

Spatial Data in R

E. Anne Chambers

Nov. 18, 2016

Map: James Cheshire (@spatialanalysis)
Code: <http://spatial.ly/2012/02/great-maps-ggplot2/>

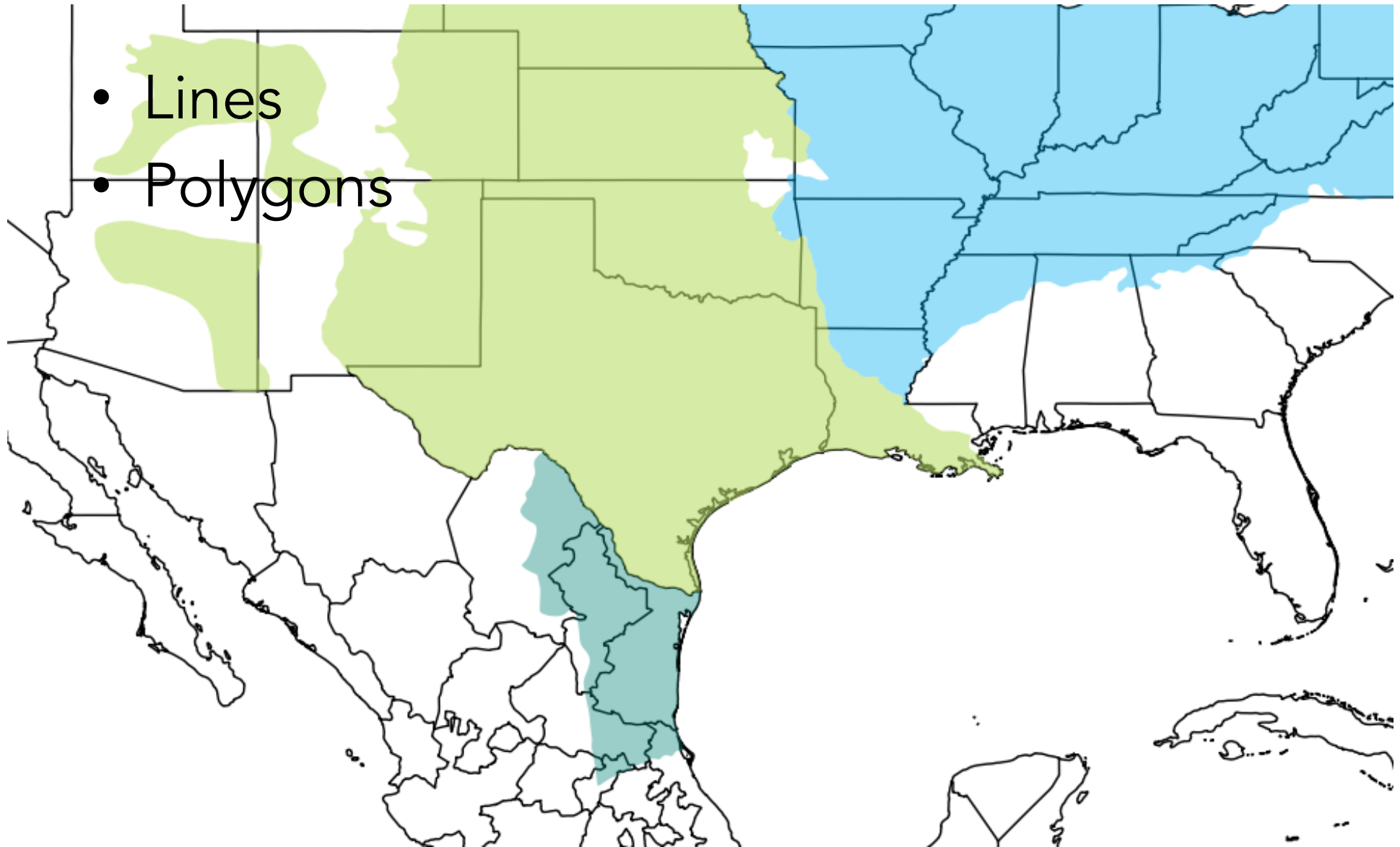
At the most basic level...

