

Expert Demographic Report of Thomas M. Bryan

Christian Ministerial Alliance

v.

State of Arkansas

September 16, 2024

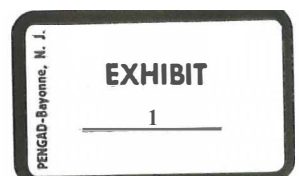


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1. I, Thomas M. Bryan, affirm the conclusions I express in this report and that these opinions are provided to a reasonable degree of professional certainty.

EXPERT QUALIFICATIONS

2. I am an expert in demography with 30 years of experience in demographic consulting and advanced analytic expertise in litigation support, state and local redistricting, and census data. I graduated with a Bachelor of Science in History from Portland State University in 1992 and obtained a Master's Degree in Urban Studies (MUS) from Portland State University in 1996. In 2002, I completed my second graduate degree in Management and Information Systems (MIS) from George Washington University and concurrently earned a Chief Information Officer certification from the General Services Administration. I currently serve on the 2030 Census Advisory Committee.¹
3. My background and experience in demography, census data, and advanced analytics with statistics and population data began in 1996 with an analyst role for the Oregon State Data Center. I continued to accumulate my broad range of experience in 1998 when I began working as a statistician for the U.S. Census Bureau in the Population Division developing population estimates and innovative demographic methods. In 2001, I joined Environmental Systems Research Institute's (ESRI)² Business Information Solutions team where I served as a professional demographer working with Geographic Information Systems (GIS) for population studies. Over the next 20 years, I continued developing extensive cross-industry experience serving in various advanced analytic and leadership roles as a demographer and data scientist for companies such as Altria and Microsoft.
4. In 2001, I founded my consultancy, BryanGeoDemographics (BGD), to meet the expanding demand for advanced analytic expertise in applied demographic research and analysis. My consultancy has broadened to include litigation support, state and local redistricting, school redistricting, and municipal infrastructure initiatives. Since 2001, I have undertaken over 150 such engagements in three broad areas:
 1. state and local redistricting,
 2. applied demographic studies, and
 3. school redistricting and municipal infrastructure analysis.

¹ <https://www.census.gov/newsroom/press-releases/2024/members-2030-census-advisory-committee.html>. My membership on this committee does not constitute an endorsement of BGD or this report by the Committee, the Census Bureau, the Department of Commerce, or the U.S. Government. The views expressed herein are my own and do not represent the views of the Committee, the Census Bureau, the Department of Commerce, or the U.S. Government.

² The global market leader in geographic information system (GIS) software, location intelligence, and mapping, see: <https://www.esri.com/en-us/about/about-esri/overview>

5. My expertise in redistricting began with McKibben Demographics where I provided expert demographic and analytic support in over 120 separate school redistricting projects between 2004 and 2012. During this time, I informally consulted on redistricting projects with Dr. Peter Morrison. In 2012, I formally began performing redistricting analytics, and I continue my collaboration with Dr. Morrison to this day. I have been involved in over 45 redistricting projects, serving in roles of increasing responsibility from population and statistical analyses, to report writing, to directly advising and supervising redistricting initiatives. In many of these roles, I performed *Gingles* analyses, risk assessments, and Federal and State Voting Rights Act (VRA) analyses in state and local areas. In each of those cases, I personally built or supervised the building of one or more databases combining demographic data, local geographic data, and election data from sources including the 2000, the 2010, the 2020 Decennial Census and numerous vintages of the American Community Survey.
6. In 1996, I began publicly presenting my work at professional conferences. I have presented on the Census, using Census data, measuring effective voting strength, developing demographic accounting models, measuring voting strength and voter registration and turnout statistics. I have also led numerous presentations and tutorials on redistricting. My recent demographic and redistricting work includes:
 - Chairing the “Uses of Census Data and New Analytical Approaches for Redistricting” session at the 2023 Population Association of America meetings in Annapolis, MD.;
 - Chairing the “Population Projections” session at the 2024 Population Association of America meetings, February 2024 (remote conference);
 - Presenting “Uses of Demographic Data and Statistical Information Systems in Redistricting and Litigating Voting Rights Act Cases: Case studies of the CPS and CES, and the ACS and EAVS” at the 2024 Population Association of America Applied Demography Conference, February 2024 (remote conference).
 - Presenting “Use of Current Population Survey (CPS) and Cooperative Election Study (CES) in Analyzing Registered Voter Turnout” at the American Statistical Association Symposium on Data Science and Statistics (SDSS), Richmond, VA. June 2024
7. I have been published since 2004. My works include “Population Estimates” and “Internal and Short Distance Migration” in the definitive demographic reference “The Methods and Materials of Demography.” In 2015, I served alongside a team of advanced demographic experts in *Evenwel, et al. v. Texas*. In *Evenwel*, I served in a leadership role in writing an Amicus Brief on the use of the American Community Survey (ACS) in measuring and assessing one person, one vote. In 2019, I co-authored “Redistricting: A Manual for Analysts, Practitioners, and Citizens,” which provides a comprehensive overview of U.S. Census data and demographic methods for redistricting applications.

8. I have significant expertise in the collection, management, analysis, and reporting of complex demographic, economic, voting, and electoral data, including the Decennial Census, the American Community Survey and associated Public Use Microdata (or “ACS PUMS” <https://www.census.gov/programs-surveys/acs/microdata.html>), the Current Population Survey Voting Supplement (or “CPS” <https://www.census.gov/topics/public-sector/voting.html>), the Cooperative Election Study (or “CES” <https://cces.gov.harvard.edu/>), the Election Administration and Voting Survey (or “EAVS” <https://www.eac.gov/research-and-data/studies-and-reports>).
9. I have been previously retained to provide expert analytics of the Current Population Survey Voting Supplement and the Cooperative Election Study in the matter of *White et al. v. Mississippi State Board of Election Commissioners* (2022-2024) in support of defendants’ demographic expert David A. Swanson. These voter turnout analytics were used to rebut and correct erroneous analytics by the plaintiffs’ expert - and were accepted by the court. I was also retained to use these datasets to provide analytics of Arizona voter registration and turnout in *Swoboda v. Fontes* (2024).
10. In addition to my expert witness work in redistricting, I have a long history of developing expert applied demographic analyses, ranging from public health data analysis of mortality statistics related to opioid use and tobacco use, public housing discrimination, municipal infrastructure and small-area population estimates and forecasts.
11. I have been deposed in the matter of *Harding v. County of Dallas* and have been deposed and/or testified in the matters of *Milligan v. Merrill*, *Thomas v. Merrill*, and *Singleton v. Merrill* over Alabama’s Congressional redistricting initiatives; *Robinson v. Ardoin* and *Galmon v. Ardoin* over Louisiana’s Congressional redistricting initiatives; *Navajo Nation v. San Juan County Board of Commissioners* over San Juan County, New Mexico’s commissioner districts, and *Petteway v. Galveston County, TX* over their county commissioner districts.
12. I have provided bipartisan expert witness support of redistricting cases, including being retained by Democratic counsel as the demographic and redistricting expert for the State of Illinois in the matter of *McConchie v. State Board of Elections*.
13. I maintain affiliations with several professional demographic organizations, including:
 - American Statistical Association
 - Population Association of America
 - Southern Demographic Association
14. I have been retained at my customary rate of \$450 per hour. My compensation for my work on this case is not dependent on the substance of my opinions or the outcome of this case.

I. SUMMARY AND OPINIONS

16. My assignment in this case was to assess the key features of the Plaintiffs’ complaint in *Christian Ministerial Alliance v. Arkansas* by measuring the demographic and political performance of Arkansas’s current congressional redistricting plan, the “2021 Enacted Plan” and comparing it with the previous congressional redistricting plan, the “2011 Enacted Plan”.
17. In the Plaintiffs’ Amended Complaint, they state:

Race was the predominant factor in creating Arkansas’s Second Congressional District in the 2021 Redistricting Plan (the “Plan”), intentionally singling out Black voters for unequal treatment and dilution of their electoral power. (¶ 1)

And in the Plaintiffs’ Opposition to Defendants Motion to Dismiss Amended Complaint, they state:

Arkansas’s 2020 Congressional Redistricting Plan (“the plan”) targets precincts serving high concentrations of Black voters in southeastern Pulaski County with laser precision, distributing them across three of Arkansas’s four congressional districts. (page 1)
18. In the Defendant’s Brief in Support of Motion to Dismiss Amended Complaint Defendants counter by stating:

In addition to drawing districts that met the one person, one vote requirement, the General Assembly also aimed—consistent with judicial precedent—to draw districts that were compact, contiguous, minimized splits between political subdivisions (like counties), preserved communities of interest, avoided pairing incumbents, and otherwise complied with federal law.
19. In this report, I analyze the available circumstantial evidence to assess whether the draw of the 2021 Enacted Plan is best explained by racial motivations or other, non-racial motivations.
20. I conclude that the 2021 Enacted Plan was drawn by balancing performance and improvements in each traditional redistricting criteria, and that when the balance was tipped (such as when it was not drawn with minimal changes) that political motivations fit the evidence better than racial motivations. My conjecture is that the precincts that were exported from D2 during the redistricting cycle were further divided between D1 and D4 in order to minimize the absorption of all of the Democratic voters from D2 into any one other district. The plan does not appear to have been intentionally drawn with “laser precision” to target Black and African American voters for unequal treatment. Rather, the evidence suggests that the use of race-neutral criteria dictated the nature of the 2021 Enacted Plan. I reach this conclusion based on observations of the very small demographic changes in D2 between the 2011 and 2021 Enacted Plans, and improvements in other traditional redistricting criteria such as compactness, splits of county/place/school district geographies (also considering areas that were *not* split), core retention, political performance, and an assessment of the Pulaski County precincts that were moved (and importantly those precincts that were not moved) in the 2021 Enacted Plan.

21. Many jurisdictions such as Arkansas require their political geography to be drawn using voting precincts or voting tabulation districts (VTDs). Precincts commonly refer to the administrative electoral geography of a county and are typically contiguous areas within which all electors go to a single polling place to cast their ballots. VTDs are similar to precincts and are oftentimes identical. But there are two important distinctions. First, the term covers other commonly used electoral geography. The Census Bureau characterizes a VTD as “a generic term adopted by the Bureau of the Census to include the wide variety of small polling areas, such as election districts, precincts, or wards, that State and local governments create for the purpose of administering elections.”³ VTDs can also differ from actual election precincts because precincts do not always follow census geography. Since these electoral geographies serve the purpose of bounding a group of eligible voters for the purpose of casting their ballots, they are typically small with no more than 5,000 people.⁴ Both precincts and VTDs can and do change over time along with changes in the population in an area and the availability of places that can effectively serve as a polling place. Finally, Census VTDs for some areas are an amalgamation of two or more electoral geographies. Conceptually, precincts are the geography that votes are collected in, and VTDs (tabulation districts) are geographies that voting data can be reported in that are consistent with Census geography and population data. An analysis of the 2021 Enacted Plan shows that it was built using the U.S. Census Bureau’s 2020 vintage whole VTDs.⁵ I use the term “precinct” and “VTD” in this report interchangeably. Note that between 2020 and 2022 the number of precincts changed, as did their numbering. In particular, two VTDs from Pulaski County that are featured prominently in my analysis (126 and 127) in 2020 are consolidated into one VTD (124) in 2022 – which changes the number of VTDs moved out of D2 from 14 (the number in the Plaintiffs’ complaint) to 13. This has no practical impact on my analysis or findings. The reader is cautioned to note the vintage when the count or name of a VTD is used herein.
22. In this report, Arkansas is demographically assessed using total population, voting age (VAP) and citizen voting age population (CVAP) – because each metric provides a unique and valuable view of the demographic characteristics of the state. Within these metrics, I assess the white, non-Hispanic (WNH), Any Part Black (APB) and Hispanic populations. Other populations such as Asian, Native Hawaiian and Pacific Islander, American Indian, “other” and multi-race (not including Black) are generally grouped in an “Other” (meaning all other) category or are not included.

³ <https://www2.census.gov/geo/pdfs/reference/GARM/Ch14GARM.pdf>

⁴ The 2020 survey by the United States Election Assistance Commission found a total of 176,933 precincts or precinct equivalents in the United States, of which 175,441 were in the 50 states plus the District of Columbia and 1,492 were in overseas U.S. territories.

⁵ Sources: <https://www2.census.gov/geo/tiger/TIGER2020PL/LAYER/VTD/2020/>, BGD calculations

23. In Arkansas, the white, non-Hispanic (WNH) population is the largest, with 2,063,550 total population. While the Any Part Black (APB) population is large, with 495,968 total population (see [Table IV.C.1](#)) in 2020 – this only represents 16.5% of the total population. As shown in [Figure IV.C.2](#) the APB population is distributed widely across the state – making any one of the four U.S. house districts a Black majority by any geographic draw impossible.
24. In their Amended Complaint, Plaintiffs state “By spreading Pulaski County’s Black voters across the First, Second, and Fourth Congressional districts, the 2021 Redistricting Plan ensures that Black people constitute no more than approximately one-fifth of the voting-age population (“VAP”) in any one district, particularly the Second Congressional District where Black voters have demonstrated growing electoral influence.”. In fact, the 2021 Enacted Plan does nothing to “ensure” this. The geographic reality of the distribution of Blacks across the state does. While Arkansas’s APB population is concentrated in Pulaski County, only approximately 1/3 of all APB in Arkansas live there (see [Appendix A.1](#)). The remaining APB in the State of Arkansas are dispersed across the state in such a way that it is not possible to change their percentage in any significant way from the 2011 Enacted Plan unless the state was entirely redrawn. Since the 2021 Enacted Plan is an adaptation of the 2011 Enacted plan, the changes due to redistricting in 2021 only fractionally change the percent APB in D2, as follows:⁶
1. The total population APB declined by -2.3 percentage points from 24.4% in 2011 to 22.1% in 2021 (the measure used for determining apportionment and representation).
 2. The Voting Age Population (VAP) APB declined by -2.3 percentage points from 22.6% in 2011 to 20.3% in 2021 (the measure used to assess the population who could be eligible to vote).
 3. The Citizen Voting Age Population (CVAP) APB declined by -2.7 percentage points from 23.4% in 2011 to 20.6% in 2021 (the measure used to measure who is currently eligible to vote).
25. The 2021 Enacted Plan shows a clear effort to improve the geographic compactness, with virtually no change in compactness for D1 and D4, a slight improvement for D2, and a significant improvement for D3. The overall compactness of the 2021 Enacted Plan is improved over the 2011 Enacted Plan (see [Table V.C.1](#)).
26. The geographic splits of Arkansas’s counties were also generally improved in the 2021 Enacted Plan. Splits of counties, places, school districts and judicial circuits are examined as follows:
1. There were five split counties under the 2011 Enacted Plan while there are only two split counties under the 2021 Enacted Plan (see [Section VI.A](#)). The 2011 Enacted Plan split of Jefferson County (the second most Black county in Arkansas) is resolved in the 2021 Enacted Plan - as are the splits of Crawford, Newton and Searcy Counties – while Pulaski County is newly split. To assess whether Blacks in Arkansas were targeted for division

⁶ May not foot due to rounding

with the intent to dilute their voting strength and representation, I hypothesized that many of the most heavily Black counties would have been targeted to be split. In an analysis ranking every county by percent APB – it was revealed that there are ten counties in Arkansas that have higher (some *much* higher) concentrations of APB populations than Pulaski County in Arkansas – and none of these are split by the 2021 Enacted Plan. Out of all the most Black counties in Arkansas – Pulaski (ranked 11th in %APB) is the only heavily Black county that is split (see [Appendix C.1](#)) and Jefferson County (ranked 2nd in %APB) which was split under the 2011 Enacted Plan is made whole in 2021.

2. In examining place splits (see [Section VI.B](#)) – the 2011 Enacted Plan split five places (cities/towns) and the 2021 Enacted Plan split six places – for a net increase of one split place. Unlike analysis by counties – more APB population is impacted by these splits in 2021 than in 2011. After ranking Arkansas’s places by percent APB (as with counties) – none of the places with the highest concentrations of APB are split by the 2021 Enacted Plan (see [Appendix C.2](#)). North Little Rock (ranked 79th in %APB) is the highest ranked heavily Black place that is split by the 2021 Enacted Plan.
3. In looking at school districts (see [Section VI.C](#)), the 2011 Enacted Plan split 52 districts (of which 49 have split pieces that are populated), while the 2021 Enacted Plan only split 41 split school districts (of which 41 have split pieces that are populated). The number of split school districts is reduced by eight - from 49 in the 2011 Enacted Plan to 41 in the 2021 Enacted Plan. After ranking Arkansas’s school districts by percent APB (as with counties and places) an interesting finding emerges. While a number of school districts with notably high Black population concentrations are newly split in and around Pulaski - other school districts with even higher concentrations of Black population under the 2011 Enacted Plan are made whole (such as Dollarway, with 60.3% APB).
4. Arkansas’s judicial circuits align with county boundaries. When these districts have split counties historically, they have done so without regard to voting precincts. I find that the 2011 Enacted Plan split Arkansas judicial circuit boundaries throughout the state, including heavily Black Jefferson County. In 2021, some districts are newly split (such as the 6th in Pulaski) while other districts such as the heavily Black 11th Circuit West containing Jefferson that were previously split are now made whole.

27. In summary, the number of counties split decreases by three, the number of places split increases by one and the number of school districts decreases by eight. Some areas with high concentrations of Black population are split anew, while others with even higher existing concentrations of Black population are made whole. Of the numerous counties, places and school districts in the state with the highest concentrations of Black population in the state – none are split by the 2021 Enacted Plan. These findings are inconsistent with Plaintiffs’ claims (Am. Compl. ¶ 2 and ¶ 4) that the 2021 Enacted Plan disregarded traditional redistricting principles such as respect for political subdivisions.

28. A focus of the Plaintiffs’ complaint is that more persons were moved than necessary in order to balance the population in each district. Importantly, minimizing change is not a redistricting requirement in Arkansas. [Section VII Differential Core Retention](#) analyzes the population moves that were made – which evidence an effort to meet numerous traditional redistricting principles. While the total number of people moved as an outcome of balancing these principles is relevant, *who* was moved is also important. For example, is there evidence that Blacks were disproportionately moved in order to rebalance the population in each district? [Table VII.1](#) shows that there are observable differences in the racial makeup of the populations that were moved between districts. But these data do not demonstrate invidious harms of Blacks statewide.

- In D1, D3 and D4, relatively *more* white non-Hispanics (WNH) and *fewer* Any Part Black (APB) were moved. That is – in three districts APB had *greater* core retention than WNH.
- In D2, relatively *more* APB and *fewer* WNH were moved. That is – only one district had *greater* core retention for WNH than APB.

The differential core retention analysis shows that minority populations did not disproportionately bear the burden of being redistricted into different districts statewide in order to rebalance the total population of each district. If minimal change *were* the overriding criteria for redistricting in Arkansas (as in some states such as Wisconsin⁷) I could find some fault with the plan – but overall the core retention statistics in total and by demographic subgroup are high in Arkansas (see [Table VII.1](#)). While an imperfect comparison - the total core retention of 92.2% is in fact identical to the core retention of Wisconsin Senate districts in 2020 where least change was legally required.⁸

29. So, what would explain the fact that more population was moved than minimally necessary? While Blacks are not close to being 50% (they are 22.1%) of the population in D2, Democrats

⁷ See Wisconsin 2021 Enrolled Joint Resolution 63 and Expert Report of Thomas M. Bryan in *Johnson v. Wisconsin Elections Commission* December 15, 2021

<https://www.wicourts.gov/courts/supreme/origact/docs/expertrepbryan.pdf>

⁸ Ibid

are. Plaintiffs make much of the 2020 election, claiming that for D2 of the 2020 Congressional race “State Senator Joyce Elliott came close to prevailing” (Am. Compl. ¶ 13) and “The competitive contest between Senator Elliott and incumbent Representative Hill was fresh in the Arkansas Legislature’s mind when it crafted the Second Congressional District” (Am. Compl. ¶ 14).

30. Thus the Plaintiffs themselves offer the most obvious explanation for why D2 was drawn the way it was: politics. In this report, the 2020 and 2022 elections are examined in detail. Had the 2021 Enacted Plan been in place for the 2020 election, Republicans would have improved their performance by +2.0 to +2.7 percentage points in D2 (compared to how it actually performed under the 2011 Enacted Plan) – with the largest improvement (+2.7) being in the 2020 congressional race (see [Section VIII.A](#)). In each of five major races in the 2022 election, *after* the 2021 plan was enacted, Republican performance was improved by +2.0 percentage points compared to how they would have performed under the 2011 Enacted Plan (see [Section VIII.B](#)).
31. In looking at the voting precincts in detail that were moved (and adjacent precincts that were not moved – but easily could have been) an important discovery was made. The 2021 map moves two precincts with very low % ABP populations out of D2 and did *not* move other *very* high percent APB populations that were in D2 and immediately adjacent to D4 (see [Figure VIII.A.8](#)) As with the analysis of county, place and school district splits – the overwhelming majority of high percentage Black precincts in Pulaski County are retained in the 2021 Enacted Plan.
32. The next analysis is of voter turnout. How did the turnout of precincts in the SE part of Pulaski County (that were moved out of D2) compare with the precincts from Cleburne County (that were moved in to D2)? It turns out that the 14 Pulaski County precincts (which became 13 in 2022) have voter turnout significantly *below* the state average – while Cleburne County has voter turnout significantly *above* the state average (see [Section VIII.C](#)). The impact of trading a low turnout majority Democratic area, and a high turnout majority Republican area, amplifies the political outcome of such a geographic swap.
33. In order to test the political influence of the precincts that were moved out of SE Pulaski County on D2, political performance was modeled using an assumption that these precincts had 100% turnout. Would leaving them in D2 and having 100% turnout from them have changed the outcome of the 2022 races? With the comparatively small share of CVAP they would have represented to all of D2 – not even 100% turnout would have been even remotely close to impacting the outcome of the 2020 nor the 2022 statewide races. See [Section VIII Political Performance](#) generally.

34. Finally, in their Amended Complaint the Plaintiffs state that there were other plans that could have been drawn without splitting counties – and that could have achieved the same political outcome as the 2021 Enacted Plan without the splitting of Pulaski County. In response, I drafted two plans for D2: BGD1 and BGD2 to see if this was true. BGD1 excludes Cleburne County from D2 – then exports only enough Pulaski precincts as would have been necessary to balance the population. BGD2⁹ keeps Pulaski County whole and exports all of Van Buren County to balance the population.

35. In these draft plans:

- Under the 2011 Enacted Plan the percent total population APB in D2 is 24.4% and under the 2021 Enacted Plan is 22.1%. The percent total population APB in D2 is 24.1% under BGD1 and 24.9% under BGD2. Both plans are roughly comparable to 2011, and *greater* than the 2021 Enacted Plan.
- The total population deviation for D2 would change from -171 in the 2021 Enacted Plan to +2,014 under BGD1 and +714 under BGD2.
- Both BGD plans would have *inferior* compactness compared to the 2021 Enacted Plan.
- Both BGD plans would have *improved* core retention compared to the 2021 Enacted Plan.
- Compared to the 2011 Enacted Plan, the BGD1 (reduced Pulaski split) plan would have improved Republican’s performance fractionally – while the BGD2 (whole county) plan would have performed *worse*. Compared to the 2021 Enacted Plan, both BGD plans both perform worse for Republicans.

36. In summary, the population in D2 needed to be reduced by approximately 16,000 in the 2021 redistricting process. The 2021 Enacted Plan very closely balances D2’s population – reducing its deviation to only -171 persons. In the process, the percent white, non-Hispanic increases slightly, and the percent Any Part Black decreases slightly. While the 2021 Enacted Plan is not a “least change” plan – the changes are so small as to be comparable with the changes in another state (Wisconsin) where “least change” is legally required. The compactness of the 2021 Enacted Plan is superior to the 2011 Enacted plan and other viable alternatives I explored. The overall number of splits under the 2021 Enacted Plan is improved – with the number of county splits decreasing by three, the number of place splits increasing by one and the number of school district splits decreasing by eight. Judicial circuits across the state continue to be split, as they were under the 2011 Enacted Plan. Some areas with high concentrations of Black population are split anew, while others with even higher concentrations of Black population under the 2011 Enacted Plan are made whole. Of the numerous counties, places and school

⁹ This plan was built to replicate D2 as it was drawn in HB 1959 Rep. Nelda Speaks “Whole County Plan”. See [Appendix G](#).

districts in the state with the highest concentrations of Black population in the state – *none* are split by the 2021 Enacted Plan. These findings are inconsistent with Plaintiffs’ claims (Am. Compl. ¶ 2 and ¶ 4) that the 2021 Enacted Plan disregarded traditional redistricting principles such as respect for political subdivisions. The 2021 Enacted Plan performs better politically for Republicans across the board, in all of both the 2020 and 2022 races.

37. In examining maps that show concentrations of Democratic voters around Pulaski County, it is plain to see that there are no other concentrations of voting precincts with heavy concentrations of Democrats that could have been considered to move out of the district that could have benefitted Republicans. The next nearest concentration of white Democrats in sufficient numbers to impact the congressional race for D2 are in the far NW corner of the state, in and around Benton and Washington Counties – more than 200 miles away from D2.
38. The 2021 Enacted Plan performs better than the 2011 Enacted Plan and other obvious alternative plans by each traditional redistricting principle. If the 2021 Enacted Plan’s objective had been to infringe Black voting strength in D2 – there were numerous ways the plan could have accomplished this – but did not. In examining the political performance of each plan – I conclude that the 2021 Enacted Plan provides the best political performance for Republicans in D2 compared to the 2011 Enacted plan and my alternative BGD plans.
39. I conclude that the evidence does not support race being the predominant factor in creating Arkansas’s Second Congressional district in the 2021 Enacted Plan. The evidence does not show that Black voters were singled out for unequal treatment or the dilution of their electoral power, and does not divide SE Pulaski County along racial lines with “laser precision.”

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II. REPORT OVERVIEW

40. [Section III](#), provides the background of the case relevant to my analysis
41. [Section IV](#), provides major demographic concepts and the demographics of Arkansas's congressional districts for their 2011 and the 2021 Enacted Plan.
42. [Section V](#), provides an analysis of the compactness of each plan and assess these plans.
43. [Section VI](#), provides an analysis of the geographic splits of Arkansas counties, places, school districts and judicial circuits.
44. [Section VII](#), provides a differential core retention analysis (or "DCRA").
45. [Section VIII](#), provides an assessment of political performance from the 2020 and 2022 elections by race.
46. [Section IX](#), provides two draft alternative plans, "BGD1" and "BGD2" and an assessment of their demographics, compactness, core retention and political performance.
47. [Section X](#), provides conclusions
48. [Section XI](#), provides references.
49. [Section XII](#), provides appendices.
50. In forming my opinions, I have considered all materials cited in this report as well as:
 1. First Amended Complaint for Injunctive and Declaratory Relief Pursuant To 42 U.S.C. § 1983 and 28 U.S.C. § 1331 dated 7/24/23.
 2. Plaintiffs' Opposition to Defendant's Motion to Dismiss Amended, dated 8/21/23.
 3. Defendant's Brief in Support of Motion to Dismiss Amended Complaint, undated.
 4. Defendant's Reply in Support of Motion to Dismiss Amended Complaint, 9/5/23.
 5. Explanatory Order, dated 2/2/24.
 6. Election data for 2020 procured from Redistricting Data Hub (RDH) and the Arkansas Secretary of State, and 2022 election data procured from the Arkansas Secretary of State SOS.
 7. The Arkansas House State Agencies and Governmental Affairs meeting on Sept. 6, 2021 <https://sg001-harmony.sliq.net/00284/Harmony/en/PowerBrowser/PowerBrowserV2/20210906/-1/21848#agenda>
 8. The Arkansas House and Senate State Agencies and Governmental Affairs meeting on Sept. 20, 2021 <https://sg001-harmony.sliq.net/00284/Harmony/en/PowerBrowser/PowerBrowserV2/20210920/-1/21833?gefdesc=&startposition=20210920125910>

9. The Arkansas House and Senate State Agencies and Governmental Affairs meeting on Sept. 27, 2021 <https://sg001-harmony.sliq.net/00284/Harmony/en/PowerBrowser/PowerBrowserV2/20210927/-1/21840#agenda>
10. The Arkansas Senate State Agencies and Governmental Affairs meeting on October 5, 2021 <https://sg001-harmony.sliq.net/00284/Harmony/en/PowerBrowser/PowerBrowserV2/20211005/-1/21879?gefdesc=&startposition=20211005103714#agenda>
11. The Arkansas Senate State Agencies and Governmental Affairs meeting on October 5, 2021 <https://sg001-harmony.sliq.net/00284/Harmony/en/PowerBrowser/PowerBrowserV2/20211005/-1/21879?gefdesc=&startposition=20211005103714#agenda> and <https://sg001-harmony.sliq.net/00284/Harmony/en/PowerBrowser/PowerBrowserV2/20211005/-1/21881?gefdesc=&startposition=20211005150241#agenda>
12. The Arkansas House meeting on October 6, 2021 <https://sg001-harmony.sliq.net/00284/Harmony/en/PowerBrowser/PowerBrowserV2/20211006/-1/21885?gefdesc=&startposition=20211006104932#handoutFile>
13. The 2024 U.S. Supreme Court decision in *Alexander v. South Carolina* (see https://www.supremecourt.gov/opinions/23pdf/22-807_3e04.pdf)
51. I reserve the right to further supplement my report and opinions.

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III. CMA v. ARKANSAS BACKGROUND

52. My understanding of the development of the 2021 Enacted Plan is as follows. In Arkansas, congressional lines are drawn by the legislature as normal legislation.¹⁰

On January 14, 2022, Arkansas's congressional map went into effect. The Arkansas General Assembly approved the congressional map plan on Oct. 6, 2021. On October 13, 2021, Gov. Asa Hutchinson announced he would not sign the plans into law, and, instead, let them go into effect without his signature. On November 4, 2021, Attorney General Leslie Rutledge (R) released a legal opinion establishing January 14, 2022 as the map's effective date. This map took effect for Arkansas' 2022 congressional elections.¹¹

53. In learning the case, I relied on the documents I was provided – as well as videos of the Arkansas House and Senate Committees on State Agencies and Governmental Affairs meetings where various “Whole County” plans were presented.

54. Subsequent to the plan being accepted, a Complaint for Injunctive and Declaratory Relief Pursuant to 42 U.S.C. § 1983 AND 28 U.S.C. § 1331 was filed by Mable Bynum, Patricia Brewer, Christian Ministerial Alliance, Carolyn Briggs, and Lynette Brown.¹² Their complaint was amended on July 24, 2023. In the Amended Complaint, Plaintiffs make numerous claims, including:

¶ 1 “Race was the predominant factor in creating Arkansas’s Second Congressional District in the 2021 Redistricting Plan (the “Plan”), intentionally singling out Black voters for unequal treatment and dilution of their electoral power.”

¶ 2: “To make this white-for-Black population swap possible, the 2021 Redistricting Plan carved Pulaski County into not two but three separate Congressional Districts with boundary lines that disregarded traditional redistricting principles such as respect for political subdivisions and sliced through the heart of longstanding Black communities of interest in the Second Congressional District with almost surgical precision.”

¶ 4: “In creating the current Second Congressional District, the 2021 Redistricting Plan contravenes traditional redistricting principles, the principles set forth by the Arkansas Board of Apportionment, and Arkansas legislators’ own stated redistricting goals by splitting counties and other political subdivisions, and communities of interest.”

¶ 5: “Slicing through the heart of Pulaski County’s large and politically effective Black community in the Second Congressional District, the 2021 Redistricting Plan divides the county’s Black voting population anchored in the Second Congressional District into three of Arkansas’s four congressional districts.”

¹⁰ <https://redistricting.ils.edu/state/arkansas/?cycle=2020&level=Congress&startdate=2022-01-14>

¹¹ https://ballotpedia.org/Redistricting_in_Arkansas_after_the_2020_census#cite_note-15

¹² <https://www.courtlistener.com/docket/67416824/christian-ministerial-alliance-v-thurston/>

¶ 6: “This drastic and unprecedented decision divides and dilutes the power of the state’s largest community of Black voters. By spreading Pulaski County’s Black voters across the First, Second, and Fourth Congressional districts, the 2021 Redistricting Plan ensures that Black people constitute no more than approximately one-fifth of the voting-age population (“VAP”) in any one district, particularly the Second Congressional District where Black voters have demonstrated growing electoral influence.”

¶ 8: “The 2021 Redistricting Plan excises fourteen voting precincts in southeastern Pulaski County that had long been included with the rest of Pulaski County in the Second Congressional District. Nearly all of these precincts comprised predominantly Black voters.”

¶ 21: “In addition, traditional redistricting principles cannot explain the targeting of Pulaski’s Black voters. Redistricting practices in Arkansas and elsewhere disfavor splitting counties and other political subdivisions. Yet the 2021 Redistricting Plan’s treatment of Black voters in Pulaski County violates that principle on multiple levels: splitting the county three ways, dividing multiple municipalities, carving up a (predominantly Black) judicial subdistrict, and even dividing all four of the major public school districts in Pulaski County—one of which now occupies parts of three different congressional districts. Traditional redistricting principles also disfavor dividing communities of interest; yet the 2021 Redistricting Plan means that Black neighbors, churchgoers, classmates, and coworkers living in close proximity will have different representation in three different Congressional districts. And none of this was necessary—other plans were introduced that fared markedly better on traditional criteria such as respect for political subdivisions.”

¶ 22 “Pursuit of any partisan advantage or monopoly cannot explain what happened here either. Other plans could have fulfilled partisan goals without singling out Black voters to such a degree. Black and white voters with the same party preference based on the 2018 and 2022 Gubernatorial elections, particularly in and around Pulaski County, were sorted differently among the relevant districts. Race, not merely party, drove who remained in the Second Congressional District and who was cut out.”

¶ 150 “In sorting voters between and among districts to apportion voters to satisfy population equality principles, the Arkansas Board of Apportionment has identified “Maintaining Cores of Existing Districts Where Practicable” as a “common redistricting principle” in Arkansas. According to the Board, this serves the important goal of “help[ing] preserve continuity of representation.” (Redistricting Standards and Requirements, Ark. Bd. of Apportionment, <https://arkansasredistricting.org/about-the-process/redistricting-criteria-2/> (last visited May 21, 2023). 27 Id)

¶ 189. “White Democratic voters were included in the redrawn Second Congressional District at a notably higher rate than Black Democratic voters within the same counties at issue. White unaffiliated voters were included in the Second Congressional District at a notably higher rate than Black unaffiliated voters within the same counties.”

55. In this report, these Plaintiffs’ claims will be assessed using standard demographic techniques, including measuring demographic characteristics, compactness, and core retention, as well as assessing the political performance of the 2011 Enacted Plan and the 2021 Enacted Plan. In the complaint Plaintiffs mention the possibility of alternative plans and their features - but did not present those plans or any evidence to support the claim that alternative plans were in any regard superior. So a revised D2 was developed under two alternative plans: BGD1 and BGD2 to test this possibility.

56. In the Plaintiffs’ Opposition to Defendant’s Motion to Dismiss Amended Complaint (pages 7-8):

At the pleading stage, Plaintiffs state a claim of racial gerrymandering by plausibly alleging that the state subordinated other factors to racial considerations, such that race predominated in the design of a challenged district. To make that showing, Plaintiffs may rely on “‘direct evidence’ of legislative intent, ‘circumstantial evidence of a district’s shape and demographics,’ or a mix of both.” *Cooper*, 581 U.S. at 291 (citation omitted). Facts probative of racial gerrymandering include: (1) racial disparities in the movement of persons into and out of the district, and other demographic impacts; (2) indications that the legislature anticipated these racially disparate impacts, such as the legislature’s access to racial demographic data during the redistricting; and (3) unexplained deviations from traditional redistricting criteria, which tend to establish that traditional redistricting criteria were subordinated in the line-drawing process. See, e.g., *Shaw v. Hunt*, 517 U.S. 899, 906 (1996) (district’s “highly irregular and geographically non-compact” shape); *Cooper*, 581 U.S. at 310-11 (legislature’s awareness and consideration of racial impact); *Ala. Legis. Black Caucus*, 575 U.S. at 274 (transgression of redistricting guidelines and subordination of traditional districting principles).

57. In the Defendant’s Brief in Support of Motion to Dismiss Amended Complaint, Defendants state (page 2):

In addition to drawing districts that met the one person, one vote requirement, the General Assembly also aimed—consistent with judicial precedent—to draw districts that were compact, contiguous, minimized splits between political subdivisions (like counties), preserved communities of interest, avoided pairing incumbents, and otherwise complied with federal law. (Am. Compl. ¶ 148.)

58. In this report, I assess these claims using standard demographic techniques, including analyzing demographic characteristics, measuring compactness, core retention and assessing political performance of the 2011 Enacted Plan, the 2021 Enacted Plan as well as two alternative plans: which I will refer to as BGD1 and BGD2.

IV. DEMOGRAPHIC ANALYSIS

59. In this section I introduce the demographic measures of total population, voting age population (VAP) and citizen voting age population (CVAP). The use of each of these measures is important, because they offer a different view of the populations and assess different parts of the Plaintiffs' complaint. Total population is used for determining apportionment and representation. VAP is used to assess the population who could be eligible to vote, and CVAP is used to measure who is currently eligible to vote. Using these definitions, I measure Arkansas's house districts under the 2011 and 2021 Enacted Plans and assess the differences between them.

A. Decennial Census

60. The Decennial Census counts people in the United States on a De Jure basis¹³ (Wilmoth, 2004: 65) and the U.S. Census Bureau attempts to count everybody once, only once, and in the right place (Cork and Voss, 2006). It is mandated by the U.S. Constitution to occur every 10 years, in years ending in zero, to provide the numbers needed to reapportion the House of Representatives, which also results in a reapportionment of the Electoral College. The decennial census numbers also are used by state governments to redraw legislative districts, and the federal government uses the numbers in various funding formulas to distribute some \$2.8 trillion in funding for highways, hospitals, schools, and many other purposes.¹⁴
61. In order for states to redraw legislative and other districts, the U.S. Census Bureau issues the PL 94-171 redistricting data file.¹⁵ Because the decennial census itself does not ask a "citizenship" question or questions about voting activities, other sources of data produced by the U.S. Census Bureau are often used in redistricting activities to include the American Community Survey (ACS) and the Current Population Survey (Morrison and Bryan, 2019).
62. Within the PL94-171 file are statistics on the total population and the VAP for the nation as a whole through other layers of statistical and administrative geographies (such as counties) down to individual census blocks.¹⁶ VAP is important because it serves as a universe for measuring who could be eligible to vote and voting strength. In assessing how to measure the population eligible to vote, the MIT Election Lab reports "VAP includes individuals who are ineligible to vote, such as non-citizens and those disfranchised because of felony convictions. Thus, two additional measures of the voting-eligible population have been developed:

¹³ all of its usual residents, regardless of whether they are present or legal.

