INVESTIGATING ELECTORAL COLLEGE REFORM:

GEOGRAPHY'S IMPACT ON ELECTIONS, AND HOW MAPS INFLUENCE OUR PERCEPTION OF ELECTION OUTCOMES

By

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ABSTRACT

Multiple events throughout the history of the United States of America have led people to call for the Electoral College system to be reformed or abandoned altogether. As the Electoral College currently functions, each state awards a set number of votes (determined by population) to the candidate who receives the largest number of votes, but many citizens feel that there are flaws in this system. Although there have been many reform propositions over the years, there are three potential methods that consistently have the most support: Popular Vote, Proportional Allocation, and Congressional Districts Allocation. This study offers insight into how each of these reform methods might change election outcomes and even more importantly, by exploring several possible election mapping techniques, it provides an analysis of how the presentation of election results in a geographic format can alter the viewer's perceptions of election outcomes and of the viability of the various reform methods. Finally, this study provides arguments for why the traditional methods of representing election outcomes tend to fall short.

CHAPTER 1: INTRODUCTION

Throughout American history, there has been much debate about the efficacy of the method of electing the President and Vice President of the United States—most of which is centered around the fact that it is not necessary for a candidate to win the popular vote in order to become President. Because of this fact, presidential campaigns tend to focus their time and money strategically; the candidates inundate battleground states and undecided voters with campaign ads and personal appearances, while traditionally Republican or Democratic states and citizens are largely ignored.

This debate intensified following the election of 2000, which had the distinction of not only being the only election in recent history in which the winner of the popular vote was not elected President (the election outcome went all the way to the Supreme Court, and the winner was ultimately decided by a 5-4 vote), but was also the first election since 1864 to have a faithless elector (the elector for Washington, D.C., Barbara Lett-Simmons, refrained from voting to protest the fact that D.C. has no representation in Congress) (Schultz 2009). These events naturally led to a renewed interest in reforming the Electoral College, with several camps lobbying for their preferred reform method to replace what they view as a flawed system.

Over a decade after that last controversial election, the debate over the necessity and manner of Electoral College reform continues. Unfortunately, for most of the voting public, the Electoral College and the methods being proposed to replace it are still something of a mystery. This study was created in order to gain a better understanding of the subject, by approaching the analysis of each proposed method from a geographic perspective. By doing so, it attempts to answer three key questions:

1. Does changing the geography of vote calculation in Presidential Elections have an effect on the election outcomes? Each of the proposed Electoral College reform methods uses a different geographic boundary by which votes are calculated and reported. The Proportional Allocation method awards Electoral College votes at the state level, the Congressional District method awards Electoral College votes at the Congressional District level, and the Popular Vote method simply aggregates votes at the national level. In theory, the fact that all of the calculations are based on the same voting outcomes, the election outcomes should all be the same. However, the arguments about which reform method is superior lead to the supposition that this is not actually the case.

2. Given the unique and varied geography of the United States, is it possible to create maps that clearly convey information not only about the election outcomes when each reform method is used, but also about the location and voting behavior of United States citizens? Traditional election maps produced by the mass media typically exist solely to illustrate which candidate won each state's electoral votes, failing to take into account the enormous impact that voter population and the available electoral votes have on the final election outcome. This often results in confusion due to the disparity in both geography and population size between the states, but the election mapping standard remains the same. The wide array of symbology available in GIS offers us a chance to explore other methods of representing election outcomes in a way that is less confusing to the viewers.

3. What do these maps actually tell us about how well each of these different methods really represents the will of the people? As is outlined in Chapter 2, each of the reform methods has well-known pros and cons. Can we use the spatial arrangement of

voting Americans as they are spread across the country, illustrated in maps, to help us understand how well each of these reform measures reflects how individuals have voted?

This study begins by investigating why the Electoral College was created in the first place, and what our founding fathers hoped it would achieve. It goes on to explore where the process began to fail in the eyes of those who oppose it, why many voters feel that it is a flawed system, and what alternatives have been suggested. In order to determine whether or not the proposed reform methods change the outcome of the elections in a manner that is a better representation of the voters, each method is applied to two past presidential elections: the controversial election of 2000, and the most recent election of 2012.

Finally, an analysis of the challenges inherent in mapping these results is undertaken, by exploring different methods of creating maps of the results of the 2012 election using different mapping techniques. The mapping exploration offers insight into how changing the visual representation of the data changes the way the viewer interprets the data. Further, it examines the impact that the geography of vote calculation has on election outcomes—exploring some of the claims made by those who are in favor of Electoral College reform in order to determine which claims have validity and which should be disregarded in the future. Lastly, it illustrates the process of creating a map that accurately represents the voters and election outcomes visually, focusing on the benefits and shortcomings of some of the common (and one uncommon) types of symbology available with Esri's ArcMap software.

CHAPTER 2: BACKGROUND

One of the many topics up for debate during the Constitutional Convention of 1787 was the manner by which the new country would choose its Presidents. The most popular two methods proposed at that time were direct election by Congress and direct election by the people, but both were met with strenuous opposition. Those who opposed the direct election by Congress argued that it would deny the President autonomy, as he would feel the need to be subservient to Congress in order to secure re-election. Opposing arguments to direct election by the people included the fear of a lack of influence on the elections by both smaller states and Southern states with high non-voting slave populations, as well as a fear that the lack of knowledge of the candidates from state to state would lead to people only voting for local favorites (which would most likely lead to only people from populous areas being elected) (Belenky 2013).

As a compromise to both sides, the third Committee of Eleven ultimately settled on an indirect election approach (Vile 2005). Although it was actually the second choice of many of the delegates, this method—involving a college of electors—was designed as a compromise in order to eliminate the fear of under-representation for the smaller and/or Southern states by giving each state one elector per Congressional representative and one for each Senator (Rose 1994). States had the option of whether or not to hold a popular vote election--despite what many people believe, holding a popular vote election is not Constitutionally mandated, and in fact South Carolina abstained from holding one until after the Civil War, for the election of 1868 (Levy 2009). Once this compromise was proposed, the Electoral College method of electing a President was subsequently ratified with little contention or debate (Longley and Peirce 1996).

At its inception, the Electoral College was structured slightly differently than it is today. The original structure called for each state to receive one elector for each of its Senate members (totaling two per state), and one elector per member of the House of Representatives (which varies based on population, but is never less than one)—Senators and Representatives were barred from serving as electors, however. Electors were to meet in their respective states to cast their vote rather than meeting in a more central location, and were expected to vote for two Presidential candidates, with no vote for Vice President. When the votes were counted, the candidate receiving the Electoral majority would be elected President, and the candidate who came in second place would be awarded the Vice Presidency. If no Electoral majority was reached, the House of Representatives would step in to decide the winner (U.S. Constitution, Art. II Sec. I).

While the basic structure of the Electoral College still remains the same, there have been several changes over the years—electors changed from being expected to choose who they felt was the best candidate to being pledged to represent a particular political party (which is the method predominantly used today), states almost unanimously adopted a "winner take all" system of awarding electoral votes, and a clear two-party system emerged (Longley and Peirce 1996). Perhaps most notable, though, was the change that led to the 12th Amendment to the Constitution. This Amendment abandoned the previous two-vote method of choosing President and Vice President and replaced it with a system in which electors cast one vote for a President and Vice President running on the same ticket (U.S. Constitution, Amend. XII).

2.1 Controversial Elections and Other Problems

For the most part, the Electoral College system has worked well over the course of our nation's history. As intended by the authors of the Constitution, it has succeeded in giving small states a voice in Presidential elections, which many argue contributes to a more unified country (Kimberling 1992). In fact, the vast majority of elections have gone smoothly and without dissent.

However, in four different elections (1824, 1876, 1888 and 2000), the winner of the popular vote failed to win a sufficient majority of electoral votes and subsequently lost the election. This roughly 7% discrepancy rate, among other factors, has led to widespread debate about the efficacy of the Electoral College since very shortly after its inception (Jenkins and Sala 1998). Opponents of the system argue that it is not a fair representation of the will of the majority of the voters—a candidate only needs to win 51% of the popular vote in a state to win 100% of the electoral votes, which has the potential to skew election outcomes (as in the aforementioned elections). Perhaps as a result of this, a large number of states, including the three most populous states, consistently distribute their electoral votes to the same party and have come to be considered "safe" for either Democratic or Republican candidates.

This fact not only contributes to lower voter participation in those areas—voter turnout in safe states is typically five to ten points lower than in swing states—it also means that candidates feel that they don't have to focus their attention on campaigning in these states, and instead choose to focus both their time and money on the swing states (Deschamps et al. 2012, Black 2012).

A swing state is defined as "a US state where the two major political parties have similar levels of support among voters, viewed as important in determining the overall result of a presidential election" (Oxford Dictionaries 2013, no page). These states are so important to political campaigns, in fact, that they have become the primary focus of the candidates in recent years.

Swing states have a pivotal impact on how campaigns are focused, both financially and strategically. Because roughly 40 states are considered a lock for one candidate or the other before the election ever starts, they are historically almost completely ignored during campaign season; typically, they receive no special TV ads or campaign visits (aside from the occasional fundraiser). Instead, all campaign stops and targeted TV ads (in other words, the vast majority of the campaign financing) are reserved for the battleground or swing states, where the candidates hope to win undecided voters over to their side.

Perhaps more troubling than the lopsided spending, though, is the fact that this extreme focus on the opinions of swing states also creates lopsided campaigning. In trying to please the swing state voters, candidates have been known to assign extra importance to the needs of the residents in those states in order to win their votes (such as Medicare to secure the votes of the elderly in Florida). This can also lead to similar behavior on the part of a first-term President hoping to win a second term, because they are more likely to make executive decisions that are skewed by the knowledge of what will win or lose votes from the swing states in the next election (Black 2012).

2.2 Proposed Reform Methods

While there have been many Electoral College reform methods proposed over the years, the three that are offered up most consistently are the focus of this study: Popular Vote, Proportional Allocation, and Congressional District Allocation.

Popular Vote

The Popular Vote method proposes that the Electoral College be eliminated altogether, in favor of a National Popular Vote. This method has the distinction of having come very close to becoming a reality: following the 1968 Presidential election (where Richard Nixon won 51% of the popular vote but won 56% of the electoral votes), House Joint Resolution 681 was created in favor of amending the Constitution to award the Presidency to whichever candidate won at least 40% of the popular vote. If no candidate won by that margin, or if there was a tie, a runoff election would be conducted between the two candidates who had earned the highest number of votes. This Resolution passed in the House of Representatives and was endorsed by President Nixon, but was subject to filibuster in the Senate and was ultimately abandoned (Johnson 2009).

Proponents of this method feel that it is superior to the Electoral College because it better represents the will of the people, and would eliminate the possibility of the less popular candidate winning the election. It would also eliminate the possibility of swing states, as states would no longer carry any electoral votes—thus, campaigns would theoretically become less lopsided and more focused on the entire population, rather than on the desires of the swing voters (Anderson 2001).

Opponents of this method fear that the lack of swing states would lead to significantly more expensive elections, as candidates would find it necessary to campaign

to the entire country instead of just to the undecided voters in key states. Additionally, many argue that a popular vote could weaken the power of the states (especially those that are less populous) (Belenky 2008).

Proportional Allocation

Unlike the National Popular Vote, the Proportional Allocation method would not require a Constitutional amendment in order to be implemented, because it does not eliminate the Electoral College altogether. Instead, it changes the manner in which the electoral votes are awarded—rather than awarding electoral votes on a winner take all basis, it would award the electoral votes proportional to the popular vote. In other words, if a candidate won 60% of the popular vote in Texas, for example, he or she would be awarded 60% of Texas' electoral votes (Neale and Whitaker 2004).

Proponents of this method feel that it has the dual benefits of better representing the popular vote while also staying true to the intentions of the Constitution. Additionally, it would create a more "national" election, as no one state would carry a guaranteed amount of electoral votes.

Those who oppose this method feel that it would undermine the current two-party system (since third parties could potentially win electoral votes without winning the state), and that it would take away the power of the smaller states in elections because they would have potentially fewer electoral votes to offer (Neale 2009)

Congressional Districts

Like the Proportional Allocation method, the Congressional District method has the benefit of not requiring a Constitutional Amendment in order to be implemented, as the manner in which electoral votes are awarded is decided by the states. In this method,

one electoral vote is awarded to the winner of each Congressional district, with the remaining two votes being awarded to the winner of the overall majority for that state (The Center for Voting and Democracy 2009).

Proponents of this method feel that it has many of the same benefits of the Proportional Allocation method, in that it is a better representation of the popular vote while still remaining true to the Constitution—and, since Maine and Nebraska have awarded votes this way since 1972 and 1992 respectively, it comes with a proven history of success (The Center for Voting and Democracy 2009).

Unfortunately, the prevalence of Gerrymandering raises concerns for many people. Gerrymandering is the practice of redrawing electoral district boundaries for the specific purpose of increasing the advantage for a certain political party (Koehler 2010). Because this practice is common in Congressional Districts, many feel that the distribution of electoral votes would potentially be skewed, giving one political party an unfair advantage. (Hirsch 2008) Additionally, many feel that rather than fixing the swing state problem, it would shift the focus of campaigns from undecided states to undecided districts (The Center for Voting and Democracy 2009).

While each reform method clearly has both strong supporters and strong opposition, it is important to set aside political ideology and answer one key question: Does this reform method accurately represent the wishes of the voters? If it does not, then it is no better than the system that is already in place. If it does, then perhaps it is worth exploring further. An exploration of past election results, re-calculated according to the top three reform propositions can help to answer that question. In order to begin

such an examination, it is necessary to find and explore election data for more than one election to determine how each reform method might impact the outcomes.

