EXHIBIT A

IN THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF GEORGIA ATLANTA DIVISION

GEORGIA STATE CONFERENCE OF THE NAACP, et al. *Plaintiffs*, v. STATE OF GEORGIA, et al. *Defendants.*	Case No. 1:21-CV-5338-ELB-SCJ-SDG
COMMON CAUSE, et al., *Plaintiffs*, v. BRAD RAFFENSPERGER *Defendant*.	Case No. 1:22-CV-00090-ELB-SCJ-SDG

Expert Report of Dr. Moon Duchin

Analysis of Race and Redistricting in Georgia

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1 Background and qualifications

I am a Professor of Mathematics and a Senior Fellow in the Jonathan M. Tisch College of Civic Life at Tufts University. At Tisch College, I am the director and principal investigator of an interdisciplinary research group called the MGGG Redistricting Lab, focused on geometric and computational aspects of redistricting. My areas of research and teaching include the structure of census data, the history of the U.S. Census, the design and implementation of randomized algorithms for generating districting plans, and the analysis of redistricting more broadly. In 2019, I was awarded a major grant from the National Science Foundation to study *Network Science of Census Data*.

I am compensated at $400/hour for my work in this case. I have previously written reports and provided testimony by deposition, a hearing, or at trial in North Carolina, Pennsylvania, Wisconsin, Alabama, South Carolina, and Texas.[1] A full copy of my CV is attached to this report.

1.1 Assignment

I have been asked to examine the Congressional, state Senate, and state House districts enacted in Georgia this year in connection with challenges under the Voting Rights Act of 1965 (VRA) and the U.S. Constitution.

[1] *NC League of Conservation Voters, et al. v. Hall, et al.* No. 21-cvs-500085 (Wake Cnty. Sup. Ct. 2021); *Carter v. Chapman*, No. 7 MM 2022, 2022 WL 702894 (Pa. Mar. 9, 2022); *Johnson v. Wis. Elections Comm'n*, No. 2021AP1450-OA, 2022 WL 621082 (Wis. Mar. 3, 2022); *Milligan, et al. v. Merrill, et al.*, Case No. 2:21-cv-01530-AMM and *Thomas, et al. v. Merrill, et al.*, Case No. 2:21-cv-01531-AMM (N.D. Ala. 2021); *SC NAACP et al. v. Alexander, et al.*, Case No. 3-21-cv-03302-MBS-TJH-RMG (D.S.C.) (three-judge ct.); *TX NAACP et al. v. Abbott*, Case No. 1:21-CV-00943-RP-JES-JVB.

In particular, I review the maps' conformance with traditional districting principles (§6), then supply demonstration maps for the "Gingles 1" prong of a VRA challenge. Using a notion of district "effectiveness" based on electoral history (§5), I show that it is readily possible to draw additional majority-minority districts, while simultaneously increasing the number of effective districts (§7). These effective districts are shown to be highly likely to provide an opportunity for Black and Latino voters to elect candidates of their choice.

I have also assessed the maps to investigate the possibility of excessively race-conscious line-drawing (§10), especially noting when traditional districting principles have been undermined in a manner that results in "packing" and "cracking"—the related practices of over-concentrating Black and Latino voters on one hand, or splitting communities and dispersing their voters over multiple districts on the other. I have considered whether or not the design of the districts ultimately leads to discernible dilution of voting opportunity for Black voters in Georgia, or for coalitions of Black and Latino voters, and have found ample evidence to support that conclusion.

All work in this report was completed by me and by research assistants working under my direct supervision.

1.2 Materials

Materials consulted in the preparation of this report include the following.

- A major source is Census data, primarily the Decennial Census releases (i.e., the PL 94-171). Other data products from the Census Bureau, including the American Community Survey and the TIGER/Line shapefiles, were also used.
- For priorities and criteria, I consulted the "2021–22 Guidelines for the House Legislative and Congressional Reapportionment Committee." These are reprinted in full in the corresponding publication by the Senate Committee on Reapportionment and Redistricting.
- Shapefiles for the enacted plans are available on the state's redistricting website, hosted at `legis.ga.gov`.
- A collection of precinct shapefiles with historical election data joined to the shapes was provided by counsel, as well as addresses for incumbent representatives. I was also provided with written transcriptions of oral testimony in public hearings in Georgia about redistricting, and with corresponding written communication.

2 Summary of findings

- Census data shows that the state of Georgia is rapidly diversifying, and in fact now has a population very nearly evenly split between White people and people of color. At the same time, it has shifted to become what we might call "bright purple," with recent elections repeatedly demonstrating that candidates preferred by Black and Latino voters can be elected by simple majority on a statewide basis.
- At a high level, an examination of recent electoral history shows that the enacted plans at all three levels are conspicuously uncompetitive, which has been fueled by acutely race-conscious moves in the recent redistricting. In particular:
  - A Congressional district that had proved to perform for the preferences of Black and Latino voters—CD 6—has been targeted to eliminate electoral opportunity. This was achieved by excising parts of urban counties and adding conservative White counties to the north of the benchmark configuration.
  - In a ripple effect from the reconfiguration of CD 6, a dense, urban, largely Black residential segment of Cobb County has been submerged in CD 14.

  - On the western edge of Georgia, CD 3 has been drawn to retain its character as a firewall between racially and politically diverse parts of the state in metro Atlanta and the Southwest region. Meanwhile, CD 13 has been kept highly packed, which is cemented in the enacted plan through race-conscious county splitting.
  - In the enacted Senate map, numerous districts that had trended into diverse and competitive population configurations were targeted for "dismantling," i.e, were re-drawn in a way that splits the population of the benchmark district across numerous new districts. This is especially visible in the reconfiguration of SD 17 and 48, which flouts traditional districting principles and creates districts that lock out opportunity.
  - There is strikingly low core retention in the enacted House plan, with roughly three in every five Georgia residents assigned to a new district today relative to the benchmark plan. This dovetails with a pattern of "dismantling" districts in a way that usually eliminates electoral opportunity for Black and Latino voters, using racially imbalanced transfers of population.

- I have introduced a label of district "effectiveness" in §5: by definition, a district is deemed effective if candidates of choice for Black and Latino voters can frequently win both primary and general elections. To make this concrete, I have used a list of four primary and eight general statewide elections selected as being highly probative for the preferences of Black and Latino Georgians. To be effective, a district must have an electoral history such that the candidate of choice would win in at least 3/4 primary elections and 5/8 general elections from this dataset. I have confirmed that this is well aligned with actual 2022 electoral performance at the Congressional and state legislative level.

- A review of metrics associated with traditional districting principles (and other principles cited in the state's redistricting guidelines) is presented in §6. My alternative plans are shown to be highly compact, to respect the integrity of counties and cities, and to be far more cognizant of the integrity of state precincts than the enacted plans.

- I present Gingles 1 alternatives on a regional/district cluster basis in §7. These plans increase both the number of majority-BHVAP districts and the number of majority-BHCVAP districts, relative to the state, while also securing the "effective" label on the basis of electoral history. The modular design of the legislative alternatives will make it easy to mix and match plans from different clusters.

- If we foreground effectiveness instead of majority demographics, we find that districts can frequently be effective even well under the 50%+1 demographic threshold. This provides helpful examples leading in to a discussion of racial gerrymandering in the following section.

- Counties are often split in a racially sorted way, beyond what the partisan geography would suggest from a race-neutral process. In many cases this secures a high partisan differential as well; in some cases, the racial differential significantly exceeds the partisan gap.

- It is extremely frequent for precinct splits to show major racial disparity. If mapmakers were using cast vote history to track partisan lean, as is frequently done around the country, then these splits of state precincts are especially telling, since the vote history can not provide a partisan basis for the decision. These splits are shown to essentially always align with packing and cracking. Again, my alternative maps show that far less precinct splitting is possible.

- Public input, such as the record of strong pushback against the targeting of CD 6 and the encroachment of CD 14 into Cobb, also explains why the enacted plans are dissonant in terms of shared community interests.

3 Demographics of Georgia

3.1 Regions, counties, and cities

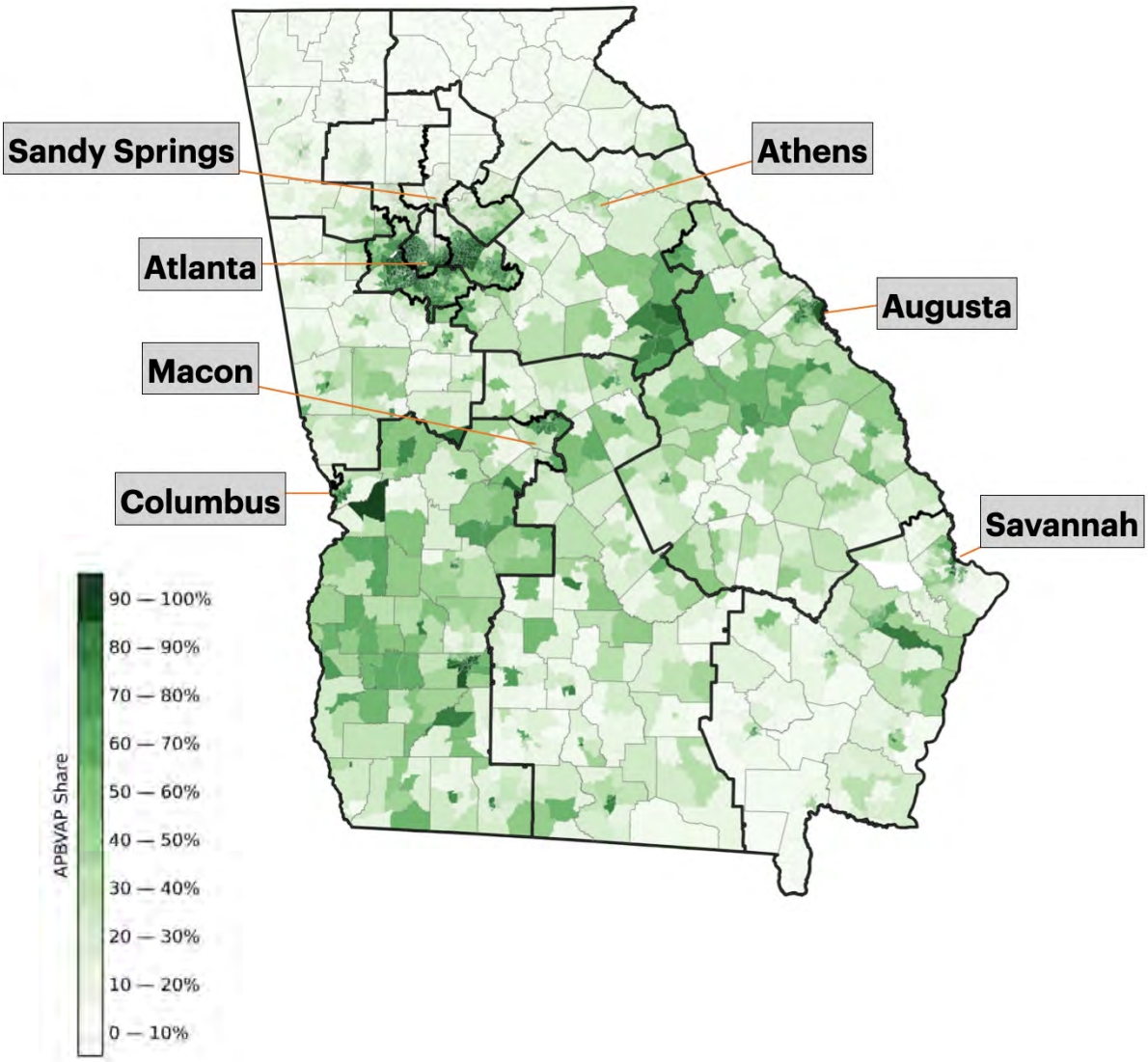


Figure 1: Choropleth of Black voting age population by state precinct, with the enacted Congressional map overlaid. County lines are shown in gray. The Atlanta metro area has dense Black population, while high proportions of Black residents in smaller cities and rural areas can be found in the swath of the state from Columbus to Augusta, broadly called Georgia's "Black Belt" region.

Georgia has 159 counties, the second highest number in the nation (after Texas with 254). Georgia's counties vary in population from Fulton County, with over a million residents, to Taliaferro County, with just 1559 residents, so that they differ by a factor of over 680×. Twenty-two of the counties are majority-Black, from DeKalb (pop. 764,382) to Taliaferro.

In Georgia, the cities proper are not very populous; even Atlanta has under 500,000 people by the 2020 Census numbers, smaller than the ideal Congressional district population of 765,136. However, the Atlanta metro area (formally the "Atlanta–Sandy Springs–Alpharetta, GA Metropolitan Statistical Area") is the eighth largest in the country, with over six million residents (6,089,815), making up nearly 57% of Georgia's total population.

3.2 Sources of population data

Apportionment and redistricting was the fundamental motivation for the establishment of the U.S. Census. The primary source of ground-truth data for redistricting is the Decennial Census tables in the PL94-171 (also called the *redistricting data release*). There are many reasons to rely on the 2020 Decennial data: it is the most recent available, it is based on a more extensive enumeration of the population (rather than a survey), it is available on the smallest geographic units (census blocks), it offers a high level of detail in its categories of race and ethnicity, and it includes both total population (TOTPOP) and voting age population (VAP).

An important secondary source of data, also produced by the Census Bureau, is the American Community Survey, or ACS. This has the advantage of being collected every year rather than at ten-year intervals, and it includes an estimate of citizen voting age population (CVAP), but this trades off with a number of well-known caveats. Since it is survey-based, it is known to have wider error bars on small geography: accordingly, the Bureau only releases single-year estimates at the tract level; 5-year estimates are released at the level of block groups, but this is still not sufficiently detailed to get exact totals on electoral districts. Furthermore, the ACS racial and ethnic categories are significantly simplified relative to the Decennial data, so that for instance it is not possible to tabulate Any-Part Black population with the same set of multiracial categories or even to tabulate Afro-Latino (Black and Hispanic) population. In addition, the use of a 5-year average will mean that the numbers are somewhat out of date, since even the most recent currently available data draws partly from 2016, which is quite a long time ago in a rapidly diversifying state. Finally, the 2020 ACS was so badly compromised by the COVID pandemic that the Bureau has cautioned people to treat the numbers that year as "experimental."[2]

For these reasons I have chosen to emphasize VAP in discussing the demographics of districts in this report, such as when counting the majority-Black districts in a plan. However, the plaintiffs' claims involve a coalition of Black and Latino voters, and the voting eligibility rate for Latino voters can be significantly lower than other groups, particularly due to a lower rate of citizenship. Therefore litigation involving Latino plaintiffs typically uses a secondary data source to validate that Gingles plans meet the 50%+1 threshold. Below, I will rely on estimated CVAP built from block-level adjusted VAP, where the citizenship rate (CVAP/VAP) for Black, Latino, White, and Other residents is pulled from the 2020 5-year ACS on larger geographies, namely census tracts. I judge this to be significantly more accurate than using the 2016-2020 5-year CVAP numbers directly. For one vivid illustration of why this is important, consider that the total voting age population of Georgia is 8,220,274 in the redistricting data, but only 8,011,265 in the 2016-2020 5-year numbers. That is, there is a shortfall of more than 200,000 adults if we pull from the ACS directly.

A full description of racial categories and of the construction of CVAP for this report can be found in Appendix A. In §8 I will confirm that my alternative plans satisfy the Gingles 1 standard for coalition districts using estimated Black and Hispanic CVAP as well as using VAP.

[2] "The Census Bureau will not release its standard 2020 ACS 1-year supplemental estimates because of the impact of the COVID-19 pandemic on data collection. Experimental estimates, developed from 2020 ACS 1-year data[,] are available on the ACS Experimental Data page. They will not be available on data.census.gov or the Application Programming Interface (API)." From www.census.gov/data/developers/data-sets/ACS-supplemental-data/2020.html, accessed January 4, 2023.

3.3 Demographic trends

A snapshot of the demographics of Georgia can be extracted from data products by the Census Bureau, as in Table 1.[3] Below, I will use the abbreviations B, H, BH, W, and POC to denote the share of population (or VAP, etc.) that is Black, Latino, Black and/or Latino, White, and people of color respectively. Detailed definitions of the racial and ethnic groupings can be found in Appendix A.

	All	Black alone	Black (APB)	Hispanic	BH Coalition	AfroLatino	White alone	POC
TOTPOP	10,711,908	3,278,119 30.60%	3,538,146 33.03%	1,123,457 10.49%	4,578,941 42.75%	82,662 0.77%	5,362,156 50.06%	5,349,752 49.94%
VAP	8,220,274	2,462,933 29.96%	2,607,986 31.73%	742,918 9.04%	3,302,581 40.18%	48,323 0.59%	4,342,333 52.82%	3,877,941 47.18%
CVAP	7,598,787	2,422,569 31.88%	2,537,328 33.39%	429,562 5.65%	2,920,522 38.43%	— —	4,285,394 56.40%	3,313,393 43.60%

Table 1: Demographics overview. The TOTPOP and VAP figures are taken from the 2020 Decennial Census. The CVAP figures use citizenship rates drawn from the most recent 5-year ACS (ending in 2020), applied to decennial VAP.

Georgia's fast growth is entirely due to the expansion in the population of people of color. In fact, the (non-Hispanic) White population of Georgia actually dropped from 2010 to 2020—from 5,413,920 to 5,362,156—while the state overall grew by over a million people. As a result, the population share of Black and Latino residents expanded from 39.75% to 42.75% in the time between the 2010 and the 2020 Census data release, while the White population share dropped markedly from 55.88% to 50.06%. Thus, to within a tenth of a percent, current redistricting data finds Georgia evenly split between White residents and people of color.

The steady diversification is visible in the citizen voting age population as well, for which we can get a snapshot each year from the American Community Survey (Table 2).[4]

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
BCVAP	1,961,750 0.3029	2,008,587 0.3049	2,055,423 0.3071	2,096,295 0.3089	2,140,693 0.3110	2,179,729 0.3123	2,228,551 0.3155	2,276,776 0.3182	2,322,275 0.3201	2,376,110 0.3230
HCVAP	188,878 0.0292	210,412 0.0319	230,724 0.0345	245,517 0.0362	263,787 0.0383	282,158 0.0404	290,840 0.0412	306,713 0.0429	324,368 0.0447	344,182 0.0468
BHCVAP	2,150,628 0.3321	2,218,999 0.3368	2,286,147 0.3415	2,341,812 0.3451	2,404,480 0.3493	2,461,887 0.3528	2,519,391 0.3567	2,583,489 0.3610	2,646,643 0.3648	2,720,292 0.3698
POC CVAP	2,239,082 0.3457	2,299,730 0.3491	2,358,789 0.3524	2,415,907 0.3560	2,477,036 0.3599	2,538,250 0.3637	2,603,198 0.3685	2,671,269 0.3733	2,738,577 0.3775	2,811,677 0.3822
WCVAP	4,237,007 0.6543	4,288,602 0.6509	4,335,200 0.6476	4,369,477 0.6440	4,405,843 0.6401	4,440,410 0.6363	4,460,606 0.6315	4,484,704 0.6267	4,516,116 0.6225	4,544,881 0.6178
total CVAP	6,476,089	6,588,332	6,693,989	6,785,384	6,882,879	6,978,660	7,063,804	7,155,973	7,254,693	7,356,558

Table 2: Georgia has seen significant growth in its citizen adult population, and nearly all of it is from communities of color. This table shows the 1-year ACS figures from 2010 through 2019.

[3] As noted in the last section, the American Community Survey (ACS) is based on an annual survey, often presented in 5-year rolling averages, where not all of the same racial and ethnic categories from the PL94-171 are available. Since the methodology, categories, and time periods are different between the ACS and the Decennial data, there is no contradiction in observing WCVAP>WVAP, for instance.

[4] As described above, the 2020 ACS was not recommended for standard use on a 1-year basis, which is why it is excluded from Table 2.

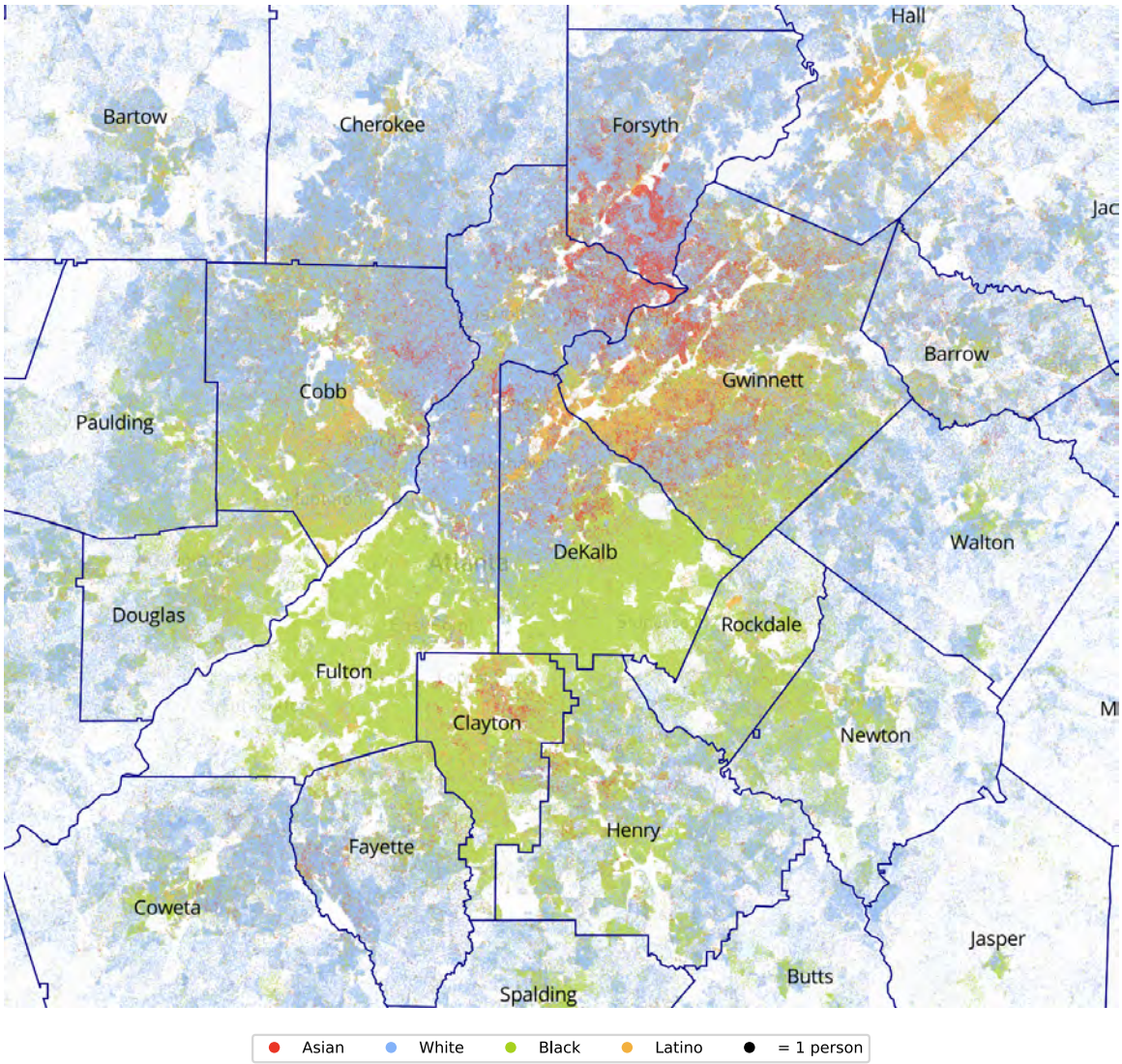


Figure 2: Racial dot density plot in the counties of the Atlanta metro area. Dense concentrations of Black population are visible in Cobb, Douglas, Fulton, Clayton, DeKalb, and southern Gwinnett Counties. Gwinnett is the heart of Georgia's Latino population, and following the I-85/I-985 corridor north connects to a substantial Latino community in Hall County.

4 Overview of enacted plans for Congress, Senate, and House

4.1 Congress

As discussed in the last section, the last decade has seen substantial growth in the Black and Latino population of Georgia and a reduction in White population. At the same time, and in a climate where the racial polarization between White Georgians and voters of color is essentially undisputed, Black and Latino candidates of choice are now routinely competitive in statewide elections, and now can frequently win outright. Despite this, the newly enacted Congressional plan makes major changes to the benchmark and does so in a way that reduces the number of performing districts for Black- and Latino-preferred candidates from 6 out of 14 (42.9%) to just 5 out of 14 (35.7%).

In 2018, Democratic candidate Lucy McBath won a surprise victory in CD 6, north of Atlanta, unseating Republican Karen Handel. She then defended her seat in 2020. My study of the Congressional plan enacted in Georgia in 2021 is completely consistent with the scenario that line-drawers targeted McBath's district, specifically by removing Black and Hispanic voters from CD 6 and replacing them with White suburban, exurban, and rural voters in Forsyth and Dawson counties. This displacement ripples across CD 11 and ends up submerging Black urban voters in rural CD 14. This is corroborated by the core retention numbers that show that CD 6 was singled out for major reconfiguration (see §10).

Correspondingly, the community of interest narratives supplied to the state in a series of public hearings and communications show that coherent and salient local identities were disregarded in the process: rural, mountainous, and industrial interests in the Northwest counties; metro Atlanta's urban counties with large Black populations and clear shared needs for infrastructure, transit, and housing; and largely suburban Forsyth and Dawson. (See §10.3.)

Strikingly, all fourteen new districts had wider than a ten-point margin between Biden and Trump in the 2020 Presidential voting—there are zero remotely competitive districts. In particular, the completely reconfigured CD 6 is now far out of reach for a Black-preferred candidate; Biden had just 42.5% of the major-party vote against Trump in the district. This lean held up in actual Congressional voting under the new lines in 2022, where the closest of the fourteen outcomes was Sanford Bishop's margin of 9.95 percentage points over opponent Chris West in CD 2; every other race was a blowout. The overall effect of the Congressional redistricting in Georgia is the instrumentalization of Black and Latino voters to achieve a profoundly uncompetitive plan in which the line-drawers have gone a long way to locking in the outcomes.

In this section I will show images, and in the following section I will present statistics, for the enacted Congressional plan compared to the benchmark plan from ten years prior. I will also consider a map I have labeled **Duncan-Kennedy**, a draft congressional map released to the public by Lt. Governor Geoff Duncan and Chairman John F. Kennedy on September 27, 2021.

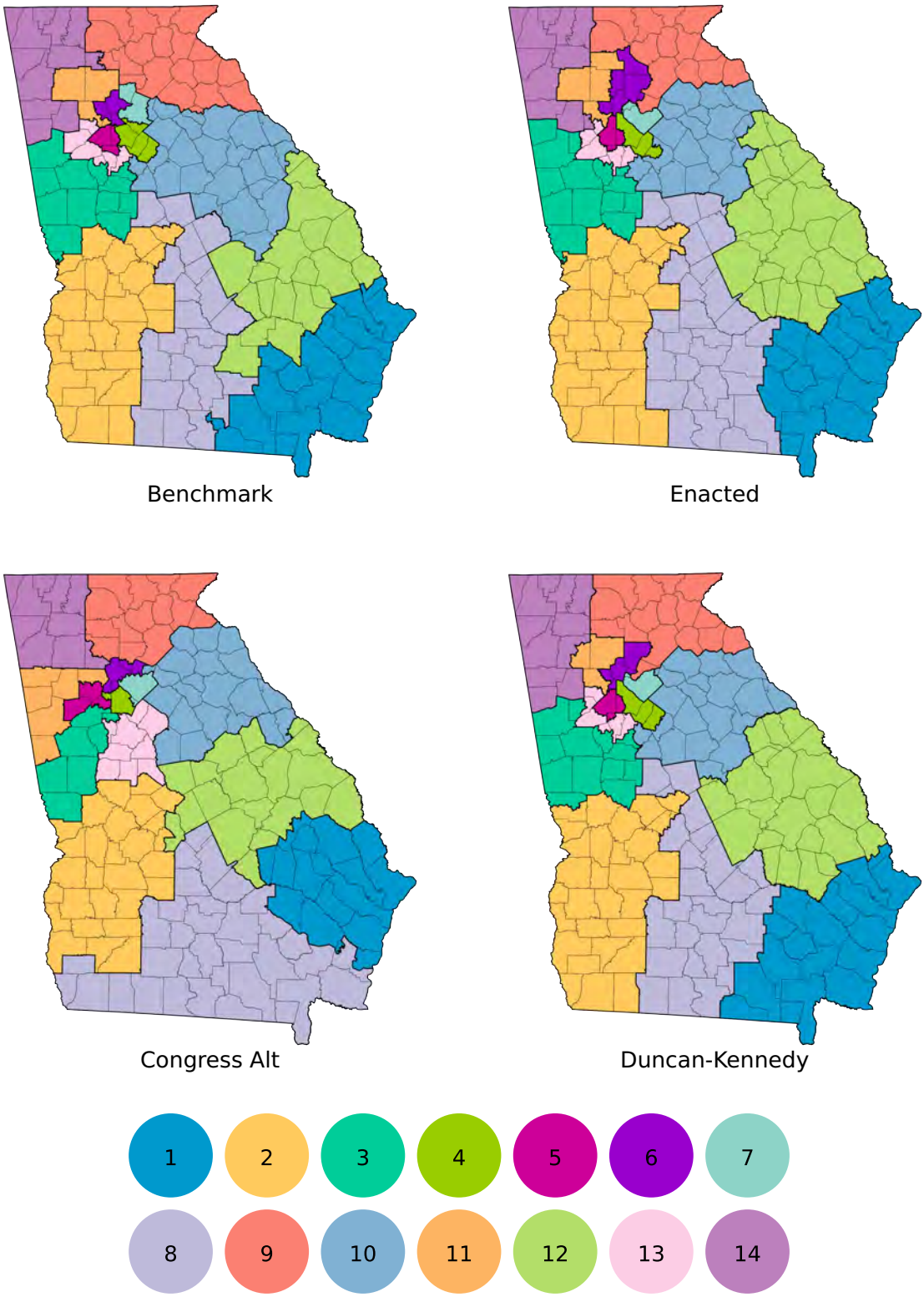


Figure 3: Congressional plans.

4.2 State Senate

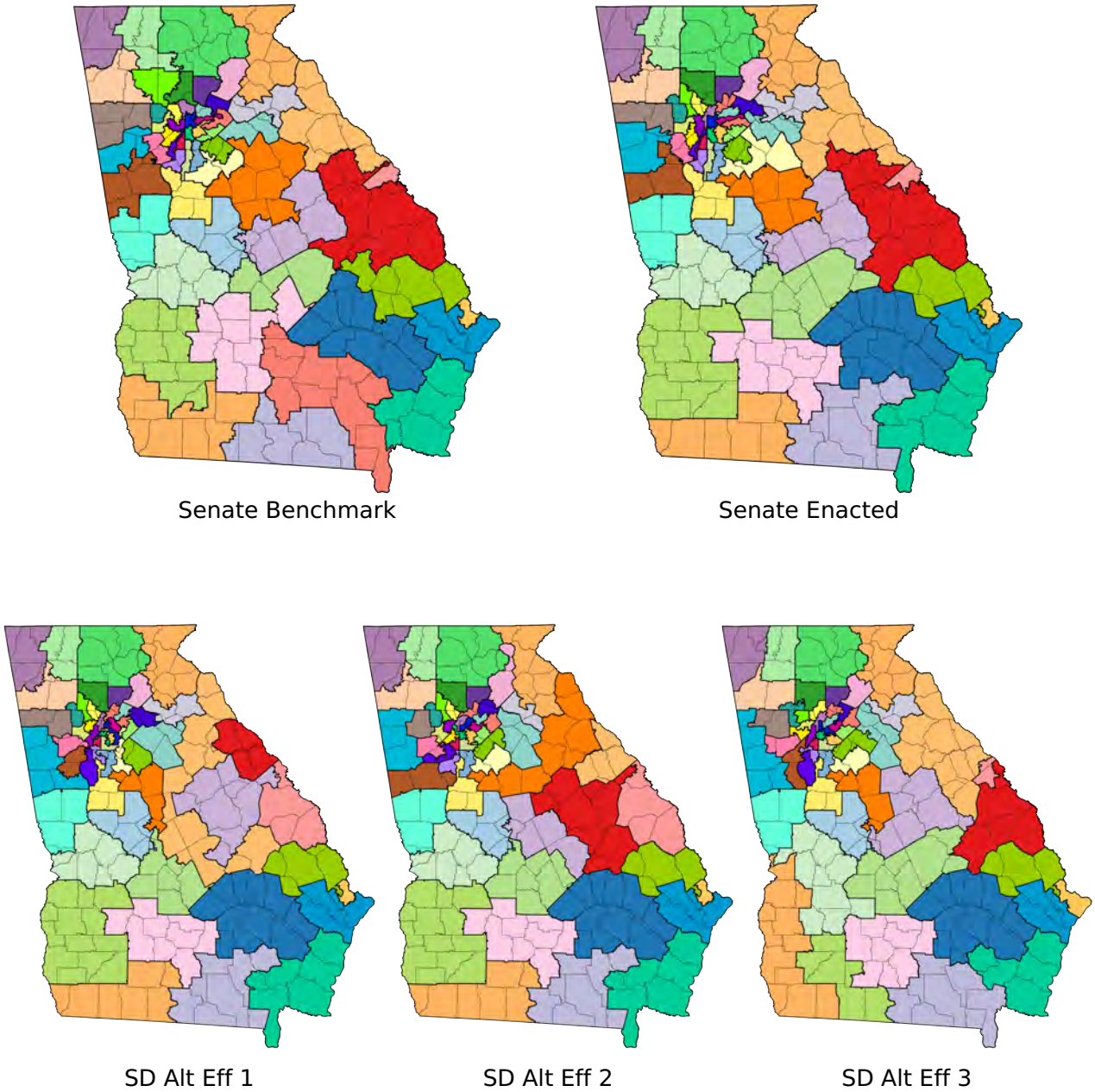


Figure 4: State Senate plans.

The state Senate plan enacted in Georgia is also remarkable in its lack of competitiveness. Despite Georgia's clear status as a new swing state, only one of the districts (SD 48) would have been within a ten-percentage-point margin (i.e., 55-45 or closer) in the Biden-Trump presidential contest of 2020. And indeed, only two of 56 districts (SD 7 and 14) were within a ten-point margin in the actual legislative voting of 2022. (Note that Georgia state Senators stand for election every two years, as for U.S. House and Georgia's state House.) More than half of the districts—30 out of 56—were uncontested.

Below, I will propose alternative districts with a *modular* approach, starting by dividing the 56 districts in the enacted plan into six district clusters, shown in Figure 5. In three of the six—Atlanta, Gwinnett, and East Black Belt—I will present alternative "Gingles 1" plans that increase the number of majority-Black and/or the number of majority-coalition districts, while ensuring that new districts are effective at securing electoral opportunity for Black and Latino voters. I will supplement the Gingles plans with regional maps showing improved effectiveness in additional clusters to create plans that span many regions of the state to form SD Alt Eff 1 and SD Alt Eff 2. Finally, I will offer an all-clusters alternative keyed to increased effectiveness alone, called SD Alt Eff 3. (See Table 10.) This is accomplished while maintaining scores for traditional districting principles that are comparable or superior to those of the enacted plan, and while giving great deference to the enacted plan by reconfiguring its own districts in clusters rather than starting from a blank map.

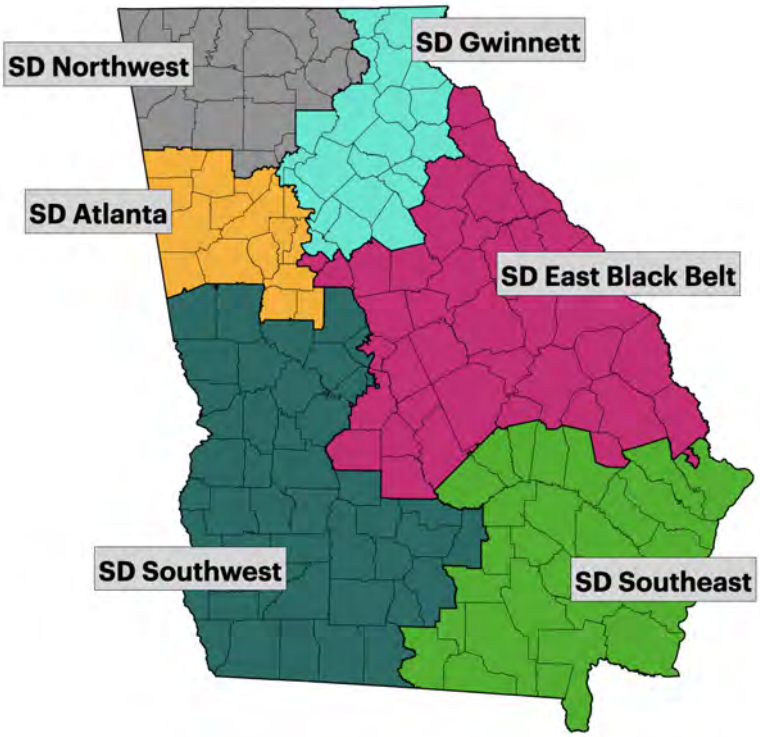


Figure 5: Six "modular" Senate clusters made up of groups of enacted districts. Below, Gingles demonstrative plans will be offered in selected clusters and effectiveness-oriented demonstrative plans will be presented in all six.

Senate Clusters

- SD Atlanta (14 districts): 6, 10, 16, 28, 30, 31, 33, 34, 35, 36, 38, 39, 42, 44
- SD Gwinnett (16 districts): 5, 7, 9, 14, 17, 27, 40, 41, 43, 45, 46, 47, 48, 49, 50, 55
- SD Southwest (6 districts): 11, 12, 13, 15, 18, 29
- SD East Black Belt (7 districts): 4, 20, 22, 23, 24, 25, 26
- SD Southeast (5 districts): 1, 2, 3, 8, 19
- SD Northwest (8 districts): 21, 32, 37, 51, 52, 53, 54, 56

4.3 State House

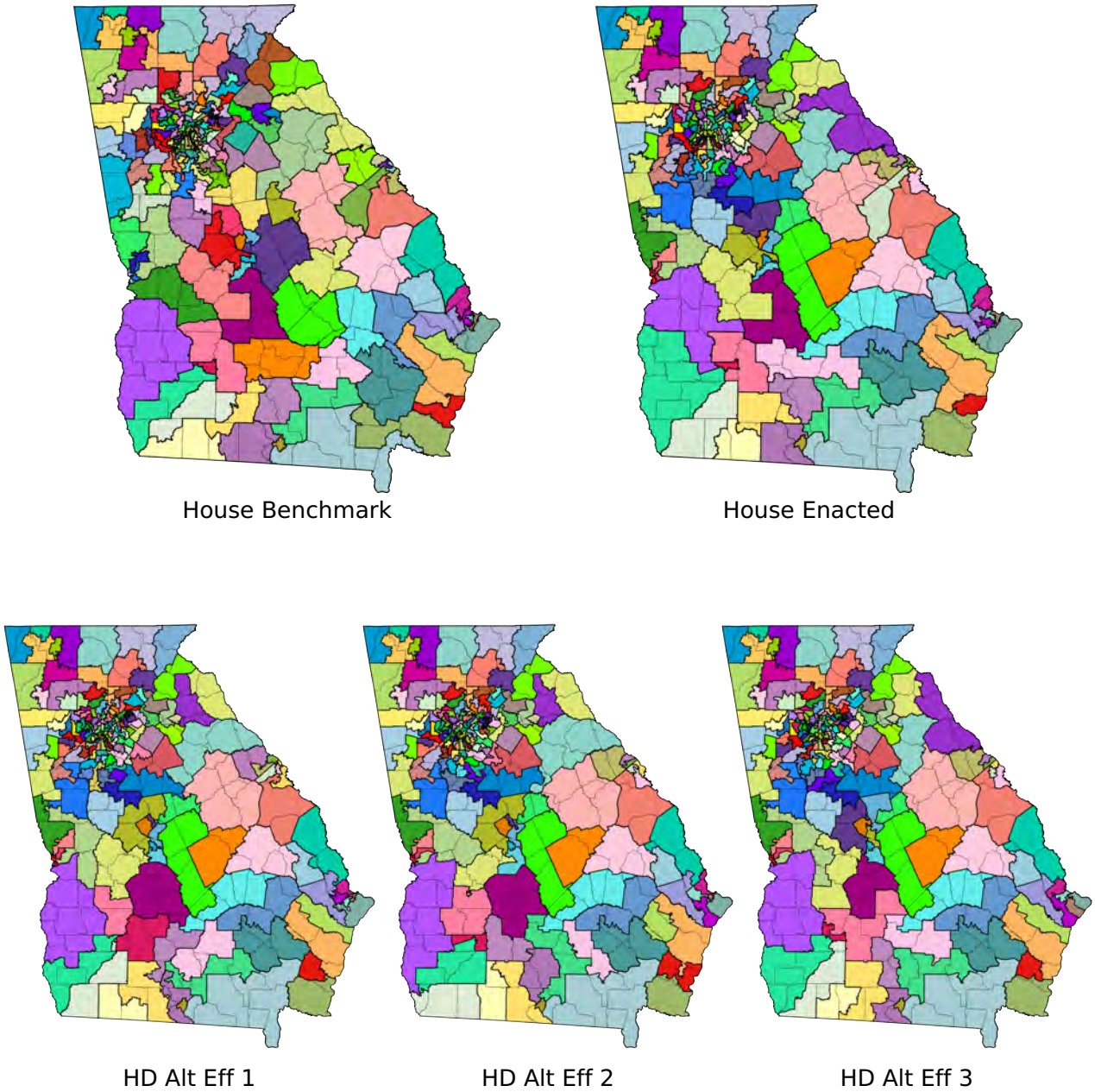


Figure 6: State House plans.

The state House plan repeats the uncompetitive design found in the other levels of redistricting; only fifteen of the 180 districts were within a ten-point margin for Biden-Trump, and only nine (HD 48, 50, 53, 99, 101, 105, 108, 117, and 151) had 2022 legislative outcomes in that range.Like in the Senate, more than half of the House districts—93 out of 180—were uncontested in 2022.

I have extended the modular approach from state Senate to the House, using seven regions formed by clusters of enacted districts, as in Figure 7. Each can be reconfigured to create

additional majority-coalition districts, and I offer up to two demonstration maps per cluster (Alt 1 and Alt 2) as Gingles 1 demonstratives in §7. As overviewed in Table 10, the alternative plans can be completed to highly effective alternatives statewide, which I call HD Alt Eff 1 and HD Alt Eff 2; a third all-clusters effective alternative is also offered, called HD Alt Eff 3.

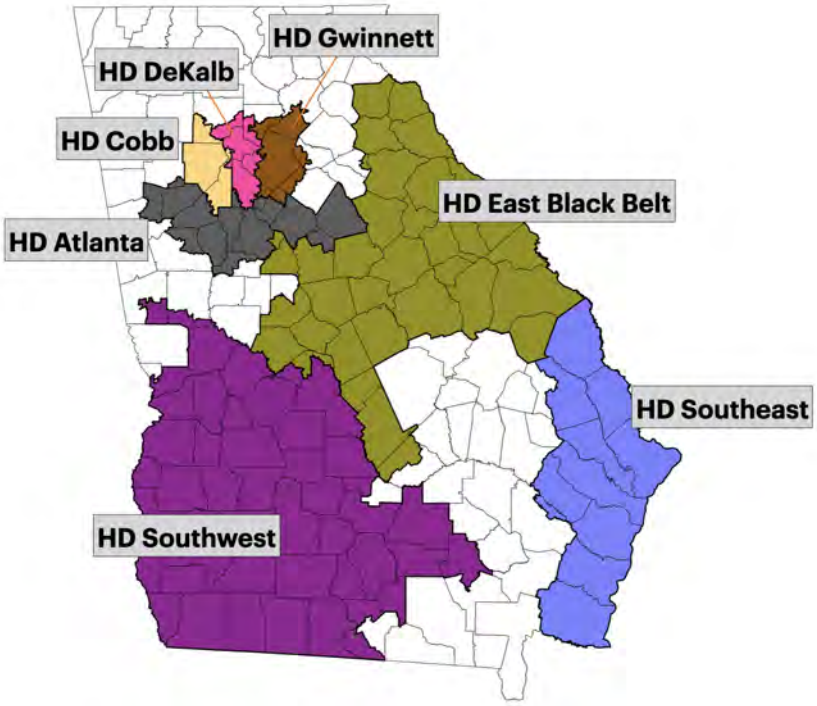


Figure 7: Seven "modular" House clusters made up of groups of enacted districts.

House Clusters

- HD Atlanta (25 districts): 61, 64, 65, 66, 67, 68, 69, 71, 73, 74, 75, 76, 77, 78, 79, 90, 91, 92, 93, 112, 113, 114, 115, 116, 117
- HD Cobb (25 districts): 20, 22, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 53, 54, 55, 56, 57, 58, 59, 60, 62, 63
- HD DeKalb (22 districts): 21, 24, 25, 47, 48, 49, 50, 51, 52, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 96, 97, 98
- HD Gwinnett (18 districts): 26, 29, 30, 94, 95, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111
- HD Southwest (18 districts): 137, 140, 141, 146, 147, 148, 150, 151, 152, 153, 154, 169, 170, 171, 172, 173, 175, 176
- HD East Black Belt (18 districts): 33, 118, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 142, 143, 144, 145, 149
- HD Southeast (12 districts): 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 179, 180

Together, these cover 138 of the 180 districts in the Georgia House. All of my demonstrative plans will leave the other 42 House districts unchanged.

5 Assessing effective opportunity-to-elect districts

The Gingles demonstration maps shown below in Section 7 are presented to satisfy the Gingles 1 condition for use with a Voting Rights Act challenge. In part, they are designed to show that it is (readily) possible to draw additional districts with a majority of Black and Latino adults in many parts of the state of Georgia, and for each of the three levels of districting plan, even while giving great deference to the Legislative enacted plan by only replacing its districts in modular clusters.[5]

In addition to demographic composition, I have offered alternative districts that showcase *effective electoral opportunity*. This shows that the harms to voters can be remedied by better design and, in the context of racial gerrymandering, demonstrates that better performance on traditional districting principles is completely compatible with greater electoral opportunity for Black and Latino voters.

