STATE OF NORTH CAROLINA

COUNTY OF WAKE

IN THE GENERAL COURT OF JUSTICE
SUPERIOR COURT DIVISION

NORTH CAROLINA LEAGUE OF CONSERVATION VOTERS, INC., *et al.,*
Plaintiffs

and

COMMON CAUSE,
Plaintiff-Intervenor,

v.

REPRESENTATIVE DESTIN HALL**,** in his official capacity as Chair of the House Standing Committee on Redistricting, *et al.*
Defendants.

Case No. 21 CVS 015426

REBECCA HARPER, *et al.*,
Plaintiffs

v.

REPRESENTATIVE DESTIN HALL**,** in his official capacity as Chair of the House Standing Committee on Redistricting, *et al.*
Defendants.

Case No. 21 CVS 500085

PLAINTIFF COMMON CAUSE'S OBJECTIONS TO LEGISLATIVE DEFENDANTS' REMEDIAL MAPS

Pursuant to Paragraph 9 of the North Carolina Supreme Court's February 4, 2021 Order and this Court's February 8, 2021 Order on the Submission of Remedial Plans, Common Cause herein submits its objections to the Legislative Defendants' Remedial Maps enacted by the General Assembly last week and submitted on February 18, 2022: S.L. 2022-3 (the "LD Congressional

Map"), S.L. 20222-2 (the "LD Senate Map") and S.L. 2022-4 (the "LD House Map"). In support of its objections, Plaintiff Common Cause appends to this submission the expert report of Jonathan Mattingly and Gregory Herschlag (**Exhibit 1,** the "Mattingly Expert Report"**)**, jointly designated with the *Harper* Plaintiffs, as well as an addendum to that report (**Exhibit 2,** the "Mattingly Addendum"), and the Second Affidavit of Christopher Ketchie (**Exhibit 3**, the "Second Ketchie Affidavit").

The LD Remedial Maps are plainly unconstitutional when evaluated using the correct metrics using appropriate data, which differ significantly from the metrics scores, using manipulated and inaccurate data, submitted by the Legislative Defendants on February 18, 2022. Despite clear instruction from this Court and the North Carolina Supreme Court on the process and substantive requirements for constitutional remedial plans, the Legislative Defendants have failed once again to undertake the proper analysis required by *Stephenson* or consider all the appropriate factors to ensure equal voting power for voters, with the result of producing maps that fall short of the established Constitutional requirements. In their disclosures, Legislative Defendants blatantly disregarded clear direction from this Court on the required transparency for this process to provide "[t]he identity of all participants involved in the process of drawing the Proposed Remedial Plans submitted to the Court." Feb. 8 Order on Submission of Remedial Plans ¶ 3(c). *See* LD Br. at 54 (failing to identify the "outside legal counsel, whose roles were restricted to providing legal advice" as having participated in the drawing process).[1] Legislative Defendants also provided a one-sided story of Senate negotiations that do not comport with contemporaneous

[1] To the extent that attorney client privilege protects the substance of that advice, it does not protect the disclosure of such counsel's identity, nor does the Court's order.

statements by other legislators,[2] and appear to have made no effort to incorporate public participation or the extensive public commentary received in the fall of 2021.

This lack of transparency is telling and reveals the same strategies of subterfuge and misdirection used by the Legislative Defendants this past fall to execute the extreme partisan gerrymanders already struck down by the North Carolina Supreme Court, right down to drawing maps through undisclosed legal counsel. *See* Dec. 29 Order on Mot. to Compel at 4–6. Legislative Defendants' Remedial Maps thus deserve the same level of scrutiny as the 2021 Enacted Maps, and not the deference that maps produced in a fair and transparent process otherwise might.

Thankfully, the constitutional shortcomings of the Legislative Defendants Remedial Maps can be swiftly and easily remedied. For the LD House Map, the implementation of Common Cause's proposed remedial House District 10, submitted on February 18, 2022, will bring this map into state Constitutional compliance, and prevent harmful vote dilution by altering just two districts within one county cluster, and thus not implicating the *Stephenson* rules at all. The LD Senate Map can similarly be brought within Constitutional bounds by the adoption of Common Cause's remedial Senate District 4 and incorporating alternative cluster proposals from the remedial legislative process, as can the LD Congressional Map. Regardless of the approach taken by the Court in directing its Special Masters, it is abundantly clear that Legislative Defendants' Remedial Maps cannot be accepted without modification.

[2] *See, e.g.,* See, e.g., Senator Dan Blue (@DanBlueNC), Twitter (Feb. 16, 2022, 2:28pm), https://twitter.com/danbluenc/status/1494030901650640897?s=21 ("This process has not been collaborative, and it is clear to me that Senate Republicans had no real interest in finding a legislative solution."); Senator Dan Blue (@DanBlueNC), Twitter (Feb. 17, 2022, 3:05pm), https://twitter.com/danbluenc/status/1494402702775828481?s=21 ("The House compromise has made the stalemate in the Senate all the more disappointing. Senate Republicans appear to think they know better than the Supreme Court.").

I. Objections to Legislative Defendants' Remedial Senate Map

The LD Senate Map constitutes an unlawful partisan gerrymander because it still diminishes and dilutes North Carolinians' voting power based on partisan affiliation by making it nearly impossible for voters who prefer one political party to elect a governing majority reflecting the will of the electorate. *See* NCSC Opinion ¶ 160. The North Carolina Supreme Court directed courts to compare the "relative chances of voters from each party electing a supermajority or majority of representatives under various possible electoral conditions," *id.* at 161, which can be accomplished by examining the plausible number of representatives elections under various elections, as well as looking at the relative chances of election a majority or supermajority under various scenarios. The Supreme Court also noted "multiple reliable ways of demonstrating the existence of an unconstitutional partisan gerrymander" including "mean-median difference analysis[,] efficiency gap analysis[,] close-votes, close-seats analysis[,] and partisan symmetry analysis" which, in combination, may demonstrate "a significant likelihood that the districting plan will give the voters of all political parties substantially equal opportunity to translate votes into seats across the plan" to render it presumptively constitutional. *Id.* at ¶ 163. And while the Court gave some examples of thresholds, i.e., a mean-median difference of 1% or less using a "representative sample of past elections," *id.* at ¶ 166, and an efficiency gap above 7% based upon prior federal case law, *id.* at ¶ 167, these were all characterized as "possible" metrics, *id.* at ¶ 164, with the overall objective of informing a determination of whether maps treat voters equally.

Legislative Defendants' submission ignores these instructions, losing the forest for the trees and instead relying predominantly on two metrics, using incomplete and skewed data, to support their proposed plans, mean-median difference and efficiency gap. For the LD Senate Plan, Legislative Defendants assert a mean-median of -0.65% and efficiency gap of -3.97%. *See* LD Br.

pp. 23-24. These scores are incorrect for reasons easily ascertained on the record. First, they are not based upon a "representative sample of past elections" but rather a much narrow set that Legislative Defendants appear to have hand-picked to render the statistics they wanted. Dr. Barber applied just 12 elections despite the more appropriate and broader set of elections that are publicly available, purportedly because these are the 12 elections used by Dr. Mattingly in his expert report during the merits phase. But Dr. Mattingly used the 12 elections to demonstrate the *cluster-level* bias, while using a broader set of 16 elections for his statewide analysis. *See* PX PX629 Mattingly Report at 11, 22 (using 16 elections to analyze statewide results for the House and Senate, respectively). In addition to this error, Legislative Defendants' expert, Dr. Barber, confusingly appears to have collated votes across elections before performing his calculations, instead of the appropriate analysis of performing calculations on individual elections and averaging them.[3]

A look at the full set of relevant metrics for the Senate plan, calculated properly and using representative sets of elections, reveals the partisan skew of this map and why Legislative Defendants pursued the odd strategy they did:

Metric	Mattingly (Ex. 1)[4]	Additional Comparators[5]
Mean-Median	1.304%	2.2% R Source: PlanScore
Efficiency Gap	4.072%	4.8% R Source: PlanScore
Partisan Symmetry (Partisan Bias)	4.0125 seat bias	4.8% R Source: PlanScore

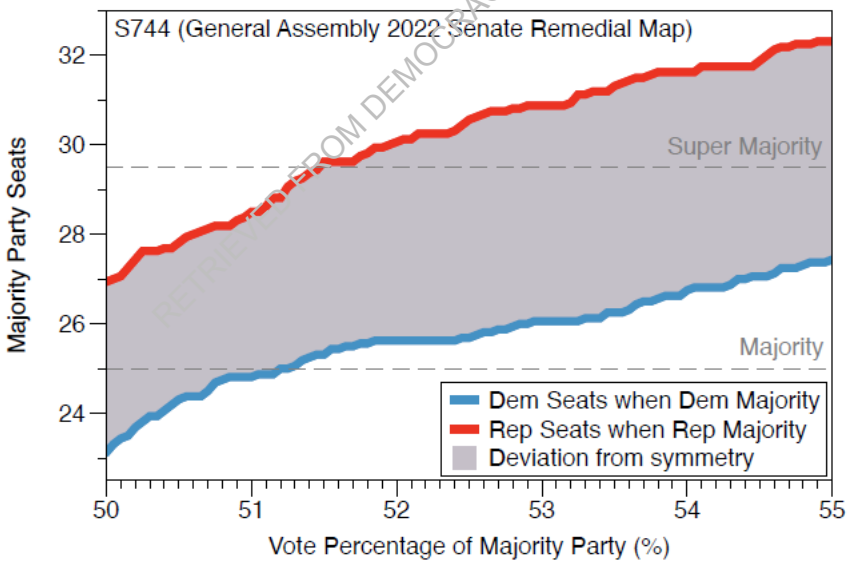
[3] This error was explained in depth by Dr. Moon Duchin in the February 21, 2022 submission by Plaintiff NCLCV. *See* Second Duchin Rep. at 14.

[4] Dr. Mattingly and Dr. Herschlag calculated their metrics using the results of sixteen recent statewide elections: *See* Ex. 1, Mattingly Expert Report p. 1. These Senate metric scores are reflected from Pages 6-7 of their report.

[5] The source data and methodology for calculating these additional comparators is disclosed in the Second Ketchie Affidavit, and is all based upon publicly available information. *See* Ex. 3, Second Ketchie Aff. at ¶ 11.

Plausible Number of Representatives Elected Comparison	29-30 R seats with 52% R vote share v. 25-26 D seats with 52% D vote share	22D-28R / 21D-29R Source: DRA Composite / PlanScore
Relative Chances of Electing Majority (26) or Supermajority (30)	R supermajority (or close) with 48 – 49% R votes D majority with 51-52% votes	R Majority: 4/6 Scenarios D Majority: 0/6 Scenarios R Supermajority: 1/6 Scenarios D Supermajority: 0/6 Scenarios Source: Second Ketchie Affidavit

Figure 5.2 from the Mattingly Expert Report (Exhibit 1) shows just how asymmetrical the LD Senate Map is, as shown by the multi-seat gap in performance for each party based on voting percentage:



To bring the LD Senate Map within constitutional bounds, the Court should first implement the proposed remedial Senate District 4 proposed by Common Cause, which will improve the partisan bias in the map overall and prevent unlawful vote dilutions for voters of color, as supported in detail by Common Cause's February 18, 2022 submission. In the interest of judicial

economy, those points will not be repeated here. However, Legislative Defendants made several erroneous assertions in their February 18, 2022 Brief that will be briefly addressed here.