- Vector data and raster data
- Vector data:
 - Lines
 - Polygons
 - Points

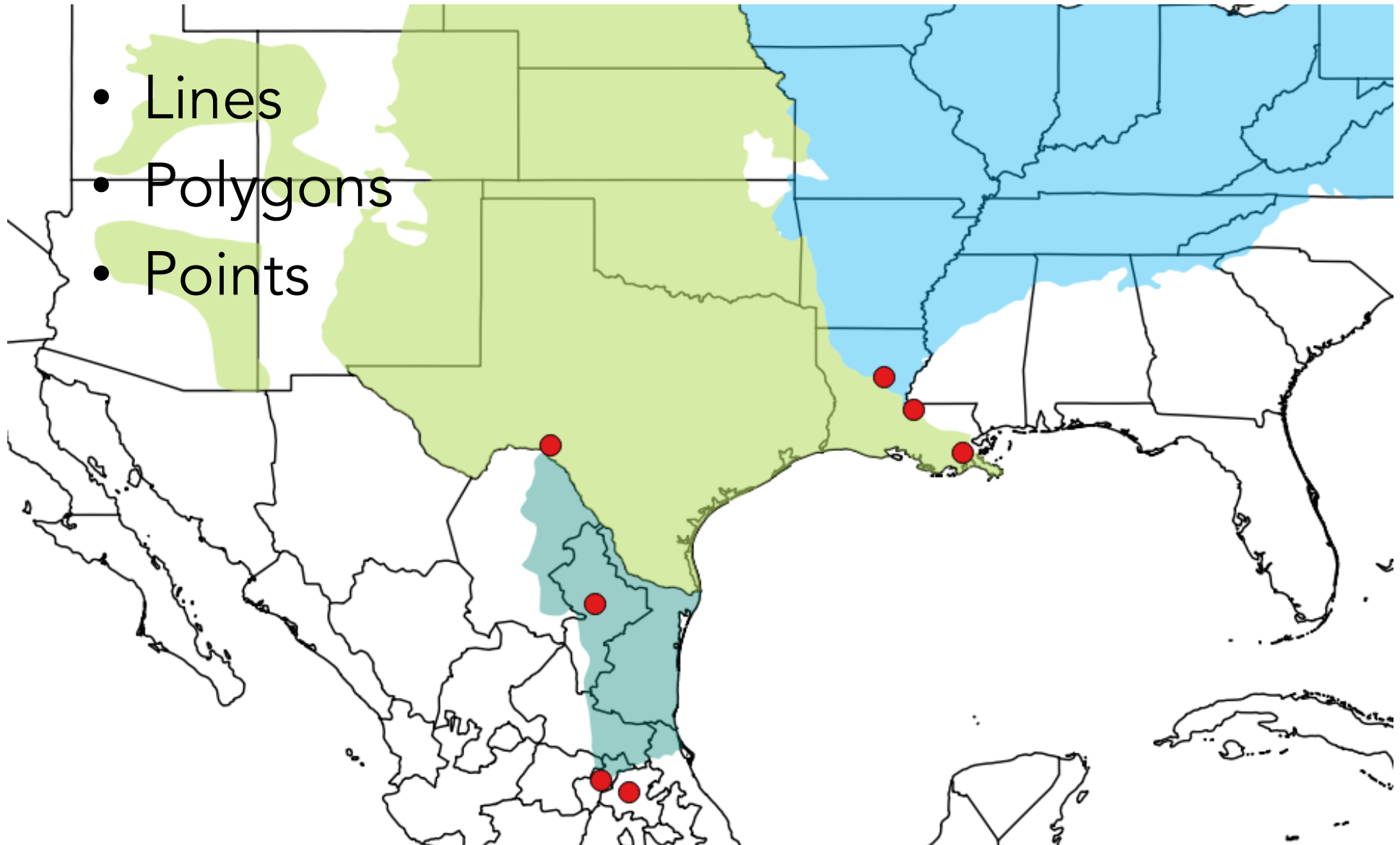
How does this extend to mapping?



How does this extend to mapping?



How does this extend to mapping?