There are many reasons that we should not rely on the 50%+1 line as a predictor of electoral opportunity. Some have argued that the Gingles/Bartlett 50%+1 requirement requires an element of race-consciousness that is in tension with other aspects of best practices in map-making. Additionally, a demographic share alone does not take into account voting eligibility, registration levels, and turnout. It has long been well understood that a majority-minority district is neither necessary nor sufficient to secure electoral opportunity.

Therefore it is critical to use electoral history to gauge whether a district affords a reasonable opportunity for a group to elect a candidate of its choice. I will describe an effectiveness analysis here and will provide demonstration maps emphasizing increased electoral opportunity for Black and Latino voters, without any racial threshold in play, in §9.

5.1 Identifying probative elections

In the voting rights sphere, it is well understood that certain past elections are more probative—that is, provide better and clearer evidence of polarization patterns and preferences—than others. The peer-reviewed literature is certainly clear that some factors flagging probative contests include the following: all other things being equal, elections are more suitable for an effectiveness analysis when they are more recent, when they have a viable POC candidate on the ballot, and when we can make confident statistical inferences about each group's preference. They are less suitable when they are blowouts or, of course, uncontested.

To this end, I have designated the following eight general elections and four Democratic primary elections (Tables 3) to be especially probative for analyzing effective electoral opportunity for Black and Latino voters in Georgia. All are recent statewide elections (held since 2018), most have a Black candidate on the ballot, and most are quite close on a statewide basis.[6]

[5] It is my understanding that the VRA, as clarified in *Bartlett v. Strickland*, requires a demonstration of additional districts that are have at least 50%+1 minority population. The usual standard uses VAP, or voting age population, when Black voters are the main minority group in a challenge; sometimes, CVAP, or citizen voting age population, is used when the principal group of plaintiffs has a large share of immigrants, as for Latino or Asian plaintiffs. In this case, the claims are for a coalition of Black and Latino voters, and I have used both VAP and CVAP, as explained in §3.2.

[6] Even Robinson's primary election, which was won with nearly 63% of the statewide vote, shows substantial district-level variation. By contrast, in the Democratic primary for Governor in 2018, Abrams won with 76.4% and with little regional variation, making it a less informative contest, which explains why it is not included.

Year	Contest	R Candidate	D Candidate	D share
2016	President	Trump-Pence	Clinton-Kaine	.4734
2018	Governor	Brian Kemp	Stacey Abrams (B)	.4930
2018	Super. Pub. Instruc.	Richard Woods	Otha Thornton (B)	.4697
2020	President	Trump-Pence	Biden-Harris (B)	.5013
2020	Public Serv. Commiss.	Lauren McDonald	Daniel Blackman (B)	.4848
2021	Senate Runoff	David Perdue	Jon Ossoff	.5061
2021	Senate Runoff Special	Kelly Loeffler	Raphael Warnock (B)	.5104
2022	Governor	Brian Kemp	Stacey Abrams (B)	.4620

Year	Contest	BH-Preferred Candidate	D share (outcome)
2018	Lt. Governor	Triana Arnold James (B)	.4475 (L)
2018	Super. Primary	Otha Thornton (B)	.4387 (1st of 3)
2018	Super. Runoff	Otha Thornton (B)	.5914 (W)
2018	Insurance Commiss.	Janice Laws Robinson (B)	.6286 (W)

Table 3: Eight general elections and four primaries and primary runoffs are chosen for the score of effectiveness.

5.2 Constructing and evaluating a score of electoral alignment

Using the four primary and eight general elections listed here, I will deem a district to be *effective* if it is electorally aligned with the preferences of Black and Latino voters in at least three out of four primaries and at least five out of eight general elections. This standard ascertains that minority-preferred candidates can be both nominated and elected from the district, and it distinguishes minority preferences from (related, but distinct) Democratic party preferences. This same core idea of measuring district effectiveness—keyed to electoral history, not to demographics of the district—appears frequently in the peer-reviewed literature, for instance in [1].

The enacted plans starkly limit the number of districts that earn the label of effective. Tables 4-6 show that five out of 14 Congressional districts are likely to give Black and Latino voters an effective opportunity to elect candidates of choice.

Similarly, the enacted plans have 19 expected effective districts out of 56 in the Senate, and 68/180 in the House. (For detailed supporting tables, see Appendix B.)

Since elections were conducted under these new districts in 2022, we can review some basic evidence about the success of the classification of "effective" opportunity districts. I have not conducted a racially polarized voting analysis, but we can nonetheless use information about whether each district elected candidates of color as a rough proxy for the preferences of voters of color. Since White and/or Republican candidates can certainly be preferred by voters of color, this is imperfect, but it is at least an indication that can help us assess the labeling mechanism.[7] Here is what we find for the enacted plans:

- 5/5 Congressional districts marked effective elected POC Democrats (100%);
- 0/9 Congressional districts marked ineffective elected POC Democrats (0%);
- 18/19 Senate districts marked effective elected POC Democrats (94.7%);
- 1/37 Senate districts marked ineffective elected POC Democrats (2.7%);
- 58/68 House districts marked effective elected POC Democrats (85.3%);
- 4/112 House districts marked ineffective elected POC Democrats (3.6%).

CD	Primaries out of 4	Generals out of 8	Effective?
1	3	0	N
2	4	8	Y
3	3	0	N
4	3	8	Y
5	3	8	Y
6	0	0	N
7	3	8	Y
8	3	0	N
9	2	0	N
10	3	0	N
11	3	0	N
12	3	0	N
13	4	8	Y
14	3	0	N

Table 4: By the standard of requiring that the candidate of choice should win at least three out of four primaries and at least five out of eight generals, the enacted plan has five districts that present an effective opportunity: CD 2, 4, 5, 7, and 13.

CD overall	James18P 0.4475	Thornton18P 0.4387	Thornton18R 0.5914	Robinson18P 0.6286
1	0.4992	0.4997	0.7150	0.6967
2	0.5515	0.4720	0.6379	0.7430
3	0.4177	0.4185	0.5388	0.6178
4	0.4566	0.4444	0.5622	0.6034
5	0.3747	0.4082	0.5611	0.5184
6	0.2815	0.3458	0.4720	0.4789
7	0.4489	0.4515	0.5968	0.6082
8	0.4861	0.4403	0.6273	0.6940
9	0.3411	0.3811	0.5444	0.5560
10	0.4112	0.4294	0.6444	0.5898
11	0.3603	0.4200	0.5276	0.5549
12	0.4928	0.4196	0.6462	0.7626
13	0.5594	0.5089	0.6524	0.7190
14	0.4190	0.3863	0.5049	0.6123

Table 5: Vote shares for the candidate of choice in probative primary and runoff elections. (Note that the Superintendent primary from 2018 (Thornton18P) is a race with three candidates, so a win is recorded if Thornton has the most votes, even if that does not exceed 50% of cast votes.)

[7] Indeed, Nan Orrock of SD 36, the only White Democrat in the Senate to be elected from a district marked effective, is an Associate Member of the Georgia Black Legislative Caucus, suggesting with high likelihood that she is the Black candidate of choice.

CD	**Clinton16**	**Abrams18**	**Thornton18**	**Biden20**	**Blackman20**	**Ossoff21**	**Warnock21**	**Abrams22**
overall	0.4734	0.4930	0.4697	0.5013	0.4848	0.5061	0.5104	0.4620
1	0.4149	0.4245	0.4105	0.4322	0.4193	0.4379	0.4386	0.3950
2	0.5463	0.5508	0.5354	0.5524	0.5445	0.5611	0.5624	0.5188
3	0.3168	0.3287	0.3119	0.3476	0.3312	0.3524	0.3564	0.3130
4	0.7692	0.7886	0.7567	0.7917	0.7789	0.7927	0.7982	0.7707
5	0.8352	0.8418	0.7910	0.8366	0.8080	0.8203	0.8287	0.8072
6	0.3603	0.3878	0.3498	0.4250	0.3851	0.4068	0.4151	0.3602
7	0.5727	0.6113	0.5788	0.6307	0.6136	0.6366	0.6421	0.5874
8	0.3430	0.3427	0.3280	0.3604	0.3473	0.3648	0.3664	0.3185
9	0.2650	0.2822	0.2668	0.3081	0.2897	0.3084	0.3129	0.2554
10	0.3510	0.3654	0.3518	0.3814	0.3650	0.3864	0.3903	0.3480
11	0.3708	0.4014	0.3741	0.4223	0.3972	0.4163	0.4233	0.3696
12	0.4324	0.4319	0.4174	0.4487	0.4331	0.4511	0.4526	0.4023
13	0.7790	0.8112	0.7916	0.8048	0.8068	0.8230	0.8261	0.8056
14	0.2767	0.2961	0.2873	0.3105	0.3015	0.3217	0.3234	0.2778

Table 6: Vote shares for the candidate of choice in probative general/runoff elections.

In addition, this method works quite well to distinguish race from party: if we flag districts with 0/4 primary wins and at least 5/8 general wins, these might reasonably be considered likely to elect White-preferred Democrats. There are no such districts in the enacted Congressional map, but the Senate map has three (which elected three White Democrats and one Asian Democrat in November 2022) and the House map has eight (which elected seven White Democrats and one Asian Democrat).

6 Metrics for enacted plans

Georgia has 14 Congressional districts, 56 state Senate districts, and 180 state House districts, making the task of redistricting into an extremely complicated balancing act. The list of substantive criteria for assessing districting plans that was published by each chamber of the Legislature reads as follows, in full:

```
A. GENERAL PRINCIPLES FOR DRAFTING PLANS
1. Each congressional district should be drawn with a total population of plus
   or minus one person from the ideal district size.
2. Each legislative district of the General Assembly should be drawn to
   achieve a total population that is substantially equal as practicable,
   considering the principles listed below.
3. All plans adopted by the Committee will comply with Section 2 of the
   Voting Rights Act of 1965, as amended.
4. All plans adopted by the Committee will comply with the United States
   and Georgia Constitutions.
5. Districts shall be composed of contiguous geography. Districts that
   connect on a single point are not contiguous.
6. No multi-member districts shall be drawn on any legislative redistricting plan.
7. The Committee should consider:
   a.  The boundaries of counties and precincts;
   b.  Compactness; and
   c.  Communities of interest.
8. Efforts should be made to avoid the unnecessary pairing of incumbents.
9. The identifying of these criteria is not intended to limit the consideration
   of any other principles or factors that the Committee deems appropriate.
```

This is unusually terse for a redistricting framework at the state level, declining to specify more detail, for example, about the operative principles of racial fairness, the definition of communities of interest, or even whether to encourage the use of quantitative metrics of compactness.

All of the plans under consideration are contiguous, and I will systematically discuss the other principles below.

6.1 Population balance

All plans are tightly balanced in population terms, using the Census redistricting data.

	Maximum positive deviation	Maximum negative deviation	Top-to-bottom deviation
EnactedCD	+1	−1	2
DuncanKennedy	+2	−1	3
CD Alt	+1	−1	2
EnactedSD	+1879	−1964	3843 (2.01%)
SD Alt Eff 1	+2457	−2598	5055 (2.64%)
SD Alt Eff 2	+2547	−2490	5037 (2.63%)
SD Alt Eff 3	+3200	−3305	6505 (3.40%)
EnactedHD	+797	−833	1630 (2.74%)
HD Alt Eff 1	+1194	−1176	2370 (3.98%)
HD Alt Eff 2	+1222	−1097	2319 (3.90%)
HD Alt Eff 3	+1173	−1026	2199 (3.70%)

Table 7: Population deviation in each plan.

6.2 Compactness

In redistricting, the notion of *compactness* is connected to the shapes of the districts, where simple boundaries and regular shapes are traditionally thought to indicate a "natural" division of population, while eccentric boundaries and contorted shapes can signal that some other agenda has predominated.

The two most common compactness metrics are the Polsby-Popper score and the Reock score. These are both *contour-based* scores that rely on the outline of the district on a map. *Polsby-Popper* is a ratio formed by comparing the district's area to its perimeter via the formula $4\pi A/P^2$. *Reock* considers how much of the smallest bounding circle is filled out by the district's area. Recently, mathematicians (such as myself) have argued for the use of discrete compactness metrics that de-emphasize the outline and instead consider how the districts are formed from units of census geography. The simplest discrete metric is called *(block) cut edges*, found by counting the number of pairs of census blocks that are adjacent to each other in the state, but are assigned to different districts. This assesses the "scissors complexity" of a plan, giving a measure of how many blocks would have to be separated from one another to divide up all the districts.

An advantage of the contour scores is that they are familiar and in wide use. An advantage of discrete scores is that they do not excessively penalize districts for having winding boundaries when those boundaries come from physical geography, like coastlines or rivers.

	avg Polsby-Popper (higher is better)	**avg Reock** (higher is better)	**Block cut edges** (lower is better)
BenchmarkCD	0.238	0.452	5775
EnactedCD	0.267	0.441	5075
DuncanKennedy	0.295	0.471	4665
CD Alt	0.287	0.452	4729
BenchmarkSD	0.250	0.421	12,549
EnactedSD	0.287	0.418	11,005
SD Alt Eff 1	0.287	0.427	10,897
SD Alt Eff 2	0.296	0.440	10,349
SD Alt Eff 3	0.295	0.431	10,479
BenchmarkHD	0.244	0.382	24,001
EnactedHD	0.278	0.391	22,014
HD Alt Eff 1	0.275	0.399	21,360
HD Alt Eff 2	0.281	0.406	21,301
HD Alt Eff 3	0.279	0.403	20,917

Table 8: Compactness scores for each plan.

Note that compactness scores should only be used to make relative assessments, comparing plans to others in the same state and at the same level of redistricting.

6.3 Respect for political boundaries

The most populous Georgia counties by 2020 population are Fulton County (pop. 1,066,710), Gwinnett County (pop. 957,062), Cobb County (pop. 766,149), and DeKalb County (pop. 764,382). Both Cobb and DeKalb are within 0.1% of ideal Congressional district size of 765,136, with Cobb slightly larger and DeKalb slightly smaller.[8]

Since there are four times as many Senate as Congressional districts, this also means that Cobb (4.005) and DeKalb (3.996) are ideally suited in population terms to make up four Senate districts; in addition, Gwinnett (5.003) is very nearly five times ideal Senate population. Instead, Cobb touches six Senate districts, DeKalb touches seven, and Gwinnett is split among nine in the enacted Senate plan. This observation spotlights the fact that it is important to consider not only how many counties are split, but into how many pieces, as in Table 9. If a unit is split in two, that adds two to the "pieces" count; likewise, if it is split into three parts, this counts as three "pieces," and so on. Unsplit units do not count toward "pieces." (A forensic look at the nature of the county and precinct splits can be found below in §10.2.) In this table, the "muni" units are Census places with functional status A ("Active government providing primary general-purpose functions").[9] These primarily include cities and towns.

	County Splits (out of 159)	**County Pieces**	**Muni Splits** (out of 538)	**Muni Pieces**	**Precinct Splits** (out of 2685)	**Precinct Pieces**
BenchmarkCD	16	38	67	141	67	134
EnactedCD	15	36	64	136	86	172
DuncanKennedy	15	36	53	114	66	132
CD Alt	13	30	58	127	47	95
BenchmarkSD	37	100	114	269	154	309
EnactedSD	29	89	109	266	144	289
SD Alt Eff 1	33	95	112	275	110	221
SD Alt Eff 2	26	78	108	264	97	196
SD Alt Eff 3	29	84	108	264	106	213
BenchmarkHD	72	284	169	506	303	630
EnactedHD	69	278	166	494	352	724
HD Alt Eff 1	73	276	164	492	279	570
HD Alt Eff 2	69	266	168	494	276	567
HD Alt Eff 3	69	265	165	478	277	567

Table 9: Number of county, muni, and precinct splits and pieces in each plan.

[8] This means that only three Georgia counties are larger than the ideal population of a Congressional district. Twelve Georgia counties are larger than ideal Senate size, and thirty-nine Georgia counties, from Fulton down to Effingham (pop. 64,769) are larger than ideal House size.

[9] https://www.census.gov/library/reference/code-lists/functional-status-codes.html

6.4 Racial demographics

Though majority-minority districts are not demanded for compliance with the Voting Rights Act, they nonetheless play a significant role in VRA litigation, especially in the Gingles 1 threshold test. For that purpose, plaintiffs must show maps with additional districts that are at least 50%+1 person composed of members of the specified minority group. Typically, when Black residents are the largest minority group, the basis for measurement is BVAP, or voting age population, as tabulated in the Decennial Census data. For a coalition of Black and Latino voters, we additionally use a secondary basis of population, in this case BHCVAP.

Here, I review the plans discussed in this report and enumerate the number of districts that have a majority of voting age population that is Black by VAP, Black and Latino by VAP, or Black and Latino by CVAP. The final column enumerates the number of districts that, according to their recent electoral history in statewide contests, are likely to provide an effective opportunity for Black and Latino voters to nominate and elect candidates of their choosing. Racial and ethnic categories are described in Appendix A, and the concept of measuring district effectiveness is delineated in §5.

	majority BVAP	**majority BHVAP**	**majority BHCVAP**	**effective**
BenchmarkCD	4	4	4	5
EnactedCD	2	5	4	5
Duncan-Kennedy	3	5	4	5
CD Alt	4	6	6	6
BenchmarkSD	14	17	17	19
EnactedSD	14	17	17	19
SD Alt Eff 1	17	23	22	23
SD Alt Eff 2	15	21	21	23
SD Alt Eff 3	8	17	16	28
BenchmarkHD	46	57	57	62
EnactedHD	49	62	60	68
HD Alt Eff 1	50	77	74	77
HD Alt Eff 2	44	75	71	79
HD Alt Eff 3	37	62	54	83

Table 10: The first three columns report the number of majority-BVAP, majority-BHVAP, and majority-BHCVAP districts, in the plans under discussion in this report. Overall, the state is 31.7% Black by VAP, 40.18% Black and Latino by VAP, and 38.43% Black and Latino by CVAP. The final column reports the number of districts labeled as effective in terms of electoral opportunity for Black and Latino voters.

6.5 Incumbency and core retention

Next, we review the handling of incumbency and the more general issue of reassigning voters to new districts in the plans under consideration. Note that members of Congress do not have to establish residency in the district that they represent, while Georgia law does have a district residency requirement for members of the state legislature.[10] In this section, I am relying on address data for incumbents that was supplied by counsel and there is certainly a strong possibility that it is not fully up-to-date or accurate.

The enacted Congressional plan double-bunked two pairs of incumbents: Nikema Williams (D) and David Scott (D) in CD 5; Jody Hice (R) and Andrew Clyde (R) in CD 10. However, Hice did not run for Congress in 2022, shifting to an unsuccessful run for Secretary of State, and David Scott already lived in CD 5 in the benchmark plan.

The enacted Senate plan also double-bunked two pairs of incumbents: Tyler Harper (R) and Carden Summers (R) in SD 13; Chuck Hufstetler (R) and Bruce Thompson (R) in SD 52. But Harper ran a successful campaign for Agriculture Commissioner, leaving Summers to win SD 13, while Thompson ran a successful campaign for Labor Commissioner, leaving SD 52 for Hufstetler. This leaves no meaningful pairings in the Senate map.

The shifting of incumbents is also apparent in the state House map. The enacted House plan seemingly double-bunks seventeen pairs of incumbents: nine R/R pairs, six D/D pairs, and two R/D pairs.

However, the apparent HD 10 collision is suspect (likely due to an inaccurate address for Lauren "Bubba" McDonald) because McDonald was reelected in HD 26, which contains no incumbent address from our list. Several seeming collisions are not meaningful because one of the Representatives had already retired or resigned: this includes Micah Gravley (now located in HD 19), Wes Cantrell (HD 21), Tommy Benton (HD 31), Matt Dollar (HD 45), Susan Holmes (HD 118), and Dominic LaRiccia (HD 176). The HD 100 collision is real, and Bonnie Rich lost to David Clark in the Republican primary; the HD 149 collision also ended in a primary showdown.

Among Democratic collisions, we note that Matthew Wilson (placed in HD 52) made an unsuccessful primary run for Insurance Commissioner; William Boddie made an unsuccessful run for Labor Commissioner; and David Dreyer (HD 62) did not run. Mitchell and Hutchinson did face off in a primary in HD 106.

Among the R/D collisions, Mickey Stephens (HD 74) died in office; Timothy Barr (HD 101) ran an unsuccessful primary for CD 10; and Winifred Dukes (HD 154) ran an unsuccessful primary for Agriculture Commissioner.

In all, this means that of 17 apparent collisions of incumbents, only three ended in a contest between incumbents. By far most of the others seem to be explained by retirement, resignation, or a run for another office.[11]

While incumbent pairings were therefore avoided, this is not to say that the new House plan was very favorable to incumbents in other ways. As I will discuss throughout this report, the state's line-drawers clearly placed a low priority on *core retention*, i.e., on maintaining voters in the same districts as they belonged to in the benchmark plan. The enacted plans for Congress and for state Senate each reassign more then two million residents to new districts relative to the prior assignment of their census block. But the House plan is on another level, with 6,135,234 people—roughly three out of every five Georgia residents—voting in a different district than before. This unusually high displacement is certainly permissible under the law, but it reveals that the legislature was willing to accept major changes to the map in pursuit of other goals. Below, in §10.1, I will present a closer look at which districts were particularly targeted for wholesale reconfiguration.

[10] See law.georgia.gov/opinions/2001-3-0.

[11] With the caveat that these numbers may not be highly meaningful without considering who planned to run again, and that they may not be wholly accurate, here are the numbers of districts with more than one incumbent address for the alternative plans. Benchmark CD - 1, SD - 0, HD - 5; Duncan-Kennedy - 3; CD Alt - 3; SD Alt Eff 1 - 11; SD Alt Eff 2 - 8; SD Alt Eff 3- 9; HD Alt Eff 1 - 35; HD Alt Eff 2 - 31; HD Alt Eff 3 - 31.

7 Gingles demonstration plans

7.1 Congressional alternatives

The state's enacted Congressional plan has two majority-BVAP districts (CD 4 and CD 13). Moving to the Black and Latino coalition, three more districts (CD 2, CD 5, and CD 7, by a hair) join these in being majority-BHVAP. However, if we switch the basis of population to CVAP rather than VAP, the number of coalition districts in the state's enacted plan drops to 4, losing CD 7.

Here, I have provided an alternative plan with 4/6/6 majority districts (by BVAP, BHVAP, and BHCVAP, respectively). That is, the six coalition-majority districts (CD 2, 3, 4, 5, 7, and 13) are still BH-majority on the basis of CVAP, making this a gain of two districts over the state. The newcomer to the list is CD 3, which runs along Georgia's western border, connecting the metro Atlanta area to Sanford Bishop's district in the southwest. By the notion of electoral effectiveness outlined in §5 below, all six of these districts offer an effective opportunity for Black and Latino voters to elect candidates of choice (Table 50).

	CD Enacted (Statewide)						**CD Alt 1**					
CD	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock
1	28.2%	6.8%	35.0%	60.4%	0.285	0.456	30.3%	6.9%	37.2%	58.5%	0.312	0.633
2	49.3%	5.1%	54.4%	42.7%	0.267	0.458	47.7%	4.7%	52.4%	44.5%	0.315	0.494
3	23.3%	5.3%	28.6%	66.8%	0.275	0.461	51.2%	7.2%	58.4%	37.4%	0.278	0.411
4	54.5%	10.1%	64.6%	28.3%	0.246	0.307	50.6%	8.2%	58.8%	33.8%	0.295	0.481
5	49.6%	6.7%	56.3%	37.9%	0.322	0.512	50.1%	11.4%	61.5%	33.4%	0.216	0.424
6	9.9%	9.1%	19.0%	66.6%	0.198	0.424	13.7%	10.9%	24.6%	57.1%	0.232	0.346
7	29.8%	21.3%	51.1%	32.8%	0.386	0.496	34.3%	22.4%	56.7%	29.4%	0.351	0.518
8	30.0%	6.1%	36.1%	60.5%	0.210	0.338	27.3%	6.9%	34.2%	63.0%	0.227	0.377
9	10.4%	12.9%	23.3%	68.3%	0.253	0.380	4.6%	11.5%	16.1%	77.9%	0.403	0.512
10	22.6%	6.5%	29.1%	66.2%	0.284	0.558	17.6%	6.9%	24.5%	69.8%	0.335	0.576
11	17.9%	11.2%	29.1%	64.0%	0.207	0.480	17.6%	7.6%	25.2%	68.1%	0.283	0.364
12	36.7%	4.9%	41.6%	54.6%	0.278	0.502	39.2%	4.6%	43.8%	51.9%	0.181	0.489
13	66.7%	10.5%	77.2%	18.8%	0.157	0.380	52.0%	6.8%	58.8%	37.8%	0.276	0.510
14	14.3%	10.6%	24.9%	71.3%	0.373	0.426	7.6%	11.0%	18.6%	77.0%	0.514	0.484
Avg					0.267	0.441					0.301	0.473

Table 11: VAP statistics and compactness comparison by district for the enacted Congressional plan and an alternative plan. The alternative plan has more majority-minority districts; it is also more compact by all three scores of compactness, including both contour-based scores in the table as well as 4665 rather than 5075 cut edges. The alternative also splits only 13 counties while the enacted plan splits 15. CVAP comparison is shown below in Table 24.

7.2 State Senate alternatives

Overall, the enacted state Senate plan creates majority BVAP/BHVAP/BHCVAP majority districts in the numbers 14/17/17 out of 56. By mixing and matching the options I have provided, my modular alternatives can replace that with a new Senate plan with and additional 1-6 majority districts.

The increase is accomplished while maintaining other traditional principles—like compactness and splitting scores—that are generally comparable to or better than those of the state's enacted plan.

Below, I will review the Gingles demonstration alternatives one cluster at a time, showing the enacted plan and alternatives (which sometimes include both an Alt 1 and an Alt 2) for each cluster. The purpose of showing multiple alternatives is to illustrate the kinds of tradeoffs present in all redistricting problems, and to give a sense of the enormous range of possible directions for satisfying the Gingles 1 threshold test.

7.2.1 SD Atlanta

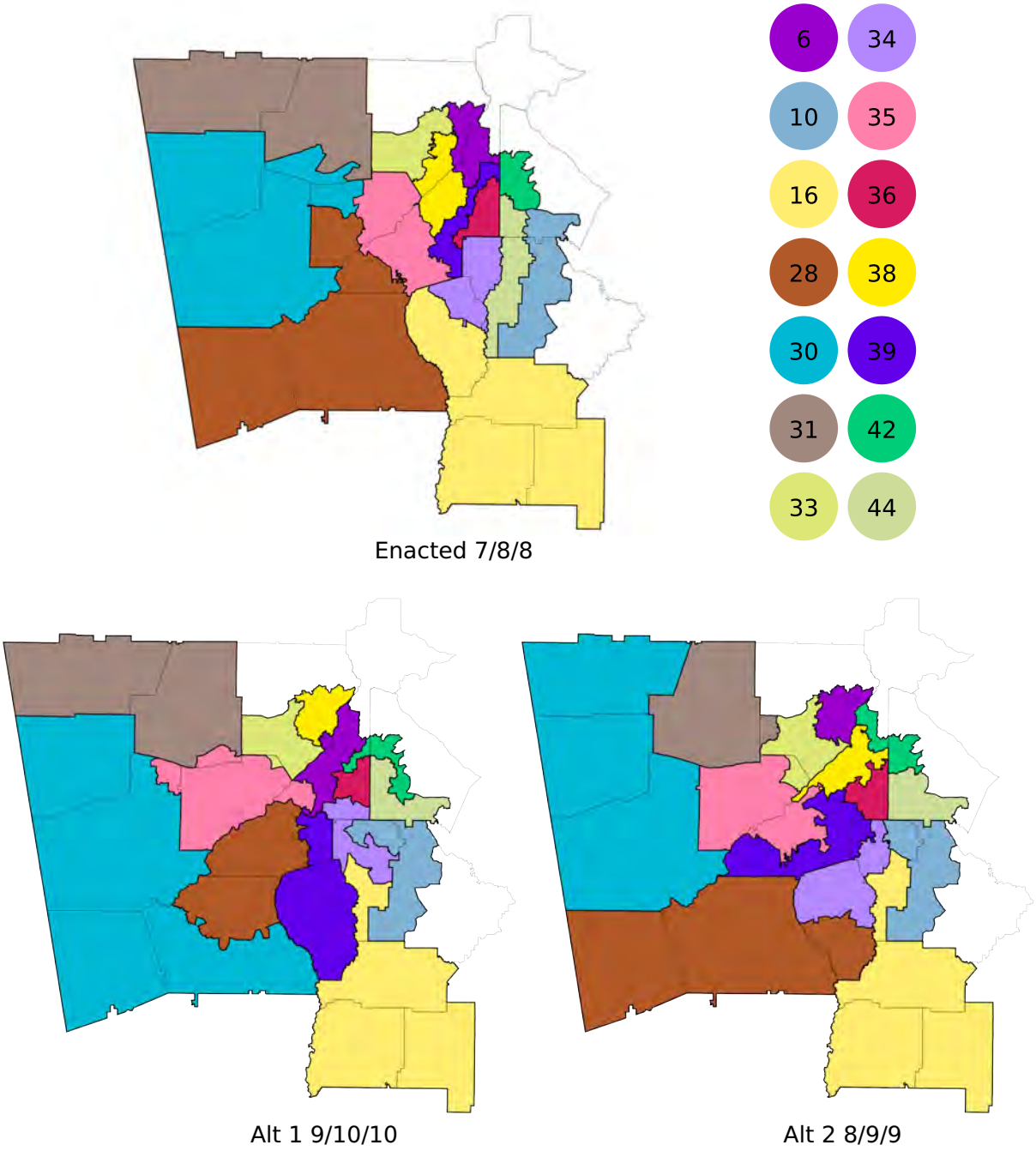


Figure 8: SD Atlanta (14 districts).

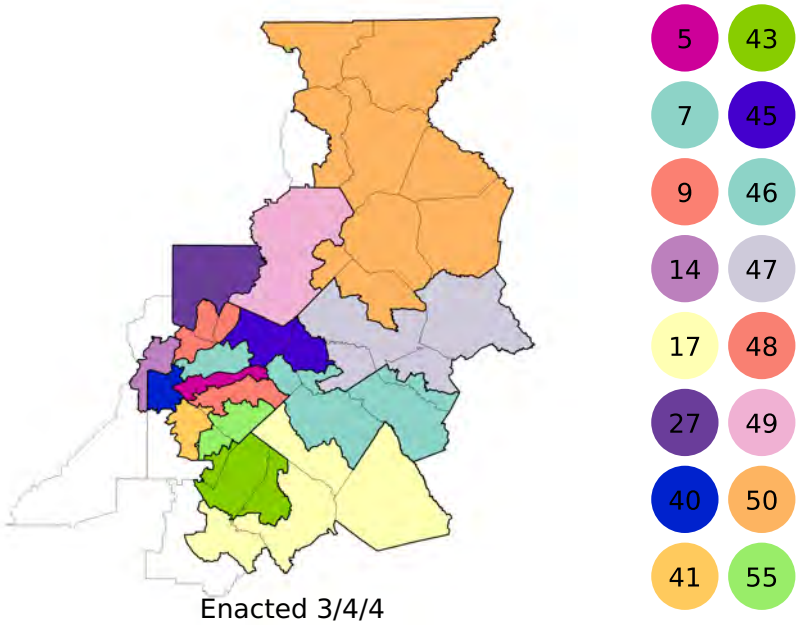
	SD Atlanta Enacted						**SD Alt 1**					
SD	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock
6	23.9%	8.2%	32.1%	57.8%	0.236	0.405	50.1%	6.1%	56.2%	39.8%	0.169	0.246
10	71.5%	5.2%	76.7%	19.6%	0.231	0.281	59.5%	11.0%	70.5%	23.4%	0.238	0.420
16	22.7%	5.0%	27.7%	66.9%	0.314	0.368	50.2%	6.2%	56.4%	40.9%	0.254	0.354
28	19.5%	6.4%	25.9%	69.4%	0.246	0.445	50.6%	6.8%	57.4%	39.3%	0.335	0.489
30	20.9%	6.1%	27.0%	69.4%	0.407	0.597	14.3%	5.1%	19.4%	76.9%	0.286	0.361
31	20.7%	7.4%	28.1%	68.3%	0.379	0.366	19.7%	7.2%	26.9%	69.4%	0.470	0.395
33	43.0%	22.9%	65.9%	30.2%	0.215	0.401	50.4%	18.1%	68.5%	27.9%	0.381	0.528
34	69.5%	12.7%	82.2%	13.4%	0.335	0.451	72.2%	11.6%	83.8%	11.5%	0.163	0.326
35	71.9%	7.5%	79.4%	18.8%	0.263	0.472	50.9%	8.0%	58.9%	38.2%	0.347	0.400
36	51.3%	7.1%	58.4%	36.2%	0.305	0.321	50.0%	5.7%	55.7%	38.8%	0.339	0.452
38	65.3%	8.4%	73.7%	21.9%	0.208	0.361	27.9%	15.4%	43.3%	46.1%	0.271	0.487
39	60.7%	5.6%	66.3%	27.9%	0.128	0.166	51.2%	5.4%	56.6%	38.6%	0.277	0.357
42	30.8%	8.6%	39.4%	51.4%	0.321	0.479	35.8%	9.6%	45.4%	43.5%	0.112	0.289
44	71.3%	8.6%	79.9%	15.3%	0.185	0.180	61.6%	3.6%	65.2%	31.0%	0.237	0.356
Avg					0.270	0.378					0.277	0.390

Table 12: SD Atlanta Alt 1 splits 8 counties within the cluster compared to 7 in the enacted plan and has a better discrete compactness score, with 2017 cut edges rather than 2197, to go with comparable Polsby-Popper and superior Reock compactness.

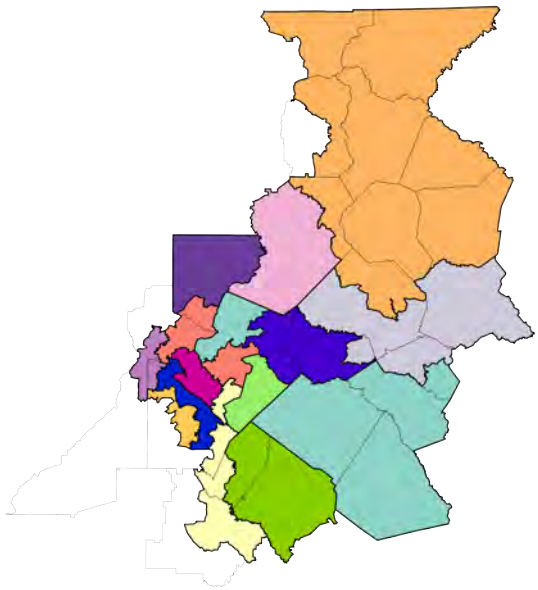
	SD Atlanta Enacted						**SD Alt 2**					
SD	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock
6	23.9%	8.2%	32.1%	57.8%	0.236	0.405	28.0%	14.9%	42.9%	46.7%	0.256	0.477
10	71.5%	5.2%	76.7%	19.6%	0.231	0.281	59.7%	9.8%	69.5%	23.3%	0.307	0.416
16	22.7%	5.0%	27.7%	66.9%	0.314	0.368	48.4%	6.1%	54.5%	42.4%	0.258	0.366
28	19.5%	6.4%	25.9%	69.4%	0.246	0.445	15.8%	6.1%	21.9%	72.8%	0.347	0.371
30	20.9%	6.1%	27.0%	69.4%	0.407	0.597	15.7%	6.6%	22.3%	74.2%	0.473	0.508
31	20.7%	7.4%	28.1%	68.3%	0.379	0.366	25.9%	6.7%	32.6%	63.6%	0.591	0.636
33	43.0%	22.9%	65.9%	30.2%	0.215	0.401	50.6%	18.2%	68.8%	27.4%	0.224	0.463
34	69.5%	12.7%	82.2%	13.4%	0.335	0.451	54.4%	11.9%	66.3%	27.9%	0.246	0.381
35	71.9%	7.5%	79.4%	18.8%	0.263	0.472	60.9%	7.5%	68.4%	29.3%	0.206	0.490
36	51.3%	7.1%	58.4%	36.2%	0.305	0.321	54.0%	6.8%	60.8%	33.6%	0.263	0.466
38	65.3%	8.4%	73.7%	21.9%	0.208	0.361	51.0%	5.6%	56.6%	37.6%	0.154	0.260
39	60.7%	5.6%	66.3%	27.9%	0.128	0.166	86.5%	5.5%	92.0%	7.0%	0.118	0.271
42	30.8%	8.6%	39.4%	51.4%	0.321	0.479	17.0%	10.7%	27.7%	61.4%	0.144	0.282
44	71.3%	8.6%	79.9%	15.3%	0.185	0.180	76.3%	3.2%	79.5%	18.7%	0.374	0.456
Avg					0.270	0.378					0.283	0.417

Table 13: SD Atlanta Alt 2 splits 6 counties within the cluster and has just 1985 cut edges, better than the enacted plan's 7 and 2197, while also improving on both contour-based compactness scores.

7.2.2 SD Gwinnett



Enacted 3/4/4



Alt 1 4/7/6

Figure 9: SD Gwinnett (16 districts).

	SD Gwinnett Enacted						**SD Alt 1**					
SD	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock
5	29.9%	41.7%	71.6%	15.7%	0.207	0.166	20.3%	34.6%	54.9%	28.0%	0.285	0.384
7	21.4%	16.6%	38.0%	37.8%	0.339	0.344	17.1%	14.3%	31.4%	45.5%	0.278	0.401
9	29.5%	18.8%	48.3%	35.8%	0.213	0.233	29.3%	27.0%	56.3%	26.2%	0.234	0.498
14	19.0%	12.1%	31.1%	57.1%	0.242	0.273	18.1%	11.4%	29.5%	57.6%	0.208	0.296
17	32.0%	5.1%	37.1%	59.4%	0.168	0.342	51.1%	6.6%	57.7%	35.9%	0.113	0.188
27	5.0%	10.2%	15.2%	71.5%	0.456	0.499	4.7%	10.2%	14.9%	70.8%	0.500	0.497
40	19.2%	21.6%	40.8%	46.3%	0.345	0.508	50.1%	17.7%	67.8%	25.1%	0.130	0.208
41	62.6%	6.7%	69.3%	21.4%	0.302	0.509	57.3%	10.0%	67.3%	23.3%	0.149	0.279
43	64.3%	6.9%	71.2%	26.5%	0.346	0.635	52.0%	7.0%	59.0%	38.3%	0.420	0.537
45	18.6%	13.1%	31.7%	55.5%	0.305	0.350	19.8%	12.1%	31.9%	58.8%	0.226	0.380
46	16.9%	7.0%	23.9%	69.9%	0.207	0.365	16.5%	5.0%	21.5%	73.4%	0.416	0.514
47	17.4%	9.6%	27.0%	67.5%	0.187	0.353	16.7%	8.7%	25.4%	68.5%	0.176	0.326
48	9.5%	7.0%	16.5%	52.2%	0.342	0.348	10.1%	6.4%	16.5%	54.8%	0.266	0.387
49	8.0%	21.9%	29.9%	65.6%	0.341	0.461	8.1%	24.6%	32.7%	62.8%	0.382	0.573
50	5.6%	8.8%	14.4%	81.5%	0.228	0.450	5.4%	6.1%	11.5%	84.3%	0.232	0.462
55	66.0%	8.7%	74.7%	20.6%	0.271	0.333	50.0%	13.9%	63.9%	30.0%	0.419	0.451
Avg					0.281	0.386					0.277	0.399

Table 14: SD Gwinnett Alt 1 has 9 splits and 2024 cut edges, both better than the enacted plan (10 and 2232). The Polsby-Popper scores are comparable while the alternative plan has a better Reock score.

7.2.3 SD East Black Belt

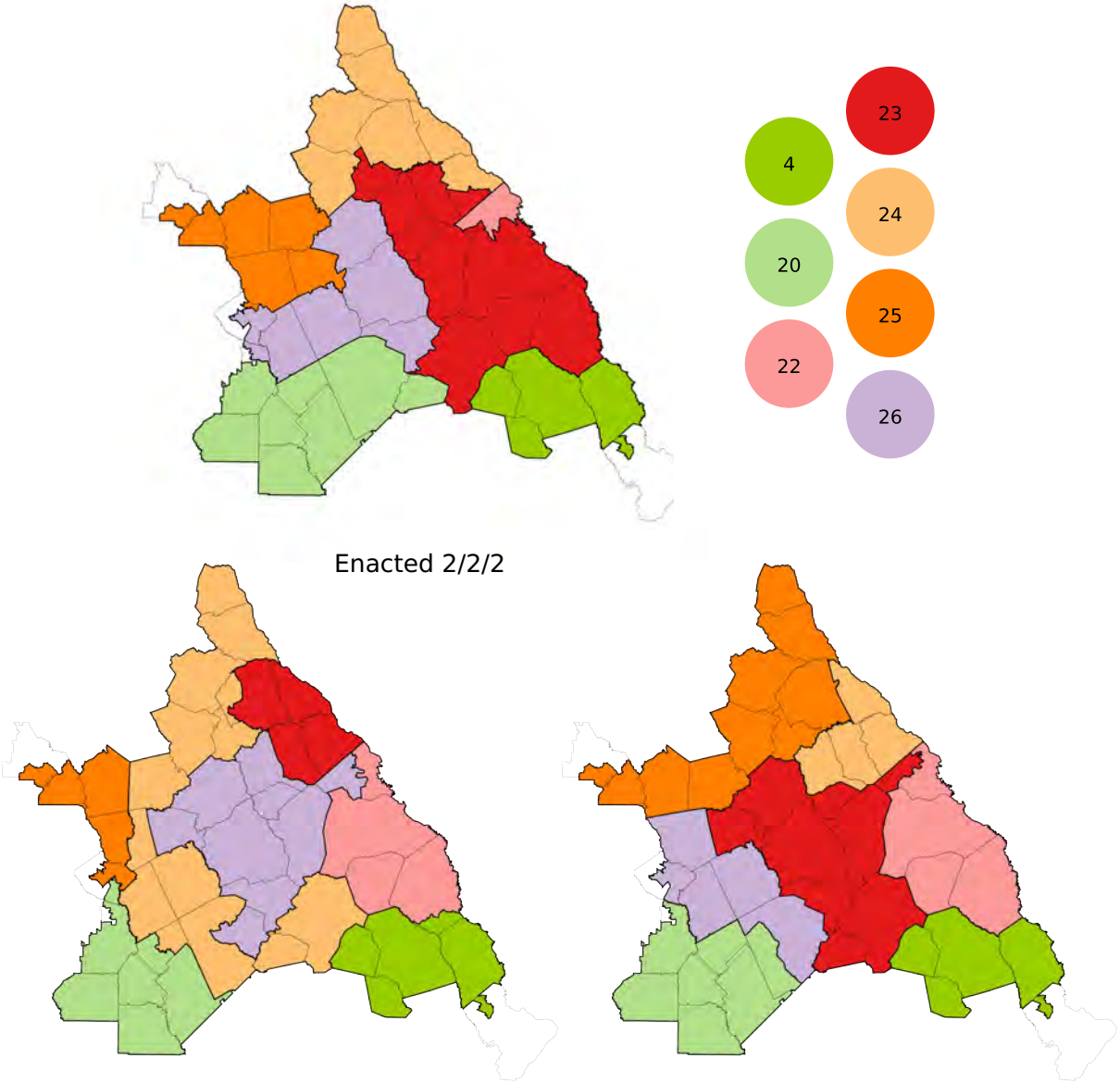


Figure 10: SD East Black Belt (7 districts).

	SD East Black Belt Enacted						**SD Alt 1**					
SD	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock
4	23.4%	5.5%	28.9%	66.8%	0.265	0.471	23.5%	5.5%	29.0%	66.7%	0.284	0.495
20	31.3%	3.5%	34.8%	61.7%	0.358	0.404	34.4%	5.1%	39.5%	56.5%	0.231	0.498
22	56.5%	5.3%	61.8%	34.4%	0.288	0.404	50.5%	3.8%	54.3%	42.6%	0.241	0.455
23	35.5%	4.5%	40.0%	56.9%	0.164	0.365	23.0%	5.6%	28.6%	64.6%	0.466	0.497
24	19.9%	4.4%	24.3%	69.8%	0.213	0.366	25.0%	3.5%	28.5%	69.1%	0.083	0.229
25	33.5%	3.7%	37.2%	59.9%	0.241	0.386	50.0%	4.0%	54.0%	43.4%	0.174	0.344
26	57.0%	4.2%	61.2%	36.6%	0.203	0.469	50.1%	3.7%	53.8%	43.4%	0.209	0.472
Avg					0.247	0.409					0.241	0.427

Table 15: SD East Black Belt Alt 1 has more cut edges than the state (1301 vs. 1021 from the enacted plan), paired with a comparable Polsby-Popper and a superior Reock score. This alternative plan splits seven counties while the state splits four within the cluster.

	SD East Black Belt Enacted						**SD Alt 2**					
SD	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock
4	23.4%	5.5%	28.9%	66.8%	0.265	0.471	23.4%	5.5%	28.9%	66.8%	0.265	0.471
20	31.3%	3.5%	34.8%	61.7%	0.358	0.404	32.5%	4.9%	37.4%	58.7%	0.304	0.586
22	56.5%	5.3%	61.8%	34.4%	0.288	0.404	50.4%	3.5%	53.9%	42.9%	0.264	0.432
23	35.5%	4.5%	40.0%	56.9%	0.164	0.365	47.4%	4.1%	51.5%	45.8%	0.231	0.441
24	19.9%	4.4%	24.3%	69.8%	0.213	0.366	23.1%	5.6%	28.7%	64.5%	0.327	0.458
25	33.5%	3.7%	37.2%	59.9%	0.241	0.386	28.2%	4.5%	32.7%	64.3%	0.176	0.311
26	57.0%	4.2%	61.2%	36.6%	0.203	0.469	51.2%	3.1%	54.3%	43.5%	0.205	0.331
Avg					0.247	0.409					0.253	0.433

Table 16: SD East Black Belt Alt 2 has just two county splits, compared to four in the state's plan. With just 1008 cut edges, it also executes a clean sweep of compactness scores relative to the enacted plan.

