

US National Parks Presentation

Exploratory Data Analysis Team 7

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How does weather influence National Park visitation and biodiversity?

- There are 423 National Parks which bring in lots of revenue to our country through tourism and job creation
- When visitation rates increase, our economy improves
- We wanted to see if weather and biodiversity affect the visitation rates to National Parks
- We decided to look at 3 states: Florida, Colorado and California
- We wanted to look at a West, Central and East coast state because they experience different weather patterns



Data Used

California:
Channel Islands
Death Valley
Joshua Tree
Lassen Volcanic
Pinnacles
Redwoods
Yosemite

Colorado:
Black Canyon
Great Sand Dunes
Mesa Verde
Rocky Mountain

Florida: Biscayne Dry Tortugas Everglades



Our Datasets

Biodiversity Dataset

- Included 2 datasets: species and parks
- Park dataset: all of the US National Parks with their name, code, acreage and lat/long
- Species dataset: the category, order, family, common and scientific name , occurrence in 2017, record status and nativeness to the park.
- We created new DF with park name, code, lat/long, and the bird and mammal counts, we then took the average of birds and mammals in each state.

Visitation Dataset

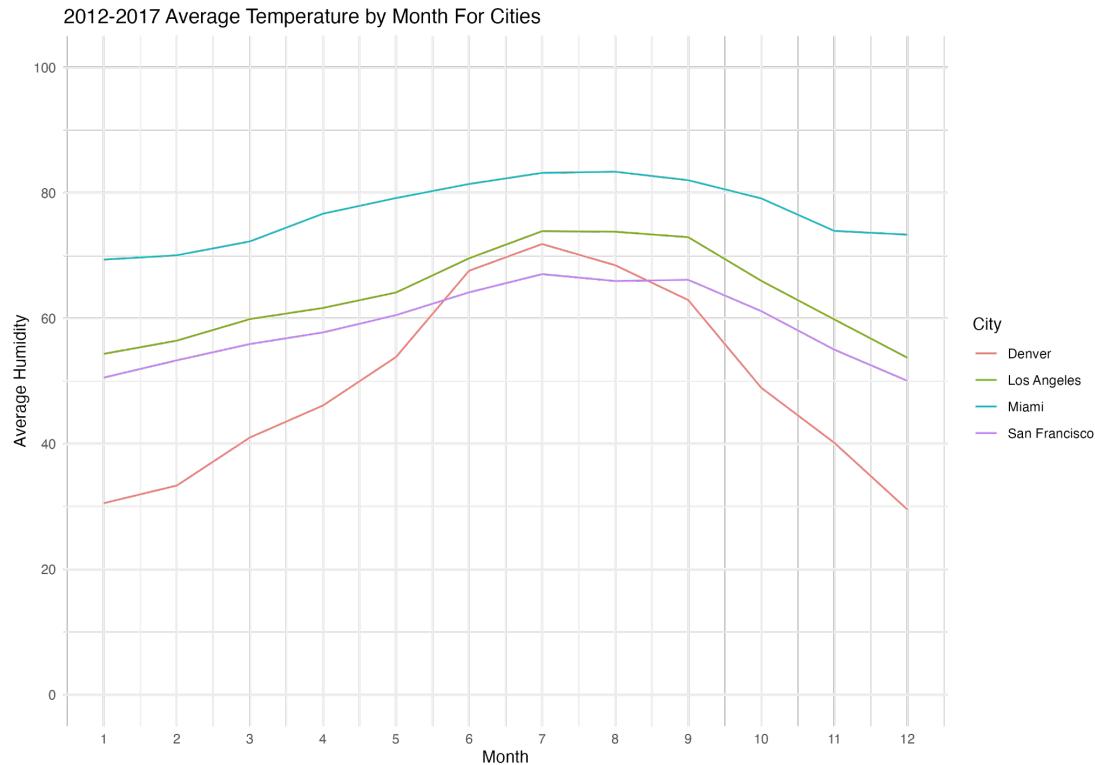
- One dataset with information for every national park that includes state, year, month, recreational visits for that time, non recreational visits for that time, how many overnight stays, what type of lodging was the overnight stay, and more.
- Originally we weren't sure what variables we wanted to use so we kept all the variables and removed the undesired parks ,states, and years we were not analyzing.
- Found the visits per state, park, and the average visits

Weather Dataset

- Included 3 datasets: hourly temperature, hourly humidity, and hourly wind speed for major cities in the United States.
- Hourly temperature dataset: Kelvin (K)
- Hourly humidity datasets: relative percentage
- Hourly wind speed dataset: mps (mile per second)
- Cleaning: convert Kelvin to Fahrenheit, and calculated average temperature per month.
- We filtered out desired cities for the research purpose leaving out with Denver, CO, Miami FL, Los Angeles, CA, and San Francisco, CA