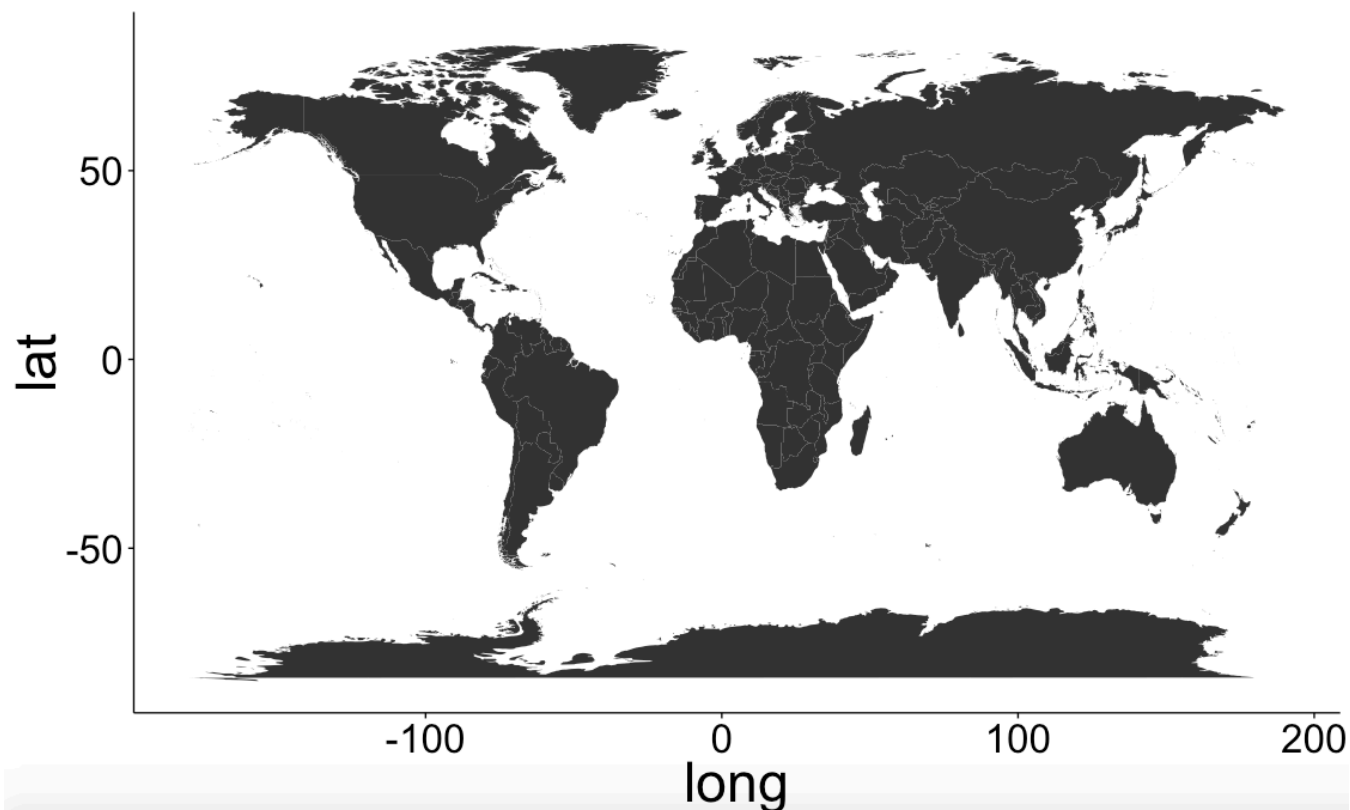


Spatial data in R

- Many packages
- Information on some packages that handle spatial data:
 - <https://cran.r-project.org/web/views/Spatial.html>
- Useful cheatsheet for key functions:
 - <http://www.maths.lancs.ac.uk/~rowlings/Teaching/UseR2012/cheatsheet.html>

Think of mapping like any other figure

- x and y coordinates are longitude and latitude



Exercise 1

- Using base R to build maps

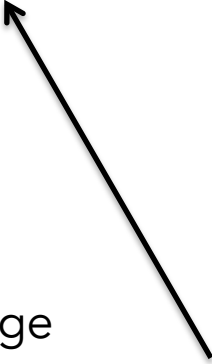
- Reading in shape files in R:

```
> readOGR(dsn = "shapefiles", layer = "name")
```


Within the rgdal package



Data source name;
directory that holds shapefile



Name of shapefile
(without .shp suffix)

