

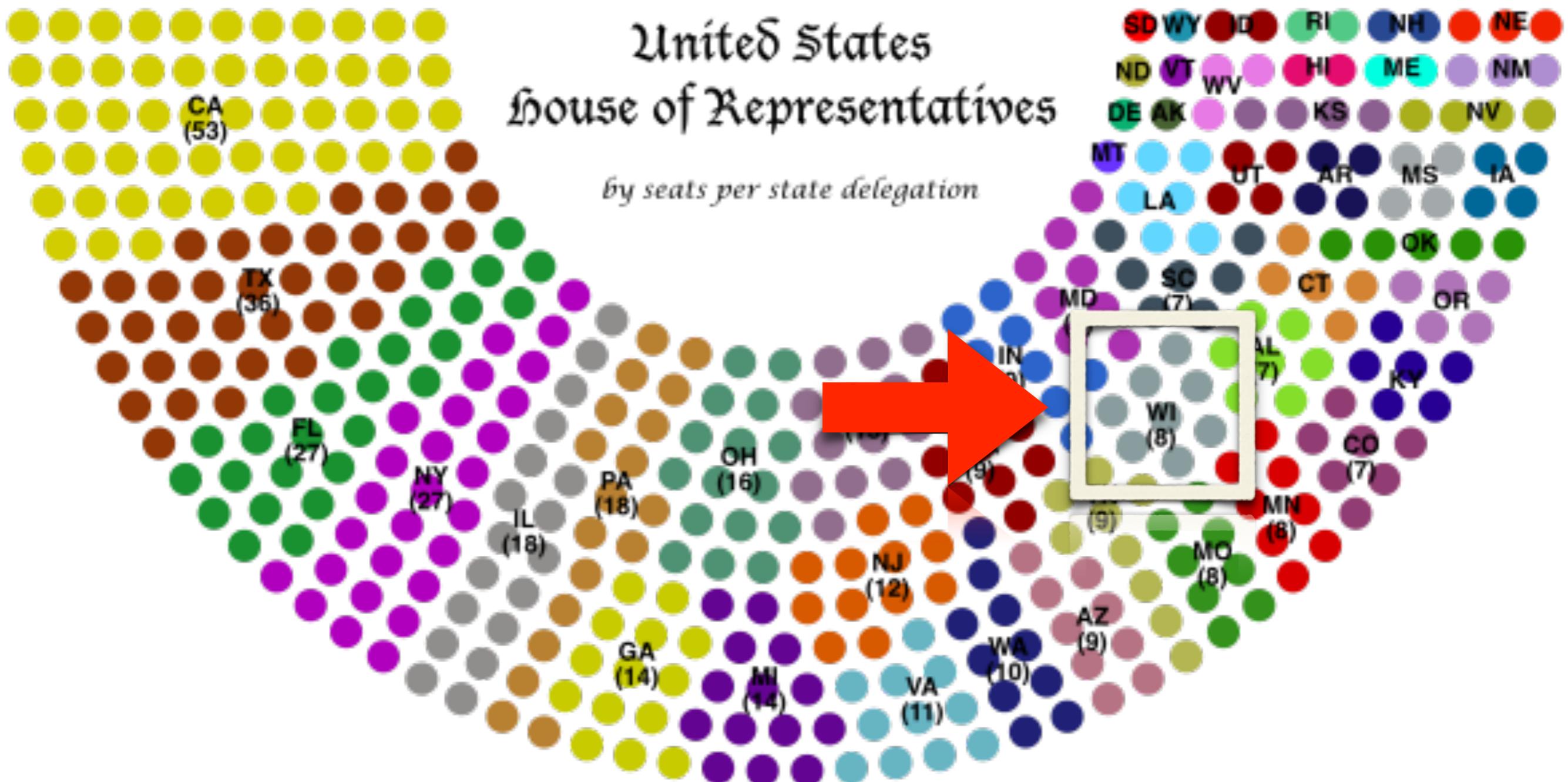
A photograph showing several protesters holding up handmade signs in front of the Supreme Court building. One sign features a blue map of the United States with the words 'GERRymandering' written across it. Another sign has 'EQUAL VOTES EQUAL DISTRICTS' written on it. A third sign held by the League of Women Voters reads '#FairMaps'. Other signs partially visible include '#FAIR' and 'EFFICIENCY GAP'.