CHAPTER 3: ELECTION DATA AND PRELIMINARY ANALYSIS

Coming up with an effective way to analyze Electoral College reform was surprisingly difficult, and this study changed direction several times while trying to determine an approach. Initially, the intention was to study the voting behavior of certain demographic groups and use population projections provided by the U.S. Census Bureau to predict and compare future election outcomes using each of the proposed reform methods. After many unsuccessful attempts at using regression analysis to predict the voting behavior of specific demographic groups, it became clear that this approach would not work, for two primary reasons: one, no one person can be defined as a single demographic (which was the reason regression analysis wouldn't work); and two, predicting future elections is incredibly difficult. There is an entire industry of professionals who attempt to predict election outcomes, and even those professionals find the science to be uncertain.

Thus, it was ultimately decided that the research questions that were to be answered didn't require a look into the future—they could be answered just as well by studying past elections. Those key questions were: how did changing the geography by which the votes are counted change the way the voice of the voters is represented and, how do maps of the election outcomes help us understand this question of representation?

Because this is a study of elections taking place in the United States, it was obvious that all data downloaded would be focused in North America, but it was less obvious at what resolution the data should be displayed. Representing all election results on a National level was dismissed immediately as being too broad, because it did not allow exploration of the geographic changes that each reform method suggested. Unfortunately, there was no one perfect choice that would work for every reform method,

which led to the decision to use United States data at three different levels: state, county and congressional district.

The state level boundaries were downloaded from the National Atlas website and were used to map the traditional Electoral College results, as well as the results when using the Proportional Allocation method (because that method also awards Electoral votes at a state level). The county level boundaries were also downloaded from the National Atlas website and were not strictly necessary, since none of the proposed reform methods award votes on a county level. However, the data was useful when mapping the Popular Vote results as they better illustrate the location of densely populated areas, which has a strong correlation with voting behavior. The 106th and 112th congressional district polygon datasets were of course essential to illustrate election results using the Congressional District method, and were added via ArcGIS online, which compiled the data from the U.S. Census TIGER files. In order to maintain the correct shape of the geography, three different projections were used: the contiguous United States were set to Lambert Conformal Conic projection; Hawaii was set to Albers Equal Area Conic for Hawaii; Alaska was set to Albers Equal Area Conic for Alaska. Positional accuracy was not a necessary component of this study, and so it was not factored in.

Once the boundaries were downloaded, the next step in the process was to find election data for the 2000 and 2012 Presidential elections at the national, state and congressional district level. Election results are calculated at the precinct level and are aggregated to determine the state and national results. While all of the resulting tables could have been aggregated from the original precinct-level data, the data was easy to find at each level, which eliminated the need for extra table manipulation. All of the

tabular data was found at the US Census website, although it required some manipulation (detailed in the next section) to determine the election outcomes with the Proportional Allocation and Congressional District methods, and a small amount of formatting before any of the tables could be joined with the boundary data.

The attribute tables of each of the boundary datasets came with extensive demographic information about the states, counties, and congressional districts from the 2000 and 2010 censuses (including population, population density, household size, income, age, race, etc.), but did not have any election information (Table 1). To make it possible to create maps of the election results, then, a join was created between the election results data and the polygon datasets on the FIPS field. This created a larger table for each dataset that included the election results along with demographic data, and made creating a map of those results possible. It also created a very unwieldy table, with quite a bit of unnecessary information. To trim it down to a more manageable size, all of the extraneous demographic information was removed from the tables, until they consisted of only the information that pertained to this study. Once all of the boundary data was in place and the tables were properly formulated, it was time to start the analysis.

Table 1: Congressional District dataset attribute table before being joined with election results

OBJECTID	DISTRICTID	STFIPS	CD113FIPS	STATE	NAME	LAST_NAME	PARTY
1	613	6	13	CA	Barbara Lee	Lee	Democrat
2	1501	15	1	HI	Colleen W. Hanabusa	Hanabusa	Democrat
3	4821	48	21	TX	Lamar Smith	Smith	Republican
4	4828	48	28	TX	Henry Cuellar	Cuellar	Democrat
5	4810	48	10	TX	Michael T. McCaul	McCaul	Republican
6	4815	48	15	TX	Rub√©n Hinojosa	Hinojosa	Democrat
7	4820	48	20	TX	Joaquin Castro	Castro	Democrat
8	4835	48	35	TX	Lloyd Doggett	Doggett	Democrat
9	4822	48	22	TX	Pete Olson	Olson	Republican
10	4809	48	9	TX	Al Green	Green	Democrat
11	4829	48	29	TX	Gene Green	Green	Democrat
12	4807	48	7	TX	John Abney Culberson	Culberson	Republican
13	4818	48	18	TX	Sheila Jackson Lee	Lee	Democrat
14	4802	48	2	TX	Ted Poe	Poe	Republican
15	1212	12	12	FL	Gus M. Bilirakis	Bilirakis	Republican
16	1206	12	6	FL	Ron DeSantis	DeSantis	Republican
17	1217	12	17	FL	Thomas J. Rooney	Rooney	Republican
18	1205	12	5	FL	Corrine Brown	Brown	Democrat
19	1210	12	10	FL	Daniel Webster	Webster	Republican
20	1215	12	15	FL	Dennis A. Ross	Ross	Republican
21	1209	12	9	FL	Alan Grayson	Grayson	Democrat
22	1211	12	11	FL	Richard B. Nugent	Nugent	Republican
23	1224	12	24	FL	Frederica S. Wilson	Wilson	Democrat
24	1223	12	23	FL	Debbie Wasserman Schultz	Schultz	Democrat
25	1225	12	25	FL	Mario Diaz-Balart	Diaz-Balart	Republican
26	1208	12	8	FL	Bill Posey	Posey	Republican
27	1218	12	18	FL	Patrick Murphy	Murphy	Democrat
28	1220	12	20	FL	Alcee L. Hastings	Hastings	Democrat
29	1221	12	21	FL	Theodore E. Deutch	Deutch	Democrat
30	1222	12	22	FL	Lois Frankel	Frankel	Democrat
31	1216	12	16	FL	Vern Buchanan	Buchanan	Republican
32	1207	12	7	FL	John L. Mica	Mica	Republican
33	4804	48	4	TX	Ralph M. Hall	Ralph M. Hall	Republican
34	3202	32	2	NV	Mark E. Amodei	Amodei	Republican
35	616	6	16	CA	Jim Costa	Costa	Democrat

3.1 Election Results

Determining the results for the two elections under different reform methods was simply a matter of creating a series of tables—each of which divided up the actual election results based on one of the proposed Electoral College reform methods—and adding up the columns for each party in order to determine the winner. In the case of the Popular Vote (Table 2), this process was straightforward addition; other reform methods required another step (or two) of calculations.

The Proportional Allocation table (Table 3) used the popular vote data to calculate the percentage of the total votes per state that went to the Democratic candidate, and then applied that percentage to the allotted Electoral College votes per state in order to determine how many Electoral votes were awarded to each candidate.

Because the Congressional District Allocation method gives one Electoral vote to the winner of each district in a state and two votes to the winner of the most districts, a table was created that calculated the winner of each district, assigned Electoral votes accordingly, and then added the total number of Electoral votes per candidate in order to determine the winner of the two Senatorial votes (Table 4).

Table 2: Popular Vote Results for the 2012 Presidential Election

State	Total Votes: M. Romney	Total Votes: B. Obama
Alabama	1,252,453	793,620
Alaska	136,848	102,138
Arizona	1,143,051	930,669
Arkansas	638,467	389,699
California	4,202,127	6,493,924
Colorado	1,125,391	1,238,490
Connecticut	631,432	912,531
Delaware	165,476	242,547
District of Columbia	17,337	222,332
Florida	4,162,081	4,235,270
Georgia	2,070,221	1,761,761
Hawaii	119,494	303,090
Idaho	420,750	212,560
Illinois	2,090,116	2,916,811
Indiana	1,412,620	1,140,425
Iowa	727,928	816,429
Kansas	678,719	427,918
Kentucky	1,087,127	679,340
Louisiana	1,152,460	808,496
Maine	290,437	397,754
Maryland	904,970	1,527,686
Massachusetts	1,177,370	1,900,575
Michigan	2,112,673	2,561,911
Minnesota	1,321,575	1,547,668
Mississippi	674,302	528,260
Missouri	1,478,961	1,215,031
Montana	264,974	200,489
Nebraska	462,972	289,154
Nevada	462,422	528,801
New Hampshire	327,870	368,529
New Jersey	1,383,233	1,960,744
New Mexico	331,915	408,312
New York	2,226,637	3,875,826
North Carolina	2,275,853	2,178,388
North Dakota	187,586	124,490
Ohio	2,593,779	2,697,260
Oklahoma	889,372	442,647
Oregon	733,743	937,321
Pennsylvania	2,619,583	2,907,448
Rhode Island	155,355	274,342
South Carolina	1,049,507	845,756
South Dakota	210,541	144,988
Tennessee	1,453,097	953,043
Texas	4,555,799	3,294,440
Utah	740,600	251,813
Vermont	92,700	199,259
Virginia	1,789,618	1,905,528
Washington	1,210,369	1,620,432
West Virginia	412,406	234,925
Wisconsin	1,408,746	1,613,950
Wyoming	170,265	68,780
Total:	59,203,328	62,633,600

Table 3: Proportional Allocation Results for the 2012 Presidential Election

State	M. Romney	B. Obama	% Democrat	Total Electoral Votes	M. Romney Electoral Votes	B. Obama Electoral Votes
Alabama	1,252,453	793,620	39%	9	6	3
Alaska	136,848	102,138	43%	3	2	1
Arizona	1,143,051	930,669	45%	11	6	5
Arkansas	638,467	389,699	38%	6	4	2
California	4,202,127	6,493,924	61%	55	22	33
Colorado	1,125,391	1,238,490	52%	9	4	5
Connecticut	631,432	912,531	59%	7	3	4
Delaware	165,476	242,547	59%	3	1	2
District of Columbia	17,337	222,332	93%	3	0	3
Florida	4,162,081	4,235,270	50%	29	14	15
Georgia	2,070,221	1,761,761	46%	16	9	7
Hawaii	119,494	303,090	72%	4	1	3
Idaho	420,750	212,560	34%	4	3	1
Illinois	2,090,116	2,916,811	58%	20	8	12
Indiana	1,412,620	1,140,425	45%	11	6	5
Iowa	727,928	816,429	53%	6	3	3
Kansas	678,719	427,918	39%	6	4	2
Kentucky	1,087,127	679,340	38%	8	5	3
Louisiana	1,152,460	808,496	41%	8	5	3
Maine	290,437	397,754	58%	4	2	2
Maryland	904,970	1,527,686	63%	10	4	6
Massachusetts	1,177,370	1,900,575	62%	11	4	7
Michigan	2,112,673	2,561,911	55%	16	7	9
Minnesota	1,321,575	1,547,668	54%	10	5	5
Mississippi	674,302	528,260	44%	6	3	3
Missouri	1,478,961	1,215,031	45%	10	5	5
Montana	264,974	200,489	43%	3	2	1
Nebraska	462,972	289,154	38%	5	3	2
Nevada	462,422	528,801	53%	6	3	3
New Hampshire	327,870	368,529	53%	4	2	2
New Jersey	1,383,233	1,960,744	59%	14	6	8
New Mexico	331,915	408,312	55%	5	2	3
New York	2,226,637	3,875,826	64%	29	11	18
North Carolina	2,275,853	2,178,388	49%	15	8	7
North Dakota	187,586	124,490	40%	3	2	1
Ohio	2,593,779	2,697,260	51%	18	9	9
Oklahoma	889,372	442,647	33%	7	5	2
Oregon	733,743	937,321	56%	7	3	4
Pennsylvania	2,619,583	2,907,448	53%	20	9	11
Rhode Island	155,355	274,342	64%	4	1	3
South Carolina	1,049,507	845,756	45%	9	5	4
South Dakota	210,541	144,988	41%	3	2	1
Tennessee	1,453,097	953,043	40%	11	7	4
Texas	4,555,799	3,294,440	42%	38	22	16
Utah	740,600	251,813	25%	6	4	2
Vermont	92,700	199,259	68%	3	1	2
Virginia	1,789,618	1,905,528	52%	13	6	7
Washington	1,210,369	1,620,432	57%	12	5	7
West Virginia	412,406	234,925	36%	5	3	2
Wisconsin	1,408,746	1,613,950	53%	10	5	5
Wyoming	170,265	68,780	29%	3	2	1
				Total	261	277

Table 4: Congressional District Results (portion) for the 2012 Presidential Election

District	State_Name	Winner	Romney Votes Awarded	Obama Votes Awarded
0104	Alabama	Romney	1	0
0106	Alabama	Romney	1	0
0105	Alabama	Romney	1	0
0102	Alabama	Romney	1	0
0103	Alabama	Romney	1	0
0101	Alabama	Romney	1	0
0107	Alabama	Obama	0	1
		Total + 2 Senate Votes for Winner	**8**	**1**
0200	Alaska	Romney	1	0
		Total + 2 Senate Votes for Winner	**3**	**0**
0905	Connecticut	Obama	0	1
0904	Connecticut	Obama	0	1
0902	Connecticut	Obama	0	1
0903	Connecticut	Obama	0	1
0901	Connecticut	Obama	0	1
		Total + 2 Senate Votes for Winner	**0**	**7**
1000	Delaware	Obama	0	1
		Total + 2 Senate Votes for Winner	**0**	**3**
1000	District of Columbia	Obama	0	1
		Total + 2 Senate Votes for Winner	**0**	**3**

3.2 Effect of the Proposed Reform Methods

The results of each individual table were then compiled into one table, where they were compared with the original Electoral votes for each election in order to understand the impact of each reform method (Table 5).