First, Legislative Defendants erroneously contend that federal precedent, and in particular *Bartlett v. Strickland*, somehow prohibit the drawing of Common Cause's proposed remedial districts because the proposed remedial districts contain less than 50% Black Voting Age Population. *See* LD Br. at 41. This is plainly not the case, as demonstrated by language in that decision expressly *sanctioning* these remedial districts. *Bartlett v. Strickland*, 556 U.S. 1, 23 (2009) ("[Section] 2 allows States to choose their own method of complying with the Voting Rights Act, and we have said that may include drawing crossover districts.").

Second, Legislative Defendants try to argue their point by purposefully confusing the *Gingles I* <u>*demonstrative*</u> districts provided by Common Cause[6] with the proposed <u>*remedial*</u> districts. This includes even excerpting the wrong figure at page 49 of their brief, and contending at page 51 that the Common Cause remedial Senate District 4 would reach into Pitt County when it would not. *See* Plaintiff Common Cause's Proposed Remedial Districts at p. 14 Figure 4 (showing a proposed remedial Senate District 4 within Edgecombe, Wilson, and Wayne counties). Such misdirection cannot overcome the plain facts: all three *Gingles* criteria are satisfied in these geographic areas, as shown by figures 1 and 3 of Common Cause's February 14 submission (which show a sufficient and geographically compact BVAP populations to constitute majorities in single-member districts) and the RPV studies in Exhibits 1 and 3 the Ketchie Affidavit appended to that submission (which show racially polarized voting in the 2021 Enacted Districts corresponding to these areas).[7]

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[6] *See* Figure 1 (HD10 *Gingles I* demonstrative) and Figure 3 (SD4 *Gingles I* demonstrative) in Plaintiff Common Cause's Proposed Remedial Districts, February 18, 2022.

[7] Legislative Defendants also asserted, without any support, that "To prove the presence of the third *Gingles* threshold condition, Common Cause is obligated to provide evidence of legally significant racially polarized

Instead of addressing the RPV studies provided by Plaintiff Common Cause, Legislative Defendants instead rely on the Lewis expert report from December 2021 that was performed using incomplete and insufficient statistical analysis,[8] and which analyzes not whether legally-significant racially polarized voting exists, but rather whether Dr. Duchin's definition of "effective Black districts" was met anywhere in the Enacted Plans.[9] Furthermore, Dr. Duchin confirmed at trial she never conducted a *Gingles* analysis at all, rendering Legislative Defendants' apparent reliance on her analysis inapposite. *See* T2 479:18–22 (Duchin) (Judge Shirley: "So you didn't do a *Gingles* analysis?" Dr. Duchin: "That's right.").

Legislative Defendants also submitted a supplemental Lewis expert report on February 18, 2022, that further shows Senate District 4 in the LD Senate Map has zero chance of electing a candidate of choice for Black voters. *See* Exhibit B to Lewis Supplemental Report at p. 4 (line "SCH22-4-004"). The supplemental Barber report submitted by Legislative Defendants on February 18, 2022 similarly shows that the BVAP level for the Senate district was intentionally reduced. *See* Barber Supplemental Report at 41 (at line "Fitch"). This proves the LD Senate Map destroys what was otherwise shown to be a functioning crossover district, providing yet another independent state law basis under the North Carolina Equal Protections Clause (Article I, Section

voting in a larger area of the state demonstrating that black voters in enacted HD10 and SD 4 could constitute a compact majority in a single member district but have been unable to elect their candidate of choice because they were submerged into a majority white districts." LD Br. at p. 48. In addition to having no support in the law, this runs contrary to direction from courts that the analysis must be district specific. *See Covington v. North Carolina*, 316 F.R.D. 117, 173 (M.D.N.C. 2016) (finding the General Assembly had failed to substantiate drawing purported VRA remedial districts because "none of the evidence Defendants have cited--without additional proof and district-specific analysis--can constitute a strong basis in evidence demonstrating that any of the challenged districts were reasonably necessary as drawn to avoid a Section 2 violation" where "evidence regarding *Gingles'* third factor in any particular district is sparse to non-existent."), *summarily aff'd*, 137 S. Ct. 2211 (2017); *id.* at 174 ("[W]hen drawing the challenged districts, Defendants made no district-specific assessment regarding the third *Gingles* factor (as properly understood).").

[8] *See* Common Cause Appellant Br. at 72; Lewis Dep. Tr. 13:3–17:2 (stating that the analysis was done "on a highly-expedited timeline" and that "it would have been prohibitive" to do his normal analysis)

[9] *See* LDTX109 Lewis Report at 5–7; *see also* Lewis Dep. Tr. 15:21–16:15 ("I don't have an opinion about, you know, what constitutes a level of racially polarized voting that would require some sort of action.")

19) for implementing the remedial Senate District 4 submitted by Common Cause. *Cf. Bartlett v. Strickland*, 556 U.S. at 24 ("[I]f there were a showing that a State intentionally drew district lines in order to destroy otherwise effective crossover districts, that would raise serious questions under both the Fourteenth and Fifteenth Amendments.").

Finally, Legislative Defendants are wrong that Common Cause's proposed remedial districts would be racial gerrymanders prohibited by *Shaw v. Reno*, 509 U.S. 63, 649 (1993) and *Alabama Legis. Black Caucus v. Alabama*, 575 U.S. 254 (2015). The remedial districts are narrowly tailored to adhere to traditional redistricting criteria and allow Black voters an equal opportunity to elect their candidates of choice, and were not drawn with race as a predominating factor. *Compare* February 18, 2022 Affidavit of Christopher Ketchie at ¶ 11 ("I also considered minimizing county splits and traversals, minimizing splits of community related boundaries such as municipalities and precincts, and maximizing compactness because I did not intend or want race to predominate in the drawing of these remedial district lines), *with Alabama Legis. Black Caucus*, 575 U.S. at 272 ("[A] plaintiff pursuing a racial gerrymandering claim must show that race was the predominant factor motivating the legislature's decision to place significant number of voters within or without a particular district." (internal quotation omitted)). Even if they were drawn with race as a predominating factor (which they were not), these remedial districts do not violate prohibitions on racial gerrymandering because they are narrowly tailored to serve several, independent, compelling government interests. *Alabama Legis. Black Caucus*, 575 U.S. at 272. The remedial Senate District 4 (and House District 10) prevent vote dilution for Black voters in violation of state Constitutional prohibitions and the Voting Rights Act, and are independently justified on each basis to bring the Senate map into Constitutional compliance with the prohibition on partisan gerrymandering.

In addition to incorporating the remedial Senate District 4 proposed by Common Cause, the Court should direct its Special Masters to bring the LD Senate Map into Constitutional compliance by modifying the same county cluster groupings that Legislative Defendants themselves acknowledged had Republican support and should be modified during the legislative process, *see* Ex. 1 at email from Sen. Paul Newton (Wake/Granville, Mecklenburg/Iredell, and New Hanover Counties), and those that were otherwise considered during the legislative process (Cumberland, Guilford, Forsyth, and Buncombe). These cluster options are further appropriate for modification because all but one were found to be partisan outliers by this Court, *see* Judgment ¶¶ 241–46 (Wake/Granville); 283–92 (Mecklenburg/Iredell); 249–56 (Cumberland); 259–67 (Guilford); 270–80 (Forsyth); 303–08 (Buncombe), and were the focus of public commentary requesting fair districts that keep communities of interest whole.

A map that incorporates Common Cause's Remedial Senate District 2 and the alternative proposed clusters that were tabled during the legislative process would likely comport with constitutional requirements with a mean-median difference of -0.2%, efficiency gap of 1.0%, and Partisan Symmetry of –0.7%. *See* Ex. 3, Second Ketchie Affidavit ¶ 21. Plaintiff Common Cause understands the other Plaintiffs in this matter have proposed alternative Senate maps that may present viable options. Regardless of how the Court chooses to direct the Special Masters in ensuring a constitutional Senate map, the LD Senate Map cannot be approved or implemented in its current form.

II. Objections to the LD Remedial State House Map

The LD House Map also falls short of constitutional standards, but can be brought within constitutional bounds by implementing the proposed House District 10 submitted by Common Cause on February 18, 2022.

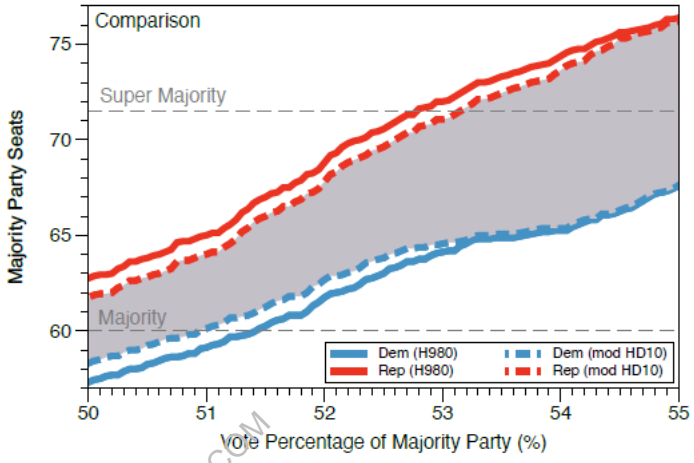
As with the Senate map, Legislative Defendants' asserted efficiency gap of -0.84% and mean-median of -.7%, *see* LD Br. at 15, are incorrect. Instead, the appropriate data used in these metrics show that this map, although less skewed on partisan grounds, is too biased to pass Constitutional muster:

Metric	Mattingly Rep. (Ex. 1)[10]	Additional Comparators[11]
Mean-Median	1.45%	1.4% R Source: PlanScore
Efficiency Gap	3.23%	3.0% R Source: PlanScore
Partisan Symmetry (Partisan Bias)	1.575 seat average deviation	2.9% R Source: PlanScore
Plausible Number of Representatives Elected Comparison	6.59375 seats average deviation	57D-63R / 58D-62R Source: DRA Composite / PlanScore
Relative Chances of Electing Majority (61) or Supermajority (72)	*See* Figure below	R Majority: 4/6 Scenarios D Majority: 1/6 Scenarios R Supermajority: 1/6 Scenarios D Supermajority: 0/6 Scenarios

These issues are remedied with the incorporation of the proposed House District 10 proposed by Common Cause on February 18, 2022. This modification consistently improves upon the partisan symmetry score of the enacted State House Map, as shown by Figures 2.1 and 2.2 one from the Mattingly Addendum (**Exhibit 2)**:

[10] Dr. Mattingly and Dr. Herschlag calculated their metrics using the results of sixteen recent statewide elections: *See* Ex. 1, Mattingly Expert Report at p. 1. These metrics and their analysis of the LD Congressional Map can be found at pages 3-5 of their report.

