The Effect of Weather On Tourism to Mount Rushmore

An analysis combining weather data and tourist visits to one of America's finest monuments

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Introduction

- This report analyzes the effect of weather on tourism to Mt. Rushmore National Park, in South Dakota.
- Clients who benefit from tourism to Mt. Rushmore will benefit from this analysis if a link between weather and tourism can be found, because weather has a significant impact on the economy and on human decisions.
- Such clients include the National Park Service (NPS) and local businesses around the Black Hills that cater to Mt. Rushmore tourists.

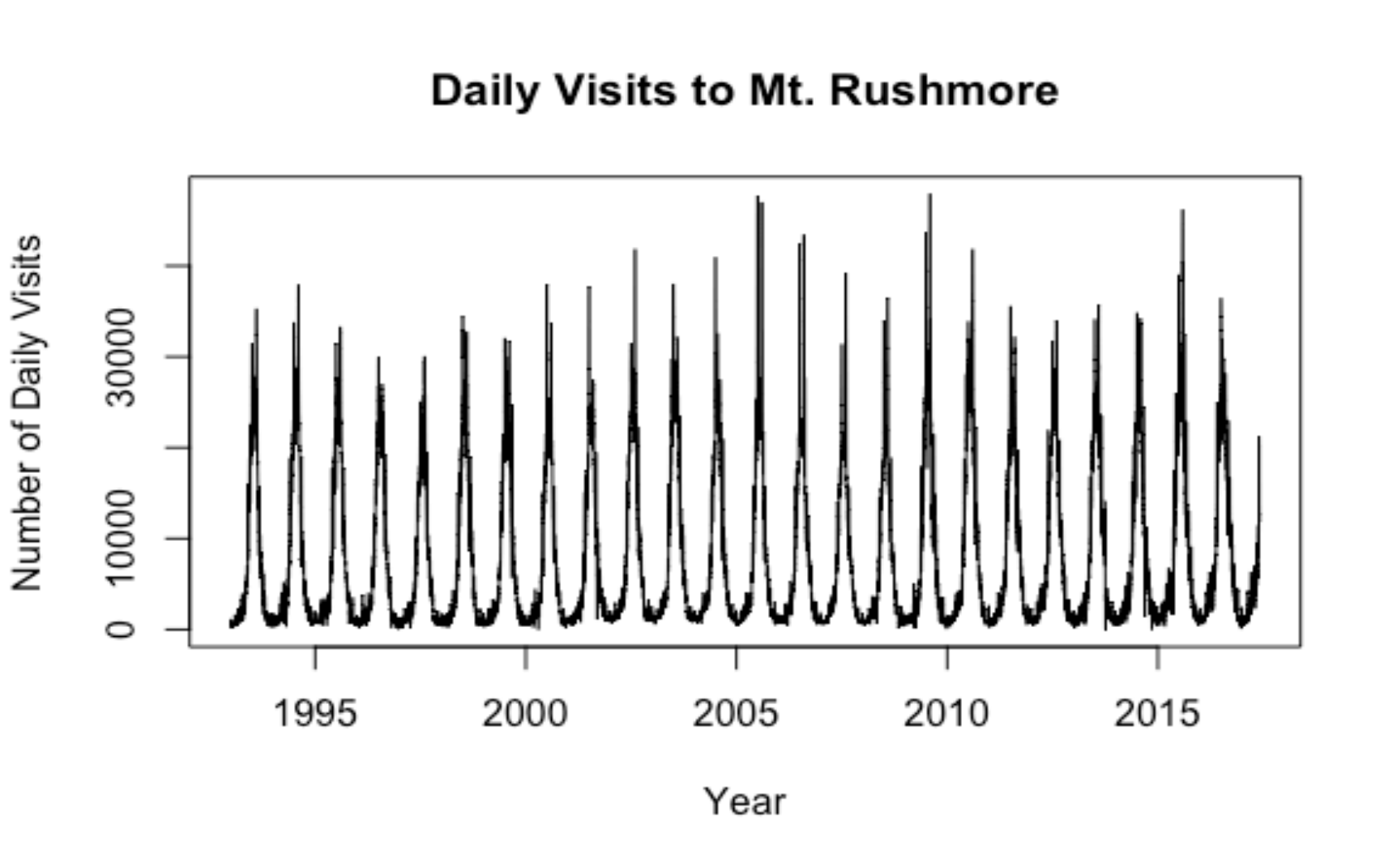
Introduction

- Results from analysis can be used by the NPS and businesses to use weather forecasts to adjust operations and improve efficiency, if a link is found.
- Daily visitation data from January 1993 to May 2017 is provided by the NPS.
- Visitation data was combined with data on precipitation, temperatures, and snowfall, from the National Oceanic and Atmospheric Administration (NOAA).

