Mini Project 1: Parker Max

```r
# Initial packages required (we'll be adding more)
library(tidyverse)
library(mdsr)        # package associated with our MDSR book
```

```r
library(maps) #loads the maps library
us_states <- map_data("state") #creates our US state Map
head(us_states)
```

```
       long      lat group order   region subregion
1 -87.46201 30.38968     1     1  alabama      <NA>
2 -87.48493 30.37249     1     2  alabama      <NA>
3 -87.52503 30.37249     1     3  alabama      <NA>
4 -87.53076 30.33239     1     4  alabama      <NA>
5 -87.57087 30.32665     1     5  alabama      <NA>
6 -87.58806 30.32665     1     6  alabama      <NA>
```

```r
PCE <- read.csv("spending.csv") #Reads the 2023 PCE Data
PCE$State <- tolower(PCE$State) #Converts the state names to be lower case to be consistent

map1 <- us_states |>
  left_join(PCE, by = c("region" = "State")) |> #joins the PCE data with the map
mutate(PCE_category = cut(X2023,
    breaks = c(0, 200000, 700000, 1200000, 1700000, 2200000, Inf),
    labels = c("< $200K", "$200k-$500k", "$700k-$1.2M", "$1.2M-$1.7M", "$1.7M-$2.2M", ">$2.5
```

```r
static_map1 <- ggplot(map1,(aes(x = long, y = lat, group = group, fill = PCE_category))) + #
  geom_polygon(color = "white") +
  scale_fill_brewer( name = "PCE (Millions of USD)") +
  theme_void() +
```

```
  labs(x = "", y = "", title = "Personal Consumption Expenditure by US State in 2023 (USD)",
print(static_map1)
```

Personal Consumption Expenditure by US State in 2023 (USD)

Data Source: Bureau of Economic Analysis – https://www.bea.gov/data/consumer
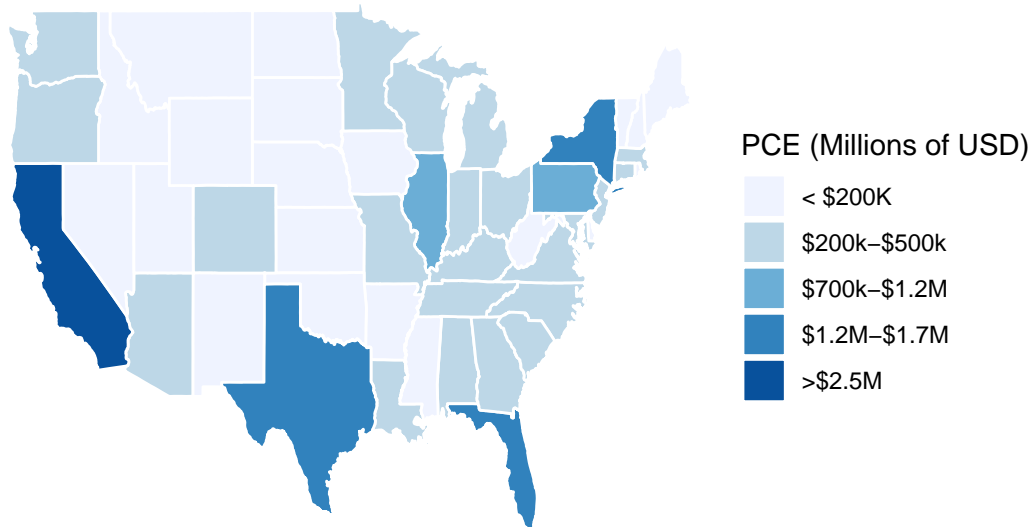
This choropleth map of the United States shows Personal Consumption Expenditure (PCE) data by state for 2023 in millions of dollars. The states are color coded using a gradient, where lighter colors represents lower PCE values and darker blue indicates higher values. The data from the Bureau of Economic Analysis shows that Texas ($2,000M+), California ($2,500M+), and Florida ($1,500M+) have the highest consumer spending. In contrast, states in the Midwest and Mountain West generally have lower PCE, with many below $500M. This shows the regional differences in economic activity and consumer spending across the U.S.

