**US National Park Visitor Statistics**

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**ABSTRACT**

There is a large amount of available information online about the US National Parks, unfortunately it is dispersed among many various websites which are often not very user friendly or even functionable. The US National Parks Service site has the most information in one place, but it lacks functionality with maps and visual graphs, and needs a major update in general. Whether planning a trip or looking for detailed information, you will likely have to visit several different websites without easily finding what you are looking for. The purpose of this project is to create a source for as much US National Park data that can be easily explored and visualized in one location. The goal is to have it centered around a data driven map with as much functionality as possible and still make it accessible and useful to both amateurs and professionals alike. This will be achieved in stages manifesting as updates to the website that add more features, layers, and data analyses over time. The ultimate result will be a visually appealing and highly accessible data resource about the US National Park Service. This paper represents the initial creation of the website and focus on Visitor Statistics for each US National Park.

**INTRODUCTION**

The purpose of this project is to create a map-based website of the US National Park Service boundaries including as much specific information as possible. This includes location, year established, elevation statistics, and website links. The Visitor Statistics for each US National Park are the primary focus for this initial website release, but future additions including elevation and temperature statistics are also planned. This initial release provides the base-map and identifies the boundaries for each US National Park creating a foundation for additional layers to be built on, in this case the US National Park Visitor Statistics. Currently this visitor data is only available in table format or listed individually for each National Park on a website, without any readily available visual representation comparing the numbers for all National Parks in one place.

Currently US National Parks are closed or have reduced access due to the restrictions in place from the COVID-19 Pandemic. Since the COVID-19 Pandemic hit rather quickly, the US National Park closures also came rather unexpectedly as a response. That implies that the visitor numbers before the closures essentially represented normal visitation rates up to the closures themselves. The visitor rates used in this analysis range from January 1979 to December 2019 providing almost 41 years of data. With this strong background of prior visitor rates, how will people respond once the US National Parks reopen? Will the US National Parks experience the highest visitation rates they have ever seen as people starved of nature escape the urban environments they have been confined to? Will visitation rates be lower than normal with people being more cautious about returning to the outdoors and public places in general? Will the visitation rates return to relatively normal numbers? This project sets the foundation to answer these questions once the US National Parks reopen and visitor numbers are published. In this way, analyzing the visitor numbers of the US National Parks will provide insights into how Americans respond after the COVID-19 Pandemic restrictions are lifted. With 62 different National Parks across the USA and its Territories, these visitation numbers will represent a cross-section of different states, regions, and overall trends. These locations also cover different climatic zones where various National Parks would otherwise be experiencing the peak or low points in their regular season so temperature and weather influences can also be taken into consideration. This website sets the stage for conducting and publishing this analysis.

**LITERATURE REVIEW**

I did not find any good or relevant journal articles about visitor statists for the US National Parks other than ones related to visitor demographics, environmental impacts of visitors, and transportation issues. All examples therefore came from online sources as websites that were about the US National Park Service, maps, or visitor numbers. These are the best examples I took inspiration from for both positive and negative attributes:

<https://www.nps.gov/gis/data_info/>

<https://www.nps.gov/articles/geodiversity-atlas-map.htm>

<https://public-nps.opendata.arcgis.com/>

<https://data.world/datasets/national-parks>

<https://www.nps.gov/im/scpn/weather-stations.htm>

**DATA SOURCES**

All visitor data for the US National Parks was downloaded directly from the US National Park Service Visitor Use Statistics website.[5] Other data related to the US National Parks is from official US National Park Service websites and Wikipedia sites. Many different sources were used and referenced during the website coding process but most of the basic structure and syntax was collected from and confirmed with W3Schools[6]. Specific tools and elements used within the website code are individually referenced below, [8]-[12]. Otherwise, all website coding knowledge and background comes from GEOG-585L *Internet Mapping,* taught by Dr. Liping Yang at the University of New Mexico during the 2020 Spring semester. Prior to this class, I had zero experience with internet mapping and computer coding.

**WEBSITE CREATION AND DATA ANALYSIS**

The website layout and function were influenced by both personal experience with websites as well as the strengths and weaknesses found in the existing US National Park maps during research and data collection. Many of the examples encountered were not map centered or had only minimally functioning maps, while most of the available data was not associated with maps or visually represented at all. The maps merely served as a series of buttons that would take you to different websites without providing a unified space to compare the locations together. The visitor data was only provided in tables which makes it almost impossible to compare rates and trends from different years where a graph can convey that information visually in a matter of moments, especially for a range of 41 years. Specific numbers may not be so obvious, but yearly trends through different seasons are easily apparent as are comparing visitor numbers from many different years. These considerations had the greatest influences on the website layout and features. Make the webpage map-centered and make the data easy to comprehend and visually appealing with all data and information displayed on the same page without needing to scroll. This makes it so everything can be seen at the same time and it is easy to move from one National Park to another without jumping to different websites and other links. Another goal of this website is to provide a portal to other websites related to the National Park Service by providing many links within this webpage, but they will be for accessing additional information for each National Park rather than required for accessing the details of this visitor analysis.