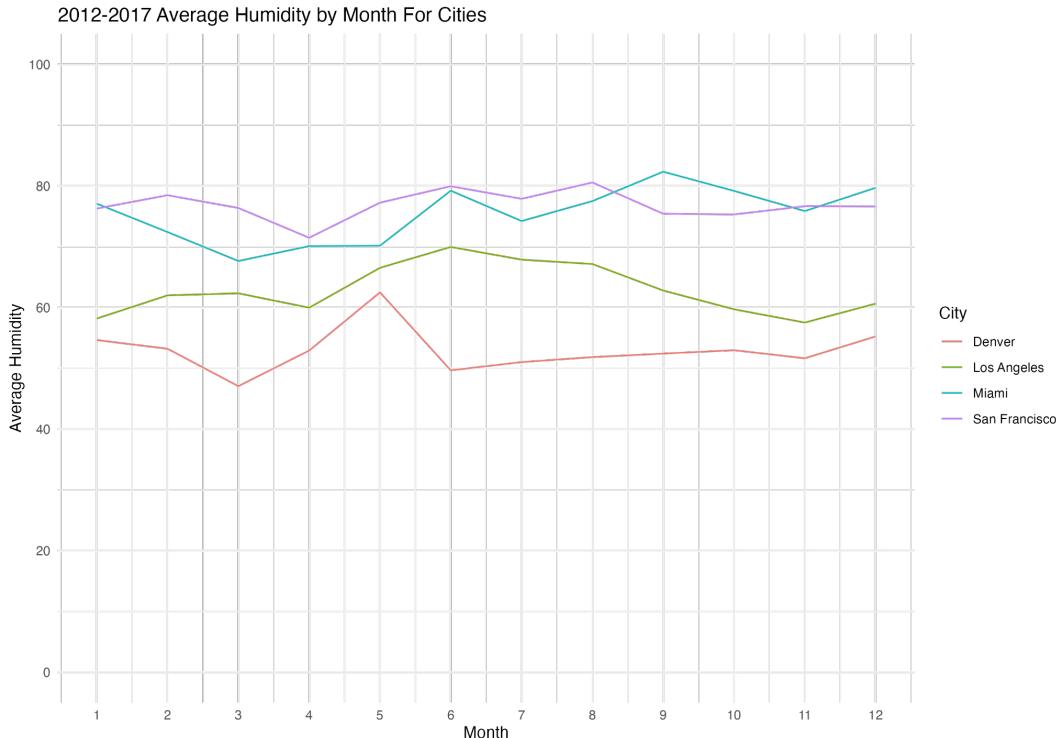
Weather Findings: Temperature

- Calculated the average temperature of the month for 2012 - 2017 for each city
- Miami(FL) has the highest temperature among all cities in every month
- Los Angeles(CA) has the second highest temperature among all cities in every month
- Denver(CO) has the most temperature fluctuation across year



- Average humidity percentage of the month for 2012 - 2017 for each city
- Out of all of the cities, Denver had the greatest variation where San Francisco had the least
- San Francisco had the highest percentage throughout the year, then Miami, Los Angeles and San Francisco respectively

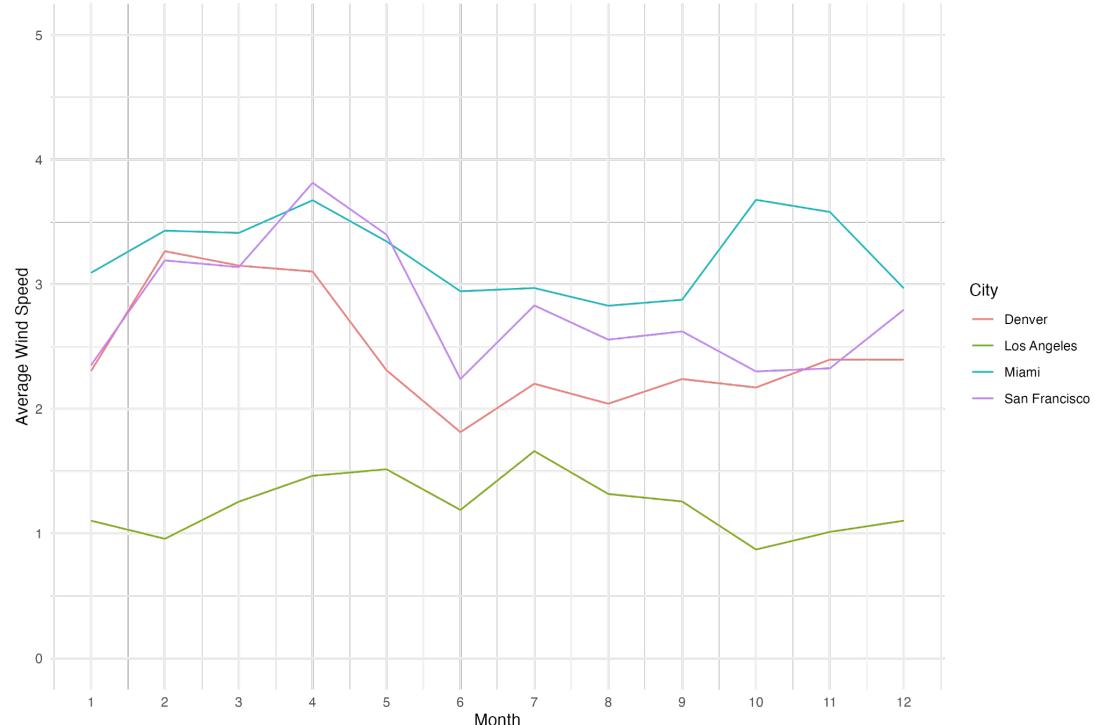
Weather Findings: Humidity



- Calculated the average wind speed of each month for 2012 - 2017 for every city.
- Miami(FL) has the highest wind speed among all cities in almost every month.
- Los Angeles(CA) has the lowest wind speed among all cities in every month and San Francisco (CA) falls in the second highest wind speed.
- Denver(CO) falls in between all the states.