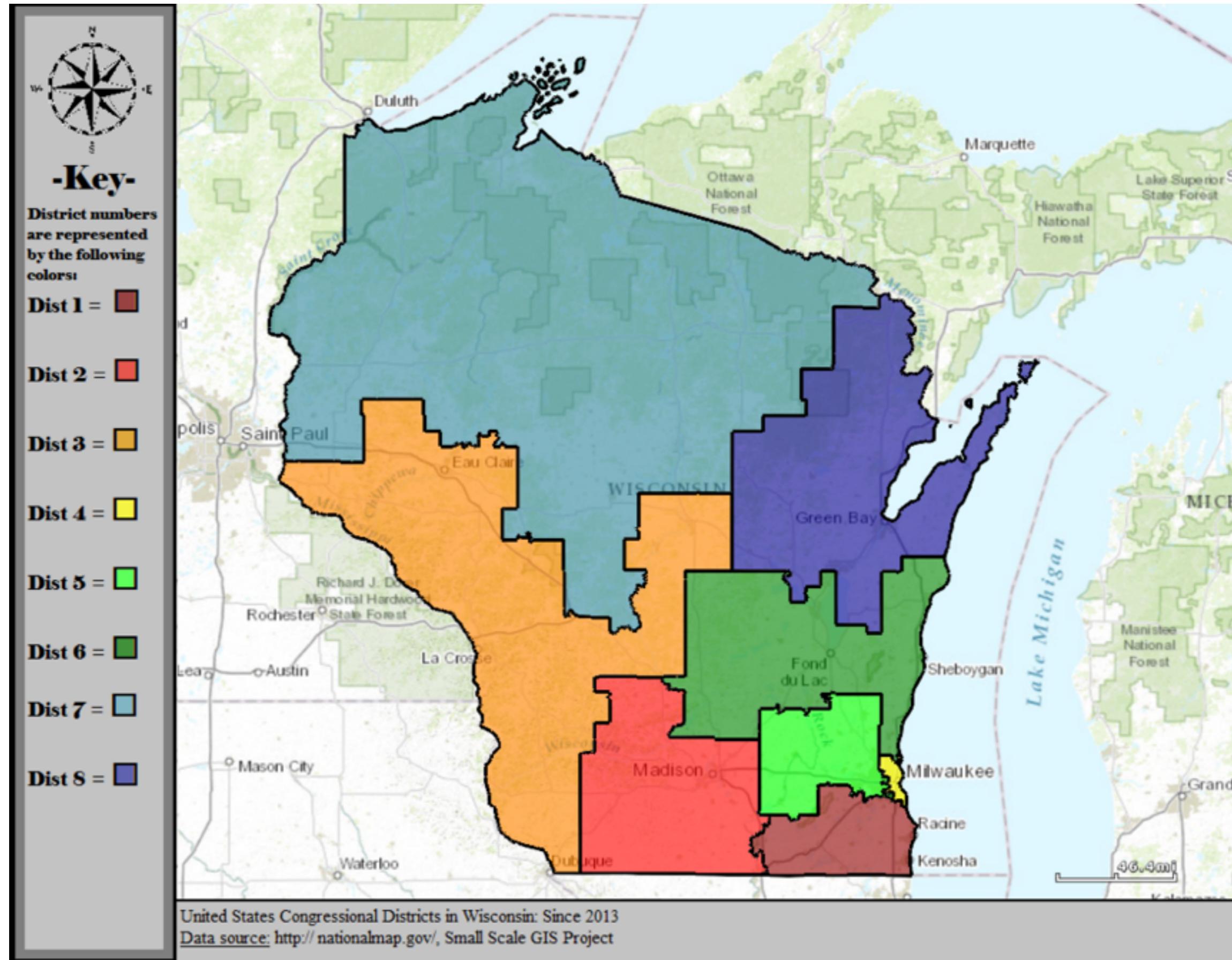
VISUALIZING GERRYMANDERING

*Efficiency Gap Analysis of the
2016 House of Representatives
Election Results*

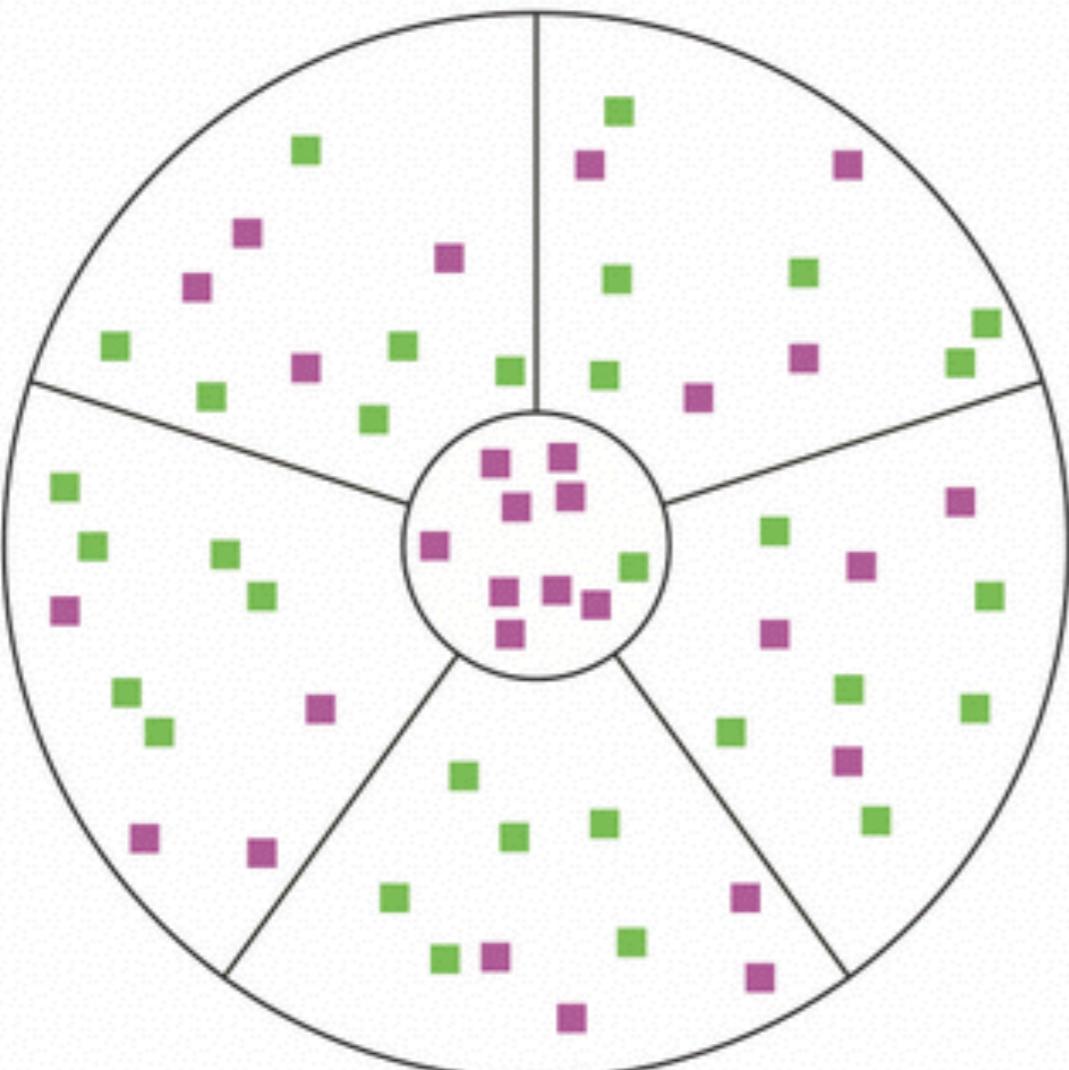
United States House of Representatives

by seats per state delegation

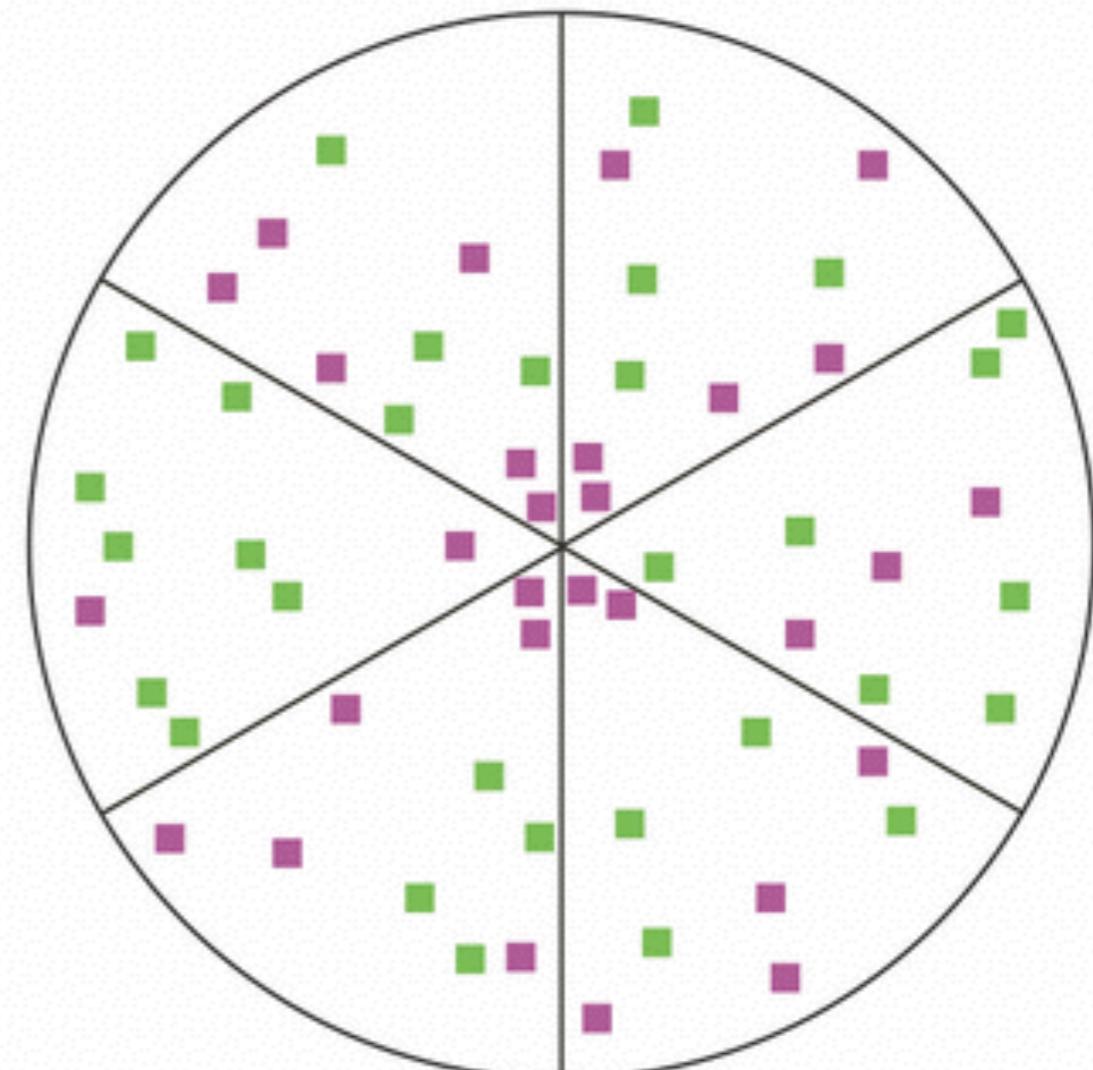




Green in charge



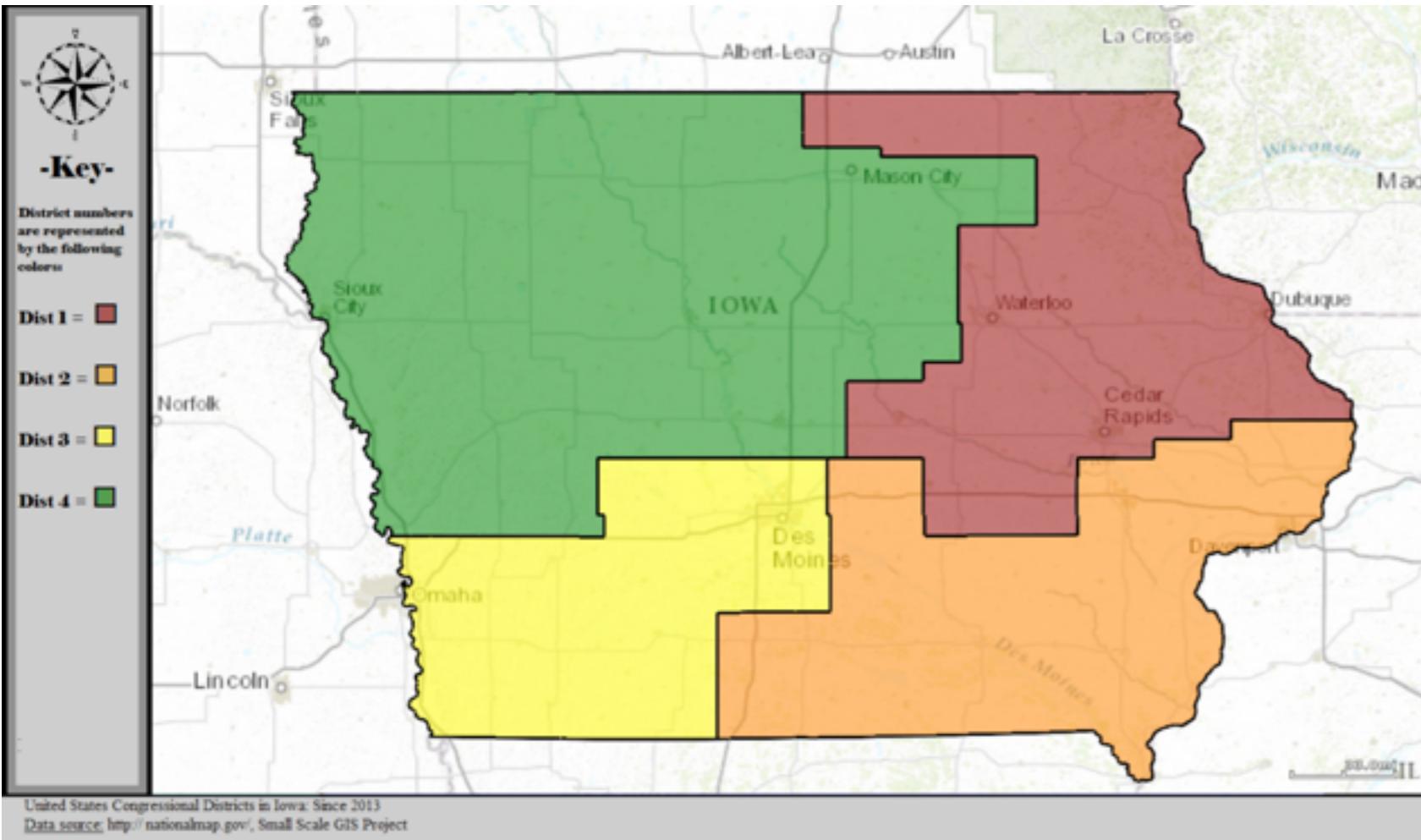
Purple in charge



HOUSTON, WE HAVE A REPRESENTATION PROBLEM!