[Interactive PCE] ::: {.cell}

```
library(leaflet)
```

```
Warning: package 'leaflet' was built under R version 4.4.2
```

```
library(sf)
```

```
Warning: package 'sf' was built under R version 4.4.2
```

```
Linking to GEOS 3.13.0, GDAL 3.10.1, PROJ 9.5.1; sf_use_s2() is TRUE
```

```r
library(leaflet)
library(htmltools)
```

Warning: package 'htmltools' was built under R version 4.4.2

```r
library(glue)
```

Warning: package 'glue' was built under R version 4.4.2

```r
library(dplyr) #reading in all the needed libraries
PCE2 <- read.csv("spending.csv") #Reads the 2023 PCE Data

states <- read_sf("https://rstudio.github.io/leaflet/json/us-states.geojson")
# Merge PCE data with states
states <- states |>
  left_join(PCE2, by = c("name" = "State"))

# Create bins for PCE values
bins <- c(0, 200000, 700000, 1200000, 1700000, 2200000, Inf)
pal <- colorBin("YlOrRd", domain = states$X2023, bins = bins)

states <- states |> # Create labels for hover tooltips
  mutate(labels = glue("<strong>{name}</strong><br/>PCE: ${X2023} Million"))

labels <- lapply(states$labels, HTML)

leaflet(states) |> # Generate interactive map
  setView(-96, 37.8, 4) |>
  addTiles() |>
  addPolygons(
    fillColor = ~pal(X2023),
    weight = 2,
    opacity = 1,
    color = "white",
    dashArray = "3",
    fillOpacity = 0.7,
    highlightOptions = highlightOptions(
      weight = 5,
      color = "#666",
      dashArray = "",
```
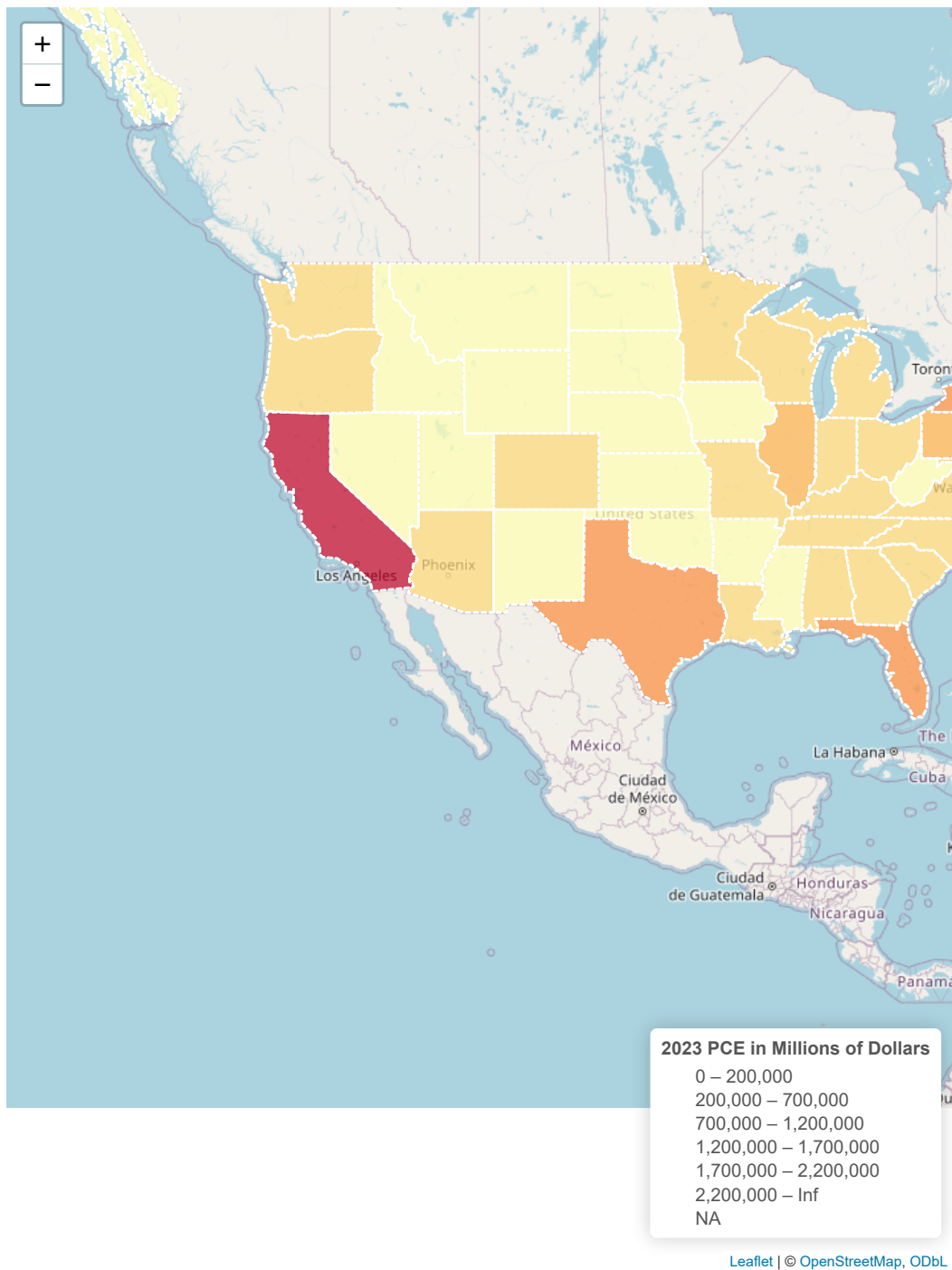
```
    fillOpacity = 0.7,
    bringToFront = TRUE),
  label = labels,
  labelOptions = labelOptions(
    style = list("font-weight" = "normal", padding = "3px 8px"),
    textsize = "15px",
    direction = "auto")) |>
addLegend(pal = pal, values = ~`X2023`, opacity = 0.7, title = "2023 PCE in Millions of Dol
  position = "bottomright")
```