¹⁴ <https://www.census.gov/newsroom/press-releases/2023/decennial-census-federal-funds-distribution.html#:~:text=The%20Census%20Bureau%20does%20not,census%2C%20ACS%20and%20other%20surveys>

¹⁵ <https://www.census.gov/programs-surveys/decennial-census/about/rdo/summary-files.html>

¹⁶ <https://www.census.gov/newsroom/blogs/random-samplings/2011/07/what-are-census-blocks.html>

- Citizen Voting Age Population (CVAP) , which is based on Census Bureau population estimates generated using the American Community Survey.
- Voting Eligible Population (VEP), which is calculated by removing felons (according to state law), non-citizens, and those judged mentally incapacitated.”¹⁷

B. ACS Citizen Voting Age Population

63. The American Community Survey (ACS) is the national source of record for CVAP data. The ACS is a set of “rolling” annual sample surveys conducted by the U.S. Census Bureau (Morrison and Bryan, 2019; U.S. Census Bureau, 2020a). It is distinct and different from the decennial census and the Current Population Survey, which also are conducted by the U.S. Census Bureau. While the American Community Survey CVAP data are not commonly used to draw districts as part of decennial redistricting, they are used in redistricting litigation to determine voting strength – particularly among minority populations.
64. The U.S. DOJ provides guidance to use CVAP to quantify voting strength for the purposes of Section 2 cases.¹⁸ That guidance states: “Section 2 prohibits both voting practices that result in *citizens* being denied equal access to the political process on account of race, color, or membership in a language minority group, and voting practices adopted or maintained for the purpose of discriminating on those bases.”¹⁹ That is – the DOJ states explicitly that Section 2 assesses the concern of *eligible* voting age population (that is: eligible citizens) not just the voting age population. To that end, the DOJ requests a “special tabulation” of the U.S. Census Bureau’s American Community Survey (ACS) which includes a question on citizenship (the decennial census does not).²⁰ For the purpose of evaluating districting plans compliance under Section 2 of the Voting Rights Act, the DOJ provides specific guidance on how to measure minority populations:²¹

The Department of Justice will follow both aggregation methods defined in Part II of the Bulletin. The Department’s initial review will be based upon allocating any response that includes White and one of the five other race categories identified in the response. Thus, the total numbers for “Black/African American,” “Asian,” “American Indian/Alaska Native,” “Native Hawaiian or Other Pacific Islander,” and “Some other race” reflect the

¹⁷ <https://electionlab.mit.edu/research/voter-turnout>

¹⁸ Refining a CVAP estimate to a VEP by removing felons, those judged mentally incapacitated or incarcerated (who are all included in the DOJ CVAP estimates) is a difficult exercise not commonly undertaken and is not required by the DOJ.

¹⁹ <https://www.justice.gov/opa/press-release/file/1429486/download>

²⁰ <https://www.census.gov/programs-surveys/decennial-census/about/voting-rights/cvap.2021.html#list-tab-1518558936>

²¹ [https://www.justice.gov/opa/press-release/file/1429486/dl#:~:text=§%2010303\(f\)\(of%20discriminating%20on%20those%20bases.](https://www.justice.gov/opa/press-release/file/1429486/dl#:~:text=§%2010303(f)(of%20discriminating%20on%20those%20bases.)

total of the single-race responses and the multiple responses in which an individual selected a minority race and White race.

The Department will then move to the second step in its application of the census data by reviewing the other multiple-race category, which is comprised of all multiple-race responses consisting of more than one minority race. Where there are significant numbers of such responses, the Department will, as required by both the OMB guidance and judicial opinions, allocate these responses on an iterative basis to each of the component single-race categories for analysis. *Georgia v. Ashcroft*, 539 U.S. 461, 473, n.1 (2003)

65. In response to this guidance, the U.S. Census Bureau reports CVAP statistics for race and ethnicity alone (non-Hispanic) and select non-Hispanic races in combination (non-Hispanic), as seen in [*Figure IV.B.1*](#):

Figure IV.B.1 American Community Survey DOJ VRA Race and Ethnicity Reporting Classifications

1	Total CVAP
2	Not Hispanic or Latino (NH)
3	American Indian or Alaska Native Alone (NH)
4	Asian Alone (NH)
5	Black or African American Alone (NH)
6	Native Hawaiian or Other Pacific Islander Alone (NH)
7	White Alone (NH)
8	American Indian or Alaska Native and White (NH)
9	Asian and White (NH)
10	Black or African American and White (NH)
11	American Indian or Alaska Native and Black or African American (NH)
12	Remainder of Two or More Race Responses (NH)
13	Hispanic or Latino

Source: https://www2.census.gov/programs-surveys/decennial/rdo/technical-documentation/special-tabulation/CVAP_2016-2020_ACS_documentation_v3.pdf.

66. The DOJ directs that two levels of minority population be produced. In order to create the first-level required DOJ estimate of the Black or African American population alone or in combination with white, the following groups are aggregated:

- Group 5 Black or African American Alone; and
- Group 10 Black or African American alone and White (NH – or “Not Hispanic”).

67. In recent cases, this first level has proven just to be a demographic exercise. Plaintiffs in cases such as these are commonly going straight to the second-level “any part” definition (see *Robinson v. Ardoin* in Louisiana for example). In order to create the second-level “any part” estimate of the Black or African American population, the following groups are aggregated:

- Group 5 Black or African American alone,
- Group 10 Black or African American alone and White (NH); and
- Group 11 American Indian or Alaska Native and Black or African American (NH).

The addition of Group 11 (adding American Indian or Alaska Natives) frequently adds little to no population to the first-level estimate of Black alone or in combination with white. Since these groups do not capture all of the possible Black or African American multi-race combinations, and do not include Black Hispanics – this aggregation can be thought of as a lower bound of the actual any-part Black or African American CVAP. The Census Bureau does not provide a true “Any Part Black” CVAP estimate.

68. Again, we have two sources of population data: (1) the decennial census from 2020 provides the total and Voting Age Population, or “VAP” and separately (2) the most recent ACS provides Citizen Voting Age Population, or “CVAP”.²² Here I will analyze and compare the total population, the VAP and the CVAP for the state as a whole and by house district for the 2011 Enacted and 2021 Enacted plans to assess Plaintiffs’ claims.²³

69. The population of the State of Arkansas grew and changed between the 2010-2020 censuses.

- Total population **grew** by +95,606 (+3.3%) from 2,915,918 to 3,011,524.
- The white, non-Hispanic (WNH) population **declined** by -109,919 (-5.1%) from 2,173,469 to 2,063,550.
- The Any Part Black (APB) population **increased** by +27,258 (+5.8%) from 468,710 to 495,968.
- The Hispanic (HISP) population **increased** by +70,797 (+38.1%) from 186,050 to 256,847.²⁴

Changes in other races and multi-race populations in particular account for the remaining differences.

²² For the purposes of this exercise, I procured the ACS 2018-2022 DOJ CVAP Special Tabulation, which is published at the Census Block Group level of geography. I then disaggregated these data with an iterative proportional fitting (IPF) algorithm using PL94-171 block-level data by race and ethnicity as “marginals.” See Morrison and Bryan, 2019 Section 3.6.1 for more information on iterative proportional fitting.

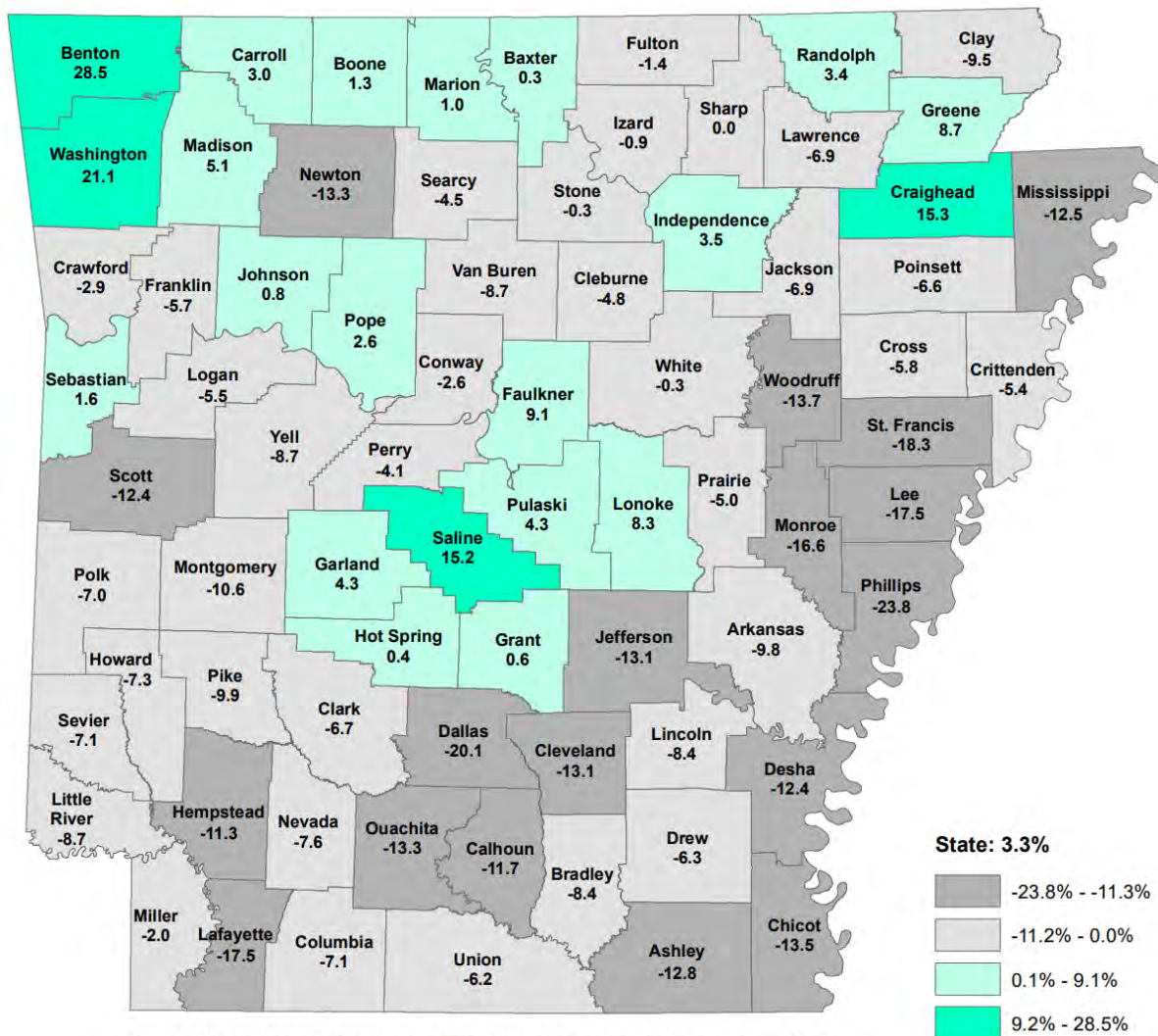
²³ Note that throughout this report, tables are shaded based on their values. Lower values are shown in red while higher values are shown in green.

²⁴ Sources: 2010 and 2020 U.S. Census PL94-171 P1 and P2 tables for Arkansas, BGD calculations.

See also: <https://www.census.gov/library/stories/state-by-state/arkansas-population-change-between-census-decade.html>

70. As shown in [Figure IV.B.2](#) this growth and decline varied significantly in different parts of the state – with many rural counties in the southern and eastern part of the state in decline, and counties in the central and northwestern part of the state growing.

Figure IV.B.2 Percent Change in Total Population by Arkansas County 2010-2020



Source: U.S. Census Bureau, 2010 Census and 2020 Census State Redistricting Data (Public Law 94-171)

Source: Arkansas State Data Center, see:

https://arstatedatacenter.youraedi.com/content/Decennial_Census/Census_2020/Redistricting/Population%20Change.pdf

C. Demographics of 2011 Enacted Plan

71. The 2011 Enacted Plan is shown in [Figure IV.C.1](#). By 2020 the total population in each house district of the 2011 Enacted Plan deviated significantly from an equal distribution - measured by the 2020 Census into $\frac{1}{4}$ equal parts – one for each of 4 districts. [Table IV.C.1](#) shows the 2020 total population by race and ethnicity for each district in the 2011 Enacted Plan.²⁵ The State of Arkansas (Defendants) describe the need to rebalance districts after the 2020 Census as follows:

Reapportionment is required to comply with the constitutional requirement that the populations of a state's congressional districts be as equal "as is practicable." *Wesberry v. Sanders*, 376 U.S. 1, 8 (1964). This is sometimes referred to as the "one person, one vote" rule. Based on the 2020 census, each of Arkansas's congressional districts "needed an ideal population of 752,881." (Am. Compl. ¶ 53.) Due to population growth in the Second and Third Districts, the General Assembly was required to rebalance the population between Arkansas's existing districts in order to comply with the one person, one vote rule. (Am. Compl. ¶¶ 52-54.) This meant redrawing boundaries to significantly reduce the population of the Third District; substantially reduce the population of the Second District; and increase the populations of the First and Fourth Districts. (see BiS MTD Amended Complaint to File page 2)

72. The populations by district and the population moves necessary to approach the target of 752,881 by district are as follows:

- D1, as it was drawn in 2011, had 716,388 people in 2020: – 36,493 (or -4.8%) **below** the target of $\frac{1}{4}$ of the total population of 752,881. This is because D1 included many counties that lost population over the decade, such as Mississippi (-12.5%), St. Francis (-18.3%), Lee (-17.5%), Phillips (-23.8%) and Monroe (-16.6%).²⁶
- D2, as it was drawn in 2011, had 769,391 people in 2020: +16,510 (or +2.2%) **above** the target of $\frac{1}{4}$ of the total population of 752,881 – driven by the growth of Saline (+15.2%).
- D3 as it was drawn in 2011, had 839,147 people in 2020: +86,266 (or +11.5%) **far above** the target of $\frac{1}{4}$ of the total population of 752,881. This is because D3 included many counties that disproportionately gained *significant* population over the decade, such as Benton (+28.5%) and Washington (+21.1%).²⁷

²⁵ Note, this table does not include other races such as Asian, American Indian and Alaska Natives, Native Hawaiian and Pacific Islander and other. APB includes a relatively small number of Blacks or African Americans who are Hispanic, thus there is some double counting between APB and Hispanics.

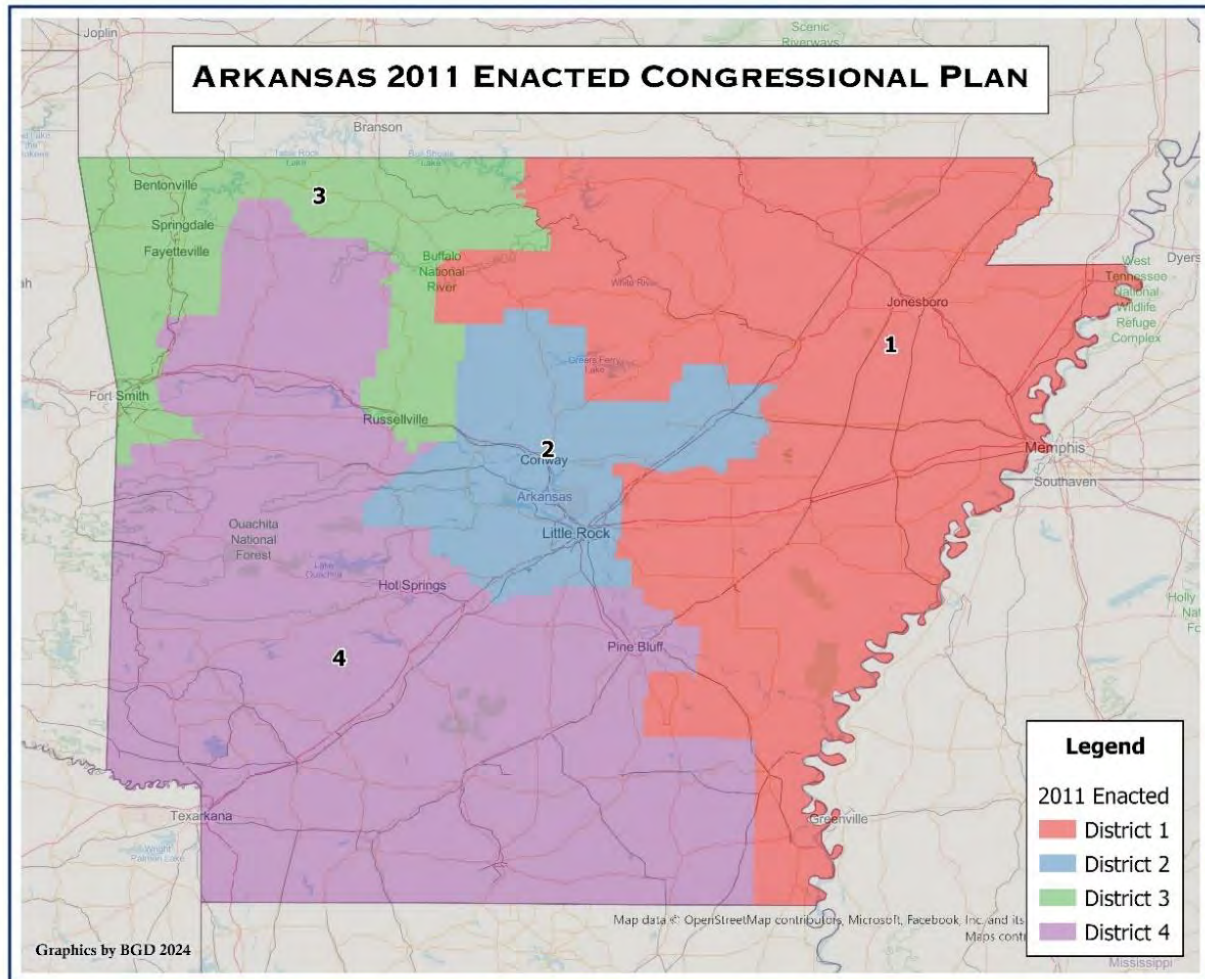
²⁶

https://arstatedatacenter.youraedi.com/content/Decennial_Census/Census_2020/Redistricting/Population%20Change.pdf

²⁷ <https://talkbusiness.net/2024/03/nwa-18th-fastest-growing-u-s-metro-benton-county-leads-states-growth/#:~:text=As%20the%20second%2Dmost%20populous,gain%20at%208%2C191%20in%202023>. And Ibid.

- D4 as it was drawn in 2011, had 686,598 people in 2020: -66,283 (or -8.8%) **below** the target of $\frac{1}{4}$ of the total population of 752,881. This is because D4 included many counties that lost population over the decade, such as Lafayette (-17.5%), Hempstead (-11.3%), Ouachita (-13.3%), Calhoun (-11.7%) and Dallas (-20.1%).²⁸

Figure IV.C.1: 2011 Enacted Plan



Source: U.S. Census TIGER shapefile for 113th Congress, <https://www.census.gov/cgi-bin/geo/shapefiles/index.php?year=2013&layergroup=Congressional+Districts>

²⁸

https://arstatedatacenter.youraedi.com/content/Decennial_Census/Census_2020/Redistricting/Population%20Change.pdf

73. [Table IV.C.1](#) shows the 2020 total population and by race and ethnicity for the 2011 Enacted Plan. In Arkansas, the white, non-Hispanic (WNH) population makes up 68.5% of the total population, which is relatively equally distributed across the state. The Any Part Black (APB) population makes up 16.5% of the total population, which was concentrated in Districts 1, 2 and 4. And finally the Hispanic (HISP) population makes up 8.5% of the population, which was concentrated in D3.

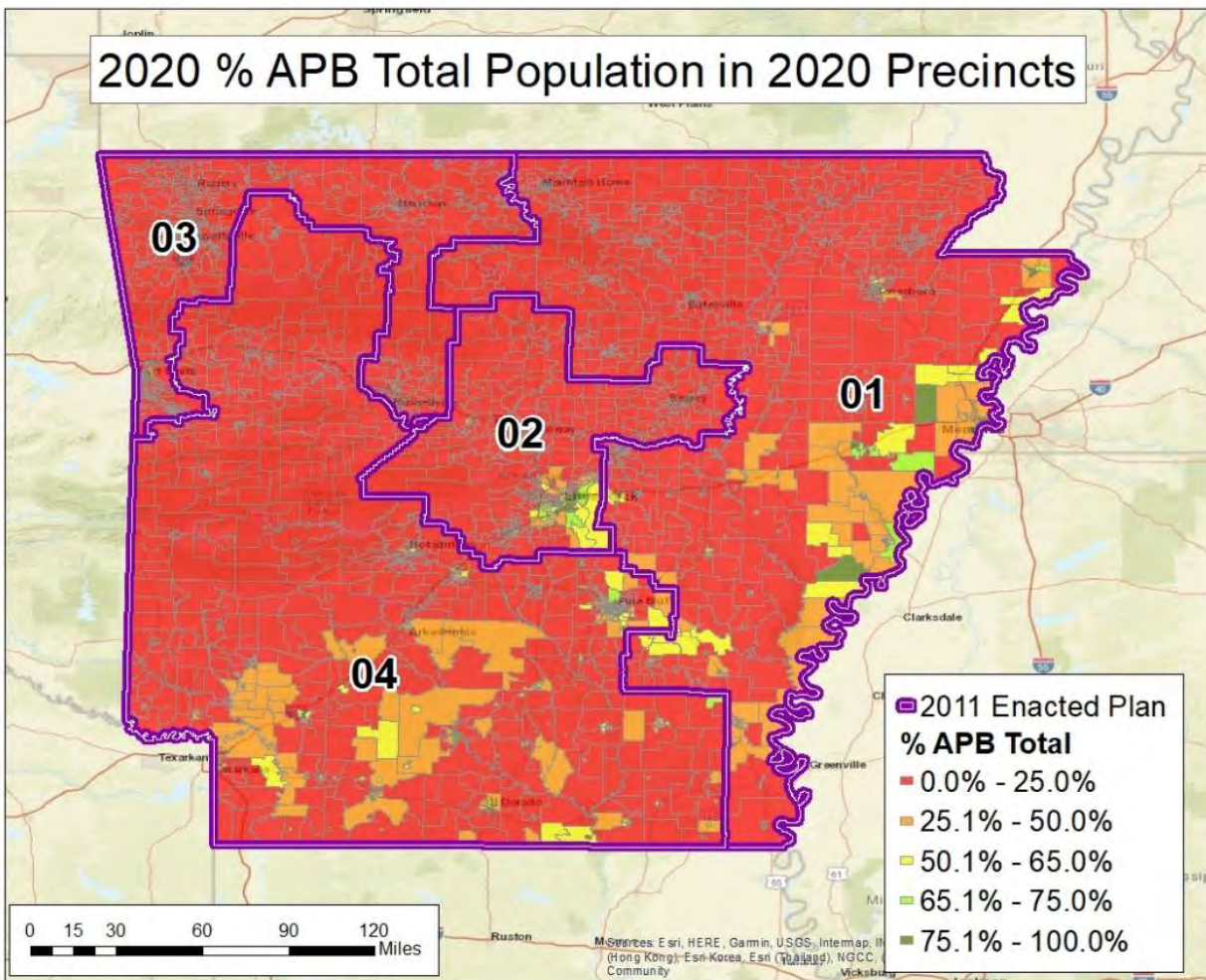
Table IV.C.1: 2011 Enacted Plan Total Population

2010 Dist	POP Total	POP_WNH	POP_APB	POP_HISP		% WNH	% APB	% HISP
01	716,388	522,936	135,726	28,349		73.0%	18.9%	4.0%
02	769,391	487,210	188,021	53,622		63.3%	24.4%	7.0%
03	839,147	582,100	34,631	130,309		69.4%	4.1%	15.5%
04	686,598	471,304	137,590	44,567		68.6%	20.0%	6.5%
Grand Total	3,011,524	2,063,550	495,968	256,847		68.5%	16.5%	8.5%

Sources: 2020 U.S. Census PL94-171 P1 and P2, BGD calculations

74. [Figure IV.C.2](#) shows the geographic distribution of APB across Arkansas. The State of Arkansas has a total APB population of 16.5%. The vast majority of the state has little to no APB population, but has higher concentrations spread around the central parts of the state in Little Rock and Pine Bluff as well as to the east along the Mississippi River.

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Figure IV.C.2: Percent APB Total Population by 2020 Voting Precinct and 2011 Enacted Plan

Sources: 2020 U.S. Census PL94-171 P1, BGD Calculations

75. This map demonstrates exactly why “Black people constitute no more than approximately one-fifth of the voting-age population (“VAP”) in any one district” (Am. Compl. ¶ 6). They are so geographically dispersed across the state that it is not possible to significantly increase their percentage beyond the ~ one-fourth share per district they had in the 2011 Enacted Plan – and why any changes due to redistricting are only going to minimally change the percent APB in D2 in either direction.

76. As shown in [Table IV.C.2](#) the 2020 VAP in the 2011 Enacted Plan is distributed similarly to the total population. The white, non-Hispanic VAP made up 71.5% of the total population, which is relatively equally distributed between districts. The Any Part Black VAP made up 15.2% of the population, which is concentrated in Districts 1, 2 and 4. And finally the Hispanic (HISP) VAP made up 7.0% of the population, which is again concentrated in D3.

Table IV.C.2: 2011 Enacted Plan Voting Age Population

2010 Dist	VAP Total	VAP_WNH	VAP_APB	VAP_HISP		% WNH	% APB	% HISP
01	551,514	416,297	95,000	17,527		75.5%	17.2%	3.2%
02	593,620	393,757	134,409	34,272		66.3%	22.6%	5.8%
03	634,264	463,963	22,080	82,614		73.1%	3.5%	13.0%
04	532,875	379,755	100,389	27,589		71.3%	18.8%	5.2%
Grand Total	2,312,273	1,653,772	351,878	162,002		71.5%	15.2%	7.0%

Sources: 2020 U.S. Census PL94-171 P3 and P4, BGD calculations

77. As shown in [Table IV.C.3](#), the 2020 CVAP in the 2011 Enacted Plan is distributed similarly to the total population and VAP. The white, non-Hispanic CVAP made up 76.9% of the total population, which is relatively equally distributed between districts. The Any Part Black CVAP made up 15.5% of the population, which is concentrated in Districts 1, 2 and 4. And finally the Hispanic (HISP) CVAP made up 4.2% of the population, which is concentrated in D3.

Table IV.C.3: 2011 Enacted Plan Citizen Voting Age Population

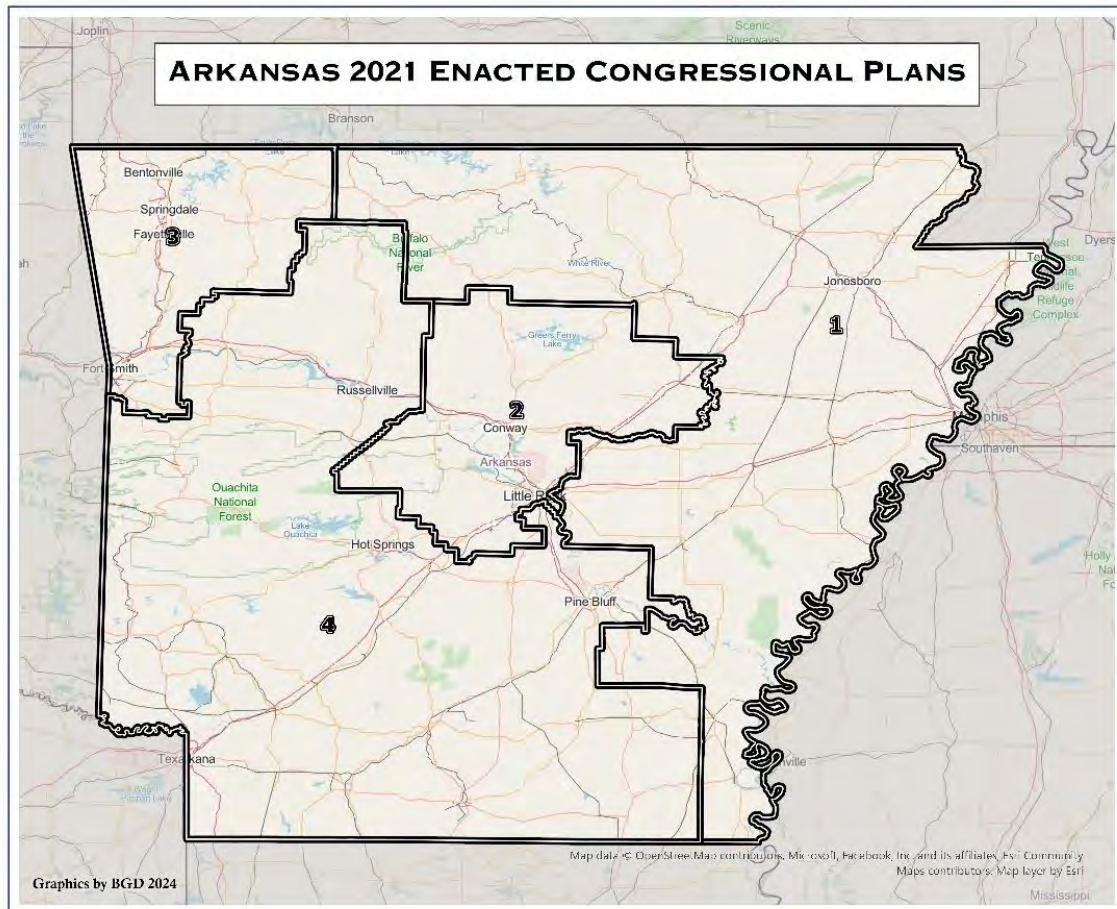
2010 Dist	CVAP Total	CVAP_WNH	CVAP_APBNH	VAP_HISP		% WNH	% APB	% HISP
01	543,276	426,821	91,663	11,622		78.6%	16.9%	2.1%
02	577,490	411,131	134,915	15,991		71.2%	23.4%	2.8%
03	592,656	489,489	19,604	50,787		82.6%	3.3%	8.6%
04	520,038	390,557	99,721	16,489		75.1%	19.2%	3.2%
Grand Total	2,233,460	1,717,998	345,904	94,888		76.9%	15.5%	4.2%

Sources: 2018-2022 American Community Survey, BGD calculations

D. Population Analysis of 2021 Enacted Plan

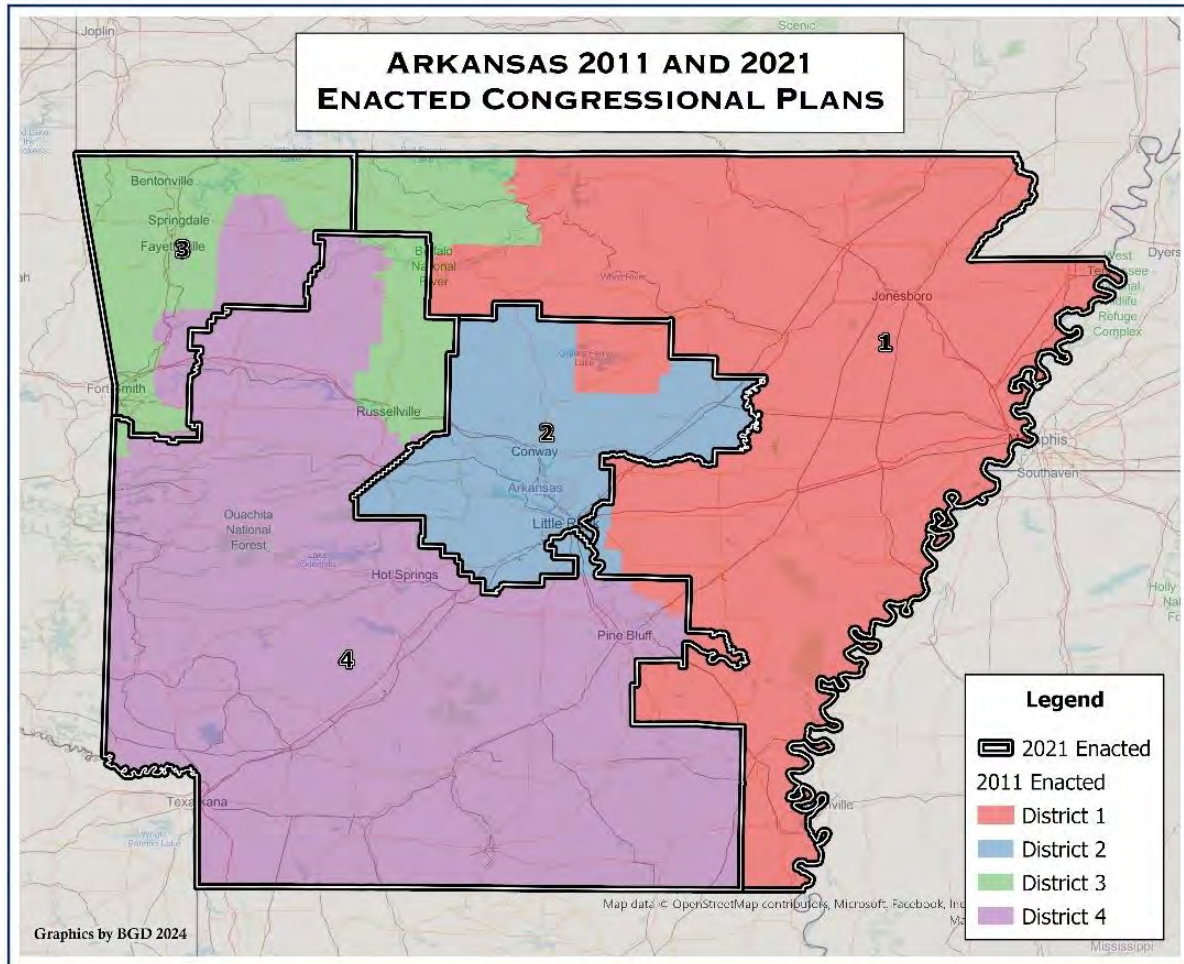
78. The 2021 Enacted Plan is shown in [Figure IV.D.1](#). Differences between the 2011 Enacted Plan and the 2021 Enacted Plan are shown in [Figure IV.D.2](#).

Figure IV.D.1: 2021 Enacted Plan



Sources: U.S. Census TIGER shapefile for 118th Congress, <https://www.census.gov/cgi-bin/geo/shapefiles/index.php?year=2023&layergroup=Congressional+Districts+%28118%29>

79. The 2021 Enacted Plan rebalances the population to nearly perfect equality. The total population ranges from a high of 753,219 in D3 (+338 or +.04% deviation) to a low of 752,509 in D1 (-372 or -.05% deviation) from the population target of 752,881.

Figure IV.D.2: 2011 and 2021 Enacted Plans

Sources: U.S. Census TIGER shapefile for 113th Congress, <https://www.census.gov/cgi-bin/geo/shapefiles/index.php?year=2013&layergroup=Congressional+Districts>,

U.S. Census TIGER shapefile for 118th Congress, <https://www.census.gov/cgi-bin/geo/shapefiles/index.php?year=2023&layergroup=Congressional+Districts+%28118%29>

80. In summary [Table IV.D.1](#) shows the 2020 total populations after the plan was newly redrawn in 2021.²⁹ The WNH population makes up 68.5% of the total population. The APB population makes up 16.5% of the population, which again is concentrated in redrawn Districts 1, 2 and 4. And finally the Hispanic (HISP) population makes up 8.5% of the population, which again is concentrated in redrawn D3. The population deviation of the plan is defined by D1 with

²⁹ Note, this table does not include other races. APB includes a relatively small number of Blacks who are Hispanic, thus there is some double counting between APB and Hispanics.

752,509 (or -372 deviation) and D4 with 753,086 (or +338 deviation) relative to the target of 752,881.³⁰

Table IV.D.1: 2021 Enacted Plan Total Population

2020 Dist	POP Total	POP_WNH	POP_APB	POP_HISP		% WNH	% APB	% HISP
01	752,509	551,532	139,921	29,297		73.3%	18.6%	3.9%
02	752,710	498,838	166,319	46,673		66.3%	22.1%	6.2%
03	753,219	509,829	31,858	124,073		67.7%	4.2%	16.5%
04	753,086	503,351	157,870	56,804		66.8%	21.0%	7.5%
Grand Total	3,011,524	2,063,550	495,968	256,847		68.5%	16.5%	8.5%

Sources: 2020 U.S. Census PL94-171 P1 and P2, BGD calculations

81. As shown in [Table IV.D.2](#) the voting age population in the 2021 Enacted Plan is distributed similarly to the total population. The white, non-Hispanic VAP makes up 71.5% of the total population, which again is relatively equally distributed between districts across the state. The Any Part Black VAP makes up 15.2% of the population, which again is concentrated in redrawn Districts 1, 2 and 4. And finally the Hispanic (HISP) VAP makes up 7.0% of the population, which again is concentrated in redrawn D3.

Table IV.D.2: 2021 Enacted Plan Voting Age Population

2020 Dist	VAP Total	VAP_WNH	VAP_APB	VAP_HISP		% WNH	% APB	% HISP
01	579,039	438,676	97,812	18,103		75.8%	16.9%	3.1%
02	582,706	402,756	118,487	30,008		69.1%	20.3%	5.1%
03	566,367	405,651	20,163	78,667		71.6%	3.6%	13.9%
04	584,161	406,689	115,416	35,224		69.6%	19.8%	6.0%
Grand Total	2,312,273	1,653,772	351,878	162,002		71.5%	15.2%	7.0%

Sources: 2020 U.S. Census PL94-171 P3 and P4, BGD calculations. See also Defendant's Reply in Support of Motion to Dismiss Amended Complaint, p. 9.

82. As shown in [Table IV.D.3](#), the CVAP in the 2021 Enacted Plan is distributed similarly to the total population and the VAP. The white, non-Hispanic (WNH) CVAP makes up 76.9% of the total population. The Any Part Black (APB) CVAP makes up 15.5% of the population, which is concentrated in redrawn Districts 1, 2 and 4. And finally the Hispanic (HISP) CVAP makes up 4.2% of the population, which is concentrated in redrawn D3.

³⁰ See also <https://sg001-harmony.sliq.net/00284/Harmony/en/PowerBrowser/PowerBrowserV2/20211005/-1/21881?gefdesc=&startposition=20211005150241#agenda> at approximately 3:13:30.

Table IV.D.3: 2021 Enacted Plan Citizen Voting Age Population

2020 Dist	CVAP Total	CVAP_WNH	CVAP_APBNH	CVAP_HISP		% WNH	% APB	% HISP
01	571,210	449,984	95,173	12,183		78.8%	16.7%	2.1%
02	566,916	419,664	117,047	14,651		74.0%	20.6%	2.6%
03	526,170	428,933	18,089	48,075		81.5%	3.4%	9.1%
04	569,165	419,417	115,594	19,979		73.7%	20.3%	3.5%
Grand Total	2,233,460	1,717,998	345,904	94,888		76.9%	15.5%	4.2%

Sources: 2018-2022 American Community Survey, BGD calculations

E. Analysis of Population Changes from the 2011 to 2021 Enacted Plan

83. While large changes were necessary to bring the 2011 Enacted plan into compliance with the one-person, one-voter requirement – minimizing those changes is not a codified redistricting requirement for the Arkansas General Assembly. Moreover, in order to meet *other* redistricting objectives (such as improving compactness and reducing geographic splits) more moves of the population beyond the bare minimum are required.

