

IN THE
UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF WASHINGTON

SUSAN SOTO PALMER, et al.,

Case No. 3:22-CV-5035-RSL

Plaintiffs,

v.

STEVEN HOBBS, in his official capacity as Secretary of State of Washington, and the STATE OF WASHINGTON,

Defendants,

and,

JOSE TREVINO, ISMAEL G. CAMPOS, and State Representative ALEX YBARRA,

Intervenor-Defendants.

EXPERT REPORT OF SEAN P. TRENDE, Ph.D.

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1 Expert Qualifications

1.1 Career

I serve as Senior Elections Analyst for Real Clear Politics. I joined Real Clear Politics in January of 2009 after practicing law for eight years. I assumed a fulltime position with Real Clear Politics in March of 2010. Real Clear Politics is a company of approximately 50 employees, with its main offices in Washington D.C. It produces one of the most heavily trafficked political websites in the world, which serves as a one-stop shop for political analysis from all sides of the political spectrum and is recognized as a pioneer in the field of poll aggregation. Real Clear Politics produces original content, including both data analysis and traditional reporting.

My main responsibilities with Real Clear Politics consist of tracking, analyzing, and writing about elections. I collaborate in rating the competitiveness of Presidential, Senate, House, and gubernatorial races. As a part of carrying out these responsibilities, I have studied and written extensively about demographic trends in the country, exit poll data at the state and federal level, public opinion polling, and voter turnout and voting behavior. In particular, understanding the way that districts are drawn and how geography and demographics interact is crucial to predicting United States House of Representatives races, so much of my time is dedicated to that task.

I am currently a Visiting Scholar at the American Enterprise Institute, where my publications focus on the demographic and coalitional aspects of American Politics.

I am also a Lecturer at The Ohio State University.

1.2 Publications and Speaking Engagements

I am the author of the 2012 book *The Lost Majority: Why the Future of Government is up For Grabs and Who Will Take It*. In this book, I explore realignment theory. It argues that realignments are a poor concept that should be abandoned. As part of this analysis, I conducted a thorough analysis of demographic and political trends beginning

in the 1920s and continuing through modern times, noting the fluidity and fragility of the coalitions built by the major political parties and their candidates.

I also co-authored the 2014 Almanac of American Politics. The Almanac is considered the foundational text for understanding congressional districts and the representatives of those districts, as well as the dynamics in play behind the elections. My focus was researching the history of and writing descriptions for many of the 2012 districts, including tracing the history of how and why they were drawn the way that they were drawn. Because the 2014 Almanac covers the 2012 elections, analyzing how redistricting was done was crucial to my work. I have also authored a chapter in Larry Sabato's post-election compendium after every election dating back to 2012.

I have spoken on these subjects before audiences from across the political spectrum, including at the Heritage Foundation, the American Enterprise Institute, the CATO Institute, the Bipartisan Policy Center, and the Brookings Institution. In 2012, I was invited to Brussels to speak about American elections to the European External Action Service, which is the European Union's diplomatic corps. I was selected by the United States Embassy in Sweden to discuss the 2016 elections to a series of audiences there and was selected by the United States Embassy in Spain to fulfill a similar mission in 2018. I was invited to present by the United States Embassy in Italy, but was unable to do so because of my teaching schedule.

1.3 Education

I received my Ph.D. in political science at The Ohio State University in 2023. I passed comprehensive examinations in both methods and American Politics. The first chapter of my dissertation involves voting patterns on the Supreme Court from 1900 to 1945; the second chapter involves the application of integrated nested LaPlace approximations to enable the incorporation of spatial statistical analysis in the study of United States elections. The third chapter of the dissertation involves the use of communities of interest in redistricting simulations. In pursuit of this degree, I also earned a Mas-

ter's Degree in Applied Statistics. My coursework for my Ph.D. and M.A.S. included, among other things, classes on G.I.S. systems, spatial statistics, issues in contemporary redistricting, machine learning, non-parametric hypothesis tests and probability theory. I also earned a B.A. from Yale University in history and political science in 1995, a Juris Doctor from Duke University in 2001, and a Master's Degree in political science from Duke University in 2001.

In the winter of 2018, I taught American Politics and the Mass Media at Ohio Wesleyan University. I taught Introduction to American Politics at The Ohio State University for three semesters from Fall of 2018 to Fall of 2019, and again in Fall of 2021. In the Springs of 2020, 2021, 2022 and 2023, I taught Political Participation and Voting Behavior at The Ohio State University. This course spent several weeks covering all facets of redistricting: how maps are drawn, debates over what constitutes a fair map, measures of redistricting quality, and similar topics. I also taught survey methodology in Fall of 2022 and Spring of 2024.

1.4 Prior Engagements as an Expert

A full copy of all cases in which I have testified or been deposed is included on my c.v, attached as Exhibit 1. In 2021, I served as one of two special masters appointed by the Supreme Court of Virginia to redraw the districts that will elect the Commonwealth's representatives to the House of Delegates, state Senate, and U.S. Congress in the following decade. The Supreme Court of Virginia accepted those maps, which were praised by observers from across the political spectrum. *E.g.*, "New Voting Maps, and a New Day, for Virginia," *The Washington Post* (Jan. 2, 2022), available at <https://www.washingtonpost.com/opinions/2022/01/02/virginia-redistricting-voting-maps-gerrymander/>; Henry Olsen, "Maryland Shows How to do Redistricting Wrong. Virginia Shows How to Do it Right," *The Washington Post* (Dec. 9, 2021), available at <https://www.washingtonpost.com/opinions/2021/12/09/maryland-virginia-redistricting/>; Richard Pildes, "Has VA Created a New Model for a Reasonably Non-Partisan Redistricting

Process,” *Election Law Blog* (Dec. 9, 2021), available at <https://electionlawblog.org/?p=126216>.

In 2019, I was appointed as the court’s expert by the Supreme Court of Belize. In that case I was asked to identify international standards of democracy as they relate to malapportionment claims, to determine whether Belize’s electoral divisions (similar to our congressional districts) conformed with those standards, and to draw alternative maps that would remedy any existing malapportionment.

I served as a Voting Rights Act expert to counsel for the Arizona Independent Redistricting Commission in 2021 and 2022.

2 Introduction

2.1 Scope of Engagement

I have been retained by Intervenor-Defendants in the above-captioned action, to evaluate the remedial maps submitted by Plaintiffs. I have been retained and am being compensated at a rate of \$450.00 per hour to provide my expert analysis.

2.2 Data Utilized

For purposes of this project, I utilized the following data:

- Block Assignment files provided by plaintiffs;
- Election results projected to the census block level, downloaded from the Redistricting Data Hub (<https://redistrictingdatahub.org/>);
- Census data for Citizen Voting Age Population by race, downloaded from <https://www.census.gov/programs-surveys/decennial-census/about/voting-rights/cvap.html>

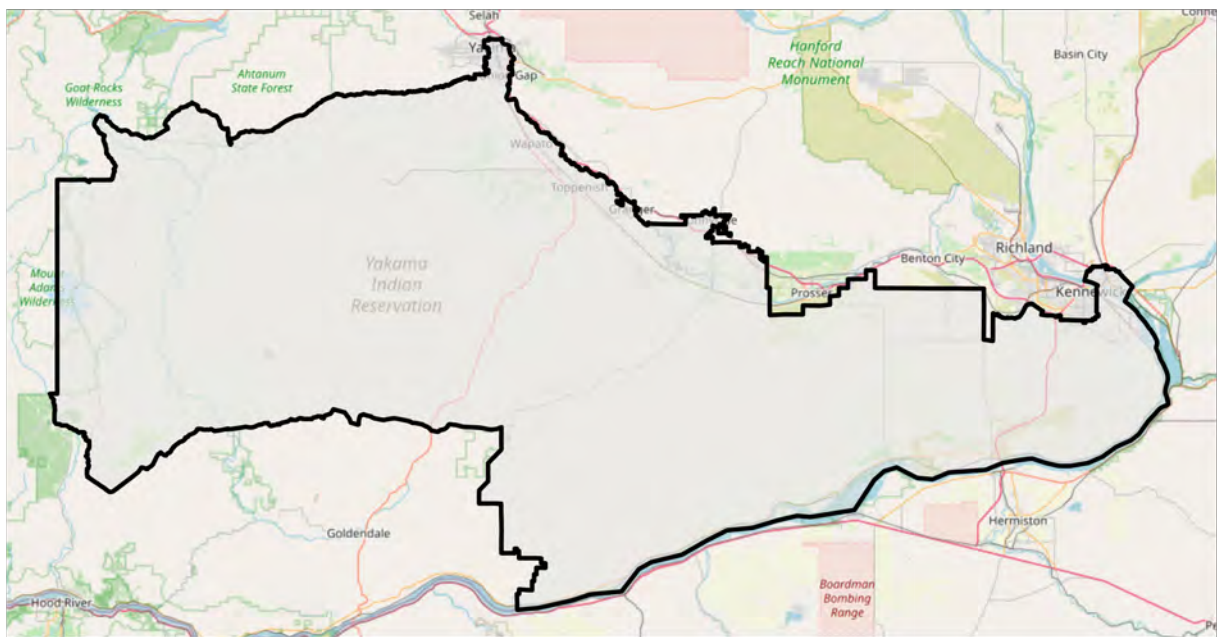
3 Analysis of Remedial Maps 1 and 2

Although five remedial maps have been submitted, there are only three variants of the actual remedial districts, with further variations on how the surrounding districts are treated. I therefore break my analysis into three parts – one for each proposed remedial district. This section covers the first two maps.

3.1 Overview

Maps 1 and 2 both use the configuration depicted in Figure 1 for their remedial VRA district:

Figure 1: Proposed VRA District in Remedial Maps 1 and 2



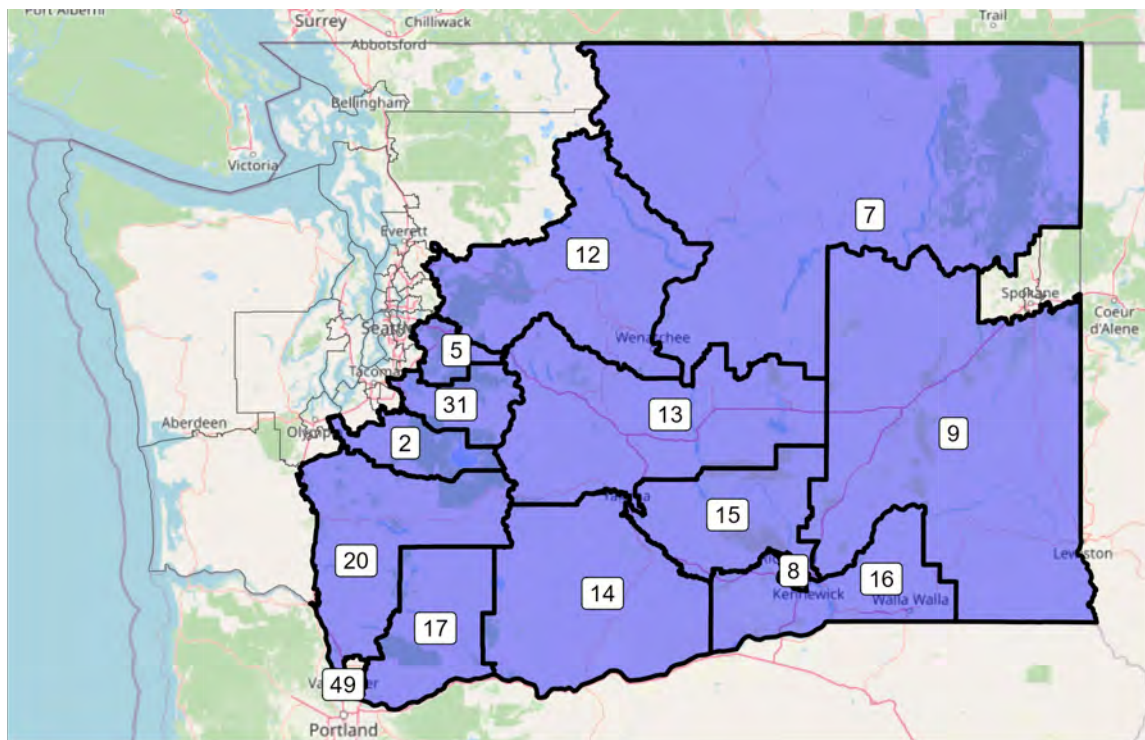
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This district combines populations from Yakima, Pasco, and several small towns along the Yakima River.

3.1.1 Remedial Map 1

Remedial Map 1, however, includes a cascade of changes that extend beyond the borders of the proposed remedial VRA district (which has been renumbered to 14 in all remedial maps). Figure 2, for example, shows which of the districts in the Enacted Map are changed in Remedial Map 1. Overall, 14 districts, or 28.6% of the districts in the state, are changed in Remedial Map 1.

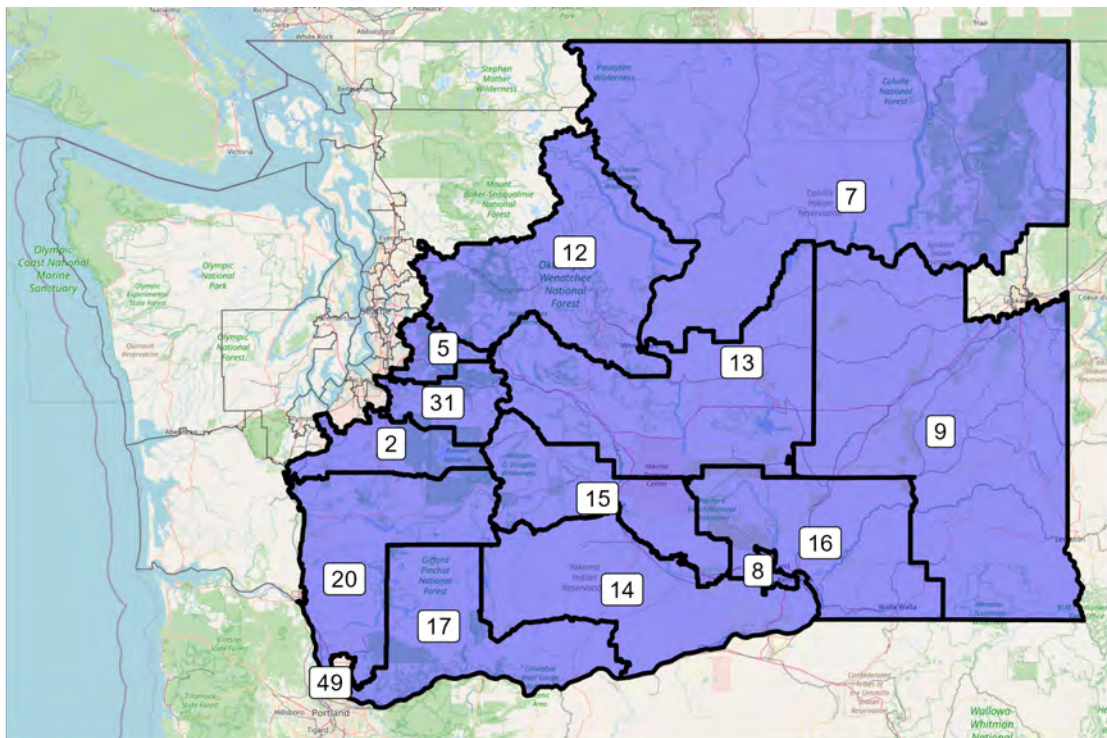
Figure 2: Enacted Map, with Districts Altered in Remedial Map 1 Highlighted



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Similarly, Figure 3 shows the districts in Remedial Map 1 with the districts that were altered from the Enacted Map highlighted.

Figure 3: Remedial Map 1, with Districts Altered from Enacted Map Highlighted

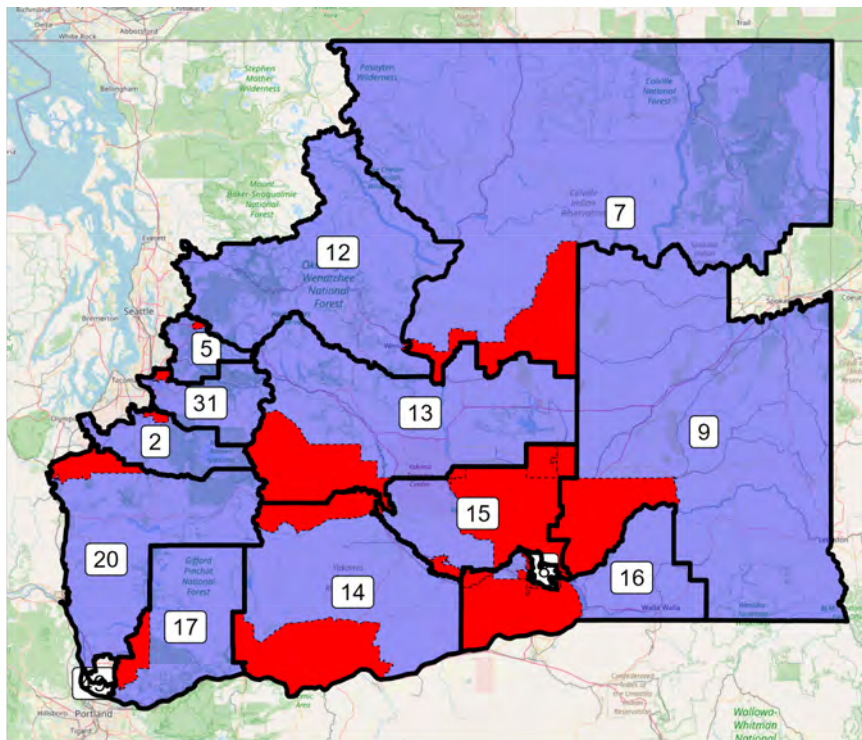


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A final visual aid for understanding what Remedial Map 1 does is found in Figure 4. This highlights the Enacted Plan districts that are changed in Map 1. It also depicts the census blocks¹ that are shifted between districts from the Enacted Plan to the remedial plan by highlighting them in red.

¹The United States Census Bureau Reports the results of the Decennial Census at various levels. The “quarks” of the census data are what are known as census blocks, which are small geographic areas that typically conform to major geographic boundaries or other visible features, such as rivers, roadways, train tracks, and so forth. Census blocks are grouped together to form block groups, which in turn are grouped together to form census tracts, which are large portions of counties.

Figure 4: Enacted Map, with Census Blocks Shifted Into Different Districts in Remedial Map 1 Highlighted in Red



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The following table summarizes these population movements. For each of the Enacted Districts that are changed, it shows to which districts its residents are moved. In other words, 21,098 residents of Enacted District 2 are moved into Remedial District 31; 21,006 residents of Enacted District 5 are moved into Remedial District 12; and so forth.

Movement of Residents, Enacted Plan v. Remedial Plan 1		
Enacted District	Remedial District 1	Total
2	31	21,098
5	12	21,006
7	13	20,961
8	16	59,854
9	16	9,612
12	7	20,938
13	15	30,654
14	15	88,714
14	17	21,311
15	8	0
15	9	9,356
15	13	9,603
15	14	97,346
15	16	16,619
16	8	59,712
16	14	12,374
16	15	12,046
17	20	21,178
20	2	20,989
31	2	0
31	5	20,880
49	17	0

In total, the map shifts 574,251 individuals among the districts, including 247,170 residents who do not reside in Enacted Districts 14, 15 or 16 and 147,050 residents who do not reside in either Enacted Districts 14, 15 or 16 or in Remedial Districts 14, 15 or 16.

Finally, the changes take place over much of the state, with blocks being shifted in 28 of the state's 39 counties, including several in western Washington. Overall, six

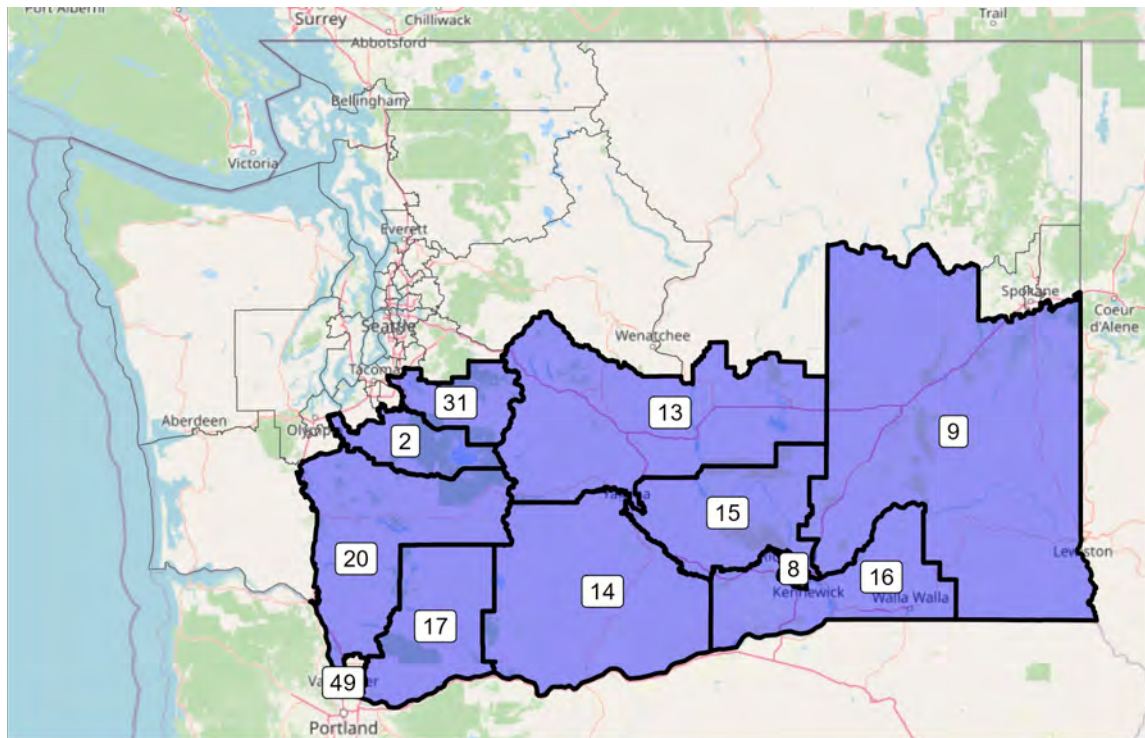
districts are moved entirely out of seven counties, while seven districts are moved into nine counties.