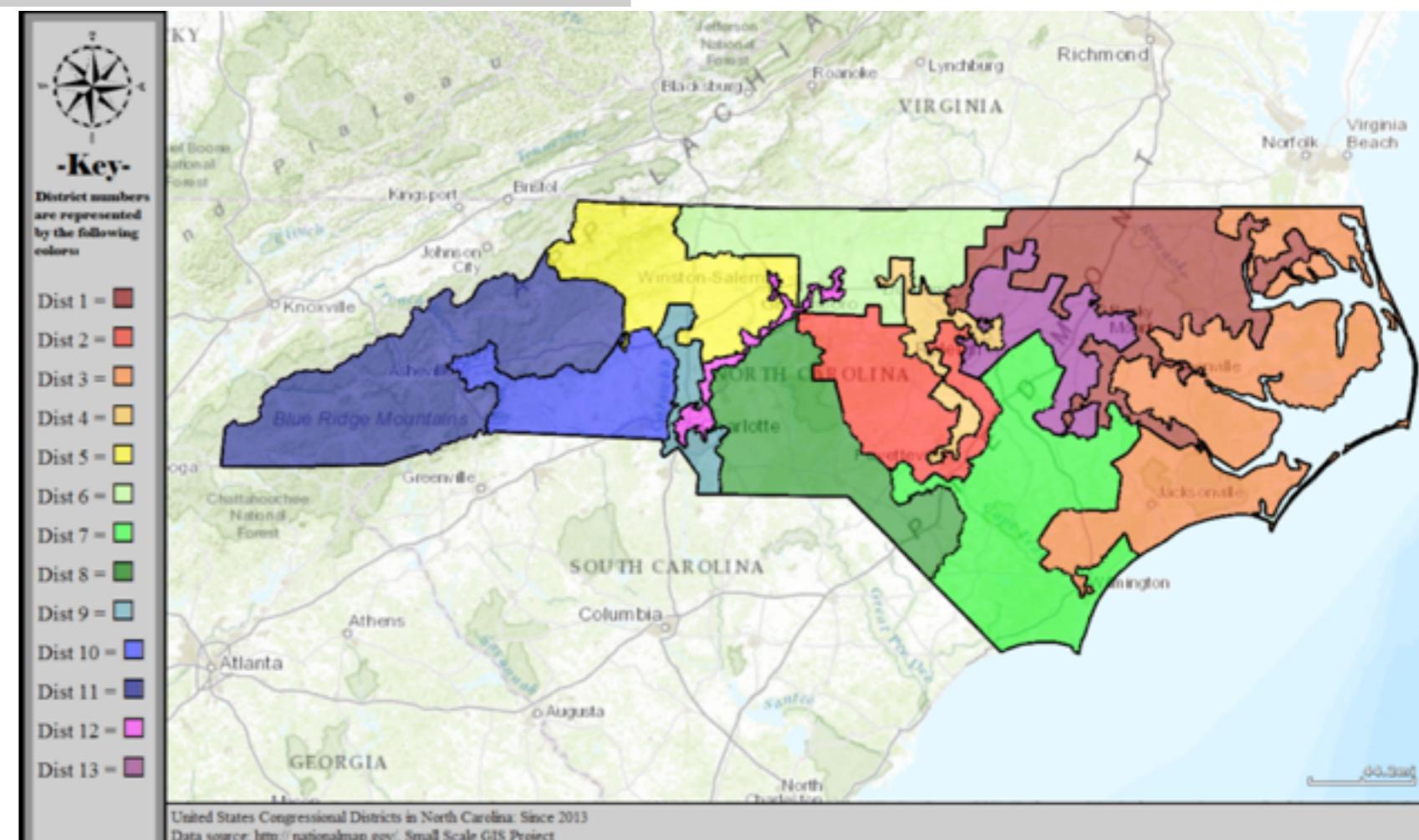
Republican electors
were able to convert
1% more votes
into 24% more seats



Iowa

Not too squiggly

North Carolina
Very squiggly

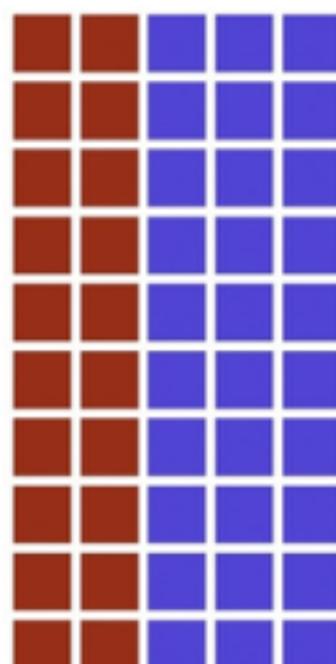


Sources: Wikipedia
https://en.wikipedia.org/wiki/Iowa%27s_congressional_districts
https://en.wikipedia.org/wiki/North_Carolina%27s_congressional_districts

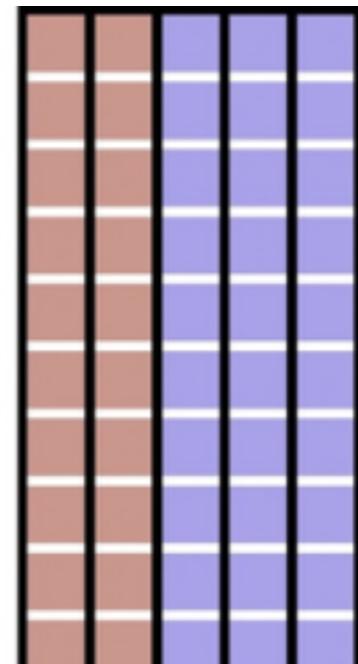
CAN YOU MEASURE GERRYMANDERING?