7.3 State House alternatives

In the state House, the enacted plan creates majority districts for BVAP/BHVAP/BHCVAP in the numbers 49/62/60 out of 180. Taken together, my modular alternatives can combine to replace that with a new House plan with up to 77 majority-BHVAP districts and up to 74 majority-BHCVAP districts.

7.3.1 HD Atlanta

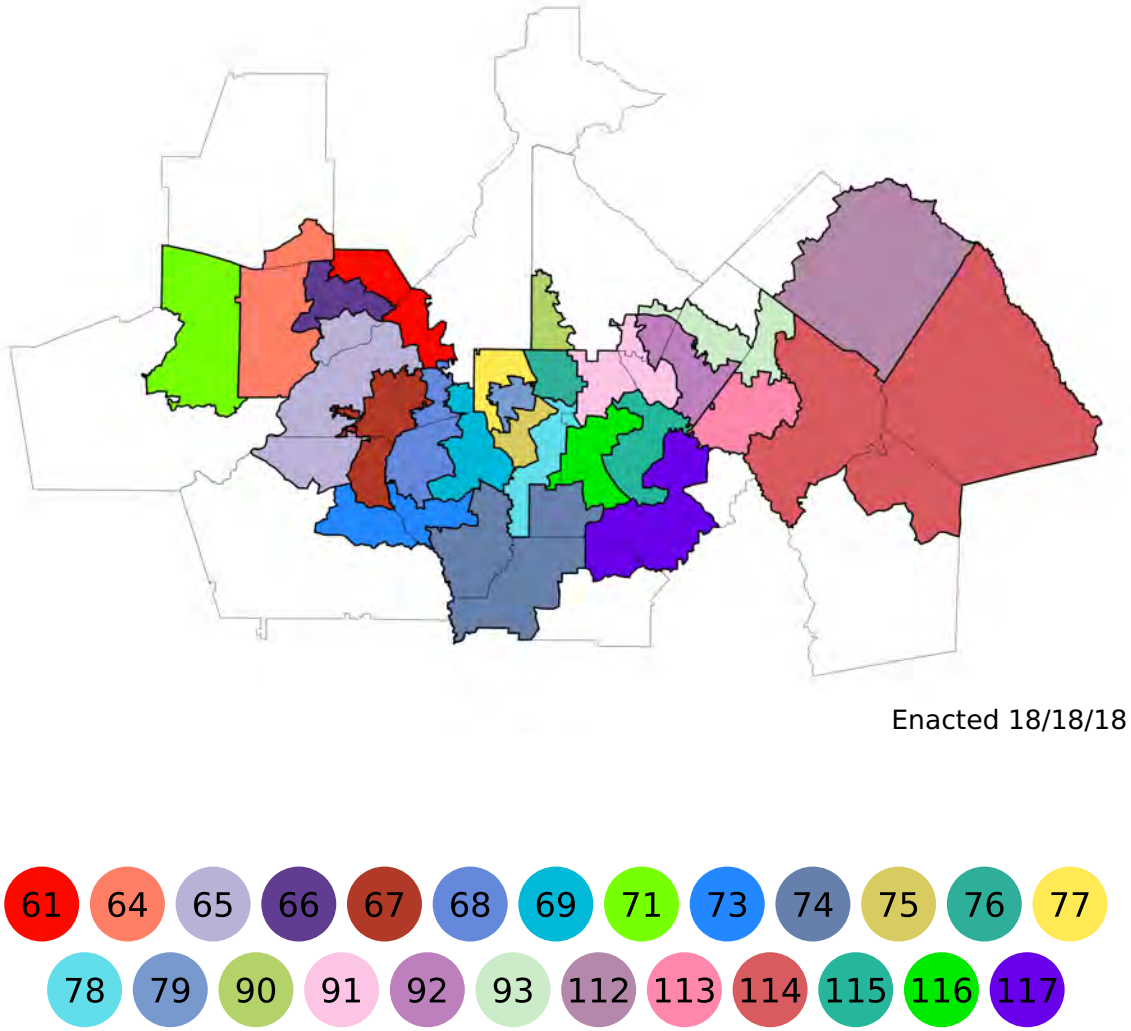
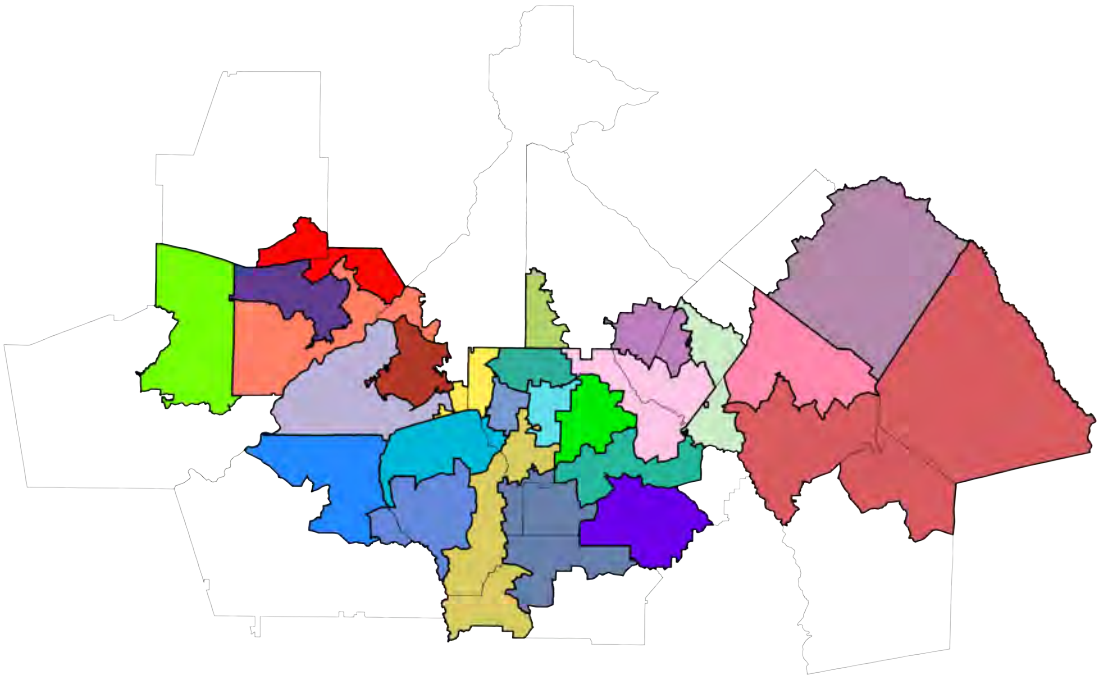
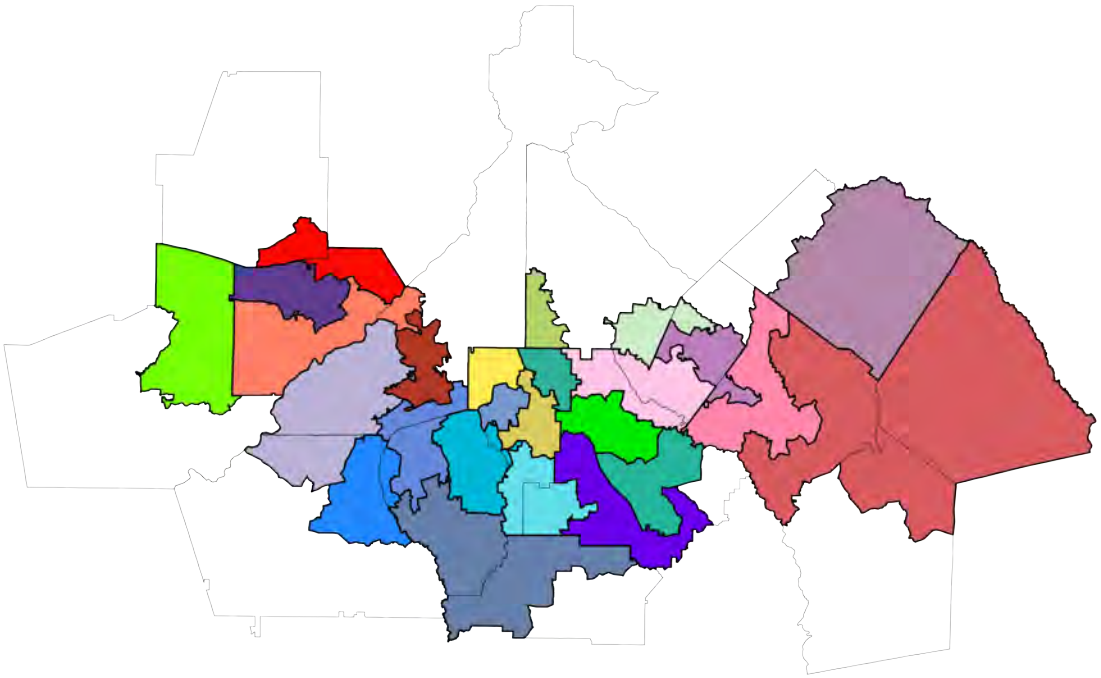


Figure 11: HD Atlanta (25 districts).



Alt 1 20/20/20



Alt 2 19/20/20

Figure 12: HD Atlanta (25 districts).

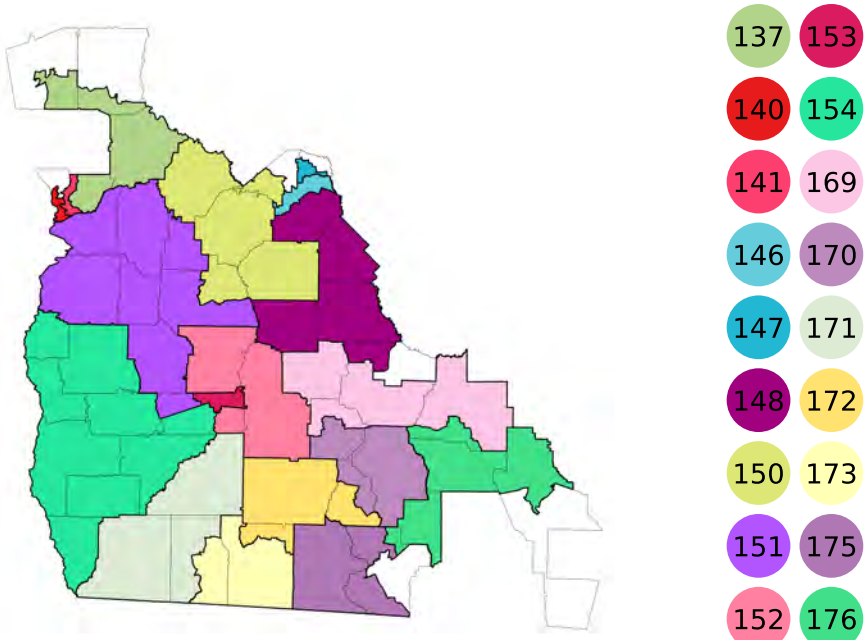
	HD Atlanta Enacted						**HD Alt 1**					
HD	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock
61	74.3%	7.6%	81.9%	16.8%	0.198	0.247	50.1%	10.0%	60.1%	37.1%	0.229	0.265
64	30.7%	7.4%	38.1%	57.8%	0.361	0.365	50.9%	6.5%	57.4%	40.0%	0.132	0.263
65	62.0%	4.5%	66.5%	31.5%	0.172	0.454	81.7%	4.7%	86.4%	12.5%	0.222	0.350
66	53.4%	9.5%	62.9%	33.9%	0.246	0.356	51.0%	9.0%	60.0%	36.2%	0.256	0.386
67	58.9%	7.8%	66.7%	30.9%	0.122	0.357	89.9%	5.4%	95.3%	4.4%	0.195	0.515
68	55.7%	6.3%	62.0%	33.9%	0.172	0.318	13.7%	6.6%	20.3%	71.5%	0.310	0.518
69	63.6%	5.4%	69.0%	26.9%	0.247	0.403	51.9%	8.8%	60.7%	34.0%	0.339	0.409
71	19.9%	6.2%	26.1%	69.8%	0.352	0.441	19.9%	6.2%	26.1%	69.8%	0.350	0.441
73	12.1%	7.0%	19.1%	72.6%	0.198	0.278	11.8%	6.4%	18.2%	75.9%	0.335	0.417
74	25.5%	5.6%	31.1%	64.4%	0.247	0.496	50.8%	6.9%	57.7%	39.7%	0.205	0.461
75	74.4%	11.3%	85.7%	11.3%	0.285	0.420	54.2%	7.7%	61.9%	34.1%	0.133	0.230
76	67.2%	13.2%	80.4%	10.5%	0.509	0.524	61.6%	20.0%	81.6%	11.2%	0.460	0.409
77	76.1%	12.2%	88.3%	7.6%	0.211	0.396	89.6%	5.0%	94.6%	3.5%	0.211	0.292
78	71.6%	8.9%	80.5%	15.0%	0.194	0.210	64.2%	11.3%	75.5%	15.4%	0.256	0.414
79	71.6%	16.0%	87.6%	7.1%	0.209	0.498	73.3%	14.6%	87.9%	8.0%	0.370	0.444
90	58.5%	4.3%	62.8%	34.0%	0.286	0.359	58.5%	4.3%	62.8%	34.0%	0.286	0.359
91	70.0%	5.9%	75.9%	22.0%	0.202	0.447	50.3%	5.2%	55.5%	40.7%	0.245	0.384
92	68.8%	4.7%	73.5%	24.1%	0.198	0.361	87.6%	3.5%	91.1%	8.3%	0.260	0.543
93	65.4%	9.6%	75.0%	22.9%	0.112	0.260	62.1%	10.4%	72.5%	25.4%	0.160	0.232
112	19.2%	3.3%	22.5%	73.7%	0.522	0.619	19.2%	3.3%	22.5%	73.7%	0.522	0.619
113	59.5%	6.7%	66.2%	31.8%	0.318	0.501	51.0%	5.1%	56.1%	41.2%	0.338	0.425
114	24.7%	3.7%	28.4%	68.8%	0.283	0.502	32.8%	4.4%	37.2%	60.3%	0.267	0.438
115	52.1%	7.0%	59.1%	36.9%	0.226	0.436	50.2%	6.0%	56.2%	38.6%	0.193	0.282
116	58.1%	7.3%	65.4%	27.2%	0.280	0.407	54.8%	8.0%	62.8%	29.6%	0.333	0.478
117	36.6%	5.4%	42.0%	54.5%	0.275	0.408	51.0%	7.2%	58.2%	39.0%	0.409	0.511
Avg					0.257	0.402					0.281	0.403

Table 17: In HD Atlanta, the enacted plan has 10 county splits and 2221 cut edges. Alt 1 maintains 10 county splits and improves to 1988 cut edges.

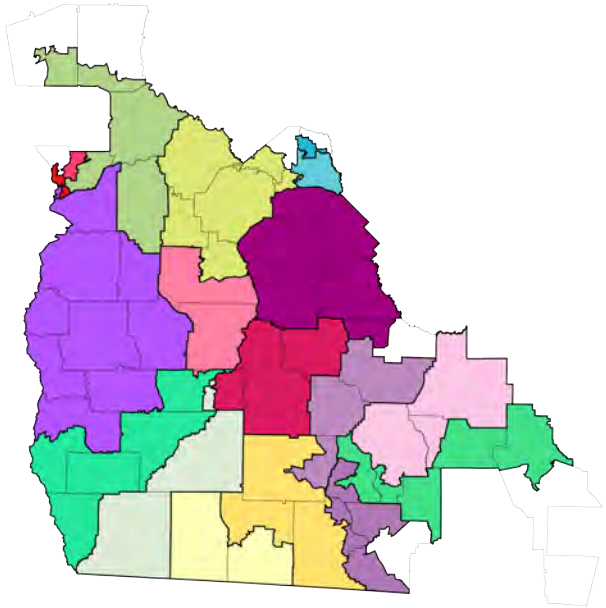
	HD Atlanta Enacted						**HD Alt 2**					
HD	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock
61	74.3%	7.6%	81.9%	16.8%	0.198	0.247	47.4%	10.1%	57.5%	39.6%	0.290	0.276
64	30.7%	7.4%	38.1%	57.8%	0.361	0.365	50.5%	6.8%	57.3%	40.0%	0.201	0.271
65	62.0%	4.5%	66.5%	31.5%	0.172	0.454	67.6%	4.1%	71.7%	26.6%	0.302	0.458
66	53.4%	9.5%	62.9%	33.9%	0.246	0.356	51.2%	9.1%	60.3%	36.0%	0.336	0.407
67	58.9%	7.8%	66.7%	30.9%	0.122	0.357	90.4%	5.3%	95.7%	4.0%	0.131	0.428
68	55.7%	6.3%	62.0%	33.9%	0.172	0.318	58.2%	6.8%	65.0%	31.0%	0.168	0.329
69	63.6%	5.4%	69.0%	26.9%	0.247	0.403	54.6%	6.3%	60.9%	34.4%	0.310	0.538
71	19.9%	6.2%	26.1%	69.8%	0.352	0.441	19.9%	6.2%	26.1%	69.8%	0.352	0.441
73	12.1%	7.0%	19.1%	72.6%	0.198	0.278	11.9%	7.0%	18.9%	73.6%	0.373	0.498
74	25.5%	5.6%	31.1%	64.4%	0.247	0.496	12.8%	5.7%	18.5%	75.5%	0.192	0.320
75	74.4%	11.3%	85.7%	11.3%	0.285	0.420	61.4%	12.0%	73.4%	17.6%	0.225	0.404
76	67.2%	13.2%	80.4%	10.5%	0.509	0.524	70.4%	13.2%	83.6%	9.6%	0.352	0.416
77	76.1%	12.2%	88.3%	7.6%	0.211	0.396	77.0%	12.6%	89.6%	7.0%	0.491	0.510
78	71.6%	8.9%	80.5%	15.0%	0.194	0.210	68.6%	8.4%	77.0%	21.0%	0.325	0.540
79	71.6%	16.0%	87.6%	7.1%	0.209	0.498	73.1%	15.5%	88.6%	7.5%	0.357	0.549
90	58.5%	4.3%	62.8%	34.0%	0.286	0.359	58.5%	4.3%	62.8%	34.0%	0.286	0.359
91	70.0%	5.9%	75.9%	22.0%	0.202	0.447	53.0%	5.2%	58.2%	38.4%	0.231	0.369
92	68.8%	4.7%	73.5%	24.1%	0.198	0.361	69.6%	6.9%	76.5%	21.3%	0.174	0.330
93	65.4%	9.6%	75.0%	22.9%	0.112	0.260	85.5%	7.2%	92.7%	7.0%	0.201	0.329
112	19.2%	3.3%	22.5%	73.7%	0.522	0.619	19.2%	3.3%	22.5%	73.7%	0.522	0.619
113	59.5%	6.7%	66.2%	31.8%	0.318	0.501	53.9%	5.6%	59.5%	37.9%	0.153	0.355
114	24.7%	3.7%	28.4%	68.8%	0.283	0.502	24.9%	3.8%	28.7%	68.6%	0.235	0.487
115	52.1%	7.0%	59.1%	36.9%	0.226	0.436	50.3%	6.9%	57.2%	39.8%	0.304	0.475
116	58.1%	7.3%	65.4%	27.2%	0.280	0.407	53.2%	7.9%	61.1%	31.0%	0.382	0.452
117	36.6%	5.4%	42.0%	54.5%	0.275	0.408	50.1%	6.5%	56.6%	38.4%	0.155	0.323
Avg					0.257	0.402					0.282	0.419

Table 18: With 9 county splits and 1995 cut edges, Alt 2 dominates the enacted plan.

7.3.2 HD Southwest



Enacted 6/6/6



Alt 1 8/8/8

Figure 13: HD Southwest (18 districts).

	HD Southwest Enacted						**HD Alt 1**					
HD	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock
137	52.1%	4.5%	56.6%	40.8%	0.165	0.328	51.7%	3.7%	55.4%	42.0%	0.143	0.259
140	57.6%	8.0%	65.6%	31.7%	0.192	0.289	57.1%	7.9%	65.0%	32.4%	0.197	0.257
141	57.5%	6.6%	64.1%	31.8%	0.200	0.261	53.6%	6.7%	60.3%	35.5%	0.299	0.423
146	27.6%	4.7%	32.3%	61.8%	0.195	0.257	23.3%	4.9%	28.2%	64.4%	0.208	0.468
147	30.1%	7.2%	37.3%	55.3%	0.261	0.331	31.8%	7.2%	39.0%	55.1%	0.220	0.341
148	34.0%	3.1%	37.1%	60.4%	0.235	0.438	38.6%	3.4%	42.0%	56.1%	0.388	0.590
150	53.6%	6.1%	59.7%	38.3%	0.275	0.439	51.2%	5.3%	56.5%	41.5%	0.250	0.544
151	42.4%	7.3%	49.7%	47.2%	0.222	0.528	51.0%	7.5%	58.5%	38.6%	0.275	0.424
152	26.1%	2.3%	28.4%	67.9%	0.297	0.394	34.2%	3.2%	37.4%	58.7%	0.314	0.473
153	67.9%	2.5%	70.4%	27.7%	0.297	0.298	52.9%	2.7%	55.6%	43.0%	0.400	0.536
154	54.8%	1.7%	56.5%	42.2%	0.332	0.410	50.1%	2.1%	52.2%	45.7%	0.175	0.261
169	29.0%	7.7%	36.7%	61.0%	0.226	0.283	24.0%	9.0%	33.0%	64.6%	0.296	0.456
170	24.2%	8.7%	32.9%	64.2%	0.342	0.531	26.8%	12.5%	39.3%	57.9%	0.223	0.285
171	39.6%	4.6%	44.2%	53.9%	0.368	0.347	51.0%	4.0%	55.0%	43.4%	0.249	0.275
172	23.3%	13.4%	36.7%	61.0%	0.316	0.437	25.1%	9.4%	34.5%	63.1%	0.217	0.375
173	36.3%	5.4%	41.7%	55.7%	0.378	0.564	35.4%	5.6%	41.0%	56.4%	0.412	0.424
175	24.2%	5.0%	29.2%	66.5%	0.374	0.472	21.0%	5.7%	26.7%	68.7%	0.143	0.273
176	22.7%	8.2%	30.9%	66.2%	0.160	0.335	23.8%	6.2%	30.0%	67.1%	0.116	0.227
Avg					0.269	0.386					0.252	0.383

Table 19: HD Southwest Alt 1 splits 12 counties within the cluster, to the state's 10 split counties. Its 2290 cut edges are more than the state's 2094, though the Reock scores are nearly identical.

7.3.3 HD East Black Belt

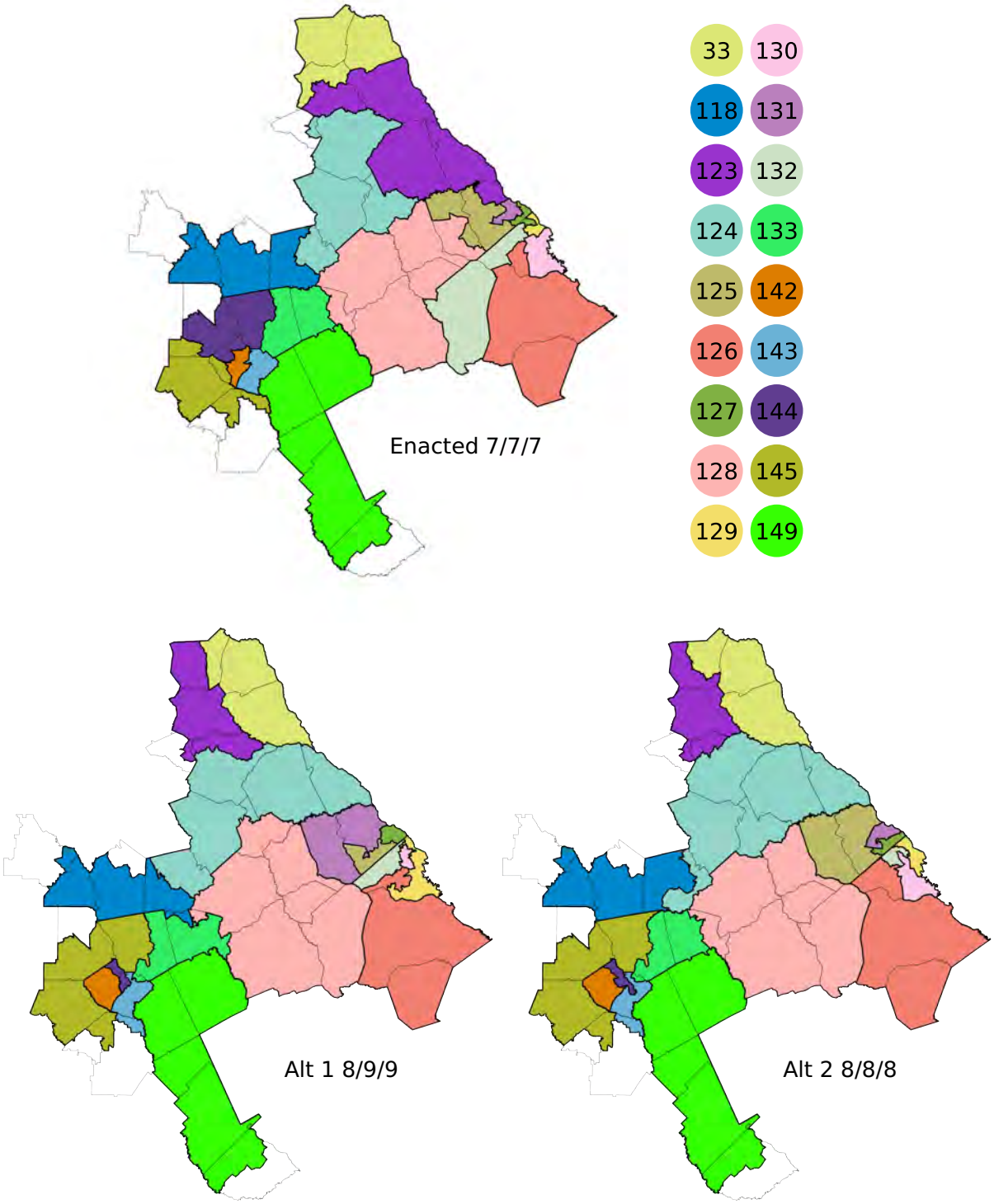


Figure 14: HD East Black Belt (18 districts).

	HD East Black Belt Enacted						**HD Alt 1**					
HD	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock
33	11.2%	3.1%	14.3%	82.3%	0.371	0.487	18.7%	3.8%	22.5%	74.6%	0.405	0.343
118	23.6%	3.7%	27.3%	69.7%	0.223	0.350	23.2%	3.1%	26.3%	70.6%	0.218	0.329
123	24.3%	4.3%	28.6%	68.1%	0.178	0.295	13.3%	5.8%	19.1%	76.3%	0.281	0.357
124	25.6%	6.2%	31.8%	65.0%	0.233	0.442	28.4%	4.7%	33.1%	64.4%	0.224	0.362
125	23.7%	7.7%	31.4%	63.0%	0.173	0.409	24.1%	8.0%	32.1%	61.5%	0.255	0.328
126	54.5%	3.2%	57.7%	40.0%	0.414	0.516	52.5%	3.5%	56.0%	41.6%	0.322	0.534
127	18.5%	4.8%	23.3%	68.1%	0.201	0.351	14.6%	4.9%	19.5%	70.1%	0.585	0.546
128	50.4%	1.7%	52.1%	46.5%	0.319	0.601	50.1%	1.6%	51.7%	46.7%	0.357	0.628
129	54.9%	4.3%	59.2%	37.2%	0.254	0.482	51.9%	3.5%	55.4%	40.7%	0.108	0.314
130	59.9%	3.9%	63.8%	33.7%	0.255	0.508	54.4%	4.3%	58.7%	38.7%	0.253	0.451
131	17.6%	5.9%	23.5%	68.2%	0.283	0.377	27.1%	5.1%	32.2%	63.3%	0.285	0.604
132	52.3%	7.8%	60.1%	35.6%	0.296	0.270	53.6%	8.2%	61.8%	33.1%	0.293	0.243
133	36.8%	2.1%	38.9%	58.4%	0.415	0.543	48.7%	2.0%	50.7%	47.2%	0.178	0.385
142	59.5%	3.7%	63.2%	34.8%	0.229	0.353	50.8%	3.7%	54.5%	42.3%	0.539	0.605
143	60.8%	4.7%	65.5%	32.3%	0.299	0.502	52.4%	6.3%	58.7%	38.4%	0.176	0.332
144	29.3%	2.6%	31.9%	63.0%	0.325	0.510	50.4%	4.3%	54.7%	41.3%	0.299	0.298
145	35.7%	5.9%	41.6%	55.1%	0.194	0.376	23.1%	2.8%	25.9%	71.1%	0.204	0.422
149	32.1%	5.7%	37.8%	61.0%	0.223	0.325	32.1%	5.7%	37.8%	61.0%	0.223	0.325
Avg					0.271	0.428					0.289	0.411

Table 20: The Alt 1 map has 10 split counties within the HD East Black Belt cluster, while the enacted plan has 9. Its 1775 cut edges improves on the state's 1887, while also being more compact by Polsby-Popper.

	HD East Black Belt Enacted						**HD Alt 2**					
HD	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock
33	11.2%	3.1%	14.3%	82.3%	0.371	0.487	18.3%	3.5%	21.8%	75.2%	0.370	0.323
118	23.6%	3.7%	27.3%	69.7%	0.223	0.350	27.0%	4.1%	31.1%	65.9%	0.229	0.342
123	24.3%	4.3%	28.6%	68.1%	0.178	0.295	13.7%	6.0%	19.7%	75.8%	0.293	0.395
124	25.6%	6.2%	31.8%	65.0%	0.233	0.442	25.5%	3.8%	29.3%	68.1%	0.234	0.381
125	23.7%	7.7%	31.4%	63.0%	0.173	0.409	30.2%	6.1%	36.3%	60.1%	0.396	0.670
126	54.5%	3.2%	57.7%	40.0%	0.414	0.516	50.7%	4.2%	54.9%	42.3%	0.394	0.494
127	18.5%	4.8%	23.3%	68.1%	0.201	0.351	17.6%	6.2%	23.8%	67.2%	0.267	0.264
128	50.4%	1.7%	52.1%	46.5%	0.319	0.601	50.2%	1.5%	51.7%	46.8%	0.409	0.672
129	54.9%	4.3%	59.2%	37.2%	0.254	0.482	50.4%	3.6%	54.0%	41.8%	0.248	0.323
130	59.9%	3.9%	63.8%	33.7%	0.255	0.508	57.1%	4.7%	61.8%	35.4%	0.231	0.325
131	17.6%	5.9%	23.5%	68.2%	0.283	0.377	17.6%	5.7%	23.3%	67.8%	0.318	0.373
132	52.3%	7.8%	60.1%	35.6%	0.296	0.270	54.4%	7.1%	61.5%	34.1%	0.219	0.278
133	36.8%	2.1%	38.9%	58.4%	0.415	0.543	46.6%	2.1%	48.7%	49.0%	0.296	0.438
142	59.5%	3.7%	63.2%	34.8%	0.229	0.353	50.1%	3.8%	53.9%	42.9%	0.436	0.605
143	60.8%	4.7%	65.5%	32.3%	0.299	0.502	52.9%	6.3%	59.2%	38.0%	0.143	0.316
144	29.3%	2.6%	31.9%	63.0%	0.325	0.510	51.0%	4.2%	55.2%	40.8%	0.226	0.243
145	35.7%	5.9%	41.6%	55.1%	0.194	0.376	23.1%	2.8%	25.9%	71.1%	0.190	0.359
149	32.1%	5.7%	37.8%	61.0%	0.223	0.325	32.1%	5.7%	37.8%	61.0%	0.223	0.325
Avg					0.271	0.428					0.285	0.396

Table 21: Alt 2 eliminates one county split relative to the enacted plan and has a sharply improved 1604 cut edges.

7.3.4 HD Southeast

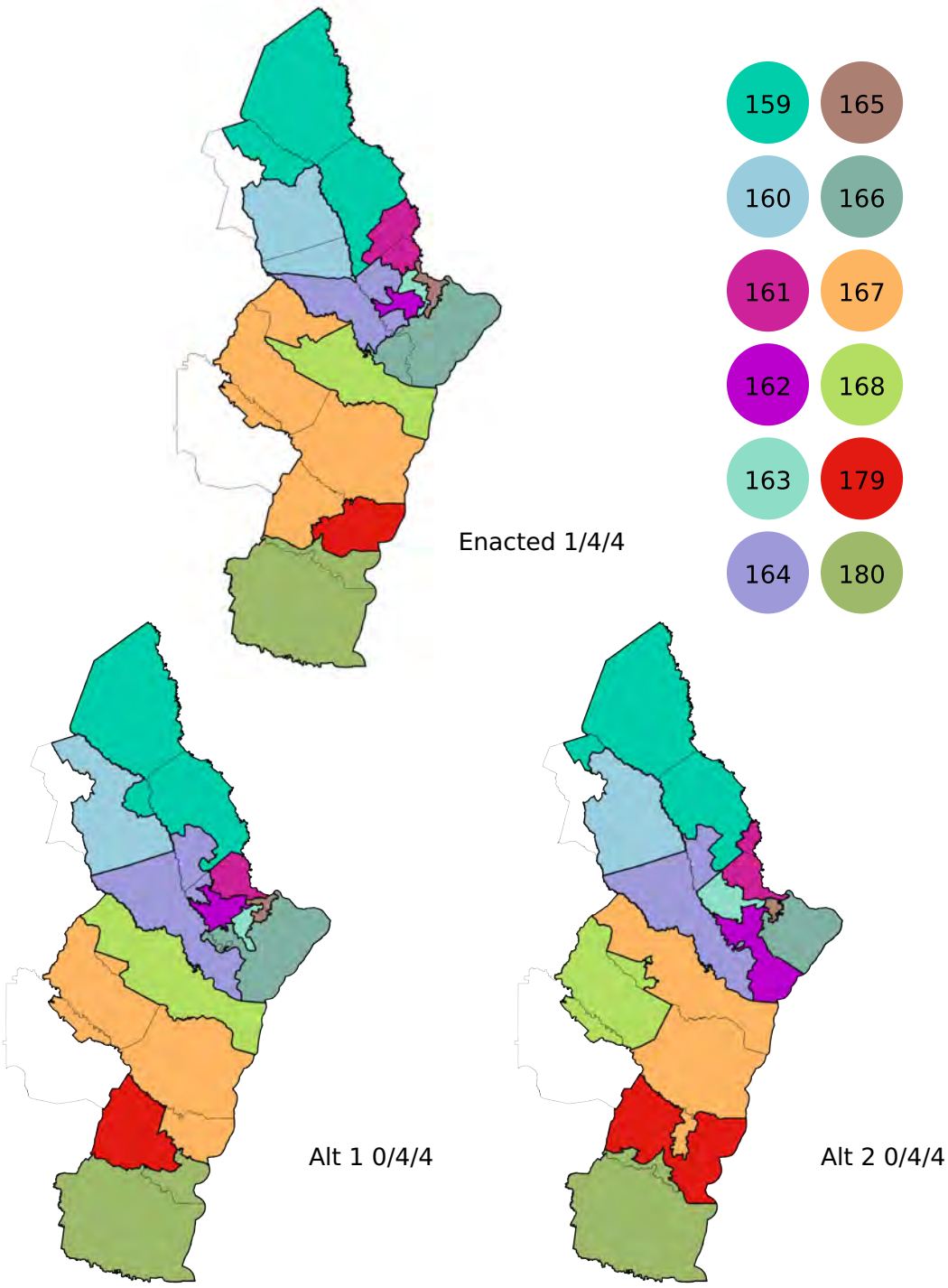


Figure 15: HD Southeast (12 districts).

	HD Southeast Enacted						**HD Alt 1**					
HD	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock
159	24.5%	2.9%	27.4%	69.4%	0.219	0.345	22.2%	3.7%	25.9%	70.5%	0.204	0.358
160	22.6%	5.0%	27.6%	68.5%	0.369	0.483	26.6%	5.1%	31.7%	64.7%	0.242	0.373
161	27.1%	6.8%	33.9%	60.2%	0.306	0.511	42.1%	8.8%	50.9%	42.7%	0.359	0.475
162	43.7%	9.6%	53.3%	40.6%	0.211	0.366	39.9%	10.5%	50.4%	42.6%	0.147	0.372
163	45.5%	7.4%	52.9%	41.9%	0.175	0.271	44.0%	6.9%	50.9%	43.7%	0.244	0.335
164	23.5%	8.5%	32.0%	60.6%	0.167	0.299	12.9%	5.1%	18.0%	76.5%	0.143	0.309
165	50.3%	5.3%	55.6%	39.2%	0.162	0.230	47.3%	4.7%	52.0%	42.9%	0.189	0.380
166	5.7%	4.1%	9.8%	84.7%	0.364	0.429	7.2%	4.7%	11.9%	82.4%	0.245	0.459
167	22.3%	7.4%	29.7%	66.0%	0.192	0.417	20.0%	6.2%	26.2%	70.1%	0.266	0.327
168	46.3%	10.3%	56.6%	39.3%	0.258	0.243	45.9%	10.7%	56.6%	39.2%	0.236	0.246
179	27.0%	6.4%	33.4%	63.7%	0.417	0.451	32.0%	7.5%	39.5%	56.9%	0.433	0.539
180	18.2%	5.6%	23.8%	71.2%	0.396	0.606	17.0%	5.4%	22.4%	72.8%	0.348	0.594
Avg					0.270	0.388					0.255	0.397

Table 22: HD Southeast Alt 1 has fewer county splits (5 vs. 6) and a better cut edges score (1122 vs. 1245) than the enacted plan.

	HD Southeast Enacted						**HD Alt 2**					
HD	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock
159	24.5%	2.9%	27.4%	69.4%	0.219	0.345	22.0%	3.6%	25.6%	70.7%	0.192	0.356
160	22.6%	5.0%	27.6%	68.5%	0.369	0.483	26.3%	5.1%	31.4%	64.9%	0.333	0.515
161	27.1%	6.8%	33.9%	60.2%	0.306	0.511	41.6%	10.0%	51.6%	42.2%	0.180	0.332
162	43.7%	9.6%	53.3%	40.6%	0.211	0.366	43.0%	8.5%	51.5%	42.5%	0.191	0.341
163	45.5%	7.4%	52.9%	41.9%	0.175	0.271	42.7%	7.7%	50.4%	43.1%	0.282	0.411
164	23.5%	8.5%	32.0%	60.6%	0.167	0.299	13.4%	5.5%	18.9%	75.6%	0.168	0.290
165	50.3%	5.3%	55.6%	39.2%	0.162	0.230	45.5%	5.0%	50.5%	44.4%	0.229	0.501
166	5.7%	4.1%	9.8%	84.7%	0.364	0.429	7.2%	4.1%	11.3%	83.0%	0.391	0.653
167	22.3%	7.4%	29.7%	66.0%	0.192	0.417	36.5%	7.4%	43.9%	52.5%	0.204	0.331
168	46.3%	10.3%	56.6%	39.3%	0.258	0.243	40.9%	10.8%	51.7%	44.3%	0.327	0.555
179	27.0%	6.4%	33.4%	63.7%	0.417	0.451	18.7%	6.0%	24.7%	71.6%	0.196	0.454
180	18.2%	5.6%	23.8%	71.2%	0.396	0.606	18.6%	5.7%	24.3%	70.7%	0.346	0.577
Avg					0.270	0.388					0.253	0.443

Table 23: Alt 2 also has just 5 county splits, to go with 1263 cut edges.

8 Secondary population estimates for coalition districts

Above, in §3.2, I described my construction of an estimated citizen voting age population for the state of Georgia. In this section, I confirm that nearly all of the majority-BHVAP districts in my alternative plans are still majority districts by BHCVAP.

	CD enacted	
CD	BH VAP	BH CVAP
1	34.5%	33.4%
2	54.0%	53.5%
3	28.3%	27.2%
4	63.9%	63.3%
5	55.6%	55.8%
6	18.7%	16.6%
7	50.2%	46.6%
8	35.8%	34.5%
9	23.0%	18.2%
10	28.8%	27.2%
11	28.7%	25.1%
12	41.2%	40.7%
13	76.3%	76.0%
14	24.6%	20.5%

	CD Alt	
CD	BH VAP	BH CVAP
1	36.6%	35.6%
2	51.8%	51.6%
3	57.7%	57.1%
4	58.0%	57.7%
5	60.6%	59.8%
6	24.0%	21.6%
7	55.5%	52.4%
8	33.8%	32.0%
9	15.9%	11.0%
10	24.2%	22.5%
11	24.7%	22.6%
12	43.2%	43.1%
13	57.9%	57.0%
14	18.3%	13.9%

Table 24: The enacted Congressional plan has 5 majority-BHVAP districts, but only four majority districts by BHCVAP. My alternative Congressional plan has 6 majority-BH districts by both either basis of population.

Next, I will present the statistics for the Alt Eff 1 and Alt Eff 2 plans in Senate and House, which use the Alt 1 and Alt 2 Gingles demonstrative plans above and add more modular effectiveness-boosting changes.

	SD enacted	
SD	BH VAP	BH CVAP
1	31.9%	31.2%
2	53.8%	54.0%
3	27.1%	24.8%
4	28.6%	27.1%
5	70.4%	65.7%
6	31.5%	30.3%
7	37.2%	34.7%
8	36.3%	35.4%
9	47.4%	44.4%
10	75.7%	75.8%
11	38.4%	36.2%
12	61.2%	60.7%
13	32.8%	31.2%
14	30.5%	26.8%
15	59.8%	59.8%
16	27.5%	26.7%
17	36.6%	35.4%
18	34.6%	33.8%
19	33.7%	31.2%
20	34.5%	34.2%
21	16.0%	13.5%
22	61.2%	61.3%
23	39.6%	39.0%
24	24.0%	23.4%
25	36.8%	36.3%
26	60.8%	60.6%
27	15.0%	11.6%
28	25.6%	24.3%
29	31.0%	30.8%
30	26.6%	24.8%
31	27.7%	25.4%
32	24.9%	21.8%
33	65.1%	61.5%
34	81.2%	80.9%
35	78.5%	78.3%
36	57.7%	57.6%
37	27.5%	24.7%
38	72.9%	73.3%
39	65.6%	67.1%
40	40.2%	33.0%
41	68.5%	69.1%
42	38.9%	37.4%
43	70.5%	69.8%
44	79.0%	79.3%
45	31.1%	28.7%
46	23.6%	22.0%
47	26.8%	24.0%
48	16.1%	16.1%
49	29.6%	20.2%
50	14.3%	10.5%
51	5.5%	3.9%
52	21.1%	18.1%
53	8.2%	6.7%
54	26.2%	16.7%
55	73.6%	73.2%
56	15.0%	13.2%

	SD Alt Eff 1	
SD	BH VAP	BH CVAP
1	31.8%	31.2%
2	53.7%	54.0%
3	26.9%	24.8%
4	28.6%	27.2%
5	53.9%	45.2%
6	55.5%	55.4%
7	30.6%	28.6%
8	36.2%	35.4%
9	55.1%	51.6%
10	69.4%	68.9%
11	38.4%	36.2%
12	61.1%	60.7%
13	32.8%	31.2%
14	28.8%	26.0%
15	59.7%	59.8%
16	55.6%	54.6%
17	56.8%	56.4%
18	34.5%	33.8%
19	33.6%	31.2%
20	39.1%	38.4%
21	15.9%	13.5%
22	53.6%	53.8%
23	28.0%	27.7%
24	28.3%	27.5%
25	53.5%	53.5%
26	53.4%	53.5%
27	14.7%	11.4%
28	56.7%	56.1%
29	31.0%	30.8%
30	19.2%	17.3%
31	26.4%	24.3%
32	24.8%	21.8%
33	67.5%	65.0%
34	82.6%	83.2%
35	58.0%	56.8%
36	54.9%	55.3%
37	27.4%	24.7%
38	42.4%	40.2%
39	55.9%	56.1%
40	66.6%	64.4%
41	66.4%	66.3%
42	44.6%	44.3%
43	58.2%	57.2%
44	64.5%	65.2%
45	31.3%	28.8%
46	21.2%	19.8%
47	25.2%	23.0%
48	16.1%	15.4%
49	32.4%	22.2%
50	11.4%	8.9%
51	5.5%	3.9%
52	21.1%	18.1%
53	8.2%	6.7%
54	26.2%	16.7%
55	62.6%	60.9%
56	14.9%	13.2%

	SD Alt Eff 2	
SD	BH VAP	BH CVAP
1	31.8%	31.2%
2	53.7%	54.0%
3	26.9%	24.8%
4	28.5%	27.1%
5	58.6%	52.2%
6	42.0%	39.8%
7	46.2%	43.2%
8	36.2%	35.4%
9	53.1%	50.5%
10	68.5%	68.5%
11	38.4%	36.2%
12	61.1%	60.7%
13	32.8%	31.2%
14	26.5%	24.6%
15	59.7%	59.8%
16	53.7%	52.7%
17	51.2%	50.3%
18	34.5%	33.8%
19	33.6%	31.2%
20	37.0%	36.4%
21	15.9%	13.5%
22	53.3%	53.5%
23	51.1%	51.2%
24	28.1%	27.8%
25	32.4%	31.4%
26	53.9%	53.9%
27	15.0%	11.6%
28	21.6%	20.3%
29	31.0%	30.8%
30	22.0%	19.4%
31	32.0%	30.3%
32	24.8%	21.8%
33	67.7%	65.4%
34	65.4%	64.4%
35	67.4%	66.8%
36	59.9%	60.5%
37	27.4%	24.7%
38	55.8%	56.4%
39	90.9%	91.5%
40	44.9%	35.6%
41	69.8%	70.6%
42	27.0%	23.7%
43	61.0%	60.3%
44	78.6%	79.0%
45	27.2%	24.9%
46	21.2%	19.5%
47	27.2%	24.7%
48	19.3%	17.7%
49	30.7%	20.6%
50	12.6%	10.3%
51	5.5%	3.9%
52	21.1%	18.1%
53	8.2%	6.7%
54	26.2%	16.7%
55	64.9%	64.7%
56	14.9%	13.2%

Table 25: The enacted Senate plan has 17 coalition districts, whether by VAP or CVAP. Both alternative plans add numerous districts, finding additional majority districts in several areas of the state.

