ARCH economic area specifically, in addition to being the gateway community and county for ARCH, Moab and Grand County also include another high profile NPS unit (Canyonlands NP, which is visited by 62% of ARCH visitors on their trip) and a heavily visited State Park (Deadhorse Point State Park, with over one million visits in 2022). In 2022, these three sites alone recorded 3,340,000 recreational visits. Additionally, BLM lands outside of designated recreation areas attract many recreational users throughout the year. Outside the COVID-19 year of 2020, since 2018 recreational uses of Moab Field Office BLM administered lands have averaged 3 million visits per year (Figure 4). This level of both site-specific and dispersed recreation, which is nearly equal to the reported visits to the combined NPS and Utah State Parks underscores the diversity of complementary outdoor recreational opportunities in the ARCH area.

Recent research by Drugova et al. (2021) found that the State of Utah’s “Mighty Five” tourism campaign, which was centered on promoting the five Utah National Parks (Zion, Bryce, Capitol Reef, Canyonlands, and Arches) significantly contributed to rapid visitation increases at Arches, Canyonlands, and Capitol Reef National Parks.<sup>8</sup> The study authors note that due to overcrowding at several National Parks in Utah, the state launched a new “demarketing” campaign in 2019 aimed partially at diverting potential tourists to high-quality alternative recreational sites in the area.

A combination of large shares of public lands and high profile heavily used recreational sites in the region combine to form the underpinnings of a local economy that is heavily dependent on travel and tourism spending. The percent of employment in Grand and San Juan Counties within the travel and tourism

<sup>8</sup> Drugova, T., Kim, M.-K., & Jakus, P. M. (2021). Marketing, congestion, and demarketing in Utah’s National Parks. *Tourism Economics*, 27(8), 1759-1778. <https://doi.org/10.1177/1354816620939722>

sectors is outlined in Figure 5.<sup>9</sup> In 2022, 48% of Grand County and 17% of San Juan County employment was attributable to these economic sectors. This heavy reliance (particularly in the case of Grand County) is compared to the entire state of Utah with approximately 13% of total employment in the travel and tourism sectors.

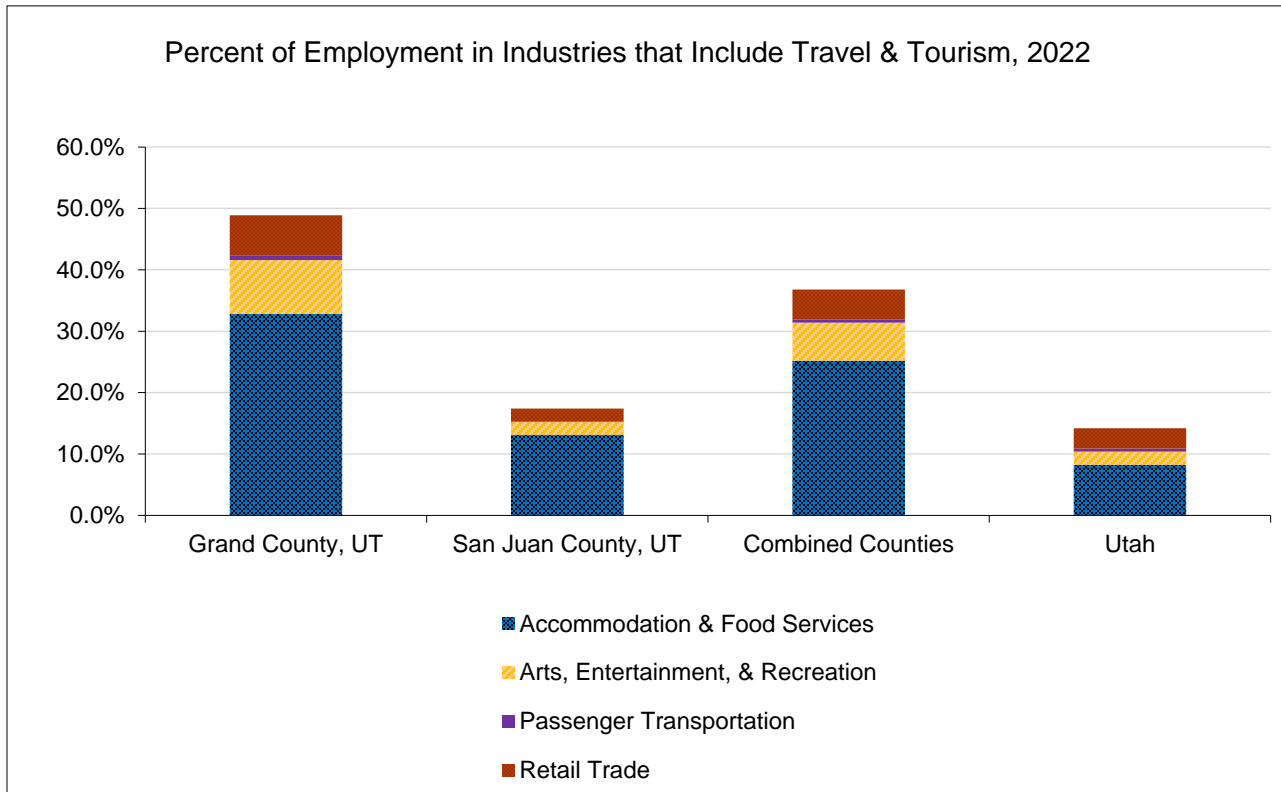


Figure 5. Travel and Tourism Employment in the ARCH counties.

ARCH NPS visitor surveys in 2021 and 2022 asked visitors about their spending within a defined geographic area surrounding the park units. For the recent visitor surveys at ARCH, the local area included the counties of Grand and San Juan, UT as well as the small community of Green River, UT (Figure 6). This area is very similar to the 2 county (Grand and San Juan) area included in the following analysis.

<sup>9</sup> Source: Headwaters Economics, Economic Profile System. <https://headwaterseconomics.org/apps/economic-profile-system/>

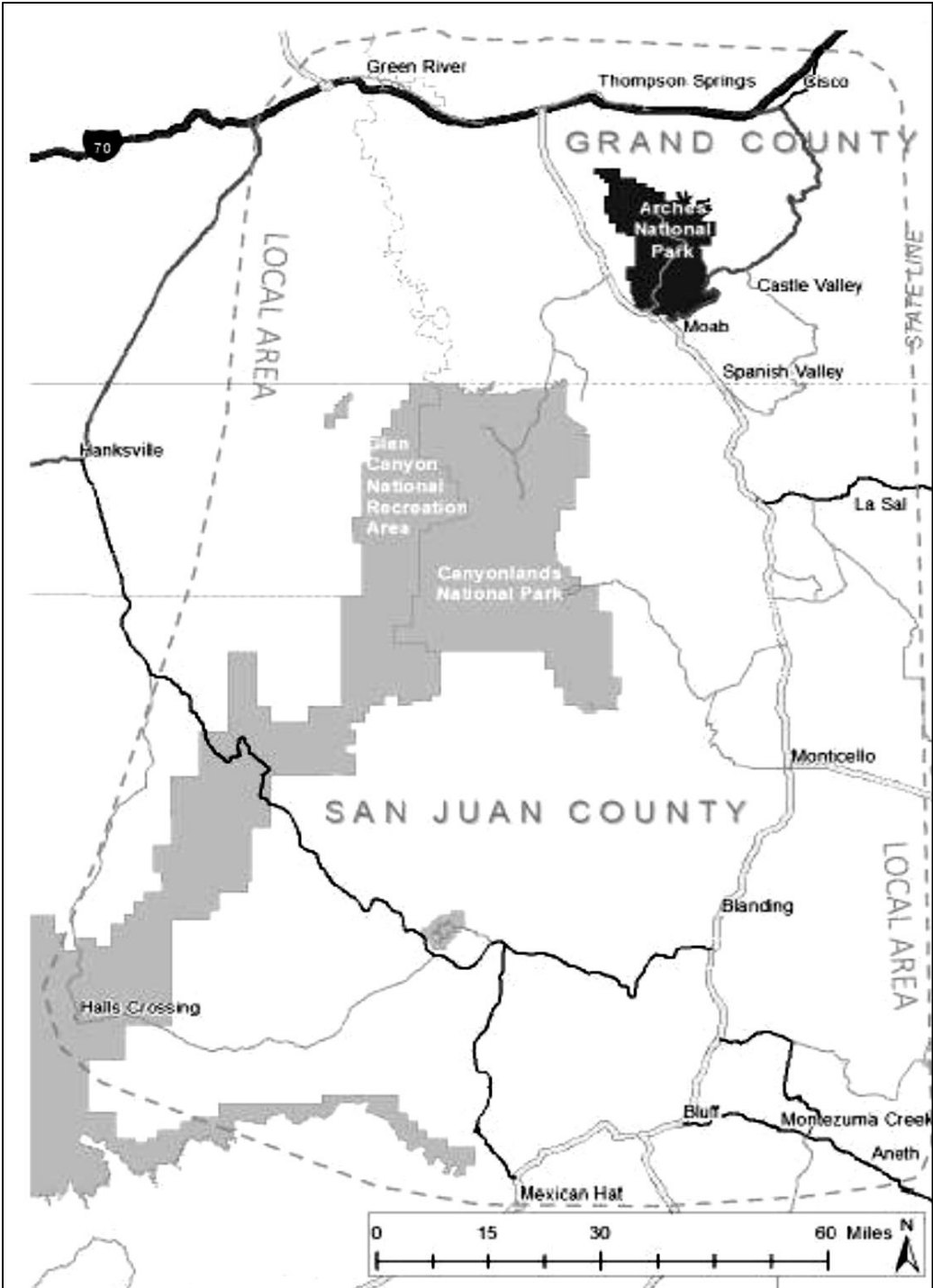


Figure 6. NPS 2022 ARCH visitor survey definition of the relevant ARCH visitor economic impact area.

## 2.2 ARCH economic analysis data

Economic data for the specified analysis area can take several forms. One form is aggregated employment, and income data from government reports—such as presented through the Economic Profile System.<sup>10</sup> A second source of data is county-level economic data aggregated and available through subscription by companies such as IMPLAN. This type of data allows very detailed impact analysis of estimated changes in visitor spending in the local area. Another approach to defining economic trends and levels in an analysis area is to examine tax data, such as sales tax data. Particularly in areas such as gateway communities where park visitor spending is dominant in the local economy, changes and trends in tax collections can help to understand the relationship between park visitation and spending in the local economic area. The economic area data is discussed below for the local 2-county (Grand and San Juan) ARCH area, as well as for the gateway community of Moab and Grand County individually.

### 2.2.1 Grand and San Juan Counties

The geographic area defined in the 2022 ARCH visitor survey asked visitors for their spending in a specific 2+ county region. This targeted area is appropriate for the purposes of analyzing potential ARCH visitor management impacts.

The community of Moab, UT is the gateway community for ARCH, and in addition to receiving the large majority of ARCH visitor spending impacts, comprises approximately 80% of all Grand County Utah taxable sales. Table 5 shows the share of ARCH visitor spending which occurs in the 2-county region (plus Green River) as compared to that entire economic area.<sup>11</sup> In total, it is estimated that ARCH visitor spending supports 23.1% of employment in the area and 8.9% of personal income in the area. These percentages underscore the importance of the park to the local area economy. This is particularly true for the gateway community of Moab where more than 80% of ARCH visitor spending occurs.

Table 5. Comparison of total Grand and San Juan County income and employment and ARCH visitor spending.