Districts Moved Into and Out of Counties, Enacted vs. Remedial 1			
District Moves Out Of		District Moves Into	
District	County	District	County
8	Franklin	2	Lewis
9	Franklin	5	Pierce
12	Douglas	7	Chelan
13	Yakima	13	Adams
15	Adams	13	Douglas
15	Franklin	14	Benton
15	Grant	14	Franklin
20	Thurston	16	Grant
—	—	17	Klickitat

3.1.2 Remedial Map 2

Remedial Map 2 alters fewer districts than does Remedial Map 1. Figure 5 shows which of the districts in the Enacted Map are changed in Remedial Map 2. Overall, the boundaries of 11 districts, or 22.4% of the districts in the state, are altered in Remedial Map 2.

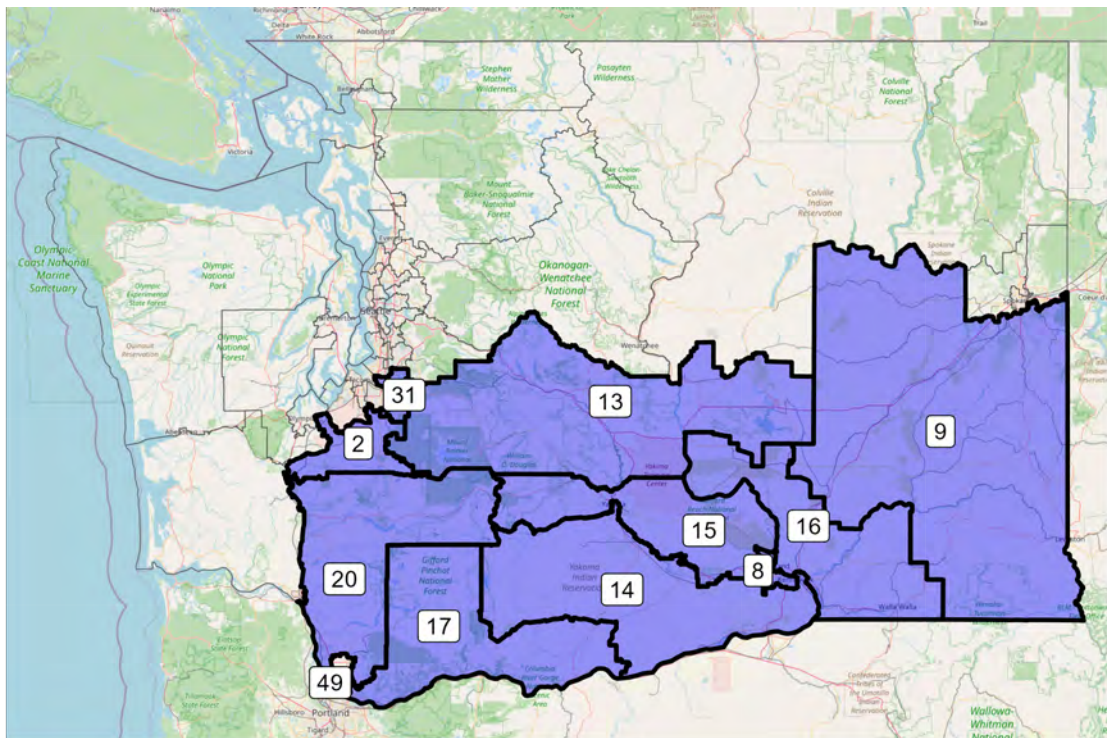
Figure 5: Enacted Map, with Districts Altered in Remedial Map 2 Highlighted



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Similarly, Figure 6 shows the districts in Remedial Map 2 with the districts that were altered from the Enacted Map highlighted.

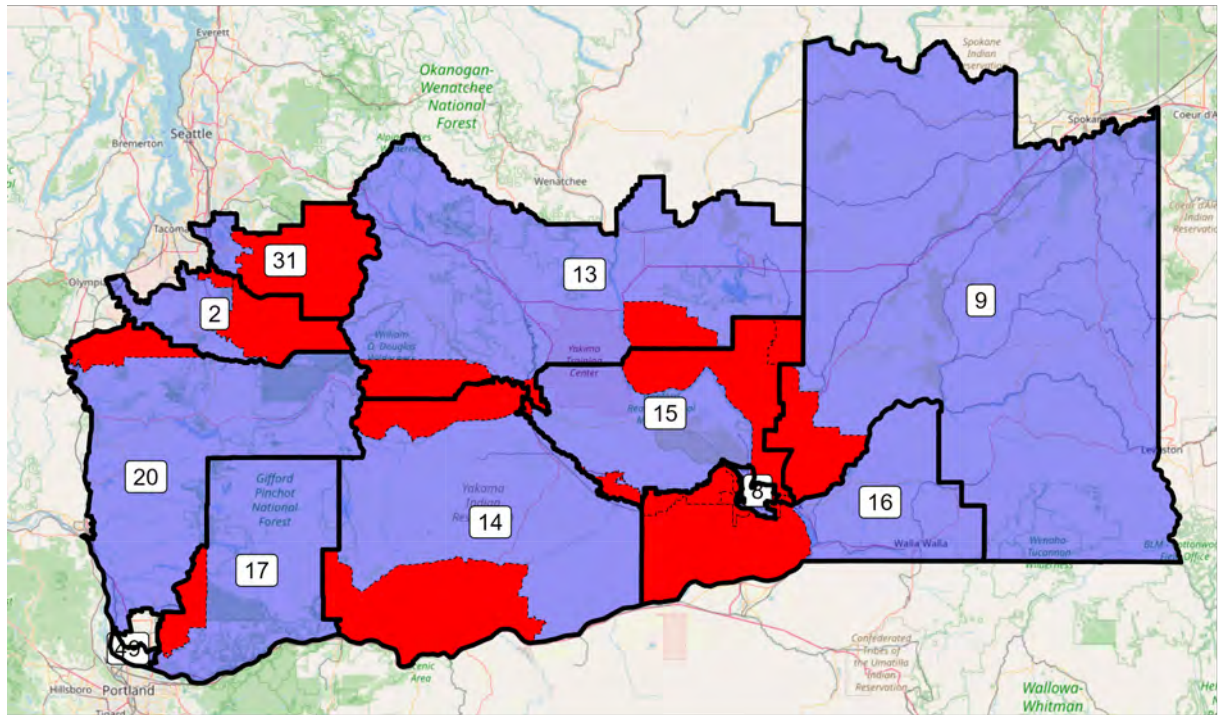
Figure 6: Remedial Map 2, with Districts Altered from Enacted Map Highlighted



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Finally, Fig. 7 highlights the Enacted Plan districts that are changed in Map 2. It also depicts the census blocks that are shifted between districts from the Enacted Plan to the remedial plan by highlighting them in red.

Figure 7: Enacted Map, with Census Blocks Shifted Into Different Districts in Remedial Map 2 Highlighted in Red



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We can once again see the degree to which the Remedial Map disrupts the Enacted Map in the following table:

Movement of Residents, Enacted Plan v. Remedial Plan 2		
Enacted District	Remedial District 1	Total
2	13	127
2	31	21,098
8	16	59,854
9	16	3,261
13	15	17,271
13	16	3,849
14	15	88,714
14	17	21,311
15	8	0
15	9	3,171
15	14	97,346
15	16	31,429
16	8	59,712
16	14	12,374
16	15	24,235
17	20	21,178
20	2	20,989
31	13	21,003
49	17	0

In total, the map shifts 506,922 individuals among the districts, including 168,630 residents who do not reside in Enacted Districts 14, 15 or 16 and 88,244 residents who do not reside in either Enacted Districts 14, 15 or 16 or in Remedial Districts 14, 15 or 16.

Finally, the changes take place over much of the state, with blocks being shifted in 21 of the state's 39 counties, including in several western Washington counties. Overall, six districts are moved entirely out of seven counties, while seven districts are moved into nine counties.

Districts Moved Into and Out of Counties, Enacted vs. Remedial 2			
District Moves Out Of		District Moves Into	
District	County	District	County
8	Franklin	2	Lewis
15	Adams	13	Columbia
15	Franklin	13	Pierce
15	Grant	14	Benton
20	Thurston	14	Franklin
—	—	16	Adams
—	—	16	Grant
—	—	17	Klickitat

3.2 HCVAP

I was asked to identify the Hispanic Citizen Voting Age Population in the district with the highest Hispanic Citizen Voting Age Population in plaintiffs' proposed remedial districts, and to compare it to the HCVAP in the Enacted Plan District 15. Estimating this is a tricky task. Because the census only reports citizen voting age population at the block group level (see *supra* note 1), and because the districts divide block groups, the population estimates must be estimated for the blocks. Those blocks can then be aggregated up to give an estimate of the HCVAP on a district-wide level.

The way that this is typically done is to take the population of the block group, and then apportion it to the blocks according to some known population of the blocks. For example, suppose that you had 1,000 Hispanic citizens of voting age in a block group, and that the block group contains three blocks: Block A, Block B and Block C. These blocks have voting age populations (which are known from the decennial census) of 500, 1500 and 2000, respectively. An analyst might observe that these blocks contain 12.5%, 37.5% and 50% of the voting age population of the block group, respectively, and apportion 125 Hispanic Citizens of Voting Age from the block group to Block A (1,000 x 12.5%), 375 to Block B (1,000 x 37.5%) and 500 to Block C (1,000 x 50%). There are other ways you

could do this. One might use the Hispanic Voting Age Population, or overall Voting Age Population, or other techniques to create the estimates. Most of these techniques will give the same answer, however, within a few tenths of a percentage point.

For purposes of this report, I have weighted the CVAP to the Total Voting Age Population for each block from the 2020 census, and the HCVAP to the Hispanic Voting Age Population for each block. The blocks were then aggregated.

HCVAP Estimates of VRA Districts in Remedial 1 and 2, and Enacted Map

Year	HCVAP% (Rem. Maps 1 and 2)	HCVAP% (Enacted Map)
2021	51.7%	52.6%
2020	51.3%	51.9%
2019	49.8%	50.0%

3.3 Compactness of the District Shapes

I was asked to consider the compactness of the districts in Remedial Maps 1 and 2, compared to the Enacted Map. In particular, I was asked to examine the analysis of Dr. Oskooii. First, and critically, Dr. Oskooii reports the overall compactness for all of the state's 49 districts in the various remedial proposals, and notes that they are similar to the Enacted Map. Oskooii Report at 13.

This is not the whole story. While Dr. Oskooii does change a surprisingly large number of districts to remedy a violation occurring in a single district, he nevertheless leaves many other districts intact in his remedial maps. Since the compactness metrics of most of the districts in the remedial maps are unchanged by definition, even fairly gratuitous decreases in the compactness of the other districts will not change the overall compactness of a remedial map when calculated on a statewide basis.

This report supplements Dr. Oskooii's aggregate analysis by examining the com-

pactness of the individual districts that are altered in each remedial map. While there are hundreds of district compactness metrics available, I focus on the two metrics employed by Dr. Oskooii: Reock and Polsby-Popper. At this stage in the litigation, I suspect that these metrics have been fully defined and explored previously, so I will be brief. The Reock score imagines a circle around the district that touches the district boundary in at least two points but never crosses that boundary. The score reflects the percentage of that circle's area that the district will fill. Thus, the more distended the district becomes, the worse it scores. A circle would have a perfect Reock score of 1; a line would have a Reock score of 0.

The Polsby-Popper score imagines a circle with the same perimeter as the district. The score is the percentage of that circle's area that the district would fill. Thus, as a district grows arms and inlets, its perimeter will increase. This will in turn increase the perimeter of the circle, which will increase the circle's area, decreasing the percentage of the circle that the district will fill, leading to a lower score.

The following table shows the 10 least compact district districts using the Reock scores for the Enacted Plan, and Remedial Plans 1 and 2. The compactness of additional districts could easily be extracted from the accompanying code.

We begin with the Reock Scores. Districts that are changed in either Remedial Plan 1 or Remedial Plan 2 are highlighted.

10 Lowest Reock Scores					
Enacted Map, Remedial 1 and Remedial 2					
Enacted Map		Remedial 1		Remedial 2	
Reock	District	Reock	District	Reock	District
0.133	42	0.133	42	0.133	42
0.180	2	0.166	2	0.174	15
0.222	43	0.219	14	0.199	2
0.243	16	0.220	15	0.202	13
0.258	41	0.222	43	0.216	16
0.279	8	0.234	17	0.219	14
0.291	49	0.256	5	0.222	43
0.295	13	0.258	41	0.234	17
0.304	40	0.281	8	0.258	41
0.308	5	0.291	49	0.281	8

Under all 3 plans, District 42 remains the least compact district. That is unsurprising, as its shape is largely dictated by the elongated shape of county Whatcom County. District 2, located in southern Pierce County and portions of eastern Thurston County, is the second-least compact in both the Enacted Plan and under Remedial Plan 1 (where it is made even less compact). Remedial Plan 2 makes this district slightly more compact.

District 14 would be less compact than all but these two Enacted Plan Districts using the Reock Score in either remedial map. Dr. Oskoi's Remedial Map 1 makes four districts less compact than the third-least compact district in the Enacted Plan, while Remedial Map 2 is even worse, making six districts less compact than the third-least compact district in the Enacted Plan. It makes District 15 less compact than any district in the Enacted Plan, save for District 42 (which again, is likely forced by the shape of Whatcom County to have a low Reock score).

Remedial Map 1 makes Districts 2, 5, 7, 9, 14, 15, 17, 20, and 49 less compact – in some cases, substantially so – while Districts 8, 12, 13, 16 and 31 are made marginally

more compact. Of particular note, the proposed remedial district sees its Reock score drop from 0.531 to 0.219, taking it from one of the most compact districts in the map to one of the least compact districts in the map.

Comparison of Reock Scores, Changed Districts, Remedial 1					
Made Less Compact			Made More Compact		
Enacted District	Reock, Enacted	Reock, Rem. 1	District	Reock, Enacted	Reock, Rem. 2
2	0.180	0.166	8	0.279	0.281
5	0.308	0.256	12	0.343	0.344
7	0.368	0.341	13	0.295	0.302
9	0.498	0.457	16	0.243	0.301
14	0.531	0.219	31	0.310	0.312
15	0.323	0.220	—	—	—
17	0.455	0.234	—	—	—
20	0.387	0.386	—	—	—
49	0.291	0.291	—	—	—

Comparison of Reock Scores, Changed Districts, Remedial 2					
Made Less Compact			Made More Compact		
Enacted District	Reock, Enacted	Reock, Rem. 2	District	Reock, Enacted	Reock, Rem. 2
9	0.498	0.481	2	0.180	0.199
13	0.295	0.202	8	0.279	0.281
14	0.531	0.219	31	0.310	0.457
15	0.323	0.174	—	—	—
16	0.243	0.216	—	—	—
17	0.455	0.234	—	—	—
20	0.387	0.386	—	—	—
49	0.291	0.291	—	—	—

Here, only three districts are made more compact, while nine districts are made less compact. Districts 13, 14, 15 and 17 all see significant reductions in their compactness; only District 31 is made appreciably more compact under this metric.

For Polsby-Popper, the story is much the same. Under the Enacted Map, only three of the districts that Dr. Oskooii changes are among the 10 least compact districts. Under Remedial Map 1 that number is 6 and under Remedial Map 2 that number is 5. Only one district has a Polsby-Popper score under 0.2 in the Enacted Plan – a district that largely follows the irregular boundaries of Renton and Tukwila. Under the two remedial plans that number grows to four.

10 Lowest Polsby-Popper Scores					
Enacted Map, Remedial 1 and Remedial 2					
Enacted Map		Remedial 1		Remedial 2	
Polsby-Popper	District	Polsby-Popper	District	Polsby-Popper	District
0.141	11	0.141	11	0.134	2
0.203	8	0.185	2	0.141	11
0.217	45	0.188	8	0.185	15
0.222	2	0.189	5	0.188	8
0.223	41	0.211	15	0.217	45
0.226	12	0.217	45	0.220	31
0.227	1	0.223	41	0.223	41
0.242	6	0.223	12	0.226	12
0.245	26	0.227	1	0.227	1
0.245	35	0.231	14	0.231	14

Once again, most of the districts that are redrawn under this map are made less compact. Under Remedial Map 1, 11 districts are made less compact, while just three are made more compact. Districts 14 and 17 stand out as having particularly large decreases in their compactness.

Comparison of Polsby-Popper Scores, Changed Districts, Remedial 1					
Made Less Compact			Made More Compact		
Enacted District	Polsby-Popper, Enacted	Polsby-Popper, Rem. 1	District	Polsby-Popper, Enacted	Polsby-Popper, Rem. 2
2	0.222	0.185	7	0.327	0.340
5	0.249	0.189	9	0.351	0.372
8	0.203	0.188	16	0.278	0.352
12	0.226	0.223	—	—	—
13	0.271	0.237	—	—	—
14	0.478	0.231	—	—	—
15	0.255	0.211	—	—	—
17	0.489	0.281	—	—	—
20	0.290	0.252	—	—	—
31	0.330	0.284	—	—	—
49	0.291	0.291	—	—	—

Under Remedial Map 2, every district that is changed is made less compact using the Polsby-Popper score, with the exception of District 9. Districts 14 and 17 once again stand out.

Comparison of Polsby-Popper Scores, Changed Districts, Remedial 2					
Made Less Compact			Made More Compact		
Enacted District	Polsby-Popper, Enacted	Polsby-Popper, Rem. 2	District	Polsby-Popper, Enacted	Polsby-Popper, Rem. 2
2	0.222	0.134	9	0.351	0.378
8	0.203	0.188	—	—	—
13	0.271	0.235	—	—	—
14	0.478	0.231	—	—	—
15	0.255	0.185	—	—	—
16	0.278	0.245	—	—	—
17	0.489	0.281	—	—	—
20	0.290	0.252	—	—	—
31	0.330	0.220	—	—	—
49	0.291	0.291	—	—	—

3.4 Compactness of Population

I was also asked to examine how District 14 in Remedial Maps 1 and 2 are put together. In particular, I was asked to look at whether there was a compact minority

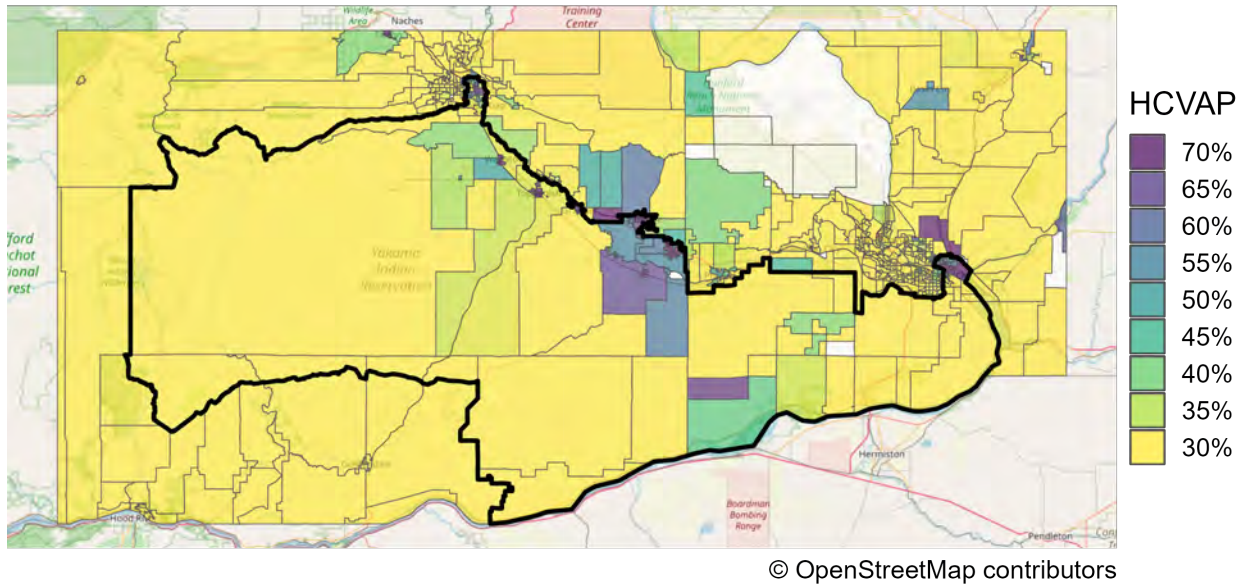
population at the core of the district, or whether the district stitched together discrete clusters of minority groups to achieve the 50% + 1 threshold.

The answer is the latter. Not only do the maps stitch together far-flung Hispanic populations, they do so while weaving in and out of otherwise compact communities that are geographically close to one another. Whatever data were used as the basis for drawing the maps – and I have no particular reason to question Dr. Oskooii’s assurances that he directly consulted neither racial nor political data – the maps nevertheless carve out Hispanic areas and Democratic areas with razor-like accuracy across a wide swath of south-central Washington, creating appendages that wrap into heavily Hispanic and Democratic areas in order to build the district.

We begin with choropleth maps. Choropleth maps are traditional “area-based” maps, where some areal unit (here, voting districts, or VTDs ²) are shaded to correspond with some data (here, percentage Hispanic CVAP). We can first look at the maps on a district-wide basis. Note that white areas have zero population; attempting to calculate a HCVAP here returns a null value.

²VTDs are a census unit that are similar to precincts, although they are not always identical

Figure 8: HCVAP of VTDs, Remedial Map 1 and 2, District 14



These color scales on these maps are truncated at 30% and 70% HCVAP. In my experience, allowing the color scale to run from 0% to 100% risks losing a good deal of data, as differences in the crucial 40% - 60% HCVAP range are blended together. This approach has been accepted in many courts in which I have testified, and has never been challenged by a court.

As you can see, the district begins with a heavy cluster of Hispanic citizens in Pasco, before looping around to the south and covering wide swaths of heavily White precincts. It then picks up a cluster of heavily Hispanic cities along the Yakima River, while ignoring heavily non-Hispanic White neighboring cities.