	HD enacted	
HD	BH VAP	BH CVAP
1	6.2%	5.7%
2	10.6%	7.4%
3	6.2%	4.7%
4	49.2%	34.8%
5	17.0%	11.1%
6	13.4%	7.8%
7	6.1%	3.7%
8	4.1%	2.9%
9	6.2%	4.9%
10	13.6%	9.2%
11	6.0%	4.8%
12	15.7%	12.6%
13	29.8%	25.8%
14	12.6%	10.4%
15	23.6%	21.3%
16	20.1%	16.7%
17	29.4%	27.4%
18	10.3%	9.4%
19	30.4%	28.8%
20	18.1%	14.5%
21	12.3%	10.0%
22	26.2%	22.6%
23	20.5%	14.1%
24	17.1%	14.1%
25	10.8%	11.0%
26	14.6%	11.0%
27	13.2%	9.5%
28	15.2%	10.6%
29	52.9%	37.6%
30	24.0%	18.9%
31	26.3%	19.6%
32	12.7%	10.7%
33	14.3%	13.4%
34	23.2%	20.2%
35	38.7%	34.8%
36	23.1%	21.6%
37	46.1%	41.2%
38	65.9%	64.0%
39	73.2%	70.6%
40	38.1%	38.6%
41	67.2%	63.0%
42	50.2%	47.9%
43	39.9%	38.6%
44	22.1%	20.2%
45	9.9%	9.1%
46	15.1%	14.0%
47	17.8%	18.2%
48	23.8%	20.0%
49	14.8%	13.5%
50	18.3%	18.4%
51	36.4%	30.0%
52	23.0%	24.5%
53	21.5%	19.6%
54	27.7%	23.8%
55	59.7%	60.2%
56	50.7%	53.6%
57	25.6%	23.8%
58	67.5%	67.9%
59	73.8%	73.9%
60	68.3%	68.1%

	HD Alt Eff 1	
HD	BH VAP	BH CVAP
1	6.2%	5.7%
2	10.6%	7.4%
3	6.2%	4.7%
4	49.2%	34.8%
5	17.0%	11.1%
6	13.4%	7.8%
7	6.1%	3.7%
8	4.1%	2.9%
9	6.2%	4.9%
10	13.6%	9.2%
11	6.0%	4.8%
12	15.7%	12.6%
13	29.8%	25.8%
14	12.6%	10.4%
15	23.5%	21.3%
16	20.0%	16.7%
17	29.3%	27.4%
18	10.2%	9.4%
19	30.2%	28.8%
20	14.4%	11.7%
21	12.3%	10.1%
22	34.4%	31.3%
23	20.4%	14.1%
24	12.9%	10.8%
25	11.5%	11.8%
26	14.2%	11.6%
27	13.2%	9.5%
28	15.2%	10.6%
29	54.8%	39.4%
30	21.8%	16.7%
31	26.2%	19.6%
32	12.7%	10.7%
33	22.4%	21.7%
34	19.5%	17.2%
35	31.9%	29.3%
36	26.5%	24.8%
37	52.9%	47.2%
38	51.9%	50.3%
39	61.7%	58.8%
40	50.7%	50.5%
41	52.5%	50.3%
42	54.9%	50.5%
43	51.0%	51.1%
44	27.5%	22.5%
45	12.7%	11.5%
46	14.0%	13.0%
47	23.0%	23.9%
48	17.9%	16.2%
49	11.3%	10.1%
50	19.2%	19.3%
51	43.3%	36.2%
52	19.5%	19.2%
53	26.3%	22.5%
54	23.0%	20.8%
55	56.0%	58.6%
56	50.7%	52.4%
57	25.2%	23.8%
58	57.2%	57.6%
59	93.5%	93.5%
60	64.5%	64.6%

	HD Alt Eff 2	
HD	BH VAP	BH CVAP
1	6.2%	5.7%
2	10.6%	7.4%
3	6.2%	4.7%
4	49.2%	34.8%
5	17.0%	11.1%
6	13.4%	7.8%
7	6.1%	3.7%
8	4.1%	2.9%
9	6.2%	4.9%
10	13.6%	9.2%
11	6.0%	4.8%
12	15.7%	12.6%
13	29.8%	25.8%
14	12.6%	10.4%
15	23.5%	21.3%
16	20.0%	16.7%
17	29.3%	27.4%
18	10.2%	9.4%
19	30.2%	28.8%
20	15.3%	11.6%
21	12.3%	10.1%
22	36.0%	32.4%
23	20.4%	14.1%
24	14.8%	12.6%
25	10.6%	10.6%
26	14.1%	11.6%
27	13.2%	9.5%
28	15.2%	10.6%
29	52.8%	37.6%
30	22.4%	17.0%
31	26.2%	19.6%
32	12.7%	10.7%
33	21.7%	21.1%
34	16.7%	14.9%
35	34.1%	30.8%
36	23.3%	19.5%
37	56.2%	50.6%
38	53.4%	51.3%
39	60.7%	58.3%
40	51.0%	50.8%
41	52.6%	50.6%
42	54.6%	50.3%
43	51.7%	50.7%
44	25.1%	24.5%
45	10.5%	10.0%
46	13.8%	13.2%
47	22.9%	23.6%
48	18.9%	16.8%
49	11.3%	10.1%
50	18.4%	18.2%
51	40.6%	34.0%
52	20.7%	21.0%
53	27.8%	23.5%
54	20.6%	18.5%
55	95.7%	95.9%
56	50.5%	52.6%
57	26.1%	25.0%
58	52.6%	54.3%
59	64.4%	64.8%
60	55.7%	55.7%

	HD enacted	
HD	BH VAP	BH CVAP
61	81.0%	80.4%
62	78.2%	78.3%
63	77.8%	77.3%
64	37.6%	36.2%
65	65.7%	65.8%
66	62.0%	60.6%
67	66.1%	65.3%
68	61.4%	61.5%
69	68.2%	68.2%
70	35.4%	33.4%
71	25.8%	23.6%
72	27.4%	24.9%
73	18.8%	17.9%
74	30.6%	29.2%
75	84.5%	84.9%
76	79.6%	80.9%
77	87.3%	87.4%
78	79.4%	79.2%
79	86.5%	86.7%
80	36.6%	28.0%
81	42.1%	34.5%
82	23.2%	22.2%
83	43.0%	28.0%
84	75.7%	76.6%
85	67.9%	71.9%
86	78.5%	80.9%
87	78.8%	79.0%
88	72.5%	73.5%
89	65.3%	65.6%
90	62.2%	62.2%
91	75.0%	74.7%
92	72.7%	72.4%
93	74.1%	73.2%
94	75.3%	75.8%
95	74.0%	73.5%
96	58.1%	52.9%
97	45.0%	42.0%
98	74.8%	68.4%
99	22.9%	23.0%
100	19.6%	18.1%
101	41.6%	39.4%
102	57.8%	53.8%
103	33.0%	29.2%
104	27.8%	25.3%
105	44.9%	42.5%
106	46.7%	45.3%
107	59.6%	55.6%
108	35.9%	30.2%
109	67.4%	64.6%
110	56.7%	55.0%
111	30.6%	28.2%
112	22.3%	21.9%
113	65.5%	64.6%
114	28.1%	26.8%
115	58.2%	57.0%
116	64.4%	64.2%
117	41.5%	40.7%
118	27.1%	26.0%
119	23.6%	21.0%
120	21.2%	19.3%

	HD Alt Eff 1	
HD	BH VAP	BH CVAP
61	59.3%	57.1%
62	88.0%	88.6%
63	65.4%	64.8%
64	56.6%	55.9%
65	85.5%	86.8%
66	58.9%	58.1%
67	94.2%	94.5%
68	19.9%	19.2%
69	59.7%	58.8%
70	35.3%	33.4%
71	25.7%	23.6%
72	27.4%	24.9%
73	17.9%	17.0%
74	56.7%	55.1%
75	60.9%	60.2%
76	80.5%	80.4%
77	93.4%	94.0%
78	74.3%	75.6%
79	86.6%	87.1%
80	60.6%	50.4%
81	51.6%	40.1%
82	16.9%	15.9%
83	22.6%	21.7%
84	80.0%	80.5%
85	58.2%	60.3%
86	94.3%	94.4%
87	63.3%	64.8%
88	68.1%	67.6%
89	68.8%	69.6%
90	62.0%	62.2%
91	54.9%	54.1%
92	90.1%	90.5%
93	71.4%	70.4%
94	85.0%	85.2%
95	56.4%	55.6%
96	52.2%	50.1%
97	58.5%	50.7%
98	68.8%	63.7%
99	24.5%	24.6%
100	20.5%	18.6%
101	37.4%	35.3%
102	54.7%	52.1%
103	30.0%	26.3%
104	26.7%	24.2%
105	52.8%	50.2%
106	57.5%	53.1%
107	54.4%	50.2%
108	53.5%	51.3%
109	56.0%	51.2%
110	52.6%	50.9%
111	31.2%	29.5%
112	22.3%	21.9%
113	55.3%	54.3%
114	36.7%	35.4%
115	55.2%	54.9%
116	61.8%	61.6%
117	57.2%	56.6%
118	26.1%	25.2%
119	23.5%	21.0%
120	21.1%	19.3%

	HD Alt Eff 2	
HD	BH VAP	BH CVAP
61	56.7%	54.2%
62	87.5%	88.1%
63	70.8%	70.5%
64	56.5%	55.8%
65	70.9%	71.4%
66	59.2%	58.2%
67	94.6%	95.0%
68	64.3%	64.4%
69	59.9%	59.6%
70	35.3%	33.4%
71	25.7%	23.6%
72	27.4%	24.9%
73	18.6%	17.6%
74	18.1%	17.0%
75	72.3%	73.0%
76	82.6%	83.5%
77	88.2%	88.6%
78	75.6%	75.0%
79	87.2%	87.6%
80	58.5%	50.1%
81	51.1%	36.6%
82	18.4%	17.6%
83	25.4%	23.5%
84	78.2%	79.2%
85	71.3%	75.0%
86	64.5%	65.9%
87	92.8%	93.2%
88	59.8%	57.8%
89	67.7%	68.8%
90	62.0%	62.2%
91	57.4%	56.7%
92	75.4%	74.9%
93	91.6%	92.0%
94	84.8%	85.0%
95	58.0%	57.3%
96	54.0%	50.0%
97	53.5%	47.3%
98	68.8%	63.7%
99	26.3%	26.2%
100	27.9%	26.4%
101	54.7%	50.4%
102	53.0%	50.6%
103	24.4%	19.5%
104	30.3%	28.2%
105	42.3%	41.4%
106	51.8%	50.7%
107	54.3%	50.4%
108	56.2%	50.4%
109	55.1%	50.4%
110	51.8%	50.4%
111	22.9%	20.4%
112	22.3%	21.9%
113	58.7%	58.1%
114	28.3%	27.0%
115	56.1%	55.6%
116	60.0%	59.8%
117	55.6%	55.2%
118	30.9%	29.9%
119	23.5%	21.0%
120	21.1%	19.3%

	HD enacted	
HD	BH VAP	BH CVAP
121	15.0%	13.8%
122	39.9%	36.6%
123	28.4%	27.9%
124	31.6%	29.3%
125	30.6%	29.6%
126	57.2%	57.2%
127	22.9%	22.1%
128	51.9%	51.9%
129	58.5%	58.9%
130	63.2%	63.1%
131	23.0%	23.1%
132	59.5%	59.5%
133	38.7%	38.7%
134	37.1%	36.5%
135	25.4%	24.9%
136	32.2%	32.0%
137	55.9%	56.1%
138	22.4%	21.9%
139	26.2%	25.8%
140	64.8%	64.9%
141	63.1%	63.6%
142	62.6%	62.4%
143	65.1%	65.0%
144	31.7%	31.6%
145	41.2%	40.3%
146	32.0%	32.0%
147	36.9%	36.1%
148	36.9%	36.3%
149	37.1%	34.2%
150	59.5%	58.7%
151	49.4%	47.5%
152	28.3%	27.9%
153	70.2%	70.2%
154	56.2%	56.1%
155	37.9%	37.8%
156	37.0%	35.1%
157	33.4%	30.9%
158	35.5%	34.3%
159	27.2%	26.8%
160	27.3%	25.4%
161	33.4%	32.2%
162	52.6%	52.6%
163	52.5%	52.5%
164	31.4%	30.4%
165	55.2%	55.7%
166	9.6%	8.4%
167	29.2%	28.2%
168	55.2%	55.3%
169	36.5%	34.9%
170	32.7%	30.2%
171	44.0%	42.8%
172	36.6%	32.3%
173	41.4%	39.6%
174	25.2%	21.3%
175	29.0%	28.5%
176	30.7%	28.2%
177	59.4%	59.4%
178	19.7%	18.2%
179	33.1%	30.8%
180	23.5%	22.1%

	HD Alt Eff 1	
HD	BH VAP	BH CVAP
121	14.9%	13.8%
122	39.8%	36.6%
123	19.0%	17.0%
124	32.9%	31.6%
125	31.2%	29.9%
126	55.5%	55.6%
127	19.1%	19.2%
128	51.5%	51.6%
129	54.7%	55.2%
130	58.0%	58.0%
131	31.5%	31.5%
132	60.8%	61.1%
133	50.4%	50.5%
134	37.0%	36.5%
135	25.4%	24.9%
136	32.1%	32.0%
137	54.9%	55.1%
138	22.4%	21.9%
139	26.1%	25.8%
140	64.0%	64.5%
141	59.1%	59.4%
142	53.9%	53.9%
143	58.2%	57.6%
144	54.2%	54.4%
145	25.6%	25.2%
146	27.8%	27.5%
147	38.4%	37.8%
148	41.7%	41.1%
149	37.0%	34.2%
150	56.2%	55.6%
151	58.0%	56.9%
152	37.1%	36.6%
153	55.3%	54.9%
154	51.9%	51.7%
155	37.8%	37.8%
156	36.9%	35.1%
157	33.4%	30.9%
158	35.4%	34.3%
159	25.6%	24.9%
160	31.2%	29.6%
161	50.1%	50.0%
162	49.7%	49.6%
163	50.3%	50.1%
164	17.6%	16.8%
165	51.5%	52.5%
166	11.6%	10.5%
167	25.6%	25.1%
168	55.0%	55.2%
169	32.9%	30.3%
170	39.1%	35.7%
171	54.8%	54.1%
172	34.3%	31.4%
173	40.7%	38.8%
174	24.7%	21.3%
175	26.3%	25.8%
176	29.8%	28.3%
177	59.4%	59.4%
178	19.7%	18.2%
179	39.0%	36.8%
180	22.0%	20.6%

	HD Alt Eff 2	
HD	BH VAP	BH CVAP
121	14.9%	13.8%
122	39.8%	36.6%
123	19.5%	17.6%
124	29.1%	27.9%
125	35.6%	35.0%
126	54.4%	54.4%
127	23.2%	22.5%
128	51.5%	51.6%
129	53.2%	53.7%
130	61.1%	61.0%
131	22.7%	22.7%
132	60.6%	61.1%
133	48.4%	48.4%
134	37.0%	36.5%
135	25.4%	24.9%
136	32.1%	32.0%
137	51.4%	51.5%
138	22.4%	21.9%
139	26.1%	25.8%
140	70.8%	71.4%
141	55.0%	55.3%
142	53.3%	53.4%
143	58.6%	58.0%
144	54.7%	54.9%
145	25.7%	25.2%
146	29.4%	29.2%
147	37.2%	36.5%
148	43.9%	43.2%
149	37.0%	34.2%
150	56.9%	56.3%
151	52.6%	51.2%
152	36.2%	35.7%
153	63.9%	63.9%
154	64.1%	63.7%
155	37.8%	37.8%
156	36.9%	35.1%
157	33.4%	30.9%
158	35.4%	34.3%
159	25.3%	24.6%
160	30.9%	29.3%
161	50.9%	50.0%
162	50.8%	50.6%
163	49.8%	50.5%
164	18.4%	17.7%
165	49.9%	50.7%
166	11.2%	10.0%
167	43.1%	42.5%
168	50.2%	50.1%
169	35.6%	34.2%
170	35.2%	33.4%
171	40.1%	37.7%
172	39.0%	35.8%
173	34.4%	33.1%
174	24.7%	21.3%
175	22.5%	21.7%
176	32.2%	29.6%
177	59.4%	59.4%
178	19.7%	18.2%
179	24.4%	22.3%
180	23.9%	22.5%

Table 26: Overall, the enacted House plan has 62 majority-BHVAP districts, dropping to 60 majority districts by BHCVAP. Both Gingles 1 demonstrative alternatives add to the count significantly.

9 Effectiveness-oriented demonstration plans

In §7 above, I presented a number of alternative plans as Gingles 1 demonstrative maps. Each of these plans increases the number of majority districts for the coalition of Black and Latino Georgians, while simultaneously ensuring that traditional districting principles are highly respected and that the new majority districts are likely to provide effective opportunity-to-elect.

In this section, I will offer an additional set of alternative plans—one new example per legislative cluster—that illustrate that my notion of effectiveness is capable of identifying opportunity districts short of the Gingles 1 demographic threshold of 50%+1. Indeed, the existence of crossover support for Black and Latino candidates of choice by Asian-American, White, and other voters is a certainty. The ease of finding alternative plans that draw on broader voting coalitions will bolster the racial gerrymandering discussion below in §10. That is, in the enacted plans, the state has not just avoided majority districts but has even conspicuously limited the number of districts providing effective opportunity-to-elect well below the level that is easily attainable from a race-neutral mapping process.

9.1 Congressional effectiveness

As a matter of mapmaking, it is extremely easy to improve on the very limited number of effective districts—just five—in the state's enacted plan (see Table 4). To do this involves relieving the packing and cracking from the enacted plan.

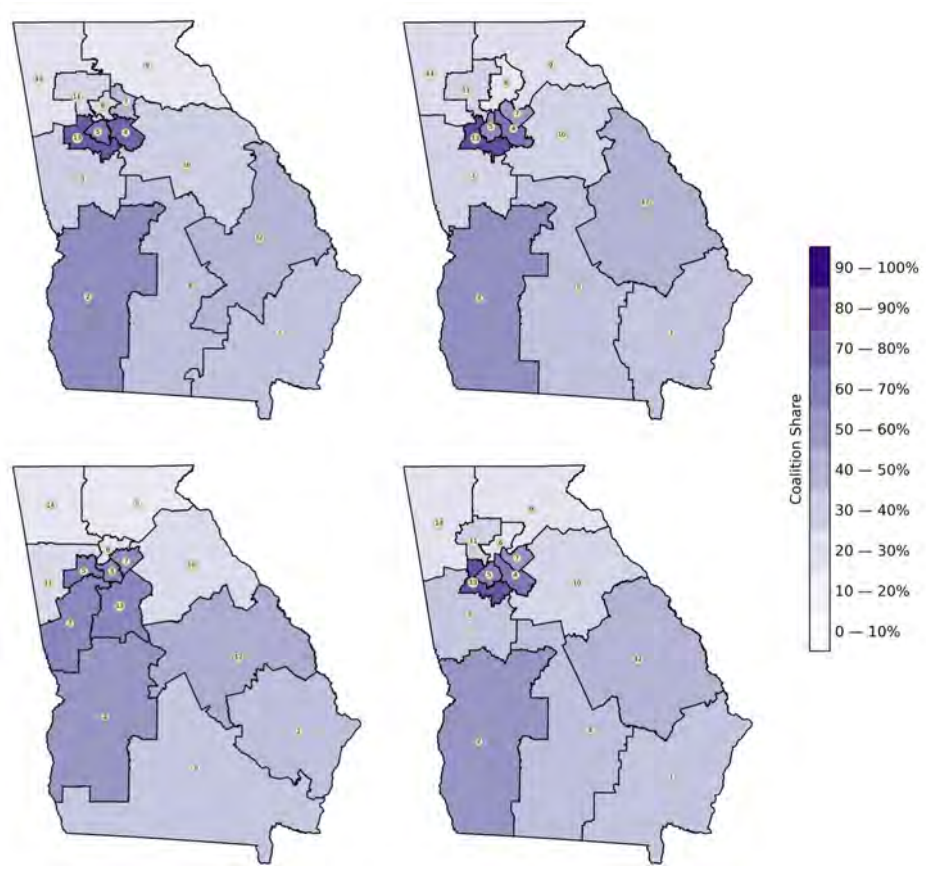


Figure 16: The benchmark plan (top left), the enacted plan (top right), and the Duncan-Kennedy plan (bottom right) all exhibit a pronounced pattern of packing and cracking relative to the alternative Congressional plan presented here (CD Alt, bottom left).

9.2 State Senate alternatives

The "Alt Eff 3" plans shown here are another set of effective alternatives; these cover the entire state, working modularly in the clusters from Atlanta, Gwinnett, Southwest, East Black Belt, Southeast, and Northwest Georgia.

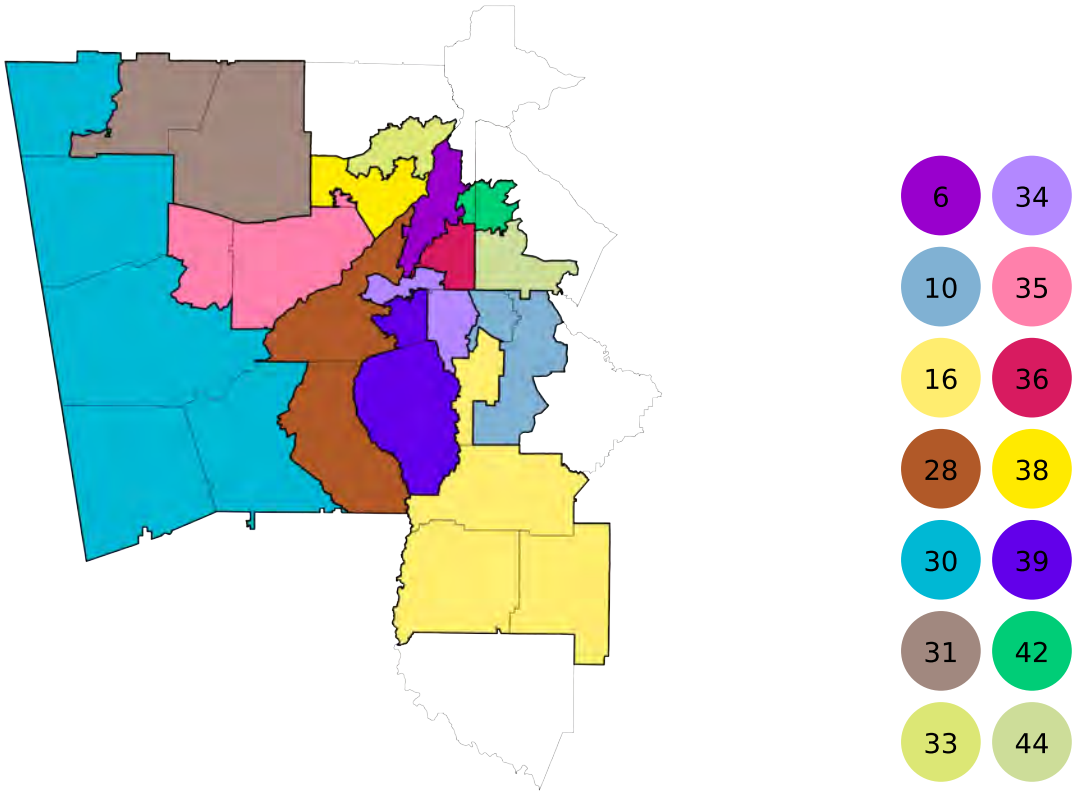


Figure 17: SD Atlanta alternative effective plan.

	SD Atlanta Enacted			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
6	23.9%	32.1%	0	8
10	71.5%	76.7%	4	8
16	22.7%	27.7%	3	0
28	19.5%	25.9%	2	0
30	20.9%	27.0%	2	0
31	20.7%	28.1%	3	0
33	43.0%	65.9%	4	8
34	69.5%	82.2%	4	8
35	71.9%	79.4%	4	8
36	51.3%	58.4%	3	8
38	65.3%	73.7%	4	8
39	60.7%	66.3%	3	8
42	30.8%	39.4%	0	8
44	71.3%	79.9%	4	8

	SD Atlanta Alt Eff 3			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
6	43.8%	50.3%	3	8
10	60.7%	70.3%	4	8
16	47.5%	53.4%	4	8
28	51.9%	57.5%	4	8
30	17.3%	24.2%	1	0
31	21.6%	27.6%	3	0
33	30.3%	50.2%	3	8
34	76.8%	88.7%	4	8
35	42.8%	51.4%	4	8
36	60.1%	66.4%	3	8
38	46.3%	59.2%	3	8
39	49.7%	55.6%	3	8
42	17.2%	27.3%	0	8
44	76.9%	80.1%	3	8

Table 27: SD Atlanta (14 districts).

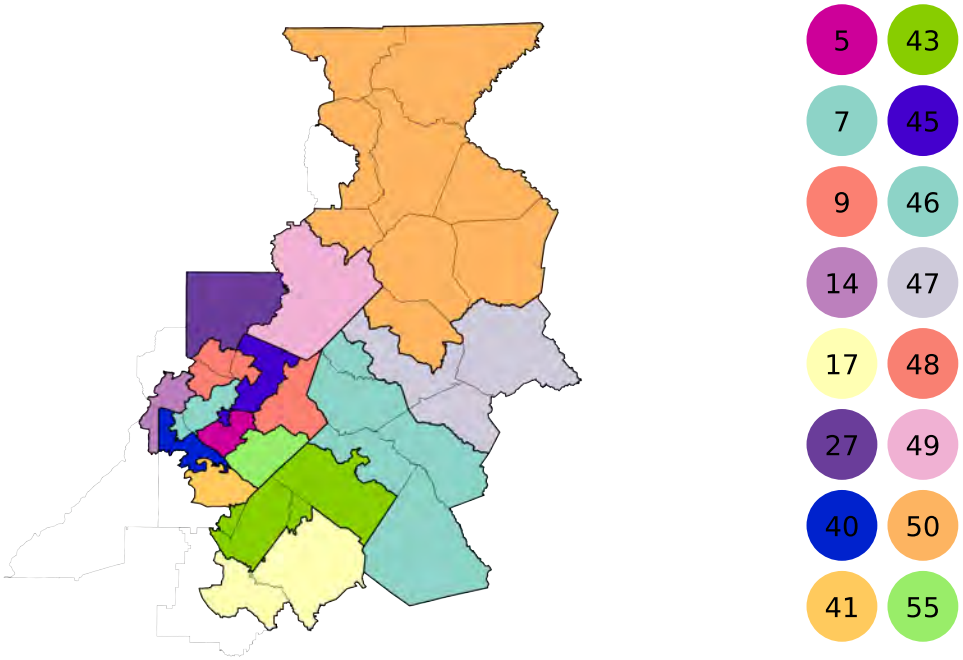


Figure 18: SD Gwinnett alternative effective plan.

	SD Gwinnett Enacted			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
5	29.9%	71.6%	3	8
7	21.4%	38.0%	3	8
9	29.5%	48.3%	3	8
14	19.0%	31.1%	0	8
17	32.0%	37.1%	3	0
27	5.0%	15.2%	0	0
40	19.2%	40.8%	0	8
41	62.6%	69.3%	3	8
43	64.3%	71.2%	4	8
45	18.6%	31.7%	3	0
46	16.9%	23.9%	1	0
47	17.4%	27.0%	3	0
48	9.5%	16.5%	1	0
49	8.0%	29.9%	1	0
50	5.6%	14.4%	1	0
55	66.0%	74.7%	4	8

	SD Gwinnett Alt Eff 3			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
5	25.2%	61.5%	3	8
7	20.2%	46.4%	3	8
9	32.1%	49.2%	3	6
14	19.0%	31.1%	0	8
17	46.9%	52.7%	4	7
27	4.7%	14.9%	0	0
40	25.6%	39.1%	0	8
41	84.8%	89.6%	4	8
43	45.4%	51.8%	4	7
45	22.4%	42.0%	3	5
46	12.0%	19.4%	1	0
47	18.8%	27.5%	2	7
48	9.9%	16.3%	2	0
49	8.2%	32.8%	1	0
50	5.3%	11.3%	1	0
55	44.0%	54.8%	4	8

Table 28: SD Gwinnett (16 districts).

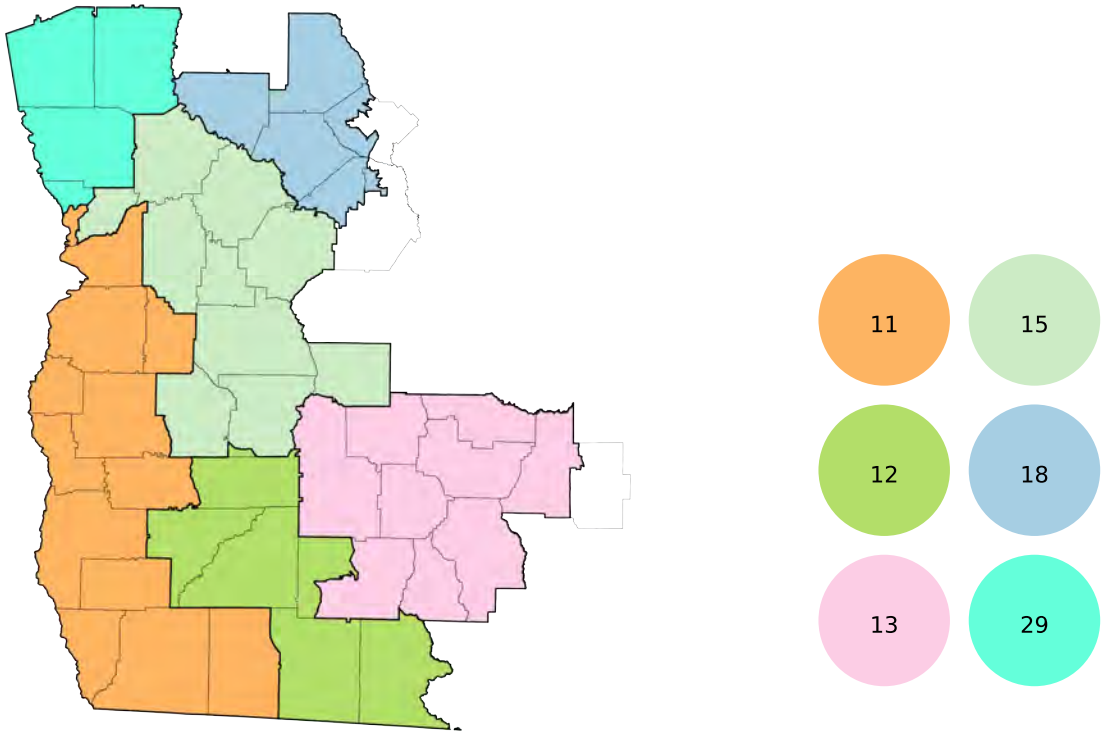


Figure 19: SD Southwest alternative effective plan.

	SD Southwest Enacted			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
11	31.0%	38.6%	4	0
12	58.0%	61.5%	4	8
13	27.0%	33.0%	4	0
15	54.0%	60.6%	4	8
18	30.4%	34.9%	3	0
29	26.9%	31.4%	3	0

	SD Alt Eff 3			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
11	44.0%	50.9%	4	6
12	50.1%	53.4%	4	7
13	25.6%	34.7%	4	0
15	50.4%	54.7%	4	8
18	30.4%	34.9%	3	0
29	27.3%	31.9%	3	0

Table 29: SD Southwest (6 districts).

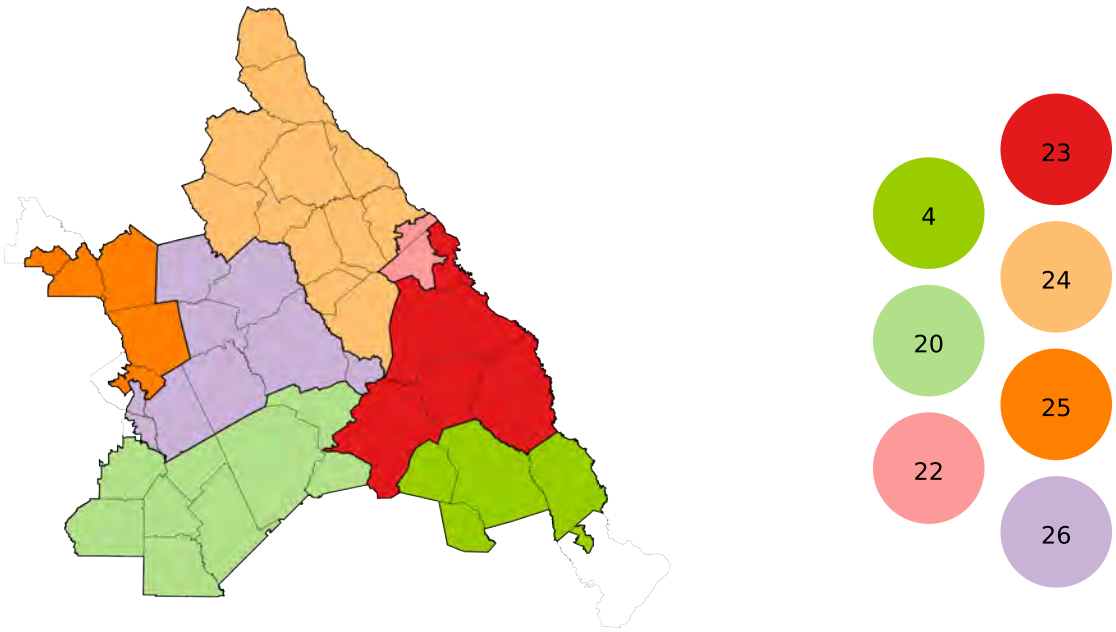


Figure 20: SD East Black Belt alternative effective plan.

	SD East Black Belt Enacted			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
4	23.4%	28.9%	3	0
20	31.3%	34.8%	3	0
22	56.5%	61.8%	4	8
23	35.5%	40.0%	3	0
24	19.9%	24.3%	3	0
25	33.5%	37.2%	3	0
26	57.0%	61.2%	3	8

	SD East Black Belt Alt Eff 3			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
4	23.4%	28.9%	3	0
20	32.0%	35.3%	3	0
22	39.1%	46.1%	4	8
23	46.1%	49.6%	3	7
24	26.5%	30.3%	3	0
25	45.7%	49.6%	3	8
26	44.0%	48.2%	3	5

Table 30: SD East Black Belt (7 districts).

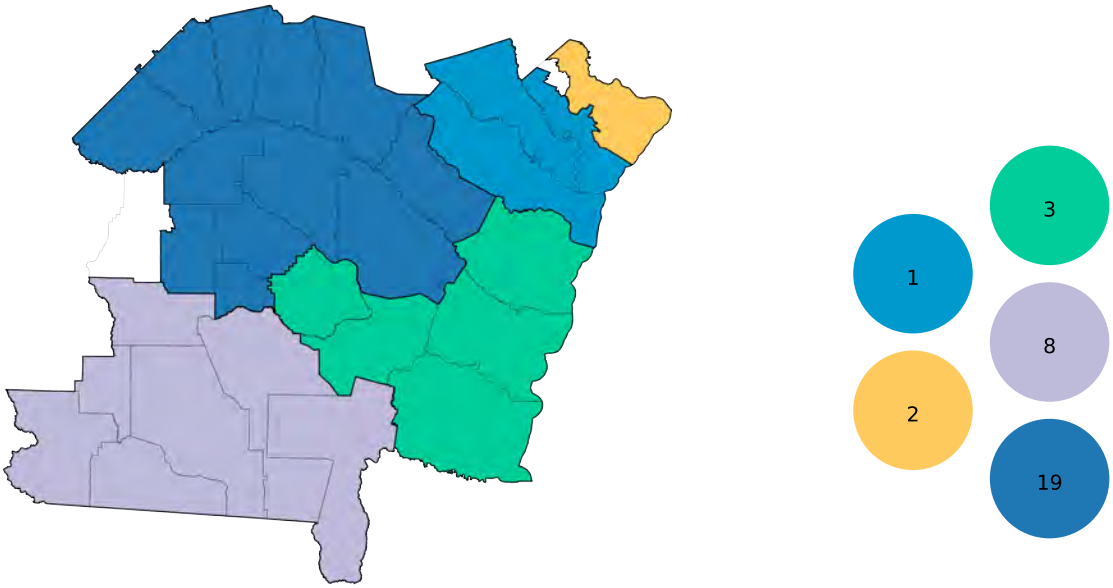


Figure 21: SD Southeast alternative effective plan.

	SD Southeast Enacted			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
1	25.1%	32.6%	3	0
2	46.9%	54.4%	4	8
3	21.2%	27.4%	3	0
8	30.4%	36.6%	4	0
19	25.7%	34.1%	4	0

	SD Southeast Alt Eff 3			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
1	34.8%	43.7%	4	6
2	37.4%	43.6%	3	8
3	19.1%	24.3%	3	0
8	32.5%	39.7%	4	0
19	25.5%	33.8%	4	0

Table 31: SD Southeast (5 districts).

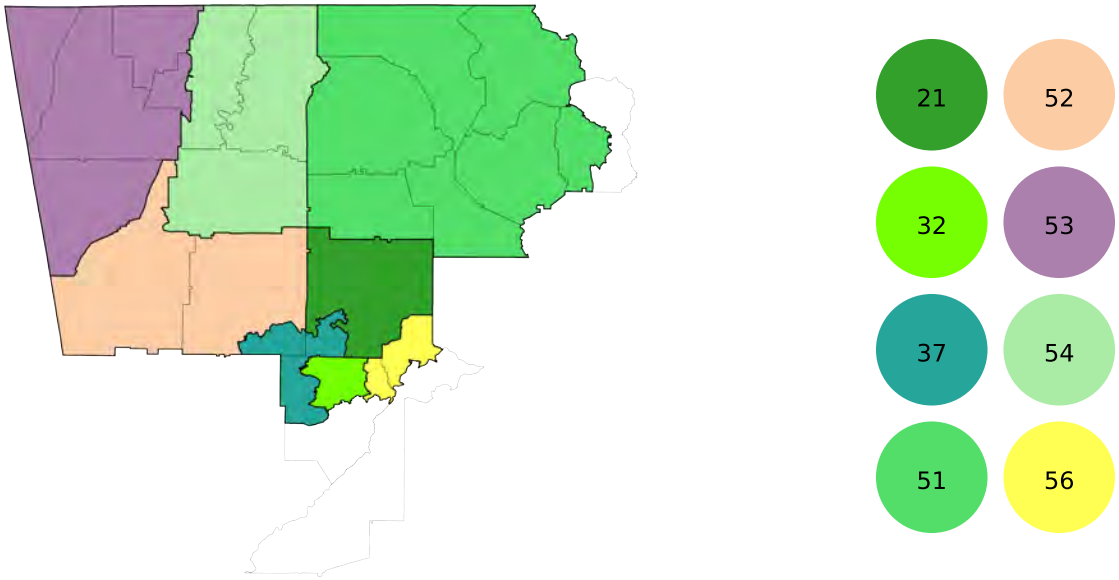


Figure 22: SD Northwest alternative plan that increases effectiveness by creating a competitive SD 32 that is well aligned with Black and Latino preferences in primary elections.

	SD Northwest Enacted			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
21	7.5%	16.3%	2	0
32	14.9%	25.4%	3	0
37	19.3%	28.0%	3	0
51	1.2%	5.5%	0	0
52	13.0%	21.2%	1	0
53	5.1%	8.3%	1	0
54	3.8%	26.4%	1	0
56	7.6%	15.3%	0	0

	SD Northwest Alt Eff 3			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
21	6.5%	16.5%	1	0
32	21.0%	31.2%	3	3
37	13.1%	22.1%	3	0
51	1.2%	5.5%	0	0
52	13.3%	22.0%	1	0
53	4.6%	7.5%	1	0
54	3.8%	26.6%	1	0
56	8.3%	14.6%	0	0

Table 32: SD Northwest (8 districts).

9.3 State House alternatives

The "Alt Eff" (alternative effective) districts in the House cover all of the regional clusters listed above: Atlanta, Cobb, DeKalb, Gwinnett, Southwest, East Black Belt, and Southeast Georgia.

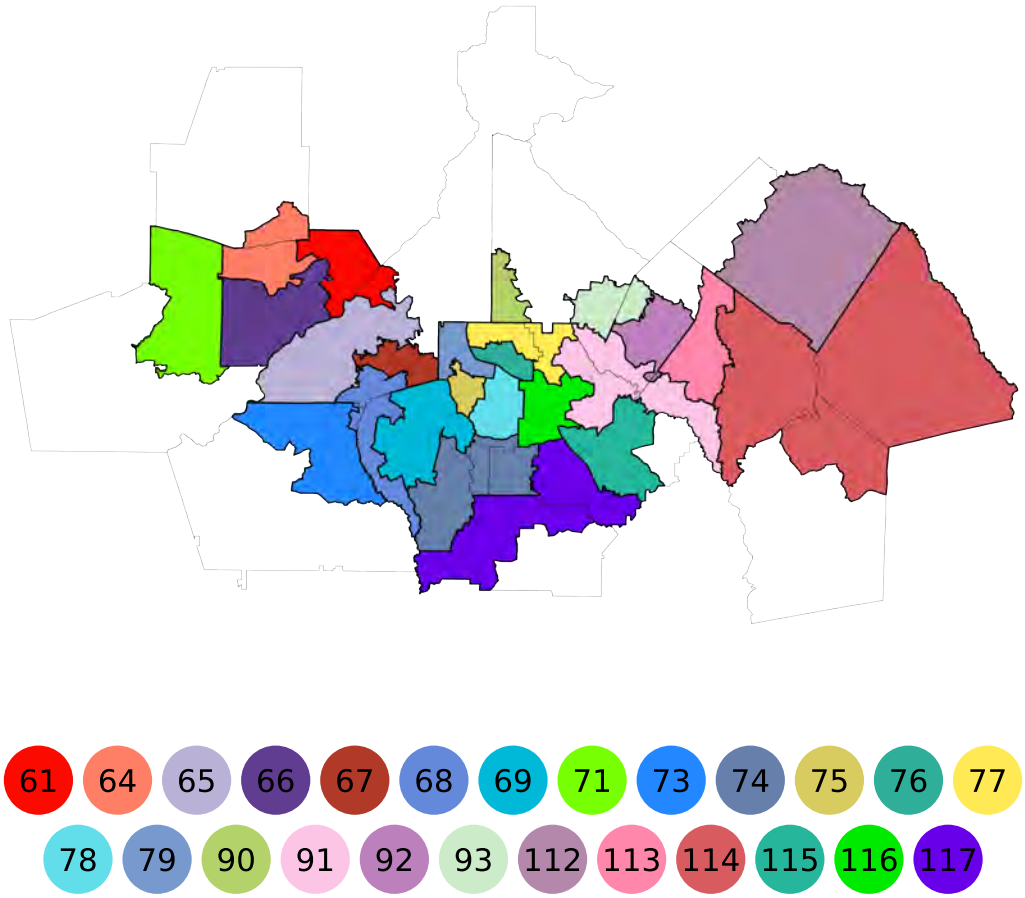


Figure 23: HD Atlanta Alt Eff 3 plan.

	HD Atlanta Enacted			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
61	74.3%	81.9%	4	8
64	30.7%	38.1%	3	0
65	62.0%	66.5%	4	8
66	53.4%	62.9%	4	8
67	58.9%	66.7%	4	8
68	55.7%	62.0%	4	8
69	63.6%	69.0%	4	8
71	19.9%	26.1%	3	0
73	12.1%	19.1%	2	0
74	25.5%	31.1%	3	0
75	74.4%	85.7%	4	8
76	67.2%	80.4%	4	8
77	76.1%	88.3%	4	8
78	71.6%	80.5%	4	8
79	71.6%	87.6%	4	8
90	58.5%	62.8%	2	8
91	70.0%	75.9%	4	8
92	68.8%	73.5%	4	8
93	65.4%	75.0%	4	8
112	19.2%	22.5%	1	0
113	59.5%	66.2%	4	8
114	24.7%	28.4%	3	0
115	52.1%	59.1%	4	8
116	58.1%	65.4%	4	8
117	36.6%	42.0%	3	0

	HD Atlanta Alt Eff 3			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
61	64.9%	74.5%	4	8
64	43.7%	52.4%	4	7
65	87.0%	90.2%	4	8
66	40.5%	48.1%	4	5
67	89.1%	94.7%	4	8
68	36.7%	44.4%	3	5
69	33.6%	40.3%	3	6
71	19.9%	26.1%	3	0
73	11.5%	17.9%	2	0
74	48.5%	54.7%	4	8
75	78.7%	90.0%	4	8
76	59.5%	76.4%	4	8
77	66.1%	80.0%	4	8
78	70.6%	79.9%	4	8
79	80.7%	91.3%	4	8
90	58.5%	62.8%	2	8
91	43.2%	48.3%	4	6
92	64.4%	71.2%	4	8
93	85.1%	92.0%	4	8
112	19.2%	22.5%	1	0
113	61.1%	66.9%	4	8
114	26.0%	30.0%	3	0
115	47.3%	53.9%	4	5
116	57.3%	65.3%	4	8
117	39.6%	45.8%	4	5

Table 33: HD Atlanta (25 districts).