	2-county ARCH area (Grand & San Juan) (2022) <sup>a</sup>	ARCH Visitor Spending impacts in 2 county area	ARCH visitor spending impacts as % of 2-County total
<b>Population</b>	24,152	--	
<b>Employment (full &amp; part-time jobs)</b>	15,358	3,558	23.1%
<b>Personal Income (thousands of 2022 \$s)</b>	\$1,261,402	\$112,310	8.9%

<sup>a</sup> Headwaters Economics, Economic Profile System, 2023

<sup>10</sup> <https://headwaterseconomics.org/apps/economic-profile-system/>

<sup>11</sup> Employment and income data for Green River, UT was not included in the 2-county totals as that data was not readily available. However, the population of Green River is only 3.6% of the population of Grand and San Juan Counties. Therefore, exclusion of this small town should have only a minor impact on the Table 3 comparisons. This assumption is consistent with the 2021 visitor survey results showing only 6% of summer and 2% of winter ARCH visitors stayed in Green River on their trip. The impact of excluding Green River from the Table 3 comparisons is to slightly overstate the importance of ARCH visitor spending on the entire local area as defined in the surveys,

### 2.2.2 ARCH Local Area Taxable Sales

Sales tax collection data and associated taxable sales are collected at several governmental levels. The state of Utah reports consistent sales and tax collections at the state, county, and town level.<sup>12</sup> Tax collections and associated taxable sales (reported at the month level) provide a valuable tracking method for overall economic activity. This is particularly true at a localized, smaller economic area level, such as a town.

Determining how economically linked a community (particularly a gateway community) is to visitation to a park unit can generally be determined through analysis of how taxable sales vary compared to park recreational visitation. Since both taxable sales and park visitation are reported at a monthly level, a few years of data on both allows generalized conclusions to be drawn.

Comparing ARCH visitation to taxable sales<sup>13</sup> in the gateway community of Moab can be measured in different ways with different implications. The simplest comparison is to once again calculate the Pearson's correlation coefficient for the two data series. In the case of the ARCH gateway economy of Moab for the years 2010 through 2022, Moab taxable sales and ARCH visitation had a correlation of 0.928. This high correlation confirms the strong economic ties between ARCH visitation and spending in Moab.

While sales tax is only one mechanism to consider expenditures in relation to ARCH visitation, it is the one that provides the most stability and transparency in prices. Utah counties and municipalities do have the ability to collect lodging taxes, formally referred to as transient room taxes (TRT). These taxes are applied to temporary lodging for stays of less than 30 consecutive days at: hotels, motels, inns, trailer courts, campgrounds, tourist homes (e.g., those routinely booked via sites like Airbnb or VRBO), and other similar accommodations. Average daily rates for each of these lodging types can vary considerably across a year.<sup>14</sup> The tax revenue yielded is dependent upon the room rate and number of nights, thus the monthly revenue can increase even if the volume of visitors decreases. This variability suggests the TRT will likely produce a lower correlation with ARCH visitation compared to traditional sales taxes. However, even with these considerations, repeating the above correlation calculations with TRT in Grand County yields a correlation of 0.845 (2012-2023 monthly data), 0.883 in Moab, and 0.767 in San Juan County.<sup>15</sup>

An extension of the simple correlation analysis is to construct a linear regression model explaining monthly taxable sales as a function of monthly ARCH visitation and a trend variable to account for population growth in the town. In a linear form the estimated coefficients for ARCH visitation are interpreted as the average taxable spending per ARCH visitor within the town. For instance, in the case of the Moab model, ARCH visitation (and the trend variable) explains 86% of the variation in Moab taxable sales over time. Further, the average ARCH visit is associated with an estimated \$113.42 in

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<sup>12</sup> Taxable sales data used in the analysis accessed from <https://tax.utah.gov/econstats/sales>

<sup>13</sup> Taxable sales in the communities are converted to constant December 2022 price levels using the CPI-U. Additionally, taxable sales were indexed for minor changes in annual sales tax rates in Moab and Grand County between 2010 and 2022.

<sup>14</sup> Based on data from the Utah Office of Tourism, short term rental average daily rates (ADR) can be observed in 2022 alone to vary from a low of \$174 (Jan-22), to a high of \$382 (Apr-22) in Grand County. Similarly, hotel ADR in 2022 varied from a low of \$120 in January, to a high of \$239 in April

<sup>15</sup> Transient Room Tax data used in the analysis is from the Utah Office of Tourism Dashboard: [https://lookerstudio.google.com/u/0/reporting/27a0442b-b6ba-4876-adfa-36dc350606bd/page/p\\_uape7817c](https://lookerstudio.google.com/u/0/reporting/27a0442b-b6ba-4876-adfa-36dc350606bd/page/p_uape7817c)

taxable spending in Moab (95% confidence interval from \$104.67 to \$122.16). Of course, spending varies dramatically across visitors with many spending nothing in the town, and others spending much more. The amounts estimated are averages across all visitors.<sup>16</sup>

Given that local economy spending is quite tightly tied to ARCH visitation levels, another question is how taxable sales have been trending over time. Figure 7 shows that in constant 2022 dollars the total taxable sales reported to the UT DOR have grown substantially from 2016 through 2022. One reason for the increase might be a growing share of local spending over the period that is not directly tied to ARCH visitation due to population growth.<sup>17</sup> Overall, except for the COVID-19 year of 2020 and a slight dip in 2022, total taxable retail and services sales have grown consistently in Moab since 2010. Similar trends can be observed for TRT revenues (Figure 8).

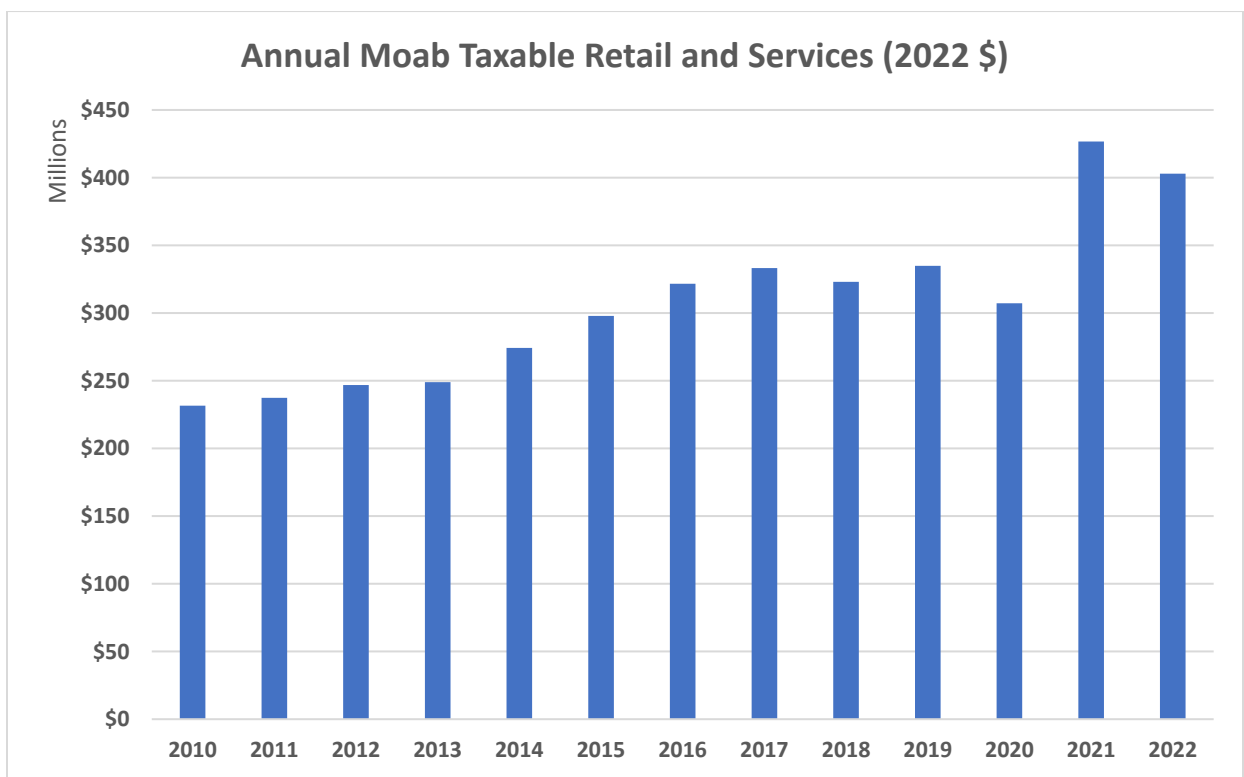


Figure 7. Moab, UT Total Annual Taxable retail and services Sales: 2010-2022 (adjusted for marginal tax rate changes)

<sup>16</sup> Attachment B shows the estimated linear regression models for both Moab and Grand County taxable sales along with plots of predicted vs. observed taxable sales at alternative ARCH visitation levels.

<sup>17</sup> The relationship of Moab economic activity and ARCH visitation is also influenced by strong and growing visitation to MOAB-area BLM lands and Utah state park lands, both of which likely see an equally strong correlation to Moab taxable sales. Additionally, while population growth in terms of primary residence has been quite low in Grand County over the past several decades, there has been a large increase in second home ownership and part-time residents, but this is not captured by census data. (Personal Communication, Bill Stevens, BLM Moab Field Office)

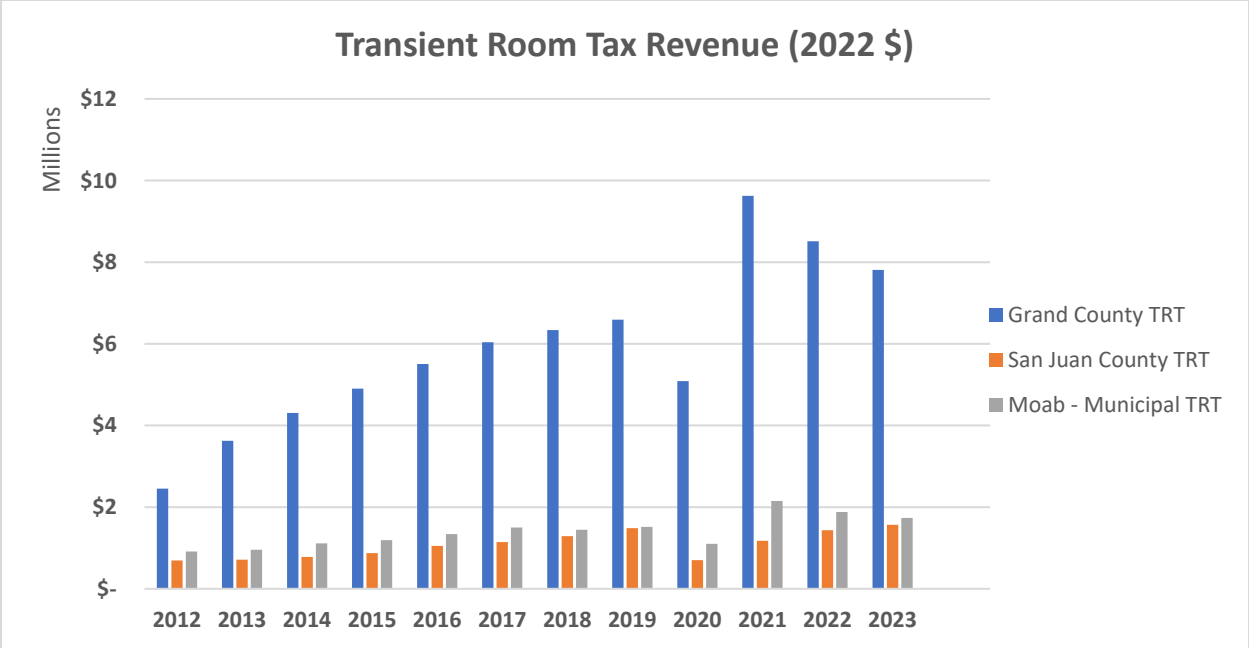


Figure 8. Transient Room Tax Revenue (2012-2023).