84. In summary, how many persons in total and by characteristic were moved between the 2011 and 2021 Enacted Plans? [Table IV.E.1](#) shows the decline of population of Districts 2 and 3, and the increase in population into Districts 1 and 4 created by the 2021 Enacted Plan. It is important to note that while a population can increase in a district, its *share* of the population can decrease if some other population increases even more. In looking at the change by race and ethnicity:

- D1's population increases in total and in each group. However, the WNH share grows fractionally while the APB share declines.
- D2's WNH population increases, while the APB and Hispanic (HISP) population decreases. Therefore, the WNH share increases, while the APB and Hispanic shares decrease.
- D3's population decreases in total and in each group. The WNH share decreases, while the Hispanic (HISP) share increases.
- D4's population increases in total and in each group. The WNH share decreases, while the APB and Hispanic (HISP) shares increase.

Table IV.E.1: 2011 to 2021 Enacted Plan Changes in Total Population

District	POP Total	POP_WNH	POP_APB	POP_HISP		% WNH	% APB	% HISP
01	36,121	28,596	4,195	948		0.3%	-0.4%	-0.1%
02	-16,681	11,628	-21,702	-6,949		2.9%	-2.3%	-0.8%
03	-85,928	-72,271	-2,773	-6,236		-1.7%	0.1%	0.9%
04	66,488	32,047	20,280	12,237		-1.8%	0.9%	1.1%

Sources: 2020 U.S. Census PL94-171 P1 and P2, BGD calculations

Note: Percent changes are within-group from 2011 to 2021. For example, in 2011, the %WNH in D1 was 73.0%, and in 2021 it was 73.3% - representing a +0.3 percentage point increase.

85. [Table IV.E.2](#) shows the resulting decline of VAP in Districts 2 and 3, and the increase in population into Districts 1 and 4. In looking at the change in percentages by race and ethnicity:

- D1's VAP increases in total and in each group. However, the WNH share grows fractionally while the APB share declines.
- D2's WNH VAP increases, while the APB and Hispanic (HISP) VAP population decreases. Therefore, the WNH share increases, while the APB and Hispanic (HISP) shares decrease.
- D3's VAP decreases in total and in each group. The WNH share decreases, while the Hispanic (HISP) share increases.
- D4's VAP increases in total and in each group. The WNH share decreases, while the APB and Hispanic (HISP) shares increase.

Table IV.E.2: 2011 to 2021 Enacted Plan Changes in Voting Age Population

District	VAP Total	VAP_WNH	VAP_APB	VAP_HISP		% WNH	% APB	% HISP
01	27,525	22,379	2,812	576		0.3%	-0.3%	-0.1%
02	-10,914	8,999	-15,922	-4,264		2.8%	-2.3%	-0.6%
03	-67,897	-58,312	-1,917	-3,947		-1.5%	0.1%	0.9%
04	51,286	26,934	15,027	7,635		-1.6%	0.9%	0.9%

Sources: 2020 U.S. Census PL94-171 P3 and P4, BGD calculations

86. [Table IV.E.3](#), shows the decline in CVAP in Districts 2 and 3, and the increase in CVAP into Districts 1 and 4 (consistent with changes in total and VAP). In looking at the change in percentages by race and ethnicity:

- D1's CVAP increases in total and in each group, but share changes are minimal.
- D2's WNH CVAP population increases, while the APB and Hispanic (HISP) CVAP population declines. Therefore, the WNH share increases, while the APB share decreases.
- D3's CVAP decreases in total and in each group. The WNH share decreases, while the Hispanic share increases.
- D4's CVAP increases in total and in each group. The WNH share decreases, while the APB share increases.

Table IV.E.3: 2011 to 2021 Enacted Plan Changes in Citizen Voting Age Population

District	CVAP Total	CVAP_WNH	CVAP_APB	CVAP_HISP		% WNH	% APB	% HISP
01	27,934	23,163	3,509	562		0.2%	-0.2%	0.0%
02	-10,574	8,532	-17,868	-1,340		2.8%	-2.7%	-0.2%
03	-66,486	-60,556	-1,515	-2,712		-1.1%	0.1%	0.6%
04	49,127	28,860	15,873	3,490		-1.4%	1.1%	0.3%

Sources: 2018-2022 American Community Survey, BGD calculations

87. This section has assessed how population changes took place in aggregate. [Section VI Differential Core Retention](#) is a deep exploration of the population moves by district, in total and by race and ethnicity.

V. GEOGRAPHIC COMPACTNESS

88. The National Conference of State Legislatures (NCSL)³¹ reports: Some principles have been adopted and used for decades by many states.³² They are often called "traditional" criteria. They include:

Compactness: Based largely on a district's physical shape and on the distance between all parts of a district. A circle is a perfectly compact district under most measures.

Contiguity: All parts of a district are connected. States sometimes make exceptions for parts of a district separated by water.

89. In the Defendant's Brief in Support of Motion to Dismiss Amended Complaint, Defendants state:

In addition to drawing districts that met the one person, one vote requirement, the General Assembly also aimed—consistent with judicial precedent—to draw districts that were compact, contiguous, minimized splits between political subdivisions (like counties), preserved communities of interest, avoided pairing incumbents, and otherwise complied with federal law. (page 2)

And

In addition to reducing the number of county splits in line with the General Assembly's stated goal, the 2021 congressional districts are also more compact. Indeed, the 2021 map eliminated the elongated and oddly shaped upside-down "U" that previously constituted the Third District. (Am. Compl. ¶ 94.) It also largely kept the shape and borders of the previous map. See *Cooper v. Harris*, 581 U.S. 285, 338 (2017).

90. Next I analyze the compactness of Arkansas's districts under the 2011 and 2021 Enacted Plans. The degree to which any district can be compact is dependent on physical features of the state, such as the irregularities of the Mississippi river to the east in Arkansas, and the geometry of the VTDs that are used to build the plan. Four of the most common compactness measures (Polsby-Popper, Reock, Convex Hull and Schwartzberg) each have unique measurement features (see [Appendix B](#)).

- For Polsby-Popper, Reock, Convex Hull – the range of possible values is 0-1, where *greater scores* closer to 1 indicate more compactness.

³¹ The National Conference of State Legislatures, created by state legislators and legislative staff in 1975, serves America's 50 states, commonwealths, territories and the District of Columbia. Every state legislator and staffer is a member of the organization and has complete access to the latest in bipartisan policy research, training resources and technical assistance tailored specifically to their needs. <https://www.ncsl.org/about-us>

³² <https://www.ncsl.org/redistricting-and-census/redistricting-criteria>

- For Schwartzberg, the range of possible values is greater than 1, with *lower scores* closer to 1 indicating greater compactness.

91. The analysis includes one table per plan, each displaying the compactness score by measure, by district – with a summary “average” statistic for each. This analysis includes a measurement of change in compactness scores from the 2011 Enacted Plan to the current 2021 Enacted Plan. My analysis shows that, on average, the current districts in the 2021 Enacted Plan are more compact than in the 2011 Enacted Plan.
92. The compactness analysis tables below show the compactness performance by district, by measure. Note that for Polsby-Popper, Reock and Convex Hull, a higher value approaching 1 reflects better compactness, while a lower Schwartzberg score approaching 1 reflects better compactness. The average values at the bottom will serve as the basis of comparison for the compactness between plans.

A. 2011 Enacted Plan Compactness

93. [Table V.A.1](#) shows the compactness scores by district, by method under the 2011 Enacted Plan. Districts 1 and 3 are relatively less compact, while Districts 2 and 4 are relatively more compact.

Table V.A.1 Compactness Scores of 2011 Enacted Plan

District	Polsby-Popper	Reock	Convex_Hull	Schwartzberg
1	0.13	0.37	0.71	2.80
2	0.24	0.46	0.71	2.02
3	0.14	0.33	0.52	2.67
4	0.28	0.41	0.80	1.88
All	0.20	0.39	0.68	2.34

Source: Calculations by BGD.

B. 2021 Enacted Plan Compactness

94. [Table V.B.1](#) shows the compactness scores by district, by method under the 2021 Enacted Plan. Now, only District 1 is relatively less compact, while Districts 2, 3 and 4 are relatively more compact.

Table V.B.1 Compactness Scores of 2021 Enacted Plan

District	Polsby-Popper	Reock	Convex_Hull	Schwartzberg
1	0.12	0.34	0.68	2.87
2	0.27	0.49	0.77	1.94
3	0.43	0.44	0.83	1.52
4	0.26	0.48	0.80	1.95
All	0.27	0.44	0.77	2.07

Source: Calculations by BGD.

Note: D1 has low compactness due to its large, irregular shape wrapped around D2, and its highly irregular border along the Mississippi River.

C. Difference in Compactness between 2011 and 2021 Enacted Plan

95. [Table V.C.1](#) shows the difference in compactness scores by district, by method between the 2011 and 2021 Enacted Plans. The compactness of D1 deteriorates very slightly. With the introduction of Cleburne County to the northeast corner of the district, the change in compactness of D2 is slightly improved for each measure. The compactness of D3 improves significantly by every measure. While the change in compactness of D4 is slightly up or down, depending on the measure. The average improvement of all districts, driven by D3, is significant for each measure.

Table V.C.1: Difference in Compactness between 2011 and 2021 Enacted Plans

District	Polsby-Popper	Reock	Convex_Hull	Schwartzberg
1	-0.01	-0.03	-0.02	0.06
2	0.02	0.03	0.06	-0.08
3	0.29	0.11	0.31	-1.15
4	-0.02	0.07	0.00	0.07
All	0.07	0.04	0.08	-0.27

Source: Calculations by BGD.

VI. GEOGRAPHIC SPLITS

96. It is a traditional redistricting principle that splits of political geographies should be minimized. However, some splits are almost always necessary, and avoiding splits of one level of geography (such as counties) may actually cause splits in other layers of geography (such as places and school districts). In redistricting for congressional districts, where the differences in population between districts must be minimized, precincts (or VTDs) may be kept intact, but splitting political geographies is unavoidable. In their Amended Complaint, Plaintiffs state:

¶ 163 “In particular, the 2021 Redistricting Plan fractures political subdivisions at multiple levels, not only the county itself but also smaller political subdivisions—including multiple municipalities, school districts, and judicial circuits within the county.”

97. In response, in the Defendant’s Brief in Support of Motion to Dismiss Amended Complaint they state (p. 3):

The only substantial difference between the previous and current maps is that the current map reduces the number of county splits. Minimizing splits of political subdivision boundaries—such as counties—is an important redistricting principle for a number of reasons, including lessening the burden on election officials creating ballots and keeping together communities of shared interests (Am. Compl. ¶ 21.) As Plaintiffs note, there was “common agreement” between members of the General Assembly “that county splits should be avoided.” (Am. Compl. ¶ 75.)

The pre-existing 2011 congressional map split a total of five counties: Crawford, Newton, Searcy, and Sebastian, all of which are in the northwest portion of the state, and Jefferson County, one of the State’s minority population centers (Am. Compl. ¶ 94.) By contrast, the 2021 map splits only two counties.³³

98. Next, I assess these claims by analyzing splits of counties, places, school districts and judicial circuits by the 2011 Enacted Plan and the 2021 Enacted Plan. I examine the size and number splits statewide to provide context for these claims and conclude with an analysis of coincident geography in Arkansas.

³³ I have validated the names and counts of split counties in the Defendant’s Brief.

A. County Geographic Splits

99. During the development of the 2021 Enacted Plan, there were several different plans presented which kept Arkansas's counties whole (See [Appendix G.1](#) Nelda Speaks Whole County Plan, [Appendix G.2](#) Stephen Meeks Whole County Plan and [Appendix G.3](#) Mark Johnson's Whole County Plan). However, "during a meeting of the House Committee on September 29, Committee Chairman Representative Dwight Tosh explained that committee members would informally rank their top three map choices from among proposals under consideration, and that the committee would then vote on the highest-ranked proposal for advancement to the full House." (Am. Compl. ¶ 78) "When the House Committee ranked the proposals before it, House Bill ("HB") 1971 was ranked highest." (Am. Compl. ¶ 79). HB 1971 – which became HB 1982³⁴ and subsequently the 2021 Enacted Plan, was a proposal advanced by Representative Nelda Speaks which split Pulaski and Sebastian Counties. While the 2021 Enacted Plan did not eliminate all county splits, it reduced the number of county splits from five (under the 2011 Enacted Plan) to two.

Table VI.A.1 2011 Enacted Plan County Splits with 2020 Total and APB Population

County	Population	D1	D2	D3	D4	Total	% APB
Crawford	Total			43,594	16,539	60,133	2.7%
	APB			1,300	319	1,619	
Jefferson	Total	2,530			64,730	67,260	57.6%
	APB	1,190			37,566	38,756	
Newton	Total			3,510	3,715	7,225	0.5%
	APB			15	23	38	
Searcy	Total	7,277		551		7,828	0.5%
	APB	38		0		38	
Sebastian	Total			115,448	12,351	127,799	8.4%
	APB			10,517	170	10,687	

Source: 2020 U.S. Census P194171 P2, BGD calculations

³⁴ Senate Bill (SB) 742 was the counterpart bill to HB 1982.

100. [Table VI.A.1](#) shows the total and APB population in split county pieces in the 2011 Enacted Plan. For example, Crawford County is split between D3 with 43,594 people and D4 with 16,539 people. Within this are 1,300 APB in D3 and 319 APB in D4. The total APB (1,619) divided by the total population (60,133) = 2.7% APB shown in the last column. Jefferson County is heavily Black, while Crawford, Newton and Searcy counties are overwhelmingly non-Black.

Table VI.A.2 2021 Enacted Plan County Splits with 2020 Total and APB Population

County	Population	D1	D2	D3	D4	Total	% APB
Pulaski	Total	8,612	357,733		32,780	399,125	38.0%
	APB	5,226	129,778		16,678	151,682	
Sebastian	Total			118,101	9,698	127,799	8.4%
	APB			10,535	152	10,687	

Sources: 2020 U.S. Census P194171 P2, BGD calculations

101. [Table VI.A.2](#) shows the two county splits in the 2021 Enacted Plan. The splits of Crawford, Jefferson, Newton and Searcy counties from 2011 are eliminated. The previous split of Sebastian County is changed slightly, and Pulaski County is newly split with a small piece in D1, a larger piece in D4 and a much larger piece remaining in D2. Of the 151,682 APB in Pulaski County, 5,226 (3.4% of Pulaski County's and 1.1% of Arkansas's APB) are sent to D1 and 16,678 (11.0% of Pulaski County's and 3.4% of Arkansas's APB) are sent to D4 under the 2021 Enacted Plan.
102. In [Appendix A.1](#) I show the top 20 Arkansas counties in terms of percent Any Part Black (APB) population, ranked from the highest to lowest. This appendix helps us see the impact of the change in counties that were split between the 2011 and 2021 Enacted Plans. What is notable about the change in splits is that one very heavily Black county (Jefferson) is made whole, while Pulaski County (which has a higher number, but much lower percentage APB population than Jefferson County) is now split instead. Jefferson County has the second highest percent APB population in the state (57.6%), while Pulaski County has the 11th highest APB population in the state (38.0%). That is - are ten counties in Arkansas that have higher (some *much* higher) concentrations of Any Part Black populations than Pulaski County in Arkansas – none of which are split by the 2021 Enacted Plan.

B. Place Geographic Splits

103. Next, I analyzed split places in Arkansas.³⁵ Arkansas has 303 cities and 188 towns for a total of 501 places.³⁶ In [Table VI.B.1](#) I show the four split places with total and APB population in the 2011 Enacted Plan. For example, Fairfield Bay city is split between D1 with 161 people and D2 with 1,947 people. Within this are two APB in D1 and 20 APB in D2. The total APB (22) divided by the total population (2,108) = 1.0% APB shown in the last column. Each of the five split places in the 2011 Enacted Plan was overwhelmingly white, and the size of the splits were insignificant.

Table VI.B.1 2011 Enacted Plan Place Splits with 2020 Total Population and % APB

Place	Population	D1	D2	D3	D4	Total	%APB
Alma City	Total			2,655	3,170	5,825	3.2%
	APB			75	109	184	
Fairfield Bay city	Fairfield Bay city	161	1,947			2,108	1.0%
	APB	2	20			22	
Quitman city	Total	660	34			694	1.3%
	APB	5	4			9	
Rudy town	Total			119	11	130	0.8%
	APB			1	0	1	
Tillar city	Total	32			140	172	12.8%
	APB	7			15	22	

Source: 2020 U.S. Census PL94-171 P2, BGD calculations

104. In [Table VI.B.2](#) I show the six split places in the 2021 Enacted Plan, or one more than under the 2011 Enacted Plan. By comparison, the size of the splits are larger. With the splitting of Pulaski County, places such as Little Rock and North Little Rock with significant Black populations are now impacted.

³⁵ I have validated the counts of split places in the Defendant's Brief.

³⁶ Arkansas has 108 Census Designated Places (CDPs) which I do not include in my analysis because they are not incorporated, political entities

Table VI.B.2 2021 Enacted Plan Place Splits with 2020 Total Population and % APB

Place	Population	D1	D2	D3	D4	Total	% APB
Alpena Town	Total	290		84		374	1.9%
	APB	5		2		7	
Humphrey city	Total	249			214	463	43.0%
	APB	124			75	199	
Jacksonville city	Total	145	29,332			29,477	44.3%
	APB	60	13,000			13,060	
Little Rock city	Total		182,222		20,369	202,591	42.3%
	APB		73,311		12,479	85,790	
N. Little Rock city	Total	6,258	58,333			64,591	45.2%
	APB	4,605	24,610			29,215	
Tillar city	Total	32			140	172	12.8%
	APB	7			15	22	

Source: 2020 U.S. Census PL94-171 P2, BGD calculations

105. Similar to my analysis of counties, I have ranked Arkansas places based on percent APB of the total population. Arkansas is distinctive in that it has numerous incorporated places with high concentrations of APB population. As shown in [Appendix C.2](#) some Arkansas places such as Tollette town and Mitchellville city have nearly 100% APB population. In ranking 501 Arkansas places, there are 78 places with higher percentages of APB population than the highest concentration Black place that is split by the 2021 Enacted Plan: North Little Rock (with 45.2% APB). That is – not one of the 78 places in Arkansas with the highest percentages of APB were split by the 2021 Enacted Plan. Other places that were newly split in the 2021 Enacted Plan included Jacksonville (with 44.3% APB) which is ranked 81st, Humphrey city (with 43.0% APB) which is ranked 84th, and Little Rock (with 42.3% APB) which is ranked 87^h.

C. School District Geographic Splits

106. There are approximately 235 unified school districts in Arkansas. Plaintiffs state (Am. Compl. ¶ 174) “The 2021 Redistricting Plan also repeatedly splits school districts within Pulaski County.” And at ¶ 175 “Specifically, the redrawn lines cut through all four of the major school districts in Pulaski County: the Little Rock School District, the North Little Rock School District, the Jacksonville School District, and the Pulaski County Special School District.”

107. Statewide - the 2011 Enacted Plan split 52 school districts, including three that are geographically split (Drew Central, Charleston and Norfolk) but whose split pieces include zero population - leaving 49 districts with split populated pieces.³⁷ See [Appendix C.3](#). By comparison, in the 2021 Enacted Plan there were 42 split school districts, including one that is geographically split (Drew Central) but whose split pieces includes zero population - leaving 41 districts with split populated pieces. The number of split school districts is reduced by eight from 49 to 41 in the 2021 Enacted Plan. See [Appendix C.4](#).
108. Similar to my analysis of counties and places, I have ranked Arkansas school districts based on %APB of the total population. [Appendix C.5](#) shows ranking of top percent APB school districts and whether they were split under the 2021 Enacted Plan. In order to provide a complete view of the changes brought about in the 2021 Enacted Plan, I am including an assessment of school districts that were made whole, newly split – and those that continued to be split. As shown in [Appendix C.6](#) - in order to achieve the reduction in split school districts from 49 to 41 – there were:
- Sixteen school districts that were made whole between the 2011 and 2021 Enacted Plan. Among these is the Dollarway School District (previously split between Districts 1 and 4, now made whole in D4 alone) – which has the fifth highest percent APB among all school districts in the state.
 - Eight school districts that were newly split between the 2011 and 2021 Enacted Plan.
109. Notably, among the school districts that were split in the 2011 Enacted Plan and remained split in the 2021 Enacted Plan were the Pulaski County Special School District and Jacksonville (North Pulaski) School District (Am. Compl. ¶ 175). That is – two of the four split school districts mentioned in the Plaintiffs’ complaint *were already split*. Both of these districts extend into Lonoke County in D1 – and by definition would be split by the Pulaski-Lonoke county boundary, regardless of any split *within* Pulaski County . The 2021 Enacted Plan serves to significantly reduce the total number of split school districts statewide. Similar to the consolidation of Jefferson County, the 2021 Enacted Plan eliminates the previous split of the school district that had the highest percent APB of any split school district in the state (Dollarway, with 60.3% APB).³⁸

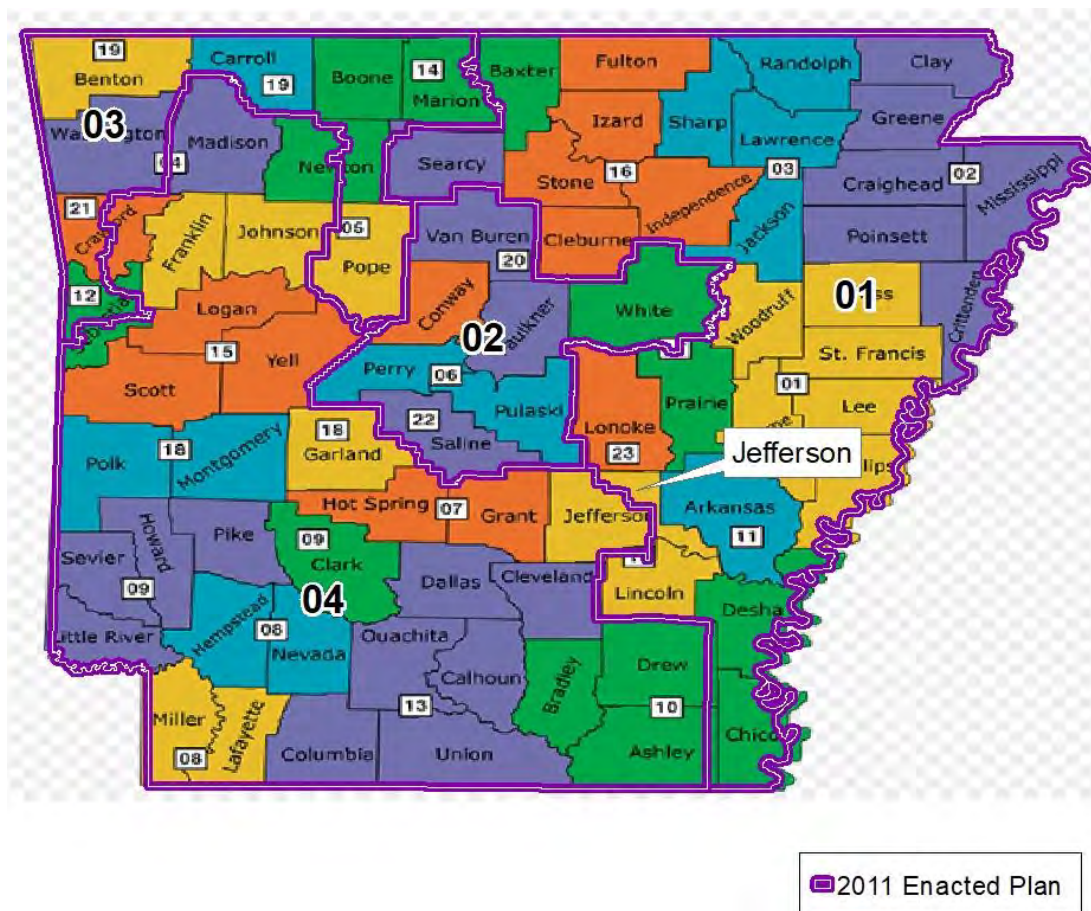
³⁷ Drew Central, Charleston and Norfolk School Districts.

³⁸ Dollarway USD was subsequently merged with Pine Bluff USD in 2023. See: <https://www.thv11.com/article/news/education/arkansas-school-district-merger/91-19048efa-99a1-458f-9bc0-680c654cb120#:~:text=In%202020%2C%20the%20Arkansas%20Department,the%202023%2D2024%20school%20year.>

D. Judicial Circuits

110. As with other geographies, Plaintiffs focus their splits analysis of judicial circuits exclusively on Pulaski County (ignoring the rest of the state) and in doing so resort to using judicial circuit *subdistricts* to attempt to make the claim of invidious line drawing there (Am. Compl. ¶ 181). *Unlike* places and schools – whole Arkansas judicial circuits conform to county boundaries. *Like* places and schools, Arkansas’s judicial circuits have not historically conformed to congressional districts – even at the whole judicial circuit district level. Since judicial circuit subdistricts do not align with VTDs, there must be an expectation that any county split from redistricting is by definition going to result in a judicial circuit district split. As shown in [Figure VI.D.1](#), the previous 2011 Enacted Plan boundaries split judicial circuit boundaries all over the state, and wherever there were county splits – there were sub-county splits of Judicial circuits. Including the 11th Circuit West split of heavily Black Jefferson County, which was resolved in the 2021 Enacted Plan.

Figure VI.D.1: 2011 Enacted Plan and Arkansas Judicial Circuits



Sources: https://ballotpedia.org/Arkansas_Circuit_Courts and <https://www.arcourts.gov/sites/default/files/arkansas-judicial-circuits-map.pdf>

E. Coincident Geography

111. It is important to note the simple fact that different layers of geography do not align with each other. By drawing a district that aligns with one kind of geography, one can be forced to split another. An analysis of what percent of boundaries are shared by different layers of geography is known as a coincident geography analysis. [Table VI.E.1](#) shows the percent of certain geographies in Arkansas that are coincident with other layers of geography.

1. 2.5% of county boundaries coincide with place boundaries.
2. 79.4% of county boundaries coincide with unified school district (USD) boundaries
3. 3.4% of place boundaries coincide with USD boundaries.
4. 100% of county boundaries coincide with VTD boundaries.
5. 57.8% of place boundaries coincide with VTD boundaries.
6. 56.9% of USD boundaries coincide with VTD boundaries.

Table VI.E.1 Percent of Coincident Geography in Arkansas

	County	Place	USD	VTD
County	100%	2.5% 1	79.4% 2	100% 3
Place		100%	3.4% 4	57.8% 5
USD			100%	56.9% 6
VTD				100%

Sources: 2020 U.S. Census TIGER shapefiles, BGD calculations

Note: Values represent the percent of borders shared by the two geographic layers statewide.

112. This demonstrates that there is very low coincidence of the different geographies Plaintiffs complain are split by the 2021 Enacted Plan, which shows that even when following one type of geography (such as counties) other types of smaller inclusive geographies (such as school districts) can be split.

F. Splits Conclusion

113. Is there any evidence that places, school districts, or judicial districts were deliberately split? No. By using 2020 VTDs to draw their plan and by splitting Pulaski County– the splits of other geographies such as places and school districts are by geographic definition. There is no way to split a county without also impacting splits of other geographies. I conclude that the splits of school districts and places are outcomes of splitting Pulaski County by VTD – not that they were separately and invidiously split with the purpose and intent of subdividing them.

114. Plaintiffs state “In creating the current Second Congressional District, the 2021 Redistricting Plan contravenes traditional redistricting principles, the principles set forth by the Arkansas Board of Apportionment, and Arkansas legislators’ own stated redistricting goals by splitting counties and other political subdivisions, and communities of interest. (Am. Compl. ¶ 4). Plaintiffs reach this broad, general conclusion by focusing exclusively on splits in Pulaski County – while ignoring the reality that there are many fewer pieces of split geography at all levels of Arkansas geography statewide – and that numerous pieces of heavily Black geography (such as Jefferson County, Dollarway School District and the 11th Circuit West district that were previously split in the 2011 Enacted Plan are now made whole in the 2021 Enacted Plan. Further - of the numerous counties, places and school districts Arkansas with the highest concentrations of Black population in the state – none are split by the 2021 Enacted Plan.
115. In summary, the number of county split decreases by three, the number of places split increases by one and the number of school districts split decreases by ten. Some areas with relatively high concentrations of Black population are split anew, while others with even higher concentrations of Black population are made whole. These findings are inconsistent with Plaintiffs’ claims (Am. Compl. ¶ 2 and ¶ 4) that the 2021 Enacted Plan disregarded traditional redistricting principles such as respect for political subdivisions.

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VII. DIFFERENTIAL CORE RETENTION

116. Courts have recognized the need to preserve the core of a prior established district as a legitimate redistricting criterion,³⁹ as well as the avoidance of contests between incumbents.⁴⁰ In the recent *Alexander v. S.C. State Conf. of the NAACP* decision the court rejected one expert’s analysis because it “failed to consider core district retention” and said “Lawmakers do not typically start with a blank slate; rather, they usually begin with the previous map and make alterations to fit various districting goals.”⁴¹ Core retention recognizes this reality.
117. A *Core Retention Analysis* (CRA), also known as a constituency report, is simply a demographic accounting of the movement of persons brought about by redistricting. A CRA is a way of quantifying precisely how a realignment affects the continuity of representation among a district’s residents.
118. Core Retention Analysis has usually considered only the *total* populations of districts in comparisons across plans. Here, I have broadened this standard demographic model, using standard methodology to analyze the core retention of groups by race and ethnicity. I refer to this as “Differential” CRA – or DCRA. The “differential” being the findings the analysis generates by district between the total population and the population by race and ethnicity – such as white non-Hispanic and Black or African Americans here. A CRA of sub-populations by race and ethnicity can and do frequently yield significant differences from a CRA of the total population.
119. While Arkansas’s 2011 Enacted Plan was in need of significant change to rebalance the population between districts, it is important to note that Arkansas’s legislature is not legally required to consider “minimizing change” as one of its redistricting criteria. Therefore it should be no surprise that the 2021 Enacted Plan would have more change than is absolutely, minimally necessary to rebalance the population from the 2021 Enacted Plan boundaries.
120. [Appendix D.1](#) shows the 2020 Census total population and by race and ethnicity for the 2011 Enacted Plan, and how those populations were retained and moved in the 2021 Enacted Plan. Districts such as D1 and D4 that had populations *below* the target population have high core retention rates. In general, they needed to keep most of their existing population – then add additional population in order to comply with one-person one-vote.
121. Other districts such as D2 and D3 had too many people under the 2011 Enacted Plan. D2 had slightly higher than the target population of 752,881. And D3 stands out because it has *significantly* more population than the target population. The core retention scores for these

³⁹ *Abrams v. Johnson*, 521 U.S. 74, 84 (1997)

⁴⁰ *Bush v. Vera*, 517 U.S. 952 (1996).

⁴¹ *Alexander v. S.C. State Conf. of the NAACP*, 144 S. Ct. 1221 (2024), see https://www.supremecourt.gov/opinions/23pdf/22-807_3e04.pdf p. 22

districts should be lower than the other districts, because they were *required* to export large numbers of people into other districts in order to achieve one-person, one, vote.

122. The substantive changes of the plan were (see [Appendix D.1](#)):

- 24,711 people were moved from D1 to D2, most of whom (22,748) were WNH – which reflects the move of Cleburne County into D2.
- 8,612 people were moved from D2 to D1, a majority of whom (5,226) were APB
- 32,780 people were moved from D2 to D4, which included 8,236 WNH, 16,678 APB and 7,249 Hispanics.⁴²
- 54,750 people were moved from D3 to D1, most of whom (49,668) were WNH
- 70,954 people were moved from D3 to D4, most of whom (56,664) were WNH
- 39,776 people were moved from D4 to D3, most of whom (34,061) were WNH

123. The swapping of population between D3 and D4 is illustrative of where large numbers of people are moved for reasons other than minimizing population change. D3 needed to lose population, but in order to improve compactness, it needed to move a large number of people out (into D4) and in return take in a smaller number of population back from other parts of D4.

124. [Table VII.1](#) shows the core retention rates for each district between the 2011 and 2021 Enacted Plan for the total population, white, non-Hispanic, Any Part Black and Hispanics. While Arkansas is not required to draw a least change plan, the core retention rates achieved by their plan are still very high.

- D1 has very high core retention in total as well as by race.
- D2 also has very high core retention, which is a reflection of high core retention of WNH, offset by lower rates of core retention of APB and Hispanics.
- D3, as expected, has relatively lower (but still high) core retention. Here, WNH has lower core retention, offset by much higher core retention of APB and Hispanics. It was an apparent goal of the mapmaker to make D3 more compact (see generally [Section V](#)). In doing so, it was necessary to move precincts with more WNH than precincts with more APB or Hispanics. There is no apparent invidious line drawing to explain the differentials in core retention we see here.
- D4 has very high core retention – with nearly 100% retention of APB.

125. This analysis shows that minority populations did not disproportionately bear the burden of being redistricted into different districts statewide in order to rebalance the total population of each district.

⁴² See also <https://sg001-harmony.sliq.net/00284/Harmony/en/PowerBrowser/PowerBrowserV2/20211005/-1/21881?gefdesc=&startposition=20211005150241#agenda> at approximately 3:19:15.

Table VII.1 2021 Enacted Plan Differential Core Retention

Core Retention	Total Pop.	WNH	APB	HISP
D1	96.2%	95.4%	99.0%	97.4%
D2	94.6%	97.7%	88.4%	85.9%
D3	85.0%	81.7%	90.5%	93.9%
D4	94.2%	92.8%	99.6%	96.2%
Total	92.2%	91.5%	94.5%	93.0%

Source: 2020 U.S. Census PL94-171, BGD calculations

126. In total, 234,110 persons changed districts in the 2021 Enacted Plan (see [Table VII.2](#) and [Appendix D.1](#)). Among those who moved:

- 175,469 (or 75.0%) were WNH (while 68.5% of the population is WNH),
- 27,091 (or 11.6%) were APB (while 16.5% of the population is APB); and
- 17,938 (or 7.6%) were Hispanic (while 8.5% of the population is Hispanic)

127. This is borne out by the overall lower core retention for WNH. Significantly and proportionately more WNH were moved by the 2021 Enacted Plan than APB or Hispanics. This finding is inconsistent with Plaintiffs' claims that the 2021 Enacted Plan intentionally singled out Black voters for unequal treatment. The core of the Plaintiffs' complaint is that the differential movement of population was excessive, invidious and driven by race. The total core retention of 92.2% is in fact high and is identical to the core retention of Wisconsin Senate districts in 2020 where least change was legally required.⁴³

Table VII.2 2021 Enacted Plan Population Retained, Moved and Total

	Total	WNH	APB	Hispanic
Total Retained	2,777,414	1,888,081	468,877	238,909
Total Moved	234,110	175,469	27,091	17,938
Total	3,011,524	2,063,550	495,968	256,847
Total Core Retention	92.2%	91.5%	94.5%	93.0%

Sources: 2020 U.S. Census PL94-171 P2, BGD Calculations

Note, the sum of those moved does not equal total moved because other populations by race are not considered in this analysis.

⁴³ See Expert Report of Thomas Bryan in *Johnson v. Wisconsin Elections Commission*, page 21 <https://www.wicourts.gov/courts/supreme/origact/docs/expertrepbryan.pdf>

VIII. Political Performance

128. In order to understand the redistricting landscape of Arkansas, it is important to not only understand the demographics and physical characteristics of the 2011 Enacted and 2021 Enacted Plans – but to also understand the political landscape of the state.⁴⁴ Here I share election information that would have been available to the Arkansas General Assembly. I use standard demographic techniques to calculate voter turnout rates for the state as a whole, and select pieces impacted by the drawing of the 2021 Enacted Plan.

A. 2020 Election

129. Arkansans overwhelmingly vote Republican. The 2020 senate race was won by in decisive fashion by Republican Senator Tom Cotton (see [Figure VIII.A.1](#)) and the 2020 presidential race in the state was won by a landslide by the Trump/Pence ticket (see [Figure VIII.A.2](#)).

Figure VIII.A.1 Arkansas 2020 Election Senate Results



Source: <https://results.enr.clarityelections.com/AR/106124/web.274956/#/summary>

⁴⁴ My analysis is a simple mathematical calculation and reporting of Arkansas's election results and is not a definitive or scientific analysis of election results or is intended as proof of political gerrymandering. Such analysis and measures exist. "a definitive measure of partisan gerrymandering has long been the "holy grail," and adjudication of partisan gerrymandering claims has long been a dialectic between courts demanding and academics striving to provide quantitative measures of increasing sophistication. This dialectic has spurred a proliferation of such measures and techniques. Some of the leading ones include partisan bias, the efficiency gap, the declination, the mean-median difference, the lopsided-outcomes test, and ensemble methods." (Cover and Niven, 2021)

Figure VIII.A.2 Arkansas 2020 Election Presidential Results

★ U.S. President, Vice President (Vote For 1)				
Areas Reporting 100%		Percentage	Votes	
AME	Brian Carroll/Amar Patel	0.14%	1,713	
CNS	Don Blankenship/William Mohr	0.17%	2,108	
DEM	Joseph R. Biden/Kamala Harris	34.78%	423,932	
GRN	Howie Hawkins/Angela Walker	0.24%	2,980	
IND	Brock Pierce/Karla Ballard	0.18%	2,141	
IND	C.L. Gammon/Phil Collins	0.12%	1,475	
IND	Kanye West/Michelle Tidball	0.34%	4,099	
IND	Phil Collins/Billy Joe Parker	0.23%	2,812	
IND	Roque 'Rocky' De La Fuente/Darcy G. Richardson	0.11%	1,321	
LIB	Jo Jorgensen/Jeremy 'Spike' Cohen	1.08%	13,133	
LIF	John Richard Myers/Tiara Suzanne Lusk	0.11%	1,372	
REP	Donald J. Trump/Michael R. Pence	62.40%	760,647	

Source: <https://results.enr.clarityelections.com/AR/106124/web.274956/#!/summary>

130. Congressional D1 was won by Republican Congressman Rick Crawford who ran unopposed. Congressional D2 was won by Republican Congressman French Hill who defeated Democratic candidate Joyce Elliott by a 10.74 percentage point margin (see [Figure VIII.A.3](#)).

Figure VIII.A.3 Arkansas 2020 Election Congressional District 2 Results

★ U.S. Congress District 02 (Vote For 1)				
Areas Reporting 100%		Percentage	Votes	
DEM	Senator Joyce Elliott	44.63%	148,410	
REP	Congressman French Hill	55.37%	184,093	
			332,503	

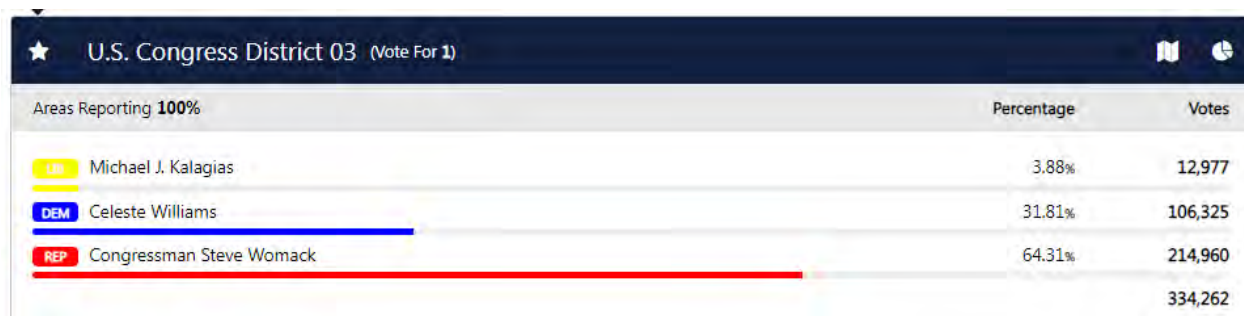
Source: <https://results.enr.clarityelections.com/AR/106124/web.274956/#!/summary>

131. The Plaintiffs specifically discuss this race (Am. Compl. ¶ 70):

However, in 2020, a Black candidate appeared to come within striking distance of breaking through this wall of exclusion in the Second Congressional District. Arkansas State Senator Joyce Elliott, a Black woman, ran for Congress in the Second District. She came close to becoming Arkansas's first Black Congressional representative, due in significant part to Black voter support in Pulaski County.