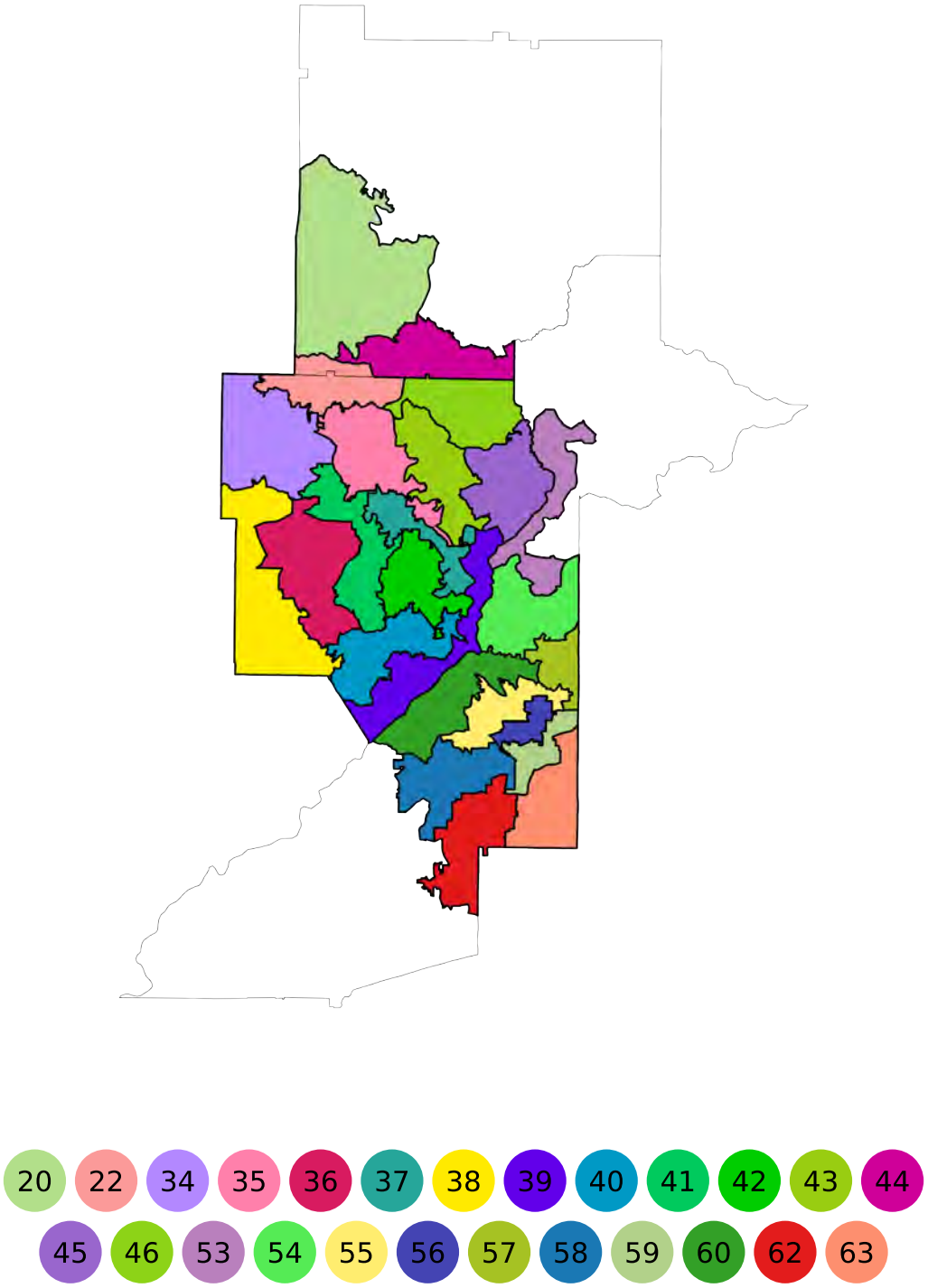


Figure 24: HD Cobb Alt Eff 3 plan.

	HD Cobb Enacted			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
20	9.3%	18.5%	1	0
22	15.1%	26.7%	3	0
34	15.7%	23.5%	3	0
35	28.4%	39.6%	3	8
36	17.0%	23.5%	3	0
37	28.2%	46.8%	3	8
38	54.2%	66.8%	4	8
39	55.3%	74.0%	4	8
40	33.0%	38.9%	3	8
41	39.4%	68.0%	4	8
42	33.7%	51.1%	3	8
43	26.5%	40.6%	3	8
44	12.0%	22.5%	2	0
45	5.3%	10.2%	0	0
46	8.1%	15.5%	0	0
53	14.5%	21.9%	0	1
54	15.5%	28.3%	0	7
55	55.4%	60.4%	3	8
56	45.5%	51.3%	3	8
57	18.1%	26.1%	0	8
58	63.0%	68.1%	3	8
59	70.1%	74.5%	3	8
60	63.9%	69.0%	3	8
62	72.3%	79.1%	3	8
63	69.3%	78.6%	3	8

	HD Cobb Alt Eff 3			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
20	6.9%	14.5%	1	0
22	22.9%	34.3%	3	5
34	15.5%	24.2%	3	0
35	31.2%	44.9%	3	8
36	38.9%	50.9%	3	8
37	33.7%	51.8%	3	8
38	41.9%	51.6%	3	8
39	45.5%	56.6%	3	8
40	39.9%	53.3%	3	8
41	32.3%	52.3%	3	8
42	28.4%	51.1%	3	8
43	16.2%	25.9%	3	5
44	11.2%	24.7%	1	0
45	5.0%	9.8%	0	0
46	9.2%	16.6%	0	0
53	17.5%	32.1%	0	7
54	12.4%	17.5%	0	1
55	50.6%	56.1%	3	8
56	44.2%	51.0%	3	8
57	18.9%	27.1%	0	8
58	93.1%	95.3%	4	8
59	51.2%	56.1%	3	8
60	57.0%	63.1%	3	8
62	81.5%	88.7%	3	8
63	61.6%	70.8%	3	8

Table 34: HD Cobb (25 districts).

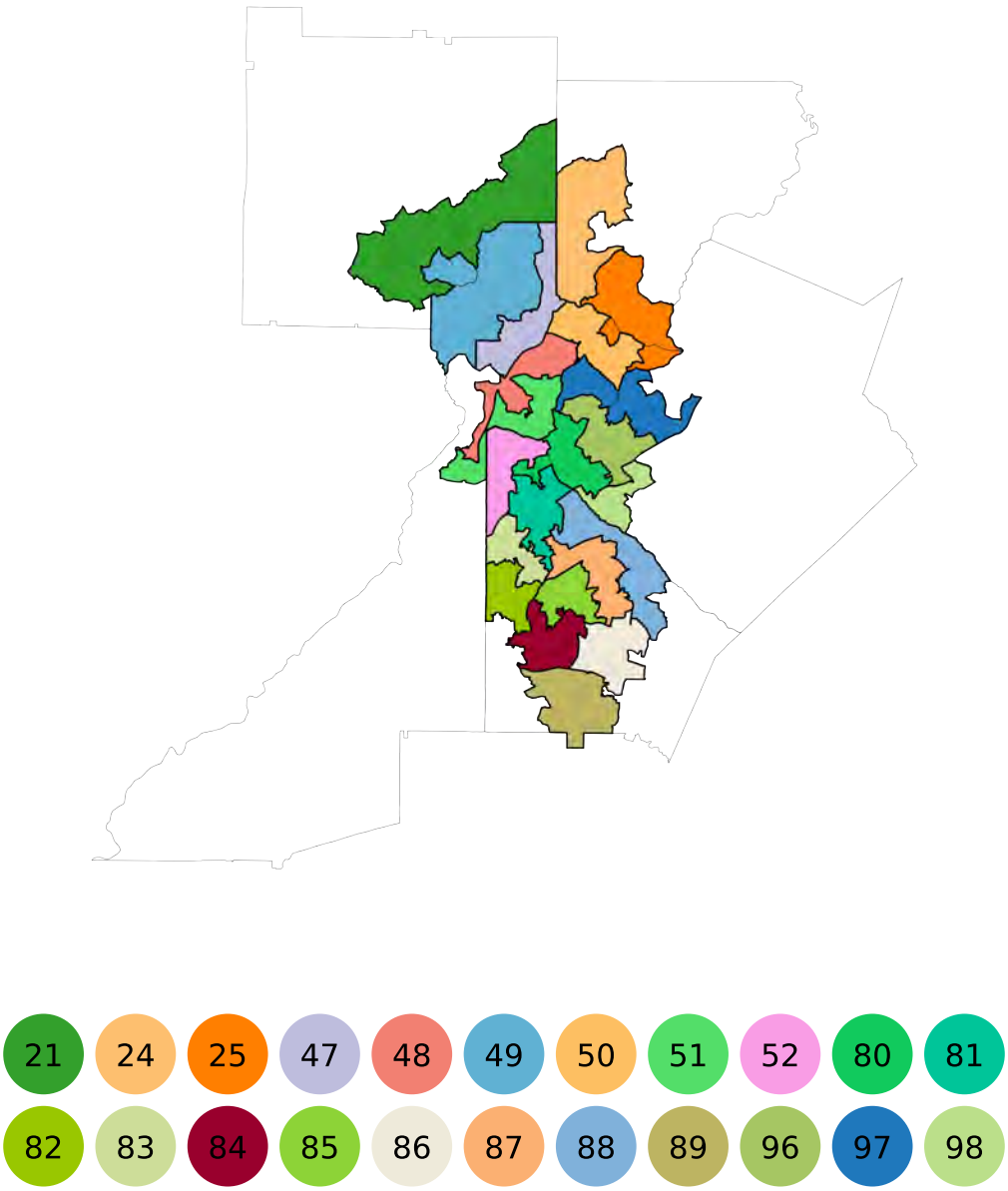


Figure 25: HD DeKalb Alt Eff 3 plan.

	HD DeKalb Enacted			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
21	5.1%	12.5%	1	0
24	7.0%	17.3%	1	0
25	5.9%	11.0%	0	0
47	10.7%	18.1%	2	0
48	11.8%	24.2%	0	1
49	8.4%	15.1%	0	0
50	12.4%	18.8%	2	8
51	23.7%	37.0%	0	8
52	16.0%	23.4%	0	8
80	14.2%	37.3%	0	8
81	21.8%	42.7%	0	8
82	16.8%	23.6%	0	8
83	15.1%	43.6%	0	8
84	73.7%	76.7%	3	8
85	62.7%	68.6%	3	8
86	75.1%	79.4%	3	8
87	73.1%	79.8%	4	8
88	63.3%	73.3%	3	8
89	62.5%	65.9%	2	8
96	23.0%	59.0%	3	8
97	26.8%	46.0%	3	8
98	23.2%	76.0%	3	8

	HD DeKalb Alt Eff 3			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
21	5.1%	12.4%	1	0
24	7.0%	17.3%	1	0
25	5.9%	10.7%	0	0
47	15.7%	31.4%	3	5
48	20.8%	32.2%	3	8
49	5.8%	11.0%	0	0
50	12.6%	19.7%	2	7
51	16.1%	24.4%	0	6
52	10.9%	16.4%	0	7
80	27.2%	60.1%	3	8
81	16.0%	49.2%	0	8
82	16.9%	23.2%	0	8
83	15.0%	36.5%	0	8
84	62.6%	67.7%	3	8
85	54.8%	59.4%	3	8
86	90.8%	94.5%	4	8
87	60.6%	68.7%	3	8
88	45.9%	59.3%	3	8
89	94.7%	97.0%	4	8
96	20.5%	50.2%	3	8
97	19.0%	32.8%	3	8
98	24.4%	71.2%	3	8

Table 35: HD DeKalb (22 districts).

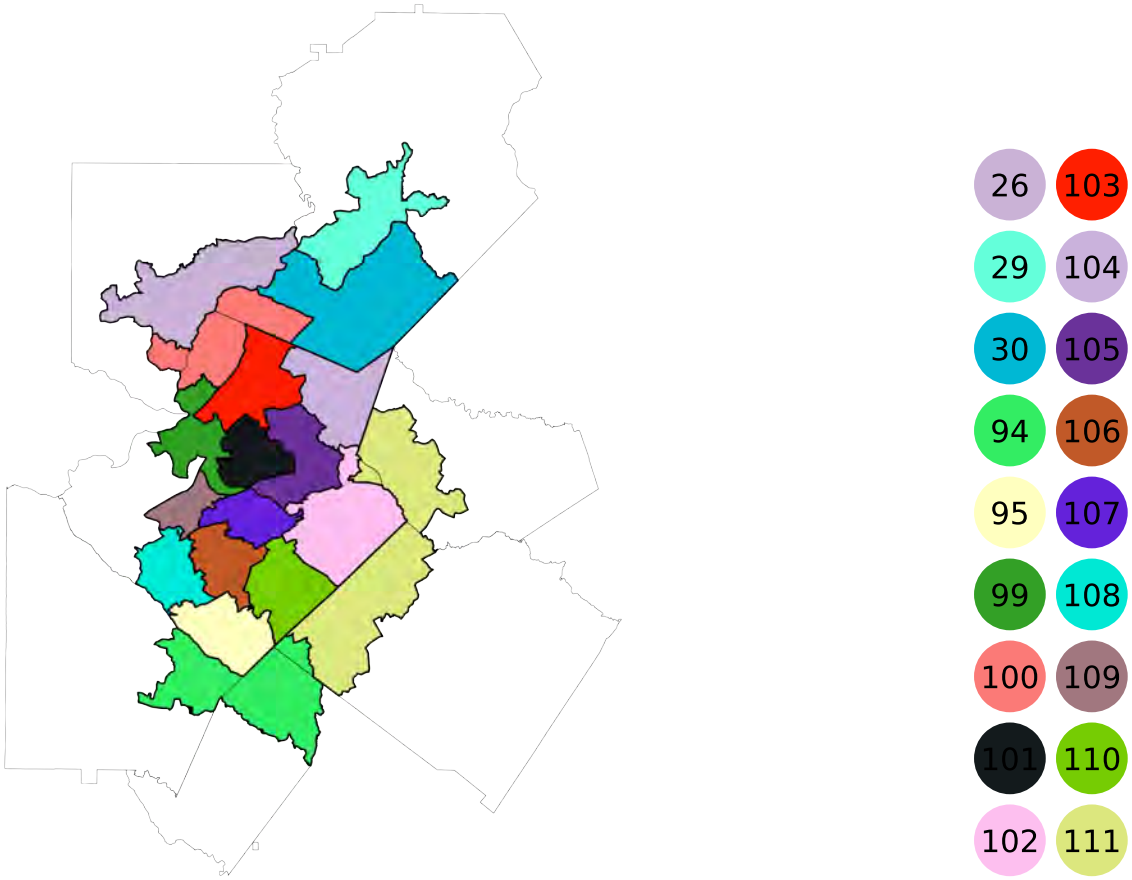


Figure 26: HD Gwinnett Alt Eff 3 plan.

	HD Gwinnett Enacted			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
26	4.0%	14.8%	0	0
29	13.6%	53.3%	2	0
30	8.1%	24.2%	0	0
94	69.0%	76.3%	4	8
95	67.2%	75.1%	4	8
99	14.7%	23.4%	3	3
100	10.0%	20.0%	1	0
101	24.2%	42.4%	3	7
102	37.6%	58.9%	3	8
103	16.8%	33.7%	3	0
104	17.0%	28.1%	3	0
105	29.0%	45.8%	3	6
106	36.3%	47.4%	3	7
107	29.6%	60.7%	3	8
108	18.4%	36.6%	3	6
109	32.5%	68.6%	3	8
110	47.2%	57.7%	4	8
111	22.3%	31.1%	3	0

	HD Gwinnett Alt Eff 3			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
26	4.1%	14.8%	0	0
29	13.6%	53.3%	2	0
30	6.6%	22.7%	0	0
94	79.8%	84.3%	4	8
95	59.7%	71.1%	4	8
99	16.9%	27.3%	3	5
100	10.1%	21.3%	2	0
101	24.4%	41.9%	3	7
102	40.2%	53.3%	4	7
103	19.5%	35.8%	3	3
104	18.9%	29.3%	3	0
105	33.2%	53.2%	3	8
106	25.4%	40.4%	3	6
107	30.2%	55.7%	3	8
108	19.8%	39.6%	3	6
109	33.5%	72.2%	4	8
110	47.5%	58.8%	4	8
111	14.1%	23.0%	3	0

Table 36: HD Gwinnett (18 districts).

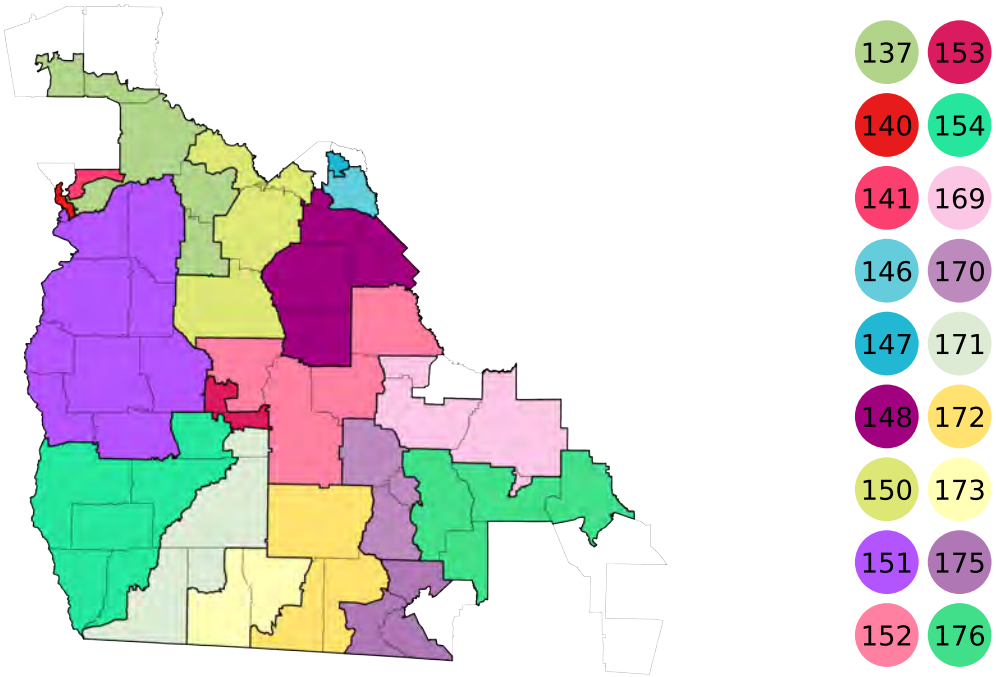


Figure 27: HD Southwest Alt Eff 3 plan.

	HD Southwest Enacted			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
137	52.1%	56.6%	4	8
140	57.6%	65.6%	4	8
141	57.5%	64.1%	4	8
146	27.6%	32.3%	4	0
147	30.1%	37.3%	4	0
148	34.0%	37.1%	4	0
150	53.6%	59.7%	4	8
151	42.4%	49.7%	4	0
152	26.1%	28.4%	4	0
153	67.9%	70.4%	4	8
154	54.8%	56.5%	4	7
169	29.0%	36.7%	3	0
170	24.2%	32.9%	3	0
171	39.6%	44.2%	4	0
172	23.3%	36.7%	4	0
173	36.3%	41.7%	4	0
175	24.2%	29.2%	4	0
176	22.7%	30.9%	4	0

	HD Southwest Alt Eff 3			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
137	55.2%	58.4%	4	8
140	59.3%	66.9%	4	8
141	49.2%	56.1%	4	8
146	23.9%	29.4%	4	0
147	31.2%	38.0%	4	0
148	39.2%	42.4%	4	0
150	55.0%	60.9%	4	8
151	45.7%	54.0%	4	7
152	28.3%	30.7%	4	0
153	60.3%	62.8%	4	8
154	50.7%	52.9%	4	6
169	27.2%	37.2%	3	0
170	27.7%	36.6%	2	0
171	47.5%	51.8%	4	0
172	23.2%	36.2%	4	0
173	34.5%	39.9%	4	0
175	24.1%	29.5%	4	0
176	20.3%	25.7%	4	0

Table 37: HD Southwest (18 districts).

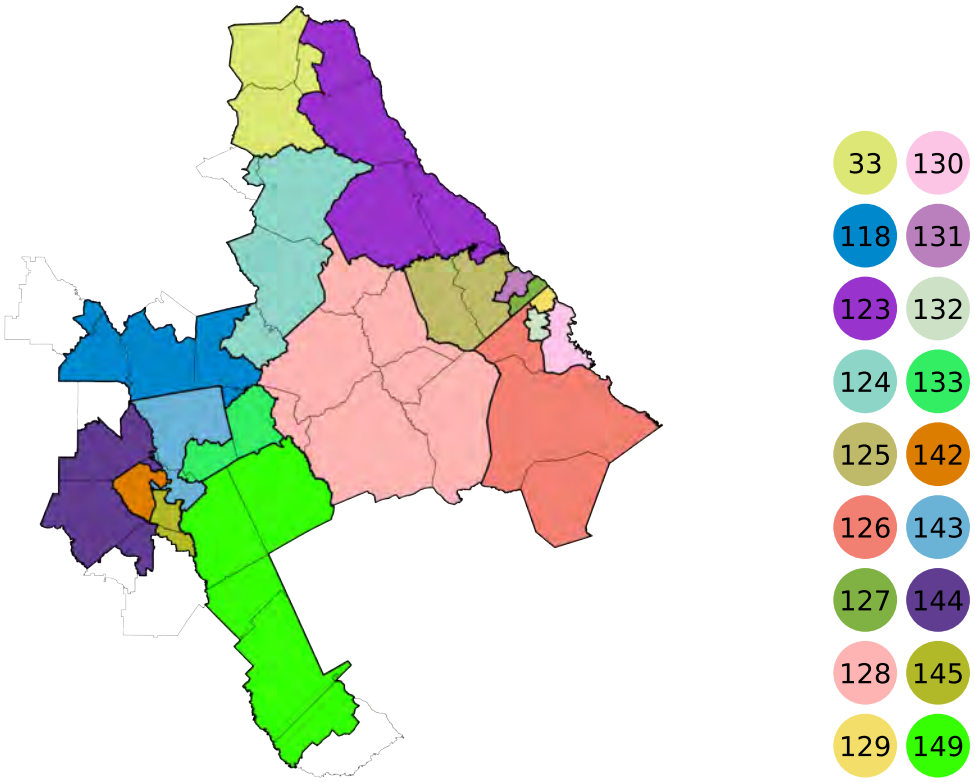


Figure 28: HD East Black Belt Alt Eff 3 plan.

	HD East Black Belt Enacted			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
33	11.2%	14.3%	3	0
118	23.6%	27.3%	3	0
123	24.3%	28.6%	3	0
124	25.6%	31.8%	2	0
125	23.7%	31.4%	3	0
126	54.5%	57.7%	4	8
127	18.5%	23.3%	3	0
128	50.4%	52.1%	2	4
129	54.9%	59.2%	3	8
130	59.9%	63.8%	4	8
131	17.6%	23.5%	3	0
132	52.3%	60.1%	4	8
133	36.8%	38.9%	3	0
142	59.5%	63.2%	3	8
143	60.8%	65.5%	3	8
144	29.3%	31.9%	3	0
145	35.7%	41.6%	3	0
149	32.1%	37.8%	2	0

	HD East Black Belt Alt Eff 3			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
33	9.3%	13.8%	3	0
118	22.8%	26.2%	3	0
123	25.5%	28.5%	3	0
124	25.3%	31.7%	2	0
125	30.7%	36.6%	3	0
126	41.0%	47.5%	4	8
127	17.2%	23.4%	3	0
128	51.9%	53.4%	2	7
129	38.2%	43.1%	3	5
130	60.6%	63.9%	4	8
131	18.0%	24.0%	3	0
132	74.7%	79.5%	4	8
133	45.4%	47.6%	3	8
142	42.1%	45.1%	3	6
143	54.8%	58.7%	3	8
144	26.0%	29.3%	3	0
145	55.1%	62.0%	4	8
149	32.1%	37.8%	2	0

Table 38: HD East Black Belt (18 districts).

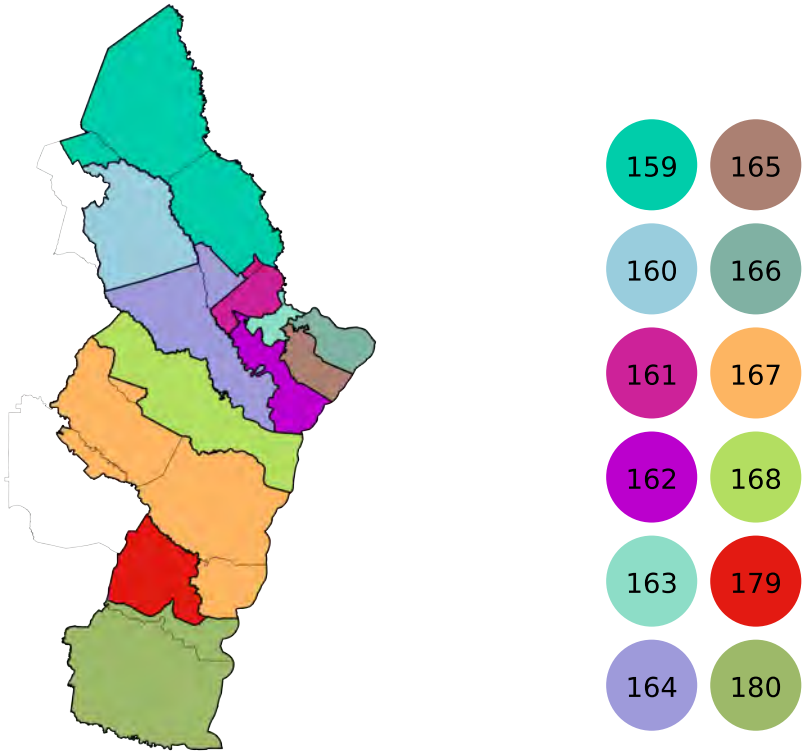


Figure 29: HD Southeast Alt Eff 3 plan.

	HD Southeast Enacted			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
159	24.5%	27.4%	2	0
160	22.6%	27.6%	2	0
161	27.1%	33.9%	4	0
162	43.7%	53.3%	4	8
163	45.5%	52.9%	3	8
164	23.5%	32.0%	3	0
165	50.3%	55.6%	4	8
166	5.7%	9.8%	3	0
167	22.3%	29.7%	3	0
168	46.3%	56.6%	4	8
179	27.0%	33.4%	3	0
180	18.2%	23.8%	3	0

	HD Southeast Alt Eff 3			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
159	22.3%	25.8%	3	0
160	26.4%	31.5%	1	0
161	34.1%	42.7%	4	6
162	38.9%	47.3%	4	8
163	50.0%	59.4%	4	8
164	13.6%	19.2%	3	0
165	27.1%	32.2%	3	5
166	29.9%	33.7%	3	8
167	18.7%	24.5%	3	0
168	45.9%	56.6%	4	8
179	31.8%	39.4%	4	0
180	18.2%	23.8%	3	0

Table 39: HD Southeast (12 districts).

10 Racial gerrymandering

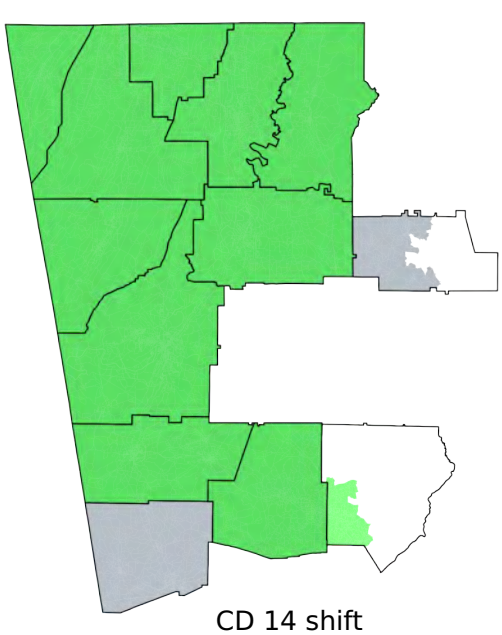
10.1 Retention, displacement, and district disruption

In this section, I will examine the *core retention*, or conversely, the *population displacement*, of the districts in the enacted plan—that is, how much of the population retains the same district assignment before and after the redistricting? I will pay particular attention to the tendency to use racially imbalanced transfers of population in rebalancing the districts, and to the impact on the districts' effectiveness for electing Black and Latino candidates of choice.

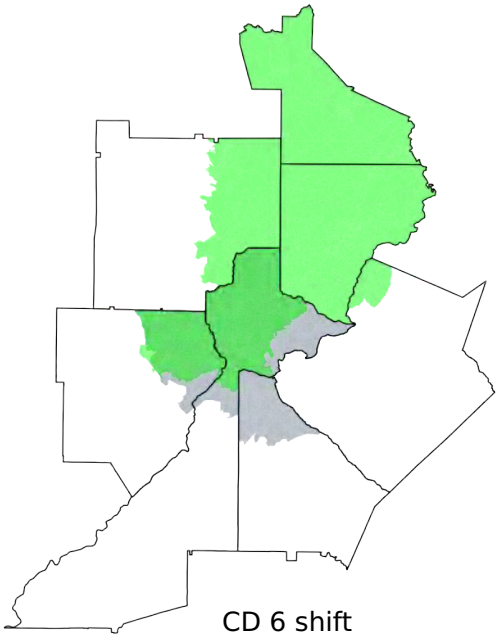
10.1.1 Congress

In Congress, the ideal district population is 765,136. Of the fourteen districts, twelve are at least reasonably similar to their benchmark configuration, i.e., at least 2/3 of their population had been assigned to the same district before redistricting. The two with more than one-in-three new voters are districts 6 and 7.

District 6 was nearly at ideal size before the redistricting, having 771,431 residents enumerated in the Census—less than seven thousand off from the target size. However, it was subjected to major reconfiguration, with at least 40,000 people from the benchmark district reassigned to each of districts 4, 5, 7, and 11, while at least 40,000 different people were drawn in from each of districts 7, 9, and 11. In all, this represents reassignment of several hundred thousand people.



CD 14 shift



CD 6 shift

Figure 30: These before-and-after plots show benchmark configurations in gray, while new district placement is in light green. We can see that CD 14 made a new incursion into Cobb County while shedding rural Haralson and part of Pickens County. Meanwhile, CD 6 went sharply the other way, withdrawing from its metro Atlanta coverage and picking up rural counties to the north. Compare to Figure 31.

These swaps transfer more urban, more Black and Hispanic neighborhoods out of CD 6, while bringing in Whiter suburban areas. For instance, the largest reassignment out of the district goes from CD 6 to CD 4, and the largest reassignment into the district goes from CD 7 to CD 6—each of those moves roughly 200,000 Georgians to a new district, which is a massive shift. But the CD 6 to CD 4 transfer is 37.5% Black or Latino Georgians; by contrast, the CD 7 to CD 6 transfer is 16.1% Black or Latino. Since CD 6 was a performing district for the coalition of Black and Latino voters before its transformation, and none of the transfers improves representational prospects in non-performing districts, this transition looks to be plainly dilutive of voting power.

Meanwhile, the changes to CD 14 are smaller in terms of land area but are distinctive in terms of density and racial composition. CD 14 has expanded into Cobb to include two majority-Black cities—Powder Springs and Austell. Besides the further fracturing of Cobb County, Figure 31 makes it clear that the movement of those areas of Cobb into the district can't be justified in terms of compactness or respect for urban/rural communities of interest. (See §10.3 for references to the public record of community testimony.)

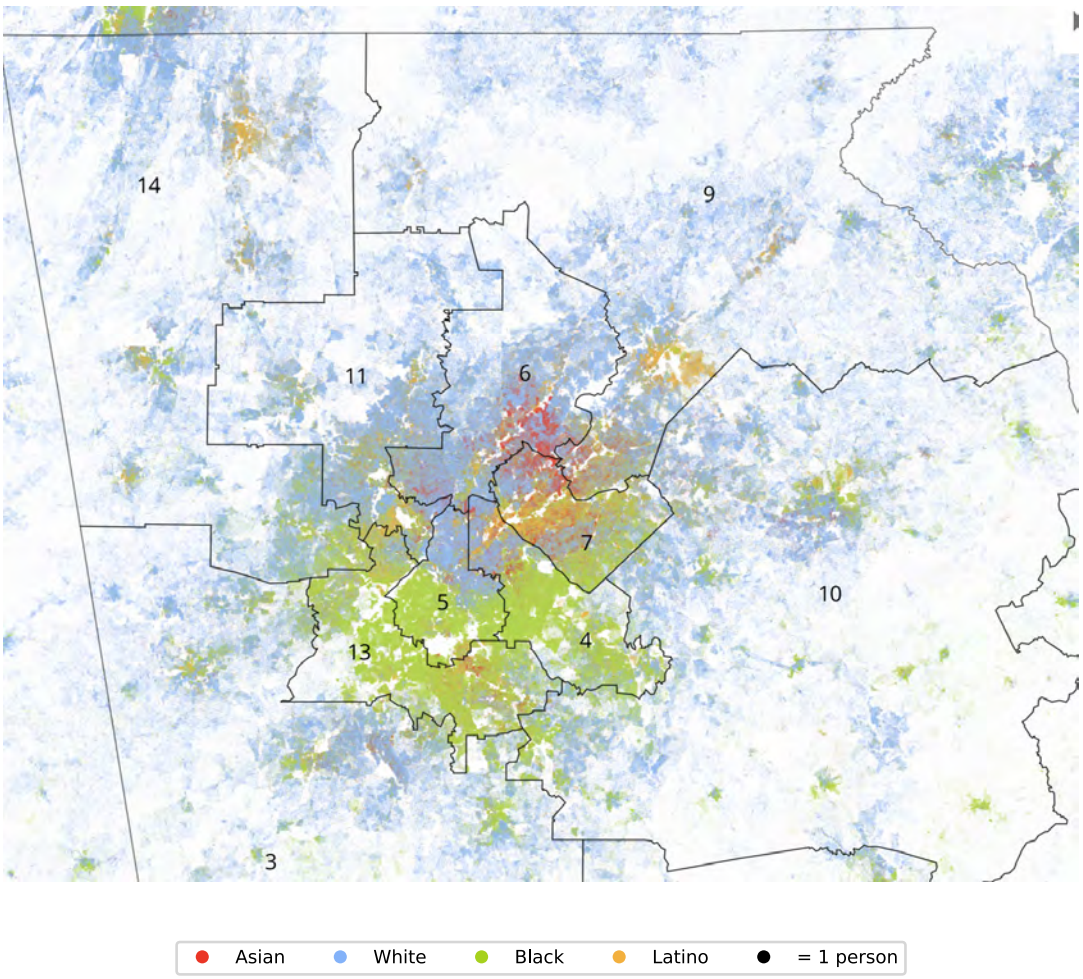


Figure 31: This dot density plot makes it clear—through thicker arrangement of dots, with green dots predominating—that dense African-American neighborhoods in Cobb were brought in at the southern tip of CD 14. These voters were therefore submerged among more numerous, dissimilar communities from CD 14. Meanwhile, the changes to district 6 added suburban/exurban/rural areas—seen with the sparsity at the north of CD 6 in the the dot density plot—unlike the bulk of the district.

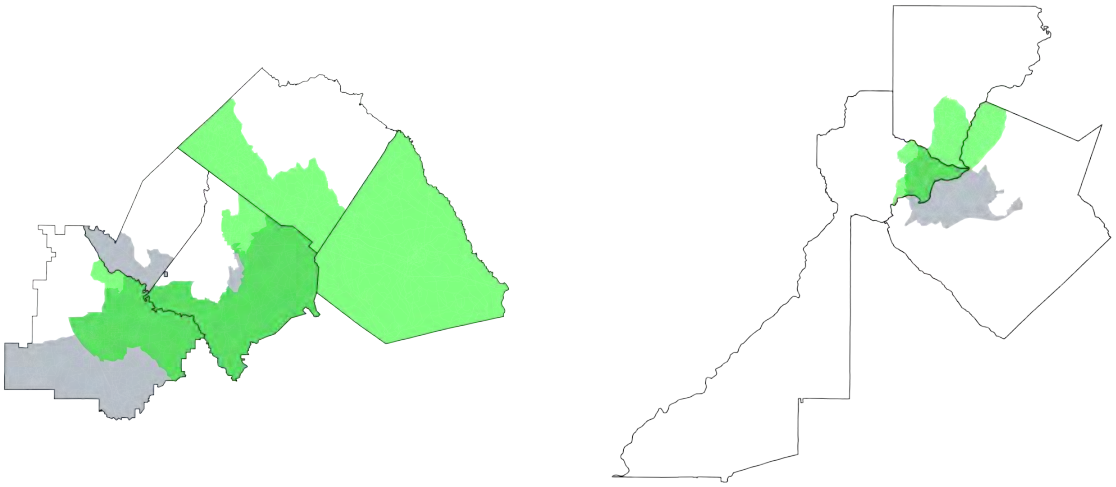
This incursion of CD 14 into Cobb is emphatically not required by adherence to traditional districting principles. For one vivid illustration of that, consider the comparison between the Duncan-Kennedy draft map and the map that was ultimately enacted. The benchmark plan from ten years ago had split Pickens County and included Haralson County in its construction of CD 14. Duncan-Kennedy retains Haralson, keeps Pickens whole in CD 9, and splits (low-density, mostly White) Bartow County to achieve population balance. Thus the shift in the final enacted plan—submerging a dense, majority-Black segment of Cobb in CD 14—was not necessary to balance population while keeping Pickens intact.

10.1.2 State Senate

When we move to smaller and more numerous districts in the Senate (ideal population 191,284), we might reasonably expect somewhat less core retention as line-drawers balance the traditional principles. However, the disruption in some cases is more than we would expect if retention were a highly prioritized goal. In the Senate, SD 7 and SD 14 have zero overlap with their previous population in the Benchmark configuration, and four other districts—SD 6, 32, 48, and 56—have less than half of their population retained.

New SD 14 is largely composed of benchmark SD 56, which was represented by Republican John Albers. The previous SD 56, which had become competitive over time (with four Republican victories and four Democratic victories across the elections in our probative dataset), was completely moved off of itself, to a new position that gave Biden only 43.7% support. Thus Albers could stay in the district numbered 56, facing largely new but very Republican-leaning voters, and win easily. This was achieved by racially imbalanced shifts: 56 → 14 has 35.5% BHVAP (substantial but still failing to secure electoral alignment in SD 14 with Black and Latino candidates of choice), while each group moved into SD 56 has under 19% BHVAP.

Another consequential district disruption occurred in benchmark district 48, which was represented by Democrat Michelle Au. Roughly two-thirds of the previous population of SD 48 was reassigned into SD 7 (see Figure 32 for geographical displacement). But the 7th district was already Democratic-controlled and was now facing the candidacy of progressive Nabilah Islam, who had been endorsed by civil rights groups including GALEO. The new SD 48 was built to be highly ineffective for Black and Latino preferences (aligned in only one of four primaries and zero of eight general elections from our probative dataset). Rather than run in the new district, Au switched to a run for the lower chamber, ultimately winning HD 50 in 2022. This district makeover was carried out with highly racially imbalanced transfers of population. Of more than 130,000 people moved from SD 48 to SD 7, 37.8% are Black and Latino, while the retained population has only 17.8% BHVAP share; and no territory reassigned into the district has BHVAP share exceeding 23.5%.



SD 17 shift SD 48 shift

Figure 32: These before-and-after plots show benchmark configurations in gray, while new district placement is in light green. The new configurations are clearly not made to improve compactness, and they increase the number of county traversals.

SD 17 also underwent a makeover: the district had become mildly overpopulated but was changed much more than needed, retaining only about half of its residents. (See, again, Figure 32.) Meanwhile, the district was transformed from effective (4/4 primaries, 5/8 generals) to ineffective (3/4 primaries, 0/8 generals). Outgoing population was roughly half Black and Latino (17 → 10 has 52.6% BHVAP, 17 → 25 has 49.0%, and 17 → 43 has 51.3%) while the significant incoming reassignments have much lower shares (25 → 17 has 20.9% and 46 → 17 has 23.8%). Notably, none of the districts that received population from SD 17 thereby became effective.

10.1.3 State House

At the House level, the ideal district size of just 59,511 necessitates substantial shifts to the districts, but once again the state's enacted map is highly disruptive, well beyond what is required. Fully 57 districts out of 180 were moved to positions completely disjoint from their benchmark locations. Furthermore, a startling 32 districts were not only moved or relabeled but effectively *dismantled*, with fewer than 30,000 prior residents assigned to any single district, so that no candidate can have the usual benefits of incumbency in terms of familiarity to their voters.

One notable category within these "dismantled" districts is those for which the ten-year demographic shifts had made the benchmark districts amenable to political swings, so that candidates from each major party would have won 2-6 out of 8 general contests in the dataset of probative elections. This includes seven districts: HD 35, 44, 48, 49, 52, 104, and 109. *Zero* of these remain in this "swingy" category after redrawing. Yet five are rebuilt to be ineffective for Black and Latino voters, while only two are made effective. Those that are rebuilt to be ineffective are subjected to racially imbalanced population transfers.

Benchmark HD	Outward	Inward
44	.425 (to HD 35)	.226 (from HD 20)
48	.464 (to HD 51)	.201 (from HD 49)
49	.227 (to HD 47)	.127 (from HD 48)
52	.436 (to HD 54)	.245 (from HD 79)
104	.715 (to HD 102)	.363 (from HD 103)

Table 40: This table records the BHVAP share of the largest district-to-district reassignment for the five "dismantled" House districts that were formerly swingy, now made ineffective. Compare Figure 33.

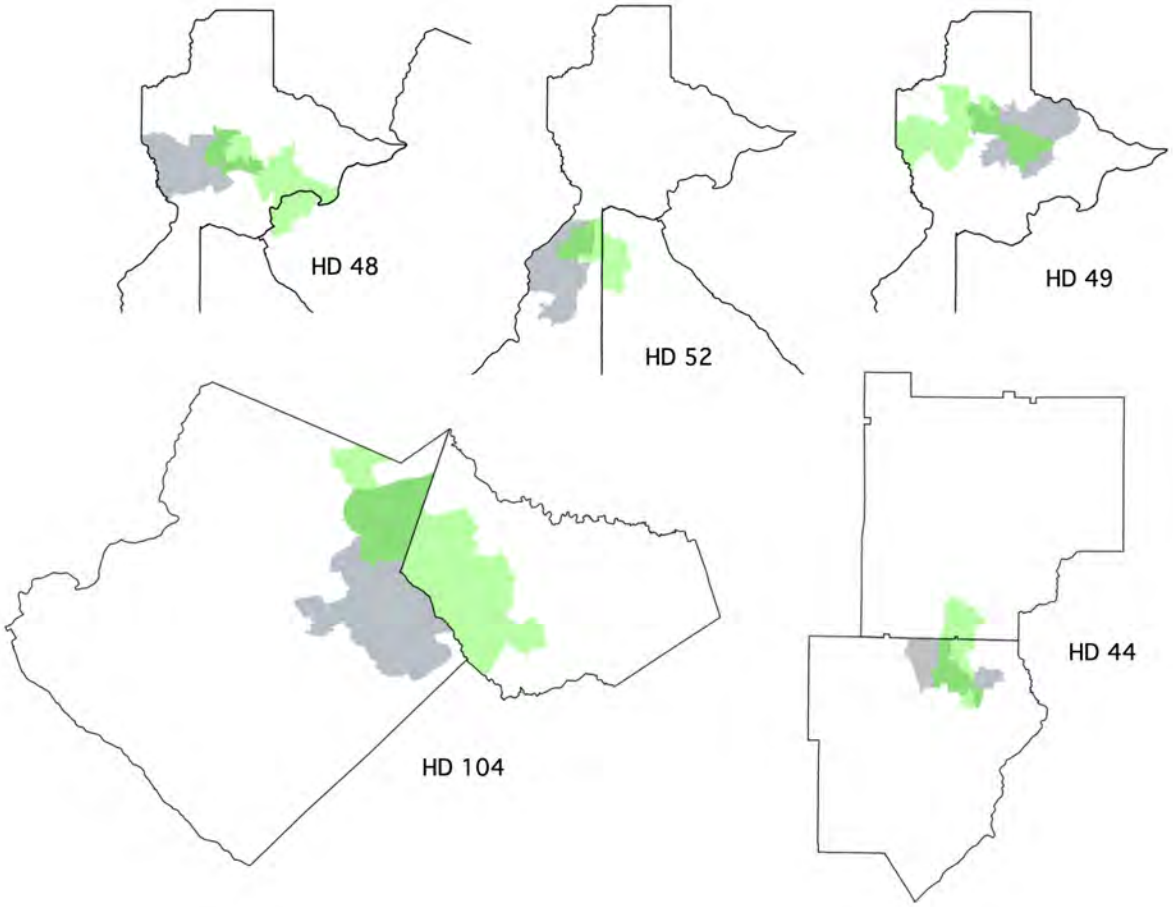


Figure 33: Each of these "dismantled" House districts from the metro Atlanta area (Table 40) was moved in such a way that the previous residents are scattered across multiple districts in the new plan. These districts had become politically swingy in the time since the last Census but are now rebuilt to be likely out of reach for Black and Latino voters' candidates of choice. The images make it clear that the shifts are not explained by traditional districting principles like compactness or respect for county lines. They is not explained by respect for municipal boundaries, as the new locations split small and midsized cities.