Given that the economic activity in the gateway community of Moab has grown between 2016 and 2022, an important comparison is between Moab and other Utah areas as a whole. Figure 9 shows that with the exception of the 2020 COVID-19 year, since 2008 Moab and Grand County have consistently seen more rapid growth in taxable retail and services sales than was experienced for the state as a whole, San Juan County, or for the combined 10-county southern Utah region. From another perspective, Moab quickly regained its place at a slightly higher increase than the state as a whole following 2020.

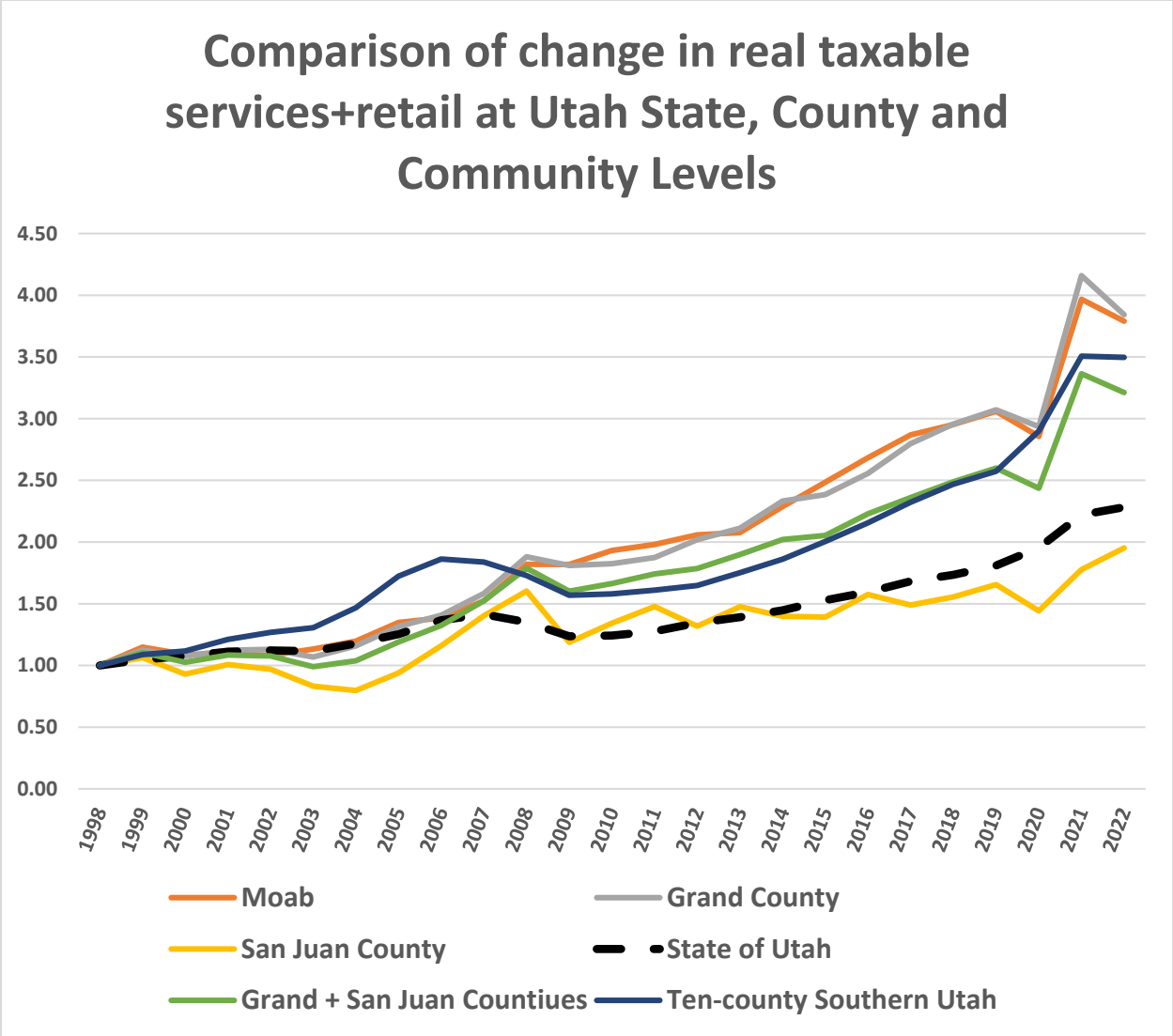


Figure 9. Comparison of Relative Growth of Taxable Sales: 2010-2022

### 2.3 Define Comparison Period ARCH visitation levels

The key driver of potential changes in economic activity and values associated with park visitation management changes is the change in the number of visitors resulting from new policies. Estimating the change in visits due to management changes requires specifying what the comparison period (old management) level of visitation is and identifying the time frame for measuring the new visitation level. In the case of ARCH, there was a pilot timed-entry reservation system in place for the 2022 season, with 2023 being the 2nd year of piloting the system. Since potential action alternatives will likely center around versions of a timed-entry, or generalized reservation system, identification of the comparison period (pre-management change) visitation levels is defined as the average of 2016-2019—a period of relatively stable visitation. This pre-pilot program level of annual recreational visitation averaged 1,612,001 for the 2016-2019 comparison period.

During the comparison period at certain periods when the visitation was particularly heavy, access to the park was closed for several hours until congestion was reduced. The fact that a system of unlimited access was resulting in longer and more frequent closures motivated the park to institute a pilot timed-entry reservation system in 2022.

Visitation levels under the current pilot system have been influenced by several external factors. The COVID-19 pandemic in 2020 led to a dramatic decrease in park visitation systemwide with few exceptions. In ARCH specifically, one notable change in visitation over time has been large variations in the share of international visitors to the park. In an August 2003 ARCH visitor survey, 36% of Arches visitors were international. From a September 2016 visitor survey, 20% of Arches visitors were international. Following the main COVID-19 period, in June of 2021, only 4% of Arches visitors were international. By June 2022 the share of international visitors had rebounded to 17%, still below pre-pandemic levels. These COVID-19 related effects on visitation can be further seen in overall visitation and spending by international travelers to Utah as a whole (Figure 10).



Figure 10. Overnight visits and spending by international travelers to Utah.

Overall, the 19 park units with a National Park naming designation in the Intermountain Region of the NPS saw a 28% decrease in visitation from the comparison (2016-2019) levels to 2020. In 2021 the Intermountain Region’s National Parks saw recreational visitation rebound to slightly above the comparison period levels (+2.1%) as the public returned to pre-pandemic activities. Finally, in 2022 these Intermountain Region National Parks saw a 9.1% decrease in visitation compared to the pre-2020 comparison years. However, 2022 was also influenced by higher gas (and thus travel) prices than 2021<sup>18</sup>. The pandemic year of 2020 is clearly an outlier that should not be used as a measure of the impact of the pilot reservation system on visitation. Similarly, the year 2021 may not be entirely representative as the public rushed to return to activities following COVID-19 lockdowns. Finally, 2022 may be the best representative year for comparison despite the likely drag on visitation by increased fuel prices and general inflation. Relying on 2022 numbers would represent a conservative choice for measuring

<sup>18</sup> On average, all grades of gasoline nationwide were priced roughly 33% higher in 2022 than in the previous year.

impacts of the pilot program on visitation. Table 6 shows monthly and annual recreational visitation for ARCH from 2010 through 2023. The 2023 data shows a slight increase from 2022 and supports the stability of the trends seen in 2022 under another year of the timed entry reservation system.

Table 6. Arches NP Total Recreational Visitation: 2010-2023

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Total
2023	31,427	41,264	132,502	151,232	188,274	180,782	165,671	144,080	174,673	140,260	83,843	48,037	1,482,045
2022	40,621	51,568	141,866	148,996	172,114	171,859	158,925	142,790	158,728	146,986	83,239	42,960	1,460,652
2021	48,725	53,986	151,077	193,914	225,789	238,499	211,928	167,686	193,002	169,983	98,362	53,914	1,806,865
2020	28,462	42,416	81,623	0	13,832	163,699	193,824	164,539	203,866	177,864	103,916	64,042	1,238,083
2019	21,499	30,239	132,191	168,788	217,474	225,206	208,993	184,890	207,857	149,764	73,420	39,381	1,659,702
2018	31,810	40,325	134,951	167,156	215,255	214,443	205,493	183,840	206,254	147,996	74,155	41,879	1,663,557
2017	21,549	38,248	128,508	155,286	188,726	193,060	192,767	177,764	187,603	138,325	72,867	44,325	1,539,028
2016	20,311	33,200	119,122	151,112	201,718	211,706	210,359	188,340	200,906	146,250	69,404	33,290	1,585,718
2015	20,699	34,255	103,649	138,903	179,804	189,073	195,748	173,186	171,711	115,859	49,087	27,273	1,399,247
2014	17,038	22,559	89,841	122,186	165,379	170,286	169,844	173,416	165,222	115,545	46,940	26,511	1,284,767
2013	11,099	16,426	73,935	108,086	149,321	154,505	156,182	147,259	143,755	57,446	43,928	20,924	1,082,866
2012	14,961	17,870	72,273	103,800	142,876	143,482	145,696	139,036	139,801	96,310	36,170	18,302	1,070,577
2011	10,182	12,932	61,950	96,537	142,251	155,481	147,426	138,600	136,246	92,728	30,863	15,562	1,040,758
2010	8,713	11,746	57,623	93,999	135,670	151,209	145,489	139,304	138,442	89,929	29,343	12,938	1,014,405

Note: The years 2016-2019 are used as a comparison period for recent years without the 2022 timed-entry reservation system.

Figure 11 shows a graphical comparison of annual ARCH visitation (2010-2022) and the average visitation of the 2016-2019 comparison period. The graph shows the dramatic decrease in visitation in 2020, the rebound in 2021, and a dip again in 2022, as compared to comparison levels.

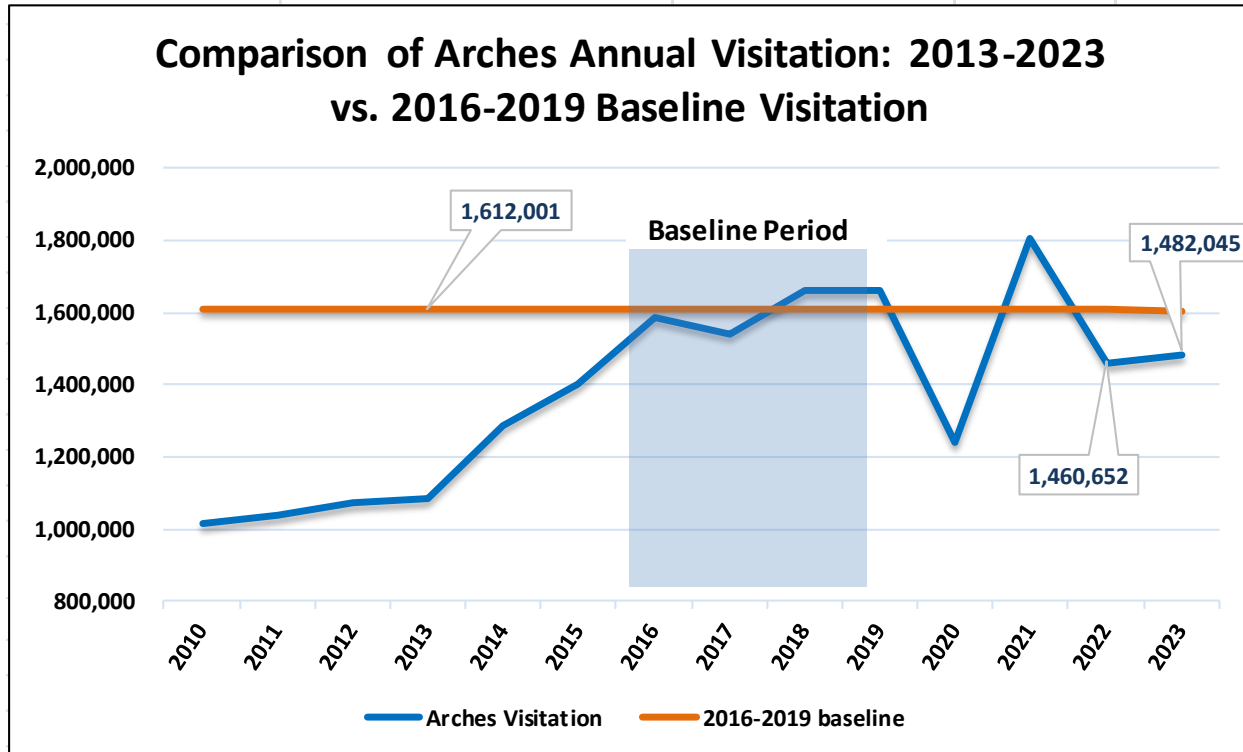


Figure 11. Comparison of ARCH Total Recreational Visitation for 2010-2023 and assumed comparison period average visitation for 2016-2019

As is the case with most NPS units, ARCH recreational visitation varies substantially by month. Figure 12 shows a comparison of the average 2016-2019 and 2022 visitation to ARCH by month. Clearly, peak visitation (and associated maximum crowding) is constrained to the June through September summer season months. Monthly trends shown in Table 6 reveal that off-peak-season months such as November through February have seen increases in visitation at far higher rates than seen during peak-season for the 2010-2022 period. One interesting result from Table 6 and Figure 12 is that while there are reductions in visitation in 2022 during the reservation months of April through September, all six non-reservation months saw increases in visitation over the 2016-2019 comparison period, suggesting that there is some transfer of use to these lesser visited months due to any real or perceived constraints of the reservation system.