The following table illustrates this. It shows all of the cities ³ in Benton, Franklin and Yakima counties, the District to which they are assigned, and the Hispanic Citizen Voting Age Population for each. They are then arranged by HCVAP. When a city appears

³Many of these places are not “cities”, in the strictest sense of the term. In the interest of word economy, I use it as a general term for locations ranging from census-designated places to cities

more than once, it means that the city is split; the HCVAP for the portion of the city contained in each district is reported separately.

Rank	District	City	HCVAP	Rank	District	City	HCVAP
1	15	Cliffdell	0.00%	25	14	Parker	26.69%
2	15	Nile	0.92%	26	16	Pasco	29.00%
3	15	Naches	1.06%	27	14	Kennewick	30.87%
4	16	Kahlotus	4.65%	28	15	Donald	33.88%
5	8	West Richland	6.44%	29	14	Union Gap	34.51%
6	8	Richland	8.59%	30	15	Zillah	34.69%
7	15	Gleed	9.77%	31	16	Connell	37.26%
8	16	Richland	9.79%	32	15	Moxee	38.29%
9	15	Summitview	10.00%	33	15	Prosser	38.83%
10	14	Finley	10.04%	34	14	Yakima	47.99%
11	15	Tampico	10.19%	35	14	Harrah	52.95%
12	15	Eschbach	11.42%	36	16	Basin City	58.62%
13	14	White Swan	14.74%	37	14	Pasco	63.38%
14	16	West Pasco	14.78%	38	15	Tieton	68.88%
15	15	Terrace Heights	15.31%	39	14	Grandview	72.77%
16	16	Benton City	16.50%	40	14	Sunnyside	73.27%
17	16	Mesa	16.62%	41	14	Wapato	73.37%
18	8	Kennewick	17.31%	42	14	Toppenish	79.14%
19	15	Selah	18.14%	43	14	Granger	82.74%
20	15	Ahtanum	19.18%	44	15	Outlook	89.47%
21	16	West Richland	20.10%	45	14	Mabton	94.55%
22	15	Yakima	22.34%	46	14	Ahtanum	—
23	15	Cowiche	22.37%	47	14	Tampico	—
24	15	Buena	23.00%	—	—	—	—

As you can see, only two of the 24 cities with the lowest HCVAPs are included

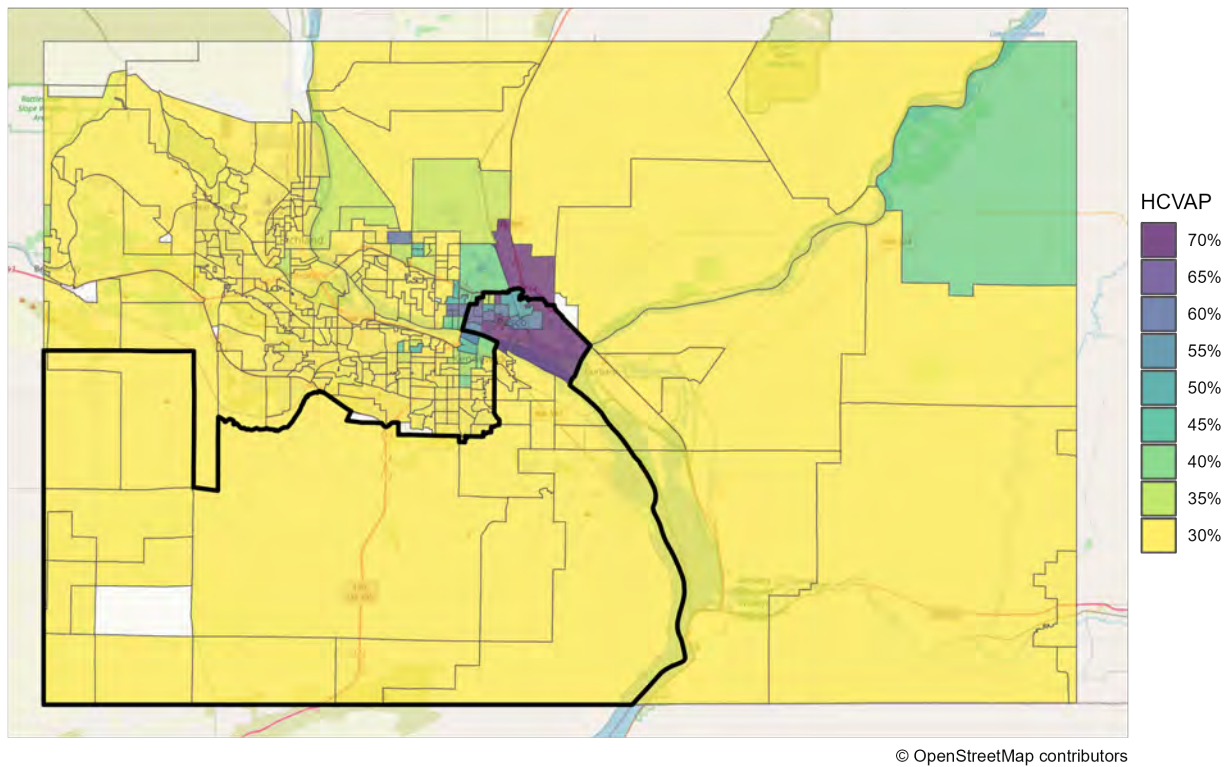
in District 14. Finley is to the South of Pasco; District 14 crosses it in order to reach Pasco. White Swan is located in the heart of the Yakima Indian reservation and is overwhelmingly Native America. On the other hand, the 14th includes every majority-Hispanic city in the three counties, with the exception of Basin City (located well to the north of Pasco) and Tieton (Northwest of Yakima) and Outlook (pop. 184).

We can also confine our inquiry to the cities in Yakima County.

Rank	District	City	HCVAP	Rank	District	City	HCVAP
1	15	Cliffdell	0.00%	17	14	Union Gap	34.51%
2	15	Nile	0.92%	18	15	Zillah	34.69%
3	15	Naches	1.06%	19	15	Moxee	38.29%
4	15	Gleed	9.77%	20	14	Yakima	47.99%
5	15	Summitview	10.00%	21	14	Harrah	52.95%
6	15	Tampico	10.19%	22	15	Tieton	68.88%
7	15	Eschbach	11.42%	23	14	Grandview	72.77%
8	14	White Swan	14.74%	24	14	Sunnyside	73.27%
9	15	Terrace Heights	15.31%	25	14	Wapato	73.37%
10	15	Selah	18.14%	26	14	Toppenish	79.14%
11	15	Ahtanum	19.18%	27	14	Granger	82.74%
12	15	Yakima	22.34%	28	15	Outlook	89.47%
13	15	Cowiche	22.37%	29	14	Mabton	94.55%
14	15	Buena	23.00%	30	14	Ahtanum	—
15	14	Parker	26.69%	31	14	Tampico	—
16	15	Donald	33.88%	—	—	—	—

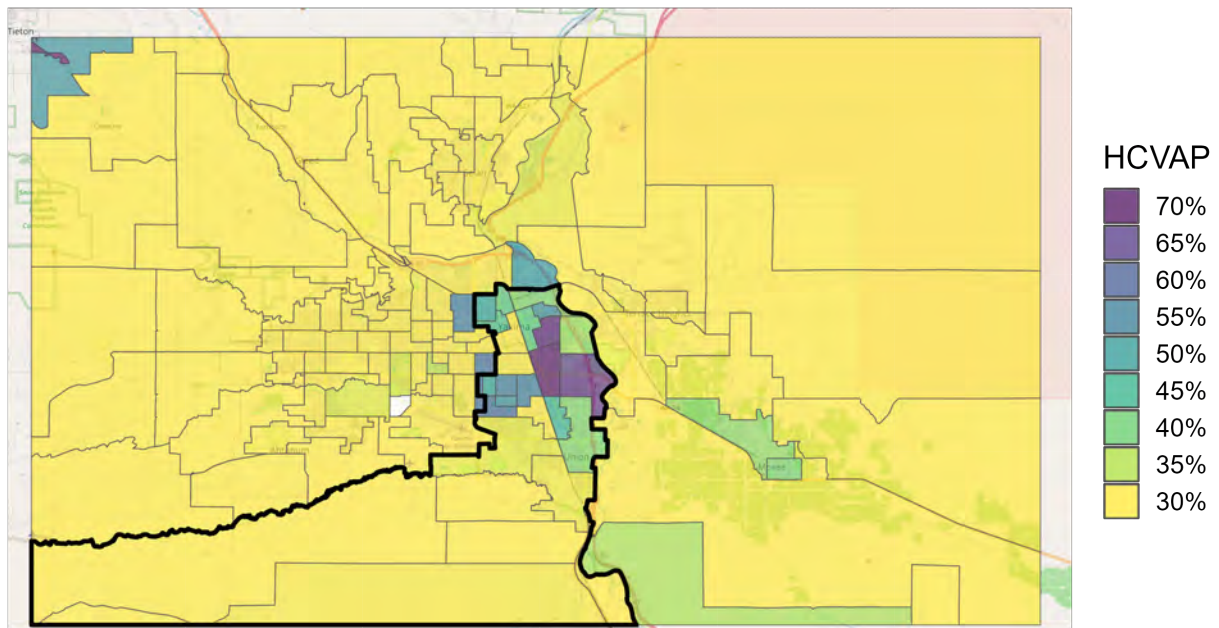
You can see this better in the following maps, which zoom in on Pasco and Yakima:

Figure 9: HCVAP of VTDs, Remedial Map 1 and 2, District 14, Pasco Area



12 of the 18 majority Hispanic VTDs are placed in District 14 in the area depicted above, along with 23 of the 286 non-majority Hispanic VTDs.

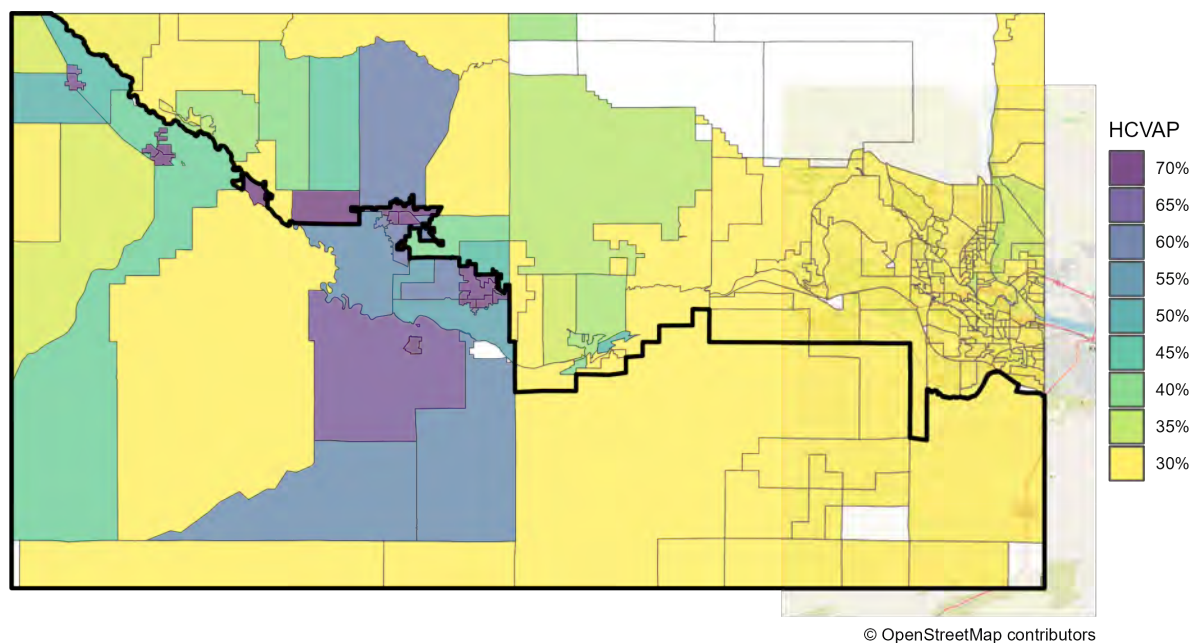
Figure 10: HCVAP of VTDs, Remedial Map 1 and 2, District 14, Yakima Area



© OpenStreetMap contributors

8 of the 14 majority Hispanic VTDs are placed in District 14 in the area depicted above, along with 21 of the 110 non-majority Hispanic VTDs.

Figure 11: HCVAP of VTDs, Remedial Map 1 and 2, District 14, Yakima River



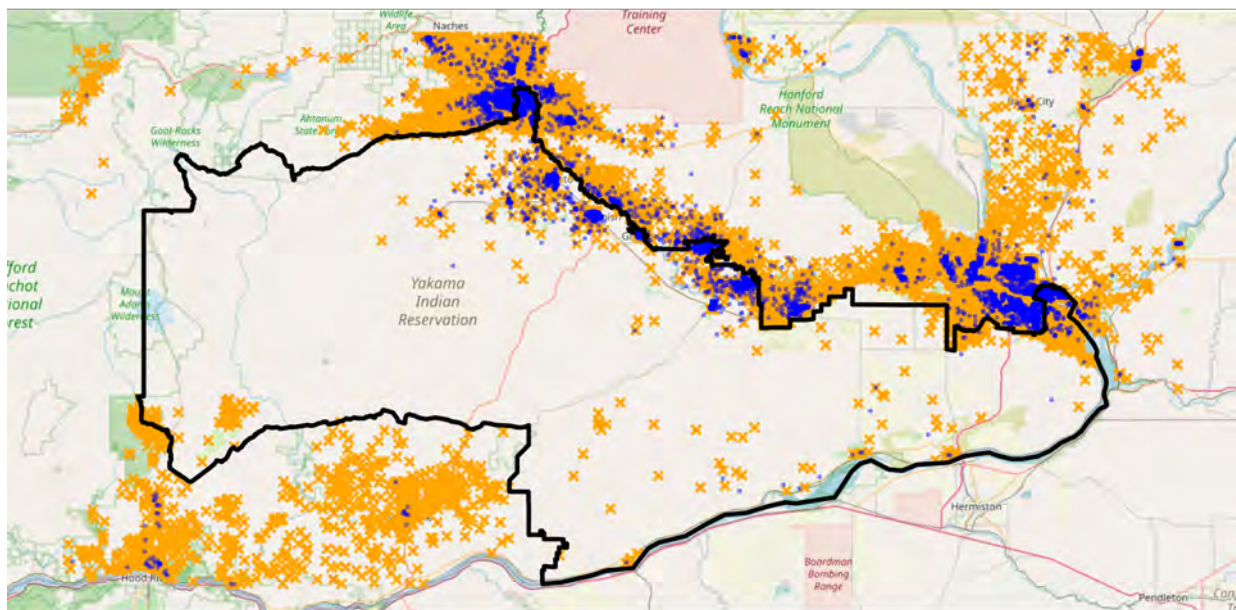
28 of the 31 majority Hispanic VTDs are placed in District 14 in the area depicted above, along with 21 of the 210 non-majority Hispanic VTDs.

One of the limitations of choropleth maps, however, is that they don't reveal populations. A VTD with 10 Hispanic residents and 10 White residents is treated the same as a VTD with 1,000 Hispanic residents and 1,000 White residents. While there may be times where those differences are immaterial, there may also be times where the difference is important.

To account for this, I will typically employ dot density maps. Dot density maps have been utilized in cases at least back to the Bethune-Hill case, where Dr. Rodden employed them to examine the distribution of residents of districts. In a dot density map, census blocks are taken as the basis for the district. In each block, a dot is drawn for every member of a group, or every ten members, or every 100 members, depending on the scale of the map. For these maps, I employ 1 blue dot for 10 Hispanic Citizens of

Voting Age, an orange “x” for 10 White Citizens of Voting Age, and a purple “+” for 10 members of other races. Obviously there is some rounding involved, but in the aggregate that typically does not matter.

Figure 12: Dot Density Map of Population, Remedial Maps 1 and 2, District 14. Here, one blue dot represents 10 Hispanic citizens of voting age, one orange x represents 10 White citizens of voting age, and one purple + represents 10 citizens of voting age of other races.



Most of the district is, in fact, largely uninhabited. You can, however, see how the district carefully avoids crossing over into heavily White areas to reach out and take in geographically dispersed Hispanic communities. In other words, there is no single Hispanic population in the district that is sufficient to constitute 50%+1 of the Citizen Voting Age Population. Rather, there are multiple isolated pockets of Hispanic clustering that are patched together to make this district work.

It is also apparent by examining the dotplots of Pasco, Yakima, and the areas in

between how the district carves out heavily Hispanic areas while avoiding areas that are more densely White.

Figure 13: Dot Density Map of Population, Remedial Maps 1 and 2, District 14, in the Pasco area. Here, one blue dot represents 10 Hispanic citizens of voting age, one orange x represents 10 White citizens of voting age, and one purple + represents 10 citizens of voting age of other races.

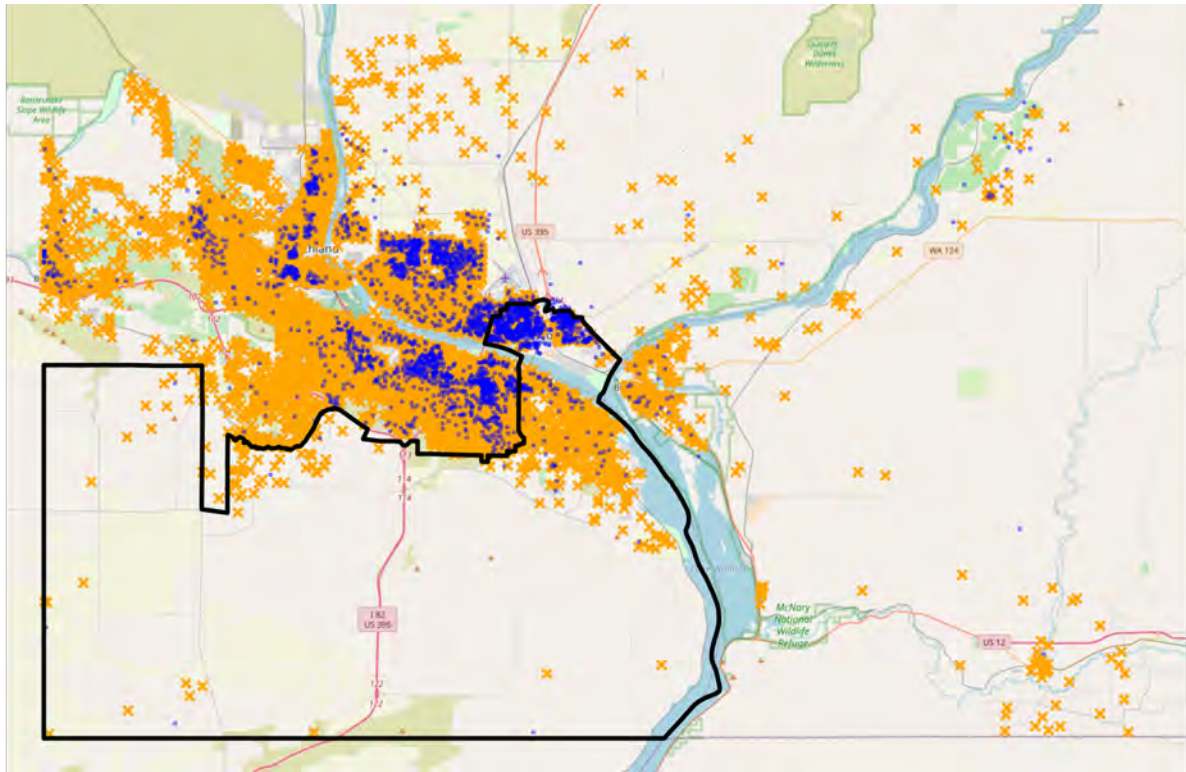


Figure 14: Dot Density Map of Population, Remedial Maps 1 and 2, District 14, in the Yakima area. Here, one blue dot represents 10 Hispanic citizens of voting age, one orange x represents 10 White citizens of voting age, and one purple + represents 10 citizens of voting age of other races.