- Shape of district boundaries
- Wasted votes
 - All votes for losing candidate are wasted
 - All votes for winning candidate beyond simple majority are wasted
- Efficiency Gap
 - Net Wasted Votes / Total Votes

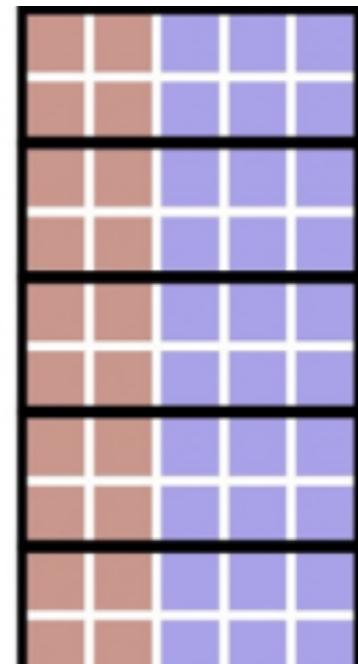
EFFICIENCY GAP EXAMPLE



**60% blue,
40% red**



**3 blue districts,
2 red districts**



**5 blue districts,
0 red districts**

Red votes wasted:

4 per district = total 20 votes

Blue votes wasted:

0 per district = total 0 votes

Total votes in state = 100

Efficiency gap = 20% favoring blue party

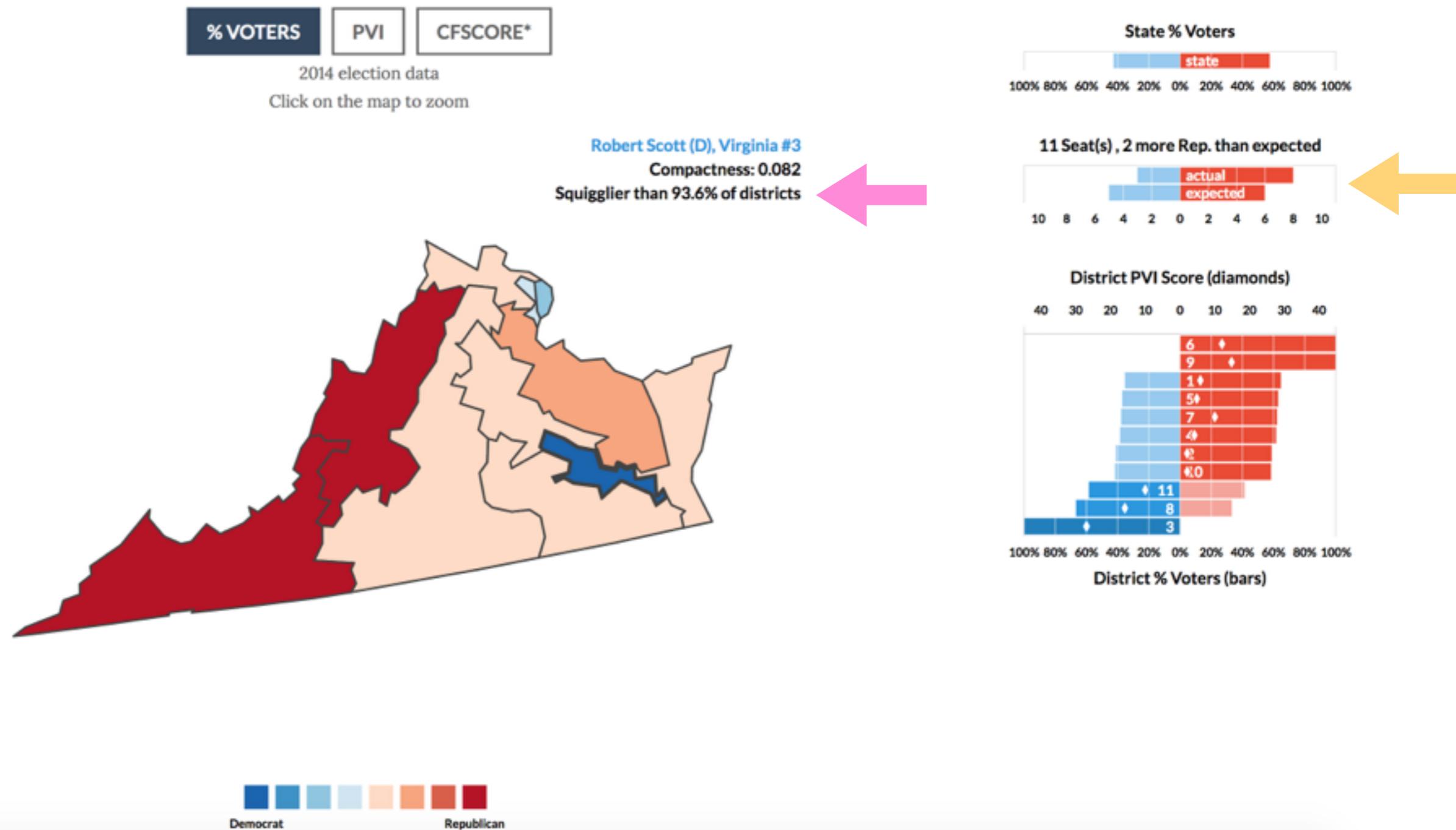
RESEARCH QUESTIONS

- Is gerrymandering the cause of representation imbalance?
- Can the efficiency gap effectively assess gerrymandering?



Republican electors
were able to convert
1% more votes
into 24% more seats

SILICON VALLEY DATA SCIENCE VISUALIZATION



AZAVEA VISUALIZATION BY PATRICK HAN

Alabama Congressional Delegation

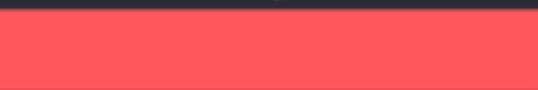
(elected 2016)

The **Republican Party** had a
10.2% efficiency gap advantage*
worth **1 extra seat**, but some seats
were left uncontested.**

34% Democratic vote



66% Republican vote



1 Democratic seat



6 Republican seats



uncontested

uncontested



* The "efficiency gap" measures how effectively a party's votes are distributed among districts and reveals partisan bias.

** This efficiency gap score assumes an opponent would have won 25% of the vote in uncontested seats.

GERRYMANDER.PRINCETON.EDU: HOW GERRYMANDED IS MY STATE?

gerrymander.princeton.edu

Run a Test

Explore U.S.

Learn More

Support

Display test results for:

2016

[U.S. Congress](#) [State Legislatures](#)

Click on your state to see how it performs on our gerrymander detection tests. You can view the historical trends using the years selector above. You can also [see how the tests work](#), or [run your own](#) with more detailed results.