132. How close was the race? The 10.74 percentage point margin is reflected in a numeric difference in votes of 35,683 (184,093 for Hill vs. 148,410 for Elliott). In order to win the race with a 50% + 1 vote margin within the universe of people who actually turned out, a candidate would have needed 166,252 votes ($332,503 / 2$). That is, Senator Elliott would have needed an additional 17,842 votes (166,252 theoretical vs. 148,410 actual) to prevail. If the analysis is not limited to the actual number of voters who turned out, and the 184,093 voters who voted for Congressman French Hill is held constant, then hypothetically 184,094 total voters would have needed to have turned out and voted for Senator Elliot for her to have prevailed. That is, Senator Elliott would have needed an additional 35,674 votes ($184,094 - 148,410$) to prevail within the universe of 1 more vote than Congressman Hill received. How would the movement of the precincts from D2 to D1 and D4 in the 2021 Enacted Plan have impacted the subsequent 2022 race? I explore this shortly in [Section VIII.C Voter Turnout](#).
133. Congressional D3 was won by Republican Congressman Steve Womack (see [Figure VIII.A.4](#)) and Congressional D4 was won by Republican Congressman Bruce Westerman (see [Figure VIII.A.5](#)). Both races were won by Republicans by approximately a 2:1 margin.

Figure VIII.A.4 Arkansas 2020 Election Congressional District 3 Results



Source: <https://results.enr.clarityelections.com/AR/106124/web.274956/#!/summary>

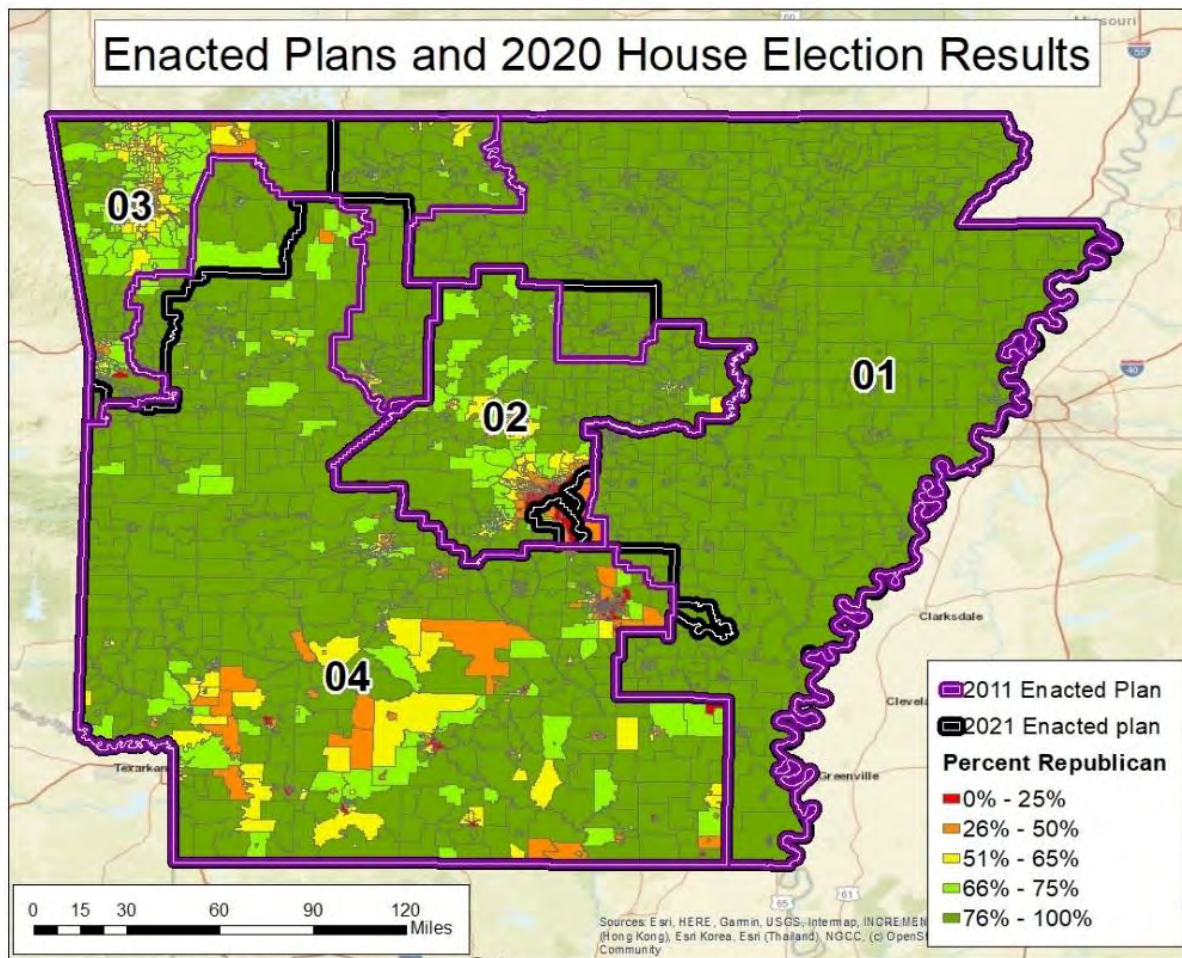
Figure VIII.A.5 Arkansas 2020 Election Congressional District 4 Results



Source: <https://results.enr.clarityelections.com/AR/106124/web.274956/#!/summary>

134. Next, I look at the geographic distribution of Republican performance using 2020 voting precincts. In [Figure VIII.A.6](#) we see Republican performance by precinct for the 2020 congressional races. D1 is solid green (100% Republican) because Republican Congressman Rick Crawford ran unopposed. While other parts of the state are also heavily Republican, there are enclaves of stronger Democratic performance in NW Arkansas, Pulaski County and south-central Arkansas.

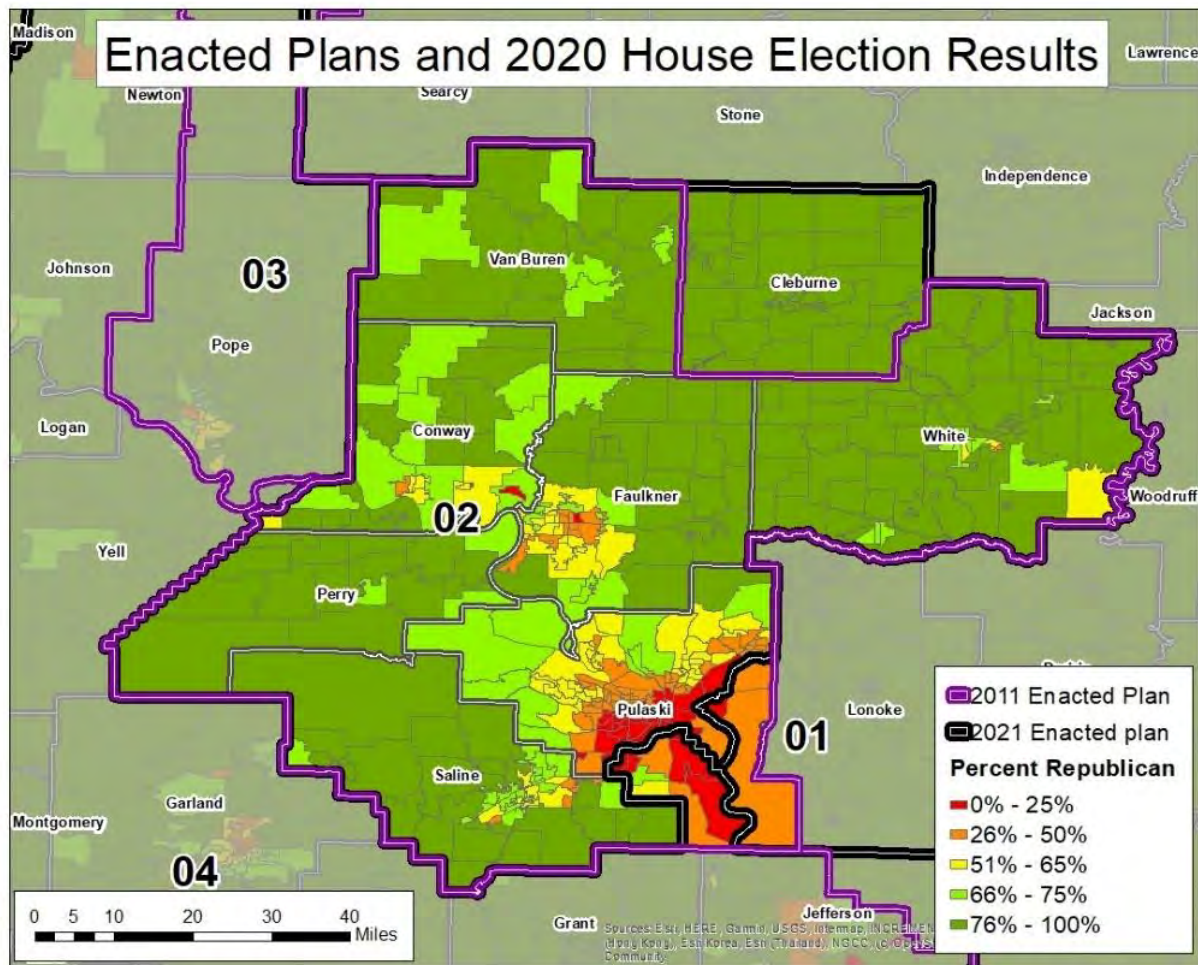
Figure VIII.A.6 Arkansas 2020 Election Congressional Results: Percent Republican



Sources: 2020 U.S. Census TIGER, Arkansas SOS Election Results, BGD calculations

135. [Figure VIII.A.7](#) shows the same results, focused on D2. This map is useful because it shows the existing strength of Republicans in most parts of the district, except in the far southeast corner of Pulaski County, which is heavily Democratic.

Figure VIII.A.7 2011 and 2021 Enacted Plans District 2 2020 Election Congressional Results: Percent Republican



Source: 2020 U.S. Census TIGER, Arkansas SOS Election Results, BGD calculations

136. Cleburne is heavily Republican – even moreso than other counties adjacent to D2 such as Van Buren County. A tabulation of election results by county bears this out. In [Appendix E](#) I show the percent voting Republican for the Presidential and Senate by county. Among 75 counties in Arkansas, Cleburne County ranks as the 6th most Republican in the presidential race, and 4th most Republican in the Senate race. By comparison, Pulaski County ranks last in Republican support – and by a large margin. If one were drawing D2 for political advantage, importing Cleburne County and exporting equal parts of the heavily Democratic portions of Pulaski County – not only would it be geographically easy and improves compactness, but also creates the most political benefit for Republicans. An examination of VTDs around the border of Pulaski County shows that there are no other concentrated Democratic areas that could have been drawn out of D2 into other districts for Republican political benefit.

137. Following is an examination of the impact of the 2021 Enacted Plan on the political outcomes of the 2020 and 2022 Election.

138. In [Table VIII.A.1](#) we see the results of the 2020 presidential race by congressional district under the 2011 and 2021 Enacted Plans. The current drawing of D1 would have resulted in a fractional decline of -0.1 percentage points, from 69.1% to 69.0% for Republicans. D2 would have improved by +2.1 percentage points, from 53.1% to 55.2%. This is offset by what would have been declines of -1.7 percentage points (from 61.9% to 60.2%) in D3 and -1.4 percentage points (from 67.7% to 66.2%) in D4. Statewide, 62.4% voted for the Trump/Pence ticket.

Table VIII.A.1 2020 Republican Presidential Performance Under 2011 and 2021 Enacted Plans by District

District	2011 Enacted	2021 Enacted	Difference
1	69.1%	69.0%	-0.1%
2	53.1%	55.2%	2.1%
3	61.9%	60.2%	-1.7%
4	67.7%	66.2%	-1.4%
Grand Total	62.4%	62.4%	

Source: Arkansas Secretary of State, BGD Calculations. See also

https://ballotpedia.org/Redistricting_in_Arkansas_after_the_2020_census#cite_note-15

Daily Kos Elections, "Daily Kos Elections 2020 presidential results by congressional district (old CDs vs. new CDs)," accessed May 12, 2022. Note – numbers may not foot due to rounding.

139. In [Table VIII.A.2](#) we see the results of the 2020 senate race. The current drawing of D1 would have resulted in a fractional decline of -0.2 percentage points, from 73.8% to 73.6%. D2 would have improved by +2.0 percentage points, from 57.8% to 59.8%. This is offset by what would have been declines of -1.7 percentage points (from 64.6% to 63.0%) in D3 and -1.3 percentage points (from 72.2% to 70.9%) in D4. Statewide, 66.5% voted for Senator Cotton.

Table VIII.A.2 2020 Republican Senate Performance Under 2011 and 2021 Enacted Plans by District

District	2011 Enacted	2021 Enacted	Difference
1	73.8%	73.6%	-0.2%
2	57.8%	59.8%	2.0%
3	64.6%	63.0%	-1.7%
4	72.2%	70.9%	-1.3%
Grand Total	66.5%	66.5%	

Sources: Arkansas Secretary of State, BGD Calculations. Note – numbers may not foot due to rounding.

140. In [Table VIII.A.3](#) we see the results of the 2020 congressional race. The current drawing of D1 would have resulted in a decline of -2.8 percentage points for Republicans, from 100.0% to 97.2%. This is because a number of precincts previously in D2 and D3 (which *were* competitive and had Democratic votes) would have been in D1 (which was previously not competitive) while D1 exported precincts (with 100% Republican performance) into D2 and D4. See [Section VII Differential Core Retention](#) for more information. D2 would have improved by +2.7 percentage points, from 55.4% to 58.1%. This is offset by what would have been declines of -1.7 percentage points (from 64.3% to 62.6%) in D3 and -1.3 percentage points (from 69.7% to 68.4%) in D4. Statewide, 70.2% voted for congressional Republicans.

Table VIII.A.3 2020 Republican Congressional Performance Under 2011 and 2021 Enacted Plans by District

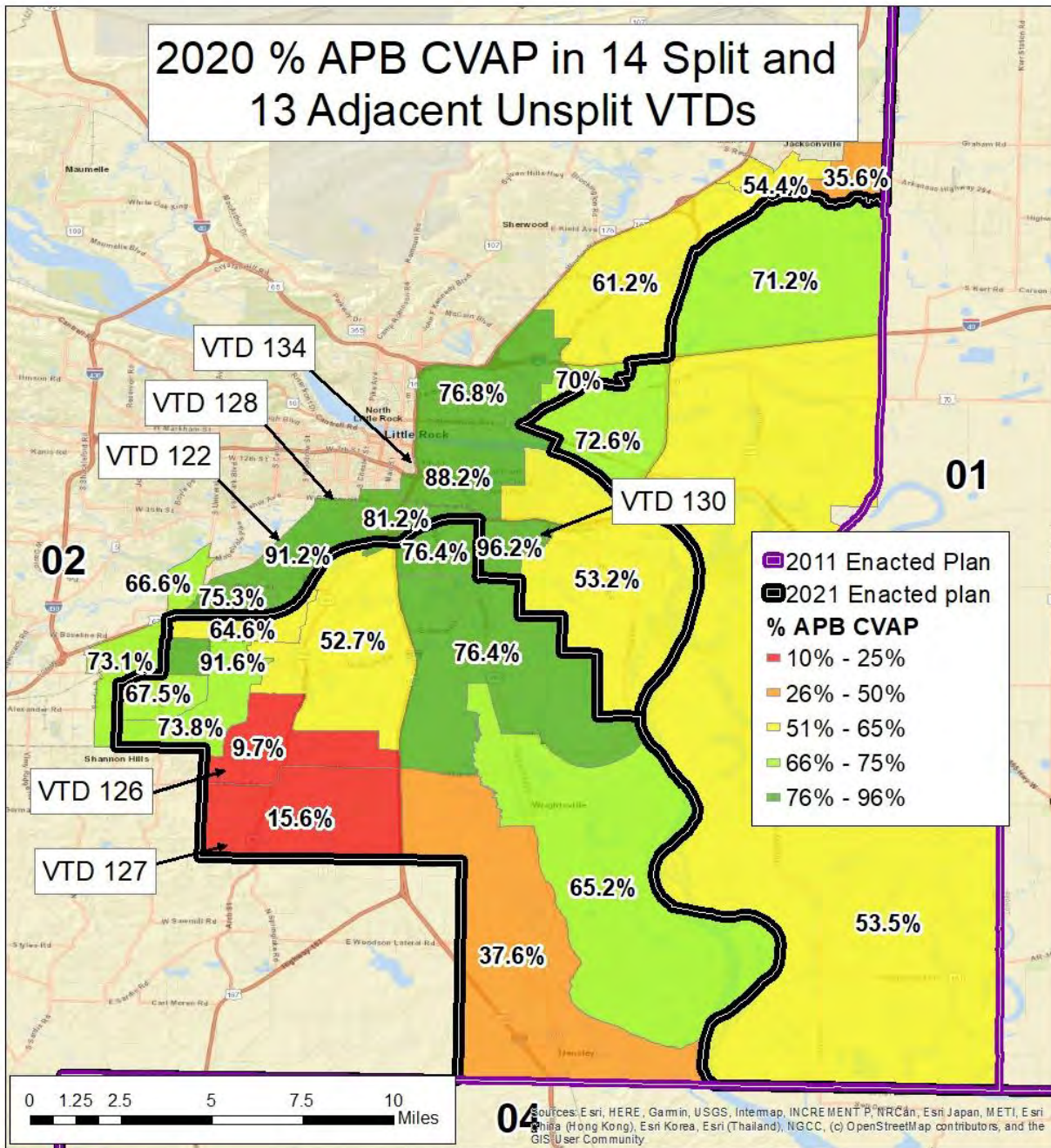
District	2011 Enacted	2021 Enacted	Difference
1	100.0%	97.2%	-2.8%
2	55.4%	58.1%	2.7%
3	64.3%	62.6%	-1.7%
4	69.7%	68.4%	-1.3%
Grand Total	70.2%	70.2%	

Sources: Arkansas Secretary of State, BGD Calculations. Note – numbers may not foot due to rounding.

141. At the heart of the Plaintiffs’ complaint is the assertion that the 2021 Enacted Plan “sliced through the heart of longstanding Black communities of interest in the Second Congressional District with almost surgical precision.” (Am. Compl. ¶ 2) and “*Nearly* all of these precincts comprised predominantly Black voters.” (Am. Compl. ¶ 6). Here, details matter.

142. In order to assess this claim, 27 precincts in and around the D1 / D2 and D4 split are measured for their percent Any Part Black CVAP. 14 precincts were actually moved (in 2020, which are 13 in 2022), and 13 adjacent precincts were *not* moved (see [Figure VIII.A.8](#)).

Figure VIII.A.8 Percent APB CVAP in Split and Unmoved VTDs in Pulaski County



Sources: 2018-2022 American Community Survey, BGD Calculations

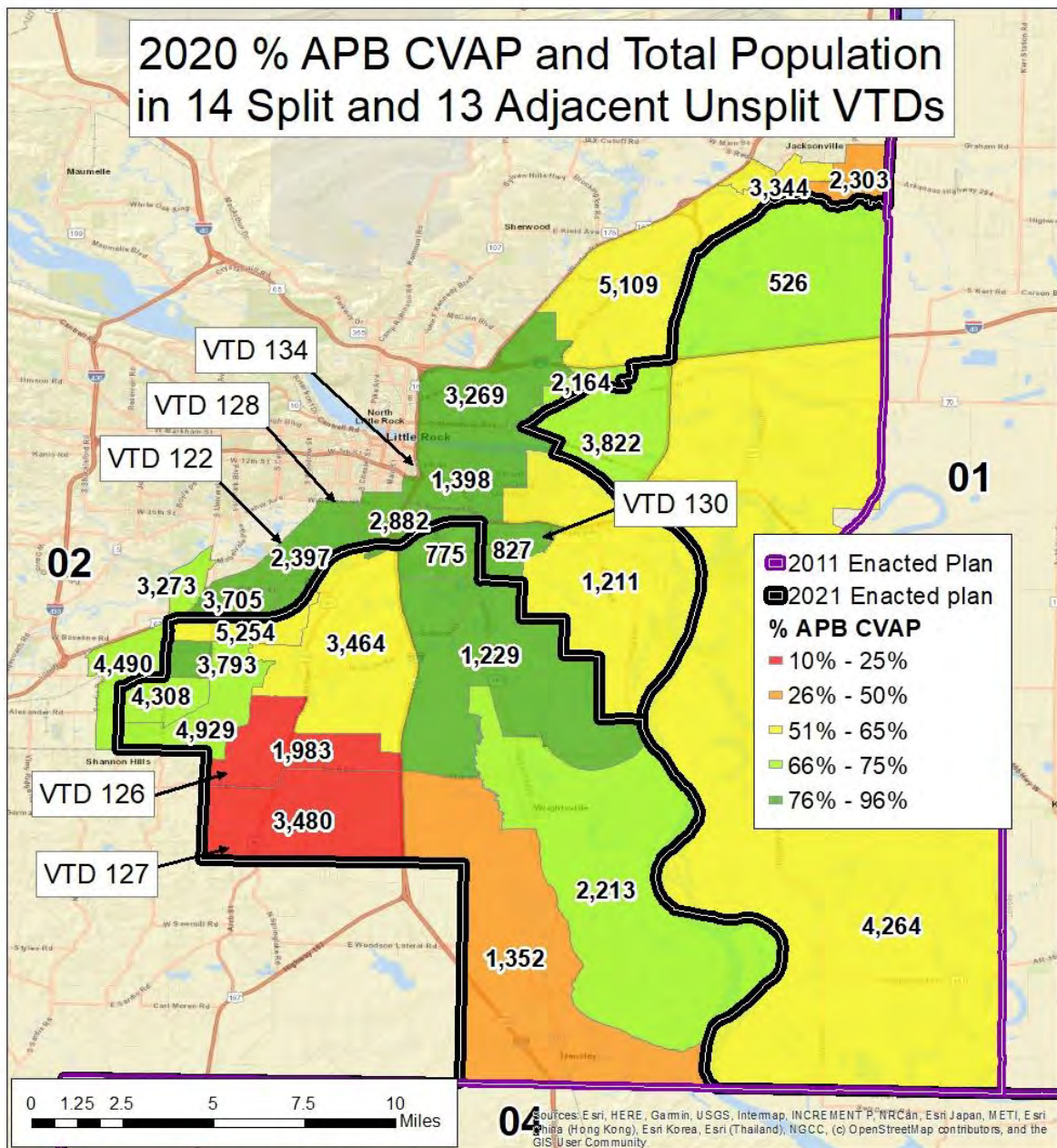
143. [Figure VIII.A.8](#) shows that there are numerous areas of very high concentration APB (including precincts 122, 128 and 134) that could have *easily* been drawn out of D2 if race was the prevailing factor and the map had been drawn with “laser precision” to maximize this outcome. Instead, these and 100 other precincts around Pulaski County with *higher* concentrations of Any Part Black CVAP than precincts 126 and 127 were kept in D2.
144. As shown in [Appendix F](#),⁴⁵ out of the Pulaski County’s 137 precincts in 2020, one need to go all the way down to the 117th highest concentrated Any Part Black CVAP precinct (that is, precinct 126 with only 9.7%) to capture all of the precincts that were moved in the 2021 Enacted Plan. That means that there were 103 precincts (out of 137) in Pulaski County that had a *higher* concentration of APB and were *not moved* than a precinct that was (precinct 126).⁴⁶ Precinct 127 (with only 15.6%) was not far behind. Most notably – the precinct with the *very highest* % Any Part Black CVAP (96.2%) in Pulaski County (Precinct 130) and one of the highest in the state (ranked 31st out of 2,759 precincts) was *not moved* and was retained in D2.
145. In the Plaintiffs’ Opposition to Defendants Motion to Dismiss Amended Complaint, the Plaintiffs state (p. 1) “Arkansas’s 2020 Congressional Redistricting Plan (“the plan”) targets precincts serving high concentrations of Black voters in southeastern Pulaski County with laser precision, distributing them across three of Arkansas’s four congressional districts”.
146. [Figure VIII.A.9](#) shows the same map labeled with total population. Would it have been possible for the map drawer to have created a D2 that created significantly more division of the Black population out of D2 – if that were their intention? Easily. All they would have had to do was:
1. Leave the relatively white VTD 126 (9.7% APB CVAP and 1,983 population) and VTD 127 (15.6% APB CVAP and 3,480 population) for a total of 5,463 total population in D2.
 2. Export the heavily Black VTD 122 (91.2% APB CVAP and 2,397 population) and VTD 128 (81.2% APB CVAP and 2,882 population) for a total of 5,297 total population out of D2.
147. [Table IV.D.1](#) shows that the final, total population of D2 was 752,710 – or 171 persons below the target population of 752,881. My understanding, communicated verbally to me from counsel in this case, is that the courts would tolerate a deviation of up to 0.7% - or approximately 5,270 persons. I believe that if map drawer was directed to work with “surgical precision” to intentionally diminish the opportunities of Black voters – they would have likely

⁴⁵ In [Appendix F](#) split precincts are shown colored in green and adjacent precincts that were not split and were kept in D2 are shown in red.

⁴⁶ Plus 13 other precincts with higher %APB populations

used as much of this latitude as possible to export as many of the highly concentrated Black population as possible that was immediately adjacent to where they drew the line.

Figure VIII.A.9 Percent APB CVAP and Total Population in Split and Unsplit VTDs in Pulaski County



Source: 2018-2022 American Community Survey, BGD Calculations

148. As it is – if they had exported the heavily Black VTDs 122 and 128 (with 5,297 total population) instead of VTDs 126 and 127 (with 5,463 total population) – then D2’s new population would have been 752,876. The negative deviation of -171 would have been reduced to a deviation of only -5 people – while moving thousands more Blacks out of D2. The availability of this option would have been evident to a map drawer, and a hypothetical map drawer motivated to target Black voters for disparate treatment could have easily made this change and justified it on the basis of “minimizing deviation.” But that did not happen.

B. 2022 Election

149. The results of the 2022 election allow us to see the political impact of the changes that were made to D2 in the 2021 Enacted Plan. Here I examine the 2022 senate, congressional, governor, attorney general (AG) and secretary of state (SOS) races by congressional district under the 2011 and 2021 Enacted Plans.

150. In [Table VIII.B.1](#) we see the results of the 2022 senate race. The current drawing of D1 results in a fractional decline of -0.1 percentage points for Republicans, from 71.9% to 71.8%. D2 improves by +2.0 percentage points, from 57.2% to 59.1%. This is offset by declines of -1.6 percentage points (from 64.8% to 63.2%) in D3 and -1.2 percentage points (from 71.2% to 70.0%) in D4. Statewide, 65.7% voted for Senator John Boozman (see also https://ballotpedia.org/United_States_Senate_election_in_Arkansas,_2022).

Table VIII.B.1 2022 Republican Senate Performance Under 2011 and 2021 Enacted Plans by District

District	2011 Enacted	2021 Enacted	Difference
1	71.9%	71.8%	-0.1%
2	57.2%	59.1%	2.0%
3	64.8%	63.2%	-1.6%
4	71.2%	70.0%	-1.2%
Grand Total	65.7%	65.7%	

Source: Arkansas Secretary of State, BGD Calculations. Note – numbers may not foot due to rounding.

151. In [Table VIII.B.2](#) we see the results of the 2022 congressional race. In 2022, D1 *was* contested with the participation of challenger Monte Hodges from the Democratic Party. The current drawing of D1 results in this newly contested environment results in a fractional decline of -0.1 percentage points for Republicans, from 73.9% to 73.8%. D2 again improves by +2.0 percentage points, from 58.1% to 60.0%. This is offset by declines of -1.8 percentage points (from 65.5% to 63.7%) in D3 and -1.2 percentage points (from 72.2% to 71.0%) in D4. Statewide, 66.8% voted for congressional Republicans. see also https://ballotpedia.org/United_States_House_of_Representatives_elections_in_Arkansas,_2022).

Table VIII.B.2 2022 Republican Congressional Performance Under 2011 and 2021 Enacted Plans by District

District	2011 Enacted	2021 Enacted	Difference
1	73.9%	73.8%	-0.1%
2	58.1%	60.0%	2.0%
3	65.5%	63.7%	-1.8%
4	72.2%	71.0%	-1.2%
Grand Total	66.8%	66.8%	

Source: Arkansas Secretary of State, BGD Calculations. Note – numbers may not foot due to rounding.

152. In [Table VIII.B.3](#) we see the results of the 2022 gubernatorial race. The current drawing of D1 results in a fractional decline of -0.1 percentage points for Republicans, from 70.2% to 70.1%. D2 again improves by +2.0 percentage points, from 53.5% to 55.5%. This is offset by declines of -1.9 percentage points (from 61.5% to 59.6%) in D3 and -1.2 percentage points (from 69.1% to 67.9%) in D4. Statewide, 63.0% voted for Governor Sarah Huckabee Sanders (see also https://ballotpedia.org/Arkansas_gubernatorial_election,_2022).

Table VIII.B.3 2022 Republican Governor Performance Under 2011 and 2021 Enacted Plans by District

District	2011 Enacted	2021 Enacted	Difference
1	70.2%	70.1%	-0.1%
2	53.5%	55.5%	2.0%
3	61.5%	59.6%	-1.9%
4	69.1%	67.9%	-1.2%
Grand Total	63.0%	63.0%	

Source: Arkansas Secretary of State, BGD Calculations. Note – numbers may not foot due to rounding.

153. In [Table VIII.B.4](#) we see the results of the attorney general race. The current drawing of D1 results in a fractional decline of -0.2 percentage points for Republicans, from 73.9% to 73.7%. D2 again improves by +2.0 percentage points, from 59.5% to 61.5%. This is offset by declines of -1.7 percentage points (from 66.4% to 64.7%) in D3 and -1.1 percentage points (from 72.7% to 71.6%) in D4. Statewide, 67.6% voted for Attorney General Tim Griffin (see also https://ballotpedia.org/Arkansas_Attorney_General_election,_2022).

Table VIII.B.4 2022 Republican Attorney General Performance Under 2011 and 2021 Enacted Plans by District

District	2011 Enacted	2021 Enacted	Difference
1	73.9%	73.7%	-0.2%
2	59.5%	61.5%	2.0%
3	66.4%	64.7%	-1.7%
4	72.7%	71.6%	-1.1%
Grand Total	67.6%	67.6%	

Source: Arkansas Secretary of State, BGD Calculations. Note – numbers may not foot due to rounding.

154. In [Table VIII.B.5](#) we see the results of the 2022 secretary of state race. The current drawing of D1 results in a fractional decline of -0.1 percentage points for Republicans, from 73.4% to 73.3%. D2 again improves by +2.0 percentage points, from 58.6% to 60.5%. This is offset by declines of -1.7 percentage points (from 66.2% to 64.4%) in D3 and -1.2 percentage points (from 72.1% to 71.0%) in D4. Statewide, 67.0% voted for Secretary of State John Thurston (see also https://ballotpedia.org/Arkansas_Secretary_of_State_election,_2022).

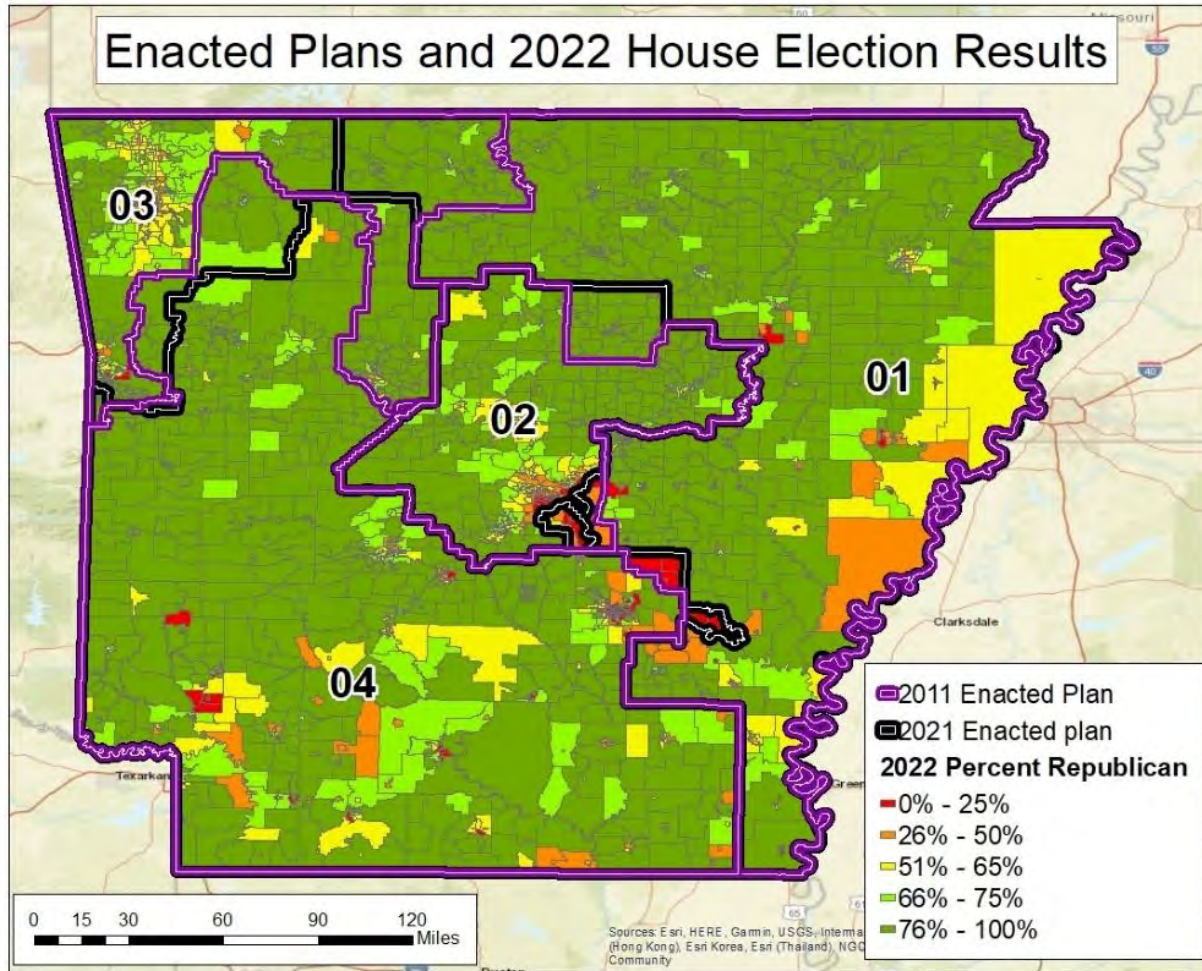
Table VIII.B.5 2022 Republican Secretary of State Performance Under 2011 and 2021 Enacted Plans by District

District	2011 Enacted	2021 Enacted	Difference
1	73.4%	73.3%	-0.1%
2	58.6%	60.6%	2.0%
3	66.2%	64.4%	-1.7%
4	72.1%	71.0%	-1.2%
Grand Total	67.0%	67.0%	

Source: Arkansas Secretary of State, BGD Calculations. Note – numbers may not foot due to rounding.

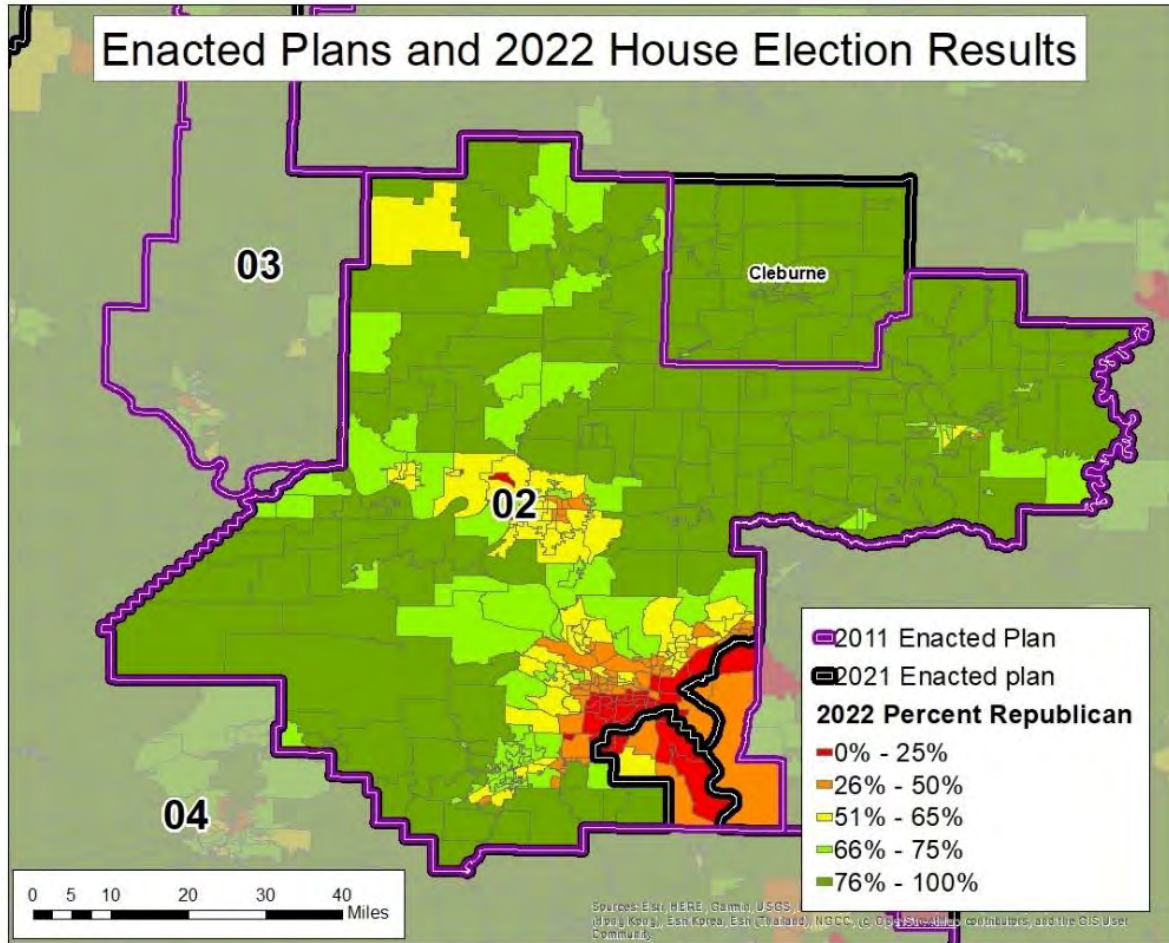
155. In conclusion, each of the major state races (senate, congressional, governor, attorney general and secretary of state) saw a uniform increase in Republican performance of 2.0 to 2.7 percentage points in D2 between the 2011 and 2021 Enacted Plan – with the largest increase (2.7) being in the congressional race.