Warning in sf::st_is_longlat(x): bounding box has potentially an invalid value
range for longlat data

file:///C:\Users\parke\AppData\Local\Temp\RtmpsB2ZRO\file37ccd386ef8\widget37cc7650646b.html

2023 PCE in Millions of Dollars

0 – 200,000
200,000 – 700,000
700,000 – 1,200,000
1,200,000 – 1,700,000
1,700,000 – 2,200,000
2,200,000 – Inf
NA

Leaflet | © OpenStreetMap, ODbL

::: This is an interactive leaflet map. It shows Personal Consumption Expenditure (PCE) data by state for 2023 in millions of dollars. The states are color coded using a gradient, where lighter colors represents lower PCE values and darker colors indicates higher values. Hovering over the states shows the data from the Bureau of Economic Analysis shows that Texas ($2,000M+), California ($2,500M+), and Florida ($1,300M+) have the highest consumer spending. In contrast, states in the Midwest and Mountain West generally have lower PCE, with many below $500M. This shows the regional differences in economic activity and consumer spending across the U.S.

Categorical Data - Static Map

```
nps_parks <- read_csv("nps_parks.csv")
```

```
Rows: 51 Columns: 2
-- Column specification -------------------------------------------------------
Delimiter: ","
chr (1): state
dbl (1): park

i Use `spec()` to retrieve the full column specification for this data.
i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```
nps_parks$state <- tolower(nps_parks$state) #when I manually entered the data, the states are
us_states <- map_data("state")
map2 <- us_states |>
  left_join(nps_parks, by = c("region" = "state")) #joins the parks data with the mapping dat
ggplot(map2, aes(long, lat, group = group, fill = factor(park))) + #treated as a categorical
  geom_polygon(color = "black") +
  scale_fill_manual(
    values = c("1" = "darkgreen", "0" = "chocolate4"), #the data is 0 = No, 1 = yes, there is
    name = "Has a National Park",
    labels = c("No", "Yes")
  ) +
  theme_void() +
  labs(title = "US States with a National Park",
       caption = "Data Source: National Park Service & Wikipedia (Manual Entry)")
```