Weather Findings: Wind Speed

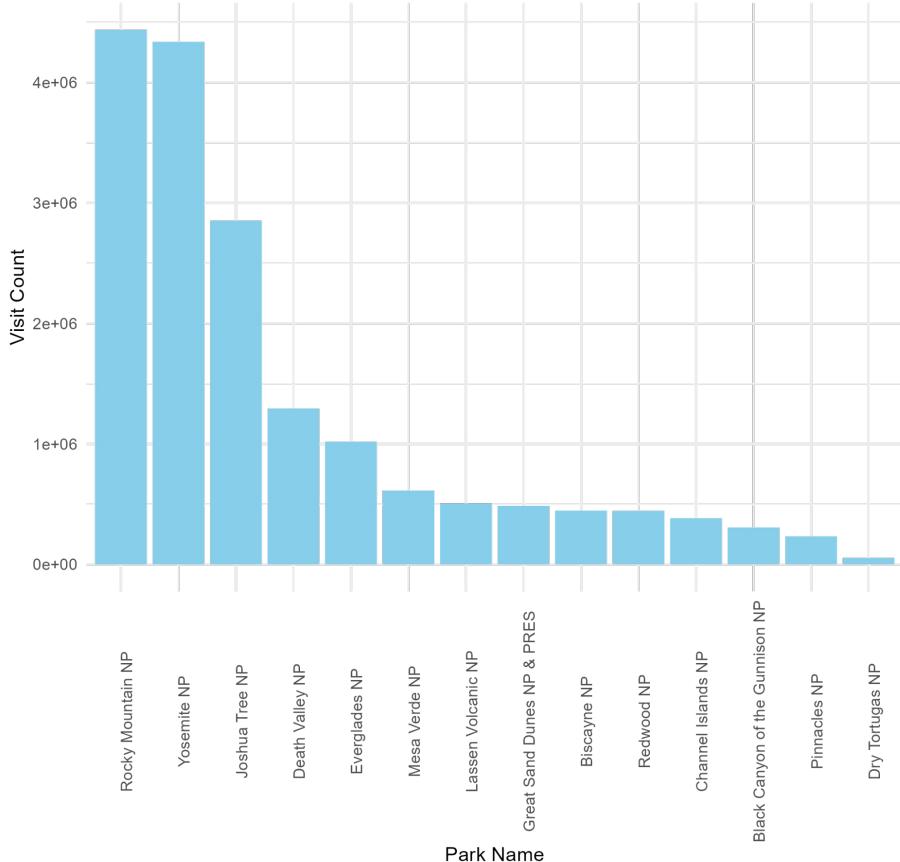
2012-2017 Average Wind Speed by Month For Cities



Visitation Findings

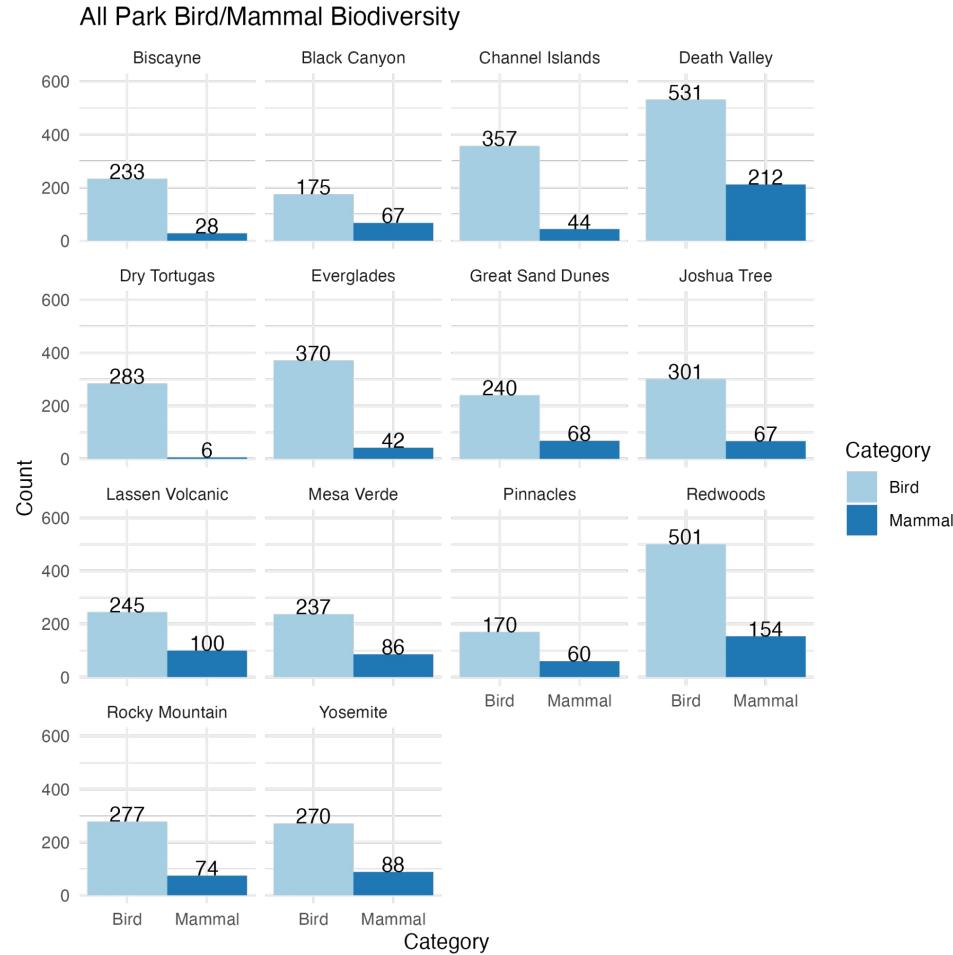
- Average visits per park in 2017
 - Colorado: 1,461,270
 - California: 1,436,373
 - Florida: 506,599
- Colorado had the most visits but just slightly, specifically to the Rocky Mountain National Park, then California where people visited Yosemite, Joshua Tree and Death Valley the most. Florida had the least amount of visitation. Out of the 3 national Parks in Florida, the Everglades were most popular.