[11] The source data and methodology for calculating these additional comparators is disclosed in the Second Ketchie Affidavit, and is all based upon publicly available information. *See* Ex. 3, Second Ketchie Aff. at ¶ 18.



This modification significantly reduces the partisan bias of the LD House Map by consistently increasing the number of Democratic-leaning districts seats across an entire range of electoral potentials (left Figure 2.1) and bringing the symmetry of how Democratic-leaning and Republican-leaning voters are treated (right Figure 2.2). This modification also reduces the mean-median difference and efficiency gaps of the House map. *See* Ex. 2, Mattingly Addendum at 2 (stating modified House map has a reduced mean-median difference of 1.01% and efficiency gap of 2.61%); Ex. 3, Second Ketchie Aff. ¶ 22 (calculating mean-median difference of 1.2% R, efficiency gap of 2.6% R, and partisan Bias of 2.5% R).

Furthermore, as with the proposed remedial Senate District 4, the proposed remedial House District 10 would also prevent unlawful vote dilution, as supported by Plaintiff Common Cause's February 18, 2022 submission and supporting materials. The supplemental Lewis expert submitted by Legislative Defendants further shows that House District 10 in the LD House Map has zero

chance of electing a candidate of choice for Black voters. *See* Exhibit B to Lewis Supplemental Report p. 1 (line "H980 Third Edition-010"). The supplemental Barber report submitted by Legislative Defendants on February 18, 2022 similarly shows that the BVAP level for this House district was intentionally reduced. *See* Barber Supplemental Report p. 30 (at line "Smith, R.").

The fact that Legislative Defendants agreed to remedy other House districts begs the question of why they still intentionally destroyed the functioning crossover district in House District 10 in the LD House Map without any legitimate explanation on the record, reinforcing the need for the remedial district proposed by Common Cause to comport with the North Carolina Equal Protections Clause. *Cf. Strickland*, 556 U.S. at 24 ("[I]f there were a showing that a State intentionally drew district lines in order to destroy otherwise effective crossover districts, that would raise serious questions under both the Fourteenth and Fifteenth Amendments.").

III. Objections to Legislative Defendants' Remedial Congressional Map

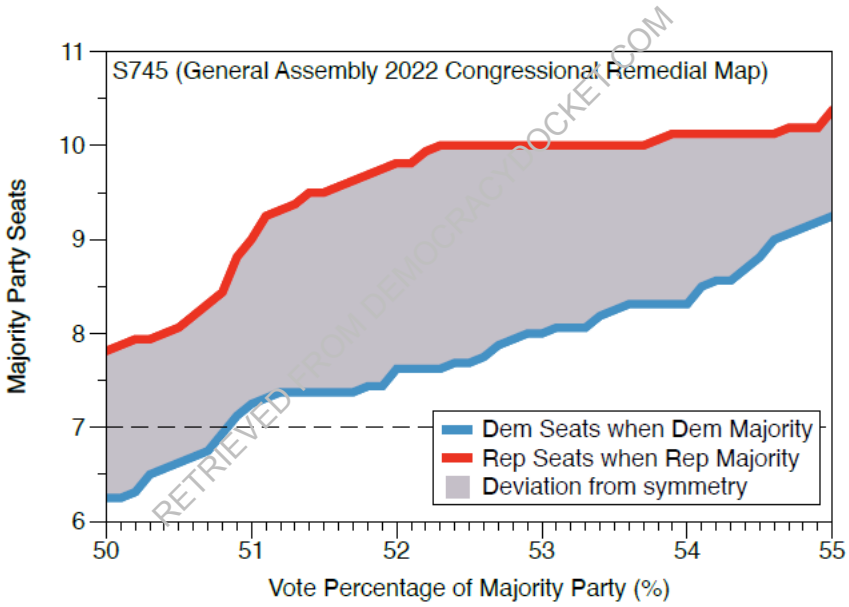
As with the Senate and House maps, the LD Congressional map does not comply with the Constitutional requirements against partisan gerrymandering and should not be adopted by this Court. Legislative Defendants again assert inaccurate median-mean (-0.61%) and efficiency gap (-5.29%) scores, *see* LD Br. at 27, which differ significantly with the scores on those metrics based upon an appropriate set of past electoral results:

Metric	Mattingly (Ex. 1)	Additional Comparators[12]
Mean-Median	1.01%	1.1% R Source: PlanScore
Efficiency Gap	2.7180%	6.4% R Source: PlanScore
Partisan Symmetry (Partisan Bias)	1.575 seats	4.9% R Source: PlanScore

[12] *See* Ex. 3, Second Ketchie Affidavit ¶ 19.

Plausible Number of Representatives Elected Comparison	8-9 R seats with 51% R vote share v. 7-8 D seats with 51% D vote share	6D-8R / 4D-10R Source: DRA Composite / PlanScore
Relative Chances of Electing Majority (8)	*See* figure below	R Majority: 5/6 Scenarios D Majority: 1/6 Scenarios

Figure 4.2 from the Mattingly Report shows just how biased the LD Congressional Map is, as demonstrated by the lack of overlap and large seats-wide gap between how either party fairs depending on vote percentage:



If Legislative Defendants had examined just 20 random plans from the Mattingly ensemble, they would have had a 99.998% of finding a plan with greater partisan symmetry. Ex. 1, Mattingly Expert Report at p. 3.

Accordingly, the Court should direct its Special Masters to bring the LD Congressional Map into Constitutional compliance. The proposed alternative by Senator Chaudhry, which was

originally drawn and proposed during the 2021 legislative process,[13] provides a viable Constitutional alternative that is grounded in the legislative record, with the exception of its split of Wake Forest University from the rest of the Triad. Senator Chaudhuri's proposed map would pair a significant part of the university community with the mountain counties in the northwestern part of the state in District 5, rather than keeping the entirety of the community of interest together with the Triad in District 6. Keeping Wake Forest University whole within the Triad-based Congressional district is important to ensure that the Congressional representative is responsive to the university's needs. Splitting university communities has occurred in North Carolina both frequently and recently,[14] and North Carolina's university students have consistently called out this unfair practice.[15]

IV. Conclusion

The North Carolina Constitution guarantees the voters of the state the right to elect state and federal representatives under district plans that provide their votes with substantially equal voting power. NCSC Opinion ¶ 222. The Legislative Defendants' Remedial Maps fail to do so, and further fail to remedy unlawful vote dilution for voters of color. For the reasons provided above, the Legislative Defendants' Remedial Maps must not be implemented without modification, and instead the Court should select a plan that comports with the constitutional requirements.

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[13] We understand this is the Congressional remedial plan offered by the Harper Plaintiffs, originally filed as S.B. 738, and proposed and tabled during the legislative process for the 2021 Congressional Map. *See* Bill Summary for S.B. 740 / S.L. 2021-174, https://ncleg.gov/BillLookUp/2021/S740, at entry for 11/2021 Senate showing "Amend Tabled A1", linking to https://webservices.ncleg.gov/ViewBillDocument/2021/53325/1/S740-BD-NBC-9229.

[14] *See* Trial T3 867:23–869:3 (Rep. Hawkins) (discussing the East Carolina University split in the Enacted House Plan).

[15] *See, e.g., Bryan Warner*, NC A&T Students Speak Out on Campus Gerrymandering, Common Cause (Mar. 22, 2016), https://www.commoncause.org/north-carolina/democracy-wire/nc-at-students-speak-out-on-campus-gerrymandering/.

Respectfully submitted, this the 21st day of February, 2022.

Allison J. Riggs (State Bar No. 40028)
allison@southerncoalition.org
Hilary H. Klein (State Bar No. 53711)
hilaryhklein@scsj.org
Mitchell Brown (State Bar No. 56122)
Mitchellbrown@scsj.org
Katelin Kaiser (State Bar No. 56799)
Katelin@scsj.org
Jeffrey Loperfido (State Bar No. 52939)
jeffloperfido@scsj.org

SOUTHERN COALITION FOR SOCIAL JUSTICE
1415 W. Highway 54, Suite 101
Durham, NC 27707
Telephone: 919-323-3909
Facsimile: 919-323-3942

J. Tom Boer* (D.C. Bar No. 469585; CA Bar. No. 199563)
tom.boer@hoganlovells.com
Olivia T. Molodanof* (CA Bar No. 328554)
olivia.molodanof@hoganlovells.com
* Admitted *Pro Hac Vice*

HOGAN LOVELLS US LLP
3 Embarcadero Center, Suite 1500
San Francisco, California 94111
Telephone: 415-374-2300
Facsimile: 415-374-2499

Counsel for Plaintiff Common Cause

CERTIFICATE OF SERVICE

This is to certify that the undersigned has this day submitted a copy of the foregoing document in the above titled action by mail and/or electronic mail, in the manner requested, to the following parties:

Sam Hirsch
Jessica Ring Amunson
Kali Bracey
Zachary C. Schuaf
Karthik P. Reddy
Urja Mittal
JENNER & BLOCK LLP
1099 New York Avenue, NW, Suite 900
Washington, D.C. 20001
shirsch@jenner.com
zschauf@jenner.com

Stephen D. Feldman
ROBINSON, BRADSHAW & HINSON, P.A.
434 Fayetteville Street, Suite 1600
Raleigh, NC 27501
sfeldman@robinsonbradshaw.com

Adam K. Doerr
ROBINSON, BRADSHAW & HINSON, P.A.
101 North Tryon Street, Suite 1900
Charlotte, NC 28246
adoerr@robinsonbradshaw.com

Erik R. Zimmerman
ROBINSON, BRADSHAW & HINSON, P.A.
1450 Raleigh Road, Suite 100
Chapel Hill, NC 27517
ezimmerman@robinsonbradshaw.com

Counsel for North Carolina League of Conservation Voters, INC., et al. Plaintiffs

Burton Craige
Narendra K. Ghosh
Paul E. Smith
PATTERSON HARKAVY LLP
100 Europa Dr., Suite 420
Chapel Hill, NC 27517
bcraige@pathlaw.com
nghosh@pathlaw.com
psmith@pathlaw.com

Lalitha D. Madduri
Jacob D. Shelly
Graham W. White
ELIAS LAW GROUP LLP
10 G. Street NE, Suite 600
Washington, D.C. 20002
MElias@elias.law
ABranch@elias.law
LMadduri@elias.law
JShelly@elias.law
GWhite@elias.law

Abha Khanna
ELIAS LAW GROUP LLP
1700 Seventh Avenue, Suite 2100
Seattle, Washington 98101
AKhanna@elias.law

Elisabeth S. Theodore
R. Stanton Jones
Samuel F. Callahan
ARNOLD AND PORTER KAYE SCHOLER LLP
601 Massachusetts Avenue NW
Washington, DC 20001
elisabeth.theodore@arnoldporter.com

Counsel for Rebecca Harper, et al. Plaintiffs

Phillip J. Strach
Thomas A. Farr
Alyssa M. Riggins
NELSON MULLINS RILEY & SCARBOROUGH LLP
4140 Parklake Avenue, Suite 200
Raleigh, North Carolina 27612
phillip.strach@nelsonmullins.com
tom.farr@nelsonmullins.com
alyssa.riggins@nelsonmullins.com

Mark E. Braden
Katherine McKnight
Richard Raile
BAKER HOSTETLER LLP
1050 Connecticut Ave NW
Suite 1100
Washington, DC 20036
mBraden@bakerlaw.com
kmcknight@bakerlaw.com
rraile@bakerlaw.com

Counsel for Legislative Defendants

Hon. Robert F. Orr
orr@rforrlaw.com

Hon. Thomas W. Ross
ncjudge@gmail.com

Hon. Robert H. Edmunds, Jr.
rhedmunds@aol.com

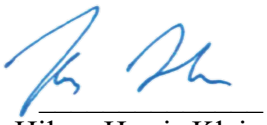
Special Masters

Terence Steed
Special Deputy Attorney General
Stephanie A. Brennan
Special Deputy Attorney General
Amar Majmundar
Senior Deputy Attorney General

NC DEPARTMENT OF JUSTICE
P.O. Box 629
Raleigh, NC 27602
tsteed@ncdoj.gov
sbrennan@ncdoj.gov
amajmundar@ncdoj.gov

Counsel for the State Defendants

This the 21st day of February, 2022.