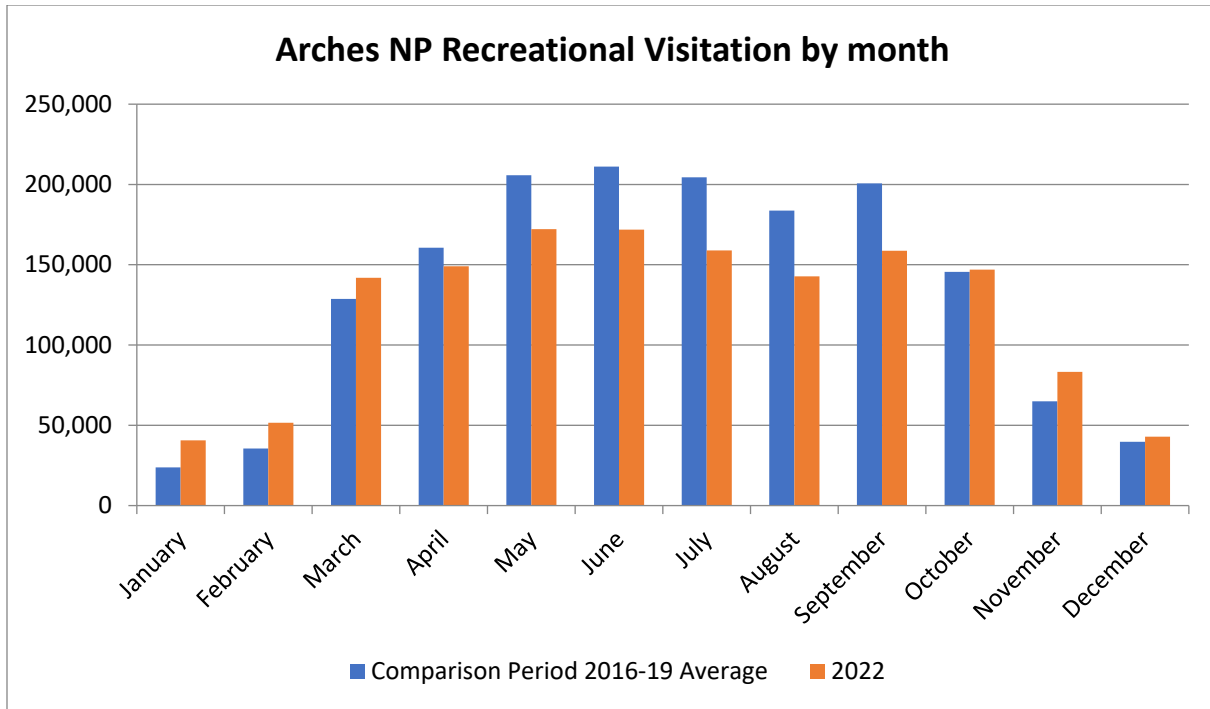


Figure 12. ARCH Recreational Visitation across Months of the Year.

#### 2.4 Average ARCH Visitor Expenditures

Visitor survey data are used to derive visitor spending effect (VSE) profiles describing visitor spending patterns. VSE profiles are developed for lodging-based visitor segments to help account for differences in spending across trip types.

Visitor spending profiles describe average expenditures made by national park visitors within local gateway regions surrounding parks and are expressed in terms of spending per party per day for visitors on day trips and spending per party per night for visitors on overnight trips. The VSE profiles have been constructed over time based on park-specific visitor surveys. The recently updated (2022) VSE estimates for ARCH are shown below (Table 7 and Table 8) for both summer and for winter visitors.

Table 7. Summary of Trip Characteristic Data<sup>19</sup>

<b>Winter 2022 Visitor Survey</b>						
variable	Local Day Trip <sup>^</sup>	Non-Local Day Trip	Lodge Outside Park	NPS Camp <sup>*</sup>	Camp Outside Park	Other <sup>^</sup>
Segment Split	0.7 %	10.4 %	70 %	2.6 %	13.9 %	2.4 %
Entry Rate	1	1	1.47	1.95	1.6	1.6
Party Size	2.78	2.33	2.33	2.69	2.21	3.16
Hours in the Park	3.6	4.44	5.72	7.86	5.34	4.18
Days in the Park	1	1	1.5	2.7	1.6	1.7
Days/nights in the Local Area		1	2.8		3.5	
Non-local visitors	0%	100%	100%	100%	100%	87%

\* Due to low respondent numbers, the values in this profile are partially or entirely based on a substitute profile made using data from all 2021-2022 ARCH surveys

<sup>^</sup>Due to low respondent numbers, the values in this profile are partially or entirely based on a substitute profile made using data from all 2021-2022 surveyed UT parks (ARCH, BRCA, CANY, CARE, ZION)

<b>Summer 2022 Visitor Survey</b>						
variable	Local Day Trip <sup>^</sup>	Non-Local Day Trip	Lodge Outside Park	NPS Camp	Camp Outside Park	Other <sup>^</sup>
Segment Split	0.4 %	8.9 %	63 %	3.9 %	23 %	0.6 %
Entry Rate	1	1	1.32	1.97	1.42	1.6
Party Size	2.78	2.97	2.85	2.94	2.69	3.16
Hours in the Park	3.6	4.47	5.63	8	5.58	4.18
Days in the Park	1	1	1.3	2.7	1.4	1.7
Days/nights in the Local Area		1	2.5	3.2	3.1	
Non-local visitors	0%	100%	100%	100%	100%	100%

<sup>^</sup>Due to low respondent numbers, the values in this profile are partially or entirely based on a substitute profile made using data from all 2021-2022 surveyed UT parks (ARCH, BRCA, CANY, CARE, ZION)

<sup>19</sup> Tables 6 and 7 were estimated by the NPS Social Science Program. Personal Communication, Mathew Flyr, May 4, 2023.

Table 8. Local area spending per party day/night \$2022

<b>Winter 2022 Visitor Survey</b>						
category	Local Day Trip <sup>^</sup>	Non-Local Day Trip	Lodge Outside Park	NPS Camp <sup>*</sup>	Camp Outside Park	Other <sup>^</sup>
Hotels	0	0	159.63	2.18	5.97	0
Camping fees	0	0	0.35	30.5	36.27	0
Restaurants	30.08	38.18	57.93	23.02	27.54	35.42
Groceries	7.02	2.73	14.76	18.02	23.23	18.64
Public transportation	0.31	0	0.2	0.45	1.3	1.14
Rental Cars	0	0	28.37	5.9	5.19	3.8
Gas	21.41	42.5	33.72	37.41	44.62	30.08
Guides and tour fees	0.41	0.32	4.54	5.51	1.23	1.14
Equipment rental	0.38	0	3.5	0	3.77	0
Recreation and entertainment	0.5	0	5.73	1.12	3.25	1.24
Souvenirs and other retail	17.21	14.32	20.91	12.3	12.31	7.86
Other expenditures	0.49	0	2.65	4.47	9.25	0
Total Average Spending per Party per Day/Night	77.81	98.05	332.29	140.88	173.93	99.32
Party Size	2.78	2.33	2.33	2.69	2.21	3.16
Ave. spending per person per Day/Night	27.99	42.08	142.61	52.37	78.70	31.43
Segment Split	0.7%	10.4%	70.0%	2.6%	13.9%	2.4%
Weighted Average spending per person per Day/Night	<b>\$117.46</b>					

\* Due to low respondent numbers, the values in this profile are partially or entirely based on a substitute profile made using data from all 2021-2022 ARCH surveys

<sup>^</sup> Due to low respondent numbers, the values in this profile are partially or entirely based on a substitute profile made using data from all 2021-2022 surveyed UT parks (ARCH, BRCA, CANY, CARE, ZION)

**Summer 2022 Visitor Survey**

category	Local Day Trip <sup>^</sup>	Non-Local Day Trip	Lodge Outside Park	NPS Camp <sup>*</sup>	Camp Outside Park	Other <sup>^</sup>
Hotels	0	0	246.3	2.21	8.07	0
Camping fees	0	0	0.46	30.9	60.11	0
Restaurants	30.72	44.15	80.09	23.5	35.25	36.16
Groceries	7.09	4	24.57	18.2	25.71	18.82
Public transportation	0.32	0	0.32	0.46	0	1.16
Rental Cars	0	8.52	27.75	5.95	3.19	3.83
Gas	21.64	44.56	41.29	37.82	52.17	30.41
Guides and tour fees	0.42	0	23.75	5.59	11.3	1.16
Equipment rental	0.38	0	5.54	0	8.68	0
Recreation and entertainment	0.51	1.11	4.69	1.14	0.75	1.26
Souvenirs and other retail	17.4	19.07	26.26	12.43	23.35	7.95
Other expenditures	0.5	0	0.99	4.52	0.28	0
<b>Total Average Spending per Party per Day/Night</b>	<b>78.98</b>	<b>121.41</b>	<b>482.01</b>	<b>142.72</b>	<b>228.86</b>	<b>100.75</b>
Party Size	2.78	2.95	3.02	2.69	2.99	3.16
Ave. spending per person per Day/Night	27.99	47.81	168.57	52.37	83.18	31.43
Segment Split	0.1%	11.3%	58.4%	1.6%	27.5%	1.1%
<b>Weighted Average spending per person per Day/Night</b>	<b>\$127.93</b>					

<sup>^</sup>Due to low respondent numbers, the values in this profile are partially or entirely based on a substitute profile made using data from all 2021-2022 ARCH surveys

<sup>\*</sup>Due to low respondent numbers, the values in this profile are partially or entirely based on a substitute profile made using data from all 2021-2022 surveyed UT parks (ARCH, BRCA, CANY, CARE, ZION)

Tables 7 and 8 lay out the detailed visitor segment characteristics and estimated expenditures. As the tables show, when adjusted for multipurpose trips, average expenditures across all visitor segments per person per day/night are \$117.46 for winter season visits and \$127.93 for summer season visits.

## 2.5 Environmental Consequences: Structure and Analysis

The remainder of Section 2 outlines the use and relevance of ARCH socioeconomic data in informing and directing the analysis of the economic impacts of alternative proposed park visitor policies.