State Park Recreational Visits in 2017



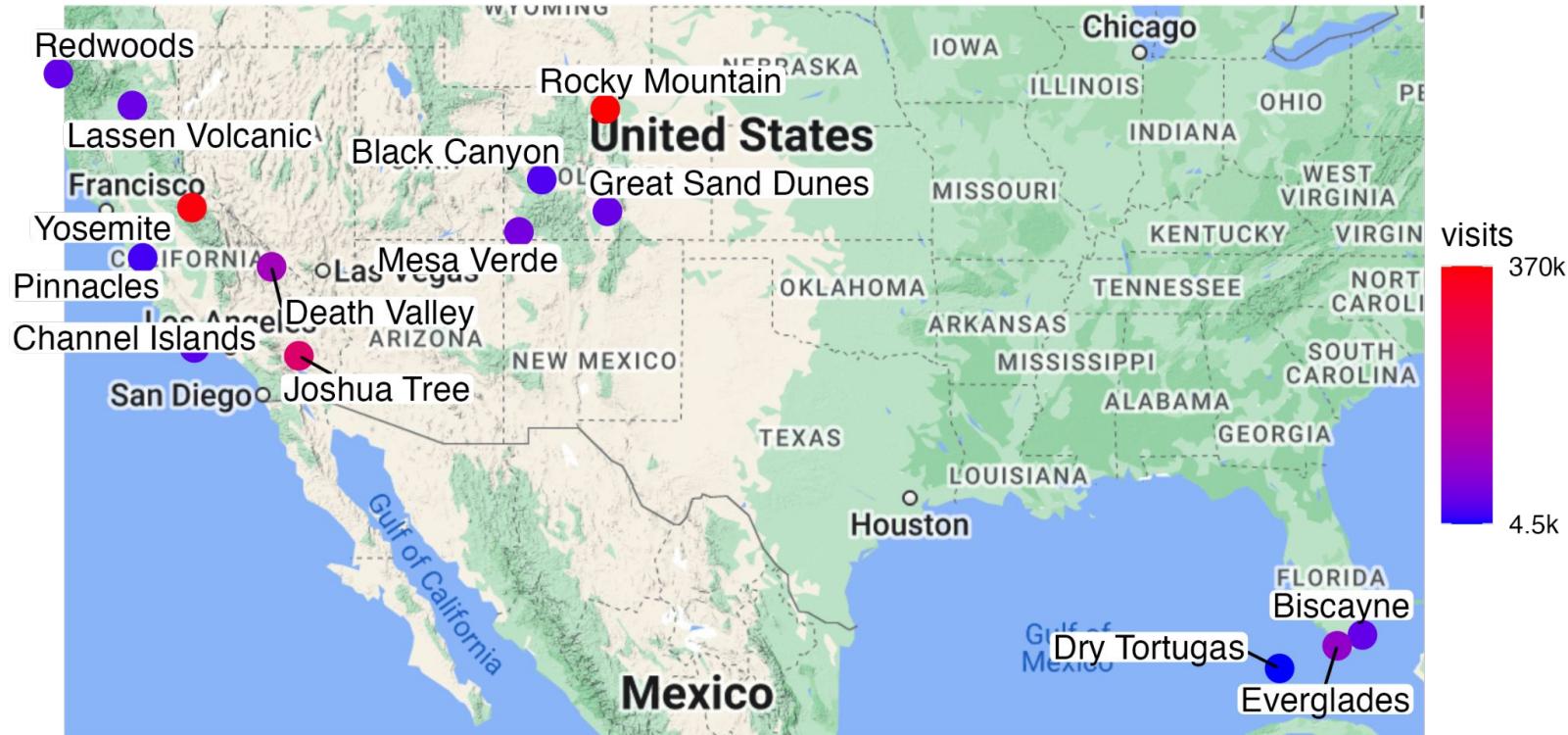
Biodiversity Findings

- All parks had more birds than mammals
- Dry Tortugas (FL) had the least amount of mammals and Pinnacles (CA) had the least amount of birds
- On average CA parks have 103.57 mammals and 339.29 birds per national park, meaning greatest biodiversity
- CO has 73.75 mammals and 232.25 birds per national park
- FL has 25.33 mammals and 295.33 birds per national park