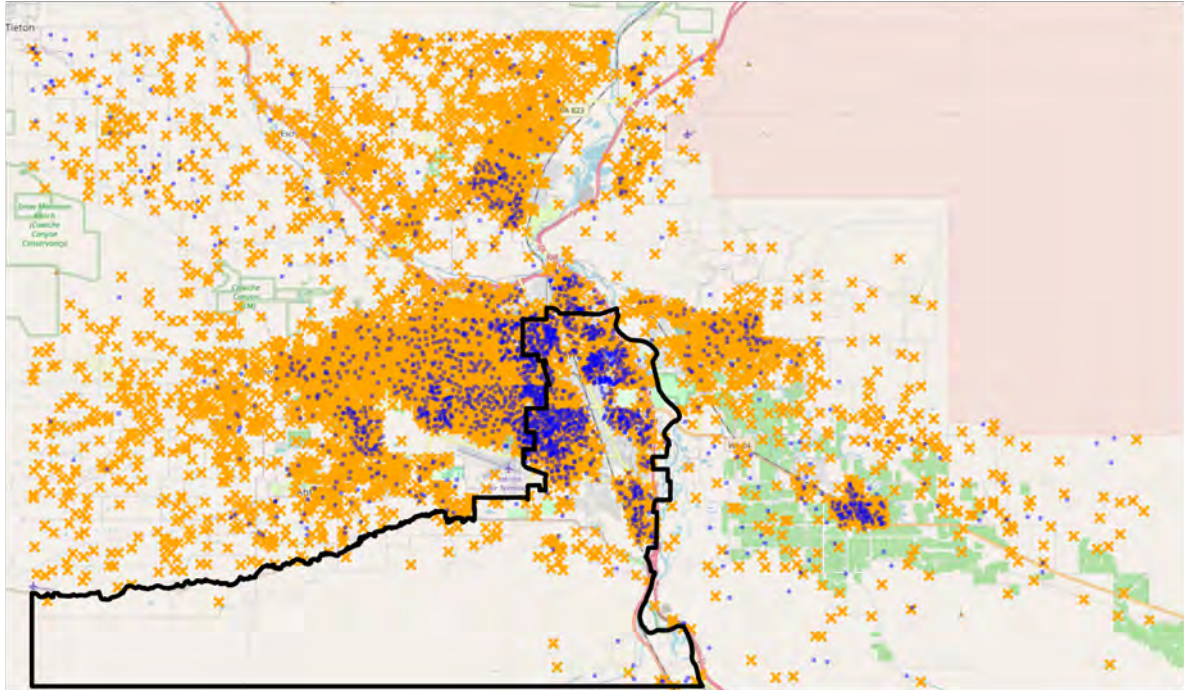
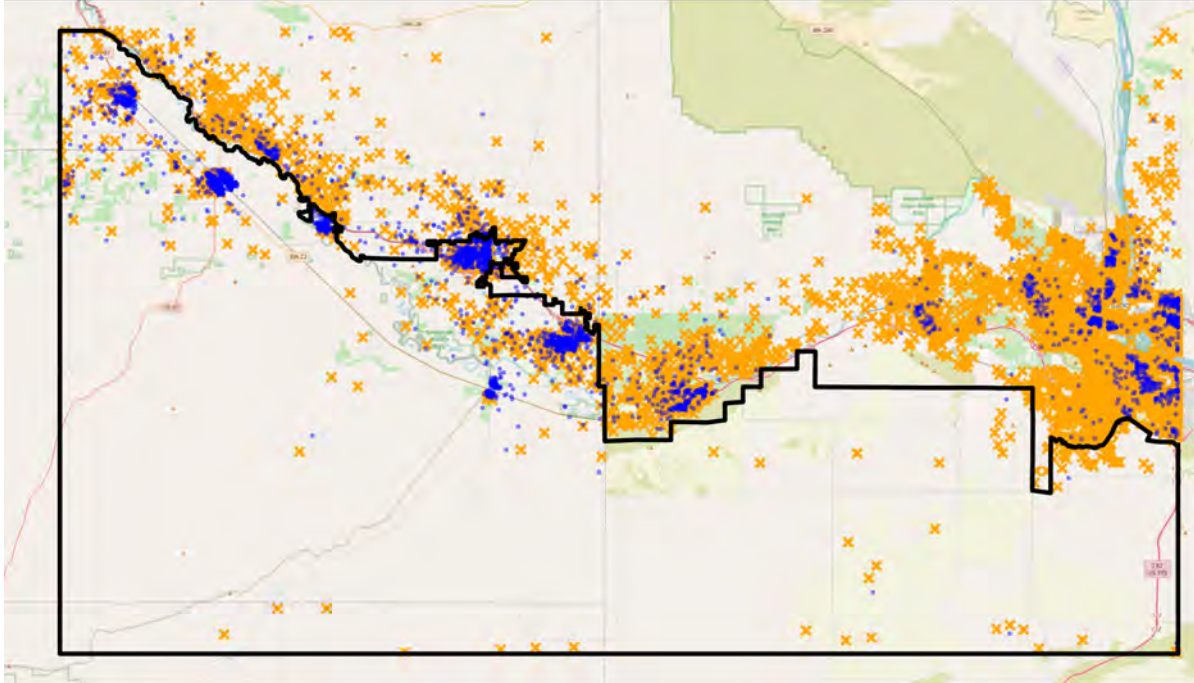


Figure 15: Dot Density Map of Population, Remedial Maps 1 and 2, District 14, in the Yakima River area. Here, one blue dot represents 10 Hispanic citizens of voting age, one orange x represents 10 White citizens of voting age, and one purple + represents 10 citizens of voting age of other races.



3.5 Political Impact

I was also asked to examine the political impact of the maps. Obviously, District 15 is transformed into a Republican-leaning district, while District 14 is made more Democratic. The question is whether other districts were quietly made more Republican or Democratic in meaningful ways.

I've once again examined the districts that were changed in Remedial Map 1, under a variety of specifications. "Total Vote, 2016-2020" examines the vote total for the 2020 Presidential, gubernatorial, Lieutenant Governor, Secretary of State, Treasurer, Auditor, Attorney General, Commissioner of Public Lands and Insurance Commissioner elections, the 2018 Senate election, and the 2016 Presidential, gubernatorial, Lieutenant

Governor, Secretary of State, Treasurer, Auditor, Attorney General, Commissioner of Public Lands and Insurance Commissioner elections. I understand that Dave’s Redistricting App (“DRA”) has been used for some of the Demonstration Maps here. The “Total Vote, DRA” examines the six elections included in the DRA composite score for 2016-2020: the 2020 and 2016 presidential elections, the 2018 and 2020 senate elections, the 2016 gubernatorial election, and the 2020 attorney general election.

The data are displayed as follows: For each race or composite index, the Democratic lead over the Republican in the Enacted District is displayed on the left, while the Democratic lead over the Republican in the Remedial District is displayed on the right. Determining whether a change is electorally meaningful is a tricky endeavor, but in general if a district sees movement in a result within the +/- 10% mark, it is potentially noteworthy.

A larger version of this image is available as a part of Exhibit 2.

Democratic (Dis)Advantage, Enacted Map vs. Remedial Map 1																				
	A.G. 2020		Governor 2020		President 2020		Treasurer 2020		Senate 2018		Governor 2016		President 2016		Senate 2016		Total Vote, 2016-2020		Total Vote, DRA	
District	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial
2	-20.3%	-21.1%	-22.8%	-23.7%	-14.7%	-15.7%	-21.2%	-22.2%	-16.2%	-17.0%	-18.9%	-18.6%	-16.0%	-16.8%	-8.1%	-7.9%	-13.9%	-14.3%	-17.0%	-17.7%
5	11.3%	9.4%	14.3%	12.0%	22.9%	20.2%	3.9%	2.4%	13.9%	12.1%	-1.0%	-2.0%	17.1%	14.9%	11.0%	9.7%	8.2%	6.9%	13.9%	11.9%
7	-33.8%	-31.7%	-38.0%	-36.0%	-31.5%	-29.4%	-36.8%	-34.8%	-27.9%	-26.1%	-29.0%	-27.4%	-33.7%	-31.7%	-20.6%	-18.8%	-27.2%	-25.6%	-31.9%	-29.9%
8	-20.4%	-24.2%	-22.2%	-26.2%	-15.8%	-19.7%	-30.0%	-34.0%	-20.4%	-24.2%	-21.8%	-23.6%	-21.7%	-25.4%	-10.5%	-12.5%	-20.0%	-22.9%	-20.3%	-23.9%
9	-20.1%	-18.7%	-21.8%	-20.6%	-16.0%	-14.8%	-26.3%	-25.2%	-14.6%	-13.2%	-20.0%	-18.7%	-19.8%	-18.5%	-11.7%	-10.4%	-17.9%	-16.8%	-18.6%	-17.4%
12	-10.2%	-6.1%	-11.3%	-6.2%	-2.0%	3.4%	-14.1%	-10.4%	-7.2%	-2.8%	-14.8%	-12.1%	-8.1%	-2.8%	-4.2%	-1.3%	-8.4%	-5.1%	-7.9%	-3.4%
13	-29.7%	-28.7%	-34.0%	-33.2%	-26.0%	-24.9%	-34.3%	-33.2%	-29.8%	-28.2%	-29.0%	-28.3%	-30.1%	-28.6%	-21.5%	-20.2%	-25.5%	-24.5%	-29.6%	-28.4%
14	-9.3%	15.2%	-12.1%	10.9%	-6.0%	16.2%	-15.4%	10.2%	-13.3%	9.6%	-10.6%	16.2%	-12.8%	14.0%	-3.5%	24.2%	-9.4%	12.5%	-10.5%	14.1%
15	-1.1%	-24.1%	-5.2%	-26.8%	0.3%	-20.6%	-6.6%	-30.6%	-7.2%	-28.2%	-0.3%	-23.1%	-1.6%	-27.1%	7.7%	-17.0%	-1.8%	-21.8%	-2.2%	-25.1%
16	-23.7%	-20.3%	-26.4%	-22.4%	-20.3%	-16.6%	-32.0%	-27.9%	-20.6%	-17.4%	-22.6%	-22.1%	-25.0%	-21.6%	-10.8%	-9.9%	-21.5%	-19.1%	-22.9%	-19.6%
17	-1.3%	1.2%	-0.0%	2.0%	3.6%	5.8%	-7.6%	-5.3%	2.5%	4.7%	-7.7%	-5.5%	-2.1%	-0.4%	-1.4%	1.5%	-2.6%	-0.6%	-0.9%	1.4%
20	-31.4%	-30.5%	-33.8%	-32.4%	-27.9%	-26.9%	-33.8%	-33.4%	-25.7%	-25.0%	-29.4%	-30.3%	-28.7%	-28.6%	-18.7%	-20.3%	-24.4%	-24.5%	-28.6%	-28.2%
31	-14.3%	-17.4%	-15.4%	-19.0%	-5.7%	-9.0%	-16.1%	-18.6%	-9.5%	-12.4%	-15.4%	-17.7%	-8.5%	-11.6%	-4.8%	-6.9%	-9.1%	-11.5%	-10.3%	-13.3%
49	20.1%	20.1%	20.6%	20.6%	22.4%	22.4%	13.2%	13.2%	24.9%	24.9%	14.9%	14.9%	16.4%	16.4%	21.0%	21.0%	15.9%	15.9%	19.6%	19.6%

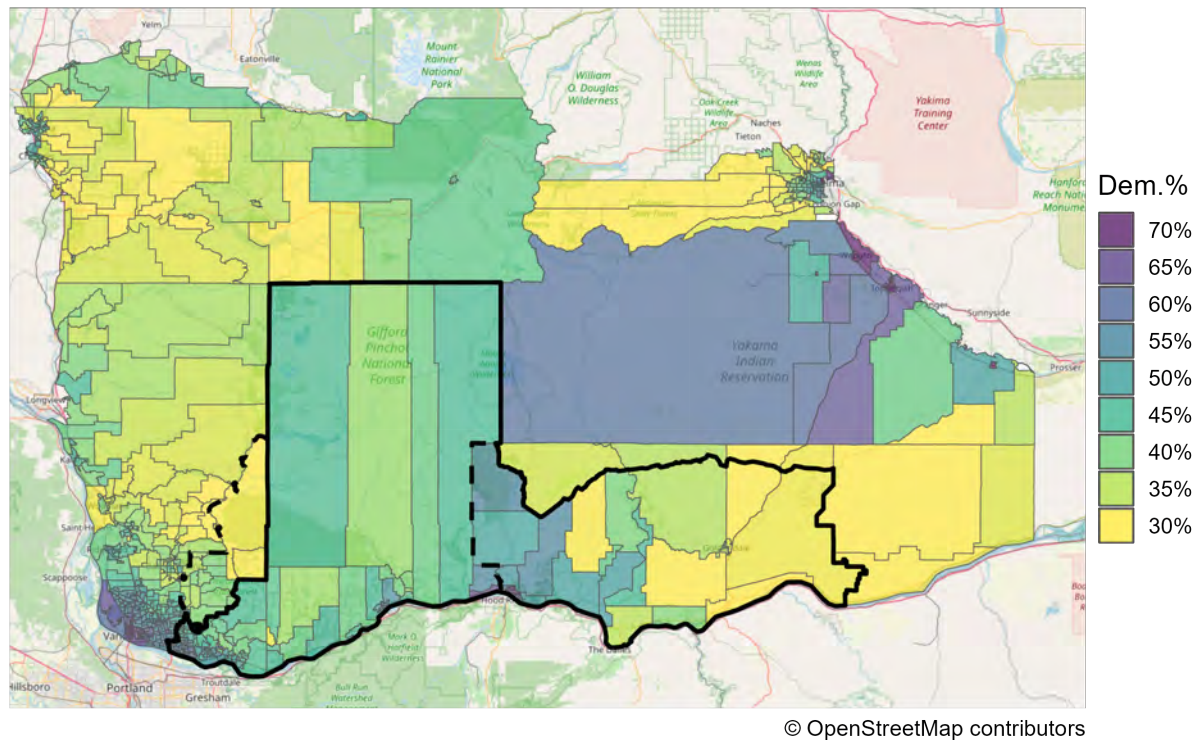
As you can see, the map creates effects beyond simply transforming District 14 into a more Democratic district (and District 15 into a more reliably Republican one). District 12, which always voted for the Republican candidate under the Enacted Map, is transformed into a district where the Republican candidate sometimes loses, and frequently has close calls. The district moves from one where, from 2016-2020, the statewide

candidate has won on average by 8.4 points to one where the candidate wins by 5.1 points. Using the DRA composite, it moves from one the Republican typically wins by 7.9 points to one where the Republican wins by 3.4 points.

More dramatically, District 17 moves from a district where the average statewide Republican candidate has won, on average, by 2.6 points to one where that candidate has won by 0.6% on average. Using the DRA elections, it flips from one where the Republican has won by 0.9% on average to one where the Democrat has won by 1.4% on average.

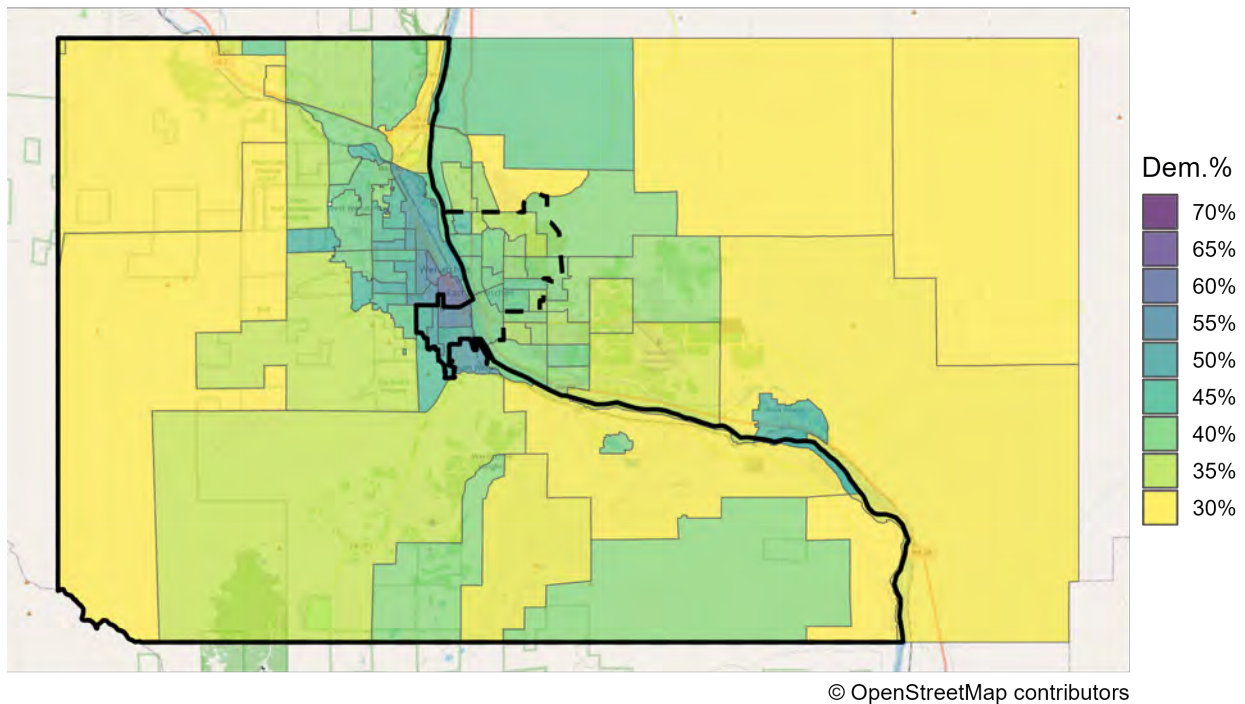
Both of these districts are presently represented by Republicans. There do not appear to be any examples of countervailing shifts that would make a Democratic incumbent appreciably more vulnerable. This could have been avoided rather easily. As you can see from below, District 17 expands into slightly Republican areas of Klickitat County under both Remedial Maps 1 and 2. However, the district gives up heavily Republican areas of Clark County to the already-heavily Republican District 20. Had the mapmaker decided instead to place parts of southeastern Vancouver into District 49, Republican incumbents would not have been endangered.

Figure 16: Democratic Percentage in VTDs, Enacted and Remedial Maps 1 and 2, District 17



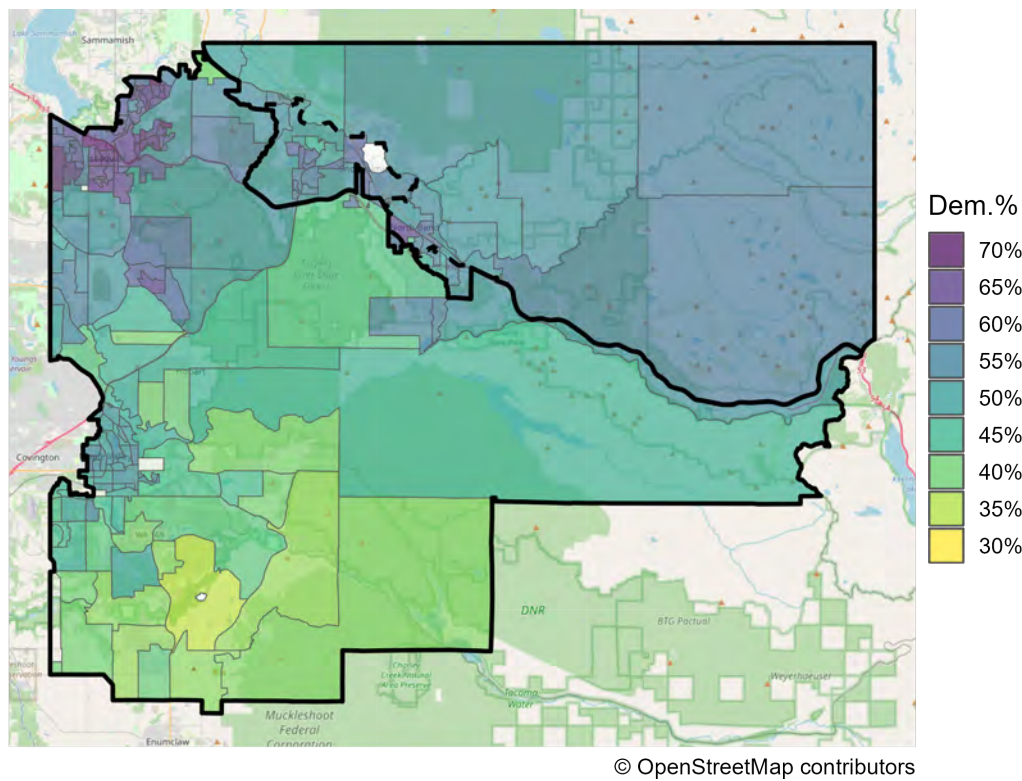
Likewise, District 12 is shifted leftward by excising from District 12 Republican-leaning East Wenatchee (60.4% Republican, using DRA's composite), where incumbent Republican Senator Brad Hawkins lives, along with two marginally Republican precincts and a Democratic precinct from Wenatchee itself; the most heavily Democratic precincts in Wenatchee are left within District 12.

Figure 17: Democratic Percentage in VTDs, Enacted and Remedial Maps 1 and 2, District 12



Likewise, rather than pushing into the eastern portions, more heavily Republican areas of District 5, Remedial Map 1 adds Snoqualmie (61.1% Democratic, using DRA's composite), helping push District 5 leftward.

Figure 18: Democratic Percentage in VTDs, Enacted and Remedial Maps 1 and 2, Districts 12 and 5



Because Remedial Map 2 changes fewer districts, does not alter District 12, and uses the same version of District 17, examining its effects provide no new information.

A larger version of this image is available as a part of Exhibit 2.

Democratic (Dis)Advantage, Enacted Map vs. Remedial Map 2																				
	A.G. 2020		Governor 2020		President 2020		Treasurer 2020		Senate 2018		Governor 2016		President 2016		Senate 2016		Total Vote, 2016-2020		Total Vote, DRA	
District	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial
2	-20.3%	-21.1%	-22.8%	-23.7%	-14.7%	-15.7%	-21.2%	-22.2%	-16.2%	-17.0%	-18.9%	-18.6%	-16.0%	-16.8%	-8.1%	-7.9%	-13.9%	-14.3%	-17.0%	-17.7%
8	-20.4%	-24.2%	-22.2%	-26.2%	-15.8%	-19.7%	-30.0%	-34.0%	-20.4%	-24.2%	-21.8%	-23.6%	-21.7%	-25.4%	-10.5%	-12.5%	-20.0%	-22.9%	-20.3%	-23.9%
9	-20.1%	-19.6%	-21.8%	-21.4%	-16.0%	-15.6%	-26.3%	-26.0%	-14.6%	-14.0%	-20.0%	-19.5%	-19.8%	-19.3%	-11.7%	-11.1%	-17.9%	-17.5%	-18.6%	-18.2%
13	-29.7%	-28.8%	-34.0%	-33.3%	-26.0%	-24.5%	-34.3%	-32.9%	-29.8%	-27.7%	-29.0%	-27.7%	-30.1%	-27.8%	-21.5%	-19.5%	-25.5%	-24.1%	-29.6%	-27.9%
14	-9.3%	15.2%	-12.1%	10.9%	-6.0%	16.2%	-15.4%	10.2%	-13.3%	9.6%	-10.6%	16.2%	-12.8%	14.0%	-3.5%	24.2%	-9.4%	12.5%	-10.5%	14.1%
15	-1.1%	-23.3%	-5.2%	-25.9%	0.3%	-19.8%	-6.6%	-30.0%	-7.2%	-27.1%	-0.3%	-22.2%	-1.6%	-25.9%	7.7%	-15.8%	-1.8%	-21.1%	-2.2%	-24.1%
16	-23.7%	-17.5%	-26.4%	-19.8%	-20.3%	-13.9%	-32.0%	-25.2%	-20.6%	-14.8%	-22.6%	-20.3%	-25.0%	-19.2%	-10.8%	-7.9%	-21.5%	-16.9%	-22.9%	-17.1%
17	-1.3%	1.2%	-0.0%	2.0%	3.6%	5.8%	-7.6%	-5.3%	2.5%	4.7%	-7.7%	-5.5%	-2.1%	-0.4%	-1.4%	1.5%	-2.6%	-0.6%	-0.9%	1.4%
20	-31.4%	-30.5%	-33.8%	-32.4%	-27.9%	-26.9%	-33.8%	-33.4%	-25.7%	-25.0%	-29.4%	-30.3%	-28.7%	-28.6%	-18.7%	-20.3%	-24.4%	-24.5%	-28.6%	-28.2%
31	-14.3%	-14.5%	-15.4%	-15.5%	-5.7%	-6.0%	-16.1%	-16.0%	-9.5%	-9.6%	-15.4%	-15.8%	-8.5%	-8.8%	-4.8%	-5.1%	-9.1%	-9.3%	-10.3%	-10.5%
49	20.1%	20.1%	20.6%	20.6%	22.4%	22.4%	13.2%	13.2%	24.9%	24.9%	14.9%	14.9%	16.4%	16.4%	21.0%	21.0%	15.9%	15.9%	19.6%	19.6%

Overall, these maps do not merely create a new, more heavily Democratic district

in southern Washington. They do so by weakening several Republican incumbents in unrelated portions of the map.