Hilary Harris Klein
Southern Coalition for Social Justice

EXHIBIT 1
TO COMMON CAUSE OBJECTIONS
(Mattingly Report)

Remedial Report : Congressional and NC Senate Plans

Greg Herschlag and Jonathan C. Mattingly

February 21, 2022

1 Introduction and summary

We have been asked by the Harper Plaintiffs and the Common Cause Plaintiffs to analyze two redistricting maps for both the North Carolina Congressional districts and the North Carolina Senate districts. Specifically, we will examine the Congressional and Senate maps that were recently passed by the General Assembly in laws 2022-3 (Congressional, S745), 2022-2 (Senate, S744), as well as alternative maps put forward by the Harper plaintiffs. The comments and analysis addressing the Harper Plaintiffs' proposed map were done solely at the request of the Harper Plaintiffs and not by the Common Cause Plaintiffs.

Because of the language in the court ruling, our primary tool of analysis is to examine partisan symmetry, which is the idea that a specific vote share should translate into a specific seat share, independent of which party received that vote.[1] The exact translation of votes to seats need not be known ahead of time; the important aspect of symmetry is that the translation is the same for both parties. As one example, under a map that has partisan symmetry, if the Republicans receive 55% of the vote and 70% of the seats, then when the Democrats receive 55%, they will also receive 70% of the seats. Prioritizing symmetry does not translate into any proportionality standard. However under a symmetric map, the party that wins the majority of the vote should win the majority of the seats (or at least not be in the minority).

The Supreme Court's order also mentioned other metrics that can give some insight into the symmetry properties (as well as other properties) of a map, including the mean-median difference and the efficiency gap. We prefer to report directly on measures of partisan symmetry and focus on those in this report, but we also report mean-median difference and efficiency gaps.

We examine partisan symmetry characteristics of the four maps under 16 historic elections from 2016 and 2020: 2016 Attorney General, 2016 Governor, 2016 Lieutenant Governor, 2016 Presidential, 2016 U.S. Senate, 2020 State Auditor, 2020 Attorney General, 2020 Commissioner of Agriculture, 2020 Commissioner of Insurance, 2020 Commissioner of Labor, 2020 Governor, 2020 Lieutenant Governor, 2020 Presidential, 2020 Secretary of State, 2020 Treasurer, and 2020 U.S. Senate.

We find that the plaintiff maps show significantly greater amounts of symmetry than the recently passed maps put forward by the North Carolina legislature. We also demonstrate that if twenty maps were drawn from our original ensemble, which was constructed without regard to partisan symmetry, it would be extremely likely to find a map with significantly superior partisan symmetry when compared with the legislature's enacted remedial maps. In other words, even drawing maps at random, it is not difficult to draw maps that achieve significantly better partisan symmetry than the legislature's proposed remedial maps.

2 Qualifications

We are Professors of Mathematics at Duke University. Dr. Mattingly is also a Professor of Statistical Science at Duke University. His degrees are from the North Carolina School of Science and Math (High School Diploma), Yale University (B.S.), and Princeton University (Ph.D.). He grew up in Charlotte, North Carolina, and currently lives in Durham, North Carolina. Dr. Herschlag's degrees are from Taylor Allderdice (High School Diploma), University of Chicago (B.S.), and the University of North Carolina at Chapel Hill (Ph.D.). He has lived in North Carolina since 2007.

Both of us lead a group at Duke University that conducts non-partisan research to understand and quantify gerrymandering. This report grows out of aspects of our group's work around the current North Carolina legislative districts which are relevant to the case being filed.

Dr. Mattingly previously submitted an expert report in Common Cause v. Rucho, No. 18-CV-1026 (M.D.N.C.), Diamond v. Torres, No. 17-CV-5054 (E.D. Pa.), Common Cause v. Lewis (N.C. Sup. Ct No. 18-cvs-014001), and Harper v. Lewis

(No. 19-cv-012667) and was an expert witness for the plaintiffs in Common Cause v Rucho and Common Cause v. Lewis. Dr. Herschlag previously submitted an affidavit in North Carolina v. Covington, No. 1:15-cv-00399. We are being paid at a rate of $400/per hour for this work. Much of the work, including the randomly generated maps, derives from an independent research effort, unrelated to this lawsuit, to understand gerrymandering nationally and in North Carolina specifically. Some of the analysis described in this report was previously released publicly as part of a non-partisan effort to inform the discussion around the redistricting process.

3 Methods

We evaluate the proposed plans using a partisan symmetry metric described below. We also report the the mean-median difference and the efficiency gap. Each of these metrics was calculated using the results of sixteen recent statewide elections: 2016 Attorney General, 2016 Governor, 2016 Lieutenant Governor, 2016 Presidential, 2016 U.S. Senate, 2020 State Auditor, 2020 Attorney General, 2020 Commissioner of Agriculture, 2020 Commissioner of Insurance, 2020 Commissioner of Labor, 2020 Governor, 2020 Lieutenant Governor, 2020 Presidential, 2020 Secretary of State, 2020 Treasurer, and 2020 U.S. Senate. In many analyses, we also consider the uniform swing of the elections under consideration which allows us to consider a varied range of statewide partisan vote fractions over multiple plausible voting patterns.

In line with the classic definition of partisan symmetry, the North Carolina Supreme Court explained, "voters are entitled to have substantially the same opportunity to electing a supermajority or majority of representatives as the voters of the opposing party would be afforded if they comprised" a given percentage "of the statewide vote share in that same election." Harper v. Hall, No. 413PA21, slip op. ¶169 (N.C. Feb. 14, 2022). To implement this directive, we measure the partisan symmetry by calculating the number of seats awarded to the party winning the majority of votes in pairs of elections that have total statewide partisan vote shares which are symmetric about the 50% level. Examples of symmetric pairs are 49% and 51% or 48% and 52%. We then report the absolute difference in the number of seats awarded. If both parties were treated symmetrically, this difference would be zero.

To take an example: we begin with the results of the 2016 Governor election and apply a "uniform swing" to reflect a 48% Democratic statewide vote share for that election. We calculate how many Republican representatives would be elected with this 48% Democratic vote share. We then apply a uniform swing to the election so that it reflects the corresponding, reciprocal Democratic vote share–i.e., 52%. We then compute the number of Democratic representatives that would be elected with that 52% Democratic vote share. We then calculate the absolute difference between the number of Republican representatives elected with 48% Democratic vote share and the number of Democratic representatives elected with a 52% Democratic vote share. Thus, if 8 Republicans were elected with 48% Democratic vote share, and 7 Democrats were elected with 52% vote share, the absolute difference would be 1 seat. (Because the figure is absolute, the value is always positive. It does not reflect which party benefits from the asymmetry; it captures only the degree of asymmetry.) We repeat this process using several sets of vote fractions which are equidistant from the majority line of 50%. Namely, we consider 45% and 55%, 46% and 54%, 47% and 53%, and 49% and 51%.

Reciprocity in a single election does not speak to possible variations in the spatial voting patterns seen across the state in different elections. Therefore, we repeat this procedure across the 16 historic statewide elections listed above, and then calculate an average of the absolute difference between the number of Republican seats elected (under the lower Democratic vote share) and the number of Democratic seats elected (under the higher Democratic vote share). The metric thus captures the average, absolute deviation, across elections and across vote shares, between the number of seats that the two parties are expected to elect at the same given vote share. Lower numbers reflect greater partisan symmetry, and in particular, reflect a more "equal opportunity to electing a supermajority or majority of representatives as the voters of the opposing party would be afforded if they comprised" a given percentage "of the statewide vote share in that same election." Harper slip op. ¶169.

We emphasize that we consider the average deviation across 16 different elections, thereby capturing the degree of partisan symmetry exhibited by the map across a variety of different election climates. This is very different from considering a single electoral vote pattern constructed by averaging elections to create a different, possibly unobserved, vote pattern, and only then assessing the deviation.

In addition to examining the averaged deviation from partisan symmetry, we also examine the mean-median difference and the efficiency gap. The mean-median is defined to be the difference between the average Democratic vote share and the median Democratic vote share.[1] The efficiency gap is defined to be the difference in wasted votes across the two parties

[1]Here we define Democratic/Republican vote share to be the fraction of the vote that went to one party compared with the vote going to both parties, i.e. $D/(R+D)$ where D and R are the Democratic and Republican votes in a district.

divided by the total vote for the two parties. Wasted votes are found by summing overall votes in losing districts and all votes in winning districts that are more than half the total votes; for example, if D and R are the Democratic and Republican votes in a district, and $D < R$ then the Democrats would have wasted D votes and the Republicans would have wasted $R - (D + R)/2$ votes. When computing the efficiency gap we uniformly swing each election to range from 45% to 55% of the vote in increments of 1%, which provides greater diversity to the elections considered. [2]

4 Congressional Districts

Using the set of statewide elections listed in Section 3, the partisan symmetry of the Harper Plaintiffs' proposed congressional map – as measured using the metric described below, which reflects the average deviation in seats won between the parties given a particular vote share – is 0.36875 seats. In practical terms, this means that for any given statewide election, the number of Democratic and Republican seats elected at a given party vote fraction will more often than not be the same number; and the expected difference averaged across a range of sixteen statewide elections is only 0.36875 seats. Only 96 of the 80,000 sampled congressional plans both accounted for incumbency and had a partisan symmetry score of less than 0.40 seats.