Table 5: Results for 2000 & 2012 Elections for all Reform Methods (winner shown in bold)

	Electoral College	**Proportional Allocation**	**Congressional District**	**Popular Vote**
2000 Election*				
Al Gore (D)	266	**270**	235	**50,999,897**
George Bush (R)	**271**	267	**303**	50,456,002
2012 Election				
Barack Obama (D)	**332**	**277**	254	**69,053,534**
Mitt Romney (R)	206	261	**284**	59,134,475

**Note: The elector for Washington D.C. abstained from voting in the 2000 election, becoming the first faithless elector since 1864*

The table makes it clear that each proposed reform method has the potential to change the outcome of the election, with the controversial 2000 election showing a large degree of variation depending on the calculation method, and the Congressional District Allocation method showing more variation than in other proposed reform methods which could possibly be due to the effects of Gerrymandering. Popular Vote and the Proportional Allocation method are the most consistent, as they are not based on geographic boundaries or a winner-take-all approach, but instead represent the voting public directly.

As mentioned in the Introduction, these tables give us valuable information, but there are still many questions to be answered, particularly about the pros and cons that have been used in the arguments for and against each of the proposed reform methods. Because finding the answers to these questions goes beyond the scope of a simple table, we now turn to a consideration of how this data can be represented on maps. The next chapter introduces a few essential cartographic principles, and then Chapter 5 applies these principles to the election results discussed here.

CHAPTER 4: MAPPING DATA

If tables can answer the question of who the winner of any past election would be with each of the proposed Electoral College reform methods, can maps provide any additional understanding? Technically, maps are not needed to provide the results of the simulation of different reform proposals —a map will not contribute any new information about who won or lost the election, no matter which reform method you choose. However, maps still contribute a great deal to the conversation by providing a visual assessment of where the voting population resides and how changing the geography of the vote calculation can enhance or silence the voice of voters from different regions.

Additionally, whether it is done consciously or unconsciously, maps can be manipulated to provoke a variety of responses in the viewer—and to tell many different stories—without ever changing the data. Because of this, it is very important that anyone viewing an election results map (or a map of anything, for that matter), understand that every map manipulates reality to a certain extent, coloring one's perception of the data (Monmonier 1996). Creating maps of the tabular election results is not as simple as putting the data into a geographic context. In traditional depictions of the Electoral College results (Figure 1), each state is colored either red or blue in order to easily identify the winner of the Electoral votes for that state (for an example of this, see Gelman 2014), although it is only since the 2000 election that red was officially the color of the Republican candidate and blue the color of the Democrats (Enda 2012).

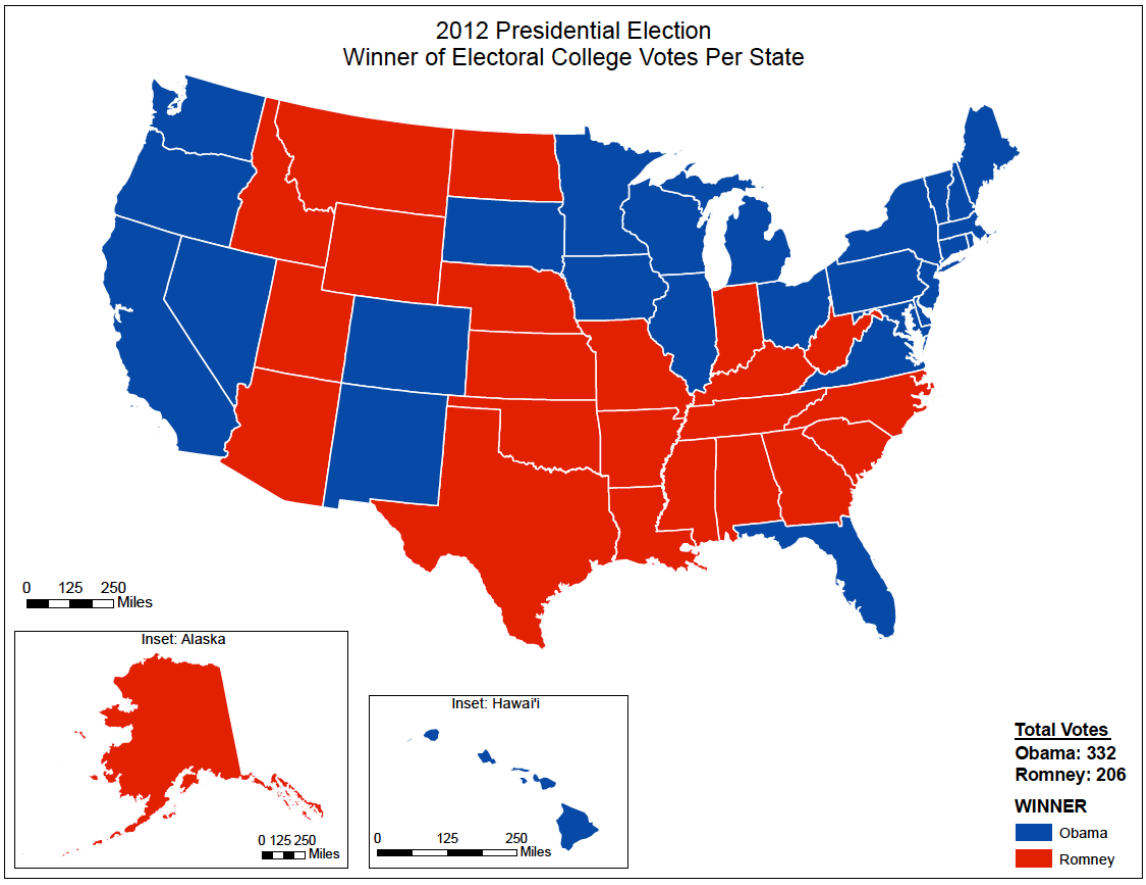

Figure 1: Electoral College results for the 2012 Presidential Election

While this approach is technically correct, it is visually misleading. To the casual viewer, the country seems dominated by the larger red states in the southern and mid-western regions, while the smaller blue states are easily overlooked. This distribution of red and blue leads many to believe that the Republican candidate won the election, when in fact the Democratic candidate, Presidential Incumbent Barack Obama, was the winner by a fairly large margin.

This raises the question: how can a map more accurately reflect the election results in a country with such vast variations in state size and population? There are many possible approaches, but all of them require sacrificing some information in order to more accurately represent others.

4.1. Fundamental Cartographic Principles

There are fundamental cartographic principles that must be observed when making any map, to ensure that the data is both represented clearly and is an accurate depiction of the phenomena that are most important. In order to ensure that these criteria are met, every map—no matter what the subject—should be created with two basic goals in mind: The first is to make something that conveys the intended information in a way that is useful to the map user, and the second is to create a map that communicates information in the most efficient and clear manner possible (Slocum, et al. 2009). Slocum et al. suggest that every map that is created with these goals in mind should be made with the following components, listed in order of importance (from most to least important):

- Thematic symbols and labels that directly relate to the theme of the map
- A clear title, subtitle, and legend
- Base data—such as boundaries, roads and city names
- A scale bar (or text) and north arrow
- Notes regarding data and/or sources
- A frame and neat lines

Once those basic guidelines are met, the more complex components of map creation can be considered. The cartographer must examine the data and decide what story the map is telling, what information is most important to the telling of that story, and how that information can be communicated effectively.

4.2 Overview of Common Thematic Mapping Techniques

Before the process of mapping the election results using each of the proposed Electoral College reform methods begins, it is important to gain a general understanding of different thematic mapping techniques, what type of phenomena they best represent, and some potential shortcomings for each. Thematic maps are designed to illustrate a particular theme (or themes) over a specific geographic area, and are the focus of this study. The following section provides a brief introduction to the techniques that were used within the context of this study, while the actual maps of the results are explored in Chapter 5.

Choropleth Maps

> *"A map in which enumeration units (or data-collection units) are shaded with an intensity proportional to the data values associated with those units" (Slocum et al. 2009, p. 502).*

Choropleth mapping is primarily used for phenomena that have a spatial variation that is the same as the boundaries being used in the study (county, state and congressional districts in this case). This type of mapping involves assigning a graduated color scheme to different classes of numeric data, generally with light colors representing low values and dark colors representing high values. In the case of this study, the choropleth technique is particularly useful to convey the differences in the number of Electoral votes awarded per state.

Choropleth maps are used liberally to demonstrate many national statistics at the state (and often county) level, but they are not without their problems. Primary among them is the modifiable areal unit problem (MAUP), which is a very common issue that occurs when performing analysis on aggregated data. The MAUP can take one of two

forms: the scale effect (which is exhibited when data is aggregated to different sizes of zones, such as counties and states) and the zone effect (which is exhibited when the general size of the zones remains constant but the boundaries of the zones are changed) (Manley 2014). These two effects can significantly change the statistics resulting from tabular or spatial analysis. While this study does not involve any in-depth spatial analysis, the MAUP still presents a problem for map audiences performing a basic visual analysis of the results—the huge amount of areal variation that occurs within the political boundaries of the United States creates a different impression of the results of the election depending on the level of aggregation presented (state, county or congressional district), creating both the zone and scale effects.

Choropleth maps do offer one way to mitigate the misleading visual zone effect of the usual blue/red binary election map shown in Figure 1. By using graduated colors it is possible to better represent the weight (or lack thereof) that each state's Electoral votes carry. This has the benefit of de-emphasizing the apparent impact that some of the larger but less populous states have on the election outcome, however, as shown in the next chapter the map still ultimately suffers from the visual weight that the larger states carry.

Proportional Symbols

> *"A map in which point symbols are scaled in proportion to the magnitude of data occurring at point locations" (Slocum et al. 2009, p. 513).*

Like choropleth maps, proportional symbols are typically used to represent numerical data that is associated with geographic locations. Often, this data is measured at and associated with specific point locations such as cities or work site locations, though proportional symbols can also be used for data that is collected over areas but represented as centrally located points. In the case of this study, the latter approach was used; proportional symbols were created to visually represent the portion of the Electoral votes that each state would have granted using the Proportional Allocation method. Using proportional symbols, the division of votes within a state can be shown without altering that state's geography. After all—a state's geography cannot be bisected simply because it would make symbolization more convenient.

This thematic mapping technique is a simple and effective method of conveying information with large size disparities, which is why it was a useful tool for mapping the traditional Proportional Allocation results, but is often not detailed enough to convey the difference between two similar values, as will be demonstrated in Chapter 5.

Dot Density Maps

> *"A map in which small symbols of uniform size (typically, solid circles) are used to emphasize the spatial pattern of a phenomenon" (Slocum et al. 2009, p. 505).*

With the dot mapping technique, one dot is placed within a spatial context to represent a set number of a particular phenomenon—in the case of this study, one dot can be used to represent a given number of votes to illustrate the popular vote outcome.

Choosing the number of entities to assign to a single dot is critical. Trying to represent each individual as a single dot is impractical—even keeping the symbology as small as possible, things quickly overlap and become confusing. For example, Los Angeles County, California is 4,752 square miles and has a population of roughly 10 million people—over 2 million of who voted in the last election. When the results of the 2012 election are represented with one tiny dot for each person who voted, each colored blue or red to indicate the party of their vote, the map is impossible to interpret (Figure 2).

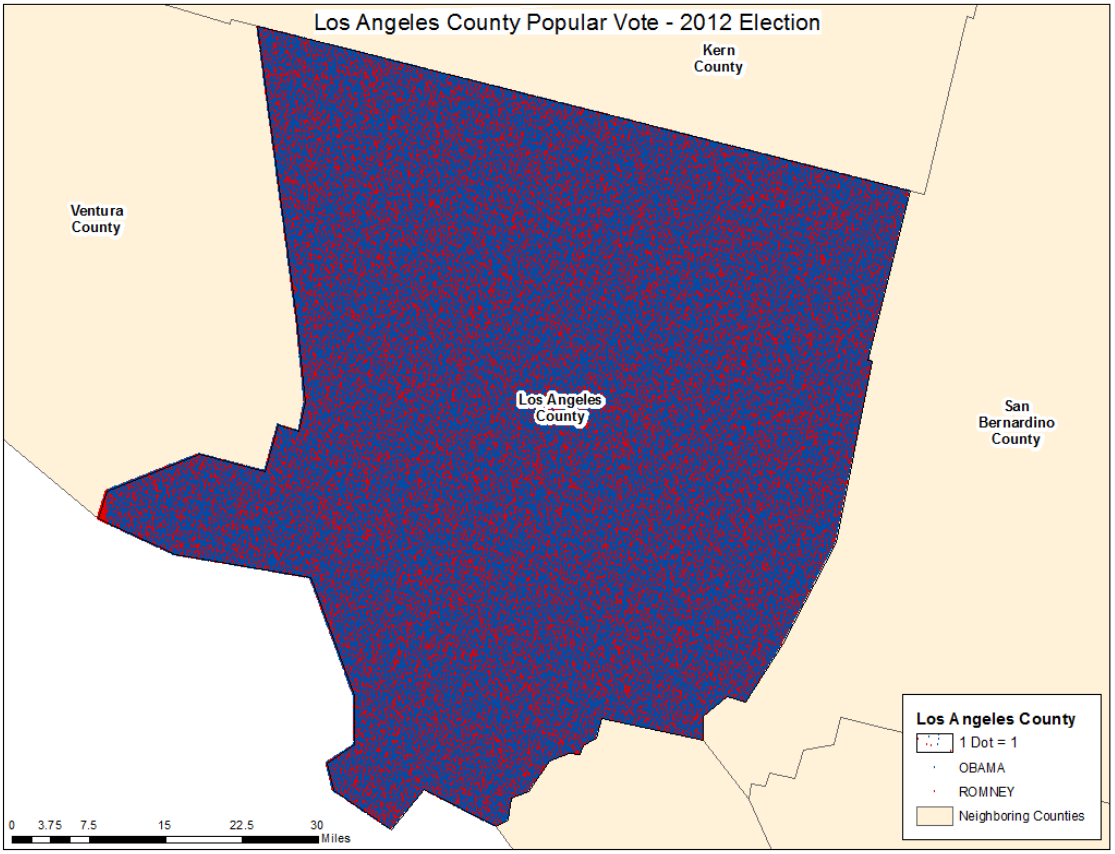

Figure 2: Voting results of the 2012 election in Los Angeles County, California, in which a single point represents each vote.
Note: Dots are distributed randomly

In order to make a map that actually conveys information clearly, it is necessary to sacrifice some of the accuracy of representing every vote, in favor of aggregation. Using the Los Angeles County example again, this time with one dot representing 1,000 votes, things quickly become easier to understand (Figure 3). There is still no way to determine at a glance exactly how many votes each candidate received in the election, but the revised map makes it more clear that blue is the predominant color, indicating that the Democratic candidate won the majority of the votes (which is in keeping with the actual results for the county, where Barack Obama won by almost one million votes).