3.6 Incumbency

I was also asked to examine the effect of the proposed remedial maps on incumbency. That is to say, I was asked to examine whether the districts pair incumbents together in the same district, or move them into new districts.

Counsel provided me with a spreadsheet containing the names, addresses, and party labels of 147 Washington state legislators. Using R, a statistical programming language commonly used in statistics and the social sciences, I was able to obtain the latitude and longitude coordinates for the addresses for incumbent senators and representatives in districts that were being changed. Using this “geocoded” data, I was able to place the candidates’ addresses in the district in which they reside.

The following table describes incumbents who are paired together under the Enacted Map and under Remedial Maps 1 and 2. Each District should have three members – a senator and two representatives – but these districts have more.

First	Last	Party	Chamber
District 5			
Lisa	Callan	D	House
Bill	Ramos	D	House
Mark	Mullet	D	Senate
Drew	Stokesbary	R	House
Phil	Fortunato	R	Senate
District 7			
Joel	Kretz	R	House
Jacquelin	Maycumber	R	House
Shelly	Short	R	Senate
Brad	Hawkins	R	Senate
District 15			
Chris	Corry	R	House
Curtis	King	R	Senate
Bruce	Chandler	R	House
Bryan	Sandlin	R	House
District 16			
Stephanie	Barnard	R	House
Nikki	Torres	R	Senate
Mark	Klicker	R	House
Skyler	Rude	R	House
Perry	Dozier	R	Senate
District 17			
Gina	Mosbrucker	R	House
Paul	Harris	R	House
Kevin	Waters	R	House
Lynda	Wilson	R	Senate

Under Remedial Map 1, Mark Mullet and Phil Fortunato are paired together in a district that, as described above, is fairly Democratic. House Minority Leader Drew

Stokesbury is drawn into the same district, along with Democratic Representatives Bill Ramos and Lisa Callan. In District 7, two Republican Senators are paired together. In District 15, three Republican House members are paired together. In District 17, three Republican House members are paired together in a district that, as described above, will become appreciably more Democratic.

In District 16, Sen. Nikki Torres is paired with Sen. Perry Dozier. Only 9.9% of the voting age population of her new district would come from her current district.

Remedial Map two will have a similar impact, albeit limited to districts 15, 16 and 17.

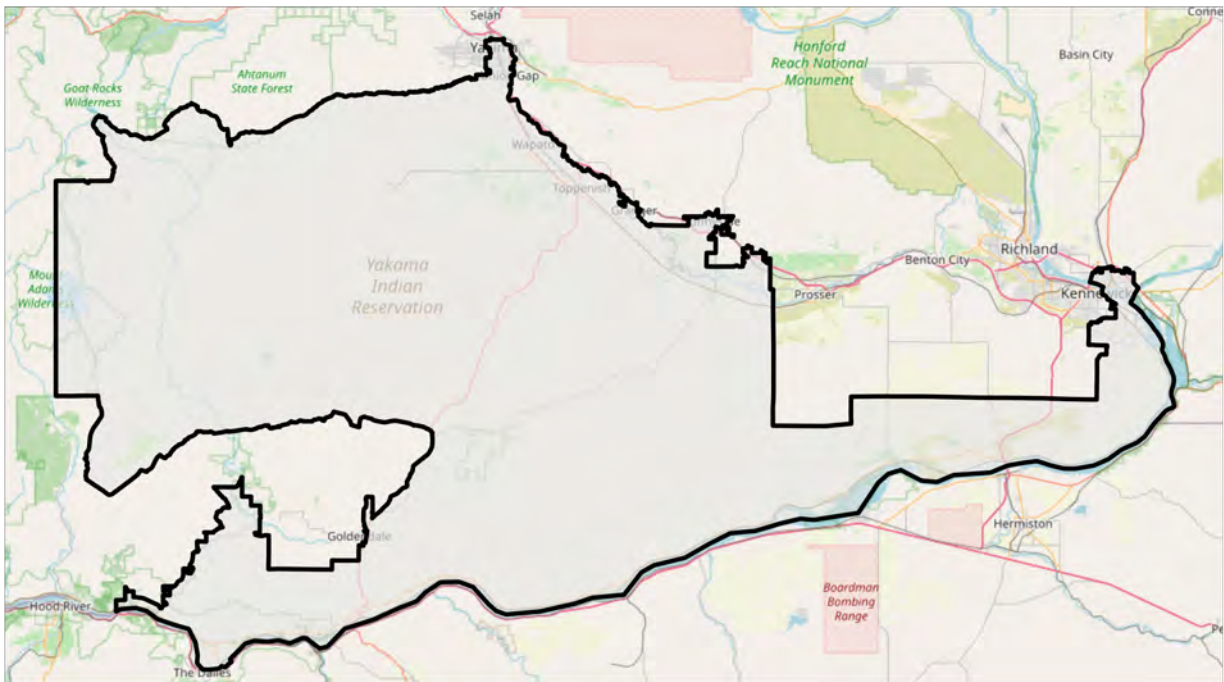
4 Analysis of Remedial Maps 3 and 4

The analysis that follows largely follows the structure of the analysis in the preceding section, and thus assumes reader familiarity with it. Given the length of the report, this section will not repeat the explanations of the maps and figures from the previous section.

4.1 Overview

Maps 3 and 4 both use the following district for as their remedial VRA district:

Figure 19: Proposed VRA District in Remedial Maps 3 and 4

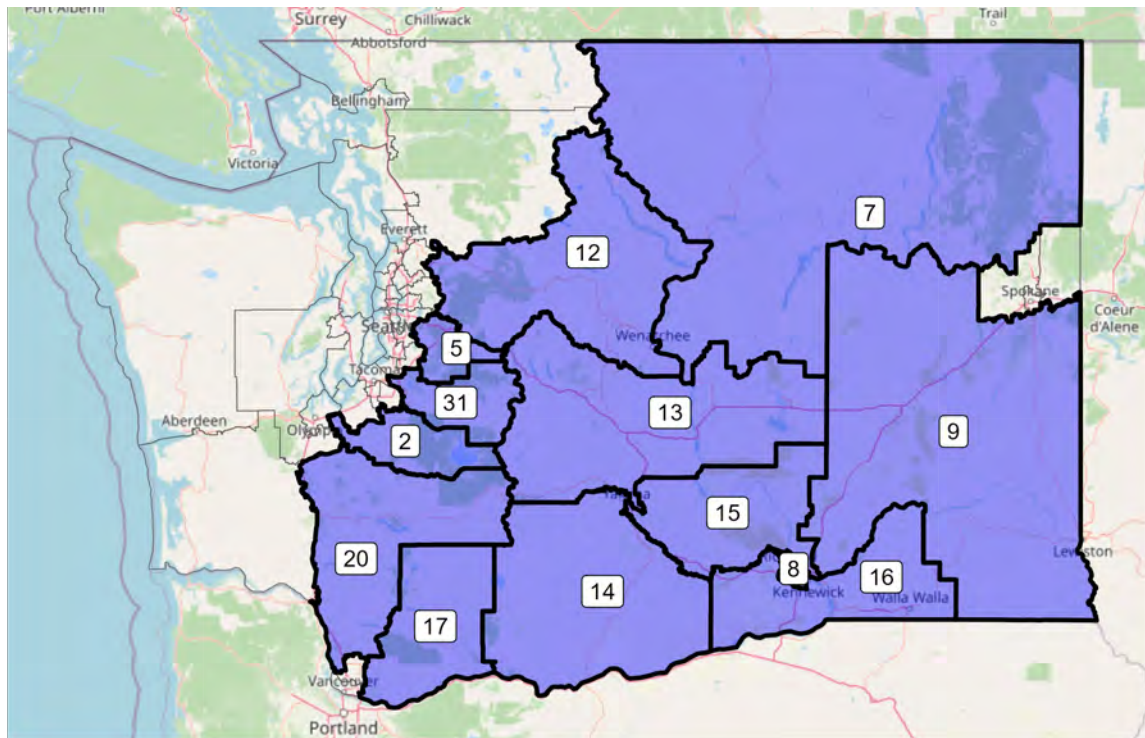


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Like the remedial district from Remedial Maps 1 and 2, this district combines populations from Yakima, Pasco, and several small towns along the Yakima River. It differs from that configuration in that it drops some of the VTDs between Pasco and Prosser, and adds population to the Southwest, giving the district a shape that somewhat resembles an octopus slithering along the ocean floor.

Like Remedial Maps 1 and 2, Map 3, involves second and third-order changes that extend well beyond the scope of District 14. Here, for example, are the Enacted Districts that are changed in Remedial Map 3.

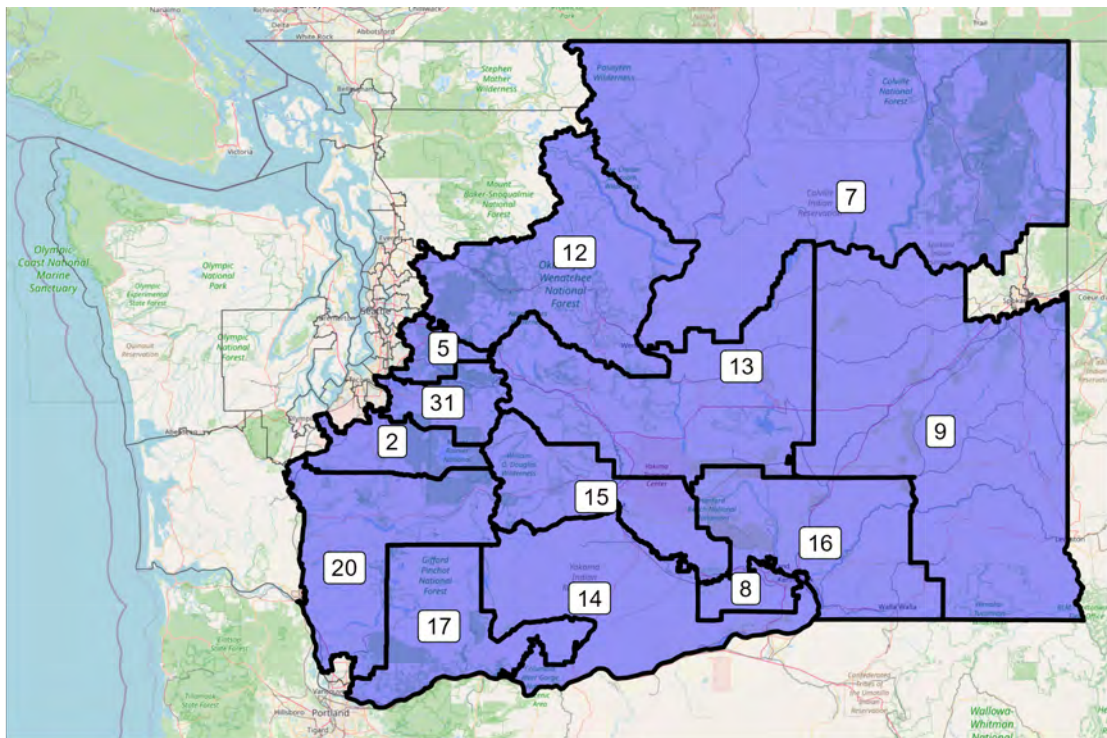
Figure 20: Enacted Map, with Districts Altered in Remedial Map 3 Highlighted



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The boundaries of 13 districts are changed, or 26.5% of the districts in the state. The changed districts ultimately look like this:

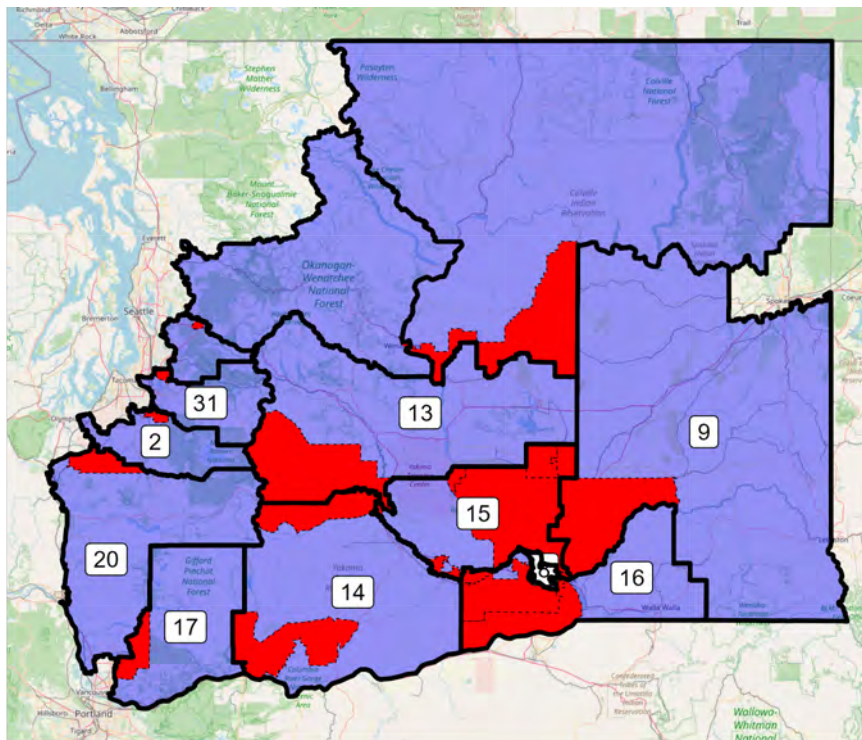
Figure 21: Remedial Map 3, with Districts Altered from Enacted Map Highlighted



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We can see this in the following figure, which highlights the census blocks that were moved from district-to-district by shading them red and placing a dashed line outlining them.

Figure 22: Enacted Map, with Census Blocks Shifted Into Different Districts in Remedial Map 3 Highlighted in Red



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The following table summarizes the population movements. It takes all of the census blocks shifted between districts, groups them by the Enacted District and Remedial District in which they are placed, and then summarizes the total population. In other words, 15,545 residents of Enacted District 2 are moved into Remedial District 31; 15,697 residents of Enacted District 5 are moved into Remedial District 12; and so forth.

Movement of Residents, Enacted Plan v. Remedial Plan 3		
Enacted District	Remedial District 3	Total
2	31	15,545
5	12	15,697
7	13	15,543
8	16	64,033
9	16	9,612
12	5	123
12	7	15,600
13	15	30,654
14	15	87,551
14	17	15,726
15	9	9,356
15	13	15,236
15	14	94,742
15	16	12,040
16	8	63,797
16	14	8,379
16	15	11,374
17	20	15,639
20	2	15,508
31	5	15,396

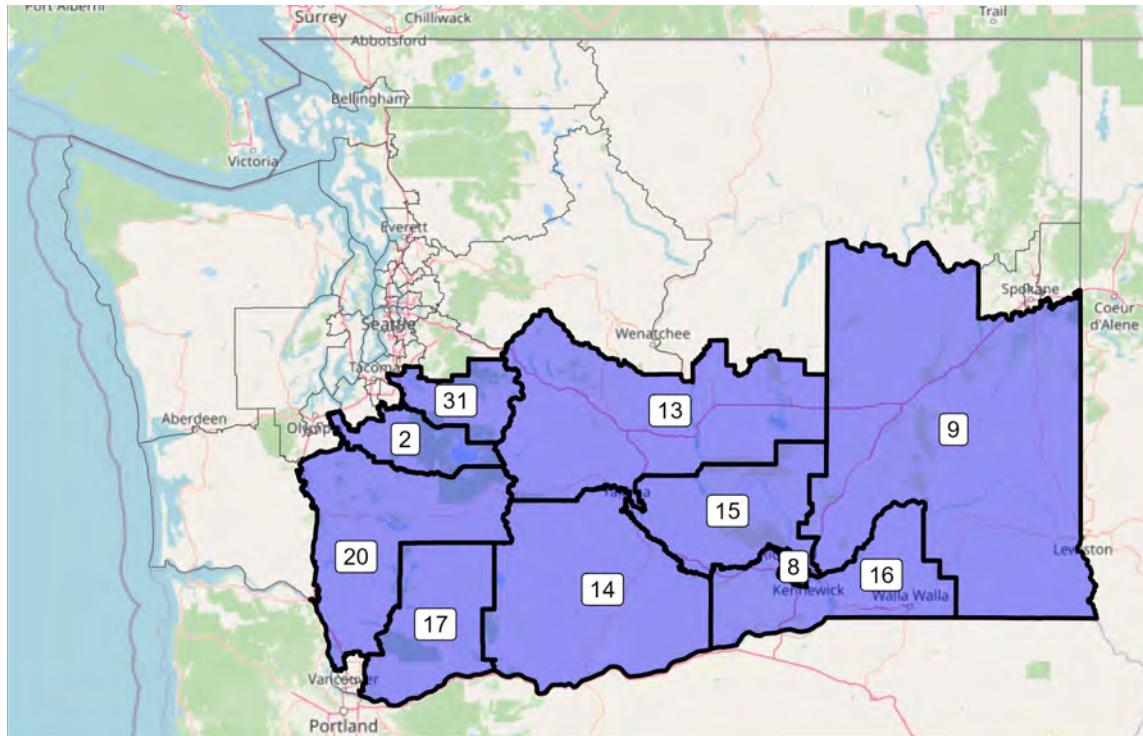
In total, the map moves 531,551 individuals around, including 213,350 residents who do not reside in Enacted Districts 14, 15 or 16 and 113,230 residents who do not reside in either Enacted Districts 14, 15 or 16 or in Remedial Districts 14, 15 or 16.

Finally, the changes take place over much of the state, with blocks being moved in 28 of the state's 39 counties, including several in western Washington. Overall, six districts are moved entirely out of six counties, while six districts are moved into eight counties.

With Remedial Map 4, fewer districts are changed, although the impact is still

notable. The Enacted Districts that are changed in Remedial Map 4 are highlighted below:

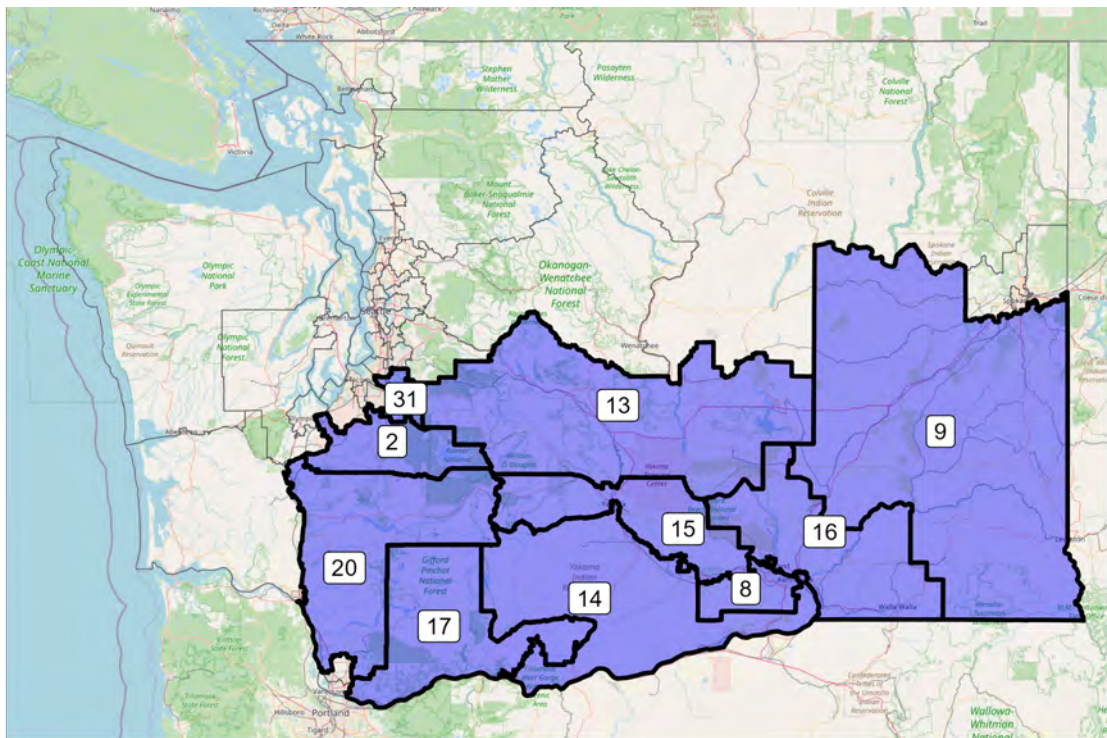
Figure 23: Enacted Map, with Districts Altered in Remedial Map 4 Highlighted



© OpenStreetMap contributors

The boundaries of 10 districts are changed, or 20.4% of the districts in the state. The changed districts ultimately look like this:

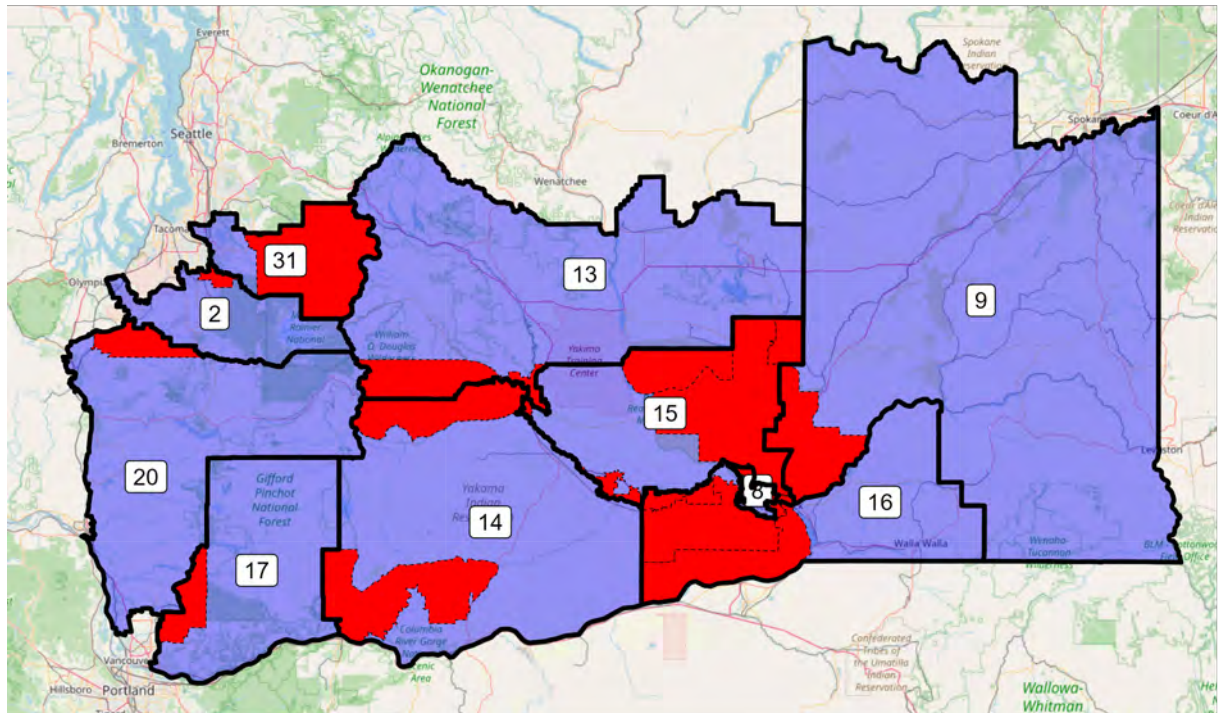
Figure 24: Remedial Map 4, with Districts Altered from Enacted Map Highlighted



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We can see this in the following figure, which highlights the census blocks that were moved from district-to-district by shading them red and placing a dashed line outlining them.