US States with a National Park
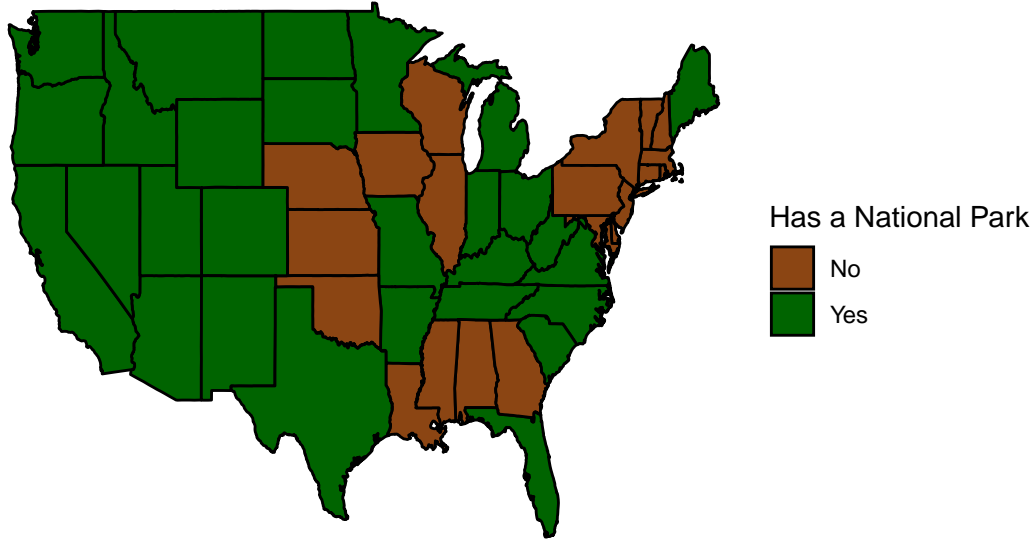
Data Source: National Park Service & Wikipedia (Manual Entry)

This choropleth map of the United States showing which states have at least one national park. States with at least one national park are shaded in dark green, while those without any are shaded in brown (the two colors of the National Parks Service!). The maps shows that the majority of US States has at least one national park in their state. The data on whether or not the states have a national park comes from the National Park Service and Wikipedia, then manually entered into a csv file.

```
states <- read_sf("https://rstudio.github.io/leaflet/json/us-states.geojson")
nps_parks_int <- read.csv("nps_parks.csv") #creates the nps_parks_int for interactive parks
# Merge nps data with states
states <- states |>
  left_join(nps_parks_int, by = c("name" = "state"))

# Create bins for PCE values
pal <- colorFactor(
  palette = c("chocolate4", "darkgreen"), # No = brown, Yes = green, color scale, these are t
  domain = states$park
)


states <- states |>
  mutate(labels = ifelse(park == 1,
                         glue("<strong>{name}</strong><br/>Has at least one National Park"),
```

```
                         glue("<strong>{name}</strong><br/>No National Park"))) #Creating the

labels <- lapply(states$labels, HTML)

leaflet(states) |> #creating the leaflet map
  setView(-96, 37.8, 4) |>
  addTiles() |>
  addPolygons(
    fillColor = ~pal(park),
    weight = 2,
    opacity = 1,
    color = "white",
    dashArray = "3",
    fillOpacity = 0.7,
    highlightOptions = highlightOptions(
      weight = 5,
      color = "#666",
      dashArray = "",
      fillOpacity = 0.7,
      bringToFront = TRUE),
    label = labels,
    labelOptions = labelOptions(
      style = list("font-weight" = "normal", padding = "3px 8px"),
      textsize = "15px",
      direction = "auto")) |>
  addLegend(
    pal = pal,
    values = ~park,
    labels = c("No", "Yes"), #labels
    opacity = 0.7,
    title = "Has a National Park?",
    position = "bottomright")
```

Warning in sf::st_is_longlat(x): bounding box has potentially an invalid value
range for longlat data

file:///C:\Users\parke\AppData\Local\Temp\RtmpsB2ZRO\file37cc75b84b43\widget37cc1bb152a7.html