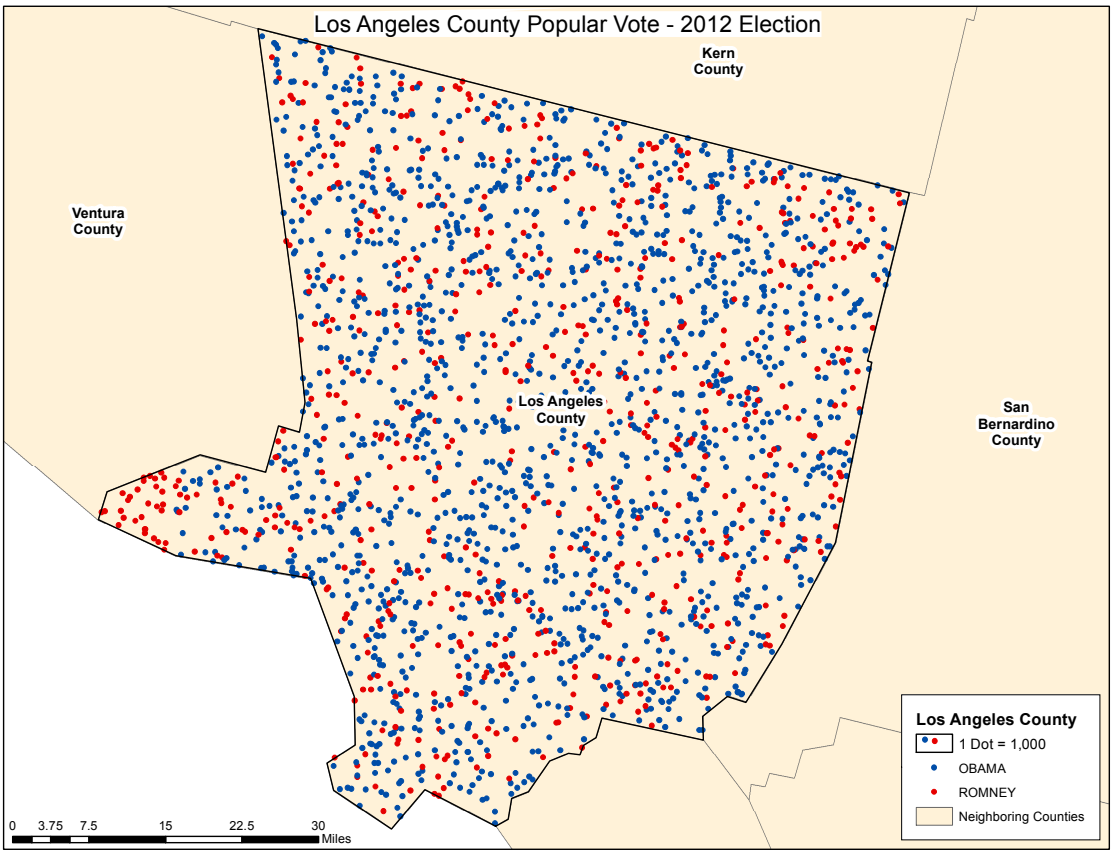

Figure 3: Voting results of the 2012 election in Los Angeles County, California, in which a single point represents 1,000 votes.

Note: The lack of randomly distributed blue dots in the western portion appears to be an artifact of the dot placement algorithm, possibly related to memory allotment. While visually distracting, the number of dots overall is correct.

Cartograms

> *"A map that purposely distorts geographic space based on the values of a theme (e.g., making the size of countries proportional to their population)" (Slocum et al. 2009, p.502).*

Cartograms were created as a solution to the areal problems that are so often encountered when attempting to represent data about different geographic regions. In this method, geographic regions are distorted to represent the weight of a thematic variable (such as population, average income, or a particular health issue). Thematic variables are given visual importance at the expense of preserving geography. Though the representation can vary, there are two traditional types of cartograms: contiguous (which maintain the geographic contiguity of the areas being represented but the shapes are distorted) and noncontiguous (which retain the shape of the areas being represented at the expense of contiguity) (Slocum et al. 2009).

Creating cartograms without the aid of computers involves complex mathematics that are beyond the scope of this study—however, there are many applications available to make creating cartograms relatively simple. In the case of this study, a contiguous areal cartogram was created using an ArcMap cartogram geoprocessing add-on, which was created by Tom Gross of Esri. This tool was obtained from the ArcScripts repository. Contiguous area cartograms have the benefit of dramatically emphasizing the important data—the actual number of Electoral votes won by each candidate—which can eliminate the confusion that often results from more traditional election mapping techniques.

Having illustrated the most common mapping techniques, we now turn to an exploration of how these different methods of representing election outcomes on maps

can enhance or detract from our interpretation of election results with respect to the geographic distribution of votes and population.

CHAPTER 5: MAPPING THE ELECTION RESULTS

While determining the winner of an election based on any of the proposed reform methods is a relatively simple process, representing the election results in a way that is informative and is not misleading is anything but. The United States is a vast country, sparsely populated in some areas (Wyoming had a population of just over 582,600 at the 2010 census) and densely populated in others (California being the most populous state, with over 38,332,500 citizens at the 2010 census). The areal size disparity of the states poses another challenge: The smallest state, Rhode Island, has a total size of only 1,544 square miles—while the largest state, Alaska, is a massive 665,384 square miles (Johnson 2009). These differences make representing election results in a way that is easily interpreted by the viewer challenging. How does one present the information that is important, while still preserving the integrity of the geography? Does the inherent bias of all maps make this an impossible task? If so, what is the best compromise?

Introducing the different reform methods only adds to the challenge, because they increase the amount of information that needs to be represented. And, because the maps of reform methods present concepts that the general public isn't familiar with, it is all the more important that the information is presented in a manner that is both clear and accurate.

Given the different geographies that are used in the various election methods, the kind of cartographic technique that best represents each method differs. These differences are explored in the following sections. Table 6 provides an overview of the exploration.

Table 6: Comparison of techniques for mapping election results

	Reform method			
Map Styles	Current	Proportional Allocation	Congressional Districts	Popular Vote
Simple Red/Blue map	✓	X	✓✓	X
Choropleth map	✓✓	✓✓	X	X
Proportional Symbols	✓	✓✓	X	X
Dot density	X	X	X	✓✓
Cartogram	✓	X	X	X
One check indicates the technique can be used to represent that method, two checks indicate the best method. X indicates the method is not appropriate.				

5.1 Mapping the Traditional Electoral College Method

As mentioned earlier, the areal differences between the boundaries of America can create visual confusion when attempting to represent election results that are awarded per state—the smaller states are often overlooked despite the large number of Electoral votes they might carry, while the larger states (which often carry few Electoral votes due to low population) give the impression that they have a bigger impact on election outcomes than they actually do.

As indicated in Table Six, one approach to more accurately represent the election outcome is the use of choropleth mapping techniques. By assigning a bolder color to the states that have a higher number of Electoral votes and a lighter color to the states that have fewer votes, it is possible to create a map that gives the viewer a better understanding of the true outcome of the election. The map is still dominated by red tones, but it is much more clear to the viewer that the majority of the large states that went red don't carry a large number of Electoral votes (as illustrated by their pale coloring), while the smaller states on the East coast actually contribute a significant number of Electoral votes (as illustrated by their darker blue coloring) (Figure 4).

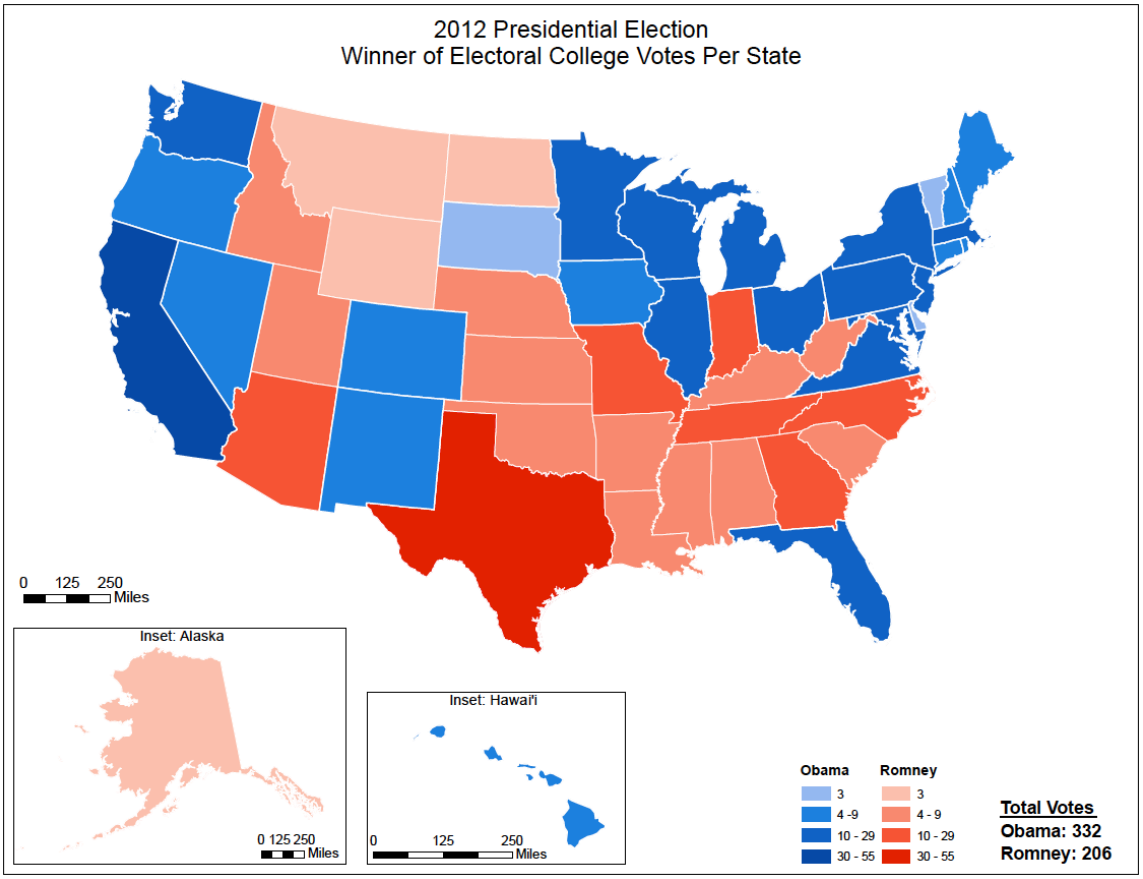

Figure 4: Electoral College results for the 2012 Presidential Election, presented in a Choropleth format based on the amount of electoral votes awarded by each state

Choropleth mapping is simple and effective, but does leave out some data that some viewers might find important to the story of the election outcome, such as population. Bringing in more information can help the viewer to understand that the areal size of the state does not necessarily correlate with either population or electoral votes awarded. One example of this is to pair a choropleth representation of the *population* of each state rather than the Electoral votes awarded. This approach de-emphasizes the visual impact of the red/blue color scheme, but still conveys the Electoral information with graduated symbols that illustrate the power that the individual states carry and which candidate won each state (Figure 5).