156. Next, I look at the geographic distribution of Republican performance in the 2022 congressional race using 2022 precincts (see [Figure VIII.B.1](#)). D1 is now differentiated particularly along the Mississippi River (since it was newly competitive with a Democratic candidate). As in 2020 – while other parts of the state are also heavily Republican, there are enclaves of stronger Democratic performance in NW Arkansas, Pulaski County and south-central Arkansas.

Figure VIII.B.1 Arkansas 2022 Election Congressional Results: Percent Republican

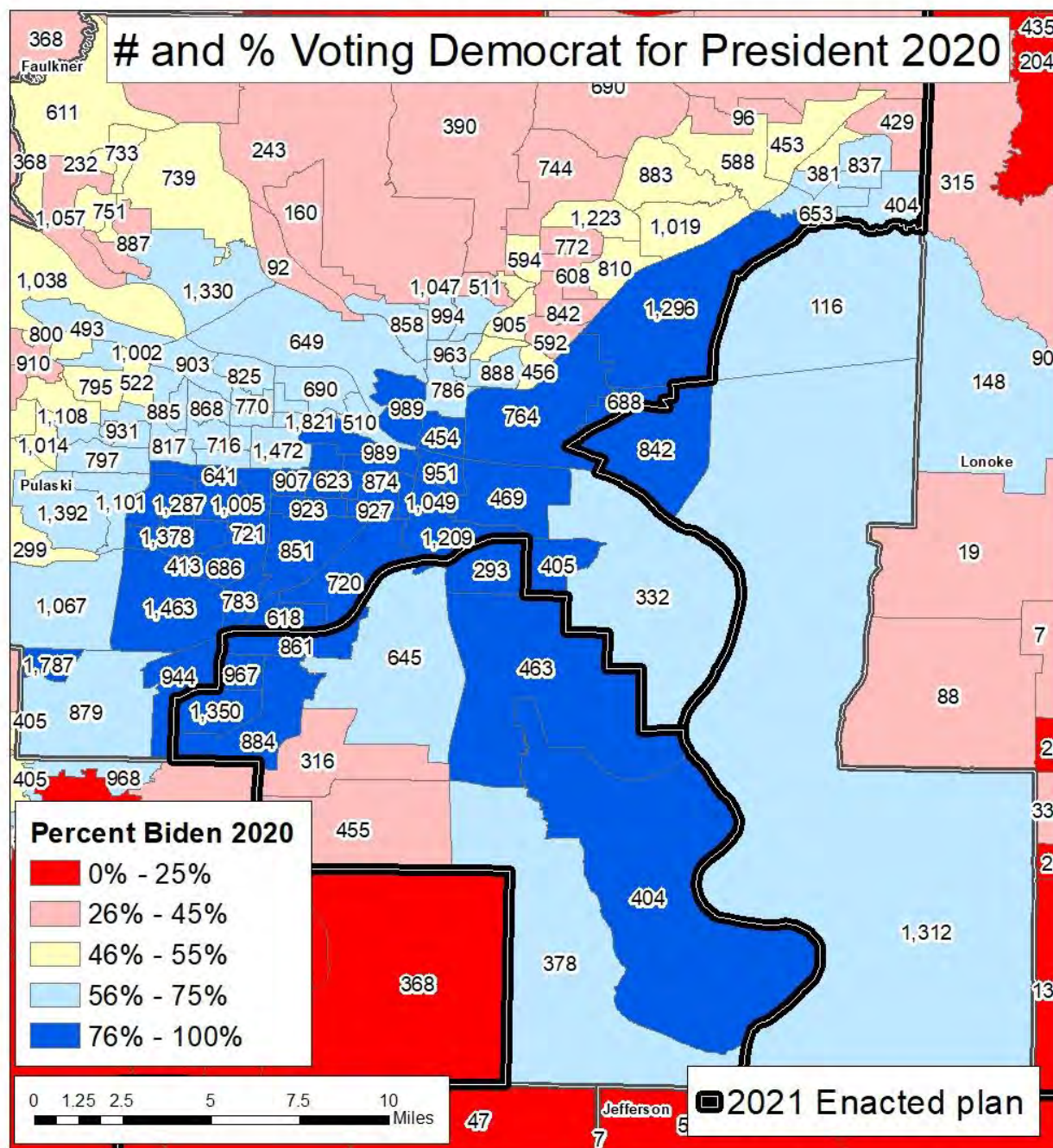
Source: 2020 U.S. Census TIGER, Arkansas SOS Election Results, BGD calculations

157. In [Figure VIII.B.2](#) we see the results of the 2022 congressional race for D2. As in 2020, Cleburne County and most of the district are heavily Republican, while the precincts exported to D1 and D4 in the 2021 Enacted Plan remain heavily Democratic.
158. As was the case in the 2020 elections, from these maps it is plain to see that there are no other concentrations of voting precincts with heavy concentrations of Democrats anywhere near D2 that could have been considered to move out of the district that could have benefitted Republicans. The next nearest concentration of white Democrats in sufficient numbers to impact the congressional race for D2 are in the far NW corner of the state, in and around Benton and Washington Counties – more than 200 miles away from D2.

Figure VIII.B.2 District 2 2022 Election Congressional Results: Percent Republican

Source: 2020 U.S. Census TIGER, Arkansas SOS Election Results, BGD calculations

159. If race were the prevailing, motivating factor in moving select Pulaski County precincts out of D2, there would be no need to further divide them into D1 and D4. It is my conjecture that the further subdivision of Pulaski's precincts into two separate districts may have been politically motivated – so as not to displace all of those Democratic voters into a single district. As shown in [Appendix H](#), in the D2 precincts that were moved in the 2021 Enacted Plan - there were 9,286 votes cast for Presidential candidate Biden in 2020, and 5,854 votes cast for Senate Candidate James in 2022. In the course of redistricting, 2,270 of candidate Biden's voters were moved to D1 and 7,016 were moved to D4. 1,388 of candidate James's voters were moved to D1 and 4,466 were moved to D4. [Figure VIII.B.3](#) shows the number of candidate Biden voters and the percent of Biden votes as a share of Biden + Trump votes.

Figure VIII.B.3 Democratic Presidential Votes by Precinct - 2020

Sources: BGD calculations, <https://redistrictingdatahub.org/dataset/vest-2020-arkansas-precinct-boundaries-and-election-results/>

C. Voter Turnout

160. When assessing the impact of the drawing of the 2021 Enacted Plan, it is useful to know how the populations in question actually impact elections. In the 2021 Enacted Plan – the two geographies that were moved that are discussed in the Plaintiffs’ Amended Complaint are Cleburne County (brought into D1 from D2) and the 13 precincts in Pulaski that were exported from D2 into D1 and D4.⁴⁷ Using data I was provided from the Arkansas Secretary of State on the 2022 election, I am able to calculate voter turnout rates to help understand the political impact of these moves.

161. With regards to calculating voter turnout rates, the MIT Election Lab reports “Turnout can be measured in the aggregate by simply counting up the number who vote in an election.” (for the numerator). For these purposes, I have summarized the total number of individuals who voted for a member of the house of representatives in the 2022 election. The MIT Election Lab goes on to state:

With the number of voters determined, we can now discuss the selection of the denominator to calculate the turnout rate. Often, states and news sources will provide turnout numbers that use registration as the denominator. This results in inconsistent measurements across states due to inconsistent practices, policies, and/or laws around the maintenance of their voter registration lists. For a more consistent measure, it is better to use a measure that reflects the population of possible voters. The easiest comparison is with the voting age population (VAP)- that is, the number of people who are 18 and older according to U.S. Census Bureau. However, VAP includes individuals who are ineligible to vote, such as non-citizens and those disfranchised because of felony convictions. Thus, two additional measures of the voting-eligible population have been developed:

- Citizen Voting Age Population (CVAP), which is based on Census Bureau population estimates generated using the American Community Survey.
- Voting Eligible Population (VEP), which is calculated by removing felons (according to state law), non-citizens, and those judged mentally incapacitated.

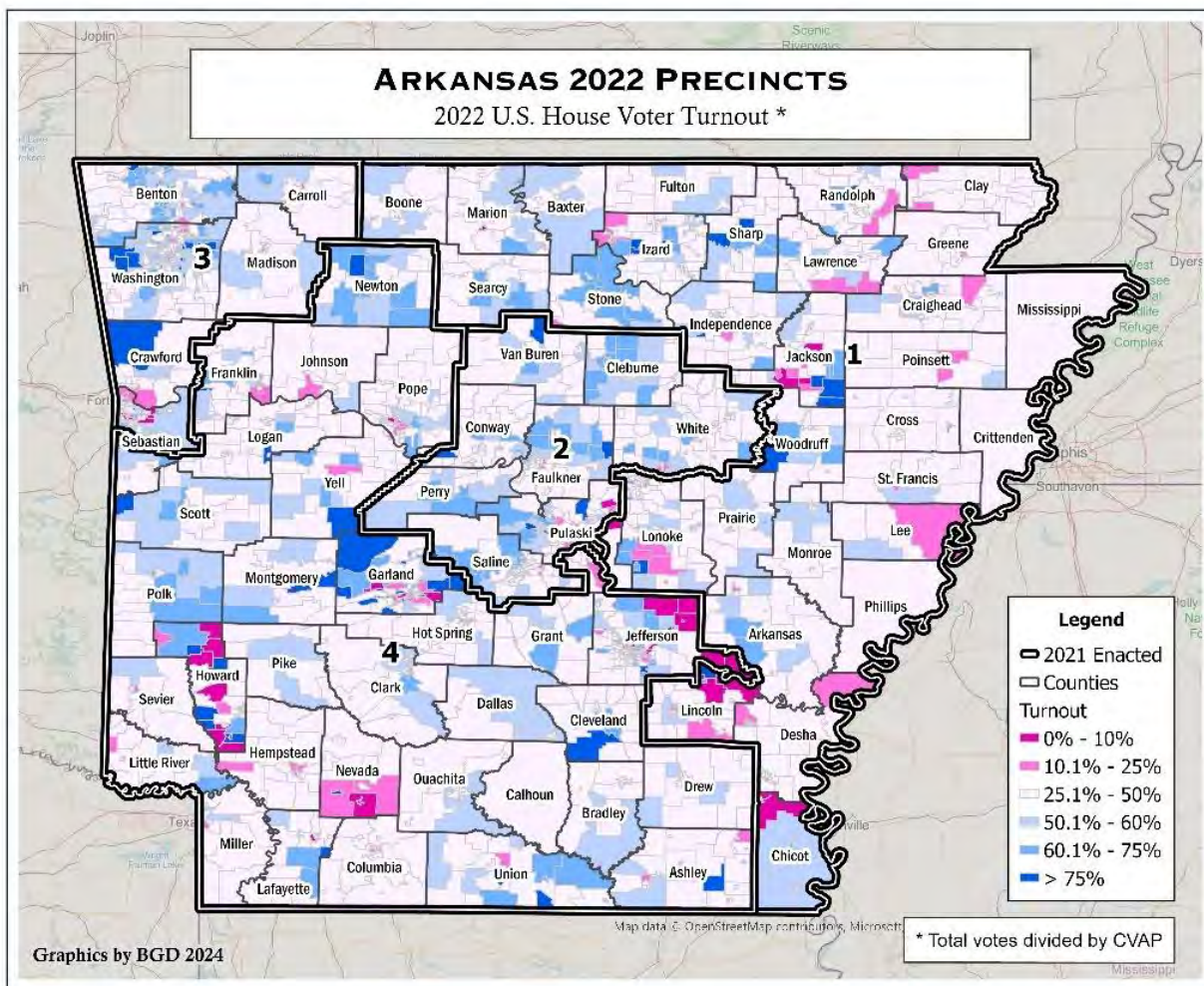
The denominator one chooses to calculate the turnout rate depends on the purposes of the analysis and the availability of data. Usually, VEP is the most preferred denominator, followed by CVAP, and then VAP.”⁴⁸

⁴⁷ Plaintiffs state in their Amended Complaint dated July 7, 2023 page 33 ¶ 140 that fourteen precincts were moved out from D2 into D1 and D4. This claim is based on the physical geography of the precincts as of 2020. Subsequent to the drawing of the 2021 Enacted Plan, Arkansas’s precincts were redrawn. Precincts 126 and 127 in Pulaski, which are two of the precincts that were moved, were made whole into one precinct: 124 as of the 2022 election based on information I was provided by counsel from the Arkansas Secretary of State.

⁴⁸ <https://electionlab.mit.edu/research/voter-turnout>

162. For this analysis, I use the number of voters who cast a vote in the 2022 congressional race as the numerator. Since there are a relatively small number of felons and incarcerated persons who are ineligible to vote, I do not make an effort to estimate these populations to refine CVAP to a more exclusive vote eligible population (VEP). In this analysis, CVAP is the denominator.

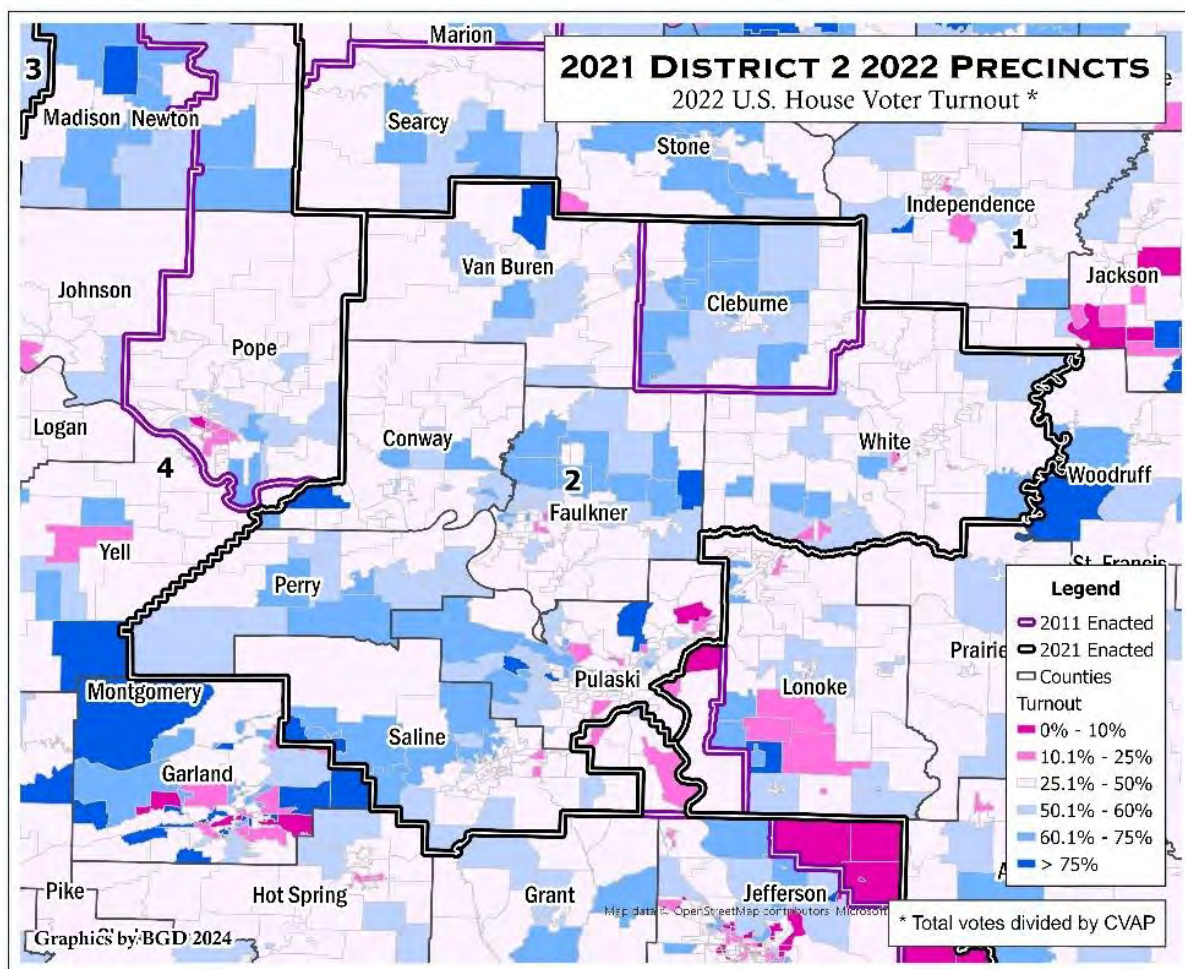
Figure VIII.C.1 Arkansas 2022 Congressional Voter Turnout



Sources: BGD calculations, 2018-2022 American Community Survey CVAP and Arkansas Secretary of State Data. Also: https://ballotpedia.org/Arkansas%27_2nd_Congressional_District_election,_2022

163. An examination of [Figure VIII.C.1](#) reveals that there are wide differences in turnout in 2022 precincts across Arkansas. In select areas across the central and western parts of the state – there are numerous precincts shaded in blue – indicating a higher percentage of voter turnout.
164. A closer examination focused on D2 as shown in [Figure VIII.C.2](#) reveals that there are many parts of D2 that have average to above-average voter turnout rates. Cleburne County stands out as being almost entirely above average. The only part of D2 which has below average voter turnout rates is the southeastern most part of the district – in Pulaski County.

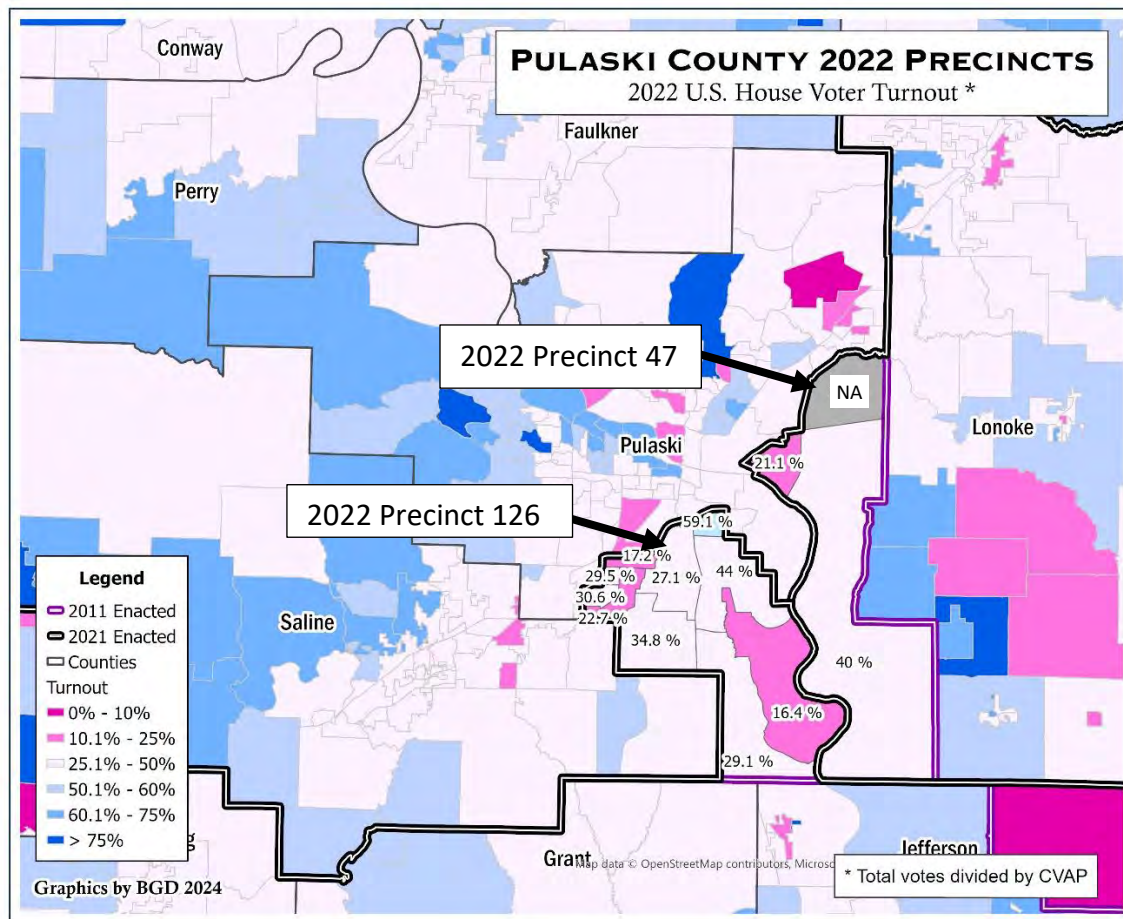
Figure VIII.C.2 District 2 2022 Congressional Voter Turnout



Sources: BGD calculations, 2018-2022 American Community Survey CVAP and Arkansas Secretary of State Data

165. A closer examination focused on Pulaski County as shown in [Figure VIII.C.3](#) reveals that there are six precincts in the portion exported to D1 and D4 in the 2021 Enacted Plan that have significantly *below* average voter turnout. While only one precinct (126) is distinctive in that it has above-average turnout (59.1%).

Figure VIII.C.3 Pulaski County 2022 Congressional Voter Turnout



Sources: 2018-2022 American Community Survey CVAP and Arkansas Secretary of State Data. Note: Precinct 47 is shown as NA because of an irregularity in reported voting data.

166. [Table VIII.C.1](#) shows an analysis of 2018-2022 total CVAP, the number of voters who turned out for the 2022 congressional race, and the estimated percent voter turnout for the state as a whole. This analysis shows that Arkansas had 40.1% voter turnout. Cleburne County exceeded this, with 49.7% turnout. Pulaski County as a whole also exceeded the state average, with 41.5% turnout. By comparison, the 13 precincts moved from D2 to D1 and D4 in the 2021 Enacted Plan only had 28.0% turnout. This difference between a high turnout majority Republican area and a low turnout majority Democratic area amplifies the political outcome of such a swap.

Table VIII.C.1 2022 Congressional Voter Turnout by Arkansas Geography

Geography	CVAP	Voter Turnout	% Voter Turnout
State of AR	2,233,460	895,102	40.1%
Cleburne County	20,080	9,983	49.7%
Pulaski County	295,690	122,714	41.5%
13 Pulaski Precincts	30,654	8,589	28.0%
12 Pulaski Precincts*	30,301	8,589	28.3%

Sources: 2018-2022 American Community Survey, Arkansas Secretary of State, BGD Calculations

* Precinct 47 has an estimated 353 CVAP, but no reported voter data. Excluding this precinct from an analysis of the precincts that were exported from D2 makes no difference in my findings.

167. Here I revisit the question I posed earlier: what was the potential impact of the 13 precincts that were exported to D1 and D4 in the 2020 election? Earlier I discussed the number of additional voters Senator Elliott would have needed to have prevailed in the race for D2: 35,674. In looking at the CVAP of the 13 Pulaski Precincts that were exported to D1 and D4 – they had 30,645 CVAP. If those precincts had 100% voter registration and 100% turnout (instead of 28%) they would have only added an extra 22,065 votes (30,654 CVAP – 8,589 who actually voted).⁴⁹ In the 2022 congressional election, where the Republican Congressman French Hill won by a much wider margin (147,975 votes against Democratic challenger Hathaway’s 86,887 votes). I conclude that the retention and hypothetical inclusion of those additional voters in D2 would not have come close to impacting the outcome.

168. [Section IX](#) presents two alternative redistricting scenarios to assess the claims by Plaintiffs that “Other plans could have fulfilled partisan goals without singling out Black voters to such a degree.”

⁴⁹ This estimate using CVAP is in fact an over-estimate of the voting eligible population, or “VEP” Precinct 131 (included in these 13 precincts) includes both Wrightsville Unit Correctional Center (<https://www.prisonersofthecensus.org/data/2020blocks/051190040052081/>) with 909 inmates and the Hawkins Center for Women (<https://www.prisonersofthecensus.org/data/2020blocks/051190040052016/>) with 453 inmates – reducing the potential voting power of this area even further.

IX. Alternative Plans

170. Next, I seek to draft two alternative District 2s that minimize the change from the 2011 Enacted Plan (which while not required, is advocated for by the Plaintiffs) and reduce or eliminate the splits of Pulaski while balancing the population as closely as possible.

A. BGD1 Plan

171. In the BGD1 Plan, I created a new D2 by reversing the inclusion of Cleburne County – and only exporting as many VTDs as minimally necessary from SE Pulaski County. D2 had 769,391 people in the 2011 Enacted Plan, which needed to be reduced by ~ 16,510 people towards the target of 752,881. I modified the 2021 Enacted Plan D2 to exclude Cleburne County (population 24,711) – leaving it in D1, just as it was in the 2011 Enacted Plan. Without Cleburne County, fewer voting precincts needed to be exported out of D2 to (into D1 and D4) to balance the district. As shown in [Figure IX.A.1](#) I started by moving the following Pulaski County precincts from D1 *back* into D2 (where they were originally in the 2011 Enacted Plan) - undoing the split with D1.

- Precinct 047: 526 people – moved from D1 to D2
- Precinct 054: 3,822 people – moved from D1 to D2
- Precinct 055: 4,264 people – moved from D1 to D2

I then looked to the precincts that had been moved to D4. All of the precincts in this area have large populations, so it is not possible to balance the total population close to the target of 752,881. I selected the following four precincts coterminous to send back to D4:

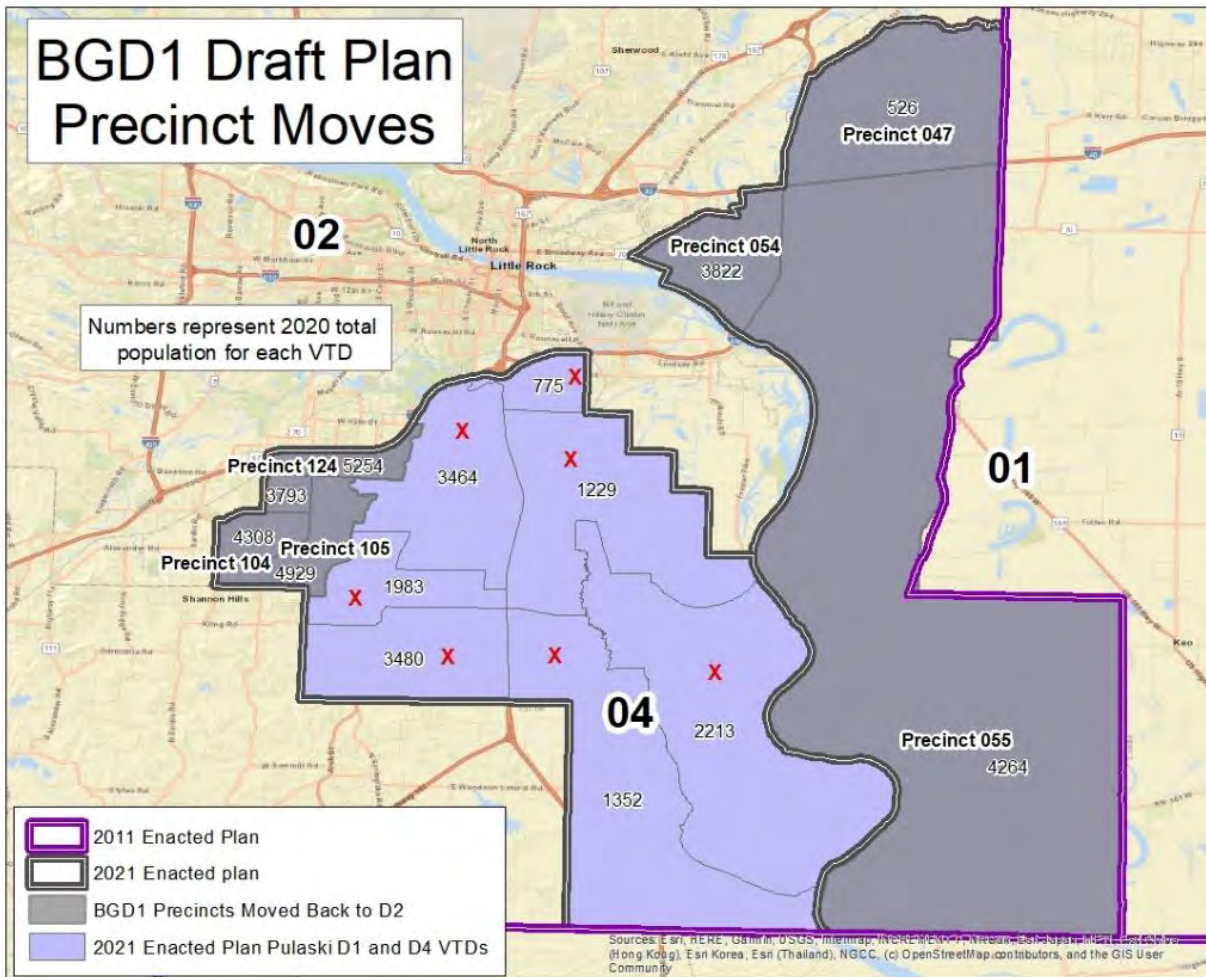
- Precinct 103: 3,793 people – moved from D1 to D4
- Precinct 104: 4,308 people – moved from D1 to D4
- Precinct 105: 4,929 people – moved from D1 to D4
- Precinct 124: 5,254 people – moved from D1 to D4

Adding these 18,284 leads to a total of 754,895 – which is 2,014 people above the target of 752,881.⁵⁰ The only alternative to reduce the deviation under this plan would be to start splitting precincts. I conclude that is no easy way to split Pulaski and minimize population deviation without including Cleburne County in D2.

⁵⁰ Not moving Precinct 105, with 4,929 people or Precinct 124 with 5,254 people would have made D2 low relative to the target population of 752,881 by approximately 3,000 people.

172. In [Figure IX.A.1](#) I highlight (in purple) the seven remaining precincts in Pulaski County that need to be exported to D4 in order for the population in D2 to balance. I have marked these seven precincts with a red **X**.

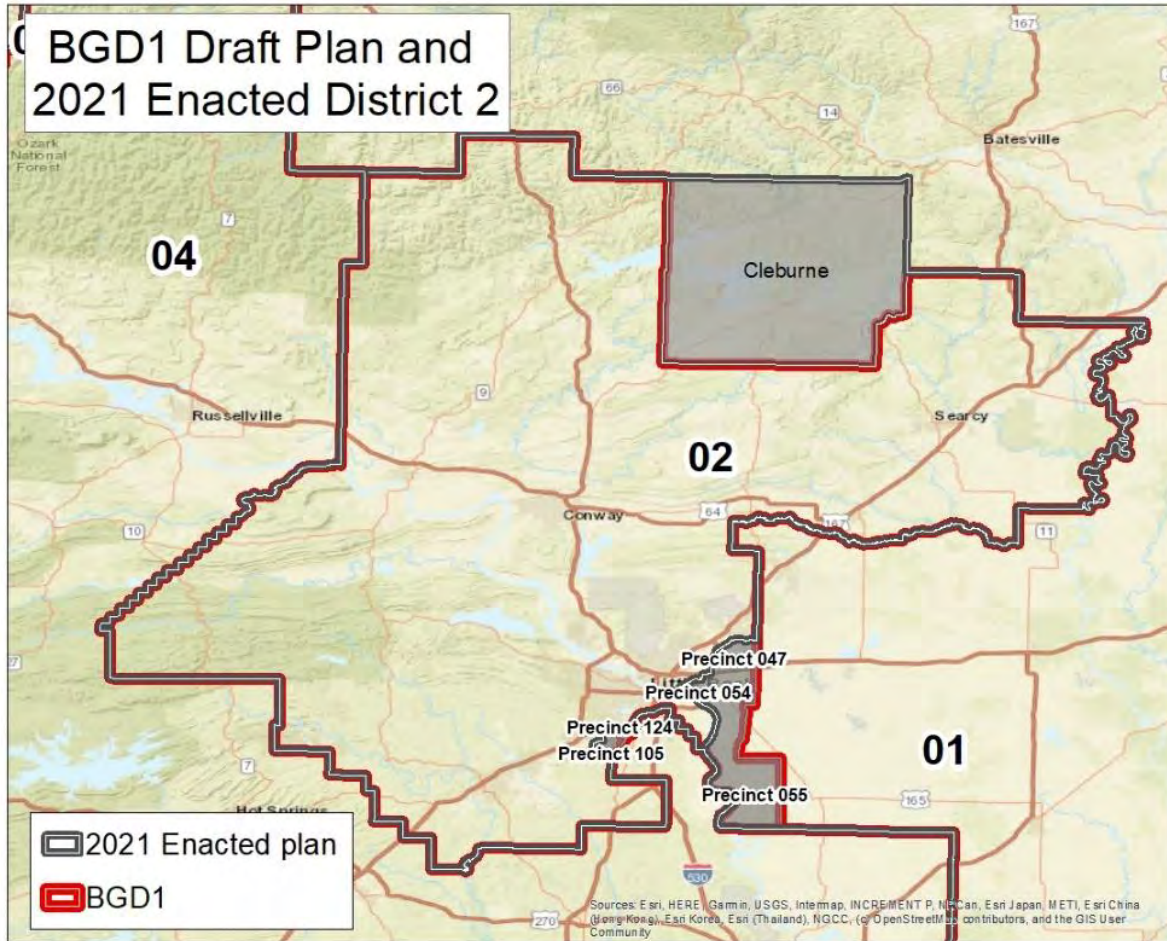
Figure IX.A.1 BGD 1 Pulaski County 2020 Precinct Moves



Sources: 2020 U.S. Census TIGER, 2020 U.S. Census PL94-171 P2, BGD calculations, built with 2020 VTDs

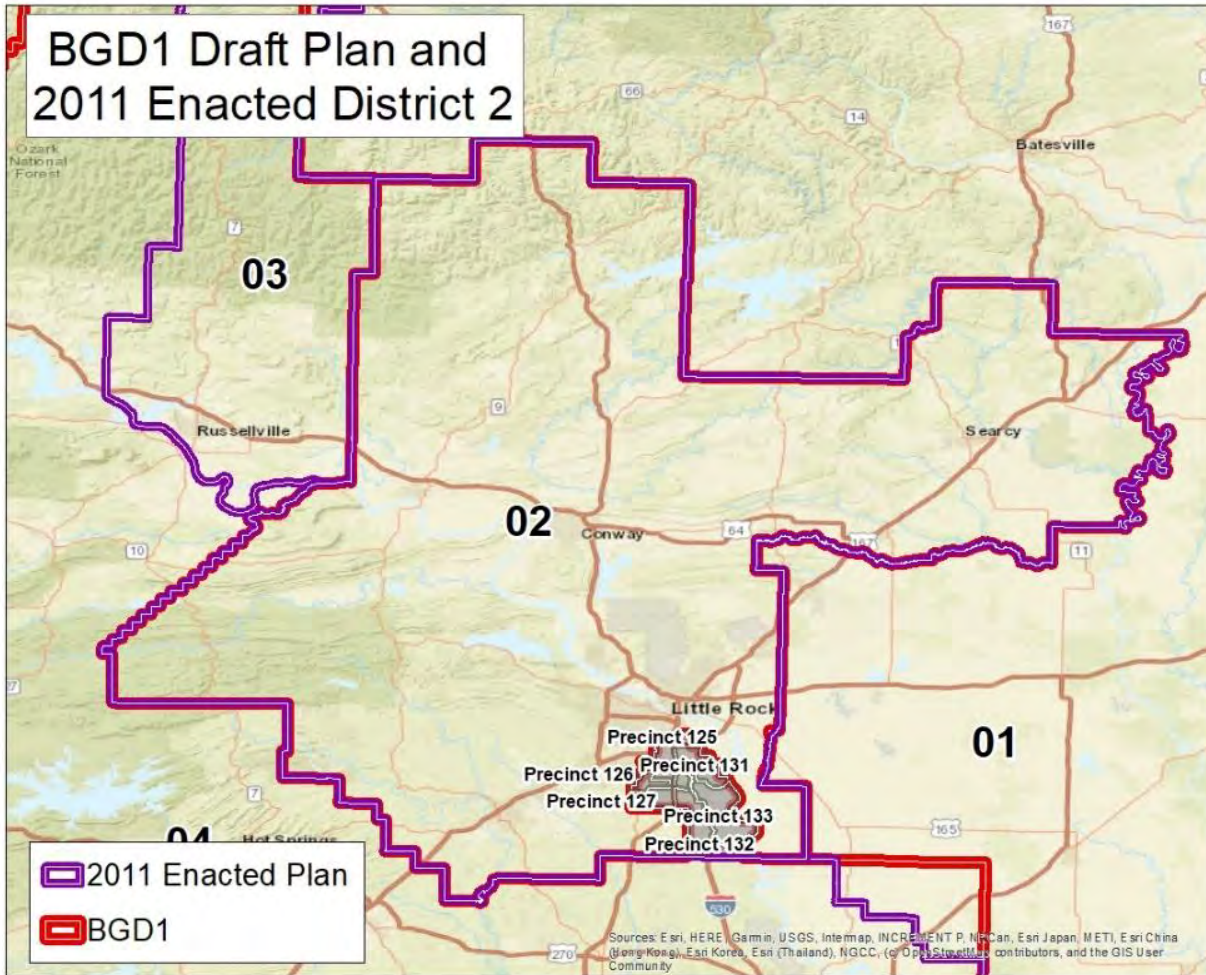
173. In [Figure IX.A.2](#) I show the BGD1 plan, D2. I have not made the effort to create a complete plan and rebalance the populations of D1, D3 or D4 in this draft – this illustration is only designed only to show what is possible with D2.