Figure 25: Enacted Map, with Census Blocks Shifted Into Different Districts in Remedial Map 4 Highlighted in Red



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Notably, District 13 is substantially reconfigured, as it is pushed over the Cascades, past Mount Rainier, and into the Seattle Metropolitan Area, in both King and Pierce counties, stretching from Ephrata to Enumclaw.

The following table summarizes the population movements.

Movement of Residents, Enacted Plan v. Remedial Plan 4		
Enacted District	Remedial District 4	Total
2	31	15,545
8	16	64,033
9	16	3,261
13	15	23,379
14	15	87,551
14	17	15,726
15	9	3,171
15	13	7,942
15	14	94,742
15	16	24,590
16	8	63,797
16	14	8,379
16	15	17,656
17	20	15,639
20	2	15,508
31	13	15,521

In total, the map moves 476,440 individuals around, including 152,886 residents who do not reside in Enacted Districts 14, 15 or 16 and 66,392 residents who do not reside in either Enacted Districts 14, 15 or 16 or in Remedial Districts 14, 15 or 16.

Finally, the changes take place over much of the state, with blocks being moved in 21 of the state's 39 counties, including in several western Washington counties. Overall, two districts are moved entirely out of three counties, while four districts are moved into six different counties.

Districts Moved Into and Out of Counties, Enacted vs. Remedial 4			
District Moves Out Of		District Moves Into	
District	County	District	County
8	Franklin	13	King
15	Adams	13	Pierce
15	Franklin	14	Benton
15	Grant	14	Franklin
—	—	16	Adams
—	—	17	Klickitat

4.2 HCVAP

I was asked to identify the Hispanic Citizen Voting Age Population in the district with the highest Hispanic Citizen Voting Age Population among the Yakima Valley districts, and to compare it to the HCVAP in the Enacted Plan District 15. The results are reported below:

HCVAP Estimates of VRA Districts in Remedial 3 and 4, and Enacted Map

Year	HCVAP% (Rem. 3 and 4)	HCVAP% (Enacted Map)
2021	50.2%	52.6%
2020	50.1%	51.9%
2019	48.0%	50.0%

4.3 Compactness

I was asked to consider the compactness of the districts in Remedial Maps 3 and 4, compared to the Enacted Map, in the same way as I did above for Remedial Maps 1 and 2.

The following table shows the 10 least compact district districts using the Reock scores for the Enacted Plan, and Remedial Plans 3 and 4. Once again, compactness scores for additional districts could easily be extracted from the accompanying code.

We begin with the Reock Scores. Districts that are changed in either Remedial Plan 3 or Remedial Plan 4 are highlighted.

10 Lowest Reock Scores					
Enacted Map, Remedial 3 and Remedial 4					
Enacted Map		Remedial 3		Remedial 4	
Reock	District	Reock	District	Reock	District
0.133	42	0.133	42	0.133	42
0.180	2	0.186	2	0.162	15
0.222	43	0.221	15	0.186	2
0.243	16	0.222	43	0.222	43
0.258	41	0.223	14	0.223	14
0.279	8	0.249	17	0.231	13
0.291	49	0.258	41	0.249	17
0.295	13	0.272	5	0.258	41
0.304	40	0.291	49	0.276	16
0.308	5	0.298	8	0.291	49

Under all 3 plans, District 42 again remains the least compact district, which is unsurprising given Whatcom County. District 2, located in southern Pierce County and portions of eastern Thurston County, is the second-least compact in both the Enacted Plan and under Remedial Plan 3.

Remedial Map 3 makes Districts 5, 7, 9, 14, 15 and 17 less compact – in some cases, substantially so – while Districts 2, 8, 12, 13, 16, 20 and 31 are made more compact. Of particular note, the proposed remedial district sees its Reock score drop from 0.323 (as District 15 in the Enacted Plan) to 0.223 (As District 14 in the Remedial Plan), making it one of the least compact districts in the map.

Comparison of Reock Scores, Changed Districts, Remedial 3					
Made Less Compact			Made More Compact		
Enacted District	Reock, Enacted	Reock, Rem. 3	District	Reock, Enacted	Reock, Rem. 3
5	0.308	0.272	2	0.180	0.186
7	0.368	0.342	8	0.279	0.298
9	0.498	0.457	12	0.343	0.343
14	0.531	0.223	13	0.295	0.302
15	0.323	0.221	16	0.243	0.312
17	0.455	0.249	20	0.387	0.387
—	—	—	31	0.310	0.312

The same is largely true for Remedial Map 4:

Comparison of Reock Scores, Changed Districts, Remedial 4					
Made Less Compact			Made More Compact		
Enacted District	Reock, Enacted	Reock, Rem. 4	District	Reock, Enacted	Reock, Rem. 4
9	0.498	0.481	2	0.180	0.186
13	0.295	0.231	8	0.279	0.298
14	0.531	0.223	16	0.243	0.276
15	0.323	0.162	20	0.387	0.387
17	0.455	0.249	31	0.310	0.325

For Polsby-Popper, the story is much the same. Under the Enacted Map, only three of the districts that Dr. Oskooii changes are among the 10 least compact districts. Under Remedial Map 3 that number is 6 and under Remedial Map 4 that number is 3. Only one district has a Polsby-Popper score under 0.2 in the Enacted Plan – a district that largely follows the irregular boundaries of Renton and Tukwila. Under the two remedial plans that number grows to three.

10 Lowest Polsby-Popper Scores					
Enacted Map, Remedial 3 and Remedial 4					
Enacted Map		Remedial 3		Remedial 4	
Polsby-Popper	District	Polsby-Popper	District	Polsby-Popper	District
0.141	11	0.141	11	0.141	11
0.203	8	0.145	14	0.145	14
0.217	45	0.190	5	0.171	15
0.222	2	0.203	15	0.208	2
0.223	41	0.208	2	0.217	45
0.226	12	0.217	45	0.223	41
0.227	1	0.219	12	0.226	12
0.242	6	0.223	41	0.227	1
0.245	26	0.227	1	0.242	6
0.245	35	0.238	13	0.245	26

Once again, most of the districts that are redrawn under this map are made less compact. Under Remedial Map 3, 9 districts are made less compact, while just four are made more compact. Districts 14 and 17 stand out as having particularly large decreases in their compactness. Using Polsby-Popper scores, the remedial district is the second-least compact district on the map, save for a district whose compactness is driven by municipal boundaries.

Comparison of Polsby-Popper Scores, Changed Districts, Remedial 3					
Made Less Compact			Made More Compact		
Enacted District	Polsby-Popper, Enacted	Polsby-Popper, Rem. 3	District	Polsby-Popper, Enacted	Polsby-Popper, Rem. 3
2	0.222	0.208	7	0.327	0.344
5	0.249	0.190	8	0.203	0.273
12	0.226	0.219	9	0.351	0.372
13	0.271	0.238	16	0.278	0.356
14	0.478	0.145	—	—	—
15	0.255	0.203	—	—	—
17	0.489	0.258	—	—	—
20	0.290	0.270	—	—	—
31	0.330	0.299	—	—	—

Under Remedial Map 4, seven districts are made less compact, while just three are made more compact, using Polsby-Popper as the metric.

Comparison of Polsby-Popper Scores, Changed Districts, Remedial 4					
Made Less Compact			Made More Compact		
Enacted District	Polsby-Popper, Enacted	Polsby-Popper, Rem. 4	District	Polsby-Popper, Enacted	Polsby-Popper, Rem. 4
2	0.222	0.208	8	0.203	0.273
14	0.478	0.145	9	0.351	0.378
15	0.255	0.171	13	0.271	0.297
16	0.278	0.266	—	—	—
17	0.489	0.258	—	—	—
20	0.290	0.270	—	—	—
31	0.330	0.246	—	—	—

4.4 Population Distribution

The changes in this map occur as a result of removing some precincts between Pasco and Grandview, and then adding some additional precincts in western Klickitat County. The maps in Pasco, Yakima, and the area between Grandview and Yakima, are only changed by a few precincts. Therefore, the same analysis from Maps 1 and 2 applies here.

4.5 Political Impact

I was also asked to examine the political impact of the maps. Once again, District 15 is transformed into a Democratic-leaning district, while District 14 is made more Republican. The question is whether other districts were quietly made more Republican or Democratic in meaningful ways.

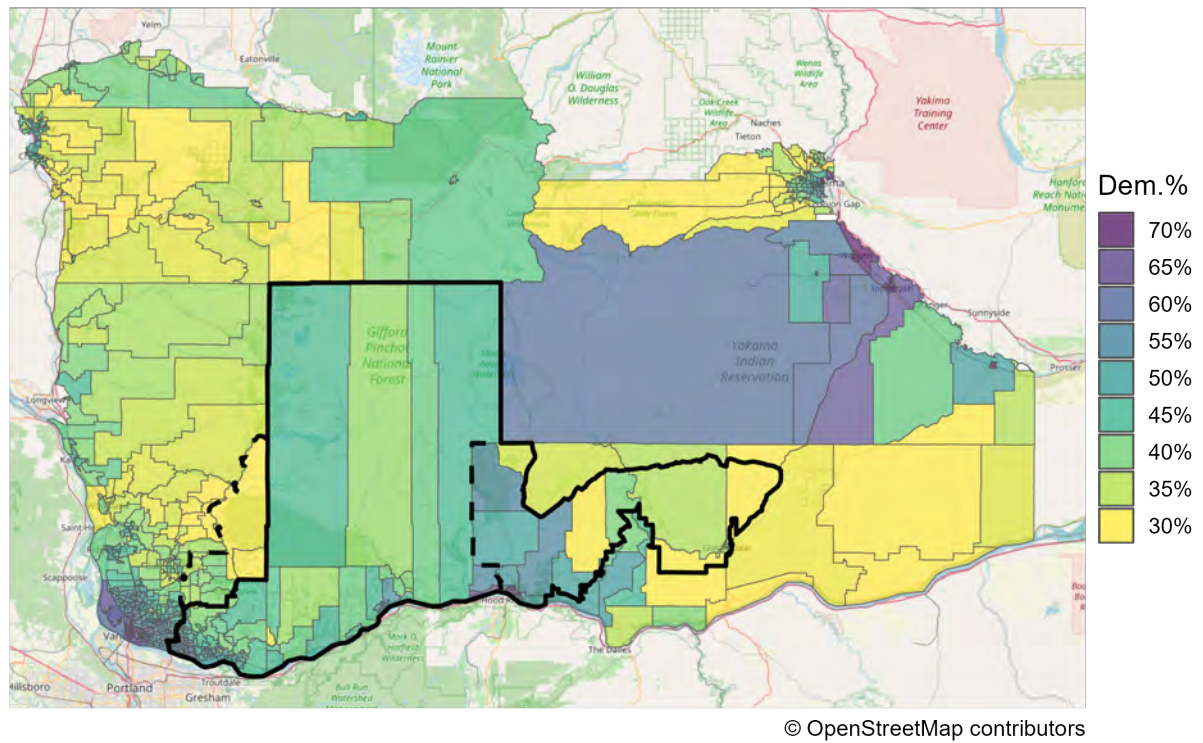
I've once again examined the districts that were changed in Remedial Map 3, under a variety of specifications.

A larger version of this image is available as a part of Exhibit 2.

Democratic (Dis)Advantage, Enacted Map vs. Remedial Map 3																				
	A.G. 2020		Governor 2020		President 2020		Treasurer 2020		Senate 2018		Governor 2016		President 2016		Senate 2016		Total Vote, 2016-2020		Total Vote, DRA	
District	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial
2	-20.3%	-20.0%	-22.8%	-22.6%	-14.7%	-14.6%	-21.2%	-21.0%	-16.2%	-15.9%	-18.9%	-17.8%	-16.0%	-15.7%	-8.1%	-7.1%	-13.9%	-13.4%	-17.0%	-16.6%
5	11.3%	9.7%	14.3%	12.3%	22.9%	20.6%	3.9%	2.7%	13.9%	12.5%	-1.0%	-1.5%	17.1%	15.3%	11.0%	10.4%	8.2%	7.3%	13.9%	12.3%
7	-33.8%	-32.3%	-38.0%	-36.6%	-31.5%	-30.0%	-36.8%	-35.5%	-27.9%	-26.7%	-29.0%	-28.0%	-33.7%	-32.3%	-20.6%	-19.4%	-27.2%	-26.1%	-31.9%	-30.5%
8	-20.4%	-25.7%	-22.2%	-27.7%	-15.8%	-21.1%	-30.0%	-35.1%	-20.4%	-25.5%	-21.8%	-24.7%	-21.7%	-26.6%	-10.5%	-13.8%	-20.0%	-24.0%	-20.3%	-25.2%
9	-20.1%	-18.7%	-21.8%	-20.6%	-16.0%	-14.8%	-26.3%	-25.2%	-14.6%	-13.2%	-20.0%	-18.7%	-19.8%	-18.5%	-11.7%	-10.4%	-17.9%	-16.8%	-18.6%	-17.4%
12	-10.2%	-6.6%	-11.3%	-6.8%	-2.0%	2.7%	-14.1%	-10.8%	-7.2%	-3.6%	-14.8%	-12.5%	-8.1%	-3.7%	-4.2%	-2.0%	-8.4%	-5.6%	-7.9%	-4.1%
13	-29.7%	-28.5%	-34.0%	-32.9%	-26.0%	-24.7%	-34.3%	-32.9%	-29.8%	-28.1%	-29.0%	-28.0%	-30.1%	-28.3%	-21.5%	-19.9%	-25.5%	-24.3%	-29.6%	-28.1%
14	-9.3%	14.6%	-12.1%	10.3%	-6.0%	15.5%	-15.4%	9.5%	-13.3%	9.4%	-10.6%	15.4%	-12.8%	13.1%	-3.5%	23.6%	-9.4%	12.0%	-10.5%	13.5%
15	-1.1%	-24.0%	-5.2%	-26.8%	0.3%	-20.6%	-6.6%	-30.5%	-7.2%	-28.1%	-0.3%	-23.1%	-1.6%	-27.0%	7.7%	-16.9%	-1.8%	-21.7%	-2.2%	-25.0%
16	-23.7%	-19.7%	-26.4%	-21.8%	-20.3%	-16.0%	-32.0%	-27.5%	-20.6%	-16.8%	-22.6%	-21.6%	-25.0%	-21.1%	-10.8%	-9.3%	-21.5%	-18.6%	-22.9%	-19.1%
17	-1.3%	1.8%	-0.0%	2.8%	3.6%	6.6%	-7.6%	-4.7%	2.5%	5.3%	-7.7%	-5.1%	-2.1%	0.3%	-1.4%	1.7%	-2.6%	-0.1%	-0.9%	2.0%
20	-31.4%	-31.3%	-33.8%	-33.3%	-27.9%	-27.7%	-33.8%	-34.1%	-25.7%	-25.7%	-29.4%	-30.7%	-28.7%	-29.2%	-18.7%	-20.5%	-24.4%	-25.0%	-28.6%	-28.9%
31	-14.3%	-17.1%	-15.4%	-18.6%	-5.7%	-8.7%	-16.1%	-18.6%	-9.5%	-11.9%	-15.4%	-17.5%	-8.5%	-11.1%	-4.8%	-6.8%	-9.1%	-11.3%	-10.3%	-13.0%

Once again, beyond the changes to Districts 14 and 15, District 12 is made more Democratic, and is turned from a district carried by former President Donald Trump into one carried by President Joe Biden. Because District 17 is not pushed as far into red areas of Klickitat County as it is in its configuration for Maps 1 and 2, it is made even more Democratic.

Figure 26: Democratic Percentage in VTDs, Enacted and Remedial Maps 3 and 4, District 17



District 12 once again gives up Republican-leaning East Wenatchee, and once again takes in bluer areas of District 5.

Figure 27: Democratic Percentage in VTDs, Enacted and Remedial Maps 3, District 12

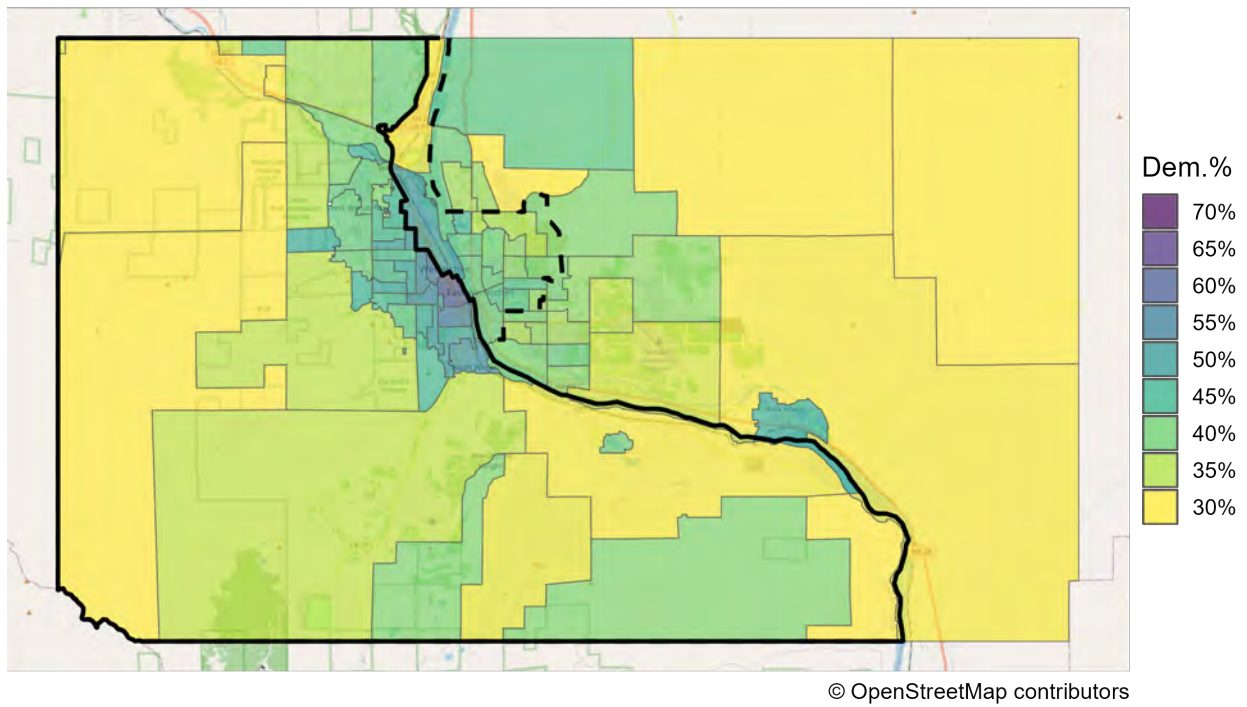
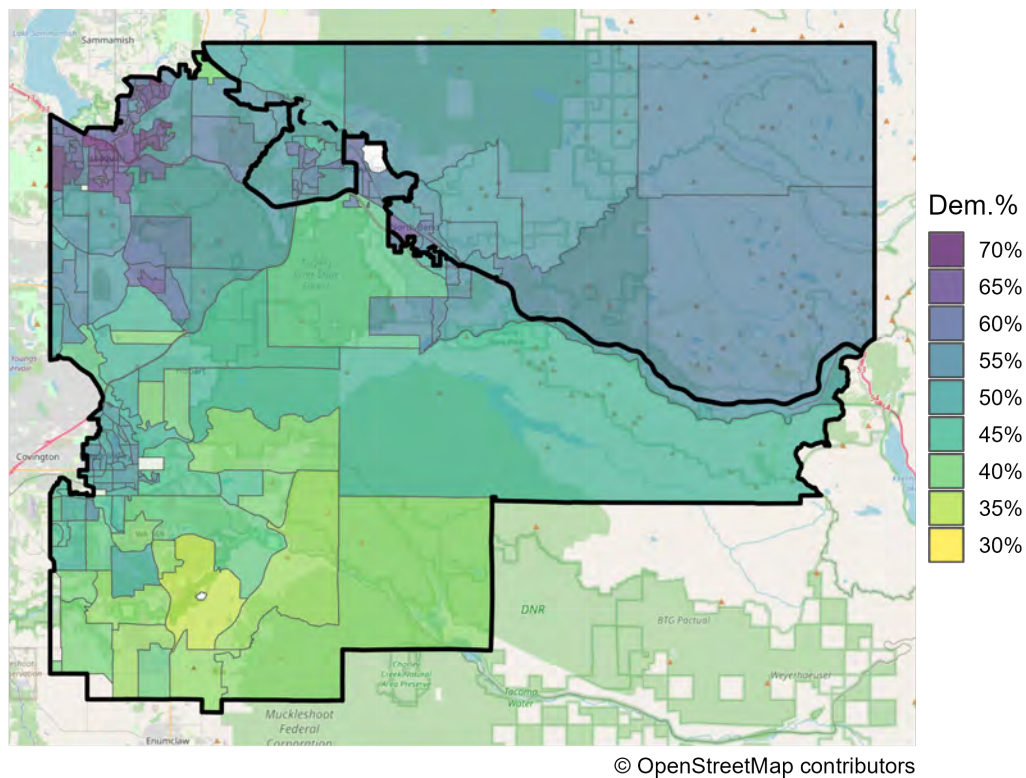


Figure 28: Democratic Percentage in VTDs, Enacted and Remedial Maps 3, District 12



Because Remedial Map 4 changes fewer districts, does not alter District 12, and uses the same version of District 17, examining its effects provide no new information.