10.2 Splitting of geographical units

10.2.1 Congress

Most counties that are split in the enacted plan show marked racial disparity across the pieces. For instance, Cobb County is split across four districts, with CD 13 and 14 receiving parts of Cobb that are collectively over 60% Black and Latino by voting age population, while CD 6 contains a part of Cobb that is about 18.5% BHVAP—consistent with a packing and cracking strategy. Fayette, Fulton, Douglas, Newton, Gwinnett, Muscogee, and Bibb are likewise all split in a way that puts pieces into different districts with at least 20 percentage points disparity in BHVAP across the split.

County	District	BVAP	BHVAP
Bibb	CD 2	.6349	.6710
	CD 8	.3098	.3394

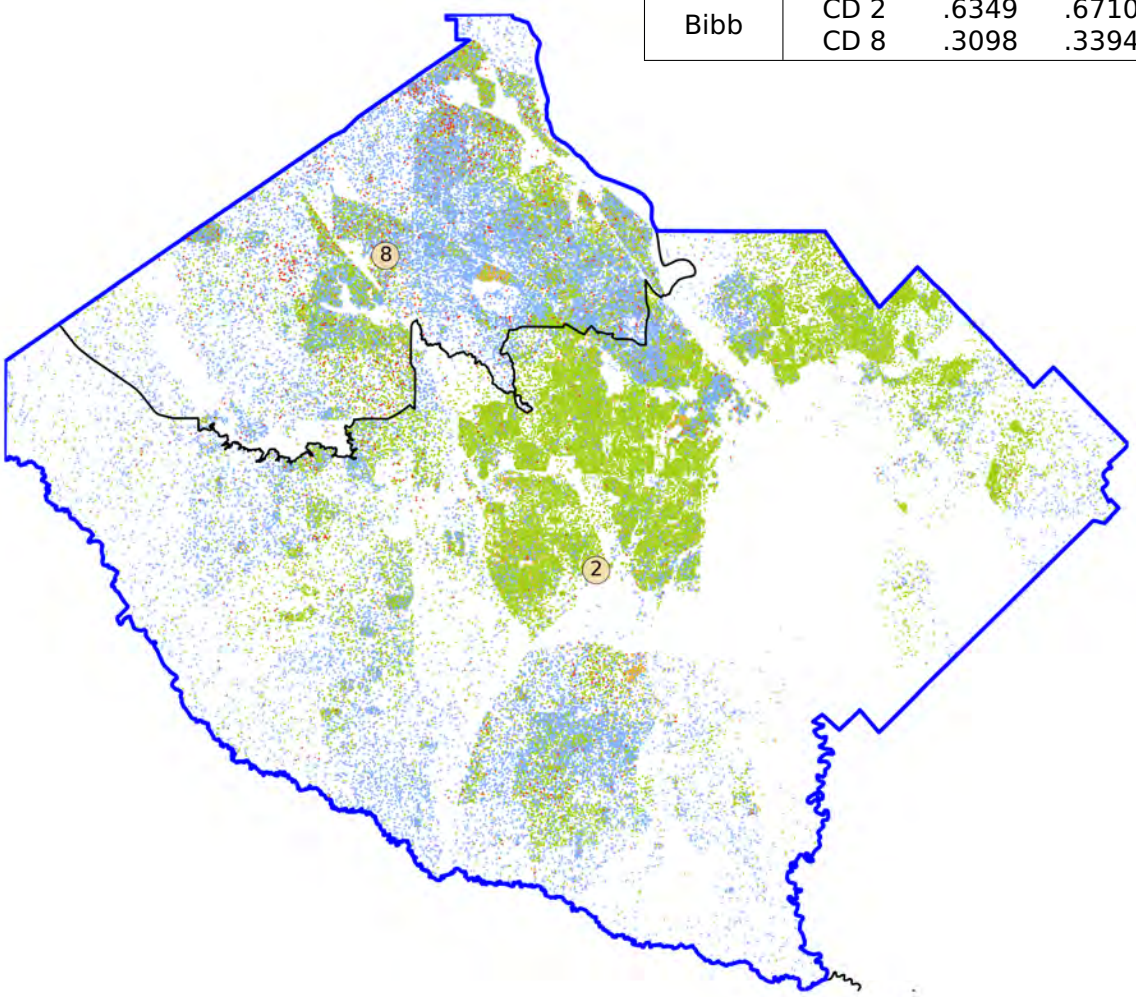


Figure 34: Minutely race-conscious decisions are evident along the boundary of CD 2 and CD 8 in Bibb County.

County	District	BVAP	BHVAP
Cherokee	CD 6	.0304	.0814
	CD 11	.0817	.1902
Clayton	CD 5	.7280	.8649
	CD 13	.7190	.8266
Cobb	CD 6	.1092	.1848
	CD 11	.2654	.3850
	CD 13	.4458	.6271
	CD 14	.4646	.5644
Douglas	CD 3	.2970	.3719
	CD 13	.5762	.6647
Fayette	CD 3	.2094	.2720
	CD 13	.5762	.6647
Fulton	CD 5	.4769	.5379
	CD 6	.1574	.2568
	CD 7	.1175	.1777
	CD 13	.8829	.9171
Gwinnett	CD 6	.1336	.2645
	CD 7	.3234	.5450
	CD 9	.2061	.3433
Henry	CD 3	.4678	.5259
	CD 10	.4414	.4948
	CD 13	.5710	.6324
Muscogee	CD 2	.5262	.5851
	CD 3	.1909	.2578

Table 41: All county splits involving CD 3, 6, 13, and 14. With the exception of the Clayton split, which is unremarkable in demographic terms, each of these is consistent with an overall pattern of cracking in CD 3 and CD 6, packing in CD 13, and submerging a small and diverse urban community in CD 14. See Appendix C for a complete list of county splits.

County	District	BVAP	BHVAP
Newton	CD 4	.6098	.6644
	CD 10	.2631	.2960

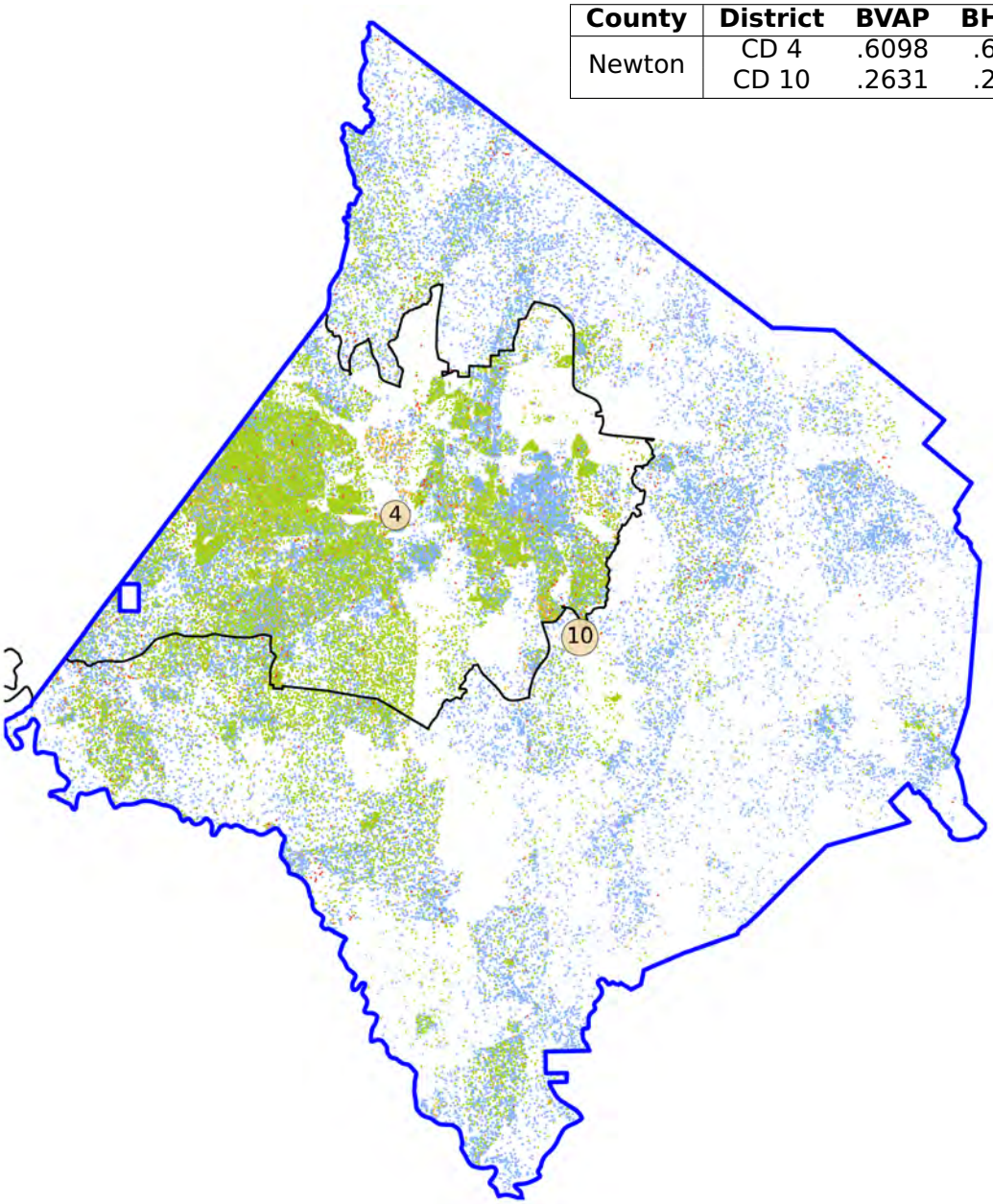


Figure 35: In Newton County, CD 4 and CD 10 are divided by a line that is consistent with packing the former district and cracking the latter.

For the purposes of investigating racial gerrymandering, the splits to state precincts can be especially revealing: these are the units at which cast votes are reported, so finer divisions are usually made in view of demographics but not voting behavior—that is, these highlight the predominance of race over even partisan concerns.[12]

Several pairs of bordering districts show significant demographic disparity across precinct splits in the Congressional plan, especially on the border of CD 4 and CD 10 (in Newton County, as in Figure 35), and on the border of CD 6 and CD 11 (in Cobb and Cherokee counties).

In particular, each precinct split with a sizeable demographic gap on the CD 6/11 border is consistent with the overall theme that CD 6 was targeted to reduce electoral opportunity for Black and Latino voters—and for Black voters, in particular.

State precinct	District	BVAP	BHVAP
MARIETTA 5A	CD 6	.1975	.4938
	CD 11	.4232	.5803
MARIETTA 6A	CD 6	.1391	.6607
	CD 11	.4738	.5464
SEWELL MILL 03	CD 6	.2225	.3042
	CD 11	.4064	.5548

Table 42: Three examples of split precincts on the CD 6 / CD 11 border that show significant racial disparity, consistent with an effort to diminish the electoral effectiveness of CD 6 for Black voters. (Note that CD 6 receives a higher share of BHVAP in Marietta 6A, but a far lower share of BVAP.)

Though the disparity in numbers is suggestive, the previous splits are geographically unremarkable. By contrast, several precinct splits on the CD 4 / CD 10 border stand out both in demographic and geographic terms.

State precinct	District	BVAP	BHVAP
ALCOVY	CD 4	.4010	.4499
	CD 10	.0512	.0620
CITY POND	CD 4	.5912	.6554
	CD 10	.3923	.4192
OXFORD	CD 4	.6444	.6932
	CD 10	.0929	.1213
DOWNS	CD 4	.6429	.7024
	CD 10	.4429	.4930

Table 43: Four examples of split precincts on the CD 4 / CD 10 border, all consistent with packing of CD 4 and cracking of CD 10.

[12] Of course, it is possible to incorporate registered voter data at the block level or to purchase commercial products with partisan modeling, but official state mappers frequently claim not to use this more fine-grained data.

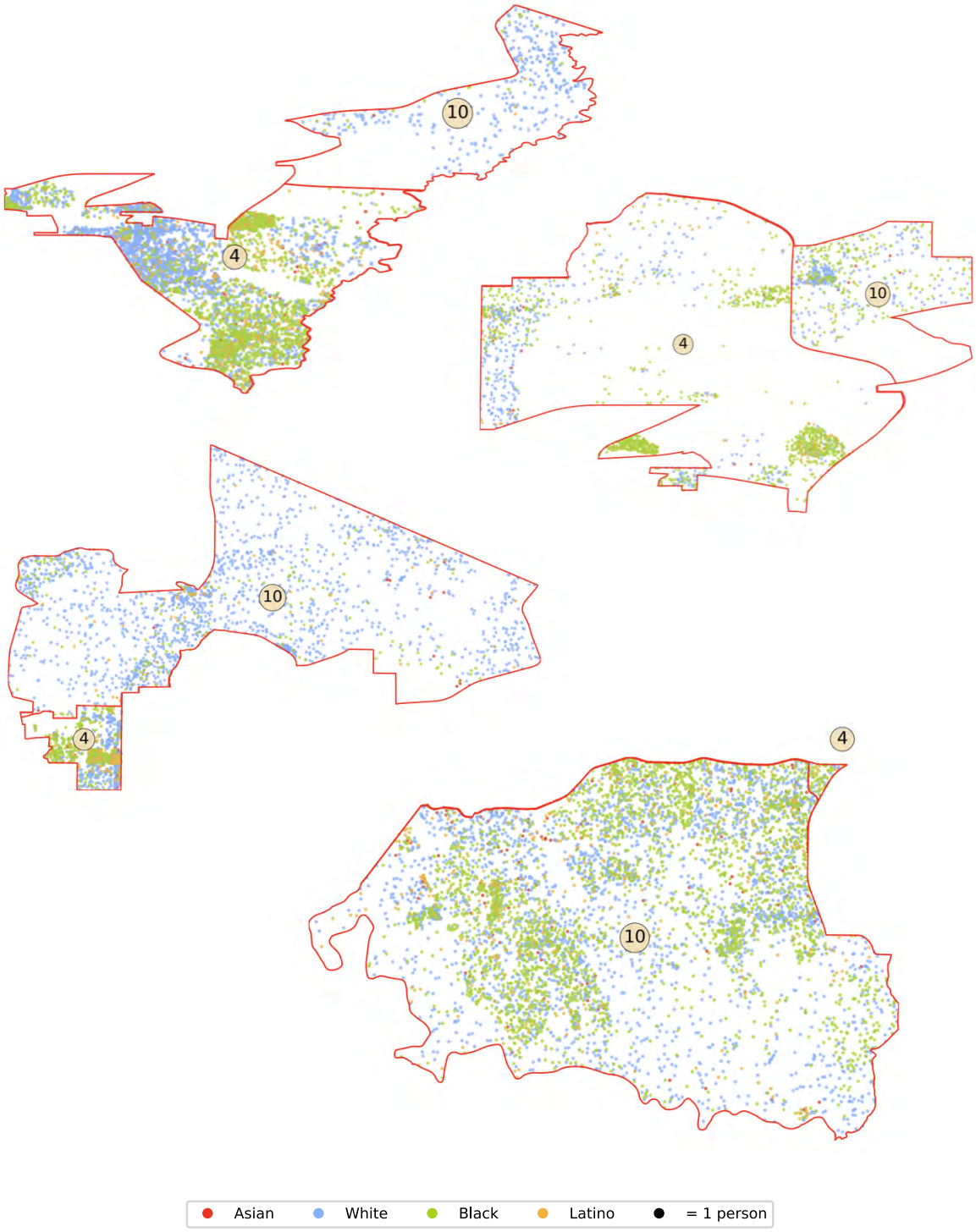


Figure 36: Split precincts on the CD 4 / CD 10 border.

10.2.2 State Senate

Similarly, numerous counties are split into unnecessarily many pieces in the Senate plan. Fourteen counties have at least a 20-point disparity in the BHVAP across the splits: Fulton (10 pieces), Gwinnett (9 pieces), DeKalb (7 pieces), Cobb (6 pieces), Bibb, Chatham, Douglas, and Houston (3 pieces each), and Newton, Clarke, Hall, Muscogee, Fayette, and Richmond (2 pieces each). Thirteen state precincts are split with a significant racial disparity between the pieces placed in different districts.

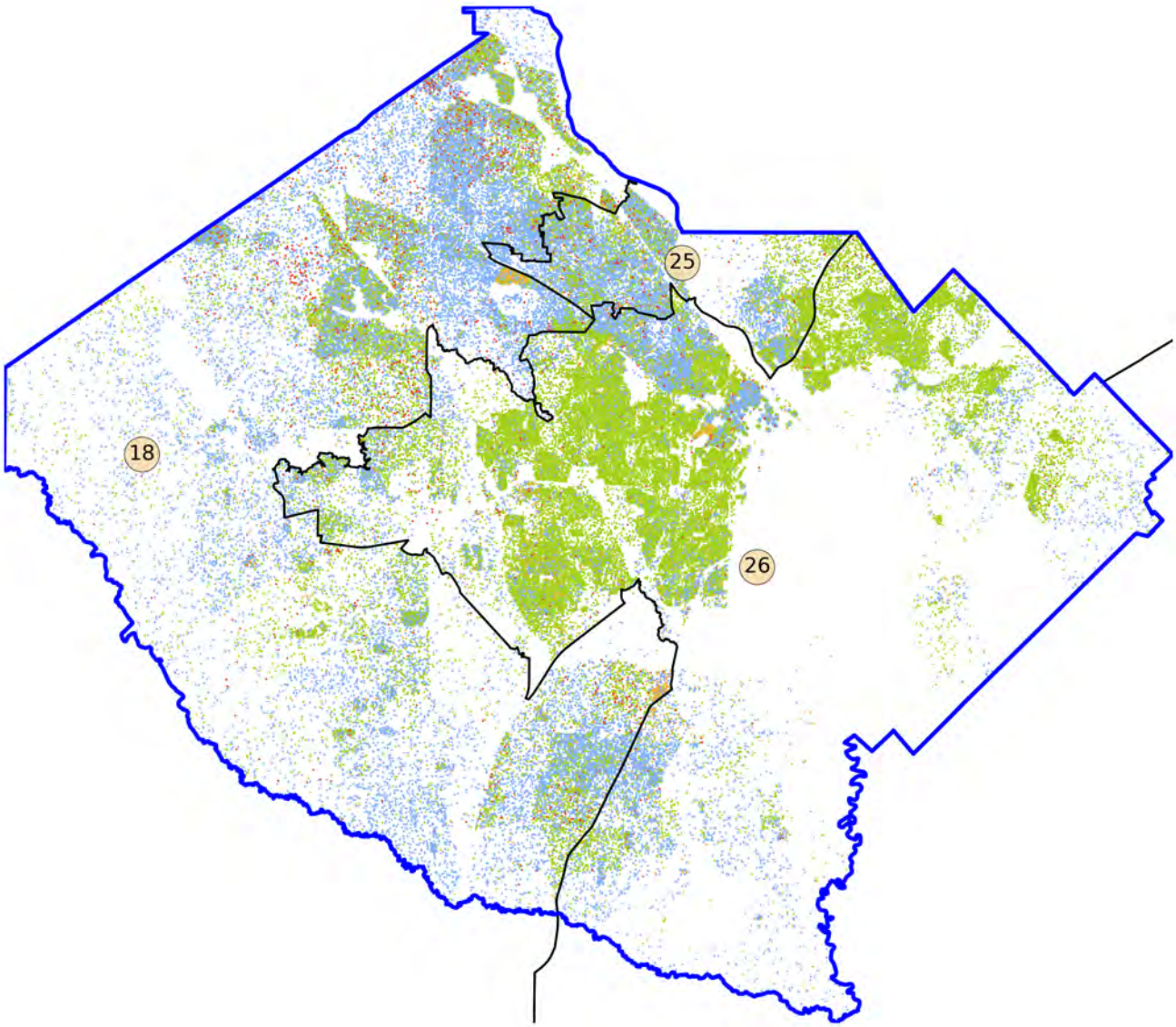


Figure 37: This figure shows the separation of Bibb County in a way that packs SD 26.

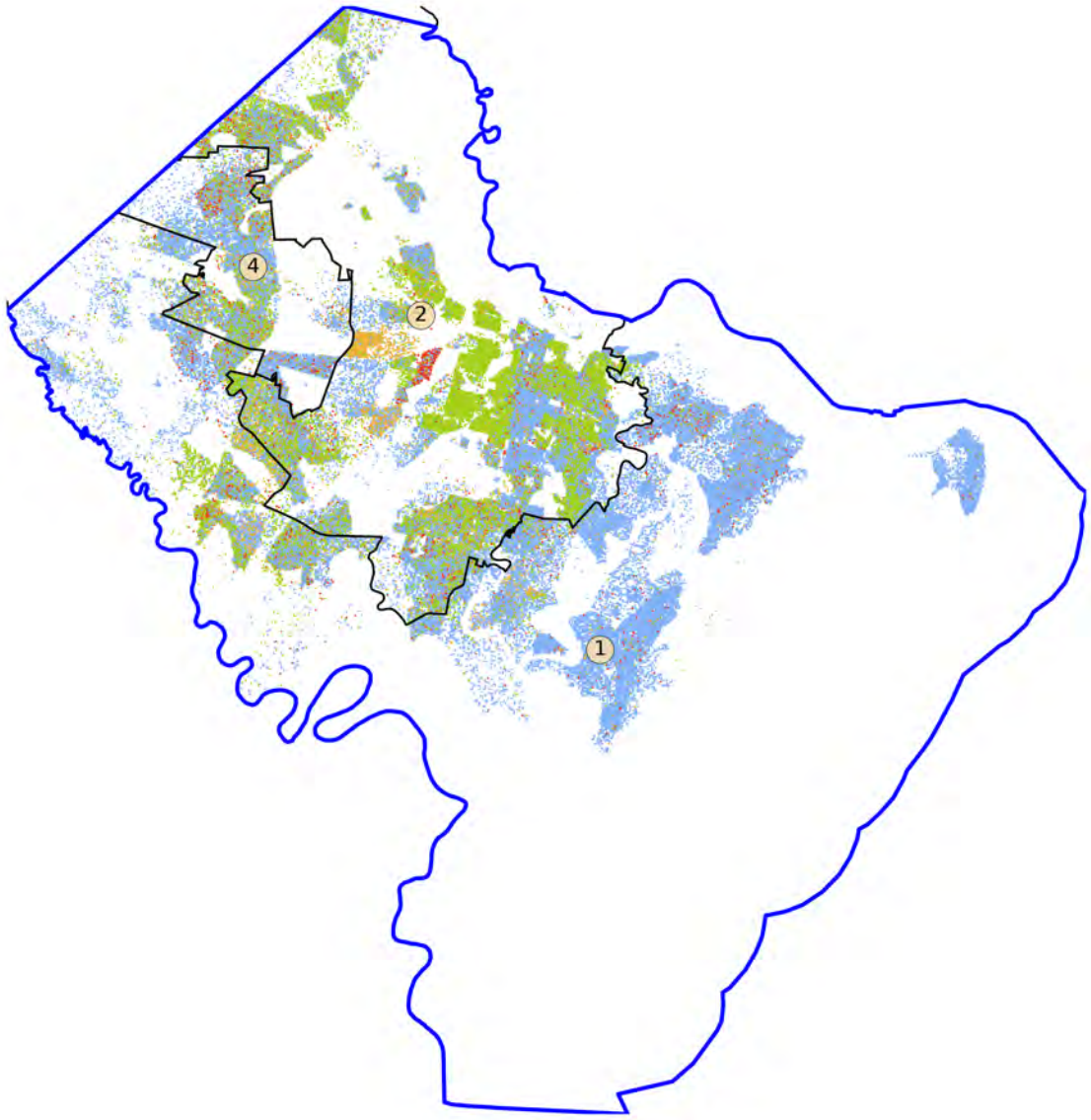


Figure 38: The pieces of Chatham County look to be clearly racially sorted into Senate districts in a way that ensures that Black and Latino voters can only have effective influence in one of the constituent districts. Indeed, SD 2 is an effective district, while SD 1 and SD 4 are not.

10.2.3 State House

In the enacted House plan, thirty counties are fractured in a racially sorted way. Besides the large counties that take the brunt of the splitting—Fulton (22 pieces), Gwinnett (21 piecees), DeKalb (17 pieces), Cobb (14 pieces)—there are also Chatham, Henry, Muscogee, Richmond, Hall, Paulding, Houston, Bibb, Coweta, Douglas, Fayette, Lowndes, Newton, Whitfield, Floyd, Rockdale, Carroll, Dougherty, Troup, Thomas, Tift, Peach, Gradie, McDuffie, Lamar, and Telfair, each with 2-7 pieces.

A striking number of state precincts—47 of them—are split with a heavy racial disparity across the division. In the case of dividing up state precincts, legislators can't use cast votes to choose a splitting optimized for partisan performance, so racially distinctive precinct splits provide particularly strong evidence that race has predominated over other principles in the creation of the map.

10.3 Community narratives

There was voluminous public input into the record when it comes to the communities of interest around the state and the impacts of redistricting decisions on their access to effective representation.

At the highest level, **County** identity and **Urban** versus **Rural** interests were the most frequent themes of the testimony, with thousands of mentions in the record. Geographically delimited regions that received frequent mention included the **Mountain** region in the Northwest and the **Black Belt** across the state's middle. Less specific geographic terms like **Lake** and **River** recur as well. **University** (or **College**) and specifically **HBCU** get plentiful mentions, and **Language** (in the sense of language accessibility) is a frequent concern.

Other frequent keywords recur in patterns that largely disaggregate by urban/suburban/rural focus. Here is a sample of terms that occur ten or more times and fall largely along lines of that classification.

- Urban: Rent/Renters, Affordable, Housing, Utilities (esp. Water)
- Urban: Poverty, Healthcare, Safety
- Urban: MARTA, Transit
- Suburban/Exurban: Corridor, Car
- Suburban/Exurban: Family, Diversity, Immigrant
- Suburban/Exurban: Park, Church, Restaurant
- Rural: Agriculture, Poultry/Chicken, Onion (incl. Vidalia, Onion Belt)
- Rural: Manufacturing, Carpet, Flooring, Industry
- Rural: Hospital, Internet, Elderly

These community testimonials are helpful for clarifying the issues around the changes to CD 6 and CD 14 that have received considerable attention above. New areas brought in to CD 6 on its north side (all of Forsyth and Dawson counties and half of Cherokee) cite interests frequently cited in suburban areas, blending to rural. By contrast, CD 6 shed population from Fulton and the northern tip of DeKalb County.

- Forsyth, Cherokee, Dawson: road infrastructure, Lake Lanier, Army Corps of Engineers, immigration (esp. Asian) and language, rural identity
- Fulton, DeKalb: public transportation, MARTA, safety net, COVID disparities, food insecurity

As we have seen, the shift in CD 14 is arguably a ripple effect from the targeting of CD 6, and residents of the new district are likewise vocal, with a sharp split between the narrative elements in the core of CD 14 and in its new protrusion into Cobb.

- Northwest counties: mountain, rural, flooring, agriculture, manufacturing
- Western Cobb: urban, metro Atlanta, housing, living wage

These community testimonies make it clear that the changes to CD 6 and CD 14 lack justification by community-of-interest reasoning, in addition to the shortfalls in other traditional districting principles detailed above.

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[3] Daryl DeFord, Moon Duchin, and Justin Solomon, *Recombination: A family of Markov chains for redistricting.* **Harvard Data Science Review**, Issue 3.1, Winter 2021.

[4] Daryl DeFord, Moon Duchin, and Justin Solomon, *A computational approach to measuring vote elasticity and competitiveness.* **Statistics and Public Policy**. Vol 7, No. 1 (2020), 69–86.

[5] Moon Duchin and Doug Spencer, *Models, Race, and the Law*. **Yale Law Journal Forum**, Volume 130 (March 2021), 744–797.

[6] MGGG Redistricting Lab, *GerryChain Python Library*. GitHub Repository. `github.com/mggg/gerrychain`

A Race, ethnicity, and citizenship

In this report, I have used the abbreviation BVAP to denote the share of voting age population that is Black alone or in combination, sometimes called "Any Part Black" (or APB). I have similarly used BHVAP for the share of VAP that is Black and/or Latino, which corresponds to the coalition of Black and Hispanic voters (sometimes called the "BH Coalition") identified in the Georgia NAACP complaint. WVAP refers to non-Hispanic single-race White population, and POCVAP is the broader designation for people of color, i.e., the complement of WVAP.

To be precise, I construct use two data columns directly from the Table P4 of the 2020 Decennial PL 94-171 block-level summary files and construct two more data columns as combinations. Hispanic voting age population ("HVAP") and non-Hispanic single-race White voting age population ("WVAP") are directly found in the P4. The combination columns are non-Hispanic (Any Part) Black VAP ("BVAP") and Other VAP, i.e., VAP not covered by any of these other categories ("OVAP"). By construction, these columns are exhaustive and non-overlapping: they sum to total VAP on each geographic unit.

- HVAP: `P4_002N`
- WVAP: `P4_005N`
- BVAP: `P4_006N, P4_013N, P4_018N, P4_019N, P4_020N, P4_021N, P4_029N, P4_030N, P4_031N, P4_032N, P4_039N, P4_040N, P4_041N, P4_042N, P4_043N, P4_044N, P4_050N, P4_051N, P4_052N, P4_053N, P4_054N, P4_055N, P4_060N, P4_061N, P4_062N, P4_063N, P4_066N, P4_067N, P4_068N, P4_069N, P4_071N, P4_073N`
- OVAP: `P4_007N, P4_008N, P4_009N, P4_010N, P4_014N, P4_015N, P4_016N, P4_017N, P4_022N, P4_023N, P4_024N, P4_025N, P4_026N, P4_027N, P4_033N, P4_034N, P4_035N, P4_036N, P4_037N, P4_038N, P4_045N, P4_046N, P4_047N, P4_048N, P4_056N, P4_057N, P4_058N, P4_059N, P4_064N, P4_070N`

To provide the best available estimate of 2020 citizen voting age population (CVAP) at the Census block level, I am using a method based combining 2020 Decennial block-level data and 2016–2020 American Community Survey (ACS) tract-level data. Any use of CVAP with block-based districting plans will require some process of estimation and disaggregation, since no ACS data product is released at that fine of a geographical resolution.

To estimate CVAP within each census block, I have applied a fractional ratio to each of these VAP columns using the citizenship rate pulled from the ACS data on the tract containing that block. Because the ACS race and ethnicity categories are different from the PL, computing this ratio requires the use of slightly different categories. All of this is done at the tract level.

- Black citizenship ratios are computed by dividing Black-alone VAP from Table B01001B by Black-alone CVAP from Table B05003B.
- Hispanic citizenship ratios are computed by dividing Hispanic VAP from Table B03002 by Black-alone CVAP from Table B05003I.
- White citizenship ratios are computed by dividing non-Hispanic White-alone VAP obtained from Table B01001H by non-Hispanic White-alone CVAP from Table B05003H.
- Citizenship ratios for the remaining ("Other") population are computed by dividing VAP from Tables B01001C (American Indian and Alaska Native alone), B01001D (Asian alone), B01001E (Native Hawaiian and Other Pacific Islander alone), B01001F (some other race alone), and B01001G (two or more races) by CVAP from Tables B05003C (American Indian and Alaska Native alone), B05003D (Asian alone), B05003E (Native Hawaiian and Other Pacific Islander alone), B05003F (some other race alone), and B05003G (two or more races).

B Electoral alignment in enacted legislative districts

SD overall	James18P 0.4475	Thornton18P 0.4387	Thornton18R 0.5914	Robinson18P 0.6286
1	0.4433	0.4957	0.7139	0.6752
2	0.5568	0.5374	0.7615	0.7245
3	0.4584	0.4566	0.6166	0.6647
4	0.4623	0.4170	0.6421	0.6800
5	0.4936	0.4604	0.6270	0.6329
6	0.2972	0.3624	0.4717	0.4602
7	0.3938	0.4327	0.5822	0.5709
8	0.5279	0.4223	0.6146	0.7182
9	0.4538	0.4486	0.6139	0.6232
10	0.5598	0.5108	0.6838	0.7221
11	0.5288	0.4219	0.5478	0.7098
12	0.5799	0.4771	0.6412	0.7634
13	0.5179	0.4354	0.6145	0.6956
14	0.3038	0.3703	0.4698	0.4570
15	0.5986	0.4502	0.5850	0.7338
16	0.4067	0.3965	0.5079	0.6065
17	0.4657	0.4581	0.6708	0.6715
18	0.4640	0.4891	0.6682	0.6932
19	0.5054	0.3997	0.6575	0.7214
20	0.4927	0.4921	0.6914	0.7050
21	0.2963	0.3435	0.5124	0.5157
22	0.5166	0.4377	0.6833	0.8227
23	0.4968	0.4249	0.6008	0.7456
24	0.4130	0.4463	0.7078	0.6693
25	0.4637	0.4260	0.6856	0.6932
26	0.4774	0.4439	0.6412	0.7312
27	0.2496	0.3162	0.4106	0.4904
28	0.4009	0.4143	0.4920	0.6198
29	0.4688	0.4364	0.5429	0.6639
30	0.3894	0.4034	0.4942	0.5762
31	0.4240	0.4460	0.5191	0.6237
32	0.3194	0.3952	0.5222	0.5230
33	0.5027	0.5156	0.6489	0.6470
34	0.5442	0.4912	0.6096	0.7214
35	0.6049	0.5417	0.7203	0.7344
36	0.3695	0.4134	0.5483	0.5050
37	0.3844	0.4495	0.5609	0.5796
38	0.5098	0.5168	0.7062	0.6948
39	0.4440	0.4444	0.6169	0.6187
40	0.2682	0.3327	0.4241	0.4099
41	0.4428	0.4385	0.5589	0.5968
42	0.2535	0.3351	0.4253	0.3403
43	0.5653	0.5018	0.6758	0.7202
44	0.5251	0.4527	0.5758	0.6902
45	0.4180	0.4387	0.6042	0.6031
46	0.3485	0.3946	0.5390	0.4958
47	0.3936	0.4419	0.6317	0.5378
48	0.3193	0.3488	0.5000	0.5144
49	0.2888	0.3402	0.4099	0.5269
50	0.2810	0.3220	0.4726	0.5497
51	0.2086	0.2667	0.3339	0.4437
52	0.3299	0.3271	0.4704	0.5792
53	0.3509	0.2385	0.3498	0.5729
54	0.3703	0.2679	0.3982	0.5208
55	0.5590	0.5016	0.6908	0.6938
56	0.2273	0.3277	0.4283	0.4432

Table 44: Vote shares for the minority candidate of choice across enacted Senate districts, in probative primary and primary runoff elections.

SD	Clinton16	Abrams18	Thornton18	Biden20	Blackman20	Ossoff21	Warnock21	Abrams22
overall	0.4734	0.4930	0.4697	0.5013	0.4848	0.5061	0.5104	0.4620
1	0.3977	0.4165	0.3963	0.4339	0.4099	0.4311	0.4331	0.3858
2	0.7278	0.7447	0.7248	0.7304	0.7221	0.7420	0.7434	0.7147
3	0.3229	0.3285	0.3163	0.3399	0.3273	0.3382	0.3379	0.2963
4	0.3117	0.3132	0.2988	0.3342	0.3181	0.3377	0.3379	0.2911
5	0.7486	0.7767	0.7503	0.7347	0.7395	0.7698	0.7727	0.7034
6	0.5632	0.5785	0.5153	0.6174	0.5559	0.5662	0.5799	0.5438
7	0.5212	0.5621	0.5250	0.5855	0.5618	0.5848	0.5909	0.5308
8	0.3339	0.3362	0.3253	0.3520	0.3407	0.3507	0.3507	0.3009
9	0.5277	0.5723	0.5426	0.6035	0.5873	0.6158	0.6215	0.5702
10	0.7684	0.8024	0.7852	0.7981	0.8013	0.8195	0.8220	0.8060
11	0.3484	0.3360	0.3236	0.3526	0.3418	0.3512	0.3511	0.3039
12	0.5805	0.5771	0.5618	0.5816	0.5746	0.5894	0.5903	0.5448
13	0.2836	0.2791	0.2623	0.2964	0.2821	0.3023	0.3036	0.2581
14	0.5421	0.5624	0.5077	0.6012	0.5528	0.5666	0.5763	0.5314
15	0.6650	0.6714	0.6544	0.6680	0.6621	0.6801	0.6822	0.6461
16	0.3199	0.3332	0.3126	0.3586	0.3371	0.3568	0.3615	0.3225
17	0.3337	0.3650	0.3507	0.3978	0.3870	0.4080	0.4110	0.3883
18	0.3656	0.3743	0.3608	0.3893	0.3766	0.3965	0.3990	0.3559
19	0.2458	0.2345	0.2314	0.2516	0.2459	0.2568	0.2574	0.2109
20	0.3251	0.3238	0.3122	0.3437	0.3311	0.3499	0.3523	0.3094
21	0.2865	0.3041	0.2721	0.3369	0.3009	0.3235	0.3316	0.2773
22	0.6911	0.7080	0.6884	0.7123	0.7013	0.7168	0.7189	0.6855
23	0.4069	0.4078	0.3962	0.4254	0.4125	0.4307	0.4322	0.3864
24	0.3010	0.2990	0.2907	0.3274	0.3034	0.3240	0.3249	0.2740
25	0.3816	0.3938	0.3806	0.4089	0.3982	0.4205	0.4234	0.3818
26	0.6410	0.6479	0.6326	0.6434	0.6399	0.6560	0.6585	0.6157
27	0.2306	0.2612	0.2360	0.3076	0.2768	0.2975	0.3039	0.2511
28	0.2846	0.2997	0.2817	0.3250	0.3060	0.3286	0.3331	0.2939
29	0.3501	0.3549	0.3378	0.3749	0.3569	0.3773	0.3798	0.3372
30	0.2961	0.3061	0.2948	0.3150	0.3076	0.3274	0.3314	0.2807
31	0.2768	0.3101	0.3029	0.3328	0.3244	0.3459	0.3490	0.3132
32	0.3634	0.4061	0.3744	0.4355	0.4082	0.4287	0.4363	0.3836
33	0.6767	0.7146	0.6898	0.7124	0.7092	0.7252	0.7293	0.6895
34	0.8201	0.8472	0.8304	0.8271	0.8331	0.8498	0.8518	0.8280
35	0.7785	0.8159	0.7983	0.8186	0.8210	0.8382	0.8411	0.8255
36	0.9069	0.9164	0.8686	0.8962	0.8771	0.8925	0.8996	0.8846
37	0.3742	0.4120	0.3838	0.4453	0.4177	0.4387	0.4462	0.4002
38	0.8220	0.8415	0.8121	0.8282	0.8156	0.8320	0.8379	0.8082
39	0.8862	0.8936	0.8506	0.8816	0.8621	0.8753	0.8824	0.8574
40	0.5980	0.6152	0.5592	0.6483	0.5997	0.6141	0.6255	0.5808
41	0.8169	0.8319	0.8047	0.8254	0.8228	0.8350	0.8393	0.8062
42	0.8317	0.8430	0.7839	0.8482	0.8179	0.8295	0.8377	0.8234
43	0.6835	0.7249	0.7088	0.7349	0.7364	0.7558	0.7580	0.7420
44	0.8673	0.8878	0.8682	0.8702	0.8751	0.8906	0.8928	0.8748
45	0.3367	0.3775	0.3525	0.4139	0.3932	0.4170	0.4229	0.3773
46	0.3751	0.3889	0.3666	0.4078	0.3816	0.4034	0.4088	0.3555
47	0.3959	0.4052	0.3904	0.4072	0.3912	0.4156	0.4199	0.3668
48	0.4010	0.4363	0.3920	0.4836	0.4411	0.4685	0.4762	0.4131
49	0.2335	0.2530	0.2350	0.2763	0.2523	0.2718	0.2773	0.2211
50	0.1716	0.1672	0.1626	0.1855	0.1710	0.1867	0.1898	0.1443
51	0.1568	0.1558	0.1503	0.1751	0.1617	0.1759	0.1790	0.1420
52	0.2450	0.2550	0.2437	0.2659	0.2519	0.2723	0.2767	0.2241
53	0.1837	0.1858	0.1826	0.2012	0.1916	0.2054	0.2045	0.1628
54	0.2193	0.2168	0.2098	0.2346	0.2247	0.2371	0.2374	0.1745
55	0.7579	0.7925	0.7743	0.7945	0.7936	0.8113	0.8143	0.7873
56	0.3639	0.3944	0.3503	0.4373	0.3894	0.4108	0.4210	0.3738

Table 45: Vote shares for the minority candidate of choice across enacted Senate districts, in probative general and general runoff elections.

SD	Primaries out of 4	Generals out of 8	Effective?
1	3	0	N
2	4	8	Y
3	3	0	N
4	3	0	N
5	3	8	Y
6	0	8	N
7	3	8	Y
8	4	0	N
9	3	8	Y
10	4	8	Y
11	4	0	N
12	4	8	Y
13	4	0	N
14	0	8	N
15	4	8	Y
16	3	0	N
17	3	0	N
18	3	0	N
19	4	0	N
20	3	0	N
21	2	0	N
22	4	8	Y
23	3	0	N
24	3	0	N
25	3	0	N
26	3	8	Y
27	0	0	N
28	2	0	N
29	3	0	N
30	2	0	N
31	3	0	N
32	3	0	N
33	4	8	Y
34	4	8	Y
35	4	8	Y
36	3	8	Y
37	3	0	N
38	4	8	Y
39	3	8	Y
40	0	8	N
41	3	8	Y
42	0	8	N
43	4	8	Y
44	4	8	Y
45	3	0	N
46	1	0	N
47	3	0	N
48	1	0	N
49	1	0	N
50	1	0	N
51	0	0	N
52	1	0	N
53	1	0	N
54	1	0	N
55	4	8	Y
56	0	0	N

Table 46: By the standard of requiring that the candidate of choice could win or advance in at least three out of four primaries and win or advance in at least five out of eight generals, the enacted plan has 19 districts that present an effective opportunity.