Figure IX.A.2 BGD1 Draft Plan and 2021 Enacted Boundaries



Sources: 2020 U.S. Census TIGER, BGD calculations

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Figure IX.A.3 BGD1 Draft Plan and 2011 Enacted Boundaries

Sources: 2020 U.S. Census TIGER, BGD calculations

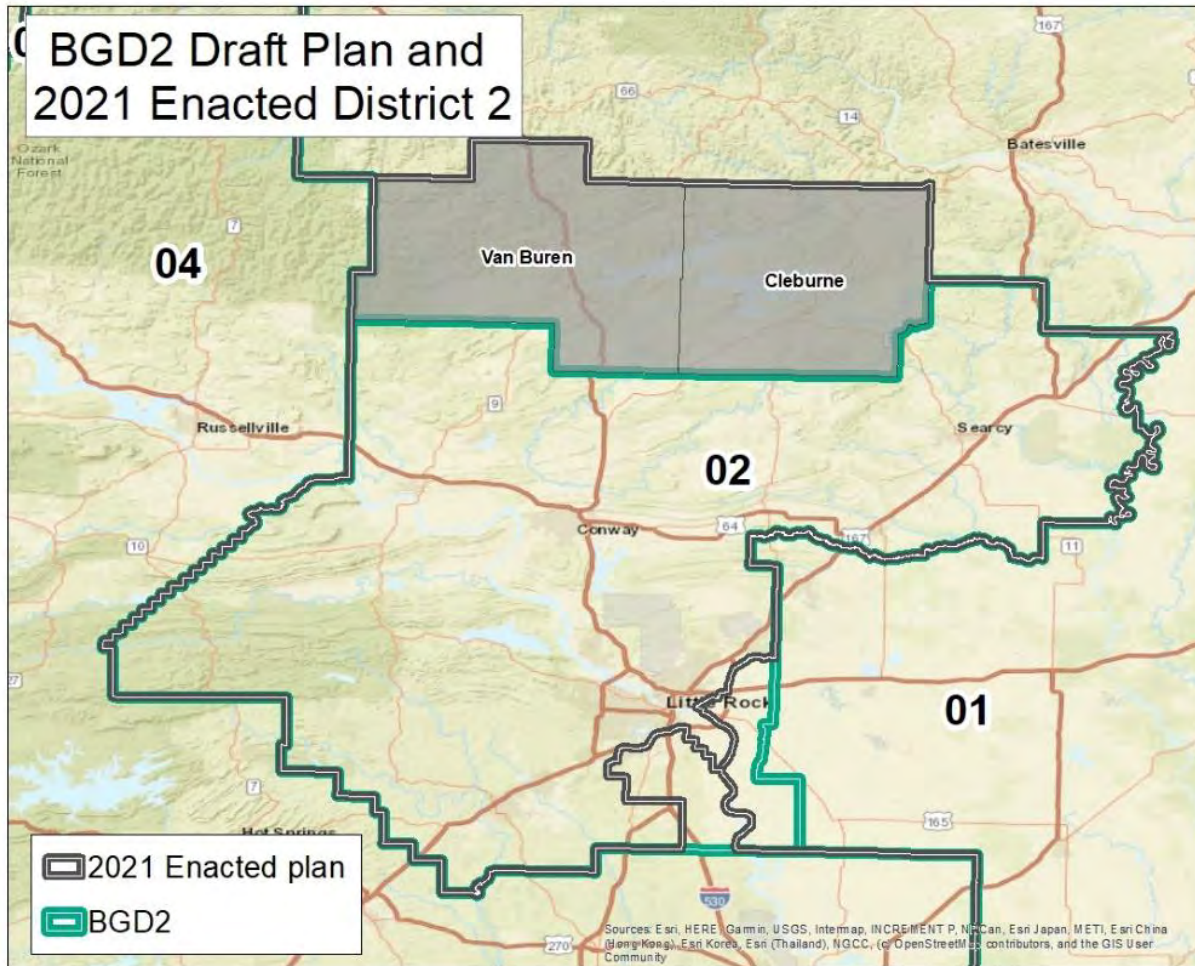
B. BGD2 Plan

174. In the BGD2 Plan, I created another alternative D2 by minimizing the change from the 2011 Enacted Plan (again, which is not required, but is advocated for by the Plaintiffs) by eliminating the splits of Pulaski County entirely while balancing the population as closely as possible to the target of 752,881 people.⁵¹ I modified the 2021 Enacted Plan D2 to exclude Cleburne County (population 24,711) – leaving it in D1 just as it was in the 2011 Enacted Plan. This made D2's population too low. Then, I added back in the 14 Pulaski County precincts

⁵¹ Other whole-county plans were developed and presented during House and Senate Committees on State Agencies and Governmental Affairs meetings, such as HB 1959 presented by Rep. Nelda Speaks, HB 1966 presented by Rep. Stephen Meeks and SB 729 presented by Mark Johnson. See [Appendix G](#). BGD Plan 2 seeks to replicate Rep. Speaks draw of District 2 in HB 1959.

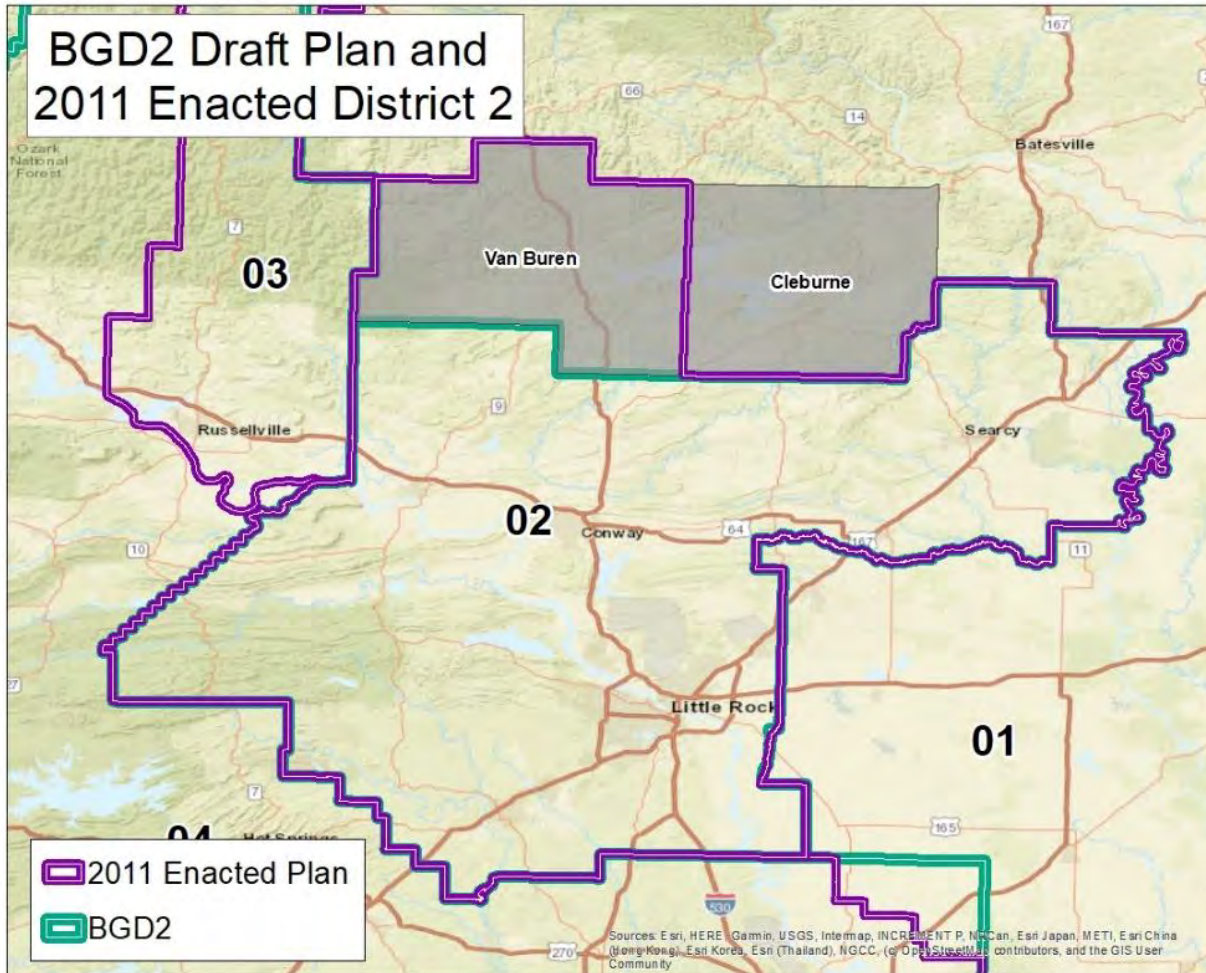
that had been split into D1 and D4 – making Pulaski County whole. This made D2’s population too high. I then identified Van Buren County as a candidate to export to reduce D2 towards the target of 752,881. These changes create a new D2 comprised of whole counties and with 753,595 population, or a deviation of only 714 people. [Figure IX.B.1](#) shows BGD2 D2 compared with the 2021 Enacted Plan.

Figure IX.B.1 BGD2 Draft Plan and 2021 Enacted Boundaries



Sources: 2020 U.S. Census TIGER, BGD calculations

175. [Figure IX.B.2](#) shows BGD2 D2 compared to the 2011 Enacted Plan.

Figure IX.B.2 BGD2 Draft Plan and 2011 Enacted Boundaries

Sources: 2020 U.S. Census TIGER, BGD calculations

C. BGD Plan Demographics for D2

176. How do these two plans compare to the 2011 and 2021 Enacted Plans? First, the deviation of D2 in BGD 1 is +2,014 (754,895 – 752,881), which is much higher than the deviation of -171 that D2 has under the enacted plan (752,710 – 752,881). Due to the size and configuration of the precincts in SE Pulaski, it is not possible to reduce this deviation while retaining geographic contiguity or avoid splitting precincts.

177. In comparing the BGD1 plan (see [Table IX.C.1](#)) with the 2011 Enacted Plan (see [Section IV.C](#)) I find the %APB among:

1. total population decreases from 24.4% to 24.1%,
2. voting age population decreases from 22.6% to 22.3%, and
3. citizen voting age population decreases from 23.4% to 23.0%.

178. In comparing the BGD1 plan (see [Table IX.C.1](#)) with the 2021 Enacted Plan (see [Section IV.D](#)) I find the %APB among:

1. total population increases from 22.1% to 24.1%,
2. voting age population increases from 20.3% to 22.3%, and
3. citizen voting age population increases from 20.6% to 23.0%.

In conclusion, the BGD1 plan's %APB in D2 is below the 2011, and above the 2021 Enacted Plans %APB.

Table IX.C.1 Demographics of BGD1 Draft Plan for District 2

Population	Total	WNH	APB	Hispanic	% APB
Total	754,895	480,718	182,155	51,901	24.1%
VAP	582,080	388,098	129,896	33,253	22.3%
CVAP	566,406	405,022	130,389	15,767	23.0%

Sources: 2020 U.S. Census PL94-171 P1, P2, P3 and P4, 2018-2022 American Community Survey, BGD calculations

179. Next I analyze the BGD2 plan's demographics. The deviation of D2 in BGD 2 is +714, which is much higher than the deviation of -171 that D2 has under the enacted plan. Due to the size and configuration of Arkansas's whole counties, it is not possible to reduce this deviation while retaining geographic contiguity without splitting one or more counties.

180. In comparing the BGD2 plan (see [Table IX.C.2](#)) with the 2011 Enacted Plan (see [Section IV.C](#)) I find the %APB among:

1. total population increases from 24.4% to 24.9%,
2. voting age population increases from 22.6% to 23.1%, and
3. citizen voting age population increases from 23.4% to 23.9%.

181. In comparing the BGD2 plan (see [Table IX.C.2](#)) with the 2021 Enacted Plan (see [Section IV.D](#)) I find the %APB among:

1. total population increases from 22.1% to 24.9%,
2. voting age population increases from 20.3% to 23.1%; and
3. citizen voting age population increases from 20.6% to 23.9%.

In conclusion, the BGD2 plan would raise the %APB in D2 above both the 2011 and 2021 Enacted Plans.

Table IX.C.2 Demographics of BGD2 Draft Plan for District 2

Population	Total	WNH	APB	Hispanic	% APB
Total	753,595	472,891	187,874	53,121	24.9%
VAP	580,842	382,063	134,321	33,961	23.1%
CVAP	564,820	399,189	134,787	15,740	23.9%

Sources: 2020 U.S. Census PL94-171 P1, P2, P3 and P4, 2018-2022 American Community Survey, BGD calculations.

D. BGD Plan Compactness for D2

182. In comparing D2's compactness in each plan, the 2021 Enacted Plan is the most compact. The BGD1 Plan is irregular. The BGD 2 Plan is somewhat of an improvement, but because the district is elongated – the Reock measure of compactness suffers.⁵²

Table IX.D.1 Compactness Scores for D2 in Enacted Plans and BGD Plans

Plan	Polsby-Popper	Reock	Convex_Hull	Schwartzberg
2011 Enacted Plan	0.24	0.46	0.71	2.02
2021 Enacted Plan	0.27	0.49	0.77	1.94
BGD1	0.20	0.45	0.70	2.22
BGD2	0.25	0.40	0.72	1.98

Sources: Calculations by BGD

E. BGD Differential Core Retention for D2

183. In comparing the plans, both of the BGD draft plans have higher core retention than the 2021 Enacted Plan. This makes sense, because both of these plans were drawn to minimize change. In the 2021 Enacted Plan, the core retention of D2 is 94.6% and APB is 88.4% (see [Appendix D.1](#)). In the BGD1 Plan, I show the core retention of D2 is 98.1% with APB is 96.9% (see [Appendix D.2](#)) In the BGD2 Plan, I show the core retention of D2 is 97.9% with APB core retention as 99.9% (see [Appendix D.3](#)).

⁵² See [Appendix B](#) for a discussion of compactness measures.

F. 2020 Political Performance for D2

184. Finally, I compare the political performance of each draft plan using the 2020 election results (see [Table IX.F.1](#)).

185. Under the BGD1 Plan, the Republican political performance would have been improved in each 2020 race – but only minimally. Compared to the 2011 Enacted Plan, the percent voting Republican for:

- president would have increased from 53.1% to 53.4%
- the senate seat would have increased from 57.8% to 58.0%; and
- the congressional seat would have increased from 55.4% to 55.6%.

186. Under the BGD2 Plan, the Republican political performance would have been hurt in each 2020 race. Compared to the 2011 Enacted Plan, the percent voting Republican for:

- president would have decreased from 53.1% to 52.5%
- the senate seat would have decreased from 57.8% to 57.3%
- the congressional seat would have decreased from 55.4% to 54.8%.

Excluding the Republican-rich, high-turnout counties of Van Buren and Cleburne and keeping Pulaski County intact would have had politically detrimental consequences for Republicans in the 2020 races.

Table IX.F.1 District 2 Republican Political Performance in 2020 by Race, by Plan

2020 Race	2011 Enacted	2021 Enacted	BGD1	BGD2
Presidential	53.1%	55.2%	53.4%	52.5%
Senate	57.8%	59.8%	58.0%	57.3%
House	55.4%	58.1%	55.6%	54.8%

Sources: Arkansas SOS Election Results, BGD calculations

Note: Shading is within each race. That is – the 2020 presidential race is shaded red to green separately from the senate race – which is independently shaded from red to green.

G. 2022 Political Performance for D2

187. Finally, I compare the political performance of each plan using the 2022 election results. (see [Table IX.G.1](#)).

188. Under the BGD1 Plan, the Republican political performance would have been improved in each race – but only minimally (just with the 2020 races). Compared to the 2011 Enacted Plan, the percent voting Republican for

- the senate seat would have increased from 57.2% to 57.4%
- the congressional seat would have increased from 58.1% to 58.3%
- the governor would have increased from 53.5% to 53.7%
- AG would have increased from 59.5% to 59.7%
- the SOS would have increased from 58.6% to 58.8%.

189. Under the BGD2 Plan, the Republican political performance would have been hurt in each race. Compared to the 2011 Enacted Plan, the percent voting Republican for:

- the senate seat would have decreased from 57.2% to 56.6%
- the congressional seat would have decreased from 58.1% to 57.6%
- the governor would have decreased from 53.5% to 52.9%
- the AG would have decreased from 59.5% to 58.9%
- the SOS would have decreased from 58.6% to 58.0%.

Excluding the Republican-rich counties of Van Buren and Cleburne and keeping Pulaski County intact would have politically detrimental consequences for Republicans in the 2022 races.

Table IX.G.1 District 2 Republican Political Performance in 2022 by Race, by Plan

2022 Race	2011 Enacted	2021 Enacted	BGD1	BGD2
Senate	57.2%	59.1%	57.4%	56.6%
House	58.1%	60.0%	58.3%	57.6%
Governor	53.5%	55.5%	53.7%	52.9%
Attorney General	59.5%	61.5%	59.7%	58.9%
Secretary of State	58.6%	60.6%	58.8%	58.0%

Sources: Arkansas SOS Election Results, BGD calculations

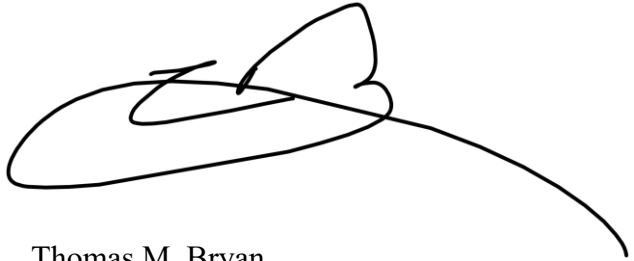
Note: Shading is within each race. That is – the 2020 presidential race is shaded red to green separately from the senate race – which is independently shaded from red to green.

X. CONCLUSIONS

190. I have assessed the population characteristics of the 2011 and 2021 Enacted Plans and analyzed each by traditional redistricting criteria – including compactness, geographic splits, core retention and political performance. In response to Plaintiffs’ claims that alternative plans could have been drawn that perform better, I have created two drafts – one of which is identical to an early draft “whole county” plan presented by Rep. Nelda Speaks (HB 1959).
191. In summary, the population in D2 needed to be reduced by approximately 16,000 persons in the redistricting process. The 2021 Enacted Plan closely balances D2’s population – reducing its deviation to -171. In the process, the percent white, non-Hispanic increases slightly, and the percent Any Part Black decreases slightly. While the 2021 Enacted Plan is not a “least change” plan – the changes are so small as to be comparable with the changes in another state (Wisconsin) where “least change” is required. The compactness of the 2021 Enacted Plan is superior to the 2011 Enacted plan and other viable alternatives I explored. The overall number of splits under the 2021 Enacted Plan is improved – with the number of county splits decreasing by three, the number of place split increasing by one and the number of school districts decreasing by eight. Some areas with high concentrations of Black population are split anew, while others with even higher concentrations of Black population are made whole. Of the numerous counties, places and school districts in the state with the highest concentrations of Black population in the state – *none* are split by the 2021 Enacted Plan.
192. These findings are inconsistent with Plaintiffs’ claims (Am. Compl. ¶ 2 and ¶ 4) that the 2021 Enacted Plan disregarded traditional redistricting principles such as respect for political subdivisions. The 2021 Enacted Plan performs better politically for Republicans across the board, in both the 2020 and 2022 races.
193. In examining maps that show concentrations of Democratic voters around Pulaski County, it is plain to see that there are no other concentrations of voting precincts with heavy concentrations of Democrats that could have been considered to move out of the district that could have benefitted Republicans. The next nearest concentration of white Democrats in sufficient numbers to impact the congressional race for D2 are in the far NW corner of the state, in and around Benton and Washington Counties – more than 200 miles away from D2.
194. The 2021 Enacted Plan performs better than the 2011 Enacted Plan and other obvious alternative plans, by each traditional redistricting principle. If the map drawer was motivated to compromise Black voting strength as the predominant objective of the plan – there were numerous ways they could have moved many more Black voters out of D2 to accomplish this – but they did not. In examining the political performance of each plan – I conclude that the 2021 Enacted Plan provides the best performance for Republicans compared to the 2011 Enacted plan and my alternative BGD plans.

195. I conclude that the evidence does not support the claim that race was the predominant factor in creating Arkansas's Second Congressional District in the 2021 Enacted Plan, nor does the evidence support the claim that the 2021 Enacted Plan divides SE Pulaski County with "laser precision" to intentionally single out Black voters for unequal treatment and dilution of their electoral power.* * *

Submitted: September 16, 2024

A handwritten signature in black ink, consisting of a large, stylized 'T' followed by a cursive 'M' and 'Bryan'.

Thomas M. Bryan

XI. REFERENCES

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XII. APPENDICES

Appendix A: Population Size and Change by County: 2010 to 2020

Appendix B: Compactness Measures

Appendix C: Geographic Splits by County, Place and School District

Appendix D: Differential Core Retention

Appendix E: 2020 Election Results by Arkansas County for Senate and
Presidential Races

Appendix F: Pulaski Counties Ranked from Highest % APB CVAP

Appendix G: Proposed Whole County Plans

Appendix H: Pulaski County Precincts Moved in the 2021 Enacted Plan

Appendix I: Terms and Definitions

Appendix A.1: 2010-2020 Population by County, by Size

County	2010 Population				2020 Population			
	Total	WNH	APB	HISP	Total	WNH	APB	HISP
Pulaski	382,748	211,697	137,860	22,168	399,125	193,993	151,682	33,153
Benton	221,339	169,605	3,603	34,283	284,333	191,761	7,553	50,540
Washington	203,065	150,546	7,363	31,458	245,871	160,566	11,778	44,755
Sebastian	125,744	91,585	9,396	15,445	127,799	82,785	10,687	19,328
Faulkner	113,237	93,326	12,444	4,435	123,498	92,573	16,853	6,790
Saline	107,118	95,298	5,472	4,087	123,416	96,745	11,808	8,507
Craighead	96,443	76,760	13,458	4,277	111,231	79,137	20,502	6,727
Garland	96,024	80,621	8,531	4,622	100,180	77,239	10,082	7,047
White	77,076	69,026	3,658	2,879	76,822	64,363	4,768	3,499
Lonoke	68,356	60,108	4,443	2,246	74,015	60,596	5,426	3,610
Jefferson	77,435	32,050	43,194	1,219	67,260	25,230	38,756	1,488
Pope	61,754	53,667	2,106	4,168	63,381	50,037	2,848	6,415
Crawford	61,948	53,770	1,045	3,760	60,133	47,627	1,619	4,567
Crittenden	50,902	23,028	26,373	1,014	48,163	18,948	26,700	1,428
Greene	42,090	40,166	392	901	45,736	40,509	1,294	1,596
Miller	43,462	30,691	11,036	1,038	42,600	27,593	11,736	1,583
Baxter	41,513	39,837	130	688	41,627	38,049	275	1,058
Mississippi	46,480	28,106	16,192	1,695	40,685	22,861	15,089	1,771
Union	41,639	25,722	13,966	1,460	39,054	22,904	13,242	1,754
Independence	36,647	32,914	895	2,139	37,938	31,511	1,253	3,258
Boone	36,903	35,139	131	674	37,373	33,753	271	973
Hot Spring	32,923	27,703	3,792	919	33,040	26,221	4,062	1,265
Carroll	27,446	23,062	176	3,489	28,260	21,175	259	4,306
Johnson	25,540	21,328	459	3,094	25,749	19,400	731	3,439
Under 25,000 Pop	798,086	607,714	142,595	33,892	734,235	537,974	126,694	37,990
Total	2,915,918	2,173,469	468,710	186,050	3,011,524	2,063,550	495,968	256,847

Sources: 2010 and 2020 U.S. Census PL94-171 P1 and P2

Appendix A.2: 2010-2020 Population Numeric and Percentage Change by County, by Size

County	2010-2020 Population # Change				2010-2020 Population % Change			
	Total	WNH	APB	HISP	Total	WNH	APB	HISP
Pulaski	16,377	-17,704	13,822	10,985	4.3%	-8.4%	10.0%	49.6%
Benton	62,994	22,156	3,950	16,257	28.5%	13.1%	109.6%	47.4%
Washington	42,806	10,020	4,415	13,297	21.1%	6.7%	60.0%	42.3%
Sebastian	2,055	-8,800	1,291	3,883	1.6%	-9.6%	13.7%	25.1%
Faulkner	10,261	-753	4,409	2,355	9.1%	-0.8%	35.4%	53.1%
Saline	16,298	1,447	6,336	4,420	15.2%	1.5%	115.8%	108.1%
Craighead	14,788	2,377	7,044	2,450	15.3%	3.1%	52.3%	57.3%
Garland	4,156	-3,382	1,551	2,425	4.3%	-4.2%	18.2%	52.5%
White	-254	-4,663	1,110	620	-0.3%	-6.8%	30.3%	21.5%
Lonoke	5,659	488	983	1,364	8.3%	0.8%	22.1%	60.7%
Jefferson	-10,175	-6,820	-4,438	269	-13.1%	-21.3%	-10.3%	22.1%
Pope	1,627	-3,630	742	2,247	2.6%	-6.8%	35.2%	53.9%
Crawford	-1,815	-6,143	574	807	-2.9%	-11.4%	54.9%	21.5%
Crittenden	-2,739	-4,080	327	414	-5.4%	-17.7%	1.2%	40.8%
Greene	3,646	343	902	695	8.7%	0.9%	230.1%	77.1%
Miller	-862	-3,098	700	545	-2.0%	-10.1%	6.3%	52.5%
Baxter	114	-1,788	145	370	0.3%	-4.5%	111.5%	53.8%
Mississippi	-5,795	-5,245	-1,103	76	-12.5%	-18.7%	-6.8%	4.5%
Union	-2,585	-2,818	-724	294	-6.2%	-11.0%	-5.2%	20.1%
Independence	1,291	-1,403	358	1,119	3.5%	-4.3%	40.0%	52.3%
Boone	470	-1,386	140	299	1.3%	-3.9%	106.9%	44.4%
Hot Spring	117	-1,482	270	346	0.4%	-5.3%	7.1%	37.6%
Carroll	814	-1,887	83	817	3.0%	-8.2%	47.2%	23.4%
Johnson	209	-1,928	272	345	0.8%	-9.0%	59.3%	11.2%
Under 25,000 Pop	-63,851	-69,740	-15,901	4,098	-8.0%	-11.5%	-11.2%	12.1%
Total	95,606	-109,919	27,258	70,797	3.3%	-5.1%	5.8%	38.1%

Sources: 2010 and 2020 U.S. Census PL94-171 P1 and P2, BGD Calculations

Appendix B: Compactness

The Reock compactness score (Reock, 1961) is computed by dividing the area of the district by the area of the smallest circle that would completely enclose it. Since the circle encloses the district, its area cannot be less than that of the district, and so the Reock compactness score will always be a number between 0 and 1 (which may be expressed as a percentage). The Reock Score (R) is the ratio of the area of the district (A_D) to the area of a minimum bounding circle (A_{MBC}) that encloses the district's geometry.

(Reock score)
$$R = \frac{A_D}{A_{MBC}}$$

The Area/Convex Hull test computes the ratio of is the ratio of the area of the district A_D to the area of the convex hull of the district (A_{MCP} - the minimum convex polygon which completely contains the district). This measure is always between 0 and 1, with 1 being the most compact.

(Convex Hull score)
$$CH = \frac{A_D}{A_{MCP}}$$

The Polsby-Popper (PP) measure is the ratio of the area of the district (A_D) to the area of a circle whose circumference is equal to the perimeter of the district (P_D). The factor 4π ensures that the resulting score takes a value between 0 and 1 - with 1 being entirely circular and the most compact.

(Polsby-Popper score)
$$PP(D) := \frac{4\pi A_D}{P_D^2},$$

Reock: Area of district relative to area of smallest circle that contains it.



Convex-Hull: Area of district relative to area of smallest convex polygon containing it.



Polsby-Popper: Area of district relative to area of circle with same circumference as the district perimeter.



The Schwartzberg test (Schwartzberg, 1966) is a perimeter-based measure that compares a simplified version of each district to a circle, which is considered to be the most compact shape possible. Taking the square root of the inverse Polsby-Popper score gives the Schwartzberg score (Belotti, 2023) which notably results in an identical ranking of geographies. Unlike other measures, the scale of Schwartzberg values is *above* 1, with *lower* values approaching 1 being most compact.

$$(\text{Schwartzberg score}) \quad PP(D)^{-1/2} := \frac{P_D}{\sqrt{4\pi A_D}},$$

Schwartzberg: Ratio of district to a circle with the same area as the district.



The Polsby-Popper and Schwartzberg ratios place high importance on district perimeter. One criticism of perimeter-related scores is that they suffer from the Coastline Paradox in which boundary lengths are not well-defined and depend on the choice of map projection and the “size of your ruler” (Bar-Natan et al. 2020, Barnes and Solomon 2021). Another criticism can be summarized with the slogan “land does not vote; people do”. In 2010, 47% of all census blocks were uninhabited (Freeman 2014); reassigning these blocks to different districts can significantly change the Polsby-Popper score, but the districts would function the same.

This is precisely why it is important to use multiple compactness scores (in this case the Polsby-Popper, Schwartzberg, Reock and Convex Hull measures) and let the reader judge which one is a better fit based on the geography of the district and method of calculation each score uses. A higher score means more compact, but the scores using different measures cannot be directly compared to each other.

**Appendix C.1: 2021 Enacted Plan County Splits with 2020 Total Population and % APB:
Top 20 Highest % APB Counties in Arkansas**

County	01	02	03	04	Grand Total	% APB	Rank
Phillips	16,568				16,568	63.7%	1
Jefferson				67,260	67,260	57.6%	2
Lee	8,600				8,600	56.1%	3
St Francis	23,090				23,090	55.5%	4
Crittenden	48,163				48,163	55.4%	5
Chicot	10,208				10,208	54.3%	6
Desha	11,395				11,395	49.3%	7
Monroe	6,799				6,799	42.3%	8
Dallas				6,482	6,482	42.0%	9
Ouachita				22,650	22,650	41.6%	10
Pulaski	8,612	357,733		32,780	399,125	38.0%	11
Mississippi	40,685				40,685	37.1%	12
Columbia				22,801	22,801	35.8%	13
Union				39,054	39,054	33.9%	14
Lafayette				6,308	6,308	33.8%	15
Nevada				8,310	8,310	31.2%	16
Hempstead				20,065	20,065	29.9%	17
Lincoln	12,941				12,941	29.5%	18
Drew				17,350	17,350	29.4%	19
Bradley				10,545	10,545	29.3%	20

Split

Sources: 2020 PL94-171 P2, BGD Calculations

Appendix C.2: 2021 Enacted Plan Places 2020 Total Population Ranked by % APB: Top 114 in Arkansas

Place	1	2	3	4	Grand Total	APB	Rank
Tollette town				185	185	95.7%	1
Anthonyville town	135				135	95.6%	2
Mitchellville city	293				293	94.9%	3
Lake View city	327				327	94.2%	4
Sunset town	184				184	94.0%	5
Jericho town	98				98	93.9%	6
Alzheimer city				696	696	93.5%	7
Holly Grove city	460				460	92.8%	8
Eudora city	1,728				1,728	91.8%	9
Jennette town	118				118	91.5%	10
Reed town	130				130	90.8%	11
Turrell city	517				517	89.9%	12
Earle city	1,831				1,831	87.7%	13
Birdsong town	32				32	87.5%	14
Allport town	86				86	87.2%	15
Gould city	663				663	87.2%	16
Haynes town	122				122	86.1%	17
Carthage city				222	222	82.0%	18
Winchester town				137	137	81.0%	19
Dermott city	2,021				2,021	80.1%	20
Marianna city	3,575				3,575	79.6%	21
Menifee town		274			274	79.6%	22
Pine Bluff city				41,253	41,253	78.8%	23
Wilmot city				416	416	78.4%	24
Wabbaseka town				180	180	78.3%	25
Hughes city	1,056				1,056	77.7%	26
Helena-West Helena city	9,519				9,519	77.2%	27
Wilmar city				395	395	74.7%	28
Montrose city				243	243	74.1%	29
Madison city	759				759	73.5%	30
Garland town				195	195	73.3%	31
Waldo city				1,151	1,151	73.2%	32
Edmondson town	243				243	72.4%	33
Forrest City city	13,015				13,015	72.2%	34
Parkin city	794				794	71.0%	35
Elaine city	509				509	70.9%	36
Cotton Plant city	529				529	70.9%	37
Parkdale city				172	172	69.8%	38

Sources: 2020 PL94-171 P2, BGD Calculations

Appendix C.2 2021 Enacted Plan Places 2020 Total Population Ranked by % APB: Top 114 in Arkansas (continued)

Place	1	2	3	4	Grand Total	APB	Rank
Strong city				410	410	67.6%	39
West Memphis city	24,520				24,520	67.4%	40
Widener town	212				212	66.5%	41
Marvell city	855				855	64.7%	42
Dumas city	4,001				4,001	64.3%	43
Lake Village city	2,065				2,065	63.7%	44
McNab town				30	30	63.3%	45
Rondo town	163				163	63.2%	46
Fargo town	57				57	63.2%	47
Blytheville city	13,406				13,406	62.7%	48
Stephens city				770	770	62.6%	49
Lewisville city				915	915	62.1%	50
Gilmore city	176				176	60.8%	51
Grady city	305				305	60.7%	52
Wrightsville city				1,542	1,542	60.6%	53
Joiner city	498				498	60.4%	54
McNeil city				381	381	60.4%	55
Rosston town				272	272	59.9%	56
Luxora city	942				942	59.6%	57
Camden city				10,612	10,612	59.2%	58
Osceola city	6,976				6,976	58.8%	59
Fordyce city				3,396	3,396	58.5%	60
Huttig city				448	448	58.5%	61
Bluff City town				118	118	57.6%	62
Stamps city				1,258	1,258	57.5%	63
Bradley city				405	405	56.3%	64
Brinkley city	2,700				2,700	54.6%	65
Fulton town				115	115	53.0%	66
El Dorado city				17,756	17,756	52.6%	67
Mineral Springs city				1,085	1,085	52.4%	68
Prescott city				3,101	3,101	52.3%	69
Chidester city				253	253	52.2%	70
Gum Springs town				91	91	51.6%	71
Twin Groves town		317			317	51.4%	72
McGehee city	3,849				3,849	49.8%	73
Augusta city	1,998				1,998	47.9%	74
Hope city				8,952	8,952	46.5%	75
Perla town				257	257	45.9%	76

Sources: 2020 PL94-171 P2, BGD Calculations

Appendix C.2 2021 Enacted Plan Places 2020 Total Population Ranked by % APB: Top 114 in Arkansas (continued)

Place	1	2	3	4	Grand Total	APB	Rank	
Warren city				5,453	5,453	45.8%	77	
Arkansas City city	376				376	45.5%	78	
North Little Rock city	6,258	58,333			64,591	45.2%	79	Split
Crossett city				4,822	4,822	44.8%	80	
Jacksonville city	145	29,332			29,477	44.3%	81	Split
LaGrange town	52				52	44.2%	82	
Buckner city				165	165	43.0%	83	
Humphrey city	249			214	463	43.0%	84	Split
Washington city				94	94	42.6%	85	
Magnolia city				11,162	11,162	42.4%	86	
Little Rock city		182,222		20,369	202,591	42.3%	87	Split
Junction City city				503	503	41.9%	88	
Monticello city				8,442	8,442	41.3%	89	
Bearden city				776	776	41.2%	90	
Gurdon city				1,840	1,840	40.9%	91	
Harrell town				210	210	40.5%	92	
Ozan town				50	50	40.0%	93	
Marion city	13,752				13,752	40.0%	94	
Stuttgart city	8,264				8,264	40.0%	95	
Shannon Hills city		4,490			4,490	39.2%	96	
Portland city				325	325	37.8%	97	
Texarkana city				29,387	29,387	37.6%	98	
Rison city				967	967	37.2%	99	
Clarendon city	1,526				1,526	36.8%	100	
Nashville city				4,153	4,153	36.1%	101	
England city	2,477				2,477	35.2%	102	
Wilton city				287	287	34.8%	103	
Wynne city	8,314				8,314	34.4%	104	
Ashdown city				4,261	4,261	34.4%	105	
East Camden town				798	798	34.0%	106	
Arkadelphia city				10,380	10,380	33.9%	107	
De Valls Bluff city	520				520	33.3%	108	
Hermitage city				525	525	32.8%	109	
Fredonia (Biscoe) town	305				305	32.5%	110	
Aubrey town	108				108	32.4%	111	
Hampton city				1,181	1,181	32.0%	112	
Marked Tree city	2,286				2,286	32.0%	113	
McCaskill town				57	57	31.6%	114	

Appendix C.3: 2011 Enacted Plan School District Splits: Total Population and %APB

District	D1	D2	D3	D4	Total	% APB	
Alma School District			6,852	8,756	15,608	2.3%	
Alpena School District			2,737	47	2,784	0.9%	
Bald Knob School District	233	6,432			6,665	3.0%	
Bauxite School District		6,408		499	6,907	4.6%	
Beebe School District	122	18,357			18,479	4.7%	
Benton School District		31,620		389	32,009	8.2%	
Berryville Public Schools			10,999	10	11,009	0.9%	
Bradford School District	1,341	1,319			2,660	1.2%	
Charleston School District			0	4,884	4,884	1.5%	
Clinton School District		8,278	34		8,312	1.0%	
Dardanelle Public Schools		117		10,119	10,236	2.6%	
Deer/Mount Judea School District			1,119	1,007	2,126	0.5%	
Dermott School District	3,088			356	3,444	59.1%	
Dollarway School District	2,198			8,480	10,678	60.3%	Split
Dover School District			8,031	1	8,032	0.9%	
Drew Central School District	0			6,170	6,170	19.6%	
Dumas School District	10,463			175	10,638	53.9%	
Fountain Lake School District		7,536		8,604	16,140	1.8%	
Glen Rose School District		2,072		3,324	5,396	1.7%	
Greenwood School District			19,863	1,369	21,232	1.9%	
Hackett Public Schools			3,839	1,641	5,480	1.4%	
Hamburg School District	68			8,076	8,144	20.4%	
Harmony Grove School District		5,851		4,500	10,351	12.1%	
Harrison School District			20,868	249	21,117	0.9%	
Hector School District	11		3,666		3,677	0.9%	
Jacksonville North Pulaski School District	1,366	37,462			38,828	35.3%	
Jasper School District			1,144	4,091	5,235	0.8%	
Jessieville School District		72		7,274	7,346	2.0%	
Lakeside School District	7,145			19,074	26,219	18.2%	
Lamar School District			110	6,992	7,102	1.6%	
Lavaca Public Schools			461	4,481	4,942	1.2%	
Mansfield School District			4	5,332	5,336	1.5%	
McGehee School District	5,922			227	6,149	42.1%	
Midland School District	3,322	601			3,923	0.7%	
Mountain Home School District	32,547		842		33,389	0.7%	
Mountainburg Schools			466	3,710	4,176	0.5%	
Norfork Schools	3,805		0		3,805	0.7%	
Ozark Mountain School District	1,030		3,892		4,922	0.6%	
Pangburn School District	906	2,362			3,268	0.9%	
Pulaski County Special School District	443	131,238			131,681	26.4%	
Quitman School District	3,206	1,835			5,041	0.6%	
Rose Bud School District	1,100	3,240			4,340	1.0%	
Searcy County School District	6,140	219	36		6,395	0.6%	
Searcy School District	56	32,791			32,847	9.4%	
Sheridan School District		9,637		16,579	26,216	3.8%	
Shirley School District	61	4,025			4,086	0.9%	
Star City School District	7,811			327	8,138	15.3%	
Two Rivers School District		1,371		4,953	6,324	1.1%	
Van Buren School District			31,548	1,624	33,172	3.4%	
West Side School District	4,059	277			4,336	0.7%	
Wonderview School District		2,759	38		2,797	3.5%	
Yellville-Summit School District	75		6,111		6,186	0.5%	

Sources: 2020 U.S. Census PL94-171 P2, BGD Calculations

Appendix C.4: 2021 Enacted Plan School District Splits: Total Population and %APB