Main Analysis: Mapping of Visitation, Bird and Mammal Biodiversity

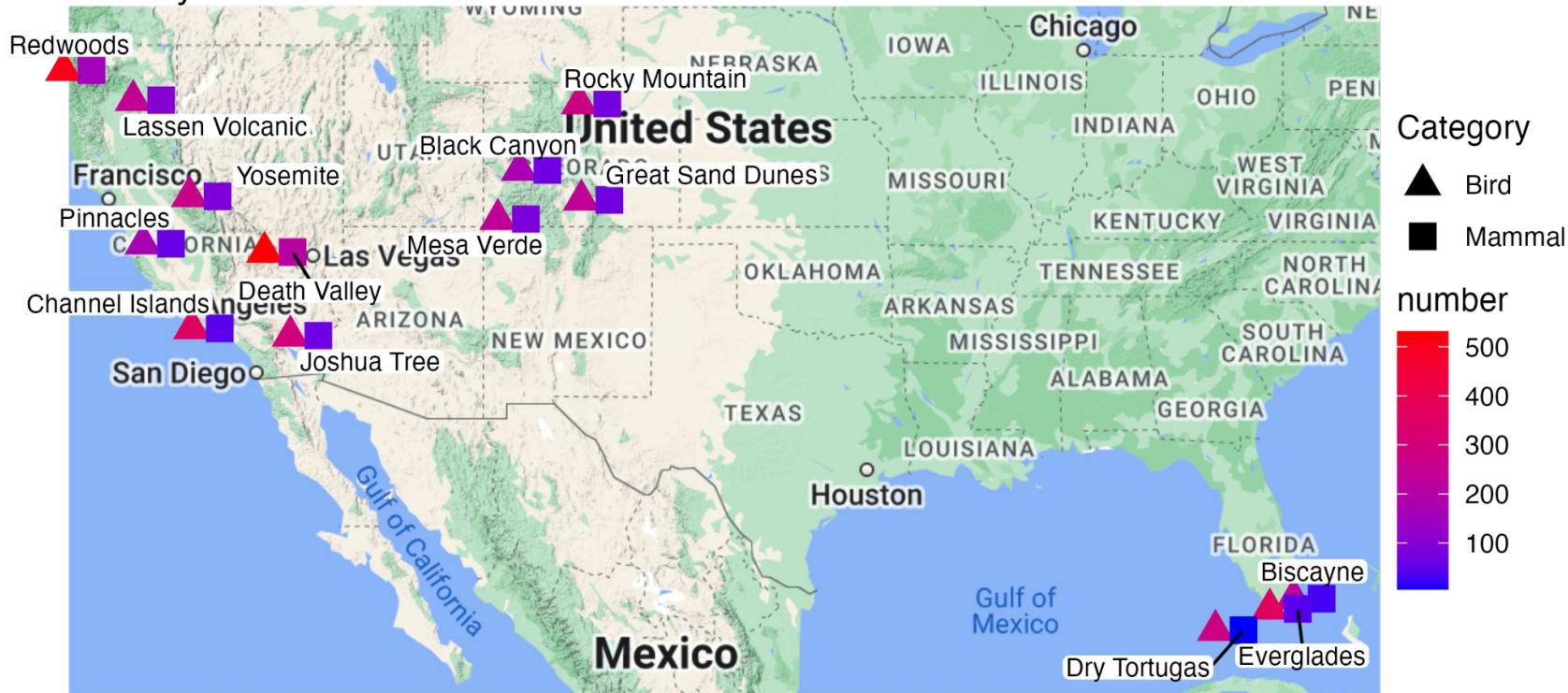
Park Visitation for all 3 states



- Colorado parks: Rocky Mountain NP had most visitation, the highest amount of birds and mammals.
- Florida parks: Everglades had the highest visitation, birds and mammals.
- California parks: Redwoods had the greatest biodiversity but Yosemite had the greatest visitation rate.

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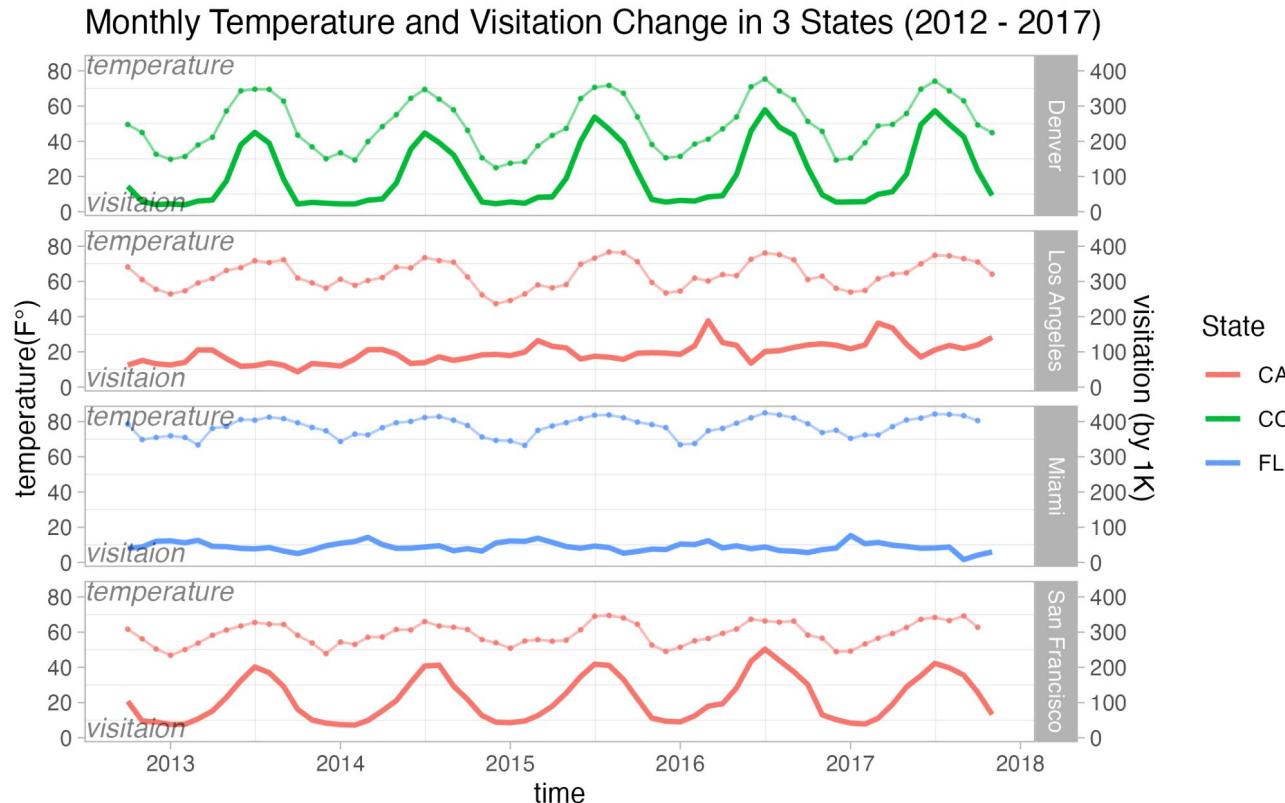
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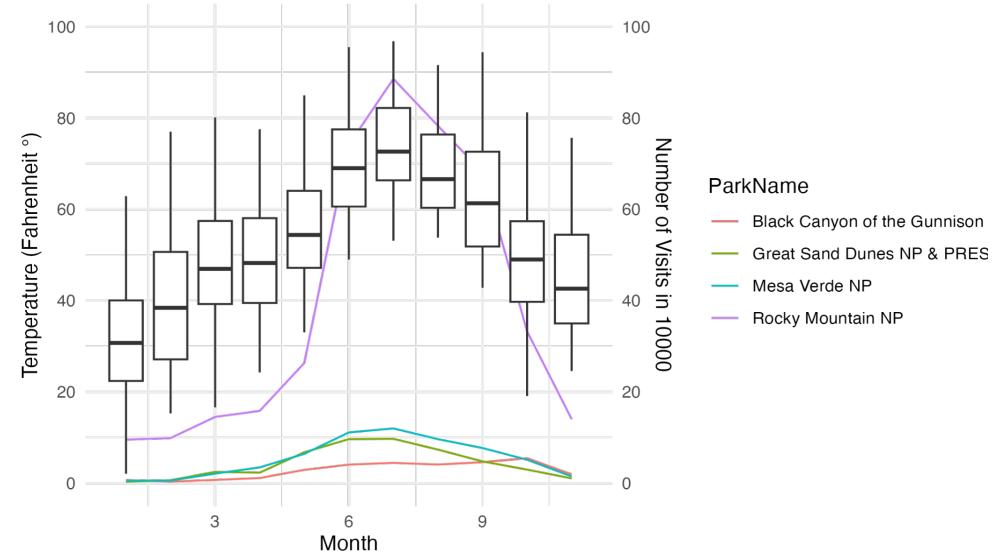
Main Analysis: Time series for Visitation and Temperature from 2012-2017