### 2.5.1 Potential Actions to Manage Visitor and Vehicle Use Levels

As of the drafting of this report, there are no settled management actions proposed by ARCH to address the park's growing visitation concerns. Conversations with park management indicate these concerns include growing congestion in some areas of the park and in certain parking areas as well as growing negative visitor impacts to the most popular sites in the park. While there are no specific management alternatives currently proposed, ARCH staff and management listed potential visitor access changes that have been used or considered in the past and could be potentially included in future management actions. These include,

- 1) A Timed-entry Reservation System:** ARCH implemented a temporary pilot timed entry system (PTES) from April 3 to October 3, 2022. This reservation system was continued for the 2023 April-October period with minor changes to beginning and ending dates (April 1 to October 31, 2023). Visitors arriving by private vehicle needed a reservation to enter the park between 06:00 and 17:00 daily in 2022 and from 07:00 to 16:00 daily in 2023. Timed entry reservations were allotted in hourly entry time blocks. Visitors can book these reservations up to three months in advance or the day before their intended visit through [www.recreation.gov](http://www.recreation.gov). If tickets were available, visitors could reserve a timed entry ticket on the day of their intended visit. Additionally, visitors could enter the park before 06:00 or 7:00 and after 16:00 or 17:00 daily without a timed entry reservation. The PTES was designed based on a "typically busy day" in 2019 of private vehicles arriving through the Moab entrance to ARCH, and the primary goal of PTES was to spread visitation more evenly throughout the day.

Continuation of the timed entry reservation system, or a modification of that system is one potential visitor management action under consideration.

- 2) Mandatory Shuttle Service:** One possible alternative management action would be to implement a mandatory shuttle system to relieve crowding on park roads and parking areas.

Each of the potential management actions presents differing analysis approaches and associated data needs regarding estimating potential economic impacts.

## 2.5.2 Estimating Changes in ARCH Visitation

### **Evidence from 2022 vs. 2016-2019 comparison periods**

In the case of ARCH, the use of a timed-entry reservation system with components similar to or identical to those proposed in the action alternatives during the 2022 April through September period provides strong observed data and associated evidence to inform the estimation of both visitation impacts and associated local area visitor expenditures.

While the time trend for ARCH (Figure 9) shows 2022 visitation was roughly 9.4% below the 2016-2019 comparison levels before the COVID-19 disruptions, a more informative comparison might be to what has happened in the other Intermountain Region NP units. Figure 13 shows a comparison of recreational visitation (as a % change from a 2016-2019 comparison period) for 2022 for the other designated NP units in the Intermountain Region. As the figure shows, the 9.4% decrease over the comparison period at ARCH falls well within the experience seen in the other parks. Overall, 12 of the 19 parks saw a decrease in visitation compared to the comparison period, and 6 had a greater percentage decrease than was observed in ARCH. Therefore, ARCH under its current pilot reservation system has not seen a disproportionate decline in annual visitation compared to the other regional park units (which, with few exceptions, have unlimited visitation policies).<sup>20</sup>

An important consideration is that examining only annual visitation can obscure differential impacts across the year. Figure 12 (above) shows the largest monthly declines between the comparison period 2016-2019 visitation and 2022 visitation for the peak season May through September months. The average decline in visitation for these five months combined was 20.0%. Even just including the heaviest use May through September months in the comparison shows that under the 2022 Timed-Entry system ARCH saw a visitation decline similar to or less than the average annual decline for the period seen in high-profile park units such as Carlsbad Caverns NP, Grand Canyon NP, and Petrified Forest NP.

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<sup>20</sup> Arches NP had a pilot timed-entry reservation system in 2022, Rocky Mountain NP and Glacier NP had a partial reservation system as well. Yellowstone NP 2022 visitation was also adversely impacted by flooding in the park.

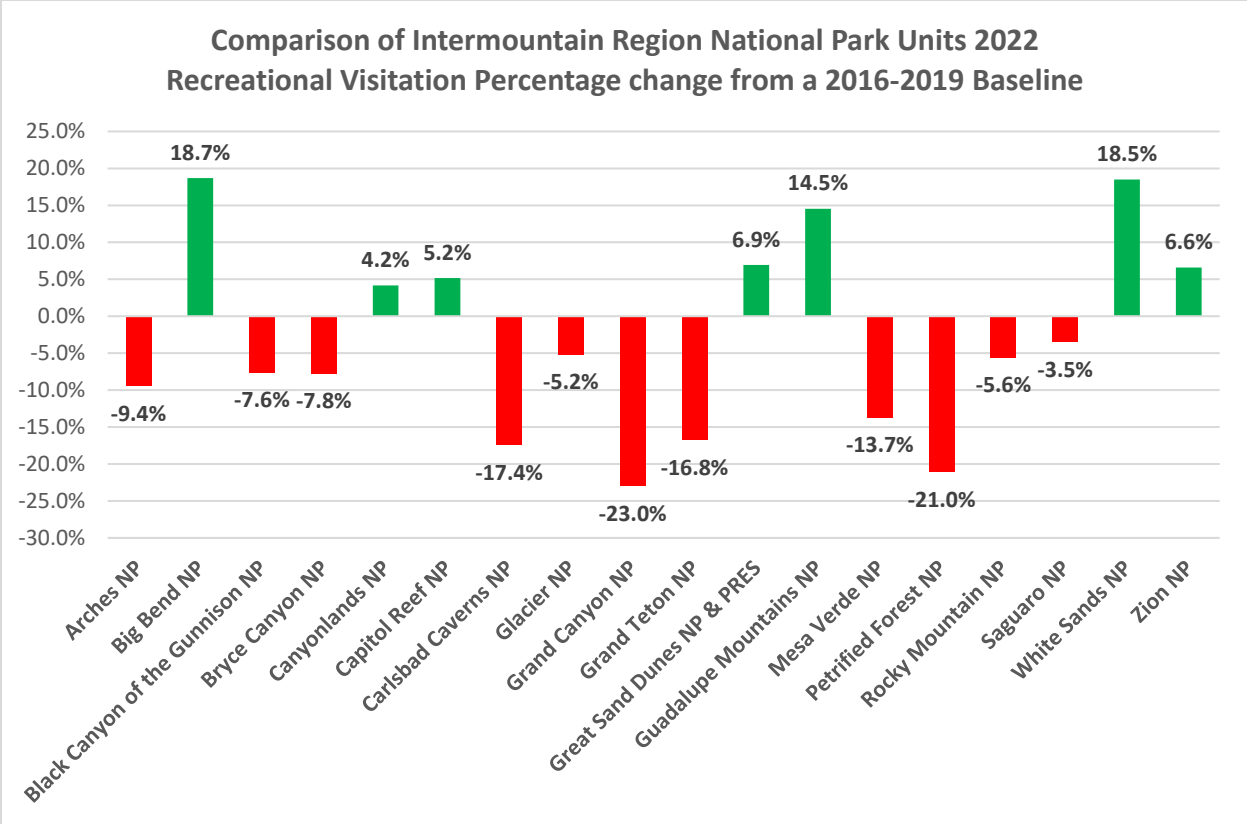


Figure 13. Comparison of 2022 Arches NP annual visitation change from 2016-2019 comparison period levels and parallel changes for the other Intermountain Region NP units.

Another comparison of the 2022 ARCH annual visitation levels is to look at it in the context of average percentage changes from the 2016-2019 levels compared to other aggregations of NPS units. In 2022 the Mighty 5” Utah NPS units saw an aggregate 0% change from the 2016-2019 levels. However, individual parks varied from -9.4% and -7.8% for Arches (ARCH) and Bryce Canyon (BRCA) to +6.6% for Zion. All units with the National Park designation in the Intermountain Region saw a -10.4% change from the comparison period, and all NPS units in the country saw a -4.6% change from the average for the comparison years (Table 9). Again, the experience at ARCH under the pilot timed-entry reservation system falls well within the average visitation changes for the different larger aggregations of NPS units.

Table 9. Comparison of ARCH and other NPS unit visitation changes

NPS Park Units	Percentage change in recreational visitation between the average of 2016-2019 and 2022
Arches NP	-9.4%
“Mighty 5” Utah NPS units	0% (Range from -9.4% and -7.8% for ARCH and BRCA to +6.6% for ZION)
All Intermountain Region units classified as NPs	-10.4%
All US NPS park units	-4.6%

The comparisons discussed here have attempted to control for time by using the same comparison years and “action” year (2022) in the calculations. However, each park is somewhat unique in having differing factors influencing visitation. For instance, Yellowstone NP experienced severe flooding in 2022 that impacted access and total visitation and was therefore not included in Figure 13.

The comparisons presented suggest that ARCH visitation overall was not disproportionately impacted by the pilot timed-entry reservation system when compared with parks without such a visitation constraint. It is clear, however, that on a monthly basis, visitation changes (as compared to the 2016-2019 comparison period) are more pronounced in the summer months when the reservation system is operating than in the off-season months (Figure 10). Further, there appears to be some shifting of use from the April-September reservation period to the October-March non-reservation period.

### **Evidence from updated 2023 visitation data**

Data for the 2023 reservation system months of April through October suggest that the visitation level seen in the first year of the pilot system (2022) are consistent, and likely conservatively represent visitation trend under the timed entry system.

Comparing the 2023 data to 2022 visitation for the same April through October months shows each of the 2023 reservation months, with the exception of October, with higher visitation than was seen in 2022. Overall, April through October recreational visitation to ARCH was 4.0% higher in 2023 than in 2022. Individual months saw changes in 2023 over 2022 ranging from -4% to +10%.

### 2.5.3 Evidence from other sources: impact of reservation system on ARCH visitation and patterns

**Evidence from ARCH Visitor Surveys:** The section 2.5.2 discussion of the significance of 2022 ARCH visitation changes is based on “observed” visitation to ARCH and other regional park units. Additional insight into impacts of the PTES on visitation levels at ARCH can be found in recent visitor survey data from ARCH.<sup>21</sup> The 2022 Summer ARCH visitor survey found that for 66% of surveyed visitors ARCH was the primary reason they came to the local area. Therefore, for 34% of visitors, visiting ARCH was either a secondary or incidental consideration for their trip. This supports the contention that a share of ARCH visitors is likely not as sensitive to ARCH visitor management policy as would be the visitor who comes to the area specifically to visit ARCH. Visitors who are visiting other area attractions may have the flexibility to modify their ARCH visit timing to secure an entry permit on their trip to the area.

Of the 34% of ARCH visitors who did not list visiting ARCH as the primary reason they came to the Moab area, roughly 1/3 listed hiking in areas outside of ARCH as their primary purpose. Another 1/3 listed touring or sightseeing as the reason, and another 1/3 listed other activities in the Moab region as the primary draw to the area (Figure 14). This group of 34% of ARCH visitors is unlikely to be impacted substantially by park visitor management actions.

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<sup>21</sup> Otak 2023. 2022 Arches National Park Visitor Spending and Experience Study: Final report on 2022 Data Collection. Natural Resource Report NPS/ARCH/NRR—20XX/XXXX. National Park Service, Fort Collins, Colorado.