Has a National Park?
0
1
NA

Leaflet | © OpenStreetMap, ODbL
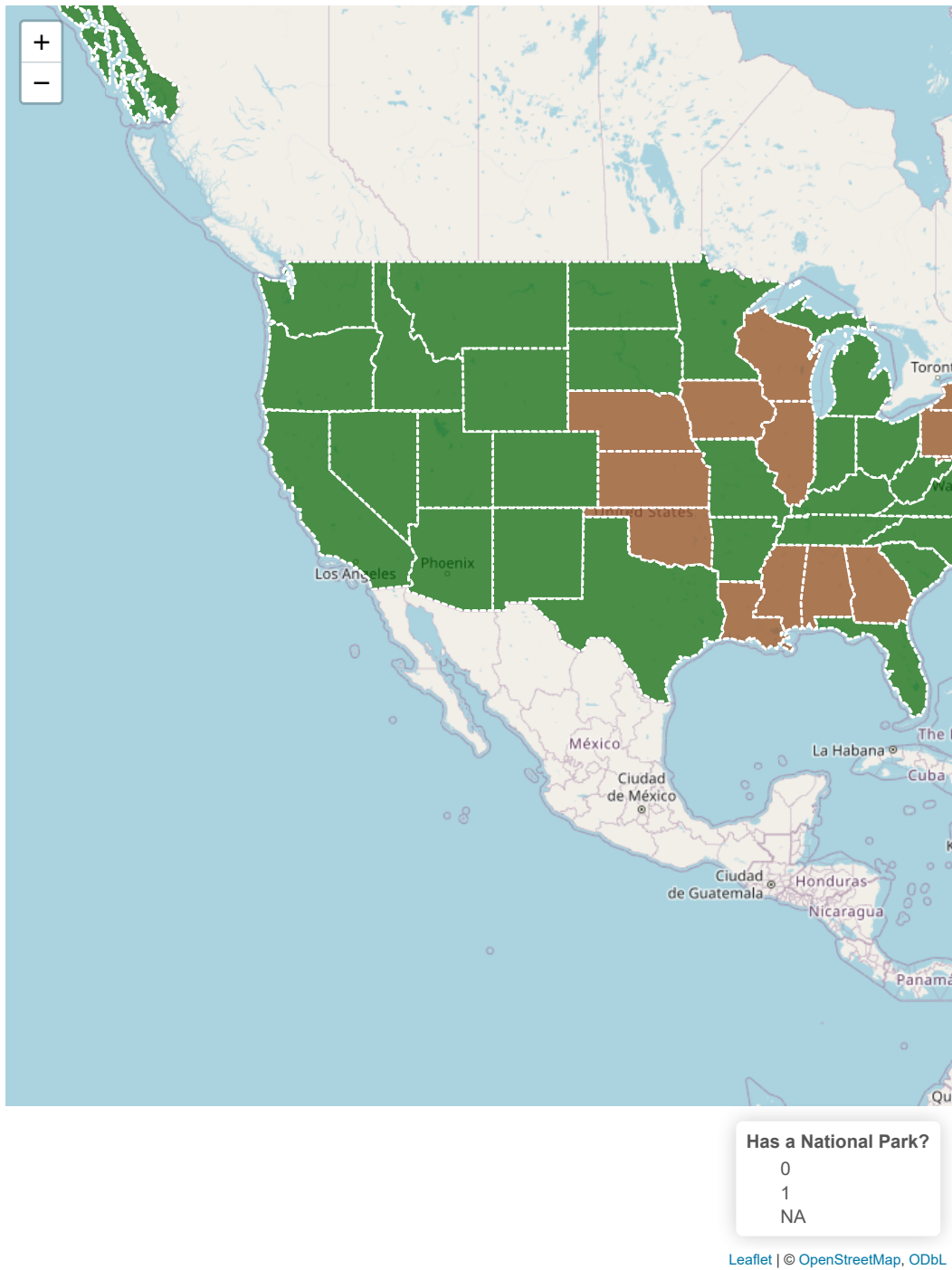
This an interactive leaflet map of the United States showing which states have at least one national park. States with at least one national park are shaded in dark green, while those without any are shaded in brown. From looking at the map and hovering over each state, it shows that the majority of US States has at least one national park in their state. The data on whether or not the states have a national park comes from the National Park Service and Wikipedia, then manually entered into a csv file.