A larger version of this image is available as a part of Exhibit 2.

Democratic (Dis)Advantage, Enacted Map vs. Remedial Map 4																				
	A.G. 2020		Governor 2020		President 2020		Treasurer 2020		Senate 2018		Governor 2016		President 2016		Senate 2016		Total Vote, 2016-2020		Total Vote, DRA	
District	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial
2	-20.3%	-20.0%	-22.8%	-22.6%	-14.7%	-14.6%	-21.2%	-21.0%	-16.2%	-15.9%	-18.9%	-17.8%	-16.0%	-15.7%	-8.1%	-7.1%	-13.9%	-13.4%	-17.0%	-16.6%
8	-20.4%	-25.7%	-22.2%	-27.7%	-15.8%	-21.1%	-30.0%	-35.1%	-20.4%	-25.5%	-21.8%	-24.7%	-21.7%	-26.6%	-10.5%	-13.8%	-20.0%	-24.0%	-20.3%	-25.2%
9	-20.1%	-19.6%	-21.8%	-21.4%	-16.0%	-15.6%	-26.3%	-26.0%	-14.6%	-14.0%	-20.0%	-19.5%	-19.8%	-19.3%	-11.7%	-11.1%	-17.9%	-17.5%	-18.6%	-18.2%
13	-29.7%	-27.2%	-34.0%	-31.7%	-26.0%	-23.0%	-34.3%	-31.6%	-29.8%	-26.9%	-29.0%	-26.8%	-30.1%	-26.6%	-21.5%	-18.6%	-25.5%	-23.0%	-29.6%	-26.7%
14	-9.3%	14.6%	-12.1%	10.3%	-6.0%	15.5%	-15.4%	9.5%	-13.3%	9.4%	-10.6%	15.4%	-12.8%	13.1%	-3.5%	23.6%	-9.4%	12.0%	-10.5%	13.5%
15	-1.1%	-23.4%	-5.2%	-26.2%	0.3%	-20.1%	-6.6%	-30.0%	-7.2%	-27.4%	-0.3%	-22.3%	-1.6%	-26.2%	7.7%	-16.0%	-1.8%	-21.2%	-2.2%	-24.3%
16	-23.7%	-17.8%	-26.4%	-20.0%	-20.3%	-14.1%	-32.0%	-25.8%	-20.6%	-14.9%	-22.6%	-20.3%	-25.0%	-19.3%	-10.8%	-7.8%	-21.5%	-17.2%	-22.9%	-17.3%
17	-1.3%	1.8%	-0.0%	2.8%	3.6%	6.6%	-7.6%	-4.7%	2.5%	5.3%	-7.7%	-5.1%	-2.1%	0.3%	-1.4%	1.7%	-2.6%	-0.1%	-0.9%	2.0%
20	-31.4%	-31.3%	-33.8%	-33.3%	-27.9%	-27.7%	-33.8%	-34.1%	-25.7%	-25.7%	-29.4%	-30.7%	-28.7%	-29.2%	-18.7%	-20.5%	-24.4%	-25.0%	-28.6%	-28.9%
31	-14.3%	-15.8%	-15.4%	-16.9%	-5.7%	-7.3%	-16.1%	-17.3%	-9.5%	-10.7%	-15.4%	-16.5%	-8.5%	-9.8%	-4.8%	-5.8%	-9.1%	-10.2%	-10.3%	-11.6%

4.6 Incumbency

Like the earlier maps, the changes here pit multiple Republican incumbents against each other or places them in unfavorable districts. In particular, Senator Torres is placed in a district based in Walla Walla where just 7.4% of the VAP is drawn from her previous district. District 7 also pairs two Senators, while Districts 15, 16, and 17 involve three Republican House incumbents being placed in the same district. Map 4, which avoids disrupting as many districts, confines the changes to districts 15, 16 and 17.

First	Last	Party	Chamber
District 5			
Lisa	Callan	D	House
Bill	Ramos	D	House
Mark	Mullet	D	Senate
Phil	Fortunato	R	Senate
District 7			
Joel	Kretz	R	House
Jacquelin	Maycumber	R	House
Shelly	Short	R	Senate
Brad	Hawkins	R	Senate
District 15			
Chris	Corry	R	House
Curtis	King	R	Senate
Bruce	Chandler	R	House
Bryan	Sandlin	R	House
District 16			
Stephanie	Barnard	R	House
Nikki	Torres	R	Senate
Mark	Klicker	R	House
Skyler	Rude	R	House
Perry	Dozier	R	Senate
District 17			
Gina	Mosbrucker	R	House
Paul	Harris	R	House
Kevin	Waters	R	House
Lynda	Wilson	R	Senate

5 Analysis of Remedial Map 5

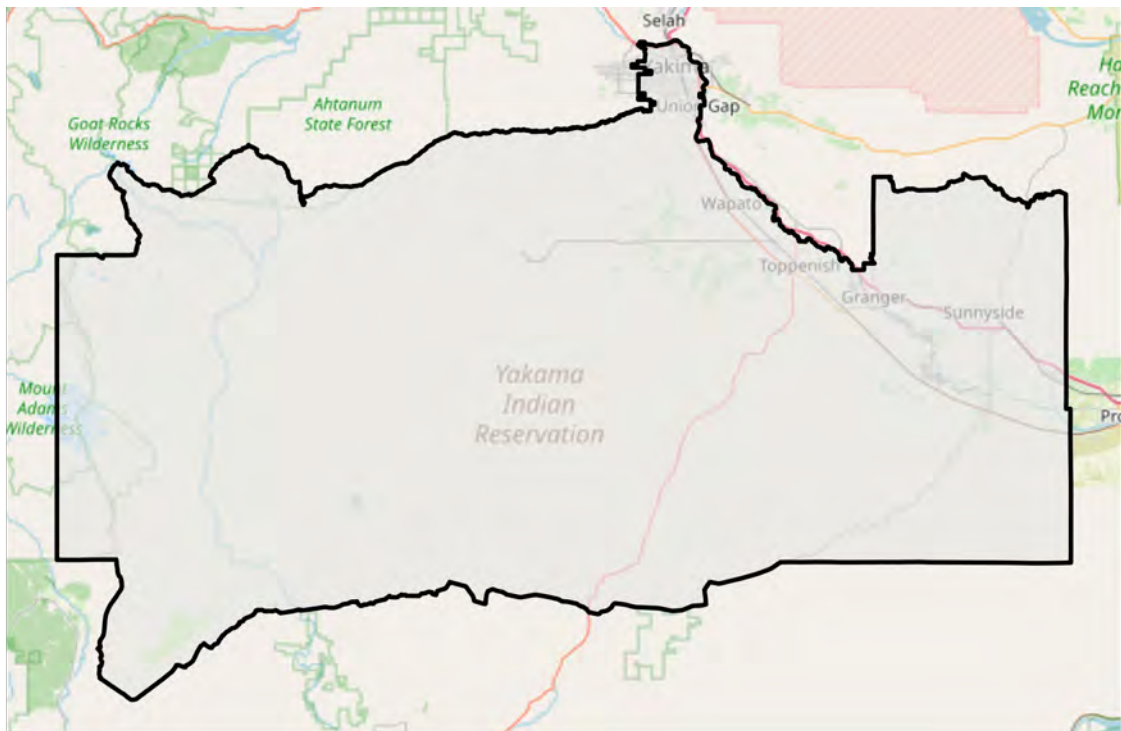
Map 5 is the least disruptive map. Only four districts are changed, all within the Yakima Valley: Districts 13, 14, 15 and 16. This allows for a relatively truncated analysis. The catch, however, is that the district reduces the HCVAP of District 14 below 47%.

HCVAP Estimates of VRA Districts in Remedial 3 and 4, and Enacted Map

Year	HCVAP% (Rem. 5)	HCVAP% (Enacted Map)
2021	46.9%	52.6%
2020	45.9%	51.9%
2019	44.7%	50.0%

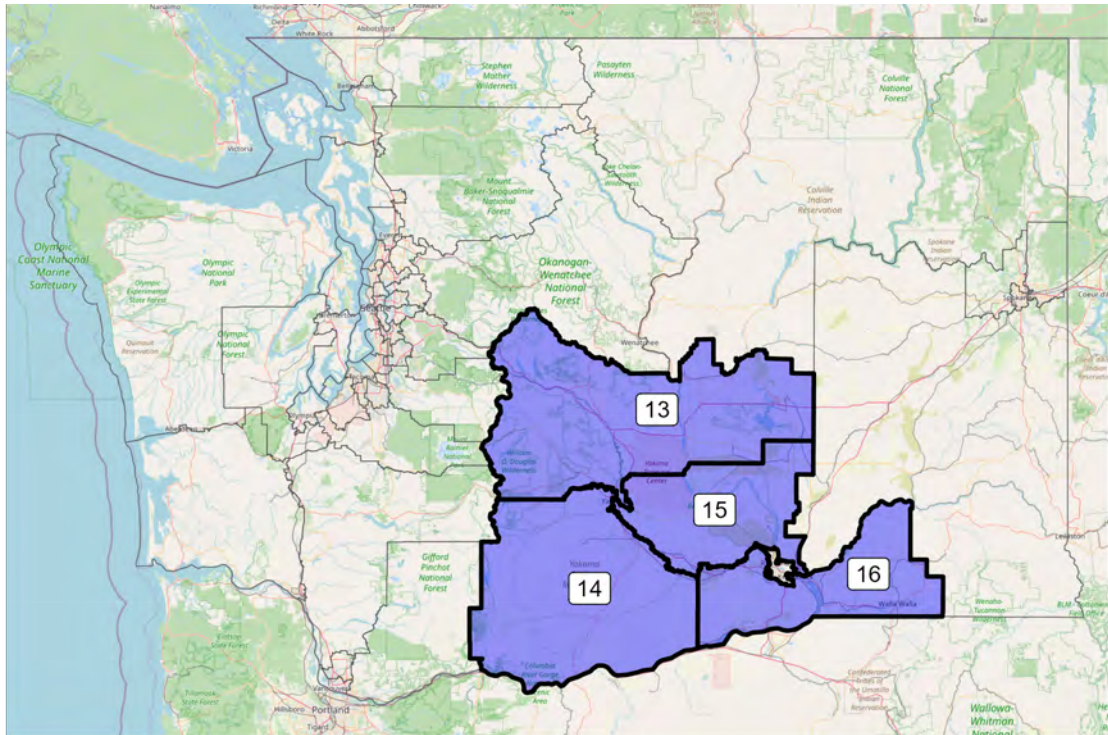
We can view our now-familiar introductory maps here:

Figure 29: Proposed VRA District in Remedial Maps 5



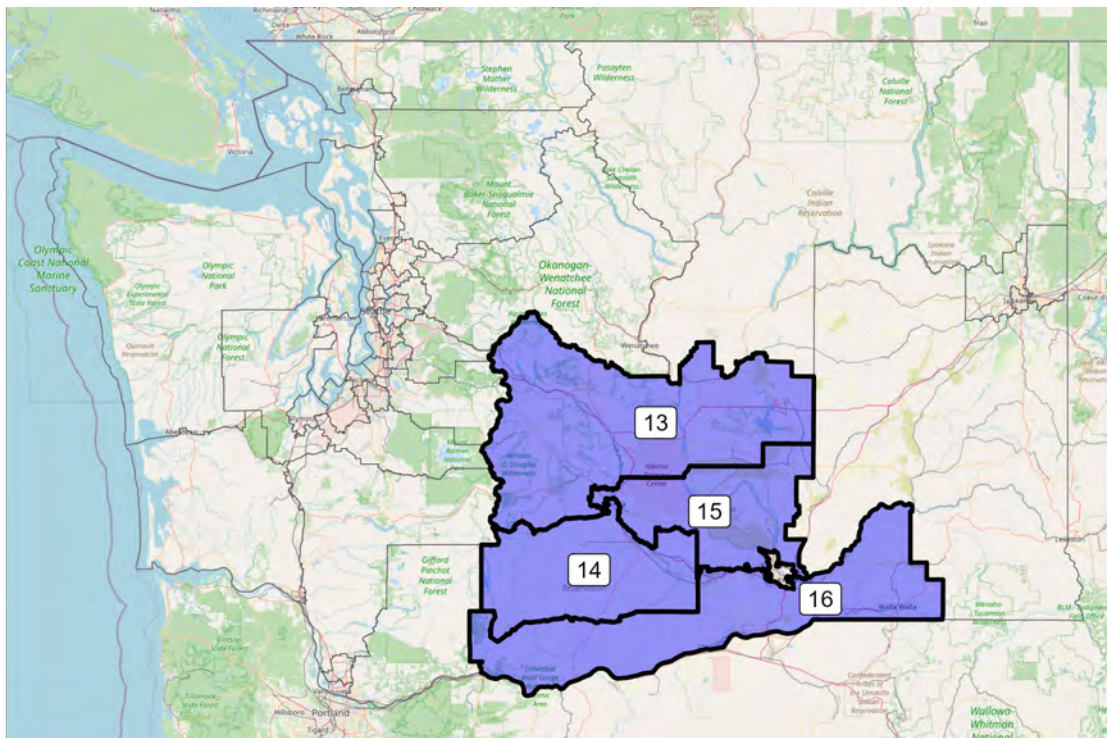
© OpenStreetMap contributors

Figure 30: Enacted Map, with Districts Altered in Remedial Map 5 Highlighted



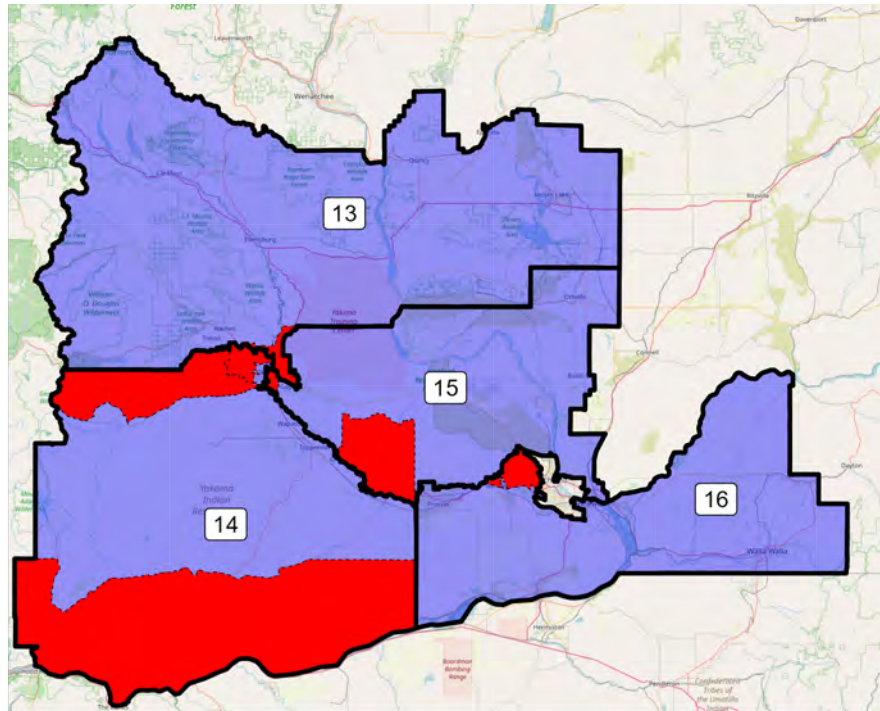
© OpenStreetMap contributors

Figure 31: Remedial Map 5, with Districts Altered from Enacted Map Highlighted



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Figure 32: Enacted Map, with Census Blocks Shifted Into Different Districts in Remedial Map 5 Highlighted in Red



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The map moves 190,745 people around, including just 15,673 who were not in districts 14, 15 or 16. No new counties are impacted.

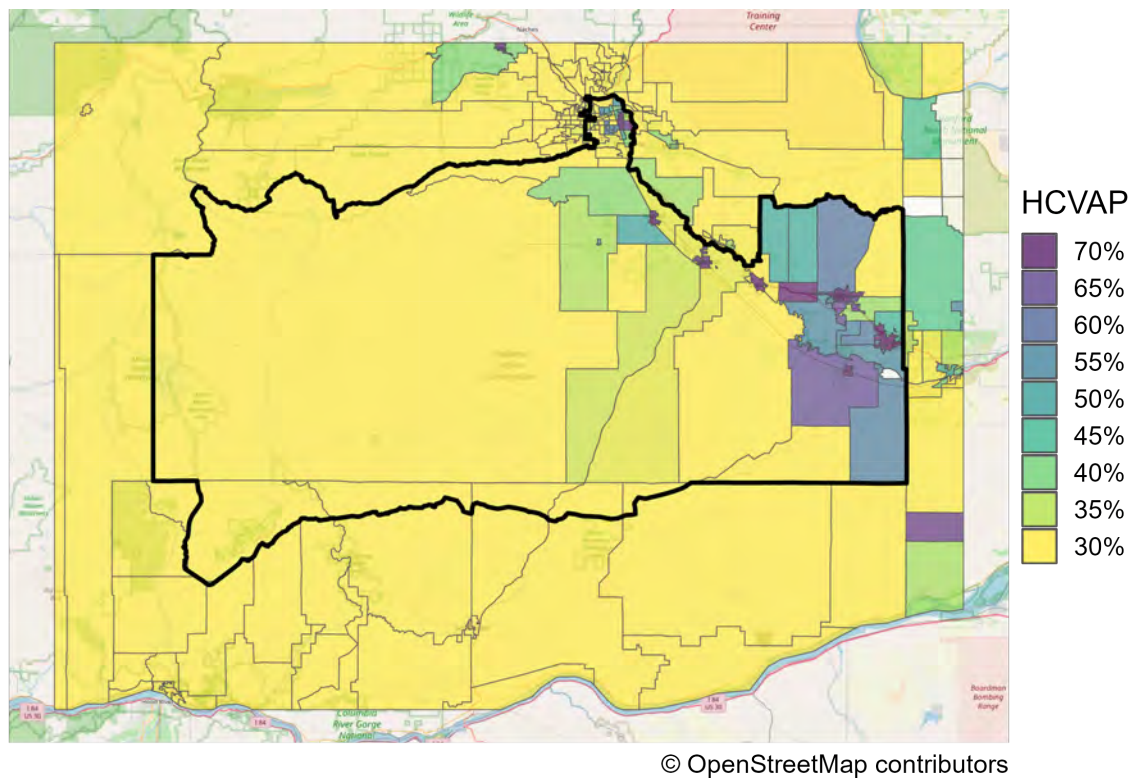
The districts that are changed do become appreciably less compact using this approach. District 16 in particular becomes the least compact district on the map, using either the Polsby-Popper or Reock score.

Comparison of Reock Scores, Changed Districts, Remedial 5					
Made Less Compact			Made More Compact		
Enacted District	Reock, Enacted	Reock, Rem. 5	District	Reock, Enacted	Reock, Rem. 5
14	0.531	0.347	13	0.295	0.307
15	0.323	0.263	—	—	—
16	0.243	0.114	—	—	—

Comparison of Polsby-Popper Scores, Changed Districts, Remedial 5					
Made Less Compact			Made More Compact		
Enacted District	Polsby-Popper, Enacted	Polsby-Popper, Rem. 5	District	Polsby-Popper, Enacted	Polsby-Popper, Rem. 5
13	0.271	0.264	—	—	—
14	0.478	0.356	—	—	—
15	0.255	0.194	—	—	—
16	0.278	0.178	—	—	—

In terms of politics, there are few changes to district partisanship. The Hispanic population is concentrated in Yakima.

Figure 33: District 14 in Remedial Map 5



Finally, the map does not pair any Senate incumbents. In the House, Representatives Mosbrucker, Klicker and Rude, all Republicans, are placed together in District 16, while Representatives Dent, Ybarra and Corry are placed together in District 13. Sen. Torres is left in District 15, however a majority of the Voting Age Population in the district (51.4%) will be new to her. Just 25% of the CVAP in her district is Hispanic.

6 Conclusion

The following table summarizes the HCVAPs of the various proposed remedial maps.

Summary HCVAP Estimates of VRA Districts in Remedial and Enacted Maps

Year	Maps 1 and 2	Maps 3 and 4	Map 5	Enacted Map
2021	51.7%	50.2%	46.9%	52.6%
2020	51.3%	50.1%	45.9%	51.9%
2019	49.8%	48.0%	44.7%	50.0%

Overall, Maps 1-4 disrupt the districts of several Republican incumbents, improve the opportunities for Democrats in districts well beyond the opportunity district that the law demands, and make several districts significantly less compact. They create a chain reaction in districts that stretches across much of the state. Map 5 mitigates some (but not all) of these problems, but does so at the expense of lowering the HCVAP substantially.

I declare under penalty of perjury under the laws of the State of Ohio that the foregoing is true and correct to the best of my knowledge and belief. Executed on 22 December 2023 in Delaware, Ohio.

Sean Trende

Sean P. Trende

7 Exhibit 1

SEAN P. TRENDE

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EDUCATION

Ph.D., The Ohio State University, Political Science, 2023. Dissertation titled *Application of Spatial Analysis to Contemporary Problems in Political Science*, September 2023.