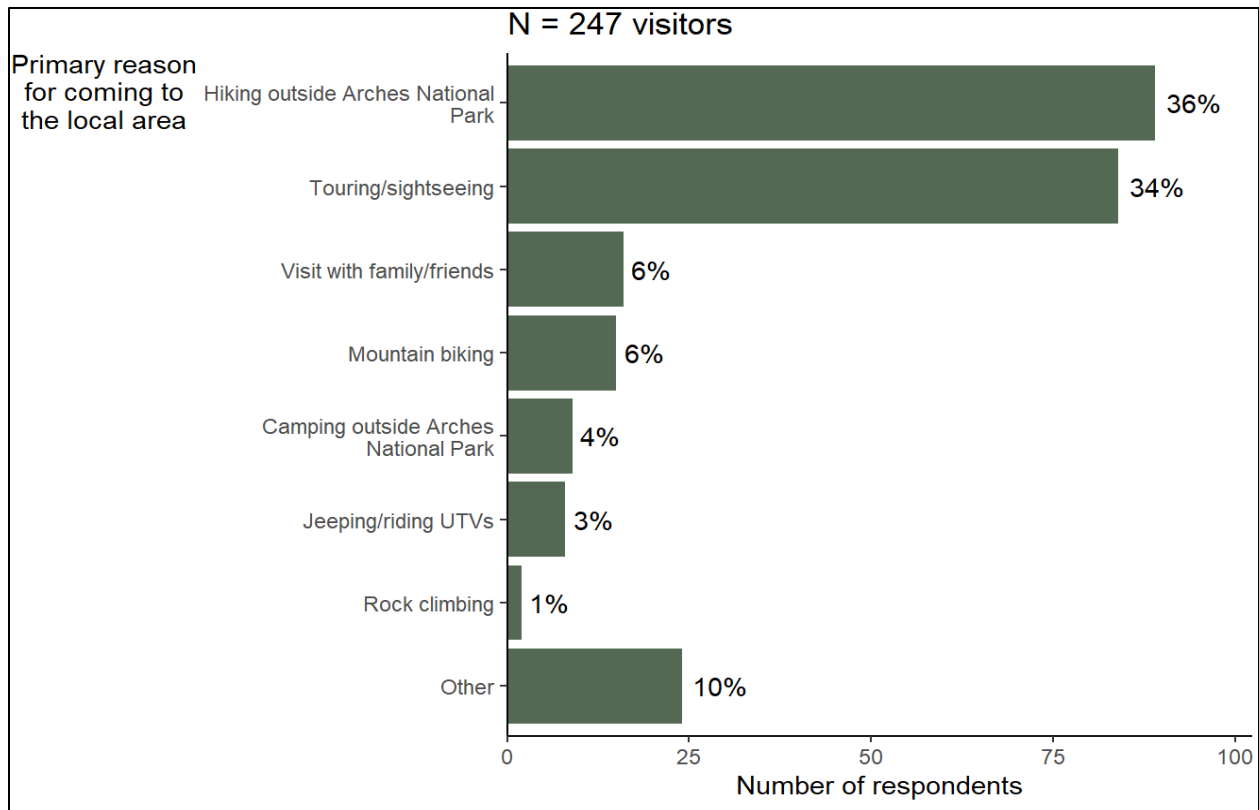


Figure 14. Moab-area primary activities undertaken by ARCH visitors who stated visiting ARCH was NOT the primary purpose for their trip. (Source: Otak 2023. 2022 Arches National Park Visitor Spending and Experience Study: Final report on 2022 Data Collection. Natural Resource Report.)

This contention is further supported by survey responses from roughly 17% of contacted visitors who did not secure a permit for their preferred time and day. Fully 85% of these people secured a reservation for a different time on the same day, and another 12% got a reservation for a different day of their preferred week. These results are consistent with survey responses showing that to secure a reservation to visit ARCH, 80% said they would be willing to visit during a different time of day (than their preferred time), 69% were willing to visit a different day of the same week, and 78% were willing to visit on weekdays rather than weekend days.

One important finding from the 2021 and 2022 Summer visitor surveys in ARCH highlights the natural human skepticism with proposed status quo changes. In the 2021 ARCH visitor survey, prior to the implementation of the 2022 PTES in ARCH, 59% of summer visitors either supported or strongly supported implementation of an advance timed entry reservation system to reduce crowding. The following Summer of 2022 (in the middle of the first year of the PTES) 85% of visitors surveyed said they either supported or strongly supported continuation of the reservation system. One caveat to these ARCH visitor survey findings is that the support for the reservation system in 2022 is from visitors who were intercepted inside the park and does not represent visitors who were unable to or chose not to enter the park due to being unable to secure a reservation and/or being turned around at the park entrance.

In 2022, 11% of intercepted visitors did not have a timed entry reservation and came to the park outside of timed entry hours. Potential visitors who came to the park without a reservation and were unable or

unwilling to modify their plans to secure a reservation may be less supportive of the program. However, it is of note that the 85% of 2022 visitors who supported the program had direct experience with the reservation system, and based on that experience supported it. Additionally, a substantial number of visitors in the 2022 survey did not have a reservation upon arriving to the local area and were able to secure one on their trip. The opinions of these visitors are also reflected in the 2022 survey averages.

One important finding from the 2022 ARCH visitor survey discussed in Section 2.2.1, is that trips to ARCH are most often made in conjunction with trips to other nearby NP units.

Given the multi-destination nature of many Arches NP trips in terms of other parks visited in the region and other activities in Moab and Grand County engaged in, it is a reasonable conclusion that inability to secure a permit for ARCH on their desired day and time would not necessarily lead to non-visitation to the local area. Recent research on recreational visitation choices recognizes that an individual park unit might be important in visitation decisions, but other nearby units also have importance as to whether the trip (and associated visitor spending) is actually made. This conclusion is supported by both the reported patterns of NP visitation from ARCH visitor surveys, and the very high correlations between monthly visitation levels for Southern Utah NP units.

Overall, the strong correlation in Utah NP visitation as well as the findings from the 2022 ARCH visitor survey provide substantial support for the conclusion that the proximate existence of many high-quality substitute recreational sites in Southern Utah likely provide substantial mitigation to any loss of visitation to the region due to potential ARCH visitors not being able to secure reservations to the park on their preferred day and time.

### **Evidence from 2022 Report on Pilot timed entry system at ARCH<sup>22</sup>**

Following the 2022 PTES season, NPS staff undertook a careful examination of comparisons of metrics between visitation levels and patterns in the 2019 pre-PTES year and 2022. Overall, this detailed analysis showed the PTES was successful in many of the goals which motivated the testing of the pilot system. Specifically in terms of improved conditions the PTES report found:

- In 2022 visitor access to the park improved during the pilot timed entry system. ARCH never closed the gate due to full parking lots during the pilot timed entry system.
- Daily visitation patterns were more evenly distributed across the hours of the day during the pilot timed entry system. More visitors arrived earlier and later at the park during the pilot timed entry system.
- Visitor access to parking was improved during the pilot timed entry system. Collectively, no parking lots exceeded practical parking capacity (defined as 90% of striped capacity) more than 5% of the time during the pilot timed entry system sampling periods, and no parking lot ever exceeded 100% of striped parking spaces.

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<sup>22</sup> Tendick, A., Meyer, C., & Miller, Z.D. 2023. Pilot Timed Entry System at Arches National Park in 2022. Natural Resource Report NPS/NRSS/ARD/NRR—2023/2490. National Park Service, Fort Collins, Colorado. <https://doi.org/10.36967/2297386>

- Visitor experience quality as measured by people per viewscape (PPV) was improved in all locations measured (Windows, Delicate Arch, Devils Garden) during the pilot timed entry system.

In terms of visitation efficiency, the report found:

- Vehicle wait times to enter the park increased during the pilot timed entry system. The time to process a vehicle at the entrance station during timed entry was 49 seconds; a 48% increase from 2019.
- Visitors arriving at the entrance gate during the pilot timed entry system without a valid reservation was about 18% during the first month of the pilot then decreased to a consistent 14% of all vehicles.

Overall, for a first-year implementation of a reservation system, the PTES appears to have worked well relative to the goals of the program. Visitation was distributed more evenly throughout the day, and throughout the resource area. Additionally, based on the ARCH visitor survey responses, the program was well-received by visitors who either came with a valid reservation (secured in advance or while in the area) or came without one outside of timed entry hours. The survey also showed a willingness by a share of visitors to be flexible in their visitation timing to ARCH in order to secure a necessary entry permit. In terms of increased entry wait times and visitors arriving without a permit, it is logical to assume that as processes are refined, and awareness of the reservation system increases both of these negative impacts of the program will be reduced. This assumption is borne out by preliminary data from ARCH showing that during the 2023 PTES period processing/wait times were reduced by 15% compared to 2022 levels.

An additional statistical analysis of the ARCH PTES implemented in 2022 was published in June 2023.<sup>23</sup> This study of the ARCH program underscored the findings above and were summarized in the paper as,

“Overall, visitor experiences parkwide and while hiking improved during PTES. Visitor characteristics were largely unchanged, though visitors were planning further in advance for their trip to ARCH and re-entering the park less. Additionally, no exclusionary effects for race, ethnicity, age, income, education level, or local residency were identified. Visitors became more supportive of timed entry during PTES, and timed entry became the most supported management action during PTES.”<sup>24</sup>

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<sup>23</sup> Miller, Z.D.; Tendick, A.; Meyer, C.; Pettebone, D.; Meldrum, B.; Lawson, S. Comparing Visitor Perceptions, Characteristics, and Support for Management Actions before and during a Pilot Timed Entry System at Arches National Park. *Sustainability* 2023, 15, 10035. <https://doi.org/10.3390/su151310035>

<sup>24</sup> Miller et al. at page 11.

#### 2.5.4 Preliminary Analysis Between Visitation/Spending and ARCH Visitor Management

Within the context of economic impacts of possible alternative visitation management changes at ARCH (or any recreational site) the fundamental mathematical estimation method remains the same. Basically, for management change, the economic impacts (within the context of a regional expenditure impact framework) can be estimated as:



For a strict expenditure “impact” analysis only changes in visitation and associated local area spending by people who reside outside the local economic area are counted. Comparing the product shown above (total change in local economy spending) to the size of the unchanged local economy spending allows estimation of percentage changes in spending. When these estimates are used as inputs to a formal regional economic input-output model (such as IMPLAN) direct, indirect, and induced impacts on employment, income, and value added can be estimated for the defined economic region.

Two possible inputs go into the equation/diagram above: the change in visitors, and the spending per visitor. While it is clear that there will always be some non-zero average level of visitor spending in the local economic area, it is not at all certain whether all management changes regarding visitor access will lead to overall measurable changes in visitation levels. The following discussion places the available data in the context of analyzing potential economic impacts associated with potential alternative ARCH visitation management changes.

Any analysis of potential economic impacts from alternative visitation policies can be described through answering a series of modeling assumptions and questions which correspond to the analysis framework presented in this paper. These are outlined below with answers based on the available data presented.

##### 1. Analysis Assumptions to be made:

**ASSUMPTION 1--Define the relevant economic analysis area:** In the case of ARCH, the 2-county region of Grand and San Juan Counties is closely tailored to capture meaningful impacts of marginal visitation changes. The most appropriate targeted economic analysis area within this 2-county region is the gateway community of Moab, which accounts for roughly 80% of Grand County spending.

**ASSUMPTION 2--Define the comparison period level of economic activity for the analysis:** The time period against which comparisons are made is the 2016-2019 period which saw relatively stable ARCH visitation before the disruptions caused by COVID-19 (2020) and COVID-19 recovery

(2021). Using an alternative comparison period based on predicted visitation using a trend model would require choosing the appropriate time period to model and deciding how to treat extraordinary years such as 2020 (COVID-19) and 2021 (COVID-19 recovery). Additionally, predicted visitation from such a model would have substantial uncertainty (error rate) associated with its predictions. As an alternative we focused on the most recent 4-year period (2016-2019) that also showed a consistent and relatively stable pattern of visitation to use as an average comparison level. A final important rationale for not employing a predictively modeled comparison visitation is that any impacts of visitation management changes will be viewed by local residents and businesses in the context of recently “experienced” visitation (and visitor expenditure) levels, not against some predicted level of visitation that has not been experienced. Therefore, grounding the comparison period for the analysis in observed, recent levels of visitation removes any discussion of impacts from the realm of “what might happen” back to “what did happen.”

## **2. Analysis Questions to be answered:**

**QUESTION 1—Is Park recreational visitation measurably tied to economic activity in the economic analysis area(s)?** The analysis area is a relatively small rural economic area. As such, ARCH visitor spending has a significant impact on the overall level of income and employment in the analysis area. For the gateway community of Moab (which between 88% and 94% of ARCH visitors stay in or visit), ARCH visitation has a direct and substantial impact on the local economy, both Grand County and Moab itself.