The legislature's 2022 remedial congressional plan has an average partisan symmetry deviation of 1.575 seats – meaning the average seat deviation between the parties given the same vote share is 4 times as high as it is in Harper plaintiffs proposed plan. This reflects that, under the enacted plan, Republicans win 8 or 9 seats when they get 51% of the vote, while Democrats win 7 or 8 seats when they get 51% of the vote. If the map makers would have examined just 20 random plans from our ensemble, they would have found a plan with higher partisan symmetry than the S745 plan with a 99.998% chance. Furthermore, there would be a 98.56% chance that at least one of those plans would have a seat deviation of less than 1. The 2022 enacted remedial Congressional plan has a mean-median gap of 1.01%. The average efficiency gap calculated by conducting uniform swings on these election results, ranging from 45% to 55% Democratic vote share, is 7.312%.

As to other partisan fairness metrics identified in the Supreme Courts order and opinion: The average mean-median difference for the Harper Plaintiffs' proposed map is 0.4504%. The average efficiency gap calculated by conducting uniform swings on these election results, ranging from 45% to 55% Democratic vote share, is 2.7180%.

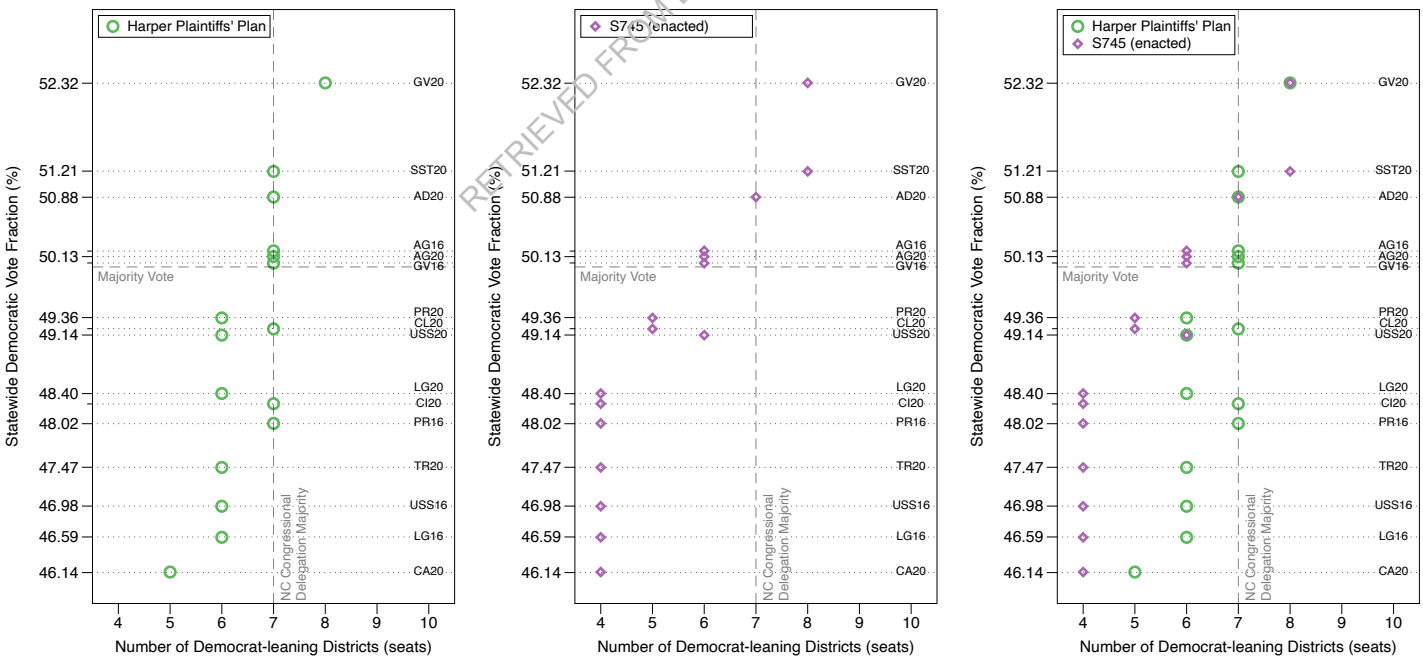


Figure 1: We show the number of seats (horizontal axis) compared with the statewide vote (vertical axis) in our 16 historic elections under the Harper Plaintiffs' map (left), and the enacted map (S745; middle). We also directly compare the two maps (right)

[2] When performing a uniform swing analysis, it is more efficient to estimate the efficiency gap using the Democratic/Republican vote fractions as opposed to the vote. Under equal votes in each district, the use of the fractions gives the exact same result, however, it will provide a slight difference if this is not true. When employing uniform swings, we use the vote fractions. In our experience, this sightly different formulation creates little difference in the values because the populations are balanced across districts.

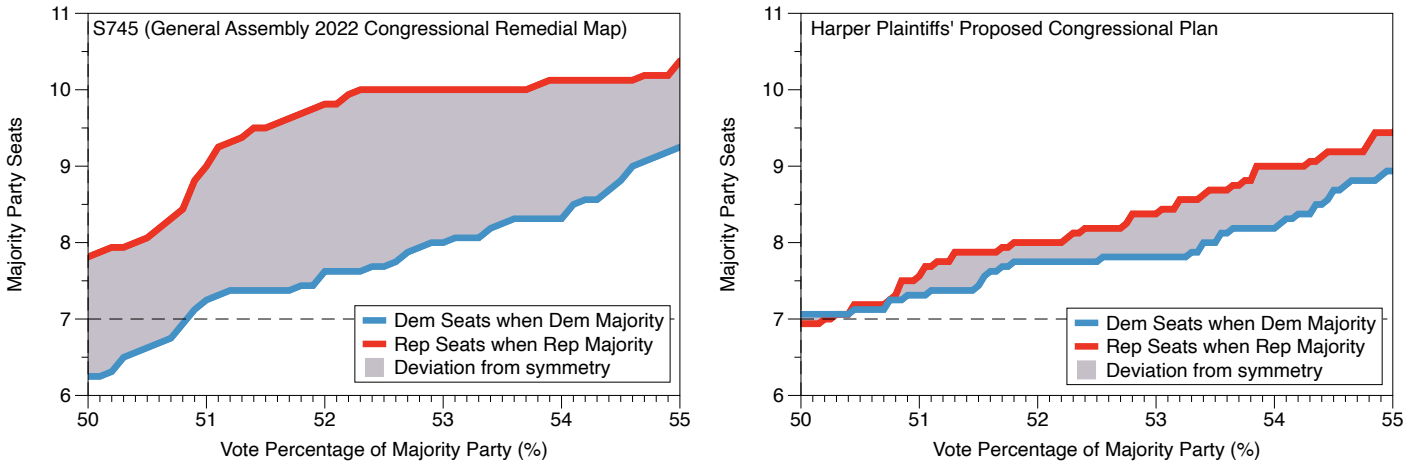


Figure 2: We show the statewide vote percentage won by the party in the majority of the vote (horizontal axis) compared with the statewide seats won by the majority party (vertical axis) in our 16 historic elections under the enacted map (S745; left), and the Harper Plaintiffs' plan (right). In a perfectly symmetric map, the blue line would always coincide with the red line.

To better illuminate the extent to which the two maps treat the parties symmetrically, we plot in Figure 1 what would be results of congressional elections run with historical elections mentioned in Section 3. We begin by noticing that the Harper Plaintiffs' proposed map always gives at at least half of the seats to the party which wins the majority of the votes. In contrast, the Legislature's S745 map only gives the Democrats at least half the seat in three of the six elections where they win the majority while always giving the Republicans at least half the seats in the elections where they win the majority of the votes. One can also understand the degree to which the maps produce seat counts which are symmetric. In a symmetric map, the behavior in the bottom half of these plots should "mirror" the behavior in the top half.

To better examine this, we calculate the seats won by the party with the majority of the vote under the sixteen specified elections when they are shifted, using the uniform swing hypothesis, to have a statewide Democratic share ranging from 45% to 55%. We then average these 16 seat counts over each of the statewide vote fractions. We plot this average in Figure 2 as a function of the statewide majority vote fraction. When the Democrats are in the Majority (Democratic vote shares of 50%-55%) we use a blue curve and plot the Democratic seat share. When the Republicans are in the Majority (Democratic vote shares of 45%-50%), we use a red curve and plot the Republican seat share. If the map is symmetric, the seats elected in response to Democratic majority votes will be the same as the seats elected in response to Republican majority votes, and the two curves will lie on top of each other. The gray shaded region emphasizes the deviation from ideal partisan symmetry.

Looking at Figure 2, we see that there is a significant deviation from symmetry in the legislature's proposed 2022 remedial Congressional plan while the Harper Plaintiffs' proposed plan shows a high degree of symmetry, particularly between 49% and 51%. Both maps favor the Republicans with respect to their deviation from partisan symmetry, as shown by the fact that the red curve is above the blue curve.

Democratic Elections						Republican Elections					
		S745 (Cong.)		Plaintiffs' Cong.				S745 (Cong.)		Plaintiffs' Cong.	
Election	Democratic Vote (%)	Dem. Seats	Dem. Split or Won Majority	Dem. Seats	Dem. Split or Won Majority	Election	Republican Vote (%)	Rep. Seats	Rep. Split or Won Majority	Rep. Seats	Rep. Split or Won Majority
GV16	50.05	6	No	7	Yes	PR20	50.64	9	Yes	8	Yes
AG20	50.13	6	No	7	Yes	CL20	50.78	9	Yes	7	Yes
AG16	50.20	6	No	7	Yes	USS 20	50.86	8	Yes	8	Yes
AD20	50.88	7	Yes	7	Yes	LG20	51.60	10	Yes	8	Yes
SST20	51.21	8	Yes	7	Yes	CI20	51.73	10	Yes	7	Yes
GV20	52.32	8	Yes	8	Yes	PR16	51.98	10	Yes	7	Yes
						TR20	52.53	10	Yes	8	Yes
						USS 16	53.02	10	Yes	8	Yes
						LG16	53.41	10	Yes	8	Yes
						CA20	53.85	10	Yes	9	Yes

Table 1: We summarize Figure 2 on the congressional two maps with the above table. Pay particular attention to the number of times which map fails to give a party the majority of seats when they win the majority of the votes. Notice that this only occurs for the Democrats.