District	D1	D2	D3	D4	Total	% APB	
Alpena School District	1,761		976	47	2,784	0.9%	
Bald Knob School District	233	6,432			6,665	3.0%	
Bauxite School District		6,408		499	6,907	4.6%	
Beebe School District	122	18,357			18,479	4.7%	
Benton School District		31,620		389	32,009	8.2%	
Booneville School District			55	7,374	7,429	1.4%	
Bradford School District	1,341	1,319			2,660	1.2%	
Charleston School District			1,153	3,731	4,884	1.5%	
Clinton School District		8,278		34	8,312	1.0%	
Concord Public Schools	313	3,737			4,050	0.8%	
Dardanelle Public Schools		117		10,119	10,236	2.6%	
Dermott School District	3,088			356	3,444	59.1%	
DeWitt School District	7,698			332	8,030	13.4%	
Drew Central School District	0			6,170	6,170	19.6%	
Dumas School District	10,463			175	10,638	53.9%	
Fountain Lake School District		7,536		8,604	16,140	1.8%	
Glen Rose School District		2,072		3,324	5,396	1.7%	
Greenwood School District			20,522	710	21,232	1.9%	
Hackett Public Schools			52	5,428	5,480	1.4%	
Hamburg School District	68			8,076	8,144	20.4%	
Harmony Grove School District		5,851		4,500	10,351	12.1%	
Harrison School District	20,868			249	21,117	0.9%	
Hector School District	11			3,666	3,677	0.9%	
Huntsville School District			15,489	14	15,503	0.7%	
Jacksonville North Pulaski School District	1,778	37,050			38,828	35.3%	Split
Jasper School District			1,168	4,067	5,235	0.8%	
Jessieville School District		72		7,274	7,346	2.0%	
Lakeside School District	7,145			19,074	26,219	18.2%	
Little Rock School District		161,638		19,456	181,094	44.7%	Split
Mansfield School District			96	5,240	5,336	1.5%	
McGehee School District	5,922			227	6,149	42.1%	
Midland School District	3,288	635			3,923	0.7%	
Mulberry School District			2,449	1,350	3,799	1.4%	
North Little Rock School District	3,608	49,931			53,539	42.9%	Split
Ozark Mountain School District	3,529			1,393	4,922	0.6%	
Pulaski County Special School District	5,035	113,322		13,324	131,681	26.4%	Split
Searcy County School District	6,176	219			6,395	0.6%	
Sheridan School District		9,637		16,579	26,216	3.8%	
Shirley School District	61	4,025			4,086	0.9%	
Star City School District	7,811			327	8,138	15.3%	
Two Rivers School District		1,371		4,953	6,324	1.1%	
Wonderview School District		2,759		38	2,797	3.5%	

Sources: 2020 U.S. Census PL94-171 P2, BGD Calculations

**Appendix C.5: 2021 Enacted Plan School Districts with 2020 Total Population and % APB:
Top 45 Highest % APB Counties in Arkansas**

School District	1	2	3	4	Grand Total	APB	Rank	
Pine Bluff School District				26,976	26,976	79.5%	1	
Earle School District	2,388				2,388	76.8%	2	
Helena-West Helena School District	11,131				11,131	73.0%	3	
West Memphis School District	25,791				25,791	66.6%	4	
Dollarway School District				10,678	10,678	60.3%	5	
Dermott School District	3,088			356	3,444	59.1%	6	
Osceola School District	6,993				6,993	58.4%	7	
Forrest City School District	19,581				19,581	58.0%	8	
Blytheville School District	14,583				14,583	57.7%	9	
Lee County School District	8,600				8,600	56.1%	10	
Dumas School District	10,463			175	10,638	53.9%	11	
Watson Chapel School District				15,227	15,227	53.8%	12	
Marvell School District	3,011				3,011	53.7%	13	
Camden Fairview School District				17,041	17,041	47.5%	14	
Fordyce School District				4,610	4,610	47.5%	15	
Augusta School District	3,021				3,021	45.9%	16	
Little Rock School District		161,638		19,456	181,094	44.7%	17	Split
Brinkley School District	3,699				3,699	44.7%	18	
Strong School District				2,638	2,638	44.4%	19	
North Little Rock School District	3,608	49,931			53,539	42.9%	20	Split
Mineral Springs School District				3,334	3,334	42.8%	21	
McGehee School District	5,922			227	6,149	42.1%	22	
El Dorado School District				24,941	24,941	41.9%	23	
Lafayette County School District				4,554	4,554	40.3%	24	
Marion School District	21,712				21,712	40.0%	25	
Magnolia School District				19,520	19,520	39.2%	26	
Clarendon School District	3,183				3,183	37.4%	27	
Prescott School District				5,062	5,062	36.8%	28	
Hope School District				13,954	13,954	36.8%	29	
Stuttgart School District	9,451				9,451	36.4%	30	
Texarkana School District				31,979	31,979	35.5%	31	
Jacksonville North Pulaski School District	1,778	37,050			38,828	35.3%	32	Split
Monticello School District				10,421	10,421	35.3%	33	
Barton-Lexa School District	2,491				2,491	33.4%	34	
Warren School District				8,148	8,148	33.3%	35	
Jonesboro Public Schools	37,764				37,764	29.6%	36	
Crossett School District				10,718	10,718	28.6%	37	
Bearden School District				2,925	2,925	28.4%	38	
Arkadelphia School District				15,447	15,447	28.1%	39	
Palestine-Wheatley School District	1,871				1,871	27.7%	40	
Wynne Public Schools	13,602				13,602	27.5%	41	
England School District	3,693				3,693	27.2%	42	
Gurdon School District				3,774	3,774	27.2%	43	
Rivercrest School District	5,461				5,461	26.8%	44	
Pulaski County Special School District	5,035	113,322		13,324	131,681	26.4%	45	Split

Sources: 2020 U.S. Census PL94-171 P2, BGD Calculations

Appendix C.6: Accounting of Changes in Split School Districts: 2011 to 2021 Enacted Plan

School District	Split Status
Alma School District	Made Whole
Berryville Public Schools	Made Whole
Deer/Mount Judea School District	Made Whole
Dollarway School District	Made Whole
Dover School District	Made Whole
Lamar School District	Made Whole
Lavaca Public Schools	Made Whole
Mountain Home School District	Made Whole
Mountainburg Schools	Made Whole
Pangburn School District	Made Whole
Quitman School District	Made Whole
Rose Bud School District	Made Whole
Searcy School District	Made Whole
Van Buren School District	Made Whole
West Side School District	Made Whole
Yellville-Summit School District	Made Whole
Charleston School District	Newly Split
Booneville School District	Newly Split
Concord Public Schools	Newly Split
DeWitt School District	Newly Split
Huntsville School District	Newly Split
Little Rock School District	Newly Split
Mulberry School District	Newly Split
North Little Rock School District	Newly Split

Sources: 2020 U.S. Census PL94-171 P2, BGD Calculations

Appendix D.1: Differential Core Retention of Total, White, non-Hispanic, Any Part Black and Hispanic Populations between the 2011 and 2021 Enacted Plans

2011 Enacted District	2021 Enacted District	Total	WNH	APB	Hispanic
1	1	689,150	498,980	134,336	27,606
	2	24,711	22,748	202	632
	4	2,527	1,208	1,188	111
2011 Enacted 1 Total		716,388	522,936	135,726	28,349
2	1	8,612	2,884	5,226	332
	2	727,999	476,090	166,117	46,041
	4	32,780	8,236	16,678	7,249
2011 Enacted 2 Total		769,391	487,210	188,021	53,622
3	1	54,750	49,668	361	1,360
	3	713,443	475,768	31,346	122,384
	4	70,954	56,664	2,924	6,565
2011 Enacted 3 Total		839,147	582,100	34,631	130,309
4	3	39,776	34,061	512	1,689
	4	646,822	437,243	137,078	42,878
2011 Enacted 4 Total		686,598	471,304	137,590	44,567
Grand Total		3,011,524	2,063,550	495,968	256,847

D1 Retained	689,150	498,980	134,336	27,606
D1 Moved	27,238	23,956	1,390	743
D1 Total	716,388	522,936	135,726	28,349
D1 Core Retention	96.2%	95.4%	99.0%	97.4%
D2 Retained	727,999	476,090	166,117	46,041
D2 Moved	41,392	11,120	21,904	7,581
D2 Total	769,391	487,210	188,021	53,622
D2 Core Retention	94.6%	97.7%	88.4%	85.9%
D3 Retained	713,443	475,768	31,346	122,384
D3 Moved	125,704	106,332	3,285	7,925
D3 Total	839,147	582,100	34,631	130,309
D3 Core Retention	85.0%	81.7%	90.5%	93.9%
D4 Retained	646,822	437,243	137,078	42,878
D4 Moved	39,776	34,061	512	1,689
D4 Total	686,598	471,304	137,590	44,567
D4 Core Retention	92.2%	91.5%	94.5%	93.0%
Total Retained	2,777,414	1,888,081	468,877	238,909
Total Moved	234,110	175,469	27,091	17,938
Total	3,011,524	2,063,550	495,968	256,847
Total Core Retention	92.2%	91.5%	94.5%	93.0%

Sources: 2020 U.S. Census PL94-171 P2, BGD Calculations

Appendix D.2: Differential Core Retention of Total, White, non-Hispanic, Any Part Black and Hispanic Populations in the BGD 1 Plan

BGD1	Total	WNH	APB	Hispanic
D2 Retained	754,895	480,718	182,155	51,901
D2 Moved	14,496	14,496	14,496	14,496
D2 Total	769,391	487,210	188,021	53,622
D2 Core Retention	98.1%	98.7%	96.9%	96.8%

Source: BGD Calculations

Appendix D.3: Differential Core Retention of Total, White, non-Hispanic, Any Part Black and Hispanic Populations in the BGD2 Plan

BGD2	Total	WNH	APB	Hispanic
D2 Retained	753,595	472,891	187,874	53,121
D2 Moved	15,796	14,319	147	501
D2 Total	769,391	487,210	188,021	53,622
D2 Core Retention	97.9%	97.1%	99.9%	99.1%

Source: BGD Calculations

Note: the 15,796 moved out of D2 equals the population of Van Buren County, which is the only geographic change to D2 compared to the 2011 Enacted Plan.

Appendix E: 2020 Election Results by Arkansas County for Senate and Presidential Races

County	Pres. Percent	Rank	Senate Percent	Rank
Scott	86.0%	1	85.6%	1
Searcy	85.1%	2	84.8%	3
Polk	85.0%	3	84.3%	6
Pike	84.5%	4	85.5%	2
Grant	84.3%	5	84.3%	5
Cleburne	83.9%	6	84.4%	4
Izard	81.9%	7	82.9%	9
Newton	81.8%	8	81.3%	17
Boone	81.7%	9	81.8%	15
Randolph	81.5%	10	82.1%	14
Cleveland	81.5%	11	84.0%	8
Franklin	81.4%	12	80.0%	27
Prairie	81.0%	13	84.1%	7
Sharp	80.9%	14	82.2%	12
Clay	80.9%	15	82.3%	11
Lawrence	80.9%	16	82.6%	10
Logan	80.7%	17	79.8%	28
Montgomery	80.6%	18	81.6%	16
Poinsett	80.6%	19	82.1%	13
Greene	80.6%	20	81.0%	18
Yell	80.3%	21	80.2%	24
White	80.2%	22	80.9%	20
Independence	80.0%	23	80.9%	19
Stone	79.6%	24	79.3%	29
Fulton	79.3%	25	80.9%	21
Van Buren	79.1%	26	80.2%	25
Marion	79.1%	27	80.4%	22
Crawford	79.0%	28	78.3%	31
Madison	78.4%	29	78.1%	32
Sevier	77.7%	30	80.3%	23
Perry	77.5%	31	77.8%	33
Lonokey	77.4%	32	77.3%	35
Baxter	77.4%	33	78.9%	30
Calhoun	77.4%	34	80.0%	26
Pope	75.8%	35	76.2%	38
Johnson	75.2%	36	75.0%	44

Sources: Arkansas SOS 2020 Election Results, BGD Calculations

Note: Red is more Republican, Blue is more Democrat

Appendix E 2020 Election Results by Arkansas County for Senate and Presidential Races (continued)

County	Pres. Percent	Rank	Senate Percent	Rank
Little River	75.2%	37	77.4%	34
Hot Spring	74.9%	38	75.8%	40
Miller	73.7%	39	76.4%	37
Cross	73.6%	40	75.2%	43
Lincoln	72.6%	41	76.5%	36
Jackson	72.5%	42	75.9%	39
Ashley	72.3%	43	74.9%	45
Howard	71.5%	44	75.6%	41
Saline	71.1%	45	73.3%	46
Arkansas	70.3%	46	75.3%	42
Conway	68.5%	47	69.5%	55
Sebastian	68.3%	48	68.4%	57
Craighead	68.2%	49	69.4%	56
Lafayette	67.7%	50	72.2%	47
Hempstead	67.6%	51	71.6%	48
Garland	67.4%	52	69.5%	54
Nevada	66.5%	53	71.1%	50
Columbia	66.2%	54	71.4%	49
Bradley	65.8%	55	69.7%	53
Union	65.2%	56	70.5%	51
Faulkner	65.2%	57	66.0%	62
Carroll	64.9%	58	66.2%	61
Woodruff	64.3%	59	70.0%	52
Drew	64.2%	60	68.1%	59
Benton	63.6%	61	64.7%	63
Dallas	62.0%	62	68.1%	58
Mississippi	61.5%	63	66.7%	60
Monroe	57.4%	64	63.1%	65
Clark	57.3%	65	63.1%	64
Ouachita	57.0%	66	62.1%	66
Washington	52.0%	67	53.3%	70
Desha	48.8%	68	57.4%	67
Lee	47.5%	69	55.4%	69
St. Francis	47.4%	70	55.7%	68
Crittenden	46.3%	71	52.7%	72
Chicot	43.7%	72	53.2%	71
Phillips	40.0%	73	49.2%	73
Jefferson	38.9%	74	46.8%	74
Pulaski	38.5%	75	43.4%	75

Sources: Arkansas SOS 2020 Election Results, BGD Calculations

Note: Red is more Republican, Blue is more Democrat

Appendix F: Pulaski 2020 Precincts Ranked from Highest % APB CVAP

PRECINCTID	CVAP_TOT	CVAP_APBNH	%APB CVAP	Split
Pulaski-Precinct 130	639	615	96.2%	Not split, border
Pulaski-Precinct 103	2,155	1,975	91.6%	Split
Pulaski-Precinct 122	1,485	1,355	91.2%	Not split, border
Pulaski-Precinct 119	1,836	1,633	88.9%	Not Split
Pulaski-Precinct 134	842	743	88.2%	Not split, border
Pulaski-Precinct 084	2,508	2,155	85.9%	Not Split
Pulaski-Precinct 117	1,964	1,685	85.8%	Not Split
Pulaski-Precinct 116	1,517	1,256	82.8%	Not Split
Pulaski-Precinct 128	2,238	1,818	81.2%	Not split, border
Pulaski-Precinct 115	2,541	2,033	80.0%	Not Split
Pulaski-Precinct 052	2,326	1,786	76.8%	Not split, border
Pulaski-Precinct 131	843	644	76.4%	Split
Pulaski-Precinct 135	372	284	76.4%	Split
Pulaski-Precinct 098	2,201	1,659	75.4%	Not Split
Pulaski-Precinct 123	1,757	1,323	75.3%	Not split, border
Pulaski-Precinct 120	2,134	1,604	75.2%	Not Split
Pulaski-Precinct 105	3,138	2,315	73.8%	Split
Pulaski-Precinct 082	2,760	2,018	73.1%	Not split, border
Pulaski-Precinct 054	3,036	2,203	72.6%	Split
Pulaski-Precinct 080	3,151	2,276	72.2%	Not Split
Pulaski-Precinct 047	353	251	71.2%	Split
Pulaski-Precinct 053	1,271	889	70.0%	Not split, border
Pulaski-Precinct 083	2,982	2,054	68.9%	Not split, border
Pulaski-Precinct 104	3,498	2,362	67.5%	Split
Pulaski-Precinct 079	3,047	2,051	67.3%	Not Split
Pulaski-Precinct 034	2,630	1,756	66.8%	Not Split
Pulaski-Precinct 102	1,884	1,255	66.6%	Not Split
Pulaski-Precinct 121	3,650	2,398	65.7%	Not Split
Pulaski-Precinct 133	2,040	1,330	65.2%	Split
Pulaski-Precinct 101	1,761	1,145	65.0%	Not Split
Pulaski-Precinct 124	3,530	2,280	64.6%	Split
Pulaski-Precinct 085	2,789	1,799	64.5%	Not Split
Pulaski-Precinct 015	3,732	2,400	64.3%	Not Split
Pulaski-Precinct 086	1,777	1,130	63.6%	Not Split
Pulaski-Precinct 048	2,970	1,819	61.2%	Not split, border
Pulaski-Precinct 019	2,073	1,195	57.7%	Not Split
Pulaski-Precinct 014	3,671	2,083	56.7%	Not Split
Pulaski-Precinct 099	1,670	947	56.7%	Not Split
Pulaski-Precinct 017	2,477	1,404	56.7%	Not Split
Pulaski-Precinct 100	1,121	622	55.4%	Not Split
Pulaski-Precinct 045	2,191	1,191	54.4%	Not split, border
Pulaski-Precinct 055	3,861	2,064	53.5%	Split
Pulaski-Precinct 037	2,792	1,492	53.4%	Not Split
Pulaski-Precinct 129	718	382	53.2%	Not split, border
Pulaski-Precinct 125	2,258	1,190	52.7%	Split
Pulaski-Precinct 009	4,861	2,539	52.2%	Not Split

Sources: 2018-2022 American Community Survey, BGD Calculations

Note: “Split” are counties that were split from D2 into D1 and D4. “Not split, border” are precincts that are still in D2, but are adjacent to the border of D1 and D4. “Not split” precincts are those that were not moved and are not adjacent to D1 and D4.

Appendix F Pulaski Counties Ranked from Highest % APB CVAP (Continued)

PRECINCTID	CVAP_TOT	CVAP_APBNH	%APB CVAP	Split
Pulaski-Precinct 089	1,879	958	51.0%	Not Split
Pulaski-Precinct 033	1,845	893	48.4%	Not Split
Pulaski-Precinct 072	1,830	880	48.1%	Not Split
Pulaski-Precinct 118	2,374	1,118	47.1%	Not Split
Pulaski-Precinct 022	3,453	1,451	42.0%	Not Split
Pulaski-Precinct 038	1,761	690	39.2%	Not Split
Pulaski-Precinct 075	2,594	1,002	38.6%	Not Split
Pulaski-Precinct 010	2,397	924	38.6%	Not Split
Pulaski-Precinct 081	2,764	1,056	38.2%	Not Split
Pulaski-Precinct 132	1,310	493	37.6%	Split
Pulaski-Precinct 074	1,953	712	36.5%	Not Split
Pulaski-Precinct 046	1,555	553	35.6%	Not split, border
Pulaski-Precinct 087	2,041	723	35.4%	Not Split
Pulaski-Precinct 016	978	336	34.4%	Not Split
Pulaski-Precinct 035	1,869	613	32.8%	Not Split
Pulaski-Precinct 094	1,562	496	31.7%	Not Split
Pulaski-Precinct 076	2,234	708	31.7%	Not Split
Pulaski-Precinct 036	2,455	768	31.3%	Not Split
Pulaski-Precinct 032	4,025	1,257	31.2%	Not Split
Pulaski-Precinct 044	2,879	895	31.1%	Not Split
Pulaski-Precinct 002	2,195	671	30.6%	Not Split
Pulaski-Precinct 001	2,164	644	29.8%	Not Split
Pulaski-Precinct 039	4,010	1,178	29.4%	Not Split
Pulaski-Precinct 007	1,140	334	29.3%	Not Split
Pulaski-Precinct 058	2,962	867	29.3%	Not Split
Pulaski-Precinct 067	2,520	735	29.2%	Not Split
Pulaski-Precinct 093	1,621	462	28.5%	Not Split
Pulaski-Precinct 095	2,357	671	28.5%	Not Split
Pulaski-Precinct 031	3,051	847	27.8%	Not Split
Pulaski-Precinct 114	2,330	603	25.9%	Not Split
Pulaski-Precinct 029	1,335	344	25.8%	Not Split
Pulaski-Precinct 008	2,060	524	25.4%	Not Split
Pulaski-Precinct 043	2,680	662	24.7%	Not Split
Pulaski-Precinct 051	1,317	320	24.3%	Not Split
Pulaski-Precinct 003	561	136	24.2%	Not Split
Pulaski-Precinct 006	613	145	23.6%	Not Split
Pulaski-Precinct 041	3,147	717	22.8%	Not Split
Pulaski-Precinct 049	2,853	648	22.7%	Not Split
Pulaski-Precinct 111	3,511	797	22.7%	Not Split
Pulaski-Precinct 069	3,055	663	21.7%	Not Split
Pulaski-Precinct 025	1,078	232	21.5%	Not Split
Pulaski-Precinct 136	2,655	566	21.3%	Not Split
Pulaski-Precinct 018	2,278	469	20.6%	Not Split
Pulaski-Precinct 112	1,519	300	19.7%	Not Split
Pulaski-Precinct 066	2,359	464	19.6%	Not Split
Pulaski-Precinct 068	2,962	581	19.6%	Not Split

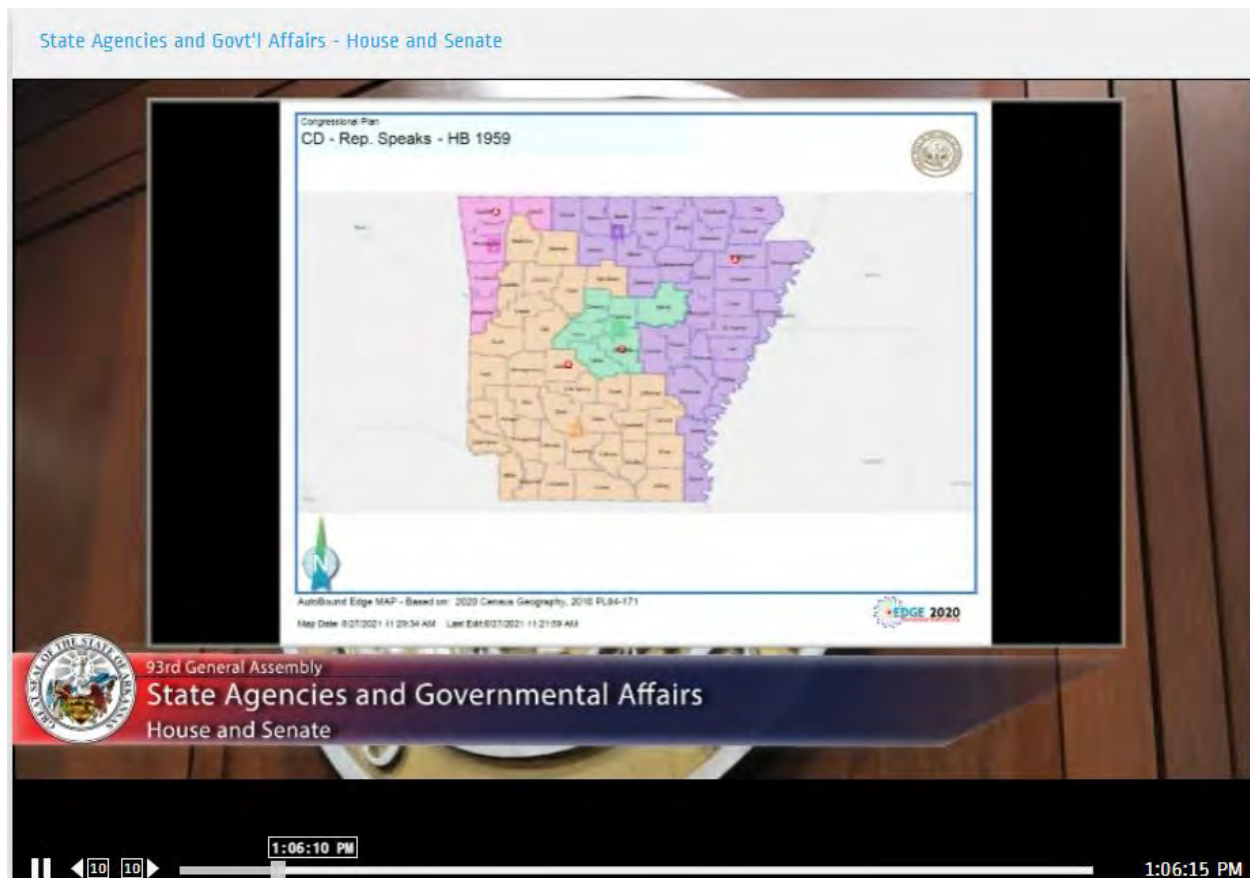
Sources: 2018-2022 American Community Survey, BGD Calculations

Appendix F Pulaski Counties Ranked from Highest % APB CVAP (Continued)

PRECINCTID	CVAP_TOT	CVAP_APBNH	%APB CVAP	Split
Pulaski-Precinct 040	1,717	319	18.6%	Not Split
Pulaski-Precinct 063	1,226	210	17.1%	Not Split
Pulaski-Precinct 004	3,396	578	17.0%	Not Split
Pulaski-Precinct 042	2,090	355	17.0%	Not Split
Pulaski-Precinct 064	3,554	580	16.3%	Not Split
Pulaski-Precinct 030	1,040	165	15.8%	Not Split
Pulaski-Precinct 021	1,095	173	15.8%	Not Split
Pulaski-Precinct 127	2,915	455	15.6%	Split
Pulaski-Precinct 077	3,559	545	15.3%	Not Split
Pulaski-Precinct 097	1,413	210	14.9%	Not Split
Pulaski-Precinct 088	2,351	347	14.8%	Not Split
Pulaski-Precinct 070	1,480	215	14.5%	Not Split
Pulaski-Precinct 027	3,829	540	14.1%	Not Split
Pulaski-Precinct 108	1,579	221	14.0%	Not Split
Pulaski-Precinct 110	1,695	234	13.8%	Not Split
Pulaski-Precinct 073	2,435	329	13.5%	Not Split
Pulaski-Precinct 012	797	107	13.4%	Not Split
Pulaski-Precinct 013	1,424	190	13.3%	Not Split
Pulaski-Precinct 113	1,461	178	12.2%	Not Split
Pulaski-Precinct 078	2,657	318	12.0%	Not Split
Pulaski-Precinct 024	1,342	160	11.9%	Not Split
Pulaski-Precinct 092	1,603	185	11.5%	Not Split
Pulaski-Precinct 050	2,179	237	10.9%	Not Split
Pulaski-Precinct 028	3,333	336	10.1%	Not Split
Pulaski-Precinct 126	1,346	131	9.7%	Split
Pulaski-Precinct 071	2,221	194	8.7%	Not Split
Pulaski-Precinct 137	2,529	197	7.8%	Not Split
Pulaski-Precinct 005	2,266	177	7.8%	Not Split
Pulaski-Precinct 106	1,299	97	7.5%	Not Split
Pulaski-Precinct 023	2,876	167	5.8%	Not Split
Pulaski-Precinct 109	2,936	164	5.6%	Not Split
Pulaski-Precinct 056	1,102	59	5.4%	Not Split
Pulaski-Precinct 060	2,727	123	4.5%	Not Split
Pulaski-Precinct 011	931	37	4.0%	Not Split
Pulaski-Precinct 020	2,483	87	3.5%	Not Split
Pulaski-Precinct 107	1,351	36	2.6%	Not Split
Pulaski-Precinct 061	2,097	55	2.6%	Not Split
Pulaski-Precinct 026	2,627	63	2.4%	Not Split
Pulaski-Precinct 090	1,689	35	2.1%	Not Split
Pulaski-Precinct 065	882	18	2.0%	Not Split
Pulaski-Precinct 062	1,095	20	1.8%	Not Split
Pulaski-Precinct 057	1,837	21	1.1%	Not Split
Pulaski-Precinct 059	1,403	5	0.3%	Not Split
Pulaski-Precinct 091	1,582	4	0.3%	Not Split
Pulaski-Precinct 096	1,105	0	0.0%	Not Split

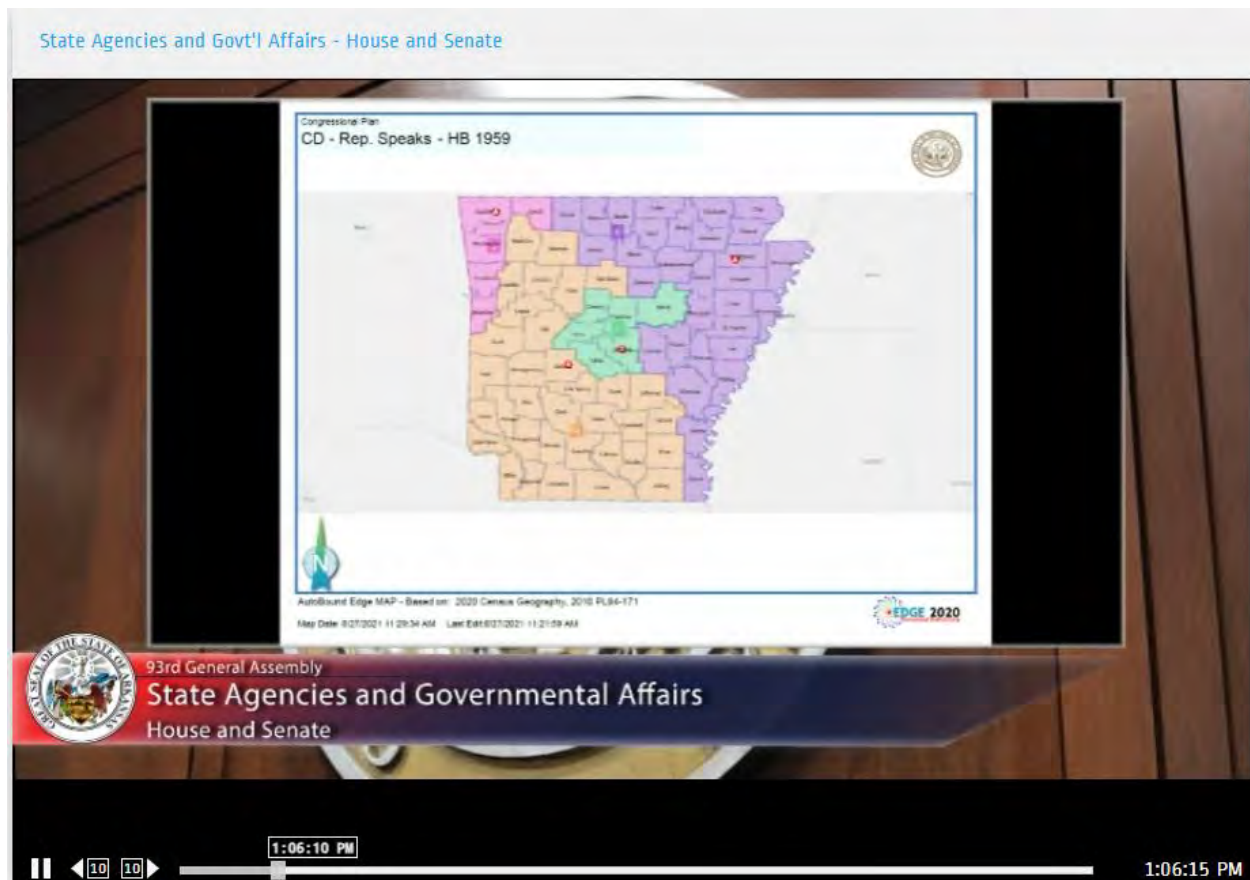
Sources: 2018-2022 American Community Survey, BGD Calculations

Appendix G.1: HB 1959 Rep. Nelda Speaks Whole County Plan



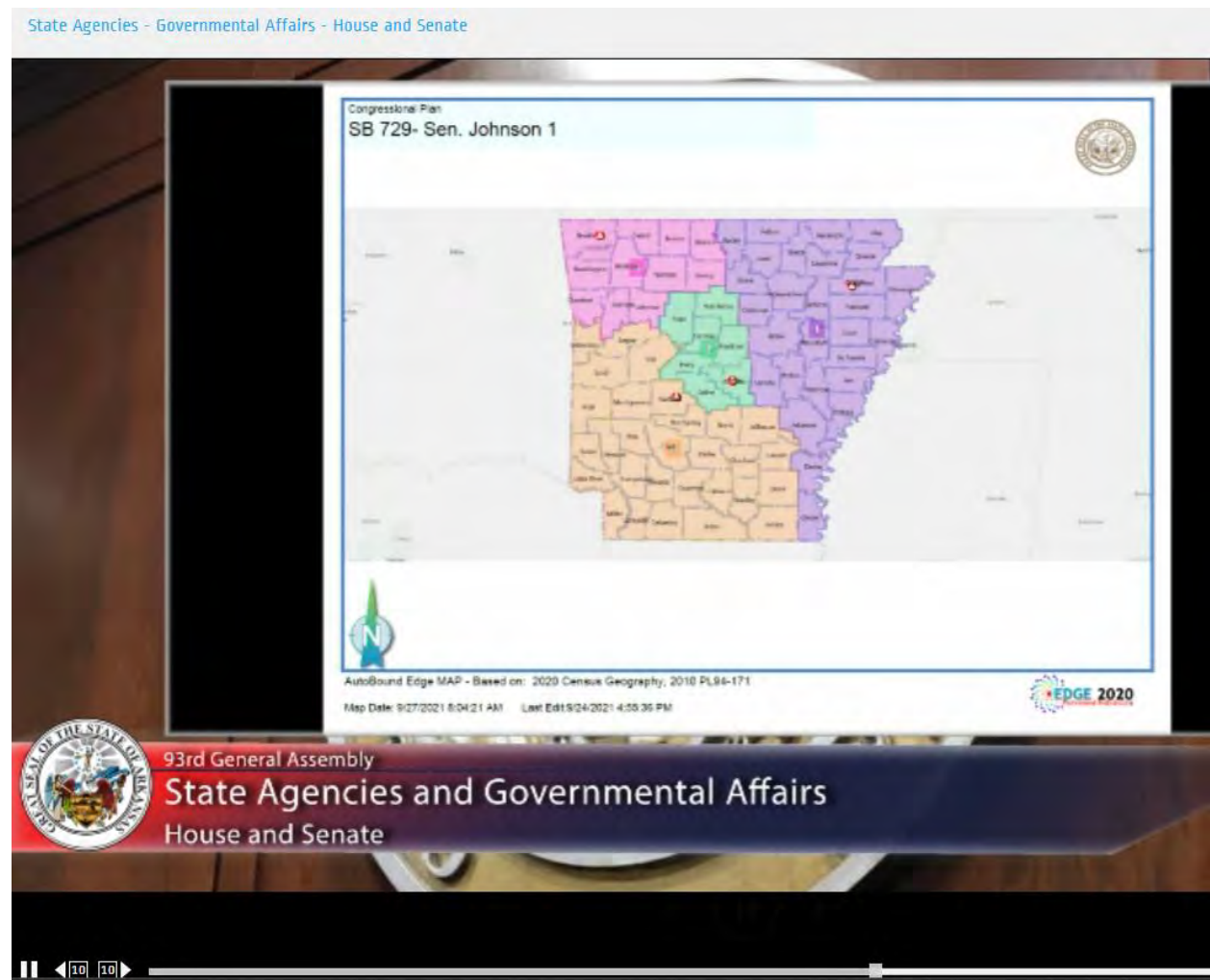
Source: The Arkansas House and Senate State Agencies and Governmental Affairs meeting on Sept. 20, 2021 <https://sg001-harmony.sliq.net/00284/Harmony/en/PowerBrowser/PowerBrowserV2/20210920/-1/21833?gefdesc=&startposition=20210920125910>

Appendix G.2: HB 1966 Rep. Stephen Meeks Whole County Plan



Source: The Arkansas House and Senate State Agencies and Governmental Affairs meeting on Sept. 27, 2021 <https://sg001-harmony.sliq.net/00284/Harmony/en/PowerBrowser/PowerBrowserV2/20210927/-1/21840#agenda>

Appendix G.3: SB 729 Sen. Mark Johnson Whole County Plan



Source: The Arkansas House and Senate State Agencies and Governmental Affairs meeting on Sept. 27, 2021 <https://sg001-harmony.sliq.net/00284/Harmony/en/PowerBrowser/PowerBrowserV2/20210927/-1/21840#agenda>

Appendix H: Pulaski County Precincts Moved in the 2021 Enacted Plan

2020 Precincts	Pres. # Biden	Pres. # Trump	2022 Precincts	Senate # James	Senate # Boozman
47	116	43	47.1 D1	0	0
54	842	234	50 D1	477	162
55	1,312	790	51 D1	911	630
Subtotal D1	2,270	1,067	Subtotal D1	1,388	792
105	884	177	109 D4	664	170
104	1,350	169	110 D4	895	166
103	967	95	111 D4	551	84
124	861	143	112 D4	495	111
125	645	300	123 D4	255	199
126	316	609	124 D4	538	911
127	455	553			
135	293	10	126 D4	208	13
131	463	96	129 D4	309	63
132	378	154	130 D4	259	114
133	404	44	131 D4	292	44
Subtotal D1	7,016	2,350	Subtotal D4	4,466	1,875
Total	9,286	3,417	Total	5,854	2,667

Source: BGD Analysis

Appendix I: Terms and Definitions

Term	Description
ACS	American Community Survey. See:
APB	Any Part Black population – defined as Black or African American alone or in combination, including Hispanic.
CPS	Current Population Survey. See: https://www.census.gov/programs-surveys/cps.html
CES	Cooperative Election Study. See: https://cces.gov.harvard.edu/
CVAP	Citizen Voting Age Population. See: https://www.census.gov/programs-surveys/decennial-census/about/voting-rights/cvap.2019.html
DCRA	Differential Core Retention Analysis - which measures how many total VAP were retained in each district when the new plan was drawn (the “core”) and how many VAP by race and ethnicity were retained (the “differential”) by district.
VAP	Voting Age Population, 18+. See: https://www.census.gov/topics/public-sector/voting/about/faqs.html
VEP	Voting Eligible Population, typically CVAP less ineligible voters such as felons and those mentally incapacitated. See: https://electionlab.mit.edu/research/voter-turnout
VRA	Voting Rights Act of 1965 See: https://www.archives.gov/milestone-documents/voting-rights-act
VTD	Voting Tabulation District, comparable with precincts.

XIII. Thomas M. Bryan Vitae

Thomas M. Bryan

Redistricting Résumé and C.V.

Introduction

I am an applied demographic, analytic and research professional who leads a team of bipartisan experts in state and local redistricting cases. I have subject matter expertise in political and school redistricting and Voting Rights Act related litigation, US Census Bureau data, geographic information systems (GIS), applied demographic techniques and advanced analytics.