**QUESTION 2—Is there evidence that alternative visitation management policies being considered will substantially impact total visitation levels?** There is no conclusive evidence that the primary management policy under consideration (TES) would substantially impact total visitation levels over time. A comparison of “comparison period” (2016-2019) ARCH visitation that occurred before the pilot timed entry program and 2022 visitation, showed that the moderate (9.4%) drop in annual visitation was well within the experience seen at other Intermountain Region NP units, and U.S. NPS units. Additionally, 2023 visitation data saw a moderate increase in visitation over 2022 levels. This suggests that the 2022-year data likely provides a conservative estimate of changes relative to the comparison period. Therefore, it is not possible to say with any confidence that the changes to ARCH annual visitation between before and during the pilot entry system are attributable to the management change.

When the primary peak visitation months during which reservation systems would be expected to be implemented are examined (May-October), 2022 visitation was 17.4% lower than during the pre-pilot comparison years of 2016-2019. This change was consistent with visitation comparisons for some other high-profile regional NPS units. Further, while individual monthly visitation impacts with the 2022 pilot system were larger in the peak summer months than in off-season months, this impact was still in the range of changes seen in other NPS designated NP units in the Intermountain Region. This result also suggests that there may be some displacement of visitor use from the reservation period to the October-March period which results from the real or perceived constraints of the reservation system.

Another factor which likely limits any potential visitation loss to the area due to visitor management policy at ARCH is the fact that a majority of ARCH visitors visit a number of NP units in southern Utah while on their overall trip. The 2022 Summer visitor survey found that 78% of ARCH visitors also visited Canyonlands NP on their trip. The multi-destination nature of their trips for a majority of ARCH visitors serves to reduce the likelihood that lack of an ARCH reservation at their preferred time will cause them to abandon their planned trip to the Moab area. Additionally, the wide availability of alternative non-NPS recreation opportunities in the Moab area, including heavily visited BLM lands and Utah State Parks, is a mitigating factor for potential visitor spending losses in the local economy.

- **QUESTION 3—Is the observed moderate 9.4% drop in ARCH visitation between the pre-pilot program comparison period and 2022 associated with a similar drop-in economic activity in the gateway communities?** No. Trends in taxable sales in the gateway community of Moab have consistently grown faster than visitation in the park. Further, sales in Moab have also grown faster (between 2016 and 2022) than sales in the State of Utah as a whole. Even when experiencing a moderate (9.4%) decrease in annual visitation in 2022 (when compared to 2016-2019 levels) there is no commensurate negative impact to local community taxable sales due to this decline because sales continued to substantially exceed those reported in the 2016-2019 comparison period. Factors that likely insulate local Moab and Grand County taxable sales from moderate changes in ARCH visitation include the existence of high-quality substitute recreation sites (Canyonlands NP and UT State Parks, as well as recreation on BLM lands), and a growing and increasingly diverse local economy. Specifically, while visitation to ARCH might decline slightly, the robust and growing local economy combined with the fact that many visitors will still come to the area to visit other high-quality sites, minimize any impacts to the local taxable spending levels.

In the case of analyzing potential economic impacts associated with ARCH visitation management changes, any analysis should recognize and be based on the decisions and questions outlined above. Specifically,

- The appropriate economic analysis area for evaluating ARCH management impacts is likely limited to the 2-county (Grand and San Juan) area and more directly to the gateway community of Moab, UT.
- For the potential management alternative of continuing a version of the currently piloted timed-entry reservation system, there is no conclusive evidence that the pilot program significantly impacted park visitation overall as compared to the experience in other NPS units.
- There is no consistently measurable negative impact to local community taxable sales due to the reservation system because sales continued to increase under the reservation system. It has been suggested the reservation system has had some positive effect on gateway community sales (due to visitors returning to town to wait for their reservation times). While this is certainly possible, there is no clear evidence from the data examined that would confirm this theory.

## 2.6 Consideration of visitor preference data and visitor net economic value per trip

There are two primary classes of park visitor data: visitor expenditure data, and visitor preference data. Expenditure data is generally estimated from park specific visitor surveys, and reports estimated average visitor spending in the local/regional economy by park visitors. These estimates are often broken out by visitor/trip type, such as non-local day visitors, or overnight camping visitors.

Visitor preference data is less common and related to specific visitation management choices, and often is only available for a specific park/management pairing when the park undertakes a purpose driven visitor survey to inform visitation management changes. Given that Federal surveys often take several years to draft and authorize, it is rare that visitor preference data for a park/management setting is available. However, indications of visitor preferences can often be inferred from other park surveys and studies and help to inform the direction (if not the absolute magnitude) of changes in visitor trip values associated with potential alternative management choices.

While there is a clear analytical process using available data to estimate changes in visitation and associated local area visitor spending from park visitation management changes, given lack of site-specific data, estimating other economic impacts of management changes is more problematic. However, past surveys and analyses of ARCH visitor use and preferences do provide qualitative evidence of likely visitor preferences related to the likely outcomes of some alternative visitation policies. One clear result from the 2022 ARCH visitor survey is that even under the 2022 pilot timed entry system a large majority of ARCH visitors supported continuing the PTES program to more evenly distribute use across the park.

In addition to supporting the ARCH PTES, 2022 surveyed visitors also experienced improved conditions both parkwide and while hiking due to visitor use being more evenly distributed across time.

## 3.0 Summary of Potential Impacts of Likely Visitation Management Alternatives

Conversation with ARCH staff indicate that proposed alternatives potentially under consideration for the draft Visitor Access and Experience Plan would include variants of PTES, or alternatively a no action open system with periodic closures during high use periods. Another possible action might be implementing either a mandatory or voluntary shuttle bus to access the park. The following discussion provides general guidance on the analysis of economic impacts from these alternative strategies.

### 3.1 No action alternative

The “no action” alternative against which the impacts of the potential action alternatives would be measured is the visitor access procedures that were in place from 2016-2019, prior to instituting the current pilot timed entry reservation system. During this period no reservations were required to access the park. Under this management practice there were a small number of high-congestion periods where the gates would be closed for brief periods (2 to 4 hours) due to safety concerns related to parking and traffic congestion. This visitation and economic data from this 2016-2019 period was used in the previous analysis (Section 2.5 above) to examine the impacts of the piloted timed-entry reservation system.

While gate closures were relatively rare during the comparison 2016-19 period, the peak visitation year of 2021 saw 118 occasions where the gate at ARCH was closed for 2-4 hours due to congestion.<sup>25</sup> When this happens, cars in the entrance queue are turned away and asked to return later. Given trends in visitation increases to ARCH over the past decade, it is not unreasonable to predict that absent some method of control of visitor use at ARCH in the future, high levels of gate closures as were seen in 2021 are certainly likely to occur in the relatively near future.

### 3.2 Potential action alternatives impact on visitor spending in the local economic area.

**1) A Timed-entry Reservation System for the park (continuation of PTES):** 2023 was the second year of a pilot timed-entry system from April 1 to October 31. Visitors arriving by private vehicle between 07:00 and 16:00 daily during these dates require a timed entry reservation. Timed entry reservations are allotted in hourly entry time blocks. This alternative would be similar to the previous pilot timed-entry systems in 2022 and 2023.

*As noted, the 2022 pilot timed entry system did not result in a statistically significant and measurable negative change in local area economic activity. Visitation under timed entry compared to a previous (2016-2019) comparison period did not decrease more than was the experience for groups of parks without a reservation system. If anything, economic activity (as measured by total taxable retail and*

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<sup>25</sup> NPS reports that in 2018 and 2019 2 and 5 closures, respectively occurred. In 2020 that number rose to 27 closures and in 2021, 118 closures. Some differences over the time period may be due to changing park staffing and willingness to implement closures as well as increased congestion.

services sales) in gateway communities has increased relative to total visitation during the period of the pilot program. However, there is insufficient data to link the reservation program with this increase.

**2) Mandatory Shuttle Bus access to the park:** This management action would potentially aim to replace private vehicle access to the park with shuttle bus access. The mandatory shuttle system would be accessed via first-come, first-serve approaches without any reservations.

*At present there is no basis on which to base estimates of changes specifically with respect to ARCH visitation (and associated economic impacts to the local area) from adoption of a mandatory shuttle bus system. However, experience from other NPS units that have adopted shuttle systems (voluntary) suggests the potential for the system leading to reduced visitation. A 2018 study by Paterson indicates that based in simple trend models for Acadia, Rocky Mountain and Zion NPs, the introduction of shuttle access to the parks was correlated with short term reductions in recreational visitation compared to what would be predicted under the pre-shuttle policy trends.<sup>26</sup>*

*The 2022 Summer visitor survey at ARCH found a striking difference between levels of support for voluntary vs. mandatory shuttle bus access to the park. While 69% of respondents expressed some support for “a voluntary shuttle system to increase modes of access,” only 25% supported “a mandatory shuttle system to reduce traffic congestion.” These results suggest that a mandatory system would be more likely to lead to reduced visitation to ARCH than would a voluntary shuttle system. Support for prospective policy changes (such as a shuttle service) often poll worse before they are enacted than after visitors have an opportunity to experience the changes. For example, the Summer 2021 ARCH visitor survey asking about a potential timed entry reservation system to reduce congestion found 59% either strongly or somewhat supported the policy change. However, in the Summer of 2022, a survey of visitors who had utilized the timed entry system found 85% strongly or somewhat supported continuation of the policy.*

### 3.3 Action alternatives impacts on park visitor trip values.

Section 3.2 focused on potential measurable impacts to local area park visitor spending patterns and levels associated with the possible action alternatives related to ARCH visitation management. A second source of economic impact not focused on the exchange of dollars in the local economy regards the “net economic value” of ARCH trips to visitors. That is, the amount of money over and above what their ARCH trip cost them that they would have been willing to pay to take the same trip. This net economic value can be substantial in the case of visitation to national park units because access to parks is not priced for profit maximization (as might be the case for a private recreational opportunity). Therefore, there is often a significant surplus value to visitors over the amount paid for park access. The amount of this surplus, or net economic value can depend on the quality of the park experience.

One of the factors that has been shown to impact the value visitors place on recreational trips is congestion experienced on the trip. ARCH visitor surveys have demonstrated clear visitor preferences for less congestion—and improved experiences on their trips to the park. In the 2021 summer ARCH

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<sup>26</sup> Paterson, R. 2018. “Evaluation of Potential Economic Impacts Associated with the Proposed Arches NP Reservation System.” Industrial Economics, Cambridge, MA.

visitor survey, 50% of respondents said they had planned some aspect of their visit to the park to coincide with less crowded conditions. While the actual dollar values associated with less congestion have not been estimated for ARCH, evidence suggests that park policies that reduce congestion and therefore increase recreational access and the opportunity for solitude for visitors would be associated with increases in average trip net economic value for the visitors that still come to the park.