HD	James18P	Thornton18P	Thornton18R	Robinson18P
overall	0.4475	0.4387	0.5914	0.6286
1	0.3468	0.2773	0.4029	0.5806
2	0.3558	0.2650	0.3670	0.5476
3	0.3294	0.2937	0.3945	0.5330
4	0.3601	0.2721	0.5187	0.5229
5	0.3824	0.2760	0.4076	0.5266
6	0.3668	0.2496	0.3206	0.5430
7	0.2157	0.2572	0.3352	0.4173
8	0.2022	0.2644	0.3595	0.4717
9	0.1832	0.2701	0.3345	0.4496
10	0.2252	0.3163	0.4472	0.5031
11	0.2662	0.2961	0.3401	0.4568
12	0.3671	0.1692	0.3117	0.6227
13	0.3179	0.3260	0.4630	0.5670
14	0.3256	0.3317	0.5040	0.5218
15	0.3293	0.3518	0.4445	0.5811
16	0.3558	0.3730	0.5240	0.6086
17	0.4020	0.4363	0.4991	0.6145
18	0.3103	0.3091	0.5047	0.5511
19	0.4618	0.4869	0.5659	0.6279
20	0.2834	0.3785	0.3855	0.5275
21	0.2883	0.3326	0.3384	0.5194
22	0.3529	0.4129	0.5129	0.5635
23	0.2889	0.3204	0.3621	0.5709
24	0.2767	0.3541	0.4194	0.5259
25	0.2764	0.2928	0.4603	0.4945
26	0.2398	0.2986	0.4209	0.4735
27	0.2327	0.3044	0.2517	0.5148
28	0.2492	0.3220	0.3758	0.4683
29	0.3352	0.3795	0.5442	0.5610
30	0.3077	0.3530	0.4525	0.4958
31	0.3087	0.3400	0.4837	0.5963
32	0.3446	0.3195	0.5192	0.6330
33	0.3395	0.4244	0.6565	0.5794
34	0.3583	0.4446	0.5187	0.5655
35	0.3881	0.4507	0.5930	0.5815
36	0.4031	0.4559	0.5856	0.5964
37	0.3663	0.4527	0.5860	0.5523
38	0.5367	0.5168	0.6730	0.6903
39	0.5356	0.5345	0.7106	0.6796
40	0.4201	0.4639	0.6151	0.5695
41	0.5164	0.5317	0.6492	0.6384
42	0.4493	0.4890	0.6054	0.5755
43	0.3315	0.4079	0.5049	0.5117
44	0.3052	0.3869	0.5337	0.5195
45	0.1732	0.3021	0.3752	0.3676
46	0.2382	0.3411	0.4515	0.4440
47	0.3159	0.3542	0.5339	0.5053
48	0.2947	0.3582	0.4743	0.4679
49	0.2675	0.3343	0.4887	0.4863
50	0.3267	0.3767	0.5004	0.5151
51	0.3394	0.3852	0.4882	0.4737
52	0.2679	0.3387	0.4328	0.4053
53	0.2273	0.3048	0.4342	0.3910
54	0.2550	0.3444	0.4524	0.4081
55	0.4218	0.4596	0.6718	0.6275
56	0.4356	0.4518	0.6229	0.6142
57	0.2056	0.3076	0.3972	0.2914
58	0.4452	0.4517	0.6291	0.6105
59	0.4683	0.4632	0.6531	0.6383
60	0.4578	0.4647	0.6671	0.6606

HD	James18P	Thornton18P	Thornton18R	Robinson18P
overall	0.4475	0.4387	0.5914	0.6286
61	0.5937	0.5530	0.7215	0.7307
62	0.4559	0.4616	0.6297	0.6200
63	0.4227	0.4396	0.5712	0.6002
64	0.4859	0.4774	0.5232	0.6528
65	0.5996	0.5377	0.7249	0.7187
66	0.5615	0.5117	0.6402	0.7097
67	0.5783	0.5225	0.7261	0.7275
68	0.5142	0.5104	0.6439	0.6898
69	0.5196	0.5166	0.6831	0.7079
70	0.4308	0.4351	0.5046	0.6431
71	0.3445	0.4125	0.5560	0.5556
72	0.3181	0.3598	0.4040	0.5030
73	0.3412	0.3844	0.4659	0.5790
74	0.4855	0.4752	0.6443	0.6397
75	0.5667	0.4732	0.5439	0.7273
76	0.5726	0.4532	0.5774	0.7483
77	0.5372	0.4834	0.6259	0.7376
78	0.5592	0.4792	0.5407	0.7231
79	0.5561	0.4554	0.5713	0.7240
80	0.2507	0.3075	0.3904	0.4083
81	0.2273	0.3192	0.4007	0.3411
82	0.1811	0.2948	0.3296	0.2414
83	0.2499	0.3328	0.4322	0.4258
84	0.4411	0.4548	0.6076	0.5958
85	0.4561	0.4392	0.5883	0.6138
86	0.4939	0.4612	0.6058	0.6512
87	0.5020	0.4629	0.5948	0.6599
88	0.4783	0.4613	0.6055	0.6211
89	0.3875	0.4030	0.5645	0.4889
90	0.3812	0.3969	0.5629	0.5003
91	0.5621	0.5012	0.7033	0.7132
92	0.5777	0.5069	0.6954	0.7293
93	0.5503	0.5024	0.6621	0.7124
94	0.5467	0.4912	0.6849	0.6899
95	0.5813	0.5091	0.7039	0.7160
96	0.4407	0.4533	0.6048	0.5762
97	0.3851	0.4260	0.5636	0.5440
98	0.4638	0.4516	0.6475	0.5829
99	0.3827	0.4466	0.5993	0.5637
100	0.3268	0.3356	0.4947	0.5489
101	0.4195	0.4367	0.5873	0.6026
102	0.4902	0.4578	0.6445	0.6531
103	0.3989	0.4094	0.5857	0.5902
104	0.4202	0.4445	0.5931	0.6166
105	0.4694	0.4604	0.6632	0.6422
106	0.4768	0.4844	0.6458	0.6273
107	0.4858	0.4463	0.6147	0.6542
108	0.3738	0.4246	0.5554	0.5502
109	0.4988	0.4650	0.5979	0.6304
110	0.5429	0.5042	0.6857	0.7014
111	0.4343	0.4549	0.6179	0.6180
112	0.3802	0.3856	0.4628	0.6032
113	0.5592	0.4986	0.6538	0.7211
114	0.3566	0.3820	0.5553	0.6116
115	0.5470	0.5100	0.6995	0.7163
116	0.5613	0.5113	0.6805	0.7260
117	0.4806	0.4765	0.6946	0.6856
118	0.4420	0.3747	0.5819	0.6716
119	0.3654	0.3998	0.4785	0.5577
120	0.3310	0.3982	0.5499	0.5099

HD	James18P	Thornton18P	Thornton18R	Robinson18P
overall	0.4475	0.4387	0.5914	0.6286
121	0.3056	0.3610	0.4634	0.4318
122	0.4470	0.4828	0.7316	0.5336
123	0.4482	0.4759	0.8210	0.6795
124	0.3929	0.3945	0.5134	0.6158
125	0.4979	0.4484	0.5532	0.7290
126	0.5713	0.4653	0.7136	0.8431
127	0.3885	0.4146	0.5601	0.6759
128	0.4836	0.3572	0.6819	0.7292
129	0.4788	0.4262	0.6829	0.7876
130	0.5291	0.4322	0.6676	0.8300
131	0.4561	0.4564	0.6071	0.6988
132	0.5114	0.4534	0.7072	0.8308
133	0.4708	0.4428	0.7327	0.7101
134	0.4537	0.3415	0.4744	0.6571
135	0.4414	0.3509	0.4942	0.6575
136	0.4119	0.4498	0.5770	0.6639
137	0.5831	0.4497	0.6210	0.7196
138	0.4087	0.4060	0.4642	0.6087
139	0.4801	0.3999	0.4545	0.6473
140	0.6020	0.4426	0.5277	0.7298
141	0.6424	0.4599	0.5801	0.7533
142	0.4658	0.4625	0.6520	0.7214
143	0.4642	0.4872	0.6748	0.7412
144	0.4126	0.4350	0.6166	0.6729
145	0.4565	0.5158	0.6740	0.7167
146	0.5166	0.5594	0.7649	0.6930
147	0.5096	0.5585	0.7068	0.6984
148	0.5185	0.4879	0.6815	0.6956
149	0.4570	0.3824	0.5110	0.6894
150	0.5420	0.5120	0.7376	0.7507
151	0.5465	0.4851	0.6725	0.7150
152	0.5542	0.4701	0.6164	0.7292
153	0.6069	0.4804	0.6392	0.7999
154	0.5679	0.4636	0.6112	0.7543
155	0.4790	0.4310	0.6517	0.6845
156	0.5283	0.4362	0.6620	0.7356
157	0.4885	0.3890	0.6939	0.7202
158	0.4889	0.3914	0.6253	0.7098
159	0.4596	0.3947	0.6056	0.6965
160	0.4117	0.3911	0.5455	0.6332
161	0.5543	0.5195	0.7135	0.7036
162	0.6043	0.5636	0.7874	0.7517
163	0.4945	0.5148	0.7413	0.6811
164	0.4995	0.5290	0.7585	0.6963
165	0.5689	0.5359	0.7661	0.7381
166	0.2755	0.4103	0.6313	0.5219
167	0.4840	0.4765	0.6980	0.7241
168	0.5505	0.5425	0.7834	0.7886
169	0.5063	0.3686	0.5592	0.6991
170	0.4510	0.4272	0.5020	0.6678
171	0.5049	0.4272	0.5864	0.7274
172	0.5519	0.4134	0.5872	0.6544
173	0.5511	0.4509	0.6016	0.7408
174	0.5238	0.3752	0.5566	0.6716
175	0.5392	0.3988	0.5253	0.7350
176	0.5464	0.4061	0.6065	0.7292
177	0.5448	0.4450	0.6370	0.7407
178	0.4627	0.4045	0.6920	0.6940
179	0.4151	0.4621	0.5945	0.6310
180	0.4609	0.4587	0.6255	0.6534

Table 47: Vote shares for the minority candidate of choice across enacted House districts, in probative primary and primary runoff elections.

HD	Clinton16	Abrams18	Thornton18	Biden20	Blackman20	Ossoff21	Warnock21	Abrams22
overall	0.4734	0.4930	0.4697	0.5013	0.4848	0.5061	0.5104	0.4620
1	0.1933	0.1964	0.1938	0.2104	0.2009	0.2160	0.2146	0.1736
2	0.1696	0.1670	0.1635	0.1901	0.1768	0.1895	0.1876	0.1425
3	0.1908	0.2018	0.1943	0.2221	0.2099	0.2233	0.2222	0.1816
4	0.3589	0.3633	0.3440	0.3835	0.3672	0.3806	0.3808	0.2906
5	0.1716	0.1733	0.1685	0.1855	0.1785	0.1926	0.1950	0.1482
6	0.1564	0.1457	0.1481	0.1641	0.1586	0.1679	0.1671	0.1177
7	0.1661	0.1629	0.1575	0.1807	0.1687	0.1815	0.1850	0.1469
8	0.1659	0.1600	0.1576	0.1819	0.1701	0.1815	0.1840	0.1422
9	0.1473	0.1523	0.1457	0.1695	0.1522	0.1705	0.1732	0.1391
10	0.1672	0.1675	0.1588	0.1859	0.1688	0.1864	0.1913	0.1485
11	0.1461	0.1550	0.1446	0.1868	0.1694	0.1863	0.1912	0.1552
12	0.1978	0.1895	0.1887	0.1945	0.1906	0.2069	0.2083	0.1607
13	0.3298	0.3437	0.3215	0.3537	0.3310	0.3571	0.3629	0.3015
14	0.1708	0.1768	0.1703	0.1916	0.1809	0.1941	0.1984	0.1604
15	0.2542	0.2749	0.2634	0.2863	0.2749	0.2949	0.2993	0.2417
16	0.2016	0.2083	0.2047	0.2237	0.2152	0.2305	0.2332	0.1941
17	0.2784	0.3264	0.3170	0.3580	0.3498	0.3747	0.3780	0.3411
18	0.1598	0.1479	0.1441	0.1598	0.1563	0.1653	0.1678	0.1314
19	0.3142	0.3525	0.3443	0.3762	0.3661	0.3887	0.3918	0.3614
20	0.2608	0.2975	0.2696	0.3349	0.3055	0.3261	0.3332	0.2815
21	0.2096	0.2398	0.2148	0.2772	0.2455	0.2657	0.2720	0.2304
22	0.3498	0.4004	0.3760	0.4163	0.3967	0.4206	0.4264	0.3756
23	0.2017	0.2210	0.2039	0.2563	0.2340	0.2535	0.2591	0.2129
24	0.2901	0.3324	0.2988	0.3727	0.3386	0.3622	0.3678	0.2989
25	0.3541	0.3882	0.3448	0.4409	0.3962	0.4224	0.4298	0.3655
26	0.2422	0.2709	0.2435	0.3235	0.2896	0.3113	0.3189	0.2710
27	0.1564	0.1633	0.1496	0.1884	0.1667	0.1841	0.1893	0.1452
28	0.1767	0.1985	0.1815	0.2357	0.2110	0.2273	0.2329	0.1893
29	0.3920	0.4240	0.3990	0.4239	0.4015	0.4255	0.4307	0.3557
30	0.2252	0.2501	0.2331	0.2841	0.2603	0.2785	0.2838	0.2300
31	0.2004	0.2126	0.2029	0.2409	0.2226	0.2442	0.2488	0.1925
32	0.1592	0.1546	0.1529	0.1702	0.1564	0.1731	0.1750	0.1345
33	0.1991	0.1743	0.1765	0.1948	0.1799	0.1959	0.1953	0.1486
34	0.3454	0.3777	0.3462	0.4205	0.3864	0.4055	0.4157	0.3698
35	0.5063	0.5603	0.5316	0.5726	0.5567	0.5802	0.5855	0.5361
36	0.3216	0.3596	0.3321	0.4022	0.3696	0.3928	0.3994	0.3632
37	0.5623	0.5933	0.5531	0.6113	0.5847	0.5981	0.6078	0.5507
38	0.6765	0.7229	0.7053	0.7243	0.7253	0.7453	0.7473	0.7174
39	0.7614	0.7930	0.7682	0.7876	0.7846	0.7991	0.8049	0.7703
40	0.6071	0.6417	0.5949	0.6673	0.6238	0.6387	0.6495	0.6207
41	0.6887	0.7199	0.6951	0.7105	0.7106	0.7256	0.7296	0.6856
42	0.6871	0.7282	0.6885	0.7158	0.6889	0.7108	0.7182	0.6714
43	0.5624	0.5885	0.5483	0.6073	0.5730	0.5827	0.5927	0.5436
44	0.3820	0.4236	0.3907	0.4598	0.4305	0.4536	0.4613	0.4096
45	0.4039	0.4203	0.3637	0.4792	0.4134	0.4354	0.4477	0.3997
46	0.3774	0.4098	0.3682	0.4495	0.4039	0.4254	0.4351	0.3895
47	0.3868	0.4048	0.3595	0.4440	0.3963	0.4171	0.4276	0.3688
48	0.4381	0.4625	0.4120	0.5147	0.4624	0.4779	0.4885	0.4344
49	0.4092	0.4330	0.3806	0.4801	0.4246	0.4420	0.4538	0.4029
50	0.5185	0.5558	0.5026	0.5939	0.5521	0.5784	0.5861	0.5154
51	0.5509	0.5728	0.5274	0.6082	0.5683	0.5811	0.5899	0.5407
52	0.5759	0.5938	0.5291	0.6361	0.5801	0.5957	0.6081	0.5697
53	0.4972	0.4992	0.4281	0.5478	0.4745	0.4843	0.4998	0.4548
54	0.5540	0.5641	0.4946	0.6104	0.5455	0.5555	0.5673	0.5443
55	0.8132	0.8121	0.7562	0.8169	0.7764	0.7909	0.8021	0.7662
56	0.9113	0.9249	0.8807	0.8971	0.8775	0.8976	0.9038	0.8875
57	0.7942	0.8025	0.7157	0.8092	0.7539	0.7714	0.7843	0.7610
58	0.9398	0.9511	0.9154	0.9213	0.9117	0.9269	0.9321	0.9165
59	0.9503	0.9603	0.9291	0.9337	0.9292	0.9425	0.9466	0.9307
60	0.8139	0.8069	0.7617	0.8065	0.7758	0.7868	0.7968	0.7698

HD	Clinton16	Abrams18	Thornton18	Biden20	Blackman20	Ossoff21	Warnock21	Abrams22
overall	0.4734	0.4930	0.4697	0.5013	0.4848	0.5061	0.5104	0.4620
61	0.8241	0.8575	0.8407	0.8504	0.8538	0.8683	0.8707	0.8555
62	0.9354	0.9434	0.9127	0.9254	0.9223	0.9341	0.9382	0.9188
63	0.9197	0.9279	0.8967	0.9085	0.9071	0.9182	0.9243	0.9017
64	0.3449	0.3899	0.3757	0.4259	0.4177	0.4440	0.4476	0.4247
65	0.6646	0.6994	0.6807	0.6976	0.6952	0.7127	0.7158	0.6883
66	0.6077	0.6610	0.6389	0.6899	0.6851	0.7115	0.7159	0.6952
67	0.6289	0.6633	0.6473	0.6617	0.6560	0.6770	0.6798	0.6488
68	0.5991	0.6305	0.6067	0.6502	0.6395	0.6468	0.6521	0.6215
69	0.7034	0.7388	0.7190	0.7409	0.7350	0.7550	0.7586	0.7380
70	0.3758	0.3878	0.3663	0.3830	0.3655	0.3904	0.3953	0.3484
71	0.3046	0.3209	0.3107	0.3286	0.3192	0.3466	0.3510	0.3045
72	0.2982	0.2866	0.2703	0.2858	0.2713	0.2873	0.2928	0.2350
73	0.2814	0.3012	0.2764	0.3612	0.3306	0.3509	0.3572	0.3125
74	0.3228	0.3558	0.3379	0.3842	0.3665	0.3878	0.3907	0.3604
75	0.8667	0.8906	0.8739	0.8644	0.8755	0.8929	0.8952	0.8733
76	0.8631	0.8796	0.8639	0.8499	0.8607	0.8808	0.8811	0.8610
77	0.9074	0.9236	0.9083	0.8944	0.9071	0.9221	0.9225	0.9037
78	0.7907	0.8215	0.8039	0.8163	0.8228	0.8375	0.8394	0.8223
79	0.8973	0.9123	0.8980	0.8806	0.8897	0.9056	0.9076	0.8831
80	0.5608	0.5777	0.5197	0.6162	0.5677	0.5827	0.5954	0.5473
81	0.6692	0.6877	0.6319	0.7157	0.6752	0.6884	0.6986	0.6678
82	0.7751	0.7927	0.7267	0.8052	0.7682	0.7819	0.7896	0.7828
83	0.6124	0.6329	0.5664	0.6586	0.5979	0.6178	0.6302	0.5951
84	0.9388	0.9450	0.9161	0.9332	0.9290	0.9364	0.9400	0.9210
85	0.9148	0.9267	0.9000	0.9007	0.9017	0.9161	0.9205	0.8964
86	0.9067	0.9202	0.9000	0.8970	0.9028	0.9143	0.9164	0.8891
87	0.8855	0.8969	0.8781	0.8808	0.8870	0.8973	0.9008	0.8691
88	0.8094	0.8265	0.8039	0.8184	0.8179	0.8302	0.8349	0.8024
89	0.9211	0.9255	0.8819	0.9191	0.9027	0.9116	0.9178	0.8978
90	0.9421	0.9516	0.9131	0.9405	0.9290	0.9385	0.9436	0.9290
91	0.7506	0.7869	0.7695	0.7855	0.7884	0.8036	0.8059	0.7915
92	0.6898	0.7382	0.7204	0.7609	0.7621	0.7773	0.7799	0.7717
93	0.7088	0.7398	0.7225	0.7465	0.7464	0.7659	0.7673	0.7439
94	0.7994	0.8186	0.8009	0.8198	0.8178	0.8312	0.8348	0.8076
95	0.7589	0.7961	0.7794	0.7942	0.7960	0.8103	0.8128	0.7867
96	0.6513	0.6831	0.6515	0.6687	0.6620	0.6836	0.6874	0.6247
97	0.6033	0.6323	0.5956	0.6397	0.6211	0.6376	0.6447	0.5854
98	0.7760	0.7949	0.7669	0.7465	0.7543	0.7825	0.7838	0.7174
99	0.4465	0.4861	0.4466	0.5278	0.4934	0.5205	0.5277	0.4671
100	0.3134	0.3485	0.3175	0.3988	0.3652	0.3912	0.3971	0.3392
101	0.4962	0.5465	0.5164	0.5636	0.5501	0.5769	0.5820	0.5249
102	0.5983	0.6426	0.6164	0.6569	0.6486	0.6771	0.6822	0.6240
103	0.3596	0.4033	0.3775	0.4331	0.4076	0.4308	0.4375	0.3809
104	0.2771	0.3149	0.2929	0.3617	0.3402	0.3650	0.3717	0.3332
105	0.4671	0.5206	0.4938	0.5442	0.5317	0.5602	0.5643	0.5130
106	0.4991	0.5508	0.5231	0.5940	0.5767	0.6043	0.6103	0.5715
107	0.6770	0.7132	0.6840	0.6943	0.6943	0.7215	0.7255	0.6621
108	0.4720	0.5095	0.4750	0.5523	0.5274	0.5540	0.5613	0.5046
109	0.7727	0.7966	0.7724	0.7461	0.7521	0.7864	0.7876	0.7234
110	0.5260	0.5994	0.5794	0.6408	0.6309	0.6597	0.6628	0.6410
111	0.2454	0.2958	0.2852	0.3471	0.3360	0.3544	0.3570	0.3372
112	0.2275	0.2296	0.2196	0.2397	0.2282	0.2442	0.2475	0.2099
113	0.6532	0.6987	0.6850	0.6957	0.6991	0.7251	0.7280	0.7106
114	0.2932	0.2988	0.2835	0.3142	0.2978	0.3200	0.3230	0.2860
115	0.5282	0.5709	0.5501	0.6104	0.6051	0.6234	0.6266	0.6147
116	0.6253	0.6895	0.6709	0.7015	0.7027	0.7221	0.7253	0.7196
117	0.3607	0.4204	0.4064	0.4769	0.4683	0.4937	0.4975	0.4951
118	0.2642	0.2664	0.2585	0.2726	0.2618	0.2850	0.2880	0.2507
119	0.2336	0.2457	0.2336	0.2721	0.2574	0.2797	0.2837	0.2422
120	0.4324	0.4353	0.4134	0.4490	0.4169	0.4440	0.4503	0.3964

HD	Clinton16	Abrams18	Thornton18	Biden20	Blackman20	Ossoff21	Warnock21	Abrams22
overall	0.4734	0.4930	0.4697	0.5013	0.4848	0.5061	0.5104	0.4620
121	0.4383	0.4382	0.4077	0.4598	0.4194	0.4425	0.4503	0.3852
122	0.7829	0.7982	0.7689	0.7877	0.7720	0.7958	0.8010	0.7655
123	0.3145	0.3023	0.3153	0.3195	0.3085	0.3193	0.3201	0.2736
124	0.3911	0.3841	0.3675	0.3980	0.3772	0.3936	0.3977	0.3395
125	0.3124	0.3380	0.3252	0.3750	0.3549	0.3784	0.3799	0.3423
126	0.6195	0.6212	0.6115	0.6197	0.6170	0.6298	0.6306	0.5894
127	0.3225	0.3389	0.3158	0.3749	0.3415	0.3649	0.3670	0.3174
128	0.5105	0.4989	0.4858	0.5025	0.4954	0.5098	0.5121	0.4545
129	0.6726	0.6733	0.6496	0.6856	0.6669	0.6835	0.6858	0.6342
130	0.6627	0.6813	0.6665	0.6839	0.6797	0.6947	0.6961	0.6730
131	0.2932	0.3217	0.2997	0.3670	0.3357	0.3639	0.3641	0.3232
132	0.6975	0.7065	0.6918	0.7024	0.6986	0.7175	0.7190	0.6724
133	0.4584	0.4527	0.4383	0.4561	0.4454	0.4705	0.4721	0.4204
134	0.3675	0.3622	0.3475	0.3672	0.3605	0.3794	0.3828	0.3402
135	0.2684	0.2653	0.2567	0.2640	0.2550	0.2713	0.2743	0.2254
136	0.3509	0.3549	0.3395	0.3499	0.3372	0.3571	0.3602	0.3056
137	0.5805	0.5883	0.5698	0.5897	0.5831	0.5999	0.6011	0.5656
138	0.2761	0.2729	0.2548	0.2985	0.2726	0.2949	0.2984	0.2546
139	0.3343	0.3473	0.3308	0.3915	0.3689	0.3872	0.3890	0.3475
140	0.7512	0.7692	0.7519	0.7471	0.7411	0.7654	0.7690	0.7451
141	0.7217	0.7419	0.7220	0.7370	0.7310	0.7494	0.7512	0.7280
142	0.6564	0.6705	0.6484	0.6687	0.6552	0.6724	0.6763	0.6316
143	0.7177	0.7223	0.7033	0.7099	0.7054	0.7228	0.7259	0.6915
144	0.3572	0.3620	0.3428	0.3923	0.3715	0.3905	0.3925	0.3457
145	0.4030	0.4083	0.3992	0.4182	0.4120	0.4290	0.4312	0.3886
146	0.3306	0.3558	0.3402	0.3840	0.3693	0.3930	0.3953	0.3570
147	0.3990	0.4414	0.4271	0.4662	0.4544	0.4793	0.4812	0.4429
148	0.3283	0.3167	0.2980	0.3276	0.3106	0.3286	0.3313	0.2913
149	0.3423	0.3256	0.3176	0.3348	0.3292	0.3441	0.3469	0.2964
150	0.5595	0.5496	0.5339	0.5455	0.5386	0.5543	0.5562	0.5107
151	0.4838	0.4720	0.4577	0.4809	0.4740	0.4877	0.4887	0.4452
152	0.2738	0.2855	0.2758	0.3017	0.2909	0.3123	0.3129	0.2793
153	0.6728	0.6798	0.6597	0.6825	0.6741	0.6887	0.6899	0.6593
154	0.5464	0.5383	0.5280	0.5377	0.5321	0.5504	0.5500	0.4931
155	0.3457	0.3279	0.3206	0.3489	0.3391	0.3541	0.3561	0.3130
156	0.2945	0.2829	0.2767	0.2976	0.2881	0.3012	0.3035	0.2486
157	0.2481	0.2370	0.2320	0.2511	0.2443	0.2572	0.2571	0.2076
158	0.3531	0.3412	0.3271	0.3492	0.3342	0.3512	0.3518	0.3047
159	0.3003	0.2928	0.2800	0.3045	0.2930	0.3104	0.3109	0.2651
160	0.3265	0.3052	0.2884	0.3178	0.2973	0.3121	0.3135	0.2560
161	0.3246	0.3679	0.3595	0.4068	0.3958	0.4200	0.4201	0.3897
162	0.6504	0.6870	0.6742	0.6721	0.6678	0.6893	0.6901	0.6576
163	0.7214	0.7313	0.7059	0.7266	0.7115	0.7291	0.7314	0.7008
164	0.3635	0.4190	0.4034	0.4286	0.4113	0.4347	0.4347	0.4062
165	0.7896	0.7899	0.7685	0.7803	0.7735	0.7851	0.7863	0.7540
166	0.3116	0.3135	0.2834	0.3470	0.3045	0.3300	0.3332	0.2844
167	0.3045	0.3125	0.3004	0.3268	0.3189	0.3377	0.3379	0.3008
168	0.6098	0.6350	0.6245	0.6225	0.6212	0.6460	0.6479	0.6024
169	0.2743	0.2641	0.2464	0.2767	0.2666	0.2806	0.2818	0.2370
170	0.2733	0.2610	0.2441	0.2846	0.2676	0.2881	0.2895	0.2362
171	0.3926	0.3819	0.3710	0.3957	0.3904	0.3953	0.3957	0.3469
172	0.2734	0.2564	0.2462	0.2732	0.2611	0.2760	0.2768	0.2273
173	0.4058	0.4008	0.3840	0.4191	0.4031	0.4133	0.4130	0.3706
174	0.2137	0.1984	0.1977	0.2076	0.2026	0.2085	0.2081	0.1994
175	0.3533	0.3524	0.3397	0.3565	0.3446	0.3541	0.3540	0.3100
176	0.2848	0.2806	0.2734	0.2866	0.2793	0.2936	0.2944	0.2505
177	0.5211	0.5375	0.5169	0.5718	0.5553	0.5697	0.5701	0.4892
178	0.1589	0.1447	0.1453	0.1585	0.1527	0.1624	0.1611	0.1272
179	0.3945	0.3937	0.3756	0.4203	0.4002	0.4030	0.4039	0.3524
180	0.3210	0.3373	0.3262	0.3423	0.3286	0.3438	0.3420	0.2955

Table 48: Vote shares for the minority candidate of choice across enacted House districts, in probative general and general runoff elections.

HD	Pri (4)	Gen (8)	Eff?
1	1	0	N
2	1	0	N
3	1	0	N
4	2	0	N
5	1	0	N
6	1	0	N
7	0	0	N
8	0	0	N
9	0	0	N
10	1	0	N
11	0	0	N
12	1	0	N
13	1	0	N
14	2	0	N
15	2	0	N
16	3	0	N
17	2	0	N
18	2	0	N
19	3	0	N
20	1	0	N
21	1	0	N
22	3	0	N
23	1	0	N
24	1	0	N
25	0	0	N
26	0	0	N
27	1	0	N
28	0	0	N
29	2	0	N
30	0	0	N
31	1	0	N
32	2	0	N
33	3	0	N
34	3	0	N
35	3	8	Y
36	3	0	N
37	3	8	Y
38	4	8	Y
39	4	8	Y
40	3	8	Y
41	4	8	Y
42	3	8	Y
43	3	8	Y
44	2	0	N
45	0	0	N
46	0	0	N
47	2	0	N
48	0	1	N
49	0	0	N
50	2	8	N
51	0	8	N
52	0	8	N
53	0	1	N
54	0	7	N
55	3	8	Y
56	3	8	Y
57	0	8	N
58	3	8	Y
59	3	8	Y
60	3	8	Y

HD	Pri (4)	Gen (8)	Eff?
61	4	8	Y
62	3	8	Y
63	3	8	Y
64	3	0	N
65	4	8	Y
66	4	8	Y
67	4	8	Y
68	4	8	Y
69	4	8	Y
70	3	0	N
71	3	0	N
72	1	0	N
73	2	0	N
74	3	0	N
75	4	8	Y
76	4	8	Y
77	4	8	Y
78	4	8	Y
79	4	8	Y
80	0	8	N
81	0	8	N
82	0	8	N
83	0	8	N
84	3	8	Y
85	3	8	Y
86	3	8	Y
87	4	8	Y
88	3	8	Y
89	2	8	N
90	2	8	N
91	4	8	Y
92	4	8	Y
93	4	8	Y
94	4	8	Y
95	4	8	Y
96	3	8	Y
97	3	8	Y
98	3	8	Y
99	3	3	N
100	1	0	N
101	3	7	Y
102	3	8	Y
103	3	0	N
104	3	0	N
105	3	6	Y
106	3	7	Y
107	3	8	Y
108	3	6	Y
109	3	8	Y
110	4	8	Y
111	3	0	N
112	1	0	N
113	4	8	Y
114	3	0	N
115	4	8	Y
116	4	8	Y
117	3	0	N
118	3	0	N
119	2	0	N
120	2	0	N

HD	Pri (4)	Gen (8)	Eff?
121	0	0	N
122	3	8	Y
123	3	0	N
124	2	0	N
125	3	0	N
126	4	8	Y
127	3	0	N
128	2	4	N
129	3	8	Y
130	4	8	Y
131	3	0	N
132	4	8	Y
133	3	0	N
134	1	0	N
135	1	0	N
136	3	0	N
137	4	8	Y
138	2	0	N
139	2	0	N
140	4	8	Y
141	4	8	Y
142	3	8	Y
143	3	8	Y
144	3	0	N
145	3	0	N
146	4	0	N
147	4	0	N
148	4	0	N
149	2	0	N
150	4	8	Y
151	4	0	N
152	4	0	N
153	4	8	Y
154	4	7	Y
155	3	0	N
156	4	0	N
157	3	0	N
158	2	0	N
159	2	0	N
160	2	0	N
161	4	0	N
162	4	8	Y
163	3	8	Y
164	3	0	N
165	4	8	Y
166	3	0	N
167	3	0	N
168	4	8	Y
169	3	0	N
170	3	0	N
171	4	0	N
172	4	0	N
173	4	0	N
174	3	0	N
175	4	0	N
176	4	0	N
177	4	7	Y
178	3	0	N
179	3	0	N
180	3	0	N

Table 49: Of 180 enacted House districts, 69 are rated as providing an effective opportunity to elect coalition candidates of choice.

	CD Alt			
CD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
1	30.3%	37.2%	3	0
2	47.7%	52.4%	4	8
3	51.2%	58.4%	4	8
4	50.6%	58.8%	3	8
5	50.1%	61.5%	3	8
6	13.7%	24.6%	0	3
7	34.3%	56.7%	3	8
8	27.3%	34.2%	4	0
9	4.6%	16.1%	0	0
10	17.6%	24.5%	3	0
11	17.6%	25.2%	2	0
12	39.2%	43.8%	3	0
13	52.0%	58.8%	4	8
14	7.6%	18.6%	1	0

Table 50: CD Alt effectiveness.

	SD Alt Eff 1			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
1	25.1%	32.6%	3	0
2	46.9%	54.4%	4	8
3	21.2%	27.4%	3	0
4	23.5%	29.0%	3	0
5	20.3%	54.9%	3	8
6	50.1%	56.2%	3	8
7	17.1%	31.4%	3	3
8	30.4%	36.6%	4	0
9	29.3%	56.3%	3	8
10	59.5%	70.5%	4	8
11	31.0%	38.6%	4	0
12	58.0%	61.5%	4	8
13	27.0%	33.0%	4	0
14	18.1%	29.5%	0	8
15	54.0%	60.6%	4	8
16	50.2%	56.4%	4	8
17	51.1%	57.7%	4	8
18	30.4%	34.9%	3	0
19	25.7%	34.1%	4	0
20	34.4%	39.5%	3	0
21	7.5%	16.3%	2	0
22	50.5%	54.3%	4	8
23	23.0%	28.6%	3	0
24	25.0%	28.5%	3	0
25	50.0%	54.0%	3	8
26	50.1%	53.8%	4	8
27	4.7%	14.9%	0	0
28	50.6%	57.4%	4	8
29	26.9%	31.4%	3	0
30	14.3%	19.4%	1	0
31	19.7%	26.9%	3	0
32	14.9%	25.4%	3	0
33	50.4%	68.5%	4	8
34	72.2%	83.8%	4	8
35	50.9%	58.9%	4	8
36	50.0%	55.7%	1	8
37	19.3%	28.0%	3	0
38	27.9%	43.3%	3	8
39	51.2%	56.6%	4	8
40	50.1%	67.8%	3	8
41	57.3%	67.3%	3	8
42	35.8%	45.4%	0	8
43	52.0%	59.0%	4	8
44	61.6%	65.2%	3	8
45	19.8%	31.9%	3	0
46	16.5%	21.5%	2	0
47	16.7%	25.4%	3	0
48	10.1%	16.5%	0	1
49	8.1%	32.7%	1	0
50	5.4%	11.5%	1	0
51	1.2%	5.5%	0	0
52	13.0%	21.2%	1	0
53	5.1%	8.3%	1	0
54	3.8%	26.4%	1	0
55	50.0%	63.9%	4	8
56	7.6%	15.3%	0	0

Table 51: Effectiveness in SD Alt Eff 1, which includes the Alt 1 Gingles maps.

	SD Alt Eff 2			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
1	25.1%	32.6%	3	0
2	46.9%	54.4%	4	8
3	21.2%	27.4%	3	0
4	23.4%	28.9%	3	0
5	29.9%	71.6%	3	8
6	23.9%	32.1%	0	8
7	21.4%	38.0%	3	8
8	30.4%	36.6%	4	0
9	29.5%	48.3%	3	8
10	71.5%	76.7%	4	8
11	31.0%	38.6%	4	0
12	58.0%	61.5%	4	8
13	27.0%	33.0%	4	0
14	19.0%	31.1%	0	8
15	54.0%	60.6%	4	8
16	22.7%	27.7%	3	0
17	32.0%	37.1%	3	0
18	30.4%	34.9%	3	0
19	25.7%	34.1%	4	0
20	31.3%	34.8%	3	0
21	7.5%	16.3%	2	0
22	56.5%	61.8%	4	8
23	35.5%	40.0%	3	0
24	19.9%	24.3%	3	0
25	33.5%	37.2%	3	0
26	57.0%	61.2%	3	8
27	5.0%	15.2%	0	0
28	19.5%	25.9%	2	0
29	26.9%	31.4%	3	0
30	20.9%	27.0%	2	0
31	20.7%	28.1%	3	0
32	14.9%	25.4%	3	0
33	43.0%	65.9%	4	8
34	69.5%	82.2%	4	8
35	71.9%	79.4%	4	8
36	51.3%	58.4%	3	8
37	19.3%	28.0%	3	0
38	65.3%	73.7%	4	8
39	60.7%	66.3%	3	8
40	19.2%	40.8%	0	8
41	62.6%	69.3%	3	8
42	30.8%	39.4%	0	8
43	64.3%	71.2%	4	8
44	71.3%	79.9%	4	8
45	18.6%	31.7%	3	0
46	16.9%	23.9%	1	0
47	17.4%	27.0%	3	0
48	9.5%	16.5%	1	0
49	8.0%	29.9%	1	0
50	5.6%	14.4%	1	0
51	1.2%	5.5%	0	0
52	13.0%	21.2%	1	0
53	5.1%	8.3%	1	0
54	3.8%	26.4%	1	0
55	66.0%	74.7%	4	8
56	7.6%	15.3%	0	0

Table 52: Effectiveness in SD Alt Eff 2, which includes the Alt 2 Gingles maps.

	HD Alt Eff 1 Part 1			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
1	4.2%	6.3%	1	0
2	3.2%	10.8%	1	0
3	3.4%	6.4%	1	0
4	5.4%	49.5%	2	0
5	4.6%	17.2%	1	0
6	1.5%	13.5%	1	0
7	0.6%	6.1%	0	0
8	1.4%	4.1%	0	0
9	1.6%	6.3%	0	0
10	3.7%	13.7%	1	0
11	1.8%	6.0%	0	0
12	9.7%	15.9%	1	0
13	19.2%	30.0%	1	0
14	6.8%	12.7%	2	0
15	14.2%	23.9%	2	0
16	11.7%	20.3%	3	0
17	23.0%	29.9%	2	0
18	8.0%	10.4%	2	0
19	24.1%	30.9%	3	0
20	9.3%	18.5%	1	0
21	5.1%	12.5%	1	0
22	15.1%	26.7%	3	0
23	6.5%	20.7%	1	0
24	7.0%	17.3%	1	0
25	5.9%	11.0%	0	0
26	4.0%	14.8%	0	0
27	3.7%	13.3%	1	0
28	3.9%	15.3%	0	0
29	13.6%	53.3%	2	0
30	8.1%	24.2%	0	0
31	7.6%	26.5%	1	0
32	8.0%	12.9%	2	0
33	11.2%	14.3%	3	0
34	15.7%	23.5%	3	0
35	28.4%	39.6%	3	8
36	17.0%	23.5%	3	0
37	28.2%	46.8%	3	8
38	54.2%	66.8%	4	8
39	55.3%	74.0%	4	8
40	33.0%	38.9%	3	8
41	39.4%	68.0%	4	8
42	33.7%	51.1%	3	8
43	26.5%	40.6%	3	8
44	12.0%	22.5%	2	0
45	5.3%	10.2%	0	0
46	8.1%	15.5%	0	0
47	10.7%	18.1%	2	0
48	11.8%	24.2%	0	1
49	8.4%	15.1%	0	0
50	12.4%	18.8%	2	8
51	23.7%	37.0%	0	8
52	16.0%	23.4%	0	8
53	14.5%	21.9%	0	1
54	15.5%	28.3%	0	7
55	55.4%	60.4%	3	8
56	45.5%	51.3%	3	8
57	18.1%	26.1%	0	8
58	63.0%	68.1%	3	8
59	70.1%	74.5%	3	8
60	63.9%	69.0%	3	8

	HD Alt Eff 1 Part 2			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
61	74.3%	81.9%	4	8
62	72.3%	79.1%	3	8
63	69.3%	78.6%	3	8
64	30.7%	38.1%	3	0
65	62.0%	66.5%	4	8
66	53.4%	62.9%	4	8
67	58.9%	66.7%	4	8
68	55.7%	62.0%	4	8
69	63.6%	69.0%	4	8
70	27.8%	35.8%	3	0
71	19.9%	26.1%	3	0
72	20.9%	27.8%	1	0
73	12.1%	19.1%	2	0
74	25.5%	31.1%	3	0
75	74.4%	85.7%	4	8
76	67.2%	80.4%	4	8
77	76.1%	88.3%	4	8
78	71.6%	80.5%	4	8
79	71.6%	87.6%	4	8
80	14.2%	37.3%	0	8
81	21.8%	42.7%	0	8
82	16.8%	23.6%	0	8
83	15.1%	43.6%	0	8
84	73.7%	76.7%	3	8
85	62.7%	68.6%	3	8
86	75.1%	79.4%	3	8
87	73.1%	79.8%	4	8
88	63.3%	73.3%	3	8
89	62.5%	65.9%	2	8
90	58.5%	62.8%	2	8
91	70.0%	75.9%	4	8
92	68.8%	73.5%	4	8
93	65.4%	75.0%	4	8
94	69.0%	76.3%	4	8
95	67.2%	75.1%	4	8
96	23.0%	59.0%	3	8
97	26.8%	46.0%	3	8
98	23.2%	76.0%	3	8
99	14.7%	23.4%	3	3
100	10.0%	20.0%	1	0
101	24.2%	42.4%	3	7
102	37.6%	58.9%	3	8
103	16.8%	33.7%	3	0
104	17.0%	28.1%	3	0
105	29.0%	45.8%	3	6
106	36.3%	47.4%	3	7
107	29.6%	60.7%	3	8
108	18.4%	36.6%	3	6
109	32.5%	68.6%	3	8
110	47.2%	57.7%	4	8
111	22.3%	31.1%	3	0
112	19.2%	22.5%	1	0
113	59.5%	66.2%	4	8
114	24.7%	28.4%	3	0
115	52.1%	59.1%	4	8
116	58.1%	65.4%	4	8
117	36.6%	42.0%	3	0
118	23.6%	27.3%	3	0
119	13.5%	23.9%	2	0
120	14.3%	21.4%	2	0

	HD Alt Eff 1 Part 3			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
121	9.6%	15.2%	0	0
122	28.4%	40.1%	3	8
123	24.3%	28.6%	3	0
124	25.6%	31.8%	2	0
125	23.7%	31.4%	3	0
126	54.5%	57.7%	4	8
127	18.5%	23.3%	3	0
128	50.4%	52.1%	2	4
129	54.9%	59.2%	3	8
130	59.9%	63.8%	4	8
131	17.6%	23.5%	3	0
132	52.3%	60.1%	4	8
133	36.8%	38.9%	3	0
134	33.6%	37.3%	1	0
135	23.8%	25.6%	1	0
136	28.7%	32.3%	3	0
137	52.1%	56.6%	4	8
138	19.3%	22.6%	2	0
139	20.3%	26.7%	2	0
140	57.6%	65.6%	4	8
141	57.5%	64.1%	4	8
142	59.5%	63.2%	3	8
143	60.8%	65.5%	3	8
144	29.3%	31.9%	3	0
145	35.7%	41.6%	3	0
146	27.6%	32.3%	4	0
147	30.1%	37.3%	4	0
148	34.0%	37.1%	4	0
149	32.1%	37.8%	2	0
150	53.6%	59.7%	4	8
151	42.4%	49.7%	4	0
152	26.1%	28.4%	4	0
153	67.9%	70.4%	4	8
154	54.8%	56.5%	4	7
155	35.9%	38.1%	3	0
156	30.3%	37.2%	4	0
157	24.7%	33.7%	3	0
158	31.2%	35.7%	2	0
159	24.5%	27.4%	2	0
160	22.6%	27.6%	2	0
161	27.1%	33.9%	4	0
162	43.7%	53.3%	4	8
163	45.5%	52.9%	3	8
164	23.5%	32.0%	3	0
165	50.3%	55.6%	4	8
166	5.7%	9.8%	3	0
167	22.3%	29.7%	3	0
168	46.3%	56.6%	4	8
169	29.0%	36.7%	3	0
170	24.2%	32.9%	3	0
171	39.6%	44.2%	4	0
172	23.3%	36.7%	4	0
173	36.3%	41.7%	4	0
174	17.4%	25.4%	3	0
175	24.2%	29.2%	4	0
176	22.7%	30.9%	4	0
177	53.9%	60.0%	4	7
178	14.8%	19.9%	3	0
179	27.0%	33.4%	3	0
180	18.2%	23.8%	3	0

Table 53: Effectiveness in HD Alt Eff 1, which includes the Alt 1 Gingles maps.

	HD Alt Eff 2 Part 1			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
1	4.2%	6.3%	1	0
2	3.2%	10.8%	1	0
3	3.4%	6.4%	1	0
4	5.4%	49.5%	2	0
5	4.6%	17.2%	1	0
6	1.5%	13.5%	1	0
7	0.6%	6.1%	0	0
8	1.4%	4.1%	0	0
9	1.6%	6.3%	0	0
10	3.7%	13.7%	1	0
11	1.8%	6.0%	0	0
12	9.7%	15.9%	1	0
13	19.2%	30.0%	1	0
14	6.8%	12.7%	2	0
15	14.2%	23.9%	2	0
16	11.7%	20.3%	3	0
17	23.0%	29.9%	2	0
18	8.0%	10.4%	2	0
19	24.1%	30.9%	3	0
20	9.3%	18.5%	1	0
21	5.1%	12.5%	1	0
22	15.1%	26.7%	3	0
23	6.5%	20.7%	1	0
24	7.0%	17.3%	1	0
25	5.9%	11.0%	0	0
26	4.0%	14.8%	0	0
27	3.7%	13.3%	1	0
28	3.9%	15.3%	0	0
29	13.6%	53.3%	2	0
30	8.1%	24.2%	0	0
31	7.6%	26.5%	1	0
32	8.0%	12.9%	2	0
33	11.2%	14.3%	3	0
34	15.7%	23.5%	3	0
35	28.4%	39.6%	3	8
36	17.0%	23.5%	3	0
37	28.2%	46.8%	3	8
38	54.2%	66.8%	4	8
39	55.3%	74.0%	4	8
40	33.0%	38.9%	3	8
41	39.4%	68.0%	4	8
42	33.7%	51.1%	3	8
43	26.5%	40.6%	3	8
44	12.0%	22.5%	2	0
45	5.3%	10.2%	0	0
46	8.1%	15.5%	0	0
47	10.7%	18.1%	2	0
48	11.8%	24.2%	0	1
49	8.4%	15.1%	0	0
50	12.4%	18.8%	2	8
51	23.7%	37.0%	0	8
52	16.0%	23.4%	0	8
53	14.5%	21.9%	0	1
54	15.5%	28.3%	0	7
55	55.4%	60.4%	3	8
56	45.5%	51.3%	3	8
57	18.1%	26.1%	0	8
58	63.0%	68.1%	3	8
59	70.1%	74.5%	3	8
60	63.9%	69.0%	3	8

	HD Alt Eff 2 Part 2			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
61	74.3%	81.9%	4	8
62	72.3%	79.1%	3	8
63	69.3%	78.6%	3	8
64	30.7%	38.1%	3	0
65	62.0%	66.5%	4	8
66	53.4%	62.9%	4	8
67	58.9%	66.7%	4	8
68	55.7%	62.0%	4	8
69	63.6%	69.0%	4	8
70	27.8%	35.8%	3	0
71	19.9%	26.1%	3	0
72	20.9%	27.8%	1	0
73	12.1%	19.1%	2	0
74	25.5%	31.1%	3	0
75	74.4%	85.7%	4	8
76	67.2%	80.4%	4	8
77	76.1%	88.3%	4	8
78	71.6%	80.5%	4	8
79	71.6%	87.6%	4	8
80	14.2%	37.3%	0	8
81	21.8%	42.7%	0	8
82	16.8%	23.6%	0	8
83	15.1%	43.6%	0	8
84	73.7%	76.7%	3	8
85	62.7%	68.6%	3	8
86	75.1%	79.4%	3	8
87	73.1%	79.8%	4	8
88	63.3%	73.3%	3	8
89	62.5%	65.9%	2	8
90	58.5%	62.8%	2	8
91	70.0%	75.9%	4	8
92	68.8%	73.5%	4	8
93	65.4%	75.0%	4	8
94	69.0%	76.3%	4	8
95	67.2%	75.1%	4	8
96	23.0%	59.0%	3	8
97	26.8%	46.0%	3	8
98	23.2%	76.0%	3	8
99	14.7%	23.4%	3	3
100	10.0%	20.0%	1	0
101	24.2%	42.4%	3	7
102	37.6%	58.9%	3	8
103	16.8%	33.7%	3	0
104	17.0%	28.1%	3	0
105	29.0%	45.8%	3	6
106	36.3%	47.4%	3	7
107	29.6%	60.7%	3	8
108	18.4%	36.6%	3	6
109	32.5%	68.6%	3	8
110	47.2%	57.7%	4	8
111	22.3%	31.1%	3	0
112	19.2%	22.5%	1	0
113	59.5%	66.2%	4	8
114	24.7%	28.4%	3	0
115	52.1%	59.1%	4	8
116	58.1%	65.4%	4	8
117	36.6%	42.0%	3	0
118	23.6%	27.3%	3	0
119	13.5%	23.9%	2	0
120	14.3%	21.4%	2	0

	HD Alt Eff 2 Part 3			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
121	9.6%	15.2%	0	0
122	28.4%	40.1%	3	8
123	24.3%	28.6%	3	0
124	25.6%	31.8%	2	0
125	23.7%	31.4%	3	0
126	54.5%	57.7%	4	8
127	18.5%	23.3%	3	0
128	50.4%	52.1%	2	4
129	54.9%	59.2%	3	8
130	59.9%	63.8%	4	8
131	17.6%	23.5%	3	0
132	52.3%	60.1%	4	8
133	36.8%	38.9%	3	0
134	33.6%	37.3%	1	0
135	23.8%	25.6%	1	0
136	28.7%	32.3%	3	0
137	52.1%	56.6%	4	8
138	19.3%	22.6%	2	0
139	20.3%	26.7%	2	0
140	57.6%	65.6%	4	8
141	57.5%	64.1%	4	8
142	59.5%	63.2%	3	8
143	60.8%	65.5%	3	8
144	29.3%	31.9%	3	0
145	35.7%	41.6%	3	0
146	27.6%	32.3%	4	0
147	30.1%	37.3%	4	0
148	34.0%	37.1%	4	0
149	32.1%	37.8%	2	0
150	53.6%	59.7%	4	8
151	42.4%	49.7%	4	0
152	26.1%	28.4%	4	0
153	67.9%	70.4%	4	8
154	54.8%	56.5%	4	7
155	35.9%	38.1%	3	0
156	30.3%	37.2%	4	0
157	24.7%	33.7%	3	0
158	31.2%	35.7%	2	0
159	24.5%	27.4%	2	0
160	22.6%	27.6%	2	0
161	27.1%	33.9%	4	0
162	43.7%	53.3%	4	8
163	45.5%	52.9%	3	8
164	23.5%	32.0%	3	0
165	50.3%	55.6%	4	8
166	5.7%	9.8%	3	0
167	22.3%	29.7%	3	0
168	46.3%	56.6%	4	8
169	29.0%	36.7%	3	0
170	24.2%	32.9%	3	0
171	39.6%	44.2%	4	0
172	23.3%	36.7%	4	0
173	36.3%	41.7%	4	0
174	17.4%	25.4%	3	0
175	24.2%	29.2%	4	0
176	22.7%	30.9%	4	0
177	53.9%	60.0%	4	7
178	14.8%	19.9%	3	0
179	27.0%	33.4%	3	0
180	18.2%	23.8%	3	0

Table 54: Effectiveness in HD Alt Eff 2, which includes the Alt 2 Gingles maps.