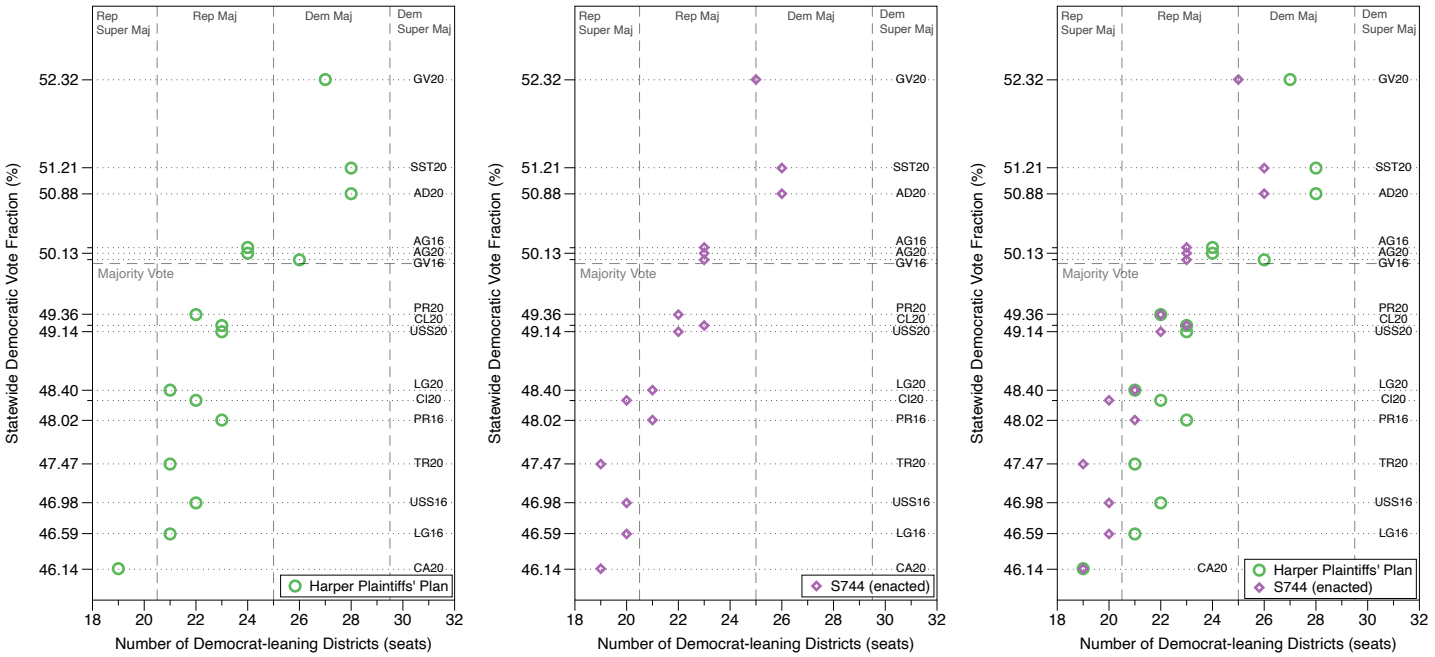


Figure 3: We show the number of seats (horizontal axis) compared with the statewide vote (vertical axis) in our 16 historic elections under the Harper Plaintiffs' map (left), and the NC Legislature's enacted map (S744; middle). We also directly compare the two maps (right).

5 Senate Districts

Using the set of statewide elections listed in Section 3, the partisan symmetry of the Harper Plaintiffs' proposed senate map – as measured using the metric described above for the congressional plans, which reflects the average deviation in seats won between the parties given a particular vote share – is 1.04375 seats.[3]

The legislature's 2022 enacted remedial senate plan has an average partisan symmetry deviation of 4.0125 seats – meaning the average seat deviation between the parties given the same vote share is again 4 times as high as it is in Harper plaintiffs proposed plan. This reflects that, under the enacted plan, Republicans win 29 or 30 seats when they get 52% of the vote, while Democrats win 25 or 26 seats when they get 52% of the vote. This is enough to potentially grant the Republicans a supermajority, whereas the Democrats either split the chamber or gain the smallest possible majority. If the map makers would have examined just 1 random plan from our ensemble, they would have found a plan with higher partisan symmetry than the S744 plan with a 99.6% chance. Furthermore, there would be a 92.5% chance that at least one of those plans would have a symmetry deviation of less than 3 seats. If they had considered 20 plans, they would have been essentially guaranteed to find one with a symmetry deviation of less than 3 seats. The 2022 enacted remedial Senate plan has a mean-median gap of 1.304%. The average efficiency gap calculated by conducting uniform swings on these election results, ranging from 45% to 55% Democratic vote share, is 4.072%.

As to other partisan fairness metrics identified in the Supreme Courts order and opinion: The average mean-median difference for the Harper Plaintiffs' proposed senate map is 0.228%. The average efficiency gap calculated by conducting uniform swings on these election results, ranging from 45% to 55% Democratic vote share, is 1.955%.

In Figure 3, we plot what would be results of North Carolina Senate elections run with historical elections mentioned in Section 3. We begin by noticing that both the Harper Plaintiffs' proposed NC Senate map and the Legislature's S744 map always give at least half of the seats to the Republican Party when they win the majority. The Harper Plaintiffs' proposed NC Senate map gives the majority of the seats to the Democrats in four out of six elections where they win the majority of the votes while the Legislature's S744 map does so in three out of six elections. More telling, the Legislature's S744 map gives the Republicans the supermajority of seats or close to it, when they receive between 51% and 52% of the votes while the Democrats barely get or share the majority when they receive between 51% and 52% of the votes.

To better understand the extent to which the two plans respond symmetrically to swings in the Democratic or Republican

[3]We remark that the coarse averaging of the measure we use is a rough approximation for the area of the gray regions shown in Figure 4 In this case, the 45%,55% vote pairing is over-weighted and drives the average up (there are only 4 other number we are averaging with). If we would have instead averaged the seat deviation across all vote fractions between 50%-55%, the deviation would have been closer to 0.5.

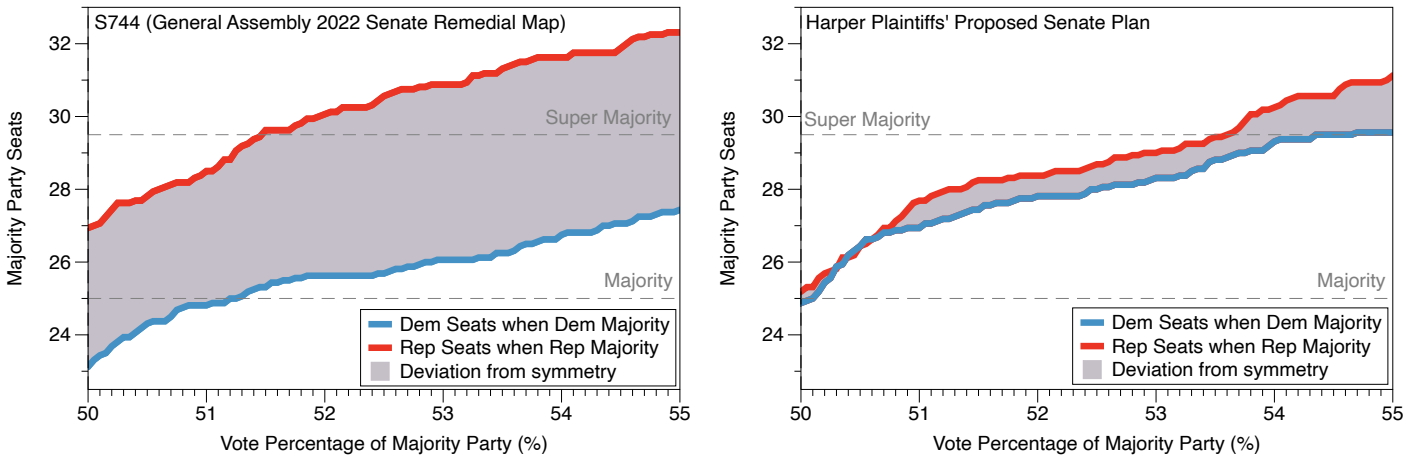


Figure 4: We show the statewide vote percentage won by the party with the majority of the vote (horizontal axis) compared with the statewide won seats by the majority party (vertical axis) in our 16 historic elections under the enacted map (S744; left), and the Harper Plaintiffs' plan (right). In a perfectly symmetric map, the blue line would always coincide with the red line

direction, we calculate the seats won by the party with the majority of the vote under the sixteen specified elections when they are shifted, using the uniform swing hypothesis, to have statewide Democratic share ranging from 45% to 55%. We then average these 16 seat counts over each of the statewide vote fractions. We plot this average in Figure 4 as a function of the statewide majority vote fraction. When the Democrats are in the Majority (Democratic vote shares of 50%-55%) we use a blue curve. When the Republicans are in the Majority (Democratic vote shares of 45%-50%), we use a red curve and plot the Republican seat share. If the response to Democratic majority votes is the same as Republican majority votes the two curves will be on top of each other. The gray shaded region emphasizes the deviation from ideal partisan symmetry.

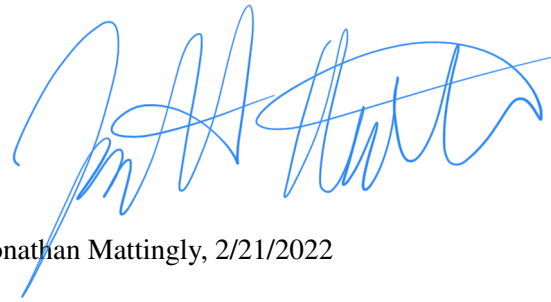
It is clear from Figure 4 that the Legislature's S744 map is significantly less symmetric than the Harper Plaintiffs' plan. It is particularly striking that Harper Plaintiffs' plan shows almost perfect symmetry for deviations immediately around 50%. Beyond that range the Harper Plaintiffs' plan actually treats Republicans more favorably than Democrats.

References

[1] Bernard Grofman and Gary King. The future of partisan symmetry as a judicial test for partisan gerrymandering after *LULAC v. Perry*. *Election Law Journal*, 6(1):457–472, 2007.

We declare under penalty of perjury under the laws of the state of North Carolina that the foregoing is true and correct to the best of our knowledge.

Greg Herschlag 2/21/2022



Jonathan Mattingly, 2/21/2022

EXHIBIT 2
TO COMMON CAUSE OBJECTIONS
(Mattingly Addendum)

Remedial Addendum on the House Districts

Greg Herschlag and Jonathan C. Mattingly

February 21, 2022

1 Introduction

This is an addendum to our report entitled "Remedial Report : Congressional and NC Senate Plans". This report addresses the NC House plan and is prepared at the request of the Common Cause Plaintiffs. The methods used here are further elaborated in that document. We begin by comparing the Legislature's enacted remedial plan (H980) with a modification proposed by the Common Cause Plaintiffs. We then point out that the Legislature's enacted remedial plan (H980) is far from the most symmetric plan possible. Looking in our previously generated ensemble, which was not generated with this in mind, it was easy to find many plans which had a better partisan symmetry characteristics than H980.

2 Analysis of House Plan H980

We continue by analyzing the House district plan H980. We do so by comparing it with (i) the Ketchie modification, and (ii) plans in our ensembles. The Ketchie modification keeps the H980 largely unchanged, but redraws House Districts (HD) 10 and 4 in order to, consistent with Common Cause's theory of the case, create an opportunity for Black voters to elect their choice. To be clear, we did not do any racially polarized voting studies in this area. As Dr. Mattingly noted in his addendum report in trial, increasing the BVAP in HD 10 also makes it much more likely to produce another Democratic House District. We compare H980 with our ensemble to investigate the extent to which the General Assembly sought to improve upon the overall plan's partisan symmetry.