With these considerations, I modeled the website based on a layout with the map filling the majority of the visible area along with a column along the right side to include the title, name and picture of the National Park, specific information and links, and then charts and graphs. The map will show the US National Park boundaries and display their name and basic information when the cursor hovers over them. When the boundaries are clicked-on, all information displayed in the right column will be updated to the specific National Park selected with its boundary on the map highlighted. The right-hand column will include a dropdown list of all US National Parks which will highlight the National Park boundary on the map when selected.

The project had three main aspects: collecting and processing the data, building the website, and then combining the data with online charts. The basic information for the US National Parks was readily available from each National Park’s website and Wikipedia pages and manually entered into .csv (comma separated values) Excel files and .json (JavaScript object notation) files for use with the website. The visitor statistics were provided individually for each National Park and this data took a lot longer to process. All individual .csv files had to be combined using a program developed and provided by the Project Advisor Dr. Liping Yang[1] and then this was further adapted for use with different charts. The website was structured around having two columns. The left side is for the map and covers 70% of the screen with the right column for information and charts taking up the remaining 30%. The map is supplied by Mapbox,[2] which provides free open source maps that could be combined with the US National Park boundaries using D3[3] code. The National Park visitor data is displayed with a multi-line chart adapted from an example on bl.ocks.org by Amber Thomas.[4] These two features represent the main aspects of the website with the location information and visitor statistical data both visually represented together. Finally, everything was pieced together into the website as it stands. This brief description represents well over 100 hours of research, data collection, and programming. This was largely a learning experience which both reinforced and expanded on what I had learned in the GEOG-585L Internet Mapping class with Dr. Liping Yang. Hours and hours of frustrating work were sprinkled with “Eureka” moments often symbolizing only tiny bits of progress in the form of what otherwise appear to be only minor cosmetic changes. Every little aspect of where something appears, how it looks, and what it does were all hard won battles and some big lessons were learned the hard way.

A big part of this project involved the research aspect of locating the most detailed and trustworthy data available along with searching for examples of website features and functions that I could incorporate in this website. Various online tutorials and examples of website codes were constantly being used and referenced throughout the entire process with W3schools[5] being one of the main resources I used. I methodically looked through all the examples of line and bar graphs I could find and carefully considered what best represented and conveyed the visitor data information. This became an important focus considering the primary function of the website and map was to accurately convey National Park visitor data. With such emphasis placed on the visual representation of the visitor data, every potential chart and graph was meticulously scrutinized for their specific strengths and weaknesses as it applied to this data. There is an incredible array of different types of charts and graphs but they each apply to different conditions. Finding the right one was paramount. The style I chose came after a long search and I give full credit for this chart being developed by Amber Thomas,[4] this multi-line chart with 2 dropdown menus is perfect for accurately displaying the monthly and yearly visitor rates for the US National Parks over a 41 year range. This is a critical aspect of the entire project.

**RESULTS and CONCLUSION**

The website: <https://roald-unm.github.io/MyWebApp/> is the ultimate result of this project. It was created and published with the GitHub.[6] Time management was a big factor in balancing time spent on research and data processing compared to website creation. I initially spent too much time on some minor style and layout features instead of completing the basic structure. This added more complexity to the code before the structure was built making the rest of the coding more difficult and time consuming instead of going back and adjust details after everything else was finished. Due to this, my website initially lacked some of the data I had collected because I spent too much time on style and research when I needed to spend more time on using the data I had already collected. Visually I am very happy with the resulting website and I think the multi-line chart conveys the trends in monthly and yearly visitor data for the US National Parks very effectively. An import conclusion from this project is that every little thing becomes a building block to add more and more data to. I had very high expectations for this project and especially the layout and functionality of the website which I now realize were rather unrealistic. There will be many updates to the website improving functionality and appearance as well as adding more visitor data once the US National Parks reopen and visitor numbers are published for 2020. Then more analysis can be conducted and published through this website related to how people respond after the COVID-19 Pandemic restrictions are lifted. With that in mind, it seems somewhat erroneous to say “conclusion” when this is just step one of the process.

**ACKNOWLEDGMENTS**

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[4] Amber Thomas, “d3v4 Multi-Line Chart, Nested Data, and 2 Dropdown Menus”, Amber Thomas’s Block b8f8c2ab12c4f21e882aeb68728216c2, <https://bl.ocks.org/ProQuestionAsker/b8f8c2ab12c4f21e882aeb68728216c2> (5/7/2017).

[5] National Park Service Visitor Statistics, <https://irma.nps.gov/STATS/>

[6] W3schools, Online Web Tutorials. <https://www.w3schools.com/>

[7] GitHub, Software Development Platform. <https://github.com/>

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