C Splits of geographical units

County	CD	TOTPOP	VAP	BVAP	BHVAP	Biden20	Abrams18
Bibb	2	108371	82489	0.6349	0.6710	0.7139	0.7250
Bibb	8	48975	38413	0.3098	0.3394	0.4596	0.4202
Cherokee	6	40881	31202	0.0304	0.0814	0.2172	0.1862
Cherokee	11	225739	171726	0.0817	0.1902	0.3233	0.2905
Clayton	5	37919	27885	0.7280	0.8649	0.8849	0.9200
Clayton	13	259676	192693	0.7190	0.8266	0.8548	0.8773
Cobb	6	165925	125728	0.1092	0.1848	0.4913	0.4476
Cobb	11	397281	313106	0.2654	0.3850	0.5535	0.5309
Cobb	13	125029	94104	0.4458	0.6271	0.7316	0.7310
Cobb	14	77914	58910	0.4646	0.5644	0.6421	0.6263
DeKalb	4	601451	465661	0.5316	0.6302	0.8171	0.8166
DeKalb	5	162931	129615	0.5145	0.5480	0.9148	0.9203
Douglas	3	42970	32601	0.2970	0.3719	0.4220	0.3803
Douglas	13	101267	75827	0.5762	0.6647	0.7230	0.7055
Effingham	1	47208	34272	0.1276	0.1756	0.2462	0.2167
Effingham	12	17561	13023	0.1887	0.2129	0.2608	0.2521
Fayette	3	102685	78539	0.2094	0.2720	0.4272	0.3914
Fayette	13	16509	13259	0.5492	0.6082	0.6394	0.6271
Fulton	5	564287	464015	0.4769	0.5379	0.8077	0.8108
Fulton	6	245494	190172	0.1574	0.2568	0.5433	0.5069
Fulton	7	92558	69229	0.1175	0.1777	0.5527	0.5060
Fulton	13	164371	123766	0.8829	0.9171	0.9291	0.9474
Gwinnett	6	34755	25061	0.1336	0.2645	0.4320	0.3889
Gwinnett	7	672579	497705	0.3234	0.5450	0.6487	0.6332
Gwinnett	9	249728	186718	0.2061	0.3433	0.5045	0.4697
Henry	3	23975	17964	0.4678	0.5259	0.5731	0.5484
Henry	10	118452	86869	0.4414	0.4948	0.5093	0.4413
Henry	13	98285	75140	0.5710	0.6324	0.7013	0.6898
Houston	2	48521	36233	0.4321	0.5075	0.5511	0.5393
Houston	8	115112	85885	0.2788	0.3276	0.3996	0.3741
Muscogee	2	175155	132158	0.5262	0.5851	0.6625	0.6625
Muscogee	3	31767	24894	0.1909	0.2578	0.3973	0.3371
Newton	4	70114	52306	0.6098	0.6644	0.7470	0.7502
Newton	10	42369	32442	0.2631	0.2960	0.3764	0.3546
Wilkes	10	1802	1491	0.3273	0.3628	0.3556	0.3607
Wilkes	12	7763	6160	0.4193	0.4481	0.4191	0.3810

Table 55: All county splits in the enacted Congressional map.

County	SD	TOTPOP	VAP	BVAP	BHVAP	Biden20	Abrams18
Bibb	18	53182	42225	0.3079	0.3413	0.4239	0.3967
Bibb	25	15513	12080	0.4120	0.4384	0.5678	0.5256
Bibb	26	88651	66597	0.6951	0.7309	0.7939	0.8072
Chatham	1	81408	65586	0.1486	0.2032	0.3982	0.3743
Chatham	2	190408	150843	0.4686	0.5368	0.7304	0.7447
Chatham	4	23475	18286	0.2596	0.3331	0.4748	0.4463
Clarke	46	52016	45312	0.1485	0.2062	0.6611	0.6499
Clarke	47	76655	61518	0.2933	0.4111	0.7355	0.7329
Cobb	6	92249	75423	0.2527	0.3229	0.5988	0.5665
Cobb	32	101467	80689	0.1946	0.2934	0.5310	0.5013
Cobb	33	192694	146415	0.4296	0.6488	0.7124	0.7146
Cobb	37	181541	138961	0.2018	0.2812	0.4547	0.4203
Cobb	38	108305	83807	0.4264	0.5438	0.7289	0.7235
Cobb	56	89893	66553	0.0706	0.1257	0.4685	0.4177
DeKalb	10	75906	58884	0.9500	0.9605	0.9600	0.9783
DeKalb	40	164997	127423	0.1719	0.3807	0.6490	0.6138
DeKalb	41	183560	139591	0.6449	0.7009	0.8404	0.8492
DeKalb	42	190940	153952	0.3078	0.3875	0.8487	0.8451
DeKalb	43	32212	24150	0.9135	0.9384	0.9394	0.9582
DeKalb	44	51049	40820	0.7415	0.7714	0.9490	0.9654
DeKalb	55	65718	50456	0.9248	0.9473	0.9511	0.9698
Douglas	28	25889	19664	0.2400	0.3042	0.3485	0.3050
Douglas	30	23454	17242	0.5045	0.5920	0.6386	0.6270
Douglas	35	94894	71522	0.5587	0.6479	0.7084	0.6871
Fayette	16	87134	66132	0.1605	0.2249	0.4142	0.3812
Fayette	34	32060	25666	0.5111	0.5670	0.6424	0.6262
Fulton	6	99152	80358	0.2261	0.3060	0.6333	0.5887
Fulton	14	192533	155340	0.1897	0.3044	0.6012	0.5624
Fulton	21	83538	62497	0.1058	0.1749	0.4711	0.4310
Fulton	28	6963	5456	0.4646	0.5403	0.6541	0.6506
Fulton	35	97945	73153	0.8757	0.9161	0.9293	0.9449
Fulton	36	192282	161385	0.5134	0.5749	0.8962	0.9164
Fulton	38	84850	64560	0.9472	0.9672	0.9589	0.9831
Fulton	39	191500	156022	0.6070	0.6549	0.8816	0.8935
Fulton	48	83219	61631	0.1140	0.1697	0.5609	0.5128
Fulton	56	34728	26780	0.0764	0.1341	0.4753	0.4280
Gwinnett	5	191921	139394	0.2994	0.7018	0.7503	0.7914
Gwinnett	7	189709	147425	0.2144	0.3714	0.5941	0.5728
Gwinnett	9	192915	142054	0.2953	0.4730	0.6008	0.5667
Gwinnett	40	25547	19577	0.3258	0.5294	0.6840	0.6640
Gwinnett	41	7463	5687	0.1662	0.2427	0.5323	0.4821
Gwinnett	45	151475	110999	0.2039	0.3351	0.4571	0.4167
Gwinnett	46	27298	19469	0.3273	0.4631	0.4781	0.4201
Gwinnett	48	46297	33367	0.1244	0.2355	0.4312	0.3849
Gwinnett	55	124437	91512	0.5135	0.6159	0.7078	0.6833
Hall	49	189355	144123	0.0796	0.2954	0.2832	0.2646
Hall	50	13781	9721	0.0637	0.5322	0.4380	0.4661
Houston	18	42875	32630	0.2983	0.3609	0.4437	0.4176
Houston	20	74275	54626	0.2606	0.3022	0.3680	0.3405
Houston	26	46483	34862	0.4485	0.5232	0.5831	0.5711
Muscogee	15	142205	107284	0.5931	0.6521	0.7443	0.7508
Muscogee	29	64717	49768	0.2144	0.2771	0.4287	0.3868
Newton	17	45536	34660	0.3080	0.3453	0.3845	0.3582
Newton	43	66947	50088	0.5941	0.6466	0.7456	0.7531
Richmond	22	193163	150450	0.5650	0.6105	0.6912	0.6838
Richmond	23	13444	10449	0.2795	0.3129	0.3975	0.3659

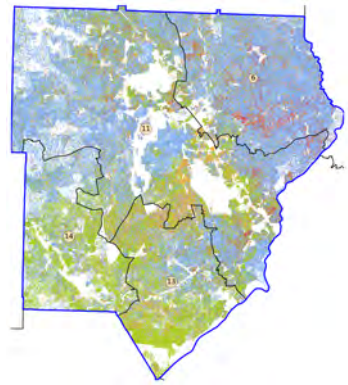
Table 56: Counties with more than 15 points BHVAP differential across Senate districts.

County	HD	TOTPOP	VAP	BVAP	BHVAP share	Biden20	Abrams18
Bibb	142	59608	44584	0.5952	0.6249	0.6687	0.6705
Bibb	143	59469	46390	0.6079	0.6501	0.7099	0.7223
Bibb	144	33948	26547	0.3263	0.3545	0.4642	0.4220
Bibb	145	4321	3381	0.2576	0.2828	0.3445	0.3323
Carroll	18	18789	14467	0.1147	0.1479	0.1918	0.1808
Carroll	70	2854	2259	0.0469	0.0668	0.1414	0.1308
Carroll	71	59538	44582	0.1992	0.2572	0.3247	0.3170
Carroll	72	37967	29688	0.2419	0.3312	0.3361	0.3285
Chatham	161	28269	21359	0.3988	0.4739	0.6095	0.6037
Chatham	162	60308	46733	0.4373	0.5246	0.6721	0.6870
Chatham	163	60123	48461	0.4549	0.5242	0.7266	0.7313
Chatham	164	38681	30732	0.2607	0.3401	0.4644	0.4676
Chatham	165	59978	48247	0.5033	0.5506	0.7803	0.7899
Chatham	166	47932	39183	0.0481	0.0851	0.3527	0.3205
Clarke	120	30095	25090	0.1937	0.2693	0.6432	0.6235
Clarke	121	26478	22991	0.1359	0.1979	0.7010	0.6934
Clarke	122	59632	48840	0.2842	0.3977	0.7990	0.8078
Clarke	124	12466	9909	0.2940	0.3941	0.7018	0.6980
Cobb	22	28586	22350	0.2048	0.2980	0.5020	0.4894
Cobb	34	59875	45758	0.1567	0.2306	0.4198	0.3770
Cobb	35	59889	48312	0.2840	0.3856	0.5726	0.5603
Cobb	36	59994	44911	0.1698	0.2300	0.4022	0.3596
Cobb	37	59176	46223	0.2818	0.4599	0.6113	0.5933
Cobb	38	59317	44839	0.5423	0.6568	0.7243	0.7229
Cobb	39	59381	44436	0.5529	0.7293	0.7876	0.7930
Cobb	40	59044	47976	0.3298	0.3798	0.6673	0.6417
Cobb	41	60122	45271	0.3935	0.6699	0.7105	0.7199
Cobb	42	59620	48525	0.3370	0.5014	0.7158	0.7282
Cobb	43	59464	47033	0.2653	0.3973	0.6073	0.5885
Cobb	44	38013	29631	0.1281	0.2176	0.4855	0.4445
Cobb	45	59738	44023	0.0528	0.0988	0.4788	0.4200
Cobb	46	43930	32560	0.0782	0.1348	0.4656	0.4206
Coweta	65	13008	9714	0.1225	0.1650	0.3213	0.2874
Coweta	67	17272	13061	0.0763	0.1352	0.2416	0.2057
Coweta	70	56267	42990	0.2904	0.3678	0.4376	0.5036
Coweta	73	31608	24269	0.1336	0.2015	0.4070	0.3136
Coweta	136	28003	21121	0.1081	0.1469	0.2325	0.2141
DeKalb	52	28300	21991	0.1398	0.1987	0.6358	0.5815
DeKalb	80	59461	44784	0.1418	0.3654	0.6100	0.5681
DeKalb	81	59007	46259	0.2183	0.4191	0.7180	0.6918
DeKalb	82	59724	50238	0.1683	0.2309	0.8035	0.7923
DeKalb	83	59416	46581	0.1512	0.4284	0.6572	0.6316
DeKalb	84	59862	47350	0.7366	0.7561	0.9324	0.9440
DeKalb	85	59373	46308	0.6271	0.6765	0.8981	0.9246
DeKalb	86	59205	44614	0.7505	0.7832	0.8931	0.9160
DeKalb	87	59709	45615	0.7308	0.7866	0.8798	0.8936
DeKalb	88	47844	37310	0.7117	0.7652	0.8359	0.8377
DeKalb	89	59866	46198	0.6254	0.6519	0.9214	0.9284
DeKalb	90	59812	48015	0.5849	0.6205	0.9401	0.9508
DeKalb	91	19700	14941	0.9586	0.9683	0.9581	0.9793
DeKalb	92	15607	11794	0.9309	0.9453	0.9403	0.9581
DeKalb	93	11690	8476	0.9040	0.9412	0.9411	0.9598
DeKalb	94	31207	23817	0.9289	0.9513	0.9523	0.9703
DeKalb	95	14599	10985	0.8971	0.9250	0.9413	0.9607
Dougherty	151	6268	4791	0.5917	0.6022	0.6466	0.6213
Dougherty	152	6187	4906	0.4855	0.5298	0.5372	0.5517
Dougherty	153	59299	45692	0.6795	0.7010	0.7454	0.7566
Dougherty	154	14036	10877	0.8612	0.8694	0.8896	0.9081

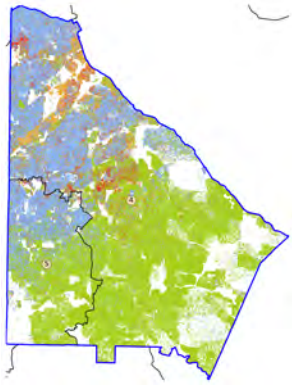
County	HD	TOTPOP	VAP	BVAP	BHVAP share	Biden20	Abrams18
Douglas	61	30206	23160	0.5396	0.6574	0.6995	0.6949
Douglas	64	35576	26860	0.2958	0.3662	0.4137	0.3741
Douglas	65	19408	14130	0.6572	0.7146	0.7568	0.7413
Douglas	66	59047	44278	0.5341	0.6181	0.6899	0.6610
Fayette	68	29719	22798	0.2259	0.3098	0.4218	0.3753
Fayette	69	37303	29554	0.4700	0.5270	0.5903	0.5574
Fayette	73	28428	21467	0.1070	0.1718	0.3793	0.3349
Fayette	74	23744	17979	0.1329	0.1724	0.3872	0.3373
Floyd	5	5099	4048	0.0336	0.0684	0.1566	0.1349
Floyd	12	34335	27071	0.0836	0.1607	0.2351	0.2152
Floyd	13	59150	45176	0.1918	0.2979	0.3687	0.3564
Fulton	25	13280	9828	0.1043	0.1651	0.5348	0.4723
Fulton	47	55235	40829	0.1130	0.1834	0.4647	0.4241
Fulton	48	43976	33385	0.1231	0.2615	0.5322	0.4840
Fulton	49	59153	45263	0.0842	0.1480	0.4815	0.4342
Fulton	50	59523	43940	0.1240	0.1826	0.5939	0.5558
Fulton	51	58952	47262	0.2368	0.3623	0.6082	0.5728
Fulton	52	31511	26534	0.1765	0.2543	0.6372	0.6074
Fulton	53	59953	46944	0.1453	0.2143	0.5485	0.4998
Fulton	54	60083	50338	0.1547	0.2766	0.6104	0.5641
Fulton	55	59971	49255	0.5538	0.5960	0.8169	0.8121
Fulton	56	58929	52757	0.4548	0.5055	0.8971	0.9249
Fulton	57	59969	52097	0.1806	0.2543	0.8092	0.8025
Fulton	58	59057	50514	0.6304	0.6732	0.9213	0.9511
Fulton	59	59434	49179	0.7009	0.7332	0.9337	0.9603
Fulton	60	59709	45490	0.6388	0.6820	0.8065	0.8069
Fulton	61	29096	22287	0.9541	0.9658	0.9654	0.9789
Fulton	62	59450	46426	0.7226	0.7807	0.9254	0.9434
Fulton	63	59381	45043	0.6933	0.7761	0.9085	0.9279
Fulton	65	27048	20542	0.8293	0.8473	0.8952	0.9088
Fulton	67	41863	31238	0.8036	0.8785	0.8985	0.9164
Fulton	68	29758	22037	0.9004	0.9274	0.9278	0.9482
Fulton	69	21379	15994	0.9415	0.9655	0.9561	0.9811
Grady	171	8115	6461	0.1696	0.2131	0.2238	0.2074
Grady	173	18121	13501	0.3394	0.4507	0.4454	0.4338
Gwinnett	30	8620	6301	0.1584	0.2484	0.3775	0.3234
Gwinnett	48	15027	11394	0.1026	0.1660	0.4955	0.4395
Gwinnett	88	11845	8763	0.3005	0.5402	0.7198	0.7597
Gwinnett	94	28004	20992	0.4197	0.5235	0.6869	0.6571
Gwinnett	95	34221	25212	0.6639	0.7452	0.8115	0.8122
Gwinnett	96	59515	44671	0.2300	0.5797	0.6579	0.6661
Gwinnett	97	59072	46339	0.2677	0.4490	0.6617	0.6608
Gwinnett	98	59998	42734	0.2325	0.7459	0.7610	0.8075
Gwinnett	99	59850	45004	0.1471	0.2279	0.5261	0.4833
Gwinnett	100	35204	25378	0.1307	0.2425	0.4252	0.3789
Gwinnett	101	59938	46584	0.2419	0.4143	0.5632	0.5431
Gwinnett	102	58959	42968	0.3762	0.5767	0.6626	0.6503
Gwinnett	103	51691	38022	0.1879	0.3607	0.4796	0.4471
Gwinnett	104	35117	25457	0.2096	0.3042	0.3993	0.3442
Gwinnett	105	59344	43474	0.2905	0.4482	0.5553	0.5328
Gwinnett	106	59112	43890	0.3627	0.4648	0.5858	0.5390
Gwinnett	107	59702	44509	0.2963	0.5937	0.6884	0.6965
Gwinnett	108	59577	44308	0.1835	0.3578	0.5536	0.5107
Gwinnett	109	59630	44140	0.3251	0.6708	0.7711	0.8246
Gwinnett	110	59951	43226	0.4719	0.5645	0.6405	0.5965
Gwinnett	111	22685	16118	0.3307	0.4520	0.4726	0.4142
Hall	27	54508	42712	0.0386	0.1354	0.1804	0.1550
Hall	28	8108	6799	0.0284	0.1772	0.2527	0.2270
Hall	29	59200	43131	0.1359	0.5284	0.4485	0.4704
Hall	30	50646	39113	0.0685	0.2374	0.2707	0.2393
Hall	31	14349	9789	0.1036	0.6834	0.4858	0.5209
Hall	100	7819	5923	0.0653	0.1867	0.2453	0.2134
Hall	103	8506	6377	0.0486	0.1396	0.2653	0.2319

County	HD	TOTPOP	VAP	BVAP	BHVAP share	Biden20	Abrams18
Henry	74	18397	13441	0.4742	0.5356	0.5834	0.5642
Henry	78	3847	2965	0.6921	0.7292	0.8470	0.8768
Henry	91	35569	27415	0.5887	0.6628	0.7223	0.7183
Henry	115	60174	44807	0.5213	0.5797	0.6153	0.5443
Henry	116	55759	42471	0.5808	0.6380	0.6848	0.6669
Henry	117	54737	40246	0.3841	0.4324	0.4416	0.3759
Henry	118	12229	8628	0.1868	0.2258	0.2874	0.2449
Houston	145	28132	20686	0.5239	0.6021	0.6151	0.6114
Houston	146	60203	44589	0.2761	0.3192	0.3840	0.3558
Houston	147	59178	44902	0.3012	0.3678	0.4662	0.4414
Houston	148	16120	11941	0.2453	0.2778	0.3271	0.3070
Lamar	134	5026	3864	0.0970	0.1198	0.1786	0.1839
Lamar	135	13474	10677	0.3411	0.3603	0.3798	0.3906
Lowndes	174	9770	7472	0.1453	0.1935	0.2019	0.1828
Lowndes	175	43692	31957	0.2018	0.2494	0.3784	0.4034
Lowndes	176	4797	3588	0.2717	0.3743	0.4485	0.4632
Lowndes	177	59992	46014	0.5388	0.5936	0.5139	0.5285
McDuffie	125	4748	3805	0.1198	0.1532	0.2199	0.1901
McDuffie	128	16884	12810	0.4660	0.4938	0.4365	0.4312
Muscogee	137	30443	22797	0.6269	0.6746	0.6665	0.6618
Muscogee	138	12190	9628	0.1224	0.1692	0.3389	0.2796
Muscogee	139	45976	35539	0.2128	0.2770	0.4306	0.3842
Muscogee	140	59294	44411	0.5763	0.6468	0.7471	0.7692
Muscogee	141	59019	44677	0.5746	0.6305	0.7368	0.7428
Newton	93	15515	12080	0.5094	0.5404	0.5824	0.5743
Newton	113	60053	44538	0.5953	0.6533	0.7534	0.7636
Newton	114	36915	28130	0.2760	0.3104	0.3491	0.3299
Paulding	16	16549	11771	0.0981	0.1406	0.2447	0.2194
Paulding	17	59120	42761	0.2302	0.2934	0.3580	0.3264
Paulding	18	10627	7838	0.1069	0.1355	0.1902	0.1750
Paulding	19	58955	44299	0.2415	0.3025	0.3762	0.3525
Paulding	64	23410	17329	0.3249	0.3881	0.4450	0.4147
Peach	145	14093	11209	0.2211	0.2688	0.3275	0.3039
Peach	150	13888	10902	0.6643	0.7715	0.7004	0.7216
Richmond	126	25990	19714	0.6887	0.7181	0.7709	0.7804
Richmond	127	19152	15842	0.2599	0.2945	0.4192	0.3905
Richmond	129	58829	46873	0.5487	0.5835	0.6537	0.6344
Richmond	130	59203	44019	0.5991	0.6308	0.6388	0.6298
Richmond	132	43433	34451	0.5267	0.6146	0.7759	0.7966
Rockdale	91	4781	3817	0.4923	0.5179	0.5997	0.5626
Rockdale	92	44666	34757	0.6054	0.6511	0.7185	0.6871
Rockdale	93	32913	24178	0.6379	0.7670	0.8062	0.8013
Rockdale	95	11210	8751	0.4101	0.4845	0.5276	0.4859
Spalding	74	16815	13276	0.1990	0.2531	0.3220	0.3121
Spalding	117	5393	4727	0.2128	0.2520	0.4014	0.3618
Spalding	134	45098	34120	0.4063	0.4443	0.4206	0.4157
Telfair	149	9486	7884	0.3950	0.5747	0.3762	0.3533
Telfair	156	2991	2306	0.3001	0.3157	0.4131	0.4024
Thomas	172	4176	3246	0.1497	0.1753	0.2050	0.2061
Thomas	173	41622	31791	0.3726	0.3977	0.4351	0.4150
Tift	169	6730	5219	0.1129	0.1590	0.1807	0.1494
Tift	170	34614	26005	0.3220	0.4365	0.3806	0.3429
Troup	72	10281	7843	0.2076	0.2372	0.2844	0.3005
Troup	136	17913	13414	0.5139	0.5540	0.5738	0.6049
Troup	137	16144	12084	0.3974	0.4346	0.3855	0.3868
Troup	138	25088	19240	0.2535	0.2783	0.3040	0.2878
Whitfield	2	27861	21447	0.0331	0.1741	0.2209	0.1926
Whitfield	4	59070	42798	0.0538	0.4915	0.3551	0.3367
Whitfield	6	15933	12017	0.0280	0.1597	0.2017	0.1727

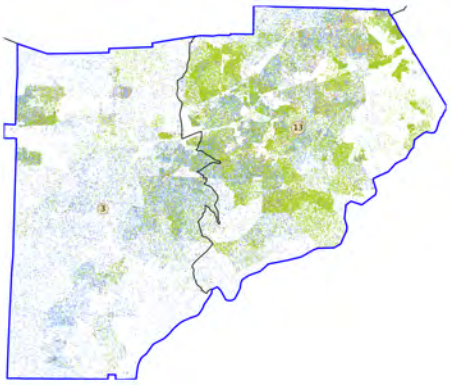
Table 57: Counties with more than 15 points BHVAP differential across House districts (table in three parts).



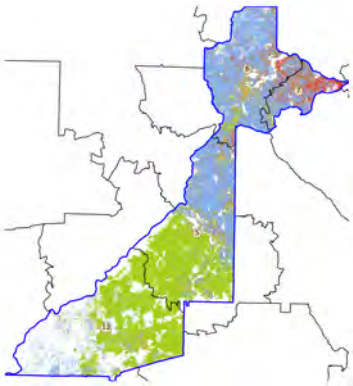
Cobb



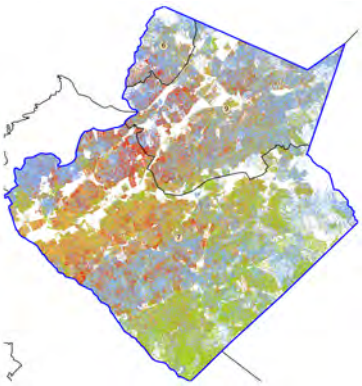
DeKalb



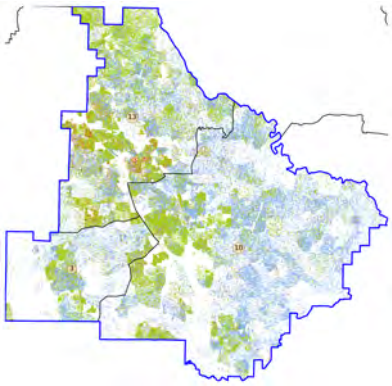
Douglas



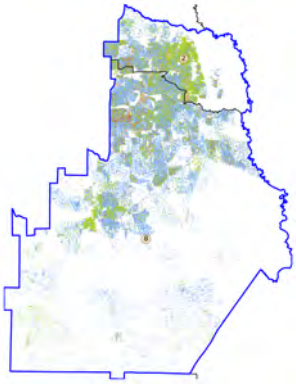
Fulton



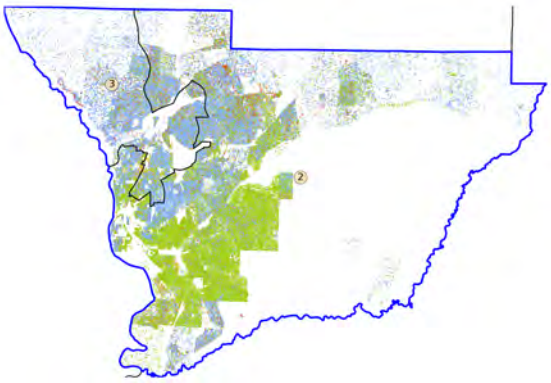
Gwinnett



Henry

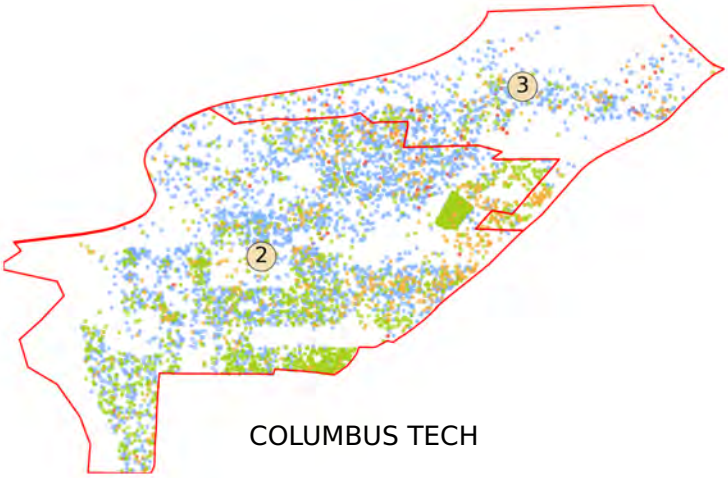


Houston

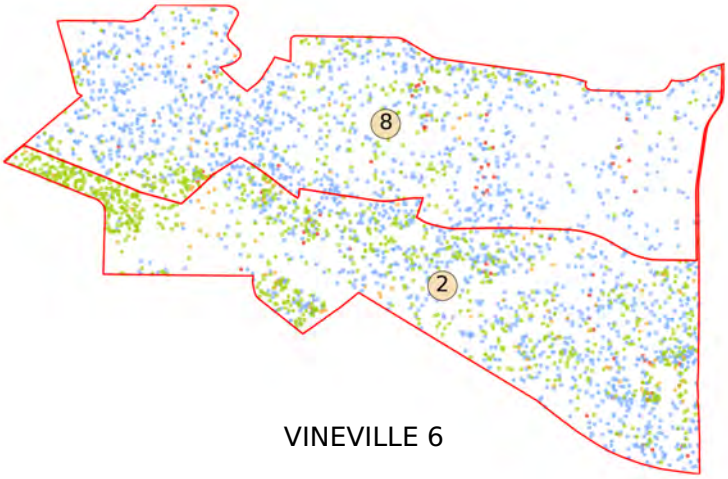


Muscogee

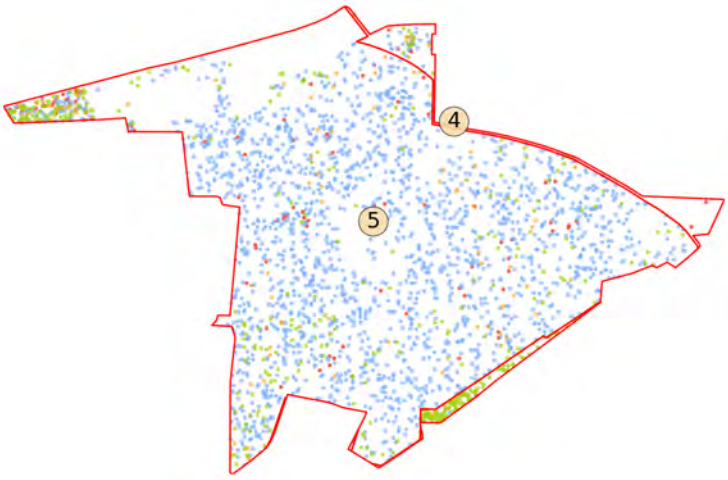
Figure 39: Additional county splits in the enacted Congressional plan with racially distinctive patterns at the boundary lines.



COLUMBUS TECH

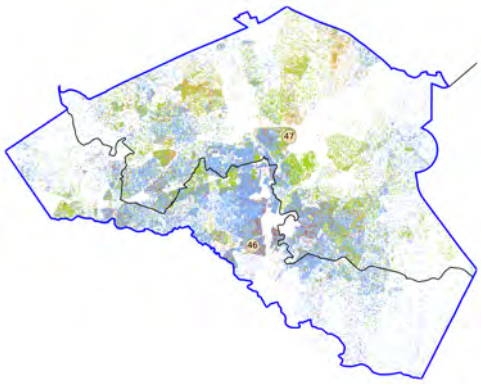


VINEVILLE 6

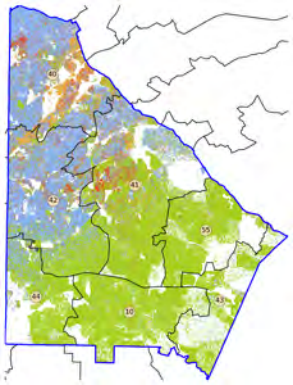


AVONDALE (AVO)

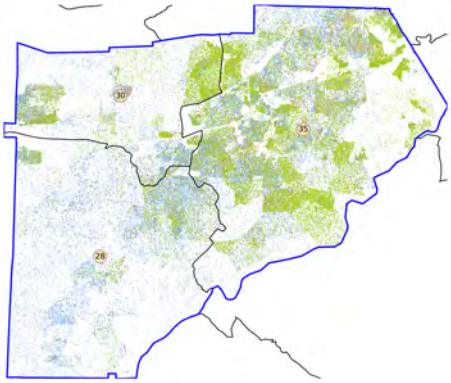
Figure 40: Illustrative precinct splits in the enacted Congressional plan showing racially distinctive patterns at the boundary lines.



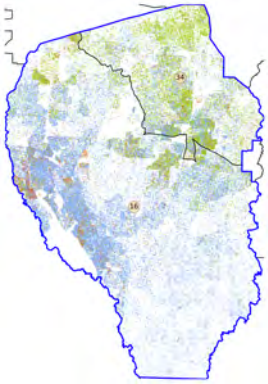
Clarke



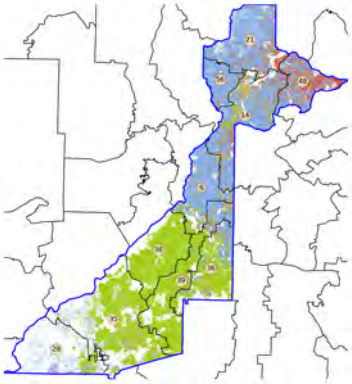
DeKalb



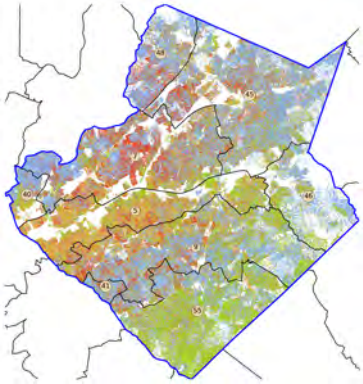
Douglas



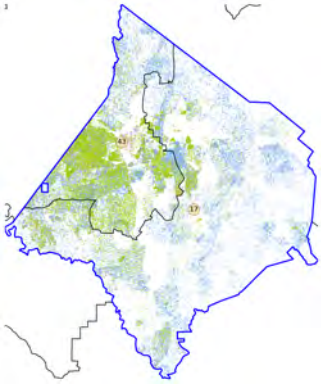
Fayette



Fulton

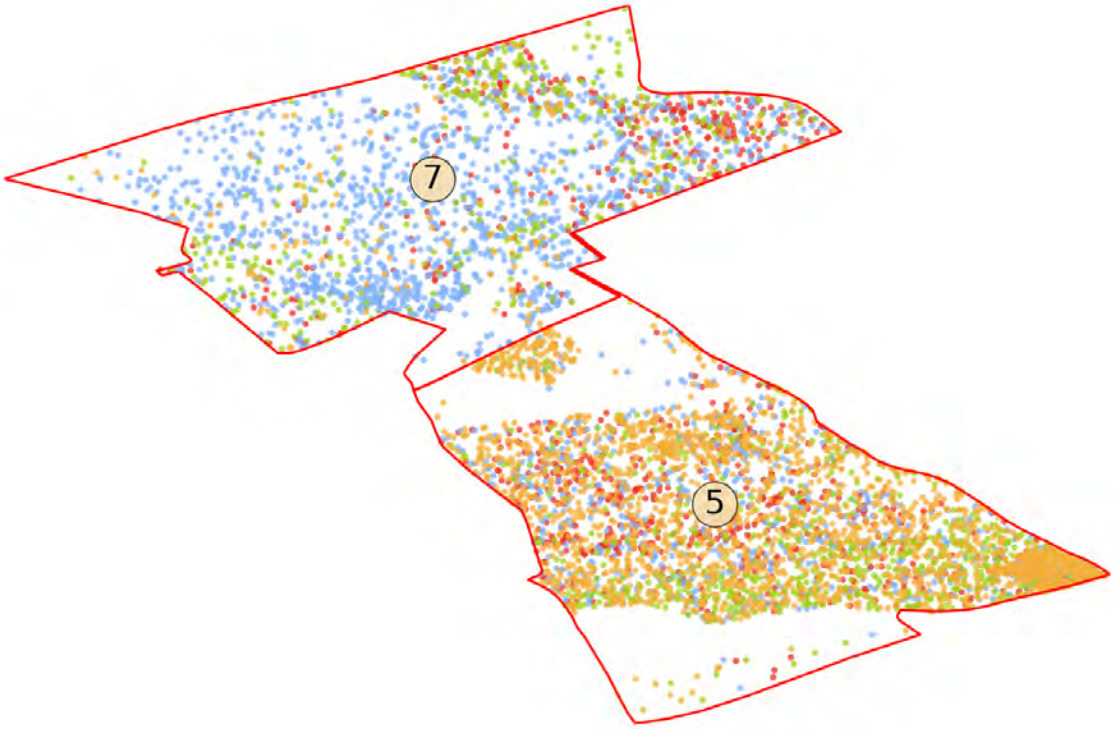


Gwinnett



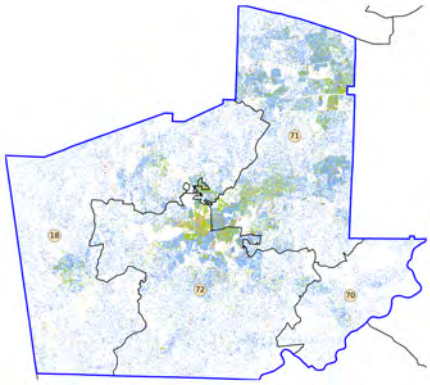
Newton

Figure 41: Additional county splits in the enacted Senate plan with racially distinctive patterns at the boundary lines.



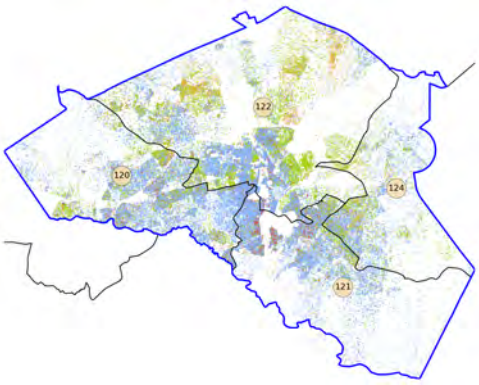
PINCKNEYVILLE W

Figure 42: An illustrative precinct split in the enacted Senate plan showing a racially distinctive pattern at the boundary lines.

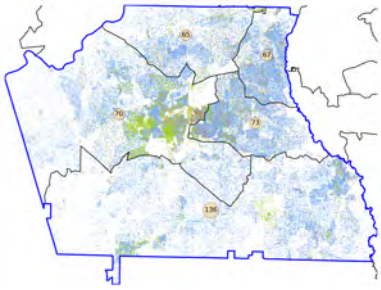


Carroll

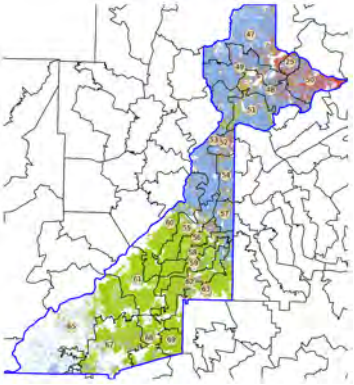
Chatham



Clarke

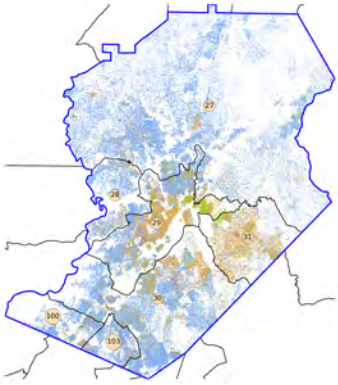


Coweta



Fulton

Gwinnett



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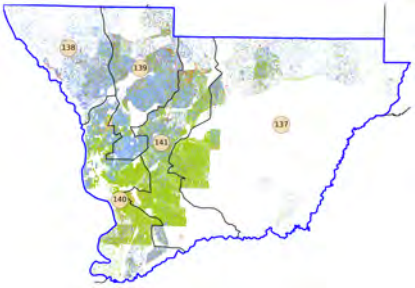

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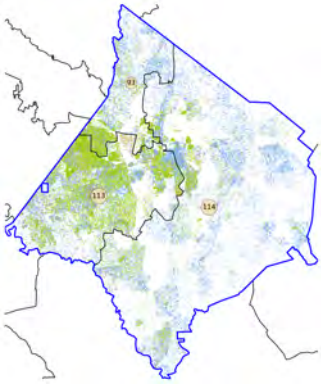
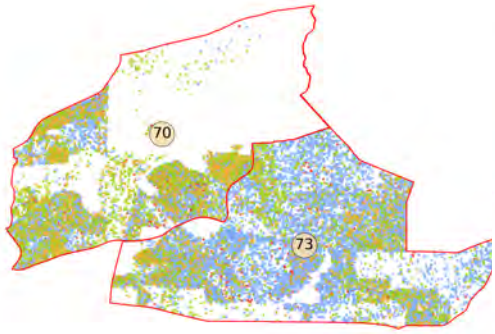
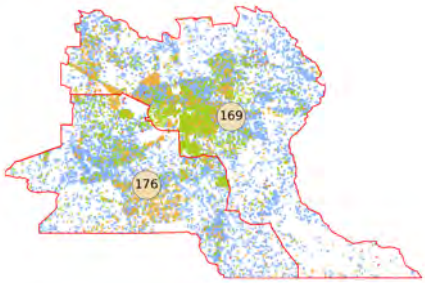


Newton

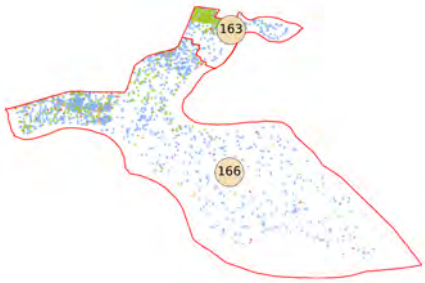
Figure 43: Illustrative county splits in the enacted House plan with racially distinctive patterns at the boundary lines.



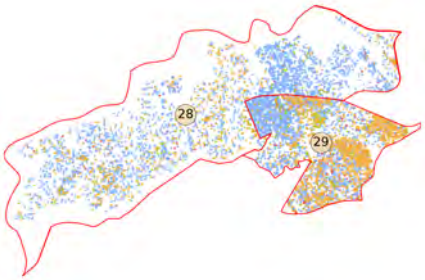
THE NEWNAN CENTRE



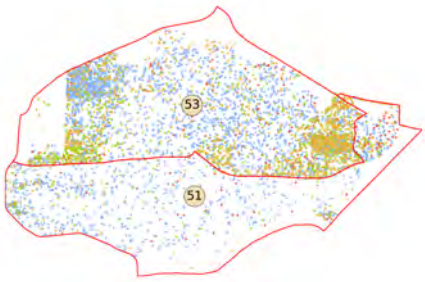
DOUGLAS



WINDSOR FOREST BAPTIST CHURCH SCHOOL



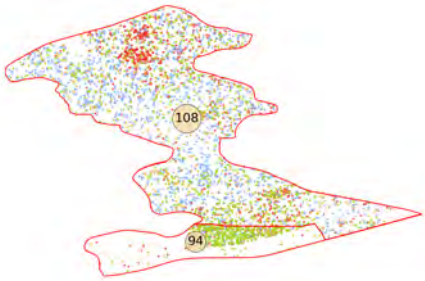
WILSON



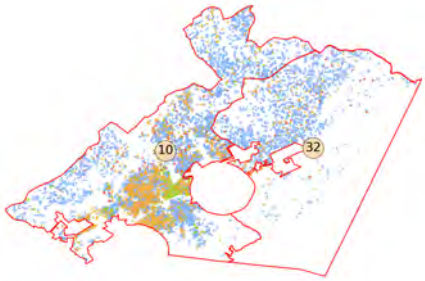
RW03

TUCKER

PINCKNEYVILLE W



CATES J



HABERSHAM SOUTH

Figure 44: Illustrative precinct splits in the enacted House plan with racially distinctive patterns at the boundary lines.

I reserve the right to continue to supplement my report in light of additional facts, testimony and/or materials that may come to light. Pursuant to 28 U.S.C. 1746, I declare under penalty of perjury of the laws of the United States that the foregoing is true and correct according to the best of my knowledge, information, and belief.

Executed this 13th day of January, 2023.

Moon Duchin