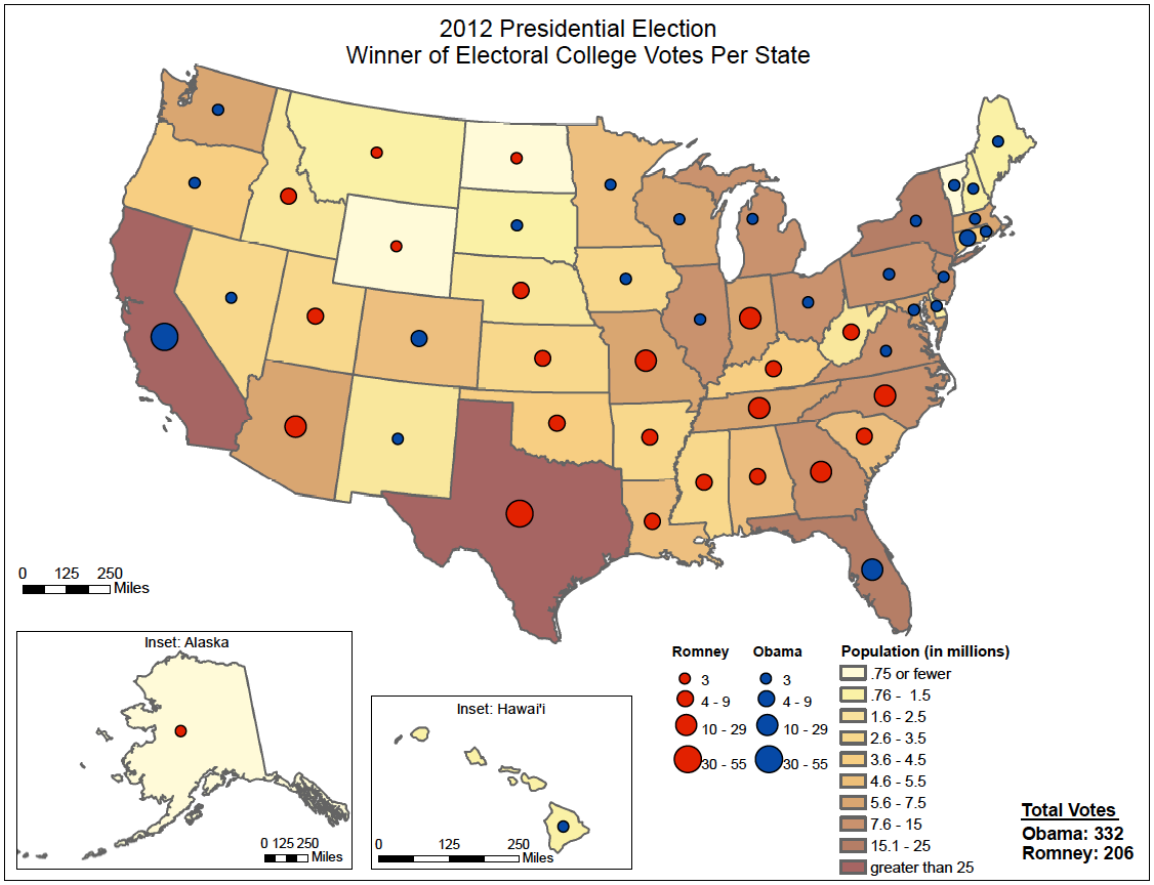

Figure 5: Electoral College results for the 2012 Presidential Election, presented in a combination choropleth and graduated symbol format based on population and the amount of electoral votes awarded by each state.

This map format is the most informative thus far, because it better conveys both the Electoral impact of each state, and *why* the number of Electoral votes per state varies so much throughout the country. Unfortunately, the map still suffers from the size disparity amongst the states—the smaller East Coast states all but disappear when placed next to the larger states in the West, but they are in fact home to a sizeable portion of the population. Additionally, it is a difficult map to interpret, because the viewer must understand the meaning of two very different symbologies, and combine them together to understand what the map is intended to relay.

One way to get around the consistent areal problem is to create a cartogram (Figure 6). As previously explained, cartograms are maps that are designed to sacrifice geographic integrity in order to better represent the impact of a particular variable. In the case of an Electoral College map, this variable would be the number of Electoral votes carried by each state.

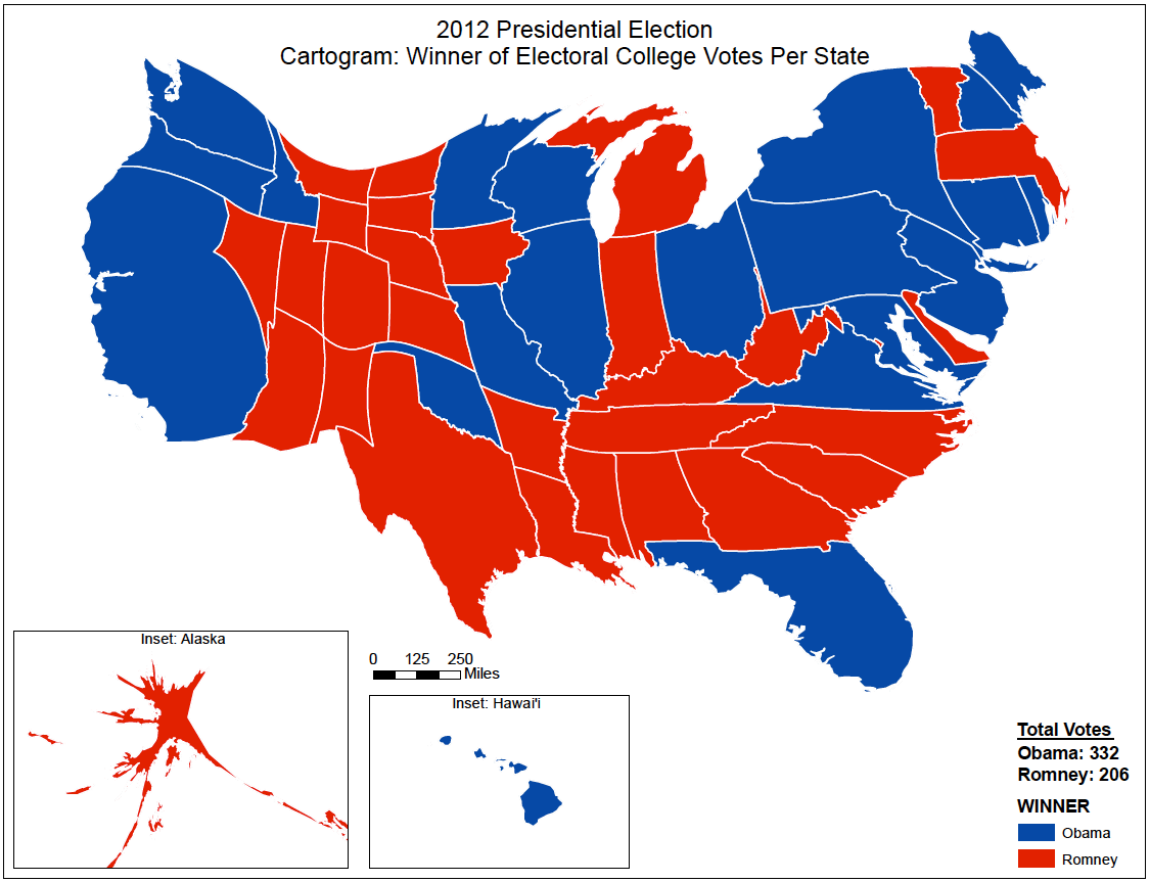

Figure 6: Electoral College results for the 2012 Presidential Election, presented as a cartogram where area is proportional to the number of electoral votes
Note: Insets shown at the same scale as main map

Cartograms solve the problem of a visually misleading map in one way—it is now much more clear that the Democratic candidate was the winner of the election—but they create a new problem, in that they render the country almost unrecognizable. The outlines of the geography of the United States can be added as an overlay (Figure 7),

which is helpful—but this adds to the visual noise of the map and distracts from the results that the Cartogram is representing.

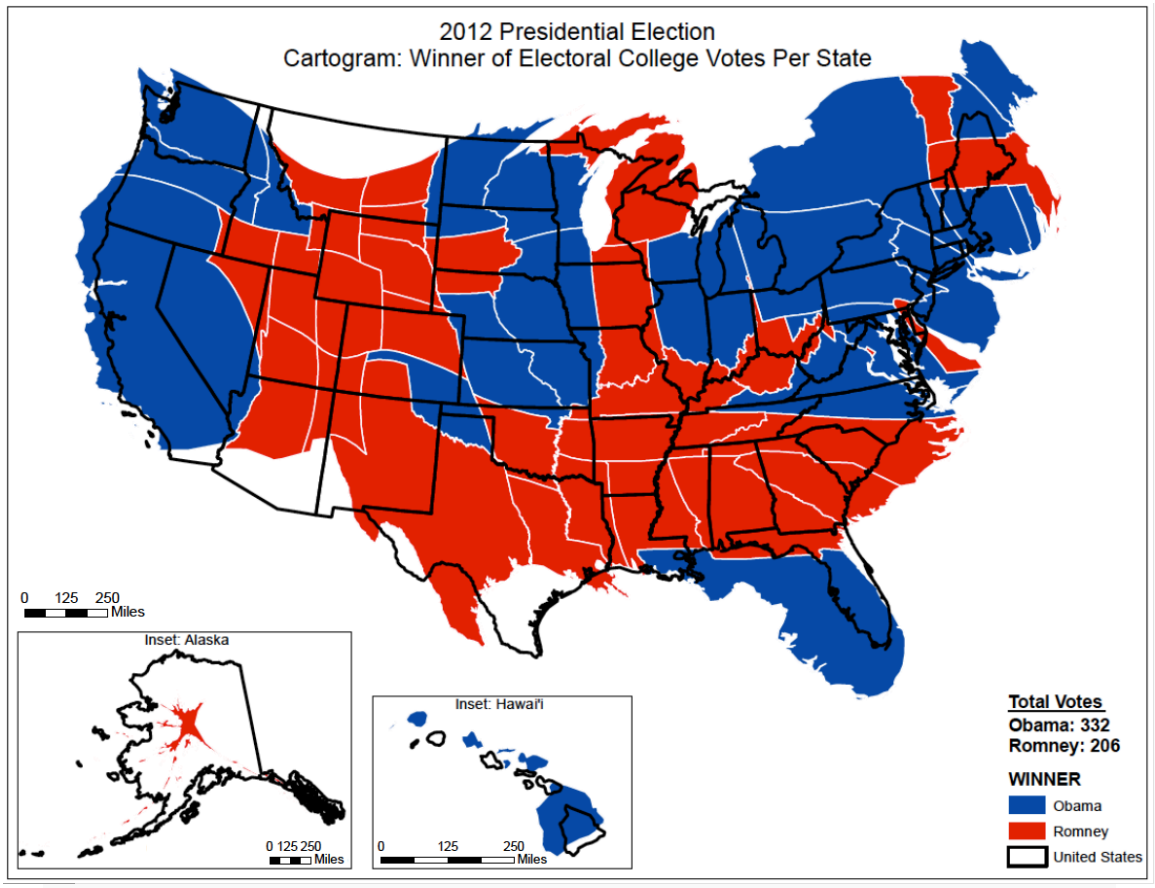

Figure 7: Electoral College results for the 2012 Presidential Election, presented as a cartogram with the outlines of the United States as an overlay to demonstrate the extent to which the geography has been altered.

The distortion of a cartogram might not be an issue when the information is being presented to an American audience who would have at least a passing understanding of the geography of their home country. To an audience less familiar with the geography of the country, however, the distortion created by the cartogram adds a degree of confusion. In short, if maintaining the geographic integrity of the country is important to the story that the map is telling, a cartogram is not a viable option.

5.2 Mapping the Popular Vote Method

The Popular Vote method presents a unique challenge when it comes to creating a results map, because the results are not actually tied to geography in any way. Of course, the citizens who are doing the voting have a geographic presence—they live in a particular city, county, and state—but a geographic unit does not alter the impact of their vote in the same way that it would with the other proposed reform methods. In spite of this, and because the geography in which we live can have a strong correlation with the way we think (and, therefore, the way we vote), choosing the appropriate representation of the voting outcome is important. Looking back at Table 6, it quickly becomes clear that almost all of the mapping techniques are inappropriate, because they are all dependent on data that is tied to geography in a strong way.

Despite the fact that the popular vote method is not tied to geography, it is nonetheless useful to create a map that somehow represents the individuals in their spatial context. The scale of the country presents a problem (as discussed previously), but so does the large population. How can each of the 122,188,009 votes of the 2012 election be represented on a map in a clear and concise way? It would perhaps be possible if there were no attention paid to geography whatsoever, however the strong correlation between population density and voting behavior means that the location of the voter cannot be entirely ignored (De Chant 2013).

Because of this correlation between population density and voting, a dot density map is the most useful approach to representing the popular vote results of the presidential election. Representing the results of the Popular Vote method nationwide, though accurate, does not provide a clear enough picture of how and where people are

voting—therefore some aggregation is required to give a better overall picture of the election. In dot density mapping, dots are dispersed randomly within the boundaries of the area they represent, so rather than showing results at state level, these dots were grouped at the county level, in order to give a better understanding of where the majority of Americans live and vote (Figure 8). Although the election data is initially collected at the precinct level, the detail of the results would not be visible at such a small level of aggregation when viewed at the national scale.

While the resulting map doesn't clearly convey who won the election, the dense clustering better indicates the voting power that these tiny states carry, while the sparse areas tell the viewer that, though large in size, those states do not contain a large voting population. Increasing the size of the dots and the number of votes that each dot represents helps matters somewhat, but the representation still suffers from over-crowding (Figure 9), which obscures much of the data as the results for one party overlap the other. The overlap problem can be mitigated by producing a results map for each party (Figures 10 and 11), but it creates a new problem, because it is difficult to compare the results without them falling on the same map.