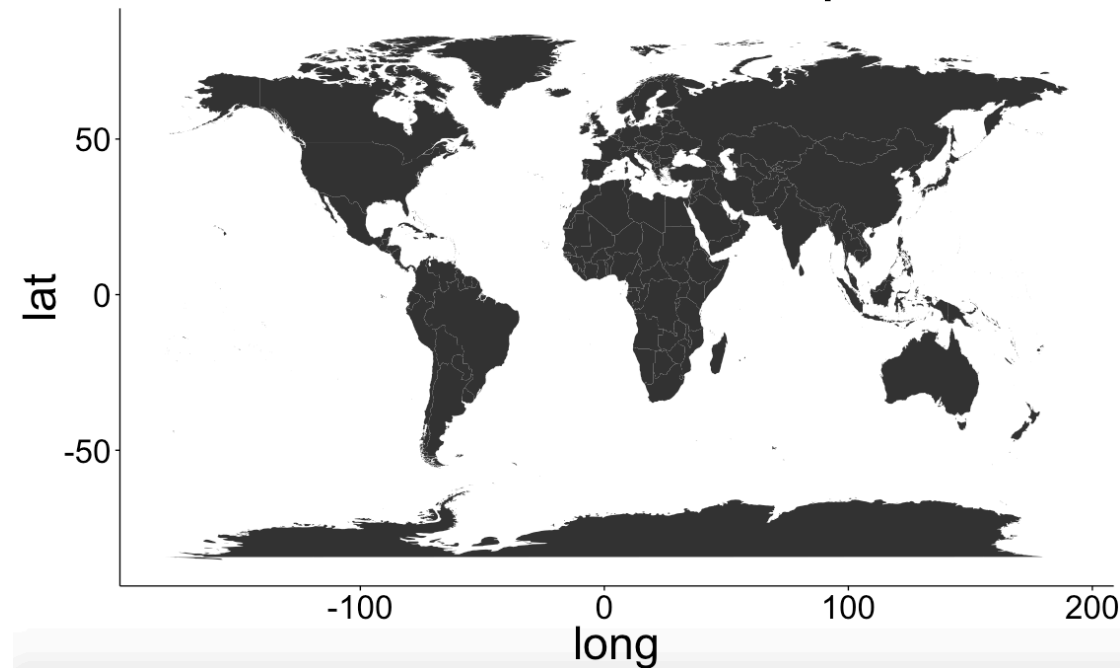


Exercise 2:

Spatial mapping with ggplot

- ggplot can create beautiful maps
- Using same syntax as we've already learned

- Let's go back to the world map I had earlier



```
> ggworld <- map_data("world")
```

Function is part of ggplot2,
creates data frame of map data

Name of maps provided

```
> ggworld <- map_data("world")
```

Let's take a look at what this dataframe looks like:

```
> head(ggworld)
```

| | long | lat | group | order | region | subregion |
|---|-----------|----------|-------|-------|--------|-----------|
| 1 | -69.89912 | 12.45200 | 1 | 1 | Aruba | <NA> |
| 2 | -69.89571 | 12.42300 | 1 | 2 | Aruba | <NA> |
| 3 | -69.94219 | 12.43853 | 1 | 3 | Aruba | <NA> |
| 4 | -70.00415 | 12.50049 | 1 | 4 | Aruba | <NA> |
| 5 | -70.06612 | 12.54697 | 1 | 5 | Aruba | <NA> |
| 6 | -70.05088 | 12.59707 | 1 | 6 | Aruba | <NA> |

```
> ggworld <- map_data("world")
```

```
> head(ggworld)
```

Now, let's use ggplot to build the world map:

```
> ggplot(ggworld,
```

```
> ggworld <- map_data("world")
```

```
> head(ggworld)
```

Now, let's use ggplot to build the world map:

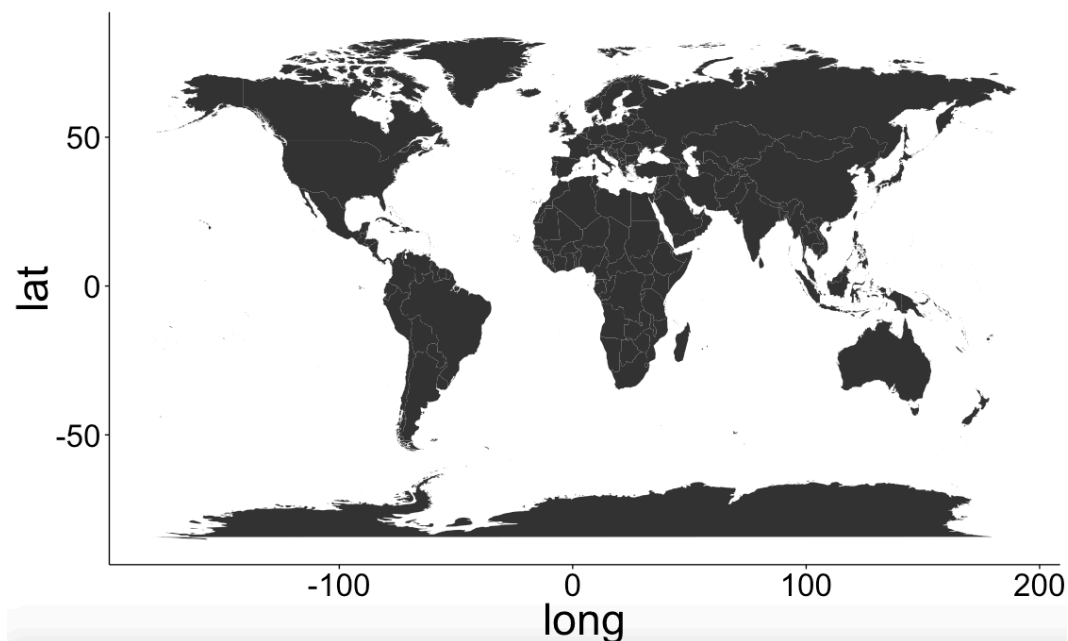
```
> ggplot(ggworld, aes(x=long, y=lat, group=group))
```

```
> ggworld <- map_data("world")
```