M.A.S. (Master of Applied Statistics), The Ohio State University, 2019.

J.D., Duke University School of Law, *cum laude*, 2001; Duke Law Journal, Research Editor.

M.A., Duke University, *cum laude*, Political Science, 2001. Thesis titled *The Making of an Ideological Court: Application of Non-parametric Scaling Techniques to Explain Supreme Court Voting Patterns from 1900-1941*, June 2001.

B.A., Yale University, with distinction, History and Political Science, 1995.

PROFESSIONAL EXPERIENCE

Law Clerk, Hon. Deanell R. Tacha, U.S. Court of Appeals for the Tenth Circuit, 2001-02.

Associate, Kirkland & Ellis, LLP, Washington, DC, 2002-05.

Associate, Hunton & Williams, LLP, Richmond, Virginia, 2005-09.

Associate, David, Kamp & Frank, P.C., Newport News, Virginia, 2009-10.

Senior Elections Analyst, RealClearPolitics, 2010-present.

Columnist, Center for Politics Crystal Ball, 2014-17.

Visiting Scholar, American Enterprise Institute, 2018-present.

BOOKS AND BOOK CHAPTERS

Larry J. Sabato, ed., *The Red Ripple*, Ch. 15 (2023).

Larry J. Sabato, ed., *A Return to Normalcy?: The 2020 Election that (Almost) Broke America* Ch. 13 (2021).

Larry J. Sabato, ed., *The Blue Wave*, Ch. 14 (2019).

Larry J. Sabato, ed., *Trumped: The 2016 Election that Broke all the Rules* (2017).

Larry J. Sabato, ed., *The Surge: 2014's Big GOP Win and What It Means for the Next Presidential Election*, Ch. 12 (2015).

Larry J. Sabato, ed., *Barack Obama and the New America*, Ch. 12 (2013).

Barone, Kraushaar, McCutcheon & Trende, *The Almanac of American Politics* 2014 (2013).

The Lost Majority: Why the Future of Government is up for Grabs – And Who Will Take It (2012).

PREVIOUS EXPERT TESTIMONY AND/OR DEPOSITIONS

Dickson v. Rucho, No. 11-CVS-16896 (N.C. Super. Ct., Wake County) (racial gerrymandering).

Covington v. North Carolina, No. 1:15-CV-00399 (M.D.N.C.) (racial gerrymandering).

NAACP v. McCrory, No. 1:13CV658 (M.D.N.C.) (early voting).

NAACP v. Husted, No. 2:14-cv-404 (S.D. Ohio) (early voting).

Ohio Democratic Party v. Husted, Case 15-cv-01802 (S.D. Ohio) (early voting).

Lee v. Virginia Bd. of Elections, No. 3:15-cv-357 (E.D. Va.) (early voting).

Feldman v. Arizona, No. CV-16-1065-PHX-DLR (D. Ariz.) (absentee voting).

A. Philip Randolph Institute v. Smith, No. 1:18-cv-00357-TSB (S.D. Ohio) (political gerrymandering).

Whitford v. Nichol, No. 15-cv-421-bbc (W.D. Wisc.) (political gerrymandering).

Common Cause v. Rucho, No. 1:16-CV-1026-WO-JEP (M.D.N.C.) (political gerrymandering).

Mecinas v. Hobbs, No. CV-19-05547-PHX-DJH (D. Ariz.) (ballot order effect).

Fair Fight Action v. Raffensperger, No. 1:18-cv-05391-SCJ (N.D. Ga.) (statistical analysis).

Pascua Yaqui Tribe v. Rodriguez, No. 4:20-CV-00432-TUC-JAS (D. Ariz.) (early voting).

Ohio Organizing Collaborative, et al v. Ohio Redistricting Commission, et al, No. 2021-1210 (Ohio) (political gerrymandering).

NCLCV v. Hall, No. 21-CVS-15426 (N.C. Sup. Ct.) (political gerrymandering).

Szeliga v. Lamone, Case No. C-02-CV-21-001816 (Md. Cir. Ct.) (political gerrymandering).

Montana Democratic Party v. Jacobsen, DV-56-2021-451 (Mont. Dist. Ct.) (early voting; ballot collection).

Carter v. Chapman, No. 464 M.D. 2021 (Pa.) (map drawing; amicus).

NAACP v. McMaster, No. 3:21-cv-03302 (D.S.C.) (racial gerrymandering).

Graham v. Adams, No. 22-CI-00047 (Ky. Cir. Ct.) (political gerrymandering).

Harkenrider v. Hochul, No. E2022-0116CV (N.Y. Sup. Ct.) (political gerrymandering).

LULAC v. Abbott, Case No. 3:21-cv-00259 (W.D. Tex.) (racial/political gerrymandering/VRA).

Moore et al., v. Lee, et al., (Tenn. 20th Dist.) (state constitutional compliance).

Agee et al. v. Benson, et al., (W.D. Mich.) (racial gerrymandering/VRA).

Faatz, et al. v. Ashcroft, et al., (Cir. Ct. Mo.) (state constitutional compliance).

Coca, et al. v. City of Dodge City, et al., Case No. 6:22-cv-01274-EFM-RES (D. Kan.) (VRA).

Milligan v. Allen, Case No. 2:21-cv-01530-AMM (N.D. Ala.) (VRA).

Nairne v. Ardoin, NO. 22-178-SDD-SDJ (M.D. La.) (VRA).

Robinson v. Ardoin, NO. 22-211-SDD-SDJ (M.D. La.) (VRA).

Republican Party v. Oliver, No. D-506-CV-2022-00041 (N.M. Cir. Ct. (Lea County)) (political gerrymandering).

COURT APPOINTMENTS

Appointed as Voting Rights Act expert by Arizona Independent Redistricting Commission (2020)

Appointed Special Master by the Supreme Court of Virginia to redraw maps for the Virginia House of Delegates, the Senate of Virginia, and for Virginia's delegation to the United States Congress for the 2022 election cycle.

Appointed redistricting expert by the Supreme Court of Belize in *Smith v. Perrera*, No. 55 of 2019 (one-person-one-vote).

INTERNATIONAL PRESENTATIONS AND EXPERIENCE

Panel Discussion, European External Action Service, Brussels, Belgium, Likely Outcomes of 2012 American Elections.

Selected by U.S. Embassies in Sweden, Spain, and Italy to discuss 2016 and 2018 elections to think tanks and universities in area (declined Italy due to teaching responsibilities).

Selected by EEAS to discuss 2018 elections in private session with European Ambassadors.

TEACHING

American Democracy and Mass Media, Ohio Wesleyan University, Spring 2018.

Introduction to American Politics, The Ohio State University, Autumns 2018, 2019, 2020, Spring 2018.

Political Participation and Voting Behavior, Springs 2020, 2021, 2022, 2023.

Survey Methodology, Fall 2022, Spring 2024.

PUBLICATIONS

James G. Gimpel, Andrew Reeves, & Sean Trende, “Reconsidering Bellwether Locations in U.S. Presidential Elections,” Pres. Stud. Q. (2022) (forthcoming, available online at <http://doi.org/10.1111/psq.12793>).

REAL CLEAR POLITICS COLUMNS

Full archives available at http://www.realclearpolitics.com/authors/sean_trende/

8 Exhibit 2

Democratic (Dis)Advantage, Enacted Map vs. Remedial Map 1

District	A.G. 2020		Governor 2020		President 2020		Treasurer 2020		Senate 2018		Governor 2016		President 2016		Senate 2016		Total Vote, 2016-2020		Total Vote, DRA	
	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial
2	-20.3%	-21.1%	-22.8%	-23.7%	-14.7%	-15.7%	-21.2%	-22.2%	-16.2%	-17.0%	-18.9%	-18.6%	-16.0%	-16.8%	-8.1%	-7.9%	-13.9%	-14.3%	-17.0%	-17.7%
5	11.3%	9.4%	14.3%	12.0%	22.9%	20.2%	3.9%	2.4%	13.9%	12.1%	-1.0%	-2.0%	17.1%	14.9%	11.0%	9.7%	8.2%	6.9%	13.9%	11.9%
7	-33.8%	-31.7%	-38.0%	-36.0%	-31.5%	-29.4%	-36.8%	-34.8%	-27.9%	-26.1%	-29.0%	-27.4%	-33.7%	-31.7%	-20.6%	-18.8%	-27.2%	-25.6%	-31.9%	-29.9%
8	-20.4%	-24.2%	-22.2%	-26.2%	-15.8%	-19.7%	-30.0%	-34.0%	-20.4%	-24.2%	-21.8%	-23.6%	-21.7%	-25.4%	-10.5%	-12.5%	-20.0%	-22.9%	-20.3%	-23.9%
9	-20.1%	-18.7%	-21.8%	-20.6%	-16.0%	-14.8%	-26.3%	-25.2%	-14.6%	-13.2%	-20.0%	-18.7%	-19.8%	-18.5%	-11.7%	-10.4%	-17.9%	-16.8%	-18.6%	-17.4%
12	-10.2%	-6.1%	-11.3%	-6.2%	-2.0%	3.4%	-14.1%	-10.4%	-7.2%	-2.8%	-14.8%	-12.1%	-8.1%	-2.8%	-4.2%	-1.3%	-8.4%	-5.1%	-7.9%	-3.4%
13	-29.7%	-28.7%	-34.0%	-33.2%	-26.0%	-24.9%	-34.3%	-33.2%	-29.8%	-28.2%	-29.0%	-28.3%	-30.1%	-28.6%	-21.5%	-20.2%	-25.5%	-24.5%	-29.6%	-28.4%
14	-9.3%	15.2%	-12.1%	10.9%	-6.0%	16.2%	-15.4%	10.2%	-13.3%	9.6%	-10.6%	16.2%	-12.8%	14.0%	-3.5%	24.2%	-9.4%	12.5%	-10.5%	14.1%
15	-1.1%	-24.1%	-5.2%	-26.8%	0.3%	-20.6%	-6.6%	-30.6%	-7.2%	-28.2%	-0.3%	-23.1%	-1.6%	-27.1%	7.7%	-17.0%	-1.8%	-21.8%	-2.2%	-25.1%
16	-23.7%	-20.3%	-26.4%	-22.4%	-20.3%	-16.6%	-32.0%	-27.9%	-20.6%	-17.4%	-22.6%	-22.1%	-25.0%	-21.6%	-10.8%	-9.9%	-21.5%	-19.1%	-22.9%	-19.6%
17	-1.3%	1.2%	-0.0%	2.0%	3.6%	5.8%	-7.6%	-5.3%	2.5%	4.7%	-7.7%	-5.5%	-2.1%	-0.4%	-1.4%	1.5%	-2.6%	-0.6%	-0.9%	1.4%
20	-31.4%	-30.5%	-33.8%	-32.4%	-27.9%	-26.9%	-33.8%	-33.4%	-25.7%	-25.0%	-29.4%	-30.3%	-28.7%	-28.6%	-18.7%	-20.3%	-24.4%	-24.5%	-28.6%	-28.2%
31	-14.3%	-17.4%	-15.4%	-19.0%	-5.7%	-9.0%	-16.1%	-18.6%	-9.5%	-12.4%	-15.4%	-17.7%	-8.5%	-11.6%	-4.8%	-6.9%	-9.1%	-11.5%	-10.3%	-13.3%
49	20.1%	20.1%	20.6%	20.6%	22.4%	22.4%	13.2%	13.2%	24.9%	24.9%	14.9%	14.9%	16.4%	16.4%	21.0%	21.0%	15.9%	15.9%	19.6%	19.6%

Democratic (Dis)Advantage, Enacted Map vs. Remedial Map 2

District	A.G. 2020		Governor 2020		President 2020		Treasurer 2020		Senate 2018		Governor 2016		President 2016		Senate 2016		Total Vote, 2016-2020		Total Vote, DRA	
	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial
2	-20.3%	-21.1%	-22.8%	-23.7%	-14.7%	-15.7%	-21.2%	-22.2%	-16.2%	-17.0%	-18.9%	-18.6%	-16.0%	-16.8%	-8.1%	-7.9%	-13.9%	-14.3%	-17.0%	-17.7%
8	-20.4%	-24.2%	-22.2%	-26.2%	-15.8%	-19.7%	-30.0%	-34.0%	-20.4%	-24.2%	-21.8%	-23.6%	-21.7%	-25.4%	-10.5%	-12.5%	-20.0%	-22.9%	-20.3%	-23.9%
9	-20.1%	-19.6%	-21.8%	-21.4%	-16.0%	-15.6%	-26.3%	-26.0%	-14.6%	-14.0%	-20.0%	-19.5%	-19.8%	-19.3%	-11.7%	-11.1%	-17.9%	-17.5%	-18.6%	-18.2%
13	-29.7%	-28.8%	-34.0%	-33.3%	-26.0%	-24.5%	-34.3%	-32.9%	-29.8%	-27.7%	-29.0%	-27.7%	-30.1%	-27.8%	-21.5%	-19.5%	-25.5%	-24.1%	-29.6%	-27.9%
14	-9.3%	15.2%	-12.1%	10.9%	-6.0%	16.2%	-15.4%	10.2%	-13.3%	9.6%	-10.6%	16.2%	-12.8%	14.0%	-3.5%	24.2%	-9.4%	12.5%	-10.5%	14.1%
15	-1.1%	-23.3%	-5.2%	-25.9%	0.3%	-19.8%	-6.6%	-30.0%	-7.2%	-27.1%	-0.3%	-22.2%	-1.6%	-25.9%	7.7%	-15.8%	-1.8%	-21.1%	-2.2%	-24.1%
16	-23.7%	-17.5%	-26.4%	-19.8%	-20.3%	-13.9%	-32.0%	-25.2%	-20.6%	-14.8%	-22.6%	-20.3%	-25.0%	-19.2%	-10.8%	-7.9%	-21.5%	-16.9%	-22.9%	-17.1%
17	-1.3%	1.2%	-0.0%	2.0%	3.6%	5.8%	-7.6%	-5.3%	2.5%	4.7%	-7.7%	-5.5%	-2.1%	-0.4%	-1.4%	1.5%	-2.6%	-0.6%	-0.9%	1.4%
20	-31.4%	-30.5%	-33.8%	-32.4%	-27.9%	-26.9%	-33.8%	-33.4%	-25.7%	-25.0%	-29.4%	-30.3%	-28.7%	-28.6%	-18.7%	-20.3%	-24.4%	-24.5%	-28.6%	-28.2%
31	-14.3%	-14.5%	-15.4%	-15.5%	-5.7%	-6.0%	-16.1%	-16.0%	-9.5%	-9.6%	-15.4%	-15.8%	-8.5%	-8.8%	-4.8%	-5.1%	-9.1%	-9.3%	-10.3%	-10.5%
49	20.1%	20.1%	20.6%	20.6%	22.4%	22.4%	13.2%	13.2%	24.9%	24.9%	14.9%	14.9%	16.4%	16.4%	21.0%	21.0%	15.9%	15.9%	19.6%	19.6%

Democratic (Dis)Advantage, Enacted Map vs. Remedial Map 3

District	A.G. 2020		Governor 2020		President 2020		Treasurer 2020		Senate 2018		Governor 2016		President 2016		Senate 2016		Total Vote, 2016-2020		Total Vote, DRA	
	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial
2	-20.3%	-20.0%	-22.8%	-22.6%	-14.7%	-14.6%	-21.2%	-21.0%	-16.2%	-15.9%	-18.9%	-17.8%	-16.0%	-15.7%	-8.1%	-7.1%	-13.9%	-13.4%	-17.0%	-16.6%
5	11.3%	9.7%	14.3%	12.3%	22.9%	20.6%	3.9%	2.7%	13.9%	12.5%	-1.0%	-1.5%	17.1%	15.3%	11.0%	10.4%	8.2%	7.3%	13.9%	12.3%
7	-33.8%	-32.3%	-38.0%	-36.6%	-31.5%	-30.0%	-36.8%	-35.5%	-27.9%	-26.7%	-29.0%	-28.0%	-33.7%	-32.3%	-20.6%	-19.4%	-27.2%	-26.1%	-31.9%	-30.5%
8	-20.4%	-25.7%	-22.2%	-27.7%	-15.8%	-21.1%	-30.0%	-35.1%	-20.4%	-25.5%	-21.8%	-24.7%	-21.7%	-26.6%	-10.5%	-13.8%	-20.0%	-24.0%	-20.3%	-25.2%
9	-20.1%	-18.7%	-21.8%	-20.6%	-16.0%	-14.8%	-26.3%	-25.2%	-14.6%	-13.2%	-20.0%	-18.7%	-19.8%	-18.5%	-11.7%	-10.4%	-17.9%	-16.8%	-18.6%	-17.4%
12	-10.2%	-6.6%	-11.3%	-6.8%	-2.0%	2.7%	-14.1%	-10.8%	-7.2%	-3.6%	-14.8%	-12.5%	-8.1%	-3.7%	-4.2%	-2.0%	-8.4%	-5.6%	-7.9%	-4.1%
13	-29.7%	-28.5%	-34.0%	-32.9%	-26.0%	-24.7%	-34.3%	-32.9%	-29.8%	-28.1%	-29.0%	-28.0%	-30.1%	-28.3%	-21.5%	-19.9%	-25.5%	-24.3%	-29.6%	-28.1%
14	-9.3%	14.6%	-12.1%	10.3%	-6.0%	15.5%	-15.4%	9.5%	-13.3%	9.4%	-10.6%	15.4%	-12.8%	13.1%	-3.5%	23.6%	-9.4%	12.0%	-10.5%	13.5%
15	-1.1%	-24.0%	-5.2%	-26.8%	0.3%	-20.6%	-6.6%	-30.5%	-7.2%	-28.1%	-0.3%	-23.1%	-1.6%	-27.0%	7.7%	-16.9%	-1.8%	-21.7%	-2.2%	-25.0%
16	-23.7%	-19.7%	-26.4%	-21.8%	-20.3%	-16.0%	-32.0%	-27.5%	-20.6%	-16.8%	-22.6%	-21.6%	-25.0%	-21.1%	-10.8%	-9.3%	-21.5%	-18.6%	-22.9%	-19.1%
17	-1.3%	1.8%	-0.0%	2.8%	3.6%	6.6%	-7.6%	-4.7%	2.5%	5.3%	-7.7%	-5.1%	-2.1%	0.3%	-1.4%	1.7%	-2.6%	-0.1%	-0.9%	2.0%
20	-31.4%	-31.3%	-33.8%	-33.3%	-27.9%	-27.7%	-33.8%	-34.1%	-25.7%	-25.7%	-29.4%	-30.7%	-28.7%	-29.2%	-18.7%	-20.5%	-24.4%	-25.0%	-28.6%	-28.9%
31	-14.3%	-17.1%	-15.4%	-18.6%	-5.7%	-8.7%	-16.1%	-18.6%	-9.5%	-11.9%	-15.4%	-17.5%	-8.5%	-11.1%	-4.8%	-6.8%	-9.1%	-11.3%	-10.3%	-13.0%

Democratic (Dis)Advantage, Enacted Map vs. Remedial Map 4

District	A.G. 2020		Governor 2020		President 2020		Treasurer 2020		Senate 2018		Governor 2016		President 2016		Senate 2016		Total Vote, 2016-2020		Total Vote, DRA	
	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial	Enacted	Remedial
2	-20.3%	-20.0%	-22.8%	-22.6%	-14.7%	-14.6%	-21.2%	-21.0%	-16.2%	-15.9%	-18.9%	-17.8%	-16.0%	-15.7%	-8.1%	-7.1%	-13.9%	-13.4%	-17.0%	-16.6%
8	-20.4%	-25.7%	-22.2%	-27.7%	-15.8%	-21.1%	-30.0%	-35.1%	-20.4%	-25.5%	-21.8%	-24.7%	-21.7%	-26.6%	-10.5%	-13.8%	-20.0%	-24.0%	-20.3%	-25.2%
9	-20.1%	-19.6%	-21.8%	-21.4%	-16.0%	-15.6%	-26.3%	-26.0%	-14.6%	-14.0%	-20.0%	-19.5%	-19.8%	-19.3%	-11.7%	-11.1%	-17.9%	-17.5%	-18.6%	-18.2%
13	-29.7%	-27.2%	-34.0%	-31.7%	-26.0%	-23.0%	-34.3%	-31.6%	-29.8%	-26.9%	-29.0%	-26.8%	-30.1%	-26.6%	-21.5%	-18.6%	-25.5%	-23.0%	-29.6%	-26.7%
14	-9.3%	14.6%	-12.1%	10.3%	-6.0%	15.5%	-15.4%	9.5%	-13.3%	9.4%	-10.6%	15.4%	-12.8%	13.1%	-3.5%	23.6%	-9.4%	12.0%	-10.5%	13.5%
15	-1.1%	-23.4%	-5.2%	-26.2%	0.3%	-20.1%	-6.6%	-30.0%	-7.2%	-27.4%	-0.3%	-22.3%	-1.6%	-26.2%	7.7%	-16.0%	-1.8%	-21.2%	-2.2%	-24.3%
16	-23.7%	-17.8%	-26.4%	-20.0%	-20.3%	-14.1%	-32.0%	-25.8%	-20.6%	-14.9%	-22.6%	-20.3%	-25.0%	-19.3%	-10.8%	-7.8%	-21.5%	-17.2%	-22.9%	-17.3%
17	-1.3%	1.8%	-0.0%	2.8%	3.6%	6.6%	-7.6%	-4.7%	2.5%	5.3%	-7.7%	-5.1%	-2.1%	0.3%	-1.4%	1.7%	-2.6%	-0.1%	-0.9%	2.0%
20	-31.4%	-31.3%	-33.8%	-33.3%	-27.9%	-27.7%	-33.8%	-34.1%	-25.7%	-25.7%	-29.4%	-30.7%	-28.7%	-29.2%	-18.7%	-20.5%	-24.4%	-25.0%	-28.6%	-28.9%
31	-14.3%	-15.8%	-15.4%	-16.9%	-5.7%	-7.3%	-16.1%	-17.3%	-9.5%	-10.7%	-15.4%	-16.5%	-8.5%	-9.8%	-4.8%	-5.8%	-9.1%	-10.2%	-10.3%	-11.6%