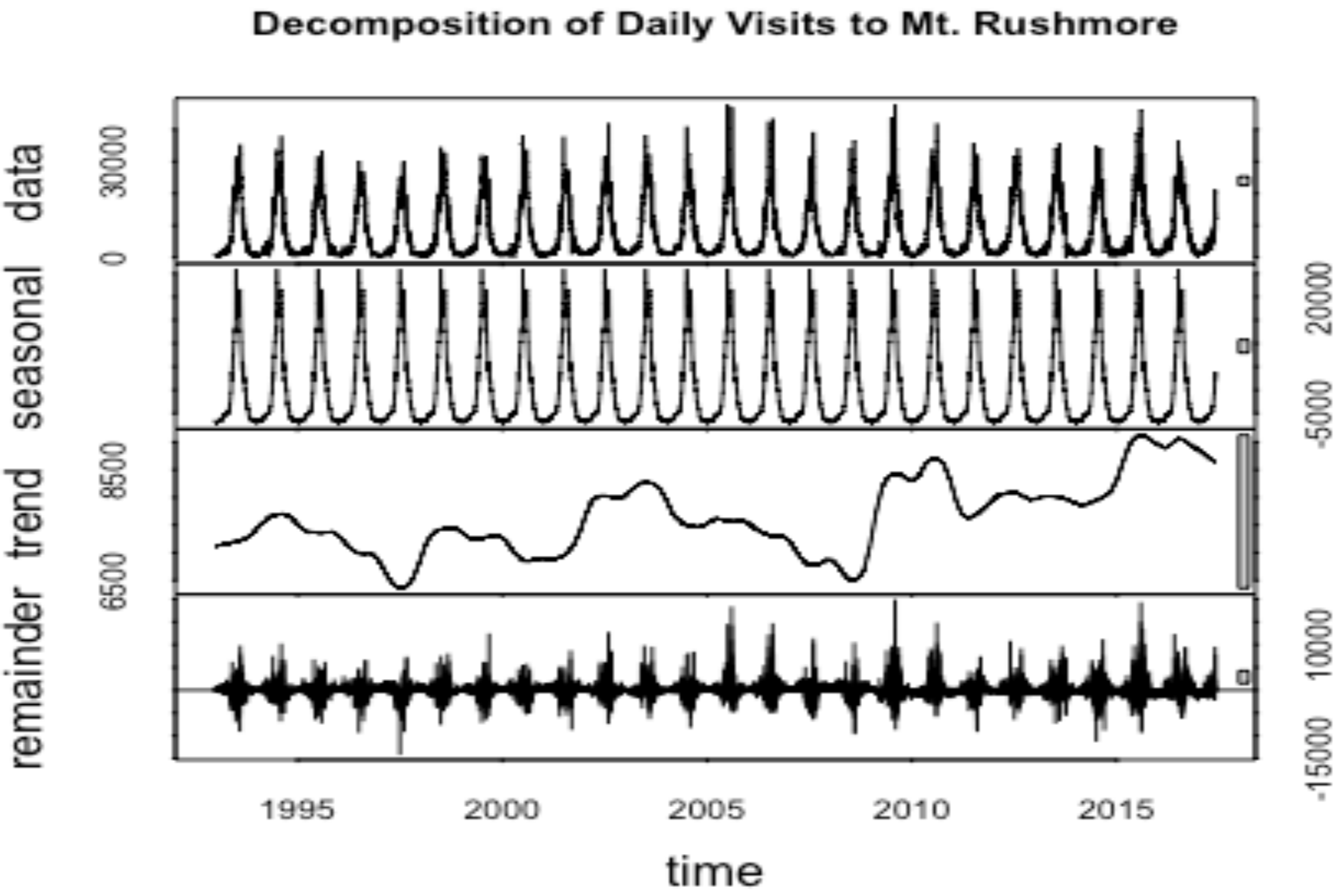
Data Insight

- The two datasets were combined, and although the temperature data had a few missing dates, a computer algorithm was used to make reasonable estimates on those data points.
- The data had significant seasonal variation, since people prefer to visit the park in the warmer months.
- Time series of the temperature and daily visitation data was decomposed and adjusted for seasonal variation.