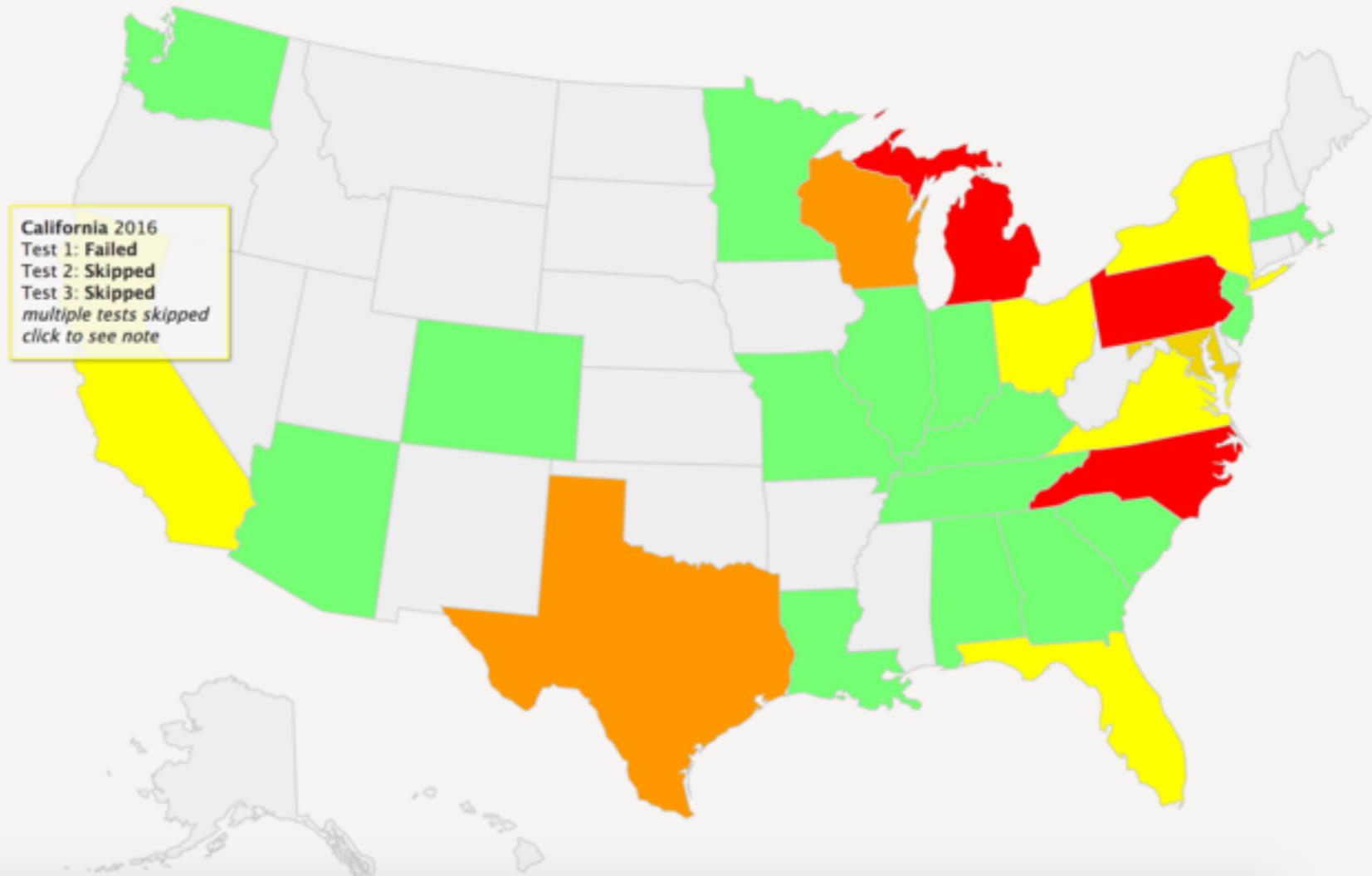
Number of tests failed:

[0](#) [1](#) [2](#) [3](#)

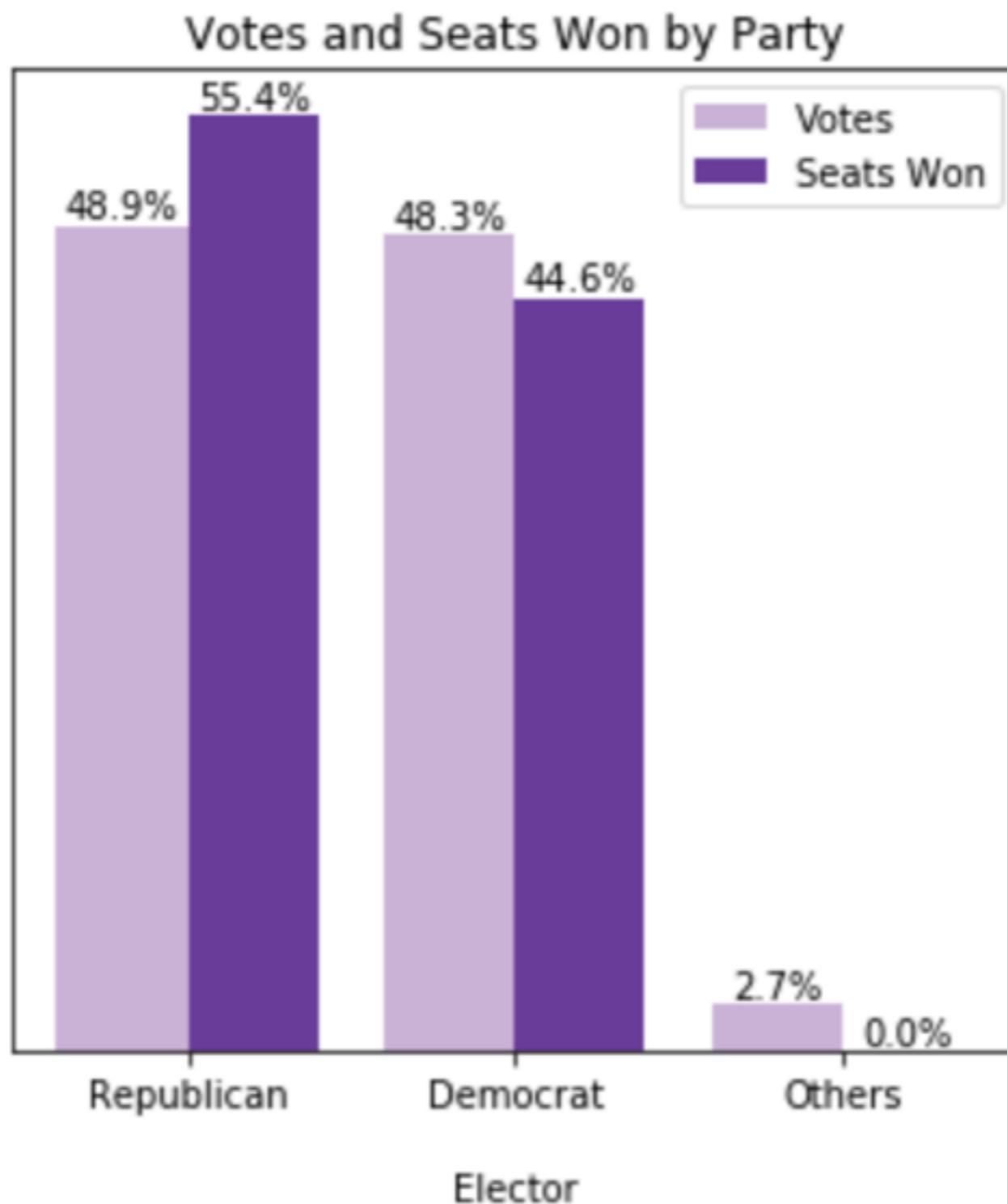
[Not enough districts](#)