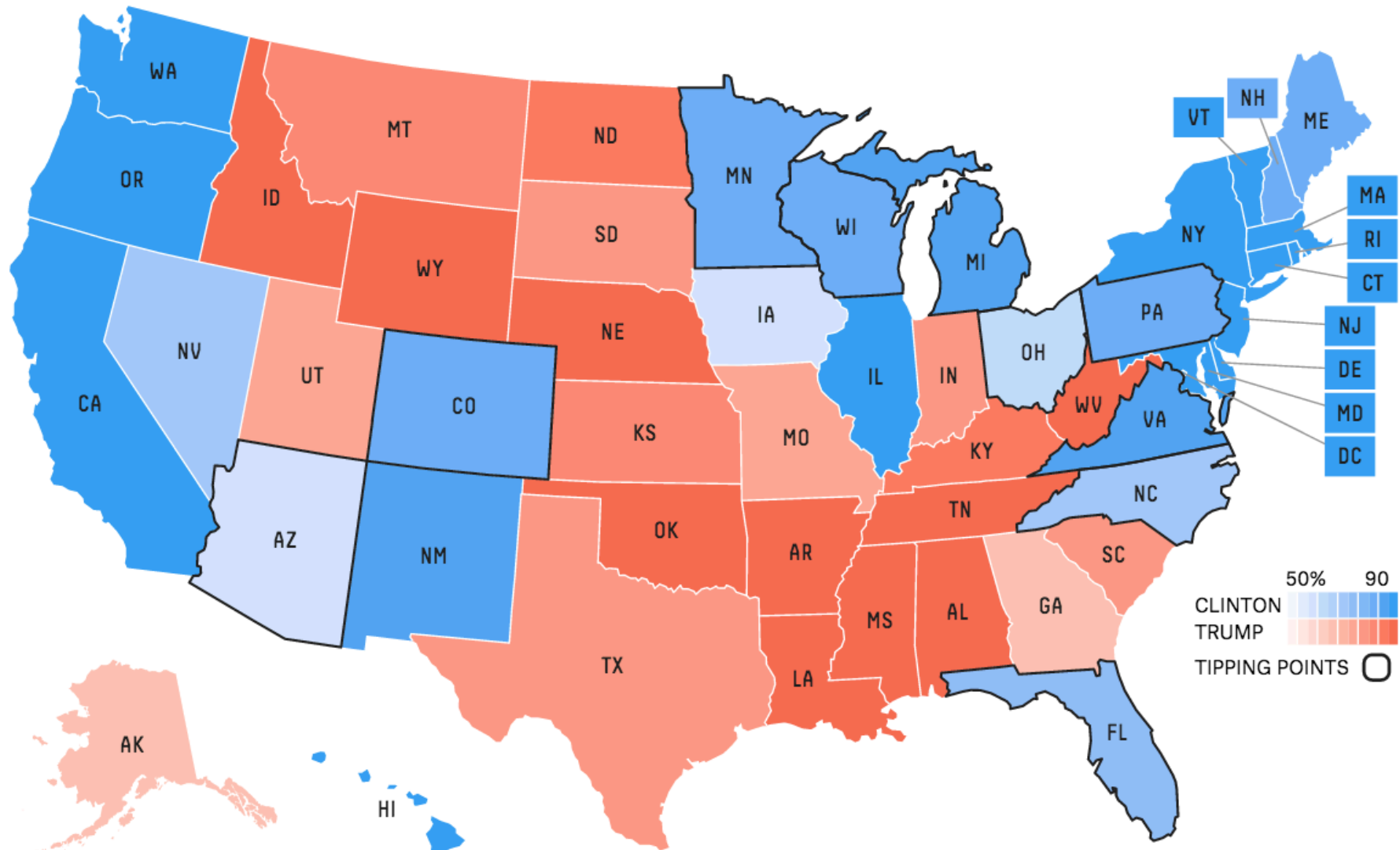
```
> head(ggworld)
```

Now, let's use ggplot to build the world map:

```
> ggplot(ggworld, aes(x=long, y=lat, group=group)) +  
  geom_polygon()
```



Exercise 3



Oct 19 election predictions (fivethirtyeight.com)

Protected Areas Database of the U.S. (PAD-US) - Land Management

Exercise 3



Exercise 3: Questions

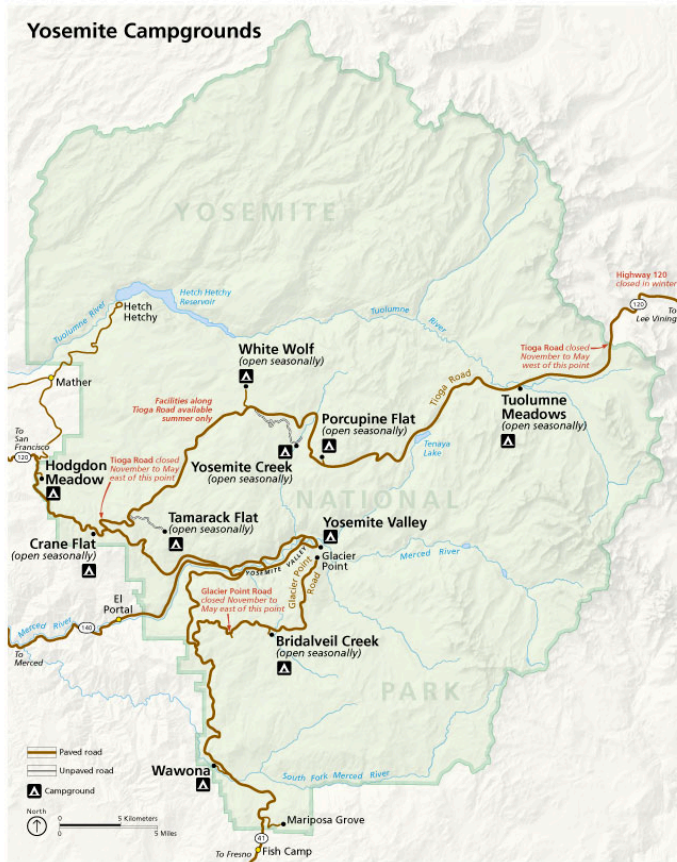
- National Parks and National Monuments make up how much land in each state?
- What states have the highest visitation to their federally-protected land?
- NPS visitation records:
<https://irma.nps.gov/Stats/reports/national>

Exercise 3: The data

```
> head(NPSdata)
```

| | visitation_2015 | name | region | area_km2 | category |
|---|-----------------|-----------------------|---------|------------|----------|
| 1 | 19430 | Russell_Cave_NM | alabama | 1.2563 | NatMon |
| 2 | 17818 | Lake_Clark_NP_&_PRES | alaska | 10601.6006 | NatPark |
| 3 | 551353 | Glacier_Bay_NP_&_PRES | alaska | 13044.5699 | NatPark |
| 4 | 37818 | Katmai_NP_&_PRES | alaska | 14869.6398 | NatPark |
| 5 | 560757 | Denali_NP_&_PRES | alaska | 19185.7868 | NatPark |
| 6 | 0 | Cape_Krusenstern_NM | alaska | 2626.9138 | NatMon |

Exercise 4: Yosemite NP



- Query Instagram to obtain records of where people went in the park

Script and additional figures from John Farrell:

<https://medium.com/i-data/visualizing-our-national-parks-2e47efc0dfb4#.apftjv69u>

https://github.com/jefarrell/Python-Instagram_API_Scripts

Exercise 4: Shape files & ggplot2

First need to read in the shape file, as we would do normally

```
> yosemite <-  
  readOGR(dsn="shapefiles", layer="nps_boundary")
```

ggplot cannot read a regular shapefile; we need to use fortify to get it into the proper format

```
> yosemite <- fortify(yosemite, region="REGION")
```