Raw Time Series for Daily Visits to Mt. Rushmore

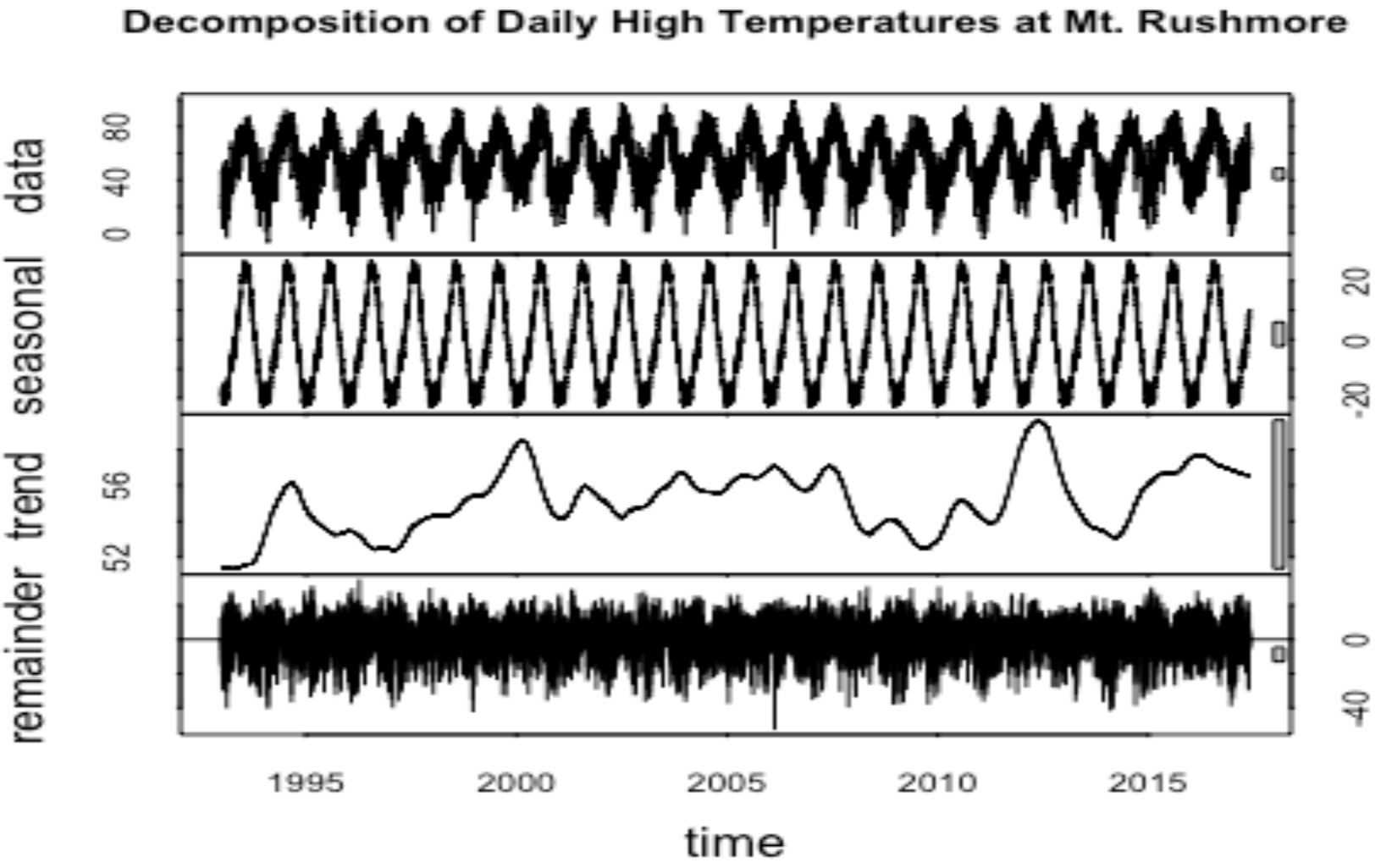


Time series decomposition for daily visits

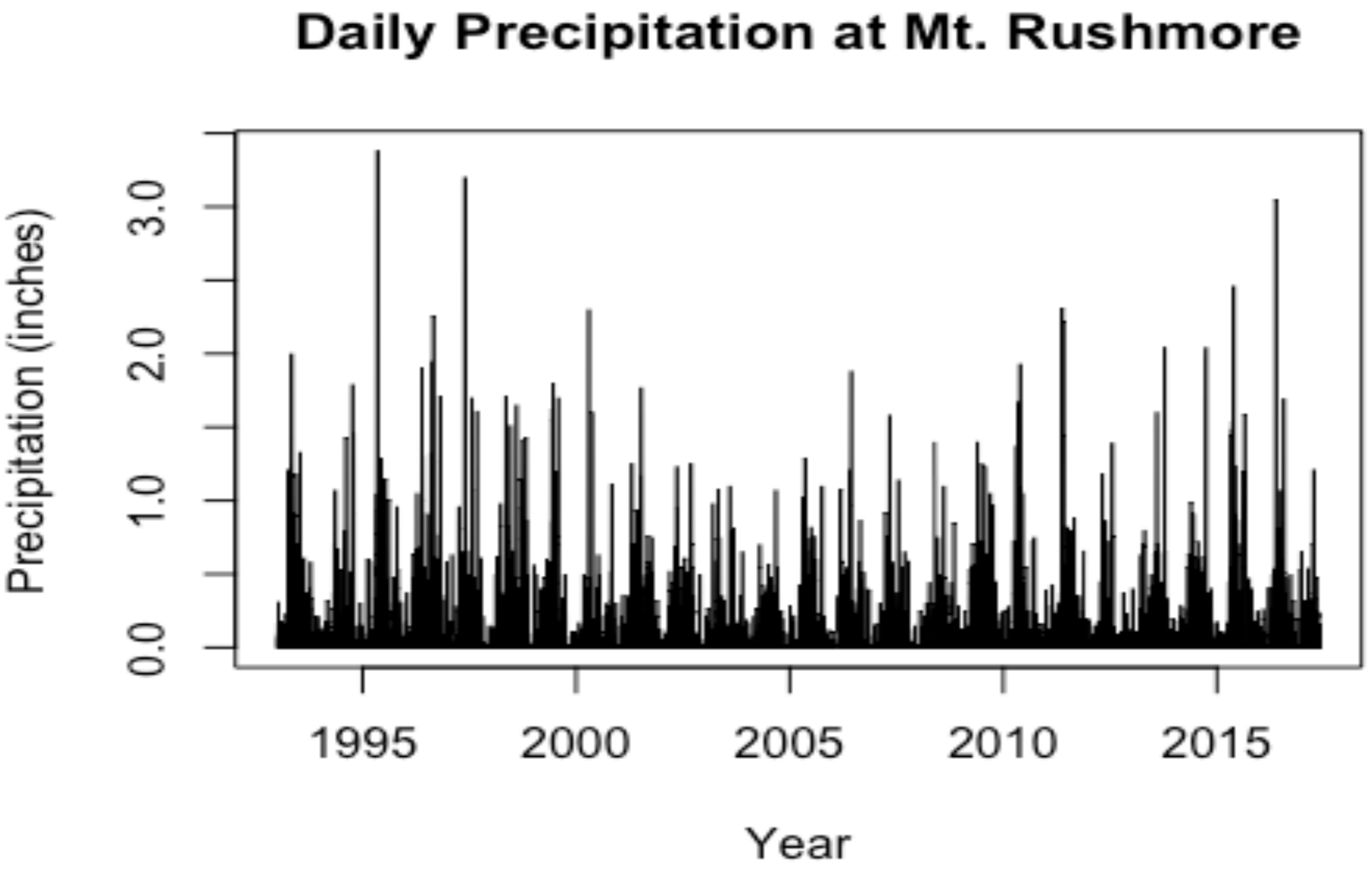


Time series decomposition for daily high temperatures

- **Daily lows look mostly the same.**

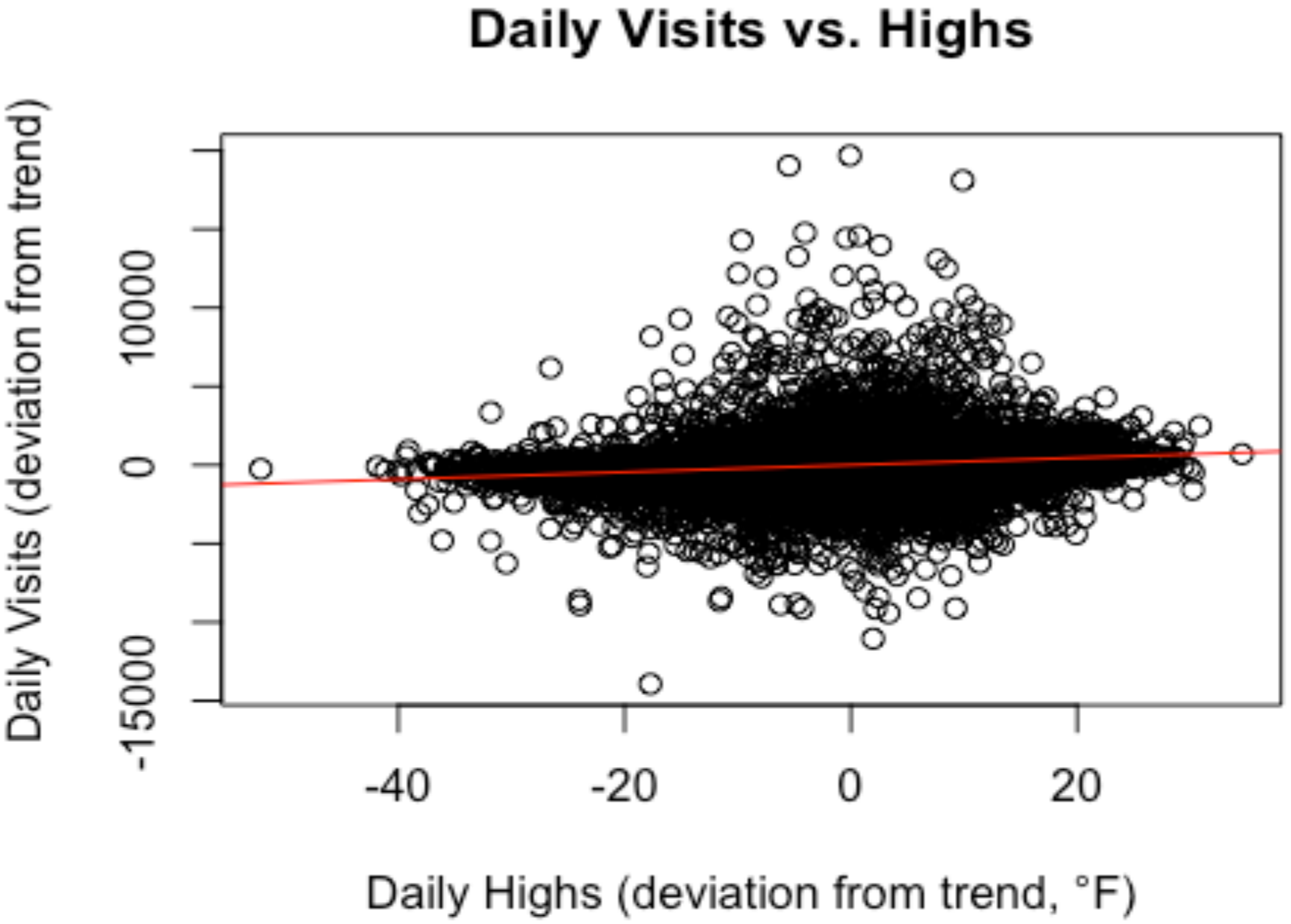


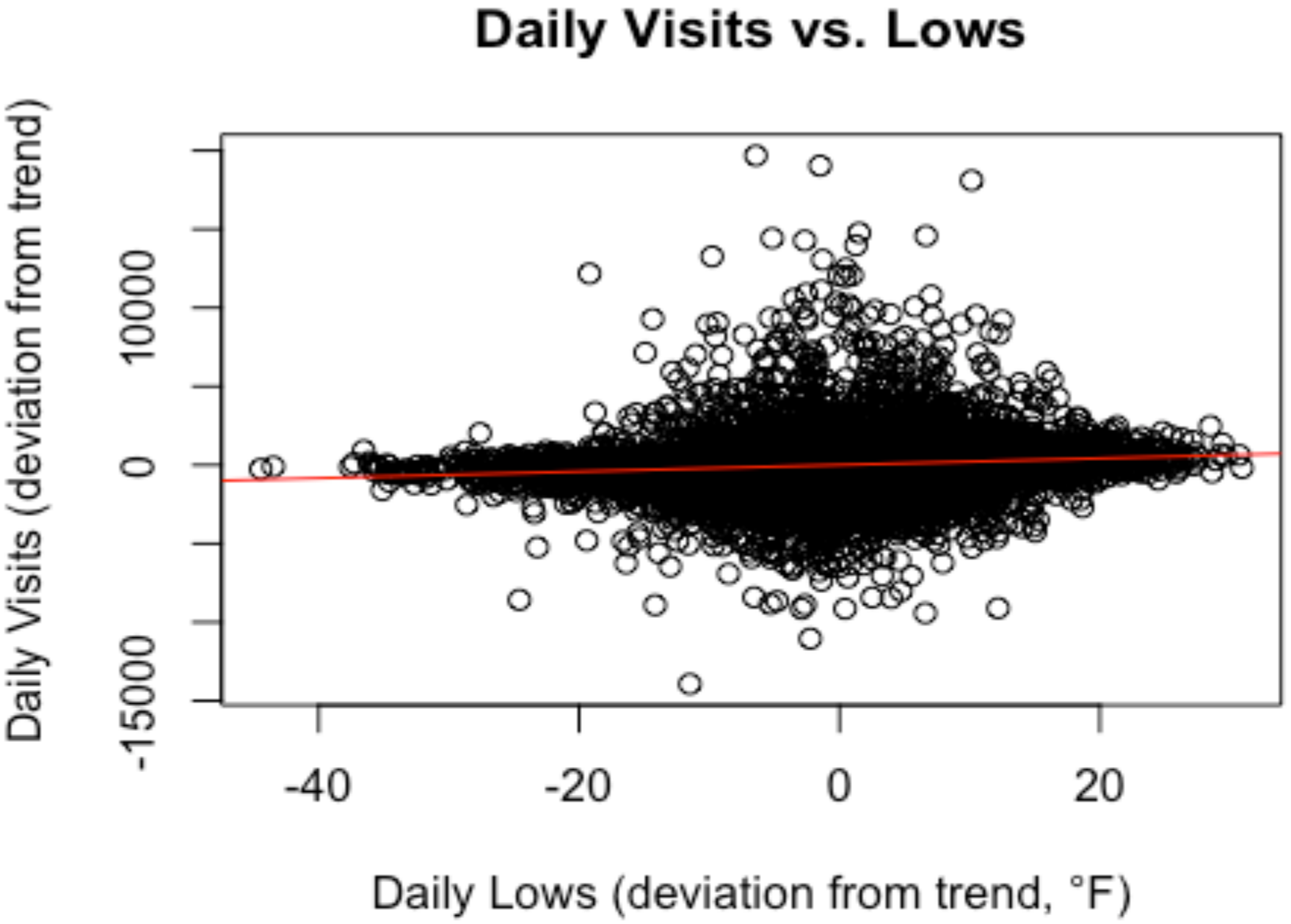
Daily Precipitation

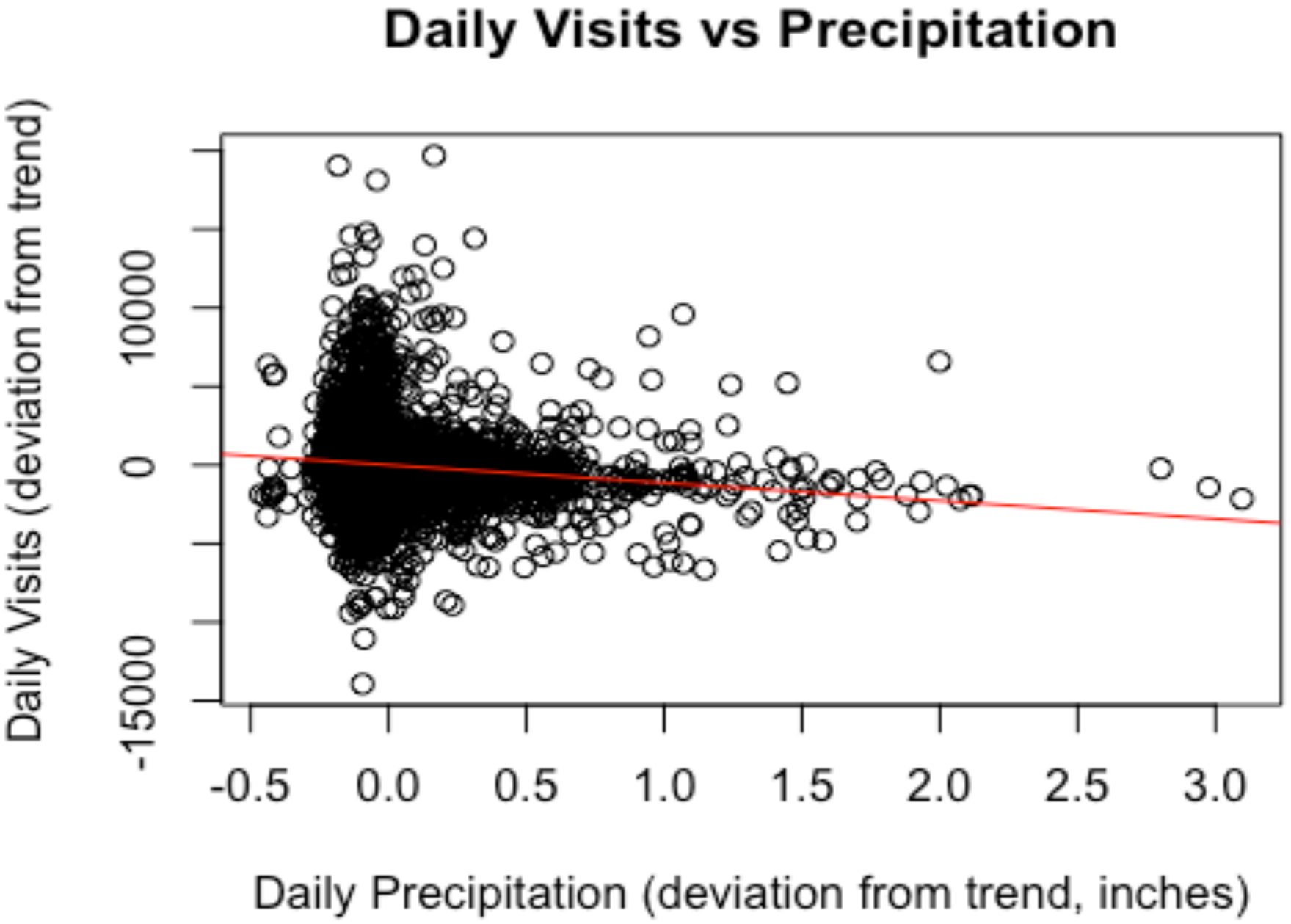


Plotting the decomposed variables

- Remaining data from the time series decomposition for daily visits, daily temperatures, and daily precipitation were extracted.