U.S. Congressional Test Results

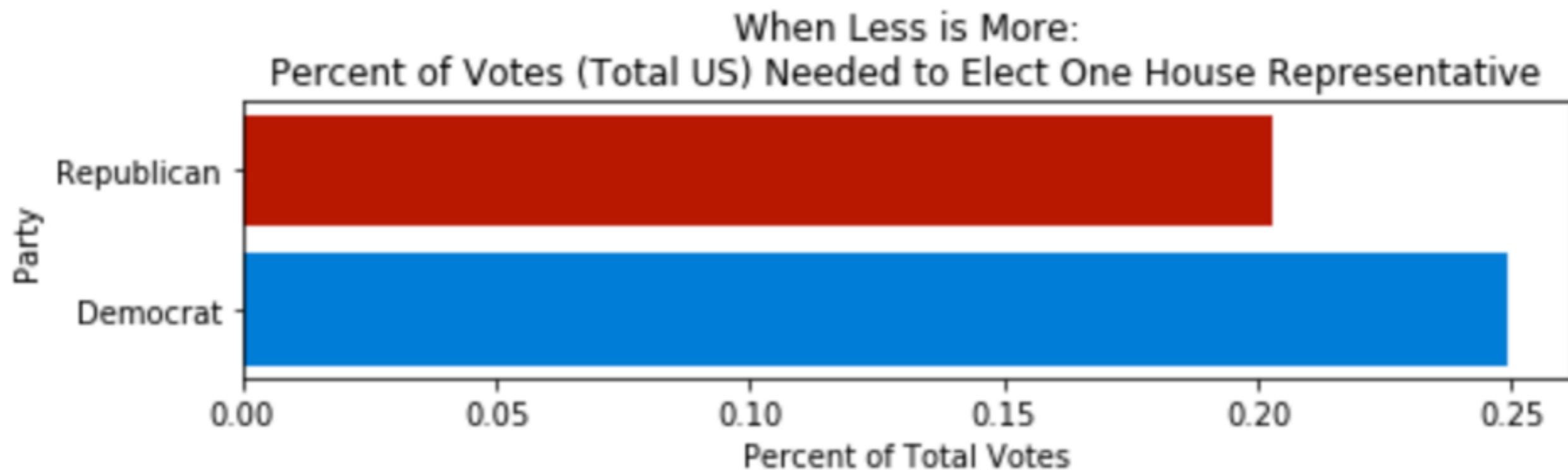
States failing more than one test: 5



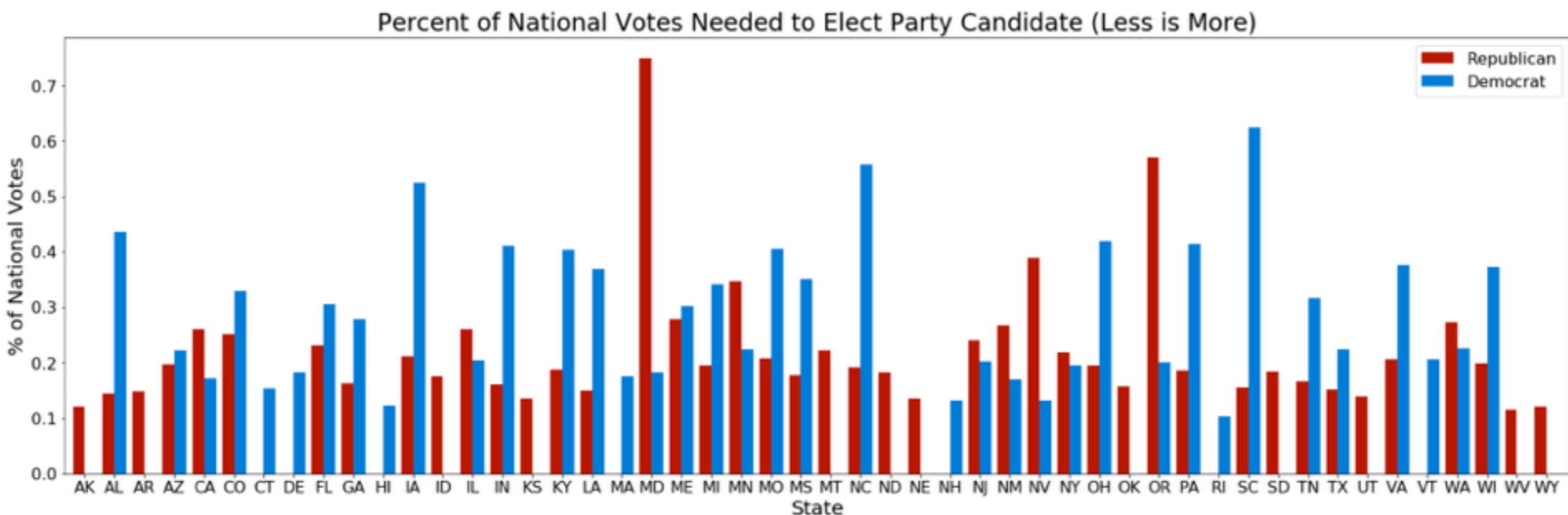
WHERE DID THE VOTES GO?



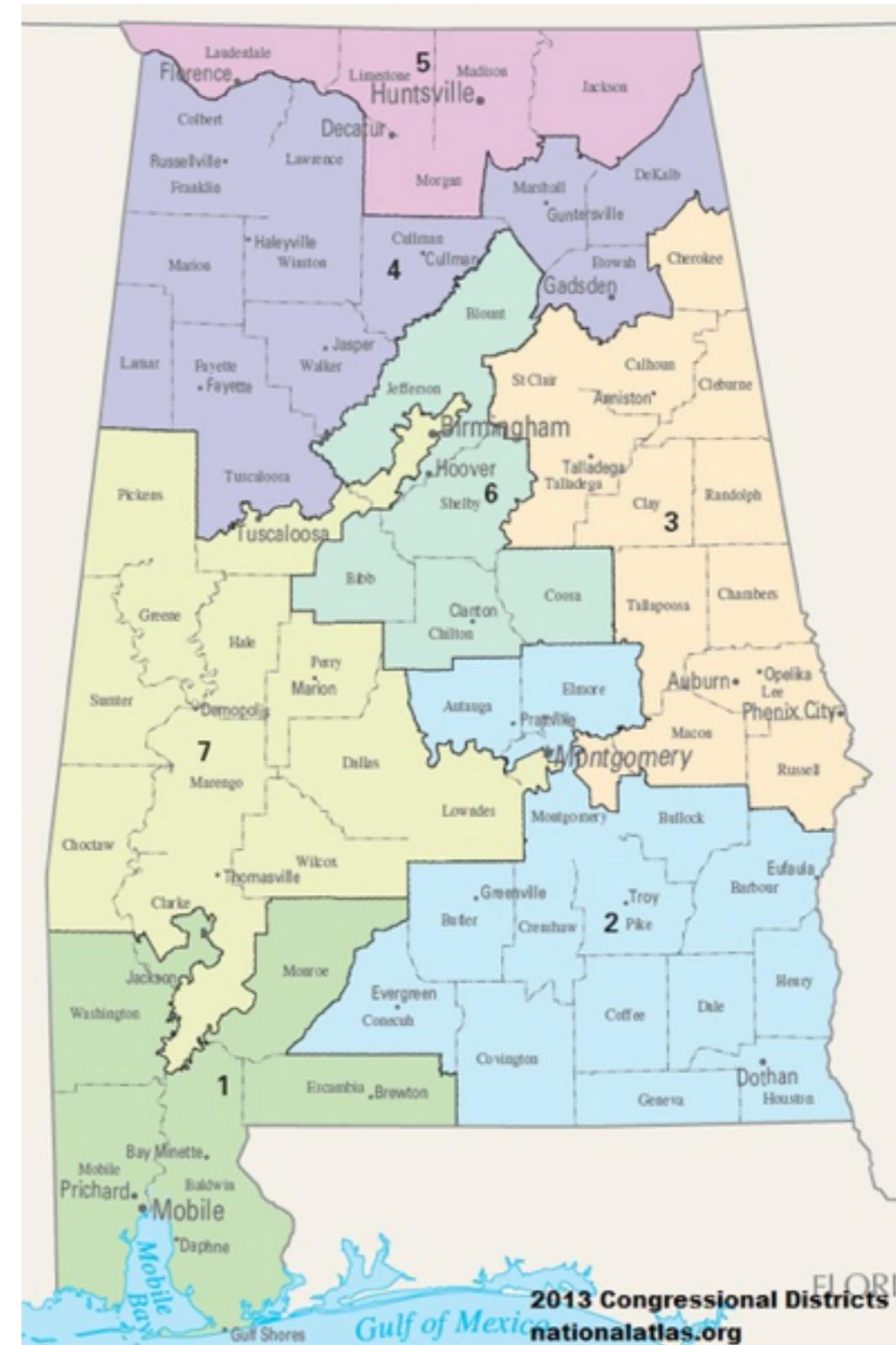
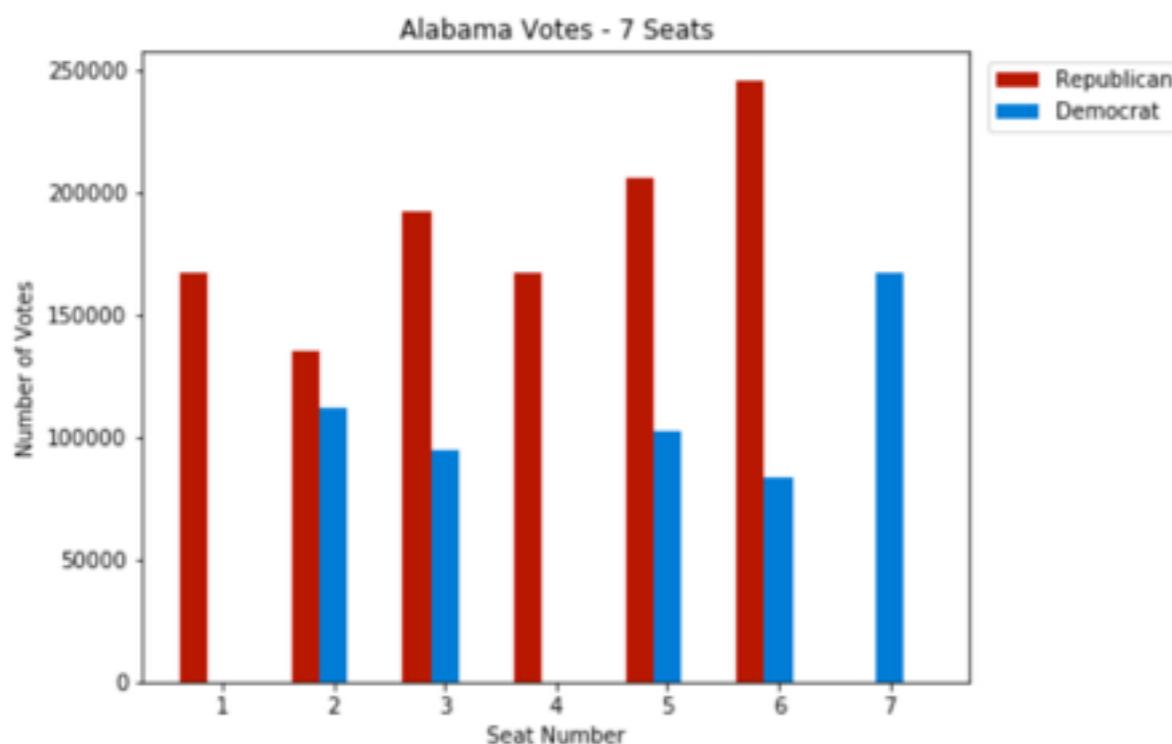
DO REPUBLICAN ELECTORS HAVE MORE POWER?