We begin by analyzing the average deviation from partisan symmetry across the 16 historic elections under symmetric uniform swings (e.g. 49% and 51% or 48% and 52%). For the H980 plan, we find an average deviation of 6.59375 seats. When making the modifications from Ketchie in HD10 and 4, we find that this deviation drops to 5.3. We examine the partisan outcomes over the 16 elections for both H980 and the modifications in Figure 1 (left). We see that the Ketchie modification consitently leads to one more Democratic district across all of the historic elections and thus consistently improves upon the partisan symmetry score of the enacted State House map.

To better understand the extent to which the two plans respond symmetrically to swings in the Democratic or Republican direction, we calculate the seats won by the party with the majority of the vote under the sixteen specified elections when they are shifted, using the uniform swing hypothesis, to have statewide Democratic share ranging from 45% to 55%. We then average these 16 seat counts over each of the statewide vote fractions. We plot this average for the H980 plan and the Ketchie modification in Figure 2 as a function of the statewide majority vote f raction. When the Democrats are in the Majority (Democratic vote shares of 50%-55%) we use a blue curve. When the Republicans are in the Majority (Democratic vote shares of 45%-50%), we use a red curve and plot the Republican vote share. If the response to Democratic majority votes is the same as Democratic majority votes the two curves will be on top of each other. The gray shaded region emphasizes the deviation from ideal partisan symmetry where the two curves lie one on top of the other.

In addition to improvements in partisan symmetry, we also examine the mean-median score and efficiency gap. For the former, we average over the 16 elections. For the latter, we take uniform swings on each election from 45%-55% in increments of 1% and average over the resulting 16×11 elections. The enacted H980 plan has an averaged mean-median score of 1.45%, whereas the Ketchie modification reduces this to 1 .01%. We see a similar reduction in efficiency gap: The enacted H980 plan has an averaged efficiency gap of 3.23%, whereas the Ketchie modification reduces this to 2.61%.

We next turn to compare the H980 map with the ensembles used in Dr. Mattingly's report of this case. We examine an ensemble of plans that does not consider municipal preservation and minimizes the double-bunking of incumbents. If the mapmakers had simply picked 20 random plans from our ensemble, then with 99.9989% probability the mapmakers would have found at least one plan with a better partisan symmetry than the Legislature's remedial plan. Similarly, the chance that

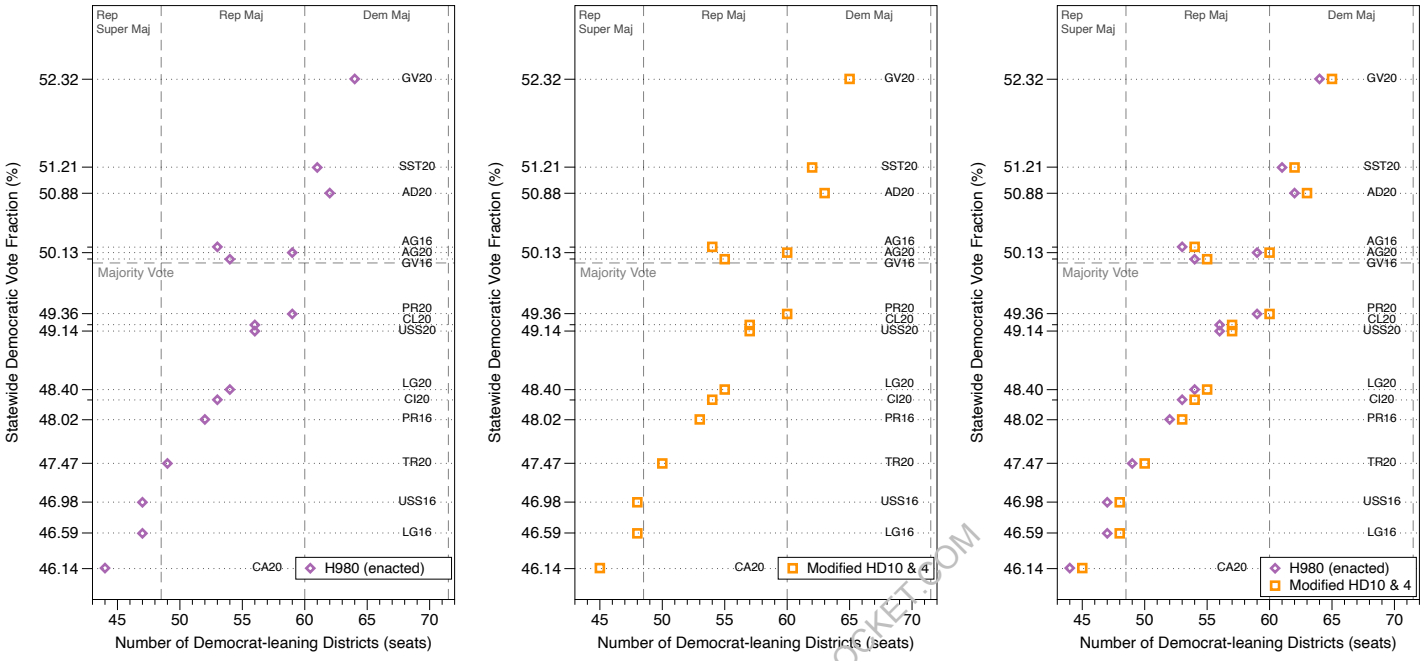


Figure 1: We show the number of seats (horizontal axis) compared with the statewide vote (vertical axis) in our 16 historic elections under the enacted map (left), the Ketchie modification (middle), and then directly compare them in the same plot (right).

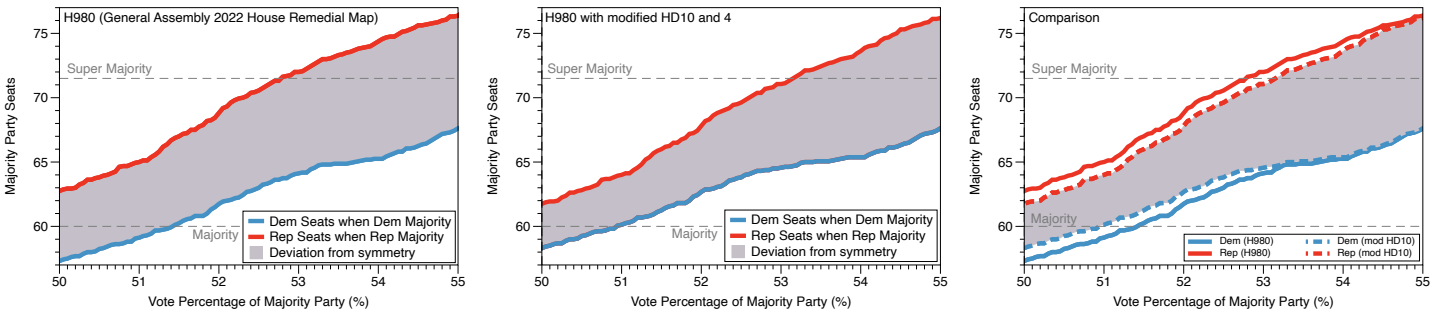


Figure 2: We show the statewide vote of the majority of the vote (horizontal axis) compared with the statewide won seats by the majority party (vertical axis) in our 16 historic elections under the enacted map (H980; left), and the modified plan (middle). We compare the difference in the deviation (right). In a perfectly symmetric map, the blue line would always coincide with the red line

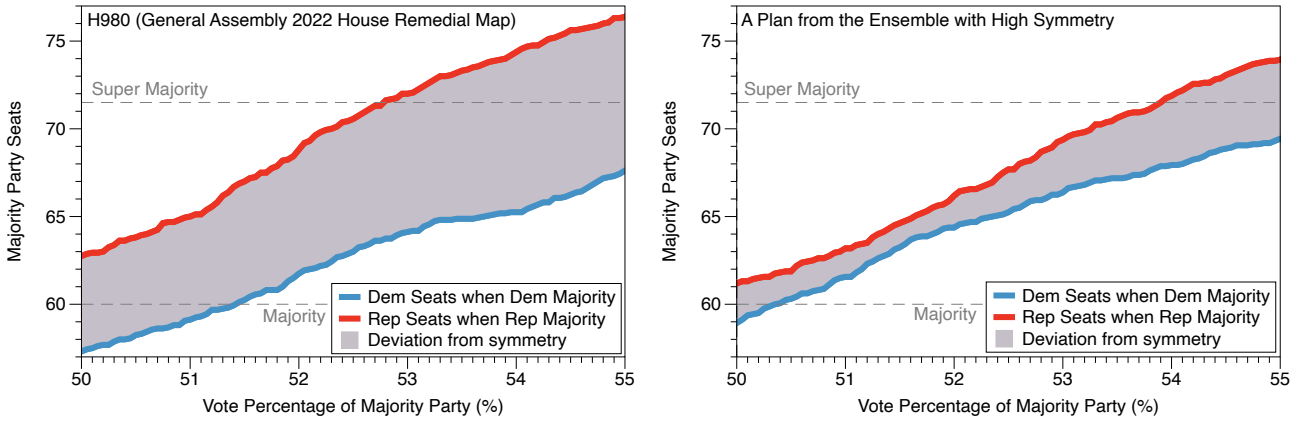


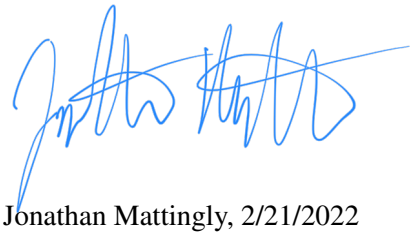
Figure 3: We show the statewide vote of the majority of the vote (horizontal axis) compared with the statewide won seats by the majority party (vertical axis) in our 16 historic elections under the enacted map (H980; left), and a plan from our ensemble that has high partisan symmetry deviation of (deviation less than 3 seats on average; right). In a perfectly symmetric map, the blue line would always coincide with the red line

one of those 20 plans would have a partisan symmetry deviation score below 5 is 90.8%. In short, it would not have been a difficult task to find a map that was better at achieving partisan symmetry than what the legislature proposed remedial plan.

We conclude by demonstrating the difference in partisan symmetry between the H980 plan and randomly chosen plans with partisan symmetry deviation less than 3, which would be easy to obtain by searching through the plans we submitted to the court. We demonstrate the result in Figure 3.

We declare under penalty of perjury under the laws of the state of North Carolina that the foregoing is true and correct to the best of our knowledge.

Greg Herschlag 2/21/2022



Jonathan Mattingly, 2/21/2022

EXHIBIT 3
TO COMMON CAUSE OBJECTIONS
(Second Ketchie Affidavit)

STATE OF NORTH CAROLINA COUNTY OF WAKE	IN THE GENERAL COURT OF JUSTICE SUPERIOR COURT DIVISION 21 CVS 015426
NORTH CAROLINA LEAGUE OF CONSERVATION VOTERS, INC., et al., REBECCA HARPER, et al., COMMON CAUSE, *Plaintiffs,* v. REPRESENTATIVE DESTIN HALL, in his official capacity as Chair of the House Standing Committee on Redistricting, et al. *Defendants.*	**SECOND AFFIDAVIT OF CHRISTOPHER DALTON KETCHIE**

NOW COMES Christopher Dalton Ketchie.