- Remaining data for daily visits was plotted against remaining data for temperatures and precipitation.


Daily Visits vs. Highs
Daily Visits (deviation from trend)
10000
0
-15000
-40
-20
0
20
Daily Highs (deviation from trend, °F)


Daily Visits vs. Lows
Daily Visits (deviation from trend)
10000
0
-15000
-40
-20
0
20
Daily Lows (deviation from trend, °F)


Daily Visits vs Precipitation
Daily Visits (deviation from trend)
10000
0
-15000
-0.5
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Daily Precipitation (deviation from trend, inches)

Very low correlation in the graphs

- The previous slides show a very low correlation between the daily visits and the weather-related variables.
- Data is not easy to fit into a straight line, and an attempt to do that will not be very helpful in predicting visits based on the weather.
- Linear regression analysis using a computer program may give us the answer.

Linear regression analysis was done

- Linear regression analysis using a computer program was done, with daily visits as the dependent variable, and weather-related factors as independent variables.
- Adjusted correlation between the independent variables and the daily visits was near 2.8%, which is very low.
- That means only 2.8% of the short-term variation in the daily visits can be explained by the weather, after adjusting for seasonal changes.

Conclusion

- After adjusting for seasonal trends, no evidence of a link between daily weather changes and park visits can be found. A 2.8% correlation is very close to zero, and therefore not meaningful.
- That means that on a day to day basis, there is no known indication of the weather having a meaningful impact on the number of visitors to Mt. Rushmore.
- Different results may be possible if analysis is broken down by season.

Recommendation

- Mt. Rushmore park should look into further analysis of the monthly or seasonal effects of the weather on daily park visits to find out if there is a link during at least some times of the year.
- Consider prediction models that are not linear.
- Further studies on how other factors besides the weather affect daily visits may further improve efficiency of the park service and local businesses.