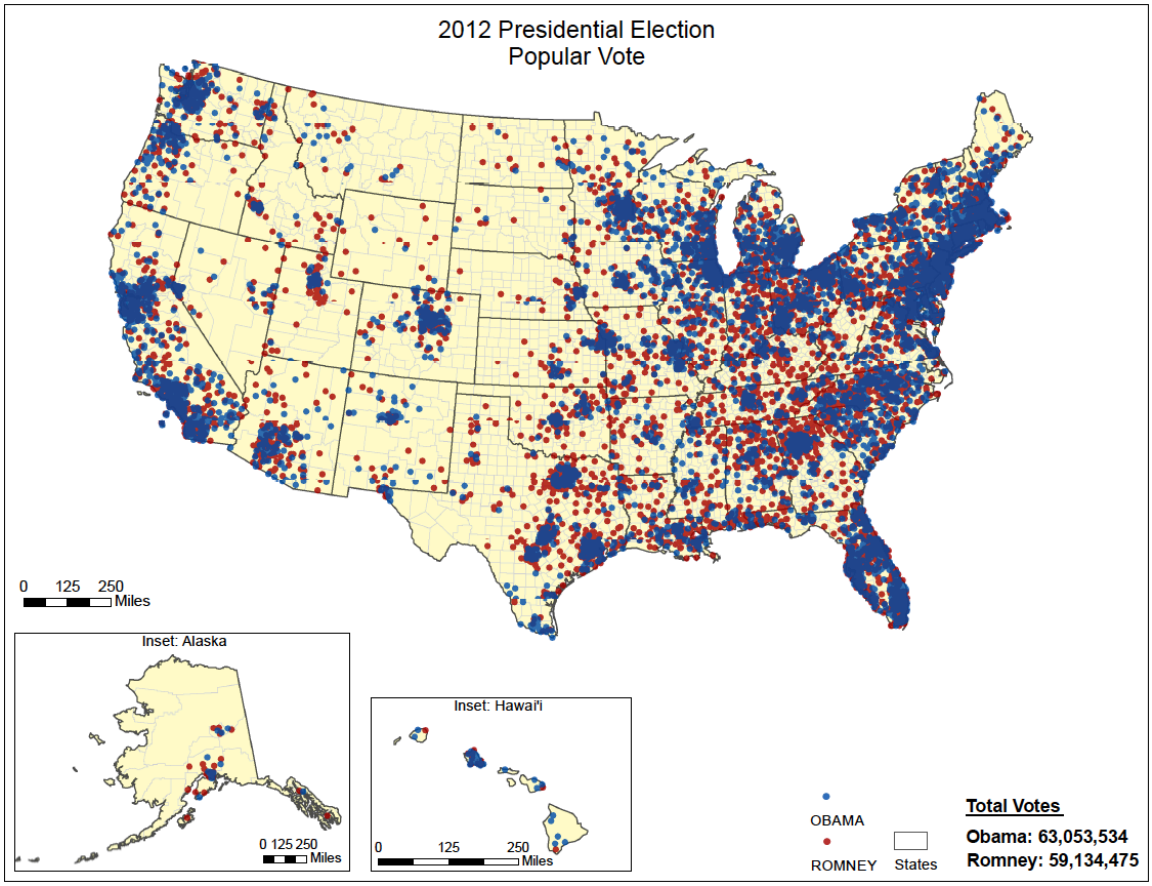

Figure 8: Voting results of the 2012 election nationwide, in which a single point represents 10,000 votes and dots are constrained by county.

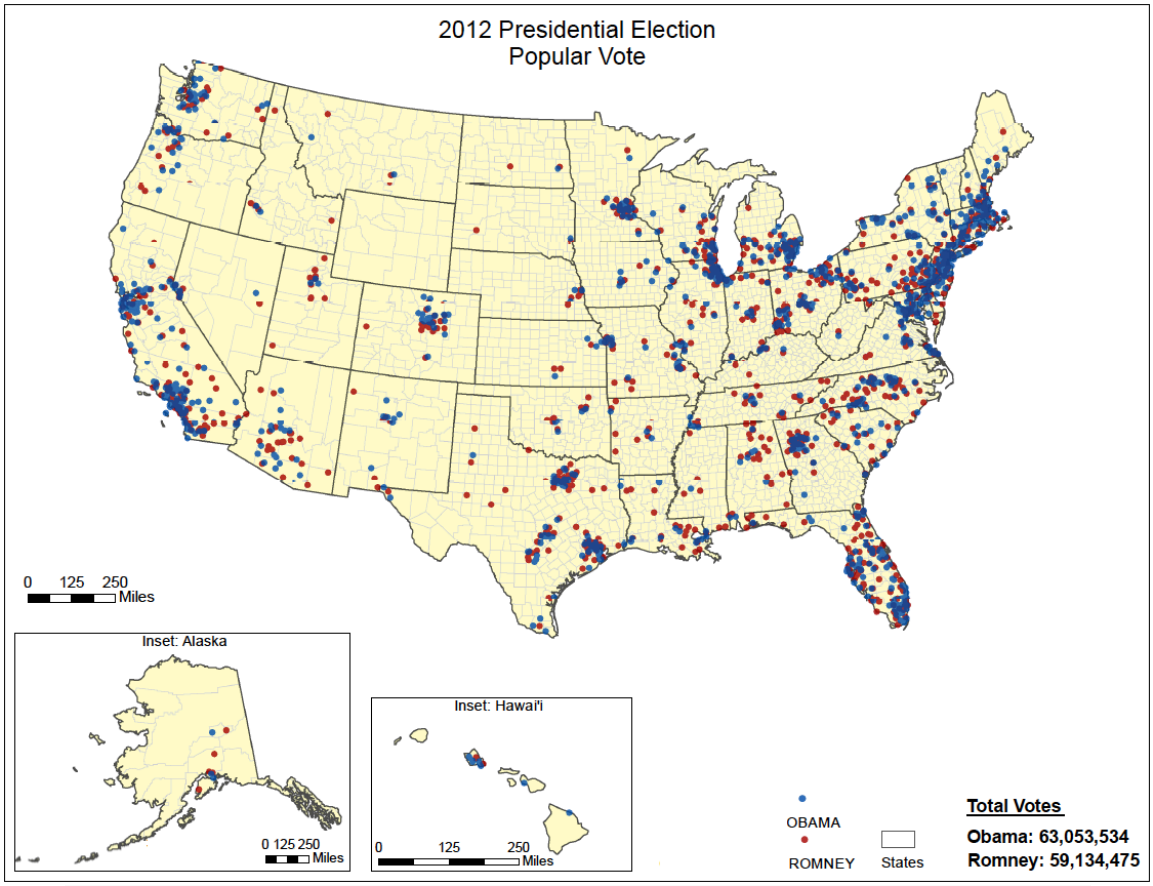

Figure 9: Voting results of the 2012 election nationwide, in which a single point represents 50,000 votes and dots are constrained by county.

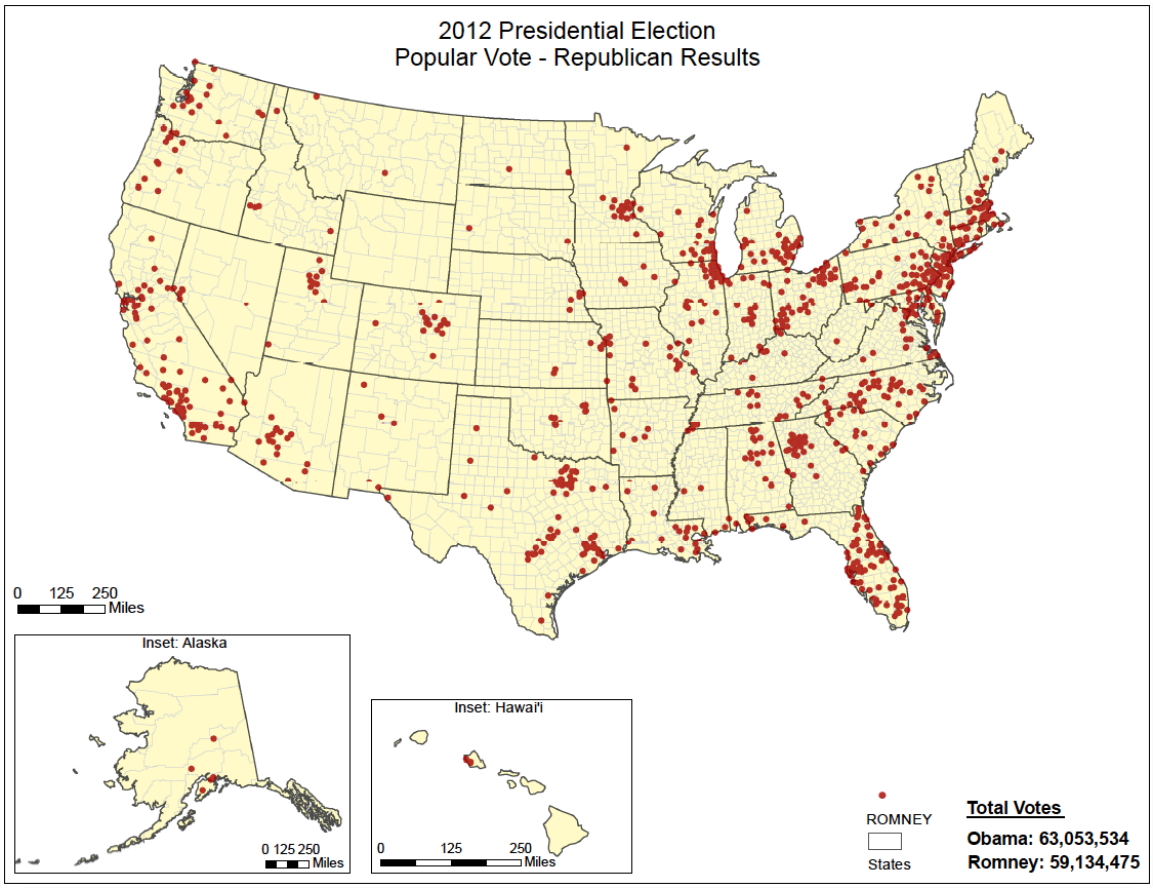

Figure 10: Republican Party voting results of the 2012 election nationwide, in which a single point represents 50,000 votes and dots are constrained by county.

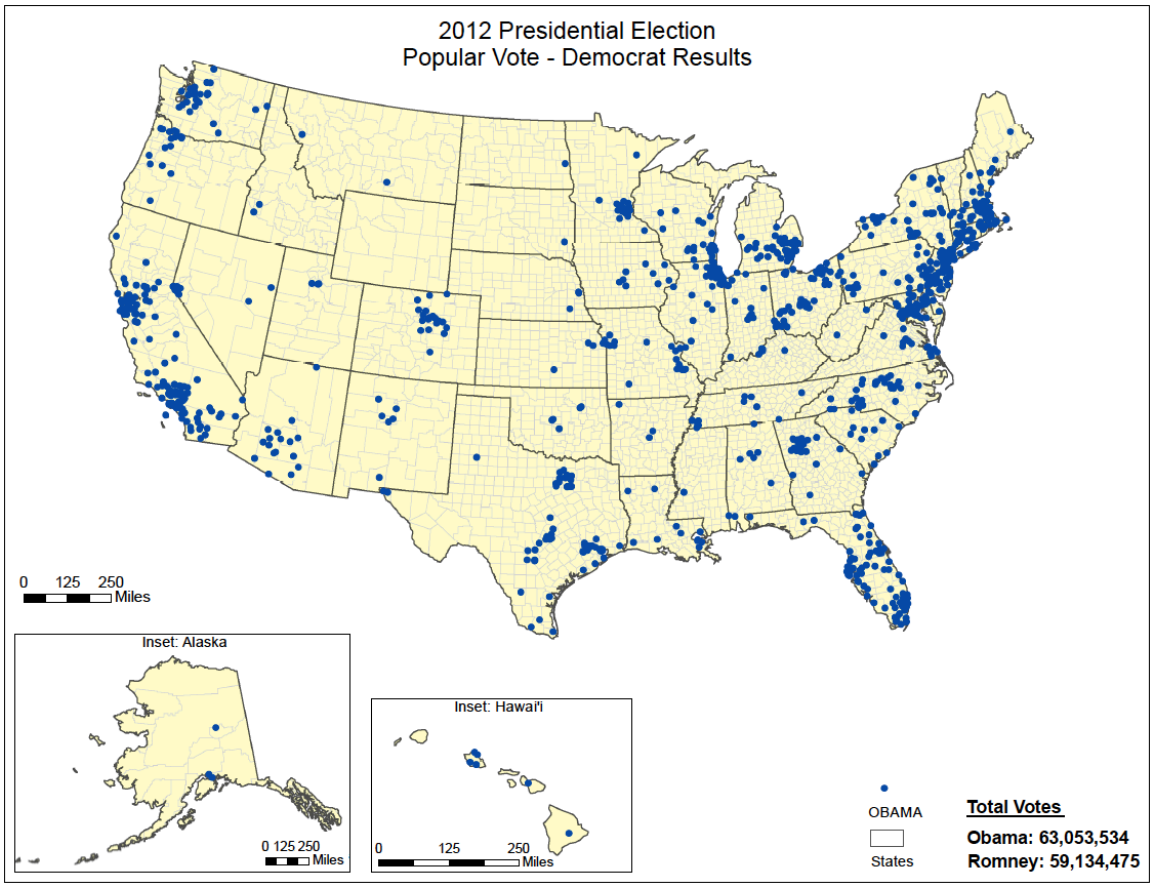

Figure 11: Democratic Party voting results of the 2012 election nationwide, in which a single point represents 50,000 votes and dots are constrained by county.

All of the maps are somewhat difficult to interpret because the size of the country and the sheer number of votes being represented obscures any detail that might otherwise have been discernible and because the necessary symbology makes it impossible to know how votes were cast in counties with fewer than 50,000 votes. However, they do allow the viewer to draw an informed conclusion about both the winner of the majority of the votes and the areas of the United States that have the strongest voting numbers.