I, Christopher Dalton Ketchie, declare as follows:

1. I am over 18 years of age, legally competent to give this Affidavit, and have personal knowledge of the facts set forth in this Affidavit.

2. I am a graduate of North Carolina State University with a master's degree in Forestry and Environmental Resources with a concentration in Geographic Information Systems (GIS). Additionally, I have over 11 years of professional GIS and data analysis experience.

3. I am employed by the Southern Coalition for Social Justice in Durham, North Carolina as a Senior Data Analyst and Quantitative Researcher, which includes the frequent use of GIS.

4. In support of Plaintiff Common Cause's objections to the remedial maps enacted by the North Carolina General Assembly in February 2022, I calculated the scores for several metrics of

these maps evaluating partisan performance using publicly available data and analytical tools. These metrics include the mean-median difference, efficiency gap, partisan symmetry / partisan bias, the plausible number of representatives elected across different electoral conditions, and the relative chances of electing a majority or (for state legislative maps) supermajority by a given political party.

5. I used the publicly available platform PlanScore to calculate the mean-median, efficiency gap, partisan symmetry / partisan bias, plausible number of representatives elected, and one of the six scenarios I used to determine the relative chances of electing majority or supermajorities. PlanScore is a project of the nonpartisan Campaign Legal Center, and is considered a reliable platform for calculating partisan metrics. *See* https://planscore.campaignlegal.org/#!2020-ushouse.

6. I used the publicly available platform Dave's Redistricting App (DRA) to calculate the plausible number of representatives elected and four of the six scenarios I used to determine the relative chances of electing a majority or supermajority, as described in more detail below. DRA is also considered a reliable platform for evaluating legislative maps and calculating partisan metrics. *See* https://davesredistricting.org/maps#home.

7. Both PlanScore and DRA draw their election data from the Voting and Election Science Team (VEST), based out of the University of Florida and Wichita State University. This data is available at https://dataverse.harvard.edu/dataverse/electionscience. PlanScore's election data and methodology can be found here: https://planscore.campaignlegal.org/models/data/2021D/. DRA's election data and methodology can be found here: https://davesredistricting.org/maps#aboutdata.

8. For the metrics that were calculated using PlanScore, I downloaded the shapefile for the proposed remedial Senate plan from the General Assembly website, then uploaded the shapefile

to PlanScore's "Score A Plan" page, which can be found at https://planscore.campaignlegal.org/upload.html. Once the shapefile was successfully uploaded, I selected the new prediction method to calculate the comparators below.

9. For the metrics that were calculated using DRA, I downloaded the block assignment file for the proposed remedial Senate plan from the General Assembly website, then imported the block assignment file to DRA using the import tool which can be found at https://davesredistricting.org/maps#. Once the block assignment file was successfully imported, I selected the "Statistics" tab at the top right of the screen and downloaded the demographics (including election data) as a .csv file and used this to calculate the comparators below.

10. For the metrics that were not calculated directly with either PlanScore or DRA, I downloaded North Carolina VEST data from the VEST Github page, which can be found at https://github.com/alarm-redist/census-2020/tree/main/vest-2020/nc. I imported 2020 VEST data into Maptitude, imported the block assignment file for the remedial Senate plan into Maptitude, and selected the relevant election (2020 North Carolina Chief Justice) as my summary field. I then exported the tabular data to a .csv file to calculate the performance of the plan using that election.

11. The results for the Legislative Defendants' remedial Senate Map S.L. 2022-2 are shown in the following table:

Metric	**Score**
Mean-Median	2.2% R
Efficiency Gap	4.8% R
Partisan Symmetry (Partisan Bias)	4.8% R
Plausible Number of Representatives Elected Comparison	22D-28R / 21D-29R (DRA / PlanScore)

Relative Chances of Electing Majority (26) or Supermajority (30)	R Majority: 4/6 Scenarios D Majority: 0/6 Scenarios R Supermajority: 1/6 Scenarios D Supermajority: 0/6 Scenarios

12. The percentages in the median-mean difference, efficiency gap, and partisan symmetry scores in the chart above indicate a bias towards Republican candidates.

13. The mean-median difference measures a party's median vote share minus its mean vote share, across all of a plan's districts. The greater the difference between a plan's median vote share and a plan's mean vote share, the greater the bias that plan exhibits against one party. PlanScore provides a detailed explanation of mean-median difference here: https://planscore.campaignlegal.org/metrics/meanmedian/

14. The efficiency gap compares each party's number of unnecessary votes across all of a plan's districts. Unnecessary votes are defined as every vote that it is not necessary for victory in a given electoral district, including every vote above the 50% plus one threshold cast for the winning party/candidate in a given district, and every vote cast for the losing candidate in a given district. The efficiency gap is then calculated by subtracting all of one party's total unnecessary votes from the other party's total unnecessary votes, and dividing that difference by the total number of votes cast. The more unequal the numbers of unnecessary votes cast for each party, the further away from zero the efficiency gap will be. PlanScore provides a detailed explanation of efficiency gap here: https://planscore.campaignlegal.org/metrics/efficiencygap/. I calculated efficiency gap using PlanScore, as detailed above.

15. Partisan symmetry/partisan bias is the difference between 50% of the seats in a plan and the share of seats a party would expect to win on a given plan in a perfectly tied election (where each party received exactly 50% of the total votes cast). To calculate partisan symmetry/partisan

bias, the observed vote share in each district is shifted by the amount necessary to simulate a tied statewide election. The greater the difference between seat share in a hypothetical perfectly tied election and 50%, the greater level of partisan bias in the plan. PlanScore provides a detailed explanation of partisan symmetry/partisan bias here: https://planscore.campaignlegal.org/metrics/partisanbias/. I calculated partisan symmetry/partisan bias using PlanScore, as detailed above.

16. The plausible number of representatives elected comparison was derived by evaluating the plan according to the partisan lean calculated for each district by the PlanScore and DRA election composites. I counted each district as a performing district for whichever party was favored by the composite, and then added up the total number of performing districts for each party to come to the final totals. I calculated the plausible number of representatives elected comparison using both PlanScore and DRA, as detailed above.

17. The relative chances of electing a majority or supermajority was derived by evaluating the plan's performance under six different election scenarios and evaluating how many of these scenarios would elect a Republican or Democratic majority, or a Republican or Democratic supermajority, using the proposed Senate plan. I calculated these metrics using PlanScore, DRA, and Maptitude, as detailed above. The only scenario that was not calculated directly with PlanScore or DRA was the 2020 Chief Justice of the North Carolina Supreme Court race. The six scenarios are:

a. PlanScore composite

b. DRA composite

c. 2020 Presidential

d. 2020 Governor

e. 2016 Lieutenant Governor

f. 2020 Chief Justice of North Carolina Supreme Court

18. For the remedial enacted House Map, S.L. 2022-4, I followed the process outlined above to calculate additional metrics to aid in the Court's review of the proposed House plan.

Metric	Score
Mean-Median	1.4% R
Efficiency Gap	3.0% R
Partisan Symmetry (Partisan Bias)	2.9% R
Plausible Number of Representatives Elected Comparison	57D-63R / 58D-62R (DRA / PlanScore)
Relative Chances of Electing Majority (61) or Supermajority (72)	R Majority: 4/6 Scenarios D Majority: 1/6 Scenarios R Supermajority: 1/6 Scenarios D Supermajority: 0/6 Scenarios

19. For the remedial enacted Congressional Map, S.L. 2022-3, I followed the process outlined above in Paragraphs 4–14 to calculate additional metrics to aid in the Court's review of the proposed Congressional plan.

Metric	Score
Mean-Median	1.1% R
Efficiency Gap	6.4% R
Partisan Symmetry (Partisan Bias)	4.9% R
Plausible Number of Representatives Elected Comparison	6D-8R / 4D-10R (DRA / PlanScore)
Relative Chances of Electing Majority (8)	R Majority: 5/6 Scenarios

	D Majority: 1/6 Scenarios

Senate Alternative Map Metrics

20. Using the same methods described above, I generated the metrics for an alternative Senate plan that starts with S.L. 2022-2 as a base plan but incorporates districts from the following amendments that were tabled from the legislative process, which are available on the General Assembly website at https://www.ncleg.gov/BillLookUp/2021/S744:

a. Common Cause remedial Senate District 4 (submitted on February 18, 2022)

b. New Hanover (A2)[1]

c. Wake (A3)[2]

d. Mecklenburg (as reflected in A9)[3]

e. Cumberland (A4)[4]

f. Guilford (A5)[5]

g. Forsyth (A8)[6]

h. Buncombe (A7)[7]

21. Using the same process outlined above, I determined this map would have mean-median difference of 0.2% R, efficiency gap of 1.0% R, and partisan symmetry of 0.7% R.

House Alternative Map Metrics

22. Using the same process outlined above, I generated the metrics for an alternative House plan that starts with S.L. 2022-4 as a base plan and incorporated the Common Cause remedial

[1] Available at https://webservices.ncleg.gov/ViewBillDocument/2021/53740/0/S744-A-NBC-9432.
[2] Available at https://webservices.ncleg.gov/ViewBillDocument/2021/53738/0/S744-A-NBC-9430.
[3] Available at https://webservices.ncleg.gov/ViewBillDocument/2021/53720/0/S744-A-NBC-9411.
[4] Available at https://webservices.ncleg.gov/ViewBillDocument/2021/53718/0/S744-A-NBC-9410.
[5] Available at https://webservices.ncleg.gov/ViewBillDocument/2021/53726/0/S744-A-NBC-9417.
[6] Available at https://webservices.ncleg.gov/ViewBillDocument/2021/53743/0/S744-A-NBC-9435.
[7] Available at https://webservices.ncleg.gov/ViewBillDocument/2021/53723/0/S744-A-NBC-9414.

House District 10 (submitted on February 18, 2022). I determined this map would have mean-median difference of 1.2% R, efficiency gap of 2.6% R, and partisan symmetry of 2.5% R.

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I declare under penalty of perjury that the foregoing is true and correct.

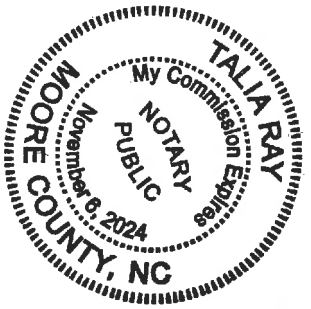
Executed this the 21st day of February, 2022.

Christopher Ketchie

Sworn and subscribed before me this the 21st day of February, 2022.

Talia Ray

Notary Public



Name: Talia Ray

My commission expires: 11/6/2024