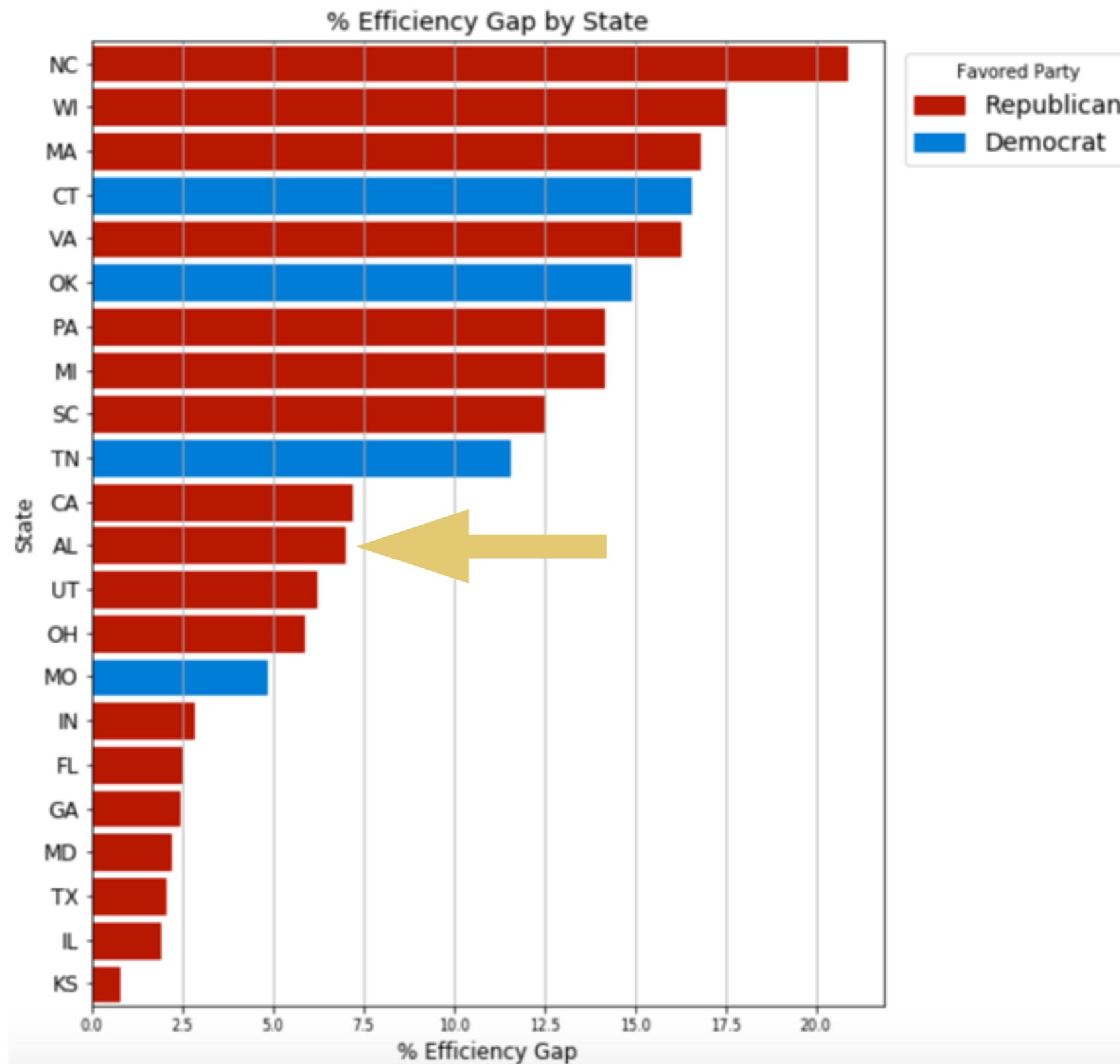
HOW DO PARTY NUMBERS COMPARE AT THE STATE LEVEL?



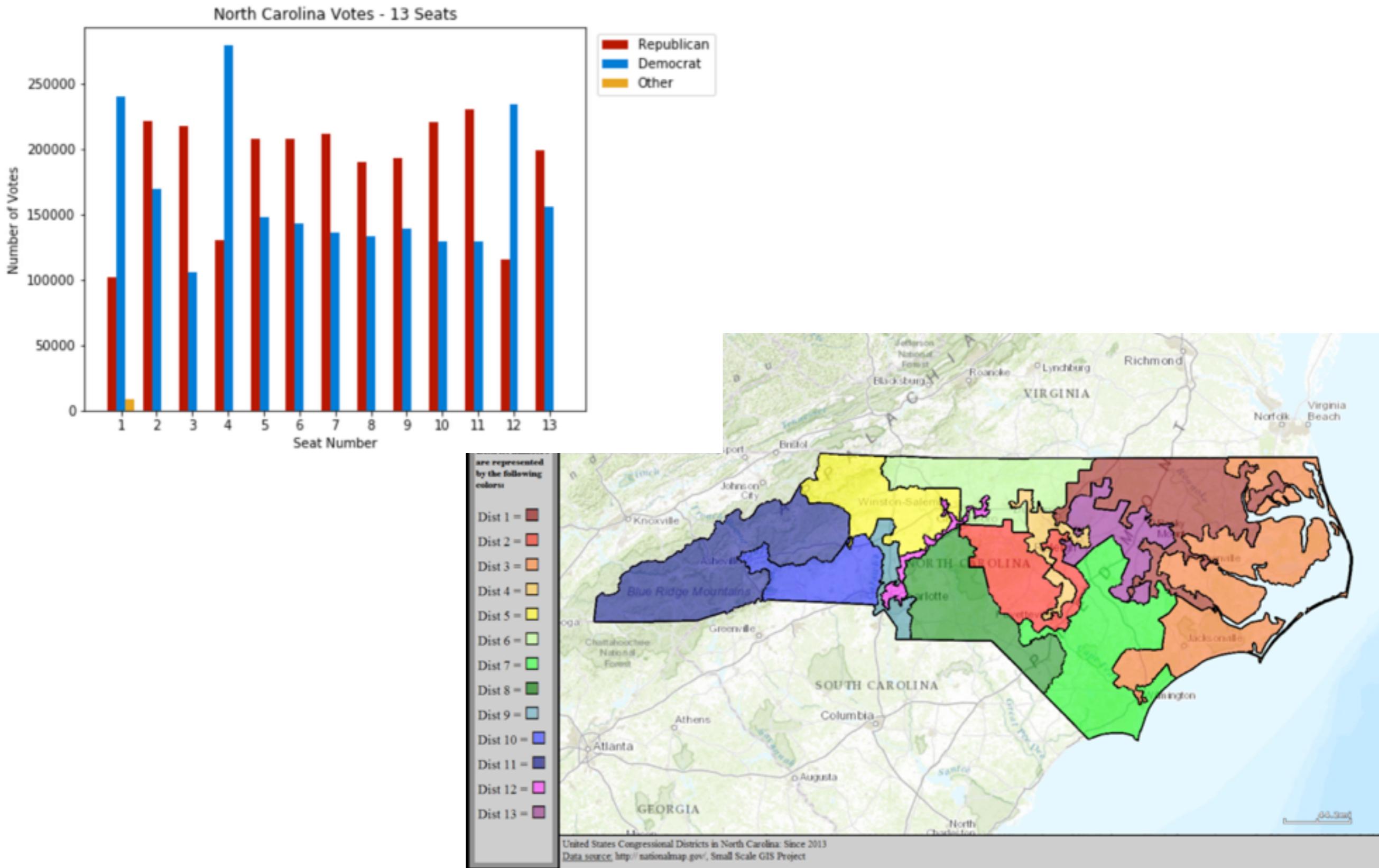
ALABAMA



CAN THE EFFICIENCY GAP HELP IDENTIFY GERRYMANDERING?