- Visitation and temperature follow each other
- + Denver & San Francisco
- - LA & Miami

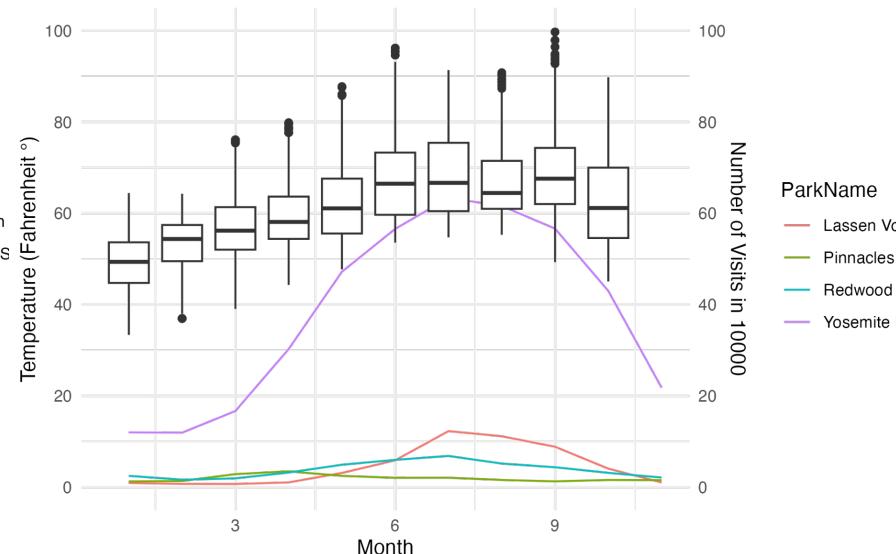


Main Analysis: Pattern Comparison

2017 Denver Temperature and Visitation

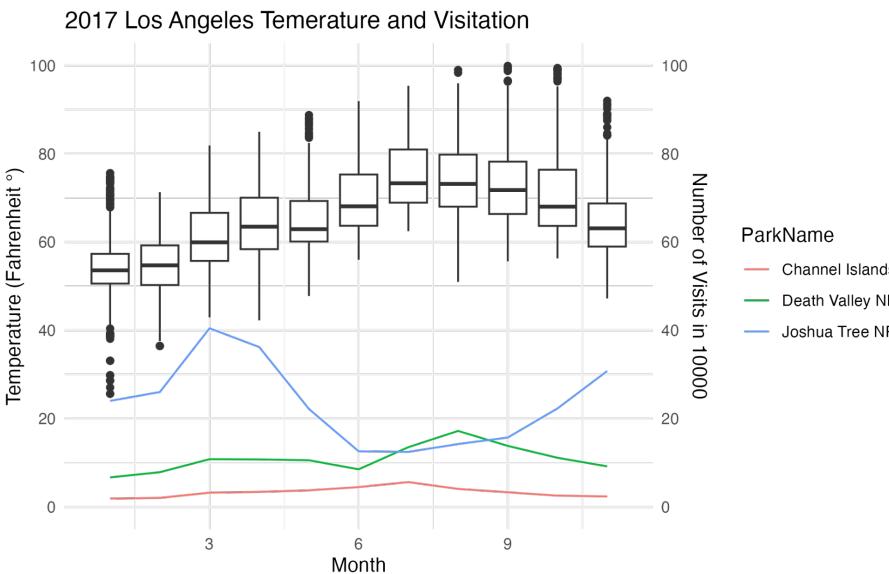
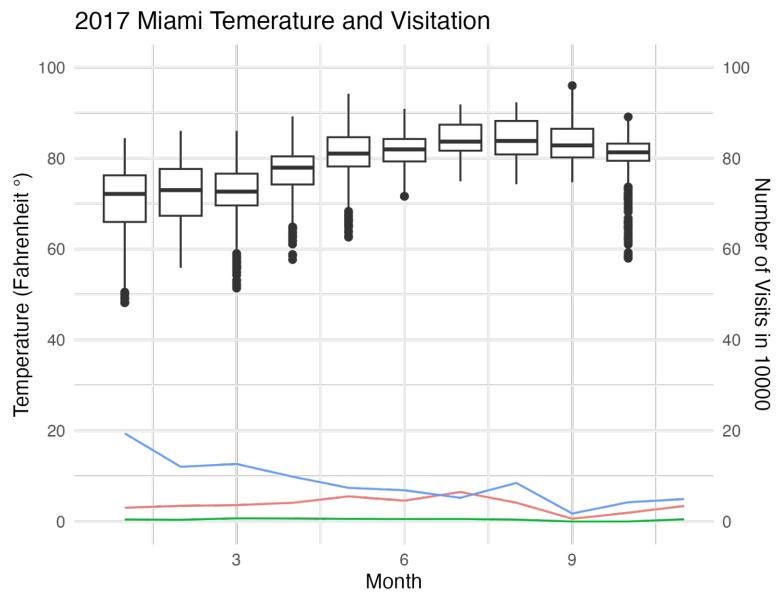