Now that the election outcomes have been examined as both a table and a map, it becomes a little easier to address the claims of the proponents of the popular vote method, as well as the concerns of some of its detractors. This method without a doubt represents the choices of the voters, just as the proponents claimed. Because there are no electoral

votes coming into play, the vote totals are an exact representation of what the voters chose. The question of whether or not the Popular Vote method would eliminate swing states is more difficult to answer. Clearly, there are no states involved in the calculation of the election totals, but at the same time, there are still some regions of the country in which the voters are more likely to be evenly divided and/or undecided—and those regions might attract the attention of campaigning presidential hopefuls in much the same way that swing states historically have, which could create "swing regions" rather than eliminate the swing state problem as many proponents hope.

If swing states were in fact to disappear, however, it is entirely possible that elections could become more expensive, as opponents of this method assert. If candidates were suddenly required to campaign across the entire country with the same focus that they currently reserve for swing states, campaign costs could skyrocket. Alternatively, costs could remain the same and campaign strategies could change focus to create a more moderate level of campaigning for the entire country.

Finally, it is evident in looking at the maps that the Popular Vote method would weaken the power of some of the less populous states—because they have fewer individual votes to offer. In fact, this method weakens the power of *every* state and increases the power of the individual, because states have no bearing in the calculation of the election winner. Whether or not this is a weakness of this method or a benefit is entirely a matter of perspective.

5.3 Mapping the Proportional Allocation Method

The Proportional Allocation Method is an attempt to bridge the gap between the traditional Electoral College and the Popular Vote Method. Electoral votes are still awarded, which negates the fears of states losing their power—but they are awarded based on the outcome of the popular vote, which addresses the concerns of those who feel that the voters are under-represented with the traditional method.

Mapping the results using this method is a matter of representing proportions of total votes per state, which as indicated in Table 6 is a good fit for the proportional symbol mapping technique. Unfortunately, while the proportional symbol technique is effective in demonstrating which areas have large differences in vote distribution, it falls short in areas where the vote distribution is similar, but not exactly the same. For instance, in Figure 12 (below), it is clear that Obama won in California (where he had an eleven point lead), because there is a noticeable difference in size between the two circles. It is much more difficult to determine the winner in Florida, however (where Obama had only a one point lead), because the two circles are nearly identical in size. Beyond that, the circles make it almost impossible to tell exactly how many votes each candidate received. Looking at New York, it is evident that Obama received a higher number of votes, but how many electoral votes was he awarded? How many went to Romney? The circles don't look dramatically different in size, but in reality Obama actually won almost twice as many electoral votes (18 to Romney's 11).

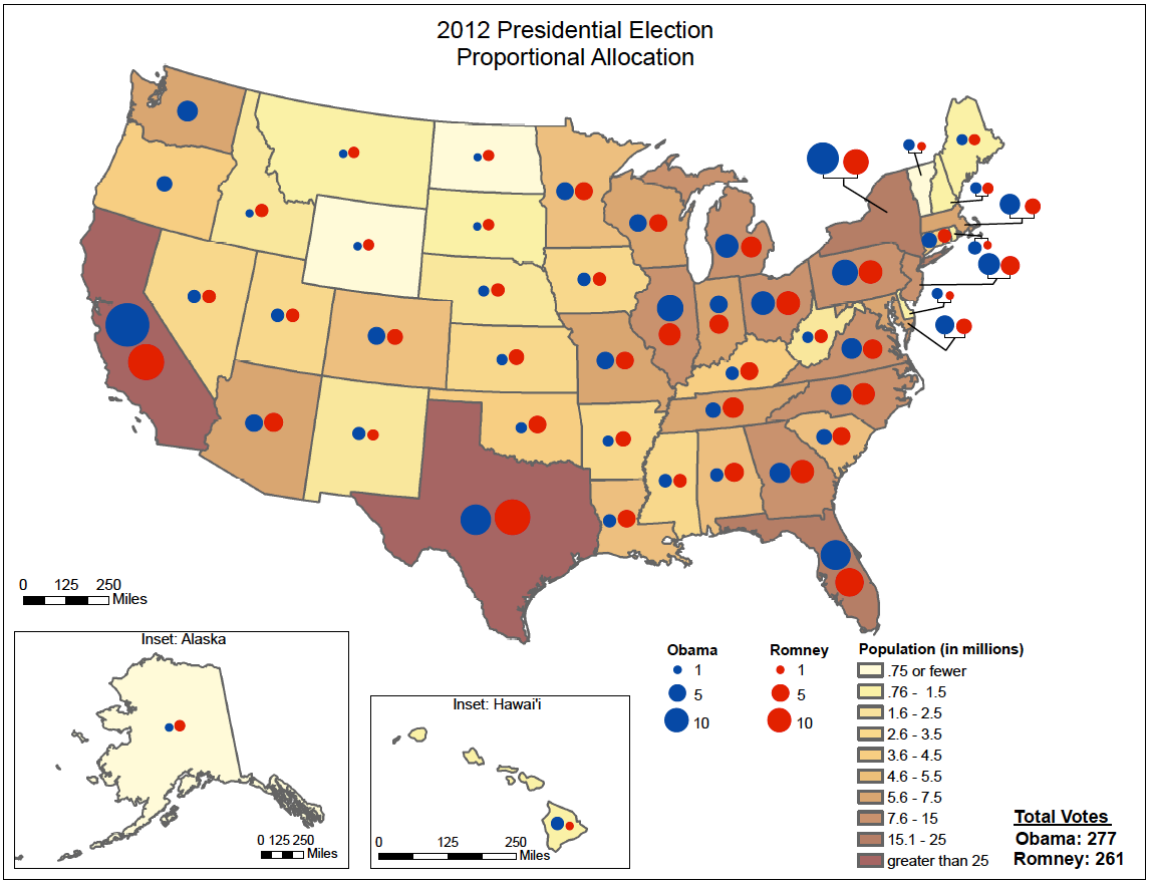

Figure 12: Proportional symbol map of the 2012 election, using the proportional allocation method

This difficulty on the part of map viewers to determine small variations in the size of different circles and make accurate comparisons between them has been studied, and some solutions have been offered to make the data representation easier to understand. Esri offers an "appearance compensation conversion" that alters the size of the circles used to make it easier for viewers to interpret the difference in circle sizes, while others feel that using graduated symbols with a set range of values (Figure 13) and a legend showing a variety of circle sizes is preferable (Meihoefer 1973).

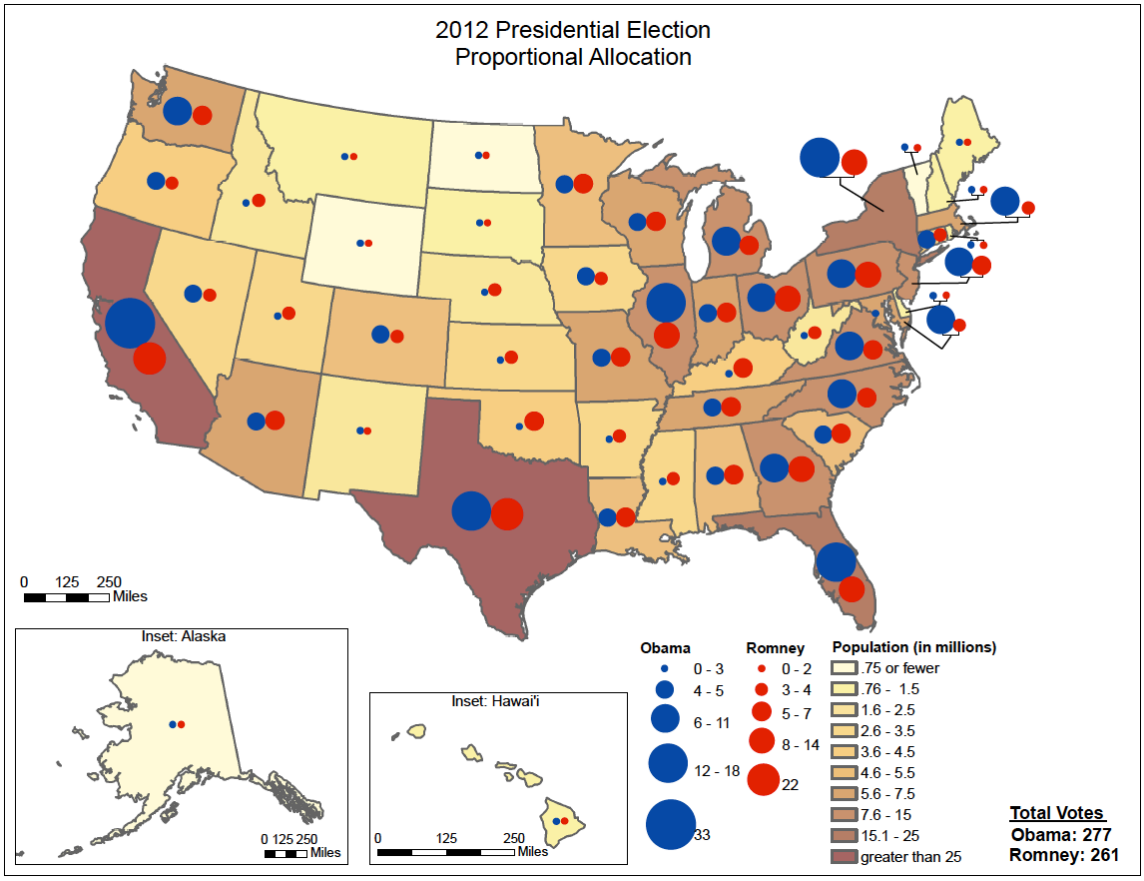

Figure 13: Graduated symbol map of the 2012 election, using the proportional allocation method

For a more precise representation of the voting distribution, proportional symbols are abandoned in favor of bar graphs (Figure 14). The bar graphs function in much the same way, but they do away with the likelihood of misinterpretation of the proportional circles. This results in a map that displays the data more accurately and with a more discernable difference between two similar but unequal values (again, such as in Florida) although it is still hard to interpret exact values in states where there are a very small number of total Electoral votes (such as in Wyoming, which has a grand total of three votes to hand out).

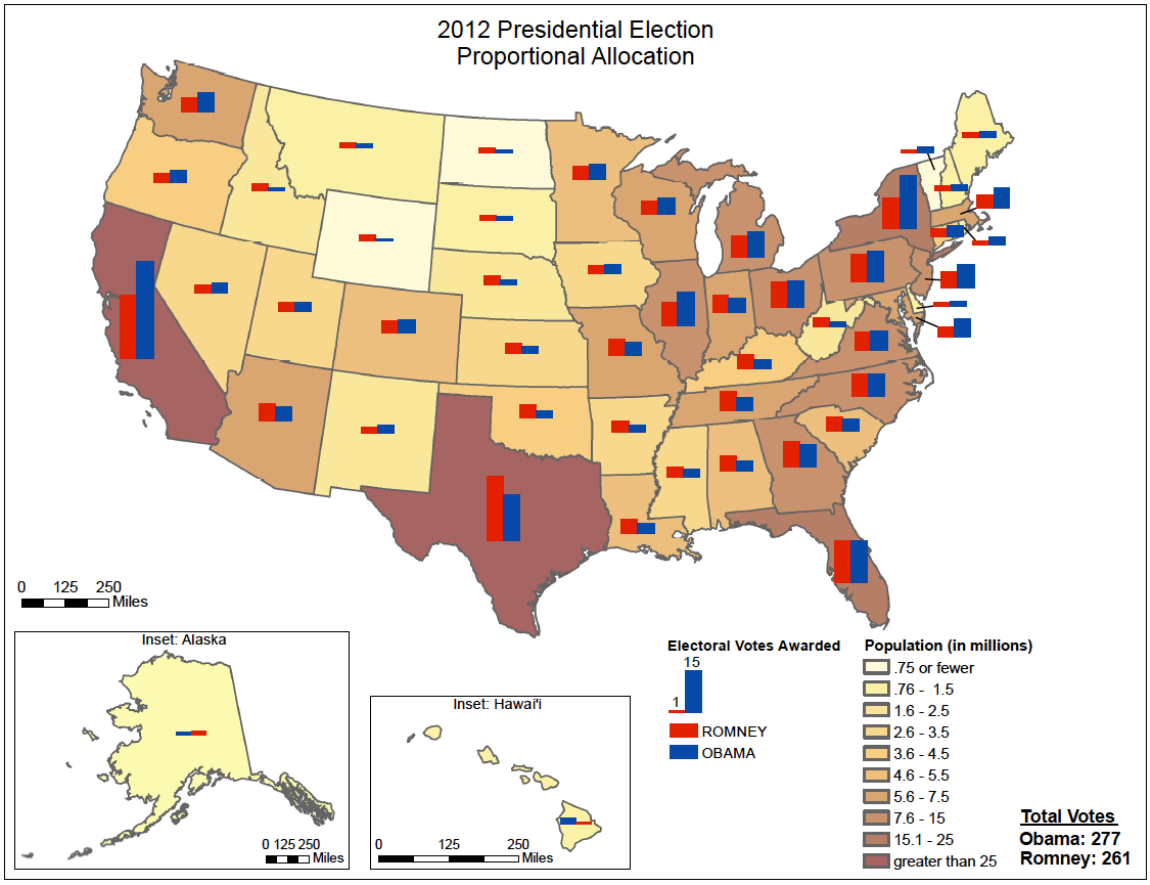

Figure 14: Bar chart map of the 2012 election, using the Proportional Allocation method and showing total population per state

Proponents of Proportional Allocation argue that the method will create a more "National" election, because the lack of a guarantee of a set number of electoral votes would eliminate the swing states. As was previously discussed, however, there is no real way of knowing if this would be true. The likelihood of swing states would be reduced, certainly, but there are still many states within the country with an even or almost even vote distribution in the 2012 election—it's likely that such states would be the focus of future campaigns under this method. Opponents of Proportional Allocation again argue that it could weaken the power of the less populous states, but the number of votes

awarded per state remains the same (until the next Census)—they are merely distributed differently.