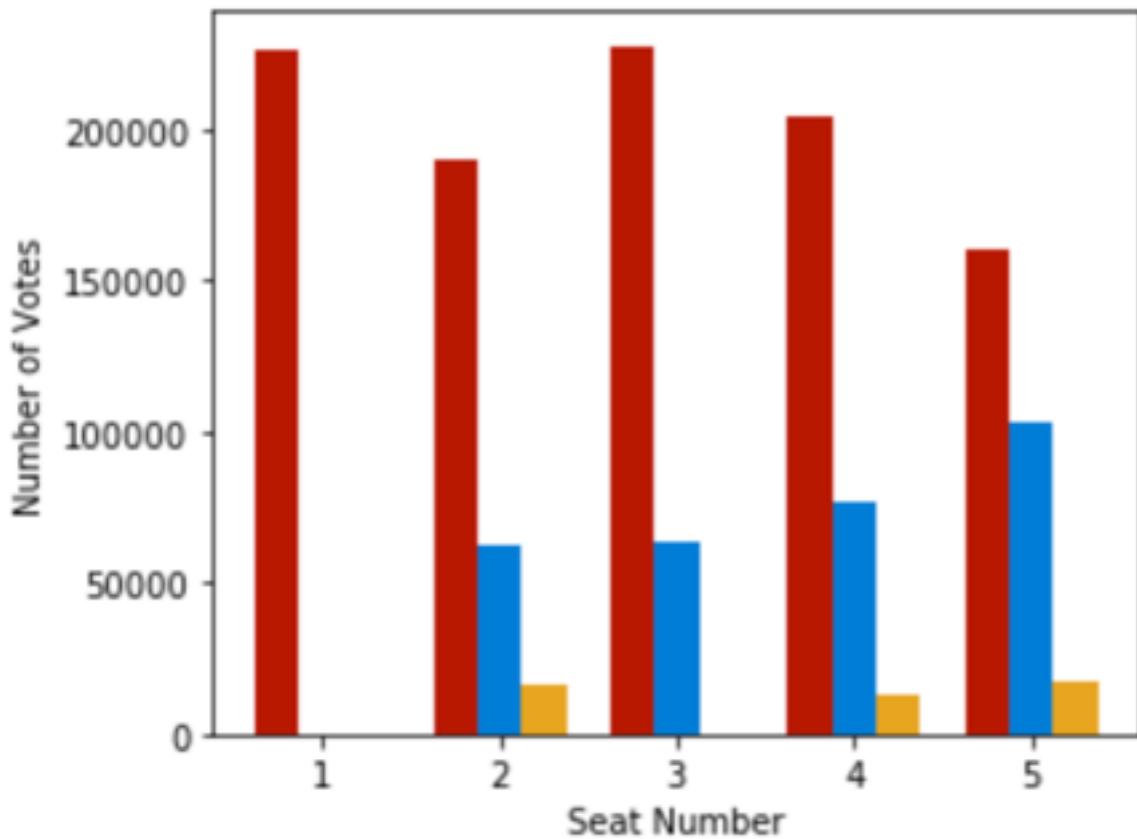


NORTH CAROLINA



OKLAHOMA

Oklahoma Votes - 5 Seats



Republican
Democrat
Other

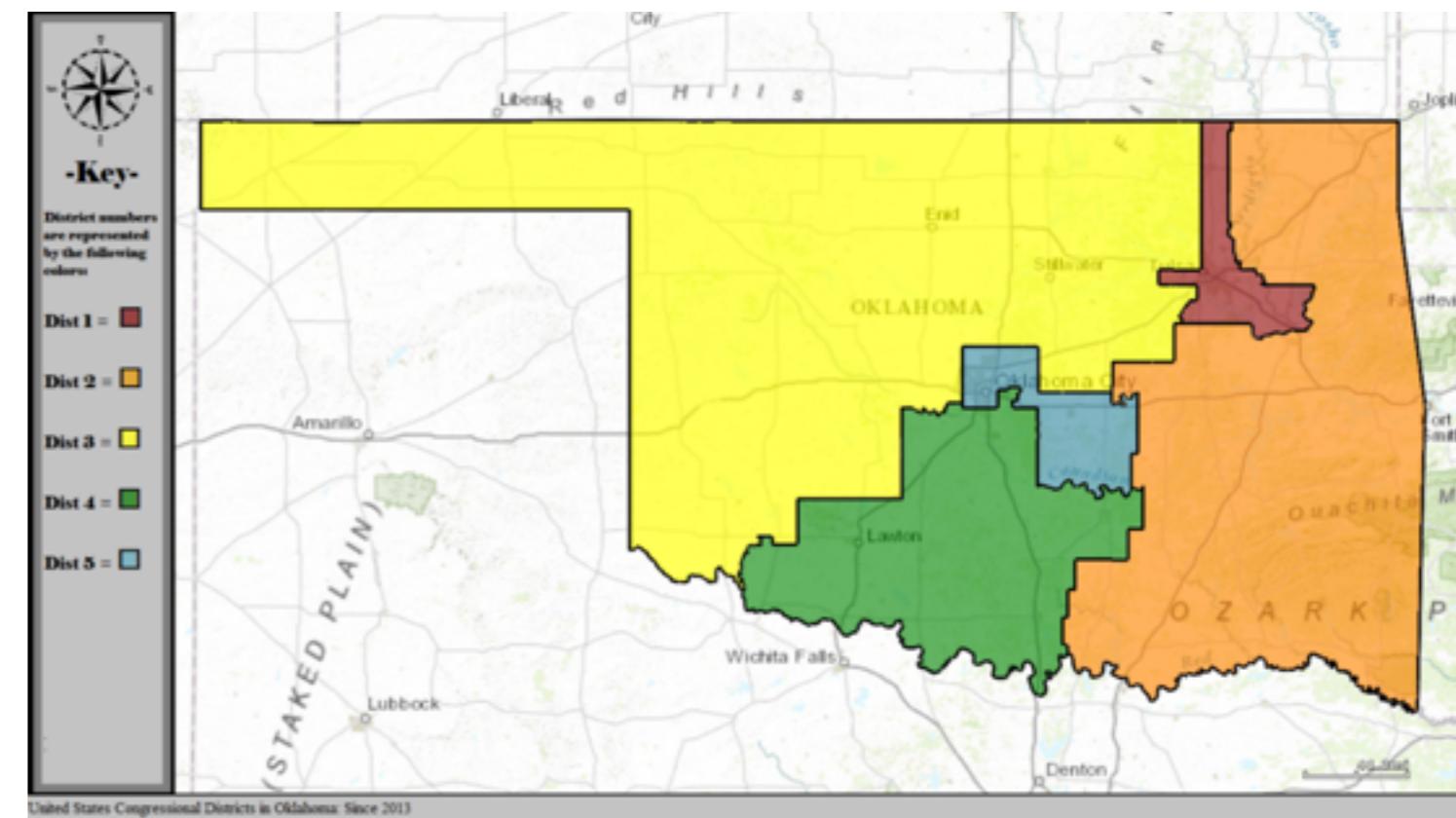


-Key-

District numbers are represented by the following colors:

- Dist 1 = ■
- Dist 2 = □
- Dist 3 = ▲
- Dist 4 = ▢
- Dist 5 = ▣

United States Congressional Districts in Oklahoma: Since 2013
Data source: <http://nationalmap.gov/>, Small Scale GIS Project



CONCLUSIONS

- Insights
 - Power imbalances noted at the national level are worse at the state level
 - The imbalance at the state level benefits republicans more often than democrats
 - Gerrymandering seems to explain many instances in which imbalance occurs
- We found a flaw with the efficiency gap metric that needs to be researched further
- We also found opportunities to improve our visualizations