Current appointee to the 2030 Census Advisory Committee (CAC)

- <https://www.census.gov/about/cac/2030cac.html>
- <https://www.census.gov/newsroom/bios/thomas-bryan.html>

Education & Academic Honors

2002 MS, Management and Information Systems - George Washington University

2002 GSA CIO University graduate - George Washington University

1997 Graduate credit courses taken at University of Nevada at Las Vegas

1996 MUS (Master of Urban Studies) Demography and Statistics core - Portland State University

1992 BS, History - Portland State University

Online

BGD company website: <https://www.bryangeodemo.com/>

ResearchGate: <https://www.researchgate.net/profile/Thomas-Bryan-6>

LinkedIn: <https://www.linkedin.com/in/thomas-bryan-424a6912>

Bryan GeoDemographics, January 2001-Current: Founder and President

I founded Bryan GeoDemographics (BGD) in 2001 as a demographic and analytic consultancy to meet the expanding demand for advanced analytic expertise in applied demographic research and analysis. Since then, my consultancy has broadened to include expert support of political, state, local and school redistricting. Since 2001, BGD has undertaken over 150 such engagements in two broad areas:

- 1) state and local redistricting; and
- 2) applied demographic studies, including health sciences and municipal Infrastructure

The core of the BGD consultancy has been in state and local redistricting and bipartisan expert witness support of litigation. Engagements include:

Redistricting

- In the matter of *Jaso v. Angleton School District* in the US District Court for the Southern District of Texas. Providing expert demographic and analytic litigation support to Defendants.
 - <https://dockets.justia.com/docket/texas/txsdce/3:2024cv00194/1964626>
- In the matter of *Bautista v. Humble School District* in the US District Court for the Southern District of Texas. Providing expert demographic and analytic litigation support to Defendants.
 - <https://dockets.justia.com/docket/texas/txsdce/4:2024cv01744/1959524>
- In the matter of *Jessica Garcia Shafer and Dona Kim Murphey v. Pearland Independent School District, et al.* in US District Court for the Southern District of Texas. Providing expert demographic and analytic litigation support to Defendants.
 - <https://dockets.justia.com/docket/texas/txsdce/3:2022cv00387/1894835>
- In the matter of *Grace, Inc. v. City of Miami* in U.S. District Court for the Southern District of Florida. Providing expert demographic and analytic litigation support to Defendants.
 - <https://thearp.org/litigation/grace-inc-v-city-miami/>
- 2023: In the matter of *Navajo Nation v. San Juan County Board of Commissioners* in the US District Court for the District of New Mexico. Providing expert demographic and analytic litigation support to Defendants. Deposed in May 2023.
 - <https://dockets.justia.com/docket/new-mexico/nmdce/1:2022cv00095/470450>
- 2022: In the matter of *White v. Mississippi State Board of Election Commissioners* in United States District Court, Northern District of MS In collaboration with demographic testifying expert Dr. David Swanson, on behalf of Defendants. Provided expert demographic and analytic litigation support of MS Supreme Court redistricting litigation.

- <https://www.aclu-ms.org/en/cases/white-v-mississippi-board-election-commissioners>
- 2022: Retained as demographic and redistricting expert for the Louisiana Attorney General in *Robinson v. Ardoin* and *Galmon v. Ardoin* and related Louisiana redistricting litigation. Offering opinions on demography and redistricting for their congressional redistricting plan and Plaintiff's proposed illustrative plans as a testifying expert. My testimony and analysis were not credited in the court's decision.
 - <https://news.ballotpedia.org/2022/04/04/louisiana-enacts-new-congressional-district-boundaries-after-legislature-overrides-governors-veto/>
- 2022: Retained by counsel as demographic and redistricting expert for the Kansas Legislature in support of *Rivera et al. v Schwab* litigation. Kansas Supreme Court found in favor of Kansas Legislature plan on June 21, 2022.
 - <https://thearp.org/litigation/rivera-v-schwab/>
 - https://www.kscourts.org/KSCourts/media/KsCourts/Opinions/125092_1.pdf?ext=.pdf
- 2022: Retained by counsel as demographic and redistricting expert for the State of Michigan in the matter of *Banerian v. Benson* and related Michigan redistricting litigation. Offering opinions on demography and redistricting for Michigan's Congressional redistricting plan. Currently before SCOTUS pending jurisdictional statement.
 - <https://www.scotusblog.com/case-files/cases/banerian-v-benson/>
- 2021: Retained as demographic and redistricting expert for the Wisconsin Legislature in *Johnson v. Wisconsin Elections Commission*, No. 2021AP001450-OA (Wis. Supreme Court) and related Wisconsin redistricting litigation. Offering opinions on demography and redistricting for redistricting plans proposed as remedies in impasse suit. The Wisconsin Supreme Court decided in favor of the Democratic Governor's plan on March 2, 2022.
 - <https://www.wpr.org/us-supreme-court-rejects-legislative-map-drawn-evers-was-endorsed-wisconsin-supreme-court>
 - <https://www.nytimes.com/2022/04/15/us/wisconsin-districts-gerrymander-supreme-court.html>
- 2021: Retained as demographic and redistricting expert by counsel for Galveston County, TX. Galveston County, TX was later sued by the US Department of Justice (*Petteway v. Galveston County, Texas*). Testified before U.S. District Judge Jeffrey Vincent Brown, who found for the

Plaintiffs. Judge Brown said of my testimony “the court credits Bryan – an eminently believable witness” and that I “testified credibly”. Defendants appealed to SCOTUS who reviewed the case in December in 2023 and refused to intervene. The case will continue in 2024 before the 5th Circuit Court.

- <https://thearp.org/litigation/united-states-v-galveston-county-tex/>
- <https://www.scotusblog.com/2023/12/supreme-court-wont-block-new-maps-for-galveston-county/>
- 2021: Retained as demographic and redistricting expert by the State of Alabama Attorney General’s office in the matters of *Milligan v. Merrill*, *Thomas v. Merrill* and *Singleton v. Merrill* over Alabama’s Congressional redistricting initiatives. My testimony and analysis were not credited in the court’s decision.
- 2021: Retained as nonpartisan demographic and redistricting expert by counsel in the State of North Carolina to prepare commissioner redistricting plans for Granville County, Harnett County, Jones County and Nash County. Each proposed plan was approved and successfully adopted.
- 2021: Served as Consultant to the Arizona Independent Redistricting Commission, presenting “Pros and Cons of (Census data) Differential Privacy”. July 13, 2021.
 - <https://irc.az.gov/sites/default/files/meeting-agendas/Agenda%207.13.21.pdf>
- 2021: Retained as demographic and redistricting expert by Democratic Counsel for the State of Illinois in the case of *McConchie v. State Board of Elections*. Prepared expert report in defense of using the American Community Survey to comply with state constitutional
 - <https://redistricting.ils.edu/case/mcconchie-v-ill-state-board-of-elections/>.
- 2021: Retained by counsel for the Chairman and staff of the Texas House Committee on Redistricting as a consulting demographic expert. Texas House Bill 1 subsequently passed by the Legislature 83-63.
 - <https://capitol.texas.gov/BillLookup/History.aspx?LegSess=873&Bill=HB1>
- 2021: In the matter of the *State of Alabama, Representative Robert Aderholt, William Green and Camaran Williams v. the US Department of Commerce; Gina Raimondo; the US Census Bureau and Ron Jarmin* in US District Court of Alabama Eastern Division. Prepared a demographic report for Plaintiffs analyzing the effects of using Differential Privacy on Census Data in Alabama and was certified as an expert witness by the Court.

- <https://www.alabamaag.gov/Documents/news/Census%20Data%20Manipulation%20Lawsuit.pdf>
- <https://www.courtlistener.com/docket/59728874/3/6/the-state-of-alabama-v-united-states-department-of-commerce/>
- 2020: In the matter of *The Christian Ministerial Alliance (CMA), Arkansas Community Institute v. the State of Arkansas*. In collaboration with demographic testifying expert Dr. Peter Morrison, on behalf of Defendants. Providing demographic and analytic litigation support.
 - [https://www.naacpldf.org/wp-content/uploads/CMA-v.-Arkansas FILED-without-stamp.pdf](https://www.naacpldf.org/wp-content/uploads/CMA-v.-Arkansas%20FILED-without-stamp.pdf)
- 2020: In the matter of *Aguilar, Gutierrez, Montes, Palmer and OneAmerica v. Yakima County* in Superior Court of Washington under the Washington Voting Rights Act (“WVRA” Wash. Rev. Code § 29A.92.60). In collaboration with demographic testifying expert Dr. Peter Morrison, on behalf of Defendants. Providing demographic and analytic litigation support.
 - <https://bloximages.newyork1.vip.townnews.com/yakimaherald.com/content/tncms/assets/v3/editorial/a/4e/a4e86167-95a2-5186-a86c-bb251bf535f1/5f0d01eec8234.pdf.pdf>
- 2018-2020: In the matter of *Rene Flores, Maria Magdalena Hernandez, Magali Roman, Make the Road New York, and New York Communities for Change v. Town of Islip, Islip Town Board, Suffolk County Board of Elections* in US District Court. On behalf of Defendants - provided a critical analysis of plaintiff’s demographic and environmental justice analysis. The critique revealed numerous flaws in both the demographic analysis as well as the tenets of their environmental justice argument, which were upheld by the court. Ultimately developed mutually agreed upon plan for districting.
 - <https://nyelectionsnews.wordpress.com/2018/06/20/islip-faces-section-2-voting-rights-act-challenge/>
 - <https://casetext.com/case/flores-v-town-of-islip-3>
- 2017-2020 In the matter of *NAACP, Spring Valley Branch; Julio Clerveaux; Chevon Dos Reis; Eric Goodwin; Jose Vitelio Gregorio; Dorothy Miller; and Hillary Moreau v East Ramapo Central School District (Defendant)* in United States District Court Southern District Of New York (original decision May 25, 2020), later the U.S. Second Circuit Court of Appeals. On behalf of Defendants, developed mutually agreed upon district plan and provided demographic and analytic litigation support.

- <https://www.lohud.com/story/news/education/2020/05/26/federal-judge-sides-naacp-east-ramapo-voting-rights-case/5259198002/>
- 2017-2020: In the matter of *Pico Neighborhood Association et al v. City of Santa Monica* brought under the California VRA. In collaboration with demographic testifying expert Dr. Peter Morrison, on behalf of Defendants. Providing demographic and analytic litigation support. Executed geospatial analysis to identify concentrations of Hispanic and Black CVAP to determine the impossibility of creating a minority majority district, and demographic analysis to show the dilution of Hispanic and Black voting strength in a district (vs at-large) system. Work contributed to Defendants prevailing in landmark ruling in the State of California Court of Appeal, Second Appellate District.
 - <https://www.santamonica.gov/press/2020/07/09/santa-monica-s-at-large-election-system-affirmed-in-court-of-appeal-decision>
- 2019: In the matter of *Johnson v. Ardoin / the State of Louisiana* in United States District Court. In collaboration with demographic testifying expert Dr. Peter Morrison, on behalf of Defendants. Provided expert demographic and analytic litigation support.
 - <https://www.brennancenter.org/sites/default/files/2019-10/2019-10-16-Johnson%20v%20Ardoin-132-Brief%20in%20Opposition%20to%20MTS.pdf>
 - <https://casetext.com/case/johnson-v-ardoin>
- 2019: In the matter of *Suresh Kumar v. Frisco Independent School District et al.* in United States District Court. In collaboration with demographic testifying expert Dr. Peter Morrison, on behalf of Defendants. Provided expert demographic and analytic litigation support. Successfully defended.
 - <https://www.friscoisd.org/news/district-headlines/2020/08/04/frisco-isd-wins-voting-rights-lawsuit>
 - <https://www.courthousenews.com/wp-content/uploads/2020/08/texas-schools.pdf>
- 2019: At the request of the City of Frisco, TX in collaboration with demographic testifying expert Dr. Peter Morrison. Provided expert demographic assessment of the City's potential liability regarding a potential Section 2 Voting Rights challenge.
- 2019: In the matter of *Vaughan v. Lewisville Independent School District et al.* in United States District Court. In collaboration with demographic testifying expert Dr. Peter Morrison, on behalf of Defendants. Provided expert demographic and analytic litigation support.
 - <https://www.nbcdfw.com/news/local/lawsuit-filed-against-lewisville-independent-school-district/1125/>

- 2019: In the matter of *Holloway, et al. v. City of Virginia Beach* in United States District Court, Eastern District of Virginia. In collaboration with demographic testifying expert Dr. Peter Morrison, on behalf of Defendants. Provided expert demographic and analytic litigation support.
 - <https://campaignlegal.org/cases-actions/holloway-et-al-v-city-virginia-beach>
- 2018: At the request of Kirkland City, Washington in collaboration with demographic testifying expert Dr. Peter Morrison. Performed demographic studies to inform the City's governing board's deliberations on whether to change from at-large to single-member district elections following enactment of the Washington Voting Rights Act. Analyses included gauging the voting strength of the City's Asian voters and forming an illustrative district concentrating Asians; and compared minority population concentration in pre- and post-annexation city territory.
 - https://www.kirklandwa.gov/Assets/City+Council/Council+Packets/021919/8b_SpecialPresentations.pdf#:~:text=RECOMMENDATION%3A%20It%20is%20recommended%20that%20City%20Council%20receive,its%20Councilmembers%20on%20a%20citywide%2C%20at-%20large%20basis
- 2018: At the request of Tacoma WA Public Schools in collaboration with demographic testifying expert Dr. Peter Morrison. Created draft concept redistricting plans that would optimize minority population concentrations while respecting incumbency. Client used this plan as a point of departure for negotiating final boundaries among incumbent elected officials.
- 2018: At the request of the City of Mount Vernon, Washington., in collaboration with demographic testifying expert Dr. Peter Morrison. Prepared a numerous draft concept plans that preserves Hispanics' CVAP concentration. Client utilized draft concept redistricting plans to work with elected officials and community to agree upon the boundaries of six other districts to establish a proposed new seven-district single-member district plan.
- 2017: In the matter of *Pico Neighborhood Association v. City of Santa Monica*. In collaboration with demographic testifying expert Dr. Peter Morrison. Worked to create draft district concept plans that would satisfy Plaintiff's claim of being able to create a majority-minority district to satisfy Gingles prong 1. Such district was not possible, and the Plaintiffs case ultimately failed in California State Court of Appeals Second Appellate District.
 - <https://law.justia.com/cases/california/court-of-appeal/2020/b295935.html>

- 2017: In the matter of *John Hall, Elaine Robinson-Strayhorn, Lindora Toudle, Thomas Jenkins, v. Jones County Board of Commissioners*. In collaboration with demographic testifying expert Dr. Peter Morrison. Worked to create draft district concept plans to resolve claims of discrimination against African Americans attributable to the existing at-large voting system.
 - <http://jonescountync.gov/vertical/sites/%7B9E2432B0-642B-4C2F-A31B-CDE7082E88E9%7D/uploads/2017-02-13-Jones-County-Complaint.pdf>
- 2017: In the matter of *Harding v. County of Dallas* in U.S. District Court. In collaboration with demographic testifying expert Dr. Peter Morrison. In a novel case alleging discrimination *against* White, non-Hispanics under the VRA, I was retained by plaintiffs to create redistricting scenarios with different balances of White-non-Hispanics, Blacks and Hispanics. Deposed and provided expert testimony on the case.
 - <https://www.courthousenews.com/wp-content/uploads/2018/08/DallasVoters.pdf>
- 2016: Retained by The Equal Voting Rights Institute to evaluate the Dallas County Commissioner existing enacted redistricting plan. In collaboration with demographic testifying expert Dr. Peter Morrison, the focus of our evaluation was twofold: (1) assess the failure of the Enacted Plan (EP) to meet established legal standards and its disregard of traditional redistricting criteria; (2) the possibility of drawing an alternative Remedial Plan (RP) that did meet established legal standards and balance traditional redistricting criteria.
 - <http://equalvotingrights.org/wp-content/uploads/2015/01/Complaint.pdf>
- 2016: In the matter of *Jain v. Coppell ISD et al* in US District Court (Texas). In collaboration with demographic testifying expert Dr. Peter Morrison. Consulted in defense of Coppell Independent School District (Dallas County, TX) to resolve claims of discriminatory at-large voting system affecting Asian Americans. While Asians were shown to be sufficiently numerous, I was able to demonstrate that they were not geographically concentrated - thus successfully proving the Gingles 1 precondition could not be met resulting the complaint being withdrawn.
 - <https://dockets.justia.com/docket/texas/txndce/3:2016cv02702/279616>
- 2016: In the matter of *Feldman et al v. Arizona Secretary of State's Office et al* in SCOTUS. In collaboration with demographic testifying expert Dr. Peter Morrison, on behalf of Defendants. Provided analytics on the locations and proximal demographics of polling stations that had been closed subsequent to *Shelby County v. Holder* (2013) which eliminated the requirement of state and local governments to obtain federal preclearance before implementing any changes to their voting laws or practices. Subsequently provided expert point of view on disparate impact as a result of H.B. 2023. Advised Maricopa County officials

and lead counsel on remediation options for primary polling place closures in preparation for 2016 elections.

- <https://arizonadailyindependent.com/2016/04/05/doj-wants-information-on-maricopa-county-election-day-disaster/>
- https://www.supremecourt.gov/DocketPDF/19/19-1257/142431/20200427105601341_Brnovich%20Petition.pdf
- 2016: In the matter of *Glatt v. City of Pasco, et al.* in US District Court (Washington). In collaboration with demographic testifying expert Dr. Peter Morrison, on behalf of Defendants. Provided analytics and draft plans in defense of the City of Pasco. One draft plan was adopted, changing the Pasco electoral system from at-large to a six-district + one at large.
 - <https://www.pasco-wa.gov/DocumentCenter/View/58084/Glatt-v-Pasco---Order---January-27-2017?bidId=>
 - <https://www.pasco-wa.gov/923/City-Council-Election-System>
- 2015: In the matter of *The League of Women Voters et al. v. Ken Detzner et al* in the Florida Supreme Court. In collaboration with demographic testifying expert Dr. Peter Morrison, on behalf of Defendants. Performed a critical review of Florida state redistricting plan and developed numerous draft concept plans.
 - <http://www.miamiherald.com/news/politics-government/state-politics/article47576450.html>
 - https://www.floridasupremecourt.org/content/download/322990/2897332/file/OP-SC14-1905_LEAGUE%20OF%20WOMEN%20VOTERS_JULY09.pdf
- 2015: In the matter of *Evenwel, et al. v. Abbott / State of Texas* in SCOTUS. In collaboration with demographic testifying expert Dr. Peter Morrison, on behalf of Plaintiffs. Successfully drew map for the State of Texas balancing both total population from the decennial census and citizen population from the ACS (thereby proving that this was possible). We believe this may be the first and still only time this technical accomplishment has been achieved in the nation at a state level. Coauthored SCOTUS Amicus Brief of Demographers.
 - https://www.supremecourt.gov/opinions/15pdf/14-940_ed9g.pdf
 - <https://www.scotusblog.com/wp-content/uploads/2015/08/Demographers-Amicus.pdf>

- 2015: In the matter of *Ramos v. Carrollton-Farmers Branch Independent School District* in US District Court (Texas). In collaboration with demographic testifying expert Dr. Peter Morrison, on behalf of Defendants. Used 2009-2013 5-year ACS data to generate small-area estimates of minority citizen voting age populations and create a variety of draft concept redistricting plans. Case was settled decision in favor of a novel cumulative voting system.
 - https://starlocalmedia.com/carrolltonleader/c-fb-isd-approves-settlement-in-voting-rights-lawsuit/article_92c256b2-6e51-11e5-adde-a70cbe6f9491.html
- 2015: In the matter of *Glatt v. City of Pasco et al.* in US District Court (Washington). In collaboration with demographic testifying expert Dr. Peter Morrison, on behalf of Defendants. Consulted on forming new redistricting plan for city council review. One draft concept plan was agreed to and adopted.
 - <https://www.pasco-wa.gov/923/City-Council-Election-System>
- 2015: At the request of Waterbury, Connecticut, in collaboration with demographic testifying expert Dr. Peter Morrison. As a result of a successful ballot measure to convert Waterbury from an at-large to a 5-district representative system, consulted an extensive public outreach and drafted numerous concept plans. The Waterbury Public Commission considered alternatives and recommended one of our plans, which the City adopted.
 - <http://www.waterburyobserver.org/wod7/node/4124>
- 2014-15: In the matter of *Montes v. City of Yakima* in US District Court (Washington). In collaboration with demographic testifying expert Dr. Peter Morrison, on behalf of Defendants. Analytics later used to support the Amicus Brief of the City of Yakima, Washington in the U.S. Supreme Court in *Evenwel v. Abbott*.
 - <https://casetext.com/case/montes-v-city-of-yakima-3>
- 2014: In the matter of *Harding v. County of Dallas* in the US Court of Appeals Fifth Circuit. In the novel case of Anglo plaintiffs attempting to claim relief as protected minorities under the VRA. Served as demographic expert in the sole and limited capacity of proving Plaintiff claim under Gingles prong 1. Claim was proven. Gingles prongs 2 and 3 were not and the case failed.
 - <https://electionlawblog.org/wp-content/uploads/Dallas-opinion.pdf>
- 2014: At the request of Gulf County, Florida in collaboration with demographic testifying expert Dr. Peter Morrison. Upon the decision of the Florida Attorney General to force inclusion of prisoners in redistricting plans – drafted numerous concept plans for the Gulf County Board of County Commissioners, one of which was adopted.

- <http://myfloridalegal.com/ago.nsf/Opinions/B640990E9817C5AB85256A9C00631387>
- 2012-2015: In the matter of *GALEO and the City of Gainesville* in Georgia. In collaboration with demographic testifying expert Dr. Peter Morrison, on behalf of Defendants -consulted on defense of existing at-large city council election system.
 - <http://atlantaprogressivenews.com/2015/06/06/galeo-challenges-at-large-voting-in-city-of-gainesville/>
- 2012-: Confidential. Consulted (through Morrison & Associates) to support plan evaluation, litigation, and outreach to city and elected officials (1990s - mid-2000s). Executed first statistical analysis of the American Community Survey to determine probabilities of minority-majority populations in split statistical/administrative units of geography, as well as the cumulative probabilities of a “false-negative” minority-majority reading among multiple districts.
- 2011-: Confidential. Consulted on behalf of plaintiffs in Committee (Private) vs. State Board of Elections pertaining to citizen voting-age population. Evaluated testimony of defense expert, which included a statistical evaluation of Hispanic estimates based on American Community Survey (ACS) estimates. Analysis discredited the defendant’s expert’s analysis and interpretation of the ACS.

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School Redistricting and Municipal Infrastructure Projects

BGD worked with McKibben Demographics from 2004-2012 providing expert demographic and analytic support. These engagements involved developing demographic profiles of small areas to assist in building fertility, mortality and migration models used to support long-range population forecasts and infrastructure analysis in the following communities:

Fargo, ND 10/2012	Charleston, SC 8/08
Columbia, SC 3/2012	Woodland, IL 7/08
Madison, MS 9/2011	White County, IN 6/08
Rockwood, MO 3/2011	Gurnee District 56, IL 5/08
Carthage, NY 3/2011	Central Noble, IN 4/08
NW Allen, IN 9/2010	Charleston First Baptist, SC 4/08
Fayetteville, AR 7/2010	Edmond, OK 4/08
Atlanta, GA 2/2010	East Noble, IN 3/08
Caston School Corp., IN 12/09	Mill Creek, IN 5/06
Rochester, IN 12/09	Rhode Island 5/06
Urbana, IL 11/09	Garrett, IN 3/08
Dekalb, IL 11/09	Meridian, MS 3/08
Union County, NC 11/09	Madison County, MS 3/08
South Bend, IN 8/09	Charleston 12/07
Lafayette, LA 8/09	Champaign, IL 11/07
Fayetteville, AR 4/09	Richland County, SC 11/07
New Orleans, LA 4/09	Lake Central, IN 11/07
Wilmington New Hanover 3/09	Columbia, SC 11/07
New Berry, SC 12/08	Duneland, IN 10/07
Corning, NY 11/08	Union County, NC 9/07
McLean, IL 11/08	Griffith, IN 9/07
Lakota 11/08	Rensselaer, IN 7/07
Greensboro, NC 11/08	Hobart, IN 7/07
Guilford 9/08	Buffalo, NY 7/07
Lexington, SC 9/08	Oak Ridge, TN 5/07
Plymouth, IN 9/08	Westerville, OH 4/07

Projects Continued

Baton Rouge, LA 4/07
 Cobb County, GA 4/07
 Charleston, SC District 20 4/07
 McDowell County, NC 4/07
 East Allen, IN 3/07
 Mt. Pleasant, SC District 2 2/07
 Peach County, GA 2/07
 North Charleston, SC District 4 2/07
 Madison County, MS revisions 1/07
 Portage County, IN 1/07
 Marietta, GA 1/07
 Porter, IN 12/06
 Harrison County, MS 9/06
 New Albany/Floyd County, IN 9/06
 North Charleston, SC 9/06
 Fairfax, VA 9/06
 Coleman 8/06
 DeKalb, GA 8/06
 LaPorte, IN 7/06
 NW Allen, IN 7/06
 Brunswick, NC 7/06
 Carmel Clay, IN 7/06
 Calhoun, SC 5/06
 Hamilton Community Schools, IN 4/06
 Dilworth, MN 4/06
 Hamilton, OH 2/06
 West Noble, IN 2/06
 New Orleans, LA 2/06
 Norwell, IN 2/06
 Middletown, OH 12/05
 West Noble, IN 11/05
 Madison, MS 11/05
 Fremont, IN 11/05
 Concord, IN 11/05

Allen County 11/05
 Bremen, IN 11/05
 Smith Green, IN 11/05
 Steuben, IN 11/05
 Plymouth, IN 11/05
 North Charleston, SC 11/05
 Huntsville, AL 10/05
 Dekalb, IN 9/05
 East Noble, IN 9/05
 Valparaiso, IN 6/05
 Penn-Harris-Madison, IN 7/05
 Elmira, NY 7/05
 South Porter/Merriville, IN 7/05
 Fargo, ND 6/05
 Washington, IL 5/05
 Addison, NY 5/05
 Kershaw, SC 5/05
 Porter Township, IN 3/05
 Portage, WI 1/05
 East Stroudsburg, PA 12/04
 North Hendricks, IN 12/04
 Sampson/Clinton, NC 11/04
 Carmel Clay Township, IN 9/04
 SW Allen County, IN 9/04
 East Porter, IN 9/04
 Allen County, IN 9/04
 Duplin, NC 9/04
 Hamilton County / Clay TSP, IN 9/04
 Hamilton County / Fall Creek TSP, IN 9/04
 Decatur, IN 9/04
 Chatham County / Savannah, GA 8/04
 Evansville, IN 7/04
 Madison, MS 7/04
 Vanderburgh, IN 7/04
 New Albany, IN 6/04

Publications

- “Using cluster analysis to identify communities of interest for purposes of legislative redistricting: A case study of parishes in Louisiana” (with David A. Swanson) May 12, 2024, *Papers in Applied Geography*, DOI: 10.1080/23754931.2024.2346326
 - <https://doi.org/10.1080/23754931.2024.2346326>
 - <https://sda-demography.org/news/13355939>
- "Forensic Demography: An Overlooked Area of Practice among Applied Demographers" *Review of Economics and Finance* (with David A. Swanson and Jeff Tayman). January 2023.
 - <https://refpress.org/ref-vol20-a94/>
- In the matter of *Banerian v. Benson*, No. 1:22-CV-00054-RMK-JTN-PLM, in US District Court of the Western District of Michigan. Declaration of Thomas Bryan. Assessing the performance of plaintiff and defendant plans against the Michigan Constitution and traditional redistricting principles. February 2022.
- In the matter of *Johnson v. Wisconsin Elections Commission*, No. 2021AP001450OA, in the Supreme Court of Wisconsin. Declaration and Rebuttal Declaration of Thomas M. Bryan. Assessing the features of proposed redistricting plans by the Wisconsin Legislature and other parties to the litigation. December 2021.
- In the matters of *Caster v. Merrill* and *Milligan v. Merrill* in US District Court of the Northern District of Alabama. Civil Action NOs. 2:21-cv-01536-AMM; 2:21-cv-01530-AMM. Declaration of Thomas Bryan. Assessing the compliance and performance of the demonstrative VRA congressional plans of Dr. Moon Duchin and Mr. William Cooper. December 2021.
- In the matter of *Milligan v. Merrill* in US District Court of the Northern District of Alabama. Civil Action NO. 2:21-cv-01530-AMM. Declaration of Thomas M. Bryan. Assessing the compliance and performance of the Milligan and State of Alabama congressional redistricting plans. December 2021.
- In the matter of *Singleton v. Merrill* in US District Court of the Northern District of Alabama. Civil Action NO. 2:21-cv-01291-AMM. Declaration of Thomas M. Bryan. Assessing the compliance and performance of the Singleton and State of Alabama congressional redistricting plans. December 2021.

- “The Effect of the Differential Privacy Disclosure Avoidance System Proposed by the Census Bureau on 2020 Census Products: Four Case Studies of Census Blocks in Alaska” PAA Affairs, (with D. Swanson and Richard Sewell, Alaska Department of Transportation and Public Facilities). March 2021.
 - <https://www.populationassociation.org/blogs/paa-web1/2021/03/30/the-effect-of-the-differential-privacy-disclosure>
 - <https://redistrictingonline.org/2021/03/31/study-census-bureaus-differential-privacy-disclosure-avoidance-system-produces-concerning-results-for-local-jurisdictions/>
 - <https://www.ncsl.org/research/redistricting/differential-privacy-for-census-data-explained.aspx>
- In the matter of the *State of Alabama, Representative Robert Aderholt, William Green and Camaran Williams v. the US Department of Commerce; Gina Raimondo; the US Census Bureau and Ron Jarmin* in US District Court of Alabama Eastern Division. Declaration of Thomas M. Bryan, Exhibit 6. Civil Action NO. 3:21-CV-211, United States District Court for Middle Alabama, Eastern Division. Assessing the impact of the U.S. Census Bureau’s approach to ensuring respondent privacy and Title XIII compliance by using a disclosure avoidance system involving differential privacy. March 2021.
 - <https://redistricting.lls.edu/wp-content/uploads/AL-commerce2-20210311-PI.zip>
 - <https://www.alabamaag.gov/Documents/news/Census%20Data%20Manipulation%20Lawsuit.pdf>
 - <https://www.courtlistener.com/docket/59728874/3/6/the-state-of-alabama-v-united-states-department-of-commerce/>
- Peter A. Morrison and Thomas M. Bryan, Redistricting: A Manual for Analysts, Practitioners, and Citizens (2019). Springer Press: Cham Switzerland.
 - <https://link.springer.com/book/10.1007/978-3-030-15827-9>
- “From Legal Theory to Practical Application: A How-To for Performing Vote Dilution Analyses.” *Social Science Quarterly*. (with M.V. Hood III and Peter Morrison). March 2017
- In the Supreme Court of the United States *Sue Evenwel, Et Al., Appellants, V. Greg Abbott, in his official capacity as Governor of Texas, et al., Appellees. On appeal from the United States District Court for the Western District of Texas. Amicus Brief of Demographers Peter A.*

Morrison, Thomas M. Bryan, William A. V. Clark, Jacob S. Siegel, David A. Swanson, and The Pacific Research Institute - As amici curiae in support of Appellants. August 2015.

- www.scotusblog.com/wp-content/uploads/2015/08/Demographers-Amicus.pdf
- Workshop on the Benefits (and Burdens) of the American Community Survey, Case Studies/Agenda Book 6 “Gauging Hispanics’ Effective Voting Strength in Proposed Redistricting Plans: Lessons Learned Using ACS Data.” June 14–15, 2012
 - <http://docplayer.net/8501224-Case-studies-and-user-profiles.html>
- “Internal and Short Distance Migration” by Bryan, Thomas in J. Siegel and D. Swanson (eds.) The Methods and Materials of Demography, Condensed Edition, Revised. (2004). Academic/Elsevier Press: Los Angeles (with D. Swanson and P. Morrison).
- “Population Estimates” by Bryan, Thomas in J. Siegel and D. Swanson (eds.) The Methods and Materials of Demography, Condensed Edition, Revised. (2004). Academic/Elsevier Press: Los Angeles (with D. Swanson and P. Morrison).
- Bryan, T. (2000). U.S. Census Bureau Population estimates and evaluation with loss functions. *Statistics in Transition*, 4, 537–549.

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Professional Presentations and Conference Participation

- 2024 “Use of Current Population Survey and Cooperative Election Study in Analyzing Registered Voter Turnout”. Scheduled for June 5, 2024 at the American Statistical Association Symposium on Data Science and Statistics (SDSS) meetings, Richmond, VA.
- 2024 Uses of Demographic Data and Statistical Information Systems in Redistricting and Litigating Voting Rights Act Cases: Case studies of the CPS and CES, and the ACS and EAVS. Presented at the 2024 Population Association of America Applied Demography Conference, February 2024.
 - <https://events.rdmobile.com/Sessions/Details/2193084>
- 2023 Population Association of America Applied Demography Conference, Annapolis, MD. February 2023.
 - <https://events.rdmobile.com/Sessions/Details/2193084>
 - “Applications of Differential Core Retention in Redistricting”
 - “Census CVAP vs. VAP in a Redistricting Context”
 - “Different Census Race Definitions in a Redistricting Context”
- 2022 Southern Demographic Association Meetings. “Census 2020 and Political Redistricting” session. Knoxville, TN, October 2022.
 - https://sda-demography.org/resources/Documents/SDA%202022%20Preliminary%20ProgramVfinal_V12.pdf
 - “Addressing Latent Demographic Factors in Redistricting: An Instructional Case” (with Dr. Peter Morrison)
- “Analysis of Differential Privacy and its Impacts on Redistricting” Presented as invited expert on the Panel on the 2020 Census at the American Statistical Association JSM meetings, Washington DC August 8, 2022.
 - <https://ww2.amstat.org/meetings/jsm/2022/onlineprogram/AbstractDetails.cfm?abstractid=323887>
- “Re-purposing Record Matching Algorithms to assess the effect of Differential Privacy on 2020 Small Area Census Data” SAE 2022: Small Area Estimation, Surveys and Data Science University of Maryland, College Park, USA 23 - 27 May, 2022. With Dr. David Swanson.
 - <https://sae2022.org/program>
- “Redistricting 101: A Tutorial” 2022 Population Association of America Applied Demography Conference, February 2022. With Dr. Peter Morrison.
 - <https://www.populationassociation.org/paa2022/home>

- “The Effect of the Differential Privacy Disclosure Avoidance System Proposed by the Census Bureau on 2020 Census Products: Four Case Studies of Census Blocks in Alaska”. 2021 American Statistical Association - Symposium on Data Science and Statistics (ASA-SDSS). With Dr. David Swanson.
 - <https://ww2.amstat.org/meetings/sdss/2021/index.cfm>
- “New Technical Challenges in Post-2020 Redistricting” 2020 Population Association of America Applied Demography Conference, 2020 Census Related Issues, February 2021. With Dr. Peter Morrison.
- “Tutorial on Local Redistricting” 2020 Population Association of America Applied Demography Conference, February 2021. With Dr. Peter Morrison.
- “Demographic Constraints on Minority Voting Strength in Local Redistricting Contexts” 2019 Southern Demographic Association meetings (coauthored with Dr. Peter Morrison) New Orleans, LA, October 2019. Winner of annual E. Walter Terrie award for best state and local demography presentation.
 - <http://sda-demography.org/2019-new-orleans>
- “Applications of Big Demographic Data in Running Local Elections” 2017 Population and Public Policy Conference, Houston, TX.
- “Distinguishing ‘False Positives’ Among Majority-Minority Election Districts in Statewide Congressional Redistricting,” 2017 Southern Demographic Association meetings (coauthored with Dr. Peter Morrison) Morgantown, WV.
- “Devising a Demographic Accounting Model for Class Action Litigation: An Instructional Case” 2016 Southern Demographic Association (with Peter Morrison), Athens, GA.
- “Gauging Hispanics’ Effective Voting Strength in Proposed Redistricting Plans: Lessons Learned Using ACS Data.” 2012 Conference of the Southern Demographic Association, Williamsburg, VA.
- “Characteristics of the Arab-American Population from Census 2000 and 1990: Detailed Findings from PUMS.” 2004 Conference of the Southern Demographic Association, (with Samia El-Badry) Hilton Head, SC.
- “Small-Area Identification of Arab American Populations,” 2004 Conference of the Southern Demographic Association, Hilton Head, SC.
- “Applied Demography in Action: A Case Study of Population Identification.” 2002 Conference of the Population Association of America, Atlanta, GA.

Professional Conference Chairs, Peer Reviews and Conference Discussant Roles

- 2024 Population Association of America Applied Demography Conference, “Population Projections” session chairman. February 2024.
 - <https://events.rdmobile.com/Sessions/Details/2195280>
- 2023 Population Association of America Applied Demography Conference, “Uses of Census Data and New Analytical Approaches for Redistricting” session chairman. Annapolis, MD, February 2023.
 - <https://www.populationassociation.org/events-publications/adc>
 - DOJ Section 2 Data Requirements vs Reality and the Impact on Redistricting
 - DOJ ACS CVAP annual data file inconsistencies
 - Differences in CVAP and VAP Reported by the USCB and the Impact on Redistricting
 - Changing Multi-Race Definitions and the Impact on Redistricting
- 2020 Population Association of America “Assessing the Quality of the 2020 Census” session chairman including Census Director Ron Jarmin. Virtual meeting, May 5, 2021.
 - <https://paa2021.secure-platform.com/a/organizations/main/home>
- “The Historical Roots of Contentious Litigation Over Census Counts in the Late 20th Century”. Peer reviewer for presentation at the Hawaii International Conference on the Social Sciences, Honolulu, Hawaii, June 17-19, 2004 with David A. Swanson and Paula A. Walashek.
- 2004 - Population Research and Policy Review External Peer Reviewer / MS #253 “A New Method in Local Migration and Population Estimation”.
- Session Discussant on “Spatial Demography” at the 2003 Conference of the Southern Demographic Association, Arlington, VA.
- Subject Moderator at the International Program Center (IPC) 2000 Summer Workshop on Subnational Population Projections for Planning, Suitland, MD.
- Session Chairman on “Population Estimates: New Evaluation Studies” at the 2002 Conference of the Southern Demographic Association, Austin, TX.
- Conference Session Chairman at the 2000 Conference of the Federal Forecasters Conference (FFC), Washington, DC.
- Session Discussant on “New Developments in Demographic Methods” at the 2000 Conference of the Southern Demographic Association, New Orleans, LA.
- Panel Discussant on GIS Applications in Population Estimates Review at the 2000 Conference of the Population Association of America, Los Angeles, CA.
- Panel Discussant on Careers in Applied Demography at the 2000 Conference of the Population Association of America, Los Angeles, CA.

Primary Software Competencies

ESRI ArcGIS

SAS

Microsoft Office

Professional Affiliations

American Statistical Association

Population Association of America

Southern Demographic Association

Relevant Work Experience

January 2001- April 2003 ESRI Business Information Solutions / Demographer

Responsibilities included demographic data management, small-area population forecasting, IS management and software product and specification development. Additional responsibilities included developing GIS-based models of business and population forecasting, and analysis of emerging technology and R&D / testing of new GIS and geostatistical software.

May 1998-January 2001 U.S. Census Bureau / Statistician

Responsibilities: developed and refined small area population and housing unit estimates and innovative statistical error measurement techniques in support of the Population Estimates Program and the Current Population Survey.

Service

Eagle Scout, 1988, Boy Scouts of America. Member of the National Eagle Scout Association. Involved in leadership of the Boy Scouts of America Heart of Virginia Council.



Founder: SCOVETH, Virginia Scouting and Veterans Oral History Project, in collaboration with the Virginia War Memorial →



References

Dr. David Swanson

david.swanson@ucr.edu

951-534-6336

Dr. Peter Morrison

petermorrison@me.com

310-266-9580