## Attachment A: Utah Taxable Retail and Services Sales Data

<b>Year</b>	<b>Month</b>	<b>Moab services and retail sales (2022 \$)</b>	<b>Grand County services and retail taxable sales (2022 \$)</b>	<b>Arches Recreational Visitation</b>
2010	1	8,698,104	11,145,983	8,713
2010	2	9,084,464	12,097,965	11,746
2010	3	16,071,029	20,148,042	57,623
2010	4	20,373,403	24,758,187	93,999
2010	5	22,456,330	27,603,131	135,670
2010	6	23,893,460	29,940,370	151,209
2010	7	19,840,084	24,742,757	145,489
2010	8	19,329,854	23,424,378	139,304
2010	9	21,855,878	26,908,877	138,442
2010	10	18,828,581	23,132,555	89,929
2010	11	11,832,873	14,300,823	29,343
2010	12	13,164,153	15,796,530	12,938
2011	1	8,719,597	10,698,299	10,182
2011	2	8,992,850	11,191,245	12,932
2011	3	15,800,213	19,772,489	61,950
2011	4	20,647,964	25,355,849	96,537
2011	5	22,873,003	28,362,468	142,251
2011	6	24,212,952	29,937,130	155,481
2011	7	20,423,682	25,077,381	147,426
2011	8	20,474,942	25,559,666	138,600
2011	9	22,855,422	28,547,310	136,246
2011	10	19,698,525	24,321,745	92,728
2011	11	12,514,893	15,564,738	30,863
2011	12	13,349,646	16,599,206	15,562
2012	1	9,748,195	12,666,576	14,961
2012	2	9,951,995	13,073,315	17,870
2012	3	17,627,603	22,107,455	72,273
2012	4	23,670,852	28,817,146	103,800
2012	5	24,029,286	29,447,267	142,876
2012	6	24,656,556	31,808,279	143,482
2012	7	21,032,432	27,429,637	145,696
2012	8	19,964,482	26,192,676	139,036
2012	9	22,321,617	28,593,773	139,801
2012	10	20,009,051	25,494,661	96,310
2012	11	12,741,334	17,860,083	36,170
2012	12	13,193,588	17,573,221	18,302

2013	1	9,826,680	12,402,844	11,099
2013	2	9,490,094	12,841,423	16,426
2013	3	19,210,906	25,777,522	73,935
2013	4	21,655,697	26,872,700	108,086
2013	5	24,731,793	32,694,534	149,321
2013	6	22,695,949	29,754,806	154,505
2013	7	21,063,173	28,965,326	156,182
2013	8	21,847,756	28,072,270	147,259
2013	9	22,961,224	31,622,672	143,755
2013	10	20,846,109	27,667,821	57,446
2013	11	13,688,195	17,915,858	43,928
2013	12	12,805,997	19,349,325	20,924
2014	1	9,843,753	15,499,229	17,038
2014	2	10,491,880	14,801,119	22,559
2014	3	18,542,557	25,173,969	89,841
2014	4	24,874,448	32,810,642	122,186
2014	5	26,766,080	35,280,124	165,379
2014	6	27,339,329	35,641,307	170,286
2014	7	23,031,678	31,823,796	169,844
2014	8	23,655,008	31,832,227	173,416
2014	9	25,317,806	32,764,200	165,222
2014	10	24,579,761	32,156,453	115,545
2014	11	14,712,939	18,809,486	46,940
2014	12	14,098,312	18,031,552	26,511
2015	1	10,656,484	13,305,852	20,699
2015	2	11,485,065	14,302,250	34,255
2015	3	21,368,144	26,351,473	103,649
2015	4	27,557,999	34,140,449	138,903
2015	5	29,417,608	36,570,527	179,804
2015	6	29,167,119	37,487,794	189,073
2015	7	25,671,014	33,049,074	195,748
2015	8	25,153,552	32,502,786	173,186
2015	9	27,252,475	34,289,769	171,711
2015	10	26,509,385	33,070,604	115,859
2015	11	15,555,633	19,170,743	49,087
2015	12	14,423,519	17,686,627	27,273
2016	1	10,517,058	13,159,951	20,311
2016	2	12,129,248	14,814,974	33,200
2016	3	25,446,818	31,355,730	119,122
2016	4	28,220,063	35,108,411	151,112
2016	5	30,972,461	38,692,237	201,718

2016	6	31,050,697	39,120,185	211,706
2016	7	27,054,976	34,586,476	210,359
2016	8	26,209,072	33,392,410	188,340
2016	9	29,601,906	37,066,996	200,906
2016	10	30,577,447	37,787,074	146,250
2016	11	18,283,802	22,405,200	69,404
2016	12	15,248,203	18,437,370	33,290
2017	1	10,433,635	13,277,198	21,549
2017	2	12,242,713	15,665,686	38,248
2017	3	26,217,811	32,703,237	128,508
2017	4	32,342,435	40,888,689	155,286
2017	5	34,473,373	43,333,147	188,726
2017	6	32,807,918	43,041,182	193,060
2017	7	28,622,054	37,070,853	192,767
2017	8	27,474,702	35,884,697	177,764
2017	9	32,044,625	40,716,695	187,603
2017	10	31,140,217	40,162,801	138,325
2017	11	20,048,662	25,299,795	72,867
2017	12	17,094,763	21,367,093	44,325
2018	1	12,837,822	16,934,568	31,810
2018	2	13,694,179	18,644,672	40,325
2018	3	28,368,795	36,763,842	134,951
2018	4	32,331,496	41,455,417	167,156
2018	5	35,230,699	45,373,145	215,255
2018	6	35,048,666	46,257,623	214,443
2018	7	28,422,887	37,860,755	205,493
2018	8	26,833,874	36,912,035	183,840
2018	9	31,088,183	41,101,817	206,254
2018	10	30,677,134	40,943,464	147,996
2018	11	20,310,077	26,472,364	74,155
2018	12	19,076,478	22,743,355	41,879
2019	1	12,685,486	16,873,707	21,499
2019	2	13,214,779	17,416,516	30,239
2019	3	27,439,458	35,251,347	132,191
2019	4	34,826,503	45,445,380	168,788
2019	5	37,450,269	48,314,692	217,474
2019	6	37,415,926	48,729,838	225,206
2019	7	29,139,072	38,925,274	208,993
2019	8	28,336,691	38,045,279	184,890
2019	9	32,971,713	43,344,245	207,857
2019	10	33,211,859	45,174,716	149,764

2019	11	20,795,398	27,082,833	73,420
2019	12	17,894,017	22,916,782	39,381
2020	1	12,894,747	17,589,046	28,462
2020	2	14,473,998	19,696,577	42,416
2020	3	19,091,847	24,677,063	81,623
2020	4	13,067,942	16,462,604	-
2020	5	20,973,877	27,199,758	13,832
2020	6	31,991,778	43,125,210	163,699
2020	7	31,991,804	44,696,174	193,824
2020	8	28,958,673	41,243,500	164,539
2020	9	37,641,712	52,067,671	203,866
2020	10	41,025,551	55,313,847	177,864
2020	11	27,525,572	35,280,836	103,916
2020	12	24,059,689	31,149,337	64,042
2021	1	18,416,070	25,402,322	48,725
2021	2	20,314,025	27,674,786	53,986
2021	3	39,493,557	54,604,133	151,077
2021	4	46,145,103	62,796,186	193,914
2021	5	47,946,631	65,327,669	225,789
2021	6	49,036,197	66,631,683	238,499
2021	7	38,269,428	53,700,153	211,928
2021	8	30,702,756	44,024,607	167,686
2021	9	38,742,880	54,133,057	193,002
2021	10	41,369,163	56,432,234	169,983
2021	11	28,736,859	38,481,082	98,362
2021	12	22,693,172	29,704,232	53,914
2022	1	16,338,969	23,919,717	40,621
2022	2	18,634,468	26,258,616	51,568
2022	3	37,170,304	49,746,782	141,866
2022	4	44,782,105	58,246,707	148,996
2022	5	43,739,041	58,153,528	172,114
2022	6	42,348,185	56,181,339	171,859
2022	7	34,398,339	45,839,221	158,925
2022	8	33,406,766	44,058,809	142,790
2022	9	40,080,509	52,201,734	158,728
2022	10	42,697,753	55,222,646	146,986
2022	11	26,625,055	35,591,306	83,239
2022	12	22,762,346	29,407,088	42,960

Attachment B: Estimated Linear Regression Tax-visitation Models.

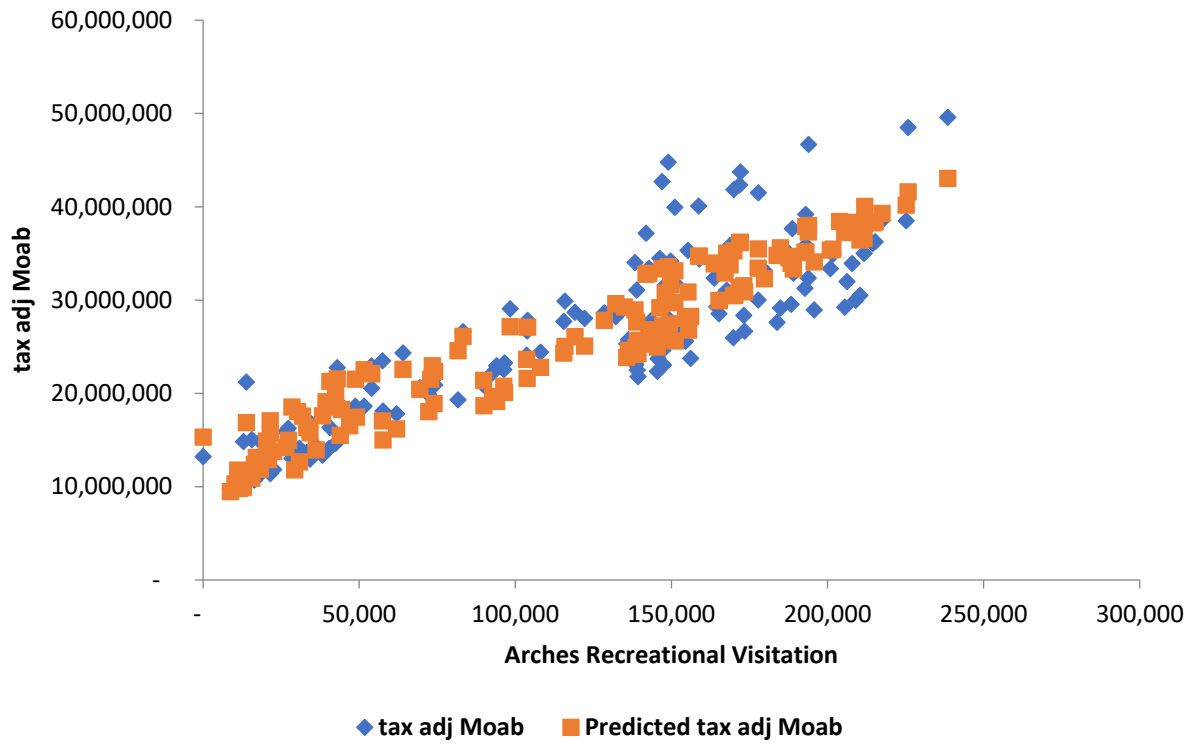
## Linear Regression Model of Moab Taxable Retail and Services Sales and ARCH visitation: Monthly 2010-2022

<i>Regression Statistics</i>	
Multiple R	0.925
R Square	0.855
Adjusted R Square	0.853
Standard Error	3,565,335
Observations	156

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	2	1.1455E+16	5.73E+15	450.5728	7.53352E-65
Residual	153	1.94488E+15	1.27E+13		
Total	155	1.33999E+16			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	7,789,173	708,229	11.00	0.00	6,390,003	9,188,343
Arches Recreational Visitation	\$113.42	4.43	25.62	0.00	\$ 104.67	\$122.16
Trend	684,317	78,838	8.68	0.00	528,565	840,068

# Arches Recreational Visitation Line Fit Plot



# Linear Regression Model of Grand County Taxable Retail and Services Sales and ARCH visitation: Monthly 2010-2022

<i>Regression Statistics</i>	
Multiple R	0.929
R Square	0.863
Adjusted R Square	0.861
Standard Error	4616677
Observations	156

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	2	2.04978E+16	1.02E+16	480.8589	1.049E-66
Residual	153	3.261E+15	2.13E+13		
Total	155	2.37588E+16			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	9,515,720	917,071	10.38	0.00	7,703,964	11,327,476
Arches Recreational Visitation	\$ 149.43	5.73	26.07	0.00	\$ 138.10	\$ 160.75
Trend	988647.7037	102085	9.68	0.00	786,969	1,190,327

# Arches Recreational Visitation Line Fit Plot