2017 San Francisco Temperature and Visitation



- Denver temp has the highest variation - all visitation increases when temp does
- San Francisco temp fluctuates less - the same pattern

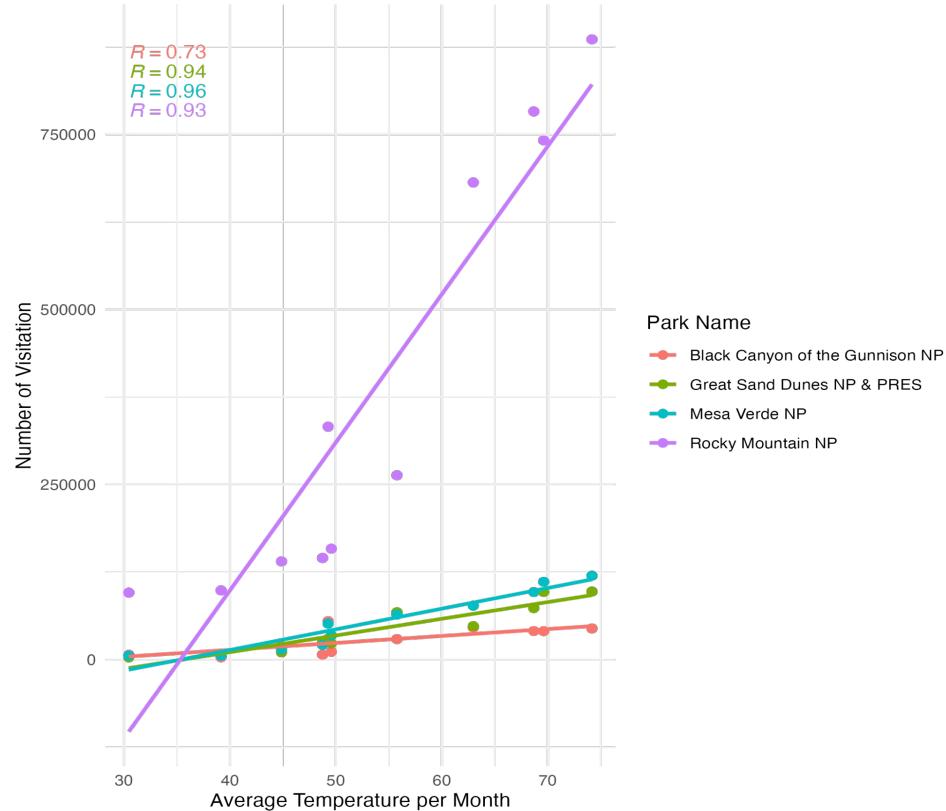
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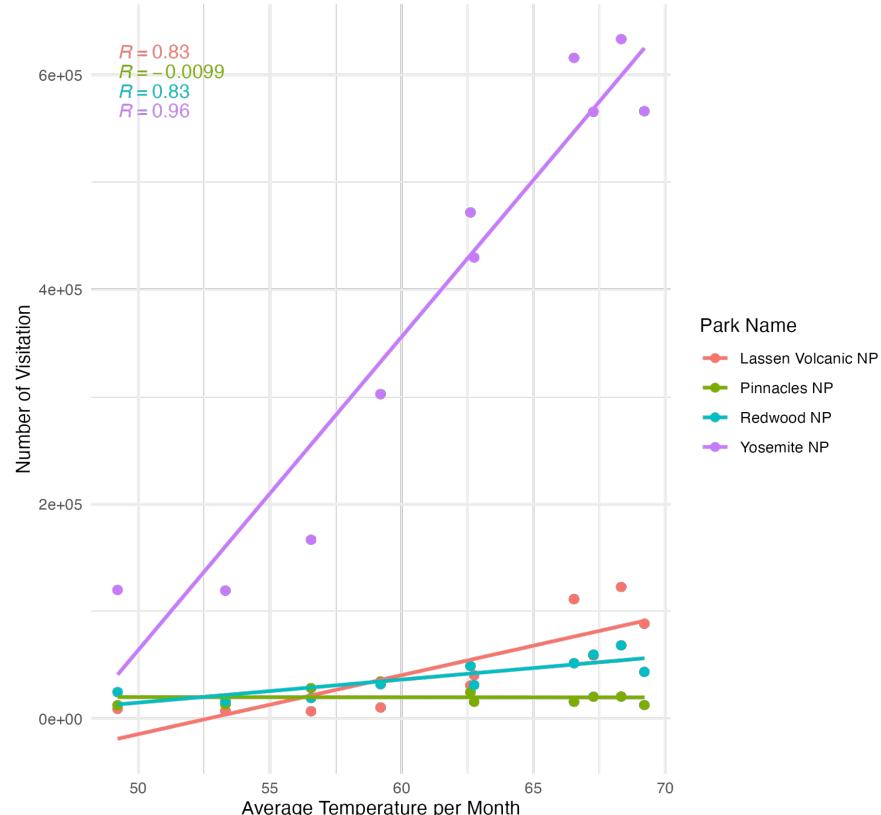
- Miami has the most consistent climate - January has the highest visitation
- Los Angeles climate fluctuations more - the same pattern, opposite to the parks last slide