5.4 Mapping the Congressional District Allocation Method

Mapping election results using the Congressional District method comes with its own unique set of challenges, which, as indicated in Table 6, limits the choices of appropriate map techniques available. Choropleth mapping, cartograms, and proportional symbols are not an option for this method, as each District awards the same number of votes: one. At first glance, it seems as though the same standard red/blue representation methods that were used for the traditional Electoral College results can be applied, since the districts are won on a winner-take-all basis (Figure 15). This is true, with one major difference: the extra two Senatorial votes awarded to the winner of each state. Those two extra votes are challenging to represent clearly on a map, because they are awarded using a different geography than the bulk of the data.

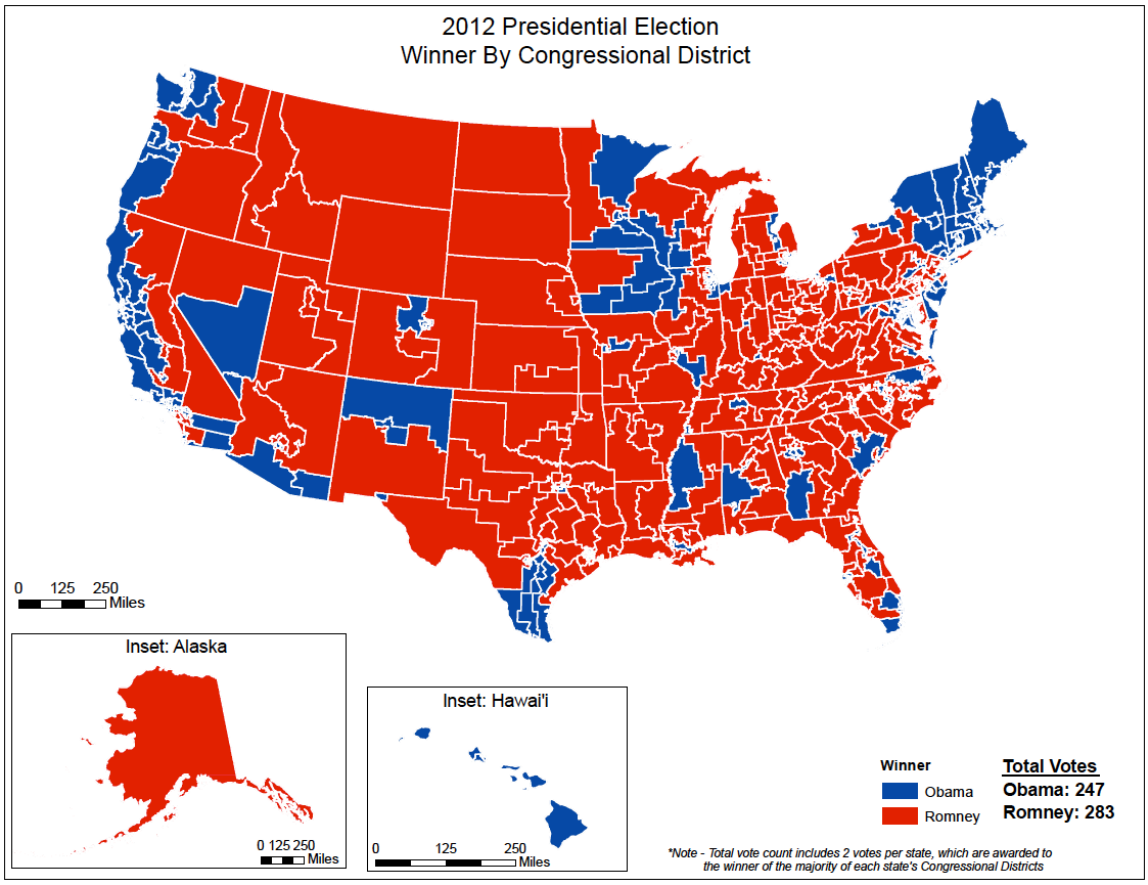

Figure 15: House of Representatives district results for the 2012 Presidential election, ***excluding the two Senatorial votes per state***

In order to represent the voting results more accurately, a transparent state-level overlay can be created, showing the color of the overall winner of each state (and thus the winner of the two Senatorial votes). This adds a slight degree of confusion, as the transparent overlay will turn the opposing colors purple, but it ensures that important information about the winner of the majority of the votes isn't lost (Figure 16).

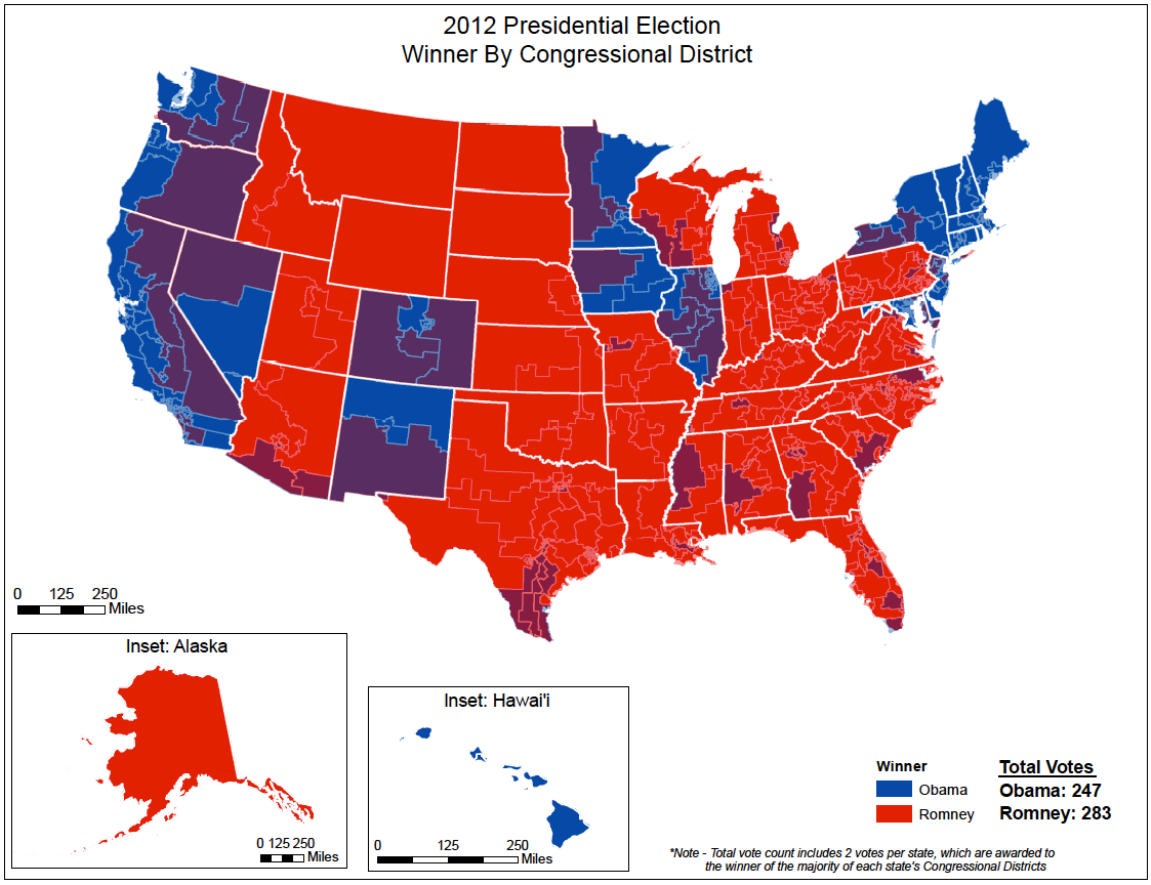

Figure 16: Congressional District results for the 2012 election, with state-level overlay

As with the traditional Electoral College maps, there is still an issue created by the vastness of some of the states, making the outcome of the election difficult to determine at a glance. Unfortunately, cartograms are not an option in this instance, for two reasons: One, each Congressional District is only worth one Electoral vote, so the cartogram cannot be calculated on that field as it was previously; two, Congressional Districts are determined by population. There are a fixed number of 435 districts total in the United States, each one of which is supposed to carry a relatively equal number of citizens. After each decennial census, the boundaries of the districts are redrawn to reflect the changes in population per state and maintain an equal population distribution. Currently, each Congressional District is home to an average of 710,767 people—so,

creating a cartogram based on population wouldn't work either, because each district carries a relatively equal weight.

Now that the Congressional District method has been examined in both table and map form, it is possible to gain a clearer perspective on the arguments for and against this type of Electoral College reform. Proponents of this method claim that it better represents the popular vote, however the results tables for both the 2000 and 2012 elections clearly shows that in both cases, the winner of the popular vote would not have been the winner of the election if the Congressional District method had been used. It is true that this method has been used in Maine and Nebraska without incident, which is something that none of the other proposed reform methods can claim. When it is applied at a national level, however, the effects of a changing geography (whether through Gerrymandering or simple redistricting without political motivation) lead some to question whether the Congressional District method would be an effective change from the Electoral College.

Having explored each of these methods from the perspective of both tables and maps, what have we learned? What has the exploration of mapping techniques told us about not only the reform methods and their relationship to the choices of the voting public, but about the challenges of mapping election results in general? The final chapter reviews the research questions posed in Chapter 1, determining what conclusions can be reached and what topics require further exploration.

CHAPTER 6: CONCLUSIONS

Many people might believe that geography has absolutely nothing to do with Presidential elections, beyond the fact that you must be a citizen of the United States in order to vote. Without an understanding of how the Electoral College functions—and how those methods that are being offered as a superior replacement function—it might seem as though the total number of votes per candidate is the only thing that matters. Upon further exploration, however, the truth becomes evident: geography has the power to change elections. In some cases, this simply refers to the fact that the geographic location of the voters can impact their political choices (De Chant 2013), while in other cases this means that geographic boundaries can actually be manipulated in order to be more likely to produce the outcome being sought by a certain political party. If it is resolved that the Electoral College is indeed in need of reform, it is vital that those who are the architects of said reform pay close attention to the manner in which votes are calculated, so that they can ideally choose a method that aligns most closely with the wishes of the voting public—even when the effects of geography are taken into account.

This study explored the Electoral College and the geography of elections in two very different ways: in the first, tables were created in order to provide a quick and clear answer to the question of whether the proposed reform methods would change election outcomes. Once it was determined that they would, in fact, change the outcomes, the study then turned to the question of *why* they would change (and whether those changes validated the claims of each method's proponents) by undertaking an in-depth visual analysis of each proposed reform method via a variety of maps created using GIS software. In doing so, it provides the reader with multiple resources, not only for

understanding how each proposed reform method functions, but also for understanding the intricacies of election mapping in general.

This investigation is not going to end the debate about how best to reform the Electoral College—or even the debate over if it needs to be reformed, at all. It is a complicated issue that has been argued about by political scientists for years, and will most likely be argued about for years to come. However, one can now see that of the many pros and cons offered for each potential reform method, one that is seldom mentioned—geography—may in fact have the biggest impact. In the case of the hotly contested 2000 Presidential election, for example, two of the proposed reform methods would have resulted in the election of Al Gore as President, while the third would have elected George Bush (as the traditional Electoral College system did). If accurately representing the choices of the voters is one of the driving forces behind the reform proposals, then close attention must be paid to the fact that only two of the proposed reform methods accomplish that task consistently: Popular Vote and Proportional Allocation. Of course, our founding fathers might argue that representing the choices of the voters was never a priority in the creation of the Electoral College.

The question of how best to represent both the results of an election geographically and the location of the voting public also does not have one definitive answer. The vast and varied geography of the United States will always pose a unique challenge in attempting to represent election outcomes, and there is no one map to suit every audience. Instead, at the onset, the map creator must ask him/herself what information they wish to convey to whom, and what map elements will enhance or detract from the viewer's understanding of that information. The map viewer, in turn,

must bear in mind the challenges a map maker faces (inconsistent geography, data limitations, and personal biases, among other things) and use that knowledge to understand that no one map can tell the whole story—but every well-constructed map can still tell the parts of the story that are most important.

There is, of course, still much to be explored on the topic. Future studies might include an in-depth exploration of the current campaign process (in which candidates focus the bulk of their money and energy on swing states), and the question of whether changing the vote calculation process can eliminate swing states altogether, or whether they would simply morph into swing counties/districts. This topic was briefly discussed in Chapter 5, but an in-depth analysis of how swing states are created and their effect on campaign strategy would no doubt yield valuable insight into the likelihood of new swing states/districts in the event of Electoral College reform.

Additionally—or perhaps even concurrently—there are still many avenues to explore in the realm of election mapping. While this study encompassed some of the most commonly found symbology methods, the availability of newer technology such as three-dimensional mapping software creates more possibilities for election mapping. What information can the added dimension convey that a traditional two-dimensional map cannot? How can this expand on a map viewer's understanding of the complexities of voting behavior and geography on election results? As technology progresses, this topic will no doubt continue to expand, creating more and more possibilities for the mapping of voters and election outcomes.

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