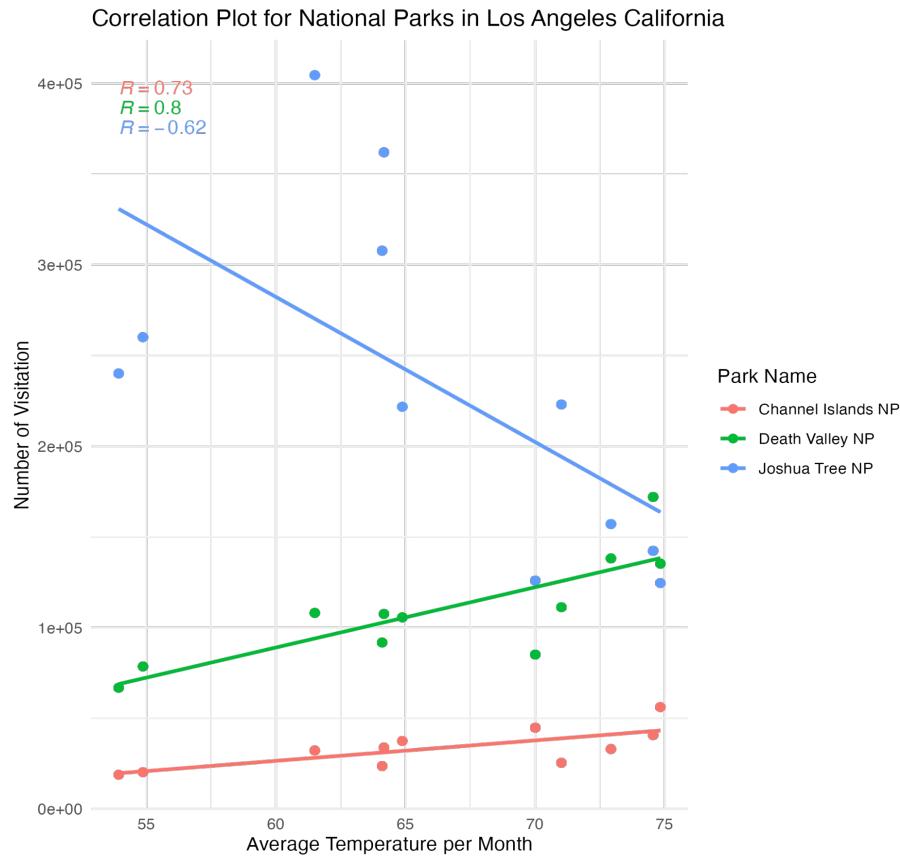
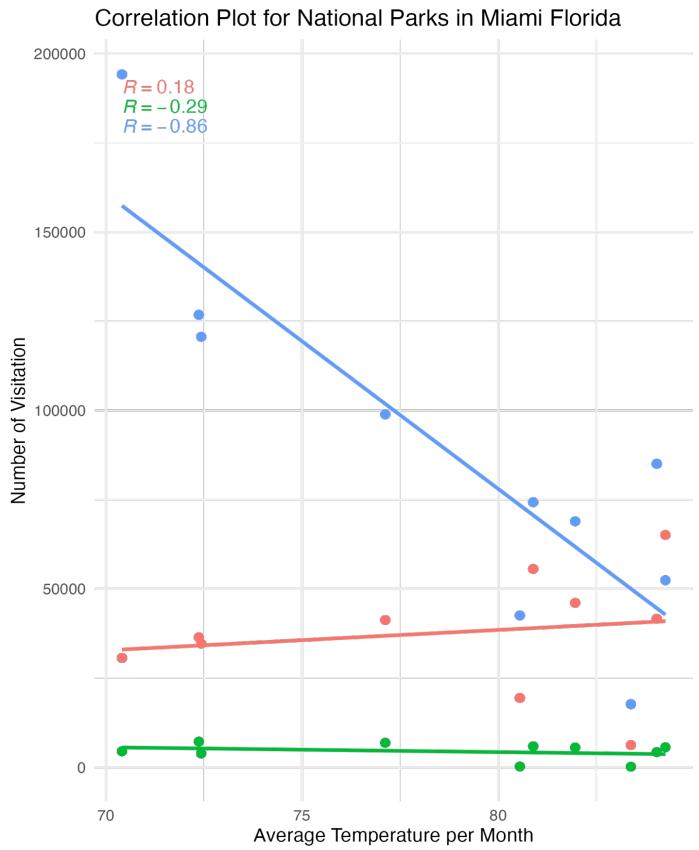
Main Analysis: Correlation based on City Weather and Visitation 2017

Correlation Plot for National Parks in Denver Colorado



Correlation Plot for National Parks in San Francisco California





- The parks that had a negative correlation between visitation and temperature were the Everglades, Miami(-0.86), Dry Tortugas, Miami(-0.29), and Joshua Tree in Los Angeles (-0.62)
- Both Mesa Verde, Denver and Yosemite, SF, had the highest value of correlation (0.96)
- Since Denver has the most fluctuation in temp, the parks have a higher positive correlation overall because people are less likely to visit when the temp is below 50 degrees
- That being said, the coldest month in Miami (70 degrees) is the busiest for visitation
- On average, California national parks have the highest visitation and biodiversity rates because although they do have 4 seasons, all the season are mild and the climate is steady
- Visitation and biodiversity is lowest when there are extreme weather conditions
- Biodiversity is greatest in mild climates (CA), birds are highest in warmer climates (FL) and mammals do well in colder climates(CO)

Citations

Beniaguev, David (2017).Historical Hourly Weather Data 2012-2017, Version 1. Retrieved November 17, 2022 from
<https://www.kaggle.com/datasets/selfishgenie/historical-hourly-weather-data>

National Park Dataset (2017). Biodiversity in National Parks, Version 1. Retrieved November 17, 2022 from
<https://www.kaggle.com/datasets/nationalparkservice/park-biodiversity>

National Park Visitation Dataset obtained from Module 5 Google Document.

Thank you!

